Description of Functions 04/2005 Edition

simodrive

SIMODRIVE 611 universal/universal E
Control Components for
Closed-Loop Speed Control and Positioning

SIEMENS

SIEMENS

SIMODRIVE 611 universal SIMODRIVE 611 universal E

Control Components for Closed–Loop Speed Control and Positioning

Description of Functions

Valid for

Control	*Software version*
SIMODRIVE 611 universal	2.x
SIMODRIVE 611 universal	3.1
SIMODRIVE 611 universal/E	3.2
SIMODRIVE 611 universal/E	3.3
SIMODRIVE 611 universal/E	3.5
SIMODRIVE 611 universal/E	4.x
SIMODRIVE 611 universal/E	5.x
SIMODRIVE 611 universal/E	6.x
SIMODRIVE 611 universal/E	7.x
SIMODRIVE 611 universal/E	**8.x**

04.05 Edition

SIMODRIVE® documentation

Printing history
Brief details of this edition and previous editions are listed below.

The status of each edition is shown by the code in the ”Remarks” column.

Status code in the ”Remarks” column:

A.... New documentation

B.... Unrevised reprint with new Order No.

C.... Revised edition with new status

If factual changes have been made on the page since the last edition, this is indicated by a new edition coding in the header on that page.

Edition	Order No.	Remarks
01.99	6SN1197–0AB20–0BP0	A
04.99	6SN1197–0AB20–0BP1	C
10.99	6SN1197–0AB20–0BP2	C
05.00	6SN1197–0AB20–0BP3	C
08.01	6SN1197–0AB20–0BP4	C
02.02	6SN1197–0AB20–0BP5	C
08.02	6SN1197–0AB20–0BP6	C
02.03	6SN1197–0AB20–0BP7	C
07.03	6SN1197–0AB20–0BP8	C
06.04	6SN1197–0AB20–1BP0	C
10.04	6SN1197–0AB20–1BP1	C
04.05	6SN1197–0AB20–1BP2	C

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Additional information can be found at:
http://www.siemens.com/motioncontrol

This publication was produced with Interleaf V 7

The controller may be able to execute functions that are not described in this documentation. However, no claim can be made regarding the availability of these functions when the equipment is first supplied or in the event of servicing.

We have checked that the contents of this document correspond to the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee complete conformance. The information in this document is regularly checked and necessary corrections are included in reprints. Suggestions for improvement are also welcome.

Subject to change without prior notice.

Order No. 6SN1197–0AB20–1BP2
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Siemens Aktiengesellschaft

Foreword

Instructions when reading

Structure of the documentation

The SIMODRIVE 611 documentation is structured as follows:

- General Documentation
- Manufacturer/Service Documentation
- Electronic Documentation

You can obtain more detailed information on the documents listed in the documentation overview as well as additional SIMODRIVE documentation from your local Siemens office.

This document does not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

The contents of this document are not part of an earlier or existing contract or agreement nor do they change this. The sales contract contains the entire obligation of Siemens. The warranty conditions specified in the contract between the parties is the sole warranty of Siemens. Any statements contained herein neither create new warranties nor modify the existing warranty.

Target group

This documentation addresses machine OEMs and service personnel who wish to use ”SIMODRIVE 611 universal”.

Technical Support

If you have any questions, please contact the following Hotline:

A&D Technical Support	Tel.: +49 (0) 180 5050 – 222 Fax: +49 (0) 180 5050 – 223 http://www.siemens.com/automation/support–request

If you have any questions regarding the documentation (suggestions, corrections), please send a fax or email:

Fax:	+49 (0) 9131/98 – 2176
Fax forms	Refer to the correction sheet at the end of the documentation
email:	motioncontrol.docu@erlf.siemens.de

Internet address

You can obtain continually updated information about our product in the Internet under:

http://www.siemens.com/motioncontrol

Certificates

Certificates for the products described in this documentation can be found under:

http://intra1.erlf.siemens.de/qm/home/index.html

Objectives

This Description of Functions provides detailed information on the functionality of the ”SIMODRIVE 611 universal” control board.

Should you wish for additional information or should exceptional problems arise that are not addressed in sufficient detail in this manual, you can request the required information from your local Siemens office.

Notice

From Edition 10.99, this documentation includes information for ”SIMODRIVE 611 universal” and ”SIMODRIVE 611 universal E”.

From Edition 02.02, this documentation includes information for ”SIMODRIVE 611 universal HR” and ”SIMODRIVE 611 universal E HR”.

- Information for users of ”SIMODRIVE 611 universal” and ”SIMODRIVE 611 universal HR”:
  —> For you, all of the Chapters are applicable with the exception of Chapter 1.4.
- Information for users of ”SIMODRIVE 611 universal E” and ”SIMODRIVE 611 universal E HR”:
  —> It is important that you read Chapter 1.4.5 first.

The Chapter and pages are coded for the reader as follows in the header line below the edition:

Designation	Significance
• none	Information is valid for 611u and 611ue
• ! not 611u !	Information is not valid for 611u
• ! not 611ue !	Information is not valid for 611ue
• ! 611ue diff !	Information differs between 611u and 611ue. In addition, the list of differences in Chapter 1.4.5 must be carefully observed.

Board	Abbreviation (only for this purpose)
• SIMODRIVE 611 universal	611u
• SIMODRIVE 611 universal E	611ue

Information for using this Manual

The following should be observed when using this manual:

1. Help: The following help is available for the reader:

- Complete table of contents
- Header line (as orientation):
  the main chapter is in the upper header line
  the sub–chapter is in the lower header line
- Chapter list of contents is provided at the beginning of each Chapter
- Appendix with
  – Abbreviations and List of References
  – Index

    If you require information regarding a specific term, then look for this in the Appendix under the Chapter ”Index”.
    The Chapter number as well as the page number is specified where information on this term can be found.

2. Parameter lists

   In this description, for the parameters, the following displays and significances are available:

- P0660 — Parameter 0660 without sub–parameter
- P1451:8 — P1451 with sub–parameters (P1451:0 to P1451:7)
  :8 — Sub–parameters that are dependent on the parameter set
- P0080:64 — P0080 with sub–parameters (P0080:0 to P0080:63)
  :64 — sub–parameters that are dependent on the traversing block

  The following applies:
  Colon (:) — the parameter has the sub–parameter
  Number: — these sub–parameters are available (from :0)
- P1650.15 — Parameter 1650 bit 15

3. Identifying ”new” or ”revised” information

   The documentation, Edition 01.99 is the first edition.
   How is the ”new” or ”revised” information identified for the other editions?

- ”from SW x.y” is provided with the information.
- The edition is in the header line on this page > 01.99.

  Exceptions:
  List of faults and warnings, parameter list

  The lists are completely updated at each edition, and a new edition can be entered in the header lines on all of the pages.
  For the individual faults and warnings, there is no software release–dependent coding regarding the parameters.

Edition of the documentation?

Software release of the board?

What is new?

There is a fixed relationship between the edition of the documentation and the software release of the control board.

The first edition 01.99 describes the functionality of SW 2.1.

Edition 04.99 describes the functionality of SW 2.x.

What are the essential new functions that have been added for SW 2.x in comparison to SW 2.1?

- Rotary axis with modulo correction
- Motor changeover for induction motors
- Optional TERMINAL modules can now be used independent of the operating mode.
- Communications via the RS485 interface (HW dependent)
- SimoCom U   Comparing parameter sets
- Example: Drive operated via PROFIBUS
Reading/writing parameters via PROFIBUS

Edition 10.99 describes the functionality of SW 2.x and SW 3.x.

What are the essential new functions that have been added for SW 3.x in comparison to SW 2.x?

- Jerk limiting
- External block change
- Input signal ”Suppress fault 608” (speed controller output limited)
- Optional PROFIBUS–DP module:
PROFIBUS–DP2, Order No. (MLFB): 6SN1114–0NB00–0AA1
PROFIBUS–DP3, Order No. (MLFB): 6SN1114–0NB01–0AA0
- PROFIBUS
Process data configuring
Motion Control with PROFIBUS–DP (clock synchronous operation)
New control signals: NSOLL_B, DIG_OUT, Gx_STW
New status signals: NIST_B, DIG_IN, XistP, IqGl, Gx_ZSW, Gx_XIST1, Gx_XIST2
Override evaluation can be set (P0883)
S7 blocks to read/write parameters
- Fixed speed setpoints for closed–loop speed controlled operation
- i^2t power module limiting
- SimoCom U   Online operation via PROFIBUS possible
Online operation via MPI interface possible
PROFIBUS diagnostics screen
Help topics for each parameter of the expert list
- Faults and warnings:
The stop response (STOP I to STOP VII) is specified for each one

- List of motors 1FE1 motors (PE spindle) new in the list
  1FT6xxx–xWxxx–xxxx motors new in the list
  (water–cooled synchronous motors)
- ”SIMODRIVE 611 universal E” control board
- First common software release for the ”SIMODRIVE 611 universal” and ”SIMODRIVE 611 universal E”

Edition 05.00 describes the functionality of SW 2.x and SW 3.x.

What are the essential new functions that have been added for SW 3.3 in comparison to SW 3.1/3.2?

- ”External position reference value” operating mode
- Axis couplings
- Angular incremental encoder interface as input
- Direct measuring system (DM, encoder 2)
- Process data
  - Encoder interface (encoder 1, 2 and 3) is written into bitwise
  - Standard telegrams 4 and 103 have been supplemented
- The encoder interface is independent of clock–synchronous operation
- Traversing to fixed endstop
- In order to execute traversing blocks, it is no longer necessary to supply the input signals ”Operating condition/reject traversing task” and ”Operating condition/intermediate stop”.
- SimoCom U ”Boot board” function
  ”User parameter list” function
- Permanent–magnet synchronous motors with field weakening (1FE1 motors, PE spindle)
  - List of 1FE1 motors, expanded
  - Reluctance torque constant introduced
- Bandstop filter with bilinear transformation or Z transformation

Edition 08.01 describes the functionality of SW 2.x, SW 3.x and SW 4.x.

What are the essential new functions that have been added for SW 4.x in comparison to SW 2.x/3.x?

- ”External position reference value” is now available in the ”Positioning” mode
- Teach–in and incremental jogging
- Slave–to–slave communications, PROFIBUS–DP
- Dynamic Servo Control (DSC)

Edition 02.02 describes the functionality of SW 2.x, SW 3.x, SW 4.x and SW 5.1.

What are the essential new functions that have been added for SW 5.1?

- Spindle positioning
- Possibility of integrating into an external safety concept ”Safe standstill”
- Expanded functionality of the ”SimoCom U” start–up tool
  - Support, motor data optimization
  - Bit masking for the ”Trace” function
- Passive referencing
- Filter parameterization (current, speed setpoint)
- ”SIMODRIVE 611 universal HR” control board (HR stands for high resolution)
- The functionality for ”SIMODRIVE 611 universal” described in the Description of Functions, also applies to ”SIMODRIVE 611 universal HR”

Edition 08.02 describes the functionality of SW 2.x, SW 3.x, SW 4.x, SW 5.x and SW 6.1.

What are the essential new functions that have been added for SW 6.1?

- PROFIdrive conformance

Edition 02.03 describes the functionality of SW 2.x, SW 3.x, SW 4.x, SW 5.x, SW 6.x and SW 7.1.

What are the essential new functions that have been added for SW 7.1?

- MDI (external block processing)

Edition 07.03 describes the functionality of SW 2.x, SW 3.x, SW 4.x, SW 5.x, SW 6.x and SW 7.

Edition 06.04 describes the functionality of SW 3.6, SW 4.1, SW 5.x, SW 6.x, SW 7.x and SW 8.1

What are the essential new functions that have been added for SW 8.1?

- Electronic handwheel
- Password protection
- Any gearbox ratio
- Changes/modifications for the CAN bus
- Direction–dependent fast–stop using a hardware switch

Edition 10.04 describes the functionality of SW 3.6, SW 4.1, SW 5.x, SW 6.x, SW 7.x and SW 8.x

The 04.05 Edition describes the functionality of SW 3.6, SW 4.1, SW 5.x, SW 6.x, SW 7.x and SW 8.x

What are the essential new functions that have been added for SW 8.3?

- Input signal ”ON/OFF 1” at a digital input terminal
- Reading the DC link voltage via PROFIBUS–DP
- Referencing (homing) with distance–coded measuring system

Definition: Who are qualified personnel?

For the purpose of this documentation and warning information on the product itself, qualified personnel are those personnel who are familiar with the installation, mounting, start–up and operation of the equipment and the hazards involved. They must have the following qualifications:

- Trained and authorized to energize, de–energize, clear, ground and tag circuits and equipment in accordance with established safety procedures.
- Trained in the proper care and use of protective equipment in accordance with established safety procedures.
- Trained in rendering first aid.

Explanation of symbols

The following information symbols are used in this documentation:

Danger

This symbol is always used if death, severe personal injury or substantial material damage **will** result if proper precautions are not taken.

Warning

This symbol is always used if death, severe personal injury or substantial material damage **can** result if proper precautions are not taken.

Caution

This symbol is always used if minor personal injury or material damage **can** result if proper precautions are not taken.

Caution

This warning (without warning triangle) indicates that material damage **can** result if proper precautions are not taken.

Notice

This warning indicates that an undesirable situation or condition **can** occur if the appropriate instructions/information are not observed.

Note

This symbol indicates important information about the product or part of the document, where the reader should take special note.

Reader's note

This symbol is shown, if it relates to important information which the reader must observe.

Technical information

Warning

Operational electrical equipment has parts and components which are at hazardous voltage levels.

Incorrect handling of these units, i.e. not observing the warning information, can therefore lead to death, severe bodily injury or significant material damage.

Only appropriately qualified personnel may commission/start up this equipment.

This personnel must have in–depth knowledge regarding all of the warning information and service measures according to this manual.

Perfect, safe and reliable operation of the equipment assumes that it has been professionally transported, stored, mounted and installed as well as careful operator control and service.

Hazardous axis motion can occur when working with the equipment.

Danger

”Protective separation” (PELV-/SELV) in the drive can only be guaranteed when the following points are taken into consideration:

- Certified components are used.
- The degree of protection for all components is ensured.
- With the exception of the DC link and motor terminals, all of the circuits (e.g. digital inputs) must fulfill the requirements of PELV or SELV circuits.
- The braking cable shield must be connected to PE through the largest possible surface area.
- For unlisted motors, ”protective separation” is required between the temperature sensor and motor winding.

Note

When handling cables, observe the following:

- They may not be damaged,
- they may not be stressed,
- they may not come into contact with rotating components.

Warning

All of the SIMODRIVE unit connections must be withdrawn or disconnected when the electrical equipment on the machines is subject to a voltage test (EN 60204–1 (VDE 0113–1), Point 20.4).
This is necessary, as the SIMODRIVE insulation has already been tested, and should not be subject to a new test (additional voltage stressing).

Warning

Start–up/commissioning is absolutely prohibited until it has been ensured that the machine in which the components described here are to be installed, fulfills the regulations/specifications of the Directive 89/392/EEC.

Warning

The information and instructions in all of the documentation supplied and any other instructions must always be observed to eliminate hazardous situations and damage.

- For special versions of the machines and equipment, the information in the associated catalogs and quotations applies.
- Further, all of the relevant national, local land plant/system–specific regulations and specifications must be taken into account.
- All work should be undertaken with the system in a no–voltage condition!

Caution

When using mobile radios (e.g. cellular phones, mobile phones, 2–way radios) with a transmission power of > 1 W close to the equipment (< 1.5 m) the function of the equipment can be disturbed.

ESDS information and instructions

Electro**S**tatic **D**ischarge **S**ensitive Devices

Note

Components, which can be destroyed by electrostatic discharge are individual components, integrated circuits, or boards, which when handled, tested, or transported, could be destroyed by electrostatic fields or electrostatic discharge. These components are referred to as **ESDS** (**E**lectro**S**tatic **D**ischarge **S**ensitive Devices).

Handling ESDS boards:

- When handling devices which can be destroyed by electrostatic discharge, personnel, workstations and packaging must be well grounded!
- Electronic boards should only be touched when absolutely necessary.
- Personnel may only come into contact with the components, if
  - they are continuously grounded through ESDS wristlets,
  - they wear ESDS shoes, ESDS shoe grounding strips in conjunction with an ESDS floor surface.
- Boards may only be placed on conductive surfaces (table with ESDS surface, conductive ESDS foam rubber, ESDS packing bag, ESDS transport containers).
- Boards may not be brought close to data terminals, monitors or television sets (minimum clearance to the screen > 10 cm).
- Boards may not be brought into contact with highly insulating materials which can be statically charged, e.g. plastic foils, insulating desktops, clothing manufactured from man–made fibers.
- Measuring work may only be carried out on the boards, if
  - the measuring unit is grounded (e.g. via protective conductor), or
  - for floating measuring equipment, the probe is briefly discharged before making measurements (e.g. a bare–metal control housing is touched).
- Only touch control boards, option modules and memory modules at the front panel or at the edge of the PC boards.

Space for your notes

Table of Contents

Space for your notes

Product Overview

1

1.1 What can ”SIMODRIVE 611 universal” do?

What can ”SIMODRIVE 611 universal” do?

”SIMODRIVE 611 universal” is a control board, which can be universally used in the modular SIMODRIVE 611 converter system as a result of its communication interfaces, the motors and encoder systems and option modules which can be used.

Two independent drive controls are implemented on a 2–axis board. The closed–loop drive controls can be operated in the following operating modes with motor frequencies up to 1400 Hz:

- Operating mode, ”speed/torque setpoint”:
  In this case, the board is used for closed–loop speed control, open–loop torque control and/or torque reduction.
- ”Positioning” mode:
  A maximum of 64 traversing blocks can be selected and executed. Every traversing block can be freely parameterized and, in addition to the block number, also contains additional data, e.g. target position, acceleration, velocity, command and block enable circuit.

Interfaces

The following interfaces are provided on the board:

- Two analog interfaces per drive (± 10 V)

  Setpoints for speed, torque (current, torque reduction or a velocity override when positioning can be entered via these interfaces.
- Angular incremental encoder interface
  - Parameterized as input: (from SW 3.3)

    Incremental position reference values can be entered.
  - Parameterized as output:

    The position actual values are available for a higher–level control via the appropriately parameterized interface.
- Four digital inputs and four digital outputs per drive

  The digital inputs/outputs can be assigned the required control/message functions by appropriate parameterization.
- Two analog outputs per drive

Optional modules

The ”SIMODRIVE 611 universal” control board can be expanded by one of the following option modules:

- Optional TERMINAL module
  This module provides an additional 8 digital inputs and 8 digital outputs (e.g. necessary to select and start a traversing block in the ”positioning” mode).

Note

The input/output terminals of the optional TERMINAL module are:

- **Before SW 4.1: permanently** assigned to **drive A** or **axis A**
- **From SW 4.1: can be freely** assigned **axes**

- Optional PROFIBUS–DP module
  To integrate the system into distributed concepts, ”SIMODRIVE 611 universal” can be operated as slave on PROFIBUS–DP using this option module (refer to Table 1-3).

Which motors can be used?

The following motors can be used with ”SIMODRIVE 611 universal”:

- 1FK6, 1FT6 servomotors up to 140 Nm
- 1FE1 permanent–magnet synchronous motors
- 1PH induction motors up to 100 kW (1PH6, 1PH4, 1PH2, 1PH7)
- Induction motors without encoder
- Standard 1LA induction motors up to 100 kW
- 1FN linear motors
- 1FW6 build–in torque motors

Note

- **Two different motor types** can be **operated** with a control board (e.g. 1FK6 synchronous motor and 1PH7 induction motor).
- Unlisted motors can also be connected.
- The motors which can be connected are listed in Chapter A.3.

Which encoders can be connected?

The following encoders can be connected when using ”SIMODRIVE 611 universal”:

– Resolver with pole pair numbers 1, 2, 3, 4, 5 and 6
– Incremental encoder with sin/cos 1Vpp up to 65535 pulses, e.g. ERN 1387 from Heidenhain
– Absolute encoder with sin/cos 1Vpp and interface with EnDat protocol, e.g. EQN 1325 from Heidenhain (EnDat protocol)
– from SW 8.1 incremental encoders with TTL signals with control board, Order No. 6SN1118–□NH01–0AA□, only for induction motors

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Note

- For a 2–axis control board, it is **not possible** to **mix encoders** with sin/cos 1Vpp and resolvers.
- Unlisted encoders can also be connected.
- The encoders which can be connected are listed in Chapter A.4.
- The following is valid for resolvers:
  The selected resolver must match the motor.
  For resolvers, pole pair number = 1 (P1018) or the pole pair number of the motor (P1112) is permissible.

Parameterizing

The equipment is integrated and adapted to the machine/system by appropriately parameterizing it. The following possibilities are available for start–up and for service:

- ”SimoCom U” parameterizing and start–up tool
  (SimoCom U under Windows, refer to Chapter 3.3)
- Display and operator unit
  (on the control board front panel)

Data save

The control board has an interchangeable memory module with a non–volatile data memory (FEPROM) to save the following data:

- Firmware (system software)
- User data

Where can ”SIMODRIVE 611 universal” be used?

The ”SIMODRIVE 611 universal” control board can be flexibly used in many applications as a result of its design.

Typical applications for this control board are, e.g.:

- Textile machines
- Packaging machines
- Machine tools
- Handling equipment
- Conveyor and transport equipment
- Machines to machine/handle wood, glass or ceramics, etc.

1

Function overview

The subsequent diagram provides an overview of the features and functions of ”SIMODRIVE 611 universal”.

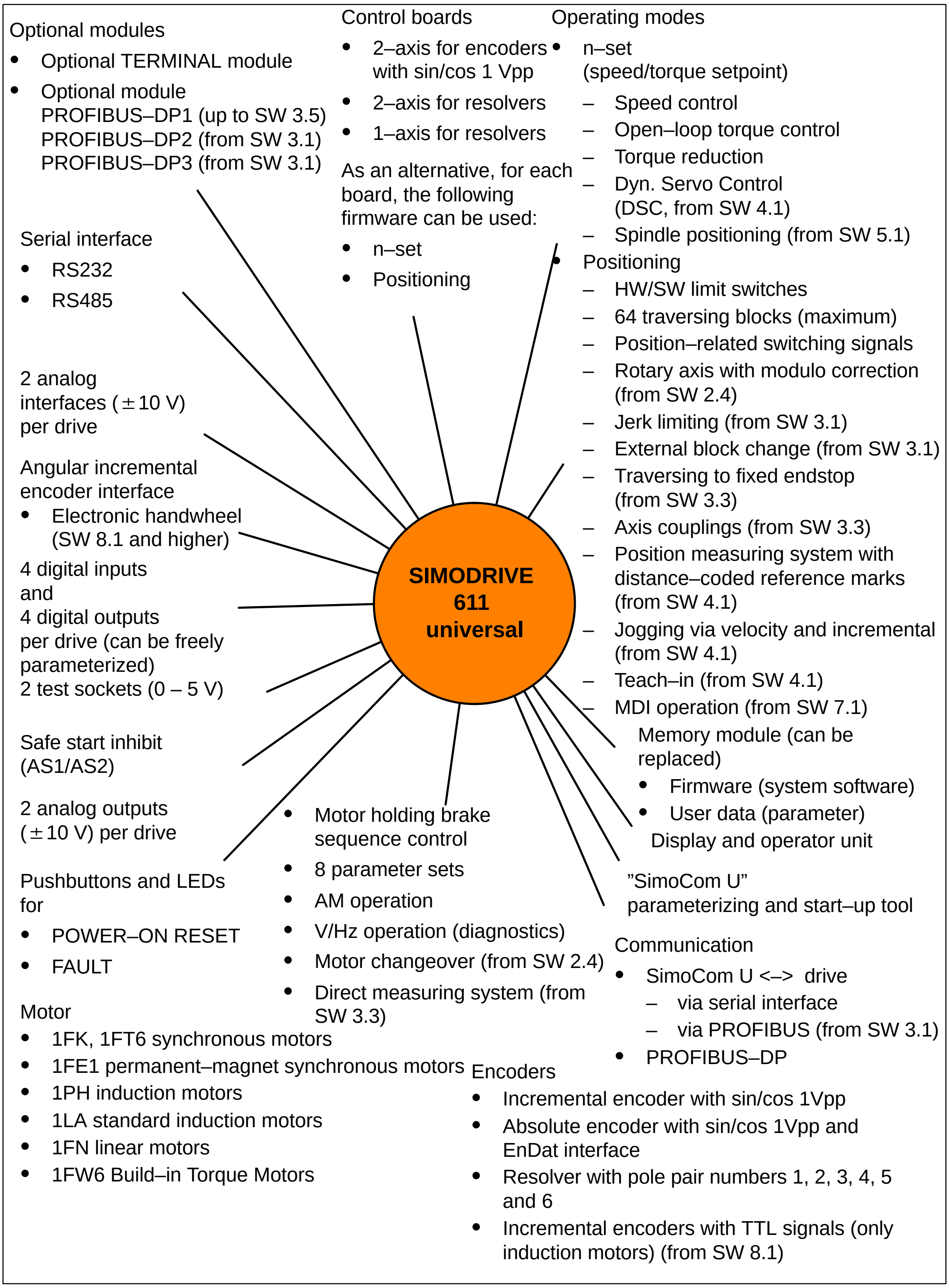

Fig. 1-1 Function overview for ”SIMODRIVE 611 universal”

1.2 ”SIMODRIVE 611 universal” in the SIMODRIVE 611 system

How is the SIMODRIVE 611 universal integrated into the SIMODRIVE 611 system?

”SIMODRIVE 611 universal” is implemented as digital control module for two drives for operation in the SIMODRIVE 611 system.

A SIMODRIVE drive group is modular and comprises the following modules and boards:

- Commutating reactors
- Supply infeed module (NE module)
- Power module(s) with control board
  - ”SIMODRIVE 611 universal” or
  - ”SIMODRIVE 611 universal HR” (from the middle of 2002 with SW 5.1)

Note

In the following chapters of the Description of Functions, a differentiation is not made between ”SIMODRIVE 611 universal” and ”SIMODRIVE 611 universal HR”.

The functionality, specified under ”SIMODRIVE 611 universal” also applies for ”SIMODRIVE 611 universal HR”.

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and, when required

- Line filter
- Monitoring and pulsed resistor module
- Transformer

Reference: /PJU/, SIMODRIVE 611,
Configuration Manual, Drive Converters

Engineering

Engineering a SIMODRIVE drive group is subdivided into the following phases as follows:

- Phase 1 (engineering)
  - The motor is selected
  - The power module and the supply infeed are selected
- Phase 2 (integration)
  - Create circuit diagrams

Note

The following documentation, SW Tools and Catalogs are available when engineering the system:

- **Reference:** /PJU/, SIMODRIVE 611,
  Configuration Manual, Drive Converters
- **Reference:** /PJM/, SIMODRIVE 611,
  Configuration Manual, Motors
  AC Motors for Feed and Main Spindle Drives
- **PC Tool:** /SP/, SIMOPRO,
  Program to engineer SIMODRIVE drives
  http://www.ad.siemens.de/mc/html_00/info/projektier_tools/
  index.htm
- **Reference:** /BU/, Catalog NC 60, Ordering Documentation
  /Z/, Catalog NC Z, Accessories and Equipment
- **CD:** Interactive Catalog CA01
- **CD:** /CD1/, DOC ON CD with all SINUMERIK
  840D/810D/FM–NC and SIMODRIVE 611D documentation

System overview

The SIMODRIVE 611 drive converter system with the "SIMODRIVE 611 universal" control board can comprise the individual components and higher–level control components as shown in the following diagram.

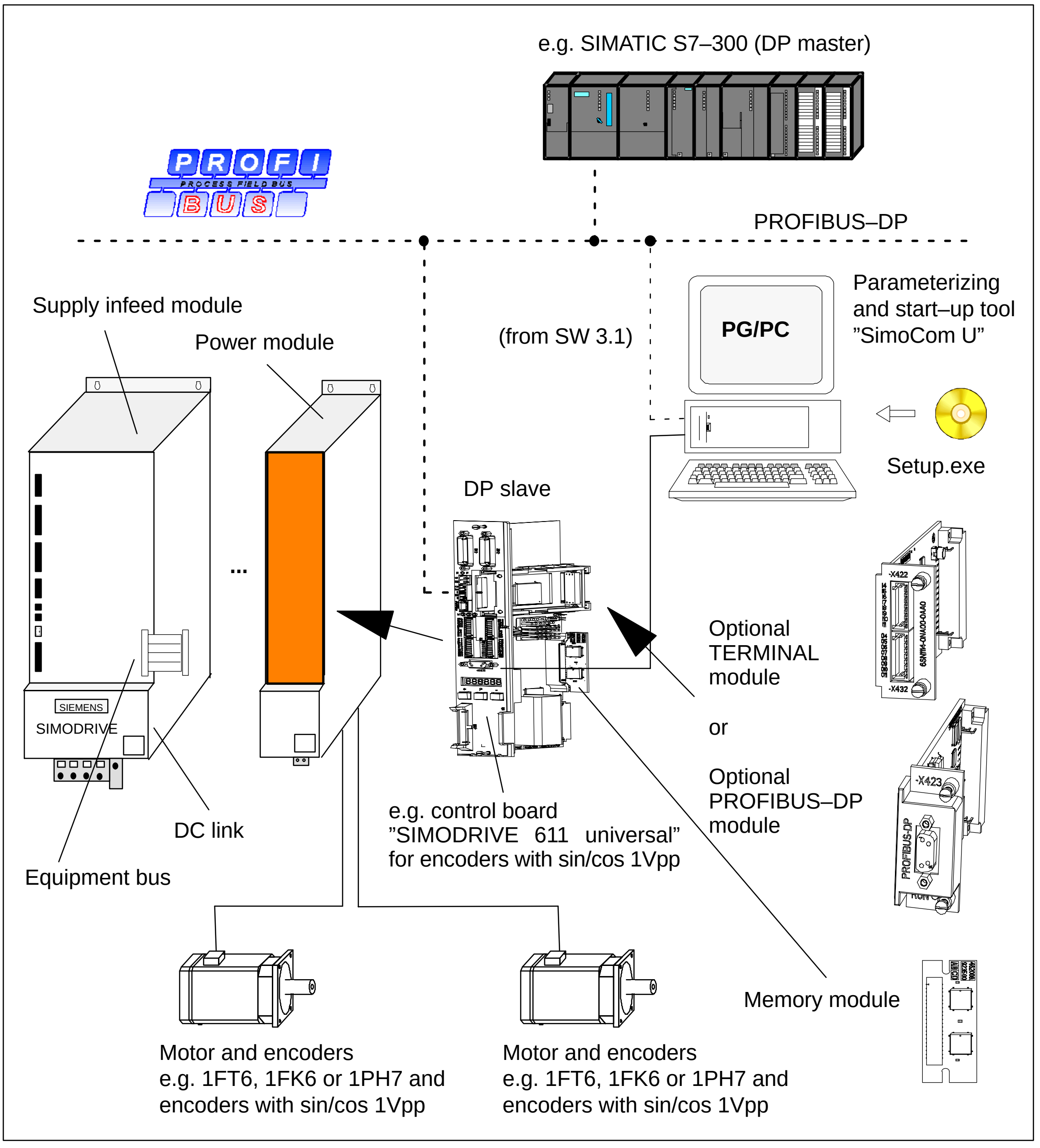


Fig. 1-2 System overview (schematic)

Components

The most important components and their function are listed in the following table.

Table 1-1 Components for the SIMODRIVE 611 system

Components	Function
Line supply infeed module (NE module)	... has the following functions: • Interface from/to the 3–phase network • Establishes the DC link voltage • Equipment bus
Equipment bus	... supplies the control boards with various voltages and enable signals.
DC link	... the power modules draw the power required to control the motors from the DC link.
Power modules	... control the motors.
”SIMODRIVE 611 universal” control board	... is used as 1 or 2–axis board in the SIMODRIVE 611 system, and can be expanded using the optional TERMINALS or PROFIBUS–DP module.
Memory module	... is integrated on the control board, can be replaced and has a non–volatile memory (FEPROM) to save the firmware and the user data.
Optional modules	... expands the interface functionality of the control board. ... the optional TERMINAL module or the optional PROFIBUS–DP module can be used.
Motor	... is connected to the power module.
Encoders	... is the angular incremental encoder to sense the actual position.
Parameterizing and start–up tool (SimoCom U) for PG/PC	... is a software running under Windows 95/98/NT2000/XP to parameterize, commission and test the ”SIMODRIVE 611 universal” control board. Furthermore, using this tool, the following functions are possible: • Parameterizing ”SIMODRIVE 611 universal” • Axes traversed • Settings optimized • Firmware downloaded • Series commissioning • Diagnostics (e.g. measuring function)

1.3 ”SIMODRIVE 611 universal” control board

Description

The ”SIMODRIVE 611 universal” control board is used in the SIMODRIVE 611 system, and it can be expanded using the optional TERMINALS or PROFIBUS–DP module.

Features

The control board has the following features:

- Versions

Table 1-2 Control board, option modules, data medium

Cons. No.	Description		Order No. (MLFB)
	Hardware	Firmware	
Control board			
1	2–axis[1] for encoders with sin/cos 1 Vpp or TTL signals[9]	n–set	6SN1118–0NH00–0AA□[2,6]
			6SN1118–0NH01–0AA0[7]
2		Positioning	6SN1118–1NH00–0AA□[2,6]
			6SN1118–1NH01–0AA0[7]
3	2–axis[1] for resolvers	n–set	6SN1118–0NK00–0AA□[2,6]
4			6SN1118–0NK01–0AA0[8]
5		Positioning	6SN1118–1NK00–0AA□[2,6]
6			6SN1118–1NK01–0AA0[8]
7	1–axis for resolvers	n–set	6SN1118–0NJ00–0AA□[2,6]
8			6SN1118–0NJ01–0AA0[8]
9		Positioning	6SN1118–1NJ00–0AA□[2,6]
10			6SN1118–1NJ01–0AA0[8]
Option module (can be alternatively used in the control board)			
1	TERMINALS	–	6SN1114–0NA00–0AA0
2	PROFIBUS–DP1[3]	–	6SN1114–0NB00–0AA0
3	PROFIBUS–DP2[4]	–	6SN1114–0NB00–0AA1
4	PROFIBUS–DP3[4]	–	6SN1114–0NB01–0AA0
Data medium			
1	CD	SimoCom U, drive firmware, Toolbox, GSD file, readme file, etc.	6SN1153–□NX20–□AG0[5] □ = 0 —> CD with the most current SW version The CD also contains previous SW versions

1) For 2–axis control boards, 1–axis operation is also possible
2) □: Space retainer for the hardware version
3) Can no longer be used from SW 4.1
4) Prerequisites: Control board from SW 3.1
5) □: Space retainer for the software version
6) ”SIMODRIVE 611 universal” control board
7) ”SIMODRIVE 611 universal HR” control board from SW 5.1
8) ”SIMODRIVE 611 universal HR” control board from SW 6.2
9) With control board, Order No. 6SN1118–□NH01–0AA□ from SW 8.1

Reader’s note

Please observe the information in the ”readme.txt” file on the CD for ”SIMODRIVE 611 universal”.

- Settings

  All drive–related settings of the control board can be made as follows:

  – using the parameterizing and start–up tool SimoCom U on an external PG/PC (refer to Chapter 3.3)

  – using the display and operator unit on the front panel (refer to Chapter 3.2)

  – using PROFIBUS–DP (parameter area, PKW area, refer to Chapter 5.6.7)

- Software and data

  The firmware and the user data are saved on a memory module which can be replaced.

- Terminals and operator control elements

  – 2 analog inputs, 2 analog outputs per drive

  – 4 digital inputs, 4 digital outputs per drive

  – 2 test sockets

  – POWER–ON RESET pushbutton with LED

  – Display and operator unit

- Safe start inhibit

  The start inhibit is addressed via terminal 663 and is signaled back using a relay with positively–driven signaling contacts (AS1/AS2). Using the start inhibit, the energy feed from the drive to the motor is interrupted.
  When the ”safe start inhibit” function is correctly used, the signaling contacts AS1/AS2 must be included in the line contactor circuit or the EMERGENCY OFF circuit.

Caution

When using the ”safe start inhibit” function, it must be ensured that the velocity goes to zero.

The control board supports the ”Safe standstill” function.

Detailed information about the ”Safe Standstill” function is provided in

Reference: /PJU/, SIMODRIVE 611,
Configuration Manual, Drive Converters

- Serial interface (RS232/RS485)
- Optional modules
  - Optional TERMINAL module,
    8 digital inputs and 8 digital outputs for drive A
  - Optional PROFIBUS–DP module
- Expanded functions from SW 5.1

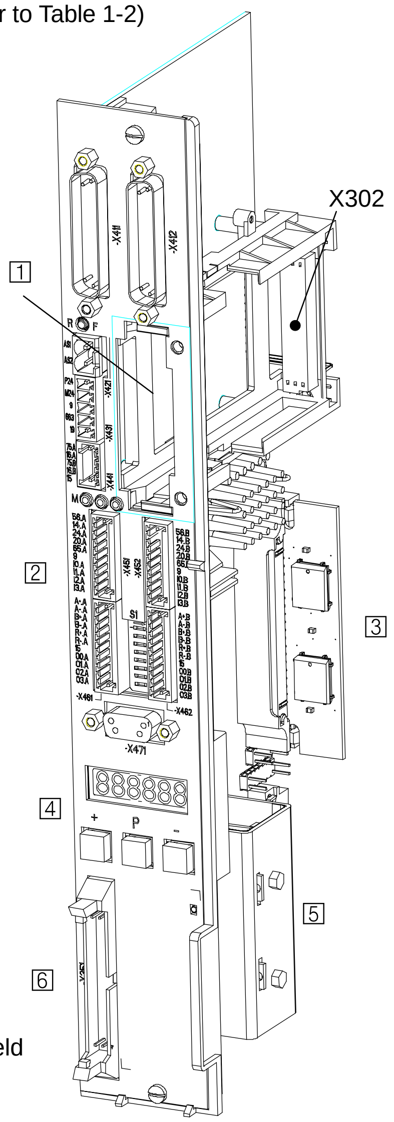
  The following expanded functionality is provided with the ”SIMODRIVE 611 universal control board for sin/cos 1Vpp encoders:
  - Higher internal resolution, interpolation factor 2048 (previously 128)
  - Pulse multiplication is possible (doubling) at the angular incremental encoder interface for absolute value encoders
  - Pulse multiplication (doubling) and division (1:2, 1:4, 1:8) are possible at the angular incremental encoder interface, also for incremental encoders
  - From SW 8.1
    It is possible to connect standard square–wave encoders (TTL) with differential signals according to RS422 and 5 V power supply voltage as pulse encoder for induction motors at the SIMODRIVE 611 universal HR” control board (Order No. 6SN1118–□NH01–0AA□).

1.3.1 Control board for 2 or 1 axis

Control board for 2 axes

The following 2–axis control boards are available:

2–axis for encoders with sin/cos 1Vpp or
2–axis for resolvers
(refer to Table 1-2)



1
Slot for
- Optional TERMINAL module
  or
- Optional PROFIBUS–DP module

2
- Interfaces
- Terminals
- Switch

3
Memory module
- Firmware
- User data

4
Display and operator unit

5
Pulse interface

6
Equipment bus

For screws:

Tighten (to establish a good shield contact) max. torque = 0.8 Nm

For plug connections:

Plug connectors with the same number of pins must be appropriately coded so that they cannot be interchanged (refer under the index entry ”Coding the mini connectors”).

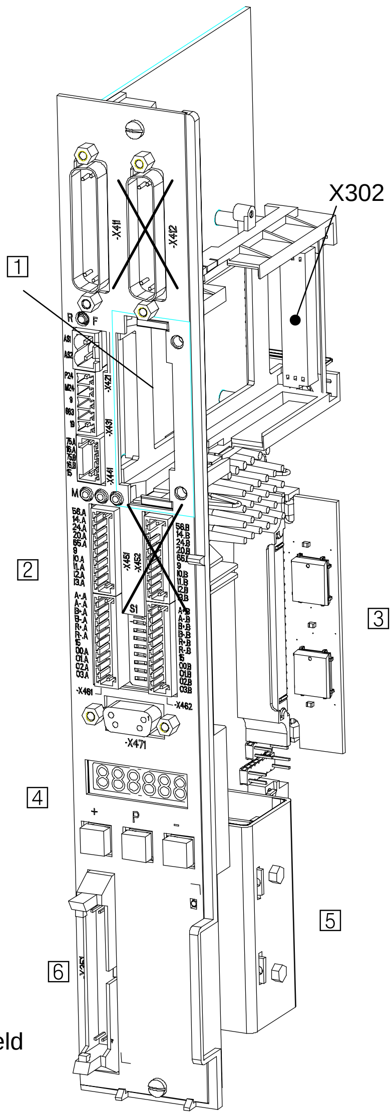
Fig. 1-3 Control boards for 2 axes

Control board for 1 axis

The following 1–axis control boards are available:

1 axis for resolvers
(refer to Table 1-2)

These interfaces have no function for the 1–axis version



1

Slot for

- Optional TERMINAL module
  or
- Optional PROFIBUS–DP module

2

- Interfaces
- Terminals
- Switch

3

Memory module

- Firmware
- User data

4

Display and operator unit

5

Pulse interface

6

Equipment bus

For screws:

Tighten (to establish a good shield contact) max. torque = 0.8 Nm

For plug connections:

Plug connectors with the same number of pins must be appropriately coded so that they cannot be interchanged (refer under the index entry ”Coding the mini connectors”).

Fig. 1-4 Control board for 1 axis

1

1.3.2 Elements on the control board front panel

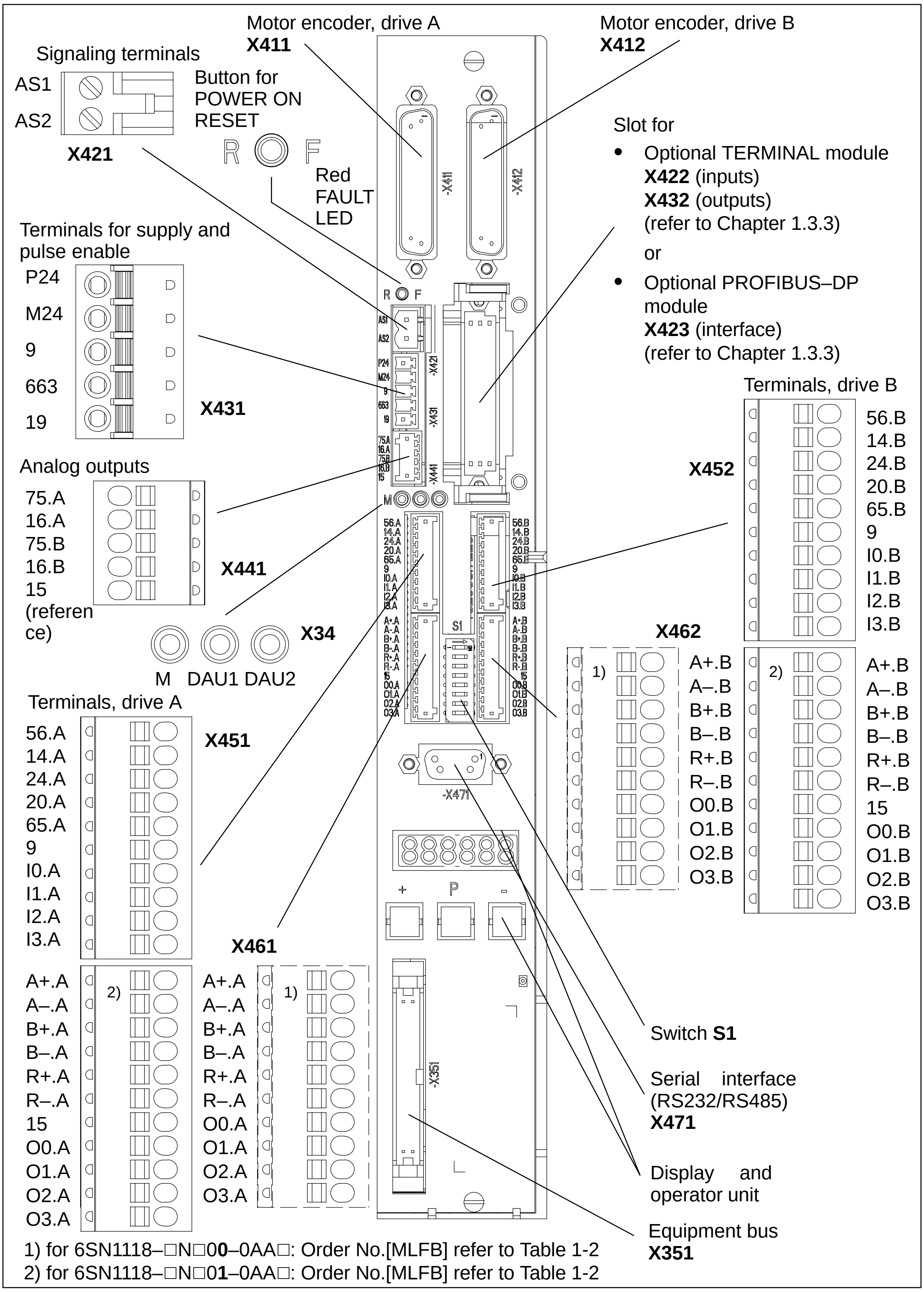


Fig. 1-5 Front panel elements (dummy cover removed, no option module inserted)

Reader’s note

The display and operator control elements provided on the front panel are described in the following.

Additional information about

- Terminals (assignment, wiring, technical data, etc.)
- Interfaces (assignment, wiring, etc.)

are included in the Chapter 2.

Button for

POWER ON–RESET,

FAULT, LED red

The component comprises a button with integrated LED.

- POWER–ON RESET, button

  The button is recessed into the front panel (hole: ∅ 3 mm). The processor runs up again when pressed.

  When the pushbutton is pressed, an LED which may have been previously bright (lit), goes dark, i.e. this indicates the pushbutton was completely actuated (the pushbutton pressure point has been reached).

Warning

When the POWER–ON RESET button is pressed, this corresponds to a POWER ON and should only be executed when the motors are at a standstill.

In order to prevent the drive from undesirably starting after POWER ON, before carrying out a POWER ON–RESET, the controller enable must be withdrawn at terminals 65.A and 65.B.

- FAULT, LED red (refer to Chapter 7.2.2)

  The LED is bright at run–up and when faults occur.

Display and operator unit

The 6–character 7–segment display with point is used to display and change parameter values and to display alarms.

The operator control PLUS, P and MINUS keys are used to select and change parameter values and/or for operator control when faults and warnings are displayed (e.g. to acknowledge these).

Reader’s note

Handling the display and operator unit

- How to parameterize ”SIMODRIVE 611 universal” is described in Chapter 3.2.
- To remove faults and warnings refer to Chapter 7.2.

Switch S1

The terminating resistor can be switched–in/switched–out using switch S1 on the front panel of the control board for the angular incremental encoder interface and the serial RS485 interface (RS485–SS).

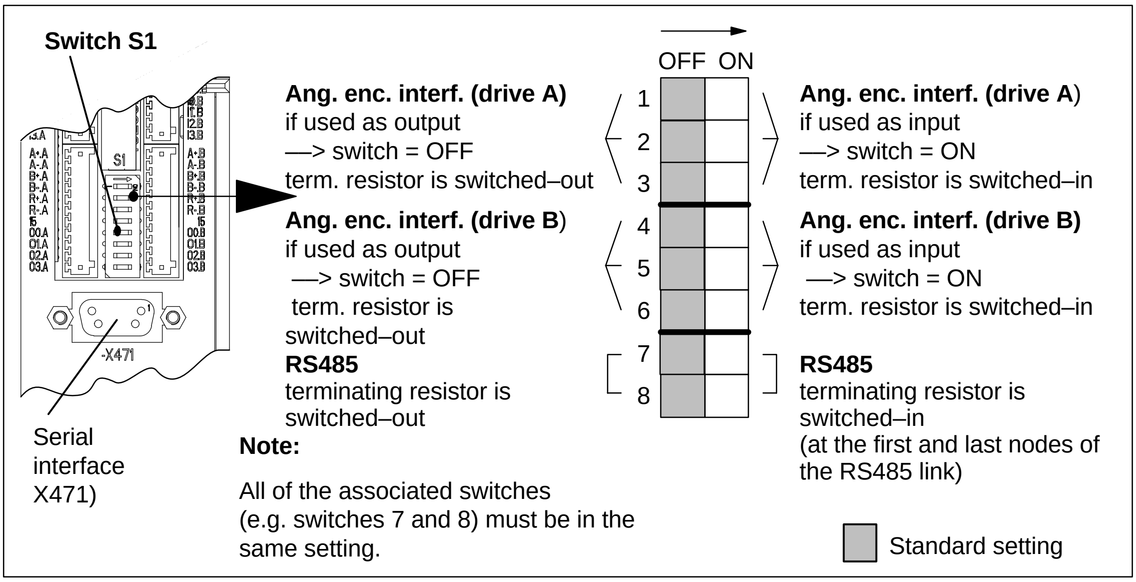


Fig. 1-6 Location and settings of switch S1

1.3.3 Optional modules

Optional TERMINAL module

An additional 8 digital inputs and outputs can be realized using this optional module.
The functionality of these inputs/outputs can be freely parameterized.

Note

- The input/output terminals of the optional TERMINAL module are
  - **Before SW 4.1: permanently** assigned to **drive A** or **axis A**
  - **From SW 4.1: can be freely** assigned **axes**
- The optional TERMINAL module can be used as follows, dependent on the software release:
  - The following applies before SW 2.4:
    The module can only be used in the ”positioning” mode.
  - The following applies before SW 2.4:
    The module can be used independently of the operating mode.

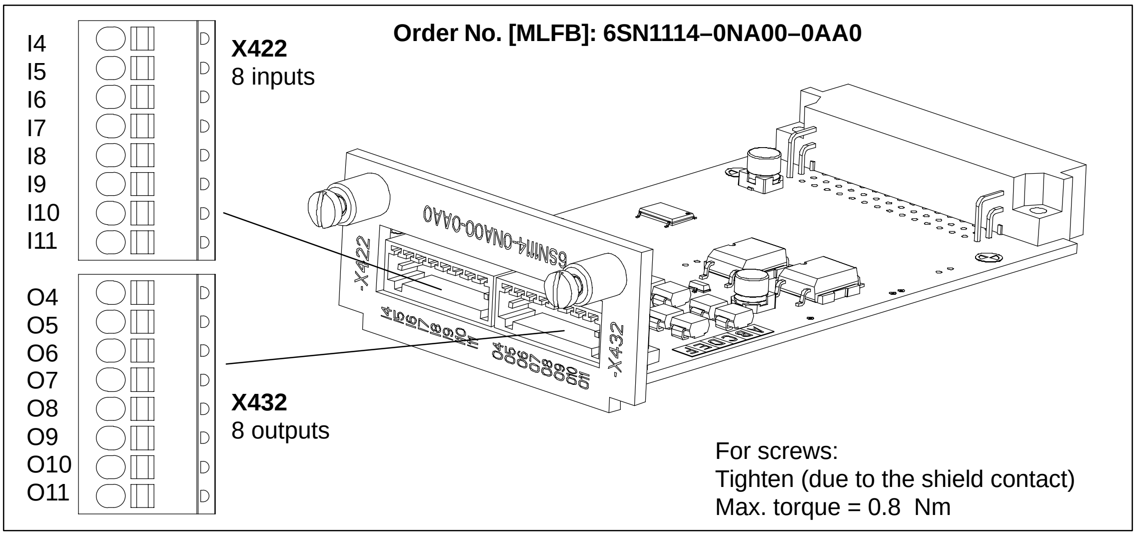


Fig. 1-7 Optional TERMINAL module

Reader’s note

Information regarding

- Installing the option
- The input and output terminals (X422 and X432)
- The connection diagram and wiring/connecting the option module

is included in Chapter 2.

Optional PROFIBUS–DP module

The ”SIMODRIVE 611 universal” control board can be connected and operated as DP slave on the PROFIBUS–DP fieldbus when this optional module is used.

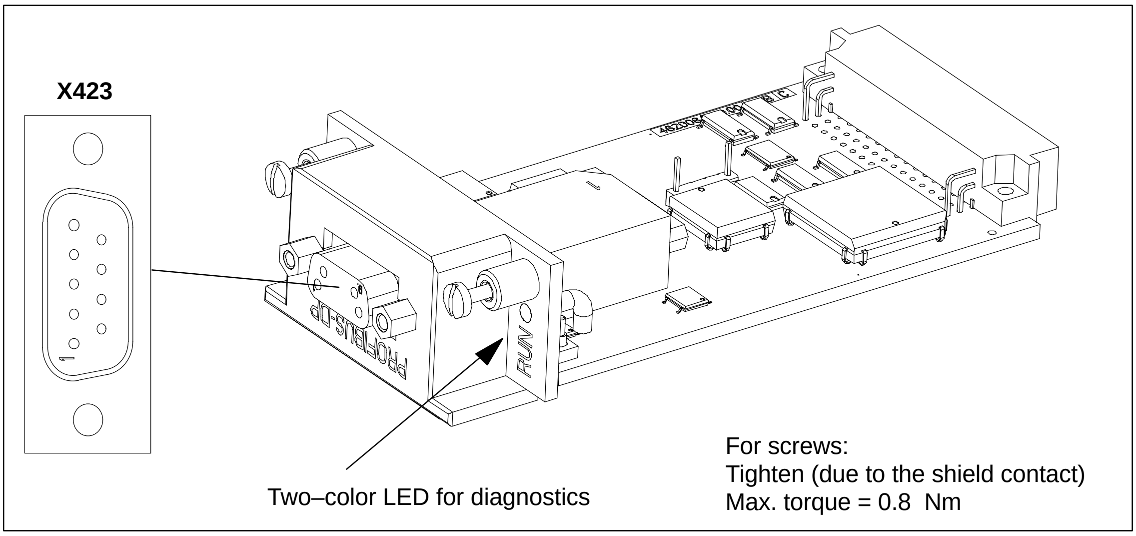


Fig. 1-8 Optional PROFIBUS–DP module

Table 1-3 Which optional modules are available?

Designation	Order No. (MLFB)	Features
PROFIBUS–DP1 (can no longer be used from SW 4.1)	6SN1114–0NB00–0AA0	• PROFIBUS–ASIC SPC3 • Cyclic data transfer (PKW and PZD section) possible
PROFIBUS–DP2	6SN1114–0NB00–0AA1	• PROFIBUS–ASIC DPC31 without PLL • For control boards SW 3.1, this module can replace the optional PROFIBUS–DP1 module
Features that PROFIBUS–DP2 and DP3 have in common		• Prerequisites: Control board from SW 3.1 is required • Cyclic data transfer (PKW and PZD section) possible • FW module can be updated using SimoCom U • Non–cyclic data transfer (DP/V1) • ”SimoCom U via PROFIBUS” possible
PROFIBUS–DP3	6SN1114–0NB01–0AA0	• PROFIBUS–ASIC DPC31 with PLL • ”Motion Control with PROFIBUS–DP” function (clock–synchronous PROFIBUS operation) is possible

Table 1-4 Which optional modules can be used for the various software releases?

Case	Firmware release	Optional module		
		DP1	DP2	DP3
1. A master configured software, generated with GSD file siem808f.gsd, can be operated with	from SW 3.1	no	yes	yes
2. A master configured software, generated with a GSD file siem8055f.gsd and P0875 = 2, can be operated with	before SW 4.1	yes	yes	yes
3. A master configured software, generated with a GSD file siem8055f.gsd and P0875 = 2, can be operated with	from SW 4.1	no	yes	yes
4. A master configured application, generated using gsd file si02808f.gsd and P0875 = 2 can be operated with	from SW 6.1	no	yes	yes

Note

Case 1 is for ”new” applications with the DP2, DP3 module.

Cases 2 and 3 are for series commissioning of drives using DP1 modules and for replacing a defective DP1 module by a DP2 module. From SW 4.1, the DP1 module can no longer be used.

Reader’s note

Information regarding

- Installing the optional module —> refer to Chapter 2
- The interface (X423) —> refer to Chapter 2
- The connection diagram and wiring/connection of the option module —> refer to Chapter 2
- Communications via PROFIBUS–DP —> refer to Chapter 5

1.4 ”SIMODRIVE 611 universal E” control board

Description

The ”SIMODRIVE 611 universal E” control board is used with SINUMERIK 802D with the ”motion control with PROFIBUS–DP” function.
Using this function, it is possible to implement a clock–synchronous drive coupling between a DP master (e.g. SINUMERIK 802D) and the DP slave ”SIMODRIVE 611 universal E”.

Features

The control board has the following features:

- Control board (refer to Chapter 1.4.1)
  - Order No. (MLFB):
    before SW 5.1: 6SN1118–0NH10–0AA□
    (”SIMODRIVE 611 universal E” control board)
    □: Space retainer for hardware function
    from SW 5.1: 6SN1118–0NH11–0AA0
    (”SIMODRIVE 611 universal E HR” control board)
  - 2–axis for encoders with sin/cos 1Vpp
  - with memory module for n–set
- Optional PROFIBUS–DP3 module (refer to Chapters 1.3.3 and 1.4.1)
  - Order No. (MLFB): 6SN1114–0NB01–0AA0
- The parameters can be set as follows:
  - using the ”SimoCom U” parameterizing and start–up tool on an external PG/PC (refer to Chapter 3.3)
  - using the display and operator unit on the front panel (refer to Chapter 3.2)
  - using PROFIBUS–DP (parameter area, PKW area, refer to Chapter 5.6.7)
- Software and data

  The software and the user data are saved on an interchangeable memory module.
- Terminals and operator control elements
  - 2 analog inputs and 2 analog outputs per drive
  - 2 digital inputs and 2 digital outputs per drive
  - 2 test sockets
  - POWER–ON RESET button with integrated LED
  - Display and operator unit
- Safe start inhibit

  Detailed information about this function is provided in

  Reference: /PJU/, SIMODRIVE 611, Configuration Manual, Drive Converters
- Serial interface (RS232, refer to Chapter 3.3.3)

1.4.1 Diagram of the board and optional module

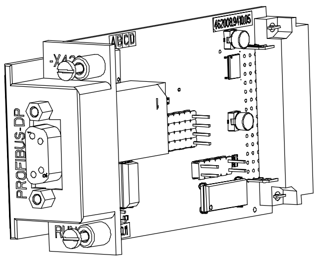
Control board with optional PROFIBUS–DP module

”SIMODRIVE 611 universal E” control board

2 axis for encoders with sin/cos 1Vpp

Optional PROFIBUS–DP3 module

with PROFIBUS–ASIC DPC31 with PLL



1

Mounting slot for the optional PROFIBUS–DP3 module

2

- Interfaces
- Terminals
- Test sockets

3

Serial interface (RS232)

4

Encoder interface for TTL encoders

5

Memory module

- Firmware
- User data

6

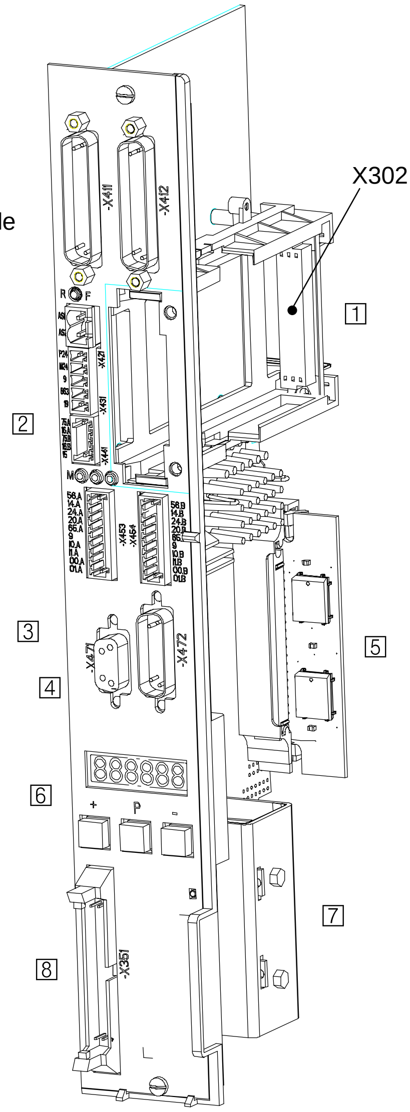
Display and operator unit

7

Pulse interface

8

Equipment bus



For screws:

Tighten (due to the shield contact)

Max. torque = 0.8 Nm

For plug connections:

Plug connectors with the same number of pins must be appropriately coded so that they cannot be interchanged (refer under the index entry ”Coding the mini connectors”).

Fig. 1-9 ”SIMODRIVE 611 universal E” control board with optional PROFIBUS–DP3 module

1

1.4.2 Elements on the control board front panel

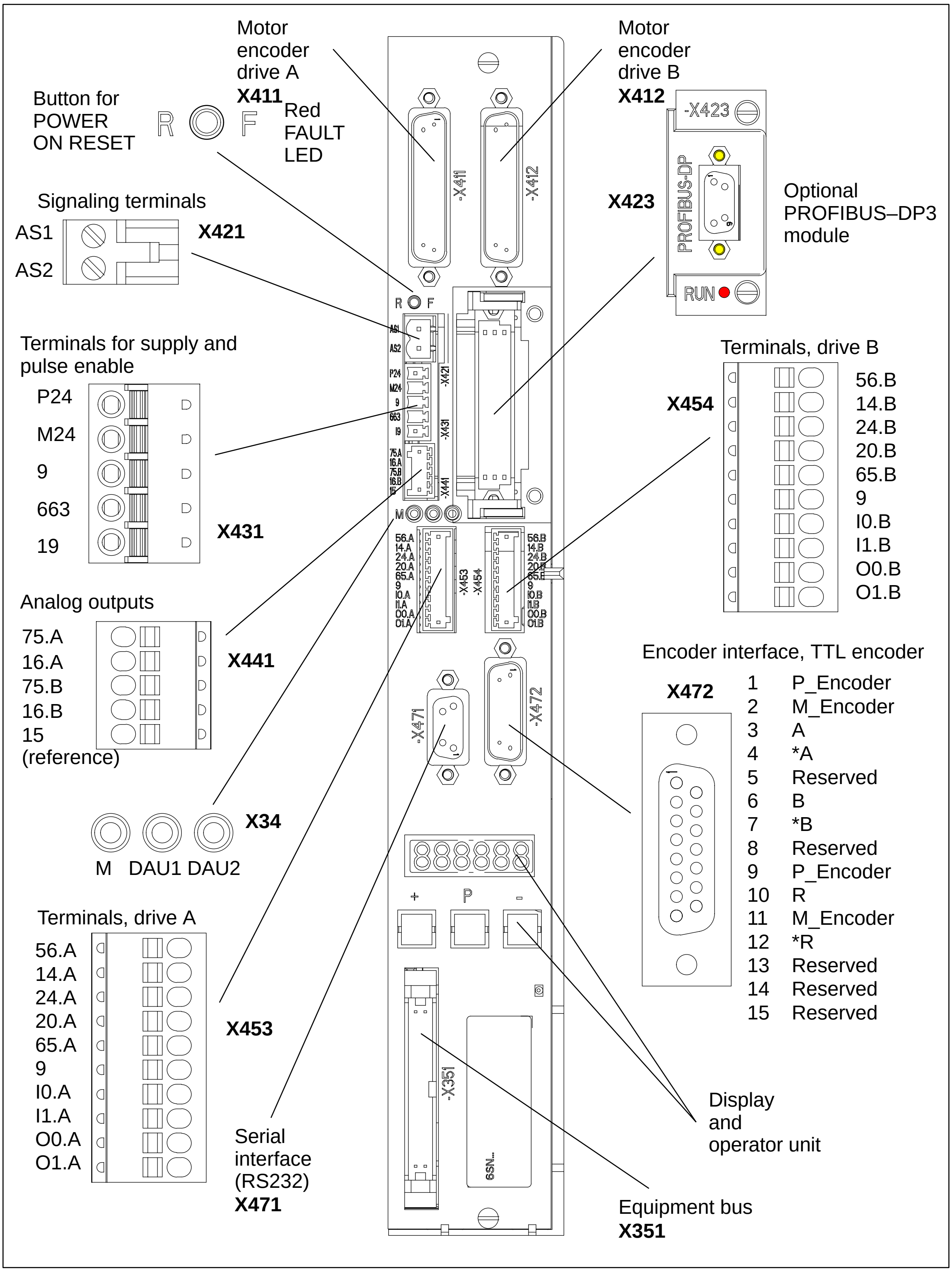


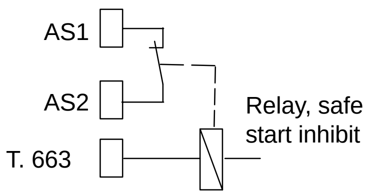
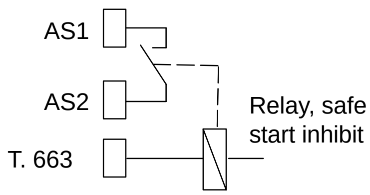
Fig. 1-10 Elements on the front panel of ”SIMODRIVE 611 universal E”

1.4.3 Description of the terminals, interfaces and operator control elements

Board–specific terminals and interfaces

The board–specific terminals and interfaces are available, common for both drive A and B.

Table 1-5 Overview of the board–specific terminals and interfaces

Terminals No.	Terminals Desig-nation	Function	Type 1)	Technical data
Signaling terminal, start inhibit (X421)				
AS1 AS2	**X421**	Signaling contact Start inhibit Feedback signal from terminal 663	NC	Connector type: 2–pin conn. strip Max. cond. cross–sect.: 2.5 mm^2 Contact: Floating NC contact Contact load capability: at 250 V_{AC} max. 1 A at 30 V_{DC} max. 2 A
	 Pulses not enabled (T. 663) The gating pulses of the power transistors are inhibited.			 Pulses enabled (T. 663) The gating pulses of the power transistors are enabled.
Terminals for supply and pulse enable (X431)				
	X431			Connector type: 5–pin conn. strip Max. cond. cross–sect.: 1.5 mm^2
P24	X431.1	External power supply for digital outputs (+24 V)	S	Voltage tolerance (including ripple): 10 V to 30 V Max. total current: 2.4 A **Note:** • The external supply is required for the 4 digital outputs (O0.A, O1.A and O0.B, O1.B). • When dimensioning the external power supply, the total current of all of the digital outputs must be taken into account.
M24	X431.2	Reference for the external supply	S	
9	X431.3	Enable voltage (+24 V)	S	Reference: Terminal 19 Maximum current (for the total group): 500 mA **Note:** The enable voltage (terminal 9) can be used to supply the enable signals (e.g. pulse enable) as 24 V auxiliary voltage.

1) NC: NC contact; S: Supply

Table 1-5 Overview of the board–specific terminals and interfaces, continued

Terminals No.	Terminals Desig-nation	Function	Type 1)	Technical data
663	X431.4	Pulse enable (+24 V)	I	Voltage tolerance (including ripple): 21 V to 30 V Typ. current consumption: 25 mA at 24 V **Note:** The pulse enable acts simultaneously on drive A and drive B. When this pulse enable is withdrawn, the drives ”coast down” unbraked.
19	X431.5	Reference (Reference for all digital inputs)	S	**Note:** If the enable signals are to be controlled from an external voltage and not from terminal 9, then the reference potential (ground) of the external source must be connected to this terminal.
Serial interface (X471)				
–	**X471**	Serial interface for ”SimoCom U”	IO	Connector type: 9–pin D–sub socket connector **Note:** • The interface can only be used as RS232 interface —> refer to Chapter 3.3.3 • Pin assignment of the interface —> refer to Chapter 2.4 • Cable diagram for RS232 —> refer to Chapter 2.5
PROFIBUS–DP interface (X423) for the optional PROFIBUS–DP3 module				
–	**X423**	Communications interface for PROFIBUS	IO	Connector type: 9–pin D–sub socket connector **Note:** • Pin assignment of the interface —> refer to Chapter 2.4 • Connecting diagram and connecting–up the optional PROFIBUS–DP module —> refer to Chapter 2.3.4 • Communications via PROFIBUS–DP —> refer to Chapter 5
Equipment bus (X351)				
–	**X351**	Equipment bus	IO	Ribbon cable: 34–pole Voltages: various Signals: various
Test sockets (X34)				
DAU1	**X34**	Test socket 1 2)	MA	Test socket: ∅ 2 mm Resolution: 8 bit Voltage range: 0 V to 5 V Maximum current: 3 mA
DAU2	**X34**	Test socket 2 2)	MA	
M	**X34**	Reference	MA	

1) I: Input; S: Supply; IO: Input/output; MA: Measuring signal, analog
2) Can be freely parameterized

Drive–specific terminals

The drive–specific terminals are available for both drive A and drive B.

Table 1-6 Overview of the drive–specific terminals

Terminals				Function	Type 1)	Technical data
Drive A		Drive B				
No.	Designation	No.	Designation			
Encoder connection (X411, X412)						
–	**X411**	–	–	Motor encoder connection, drive A	I	**Reference:** /PJU/ SIMODRIVE 611, Configuration Manual, Drive Converters, Chapter ”Indirect and direct position sensing” **Encoder limit frequencies:** • Enc. with sin/cos 1Vpp: 350 kHz • Resolver: 432 Hz
–	–	–	**X412**	Motor encoder connection, drive B or connection, direct measuring system (from SW 3.3)	I	
Analog outputs (X441)						
75.A	X441.1	–	–	Analog output 1 2)	AO	Connector type: 5–pin conn. strip Wiring: refer to 3) Max. conductor cross–section for finely–stranded or solid conductors: 0.5 mm^2 Voltage range: –10 V to +10 V Max. current: 3 mA Resolution: 8 bit Update: In the speed–controlled clock cycle Short–circuit proof
16.A	X441.2	–	–	Analog output 2 2)	AO	
–	–	75.B	X441.3	Analog output 1 2)	AO	
–	–	16.B	X441.4	Analog output 2 2)	AO	
15	X441.5	15	X441.5	Reference	–	

1) I: Input; AO: Analog output
2) Can be freely parameterized
3) The analog outputs (X441) should be connected through a terminal strip.
A shielded cable should be used together for all of the analog outputs together between X441 and the terminal strip. For this cable, the shield must be connected at both cable ends.
The 4 analog cables can be routed away from the terminal strip. The shield of the cables must be connected and the ground cables must be connected to a common ground terminal.

1

Table 1-6 Overview of the drive–specific terminals, continued

Terminals				Function	Type 1)	Technical data
Drive A		Drive B				
No.	Desig-nation	No.	Desig-nation			
Terminals for the analog inputs and digital inputs/outputs (X453, X454)						
	X453		**X454**	Connector type: 10–pin conn. strip Max. conductor cross–section for finely–stranded or solid conductors: 0.5 mm^2		
56.A	X453.1	56.B	X454.1	none	–	–
14.A	X453.2	14.B	X454.2	none	–	–
24.A	X453.3	24.B	X454.3	none	–	–
20.A	X453.4	20.B	X454.4	none	–	–
65.A	X453.5	65.B	X454.5	Controller enable drive–specific	I	Typ. current consumption: 6 mA at 24 V Signal level (incl. ripple) High signal level: 15 V to 30 V Low signal level: –3 V to 5 V Electrical isolation: Ref. is T. 19/T. M24
9	X453.6	9	X454.6	Enable voltage (+24 V)	S	Reference: Terminal 19 Maximum current (for the total group): 500 mA **Note:** The enable voltage (terminal 9) can be used to supply the enable signals (e.g. controller enable).
I0.A	X453.7	I0.B	X454.7	Digital input 0 2) Fast input 3)	DI	Voltage: 24 V Typ. current consumption: 6 mA at 24 V Signal level (incl. ripple) High signal level: 15 V to 30 V Low signal level: –3 V to 5 V Electrical isolation: Ref. is T. 19/T. M24 **Note:** • The parameterization of the input terminals and the standard assignment is described in Chapter 6.4.2. • An open–circuit input is interpreted as 0 signal.
I1.A	X453.8	I1.B	X454.8	Digital input 1 2)	DI	

1) I: Input; S: Supply; DI: Digital input
2) Can be freely parameterized
All of the digital inputs are de–bounced per software. For the signal detection, this results in a delay time of between 1 and 2 interpolation clock cycles (P1010).
3) I0.x is internally hard–wired to the position sensing function where it acts almost instantaneously.

Table 1-6 Overview of the drive–specific terminals, continued

Terminals				Function	Type 1)	Technical data
Drive A		Drive B				
No.	Designation	No.	Designation			
O0.A	X453.9	O0.B	X454.9	Digital output 0 2)	DO	Rated current per output: 500 mA Max. current per output: 600 mA Voltage drop, typical: 250 mV at 500 mA Short–circuit proof **Note:** Parameterization of the output terminals as well as the standard assignment is described in Chapter 6.4.5.
O1.A	X453.10	O1.B	X454.10	Digital output 1 2)	DO	
	Note: • The power switched via these outputs is supplied via terminals P24/M24 (X431). This must be taken into account when dimensioning the external supply. • The digital outputs only ”function” if an external power supply is available (+24 V, T. P24/M24).					

1) DO: Digital output
2) Can be freely parameterized
The digital outputs are updated in the interpolation clock cycle (P1010). This is supplemented by a hardware–related delay time of approx. 200 µs.

1

Encoder interface for TTL encoders (X472)

Table 1-7 Encoder interface for TTL encoders (X472)

<table>
<tr><th colspan="2">Pin</th><th rowspan="2">Function</th><th rowspan="2">Type 1)</th><th rowspan="2">Technical data</th></tr>
<tr><th>No.</th><th>Designation</th></tr>
<tr><td colspan="2">X472</td><td colspan="3">Connector type: 15–pin D–sub socket connector</td></tr>
<tr><td>1</td><td>P_Encoder</td><td rowspan="15">Possibility of connecting a power supply for an additional measuring system
(TTL encoders, encoder 3)
The information is transferred to a higher–level control via PROFIBUS.
Refer to Chapter 5.6.4</td><td>S</td><td rowspan="15">• Recommended for TTL encoders:
Order No. (MLFB): 6FX2001–2□B02
Encoder pulse number = 1024
□ = Space retainer for conn. types A, C, I or G
• Cabling
– Max. cable length: 15 m
– Recommended encoder cable:
Order No. (MLFB): 6FX2002–2CA11–1□□0
□ = Space retainer for cable type (length, ...)
Reference:
/Z/ Catalog NC Z, Accessories and Equipment
• Encoder power supply
– Voltage: 5.1 V ±2 %
– Short–circuit proof
– Max. current: 300 mA
– Max. short–circuit curr.: 3.5 A
• Encoder limit frequency
– TTL encoder: 1 MHz</td></tr>
<tr><td>2</td><td>M_Encoder</td><td>S</td></tr>
<tr><td>3</td><td>A</td><td>I</td></tr>
<tr><td>4</td><td>*O</td><td>I</td></tr>
<tr><td>5</td><td>Reserved</td><td>–</td></tr>
<tr><td>6</td><td>B</td><td>I</td></tr>
<tr><td>7</td><td>*B</td><td>I</td></tr>
<tr><td>8</td><td>Reserved</td><td>–</td></tr>
<tr><td>9</td><td>P_Encoder</td><td>S</td></tr>
<tr><td>10</td><td>R</td><td>I</td></tr>
<tr><td>11</td><td>M_Encoder</td><td>S</td></tr>
<tr><td>12</td><td>*R</td><td>I</td></tr>
<tr><td>13</td><td rowspan="3">Reserved</td><td>–</td></tr>
<tr><td>14</td><td>–</td></tr>
<tr><td>15</td><td>–</td></tr>
</table>

1) I: Input; S: Supply

Button for

POWER ON–RESET,

FAULT, LED red

The component comprises a button with integrated LED.

- POWER–ON RESET, button

  The button is recessed into the front panel (hole: ∅ 3 mm).
  The processor runs up again when pressed.

  When the pushbutton is pressed, an LED which may have been previously bright (lit), goes dark, i.e. this indicates the pushbutton was completely actuated (the pushbutton pressure point has been reached).

Warning

When the POWER–ON RESET button is pressed, this corresponds to a POWER ON and should only be executed when the motors are at a standstill.

In order to prevent the drive from undesirably starting after POWER ON, before carrying out a POWER ON–RESET, the controller enable must be withdrawn at terminals 65.A and 65.B.

- FAULT, LED red (refer to Chapter 7.2.2)

  The LED is bright at run–up and when faults occur.

Display and operator unit

The 6–character 7–segment display with point is used to display and change parameter values and to display alarms.

The operator control PLUS, P and MINUS keys are used to select and change parameter values and/or for operator control when faults and warnings are displayed (e.g. to acknowledge these).

Reader’s note

Handling the display and operator unit

- To parameterize the drive, refer to Chapter 3.2
- To remove faults and warnings, refer to Chapter 7.2.1

1.4.4 Commissioning the board with ”SimoCom U”

Requirements

The following prerequisites must be fulfilled in order to be able to commission a drive using the ”SimoCom U” parameterizing and start–up tool:

1. All of the prerequisites for commissioning are fulfilled, according to Chapter 4.1 this means that the system with ”SIMODRIVE 611 universal E” can be commissioned.
2. The checklist for commissioning according to Chapter 4.1 has been checked.
3. The optional PROFIBUS–DP3 module is inserted into the control board (refer to Chapter 1.3.3).
4. The ”SimoCom U” tool is installed on the PC/PG, which is to be used to commission the drive.
5. There is a connecting cable between the PG/PC and control board (RS232 connecting cable, refer to Chapter 2.5).
6. The PC/PG with ”SimoCom U” is connected to the control board (X471).

Reader’s note

- Cable diagrams for the connecting cable — refer to Chapter 2.5
- Everything about ”SimoCom U” — refer to Chapter 3.3

Procedure when commissioning the drive for the first time

Please proceed as follows when commissioning ”SIMODRIVE 611 universal E” using the ”SimoCom U” parameterizing and start–up tool for the first time:

1. Power–up the drive group
2. Start SimoCom U
3. Request online operation for drive A

   Operator action:
   Execute the ”Search for online drives” function in the ”Start–up” menu, and select drive A in the ”Drive and dialog browser”.

   Is the ”start–up required” window displayed?

   – Yes: —> Start the drive configuration assistant

     —>This means you signal the drive the existing configuration (PROFIBUS node address, power module, motor, etc.).

   – No: —> Press ”re–configure drive” button

     —> This means that you change the configuration on the control board (PROFIBUS node address, power module, motor, etc.).

4. Execute the drive configuration, and at the end, press the ”Calculate controller data, save, reset” button.

Note

If drive B is to be commissioned, then the points must be executed for drive B from point 3 onwards.

1.4.5 What are the differences with respect to ”SIMODRIVE 611 universal”?

Table 1-8 Differences with respect to ”SIMODRIVE 611 universal”

<table>
<tr><th rowspan="2">Differ-
ence</th><th colspan="2">SIMODRIVE</th><th rowspan="2">This should be observed for
SIMODRIVE 611 universal E</th></tr>
<tr><th>611 universal</th><th>611 universal E</th></tr>
<tr><td>The informa-
tion in this doc-
ument</td><td>The following chapter is of no significance:
• Chapter 1.4</td><td colspan="2">Note for the reader:
Before the 10.99 Edition (SW 3.1) the following was valid:
This documentation only contains information for ”SIMODRIVE 611 universal”.
From the 10.00 Edition (SW 3.1) the following is valid:
This documentation contains information for ”SIMODRIVE 611 universal” and ”SIMODRIVE 611 universal E”.
The information for ”SIMODRIVE 611 universal E” is provided in this Chapter.
The following abbreviations have been introduced to identify the information for both modules in the other chapters:
Board — Abbreviation (only for this purpose)
• SIMODRIVE 611 universal — 611u
• SIMODRIVE 611 universal E — 611ue
The following applies for users of ”SIMODRIVE 611 universal E”:
The Chapter and pages are coded for the reader as follows in the header line below the edition:
Designation — Significance
• none — Information is valid for 611u and 611ue
• ! not 611u ! — Information is not valid for 611u
• ! not 611ue ! — Information is not valid for 611ue
• ! 611ue diff ! — Information differs between 611u and 611ue. In addition, this list of differences must be carefully observed.</td></tr>
<tr><td>Oper-
ating
mode</td><td>• Speed/torque setpoint

• Positioning</td><td>• Speed/torque setpoint

• no</td><td>• Permissible settings are:
– P0700 = 0 (the drive is inactive, only drive B)
Thus, a double–axis module can only be operated as single–axis module.
Should communications be established with inactive drive B via PROFIBUS?
If yes, then communications must be disabled with P0875 = 0.
– P0700 = 1
(operating mode ”speed/torque setpoint”)
P0700 = 3 is not permissible</td></tr>
<tr><td>Memory
module</td><td>... for n–set
... for pos</td><td>... for n–set</td><td>The rear of the memory module is identified as follows:
• URL.–SOFTWARE N_SOLL–611U (before SW 4.2)
• SYS.–SOFTWARE N_SOLL–611U (from SW 4.2)</td></tr>
</table>

Table 1-8 Differences with respect to "SIMODRIVE 611 universal", continued

Differ-ence	SIMODRIVE 611 universal	SIMODRIVE 611 universal E	This should be observed for SIMODRIVE 611 universal E
Software release	• SW 1.1 • SW 2.1 • SW 2.4 • SW 3.x • SW 4.1 • SW 5.1 • SW 6.1	• no • no • no • SW 3.x • SW 4.1 • SW 5.1 • SW 6.1	Software release 3.1 is the first software release which is used for both modules. The following applies for "SIMODRIVE 611 universal E": Software from SW 3.1 onwards must be used.
Module type	The module is identified using P0870 (module type)		P0870 = 0004_{hex} —> it involves a "SIMODRIVE 611 universal E" control board, 2–axes for encoders with sin/cos 1 Vpp
Analog inputs	• T. 56.x/14.x • T. 24.x/20.x	• no • no	The information in Chapter 6.6 is of no significance.
Digital in-puts:	• Term. I0.x • Term. I1.x • Term. I2.x • Term. I3.x	• Term. I0.x • Term. I1.x • no • no	• Effective parameters are: – P0660 (function, input terminal I0.x) – P0661 (function, input terminal I1.x) P0662 and P0663 are ineffective
Digital outputs:	• Term. O0.x • Term. O1.x • Term. O2.x • Term. O3.x	• Term. O0.x • Term. O1.x • no • no	• Effective parameters are: – P0680 (signal function, output terminal O0.x) – P0681 (signal function, output terminal O1.x) P0682 and P0683 are ineffective
Optional TERMI-NAL module	Yes, can be used	No, cannot be used	P0664 to P0671 (function, input terminal I4 to I11) and P0684 to P0691 (signaling function, output terminal O4 to O11) are of no significance
Optional TERMI-NAL module	• PROFIBUS DP1 • PROFI-BUS–DP2 • PROFI-BUS–DP3	• no • no • PROFI-BUS–DP3	P0872 = 4 —> The following option module was detected: Optional PROFIBUS–DP3 module (from SW 3.1) with PROFIBUS–ASIC DPC31 with PLL Order No. (MLFB): 6SN1114–0NB01–0AA0
Serial in-terface	• RS232 • RS485 (indepen-dent of the hardware)	• RS232 • no	• Permissible settings – P0801 = 0 (RS232 interface, standard) P0801 = 1 is interpreted just like P0801 = 0 P0802 and P0803 are of no significance

Table 1-8 Differences with respect to ”SIMODRIVE 611 universal”, continued

Difference	SIMODRIVE 611 universal	SIMODRIVE 611 universal E	This should be observed for SIMODRIVE 611 universal E
Angular incremental encoder interface	yes	no	• Permissible settings, drive A – P0890 = 0 Encoder interface, inactive – P0890 = 4 Encoder interface, active • Permissible settings, drive B – P0890 = 0 Encoder interface, inactive For all other parameter values, a fault is signaled. The encoder interface is not suitable to connect a direct measuring system for the following reasons: • The encoder signals are not evaluated in the drive. • The drive transfers the information which is sensed to a higher–level of control using the appropriate process data. • The encoder interface is used for the ”Motion Control with PROFIBUS–DP” function (clock cycle synchronous operation, e.g. together with SINUMERIK 802D). **Note:** • ”Motion Control with PROFIBUS” function —> refer to Chapter 5.8 • Configuring telegrams —> refer to Chapter 5.6.5 • Encoder interface —> refer to Chapter 5.6.4
Encoder interface (TTL encoder)	no	yes The encoder interface is used to connect an additional measuring system (TTL encoders, encoder 3)	
Encoder interface (process data)	• Encoder 1 • Encoder 2 (from SW 3.3) • no	• Encoder 1 • Encoder 2 (from SW 3.3) • Encoder 3	Encoder 1 Motor measuring system (X411, X412) Encoder 2 Direct measuring system (X412) Encoder 3 TTL encoder (X472) Description of the process data —> refer to Chap. 5.6.4
Traversing to fixed endstop	yes from SW 3.3	no	This function is programmed using the FIXED ENDSTOP command in the ”Positioning” mode. The operating mode is not possible for SIMODRIVE 611 universal E —> function not available
Axis couplings	yes from SW 3.3	no	This function can be used in either the ”External position reference value” mode or ”Positioning”. Operating modes are not possible for SIMODRIVE 611 universal E —> function is not available

■

Space for your notes

Installing and Connecting-Up 2

2.1 Installing/removing control boards and modules

Warning

It is only permissible to install/remove a control board or an option module when the system is in a no–voltage condition (powered down).

If boards or option modules are inserted or withdrawn under voltage, this can result in data loss or destruction of components.

Note

The screws retaining electrical connections at the modules must be tightened with the following torque:

Screw size	—>	tightening torque
M3	—>	0.5 Nm (for electrical connections)
M3	—>	0.8 Nm (for mechanical connections)
M4	—>	1.8 Nm
M5	—>	3.0 Nm
Tolerance	—>	0/+30 %

After transport, the screws should be tightened!

Installing the control board

The following points must be observed when installing the "SIMODRIVE 611 universal" control board into the power module (refer to Fig. 2-1):

Warning

The ESDS measures must be observed when installing/removing the control board.

1. Ensure that the power module is in a no–voltage condition.
2. Check that the memory module is inserted and locked into place in the control board.
   If it is not inserted, then refer to the point "installing/removing the memory module".
3. Insert the control board in the power module.
4. Tighten up the screws retaining the board
   (2 screws on the front panel, max. torque= 0.8 Nm).
5. Connect–up the front panel of the board corresponding to the connection diagram (refer to Chapter 2.3.1).
   The mating connectors are inserted at the appropriate interface.

Installing/ removing an option module

An option module is installed/removed from the control board as follows (refer to Fig. 2-1):

Warning

When installing/removing an option module, observe the ESDS measures.

---

1. Ensure that the control board is in a no–voltage condition.
2. Removing (changing):
   Release the screws at the slot and withdraw the option module from the ”old” control board.

   Installing:
   Remove the screws for the cover at the slot for the option module.
3. Insert the module through the front panel until it latches into place.
4. Tighten up the screws holding the module
   (2 screws in the front panel, max. torque = 0.8 Nm).
5. Connect–up the front panel of the option module corresponding to the connection diagram (refer to Chapter 2.3.3).
   The mating connectors are inserted at the appropriate interface.

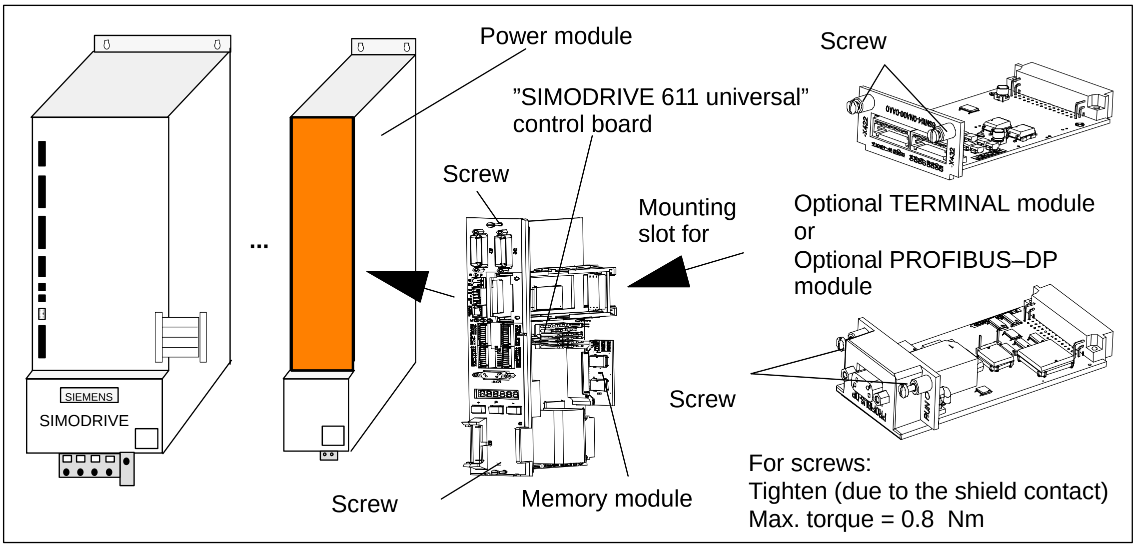


Fig. 2-1 Installing the control board and an option module

Note

The PROFIBUS firmware, associated with the 611u firmware must be available on the PROFIBUS–DP option module. Otherwise the firmware must be upgraded. PROFIBUS–DP1 option modules from SW 4.1 – and also in this particular case – can no longer be used.

Installing/ removing the memory module

The memory module can be replaced, and when supplied from the factory, a new control board is already installed.

When replacing the control board (service), the memory module can be transferred from the old control board to the new control board. This means that the system software can be transferred over with the user files without requiring any other resources.

What types of memory modules are available?

There are memory modules for n–set or positioning.
This is labeled at the rear of the memory module:

Designation	can be inserted in control board
before SW 4.2	
URL.–SOFTWARE POS.–611U	for positioning (refer to Chap. 1.3)
URL.–SOFTWARE N_SOLL–611U	for n–set (refer to Chapter 1.3)
from SW 4.2	
SYS.–SOFTWARE POS.–611U	for positioning (refer to Chap. 1.3)
SYS.–SOFTWARE N_SOLL–611U	for n–set (refer to Chapter 1.3)

The software designation refers to the system software including the initial program loader.

How is the memory module replaced?

A memory module is inserted/replaced as follows:

Warning

The ESDS measures must be observed when installing/removing the memory module.

---

1. Place the old and new control boards on an ESDS–compatible surface (to the left of the front panel).
2. Press the memory module latches downwards and outwards until they release (refer to Fig. 2-2).
3. Remove the memory from its connections (upwards).
4. Insert the
   old memory module into the new control board and the new memory module into the old control board.
   The latches must automatically engage.
5. Check that the latches are correctly engaged.

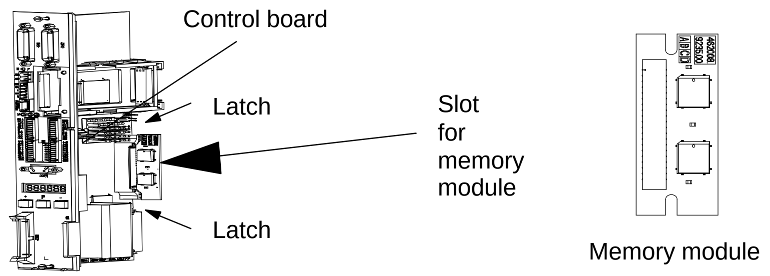


Fig. 2-2 Installing/removing the memory module

Replacing defective control boards by new ones

From delivery date 04.2002 onwards, there will be a new ”SIMODRIVE 611 universal” or ”SIMODRIVE 611 universal E” control board with a higher encoder resolution (refer to Chapter 1.3 or 1.4). This new hardware simultaneously replaces the previous types and is coupled to the new software ⩾SW 5.1.

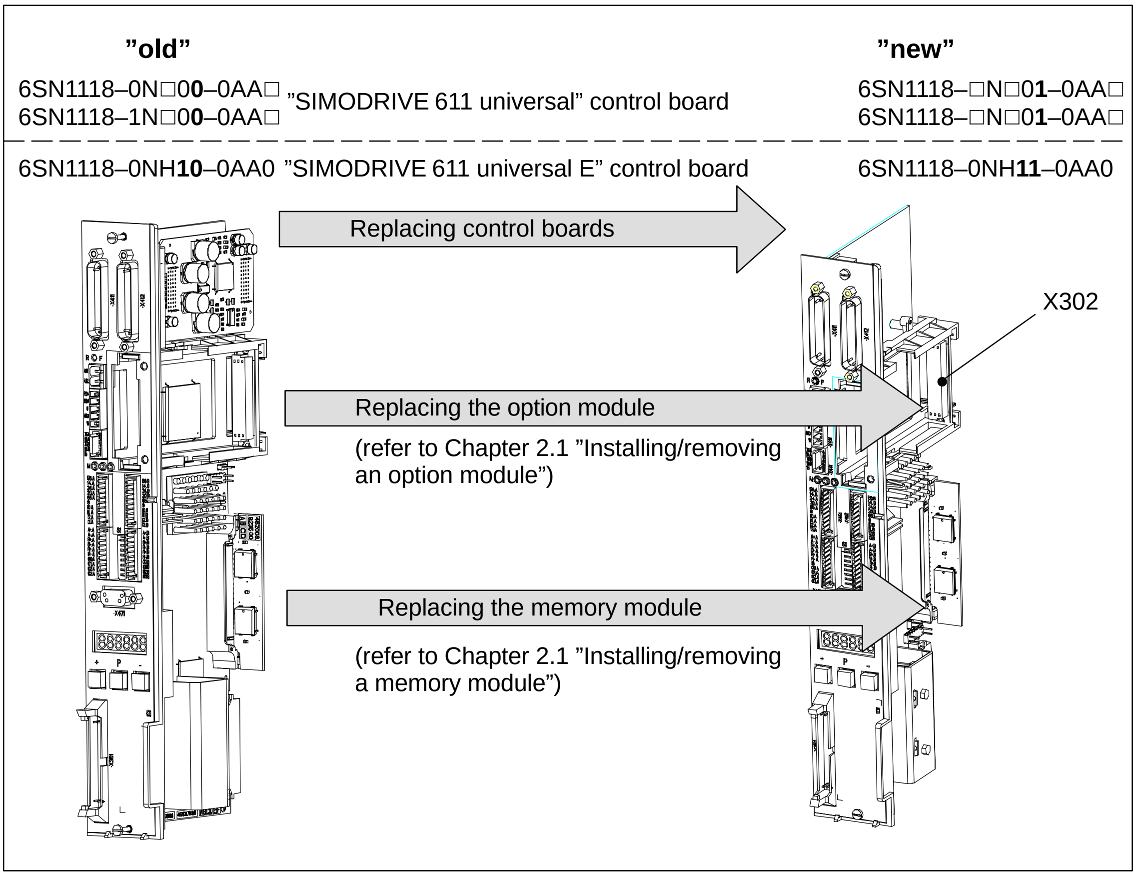


Fig. 2-3 Replacing a defective control board by a new one

How is a control board replaced?

A control board is installed/removed as follows:

1. Ensure that the power module is in a no–voltage condition.
2. Release the screw connection and withdraw the ”old” control board from the power module.
3. Remove the memory module from the defective ”old” and insert this into the ”new” control board, refer to Point ”Installing/removing a memory module”.
4. Insert the ”new” control board and connect–up the equipment bus.
5. Install the ”SimoCom U” start–up tool **with version 5.1 (or higher)** or, when using an ”older” version, observe the following information:

– Exit SimoCom U.
– Make a back–up copy of the test file ”...\siemens\lists\control.txt” in the main SimoCom U directory (generally under ”C:\Programs\Siemens\SimoComU”).
– Then open this file with **Microsoft Wordpad** (not with a text editor!).
– Search for the following line under the Section ”611U” or the last line of this section:
– 6SN1118–1NJ00–0AAx 259 0x00000000 1 1 2 1 ;611U resolver 1–axis X_SOLL
– Insert the following lines directly below:
– 6SN1118–0NH01–0AA0 5 0x00000000 2 2 1 7 ;611U encoder HR 2–axis N_SOLL
– 6SN1118–0NK01–0AA0 7 0x00000000 1 2 1 8 ;611U resolver HR 2–axis N_SOLL
– 6SN1118–0NJ01–0AA0 8 0x00000000 1 1 1 8 ;611U resolver HR 1–axis N_SOLL
– 6SN1118–1NH01–0AA0 261 0x00000000 2 2 2 7 ;611U encoder HR 2–axis X_SOLL
– 6SN1118–1NK01–0AA0 263 0x00000000 1 2 2 8 ;611U resolver HR 2–axis X_SOLL
– 6SN1118–1NJ01–0AA0 264 0x00000000 1 1 2 8 ;611U resolver HR 1–axis X_SOLL
– As last line, insert under the Section ”611UE”:
– 6SN1118–0NH11–0AA0 9 0x00000000 2 2 1 9 ;611UE encoder HR 2–axis N_SOLL
– Save the ”control.txt” file.
– Restart SimoCom U and continue with Point 6.

6. Save your machine data from the ”old” memory module (File: ”*.par”) using the ”SimoCom U” start–up tool.
7. Again remove the ”new” control board and replace the ”old” memory module by the ”new” memory module. Software release ⩾ SW 5.1 is already installed on the ”new” memory module.
8. Insert the ”new” control board back into the power module and tighten the retaining screws (2 screws at the front panel, torque = 0.8 Nm).
9. Re–connect the front panel of the module corresponding to the connection diagram.

   Insert the mating connector at the appropriate interface.

Notice

For ”SIMODRIVE 611 universal”, connectors X461 and X462 have been extended to an 11–pole version. This means that the signal conductors connected to this terminal block must be re–connected to the new (11–pole) terminal block (terminal block assignment, refer to Fig. 1-5).

10. Download your machine data, saved under 6., into the ”new” control board using the ”SimoCom U” start–up tool.

Warning

It is only permissible to install/remove a control board when the system is in a no–voltage condition (i.e. powered–down).

If a control board is inserted or removed under voltage (with the system powered–up), this can result in data being lost or components being destroyed.

The ESDS measures must be observed when installing/removing the control board.

Note

For spare control boards, a set of installation instructions are provided which describes how the control board is replaced.

2.2 Connecting–up

2.2.1 General information on connecting–up

Reader's note

Information on the subjects

- Cabinet design
- Basic rules regarding electromagnetic compatibility (basic EMC rules)
- Potential bonding
- Cable routing
- EMC–compliant wiring
- Shielding and shield connections
- Handling modules that can be damaged by electrostatic discharge (ESDS measures), etc.

are included in

Reference: /EMV/ EMC Guidelines, Configuration Manual

Warning

Cable shields and cores/conductors of power cables which are not used (e.g. brake conductors) must be connected to PE potential in order to discharge charges arising from capacitive coupling.

Hazardous voltages can occur if this is not observed.

Mini connector MICRO–COMBICON

For the ”SIMODRIVE 611 universal” control board, a compact connector is used (this is also known as mini connector).
The following information is required when handling this mini connector:

- Introducing conductors (refer to Fig.2-4):
  - for solid conductors with 0.2 – 0.5 mm^2 or stranded conductors with end sleeve

    The conductors can be introduced without having to use a tool.

    Procedure:
    Insert the conductor into the required terminal.
  - for solid conductors < 0.2 mm^2 or stranded conductors without end sleeve

    The lever–type opener must be pressed in order to introduce the conductor (e.g. using a screwdriver 0.4 • 2.0 • 20 mm).

    Procedure:
    Depress the lever–type opener below to the particular terminal. Insert the conductor into the opening provided and then release the lever–type opener.
- Coding (refer to Fig. 2-4):
  The connectors with the same number of pins should be coded so that the incorrect connector cannot be inserted. A star with 6 individual coding profile is supplied with each control board.

  Procedure:
  Insert the coding element into the required coding groove on the base housing. Now break–off the appropriate coding lug at the connector section (e.g. coding groove/lug 2).

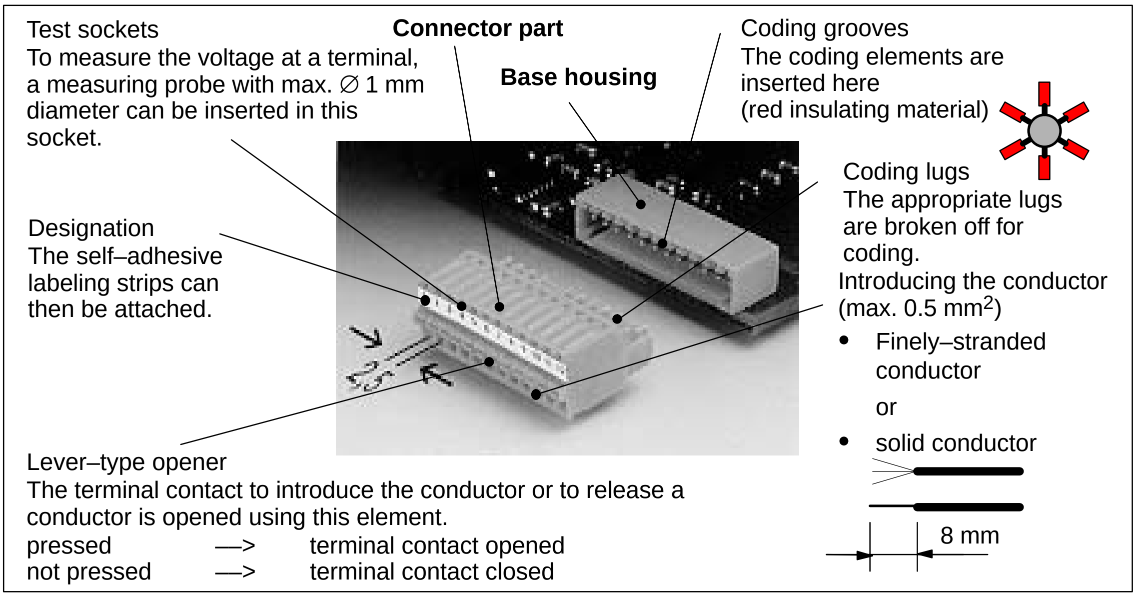


Fig. 2-4 Compact connector (Mini connector)

Recommended cable

The following cables are recommended when connecting–up the most important terminals on the control board:

Table 2-1 Recommended cable

Cable for	Description	Order No. (MLFB)
Analog inputs	Term. 56.A/14.A cond. 2 • 2 • 0.38 mm^2 Term. 24.A/20.A cond. 2 • 2 • 0.38 mm^2 **Note:** 4–conductor connection, e.g. at drive A	6FX2008–1BD21–□□□□ Cable, sold by the meter, twisted pairs with overall shield Conductors: 4 • 2 • 0.38 mm^2 + 4 • 0.5 mm^2
Analog outputs	Term. 75.A/15 conductor 2 • 0.5 mm^2 Term. 16.A/15 conductor 2 • 0.5 mm^2	
Angular incremental encoder interface	Term. A+.A conductor 1 • 0.38 mm^2 Term. A–.A conductor 1 • 0.38 mm^2 Term. B+.A conductor 1 • 0.38 mm^2 Term. B–.A conductor 1 • 0.38 mm^2 Term. R+.A conductor 1 • 0.38 mm^2 Term. R–.A conductor 1 • 0.38 mm^2 Terminal 15 (from SW 5.1) conductor 1 • 0.38 mm^2 Remaining: Conductor 1 • 0.38 mm^2 + 4 • 0.5 mm^2	6FX2008–1BD21–□□□□ Cable, sold by the meter, twisted pairs with overall shield Conductors: 4 • 2 • 0.38 mm^2 + 4 • 0.5 mm^2
Input/output terminals	Term. I0.x to term. I3.x Term. O0.x to term. O3.x Term. I4 to term. I11 Term. O4 to term. O11	50–conductor cable without overall shield Conductors: 50 • 0.38 mm^2

Shield connection to the side of the power module

To connect the shield to the side of the power module, the cable end must be prepared as illustrated in Fig. 2-5.

With the shield exposed, the cable is connected at the top of the power module using a shield connecting terminal (tapped holes are provided).

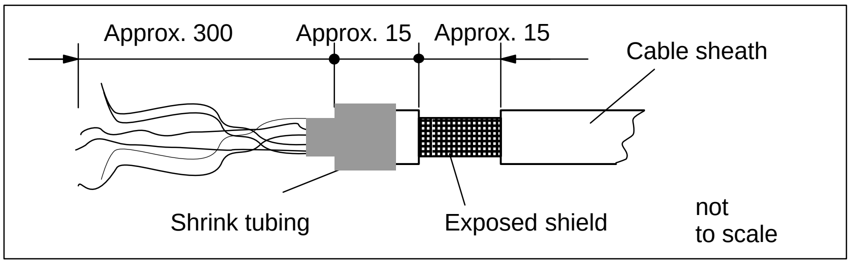


Fig. 2-5 Preparing the cable end for the shield connection

Note

- The cable shield should be connected at both cable ends through the largest possible surface area.
- Recommendation for the end of the conductor:
  Remove 5 mm of insulation from the end of the conductor and attach the specified cable lug using the manual crimping tool.
  - Pin–type cable lug from the AMP company
    Type A, yellow, DIN cable cross–section range 0.14 – 0.35 mm^2, max. insulation diameter 2.1 mm, Order No.: 165514–1
  - Manual crimping tool from AMP
    CERTI–CRIMP, Order No.: 169485–0

2

2.2.2 Connecting–up and setting the line supply infeed module

Connecting–up

Connecting–up the line supply infeed module will not be described in any more detail in this documentation. The following applies:

Reader's note

Information on connecting–up the supply infeed modules, technical data as well as an interface overview are included in:

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter "Line supply infeed (NE)"

Setting switch S1

There is a 6–position switch S1 on the top or front of the line supply infeed module.
The setting of this switch is not described in any more detail in this documentation. The following applies:

Reader's note

Information on setting switch S1 at the line supply infeed module is included in:

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter "Line supply infeed (NE)"

2.2.3 Connecting–up the power module

Table 2-2 Overview of the interfaces

Terminals No.	Terminals Desig-nation	Function	Type 1)	Technical data
Motor connections				
U2 V2 W2	A1	Motor connection for drive A	O	**Note:** Additional information on connecting–up the power module, technical data as well as interface overview are included in: **Reference:** /PJU/ SIMODRIVE 611 Configuration Manual, Drive Converters Chapter ”Power module”
U2 V2 W2	A2	Motor connection for drive B (only for 2–axis power modules)	O	
PE	⏚	Protective conductor	I	0 V Screw
DC link				
P600 M600	–	DC link	IO	Busbar
Equipment bus				
–	X151	Equipment bus	IO	Ribbon cable: 34–pole Voltages: various Signals: various

1) O: Output; I: Input; IO: Input/output

Warning

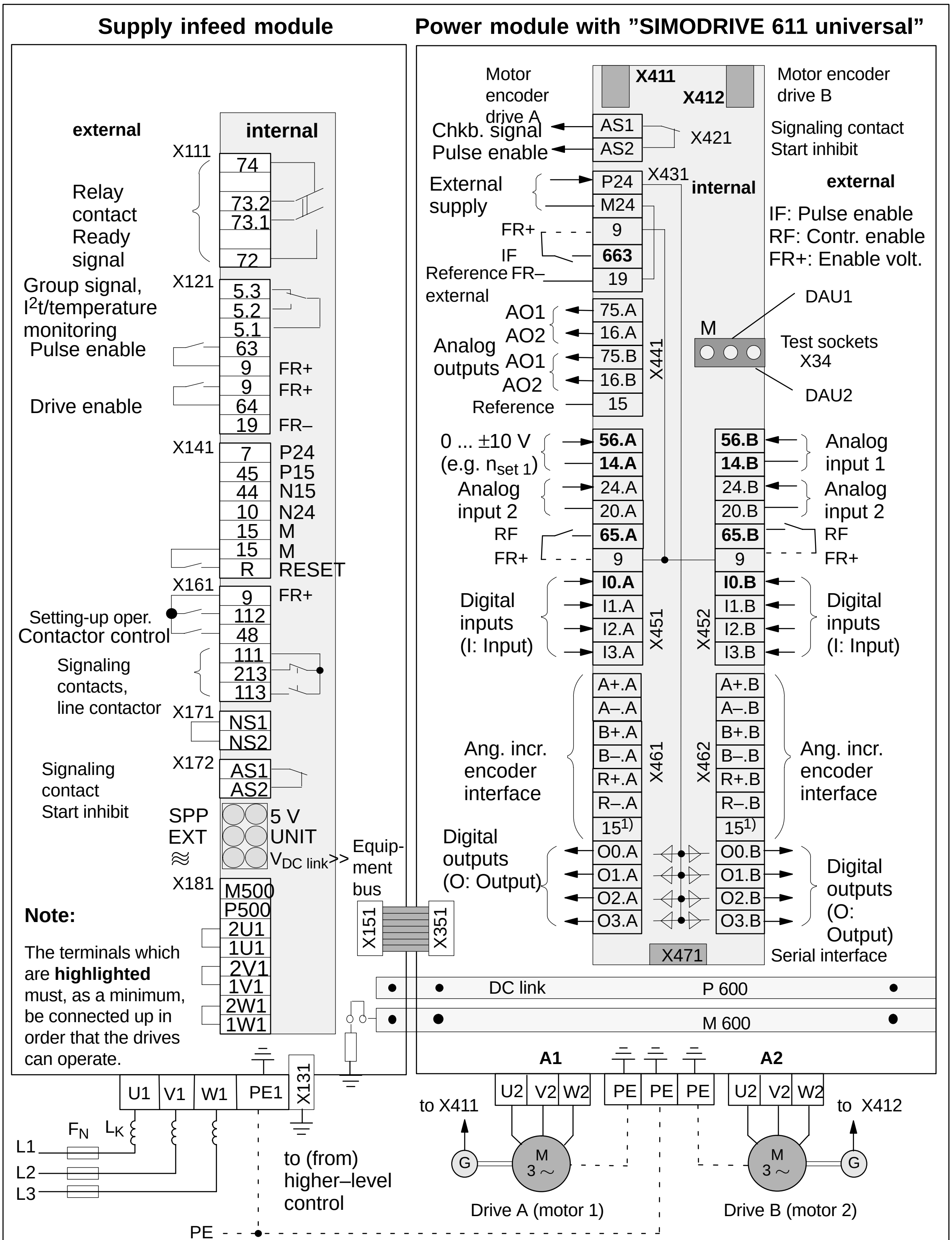
If a contactor is used between the motor and the power module, then it must be ensured that this contactor is only switched in a no–current condition (power circuit).

Powering–down:
When terminal 663 (pulse cancellation) is simultaneously de–energized and the coil of the power contactor, this condition is maintained. The pulses are almost instantaneously canceled, the contactor contacts are then in a no–current condition, and switch somewhat later due to the contact delay.

Powering–up:
Terminal 663 may only be energized if all of the main contacts of the power contactor are closed (e.g. terminal 663 is switched through an auxiliary contact of the power contactor).

2.3 Connection diagram and wiring

2.3.1 Connection diagram for the "SIMODRIVE 611 universal" board



1) from SW 5.1, for 6SN1118–□N□**0**1–0AA□: Order No.[MLFB] refer to Table 1-2

Fig. 2-6 Connection diagram for the control board

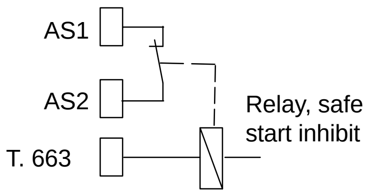
2.3.2 Connecting–up the control board

Board–specific terminals and interfaces

The board–specific terminals and interfaces are available, common for both drive A and B.

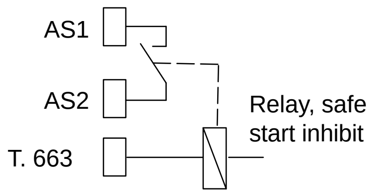
Table 2-3 Overview of the board–specific terminals and interfaces

Terminals		**Function**	**Type** 1)	**Technical data**	
No.	**Desig-nation**				
Signaling terminal, start inhibit (X421)					
AS1 AS2	X421	Signaling contact Start inhibit Feedback signal from terminal 663	NC	Connector type: Max. cond. cross–sect. Contact: Contact load capability:	2–pin conn. strip 2.5 mm^2 Floating NC contact at 250 V_{AC} max. 1 A at 30 V_{DC} max. 2 A



Pulses not enabled (T. 663)

The gating pulses of the power transistors are inhibited.



Pulses enabled (T. 663)

The gating pulses of the power transistors are enabled.

1) NC: NC contact

Table 2-3 Overview of the board–specific terminals and interfaces, continued

<table>
<tr><th colspan="2">Terminals</th><th rowspan="2">Function</th><th rowspan="2">Type 1)</th><th rowspan="2">Technical data</th></tr>
<tr><th>No.</th><th>Desig-nation</th></tr>
<tr><td colspan="5">Terminals for supply and pulse enable (X431)</td></tr>
<tr><td></td><td>X431</td><td></td><td></td><td>Connector type: 5–pin conn. strip
Max. cond. cross–sect.: 1.5 mm²</td></tr>
<tr><td>P24</td><td>X431.1</td><td>External power supply for digital outputs (+24 V)</td><td>S</td><td rowspan="2">Voltage tolerance (including ripple): 10 V to 30 V</td></tr>
<tr><td>M24</td><td>X431.2</td><td>Reference for the external supply</td><td>S</td></tr>
<tr><td></td><td colspan="4">The external supply is required for the following digital outputs:
• 8 outputs of the drive–specific terminals (X461, O0.A – O3.A/X462, O0.B – O3.B)
• 8 outputs of the optional TERMINAL module (X432, O4 – O11)
When dimensioning the external power supply, the total current of all of the digital outputs must be taken into account.
Maximum total current:
• for the control board (all 8 outputs): 2.4 A
• for the optional TERMINAL module (all 8 outputs): 480 mA
Example:
Board/module | Outputs | Dimensioning the external supply
Control board | 8 | max. 1.5 A —> 24 V/1.5 A
Control module + optional TERMINAL module | 8 + 8 | max. (1.5 A + 280 mA) —> 24 V/1.8 A</td></tr>
<tr><td>9</td><td>X431.3</td><td>Enable voltage
(+24 V)</td><td>S</td><td>Reference: Terminal 19
Maximum current (for the total group): 500 mA
Note:
The enable voltage (terminal 9) can be used to supply the enable signals (e.g. pulse enable) as 24 V auxiliary voltage.</td></tr>
<tr><td>663</td><td>X431.4</td><td>Pulse enable
(+24 V)</td><td>I</td><td>Voltage tolerance (including ripple): 21 V to 30 V
Typ. curr. consumption: 25 mA at 24 V
Note:
The pulse enable acts simultaneously on drive A and drive B. When this pulse enable is withdrawn, the drives ”coast down” unbraked.</td></tr>
<tr><td>19</td><td>X431.5</td><td>Reference
(Reference for all digital inputs)</td><td>S</td><td>Note:
If the enable signals are to be controlled from an external voltage and not from terminal 9, then the reference potential (ground) of the external source must be connected to this terminal.</td></tr>
</table>

1) I: Input; S: Supply

Table 2-3 Overview of the board–specific terminals and interfaces, continued

Terminals No.	Terminals Desig-nation	Function	Type 1)	Technical data
Serial interface (X471)				
–	X471	Serial interface for "SimoCom U"	IO	Connector type: 9–pin D–sub socket connector **Note:** • Online operation via the serial RS232/RS485 interface —> refer to Chapter 3.3.3 • Pin assignment of the interface —> refer to Chapter 2.4 • Cable diagram —> refer to Chapter 2.5
Equipment bus (X351)				
–	X351	Equipment bus	IO	Ribbon cable: 34–pin Voltages: various Signals: various
Test sockets (X34)				
DAU1	X34	Test socket 1 2)	MA	Test socket: ∅ 2 mm Resolution: 8 bit Voltage range: 0 V to 5 V Maximum current: 3 mA
DAU2		Test socket 2 2)	MA	
M		Reference	MA	

1) IO: Input/output; MA: Measuring signal, analog
2) Can be freely parameterized

Drive–specific terminals

The drive–specific terminals are available for both drive A and drive B.

Table 2-4 Overview of the drive–specific terminals

Terminals				Function	Type[1]	Technical data
Drive A		Drive B				
No.	Desig-nation	No.	Desig-nation			
Encoder connection (X411, X412)						
–	X411	–	–	Motor encoder connection, drive A	I	**Reference:** /PJU/ SIMODRIVE 611, Configuration Manual, Drive Converters Chapter ”Indirect and direct position sensing” **Encoder limit frequencies:** • Enc. with sin/cos 1Vpp: 350 kHz • Resolver: 12 bit 432 Hz 14 bit 108 Hz • Enc. with TTL signal[4]: 420 kHz
–	–	–	X412	Motor encoder connection, drive B or connection, direct measuring system (from SW 3.3)	I	
Analog outputs (X441)						
75.A	X441.1	–	–	Analog output 1[2]	AO	Connector type: 5–pin conn. strip Wiring: refer to[3] Max. conductor cross–section for finely–stranded or solid conductors: 0.5 mm^2 Voltage range: –10 V to +10 V Max. current: 3 mA Resolution: 8 bit Update: In the speed–contr. clock cycle Short–circuit proof
16.A	X441.2	–	–	Analog output 2[2]	AO	
–	–	75.B	X441.3	Analog output 1[2]	AO	
–	–	16.B	X441.4	Analog output 2[2]	AO	
15	X441.5	15	X441.5	Reference (electronics ground)	–	

1) I: Input; AO: Analog output
2) Can be freely parameterized
3) The analog outputs (X441) should be connected through a terminal strip.
A shielded cable should be used together for all of the analog outputs together between X441 and the terminal strip. For this cable, the shield must be connected at both cable ends.
The 4 analog cables can be routed away from the terminal strip. The shield of the cables must be connected and the ground cables must be connected to a common ground terminal.
4) Only with control board, Order No. 6SN1118–□NH01–0AA□, from SW 8.1

Table 2-4 Overview of the drive–specific terminals, continued

Terminals				Function	Type 1)	Technical data
Drive A		Drive B				
No.	Designation	No.	Designation			
Terminals for analog inputs and digital inputs/outputs (X451, X452)						
	X451		**X452**	Connector type: 10–pin conn. strip Max. conductor cross–section for finely–stranded or solid conductors: 0.5 mm^2		
56.A	X451.1	56.B	X452.1	Analog input 1	AI	Differential input Voltage range (limit values): –12.5 V to +12.5 V Input resistance: 100 kΩ Resolution: 14 bits (sign + 13 bits) Wiring: Connect the cable with the braided shield at both ends
14.A	X451.2	14.B	X452.2	Reference 1		
24.A	X451.3	24.B	X452.3	Analog input 2		
20.A	X451.4	20.B	X452.4	Reference 2		
65.A	X451.5	65.B	X452.5	Controller enable drive–specific	I	Typ. curr. consumption: 6 mA at 24 V Signal level (incl. ripple) High signal level: 15 V to 30 V Low signal level: –3 V to 5 V Electrical isolation: Ref. is T. 19/T. M24
9	X451.6	9	X452.6	Enable voltage (+24 V)	S	Reference: Terminal 19 Maximum current (for the total group): 500 mA **Note:** The enable voltage (terminal 9) can be used to supply the enable signals (e.g. controller enable).
I0.A	X451.7	I0.B	X452.7	Digital input 0 2) Fast input 3) e.g. for equivalent zero mark, external block change (from SW 3.1)	DI	Voltage: 24 V Typ. current consumption: 8.6 mA at 24 V Signal level (incl. ripple) High signal level: 15 V to 30 V Low signal level: –3 V to 5 V Electrical isolation: Ref. is T. 19/T. M24 **Note:** • Parameterization of the input terminals and the standard assignment is described in Chapter 6.4.2. • An open–circuit input is interpreted as 0 signal.
I1.A	X451.8	I1.B	X452.8	Digital input 1 2)	DI	
I2.A	X451.9	I2.B	X452.9	Digital input 2 2)	DI	
I3.A	X451.10	I3.B	X452.10	Digital input 3 2)	DI	

1) I: Input; DI: Digital input; AI: Analog input; S: Supply,
2) Can be freely parameterized
All of the digital inputs are de–bounced per software. For the signal detection, this results in a delay time of between 1 and 2 interpolation clock cycles (P1010).
3) I0.x is internally hard–wired to the position sensing function where it acts almost instantaneously.

2

Table 2-4 Overview of the drive–specific terminals, continued

Terminals				Function	Type 1)	Technical data
Drive A		Drive B				
No.	**Designation**	**No.**	**Designation**			
Drive–specific terminals (X461, X462)						
	X461		**X462**	Connector type: 10–pin conn. strip Max. conductor cross–section for finely–stranded or solid conductors: 0.5 mm^2		
A+.A	X461.1	A+.B	X462.1	Signal A+	IO	Angular incremental encoder interface Wiring: • Cable with braided shield, connected at both ends. • The reference ground of the connected node should be connected to terminal 15.
A–.A	X461.2	A–.B	X462.2	Signal A–	IO	
B+.A	X461.3	B+.B	X462.3	Signal B+	IO	
B–.A	X461.4	B–.B	X462.4	Signal B–	IO	
R+.A	X461.5	R+.B	X462.5	Signal R+	IO	
R–.A	X461.6	R–.B	X462.6	Signal R–	IO	
15 3)	X461.7	15	X462.7	Ground reference	–	
	Note: Devices (stations) can be connected which conform to the RS485/RS422 standard. The angular incremental encoder interface can be parameterized as either input or output (refer to Chap. 6.8). • Input (from SW 3.3) To enter incremental position reference values • Output To output incremental position actual values					
O0.A	X461.8	O0.B	X462.8	Digital output 0 2)	DO	Rated current per output: 500 mA Max. current per output: 600 mA Total current, max.: 2.4 A (valid for these 8 outputs) Voltage drop, typical: 250 mV at 500 mA Short–circuit proof **Note:** Parameterization of the output terminals as well as the standard assignment is described in Chapter 6.4.5. Example: If all 8 outputs are simultaneously controlled, then the following is valid: Σ Current = 240 mA —> OK Σ Current = 2.8 A —> not OK, as the summed current (total current) is greater than 2.4 A.
O1.A	X461.9	O1.B	X462.9	Digital output 1 2)	DO	
O2.A	X461.10	O2.B	X462.10	Digital output 2 2)	DO	
O3.A	X461.11	O3.B	X462.11	Digital output 3 2)	DO	
	Note: • The power switched via these outputs is supplied via terminals P24/M24 (X431). This must be taken into account when dimensioning the external supply. • The digital outputs only ”function” if there is an external supply (+24 V/0 V, terminals P24/M24).					

1) DO: Digital output; IO: Input/output
2) Can be freely parameterized
The digital outputs are updated in the interpolation clock cycle (P1010). This is supplemented by a hardware–related delay time of approx. 200 µs.
3) ”SIMODRIVE 611 universal HR” Order No.[MLFB] 6SN1118–□N□□1–□□□□ (with SW 5.1 or higher)

2.3.3 Connection diagram, connecting–up the optional TERMINAL module

Connection diagram for the optional TERMINAL module

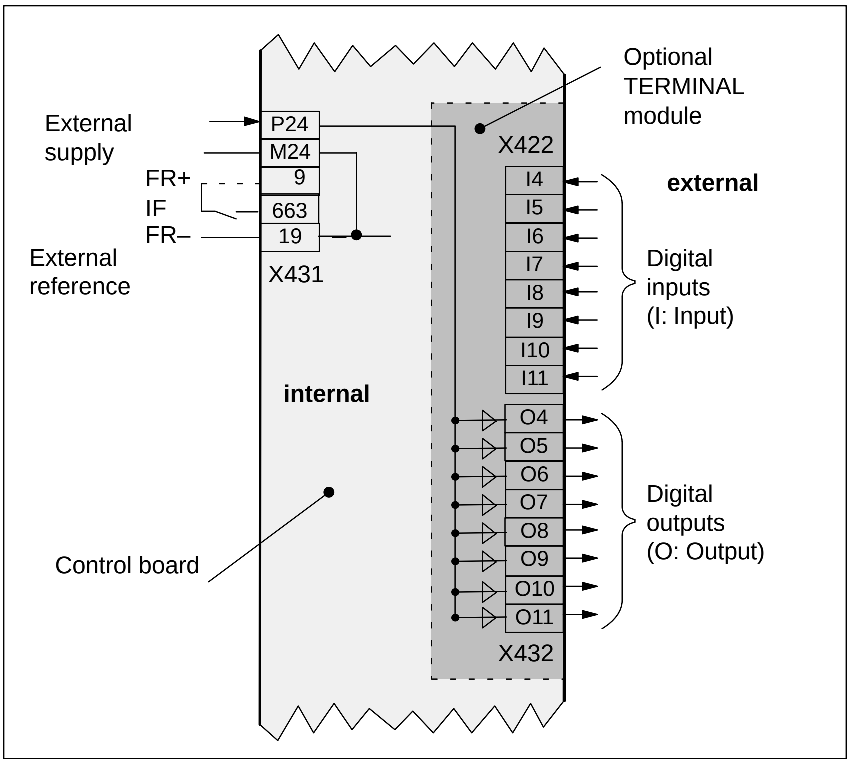


Fig. 2-7 Connection diagram for the optional TERMINAL module

Connecting–up the optional TERMINAL module (X422, X432)

Connector type: 8–pin plug connector
Max. conductor cross–section for finely–stranded or solid conductors: 0.5 mm^2

2

Table 2-5 Interface overview for the optional TERMINAL module

Terminals No.	Terminals Designation	Function	Type 1)	Technical data
Digital inputs (X422)				
I4	X422.1	Digital input 4 2)	DI	Voltage: 24 V Typ. current consumption: 6 mA at 24 V Electrical isolation: Ref. is T. 19/T. M24 Signal level (incl. ripple) High signal level: 15 V to 30 V Low signal level: –3 V to 5 V **Note:** An open–circuit input is interpreted as 0 signal.
I5	X422.2	Digital input 5 2)	DI	
I6	X422.3	Digital input 6 2)	DI	
I7	X422.4	Digital input 7 2)	DI	
I8	X422.5	Digital input 8 2)	DI	
I9	X422.6	Digital input 9 2)	DI	
I10	X422.7	Digital input 10 2)	DI	
I11	X422.8	Digital input 11 2)	DI	
Digital outputs (X432)				
O4	X432.1	Digital output 4 3)	DO	Rated current per output: 100 mA Max. current per output: 120 mA Total current, max.: 480 mA (valid for these 8 outputs) Short–circuit proof Voltage drop, typical: 50 mV at 100 mA Electrical isolation: Ref. is T. 19/T. M24 Example: If all 8 outputs are simultaneously controlled, then the following is valid: Σ Current = 240 mA —> OK Σ Current = 540 mA —> not OK, as the total current is greater than 480 mA.
O5	X432.2	Digital output 5 3)	DO	
O6	X432.3	Digital output 6 3)	DO	
O7	X432.4	Digital output 7 3)	DO	
O8	X432.5	Digital output 8 3)	DO	
O9	X432.6	Digital output 9 3)	DO	
O10	X432.7	Digital output 10 3)	DO	
O11	X432.8	Digital output 11 3)	DO	
	Note: • The parameterization of the terminals and the standard assignment is described in Chap. 6.5. • The power switched via these outputs is supplied via the board–specific terminal 431 (external supply, P24, M24) from the control board. This must be taken into account when dimensioning the external supply. • The digital outputs only ”function” if an external power supply is available (+24 V, T. P24/M24).			

1) DI: Digital input; DO: Digital output
2) Can be freely parameterized
All of the digital inputs are de–bounced per software. For the signal detection, this results in a delay time of between 1 and 2 interpolation clock cycles (P1010).
3) Can be freely parameterized
The digital outputs are updated in the interpolation clock cycle (P1010). This is supplemented by a hardware–related delay time of approx. 200 µs.

2.3.4 Connection diagram, connecting–up the optional PROFIBUS–DP module

Connection diagram for the optional PROFIBUS–DP module

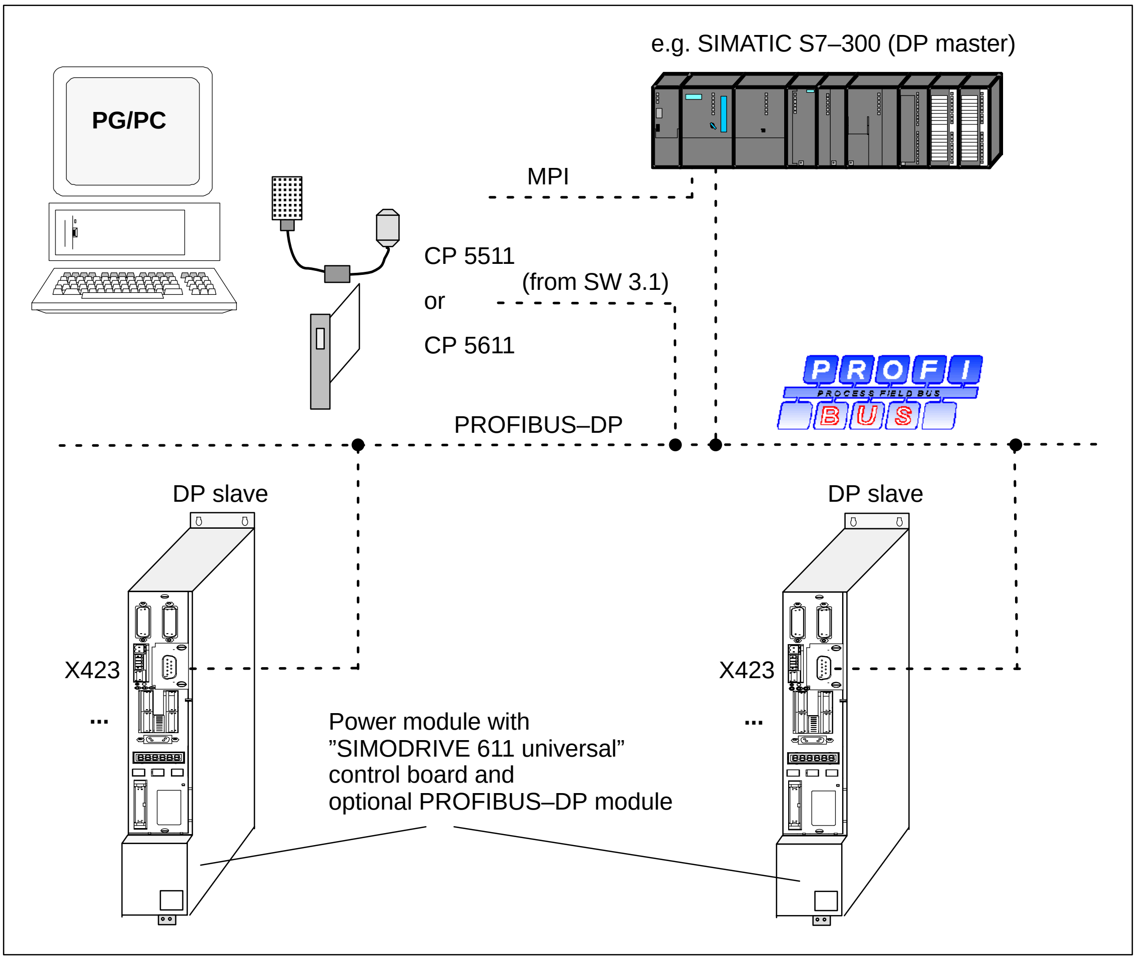


Fig. 2-8 Connection diagram for the optional PROFIBUS–DP module

Warning

The serial interface (X471) and the PROFIBUS–DP interface (X423) use 9–pin D–SUB socket connectors.

If the cables are interchanged when connecting–up, this could destroy the module or board of the communications partner.

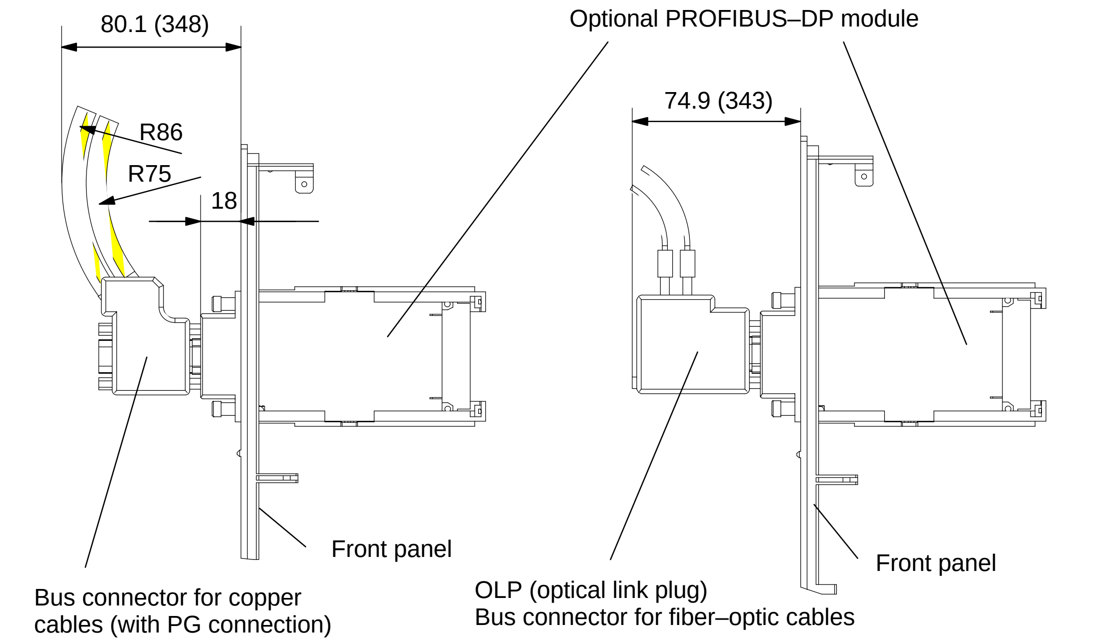
2

Bus connector and mounting dimensions

The following bus connectors can be connected to the optional PROFIBUS–DP module:

- Bus connector for copper cable (e.g.: Cable 6XV1 830–0AH10)
  Order No. (MLFB): 6ES7 972–0BB40–0XA0 (with PG connection)
  Order No. (MLFB): 6ES7 972–0BA40–0XA0 (without PG connection)

  The following bus connectors are permissible for copper cable:
  Order No. (MLFB): 6FX2 003–0AA03 (with PG connection)
  Order No. (MLFB): 6FX2 003–0AA02 (without PG connection)
  Order No. (MLFB): 6GK1 500–0EA00 (axial cable outlet)
- OLP (optical link plug)
  Bus connector for fiber–optic cables (baud rate: max. 1.5 Mbaud)
  Order No. (MLFB): 6GK1 502–1AA00



Note:

- The dimensions in brackets specify the total depth up to the rear cabinet panel.
- The external shield should be connected through the largest possible surface area (refer to Fig. 2-5).

Fig. 2-9 Mounting depth of the bus connector for the optional PROFIBUS–DP module

Reader's note

Additional information on configuring a PROFIBUS–DP network is provided in:

References: /IK10/ SIMATIC NET, Industrial communications, Catalog IK 10

/STPI/ PROFIBUS & AS Interface, Components Connected to the Field Bus, Catalog ST PI

2.4 Pin assignment of the interfaces

Pin assignment of X411/X412 for the control board for encoder with sin/cos 1Vpp and TTL signal (from SW 8.1)

Connector designation: X411 —> Drive A
X412 —> Drive B
Connector type: 25–pin, D–Sub, plug connector

Table 2-6 Assignment of X411/X412 for encoders with sin/cos 1Vpp

Pin	Signal name	Pin	Signal name
1	P_Encoder	14	5 V sense
2	M_Encoder	15	EnDat_DAT
3	A	16	0 V sense
4	*O	17	R
5	Inner shield	18	*R
6	B	19	C
7	*B	20	*C
8	Inner shield	21	D
9	Reserved	22	*D
10	EnDat_CLK	23	*EnDat_DAT
11	Reserved	24	Inner shield
12	*EnDat_CLK	25	–Temp
13	+Temp	–	–

Cable	Order No. (MLFB)
Motor encoder, incremental	6FX□ 002–2CA31–1□□0
Motor encoder absolute	6FX2 002–2EQ00–1□□0
Motor encoder absolute (EnDat)	6FX2 002–2EQ10–1□□0

□: Space retainer for the cable type (length, ...)

Motor encoder, TTL signal — the user does not have to assemble a shielded connecting cable
(only with control board, Order No. 6SN1118–□NH01–0AA□, from SW 8.1)

References: /Z/ Catalog NC Z, Accessories and Equipment

Pin assignment of X411/X412 for the control board for resolvers

Connector designation: X411 —> Drive A
X412 —> Drive B
Connector type: 25–pin, D–Sub, plug connector

Table 2-7 Assignment of X411/X412 for resolvers

Pin	Signal name	Pin	Signal name
1	Reserved	14	Reserved
2	M_Encoder	15	Reserved
3	SIN_PLUS	16	Reserved
4	SIN_MINUS	17	Reserved
5	Inner shield	18	Reserved
6	COS_PLUS	19	Reserved
7	COS_MINUS	20	Reserved
8	Inner shield	21	Reserved
9	Excitation_Pos	22	Reserved
10	Reserved	23	Reserved
11	Excitation_Neg	24	Inner shield
12	Reserved	25	Temp–
13	Temp+	–	–

Cable Order No. (MLFB)

Resolver in the motor 6FX2 002–2CF01–1□□0
□: Space retainer for the cable type (length, ...)

References: /Z/ Catalog NC Z, Accessories and Equipment

Serial interface X471

Connector type: 9–pin, D–Sub socket connector

Table 2-8 Assignment of the serial interface

Pin	Signal name	Pin	Signal name
1	RS485 DATA+	6	Reserved
2	RS232 TxD	7	RS232 CTS
3	RS232 RxD	8	RS232 RTS
4	Reserved	9	RS485 DATA–
5	Ground, 0 V	–	–

Note:

- The serial interface can be declared an RS232 or an RS485 interface by appropriate parameterization (refer to Chapter 3.3.3).
- When set as an RS485 interface, a terminating resistor can be switched in/out via switch S1 on the front panel.
- The cable diagrams for the serial interface are provided in Chapter 2.5.

Pin assignment of X423 for the optional PROFIBUS–DP module

Connector type:9–pin, D–Sub socket connector

Table 2-9 Assignment of the PROFIBUS–DP interface

Pin	Signal name	Pin	Signal name
1	Reserved	6	VP, Supply voltage plus (P5V)
2	Reserved	7	Reserved
3	RxD/TxD–P, Receive/send data P B cable	8	RxD/TxD–N, Receive/send data N A cable
4	RTS, Request To Send	9	Reserved
5	DGND, Data reference potential (M5V)	–	–

2.5 Cable diagrams

Cable diagram for RS232

Cable diagram: 9/9 conductor

A commercially available 1 : 1 serial extension cable can be used to connect a PG/PC to ”SIMODRIVE 611 universal”.

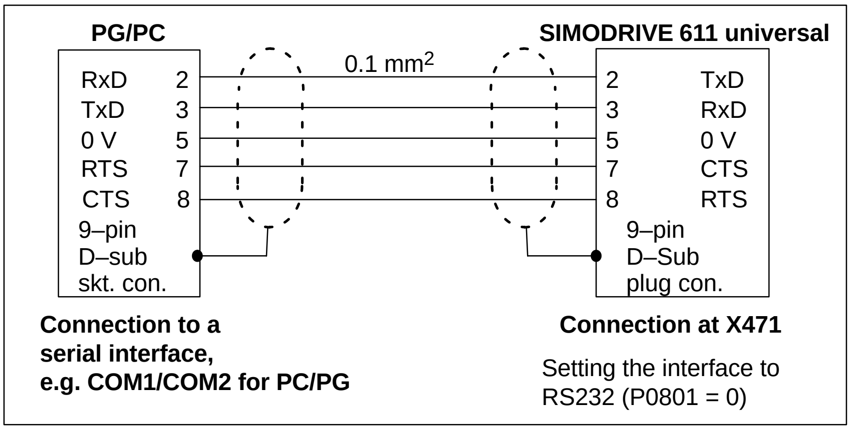


Fig. 2-10 RS232 connecting cable with RTS/CTS lines:
PG/PC <–> SIMODRIVE 611 universal

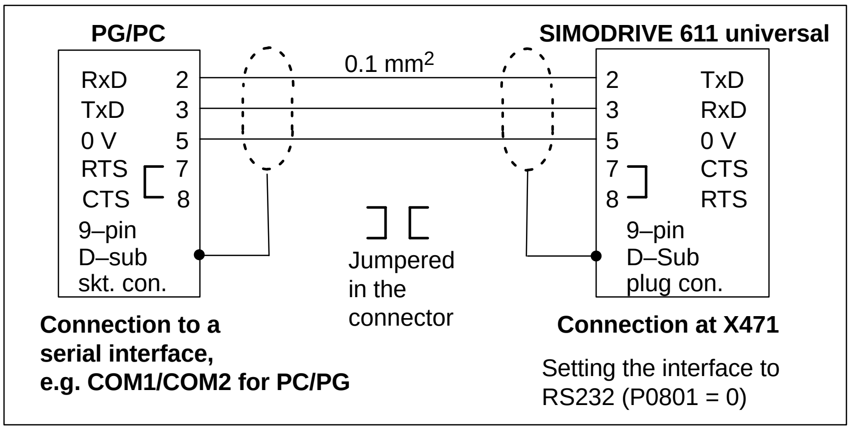


Fig. 2-11 RS232 connecting cable without RTS/CTS lines:
PG/PC <–> SIMODRIVE 611 universal

Cable diagram: 25/9 conductor

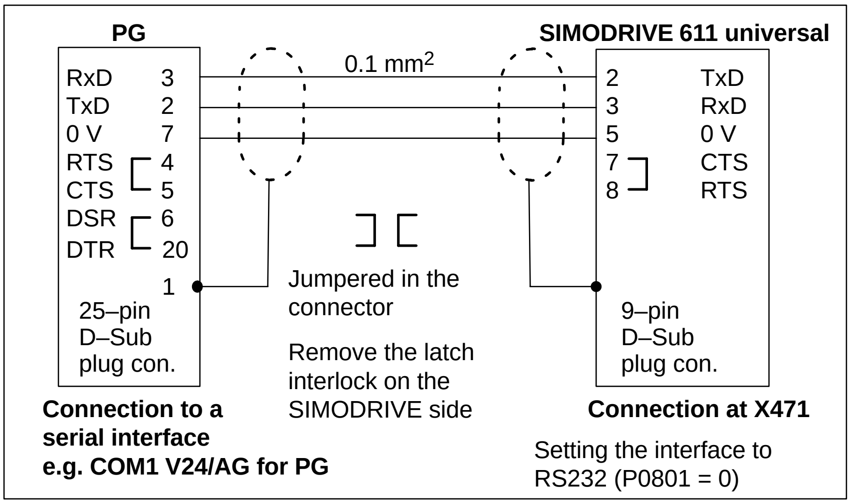


Fig. 2-12 RS232 connecting cable: PG <–> SIMODRIVE 611 universal

Order no.: 6FC9 348–2T☐00 ☐ = B —> Length 5 m
☐ = C —> Length 10 m

Cable diagram for RS485

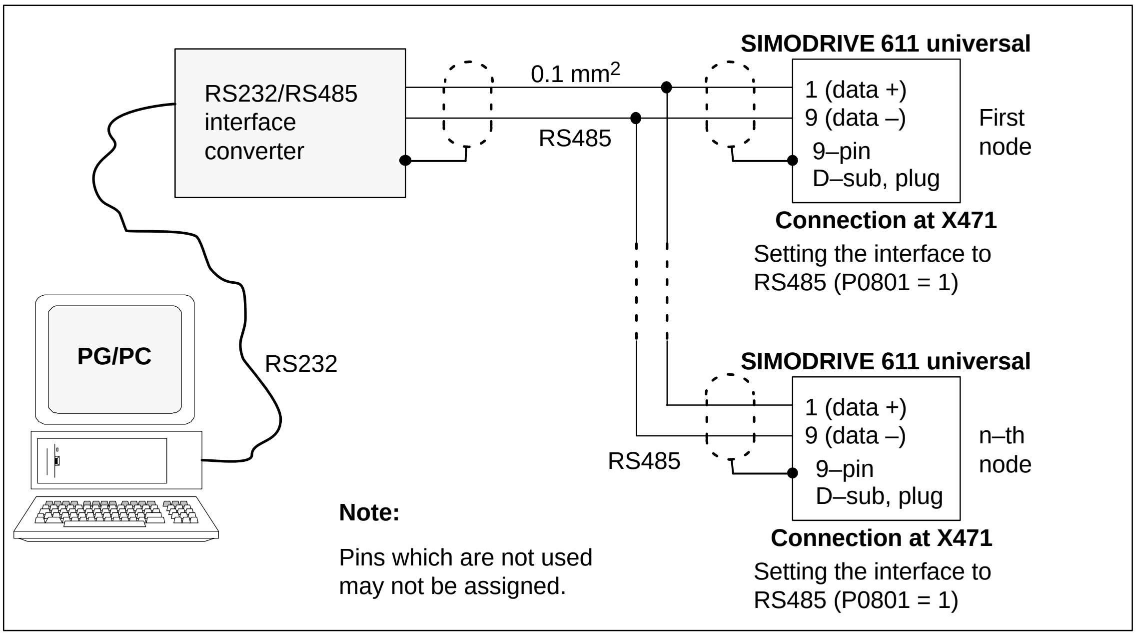


Fig. 2-13 RS485 connecting cable:
PG/PC <—> RS232/RS485 interface converter <—> SIMODRIVE 611 universal

■

Parameterizing the Board

3

3.1 Overview when parameterizing

General information

You can parameterize ”SIMODRIVE 611 universal” as follows:

- Using the display and operator unit on the front panel of ”SIMODRIVE 611 universal”
- Using the parameterizing and start–up tool (SimoCom U) on a PG/PC
  - SimoCom U via serial interface (RS232/RS485) —> refer to Chapter 3.3.3
  - SimoCom U via PROFIBUS–DP (CP 5511/CP 5611/CP 5613) —> refer to Chapter 3.3.4

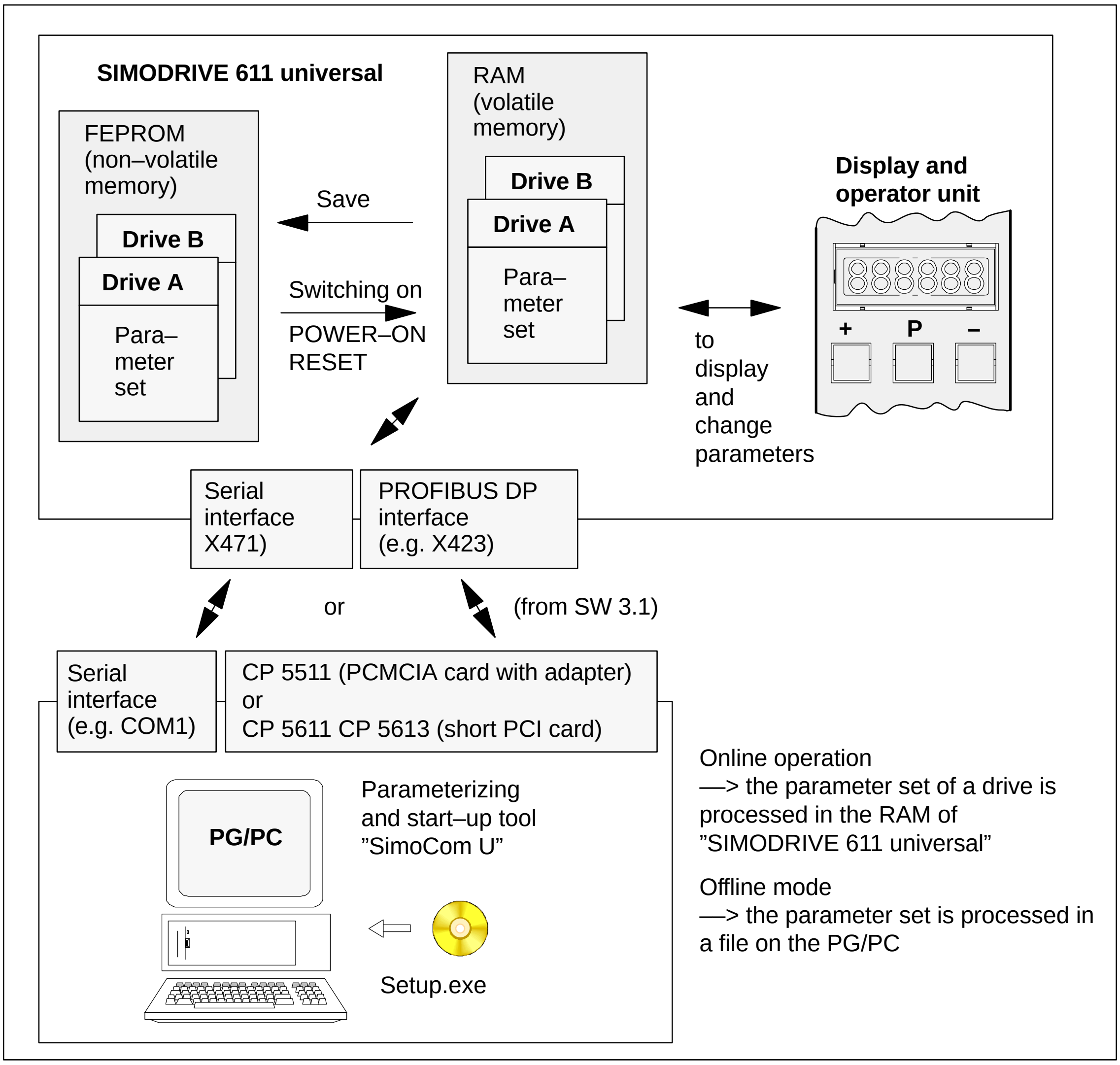


Fig. 3-1 Overview when parameterizing

3.2 Parameterizing using the display and operator unit

General information

The display and operator unit is used to

- Select, display and change parameters, sub–parameters and parameter values (refer to Chapter 3.2.1)
- Display and control when faults and warnings occur (refer to Chapter 7.2)

3

Operating statuses of the display unit

The display unit on the front panel of the ”SIMODRIVE 611 universal” control board can have the following operating statuses:

Table 3-1 Operating statuses of the display unit

Operating mode	Selection	Description
Power–on mode	Automatically after power–on ↓ The parameterizing mode is selected by pressing any key on the operator unit (PLUS/MINUS/P key).	• Power–on before first commissioning: The following is displayed ”A1106” or ”b1106”. • Power–on after the first commissioning: After power–on and error–free run–up, the system goes into cyclic operation and ”_ _ _ run” is displayed.
Parameterizing mode (refer to Chapter 3.2.1)	This mode can be selected from • Power–on mode or • Alarm mode	The parameterizing mode is used to select parameters and sub–parameter numbers and to display and change parameter values. **Note:** You cannot change into another mode from the parameterizing mode. The other modes are automatically selected.
Alarm mode (refer to Chapter 7.2)	↑ The parameterizing mode is selected by pressing the MINUS key on the operator unit. Automatically after at least one fault or warning occurs	The alarm mode is used to display faults and warnings.

3.2.1 Parameterizing mode

Display types

In the parameterizing mode, a differentiation is made between the following display types:

- Parameter display
- Sub–parameter display

Note

Only those parameters are displayed, which correspond to the selected authorization level.
Parameter P0651 is used to define which parameters can be read and written into (refer to Chapter 4.5).

- Value display

Parameters without sub–parameter and value display, max. 6 digits

These parameters can be displayed and handled in the following ways (example with A1400: Parameter 1400 from drive A):

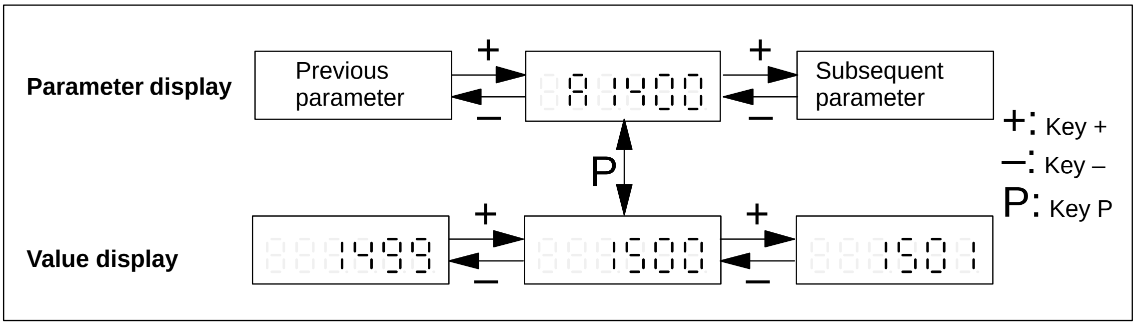


Fig. 3-2 Handling parameters without sub–parameter and value display, max. 6 positions

Parameter with sub–parameter and value display, max. 6 digits

These parameters can be displayed and handled in the following ways (example with A1401: Parameter 1401 from drive A):

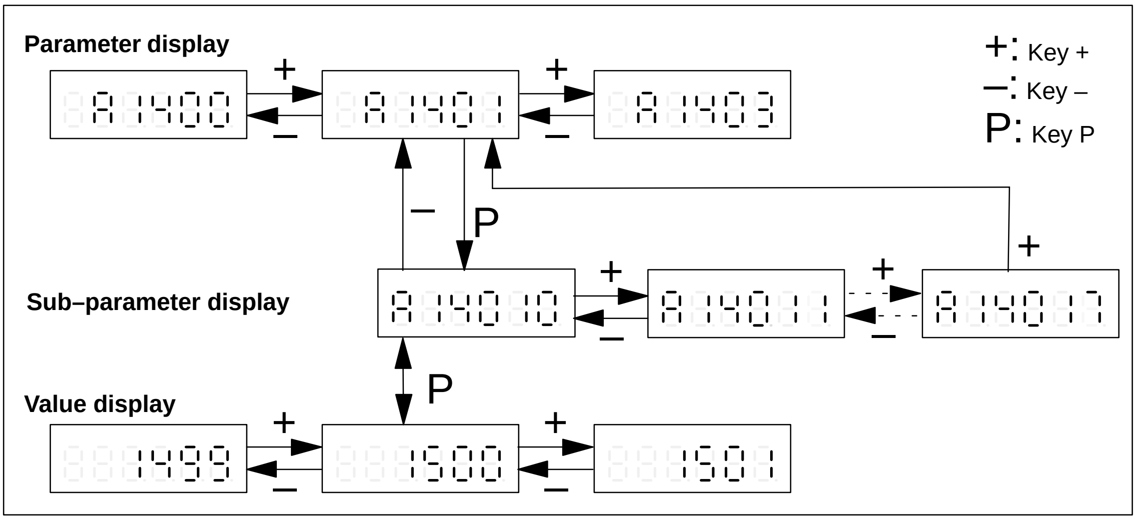


Fig. 3-3 Handling parameters with sub–parameter and value display, max. 6 positions

Parameters without sub–parameter and value display > 6 digits

For these parameters, the following display and handling possibilities exist (example with A0160: Parameter 0160 from drive A):

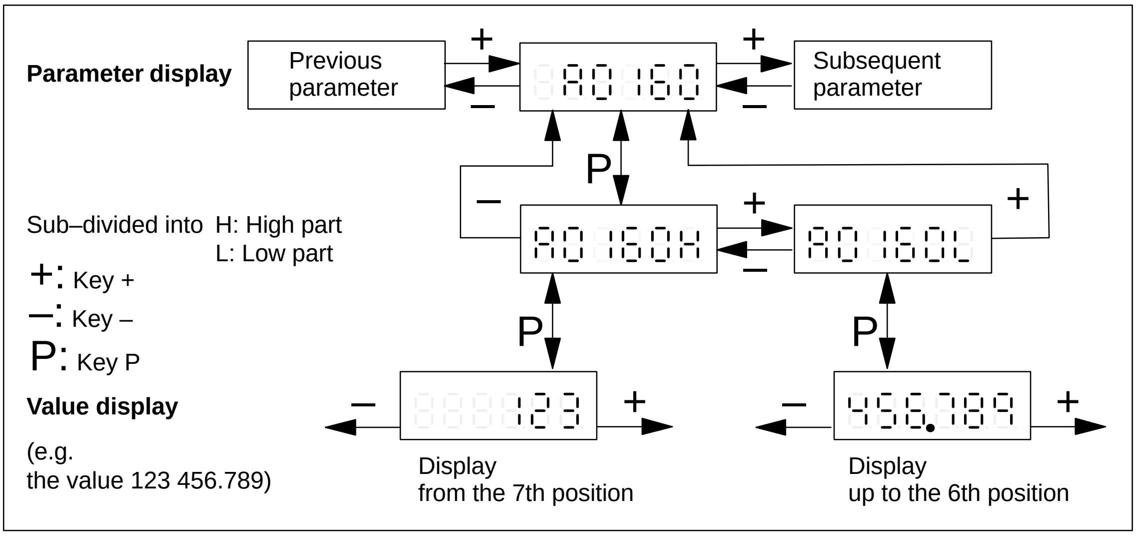


Fig. 3-4 Handling parameters with sub–parameter and value display > 6 positions

Parameters with sub–parameter and value display > 6 digits

These parameters can be displayed and handled in the following ways (example with A0081: Parameter 0081 from drive A):

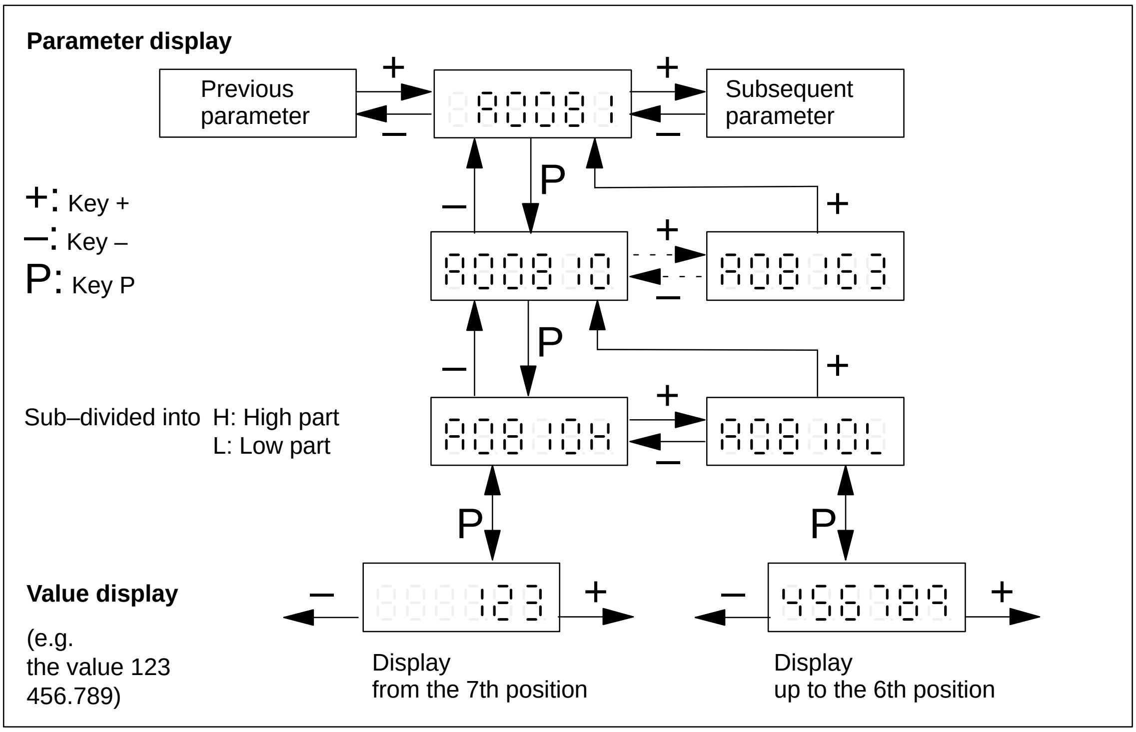


Fig. 3-5 Handling parameters with sub–parameter and value display > 6 positions

---

Note

Examples:	Display in A081.0H	A081.0L
• P0081:0 = 123 456.789 mm	123	456.789
• P0081:5 = –3 459.765 mm	–3	459.765

Key combinations

The following key combinations are available to make operator entries in the display types:

Table 3-2 Key combinations for operator control in the display types

Display type	Key combinations			Meaning
Parameter display	+			Jump to the next higher existing parameter number
			–	Jump to the next lower existing parameter number
	+	P		Fast scrolling up[1] (jumps over five existing parameters)
		P	–	Fast scrolling down[1] (jumps over five existing parameters)
	+		–	Jump to the same parameter of another drive
		P		Jump to the sub–parameter display or to the value display
Sub–parameter display	+			Jump to the next sub–parameter number or back to the parameter display
			–	Jump to the previous sub–parameter number or back to the parameter display
	+	P		Fast scrolling up[1] (jumps over a maximum of five existing sub–parameters)
		P	–	Fast scrolling down[1] (jumps over a maximum of five existing sub–parameters)
	+		–	Jump to the selected sub–parameter of the same parameter of the other drive
		P		Jump to the value display
Value display	+			Parameter is incremented by 1 (at the least–significant position)
			–	Parameter value is decremented by 1 (at the least significant position)
	+	P		Fast scrolling up[1] accelerating
		P	–	Fast scrolling down[1] accelerating
		P		Jump to the parameter or sub–parameter display

1) Setting to the lower or the upper limit

Parameters for drives A and B

The parameters of a drive are displayed in a numerical sequence.
By simultaneously pressing the PLUS and MINUS keys in the parameter and sub–parameter display, it is possible to jump to the same parameter of the other drive.
The parameters of drive A are designated with ”A ...” and the parameters of drive B with ”b ...”.

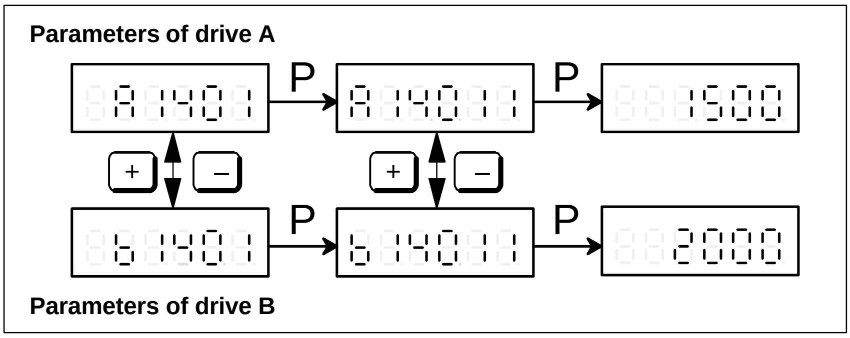


Fig. 3-6 Parameter display for drive A and B

Representation of hexadecimal values

Hexadecimal numbers are displayed in the following form:
_ _ _ _ _ *0.* to *F.F.F.F.F.F.*

Displaying parameter numbers

While a parameter value is being displayed, the associated parameter or sub–parameter number is cyclically displayed every 10 seconds for one second. This function can be enabled/disabled using P1650 bit 15.

P1650.15	= 0	Cyclic display is active (standard)
	= 1	Cyclic display is inactive

Designating parameters which are effective after POWER ON

The parameters, which are effective after POWER ON, are designated in the parameter display by a point after the drive letters.

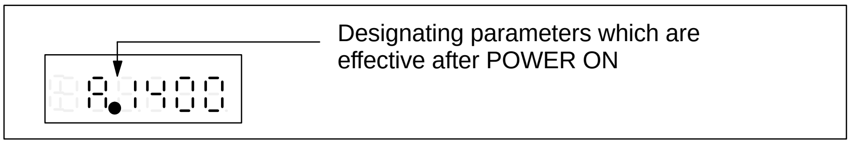


Fig. 3-7 Designating parameters which are effective after POWER ON

3.2.2 Example: Changing a parameter value

Example: Changing a parameter value

Task description:

The analog setpoint is to be inverted via terminal 56.B/14.B. In this case, in drive B, parameter P0608 must be set to 1.

Assumptions:

- The drive was already commissioned once.
- Presently ”_ _ _ run” is being displayed.

Operator actions:

1. Select the parameterizing mode

   —> press any key on the operator unit (e.g. ”P”)
2. Select drive B

   —> Simultaneously press the PLUS and MINUS keys
3. Remove write protection

   —> Set P0875 to 4
4. Activate inversion, terminals 56.B/14.B

   —> Set P0608 to 1
5. Save the parameters in the FEPROM

   —> Set P0652 to 1
6. Re–activate write protection

   —> Set P0875 to 0

Note

The analog setpoint via terminal 56.B/14.B is now processed inverted. At the next power–on, after error–free run–up, ”_ _ _ run” is displayed again.

When reading/writing parameters using the display and operator unit, the following generally applies:
The read and write protection (P0651) should be taken into account.

3.3 Parameterizing using the parameterizing and start–up tool SimoCom U

3.3.1 Installing SimoCom U

Note

”SimoCom U” is a tool that is used for commissioning, diagnostics and parameterization. It is not permissible to use this tool as operator interface for continuous operation of drives!

Prerequisite

A PG/PC is required to install the tool; it must fulfill the following minimum requirements:

- Operating system:
  Windows 98® or Windows NT® or
  from SW 4.1 also Windows ME® or Windows 2000®or
  from SW 6.1, also Window XP®
- 32 MB RAM memory
- Free memory required on the hard disk
  - Installing with one language —> 30 MB
  - Installing each additional language —> plus approx. 10 MB
- 1 free serial interface (RS232 interface)

Software supply

The various software versions are supplied on a CD–ROM.

Further, the software is available in the Internet under the following address:

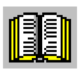
http://www.ad.siemens.de/
—> Products & Solutions —> Drive systems —> Drive converters —> SIMODRIVE 611 —> 611 universal —> Downloads

Which SimoCom U version is the optimum one?

The ”SimoCom U” parameterizing and start–up tool can be used for various drives.

The functional scope of ”SimoCom U” tool will be continually adapted to the functional expansion of these drives.

In order to parameterize and handle all of the functions of a drive using ”SimoCom U”, the optimum matching ”SimoCom U” must be used, depending on the drive software release.



Reader’s note

Which version of SimoCom U optimally matches which drive and which drive software release?

refer to SimoCom U as follows:

Help —> Info about ”SimoCom U” ... —> Versions

Installing ”SimoCom U”

This is how you install the ”SimoCom U” tool on your PG/PC:

Reader’s note

The ”readme.txt” file is provided on the software CD.
Please observe the information, tips and tricks provided in this file.

---

1. Insert the software CD into the appropriate drive of your PG/PC.
2. Run the ”setup.exe” file in the ”disk1” directory of the required version of ”SimoCom U”.
   –> START –> RUB –> OPEN SETUP.EXE –> OK
3. Follow the instructions which the installation program displays step–by–step.

   Result:

   – The ”SimoCom U” tool has now been installed in the target directory which you selected.

   – The tool can e.g. be started as follows:
   –> START –> PROGRAMS –> SIMOCOMU
   –> SimoComU –> click on selection

Note

The firmware on the CD can be loaded into the appropriate module using the ”SimoCom U” tool.

Un–installing SimoCom U

You can un–install the ”SimoCom U” parameterizing and start–up tool from your PG/PC:

- Using the SimoCom U program

  The ”SimoCom U” tool can, e.g. be uninstalled as follows:

  –> START –> PROGRAMS –> SIMOCOMU
  –> Un–install SimoComU –> click

- Using the Control Panel just like any other Windows program

  – Select the ”control panel”
  –> START –> SETTINGS –> CONTROL PANEL

  – Double–click on the ”Software” symbol

  – Select the ”SimoCom U” program in the selection field

  – Press the ”add/remove...” button and then follow the instructions

3.3.2 Entry into SimoCom U

Prerequisite

The SimoCom U parameterizing and start–up tool is installed and started on the PG/PC acc. to Chapter 3.3.1.

The following basic screen is displayed after the first start:

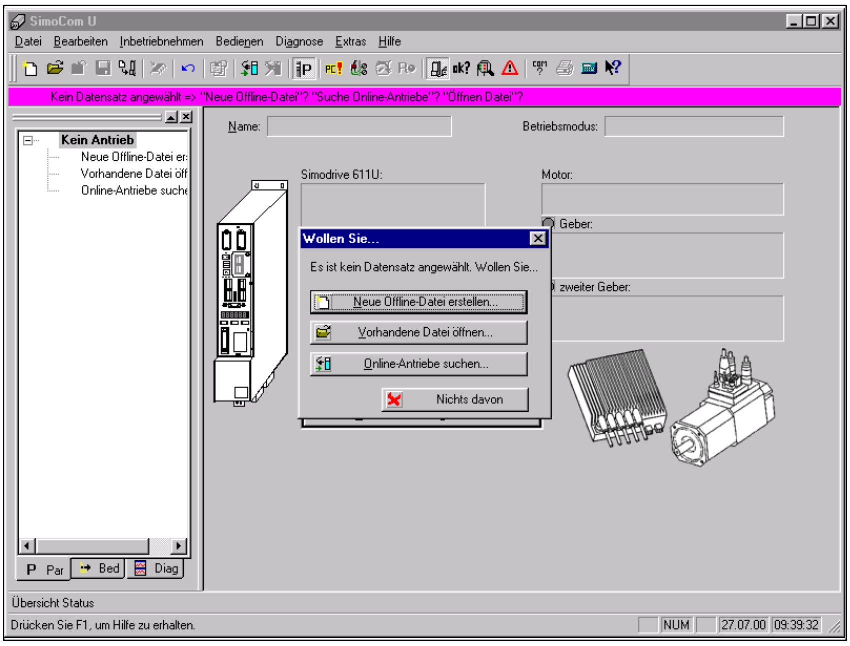


Fig. 3-8 Basic screen of SimoCom U for the latest version

Note

When using SimoCom U, please be aware of the following:

The program attempts to ”think with you”:

- If you select a command, which is presently not available for a specific reason (e.g. you are offline and wish to ”move an axis ”), then the program does what you would probably wish it to do:
  It goes ”online”, and offers you a list of drives and after the required drive has been selected, it opens the traversing window. However, if you do not wish to do this, then you can exit and continue as required.
- Only the information is provided in the dialog boxes which must be available as a result of the selected configuration.
  Example:
  If a synchronous motor is set, then a ramp–function generator is not made available in the dialog boxes for parameterization.

Information on SimoCom U

The information listed in Table 3-3 provides basic information and instructions on how to handle the SimoCom U parameterizing and start–up tool.

Table 3-3 Information on SimoCom U

Function	Description
Tasks, which can be executed using SimoCom U	• Check the wiring (go into the Online Help: connection diagrams) • Establish a connection to the drive to be parameterized • Change the parameters – The essential parameters are changed in interactive dialog – All of the parameters can be changed using the list parameterization • Upgrade firmware • Optimize the controller parameters • Traverse the axis • Diagnose the drive status – Obtain an overview of all of the connected drives and their status – Identify the connected hardware – Obtain a display of the terminal status – Obtain a display of the alarms and information on how they can be removed • Carry–out diagnostics – Parameterize the test sockets (DAU1, DAU2) This means that selected signals in the drive can be routed to the test sockets for measurement with an oscilloscope. – Execute the measuring function It is possible to measure the most important quantities in the closed–loop current and speed control loop in the time and frequency domains without having to use external measuring equipment; these can then also be graphically displayed. – Execute the trace function Selected measuring quantities in the drive can be measured corresponding to the specified measuring parameters, and graphically displayed using SimoCom U. • Simulate terminal signals • Save the results – Save the parameters in the drive FEPROM – Save the parameters in a file/open a file – Print the parameters • Comparing parameter sets (from version 02.04) This allows the differences between 2 parameter sets to be identified. • Boot the board (from version 03.03) The board status when originally shipped can be re–established using this function. • User–parameter list (from version 03.03) The user can include a parameter in this list. This list has the same functionality as the expert list. • Password protection (from version 08.01) Using this function, access protection can be provided for SimoCom U and the drive firmware so that the drive configuration cannot be changed. To set the password protection, refer to Chapter 4.3.3.

Table 3-3 Information on SimoCom U, continued

Function	Description
Working offline	... this means that you are only working at the computer and you do not have a connection to a ”SIMODRIVE 611 universal” drive. The opened files are now included in the drive selection box of the toolbar.
Working online	... this means that you are connected with one or several SIMODRIVE 611 universal drives and SimoCom U also knows these drives. This is the case, if SimoCom U has already searched for the interface. You go online, if • You default setting in the menu ”Options/Settings/Communications” is set to ”connect via COMx” (this is realized when starting SimoCom U) • You make the selection with the operator action ”Search for online drives” In the online mode, the toolbars of the opened files are included in the drive selection box together with all of the drives available at the interface. Recommended interface setting: If you are starting SimoCom U for the first time, then you will be prompted about the default setting of the interface: • If you predominantly work in the office, then select ”work offline”. • If you predominantly work at the machine, then select ”connect via” and the serial interface at your computer. **Note:** The parameters, displayed via SimoCom U, are not cyclically read. Examples: • If a parameter of an open dialog box is changed in online operation using the display and operator unit, then this parameter remains ”frozen” in the open dialog box. • If a first commissioning is executed using the display and operator unit while SimoCom U is in the online mode with the drive, then SimoCom U cannot identify that the drive has been started up (commissioned). Remedy: After changing parameters using the display and operator unit or via PROFI-BUS–DP, you should first go offline with SimoCom U, in order to go back online with updated data.
Working in the drive or in the file	You can work in a file directly in the drive or only at the PC – however, only with one data set at any one time. For instance, you can be connected with a double axis module (and therefore have access to the parameter sets in the two drives A and B) and at the same time, have several files open. All of these parameter sets are then displayed in the selection box in the toolbar, and also in the ”file” menu. When you select ”Drive A”, you will see the status and the parameters which are active directly in Drive A – otherwise none. When changing over to a ”my.par” file, then you will only see the parameters of this file. Opened parameter files can also be re–closed: Menu ”File/Close file”.

Table 3-3 Information on SimoCom U, continued

Function	Description
Expert list	... displays all of the ”SIMODRIVE 611 universal” parameters. You can individually change any parameter via the expert list. The operator has no additional support here. This list parameterization should only be used in exceptional cases. • Operator control information – Call: Menu ”Start–up/Additional parameters/Expert list” – If you open the list, you will additionally obtain the menu, which can also be reached using the righthand mouse key. – It is especially interesting that the standard value and value limits for the actual parameters are displayed in the status line. – Modified values only become effective after pressing the Enter key or if another parameter was selected. Values which are inactive have a red background. – In the ”List” menu, you can select which data should appear in the list: All, or only the controller data, or only the sub–parameter set 0 or .... Furthermore, you can search for specific terms with F3 (or list/search menu), e.g. you can search for ”temp” if you wish to change the temperature warning threshold value. – Bit–coded values: Go with the cursor to the line and press F4 (or menu, List/bit values). You then obtain a plain text display of the individual bits and can select these at a click of the mouse.
Assign the PC the master control	... means that the terminal signals are ignored at the terminals and instead, the drive evaluates signals set by the PC. This means that the enable signals to traverse the drive can be output from the PC. Exception: The pulse enable (terminal 663) and the controller enable (terminal 65.x) must be provided, as before, via the input terminals. This is for safety: You can withdraw these enable signals at any time, using a switch in order to switch the drive into a no–current condition or shut it down.
Transfer the master control from the PC back to the terminals	... you then obtain a display of the voltage level available at the terminals compared to the signals set by the PC. The master control is only transferred back to the terminals after acknowledgement.

Table 3-3 Information on SimoCom U, continued

Function	Description
Commissioning required	A drive that has still not been commissioned, logs–on with: ”Commissioning required!” You have 5 possibilities: 1. Open the Start–up Assistant – if you have not already created a file, which you wish to load into the drive. 2. Load an existing file into the drive. 3. Optionally, you can switch the drive, which logs–on, into the passive state (this is only possible for drive B). 4. Work offline – this means that you disconnect the link to the drive without start up the drive. 5. Emergency exit – in this case, you remain online without carrying out any commissioning (e.g. in order to upgrade the firmware before commissioning)
Procedure when commissioning	Recommendation: Go through the ”Start–up” menu, from the top to the bottom. The parameters are arranged according to importance:
1.) Drive configuration	... here, enter which power modules, which motors, which encoders are used with this drive, and in which operating mode the drive is used. If this data is changed, the controller data is re–calculated, i.e. previous changes made to the relevant parameters will be overwritten.
2.) Basic commissioning	... here, you will find the data, which is in most cases necessary and also sufficient for the motor and the operating mode that has been entered. You can access all of the parameters in the expert list.
Traverse the drive	After the drive has been configured, you can already operate the drive from the PC. Call: ”Operator control/Traverse/ ...” menu
Data transfer	Also here, the program attempts to ”think with you”: If you are working with drive A and select ”File/Load into drive”, then the program assumes that you wish to download a file, still to be selected, into this drive A. If a file is presently open, then the program assumes that using the same command, you wish to download this open data set into a drive still to be selected. If these assumptions are not applicable, then you can always undo by canceling.

Integrated help

The ”SimoCom U” tool has an integrated Help function, which helps you to use the tool and the ”SIMODRIVE 611 universal” drive.
This is how you call up the integrated help function:

- Using the menu command **Help ▸ Help subjects...**

  or
- By pressing the **Help** button

  or
- By pressing key **F1**

Printing

Data for the following dialog boxes can be printed using the print symbol in the symbol bar:

- Traversing blocks
- Teach In
- User parameter list
- Operating conditions
- Status parameters
- Trace function
- Measurement function
- Expert list

3.3.3 Online operation: SimoCom U via a serial interface

General information

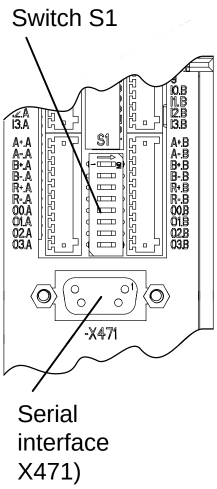
The serial interface (X471) can be used as RS232 interface or as RS485 interface.

- Used as RS232 interface
  —> refer under the index entry, ”Communications via RS232”
- Used as RS485 interface
  —> refer under the index entry ”Communications via RS485”

Parameter overview

The following parameters are available for the serial interface (X471):

Table 3-4 Overview of the serial interface

Interface	Parameters						
	No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
	0801	Toggling between RS232/RS485	–1	0	1	–	PO
		The serial interface (X471) is either set to RS232 or RS485 using this parameter. = 1 Interface is set to RS485 = 0 Interface is set to RS232 = –1 Reserved The interface can be changed over from both drives. As the interface can either be set to RS232 or to RS485, when changing the parameter in a drive, the parameter in the other drive is automatically changed. **Note:** The RS485 interface can only function for control boards from a certain hardware version onwards. —> refer under the index entry ”RS485 (from HW ...1)”					
	0802	Drive number for RS485	0	0	31	–	PO
		In an RS485 group, using this parameter, each drive must be assigned a unique drive number that is used for addressing. = 0 The drive is not available in the RS485 group = 1 to 31 The drive has this valid drive number **Note:** • The drive number must be unique in the complete group. • The terminating resistor is switched in/out using switch S1 (on: Switch 7 and 8 = ON).					
Note: Before changing over the serial interface, it must be checked that the appropriate ”correct” connecting cable is connected at X471.							

Interface parameters

For ”SIMODRIVE 611 universal”, the interface parameters for the serial interface are permanently assigned and cannot be changed.

Communications via RS232

The serial RS232 interface is used to connect the ”SIMODRIVE 611 universal” control board to a PG/PC.
The parameterizing and start–up tool SimoCom U communicates via this interface in the online mode (refer to Fig. 3-9).

Note

When changing the drive (changing–over the serial connecting cable) while there is an open connection to SimoCom U, first wait until the SimoCom U has recognized that the connection has been interrupted (a dialog box opens within a few seconds). You can then insert the cable into the new drive. In the dialog box, you can then select whether you wish to re–connect or cancel.

The following should be observed when establishing a communications link:

1. Parameter P0801 ”toggling between RS232/RS485)”:
   The parameter must be set to RS485 (P0801 = 0).
   Recommendation:
   Set or check this parameter using the display and operator panel (refer to Chapter 3.2).
2. RS232 connecting cable
   between PG/PC and ”SIMODRIVE 611 universal”
   (cable diagram: refer to Chapter 2.5).

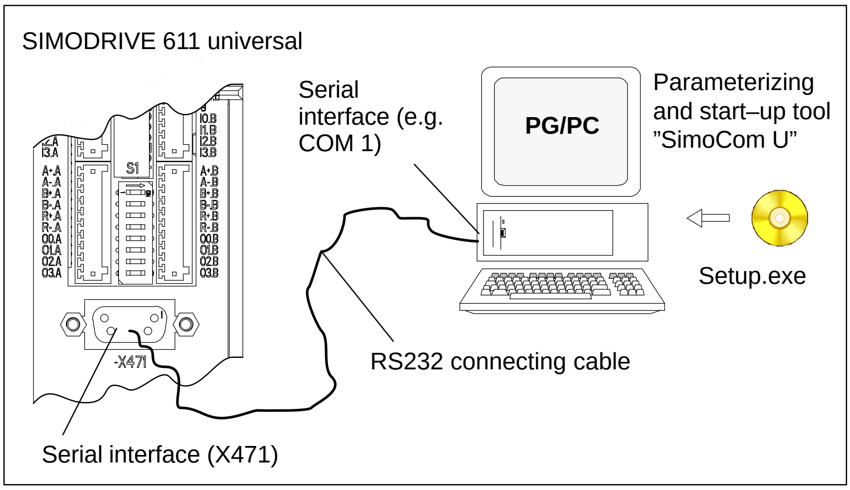


Fig. 3-9 Communications via RS232

Communications via RS485

(the function is dependent on the hardware)

The serial RS485 interface is used to connect several "SIMODRIVE 611 universal" control boards in an RS485 group.
The SimoCom U parameterizing and start–up tool communicates, in the online mode, via an RS232/RS485 interface converter and the selected drive in the RS485 group (refer to Fig. 3-10).

Notice

The RS485 interface can only function with control boards from the appropriate hardware version (refer to Order No., MLFB).

Control board (Order No.)	RS485?
• 6SN1118–□N□00–0AA0	RS485 cannot be used
• from 6SN1118–□N□00–0AA**1**	RS485 can be used

□: Space retainer for the Order No.

For communications via RS485, the following should be observed:

1. Parameters
   - P0801 (toggling between RS232/RS485)
     The parameter must be set to RS485 (P0801 = 1).

     Recommendation:
     Set or check this parameter using the display and operator panel (refer to Chapter 3.2).
   - P0802 (drive number for RS485)
     The drive number for each drive is selected via this parameter.
2. Interface converter RS232/RS485
   For operation via RS485, a commercially available RS232/RS485 converter is required between the PC and RS485 bus.

   The interface converter must have the following features:
   - The converter itself must automatically change over the data flow direction.
   - It is not permissible that the converter sends an "echo" back to the PC.

   Recommended RS232/RS485 interface converter name:
   - Name: PC/PPI cable (RS232/RS485 converter)
   - Order No.: 6ES7 901–3BF20–0XA0
   - Cable length: 5 m
   - Connector: on the RS232 side: 9–pin socket connector
     on the RS485 side: 9–pin plug connector
   - Power supply: via the connector on the RS485 side
     RS485 side (+24 V/0.5 W)
   - Data transfer rate: set to 38.4 kbaud

3. Cable
   - RS232 connecting cable
     Cable between the PG/PC and interface converter
     (cable diagram: refer to Chapter 2.5)
   - RS485 connecting cable
     Cable between the RS232/RS485 interface converter and the nodes to establish an RS485 link
     (cable diagram: refer to Chapter 2.5 or Fig. 3-10)
4. Terminating resistor for the RS485 bus

   Generally applies:
   First and last node —> terminating resistor switched–in
   Other nodes on the bus —> terminating resistor switched–out
   (switch S1, refer to Chapter 1.3.2)

Example:
Communications between the PG/PC and 6 drives via RS485

Communications from a PG/PC to 3 ”SIMODRIVE 611 universal” control boards (2–axis versions) should be possible via the serial interface. Online operation between a PG/PC and the individual control boards must be realized via an RS232/RS485 converter and the appropriate cabling on the RS485 side, so that the drive can go online at any time.

Assumptions for the example:

- The recommended RS232/RS485 converter is used (PC/PPI cable). Set all of the switches at the converter to ”0”.
- The serial interface must be set to RS485 for all drives (P0801 = 1).
- Setting the drive number (P0802)
  - 1st board Drive A: Drive number for RS485 = 4
    Drive B: Drive number for RS485 = 2
  - 2nd board Drive A: Drive number for RS485 = 7
    Drive B: Drive number for RS485 = 8
  - 3rd board Drive A: Drive number for RS485 = 5
    Drive B: Drive number for RS485 = 3
- Terminating resistor for the RS485 bus
  - Interface converter: First node
    —> Switch–in the terminating resistor
    or solder into the socket (refer to Fig. 3-10)
  - 1st and 2nd board: No first or last node
    —> Switch–out the terminating resistor
  - 3rd board: Last node
    —> Switch–in the terminating resistor

Basic solution for the example:

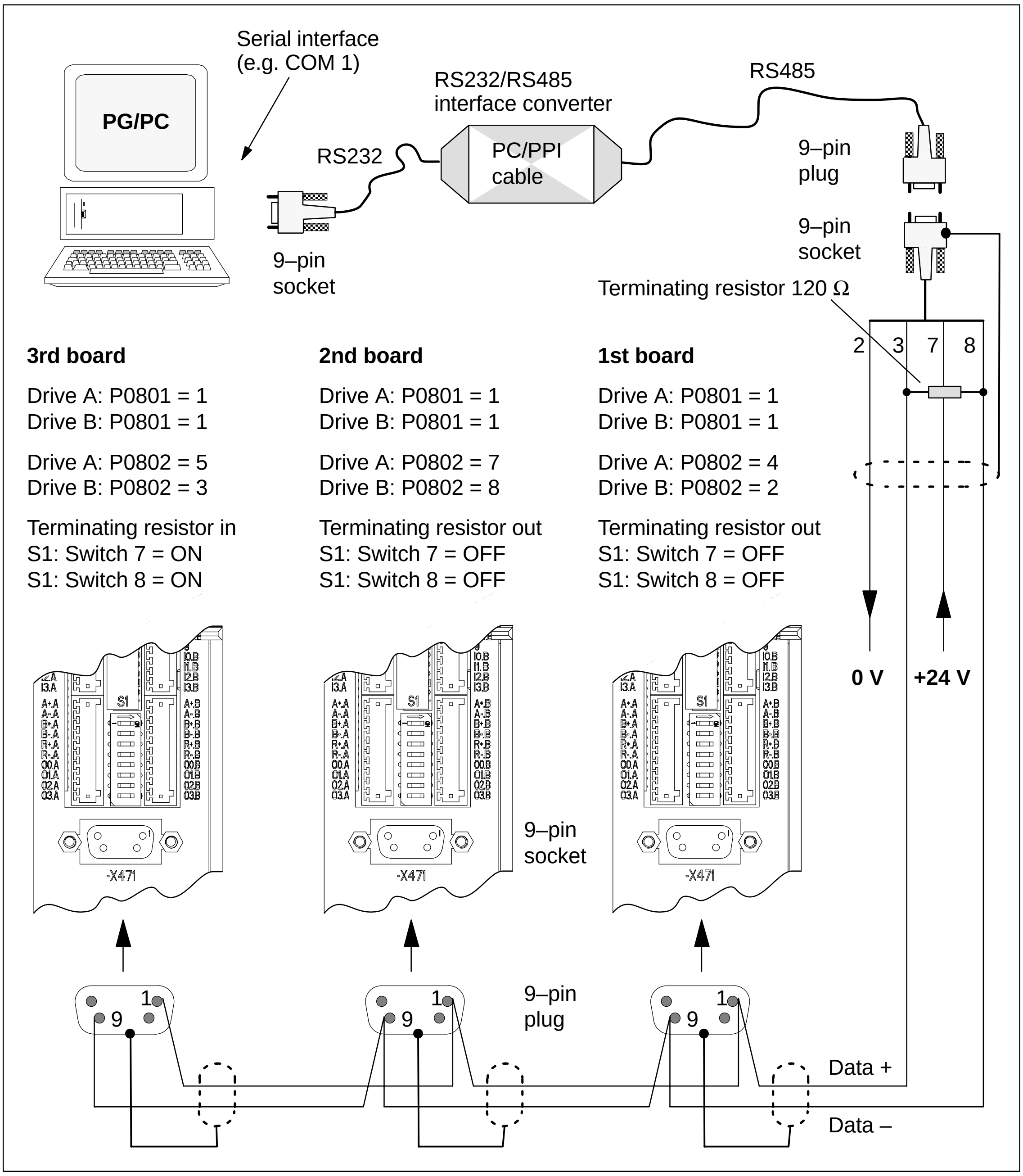


Fig. 3-10 Communications via RS485 (example with 3 nodes)

Note

Essentially the same as when specifying the possible node addresses (drive numbers), up to 31 drives can be connected to an RS232/RS485 interface converter (PC/PPI cable).

3.3.4 Online operation: SimoCom U via PROFIBUS–DP (from SW 3.1)

Description

The ”SimoCom U” parameterizing and start–up tool can communicate with the drives via the serial interfaces and also via the PROFIBUS–DP fieldbus.

The following online modes are possible:

- Online operation via the CP 5511/CP 5611/CP 5613 directly with the fieldbus

  PC/PG <—> CP 5511 / CP 5611 / CP 5613 <—> PROFIBUS <—> drives

- Online operation via the MPI interface of SIMATIC S7

  PC/PG <—> MPI <—> PROFIBUS <—> drives

If the subsequently listed prerequisites are fulfilled, then online operation can be established between SimoCom U, and all of the drives connected to the bus (”DP slaves 611U”).

Settings for SimoCom U

For SimoCom U, communications via PROFIBUS–DP can be set as follows:

- Options – Settings – Communications —> ”Interface” dialog”
- For ”For ”Go online” connect via” set the following:
  —> ”PROFIBUS” and
    —> ”Direct connection”
      —> if the coupling is directly with the field bus
      or
    —> ”MPI –> PROFIBUS Routing”
      —> if the coupling is via the MPI interface
      or
    —> ”Communication via OPC server” (from SW 6.1)
      —> if the coupling is via OPC server

Then, online operation can be established directly to the drive via the fieldbus using the ”Search for online drives” function.

3

Requirements

In order to go online with a drive via the PROFIBUS–DP fieldbus using ”SimoCom U”, the following prerequisites must be fulfilled:

1. ”SIMODRIVE 611 universal” control board from SW 3.1 with the following option module:
   - Optional PROFIBUS–DP2 module (with ASIC DPC31 without PLL)
     Order No. (MLFB): 6SN1114–0NB00–0AA1

     or
   - Optional PROFIBUS–DP3 module (with ASIC DPC31 with PLL)
     Order No. (MLFB): 6SN1114–0NB01–0AA0
2. ”SimoCom U” parameterizing and start–up tool from version 3.1
3. Communication boards, if connected via PROFIBUS
   - CP 5511 (PROFIBUS coupling via PCMCIA card)

     Design:
     PCMCIA card, type 2 + adapter with 9–pin SUB–D socket connector to connect to PROFIBUS.

     Order No. (MLFB): 6GK1551–1AA00

     or
   - CP 5611 (PROFIBUS coupling through a short PCI card)

     Design:
     Short PCI card with 9–pin SUB–D socket to connect to PROFIBUS.

     Order No. (MLFB): 6GK1561–1AA00
   - CP 5613 (PROFIBUS coupling via short PCI card)
     (from SW 4.1)

     Design:
     Short PCI card with 9–pin SUB–D socket to connect to PROFIBUS,
     diagnostic LEDs,
     PROFIBUS controller ASPC2 StepE

     Order No. (MLFB): 6GK1561–3AA00
4. SIMATIC–CPU, if connected via an MPI interface

   A routing–capable SIMATIC–CPU is required for a coupling via MPI interface.
5. S7–DOS from V5.0

   This software is supplied on the CD for ”SIMODRIVE 611 universal” (refer to Chapter 1.3).
6. Connecting cable
   - between CP 5511 or CP 5611 and the PROFIBUS fieldbus

     or
   - between the MPI interface from the PG and SIMATIC CPU

Note

Going online/offline in cyclic operation via PROFIBUS:

While PROFIBUS is in cyclic operation, SimoCom U with CPxx can be attached or disconnected from the fieldbus via the following plug–in cable without creating a fault

Order No. (MLFB): 6ES7901–4BD00–0XA0 (plug–in cable)

Prerequisites with the OPC server (from SW 6.1)

In order to go online with a drive using ”SimoCom U” via an OPC server PROFIBUS–DP, the OPC server must first be installed according to the manufacturers instructions and the following prerequisites must be fulfilled:

- Hardware
  - PROFIBUS card must be installed in the PC – cards from third–party manufacturers can also be used
  - Connecting cable
- Software
  - Driver software and the associated OPC server for the installed Profibus card
  - Configuring software for the OPC server
    Most OPC server/Profibus cards require a bus setting (e.g. baud rate, protocol) – several also require that the existing drives are configured on the bus.

Note for the reader

Please refer to the documentation of the appropriate manufacturer regarding information on how to configure a PROFIBUS card and OP server. These procedures depend on the particular manufacturer.

  - The OPC server, provided by the manufacturer, offers a possibility of accessing MSAC2 services according to DPV1 (EN50170) including the DataTransport service.
    OPC servers that have registered themselves with the system under the Category ”Profibus–DPV1–OPC server Version 1.0” fulfill this requirement.
    When selecting the interface, SimoCom U offers this OPC server in a separate selection box.

- SimoCom U from Version 6.1

  After this configuration of the OPC server has been activated, the access route to ”Communications via OPC server” can be set in SimoCom U under ”Options/Settings/Communication”.

  The OPC server to be used should then be selected using the ”OPC Configuration” button:

  – We recommend that the option ”Display all DPV1–OPC–Server” is selected and an OPC server selected from the selection box located below. The OPC servers, which are displayed for this particular selection, guarantee that the utilities (services), required by SimComU, as described in the software prerequisites, are provided.

  – If the required OPC server is not listed, but the required utilities (services) are however available, then the button ”Display all OPC servers” should be selected, whereby, all of the utilities, installed in the PC which support the OPC, are listed.

  – Alternatively, the so–called ClassID of the OPC server can be directly entered under the ”Specify OPC server name (only for experts!).

Example: SimoCom U via PROFIBUS–DP

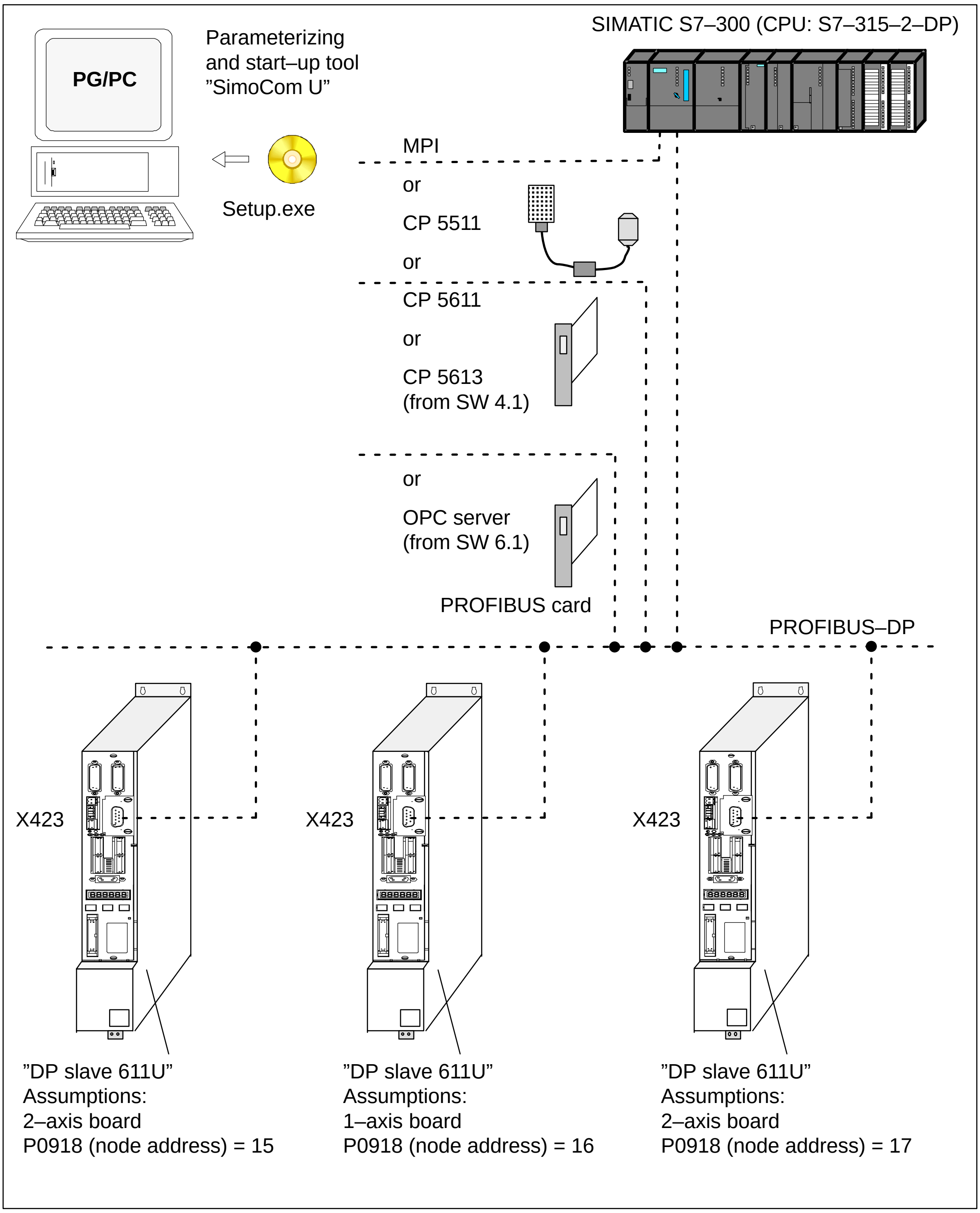


Fig. 3-11 SimoCom U via PROFIBUS (example with 3 control boards)

■

Space for your notes

Commissioning

4

4.1 General commissioning information

Commissioning

The following differentiation is made when commissioning the ”SIMODRIVE 611 universal” control board:

- First commissioning

  If there is still not a matching parameter set for the drive, then the drive must be commissioned for the first time.

  The drive can be commissioned for the first time using

  – the SimoCom U tool (refer to Chapter 4.3.1)

  – the display and operator unit (refer to Chapter 3.2.1)

- Series commissioning

  An existing data set can be transferred to the control board via the SimoCom U tool (refer to Chapter 4.3.2).

  Examples:

  – Several systems having the same configuration and functions are to be commissioned.
  For the first system, a first commissioning must be executed, and for additional systems, a series commissioning.

  – Replacing a control board.

Note

- SimoCom U is a start–up tool for ”qualified commissioning personnel”
- **SimoCom U has neither been designed nor is suitable for operational control of the system!**
- When called via several PCs, only that PC displays modified data, from which the changes were also made!

Note

The original status of the board when shipped can always be re–established as follows:

- via P0649 = 1 (from SW 3.1)
- via the SimoCom U tool using the ”boot board” function (from version 03.03)

Prerequisites for commissioning

The SIMODRIVE 611 universal control board can be commissioned the fastest if the following prerequisites are checked and fulfilled before commissioning is started:

Table 4-1 Prerequisites for commissioning

The following conditions must be fulfilled before commissioning!	**OK** ✓
The SIMODRIVE drive group has been configured.	
The wiring has been completed.	
The Order Nos. (MLFBs) of the power module, motor and encoder are known.	
Checks for the supply infeed module (NE module) Switch S1: Check the settings of this switch at the NE and monitoring module (e.g.: Has the line supply voltage been set to 400 V or 480 V?) **Reference:** /PJU/, SIMODRIVE 611 Configuration Manual, Drive Converters	
The system has been prepared so that it can be powered–up.	

Check list for commissioning

The following checklist should help you to simply commission the components that we supplied, and to also guarantee a high availability when used in conjunction with your product:

- Observe all of the ESD measures when handling components.
- All screws are tightened to the correct torque. Pay special attention to the DC link bolt connections (1.8 Nm torque).
- All connectors are correctly attached and locked/screwed in place.
- Screw the control components into the power module.
- Observe the power–on sequence in the Configuration Manual.
- If the equipment is powered up and down too frequently, the DC link pre–charging circuit will be inhibited. This can only be re–charged again after a cooling time of several minutes (e.g. 4 minutes) with the line supply disconnected (powered down).
- Are there line supply/motor contactors connected to the drive converter? It is only permissible to switch these when they are in a no–current condition.
- All components are grounded and correctly shielded.
  Connection X131 is grounded.
- The load capability of the central power supply system is not exceeded
- Only discharge the unit at the DC link buses through a minimum of 20 Ω.

- The units are designed for the specified mechanical, climatic and electrical ambient conditions. None of the limit values may be exceeded in operation nor during transport. Please pay special attention to the following:
  - Line supply conditions
  - Pollutants
  - Damaging gases
  - Climatic ambient conditions
  - Storage/transport
  - Shock stressing
  - Vibration stressing
  - Ambient temperature
  - Total (summed) current of the digital outputs (refer to Chap. 2.3)

Reader's note

More detailed information on the drive group and the ambient conditions is provided in:

Reference: /PJU/ SIMODRIVE 611
Configuration Manual, Drive Converters

Caution

Generally, the following is valid: Before powering–up or down using the main switch or a line contactor, terminal 63 (pulse enable) and/or terminal 48 (start terminal, contactor control) must be de–energized or disconnected at the supply infeed module (NE module!

Otherwise, there is a danger that the line supply infeed module will be destroyed.

Upgrading the firmware of the optional PROFIBUS module

In order that the optional PROFIBUS module can be upgraded error–free, the cyclic PROFIBUS connection must interrupted. In this case, the physical connection must also be interrupted, i.e. the PROFIBUS connector must be withdrawn.

The firmware cannot be upgraded while data is being transferred via the PROFIBUS.

Note

If the firmware is updated via PROFIBUS–DP and is then interrupted, the firmware can only be downloaded via the serial link. This is the case for the existing software releases $<$ SW 4.1 or $\geqslant$SW 7.2.

4.2 Run–up of ”SIMODRIVE 611 universal”

General information

At run–up, a differentiation is made, as to whether the drive was already commissioned.

- Still not commissioned

  ⇒ The drive requests a commissioning routine
  —> refer to Chapter 4.3.1 or 3.2.1

- Already commissioned

  ⇒ When in an error–free condition, the drive runs up until the following is displayed
  ”_ _ _ **run**”.

Reader's note

Information regarding fault/error handling and diagnostics is provided in Chapter 7.

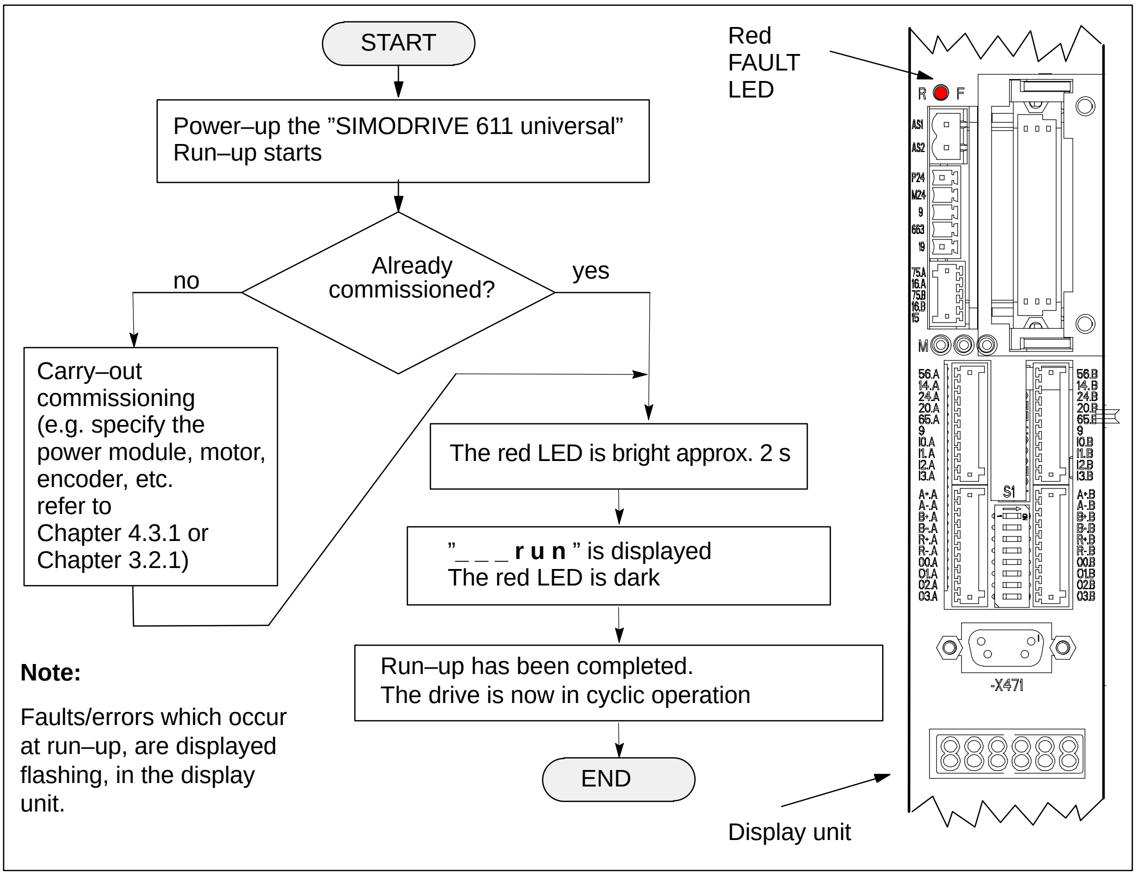


Fig. 4-1 Run–up of ”SIMODRIVE 611 universal”

4.3 Commissioning via SimoCom U

Prerequisites

The following prerequisites must be fulfilled in order to be able to commission a drive using the ”SimoCom U” parameterizing and start–up tool:

1. All of the prerequisites for commissioning, according to Chapter 4.1, have been fulfilled, i.e. the system with ”SIMODRIVE 611 universal” can be commissioned.
2. The checklist for commissioning according to Chapter 4.1 has been checked.
3. The ”SimoCom U” tool is installed on the PC/PG, which is to be used to commission the drive.
4. There is a connecting cable between the PG/PC and the control board (e.g. RS232 connecting cable, refer to Chapter 2.5).
5. The PC/PG with ”SimoCom U” is connected to the control board (X471).

Reader’s note

- Cable diagrams for the connecting cable refer to Chapter 2.5
- Installing ”SimoCom U”,
  Introduction to ”SimoCom U” and
  establishing online operation refer to Chapter 3.3

4.3.1 First commissioning with SimoCom U

Procedure when commissioning the drive for the first time

When ”SIMODRIVE 611 universal” is first commissioned using the ”SimoCom U” parameterizing and start–up tool, proceed as follows:

1. Power–up the drive group
2. Start SimoCom U
3. Request online operation for drive A

   Operator action:
   Execute the ”Search for online drives” function in the ”Start–up” menu, and select drive A in the ”Drive and dialog browser”.

   Is the ”start–up required” window displayed?

   – Yes: —> Start the drive configuration assistant

     —> This signals the drive the existing configuration (power module, motor, etc.).

   – No: —> Press ”re–configure drive” button

     —> This adapts the control board to the present configuration (power module, motor, etc.).

4. Execute the drive configuration, and at the end, press the ”Calculate controller data, save, reset” button.
5. Carry–out basic commissioning

   Set the ”Drive and dialog browser” (lefthand window) to ”Parameter”. To do this, press the ”P Par” button below the browser.

   The commissioning is now executed by working through the remaining dialog boxes for this drive in the ”Drive and dialog browser” from the top to the bottom. The required settings are made in the selected dialog boxes.

Note

If drive B is to be commissioned, then the points must be executed for drive B from point 3 onwards.

4

4.3.2 Series commissioning with SimoCom U

Procedure for series commissioning

For series commissioning of ”SIMODRIVE 611 universal” with the ”SimoCom U” parameterizing and start–up tool, proceed as follows:

1. Power–up the drive group
2. Start SimoCom U
3. Request online operation for drive A

   Operator action:
   Click–on the ”Search for online drives” in the ”Start–up” menu, and select ”Drive A” in the selection box.

   Is the ”start–up required” window displayed?

   – Yes:
     —> Click on the ”Load parameter file into the drive...” button

     —> After you have selected the required parameter file for drive A and have pressed ”open”, the file is downloaded into drive A.

   – No:
     —> Click on the menu ”File —> Load into drive —> Load and save in the drive”

     —> After you have selected the required parameter file for drive A and have pressed ”open”, the file is downloaded into drive A.

Note

If drive B is to be commissioned, then the points must be executed for drive B from point 3 onwards.

4.3.3 Password protection with SimoCom U (from SW 8.1)

General information

Access protection using a password is possible in order to ensure that when service is carried–out the drive configuration is not changed.

The ”SimoCom U” parameterizing and start–up tool has a password input and change view in order to carry–out the following on a connected drive:

- Activate/de–activate the password protection
- Define the password
- Define the functions that are to be protected using the password

For a series commissioning, the password and the password configuration are transferred to the drive just like any other parameter assignment.

The password is not necessary to do the following:

- Open files
- Downloading files into a drive

The password must only be entered if the protected functions are to be accessed in the file or in the drive.

SimoCom U allows the password function to be copied between several drives.

Note

The function ”Password protection” only functions with a ”SimoCom U” parameterizing and start–up tool version $\geqslant$8.1.

Procedure when setting–up the password

Proceed as follows when setting–up a password using the ”SimoCom U” parameterizing and start–up tool:

1. Power–up the drive group
2. Start SimoCom U
3. Request that the required drive either goes into the offline or online mode
4. In the ”drive and dialog browser” (lefthand window), select the ”password” folder
5. Access to enter a PIN and browser to enter the functions to be protected is activated by a ”check” in the ”Activate password protection” field (righthand window)
6. Enter a PIN (4–digit number from 1000...9999) and acknowledge

7. Define the functions to be protected
   —> The safety–relevant functions are displayed in the ”righthand” display window (browser) with a ”check” in the particular field (default setting).
   —> Further, additional functions can be assigned password protection by activating the button ”Activate all functions” or by entering a ”check” in the field of the function to be protected.
8. Press the ”Accept password configuration” button
9. Save the changes

Note

The ”Activate safety–relevant functions” and ”Activate all functions” buttons should only be pressed when actually required.

Access protection

Individual functions (operator masks, menu items, ...) can be protected or enabled.

The following safety–relevant functions are set as default values:

- Expert list
- Load to drive
- Reconfigure drive
- Establish the standard values of the current drive configuration
- Upgrade firmware
- User parameter list

Access with SimoCom U <Version 8.1

The drive inhibits write access operations via SimoCom U <Version 8.1 and outputs a warning.

In order to be able to change the drive in any way, a SimoCom U $\geq$Version SW 8.1 must be used.

Access via the 7–segment display

The drive inhibits all access operations via the 7–segment display. The 7–segment display is then only used to display ”_ _ _run” or warnings and alarms that are present.

Access via databus

Access operations via PROFIBUS–DP, CAN bus and other unlisted modules are not prevented, as in the normal operating state of the machine, these channels cannot be manipulated by the operator.

Enable the access

You can access a password–protected function via SimoCom U as follows:

1. In the online mode, SimoCom U prompts for the password.
   —> Enter password
2. All of the protected functions in the ”righthand” browser of the menu screen can now be changed.
3. After entry, the password remains valid up to the next time that SimoCom U goes online.
4. The protected functions cannot be accessed if the password was not entered.
5. If the password was incorrectly entered five times in a row, then SimoCom U must be re–started before the password can be re–entered.

Password forgotten?

The drive must be deleted using ”delete drive configuration” or ”boot board”. This deletes the complete parameterization.

Note

Before activating password protection using SimoCom U, we recommend that the functioning configuration of the drive is saved in a file.

There is no generally–valid password!

Password protection and other programs with SimoCom U

When using A&D Data Management (ADDM) and other programs, that SimoCom U uses, then password protection may not be activated.

4.3.4 Automated firmware download (from SW 8.1)

General information

Automated firmware download is possible using the ”SimoCom U” parameterizing and start–up tool.

This means that both the actual firmware as well as also the previous version releases (e.g. SW 7.2) can be downloaded.

”SimoCom U” is configured for the appropriate drive using registry files.

Data can be downloaded via the data bus (e.g. PROFIBUS–DP) or the serial interface.

Requirement

- When downloading via PROFIBUS–DP, the correct PROFIBUS node address must be parameterized for the appropriate drive.
- The registry files must be edited so that they match a specified drive configuration.
- It is necessary that ”SimoCom U” was installed – however, the application may not run while changing or running the registry file.

Proceed as follows

1. Edit the .reg file and carry–out the settings (refer to Fig. 4-2).

   If you wish to only change the file names, the path or the PROFIBUS address, then the settings are also possible via SimoCom U without using the .reg files.

   —> Using the dialog menu ”Service” —> ”Automated firmware download” —> ”Define file” or ”Options” —> ”Settings” —> ”Communications”

2. Run the .reg file if you have not carried–out the settings via SimoCom U.

   —> The Windows registry editor prompts after the settings have been transferred into the registry.

   —> Acknowledge with ”Enter”.

   —> The Windows registry editor signals that the settings have been successfully transferred into the registry

   —> Again acknowledge this message with ”Enter”.

```
Windows Registry Editor Version 5.00

[HKEY_CURRENT_USER\Software\Siemens\SimoCom U\V08.00.05
"FixedFirmwareFile"="D:\\Firmware\\611u.ufw"
"ShowBedWarnMsg"=dword:00000000
"WorkOnline"=dword:00000001
"PortType"=dword:00000004
"ProfibusAdresse"=dword:00000010
"FirstInvocation"=dword:00000000
```

SimoCom U Version

D:\\Firmware\\611u.ufw is the file name and the path for the firmware that is downloaded.

00000010 is the PROFIBUS address for the drive – in this case Drive No. 16 (hexadecimal).

Fig. 4-2 Text example for the ".reg" file when connected via PROFIBUS DP

3. Go online with SimoCom U

   —> Press **CTRL+H** to download the firmware

   —> SimoComU prompts you as to whether you wish to download the firmware into your drive.

   —> Acknowledge this using the "Enter" key

4. A "display window" shows the firmware being downloaded

   —> A drive reset is requested once the download has been successfully completed.

   —> Acknowledge this using the "Enter" key

5. Wait until the drive is again online and then check that the system is correctly operating.

   —> Then close SimoCom U
   (key combination **CTRL+ALT+Shift+F12)**.

Note

- In order to upgrade or downgrade several drives, you will require ."reg" files for each drive with the matching PROFIBUS address. Repeat all of the steps from the beginning to the end for each drive for which you wish to download the matching firmware.
- In order to download via the serial interface, an appropriate connection must be established and the line
  "PortType"=dword:00000004
  changes into
  "PortType"=dword:00000001,,
  —> refer to the text example in the diagram 4-2.
  The information in the ProfibusAdresse" line is ignored.
- When retrograding the drive to a previous firmware release, it must be carefully noted that after downloading the system software and the module has run–up, it may be necessary to re–commission the drive.

4.4 Commissioning using the display and operator unit

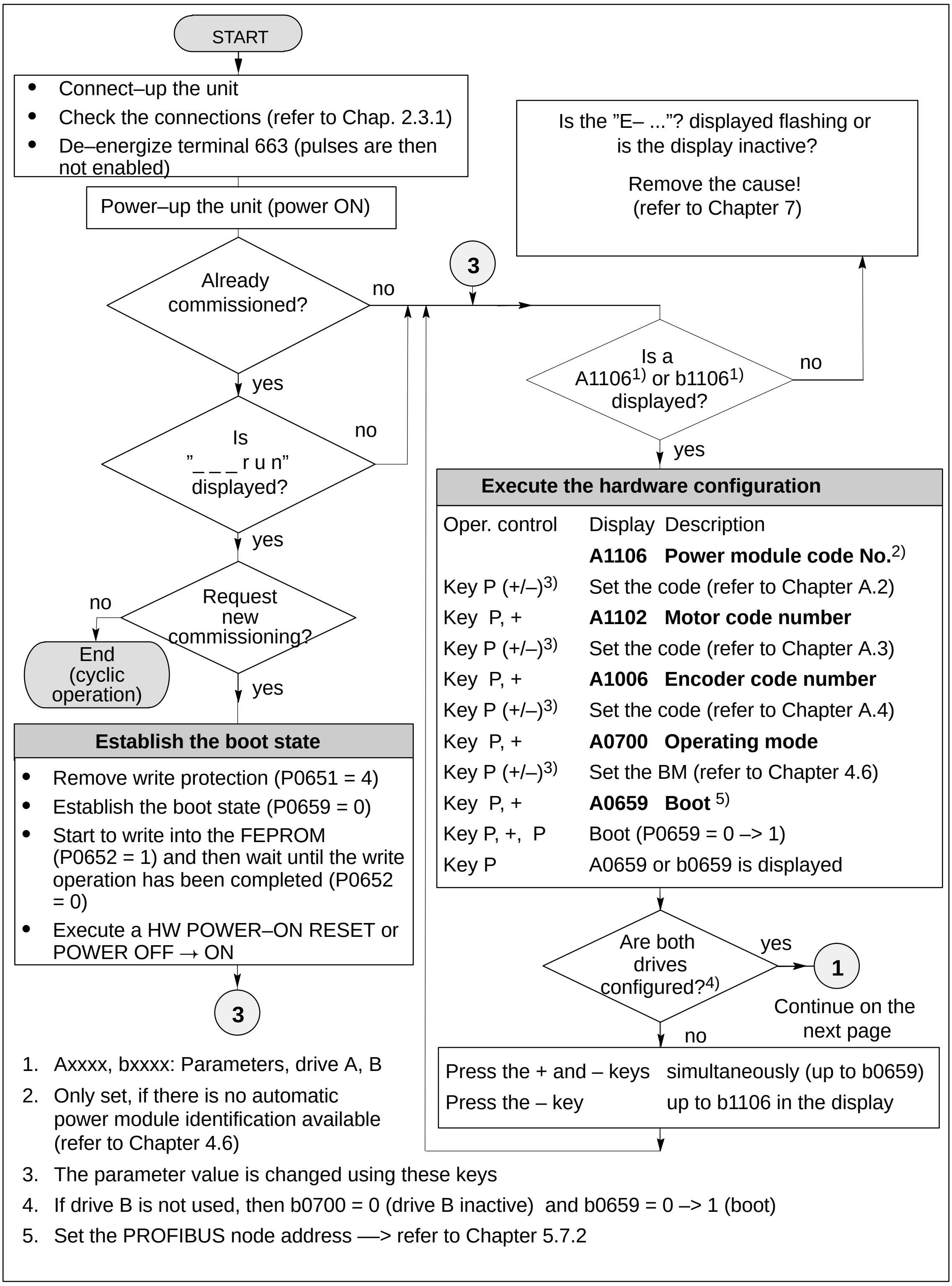


Fig. 4-3 Commissioning using the display and operator unit (Part 1 of 3)

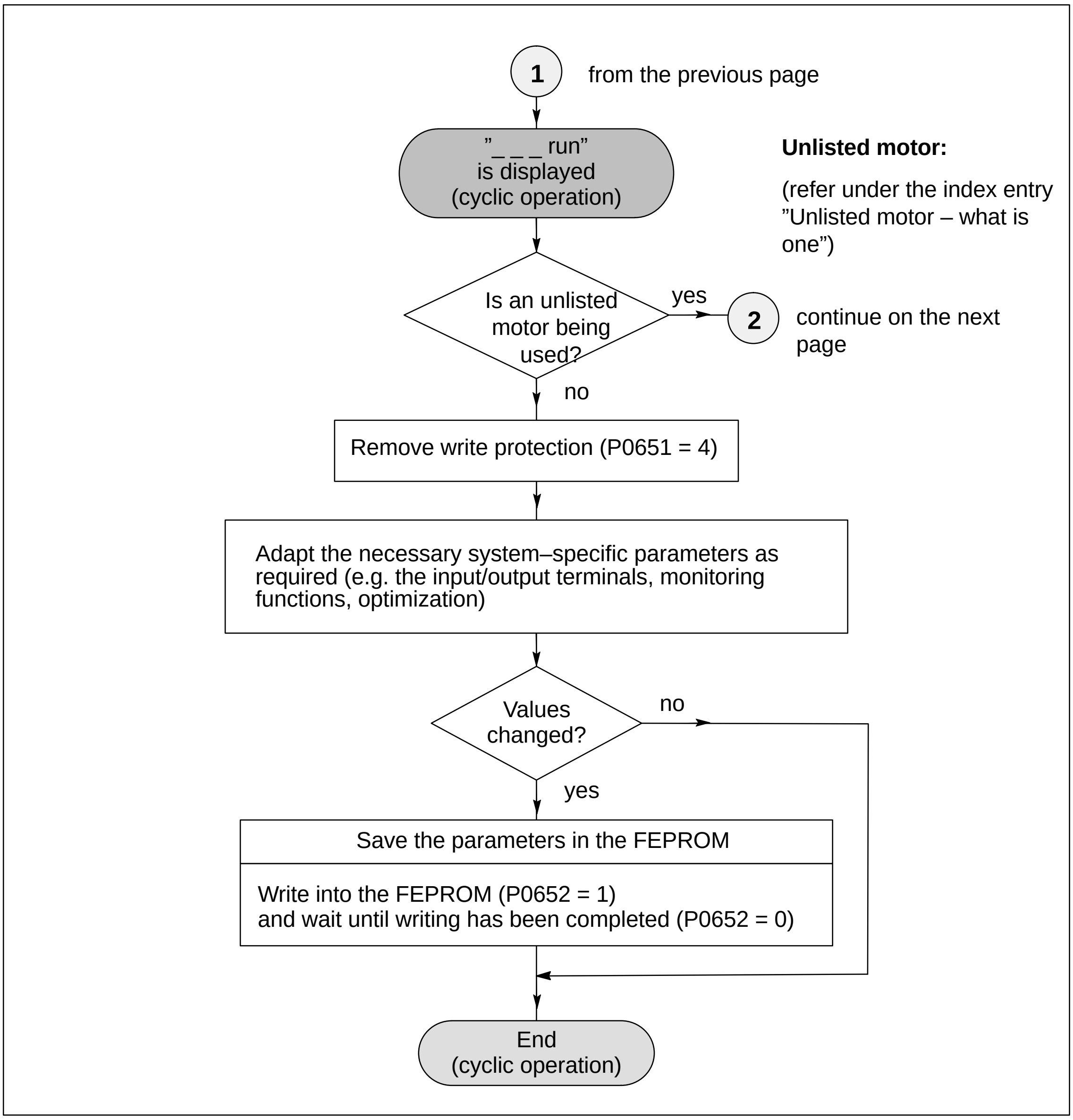


Fig. 4-4 Commissioning using the display and operator unit (Part 2 of 3)

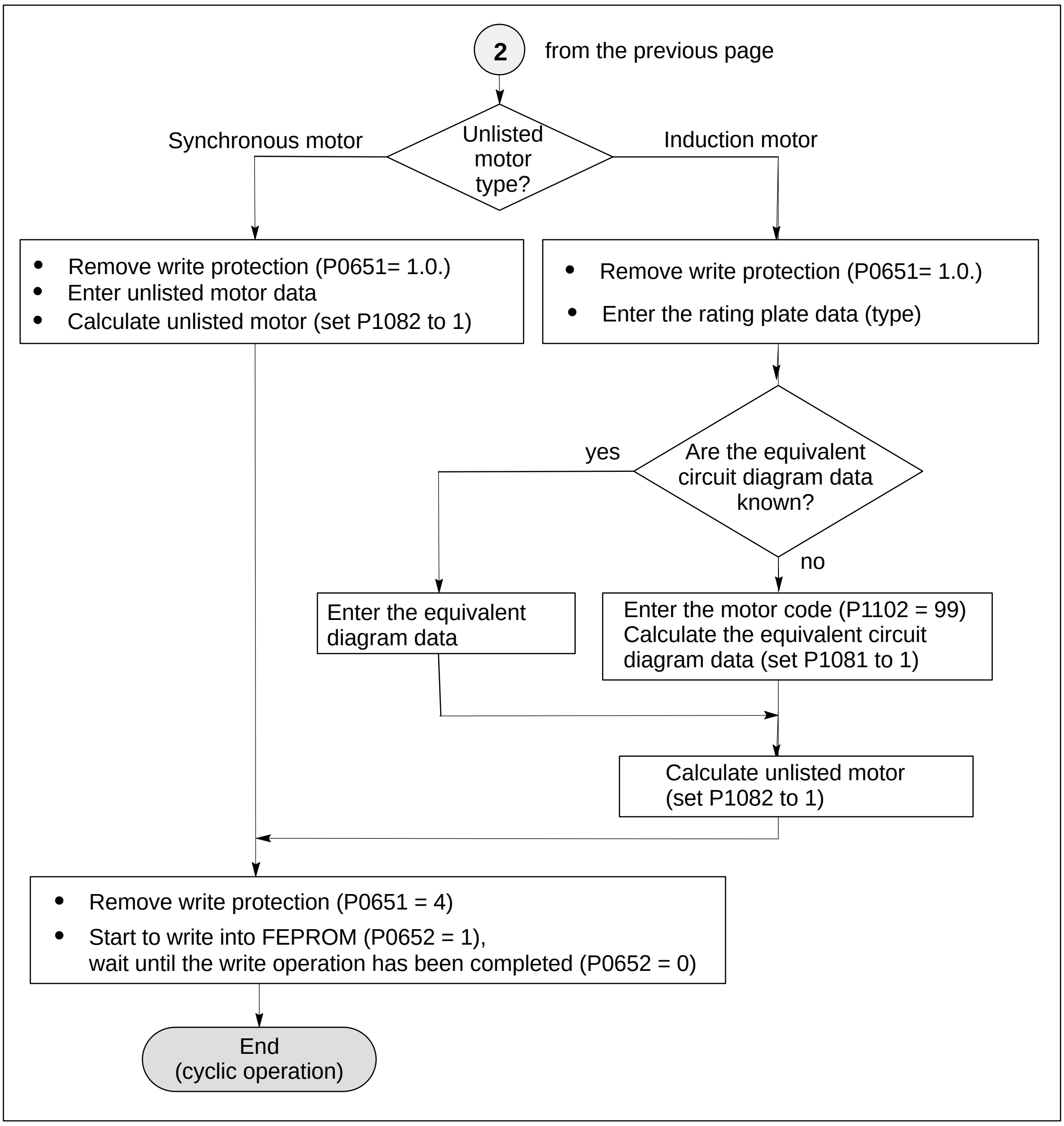


Fig. 4-5 Commissioning using the display and operator unit (Part 3 of 3)

Reader's note

What is an unlisted motor?

A motor, which is not defined using a motor code number, and is therefore also not in the Attachment (refer to Chapter A.3.1, A.3.4 and A.3.5) is classified as an unlisted motor.
The motor can be supplied from Siemens or from another motor manufacturer.
To commission an unlisted motor, the associated parameters are required (refer under the index entry " Unlisted motor – parameters for...".

4.5 Function–initiating and diagnostic parameters

Function–initiating parameters

Table 4-2 Function–initiating parameters

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0649	Delete parameters, drive A and B (from SW 3.1)	0	0	1	–	PO
	... all of the parameters can be deleted in the memory module FEPROM (user data). After these parameters have been deleted, the status of the control board when it was first supplied is re–established. 0 Standard value 1 All of the parameters should be deleted (establish the status when first supplied) **Procedure when deleting all parameters:** • Switch–out the pulse and controller enable (e.g. via terminal 663, 65.A and 65.B) • Remove write protection (P0651 = 10_{Hex}, only for the display and operator unit) • Activate that all parameters are deleted in the FEPROM (P0649 = 1) • Write into the FEPROM (P0652 = 1) • Carry–out HW POWER–ON RESET After run–up, the board status when originally supplied is re–established.					
0651	Read and write protection	0	0	10	hex	Immedi-ately
	This defines which parameters can be read (visible) or can be written into. 0 Parameters for standard commissioning (operator prompting) can be read 1 Parameters for standard commissioning (operating prompting) can be read and written into 2 All parameters can be read 4 All parameters can be read and written into (Exception: Motor data parameters cannot be written into) 8 Motor data parameters can be read and written into 10 All parameters (including motor data parameters) can be read and written into **Note:** Read and write protection is only of significance when parameterizing the display and operator unit.					
0652	Transfer into the FEPROM	0	0	1	–	Immedi-ately
	This means that parameter values can be transferred from the RAM into the FEPROM. 0 –> 1 The parameter values in the RAM are written into the FEPROM The parameter is automatically set to 0 at the end of the data save operation. 1 Data is being saved – other parameters cannot be selected					

Table 4-2 Function–initiating parameters, continued

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0659	Boot	0	0	4	–	PO
	... it is possible to toggle between the boot and standard state. 0 Establish the boot state Sequence: Remove write protection (P0651 = 4), establish the boot state (P0659 = 0), write into the FEPROM (P0652 = 1), hardware POWER–ON RESET Only the following parameters can be selected and changed in the boot state (first commissioning): – P1106 (power module code number), if it was not automatically identified – P1102 (motor code number) – P1006 (IM encoder code number) – P0700 (operating mode) – P0918 (PROFIBUS node address) – P0659 (boot), execute in the sense of a boot 0 → 1 Boot All of the parameters, which are not listed above, are appropriately pre–set (default) standard values or are preset as a result of internal ”calculate controller data” routine. 1 Standard state The standard values are loaded. The motor code and power module code are write–protected. The boot state can be re–established (with P0659 = 0). 2, 3, 4 Internal Siemens					
1080	Calculate controller data	0	0	1	–	Immedi-ately
	Using this function, suitable settings for the control parameters are calculated from the motor parameters and several other parameters. 0 –>1 The controller data is being calculated, the function is active 0 Function inactive or exited error–free **Note:** • Recommendation: Execute this function with SimoCom U, as the calculated parameters are then displayed, and are only transferred and overwritten after acknowledgment. • At the end of the calculation, the parameter is automatically reset to 0 or a fault code is written into it. • If there is an error condition, the parameters for current, flux and speed controller were not able to be optimally pre–assigned. Standard values were entered. The function can be re–started after the error cause has been removed. **Fault code:** –15 Magnetizing reactance (P1141) = 0 –16 Leakage reactance (P1139/P1140) = 0 –17 Rated motor frequency (P1134) = 0 –18 Rotor resistance (P1138) = 0 –19 Motor moment of inertia (P1117) = 0 –21 Speed at the start of field weakening (P1142) = 0 –22 Motor standstill current (P1118) = 0 –23 The ratio between the maximum motor current (P1104) and the motor standstill (stall) current (P1118) is greater than the maximum value for the torque limit (P1230) and the power limit (P1235) –24 The ratio between the rated motor frequency (P1134) and the rated motor speed (P1400) is not permissible (pole pair number)					

Table 4-2 Function–initiating parameters, continued

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1081	Calculate the equivalent circuit diagram data (ARM)	0	0	1	–	Immedi-ately
	1 Equivalent circuit diagram data is calculated, the function is active 0 Inactive or exited fault–free **Procedure for unlisted motors:** • Select ”unlisted motor” when commissioning the system for the first time (refer to Chap. A.3) • Enter all rating plate data • Calculate the equivalent circuit diagram data via P1081 = 1 • Calculate the unlisted motor via P1082 = 1 **Note:** • At the end of the calculation, the parameter is automatically reset to 0 or a fault code is written into it. • Under fault conditions, the equivalent circuit diagram data are not changed (exception: Coding –56). The function can be re–started after the cause of the fault has been removed. **Fault code:** –51 Rated motor power (P1130) = 0 –52 Rated motor voltage (P1132) = 0 –53 Rated motor current (P1103) = 0 –54 Cos φ (P1129 = 0 or > 0.996) –55 The ratio between the rated motor frequency (P1134) and the rated motor speed (P1400) is not permissible (pole pair number) –56 Warning: Speed at the start of field weakening (P1142) < Rated motor speed (P1400) –57 The function is only only permissible for unlisted motors (P1102 = 99)					
1082	Calculate unlisted motor	0	0	1	–	Immedi-ately
	... the ”Calculate unlisted motor” function is started. Parameters P1105 (only SRM), P1147, P1241, P1401 are pre–assigned, the ”Calculate controller data” function executed and the appropriate unlisted motor code entered into P1102. By entering the unlisted motor code in P1102, at the next POWER ON, motor data which were possibly changed, are no longer overwritten by the catalog motor data (previous motor code). 0 Inactive 1 Calculating the unlisted motor **Procedure:** Are all equivalent circuit diagram data known? • if no: Calculate the equivalent circuit diagram data via P1081 and set P1082 to 1 • if yes: Enter all of the equivalent circuit diagram data and set P1082 to 1 **Note:** At the end of the calculation, the parameter is automatically set to 0, or an error code is written into it (refer to the ”calculate controller data” function, P1080).					
1083	Function selection, motor data optimization (ARM)	1	1	4	–	Immedi-ately
	... specifies the function number for the motor data optimization. 1 Determine the leakage inductance and rotor resistance 2 Determine the no–load current and magnetizing reactance 3 Determine the speed at field weakening 4 Determine the moment of inertia					

4

Table 4-2 Function–initiating parameters, continued

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1084	Start motor data optimization (ARM)	0	0	1	–	Immedi-ately
	... starts the "motor data optimization" function, which is set in P1083. 0 Inactive or exited fault–free 1 Start motor data optimization **Note:** At the end, 0 or a fault code is automatically written into the parameter. **Fault code:** –2 A pulse frequency (P1100) of 4 kHz or 8 kHz is required –3 Controller/pulse enable missing –4 Speed setpoint <> 0 –5 Motor is presently being changed–over –6 Error when determining the leakage inductance (result) < 0) –7 V/f mode is active –8 The incorrect motor was selected because of the motor changeover –9 Parameterized maximum speed is too low for the measurement –11 Changeover speed, open–loop/closed–loop control is too high (P1466) –12 Speed range too low (P1466 or P1160 too high) –13 Ramp–function generator enable missing –14 Open–loop torque controlled mode is selected –15 Motor data optimization for the listed motor not permissible (from SW 3.3) –16 Excessively high current results in limiting by the i2t power module model					

Diagnostic parameters

Diagnostic parameters are display parameters, i.e. they can only be read.

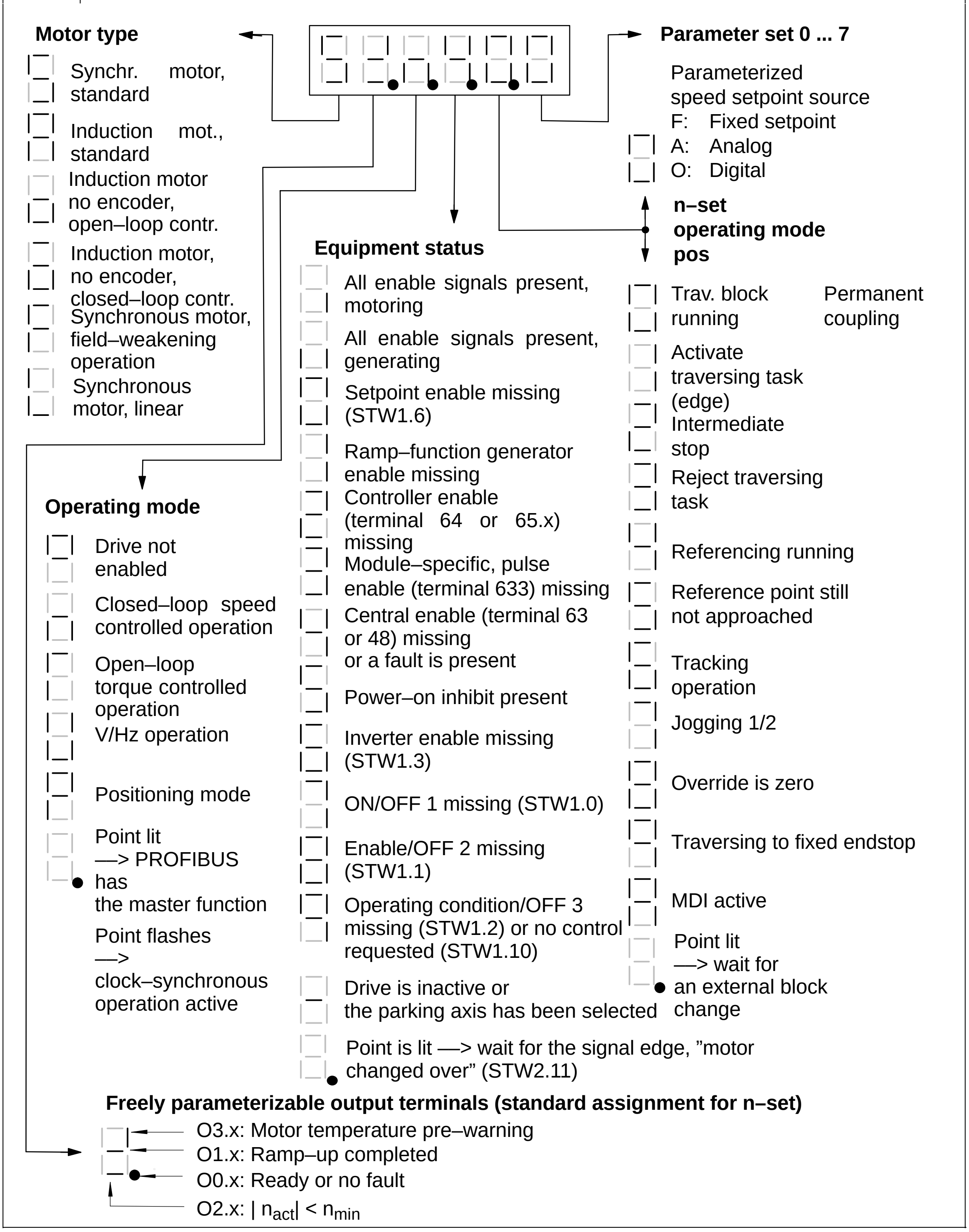
The following parameters are used for diagnostics:

Table 4-3 Diagnostic parameters

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0599	Active motor data set (from SW 2.4)	–	–	–	hex	RO
	... indicates whether the motor changeover has been enabled, or which motor data set is active. 0 Motor changeover inhibited (P1013 = 0) 1 Motor data set 1 (P1xxx) active 2 Motor data set 2 (P2xxx) active 3 Motor data set 3 (P3xxx) active 4 Motor data set 4 (P4xxx) active **Note:** Motor changeover is described in Chapter 6.11.					

Table 4-3 Diagnostic parameters, continued

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0600	Operating display	–	–	–	hex	RO
	... displays the actual operating status of the unit.					



Additional parameters for diagnostics (refer to Chapter A.1)

The following additional parameters are available for diagnostics:

- P0653 Image, input signals, Part 1
- P0654 Image, input signals, Part 2
- P0655 Image, input signals, Part 3 (from SW 3.3)
- P0656 Image, output signals, Part 1
- P0657 Image, output signals, Part 2
- P0658 Image, output signals, Part 3
- P0678 Image of the input terminals
- P0698 Image of the output terminals

4.6 Parameters for hardware, operating mode and clock cycles

Hardware parameters

The drive must identify the hardware used (motor, power module and encoder) so that it can behave appropriately. The hardware can only be identified when the drive is in the booted state.

- Specifying the hardware with the display and operator unit

  In order to specify the motor, power module and encoder used, the appropriate code must be determined from the tables, using the Order No. (MLFB) and entered in the parameter.

- Specifying the hardware with SimoCom U

  The motor, power module and encoder are selected from a list using the relevant Order Nos. (MLFB). The appropriate code is then automatically entered.

Caution

A power module could be destroyed for the following reasons:

- Incorrect power module code or motor code
- Incorrect motor data
- Inverter clock frequency or current controller gain too high

Calculate equivalent circuit diagram data, calculate unlisted motor

Procedure when first commissioning an unlisted motor
(also refer to Chapter 3.2.1):

- Select "unlisted motor", e.g. synchronous or induction motor
- Enter all of the rating plate data, and if known, all of the equivalent circuit diagram data. The equivalent circuit diagram data can also be calculated using parameter P1081.
- Set parameter P1082 "Calculated unlisted motor".
  This means that the controller data is internally calculated and the motor code number corresponding to the motor type is saved.

Automatic power module identification

The "SIMODRIVE 611 universal" control board has an automatic power module detection function, i.e. the control board automatically detects and identifies power modules with this function.

Which power modules have an automatic identification function?

Only power modules from a specific hardware version have the automatic power module identification function (refer to Order No.).

Power module (Order No.)	Automatic identification?
• 6SN112□–□□□□□–□□□**0**	No automatic identification
• from 6SN112□–□□□□□–□□□**1**	Automatic identification

□: Space retainer for the Order No.

After the first commissioning, a value is in P1106 (power module code No.) which corresponds to the particular power module.

An automatic power module identification routine is executed each time the control board runs up. In this case, the value in P1106 is compared with the value of the power module identified in P1110.
If the values are not the same, there is an error condition, and an appropriate fault message is signaled.

Table 4-4 Hardware parameters

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1102	Motor code number	0	0	FFFF	–	PO
	The motor code number defines the connected motor. **Note:** • The motor code of the existing motor is located in the following lists: – for rotating synchronous motors (SRM) —> refer to Chapter A.3.1 – for permanent–magnet synchronous motors with field–weakening (1FE1 motor, PE spindle, from SW 3.1) —> refer to Chapter A.3.2 – for linear synchronous motors (SLM) —> refer to Chapter A.3.4 – for induction motors (ARM) —> refer to Chapter A.3.5 • At the first commissioning and at each POWER ON, the motor data are pre–assigned according to the entered motor code (Exception: unlisted motor). • For unlisted motors, the parameters must be manually assigned (refer to Chapter A.3).					
1106	Power module code number	0	0	FFFF	–	PO
	The power module code number defines the power module used. **Note:** • The power module code can be determined from a list (refer to Chapter A.2). • It is not necessary to select power modules with automatic identification.					
1006	IM encoder code number	0	0	65 535	–	PO
	The encoder code number describes the connected encoders. **Note:** • The encoder code number can be determined from a list (refer to Chapter A.4). • At the first commissioning and at each POWER ON the encoder data are pre–assigned corresponding to the entered encoder code number (Exception: Unlisted encoder). • For unlisted encoders, the parameters must be manually assigned (refer to Chapter A.4).					

Parameters for the operating mode

The operating mode of ”SIMODRIVE 611 universal” is set using P0700 (operating mode).

It is not possible to change over the operating mode in the powered–on status, as the parameter only becomes effective after POWER ON.

Table 4-5 Operating mode parameters

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0700	Operating mode	0	1	3	–	PO

= 0 Drive inactive only drive B)
This means that a double–axis module can only be operated in the single–axis mode.
Should there be no communications with the inactive drive B via PROFIBUS?
If yes, then communications must be disabled using P0875 = 0.

= 1 Speed/torque setpoint (refer to Chapter 6.1)
In this mode, the drive can be operated in the following operating states:
– closed–loop speed controlled mode (n_{set} mode)
– open–loop torque controlled mode (M_{set} mode)
– torque reduction (M_{Red})

= 2 External position reference value (from SW 3.3)
No longer available from SW 4.1. Select the positioning mode.

= 3 Positioning (from SW 2.1, refer to Chapter 6.2)
Traversing blocks can be selected and executed in this operating mode.
Every traversing block can be freely parameterized, and in addition to the block number, it also contains additional data, e.g. target position, acceleration, velocity, command and block enable circuit.

Note:

- The drive can be operated in the ”speed/torque setpoint” mode and ”positioning” modes via terminals or via PROFIBUS–DP or mixed (refer to Chapter 5.4).
- For operation with PROFIBUS–DP:

Operating mode	Overview of process data
– Speed/torque setpoint	(refer to Chapter 5.6.1)
– Positioning (from SW 2.1)	refer to Chapter 5.6.1

4

Parameters for clock cycles

For ”SIMODRIVE 611 universal”, the clock cycles (current controller, speed controller, position controller and interpolation clock cycles) are set as standard, and generally do not have to be changed.

However, the speed controller dynamic performance can be further enhanced by reducing the clock cycle times (current controller and speed controller clock cycles).

Note

In standard operation, use the standard clock cycle settings.

After the clock cycles have been changed, the ”calculate controller data” function (P1080 = 1) should be executed.

Table 4-6 Clock cycle parameters

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1000	Current controller clock cycle	2	4	4	31.25 µs	PO
1001	Speed controller clock cycle	2	4	16	31.25 µs	PO
1009	Position controller cycle	32	32	128	31.25 µs	PO
1010	Interpolation clock cycle	64	128	640	31.25 µs	PO

The clock cycles are derived from the basic hardware clock cycle (31.25 µs).
When changing the clock cycles, the data in the following tables and the associated limitations must be observed.

Current ctr clk cycle P1000	Speed ctr clk cycle P1001	Position ctr clk cycle P1009	Interpolation clock cycle P1010	Clock cycles / Values
4 (125 µs)	4 (125 µs)	32 (1 ms)	128 (4 ms)	Standard
2 (62.5 µs) 4 (125 µs)	2 (62.5 µs) 4 (125 µs) 8 (250 µs) 12 (500 µs)	1 ms to 4 ms	4 ms to 20 ms	Possible values (also refer to Limitations) Tip: 31.25 µs • 32 = 1 ms

Limitations:

- The clock cycles for both active axes must be set the same on a control board.
- Current controller clock cycle: for 2 active axes and positioning, 62.5 µs is not permissible
- Speed controller clock cycle: Speed controller clock cycle ≥ Current controller clock cycle for 2 active axes, 62.5 µs is not permissible
- Position controller clock cycle: must be an integer multiple of the speed contr. clock cycle
- Interpolation clock cycle: must be an integer multiple of the position contr. clock cycle

4.7 Induction motor operation with induction motor

4.7.1 Description

IM operation

The IM function permits pure encoderless operation (IM operation) or mixed operation (encoderless operation/operation with encoder).

The induction motor operation for a ”SIMODRIVE 611 universal” drive is used for 4–quadrant closed–loop speed control of induction motors without speed or rotor position encoder.

Induction motor operation permits higher demands to be fulfilled regarding the dynamic control performance and the stall immunity of conventional converter drives with V/Hz characteristic control. Compared to drives with rotor position encoder, the speed accuracy is somewhat lower and therefore it must be taken into account, that in the lower speed range, the dynamic response and smooth running characteristics will deteriorate.

4

Applications

IM (Induction Motor) operation is used, e.g. in the area of special high–speed motors, for grinding applications and for drives for punches and presses.

Closed–loop control

As the dynamic performance in IM operation is less than MSD operation with encoder, a speed–torque–frequency pre–control is implemented to improve the control dynamic performance.
This pre–control is only active in induction motor operation. It pre–controls, with information about the drive torque, taking into account the existing torque and current limits and the load (motor – P1117 + load – P1123:8 (from SW 2.4)), the torque required for a particular speed change, in the fastest possible time.
This means, that when correctly parameterized, overshoot is prevented and the controlled dynamic performance is enhanced.

For the torque pre–control, a smoothing time can be parameterized via P1459.
The speed controller is parameterized for induction motor operation using P1451 and P1453 due to the low dynamic performance.

In the low speed range, for pure induction motor operation, the actual speed, the orientation and the actual flux can no longer be calculated. This is due to the accuracy of the measured values and the parameter sensitivity of the technique. Thus, an open–loop current/frequency control is selected.
The changeover threshold is parameterized using P1466 , whereby a 5 % hysteresis is implemented.
In order to be able to accept a high load torque, even in the open–loop controlled range, the motor current can be increased via P1458.

Behavior after pulse cancellation

When the pulses are canceled and in pure induction motor operation, the drive converter has no information about the actual motor speed. When the pulses are re–enabled, the speed actual value must first be searched for.

Parameter P1012.7 can be used to define whether the search should start at the setpoint speed or at speed = 0.

P1012.7	= 0	Search starts at the setpoint speed
	= 1	Search starts at speed = 0

When the motor is stationary and P1012.7 = 0, you should avoid applying a high setpoint before the pulses have been enabled.

Warning

When deleting the gating pulses for the motor (terminal 663, terminal 63 or internally canceling the pulses when faults are present), there is no motor speed data. The computed speed actual value is then set to zero. Thus, all of the speed actual value signals, speed actual value messages and output signals ($|n_{act}| < n_{min}$, ramp–function generator ended, $|n_{act}| < n_x$, $n_{set} = n_{act}$) are no longer reliable.

MSD/IM operation

The IM function allows the control characteristic to be changed over, online from MSD to IM control (it is not possible to have mixed operation on MSD and IM control).
The changeover is realized automatically depending on the setting of the speed threshold in P1465.

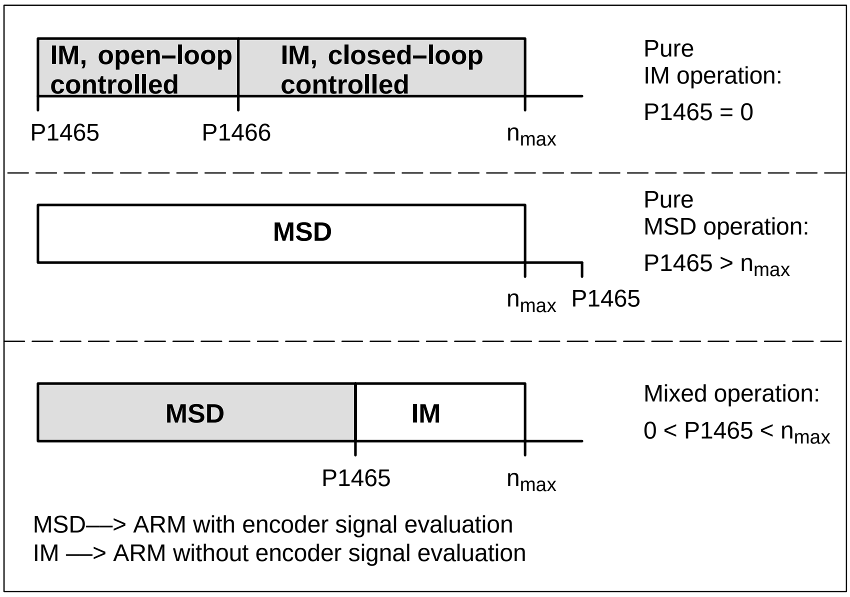


Fig. 4-6 Operating ranges, MSD/IM

Note

For pure IM operation, a rotor position encoder is not necessarily required. A fixed temperature must be selected in P1608, as in this case, generally temperature sensing is not connected.

When IM operation is selected, only drive converter frequencies (P1100) of 4 or 8 kHz are permissible.

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter ”Power modules”

Operating display

The actual operating status of the drive is displayed in P0600 (operating display) (refer to Chapter 4.5).

Series reactor

When high–speed special motors are used, or other low leakage induction motors, a series reactor may be required to ensure stable operation of the current controller.
This reactor is taken into account in the current model using P1119.

4.7.2 Commissioning induction motors (ARM) without encoder

Danger

The EMERGENCY STOP functions must always be functioning when commissioning the drive. The relevant safety regulations must be observed to exclude danger for man and machine.

When optimizing the motor data, motor movements are initiated, which can reach the maximum motor speed.

Motor data optimization

The use of unlisted induction motors with ”SIMODRIVE 611 universal” is supported with the motor data optimization.

Often, the commissioning engineer only knows the rating plate data (manufacturer’s data according to DIN VDE 0530, Part 1) of the motor.

The “Calculate equivalent circuit diagram data” function can be used to calculate other motor data.
The result of the calculation is merely an approximate estimate. The motor data optimization is used to improve the result.

When optimizing the motor data, voltage, current and speed setpoint patterns are output to the motor, and information regarding the equivalent circuit diagram data is taken from the motor response.

Prerequisites for commissioning

The following prerequisites are necessary when commissioning the drive system:

- Pulses, controller, and ramp–function generator must be enabled.
- Motor data optimization is possible in the MSD and IM modes.
- For MSD operation, it is not necessary to determine the moment of inertia.

Commissioning, induction motors without encoder

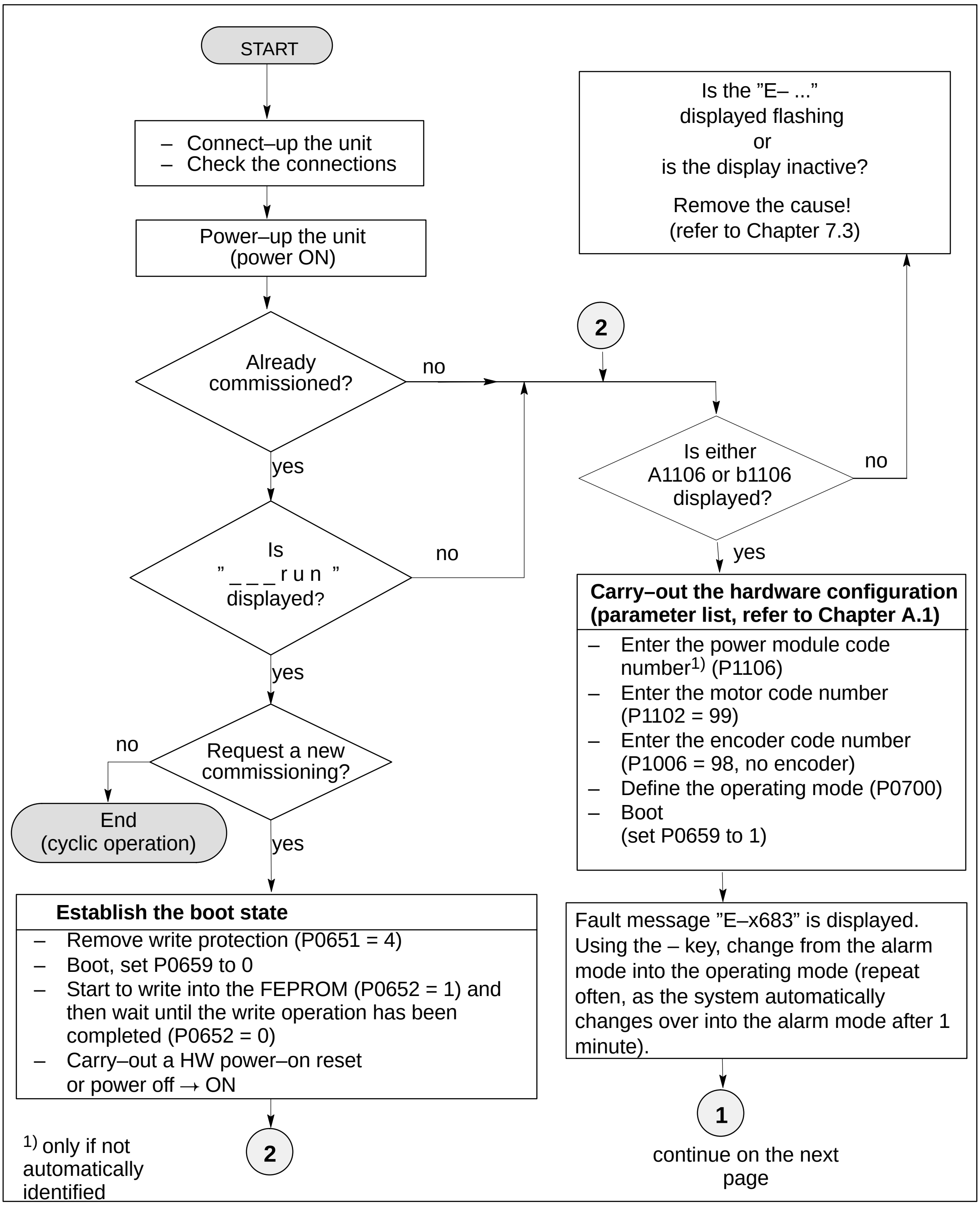


Fig. 4-7 Commissioning induction motors without encoder (Part 1)

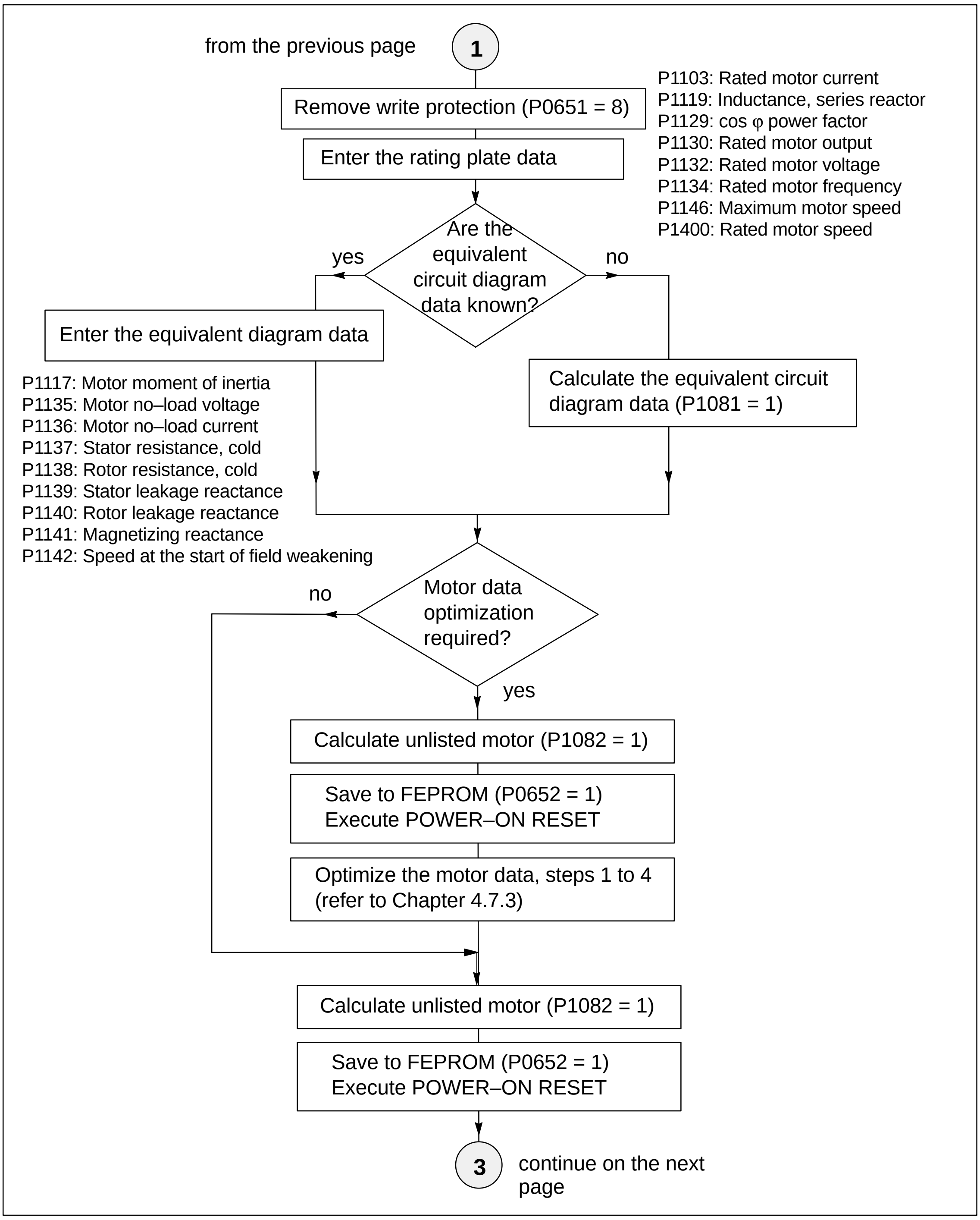


Fig. 4-8 Commissioning induction motors without encoder (Part 2)

from the previous page 3

Check the following parameters, and if required, change:

P1401:8	Speed for the max. useful motor speed
P0610/0615	Drift/offset correction, terminal 56.x/14.x/terminal 24.x/20.x
P0618	Normalization voltage
P1451:8/1453:8	P gain, speed controller IM/integral action time
P1256:8/1257:8	Ramp–function generator, ramp–up/ramp–down time
P1147	Speed limiting
P1123:8	Load moment of inertia (from SW 2.4)
P1417:8	nx for ”nact < nx” signal
P1418:8	nmin for ”nact < nmin” signal
P1426:8	Tolerance bandwidth for ”nset = nact” signal
P1427	Delay time ”nset = nact” signal
P1428	Threshold torque Mdx
P1429	Delay time ”Md < Mdx” signal
P1230:8	1st torque limit
P1235:8	1st power limit
P1458	Current setpoint, open–loop controlled range IM
P1459	Torque smoothing time constant IM
P1465	Changeover speed IM
P1466	Changeover speed, open–loop/closed–loop control IM
P0660 – 0663	Function, input terminal I0.x/I1.x/I2.x/I3.x
P0680 – 0683	Signaling function, output terminal O0.x/O1.x/O2.x/O3.x

Write into the FEPROM (P0652 = 1)
and wait until writing has been completed (P0652 = 0)

Enable write protection (P0651 = 0)

Save parameters in the file
and document

End

Fig. 4-9 Commissioning induction motors without encoder (Part 3)

4.7.3 Motor data optimization, steps 1 to 4

Reader’s note

What happens to the faults occurring during motor data optimization?

Faults, which occur during the commissioning steps, are written into P1084 as fault code (refer to the parameter list in Chapter A.1).

Prerequisites for the commissioning steps 1 to 4:

- Switch in the pulse, controller and ramp–function generator enable signal
- Remove write protection (P0651 = 8)
- Set the converter switching frequency (P1100) to 4 or 8 kHz

---

Optimizing using ”SimoCom U”

From SW 5.1, the ”SimoCom U” start–up tool supports motor data optimization.

After ”motor data optimization” has been selected, a menu is displayed in which, the following optimization steps can be selected one after another from the ”Settings” selection box. These optimizing steps can be started using the ”Start” button:

1. Step 1: Determining the resistances and reactances
2. Step 2: Finely defining the no–load current, magnetizing field reactance
3. Step 3: Determining the speed at the start of field weakening
4. Step 4: Determining the moment of inertia

For the listed parameters, the results of the optimization steps are displayed, up–to–date, in the menu screen.

Optimizing with the parameter settings

The motor can also be optimized as follows using parameter settings.

Commissioning step 1

Determine the resistance and reactance values of the motor and an improved no–load current value.

Note

- The motor does not move and may not move during this measurement.
- Monitoring is not possible, as the induction motor does not have an encoder.

Carrying–out step 1

The step is executed as follows:

1. Select the step: P1083 = 1
2. Start the step: P1084 = 1
   - P1084 = 1 The step was started and is running – it can be exited with P1084 = 0.
   - P1084 = 1/0 The step was successfully completed
   - P1084 = –x The step was cancelled with fault–x (refer to P1084 in Chapter A.1) Start again after the fault has been removed.

Changed parameters

The following parameters are calculated/written into:

- P1136, P1137, P1138, P1139, P1140, P1141

Commissioning step 2

Determine the no–load current and magnetizing reactance.

The no–load current is set, so that at rated speed, the no–load voltage is present at the motor terminals.

Danger

The motor is accelerated, with a positive rotating field, up to the rated speed.

Note

If the speed actual value is not steady (resolver, toothed–wheel encoder), it cannot be guaranteed that this commissioning step is correctly executed (the setting takes too long).

Remedy: Set the speed actual value smoothing (P1522) to min. 1 ms.

Carrying–out step 2

The step is executed as follows:

1. Select the step: P1083 = 2
2. Start the step: P1084 = 1
   - P1084 = 1 The step was started and is running – it can be exited with P1084 = 0.
   - P1084 = 1/0 The step was successfully completed
   - P1084 = –x The step was cancelled with fault–x (refer to P1084 in Chapter A.1) Start again after the fault has been removed.

Changed parameters

The following parameters are calculated/written into:

- P1136, P1141

Commissioning step 3

Determine the speed at the start of field weakening.

When traveling at the threshold speed for the start of field weakening and a DC link voltage $V_{DC\ link}$, the converter output voltage is set to 380 V. If $V_{DC\ link}$ < 600 V, the converter output voltage is reduced by the factor $V_{DC\ link}$/ 600 V.

Danger

The motor is accelerated up to the speed at the start of field weakening with a positive rotating field; the speed is limited to the currently effective limit.

Note

If the speed actual value is not steady (resolver, toothed–wheel encoder), it cannot be guaranteed that this commissioning step is correctly executed (the setting takes too long).

Remedy: Set the speed actual value smoothing (P1522) to min. 1 ms.

Carrying–out step 3

The step is executed as follows:

1. Select the step: P1083 = 3
2. Start the step: P1084 = 1
   - P1084 = 1 The step was started and is running – it can be exited with P1084 = 0.
   - P1084 = 1/0 The step was successfully completed
   - P1084 = –x The step was cancelled with fault–x (refer to P1084 in Chapter A.1) Start again after the fault has been removed.

Changed parameters

The following parameters are calculated/written into:

- P1142

Commissioning step 4

(not required when carrying–out self–commissioning in the MSD mode)

Determine the moment of inertia.

The moment of inertia is set, so that when the motor accelerates to the maximum speed, no I component is set in the speed controller.

Note

If there is a significant load moment of inertia in actual operation, this step should be executed with a coupled load.

For identification runs, the total moment of inertia (P1117 + P1123:8 (from SW 2.4)) is taken into account and corrected in P1117. The commissioning engineer must make the appropriate distribution between P1117 and P1123:8 (parameter set independent and dependent).

4

Danger

The motor is accelerated with a positive field direction of rotation up to the maximum speed along the torque limit.

Carrying–out step 4

The step is executed as follows:

1. Select the step: P1083 = 4
2. Start the step: P1084 = 1
   - P1084 = 1 The step was started and is running – it can be exited with P1084 = 0.
   - P1084 = 1/0 The step was successfully completed
   - P1084 = –x The step was cancelled with fault–x (refer to P1084 in Chapter A.1) Start again after the fault has been removed.

Changed parameters

The following parameters are calculated/written into:

- P1117

Parameter overview

For IM operation (encoderless operation), the following parameters are available:

Table 4-7 Parameter overview for IM operation (encoderless operation)

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effec-tive**
1451:8	P gain, speed controller IM (ARM)	0.0	0.3	9 999.999	Nms/rad	Imme-diately
	... the P gain of the speed controller in IM operation is set (operation without encoder). **Note:** The parameter is preset when executing the ”calculate controller data”/”calculate unlisted motor” function.					
1453:8	Integral action time, speed controller IM (ARM)	0.0	140.0	6 000.0	ms	Imme-diately
	... the integral action time of the speed controller is set in IM operation (operation without encoder). **Note:** The parameter is preset when executing the ”calculate controller data”/”calculate unlisted motor” function.					
1458	Current setpoint open–loop controlled range IM (ARM)	0.0	90.0	150.0	%	Imme-diately
	For pure IM operation (P1465 = 0), the drive is open–loop, current–frequency controlled below the changeover speed (P1466). In order to be able to accept a higher load torque, the motor current in this range can be increased using P1458. **Note:** This is entered as a percentage of the rated motor current (P1103). The current is limited to 90% of the current limit value (P1238).					
1459	Torque smoothing time constant AM (ARM)	0.0	4.0	100.0	ms	Imme-diately
	... the pre–control value for the torque is smoothed (initial rounding–off). **Note:** In IM operation, a speed–torque–frequency pre–control is implemented due to the low dynamic performance.					
1465	Changeover speed MSD/IM (ARM)	0.0	100 000.0	100 000.0	RPM	Imme-diately
	Above this, the drive runs, in IM operation with the speed set in this parameter. P1465 = 0 pure IM operation P1466 < P1465 < n_{max} mixed operation, MSD/IM P1465 > n_{max} only MSD operation **Note:** • When IM operation is selected, only pulse frequencies (P1100) of 4 and 8 kHz are permissible. • The parameter is preset to 0 when first commissioning, if there is no motor measuring system (P1006 = 98, P1027.5 = 1).					
1466	Changeover speed, closed–loop/open–loop control IM (ARM)	150.0	300.0	100 000.0	RPM	Imme-diately
	For pure IM operation (P1465 = 0), the drive is open–loop, current–frequency controlled below the speed set using this parameter. **Note:** The parameter is preset when executing the ”calculate controller data”/”calculate unlisted motor” function.					

4.8 Permanent–magnet synchronous motor with field–weakening (PE spindle)

4.8.1 Description

What is a permanent–magnet synchronous motor with field weakening?

The permanent–magnet synchronous motors with field weakening (1FE1 motor series) are liquid–cooled synchronous motors, which are supplied as components. After the components have been assembled on the spindle, a complete motor spindle unit is formed.

The rotors of 1FE1 motors are equipped with permanent magnets. The high speeds for spindle operation are achieved by a current which opposes the field. This is similar to field weakening for induction motors.

Advantages

The advantages of permanent–magnet spindles in comparison to induction motors are:

- Extremely low power loss in the rotor
  —> low bearing temperature
- Higher torque for the same active part dimensions
  —> more compact machine design
- Shorter accelerating times with the same moment of inertia
- Improved efficiency
- Favorable Cos φ
  —> it may be possible to use a smaller power module
- More favorable speed/power characteristic
  —> no power reduction in the upper speed range

Reader’s note

Detailed information on 1FE1 motors, configuring and mounting built–in motors are provided in:

Reference: /PJFE/ AC Motors for Main Spindle Drives
Synchronous Build–in Motors 1FE1
Planning/Mounting Guide
Manufacturers Documentation

Motor spindle components

A motor spindle generally consists of the following components:

- Spindle box
- Spindle with bearings
- Cooling system

  The spindle manufacturer is responsible for designing the bearings, lubrication and cooling.
- Build–in motor
  - 4–pole series (especially suitable for high speeds)
  - 6–pole series (especially suitable for high torque)
  - A VP module (VPM) is required, depending on the EMF (rotor voltage) (VPM: Voltage Protection Module)
  - Maximum speed: up to 16 000 RPM
Maximum torque: up to 310 Nm
(depending on the frame size)
- Encoder system (integrated encoder)
  - Hollow shaft measuring systems with sin/cos 1 Vpp (e.g. SIZAG 2 or SIMAG H)

System prerequisites

The prerequisites are as follows:

- Control board
SIMODRIVE 611 universal for encoders with sin/cos 1Vpp
- Maximum motor cable length = 50 m

4.8.2 Commissioning 1FE1 motors

General information on commissioning 1FE1 motors

The following questions must be positively responded to before commissioning 1FE1 motors:

- Are all of the prerequisites for commissioning checked and were the points in the checklist for commissioning checked (refer to Chapter 4.1)?
- Is the motor used a standard or an unlisted motor?
  - Standard motor?

    The motor is in a list of permanent–magnet synchronous motors with field weakening, and has an allocated motor code (refer to Chapter A.3.2)?

    When commissioning, the motor used is selected from a list.
  - Unlisted motor?

    The motor is not included in the list of permanent–magnet synchronous motors with field–weakening, and it does not have a motor code (refer to Chapter A.3.2)?

    When commissioning, the data of the motor used must be available and must be manually entered.

    The data required can be found in the table under the index entry ”Unlisted motor – parameters for PE spindle”.
- Are the motor and encoder already mounted and ready to be powered up?

4

Commissioning 1FE1 motors with SimoCom U

1FE1 motors are commissioned using the SimoCom U parameterizing and start–up tool as follows:

1. Establish online operation

   Operator action: e.g. with ”Commissioning – search for online drives”
2. Configure the drive

   Generally, the following is valid:
   You can reach the next or the previous dialog box by pressing ”next” or ”back”.

   - ”Drive name” dialog box
   - ”Power module” dialog box (only if it is not automatically identified)
   - ”Motor selection” dialog box for standard motors:

”Motor” field –> Standard motor	”Motor type” field –> 1FT6, 1FK6, 1FE1, 1FW6 (synchronous)

     —> select the motor used
     —> continue with the ”measuring system/encoder” dialog box

– ”Motor selection” dialog box for unlisted motor:

”Motor” field	”Motor type” field
–> Enter data	–> Synchronous motor (SRM)

After ”continue”, the motor data and the pre–setting for the current controller adaptation must be entered:

P No.	Name	Value	Units
1103	Rated motor current		A(rms)
1104	Maximum motor current (as for P1122)		A(rms)
1112	Motor pole pair number		–
1113	Torque constant		Nm/A
1114	Voltage constant		V(rms)
1115	Armature resistance		Ohm
1116	Armature inductance		mH
1117	Motor moment of inertia		kgm^2
1118	Motor standstill current		A(rms)
1122	Motor limiting current (as for P1104)		A(rms)
1128	Optimum load angle (from SW 3.3)		Degrees
1146	Maximum motor speed		RPM
1149	Reluctance torque constant (from SW 3.3)		mH
1180	Lower current limit adaptation	0	%
1181	Upper current limit adaptation	30	%
1182	Current controller data factor	30	%
1400	Rated motor speed		RPM

– ”Measuring system/encoder” dialog box

Field
”Which motor measuring system are you using?” –> Enter data

The encoder data should be entered after ”continue”:

Incremental – without zero mark	yes
Rotor position identification	yes
Note: This results in, P1011 = $3XXX_{Hex}$	
Speed actual value inversion	first remains like this
P1005 (encoder pulse number)	_ _ _ _ _ _

– ”Operating mode” dialog box

– ”Complete the drive configuration” dialog box

After the data that has been set has been carefully checked, the drive configuration is completed by pressing
”Accept this drive configuration”.

3. Set PE specific parameters and activate the PE spindle (only for unlisted motors)
   – Enter or change the following parameters via the expert list.

P No.	Name	Value	Units
1136	Motor short–circuit current		A(rms)
1142	Speed at the start of field weaken-ing		RPM
1015	Activate PE–MSD	1: Activated 0: De–acti-vated	–

   – Execute the ”calculate controller data” function

     After this, the controller data is pre–assigned, PE–specific.

   – Save the parameters in the FEPROM

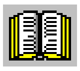
   – Carry–out a POWER–ON RESET

Note

This completes the basic commissioning.

The motor can be operated with these settings.

After this first commissioning, for reasons of accuracy, the rotor position identification run must be executed with zero mark and the angular commutation offset determined.



Reader’s note

Additional commissioning instructions/information regarding motor optimization are provided in the following.

Additional commissioning information/ instructions to optimize the motor

1. Check the control sense of the speed control loop
   - P1146 = _ _ _ _ _ _
     P1147 = _ _ _ _ _ _ Note values so that they can be written back into the system
   - P1146 (maximum motor speed) —> enter a low value P1147 (speed limiting) —> enter a low value
   - Enable the drive and operate the drive with a low speed setpoint

If	then
No error	Control sense OK
Fault (e.g. the drive oscillates at n_{set} = 0)	If the control sense is incorrect, e.g. due to incorrect phase sequence (counter–clockwise rotating field) or interchanged encoder tracks —> correct the phase sequence or change the inversion of the speed actual value (P1011.0) and carry out POWER ON–RESET
Fault (e.g. fault 608)	If the control sense or encoder pulse number (P1005) is incorrect —> correct P1005 and execute a POWER–ON RESET

   - P1146 and P1147: Re–enter the old parameter values

2. Additional possibilities to identify the rotor position (determine the angular commutation offset)
   - Incremental measuring system (with zero mark)

     Set P1011.12 = 1
     Carry–out a HW–RESET
     Set P1017.0 = 1
     Switch–in the pulse and controller enable signals
     Move the axis over the zero mark (e.g. enter low n_{set})
     —> The angular offset is automatically entered into P1016
     —> Fault 799 is displayed
     (Save to FEPROM and HW–RESET required)
     Save to FEPROM and carry–out a HW–RESET

   - Absolute measuring system (with CD track)

     Power–up with the controller and pulses disabled
     Set P1017.0 = 1
     Switch–in the controller and pulse enable
     —> The angular offset is automatically entered into P1016
     —> Fault 799
     (Save to FEPROM and HW–RESET required) is displayed
     Save to FEPROM and carry–out a HW–RESET

3. Check and set the rotor position identification routine via the test function

   To check the rotor position identification, using a test function, you can determine the difference between the calculated rotor angle position and that actually used by the closed–loop control. Proceed as follows:

   – Start the test function several times and evaluate the difference
     Start Set P1736 (test rotor position identification) to 1
     Difference P1737 (difference, rotor position identification)

     = _ _ _ _ , _ _ _ _ , _ _ _ _ , _ _ _ _ , _ _ _ _

   – Is the spread of the measured values less than 2 degrees electrical?
     Yes: OK
     No: Increase P1019 (e.g. by 10 %)
     and repeat the measurements

     If OK after having repeated the measurements, then the angular commutation offset can be re–determined:

     For an incremental measuring system:
     as for Point 2. (determining the angular commutation offset)

     For an absolute measuring system:
     Power–down the drive (POWER ON–RESET)
     Power–up the drive with the pulse or controller enable signals switched–out
     Set P1017.0 to 1
     Switch–in the pulse and enable signals
     —> The angular offset is automatically entered into P1016
     —> Fault 799 (Save to FEPROM and HW–RESET required) is displayed
     Save to FEPROM and carry–out a HW–RESET

4. Check the rotor position identification routine via the ramp–up time measurement

   In order to check the rotor position identification routine, the ramp–up time measurements can also be made in both directions of rotation.

   Objective:
   Set P1016 so that the ramp–up times in both directions of rotation are approximately the same

5. Set the current controller adaptation (refer to Chapter 4.8.3)

   – P1120 is pre–set with ”Calculate controller data”

   – Check the pre–setting for the current controller adaptation (the values were already entered together with the motor data):
     P1180 = 0 %, P1181 = 30 %, P1182 = 30 %

4

4.8.3 Current controller adaptation

Pre–setting of the current controller adaptation

The current controller adaptation must be pre–set as follows before subsequently setting and checking:

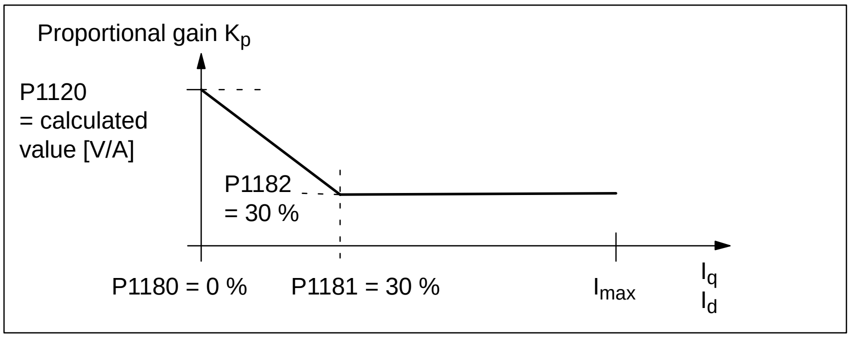


Fig. 4-10 Pre–setting of the current controller adaptation for 1FE1 motors

Setting the current controller adaptation

To check and set the current controller adaptation, different current setpoint steps are entered via the SimoCom U parameterizing and start–up tool using the measuring function. The appropriate step response is then evaluated (current actual value = torque actual value).

Goal when setting the P gain K_p

The adaptation characteristic for the P gain K_p of the current controller should be set over the complete current I_q, so that the controller is optimally set at each current, and does not overshoot.

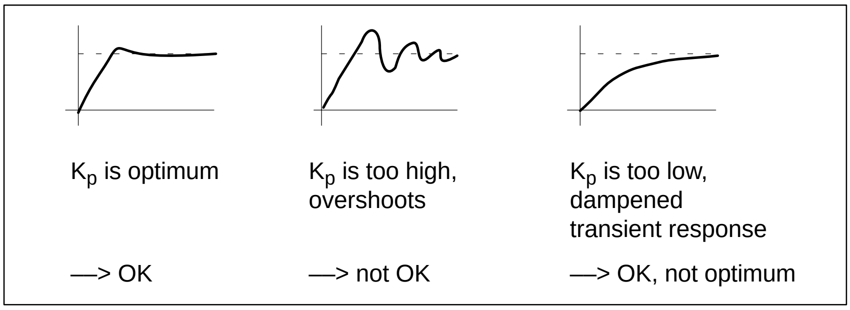


Fig. 4-11 How should the step response be evaluated?

Procedure when checking the adaptation characteristic

The pre–setting (default) of the adaptation characteristic can, e.g. be checked and set as follows:

1. Current setpoint input (amplitude = 2 % + offset = 0 %)

   Check the start of the adaptation characteristic for I_q = 0 %.

   Step response?
   OK: P1120 is correct
   Not OK: Increase/decrease P1120
   —> Target: Optimum transient response (refer to Fig. 4-11, left)

2. Current setpoint input (amplitude = 2 % + offset = 100 %)

   Check the constant adaptation characteristic range at I_q = 100 %.

   Step response?
   OK: P1182 is correct
   Not OK: Increase/decrease P1182
   —> Objective: Optimum transient response (refer to Fig. 4-11, left)

3. Current setpoint input (2 % amplitude + 30, 20, 10, 5 % offset)

   Check the transition point and the gradient of the adaptation characteristic at I_q = 30 %, 20 %, 10 %.

   Step response?
   OK: P1181 is correct
   Not OK: Increase/decrease P1181
   —> Objective: Well dampened transient response (refer to Fig. 4-11, right)

Note

The reference for the current setpoint (amplitude and offset) refer to the power module transistor current (P1107, units: A(pk), peak value).

Example:
P1107 = 50 A(pk) —> 50 A/$\sqrt{2} \approx$ 36 A(rms) —> 50 % $\doteq$ 18 A
—> 10 % $\doteq$ 3.6 A, etc.

4

Parameter overview

The following parameters are used for the current controller adaptation:

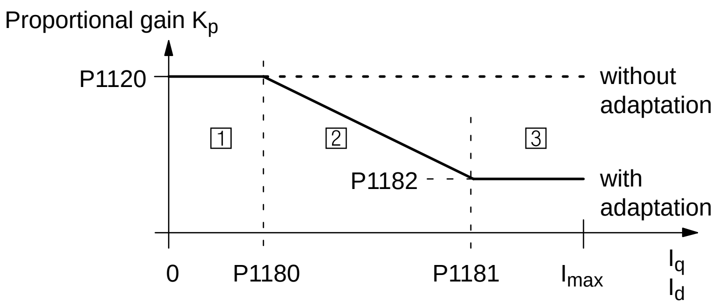
Table 4-8 Parameter overview for the current controller adaptation

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1180	Lower current limit adaptation (SRM, SLM)	0.0	0.0	100.0	%	Immediately
1181	Upper current limit adaptation (SRM, SLM)	0.0	100.0	100.0	%	Immediately
1182	Factor, current controller adaptation (SRM, SLM)	1.0	100.0	100.0	%	Immediately

The P gain of the current control (K_P, P1120) can be reduced, depending on the current, using the controller adaptation.

The adaptation characteristic is defined using P1180, P1181 and P1182.
The following value pairs are obtained:

- First value pair: P1180 / 100 %
- Second value pair: P1181 / P1182



$\boxed{1}$ Constant lower current range: I_q or I_d < P1180

$\boxed{2}$ Adaptation range: P1180 < I_q or I_d < P1181

$\boxed{3}$ Constant upper range: I_q or I_d > P1181

Note:

P1180, P1181: Percentage values referred to P1104 (max. motor current)

P1182: Percentage value referred to P1120 (P gain, current controller)

The following applies: P1180 (lower current limit adaptation) < P1181 (upper current limit adaptation)

4.8.4 Parameters for PE spindles

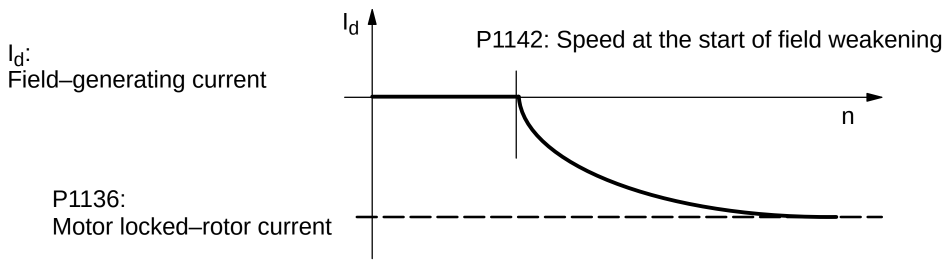
Parameter overview

The following parameters are used for permanent–magnet spindles (PE spindles):

Table 4-9 Parameter overview for PE spindles

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1015	Activate PE–MSD (SRM)	0	0	1	–	PO
	... the permanent–magnet spindle (PE spindle, 1FE1 motor) is activated/deactivated for this drive. = 1 Permanent–magnet spindle is activated = 0 Permanent–magnet spindle is de–activated					
1128	Optimum load angle (SRM)	90.0	90.0	135.0	Degrees	Immedi-ately
	For synchronous motors that have rotors that are not symmetrical around the rotational axis, the additional reluctance torque can be used to increase the torque. The optimum load angle specifies at which load angle the torque reaches a maximum value at 150 % rated current. Note: Refer to P1149 (reluctance torque constant) Synchronous motors without rotors that are symmetrical around their rotational axis: e.g. 1FE motors • Operation with reluctance torque: P1128 and P1149 not equal to the standard value • Operation without reluctance torque: P1128 and P1149 equal to the standard value					
1136	Motor short–circuit current	0.0	0.0	500.0	A(rms)	Immedi-ately
	The parameter is set by selecting the motor from the motor list or according to the data sheet of the motor manufacturer. If the motor manufacturer has no data, then the motor locked–rotor current can be calculated according to the following formula: P1136 = (P1114 • 60 [sec]) / (1000 • $\sqrt{3}$ • P1112 • P1116 • 2π) **Note:** P1112 Motor pole pair number P1114 Voltage constant P1116 Armature inductance **Note:** For PE spindles, the maximum motor short–circuit current (no–load current) has an effect on the high motor speeds. This means, if the power module rating is too low, then the maximum speed will not be reached. Otherwise, the functionality is not restricted.					

Table 4-9 Parameter overview for PE spindles, continued

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1142	Speed at the start of field weakening (SRM, ARM)	0.0	0.0	100 000.0	RPM	Immedi-ately
	The speed at the start of field weakening is assigned when selecting the motor from the motor list, or according to the motor manufacturer's data sheet. If the motor manufacturer has no data, then the speed at the start of field weakening can be calculated according to the following formula: P1142 = 380 V • 1000 [RPM] / P1114 **Note:** P1114 Voltage constant  					
1145	Stall (standstill) torque reduction factor	5.0	100.0	1000.0	%	Immedi-ately
1149	Reluctance torque constant (SRM)	0.0	0.0	300.0	mH	Immedi-ately
	For synchronous motors that have rotors that are not symmetrical around the rotational axis, the additional reluctance torque can be used to increase the torque. The reluctance torque constant multiplied by the torque and field–generating current provides the torque increased as a result of the reluctance torque. Note: Refer to P1128 (optimum load angle) Synchronous motors that have rotors that are not symmetrical around the rotational axis: e.g. 1FE motors • Operation with reluctance torque: P1128 and P1149 not equal to the standard value • Operation without reluctance torque: P1128 and P1149 equal to the standard value					

4.9 1FW6 build–in torque motors (from SW 6.1)

4.9.1 Description

What is a permanent–magnet synchronous motor with field weakening?

Build–in torque motors are liquid–cooled, slow–speed (high pole number), permanent–magnet three–phase synchronous motors with hollow–shaft rotors. The motors are supplied as build–in components which are kept together, when shipped, using an assembly unit. In addition, a bearing and a rotary encoder are required for a complete drive unit.

The stator and the rotor have flanges at both ends with centering surfaces and tapped holes which allow them to be integrated into a machine.

Advantages

The motors distinguish themselves as follows:

- Extremely high power density
- High torque with a compact design and low envelope dimensions
- Wide range of types
- High overload capability (factor 1.8 ... 2.0)
- Low moment of inertia
- High degree of availability as there are no gearbox components in the mechanical drive transmission line which are subject to wear
- Cable and cooling connections, either radial or axial
- Water cooling to increase the rated power
- Directly flanged to the machine

Reader's note

Detailed information on 1FW6 motors and to engineer and mount build–in torque motors is provided in:

Reference: /PJTM/ Configuration Manual
1FW6 Build–in Torque Motors
Manufacturers documentation

Components of build–in torque motors

Generally, a build–in torque motor comprises the following components:

- Stator
  This comprises an iron core and a three–phase winding. The winding is cast in polyurethane in order to better dissipate the power losses. The motor can be force–cooled using a liquid heat exchanger (main heat exchanger) around its circumference.
- Rotor
  This is the reaction part of the motor. It comprises a cylindrical hollow steel shaft which has permanent magnets around its circumference.
- Cooling
  The cooling version depends on the outer diameter.
- Encoder system
  - Absolute incremental encoder with EnDat
    (e.g. RCN 723, Heidenhain)
  - Incremental encoder ($1V_{pp}$)
    (e.g. RON 786, Heidenhain)
  - Min. encoder pulse number z_{min} = 2048
  - Max. encoder pulse number z_{max} = 65535

System prerequisites

The prerequisites are as follows:

- Control board
  SIMODRIVE 611 universal (encoder interpolation depends on the number of pulses of the incremental encoder)
- Build–in torque motors should be set–up as feed motors
- Maximum motor cable length = 50 m

Note

When build–in torque motors (direct drives) are connected to controlled infeeds, an HFD commutating reactor with the appropriate resistance must be used as otherwise electrical system oscillations could occur.

When engineering the HFD commutating reactor with resistor, refer to:

Reference: /PJU/ SIMODRIVE 611
Configuration Manual
Manufacturers Documentation

4.9.2 Commissioning 1FW6 motors

General information on commissioning 1FW6 motors

The following questions must be positively answered before commissioning 1FE1 motors:

- Are all of the prerequisites for commissioning checked and were the points in the checklist for commissioning checked (refer to Chapter 4.1)?
- Is the motor used a standard or an unlisted motor?
  - Standard motor?

    In the Catalog, the motor is listed as a permanent–magnet synchronous motor without field weakening and has an assigned motor code (refer to Chapter A.3.3)?

    When commissioning, the motor used is selected from a list.
  - Unlisted motor?

    The motor is not included in the list of permanent–magnet synchronous motor without field weakening and also does not have a motor code (refer to Chapter A.3.3)?

    When commissioning, the data of the motor used must be available and must be manually entered.

    The necessary data is listed in the table under the index entry ”Unlisted motor – parameters for 1FW6 motor”.
- Are the motor and encoder already mounted and ready to be powered up?

Commissioning 1FW6 motors with SimoCom U

1FW6 motors are commissioned as follows using the SimoCom U parameterizing and start–up tool:

Reader’s note

Also refer to commissioning 1FE1 motors with SimoCom U in Chapter 4.8.2.

Additional commissioning information/ instructions to optimize the motor

For 1FW6 torque motors, the commutation required for synchronous motors can be automatically set using the software–based rotor position identification technique.

The following two techniques can be applied for all frame sizes of 1FW6 torque motors:

- Saturation–based technique (from SW 5.1)
  - This technique can also be used to determine the angular commutation offset once in conjunction with an absolute measuring system (e.g. RCN 723 from Heidenhain).
  - This technique may only be used for horizontal axes that are free to move and are not braked (stiction < 10 % of the rated motor torque).
  - When this technique is applied, under worst case condition, the rotor can move in the range of ± 5 degrees.
- Motion–based technique (from SW 6.1)
  - This technique does not cause the rotor to move which means that it can also be used for axes which are locked (e.g. using a brake).
  - Depending on the actual mechanical design, this can result in a higher noise level when the axis is powered–up during the identification routine.

The measuring system must be very stiffly mounted if this technique is used.

4.9.3 Thermal motor protection

1FW6 stators are equipped with the two following temperature monitoring circuits to protect the stator against inadmissibly high thermal stressing as well as to monitor the temperature during the commissioning phase and in operation:

- 2 x Temp–S (one switching threshold at 130°C and another at 150°C)
- 1 x Temp–F

Reader’s note

Detailed information on how to connect and evaluate the temperature monitoring circuits is provided in:

Reference: /PJTM/ Configuration Manual
1FW6 Build–in Torque Motors
Manufacturers documentation

4.10 Linear motors (1FN1, 1FN3 motors)

4.10.1 General information on commissioning linear motors

General information on commissioning linear motors

Before commissioning motors, the following questions must be answered:

- Are all of the prerequisites for commissioning checked and were the points in the checklist for commissioning checked (refer to Chapter 4.1)?
- Is there a control board with sin/cos 1 Vpp (refer to Chapter 1.3)?

Reader's note

Detailed information on linear motors, encoders and power connection, configuring and mounting are provided in:

Reference: /PJLM/ Configuration Manual
1FN1, 1FN3 Linear Motors
Manufacturers/Service Documentation

Checks in the no–current state

The following checks can be made:

1. linear motors
   - – Which linear motor is being used?
   - – Is the motor in the list (refer to Chapter A.3.4)?

     Yes Which? 1FN _ _ _ _ – _ _ _ _ _ _ – _ _ _ _

     No Is the data of the "unlisted" linear motor available? (refer under the index entry "Unlisted motor – Parameters for SLM")
   - – Is the motor already mounted and ready to be powered up?
   - – If a cooling circuit is being used, is it functional?

2. Mechanical system
   - Is the axis easy to move over the complete traversing range?
   - Does the air gap between the primary and secondary section and the mounting dimensions correspond to the motor manufacturer's data (refer to Chapter 4.10.4)?
   - Suspended/hanging axis:
     If weight equalization is being used for the axis, is this functional?
   - Brake:
     If a brake is being used, is it correctly controlled?
   - Traversing range limiting:
     Are the mechanical end stops available and tightly bolted to both ends of the traversing path?
   - Are the moving feeder cables correctly routed in a cable drag assembly?
3. Measuring system (refer to Chapter 4.10.6)
   - Which measuring system is being used? _ _ _ _ _ _ _ _ _ _ _ _ _

     Absolute or incremental abs ☐ incr ☐

     Grid spacing _ _ _ _ _ _ _ _ _ _ _ µm

     Zero marks (number and position) _ _ _ _ _ _ _ _ _ _ _ _ _
   - Which is the positive drive direction? (refer to Chapter 4.10.6)
     Which is the positive counting direction of the measuring system?

     Invert (P1011.0)? yes ☐ no ☐
4. Connecting–up
   - Power module (connect UVW, phase sequence, clockwise rotating field)
   - Protective conductor connected?
   - Screen connected?
   - Temperature monitoring circuits:
     Are the cables connected to the terminal block of the screen connecting plate?

     —> Temperature sensor (Temp–F):
     The average absolute winding temperature can be measured using the temperature sensor (Temp–F).

     —> Overtemperature switch (Temp–S)
     The individual motor phase windings can be digitally monitored for overtemperature using the overtemperature trip circuit (Temp–S).

Danger

The circuits of Temp–F and Temp–S neither have ”protective separation” between each other nor to the power circuits in accordance with VDE 0160/EN 50178.

This is the reason that they may not be considered as SELV/PELV circuit nor may they be connected with such circuits. Also refer to

Reference: /PJLM/ Configuration Manual
1FN1, 1FN3 Linear Motors
Section ”General information on the connection system (CON)”

– Temperature sensor evaluation (refer to Chapter 4.10.5)

Reader’s note

Section ”General information on the connection system (CON)” in:

Reference: /PJLM/ Configuration Manual,
1FN1, 1FN3 Linear Motors

5. Measuring system cable
   Is the measuring system cable inserted at X411/X412 or at the adapter connector of the temperature sensor coupling cable?

Danger

Presently, the connection does not correspond to ”protective separation” according to VDE 0160/EN 50178.

This is the reason that they may not be considered as SELV/PELV circuit nor may they be connected with such circuits. Also refer to

Reference: /PJLM/ Configuration Manual
1FN1, 1FN3 Linear Motors
Section ”General information on the connection system (CON)”

4.10.2 Commissioning: Linear motor with one primary section

Procedure when commissioning using SimoCom U

Linear motors with a primary section (single motor) should be commissioned as follows using the parameterizing and start–up tool:

Warning

The pulse enable (terminal 663) must be switched–out (de–energized) for safety reasons before the drive is powered–up.

---

1. Establish online operation

   Operator action: e.g. with ”Commissioning – search for online drives”

2. Configure the drive

   Generally, the following is valid:
   You can reach the next or the previous dialog box by pressing ”next” or ”back”.

   – ”Drive name” dialog box

   – ”Power module” dialog box (only if it is not automatically identified)

   – ”Motor selection” dialog box:

   Is the linear motor included in the list of linear motors?

”Motor” field –> Standard motor	”Motor type” field –> 1FNx (linear)

   The linear motor is not included in the list of linear motors?
   —>Unlisted motor

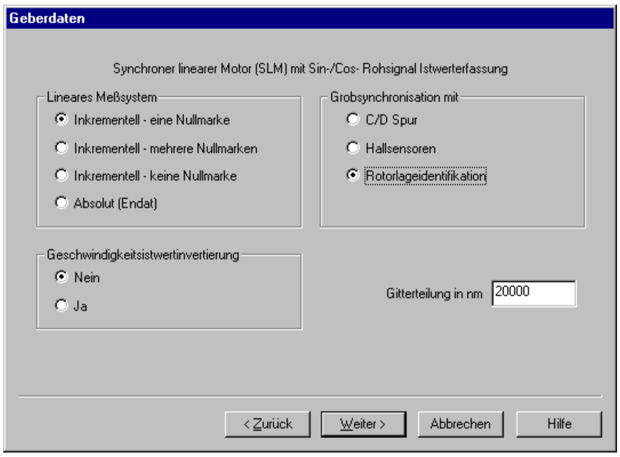
”Motor” field –> Enter data	”Motor type” field –> Linear motor (SLM)

   The motor data should be entered after ”continue”.

– ”Measuring system/encoder” dialog box

Field
”Which motor measuring system are you using?” –> Enter data

The encoder data should be entered after ”continue”.



”Linear measuring system” field

Incremental – a zero mark
There is an incremental measuring system with 1 zero mark in the traversing range.

Incremental – several zero marks
An incremental measuring system is used with several zero marks in the traversing range.

Incremental – no zero mark
An incremental measuring system is used without any zero marks in the traversing range.

Absolute (EnDat)
An absolute measuring system (EnDat) is used.

Speed actual value inversion
The inversion must be set, as was already determined under ”Check in the no–current status”.

Grid spacing
The grid spacing should be set as was already entered in the ”check in the no–current status” point.

Rotor position identification yes
(only for incremental measuring systems)

– ”Operating mode” dialog box

– ”Complete the drive configuration” dialog box

After the data that has been set has been carefully checked, the drive configuration is completed by pressing ”Accept this drive configuration”.

3. Fixed temperature?

   If the temperature monitoring is realized through a PLC and not through the drive (refer to case c), then for the temperature sensor evaluation, refer to Chapter 4.10.5), the monitoring function must be disabled by specifying a fixed temperature > 0.

   – P1608 (fixed temperature) = e.g. 80 °C Monitoring off

   – P1608 (fixed temperature) = 0 °C Monitoring on

4. Reduce the maximum motor current for safety reasons

   – P1105 (maximum motor current) = e.g. enter 20 %

Danger

Linear drives can achieve significantly higher rates of acceleration and velocities than conventional drives.

The traversing range must always be kept clear in order to avoid any potential danger for man or machine.

---

5. Determine the angular commutation offset

   The angular commutation offset is determined as follows:

   a) Select the identification technique using P1075. Possibly adapt other machine data for the rotor position identification routine.

   b) Save the parameters and carry–out a POWER ON RESET.

   c) Depending on the measuring system used, proceed as follows:

For an incremental measuring system:

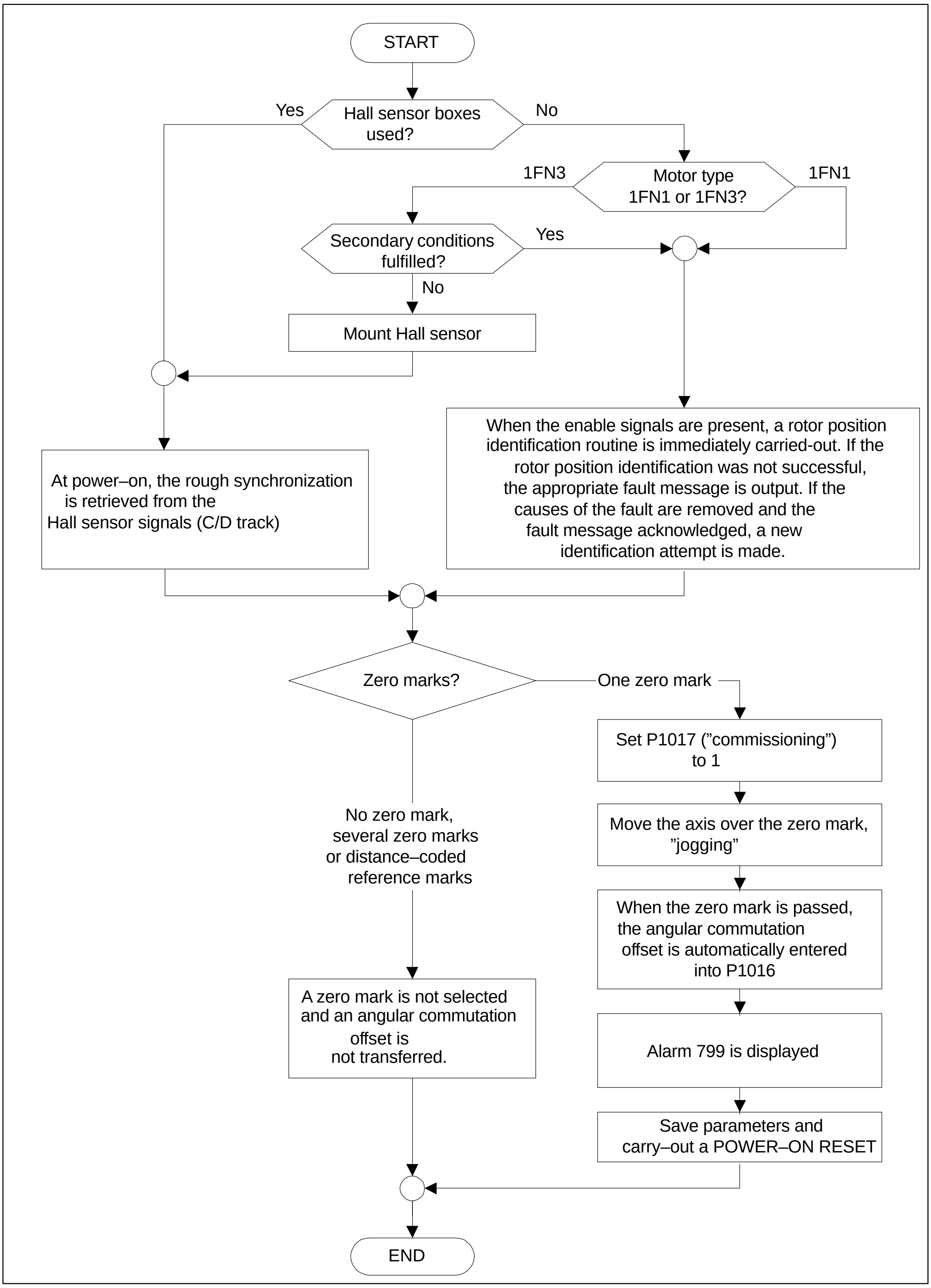


Fig. 4-12 Incremental measuring system

For an absolute measuring system:

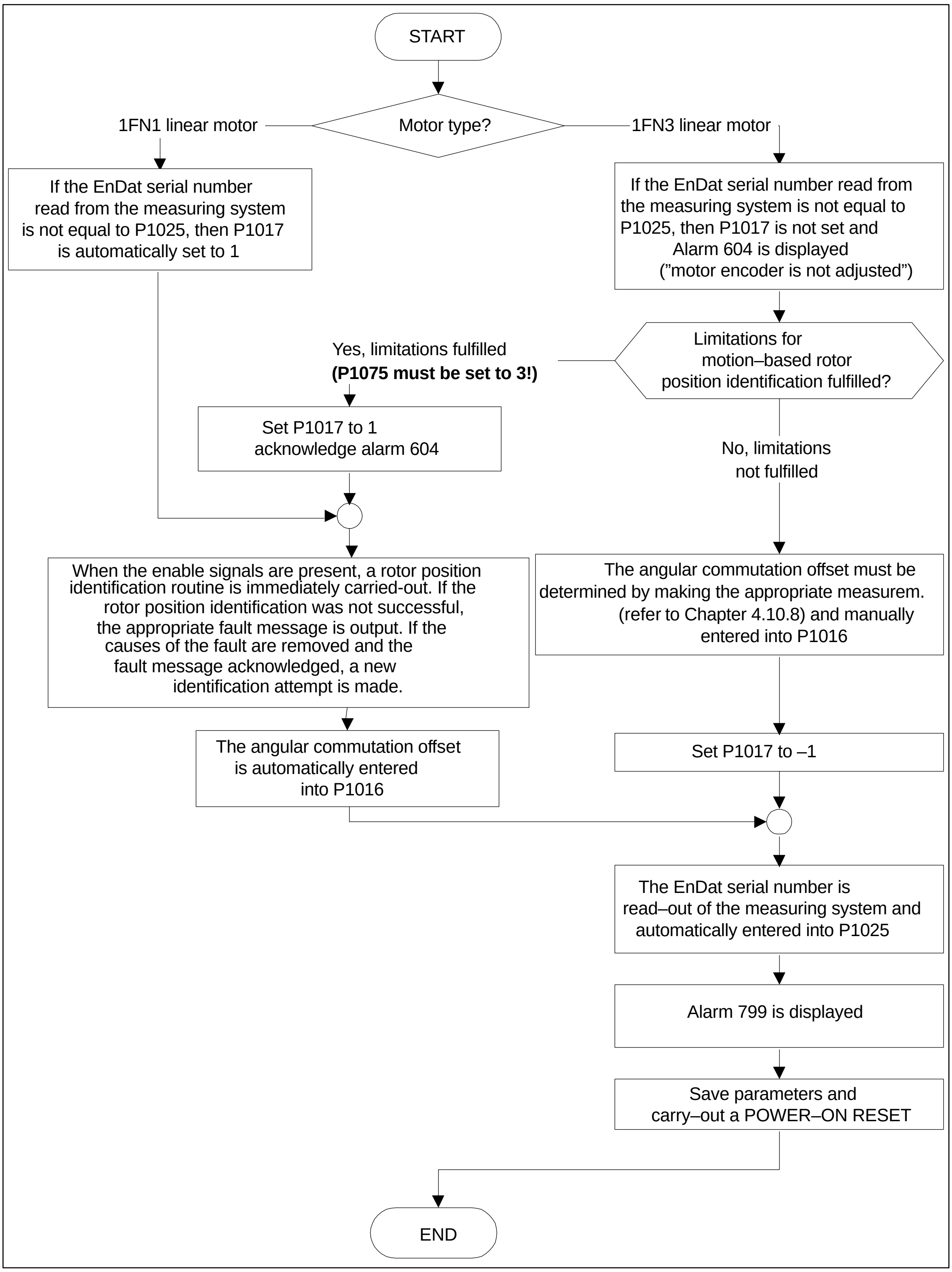


Fig. 4-13 Absolute measuring system

For a distance–coded measuring system:

”SIMODRIVE 611 universal” from SW 8.3 supports this measuring system. Just the same as for incremental measuring systems, several zero marks must be selected.

Note

For unlisted motors, a rotor position identification routine to determine the angular commutation offset cannot be guaranteed. Depending on the motor design, the following can be possibly used for both measuring systems:

- The technique based on saturation,
- The technique based on motion,
- For an absolute measuring system: The angular commutation offset is determined by making the appropriate measurements (refer to Chapter 4.10.8).

When commissioning has been completed, it is absolutely necessary that the angular commutation offset is carefully checked again by making the appropriate measurements. This is independent of whether it involves an unlisted or SIEMENS motor!

---

6. Traverse the axis and check that it is functioning correctly
   – Traversing in the closed–loop speed controlled mode

     When a speed setpoint is entered, does the axis traverse correctly?
     Yes Set the rotor position identification (Point 10.)
     No longer reduce the maximum current
     (set P1105 to 100 %)
     Optimize the current and speed controllers
     (refer to Chapter 6.1.4)
     If a higher–level closed–loop position control is used, after these points have been executed, the linear motor has been commissioned, otherwise after ”yes” immediately proceed with the next point.

     No Resolve the problem (refer to Chapter7.3.2)
     If fault 608 (speed controller output limited)
     is displayed
     —> Invert the speed actual value (change P1011.0)

   – Traversing in the positioning mode

     Does the axis traverse with a positive velocity setpoint in the required direction?
     Yes OK
     No Change P0232 (position reference value inversion)

     Is the traversing path OK (10 mm is specified —> 10 mm traversing path)?

7. Set or carry–out referencing/adjusting
   – Increm. measuring system: Referencing (refer to Chap. 6.2.5)
   – Absolute measuring system: Adjust (refer to Chapter 6.2.7)

8. Set the setpoint limit switch
   – P0314, P0315 and P0316
     (refer under the index entry ”Software limit switch”)
9. Optimizing the axis controller settings

   Note:
   Generally, the automatic controller setting for linear motors does not provide adequate results, as the measuring system mounting plays a significant role in the closed–loop control characteristics.

   – Current and speed controllers (refer to Chapter 6.1.4)
   – Position controller (refer under the index entry ”Kv factor”)

10. Check and set the rotor position identification

    To check the rotor position identification, using a test function, you can determine the difference between the calculated rotor angle position and that actually used by the closed–loop control. Proceed as follows:

    – Start the test function several times and evaluate the difference
      Start Set P1736 (test rotor position identification) to 1
      Difference P1737 (difference, rotor position identification)

      = _ _ _ _ , _ _ _ _ , _ _ _ _ , _ _ _ _ , _ _ _ _

    – Is the spread of the measured values less than 10 degrees electrical?
      Yes: OK
      No: Increase P1019 (e.g. by 10 %)
      and repeat the measurements

      If OK after having repeated the measurements, then the angular commutation offset can be re–determined:

      For an incremental measuring system
      (incremental – one zero mark):
      as for Point 5. (determining the angular commutation offset)

      For an absolute measuring system:
      Power–down the drive (POWER ON–RESET)
      Power–up the drive with the pulse or controller enable signals switched–out
      Set P1017.0 to 1
      Switch–in the pulse and enable signals
      —> The angular offset is automatically entered into P1016
      —> Fault 799
      (Save to FEPROM and HW–RESET required)
      is displayed
      Save to FEPROM and carry–out a HW–RESET

      For incremental measuring system
      (incremental – no or several zero marks):
      Save to FEPROM and carry–out a HW RESET

4.10.3 Commissioning: Linear motor with 2 identical primary sections

General information

If it is certain that the EMF of both motors have the same relative phase position to one another, the connecting cables can be connected in parallel and operated from one drive.

Linear motors, which are connected in parallel, are commissioned, based on the commissioning of a single linear motor.

First, only one linear motor (motor 1) is connected to the drive, and is commissioned as individual motor (1FNx ...). The angular commutation offset is automatically determined and noted.

Instead of motor 1, motor 2 is connected and is commissioned as individual motor. Also here, the angular commutation offset is automatically determined and noted.

If the difference between the angular commutation offset of motor 1 and motor 2 is less than 10 degrees electrical, both motors can be connected in parallel to the drive and commissioned as a parallel circuit configuration of 2 linear motors (e.g. 2 • 1FN1xxx).

Procedure for commissioning linear motors connected in parallel

Linear motors connected in parallel are commissioned as follows:

1. Disconnect the parallel circuit

   Only connect motor 1 to the power module.

2. Commission motor 1 as a single motor

   —> Observe the information/data in Chapter 4.10.1

   —> Commission as described in Chapter 4.10.2 (up to and including Point 5.)

   —> Check and set the rotor position identification (refer to Chapter 4.10.2, Point 10.)

3. Traverse the axis and check that it is functioning correctly

4. Note the angular commutation offset of motor 1

   – P1016 (motor 1) = _ _ _ _ _ _ _ _ _ degrees electrical

5. Power–down and wait until the DC link has been discharged

6. Instead of motor 1, connect motor 2 to the power module

   Important:
   For a Janus configuration (refer to Chapter 4.10.7) interchange phases U and V.

7. Power–up with the pulse and controller enable signals switched out

4

8. Determine the angular commutation offset of motor 2

   For an incremental measuring system:
   as for Chapter 4.10.2, Point 5. (determining the angular commutation offset)

   For an absolute measuring system:
   Power–down the drive (POWER ON–RESET)
   Power–up the drive with the pulse or controller enable signals switched–out
   Set P1017.0 to 1
   Switch–in the pulse and enable signals
   —> The angular offset is automatically entered into P1016
   —> Fault 799
   (Save to FEPROM and HW–RESET required)
   is displayed
   Save to FEPROM and carry–out a HW–RESET

9. Traverse the axis and check that it is functioning correctly

10. Note the angular commutation offset of motor 2

    – P1016 (motor 2) = _ _ _ _ _ _ _ _ degrees electrical

11. Deviation between Point 4. (motor 1) and Point 10. (motor 2)

    if $\leq$ 10 degrees—> OK

    If > 10 degrees
    —> Check and correct the mechanical arrangement
    (refer to Chapter 4.10.4 and 4.10.7)
    or
    —> Carry–out a check by making the appropriate measurements
    (refer to Chapter 4.10.8)

12. Delete the drive configuration

    Operator action: ”Options – Service – Delete drive configuration”

13. Power–down and wait until the DC link has been discharged

14. Connect the 2 linear motors in parallel again

    Connect both of the motors back to the power module.

15. Power–up with the pulse and controller enable signals switched out

16. Commission the linear motors connected in parallel

    – Work completely through Chapter 4.10.2
    – In the ”motor selection” dialog box, select the motor connected in parallel (2 • 1FNx ...)
      or
      enter the data of the unlisted motor connected in parallel (refer under the index entry ”unlisted motor – parameters for SLM”)

17. Compare the angular commutation offset between motors 1 and 2

P1016 (motor 1, refer to Point 4.) = _ _ _ _ _
P1016 (motor 2, refer to Point 10.) = _ _ _ _ _

if the difference $\leq$ 10 degrees OK

if the difference $>$ 10 degrees not OK

Check and correct the motor cable connection at the power module and determine the angular commutation offset.

For an incremental measuring system:
as for Chapter 4.10.2, Point 5. (determining the angular commutation offset)

For an absolute measuring system:
Power–down the drive (POWER ON–RESET)
Power–up the drive with the pulse or controller enable signals switched–out
Set P1017.0 to 1
Switch–in the pulse and enable signals
—> The angular offset is automatically entered into P1016
—> Fault 799 (Save to FEPROM and HW–RESET required) is displayed
Save to FEPROM and carry–out a HW–RESET

4.10.4 Mechanical system

The mounting dimensions can be checked before mounting the motor, e.g. using the final dimensions and feeler gauges.

The mounting dimensions must lie within the specified tolerance bandwidth over the complete traversing distance.

Note

The valid mounting dimensions can be taken from the following literature:

- **Reference:** //PJLM/ Configuration Manual 1FN1, 1FN3 Linear Motors
- The data sheet of the appropriate motor

For mounting dimension and air gap, the following applies:
Only the mounting dimension is decisive and not the air gap which can be measured, when it comes to maintaining the electrical and system–related characteristics of the linear motor. The air gap must be large enough so that the motor can freely move.

Checking the mounting dimensions and air gap 1FN1

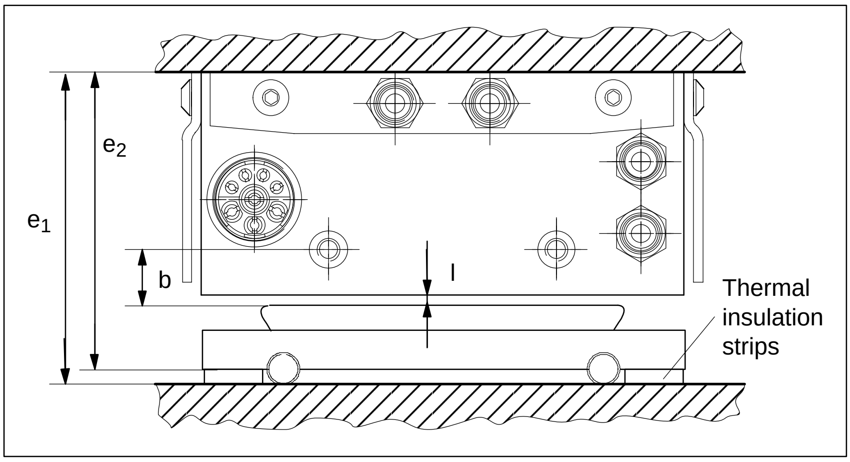


Fig. 4-14 Important dimensions when mounting 1FN1 motors

Table 4-10 Important mounting dimensions and air gap for 1FN1 motors

Linear motors	1FN1 ...	
Important dimension to be checked	**1FN1 07□**	**1FN1 12□ 1FN1 18□ 1FN1 24□**
Mounting dimension e_1 [mm]	80.7 ± 0.3	106.7 ± 0.3
Mounting dimension e_2 [mm] (without thermal insulating strips)	76.7 ± 0.3	101.7 ± 0.3
Measurable air gap l [mm] (without taking into account the mounting dimension tolerance)	$1.1\ ^{+0.3}/_{-0.45}$	$1.1\ ^{+0.3}/_{-0.45}$
Clearance b [mm] (without taking into account the mounting dimension tolerance)	13 ± 1	13 ± 1

Checking the mounting dimensions 1FN3

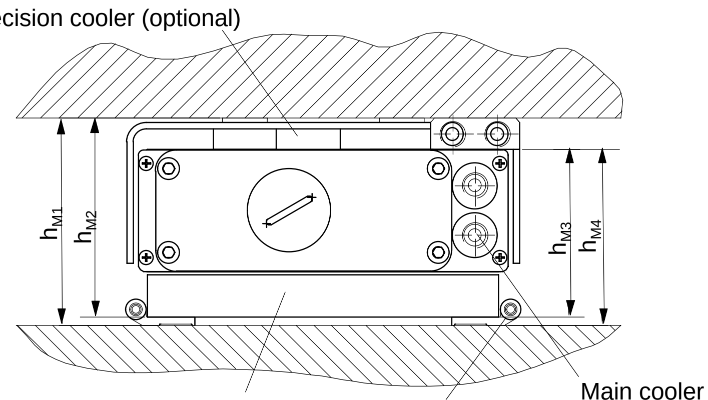


Fig. 4-15 Important dimensions when mounting the motor

Table 4-11 Important dimensions, motor mounting

Motor frame size	Mounting tolerance	Nominal air gap with secondary cover	Nominal air gap without secondary cover	Mounting dimension with precision and secondary section	Mounting dimension with precision cooler without secondary section cooler	Mounting dimension without precision and secondary section	Mounting dimension without precision cooler with secondary section cooler
	[mm]	[mm]	[mm]	h_{M1} [mm]	h_{M2} [mm]	h_{M3} [mm]	h_{M4} [mm]
1FN3 050– ... 1FN3 100– ...	± 0.3	0.9	1.3	63.4	60.4	48.5	51.5
1FN3 150– ...	± 0.3	0.9	1.3	65.4	62.4	50.5	53.5
1FN3 300– ...	± 0.3	0.9	1.3	79.0	76.0	64.1	67.1
1FN3 450– ...	± 0.3	0.9	1.3	81.0	78.0	66.1	69.1
1FN3 600– ...	± 0.3	0.9	1.3	86.0	76.0	64.1	67.1
1FN3 900– ...	± 0.3	0.9	1.3	88.0	78.0	66.1	69.1

Checking the air gap

After mounting the motor components, the air gap between the primary and secondary sections can be optionally checked. Generally, this is not necessary. If the mounting dimensions are correct, the correct air gap is automatically obtained. If, after mounting, the air gap does not match the data in Table 4-11, either the motor has been incorrectly mounted, or the specified motor dimensions were not maintained when the motor was produced.

4.10.5 Thermal motor protection

Description

Two independent monitoring circuits are available for the 1FN1, 1FN3 primary sections for thermal motor protection.

The absolute, average winding temperature can be measured using the temperature sensor (Temp–F) comprising a temperature sensor (KTY 84).

The overtemperature shutdown circuit (Temp–S) allows each individual motor phase winding to be digitally monitored for an overtemperature condition.

The two independent temperature circuits Temp–F and Temp–S can be used for motor protection, either individually or together. At least one Temp_S must be used for the motor overtemperature protection.

The circuit and connection system for Temp–F and Temp–S are described in detail in:

Reader's note

Section "General information on the connection system (CON)" in:

Reference: /PJLM/ Configuration Manual,
1FN1, 1FN3 Linear Motors

Danger

The circuits of Temp–F and Temp–S neither have "protective separation" between each other nor to the power circuits in accordance with VDE 0160/EN 50178.

Thus, they may not be used as SELV/PELV circuits, or connected with these. Also refer to the literature reference mentioned above!

Note

Temp–S must be connected for thermal motor protection; it is not permissible not to connect Temp–S!

Temp–F can be optionally connected to a measuring device for commissioning and testing.

For regular operation, the Temp–F connections should be short–circuited and connected to PE.

Temperature sensor Temp–F

The resistance change is proportional to the winding temperature change.

Resistance when cold (20 °C): approx. 580 Ohm

Resistance when hot (100 °C): approx. 1000 Ohm

Response temp.:

1FN1:
Pre–warning at 120 °C
Trip at 155 °C ± 5 °C
(standard setting)

1FN3:
Pre–warning at 100... 110°C (depending on the machine type)
Trip at120 °C ± 5 °C

4

Warning

- If the user carries out an additional high–voltage check, the cable ends of the Temp–F should be short–circuited before the check! If the test voltage is connected to the temperature sensors, it will destroy them.
- When connecting–up Temp–F, please observe the polarity!

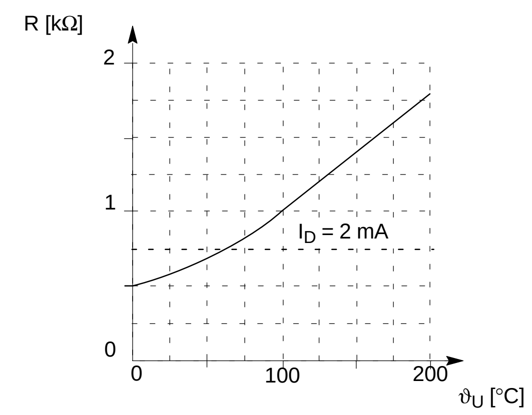


Fig. 4-16 Characteristic, temperature sensor (Temp–F)

Note

The temperature sensor (Temp–F) only evaluates the winding temperature of one phase in the primary section. However, the phases in the synchronous motor are loaded to different degrees depending on the particular load, so that in the worst case, the phases, not measured, have the higher temperatures.

Note

For protective separation, it is not permissible to connect Temp–F at the encoder connector X411/X412 of the SIMODRIVE power module without using a suitable protective module.

When handling and connecting Temp–F, it must be assumed, that when the drive is powered up, there are hazardous voltages at the terminals on the motor side and at the Temp–F connecting cable – this means that the drive must always be disconnected so that it is ensured that it really is in a no–voltage condition.

Temperature shutdown circuit Temp–S for 1FN1 (bimetallic NC contact – triplet)

The overtemperature shutdown circuit Temp–S has an NC contact for each motor phase winding. The NC contacts are connected in series.

Table 4-12 Shutdown and switch–in temperatures for the overtemperature shutdown circuit

	1FN1 07□, 1FN1 12□	**1FN1 18□, 1FN1 24□**
Shutdown temperature	130 °C	140 °C
Switch–in temperature	approx. 70 °C	approx. 70 °C
Tolerance, switch–in temperature	± 20 °C	± 20 °C
Tolerance, shutdown temperature	± 5 °C	± 5 °C

Temp–S can be connected to the PLC through a series resistor 20 Ω < R_V ≤ 100 Ω via a 3RN1013–1BW10 thermistor motor protection device.

The series resistor is required in the sensor circuit due to the short–circuit detection function which is integrated in the 3RN1013–1BW10 thermistor motor protection device. Several Temp–S circuits can be connected in series for each 3RN1013–1BW10 thermistor motor device. However, only one series resistor should be used for each 3RN1013–1BW10 thermistor motor protection device R_V.

Temperature shutdown circuit Temp–S for 1FN3 (PTC triplet)

Temperature shutdown circuit comprising PTC temperature sensors (PTC elements).

There is one PTC temperature sensor (PTC element) in each of the three phase windings (U, V and W). The PTC elements are connected in series. The characteristics of the PTC elements are in compliance with DIN VDE 0660 Part 303, DIN 44081 and DIN 44082.

Type:	PTC temperature resistor
Nominal response temp. (ϑ_{NAT})	120 °C ± 5 K
Triplet resistance when cold	
at T < ϑ_{NAT} –20 K:	min. 60 Ω (3 × 20 Ω) max. 750 Ω
Minimum triplet resistance when hot	
at T = ϑ_{NAT} –5 K:	min. 590 Ω (550 Ω + 2 × 20 Ω) max. 1650 Ω (3 × 550 Ω)
at T = ϑ_{NAT} +5 K:	min. 1370 Ω (1330 Ω + 2 × 20 Ω) max. 3990 Ω (3 × 1330 Ω)
at T = ϑ_{NAT} +15 K:	min. 4100 Ω (4000 Ω + 2 × 20 Ω) max. 12000 Ω (3 × 4000 Ω)

Temp–S can be connected to a PLC via a 3RN1013–1BW10 thermistor motor protection device. A max. of two Temp–S circuits can be connected in series for each 3RN1013–1BW10 thermistor motor protection device (total resistance when cold ≤ 1.5 kΩ).

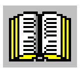
Note

For protective separation, it is not permissible to connect Temp–S to the PLC or at the encoder connector X411/X412 of the SIMODRIVE power module without using a 3RN1013–1BW10 thermistor motor protective device.

When handling and connecting Temp–F, it must be assumed, that when the drive is powered up, there are hazardous voltages at the terminals on the motor side and at the Temp–F connecting cable – this means that the drive must always be disconnected so that it is ensured that it really is in a no–voltage condition.

How are the temperature sensors evaluated?

Please refer to the following note for the reader



Reader's note

Section ”General information on the connection system (CON)” in:

Reference: /PJLM/ Configuration Manual,
1FN1, 1FN3 Linear Motors

4

4.10.6 Measuring system

Determining the control sense

The control sense of an axis is correct if the positive direction of the drive (= clockwise rotating field U, V, W) coincides with the positive counting direction of the measuring system.

Note

The data to determine the drive direction is only valid for Siemens motors (1FNx motors).
If the positive direction of the drive and positive counting direction of the measuring system **do not coincide**, then when commissioning, the speed actual value (P1011.0) must be inverted in the "measuring system/encoder" dialog box.
The control sense can also be checked by first parameterizing the drive, and then manually moving it, with the enable signals inhibited (switched out).
If the axis is pushed in the positive direction (refer to the definition in Fig. 4-17), then the velocity actual value must also count in the positive direction.

Determining the drive direction

The direction of the drive is positive if the primary section moves relative to the secondary section in the opposite direction to the cable outlet direction.

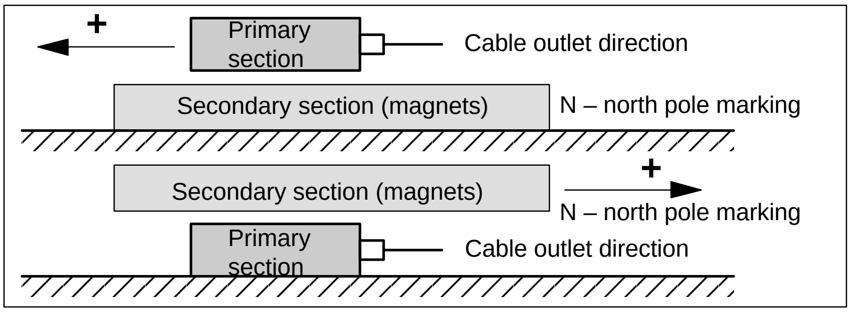


Fig. 4-17 Determining the positive direction of the drive

Determining the counting direction of the measuring system

The counting direction is determined depending on the measuring system itself.

- Measuring systems from the Heidenhain Company

Note

The counting direction of the measuring system is positive, if the distance between the sensor head and rating plate increases.

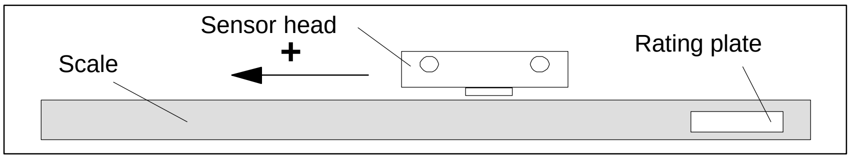


Fig. 4-18 Determining the counting direction for measuring systems from the Heidenhain Company

- Measuring systems from Renishaw (e.g. RGH22B)

The RGH22B measuring system from Renishaw (grid division = 20 µm) only has connections which are compatible to Heidenhain from serial number G69289 onwards. For earlier sensor heads, the zero mark cannot be evaluated.
As the reference mark for the Renishaw RGH22B has a direction–dependent position, with control cables BID and DIR, the encoder must be parameterized, so that the reference mark is only output in one direction.
The direction (positive/negative) depends on the geometrical arrangement at the machine and the reference point approach direction.

Table 4-13 Signal and pin assignments, signal marshaling

Signal	Cable color	Round connector, 12–pin	connected to	
			+5 V	0 V
BID	Black	Pin 9	Reference mark in both directions	Reference mark in one direction
DIR	Orange	Pin 7	Positive directions	Negative direction
+5 V	Brown	Pin 12		
0 V	White	Pin 10		

The counting direction of the measuring system is positive if the sensor head moves relative to the gold band in the cable outlet direction.

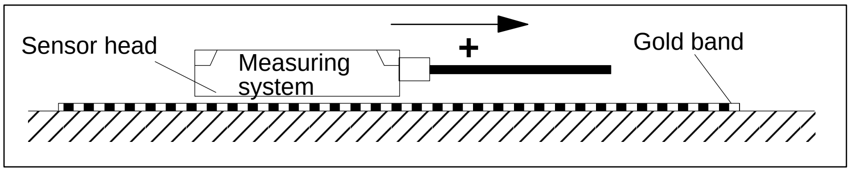


Fig. 4-19 Determining the counting direction for measuring systems from Renishaw

Note

If the sensor head is mechanically connected to the primary section, the cable outlet direction must be different. Otherwise, invert the actual value!

- Measuring systems from Zeiss (e.g. LIE 5)

Note

The positive counting direction of the linear measuring system from the Zeiss company should be determined just like the measuring system RGH22B from Renishaw (refer to Fig. 4-19).

Temperature sensor coupling cable

The temperature sensor coupling cable is used to couple the temperature sensor circuit Temp–F into the encoder cable using connector boxes. The transition from the power cable to encoder cable can be realized at the machine as well as in the cabinet.

How are the temperature sensor coupling cable and length measuring system connected?

Please refer to the following note for the reader

Reader's note

Section "General information on the connection system (CON)" in:

Reference: /PJLM/ Configuration Manual,
1FN1, 1FN3 Linear Motors

If an incremental measuring system is used, the drive is roughly synchronized using the rotor position identification.

Warning

When connecting–up the temperature monitoring circuits, carefully observe the specifications relating to protective separation DIN EN 50178.

Information on protective separation can be taken from:

Reference: /PJLM/ Configuration Manual,
1FN1, 1FN3 Linear Motors

4.10.7 Parallel and double–cam arrangement of linear motors

Note

Only identical linear motors (the same forces, winding types, secondary section types and air gap) may be connected in parallel. (Order designation or Order No. [[MLFB] of the primary sections to be connected in parallel must be identical up to the winding sense and/or primary section length.)

If linear motors in an axis are connected in parallel, the position of the primary sections with respect to one another and to the secondary sections must exhibit a specific grid, in order to achieve a matching electrical phase position.

Additional data, refer to:

Reference: PJLM/ SIMODRIVE
Configuration Manual, 1FN1, 1FN3
Linear Motors

Temperature sensor and electrical wiring (refer to Chapter 4.10.5)

The temperature sensors can be evaluated, for example, as follows:

- Temperature sensor
  - Motor 1: Evaluated by the drive
  - Motor 2: Not connected
    (short–circuited and connected with PE)
- Temperature switch
  - Motor 1 and 2: Evaluated by a PLC

Reader's note

Section "General information on the connection system (CON)" in:

Reference: /PJLM/ Configuration Manual,
1FN1, 1FN3 Linear Motors

Warning

When connecting–up the temperature monitoring circuits, carefully observe the specifications relating to protective separation DIN EN 50178.

Information on protective separation can be taken from:

Reference: /PJLM/ Configuration Manual, 1FN1, 1FN3
Linear Motors

4.10.8 Checking the linear motor by making measurements

Why make measurements?

If the linear motor was commissioned according to the relevant instructions, and unexplained fault/error messages still occur, then all of the signals must be checked using an oscilloscope.

Checking the phase sequence U–V–W

For primary sections connected in parallel,
the EMF_U from motor 1 must be in phase with the EMF_U from motor 2.
The same applies to EMF_V and EMF_W.
These must be checked using the appropriate measurements.

Procedure for making the necessary measurements:

- De–energize terminal 48 (NE module) and terminal 663 (drive).
- Important: Wait until the DC link has been discharged!
- Disconnect the power cables at the drive.
  If primary sections are connected in parallel, please disconnect.
- Form an artificial neutral point using 1 kOhm resistors.

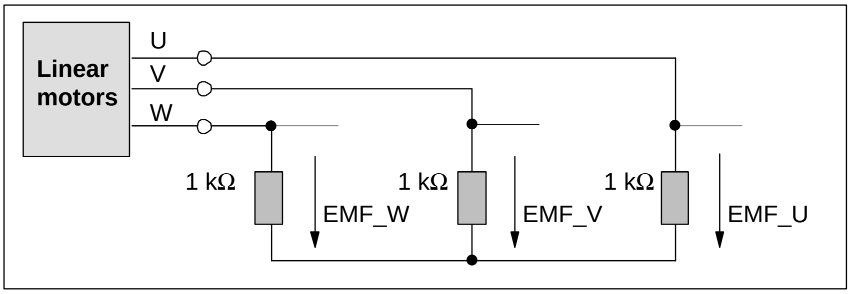


Fig. 4-20 Configuration for making the measurements

For a positive traversing direction, the phase sequence must be U–V–W. The direction of the drive is then positive if the primary section moves relative to the secondary section in the opposite direction to the cable outlet direction.

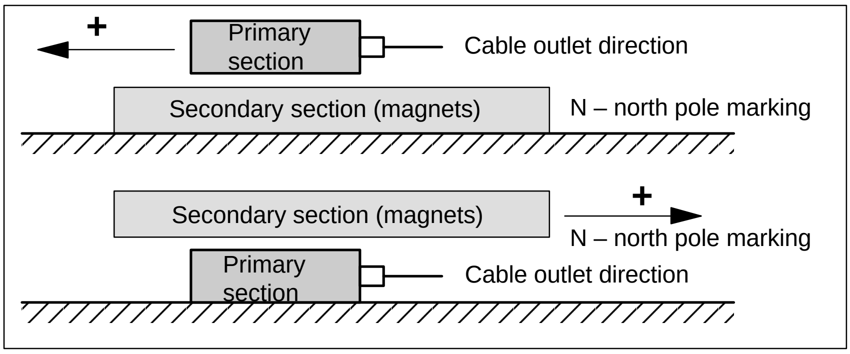


Fig. 4-21 The positive direction of the drive (clockwise rotating field)

4.11 Direct measuring system for position control (from SW 3.3)

Description

Alternative to the motor encoder (indirect measuring system, IM) in the ”positioning” operating mode, a direct measuring system (DM) can be used for closed–loop position control.

The direct measuring system for drive A, for a 2–axis control board, is connected to X412 (motor encoder, drive B). In this case, drive B must be de–activated.

After the direct measuring system has been activated, the drive evaluates both measuring systems as follows:

- Motor encoder, drive A (IM) at X411:
  —> for the closed–loop speed control of the axis
  —> for the coarse synchronization of the axis rotor position
- Direct measuring system (DM) for drive A at X412:
  —> for the closed–loop position control and ”precise” position sensing of axis A

Advantage:

The ”actual” position of the axis is sensed using a direct measuring system. Any play between the motor and table is corrected.

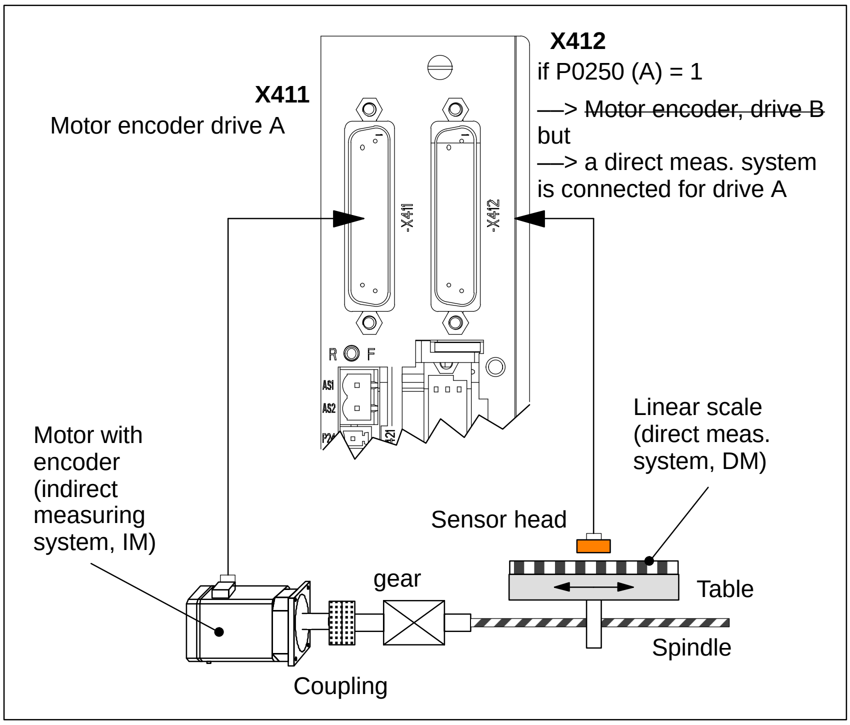


Fig. 4-22 Indirect and direct measuring system for drive A

Limitations and rules for a direct measuring system

The following limitations and rules apply:

1. The direct measuring system may only be directly connected at the load side without measuring gearbox.
2. Which combinations of power module and control board are possible for a direct measuring system?
   – 1–axis power module with 2–axis control board

     In this case, drive B is not available.

   – 2–axis power module with 2–axis control board

     Drive B is available.

     The following applies: Switch drive B into a passive state (P0700 (B) = 0)
3. Which encoder systems are available for the direct measuring system?

   Dependent on the 2–axis board with encoder for sin/cos 1 Vpp or for resolver, the following rotary or linear measuring systems can be connected at X412:

   – Incremental encoder with sin/cos 1 Vpp

   – Absolute value encoder with EnDat protocol

   – Resolver with any pole pair number
4. Process data for the direct measuring system

   The actual values of the position controller can be read via status word XistP.
5. The ”direct measuring system” function is activated with P0250 (A) = 1.

   The following applies:

   – This activation becomes effective after POWER ON

   – The direct measuring system must have been commissioned —> refer to ”commissioning the direct measuring system”

   – It is not permissible to operate drive A without a motor measuring system.

     —> The following must be valid: P1027.5 (A) = 0

   – The input terminal I0.B (fast input from drive B) can be assigned a function for the direct measuring system from drive A via P0672.

     e.g. the ”Equivalent zero mark” function (P0672=79) or ”flying measurement” (P0672=80)

6. Output the direct measuring system via the angular incremental encoder interface
   – Before SW 4.1 the following applies:

     The direct measuring system signals cannot be output via the angular incremental encoder interface.

     If the angular incremental encoder interface is switched as output (P0890 = 1), then the following is valid, independent of activating the direct measuring system (P0250 (A) = 0 or 1):

Interface		Output signals
Ang. incr. enc. interf.	(A)	Signals of the motor meas. system
Ang. incr. enc. interf.	(B)	No signals

   – The following applies from SW 4.1:

     The direct measuring system signals can be output via the angular incremental encoder interface. The angular incremental encoder interface as output becomes automatically active if P0890 is set to 1 for the motor measuring system AND the direct measuring system is activated (P0250 = 1). However, parameters P0892 and P0893 are not effective for the angular incremental encoder interface (B).

Interface		Output signals
Ang. incr. enc. interf.	(A)	Signals of the motor meas. system
Ang. incr. enc. interf.	(B)	Signals of the direct

7. Direction adaptation for direct measuring systems
   – P0231 Position act. value inversion
   – P0232 Position ref. value inversion
8. You can toggle between the indirect measuring system (IM) and the direct measuring system (DM) by changing P0250 and executing a POWER–ON RESET.
   – The parameters for the closed–loop position control are only available once and must also be appropriately adapted, e.g.:

P0231	Position act. value inversion
P0332	Position ref. value inversion
P0201	Backlash compensation

   – The parameters for the gearbox and spindle pitch are only available once and must be set for the indirect measuring system, e.g.:

P0236	Spindle pitch
P0237:8	Encoder revolutions
P0238:8	Load revolutions

   – The adjustment status for absolute value encoders is changed after changeover, i.e. P0175 is set to 0. A re–adjustment is required.
9. Which measuring system does the drive control use?

   —> refer to P1792 (active measuring system)

4

Commissioning the direct measuring system

The following should be observed when commissioning:

Prerequisites:

1. The direct measuring system must have been installed, connected at X412 and the system must be ready to be powered up.
2. The specified rules and limitations have been maintained.

Procedure:

1. Enter an encoder code for the direct measuring system

   The encoder code number is requested when first commissioning the system in the "Positioning" mode via P1036.

if	then
No DM	P1036 = 0
DM available	P1036 = 99 (unlisted encoder) and enter data (refer to Chapter A.4)

2. Activate the direct measuring system

   Set P0250 (A) to 1

3. Execute a POWER–ON RESET and check the function

Parameter overview (refer to Chapter A.1)

The following parameters are available for the indirect and direct measuring systems:

Table 4-14 Parameter overview for indirect and direct measuring systems

Indirect meas. system (IM[1]), motor encoder)		Direct measuring system (DM[2]))	
Parameters		Parameters	
No.	Name	No.	Name
0250	Activates the direct measuring system (only possible for drive A)	–	–
1005	IM encoder pulse number	1007	DM encoder pulse number
1006	IM encoder code number	1036	DM encoder code number
1008	IM encoder phase error correction	–	–
1011	IM configuration, actual value sensing	1030	DM configuration, actual value sensing
1018	IM pole pair number resolver	1040	DM pole pair number resolver
1021	IM multi–turn resolution, absolute value encoder	1031	DM multi–turn resolution, absolute value encoder
1022	IM single–turn resolution, absolute value encoder	1032	DM single–turn resolution, absolute value encoder
1023	IM diagnostics	1033	DM diagnostics
1024	IM grid division	1034	DM grid division
1025	IM serial number, low component	1038	DM serial number, low component
1026	IM serial number, high component	1039	DM serial number, high component
1027	IM configuration, encoder	1037	DM configuration, encoder

1) IM —> indirect measuring system (motor encoder)
2) DM —> direct measuring system (encoder 2)

4.12 Connecting induction motors with TTL encoder (from SW 8.1)

Description

Standard square–wave encoders (TTL) with differential signals according to RS422 and 5 V power supply voltage can be connected as pulse encoder for induction motors to the control board ”SIMODRIVE 611 universal HR” (Order No. 6SN1118–□NH01–0AA□).

The maximum encoder limiting frequency is 420 kHz.

Connection

Encoder connection	X411/X412
Pin assignment of the interface:	refer to Chapter 2.4
Encoder cable:	Users must assemble these themselves
Max. cable length:	50 m

Note

If an induction motor with TTL encoder is connected to ”SIMODRIVE 611 universal HR”, then it is not permissible that the angular incremental encoder interface is used as output.

Warning

If individual or several signals of the encoder are short–circuited or interrupted – under certain circumstances – it is possible that the encoder signal monitoring does **not** respond and the motor can move in an uncontrolled fashion.

Parameter overview (refer to Chapter A.1)

The following parameters are available for connecting an induction motor with TTL encoder:

- P1011 IM configuration, actual value sensing
- P1005 IM encoder pulse number
- P1027 IM configuration, encoder

■

Space for your notes

Communications via PROFIBUS DP

5

5.1 General information about PROFIBUS–DP for ”SIMODRIVE 611 universal”

General information

PROFIBUS DP is an international, open fieldbus standard, which is specified in the European Fieldbus Standard EN 50170 Part 2.

PROFIBUS DP is optimized for fast, data transfer at the field level for time–critical applications.

The fieldbus is used for cyclic and non–cyclic data transfer between a master and the slaves assigned to this master.

The following communication possibilities are available:

- **Cyclic communications**

  —> Setpoint, actual value transfer using process data (PZD communications)

  – According to the DP standard functionality

    For standard DP operation, a new cycle is started after the old cycle has been completed.
    —> refer to Chapter 5.2

  – Clock–cycle synchronous functionality

    For clock–cycle synchronous operation a new cycle is started with the set Tp clock cycle.
    —> refer to Chapter 5.2

  – Slave–to–slave communications

    Fast, distributed data transfer between drives (slaves) is possible using the ”slave–to–slave” communications function without involving the master.
    —> refer to Chapter 5.10

- **Non–cyclic communications**

  —> Access to the drive parameters

  – Parameterization using the ”SimoCom U” tool
    —> refer to Chapter 3.3

  – Data transfer using the SIMATIC Operation Panel (SIMATIC OP)
    —> refer to Chapter 5.3

  – PKW area in the net data structure according to PPOs
    —> refer to Chapter 5.6.7

  – Data exchange with the master (e.g. SIMATIC S7) and other control devices, utilizing the DPV1 utility (service) ”read data set/write data set” corresponding to the PROFIdrive Profile
    —> refer to Chapter 5.3

- **Engineering**

  —> Configuring defines the data, which the master transfers to the ”DP slaves” at every bus run–up via the parameterizing telegram and the configuration telegram.

  The system can be configured in the following ways (refer to Chapter 5.7):

  – using the GSD file (SIEM808F.GSD/SI02808F.GSD)

  – using the ”Slave object manager” (Drive ES)

PROFIdrive conformance

The profile defines, among other things, how setpoints and actual values are transferred and how drive parameters can be accessed.

- The profile includes the necessary definitions for the operating mode ”Speed setpoint” and ”Positioning”.
- It defines the basic drive functions and leaves sufficient freedom for application–specific expanded functionality and ongoing developments.
- The profile includes an image of the application functions on PROFIBUS–DP.
- The PROFIdrive Profile provides a total of 6 different application classes.
- ”SIMODRIVE 611 universal” is in conformance with the profile for application Class 1 and from SW 6.1, application Class 4.

The following functional scope has been implemented corresponding to the directive PROFIdrive V3.1 – 2002:

- Clock–cycle synchronous operation
- Configuring a telegram
- Encoder interface
- Non–cyclic parameter access using DPV1 utilities
- Profile parameters

The following parameters should be set in order, for this functionality, to achieve the precise compatibility to profile version V3.1:

- P0878 Bit 0 =1, Bit 1 = 1, Bit 2 = 1 (from SW 8.2)
- P0879 Bit 0 = 1, Bit 1 = 0, Bit 2 = 0, Bit 9 =1
- P1012 Bit 12 = 1, Bit 13 = 1, Bit 14 = 0

Master and slaves

For PROFIBUS, a differentiation is made between master and slave units.

- Master (active bus device)

  Devices, which represent a master on the bus, define data transfer along the bus, and are therefore known as active bus nodes.
  A differentiation is made between two classes of master:

  – DP Master class 1 (DPMC1):
  These are central master systems that exchange data with the slaves in defined message cycles.
  Examples: SIMATIC S5, SIMATIC S7, etc.

  – DP Master class 2 (DPMC2):
  These are devices for configuring, commissioning, operator control and monitoring during running operations.
  Examples: Programming units, operator control and visualization devices

- Slaves (passive bus nodes)

  These devices may only receive, acknowledge and transfer messages to a master when so requested.

Reader's note

The ”SIMODRIVE 611 universal” control board with the optional PROFIBUS–DP module is a slave on the fieldbus.
In the following text, this slave is designated the ”DP slave 611U” .

Data transfer technology, baud rate

PROFIBUS supports data transfer according to RS485 and also data transfer using fiber–optic cable.

The ”DP–Slave 611U” automatically detects the baud rate set at the bus at power–on.
The following baud rates are possible:
9.6 kbaud, 19.2 kbaud, 93.75 kbaud, 187.5 kbaud,
500 kbaud, 1.5 Mbaud, 3.0 Mbaud, 6.0 Mbaud and 12 Mbaud

Note

- When using Optical Link Plugs (OLPs), the baud rate is limited to 1.5 Mbaud.
- When several slaves are connected to a master, for practical and sensible operation with SimoCom U, a baud rate $\geqslant$187.5 kbaud should be set.

When commissioning the fieldbus, the baud rate is defined the **same for all devices** starting from the master.

Data transfer via PROFIBUS

Data is transferred between the master and slaves according to the master/slave principle. The drives are always the slaves. This permits extremely fast cyclic data transfer.

In addition, non–cyclic communications functions are also used for parameterization, diagnostics and fault/error handling during cyclic data transfer with drives.

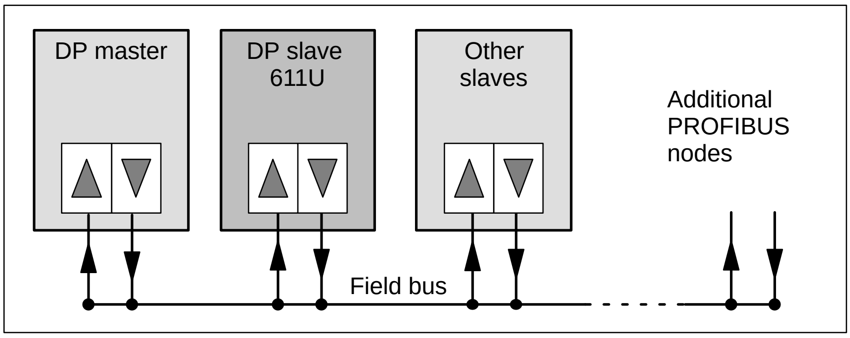


Fig. 5-1 Data transfer via PROFIBUS

Transferring words and double words

All of the word and double word formats used are transferred in the Big Endian format, i.e. the high byte or high word is transferred before the low byte or low word.

Protocols

The communications type corresponds to the protocol shown in Fig. 5-2 for the ”DP slave 611U”.

DPV1 parameter channel (from SW 6.1)

Parameters can be read and written into according to the protocol, defined in the PROFIdrive Profile via the DPV1 parameter channel.

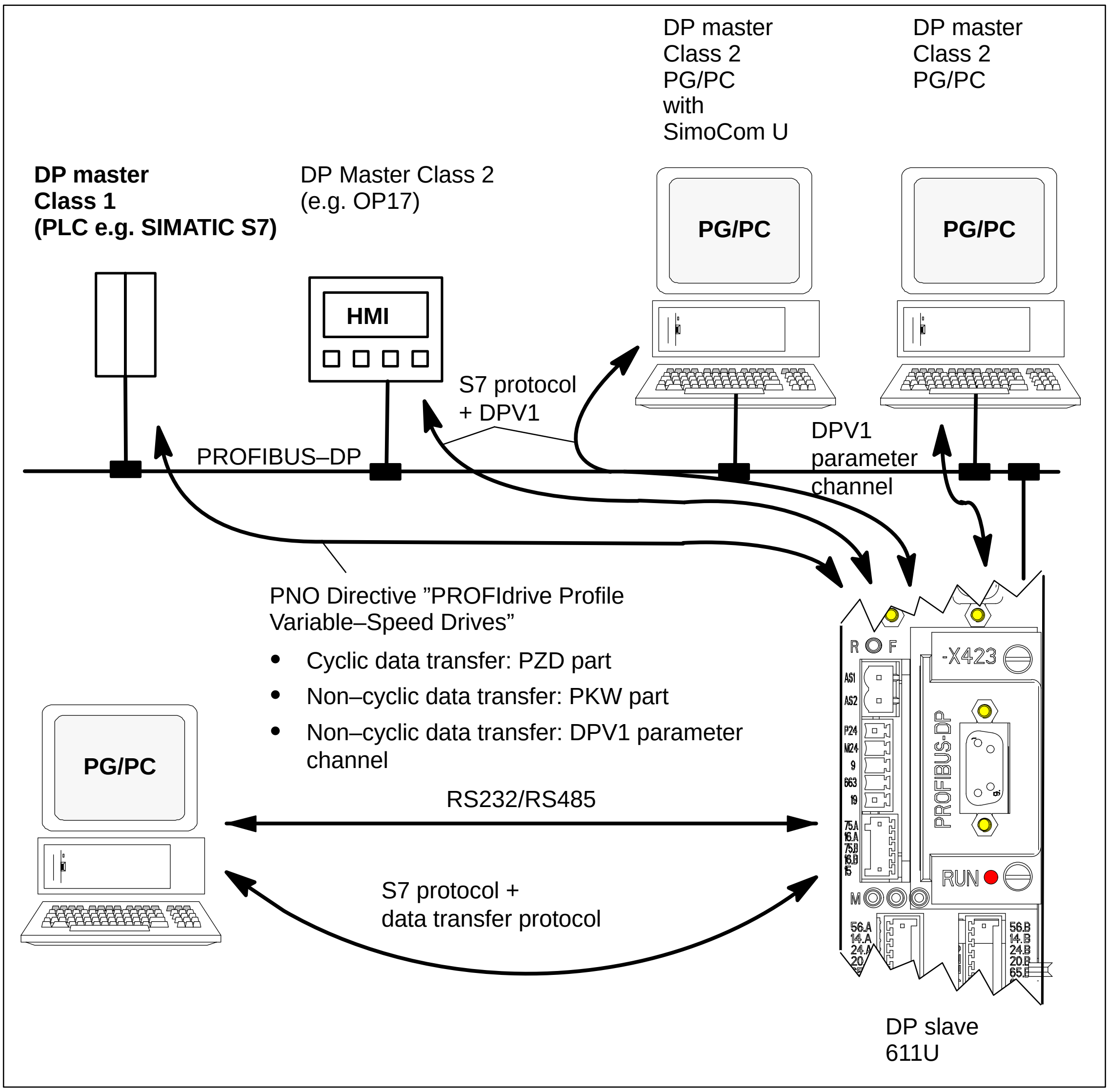


Fig. 5-2 Protocol for ”DP slave 611U”

”SIMODRIVE 611 universal” with optional PROFIBUS–DP module

The ”SIMODRIVE 611 universal” control board together with the optional PROFIBUS–DP module is used to connect drives to higher–level automation systems via PROFIBUS–DP.

”SIMODRIVE 611 universal” identifies the installed optional PROFIBUS–DP module at power–on.

If an optional module is used, the input/output functions can be selected via PROFIBUS–DP, or also entered as setpoints.
The compatibility between the terminal and PROFIBUS signals is described in Chapter 5.4.

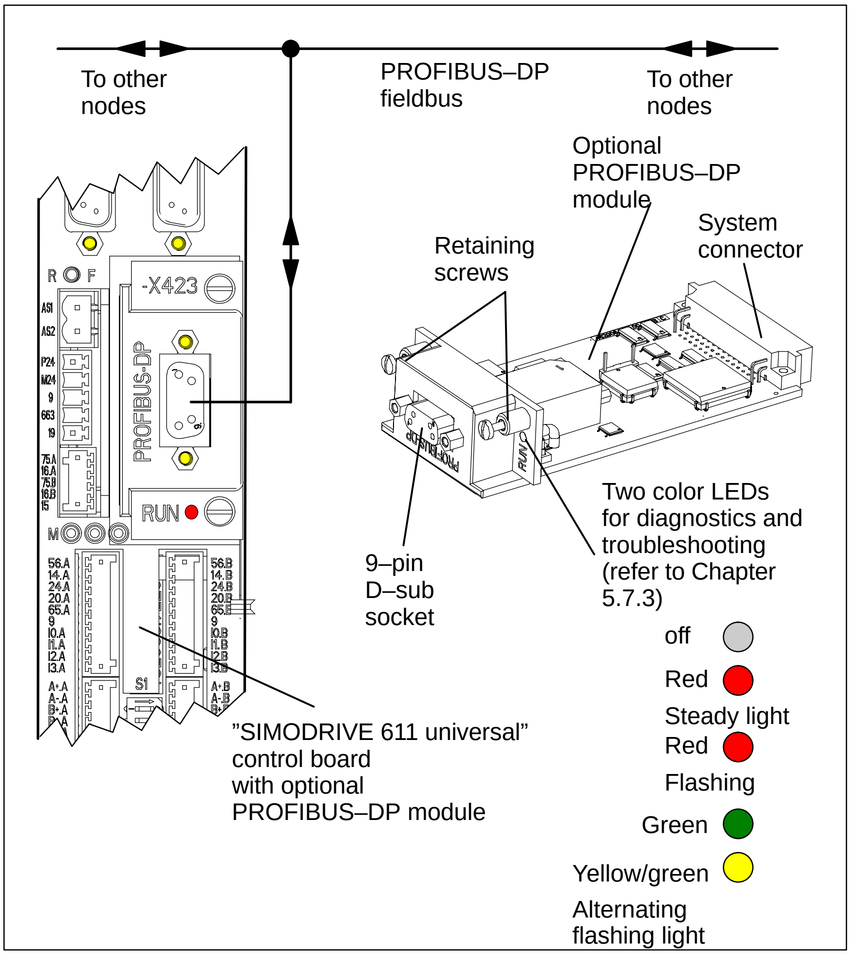


Fig. 5-3 ”SIMODRIVE 611 universal” with optional PROFIBUS–DP module

Reader’s note

- Which modules are available? refer to Chapter 1.3.3
- Installing the optional module refer to Chapter 2.1
- Connecting–up diagram and connecting–up the optional module refer to Chapter 2.3.4

5.2 Basic functions of the cyclic data transfer

Net data structure according to PPOs

The structure of the net data for cyclic operation, is designated as parameter–process data–object (PPO) in the ”PROFIBUS profile, variable–speed drives”.

The net data structure for cyclic data transfer is sub–divided into two areas, which are transferred in each telegram.

- Parameter area (PKW, parameter identification value)

  This telegram section is used to read and/or write parameters and to read out faults. The data transfer is optional and can be defined by appropriately configuring the system.

  The mechanisms, used to apply the PKW part, are described in Chapter 5.6.7.

- Process data area (PZD, process data)

  This area contains the control words, setpoints and status information and actual values.

  The following data is transferred with the process data:

  – Control words and setpoints (task: master —> drive) and

  – Status words and actual values (responses: drive —> master)

When the bus system is commissioned, the master defines which PPO type is used to address a drive. The ”DP slave 611U” is automatically signaled the selected PPO–TYPE at run–up via the configuration telegram.

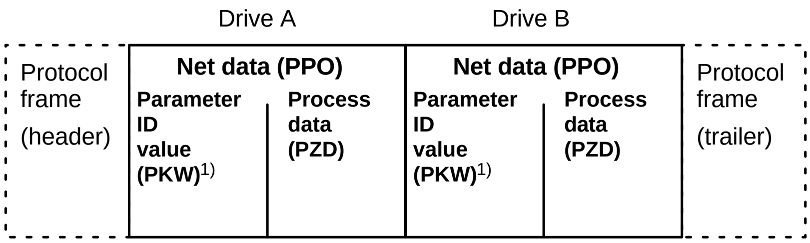
Telegram structure for cyclic data transfer

With cyclic data transfer, setpoints and actual values are transferred one after the other between the master and its associated slaves in a cycle.

For standard DP operation, a new cycle is started after the old cycle has been completed.

For clock–synchronous operation, a new cycle is started with the selected T_{DP} clock cycle.

The telegrams of the cyclic data transfer have, in both cases, the following basic structure:



Note:

Net data for drive B is only transferred, if the ”DP slave 611U” operates as double–axis module.

—> refer to Chapter 5.9 under P0875

1) Transfer is optional and is defined by appropriately configuring the system.

Fig. 5-4 Telegram structure for cyclic data transfer

PPOs

The PPO selection can be subdivided into:

- Net data **without** parameter area
  with 2 to 16 words for the process data.

  and

- Net data **with** parameter area
  with 2 to 16 words for the process data.
  These are the PPO types 1, 2 and 5.

A different number of process data is permissible for the setpoints and actual values (from SW 3.1).

In addition to be able to freely set the number of process data, the configuring allows standard settings to be selected. This includes, in addition to the PPO types PPO1 to PPO5 (refer to Table 5-1) a whole series of configured functions (GSD file, Drive ES), which are suitable for the various standard telegrams.

Table 5-1 Parameter process data objects (PPO types)

	Net data													
	PKW • Refer to Chapter 5.6.7				**PZD** • In closed–loop speed controlled operation, refer to Chapter 5.6.6 • In the positioning mode, refer to Chapter 5.6.6									
	PKE	IND	PWE		PZD 1	PZD 2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
	1st word	2nd word	3rd word	4th word	1st word	2nd word	3rd word	4th word	5th word	6th word	7th word	8th word	9th word	10th word
PPO1														
PPO2														
PPO3														
PPO4														
PPO5														

Abbreviations:

PPO	Parameter Process data Object	IND	Sub–index, sub–parameter number, array index
PKW	Parameter ID value	PWE	Parameter value
PKE	Parameter ID	PZD	Process data

Notice

The five various PPOs are selected with different data length depending on the task that the drive has to fulfill in the automation environment.

Configuring process data (from SW 3.1)

The process data structure of the telegram can be defined and configured as follows from SW 3.1:

- By selecting a standard telegram
- By freely configuring a telegram
  —> Refer to Chapter 5.6.5

5.3 Basic functions of the non–cyclic data transfer

Non–cyclic parameter access

There are three non–cyclic channels which can be accessed on the drive parameters from ”SIMODRIVE 611 universal” via PROFIBUS–DP.

An overview of how parameters can be accessed for ”SIMODRIVE 611 universal” is shown in the following diagram.

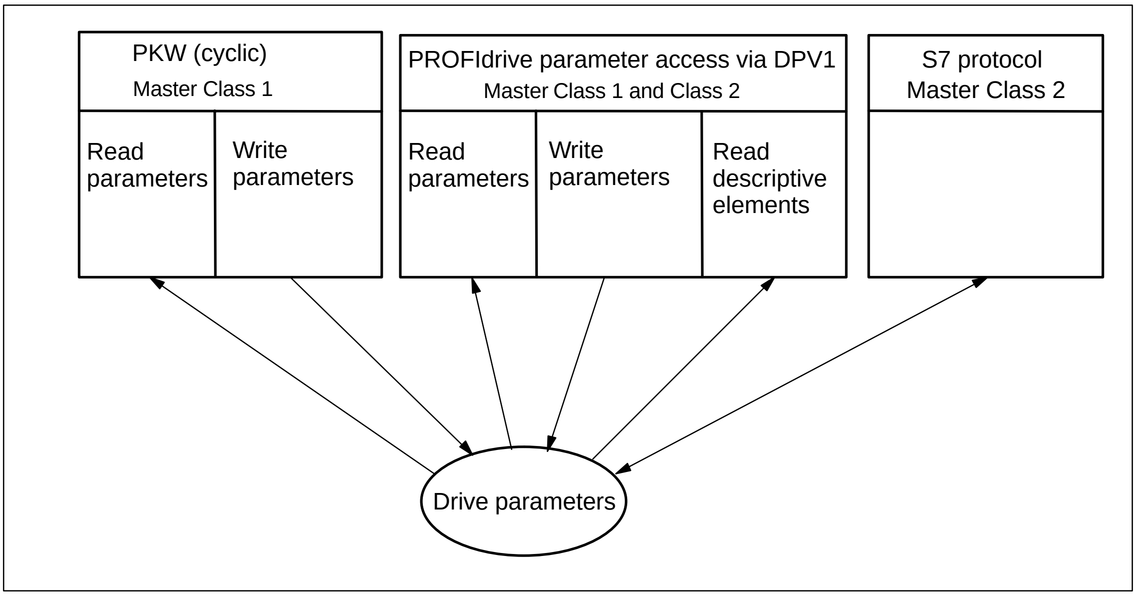


Fig. 5-5 Overview, parameter access operations for PROFIdrive

Note

Every parameter is allocated a parameter number. Profile–specific parameters are defined for the ranges decimal 900 to 999 and are reserved from decimal 60000 to 65535.

In order to remain compatible to previous parameter assignments, when accessing via the DPV1 parameter channel (reading/writing) in the drive firmware, the index is output starting with 1 and on the PROFIBUS side reduced by 1 (n–1).

PKW (cyclic)

”SIMODRIVE 611 universal” is compatible to the PKW mechanism in the PROFIdrive Profile, Version 2 and P0879.11; this allows a non–cyclic parameter access to be carried–out within the cyclic data exchange.

Parameter access via DPV1

Using PROFIdrive, it is possible to transfer parameters via DPV1 using non–cyclic communications. The parameter definition and parameter access via the DPV1 mechanism is defined in the PROFIdrive parameter model, which is part of the PROFIdrive Profile Version 3.

The function blocks and project examples for SIMATIC S7 can be used to transfer drive parameters in a non–cyclic fashion:

Product	Order No. (MLFB):
Drive ES SIMATIC	6SW1700–5JC00–2AA0

Note for the reader

Reference: /KT654/, PROFIdrive–Profile Drive Technology, Draft Version 3.1 July 2002, (Chapter 3.4)

Parameters, reading/writing DPV1 (from SW 6.1)

A protocol has been defined for accessing parameters which comprises tasks and the associated responses. The tasks are non–cyclically transferred using the DPV1 utility ”write data” and the responses with ”read data”. Several drive parameters (e.g. traversing block) can be simultaneously accessed using a task/response.

A DPV1 parameter task and a DPV1 parameter response with individual fields is defined and documented in the PROFIdrive profile.

When reading and writing parameters, that, depending on the current configuring of the drive, are not valid – e.g. P1083 is only valid for induction motors, however, a synchronous motor is configured – then the Siemens–specific DPV1 error code 0x65 (parameter presently de–activated) is output.

Values of signal parameters (50000–type parameters) can only be read if this was configured in the PROFIBUS telegram (P0915, P0916). A negative acknowledgement (DPV1 error code 0x65) is output when reading signal parameters using non–cyclic data transfer that were not configured in the Profibus Telegram.

Read the parameter description DPV1 (from SW 6.1)

The parameters, defined by the profile, are documented in a list form in the PROFIdrive profile.

This includes both parameters with the implementation rule *”mandatory”*, i.e. parameters that are absolutely necessary in order to be in conformance with the profile as well as parameters with the implementation rule *”optional”* .

Parameter descriptions can be read so that now a master knows which parameters a drive knows and the properties which each of these parameters has.

Note for the reader

Reference: /PPA/ PROFIdrive–Profile Drive Technology, Draft Version 3.1 July 2002, (Chapter 3.4)

S7 protocol DPV1

It is possible to non–cyclically transfer parameters via the S7 protocol. For this type of communication, the S7 protocols link to DPV1.

Communications with SIMATIC OP (from SW 4.1)

From SW 4.1, data can be transferred, using the SIMATIC Operator Panel (SIMATIC OP) to ”SIMODRIVE 611 universal” via the PROFIBUS–DP.

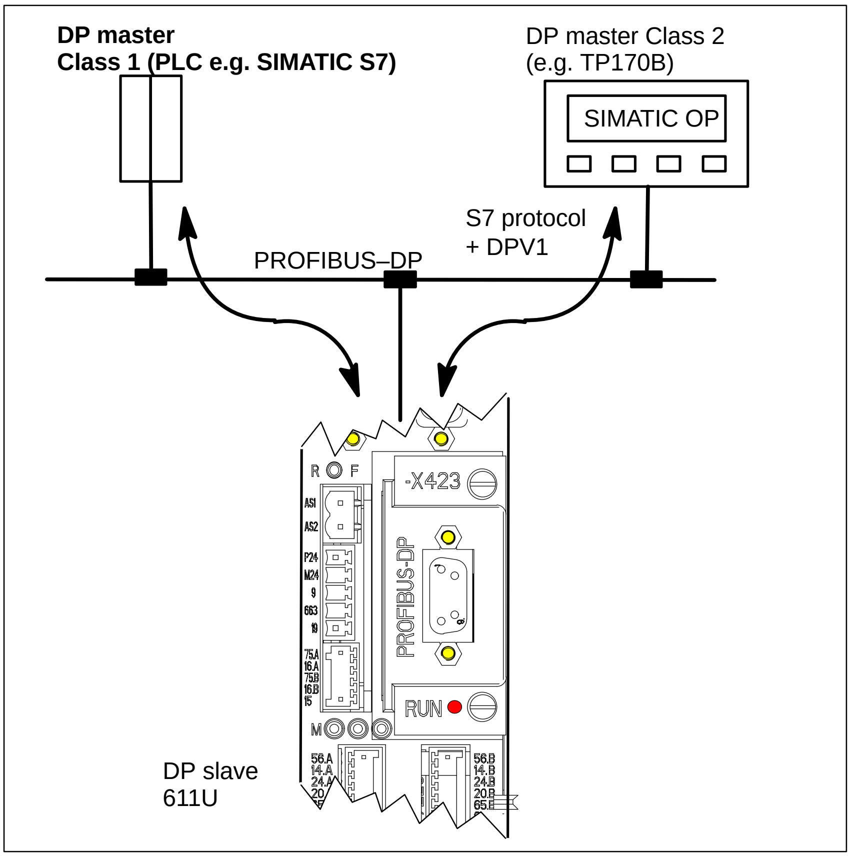


Fig. 5-6 Communications, SIMATIC OP – ”SIMODRIVE 611 universal”

- Technical details
  - Communications are established directly between the SIMATIC OP (e.g. TP170B) as Master Class 2 and the ”SIMODRIVE 611 universal” as slave using the S7 protocol and the non–cyclic DPV1 utilities.
  - SIMATIC OP can read and write into drive parameters.
  - A Class 1 master is not required.
- Configured in SIMATIC OP
  - The drive parameters are addressed using the data block and data word.
    —> Axis A:
    Data block number_OP = parameter number_611U
    Data word_OP = sub–parameter_611U
    —> Axis B:
    Data block number_OP = parameter number_611U + 10000
    Data word_OP = sub–parameter_611U
- Parameterization in the ”SIMODRIVE 611 universal”
  - A DP2 or DP3 module with a correctly entered DP address (P0918) must be inserted.
  - Parameterize from where the drive is to be operated

    —> PROFIBUS–DP Master Class 1:
    Set P0875 = P872

    —> HW terminals
    Set P0875 to 0
- Setpoint input
  - it is not possible to directly enter setpoints from the SIMATIC OP.
  - Setpoints can be indirectly entered using the SIMATIC OP by changing parameters, e.g. P0641 (fixed setpoint)

    —> Enter the setpoint via HW terminals (P0875 = 0)

Danger

For applications where the setpoint is entered using the SIMATIC OP, in addition, an enable or EMERGENCY STOP signal should be connected to SIMATIC OP, as an interrupted connection between SIMATIC OP and ”SIMODRIVE universal” does not result in a drive fault.

5.4 Terminal signals and PROFIBUS signals

Standard case

When first commissioning the system with the optional PROFIBUS–DP module inserted (standard case), the control board terminals are automatically pre–assigned as follows:

- Digital input terminals: Terminals I0.x, I1.x, I2.x, I3.x = inactive
- Analog input terminals: Terminals 56.x/14.x, 24.x/20.x = switched–out

Table 5-2 Input terminals for the standard case

If	then
at the first commissioning in the booted state, an optional PROFIBUS–DP module was identified,	These parameters are then pre–assigned as follows: • P0660 = 0 (function, input terminal I0.x) • P0661 = 0 (function, input terminal I1.x) • P0662 = 0 (function, input terminal I2.x) • P0663 = 0 (function, input terminal I3.x) • P0607 = 0 (analog setpoint, terminal 56.x/14.x) • P0612 = 0 (analog setpoint, terminal 24.x/20.x)
Note: • Parameter value 0 signifies: the terminal is inactive • x signifies: Space retainer for drive A or B	

Mixed operation

The terminal which is inactive or switched out as standard, can be re–assigned a function by appropriately parameterizing the terminal.

Note

- Rule for input signals:
  - A HW terminal **has priority over** a PROFIBUS signal.
- Rule for output signals:
  - The signal is output via the hardware terminal **and** PROFIBUS

Example

There is an optional PROFIBUS–DP module, but in spite of this, an analog speed setpoint is to be input via input, terminal 56.x/14.x.

Solution:
P0607 = 1 —> n_{set}/M_{set} mode possible via terminal 56.x/14.x

The analog speed setpoint via 56.x/14.x is used. The speed setpoint transferred via PROFIBUS–DP is ignored.

5.5 Internal effect of PROFIBUS signal and hardware terminals

Central enable signals

Fig. 5-7 indicates which input terminal signals and PROFIBUS control signals have an effect on the central internal enable signals.

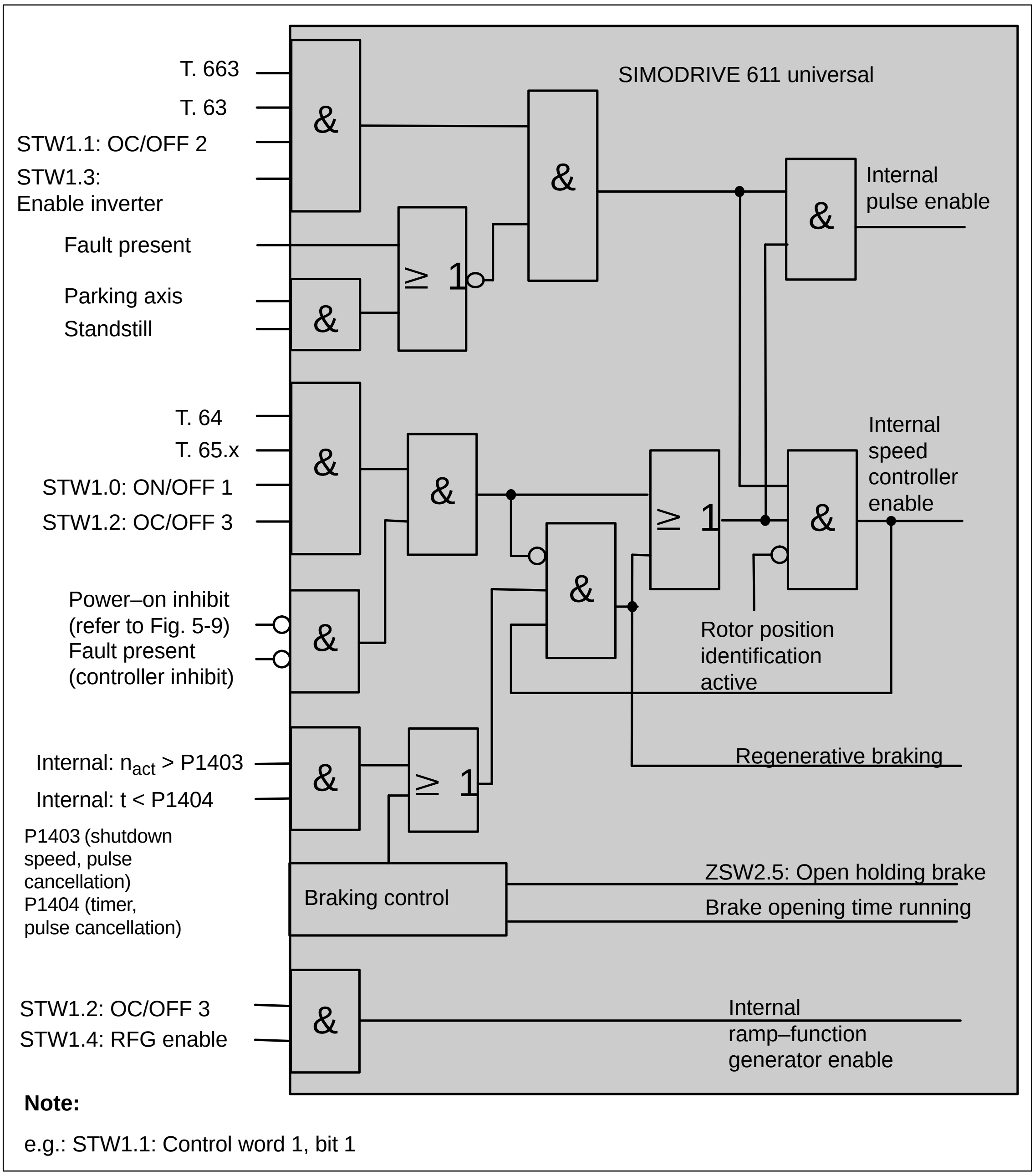


Fig. 5-7 Central enable signals and their dependency on the hardware terminals and PROFIBUS signals

5

Statuses from the terminal and control signals

Fig. 5-8 shows which input terminal signals and PROFIBUS control signals have a significant effect on the most important status signals and how they are formed.

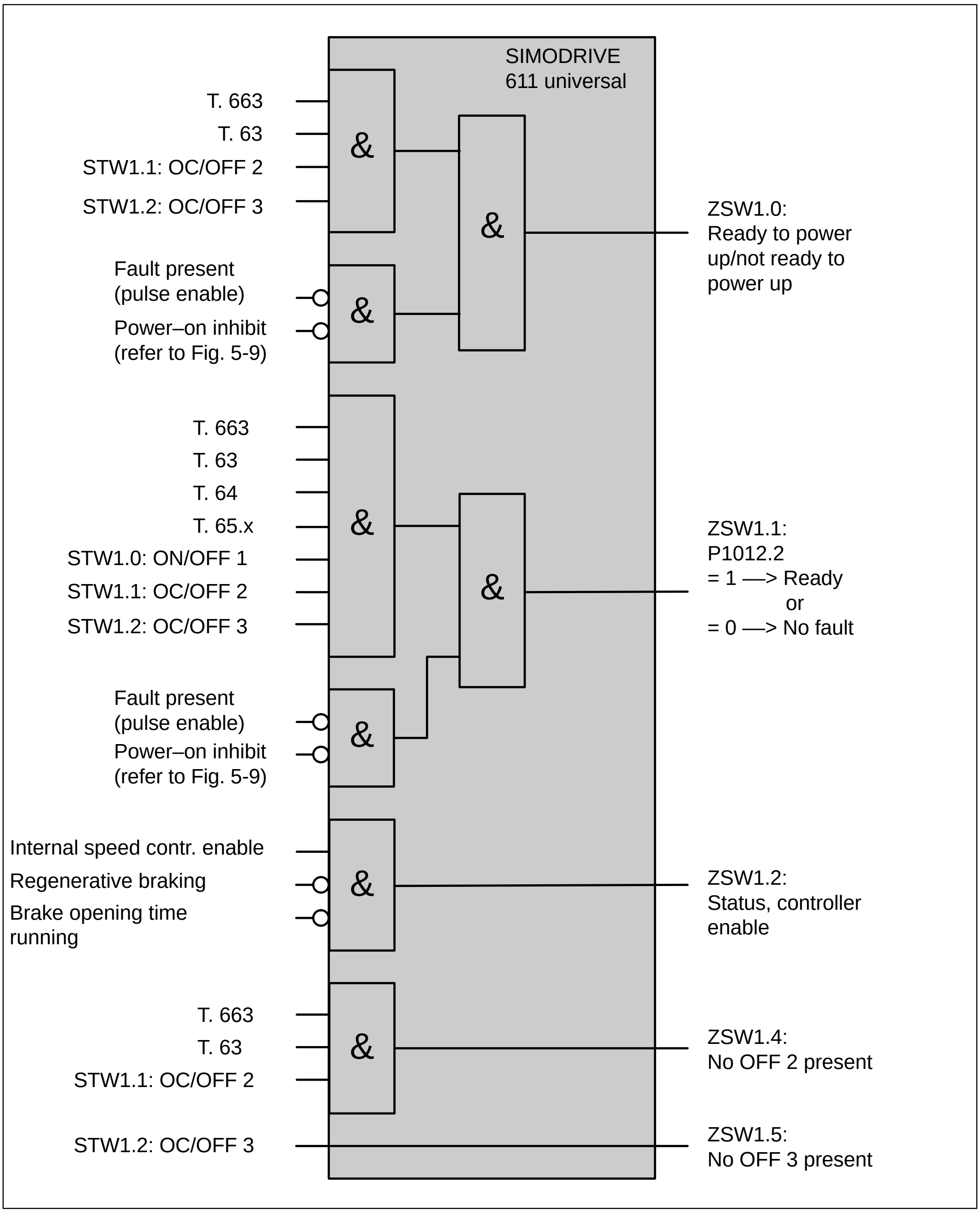


Fig. 5-8 Statuses dependent on the hardware terminals and PROFIBUS signals

Power–on inhibit

If the power–on inhibit is activated (P1012.12 = 1), the drive can no longer move by itself after the ”power–on inhibit” has been reached.

The ”power–on inhibit” status must be removed in order to traverse the drive.

In order to activate the behavior/response in conformance with the PROFIdrive from SW 6.1, bit 13 (power–on inhibit according to the PROFIdrive Profile) is pre–assigned a value of 1 in parameter P1012 (function switch). This means that the behavior/response, in conformance with PROFIdrive, is activated as standard.

Fig. 5-9 indicates which signals and parameters affect the power–on inhibit.

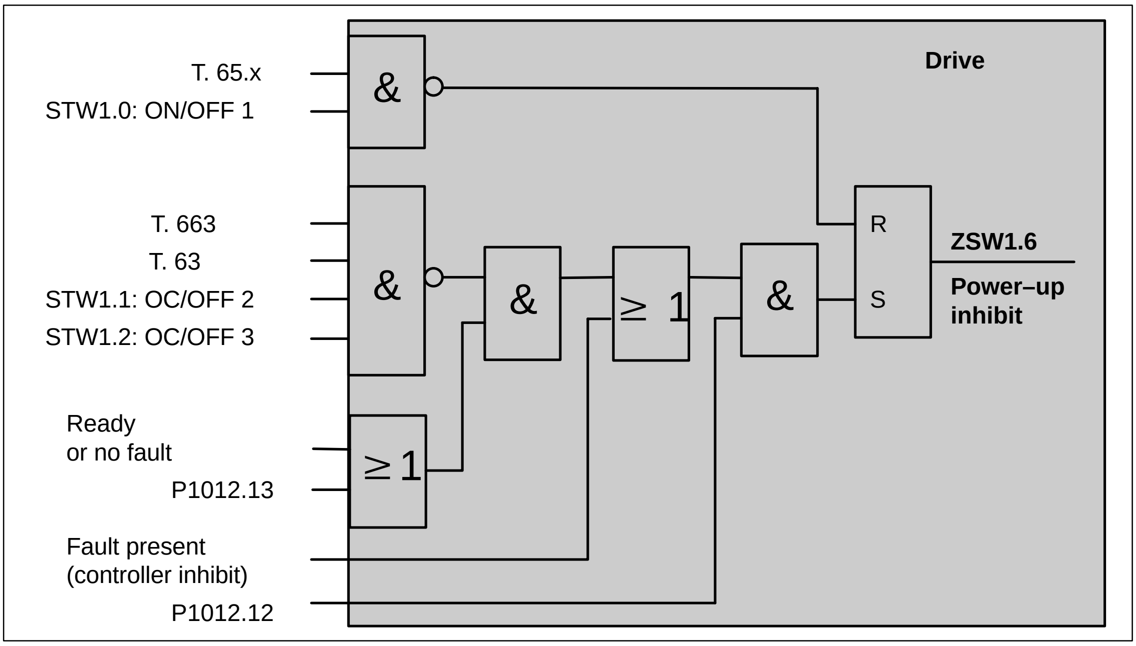


Fig. 5-9 Generating the power–on inhibit

Note

If, in addition to P1012.13=1 also P1012.14=1 is set to 1, if the status of signals STW1.1 (OC/OFF 2), STW1.2 (OC/OFF 3 and STW1.0 (ON/OFF 1) simultaneously change
from 0 —> 1, this does **not** result in the ”power–on inhibit” state.

Removing the power–on inhibit?

If there is no longer a setting condition for the power–on inhibit, then it can be removed as follows:

- Withdraw the controller enable, terminal 65.x, or
- Reset control signal STW1.0

Switching out the power–on inhibit?

The power–on inhibit can be switched–out with P1012.12 = 0.

5.6 Net data (PKW and PZD area)

5.6.1 Overview of the process data (PZD area)

Reader's note

In the index, for each process data (control/status word), it is specified on which page information can be found on this word.

- refer to ”Process data in the n–set mode – control words ...”
  refer to ”Process data in the n–set mode – status words ...”
- refer to ”Process data in the pos mode control words ...”
  refer to the ”Process data in the pos mode – status words – ...”

Overview of the control words (setpoints)

From the perspective of the DP master, control words are setpoints. The ”DP slave 611U” provides an image of the received process data P1788:17 (control words, setpoints) in P1788:17 (received process data, PROFIBUS).

Table 5-3 Overview of the control words (setpoints)

Control word				Operating mode		Comment
Abbreviation	**Meaning**	**Data type4)**	**Signal number1)**	**n–set**	**pos**	
STW1	Control word 1	U16	50001	x	–	
STW1	Control word 1	U16	50001	–	x	
STW2	Control word 2	U16	50003	x	x	
NSOLL_A	Speed setpoint, most significant word (nsoll–h)	I16	50005	x	–	
NSOLL_B	Speed setpoint, most significant and least significant word (nsoll–(h+l))	I32	50007	x	–	from SW 3.1
G1_STW	Encoder 1, control word2)	U16	50009	x	–	from SW 3.1
G2_STW	Encoder 2, control word3)	U16	50013	x	–	from SW 3.3
G3_STW	Encoder 3, control word2)	U16	50017	x	–	from SW 3.1
XERR	System deviation (DSC)	I32	50025	x	–	from SW 4.1
KPC	Position controller gain factor (DSC)	U32	50026	x	–	from SW 4.1
MomRed	Torque reduction	U16	50101	x	x	
DAU1	Analog output, terminal 75.x/15	I16	50103	x	x	
DAU2	Analog output, terminal 16.x/15	I16	50105	x	x	
DIG_OUT	Digital outputs, terminals O0.x to 03.x	U16	50107	x	x	from SW 3.1
XSP	Target position for ”spindle positioning”	I32	50109	x	–	from SW 5.1
DezEing	Distributed inputs	U16	50111	x	x	from SW 4.1
MsollExt	External torque setpoint	I16	50113	x	–	from SW 4.1
QStw	Control word, slave–to–slave communication	U16	50117	–	x	from SW 4.1
SatzAnw	Block selection	U16	50201	x	x	(n–set, from SW 5.1)
PosStw	Position control word	U16	50203	–	x	
Over	Override	U16	50205	–	x	
Xext	External position reference value	I32	50207	–	x	from SW 4.1
dXcorExt	Correction, external position reference value	I32	50209	–	x	from SW 4.1
MDIPos	MDI position	I32	50221	–	x	from SW 7.1
MDIVel	MDI velocity	U32	50223	–	x	from SW 7.1
MDIAcc	MDI acceleration override	U16	50225	–	x	from SW 7.1.
MDIDec	MDI deceleration override	U16	50227	–	x	from SW 7.1

5

Table 5-3 Overview of the control words (setpoints), continued

Control word				Operating mode		Comment
Abbrevi-ation	**Meaning**	**Data type[4)]**	**Signal number[1)]**	**n–set**	**pos**	
MDIMode	MDI mode	U 16	50229	–	x	from SW 7.1

1) From SW 3.1 the following applies:
The signals are assigned to the process data in the setpoint telegram using P0915:17 (PZD setpoint assignment, PROFIBUS) (refer under the index entry ”Process data, configuring”).
2) Before SW 3.3, the following applies:
This process data is only available if clock–synchronous operation is also running.
3) Process data for encoder 2 must be activated via P0879.12.
4) Data type: U16/U 32 —> unsigned integer 16/32 bit ; I16/I 32 —> integer 16/32 bit

Overview of the status words (actual values)

From the perspective of the DP master, status words are actual values.

The ”DP slave 611U” indicates an image of the sent process data (status words, actual values) in P1789:17 (sent process data, PROFIBUS).

Table 5-4 Overview of the status words (actual values)

Status word				Operating mode		Comment
Abbreviation	Meaning	Data type4)	Signal number1)	n–set	pos	
ZSW1	Status word 1	U16	50002	x	–	
ZSW1	Status word 1	U16	50002	–	x	
ZSW2	Status word 2	U16	50004	x	x	
NIST_A	Speed actual value, most significant word (nist–h)	I16	50006	x	x	
NIST_B	Speed actual value, most significant and least significant word (nist–(h+l))	I32	50008	x	x	from SW 3.1
G1_ZSW	Encoder 1, status word2)	U16	50010	x	–	from SW 3.1
G1_XIST1	Encoder 1, pos. actual value 12)	U32	50011	x	–	
G1_XIST2	Encoder 1, pos. actual value 22)	U32	50012	x	–	
G2_ZSW	Encoder 2, status word3)	U16	50014	x	–	from SW 3.3
G2_XIST1	Encoder 2, pos. actual value 13)	U32	50015	x	–	
G2_XIST2	Encoder 2, pos. actual value 23)	U32	50016	x	–	
G3_ZSW	Encoder 3, status word2)	U16	50018	x	–	from SW 3.1
G3_XIST1	Encoder 3, pos. actual value 12)	U32	50019	x	–	
G3_XIST2	Encoder 3, pos. actual value 22)	U32	50020	x	–	
MeldW	Message word	U16	50102	x	x	
ADU1	Analog input, terminal 56.x/14	I16	50104	x	x	
ADU2	Analog input, terminal 24.x/20	I16	50106	x	x	
DIG_IN	Digital inputs, terminals I0.x to I3.x	U16	50108	x	x	from SW 3.1
Ausl	Utilization	U16	50110	x	x	
Pwirk	Active power	U16	50112	x	x	
Msoll	Smoothed torque setpoint	I16	50114	x	x	
IqGl	Smoothed, torque–generating current Iq	I16	50116	x	x	from SW 3.1
QZsw	Status word, slave–to–slave communications	U16	50118	–	x	from SW 4.1
UZK1	DC link voltage	U16	50119	x	x	from SW 8.3
AktSatz	Currently selected block	U16	50202	x	x	(n–set from SW 5.1)
PosZsw	Positioning status word	U16	50204	–	x	
XistP	Position actual value (pos. mode)	I32	50206	–	x	from SW 3.1

Table 5-4 Overview of the status words (actual values), continued

Status word		Data type[4)]	Signal number[1)]	Operating mode		Comment
Abbreviation	Meaning			n–set	pos	
XsollP	Position reference value (positioning mode)	I32	50208	–	x	from SW 4.1
dXcor	Correction, position reference value	I32	50210	–	x	from SW 4.1

1) From SW 3.1 the following applies:
The signals are assigned to the process data in the actual value telegram using P0916:17 (PZD actual value assignment, PROFIBUS) (refer under the index entry ”Process data, configuring”).
2) Before SW 3.3, the following applies:
This process data is only available if clock–synchronous operation is also running.
3) Process data for encoder 2 must be activated via P0879.12.
4) Data type: U16/U32 —> Unsigned integer 16/32 bit ; I 16/I 32 —> integer 16/32 bit

5.6.2 Description of the control words (setpoints)

Control word STW1 (n–set mode)

Table 5-5 Control word STW1 for the n–set mode

STW 1

Bit	Meaning
15	Spindle positioning on (from SW 5.1)
14	Open–loop torque controlled mode
13	Acceleration time zero for controller enable (from SW 3.1)
12	Opening the holding brake for test purposes (from SW 4.1)
11	Reserved
10	Control requested/no control requested
9	Reserved
8	Activate the function generator (edge) (from SW 8.1)
7	Reset the fault memory
6	Enable setpoint/inhibit setpoint
5	Ramp–function generator start/ramp–function generator stop
4	Ramp–function generator enabled
3	Enable inverter/pulse inhibit
2	Operating condition/OFF 3
1	Operating condition/OFF 2
0	ON/OFF 1

Note:

- The control signals, from the perspective of ”SIMODRIVE 611 universal”, are input signals and are described in Chapter 6.4.3.
  Also refer in the index under ”Input signal, digital ...”.
- The signals designated like this must have at least a 1–signal in order to be able to operate a motor with the speed setpoint NSOLL_A or NSOLL_B.

Control word STW1 (pos mode)

Table 5-6 Control word STW1 for positioning

STW 1

Request passive referencing (from SW 5.1)1)
Reserved
External block change (from SW 3.1)
Opening the holding brake for test purposes (from SW 4.1)
Start referencing/cancel referencing
Control requested/no control requested
Jogging 2 ON/jogging 2 OFF
Jogging 1 ON/jogging 1 OFF

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Reset the fault memory
Activate traversing task (edge)
Operating condition/intermediate stop
Operating condition/reject traversing task
Enable inverter/pulse inhibit
Operating condition/OFF 3
Operating condition/OFF 2
ON/OFF 1

Note:

- The control signals, from the perspective of "SIMODRIVE 611 universal", are input signals and are described in Chapter 6.4.3.

  Also refer in the index under "Input signal, digital ...".
- The signals which have been identified in this way, must have at least a 1 signal in order to be able to start a traversing block using the control signal "activate traversing task (edge)".

1) QStw.1 is OR'd.

Control word STW2

Table 5-7 Control word STW2

STW 2

Master sign–of–life (from SW 3.1)
Motor changed over (from SW 2.4)1)
Motor data changeover 1st input (from SW 2.4)1)
Motor data changeover 1st input (from SW 2.4)1)
Suppress fault 608 (from SW 3.1)

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Selection, parking axis
Integrator inhibit, speed controller
Reserved
Ramp–up time zero
First speed setpoint filter off
Parameter set changeover: Bit 2, Bit 1, Bit 0

Note:

The control signals, from the perspective of ”SIMODRIVE 611 universal”, are input signals and are described in Chapter 6.4.3.

Also refer in the index under ”Input signal, digital ...”).

1) Only available in the n–set mode

Control word NSOLL_A NSOLL_B (n–set mode)

The speed setpoint can be entered as follows:

- via NSOLL_A (nsoll–h) —> lower resolution
- via NSOLL_B (nsoll–h + nsoll–l) —> higher resolution

Table 5-8 Speed setpoint via NSOLL_A or via NSOLL_B

NSOLL_B										
NSOLL_A (nsoll–h)				nsoll–l[1]				Decimal value for		Comment
Bit 31[2]	24	23	16	15	8	7[3]	0[3]	nsoll–h	nsoll–h + nsoll–l	
7	F	F	F	F	F	F[3]	F[3]	+32 767	2 147 483 647	Highest value[4]
:				:				:	:	:
4	0	0	0	0	0	0	0	+16 384	1 073 741 824	Positive normalization value (P0880)
:				:				:	:	:
0	0	0	0	0	0	0	0	0	0	nset = 0
F	F	F	F	F	F	F	F	–1	–1	nset = –1
:				:				:	:	:
C	0	0	0	0	0	0	0	–16 384	–1 073 741 824	Negative normalization value (P0880)
:				:				:	:	:
8	0	0	0	0	0	0	0	–32 768	–2 147 483 648	Lowest value[4]

1) The speed setpoint resolution is increased with nsoll–l.
The control word nsoll–l is only transferred for the PPO types PPO2, PPO4 and PPO5.
2) Sign bit: Bit = 0 —> positive value, bit = 1 —> negative value
3) The drive does not evaluate these values (low byte from nsoll–l)
4) The speed is limited by the lowest setting in P1401/P1405/P1146 or P1147.

Speed normalization (P0880)

P0880 is used to define which speed is obtained for NSOLL_A = 4000_{Hex} or NSOLL_B = 4000 0000_{Hex}.

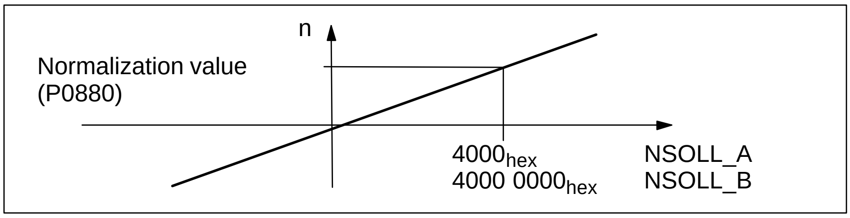
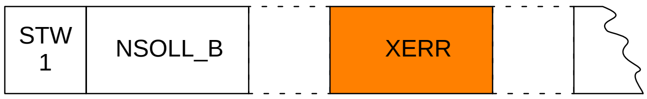


Fig. 5-10 Normalization of speed

Example:
Assumptions: The speed setpoint is entered via nsoll–h and P0880 = 16384
—> resolution = 1, i.e. 1 digit ≙ 1 RPM

Control word XERR (n–set mode) (from SW 4.1)

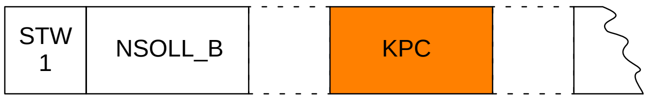
The system deviation for the dynamic servo control (DSC) is transferred via this control word.



The format of XERR is identical with the format of G1_XIST1 (refer to Chapter 5.6.4)

Control word KPC (n–set mode) (from SW 4.1)

For dynamic servo control (DSC) the position controller gain factor is transferred via this control word.



Transfer format: KPC is transmitted in the units 0.001 1/s

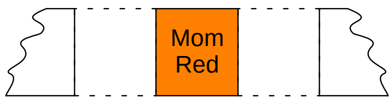
Example:
A2C2AH ≙ 666666D ≙ KPC = 666.666 1/s ≙ KPC = 40 1000/min

Value range: 0 to 4000.0

Special case:
For KPC = 0, the dynamic servo control is de–activated.

Control word MomRed

The torque limit presently valid in the drive can be reduced using this control word.



Normalization of MomRed (P0881)

The normalization of MomRed is defined using P0881 (evaluation, torque reduction PROFIBUS). All 16 bits in the PROFIBUS process data are evaluated and interpreted as positive number. The result of the conversion is a percentage factor k which is applied to P1230 (torque limit) and P1235 (power limit).

$$k = \text{maximum}\left(0;\ 1 - \frac{\text{P0881/100 \%}}{16384} \cdot \text{MomRed}\right)$$

Example:
Assumption: Best possible resolution for the full limiting range

Input: P0881 = 25 %

It then means:

- Full torque

  MomRed = 0000
  —> k = 1 (i.e. 1 · P1230 and 1 · P1235 are effective)
- No torque

  MomRed = FFFF
  —> k = 1 – 65535 / 65536 = 0.0000153 or almost 0

with a total of 65536 intermediate steps.

When P0881 is parameterized > 25 %, then it is possible to reduce to precisely 0.

Control word DAU1 DAU2

The 2 analog outputs of a drive can be controlled using these control words.

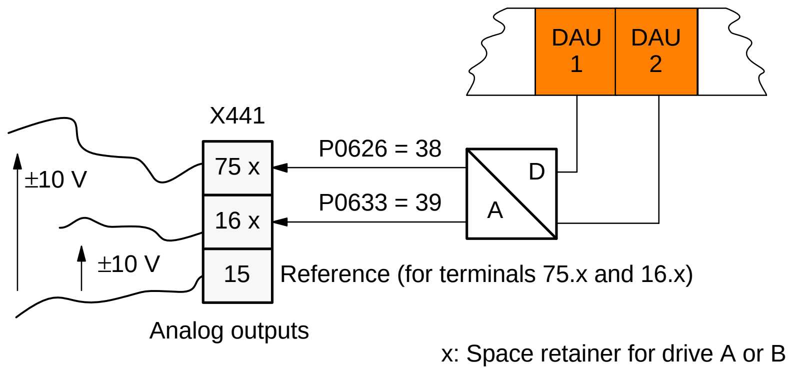


Table 5-9 Control word DAU1, DAU2

Control word	Terminal/ analog output	Parameter/Signal No.
DAU1 (PROFIBUS)	X441 Terminal 75.x/15	P0626 = 38 (Signal DAU1 from PROFIBUS–PPO)
DAU2 (PROFIBUS)	X441 Terminal 16.x/15	P0633 = 39 (Signal DAU2 from PROFIBUS–PPO)

Note:

- It is only possible to control the analog outputs via PROFIBUS–DP if the appropriate signal number is specified in P0626 or P0633.
- The parameters available to parameterize the analog outputs, are still valid (refer to Chapter 6.7).

Transfer format:

4000_{Hex} ≙ 5 V, if the shift factor = 0 and the offset = 0
4000_{Hex} ≙ 10 V, if the shift factor = 1 and the offset = 0

Control word DIG_OUT (from SW 3.1)

The digital outputs at the drive can be controlled, using this control word from the master side via PROFIBUS.

This terminal must be assigned function number 38 so that an output terminal can be controlled.

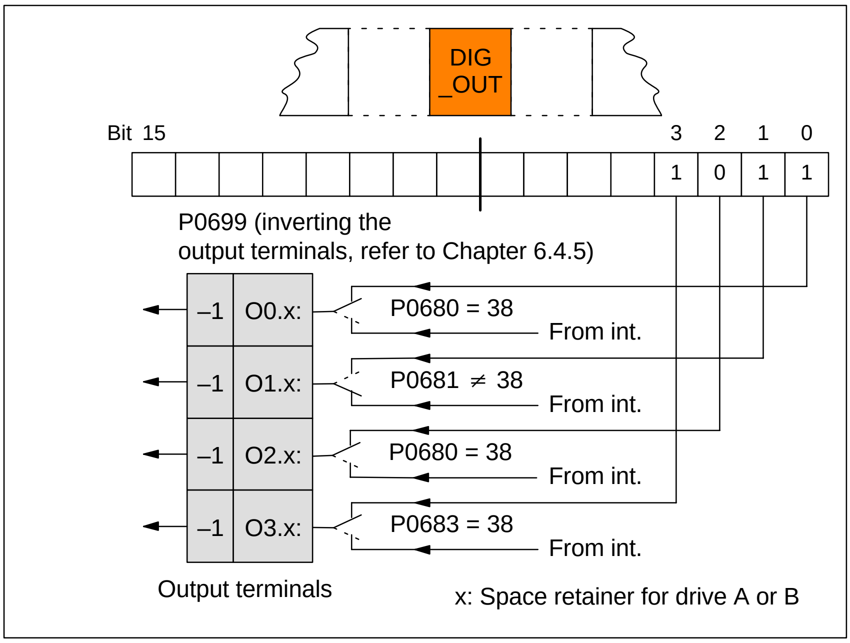
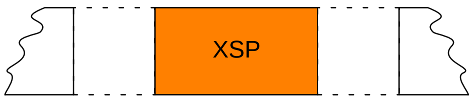


Fig. 5-11 Control word DIG_OUT (from SW 3.1)

Control word XSP (n–set mode) (from SW 5.1)

For the ”Spindle positioning” function, the target position is entered via this control word.



Data transfer format:	1000 ≙ 1 degree
Example:	XSP = 145500 —> 145.5 degrees

Control word DezEing (from SW 4.1)

Control signals can be directly read in from another slave (publisher) using this control word without the signals having first to be routed via the master.

The individual bits in the control word must then be assigned functions using P0888, for example, ”ramp–function generator enable” or ”hardware limit switch”.

Table 5-10 Control word DezEing

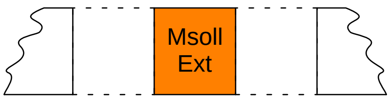
Dez Eing																
	Parameterize with P0888															
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
									Parameterize with P0888							

Note:

The control signals, from the perspective of ”SIMODRIVE 611 universal”, are input signals and are described in Chapter 6.4.3. Also refer in the index under ”Input signal, digital ...”).

Control word MsollExt (from SW 4.1)

For two rigidly connected drives, the actual torque setpoint of the master drive (ZSW Msoll) can be read into the slave drive using this control word.



Normalization of MsollExt (P0882)

Normalization of MsollExt is defined using P0882 (evaluation, torque setpoint PROFIBUS).

The polarity of the torque setpoint can be inverted by entering negative values.

Actual torque setpoint for

- Synchronous motors:

$$\text{Torque setpoint [Nm]} = P1118 \cdot P1113 \cdot \frac{P0882}{4000_{hex}} \cdot \text{MsollExt}$$

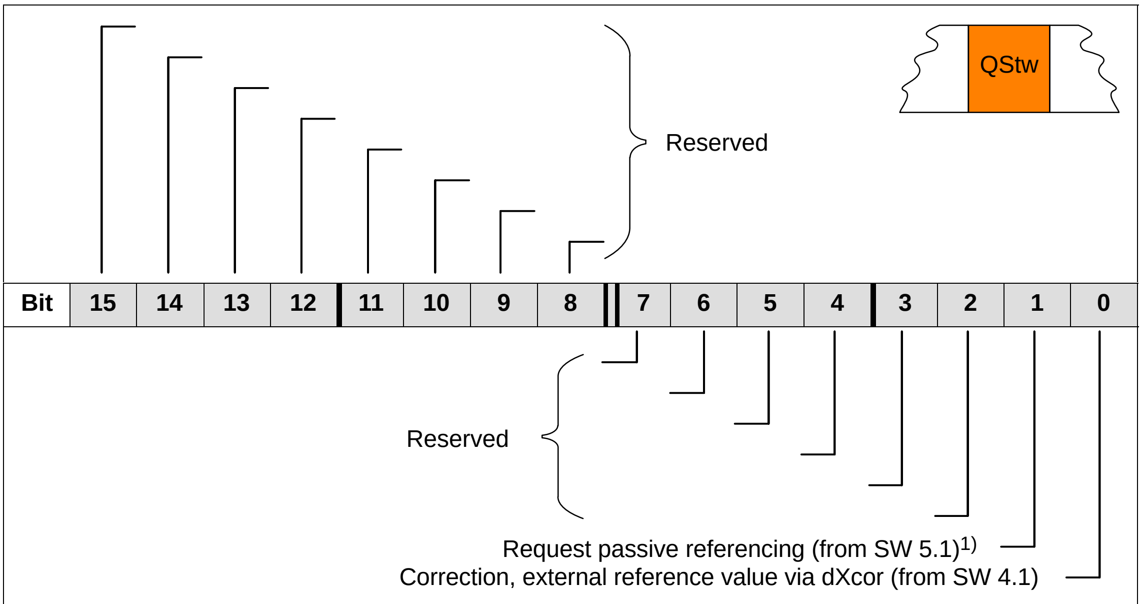
- Induction motors:

$$\text{Torque setpoint [Nm]} = \frac{60 \cdot P1130 \cdot 1000}{2\,\pi \cdot P1400} \cdot \frac{P0882}{4000_{hex}} \cdot \text{MsollExt}$$

Note
The slave drive must be changed over into the open–loop torque controlled mode using STW1.14.

Control word QStw (pos mode) (from SW 4.1)

Table 5-11 Control word QStw



Note:

The control signals, from the perspective of "SIMODRIVE 611 universal", are input signals and are described in Chapter 6.4.3 .

Also refer in the index under "Input signal, digital ...").

1) STW1.15 is OR'd.

Control word SatzAnw

Table 5-12 Control word SatzAnw for positioning

STW 1	Satz Anw

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Activate MDI (from SW 7.1)	Reserved	Activate ang. incr. encoder, handwheel (from SW 8.1)	Angular incremental encoder handwheel evaluation, bit 1 (from SW 8.1)	Angular incr. encoder handwheel evaluation, bit 0 (from SW 8.1)	Reserved	Reserved	Reserved	Reserved	Reserved	2^5	2^4	2^3	2^2	2^1	2^0

Bits 5 to 0: Block selection (Traversing block 0 to 63)

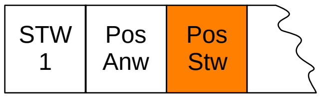
Note:

The control signals, from the perspective of "SIMODRIVE 611 universal", are input signals and are described in Chapter 6.4.3.

Also refer in the index under "Input signal, digital ...").

Control word PosStw (pos mode)

Table 5-13 Control word (PosStw) for positioning



Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Bits 15 to 8: Reserved

Invert the angular incr. encoder input (from SW 3.5)
Activate teach–in (edge) (from SW 4.1)
Incremental jogging (from SW 4.1)
Activates coupling (from SW 3.3)
Fixed end stop, sensor (from SW 3.3)
Reference cams
Set reference point
Tracking operation

Note:
The control signals, from the perspective of SIMODRIVE 611 universal are input signals and are described in Chapter 6.4.3 (also refer to the index entry under Input signal, digital ...).

Control word Over (pos mode)

The percentage value for the velocity override is specified using this control word.

Normalization of the override (P0883)

The override normalization is defined using P0883 (override evaluation PROFIBUS).

$$\text{Actual override} = \frac{\text{P0883}}{16384} \cdot \text{Over}$$

Notice

As the drive cannot rotate with Over = 0 %, then it is important for PPO types 2, 4 and 5, that a practical value (greater than 0%) is in this control word.

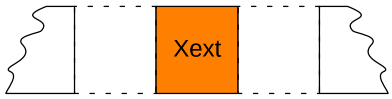
Negative values are interpreted as maximum value, as this control word is viewed unsigned.

Control word Xext (pos mode) (from SW 4.1)

Using this control word, a master drive can control a slave drive with a position reference value.

Xext can be connected with the XsollP or XistP quantities from the master drive.

When using a SIMODRIVE 611 universal in the n–set mode as master drive, a connection can be made with the actual value Gx_XIST1 from the encoder interface.



Data transfer format: P0895 and P0896 define the input format

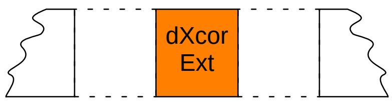
The following applies: $\text{Position in MSR} = \text{input value} \cdot \dfrac{\text{P0896}}{\text{P0895}}$

Note

An input evaluation of the setpoints received via the source is only made for a coupling via the angular incremental encoder (P0891 = 0 or 1) and via PROFIBUS–DP (P0891 = 4).

Control word dXcorExt (pos mode) (from SW 4.1)

The correction value, by which the position reference value jumps, e.g. when referencing in the master drive (publisher) can also be read–in and taken into account in the slave drive (subscriber) using this control word.

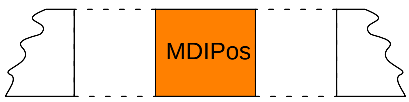


Data transfer format: P0895 and P0896 define the input format

The following applies: $\text{Position in MSR} = \text{input value} \cdot \dfrac{\text{P0896}}{\text{P0895}}$

Control word MDIPos (pos mode) (from SW 7.1)

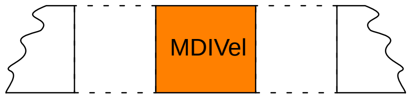
For MDI blocks, the position is transferred via this control word.



Data transfer format: Units as for parameter P0081:64 in MSR
Limits: min: –200000000 MSR
max: 200000000 MSR

Control word MDIVel (pos mode) (from SW 7.1)

For MDI blocks, the speed is transferred via this control word.



Transfer format:Units as for parameter P0082:64 in c*MSR/min
Limits min: 1000 c*MSR/min
max: 2000000000 c*MSR/min

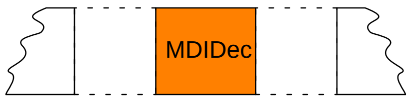
Control word MDIAcc (pos mode) (from SW 7.1)

For MDI blocks, the acceleration override is transferred via this control word.

Data transfer format: Units as for parameter P0083:64 in %
Limits: min: 1 %
max: 100 %

Control word MDIDec (pos mode) (from SW 7.1)

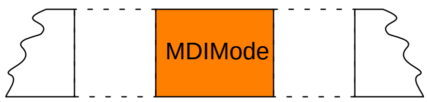
For MDI blocks, the deceleration override is transferred via the control word.



Data transfer format: Units as for parameter P0084:64 in %
Limits: min: 1 %
max: 100 %

Control word MDIMode (pos mode) (from SW 7.1)

For MDI blocks, the mode is transferred via this control word.



Data transfer format: Units as for parameter P0087:64 in Hex

The following ID is only active for MDI:
x0x = ABSOLUTE
x1x = RELATIVE
x2x = ABS_POS
x3x = ABS_NEG
0xx = END
3xx = CONTINUE EXTERNAL

5.6.3 Description of the status words (actual values)

Status word ZSW1 (n–set mode)

Table 5-14 Status word ZSW1 for the n–set mode

ZSW 1	n–ist–h	n–ist–l	ZSW 2

Bit	Meaning
15	Spindle positioning on (from SW 5.1)
14	Open–loop torque controlled mode
13	Function generator active (from SW 6.1)
12	Reserved
11	Reserved
10	Comparison value reached/comparison value not reached
9	Control requested/no control possible
8	$n_{set} = n_{act}$
7	Warning present/no warning present
6	Power–on inhibit/no power–on inhibit
5	No OFF 3 present/OFF 3 present
4	No OFF 2 present/OFF 2 present
3	Fault present/no fault present
2	Status, controller enable
1	Ready or no fault
0	Ready to be powered–up/not ready to be powered–up

Note:

From the perspective of SIMODRIVE 611 universal, status signals are output signals and are described in Chapter 6.4.6.

Also refer in the index under ”Output signal, digital ...”).

5

Status word ZSW1 (pos mode)

Table 5-15 Status word ZSW1 for positioning

ZSW 1	Pos Anw	Pos Zsw	ZSW 2

Request passive referencing (from SW 5.1)
Reserved
Drive stationary/drive moving
Setpoint acknowledge (edge)
Reference point set/no reference point set
Reference position reached/outside reference position
Control requested/no control possible
No following error/following error

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Warning present/no warning present
Power–on inhibit/no power–on inhibit
No OFF 3 present/OFF 3 present
No OFF 2 present/OFF 2 present
Fault present/no fault present
Status, controller enable
Ready or no fault
Ready to be powered–up/not ready to be powered–up

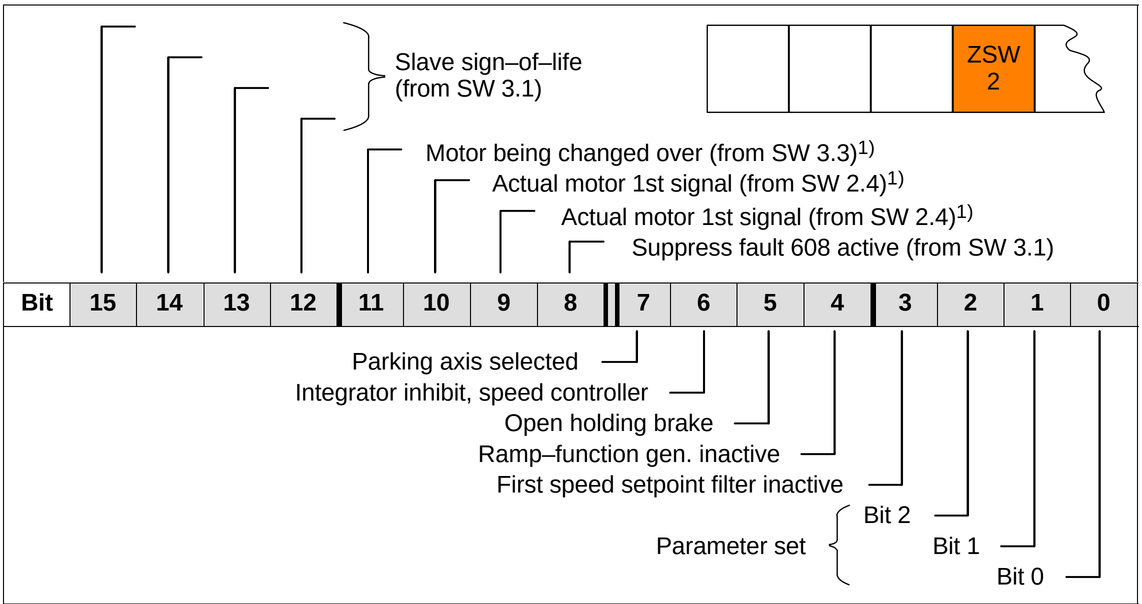
Note:

From the perspective of SIMODRIVE 611 universal, status signals are output signals and are described in Chapter 6.4.6.

Also refer in the index under ”Output signal, digital ...”).

Status word ZSW2

Table 5-16 Status word ZSW2

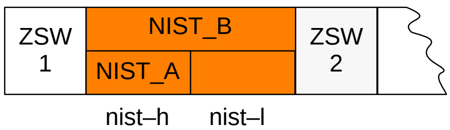


Note:
From the perspective of SIMODRIVE 611 universal, status signals are output signals and are described in Chapter 6.4.6.
Also refer in the index under ”Output signal, digital ...”).

1) Only available in the n–set mode

Status word NIST_A NIST_B

For closed–loop speed controlled operation, the speed actual value is displayed as follows:



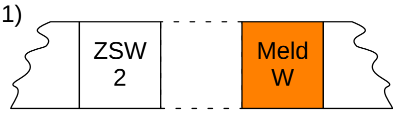
NIST_A (nist–h) —> lower resolution
NIST_B (nist–(h+l)) —> higher resolution

Note

The speed actual value is signaled in the same format as the speed setpoint is specified
(refer to control word NSOLL_A (nsoll–h) and NSOLL_B (nsoll–(h+l)).

Status word MeldW

Table 5-17 Status word MeldW



Bit	Meaning
15	Spindle position reached (spindle position 2, from SW 5.1)
14	Position reached (spindle position 1, from SW 5.1)
13	Pulses enabled (from SW 3.1)
12	Reserved
11	Reserved
10	Power module current not limited (from SW 3.1)
9	Reserved
8	$n_{set} = n_{act}$
7	Heatsink temperature pre–warning
6	Motor overtemperature pre–warning
5	Variable signaling function
4	DC link monitoring $V_{DC\ link} > V_x$
3	$\| n_{act} \| < n_x$
2	$\| n_{act} \| < n_{min}$
1	$\| M \| < M_x$
0	Ramp–up completed

Note:

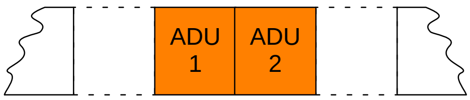
From the perspective of SIMODRIVE 611 universal, status signals are output signals and are described in Chapter 6.4.6.

Also refer in the index under "Output signal, digital ...").

Status word ADU1

ADU2

The actually converted values of the 2 analog inputs of a drive are displayed using these status words.



Status word	Analog input	
ADU1	X451	terminal 56.x/14.x
ADU2	X451	terminal 24.x/20.x

Note

The parameters available to parameterize the analog inputs are still valid (refer to Chapter 6.6).

Data transfer format: $4000_{hex} \doteq 10$ V

Update rate at which this signal is provided:

- Clock–cycle synchronous PROFIBUS–DP
  —> generally: DP clock cycle, sensed at instant in time T_i
- non–clock–cycle synchronous PROFIBUS–DP
  —> n–set mode: Position controller clock cycle (P1009)
  —> pos mode: Interpolation clock cycle (P1010)

Status word DIG_IN (from SW 3.1)

The digital inputs at the drive can be read via the PROFIBUS and evaluated on the master side using this status word.

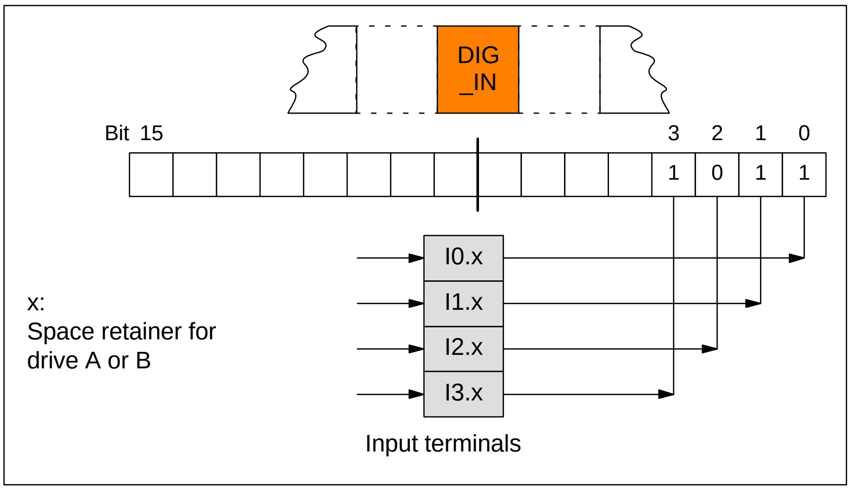
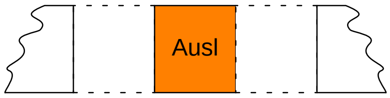


Fig. 5-12 Status word DIG_IN (from SW 3.1)

Status word Ausl

This status word is used to display the ratio between the actual torque and torque limit or between the actual power and the power limit.



Note

The utilization value is smoothed using P1251 (time constant (smoothing) motor utilization).

Data transfer format: $7FFF_{hex} \doteq 100\ \%$

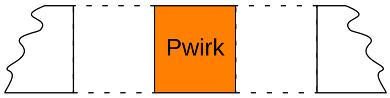
Update rate at which this signal is provided:

- Clock–cycle synchronous PROFIBUS–DP
  —> n–set mode: Position controller clock cycle (T_{MAPC}) of the master
  —> pos mode: Position controller clock cycle (P1009)
- non–clock–cycle synchronous PROFIBUS–DP
  —> n–set mode: Position controller clock cycle (P1009)
  —> pos mode: Interpolation clock cycle (P1010)

Status word Pwirk

The actual drive active power is displayed using this status word.

The active power is calculated from the speed actual value and the actual torque setpoint. Contrary to the torque and power limits, in this case, the current limiting is not taken into account.



Data transfer format: 100 ≙ 1 kW

Update rate at which this signal is provided:

- Clock–cycle synchronous PROFIBUS–DP

  —> n–set mode: Position controller clock cycle (T_{MAPC}) of the master

  —> pos mode: Position controller clock cycle (P1009)

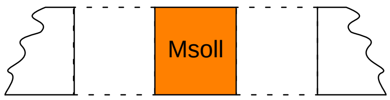
- non–clock–cycle synchronous PROFIBUS–DP

  —> n–set mode: Position controller clock cycle (P1009)

  —> pos mode: Interpolation clock cycle (P1010)

Status word Msoll

The drive torque is displayed using this status word.



Normalization of Msoll (P0882)

The normalization of Msoll is defined (from SW 4.1) using P0882 (evaluation, torque setpoint PROFIBUS).

actual torque setpoint for

- synchronous motors:

$$\text{Torque setpoint [Nm]} = \text{P1118} \cdot \text{P1113} \cdot \frac{\text{P0882}}{4000_{hex}} \cdot \text{Msoll}$$

- Induction motors:

$$\text{Torque setpoint [Nm]} = \frac{60 \cdot \text{P1130} \cdot 1000}{2\,\pi \cdot \text{P1400}} \cdot \frac{\text{P0882}}{4000_{hex}} \cdot \text{Msoll}$$

Note

The reference torque is displayed in P1725 (normalization, torque setpoint).
The torque value is smoothed via P1252 (transition frequency, torque setpoint smoothing).

Transfer format: 4000_{Hex} = 16384 ≙ reference torque (in P1725)

Update rate at which this signal is provided:

- Clock–cycle synchronous PROFIBUS–DP

  —> generally: DP clock cycle, sensed at instant in time T_i

- non–clock–cycle synchronous PROFIBUS–DP

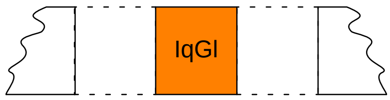
  —> n–set mode: Position controller clock cycle (P1009)

  —> pos mode: Interpolation clock cycle (P1010)

Status word IqGl (from SW 3.1)

The actual smoothed torque–generating current Iq of the drive is displayed using this status word.

The smoothing can be set using P1250 (transition frequency, current actual value smoothing).



Transfer format: 4000_{Hex} = 16384 ≙ P1107 (transistor limit current)

Update rate at which this signal is provided:

- Clock–cycle synchronous PROFIBUS–DP
  —> generally: DP clock cycle, sensed at instant in time T_i
- non–clock–cycle synchronous PROFIBUS–DP
  —> n–set mode: Position controller clock cycle (P1009)
  —> pos mode: Interpolation clock cycle (P1010)

5

Status word QZsw (pos mode) (from SW 4.1)

Table 5-18 Status word QZsw

Bit	Meaning
15 – 8	Reserved
7 – 2	Reserved
1	Request passive referencing (from SW 5.1)
0	Correction, external reference value via dXcor (from SW 4.1)

Note:

From the perspective of SIMODRIVE 611 universal, status signals are output signals and are described in Chapter 6.4.6.

Also refer in the index under ”Output signal, digital ...”).

Status word AktSatz

Table 5-19 Status word AktSatz for positioning

ZSW 1	Akt Satz	Pos Zsw	ZSW 2

Bit	Meaning
15	MDI active (from SW 7.1)
14	External block change (from SW 7.1)
13	Angular incremental encoder handwheel active (from SW 8.1)
12	Angular incremental encoder handwheel evaluation, bit 1 (from SW 8.1)
11	Angular incr. encoder handwheel evaluation, bit 0 (from SW 8.1)
10	Reserved
9	Reserved
8	Reserved
7	Reserved
6	Reserved
5	Status, block selection (Traversing block 0 to 63): 2^5
4	2^4
3	2^3
2	2^2
1	2^1
0	2^0

Note:

As long as the block is not active, a –1 is displayed. The actual block number is displayed with the input signal ”activate traversing task”.

From the perspective of SIMODRIVE 611 universal, status signals are output signals and are described in Chapter 6.4.6.

Also refer in the index under ”Output signal, digital ...”).

Status word PosZsw (pos mode)

Table 5-20 Status word PosZsw for positioning

ZSW 1 | Akt Satz | Pos Zsw

Bit	Meaning
15	Teach–in executed (from SW 4.1)
14	Traverse to fixed end stop active (from SW 3.3)
13	Fixed endstop clamp. torque reached (from SW 3.3)
12	Fixed end stop reached (from SW 3.3)
11	Direct output 2 via the traversing block
10	Direct output 1 via the traversing block
9	Cam switching signal 2
8	Cam switching signal 1
7	Plus software limit switch actuated
6	Minus software limit switch actuated
5	Axis moves backwards
4	Axis moves forwards
3	In synchronism (from SW 3.3)
2	Setpoint static
1	Velocity limiting active
0	Tracking mode active

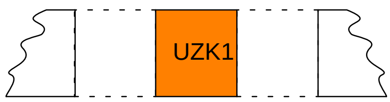
Note:

From the perspective of SIMODRIVE 611 universal, status signals are output signals and are described in Chapter 6.4.6.

Also refer in the index under ”Output signal, digital ...”).

Status word UDClink1 (from SW 8.3)

The actual DC link voltage in the drive is displayed using this status word.



Data transfer format: hexadecimal, non–normalized
e.g.: 258_{hex} = 600_{dec} = 600 V

The reading of the status word UZK1 should be configured in the standard telegram (P0922 = 0; refer to Chapter 5.6.5).

Status word XistP (pos mode) (from SW 3.1)

Position actual value (positioning)

P1792 = 1 —> XistP is received from the motor meas. system

P1792 = 2 —> XistP is received from the direct measuring system

Table 5-21 Status word XistP (from SW 3.1)

XistP (from SW 3.1)									Comment
Bit 31[1)]	**24**	**23**	**16**	**15**	**8**	**7**	**0**	**Decimal values**	
7	F	F	F	F	F	F	F	2 147 483 647	Highest value
	:				:			:	:
0	0	0	0	0	0	0	0	0	XistP = 0[2)]
F	F	F	F	F	F	F	F	–1	XistP = –1
	:				:			:	:
8	0	0	0	0	0	0	0	–2 147 483 648	Lowest value

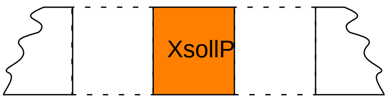
1) Sign bit: Bit = 0 —> positive value, bit = 1 —> negative value
2) Resolution: 1 digit ≙ 1 measuring system grid (MSR)

Transfer format: P0884 and P0896 define the position output format

The following applies: $\text{Output value} = \text{position in MSR} \cdot \frac{P0884}{P0896}$

Status word XsollP (pos mode) (from SW 4.1)

The actual position reference value at the output of the interpolator or at the input of the fine interpolator is displayed in the drive using this status word.

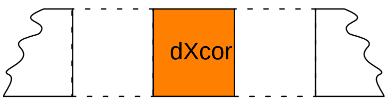


Transfer format: P0884 and P0896 define the position output format

The following applies: $\text{Output value} = \text{position in MSR} \cdot \frac{P0884}{P0896}$

Status word dXcor (pos mode) (from SW 4.1)

The correction value by which the position reference value jumps, e.g. when referencing in the master drive (publisher) is displayed in the drive using this status word.



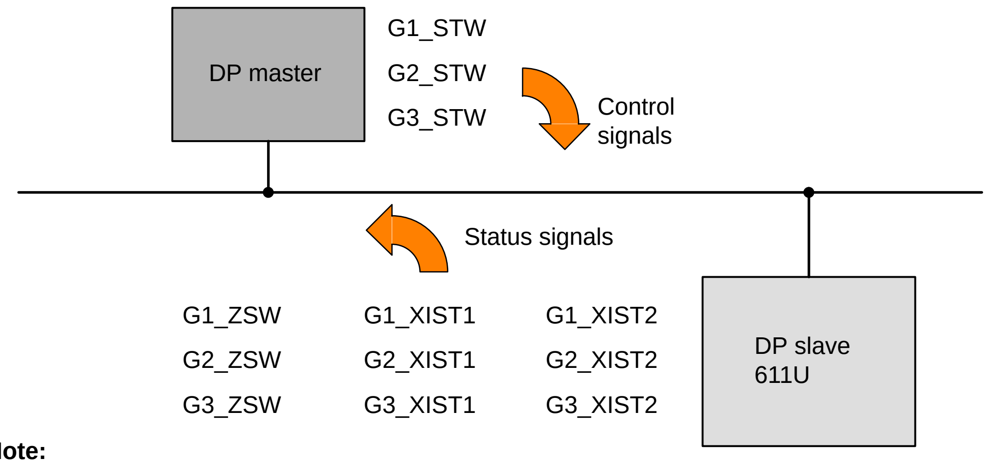
Transfer format: P0884 and P0896 define the position output format

The following applies: $\text{Output value} = \text{position in MSR} \cdot \frac{P0884}{P0896}$

5.6.4 Encoder interface (n–set mode, from SW 3.1)

Encoder interface process data

The encoder interface comprises the following process data:



Note:

G1_ ...	Encoder 1	—> Motor encoder	Drives A, B: X411, X412
G2_ ...	Encoder 2	—> Direct meas. system	Only drive A: X412 (from SW 3.3)
G3_ ...	Encoder 3	—> Additional meas. system	X472 (only for ”SIMODRIVE 611 universal E”)

Fig. 5-13 Process data of the encoder interface

Note

- The process data of the encoder interface can be included in the telegram when configuring the process data.
  —> Refer to Chapter 5.6.5
  – Encoder 1: Standard telegram 3 or 102 (refer to P0922)
  – Encoder 2: Standard telegram 103 (refer to P0922)
  – Enc. 1 and 3: Standard telegram 104 (refer to P0922)
- The process data for encoder 2 must be activated via P0879.12.
- The description of this process data can be taken from the following literature:
  Reference: /PPA/, PROFIdrive Profile Drive Technology

Gx_STW Encoder x control word

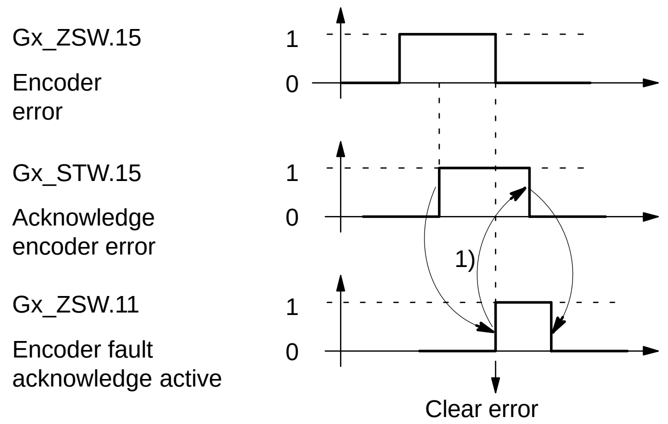
x: Space retainer for encoder 1, 2 or 3

—> to control the encoder functionality

Table 5-22 Description of the individual signals in the encoder control word (Gx_STW)

<table>
<tr><th>Bit</th><th colspan="2">Name</th><th colspan="2">Signal status, description</th></tr>
<tr><td>0</td><td rowspan="9">Find reference marker
or
Flying measurement</td><td rowspan="4">Functions</td><td colspan="2" rowspan="4">If bit 7 = 0, then find reference marker request applies:
Bit Meaning
0 Function 1 Reference marker 1
1 Function 2 Reference marker 2
2 Function 3 Reference marker 3
3 Function 4 Reference marker 4
If bit 7 = 1, then flying measurement request applies:
Bit Meaning
0 Function 1 Measuring probe, positive edge
1 Function 2 Measuring probe, negative edge
Note:
• Bit x = 1 Request function
Bit x = 0 Do not request function
• The following applies if more than 1 function is activated:
The values for all functions cannot be read until each activated function has been terminated and this has been confirmed in the corresponding status bit (ZSW.0/.1/.2/.3 ”0” signal again).
• Find reference marker
Up to 4 reference markers can be found. Reference markers can also be skipped (e.g. find reference markers 1 and 3).
• Equivalent zero mark
Input terminal I0.x with function number 79 (refer to Chapter 6.4.2)
P0879.13/.14 (refer to Chapter A.1)
• Flying measurement
The positive and negative edge can be activated simultaneously.
The measuring probe signal is recognized depending on the direction. The values are read out in succession.
Input terminal I0.x with function number 80 (refer to Chapter 6.4.2)</td></tr>
<tr><td>1</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td><td rowspan="3">Command</td><td colspan="2" rowspan="3">Bit 6, 5, 4 Meaning
000 –
001 Activate function x
010 Read value x
011 Abort function x</td></tr>
<tr><td>5</td></tr>
<tr><td>6</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Mode</td><td>1</td><td>Flying measurement</td></tr>
<tr><td>0</td><td>Find reference marker (zero marker or BERO proximity switch)</td></tr>
</table>

Table 5-22 Description of the individual signals in the encoder control word (Gx_STW), continued

Bit	Name	Signal status, description	
8 ... 12	–	Reserved	
13	Request absolute value cyclic	1	Request to cyclically transfer the absolute track of the absolute value encoder (EnDat encoder) via Gx_XIST2 Used for (e.g.): • Additional measuring system monitoring • Synchronization during ramp–up
		0	No request
14	Activate parking encoder	1	Request to disable the measuring system monitoring and the actual value sensing Used for (e.g.): Removing an encoder or motor with encoder without having to change the drive configuration and without causing a fault.
		0	No request
15	Acknowledge encoder error	0/1	Request to reset encoder faults  1) Signal must be reset by user
		0	No request

Example 1: Find reference marker

Assumptions for the example:

- Distance–coded reference marker
- Two reference markers (function 1/function 2)
- Closed–loop position control with encoder 1

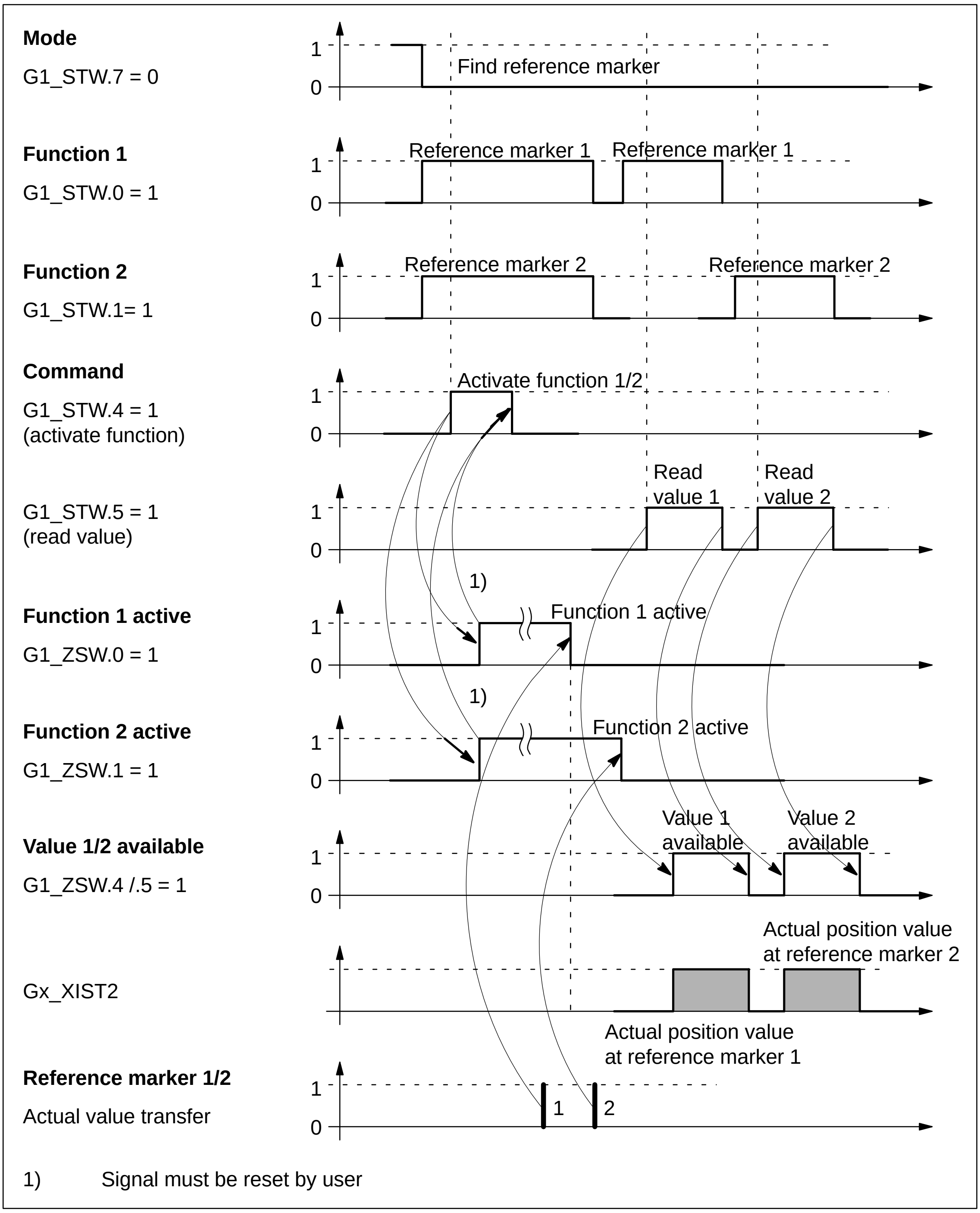


Fig. 5-14 Function chart for ”find reference marker”

Example 2: Flying measurement

Assumptions for the example:

- Measuring probe with a positive edge (function 1)
- Closed–loop position control with encoder 1

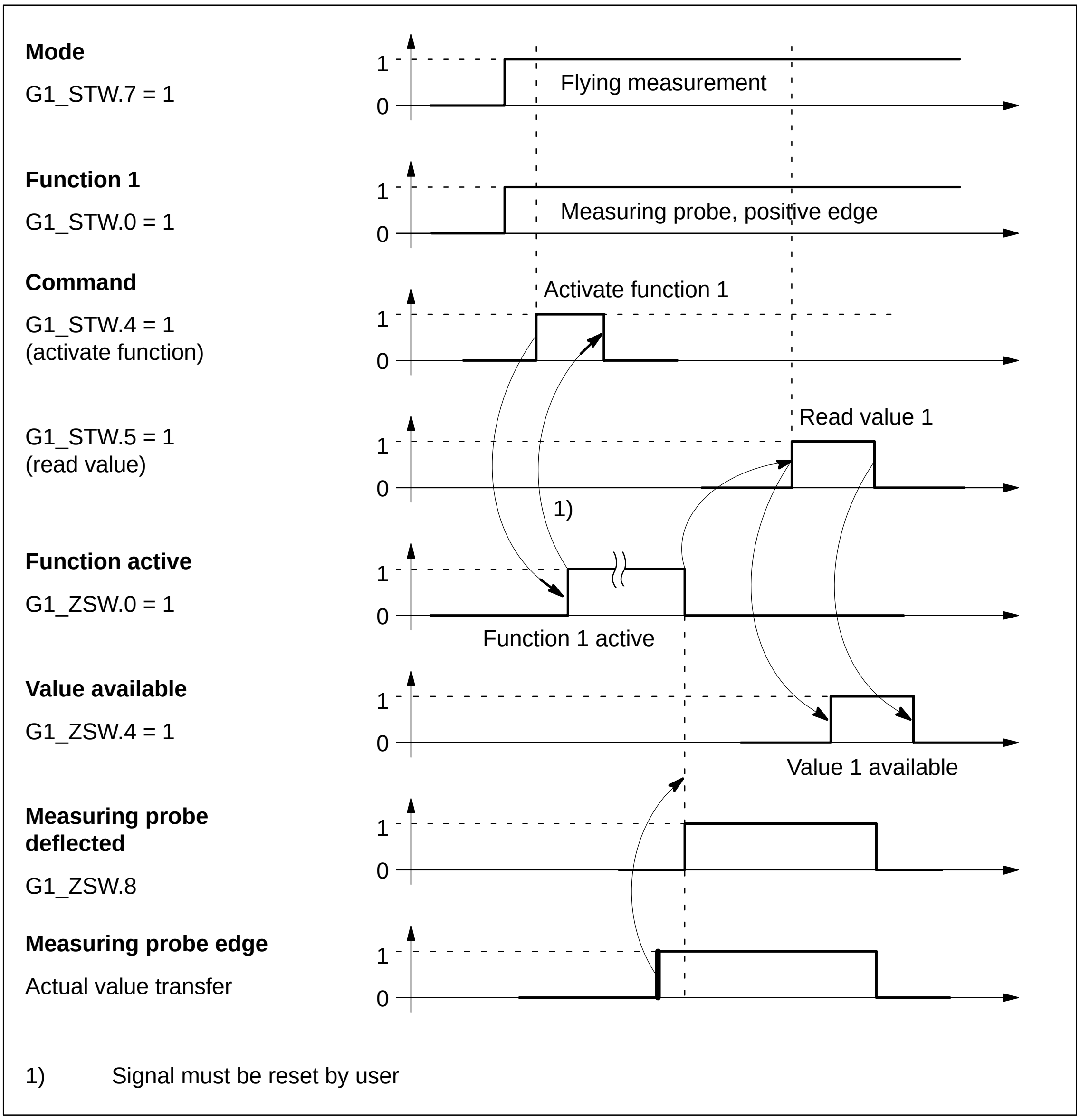


Fig. 5-15 Function chart for ”flying measurement”

Gx_ZSW Encoder x status word

x: Space retainer for encoder 1, 2 or 3

—> to display statuses, acknowledgments, faults/errors etc.

Table 5-23 Description of the individual signals in the encoder status word (Gx_ZSW)

Bit	Name	Signal status, description
0 1 2 3	Find reference marker or Flying measurement **Status:** **Function 1 – 4 active**	Valid for find reference marker and flying measurement Bit Meaning 0 Function 1 Reference marker 1 Measuring probe, positive edge 1 Function 2 Reference mark 2 Measuring probe, negative edge 2 Function 3 Reference marker 3 3 Function 4 Reference marker 4 **Note:** • Bit x = 1 Function active Bit x = 0 Function inactive • P0879 is set to indicate whether it involves a zero mark or an equivalent zero mark (BERO). The equivalent zero mark must be parameterized at input terminal I0.x.
4 5 6 7	Find reference marker or Flying measurement **Status:** **Value 1 – 4 available**	Valid for find reference marker and flying measurement Bit Meaning 4 Value 1 Reference marker 1 Measuring probe, positive edge 5 Value 2 Reference mark 2 Measuring probe, negative edge 6 Value 3 Reference marker 3 7 Value 4 Reference marker 4 **Note:** • Bit x = 1 Value available Bit x = 0 Value not available • Only one value can be fetched at a time. Reason: Only one shared status word Gx_XIST2 is available for reading the values. • The measuring probe must be parameterized at input terminal I0.x.
8	Find reference marker or Flying measurement Measuring probe deflected	1 Measuring probe deflected 0 Measuring probe is not deflected
9 10	–	Reserved
11	Encoder fault acknowledge active	1 Encoder fault acknowledge active **Note:** Refer under STW.15 (acknowledge encoder error) 0 No acknowledgement active
12	–	Reserved

Table 5-23 Description of the individual signals in the encoder status word (Gx_ZSW), continued

Bit	Name	Signal status, description	
13	Transmit cyclic absolute value	1	Acknowledgement for Gx_STW.13 (request cyclic absolute value) **Note:** Cyclic transmission of the absolute value can be interrupted by a function with higher priority. The bit remains set although no absolute value is transmitted via Gx_XIST2. —> refer to Fig. 5-17 —> refer to Gx_XIST2
		0	No acknowledgement
14	Parking encoder active	1	Acknowledgment for Gx_STW.14 (activate parking encoder)
		0	No acknowledgement
15	Encoder error	1	Encoder or actual value sensing fault present **Note:** The error code is stored in Gx_XIST2
		0	No fault present

Gx_XIST1

Encoder x position actual value 1 —> position actual value

- Resolution: Encoder pulses • 2^n

  n: Fine resolution
  Number of bits for the internal multiplication

  The fine resolution is defined via P1042/P1044.

  P1042 Encoder 1, fine resolution G1_XIST1

  P1044 Encoder 2 fine resolution G2_XIST1

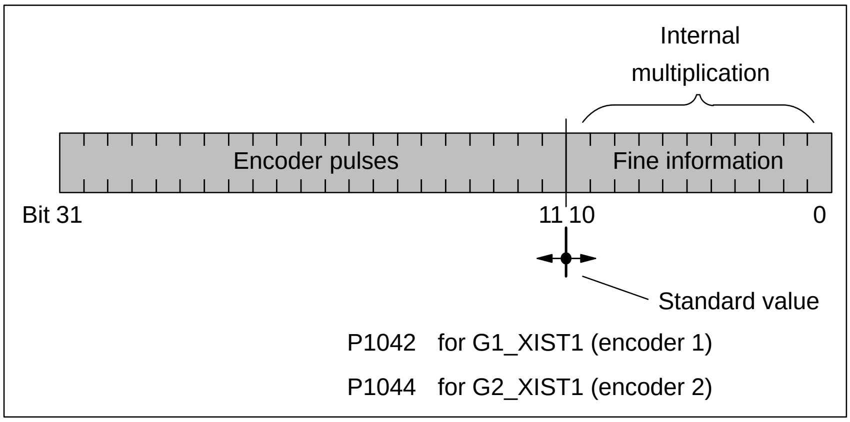


Fig. 5-16 Partitioning and settings for Gx_XIST1

- Encoder pulses
  - The following applies for encoders with sin/cos 1Vpp:

    Encoder pulses = No. of sinusoidal signal periods
  - The following applies for resolvers with 12–bit resolution:

    Encoder pulses = 1024 • No. of pole pairs of resolver
  - The following applies for resolvers with 14–bit resolution:

    Encoder pulses = 4096 • No. of pole pairs of resolver
- The following applies after power up: Gx_XIST1 = 0
- An overflow Gx_XIST1 must be viewed from the higher–level control
- In the drive there is no modulo view of Gx_XIST1

Gx_XIST2

Encoder x position actual value 2 —> Additional position actual value

Different values are entered in Gx_XIST2 depending on the function (refer to Fig. 5-17).

- Priorities for Gx_XIST2

  The following priorities should be considered for values in Gx_XIST2:

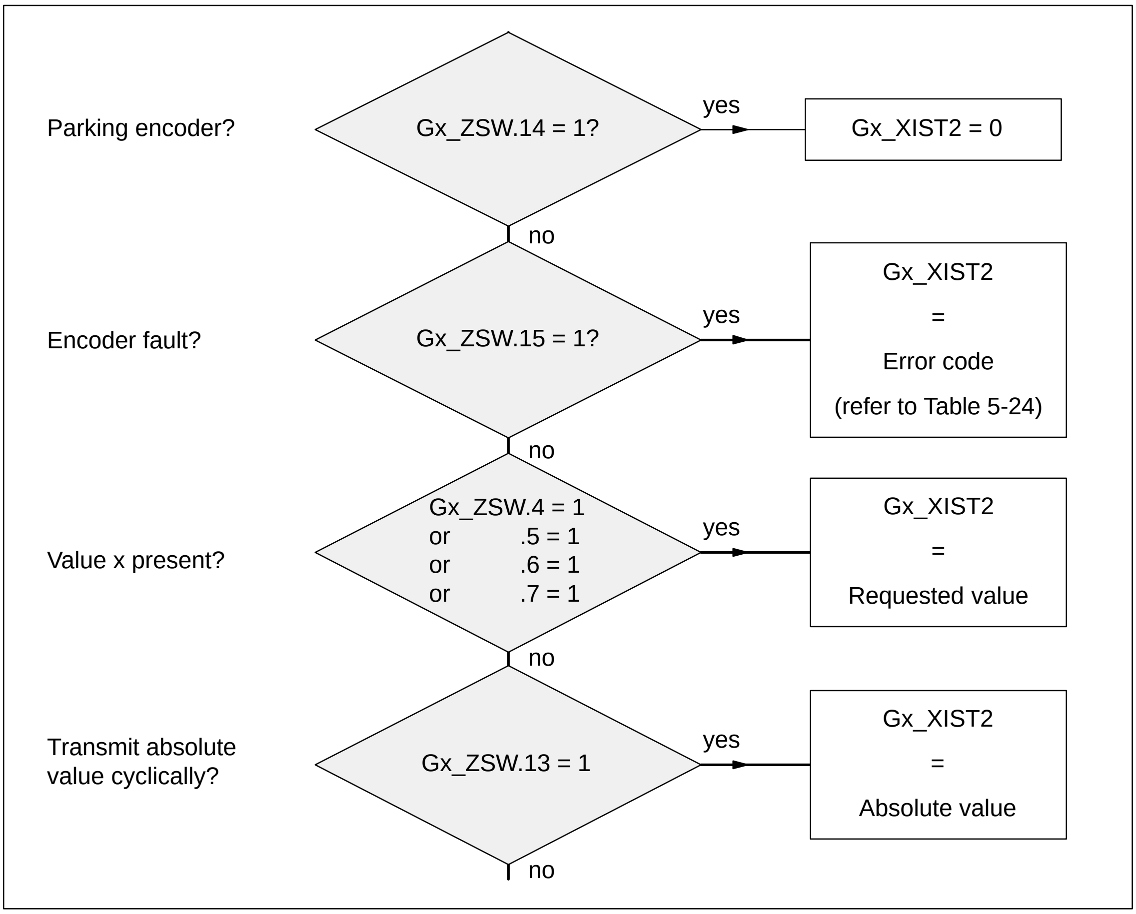


Fig. 5-17 Priorities for functions and Gx_XIST2

- Resolution: Encoder pulses • 2^n

  n: Fine resolution
  Number of bits for the internal multiplication

  The fine resolution is defined via P1043/P1045 or P1042/P1044 for the ”requested value” or the ”absolute value” in Gx_XIST2.

P1043	Encoder 1, fine resolution, absolute track G1_XIST2
P1045	Encoder 2, fine resolution, absolute track G2_XIST2
P1042	Encoder 1, fine resolution G1_XIST1
P1044	Encoder 2 fine resolution G2_XIST1

5

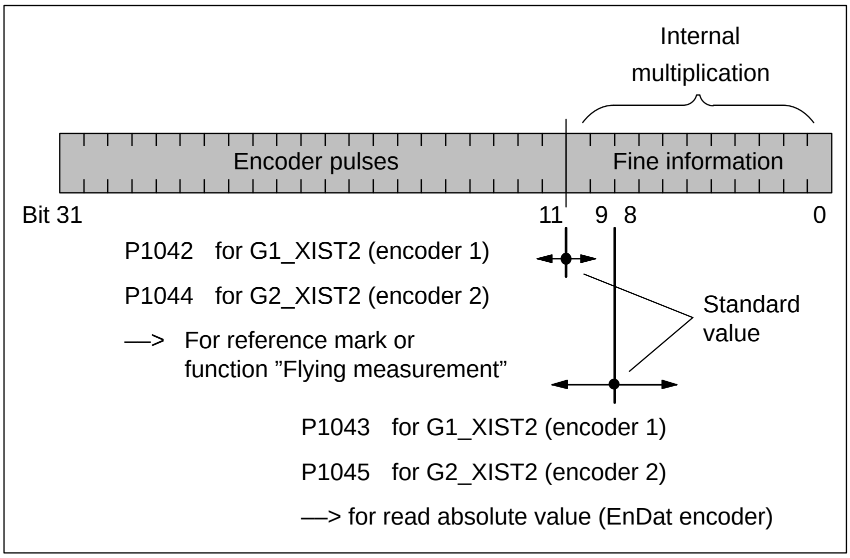


Fig. 5-18 Partitioning and settings for Gx_XIST2

- Encoder pulses
  - The following applies for encoders with sin/cos 1Vpp:

    Encoder pulses = No. of sinusoidal signal periods
  - The following applies for resolvers with 12–bit resolution:

    Encoder pulses = 1024 • No. of pole pairs of resolver
  - The following applies for resolvers with 14–bit resolution:

    Encoder pulses = 4096 • No. of pole pairs of resolver

- Error code

Table 5-24 Fault code in Gx_XIST2

Gx_XIST2	Meaning	Possible causes/description
1_{hex}	Encoder sum error	The fault description should be taken from the following faults (refer to Chapter 7.3.2): • Fault 514 Motor measuring system (encoder 1) • Fault 609 Encoder limiting frequency exceeded • Fault 512 Direct measuring system (encoder 2) • Fault 615 DM encoder limiting frequency exceeded
2_{hex}	Zero mark monitoring	The fault description should be taken from the following faults (refer to Chapter 7.3.2): • Fault 508 Motor measuring system (encoder 1) • Fault 514 Direct measuring system (encoder 2)
3_{hex}	Abort parking encoder	The ”parking axis” was already selected.
4_{hex}	Abort, reference mark search	• A fault is present (Gx_ZSW.15 = 1) • Parking encoder/axis active • ”Flying measurement” function already active • Change of function type • No reference marker programmed • Hardware already busy with another function • Only BERO: BERO not at terminal I0.x • Not BERO: EnDat encoder used • Invalid combination of reference markers for distance–coded encoder (1–2, 3–4, 1–2–3–4 are supported)
5_{hex}	Retrieve reference value interrupted	• A fault is present (Gx_ZSW.15 = 1) • Parking encoder/axis active • No reference marker programmed • Requested value not available • Change of function type
6_{hex}	Abort, flying measurement	• A fault is present (Gx_ZSW.15 = 1) • Parking encoder/axis active • Change of function type • Reference point approach still active • Measuring probe not at terminal I0.x and measuring probe 1 not used • Hardware already busy with another function • Spindle positioning active (P0125=1, from SW 5.1)
7_{hex}	Abort, retrieve measured value	• A fault is present (Gx_ZSW.15 = 1) • Parking encoder/axis active • Change of function type • Requested value not available • Not exactly 1 value to be retrieved
8_{hex}	Abort absolute value transmission on	• EnDat encoder not used

5

Table 5-24 Fault code in Gx_XIST2, continued

Gx_XIST2	Meaning	Possible causes/description
A_{Hex}	Fault when reading the absolute track of the absolute value encoder (EnDat encoder)	For further diagnostics: • —> refer to P1023 IM diagnostics • —> refer to P1033 DM diagnostics
$F01_{Hex}$ (from SW 8.2)	Command is not supported	• Encoder x control word Gx_STW.6 = 1

Limitations and rules when connecting–up encoder 2 (direct measuring system)

The following limitations and rules apply:

1. Which combinations of power module and control board are possible?
   – 1–axis power module with 2–axis control board
     In this case, drive B is not available.
   – 2–axis power module with 2–axis control board
     Drive B is available.
     The following applies: Switch drive B into a passive state (P0700 (B) = 0)
2. Which encoder systems are available for encoder 2?
   Dependent on the 2–axis board with encoder for sin/cos 1 Vpp or for resolver, the following rotary or linear measuring systems can be connected at X412:
   – Incremental encoder with sin/cos 1 Vpp
   – Absolute value encoder with EnDat protocol
   – Resolvers
3. Process data for encoder 2
   – Control word: G2_STW
   – Status words: G2_ZSW, G2_XIST1 and G2_XIST2
4. Encoder 2 is activated with P0879.12 (A) = 1.
   The following applies:
   – This activation becomes effective after POWER ON
   – Encoder 2 must be commissioned
     —> refer to the Start–up Assistant of SimoCom U
   – It is not permissible to operate drive A without a motor measuring system.
     —> The following must be valid: P1027.5 (A) = 0
   – Input terminal I0.B (fast input from drive B) can be assigned a function for encoder 2 from drive A via P0672.
     e.g. the ”equivalent zero mark” or ”flying measurement” function

5.6.5 Configuring process data (from SW 3.1)

Description

The process data structure of the telegram can be defined and configured as follows:

1. By selecting a standard telegram (P0922 > 0)

   Examples:

   – P0922 = 1 standard telegram for n_{set} interface 16 bit

   – P0922 = 101 telegram is as for SW 2.4
   (dependent on the operating mode)

2. By freely–configuring the telegram (P0922 = 0)

   Example:

   – P0922 = 0 **Before SW 4.1:**

   PZD1 to PZD4 are defined as standard
   PZD5 to PZD16 can be freely configured

   From SW 4.1:
   PZD1 remains defined as standard
   PZD2 to PZD16 can be freely configured

   Setpoint direction
   (refer to the parameter overview for P0915:17)
   e.g.:
   P0915:5 = xxxx (required signal ID)
   P0915:6 = yyyy ...

   or
   Actual value direction
   (refer to the parameter overview for P0916:17)
   e.g.:
   P0916:5 = uuuu (requested signal ID)
   P0916:6 = vvvv ...

Note

Standard signals, defined in the PROFIdrive Profile as well as special signals only defined for the ”DP slave 611U” can be configured as setpoints/actual values.

For double–word signals (32 bits) the appropriate signal ID must be configured twice on adjacent process data.
Example:
P0916:7 = 50011 —> G1_XIST1 is assigned to PZD7
P0916:8 = 50011 —> G1_XIST1 is assigned to PZD8
—> as G1_XIST1 is a double word (32 bits), it must be assigned 2 PZDs.

5

Parameter overview

The following parameters are available for the process data configuring:

Table 5-25 Parameters for configuring the process data

No.	Name	Min.	Standard	Max.	Units	Effective
0915:17	PZD setpoint assignment PROFIBUS	0	0	65 535	–	Immedi-ately

... is used to assign the signals to the process data in the setpoint telegram.
Permissible signals for the setpoint direction (control words) are:

ID	Significance	Abbrev.	Length	Mode
• Signals according to the PROFIdrive Profile				
0	No signal	NIL	16 bit	
50001	Control word 1	STW1	16 bit	
50003	Control word 2	STW2	16 bit	
50005	Speed setpoint A (nsoll–h)	NSOLL_A	16 bit	n–set
50007	Speed setpoint B (n–soll (h + l))	NSOLL_B	32 bit	n–set
50009	Encoder 1 control word	G1_STW	16 bit	n–set
50013	Encoder 2 control word (from SW 3.3)	G2_STW	16 bit	n–set
50017	Encoder 3 control word	G3_STW	16 bit	n–set
50025	System deviation (DSC) (from SW 4.1)	XERR	32 bit	n–set
50026	Pos. contr. gain factor (DSC) (from SW 4.1)	KPC	32 bit	n–set
• Equipment–specific signals, especially for ”SIMODRIVE 611 universal”				
50101	Torque reduction	MomRed	16 bit	
50103	Analog output, terminals 75.x/15	DAU1	16 bit	
50105	Analog output, terminals 16.x/15	DAU2	16 bit	
50107	Digital outputs, terminals O0.x to O3.x	DIG_OUT	16 bit	
50109	Target pos. for ”Spindle positioning” (from SW 5.1)	XSP	32 bit	n–set
50111	Distributed inputs	DezEing	16 bit	
50113	Torque setpoint external (read–in, subscriber) (from SW 4.1)	MsollExt	16 bit	
50117	Ctrl word slave–to–slave traffic (from SW 4.1)	QStw	16 bit	pos
50201	Block selection	SatzAnw	16 bit	
50203	Position control word	PosStw	16 bit	pos
50205	Override	Over	16 bit	pos
50207	Ext. position reference value (from SW 4.1)	Xext	32 bit	pos
50209	Correction, ext. pos. ref. val. (from SW 4.1)	XcorExt	32 bit	pos
50221	MDI position (from SW 7.1)	MDIPos	32 bit	pos
50223	MDI velocity (from SW 7.1)	MDIVel	32 bit	pos
50225	MDI acceleration override (from SW 7.1)	MDIAcc	16 bit	pos
50227	MDI deceleration override (from SW 7.1)	MDIDec	16 bit	pos
50229	MDI mode (from SW 7.1)	MDIMode	16 bit	pos

Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
	Note: • For P0922 > 0, the following is valid: P0915:17 is pre–assigned at run–up corresponding to the selected standard telegram in P0922. A change made to P0915:2 to P0915:16 is overwritten again at the next run–up corresponding to the selected standard telegram. • Operating mode not specified —> possible in every operating mode • The following applies for P0922 = 0: **Before SW 4.1** —> From P0915:5 (assignment for PZD5), process data can be freely configured. This means from P0915:5, the signal ID of the requested signal can be entered. **From SW 4.1** —> From P0915:2 (assignment for PZD2), process data can be freely configured, i.e. from P0915:2, the signal ID of the required signal can be entered. P0915:0 No significance P0915:1 PZD1 Configuring not possible (standard setting) P0915:2 PZD2 Free configuring possible (from SW 4.1, before SW 4.1 from PZD5), i.e. enter the required signal ID ... ... P0915:16 PZD16 Free configuring possible, i.e. enter the required signal ID • An overview of the control words is available in Chapter 5.6.1. • The process data for encoder 2 must be activated via P0879.12.					

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Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
0916:17	PZD actual value assignment, PROFIBUS	0	0	65 535	–	Immedi-ately

... is used to assign the signals to the process data in the actual value telegram.

Permissible signals for the actual value direction (status words) are:

ID	Significance	Abbrev.	Length	Mode
• Signals according to the PROFIdrive Profile				
50000 / 0	No signal	NIL	16 bit	
50002	Status word 1	ZSW1	16 bit	
50004	Status word 2	ZSW2	16 bit	
50006	Speed actual value A (nist–h)	NIST_A	16 bit	
50008	Speed actual value B (n–ist (h + l))	NIST_B	32 bit	
50010	Encoder 1 status word	G1_ZSW	16 bit	n–set
50011	Encoder 1 position actual value 1	G1_XIST1	32 bit	n–set
50012	Encoder 1 position actual value 2	G1_XIST2	32 bit	n–set
50014	Encoder 2, status word (from SW 3.3)	G2_ZSW	16 bit	n–set
50015	Encoder 2, pos. act. value 1 (from SW 3.3)	G2_XIST1	32 bit	n–set
50016	Encoder 2, pos. act. value 2 (from SW 3.3)	G2_XIST2	32 bit	n–set
50018	Encoder 3 status word	G3_ZSW	16 bit	n–set
50019	Encoder 3 position actual value 1	G3_XIST1	32 bit	n–set
50020	Encoder 3 position actual value 2	G3_XIST2	32 bit	n–set
• Equipment–specific signals, especially for ”SIMODRIVE 611 universal”				
50102	Message word	MeldW	16 bit	
50104	Analog input, terminals 56.x/14	ADU1	16 bit	
50106	Analog input, terminal 24.x/20	ADU2	16 bit	
50108	Digital inputs, terminals I0. to I3.x	DIG_IN	16 bit	
50110	Utilization	Ausl	16 bit	
50112	Active power	Pwirk	16 bit	
50114	Smoothed torque setpoint	Msoll	16 bit	
50116	Smoothed, torque–generating current Iq	IqGl	16 bit	
50118	Ctrl word slave–to–slave traffic (from SW 4.1)	QZsw	16 bit	pos
50119	DC link voltage (from SW 8.3)	UZK1	16 bit	
50202	Currently selected block	AktSatz	16 bit	
50204	Positioning status word	PosZsw	16 bit	pos
50206	Position actual value (positioning mode)	XistP	32 bit	pos
50208	Position reference value (from SW 4.1)	XsollP	32 bit	pos
50210	Correction, pos. ref. value (from SW 4.1)	Xcor	32 bit	pos

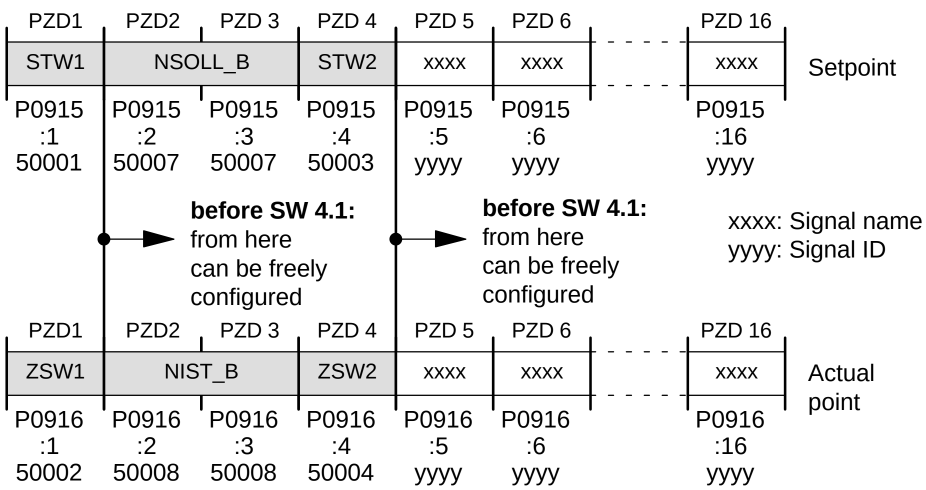
Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
	Note: • The following applies for P0922 > 0: P0915:17 is pre–assigned at run–up corresponding to the selected standard telegram in P0922. A change made to P0916:2 to P0916:16 is again overwritten at the next run–up corresponding to the selected standard telegram. • Operating mode not specified —> possible in every operating mode • The following applies for P0922 = 0: **Before SW 4.1** —> From P0916:5 (assignment for PZD5), process data can be freely configured. This means from P0916:5, the signal ID of the requested signal can be entered. **From SW 4.1** —> From P0916:2 (assignment for PZD2), process data can be freely configured, i.e. from P0916:2, the signal ID of the required signal can be entered. P0916:0 No significance P0916:1 PZD1 Configuring not possible (standard setting) P0916:2 PZD2 Free configuring possible (from SW 4.1, before SW 4.1 from PZD5), i.e. enter the required signal ID ... ... P0916:16 PZD16 Free configuring possible, i.e. enter the required signal ID • An overview of the status words is provided in Chapter 5.6.1. • The process data for encoder 2 must be activated via P0879.12.					

Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
0922	Telegram selection PROFIBUS	0	101	104	–	PO
	... is used to set the free configurability or to select a standard telegram. **Note:** The signal IDs of the process data can be entered into P0915:17 and P0916:17 and pre–assigned default values corresponding to the selection when the drive runs up.					
P0922 =	**0** **The telegram can be freely configured** i.e. PZD1 is pre–assigned default values as standard, dependent on the selected operating mode and PZD2 to PZD16 can be configured using P0915:2 to P0915:16 or P0916:2 to P0916:16 by entering the required signal ID.					

Operating mode:
P0700 = 1 (speed/torque setpoint)



Operating mode:
P0700 = 3 (positioning)

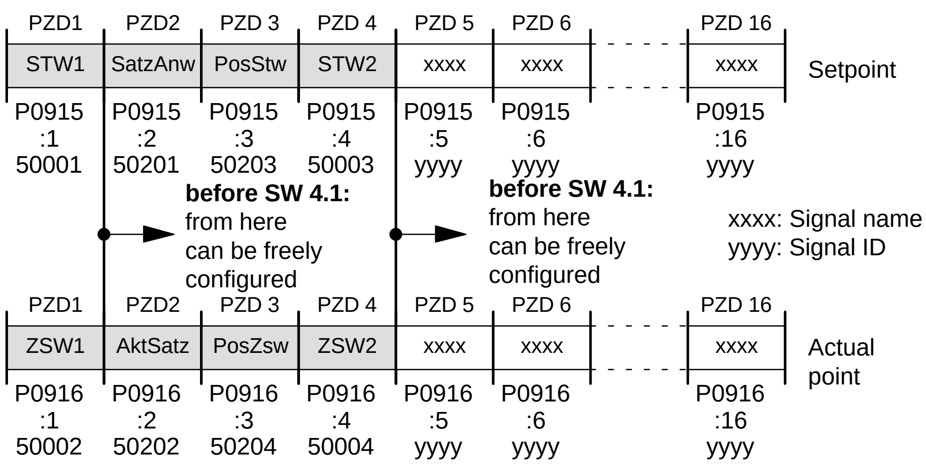


Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 =	**1 Standard telegram 1, n_{set} interface 16 bit**					

PZD1	PZD2	
STW1	NSOLL_A	Setpoint
P0915 :1 50001	P0915 :2 50005	

PZD1	PZD2	
ZSW1	NIST_A	Actual point
P0916 :1 50002	P0916 :2 50006	

No.	Name
P0922 =	**2 Standard telegram 2, n_{set} interface 32 bit without encoder**

PZD1	PZD2	PZD 3	PZD 4	
STW1	NSOLL_B		STW2	Setpoint
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	

PZD1	PZD2	PZD 3	PZD 4	
ZSW1	NIST_B		ZSW2	Actual point
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	

No.	Name
P0922 =	**3 Standard telegram 3, n_{set} interface 32 bit with encoder 1**

PZD1	PZD2	PZD 3	PZD 4	PZD 5	
STW1	NSOLL_B		STW2	G1_STW	Setpoint
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50009	

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	
ZSW1	NIST_B		ZSW2	G1_ZSW	G1_XIST1		G1_XIST2		Actual point
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50010	P0916 :6 50011	P0916 :7 50011	P0916 :8 50012	P0916 :9 50012	

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 = from SW 3.3	**4** **Standard telegram 4, n_{set} interface, 32–bit with encoder 1 and encoder 2**					

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6
STW1	NSOLL_B		STW2	G1_STW	G2_STW
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50009	P0915 :6 50013

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9
ZSW1	NIST_B		ZSW2	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50010	P0916 :6 50011	P0916 :7 50011	P0916 :8 50012	P0916 :9 50012

PZD 10	PZD 11	PZD 12	PZD 13	PZD 14
G2_ZSW	G2_XIST1		G2_XIST2	
P0916 :10 50014	P0916 :11 50015	P0916 :12 50015	P0916 :13 50016	P0916 :14 50016

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 = from SW 4.1	**5** **Standard telegram 5, n_{set} interface with KPC (DSC) and encoder 1**					

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9
STW1	NSOLL_B		STW2	G1_STW	XERR		KPC	
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50009	P0915 :6 50025	P0915 :7 50025	P0915 :8 50026	P0915 :9 50026

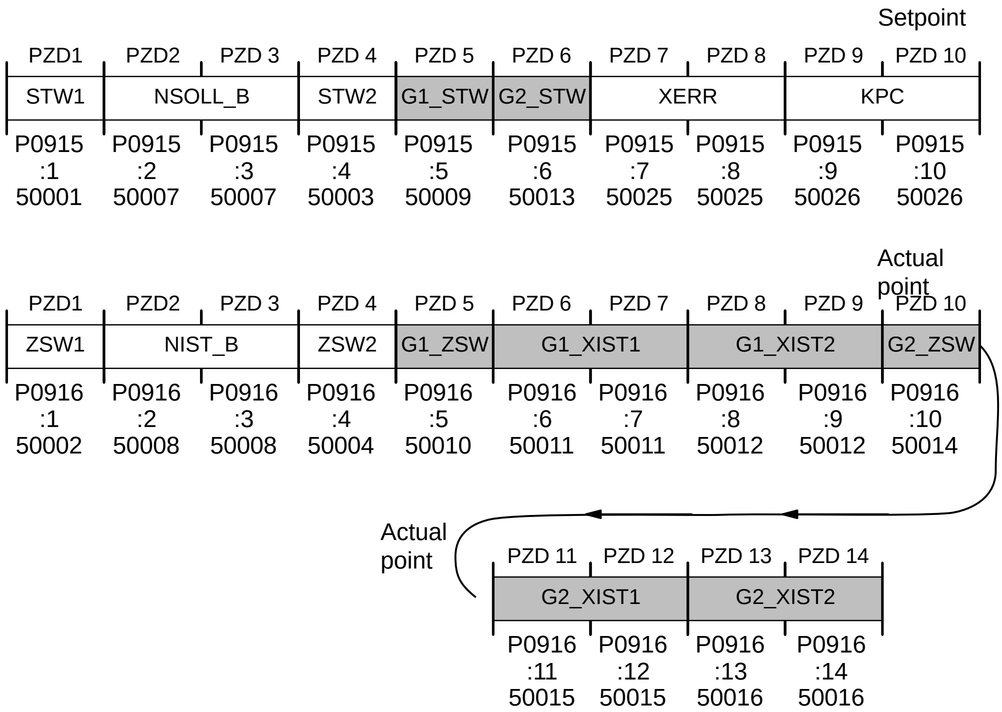
Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9
ZSW1	NIST_B		ZSW2	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50010	P0916 :6 50011	P0916 :7 50011	P0916 :8 50012	P0916 :9 50012

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 = from SW 4.1	**6 Standard telegram 6, n_{set} interface with KPC (DSC) and encoder 1 and encoder 2**					



This process data is associated with the encoder interface (refer to Chapter 5.6.4)

Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 =	**101** **The telegram has the same structure as in SW 2.4**					

this means that the process data are pre–assigned default values as follows depending on the selected operating mode.

Operating mode: P0700 = 1 (speed/torque setpoint)

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7
STW1	NSOLL_B		STW2	MomRed	DAU1	DAU2
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101	P0915 :6 50103	P0915 :7 50105

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
ZSW1	NIST_B		ZSW2	MeldW	ADU1	ADU2	Ausl	Pwirk	Msoll
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102	P0916 :6 50104	P0916 :7 50106	P0916 :8 50110	P0916 :9 50112	P0916 :10 50114

Operating mode: P0700 = 3 (positioning)

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7
STW1	SatzAnw	PosStw	STW2	Over	DAU1	DAU2
P0915 :1 50001	P0915 :2 50201	P0915 :3 50203	P0915 :4 50003	P0915 :5 50205	P0915 :6 50103	P0915 :7 50105

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
ZSW1	AktSatz	PosZsw	ZSW2	MeldW	ADU1	ADU2	Ausl	Pwirk	Msoll
P0916 :1 50002	P0916 :2 50202	P0916 :3 50204	P0916 :4 50004	P0916 :5 50102	P0916 :6 50104	P0916 :7 50106	P0916 :8 50110	P0916 :9 50112	P0916 :10 50114

No.	Name
P0922 =	**102** **Standard telegram 102, n_{set} interface with encoder 1**

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6
STW1	NSOLL_B		STW2	MomRed	G1_STW
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101	P0915 :6 50009

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
ZSW1	NIST_B		ZSW2	MeldW	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102	P0916 :6 50010	P0916 :7 50011	P0916 :8 50011	P0916 :9 50012	P0916 :10 50012

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 = from SW 3.3	**103 Standard telegram 103, n_{set} interface with encoder 1 and encoder 2**					

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7
STW1	NSOLL_B		STW2	MomRed	G1_STW	G2_STW
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101	P0915 :6 50009	P0915 :7 50013

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
ZSW1	NIST_B		ZSW2	MeldW	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102	P0916 :6 50010	P0916 :7 50011	P0916 :8 50011	P0916 :9 50012	P0916 :10 50012

Actual point

PZD 11	PZD 12	PZD 13	PZD 14	PZD 15
G2_ZSW	G2_XIST1		G2_XIST2	
P0916 :11 50014	P0916 :12 50015	P0916 :13 50015	P0916 :14 50016	P0916 :15 50016

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 =	**104 Standard telegram 104, n_{set} interface with encoder 1 and encoder 3**					

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7
STW1	NSOLL_B		STW2	MomRed	G1_STW	G3_STW
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101	P0915 :6 50009	P0915 :7 50017

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
ZSW1	NIST_B		ZSW2	MeldW	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102	P0916 :6 50010	P0916 :7 50011	P0916 :8 50011	P0916 :9 50012	P0916 :10 50012

Actual point

PZD 11	PZD 12	PZD 13	PZD 14	PZD 15
G3_ZSW	G3_XIST1		G3_XIST2	
P0916 :11 50018	P0916 :12 50019	P0916 :13 50019	P0916 :14 50020	P0916 :15 50020

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 = from SW 4.1	**105 Standard telegram 105, n_{set} interface with KPC (DSC) and encoder 1**					

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
STW1	NSOLL_B		STW2	MomRed	G1_STW	XERR		KPC	
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101	P0915 :6 50009	P0915 :7 50025	P0915 :8 50025	P0915 :9 50026	P0915 :10 50026

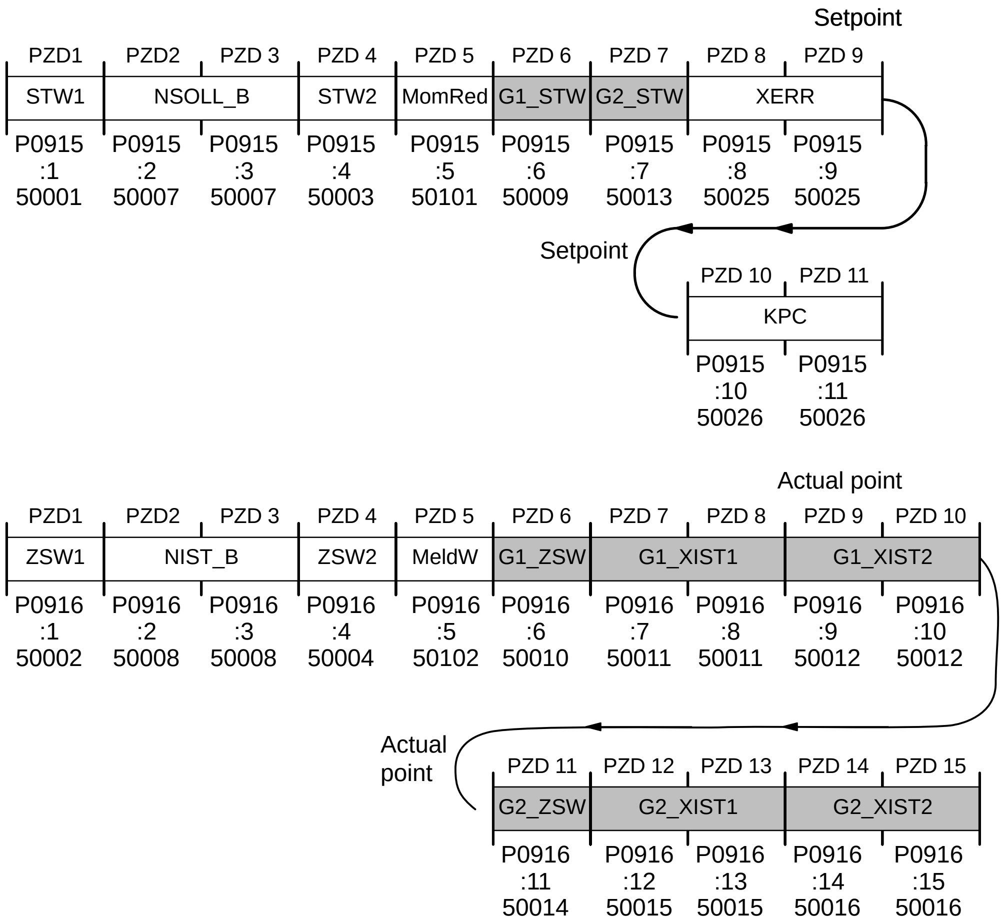
Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
ZSW1	NIST_B		ZSW2	MeldW	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102	P0916 :6 50010	P0916 :7 50011	P0916 :8 50011	P0916 :9 50012	P0916 :10 50012

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 = from SW 4.1	**106** **Standard telegram 106, n_{set} interface with KPC (DSC) and encoder 1 and encoder 2**					



This process data is associated with the encoder interface (refer to Chapter 5.6.4)

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Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 = from SW 4.1	**107** **Standard telegram 107, n_{set} interface with KPC (DSC) and encoder 1 and encoder 3**					

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10	PZD 11
STW1	NSOLL_B		STW2	MomRed	G1_STW	G3_STW	XERR		KPC	
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101	P0915 :6 50009	P0915 :7 50017	P0915 :8 50025	P0915 :9 50025	P0915 :10 50026	P0915 :11 50026

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
ZSW1	NIST_B		ZSW2	MeldW	G1_ZSW	G1_XIST1		G1_XIST2	
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102	P0916 :6 50010	P0916 :7 50011	P0916 :8 50011	P0916 :9 50012	P0916 :10 50012

Actual point

PZD 11	PZD 12	PZD 13	PZD 14	PZD 15
G3_ZSW	G3_XIST1		G3_XIST2	
P0916 :11 50018	P0916 :12 50015	P0916 :13 50015	P0916 :14 50016	P0916 :15 50016

This process data is associated with the encoder interface (refer to Chapter 5.6.4)

No.	Name
P0922 = from SW 4.1	**108** **Standard telegram 108, positioning, master drive for the position reference value coupling (publisher)**

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5
STW1	SatzAnw	PosStw	STW2	Over
P0915 :1 50001	P0915 :2 50201	P0915 :3 50203	P0915 :4 50003	P0915 :5 50205

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
ZSW1	AktSatz	PosZsw	ZSW2	MeldW	XsollP		QZsw	Xcor	
P0916 :1 50002	P0916 :2 50202	P0916 :3 50204	P0916 :4 50004	P0916 :5 50102	P0916 :6 50208	P0916 :7 50208	P0916 :8 50118	P0916 :9 50210	P0916 :10 50210

Table 5-25 Parameters for configuring the process data, continued

No.	Name	Min.	Standard	Max.	Units	Effective
P0922 = from SW 4.1	**109** **Standard telegram 109, positioning, slave drive for the position reference value coupling (subscriber)**					
P0922 = (from SW 7.1)	**110** **Standard telegram 110, positioning with MDI**					

Telegram 109

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
STW1	SatzAnw	PosStw	STW2	Over	Xext		QStw	XcorExt	
P0915 :1 50001	P0915 :2 50201	P0915 :3 50203	P0915 :4 50003	P0915 :5 50205	P0915 :6 50207	P0915 :7 50207	P0915 :8 50117	P0915 :9 50209	P0915 :10 50209

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7
ZSW1	AktSatz	PosZsw	ZSW2	MeldW	XistP	
P0916 :1 50002	P0916 :2 50202	P0916 :3 50204	P0916 :4 50004	P0916 :5 50102	P0916 :6 50206	P0916 :7 50206

Telegram 110

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9
STW1	SatzAnw	PosStw	STW2	Over	MDIPos		MDIVel	
P0915 :1 50001	P0915 :2 50201	P0915 :3 50203	P0915 :4 50003	P0915 :5 50205	P0915 :6 50221	P0915 :7 50221	P0915 :8 50223	P0915 :9 50223

PZD 10	PZD 11	PZD 12
MDIAcc	MDIDec	MDIMode
P0915 :10 50225	P0915 :11 50227	P0915 :12 50229

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7
ZSW1	AktSatz	PosZsw	ZSW2	MeldW	XistP	
P0916 :1 50002	P0916 :2 50202	P0916 :3 50204	P0916 :4 50004	P0916 :5 50102	P0916 :6 50206	P0916 :7 50206

5.6.6 Defining the process data according to the PPO type

Process data in the closed–loop speed–controlled mode

The following process data is transferred in the speed–controlled mode when using standard telegram 101, depending on the particular PPO type:

Table 5-26 Process data in the closed–loop speed controlled mode

					PZD									
					PZD 1 1st word	PZD 2 2nd word	PZD 3 3rd word	PZD 4 4th word	PZD 5 5th word	PZD 6 6th word	PZD 7 7th word	PZD 8 8th word	PZD 9 9th word	PZD 10 10th word
Master → Slave Control words (setpoints)					STW 1	n–soll–h	n–soll–l	STW 2	Mom Red	DAU 1	DAU 2			
					The control words are described in Chapter 5.6.2. The status words are described in Chapter 5.6.3.									
Master ← Slave Status words (actual values)					ZSW 1	n–ist–h	n–ist–l	ZSW 2	Meld W	ADU 1	ADU 2	Ausl	Pwirk	Msoll
PPO1														
PPO2														
PPO3														
PPO4														
PPO5														

Abbreviations:

PPO	Parameter Process data Object	ZSW1	Status word 1
PZD	Process data	n–ist	Speed actual value
STW1	Control word 1	ZSW2	Status word 2
n–soll	Speed setpoint	MeldW	Message word
STW2	Control word 2	ADU1	Analog input, terminal 56.x/14.x
MomRed	Torque reduction	ADU2	Analog input, terminal 24.x/20.x
DAU1	Analog output, terminal 75.x/15	Ausl	Utilization
DAU2	Analog output, terminal 16.x/15	Pwirk	Active power
		Msoll	Smoothed torque setpoint

Note

Operation is also possible with the PPO types which cannot transfer all process data (e.g. PPO1 and PPO3).

PPO type 3 is sufficient for closed–loop speed controlled operation with a simple basic functionality (2 control and 2 status words).

Example: Operating the drive via PROFIBUS in the closed–loop speed controlled mode

The ”SIMODRIVE 611 universal” drive should be operated in the mode ”speed/torque setpoint” with a speed of 1500 RPM via PROFIBUS–DP.

Assumptions for the slave:

- The drive has been completely commissioned is connected to PROFIBUS–DP and is ready to run.
- P0918 (PROFIBUS node address) = 12

Assumptions for the master:

- The DP master is a SIMATIC S7 (CPU: S7–315–2–DP)
- Hardware configuration
  - 1–axis, PPO type 1, node address = 12
  - Part / I address / O address

Part	I address	O address
PKW	272 – 279	272 – 279 (not shown in the example)
PZD	280 – 283	280 – 283

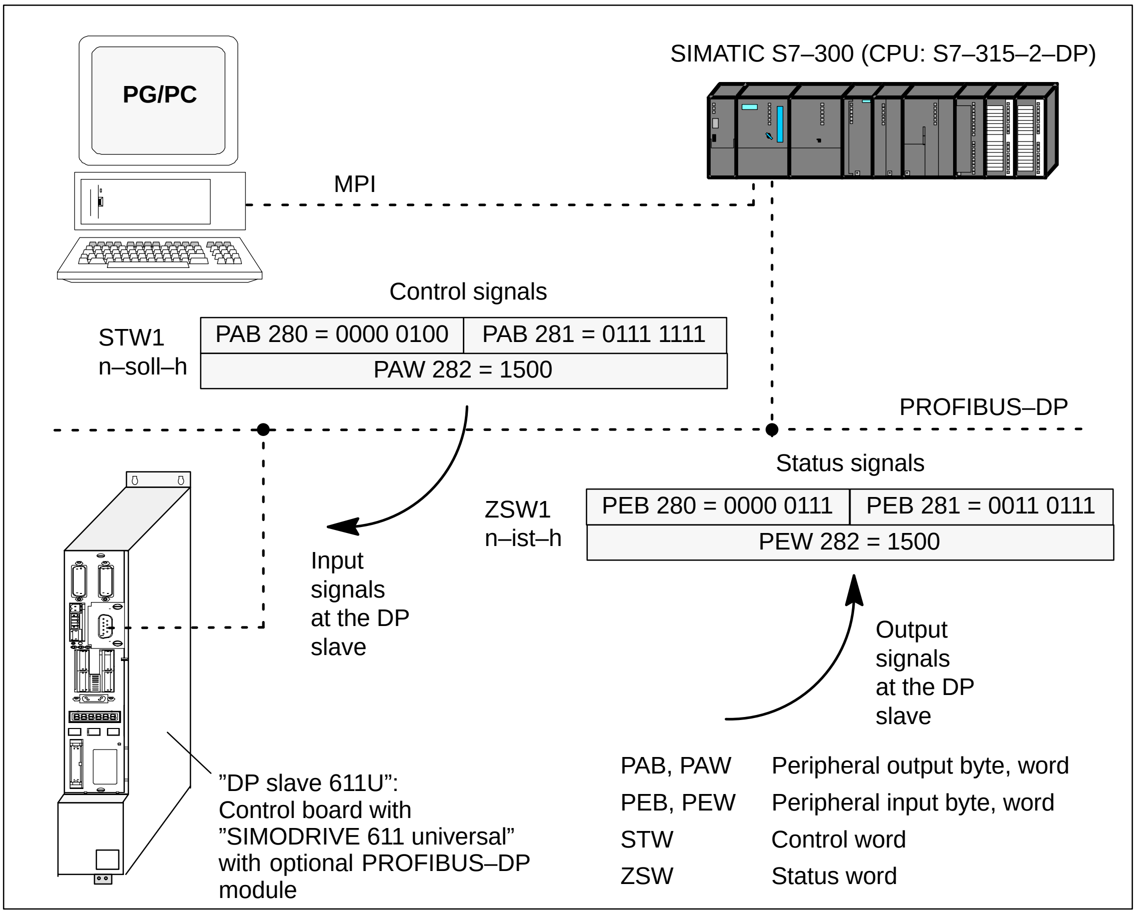


Fig. 5-19 Example: Operate the drive via PROFIBUS

Process data in the positioning mode

Dependent on the PPO type, in the positioning mode, the following process data is transferred when using standard telegram 101:

Table 5-27 Process data in the positioning mode

					PZD									
					PZD 1	PZD 2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
					1st word	2nd word	3rd word	4th word	5th word	6th word	7th word	8th word	9th word	10th word
Master → Slave Control words (setpoints)					STW 1	Satz Anw	Pos Stw	STW 2	Over	DAU 1	DAU 2			
					The control words are described in Chapter 5.6.2. The status words are described in Chapter 5.6.3.									
Master ← Slave Status words (actual values)					ZSW 1	Akt Satz	Pos Zsw	ZSW 2	Meld W	ADU 1	ADU 2	Ausl	Pwirk	Msoll
PPO1														
PPO2														
PPO3														
PPO4														
PPO5														

Abbreviations:

PPO	Parameter Process data Object	ZSW1	Status word 1
PZD	Process data	AktSatz	Currently selected block
STW1	Control word 1	PosZsw	Positioning status word
SatzAnw	Block selection	ZSW2	Status word 2
PosStw	Position control word	MeldW	Message word
STW2	Control word 2	ADU1	Analog input, terminal 56.x/14.x
Over	Override	ADU2	Analog input, terminal 24.x/20.x
DAU1	Analog output, terminal 75.x/15	Ausl	Utilization
DAU2	Analog output, terminal 16.x/15	Pwirk	Active power
		Msoll	Smoothed torque setpoint

Note

Operation is also possible with the PPO types which cannot transfer all process data (e.g. PPO1 and PPO3).

For the positioning mode with a basic functionality, PPO type 3 is sufficient (2 control and 2 status words).

5.6.7 Parameter area (PKW area)

Tasks

For PPO types 1, 2 and 5 for the net data (useful data), a parameter range with 4 words is also transferred.
The following tasks are possible using the parameter range:

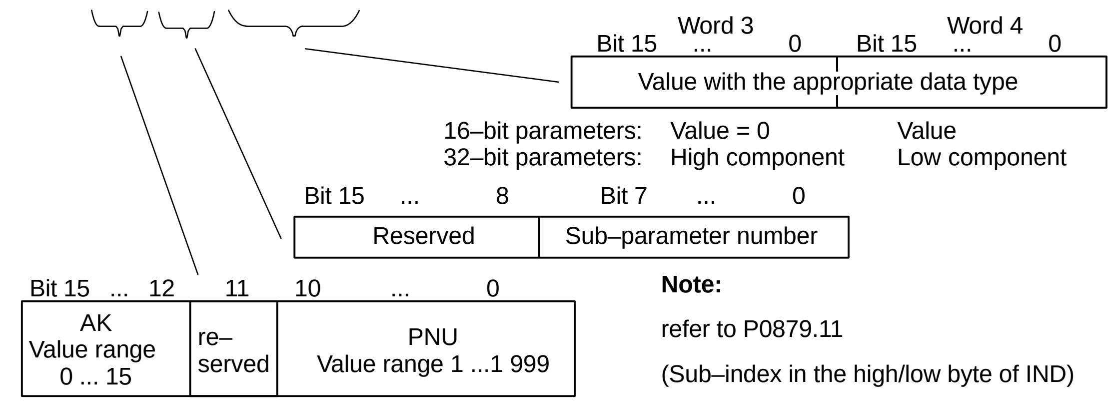
- Request parameter value (reading parameters)
- Change parameter value (write into parameters)
- Request number of array elements

Structure of the PKW area

The PKW area comprises the parameter ID (PKE), the sub–index (IND) and the parameter value (PWE).

Table 5-28 Structure of the parameter area (PKW)

	Net data													
	PKW				PZD									
	PKE	IND	PWE		PZD 1	PZD 2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10
Word	1	2	3	4	1	2	3	4	5	6	7	8	9	10
PPO1														
PPO2														
PPO5														



Note:

refer to P0879.11

(Sub–index in the high/low byte of IND)

Abbreviations:

PPO	Parameter Process data Object
PKW	Parameter ID value
PZD	Process data
PKE	Parameter ID
IND	Sub–index, sub–parameter number, array index
PWE	Parameter value
AK	Task and response ID (refer to Table 5-29 or 5-30)
PNU	Parameter number

Task telegram, IDs

The IDs for the task telegram (master —> slave) should be taken from the following table:

Table 5-29 Task IDs (master —> slave)

Task identification	Function	Response ID (positive)
0	No task	0
1	Request parameter value	1, 2
2	Change parameter value (word)	1
3	Change parameter value (double word)	2
4, 5	–	–
6	Request parameter value (array)	4, 5
7	Change parameter value (array word)	4
8	Change parameter value (array double word)	5
9	Request number of array elements	6
10 (from SW 3.5)	Quickly change the parameter value (array, double word)	5

Note:

- **All** of the ”SIMODRIVE 611 universal” parameters can be read and written into the using the task IDs 6, 8 and 10.
- The negative response ID is 7.
- The IDs are defined so that they indicate which fields of the PK interface must also be evaluated.
- Task 8 Data is first calculated into the control and then a response telegram is sent
- Task 10 Data is calculated into the control and a response telegram is sent at the same time

  For example, in order to be able to issue a start task immediately after a traversing block has been completely transferred, the last write task should have the ID 8.

Response telegram, IDs

The IDs for the response telegram (slave —> master) can be taken from the following table:

Table 5-30 Response IDs (slave —> master)

Response ID	Function
0	No response
1	Transfer parameter value (word)
2	Transfer parameter value (double word)
3	–
4	Transfer parameter value (array word)
5	Transfer parameter value (array double word)
6	Transfer number of array elements
7	Task cannot be executed (with error number)
8, 9 and 10	–

How is a task executed?

The master transfers a task to a slave and repeats this task for at least as long as the associated response is received from the slave.

The slave provides the response until the master has formulated a new task.
For responses, which include parameter values, the slave always cyclically responds with an updated value. This involves all responses to the tasks ”request parameter value” and ”request parameter value (array)”.

Fault evaluation

If tasks cannot be executed, the slave responds as follows:

- Outputs a response ID = 7
- Outputs an error number in word 4 of the parameter area

Table 5-31 Error IDs for ”DP slave 611U”

Fault ID	Error cause
0	Illegal parameter number (the parameter does not exist)
1	Parameter value cannot be changed (Parameter can only be read or is write protected)
2	Upper or lower value limit exceeded
3	Incorrect sub–index
4	No array (parameter does not have any sub–parameter)
5	Incorrect data type (is not required for the type conversion)
6 to 19	not required
20 to 100	Reserved

5

Data types

The data type, assigned to the parameter must be written into the parameter value via the PKW mechanism (refer under data type in the parameter list in Chapter A.1).

Table 5-32 Data types

Data type for ”DP slave 611U”	Explanation	Data type for SIMATIC S7
Integer16	Integer number, 16 bit	INT
Integer32	Integer number, 32 bit	DINT
Unsigned16	Integer number without sign (unsigned) 16 bit	WORD
Unsigned32	Integer number without sign (unsigned) 32 bit	DWORD
Floating point	Floating–point number	REAL

Transferring traversing blocks

For ”SIMODRIVE 611 universal”, the traversing blocks in the ”positioning” operating mode are saved in parameters, and can therefore be read and changed using the PKW mechanism.

Reader’s note

The parameters for the traversing blocks are described in Chapter 6.2.10.

When mapping the traversing blocks to the parameters, the parameter number defines the block components (position, velocity, etc.) and the sub–parameter number of the traversing block number.

Example: P0081:17 Position for traversing block 17

Addressing in the PKW mechanism:

- The parameter ID (PKE) addresses the block components.
- The sub–index (IND) addresses the traversing block number

This means that a complete set can only be read or changed one after the other via the individual components.

From SW 7.1, during positioning, a new position or a new traversing block can be accepted and executed (flying block change) using the function ”MDI” (refer to Chapter 6.2.12).

Rules for processing tasks/responses

1. A task or a response can always only be referred to one parameter.
2. The master must repeat a task until it has received the appropriate response from the slave.
3. The slave provides the response until the master has formulated a new task.
4. The master recognize the response to a task which it issued:
   – by evaluating the response ID
   – by evaluating the parameter number (PNU)
   – also, if required, by evaluating the parameter index (IND)
5. For response telegrams, which include parameter values, the slave always cyclically responds with an updated value. This involves all responses to the tasks ”request parameter value” and ”request parameter value (array)”.

Example: Reading parameters via PROFIBUS

When there is at least one fault, the drive fault buffer (P0945:1 to P0945:8) should be read out via PROFIBUS, and buffered on the master side.

Assumptions for the slave:

- The drive has been completely commissioned is connected to PROFIBUS–DP and is ready to run.
- P0918 = 12 (PROFIBUS node address) has been set

Assumptions for the master:

- The DP master is a SIMATIC S7 (CPU: S7–315–2–DP)
- Hardware configuration
  - 1–axis, PPO type 1, node address = 12
Part	I address	O address
PKW	272 – 279	272 – 279
PZD	280 – 283	280 – 283 (not shown in the example)

What has to be programmed on the master side?

If the input signal from the peripheral (I/O) area E281.3 (ZSW1.3, fault present/no fault present) = ”1” signal, then the following must be executed on the master side (refer to Fig. 5-20):

1. Programming SFC14 and SFC15

   The standard functions SFC14 ”Read slave data” and SFC15 ”write slave data” are required in order to consistently transfer more than 4 bytes.

2. Request parameter value
   - Write into the PKW output signals (PAB 272 –279)
     with
     AK = 6, PNU = 945, IND = 1, PWE = no significance

3. Read parameter value and save
   - Evaluate the PKW input signals (PEB 272 –279)
   - If AK = 4 or 5,
     PNU = 945, IND = 1 and PWE = xx then OK
   - Read and save P945:1 = xx
   - If AK = 7,
     then evaluate the fault number in PEW 278 (refer to Table 5-31)

4. Repeat points 1 and 2 to read the other sub–parameters of the fault condition

P945:2	—> PNU = 945, IND = 2
to	to
P945:8	—> PNU = 945, IND = 8

   This repetitive procedure can be exited if a ”0” is in one of the sub–parameters.
   All of the faults of the last fault situation are then detected.

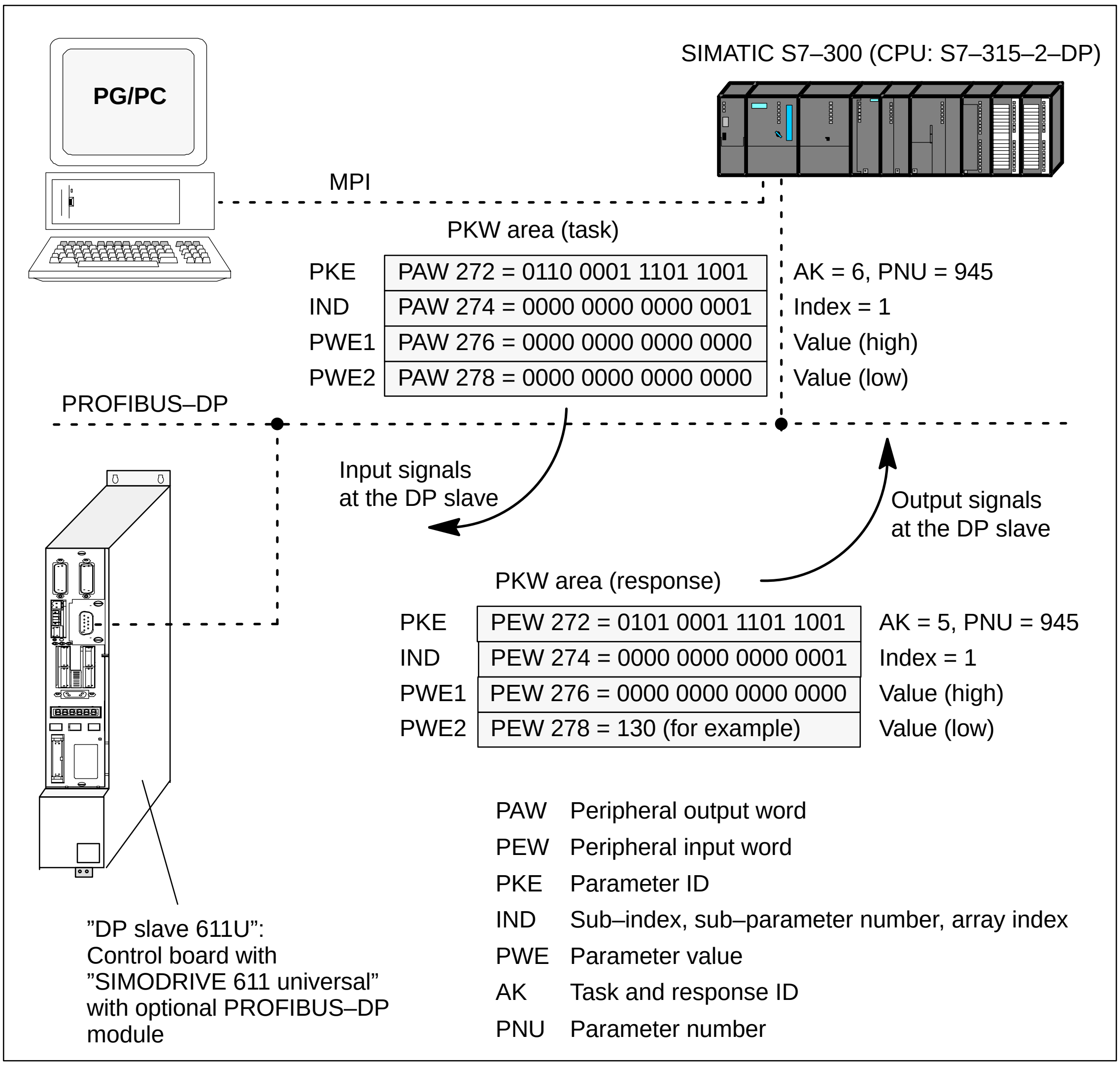


Fig. 5-20 Example: Reading parameters via PROFIBUS

Note

The ”FC 92” SIMATIC S7 block can be used for ”read parameters via PROFIBUS”.
This block is included in the toolbox of the CD for ”SIMODRIVE 611 universal” in the file ”s7_Baust.arj” and is documented using its block comments.

There are additional application examples in the toolbox with the ”read/write parameter” function
(e.g. interface 611u <—> S7 in the file ”611u39.arj”).

Example: Reading parameters via PROFIBUS

Depending on a condition, the position in traversing block 4 (P0081:3) should be adapted as required via PROFIBUS.
In this particular example, P0081:3 = 14 586 is written.

Assumptions for the slave:

- The drive has been completely commissioned is connected to PROFIBUS–DP and is ready to run.
- P0700 = 3 (”positioning” mode) has been set
- P0918 = 12 (PROFIBUS node address) has been set

Assumptions for the master:

- The DP master is a SIMATIC S7 (CPU: S7–315–2–DP)
- Hardware configuration
  - 1–axis, PPO type 1, node address = 12
  - Part / I address / O address

Part	I address	O address
PKW	272 – 279	272 – 279
PZD	280 – 283	280 – 283 (not shown in the example)

What has to be programmed on the master side?

If the condition to write the position in traversing block 4 is available, then the following must occur on the master side
(refer to Fig. 5-21):

1. Write the parameter value (define task)
   - PKW output signals (PAB 272 – 279) written into
     with
     AK = 8, PNU = 81, IND = 3, PWE2 = 14586
2. Check the task
   - Evaluate the PKW input signals (PEB 272 –279)
   - If AK = 5, PNU = 81, IND = 3 and PWE2 = 14586 then OK
   - If AK = 7,
     then evaluate the fault number in PEW 278 (refer to Table 5-31)

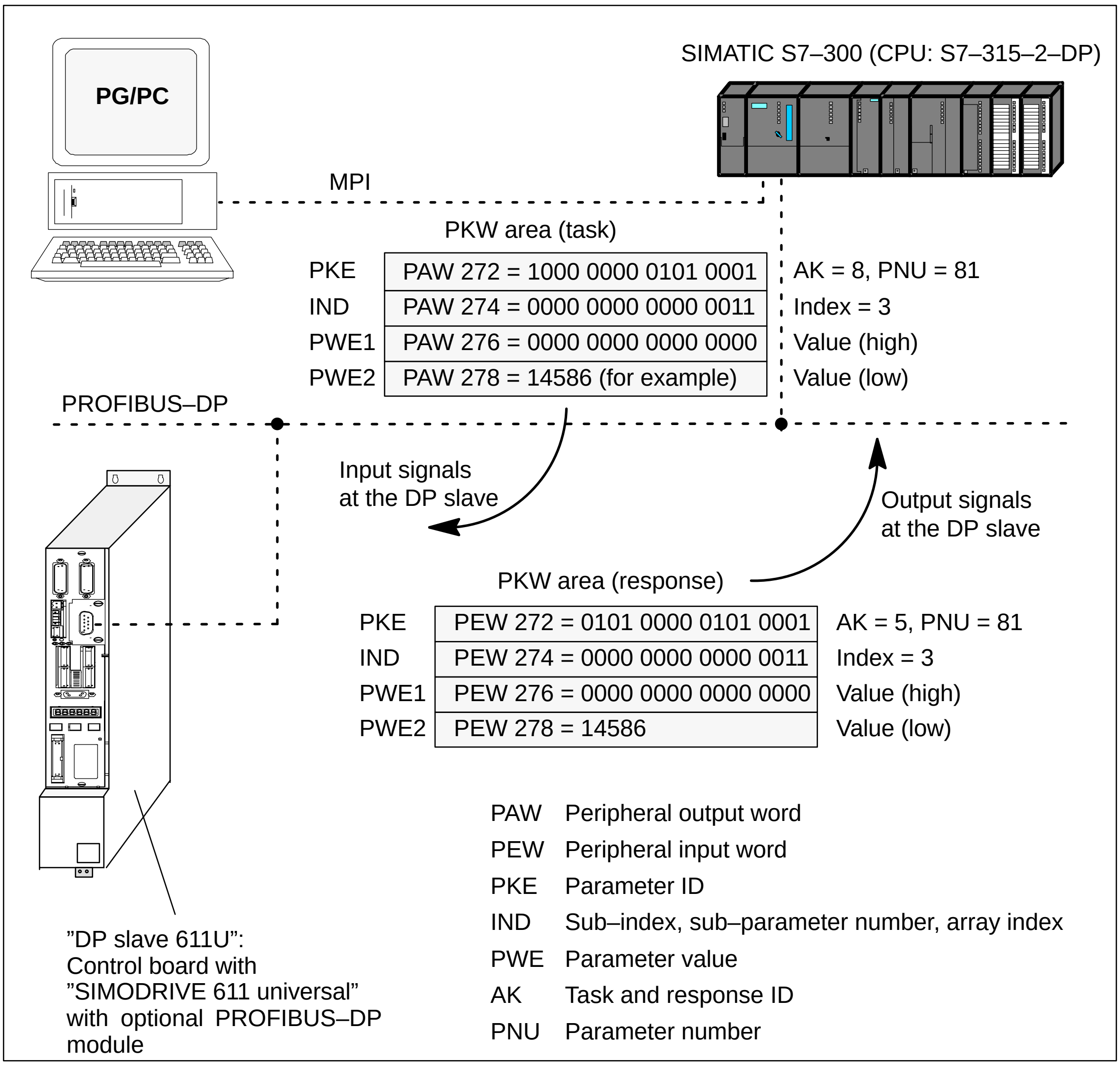


Fig. 5-21 Example: Writing parameters via PROFIBUS

Note

The ”FC 93” SIMATIC S7 block can be used to ”write parameters via PROFIBUS”.
This block is included in the toolbox of the CD for ”SIMODRIVE 611 universal” in the file ”s7_Baust.arj” and is documented using its block comments.

There are additional application examples in the toolbox with the ”read/write parameter” function
(e.g. interface 611u <—> S7 in the file ”611u39.arj”).

5.7 Settings at the PROFIBUS DP master

5.7.1 Master device file and configuring

Performance features of the PROFIBUS devices

PROFIBUS devices have different performance features.
In order that all of the master systems can correctly address the ”DP slave 611U”, the characteristic features of the slave are combined in a standardized master device file (GSD).

The ”DP slave 611U” is exclusively operated as DP slave.

Master device file for ”DP slave 611U”

The following master device files (GSDs) are available for the ”DP slave 611U”:

Before SW 4.1:

- SIEM8055.GSD for the optional PROFIBUS–DP1 module
- SIEM808F.GSD for the optional PROFIBUS–DP2 and DP3 modules

From SW 4.1:

- SIEM808F.GSD for the optional PROFIBUS–DP2 and DP3 modules

From SW 6.1:

- SIEM808F.GSD for the optional PROFIBUS DP2 and DP3 modules (PROFIdrive application Class 1)
- SI02808F.GSD for the optional PROFIBUS DP2 and DP3 modules (PROFIdrive application Class 4)

  Using the GSD file SI02808F.GSD, it is no longer necessary to enter the block for clock–cycle synchronism into the parameterizing telegram manually byte–for–byte.

  In order to use the GSD file SI02808F.GSD, a configuring tool is required which supports the GSD Revision 4 (e.g. Step7 HW–Config Version x.xx)

Reader’s note

From SW 4.1, the optional PROFIBUS–DP1 module can no longer be used.

Compatibility conditions, GSD file and optional modules are described in Chapter 1.3.3 in Table 1-4.

The GSDs are available as ASCII files on the data medium (e.g. CD) for ”SIMODRIVE 611 universal”.

These files uniquely describe the features and properties of the ”DP slave 611U” in a precisely defined format.

The GSD file must be inserted into the configuring tool of the master.

If this is not possible, then the appropriate information must be derived for the ”DP slave 611U” from the GSD file.

Reader’s note

Information on the PROFIBUS–DP master settings should be taken from the literature of the master used.

Engineering

Configuring defines the data, which the master transfers to the ”DP slaves” at every bus run–up via the parameterizing telegram and the configuration telegram.

Configuring can be realized in the following ways:

1. Using the GSD ”SIEM808F.GSD” or ”SI02808F.GSD”
2. Using the ”Slave Object Manager (Drive ES Slave–OM)”, which is included in the following products:

Product	Order No. (MLFB):
Drive ES Basic V5.1 SP2	6SW1700–5JA00–1AA0 (single license) 6SW1700–5JA00–1AA1 (company license) 6SW1700–5JA00–1AA4 (upgrade)
Drive ES SIMATIC V5.2	6SW1700–5JC00–2AA0 6SW1700–5JC00–2AA4 (upgrade)

The products, require as basis, the basic SIMATIC–STEP 7 software.

Compared to the GSD file, Drive ES offers a higher degree of user friendliness regarding the telegram structure and clock cycle–synchronous operation.

Slave–to–slave communications does not function without Drive ES.

The following is valid from SW 3.1:
The parameterizing and configuration data, received from the ”DP slave 611U” are displayed in the following parameters:

- P1783:64 received PROFIBUS parameterizing data
- P1784:64 received PROFIBUS configuration data

Parameterizing telegram

For the parameterizing data, the following should be noted:

- for DP slaves with SIEM8055.GSD

  The drive only expects the 6–byte standard DP parameterizing telegram.

- for DP slaves with SIEM808F.GSD (from SW 3.1)
  - If there is no clock–synchronous operation

    The standard setting from the GSD can be used for the parameterizing data.
  - If there is clock–synchronous operation

    The parameterizing data must, in some cases, be modified (refer to Chapter 5.8.5).

Configuration telegram

The following must be observed for the configuration data:

- for DP slaves with SIEM8055.GSD

  Using the configuration telegram, the ”DP slave 611U” is signaled the PPO type, the axis number and consistent or inconsistent data transfer mode.

  A consistent data transfer is selected as standard via the GSD file. The ”DP slave 611U” also accepts an inconsistent data transfer (refer to Table 5-33).
  Consistent and inconsistent entries can also be mixed (e.g. the PKW area with consistent and the PZD area with inconsistent data transfer).

5

Table 5-33 Permissible configuration telegrams

PPO	Data transfer			
	Consistent (over the complete length)		Inconsistent (consistent over 1 word)	
	1–axis	2–axis	1–axis	2–axis
1	F3F1	F3F1F3F1	7371	73717371
2	F3F5	F3F5F3F5	7375	73757375
3	F1	F1F1	71	7171
4	F5	F5F5	75	7575
5	F3F9	F3F9F3F9	7379	73797379

- for DP slaves with SIEM808F.GSD (from SW 3.1)

  Using the configuration telegram, the "DP slave 611U" is signaled the length of the I/O data, the axis number and consistent or inconsistent data transfer mode.

  Net data – maximum length
  The maximum length of the net data is 20 words for each drive (PKW section = 4 words, PZD section = max. 16 words).

  PZD – minimum length
  if no clock–synchronous operation: I/O = min. 2/2 words
  for clock–synchronous operation: I/O = min. 4/4 words

  Any combination of I/O data is possible, whereby the length for the data must be specified as either word or double–word resolution (one word = 16 bits).

  The 2–byte ID $01FE_{hex}$ is used to differentiate between the two configuration data of the two drives.

  A PKW section is present, if the first entry for an axis is $F3_{hex}$.

Table 5-34 IDs in the configuration telegram

Entry	Meaning	Data transfer	
		Consistent	**Inconsistent**
1	PKW No PKW	F3 00 or ≠ F3	
1 or 2 ... last	n words I/O	F(n–1) with the exception F3	7(n–1)
1 or 2 ... last	n words I	D(n–1)	5(n–1)
1 or 2 ... last	n words O	E(n–1)	6(n–1)

Table 5-35 Examples: Configuration data for SIEM808F.GSD

Example	Data transfer			
	Consistent (complete length)		**Inconsistent (consistent over 1 word)**	
	1–axis	**2–axis**	**1–axis**	**2–axis**
With PKW with PZD = 10/10 words (I/O), ≙ PPO 5)	F3F9	F3F9 **01FE** F3F9	F379 the PKW section is always consistent	F379 **01FE** F379
Without PKW with PZD = 8/15 words (I/O)	D7EE	D7EE **01FE** D7EE	576E	576E **01FE** 576E

5.7.2 Commissioning

Prerequisites for a slave

In order to commission the "DP slave 611U" the slave must fulfill the following prerequisites or these prerequisites must be clarified:

- What is the node address of the DP slave?

  The node address must be set in P0918.

- In which mode is the DP slave operated?

  This mode is set in P0700.

  The selected mode is significant when defining the functional scope of the DP slave and the function of the control and status signals.

  – "Speed/torque setpoint" mode
    The closed–loop speed controlled mode represents a functional subset of the positioning mode.
    The functional scope is defined by the control and status words specified in Chapter 5.6.1.

  – "Positioning" mode
    In the positioning mode, the functional scope is defined by the control and status words, specified in Chapter 5.6.1.

Note

In order to commission all of the nodes connected to PROFIBUS, it now may be necessary to temporarily disable the "disturbing" DP slaves (also refer to the Chapter 5.9 under P0875).

Caution

With the "DP slave 611U" powered–up, the enable terminals and PROFIBUS enable signals are required in order to enable the drive and to operate it.
If the "DP slave 611U" is switched out via P0875 = 0, then the drive is already enabled using the local enable terminals (e.g. terminal 663, 65.x). Thus, the enable signals via the PROFIBUS control word are no longer necessary.

Prerequisites and information about or to the master

When starting–up the ”DP slave 611U” the following must be taken into consideration on the master side:

- Node address (station address)
  What is the node address (P0918) of the ”DP slave 611U” which is to be commissioned?
- Master device file (GSD file)
  Is there a GSD file for the ”DP–Slave 611U” for the master?
  If not, then the GSD file must be inserted into the configuring tool of the master for the ”DP–Slave 611U”.
- Data transfer (consistent/non–consistent)

  The following applies when programming the data transfer (consistent/inconsistent) in the user program of the master:
  (e.g. for the SIMATIC S7, CPU 315–2DP)

  – PKW part

    —> with SFC 14/15

  – PZD part

    consistent data transfer (consistent over the complete length):

    —> with SFC 14/15

    non–consistent data transfer (consistent over one word):

    —> An SFC14/15 cannot be used. Instead, a direct peripheral access must be used (PAW/PEW).

Parameterizing the ”DP–Slave–611U” via PROFIBUS

Communications must be possible between the master and slave when parameterizing a DP slave via PROFIBUS.
To realize this, for ”DP slave 611U”, the PROFIBUS node address must be set in P0918.

This can be done as follows:

1st possibility: Commission the system for the first time using the display and operator panel and then set the PROFIBUS address

Procedure:

- Fully commission the system using the display and operator panel (refer to Chapter 4.4)
- Set the PROFIBUS node address
  P0918 = required address
- Save the parameters in the FEPROM: set A0652 to 1
- carry–out a POWER–ON RESET

2nd possibility: Only set the PROFIBUS address using the display and operator unit

There are the following possibilities:

Setting the PROFIBUS node address via operator action (from SW 3.1)

Prerequisites:

- Neither faults nor warnings are displayed (if required, press the MINUS key, refer to Chapter 7.2.1).

Proceed as follows:

1. Set the PROFIBUS node address
   - Press the ”P” key for longer than 3 seconds

     —> The actual value of
     P0918 (PROFIBUS node address) is displayed
   - Press the ”+” or ”–” key to set the required address
   - Press the ”P” key again to exit the entry field
2. Save the PROFIBUS node address in the FEPROM
   - Press the ”+” or ”–” key

     —> P0652 (transfer into the FEPROM) is displayed
   - Press the ”P” key to change the parameter
   - Press the ”+” key to set P0652 to 1
     and wait until P0652 = 0
3. Execute a POWER–ON RESET
   - Press the ”POWER–ON RESET” button on the front panel of the board

     —> the selected PROFIBUS node address
     is effective after run–up

Setting the PROFIBUS node address using the dialog box for the first start–up

1. Carry out the first commissioning (start–up) using the display and operator unit and for the hardware configuration, do not enter the configuration data up to the node address (refer to Chapter 4.4).

A1106	(power module code number)	do not set
...	(other parameters)	do not set
A0918	(PROFIBUS node address)	**set**
A0652	(write into the FEPROM) = 1	**set**

2. carry–out a POWER–ON RESET
3. —> cyclic operation between
   ”DP slave 611U” <——> PROFIBUS–DP master is possible

Note

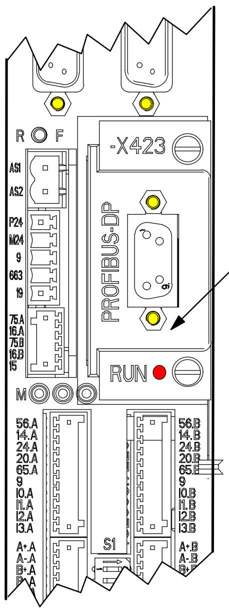
The system can be commissioned and parameterized as follows:

- With ”SimoCom U via PROFIBUS–DP” (from SW 3.1)
  – Establish online operation (refer to Chapter 3.3.4)
  – Carry–out the first or series commissioning (start–up) using SimoCom U
    (refer to Chapter 4.3.1 or 4.3.2, P0918 (PROFIBUS node address) may not be overwritten).
- Using ”read/write parameter ” via PKW section
  The parameters of the ”DP slaves 611U” can be read/written into via the PKW section from the PROFIBUS–DP master.

5.7.3 Diagnostics and troubleshooting

LED display of the option module

There is a two–color LED with the following significance on the front of the optional PROFIBUS DP module:



LED	Significance
off	• The module has still not be started from the control board or it has not been enabled (P0875)
Red Steady light	• The module has been enabled (P0875) and started from the control board, there are **no cyclic communications** (MSCY_C1, Data Exchange, net data transport) between the master and this module as PROFIBUS slave or there was a communications failure (watchdog) Check! (if cyclic communications was previously active): – is the DP slave node address correct (P0918 ≠ 0)? – is the bus connection OK? – terminating resistor? – are all of the bus cables inserted?
Red Flashing	• The module has an internal, fatal error Counter–measure: Execute POWER–ON RESET Replace the option module
Green	• The module is enabled (P0875) and has been started from the control board, **cyclic communications** has been established (MSCY_C1, Data Exchange, net data transport) between the master and this module as PROFIBUS slave
Yellow/green Alternating flashing light	• The firmware is upgraded on the optional module via the serial interface

Fig. 5-22 LED displays for diagnostics

Fault display on the control board

Faults and warnings are displayed on the display unit located on the front panel of the control board.

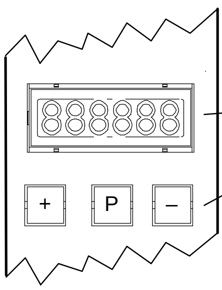


Fig. 5-23 Fault display on the control board

Evaluating faults via PROFIBUS–DP

Faults which occur are entered into a fault buffer. The fault code, fault number, fault time and fault value for each fault are specified using the appropriate parameters.

Status signal for faults

The ”SIMODRIVE 611 universal” drive signals as to whether there is at least one fault using the status bit or output signal ZSW1.3 ”Fault present/no fault present”.

Fault buffer

The fault buffer comprises 8 fault cases, each of which can include 8 fault entries.

For fault case 1, the faults which have occurred are saved and they remain there until the fault case has been removed, i.e. all of the faults have been removed and also acknowledged.

In fault cases 2 to 8, the acknowledged fault cases since the last POWER ON are saved. The number of fault cases since POWER ON can be read from P0952.

Index	**P0945:65 Fault code**	**P0947:65 Fault number**	**P0948:65 Fault time**	**P0949:65 Fault value**	
0	No significance				
1	101	2	t_101	w_101	**Fault case 1**
2	114	10	t_114	w_114	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	90	3	t_90	w_90	**Fault case 2**
10	0	0	0	0	
to		to			
16	0	0	0	0	
		to			to
57	0	0	0	0	**Fault case 8**
58	0	0	0	0	
to		to			
64	0	0	0	0	

Fig. 5-24 Fault buffer structure

Rules regarding the fault buffer

The following rules apply to the fault buffer:

- At POWER ON, the complete fault buffer is deleted.
- The faults are entered in the sequence that they occur, in the parameter of fault case 1, i.e.
  - 1st fault that has occurred —> parameter with index 1
  - 2nd fault that has occurred —> parameter with index 2, etc.

  If more than 8 faults occur, then these are not displayed.
- Fault case 1 is considered to have been resolved, if, the following is valid for **all** of the entered faults:
  - the cause has been removed and
  - the fault has been acknowledged

  The fault buffer is then re–arranged so that the faults of fault case 1 go into fault case 2 and those from fault case 2 into fault case 3 etc. This means that the parameters of fault case 1 are again free for additional entries.

  If more than 8 fault cases have occurred since the last POWER ON, then fault case 8 is overwritten, the oldest fault case is eliminated.
- If, in fault case 1, there is at least one fault, which must be acknowledged with POWER ON, then this is valid for the complete fault case.

Reader's note

A description of the faults, the way in which they can be acknowledged as well as a list of all the faults, is provided in Chapter 7.

Evaluating warnings via PROFIBUS–DP

The warnings which occurred, are displayed, bit–coded in P0953 to P0960.

Status signal for warnings

The ”SIMODRIVE 611 universal” drive signals as to whether there is at least one message present via the status bit or output signal ZSW1.7 ”Warning present/no warning present”.

Reader's note

A description of the warnings as well as a list of all of the warnings is provided in Chapter 7.

Diagnostics of the process data

The sent and received process data of the ”DP slaves 611U” are displayed using the following parameters:

- P1788:17 Received process data PROFIBUS
- P1789:17 Sent process data PROFIBUS

Diagnostics of the PKW data (from SW 2.4)

The sent and received PKW data of the ”DP slave 611U” are displayed using the following parameters:

- P1786:5 Received PKW data PROFIBUS
- P1787:5 Sent PKW data PROFIBUS

Diagnostics of the parameterizing and configuration data (from SW 3.1)

The parameterizing and configuration data, received from the DP master, are displayed using the following parameters:

- P1783:64 received PROFIBUS parameterizing data
- P1784:64 received PROFIBUS configuration data

5.8 Motion Control with PROFIBUS–DP (from SW 3.1)

General information

Using the ”Motion Control with PROFIBUS DP” function, a clock–cycle synchronous drive coupling can be established between a DP master and one or several slaves via the PROFIBUS fieldbus.

Reader’s note

The clock–synchronous drive coupling is defined in the following documentation:

Reference: /PPA/, PROFIdrive Profile for Drive Technology, Version 3.1 July 2002

Which clock–synchronous masters are there?

Clock–synchronous operation can be implemented using the following DP masters:

Table 5-36 Examples for clock–synchronous masters

DP–MASTER	DP slave 611U
SINUMERIK 802D	In the ”speed/torque setpoint” mode (n–set mode)
SINUMERIK 840Di	
Positioning and path control board FM 357–2	
SIMATIC S7–300 6ES7315–2AF03–xxxx	In the ”positioning” operating mode (pos mode)

Activation

The clock–cycle synchronous drive coupling can be activated if all of the prerequisites of the DP master and DP slave have been fulfilled and the function has been selected in the DP master by appropriately parameterizing/configuring it.

Parameterizing equidistant operation

The parameters for equidistant operation are included in the slave–specific master device file SIEM808F.GSD. Parameterization is also possible via Drive ES.

The master configuring ensures, that all of the DP slaves in the application use the same clock cycle times and processing instants.

When PROFIBUS runs–up, the information required by the DP slaves, is transferred from the master to all of the slaves via the parameterizing telegram.

DP cycle

Every DP cycle starts with a Global Control Telegram (GC), which is then followed, one after the other, with the data transfer with the individual slaves (S1, S2, ...).

The GC telegram is a broadcast telegram, sent from the master, and which is received simultaneously by all slaves.

The internal clock cycles of the ”DP slave 611U” are synchronized to the DP clock cycle using this GC telegram and the PLL used for the optional PROFIBUS–DP3 module.

Prerequisites and features

The clock–synchronous coupling has the following prerequisites and features:

- Prerequisites for the DP slave (refer to Chapter 1.3.3)
  - ”SIMODRIVE 611 universal” control board from SW 3.1
  - Optional PROFIBUS–DP3 module with ASIC DPC31 and PLL (Order No.: 6SN1114–0NB01–0AA0)
- Prerequisites for the DP master
  - ”Motion Control with PROFIBUS–DP” function
  - Using a DP interface in the DP master, which can realize clock–cycle synchronous operation
  - Data transfer rate: Can be set between 1.5 and 12 Mbaud
- Telegram data transfer between a DP master and slave in equidistant cycles.
- Post synchronization of the slave clock cycles to the equidistant DP cycle via the Global Control Telegram at the start of a DP cycle.
- The maximum permissible fluctuations when recognizing a Global Control Telegram (Jitter) via the optional PROFIBUS DP module is dependent on the data transfer rate as follows:

Data transfer rate	Max. permissible jitter
12 Mbaud	1.0 µs
3 or 6 Mbaud	0.9 µs
1.5 Mbaud	0.8 µs

  Clock–synchronous operation with the ”DP slave 611U” is only guaranteed when the maximum permissible jitter is maintained.

  When configuring the bus system, it should be ensured, that especially when, e.g. repeaters or optical bus components are used, the maximum permissible jitter is not exceeded.

5.8.1 Equidistant DP cycle operation in the n–set mode

Overview

With the function, the closed–position control loop is closed through PROFIBUS. The position controller is in the DP master, the closed–loop current and speed control as well as the position actual value sensing (encoder interface) are in the DP slave.

The position controller clock cycle is transferred to the DP slaves via the fieldbus, and the slaves synchronize their speed/current controller clock cycle to the position controller clock cycle of the DP master.

The DP master enters the speed setpoint.

The motor encoder or another measuring system can be used for the position actual value sensing in the DP slave.

- Direct measuring system at X412 —> Encoder 2 (from SW 3.3)
- Additional measuring system at X472 —> Encoder 3
  TTL encoder, P0890 = 4, only SIMODRIVE 611 universal E

The encoder interface must be configured in the process data.

—> Refer to Chapter 5.6.5

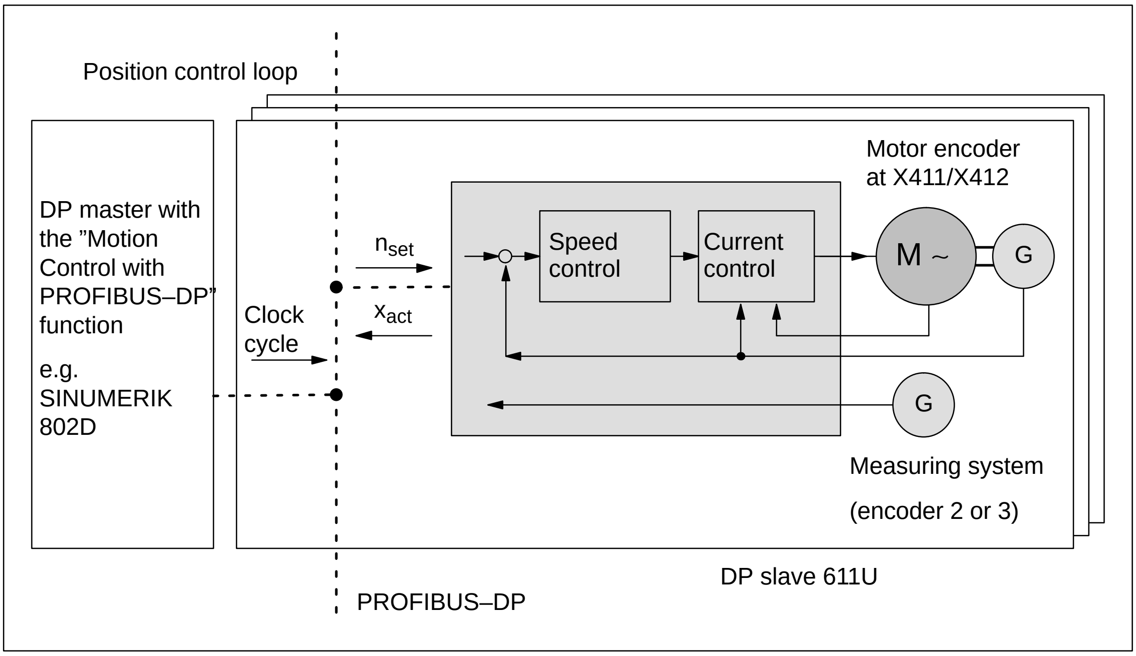


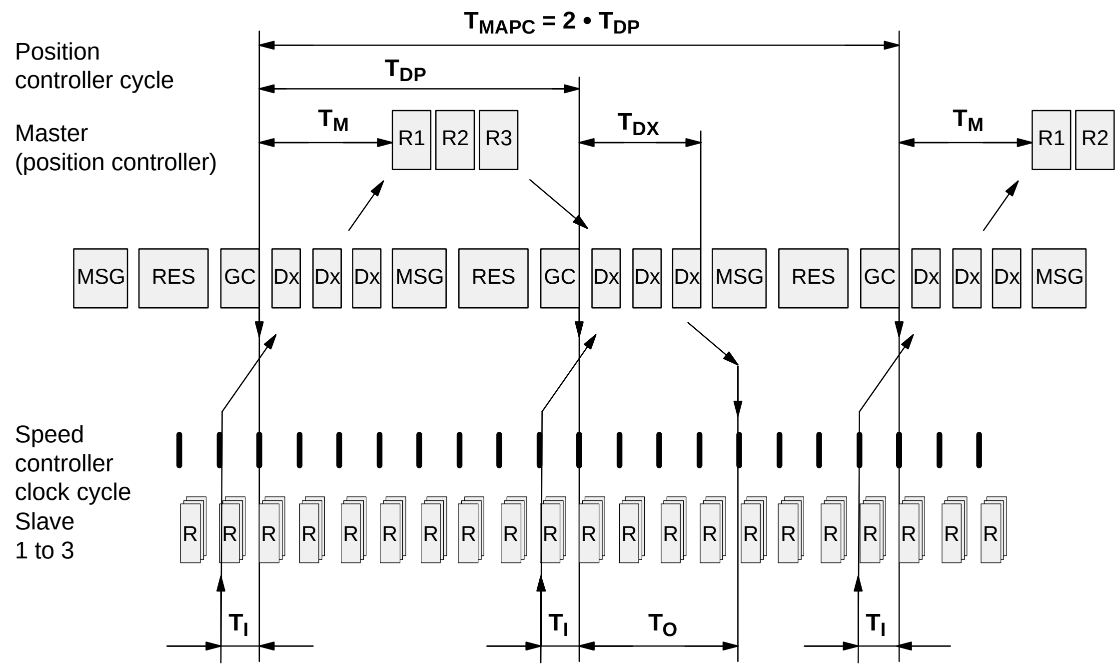
Fig. 5-25 Overview for "motion control with PROFIBUS–DP": Example with DP master and 3 DP slaves

Timing

The position actual value x_{act} is read in to the telegram image at time T_I before the start of each DP clock cycle, and is transferred to the DP master at the next DP cycle.

The closed–loop DP master control starts at the time T_M after each position controller clock cycle, and uses the slave actual values which were previously read. The master transfers the calculated setpoints to the telegram image of the slave in the next DP cycle. The speed setpoint n_{set} is input into the control at instant T_O after the start of the DP cycle.

By minimizing the times T_O and T_I the deadtime is also minimized in the higher–level position control loop.



T_{MAPC}	Master Application Cycle Position controller cycle
T_{DP}	DP cycle time DP cycle time
T_{DX}	Data Exchange Time: Sum of the data transfer times of all of the slaves
T_M	Master time: Start of the closed–loop master control
T_I	Input time: Instant in time for the actual value sensing
T_O	Output time: Time of setpoint transfer
GC	Global Control Telegram (Broadcast Telegram)
R	Computation time, speed/position controller
Dx	Slaves: Net data transfer between master and slave 1 – n
MSG	Acyclical utilities (for example, DP/V1, token passing)
RES	Reserve: ”Active pause” until the isochronous (equidistant) cycle has expired

Fig. 5-26 Example: optimized DP cycle with $T_{MAPC} = 2 \cdot T_{DP}$

Average value generation for n_{set}

In the "DP slave 611U", the speed setpoint is transferred at instant T_O in each nth DP clock cycle ($n = T_{MAPC}/T_{DP}$).

In order to eliminate having to trace the setpoint steps, the speed setpoint can be averaged using an average value filter (P1012.8).

5.8.2 Equidistant DP cycle operation in the positioning mode

Overview

The traversing movements can be simultaneously started for several drives via the clock–synchronous PROFIBUS.

If the traversing blocks have been parameterized the same (travel, velocity, acceleration) in the various drives, then the axes can also move in synchronism.

Traversing blocks are simultaneously started and synchronous movements of the motion profile are realized precisely in the IPO clock cycle.

In this case, position differences only result in different following errors in the axes.

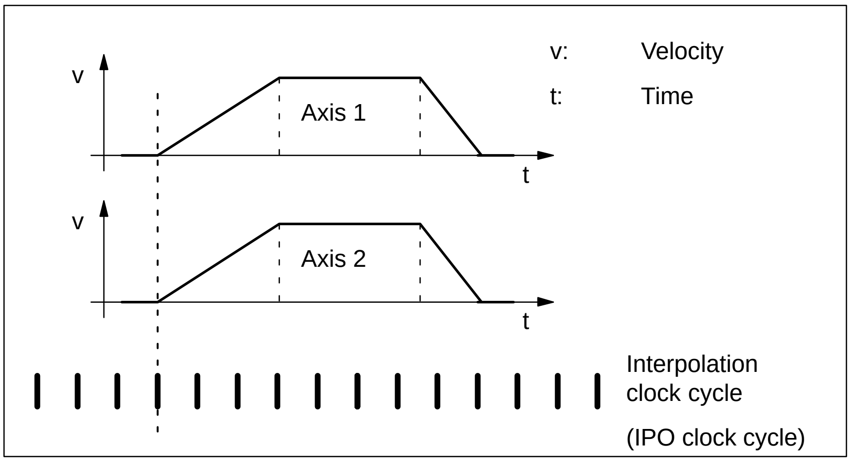
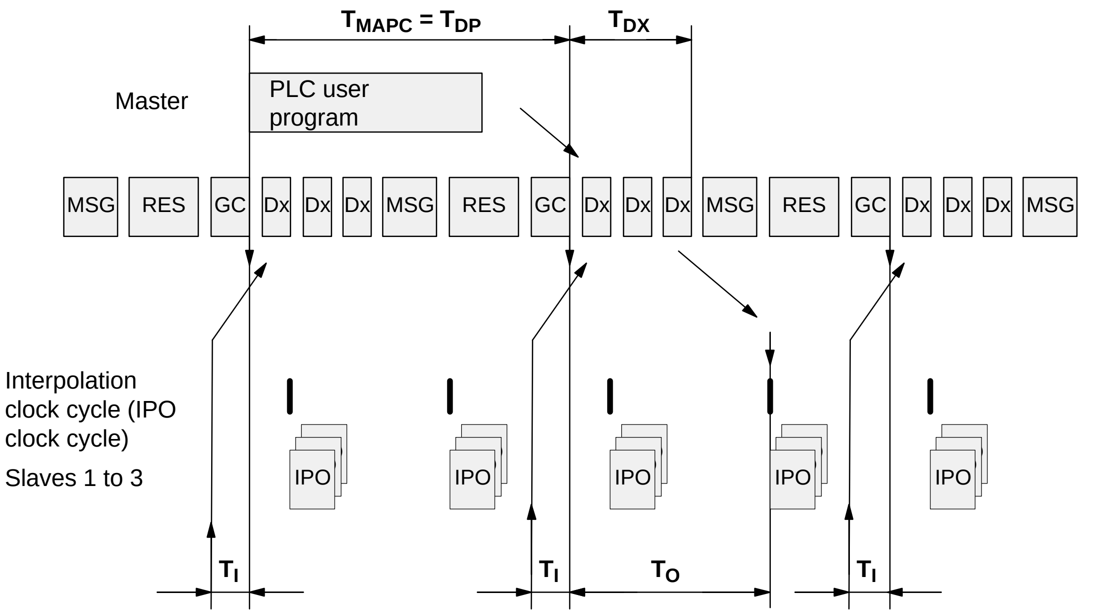


Fig. 5-27 Example: Simultaneously starting the traversing motion

Timing

The clock–cycle synchronous PROFIBUS ensures that the IPO clock cycles run in synchronism in all of the axes involved which means that the traversing enable signals are effective at precisely the same time.

The SYNC telegram from the DP master guarantees that the axes start in the same DP clock cycle.



T_{MAPC}	Master Application Cycle Master application clock cycle
T_{DP}	DP cycle time DP cycle time
T_{DX}	Data Exchange Time: Sum of the data transfer times of all of the slaves
T_I	Input time: Instant in time for the actual value sensing
T_O	Output time: Time of setpoint transfer
GC	Global Control Telegram (Broadcast Telegram)
Dx	Slaves: Net data transfer between master and slave 1 – n
MSG	Acyclical utilities (for example, DP/V1, token passing)
RES	Reserve: ”Active pause” until the isochronous (equidistant) cycle has expired

Fig. 5-28 Example: T_{IPO} = 4 ms and T_{DP} = 8 ms

Requirements

General prerequisites:

- The interpolation clock cycle (P1010) must be parameterized the same for all axes.
- The master application clock cycle T_{MAPC} must be an integer multiple of the interpolation clock cycle.
- T_I and T_O must be the same for all axes.
- T_{DP} must be less than or equal to 16 ms.
- For masters, which cannot generate a master sign of life (e.g. SIMATIC S7), T_{MAPC} must be = to T_{DP} and the sign–of–life monitoring in operation must be disabled using P0879.8 = 1.

Additional prerequisites for SIMATIC S7:

- Presently, there is no run level that is in synchronism with DP cycle in S7 user programs. This means, that if axes are to be simultaneously started, in addition to the clock–synchronous PROFIBUS operation, the ”classic” SYNC mechanism must be used.

  SYNC mechanism

  —> refer to the documentation of the DP master SIMATIC S7 (SFC 11 ”DPSYNC_FR”)

  The SYNC mechanism may only be activated after the drive has set the status bit ZSW1.9 ”control requested”.

5.8.3 Times in the equidistant DP cycle

General information

The ”DP slave 611U” requires the following time information for equidistant operation, clock cycles and signal processing instants:

Table 5-37 Time settings for ”DP slave 611U”

Name	Value1)	Limit value	Description
T_{BASE_DP}	$5DC_{hex}$ $\doteq 1500_{dec}$:	–	Time base for T_{DP} Calculation: T_{BASE_DP} = 1500 • T_{Bit} = 125 µs T_{Bit} = 1/12 µs at 12 Mbaud
T_{DP}	8	$T_{DP} \geq T_{DP\_MIN}$	DP cycle time T_{DP} = integer multiple • T_{BASE_DP} Calculation: T_{DP} = 8 • T_{BASE_DP} = 1 ms
		T_{DP_MIN} = 8	Minimum DP cycle time Calculation: T_{DP_MIN} = 8 • T_{BASE_DP} = 1 ms
T_{MAPC}	1	n • T_{DP} n = 1 – 14	Master application cycle time This is the time frame in which the master application generates new setpoints (e.g. in the position controller cycle). Calculation: T_{MAPC} = 1 • T_{DP} = 1 ms
T_{BASE_IO}	$5DC_{hex}$ $\doteq 1500_{dec}$:	–	Time base for T_I, T_O Calculation: T_{BASE_IO} = 1500 • T_{Bit} = 125 µs T_{Bit} = 1/12 µs at 12 Mbaud
T_I	2	$T_{I\_MIN} \leq T_I < T_{DP}$	Time of actual value sensing Is the time, where the position actual value is sensed before the start of a DP cycle. T_I = integer multiple of T_{BASE_IO} Calculation: T_I = 2 • 125 µs = 250 µs For T_I = 0, the following is valid: $T_I \doteq T_{DP}$
		T_{I_MIN} = 1	Minimum T_I Calculation: T_{I_MIN} = 1 • T_{BASE_IO} = 125 µs
T_O	4	$T_{DX} + T_{O\_MIN}$ $\leq T_O \leq T_{DP}$	Time of setpoint transfer This is the time that the setpoints (speed setpoint) are transferred to the closed–loop control after the start of DP cycle. T_O = integer multiple of T_{BASE_IO} Calculation: T_O = 4 • 125 µs = 500 µs For T_O = 0, the following is valid: $T_O \doteq T_{DP}$
		T_{O_MIN} = 1	Minimum time interval between T_O and T_{DX} T_{O_MIN} = 1 • T_{BASE_IO} = 125 µs

Table 5-37 Time settings for ”DP slave 611U”, continued

Name	Value[1)]	Limit value	Description
T_{DX}	$E10_{hex}$ $\doteq 3600_{dec}$	$T_{DX} < T_{DP}$	Data exchange time This is the time which is required to transfer, within one DP cycle, the process data to all of the slaves. T_{DX} = integer multiple of T_{Bit} T_{Bit} = 1/12 µs at 12 Mbaud Calculation: $T_{DX} = 3600 \bullet T_{BIT} = 300$ µs
T_{PLL_W}	0	–	PLL window (half the window width of the GC synchronizing window) The following applies to the setting: • Small window —> minimization of synchronization fluctuations on the drive • Large window —> larger tolerance with respect to GC fluctuations Calculation: (assumption: $T_{PLL\_W} = A_{Hex} \doteq 10_{Dec}$) $T_{PLL\_W} = 10 \bullet T_{BIT} = 0.833$ µs T_{Bit} = 1/12 µs at 12 Mbaud Recommendation: Set T_{PLL_W} to 0 (standard value) —> the ”DP slave 611U” then automatically uses the standard value of 0.81 µs
T_{PLL_D}	0	–	PLL dead time The PLL deadtime can be used to compensate for different data transfer times to the slaves (e.g. due to the use of repeaters). The slaves with faster transfer times are delayed with a corresponding PLL dead time. Calculation: $T_{PLL\_D} = 0 \bullet T_{BIT} = 0$ µs T_{Bit} = 1/12 µs at 12 Mbaud

1) The values correspond to the master device file SIEM808F.GSD

5

Setting criteria

The following criteria must be taken into account when setting the times:

- DP cycle (T_{DP})
  - Time T_{DP} must be set the same for all bus nodes.
  - The following must be valid: $T_{DP} > T_{DX}$ and $T_{DP} \geqq T_O$

    Time T_{DP} is therefore long enough to permit communications with all of the bus nodes.
  - Specific reserves must be available

    This means that additional masters can be connected and non–cyclic communications can be realized.
- T_I and T_O
  - n–set mode: Setting the times in T_I and T_O as short as possible reduces the dead time in the position control loop.
  - The following must be valid: $T_O > T_{DX} + T_{Omin}$
- The following is valid for interpolating axes:
  - T_I of the interpolating axes should be the same
  - T_O of the interpolating axes should be the same

5.8.4 Bus run–up, synchronization and net data save

Bus run–up and synchronization

When running–up, the DP master checks the DP slave by requesting diagnostic information.
The following faults/errors are identified:

- Parameterizing and configuring errors
- The DP slave has been assigned to another master
- Static user diagnostics
- Operational readiness of the DP slave

If a fault has not been detected, then the DP master, with this DP slave, goes into cyclic net data operation, i.e. input and output data are exchanged.

With the transition into cyclic net data transfer, the DP slave is synchronized to the master sign–of–life.

The DP slave runs in synchronism with the master, if

- The status signal ZSW1.9 (control requested/no control possible) = ”1”

  and
- The slave sign–of–life (ZSW2.12 to ZSW2.15, value = 1 to 15) is counted

Net data save

The net data save is realized in both data transfer directions (master <—> slave) using a sign–of–life that comprises a 4–bit counter.

The sign–of–life counter is always incremented from 1 to 15, and then starts again with the value 1.

- Master sign–of–life
  - The control signals STW2.12 to STW2.15 are used as master sign–of–life.
  - The master sign–of–life counter is incremented in each master application cycle (T_{MAPC}).
  - P0879. 2 to .0 Permissible sign–of–life error
  - P0879. 8 Operation with/without Master sign–of–life monitoring
  - Monitoring

    The master sign–of–life is monitored in the DP slave. If the master sign–of–life does not consecutively correspond to the expected value or more often than is permitted in P0879 bit 2 to bit 0, then the following occurs:

    —> fault 597 (PROFIBUS: synchronization error) is output

    —> zero is output as slave sign–of–life

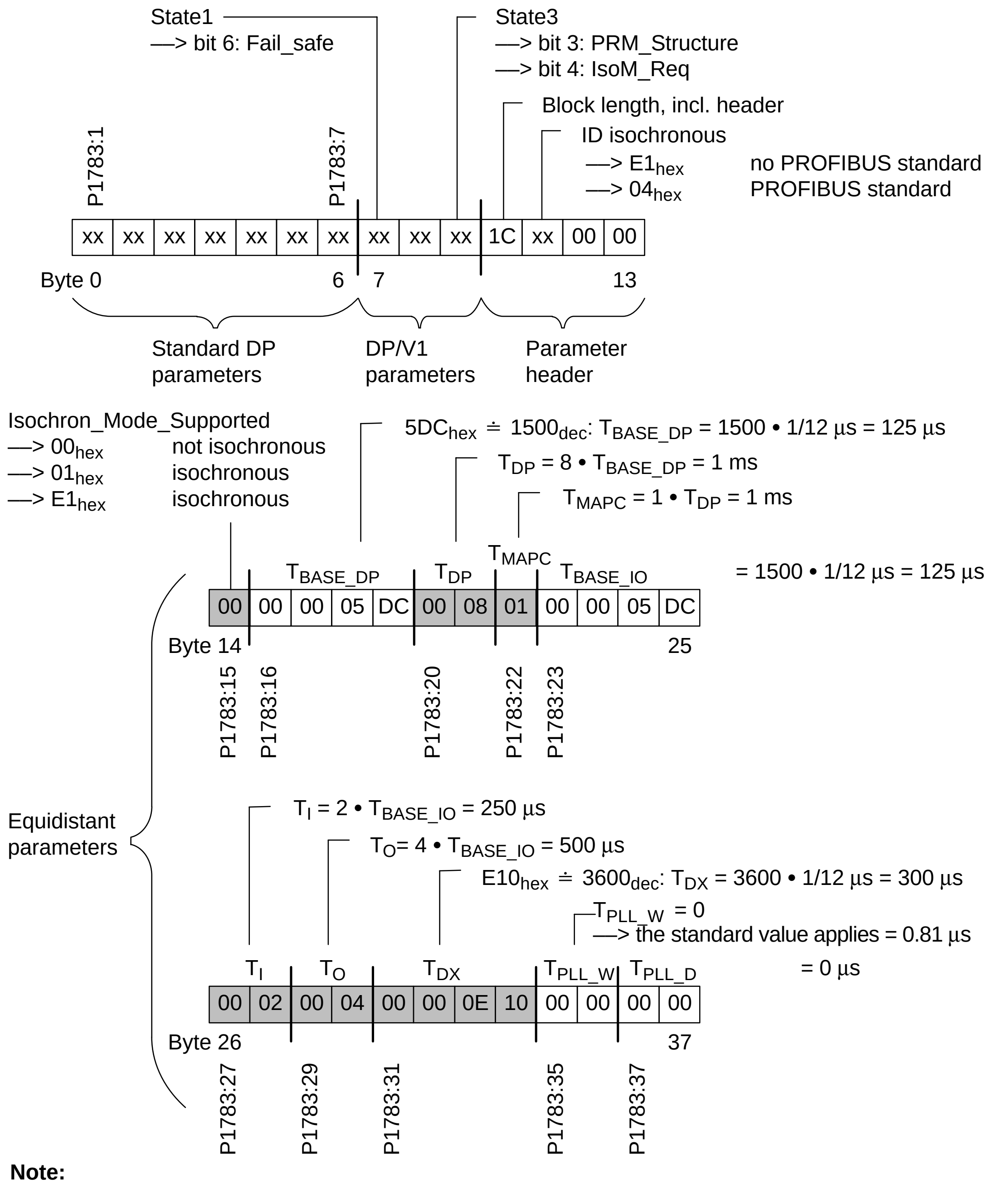
    —> the status signal ZSW1.9 (control requested/control not possible) is set to ”0”

    —> the system re–synchronizes to the master sign–of–life
- Slave sign–of–life
  - The status signals ZSW2.12 to ZSW2.15 are used as slave sign–of–life.
  - The slave sign–of–life counter is incremented in every DP cycle (T_{DP}).

5

5.8.5 Parameterization using the parameterizing telegram

For parameterization, the "DP slave 611U" is supplied with the following equidistant parameters within a parameterizing telegram (Set_Prm):



Note:

P1783:64 is used for diagnostics, parameterizing data.

- P1783:0 No. of valid bytes
- P1783:1 1st byte of the received parameterizing data, etc.

e.g. 02 This data must be set

Fig. 5-29 Parameterizing telegram Set_Prm

5.9 Parameter overview of PROFIBUS–DP

Parameter overview

The following parameters are available for PROFIBUS–DP:

Table 5-38 Parameters for PROFIBUS–DP

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0872	Optional module type	–	–	–	–	RO
	... indicates which optional module was identified when the control board was powered–up. 0 No option module 1 Optional TERMINAL module, Order No. (MLFB): 6SN1114–0NA00–0AA0 2 Optional PROFIBUS–DP1 module with PROFIBUS–ASIC SPC3, Order No. (MLFB): 6SN1114–0NB00–0AA0 3 Optional PROFIBUS–DP2 module (from SW 3.1) with PROFIBUS–ASIC DPC31 without PLL, Order No. (MLFB): 6SN1114–0NB00–0AA1 4 Optional PROFIBUS–DP3 module (from SW 3.1) with PROFIBUS–ASIC DPC31 with PLL Order No. (MLFB): 6SN1114–0NB01–0AA0					
0873	Option module version	–	–	–	hex	RO
	... displays the version of the particular option module.					
0875	Expected optional module type	0	0	4	–	PO
	... indicates which option module was expected as a result of the parameterization. The parameters are automatically set at the first start–up corresponding to P0872 (option module type). **Examples:** • P0875 = P0872 —> normal situation after first commissioning —> no error is signaled at run–up • P0875 = 3 and P0872 = 0 —> the optional PROFIBUS–DP2 module has been parameterized but was not detected —> a fault was signaled when the system ran up **Note:** Switch–out the communications or the ”DP slaves 611U” when the module is inserted: • 1–axis module —> the ”DP slave 611U” is switched–out from drive A with P0875 = 0 • 2–axis module —> with P0875 = 0, the communications with drive B is switched–out from drive B —> with P0875 = 0 in both drives, the ”DP slave 611U” is switched–out This means, that e.g. ”disturbing” slaves can be temporarily disabled when commissioning the other nodes (refer under the index entry ”Start–up PROFIBUS–DP”). After disabling the communications or the module, P0875 must be again set to P0872.					

5

Table 5-38 Parameters for PROFIBUS–DP, continued

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0879	PROFIBUS configuration (from SW 3.1)	0	1	FFFF	hex	PO
	Bit 2, 1, 0 Permissible sign–of–life error Bit 8 Operation with/without master sign–of–life monitoring Bit 11 PKW area: Sub–index in the high/low byte of IND (from SW 3.3) Bit 12 Activates the direct measuring system (encoder 2) for the encoder interface (from SW 3.3) Bit 13 Incremental motor measuring system with/without equivalent zero mark Bit 14 Incremental, direct meas. system with/without equivalent zero mark (from SW 3.3)					
0880	Speed evaluation PROFIBUS (SRM, ARM) Motor velocity evaluation PROFIBUS (SLM)	0.0	16 384.0	100 000.0	RPM m/min	Immediately
	... defines the normalization of the speed or velocity when using PROFIBUS–DP. 4000_{Hex} or 16384_{Dec} ≙ of the speed or velocity in P0880					
0881 (from SW 4.1)	Evaluation, torque/power reduction PROFIBUS (SRM, ARM) Evaluation, force/power reduction PROFIBUS (SLM)	0.0	16 384.0	16 384.0	% %	Immediately
	... defines the normalization of the torque/power reduction or force/power reduction when using PROFIBUS–DP. **Note:** 4000 hex or 16384 dec in the control word MomRed corresponds to a reduction by the percentage specified in P0881.					
0882 (from SW 4.1)	Torque setpoint evaluation PROFIBUS (SRM, ARM) Force setpoint evaluation PROFIBUS (SLM)	–16384.0	800.0	16 384.0	% %	Immediately
	... defines the normalization of the torque or force setpoint when entered via PROFIBUS–DP. **Note:** P0882 is a percentage value referred to the rated motor torque. The parameter acts on the process data MsollExt (torque setpoint external in the input direction) and Msoll (torque setpoint in the output direction). 4000 hex or 16384 dec in the control word corresponds to the percentage entered into P0882.					
0883	Override evaluation, PROFIBUS (from SW 3.1)	0.0	16 384.0	16 384.0	%	Immediately
	... defines the normalization of the override when entered via PROFIBUS DP. 4000_{hex} or 16384_{dec} ≙ the override in P0883					
0884 (from SW 4.1)	PROFIBUS position output evaluation number of increments	1	2048	8388607	–	PO
	... defines the normalization of the override when entered via PROFIBUS. 4000_{hex} or 16384_{dec} ≙ the override in P0883					

Table 5-38 Parameters for PROFIBUS–DP, continued

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0888:16 (from SW 4.1)	Function, distributed input (PROFIBUS)	0	0	82	–	Immediately
	... defines which function a signal has which was read in via the PROFIBUS–PZD for distributed inputs (DezEing). The function number from the "list of input signals" is entered. The following applies for the individual indices of P0888: :0 Function DezEing bit 0 :1 Function DezEing bit 1 :2 etc.					
0891 (from SW 3.3)	Source, external position reference value	–1	–1	4	–	PO
	... defines the source for the external position reference value. –1 No external position reference value 0 Angular incremental encoder interface 1 Motor encoder, drive A (only drive B in double–axis modules) (only for compatibility, recommended value = 2) 2 Pos. act. value drive A (only drive B in double–axis modules, from SW 4.1) 3 Pos. ref. value, drive A (only drive B in double–axis modules, from SW 4.1) 4 PROFIBUS–DP (from SW 4.1)					
0895 (from SW 3.3)	External position reference value – number of increments	1	2048	8388607	–	PO
	... defines, together with P0896 for couplings, the ratio between input increments and the dimension system grids. **Note:** —> P0895 input pulses at the angular incremental encoder correspond to P0896 MSR —> Setpoint input from P0895 corresponds to P0896 MSR refer to P0896					
0896 (from SW 3.3)	External position reference value – number of dimension system grids	1	10000	8388607	MSR	PO
	... defines, together with P0895, for couplings, the ratio between the input pulse periods (or input bit) and the dimension system grids.					
0915	PZD setpoint assignment, PROFIBUS (from SW 3.1)	0	0	65 535	–	Immediately
	... is used to assign the signals to the process data in the setpoint telegram. —> Refer to Chapter 5.6.5					
0916	PZD actual value assignment, PROFIBUS (from SW 3.1)	0	0	65 535	–	Immediately
	... is used to assign the signals to the process data in the actual value telegram. —> Refer to Chapter 5.6.5					

5

Table 5-38 Parameters for PROFIBUS–DP, continued

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0918	PROFIBUS node address	0	0	126	–	PO
	... specifies the address of the drives as DP slave on PROFIBUS. **Note:** • There is **one** node address for the control board, although it is designed for two drives. When changing the parameter in one drive, the parameter in the other drive is automatically adapted. • Every node connected to PROFIBUS must have a unique address.					
0922	Telegram selection PROFIBUS (from SW 3.1)	0	101	104	–	PO
	... is used to set the free configurability or to select a standard telegram. —> Refer to Chapter 5.6.5					
0945:65	Fault code	–	–	–	–	RO
	... the fault code, i.e. the number of the fault which occurred, is entered. The faults which occurred, are entered as follows into the fault buffer: – first fault which occurred —> parameter with index 1 to – Eight faults which occurred —> parameter with index 8 **Note:** • The following belongs to a fault: Fault code (P0945:65), fault number (P0947:65), fault time (P0948:65) and fault value (P0949:65) • A description of the faults, the way in which they can be acknowledged as well as a list of all the faults, is provided in Chapter 7. • This parameter is reset at POWER ON.					
0947:65	Fault number	–	–	–	–	RO
	Note: This parameter is of no significance.					
0948:65	Fault time	–	–	–	ms	RO
	This parameter specifies at which relative system time, the fault occurred. **Note:** This parameter is set to zero at POWER ON, and the time is then started.					
0949:65	Fault value	–	–	–	–	RO
	The supplementary information associated with a fault which occurred, is entered in this parameter. **Note:** • A description of the faults, the way in which they can be acknowledged as well as a list of all the faults, is provided in Chapter 7. • This parameter is reset at POWER ON.					

Table 5-38 Parameters for PROFIBUS–DP, continued

Parameters						
No.	**Description**	**Min.**	**Stan-dard**	**Max.**	**Units**	**Effec-tive**
0952	Number of faults	–	–	–	–	RO
	The parameter specifies the faults which occurred after POWER ON an. **Note:** This parameter is reset at POWER ON.					
0953	Warnings 800 – 815	–	–	–	hex	RO
0954	Warnings 816 – 831	–	–	–	hex	RO
0955	Warnings 832 – 847	–	–	–	hex	RO
0956	Warnings 848 – 863	–	–	–	hex	RO
0957	Warnings 864 – 879	–	–	–	hex	RO
0958	Warnings 880 – 895	–	–	–	hex	RO
0959	Warnings 896 – 911	–	–	–	hex	RO
0960	Warnings 912 –927	–	–	–	hex	RO
	... indicates which warning(s) is (are) present. Bit x = 1 warning yyy present Bit x = 0 a warning is not present **Example:** P0955 = 0110 —> bits 8 and 4 are set —> warnings 840 and 836 are present					

Parameter	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0 Bit
P0953	815	814	813	812	811	810	809	808	807	806	805	804	803	802	801	800
P0954	831	830	829	828	827	826	825	824	823	822	821	820	819	818	817	816
P0955	847	846	845	844	843	842	841	840	839	838	837	836	835	834	833	832
P0956	863	862	861	860	859	858	857	856	855	854	853	852	851	850	849	848
P0957	879	878	877	876	875	874	873	872	871	870	869	868	867	866	865	864
P0958	895	894	893	892	891	890	889	888	887	886	885	884	883	882	881	880
P0959	911	910	909	908	907	906	905	904	903	902	901	900	899	898	897	896
P0960	927	926	925	924	923	922	921	920	919	918	917	916	915	914	913	912

No.	Description	Min.	Stan-dard	Max.	Units	Effec-tive
0963 (from SW 4.1)	Baud rate PROFIBUS	–	–	–	–	RO
	... contains the actual baud rate of the PROFIBUS. 0 9.6 kbit/s 1 19.2 kbit/s 2 93.75 kbit/s 3 187.5 kbit/s 4 500 kbit/s 6 1500 kbit/s 7 3000 kbit/s 8 6000 bit/s 9 12000 kbit/s 10 31.25 kbit/s 11 45.45 kbit/s					

Table 5-38 Parameters for PROFIBUS–DP, continued

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0967	PROFIBUS control word	–	–	–	hex	RO
	... is the image of control word STW1. **Note:** The bit assignment can be found as follows: under the index entry ”Process data in the n–set mode – control words – STW1” under the index entry ”Process data in the pos mode – control words – STW1” (from SW 2.1) under the index entry ”Process data in the x–set mode – control words – STW1” (from SW 3.3)					
0968	PROFIBUS status word	–	–	–	hex	RO
	... is the image of status word ZSW1. **Note:** The bit assignment can be found as follows: under the index entry ”Process data in the n–set mode – status words – ZSW1” under the index entry ”Process data in the pos mode – status words – ZSW1” (from SW 2.1) under the index entry ”Process data in the x–set mode – status words – ZSW1” (from SW 3.3)					
0969	Actual time difference	–	–	–	ms	RO
	... contains the relative system time since the last time that the drive was powered–up or since the last counter overflow					
1781:17 (from SW 4.1)	Setpoint source, PROFIBUS process data	–	–	–	hex	RO
	... indicates the source of the process data received via PROFIBUS The high byte includes a reference to the source device (0xFF for the master, DP address for a Publisher) and the lower byte includes the offset within the received telegram (counted in bytes starting with 1). The following applies: P1781:0 Number of valid entries P1781:1 Source of process data 1 (STW1) P1781:2 Source of process data 2 (PZD2), etc.					
1782:17 (from SW 4.1)	Target offset, PROFIBUS process data	–	–	–	hex	RO
	... indicates which offset process data, sent to the master or the subscribers via PROFIBUS, have in the sent telegram (counted in bytes starting with 1). The following applies: P1782:0 Number of valid entries P1782:1 Target offset of process data 1 (ZSW1) P1782:2 Target offset of process data 2 (PZD2), etc.					

Table 5-38 Parameters for PROFIBUS–DP, continued

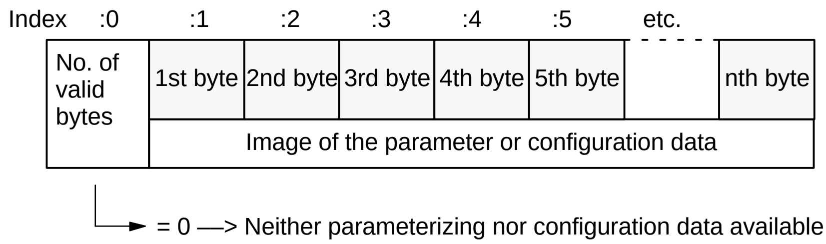
Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1783:64	Received parameterizing data PROFIBUS (from SW 3.1)	–	–	–	hex	RO
1784:64	Received configuration data PROFIBUS (from SW 3.1)	–	–	–	hex	RO
	P1783:64 ... is an image of the parameterizing data received from the DP slave (refer to Chapter 5.8.5). P1784:64 ... is an image of the configuration data received from the DP slave (refer to Chapter 5.7.1). 					
1785:13 (from SW 3.1)	Extended PROFIBUS diagnostics	–	–	–	hex	RO
	... contains diagnostics information to operate PROFIBUS. The following applies for the individual indices of P1785: :0 Error master sign–of–life since POWER ON :1 Clock–cycle synchronous operation selected :2 Interpolation clock cycle (Tipo) in us :3 Position controller clock cycle (Tlr) in us :4 Master application cycle type (Tmapc) in us :5 DP cycle time (Tdp) in us :6 Data exchange time (Tdx) in us :7 Instant in time of the setpoint sensing (To) in us :8 Instant in time of the actual value sensing (Ti) in us :9 PLL window (Tpllw) in 1/12us :10 PLL delay time (Tplld) in 1/12us :11 External slave–to–slave communication connections :12 Internal slave–to–slave communication connections					

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Table 5-38 Parameters for PROFIBUS–DP, continued

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1786:5	Received PKW data, PROFIBUS (from SW 2.4)	–	–	–	hex	RO
1787:5	Sent PKW data, PROFIBUS (from SW 2.4)	–	–	–	hex	RO

P1786:5 ... is an image of the PKW data received from the DP slave.

P1787:5 ... is an image of the PKW data sent to the DP master.

Index	:0	:1	:2	:3	:4
	No. of valid words	PKE	IND	PWE	
		Image of the PKW data			

= 0 —> no PKW data available
= 4 —> PKW data available

PKE Parameter ID
IND Sub–index, sub–parameter number, array index
PWE Parameter value
PKW Parameter ID value

Note:

The parameter range (PKW range) is described in Chapter 5.6.7.

No.	Description	Min.	Standard	Max.	Units	Effective
1788:17	Received process data PROFIBUS	–	–	–	hex	RO
1789:17	Sent process data PROFIBUS	–	–	–	hex	RO

P1788:17 ... is an image of the process data received from the DP slave (control words).

P1789:17 ... is an image of the process data sent to the DP master (status words).

Index	:0	:1	:2	:3	...	:14	:15	:16
	No. of valid words	PZD 1	PZD 2	PZD 3	...	PZD 14	PZD 15	PZD 16
		Image of the process data (PZD)						

PZD: Process data

Note:

- The number of valid words in P1788:0 and P1789:0 depends on the selected PPO type.
- Invalid words (are contained in parameters with an index greater than the number) have the value 0.
- Example:
  P1788:0 = 2 2 words are valid, i.e. it involves either a PPO1 or PPO3 P1788:1 contains the process data 1 (PZD1) P1788:2 contains the process data 2 (PZD2)
  P1788:3 to P1788:10 have the value 0
- An overview of the process data in the speed–controlled mode and in the positioning mode is included in Chapter 5.6.1.

Additional parameters relevant for PROFIBUS–DP (refer to Chapter A.1)

- P0600 Operating display
- P0607 Analog setpoint, terminal 56.x/14.x
- P0612 Analog setpoint, terminal 24.x/20.x
- P0653 Image, input signals, Part 1
- P0654 Image, input signals, Part 2
- P0656 Image, output signals, Part 1
- P0657 Image, output signals, Part 2
- P0658 Image, output signals, Part 3
- P0660 Function, input terminal I0.x
- P0661 Function, input terminal I1.x
- P0662 Function, input terminal I2.x
- P0663 Function, input terminal I3.x
- P0680 Function, output terminal O0.x
- P0681 Function, output terminal O1.x
- P0682 Function, output terminal O2.x
- P0683 Function, output terminal O3.x
- P0972 Request POWER–ON RESET (from SW 3.3)
- P1012.2 Function switch
  Bit 2 ”Ready or no fault”
- P1012.12 Function switch
  Bit 12 ”power–on inhibit”
- P1795 Optional module (PROFIBUS): Firmware version

5.10 Slave–to–slave communications (from SW 4.1)

5.10.1 General information

Description

For PROFIBUS–DP, the master addresses all of the slaves one after the other in a DP cycle. In this case, the master transfers its output data (setpoints) to the particular slave and receives as response the input data (actual values).

Fast, distributed data transfer between drives (slaves) is possible using the ”slave–to–slave” communications function without involving the master.

The following terms are used for the functions described here:

- Slave–to–slave communications
- Data exchange broadcast (DXB.req)
- Slave–to–slave communications (is used in the following)

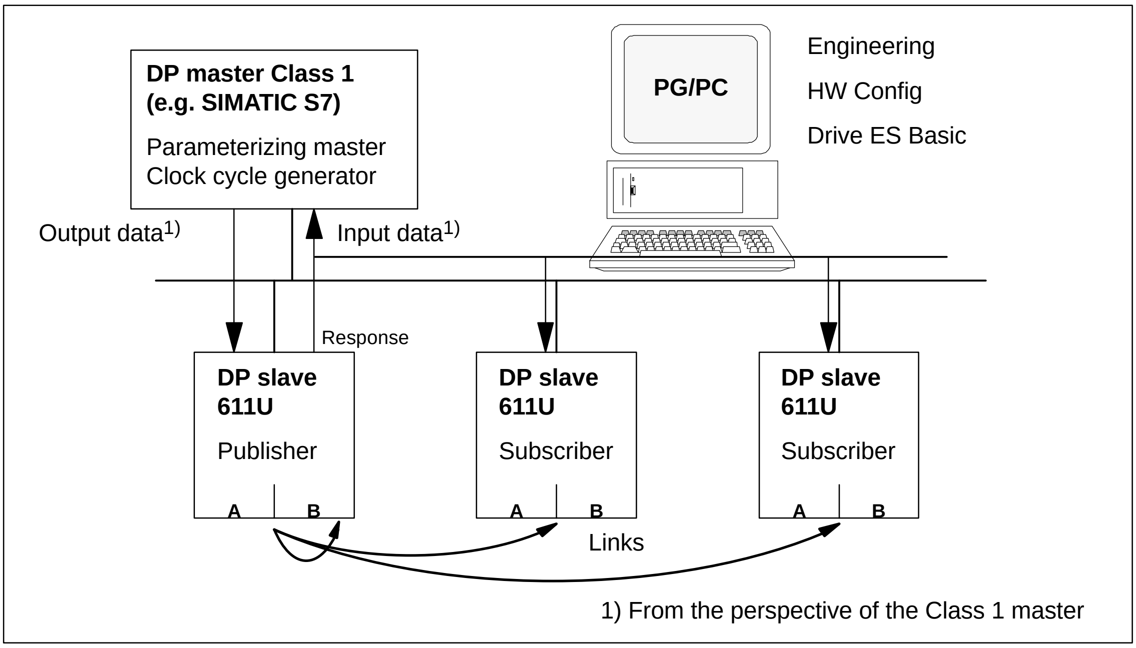


Fig. 5-30 Slave–to–slave communications with the publisher–subscriber module

Publisher

For the ”slave–to–slave communications” function, at least one slave must accept the role of publisher.

The master addresses the publisher, when transferring the output data, with a modified Layer 2 function code (DXB.req). The publisher then sends its input data to the master with a broadcast telegram to all bus nodes.

Subscribers

The subscribers evaluate the broadcast telegrams, sent from the publishers, and use the data which has been received as setpoints.

The setpoints are used, in addition to the setpoints received from the master, corresponding to the configured telegram structure (P0915).

Links and taps

The links configured in the subscriber (connection to publisher) contain the following information:

- From which publishers may input data be received?
- Which input data is there?
- A which location should the input data be used as setpoints?

Several taps are possible within a link. Several input data or input data areas, which are not associated with one another, can be used as setpoint via a tap.

Links are possible to the device itself. This means, e.g. that for a two–axis module, data can be transferred from drive A to B. This internal link corresponds, as far as the timing is concerned, to a link via PROFIBUS.

5

Prerequisites and limitations

The following limitations should be observed for the ”slave–to–slave” communications function:

- Drive ES Basic V5.1 SP1
- Optional PROFIBUS–DP2 module ≥ SW 4.1
- Optional PROFIBUS–DP3 module ≥ SW 4.1
- SIMODRIVE 611 universal ≥ SW 4.1
- Number of process data max. of 16 per drive
- Number of links to publishers max. 3 and 1 internal
- Number of taps per link max. 8

Applications

For example, the following applications can be implemented using the ”slave–to–slave communications” function:

- Axis couplings (this is practical for clock cycle synchronous operation) (refer to Chapter 6.3)
  - Angular synchronism where the position reference value or position actual value is entered
  - Torque setpoint coupling (master/slave operation)

    Master drive <—> Slave drive
    Closed–loop speed controlled Open–loop torque controlled
- Entering digital input signals from another slave (refer to Chapter 5.10.4)

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”slave–to–slave communications” function:

- P0032 External position reference value
- P0400 Reference point coordinate, master drive
- P0401 Coupling factor, revolutions master drive
- P0402 Coupling factor, revolutions slave drive
- P0410 Configuration, coupling that can be switched–in
- P0412 Synchronous offset position
- P0413 Offset, synchronous velocity
- P0420 Position difference, measuring probe to the zero point, slave drive
- P0425:16 Coupling positions
- P0879 PROFIBUS configuration
- P0882 Evaluation, torque setpoint PROFIBUS
- P0884 PROFIBUS position output evaluation Number of increments
- P0888 Function, distributed inputs (PROFIBUS)
- P0891 Source, external position reference value
- P0895 External position reference value – No. of increm.
- P0896 Ext. position reference value – No. of dimension system grids
- P0897 Inversion, external position reference value
- P0898 Modulo range, master drive
- P1781 Setpoint source, PROFIBUS process data
- P1782 Target offset, PROFIBUS process data
- P1785:13 Extended PROFIBUS diagnostics

Input/output signals (refer to Chapter 5.6)

The following signals are available for the ”slave–to–slave communications” function:

- Input signals
  - ”Correction, external position reference value via dXcor (from SW 4.1)”

    —> via the PROFIBUS control signal ”QStw.0”
  - ”Request passive referencing (from SW 5.1)”

    —> via the PROFIBUS control signal QStw.1 or STW1.15”
- Output signals
  - ”Correction, external position reference value via dXcor (from SW 4.1)”

    —> via PROFIBUS control signal ”QZsw.0”
  - ”Request passive referencing (from SW 5.1)”

    —> via the PROFIBUS control signal QZsw.1 or ZSW1.15”

5.10.2 Setpoint assignment in the subscriber

Setpoints?

The following statements can be made about the setpoint/reference values:

- Number of setpoint/reference values

  When bus communications is being established, the master signals the slave the number of setpoints/reference values (process data) to be transferred using the configuring telegram (ChkCfg).

- Contents of the setpoints/reference values

  The structure and contents of the data are defined for the ”DP slave 611U” using the local process data configuring (P0915, P0922).

- Operation as ”standard” DP slave

  The drive (slave) only receives its setpoints and output data from the DP master.

- Operation as subscriber

  When operating a slave subscriber, some of the setpoints are entered from one or several publishers instead of from the master.

  The slave is signaled the assignment when bus communications are being established, using the parameterizing and configuring telegram.

5

Example, setpoint assignment

The slave in Fig. 5-31 receives its process data as follows:

- STW1 and STW2 from the master
- NSOLL_B and MomRed as tap from a publisher

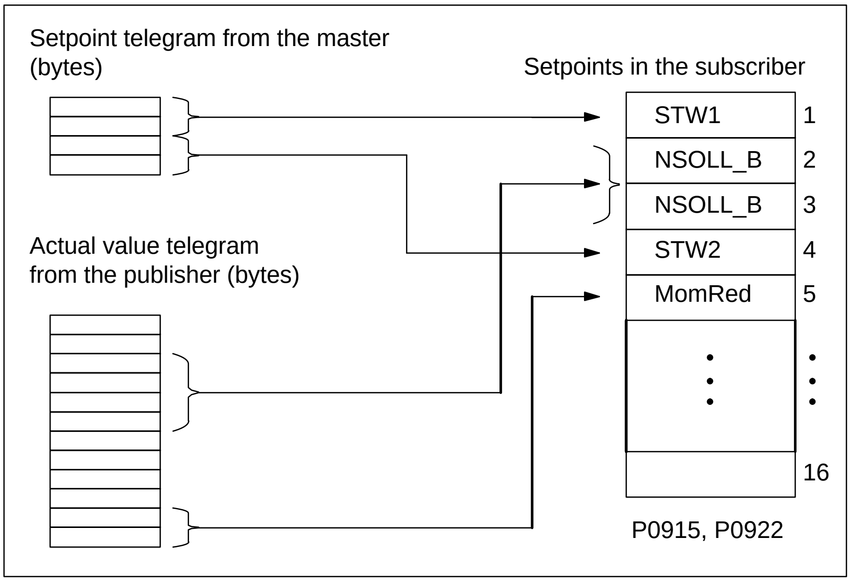


Fig. 5-31 Example, setpoint assignment

5.10.3 Activating/parameterizing slave–to–slave communications

The ”slave–to–slave communications” function must be activated both in the publishers as well as in the subscribers.

Activation in the publisher

By configuring the links with Drive ES Basic, the master can identify which slaves are to be addressed as publisher with a modified layer 2 function code (DXB request).

The publisher then does not send its input data to the master, but to all bus nodes as broadcast telegram.

Activation in the subscriber

The slave, which is to be used as subscriber, requires a filter table. The slave must know which setpoints are received from the master and which are received from a publisher.

The filter table contains the following information:

- From which publisher is data to be retrieved?
- The length of the publisher input data (test purposes)?
- From which position (offset) in the input data is data to be taken?
- How much data is to be taken?
- To which position in the setpoints is the data, which has been taken, to be copied?

Parameterizing telegram (SetPrm)

The filter table is transferred, as dedicated block from the master to the slave with the parameterizing telegram when bus communications are established.

If:	The block for the filter table is not available or element ”number of links” = 0
Then:	—> no subscriber functionality

The precise structure of this block, together with the permissible setting values is shown in Fig. 5-32.

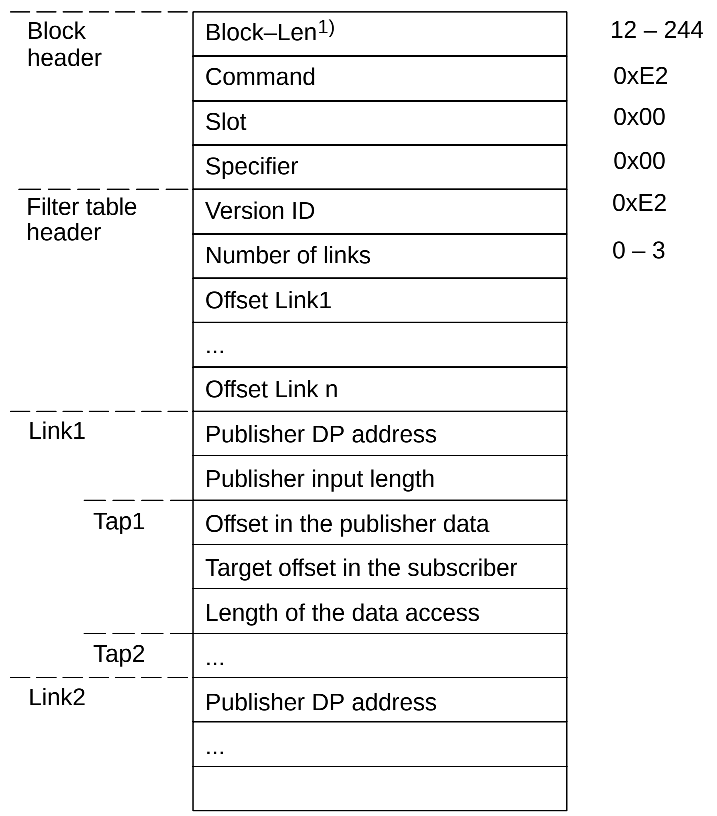
Configuration telegram (ChkCfg)

Using the configuration telegram, a slave knows how may setpoints are to be received from the master and how many actual values are to be sent to the master.

For slave–to–slave communications, a special empty ID is required for each data access, which is then transferred with the ChkCfg.

Structure of the empty ID for Drive ES Basic (S7 ID format):

0x04 0x00 0x00 **0xD3** 0x40



1) Data in bytes
2) Calculated from the version ID

Fig. 5-32 Filter block in the parameterizing telegram (SetPrm)

5.10.4 Telegram structure

Configuring a telegram

In order to be able to use the process data for slave–to–slave communications, the appropriate signal IDs must be entered into P0915 and P0916 for the telegram configuration.

Synchronous operation

For synchronous operation, where position reference values or actual values are entered for the axis couplings (refer to Chapter 6.3), the following process data is required for data transfer via PROFIBUS–DP:

- Signals for synchronous operation in the actual value direction (publisher)
  - Position actual value —> Signal ID 50206
  - Position reference value —> Signal ID 50208
  - Correction, position reference value —> Signal ID 50210
  - Status word, slave–to–slave comm. —> Signal ID 50118
- Signals for synchronous operation in the setpoint direction (subscriber)
  - External position reference value —> Signal ID 50207
  - Correction, ext. position ref. value —> Signal ID 50209
  - Control word, slave–to–slave comm. —> Signal ID 50117

For a description of this process data, refer to Chapter 5.6.

Example,synchronous operation

An example of a synchronous application, from the perspective of the slave drive, is shown in Fig. 5-33. Most of the control words are entered from the PROFIBUS–DP master; whereas, the actual setpoints/reference values are sent from a ”SIMODRIVE 611 universal” as master drive.

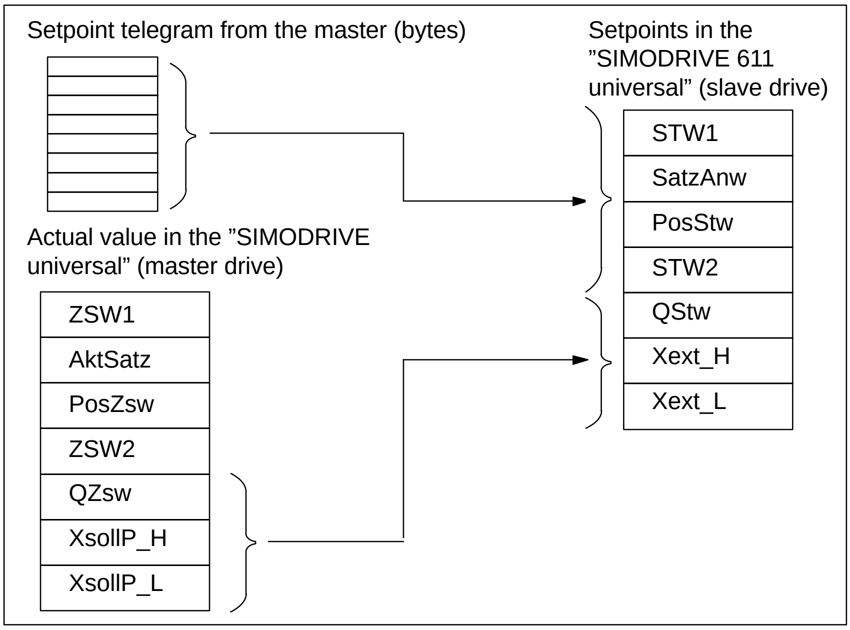


Fig. 5-33 Example, assigning the process data for a synchronous application

Distributed input signals

When distributed input signals are read in, a ”SIMODRIVE 611 universal” can directly read in control signals from another slave (publisher) without the signals first having to be routed via the master.

Either an input module, which is capable of slave–to–slave communications (e.g. ET200) can be used as publisher, or another drive, whose status signals can be used as control signals.

The following process data is required for the telegram configuring to read in these input signals:

Distributed inputs —> Signal ID 50111

For a description of the process data, refer to Chapter 5.6.

The individual bits in the process data must be assigned functions using parameter P0888. The same function IDs are used as when parameterizing the input terminals via P0660 to P0671 (function numbers from the ”List of input signals”, refer to Chapter 6.4.2).

Using this function assignment, signal sources can be mixed. The following hierarchy applies (1. = highest priority):

1. The signal comes from the local digital input on the ”SIMODRIVE 611 universal” hardware.
2. The signal comes from a publisher via the process data ”DezEing”.
3. Signal comes from the PROFIBUS master via ”STW1”, ”STW2”, etc.

Example, mixed operation

For the example from Fig. 5-34, all setpoints, with the exception of the hardware limit switch, are entered from the PROFIBUS–DP master.

The hardware limit switches are read in via an ET200 module and entered into the process data ”DezEing” (bit 0 and bit1).

In this case, it is necessary that the appropriate telegram is configured using P0915 and P0888 is assigned the function numbers for the hardware limit switch.

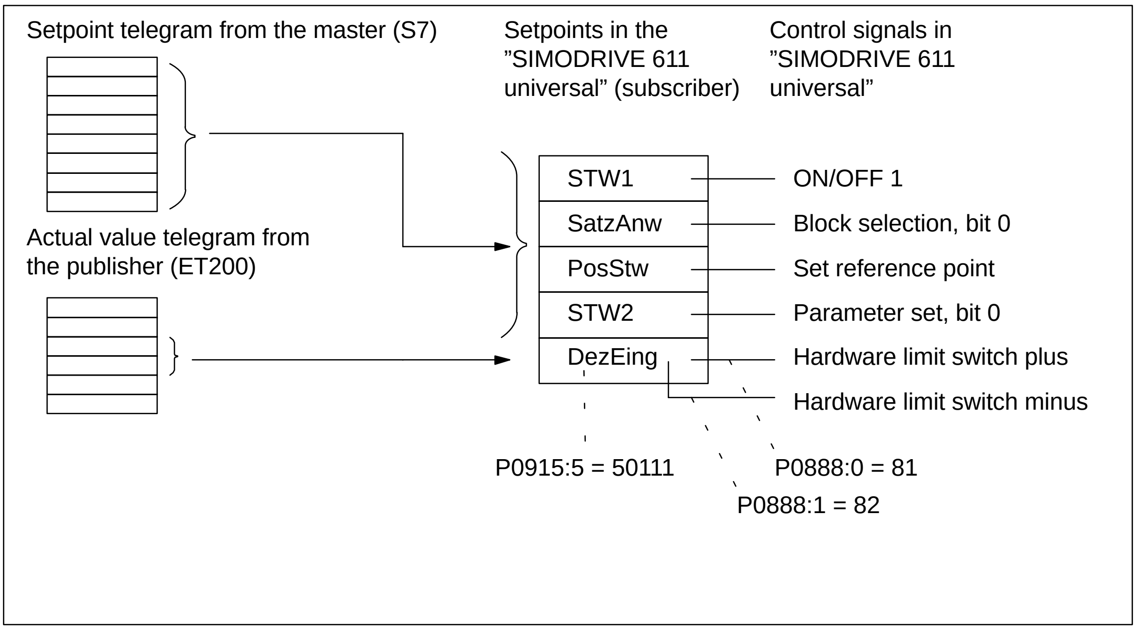


Fig. 5-34 Example, mixed operation for the control signals

5.10.5 Example: Coupling 2 drives (master, slave drive)

General information

The following example is based on the functionality of slave–to–slave communications via PROFIBUS–DP. It shows the steps which are necessary, using SimoCom U, to parameterize the master and slave drive.

We recommend the following sequence when parameterizing:

1. Parameterizing the master, e.g. SIMATIC S7
2. Parameterizing the master drive
3. Parameterizing the slave drive

Assumptions for the example

- Standard telegram 108 for the master drive (publisher)
- Standard telegram 109 for the slave drive (subscriber)
- Default ± 5 m, sufficient for the traversing range
- An SFC14/15 cannot be used
- P1009 = 4 ms

Parameterizing DP master

The steps when configuring an S7 are shown in the following Figs.:

The following data should be parameterized in the DP master (S7):

- Configuration, master drive matching telegram 108
  —> number of process data
  - 4 words, PKW
  - 10 words, actual values to the DP master (inconsistent)
  - 10 words, setpoints from the DP master (inconsistent)

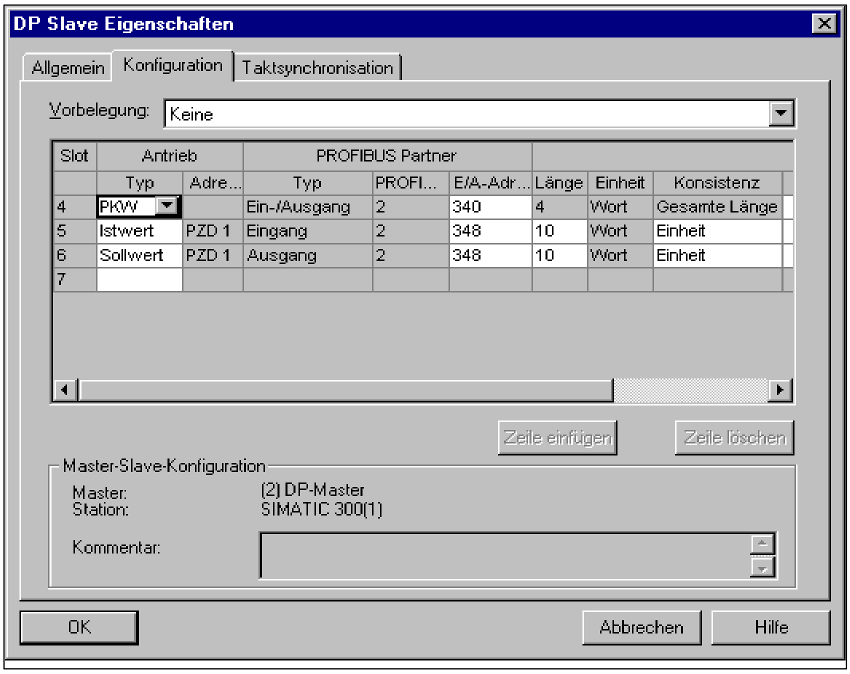


Fig. 5-35 Example, configuring the master drive for S7

- Configuring the slave drive matching telegram 109
  —> Definition of the slave–to–slave communications link
  – 4 words, PKW
  – 10 words, actual values to the DP master (inconsistent)
  – 5 words, setpoints from the DP master (inconsistent)
  – 5 words, setpoints via slave–to–slave communications

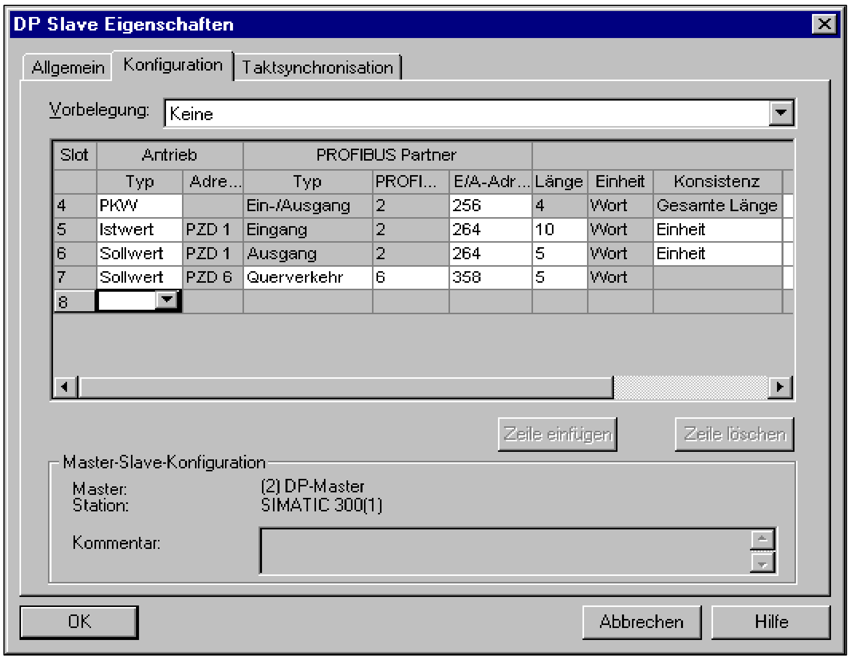


Fig. 5-36 Example, configuring the slave drive for S7

- Clock cycle synchronization —> applicable for the master and slave drives

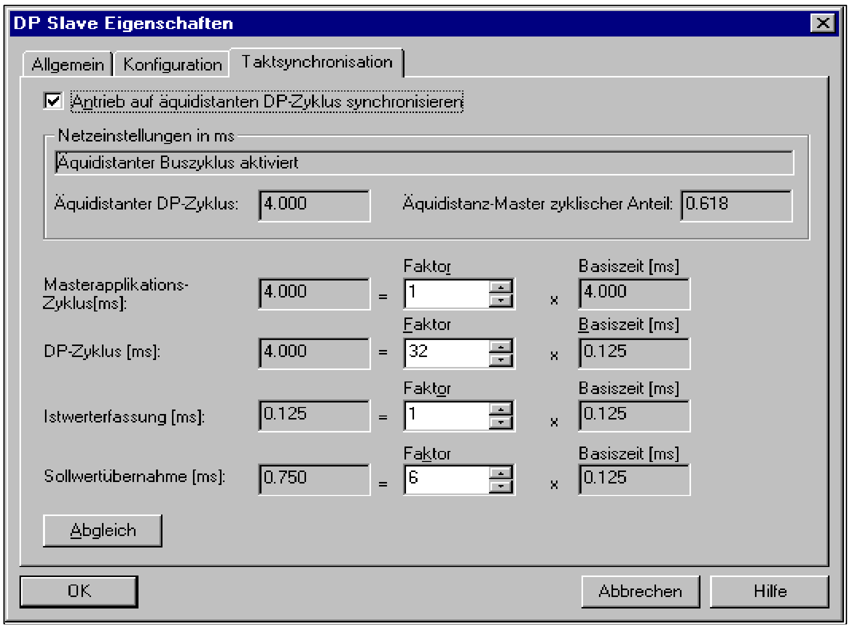


Fig. 5-37 Example, clock cycle synchronization for configuring S7 DP cycle 4 ms

Parameterizing the master drive

The following parameters have been set:

- P0922 = 108
  —> Standard telegram 108: Master drive for the position reference value coupling
- Normalization via P0884 and P0896

  Setting for the best possible resolution:
  P0884 = 2048 increments ≙ P0896 = 5 MSR

  The default setting can be changed according to the following formula:

  Max. traversing distance which can be represented: $\pm \frac{2^{31}}{P0884} \cdot P0896$
- Optional: Inverting the external position reference value using P0897

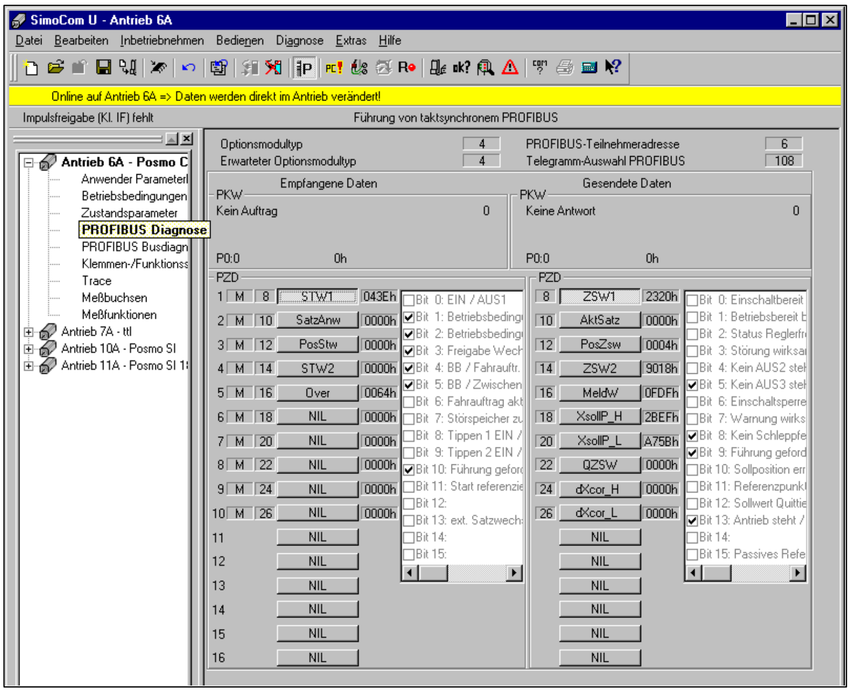


Fig. 5-38 Parameterizing the master drive

Note

In order to ensure that the process data is correctly assigned between the publisher and subscriber, the offsets of the sent and received data must match.

For example, actual values (sent data) for PZD 18 (XsollP_H) in the master drive (Fig. 5-38) must match the setpoint/reference value (received data) for PZD 18 (Xext_H) in the slave drive (Fig. 5-39).

Parameterization, slave drive

The following parameters have been set:

- P0922 = 109

  —> Standard telegram 109: Slave drive for the position reference value coupling

- P0891 = 4
  —> Source for ”External position reference value”: PROFIBUS–DP

- Normalization using P0895 and P0896

  Setting for the best possible resolution:
  P0895 = 2048 increments ≙ P0896 = 5 MSR

  Max. traversing distance which can be represented:

  $$\pm \frac{2^{31}}{P0895} \cdot P0896$$

- Optional: Inverting the external position reference value using P0897

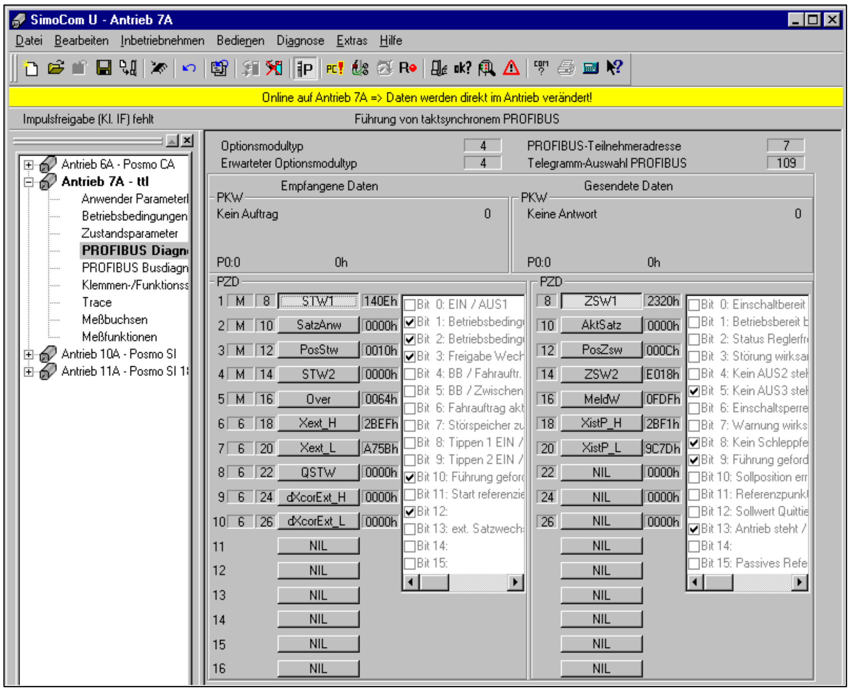


Fig. 5-39 Parameterization, slave drive

Configuring the coupling

The following parameters should be set at the slave drive:

- Source for the ”external position reference value”

  —> e.g. P0891 = 4: PROFIBUS–DP

- Select the coupling type using P0410

  —> e.g. P0410 = 7: Coupling to the absolute position + P0412 via the digital input signal

- Define the optional coupling factor for revolutions, master and slave drive

  —> P0401 and P0402 (e.g. 1)

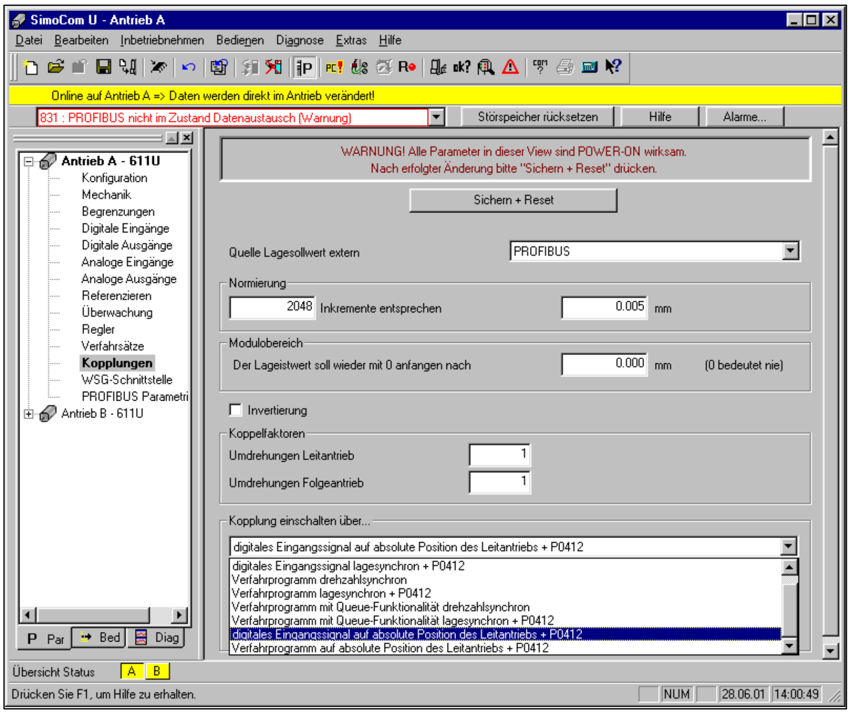


Fig. 5-40 Parameterizing the couplings

The DP master must set control word PosStw.4 in order to activate the coupling.

■

Space for your notes

6 Description of the Functions

6.1 Operating mode, speed/torque setpoint (P0700 = 1)

6.1.1 Application examples

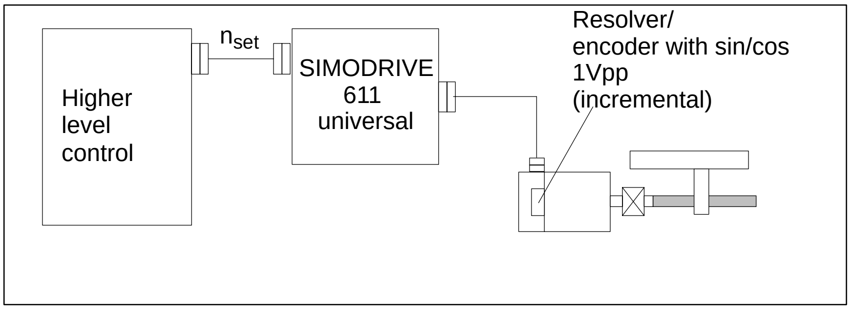


Fig. 6-1 Variable–speed drive

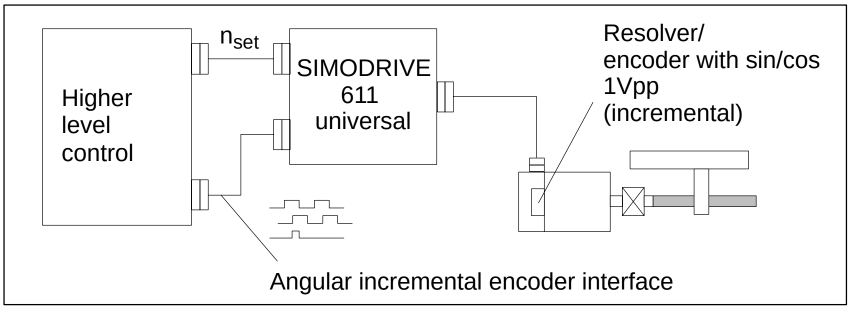


Fig. 6-2 Positioning drive using a higher–level open–loop control, position actual value generation via angular incremental encoder

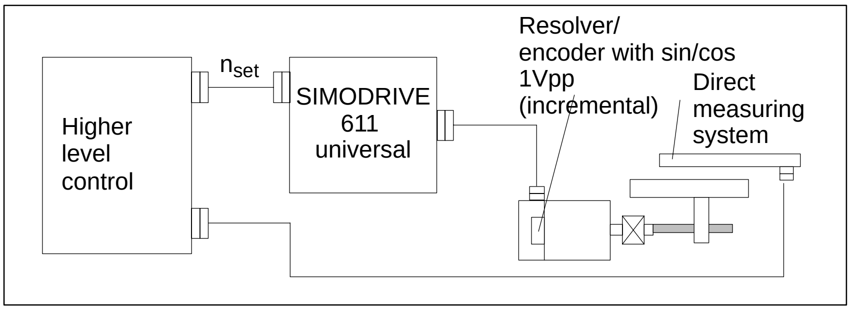


Fig. 6-3 Positioning drive using a higher–level open–loop control, position actual value generation via a direct measuring system

6

6.1.2 Current and speed control

General information

For ”SIMODRIVE 611 universal”, in the ”speed/torque setpoint” mode, a setpoint can be entered as follows via analog inputs 1 and 2:

- Terminal 56.x/14.x (refer to Chapter 6.6)
  - Speed setpoint n_{set} analog/torque setpoint M_{set} analog
- Terminal 24.x/20.x (refer to Chapter 6.6)
  - Speed setpoint n_{set} analog/torque setpoint M_{set} analog/setpoint for torque reduction M_{red} analog

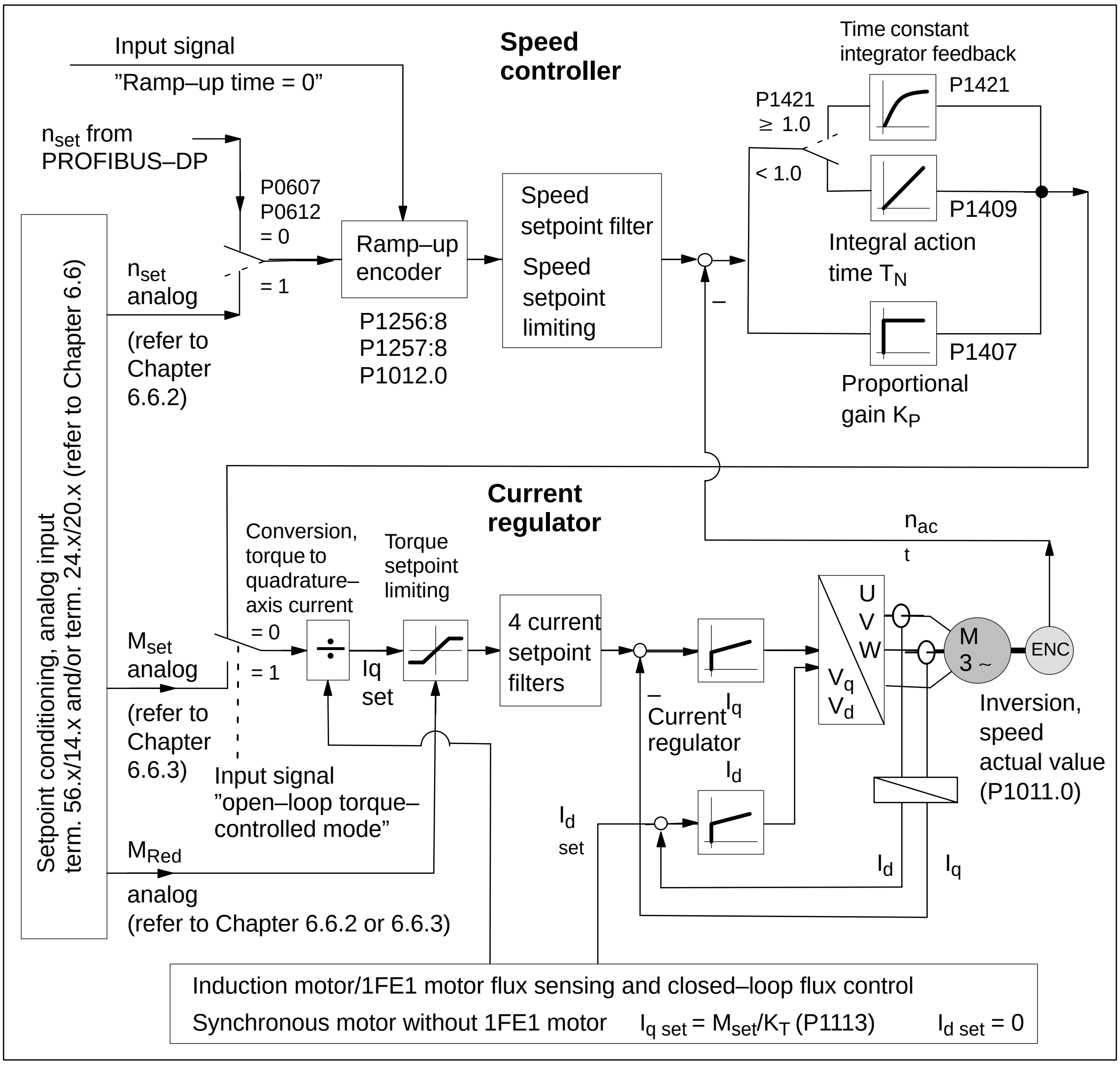


Fig. 6-4 Current and speed control

Reader’s note

Described in the following:

- Ramp–function generator
- Optimizing the current and speed controllers
- Speed controller adaptation

All additional parameters to optimize the current and speed control loop can be adapted using the expert list.

Detailed information regarding the current and speed control loop are included in:

Reference: /FBA/ SIMODRIVE 611D/SINUMERIK 840D/810D
Description of Functions, Drive Functions

6.1.3 Ramp–function generator

General information

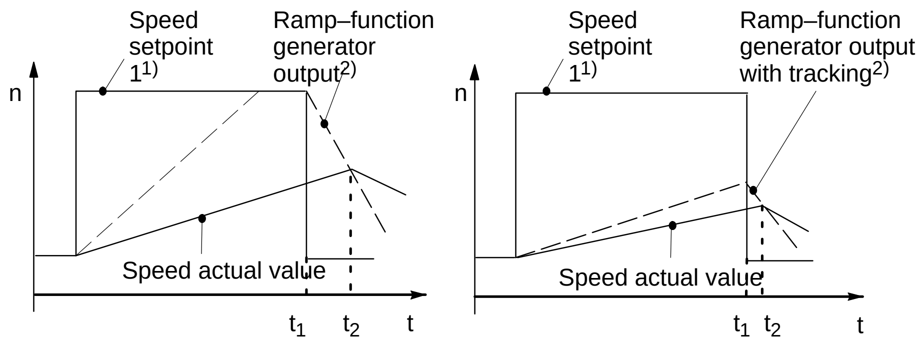
The ramp–function generator is used to limit the acceleration when the analog setpoint voltage has step changes.
Various parameter set–dependent ramps can be entered for ramp–up and ramp–down.

Parameter overview

The following parameters are available for the ramp–function generator:

Table 6-1 Parameter overview for the ramp–function generator

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0616:8 from SW 2.4 1256:8	Ramp–function generator, ramp–up time (ARM) (SRM, SLM)	0.0	2.0 0.0	600.0	s	Immedi-ately
	The setpoint is increased from zero up to the maximum permissible actual speed within this time. • Max. permissible actual speed for synchronous motors: Minimum from 1.1 • P1400 and P1147 (from SW 7.1 1.05 • P1400 and P1147 with ”SIMODRIVE 611 universal HR”, resolver) • Max. permissible actual speed for induction motors: Minimum from P1146 and P1147 • Max. permissible actual speed for linear motors: from P1147					
0617:8 from SW 2.4 1257:8	Ramp–function generator, ramp–down time (ARM) (SRM, SLM)	0.0	2.0 0.0	600.0	s	Immedi-ately
	The setpoint is changed from the maximum permissible actual speed to zero within this time. • Max. permissible actual speed for synchronous motors: Minimum from 1.2 •P1400 and P1147 • Max. permissible actual speed for induction motors: Minimum from P1146 and P1147					
1012.0	Ramp–function generator tracking	–	–	–	hex	Immedi-ately
	The ramp–function generator tracking can be activated/de–activated using P1012 bit 0. = 1 Ramp–function generator tracking active (standard) = 0 Not active					



Without RFG tracking
The drive continues to accelerate between t_1 and t_2, although the speed setpoint (e.g. setpoint 0) is less than the speed actual value.

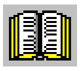
With RFG tracking
The ramp–function generator output is prevented from leading the speed actual value so that t_1 and t_2 almost merge.

Note:
1) For example, from the PROFIBUS control word NSOLL or P0641 (fixed speed setpoint).

Input/output signals for the ramp–function generator

For the ramp–function generator, the following signals are used:

- Input signal – Ramp–function generator enable
  – Ramp–up time zero
  – Ramp–up time zero for contr. enable (from SW 3.1)
- Output signal – Ramp–up completed

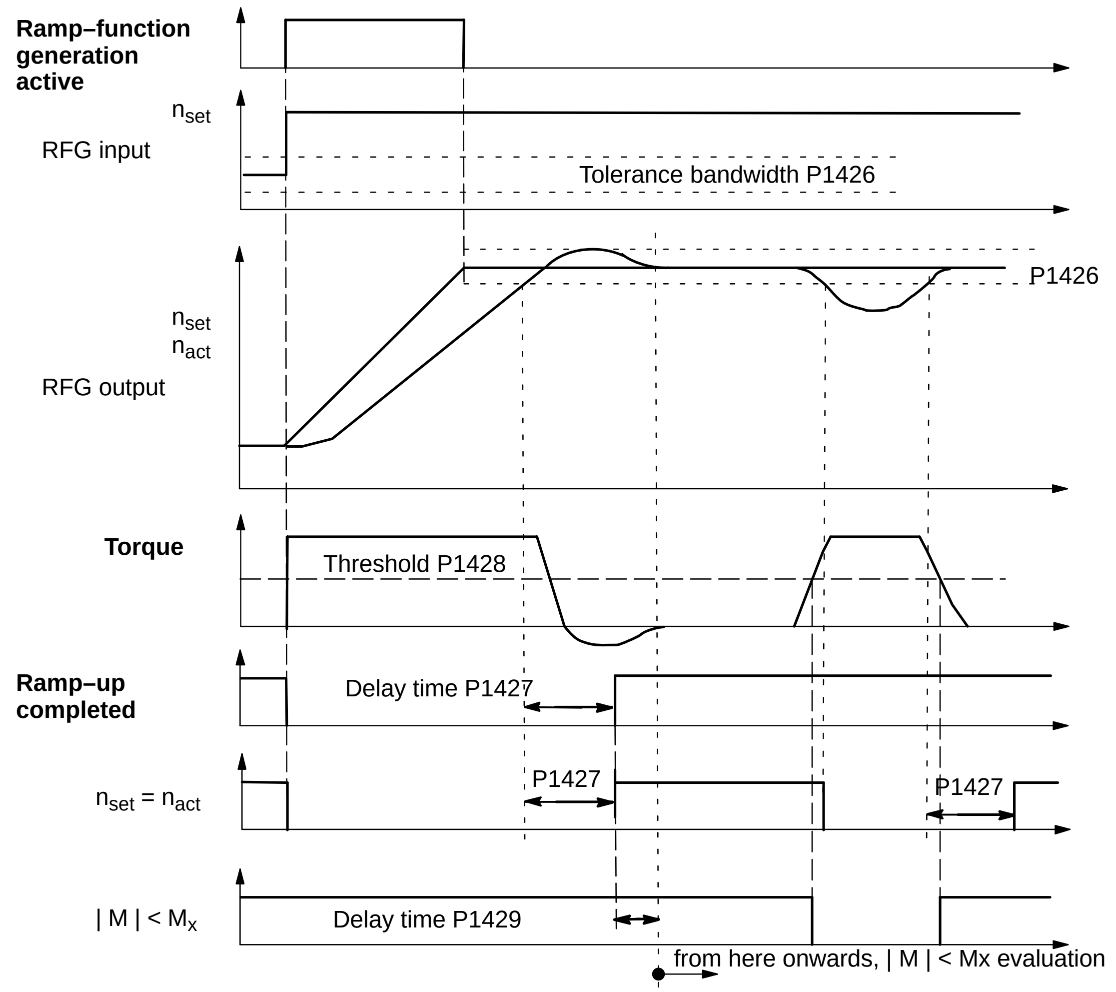


Reader's note

The signals can be entered or output as follows:

- via terminals —> refer to Chapter 6.4.2 or 6.4.5
- via PROFIBUS–DP —> refer to Chapter 5.6.1

All of the input/output signals are shown and described in Chapter 6.4.3 and 6.4.6 and can be found in the Index under "Input signal..." or "Output signal...".



1) For an active average–value filter for the speed setpoint (P1012.8=1), a setpoint step somewhat greater than P1426 must be used in order to clearly identify the start of a new ramp–up operation.

Fig. 6-5 Signal characteristics for the ramp–function generator

6.1.4 Optimizing the closed–loop current and speed controller

When optimizing the cascaded control structure (current, speed controller), you generally proceed from the inside to the outside.

Optimizing the current controller

At the first commissioning or later, the current controller is pre–set using the ”Calculate controller data” function, and generally no longer has to be optimized.

However, all parameters for the current control loop can be adapted via the expert list of the ”SimoCom U” tool.

Optimization speed controller

At the first start–up (first commissioning) or later, the speed controller is pre–set using the ”Calculate controller data”.

This speed controller setting is calculated for a motor operating under no–load conditions, and corresponds to a ”safe” setting.

In order to be able to fully utilize the dynamic performance of the drive including the mechanical system, some post–optimization will be necessary.

- Optimizing using the ”SimoCom U” tool

  The controller setting for ”SIMODRIVE 611 universal” can be automatically executed using the ”SimoCom U” tool (only in online operation).

  Call:
  Press the ”Execute automatic controller setting” button under ”Controller” and execute the steps offered.

Reader’s note

Recommendation when optimizing the controller:

Optimize the control loop with ”SimoCom U” and the ”Execute automatic controller setting” function.

- Optimization using the display and operator control unit:
  - Remove write protection —–> set P0651 to 4
  - Increase the proportional gain Kp (P1407:8) until the motor makes a whistling sound
  - Reduce the proportional gain Kp (P1407:8) until this whistling sound disappears
  - The integral action time T_N (P1409:8) can be retained

Table 6-2 Parameters for the speed controller optimization

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1407:8	P gain, speed controller (SRM, ARM) P gain, velocity controller (SLM)	0.0	0.3 2 000.0	999 999.0	Nm*s/rad Ns/m	Immediately
	... specifies the magnitude of the proportional (gain K_p, proportional component) of the control loop.					
1409:8	Integral action time, speed controller (SRM, ARM) Integral action time, velocity controller (SLM)	0.0	10.0	500.0	ms	Immediately
	... specifies the integral action time (T_N, integral component) of the control loop.					

Reader's note

When optimizing, e.g. linear drives, it may be necessary to set the current and speed setpoint filters.
This procedure is described in:

Reference: /FBA/ SIMODRIVE 611D/SINUMERIK 840D/810D Description of Functions, Drive Functions

6

6.1.5 Speed controller adaptation

Description

The speed controller can be adapted, depending on the speed or velocity, using the speed/velocity controller adaptation.

For example, in order to better overcome stiction at lower speeds, a higher proportional gain can be set than for higher speeds.

Enabling/disabling adaptation

Adaptation is enabled/disabled with P1413.

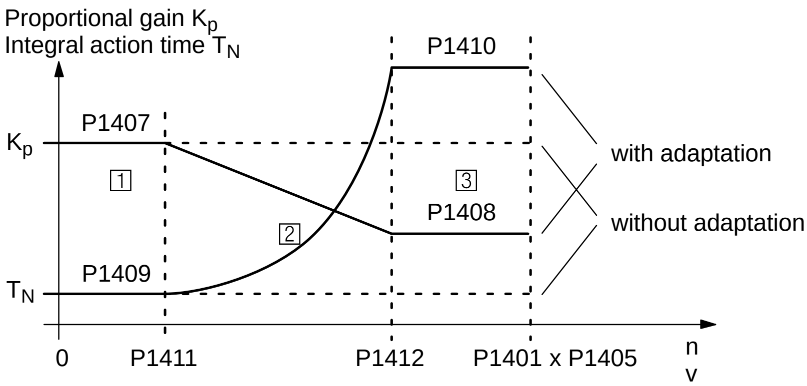
- The following is valid with the adaptation enabled (P1413 = 1):

  Proportional gain (K_p):
  The settings in P1407 and P1408 are effective as a function of the lower (P1411) and upper thresholds (P1412).
  The values are linearly interpolated in the adaptation range.

  Integral action time (T_N):
  The settings in P1409 and P1410 are effective as a function of the lower (P1411) and upper thresholds (P1412).

- With adaptation disabled (P1413 = 0) the following is valid:

  The proportional gain (K_p, P1407) and the integral action time (T_N, P1409) are effective over the complete range.



1	Constant lower speed range	(n or v < P1411)
2	Adaptation range	(P1411 < n or v < P1412)
3	Constant upper speed range	(n or v > P1412)

Fig. 6-6 Adaptation of the speed controller parameters using the characteristic

Parameter overview

The following parameters are available for the speed controller adaptation:

Table 6-3 Parameters for the speed controller adaptation

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1413	Select adaptation, speed controller (SRM) Select adaptation, speed controller (ARM) Select adaptation, velocity controller (SLM)	0	0 1 0	1	–	Immediately
	... the adaptation can be activated/de–activated immediately. 1 The adaptation is active 0 The adaptation is not active **Note:** For induction motors (ARM), the speed controller adaptation is switched–in as standard.					
1408:8	P gain, upper adaptation speed (SRM, ARM) P–gain, upper adaptation velocity (SLM)	0.0	0.3 2 000.0	999 999.0	Nm*s/rad Ns/m	Immediately
	... defines the P gain in the constant, upper range (n or v > P1412). **Note:** When a value of 0 is entered, the associated integral component (P1410) is automatically de–activated.					
1410:8	Integral action time, upper adaptation speed (SRM, ARM) Integral action time, upper adaptation velocity (SLM)	0.0	10.0	500.0	ms	Immediately
	... defines the integral action time in the constant, upper range (n or v > P1412). **Important:** With the adaptation activated, you should avoid de–activating the integral component for only one range (P1409 = 0 and P1410 ≠ 0 or vice versa). Problem: Torque jumps when resetting the integral value at the transition from the adaptation range to the constant range. **Note:** If a value of 0 is entered, this de–activates the integral component for the range greater than set in P1412.					
1411	Lower adaptation speed (SRM, ARM) Lower adaptation velocity, motor (SLM)	0.0	0.0	100 000.0	RPM m/min	Immediately
	... defines the lower threshold for adaptation.					
1412	Upper adaptation speed (SRM, ARM) Upper adaptation velocity, motor (SLM)	0.0	0.0	100 000.0	RPM m/min	Immediately
	... defines the upper threshold for adaptation.					

6

6.1.6 Fixed speed setpoint (from SW 3.1)

Description

Speed setpoints can be defined in parameters using this function. The required fixed setpoint for the speed setpoint input is selected via input signals. The currently selected fixed setpoint can be displayed via output signals.

Advantage:

An analog voltage is not required for the speed setpoint input, and the setpoint can be precisely set.

Input/output signals

The following signals are used for the ”fixed speed setpoint” function:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  - Fixed speed setpoint 1st input (function number = 15)
  - Fixed speed setpoint 2nd input (function number = 16)
  - Fixed speed setpoint 3rd input (function number = 17)
  - Fixed speed setpoint 4th input (function number = 18)
- Output signals
  (refer under the index entry, ”Output signal, digital – ...”)
  - Status, fixed speed setpoint 1st output (function number = 15)
  - Status, fixed speed setpoint 2nd output (function number = 16)
  - Status, fixed speed setpoint 3rd output (function number = 17)
  - Status, fixed speed setpoint 4th output (function number = 18)

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”fixed speed setpoint” function:

- P0641:16 Fixed speed setpoint (SRM, ARM)
  Fixed velocity setpoint (SLM)

Commissioning the function

The following sequence is practical when commissioning:

1. Enter the required fixed speed setpoints (refer to Chapter A.1)
   P0641:0 = no significance
   P0641:1 = required fixed setpoint 1
   P0641:2 = required fixed setpoint 2, etc.
2. Parameterize the input terminals (refer to Chapters 6.4.2 and 6.4.3)
3. Parameterize the output terminals (refer to Chapters 6.4.5 and 6.4.6)
4. Check the function

6.1.7 Monitoring functions

Motor temperature monitoring

The temperature limit values are pre–assigned, corresponding to the selected motor when the motor code is specified; the user should not change these.

The following motor temperature monitoring functions are available:

- Temperature monitoring with pre–warning (P1602 + P1603)

  If the temperature warning threshold (P1602) is exceeded, the result is as follows:

  – Warning 814 is output

  – Timer (P1603) is started

  – Motor overtemperature is signaled via terminal 5.x at the NE module

    Note:
    This signal is saved, if it is still present after the time in P1603 has expired.

  – The ”motor temperature pre–warning” (MeldW.6) output signal is set

  If the overtemperature condition still remains after the time set in P1603, then this results in fault 614 and the drive is powered down.

  The monitoring function can be enabled/disabled using P1601.14.

- Temperature monitoring without pre–warning (P1607)

  If the temperature threshold in P1607 is exceeded, this immediately results in fault 613 and the drive is powered down.

  The monitoring function can be enabled/disabled using P1601.13.

Note

The temperature monitoring functions (warning P1602 + timer P1603 or P1607) are not subject to any mutual restrictions, i.e. it is permissible that P1607 < P1602.

- Specifying a fixed temperature (P1608)

  When a fixed temperature is specified, the temperature–dependent adaptation of the rotor resistance is executed with this fixed temperature.

Note

The temperature monitoring functions of the motor, set using P1602 or P1607, are then no longer effective.

Table 6-4 Parameters for the motor temperature monitoring function

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0603	Motor temperature	–	–	–	°C	RO
	... displays the motor temperature measured using the temperature sensor. **Note:** This display is not valid, if a fixed temperature was entered in P1608.					
1602	Warning threshold, motor overtemperature	0	120	200	°C	Immediately
	The parameter specifies the permissible thermal steady–state motor temperature, and is appropriately pre–assigned when the motor code is specified. **Note:** If the temperature warning threshold is exceeded, initially, ”only” warning 814 is output, which is withdrawn when the temperature threshold is fallen below. If the overtemperature condition remains for a time longer than that set in P1603, then this results in fault 614. Monitoring can be enabled/disabled via P1601.14.					
1603	Timer, motor temperature alarm	0	240	600	s	Immediately
	The parameter defines the time, which is started when the temperature warning threshold is exceeded (P1602).					
1607	Shutdown limit, motor temperature	0	155	200	°C	Immediately
	The temperature defines the shutdown limit for the temperature monitoring without pre–warning. If the shutdown limit is exceeded, this results in fault 613.					
1608	Fixed temperature	0	0	200	°C	Immediately
	If a value > 0 is entered, the rotor resistance is adapted depending on the temperature using this fixed temperature. **Note:** • This can be necessary, e.g. if a motor does not have any temperature sensor. • This means, that, e.g. the temperature monitoring for linear motors is switched–out if the monitoring is realized using an external PLC. • The temperature monitoring functions of the motor, set using P1602 and P1603 or P1607, are then no longer effective.					

Torque setpoint monitoring (speed controller output limited, speed controller at its endstop)

The following is monitored:

- Is the speed controller output (torque setpoint) at its limit for longer than the time in P1605 (torque, power, stall or current limit)?

  and

- Is the absolute actual speed less than that in P1606?

When the monitoring function responds, fault 608 (speed controller output limited) is output and the pulse enable is withdrawn.

Note

Fault 608 (speed controller output limited) can be suppressed using the input signal ”suppress fault 608 (from SW 3.1)”.

Table 6-5 Parameters for the torque setpoint monitoring

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1605	Timer, n controller at its limit	20.0	200.0	10 000.0	ms	Immedi-ately
	... specifies how long the speed controller output may be at its limit, without a fault condition being generated. **Important:** If P1605 < P1404, then regenerative braking can be canceled with fault 608, whereby the drive then coasts down.					
1606	Threshold, speed controller at its limit (SRM) (ARM) (SLM)	0.0	90 000.0 30.0 500.0	100 000.0	RPM RPM m/min	Immed.
	... specifies up to which speed the torque setpoint monitoring is active, i.e. up to this value, fault 608 (speed controller output limited) can be output. **Note:** For PE spindles (P1015 = 1), the standard assignment is the same as for ARM (30.0 RPM).					

DC link monitoring

The DC link of the drive system is monitored for an undervoltage condition.
The set DC link undervoltage warning threshold in P1604 is monitored and the monitoring result is displayed via the ”DC link monitoring $V_{DC\ link} > V_x$ output signal.

The DC link voltage is generally monitored in the NE modules. If the fixed monitoring limits are exceeded or fallen below, then the NE module automatically carries out shutdown operations.

Table 6-6 Parameters for the DC link monitoring

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1604	DC link undervoltage warning threshold	0	200	680	V(pk)	Immedi-ately
	... specifies the DC link undervoltage warning threshold V_x to output the signal ”DC link monitoring $V_{DC\ link} > V_x$”. **Note:** The DC link voltage is sensed by the NE module or a monitoring module, and can also be output as analog signal (0 – 10 V) via an analog output.					

From SW 4.1, the following monitoring functions/warnings are available for the DC link voltage, which result in the drive being powered down (tripped):

- Monitoring the DC link for an overvoltage condition

  Threshold: P1163 ”Max. DC link voltage”

  Fault 617, if the DC link voltage, when the pulses are enabled, is greater than the threshold. The shutdown response can be configured using P1613 bit 16 or 17.

- Monitoring for a DC link undervoltage condition

  Threshold: P1162 ”Minimum DC link voltage”

  Defines the permissible lower limit for the DC link voltage.

  Fault 616 is generated if the DC link voltage when setting the enable signals is less than the threshold. The monitoring only becomes active if $V_{DC\ link}$ (P1701) has at least fallen below the value in P1162 once.
  The shutdown response to fault 616 can be configured using P1613 bit 16 or 17.

If the standard value is entered in P1162/P1163, then the appropriate monitoring is inactive.

Hardware limit switch (HW limit switch) (from SW 8.1)

When using ”SIMODRIVE 611 universal” with a higher–level control, it can occur that for coordinate transformation, e.g. shifting and rotating the tool, that the software limit switches cannot be activated/evaluated in the higher–level control.

An axis fast stop is possible using a hardware limit switch monitoring function.

The HW limit switches must be connected to an input terminal with the following function numbers:

- ”Plus hardware limit switch” function —> function number 81
- ”Minus hardware limit switch” function —> function number 82

  —> Refer to Chapter 6.4.2

Traverse to a hardware limit switch?

When traversing to a hardware limit switch, the associated input signal is set to ”0” and the following response is automatically initiated:

- A setpoint of zero is entered in the selecting speed direction – the axis is braked and comes to a standstill. The drive remains in the closed–loop controlled mode.

  If it is switched–in, the ramp–function generator remains active. The braking that is initiated runs with or without braking ramp.

- One of the following warnings is output:
  - Warning 800 Minus hardware limit switch
  - Warning 801 Plus hardware limit switch

The hardware limit switch signal must always remain at a ”0 signal” outside the permitted traversing range. A brief change from ”0 signal” to ”1 signal” is not permitted.

As a result of the zero speed input when reaching the hardware limit switch, alarms, e.g. ”following error too high” or similar faults must be detected in the higher–level control.

How do you move away from a hardware limit switch?

If an axis is at a hardware limit switch, then it can be moved away as follows:

- Enter a setpoint in the oppositive direction to the approach direction

  or

- Withdraw the controller enable and move the drive away manually

After moving away from the hardware limit switch, warning 800 or 801 is automatically deleted.

6

Other monitoring functions

Reader's note

For "SIMODRIVE 611 universal", additional monitoring functions can be parameterized, and processed via output signals (terminals, PROFIBUS) (refer to Chapter 6.4.6).

6.1.8 Limits

Limiting the speed setpoint

The speed setpoint is limited to the maximum value which is set.

How is the speed setpoint limiting calculated?

Motor type	Interdependencies
• SRM, SLM:	P1405 • P1401:8
• ARM:	Minimum (P1405 • P1401:8, 1.02 • P1147, 1.02 • P1146)

Note

The maximum useful motor speed, set via P1401:8, is taken into account when calculating the speed setpoint, i.e. P1401:8 acts as speed limiting.
This is valid, independent of whether the setpoint is entered via a terminal or PROFIBUS–DP.

Speed limiting

If the speed actual value exceeds the selected limit value by more than 2%, then the torque, when motoring, is set to 0.
Thus, further acceleration is not possible.
If the speed actual value drops below the limit value, the torque limiting is withdrawn again.

How is the speed limiting calculated?

Motor type	Interdependencies
• SRM:	Minimum (P1147, 1.2 • P1400)
• ARM, SLM, PE spindle:	Minimum (P1147, P1146)

Table 6-7 Parameters for speed limiting

<table>
<tr><th colspan="7">Parameters</th></tr>
<tr><th>No.</th><th>Description</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>1146</td><td>Maximum motor speed (SRM)
Maximum motor speed (ARM)
Maximum motor velocity (SLM)</td><td>0.0</td><td>0.0
15000.0
0.0</td><td>100 000.0</td><td>RPM
RPM
m/min</td><td>PO</td></tr>
<tr><td></td><td colspan="6">... specifies the maximum motor speed or maximum motor velocity defined by the motor manufacturer.
Note:
This is only included in the speed limiting for rotary induction motors (ARM).</td></tr>
<tr><td>1147</td><td>Speed limit (SRM)
Speed limit (ARM)
Velocity limit, motor (SLM)</td><td>0.0</td><td>7 000.0
8 000.0
120.0</td><td>100 000.0</td><td>RPM
RPM
m/min</td><td>Immediately</td></tr>
<tr><td></td><td colspan="6">... specifies the maximum permissible motor speed or motor velocity.
When commissioning the system for the first time and for ”calculate unlisted motors”, the parameter is pre–assigned as follows:
• SRM 1.1 • P1400
1.05 • P1400 (from SW 7.1 with ”SIMODRIVE 611 universal HR”, resolver)
• ARM, SLM, PE spindle P1146
Speed actual value > Speed limit
• Exceeded by more than 2 %:
The torque limit when motoring is internally set to zero, the drive is prevented from accelerating any further.
With the appropriate setting, the ”speed controller at its limit” monitoring can respond.</td></tr>
<tr><td>1401:8</td><td>Speed for max. useful motor speed (SRM, ARM)
Velocity for max. motor useful velocity (SLM)</td><td>–100 000.0</td><td>0.0</td><td>100 000.0</td><td>RPM
m/min</td><td>Immediately</td></tr>
<tr><td></td><td colspan="6">... limits the speed to the maximum useful motor speed.
The parameter is pre–set at the first start–up and for ”Calculate unlisted motor”:
• SRM P1400
• ARM, SLM, PE spindle P1146
Note:
P1401:8 is used for normalization for speed setpoints entered via analog inputs (refer to Chapter 6.6).</td></tr>
<tr><td>1405:8</td><td>Monitoring speed, motor (SRM, ARM)
Monitoring velocity, motor (SLM)</td><td>100.0</td><td>110.0</td><td>110.0</td><td>%</td><td>Immediately</td></tr>
<tr><td></td><td colspan="6">... specifies the maximum permissible setpoint as a percentage referred to P1401:8.
The parameter is pre–assigned as follows when the system is commissioned for the first time and for ”calculate unlisted motor”:
• SRM 110 %
105 % (from SW 7.1 with ”SIMODRIVE 611 universal HR”, resolver)</td></tr>
</table>

Limiting the torque setpoint

The following limits all effect the torque setpoint at the speed controller output. The ”lowest” (minimum) is used if different limits are available.

- Torque limiting
  The value specifies the maximum permissible torque, whereby different limits can be parameterized for motoring and generating operation.
- Power limiting
  The value specifies the maximum permissible power, whereby different limits can be parameterized for motoring and generating operation.
- Stall limiting (only for ARM and PE spindle)
  The stall limiting is internally calculated in the drive from the motor data. The internally calculated limit can be changed using the torque reduction factor.

Warning

If the stall limit has been set too high, this can cause the motor to ”stall”.

As the current limiting additionally limits the maximum torque which the motor can provide, if the torque limit is increased, more torque will only be available if a higher current can also flow. It may be necessary to also adapt the current limit.

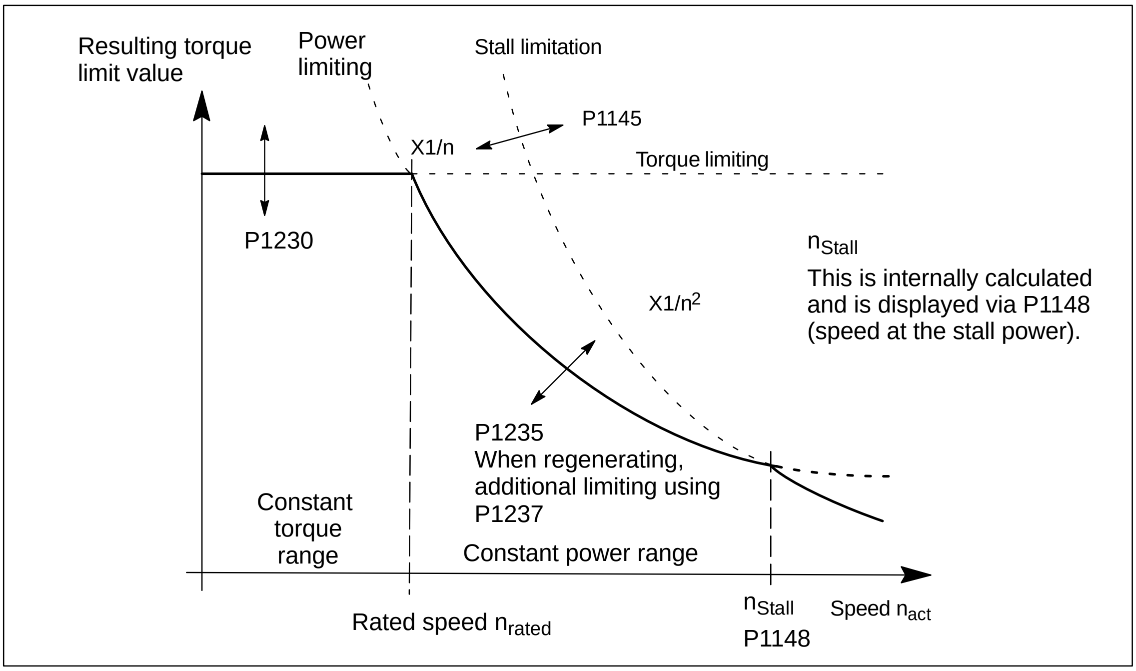


Fig. 6-7 Limiting the torque setpoint

The torque/power can be reduced continuously by reducing the currently effective torque limit using ”MomRed” control word (refer to Chapter 5.6.6). The result of the conversion is a percentage factor k which is applied to P1230 (torque limit) and P1235 (power limit). For the specified k factor, P1230 is replaced by k*P1230 and P1235, by k*P1235 in Fig. 6-7.

Table 6-8 Parameters for limits

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1145	Stall torque reduction factor	5.0	100.0	1 000.0	%	Immediately
	... the start of stall torque limiting can be changed (refer to Fig. 6-7). For a setting greater than 100%, the intervention point is increased. For a setting of less than 100%, the intervention point is decreased.					
1230:8	1st torque limit value (SRM, ARM) 1st force limit value (SLM)	5.0	100.0	900.0	%	Immediately
	... specifies the maximum torque referred to the pull–out torque (SRM), rated motor torque (ARM) or stall force (SLM) of the motor. **SRM/SLM:** Stall torque/stall force = P1118 • P1113 P1118: Motor standstill (stall) current P1113: Torque constant **ARM:** Rated motor torque = ((P1130 • 1000)/(2π • P1400/60)) = 9549.3 • (P1130/P1400) P1130: Rated motor power P1400: Rated motor speed The minimum of the torque, power and stall torque limits are always effective as limit (refer to Fig.6-7). The standard pre–assignment for ARM is 100%. For SRM/SLM, this is realized with the following operator action **Calculate controller data**, whereby the value is obtained from the following formula: SRM/SLM: P1230 = (P1104/P1118) • 100 % The following is especially true for ARM: In order to achieve significantly shorter accelerating times up to the maximum speed, the power and current limits must also be increased. Important: If the motor is overloaded for a longer period of time, this can result in an impermissible temperature rise (the drive is shutdown as a result of a motor overtemperature condition); the motor can also be destroyed.					

Table 6-8 Parameters for limits, continued

Parameters						
No.	Description	Min.	Standard	Max.	Units	Effec-tive
1235:8	1st power limit value	5.0	100.0	900.0	%	Imme-diately
	... specifies the maximum permissible power referred to the motor power (SRM) or the rated motor power (ARM – P1130: Rated motor power). Motor power for SRM [kW] = 1/9549.3 • (P1118 • P1113) • P1400 P1118: Motor standstill (stall) current P1113: Torque constant P1400: Rated motor speed As shown in Fig. 6-7, using the power limiting (constant power), the torque is limited ($P = 2\pi \cdot M \cdot n$; with P = constant —> $M \sim 1/n$). The minimum of the torque, power and stall torque limits are always effective as limit (refer to Fig.6-7). **SRM/SLM:** P1235 = (P1104/P1118) • 100 % For SRM/SLM, this parameter is automatically pre–assigned using the operator action **calculate controller data**, whereby the value is obtained from the formula above : **ARM:** The standard default is 100 %. The following is especially true for ARM: If the speed at the start of field weakening is greater than the rated speed, then the ramp–up times can already be shorted and the power yield increased if only the power limit is increased (with the same current limit). As the current limit (P1238) can also limit the maximum torque which can be specified, if the output limit (power limit) is increased further, more torque can only be obtained if the current limit is also increased. Important: If the motor is overloaded for a longer period of time, this can result in an impermissible temperature rise (the drive is shutdown as a result of a motor overtemperature condition); the motor can also be destroyed. Corresponding parameters are: P1104, P1145 and P1233 to P1238					
1233:8	Regenerative limiting	5.0	100.0	100.0	%	Imme-diately
	... specifies the regenerative limiting. The setting refers to the parameter value in P1230.					
1237	Maximum regenerative power	0.1	100.0	500.0	kW	Imme-diately
	... allows the regenerative power to be limited for the input/regenerative feedback module. An appropriately lower value should be entered here, especially when using an uncontrolled NE module.					

Note

Torque/power reduction
It is possible to continuously reduce the torque/power by reducing the effective torque limit.

- for terminals:
  via analog input 2 (terminal 24.x/20, refer to Chapter 6.6.4).
- for PROFIBUS–DP:
  using the ”MomRed” control word (refer to Chapter 5.6.6).

Current limiting

The motor current is limited to a maximum value.

The maximum value is obtained from the minimum between the parameterization according to Table 6-9 and the limiting as a result of the power module.

Table 6-9 Parameters for the current limiting

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1238	Current limit (ARM)	0.0	150.0	400.0	%	Immediately
	... specifies the maximum permissible motor current referred to the rated motor current (P1103). In order to shorten the ramp–up (accelerating) times, it may make sense to set the current limit to values > 100 %, and additionally increase the power and torque limit. If the motor current is at its limit due to high torque/power limits, the monitoring function intervenes with P1605 and P1606 (speed controller at its limit).					
1105	Reducing the maximum motor current (SRM, SLM)	0	100	100	%	Immediately
	... specifies the maximum permissible motor current referred to the maximum motor current (P1104). The parameter is pre–set at the first start–up and for ”Calculate unlisted motor”: SRM: P1105 = (P1122/P1104) • 100 %					

6

6.1.9 Position measuring system with distance–coded reference marks (from SW 4.1)

General information

In order that large distances do not have to be traversed for reference point approach, for indirect and direct measuring systems, it is possible to use a position measuring system with distance–coded reference marks.

This guarantees that the measuring system has already been referenced after a short traversing distance (e.g. 20 mm).

Note

Referencing with distance–coded reference marks is only possible using PROFIBUS–DP in an external control (refer to Chapter 5.6.4). It is not possible to evaluate the coding in the board itself!

From SW 8.3 for rotary encoder systems:
The SIMODRIVE module is, in the pos mode, in the position to autonomously reference (home) without an external control.

Proceed as follows

The procedure is the same as when referencing with normal incremental measuring systems.

The following conditions should be observed:

- Indirect measuring system (motor measuring system, IM)
  - P1027.7 = 1 (IM configuration, encoder)
    —> distance–coded reference scale
  - P1050 or P1051
    —> basic distance between two fixed reference marks
- Direct measuring system (DM)
  - P1037.7 = 1 (DM configuration, encoder)
    —> distance–coded reference scale
  - P1052 or P1053
    —> distance–coded reference scale

6.2 Positioning mode (P0700 = 3, from SW 2.1)

General information on positioning for ”SIMODRIVE 611 universal”

The following functions are available in the ”positioning” mode:

- Referencing or adjusting
  – Referencing for incremental positioning measuring systems
  – Adjusting absolute position measuring systems
  – Set reference point
- Programming and selecting traversing blocks
  The max. 64 traversing blocks per drive can be freely programmed and are saved in the parameters.
  – How many blocks can be individually selected via terminals?
  Drive A + optional TERMINAL module: all 64 blocks
  Drive B: Block 0 or 1 can be selected (1 input terminal)
  – How many blocks can be individually selected via PROFIBUS–DP?
  Drives A and B: all 64 blocks

  A block contains the following information:
  – Block number
  – Item
  – Velocity
  – Acceleration override
  – Deceleration override
  – Command
  – Command parameters
  – Mode: Block change enable – positioning mode – IDs

  When programming a traversing block, the block enable condition is specified. This means that when starting a block, precisely one block can be executed (for a block enable condition END) or automatic, even for several blocks (if the block enable condition CONTINUE FLYING, CONTINUE WITH STOP, CONTINUE EXTERNAL).
  The blocks are executed according to the consecutive block number up to the block with the block enable condition END.
- Position–related switching signals (cams)
  Signals are generated and output as a function of the actual position actual value and parameter setting.
- Jogging
  This operating mode allows speed–controlled traversing in the ”positioning” mode. From SW 4.1, the drive can be jogged in the closed–loop position controlled mode (incremental) (refer to Chapter 6.2.9).
- Monitoring functions
  Dynamic following error monitoring, positioning monitoring, standstill monitoring, hardware/software limit switches

6

6.2.1 Encoder adaptation

Normalization of the encoder signals

The mechanical characteristics of the axis must be specified using the appropriate parameters to adapt the encoder.

The ”SIMODRIVE 611 universal” drive calculates the ratio between the travel and the encoder increments from this data, which means that motion on the load side can be determined.

Linear axis with rotary motor encoder

The following parameters are supplied using this configuration:

- P1027.4 = 0: Rotary motor encoder
- P1005 Encoder pulses per revolution (only encoders with sin/cos 1Vpp)
- P0236 Spindle pitch or fictitious spindle pitch
- P0237:8 Encoder revolutions
- P0238:8 Load revolutions

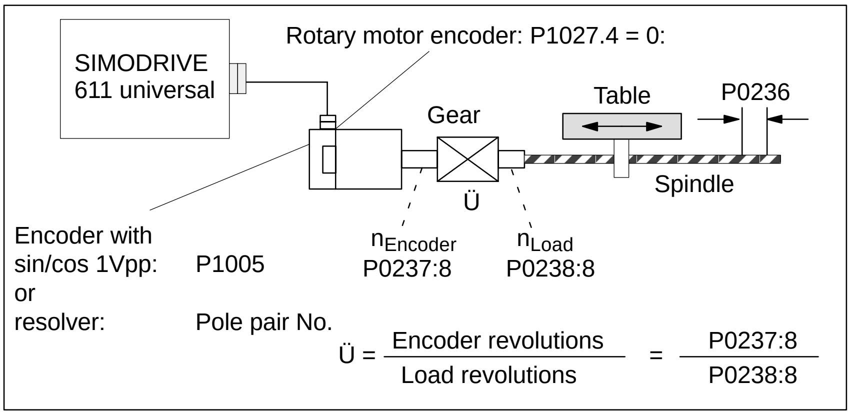


Fig. 6-8 Linear axis with rotary motor encoder (ballscrew)

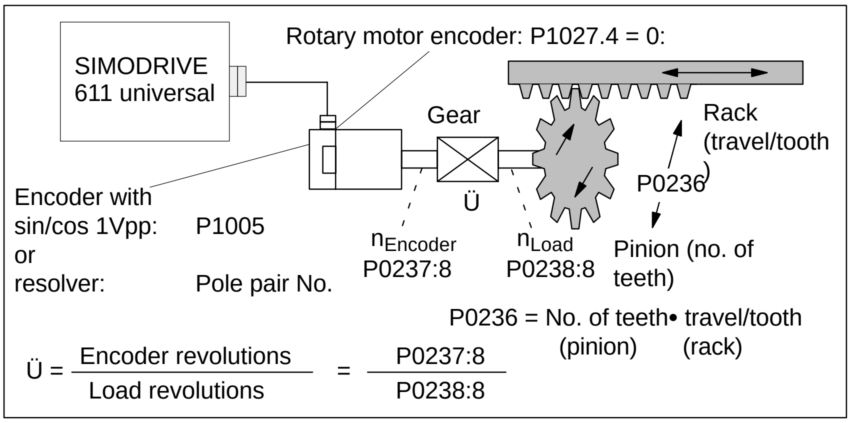


Fig. 6-9 Linear axis with rotary motor encoder (rack/pinion)

Linear axis with linear motor encoder

The following parameters are supplied using this configuration:

- P1027.4 = 1: Linear motor encoder
- P1024 Grid divisions, linear measuring system

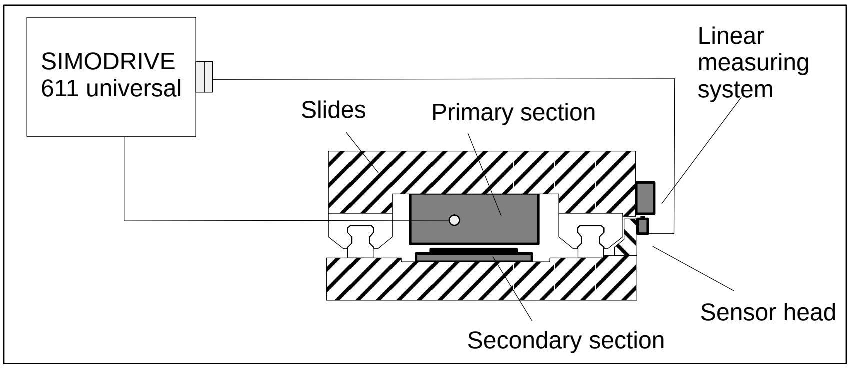


Fig. 6-10 Linear axis with linear motor encoder

Rotary axis with rotary motor encoder

The following parameters are supplied using this configuration:

- P1027.4 = 0: Rotary motor encoder
- P1005 Encoder pulses per revolution (only encoders with sin/cos 1Vpp)
- P0237:8 Encoder revolutions
- P0238:8 Load revolutions

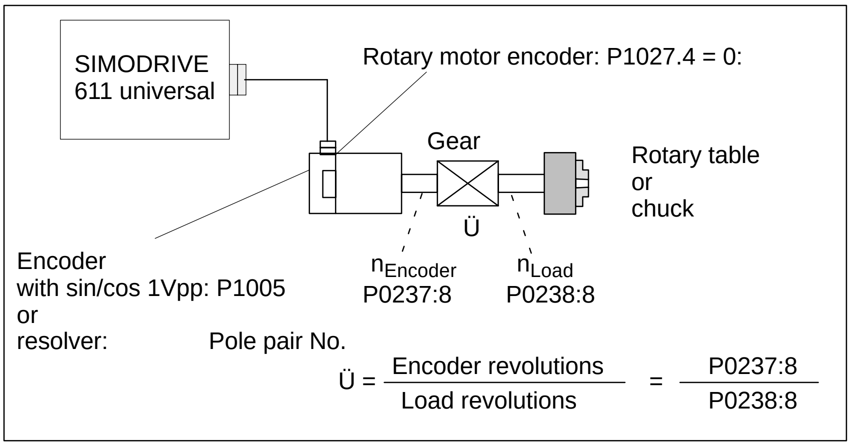


Fig. 6-11 Rotary axis with rotary motor encoder

Rotary axis without/with modulo correction (from SW 2.4)

A modular rotary axis is set via the following parameters:

- P0241 Activates the modulo conversion, rotary axis
- P0242 Modulo range, rotary axis

Secondary conditions for axis/encoder

The following secondary conditions must be observed, dependent on the axis type:

Table 6-10 Restrictions for axis/encoder

<table>
<tr><th colspan="2">Axis/encoder</th><th>Restrictions</th></tr>
<tr><td rowspan="3">Linear axis</td><td>Rotary incremental encoder</td><td>The axis must be referenced after power–up.</td></tr>
<tr><td>Linear absolute value encoder
(e.g. LC 181)</td><td>none</td></tr>
<tr><td>Rotary absolute value encoder
(e.g. EQN 1325, P1021 = 4096)</td><td>Overflow after the number of revolutions entered in P1021 (multiturn resolution, motor absolute value encoder).
For linear axis with encoder connected to the motor, the following is valid:
—> The maximum traversing travel is: P1021 • effective spindle pitch
Example: EQN 1325, 10 mm spindle pitch
—> max. traversing distance = –20.48 m to 20.48 m
• The machine zero can be completely freely selected in the range from –20.48 m to +20.48 m.</td></tr>
<tr><td rowspan="2">Rotary axis
endlessly rotating</td><td>Incremental encoder</td><td>The axis must be referenced after power–up.</td></tr>
<tr><td>Absolute value encoders</td><td>Motor encoder —> max. revolutions in P1021 (e.g. 4096)
Note:
The same restrictions apply as for linear axes and rotary absolute value encoders.</td></tr>
</table>

Table 6-10 Restrictions for axis/encoder, continued

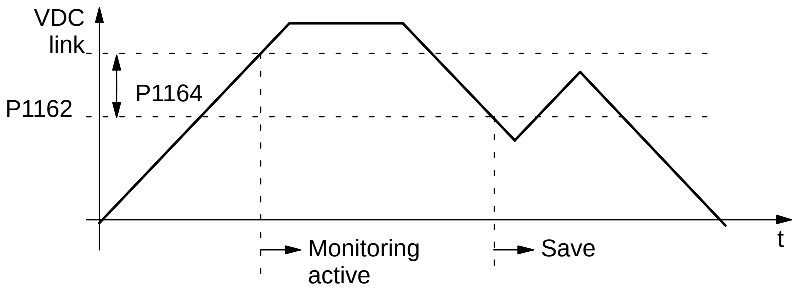
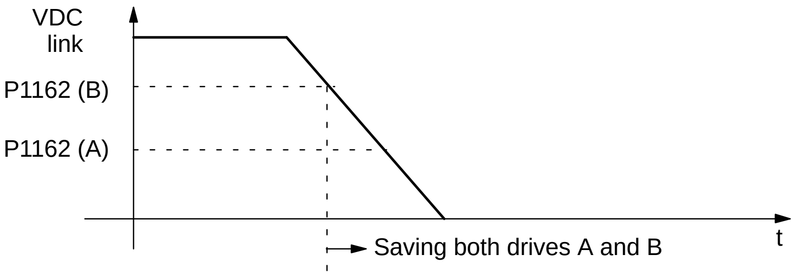
<table>
<tr><th colspan="2">Axis/encoder</th><th>Restrictions</th></tr>
<tr><td>Rotary axis
en-dlessly rotating
(modulo rotary axis)</td><td>Absolute value encoders</td><td>The encoder must be mounted onto the motor.
Important: Before SW 8.1:
The gear ratio cannot be freely selected.
The ratio between the encoder and load must be selected so that the full range of encoder is an integer multiple of the modulo range.
The following condition must be fulfilled:
$P1021 \bullet \frac{P0238:8}{P0237:8} \bullet \frac{360\ 000}{P0242}$ = integer multiple
P1021 Multi–turn resolution, abs. value enc. motor
P0238:8 Load revolutions
P0237:8 Encoder revolutions
P0242 Modulo range, rotary axis
Example: P1021 = 4096
P0237:0 = 64, P0238:0 = 72
P0242 = 360 000
are permitted, because 4096 • 72/64 • 360/360 = 4608 = is an integer number
Note:
When a fault develops, fault 139 is signaled (modulo range and ratio do not match).
From SW 8.1:
Any gearbox ratio can be selected. The following condition applies:
Modulo range, Endat encoder (traversing range) ⩾ modulo range, load
$P1021 \bullet \frac{P0238:8}{P0237:8} \bullet \frac{360\ 000}{P0242} \geqslant 1$
Prerequisites:
• DC link has been connected
• P1162>0 , e.g. 500 V for a controlled infeed
In order to supply the control board from the DC link, at the infeed/regenerative feedback module, the DC link must be connected to terminals M500 and P500 of terminal strip X181 (refer to Reference/PJU/). This means that when the DC link voltage is either removed or decreases, the energy saved in the DC link can be used to maintain the closed–loop control for a specific time. When powering–down or when the DC link voltage decreases, the supply for the closed–loop control must still be maintained until the data save operation has been completed.
The thresholds to save the absolute value encoder data as a function of the DC link voltage are shown in the following diagram. For reasons of simplicity, the DC link charging and the decrease in the DC link voltage are shown as linear characteristics.

</td></tr>
</table>

Table 6-10 Restrictions for axis/encoder, continued

<table>
<tr><th colspan="2">Axis/encoder</th><th>Restrictions</th></tr>
<tr><td>Rotary axis
en-dlessly rotating
(modulo rotary axis)</td><td>Absolute value encoders</td><td>Saving the encoder values for a double–axis module (drive A/B).


The gear ratio can be freely selected (fault 139 is no longer output).
Example: P0237:0 = 3
P0238:0 = 1
After the measuring system has been adjusted, the position of the load is determined from the absolute position of the motor measuring system via the gearbox factor (Ü=P0238:8/P0237:8). In order to determine the clear position of the load, then it must be guaranteed that after being powered–down, the motor can only move within half of the absolute encoder range that can be represented (coast down or manual motion). This is the reason that it is not permissible to use single–turn absolute value encoders. Exceptions are possible if the user can ensure that the drive does not move by more than half of an encoder revolution.
Important:
If half of the absolute encoder range that can be represented is exceeded after powering–down, then the assumed actual position is incorrect and after powering–up again no fault or warning is generated!
Note:
• When the DC link voltage starts to ramp–up, the DC link coupling must be maintained in order to supply the electronics.
• If a fault condition develops, fault 149 (incorrect data for modulo drive with absolute value encoder and any gearbox factor). In this case, P1162 (minimum DC link voltage) should be checked as the encoder data is saved when the entered threshold value is fallen below. The axis must be re–adjusted after fault 149 occurs.
• If the position setpoint (reference value inversion is selected when commissioning the drive, then initially, a power–on must be carried–out. The reference point can only be set after this.
Notice:
If the drive goes into regnerative operation after power–down, then this can also cause problems when saving data if the control board is re–activated by the energy fed back.
From SW 8.2:
As long as the signals were still not available at terminals 48 and 63 of the NE module, the electronics power supply of the control board can be shut down again after run–up.</td></tr>
</table>

Table 6-10 Restrictions for axis/encoder, continued

Axis/encoder		Restrictions
Rotary axis en-dlessly rotating (modulo rotary axis)	Incremental en-coder	For incremental encoders, the above condition is not checked. If the mechanical machine design does not fulfill the condition above, then the rotary axis must be re–referenced after each endless operation and when being powered up. The following is valid when evaluating the zero mark: • The evaluated zero mark must always be located at the same load side position of the modulo range (the ratio is taken into account). • For several zero marks, one must be defined for evaluation (e.g. set via cams). • If it is not possible to reference the system using the encoder zero mark, then the equivalent zero mark must be used (e.g. BERO at the input with the ”equivalent zero mark” function).

Parameter overview

Table 6-11 Parameters for the encoder adaptation

No.	Name	Min.	Standard	Max.	Units	Effective
1027.4	IM configuration, encoder	–	–	–	hex	PO
	The motor encoder type is specified using P1027, bit 4. **Bit 4** **Linear measuring system** = 1 Linear motor encoder = 0 Rotary motor encoder					
1005	IM encoder pulse number (SRM, ARM)	0	2048	65 535	–	PO
	The parameter is only relevant for rotary motor encoders. • For encoders with voltage signals sin/cos 1 Vpp (rotary motor encoder) The encoder pulses per revolution are specified using this parameter. • for resolvers The parameter has no significance. The ”fictitious” encoder pulses are internally calculated from the pole pair number (P1018) of the resolver.					
0236	Leadscrew pitch	1	10 000	8 388 607	MSR/ rev	PO
	The spindle pitch is specified in this parameter (e.g. ballscrew spindle with 10 mm/revolution and metric dimension system —> P0236 = 10 000 MSR/rev).					
0237:8	Encoder revolutions	1	1	8 388 607	–	PO

6

Table 6-11 Parameters for the encoder adaptation, continued

No.	Name	Min.	Standard	Max.	Units	Effective
0238:8	Load revolutions	1	1	8 388 607	–	PO
	The gearbox ratio between the motor encoder and load is specified using these parameters. $ü = \frac{\text{Encoder revolutions}}{\text{Load revolutions}} = \frac{\text{P0237:8}}{\text{P0238:8}}$ Ü: Ratio **Note:** The parameters are dependent on the parameter set. The effective parameter set can be selected via the ”parameter set changeover” input signals.					
0241	Activates the modulo conversion, rotary axis (SRM, ARM) (from SW 2.4)	0	0	1	–	PO
	... activates/de–activates the modulo conversion for a rotary axis. 1 Modulo conversion activated, the modulo correction is executed according to P0242 0 Modulo conversion de–activated					
0242	Modulo range, rotary axis (SRM, ARM) (from SW 2.4)	1	360 000	100 000 000	MSR	PO
	... defines the modulo range of the rotary axis. Practical modulo range values include: n • 360 degrees with n = 1, 2, ...					
1162	Minimum DC link voltage	0	0	800	V(pk)	Immedi-ately
	... defines the permissible lower limit for the DC link voltage. If the DC link voltage falls below the parameterized value, then the stop response, parameterized in P1613, bit 16 is initiated and the encoder data is saved in the FEPROM.					
1164	Hysteresis, DC link voltage (from SW 8.1)	0	50	600	V(pk)	Immedi-ately
	... defines the hysteresis for the DC link voltage. This parameter refers to P1162. For absolute value encoders with freely selectable gear ratio, when voltage fluctuations occur, several data save operations of the absolute value encoder data can, to a certain extent, be suppressed. These fluctuations can occur, e.g. when the drive regenerates into the DC link.					

6.2.2 Units for travel, velocity and acceleration

Dimension system grid (MSR)

When setting the dimension system (mm, inch or degrees) for a drive configuration in the ”Position mode”, then the dimension system grid (MSR) is also defined:

Table 6-12 Dimension system and dimension system grid (MSR)

Dimension system		Meaning
P0100 = 1	mm	1 MSR = 10^{-3} mm (µm, micrometers)
P0100 = 2	inch	1 MSR = 10^{-4} inch
P0100 = 3	Degrees	1 MSR = 10^{-3} degrees (mdegrees, milli degrees)

Reader’s note

The units of the physical quantities are displayed differently or must be interpreted differently.

- In the parameter list (refer to Chapter A.1) and when reading and writing into parameters via PROFIBUS–DP, there is the dimension system grid (MSR) or a multiple (constant) of the MSR.

  Examples in the mm dimension system:

  – Distance (travel) has the units [MSR]

  – Velocity has the units [c*MSR/min], c = 1

  – Acceleration has the units [1000 MSR/s^2]

- For the display unit on the front panel of the control board and for SimoCom U (for the dialog boxes and the expert list), there are converted units.

  Examples in the mm dimension system:

  – Travel (distance) has the units [mm]

  – Velocity has the units [mm/min]

  – Acceleration has the units [mm/s^2]

The units for the various dimension systems (mm, inch or degrees) can be listed in the following tables using specific examples.

6

Units in the metric dimension system

In the metric dimension system (P0100 = 1), the following units are used for distance, velocity and acceleration:

Table 6-13 Units in the metric dimension system

Physical quantity		Units for			
		Parameter list (A.1)	PROFI-BUS–DP (5.6.7)	Display unit (3.2)	SimoCom U (3.3)
Distance		**µm**		**mm**	
Example:	123.456 mm	123456 [MSR] —> 123.456 mm		123.456 mm	
Velocity		**µm/min**		**mm/min**	
Example:	4766.176 mm/min	4766176 [c * MSR/min]1) —> 4766.176 mm/min —> 4.766176 m/min		4766.176 mm/min	
Acceleration		**mm/s^2**		**mm/s^2**	
Example:	$4.378\ m/s^2$	4378 [$1000\ MSR/s^2$] —> $4378\ mm/s^2$ —> $4.378\ m/s^2$		$4.378\ mm/s^2$	

1) The units are specified as follows in the parameter list (refer to Chapter A.1): [c * MSR/min], c = 1

Units in the inch dimension system

In the inch dimension system (P0100 = 2) the following units are used for distance, velocity and acceleration:

Table 6-14 Units in the inch dimension system

Physical quantity		Units for			
		Parameter list (A.1)	PROFI-BUS–DP (5.6.7)	Display unit (3.2)	SimoCom U (3.3)
Distance		**10^{-4} inch**		**inch**	
Example:	313.5800 cm	1234567 [MSR] —> 123.456 7 inch		313.5800 cm	
Velocity		**10^{-4} inch/min**		**inch/min**	
Example:	476.1765 inch/min	4761765 [c * MSR/min]1) —> 476.1765 inch/min		476.1765 inch/min	
Acceleration		**$10^{-1}\ inch/s^2$**		**$inch/s^2$**	
Example:	$243.7\ inch/s^2$	2437 [$1000\ MSR/s^2$] —> $2437*0.1\ inch/s^2$ —> $243.7\ inch/s^2$		$619.00\ cm/s^2$	

1) The units are specified as follows in the parameter list (refer to Chapter A.1): [c * MSR/min], c = 1

Units in the degree dimension system

In the degrees dimension system (P0100 = 3) the following units are used for distance, velocity and acceleration:

Table 6-15 Units in the degree dimension system

Physical quantity		Units for			
		Parameter list (A.1)	**PROFI-BUS–DP (5.6.7)**	**Display unit (3.2)**	**SimoCom U (3.3)**
Distance Example:	 123.456 degrees	**mdegrees** 123456 [MSR] —> 123.456 degrees		**Degrees** 123.456 degrees	
Velocity Example:	 4766.17 degrees/ min	**10 mdegrees/min** 476617 [c * MSR/min][1)] —> 4766.17 degrees/min		**degrees/min** 4766.17 degrees/min	
Acceleration Example:	 24 degrees/s^2	**degrees/s^2** 24 [1000 MSR/s^2] —> 24 degrees/s^2		**degrees/s^2** 24 degrees/s^2	

1) The units are specified as follows in the parameter list (refer to Chapter A.1): [c * MSR/min], c = 10

6

6.2.3 Closed–loop position control components

General information

The closed–loop control of an axis consists of the current and speed control loop and a higher–level position control loop.

The closed–loop position control fulfills the following tasks:

- Controls the velocity of the drive during movement
- The axis is precisely moved to the programmed target position
- Holds the axis at a target position even when disturbances are present

The closed–loop position controller is a P controller. Various function units are provided in its environment, which provide support for special tasks in the motion control, and which can be adapted to the axis characteristics using numerous parameters.

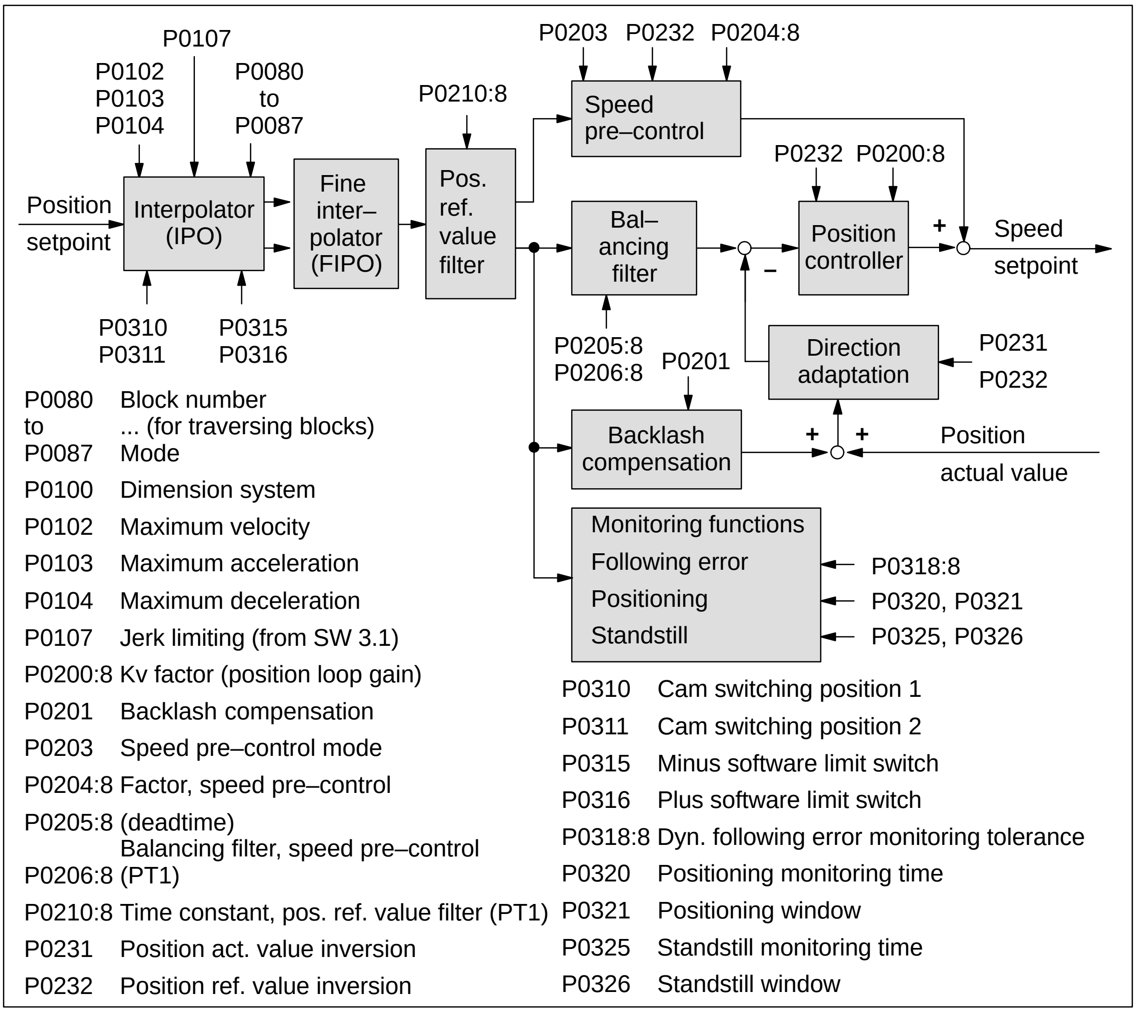


Fig. 6-12 Closed–loop position control components

Dimension system setting P0100

The units of an axis are defined using the dimension system setting.

Note

- In the following text, the dimension system grid (MSR) term is used as unit of the selected dimension system.
  – The following is valid depending on P0100:
  1 MSR = 10^{-3} mm or 10^{-4} inch or 10^{-3} degrees
  – Example: Assumption P0100 = 1 —> 10^3 MSR = 1 mm
- The dimension system is selected depending on the axis type (linear axis, rotary axis), i.e. for a rotary axis, the dimension system 10^{-3} degrees must be parameterized.
- The dimension system setting must be specified when ”SIMODRIVE 611 universal” is commissioned for the first time.

Dimension system changeover mm <–> inch

Recommendation:
Carry–out the first start–up using the ”correct” dimension system, so that it isn’t necessary to later changeover (refer to the following warning information).

If, after ”SIMODRIVE 611 universal” has been first commissioned, it is still necessary to changeover the dimension system setting from mm to inch, then the following steps must be executed:

1. Enter the required dimension system into P0100
2. Carry–out a power on

   During run–up, it is identified, that P0100 $\neq$ P0101 and automatically, all of the parameters, dependent on the dimension system (refer to Chapter A.1) are converted corresponding to the setting in P0100.

   Parameters that are dependent on the dimension system have the following units:

   – MSR
   – k * MSR/min
   – 1 000 MSR/s
   – 1 000 MSR/s^2
   – 1 000 MSR/s^3
   – MSR/rev

   Example:
   If 254 mm is located in P0081:4 = 254 [mm] and a changeover is made from metric to inch (imperial units), then afterwards, 10 [inch] is located in P0081:4.

6

Warning

Although it is possible to subsequently changeover the dimension system, we recommend that you do not do this:

When subsequently changing–over the dimension system from mm to inch, data, dependent on the dimension system, is converted, whereby rounding–off errors can occur and value limits can be violated.

The conversion is not made when changing between a rotary axis (degrees) and linear axis (mm/inch).

Table 6-16 Parameters for the dimension system setting and changeover

No.	Name	Min.	Standard	Max.	Units	Effective
0100	Dimension system	1	1	3	–	PO
	... specifies the dimension system grid (MSR) which is being used. = 1 —> 1 MSR = 10^{-3} mm used for linear axes in the metric system = 2 —> 1 MSR = 10^{-4} mm used for linear axes in the inch (imperial) system = 3 —> 1 MSR = 10^{-3} degrees used for rotary axes **Example:** P0100 = 1 —> 345 123 MSR = 345.123 mm					
0101	Actual dimension system	–	–	–	–	RO
	... indicates the currently active dimension system. **Note:** If it is identified at POWER ON that P0100 ≠ is P0101, then a dimension system changeover is automatically made.					

Maximum velocity P0102

The maximum velocity of an axis is defined using this parameter.

The drive is limited to this velocity if a higher velocity is specified or programmed via the override for the reference point approach or is programmed in the traversing block.

The maximum velocity limit is effective for reference point approach, when executing a traversing block and in the jogging mode.

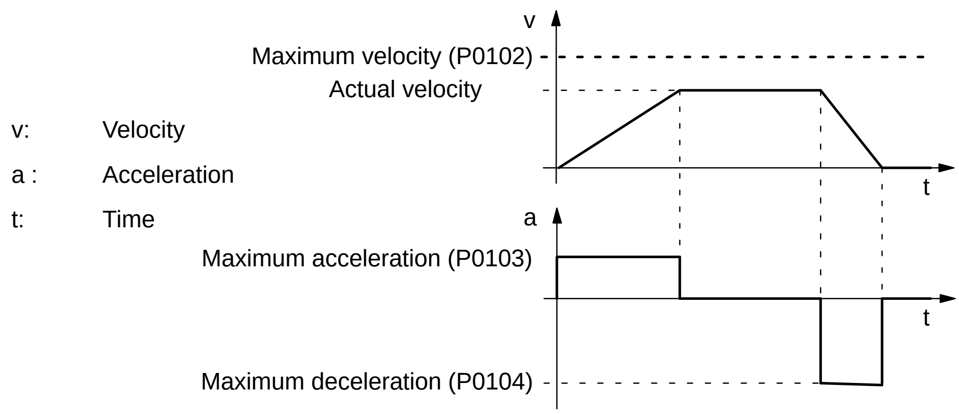
Maximum acceleration P0103
Maximum deceleration P0104

The maximum acceleration when approaching and the maximum deceleration when braking an axis can be specified, independently of one another, using these two parameters.

The selected acceleration and deceleration are effective for reference point approach, when executing a traversing block, and when jogging (jog mode).

Table 6-17 Parameters for the maximum velocity, acceleration and deceleration

No.	Name	Min.	Standard	Max.	Units	Effective
0102	Maximum velocity	1 000	30 000 000	2 000 000 000	c*MSR/min	Immediately
	... defines the maximum velocity of the axis in the ”Positioning” mode.					
0103	Maximum acceleration	1	100	999 999	1 000 MSR/s^2	Vset_0
0104	Maximum deceleration	1	100	999 999	1 000 MSR/s^2	Vset_0
	... defines the maximum acceleration/deceleration of the axis when approaching/braking.					



Note:

- The maximum acceleration/deceleration is a step function.
- The effective acceleration or deceleration can be set in the traversing block using an override (P0083:64 or P0084:64).

Jerk limiting P0107 (from SW 3.1)

Acceleration and deceleration are step–like if jerk limiting is not used.

Using jerk limiting, a ramp–type increase can be parameterized for both quantities, so that approach and braking are ”smooth” (jerk–limited).

Applications

Jerk limiting can be used, e.g. for positioning tasks using liquids or generally to reduce the mechanical stressing on an axis.

Table 6-18 Jerk limiting parameters

No.	Name	Min.	Standard	Max.	Units	Effective
0107	Jerk limiting	0	0	100 000 000	1 000 MSR/s^3	Vset_0

The duration of the acceleration ramp (jerk time T_R) is calculated from the higher value of the maximum acceleration (P0103), the maximum deceleration (P0104) and the selected jerk limiting (P0107).

$$T_R\ [s] = \frac{amax\ [10^3\ MSR/s^2]}{r\ [10^3\ MSR/s^3]}$$

v: Velocity
a_{max}: Acceleration (higher value from P0103 and P0104)
r: Jerk
T_R: Jerk time (calculated jerk time: refer to P1726)

0 Jerk limiting off

> 0 Jerk limiting on, the selected value is effective (refer to P1726)
Note:
The jerk is internally limited to the appropriate jerk time of 200 ms.

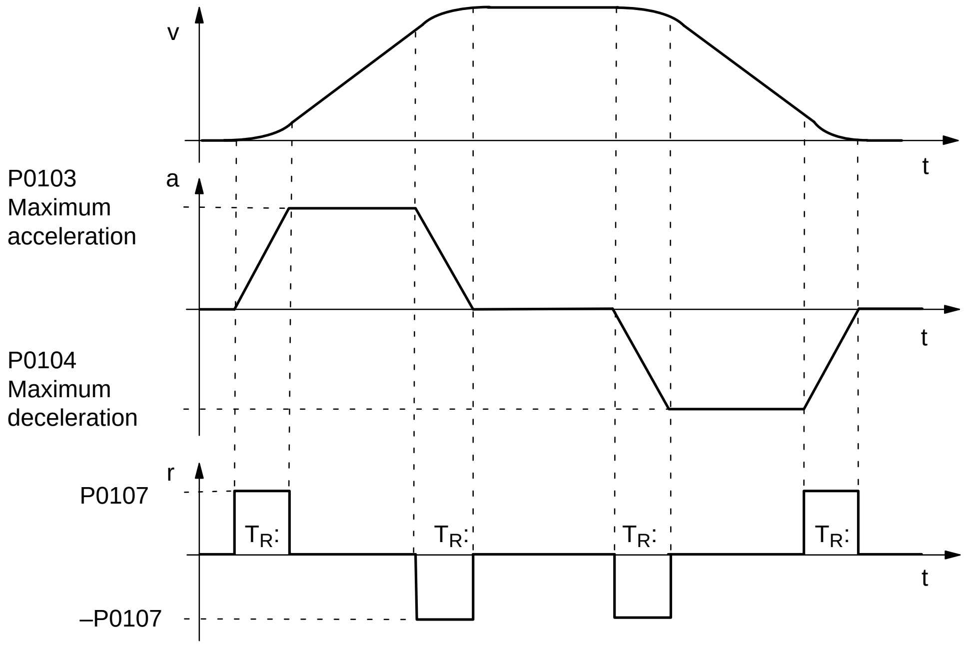


Table 6-18 Jerk limiting parameters, continued

No.	Name	Min.	Standard	Max.	Units	Effective
	Note: • The following is valid for this diagram: Acceleration and deceleration have been set the same. • If, when setting the jerk limiting, the warning 870 "Jerk: Jerk time is limited" is displayed, then the actual motion is "harder" than that set in P0107. • For traversing motion with a direct transition between acceleration and deceleration (i.e. jerk time T_R is greater than the constant velocity phase), jerk r can increase up to twice the parameterized jerk.					
1726	Calculated jerk time	–	–	–	ms	RO
	... indicates the calculated, current effective jerk time. **Note:** The jerk time is internally limited to 200 ms.					

Table 6-19 Examples for acceleration, deceleration and jerk limiting

P0103[1)] (Maximum acceleration) [1000 MSR/s^2]	**P0104[1)] (Maximum deceleration) [1000 MSR/s^2]**	**P0107[1)] (Jerk limiting) [1000 MSR/s^3]**	**Which jerk time is effective for acceleration and deceleration?**
= 2 000 —> 2 m/s^2	= 2 000 —> 2 m/s^2	= 100 000 —> 100 m/s^3	a_{max} = 2 m/s^2 —> Jerk time = 20 ms
= 8 000 —> 8 m/s^2	= 2 000 —> 2 m/s^2	= 100 000 —> 100 m/s^3	a_{max} = 8 m/s^2 —> Jerk time = 80 ms The jerk time of 80 ms is effective for acceleration and deceleration.
= 2 000 —> 2 m/s^2	= 8 000 —> 8 m/s^2	= 100 000 —> 100 m/s^3	a_{max} = 8 m/s^2 —> Jerk time = 80 ms The jerk time of 80 ms is effective for acceleration and deceleration.
= 30 000 —> 30 m/s^2	= 25 000 —> 25 m/s^2	= 100 000 —> 100 m/s^3	a_{max} = 30 m/s^2 —> Jerk time = 300 ms A warning is output, and the jerk is limited corresponding to the jerk time of 200 ms for acceleration and deceleration.
= 8 000 —> 8 m/s^2	= 2 000 —> 2 m/s^2	= 200 000 —> 200 m/s^3	a_{max} = 8 m/s^2 —> Jerk time = 40 ms The jerk time of 40 ms is effective for acceleration and deceleration.

1) Prerequisites:
There is a metric linear axis (dimension system P0100 = 1 —> 1000 MSR = 1 mm)

Velocity override
P0111
P0112

The velocity of an axis can be influenced using the velocity override or also known as just override.

Note

The maximum traversing velocity is limited by the maximum velocity set in P0102.

The override has no effect on the acceleration/deceleration, i.e. when the override is doubled, the axis velocity is doubled, but the positioning time is not halved.

How can the override be entered?

The override can be entered as follows:

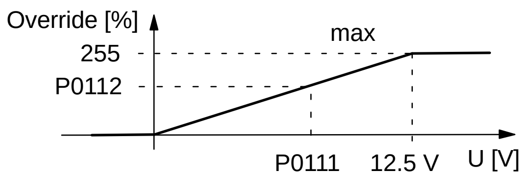
- Analog input, terminals 56.x/14.x
  The following prerequisites must be fulfilled to enter an override via the analog input:
  - Set P0607 to 2 (refer to Chapter 6.6):
    The analog input is declared as override input.
  - Set P0111 and P0112:
    The reference voltage and normalization is defined.
  - SimoCom U may not have the master control.
- PROFIBUS–DP
  The override is entered via the ”Over” control word.
- SimoCom U
  SimoCom U must have the master control to set an override.

Table 6-20 Parameter for override via analog input, terminal 56.x/14.x

No.	Name	Min.	Standard	Max.	Units	Effective
0111	Normalization voltage, override	5.0	10.0	12.5	V(pk)	Immedi-ately
0112	Normalization, override	0	100	255	%	Immedi-ately

P0111: ... defines at which input voltage the override, specified in P0112 is valid.

P0112: ... defines which override is valid when applying the voltage specified in P0111.



Standard values:
P0111 = 10.0 V
P0112 = 100 %
—>
10 V at term. 56.x/14.x ≙ 100 % override
0 V at term. 56.x/14.x ≙ 0 % override

Note:

For analog input, terminal 56.x/14.x, in addition the following parameters are effective (refer to Chapter 6.6):

P0608 Inversion, terminal 56.x/14.x
P0609 Smoothing time, terminal 56.x/14.x
P0610 Offset correction, terminal 56.x/14.x

Limit switch monitoring functions

For "SIMODRIVE 611 universal", the following limit switch monitoring functions can be used:

- Hardware limit switch (HW limit switch)
- Software limit switches (SW limit switches)

The limit switch monitoring functions can be used to limit the operating range or to protect the machine.

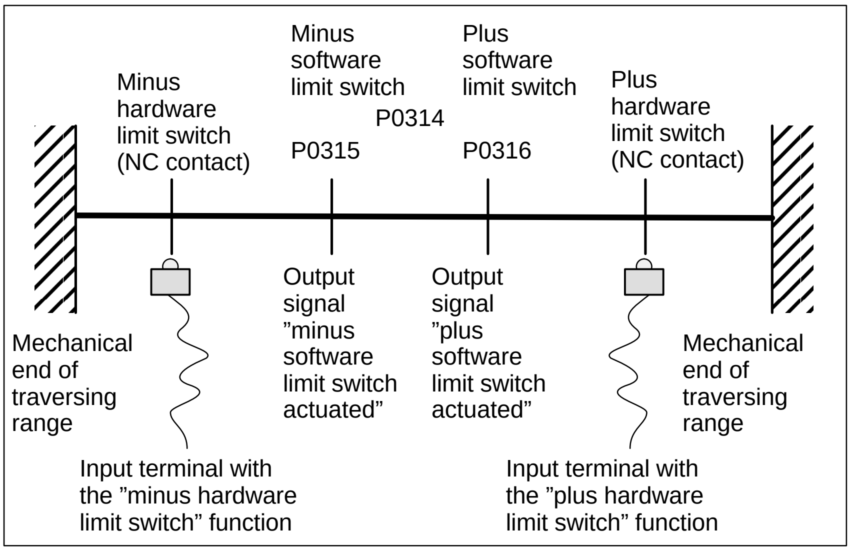


Fig. 6-13 Overview of the limit switch monitoring functions

Hardware limit switch (HW limit switch)

There is a hardware limit switch for every axis and every approach direction.

The HW limit switches must be connected to an input terminal with the following function numbers:

- "Plus hardware limit switch" function —> function number 81
- "Minus hardware limit switch" function —> function number 82

  —> Refer to Chapter 6.4.2

Traverse to a hardware limit switch?

When traversing to a hardware limit switch, the associated input signal is set and the following response is automatically initiated:

- The axis is braked with the deceleration level set in P0104 (maximum deceleration) and therefore comes to a standstill after the limit switch. The drive remains in the closed–loop controlled mode.
- One of the following faults is signaled:
  - Fault 140 Minus hardware limit switch
  - Fault 141 Plus hardware limit switch
- The jogging key is inhibited in the direction of motion
- The traversing block is exited

How do you move away from a hardware limit switch?

If an axis is at a hardware limit switch, then it can be moved away as follows:

- Return the axis to the valid traversing range
  - Move away jogging in the opposite direction to the approach direction

    or
  - Withdraw the controller enable and move the drive away manually
- Withdraw controller enable (terminal 65.x)
- Acknowledge the fault

Software limit switches (SW limit switches) P0314 P0315 P0316

The minus software limit switch (P0315) and the plus software limit switch (P0316) must be appropriately set to limit the working range or to protect the machine.

Notice

The software limit switches only become active if the following conditions exist:

- The function is activated via P0314
- The axis is referenced (”reference point set” output signal)

Only then is it certain that the axis will be immediately stopped if it attempts to move out of the permissible range.

Note

The SW limit switch monitoring is dependent on the axis type as follows:

- For a linear axis or rotary axis with modulo correction, the following is valid:

  The software limit switches can be activated via P0314 and set via P0315 and P0316.
- For rotary axis with modulo correction (from SW 2.4), the following is valid:

  The software limit switches are automatically de–activated. If monitoring is parameterized, it has no effect.

Output signals

The status of a software limit switch is displayed using the following signals (refer to Chapter 6.4.5):

- ”Minus software limit switch actuated” output signal

  or
- ”Plus software limit switch actuated” output signal

Traverse to a software limit switch?

When traversing to a software limit switch, the following response is automatically initiated:

- Behavior in the jog mode (via velocity)
  - When the axis reaches the software limit switch, it is braked with the deceleration level set in P0104 (maximum deceleration) and therefore comes to a standstill after the limit switch.
  - One of the following faults is signaled:

    Fault 132 (drive is located after the minus software limit switch)

    Fault 133 (drive is located after the plus software limit switch)
  - The jog button is inhibited in the approach direction.
- Behavior in the positioning mode (traversing blocks) and for incremental jogging operation (from SW 4.1)
  - The axis comes to a standstill directly at the software limit switch.
  - The traversing block or jogging operation is interrupted.
  - One of the following faults/warnings is signaled:

    P0118.0 = 0 (standard, before SW 4.1)

    Fault 119 (PLUS software limit switch actuated)

    Fault 120 (MINUS software limit switch actuated)

    P0118.0 = 1 (from SW 4.1)

    Warning 849 (PLUS software limit switch actuated)

    Warning 850 (MINUS software limit switch actuated)
  - When a target position is parameterized after a software limit switch, the traversing block is not started and fault 101 or 102 is output.

6

How do you move away from a software limit switch?

If an axis is at a software limit switch, then it can be returned to the valid traversing range as follows:

- P0118.0 = 0 (standard, before SW 4.1)
  - Return the axis to the valid traversing range

    In the jogging mode (via velocity), move away in the direction opposite to the approach direction

    or

    Withdraw the controller enable and move the drive away manually
  - Withdraw controller enable (terminal 65.x)
  - Acknowledge the fault
- P0118.0 = 1 (from SW 4.1)
  - In the jogging mode (incremental or via velocity), move away in the direction opposite to the approach direction

    or
  - Move away, with the traversing block in the opposite direction to the approach direction

If an axis is located after a software limit switch, then it is only possible to move away in the opposite direction to the approach direction in the jog mode via velocity.

Table 6-21 Parameters for software limit switch

No.	Name	Min.	Standard	Max.	Units	Effective
0118	Software limit switch configuration	0	0	1	–	Immedi-ately
	The configuration for software limit switch reached is defined using these parameters. Bit 0 = 1 Software limit switch reached with warning 849/850 (from SW 4.1) Bit 0 = 0 Software limit switch reached with fault 119/120 (before SW 4.1)					
0314	Activate software limit switch	0	0	1	–	PrgE
	The software limit switches can be activated/de–activated using these parameters. = 1 Software limit switch active = 0 Software limit switch inactive (e.g. this is necessary for a rotary axis)					
0315	Minus software limit switch	–200 000 000	–200 000 000	200 000 000	MSR	PrgE
0316	Plus software limit switch	–200 000 000	200 000 000	200 000 000	MSR	PrgE
	The minus and plus positions for the software limit switches are set using these parameters. **Note:** The following applies: P0315 (minus software limit switch) < P0316 (plus software limit switch)					

Position–related switch signals (cams)
P0310
P0311

Using the position–dependent switching signals 1 and 2, cams can be simulated without any mechanical equipment (e.g. at inaccessible positions), dependent on the actual position value.

The absolute cam switching positions are entered via parameter, and the associated cam switching signals are output as output signal.

Notice

Only after the axis has been referenced, is it guaranteed that the cam switching signals really do have a ”true” position reference when output.

This means that an AND logic operation must be externally established between the ”Reference point set/reference point not set” output signal and the ”Cam switching signals 1, 2” output signals (e.g. using an external PLC).

Table 6-22 Parameters for position–related switching signals (cams)

No.	Name	Min.	Standard	Max.	Units	Effective
0310	Cam switching position 1	–200 000 000	0	200 000 000	MSR	Immedi-ately
0311	Cam switching position 2	–200 000 000	0	200 000 000	MSR	Immedi-ately
	The cam switching positions 1 and 2 are set using these parameters. The following assignment applies: P0310 (cam switching position 1) —> cam switching signal 1 P0311 (cam switching position 2) —> cam switching signal 2 **Note:** Also refer under the index entry ”Output signal, cam switching signals 1 and 2”					

6

Backlash compensation P0201

When mechanical force is transferred between a machine part and its drive, generally backlash occurs. If the mechanical system was to be adjusted/designed so that there was absolutely no play, this would result in high wear. Thus, backlash (play) can occur between the machine component and the encoder.

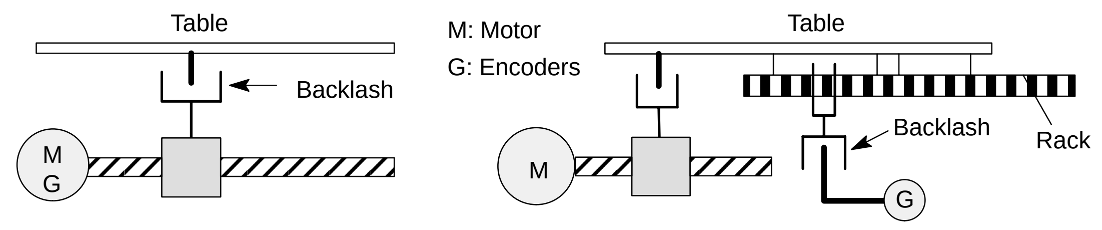
For axes with indirect position sensing, mechanical backlash results in a falsification of the traversing distance, as, at direction reversal, the axis travels either too far or not far enough corresponding to the absolute value of the backlash.

Note

The backlash compensation is active, after

- the axis has been referenced for incremental measuring systems
- the axis has been adjusted for absolute measuring systems

In order to compensate the backlash, the determined backlash must be specified in P0201 with the correct polarity.
At each direction of rotation reversal, the axis actual value is corrected dependent on the actual traversing direction.



The encoder actual value leads the actual value (table) at direction reversal.
—> the table doesn't travel far enough
—> **positive backlash** (standard case)

The actual value (table) leads the encoder actual value at a direction of rotation reversal.
—> the table travels too far
—> **negative backlash**

Fig. 6-14 Positive and negative backlash compensation

Table 6-23 Parameters for backlash compensation

No.	Name	Min.	Standard	Max.	Units	Effective
0201	Backlash compensation	–20 000	0	20 000	MSR	Immedi-ately

... switches the backlash compensation in/out, and defines the absolute backlash amount for a positive or negative backlash.

= 0 The backlash (play) compensation is disabled

> 0 Positive play (standard situation)
For a direction of rotation reversal, the encoder actual value leads the actual value (table). The table does not travel far enough.

< 0 Negative play
The actual value (table) leads the encoder actual value at direction reversal. The table travels too far.

Note:

- Reference point approach: When is the compensation value switched–in?
  When the zero mark is detected, backlash compensation is activated, only for P0173 = 1 (no reference cams).
  If the axis continues to move
  – in the same direction after the reference point approach —> then a compensation value is not entered
  – in the opposite direction —> the compensation value is entered when the velocity set-point reverses
- Reference point setting: When is the compensation value switched–in?
  The behavior when first traversing after the ”Set reference point” in the positive or negative direction depends on the setting ”Reference point approach – plus/minus” (P0166).
  P0166
  0 Traversing in the pos. direction —> a comp. value is not entered
  Traversing in the neg. direction —> comp. value is immediately entered
  1 Traversing in the pos. direction —> comp. value is immediately entered
  Traversing in the neg. direction —> a comp. value is not entered
  = 1 —> Negative direction
  = 0 —> Positive direction
  If the reference point is simply set again (new command, with and without withdrawing the bit ”axis is referenced”), then for backlash compensation, the system acts as if the reference point was not set again.
  The behavior mentioned above is only seen after power–on or POWER–ON RESET!
- Absolute value encoder adjusted: When is the compensation value switched–in?
  The behavior when first traversing after power–on, depends on the setting for ”reference cams – with/without” (P0173) and ”Direction reference point approach – positive/negative” (P0166).
  The following applies:

P0173	P0166	
0	0	Traversing in the pos. direction —> comp. value is immediately entered Traversing in the neg. direction —> a comp. value is not entered
0	1	Traversing in the pos. direction —> comp. value is not entered Traversing in the neg. direction —> a comp. value is immediately entered
1	0	Traversing in the pos. direction —> comp. value is not entered Traversing in the neg. direction —> a comp. value is immediately entered
1	1	Traversing in the pos. direction —> comp. value is immediately entered Traversing in the neg. direction —> a comp. value is not entered

P0166: = 1 —> Negative direction
= 0 —> Positive direction

P0173: = 1 —> No reference cams used
= 0 —> Reference cams used

6

Position loop gain (Kv factor) P0200:8 P0031

The position loop gain (Kv factor) defines which following error is obtained at which axis traversing velocity.
The mathematical (proportional) equation is as follows:

$$\text{Kv factor} = \frac{\text{Velocity v}}{\text{Following error } \Delta s} \quad [1000/\text{min}] \qquad \frac{\frac{1\text{ m}}{\text{min}}}{\text{mm}} = \frac{1000}{\text{min}}$$

The K_v factor influences the following important characteristic quantities of the axis:

- Positioning accuracy and holding control
- Uniformity of the motion
- Positioning time

The better the axis design (high degree of stiffness), then the higher is the achievable K_v factor, and therefore the better the axis parameters from the technological perspective (lower following error).

Note

The stable position loop gain which can actually be set for the complete position control loop is influenced by time constants as well as backlash (play) and spring elements in the control loop.

The required Kv factor is entered in P0200:8.
The actual (measured) Kv factor is displayed in P0031.

Table 6-24 Parameters for the position loop gain

No.	Name	Min.	Standard	Max.	Units	Effective
0200:8	Kv factor (position loop gain)	0.0	1.0	300.0	1 000/min	Immediately
	The Kv factor defines at which traversing velocity of the axis which following error is obtained. Low Kv factor: Slow response to setpoint–actual value difference Δs is high High Kv factor: Fast response to setpoint–actual value difference, Δs is small Examples: Kv factor Significance = 0.5 at v = 1 m/min an Δs of 2 mm = 1 is obtained at v = 1 m/min an Δs of 1 mm = 2 is obtained at v = 1 m/min an Δs of 0.5 mm is obtained **Note:** The following parameters are available for position loop gain diagnostics: • P0029 Following error • P0030 System deviation, position controller input • P0031 Actual Kv factor (position loop gain) Refer under the index entry ”Diagnostics of the motion status”					

Speed pre–control
P0203
P0204:8
P0205:8
P0206:8

For speed pre–control, in addition a speed/velocity setpoint can be directly entered at the speed controller input. This additional setpoint can be weighed with a factor.

The speed pre–control improves the control characteristics of the position control loop in so much that for a constant velocity, the following error is almost completely reduced, i.e. to almost zero.

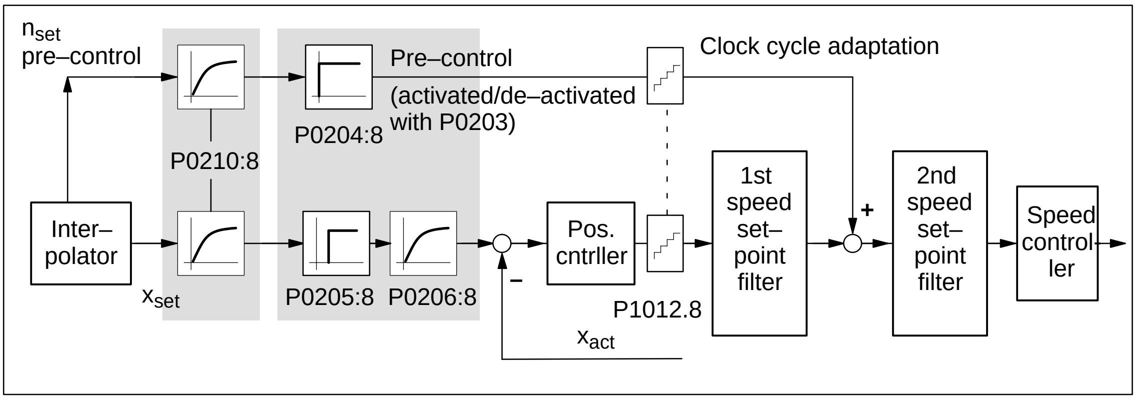


Fig. 6-15 Speed pre–control

Setting the speed pre–control

The following prerequisites must be fulfilled to set the speed pre–control:

- The current, speed and position control loop must be optimized.

After that, the speed pre–control can be set as follows:

1. Set P0203 = 1 —> this activates speed pre–control
2. Set P0204:8 to 100 % (this is the standard value)
3. P0206:8 = Set the approximate value from the sum of P1502:8 (time constant, speed setpoint filter 1) and P1503:8 (time constant, speed setpoint filter 2)
4. P0205:8 = determine the value
   Setting goal is: Positioning without undershoot or overshoot

   Recommendation:
   Traverse the axis using the traversing blocks, and evaluate positioning by plotting the position actual value using the trace function (refer to Chapter 7.4.2).
   With the trace function, the approach characteristics of the axis can be zoomed in using the appropriate scaling and then evaluated.

6

Table 6-25 Parameters for speed pre–control

No.	Name	Min.	Standard	Max.	Units	Effective
0203	Speed pre–control mode	0	0	1	–	Immedi-ately
	... the speed pre–control can be activated/de–activated. 1 Speed pre–control active 0 Pre–control not active					
0204:8	Factor, speed pre–control	1.0	100.0	100.0	%	Immedi-ately
	... the supplementary speed setpoint which was entered is weighted. When the axis control loop has been optimally set as well as a precisely determined equivalent time constant of the speed control loop (P0205, P0206), the pre–control factor has the value 100%.					
0205:8	Balancing filter, speed pre–control (dead time)	0.0	0.0	10.0	ms	Immedi-ately
	... allows the performance of the speed control loop to be simulated with a dead time. **Note:** The entered value is limited to two position controller clock cycles (P1009) (1 position controller clock cycle is, as standard = 2 ms, refer to Chapter 4.6).					
0206:8	Balancing filter, speed pre–control (PT1)	0.0	0.0	100.0	ms	Immedi-ately
	... allows, in addition to P0205:8 the performance of the speed control loop to be simulated using a PT_1 filter (low–pass filter). ... allows a possibly active speed setpoint smoothing to be better emulated (PT1).					
0210:8	Time constant, position reference value filter	0.0	0.0	1 000.0	ms	Immedi-ately
	... is the time constant of the PT1 position reference value filter. The effective Kv factor is reduced using the filter (position loop gain). **Applications:** • To reduce the pre–control dynamic performance Example: Kv factor = 3 * 1000/min —> P0210:8 = 20.0 ms • Jerk limiting This makes it possible to achieve smoother control characteristics with improved response to disturbances.					
1012.8	Average value filter, speed setpoint	–	–	–	hex	Immedi-ately
	... selects whether the speed setpoint steps from the position controller output (position controller clock cycle) are interpolated in the speed controller clock cycle (adapted). = 1 Average value filter, speed setpoint filter on (standard) Disadvantage: Delay in the position control loop by half a position controller clock cycle. = 0 Average value filter, speed setpoint off					

Direction adaptation P0231 P0232

The position actual value and the position reference value can be adapted using these parameters.

The direction adaptation should be made as follows:

1. The position control sense is not correct?

   Effect:
   A fault is immediately signaled when moving the axis (e.g.: 131 (following error too high) or 135 (standstill monitoring has responded).

   Remedy:
   Invert the position actual value in P0231; POWER ON and check the control sense.

2. The direction of motion is not correct?

   Effect:
   The axis does not move in the required direction.

   Remedy:
   Invert the position reference value in P0232; POWER ON, and check the direction of motion.

Table 6-26 Parameters for direction adaptation

No.	Name	Min.	Standard	Max.	Units	Effective
0231	Position actual value inversion	0	0	1	–	PO
	... the control sense of the position controller is established. = 1 Position actual value inversion = 0 No position actual value inversion **Note:** If the control sense of the position controller is not correct, then the position actual value must be inverted. The direction of motion is set using P0232.					
0232	Position reference value inversion	0	0	1	–	PO
	... the required motion direction is selected. = 1 Position reference value inversion Positive motor speed —> the position is decreased (negative position count direction) = 0 No position reference value inversion Positive motor speed —> the position is increased (positive position count direction) **Note:** The position controller control sense is not influenced, i.e. it is internally taken into consideration.					

6

Dynamic following error monitoring

When traversing an axis, a difference is obtained between the position reference value and position actual value, dependent on the following quantities (following error):

- The instantaneous traversing velocity
- The stabilizing characteristics of the position control loop, i.e. of the selected position control loop gain (Kv factor, P0200:8)

Fluctuations of the following error for a traversing axis signify inaccurate positioning.
In order to be able to check these fluctuations, the following error monitoring must be appropriately set.

Mode of operation

The dynamic following error monitoring is activated/de–activated with P0318:8, and is based on the continuous comparison between the measured and a calculated position actual value.

To calculate the following error, a model is used, which simulates the dynamic performance of the position control loop.

A tolerance bandwidth (P0318:8) for the maximum following error deviation is permitted so that the monitoring does not erroneously respond as a result of slight speed fluctuations (caused by load changes or by a control loop model error).

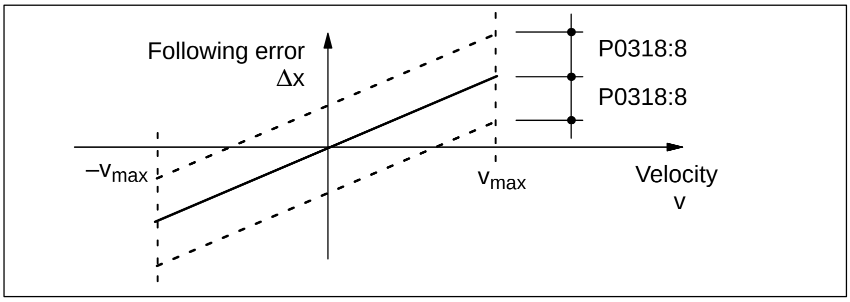


Fig. 6-16 Following error

Fault

When the monitoring function responds, the drive is braked down to standstill with the deceleration set in P0104 (max. deceleration) and fault 131 (following error too high) is output.
A changeover is made into the tracking mode.

Table 6-27 Parameters for the dynamic following error monitoring

No.	Name	Min.	Standard	Max.	Units	Effective
0318:8	Dynamic following error monitoring tolerance	0	1 000	200 000 000	MSR	Immediately
	The parameter defines the maximum deviation between the measured and the calculated position actual value before an error is signaled. The tolerance bandwidth is intended to prevent the dynamic following error monitoring erroneously responding caused by slight speed fluctuations resulting from operational control sequences (e.g. load surges). 0 Dynamic following error monitoring is de–activated ≥ 1 The dynamic following error monitoring is active with this value					

Standstill monitoring

Using the standstill monitoring function, it can be detected when the axis leaves the target position (under load, for hanging axes, etc.).

Mode of operation

The standstill monitoring time (P0325) is started after a motion block has been completed (position reference value = target reference value).
After the delay time has expired, it is cyclically monitored as to whether the position actual value remains within the defined standstill window (P0326).

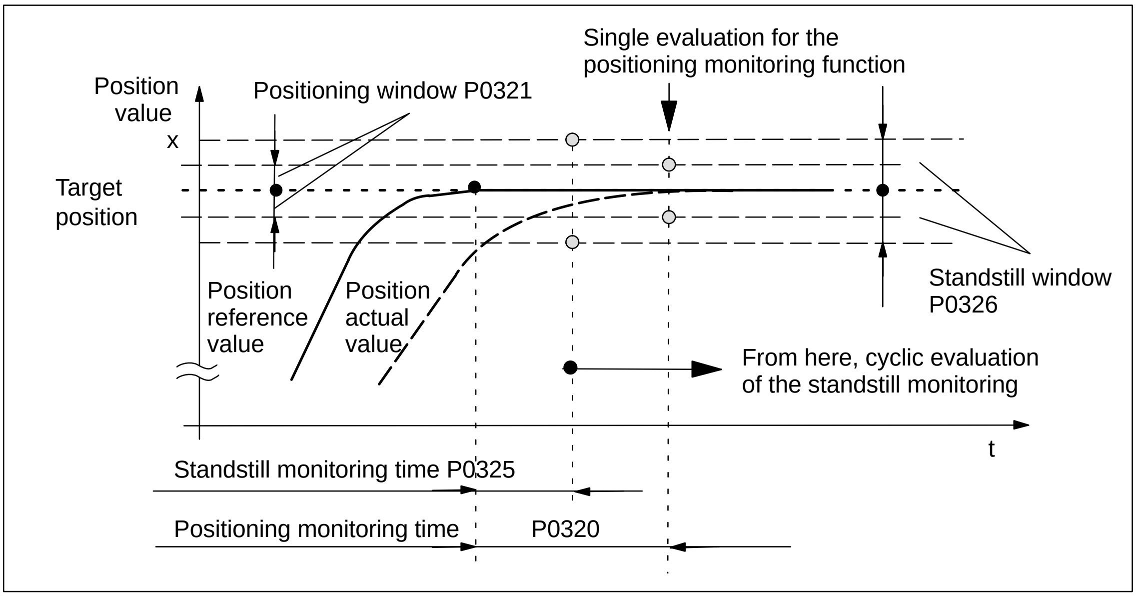


Fig. 6-17 Standstill and positioning monitoring

Fault

When the standstill monitoring function responds, the drive is braked down to standstill with the deceleration level set in P0104 (maximum deceleration) and fault 135 (standstill monitoring) is signaled.
A changeover is made into the tracking mode.

Switching–off

The standstill monitoring function is disabled, if

- a new traversing block is started
- Tracking mode is selected
- The standstill window has the value zero (P0326 = 0)

Table 6-28 Parameters for the standstill monitoring function

No.	Name	Min.	Standard	Max.	Units	Effective
0325	Standstill monitoring time	0	400	100 000	ms	Immedi-ately
	This parameter defines the time after which, when approaching the position, the following error must be within the standstill window (P0326). **Note:** • The standstill monitoring time is rounded–off in the drive to an integer multiple of the position controller clock cycle (P1009). • If a larger value is entered in P0325 than in P0320, this is limited internally in the drive to P0320.					
0326	Standstill window	0	200	20 000	MSR	Immedi-ately
	This parameter defines the standstill window, within which the position actual value must be located after the standstill monitoring time has expired (P0325). 0 Standstill monitoring is de–activated ≥ 1 Standstill monitoring is active with this value					

Standstill and positioning monitoring

There are the following differences between the standstill and positioning monitoring:

- Standstill monitoring (zero–speed monitoring)

  After the standstill monitoring time has expired, the system **cyclically** checks whether the axis remains within the standstill window around the target position.

  Objective: Continually checks that the position is maintained

- Positioning monitoring

  For this monitoring function, after the positioning monitoring time has expired, it is checked **once** whether the actual position lies within the positioning window around the target position.

  Objective: Single check as to whether the position has been reached with sufficient accuracy

---

Note

The following is valid when setting the standstill and positioning monitoring:

- Standstill monitoring time ≤ positioning monitoring time (P0325 ≤ P0320)
- Standstill window ≥ positioning window (P0326 ≥ P0321)

Positioning monitoring

The positioning monitoring can be used to identify when the target position is precisely approached.

Mode of operation

In order to ensure that an axis is positioned within a specific time, after a motion block has been completed (partial position reference value = 0, ≙ time t_1 in Fig. 6-18) the positioning monitoring time (P0320) is started.
After this time has expired, it is checked once as to whether the position actual value lies within the positioning window (P0321).

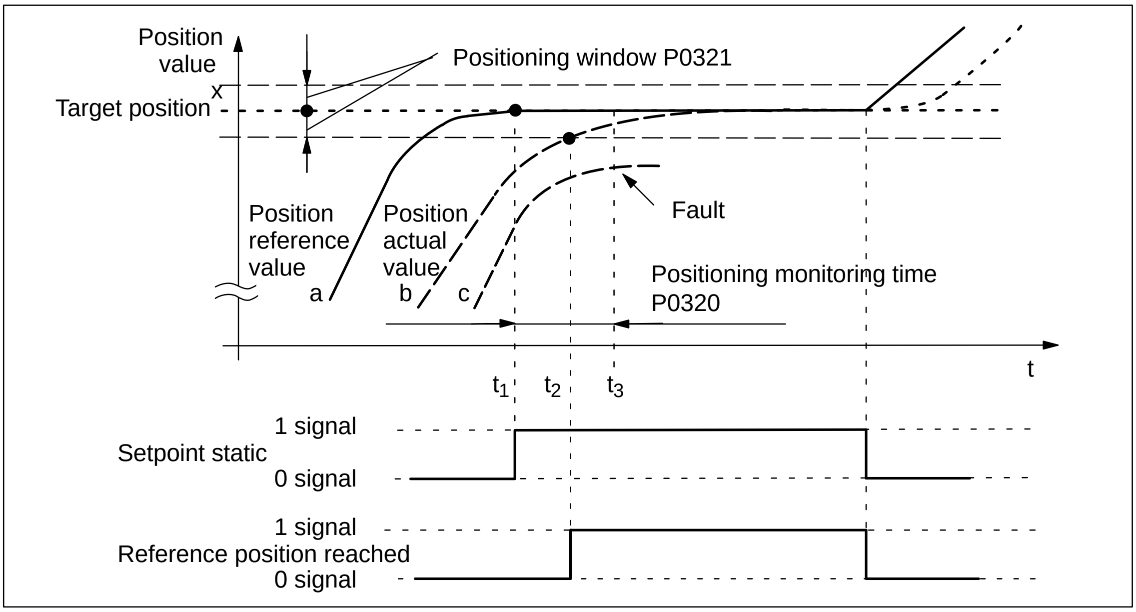


Fig. 6-18 Positioning monitoring

Table 6-29 Explanation of curves a, b and c

Curve	Description
a	After the target position has been reached in t_1 the interpolator starts the positioning monitoring time.
b	From time t_2 the position actual value is within the positioning window. Positioning is considered as having been completed.
c	After the positioning monitoring time has expired in t_3, the position actual value lies outside the positioning window. This results in an error.

Output signals

The following output signals are available
(description, refer under the index entry ”Output signal...”):

- Output signal, ”setpoint static”
- Output signal, ”reference position reached”

Fault

When the monitoring function responds, the drive is shutdown and fault 134 is issued (positioning monitoring). A changeover is made into the tracking mode.

Table 6-30 Parameters for the positioning monitoring function

<table>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>0320</td><td>Positioning monitoring time</td><td>0</td><td>1 000</td><td>100 000</td><td>ms</td><td>Immedi-
ately</td></tr>
<tr><td></td><td colspan="6">This parameter defines the time when approaching the position, after which the following error must be within positioning window (P0321).
Note:
The following applies when setting the positioning and standstill monitoring:
Positioning monitoring time (P0320) ≥ Standstill monitoring time (P0325)</td></tr>
<tr><td>0321</td><td>Positioning window</td><td>0</td><td>40</td><td>20 000</td><td>MSR</td><td>Immedi-
ately</td></tr>
<tr><td></td><td colspan="6">This parameter defines the positioning window within which the position actual value must be located after the positioning monitoring time has expired (P0320).
0 Positioning monitoring is de–activated
≥ 1 Positioning monitoring is active with this value
Note:
• The following applies when setting the positioning and standstill monitoring:
Positioning window (P0321) ≤ Standstill window (P0326)
• The following is valid if the specified positioning window is not reached:
– The motion block has not been completed
– It is not possible to traverse the axis any further
– After the time in P0320 has expired, fault 134 is issued (positioning monitoring)
• The size of the positioning window influences the block change time.
The lower that this tolerance is selected, then the longer positioning takes. It also takes that much longer until the next traversing block can be executed.</td></tr>
</table>

Tracking mode

If an axis is in the tracking mode, then the control is disabled and its position reference value tracks the actual position actual value.

The actual position of the axis is still being sensed – this means that it is not necessary to re–home (re–reference) the axis when the tracking mode (correcting mode) is cancelled.

Selection, signals

In the tracking mode, there are various selection possibilities and signals:

- The tracking mode is selected, if
  - controller enable terminal 65.x is withdrawn
    and
    the ”tracking mode” input signal is set to ”1”
  - Jogging operation (jogging 1, 2) is active (when jogging via the velocity, not for incremental jogging)
  - When a fault develops, automatically using ”SIMODRIVE 611 universal”
    (only for a STOP 0, I or II stop response)
- In all cases, the checkback signal is realized using the output signal ”tracking mode active”.

Activation

The ”tracking mode” input signal is only relevant if the controller enable (terminal 65.x) of the drive is withdrawn or if the controller is re–enabled.

- Tracking mode = 1 (so–called tracking)

  When the axis–specific controller enable is withdrawn (terminal 65.x), the position reference value of the associated axis continually tracks the position actual value. In this status, the ”tracking mode active” output signal = ”1”.

  If the controller is re–enabled, all additional axis movements start at the actual position which may have changed.
- Tracking mode = 0 (stopping)

  No tracking operation is activated when the controller enable is withdrawn and the following error, positioning and standstill monitoring are disabled. This means that the old position reference value is kept. If the axis is pushed out of its position, a following error occurs between the position reference value and the position actual value, which is compensated when the controller enable is set. In this status, the ”tracking mode active” output signal = ”0”. However, when the monitoring function is enabled, tracking operation is activated and the position reference value follows the position actual value.

  All additional axis movements start at the reference position, which was available before the controller enable was withdrawn.

6

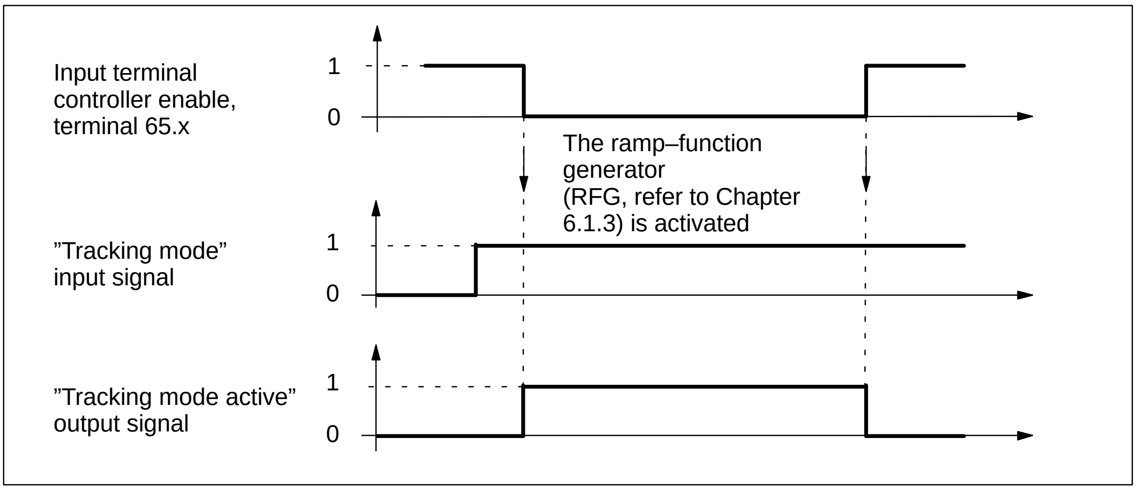


Fig. 6-19 Characteristics (time) in the tracking mode

Note

If the tracking mode is active and the input signal ”tracking operation” is set, then the dynamic following error monitoring, the positioning monitoring and the standstill monitoring are not effective.

Diagnostics: Motion status of the axis

The following parameters provide information about the actual motion status of an axis:

- P0020 Position reference value
- P0021 Position actual value
- P0022 Distance to go
- P0023 Velocity setpoint
- P0024 Velocity actual value
- P0025 Effective override
- P0026 Position act. value, ext. block change (from SW 3.1)
- P0029 Following error
- P0030 System deviation, position controller input
- P0031 Actual Kv factor (position loop gain)

Reader’s note

The parameters are displayed and described in the parameter list is Chapter A.1.

6.2.4 Referencing and adjusting

Definitions

In order that the ”SIMODRIVE 611 universal” drive precisely identifies the machine zero point after power–on, the axis measuring system must be synchronized with the machine.

This synchronization is realized when referencing incremental measuring systems or adjusting absolute measuring systems.

Notice

The following functions are ineffective for axes which are either not referenced not adjusted:

- Software limit switch
- Backlash compensation
- Start the traversing blocks

6.2.5 Referencing for incremental measuring systems

6

General information

For axes with incremental measuring systems, each time the system is powered–up, the position reference to the machine zero point must be established.

Synchronization is realized for a reference point approach by accepting a specific position value at a known point of the axis.

Note

- Before SW 4.1:

  The encoder must be re–referenced if, for a referenced incremental measuring system, a parameter set was changed over.

- From SW 4.1:

  Using P0239, the behavior for a parameter set changeover can be set for a motor measuring system.

  P0239 = 0: Behavior as before SW 4.1 (standard)

  P0239 = 1: For a parameter set changeover, it is only necessary to re–reference the encoder, if the ratio P0237/P0238 has changed.

Starting the reference point approach

The reference point approach can be started in the ”positioning” mode via the ”start referencing” input signal.

The signal can be entered via an input terminal or via PROFIBUS–DP, and must remain set until the end of the reference point approach travel via the ”reference point set” output signal.
If the ”start referencing” signal is reset during referencing, then referencing is exited and the drive stops.

For a 2–axis control board, the reference point approach for both axes can be started and executed, either one after the other or simultaneously.

The approach direction for reference point approach is defined using P0166.

Axis with reference cams (P0173 = 0)

Axes, which have several zero marks over their complete traversing range (e.g. incremental, rotary measuring system), require a reference cam to select the ”correct” zero mark when referencing.

The reference point approach for these axes is executed in 3 phases:

Phase 1:
Traverse to the reference cams

When starting the reference point approach, the following statuses are available:

- Axis is located in front of the reference cam
  After the reference point approach is started, the axis moves with the reference point approach velocity (P0163) in the direction specified by P0166.
  The drive detects the reference cam using the input signal ”reference cam” and for a ”1” signal brakes down to standstill.
  It continues with the ”synchronization with the zero pulse”.

Note

The maximum permissible distance from the starting position up to the reference cams can be monitored using P0170 (maximum distance to the reference cams).

The override influences the reference point approach velocity.

- The axis is located at the reference cam
  After the reference point approach has started, it is considered as having been completed with ”travel to the reference cam”.
  It continues with the ”synchronization with the zero pulse”.

Phase 2: Synchronization using the zero pulse

The axis traverses with the reference point shutdown velocity (P0164) in the opposite direction to that specified in P0166.
After the reference cam has been left (input signal, ”reference cam” = ”0” signal), the axis synchronizes with the first zero pulse. The axis brakes down to standstill.
The system continues with ”traverse to reference point”.

Note

The maximum permissible travel from the reference cams to the zero pulse can be monitored using P0171 (max. distance between the reference cam/zero pulse).

The override is not effective.

Phase 3: Traversing to the reference point

The axis traverses with the reference point approach velocity (P0165), the reference point offset (P0165) in a positive or negative direction referred to the zero pulse.
The following is achieved when the axis reaches the reference point

- The reference point coordinate (P0160 = 0) is transferred as the new reference position.
- The ”reference point set” output signal is set to a ”1” signal.
- From SW 8.3, the reference point approach (homing) can be terminated after the zero mark has been detected, refer to Table 6-33 (P0160 = 1).

Note

If the reference point offset is less than the braking travel of the axis from the reference point shutdown velocity to standstill, then the reference point is approached from the other direction.

The override is not effective.

Mounting a reference cam

The reference cam signal must be connected to an input terminal with function number 78 (reference cam).
Parameter P0167 can be used to adapt the signal characteristics of the reference cam (NO/NC characteristics).

Table 6-31 Adapting the reference cam signal

If	then, when approaching/exiting the reference cam	P0167
NO contact	a 0/1 edge or 1/0 edge —>	P0167 = 0 (no inversion) (standard)
NC contact	a 1/0 edge or 0/1 edge —>	P0167 = 1 (inversion)

6

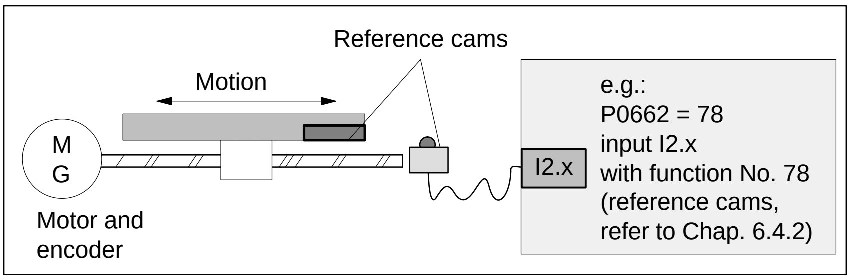


Fig. 6-20 Mounting a reference cam

Adjusting the reference cam

The following factors influence how the drive identifies the reference cam from a time perspective:

- Accuracy or time delay when detecting a reference cam
- Delay at the input, position controller clock cycle, interpolation clock cycle, ...

Warning

If the reference cam is not adjusted, so that at each reference point approach, the same zero pulse is recognized for synchronization, then an ”incorrect” machine zero point is obtained.

Recommendation:
Experience has shown that it is best to adjust the reference cam edge, required for synchronization, at the center between two zero pulses.

Example when adjusting the reference cam

After the reference point approach, the distance between the reference cams and the zero pulse can be read in P0172.
This means that when the distance between 2 zero pulses is known, the reference cam offset travel can be calculated.

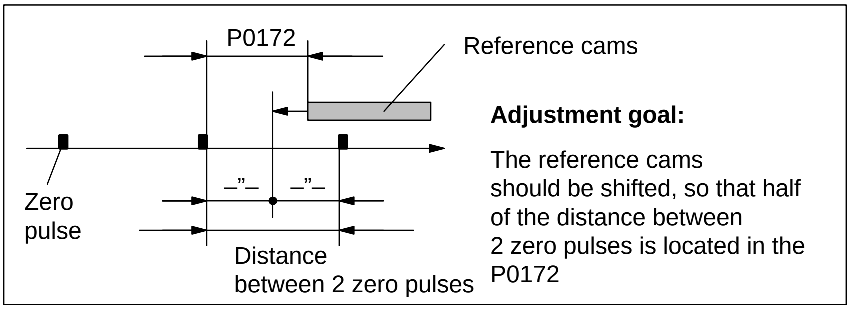


Fig. 6-21 Adjusting the reference cam

What is the minimum length of a reference cam?

The reference cam must be long enough, so that when the cam is approached with the reference point approach velocity, the braking travel ends right at the cam (the axis comes to a standstill at the cam), and the cam is exited with the reference point shutdown velocity.

The minimum length of the reference cam is calculated as follows:

$$\text{Min. length} = \frac{(\text{reference point approach velocity})^2}{2 \bullet \text{deceleration}} = \frac{\text{P0163}^2}{2 \bullet \text{P0104}}$$

Note:

This only applies if the jerk limiting is not active (P0107 = 0), otherwise longer.

Table 6-32 Reference cam up to the end of the traversing range?

If...,	Then ...
the cam extends up to the end of the traversing range, **Recommendation**	the reference point approach can be started from every point of the axis. **Reason:** There are 2 conditions in this case (in front of and actually at the cam). The axis behaves appropriately at the start of the reference point approach, and traverses correctly for the reference point approach.
the reference cam does not extend up to the end of the traversing range,	The axis must be traversed into the range, determined at start–up, before the reference point approach is started. **Reason:** In this case, there are 3 initial conditions (in front of, at or behind the cam). The drive cannot differentiate between in front of and behind the cam, and for the reference point approach, for a specific initial condition it does not reach the reference cam.

Axis without reference cams (P0173 = 1)

Axes, which only have one zero mark over their complete traversing range (e.g. rotary axes), do not require any reference cams when referencing.

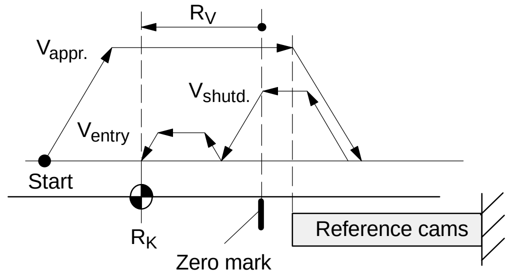
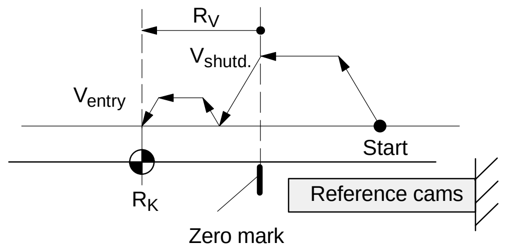
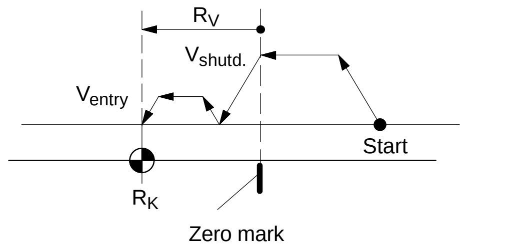
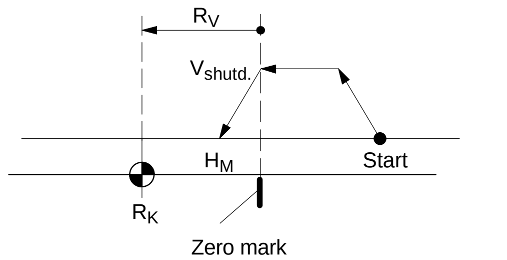
A reference point approach for these axes is executed as follows:

1. Synchronization with the zero pulse (phase 2, refer to ”axis with reference cams” (P0173 = 0)”
2. Travel to the reference point (phase 3, refer to ”axis with reference cam (P0173 = 0)”

Motion sequence when referencing

The referencing motion is shown in the following table as a function of the reference cams.

Table 6-33 Sequence when referencing (homing) for an incremental measuring system

<table>
<tr><th>With/with-out</th><th>In front of/at</th><th rowspan="2">Motion sequence</th></tr>
<tr><th colspan="2">Reference cams</th></tr>
<tr><td rowspan="2">Axis with reference cams (P0173=0)</td><td>Axis is in front of the reference cam</td><td>
</td></tr>
<tr><td>Axis is at the reference cam</td><td>
</td></tr>
<tr><td rowspan="2">Axis without reference cams (P0173=1)</td><td>Axis traverses/ moves to the reference point (P0161=0)1)</td><td>
</td></tr>
<tr><td>Axis traverses/ moves to after the zero mark (P0161=1)1) (from SW 8.3)</td><td>
</td></tr>
<tr><td colspan="3">Abbreviations:
$V_{appr.}$ P0163 (reference point approach velocity)
$V_{shutd.}$ P0164 (reference point shutdown velocity)
V_{entry} P0165 (reference point entry velocity)
R_V P0162 (reference point offset)
R_K P0160 (reference point coordinate)
H_M P0161 (stopping for marks)
1) When referencing (homing), the act. position is not displayed in SimoCom U.</td></tr>
</table>

6.2.6 Referencing with a distance–coded measuring system (from SW 8.3)

General information

In the case of measurement systems with distancecoded reference marks, it is not necessary to evaluate a reference cam or approach a defined reference point in order to reference the machine axis.

Measurement systems of this type consist of a line grid and a reference mark track running parallel to this. The distance between two consecutive reference marks (zero marks) is defined differently, so that the absolute position of the machine axis can be determined from the distance.

For axes with incremental measuring systems, each time the system is powered–up, the position reference to the machine zero point must be established.

Synchronization is realized at reference point approach by accepting a specific position value at a known point of the axis.

Note

The distance between the zero marks is continually monitored.

Only encoders are monitored, where the pulse number can be divided by 16 or 10!

Starting the reference point approach

The reference point approach can be started in the ”positioning” mode via the ”start referencing” input signal.

The input signal should be entered via the input terminal with function number 65 and this must remain set up until the end of the reference point approach is signaled using the output signal ”reference point set” (function number 61).

If the ”start referencing” signal is reset during referencing, then referencing is exited and the drive stops.

While referencing, at least two reference marks (zero marks) are passed. The referencing is completed once these zero marks have been passed and the axis has braked.

For a 2–axis control board, the reference point approach for both axes can be started and executed, either one after the other or simultaneously.

The approach direction for reference point approach is defined using P0166.

The reference point approach is executed in 2 phases (refer to the table 6-34):

Phase 1: Synchronization using the two zero pulses

The axis traverses with the reference point shutdown velocity (P0164) in the direction specified in P0166.

The synchronization takes place when two zero pulses are passed (position of two zero marks). After the second zero pulse, the drive brakes down to standstill.

The system continues with ”traverse to reference point”.

Note

The maximum permissible distance from the start up to the second zero pulse can be monitored using P0171 (max. distance between reference cams and start/zero pulses). It makes sense to set the basic distance (clearance) for distance–coded measuring systems.

The override is not effective.

Phase 2: Traversing to the reference point (home position)

The axis traverses with the reference point approach velocity (P0165), the reference point offset (P0162) referred to the zero of the encoder, in the positive or negative direction.

The following is achieved when the axis reaches the reference point:

- The reference point coordinate (P0160) is transferred as the new reference position.
- The ”reference point set” output signal is set to a ”1” signal.

Note

If, after the second zero point, a reference point approach is not required (P0161 = 1), then the absolute position of the current position is calculated and accepted in the drive.

The ”reference point set” output signal is set to a ”1” signal. Parameter P0162 and P0160 act the same as for a reference point approach with one zero mark. The reference point offset does not refer to the zero mark passed, but to the encoder zero.

Parameter change when re–commissioning (new commissioning)

For a machine with distance–coded reference marks, there is not requirement to reference using cams.

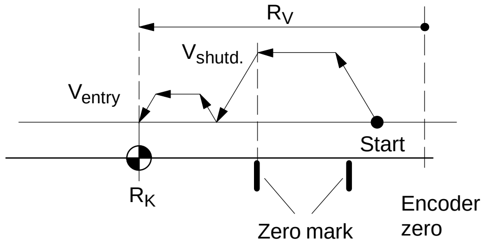
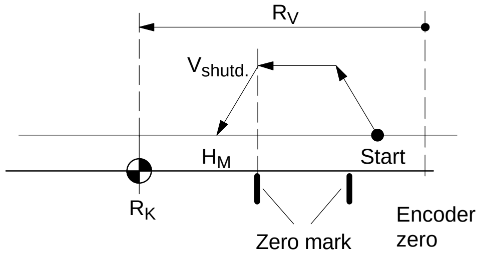
Standard setting when referencing with distance–coded measuring system:

—> P0173 = 1: ”Referencing without cams”

Motion sequence when referencing

The referencing motion is shown in the following table as a function of the zero marks.

Table 6-34 Sequence when referencing with a distance–coded measuring system

With/ without	**In front of/at**	**Motion sequence**
Reference cams		
Axis **without** reference cams (P0173=1)	Axis traverses/ moves to the reference point (P0161=0)1)	
	Axis traverses/ moves to after the zero mark (P0161=1)1) (from SW 8.3)	

Abbreviations:

$V_{appr.}$	P0163 (reference point approach velocity)
$V_{shutd.}$	P0164 (reference point shutdown velocity)
V_{entry}	P0165 (reference point entry velocity)
R_V	P0162 (reference point offset)
R_K	P0160 (reference point coordinate)
H_M	P0161 (stopping at marks)

1) When referencing, the actual abs. position is not displayed in SimoCom U.

Input/output signals (refer to Section 6.4)

The following signals are used for the ”referencing with distance–coded measuring system” function:

- Input signals
  (refer under the index entry, ”Input signal, digital – ...)
  - Input signal ”Start referencing/cancel referencing”

    —> using an input terminal with function number 65
- Output signals
  (refer under the index entry ”Output signal, digital – ...)
  - Output signal ”Reference point set/no reference point set”

    —> using an output terminal with function number 61

Parameter overview (refer to 6.2.8 and A.1)

The following parameters are available for ”referencing with distance–coded measuring system” function:

- P0161 Stopping at marks (from SW 8.3)
- P0173 Reference point approach without reference cams
- P1027 IM configuration, encoder
- P1037 DM configuration encoder
- P1050 IM reference mark distance for distance–coded scales
- P1051 IM reference mark distance for distance–coded rotary encoders
- P1052 DM reference mark distance for distance–coded scales
- P1053 DM reference mark distance for distance–coded rotary encoders
- P1054 IM difference for distance–coded rotary encoders (from SW 8.3)
- P1055 DM difference for distance–coded rotary encoders (from SW 8.3)

6.2.7 Adjusting absolute measuring systems

General information

Axes with absolute value encoders automatically obtain their reference position without any axis motion after power–on.

Prerequisites:

- There is an absolute value encoder (single–turn/multi–turn absolute value encoder) (P0175 = 0)
- Absolute value encoder is considered to have been adjusted (P0175 = 3 for indirect measuring system P0175 = 4 for direct measuring system)

Adjusting the absolute value encoder

An absolute value encoder should be adjusted once when commissioning the axis or after opening the mechanical coupling between the measuring system and mechanical system, for example, after:

- Replacing the measuring system and/or motor
- Changing the gearbox ratio (when changing the gearbox factors)
- Selection, ”parking axis” (if another EnDat encoder was connected)

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Note

- ”SIMODRIVE 611 universal” can only identify if the mechanical coupling between the measuring system and mechanical system is released, if it is powered up.
- When a parameter set is changed–over in operation (e.g. a gear ratio is changed), the ”not adjusted” information is lost at power–down if ”save to Feprom” is not explicitly initiated.

- Before SW 4.1:

  If a parameter set changeover was carried out with an adjusted absolute encoder for a particular motor measuring system, then the encoder must be re–adjusted.
- From SW 4.1:

  Using P0239, the behavior for a parameter set changeover can be set for a motor measuring system.

  P0239 = 0: Behavior as before SW 4.1 (standard)

  P0239 = 1: For a parameter set changeover, it is only necessary to adjust the encoder if the mechanical ratio of P0237/P0238 has been changed.

Procedure to adjust an absolute value encoder using the display and operator control unit

The following sequence is practical when adjusting absolute value encoders:

1. Traverse the axis to a known or measured position (this is the required actual value).
   The axis can be traversed, e.g. using ”Jogging 1” or ”Jogging 2”.
2. Set P0160 to ”required actual value”
3. Set P0175 = 1
   The ”SIMODRIVE 611 universal” drive determines the difference between the required actual value in P0160 and the encoder actual value and enters it into an internal parameter.
   If a fault occurs, then P0175 is set to –1.
   If the operation was error–free, then P0175 is set to 2, 3 or 4 (refer to Chapter 6.2.8) and Fault 799 (save to FEPROM and HW RESET required) is signaled.
   – Save parameters in the FEPROM (P0652 = 1)
   – Carry–out a HW–RESET (press the POWER–ON RESET button on the front panel of the control board)
4. Test: Is the actual value correctly displayed after power–on?

Procedure when adjusting an absolute value encoder using SimoCom U

The absolute value encoder is adjusted, supported by the operator. The following sequence is practical:

1. Establish online operation between SimoCom U and the drive
2. Traverse the axis to a known or measured position (this is the required actual value).
   The axis can be traversed, e.g. using ”Jogging 1” or ”Jogging 2”.
3. Select the ”referencing” dialog box
   – Enter the ”required actual value” into the appropriate field.
   – Set ”Absolute value” button
     The ”SIMODRIVE 611 universal” drive determines the difference between the required actual value in P0160 and the encoder actual value and enters it into an internal parameter.
     If this operation is error–free, fault 799 is then signaled (save to FEPROM and HW–RESET) and the operator is prompted to:

     Save parameters in the ”FEPROM”

     and

     carry out a ”HW–RESET”
4. Test: Is the actual value correctly displayed after power–on?

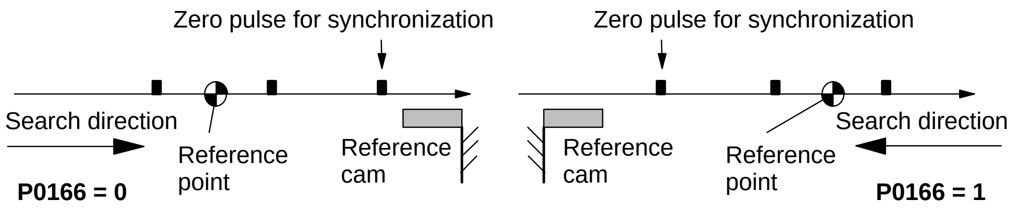
6.2.8 Parameter overview for referencing/adjustments

Table 6-35 Parameter overview when referencing/adjusting

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0160	Reference point coordinate	–200 000 000	0	200 000 000	MSR	Immediately
	The parameter defines the position value which is set, as actual axis position, after referencing or adjusting. • Incremental measuring system After the reference point has been reached, the drive accepts the position value in this parameter as the current axis position. • Absolute value encoders When adjusting the encoder, the position value in this parameter is set as the actual axis position. The difference to the actual encoder actual value is entered into P0162.					
0161	Stopping at marks (from SW 8.3)	0	0	1	–	Immediately
	...defines the behavior when stopping at marks. 0 Reference point approach is not interrupted at marks (standard) 1 Reference point approach remains stationary, if the first zero mark or, for distance–coded measuring systems, the second zero mark was found.					
0162	Reference point offset	–200 000 000	–2 000	200 000 000	MSR	PrgE
	Incremental measuring system After the reference zero pulse has been identified, the axis is moved through this distance. The axis has reached the reference point of this position, and accepts the reference point coordinate (P0160) as new actual value.					
0163	Reference point approach velocity	1 000	5 000 000	2 000 000 000	c*MSR/min	PrgE
	The axis moves with this velocity towards the reference cam after the reference point approach has been started. The velocity must be set, so that after the reference cam has been reached, and braking, the following conditions must be fulfilled: • The axis must come to a standstill at the reference cam • It is not permissible that the hardware limit switch is reached when braking					
0164	Reference point shutdown velocity	1 000	300 000	2 000 000 000	c*MSR/min	PrgE
	The axis moves with this velocity between identifying the reference cam and synchronizing with the first zero pulse (reference zero pulse).					
0165	Reference point entry velocity	1 000	300 000	2 000 000 000	c*MSR/min	PrgE
	The axis traverses with this velocity between synchronizing with the first zero pulse (reference zero pulse) and reaching the reference point.					

6

Table 6-35 Parameter overview when referencing/adjusting, continued

<table>
<tr><th colspan="7">Parameters</th></tr>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Ef-
fec-
tive</th></tr>
<tr><td>0166</td><td>Reference cam approach direction</td><td>0</td><td>0</td><td>1</td><td>–</td><td>PrgE</td></tr>
<tr><td></td><td colspan="6">This parameter defines the approach direction/search direction of the reference cam.
At power–on, the axis can be located in front of or at the reference cam.
• Assumption: The axis is located in front of the reference cam.
When starting reference point approach, the reference cam is searched for in the direction specified in this parameter.
• Assumption: The axis is located at the reference cam
When starting the reference point approach, the reference cam is already known. The axis now moves away from the reference cam in the direction opposite to that entered in this parameter and continues the reference point approach.
1 The reference cam is in the negative direction
0 The reference cam is in the positive direction


Note:
For an axis without reference cam (P0173 = 1), referencing is started with phase 2 (synchronizing with the zero reference pulse).
The approach direction when searching for the zero pulse is defined using P0166.</td></tr>
<tr><td>0167</td><td>Inverting reference cam</td><td>0</td><td>0</td><td>1</td><td>–</td><td>Im-
medi-
ately</td></tr>
<tr><td></td><td colspan="6">... the switching behavior of the reference cam signal (input terminal with function number 78) is adapted.
1 Inversion —> necessary for an NC contact
0 No inversion —> necessary for a NO contact, standard</td></tr>
<tr><td>0170</td><td>Maximum distance to the reference cam</td><td>0</td><td>10 000 000</td><td>200 000 000</td><td>MSR</td><td>PrgE</td></tr>
<tr><td></td><td colspan="6">... specifies the maximum distance the axis can traverse from starting the reference point approach in order to find the reference cams.
Note:
When a fault condition occurs, the axis remains stationary and fault 160 is signaled (reference cam not reached).</td></tr>
</table>

Table 6-35 Parameter overview when referencing/adjusting, continued

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0171	Max. distance up to the zero pulse	0	20 000	200 000 000	MSR	PrgE
	... specifies the maximum distance the axis can move when leaving the reference cam or from the start in order to find the zero pulse. **Note:** • If a fault condition occurs, the axis remains stationary and fault 162 is signaled (no reference zero pulse available). • If P0171 is entered and it is insignificantly higher than P0172, a fault can occur due to a degree of uncertainty when determining the actual value travel.					
0172	Distance up to the zero pulse	–	–	–	MSR	RO
	The distance between leaving the reference cam or from the start and reaching the zero pulse is entered in this parameter. **Note:** • This parameter helps to adjust the reference cam during start–up. • There is some uncertainty in the actual distance between the reference cam and reference zero pulse. This is caused by the switching behavior (timing) of the reference cam switch and the sampling of the reference cam switching signals in the interpolation clock cycle. The measured distance in P0172 can therefore be different at each reference point approach.					
0173	Reference point approach without reference cams	0	0	1	–	PrgE
	... identifies the type of axes, which do not require reference cams for referencing. These are the following axes: • Axes that have only one zero mark over the complete traversing range • Rotary axes that only have one zero mark per revolution 1 No reference cam available For these axes, the reference point approach starts with phase 2 (synchronization with the reference zero pulse). The approach direction is defined using P0166 (reference cam approach direction). 0 Reference cams available For these axes, the reference point approach starts with phase 1 (travel to the reference cams).					
0174	Referencing mode – position measuring system	1	1	2	–	Immediately
	The parameter defines the referencing mode. 1 Incremental measuring system available The zero pulse on the encoder track is evaluated. 2 There is an incremental measuring system with equivalent zero mark Instead of the zero mark from the encoder, an ”equivalent zero mark” (e.g. a BERO pulse) is expected at the input terminal I0.x. **Note:** The equivalent zero mark is identified, depending on the direction (refer under the index entry ”Input signal – equivalent zero mark”).					

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Table 6-35 Parameter overview when referencing/adjusting, continued

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0175	Adjustment status – absolute position measuring system	0	0	4	–	Immediately
	... indicates the status when adjusting the absolute value encoder –1 Error/fault occurred when adjusting the encoder 0 Absolute value encoder has not been adjusted. Pre–setting when commissioning the system for the first time. 1 Absolute value encoder has still not been adjusted. Adjustment has been initiated. The parameter is set to 2 for an error–free adjustment. If an error occurs when making the adjustment, the parameter is set to –1. 2 The absolute value encoder has been adjusted (before SW 3.1) 3 The absolute value encoder IM has been adjusted (from SW 3.1) 4 The absolute value encoder DM has been adjusted (from SW 3.3) **Note:** • If a valid adjustment becomes invalid, then P0175 is set from 2 to 0. This can be realized by manually changing the parameter as well as from ”SIMODRIVE 611 universal” itself (e.g. for a parameter set changeover, as this signifies that the mechanical coupling between the measuring system and mechanical system has been opened – gearbox changeover. • If a series start–up is executed (copying the parameters from drive x to drive y), then the adjustment value is also reset due to the ”serial number motor measuring system” (P1025/P1026) (P0175 = 0).					
0239	Re–referencing or re–adjustment only when required (SRM ARM) (from SW 4.1)	0	0	1	–	Immediately
	0 Referencing or adjustment is withdrawn when a parameter set is changed (standard) 1 Referencing or adjustment is only withdrawn when a parameter set is changed if the mechanical ratio (Ü = P0237:8/P0238:8) has changed.					
1050	IM reference mark distance for distance–coded measuring scales (from SW 4.1)	0	20 000	4294967295	µm	PO
	...specifies the basic distance between two fixed reference marks. If the control detects that the distance between each two reference marks is different and therefore incorrect, then the axis remains stationary. Fault 508 (zero mark monitoring, motor measuring system) is signaled. **Note:** This monitoring is only activated if P1050/P1024*1000 can either be divided by 16 or by 10.					

Table 6-35 Parameter overview when referencing/adjusting, continued

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1051	IM reference mark distance for distance–coded rotary encoders (from SW 4.1)	0	20 000	4294967295	mdegrees	PO
	...specifies the basic distance between two fixed reference marks. If the control detects that the distance between each two reference marks is different and therefore incorrect, then the axis remains stationary. Fault 508 (zero mark monitoring, motor measuring system) is signaled. **Note:** This monitoring is only activated if P1051/1000*P1005/360 can either be divided by 16 or by 10.					
1052	DM reference mark distance for distance–coded measuring scales (from SW 4.1)	0	20 000	4294967295	µm	PO
	...specifies the basic distance between two fixed reference marks. If the control detects that the distance between each two reference marks is different and therefore incorrect, then the axis remains stationary. Fault 514 (zero mark monitoring, direct measuring system) is signaled. **Note:** This monitoring is only activated if P1052/P1034*1000 can either be divided by 16 or by 10.					
1053	DM reference mark distance for distance–coded rotary encoders (from SW 4.1)	0	20 000	4294967295	mdegrees	PO
	...specifies the basic distance between two fixed reference marks. If the control detects that the distance between each two reference marks is different and therefore incorrect, then the axis remains stationary. Fault 514 (zero mark monitoring, direct measuring system) is signaled. **Note:** This monitoring is only activated if P1053/1000*P1007/360 can either be divided by 16 or by 10.					
1054	IM difference for distance–coded rotary encoders (from SW 8.3)	0 0	20 20	450 000 500 000	mdegrees µm	PO
	...specifies the distance between two reference marks for distance–coded encoders, indirect measuring system (motor measuring system).					
1055	DM difference for distance–coded rotary encoders (from SW 8.3)	0 0	20 20	450 000 500 000	mdegrees µm	PO
	...specifies the distance between two reference marks for distance–coded encoders, direct measuring system.					

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6.2.9 Jogging operation

Description

Closed–loop speed controlled traversing is made possible when jogging in the ”positioning” mode. Jogging is executed using the input signal ”Jogging 1, 2 ON” .

Changing over into the jogging mode

The jogging mode can be selected using the input signal ”jogging incremental” (refer to Fig. 6-22):

- Jogging via velocity (standard)
- Jogging via velocity and increments (from SW 4.1)

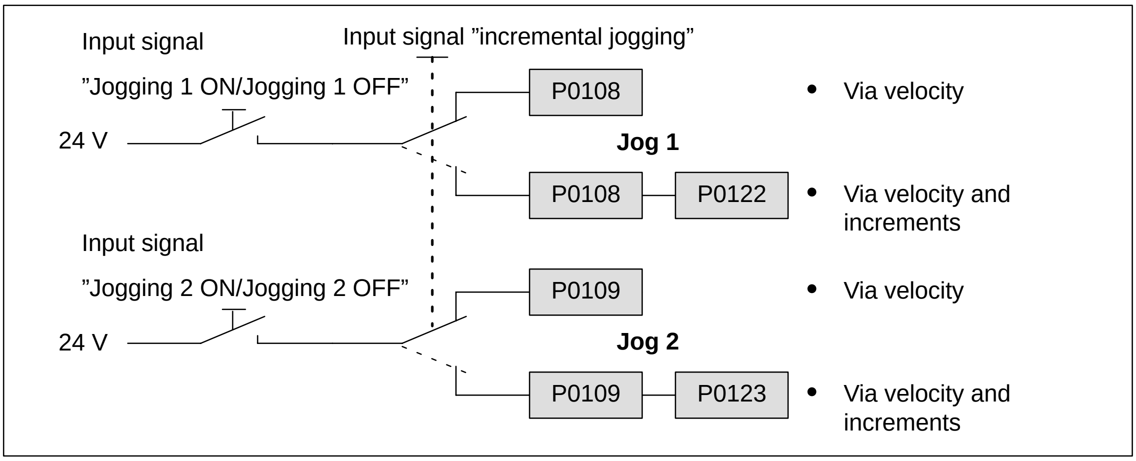

Fig. 6-22 Jogging: Via velocity or incrementally

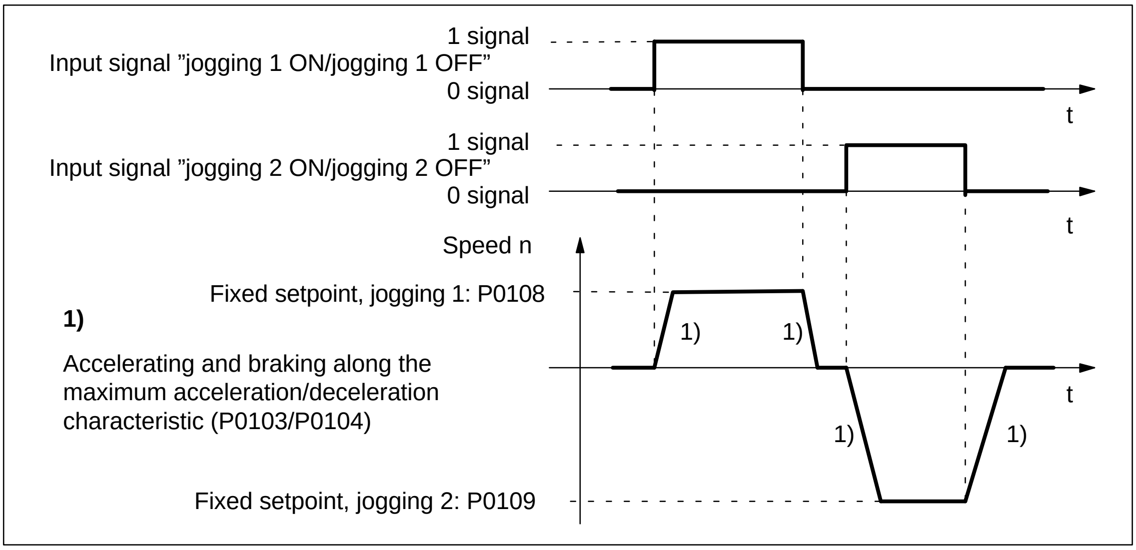

Fig. 6-23 Accelerating and braking when jogging

Note

The following is valid when jogging:

- The traversing direction is defined by the sign of P0108 or P0109.
- When the jogging signal is withdrawn, the axis comes to an immediate stop and, at the next ”1” signal is re–started with the same task.
- It is not possible to continue after incremental jogging has been interrupted.
- The software limit switches are effective if they have been activated and set for this axis, and the axis has been referenced. Contrary to operation in the positioning mode, the axis only starts to brake when the software limit switch is reached. The travel beyond the software limit switch depends on the active velocity setpoint for jogging 1/2 (P0108/P0109, override) and the selected maximum deceleration (P0104).
- The override is effective.
- If input signals for jogging 1 and 2 are simultaneously available, then an appropriate fault is signaled.
- If the position reference value is inverted (P0231, P0232), then the direction of rotation also changes in the jogging mode.
- For speed–controlled jogging, the drive is in the tracking status. In this case, the velocity setpoint and actual value are formed from the speed controller.

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Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”jogging mode” function:

- P0108 Velocity setpoint, jogging 1
- P0109 Velocity setpoint, jogging 2
- P0122 Jogging 1, increments (from SW 4.1)
- P0123 Jogging 2, increments (from SW 4.1)

Input signals (refer to Chapter 6.4)

The following signals are available for the ”jogging mode” function:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  – Input signal ”jogging 1 ON/jogging 1 OFF”
    —> using an input terminal with function number 62
    —> via PROFIBUS control signal ”STW1.8”
  – Input signal ”jogging 2 ON/jogging 2 OFF”
    —> using an input terminal with function number 63
    —> via PROFIBUS control signal ”STW1.9”
  – Input signal, ”incremental jogging ” (from SW 4.1)
    —> using an input terminal with function number 61
    —> via the PROFIBUS control signal ”PosStw.5”

6.2.10 Programming traversing blocks

Overview

A maximum of 64 traversing blocks can be programmed. The information associated with each block is listed in the following table:

Table 6-36 Overview of the traversing blocks

<table>
<tr><th colspan="3">Block memory...</th><th>Description</th><th colspan="2">Memory</th></tr>
<tr><td>80:0</td><td>80:1</td><td>...</td><td>Block number
A traversing block must be assigned a block number between 0 and 63, so that it becomes valid and can be started.</td><td>...</td><td>80:63</td></tr>
<tr><td>81:0</td><td>81:1</td><td>...</td><td>Item
Specifies the target position in the block to be approached.</td><td>...</td><td>81:63</td></tr>
<tr><td>82:0</td><td>82:1</td><td>...</td><td>Velocity
Specifies the velocity with which the target position is approached.</td><td>...</td><td>82:63</td></tr>
<tr><td>83:0</td><td>83:1</td><td>...</td><td>Acceleration override
This allows the acceleration to be influenced, referred to P0103.</td><td>...</td><td>83:63</td></tr>
<tr><td>84:0</td><td>84:1</td><td>...</td><td>Deceleration override
This allows the deceleration to be influenced, referred to P0104.</td><td>...</td><td>84:63</td></tr>
<tr><td>85:0</td><td>85:1</td><td>...</td><td>Command
Each traversing block must contain a command (refer to Table 6-37).
1 POSITIONING (Standard)
+: Block number, position, velocity,
Acceleration override, deceleration override, mode
2/3 ENDLESS TRAVERSING_POS/ENDLESS TRAVERSING_NEG
+: Block number, velocity,
Acceleration override, deceleration override, mode
4 WAIT
+: Block number, delay time in the ”command parameter”, mode
5 GOTO
+: Block no., target block no. in the ”command parameter”, mode
6/7 SET_O/RESET_O
+: Block number, output No. in the ”command parameter”, mode
8 FIXED ENDSTOP (from SW 3.3)
+: Block number, position, velocity,
Acceleration override, deceleration override,
Value range and units for clamping torque/clamping force in the ”Command parameter”, mode
9/10 COUPLING_IN/COUPLING_OUT (from SW 3.3)
+: Block number, mode</td><td>...</td><td>85:63</td></tr>
<tr><td>86:0</td><td>86:1</td><td>...</td><td>Command parameters
Additionally required information to execute the command is specified here.</td><td>...</td><td>86:63</td></tr>
</table>

Table 6-36 Overview of the traversing blocks, continued

Block memory...			**Description**	**Description**			**Memory**	
			Mode					
			Spindle positioning (from SW 5.1)	Block change enable	Positioning mode	IDs		
87:0	87:1	...	**X**xxx Target position via 0: Traversing block running 1: PROFIBUS	x**X**xx 0: END (standard) 1: CONTINUE WITH STOP 2: CONTINUE FLYING 3: CONTINUE EXTERNAL	xx**X**x 0: ABSOLUTE (standard) 1: RELATIVE 2: ABS_POS 3: ABS_NEG	xxx**X** 1: SKIP_ BLOCK	...	87:63

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Command–dependent block information

The minimum block information which has to be made in a traversing block with this command, is specified in the following table, for each command.

Table 6-37 Command–dependent block information

Block information		Command–dependent block information which is required									
Block number	P0080:64	x	x	x	x	x	x	x	x	x	x
Item	P0081:64	x	–	–	–	–	–	–	x	–	–
Velocity	P0082:64	x	x	x	–	–	–	–	x	–	–
Acceleration override	P0083:64	x	x	x	–	–	–	–	x	–	–
Deceleration override	P0084:64	x	x	x	–	–	–	–	x	–	–
Command	P0085:64	POSITIONING	ENDLESS TRAVERSING_POS	ENDLESS TRAVERSING_NEG	WAITING	GOTO	SET_O	RESET_O	FIXED ENDSTOP (from SW 3.3)	COUPLING_IN (from SW 3.3)	COUPLING_OUT (from SW 3.3)
Command parameters	P0086:64	–	–	–	x	x	x	x	x	–	–
Mode	P0087:64										
• IDs											
– SKIP BLOCK		+	+	+	+	+	+	+	+	+	+
• Positioning mode 1)											
– ABSOLUTE		x	–	–	–	–	–	–	x	–	–
– RELATIVE		x	–	–	–	–	–	–	x	–	–
– ABS_POS (from SW 2.4) 2)		x	–	–	–	–	–	–	x	–	–
– ABS_NEG (from SW 2.4) 2)		x	–	–	–	–	–	–	x	–	–
• Block change enable 1)											
– END		x	x	x	x	–	x	x	x	x	x
– CONTINUE WITH STOP		x	–	–	x	–	x	x	x	x	x
– CONTINUE FLYING		x	–	–	–	–	x	x	x	–	–
– CONTINUE EXTERNAL (from SW 3.1)		x	x	x	x	–	–	–	–	x	–

Note:

- 1) Only 1 info can be alternatively specified
- 2) Only possible for rotary axis with modulo correction
- x: This information **must** be specified for this command
- +: This information **can** be specified
- –: This information is **not relevant**

Note

Input errors when entering block information are displayed using the appropriate error messages, for all traversing blocks after a traversing block has started.

Parameter overview

All of the parameters, which are used to program traversing blocks, are shown in the following.

Table 6-38 Parameters used to program traversing blocks

No.	Name	Min.	Standard	Max.	Units	Effective
0079	Reformatting the memory	0	0	1	–	Immedi-ately

... the memory for the traversing blocks can be reformatted, i.e. re–assigned.

0 Inactive, initial status

0 –> 1 Memory is being reformatted
When reformatting, increasing block numbers are written into the blocks at the beginning of the memory. Invalid blocks (block number – 1) are at the end of the memory.

Note:

- After reformatting has been completed, the parameter is automatically reset to 0.
- Advantages of a reformatted memory:
  When the blocks are displayed via SimoCom U or via the display unit on the front panel, the blocks are located at the beginning of the memory and are sorted according to increasing block numbers; there are no gaps.

	:0	:1	:2	:3		:63
P0080	–1	20	–1	15	...	–1
P0081	xxx	xxx	xxx	xxx	...	xxx
to	...	...	...	...	...	...
P0088	yyy	yyy	yyy	yyy	...	yyy

before reformatting

	:0	:1	:2	:3		:63
P0080	15	20	–1	–1	...	–1
P0081	xxx	xxx	xxx	xxx	...	xxx
to	...	...	...	...	...	...
P0088	yyy	yyy	yyy	yyy	...	yyy

after reformatting

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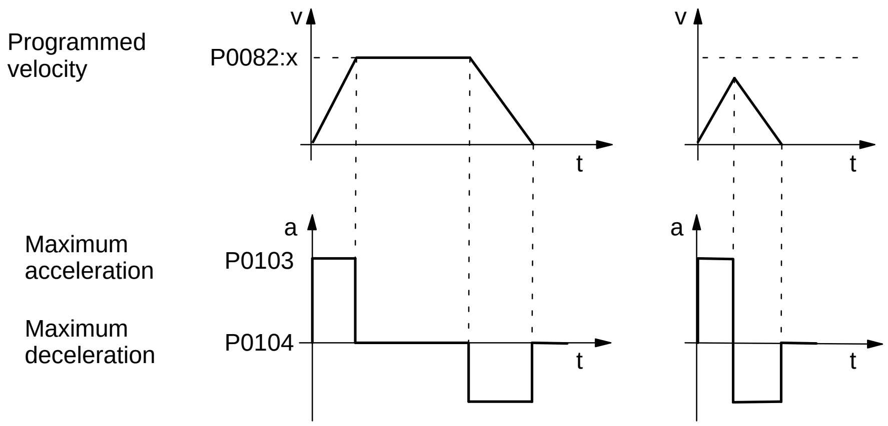
Table 6-38 Parameters used to program traversing blocks, continued

No.	Name	Min.	Standard	Max.	Units	Effective
0080:64	Block number	–1	–1	63	–	PrgE
	A traversing block must be assigned a valid block number so that it can be started. –1 Invalid block number Blocks, with this block number are not taken into account by the program interpreter. 0 to 63 Valid block number **Note:** • The block change enable is saved in the traversing block in P0087:64 (mode – block change enable). There are the following possibilities for the block change enable: – END (standard) – CONTINUE WITH STOP – CONTINUE FLYING – CONTINUE EXTERNAL (from SW 3.1) • Several blocks are processed in an increasing sequence of the block numbers (e.g. for blocks with the block change enable condition CONTINUE FLYING). • The block number must be unique over all traversing blocks otherwise fault 109 (block number available twice) is output when a traversing block is started. • A valid block is ”disabled” by entering the block number ”–1”, i.e. the block information remains saved, unchanged and when this block is re–assigned a valid block number, then the block information becomes visible again. Recommendation: Disable the block with ”suppress block” (skip block) (refer to P0087:64).					
0081:64	Item	–200 000 000	0	200 000 000	MSR	PrgE
	... specifies the target position in the traversing block. **Note:** • The target position is approached depending on P0087:64 (mode – positioning mode). • If, when selecting the traversing block, it is identified that the traversing range has been violated, then an appropriate fault signal is output.					

Table 6-38 Parameters used to program traversing blocks, continued

No.	Name	Min.	Standard	Max.	Units	Effective
0082:64	Velocity	1 000	600 000	2 000 000 000	c*MSR/min	PrgE
	... defines the velocity with which the target position is approached.  Velocity and acceleration profile for "long" or "short" blocks **Note:** • x: Space retainer in the block memory • If the programmed velocity in P0082:64 is greater than in P0102 (maximum velocity), then the axis is limited to the maximum velocity and warning 803 is issued (programmed velocity > maximum velocity). • For short traversing distances, it is possible that the programmed velocity will not be reached.					
0083:64	Acceleration override	1	100	100	%	PrgE
	... specifies which override is effective at the maximum acceleration (P0103). $a_{act} = P0103 \cdot \frac{P0083:x}{100\ \%}$ x: Space retainer in the block memory					
0084:64	Deceleration override	1	100	100	%	PrgE
	... specifies which override is effective at the maximum deceleration (P0104). $a_{brake,\ act} = P0104 \cdot \frac{P0084:x}{100\ \%}$ x: Space retainer in the block memory					

6

Table 6-38 Parameters used to program traversing blocks, continued

No.	Name	Min.	Standard	Max.	Units	Effective
0085:64	Command	1	1	10	–	PrgE

Every traversing block must include precisely one command for execution.

1 **POSITIONING**
Using this command, the axis can be linearly traversed (point to point, PTP).

Note: Other block parameters are still effective (refer to Table 6-37).

2 **ENDLESS TRAVERSING_POS**

3 **ENDLESS TRAVERSING_NEG**
With this command, the axis can be traversed with the velocity specified in the block, up to
– a limit switch is reached
– the motion is interrupted by the input signal ”OC/intermediate stop”
– the motion is interrupted by the input signal ”OC/reject traversing task”

Note: Other block parameters are still effective (refer to Table 6-37).

4 **WAITING**
A delay time, which should expire before the following traversing block is processed, can be defined using this command.
The delay time is specified in the command parameter (P0086:x).

Note:
The command parameter is entered in ms, and is internally and automatically rounded–off to a multiple of the interpolation clock cycle (P1010).

5 **GOTO**
Jumps can be executed within a sequence of traversing blocks using this command.
The jump destination and the block number are specified in the command parameter (P0086:x).

Note:
If the specified block number does not exist, then an appropriate fault is signaled when a traversing block is started.

6 **SET_O**

7 **RESET_O**
An output signal can be set or reset using these commands.

P0086:x (command parameter) is used to specify which output terminal or which status bit is to be controlled.

P0086:x = 1 —> Output with Fct. No. 80 (direct output 1 via traversing block)
P0086:x = 2 —> Output with Fct. No. 81 (direct output 2 via traversing block)
P0086:x = 3 —> Output with Fct. Nos. 80 and 81 are controlled

P0086:x = 1 —> status bit ”direct output 1 via traversing block”
P0086:x = 2 —> status bit ”direct output 2 via traversing block”
P0086:x = 3 —> both status bits are controlled

Note:
The function numbers for the outputs and the PROFIBUS bits are listed in the list of output signals (refer to Chapter 6.4.6) under ”Output signal, direct output 1/2 via traversing block”.

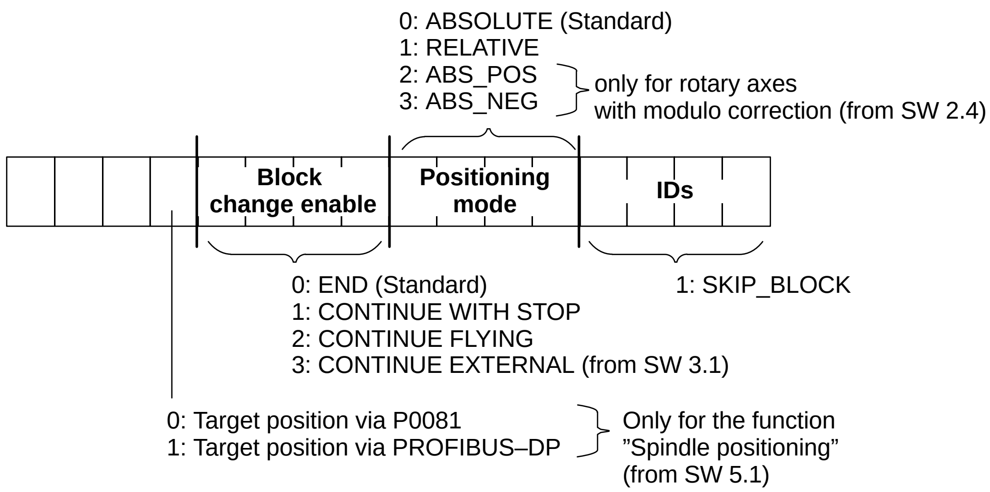
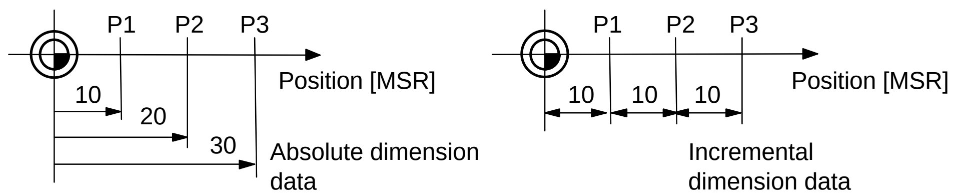
The output signals, influenced using SET_O or RESET_O remain ”frozen”, when a fault develops, when a traversing block is interrupted, or at the end of the program. This means, that the signals are exclusively influenced using the SET_O/RESET_O commands. When starting or exiting the program, the output signals may possibly have to be ”programmed” in an initial status.

Table 6-38 Parameters used to program traversing blocks, continued

No.	Name	Min.	Standard	Max.	Units	Effective
	8 **FIXED ENDSTOP (from SW 3.3)** The ”traverse to fixed endstop” function is activated using this command. **9** **COUPLING_IN (from SW 3.3)** **10** **COUPLING_OUT (from SW 3.3)** Using these commands, the axis coupling that can be switched–in/out can be switched–in/out in the ”positioning” mode. **Note:** The block change enable ”CONTINUE EXTERNAL” can be parameterized in the traversing block ”COUPLING IN”. In the ”COUPLING OUT” traversing block, a fault is output for ”CONTINUE EXTERNAL”.					
0086:64	Command parameters	0	1	65 535	–	PrgE
	... specifies the additional information required for the following commands. Command — Additional information WAITING — Waiting time in ms GOTO — block number SET_O — 1, 2, 3: Set direct output 1, 2 or 3 (both signals) RESET_O — 1, 2, 3: Reset, direct output 1, 2 or 3 (both signals) FIXED ENDSTOP (from SW 3.3) Clamping torque or clamping force Rotary drive: 1 – 65 535 [0.01 Nm] Linear drive: 1 – 65 535 [N] **Note:** The command–dependent required block information is listed in the Table 6-37.					

6

Table 6-38 Parameters used to program traversing blocks, continued

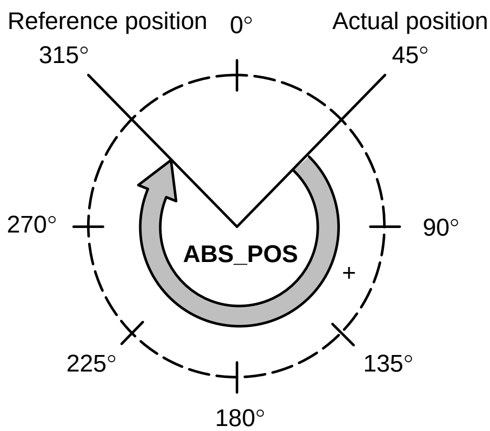
<table>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>0087:64</td><td>Mode</td><td>0</td><td>0</td><td>1331</td><td>hex</td><td>PrgE</td></tr>
<tr><td></td><td colspan="6">... specifies the following additional information for several commands:

</td></tr>
<tr><td>0087:64
xxxX</td><td colspan="6">SKIP_BLOCK ID
A block with the ID SKIP_BLOCK is not processed, and is skipped.</td></tr>
<tr><td>0087:64
xxXx</td><td colspan="6">ABSOLUTE or RELATIVE positioning mode
This data defines whether the program position should be interpreted as being absolute (as coordinate point) or relative (as the distance to be moved).
• ABSOLUTE or RELATIVE for linear axis or rotary axis without modulo correction
– ABSOLUTE:
The axis moves to the specified position and references itself to the axis zero. The software limit switch monitoring is effective.
– RELATIVE:
The axis moves around the specified position in the negative or positive direction and references itself to the last position it approached.
The software limit switch monitoring is effective.


Examples for ABSOLUTE:
Position = +30 Travel to 30
Position = –10 Travel to –10
Examples for RELATIVE:
Position = –10 Travel through 10 negative
Position = +10 Travel through 10 positive</td></tr>
</table>

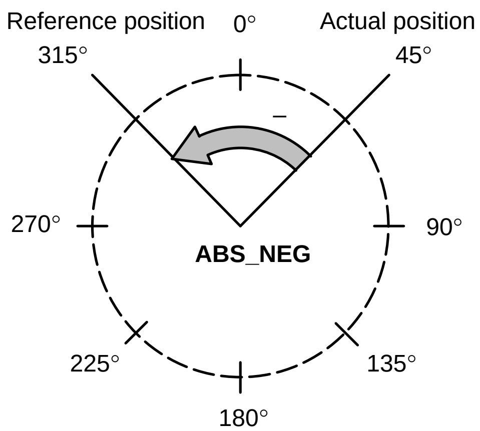
Table 6-38 Parameters used to program traversing blocks, continued

<table>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td></td><td colspan="6">• ABSOLUTE or RELATIVE for rotary axis with modulo correction (from SW 2.4)
– ABSOLUTE:
The axis approaches the program position within the modulo range, and it automatically selects the shortest distance. For the same distance in both directions, the axis moves in the positive direction.
For values with a negative sign or a value outside the modulo range, an appropriate fault is output when a traversing block starts.
– RELATIVE:
The axis traverses through the programmed position in a negative or positive direction and refers itself to the position which was last approached.
The traversing distance can also be greater than the modulo range.</td></tr>
<tr><td>0087:64

xxXx</td><td colspan="6">Positioning mode ABS_POS or ABS_NEG (only rotary axis with modulo correction)
With this information, for a rotary axis with modulo correction (P0241 = 1), the direction of travel is specified along with the reference position.
– ABS_POS (from SW 2.4):
The rotary axis traverses in the positive direction with respect to the reference position within the modulo range.
– ABS_NEG (from SW 2.4):
The rotary axis traverses in the negative direction with respect to the reference position within the modulo range.
Note:
An appropriate fault is signaled when starting a traversing block for values with negative sign or for a value outside the modulo range.



Example:
Positioning mode = ABS_POS
Position = 315
—> traverse to 315° in a pos. direction



Example:
Positioning mode = ABS_NEG
Position = 315
—> traverse to 315° in a neg. direction</td></tr>
<tr><td>0087:64

xXxx</td><td colspan="6">Block change enable END
The block change enable can be used for the following traversing blocks:
• For pure single block operation, i.e. each block must be individually selected and started
• At the last block of a block sequence, i.e. the block identifies the end of the block sequence.</td></tr>
</table>

6

Table 6-38 Parameters used to program traversing blocks, continued

<table>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>0087:64

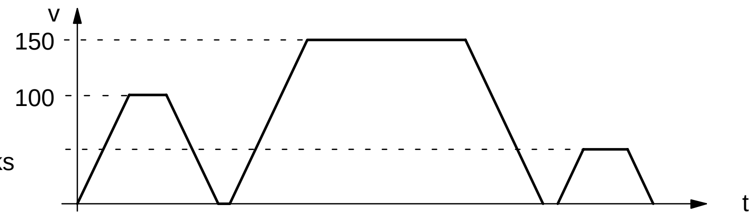
xXxx</td><td colspan="6">

Block change enable CONTINUE WITH STOP
This block change enable has the following properties
(corresponds to ”precise stop G60” acc. to DIN 66025):

- The position programmed in the block is precisely approached
- The axis braked until the positioning window is reached (P0321)
  For P0321=0 or if the following error is less than P0321, the block change is executed as soon as the interpolator has reached its position reference value.
- The block is changed when the positioning window is reached.

Blk	Pos.	Vel.	Command	Pos. mode	Block change enable
0	10	100	POSITIONING	ABSOLUTE	CONTINUE WITH STOP
1	30	150	POSITIONING	RELATIVE	CONTINUE WITH STOP
2	10	50	POSITIONING	RELATIVE	END

Example:
Programming
3 traversing blocks



Note:
For an existing axis coupling (position coupling), the positioning window is not effective for CONTINUE WITH STOP. If this represents a problem in an application when the master drive is stationary, then the PLC would first have to release the coupling and then position the slave drive normally.

</td></tr>
<tr><td>0087:64

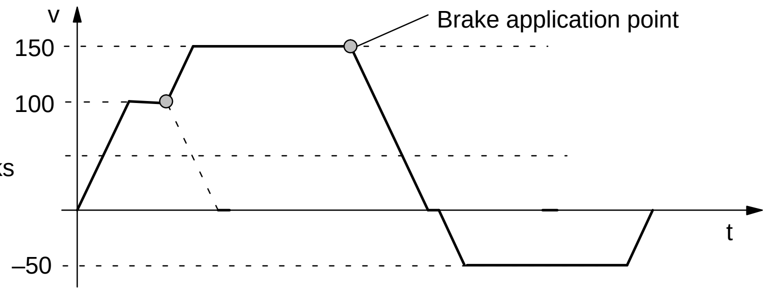
xXxx</td><td colspan="6">

Block change enable CONTINUE FLYING
This block change enable has the following properties
(corresponds to ”precise stop G64” acc. to DIN 66025):

- The following block is immediately processed when the time to apply the brake is reached
- For a direction change, the axis brakes down to standstill and waits until the position actual value has reached the positioning window (this corresponds to the block change enable ”continue with stop”
- If the deceleration override (P0084:64) between the actual block and the block to be changed into on the fly differ, then the flying block change is automatically prevented and instead of this, the CONTINUE WITH STOP block change executed

Blk	Pos.	Vel.	Command	Pos. mode	Block change enable
0	10	100	POSITIONING	ABSOLUTE	CONTINUE FLYING
1	30	150	POSITIONING	ABSOLUTE	CONTINUE FLYING
2	10	50	POSITIONING	ABSOLUTE	END

Example:
Programming
3 traversing blocks



There is a direction of reversal between block 1 and block 2. This is the reason that at the braking instant, the drive brakes from block 1 down to standstill and waits until the position actual value reaches the positioning window. After this, block 2 is executed.
Note:
For traversing blocks whose distance is able to be travelled through within an IPO clock cycle, then the drive brakes briefly.

</td></tr>
</table>

Table 6-38 Parameters used to program traversing blocks, continued

No.	Name	Min.	Standard	Max.	Units	Effective
0087:64 xXxx	**Block change enable CONTINUE EXTERNAL (from SW 3.1)** This block change enable has the following properties: • For a traversing block with the block change enable CONTINUE EXTERNAL, a flying block change is made if an edge of the input signal ”external block change” is identified. If the deceleration override (P0084:64) differs between the current and the block which is to be changed into flying, then a flying block change is made. • When using the commands SET_O and RESET_O, it is not possible to use the block change enable CONTINUE EXTERNAL! • What happens, if...? – The following traversing block is programmed in the RELATIVE positioning mode —> The programmed position refers to the actual value at the instant that the external block change is requested – The braking travel is greater than the distance programmed in the following block —> The axis is held at the parameterized deceleration ramp and then traverses to the target position in the opposite direction. – A different behavior is necessary for ”external block change”? Then the required behavior must be set in P0110: P0110 = 0 (standard) —> If the signal is not available up to the start of braking, then the axis is stopped in front of the target position (dependent on: Acceleration, deceleration, positioning velocity) and fault 109 (external block change not requested in the block) is output. = 1 —> If the signal is not present up to the start of braking, then a flying block change is made (refer to block change enable CONTINUE FLYING). = 2 —> The block is traversed, independent of the signal, to the end. The system only waits for the signal at the end of the block; when the signal is detected, a block change is executed. = 3 (from SW 5.1) —> if the signal is not present up to the end of the block, then the axis waits for the signal and when the signal is identified, a block change is made. **Note:** When P0110 is changed, the change is not accepted after v_set=0, but instead, only after the end of the program when the traversing block is re–started. – The subsequent traversing block is programmed with the WAIT command? After the signal edge has been detected, the position actual value is written into P0026, and the axis is braked down to standstill with the programmed deceleration (P0104 + deceleration override in P0084:64) and then the system waits. The other position data refer to the block change position. – Does the acceleration override (P0083:64) or deceleration override (P0084:64) differ between the actual (current) block and the following block to be changed into? When the ”external block change” input signal is detected, the acceleration or deceleration override of the block, which is now current, becomes valid and is immediately effective. – Was the deceleration changed during the braking ramp when positioning in absolute terms? —> a change is not accepted. Positioning is realized with the previously set braking ramp (P0084 or P0094). **Note:** If P0110 $\geq$ 2, then input terminal I0.x or I0.B may not be used as input, as, for these, the block change can be initiated from different signal edges.					

Table 6-38 Parameters used to program traversing blocks, continued

<table>
<tr><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td></td><td colspan="6">

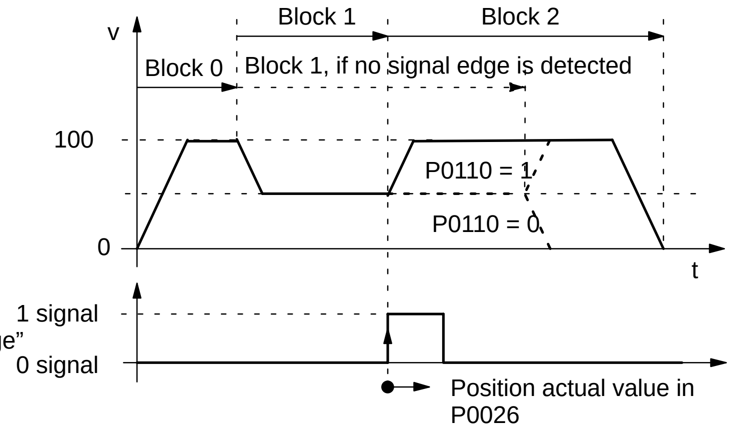
- The position actual value when detecting a signal edge at input signal ”external block change” is written into P0026 (position actual value, external block change).

<table>
<tr><th>Blk</th><th>Pos.</th><th>Vel.</th><th>Command</th><th>Pos. mode</th><th>Block change enable</th></tr>
<tr><td>0</td><td>100</td><td>100</td><td>POSITIONING</td><td>ABSOLUTE</td><td>CONTINUE FLYING</td></tr>
<tr><td>1</td><td>200</td><td>50</td><td>POSITIONING</td><td>ABSOLUTE</td><td>CONTINUE EXTERNAL</td></tr>
<tr><td>2</td><td>300</td><td>100</td><td>POSITIONING</td><td>ABSOLUTE</td><td>END</td></tr>
</table>

Example:
Programming
3 traversing blocks

Block 1 with
CONTINUE
EXTERNAL

Input signal
”external block change”



Note:
Refer under the index entry ”Input signal – external block change”.
</td></tr>
<tr><td>0087:64

Xxxx</td><td colspan="6">

Spindle positioning (from SW 5.1)

For the ”Spindle positioning” function, the target position is programmed in P0081 or transferred via PROFIBUS–DP.

Note:
Refer under the index entry ”Spindle positioning”
</td></tr>
</table>

6.2.11 Starting, interrupting and exiting traversing blocks

Overview

The following input/output signals are available for traversing blocks:

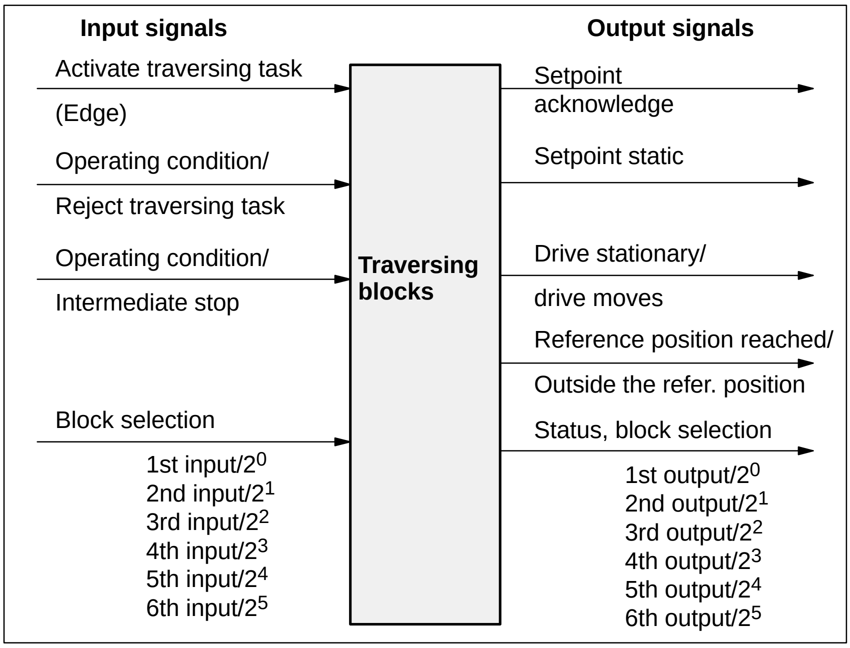


Fig. 6-24 Input/output signals for traversing blocks

Note

- Prerequisite for ”activate traversing task”:
  - All of the enable signals are set and the controlled drive is in the controller enable status (refer to Chapter 5.5, Fig. 5-8).
  - Previous jog operation must have been fully completed – this means that the output signal ”tracking operation active” must be 0 (Fct. No. 70 or PosZsw.0).
- When starting blocks, there must be at least 3 IPO clock cycles between the signal ”activate traversing task” and the motion being interrupted via ”OC/reject traversing task” or ”OC/intermediate stop”. This applies both for operation using PROFIBUS–DP as well as when using terminals.

Reader’s note

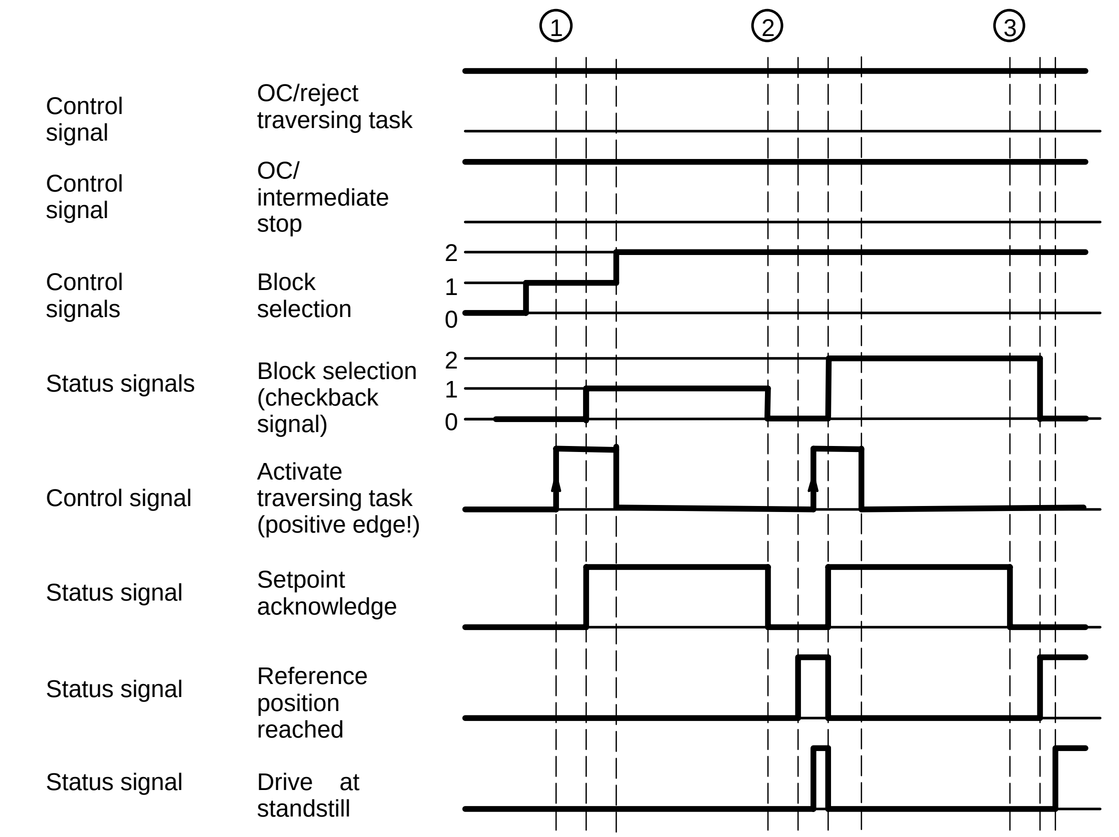
Generally, input/output signals are used in the following.

The following is true when viewed from ”SIMODRIVE 611 universal”:

- for input signals:
  - when entered via terminals –> input terminal signals
  - when entered via PROFIBUS–DP –> control signals
- for output signals:
  - if output via terminals –> output terminal signals
  - if output via PROFIBUS–DP –> status signals

Example: Sequential start of individual blocks

In this case, a new traversing block is only started if the previous block had been completed, i.e. the drive has reached the reference position.



1 Selecting and starting the first traversing block
—> selected via ”block selection”
—> edge of ”activate traversing task” —> ”setpoint acknowledgment” is set to a ”1” signal.

2 End of the first positioning operation,
—> ”setpoint acknowledgment” is reset
—> ”reference position reached” is set if the actual position is within the defined window
—> ”drive stationary” is set, if the speed is less than the speed limit for ”drive stationary”
The second traversing block is started

3 End of the second positioning operation

Fig. 6-25 Sequentially starting individual blocks

Note

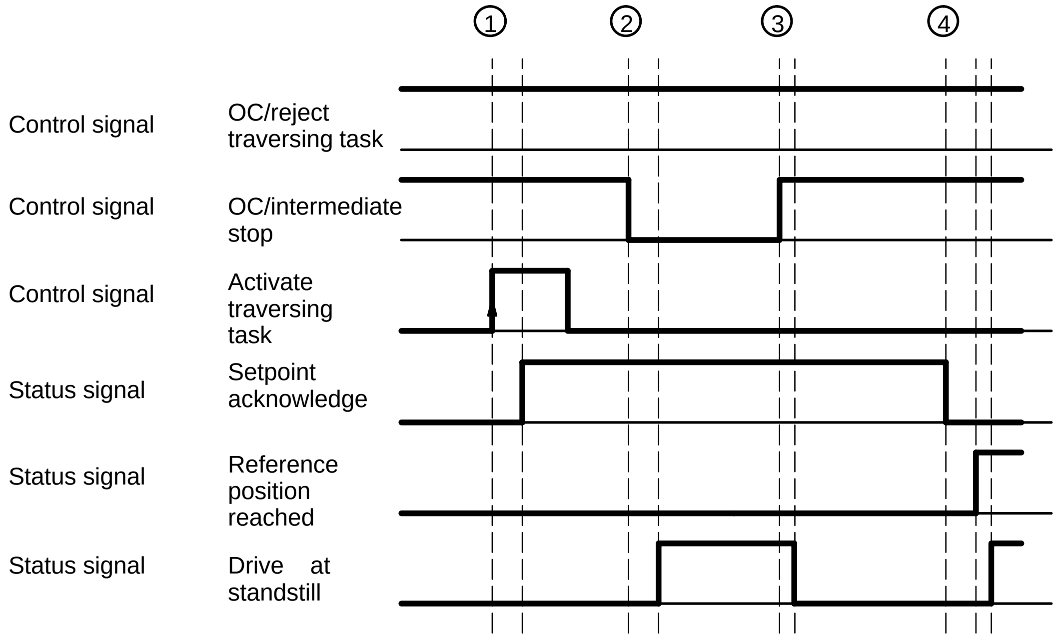
The selection and the status of the block selection are not binary–coded, but represented, simplified as value.

Intermediate stop

A traversing block can be interrupted using the ”operating condition/intermediate stop” control signal.

Features:

- A block which has been interrupted with ”intermediate stop” can then be continued.
- An axis in ”intermediate stop” can be traversed in the jog mode or referencing can be started. The interrupted traversing block is exited.
- If a traversing block is interrupted using the ”wait” command with ”Intermediate stop”, then the delay (waiting) time is stopped.



1 Selecting and starting the traversing block

2 Interrupting the traversing block
—> ”operating condition/intermediate stop” is reset
—> the axis is braked using the parameterized deceleration and ”drive stationary” signaled if the limit speed for standstill is fallen below

The ”setpoint acknowledgement” and ”reference position reached” signals are not influenced by an intermediate stop.

3 Continuing the traversing block
—> ”operating condition/intermediate stop” is set
—> the interrupted traversing block is continued and ”drive stationary” reset, if the speed limit for standstill is exceeded

4 End of positioning

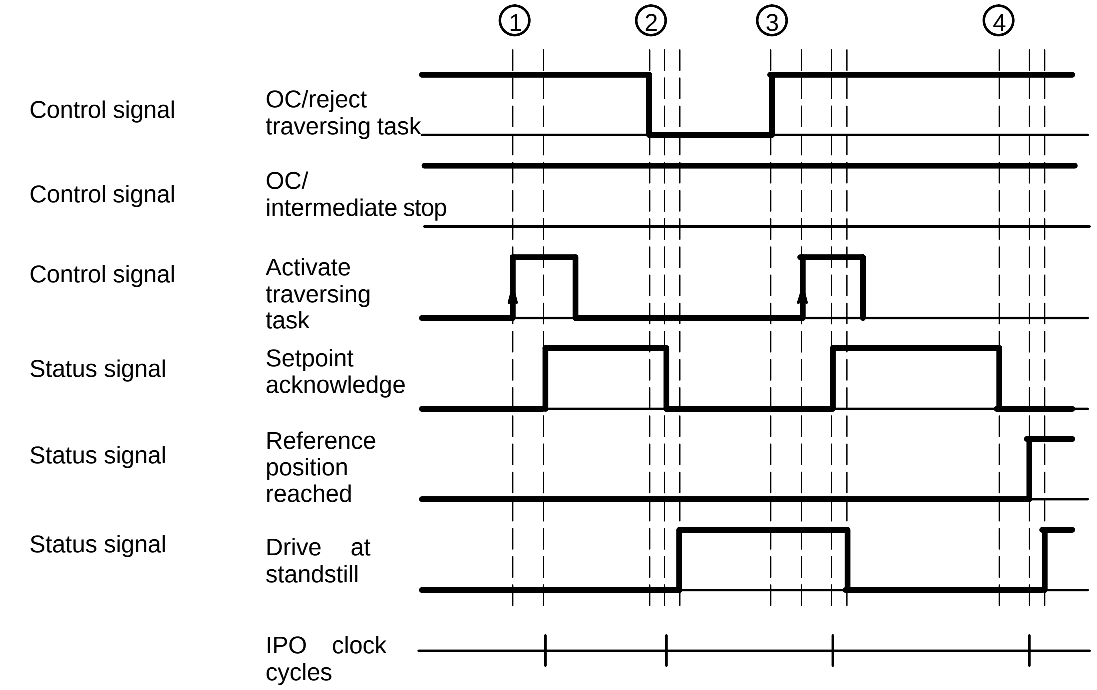
Fig. 6-26 Characteristics of an intermediate stop of a traversing block

Reject traversing task

A traversing block can be interrupted using the ”OC reject/traversing task” control signal.

Features:

- A block, interrupted with ”reject traversing task” can no longer be continued.
- A ”delete distance to go” is executed.
- It is also possible for a block with intermediate stop.



1 Selecting and starting the traversing block

2 Interrupting the traversing block using ”reject traversing task”
—> ”operating condition/reject traversing task” is reset
—> ”setpoint acknowledgement” is reset
—> the axis is braked down to standstill with the maximum deceleration and ”drive stationary” signaled if the speed limit for standstill is fallen below.

”Reference position reached” is not set.

3 Selecting and starting an additional (or the same) traversing block

4 End of positioning

Fig. 6-27 Characteristics when aborting a traversing block

Diagnostics: Image of the actual traversing block (refer to Chapter A.1)

Information about the traversing block presently being processed can be read from the following parameters:

- P0001 Actual traversing block – block number
- P0002 Actual traversing block – position
- P0003 Actual traversing block – velocity
- P0004 Actual traversing block – acceleration override
- P0005 Actual traversing block – deceleration override
- P0006 Actual traversing block – command
- P0007 Actual traversing block – command parameter
- P0008 Actual traversing block – mode

6

6.2.12 MDI operation (from SW 7.1)

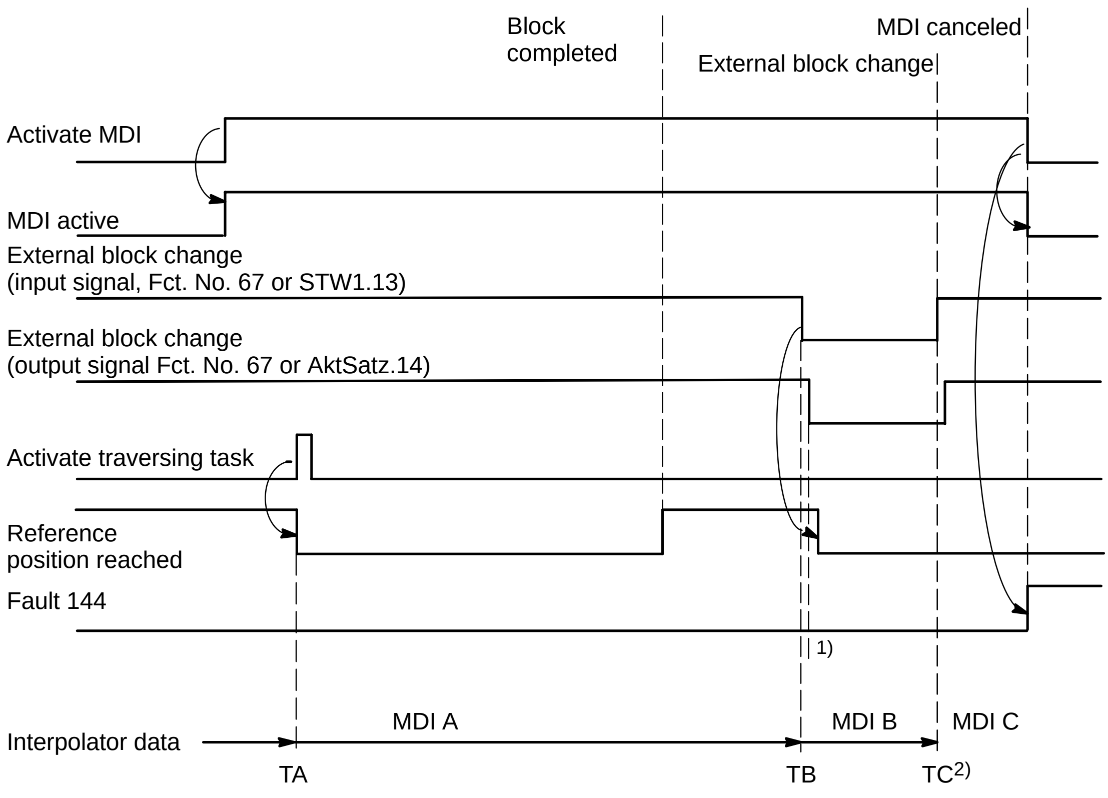
Description

Using the ”MDI operation” function and when in the ”positioning” mode it is possible to change the parameters of the MDI block (e.g. reference position, velocity, etc.) via process data and PROFIBUS–DP and/or via parameters (P0091 to P0094, P0097) while this is executed. If, for this particular block, the block change enable CONTINUE EXTERNAL is parameterized, then the changes which were made can be immediately activated with the signal to change the block. This means that the changes are accepted in the interpolator. For the block change enable END, the changes only become effective when this traversing block is re–started in the interpolator.

In this MDI block, only RELATIVE, ABSOLUTE positioning operations can be executed and for rotary axes with modulo correction, in addition, ABS_POS and ABS_NEG.

In this case, only END or CONTINUE EXTERNAL with P0110=2 or 3 are permissible as block change enable condition.

Signal timing MDI



1) For the earliest possible instant in time to enter new block parameters (PZD and/or default block), refer to Table 6-49 output signal function No. 67.

2) A new positioning operation is started without the MDI end position having been reached.

Fig. 6-28 Control and status signals for MDI

The data available in the block parameters (PZD and/or default block) at instant in time TA is transferred into the interpolator and processed. This data (MDI A) remains valid up to instant in time TB when new data is transferred into the interpolator. In turn, these (MDI B) remain valid until new data is transferred (TC/MDI C).

Note

The following applies for the MDI mode:

- MDI is switched–in using the ”activate MDI” signal via terminal (Fct.–No. 83) or PROFIBUS (SatzAnw.15). The ”MDI active” signal is used for the feedback signal which is either transferred via terminal (Fct. No. 83) or PROFIBUS (AktSatz.15). A traversing block can be entered using process data (MDIPos, MDIVel, MDIAcc, MDIDec, MDIMode) via PROFIBUS–DP and started using the signal ”activate traversing task”.
- If either no MDI block or only individual block parameters are entered via PROFIBUS–DP, then the missing parameters are taken from the MDI default block (P0091 to P0094, P0097). However, if MDI process data are parameterized in P0915:17 and these are also transferred via PROFIBUS–DP, then the values in parameters P0091 to P0094 and P0097 are not taken into account.
- If CONTINUE EXTERNAL is parameterized as block change enable, then actual block parameters of the MDI block (entered via PZDs and/or MDI default block) are immediately transferred into the interpolator with the signal ”external block change”.
- For an MDI block, the block change enable signals CONTINUE WITH STOP and CONTINUE FLYING, are not possible. The block change enable CONTINUE EXTERNAL is only permissible with P0110=2 or 3 (configuration of an external block change).
- If the signal ”Activate MDI” is set to 0 while an MDI block is still running, then fault 144 is initiated. This means that MDI operation can only be disabled after the target position has been reached.
- The signals ”operating condition/reject traversing task” and ”operating condition/intermediate stop” are effective just the same as in the normal ”positioning” operating mode.
  The monitoring functions, e.g. software and hardware switches are also active.

MDI positioning block

The MDI block is a positioning block which can contain the following data:

Position	input MSR
Velocity	input c • MSR/min
Acceleration override	percentage of P0103
Deceleration override	percentage of P0104
Mode	ID x0x = ABSOLUTE x1x = RELATIVE x2x = ABS_POS x3x = ABS_NEG 0xx = END 3xx = CONTINUE EXTERNAL

The block parameters entered using PZDs via PROFIBUS–DP, are cyclically transferred. The block parameters which do not exist here, are supplemented by the data from the default block (P0091 to P0094, P0097). The parameters, valid up to when the traversing task is activated or the external block change, are then transferred into the interpolator and executed. This means, for example, that it may be sufficient to just enter the position reference value using PZD and to use the remaining data (velocity, acceleration override, etc.) from the default block.

MDI and external block change

If CONTINUE EXTERNAL block change enable is parameterized in the MDI block then the transfer of the ”possibly modified” block parameter into the running or ”waiting” MDI block is triggered using the ”external block change” signal. P0110 defines when the values become effective i.e. when they are transferred into the interpolator:

- P0110 = 2

  The system only waits for the signal at the end of the block; when the signal is detected, a block change is executed.

- P0110 = 3

  If the signal is not present up to the end of the block, then the axis waits for the signal and when this is detected, a block change is made. (from SW 5.1).

For the MDI function, only the configuration P0110 = 2 or 3 is permitted.

Note

If the deceleration was changed during the braking ramp with absolute positioning, then this is not accepted. Positioning is realized with the previously set braking ramp (P0084 or P0094).

MDI block influence

The input signal ”reject traversing task” deletes the programmed MDI block.

The input signal ”intermediate stop” holds the MDI block.

Limitations/secondary conditions

- There is only one MDI block.
- The reference point must be approached or set, also for incremental MDI blocks.
- The MDI block can be entered via PROFIBUS–DP or the default block (P0091 to P0094, P0097). A combination is also possible. This means, for example, the position is entered via PROFIBUS and the remaining block parameters are taken from the default block.
- The interpolator requires 2 IPO clock cycles for a block change.
- If the transfer of modified block parameters is initiated using the ”external block change” signal while the MDI block is interrupted with an intermediate stop – then after the intermediate stop is withdrawn, the modified block is executed.
- For MDI blocks where the programmed position can no longer be reached in the specified direction of rotation, initially the axis is braked down to standstill and is then moved to the target position in the opposite direction.
- If relative positioning (incremental dimension) is parameterized for an MDI block, then for a CONTINUE EXTERNAL block change enable positioning is re–started from the current actual position with ”external block change”.
- The clock cycles (current controller, speed controller, positioning controller and interpolation clock cycle) are, for ”SIMODRIVE 611 universal” set as standard and must be increased for a double–axis module for two–axis operation (P1000, P1001, P1009, P1010).
- If, for an MDI block, the deceleration override (STW MDIDec or P0094) is reduced too much, then fault 131 is output. However, for absolute positioning, this only applies if the braking ramp has still not started.
- If, for an MDI block, a block change is initiated, and the new target position does not differ from the previous target position, then the ”reference position reached” output signal is not reset.

6

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”MDI” function:

- P0091 MDI position
- P0092 MDI velocity
- P0093 MDI acceleration override
- P0094 MDI deceleration override
- P0097 MDI mode
- P0110 Configuration, external block change
- P0655 Image, input signals, Part 3
- P0657 Image, output signals, Part 2
- P0915:17 PZD setpoint assignment, PROFIBUS
- P0916:17 PZD actual value assignment, PROFIBUS
- P0922 Telegram selection PROFIBUS

The MDI traversing block, transferred using the MDI telegram can be read, as before, using parameters P0001 to P0008.

Input/output signals (refer to Section 6.4)

The following signals are used for the ”MDI” function:

- Input signals
  (refer under the index entry ”Input signal, digital – ...)
  - Input signal ”activate MDI”

    —> using an input terminal with function number 83

    —> using the PROFIBUS control signal ”SatzAnw.15”
  - Input signal ”external block change”
    (declares the MDI block valid)

    —> using an input terminal with function number 67

    —> using PROFIBUS control signal ”STW1.13”
  - Input signal ”operating condition/reject traversing task (deletes the programmed MDI block)

    —> using an input terminal with function number 58

    —> using the PROFIBUS control signal ”STW1.4”
  - Input signal ”operating condition/intermediate stop”
    (holds the MDI block)

    —> using an input terminal with function number 59

    —> using the PROFIBUS control signal ”STW1.5”
- Output signals
  (refer under the index entry, ”output signal, digital – ...)

  The output signals are only effective when ”Activate MDI” is selected.
  - Output signal ”MDI active”

    —> using an output terminal with function number 83

    —> using the PROFIBUS status signal ”AktSatz.15”
  - Output signal ”external block change” (this is an image of the input signal ”external block change”)

    —> using an output terminal with function number 67

    —> using the PROFIBUS status signal ”AktSatz14”

6.3 Axis couplings (from SW 3.3)

General information

”SIMODRIVE 611 universal” allows drives to be coupled via PROFIBUS–DP or via terminals.

The main applications include:

- Position reference value and position actual value coupling (”synchronous operation”)

  —> Refer to Chapter 6.3.1

- Torque setpoint coupling (”master/slave operation”)

  —> Refer to Chapter 6.3.3

Coupling via PROFIBUS–DP

Communications is realized using PROFIBUS–DP slave–to–slave communications. One or several slaves (drives) are operated as publishers, i.e. they not only provide their actual values to the DP master, but also to other slaves (subscribers) per broadcast.

Configuring defines which subscribers accept which data as setpoints from which publisher.

From the perspective of the coupling, the master drive is a publisher and a slave drive is a subscriber.

Coupling via terminals

The coupling is realized for a

- Position actual value coupling via the angular incremental encoder interface (X461/X462) where the direction can be changed–over. Up to 31 angular incremental encoder inputs can be connected at angular incremental encoder output. The terminating resistor should be switched–in at the last device (node) (S1.7 and S1.8).
- Torque coupling via analog inputs (X441/X442) or analog outputs (X451/X452).

6.3.1 Position reference value and position actual value coupling

”SIMODRIVE 611 universal” as master drive

The master drive must output process data via PROFIBUS–DP which the slave drive can use as position reference value. The following process data is available:

- XsollP (position reference value, number 50208)
- XistP (position actual value, number 50206)

Depending on the actual requirements, it is possible/necessary to output additional process data.

Beyond the output of these signals, the master drive is parameterized as a conventional positioning drive (”Positioning” mode, P0700 = 3).

”SIMODRIVE 611 universal” assumes that when the position reference value XsollP is output via PROFIBUS–DP, that it is being used as master drive. In order that the master and slave drive simultaneously process the position reference values, the master drive correspondingly delays transferring data to its own position controller. If the position reference value is only to be output for diagnostic purposes, then the delay can be disabled using P1004.9 = 0.

”SIMODRIVE 611 universal” as master drive, angular increm. encoder interface

The angular incremental encoder interface (X461/X462) is set as output with P0890 = 1. This means that the incremental position actual value of the motor encoder or a direct measuring system is output (refer to Chapter 6.8.1).

”SIMODRIVE 611 universal” as slave drive

An interface for an external position reference value is available in the ”positioning” mode (P0700 = 3).

Possible signal sources include:

- PROFIBUS–DP
- Angular incremental encoder interface (X461/X462, switched as input)
- Internal coupling in the double axis module

The external position reference value is entered via PROFIBUS–DP with the following process data

- Xext (external position reference value, number 50207)

Depending on the actual requirements, it is possible/necessary to output additional process data.

The normalization of the process data XsollP, XistP (master drive) or Xext (slave drive) can be parameterized using a numerator/denominator pair This means that not only is a coupling possible between ”SIMODRIVE 611 universal” drives, but also with other bus nodes (DP master or DP slave).

When the interface is switched–in, the drive responds to absolute position reference values which are entered via the angular incremental encoder interface, switched as input, or PROFIBUS–DP. In addition, traversing blocks can be executed, which result in superimposed motion.

When the interface is switched–out, the drive can execute, as usual, autonomous movements via traversing blocks.

The position reference value interface can be switched–in/switched–out via an input signal (PROFIBUS–DP or terminal) or via a traversing block.

The following possibilities are available to reference incremental position measuring systems:

- When the interface is switched–out, the drive can be individually referenced as usual (refer to Chapter 6.2.4).
- When the interface is switched–in, the drive follows the reference motion of the master drive via the ”passive referencing” function (from SW 5.1).

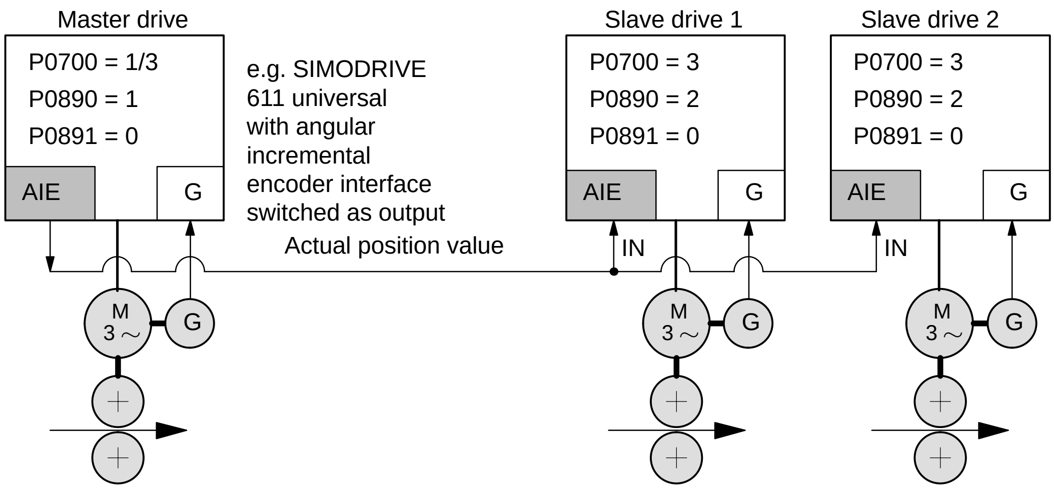
Table 6-39 Overview: Position reference value interface

Features	Description
Can be switched–in/out	• Activated via input signal ”activate coupling” and ”activate coupling via I0.x” or PROFIBUS bit PosStw.4 P0410 = 1 Speed–synchronous P0410 = 2 Position–synchronous P0410 = 7 To the absolute position of the master drive from + P0412 (from SW 4.1) • via a traversing block with the COUPLING_IN or COUPLING_OUT command P0410 = 3 Speed–synchronous P0410 = 4 Position–synchronous P0410 = 8 To the absolute position of the master drive from + P0412 (from SW 4.1) • via the traversing block with the COUPLING_IN or COUPLING_OUT command and queue functionality (being prepared) P0410 = 5 Speed–synchronous P0410 = 6 Position synchronous + P0412
Superimposed motion	Yes, via traversing blocks with the coupling switched–in
Autonomous motion	Yes, via traversing blocks with the coupling switched–out
Possible position reference value source	• Angular incremental encoder interface switched as input • Drive A (for an internal coupling) • PROFIBUS–DP master (from SW 4.1) • PROFIBUS–DP slave (slave–to–slave communications) (from SW 4.1)
Parameterize the angular incremental encoder interface as output P0890 = 1 Output pos. actual values	• P0892 Factor, angular incr. enc. pulse no./enc. pulse no. • P0893 Angular incremental encoder zero pulse offset —> Refer to Chapter 6.8.1
Parameterize the angular incremental encoder interface as input P0890 = 2 Receive position reference values	• P0891 Source, external position reference value • P0894 Angular incremental encoder input signal waveform • P0895 External position reference value – No. of increments • P0896 Ext. position reference value – No. of dimension system grids • P0897 Inversion, external position reference value • P0401 Coupling factor, revolutions master drive • P0402 Coupling factor, revolutions slave drive —> Refer to Chapter 6.8.2
Parameterize PROFIBUS interface as input	• P0891 Source, external position reference value • P0895 External position reference value – No. of increments • P0896 Ext. position reference value – No. of dimension system grids • P0897 Inversion, external position reference value • P0898 Modulo range, master drive • P0401 Coupling factor, revolutions master drive • P0402 Coupling factor, revolutions slave drive
Referencing for incremental measuring systems	Required, if autonomous or superimposed motion has to be executed via traversing blocks —> Refer to Chapter 6.2.4
Available in the operating mode	”Positioning” (P0700 = 3)

6

Application possibilities

- Angular incremental encoder interface, switched as input, as position reference value source.



P0700 Operating mode
P0890 Activates the angular incr. enc./encoder interface
P0891 Source, external position reference value

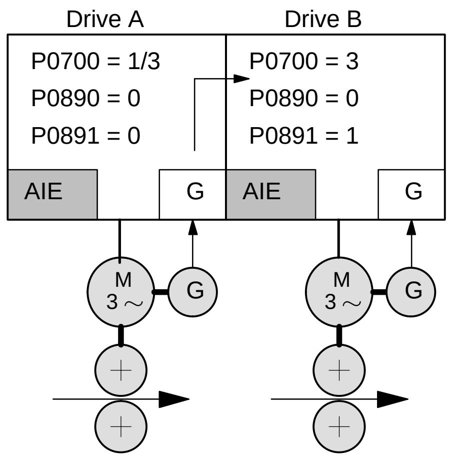
Fig. 6-29 Angular incremental encoder interface as position reference value source

Internal coupling

- For a double–axis module, an internal coupling can be switched–in with drive A as master drive and drive B as slave drive.

Advantage:

For the internal position actual value coupling, the angular incremental encoder interface is not assigned.



P0700 Operating mode
P0890 Activates the angular incr. enc./encoder interface
P0891 Source, external position reference value

Fig. 6-30 Internal position actual value coupling

- DP master as position reference value source.

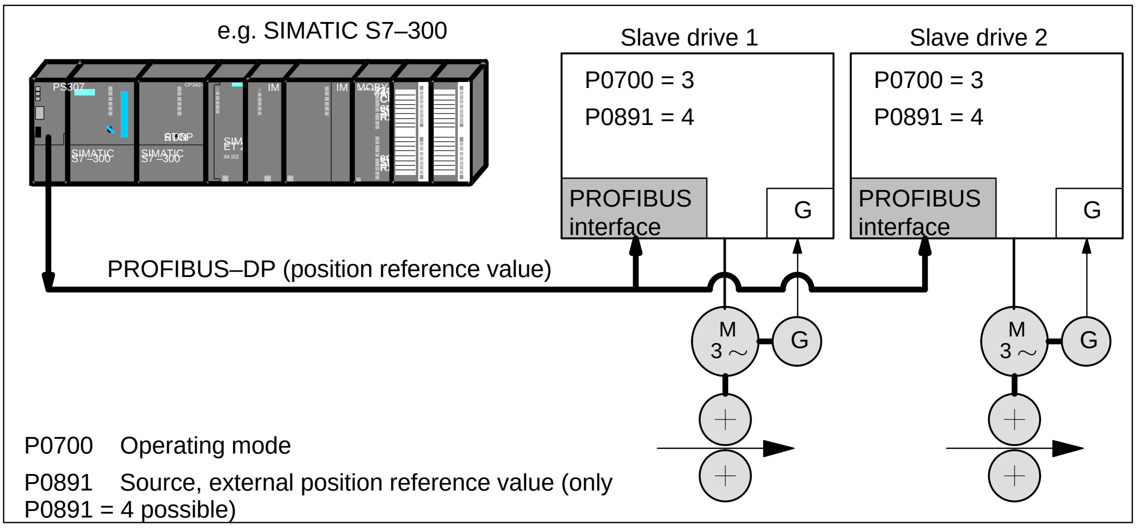


Fig. 6-31 DP master, e.g. SIMATIC S7–300, as source for ”external position reference value ”

- Synchronous coupling between several DP slaves, of which, one must be a master drive.

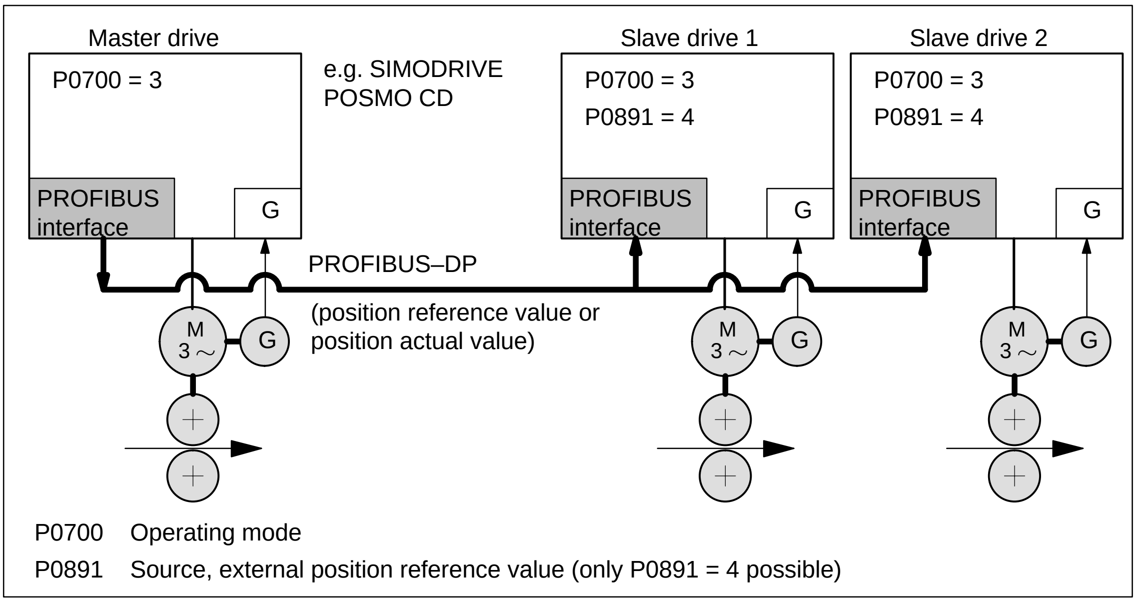


Fig. 6-32 Synchronous coupling between several DP slaves

6

Parameterizing the setpoint source

The external position reference value source is selected using P0891.

- P0891 = 0 Angular incremental encoder interface (X461/X462)
- P0891 = 1 Motor encoder drive A
- P0891 = 2 Position actual value, drive A
- P0891 = 3 Position reference value, drive A
- P0891 = 4 Coupling via PROFIBUS–DP (the telegram must be appropriately parameterized for the master and slave drive sides)

P0891 = 1, 2 or 3 is only possible on drive B for a double–axis module.

PROFIBUS–DP process data and standard telegrams

The following process data is available for the master drive:

- XsollP (position reference value, number 50208)
- XistP (position actual value, number 50206)
- QZsw (status word, slave–to–slave communications, number 50118)
- dXcor (correction, position reference/actual value, number 50210)

The process data XsollP, QZsw and dXcor are included in standard telegram 108.

The following process data are available for the slave drive:

- Xext (external position reference value, number 50207)
- QStw (status word, slave–to–slave communications, number 50117)
- dXcorExt (correction, external position reference value, number 50209)

The process data Xext, QStw and dXcorExt are included in standard telegram 109.

For a position reference value coupling between ”SIMODRIVE 611 universal” drives, we recommend that standard telegram 108 is used for the master drive and standard telegram 109 for the slave drive.

Note

- It is not necessary to transfer dXcor or dXcorExt if, with the coupling switched–in, no external jumps/steps can occur in the external position reference value.
- It is not necessary to transfer QZsw or QStw if, when the coupling is switched–in, no external jumps/steps can occur in the position reference value and the ”passive referencing” function is not required.
- In the example in Chapter 5.10.5 for coupling 2 drives (master, slave drive) a description is provided how the hardware configuration can be parameterized for the necessary slave–to–slave data transfer and with SimoCom U, the telegrams.

Input/output evaluation

Setpoints, entered via the source, are evaluated at the input for the following couplings:

—> via the angular incremental encoder (P0891 = 0 or 1)

—> via PROFIBUS–DP (P0891 = 4)

- Input format (slave drive):
  - Xext (external position reference value, number 50207)
  - dXcorExt (correction, external position reference value, number 50209)

  The following applies: $\text{Position in MSR} = \text{input value} \cdot \dfrac{P0896}{P0895}$

- The output is evaluated —> PROFIBUS–DP
  Output format (master drive):
  - XsollP (position reference value, number 50208)
  - XistP (position actual value, number 50206)
  - dXcor (correction, position reference/actual value, 50210)

  The following applies: $\text{Output value} = \text{position in MSR} \cdot \dfrac{P0884}{P0896}$

  The output value must be able to be represented using 32 bits. This means that the maximum traversing distance that can be represented is:

  $$-2^{31} \frac{P0896}{P0895\ (P0884)} \ \cdots \ (2^{31}-1) \frac{P0896}{P0895\ (P0884)}$$

- The standard settings for PROFIBUS–DP are:
  - P0884 = 10000
  - P0895 = 10000
  - P0896 = 10000 MSR (µm)

  Recommendation: Modify the standard setting as follows to achieve the best possible resolution:
  - P0884 = 2048
  - P0895 = 2048
  - P0896 = 5 MSR (µm)

  For this setting, the resolution is $\dfrac{5}{2048}$ µm
  and the traversing distance that can be represented is ± 5.24 m.

Note

Changes to P0884, P0895 and P0896 are incorporated in P0032 (external position reference value).

Position reference value inversion

The external position reference value can be inverted using P0897.

Note

Changes to P0897 are incorporated in P0032 (external position reference value).

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Coupling factor

A coupling factor for all setpoint sources can be defined using P0401 and P0402. Revolutions of the master drive (P0401) correspond to revolutions of the slave drive (P0402).

Setpoint steps

If steps (jumps) occur in the external position reference value, e.g. after referencing the master drive, this must be signaled to the slave drive so that this does not execute this step

- Coupling via PROFIBUS–DP

  —> QZsw.0 = 1 (publisher) or QStw.0 = 1 (subscriber)

  The amplitude of the step is transferred in dXcor and is received in the dXcorExt.
- Coupling via the angular incremental encoder

  —> not necessary, as it involves an incremental setpoint input
  Exception:
  For P0891 = 7 or 8, it may be necessary to use the signal ”setpoint, master drive” on the slave drive side.

Note

- A ”SIMODRIVE 611 universal” as slave drive also operates with PROFIBUS master drives together which do not support the concept of multiple correction value transfer. The only thing that is necessary, is that, for a setpoint step, the control bit and the correction value are correctly set. In this case, there is a danger, that after the telegram has been lost, a setpoint step occurs.
- The slave drive corrects the setpoint when the 0/1 edge of the control bit is detected.
- If it can be ensured that at the instant that the setpoint step occurs, there is no coupling, then it is not necessary to transfer the step location Xcor.

Coupling configuration (P0410)

The coupling type is configured in the slave drive using P0410.
The following is defined for a coupling via P0410:

- Can be switched–in/switched–out via an input signal or traversing block
- Speed synchronism, position synchronism or to the absolute position of the master drive

—> refer to the following information.

For PROFIBUS–DP, P0410 = 7, i.e. can be switched–in/out via the input signal, coupling is preset to the absolute position.

Coupling–in/out via the input signal (P0410 = 1, 2 or 7)

For P0410 = 1, 2 or 7, the coupling can be switched–in/out via an input signal.

The following applies:

- When switching–in/switching–out the coupling, the drive to be coupled must remain stationary and a traversing program may not run.
- The coupling is switched–in/switched–out using the ”activate coupling” input signal.
  The input signal can be entered via input terminal or via PROFIBUS DP.
  - via an input terminal with function number 72 and 73
  - Via PROFIBUS signal ”PosStw.4”
    What can be programmed for the coupling that is switched–in?
    After the ”activate traversing task” input signal, traversing blocks can be programmed with the commands:
    Relative position input, WAIT, GOTO, SET_O, RESET_O, ENDLESS TRAVERSING_POS, ENDLESS TRAVERSING_NEG
- Additional block change enable circuits are:

  Block change enable END, CONTINUE WITH STOP, CONTINUE FLYING and CONTINUE EXTERNAL (only for P0110 = 2)
- The coupling can be configured for speed synchronism, position synchronism or an absolute position.
  - P0410 = 1 Speed synchronism via input signal
    —> refer to Fig. 6-33
  - P0410 = 2 Position synchronism via input signal
    —> refer to Fig. 6-34
  - P0410 = 7 Absolute position (from SW 4.1)

Note

If a traversing block is parameterized with COUPLING_IN and/or COUPLING_OUT and if the coupling is to be controlled using a digital signal, then when any traversing block is started, fault 166 is always output (not that traversing block with COUPLING_IN or with COUPLING_OUT).

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Coupling–in/out via traversing block (P0410 = 3, 4 or 8)

For P0410 = 3, 4 or 8, the coupling can be switched–in/switched–out via a traversing block.

The following applies:

- The coupling is switched–in/switched–out using the following commands:
  - COUPLING_IN

    What happens after COUPLING_IN?

    The drive waits until synchronism is achieved, and then executes the appropriate block change enable.

    When programmed with CONTINUE FLYING, the command always results in the block change enable CONTINUE WITH STOP.

    What can be programmed for the coupling that is switched–in?

    Traversing blocks can be programmed with the commands: Relative position data, WAIT, GOTO, SET_O,
    RESET_O.
    For ENDLESS TRAVERSING_POS, ENDLESS TRAVERSING_NEG, fault 105 is output.

    For a coupling that is kept closed, the programmed value is switched to the position reference value, received via the angular incremental encoder interface, so that a superimposed motion is obtained.
  - COUPLING_OUT

    What happens after COUPLING_OUT?

    The drive switches–out the coupling, brakes down to standstill, and then executes the programmed block change enable.
- Additional block change enable circuits are:

  Block change enable END, CONTINUE WITH STOP, CONTINUE FLYING and CONTINUE EXTERNAL (only for P0110 = 2)

Note

- For blocks with COUPLING_IN/COUPLING_OUT, a block change enable with CONTINUE FLYING is not possible.
- For blocks with COUPLING_OUT, a block change enable with CONTINUE EXTERNAL is not possible.

- The coupling can be configured for speed synchronism, position synchronism or an absolute position.
  - P0410 = 3 Speed synchronism via traversing block

    —> refer to Fig. 6-33
  - P0410 = 4 Position synchronism via traversing block

    —> refer to Fig. 6-34
  - P0410 = 8 Absolute position (from SW 4.1)

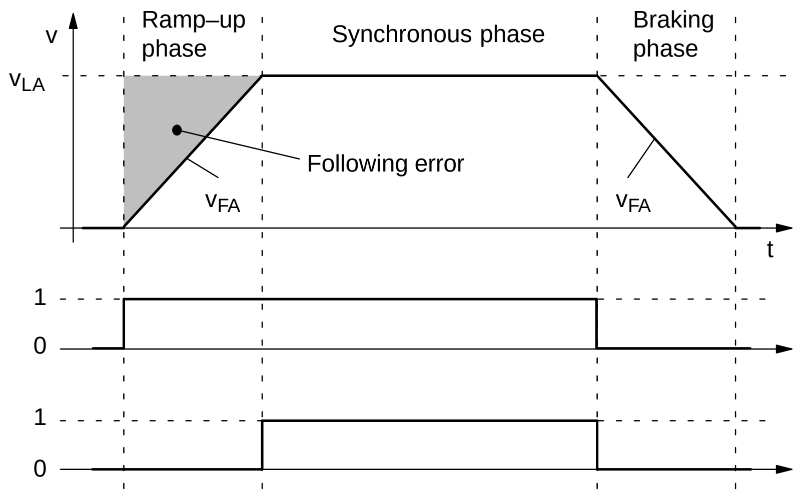
    —> refer to Fig. 6-35

Speed synchronism (P0410 = 1 or 3)

For a speed–synchronous coupling, the drive accelerates after the coupling has been switched–in, with the acceleration in P0103, up to the speed of the master drive.

The following error, that is automatically obtained when the slave drive accelerates due to the different output velocities, is no longer reduced to zero.

The position difference of the two drives is constant in the synchronous phase.



v_{LA} Speed, master drive
v_{FA} Speed setpoint, slave drive

Fig. 6-33 Speed synchronism (P0410 = 1 or 3)

Reader's note

The phases are described in Table 6-40.

Position synchronism (P0410 = 2 or 4)

For the position–synchronous coupling, the slave drive takes into account the distance moved by the master drive and the position offset, entered in P0412

After speed synchronism has been reached, the following error which has occurred and the position offset in P0412 is moved through with the supplementary speed in P0413.

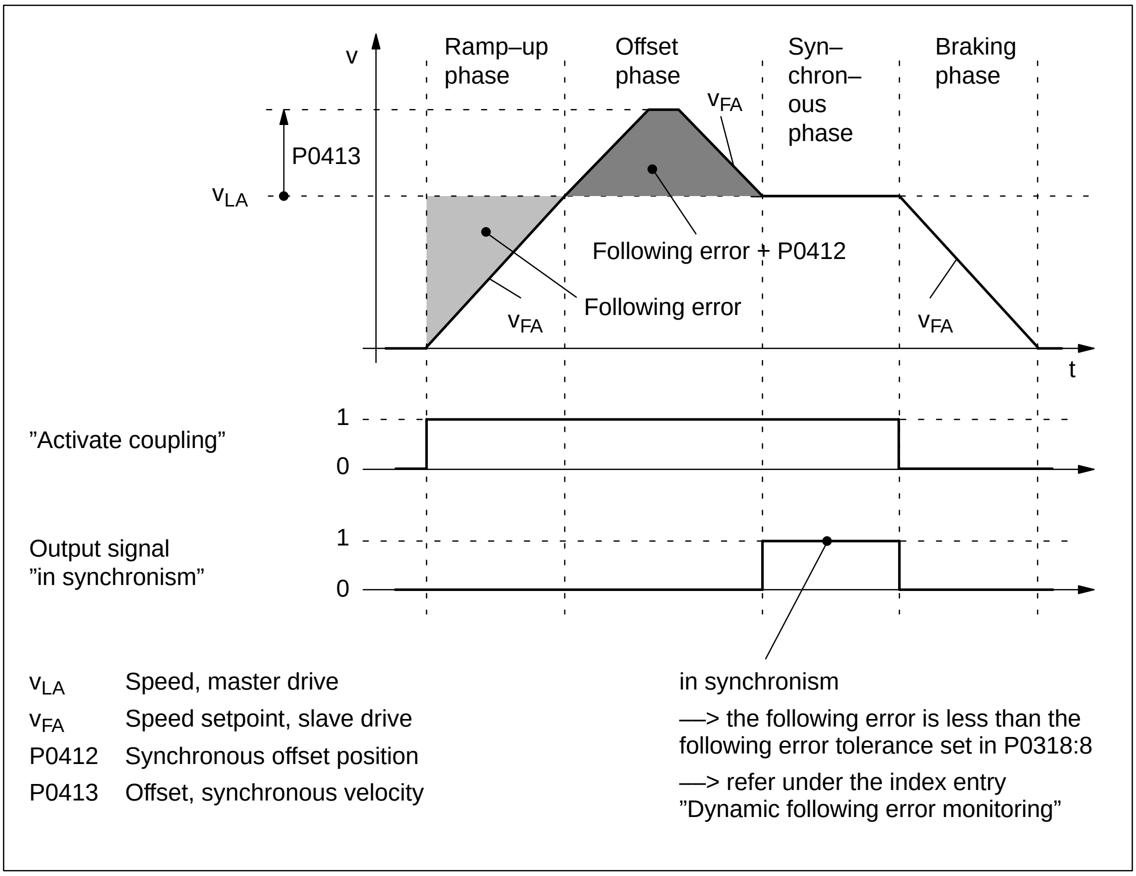


Fig. 6-34 Position synchronism (P0410 = 2 or 4)

Contrary to the coupling to the absolute position, an offset between the master and slave drives, existing before the coupling was established, is no longer taken into account in the offset phase.

Reader's note

The phases are described in Table 6-40.

Coupling to an absolute position (P0410 = 7 or 8) (from SW 4.1)

With this function, the slave drive, for P0410 = 7 or 8, synchronizes to the absolute position of the master drive plus an adjustable offset P0412. After synchronization, the master and slave drives have the same absolute position with the exception of the offset P0412.

The coupling can be switched–in/out using an input signal (P0410 = 7) or using a traversing block (P0410 = 8).

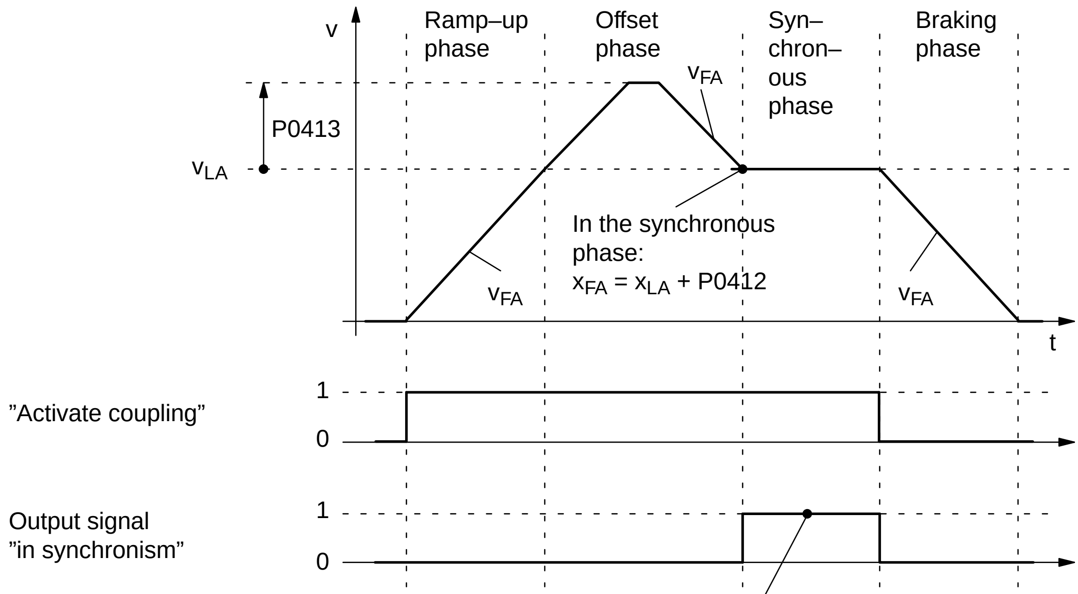
The following secondary conditions must be observed in order to realize a coupling to an absolute position:

- For P0891 = 2, 3 or 4, the master drive absolute position is available to the slave drive.
- For P0891 = 0 or 1, the slave drive absolute position is not automatically made available to the slave drive.

  The reference point coordinates are communicated to the slave drive once using the input signal ”set position reference value, master drive” (function number 74) if the source of the external position reference value is either the angular incremental encoder interface (P0891 = 0), or for double–axis modules, the motor encoder of drive A (P0891 = 1). The value of P0400 (reference point coordinate, master drive) is written into P0032 (external position reference value).

  After a positive edge, the display parameter P0032 ”External position reference value” coincides with the master drive absolute position.

  A coupling should only be closed at the absolute position of the master drive after ”set setpoint, master drive” as only then can be guaranteed that the slave drive has been correctly referenced.
- —> refer to the example, Chapter 5.10.5



v_{LA}	Speed, master drive
v_{FA}	Speed setpoint, slave drive
x_{LA}	Position, master drive
xX_{FA}	Position, slave drive
P0412	Synchronous offset position
P0413	Offset, synchronous velocity

in synchronism

—> the following error is less than the following error tolerance set in P0318:8

—> refer under the index entry ”Dynamic following error monitoring”

Fig. 6-35 To absolute position (P0410 = 7 or 8)

Reader’s note

The phases are subsequently described in Table 6-40.

Table 6-40 Description of the phases for speed or position synchronism

<table>
<tr><th>Phases</th><th>speed–synchronous
(P0410 = 1 or 3)</th><th>position–synchronous
(P0410 = 2 or 4)</th><th>Absolute position
(P0410 = 2 or 4)
(from SW 4.1)</th></tr>
<tr><td>Initializing</td><td colspan="3">After the coupling has been switched–in, the speed setpoint for the slave drive is ramped up to the master drive speed.
The ramp gradient corresponds to the acceleration in P0103.
This phase is completed after the slave drive has reached the speed of the master drive.</td></tr>
<tr><td>Offset phase</td><td>–</td><td>After speed synchronism has been reached, the summed following error and the position offset, entered in P0412 is moved through with speed v_{LA} + P0413.</td><td>After speed synchronism has been reached, the drive moves by the offset in the absolute position of the master and slave drive and the position offset, entered into P0412 with speed v_{LA} + P0413.</td></tr>
<tr><td>Synchronous phase</td><td colspan="3">For coupling–in/out using the input signal, the following applies (P0410 = 1, 2 or 7):
—> A traversing program can be started.
For coupling–in/out using the traversing block, the following applies (P0410 = 3, 4 or 8):
—> The traversing program is continued.
Note:
• The setpoint input via the angular incremental encoder interface, switched as input, and the setpoint input via the traversing blocks are superimposed on one another.
• Traversing blocks with relative position data are permissible.
• —> refer under the index entry ”Output signal, digital – in synchronism”</td></tr>
<tr><td>Braking phase</td><td colspan="3">After the coupling has been switched–out, the drive goes into the braking phase and brakes down to standstill with the deceleration set in P0104.
For coupling–in/out using the input signal, the following applies (P0410 = 1, 2 or 7):
—> A traversing program can be started.
For coupling–in/out using the traversing block, the following applies (P0410 = 3, 4 or 8):
—> The traversing program is continued.
Note:
For coupling–in/out via input signal, the braking phase may only be initiated, if a traversing program is no longer running for the slave drive.</td></tr>
</table>

6

Coupling using the queue functionality (P0410 = 5 or 6) (being prepared)

With this function, a coupling is established between the master and slave drives depending on a position memory (queue) being processed.

- Coupling always switched–in/out via the traversing program
- P0410 = 5: speed–synchronous
- P0410 = 6: position–synchronous

Application example, queue functionality (refer to Fig. 6-36)

The master drive drives a conveyor belt. The position of the workpieces is detected using a measuring probe and saved in the slave drive in P0425:16. If a workpiece approaches its waiting position, the slave drive must accelerate in plenty of time so that it can move in synchronism with the workpiece in the machinery range.

Prerequisites:

If a workpiece is detected, the distance, measured to the actual slave drive position is continuously entered into P0425:16. The first workpiece is entered under P0425:0 and the last under P0425:15.

A maximum of 16 positions can be saved —> otherwise, fault 168 is output (overflow, buffer memory).

For slave drives, a traversing program cyclically runs with coupling and machining commands.

Sequence:

1. The COUPLING IN command is executed, i.e. the slave drive waits to be synchronized to the master drive.
2. When will synchronization start, i.e. when will the coupling be switched–in?

   Synchronization is started when the next workpiece has reached the slave drive, i.e. if the distance between the workpiece and the slave drive in the next interpolation clock cycle k is

   less than $\frac{v^2_{LA}}{2a_{FA}}$

   v_{LA} Speed, master drive

   a_{FA} Acceleration, slave drive
3. To start, speed synchronism is established. After this, the oldest position is deleted from the position memory and for P0410 = 6, position synchronism established.

   The equalization motion is extremely short, as synchronization is predictive.

   After synchronism has been established, additional commands can be executed (e.g. to machine the workpiece).

   For the commands, the same conditions apply as for the programmable couplings.

4. The coupling is switched–out using the command COUPLING_OUT. The drive remains stationary and the program is continued. From this time onwards, there are no restrictions regarding the commands.

   The slave drive can be returned to the waiting position e.g. using an additional command (POS ABS).

Traversing program in the slave drive

COUPLING IN ; wait until the next workpiece comes close

POS REL ; relative traversing motion

... blocks to be processed (i.e. for machining)

COUPLING OUT

POS ABS waiting position ; retraction to the waiting position

GOTO start

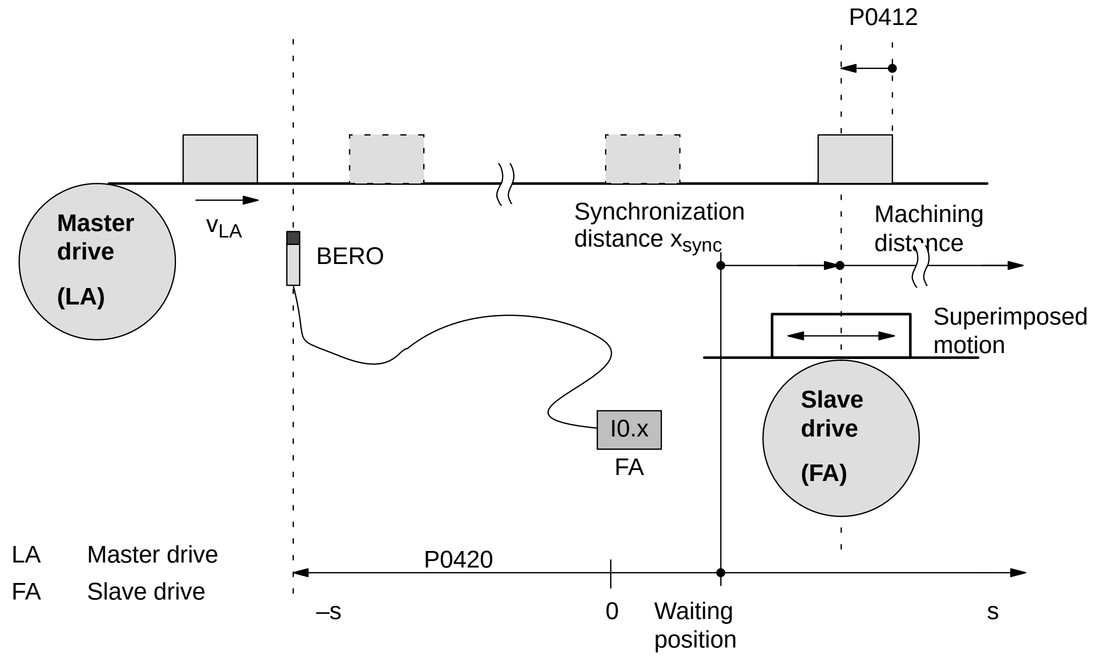


Fig. 6-36 Application example: Coupling via an input terminal with queue functionality

Axis coupling for modulo rotary axes (from SW 4.1)

In order to implement an axis coupling for modulo rotary axes, the following settings must be made:

- Which settings have to be made for the master axis?
  - ”Positioning” mode (P0700 = 3)
  - Set the modulo rotary axis (P0241, P0242)
- Which settings have to be made for the slave axis?
  - ”Positioning” mode (P0700 = 3)
  - Set the modulo rotary axis (P0241, P0242)
  - For the slave axis, the modulo range of the master axis must be specified in P0898.

    i.e.: P0242 (master axis) $=$ P0898 (slave axis)

Note

The modulo range of the master axis can be the same or not equal to the modulo range of the slave axis.

i.e.: P0242 (master axis) $=$ or $\neq$ P0242 (slave axis)

Modulo correction

Position reference value steps as a result of modulo correction are detected by the slave drive itself, i.e. it is not permissible that control bit QStw.0 or the correction value dXcorExt are set.

The following is required:

- P0898 must be correctly parameterized for the slave drive.
- The traversing difference between two position reference values is the maximum of half the modulo range (so that the direction of motion is clear)

Telegram loss

Telegrams may be lost when transferring data via Profibus–DP. In this case, the slave drive must extrapolate a new reference value position from the previous acceleration and velocity.

The correct position is only approached with the next valid telegram. If more telegrams are lost than are parameterized in P0879, Fault 595 or 597 is output and the drive comes to a standstill.

Limitations/ secondary conditions

The following secondary conditions must be observed for position reference value and actual value coupling:

- Resolution of the angular incremental encoder interface

  It should be carefully observed that the coupling must be configured with a high resolution (encoder), e.g. for

  —> a good resolution: 2048 pulses correspond to 10 mm

  —> a poor resolution: 1250 pulses correspond to 1500 mm

- Travel to fixed endstop and axis coupling
  - It is not permissible to activate the ”travel to fixed endstop” function when in the coupled mode (Fault 173).
  - The axis coupling cannot be switched–in during the ”travel to fixed endstop” function (Fault 173).
- If it is predicted that a software limit switch will be passed, for coupled axes, one of the following faults/warnings will be signaled:
  - Fault 132 or 133 after a software limit switch has been passed (minus or plus)
  - Warning 891
    (software limit switch PLUS actuated, coupled)
  - Warning 892
    (software limit switch MINUS actuated, coupled)

  For a coupled drive, there is no response to warning 891 or 892. This can be signaled to the master drive using the output signal ”warning present”; this then allows the master drive to respond.
- Only relative position data is permissible for traversing blocks when in the coupled mode (Fault 165).
- During an active coupling, a block change enable CONTINUE EXTERNAL is only possible with P0110 = 2 (Fault 172).
- The position of the master drive, at which the coupling was requested, is in P0425:0.
- The following applies for P0410 = 1, 2 or 7:
  - It is not possible to program the commands COUPLING_IN or COUPLING_OUT (Fault 166).
  - The coupling can be switched–in/switched–out via input terminal as follows:

    1.)

    Assign function 72 to any input terminal
    —> Input signal ”activate coupling”

    or

    2.) (recommendation, as it is a fast input)

    Assign function number 73 to input terminal I0.x
    —> Assign the input signal ”Activate coupling via I0.x”
    and
    function number 72 to any other input terminal
    —> Input signal ”Activate coupling”
    (refer to Chapter 6.4.3 Function numbers 72 and 73)
- The following applies for P0410 = 3, 4 or 8:

  The coupling cannot be switched–in/switched–out via an input signal.

6

- Rotary axis with modulo correction and basic coupling

  The following applies for SW 3.3:
  The coupling mode for rotary axes with modulo correction is not permissible for the master and slave drive.

  The following applies from:
  The coupling mode is permissible for rotary axes with modulo correction.

- Direct measuring system and axis coupling

  For a drive with direct measuring system, the actual values of the motor measuring system are always output via the angular incremental encoder interface switched as output.

  This means that an actual value coupling cannot be realized using the direct measuring system.

- The following applies for P0410 = 5 or 6 (from SW 3.5):

  – It is only possible to precisely determine the position using the fast input I0.x.

    —> refer under the index entry ”Input signal, digital – flying measurement/length measurement”

  – The standstill time of the slave drive up to the next workpiece must be at least 1 IPO clock cycle (P1010).

  – After COUPLING OUT for the slave drive, the drive should retract to its waiting position as otherwise it will continue to be positioned away from the target position.

- The following secondary conditions have to be taken into consideration when parameterizing P0891:

  – The following applies for P0891 = 1:

    —> only exists for drive B;

    —> for drive A, P0891 must be 0

  – The following applies for P0891 = 2 or 3:

    —> Selectable for drive A or B

    —> The other drive is then the master drive where P0891 must be set to 0.

    —> Coupling via the input signal ”Activate coupling via I0.x” (fast input) is not possible

- If a setpoint source is selected, which is not available for the drive, e.g. there is no optional PROFIBUS–DP module, then Fault 788 is output.

- It is possible to have mixed operation of position reference value sources within a drive group. For instance, drive A can receive its setpoint via the angular incremental encoder and transfer this to other drives via PROFIBUS–DP. The following secondary conditions must be observed:
  - The synchronous operation of the drive group is poor as a result of the different data propagation times.
  - There are differences in the position resolution between the individual sources.
- Limitations for a slave axis

Warning

When superimposing the speed of the master and slave drives, a resulting slave drive speed can be obtained which is greater than the maximum speed P0102. For slave axes, the speed monitoring in P1147, P1401:8 and P1405:8 applies.

Note

For coupled operation via PROFIBUS–DP, we recommend that internal couplings are not used. Instead, the second drive should be parameterized as subscriber (refer to Chapter 5.10).

Passive referencing for a slave drive (from SW 5.1)

The slave drive cannot autonomously reference if there is a permanent coupling. Instead, the master drive specifies the referencing motion. Using passive referencing, the slave drive can also be referenced.

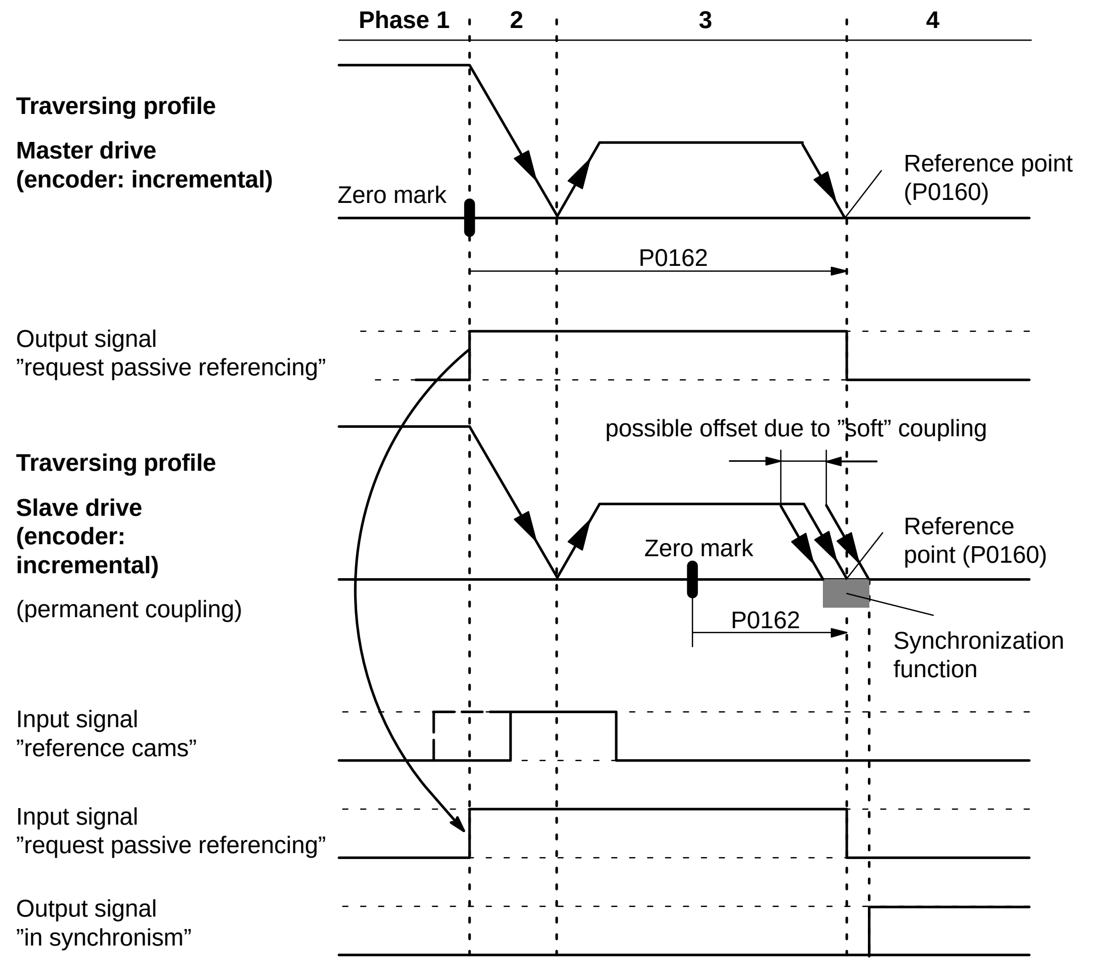
When executing passive referencing, the slave drive is precisely re–positioned at its own reference point.

The following commissioning help is available to determine and enter the reference point offset for the slave drive.

This means, e.g. that it is possible, for a gantry group, to automatically correct any possible skewing.

Passive referencing is possible for axes with absolute or incremental encoder. However, the drive with the absolute value encoder must first be adjusted using absolute value setting (Fault 176).

- Master and slave drive with incremental encoder.



P0160 Reference point coordinates

P0162 Reference point offset

Fig. 6-37 Sequence when passively referencing (master and slave drive with incremental encoder)

- Master drive with absolute value encoder and slave drive with incremental encoder.

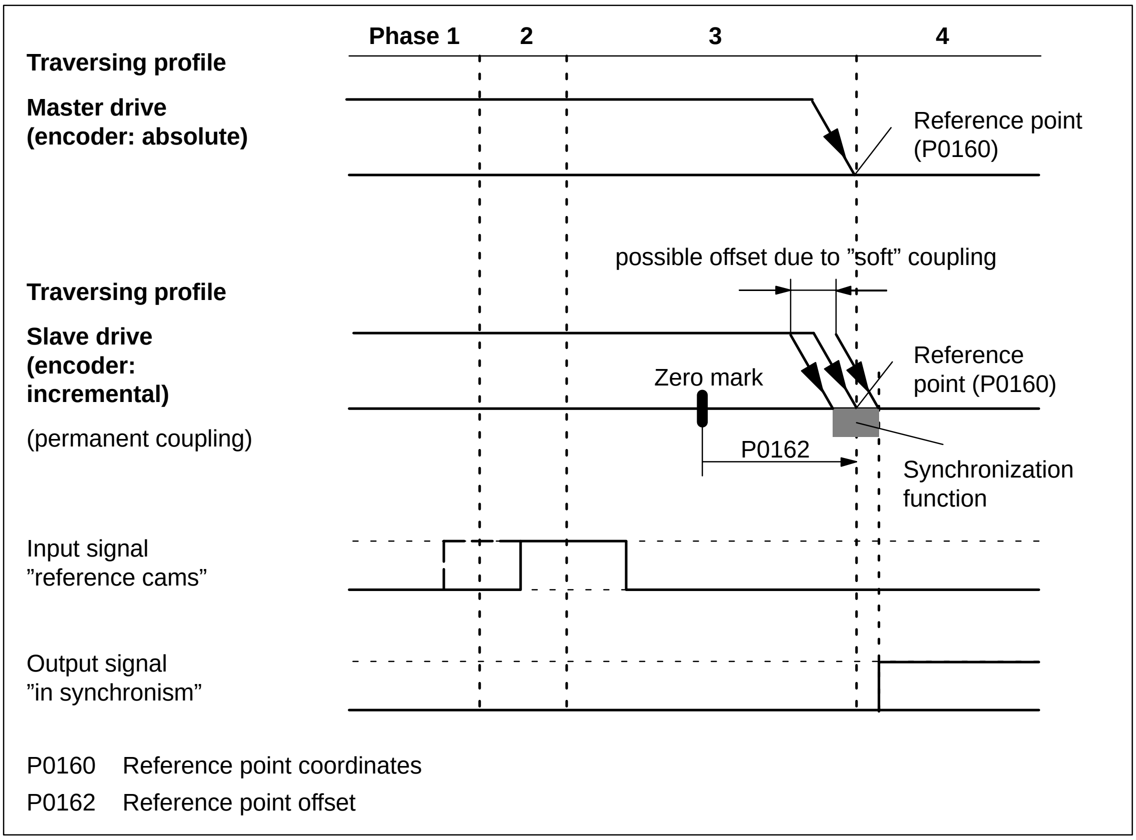


Fig. 6-38 Sequence when passively referencing (master drive with absolute value encoder, slave drive with incremental encoder)

If the slave drive with incremental encoder does not have any reference cams, then it must be referenced using the ”set reference point” input signal.

- Master drive with incremental encoder and slave drive with absolute value encoder.

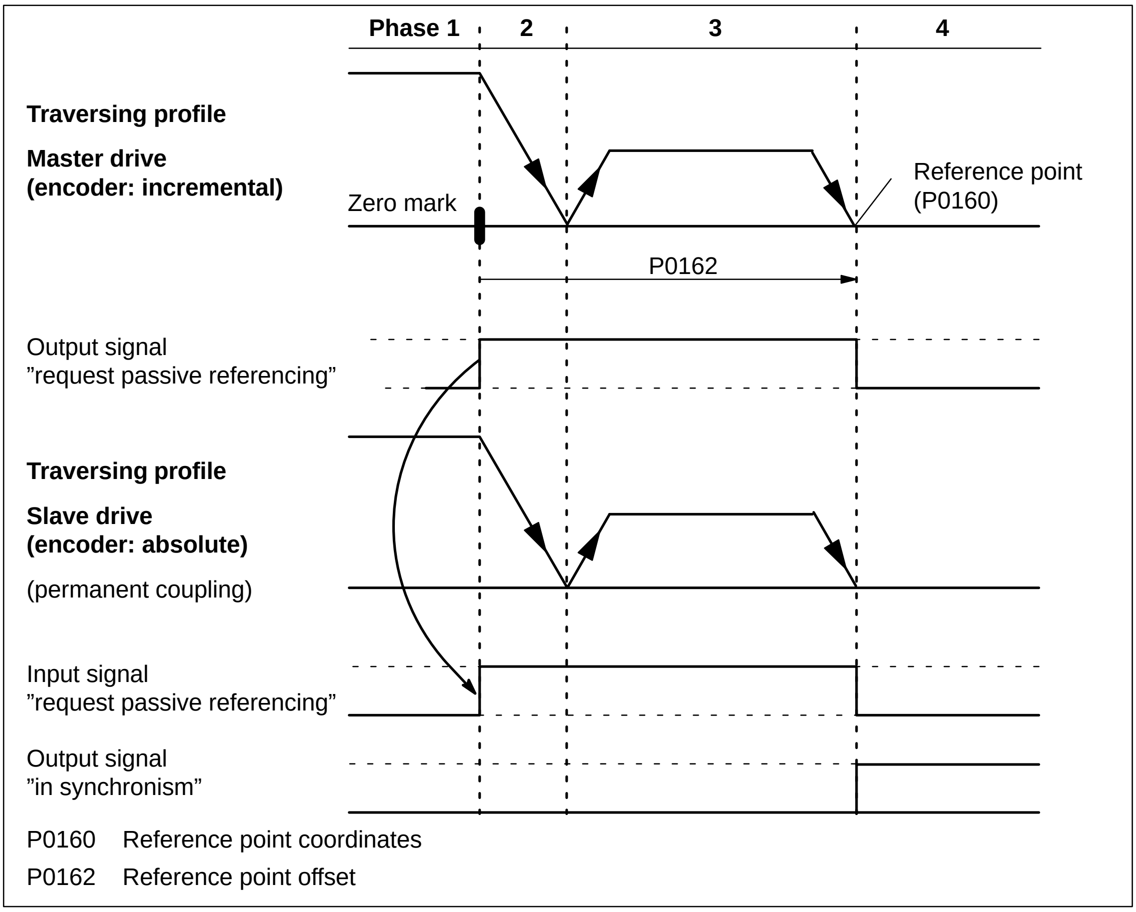


Fig. 6-39 Sequence when passively referencing (master drive with incremental encoder and slave drive with absolute value encoder)

Note

For a rigid mechanical coupling between the master and slave axes, it is not permissible that P0179 is set to 2 if the slave drive is equipped with an absolute value encoder. Otherwise, the slave drive would position (in absolute terms) to the position specified in P0160.

- Master and slave drive with absolute value encoder.

  For master and slave drive with absolute value encoder, passive referencing is not practical, as the axes have been adjusted corresponding to Chapter 6.2.7 (Adjustment for absolute measuring systems).

Timing when passively referencing (from SW 5.1)

The following timing for passive referencing applies when using incremental encoders for the master and slave drives. When referencing the master drive, after its zero mark is reached, passive referencing for the slave drive is requested. The master drive then traverses through the reference point offset up to the reference point.

During this travel, the slave drive must detect a 1/0 edge at the "reference cam" input signal and then its own zero mark.

After the master drive has reached its reference point, the slave drive is moved to its reference point.

- Phase 1 Master drive searches for its zero mark

  The master drive has moved away from the reference cam and searches for the next zero mark.

  After the zero mark has been found, the following is initiated:

  – The drive is braked down to standstill

  – Master drive:
  Set the "request passive referencing" output signal

  – Slave drive:
  When the "request passive referencing" input signal has been detected, the slave drive starts to search for the 1/0 edge of the input signal "reference cams" after which it searches for the zero mark

- Phase 2 The master drive starts to its reference point

  The master drive moves to traverse to its reference point. During this traversing operation, the slave drive continues to search for its zero mark.

- Phase 3 The master drive approaches its reference point

  When the reference point is reached, the following is initiated:

  – The "request passive referencing" output signal is reset

  If the slave drive, up to this instant in time, has not found a zero mark, fault 175 is signaled.

- Phase 4 Slave drive referenced

  – For P0179 = 0

  After the reference point is reached, the value from P0160 is accepted as new actual value (set reference point).

  – For P0179 = 2

  After the axis has reached its standstill position, the axis is traversed, corresponding to P0162, to its own reference point with the velocity defined in P0413. The value from P0160 is then accepted as new actual value.

  —> Refer under the commissioning help for passive referencing of the slave drive

6

Commissioning help to passively reference the slave drive (from SW 5.1)

The commissioning help is used to determine the reference point offset in P0162 for the slave drive.

Prerequisites: Set P0179 = 0

1. Carry–out passive referencing as usual (Fig.6-37).

Note

To execute the following points, the master drive must be precisely positioned at its reference point!

---

2. Slave drive:
   – In the jogging mode, the axis moves to its measured reference point

---

Note

Before ”jogging”, the coupling must be switched–out, otherwise ”jogging” is not possible. Switch–in the coupling again afterwards.

---

3. Slave drive:
   – Set P0179 = 1
   —> the distance between the zero mark and approached reference point is saved as offset in P0162
   – P0179 is internally set to 2
4. Save the parameters in the FEPROM
5. Carry–out a power on

This means that for future referencing, the reference point of the slave drive is ”correctly” approached.

Secondary conditions and limitations when passively referencing (from SW 5.1)

The following secondary conditions apply:

- The slave drive must find its own zero mark during phases 2 and 3.
- Passive referencing between the master and slave drive is controlled using the following signals:
  – Master drive: Output signal ”request passive referencing”
    —> using the output terminal with function number 69 (refer to Chapter 6.4)
    —> using the PROFIBUS status signal QZsw.1 (refer to Chapter 5.6.3)
  – Slave drive: Input signal ”request passive referencing”
    —> using an input terminal with function number 69 (refer to Chapter 6.4)
    —> using the PROFIBUS control signal QStw.1 (refer to Chapter 5.6.2)

The master drive output signal should be connected to the input signal of the slave drive.

Exception:

If, for a double–axis module, P0891 (B) = 1, i.e. the position actual value of drive A is internally connected to the position reference value from drive B, then the following applies:

The ”request passive referencing” output signal from drive A (master drive A) is internally and automatically recognized by drive B (slave drive). In this case, external wiring is not required.

- The permanent coupling can be switched–in via an input signal or with the traversing block. Additional traversing blocks are not permitted.

  Example, switching–in with a traversing block using the ”Start–up Tool SimoCom U”:
  Command: COUPLING IN
  Block change enable: End

- If reference point approach is started at the master drive, and the slave drive is coupled–out and coupled–in again, then the slave drive outputs faults 131 and 605 if the master drive has reached its reference point. This means that after a reference point approach has been started, it is no longer possible to de–couple the axes.

Parameter overview (refer to Chapter A.1)

The following parameters are used for the ”axis coupling” function:

- P0179 Mode, passive referencing (from SW 5.1)
- P0400 Ref. point coordinate, master drive (from SW 4.1)
- P0401 Coupling factor, revolutions master drive
- P0402 Coupling factor, revolutions slave drive
- P0410 Configuration, coupling that can be switched–in
- P0412 Synchronous offset position
- P0413 Offset, synchronous velocity
- P0420 Position difference, measuring probe to the zero point, slave drive (from SW 3.5)
- P0425:16 Coupling positions
- P0898 Modulo range, master drive (from SW 3.5)
- P0884 Position output value PROFIBUS – No. of increments
- P0891 Source, external position reference value
- P0895 External position reference value – No. of increments
- P0896 Ext. position reference value – No. of dimension system grids
- P0897 Inversion, external position reference value
- P0898 Modulo range, master drive

Input/output signals (refer to Chapter 6.4, 5.6.2, 5.6.3)

The following signals are used for the function ”axis coupling”:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  - Input signal, ”activate coupling”

    —> using an input terminal with function number 72

    —> using the PROFIBUS control signal ”PosStw.4”
  - Input signal, ”activate coupling via I0.x”

    —> using an input terminal with function number 73
  - Input signal ”set setpoint, master drive” (from SW 4.1)

    —> using an input terminal with function number 74
  - Input signal ”request passive referencing” (from SW 5.1)

    —> using an input terminal with function number 69

    —> using the PROFIBUS control signal ”STW1.15” or alternatively ”QStw.1”
- Output signals
  (refer under the index entry, ”Output signal, digital – ...”)
  - Output signal, ”in synchronism”

    —> using an output terminal with function number 71

    —> using the PROFIBUS status signal ”PosZsw.3”
  - Output signal ”Request passive referencing” (from SW 5.1)

    —> using an output terminal with function number 69

    —> using the PROFIBUS control signal ”ZSW1.15” or alternatively ”QZsw.1”

Additional input/output signals

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  - Input signal, ”set reference point”
  - Input signal ”reference cams”
- Output signals
  (refer under the index entry, ”Output signal, digital – ...”)
  - Output signal, ”controller enable status”
  - Output signal ”fault present”
  - Output signal, ”warning present”

6.3.2 Handling faults in the master and slave drives

Overview

If a coupling is active, the master drive must be able to respond to slave drive faults.

It must also be guaranteed that the slave drive is reliably stopped, if the master drive develops a fault.

Faults in the slave drive

Dependent on the stop responses, the following should be observed for faults and warnings in the slave drive:

Table 6-41 Behavior when faults develop in the slave drive

Fault situations	What happens when these fault situations occur?
Faults with stop response STOP I STOP II STOP III	• The coupling is disconnected (switched–out) • The slave drive is appropriately braked • Output signals – Status, controller enable = 0 – Fault present = 1 – Warning present = 0
Faults with stop response STOP IV STOP V STOP VI	• Block processing is interrupted • The slave drive remains closed–loop controlled and coupled • Output signals – Status, controller enable = 1 – Fault present = 1 – Warning present = 0
Warnings with stop response STOP VII	• No response for the slave drive • Output signals – Status, controller enable = 1 – Fault present = 0 – Warning present = 1
Controller enable withdrawn	• When the controller enable is withdrawn, this does not have to result in faults being output • Output signals – Status, controller enable = 0 – Fault present = 0 – Warning present = 0
Note: The required stop response can be initiated for a group of axes by appropriately externally evaluating the output signals of the slave drive.	

6

Example:

In Fig. 6-40 it is shown how a differentiation can be made between these three stop classes as well as the withdrawal of the controller enable from the three output signals "status, controller enable", "fault present" and "warning present". Furthermore, it is indicated how the master drive and therefore the other slave drives could respond to these signals.

Note

The logical operations can be further optimized for the displayed behavior. However, at this position, it is important that a differentiation can be made between the various fault classes.

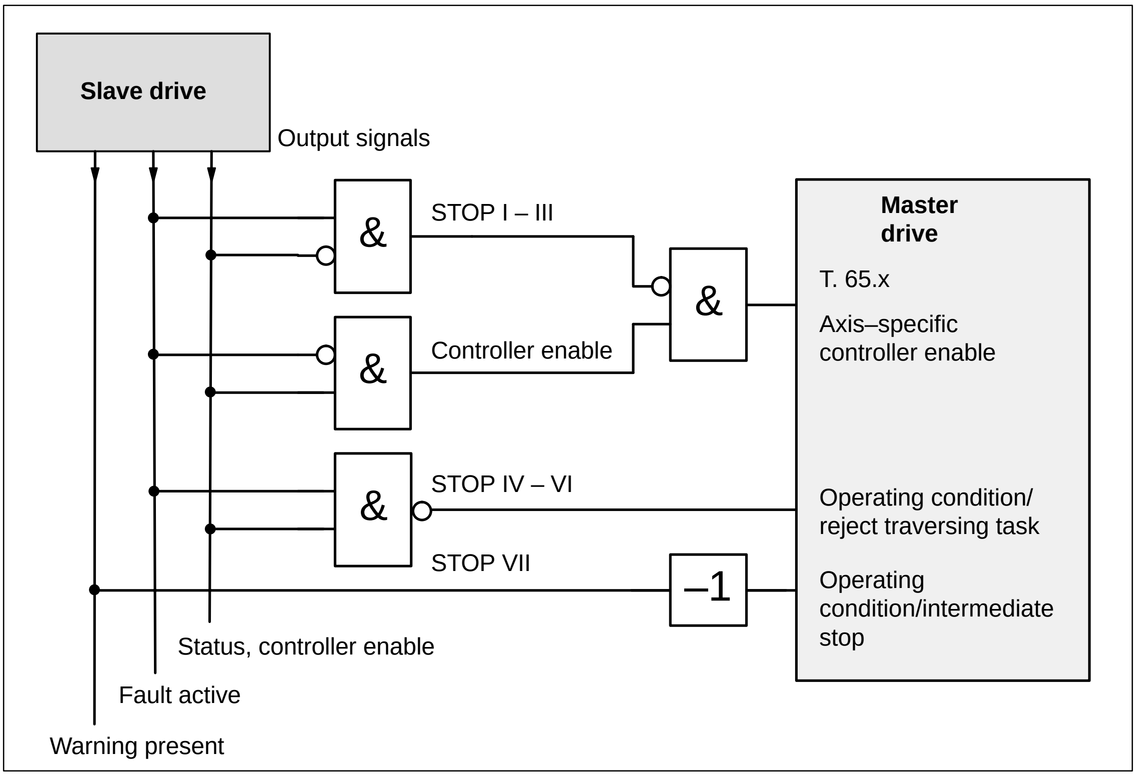


Fig. 6-40 Example: Handling faults in the slave drive through the master drive

Faults in the master drive

Faults in the master drive can be just as flexibly handled as the faults in the slave drive which were discussed above.

In this case, the master drive output signals are used, and are correspondingly connected to the input signals of the slave drive.

For an actual value coupling, it is not absolutely necessary to handle master drive faults, as the slave drive follows the actual value of the master drive anyway, and brakes when a fault situation develops.

On the other hand, for a setpoint coupling, it should be ensured that when the setpoints fail, the group of axes is correctly stopped.

6.3.3 Torque setpoint coupling (from SW 4.1)

Description

A torque setpoint coupling (master/slave operation) between two rigidly connected drives can be established via analog signals or PROFIBUS–DP.

How is this function activated?

- The master drive is changed–over into the closed–loop speed controlled mode.
- The torque setpoint at the speed controller output of the master drive is provided via the process data ”Msoll” (number 50114).
- The slave drive must be changed–over into the open–loop torque controlled mode using process data ”STW1.14”.
- The torque setpoint of the master drive should be read into the slave drive using process data ”MsollExt” (number 50113).

Scaling

P0882 determines the normalization of process data ”Msoll” and ”MsollExt”. The percentage value of the rated motor torque, entered into P0882, corresponds to value 16384 in the PROFIBUS interface.

The polarity of the torque setpoint can be inverted by entering negative values.

The torque, corresponding to 16384, is displayed in Nm in P1725 (P0882 · rated motor torque).

Smoothing and clock cycle

The ”Msoll” process data is smoothed using the transition frequency set in P1252. The pre–setting P1252 = 100 Hz can result in problems for mechanical couplings. If required, the smoothing (deadtime) should be disabled using P1252 = 0.

Note

For torque setpoint couplings via PROFIBUS–DP, when compared to coupling via analog signals (refer to Chapter 6.6), there is a longer dead time ($\geq$ 1 ms instead of the speed controller clock cycle).

6

Application example master/slave

The master/slave functionality is realized using analog signals or PROFIBUS–DP.

Note

Master/slave operation is only possible for motors with encoders!

- An example of a coupling between two drives with analog input/outputs is described in Chapter 6.6.5.
- The following example shows a coupling with PROFIBUS–DP.

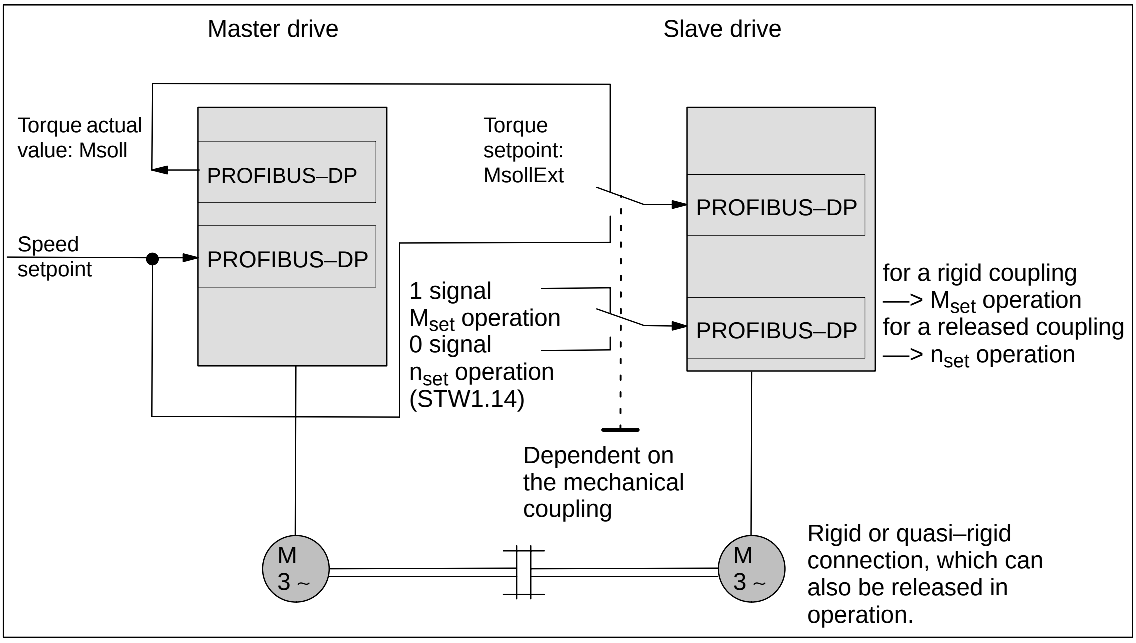


Fig. 6-41 Example: Coupling two drives with master/slave to PROFIBUS–DP

Warning

If, for a master/slave configuration, the rigid mechanical coupling is released (the coupling is opened) then at the same time the slave drive must be changed over to n_{set} operation as otherwise the slave drive would accelerate in an uncontrolled fashion to the maximum speed.

Parameterizing DP master

The diagrams 6-43 and 6-42 indicate the steps when configuring S7 for an example with the standard telegram 102 as template.

In the example, it is assumed that the encoder interface is not required. The appropriate process data is therefore canceled.

The following data should be parameterized in the DP master (e.g. SIMATIC S7):

- Configuration, master drive —> Number of process data which must match the selected telegrams
  - 4 words, PKW
  - 6 words, actual values to the DP master
  - 5 words, setpoints from the DP master

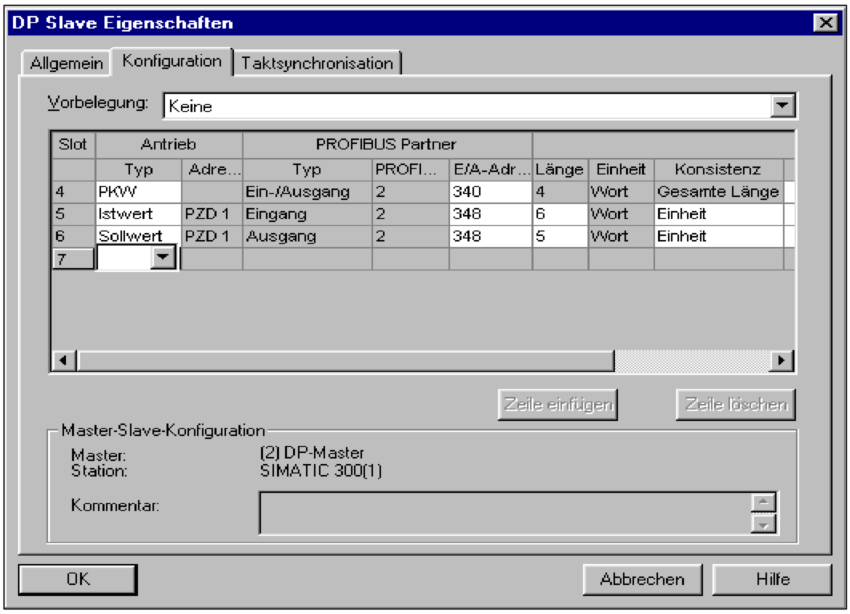


Fig. 6-42 Example, configuring the master drive for S7

- Configuring the slave drive to match the telegram —> define the slave–to–slave communication link
  - 4 words, PKW
  - 5 words, actual values to the DP master
  - 5 words, setpoints from the DP master
  - 1 word, setpoints via slave–to–slave communications

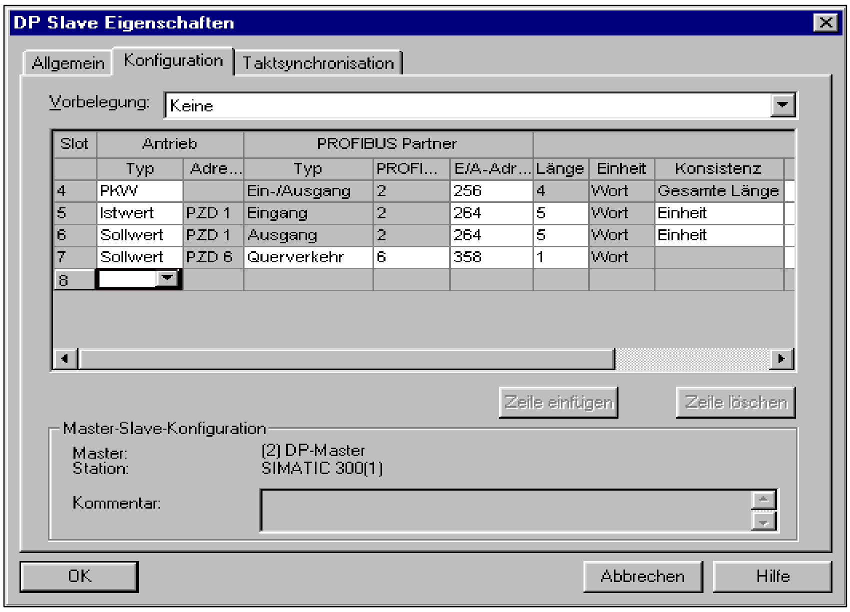


Fig. 6-43 Example, configuring the slave drive for S7

Parameterizing the master drive

The following parameters should be set:

- P0922 = 0
  In the example, the standard telegram 102 is extended by Msoll.
  —> the telegram should be configured as follows:
- P0916:6 = 50114 —> status word Msoll
- Check P1252 (smoothing, Msoll)
- P0915:6 = 0 and P0916:7... 10 = 0
  —> disable the encoder interface (optional)

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5
STW1	NSOLL_B		STW2	MomRed
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6
ZSW1	NIST_B		ZSW2	MeldW	Msoll
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102	P0916 :6 50114

Fig. 6-44 Configuring the telegram, master drive

Parameterizing the slave drive

The following parameters should be set:

- P0922 = 0
  In the example, the standard telegram 102 is extended by MsollExt.
  —> the telegram should be configured as follows:

Setpoint

PZD1	PZD2	PZD 3	PZD 4	PZD 5	PZD 6
STW1	NSOLL_B		STW2	MomRed	MsollExt
P0915 :1 50001	P0915 :2 50007	P0915 :3 50007	P0915 :4 50003	P0915 :5 50101	P0915 :6 50113

Actual point

PZD1	PZD2	PZD 3	PZD 4	PZD 5
ZSW1	NIST_B		ZSW2	MeldW
P0916 :1 50002	P0916 :2 50008	P0916 :3 50008	P0916 :4 50004	P0916 :5 50102

Fig. 6-45 Configuring a telegram, slave drive

- P0915:6 = 50113 —> control word MsollExt
- P0916:6 ... 10 = 0 —> disables the encoder interface (optional)

Note

The normalization at the master and slave drive can be influenced using P0882.

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”torque setpoint coupling” function:

- P0607 Analog setpoint, terminal 56.x/14.x
- P0612 Analog setpoint, terminal 24.x/20.x
- P0618 Normalization voltage, speed setpoint
- P0619 Normalization voltage, torque setpoint
- P0620 Normalization voltage, torque/power reduction
- P0882 Evaluation, torque setpoint PROFIBUS
- P0881 Evaluation, torque/power reduction PROFIBUS
- P0916 PZD actual value assignment, PROFIBUS
- P0922 Telegram selection PROFIBUS
- P1240:8 Offset, torque setpoint (closed–loop speed–controlled)
- P1241:8 Normalization, torque setpoint
- P1242:8 Offset, torque setpoint (open–loop torque–controlled)
- P1243:8 Normalization, torque/power reduction
- P1252 Transition frequency, torque setpoint smoothing
- P1725 Normalization, torque setpoint

Input/output signals (refer to Chapter 6.4)

The following signals are used for the function ”torque setpoint coupling”:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  - Input signal ”open–loop torque controlled operation”

    —> using an input terminal with function number 4

    —> using the PROFIBUS control signal ”STW1.14”
  - Input signal ”external torque setpoint”

    —> using the PROFIBUS control signal ”MsollExt”
  - Input signal ”torque limit reduction”

    —> using the PROFIBUS control signal ”MomRed”
- Output signals
  (refer under the index entry, ”Output signal, digital – ...”)
  - Output signal, ”in synchronism”

    —> using an output terminal with function number 71

    —> using the PROFIBUS status signal ”PosZsw.3”
  - Output signal ”open–loop torque controlled operation”

    —> using the PROFIBUS status signal ”ZSW1.14”
  - Output signal ”smoothed torque setpoint”

    —> using the PROFIBUS status signal ”Msoll”
  - Output signal ”smoothed torque–generating current Iq”

    —> using the PROFIBUS status signal ”IqGl”

6.3.4 Equalization controller (from SW 7.1)

Description

For mechanically coupled axes, e.g. a rotating track which is driven through two axes, then it is not sufficient to just enter identical speed setpoints at both axes. Due to the drift, which is always present in a real system, different torques occur at the coupling element.

A torque equalization controller is implemented in the ”SIMODRIVE 611 universal” software for applications such as these.

Closed–loop control structure

The mechanically coupled axes are in the master/slave mode. The actual equalization controller is computed in the slave axis. The slave and master axes are set using parameters.

If a pre–tensioning torque is required (gearbox, play), a parameterizable supplementary torque is entered at the torque comparison location, which, when the equalization controller is activated, gradually increases along a smoothing characteristic which can be parameterized.

If different motors are used or if these are installed so that they oppose each other, then torque weighting can be parameterized.

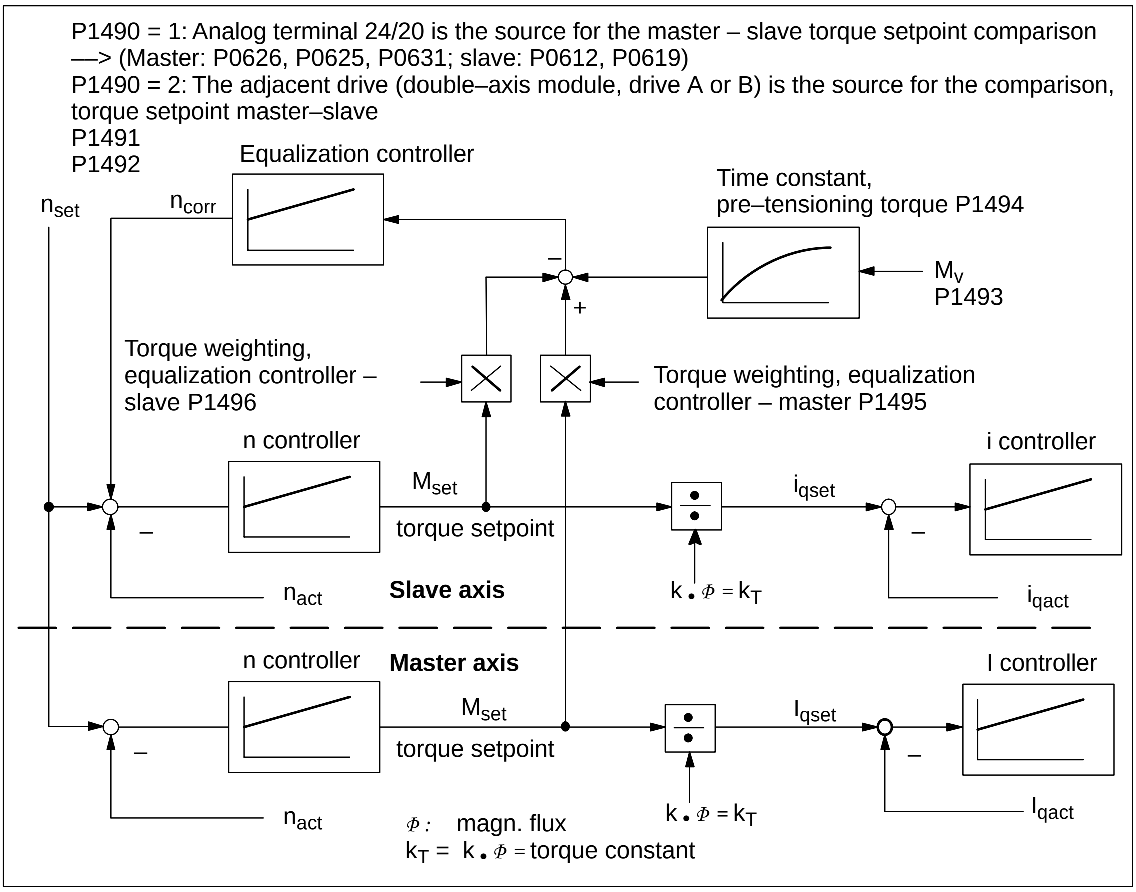


Fig. 6-46 Closed–loop control structure, equalization controller

6

How is the torque setpoint transferred?

As can be seen from Fig. 6-46, for the equalization control, M_{set} must be transferred from the master axis to the slave axis. This can be done in the following ways:

- Double–axis module – internal coupling

  M_{set} is coupled between the master drive and slave drive in the software.

- Single–axis modules coupled via I/O terminals

  For most applications, the torque coupling is limited to higher power ratings. This means that typically single–axis modules are used

  In this case, the electrical coupling is established using analog I/O terminals.

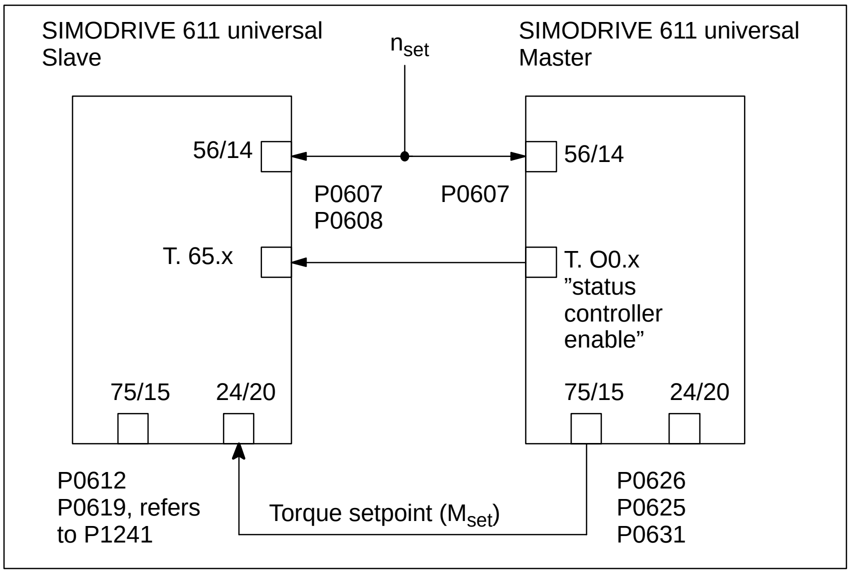


Fig. 6-47 Axis coupling with 2 single–axis modules through analog I/O terminals

Warning

If the master axis is not in the closed–loop control mode or if the mechanical coupling is released, the slave axis, for a set tensioning torque, can accelerate up to the maximum speed if the torque is sufficient. This also occurs if the equalization controller has, after a longer period of time, a high system deviation due to the integrator. This then enters a high supplementary setpoint.

Note

When the equalization controller is activated, induction motors cannot be changed–over!

Parameter overview (refer to Chapter A.1)

The following parameters should be set for the ”equalization controller” function, if the coupling is realized via analog I/O terminals:

- P0607 Analog setpoint, terminal 56.x/14.x

  Parameterize the speed setpoint at both axes:

  Master axis: P0607 = 1

  Slave axis: P0607 = 1
  P0608 = 1, if the direction of rotation is to be inverted

- P0626 Signal number, analog output terminals 75.x/15 (only for an analog setpoint coupling)

  Master axis: P0626 = 36 (torque setpoint, finely normalized)

  P0625 = 50

  P0631 = 1

- P0612 Signal number, analog setpoint terminals 24.x/20.x (only for an analog setpoint coupling)

  Slave axis: P0612 = 3, is automatically set if, when using the parameterizing and start–up tool ”SimoCom U”, ”slave axis with analog coupling” is selected in the parameterizing screen form ”equalization controller” for activate equalization controller.

  P0619 = 5 (P0619 refers to P1241)

  P1241 – pre–assigned the rated torque

Note

If P1490 = 1 and P0612 ≠ 3, then fault 738 is output.

- P1490 Activates the equalization controller

  Master axis: P1490 = 0

  Slave axis: P1490 = 0
  —> No source or no equalization controller

  P1490 = 1
  —> Equalization controller is active,
  Source is terminal 24/20
  Parameterization of P0626, P0625, P0612, P0619

  P1490 = 2
  —> Equalization controller is active
  The source is the adjacent drive (drive A or B)

6

Settings for the slave axis:

- P1491 P gain, equalization controller

  Recommended setting: $V_{p\ \text{equalization controller}} = 0.5/V_{p\ \text{speed controller}}$
- P1492 Integral action time, equalization controller

  Recommended setting: $T_{N\ \text{equalization controller}} = 10 \bullet T_{N\ \text{speed controller}}$
- P1493 Pre–tensioning torque (pre–tensioning force) equalization controller

  If a pre–tensioning torque is required (e.g. gearbox, play), a supplementary torque can be added at the torque comparison point using P1493. When the equalization controller is activated, this supplementary torque gradually increases. This delay is achieved using a PT1 element which can be set using P1494.
- P1494 Pre–tensioning torque (pre–tensioning force) equalization controller

  P1494 is used to enter the time constant for the PT1 element which ensures that the pre–tensioning torque gradually increases (pre–tensioning force) when the equalization controller is activated.
- P1495 Torque weighting, equalization controller – master

  If different motors are involved in the closed–loop equalization control, then a torque weighting of the torque setpoint (or force weighting of the force setpoint (SLM)) of the master axis can be set using P1495.
- P1496 Torque weighting, equalization controller – slave

  If various motors are involved in the closed–loop equalization control, then a torque weighting of the torque setpoint or force weighting of the force setpoint (SLM) of the slave axis can be set.

The equalization controller is computed in the 1 ms clock cycle time and the speed controller is computed in the speed controller clock cycle. In order to achieve a softer transition between these times slices, the setpoint steps (jumps) can be smoothed using a speed setpoint filter as PT1 system (1 ms time constant).

How is the equalization controller commissioned?

The equalization controller is set as follows using SimoCom U:

Example:

- **Setting for the master axis for an analog coupling**

  The settings in the menu view "equalization controller" result in the analog output being set.

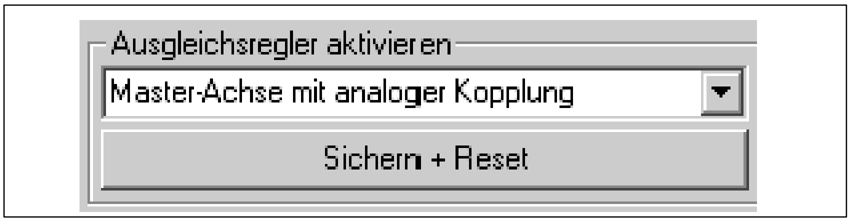


Fig. 6-48 Setting the master axis

The output normalization of the master axis is displayed as follows in the menu view "equalization controller":

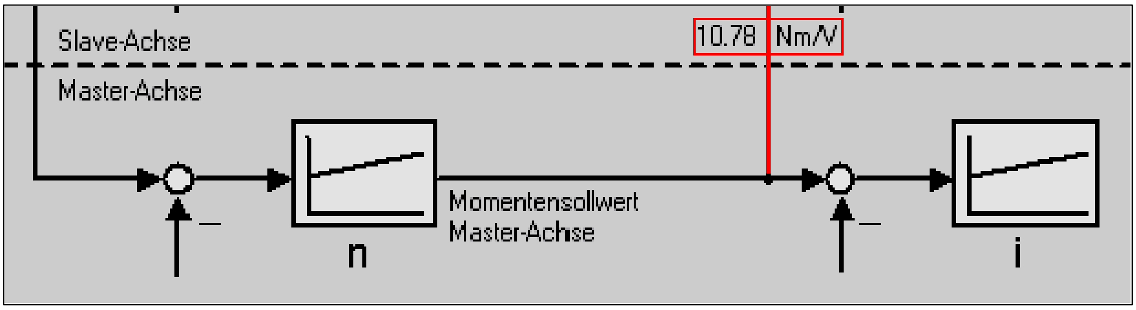


Fig. 6-49 Display, output normalization, master axis

- **Setting for the slave axis for an analog coupling**

  The settings in the menu view "equalization controller" cause the equalization controller to be activated and the input of the slave axis to be set. As the motors move in opposite directions; the direction of rotation is inverted.

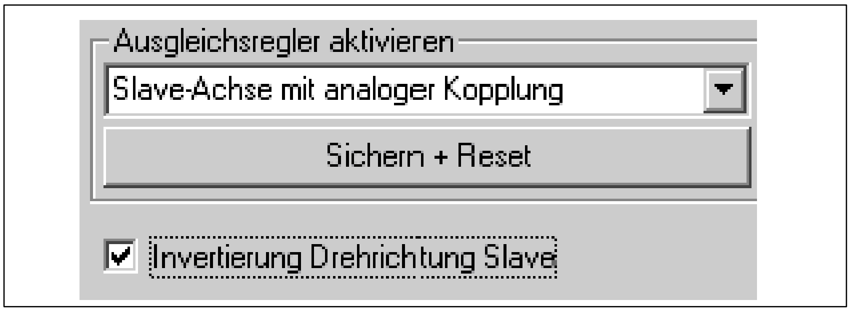


Fig. 6-50 Setting for the slave axis

6

The torque setpoint of the master axis is transferred via the analog inputs. The output normalization and the input normalization must match.

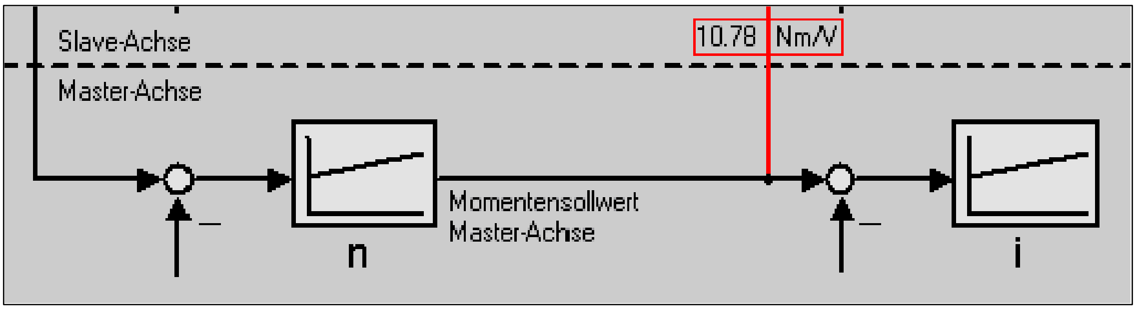


Fig. 6-51 Display, input normalization, slave axis

Recommended setting, equalization controller:

$V_{p\ \text{equalization controller}} = 0.5/V_{p\ \text{speed controller}}$

$T_{N\ \text{equalization controller}} = 10 \bullet T_{N\ \text{speed controller}}$

When inverting the speed, the sign of the torque weighting should be carefully observed.

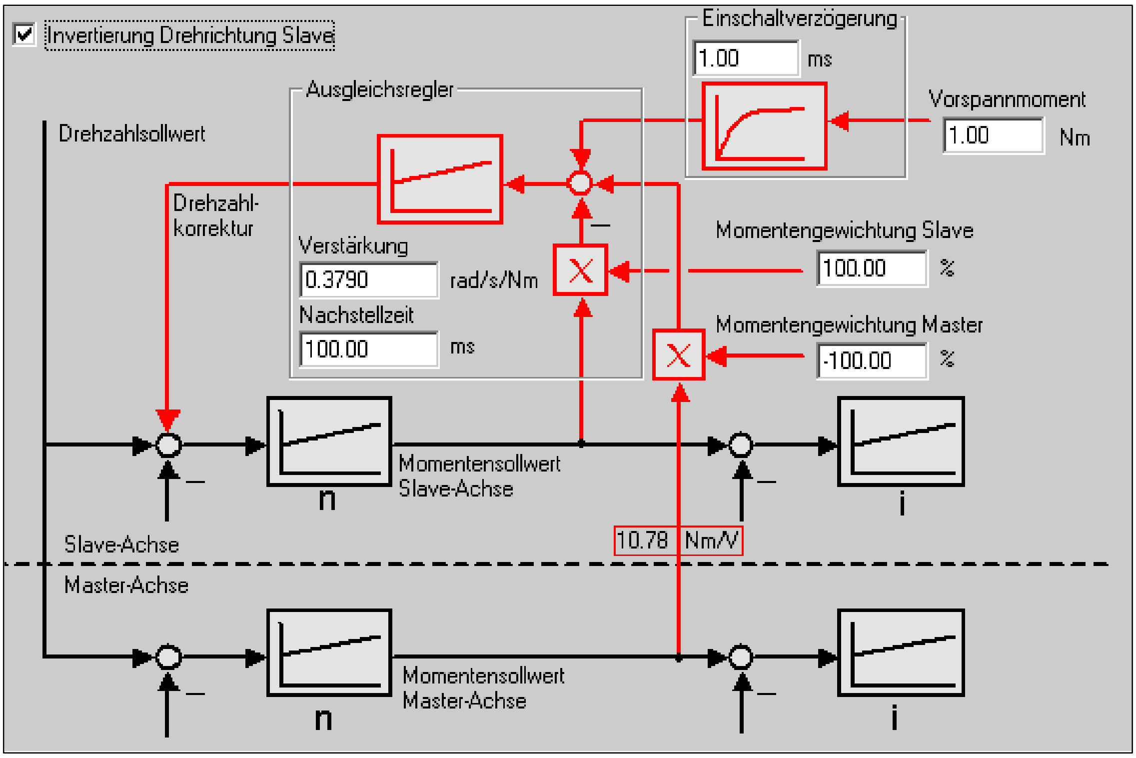


Fig. 6-52 Inverting the direction of rotation, slave axis

6.4 Input/output terminals of the control board

6.4.1 Permanently–connected input terminals

Table 6-42 Permanently–connected input terminals

Terminals Drive A	 Drive B	Function	Description
663 X431.4		Pulse enable, module–specific	The inverter is enabled (motor control), if the enable voltage is available at the following terminals: 1. Terminal 63 (pulse enable, group–specific, at the NE and monitoring module) 2. Terminal 64 (controller enable, group–specific, at the NE or monitoring module) 3. Terminal 48 (contactor control, at the NE module) 4. Terminal 663 (pulse enable, board–specific) 5. Terminal 65.x (controller enable, axis–specific) If terminal 663 is opened while the motor is rotating, the inverter is immediately (< 1 ms) inhibited, and the motors connected to this module coast down in a no–current condition. If the module is enabled using terminal 663, then the enable operation takes approx. 20 ms.
65.A X451.5	65.B X452.5	Axis–specific controller enable	The controller enable is dependent on the following enable signals: 1. Terminal 63 (pulse enable, group–specific, at the NE and monitoring module) 2. Terminal 64 (controller enable, group–specific, at the NE or monitoring module) 3. Terminal 663 (pulse enable, board–specific) 4. Terminal 65.x (controller enable, axis–specific) 5. RFG, fault drive x (internal enable signal) 6. PROFIBUS enable signals If the associated terminal 65.x is opened while the motor is rotating, then the drive brakes along the ramp–function generator ramp. If the n_{min} threshold (P1403) is exceeded (as absolute value), or after the pulse cancellation timer has expired (P1404), the inverter is inhibited (pulses canceled), and the motor is shutdown without any overshoot.

Note:

- x: Space retainer for drive A or B
- If the enable signals are missing, which are required to operate the drive, these can be determined using P0600 (operating display) (refer to Chapter 4.5).

6.4.2 Freely–parameterizable digital input terminals

Description

There are 4 freely parameterizable input terminals for every axis.

A terminal is parameterized by entering the appropriate required function number into the assigned parameter.

Which function numbers are available? —> Refer to Chapter 6.4.3

Note

- Rules when assigning input terminals a multiple number of times

  The terminals are evaluated in the following sequence:
  I0.x – I1.x – I2.x – I3.x – I4 – I5 – ... – I11
  If a function is assigned a multiple number of times to an input terminal, influence is only possible using the ”last” terminal assigned this particular function.
- Rule regarding hardware terminal and PROFIBUS signal

  The hardware terminal has priority over the PROFIBUS signal, this means that a signal via a terminal always has priority over the ”same” PROFIBUS signal.

Notice

The terminals may only be parameterized when the drive pulses are canceled.

If terminal functions are activated, however, are not connected–up, then the ”0” signal is effective.

Overview of the terminals and parameters

There is the following assignment between terminals, drives and parameters:

Table 6-43 Overview of the freely–parameterizable input terminals

Terminals				Parameters						
Drive A		Drive B		No.	Name	Min.	Standard	Max.	Units	Effective
I0.A	X451.7	I0.B	X452.7	0660	Function, input terminal I0.x	0	0 (SRM, SLM) 35 (ARM)	82	–	Immediately
I1.A	X451.8	I1.B	X452.8	0661	Function, input terminal I1.x	0	0 (SRM, SLM) 7 (ARM)	82	–	Immediately

Table 6-43 Overview of the freely–parameterizable input terminals, continued

Terminals				Parameters						
Drive A		Drive B		No.	Name	Min.	Standard	Max.	Units	Effective
I2.A	X451.9	I2.B	X452.9	0662	Function, input terminal I2.x	0	3	82	–	Immediately
I3.A	X451.10	I3.B	X452.10	0663	Function, input terminal I3.x	0	4	82	–	Immediately
–	–	–	–		Each input terminal can be assigned a function using these parameters. The function number from the list of input signals is entered (refer to Chapter 6.4.3). **Note:** The status of the input terminals is displayed in P0678 for diagnostic purposes (refer to Chapter 4.5).					

6.4.3 List of input signals

Reader’s note

The drive receives the input signals, listed in the Tables 6-44 and 6-45 either from an input terminal or as control bit from PROFIBUS–DP. All of the input signals can be found under the index entry ”Input signal...”.

The following must be specified for each signal:

- Fct. No.:
  The function number is required to parameterize the input terminal via the display and operator control unit.
- Operating mode (P0700):
  This specifies in which operating mode the signal is available (x: Available, –: Not available).
  n–set: ”Speed/torque setpoint” mode
  pos: ”Positioning” mode
- PROFIBUS bit:
  The bit name is required to control the signal via PROFIBUS–DP (refer to Chapter 5.6.1).
  Example: STW1.4 —> that means control word 1, bit 4

Table 6-44 Overview of the input signals

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Inactive	**0**	**x**	**x**	**–**
Reset the fault memory	**3**	**x**	**x**	**STW1.7**
Open–loop torque controlled mode	**4**	**x**	**–**	**STW1.14**
Motor data set changeover (from SW 2.4) **1st input/2^0** **2nd input/2^1**	 **5** **6**	 **x** **x**	 **–** **–**	 **STW2.9** **STW2.10**
Ramp–up time zero	**7**	**x**	**x**	**STW2.4**
Integrator inhibit, speed controller	**8**	**x**	**x**	**STW2.6**
Parameter set changeover **1st input/2^0** **2nd input/2^1** **3rd input/2^2**	 **9** **10** **11**	 **x** **x** **x**	 **x** **x** **x**	 **STW2.0** **STW2.1** **STW2.2**
Fixed speed setpoint (from SW 3.1) **1st input/2^0** **2nd input/2^1** **3rd input/2^2** **4th input/2^3**	 **15** **16** **17** **18**	 **x** **x** **x** **x**	 **–** **–** **–** **–**	 **–** **–** **–** **–**
First speed setpoint filter off	**25**	**x**	**x**	**STW2.3**
Suppress fault 608 (from SW 3.1)	**26**	**x**	**x**	**STW2.8**
Spindle positioning on (from SW 5.1)	**28**	**x**	**–**	**STW1.15**
ON/OFF 1 (from SW 8.3)	**31 (from SW 8.3)**	**x**	**x**	**STW1.0**
Operating condition/OFF 2	**32 (from SW 4.1)**	**x**	**x**	**STW1.1**
Operating condition/OFF 3	**33 (from SW 5.1)**	**x**	**x**	**STW1.2**
Enable inverter/pulse inhibit	**34 (from SW 4.1)**	**x**	**x**	**STW1.3**
Ramp–function generator enabled	**35**	**x**	**–**	**STW1.4**
Selection, parking axis	**40**	**x**	**x**	**STW2.7**
Opening the holding brake for test purposes (from SW 4.1)	**42**	**x**	**x**	**STW1.12**
Block selection **1st input/2^0** **2nd input/2^1** **3rd input/2^2** **4th input/2^3** **5th input/2^4** **6th input/2^5**	**50** **51** **52** **53** **54** **55**	**x** **x** **x** **x** **x** **x**	**x** **x** **x** **x** **x** **x**	**SatzAnw.0** **SatzAnw.1** **SatzAnw.2** **SatzAnw.3** **SatzAnw.4** **SatzAnw.5**
Operating condition/reject traversing task	**58**	**–**	**x**	**STW1.4**
Operating condition/intermediate stop	**59**	**–**	**x**	**STW1.5**
Activate traversing task (edge)	**60**	**–**	**x**	**STW1.6**
Incremental jogging (from SW 4.1)	**61**	**–**	**x**	**PosStw.5**

Table 6-44 Overview of the input signals, continued

Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n–set	pos	
Jogging 1 ON/jogging 1 OFF	**62**	**–**	**x**	**STW1.8**
Jogging 2 ON/jogging 2 OFF	**63**	**–**	**x**	**STW1.9**
Activate teach–in (edge) (from SW 4.1)	**64**	**–**	**x**	**PosStw.6**
Control requested/no control requested	**–**	**x**	**x**	**STW1.10**
Start referencing/cancel referencing	**65**	**–**	**x**	**STW1.11**
External block change (from SW 3.1)	**67**	**–**	**x**	**STW1.13**
Fixed end stop, sensor (from SW 3.3)	**68**	**–**	**x**	**PosStw.3**
Request passive referencing (from SW 5.1)	**69**	**–**	**x**	**STW1.15**
Tracking operation	**70**	**–**	**x**	**PosStw.0**
Set reference point	**71**	**–**	**x**	**PosStw.1**
Activates coupling (from SW 3.3)	**72**	**–**	**x**	**PosStw.4**
Activate the coupling via I0.x (from SW 3.3)	**73**	**–**	**x**	**–**
Setpoint setting, master drive (from SW 4.1)	**74**	**–**	**x**	**QStw.0**
Invert the angular incr. encoder input (from SW 3.5)	**75**	**–**	**x**	**PosStw.7**
Reference cams	**78**	**–**	**x**	**PosStw.2**
Equivalent zero mark	**79**	**x**	**x**	**–**
Flying measurement/length measurement (from SW 3.1)	**80**	**x**	**–**	**–**
Plus hardware limit switch (NC contact) (n–set from SW 8.1)	**81**	**x**	**x**	**–**
Minus hardware limit switch (NC contact) (n–set from SW 8.1)	**82**	**x**	**x**	**–**
Activate MDI (from SW 7.1)	83	–	x	SatzAnw.15
Activate angular incremental encoder, handwheel (from SW 8.1)	84	–	x	SatzAnw.13
Angular incremental encoder handwheel evaluation, bit 0 (from SW 8.1)	85	–	x	SatzAnw.11
Angular incremental encoder handwheel evaluation, bit 1 (from SW 8.1)	86	–	x	SatzAnw.12
ON/OFF 1	**–**	**x**	**x**	**STW1.0**
Ramp–function generator start/ramp–function generator stop	**–**	**x**	**–**	**STW1.5**
Enable setpoint/inhibit setpoint	**–**	**x**	**–**	**STW1.6**
Activate function generator (edge) (from SW 8.1)	**–**	**x**	**–**	**STW1.8**
Acceleration time zero for controller enable (from SW 3.1)	**–**	**x**	**–**	**STW1.13**
Motor changed over (from SW 2.4)	**–**	**x**	**–**	**STW2.11**
Master sign–of–life (from SW 3.1)	**–**	**x**	**x**	**STW2.12 STW2.13 STW2.14 STW2.15**

6

Table 6-45 List of input signals

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td>Inactive</td><td>0</td><td>x</td><td>x</td><td>–</td></tr>
<tr><td colspan="5">The input with this function is switched ”inactive”.
The input terminal can still be connected–up, but is not evaluated.
Application:
During commissioning (start–up), ”disturbing” inputs are first disabled, and are then activated later and commissioned.</td></tr>
<tr><td>Reset fault memory</td><td>3</td><td>x</td><td>x</td><td>STW1.7</td></tr>
<tr><td colspan="5">Faults that are present that are acknowledged with RESET FAULT MEMORY, are reset via this input signal.
Before acknowledging faults/errors, their cause must first be removed.
Prerequisites: The controller enable signal at terminal 65.x has been withdrawn.
1 signal No effect
0/1 signal The fault memory is reset and the fault(s) acknowledged using a 0/1 edge.
0 signal No effect
Note:
• Faults, which can be acknowledged with POWER ON, cannot be reset in this fashion.
• The drive remains in the fault condition until all of the faults/errors have been removed. In the PROFIBUS mode the system then goes into the ”power–on inhibit” status.
• From SW 6.1 onwards and for P1012.12=1, the fault can also be acknowledged without the prerequisite that the control signal STW1.0=0. The drive however, remains in the ”power–on inhibit” condition.</td></tr>
<tr><td>Open–loop torque controlled mode</td><td>4</td><td>x</td><td>–</td><td>STW1.14</td></tr>
<tr><td colspan="5">It is possible to toggle between closed–loop speed controlled and open–loop torque controlled operation via this input signal.
1 signal Open–loop torque controlled operation (M_{set} mode)
0 signal Closed–loop speed controlled operation (n_{set} mode)
Application: Master/slave, refer to Chapter 6.6.5.</td></tr>
<tr><td>Motor data set changeover (from SW 2.4)
1st input/2^0
2nd input/2^1</td><td>
5
6</td><td>
x
x</td><td>
–
–</td><td>
STW2.9
STW2.10</td></tr>
<tr><td colspan="5">It is possible to toggle between a total of 4 motors/motor data sets using these 2 input signals.
<table>
<tr><th>Motor data set</th><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>1st input/weighting 2^0</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>2nd input/weighting 2^1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
</table>
Note:
• The motor changeover version and therefore the behavior of the terminal, is selected using P1013 (motor changeover).
• Output terminal signals with function numbers 11, 12, 13 and 14 (motors 1, 2, 3 or 4 selected) are used to control the contactors to change over the motor.
• In order to ensure that the function changes over in a controlled fashion (identified as being simultaneous) the switching operation of the inputs must be completed with one interpolation clock cycle (P1010).
• Motor changeover is described in Chapter 6.11.</td></tr>
</table>

Table 6-45 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Ramp–up time zero	**7**	**x**	**x**	**STW2.4**
The ramp–function generator (RFG) can be switched–in and out via this input signal. 1 signal Ramp–function generator off This acts just like a ramp–up and ramp–down of the ramp–function generator of 0 ms. 0 signal Ramp–function generator on				
Integrator inhibit, speed controller	**8**	**x**	**x**	**STW2.6**
The integral component of the speed controller can be inhibited or enabled using this input signal. 1 signal Integrator inhibit, speed controller 0 signal The speed controller integrator is not inhibited **Note:** For a 1 signal, the integral component of the speed controller is deleted (cleared) and the integrator is inhibited.				
Parameter set changeover **1st input/2^0** **2nd input/2^1** **3rd input/2^2**	 **9** **10** **11**	 **x** **x** **x**	 **x** **x** **x**	 **STW2.0** **STW2.1** **STW2.2**

It is possible to toggle between a total of 8 parameter sets using these 3 input signals.

Parameter set	0	1	2	3	4	5	6	7
1st input/weighting 2^0	0	1	0	1	0	1	0	1
2nd input/weighting 2^1	0	0	1	1	0	0	1	1
3rd input/weighting 2^2	0	0	0	0	1	1	1	1

Standard setting

Note:

- The bits, which are not assigned to an input terminal, are treated just like a 0 signal.
- To change over, e.g. from parameter set 0 to 1, only the signal of the 1st input is necessary.
- In order to ensure that the function changes over in a controlled fashion (identified as being simultaneous) the switching operation of the inputs must be completed with one interpolation clock cycle (P1010).
- The ”parameter set changeover” function is described in Chapter 6.10.

Table 6-45 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Fixed speed setpoint (from SW 3.1)				
1st input/2^0	**15**	**x**	**–**	**–**
2nd input/2^1	**16**	**x**	**–**	**–**
3rd input/2^2	**17**	**x**	**–**	**–**
4th input/2^3	**18**	**x**	**–**	**–**

Using these input signals, the ”fixed speed setpoint” function can be selected with the required fixed setpoints 1 to 15, or the function can be canceled.

Fixed speed setpoint		**1**	**2**	**3**	**4**	**5**	**...**	**15**
1st input/weighting 2^0	0	1	0	1	0	1	...	1
2nd input/weighting 2^1	0	0	1	1	0	0	...	1
3rd input/weighting 2^2	0	0	0	0	1	1	...	1
4th input/weighting 2^3	0	0	0	0	0	0	...	1
Active fixed speed setpoint	↑	P0641:1	P0641:2	P0641:3	to			P0641:15

Canceling the function

Selecting the function and the required fixed setpoint

Note:

- The ”fixed speed setpoint” function is described in Chapter 6.1.6.
- If the function is canceled, an analog setpoint can be entered via terminals 56.x/14 and/or terminals 24.x/20.
- In order to ensure that the function changes over in a controlled fashion (identified as being simultaneous) the switching operation of the inputs must be completed with one interpolation clock cycle (P1010).
- Refer to the ”status, fixed speed setpoint 1st to 4th input” output signal in Chapter 6.4.6.

Signal name, description	Fct. No.	n–set	pos	PROFIBUS bit
First speed setpoint filter off	**25**	**x**	**x**	**STW2.3**

The first speed setpoint filter is switched–in/switched–out using this input signal.

Important:

This function is only effective if the filter was parameterized using P1501:8 as lowpass filter (e.g. PT1).

Thus, the low–pass filter of the 1st speed setpoint filter can be disabled/enabled using this input signal, which allows the speed setpoint to be smoothed.

1 signal	First speed setpoint filter is disabled	—>	Low–pass filter is disabled
0 signal	First speed setpoint filter is enabled	—>	Low–pass filter is enabled

Note:

The status of the 1st speed setpoint filter is displayed using the ”first speed setpoint filter inactive” output signal.

Table 6-45 List of input signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td>Suppress fault 608 (from SW 3.1)</td><td>26</td><td>x</td><td>x</td><td>STW2.8</td></tr>
<tr><td colspan="5">Fault 608 (speed controller output limited) can be suppressed/displayed using this input signal.
1 signal Fault 608 (speed controller output limited) is suppressed
0 signal Fault 608 is not suppressed
Note:
• The status of the suppressed function is signaled via the PROFIBUS status signal ZSW2.8 ”Suppressing fault 608 active (from SW 3.1)”.
• Refer under the index entry ”Output signal – suppress fault 608 active (from SW 3.1)”
• It is also possible to suppress the fault using P1601.8 (faults which can be suppressed 2, Fault 608).</td></tr>
<tr><td>Spindle positioning on (from SW 5.1)</td><td>28</td><td>x</td><td>–</td><td>STW1.15</td></tr>
<tr><td colspan="5">The function is activated using this input signal.
1 signal Activates the ”spindle positioning” function
0 signal De–activates the function
Note:
• Prerequisites to activate the ”Spindle positioning” function
  – ”n–set” mode —> P0700 = 1
• The ”spindle positioning” function is described in Chapter 6.15 (from SW 5.1).</td></tr>
<tr><td>ON/OFF 1</td><td>31 (from SW 8.3)</td><td>x</td><td>x</td><td>STW1.0</td></tr>
<tr><td colspan="5">0/1 signal ON
state ”drive ready”
The prerequisite is that STW1.1 and STW1.2 or the input signals ”operating condition / OFF2” (Fct. No. 32) and ”operating condition / OFF3” (Fct. No. 33) are also set.
The pulses remain canceled until the prerequisites for pulse enable have been fulfilled.
0 signal OFF 1
Stop
The drive brakes along the ramp–function generator ramp.
The gating pulses of the power transistors are cancelled (pulse inhibit) if one of the following conditions is fulfilled:
– $|n_{act}|$ < n (P1403)
or
– the pulse cancellation timer stage (P1404) has expired</td></tr>
<tr><td>Operating condition/OFF 2</td><td>32 (from SW 4.1)</td><td>x</td><td>x</td><td>STW1.1</td></tr>
<tr><td colspan="5">1 signal Operating condition
Prerequisite for the ”drive ready” status.
0 signal OFF 2
The motor is switched into a no–current condition and ”coasts down”.
Note:
The characteristics at power–on again can be defined via P1012.12.
P1012.12 = 1 Power–on inhibit for alarm and OFF 2/OFF 3
  = 0 No power–on inhibit</td></tr>
</table>

6

Table 6-45 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Operating condition/OFF 3	**33 (from SW 5.1)**	**x**	**x**	**STW1.2**
1 signal — Operating condition Prerequisite for the ”drive ready” status and ”ready to power–up”. 0 signal — OFF 3 Fast stop The drive brakes along the torque limit/current limit without ramp–function generator. In the open–loop torque controlled mode, this limit only corresponds to the torque setpoint entered and not the maximum possible torque. The gating pulses of the power transistors are cancelled (pulse inhibit) if one of the following conditions is fulfilled: – $\|n_{act}\| < n$ (P1403) or – the pulse cancellation timer stage (P1404) has expired **Note:** The characteristics at power–on again can be defined via P1012.12. P1012.12 = 1 Power–on inhibit for alarm and OFF2/OFF3 = 0 No power–on inhibit				
Enable inverter/pulse inhibit	**34 (from SW 4.1)**	**x**	**x**	**STW1.3**
1 signal — Enable inverter Pulse enable, ramp–up with the setpoint entered 0 signal — Pulse inhibit The motor coasts down. In closed–loop speed controlled operation, the ”drive ready” state remains set.				
Ramp–function generator enable	**35**	**x**	**–**	**STW1.4**
This input signal has the following characteristics, dependent on the signal level: 1 signal — Ramp–function generator is enabled Any speed setpoint can be entered. This is the condition that the motor rotates. 1/0 signal — Ramp–function generator is not longer enabled The drive brakes at the torque/current limit without ramp–function generator. This is the fastest possible braking at the torque/current limit. 0 signal — The ramp–function generator output (speed setpoint) is set to 0. **Application:** The drive can be braked as quickly as possible using this signal, i.e. not along the ramp–function generator ramp, but at the torque limit.				

Table 6-45 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Selection, parking axis	**40**	**x**	**x**	**STW2.7**
The drive can be declared a ”parking axis”, using this input signal. 1 signal ”Parking axis” selected The parking axis selection is only activated when the pulses are canceled or the controller is inhibited with subsequent pulse cancellation (e.g. using terminal 663, 63, 65.x, control signal ON/OFF 1) (refer to the output signal ”parking axis selected”). The encoder–specific monitoring functions are suppressed for a parking axis. The output signal ”reference point set” is withdrawn. 0 signal ”Parking axis” canceled The monitoring functions are active corresponding to the setting in P1600. **Application:** It is possible to change over from one motor encoder unit to another unit using the ”parking axis” function, without having to power down the drive. **Note:** After the ”parking axis” function has been canceled, the following is valid: • Incremental measuring system: The axis must be re–referenced (refer to Chapter 6.2.5). • Absolute measuring system (EnDat): The axis must be re–adjusted (refer to Chapter 6.2.7). The adjustment status cannot be withdrawn by just selecting or canceling the ”parking axis” function. This status is only permanently withdrawn when an another absolute value encoder has also been automatically detected.				
Opening the holding brake for test purposes (from SW 4.1)	**42**	**x**	**x**	**STW1.12**
A holding brake can be opened for test purposes during the commissioning phase using this input signal. 1 signal The function is activated 0 signal De–activates the function **Note:** This input signal is only evaluated if the brake control is activated using P0850 = 1. In the operating mode, the brake is controlled using P0850 (operating sequence control) and not via this input signal.				

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Table 6-45 List of input signals, continued

Signal name, description		Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Block selection	**1st input/2^0**	**50**	**x**	**x**	**SatzAnw.0**
	2nd input/2^1	**51**	**x**	**x**	**SatzAnw.1**
	3rd input/2^2	**52**	**x**	**x**	**SatzAnw.2**
	4th input/2^3	**53**	**x**	**x**	**SatzAnw.3**
	5th input/2^4	**54**	**x**	**x**	**SatzAnw.4**
	6th input/2^5	**55**	**x**	**x**	**SatzAnw.5**

Traversing blocks 0 to 63 can be selected using these 6 input signals.

Block number	**0**	**1**	**2**	**3**	**4**	**5**	**...**	**31**	**...**	**63**
1st input/weighting 2^0	0	1	0	1	0	1	...	1	...	1
2nd input/weighting 2^1	0	0	1	1	0	0	...	1	...	1
3rd input/weighting 2^2	0	0	0	0	1	1	...	1	...	1
4th input/weighting 2^3	0	0	0	0	0	0	...	1	...	1
5th input/weighting 2^4	0	0	0	0	0	0	...	1	...	1
6th input/weighting 2^5	0	0	0	0	0	0	...	0	...	1

Note:

- The bits, which are not assigned to an input terminal, are treated just like a 0 signal.
- When a block is selecting using PROFIBUS–DP (control word SatzAnw), the sign is not evaluated. The PROFIBUS bits SatzAnw.6...15 are ignored, e.g. an input of 65 is interpreted as 1.
- Also refer to the input signal ”activate traversing task (edge)”

Signal name, description	Fct. No.	n–set	pos	PROFIBUS bit
Operating condition/reject traversing task	**58**	**–**	**x**	**STW1.4**

This input signal is used as traversing enable to process traversing blocks.

1 signal Operating condition for positioning
The 1 signal is a prerequisite so that a traversing task can be activated.

0 signal The traversing task is rejected
When the block is being actively processed, the drive brakes with the specified deceleration (P0104) taking into account the deceleration override (P0084) to n = 0 with the following effects:
– The drive remains in closed–loop position control and the standstill monitoring function is activated
– The actual traversing task is rejected and **delete residual distance** is carried–out.

Note:

- If the axis was stopped with an ”intermediate stop”, and ”reject traversing task” was requested, then a delete distance to go is also executed.
- As long as ”reject traversing task” is present, a traversing block cannot be started, i.e. the ”activate traversing task (edge)” signal is ignored
- Execute traversing blocks:
  - Before SW 3.3 the following applies:

    This signal must be supplied to execute traversing blocks.
  - From SW 3.3, the following applies:

    In order to execute traversing blocks, it is no longer necessary to supply this signal.
    —> However, only if the signals are not connected to an input.
- Also refer to the input signal ”activate traversing task (edge)”

Table 6-45 List of input signals, continued

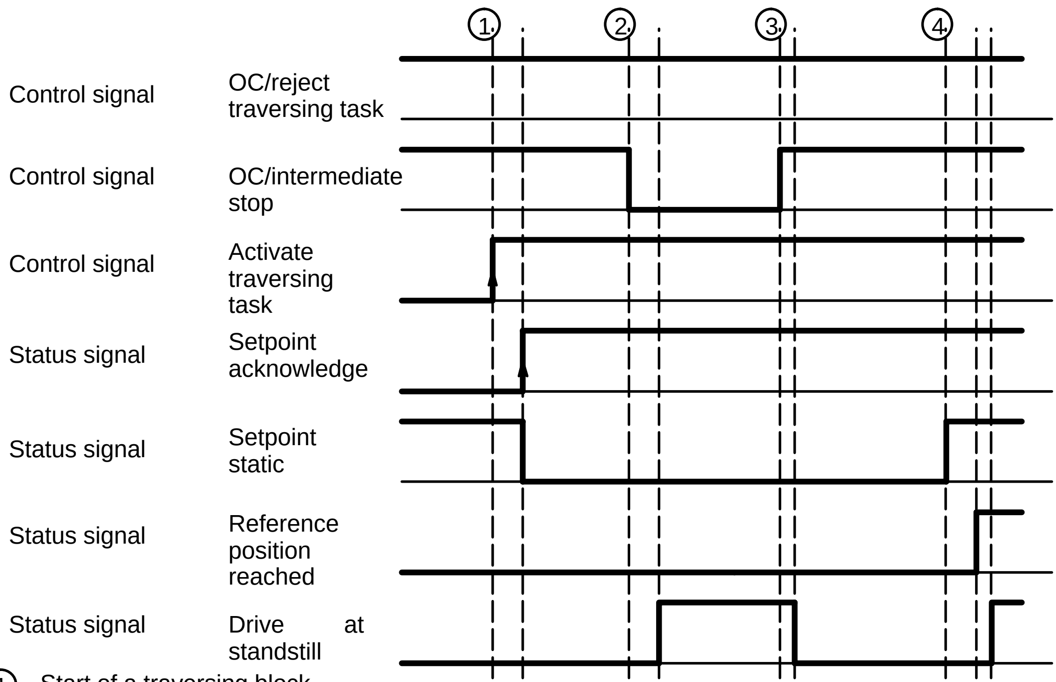
Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Operating condition/intermediate stop	**59**	**–**	**x**	**STW1.5**

Using this input signal, traversing block processing can be interrupted and then continued.

1 signal — Operating condition for positioning
The 1 signal must be continuously present in order to process a traversing block.

0/1 signal — A traversing block, interrupted by ”intermediate stop”, is continued.

0 signal — Intermediate stop
When the block is being actively processed, the drive brakes with the specified deceleration (P0104) taking into account the deceleration override (P0084) to n = 0 with the following effects:
– The drive remains in closed–loop position control and the standstill monitoring function is activated
– The actual traversing task is not rejected and is continued for a 0/1 edge



1. Start of a traversing block
2. Interrupting the traversing block using ”intermediate stop”
3. Continuing the traversing block
4. End of positioning

Note:

- An axis in ”intermediate stop” can be traversed in the jog mode or referencing can be started. The interrupted traversing block is exited.
- Execute traversing blocks:
  - Before SW 3.3 the following applies:
    This signal must be supplied to execute traversing blocks.
  - From SW 3.3, the following applies:
    In order to execute traversing blocks, it is no longer necessary to supply this signal.
    —> However, only if the signals are not connected to an input.

6

Table 6-45 List of input signals, continued

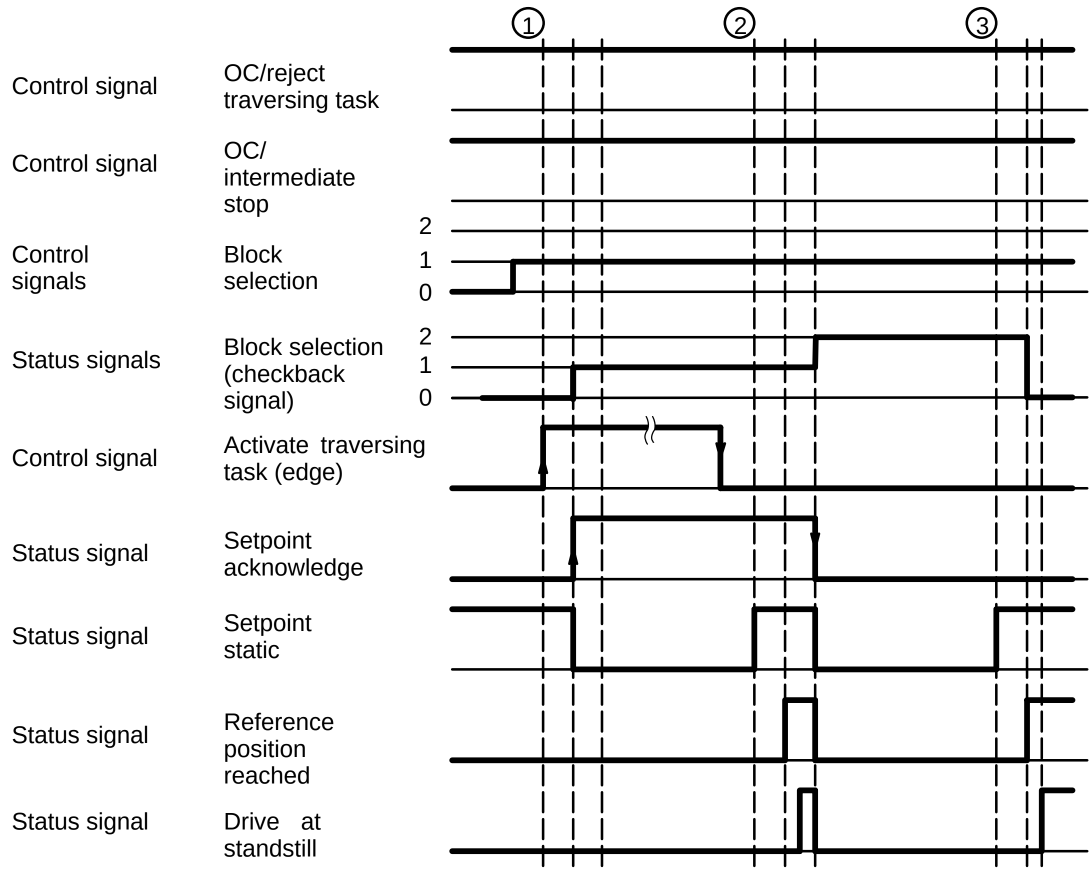
Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Activate traversing task (edge)	**60**	**–**	**x**	**STW1.6**

A 0/1 edge of this input signal starts the traversing block selected using ”block selection”.

An edge change is only permissible, if

- The drive has confirmed the previous traversing block via the ”acknowledge setpoint” output signal
- The axis is referenced
  (reference point set/no reference point set” output signal = ”1”)
- The input signals ”operating condition/intermediate stop” and ”operating condition/reject traversing task” must be set to 1 in order to be able to start a block.

If a traversing task is activated and the secondary conditions are not fulfilled, then an appropriate warning is signaled. The ”setpoint acknowledgment” output signal is only set if the block was started so that a traversing task can be activated with the next signal edge.



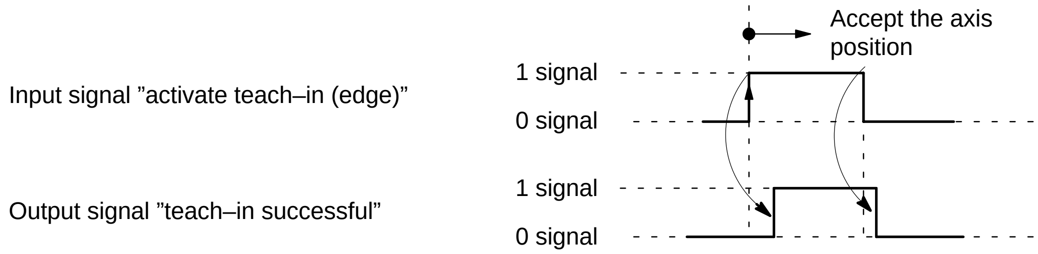
1 Select and start a traversing block
2 End of the positioning operation and automatic block change
3 End of the positioning operation and end of program

Table 6-45 List of input signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td>Incremental jogging (from SW 4.1)</td><td>61</td><td>–</td><td>x</td><td>PosStw.5</td></tr>
<tr><td colspan="5">This input signal is used to define whether jogging is executed via velocity or via velocity and increments.
1 signal Jogging via velocity and increments is effective
0 signal Jogging via velocity is effective
Note:
This input signal is effective for jogging 1 and jogging 2.
The ”jogging mode” function is described in Chapter 6.2.9.</td></tr>
<tr><td>Jogging 1 ON/jogging 1 OFF</td><td>62</td><td>–</td><td>x</td><td>STW1.8</td></tr>
<tr><td>Jogging 2 ON/jogging 2 OFF</td><td>63</td><td>–</td><td>x</td><td>STW1.9</td></tr>
<tr><td colspan="5">Using these input signals closed–loop speed controlled traversing is possible in the ”positioning” mode, without changing the mode.
• For jogging 1, the drive traverses with the speed/velocity in P0108.
• For jogging 2, the drive traverses with the speed/velocity P0109.
1 signal The drive traverses with the parameterized speed/velocity
1/0 signal The drive brakes down to standstill with the deceleration set in P0104 (maximum deceleration). The closed–loop position control is re–activated after the braking operation has been completed.
0 signal Output status for jogging
0/1 signal The drive accelerates to the speed/velocity, parameterized in P0108/P0109 with the acceleration set in P0103 (maximum acceleration)
Note:
For jogging, the software limit switch and the override are effective.</td></tr>
</table>

6

Table 6-45 List of input signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td>Activate teach–in (edge) (from SW 4.1)</td><td>64</td><td>–</td><td>x</td><td>PosStw.6</td></tr>
<tr><td colspan="5">The ”teach–in” function is activated using this input signal.
When activated, the actual position reference value is entered as position reference value for the selected traversing block.
1 signal No effect
1/0 signal Resets the ”teach–in successful” output signal
0 signal No effect
1/0 edge Activates ”teach–in” and transfer the instantaneous axis position into the teach–in block


Note:
• Prerequisites to activate the ”teach–in” function:
– ”Positioning” mode —> P0700 = 3
– Traversing program isn’t running —> Output signal ”drive stationary” = ”1”
– Axis is referenced —> Output signal ”reference point set” = ”1”
• Refer under the index entry ”Output signal – teach–in successful”
• The ”teach–in” function is described in Chapter 6.13.</td></tr>
<tr><td>Control requested/no control requested</td><td>–</td><td>x</td><td>x</td><td>STW1.10</td></tr>
<tr><td colspan="5">1 signal This input signal must be set so that process data, transferred from the PROFIBUS master, is accepted by the slave and becomes effective.
Recommendation:
The input signal should only be set to ”1”, after the PROFIBUS slave has signaled back a realistic status using the status bit ”control requested/no control possible” = ”1”.
0 signal Data transferred from the PROFIBUS master is rejected by the slave, i.e. it is accepted as zero.</td></tr>
<tr><td>Start referencing/cancel referencing</td><td>65</td><td>–</td><td>x</td><td>STW1.11</td></tr>
<tr><td colspan="5">... starts the reference point approach of an axis.
0/1 signal The reference point approach is started
1/0 signal A reference point approach which has been started is interrupted
The drive brakes with the deceleration rate specified in P0104 (maximum deceleration).
The ”reference point set” output signal remains at ”0”.</td></tr>
</table>

Table 6-45 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
External block change (from SW 3.1)	**67**	**–**	**x**	**STW1.13**

For a traversing block with the block change enable CONTINUE EXTERNAL, a flying block change can be initiated using this input signal (refer to Chapter 6.2.10).

0/1 edge or

1/0 edge — The external block change is initiated
When the edge is detected, in addition to the block change, the position actual value of the axis is written into P0026 (position actual value, block change).
The behavior when the signal edge is missing can be set using P0110 (configuration, external block change).

Note:

If the braking distance of the new block is too high due to a lower velocity override, then the block change enable is changed from CONTINUE FLYING to CONTINUE WITH STOP.

The ”external block change” function can be initiated as follows:

- Using input terminal I0.x or, for a direct measuring system, via I0.B (P0672)
  - Recommended if P0110 ⩽ 1, as it is a fast input
  - If the ”external block change” function was parameterized at input terminal I0.x, then other terminals with this function, or the ”external block change” PROFIBUS control signal, no longer have any effect.
  - The external block change is detected depending on the direction.

    The following applies:
    Traversing in a positive direction —> the 1/0 edge is identified as external block change
    Traversing in the negative direction —> the 0/1 edge is identified as external block change

    The actual value can be inverted using P1011.0, P0231 and P0232.

    There is no inversion, if none or 2 of these parameters are set to invert

    —> increasing (decreasing) position actual value corresponds to a positive (negative) direction

    The value is inverted, if one or all 3 parameters are set to invert.

    —> increasing (decreasing) position actual value corresponds to a negative (positive) direction
  - The value in P0026 corresponds to the existing position when the block change is detected.
- Using input terminal I1.x to I3.x or I4 to I11
  - Recommended, if P0110 ⩾ 2
  - The external block change is independent of the direction.
  - The value in P0026 does not precisely correspond to the block change position due to internal signal propagation times.
- Using the PROFIBUS control signal STW1.13
  - The external block change is independent of the direction.
  - The value in P0026 does not precisely correspond to the block change position due to internal signal propagation times.
- Refer under the index entry ”Block change enable – CONTINUE EXTERNAL”.

Note:

If P0110 ⩾ 2, then input terminal I0.x or I0.B may not be used as input, as, for these, the block change can be initiated from different signal edges.

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Table 6-45 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Fixed end stop, sensor (from SW 3.3)	**68**	**–**	**x**	**PosStw.3**
Using this input signal, the drive recognizes the ”fixed endstop reached” status via an external sensor. 1 signal Fixed endstop is reached 0 signal Fixed endstop has not been reached (standard) **Prerequisites:** The signal is only effective, if P0114 (fixed endstop, configuration 2) = 1. **Note:** The ”travel to fixed endstop” function is described in Chapter 6.12.				
Request passive referencing (from SW 5.1)	**69**	**–**	**x**	**STW1.15**
Using this input signal, passive referencing for the slave drive is controlled. 1/0 signal Set reference point P0179 = 0: The value in P0160 (reference point coordinate) is set as the actual axis position. = 2: The axis moves through the deviation to the reference position. 0/1 signal The reference cam and zero mark search are activated An appropriate fault is signaled if a zero mark has not been found up to the 1/0 edge. **Note:** The ”passive referencing” function is described in Chapter 6.3.				
Tracking mode	**70**	**–**	**x**	**PosStw.0**
The tracking mode for the axis is selected via this input signal. 1 signal Selecting tracking operation The axis is switched into the tracking mode if the controller enable is additionally withdrawn via terminal 65.x. In the tracking mode, the position control loop is open. The position reference value continuously tracks the actual value, i.e. the actual value is further sensed and updated but a setpoint is not output. If the axis is shifted from its position due to external effects, then the monitoring does not output an error message. 0 signal Canceling the tracking mode If the controller is re–enabled, then the axis movement continues at the new actual position which could have changed. The position control loop is closed. **Note:** • The tracking mode status is displayed via the ”tracking mode active” output signal. • The tracking mode can also be selected as internal control response to an error. • Refer under the index entry ”Tracking mode”				

Table 6-45 List of input signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td>Set reference point</td><td>71</td><td>–</td><td>x</td><td>PosStw.1</td></tr>
<tr><td colspan="5">An axis can be assigned a required actual value (P0160) (actual value setting) at any position using the 0/1 edge of the input signal. This is only possible if a traversing block is not being executed
0/1 signal The reference point is set, i.e. the value P0160 is assigned as actual position. After this, the axis is considered to have been referenced (output signal ”reference point set” = ”1”).
Note:
If the reference point is still set again (new command), then for the backlash compensation, the system behaves as if the reference point was not set again.</td></tr>
<tr><td>Coupling is activated (from SW 3.3)</td><td>72</td><td>–</td><td>x</td><td>PosStw.4</td></tr>
<tr><td colspan="5">The coupling, set via P0410, is activated using this input signal.
1 signal No function
0/1 signal Activate coupling
The coupling is activated corresponding to P0410.
P0410
= 1 or 2 —> Coupling is switched–in
= 3 or 4 —> The signal has no significance
= 5 or 6 —> The coupled position is transferred into the queue (being prepared)
= 7 —> Coupling is switched–in at the absolute position of the master drive (from SW 4.1)
= 8 —> Coupling via the traversing program to the absolute position of the master drive (from SW 4.1)
0 signal Coupling–out, initial status
Note:
• Recommended for powering–up with a precise position:
Use the fast input I0.x on the control board.
—> refer to the input signal ”activate coupling via I0.x” (function number 73)
• The position when switching–in the coupling is displayed in P0425:0.
• The ”axis coupling” function is described in Chapter 6.3.</td></tr>
</table>

Table 6-45 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Activate coupling via I0.x (from SW 3.3)	**73**	**–**	**x**	**–**

The coupling, set via P0410 is activated via the fast input I0.x using this input signal.

The activate coupling ”input signal” (function number 72) prepares the switching–in process via terminal I0.x.

The edge of the input signal ”activate coupling via I0.x” (function number 73) switches–in the coupling.

The coupling is switched–out via the ”activate coupling” input signal (function number 72).

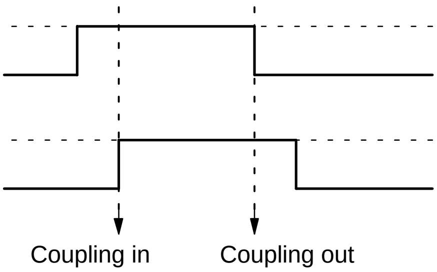
1 signal	No significance
1/0 signal	This edge switches–in the coupling for a positive traversing direction of the master axis
0/1 signal	This edge switches–in the coupling for a negative traversing direction of the master axis Prerequisites: Input signal, ”activate coupling” (function number 72) = ”1”
0 signal	No significance

Input signal, ”activate coupling”

Input terminal with function number 72 or control signal PosStw.4

Input signal, ”activate coupling via I0.x”

Input terminal I0.x with function number 73



Note:

- The position when switching–in the coupling is displayed in P0425:0.
- Function number 73 is only effective when assigned to input terminal I0.x.
- The ”activate coupling via I0.x” signal is recognized, dependent on the direction.
  —> refer under the index entry ”Input signal, digital – external block change”
- The ”axis coupling” function is described in Chapter 6.3.

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Set setpoint, master drive (from SW 4.1)	**74**	**–**	**x**	**QStw.0**

The absolute position of the master drive is set in the slave drive to the reference point coordinates using this input signal.

1 signal	No significance
0/1 signal	The absolute position of the master drive is signaled to the slave drive once
0 signal	No significance

Note:

- The input signal ”set setpoint, master drive” is only required for P0891 = 0 or 1. Only after this, may a coupling be switched–in to the absolute position of the master drive (P0410 = 7 or 8)
  —> otherwise, Fault 177 is output.
- The reference point coordinates of the master drive are signaled to the slave drive using P0400.
- The ”axis coupling” function is described in Chapter 6.3.

Table 6-45 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Invert the angular incremental encoder input (from SW 3.5)	**75**	**–**	**x**	**PosStw.7**

The incremental position reference value, received via the angular incremental encoder interface, can be inverted using this input signal. When inverting, the incremental position reference value becomes effective in the opposite direction.

1 signal	Inverting the incremental position reference value via the angular incremental encoder interface
0 signal	No inversion

Note:

- Angular incremental encoder interface as input refer to Chapter 6.8.2
- The signal may only change when the axis is stationary.

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Reference cams	**78**	**–**	**x**	**PosStw.2**

This input signal is used to signal, when referencing, whether the axis remains stationary at the reference cam.

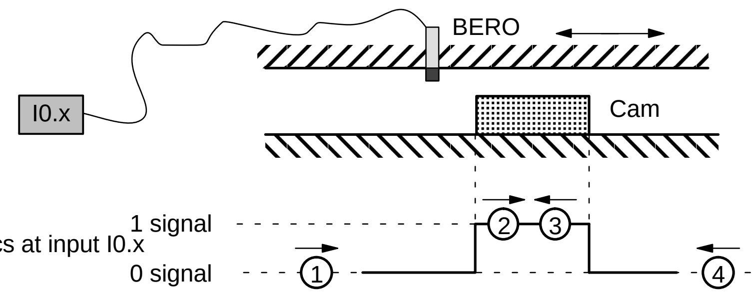
1 signal	The axis is located at the reference cam
0 signal	The axis is not located at the reference cam

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Equivalent zero mark	**79**	**x**	**x**	**–**

If the encoder zero pulse cannot be evaluated when referencing, then a signal supplied from a mounted sensor can be fed via this input as ”zero mark equivalent”.

1 signal	No significance
1/0 signal	When passing the zero mark cam in a positive direction, this edge is detected as the equivalent zero mark
0/1 signal	When passing the zero mark cam in a negative direction, this edge is detected as the equivalent zero mark
0 signal	No significance

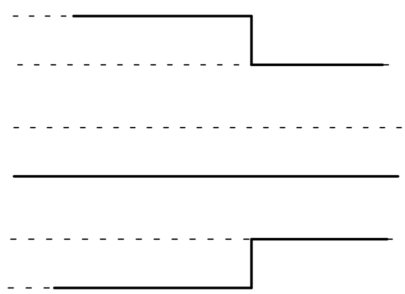
Assumption:
The BERO is high active



1 2 Starting in front of or at the cam and traversing in a positive direction —> the 1/0 edge at input I0.x is identified as equivalent zero mark

3 Starting at the cam and traversing in a negative direction —> an equivalent zero mark is not identified

4 Starting after the cam and traversing in a negative direction —> the 0/1 edge at input I0.x is identified as the equivalent zero mark



6

Table 6-45 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit

Note:

- This function must be executed via input terminal I0.x (fast input).
- Activate the ”equivalent zero mark” function for an incremental measuring system:
  - refer to P0174
  - refer to P0879.13 or P0879.14
- The equivalent zero mark is identified as a function of the direction.
- The actual value can be inverted using P1011.0, P0231 and P0232.
  - There is no inversion, if none or 2 of these parameters are set to invert
    —> increasing (decreasing) position actual value corresponds to a positive (negative) direction
  - The value is inverted, if one or all 3 parameters are set to invert.
    —> increasing (decreasing) position actual value corresponds to a negative (positive) direction

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Flying measurement/length measurement (from SW 3.1)	**80**	x	–	–

The encoder actual value can be retrieved via an input with this function.

0/1 signal or
1/0 signal The actual encoder value is retrieved

Note:

- This function must be executed via the fast I0.x input.
- The function is only available for ”Motion Control with PROFIBUS–DP”.
  —> refer under the index entry ”Encoder interface (from SW 3.1)”
- The function is only available for the control board ”SIMODRIVE 611 universal” from Order No. 6SN1118–xxxxx–0AA**2** and control board ”SIMODRIVE 611 universal HR”.
- This function cannot be executed for spindle positioning active (P0125=1).
- The measuring probe signal is defined depending on the parameterized edge in control word Gx_STW.0/1 (refer to Chapter 5.6.4).
- The edge clearance must be at least 150 ms. Measuring probe edges that are received faster (low clearance between signals) cannot be evaluated.

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Plus hardware limit switch (NC contact)	**81**	x 1)	x	–
Minus hardware limit switch (NC contact)	**82**	x 1)	x	–

A hardware limit switch can be connected at an input with this function in order to limit the traversing range in either the positive or negative direction.

1/0 signal The plus or minus hardware limit switch has been actuated
The axis is braked. The drive remains in closed–loop control.
In the pos mode:
The axis can be moved away from the limit switch in the jog mode.
In the n–set mode (from SW 8.1):
The axis can be moved away from the limit switch using a setpoint that is opposite to the approach direction.

1 signal No significance

Note:

1) from SW 8.1

—> refer under the index entry ”hardware limit switch”

Table 6-45 List of input signals, continued

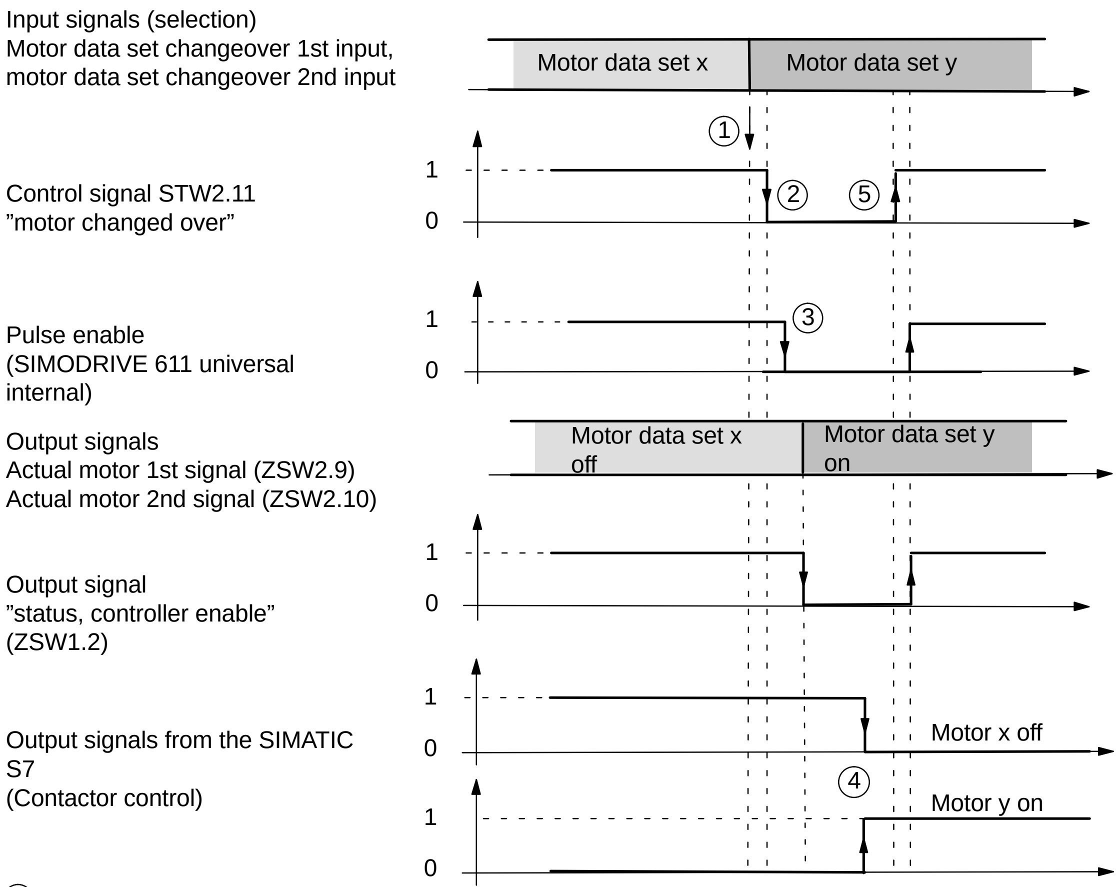
Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Activate MDI (from SW 7.1)	**83**	**–**	**x**	**SatzAnw.15**
1 signal: The MDI function is activated. 0 signal: The MDI function is not activated. **Note:** If MDI is switched–in with the traversing program active, or is switched–out while the traversing block is running, alarm 144 is initiated which interrupts the traversing program/traversing block.				
Activate angular incremental encoder, handwheel (from SW 8.1)	**84**	**–**	**x**	**SatzAnw.13**
1 signal: The angular incremental encoder handwheel function is activated. 0 signal: The angular incremental encoder handwheel function is not activated. **Note:** • If the input signal ”jogging 1 ON/jogging 1 OFF” or ”jogging 2 ON/jogging 2 OFF” and ”activate angular incremental encoder, handwheel” are switched–in, Alarm 121 is output. • The ”angular incremental encoder, handwheel” function is described in Chapter 6.8.				
Angular incremental encoder handwheel evaluation, bit 0 (from SW 8.1)	**85**	**–**	**x**	**SatzAnw.11**
Angular incremental encoder handwheel evaluation, bit 1 (from SW 8.1)	**86**	**–**	**x**	**SatzAnw.12**
The factors entered using parameter P0900 are calculated–in using these 2 input signals. **Ang. incr. enc. hwh. eval.**: **1** / **10** / **100** / **1000** (standard setting) Bit 0: 0 / 1 / 0 / 1 Bit 1: 0 / 0 / 1 / 1 **Note:** —> refer under the index entry ”Angular incremental encoder interface”				
Ramp–function generator start/ramp–function generator stop	**–**	**x**	**–**	**STW1.5**
1 signal: The ramp–function generator is enabled 0 signal: The setpoint at the ramp–function generator output is frozen				
Enable setpoint/inhibit setpoint	**–**	**x**	**–**	**STW1.6**
1 signal: Enable setpoint The setpoint at the ramp–function generator input is enabled. 0 signal: Inhibit setpoint The setpoint at the ramp–function generator input is set to zero.				

Table 6-45 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Motor changed over (from SW 2.4)	**–**	**x**	**–**	**STW2.11**

For P1249 = 1 motor changeover is controlled via this input signal.

1 signal	Initial status
1/0 signal	Pulse enable is withdrawn
0 signal	Initial status, selecting a motor corresponding to the motor data set
0/1 signal	Enable the pulses



1. Selects the required motor data set
2. Signal to ”SIMODRIVE 611 universal”: The pulse enable is internally withdrawn after STW2.11 = 0
3. The motors are only changed over when the pulses have been canceled (switched–in a no–current condition)
4. Selects the motor corresponding to the motor data set
5. Signal to ”SIMODRIVE 611 universal”: enable the pulses (STW2.11 edge 0 – 1)

Note:

The ”motor changeover” function is described in Chapter 6.11.

Table 6-45 List of input signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Accelerating time zero for controller enable (from SW 3.1)	**–**	**x**	**–**	**STW1.13**
The ramp–function generator (RFG) can be enabled/disabled as a function of the controller enable via this input signal. 1 signal Operating case: Controller enabled —> the drive ramp–function generator is off —> the "zero ramp–up time" is controlled —> a higher–level control can assume the ramp–function generator function Error situation: Controller not enabled —> drive ramp–function generator is on —> the drive brakes via P1257:8 (ramp–fct. generator ramp–down time) 0 signal Ramp–function generator on **Application:** The following is valid when the signal is set: If the controller is enabled, a higher–level control can assume the ramp–function generator function. If the controller is not enabled, the drive ramp–function generator is again effective. **Note:** Refer to the "zero ramp–up time" input signal				
Master sign–of–life (from SW 3.1)	**–**	**x**	**x**	**STW2.12 STW2.13 STW2.14 STW2.15**
For the "Motion Control with PROFIBUS–DP" function, these control signals are used as sign–of–life (4–bit counter). The sign–of–life counter is incremented from 1 to 15 and then starts again with the value 1. **Note:** The "Motion Control with PROFIBUS–DP" function is described in Chapter 5.8.				
Activate function generator (edge) (from SW 8.1)	**–**	**x**	**–**	**STW1.8**
When the function generator or the measuring function is appropriately parameterized, a synchronous start of the function generator or the measuring function is activated – e.g. for mechanically coupled axes (gantry axis group). 0/1 signal Function generator or measuring function is activated 1/0 signal Function generator or measuring function is de–activated **Note:** The function generator is described in Chapter 7.4.1.				

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6.4.4 Permanently–connected output terminals

Table 6-46 Permanently–connected output terminals

Terminals		Function	Description
Drive A	Drive B		
X421			
AS1 AS2		Checkback signal, start inhibit	The relay contact (NC contact) pulls–in, if the enable voltage is available at terminal 663 (module–specific pulse enable).

Note

Mode of operation, application purpose and additional information on the ”safe start inhibit” is included in:

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter ”Start inhibit in the drive modules”

6.4.5 Freely–parameterizable digital output terminals

Description

There are 4 freely–parameterizable output terminals for each axis.

A terminal is parameterized by entering the appropriate required function number into the assigned parameter.

Which function numbers are available? —> Refer to Chapter 6.4.6

P0699 is used to define as to whether the output signal is output, inverted, or not inverted.

Notice

The terminals may only be parameterized when the drive pulses are canceled.

Overview of the terminals and parameters

There is the following assignment between terminals, drives and parameters:

Table 6-47 Overview for freely–parameterizable output terminals

<table>
<tr><th colspan="4">Terminals</th><th colspan="7">Parameters</th></tr>
<tr><th colspan="2">Drive A</th><th colspan="2">Drive B</th><th>No.</th><th>Name</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>O0.A</td><td>X461.7</td><td>O0.B</td><td>X462.7</td><td>0680</td><td>Signaling function, output terminal O0.x</td><td>0</td><td>33</td><td>82</td><td>–</td><td>Immediately</td></tr>
<tr><td>O1.A</td><td>X461.8</td><td>O1.B</td><td>X462.8</td><td>0681</td><td>Signaling function, output terminal O1.x</td><td>0</td><td>2</td><td>82</td><td>–</td><td>Immediately</td></tr>
<tr><td>O2.A</td><td>X462.9</td><td>O2.B</td><td>X462.B</td><td>0682</td><td>Signaling function, output terminal O2.x</td><td>0</td><td>1</td><td>82</td><td>–</td><td>Immediately</td></tr>
<tr><td>O3.A</td><td>X461.10</td><td>O3.B</td><td>X462.10</td><td>0683</td><td>Signaling function, output terminal O3.x</td><td>0</td><td>5</td><td>82</td><td>–</td><td>Immediately</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td></td><td colspan="6">A function can be assigned to each output terminal using these parameters.
The function number from the list of output signals is entered (refer to Chapter 6.4.6).
Note:
The status of the output terminals is displayed in P0698 for diagnostics (refer to Chapter 4.5).</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td>0699</td><td>Inversion Output terminal signals</td><td>0</td><td>0</td><td>FFF</td><td>hex</td><td>Immediately</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td></td><td colspan="6">The output terminal signals can be inverted using this parameter.
<table>
<tr><td>$2^0 = 1$</td><td>res.</td><td>O8</td><td>O4</td><td>O0.x:</td></tr>
<tr><td>$2^1 = 2$</td><td>res.</td><td>O9</td><td>O5</td><td>O1.x:</td></tr>
<tr><td>$2^2 = 4$</td><td>res.</td><td>O10</td><td>O6</td><td>O2.x:</td></tr>
<tr><td>$2^3 = 8$</td><td>res.</td><td>O11</td><td>O7</td><td>O3.x:</td></tr>
<tr><td>P0699 =</td><td>0</td><td>5</td><td>0</td><td>6 hex</td></tr>
<tr><td>Example: —></td><td></td><td>O8
O10</td><td></td><td>O1.x
O2.x</td></tr>
</table>
are output inverted
Note:
O4 – O11 are available on the optional TERMINAL module (refer to Chapter 6.5).</td></tr>
</table>

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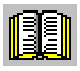
6.4.6 List of output signals



Reader's note

The drive "signals" the output signals, listed in the Tables 6-48 and 6-49 either through an output terminal or as status bit to PROFIBUS–DP.
All of the output signals can be found in the Index under Output signal... .

For output signals, which are assigned to terminals, an inversion can be parameterized. In this list, these output signals are represented as **not inverted**.
If an output signal inversion has been parameterized, then this must be appropriately taken into account when representing the signal.

The following must be specified for each signal:

- Fct. No.:
  The function number is required to parameterize the output terminal via the display and operator control unit.
- Operating mode (P0700):
  This specifies in which operating mode the signal is available (x: Available, –: Not available).

  n–set: "Speed/torque setpoint" mode
  pos: "Positioning" mode
- PROFIBUS bit:
  The bit name is required to read the signal via PROFIBUS–DP (refer to Chapter 5.6.1).
  Example: ZSW2.10 —> that means, status 2 bit 10

Table 6-48 Overview of the output signals

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Inactive	**0**	**x**	**x**	**–**
$\mid n_{act}\mid < n_{min}$	**1**	**x**	**x**	**MeldW.2**
Ramp–up completed	**2**	**x**	**x**	**MeldW.0**
$\mid M \mid < M_x$	**3**	**x**	**x**	**MeldW.1**
$\mid n_{act}\mid < n_x$	**4**	**x**	**x**	**MeldW.3**
Motor overtemperature pre–warning	**5**	**x**	**x**	**MeldW.6**
Heatsink temperature pre–warning	**6**	**x**	**x**	**MeldW.7**
Variable signaling function	**7**	**x**	**x**	**MeldW.5**
Open–loop torque controlled mode	**–**	**x**	**–**	**ZSW1.14**
Integrator inhibit, speed controller	**–**	**x**	**x**	**ZSW2.6**
Parameter set **1st input/2^0** **2nd input/2^1** **3rd input/2^2**	 **–** **–** **–**	 **x** **x** **x**	 **x** **x** **x**	 **ZSW2.0** **ZSW2.1** **ZSW2.2**
Motor 1 selected (from SW 2.4) **Motor 2 selected** **Motor 3 selected** **Motor 4 selected**	**11** **12** **13** **14**	**x** **x** **x** **x**	**–** **–** **–** **–**	**–** **–** **–** **–**
Status, fixed speed setpoint (from SW 3.1) **1st output/2^0** **2nd output/2^1** **3rd output/2^2** **4th output/2^3**	 **15** **16** **17** **18**	 **x** **x** **x** **x**	 **–** **–** **–** **–**	 **–** **–** **–** **–**
$n_{set} = n_{act}$	**20**	**x**	**–**	**ZSW1.8**
		x	**x**	**MeldW.8**
Spindle positioning on (from SW 5.1)	**28**	**x**	**–**	**ZSW1.15**
Warning present/no warning present	**29 (from SW 3.3)**	**x**	**x**	**ZSW1.7**
DC link monitoring $V_{DC\ link} > V_x$	**30**	**x**	**x**	**MeldW.4**
Fault present/no fault present	**31**	**x**	**x**	**ZSW1.3**
Status, controller enable	**32**	**x**	**x**	**ZSW1.2**
Ready or no fault	**33**	**x**	**x**	**ZSW1.1**
Parking axis selected	**34**	**x**	**x**	**ZSW2.7**
Open holding brake	**35**	**x**	**x**	**ZSW2.5**
Pulses enabled (from SW 3.1)	**36**	**x**	**x**	**MeldW.13**
Power module current not limited (from SW 3.1)	**37**	**x**	**x**	**MeldW.10**
Control via PROFIBUS (from SW 3.1)	**38**	**x**	**x**	**PZD ”DIG_OUT”**

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Table 6-48 Overview of the output signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Status, block selection 1st output/2^0 2nd output/2^1 3rd output/2^2 4th output/2^3 5th output/2^4 6th output/2^5	**50 51 52 53 54 55**	**x x x x x x**	**x x x x x x**	**AktSatz.0 AktSatz.1 AktSatz.2 AktSatz.3 AktSatz.4 AktSatz.5**
Ready to be powered–up/not ready to be powered–up	**–**	**x**	**x**	**ZSW1.0**
No OFF 2 present/OFF 2 present	**–**	**x**	**x**	**ZSW1.4**
No OFF 3 present/OFF 3 present	**–**	**x**	**x**	**ZSW1.5**
Power–on inhibit/no power–on inhibit	**–**	**x**	**x**	**ZSW1.6**
No following error/following error	**58**	**–**	**x**	**ZSW1.8**
Spindle position reached (from SW 5.1)	**59**	**x**	**–**	**MeldW.15**
Control requested/no control possible	**–**	**x**	**x**	**ZSW1.9**
Comparison value reached/comparison value not reached	**–**	**x**	**–**	**ZSW1.10**
Reference position reached/outside reference position	**60**	**–**	**x**	**ZSW1.10**
		x	**–**	**Meldw.14**
Reference point set/no reference point set	**61**	**–**	**x**	**ZSW1.11**
Setpoint acknowledge	**62**	**–**	**x**	**ZSW1.12**
Teach–in executed (from SW 4.1)	**64**	**–**	**x**	**PosZsw.15**
Drive stationary/drive moving	**–**	**–**	**x**	**ZSW1.13**
Function generator active (from SW 6.1)	**–**	**x**	**–**	**ZSW1.13**
First speed setpoint filter inactive	**–**	**x**	**x**	**ZSW2.3**
Ramp–function gen. inactive	**–**	**x**	**x**	**ZSW2.4**
Actual motor 1st signal (from SW 2.4) 2nd signal	**– –**	**x x**	**– –**	**ZSW2.9 ZSW2.10**
Motor being changed over (from SW 3.3)	**–**	**x**	**–**	**ZSW2.11**
Slave sign–of–life (from SW 3.1)	**–**	**x**	**x**	**ZSW2.12 ZSW2.13 ZSW2.14 ZSW2.15**
Suppress fault 608 active (from SW 3.1)	**–**	**x**	**x**	**ZSW2.8**
Traverse to fixed end stop active (from SW 3.3)	**66**	**–**	**x**	**PosZsw.14**
External block change (from SW 7.1)	67	–	x	AktSatz.14

Table 6-48 Overview of the output signals, continued

Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n–set	pos	
Fixed end stop reached (from SW 3.3)	**68**	**–**	**x**	**PosZsw.12**
Request passive referencing (from SW 5.1)	**69**	**–**	**x**	**ZSW1.15**
Tracking mode active	**70**	**–**	**x**	**PosZsw.0**
In synchronism (from SW 3.3)	**71**	**–**	**x**	**PosZsw.3**
Setpoint static	**72**	**–**	**x**	**PosZsw.2**
Fixed endstop clamping torque reached (from SW 3.3)	**73**	**–**	**x**	**PosZsw.13**
Axis moves forwards	**74**	**–**	**x**	**PosZsw.4**
Axis moves backwards	**75**	**–**	**x**	**PosZsw.5**
Minus software limit switch actuated	**76**	**–**	**x**	**PosZsw.6**
Plus software limit switch actuated	**77**	**–**	**x**	**PosZsw.7**
Cam switching signal 1	**78**	**–**	**x**	**PosZsw.8**
Cam switching signal 2	**79**	**–**	**x**	**PosZsw.9**
Direct output 1 via the traversing block	**80**	**–**	**x**	**PosZsw.10**
Direct output 2 via the traversing block	**81**	**–**	**x**	**PosZsw.11**
Velocity limiting active	**82**	**–**	**x**	**PosZsw.1**
MDI active (from SW 7.1)	83	–	x	AktSatz.15
Angular incremental encoder handwheel active (from SW 8.1)	84	–	x	AktSatz.13
Angular incremental encoder handwheel evaluation, bit 0 (from SW 8.1)	85	–	x	AktSatz.11
Angular incremental encoder handwheel evaluation, bit 1 (from SW 8.1)	86	–	x	AktSatz.12

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Table 6-49 List of output signals

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Inactive	**0**	**x**	**x**	**–**

An output with this function is "disabled", i.e. a signal is not output (continuously 0 V).

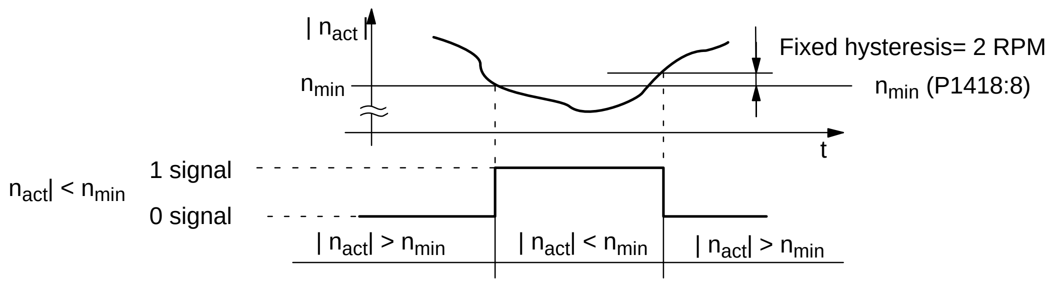
The output terminal can still be connected–up, but it is not evaluated.

Application:

To start–up a drive (commission a drive) the "disturbing outputs" are first switched–out, and then are subsequently activated to be commissioned.

Signal name, description	Fct. No.	n–set	pos	PROFIBUS bit
$\| n_{act}\| < n_{min}$	**1**	**x**	**x**	**MeldW.2**

This output signal is used to display whether the absolute actual speed ($| n_{act} |$) is less than or greater than the selected threshold speed (n_{min}, P1418:8).



Application:

The gearbox stage is only mechanically changed–over if the speed is less than that set in P1418:8, in order to reduce the stressing on the mechanical system.

Signal name, description	Fct. No.	n–set	pos	PROFIBUS bit
Ramp–up completed	**2**	**x**	**x**	**MeldW.0**

The end of a ramp–up operation is displayed after the speed setpoint has been changed, using this output signal.

1 signal Ramp–up has been completed

1/0 signal Ramp–up starts
The start–up is identified, if
– the speed setpoint changes
and
– the defined tolerance bandwidth (P1426) is exited.

0 signal Ramp–up runs

0/1 signal Ramp–up has been completed
The end of ramp–up is identified, if
– the speed setpoint is constant
and
– the speed actual value is within the tolerance bandwidth around the speed setpoint
and
– the delay time has expired (P1427).

Note:

Detailed information on the ramp–function generator is provided in Chapter 6.1.3.

Table 6-49 List of output signals, continued

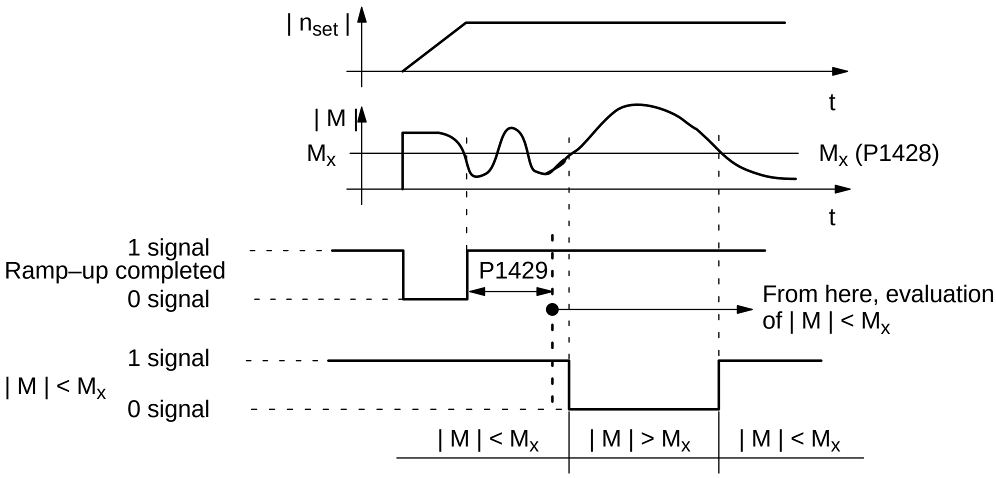
Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n–set	pos	
| M | < M_x	**3**	**x**	**x**	**MeldW.1**

This output signal indicates whether the absolute torque | M | is less than or greater than the selected torque (M_x, P1428). The value refers to the actual torque limiting when motoring including all limits (refer to Chapter 6.1.8, Fig. 6-7).

The evaluation | M | < M_x is only realized in the n–set mode, if

- The ”ramp–up completed” status is signaled

  and
- The delay time in P1429 has expired.



Application:

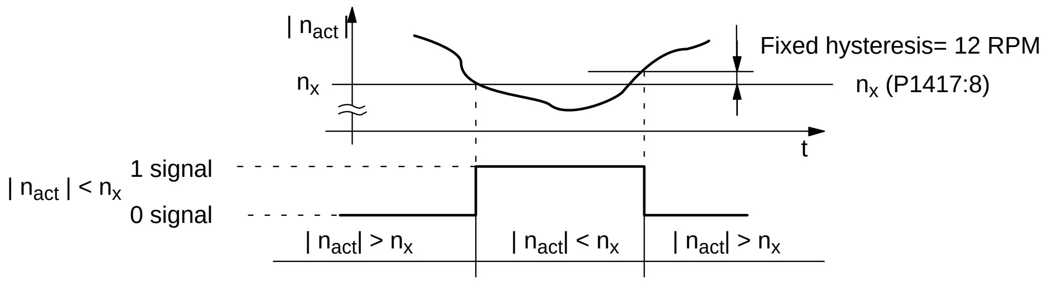
Using this signal, a motor overload condition can be detected in order to be able to introduce an appropriate response (stop the motor or reduce the load).

Note:

In the pos mode, the ”ramp–up completed” state is always signaled, i.e. the delay time in P1429 has already expired. The signal | M | < M_x immediately changes the signal state. Only when the delay time in P1429 changes, is the signal | M | < M_x output delayed by this time.

Signal name, description	Fct. No.	n–set	pos	PROFIBUS bit
| n_{act}| < n_x	**4**	**x**	**x**	**MeldW.3**

This output signal is used to display as to whether the absolute actual speed (| n_{act} |) is less than or greater than the selected threshold speed (n_x, P1417:8).



Application:

Speed monitoring

6

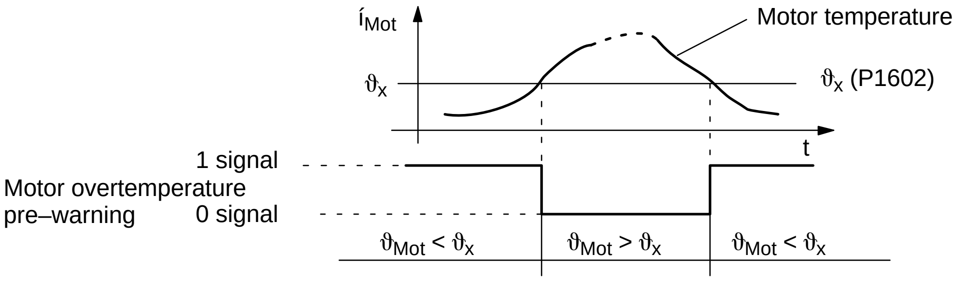
Table 6-49 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Motor overtemperature pre–warning	**5**	**x**	**x**	**MeldW.6**

This output signal is used to display whether the motor temperature (ϑ_{Mot}) is less than or greater than the selected motor temperature (ϑ_x, P1602) warning threshold.

Note:

- If the motor temperature warning threshold is exceeded, initially, ”only” an appropriate signal is output. When the warning threshold is fallen below, the signal is automatically withdrawn.
- If the overtemperature remains for a time longer than that set in P1603, then an appropriate fault is output.
- The motor temperature monitoring function can be disabled/enabled using P1601.14.



Application:

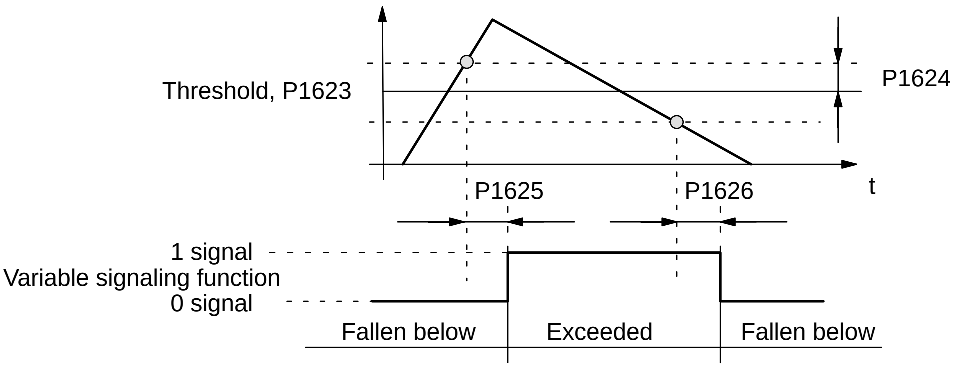
The user can respond to this message by reducing the load, thereby preventing the motor from shutting down with the ”Motor temperature exceeded” fault after the set time has elapsed.

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Heatsink temperature pre–warning	**6**	**x**	**x**	**MeldW.7**

This output signal is used to display whether the temperature of the heatsink in the power module has been exceeded.
The hardware temperature switch–in the power module cannot be parameterized.

1 signal	No heatsink temperature pre–warning The temperature is within the permissible range.
0 signal	Heatsink temperature pre–warning The temperature is outside the possible range. If the excessive temperature remains, then the drive is powered down after approx. 20 s (tripped).

Table 6-49 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td>Variable message function</td><td>7</td><td>x</td><td>x</td><td>MeldW.5</td></tr>
<tr><td colspan="5">
This output signal indicates whether any selected internal quantity has been fallen below or exceeded a selectable threshold value.
A hysteresis (P1624) can be specified for the threshold value and a time for the pull–in or drop–out delay (P1625, P1626) can be specified for the signal output.
The quantity to be monitored can either be selected by entering a signal number (P1621) or by entering an address (P1620.1 and P1622).
P1620.0 1: active
0: not active
P1620.1 1: address range Y
0: address range X
P1620.2 1: comparison with the sign
0: comparison without the sign
P1621 Signal number, variable signaling function
The signal number from the signal selection list for analog outputs must be entered here (refer to Chapter 6.7 under Table 6-56).
If the signal number = 1 (physical address), then the address must be entered into P1620.1 of the address range and in P1622, the address (this is only relevant for Siemens service activities).
P1622 Address, variable message function
P1623 Threshold, variable message function
P1624 Hysteresis, variable message function
Note: The threshold and hysteresis are obtained from the signals specified in the normalization P1621. The normalization is described in Chapter 6.7 under Table 6-56 and can be partially read–out of parameters.
P1625 Pull–in delay variable message function
P1626 Drop–out delay variable message function


</td></tr>
<tr><td>Open–loop torque controlled mode</td><td>–</td><td>x</td><td>–</td><td>ZSW1.14</td></tr>
<tr><td colspan="5">
This output signal is used to signal whether closed–loop speed controlled or open–loop torque controlled operation has been selected (STW1.14).
1 signal Open–loop torque controlled operation (M_{set} mode)
0 signal Closed–loop speed controlled operation (n_{set} mode)
</td></tr>
</table>

6

Table 6-49 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td>Integrator inhibit, speed controller</td><td>–</td><td>x</td><td>x</td><td>ZSW2.6</td></tr>
<tr><td colspan="5">This output signal is used to signal whether the integral component of the speed controller is inhibited or enabled.
1 signal Integrator inhibit, speed controller
0 signal The speed controller integrator is not inhibited</td></tr>
<tr><td>Parameter set
1st input/2^0
2nd input/2^1
3rd input/2^2</td><td>
–
–
–</td><td>
x
x
x</td><td>
x
x
x</td><td>
ZSW2.0
ZSW2.1
ZSW2.2</td></tr>
<tr><td colspan="5">These 3 output signals are used to output the selected parameter set.
<table>
<tr><th>Parameter set</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th></tr>
<tr><td>1st input/weighting 2^0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>2nd input/weighting 2^1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>3rd input/weighting 2^2</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
</table>
Note:
• The ”parameter set changeover” function is described in Chapter 6.10.</td></tr>
<tr><td>Motor 1 selected (from SW 2.4)
Motor 2 selected
Motor 3 selected
Motor 4 selected</td><td>11
12
13
14</td><td>x
x
x
x</td><td>–
–
–
–</td><td>–
–
–
–</td></tr>
<tr><td colspan="5">The motor changeover contactors are controlled via these output terminal signals.
1 signal Motor 1, 2, 3 or 4 is selected
0 signal The motor has not been selected
Note:
• The motor changeover version and therefore the behavior of the terminal, is selected using P1013 (motor changeover).
• To select the motors or motor data sets, input terminal signals are available with function numbers 5 and 6 (motor data set changeover 1st input/2nd input).
• Motor changeover is described in Chapter 6.11.</td></tr>
</table>

Table 6-49 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Status, fixed speed setpoint (from SW 3.1)				
1st output/2^0	**15**	**x**	**–**	**–**
2nd output/2^1	**16**	**x**	**–**	**–**
3rd output/2^2	**17**	**x**	**–**	**–**
4th output/2^3	**18**	**x**	**–**	**–**

These output signals are used to display which fixed setpoint is selected via the input signals, and which parameters specify the speed setpoint.

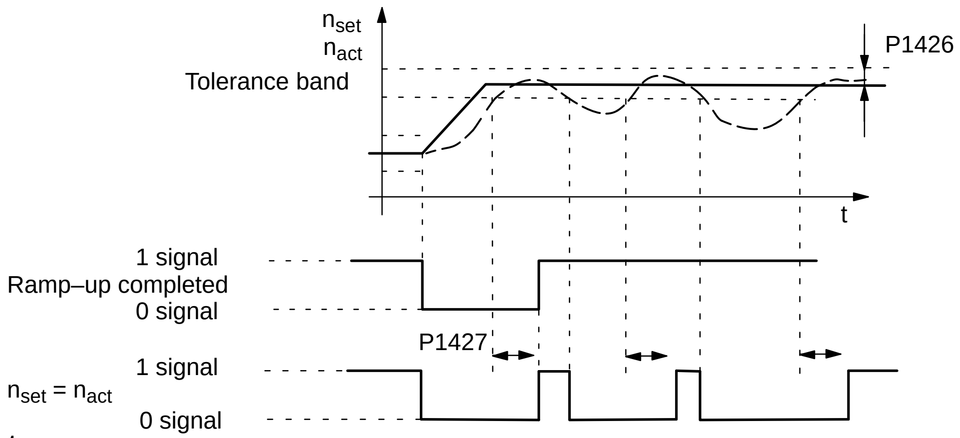
Fixed speed setpoint		1	2	3	4	5	...	15
1st output/weighting 2^0	0	1	0	1	0	1	...	1
2nd output/weighting 2^1	0	0	1	1	0	0	...	1
3rd output/weighting 2^2	0	0	0	0	1	1	...	1
4th output/weighting 2^3	0	0	0	0	0	0	...	1
Effective fixed speed setpoint	–	P0641:1	P0641:2	P0641:3			to	P0641:15

Note:

- The ”fixed speed setpoint” function is described in Chapter 6.1.6.
- Refer to the ”Fixed speed setpoint 1st to 4th input” output signal in Chapter 6.4.3.

Signal name, description	Fct. No.	n–set	pos	PROFIBUS bit
$n_{set} = n_{act}$	**20**	**x**	**–**	**ZSW1.8**
		x	**x**	**MeldW.8**

This output signal is used to display whether the speed actual value (n_{act}) has entered the tolerance bandwidth (P1426), and has remained in this tolerance bandwidth for at least a time (P1427).



Note:

When spindle positioning is selected (P0125=1), ZSW1.8 behaves/responds just the same as Fct. No. 58 (positioning mode)

Table 6-49 List of output signals, continued

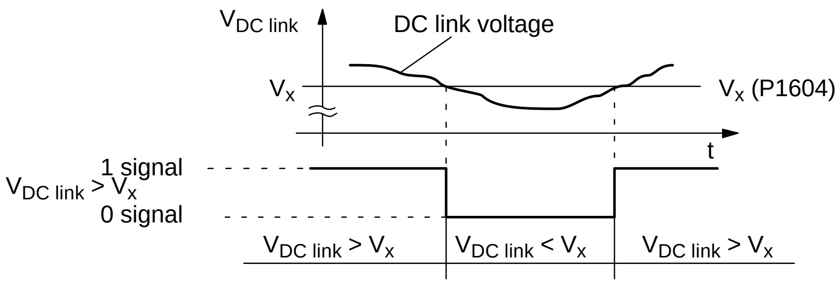
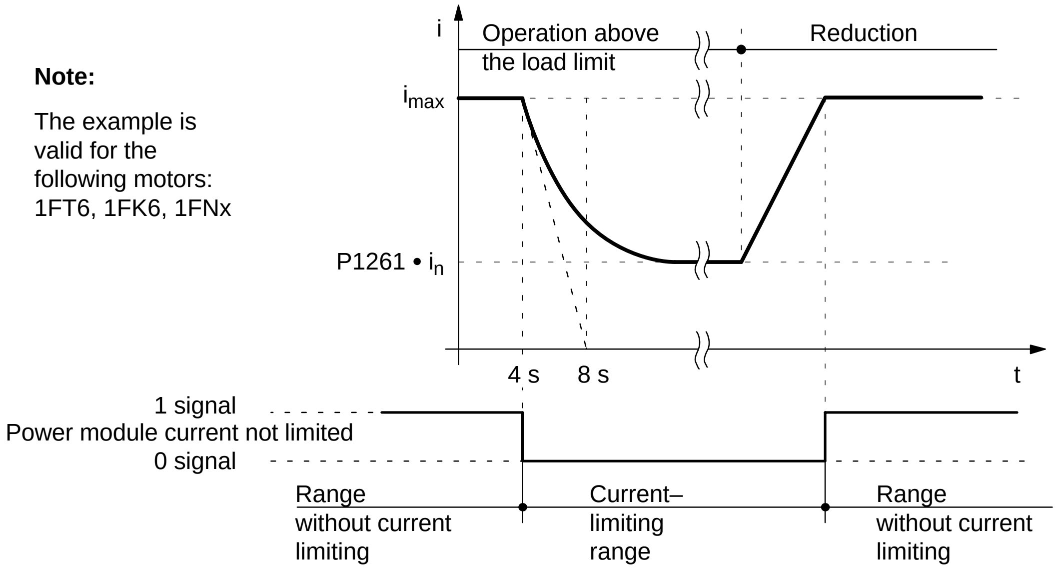
Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Spindle positioning on (from SW 5.1)	**28**	**x**	**–**	**ZSW1.15**
This signal displays as to whether the ”spindle positioning” function has been activated. 1 signal ”Spindle positioning” function is active 0 signal Function is not active **Note:** • Refer under the index entry ”Input signal – spindle positioning on” • The ”spindle positioning” function is described in Chapter 6.15 (from SW 5.1)				
Warning present/no warning present	**29 (from SW 3.3)**	**x**	**x**	**ZSW1.7**
The output signal indicates whether the drive is signaling at least one warning. 1 signal Warning present Which warning(s) is(are) present? This can be identified by evaluating P0953 to P0960 (Warnings 800 to 927) (refer to Chapter 5.9). 0 signal Warning not present				
DC link monitoring $V_{DC\ link} > V_x$	**30**	**x**	**x**	**MeldW.4**
This output signal is used to display whether the DC link voltage ($V_{DC\ link}$) is less than or greater than the selected DC link undervoltage warning threshold (V_x, P1604).  				
Fault present/no fault present	**31**	**x**	**x**	**ZSW1.3**
The output signal indicates whether the drive is signaling at least one fault. 1 signal Fault present There is at least one fault present. The cause of the fault or faults which is (are) present, must be removed and the fault then acknowledged. 0 signal No fault present **Note:** Refer to Chapter 7 for information on the faults as well as their acknowledgment.				
Status, controller enable	**32**	**x**	**x**	**ZSW1.2**
This output signal is used to display whether the speed controller is active and is ready to accept speed setpoints. 1 signal The speed controller is active and setpoints can be accepted 0 signal The speed controller is not active				

Table 6-49 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td>Ready or no fault</td><td>33</td><td>x</td><td>x</td><td>ZSW1.1</td></tr>
<tr><td colspan="5">Depending on P1012.2, this output signal indicates whether
• The drive is ready (—> ”Ready” message”)
• No faults present (—> ”No fault” message)
<table>
<tr><td></td><td>if P1012.2 = ”1”, the following is valid:</td><td>if P1012.2 = ”0”, the following is valid:</td></tr>
<tr><td>Signal</td><td>”Ready”</td><td>”No fault”</td></tr>
<tr><td>1 signal
0 signal</td><td>Drive is ready
Not ready</td><td>There is no fault present
There is at least one fault</td></tr>
<tr><td>Conditions</td><td>No faults are present</td><td>No faults are present</td></tr>
<tr><td></td><td>and</td><td></td></tr>
<tr><td></td><td>the board–specific pulse enable
is present (T. 663 = ”1”)</td><td>independent of terminal 663</td></tr>
<tr><td></td><td>and</td><td></td></tr>
<tr><td></td><td>the drive–specific controller enable
is available (T. 65.x = ”1”)</td><td>independent of terminal 65.x</td></tr>
<tr><td></td><td>and</td><td></td></tr>
<tr><td></td><td>the group–specific enable signals are available
(NE module, terminals 48, 63 and 64)</td><td>independent of the NE module</td></tr>
<tr><td></td><td>and</td><td></td></tr>
<tr><td></td><td>the following PROFIBUS control signals
are available:
independent of the control signals
STW1.0 = ”1” (ON/OFF 1)
STW1.1 = ”1” (Operating condition/OFF 2)
STW1.2 = ”1” (Operating condition/OFF 3)</td><td></td></tr>
</table>
Note:
• The ”no fault” message is also transferred to the line supply infeed module (NE module, terminals 72, 73, 74).
• From SW 6.1 and for P1012.12=1 a fault can also be acknowledged without STW1.0=0. However, the drive then remains in the ”Power–on inhibit” state (refer to Chapter 5.5 ”Generating the power–on inhibit”; Fig.5-9).</td></tr>
<tr><td>Parking axis selected</td><td>34</td><td>x</td><td>x</td><td>ZSW2.7</td></tr>
<tr><td colspan="5">This output signal is used to indicate whether the axis ”parks”.
For a ”parking axis”, all of the encoder–specific monitoring and evaluation functions are disabled. This allows the encoder to be withdrawn without initiating an alarm.
1 signal Parking axis selected
0 signal Parking axis not selected</td></tr>
<tr><td>Open holding brake</td><td>35</td><td>x</td><td>x</td><td>ZSW2.5</td></tr>
<tr><td colspan="5">A motor holding brake can be controlled using an external auxiliary contactor via an output with this function.
The brake sequence control is executed in the ”SIMODRIVE 611 universal”.
1 signal The auxiliary contactor for the motor holding brake is energized
0 signal The auxiliary contactor is not energized
Note:
Refer to Chapter 6.9 for information on the motor holding brake.</td></tr>
</table>

6

Table 6-49 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td>Pulses enabled (from SW 3.1)</td><td>36</td><td>x</td><td>x</td><td>MeldW.13</td></tr>
<tr><td colspan="5">This output signal is used to display whether the motor control pulses for this drive are enabled or inhibited.
1 signal The motor control pulses are enabled
0 signal The pulses are inhibited
Application:
An armature short–circuit contactor may only be energized when the pulses are inhibited.
This signal can be evaluated as one of several conditions to control an armature short–circuit contactor.</td></tr>
<tr><td>Power module current not limited (from SW 3.1)</td><td>37</td><td>x</td><td>x</td><td>MeldW.10</td></tr>
<tr><td colspan="5">This output signal is used to display whether the power module current is limited via the i^2t power module limiting.
1 signal Power module current not limited
0 signal Power module current is limited
Note:
The example is valid for the following motors: 1FT6, 1FK6, 1FNx


Note:
The ”i^2t power module limiting” function is described in Chapter A.2.</td></tr>
</table>

Table 6-49 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Control via PROFIBUS (from SW 3.1)	**38**	**x**	**x**	**PZD ”DIG_OUT”**

The output terminal with this function can be controlled via PROFIBUS.

In this case, process data has to be configured, and then signal 50107 assigned to the PZD to be controlled in the setpoint telegram (digital outputs, terminals O0.x to O3.x, DIG_OUT).

The following definitions apply:

Assigning the function to the terminal	Parameterizing the	control using
• Term. O0.x	—> P0680 = 38	Bit 0 from PZD ”DIG_OUT”
• Term. O1.x	—> P0681 = 38	Bit 1 from PZD ”DIG_OUT”
• Term. O2.x	—> P0682 = 38	Bit 2 from PZD ”DIG_OUT”
• Term. O3.x	—> P0683 = 38	Bit 3 from PZD ”DIG_OUT”

Note:

- P0699 (inverting output terminals) can be used to set the output signal inversion by the drive.
- Refer to Chapter 5.6.5 for information on configuring process data.

Signal name, description	Fct. No.	n–set	pos	PROFIBUS bit
Status, block selection 1st output/2^0	**50**	**x**	**x**	**AktSatz.0**
2nd output/2^1	**51**	**x**	**x**	**AktSatz.1**
3rd output/2^2	**52**	**x**	**x**	**AktSatz.2**
4th output/2^3	**53**	**x**	**x**	**AktSatz.3**
5th output/2^4	**54**	**x**	**x**	**AktSatz.4**
6th output/2^5	**55**	**x**	**x**	**AktSatz.5**

These output signals are used to display which traversing block is being presently processed.

Block number	**0**	**1**	**2**	**3**	**4**	**5**	**...**	**31**	**...**	**63**
1st output/weighting 2^0	0	1	0	1	0	1	...	1	...	1
2d output/weighting 2^1	0	0	1	1	0	0	...	1	...	1
3rd output/weighting 2^2	0	0	0	0	1	1	...	1	...	1
4th output/weighting 2^3	0	0	0	0	0	0	...	1	...	1
5th output/weighting 2^4	0	0	0	0	0	0	...	1	...	1
6th output/weighting 2^5	0	0	0	0	0	0	...	0	...	1

Signal name, description	Fct. No.	n–set	pos	PROFIBUS bit
Ready to be powered–up/not ready to be powered–up	**–**	**x**	**x**	**ZSW1.0**

The output signal indicates whether the drive is ready to be powered–up.

1 signal	Ready to power–up In order that the drive goes into this state, the following conditions must be fulfilled: – the two operating conditions are available via STW1 (xxxx xxxx xxxx x11x) – the following enable signals are available: Terminal 63 (NE module), terminal 663 – No fault present – No power–on inhibit present
0 signal	Not ready to be powered–up The drive is not ready to be powered–up.

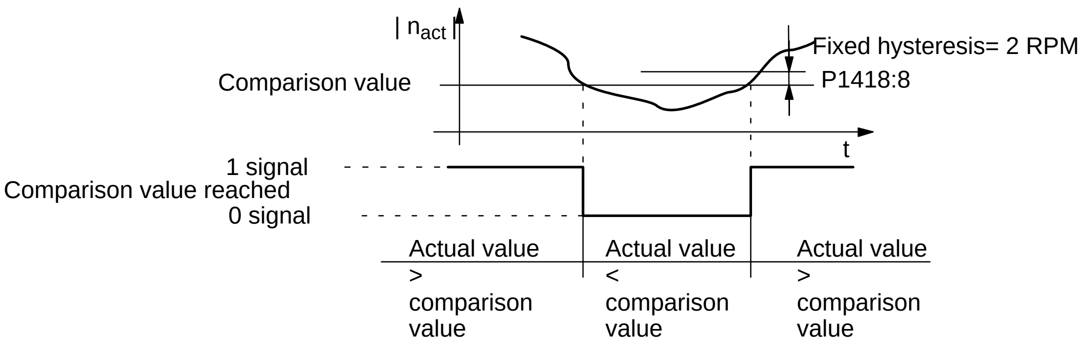
Signal name, description	Fct. No.	n–set	pos	PROFIBUS bit
No OFF 2 present/OFF 2 present	**–**	**x**	**x**	**ZSW1.4**

1 signal	No OFF 2 present
0 signal	OFF 2 present

Table 6-49 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
No OFF 3 present/OFF 3 present	**–**	**x**	**x**	**ZSW1.5**
1 signal No OFF 3 present 0 signal OFF 3 present				
Power–on inhibit/no power–on inhibit	**–**	**x**	**x**	**ZSW1.6**
1 signal Power–on inhibit It is only possible to power–up the drive again using OFF 1 and then ON (STW1.0) (or withdrawing terminal 65.x). 0 signal No power–on inhibit **Note:** The ”power–on inhibit” function can be disabled via P1012.12.				
No following error/following error	**58**	**–**	**x**	**ZSW1.8**
When the axis is traversed, closed–loop position controlled, using a model, the theoretically permissible following error is calculated from the instantaneous traversing velocity and the selected Kv factor. A following error window can be defined using P0318, which defines the permissible relative deviation from this calculated value. This output signal specifies whether the actual following error is within the following error window, defined using P0318. 1 signal No following error The actual following error is within the defined following error window. 0 signal Following error The actual following error of the axis is outside the defined following error window. **Note:** Refer under the index entry ”Following error monitoring”.				
Spindle position reached (from SW 5.1)	**59**	**x**	**–**	**MeldW.15**
This signal displays as to whether the target position has been reached. 1 signal The spindle has reached the target position within the tolerance window (P0134). 0 signal The spindle has not reached the target position or alarms 131, 134 and 135 have occurred. **Note:** The ”spindle positioning” function is described in Chapter 6.15 (from SW 5.1).				

Table 6-49 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td>Control requested/no control possible</td><td>–</td><td>x</td><td>x</td><td>ZSW1.9</td></tr>
<tr><td colspan="5">The status of the DP slave is signaled to the DP master using this output signal.
1 signal Control requested
The DP master is requested to accept control.
Recommendation:
As a result of this output signal, the DP master should accept control and control bit STW1.10 ”Control requested/not control requested” should be set to ”1”.
Note: (from SW 4.1)
For a two–axis drive, this bit is only influenced at axes which also retrieve data from a publisher via slave–to–slave communications
(refer to Chapter 5.10).
0 signal Control not possible
The DP master is signaled that control is not possible. This is, for example, the case for the following states:
– the ”DP slave 611U” has still not irun–up
– the ”SimoCom U” tool has taken–over the master control
– the clock–cycle synchron. PROFIBUS no longer operates with clock cycle synchronism
– for slave–to–slave communications, not all of the links have been established to the publisher (from SW 4.1)</td></tr>
<tr><td>Comparison value reached/comparison value not reached</td><td>–</td><td>x</td><td>–</td><td>ZSW1.10</td></tr>
<tr><td colspan="5">The output signal indicates whether the comparison value, set using P1418:8, has been fallen below.
1 signal actual value > comparison value (P1418:8)
0 signal actual value < comparison value (P1418:8)


Note:
• The output signal corresponds to the $| n_{act} | < n_{min}$ signal with inverted logic.
• In n–set operation, this signal occupies the PROFIBUS bit ZSW1.10 if spindle positioning has not been selected (from SW 5.1) (P0125=0). For the ”spindle positioning” function (from SW 5.1), the ”reference position reached/outside reference position” signal occupies ZSW1.10 (P0125=1), refer to output signal Function No. 60.</td></tr>
</table>

Table 6-49 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td rowspan="2">Reference position reached/outside reference position</td><td rowspan="2">60</td><td>–</td><td>x</td><td>ZSW1.10</td></tr>
<tr><td>x</td><td>–</td><td>Meldw.14</td></tr>
<tr><td colspan="5">This output signal is used to display, in the positioning mode (ZSW1.10), whether the axis has reached the end of the traversing block (position reference value = target position) and the position actual value lies within the positioning window (P0321).
In the n–set mode, MeldW.14 indicates that the reference position has been reached when positioning the spindle
1 signal: Reference position reached
The axis/spindle is at the end of a traversing task and the position monitoring time (P0320) has expired within the positioning window (P0321).
0 signal: Outside the reference position
The axis/spindle is outside the positioning window.
Note:
• The signal is not set when the axis stops, if
– the axis is in the closed–loop speed controlled jogging mode
– an ongoing traversing block is interrupted or canceled using ”intermediate stop” or ”stop” which means that the target position has not been reached
• The signal remains set, until
– a new traversing block is started
– the axis is traversed in the jogging mode
– a reference point approach is started
– a fault (alarm) occurs (e.g. one of the monitoring windows P0318, P0321 or P0326) has been exceeded
• The signal remains set if a traversing block is re–started and there is no difference between the target position and the previous position.</td></tr>
<tr><td>Reference point set/no reference point set</td><td>61</td><td>–</td><td>x</td><td>ZSW1.11</td></tr>
<tr><td colspan="5">The output signal indicates whether an axis is referenced.
When referencing, the incremental measuring system of the axis is synchronized with the drive.
1 signal: Reference point set
The axis has a valid reference point.
0 signal: Reference point set
The axis does not have a valid reference point.
Note:
The following functions are not effective for an axis which is not referenced:
• Software limit switch
• Backlash compensation
• Start the traversing blocks</td></tr>
</table>

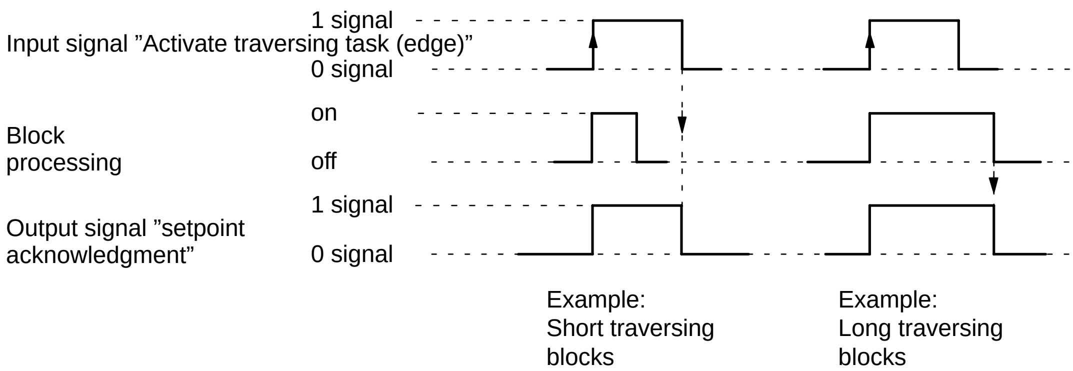
Table 6-49 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Acknowledge setpoint	**62**	**–**	**x**	**ZSW1.12**

Using this output signal, the drive indicates that a new traversing tasks was accepted with the input signal ”activate traversing task (edge)” and when this traversing task was executed.

1 signal The traversing task is processed
The signal is set as soon as the traversing task in the drive is started with the ”Activate traversing task” input signal.

0 signal A traversing task is not being processed
After a traversing task has been completed and (from SW 2.4) the ”activate traversing task (edge)” input signal has been reset, the output signal is again reset.
A new traversing task may be started via the ”Activate traversing task (edge)” input signal.



Note:

Refer to the input signal ”Activate traversing task (edge)” in Chapter 6.4.3.

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Teach–in executed (from SW 4.1)	**64**	**–**	**x**	**PosZsw.15**

This signal indicates whether the ”teach–in” function was successfully executed after activation.

1 signal ”Teach–in” function executed

0 signal Function not executed

Note:

- Refer under the index entry ”Input signal – activate teach–in (edge)”
- The ”teach–in” function is described in Chapter 6.13.

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Drive stationary/drive moving	**–**	**–**	**x**	**ZSW1.13**

The output signal provides information about the actual operating status of the axis.

1 signal Drive stationary
The absolute actual speed is less than or equal to the threshold speed (n_{min}, P1418).

0 signal Drive is traversing
The absolute actual speed is greater than the threshold speed (n_{min}, P1418).

Note:

- The function of the output signal$| n_{act} | < n_{min}$ corresponds to this signal.
- This output signal cannot be used to identify whether the drive is crawling.

Table 6-49 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Function generator active (from SW 6.1)	–	x	–	**ZSW1.13**
The output signal provides information about the status of the function generator or the measuring function. 1 signal The function generator or the measuring function in the drive is active. 0 signal The function generator or the measuring function in the drive is not active.				
First speed setpoint filter inactive	–	x	x	**ZSW2.3**
The output signal specifies whether the first speed setpoint filter is active/inactive. 1 signal First speed setpoint filter is inactive —> Low–pass filter is disabled 0 signal First speed setpoint filter is active —> Low–pass filter is enabled **Note:** The first speed setp. filter can be enabled/disabled using the ”first speed setpoint filter off” input signal.				
Ramp–function gen. inactive	–	x	x	**ZSW2.4**
The output signal specifies whether the ramp–function generator is active. The ramp–function generator can be switched–in/switched–out, e.g. using the input signal ”Ramp–up time zero”. 1 signal Ramp–function generator inactive 0 signal Ramp–function generator active **Note:** If the input signal STW2.4=0 is selected, then ZSW2.4 remains at 1 as long as the motor is stationary. ZSW2.4 only goes to zero when the motor is moving.				
Actual motor (from SW 2.4) **1st signal** **2nd signal**	– –	x x	– –	**ZSW2.9** **ZSW2.10**
These 2 status signals can be used to identify which motor/motor data set is selected. **Motor data set**: 1 / 2 / 3 / 4 1st signal/ZSW2.9: 0 / 1 / 0 / 1 2nd signal/ZSW2.10: 0 / 0 / 1 / 1 **Note:** • Motor changeover is described in Chapter 6.11. • If, for P1249 = 1 a motor changeover was initiated via the input signals ”motor data set changeover 1st input or 2nd input” and these output signals did not change, then P1013 (motor changeover) was incorrectly parameterized.				
Motor being changed over (from SW 3.3)	–	x	–	**ZSW2.11**
The output signal indicates whether the motor is being changed over. 1 signal The motor is being changed over During this time, the drive pulses are canceled. 0 signal Otherwise **Note:** The ”motor changeover for induction motors (from SW 2.4)” function is described in Chapter 6.11.				

Table 6-49 List of output signals, continued

Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n–set	pos	
Slave sign–of–life (from SW 3.1)	**–**	**x**	**x**	**ZSW2.12 ZSW2.13 ZSW2.14 ZSW2.15**
For the "Motion Control with PROFIBUS–DP" function, these status signals are used as sign–of–life (4–bit counter). The sign–of–life counter is incremented from 1 to 15 and then starts again with the value 1. It only starts to count, if: • The clock–cycle synchronous PROFIBUS operates in clock–cycle synchronism • For slave–to–slave communications, all of the links between the publisher and subscriber have been established (from SW 4.1) **Note:** The "Motion Control with PROFIBUS–DP" function is described in Chapter 5.8. The "slave–to–slave communications" function is described in Chapter 5.10 (from SW 4.1).				
Suppress fault 608 active (from SW 3.1)	**–**	**x**	**x**	**ZSW2.8**
This output signal is the checkback signal when suppressing fault 608 is activated via the input signal "suppress fault 608" (from SW 3.1)". 1 signal Suppressing fault 608 is active (speed controller output limited) 0 signal Suppressing fault 608 is not active **Note:** • Suppressing fault 608 (speed controller output limited) can be activated as follows: – via an input terminal with function number 26 – via the PROFIBUS control signal STW2.8 • Refer under the index entry "Input signal – suppressing fault 608 (from SW 3.1)"				
Traverse to fixed endstop active (from SW 3.3)	**66**	**–**	**x**	**PosZsw.14**
This output signal is used to display whether the "travel to fixed endstop" function is active. 1 signal Block with the FIXED ENDSTOP command is being processed The "travel to fixed endstop" function has been selected. 0 signal No block with the FIXED ENDSTOP command is being processed The "travel to fixed endstop" function has been canceled. **Note:** • The "travel to fixed endstop" function is described in Chapter 6.12.				
External block change (from SW 7.1)	**67**	**–**	**x**	**AktSatz.14**
This output signal is used to display whether the "External block change" function is active. 1 signal The "external block change" function is selected. 0 signal The "external block change" function is canceled. **Note:** • This output signal is an image of the input signal "External block change" (Fct. No. 67 and STW1.13). • When the edge of this output signal changes, this indicates that a block change has taken place, i.e. especially in the MDI mode, a new MDI block may now be entered via PZD and/or default block (refer to Chapter 6.2.12).				

6

Table 6-49 List of output signals, continued

Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n–set	pos	
Fixed endstop reached (from SW 3.3)	**68**	**–**	**x**	**PosZsw.12**
This output signal is used to display whether the drive is in the ”fixed endstop reached” status. 1 signal The drive is in the ”fixed endstop reached” status 0 signal The drive is not in the ”fixed endstop reached” status **Note:** • The ”fixed endstop reached” status is assumed, dependent on the setting in P0114 (fixed endstop, configuration 2). • The ”travel to fixed endstop” function is described in Chapter 6.12.				
Request passive referencing (from SW 5.1)	**69**	**–**	**x**	**ZSW1.15**
The master drive requests passive referencing for the slave drive, using this output signal. To realize this, this output signal must be logically interlocked with the input signal ”request passive referencing” for the slave drive. 1 signal The master drive has detected its zero mark This means that for the slave drive, the reference cam and zero mark search are activated While the signal is set, the slave axis must move over a zero mark otherwise an appropriate fault is signaled. 0 signal The master drive has reached its reference point **Note:** • If, for a double–axis module P0891 (B) = 1, this means that the position actual value from drive A is internally connected to the position reference value of drive B, then the following applies: The output signal ”request passive referencing” from drive A (master drive) is internally and automatically detected from drive B (slave drive). In this case, external wiring is not required. • The ”request passive referencing” output signal is always output at the reference point approach when the zero mark has been recognized. • The ”passive referencing” function is described in Chapter 6.3.				
Tracking mode active	**70**	**–**	**x**	**PosZsw.0**
This output signal is a checkback signal that the tracking mode has been activated via the ”tracking mode” input signal. 1 signal Tracking mode active 0 signal Tracking mode not active **Note:** If the tracking mode is active as internal response to an error/fault, then this is also displayed using this input signal.				

Table 6-49 List of output signals, continued

<table>
<tr><th rowspan="2">Signal name, description</th><th rowspan="2">Fct. No.</th><th colspan="2">Operating mode</th><th rowspan="2">PROFIBUS bit</th></tr>
<tr><th>n–set</th><th>pos</th></tr>
<tr><td>In synchronism (from SW 3.3)</td><td>71</td><td>–</td><td>x</td><td>PosZsw.3</td></tr>
<tr><td colspan="5">This output signal is used to display whether the slave drive is in synchronism with the master drive.
1 signal The slave drive is in synchronism with the master drive
0 signal The slave drive is not in synchronism
Note:
• When is a drive in synchronism
If, for an active axis coupling, the following error is less than the following error tolerance set in P0318:8.
—> refer under the index entry ”Dynamic following error monitoring”
• For axis couplings in the ”positioning” mode, the signal is not influenced by superimposed axis motion as a result of traversing blocks.
• The ”axis coupling” function is described in Chapter 6.3.</td></tr>
<tr><td>Setpoint static</td><td>72</td><td>–</td><td>x</td><td>PosZsw.2</td></tr>
<tr><td colspan="5">This output signal indicates the processing status of a traversing block on the setpoint side.
1 signal The axis is stationary as far as the setpoint is concerned, i.e. the interpolator outputs the velocity setpoint 0.
0 signal A traversing block is being processed in the interpolator, i.e. a velocity setpoint $\neq$ 0 is output.
Note:
• Together with the ”status block selection” output signal, it can be defined as to which traversing block is being processed.
• This output signal is also supplied for the ”Jogging, incremental” function.
• Refer under the index entry ”Positioning monitoring”</td></tr>
<tr><td>Fixed endstop clamping torque reached (from SW 3.3)</td><td>73</td><td>–</td><td>x</td><td>PosZsw.13</td></tr>
<tr><td colspan="5">This output signal displays whether the drive is in the ”fixed endstop reached” status and whether the programmed clamping torque has been reached.
1 signal The drive has provided the programmed clamping torque
0 signal The drive provides less torque than the clamping torque
Note:
• The ”behavior, clamping torque not reached” can be set using P0113.1.
• The ”travel to fixed endstop” function is described in Chapter 6.12.</td></tr>
<tr><td>Axis moves forwards</td><td>74</td><td>–</td><td>x</td><td>PosZsw.4</td></tr>
<tr><td>Axis moves backwards</td><td>75</td><td>–</td><td>x</td><td>PosZsw.5</td></tr>
<tr><td colspan="5">The actual direction of motion of the axis for an active traversing block is displayed using these output signals.
1 signal The axis moves forwards or backwards
0 signal The axis does not move forwards or does not move backwards
Note:
If both signals = ”0”, then no axis movement is active.</td></tr>
</table>

6

Table 6-49 List of output signals, continued

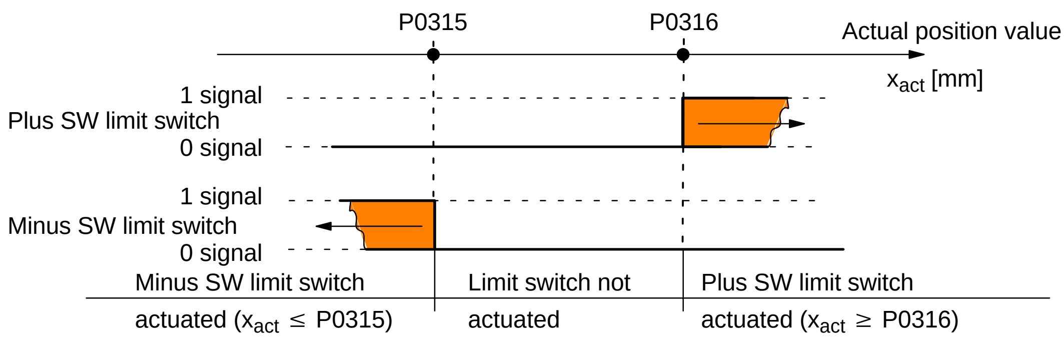
Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n–set	pos	
Minus software limit switch actuated	**76**	**–**	**x**	**PosZsw.6**
Plus software limit switch actuated	**77**	**–**	**x**	**PosZsw.7**

The traversing range of the axis can be defined using the software limit switches plus (P0316) and minus (P0315) (refer under the index entry "Software limit switch).

The output signals indicate whether the appropriate software limit switch has been actuated.

1 signal The plus or minus software limit switch has been actuated

0 signal Neither the plus nor minus software limit switch has been actuated



Note:

The software limit switches only become active after the axis has been referenced.

Table 6-49 List of output signals, continued

Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n–set	pos	
Cam switching signal 1	**78**	**–**	**x**	**PosZsw.8**
Cam switching signal 2	**79**	**–**	**x**	**PosZsw.9**

For the ”position–related switching signals (cams)” function, the simulated cam signal is output via these output signals.

Cam switching signal 1

1 signal Position actual value $x_{act} \leq$ cam switching position 1 (P0310)

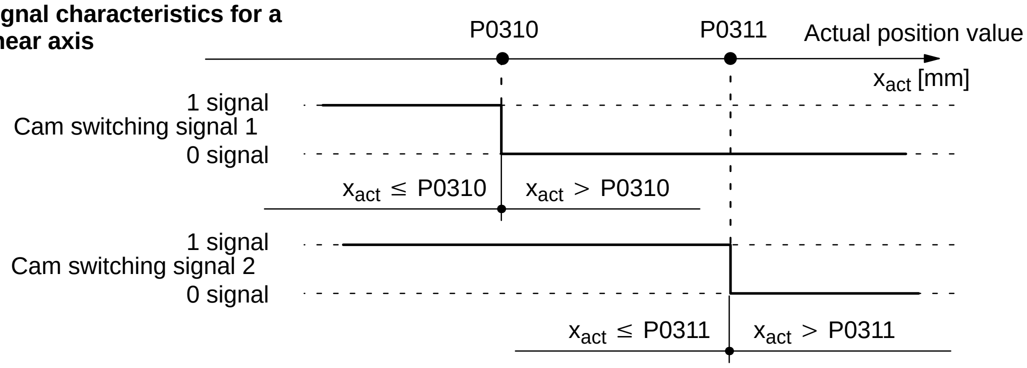
0 signal Position actual value $x_{act} >$ cam switching position 1 (P0310)

Cam switching signal 2

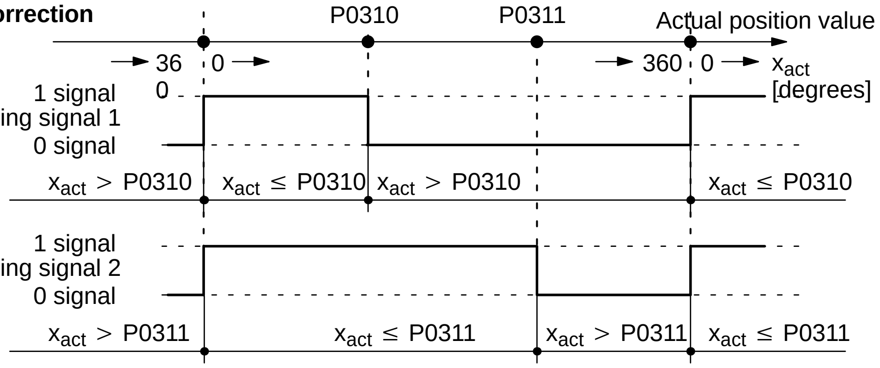
1 signal Position actual value $x_{act} \leq$ cam switching position 2 (P0311)

0 signal Position actual value $x_{act} >$ cam switching position 2 (P0311)

Signal characteristics for a linear axis



Signal characteristics for a rotary axis with modulo correction (from SW 2.4)



Note:

- Only after the axis has been referenced can it be guaranteed that the cam switching signals have a ”true” position reference when they are output.
  This is the reason that an external AND logic operation must be established between the output signal ”reference point set/no reference point set” and the output signals ”cam switching signals 1,2” (e.g. using an external PLC).
- The function ”position–related switching signals (cams)” is described in Chapter 6.2.3.

Table 6-49 List of output signals, continued

Signal name, description	Fct. No.	Operating mode		PROFIBUS bit
		n–set	pos	
Direct output 1 via the traversing block	**80**	**–**	**x**	**PosZsw.10**
Direct output 2 via the traversing block	**81**	**–**	**x**	**PosZsw.11**

- For output terminals:

  If an output is parameterized with this function, then this output can be set or reset from the traversing block using the SET_O or RESET_O command.
- For PROFIBUS–DP:

  The status signals can be set or reset from the traversing block using the SET_O or RESET_O command.

Note:

- The following commands are used to set and reset output signals:
  SET_O/RESET_O command and command parameter = 1 —> set/reset direct output 1
  SET_O/RESET_O command and command parameter = 2 —> set/reset direct output 2
  SET_O/RESET_O command and command parameter = 3 —> set/reset both signals
- Programming traversing blocks is described in Chapter 6.2.10.

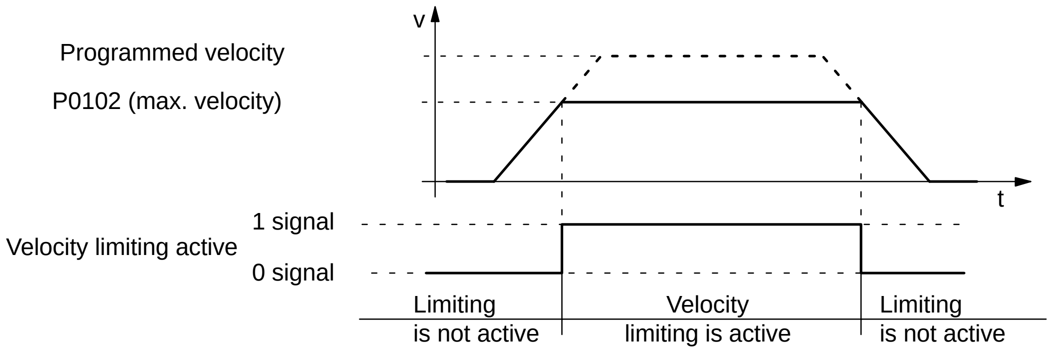
Signal name, description	Fct. No.	n–set	pos	PROFIBUS bit
Velocity limiting active	**82**	**–**	**x**	**PosZsw.1**

The output signal indicates whether the velocity is limited.

The limiting is, for example, active if the programmed velocity is greater than the maximum velocity (P0102), taking into consideration the override.

1 signal Velocity is limited

0 signal Velocity is not limited



Note:

This signal is not output when jogging via velocity!

Signal name, description	Fct. No.	n–set	pos	PROFIBUS bit
MDI active (from SW 7.1)	**83**	**–**	**x**	**AktSatz.15**

The output signal indicates whether the MDI function is operational.

1 signal The MDI function is active.

0 signal The MDI function is not active.

Table 6-49 List of output signals, continued

Signal name, description	Fct. No.	Operating mode n–set	Operating mode pos	PROFIBUS bit
Angular incremental encoder handwheel active (from SW 8.1)	**84**	**–**	**x**	**AktSatz.13**
The output signal indicates whether the angular incremental encoder handwheel function is operational. 1 signal The angular incremental encoder handwheel function is active. 0 signal The angular incremental encoder handwheel function is not active.				
Angular incremental encoder handwheel evaluation, bit 0 (from SW 8.1)	**85**	**–**	**x**	**AktSatz.11**
Angular incremental encoder handwheel evaluation, bit 1 (from SW 8.1)	**86**	**–**	**x**	**AktSatz.12**
These 2 status signals can be used to define which angular incremental encoder handwheel evaluation is selected via parameter P0900.				

Ang. incr. enc. hdw. eval.	**0**	**1**	**2**	**3**	(corresponding to P0900[4])
Bit 0	0	1	0	1	
Bit 1	0	0	1	1	

Note:

The ”angular incremental encoder handwheel evaluation” function is described in Chapter 6.8.

6

6.5 Input/output terminals for the optional TERMINAL module

Description

An optional TERMINAL module has 8 input and 8 output terminals, which can be freely parameterized (refer to Chapter 1.3.3).

A terminal is assigned any function by entering the function number corresponding to the required function into the parameter assigned to the terminal.

Notice

The terminals may only be parameterized when the drive pulses are canceled.

Overview of the terminals and parameters

The following assignment exists between the input/output terminals, drives and parameters:

Table 6-50 Terminals and parameters for the optional TERMINAL module

Terminals		Parameters						
Drive A/B		No.	Name	Min.	Standard	Max.	Units	Effective
Input terminals								
I4	X422.1	0664	Function, input terminal I4	0	60	82	–	Immed.
I5	X422.2	0665	Function, input terminal I5	0	59	82	–	Immed.
I6	X422.3	0666	Function, input terminal I6	0	58	82	–	Immed.
I7	X422.4	0667	Function, input terminal I7	0	50	82	–	Immed.
I8	X422.5	0668	Function, input terminal I8	0	51	82	–	Immed.
I9	X422.6	0669	Function, input terminal I9	0	52	82	–	Immed.
I10	X422.7	0670	Function, input terminal I10	0	53	82	–	Immed.
I11	X422.8	0671	Function, input terminal I11	0	54	82	–	Immed.
Output terminals								
O4	X432.1	0684	Signaling function output terminal O4	0	72	82	–	Immed.
O5	X432.2	0685	Signaling function output terminal O5	0	60	82	–	Immed.
O6	X432.3	0686	Signaling function output terminal O6	0	62	82	–	Immed.
O7	X432.4	0687	Signaling function output terminal O7	0	50	82	–	Immed.
O8	X432.5	0688	Signaling function output terminal O8	0	51	82	–	Immed.

Table 6-50 Terminals and parameters for the optional TERMINAL module, continued

Terminals		Parameters						
Drive A/B		No.	Name	Min.	Standard	Max.	Units	Effective
O9	X432.6	0689	Signaling function output terminal O9	0	52	82	–	Immed.
O10	X432.7	0690	Signaling function output terminal O10	0	53	82	–	Immed.
O11	X432.8	0691	Signaling function output terminal O11	0	54	82	–	Immed.
–	–	0699	Inverting the output terminal signals	0	0	FFF	hex	Immed.

$2^0 = 1$	res.	O8	O4	O0.x:
$2^1 = 2$	res.	O9	O5	O1.x:
$2^2 = 4$	res.	O10	O6	O2.x:
$2^3 = 8$	res.	O11	O7	O3.x:

O0.x – O3.x are available on the control board (refer to Chapter 6.4.5)

P0699 = 0 5 0 6 hex
—> O8 O1.x
Example: O10 O2.x
are output inverted

–	–	0676	Assignment, inputs of the optional TERMINAL module (from SW 4.1)	0	0	3	–	Immed.
–	–	0696	Assignment, outputs optional TERMINAL module (from SW 4.1)	0	0	3	–	Immed.

Each input/output terminal can be assigned a function using these parameters.

Note:

- Input terminals:
  The function number from the list of input signals is entered (refer to Chapter 6.4.3).
  The status of the input terminals is displayed in P0678 for diagnostic purposes (refer to Chapter 4.5).
- Output terminals:
  The function number from the list of output signals is entered (refer to Chapter 6.4.6).
  The status of the output terminals is displayed in P0698 for diagnostics (refer to Chapter 4.5).
  The signals of the output terminals can be output inverted (P0699).
- Assignment of the terminals:
  Before SW 4.1 the following applies:
  All of the input/output terminals for the optional TERMINAL module are permanently assigned drive A.
  From SW 4.1, the following applies:
  For a double–axis module, the input/output terminals can be assigned, blockwise to either drive A or B (P0676, P0696).

6.6 Analog inputs

Description

For ”SIMODRIVE 611 universal”, there are two analog inputs for each drive.

In the ”speed/torque setpoint” mode, the setpoint can be entered for the following functions via these analog inputs:

- Speed Speed–controlled operation (n_{set} operation)

  For the n_{set} mode, the analog voltage at terminal 56.x/14.x and/or terminal 24.x/20.x is used as speed setpoint.

- Torque: Open–loop torque controlled operation (M_{set} mode)

  For the M_{set} mode the analog voltage at terminal 56.x/14.x and/or terminal 24.x/20.x is used as torque setpoint.

  Open–loop torque control is used, if

  – the speed controller is implemented in a higher–level control, or

  – the master/slave functionality is used

- Torque/power reduction (M_{red} mode)

  It may be necessary to reduce the maximum drive torque to protect the machine components. The following possibilities exist:

  – Permanent torque limiting
  This limit function can be set via parameters P1230 or P1235 (refer to Chapter 6.1.8).

  – Variable torque limiting
  In this case, analog input 2 is set to M_{red} mode and the analog voltage at terminal 24.x/20.x is used to continuously reduce the torque.

In the ”positioning” mode, a setpoint can be entered for the velocity override via analog input 1.

6.6.1 Basic setting of the analog inputs

Parameter overview

The following functions can be assigned to analog input 1 and 2 of a drive using the appropriate parameterization:

Table 6-51 Parameters for the function of the analog inputs

Analog input 1	Analog input 2	No.	Description	Min.	Standard	Max.	Units	Effective
56 x 14 x	–	0607	Analog setpoint, terminal 56.x/14.x	0	1	2	–	Immediately
			The parameter defines whether and how the analog setpoint is used at this analog input. = 0 —> off = 1 —> n_{set}/M_{set} mode (refer to Note) = 2 Velocity override (refer under the index entry "Override")					
–	24 x 20 x	0612	Analog setpoint, terminal 24.x/20.x	0	0	2	–	Immediately
			The parameter defines whether and how the analog setpoint is used at this analog input. = 0 —> off = 1 —> n_{set}/M_{set} mode (refer to Note) = 2 —> M_{red} mode					

Note:

- x: Space retainer for drive A or B
- n_{set}/M_{set} mode:
  It is always possible to toggle between n_{set} and M_{set} mode using the "open–loop torque controlled operation" input signal (refer to Chapter 6.4.2).

  0 signal: n_{set} mode
  1 signal: M_{set} mode

  Input terminal I3.x is assigned, as standard, to the "open–loop torque controlled mode" signal.

  When toggling between n_{set} and M_{set} mode, it should be noted, that a setpoint, which may be present at the terminals, becomes immediately effective in the other operating mode.

6.6.2 n_{set} mode or n_{set} with M_{red} mode

n_{set} mode via term. 56.x/14.x and/or T. 24.x/20.x

The voltage for the speed setpoint is dependent on the parameterization of the analog inputs and can comprise the voltage at terminal 56.x/14.x and/or terminal 24.x/20.x as well as the appropriate offset corrections and inversions (refer to Fig. 6-53).

Prerequisites:

- ”Open–loop torque controlled operation” input signal = 0 signal
- P0607 P0612 Speed setpoint via

P0607	P0612	Speed setpoint via
= 1	= 1	T. 56.x/14.x and T. 24.x/20.x
= 0	= 1	T. 24.x/20.x
= 1	= 0	T. 56.x/14.x

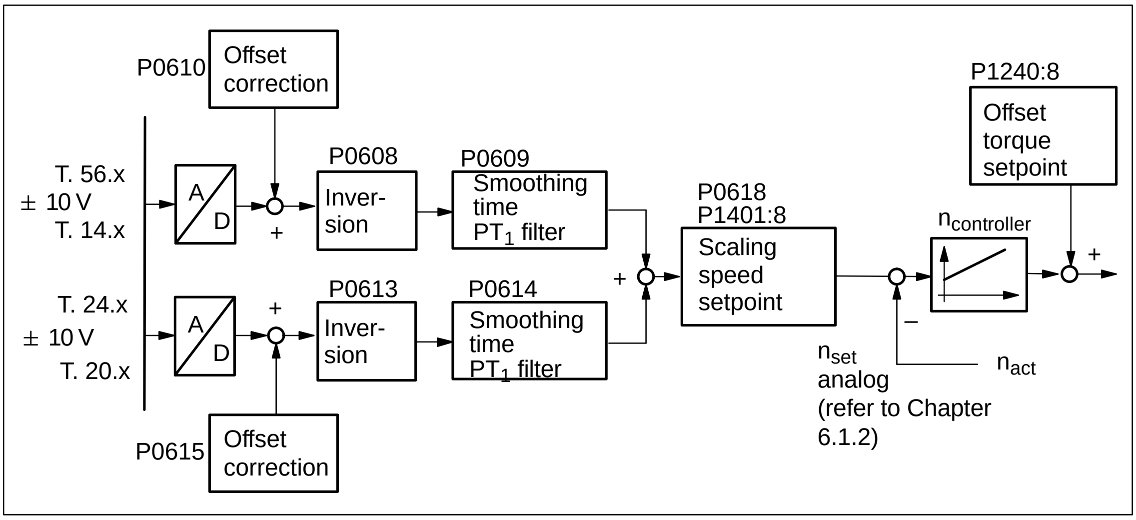


Fig. 6-53 Closed–loop speed control via terminal 56.x/14.x and/or terminal 24.x/20.x

n_{set} mode via term. 56.x/14.x and M_{red} mode via term. 24.x/20.x

Prerequisites:

- ”Open–loop torque controlled operation” input signal = 0 signal
- P0607 = 1 Speed setpoint via terminal 56.x/14.x
  P0612= 2 Setpoint for M_{red} via terminal 24.x/20.x

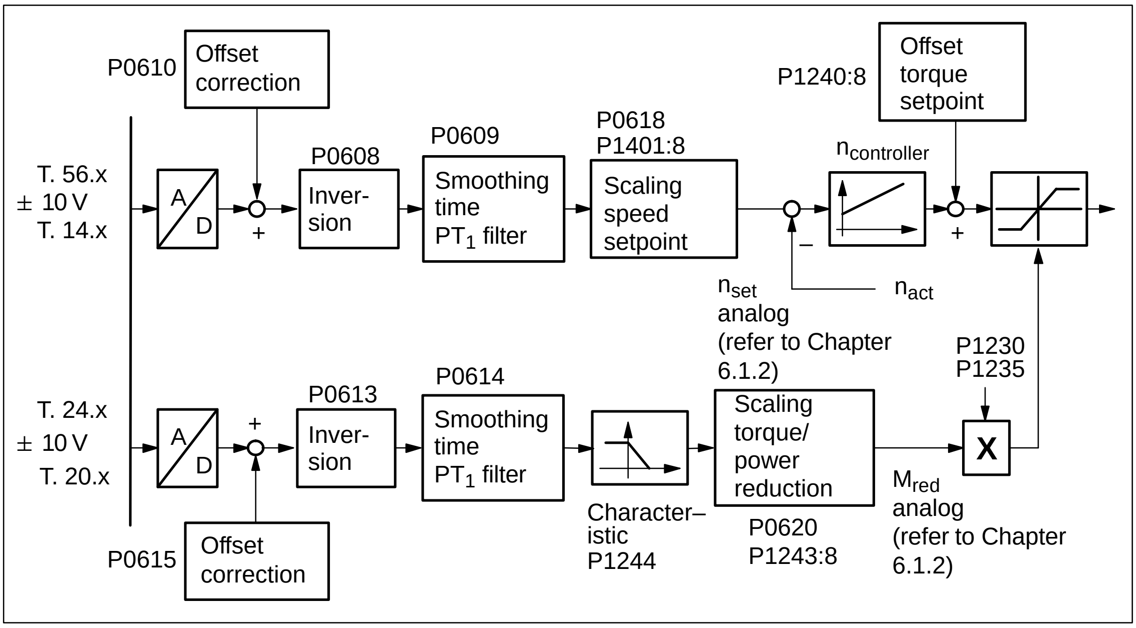


Fig. 6-54 Closed–loop speed controlled mode via terminal 56.x/14.x and torque/power reduction via terminal 24.x/20.x

Reader’s note

The torque/power reduction via terminal 24.x/20.x is described in Chapter 6.6.4.

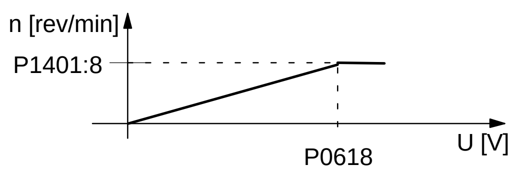
Parameter overview

The following parameters are available to parameterize the n_{set} mode using terminal 56.x/14.x and/or terminal 24.x/20.x:

Table 6-52 Parameters for the n_{set} mode

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0606	Voltage at terminals 56.x/14.x	–	–	–	V(pk)	RO
0611	Voltage at terminals 24.x/20.x	–	–	–	V(pk)	RO
	... indicates the analog voltage presently available at this input terminal.					
0608	Inversion, terminal 56.x/14.x	0	0	1	–	Immediately
0613	Inversion terminal 24.x/20.x	0	0	1	–	Immediately
	An inversion internally inverts the sign of the analog setpoint at this terminal. The motor direction of rotation is reversed. 0 No inversion 1 Inversion There is the following assignment between inversion, direction of rotation, and setpoint: • Without inversion, the motor rotates clockwise for a positive setpoint • With inversion, the motor rotates anti–clockwise for a positive setpoint Definition of the direction of rotation: • When viewing the output shaft, the shaft rotates counter–clockwise → The motor direction of rotation is counter–clockwise • When viewing the output shaft, the shaft rotates clockwise → The motor direction of rotation is clockwise					
0609	Smoothing time, terminal 56.x/14.x (SRM, SLM) (ARM)	0.0	0.0 3.0	1 000.0	ms	Immediately
0614	Smoothing time, terminal 24.x/20.x (SRM, SLM) (ARM)	0.0	0.0 3.0	1 000.0	ms	Immediately
	This allows the output of the A/D converter to be smoothed using a PT_1 filter.					
0610	Drift/offset correction terminal 56.x/14.x	–9 999.9	0.0	9 999.9	mV(pk)	Immediately
0615	Drift/offset correction terminal 24.x/20.x	–9 999.9	0.0	9 999.9	mV(pk)	Immediately
	If the motor still continues to turn even with a speed setpoint of 0 V, and this is not desired, then this parameter can be used to enter a voltage offset to adjust the analog input for zero output.					

Table 6-52 Parameters for the n_{set} mode, continued

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0618	Normalization voltage speed setpoint	5.0	9.0	12.5	V(pk)	Immediately
1401:8	Speed for max. useful motor speed (SRM, ARM) Velocity for max. motor useful velocity (SLM)	–100 000.0	0.0	100 000.0	RPM m/min	Immediately
	P0618: This defines the input voltage at which the maximum useful motor speed is reached. P1401:8: The parameter specifies the maximum motor useful speed, and represents the reference value for P0618. The standard value is pre–assigned for the hardware configuration depending on the motor used.  **Example:** P0618 = 9 P1401:8 = 2000 —> at 9 V, the motor reaches a speed of 2000 RPM **Note:** The maximum useful motor speed, set using P1401:8 is taken into account when calculating the speed setpoint. This means that P1401:8 acts as a speed limit. This is independent of whether the setpoint is entered via a terminal or PROFIBUS.					
1240:8	Offset, torque setpoint (closed–loop speed controlled) (SRM, ARM) Offset, force setpoint (closed–loop speed controlled) (SLM)	–50 000.0	0.0	50 000.0	Nm N	Immediately
	This parameter value is added to the torque setpoint or force setpoint (SLM). **Note:** This allows a weight equalization to be set.					
0620 1243 1244	For the torque/power reduction via terminal 24.x/20.x (refer to Chapter 6.6.4), this parameter can be used to make adjustments.					

6.6.3 M_{set} mode or M_{set} with M_{Red} mode

M_{set} mode via terminal 56.x/14.x and/or T. 24.x/20.x

The analog torque setpoint $M_{set\ analog}$ is dependent on the parameterization of the analog inputs and can comprise the voltage at terminal 56.x/14.x and/or terminal 24.x/20.x as well as the offset correction, inversions and the torque setpoint offset (refer to Fig. 6-55).

Prerequisites:

- ”Open–loop torque controlled operation” input signal = 1 signal
-

P0607	P0612	Torque setpoint via
= 1	= 1	T. 56.x/14.x and T. 24.x/20.x
= 0	= 1	T. 24.x/20.x
= 1	= 0	T. 56.x/14.x

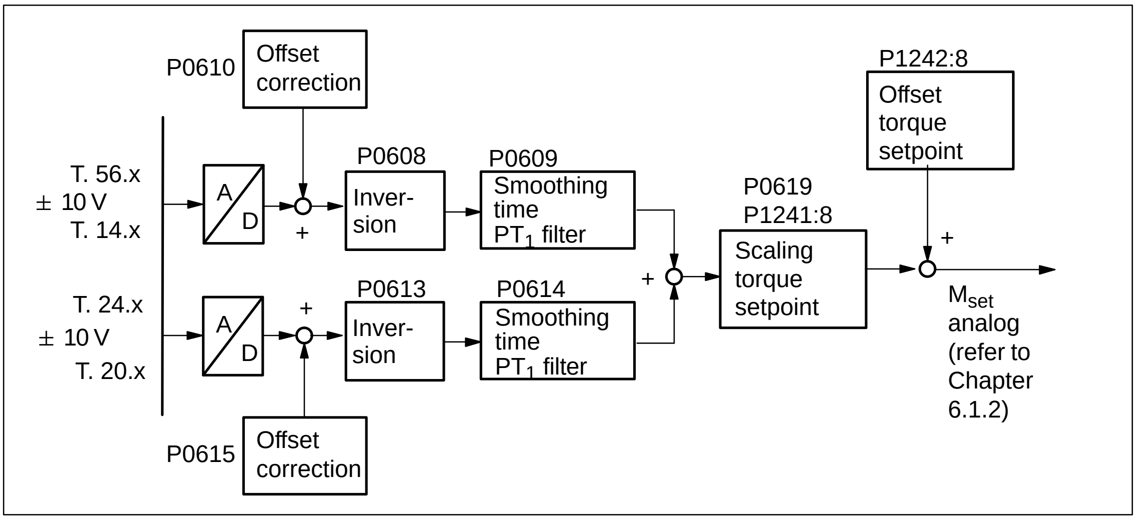


Fig. 6-55 Open–loop torque control via terminal 56.x/14.x and/or terminal 24.x/20.x

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Note

Before SW 4.2:
The setpoint for M_{set} operation can only be entered via analog inputs (terminals). It is not possible to enter a setpoint via PROFIBUS.

From SW 4.2:
The setpoint for M_{set} operation can either be entered via analog inputs (terminals) or PROFIBUS–DP.

M_{set} mode via term. 56.x/14.x and M_{red} mode via term. 24.x/20.x

Prerequisites:

- ”Open–loop torque controlled operation” input signal = 1 signal
- P0607 = 1 Torque setpoint via terminal 56.x/14.x
  P0612= 2 Setpoint for M_{red} via terminal 24.x/20.x

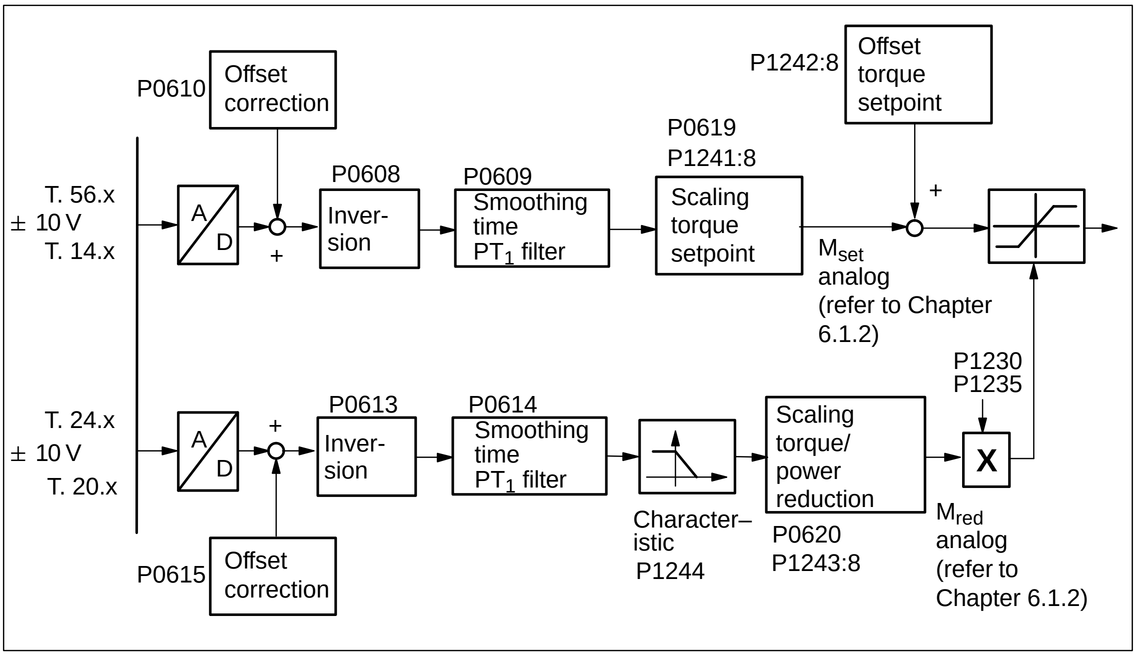
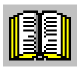


Fig. 6-56 Open–loop torque controlled operation via terminal 56.x/14.x and torque/power reduction via terminal 24.x/20.x



Reader’s note

The torque/power reduction via terminal 24.x/20.x is described in Chapter 6.6.4.

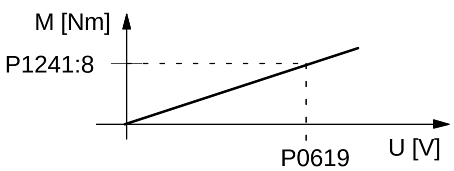
6

Parameter overview

The following parameters are provided to parameterize the M_{set} mode using terminal 56.x/14.x and/or terminal 24.x/20.x:

Table 6-53 Parameter for M_{set} mode using terminal 56.x/14.x and/or terminal 24.x/20.x

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0606	Voltage at terminals 56.x/14.x	–	–	–	V(pk)	RO
0611	Voltage at terminals 24.x/20.x	–	–	–	V(pk)	RO
	... indicates the analog voltage presently available at this input terminal.					
0608	Inversion terminal 56.x/14.x	0	0	1	–	Immediately
0613	Inversion terminal 24.x/20.x	0	0	1	–	Immediately
	An inversion internally inverts the sign of the analog setpoint at this terminal. This causes the torque to be reversed. 1 Inversion 0 No inversion					
0609	Smoothing time, terminal 56.x/14.x (SRM, SLM) (ARM)	0.0	0.0 3.0	1 000.0	ms	Immediately
0614	Smoothing time, terminal 24.x/20.x (SRM, SLM) (ARM)	0.0	0.0 3.0	1 000.0	ms	Immediately
	This allows the output of the A/D converter to be smoothed using a PT_1 filter.					
0610	Drift/offset correction terminal 56.x/14.x	–9 999.9	0.0	9 999.9	mV(pk)	Immediately
0615	Drift/offset correction terminal 24.x/20.x	–9 999.9	0.0	9 999.9	mV(pk)	Immediately
	If, for a setpoint input of 0 volt, the motor starts to rotate, and this is not desired, then a voltage offset can be entered using this parameter to adjust the analog input for zero output					
0619	Normalization voltage, torque setpoint	5.0	10.0	12.5	V(pk)	Immediately
1241:8	Normalization, torque setpoint (SRM, ARM) Normalization, force setpoint (SLM)	1.0	10.0	50 000.0	Nm N	Immediately
	P0619: This defines at which input voltage the torque setpoint normalization is reached. P1241:8: The parameter represents the reference value for P0619. The standard value for M_{rated} is pre–assigned ”calculate controller data”.					



Standard values:
P0619 = 10
P1241:8 = M_{rated}
—> at 10 V, M_{rated} is reached

Table 6-53 Parameter for M_{set} mode using terminal 56.x/14.x and/or terminal 24.x/20.x, continued

Parameters						
No.	**Description**	**Min.**	**Stan-dard**	**Max.**	**Units**	**Effec-tive**
1242:8	Offset torque setpoint (open–loop torque controlled) (SRM, ARM) Offset force setpoint (open–loop torque con-trolled) (SLM)	–50 000.0	0.0	50 000.0	Nm N	Imme-diately
	This parameter value is added to the torque setpoint or force setpoint (SLM). **Note:** Thus, a pre–tensioning torque can be generated.					
0620	For the torque/power reduction via terminal 24.x/20.x (refer to Chapter 6.6.4), this parameter can be used to make adjustments.					
1243:8						
1244						

6.6.4 Torque/power reduction via terminal 24.x/20.x

Description

A continuous torque/power reduction (M_{red} mode) is possible via analog input 2 (terminal 24.x/20.x) by entering an analog voltage.

The reduction is:

- In the constant torque range,
  referred to the 1st torque limit (P1230)
- Constant power range
  referred to the first power limit (P1235)

Characteristics to reduce the torque/power

The following characteristics can be set, as a function of parameter P1244, using the setpoint from terminal 24.x/20.x:

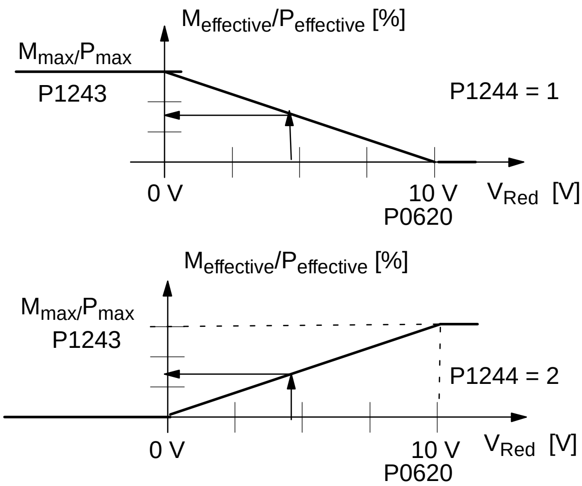
- Negative characteristic (P1244 = 1)
  - Application
    For wire breakage, the input voltage is 0 V
    —> the limits for the torque/power are effective, defined with the normalization (maximum values)
    —> this case is suitable for applications which require a torque when a fault occurs (e.g. hanging axes)
- Positive characteristic (P1244 = 2)
  - Application
    For a wire breakage, a 0 V input voltage becomes effective
    —> there is no torque/power
    —> this case is suitable for applications which do not require torque under fault/error conditions

Parameter overview

The following parameters are available to parameterize the M_{red} mode using terminal 24.x/20.x:

Table 6-54 Parameter for the M_{red} mode

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
0611	Voltage at terminals 24.x/20.x	–	–	–	V(pk)	RO
0613	Inversion terminal 24.x/20.x	0	0	1	–	Immediately
	For the torque/power reduction, internally only positive setpoints are effective. For a negative analog setpoint at terminal 24.x/20.x, an inversion function must be switched–in.					
0614	Smoothing time, terminal 24.x/20.x (SRM, SLM) (ARM)	0.0	0.0 3.0	1 000.0	ms	Immediately
0615	Drift/offset correction terminal 24.x/20.x	–9 999.9	0.0	9 999.9	mV(pk)	Immediately
	Note: These parameters are described in Chapter 6.6.3.					
0620	Normalization voltage, torque/power reduction (SRM, ARM) Normalization voltage, force/power reduction (SLM)	5.0	10.0	12.5	V(pk)	Immediately
1243:8	Normalization, torque/power reduction (SRM, ARM) Normalization, force/power reduction (SLM)	0.0	100.0	100.0	%	Immediately
	P0620: ... defines up to which maximum voltage, a reduction can be made. P1243:8 ... defines up to which maximum torque or power a reduction can be made. The data is a percentage with the following reference: Reference for torque: P1230 (1st torque limit) Reference for power: P1235 (1st power limit)					



Example:

P1244 = 1 (neg. characteristic)
P0620 = 5 V
P1243 = 50 %
—>
with an input voltage of 0 V to 5 V, the torque/power can be reduced from 50 % to 0 %, referred to P1230/P1235

Note:

The actual reduction is displayed in P1717.

Table 6-54 Parameter for the M_{red} mode, continued

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1244	Characteristic type, torque/power reduction (SRM, ARM) Characteristic type, force/power reduction (SLM)	1	1	2	–	Immediately
	... defines whether the reduction is realized with a negative or a positive characteristic. = 1 Negative characteristic = 2 Positive characteristic					
1259 (from SW 3.7)	Torque/power reduction mot./gen. (SRM, ARM) Force/power reduction mot./gen. (SLM)	0	0	1	–	Immediately
	... defines how the torque/power reduction or force/power reduction is effective depending on the state motoring/regenerating. =0 Reduction is effective, motoring and generating = 1 Reduction is only effective motoring In an emergency situation, the axis can still be quickly braked for P1259 = 1.					

6

6.6.5 Application example master/slave

Application example master/slave

The master/slave functionality is implemented using the analog inputs/ outputs.

The master enters the torque setpoint for the slave via an analog output (terminals 75.x/15 or 16.x/15). Refer to Chapter 6.7).

Note

Master/slave operation is only possible for motors with encoders!

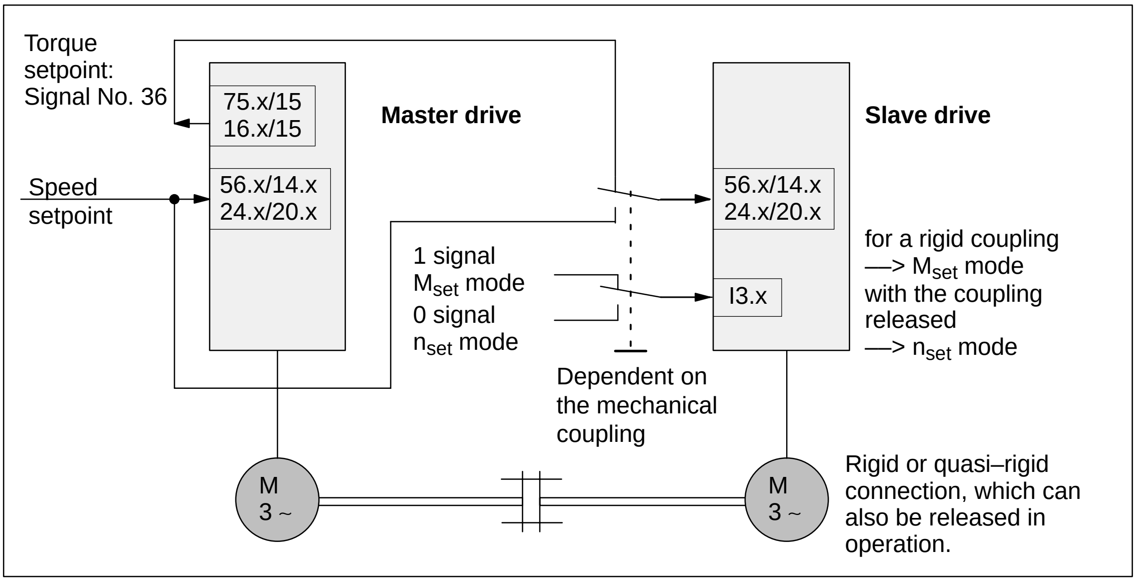


Fig. 6-57 Example: Coupling 2 drives with master/slave with analog I/O

Warning

If, for a master/slave configuration, the rigid mechanical coupling is released (the coupling is opened) then at the same time the slave drive must be changed over to n_{set} operation as otherwise the slave drive would accelerate in an uncontrolled fashion to the maximum speed.

Example: Settings for the master drive

The following settings are necessary for the master drive:

- Set the analog output

  Term. 75.x/15 P0626 = 36 (torque setpoint (finely normalized))

  P0627 = 0 (shift factor)

  P0631 = 1 (overcontrol protection on)

  Term. 16.x/15 P0633 = 36 (torque setpoint (finely normalized))

  P0634 = 0 (shift factor)

  P0638 = 1 (overcontrol protection on)

- Set DAU (D/A converter) normalization

  P0625 = 50 —> +5 V ≐ twice the rated torque

Example: Settings for the slave drive

For the slave drives the following settings are necessary:

- Set the analog input

  Terminal 56.x/14.x P0607 = 1 (n_{set}/M_{set} mode)

  Terminal 24.x/20.x P0612 = 1 (n_{set}/M_{set} mode)

- Set the normalization

  P0619 = 5 (normalization voltage, torque setpoint)

  P1241 = rated torque, slave–motor
  (normalization, torque setpoint)

- Set the digital input

  Function number = 4 (open–loop torque controlled mode)

  Terminal on the control board —> refer to Chap. 6.4.2

  Terminal on the optional TERMINAL module —> refer to Chap. 6.5

6

6.7 Analog outputs

Description

There are two freely parameterizable analog outputs with the following features for each drive:

- Resolution of the DAU (D/A converter):
  8 bit
- Voltage range: –10 V to +10 V
- Update: in the speed controller clock cycle (P1001)

Parameter overview

The following parameters are available to parameterize the analog outputs:

Table 6-55 Parameter overview for the analog outputs

Terminals		Parameters						
No.	Designation	No.	Name	Min.	Standard	Max.	Units	Effective
		0626	Signal number analog output terminals 75.x/15	0	34	530	–	Immediately
			... defines which signal is output. In this case, the appropriate signal number must be entered from the "signal selection list for analog output" (refer to table 6-56).					
		0627	Shift factor analog output terminals 75.x/15	0	0	47	–	Immediately
			... defines the shift factor, with which the output signal is manipulated (refer to Fig. 6-60). Only an 8 bit output window can be output from a 24/48 bit signal due to the 8–bit resolution. The shift factor can be used to define which eight of the 24/38 bits are located in the output window and should be output. A shift factor for each signal is recommended in the signal selection list for analog outputs (refer to Table 6-56).					
		0628	Offset analog output terminal 75.x/15	–128	0	127	–	Immediately
75.A 75.B ↓ 15	X441.1 X441.3 ↓ X441.5		... specifies an offset to the 8–bit output signal. **Note:** • The signal to be output is shifted by 20/256 V (78 mV) by changing the offset by 1 digit. • P0628 = –128 ≙ –10 V, P0628 = 127 ≙ +10 V					
		0631	Overcontrol protection analog output, terminal 75.x/15	0	1	1	–	Immediately
			... switches the over–control protection on or off. = 1 Overcontrol protection on (standard) The bits above the 8–bit wide window cause +10 V or –10 V to be output, i.e. the output is not overcontrolled. = 0 Over–control protection off The bits above the 8–bit wide window are ignored. The analog value is exclusively defined by the 8–bit window, i.e. the output can be overcontrolled.					
		0632	Smoothing time analog output terminal 75.x/15	0.0	0.0	1 000.0	ms	Immediately
			... smooths the output signal with a 1st order proportional element (PT1 element, low–pass filter). The filter is de–activated with P0632 = 0.0. The following generally applies: low smoothing time —> low smoothing effect high smoothing time —> high smoothing effect					

Table 6-55 Parameter overview for the analog outputs, continued

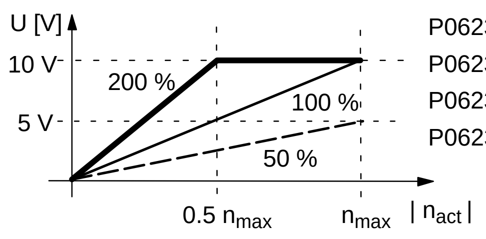
Terminals		Parameters						
No.	**Desig-nation**	**No.**	**Name**	**Min.**	**Stan-dard**	**Max.**	**Units**	**Ef-fec-tive**
16.A 16.B ↓ 15	X441.2 X441.4 ↓ X441.5	0633	Signal number analog output terminals 16.x/15	0	35	530	–	Im-medi-ately
			Note: refer to the description of P0626 for terminal 75.x/15					
		0634	Shift factor analog output terminals 16.x/15	0	0	47	–	Im-medi-ately
			Note: refer to the description of P0627 for terminal 75.x/15					
		0635	Offset analog output terminal 16.x/15	–128	0	127	–	Im-medi-ately
			Note: refer to the description of P0628 for terminal 75.x/15					
		0638	Overcontrol protection, analog output terminal 16.x/15	0	1	1	–	Im-medi-ately
			Note: refer to the description of P0631 for terminal 75.x/15					
		0639	Smoothing time analog output terminal 16.x/15	0.0	0.0	1 000.0	ms	Im-medi-ately
			Note: refer to the description of P0632 for terminal 75.x/15					
–	–	0623 Signal No. 34	DAU normalization, speed actual value (SRM, ARM) DAU normalization, actual motor velocity (SLM)	–200.0	100.0	200.0	%	Im-medi-ately
			... defines, for the output of ”absolute motor speed, finely normalized” (Signal No. 34), which voltage is output at the maximum speed n_{max}. The maximum speed n_{max} is given by: for SRM: minimum (1.2 x P1400, P1147) for ARM/SLM: minimum (P1146, P1147)  Examples: P0623 = 100 % –> +10 V ≙ n_{max} P0623 = 50 % –> +5 V ≙ n_{max} P0623 = 200% –> +10 V ≙ 0.5 n_{max} P0623 = –50% –> –5V ≙ n_{max}					

Table 6-55 Parameter overview for the analog outputs, continued

Terminals		Parameters						
No.	Desig-nation	No.	Name	Min.	Stan-dard	Max.	Units	Ef-fec-tive
–	–	0624 Signal No. 35	DAU normalization, motor utiliza-tion	–200.0	100.0	200.0	%	Im-medi-ately
			... defines, for the output of ”utilization (M_{set}/$M_{set, limit}$, finely normalized” (Signal No. 35) which voltage is obtained when • |maximum torque| (at n = 0 to n_{rated}) • |power| (at n > n_{rated}). is reached. Examples: P0624 = 100 % –> +10 V ≙ Max. torque or power P0624 = 50 % –> +5 V ≙ Max. torque or power					
–	–	0625 Signal No. 36	D/A normalization, torque setpoint (SRM, ARM) D/A normalization, force setpoint (SLM)	–200.0	100.0	200.0	%	Im-medi-ately
			... defines for the output of ”torque setpoint, finely normalized” (Signal No. 36), which voltage is output when 200% rated torque is reached. Examples: P0625 = 100 % –> +10 V ≙ twice the rated torque P0625 = 50 % –> +5 V ≙ twice the rated torque **Note:** The output of signal No. 36 is signed.					

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Signal selection list for analog output

Table 6-56 Signal selection list for analog outputs

Signal No.	Signal Designation	Operating mode n–set	Operating mode pos	Displayed in	Shift factor	Bit width	Units	Normalization (corresponds to LSB)
0	No signal	x	x	–	–	–	–	–
1	Physical address	x	x	–	0	24	–	–
2	Current act. value, phase U	x	x	–	4	24	μA_{pk}	P1710
3	Current actual value, phase V	x	x	–	4	24	μA_{pk}	P1710
4	Field–generating current actual value I_d	x	x	–	4	24	μA_{pk}	P1710
5	Torque–generating current actual value I_q	x	x	P1708 (%) P1718 (A)	4	24	μA_{pk}	P1710
6	Current setpoint I_q (limited after the filter)	x	x	–	4	24	μA_{pk}	P1710
7	Current setpoint I_q (in front of the filter)	x	x	–	4	24	μA_{pk}	P1710
8	Speed actual value, motor (SRM, ARM) Velocity actual value, motor (SLM)	x	x	P0602	6	24	RPM m/min	P1711
9	Speed setpoint (SRM, ARM) Velocity setpoint (SLM)	x	x	P0601 (only for controller enable)	6	24	RPM m/min	P1711
10	Speed setpoint, reference model (SRM, ARM) Velocity setpoint, reference model (SLM)	x	x	–	6	24	RPM m/min	P1711
11	Torque setpoint (speed controller output) (SRM, ARM) Force setpoint (speed controller output) (SLM)	x	x	P1716	4	24	μNm μN	P1713
12	Torque setpoint limit (pos.) (SRM, ARM) Force setpoint limit (pos.) (SLM)	x	x	–	4	24	μNm μN	P1713
13	Motor utilization max (M_{set}/M_{max}, p_{set}/p_{max})	x	x	P0604	8	16	%	8000H ≙ 100%
14	Active power	x	x	–	12	16	kW	0.01 kW
15	Rotor flux setpoint	x	x	–	1	24	μVs	P1712
16	Rotor flux actual value	x	x	–	1	24	μVs	P1712

Table 6-56 Signal selection list for analog outputs, continued

Signal		Operating mode		Displayed in	Shift factor	Bit width	Units	Normalization (corresponds to LSB)
No.	**Designation**	**n–set**	**pos**					
17	Quadrature voltage V_q	x	x	–	11	24	V	P1709 • $V_{DC\ link}/2$
18	Direct–axis voltage V_d	x	x	–	11	24	V	P1709 • $V_{DC\ link}/2$
19	Current setpoint I_d	x	x	–	4	24	μA_{pk}	P1710
20	Motor temperature	x	x	P0603	13	24	°C	0.1 °C
21	DC link voltage at the NE module	x	x	P1701	13	24	V	1 V
22	Zero mark signal, motor measuring system	x	x	–	17	16	–	–
23	Bero signal/equivalent zero mark (bit 11, inverted)	x	x	–	12	16	–	–
24	Absolute speed actual value (SRM, ARM) Absolute velocity actual value (SLM)	x	x	–	6	24	RPM m/min	P1711
25	Slip frequency setpoint	x	x	–	8	24	1/s	$\frac{2000 \times 2\Pi}{800000H \times 1s}$
26	Zero mark signal, direct measuring system	x	x	–	17	24	–	–
27, 28	Reserved	–	–	–	–	–	–	–
29	Actuator voltage, Q input	x	x	–	11	24	V	P1709 • $V_{DC\ link}/2$
30	Actuator voltage, D input	x	x	–	11	24	V	P1709 • $V_{DC\ link}/2$
31	Normalized, electrical rotor position (10 000 hex = 360°)	x	x	–	7	24	Degrees	–
32	Absolute voltage setpoint	x	x	P1705	11	24	V	P1709
33	Absolute current actual value	x	x	P1719	4	24	μA_{pk}	P1710
34	Absolute speed actual value (finely normalized) (SRM, ARM) Absolute velocity actual value (finely normalized) (SLM) Note: P0623 is the reference	x	x	–	0	24	RPM m/min	P1740
35	Utilization (finely normalized) Note: P0624 is the reference	x	x	–	0	24	%	P1741

Table 6-56 Signal selection list for analog outputs, continued

Signal		Operating mode		Displayed in	Shift factor	Bit width	Units	Normalization (corresponds to LSB)
No.	Designation	n–set	pos					
36	Torque setpoint (finely normalized) (SRM, ARM) Force setpoint (finely normalized) (SLM) Note: P0625 is the reference	x	x	–	0	24	µNm µN	P1742
37	Speed setpoint at terminals 56.x/14.x, 24.x/20.x (SRM, ARM) Velocity setpoint at terminals 56.x/14.x, 24.x/20.x (SLM)	x	x	–	6		RPM m/min	P1711
38	Signal DAU1 from PROFIBUS–PPO	x	x	–	0	16	–	–
39	Signal DAU2 from PROFIBUS–PPO	x	x	–	0	16	–	–
40	Speed setpoint from PROFIBUS PPO (SRM, ARM) Velocity setpoint from PROFIBUS PPO (SLM)	x	x	–	6	24	RPM m/min	P1711
41	Rotor position, finely/coarsely synchronized (from SW 5.1) 0: Still not synchronized 1: Coarsely synchronized 3: Coarsely and finely synchronized	x	x	–	21	16	–	–
42	Input terminals (refer to P0678) (from SW 5.1)	x	x	–	7	16	–	–
43	Torque setpoint limit (neg.) (SRM, ARM) Force setpoint limit (neg.) (SLM) (from SW 7.1)	x	x	–	4	24	µNm µN	P1713
44	Speed correction value (SRM, ARM) Velocity correction value (SLM) (from SW 7.1)	x	x	–	0	24	RPM m/min	P1711
45 to 69	Reserved	–	–	–	–	–	–	–
70	Position controller output (SRM, ARM) (SLM)	x	x	–	6		RPM m/min	P1711

Table 6-56 Signal selection list for analog outputs, continued

Signal No.	Signal Designation	Operating mode n–set	Operating mode pos	Displayed in	Shift factor	Bit width	Units	Normalization (corresponds to LSB)
71	Pre–control speed (SRM, ARM) (SLM)	–	x	–	6	24	RPM m/min	P1711
72	System deviation, position controller input	x	x	P0030	27	48	MSR	MSR • 2^{-11}
73	Actual position value	x	x	P0021	19	48	MSR	MSR • 2^{-11}
74	Position setpoint	x	x	P0020	19	48	MSR	MSR • 2^{-11}
75	Velocity setpoint IPO	x 4)	x	P0023	30	48	MSR/s	P1743
76	Following error	x	x	P0029	27	48	MSR	MSR • 2^{-11}
77	Following error, dynamic model	x	x	–	27	48	MSR	MSR • 2^{-11}
78	External position reference value (from SW 3.5)	–	x	P0032	19	48	MSR	MSR • P0403/P0404 • 2^{-11}
79	External velocity setpoint (from SW 3.5)	–	x	–	30	48	MSR	P1744
80	DSC system deviation (from SW 4.1)	x	–	P0915	4	32	–	P1745
81	DSC pre–controlled speed, motor (from SW 4.1) DSC pre–control velocity, motor (from SW 4.1)	x	–	P0915	6	32	RPM	P1711
82	DSC system deviation from PROFIBUS PPO (from SW 7.1)	x	–	P0915	6	32	RPM	P1711
83	Equalization controller input (from SW 7.1)	x	x	–	4	24	µNm µN	P1713
84	Equalization controller output (from SW 7.1)	x	x	–	4	24	RPM	P1711
84	Torque setpoint – master axis (from SW 7.1)	x	x	–	4	24	µNm µN	P1713
499 3)	PROFIBUS PKW task (request) identification (from SW 5.1)	x	x	P1786:1	8	16	–	–
500 3)	PROFIBUS PKW response ID (from SW 5.1)	x	x	P1787:1	8	16	–	–
501 3)	PROFIBUS control word 1 (STW1) (from SW 5.1)	x	x	P1788:x 1)	8	16	–	–
502 3)	PROFIBUS status word 1 (ZSW1) (from SW 5.1)	x	x	P1789:x 2)	8	16	–	–

6

Table 6-56 Signal selection list for analog outputs, continued

Signal		Operating mode		Displayed in	Shift factor	Bit width	Units	Normalization (corresponds to LSB)
No.	Designation	n–set	pos					
503 **3)**	PROFIBUS control word 2 (STW2) (from SW 5.1)	x	x	P1788:x 1)	8	16	–	–
504 **3)**	PROFIBUS status word 2 (ZSW2) (from SW 5.1)	x	x	P1789:x 2)	8	16	–	–
505 **3)**	PROFIBUS encoder 1 control word (G1_STW) (from SW 5.1)	x	–	P1788:x 1)	8	16	–	–
506 **3)**	PROFIBUS encoder 1 status word (G1_ZSW) (from SW 5.1)	x	–	P1789:x 2)	8	16	–	–
507 **3)**	PROFIBUS encoder 2 control word (G2_STW) (from SW 5.1)	x	–	P1788:x 1)	8	16	–	–
508 **3)**	PROFIBUS encoder 2 status word (G2_ZSW) (from SW 5.1)	x	–	P1789:x 2)	8	16	–	–
509 **3)**	PROFIBUS distributed inputs (DezEing) (from SW 5.1)	x	x	P1788:x 1)	8	16	–	–
510 **3)**	PROFIBUS message word (MeldW) (from SW 5.1)	x	x	P1789:x 2)	8	16	–	–
511 **3)**	PROFIBUS digital outputs, terminals O0.x to O3.x (DIG_OUT) (from SW 5.1)	x	x	P1788:x 1)	19	16	–	–
512 **3)**	PROFIBUS digital inputs terminals I0.x to I3.x (DIG_IN) (from SW 5.1)	x	x	P1789:x 2)	19	16	–	–
513 **3)**	PROFIBUS block selection (SatzAnw) (from SW 5.1)	x	x	P1788:x 1)	17	16	–	–
514 **3)**	PROFIBUS currently selected block (AktSatz) (from SW 5.1)	x	x	P1789:x 2)	17	16	–	–
515 **3)**	PROFIBUS position control word (PosStw) (from SW 5.1)	–	x	P1788:x 1)	8	16	–	–
516 **3)**	PROFIBUS position status word (PosZsw) (from SW 5.1)	–	x	P1789:x 2)	8	16	–	–
517 **3)**	PROFIBUS control word slave–to–slave communications (QStw) (from SW 5.1)	–	x	P1788:x 1)	22	16	–	–
518 **3)**	PROFIBUS status word slave–to–slave communications (QZsw) (from SW 5.1)	–	x	P1789:x 2)	22	16	–	–
519 **3)**	PROFIBUS encoder 1 position actual value 1 (G1_XIST1) (from SW 7.1)	x	–	P1789:x 1)	8	32	–	–
520 **3)**	PROFIBUS encoder 1 position actual value 2 (G1_XIST2) (from SW 7.1)	x	–	P1789:x 1)	8	32	–	–

Table 6-56 Signal selection list for analog outputs, continued

Signal		Operating mode		Displayed in	Shift factor	Bit width	Units	Normalization (corresponds to LSB)
No.	Designation	n–set	pos					
522 3)	PROFIBUS encoder 2 position actual value 1 (G2_XIST1) (from SW 7.1)	x	–	P1789:x 1)	8	32	–	–
523 3)	PROFIBUS encoder 2 position actual value 2 (G2_XIST2) (from SW 7.1)	x	–	P1789:x 1)	8	32	–	–
524 3)	PROFIBUS encoder 3 position actual value 1 (G3_XIST1) (from SW 7.1)	x	–	P1789:x 1)	8	32	–	–
525 3)	PROFIBUS encoder 3 position actual value 2 (G3_XIST2) (from SW 7.1)	x	–	P1789:x 1)	8	32	–	–

Note:

- Abbreviations
  - rms: rms value
  - pk: Peak value
  - LSB: Least significant bit
  - MSR: Dimension system grid
- Signal marking?
  - Not marked: For SimoCom U, the signal is available as standard
  - Marked in gray: For SimoCom U, the signal is only available when the expert mode is activated

1) Dependent on the assignment in P0915:17

2) Dependent on the assignment in P0916:17

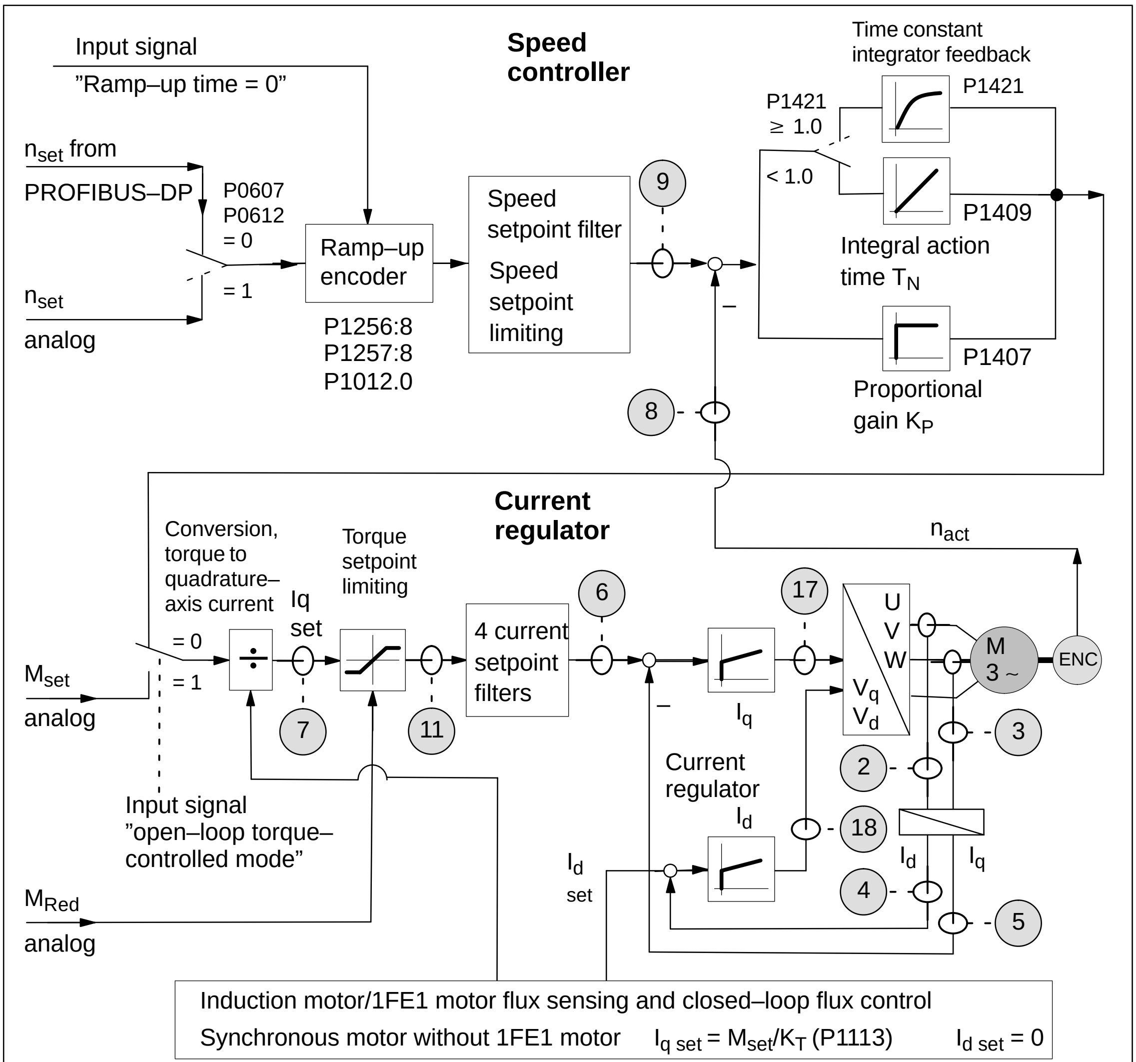
3) PROFIBUS signal only supplies a value if it is set in P0615 or P0916.

4) This only applies for spindle positioning

6

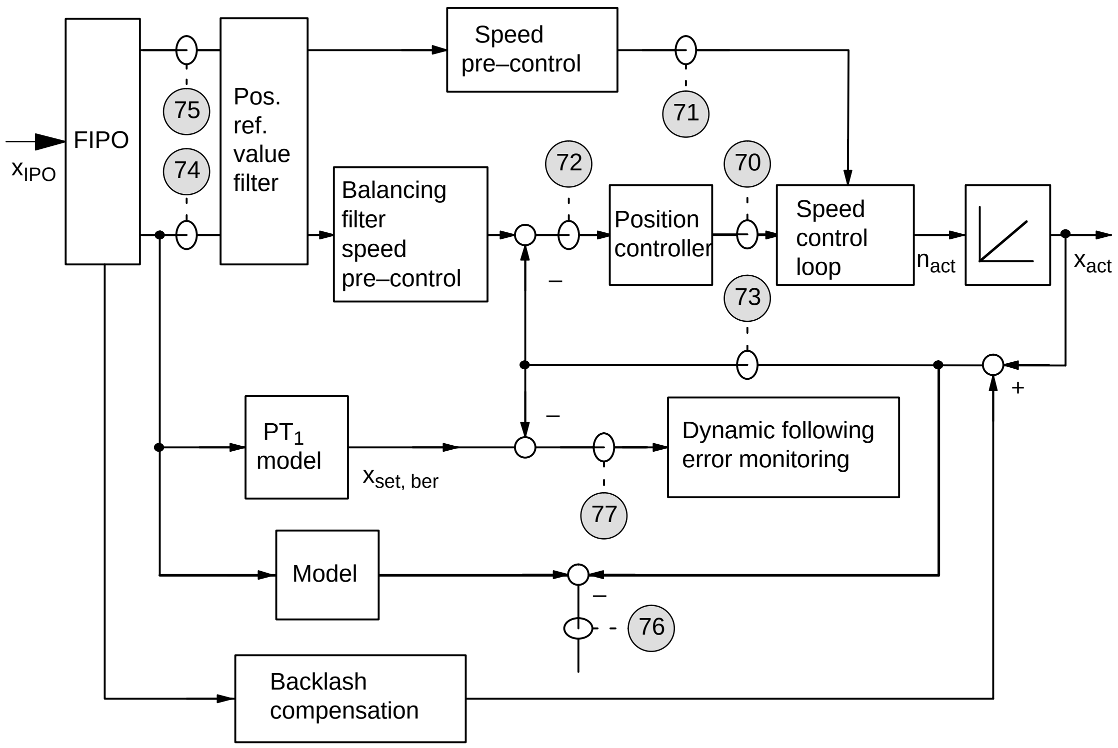
Where are the signals taken from?

Figs. 6-58 and 6-59 show, using the controller structures, where the most important analog signals are taken from for the current and speed controller or for the position controller.



Signal No.	Signal name
2	Current actual value phase U
3	Current actual value phase V
4	Field–generating current actual value I_d
5	Torque–generating current actual value I_q
6	Current setpoint I_q (limited after the filter)
7	Current setpoint I_q (in front of the filter)
8	Speed actual value motor (SRM, ARM), velocity actual value, motor (SLM)
9	Speed setpoint (SRM, ARM), velocity setpoint (SLM)
11	Torque setpoint (SRM, ARM), force setpoint (SLM)
17	Quadrature–axis voltage V_q
18	Direct–axis voltage V_d

Fig. 6-58 Analog signals for the current and speed control loop



Signal No.	Signal name
70	Output, position controller
71	Pre–control speed
72	System deviation, position controller input
73	Position actual value
74	Position reference value
75	Velocity setpoint IPO
76	Following error
77	Following error, dynamic model

Fig. 6-59 Analog signals for the position control loop

Shift factor

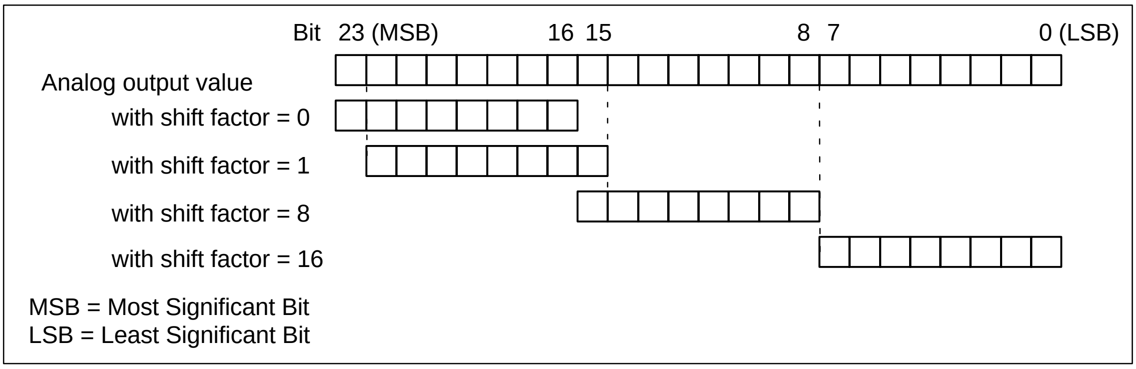


Fig. 6-60 Shift factor for analog output of 24–bit signals

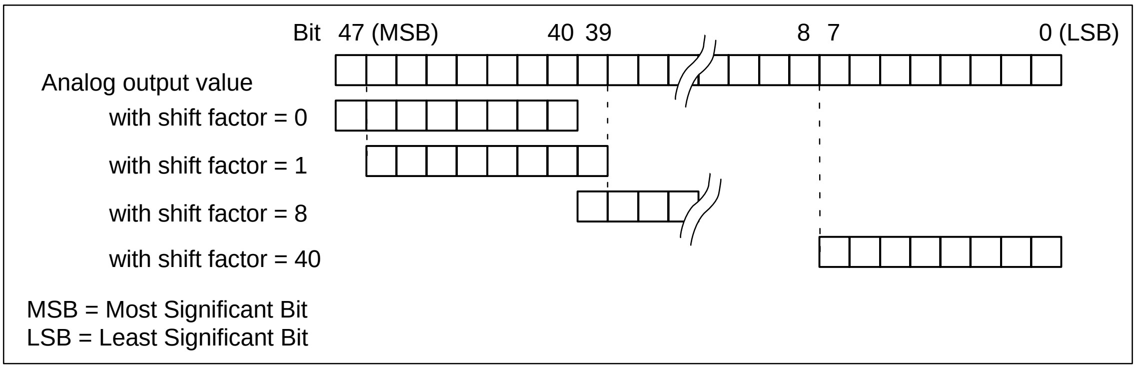


Fig. 6-61 Shift factor for analog output of 48–bit signals

Voltage range

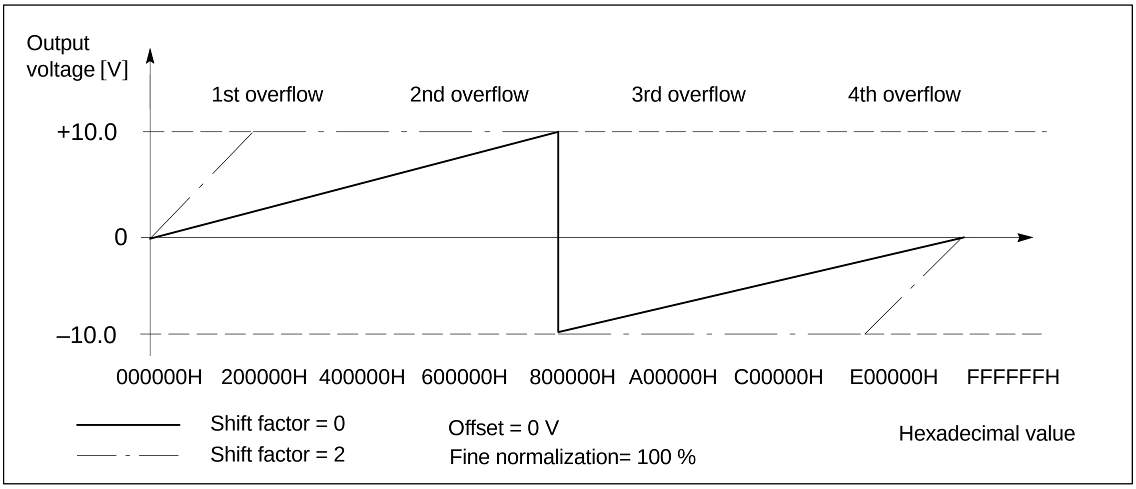


Fig. 6-62 Analog output voltage with overcontrol protection (P0631/P0638 = 1)

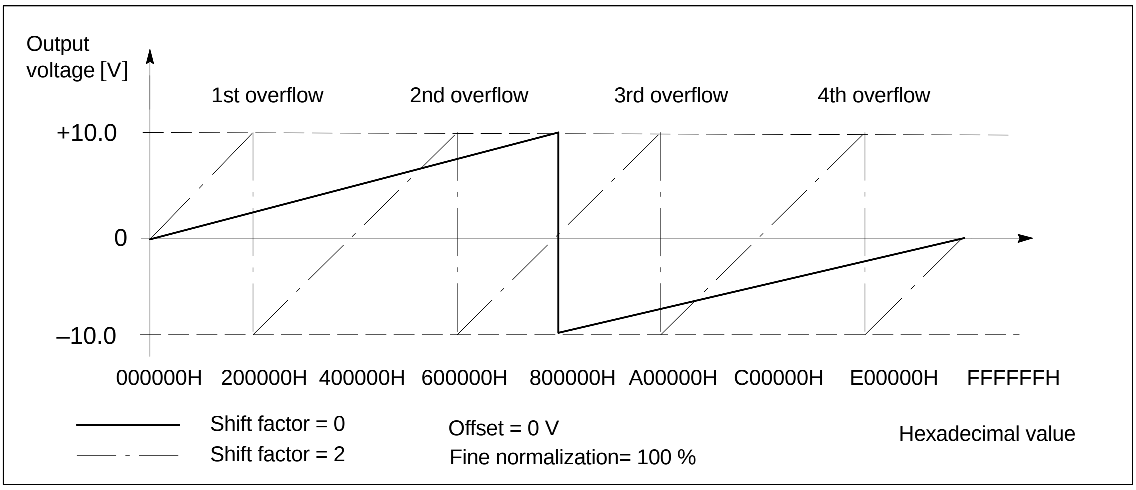


Fig. 6-63 Analog output voltage without overcontrol protection (P0631/P0638 = 0)

6.8 Angular incremental encoder interface (X461, X462)

Description

Incremental setpoints can be read–in (input, from SW 3.3) and incremental actual values output via this interface.

An electronic handwheel can be connected to this interface (from SW 8.1).

- Incremental position actual value is output via the angular incremental encoder interface

  —> P0890 = 1
  —> the interface is switched as output
  —> refer to Chapter6.8.1

  The incremental position actual value of the drive is output via the interface. The actual value can be used by a high–level control.

Notice

The control board only supplies ”correct” angular incremental encoder signals after it has completely run–up.
In order that a higher–level control does not go into a fault condition, the control board must first run up, before the angular incremental encoder interface signals can be evaluated. The criterion for this is the ”ready” signal.

Switch–on sequence (e.g.):
”SIMODRIVE 611 universal”
control board —> higher–level control

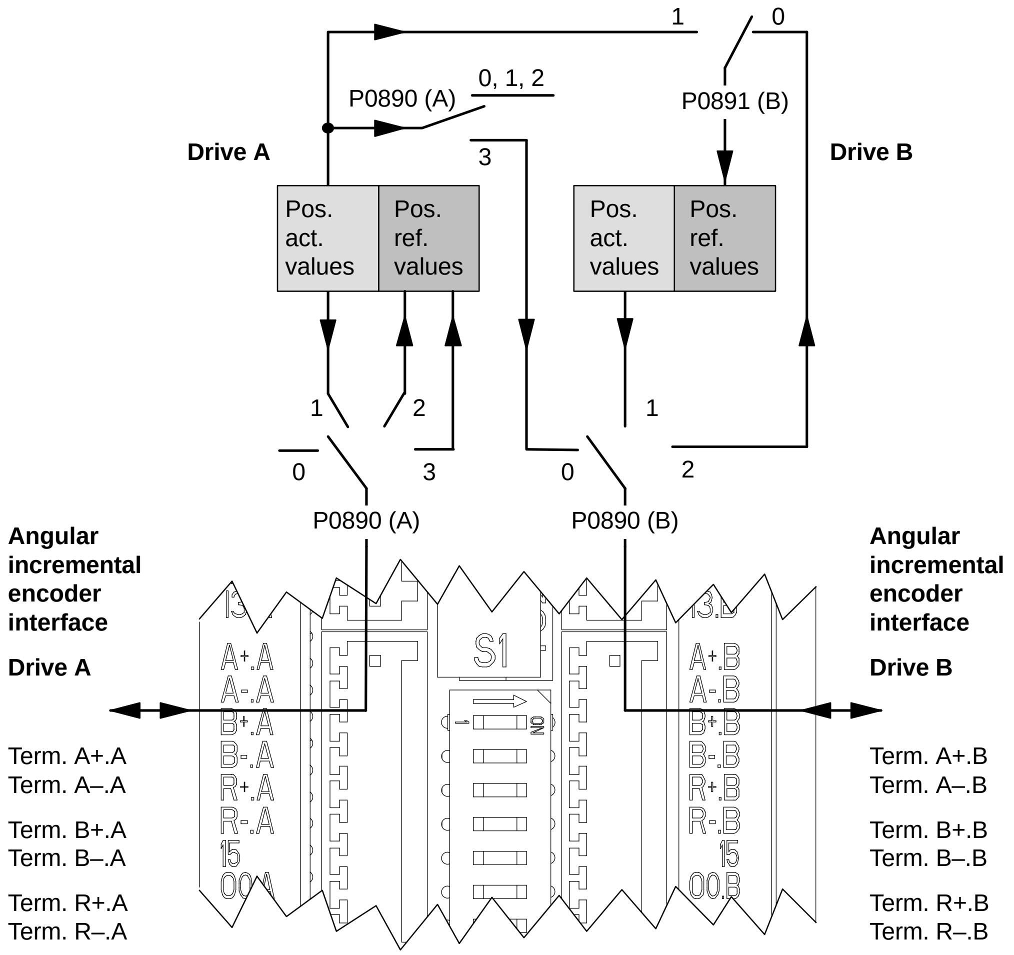
- Enter the incremental position setpoint value via the angular incremental encoder interface (from SW 3.3)

  —> P0890 = 2
  —> the interface is switched as input
  —> refer to Chapter 6.8.2

  An incremental position reference value can be entered via the interface.

Parameterizing the angular incremental encoder interface (P0890 and P0891)

The angular incremental encoder interface is set for drive A and B using P0890. For drive B, the position actual value of drive A can be internally connected to the position reference value (position setpoint) of drive B using P0891.



P0890 Activates the angular incr. enc./encoder interface
- = 1 Switch as output
- = 2 Switch as input (from SW 3.3)
- = 3 Switch as input and output actual values from A internally via B, from SW 3.3, only drive A)

P0891 Angular incremental encoder, position actual value coupling internal double–axis module
- = 1 Actual value from A internally entered as setpoint for B, from SW 3.3, only drive B)

Fig. 6-64 Angular incremental encoder interface for drives A and B: Parameterized using P0890 and P0891

6.8.1 Angular incremental encoder interface as output (P0890 = 1)

Description

The angular incremental encoder interface (X461, X462) is set as output using P0890 = 1, i.e. the incremental position actual value of the motor encoder is output via terminals A+.x/A–.x, B+.x/B–.x, R+.x/R–.x.

The encoder signals are output, depending on the encoder type, and can still be partially manipulated (e.g. scaling or shifting, refer to Table 6-57).

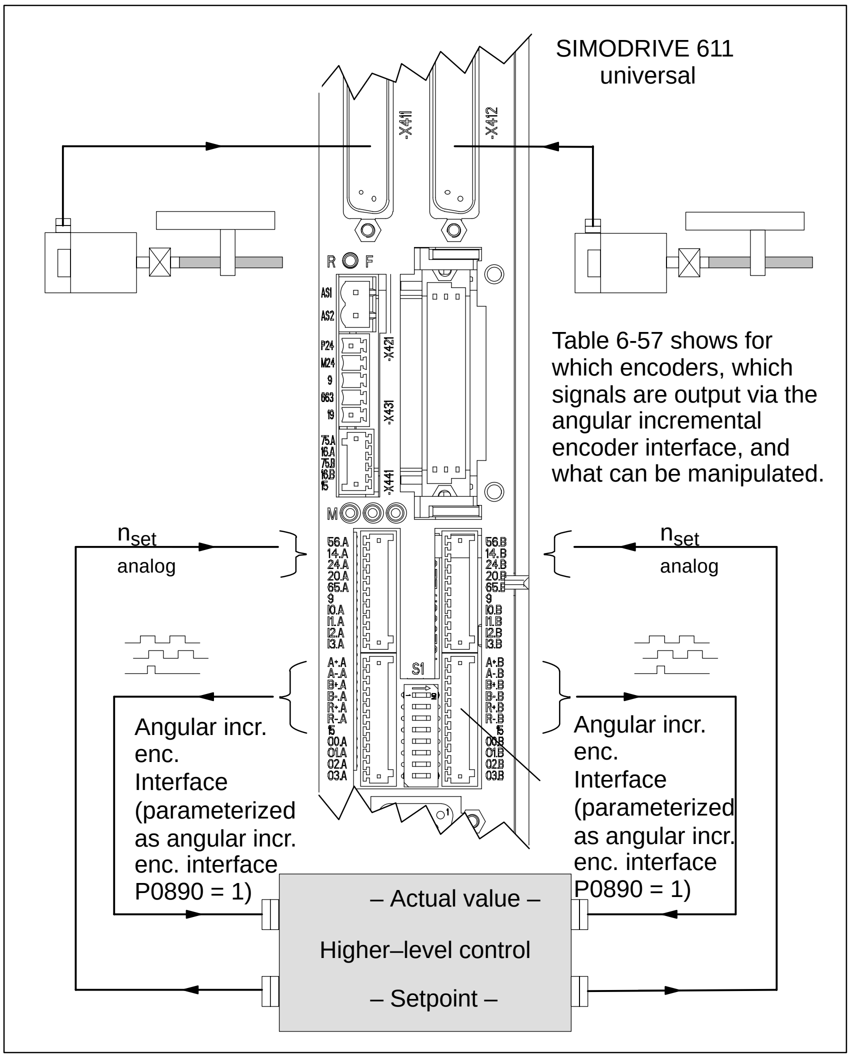


Fig. 6-65 Angular incremental encoder interface parameterized as output

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Note

If, from SW 8.1, an induction motor with TTL encoder is connected to ”SIMODRIVE 611 universal HR”, then it is not permissible that the angular incremental encoder interface is used as output.

Overview: Encoder – angular incremental encoder signals – manipulation

The following table shows which signals are output for which encoder types and with which parameters they can be manipulated.

Table 6-57 Encoder – angular incremental encoder signals – manipulation

<table>
<tr><th rowspan="2">Encoder type</th><th colspan="2">Angular incremental encoder signals</th><th rowspan="2">Distance between the zero pulses</th><th>Factor, angular enc. pulse no./ enc. pulse no. which can be used?</th><th>Can the angular increm. encoder zero pulse be shifted?</th></tr>
<tr><th>A/B</th><th>R</th><th>P0892</th><th>P0893</th></tr>
<tr><td>Resolver
(pole pair no.)
2p = 1 (1–speed)
4p = 2 (2–speed)
6p = 3 (3–speed)
8p = 4 (4–speed)</td><td>1024 pulses/rev
2048 pulses/rev
3072 pulses/rev
4096 pulses/rev</td><td>Can be evaluated</td><td>1024 pulses
4096 pulses
(from SW 6.1)</td><td>yes</td><td>yes</td></tr>
<tr><td>Encoder with sin/cos 1Vpp, incremental (without EnDat), rotating/linear</td><td rowspan="4">P0892 = 0 (factor 1:1)
output timing unchanged via the angular incremental encoder interface (sinusoidal becomes squarewave/ TTL)
P0892 = 1, 2, 3 (factor 1:x)
are output corresponding to the factor (sinusoidal becomes squarewave/TTL)
P0892 = 4 (factor 2:1, from SW 5.1)
are output corresponding to the factor (sinusoidal becomes squarewave/TTL)</td><td>Can be evaluated</td><td>Dependent on the encoder</td><td>yes
(from SW 5.1)</td><td>no</td></tr>
<tr><td rowspan="2">Encoder with sin/cos 1Vpp with EnDat, rotating</td><td>For pulse number 2^n:
Can be evaluated</td><td>2^n
Encoder pulses/rev</td><td rowspan="2">yes</td><td rowspan="2">yes</td></tr>
<tr><td>If not pulse number 2^n, then the signal is present but random
(this means that it cannot be evaluated)</td><td>Cannot be evaluated
(as it is a random signal)</td></tr>
<tr><td>Encoder with sin/cos 1Vpp with EnDat, linear</td><td>Signal available, but random
(this means that it cannot be evaluated)</td><td>Cannot be evaluated
(as it is a random signal)</td><td>yes</td><td>no</td></tr>
<tr><td colspan="6">Note:
• When using absolute value encoders (EnDat), an absolute value is not transferred via the angular incremental encoder interface, but encoder signals conditioned from ”SIMODRIVE 611 universal”.
• In order that the zero offset is correctly taken into account, the drive must be stationary while the control board runs–up.</td></tr>
</table>

Encoder with sin/cos 1Vpp

The TTL signals of the pulse encoder simulation (angular incremental encoder) are derived from the zero cross–overs of the sin/cos signals. These signals are relatively flat which means that at lower speeds, multiple edges can occur at the changeover points with up to approx. half of the sampling frequency.

For several counter modules, encoder monitoring circuits erroneously signal faults. This is the reason that there is a secondary module with a lower sampling frequency which can prevent the erroneous response of the encoder monitoring function, e.g. the SIMATIC FM 354.

- Module, Order No. 6SN1118–0NH00–0**A**A2 (Catalog)
  - Angular incremental encoder sampling frequency 32 MHz
  - Multiple edges up to approx. 16 MHz
  - Useful angular incremental encoder signal, max. to approx. 350 kHz (for encoders with 2048 pulses/rev. max. 10500 RPM)
- Module, Order No.[MLFB] 6SN1118–0NH00–0**B**A2 (alternative)
  - Angular incremental encoder sampling frequency 1.2 MHz
  - Multiple edges up to approx. 600 kHz
  - Useful angular incremental encoder signal, max. to approx. 200 kHz (for encoders with 2048 pulses/rev. max. 6000 RPM)

From the following module, it can be assumed that the encoder monitoring will no longer incorrectly respond for several counter modules.

- Module Order No. [MLFB] 6SN1118–□NH01–0AA□
  - Angular incremental encoder sampling frequency 4 MHz
  - Multiple edges up to approx. 2 MHz
  - Useful angular incremental encoder signal, max. to approx. 420 kHz (for encoders with 2048 pulses/rev. max. 12300 RPM)

Angular incremental encoder interface output for pulse/direction signal

If the angular incremental encoder interface is to be operated as setpoint input, as pulse/direction signal or as forwards/reverse signal, then the angular incremental encoder interface of another ”SIMODRIVE 611 universal” module may not be used as setpoint source. The axis undesirably traverses as a result of the multiple edges inherent to the system.

If the angular incremental encoder interface is used as setpoint input (pulse/direction signal or up/down signal), then a suitable setpoint source, e.g. stepping motor control must be used with exactly the same pulse number as master.

In order to couple to SIMODRIVE 611 universal modules, the quadrature signal input signal waveform (P0894 = 0) should be used.

Parameter overview (refer to Chapter A.1)

The following parameters must be observed when setting the angular incremental encoder interface as output for incremental position actual values:

- P0890 Activates the angular incr. enc./encoder interface
- P0892 Factor, angular incr. enc. pulse no./enc. pulse no.
- P0893 Angular incremental encoder zero pulse offset

Angular incremental encoder signals for resolvers

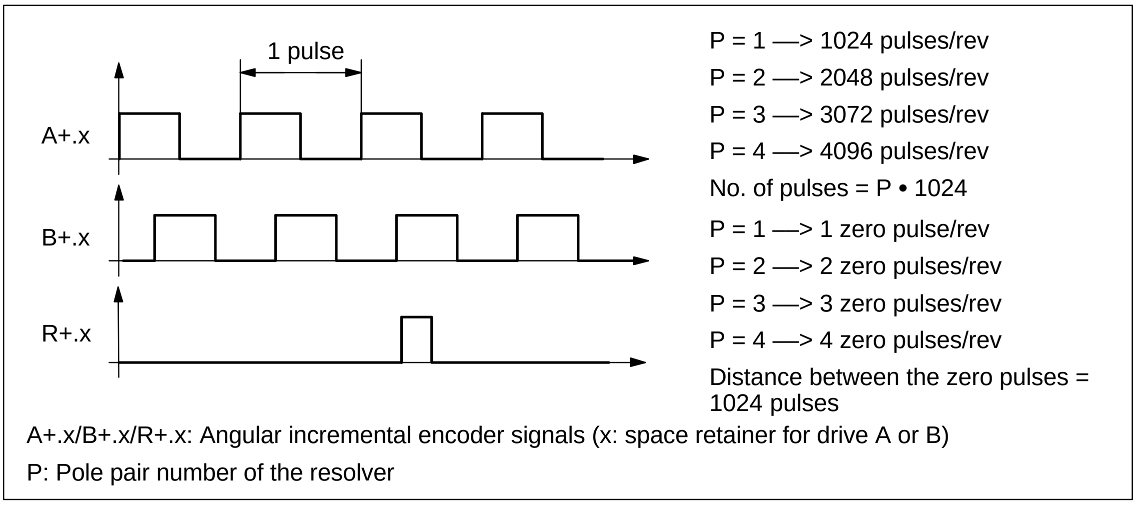

Fig. 6-66 Angular incremental encoder signals for resolvers

Angular incremental encoder signals for incremental encoders with sin/cos 1Vpp

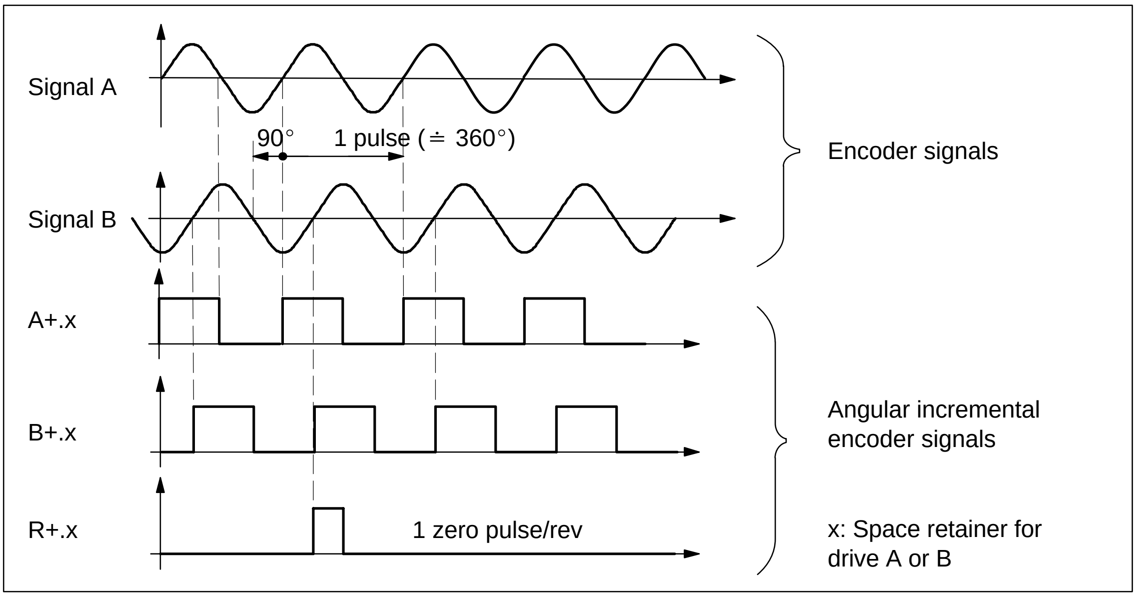

Fig. 6-67 Angular incremental encoder signals for incremental encoders with sin/cos 1Vpp

Angular incremental encoder signals for absolute value encoders with sin/cos 1Vpp and EnDat interface

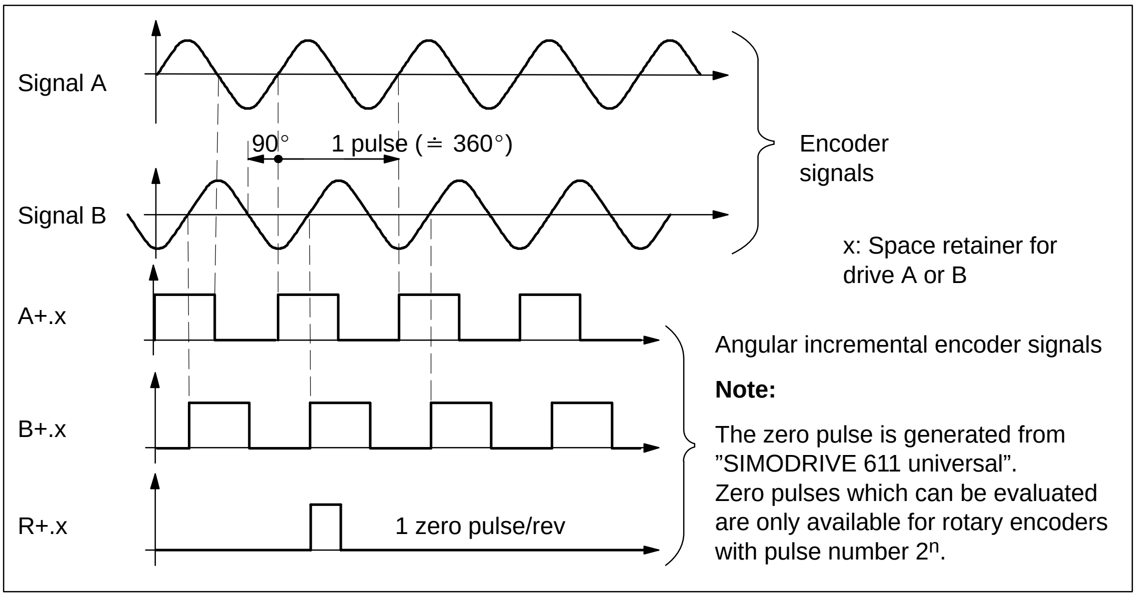

Fig. 6-68 Angular incremental encoder signals for absolute value encoders with sin/cos 1Vpp and EnDat interface

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Note

If the absolute value encoder has more than 2^n=2048 increments (n=11), then one zero mark is output for each 2048 increments.

This means, that encoder pulse number/2048 zero marks are output at the angular incremental encoder interface per motor revolution; whereby the factor angular incremental encoder pulse number/encoder pulse number is selected as 1:1.

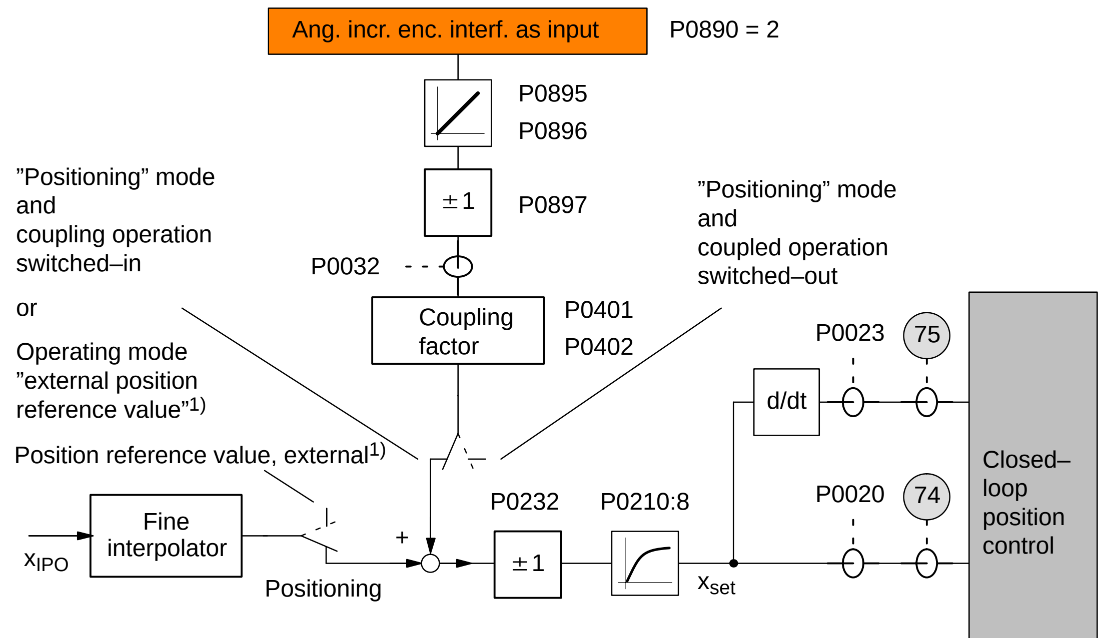
6.8.2 Angular incremental encoder interface as input (P0890 = 2, from SW 3.3)

Description

The angular incremental encoder interface (X461, X462) is set as input with P0890 = 2, i.e. an incremental position reference value can be entered from an external control via terminals A+.x/A–.x, B+.x/B–.x and R+.x/R–.x.

Incremental position reference value via angular incremental encoder interface

The incremental position reference values, entered via the angular incremental encoder interface, are entered after the fine interpolator.



- Parameter (refer to Chapter A.1):
  - P0020 Position reference value
  - P0023 Velocity setpoint
  - P0032 External position reference value
  - P0210:8 Time constant, position reference value filter
  - P0401 Coupling factor, revolutions master drive
  - P0402 Coupling factor, revolutions slave drive
  - P0890 Activates the angular incr. enc./encoder interface
  - P0895 Number of input pulse periods
  - P0896 Number of dimension system grids
  - P0897 Inversion, external position reference value
- Analog signals (refer to Chapter 7.4.3):
  - 74 Position reference value
  - 75 Velocity setpoint

1) From SW 3.3, from SW 4.1, no longer possible.

Fig. 6-69 Incremental position reference value via angular incremental encoder interface

6

Input signal waveform (P0894)

The following input waveforms can be selected:

Quadrature signal (P0894 = 0)

The position reference value is entered via track A and track B, offset through 90 degrees. The direction of rotation identification is realized via the signal sequence.

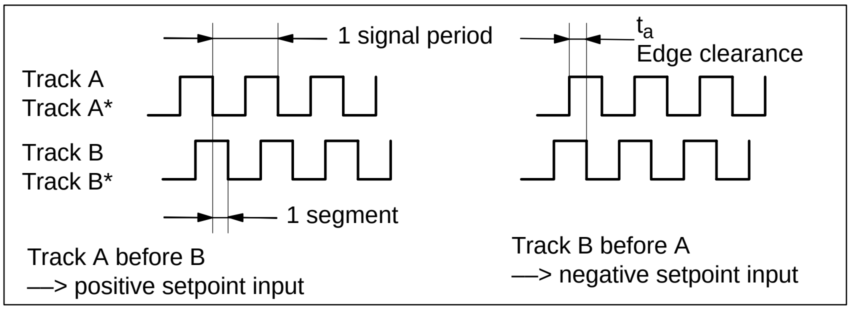


Fig. 6-70 Position reference value input via quadrature signals (P0894 = 0)

Pulse/direction signal (P0894 = 1)

The position reference value is entered via track A and the direction identification via track B.

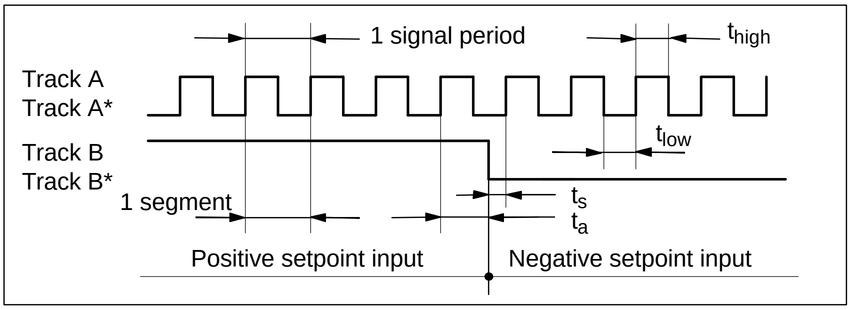


Fig. 6-71 Position reference value input via pulse/direction signal (P0894 = 1)

Forwards/backwards signal (P0894 = 2)

The position reference value is entered, depending on the selected direction, via track A or B with the corresponding other track.

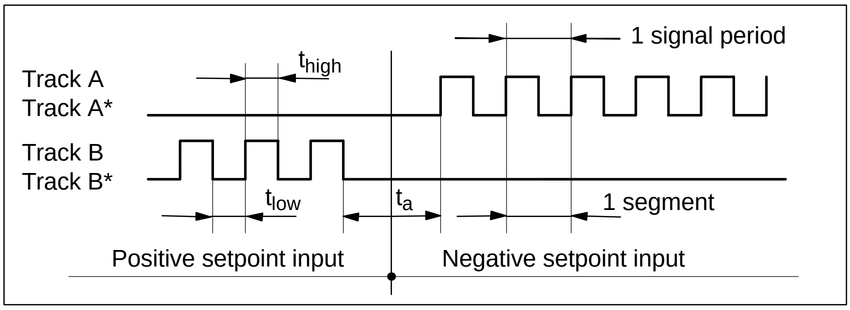


Fig. 6-72 Position reference value entered via the forwards/backwards signal (P0894 = 2)

Input format (P0895 and P0896)

These parameters are used to define how many signal periods correspond to the distance to be traveled.

Example:

Assumption:
The dimension system is set to linear, metric
—> 1 MSR = 0.001 mm

The axis should move through 10 mm with 2048 signal periods.

—> P0895 = 2 048

—> P0896 = 10 000 [MSR]

Terminating resistor

If the angular incremental encoder interface is operated as input, then the following applies:

—> Switch–in the terminating resistor via switch 1

—> Refer to Chapter 1.3.2

Position reference value display (P0032)

The position reference value, entered via the angular incremental encoder interface, is displayed using this parameter.

- P0032 —> Pos. ref. value via the angular incr. enc. interf.
- P0020 —> Position reference value for the pos. controller

It is not absolutely necessary that P0032 and P0020 are the same (e.g. for an axis coupling).

Input limiting frequencies and signal limits

It is only guaranteed that the input signals are correctly identified and processed via the angular incremental encoder interface, switched as input if the following input limiting frequencies and signal limits are maintained:

Table 6-58 Input limiting frequencies and signal limits

Input signal waveform	Input limiting frequency Position controller clock cycle (P1009)[1)			Signal limits
	1 ms	2 ms	4 ms	
Quadrature signal (P0894 = 0)	2.5 MHz	2 MHz	1 MHz	Edge clearance $t_a \geq 100$ ns Pulse width t_{high}, $t_{low} \geq 100$ ns Set–up time $t_s \geq 20$ ns
Pulse/direction signal (P0894 = 1)	5 MHz	5 MHz	4 MHz	
Forwards/backwards signal (P0894 = 2)	5 MHz	5 MHz	4 MHz	

1) For clock–synchronous PROFIBUS operation, each time that clock synchronism is established, the position controller clock is briefly and internally increased in the slave. This means, at this particular instant, the signal frequency may not exceed half of the permissible input limiting frequency.

Parameter overview (refer to Chapter A.1)

When setting the angular incremental encoder interface as input for incremental position reference values, the following parameters must be observed:

- P0032 External position reference value
- P0890 Activates the angular incr. enc./encoder interface
- P0891 Source, external position reference value
- P0894 Angular incremental encoder input signal waveform
- P0895 External position reference value – No. of increments
- P0896 Ext. position reference value – No. of dimension system grids
- P0897 Inversion, external position reference value

Input signal (refer to Chapter 6.4)

For ”angular incremental encoder interface as input”, the following signal is available:

- Input signal ”invert angular increm. encoder input” (from SW 3.5) (refer under the index entry ”Input signal, digital ...”)

  —> using an input terminal with function number 75

  —> using the PROFIBUS control signal ”PosStw.7”

6.8.3 Electronic handwheel (from SW 8.1)

Description

An electronic handwheel can be connected to the angular incremental encoder interface. Electronic handwheels can be used to traverse the selected axes simultaneously in manual mode. The evaluation of the handwheel pulses is defined using the indexing dimension evaluation.

Angular incremental encoder handwheel evaluation

The electronic handwheel can, in the positioning mode, be activated via an input terminal function and via PROFIBUS–DP. The signals from the angular incremental encoder interface are velocity signals. The handwheel and drive do not move in synchronism.

Acceleration and braking is realized according to P0103 and P0104. The drive speed is limited by P0102.

The increments of the electronic handwheel can be assigned four factors using two input terminals.

These factors are specified in P0900:

	Bit 1	Bit 0	Handwheel evaluation (standard)
P0900[0]	0	0	1 MSR
P0900[1]	0	1	10 MSR
P0900[2]	1	0	100 MSR
P0900[3]	1	1	1000 MSR

Sub–parameters P0900[0] up to P0900[3] can be optionally assigned factors up between 1 and 10000.

Reader's note

If the drive is moved using the electronic handwheel, then the drive behavior corresponds to that of jogging, refer to Chapter 6.2.9.

Example:

The electronic handwheel supplies 100 incr./rev. One handwheel revolution corresponds to a value of 1 mm.
200 handwheel revolutions in one minute correspond to a velocity of 200 mm/min. The handwheel evaluation is entered using the input signal ”angular incremental encoder handwheel evaluation, bit 0”.
The following should be parameterized:

- Spindle pitch 10 mm/rev —> P0236=10.000
- Quadrature signal activated —> P0894=0
- Angular incremental encoder handwheel evaluation 10 —> P0900[1]=10

Angular incremental encoder – direction-dependent

An axis is moved using the ”electronic handwheel” dependent on the direction.

The direction should be set as follows using parameter P0899[8]:

- P0899[8]=0: positive and negative direction (standard)
- P0899[8]=1: only in the positive direction
- P0899[8]=2: only in the negative direction

Note

Angular incremental encoder pulses in the inhibited direction do not result in the output of faults or warnings.

In the inhibited direction, only the pulses of the velocity setpoint are cancelled. The velocity actual value must not necessarily follow the velocity setpoint, e.g. as a result of external forces or transient operations. As a result, motion is also possible in the direction that has not been enabled.

Angular incremental encoder inversion

The handwheel direction of rotation can be inverted as follows:

- Using the input terminal function No. 75 ”Invert angular incremental encoder input”, i.e. when the axis is stationary, the incremental position reference value is immediately inverted with a 1 signal at the input terminals.
- ”External inversion position reference value”, via parameter P0897 – i.e. the inversion of the incremental position reference value with P0897 = 1 – is only effective after power on.

Fault handling

The following actions are not possible and initiate the appropriate faults:

- If the input terminals Fct. No. 62 or control signal STW1.8 (jogging 1 ON) or Fct. No. 63 or STW1.9 (jogging 2 ON) and Fct. No. 84 or SatzAnw.13 (activate angular incremental encoder, handwheel) are simultaneously activated, then fault 121 is output.
- If input terminal Fct. No. 72 or control signal PosStw.4 (activate coupling) and Fct. No. 84 or SatzAnw.13 (activate angular incremental encoder handwheel) are simultaneously activated, if a position reference value source is active via Parameter P0891, then fault 167 is output.

Parameter overview (refer to Chapter A.1)

The following parameters must be observed when connecting a handwheel to the angular incremental encoder interface:

- P0890 Activates the angular incr. enc./encoder interface
- P0899 Enters the angular incremental encoder direction
- P0900 Angular incremental encoder handwheel evaluation
- P0102 Maximum velocity
- P0103 Maximum acceleration
- P0104 Maximum deceleration
- P0655 Image, input signals, Part 3
- P0657 Image, output signals, Part 2

Input/output signals (refer to Section 6.4)

The following signals are used to connect a handwheel to the angular incremental encoder interface:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  - Input signal, ”activate angular incremental encoder handwheel” (from SW 8.1)
    —> using an input terminal with function number 84
    —> using the PROFIBUS control signal ”SatzAnw.13”
  - Input signal, ”angular incremental encoder handwheel evaluation, bit 0” (from SW 8.1)
    —> using an input terminal with function number 85
    —> using the PROFIBUS control signal ”SatzAnw.11”
  - Input signal, ”angular incremental encoder handwheel evaluation, bit 1” (from SW 8.1)
    —> using an input terminal with function number 86
    —> using the PROFIBUS control signal ”SatzAnw.12”
- Output signals
  (refer under the index entry, ”Output signal, digital – ...”)
  - Output signal, ”angular incremental encoder handwheel active” (from SW 8.1)
    —> using an output terminal with function number 84
    —> using the PROFIBUS status signal ”AktSatz.13”
  - Output signal, ”angular incremental encoder handwheel evaluation, bit 0” (from SW 8.1)
    —> using an output terminal with function number 85
    —> using the PROFIBUS status signal ”AktSatz.11”
  - Output signal, ”angular incremental encoder handwheel evaluation, bit 1” (from SW 8.1)
    —> using an output terminal with function number 86
    —> using the PROFIBUS status signal ”AktSatz.12”

Note

Compared to the input of control signals via PROFIBUS–DP, the input terminal functions No. 84 to 86 have a higher priority.

6.9 Motor holding brake

Description

For axes, which must be secured against undesirable motion when powered down, the brake sequence control of "SIMODRIVE 611 universal" can be used to control the motor holding brake.

The relay for the motor holding brake is controlled via a freely–parameterizable output terminal.

SIEMENS motors are optionally available with a motor holding brake.

Warning

It is not permissible to use the motor holding brake as working brake, as it is generally only designed for a limited number of emergency braking operations.

Activation

The brake sequence control is activated by setting P0850 to 1.

This function is possible either the n–set mode or pos mode.

Connecting the motor holding brake

The brake sequence control operates with the "open holding brake" output signal. The signal can be output as follows:

- Using a freely–parameterizable output terminal

  The required output signal for the control board or the optional TERMINAL module must therefore be assigned function No. 35 for the motor holding brake by appropriately parameterizing it.

  Output terminals on the control board
  0.x, O1.x, O2.x and O3.x (parameterization, refer to Chap. 6.4.5)

  Output terminals for the optional TERMINAL module
  O2, O3 to O11 (parameterization, refer to Chapter 6.5)

  P0699 can be used, for each output terminal, to set whether the signal is output inverted.

  The relay for the motor holding brake is connected at the parameterized output terminal.

- Via status signal for PROFIBUS–DP

  The DP master must process the "open holding brake" status signal. The signal must be connected to the digital output of the master, to which the relay for the motor holding brake is connected.

Parameter overview (refer to Chapter A.1)

The following parameters are used for the ”motor holding brake” function:

- P0850 Activates the brake control
- P0851 Brake opening time
- P0852 Speed, close holding brake (SRM, ARM)
  Motor velocity, close holding brake (SLM)
- P0853 Brake delay time
- P0854 Controller inhibit time

Information for enabling the controller and pulses

Note

For controller enable:
Issuing and withdrawing the controller enable is dependent on several internal and external enable signals (refer to Chapter 6.4.1).

For pulse enable:
Issuing and withdrawing the pulse enable is dependent on several internal and external enable signals (refer to Chapter 6.4.1).

Open brake

When ”controller enable” is issued, the speed controller is active and controls with $n_{set} = 0$.
The speed setpoints are only transferred after the brake opening time has expired.
This is signaled using the ”status, controller enable” output signal.

Objective when setting the brake opening time

The brake opening time should be selected, so that after the ”controller enable” is issued, the speed controller becomes active when the motor holding brake opens.
For all other settings, the control acts against the brake.

The following applies:
Brake opening time (P0851) $\geq$ Time to open the holding brake

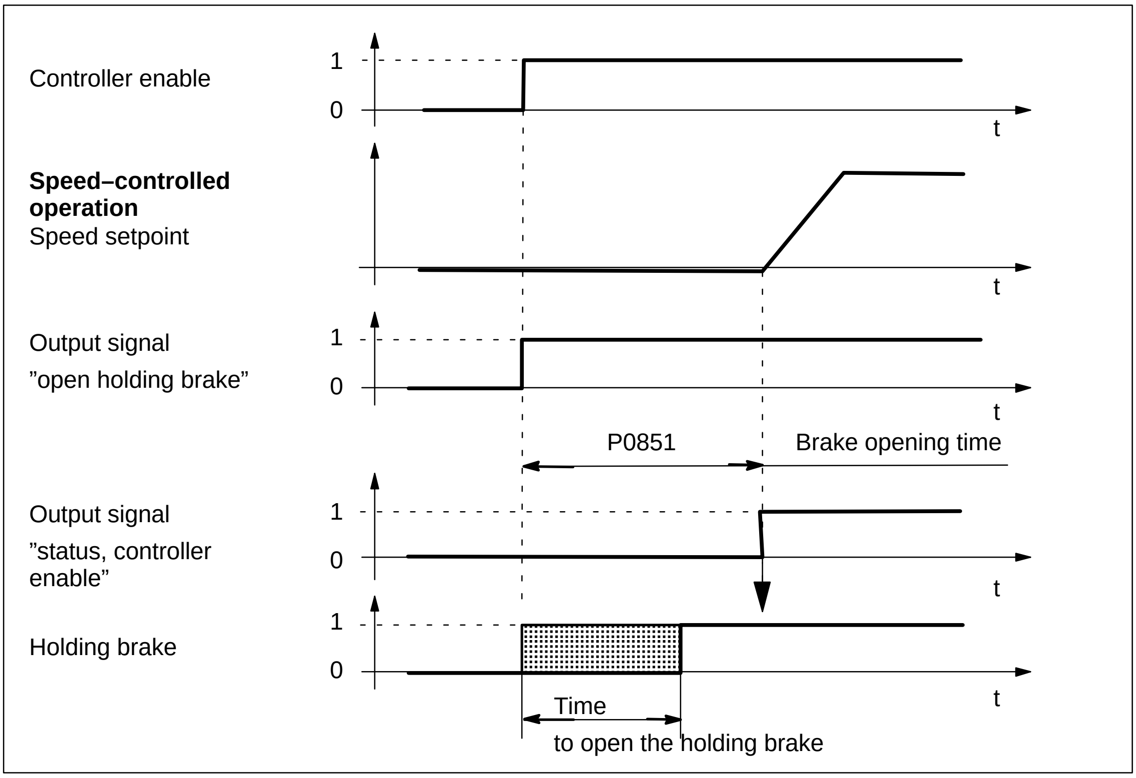


Fig. 6-73 Opening the brake: Characteristics when issuing ”controller enable”

Closing the brake when withdrawing the ”controller enable”

The axis is actively braked when the ”controller enable” is withdrawn. The brake delay time (P0853) is started when the ”ramp–function generator enable” signal drops–out, i.e. at nset = 0.

At n = $n_{holding\ brake}$ (P0852), the following is valid:

- The ”open holding brake” output signal is deleted

  Note:
  After the brake delay time has expired (P0853), the ”open holding brake” output signal is always canceled.

Objective for this setting

The time required to close the holding brake should be adjusted so that the control is only withdrawn after the brake has closed. This prevents an axis from possibly sagging.

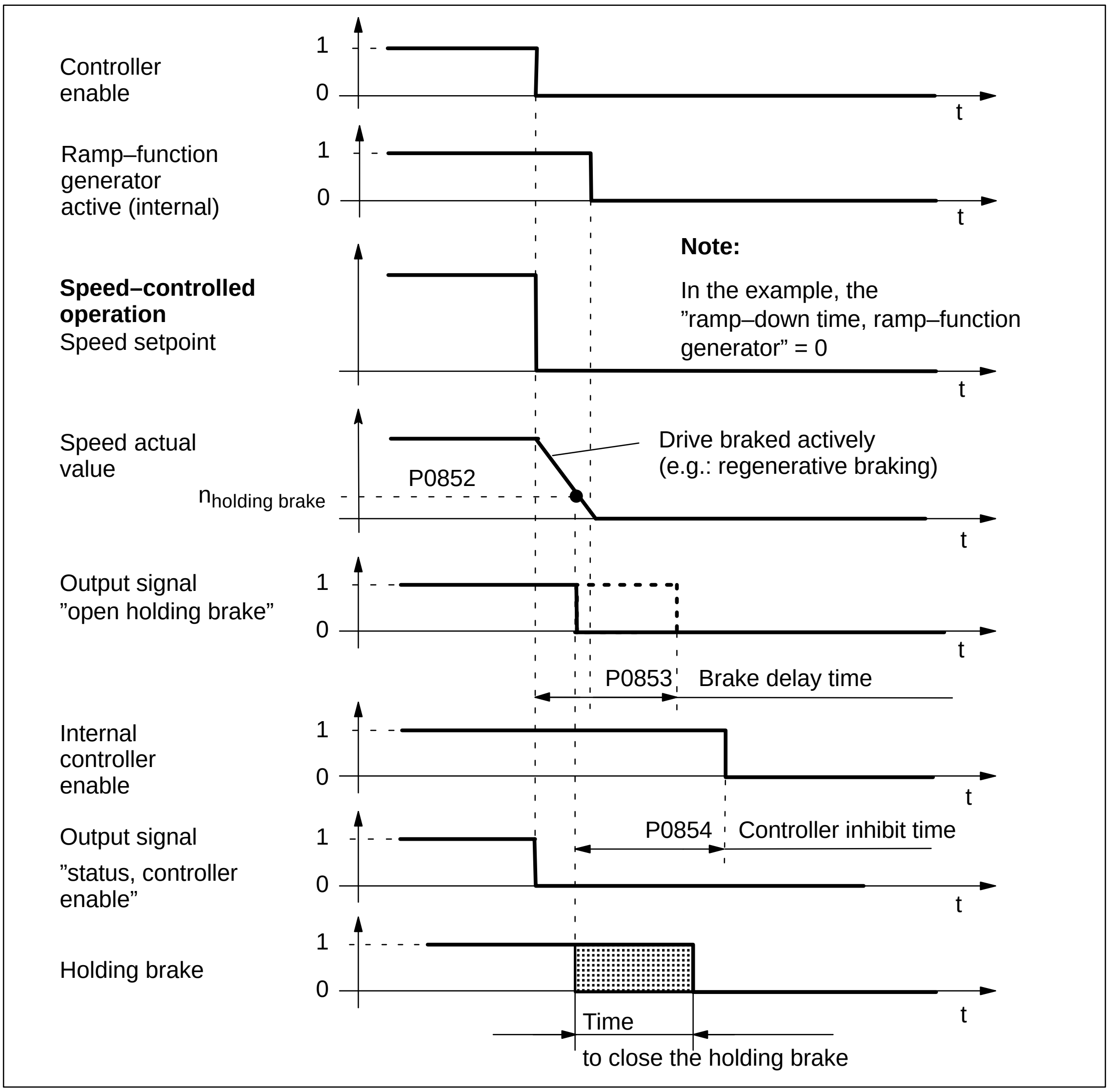


Fig. 6-74 Closing the brake: Behavior when withdrawing ”controller enable”

Closing the brake when the ”pulse enable” is withdrawn

When the pulse enable is withdrawn, the drive coasts down, and the ”open holding brake” output signal is canceled.

After the time taken for the brake to close, the drive is braked by the motor holding brake.

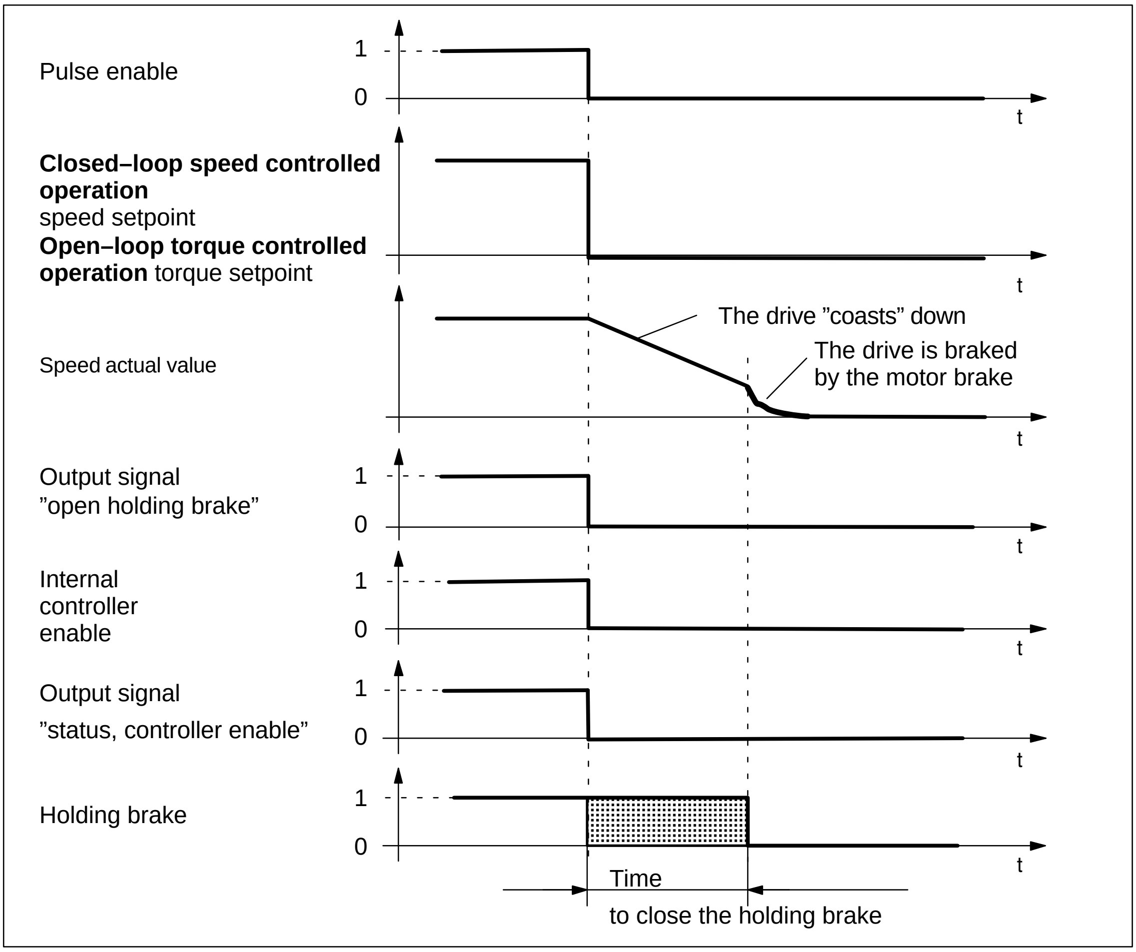


Fig. 6-75 Closing the brake: Behavior when withdrawing ”pulse enable”

Example: Motor with motor holding brake

Task description, assumptions:

A motor with holding brake for a hanging axis is connected to drive A. The motor holding brake is to be controlled via output terminal O3.A.

What other settings are required?

1. Connect–up the relay to control the motor holding brake
2. Assign the function ”holding brake” to output terminal O3.A (P0683 = 35)
3. Activate the brake sequence control in the drive (P0850 = 1)
4. Set the parameter to open the holding brake

   P0851 (brake opening time)
   This time must be set, so that it is equal to or greater than the time to open the holding brake.
5. Set the parameters for closing the holding brake when withdrawing the controller enable

   P0852 (speed, close holding brake)

   P0853 (brake delay time)
   The brake delay time (P0853) must be harmonized with the speed at which the holding brake closes (P0852).

   P0854 (controller inhibit time)
   The controller inhibit time must be harmonized with the time that it takes to close the brake so that the drive cannot drop.

   Example of determining the controller inhibit time:
   Mark the position of the axis and initiate an alarm that withdraws the controller enable.
   Does the axis sag? If yes, then increase the controller inhibit time

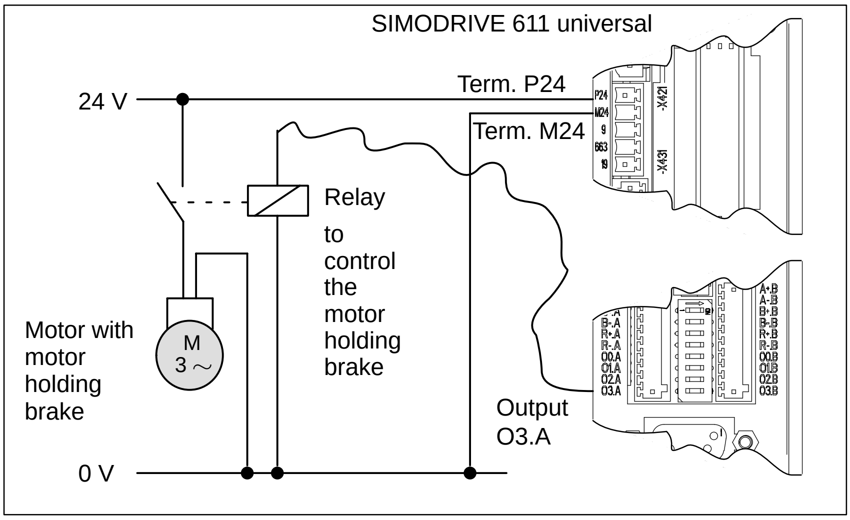


Fig. 6-76 Example: Controlling the motor holding brake via output O3.A

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6.10 Parameter set changeover

Description

By selecting parameter sets, the appropriate parameter set–dependent parameters become effective.
This means that parameters can be adapted to various requirements, e.g.

- Dynamic adaptations (jerk and acceleration)
- Gearbox stage changeover (high or low speed)

It is possible to toggle between a maximum of 8 parameter blocks (parameter blocks 0 to 7) via the appropriate input signals.

Parameters that are independent and dependent on the parameter set

For ”SIMODRIVE 611 universal” the following parameter types are available, referred to the parameter set changeover:

- Parameter set–independent parameters

  These parameters only have one parameter value, and are effective, independent of the selected parameter set.

  Example:
  P0660 Function, input terminal I0.x

- Parameter set–dependent parameters

  These parameters have, for every parameter set, a parameter value which is effective, dependent on the selected parameter set.

  Example:
  P1407:8 P–gain, speed controller (ARM, SRM)
  P–gain, velocity controller (SLM)
  P1407:0 is effective, if parameter set 0 is selected (standard)
  ...
  P1407:7 is effective, if parameter set is selected

Table 6-59 Parameter set–dependent parameters

Parameters for parameter set				Operating mode		
0	**1**	**...**	**7**	**n_{set}**	**pos**	**Description**
0115:0	0115:1	...	0115:7	–	x	Fixed endstop, max. following error (from SW 3.3)
0116:0	0116:1	...	0116:7	–	x	Fixed endstop, monitoring window (from SW 3.3)
0200:0	0200:1	...	0200:7	x [1)]	x	Kv factor (position loop gain)
0204:0	0204:1	...	0204:7	–	x	Factor, speed pre–control
0205:0	0205:1	...	0205:7	x [1)]	x	Balancing filter, speed pre–control (dead time)
0206:0	0206:1	...	0206:7	x [1)]	x	Balancing filter, speed pre–control (PT1)
0210:0	0210:1	...	0210:7	x [1)]	x	Time constant, position reference value filter
0237:0	0237:1	...	0237:7	x [1)]	x	Encoder revolutions

Table 6-59 Parameter set–dependent parameters, continued

Parameters for parameter set				Operating mode		
0	1	...	7	n_{set}	pos	Description
0238:0	0238:1	...	0238:7	x [1)]	x	Load revolutions
0318:0	0318:1	...	0318:7	x [1)]	x	Dynamic following error monitoring tolerance
1123:0	1123:1	...	1123:7	x	x	Load moment of inertia (ARM, SRM) (from SW 2.4) Load mass (SLM)
1200:0 to 1221:0	1200:1 to 1221:1	... ...	1200:7 to 1221:7	x	x	Current Setpoint Filter
1230:0	1230:1	...	1230:7	x	x	1. Torque limit value (ARM, SRM) 1. Force limit value (SLM)
1233:0	1233:1	...	1233:7	x	x	Regenerative limiting
1235:0	1235:1	...	1235:7	x	x	1. power limit value
1240:0	1240:1	...	1240:7	x	x	Offset, torque setpoint (speed controlled) (ARM, SRM) Offset, force setpoint (speed–controlled) (SLM)
1241:0	1241:1	...	1241:7	x	–	Normalization, torque setpoint (ARM, SRM) Normalization, force setpoint (SLM)
1242:0	1242:1	...	1242:7	x	–	Offset, torque setpoint (torque controlled) (ARM, SRM) Offset, force setpoint (open–loop torque contr.) (SLM)
1243:0	1243:1	...	1243:7	x	x	Normalization, torque/power reduction (ARM, SRM) Normalization, force/power reduction (SLM)
1256:0	1256:1	...	1256:7	x	–	Ramp–function generator, ramp–up time (from SW 2.4)
1257:0	1257:1	...	1257:7	x	–	Ramp–function generator, ramp–down time (from SW 2.4)
1401:0	1401:1	...	1401:7	x	x	Speed for max. useful motor speed (ARM, SRM) Velocity for max. useful motor velocity (SLM)
1405:0	1405:1	...	1405:7	x	x	Monitoring speed, motor (ARM, SRM) Monitoring velocity, motor (SLM)
1407:0	1407:1	...	1407:7	x	x	P gain, speed controller (ARM, SRM) P gain, velocity controller (SLM)
1408:0	1408:1	...	1408:7	x	x	P gain, upper adaptation speed (ARM, SRM) P–gain, upper adaptation velocity (SLM)
1409:0	1409:1	...	1409:7	x	x	Integral action time, speed controller (ARM, SRM) Integral action time, velocity controller (SLM)
1410:0	1410:1	...	1410:7	x	x	Integral action time, upper adaptation speed (ARM, SRM) Integral action time, upper adaptation velocity (SLM)
1414:0	1414:1	...	1414:7	x	x	Natural frequency, reference model, speed (ARM, SRM) Natural frequency, reference model, velocity (SLM)
1415:0	1415:1	...	1415:7	x	x	Damping, reference model, speed (ARM, SRM) Damping, reference model, velocity (SLM)

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Table 6-59 Parameter set–dependent parameters, continued

Parameters for parameter set				Operating mode		
0	**1**	**...**	**7**	**n_{set}**	**pos**	**Description**
1417:0	1417:1	...	1417:7	x	x	n_x for ”n_act < n_x” signal
1418:0	1418:1	...	1418:7	x	x	n_min for ”n_act < n_min” signal
1421:0	1421:1	...	1421:7	x	x	Time constant, integrator feedback (speed controller)
1426:0	1426:1	...	1426:7	x	x	Tolerance bandwidth for ”n_set = n_act” signal
1428:0	1428:1	...	1428:7	x	x	Threshold torque M_x (ARM, SRM) Threshold force F_x (SLM)
1451:0	1451:1	...	1451:7	x	x	P gain, speed controller IM (ARM)
1453:0	1453:1	...	1453:7	x	x	Integral action time, speed controller IM (ARM)
1500:0 to 1521:0	1500:1 to 1521:1	... ...	1500:7 to 1521:7	x	x	Speed setpoint filter (ARM, SRM) Velocity setpoint filter (SLM)

Note:
x: The parameter is available in this operating mode
–: The parameter is not available in this operating mode
x[1)] for spindle positioning (from SW 5.1)

Note

Only parameter set 0 is parameterized using this SimoCom U parameterizing and start–up tool via the interactive dialog operation.

Parameter sets 1 to 7 must be parameterized using the Expert list of SimoCom U.

How can you toggle between parameter sets?

You can toggle between parameter sets 0 and 7 using the following input signals:

- Input signal ”parameter set changeover 1st input”
- Input signal ”parameter set changeover 2nd input”
- Input signal ”parameter set changeover 3rd input”

Note

The input signals to change over the parameter set can be entered via input terminals or via PROFIBUS–DP (refer to Chapter 6.4.3 or under the index entry ”input signal, parameter set changeover”).

For a parameter set changeover in the positioning mode (P0700=3), for the same gear set ratios, the reference point is lost. This is not the case if P0239=1.

Application Example

Task description:
Drive A and therefore the coupled mechanical system is loaded to various degrees (e.g. with and without load).

In order to adapt the system to the masses to be moved, the parameter set–dependent parameters are defined in parameter sets 0 and 1 corresponding to the different loads.

Input terminal I0.A is to be used to toggle between parameter set 0 and 1:

Input terminal		Parameter	Description
I0.A	1st input	P0660 = 9	Changeover
xx	2nd input	xx	Acts just like a 0 signal
xx	3rd input	xx	Acts just like a 0 signal

The input terminals to toggle between the parameter sets, is controlled from a higher–level PLC as a function of the mass being moved.

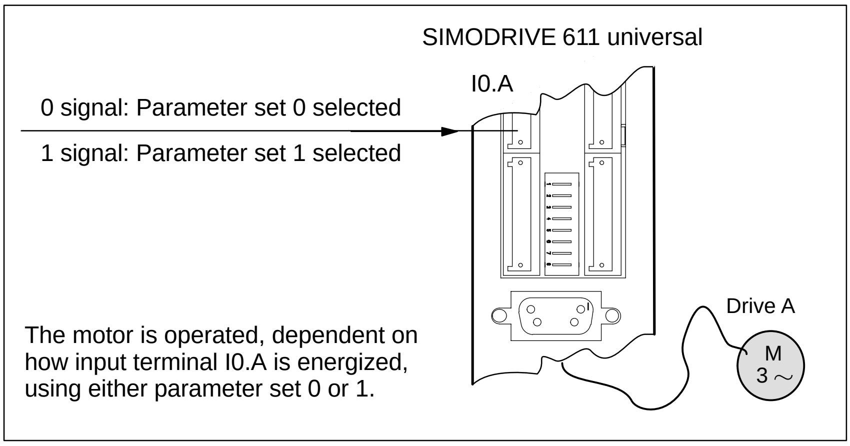


Fig. 6-77 Example: Parameter set changeover

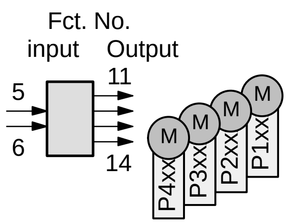
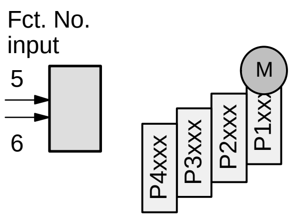
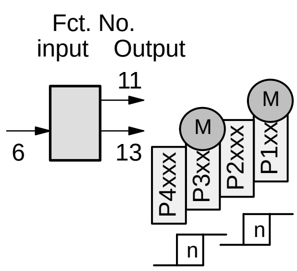
6.11 Motor changeover for induction motors (from SW 2.4)

6.11.1 General information on motor changeover

Versions for motor changeover

The following changeover functions can be implemented depending on the setting in P1013 (motor changeover):

Table 6-60 Motor changeover versions

P1013	changeover	Description	Reference
0	none	**Properties:** Motor data set 1 (P1xxx) is always selected.	–
1	Max. 4 motors, each with 1 motor data set 	**Features:** • The motor/motor data sets are changed over using freely–parameterizable input/output terminals. • The pulses are canceled at each changeover operation. **Application:** • Changing over several motors[1)2)]	Refer to Chapter 6.11.2
2	1 motor with max. 4 motor data sets 	**Features:** • The motor data sets are changed over using freely–parameterizable input terminals. • The pulses are not canceled when changing over. **Application:** • Adaptation of the motor and controller data (e.g. pulse frequency changeover)	Refer to Chapter 6.11.3
3	Max. 2 motors each with 2 motor data sets 	**Features:** • The motors/motor data sets are changed over via a freely parameterizable input terminal and via the speed thresholds. • If an input terminal is used to change over, the pulses are canceled. • The pulses are not canceled if changeover is realized using speed thresholds. **Application:** • Speed–dependent adaptation of the motor and controller data (e.g. pulse frequency changeover) for – one motor – two motors – star/delta operation	Refer to Chapter 6.11.4

1) Encoder changeover is not possible.
2) Only 1 motor can be used with encoder.

Motor data sets

For the ”SIMODRIVE 611 universal” control board, there are data sets for a maximum of 4 induction motors.

Note

The currently effective motor data set is displayed in P0599 (active motor data set).

It is only possible to enable motor changeover in the ”speed/torque setpoint” mode (P0700 = 1).

Before motor changeover can be selected, the motor data must be entered into the associated parameters 2xxx, 3xxx and/or 4xxx. For motors with Code No., it is sufficient to make the entry in Px102. After this, in both cases, it is necessary to carry–out a ”calculate controller data” routine using Px080 = 1.

Table 6-61 Motor data set–dependent parameters

Motor data set				**Meaning**
1	**2**	**3**	**4**	
1100	2100	3100	4100	Frequency, pulse–width modulation
1102	2102	3102	4102	Motor code number (99 is entered for non–catalog motors) **Note:** • When using several catalog motors, the motor data is only valid after first entering the appropriate motor code, followed by data save and POWER ON. • For a motor changeover with ”gap” (e.g. from motor 1 to 3), a motor code number (dummy code) must be entered in the intermediate motor data set, i.e. the appropriate parameter may not have the value zero. • After manually changing the motor code number, the following parameters must be checked, and if required, set to practical values: – P1401, P2401, P3401 or P4401 (speed for the maximum useful motor speed) – P1147, P2147, P3147 or P4147 (speed limiting)
1103	2103	3103	4103	Rated motor current
1117	2117	3117	4117	Motor moment of inertia
1119	2119	3119	4119	Inductance of the series reactor
1120	2120	3120	4120	P gain, current controller
1121	2121	3121	4121	Integrator time of current controller
1123:8	2123:8	3123:8	4123:8	Load moment of inertia
1125	2125	3125	4125	Ramp–up time 1 for V/Hz operation

Table 6-61 Motor data set–dependent parameters, continued

Motor data set				Meaning
1	2	3	4	
1127	2127	3127	4127	Voltage at f = 0, V/Hz operation
1129	2129	3129	4129	cos phi power factor
1130	2130	3130	4130	Rated motor power
1132	2132	3132	4132	Rated motor voltage
1134	2134	3134	4134	Rated motor frequency
1135	2135	3135	4135	Motor no–load voltage
1136	2136	3136	4136	Motor no–load current
1137	2137	3137	4137	Stator resistance, cold
1138	2138	3138	4138	Rotor resistance, cold
1139	2139	3139	4139	Stator leakage reactance
1140	2140	3140	4140	Rotor leakage reactance
1141	2141	3141	4141	Magnetizing reactance
1142	2142	3142	4142	Speed at the start of field weakening
1145	2145	3145	4145	Stall (standstill) torque reduction factor
1146	2146	3146	4146	Maximum motor speed
1147	2147	3147	4147	Speed limiting
1148 [1)]	2148 [1)]	3148 [1)]	4148 [1)]	Speed at the start of the stall power
1150	2150	3150	4150	P gain, flux controller
1151	2151	3151	4151	Integral action time, flux controller
1160	2160	3160	4160	Speed at the start of flux sensing
1180	2180	3180	4180	Lower current limit adaptation
1181	2181	3181	4181	Upper current limit adaptation
1182	2182	3182	4182	Factor, current controller adaptation
1230:8	2230:8	3230:8	4230:8	1st torque limit value
1233:8	2233:8	3233:8	4233:8	Regenerative limiting
1235:8	2235:8	3235:8	4235:8	1st power limit value
1238	2238	3238	4238	Current limit value
1240:8	2240:8	3240:8	4240:8	Offset, torque setpoint (speed controlled)
1241:8	2241:8	3241:8	4241:8	Normalization, torque setpoint
1242:8	2242:8	3242:8	4242:8	Offset, torque setpoint (torque controlled)
1243:8	2243:8	3243:8	4243:8	Normalization, torque/power reduction
1245	2245	3245	4245	Threshold for speed–dep. Msoll smoothing
1246	2246	3246	4246	Hysteresis for speed–dep. Msoll smoothing
1256:8	2256:8	3256:8	4256:8	Ramp–function generator, ramp–up time
1257:8	2257:8	3257:8	4257:8	Ramp–function generator, ramp–down time

Table 6-61 Motor data set–dependent parameters, continued

Motor data set				Meaning
1	2	3	4	
1400	2400	3400	4400	Rated motor speed
1401:8	2401:8	3401:8	4401:8	Speed for the max. useful motor speed
1403	2403	3403	4403	Shutdown speed, pulse cancellation
1405:8	2405:8	3405:8	4405:8	Monitoring speed, motor
1407:8	2407:8	3407:8	4407:8	P gain of speed controller
1408:8	2408:8	3408:8	4408:8	P gain, upper adaptation speed
1409:8	2409:8	3409:8	4409:8	Integral action time, speed controller
1410:8	2410:8	3410:8	4410:8	Integral action time, upper adaptation speed
1411	2411	3411	4411	Lower adaptation speed
1412	2412	3412	4412	Upper adaptation speed
1413	2413	3413	4413	Select adaptation, speed controller
1417:8	2417:8	3417:8	4417:8	nx for ”nact < nx” signal
1418:8	2418:8	3418:8	4418:8	nmin for ”nact < nmin” signal
1426:8	2426:8	3426:8	4426:8	Tolerance bandwidth for ”nset = nact” signal
1451:8	2451:8	3451:8	4451:8	P gain, speed controller IM
1453:8	2453:8	3453:8	4453:8	Integral action time, speed controller IM
1458	2458	3458	4458	Current setpoint, open–loop controlled range IM
1459	2459	3459	4459	Torque smoothing time constant IM
1465	2465	3465	4465	Changeover speed, MSD/IM
1466	2466	3466	4466	Changeover speed, closed–loop/open–loop control IM
1602	2602	3602	4602	Warning threshold, motor overtemperature
1607	2607	3607	4607	Shutdown limit, motor temperature
1608	2608	3608	4608	Fixed temperature
1712 [1)]	2712 [1)]	3712 [1)]	4712 [1)]	Weighting, rotor flux representation
1713 [1)]	2713 [1)]	3713 [1)]	4713 [1)]	Weighting, torque representation
1725 [1)]	2725 [1)]	3725 [1)]	4725 [1)]	Normalization, torque setpoint

1) These parameters are read–only.

6

Selecting the motor data sets and motors via input/output signals

The following input and output signals are used to select the motor data set and the associated motor:

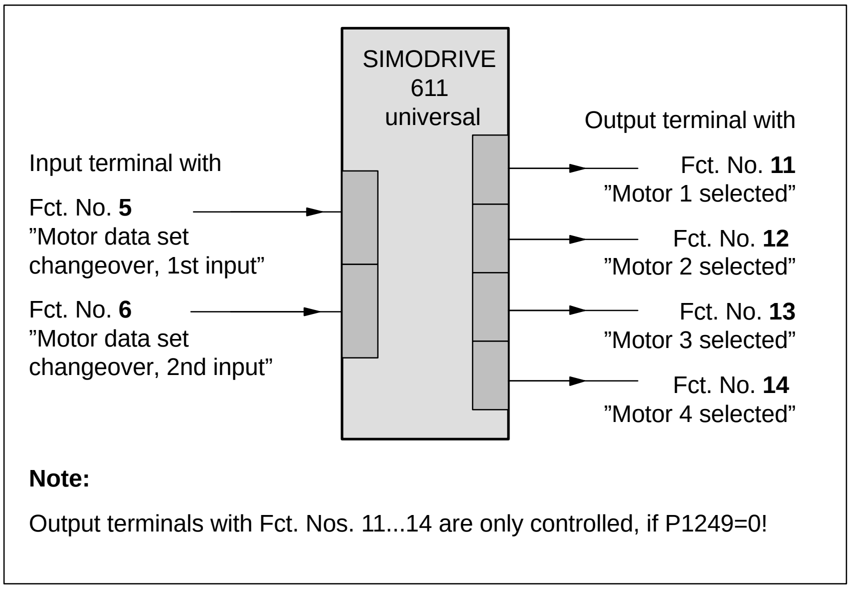


Fig. 6-78 Input/output signals: freely–parameterizable terminals

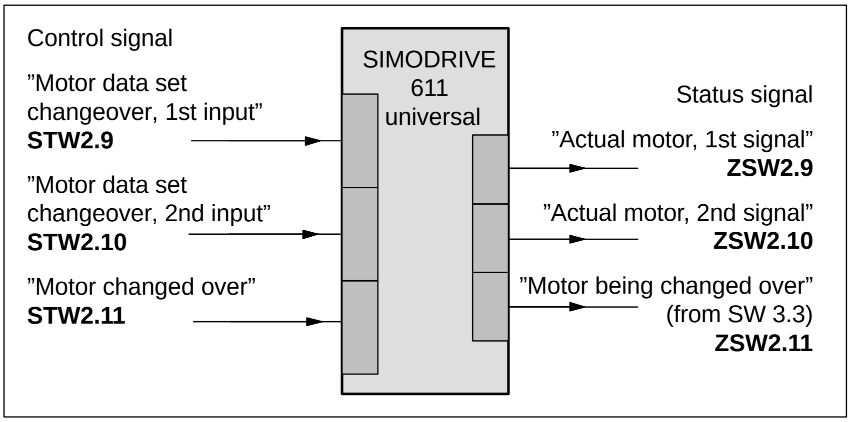


Fig. 6-79 Input/output signals: PROFIBUS signals

Reader's note

- Input signals: refer under the index entry ”Input signal...”
  Output signals: refer under the index entry ”Output signal ...”
- The wiring of the input/output terminals for the control board and for the optional TERMINAL module is described in Chapter 2.2.
- The following input/output terminals are available:
  - for the control board: I0.x to I3.x or O0.x to O3.x
    x: Space retainer for drive A or B
  - for the optional TERMINAL module: I4 to I11 or O4 to O11
- The parameterization of the input/output terminals is described as follows:
  - for the control board: in Chapter 6.4.2 and 6.4.5
  - for the optional TERMINAL module: in Chapter 6.5

Pulse frequency changeover

A dedicated power module pulse frequency (P1100) can be parameterized for each motor data set.

The speed requirement of the motor can be better adapted by changing over the pulse frequency. With a higher pulse frequency, higher speeds can be achieved.

The following applies for the pulse frequency, it must have at least approx. 6 the frequency of the instantaneous motor frequency.

High pulse frequencies mean high switching losses and therefore poor utilization.
At a pulse frequency of 8 kHz, only 40–55% of the possible current that is available at 3.2 kHz is available.

6.11.2 Changeover, max. 4 motors each with 1 data set (P1013 = 1)

Description

For this changeover version (P1013 = 1), a maximum of 4 motors each with one associated motor data set can be changed over.

Note

The pulses are canceled at each changeover.

Input/output signals for changeover

The following 2 input and 4 output signals are available to changeover a maximum of 4 motors/motor data sets:

Table 6-62 Input/output terminal signals

Input terminal with function No.		Effective motor data set	Output terminal with function No.			
6	**5**		**14**	**13**	**12**	**11**
0	0	P1xxx	0	0	0	1
0	1	P2xxx	0	0	1	0
1	0	P3xxx	0	1	0	0
1	1	P4xxx	1	0	0	0

Note

The number of contactors which can be controlled for motor changeover is limited by the number of output terminals.

Output terminals 11, 12, 13 and 14 are not controlled, if P1249 = 1.

How does a changeover work?

”SIMODRIVE 611 universal” receives a request for changeover, if the signal status at one of the two input terminals for motor data set changeover has changed.

A changeover is then realized automatically as follows:

1. The pulses are canceled and the motor selection outputs are reset
2. Time t_1 starts (this is set to 320 ms)
3. After time t_1 expires, the ”correct” output terminal is set to select the motor
4. Time t_2 starts (this is set to 160 ms)
5. After time t_2 expires, the pulses are enabled

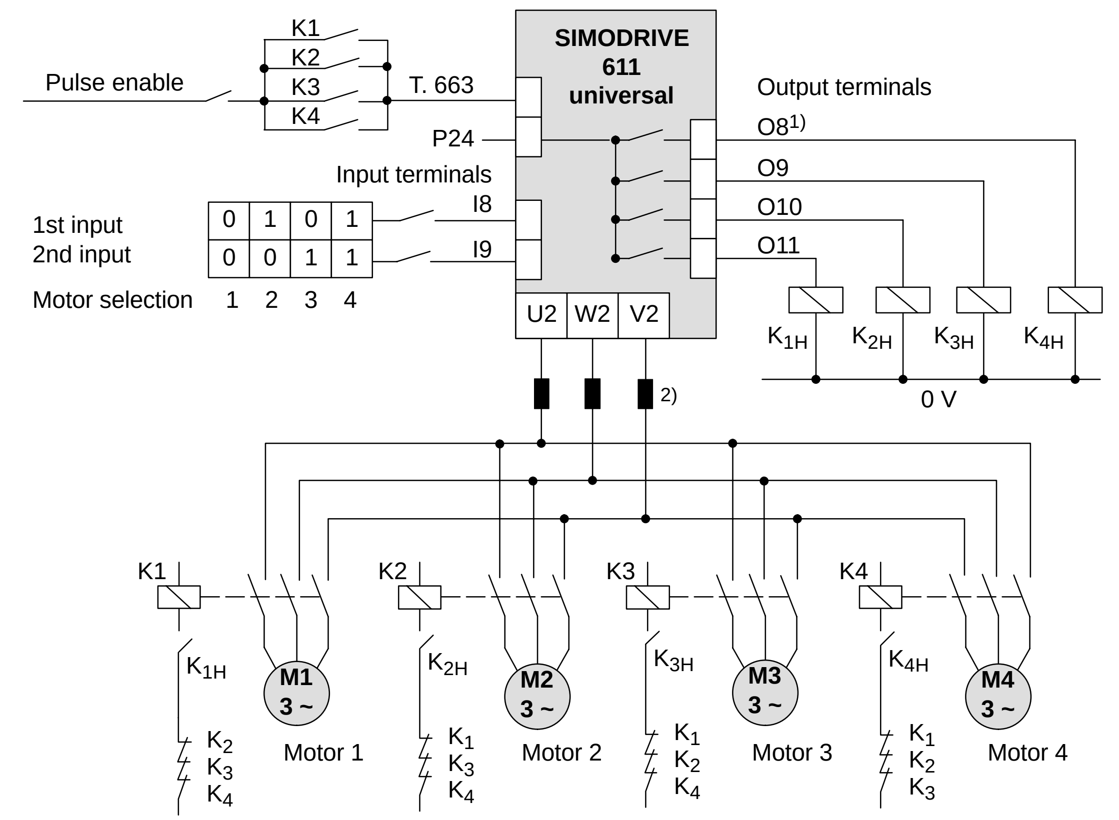
Application example

4 motors should be operated with drive A from "SIMODRIVE 611 universal".

Assumptions for the example:

- An optional TERMINAL module is used.
- The changeover is realized via the following input/output terminals:

I8 (X422.5)	P0668 (function, input terminal I8) = 5
I9 (X422.6)	P0669 (function, input terminal I9) = 6
O8 (X432.5)	P0688 (signaling function, output terminal O8) = 11
O9 (X432.6)	P0689 (signaling function, output terminal O9) = 12
O10 (X432.7)	P0690 (signaling function, output terminal O10) = 13
O11 (X432.8)	P0691 (signaling function, output terminal O11) = 14



1) Several motors cannot be simultaneously selected as this is interlocked per software. The recommended contactor interlocking additionally guarantees that only one motor can be operated at any one time.

2) Only necessary for special high–speed motors.

Fig. 6-80 Recommended circuit: Changing over 4 motors, each with one motor data set

6

6.11.3 Changeover, 1 motor with max. 4 data sets (P1013 = 2)

Description

For this changeover version (P1013 = 2) for one motor, a maximum of 4 motor data sets can be changed over.

Note

The pulses are **not** canceled at changeover, i.e. the changeover is made with the pulses enabled.

This version can be used to adapt the motor and controller data.

Input/output signals

The following input/output signals are used for this changeover version:

Table 6-63 Input/output terminal signals

Input terminal with function No.		Effective motor data set	Output terminal with function No.			
6	**5**		**14 1)**	**13 1)**	**12 1)**	**11 1)**
0	0	P1xxx	0	0	0	0
0	1	P2xxx	0	0	0	0
1	0	P3xxx	0	0	0	0
1	1	P4xxx	0	0	0	0

1) The output terminals with function numbers 11 to 14 are not energized.

6.11.4 Changeover, max. 2 motors each with 2 data sets (P1013 = 3)

Description

For this changeover version (P1013 = 3) a maximum of 2 motors each with 2 associated motor data sets can be changed over.

The changeover is realized using the input terminal with function number 6 and using the appropriately selected speed thresholds in P1247 or P1248. At changeover, the absolute speed value is considered.

Changeover is also possible during operation. When changing over between star and delta operation, it is possible to additionally select between eight drive parameter sets [0...7].

Input/output signals

The following input/output signals are used for this changeover version:

Table 6-64 Input/output terminal signals

Input terminal with function No.		**Speed threshold3)**	**Effective motor data set**	**Output terminal with function No.**			
6 1)	**5 2)**			**14 4)**	**13**	**12 4)**	**11**
0	–	n < P1247	P1xxx	0	0	0	1
		n > P1247	P2xxx	0	0	0	1
1	–	n < P1248	P3xxx	0	1	0	0
		n > P1248	P4xxx	0	1	0	0

1) If the input terminal is used to change over the motor, then the pulses are canceled at the changeover.
2) The input terminal with function number 5 is inactive for this changeover version.
3) The pulses are not canceled if changeover is realized using speed thresholds.
4) Output terminals with function numbers 12 and 14 are not energized.

Note

Output terminals 11 and 13 are not energized, if P1249 = 1.

Application example: Star/delta changeover (version: P1013 = 3)

Motors with star/delta changeover permit a wide constant power range.

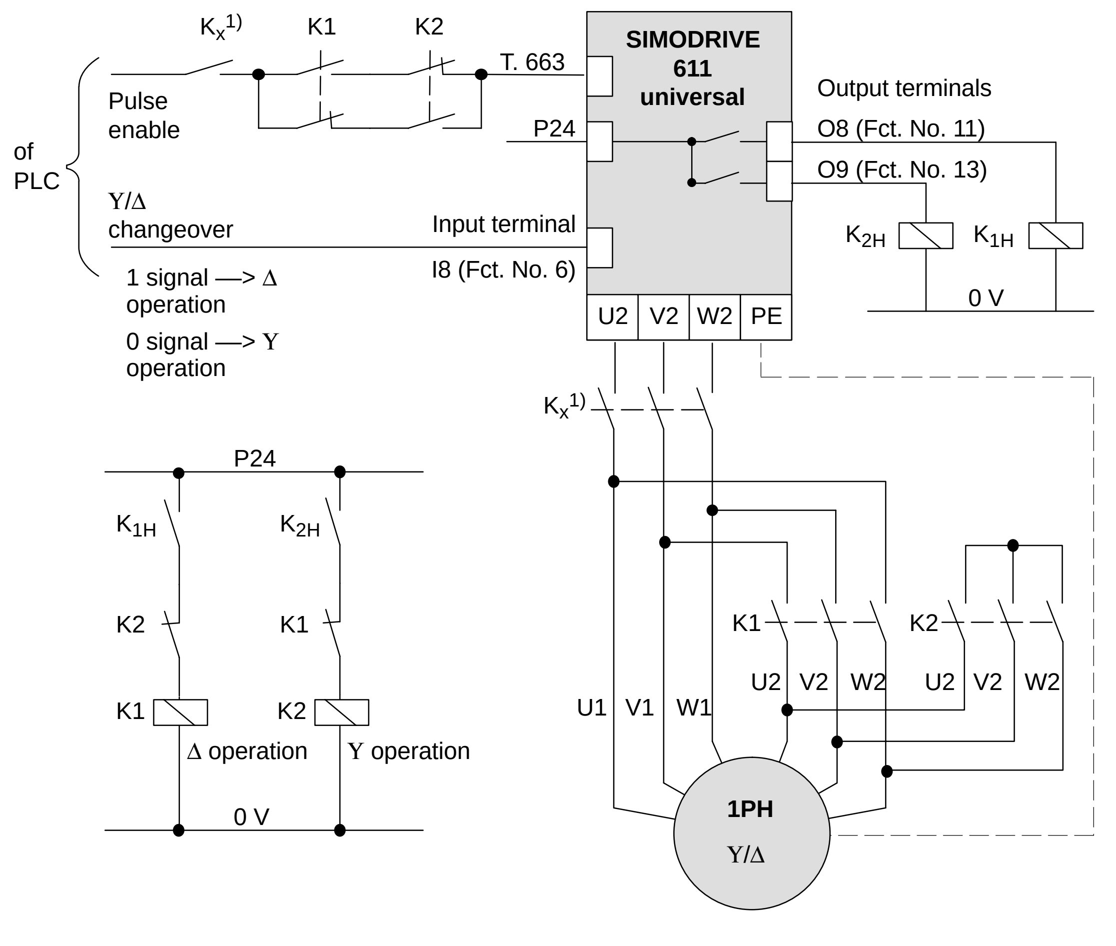
At lower speeds, the motor is operated in the star circuit configuration (high torque) and at higher speeds, in the delta circuit configuration (high stall torque).

Assumptions for the example:

- The motor is operated with drive A.
- An optional TERMINAL module is used.
- The changeover is realized via the following input/output terminals:

  I8 (X422.5) P0668 (function, input terminal I8) = 6

  O8 (X432.5) P0688 (signaling function, output terminal O8) = 11
  O9 (X432.6) P0689 (signaling function, output terminal O9) = 13
- P1247 = 700
  i.e. 0 < n < 700 —> motor in the star mode
  n > 700 —> motor in the delta mode



1) A safe operating stop is not guaranteed by just opening K1 and K2. This is the reason that for safety–related reasons, contactor K_x should be used to provide electrical isolation. This contactor may only be switched–in the no–current condition, i.e. the pulse enable must be withdrawn 40 ms before the contactor is opened (de–energized).

Fig. 6-81 Recommended circuit: Changing over a motor in star/delta operation

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Notice

Main contactors K1 and K2 must be switched in the no–current condition.

If this is not observed, the drive converter and contactors could be destroyed.

6

6.11.5 Parameters for motor changeover

Parameter overview

The following parameters are available for motor changeover:

Table 6-65 Parameters for motor changeover

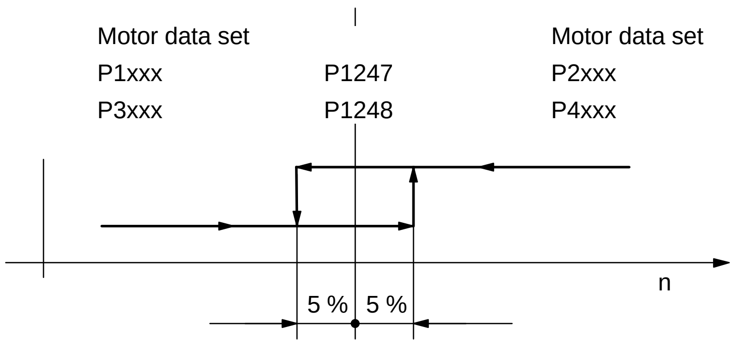
<table>
<tr><th colspan="7">Parameters</th></tr>
<tr><th>No.</th><th>Description</th><th>Min.</th><th>Standard</th><th>Max.</th><th>Units</th><th>Effective</th></tr>
<tr><td>1013</td><td>Enable, motor changeover (ARM)</td><td>0</td><td>0</td><td>3</td><td>–</td><td>PO</td></tr>
<tr><td></td><td colspan="6">... the motor changeover is enabled or the motor changeover type is selected
Value Description
0 Motor changeover inhibited
1 Motor changeover with pulse cancellation
2 Motor changeover without pulse cancellation (data set changeover)
3 Motor changeover using speed thresholds (P1247, P1248)
Note:
It is only possible to enable motor changeover in the ”speed/torque setpoint” mode (P0700 = 1).</td></tr>
<tr><td>1247</td><td>Speed threshold
motor changeover 1/2 (ARM)</td><td>100.0</td><td>100 000.0</td><td>100 000.0</td><td>RPM</td><td>Immedi-
ately</td></tr>
<tr><td>1248</td><td>Speed threshold
motor changeover 3/4 (ARM)</td><td>100.0</td><td>100 000.0</td><td>100 000.0</td><td>RPM</td><td>Immedi-
ately</td></tr>
<tr><td></td><td colspan="6">... the speed thresholds for the motor changeover are defined with speed threshold (P1013 = 3).
P1247:
Below P1247 minus 5% hysteresis, the first motor data set is selected (P1xxx).
Above P1247 plus 5% hysteresis, the second motor data set is selected (P2xxx).
P1248:
Below P1248 minus 5% hysteresis, the third motor data set is selected (P3xxx).
Above P1248 plus 5% hysteresis, the fourth motor data set is selected (P4xxx).

</td></tr>
</table>

Table 6-65 Parameters for motor changeover, continued

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1249	External contactor control motor changeover (ARM)	0	0	1	–	Immedi-ately
	... specifies whether the contactors for motor changeover are controlled from the drive or from an external control. 1 Motor changeover via external control The contactor control for the motor changeover is realized using an external control via the "motor changeover" input signal (STW2.11). The output terminals with function numbers 11, 12, 13 and 14 are not energized. 0 Motor changeover via drive The contactors to change over the motor are controlled from the drive via the output terminals with function numbers 11, 12, 13 and 14. **Note:** The contactors used to change–over the motor must be switched in a no–current condition. If an external control is used to changeover the motor, and it is "incorrectly" changed over (e.g. the pulses are present), it is possible that the power/supply infeed module will be destroyed. Recommendation: Motor changeover should be realized using the drive output terminals (P1249 = 0).					

6.12 Travel to fixed endstop (positioning mode) (from SW 3.3)

Description

A linear or rotary axis can be traversed in the ”positioning” mode by specifying a target position and a maximum possible torque using the ”travel to fixed endstop” function. When a fixed endstop is reached, then the defined torque/force is established.

This property can be used, e.g. for the following tasks:

- To clamp workpieces (e.g. to press the spindle sleeve against the workpiece)
- Approaching the mechanical reference point
- Carry out simple measuring operations (e.g. with a low torque)

The function is programmed using the FIXED ENDSTOP command. The clamping torque must also be specified in this traversing block. The following applies:

Drive	Value range and units for the clamping torque/clamping force
• Rotating	1 – 65 535 [0.01 Nm]
• Linear	1 – 65 535 [0.01 N]

A selectable fixed endstop monitoring window prevents the drive from continuing after the fixed endstop has been reached (e.g. when the fixed endstop breaks–off)

Note

When jogging (closed–loop speed control), travel to the fixed endstop is also possible by suppressing fault 608 (speed controller output limited) using the ”suppress fault 608” input signal.

The ”travel to fixed endstop” function may not be used for coupled axes.

Application example

The following applies to axes with incremental measuring system:

After a traversing block has been executed with the ”fixed endstop command” and the block change enable END, the axis can be re–referenced at the fixed endstop using the ”set reference point” function.

Flowchart

The following sequence applies for the ”travel to fixed endstop” function:

- How is this function started?

  The function is started when executing a traversing block with the FIXED ENDSTOP command.

  The same data as for a positioning set should be made in this traversing block and, in addition, also the clamping torque in [0.01 Nm] or the clamping force in [N] (refer under the index entry ”Command–dependent block information”).

  In order that the fixed endstop (workpiece) can be reached at all, it must be located between the start and target positions. The target position must be selected a considerable distance behind the fixed endstop.

- How is the axis moved after start?
  - After starting the block, the axis travels in the direction of the target position with the programmed velocity.
  - The clamping torque/clamping force, programmed in this block, already becomes effective from the starting position, i.e. the axis moves to the fixed endstop with the reduced torque limit/force limit.
  - The dynamic following error monitoring is not effective when traveling to the endstop.

- What happens if ...
  - ... the fixed endstop is reached before the target position is reached (standard case)?

    —> refer to ”What happens if the fixed endstop is reached?”
  - ... the fixed endstop is not reached, but the target position is approached?

    —> refer to ”What happens if the fixed endstop is not reached?”
  - ... the programmed clamping torque is not reached.

    —> refer to ”What happens if the fixed endstop is reached but the programmed clamping torque is not reached?”
  - ... the axis is first at the fixed endstop and then leaves this position, i.e. has the fixed endstop broken off?

    —> then the fixed endstop monitoring becomes effective, i.e. the axis then moves by the distance, set in P0116:8 (fixed endstop monitoring window) plus the braking ramp.

    —> refer to ”fixed endstop” monitoring window

6

What happens if the fixed endstop is reached?

If the axis moves to a fixed endstop, then the behavior is as follows:

- The closed–loop drive control increases the torque for the axis up to the programmed clamping torque, and then keeps it constant.
- The ”fixed endstop reached” status is reached as follows, depending on P0114 (fixed endstop, configuration 2):

Table 6-66 Behavior, if the fixed endstop is reached

If	the following is valid for the ”fixed endstop reached” status:
P0114 = 0 (Standard)	The status is automatically reached, if the following error exceeds the theoretically calculated following error by the value entered in P0115:8. **Note:** • Refer under the index entry ”Dynamic following error monitoring” • The following applies for the target position: Target position > position, fixed endstop + P0115:8 + braking travel
P0114 = 1	The status is only reached, if it is recognized via the ”sensor, fixed endstop” input signal.

- The following applies after the ”fixed endstop reached” status has been recognized:
  - The distance to go is deleted
  - The position reference value is tracked
  - The fixed endstop monitoring is activated
  - The controller enable remains active
  - The ”fixed endstop reached” output signal is set
  - Is the programmed clamping torque reached?

    Yes —> the output signal
    ”fixed endstop, clamping torque reached” is set

    No —> the behavior is dependent on P0113.1

Table 6-67 Behavior, if the clamping torque is not reached

If	Then the following is valid:
P0113.1 = 0 (Standard)	Warning 889 is signaled The block change enable is only realized, as programmed in the block, only after the clamping torque has been reached.
P0113.1 = 1	Warning 889 is signaled and a block change is made The block change enable is realized as programmed in the block.
Note: The block change enable CONTINUE FLYING, behaves just like the block change enable CONTINUE WITH STOP.	

– The clamping torque remains, if ...

subsequently, e.g. blocks are processed with the commands WAIT, GOTO, SET_O or RESET_O

There is no subsequent block, i.e. the traversing program has been completed

– the position can be read in P0002 (actual traversing block – position)

What happens if the fixed endstop is not reached?

If, for a traversing block, the axis moves to the brake initiation point with the FIXED ENDSTOP command, without detecting the status ”fixed endstop reached”, then the following behavior applies, dependent on P0113.0:

Table 6-68 Behavior, if the fixed endstop is not reached

If	Then the following is valid:
P0113.0 = 0 (Standard)	Fault 145 is signaled The torque limiting is automatically disabled. The axis is braked and comes to a standstill in front of the programmed target position. The deviation from the reference position depends on: • Positioning velocity • Acceleration • Deceleration
P0113.0 = 1	A block change is made The torque limiting is automatically disabled. The block change enable is realized as programmed in the block.

Canceling the ”travel to fixed endstop” function

The ”travel to fixed endstop” function is interrupted, and if warning 889 is present it is acknowledged, if one of the following occurs:

- The next block is processed with the POSITIONING command
- the jogging mode is selected if previously interrupted
  —> with the input signal ”reject operating condition/traversing task”
- The controller enable is withdrawn (—> fault 147)
- Pulse enable is withdrawn (—> fault 147)

Interrupting or exiting the ”travel to fixed endstop” function

The following applies for a traversing block with the FIXED ENDSTOP command:

- Interrupt and continue
  —> using the ”operating condition/intermediate stop” input signal
- Exit
  —> using the ”operating condition/reject traversing task” input signal

In all of these cases, the drive is correspondingly braked.

Interruption at the fixed endstop:
The drive remains at the fixed endstop, and can be moved away from it either in the jog mode, or by starting a new traversing block.

- Abort
  —>while ”traversing to fixed endstop”

  The drive brakes and maintains this position with a reduced torque as ”traverse to fixed endstop” is still active The position is monitored using P0326. Fault 145 is signaled when the tolerance window in P0326 is exceeded.

Fixed endstop monitoring window

If the axis travels by more than the monitoring window, set in P0116:8 when it reaches the ”fixed endstop reached” status, then the ”travel to fixed endstop” function is canceled as a result of fault 146 (fixed endstop, axis outside the monitoring window), and the axis is stopped.

The following applies for the fixed endstop monitoring window:

- Set using P0116:8 (fixed endstop monitoring window).
- The monitoring window generally applies for a drive, which means, in order to adapt it for an individual traversing block, P0116:8 must be correspondingly re–written into before the block starts.
- The value in P0116:8 is valid both in the positive as well as the negative travel directions.
- The window setting must be selected, so that a fault is only initiated if the endstop breaks.

Hanging axis without mechanical weight equalization

For a hanging axis without mechanical weight equalization, when programming the clamping torque and when defining the fixed endstop monitoring window, it must be taken into consideration as to whether the electronic weight equalization is set via P1240:8.

The clamping torque, effective for ”travel to fixed endstop” is made up as follows:

- Programmed clamping torque in the traversing block

  and

- P1240:8 (offset, torque setpoint speed–controlled)

The following applies when programming the clamping torque for a hanging axis without mechanical weight equalization:

Table 6-69 Clamping torque for a hanging axis

If	then
A torque offset is not entered (P1240:8 = 0)	Take into account the weight equalization when programming the clamping torque.
A torque offset is entered (P1240:8 $\neq$ 0)	The weight equalization is not taken into account when programming the clamping torque

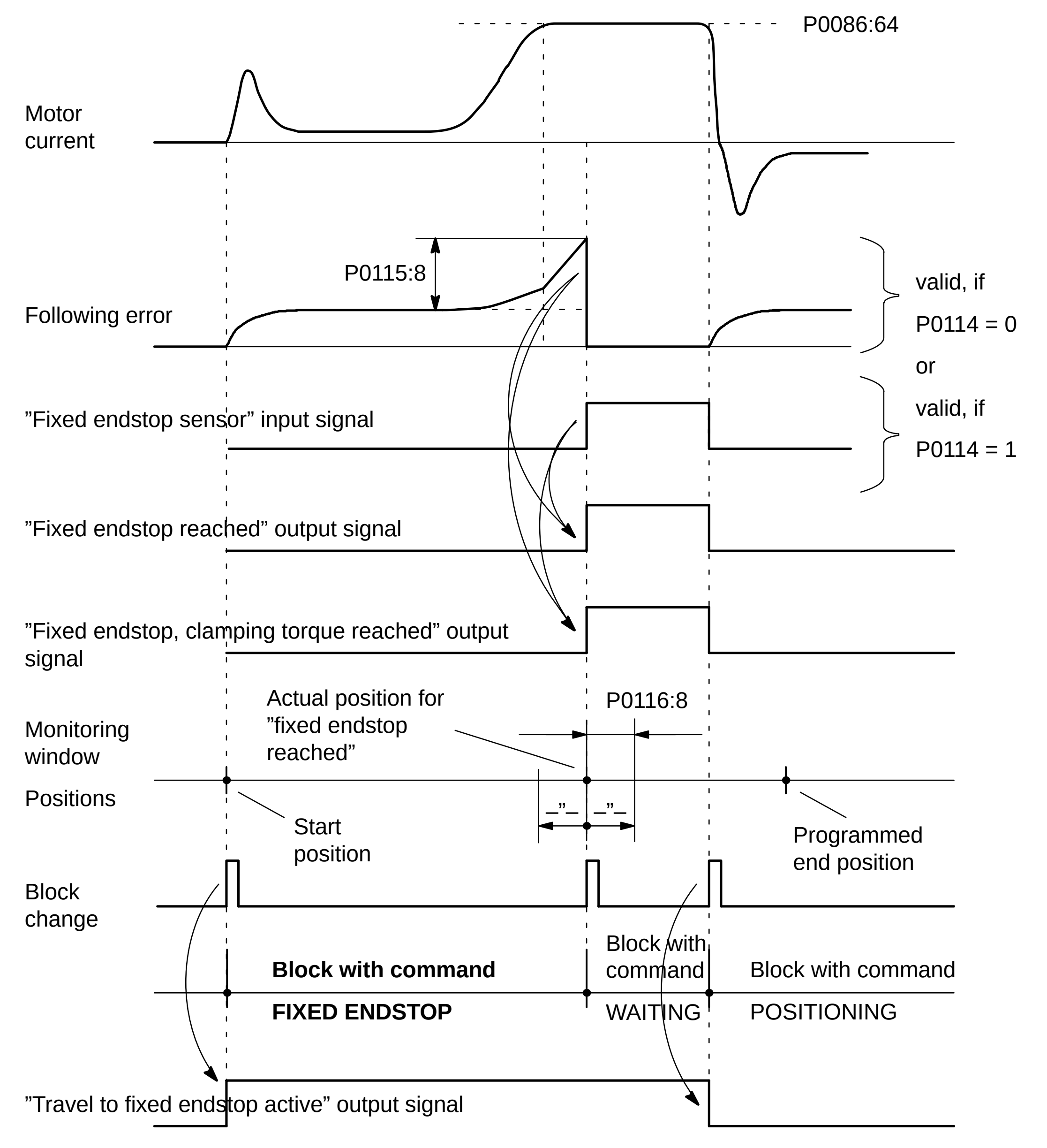
Diagnostics for "travel to fixed endstop"

The following diagnostics are available for the activated function:

- Display via P0600 (operating status)
- Display via "travel to fixed endstop active" output signal

Signal characteristics

The motor current, following error, input/output signals and positions for the "travel to fixed endstop" function are illustrated in the following diagram.



P0086:64	Command parameter – clamping torque
P0114	Fixed endstop, configuration 2
P0115:8	Fixed endstop, maximum following error
P0116:8	Fixed endstop, monitoring window

Fig. 6-82 Signal timing for the "travel to fixed endstop" function

Travel to fixed endstop and EMERGENCY OFF

Caution

It must be ensured, that after the ”travel to fixed endstop” function is withdrawn as a result of EMERGENCY OFF, the machine cannot go into a potentially hazardous state (e.g. the clamped workpiece drops out of the clamping mechanism after EMERGENCY OFF).

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”travel to fixed endstop” function:

- P0113 Fixed endstop, configuration 1
- P0114 Fixed endstop, configuration 2
- P0115:8 Fixed endstop, maximum following error
- P0116:8 Fixed endstop, monitoring window
- P1240:8 Offset, torque setpoint (speed controlled)
  Offset, force setpoint (speed controlled)

Input/output signals

The following signals are used for the function ”traverse to endstop”:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  - ”Fixed endstop sensor” input signal
    —> using an input terminal with function number 68
    —> using PROFIBUS control signal PosStw.3
- Output signals
  (refer under the index entry, ”Output signal, digital – ...”)
  - ”Fixed endstop reached” output signal
    —> using an output terminal with function number 68
    —> using PROFIBUS status signal PosZsw.12
  - ”Fixed endstop, clamping torque reached” output signal
    —> using an output terminal with function number 73
    —> using PROFIBUS status signal PosZsw.13
  - ”Travel to fixed endstop active” output signal
    —> using an output terminal with function number 66
    —> using PROFIBUS status signal PosZsw.14

6.13 Teach–in (from SW 4.1)

Description

Using this function, an approached axis position can be directly entered into a specific traversing block as position reference value.

The axis can be traversed to the required position e.g. using ”jogging” and/or ”incremental jogging.

The ”teach–in” function is activated using the ”activate teach–in (edge)” input signal in the ”positioning” mode.

It is not possible to activate ”teach–in” while a traversing program is running.

Table 6-70 Overview of teach–in

Question?	Parameters	Description
In which traversing block is the position value be written?	Teach–in block	
	P0120 = –1 (Standard)	The position value (actual position reference value) is written into the traversing block which is selected either via digital input signals (Fct. No. 50 to 55) or the PROFIBUS control signal SatzAnw.0 – .5.
	P0120 ≥ 0	The position value (actual position reference value) is written into the traversing block which is specified using P0120.
How does the teach–in block become a complete traversing block?	Teach–in standard block	
	P0121 = –1 (Standard)	When activating ”Teach–in”, only the position value is written into the selected block (the actual position reference value). All other data must be manually entered to make it a complete traversing block.
	P0121 ≥ 0	For ”teach–in”, the block, defined using P0121, is transferred into the selected block and the position value (actual position reference value) is overwritten. P0087 is not completely transferred, but only the position mode and the block enable condition. Information as to whether the block is suppressed or not is not transferred into the new block.
What are the various configuration possibilities?	Teach–in configuration	
	P0124.0 = 1	Automatically increase the block number (P0120 ≥ 0) In this mode, after each successful ”teach–in”, the teach–in block in P0120 is automatically increased. In this case, the teach in blocks are overwritten. If the teach–in block is selected using an input signal (P0120 = –1) and the ”automatically increase block number” function is enabled, then the following applies: • The first teach–in block is selected via input signals • Additional teach–in blocks are defined using P0120
	P0124.1	The block number is automatically searched for = 1: In this mode, for ”teach–in”, a search is made for the block in P0120. If an invalid block is selected via P0120, then this block is generated in the memory at the first position where there is still no block. A complete block is generated (although P0121 = –1). = 0: If the block in P0120 or the block selected via the input signals is not available, then fault 183 is output.

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”teach–in” function:

- P0120 Teach–in block
- P0121 Teach–in standard block
- P0124 Teach–in configuration

Input/output signals (refer to Chapter 6.4)

The following signals are used for the ”teach–in” function:

- Input signals
  (refer under index entry ”Input signal, digital – ...”)
  - Input signal ”activate teach–in (edge)”

    —> using an input terminal with function number 64

    —> using the PROFIBUS control signal ”PosStw.6”
  - Input signal ”block selection 1st to 6th input”

    —> using an input terminal with function number 50 – 55

    —> using PROFIBUS control signal SatzAnw.0 – .5
- Output signals
  (refer under the index entry, ”Output signal, digital – ...”)
  - Output signal ”teach–in successful”

    —> using an output terminal with function number 64

    —> using the PROFIBUS status signal ”PosZsw.15”

Note

The positions with teach–in are only transferred into the RAM memory. Data is manually saved using the ”SimoCom U” parameterizing and start–up tool with ”Save in the drive (FEPROM)”.

6.14 Dynamic servo control (DSC, from SW 4.1)

Description

The ”dynamic servo control” (DSC) is a closed–loop control structure which is computed in a fast speed controller clock cycle and is supplied with setpoints by the control in the position controller clock cycle.

This allows higher position controller gain factors to be achieved.

Requirement

The following prerequisites are necessary to use dynamic servo control:

- n–set mode
- Isochronous PROFIBUS–DP
- The position controller gain factor (KPC) and the system deviation (XERR) must be included in the PROFIBUS–DP setpoint telegram (refer to P0915)
- The position actual value must be transferred to the master in the actual value telegram of PROFIBUS–DP via the encoder interface Gx_XIST1 (refer to Chapter 5.6.4)
- When DSC is activated, the speed setpoint N_SOLL_B from the PROFIBUS telegram is used as speed pre–control value
- The internal quasi–position controller uses the position actual value from the motor measuring system (G1_XIST1)

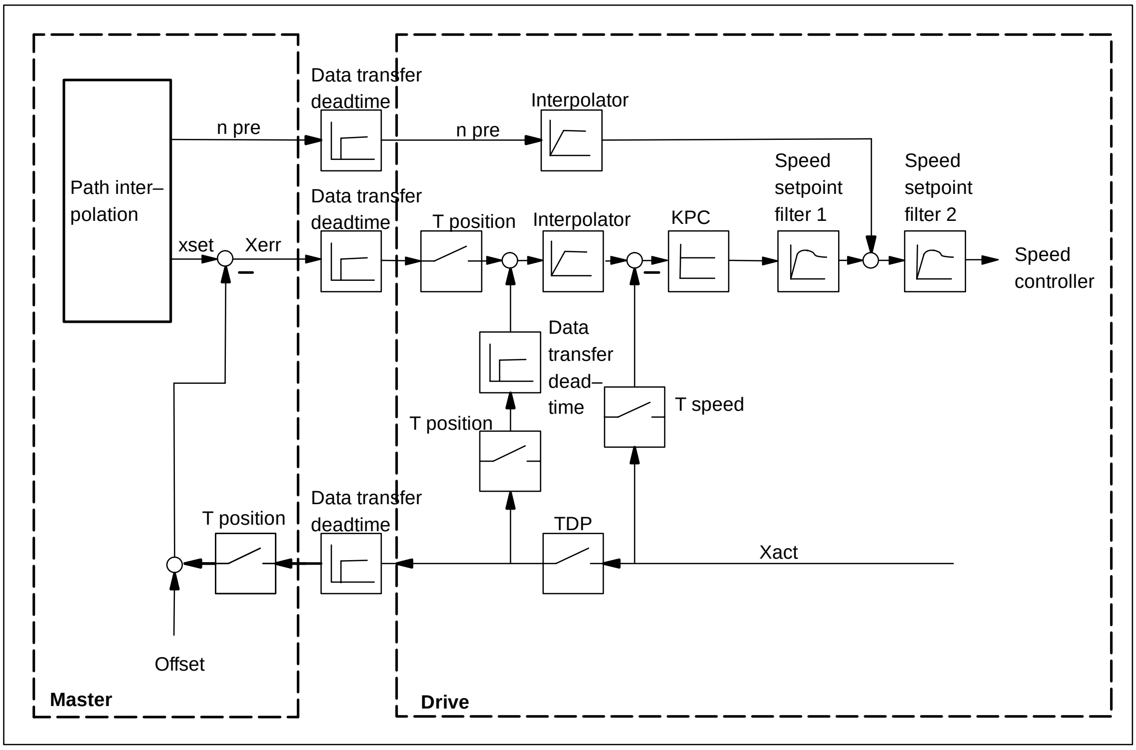


Fig. 6-83 Principle of dynamic servo control; the speed setpoint is used for speed precontrol

Activation

If the prerequisites for DSC have been fulfilled, the function is activated by transferring a value for KPC > 0 in the PROFIBUS telegram.

When DSC is activated, the position controller gain in the master should be set again.

Deactivating

The DSC function is de–activated by setting KPC = 0. Then, only the speed pre–control is effective.

Higher gain factors can be set using DSC. This is the reason that the control loop can become unstable when DSC is disabled. Before disabling DSC (e.g. for optional tests) the KV factor must be reduced in the master.

Speed setpoint value filter

When using DSC, a speed setpoint filter is no longer required to round–off the speed setpoint stages.

When using the DSC function, it only makes sense to use speed setpoint filter 1 to support the position controller, e.g. to suppress resonance effects.

6.15 Spindle positioning (from SW 5.1)

Description

Using the ”spindle positioning” function, in the ”n–set” mode, the spindle can be traversed to a specific position and then held there.

Activation

The function is activated in the ”n–set” mode (P0700 = 1) via the input signal ”spindle positioning on” or via PROFIBUS–DP (STW1.15), if P0125 = 1 (spindle positioning active).

Note

If the ”spindle positioning” function is carried–out using NC functionality (e.g. SINUMERIK 802D), then P0125 must be set to 0 (spindle positioning de–activated).

In addition, a traversing block number must be entered via a terminal or PROFIBUS–DP. If a bit is not selected for the traversing block number, then data in traversing block 0 is used.

The following is mainly defined in the traversing block:

- The target position (also via PROFIBUS–DP control word XSP is possible, being prepared)
- The search velocity, and
- How the axis approaches the target position:

The target position can be approached as follows:

- With the actual direction of rotation
- With a defined direction of rotation (clockwise, counter–clockwise)

Position actual value sensing

- With a motor encoder (sin/cos 1 Vpp)
- With a motor encoder (sin/cos 1 Vpp) and external zero (BERO) at the spindle when the gearbox stage is being changed–over
- with direct measuring system (spindle encoder, sin/cos 1 Vpp) via encoder connection X412 (drive B)

Limitations/ secondary conditions

- Spindle positioning only with motor 1.
- If spindle positioning has been selected, then the encoder information for PROFIBUS–DP (G1_STW, G1_ZSW) is no longer precisely transferred.
- If ”spindle positioning on” is selected using a terminal or PROFIBUS–DP (for P0125 = 1), then the ”relative” positioning mode (P0087:64) may no longer be programmed in the currently selected traversing block.
- When spindle positioning is selected, it is not possible to change over the motor via PROFIBUS–DP.
- Spindle positioning is not supported in conjunction with the absolute measuring system.

Positioning

If the drive has still not been referenced, it is automatically referenced after activating the ”spindle positioning on” function.

The positioning operation is executed via the position controller and is carried–out in several phases:

1. Selecting the ”spindle positioning on” function via terminal or PROFIBUS–DP in the ”n–set” mode
2. Traversing to the search velocity
3. Traversing with search velocity and searching for the zero mark (BERO)
4. Braking to the 1st target position (angle)

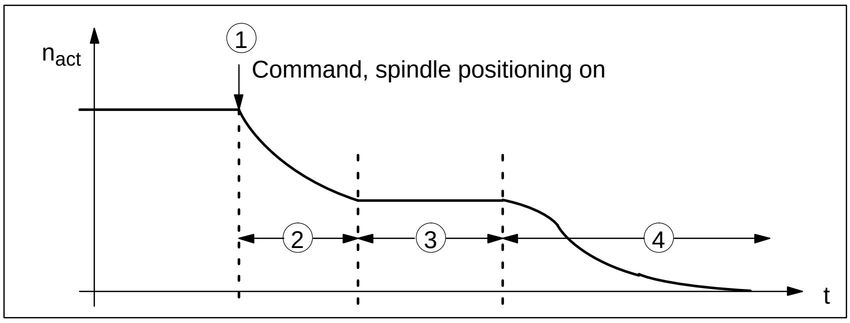


Fig. 6-84 Example, spindle positioning

If the drive is at the 1st target position, then the additional target positions can be approached immediately by selecting another traversing block.

In order to guarantee a defined changeover to the next position (via terminals), only one bit should be changed when selecting the traversing block.

If, when the controller is inhibited, the spindle is pushed (pressed) out of a parameterized tolerance window, then the position actual value is corrected (tracked). If the controller is then re–enabled, the spindle remains at that particular position. It is only re–positioned again if ”spindle positioning” is activated.

Parameter overview (refer to Chapter A.1)

The following parameters are available for the ”spindle positioning” function:

- P0080 Block number (traversing blocks)
- P0081 Position reference value (traversing blocks)
- P0082 (Search) velocity (traversing blocks)
- P0083 Acceleration override
- P0084 Deceleration override
- P0087 (Spindle) positioning mode
- P0102 Maximum velocity
- P0103 Maximum acceleration
- P0104 Maximum deceleration
- P0125 Spindle positioning active
- P0126 Spindle positioning, zero mark tolerance window
- P0127 Spindle positioning, setting the internal zero mark
- P0128 Spindle positioning, offset, zero mark

- P0129 Spindle positioning, tolerance, search velocity
- P0130 Spindle positioning, lowest search velocity
- P0131 Spindle positioning, motion window
- P0133 Spindle positioning, max. search velocity
- P0174 Referencing mode – position measuring system
- P0200 Kv factor (position loop gain)
- P0231 Position act. value inversion
- P0232 Position ref. value inversion
- P0237 Encoder revolutions
- P0238 Load revolutions
- P0242 Modulo range, rotary axis
- P0250 Activating the direct measuring system

The following diagnostic parameters are available for the ”spindle positioning” function:

- P0001 Actual traversing block – block number
- P0002 Actual traversing block – position
- P0003 Actual traversing block – velocity
- P0004 Actual traversing block – acceleration override
- P0005 Actual traversing block – deceleration override
- P0008 Actual traversing block – mode
- P0020 Position reference value
- P0021 Position actual value
- P0024 Velocity actual value
- P0132 Spindle positioning, zero mark difference (BERO)
- P0136 Spindle positioning, active/inactive
- P0137 Spindle positioning, status

Setting values for the position actual value monitoring:

- P0134 Spindle positioning, positioning window reached
- P0318 Dynamic following error monitoring tolerance
- P0320 Positioning monitoring time
- P0321 Positioning window (reference position reached)
- P0326 Standstill window

Warning

When the monitoring is disabled via parameters P0318, P0321 and P0326, it should be noted that under fault conditions, the drive can accelerate up to the max. speed.

Approaching the target position using the traversing block parameters

The target position approach is defined using the parameters of the selected traversing block.

Table 6-71 Parameters for ”spindle positioning”

<table>
<tr><th>Parame-ters</th><th>Parameter text</th><th colspan="3">Value and description</th></tr>
<tr><td>P0080:N</td><td>Block number</td><td colspan="3">0... 63</td></tr>
<tr><td>P0081:N</td><td>Item</td><td colspan="3">Target position in degrees</td></tr>
<tr><td>P0082:N</td><td>Velocity</td><td colspan="3">Search velocity in degrees/min. The velocity is always referred to the load side, i.e. for a ratio of 4:1 (motor/load), the motor rotates 4 x faster.</td></tr>
<tr><td>P0083:N</td><td>Acceleration override</td><td colspan="3">This allows the acceleration to be influenced, referred to P0103.</td></tr>
<tr><td>P0084:N</td><td>Deceleration override</td><td colspan="3">This allows the deceleration to be influenced, referred to P0104.</td></tr>
<tr><td rowspan="6">P0087:N</td><td rowspan="6">Mode</td><td colspan="3">U0W0$_{Hex}$
U = target position input
0: Input via traversing block (P0081:N)
1: Input via PROFIBUS–DP; control word XSP (Signal No. 50109)
W = Positioning mode
The behavior when approaching the target position is defined in parameter P0087. The behavior depends on whether the ”spindle positioning” function is already active and the 1st position was approached or not.</td></tr>
<tr><td></td><td>Behavior for nset active</td><td>Behavior if the 1st target position has already been reached</td></tr>
<tr><td>W = 0 ABSOLUTE (Standard)</td><td>The position is approached with the actual direction of rotation</td><td>The new target position is approached through the shortest distance</td></tr>
<tr><td>W = 1 RELATIVE</td><td>Not possible</td><td>The new position is incrementally approached.</td></tr>
<tr><td>W = 2 ABS_POS</td><td>The position is approached in the positive direction.</td><td>The new target position is approached in absolute terms and in the positive direction (clockwise rotation)</td></tr>
<tr><td>W = 3 ABS_NEG</td><td>The position is approached in the negative direction.</td><td>The new target position is approached in absolute terms and in the negative direction (counter–clockwise).</td></tr>
</table>

Structure of the traversing block

No. (P0080)	Command	Mode (P0087 W	Position (P0081)	Velocity (P0082) degrees/min	Acceleration (referred to P0103)	Deceleration (referred to P0104)
0	Positioning[1)]	ABSOLUTE	0°	72000	100 %	100 %
1	Positioning[1)]	ABS_POS	90°	3600	100 %	100 %

1) only this entry is possible

Fig. 6-85 Example: Programming the traversing block

If no bit is selected when selecting the block with the ”spindle positioning on” command, then traversing block 0 is automatically selected. The axis then positions with the values from traversing block 0.

In the example, Fig. 6-85 (Standard setting) the drive moves to the position value zero degrees from the actual speed and direction of rotation, at a search velocity of 72000 degrees/min (200 RPM).

If bit 0 is set in this state, when selecting the traversing block (via terminal or PROFIBUS–DP), then the drive rotates according to the ABS_POS mode in the clockwise sense with the max. velocity of 3600 degrees/min and remains stationary at the 90 degrees position.

After bit 0 is switched–out, the axis moves from 90 degrees to 0 degrees.

The ”spindle positioning on” command must always be present. If the command is switched–out, then the axis rotates at the speed of the currently effective speed setpoint.

Search rate

The search velocity depends on the initial velocity at the instant that the ”spindle positioning” function is activated at n–set (refer to Fig. 6-86).

In this case, the following parameters are effective:

P0082 Velocity

P0083 Acceleration override

P0084 Deceleration override

P0103 Max. acceleration

P0104 Max. deceleration

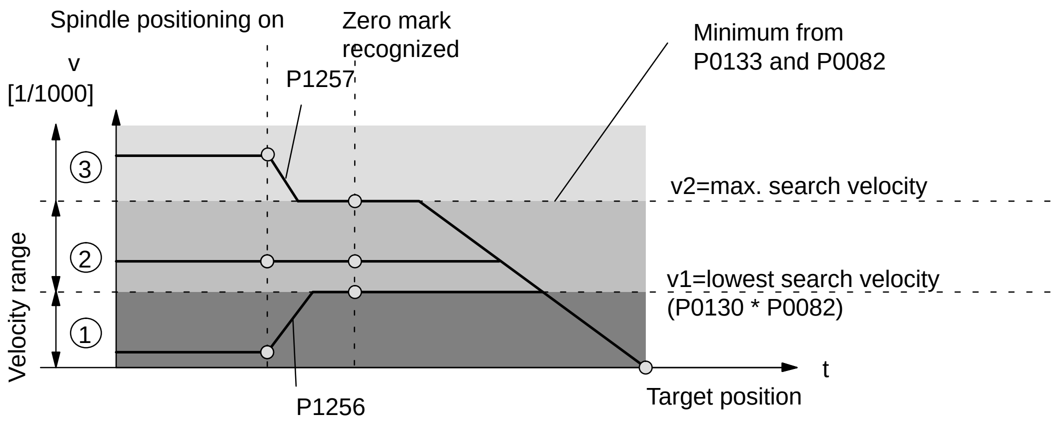
P0129 Spindle positioning, tolerance, search velocity

P0130 Spindle positioning, lowest search velocity

P0133 Spindle positioning, max. search velocity

P1256 Ramp–function generator, ramp–up time

P1257 Ramp–function generator, ramp–down time



1 In this velocity range, the **drive accelerates** to the search velocity v1. The drive traverses to the target position if the zero mark is recognized.

2 In this velocity range (search velocity), the **drive traverses without changing its velocity** until the zero mark has been recognized. The drive then traverses to the target position.

3 In this velocity range, the **drive brakes** to the search velocity v2. The drive traverses to the target position if the zero mark is recognized.

Condition: The maximum velocity P0102 must be greater than v2.

Fig. 6-86 Spindle positioning at n–set, if the axis was previously referenced

Spindle positioning, zero mark offset

Procedure to shift the zero mark and set it to a specific value:

1. possibility:
   – Enter the zero mark offset directly into P0128.
2. possibility:
   – Traverse the spindle to the required position, e.g. manually rotate
   – Set P0127 to 1. This means that the actual position value is transferred into P0128. P0127 automatically changes to 0.

Encoder configuration

P0250 and P0174 must be set to the existing measuring system.

Table 6-72 Encoder configuration for spindle positioning

	P0250	P0174
Indirect measuring system (motor encoder) with encoder zero mark In addition, the gearbox ratio must be entered into P0237 (encoder revolutions) and P0238 (load revolutions)	0	1
Indirect measuring system (motor encoder) with external zero mark In addition, the gearbox ratio must be entered into P0237 (encoder revolutions) and P0238 (load revolutions)	0	2
Direct measuring system with encoder zero mark	1	1

It is possible to select position actual value inversion using parameter P0231.

Spindle drive with gearbox (BERO)

For spindle drives with gearboxes, an external zero mark (BERO) should be provided as reference point if the spindle has to be positioned.

For multi–stage gearboxes, the gearbox stage ratios must be taken into account. The ratios must be entered via parameter P0237 (gearbox revolutions) and P0238 (load revolutions). For parameter set 0, the ratio of the first gearbox stage can be defined using SimoCom U in the menu screen ”Mechanical system” (1:1 is the basic setting).

Additional gearbox stage ratios must be entered using the Expert list (P0237:x, P0238:x; x = 1 to 7).

Example:

If a changeover gearbox with a ratio of 1:1 or 1:4 is used, for the 1st gearbox stage, parameters P0237:0 and P0238:0 remain unchanged (because 1:1) and for the ratio 1:4, the following values are entered into parameters P0237:1 = 1 and P0238:1 = 4. These values become valid after ”Power on”.

The ratio can be checked using parameter P0132. In this case, the distance between two zero marks is displayed in degrees. If the values which are displayed deviate from 360 degrees, then the gear–up/gear–down ratio was not correctly parameterized.

Input/output signals (refer to Section 6.4)

The following signals are used for the ”spindle positioning” function:

- Input signals
  (refer under the index entry ”Input signal, digital – ...)
  - Input signal, ”spindle positioning on”

    —> using an input terminal with function number 28

    —> using the PROFIBUS control signal ”STW1.15”
  - Input of traversing blocks

    —> via an input terminal, or

    —> via PROFIBUS–DP

    When the traversing block selection is changed (number), the position is immediately changed to the position specified in the traversing block.
- Output signals
  (refer under the index entry, ”output signal, digital – ...)

  The output signals are only effective when selecting ”spindle position on”.
  - Output signal, ”spindle positioning on”

    —> using an output terminal with function number 28

    —> using the PROFIBUS status signal ”ZSW1.15”
  - Output signal ”spindle position reached”

    —> setting a window with P0134

    —> using an output terminal with function number 59

    —> using PROFIBUS status signal ”MeldW.15”
  - Output signal ”reference position reached/outside reference position”

    —> setting values with P0320, P0321

    —> using an output terminal with function number 60

    —> using PROFIBUS status signal ”MeldW.14”

Short commissioning (example)

Hardware structure: Encoder signals and zero pulse from the motor encoder

Software prerequisites:

- Software release ≥ SW 5.1
- The spindle positioning program must be activated via SimoCom U or P0125 =1.
- Select the ”spindle positioning on” function via terminal (Fct. No. 28) or PROFIBUS–DP (STW1.15). (e.g. ”spindle positioning on ” via terminal I2.A).

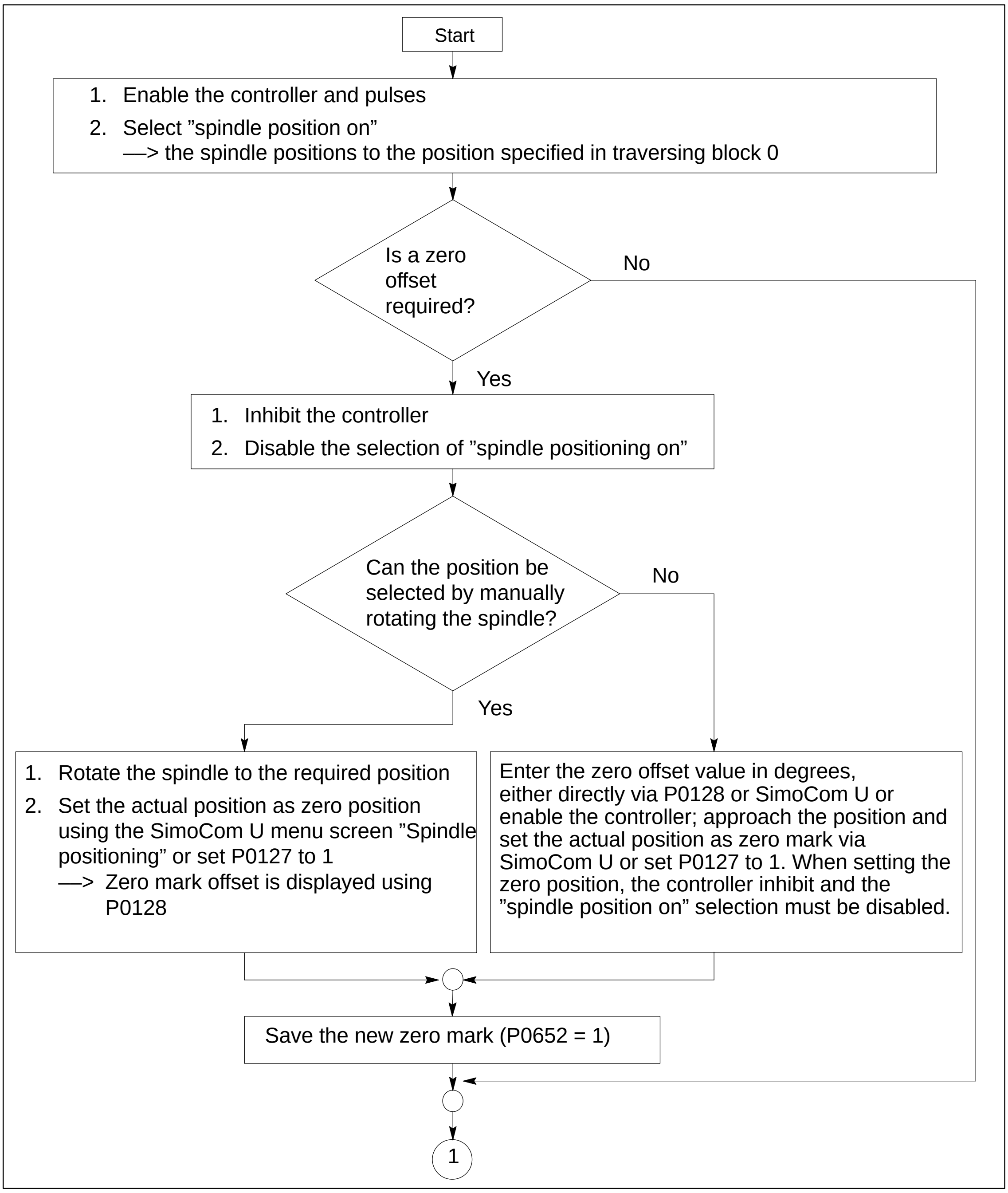


Fig. 6-87 Commissioning example, spindle positioning

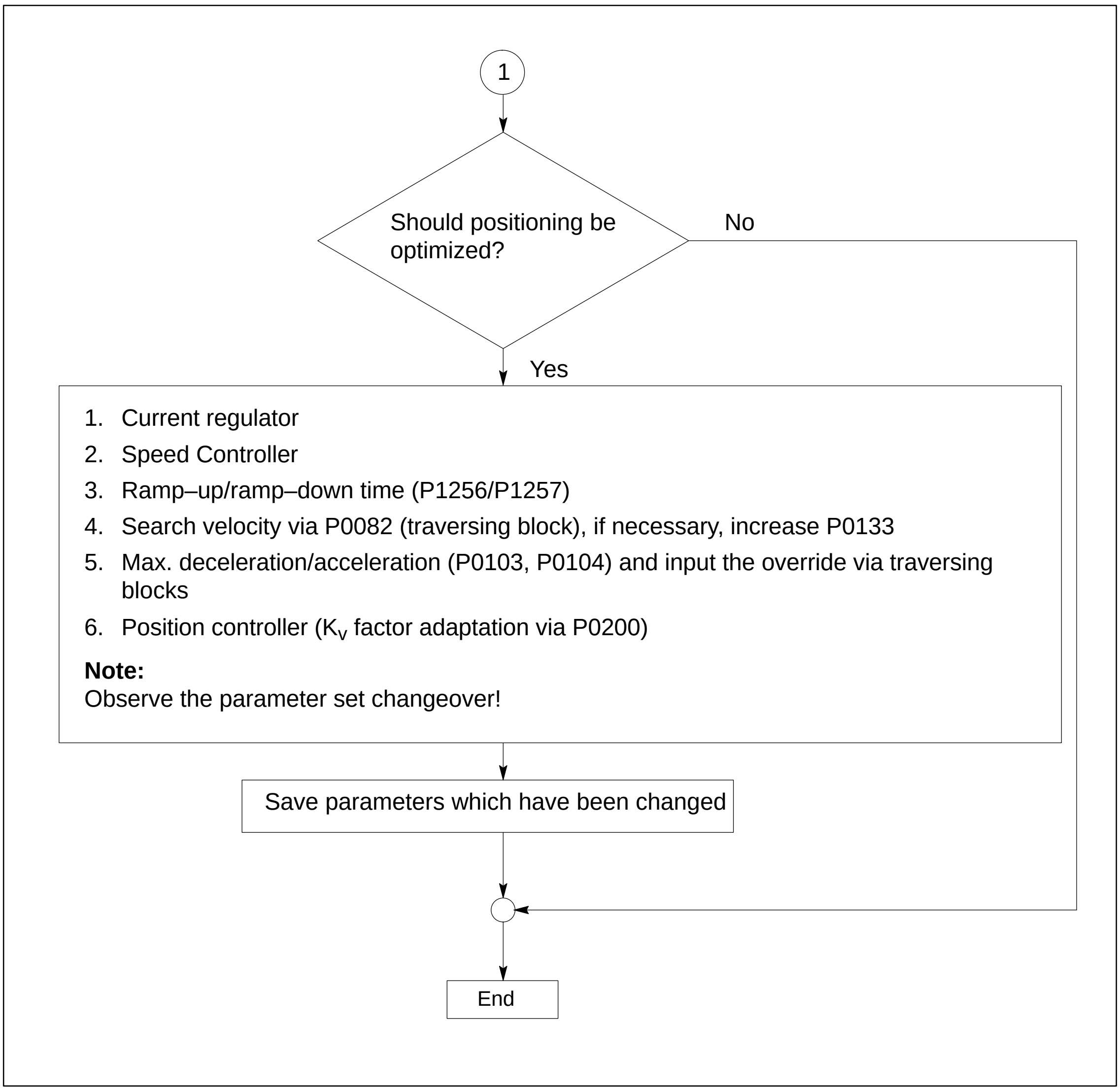


Fig. 6-88 Commissioning example, spindle positioning, continued

6.16 Rotor position synchronization/rotor position identification

Description

Drive converters with field–orientated closed–loop control impress the current into permanent–magnet synchronous motors to establish the magnetic flux in the motor.
At power–on, the rotor position identification automatically determines the absolute rotor position using the maximum of the magnetic flux.

The rotor position identification is used for:

- Determining the rotor position (coarse synchronization and fine synchronization)
- Supports commissioning when determining the commutation angle offset

Two techniques can be used for the rotor position identification routine:

- A technique based on saturation
- A technique based on movement (from SW 6.1).

The particular technique can be selected using parameter P1075.

Coarse synchronization

Determining the rotor position

The rotor position identification routine automatically determines the motor rotor position. This means that the motor encoder does not require any additional position information from the encoder (C/D track). For linear motors, Hall sensors are not required if the limitations and secondary conditions are maintained.

Fine synchronization

Passing–over the zero mark

As a result of the accuracy of the identification technique, the rotor position which has been determined can be accepted at the zero for the fine synchronization.

Equivalent of the encoder adjustment

Encoder adjustment is not required if the rotor position identification routine is used for coarse and fine synchronization.

Configuration, actual value sensing motor encoder

In P1011, bit 12 (identify coarse position) is set in order that the rotor position identification technique is initiated when powering–up the drive. If bit 13 is set (fine position identification), a rotor position identification is executed independently of bit 12.

Parameter overview (refer to Chapter A.1)

The following parameters are used for the rotor position synchronization/rotor position identification:

- P1011 IM configuration, actual value sensing
- P1016 Angular commutation offset
- P1017 Commissioning support
- P1019 Current, rotor position identification
- P1020 Maximum rotation, rotor position identification (SRM)
  Maximum movement, rotor position identification (SLM)
- P1075 Technique, rotor position identification (SRM, SLM)
- P1076 Load moment of inertia RLI (SRM)
  Load mass RLI (SLM)

The following diagnostics parameters are used rotor position synchronization/rotor position identification:

- P1734 Diagnostics, rotor position identification
- P1736 Test, rotor position identification
- P1737 Difference, rotor position identification

Limitations/ secondary conditions

The following limitations/secondary conditions apply for the technique based on both saturation and movement:

For the technique based
on saturation
(P1075=1)

- This technique can be used for both braked and non–braked motors.
- The technique cannot be used for motors which are moving.
- The current which is entered must be adequate in order to generate a significant measuring signal.
- The technique can only be started when the controller and pulses are enabled as current must flow through the motor.
- When using an absolute motor measuring system, the rotor position identification can only be used to determine the commutation angle offset (P1016).
- The measurement and evaluation take approx. 250 ms.

Warning

When the motors are not braked, the motor rotates or moves as a result of the current impressed during the measurement. The magnitude of the motion depends on the magnitude of the current and the moment of inertia of the motor and load.

For the technique based on motion (P1075=3, from SW 6.1)

- This has only been released for 1FN3 motors.
- Due to the different mechanical designs, for the motion–based rotor position identification technique, the result must be checked once when the drive system is first commissioned. The deviation of measured rotor position should be < 10° electrical.
- The measuring system must stiffly mounted.
- The axis stiction must be low in comparison to the rated motor torque. An excessively high stiction can have a significant negative impact on the accuracy of the rotor position identification and, under certain circumstances, make it impossible to execute the rotor position identification with motion.
- The technique may only be used for horizontal axes which can freely move and which do not have a brake.
- During the rotor position identification run, it is not permissible that external forces are applied to the motor.
- If the previous secondary conditions/limitations are not fulfilled, then 1FN3 motors can only be operated with Hall sensor boxes or with absolute measuring systems.
- When using an absolute motor measuring system, the rotor position identification can only be used to determine the commutation angle offset (P1016).
- The technique can only be started when the controller and pulses are enabled as current must flow through the motor.
- When this technique is used, under worst case condition, movement in the range of ± 10 mm can occur.
- Until the identification has been completed, the axis to be identified must be set in the tracking mode in order to suppress fault 135 during the identification routine (standstill monitoring).
- When starting the rotor position identification routine via P1736 as a test:
  - For a test start, fault 135 (standstill monitoring) can be output, which must be acknowledged with RESET.
  - For coupled axes, the test start for rotor position identification is not permitted

Parameterization for the motion–based technique (from SW 6.1)

For the parameterization of the rotor position identification for the motion–based technique, initially, a rotor position identification run must be made with a standard parameterization.

The noise which is generated should be heard as a sequence of soft surges.

6

The following should be done if faults occur:

- Fault 611 (inadmissible motion):
—> Increase the parameterized load mass (P1076), check the maximum permissible motion (P1020) and if required, increase.
- Fault 610 (rotor position identification unsuccessful) and P1734 = –4 (current rise too low):
—> The motor is not correctly connected
—> The motor power connections must be checked.
- Fault 610 (rotor position identification unsuccessful) and P1734 = –6 (max. permissible duration exceeded):
—> This can be due to the following reasons:
  - external forces have faulted the identification routine (e.g. coupled axes have not been opened, surges, etc.),
  - if the drive emits an excessive noise (a loud whistling sound) during the identification routine, then the identification technique has become unstable:
  —> P1076 must be reduced,
  - Extremely low encoder resolution:
  —> use an encoder with a higher resolution
  - encoder mounting is not stiff enough:
  —> improve the mounting.
- Fault 610 (rotor position identification unsuccessful) and P1734 = –7 (no clear rotor position has been found:
—> This can be due to the following reasons:
  - the axis cannot freely move (e.g. the motor rotor is locked)
  - external forces have disturbed the identification routine (refer above)
  - the axis has an extremely high friction:
  —> the identification current (P1019) must be increased

If the rotor position identification routine was successful, the rotor position which was found should be checked. This test function can determine the difference between the determined rotor position angle and the rotor position angle used by the closed–loop control.

The following procedure should be applied several times:

1. Start the test function using P1736 = 1.
2. Evaluate the difference in P1737 – a spread of the measured values of less than 10 degrees is acceptable. If this is not the case, then a higher current must be used for the identification routine (P1019).

■

Fault Handling/Diagnostics 7

7.1 Overview of faults and warnings

Table 7-1 Overview of faults and warnings

<table>
<tr><th colspan="2">Type</th><th>Range</th><th>Description</th></tr>
<tr><td rowspan="2">Alarms</td><td>Fault

have the numbers

< 800

and are dis-played with ”E–xxx”</td><td>1
...
799</td><td>When faults occur
• The segment display automatically changes over
• The fault No. is output, flashing
e.g. E–A008 —> Error 8 from drive A
E–b714 —> Error 714 from drive B
• An appropriate stop response is initiated
Features
• They are displayed in the sequence in which they occurred
• If several faults are present, then the 1st fault and all of the additional faults can be displayed using the PLUS key (refer to Fig. 7-2)
• Faults with/without supplementary information
– without supplementary information
The cause of the fault is only defined by the fault number.
– with supplementary information
The cause of the fault is defined by the fault number and supplementary information.
For the display unit, a change is made between the fault (output with E...) and the supplementary information (where only a value is output) .
• Starting from the fault display, you can changeover into the parameterizing mode using the MINUS key
• Faults have a higher priority than the warnings
Removing faults
• Remove the cause of the fault
• Acknowledge the fault (is specified for every fault)</td></tr>
<tr><td>Warning

have the numbers

≥ 800

and are dis-played with ”E xxx”</td><td>800
...
927</td><td>When warnings occur
• The segment display automatically changes over
• The warning number is output flashing
e.g. E A805 —> Warning 805 from drive A
E b810 —> Warning 810 from drive B
Features
• If several warnings are present, there is no relationship between the time which they occurred and their display
• Only one warning is displayed
• The warning with the lowest number is displayed
• Starting from the fault display, you can changeover into the parameterizing mode using the MINUS key
Removing warnings
• Warnings are self–acknowledging,
i.e. they automatically reset themselves once the condition is no longer fulfilled</td></tr>
</table>

Acknowledgement

In the list of faults and warnings (refer to Chapter 7.3), for each fault and warning, an explanation is given under ”Acknowledge”, as to how they can be acknowledged after the cause has been removed.

Acknowledging faults with POWER ON

Faults, which are to be acknowledged with POWER ON, can be alternatively acknowledged as follows:

1. POWER ON
   —> power–off/power–on ”SIMODRIVE 611 universal”
2. Press the POWER–ON RESET button on the front panel of the control board
3. POWER–ON RESET with the ”SimoCom U” tool

The processor runs up again, all of the faults are acknowledged, and the fault buffer is re–initialized.

Acknowledging faults with RESET FAULT MEMORY

Faults, which are to be acknowledged with RESET FAULT MEMORY, can be alternatively acknowledged as follows:

Notice

Prerequisites when acknowledging:

- **Disable the controller enable via terminal 65.x**

  or
- **Set the PROFIBUS control signal STW1.0 to ”0”**

  From SW 6.1 and for P1012.12=1, the fault can also be acknowledged without this prerequisite. However, the drive then remains in the ”Power–on inhibit” state (refer to Chapter 5.5 ”Generating the power–on inhibit”; Fig.5-9).
- **Set the appropriate bus signal (e.g. for the CAN bus, from SW 8.1)**

---

1. Carry–out POWER ON acknowledgment
   In addition to the POWER ON faults, all of the faults, which can be acknowledged with RESET FAULT MEMORY, are also acknowledged.
2. Set the input terminal with the ”reset fault memory” function to ”1”
3. Press button P on the display and operator control unit
4. Using PROFIBUS–DP: Set STW1.7 (reset fault memory) to ”1”
5. Set terminal R on the NE module to ”1”

   When this terminal is energized, ”reset fault memory” is effective for all of the control boards of the complete drive group.
6. For the ”SimoCom U” tool in the dialog box ”Alarm report” by pressing the ”Reset fault memory” button

If a fault is acknowledged, before the cause, e.g. overtemperature, DC link undervoltage etc. was removed, then the fault message is subsequently de–activated at that instant in time when the cause is no longer present. The fault memory must no longer be reset again.

Stop responses

In the list of faults and warnings, for each fault and warning, the stop response and its effects are specified under ”stop response”.

—> Refer to Chapter 7.3

Note

Handling faults in the master and slave drive for coupled axes, refer to Chapter 6.3.2.

Table 7-2 Stop responses and their effect

Stop response	Stopping via...	Effect
STOP I	Internal pulse inhibit	• Immediate pulse cancellation. • The drive ”coasts down”.
STOP II	Internal control inhibit	• Closed–loop speed controlled operation – By immediately entering $n_{set} = 0$ the drive is braked along the down ramp. – If the speed actual value falls below the value in P1403 (shutdown speed, pulse cancellation), or if the time in P1404 (timer stage, pulse cancellation) has expired, then the pulses are canceled. • Torque control mode – The drive does not actively brake. – If the speed actual value falls below the value in P1403 (shutdown speed, pulse cancellation), or if the time in P1404 (timer stage, pulse cancellation) has expired, then the pulses are canceled.
STOP III	$n_{set} = 0$	• The axis is braked, closed–loop speed controlled with the maximum deceleration (P0104). • The drive remains in the closed–loop controlled mode.
STOP IV	Interpolator (P0104)	• The axis is braked closed–loop position controlled with the maximum deceleration (P0104). • The drive remains in the closed–loop controlled mode. • The axes remain coupled.
STOP V	Interpolator (P0104 • P0084:64)	• The axis is braked closed–loop position controlled using the programmed deceleration (P0104 • deceleration override in P0084:64). • The drive remains in the closed–loop controlled mode.
STOP VI	End of block	• Standstill after the end of a block. • The drive remains in the closed–loop controlled mode.

Table 7-2 Stop responses and their effect, continued

Stop response	Stopping via...	Effect
STOP VII	None	• No effect. • Acknowledgment is not required. • That is a warning
Can be parame-terized	P1600 and P1601 Refer to Chapter A.1	Faults that can be suppressed This means: These faults can be de–activated. • Which faults can be suppressed? The faults, specified in P1600 and P1601 can be suppressed. e.g. faults 508, 509, 608 etc. • How can they be suppressed? By setting the parameter bit assigned to the fault via P1600 and P1601. Example: Fault 608 is to be suppressed. —> set P1601.8 to 1
	P1612 and P1613 (from SW 3.3) Refer to Chapter A.1	Faults which can be set This means: For these faults, either STOP I or STOP II can be set as stop response. • Which faults can be set? The faults, specified in P1612 and P1613, can be set. e.g. faults 504, 505, 607 etc. • How can these be set? By setting the parameter bit assigned to the fault via P1612 and P1613. Example: STOP II should be initiated as response to fault 608. —> set P1613.8 to 0

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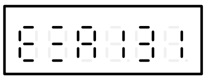
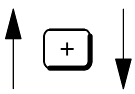
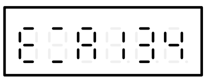
7.2 Displaying and handling faults and warnings

7.2.1 Display and operator control via the display and operator unit

Displaying faults and warnings

The segment display is automatically changed over into the alarm mode when one or several faults or warnings occur. The faults and warnings are output flashing on the display unit. They can be displayed as follows:

Table 7-3 Displaying alarms on the display unit

Display example (flashing display)	Description
1. This is what it looks like if **a** fault has occurred (refer to Fig. 7-1).	
	• E: it involves a fault (Code: 1 hyphen) • 1 hyphen: there is one fault present • A: the fault is assigned to drive A • 608: is the fault number
2. This is what it looks like if **several** faults have occurred (refer to Fig. 7-2).	
  	• E: it involves several faults (Code: 3 hyphens) • 3 hyphens: – several faults are present – this is the first which occurred • A: the fault is assigned to drive A • 131: is the fault number **Note:** By pressing the PLUS button, several faults can be displayed for each additional fault. • E: it involves an additional fault (code: 2 hyphens) • 2 hyphens: – several faults are present – this is an additional fault • A: the fault is assigned to drive A • 134: is the fault number
3. This is what it looks like if a warning is present (refer to Fig. 7-3).	
	• E: it involves a warning (code: no hyphen) • A: the warning is assigned to drive A • 804: is the warning number

Operator control, if a fault is present

When a fault occurs, it can be handled using the MINUS and P keys as shown in the following diagram.

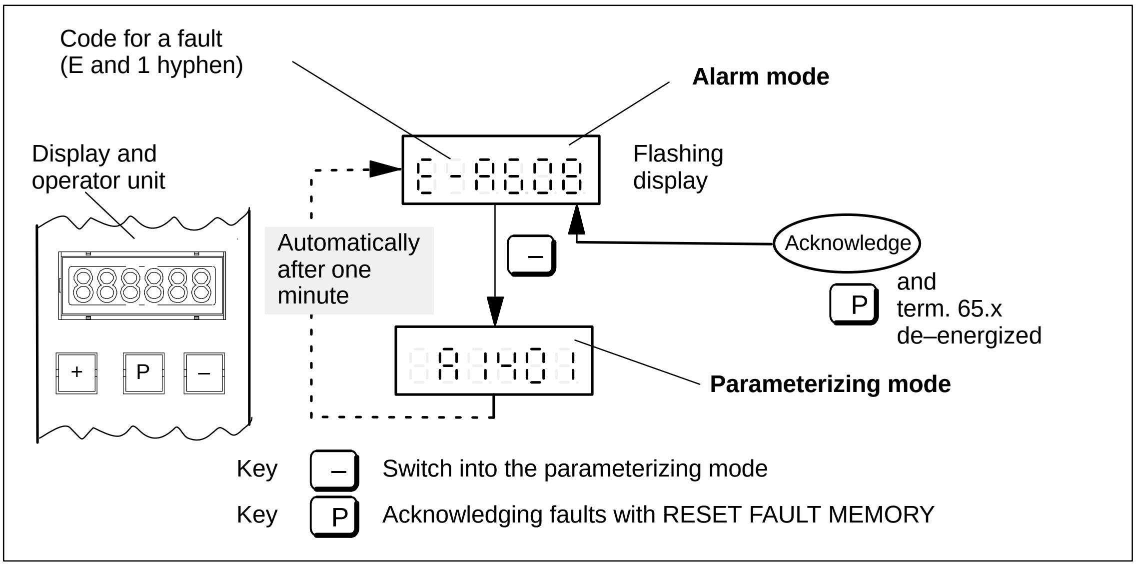


Fig. 7-1 Operator control, if a fault is available

Operator control, if several faults have occurred

When faults occur, they can be handled as shown in the following diagram using the PLUS, MINUS and P keys.

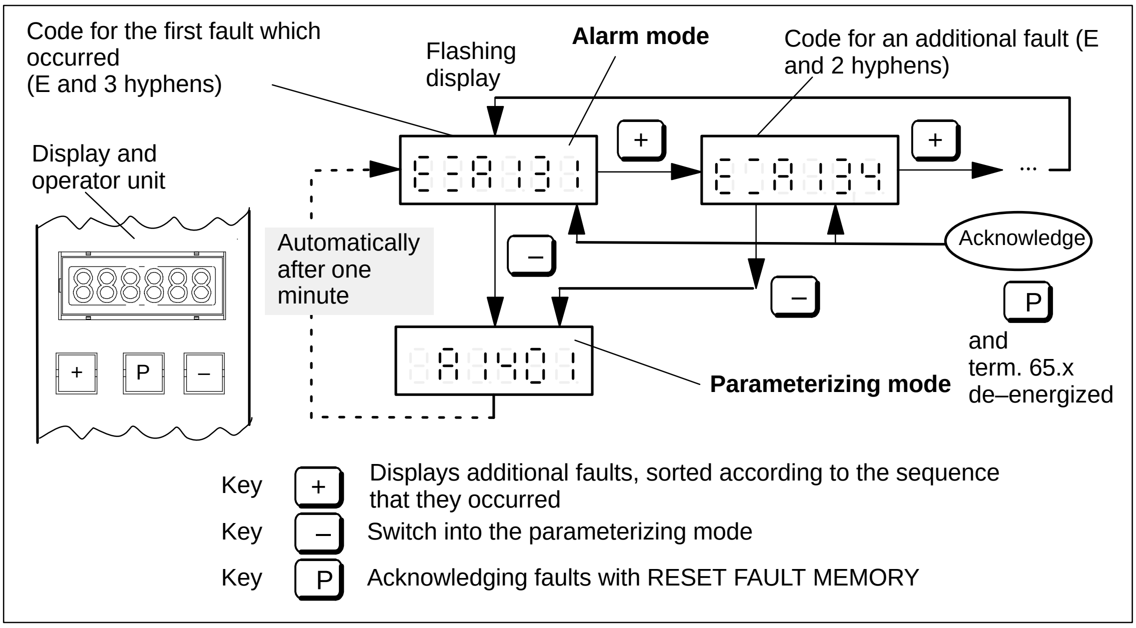


Fig. 7-2 Handling several faults

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Operator action, if one warning is present

When warnings occur, they can be handled using the MINUS key as shown in the following diagram.

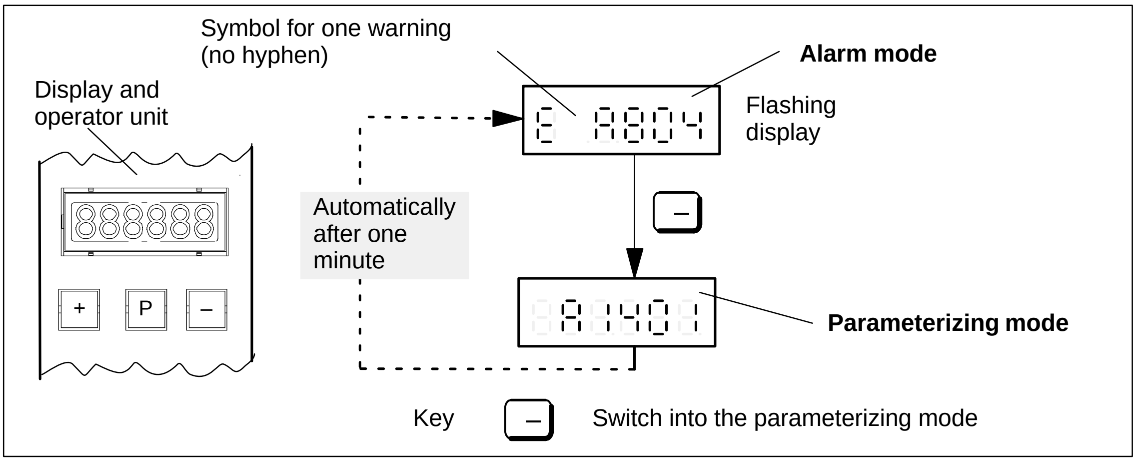

Fig. 7-3 Operator action, if one warning is present

7.2.2 FAULT LED on the front panel

LED display on the control board

There is a button with integrated LED on the front panel of the ”SIMODRIVE 611 universal” control board.

R: Pushbutton for POWER–ON RESET

F: FAULT LED for diagnostics

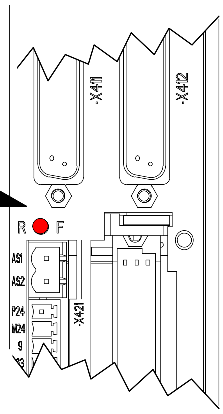

Fig. 7-4 FAULT LED on the front panel of the control board

What significance does the FAULT LED have?

If a FAULT–LED is lit on the front panel of the control board, it can be interpreted as follows:

Table 7-4 Significance of the FAULT LED

If	then
The **FAULT LED** on the front panel of the control board **lights up**	• there is at least one fault (No.: < 800, the fault number is displayed on the display unit) • the control board is running–up (approx. 2 sec). The LED goes dark after a successful run–up. • a first commissioning is requested • the memory module is not inserted on the control module or is not ”correctly” inserted • the control board is defective

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7.3 List of faults and warnings

7.3.1 Fault without a number being displayed

Fault — **After power–on, the operating display is inactive**

Cause
- At least 2 phases are missing (NE module)
- At least 2 input fuses have ruptured (NE module)
- Defective electronics power supply in the NE module
- Equipment bus connection (ribbon cable) from the NE module to the ”SIMODRIVE 611 universal” control board is either not inserted or defective
- Defective control board

Fault — **After the controller enable, the motor is stationary at $n_{set} \neq 0$**

Cause
- P1401:8 is set to zero
- Power–on inhibit is present for PROFIBUS operation
  Remove the power–on inhibit with
  A ”high – low – high” signal change at 65.x or
  the control bit STW1.0 (ON/OFF 1)
  or
  set bit 12 of parameter 1012 to zero

Fault — **After the controller has been enabled, the motor briefly moves**

Cause
- Defective power module

Fault — **After the controller has been enabled, the motor rotates at max. 50 RPM at n_{set} > 50 RPM or the motor oscillates at n_{set} < 50 RPM**

Cause
- Motor phase sequence is incorrect (interchange 2 phase connections)
- The entered encoder pulse number was too high

Fault — **After the controller is enabled, the motor accelerates to a high speed**

Cause
- Encoder pulse number too small
- Open–loop torque controlled mode selection?

Fault — **”– – – – – –” is output on the display unit**

Cause
- There is no drive firmware in this memory module.
- Remedy, refer to fault 001

7.3.2 Error with fault/warning number

Version: 08.03.07

Reader's note

- In some instances, the space retainers (e.g. \%u) are specified for the texts of the individual faults and warnings.
  In online operation with SimoCom U instead of a space retainer, an appropriate value is displayed.
- The complete list is updated corresponding to the Edition of this documentation (refer to the Edition in the header lines) and corresponds to the software release of "SIMODRIVE 611 universal" documented here.
  The individual faults/warnings are not coded dependent on the software release.

000 **Alarm diagnostics not possible**

Cause
– Communications to the drive have been interrupted.
– Different versions of the "SimoCom U" start-up and parameterizing tool and the drive.

Remedy
– Check the communications to the drive (cable, interfaces, ...)
– The V_611U<Version>.acc file on the hard disk of the PG/PC should be adapted to the drive as follows:
  – Exit "SimoCom U"
  – Delete the V_611U<Version>.acc file (search and delete the file)
  – Restart "SimoCom U" and go online
  The V_611U<Version>.acc file is now re-generated and is harmonized to the drive version.
Never delete the file V000000.acc!

001 **The drive does not have firmware**

Cause
No drive firmware on the memory module.

Remedy
– Load the drive firmware via SimoCom U
– Insert the memory module with firmware

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

002 Computation time overflow. Suppl. info: \%X

Cause	The computation time of the drive processor is no longer sufficient for the selected functions in the specified cycle times. Supplementary information: only for siemens-internal error diagnostics
Remedy	Disable functions which take up a lot of computation time, e.g.: – Variable signaling function (P1620) – Trace function – Start-up with FFT or analyzing the step response – Speed feedforward control (P0203) – Min/Max memory (P1650.0) – DAC output (max. 1 channel) Increase cycle times: – Current controller cycle (P1000) – Speed controller cycle (P1001) – Position controller cycle (P1009) – Interpolation cycle (P1010)
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

003 NMI due to watchdog. Suppl. info: \%X

Cause	The watchdog timer on the control module has expired. The cause is a hardware fault in the time basis on the control module. Supplementary information: only for siemens-internal error diagnostics
Remedy	– Replace control module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

004 Stack overflow. Suppl. info: \%X

Cause	The limits of the internal processor hardware stack or the software stack in the data memory have been violated. The cause is probably a hardware fault on the control module. Supplementary information: only for siemens-internal error diagnostics
Remedy	– Power down/power up drive module – Replace control module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

005 Illegal Opcode, Trace, SWI, NMI (DSP). Suppl. info: \%X

Cause	The processor has detected an illegal command in the program memory. Supplementary information: only for siemens-internal error diagnostics
Remedy	– Replace control module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

006 Checksum test error. Suppl. info: \%X

Cause	During the continuous check of the checksum in the program/data memory, a difference was identified between the reference and actual checksum. The cause is probably a hardware fault on the control module. Supplementary information: only for siemens-internal error diagnostics
Remedy	– Replace control module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

007 Error when initializing. Supplementary info: \%X

Cause	An error occurred when loading the firmware from the memory module. Cause: Data transfer error, FEPROM memory cell defective Supplementary information: only for siemens-internal error diagnostics
Remedy	Carry-out RESET or POWER-ON. If a download is still unsuccessful after several attempts, the memory module must be replaced. If this is unsuccessful the control module is defective and must be replaced.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

020 NMI due to cycle failure

Cause	Basic cycle has failed. Possible causes: EMC faults, hardware fault, control module
Remedy	– Check the plug-in connections – Implement noise suppression measures (screening, check ground connections) – Replace control module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

025 SSI interrupt

Cause	An illegal processor interrupt has occurred. An EMC fault or a hardware fault on the control module could be the reason.
Remedy	– Check the plug-in connections – Replace control module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

026 SCI interrupt

Cause: An illegal processor interrupt has occurred. An EMC fault or a hardware fault on the control module could be the reason.

Remedy:
– Check the plug-in connections
– Replace control module

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

027 HOST interrupt

Cause: An illegal processor interrupt has occurred. An EMC fault or a hardware fault on the control module could be the reason.

Remedy:
– Check the plug-in connections
– Replace control module

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

028 Actual current sensing during power-up

Cause: When the current actual value sensing runs up, or in cyclic operation at pulse inhibit, a 0 current is expected. The drive system then identifies that no currents are flowing (excessive deviation to the theoretical center frequency). It is possible that the hardware for the current actual value sensing is defective.

Remedy:
– Check the plug-in connections
– Check whether the control module is correctly inserted
– Replace control module
– Replace the power section

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

029 Incorrect measuring circuit evaluation. Suppl. info: \%X

Cause: The motor measuring system has a motor encoder with voltage output which requires a measured circuit evaluation with voltage input, or a resolver with appropriate evaluation. Another measuring circuit evaluation was identified.
Supplementary information: only for siemens-internal error diagnostics

Remedy:
– Check the plug-in connections
– Implement noise suppression measures (screening, check ground connections, ...)
– Control module and encoder must be the same type (sin/cos or resolver)
– Replace control module

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

030 S7 communication error. Supplementary info: \%X

Cause	A fatal communication error was identified, or the drive software is no longer consistent. The cause is erroneous communications or a hardware fault on the control module. Supplementary information: only for siemens-internal error diagnostics
Remedy	– Implement noise suppression measures (screening, check ground connections, ...) – Replace control module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

031 Internal data error. Suppl. info: \%X

Cause	Error in the internal data, e.g. errors in the element/block lists (incorrect formats, ...). The drive software is no longer consistant. The cause is propably a hardware fault on the control module. Supplementary information: only for siemens-internal error diagnostics
Remedy	– Re-load drive software – Replace control module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

032 Incorrect number of current setpoint filters

Cause	An illegal number of current setpoint filters was entered (> 4) (maximum number = 4).
Remedy	Correct number of current setpoint filters (P1200).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

033 Incorrect number of speed setpoint filters

Cause	An inadmissible number of speed setpoint filters (> 2) was entered (max. number = 2).
Remedy	Correct number of speed setpoint filters (P1500)
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

034 Axis count function has failed

Cause	The function for determining the number of axes that physically exist on the power section has calculated an illegal value.
Remedy	Check that the control module is correctly inserted in the power section or whether the power section is defective.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

035 Error when saving the user data. Supplementary info: \%X

Cause	An error occurred when saving the user data in the FEPROM on the memory module. Cause: Data transfer error, FEPROM memory cell defective Note: The user data which was last saved, is still available as long as a new data backup was unsuccessful. Supplementary information: only for siemens-internal error diagnostics
Remedy	Initiate another data backup. If data backup is still unsuccessful after several attempts, then the memory module must be replaced. If the user data, valid up to the error, is to be used in the new memory module, then it must be read out via SimoCom U before the memory module is replaced, and loaded again after it has been replaced.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

036 Error when downloading the firmware. Suppl. info: \%X

Cause	An error occurred when loading a new firmware release. Cause: Data transfer error, FEPROM memory cell defective Note: As the previously used firmware was erased when downloading, the drive expects a new firmware download after RESET or POWER ON. Supplementary information: only for siemens-internal error diagnostics
Remedy	Execute RESET or POWER ON. If a download is still unsuccessful after several attempts, the memory module must be replaced. If this is unsuccessful the control module is defective and must be replaced.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

037 Error when initializing the user data. Supplementary info: \%X

Cause	An error occurred when loading the user data from the memory module. Cause: Data transfer error, FEPROM memory cell defective Supplementary information: only for siemens-internal error diagnostics
Remedy	Execute POWER ON. If a download is still unsuccessful after several attempts, the memory module must be replaced. If this is unsuccessful the control module is defective and must be replaced.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

039 Error during power section identification. Supplementary info: \%X

Cause
Supplementary information
0x100000:
More than 1 power section type was identified.
0x200000:
No power section type was identified, although it would have been possible.
0x30xxxx:
The identified power module differs from the entered PM (P1106). To xxxx: the code of the identified PM is entered here.
0x400000:
Different power section codes (P1106) are entered for this 2-axis module.

Remedy
– Execute RESET or POWER ON
– Check whether the control module is correctly inserted in the power module

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

040 Expected option module is not available.

Cause
The parameterization (P0875) expects an option module which is not available on this control module.

Remedy
Compare the type of the expected option module (P0875) with the type of the inserted option module (P0872) and check/replace the inserted option module or cancel the option module with P0875 = 0.

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

041 The firmware does not support the option module. Suppl. info: \%u

Cause
Supplementary info = 1:
An option module is inserted (P0872) or parameterized (P0875), which is not supported by the firmware release of the control module.

Remedy
Supplementary info = 1:
– Upgrade the firmware
– Use a legal option module
– Cancel the option module with P0875 = 0
Supplementary info = 2:
– Use a permissible option module (DP3)
– Cancel the option module with P0875 = 0
Supplementary info = 3:
– Replace the option module hardware DP1 by option module DP2 or DP3, without changing the drive parameters and the master configuring. The parameter for the expected option module remains at P0875 = 2.

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

042 Internal software error. Supplementary info \%u

Cause
There is an internal software error.
Supplementary information: only for siemens-internal error diagnostics

Remedy
– Execute POWER ON-RESET (press button R)
– Re-load the software into the memory module (execute software update)
– Contact the Hotline
– Replace control module

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

043 Firmware, option module

Cause
The option module does not contain the currently required firmware.

Remedy
Use a module with suitable firmware or upgrade the firmware

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

044 Connection to the option module failed. Supplementary info \%X

Cause
The BUS coupling has failed.

Remedy
– Execute POWER ON-RESET (press button R)
– Replace option module

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

045 Expected option module is axially unequal

Cause	The option module type, expected from the parameterization, is different for the two axes of a two-axis module.
Remedy	Set the expected option module type in P0875 the same for both axes, or cancel for axis B by setting P0875 to 0.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

048 Illegal status PROFIBUS hardware

Cause	An illegal status of the PROFIBUS controller was recognized.
Remedy	– Execute POWER-ON RESET – Check the PROFIBUS unit screw connection – Replace drive module
Acknowledgement	POWER ON
Stop response	STOP II

101 Target position block \%n < plus software limit switch

Cause	The target position specified in this block lies outside the range limited by P0316 (plus software limit switch).
Remedy	– Change the target position in the block – Set the software limit switches differently
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

102 Target position block \%n < minus software limit switch

Cause	The target position specified in this block lies outside the range limited by P0315 (minus software limit switch).
Remedy	– Change the target position in the block – Set the software limit switches differently
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

103 Block number \%n: Direct output function not possible

Cause	For the SET_O or RESET_O command, an illegal value was entered in P0086:64 (command parameter).
Remedy	Enter value 1, 2 or 3 in P0086:64 (command parameter).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

104 Block \%n: There is no jump target

Cause	A jump is programmed to a non-existent block number in this traversing block.
Remedy	Program the existing block number.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

105 Illegal mode specified in block \%n

Cause	Illegal data is in P0087:64/P0097 (mode). A data position in P0087:64/P0097 has an inadmissible value. For the commands SET_O and RESET_O, the CONTINUE EXTERNAL block change enable is not permissible. For MDI: The configuration of the external block change P0110 is incorrect. The external block change is only permissible with P0110 = 2 or 3. Block change enable only with ”END” or ”CONTINUE EXTERNAL”. For axis couplings: For COUPLING_IN/COUPLING_OUT via a traversing block (P0410=3, 4 or 8), a block change enable with CONTINUE FLYING is not possible.
Remedy	Check and correct P0087:64/P0097.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

106 Block \%n: ABS_POS mode not possible for linear axis

Cause	For a linear axes, the positioning mode ABS_POS was programmed (only for rotary axes).
Remedy	Change P00987:64/P0097 (mode).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

107 Block \%n: ABS_NEG mode not possible for a linear axis

Cause	For a linear axes, the positioning mode ABS_NEG was programmed (only for rotary axes).
Remedy	Change P00987:64/P0097 (mode).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

108 Block number \%n available twice

Cause	There are several traversing blocks with the same block number in the program memory. The block numbers must be unique over all traversing blocks.
Remedy	Assign unique block numbers.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

109 External block change not requested in block \%n

Cause	External block change was not requested for a traversing block with block step enable CONTINUE EXTERNAL and P0110 (configuration of external block change) = 0.
Remedy	Remove the cause that the signal edge is missing at the input terminal or for a PROFIBUS control signal STW1.13 or for the appropriate fieldbus signal.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

110 Selected block number \%n does not exist

Cause	A block number was selected which is not available in the program memory or has been suppressed.
Remedy	Select the existing block number. Program the traversing block with the selected block number.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

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111 GOTO in block number \n not permissible

Cause	The step command GOTO may not be programmed for this block number.
Remedy	Program another command.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

112 Activate traversing task and start referencing, handwheel simultaneously

Cause	A positive signal edge was simultaneously detected for the input signals ”Activate traversing task” and ”Start referencing” and ”Activate handwheel”. At power-on or POWER-ON RESET, if both input signals have a ”1” signal, then for both signals a 0/1 edge (positive edge) is simultaneously identified.
Remedy	Reset both input signals, and re-start the required function after the fault has been acknowledged.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

113	**Activate traversing task and jog, handwheel simultaneously**
Cause	A positive signal edge was simultaneously detected for the input signals ”Activate traversing task” and ”Jog 1”, ”Jog 2” and ”Activate handwheel”. At power-on or POWER-ON RESET, if both input signals have a ”1” signal, then for both signals a 0/1 edge (positive edge) is simultaneously identified.
Remedy	Reset both input signals, and re-start the required function after the fault has been acknowledged.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV
114	**Block change enable END in block number \%n expected**
Cause	The traversing block with the highest block number does not have END as block step enable.
Remedy	– Program this traversing block with block step enable END. – Program the GOTO command for this traversing block. – Program additional traversing blocks with higher block number and program the block step enable END (highest block number) in the last block.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI
115	**Traversing range start reached**
Cause	The axis has moved to the traversing range limit in a block with the command ENDLOS_NEG (–200 000 000 MSR).
Remedy	– Acknowledge fault – Move away in the positive direction (e.g. jog)
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V
116	**Traversing range end reached**
Cause	The axis has moved to the traversing range limit in a block with the command ENDLOS_POS (200 000 000 MSR).
Remedy	– Acknowledge fault – Move away in the negative direction (e.g. jog)
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

117 Target position block \%n < start of the traversing range

Cause	The target position specified in this block lies outside the absolute traversing range (–200 000 000 MSR).
Remedy	Change the target position in the block
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

118 Target position block \%n < end of the traversing range

Cause	The target position specified in this block lies outside the absolute traversing range (200 000 000 MSR).
Remedy	Change the target position in the block
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

119 PLUS software limit switch actuated

Cause	For a block with the ENDLOS_POS command, the axis has actuated the plus software limit switch (P0316) for absolute or relative positioning. The behavior for software limit switch reached, can be set using P0118.0.
Remedy	– Acknowledge fault – Move away in the negative direction, jog mode
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

120 MINUS software limit switch actuated

Cause	For a block with the ENDLOS_NEG command, the axis has actuated the minus software limit switch (P0315) for absolute or relative positioning The behavior for software limit switch reached, can be set using P0118.0.
Remedy	– Acknowledge fault – Move away in the positive direction, jog mode
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

121 Jog 1, jog 2 or handwheel simultaneously active

Cause	The input signals ”jog 1”, ”jog 2” or ”activate handwheel” were simultaneously activated.
Remedy	– Reset both input signals – Acknowledge the fault – Activate the required input signal
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

7

122	**Parameter \%u: value range limits violated**
Cause	The value range limit of the parameter was violated when the dimension system was changed over from inches to millimeters.
Remedy	Place the parameter value within the value range.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
123	**Linear encoder for the selected dimension system illegal**
Cause	For a linear encoder, the dimension system was set to degrees.
Remedy	Change the dimension system setting (P0100).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
124	**Referencing and jog simultaneously started**
Cause	For the ”start referencing” and ”Jog 1” and ”Jog 2” input signals, a positive edge was simultaneously identified.
Remedy	Reset both input signals, and re-start the required function after the fault has been acknowledged.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V
125	**Falling edge of the reference cam not identified**
Cause	When moving away from the reference cams, the traversing range limit was reached, as the 1/0 edge of the reference cam was not identified.
Remedy	Check the ”reference cam” input signal and repeat the reference point approach.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)
126	**Block \%n: ABS_POS for rotary axis, is not possible without modulo conversion**
Cause	The ABS_POS positioning mode is only permitted for a rotary axis with activated module conversion (P0241 = 1).
Remedy	Use the valid positioning mode for this axis type.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

127 **Block \%n: ABS_NEG for rotary axis is not possible without modulo conversion**

Cause: The ABS_NEG positioning mode is only permitted for a rotary axis with activated modulo conversion (P0241 = 1).

Remedy: Use the valid positioning mode for this axis type.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP VI

128 **Block \%n: Target position lies outside the modulo range**

Cause: The programmed target position (P0081:64/P0091) is outside the selected modulo range (P0242).

Remedy: Program valid target position.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP VI

129 **Maximum velocity for a rotary axis with modulo conversion too high**

Cause: The programmed maximum velocity (P0102) is too high to correctly calculate the modulo offset. The maximum velocity may only be so high, that 90% of the modulo range (P0242) can be traveled through within one interpolation cycle (P1010).

Remedy: Reduce maximum velocity (P0102).

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP V

130 **Controller or pulse enable withdrawn in motion**

Cause: Possible causes are:
– One of the following enable signals was withdrawn while moving: Terminals 48, 63, 64, 663, 65.x, PROFIBUS or bus enable signals, PC enable from SimoCom U
– Another fault has occurred, which causes the controller or pulse enable to be withdrawn
– The drive is in the power-on inhibit state

Remedy:
– Set the enable signals or check the cause of the first fault which occurred and remove
– Remove the power-on inhibit with the edge (0 —> 1) at control word STW1.0 or terminal 65.
– Withdraw the power-on inhibit from the fieldbus signal.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP II

7

131 Following error too high

Cause: Possible causes are:
– The torque or acceleration capability of the drive is exceeded
– Position measuring system fault
– The position control sense is not correct (P0231)
– Mechanical system blocked
– Excessive traversing velocity or excessive position setpoint differences

Remedy: Check the above causes and remove.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP II

132 Drive located after the minus software limit switch

Cause: The axis was moved to the minus software limit switch (P0315), jog mode.
The fault can also occur if the software limit switches are inactive if the position actual value falls below the limit value of –200 000 000 MSR, that corresponds to 555 revolutions for a rotary axis.

Remedy: Return the drive into the traversing range using jog button 1 or 2. Then acknowledge the fault.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP III

133 Drive located after the plus software limit switch

Cause: The axis was moved to the plus software limit switch (P0316), jog mode.
The fault can also occur if the software limit switches are inactive if the position actual value exceeds the limit value of 200 000 000 MSR, that corresponds to 555 revolutions for a rotary axis.

Remedy: Return the drive into the traversing range using jog button 1 or 2. Then acknowledge the fault.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP III

134 Positioning monitoring has responded

Cause: The drive has not yet reached the positioning window (P0321) after the positioning monitoring time (P0320) has expired.
Possible causes:
– Positioning monitoring time (P0320) parameters too low
– Positioning window (P0321) parameters too low
– Position loop gain (P0200) too low
– Position loop gain (P0200) too high (instability/tendency to oscillate)
– Mechanical block

Remedy: Check above parameters and correct.

Acknowledgement: RESET FAULT MEMORY

Stop response: STOP II

135 Standstill monitoring has responded

Cause
The drive has left the standstill window (P0326) after the standstill monitoring time (P0325) has expired.
Possible causes are:
– Position actual value inversion (P0231) incorrectly set
– Standstill monitoring time (P0325) parameters too low
– Standstill window (P0326) parameters too low
– Position loop gain (P0200) too low
– Position loop gain (P0200) too high (instability/tendency to oscillate)
– Mechanical overload
– Check connecting cable motor/converter (phase missing, exchanged)

Remedy
Check above parameters and correct.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II

136 Conv.factor,feedforward contr.speed,parameter set \%d,cannot be represented

Cause
The conversion factor in the position controller between velocity and speed cannot be displayed.
This factor depends on the following parameters:
– Spindle pitch (P0236), for linear axes
– Gearbox ratio (P0238:8/P0237:8).

Remedy
Check the above mentioned parameters and correct.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II

137 Conv.factor,pos.contr.output,parameter set \%d,cannot be represented

Cause
The conversion factor in the position controller between the following error and the speed setpoint cannot be displayed.
This factor depends on the following parameters:
– Spindle pitch (P0236) (for linear axes)
– Gearbox ratio P0238:8/P0237:8
– Position control loop gain P0200:8

Remedy
Check the above mentioned parameters and correct.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II

138 Conversion factor between the motor and load too high

Cause
The conversion factor between the motor and load is greater than 2 to the power of 24 or less than 2 to the power of –24.

Remedy
Check the following parameters and correct:
P0236, P0237, P0238, P1005, P1024

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

139 Modulo range and ratio do not match

Cause	For multi-turn absolute value encoders, the ratio between the encoder and load must be selected so that the complete encoder range is an integer multiple of the modulo range. The following condition must be fulfilled: P1021 * P0238:8 / P0237:8 * 360 / P0242 must be integer numbers.
Remedy	– Check and correctP1021, P0238:8, P0237:8 – Adapt the modulo range (P0242)
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

140 Minus hardware limit switch

Cause	A 1/0 edge was identified at the ”Minus hardware limit switch” input signal.
Remedy	Return the drive into the traversing range using jog button 1 or 2. Then acknowledge the fault.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP III

141 Plus hardware limit switch

Cause	A 1/0 edge was identified at the ”Plus hardware limit switch” input signal.
Remedy	Return the drive into the traversing range using jog button 1 or 2. Then acknowledge the fault.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP III

142 Input I0.x not parameterized as equivalent zero mark

Cause	When entering an external signal as equivalent zero mark (P0174 = 2), input I0.x must be assigned ”equivalent zero mark” function (Fct. No.:79). if a direct measuring system is used, input I0.B must be assigned the ”equivalent zero mark” function (Fct. No.: 79).
Remedy	– Motor measuring system: P0660 = 79 – Direct measuring system: P0672 = 79
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

143 Endless traversing and external block change in block \%n

Cause	The block change enable CONTINUE_EXTERNAL for the ENDLESS_POS or ENDLESS_NEG command is only permitted with P0110 = 0 or 1.
Remedy	Block change enable or change P0110.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

144 Switching-in/switching-out MDI erroneous

Cause	In the active traversing program, MDI was switched-in or, in the active MDI block, MDI was switched-out.
Remedy	Acknowledge fault Change P0110
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

145 Fixed endstop not reached

Cause	In a traversing block with the FIXED ENDSTOP command, the fixed endstop was not reached. The fixed endstop lies outside the position programmed in this block. After interrupting the traverse to fixed endstop function, the drive was forced out of the position (support position).
Remedy	Check programming Increase kP0326 if the drive was forced out of the position.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

146 Fixed endstop, axis outside the monitoring window

Cause	In the "Fixed endstop reached" status, the axis has moved outside the defined monitoring window.
Remedy	– Check P0116:8 (fixed endstop, monitoring window) – Check mechanical system
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

147 Enable signals withdrawn at the fixed endstop

Cause	Possible causes are: – One of the following enable signals was withdrawn while traversing to the fixed endstop: Terminals 48, 63, 64, 663, 65.x, PROFIBUS and bus enable signals, PC enable from SimoCom U – Another fault has occurred, which causes the controller or pulse enable to be withdrawn
Remedy	Set the enable signals and check the cause of the first fault and remove.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

148 Velocity in block \%n outside the range

Cause	The velocity, specified in this block lies outside the range (1 000 to 2 000 000 000 c*MSR/min).
Remedy	Change the velocity in the block
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

7

149 **Incorrect data for modulo axis with absolute encoder. Supplementary info \%u**

Cause
Data error for modulo drive with absolute encoder and any gear factor.
– Data was not able to be saved after power-on.
– Absolute position was not able to be read-out of the encoder.
Supplementary information: only for siemens-internal error diagnostics

Remedy
– Adjust the drive by setting the absolute value.
– Check the switching threshold in P1162 (minimum DC link voltage).

Acknowledgement
POWER ON

Stop response
STOP V

150 **External position reference value < max. traversing range suppl. info \%u**

Cause
The external position reference value has exceeded the upper traversing range limit.
Supplementary info = 0:
Limit exceeded after the coupling factors P0401/P0402 identified, i.e. P0032 > 200 000 000 MSR.
Supplementary info = 1:
Limit exceeded after the coupling factors P0401/P0402 identified, i.e. P0032 * P0402 / P0401 > 200 000 000 MSR.

Remedy
Return the external position reference value to the value range. Then acknowledge the fault.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II

151 **External position reference value < min. traversing range suppl. info \%u**

Cause
The external position reference value has fallen below the lower traversing range limit.
Supplementary info = 0:
Limit fallen below after the coupling factors P0401/P0402 identified, i.e. P0032 < – 200 000 000 MSR.
Supplementary info = 1:
Limit fallen below after the coupling factors P0401/P0402 identified, i.e. P0032 * P0402 / P0401 < – 200 000 000 MSR.

Remedy
Return the external position reference value to the value range. Then acknowledge the fault.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II

152 **Pos.ref.val. and act.val. output via the bus interf. limited. Suppl. info \%X**

Cause
The output of the position reference value, position actual value or position correction value is parameterized via PROFIBUS or the bus interface. However, the value to be output can no longer be represented in 32 bits and was therefore limited to the maximum values 0x7fffffff or 0x80000000.
The traversing range which can be displayed is given by
Lower limit: – 2147483648 * P896 / P884
Upper limit: + 2147483647 * P896 / P884
The supplementary information explains which process data has violated the lower or upper limit:

Supplementary info	process data	Violation
xx1	Position reference value Xset (No. 50208)	Upper limit exceeded
xx1	Position reference value Xset (No. 50208)	Lower limit fallen below
x1x	Position actual value Xact (No. 50206)	Upper limit exceeded
x2x	Position actual value Xact (No. 50206)	Lower limit fallen below
1xx	Position correction value dxKorr (No. 50210)	Upper limit exceeded
2xx	Position correction value dxKorr (No. 50210)	Lower limit fallen below

Remedy
– Move drive back e.g. by jogging in the representable traversing range.
– Adapt the lower and upper limit to the required traversing range using P884 and P896.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP III

160 **Reference cam not reached**

Cause
After starting the reference point approach, the axis moves through the distance in P0170 (max. distance to the reference cam) without finding the reference cam.

Remedy
– Check the ”reference cam” signal
– Check P0170
– If it is an axis without reference cam, then set P0173 to 1

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP V

161 **Reference cams too short**

Cause
When the axis moves to the reference cam, and does not come to a standstill at the cam, then this error is signaled, i.e. the reference cam is too short.

Remedy
– Set P0163 (reference point approach velocity) to a lower value
– Increase P0104 (maximum deceleration)
– Use larger reference cam

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP V

162 No zero reference pulse present

Cause	After the reference cam was left, the axis moved through the distance in P0171 (max. distance between reference cam/zero pulse) without finding the zero pulse.
Remedy	– Check the encoder with reference to the zero mark – Set P0171 to a higher value
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V

163 Encoderless operation and operating mode do not match

Cause	Encoderless operation was parameterized (P1006) and the ”Positioning” mode selected.
Remedy	Set operating mode ”speed/torque setpoint” (P0700 = 1)
Acknowledgement	POWER ON
Stop response	STOP V

164 Coupling released during the traversing job.

Cause	The coupling was disconnected while a traversing task was running
Remedy	First exist the traversing task and then disconnect the coupling.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP III

165 Absolute positioning block not possible

Cause	Traversing blocks with absolute position data are not permitted while the axis coupling is activated.
Remedy	Correct traversing block
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

166 Coupling not possible

Cause	– No coupling can be established in the actual operating status. – For P0891=2 or 3, it is not possible to couple using the input signal ”Activate coupling through I0.x” (fast input).
Remedy	– Check the coupling configuration (P0410) – Set angular encoder interface (P0890, P0891) – Check the source of the external position reference value and input signal source.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP VI

167 Activate coupling signal present

Cause
– The input signal ”Activate coupling” is present. An edge of the input signal is necessary to activate the coupling.
– In the jog mode, while traversing, the input signal ”coupling on” was entered.
– The ”coupling in” input signal was entered in handwheel operation.

Remedy
Reset ”Activate coupling” input signal
Acknowledge fault
Set the input signal again to switch-in the coupling

Acknowledgement RESET FAULT MEMORY

Stop response STOP II

168 Overflow, buffer memory

Cause
Occurs for couplings with queue functionality.
A maximum of 16 positions can be saved in P0425:16.

Remedy Ensure that maximum 16 positions are saved.

Acknowledgement POWER ON

Stop response STOP IV

169 Coupling trigger missed

Cause
Occurs for couplings with queue functionality.
Synchronizatin is requested using the KOPPLUNG_ON command and it is identified that the position at which the coupling is switched-in, has already bee passed.

Remedy
Ensure that the slave drive was stationary for at least 1 IPO clock cycle (P1010), before the coupling for the next element in the position memory must be switched-in.

Acknowledgement RESET FAULT MEMORY

Stop response STOP IV

170 Coupling switched-out during the traversing program

Cause
While the drive was executing a traversing program, the ”Activate coupling” input signal was reset.

Remedy
Only switch-out the coupling if the traversing program has been completed.

Acknowledgement RESET FAULT MEMORY

Stop response STOP IV

171 Coupling not possible

Cause
While the drive was executing a traversing program, the ”Active coupling” input signal was set.

Remedy
Only switch-in the coupling if the traversing program has been completed.

Acknowledgement RESET FAULT MEMORY

Stop response STOP V

172	**External block change for coupling not possible**
Cause	If there is an existing coupling, traversing blocks with external block enable are only permitted if P0110 = 2.
Remedy	Correct traversing program Change P0110 (configuration, external block change)
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV
173	**Coupling and traverse to endstop simultaneously**
Cause	Not possible to simultaneously couple and traverse to the endstop.
Remedy	Correct traversing program
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP V
174	**Passive referencing not possible**
Cause	For the passive referencing, the encoder interface must be switched as input and the ”Positioning” mode must be set.
Remedy	– Set the ”Positioning” mode (P0700) – Set angular encoder interface (P0890, P0891)
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV
175	**Passive referencing not realized. Supplementary info: \%u**
Cause	While the master drive corrects the zero mark offset, the slave drive must pass over a zero mark. Supplementary information 0 = Reference cam not found 1 = Reference cam not left 2 = Zero reference pulse not found
Remedy	Ensure that the cam of the slave drive is located between the cam and the reference point of the master drive. Appropriately shift the cam and/or increase the reference point offset (P0162) at the master drive. If the zero pulse is not found, the reference point offset (P0162) must also be increased at the master drive.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV
176	**Absolute encoder must be adjusted**
Cause	Passive referencing with absolute encoders (e.g. EnDat encoders) is only possible after the encoder has been adjusted.
Remedy	Adjust the drive by setting the absolute value.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

177 **Start-up passive referencing P179 not possible**

Cause	The start-up help for passive referencing determines the reference point offset in P0162 in the slave drive. The following prerequisites must be available: – (permanent) position coupling exists to the master drive – Master drive must be precisely at its reference point – Slave drive has passed the zero mark.
Remedy	– Establish a coupling at the slave drive: PosStw.4 or input terminal function 72/73 – Reference the master drive: STW1.11 or input terminal function 65 at the master drive – ”Wiring” check: The requirement for passive referencing must be transferred from the master to the slave drive: Masterdrive: Output via ZSW1.15, QZsw.1 or output terminal function 69 Slave drive: read-in via STW1.15, QStw.1 or input terminal function 69
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

180 **Teach-in without reference point**

Cause	Teach-in only possible for a referenced axis.
Remedy	Request reference axis and teach in
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

181 **Teach-in block invalid**

Cause	The specified teach-in block is invalid.
Remedy	Specify the valid and existing traversing block.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

182 **Teach-in standard block invalid**

Cause	The specified teach-in standard block is invalid.
Remedy	Specify the valid and existing traversing block.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

183 **Teach-in block not found**

Cause	The specified teach-in block is not found.
Remedy	Select the valid and existing traversing block. Activate ”Automatically search for block numer” function.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

184 Teach-in standard block not found

Cause	The specified teach-in standard block is not found.
Remedy	Generate the required standard block for the specified block number Enter the correct block number.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP IV

185 Positioning mode invalid

Cause	For the ”Spindle positioning” function, the positioning mode (P0087) is not valid.
Remedy	Program traversing block positioning as absolute, absolute positive or absolute negative.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

186 Spindle cannot be referenced, supplementary info \%d

Cause

For the ”Spindle positioning” function, an error has occurred while positioning.

Supplementary info	Significance
0	The distance between the last two zero marks was not correct.
1	For two revolutions a zero mark was no longer detected, which was in a tolerance bandwidth of P0126.

Remedy	Check cable and connections.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

187 **Conversion factor spindle pos. cannot be represented, supplementary info \%d**

Cause

Conversion factors for spindle positioning was not able to be intialized
Supplementary info, ones and tens position:
00: Conversion factor, velocity to speed too small
01: Conversion factor, velocity to speed too high
02: Conversion factor, adaptation filter too low (–> increase P0210)
03: Conversion factor, adaptation filter too high (–> reduce P0210)
04: Conversion factor, pre-control balancing filter too low (–> increase P0206)
05: Conversion factor, pre-control balancing filter too high (–> reduce P0206)
06: Conversion factor, sum delay too small
07: Conversion factor, sum delay too large
08: Conversion factor, following error model too small
09: Conversion factor, following error model too large
The hundreds position of the supplementary info contains the parmeter set involved.

Remedy

Check and correct specified parameters.

Acknowledgement

RESET FAULT MEMORY

Stop response

STOP II

188 **Spindle positioning: P\%d illegal**

Cause

Spindle positioning requires the following parameteriation:
P0241 = 1
P0100 = 3

Remedy

Correct the specified parameter or cancel spindle positioning by setting P0125 to 0.

Acknowledgement

RESET FAULT MEMORY

Stop response

STOP II

189 **Jogging, incremental invalid**

Cause

1. Jogging incremental is not valid in this mode.
2. An attempt was made to move an axis away from a software limit switch using incremental jogging – however the axis is not at the software limit switch, but behind it.
3. An attempt was made while executing one or several traversing blocks (also via an axis coupling) to activate incremental jogging.

Remedy

1. Commission the drive in the positioning mode.
2. Move back with jog key 1 or 2 with velocity.
3. Interrupt traversing blocks with the operating condition, reject traversing task.

Acknowledgement

RESET FAULT MEMORY

Stop response

STOP VI

190	**Actual firmware does not support spindle positioning**
Cause	This firmware does not support the spindle positioning function.
Remedy	Set parameter P0125 to 0
Acknowledgement	POWER ON
Stop response	STOP II
191	**Zero mark setting unsuccessful**
Cause	It is not possible to set the internal zero mark, if 1st input signal ”Spindle positioning on” is set, or 2. Still no zero mark found.
Remedy	Maintain the following sequence: 1. Execute spindle positioning —> zero mark found 2. Withdraw input signal ”spindle positioning on” 3. Set the internal zero mark (P0127=1).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II
192	**Max. search velocity too high**
Cause	The maximum search velocity for spindle positioning is greater than the maximum motor speed.
Remedy	Reduce parameter P0133 or reduce the velocity in the traversing block.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II
193	**Zero mark not found**
Cause	The zero mark (encoder or equivalent zero mark, e.g. BERO) was not found. Gearbox ratio (mechanical system) was not correctly parameterized using parameter P0237/P0238.
Remedy	– Check the equivalent zero mark (BERO) function, if required, replace the BERO – Readjust the clearance when using BERO – Check the cabling – Correctly parameterize the gearbox ratio (mechanical system) using parameter P0237/P0238
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II
194	**Spindle positioning is only possible with motor 1**
Cause	Spindle positioning is only possible with motor 1.
Remedy	Activate motor data set 1 before the spindle positioning command.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

195 Speed pre-control not permissible

Cause	Speed pre-control is not permissible with spindle positioning.
Remedy	Cancel the speed pre-control (P0203)
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

196 Illegal combination of input signals (warning \%u)

Cause	An illegal combination of signals is present at the inputs, at the Profibus control words or at the appropriate bus signals. The detailed cause of the error can be taken from the help text associated with the warning that is entered as supplementary information. This fault can be activated or suppressed using Parameter P338. Supplementary information: Warning number
Remedy	Change the input signals or suppress the fault using P338.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

501 Measuring circuit error, absolute current

Cause	1. The smoothed absolute current (P1254, current monitoring time constant) is greater than 120 % of the permissible power section current (P1107). 2. For an active rotor position identification, the permissible current threshold was exceeded. 3. The P gain of the controller (P1120) has been set too high.
Remedy	– Motor/controller data not correct – For active rotor position identification P1019 (current, rotor position identification) check and if required reduce – Reduce the P gain of current controller (P1120), check the current controller adaptation (P1180, P1181, P1182) – Replace control module – Replace the power section
Acknowledgement	POWER ON
Stop response	parameterizable

504 Measuring circuit error, motor measuring system

Cause
The encoder signal level is too low, faulted (incorrect shielding), or the cable breakage monitoring function has responded.

Remedy
– Use the original Siemens pre-assembled encoder cables (better screening)
– Check for sporadic interruptions (loose contact, e.g. when the drag cable is being moved)
– For toothed-wheel encoders, check the clearance between the toothed wheel and sensor
– Check the encoder, encoder cables and connectors between the motor and control module
– Check the screen connection at the front panel of the control module (top screw)
– Replace the encoder cables or the control module
– Exchange the encoder or motor

Acknowledgement
POWER ON

Stop response
parameterizable

505 Meas.circ.error motor meas.syst.abs.track

Cause
1. The motor absolute track (CD track) is monitored for an interrupted conductor. For optical encoders, the absolute track supports the evaluation of the mechanical position within one motor revolution.
2. For absolute encoders with EnDat interface, this fault displays an initialization error.
Note:
Additional information on the reason for the fault is included in P1023 (IM diagnostics).

Remedy
– Incorrect encoder cable type
– Check for sporadic interruptions (loose contact, e.g. when the drag cable is being moved)
– Remove noise which is coupled in due to inadequate screening of the cable by replacing the encoder cable
– Incorrect encoder type configured (e.g. ERN instead of EQN)
– Check the encoder, encoder cables and connectors between the motor and control module
– Replace control module
– Replace encoder

Acknowledgement
POWER ON

Stop response
parameterizable

507 Synchronization error rotor position

Cause	The difference between the actual rotor position and the new rotor position, which was determined by fine synchronization is greater than 45 degrees electrical. When commissioning a linear motor with rotor position identification (e.g. linear motor, 1FE1 motor), the fine synchronization was not adjusted.
Remedy	– Adjust the fine synchronization using P1017 (commissioning help function) – Check encoder cable, encoder cable connection and grounding (possibly EMC problems) – Check the shield contact, front panel, control module (upper screw) – Replace control module – Exchange the encoder or motor
Acknowledgement	POWER ON
Stop response	parameterizable

508 Zero mark monitoring, motor measuring system

Cause	The measured rotor position fluctuates between 2 encoder zero marks (encoder lines may have been lost). Note: The encoder monitoring function can be disabled using P1600.8.
Remedy	– Use the original Siemens pre-assembled encoder cables (better screening) – Check for sporadic interruptions (loose contact, e.g. due to cable drag movements) – For toothed-wheel encoders, check the clearance between the toothed wheel and sensor – Check the encoder, encoder cables and connectors between the motor and control module – Check the shield contact, front panel, control module (upper screw) – Replace the encoder cables or the control module – Replace control module – Exchange the encoder or motor
Acknowledgement	POWER ON
Stop response	parameterizable

509 Drive converter limiting frequency exceeded

Cause	The speed actual value has exceeded the maximum permissible value.
Remedy	– Encoder pulse number is too low, enter the actual encoder pulse number in P1005 – Stop the belt slipping in open-loop torque controlled mode (the belt slips) – Check P1400 (rated motor speed) – Check P1146 (maximum motor speed) – Check P1147 (speed limiting) – Check P1112 (motor pole pair number) – Check P1134 (rated motor frequency)
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

512 Measuring circuit error, direct measuring system

Cause	The encoder signal level is too low, faulted (incorrect shielding), or the cable breakage monitoring function has responded.
Remedy	– Use the original Siemens pre-assembled encoder cables (better screening) – Check for sporadic interruptions (loose contact, e.g. due to cable drag movements) – For toothed-wheel encoders, check the clearance between the toothed wheel and sensor – Check the encoder, encoder cables and connectors between the encoder and control module – Check the shield contact, front panel, control module (upper screw) – Replace the encoder cables or the control module – Replace encoder
Acknowledgement	POWER ON
Stop response	parameterizable

513 Measuring circuit error, direct measuring system absolute track

Cause
For absolute encoders with EnDat interface, this fault indicates an initialization error.
Note:
Additional information on the reason for the fault is included in P1033 (DM diagnostics).

Remedy
– Incorrect encoder cable type
– Check for sporadic interruptions (loose contact, e.g. when the drag cable is being moved)
– Remove noise which is coupled in due to inadequate screening of the cable by replacing the encoder cable
– Incorrect encoder type configured (e.g. ERN instead of EQN)
– Check the encoder, encoder cables and connectors between the encoder and control module
– Replace control module
– Replace encoder

Acknowledgement POWER ON

Stop response parameterizable

514 Zero mark monitoring, direct measuring system

Cause
A fluctuation in the measured values has occurred between 2 encoder zero marks (encoder pulses may have been lost).
Note:
The encoder monitoring can be disabled using P1600.14.

Remedy
– Use the original Siemens pre-assembled encoder cables (better screening)
– Check for sporadic interruptions (loose contact, e.g. due to cable drag movements)
– For toothed-wheel encoders, check the clearance between the toothed wheel and sensor
– Check the encoder, encoder cables and connectors between the motor and control module
– Check the shield contact, front panel, control module (upper screw)
– Replace the encoder cables or the control module
– Replace encoder

Acknowledgement POWER ON

Stop response parameterizable

515 Power module temperature, exceeded

Cause	The power section temperature is sensed using a temperature sensor on the heatsink. The drive is immediately shut down 20 seconds after the heatsink temperature alarm in order to prevent the power section being thermally destroyed (regenerative stop).
Remedy	Improve the drive module cooling, e.g. using: – Higher airflow in the switching cabinet, possibly cool the ambient air of the drive modules – Avoid many acceleration and braking operations which follow quickly one after the other – Check that the power section for the axis/spindle is adequate, otherwise use a higher-rating module – Ambient temperature too high (refer to the Configuration Manual) – Permissible installation altitude exceeded (refer to the Configuration Manual) – Pulse frequency too high (refer to the Configuration Manual) – Check fan, if required, replace – Maintain the minimum clearance above and below the power section (refer to the Configuration Manual)
Acknowledgement	POWER ON
Stop response	parameterizable

591 Pos.contr.clock cycle not equal to DP clock cycle/master applic. clock cycle

Cause	For a 2-axis module, one axis is in the n-set mode and one axis in the positioning mode. For the axis in the n-set mode, a position controller clock cycle (of the master) is entered via the clock-cycle synchronous Profibus or the bus interface. This position controller clock cycle differs from the parameterized position controller clock cycle (P1009) of the axis in the positioning mode. The position controller clock cycle of the master is obtained, in the n-set mode, from the DP clock cycle (Tdp) or the clock cycle of the bus interface multiplied by the time grid Tmapc.
Remedy	For a clock cycle synchronous PROFIBUS (isochronous) or the bus interface, the clock cycles configured for the bus (parameterization) are aligned with the position controller clock cycle P1009 from the positioning axis and n-set axis.
Acknowledgement	POWER ON
Stop response	STOP II

592 Spindle positioning: Pos. contr. not equal to master application clock cycle

Cause
The function ”spindle positioning” requires, for a clock-cycle synchronous PROFIBUS or the bus interface, that the position controller clock cycle of the master matches the parameterized position controller clock cycle (P1009). The position controller clock cycle of the master is obtained from the DP clock cycle (Tdp) multiplied by the time grid Tmapc.

Remedy
For the clock-cycle synchronous PROFIBUS or the bus interface, the clock cycles configured for the bus (parameterization) are aligned with the position controller clock cycle P1009.

Acknowledgement
POWER ON

Stop response
STOP II

593 Fieldbus: Drive is not in synchronism. Supplementary info: \%X

Cause
Supplementary information
0x01:
The master sign-of-life has more consecutive failures than permitted. The permissible sign-of-life errors are specified using P0879 bits 2–0 (configuration).
0x02:
The Global Control telegram to synchronize the clock cycles has failed in operation for several consecutive DP clock cycles or in several DP clock cycles has violated the time grid specified using the parameterizing telegram (refer to times Tdp and Tpllw). If the complete DP communications permanently fails, at the latest after the response monitoring times specified when configuring the bus, fault 595 is also output.

Remedy
– Check whether communications is briefly or continuously interrupted.
– Check whether the BUS master can operate in clock cycle synchronism and outputs the global control telegrams, necessary for clock cycle synchronous operation, in the equidistant DP clock cycle.
– Check whether clock synchronism has been activated in the bus configuration, although it is not controlled by the master used.
– Check whether the master sign-of-life is received and incremented in the parameterized clock cycle.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II

7

595	**Fieldbus: Cyclic data transfer was interrupted**
Cause	The cyclic data transfer between the master and slave was interrupted due to the fact that cyclic frames were missing, or due to the reception of a parameterizing or configuring frame. Examples: – Bus connection interrupted – Master runs up again – Master has changed into the ’Clear’ state For a passive axis, fault cannot be acknowledged using ”RESET FAULT MEMORY”.
Remedy	Check the master and bus connection to the master. As soon as cyclic data transfer runs again, the fault can be acknowledged. Set P0875 to 0 in the passive axis.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II
596	**PROFIBUS: Connection to the publisher \%u interrupted**
Cause	Cyclic data transfer between this slave and a slave-to-slave communications publisher was interrupted as cyclic telegrams were missing. Examples: – Bus connection interrupted – Publisher failure – Master runs up again – The response monitoring (Watchdog) for this slave was de-activated via the parameterizing telegram (SetPrm) (Diagnostics: P1783:1 bit 3 = 0). Supplementary info: PROFIBUS address of the publisher
Remedy	Check the publisher and bus connections to the publisher, to the master and between the master and publisher. If the watchdog is deactivated, activate the response monitoring for this slave via Drive ES. As soon as cyclic data transfer runs again, the fault can be acknowledged.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

597 PROFIBUS: Drive not in synchronism. Supplementary information: \%X

Cause	Supplementary information 0x01: The master sign-of-life (STW2, bits 12–15) has more consecutive failures than permitted. The permissible sign-of-life error is specified using P0879 bit 2–0 (PROFIBUS configuration). 0x02: The Global Control Telegram to synchronize the clock cycles in operation has consecutively failed over several consecutive DP clock cycles, or has violated the time grid, specified by the parameterizing telegram (refer to times Tdp and Tpllw) over several consecutive DP clock cycles. If the complete DP communications continuously fails, in addition, fault 599 is output, at the latest after the watchdog monitoring time specified when the bus was configured.
Remedy	– Check whether communications is briefly or continuously interrupted. – Check whether the PROFIBUS master can operate in clock cycle synchronism and the Global Control Telegrams, required for clock cycle synchronous operation, are output in the equidistant DP clock cycle. – Check whether clock synchronism has been activated in the bus configuration, although it is not controlled by the master used. – Check whether the master sign-of-life (STW2, bits 12–15) is received and is incremented in the parameterized clock cycle.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II

7

598 PROFIBUS: Synchronization error. Supplementary info: \%X

Cause

Supplementary information
0x01:
The expected 1st global control clock cycle display did not occur within the waiting time.
0x02:
PLL synchronization unsuccessful
0x03:
When synchronizing to the clock cycle, the global control clock cycle had more consecutive failures than are permitted.
0x06:
The data frames w. the process data (setpoint direction) were only received after the time (To-125us) in the slave has expired.

Remedy

– Check whether the PROFIBUS master can operate in synchronism with the clock cycle, and that the necessary global-control frames are output for operation in synchronism with the clock cycle.
– Check whether clock synchronism has been activated in the bus configuration, although it is not controlled by the master used.
– Check whether the equidistant DP clock cycle, transferred with the parameterizing telegram, was actually set and activated at the master.
– Check whether the time Tdx, defined in the master software, corresponds to the actual data transfer time to all of the slaves and is less than the configured time (To-125us).

Acknowledgement RESET FAULT MEMORY

Stop response STOP II

599 PROFIBUS: Cyclic data transfer was interrupted

Cause

The cyclic data transfer between the master and slave was interrupted due to the fact that cyclic frames were missing, or due to the reception of a parameterizing or configuring frame.
Examples:
– Bus connection interrupted
– Master runs up again
– Master has changed into the ’Clear’ state
For a passive axis, fault cannot be acknowledged using ”RESET FAULT MEMORY”.

Remedy

Check the master and bus connection to the master. As soon as cyclic data transfer runs again, the fault can be acknowledged.
Set P0875 to 0 in the passive axis.

Acknowledgement RESET FAULT MEMORY

Stop response STOP II

601 Error in AD conversion, terminal 56/14 or 24/20

Cause	A timing error was identified when reading-out the A/D converter for terminal 56.x/14.x or 24.x/20.x. The read values are probably incorrect/faulty.
Remedy	Replace closed-loop control module
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

602 Open-loop torque controlled oper. w/o encoder is not perm.

Cause	In the IM mode, open-loop torque controlled operation was selected via an input terminal or via PROFIBUS-DP or the bus interface.
Remedy	Deselect the torque-controlled operation or leave the IM mode (changeover speed P1465).
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

603 Changeover to non-parameterized motor data set

Cause	An attempt was made to change over to a motor data set which was not parameterized.
Remedy	Parameterizing motor data set
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

604 Motor encoder is not adjusted

Cause	For an EnDat motor measuring system, it was identified that the serial number does not match that saved, i.e. the encoder has still not run with this drive.
Remedy	1FN3 linear motors (if P1075=1): Measure the rotor position offset to the EMF of the U_R phase and add to P1016 as the commutation angle offset. Then set P1017 to –1 in order to save the serial number of the EnDat encoder. otherwise: To determine commutation angle offset in P1016, initiate the rotor position identification routine via P1017=1. The rotor position identification routine is executed by acknowledging the fault and setting the enable signals. Note: also refer to description of P1017
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

7

605	**Position controller output limited**
Cause	The speed setpoint requested from the position controller lies above the max. motor speed. Possible causes: – Programmed velocity (P0082:64) too high – Max. acceleration (P0103) or deceleration (P0104) too high – Axis is overloaded or blocked
Remedy	– Check and correct the above parameter
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable
606	**Flux controller output limited**
Cause	The specified flux setpoint cannot be realized, although maximum current is input. – Motor data are incorrect – Motor data and motor connection type (star/delta) do not match – Motor has stalled because motor data are extremely inaccurate – Current limit is too low for the motor (0.9 * P1238 * P1103 < P1136) – Power section is too small
Remedy	– Correct the motor data – If required use a larger power section
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable
607	**Current controller output limited**
Cause	The entered setpoint cannot be impressed in the motor, although the maximum voltage has been entered. The cause could be that the motor is not connected, or a phase is missing.
Remedy	– Check the connecting cable, motor/drive converter (phase missing) – Check the motor contactor – DC link voltage present? – Check the DC link busbar (check that the screws are tight) – Use monitoring function in the power section has responded (RESET by powering off/powering on) – Replace the power section or control module
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable
608	**Speed controller output limited**
Cause	The speed controller is at its limit for an inadmissibly long time (torque or current limit). The permissible time is defined in P1605, the upper speed limit when the monitoring responds, in P1606. Synchronous motor: In correct operation, the correctly optimized axis drive should never reach its current limit, not even with large speed changes (changing from rapid traverse in the positive direction to rapid traverse in the negative direction). P1605 = 200 ms

P1606 = 8000 rev/min
Induction motor:
Acceleration and braking with the maximum torque/current are usual in operation, only a stalled drive (0 speed) is monitored.
P1605 = 200 ms
P1606 = 30 rev/min
1. At the first commissioning, after the software has been replaced or the software has been upgraded, after the parameters have been entered the ”calculate motor data” or ”calculate controller data” function was not executed. The drive then keeps the default values (for the values to be calculated this is zero) which can, under certain circumstances, result in this fault (P1605 and P1606 should be adapted to the mechanical and dynamic capabilities of the axis).
2. An undesirable input of a high torque reduction via the analog inputs or via PROFIBUS and the bus interface. For PROFIBUS and the bus interface, this effect especially occurs when changing from the positioning mode to the speed setpoint input mode (check as to whether a torque reduction is entered. Diagnostics using P1717, 0%: No torque, 100%: Full torque).

Remedy

– Check connecting cable motor/converter (phase missing, exchanged)
– Check the motor contactor
– Check the torque reduction (P1717)
– DC link voltage present?
– Check the DC link voltage (check that the screws are tight)
– Unblock the motor
– Is the motor encoder connected?
– Check the motor encoder cable screen
– Is the motor grounded (PE connection)?
– Check the encoder pulse number (P1005)
– Does the encoder cable fit to the encoder type?
– Check the direction of rotation of the encoder tracks (e.g. toothed-wheel encoder, P1011)

Adapt parameters P1605 and P1606 to the mechanical and dynamic capabilities of the axis. Check whether a torque reduction has been entered (diagnostics via P1717, 0%: no torque, 100%: full torque).
For linear motors:
– Check actual value inversion
– Check the reduction in the maximum motor current (P1105) and if required increase the value
– Check the power cable connection
– For the parallel circuit configuration, are the motors correctly assigned and electrically connected?
– Use monitoring function in the power section has responded (RESET by powering off/powering on)
– Replace the power section or control module

Acknowledgement

RESET FAULT MEMORY

Stop response

parameterizable

7

609 Encoder limit frequency exceeded

Cause	The speed actual value exceeds the encoder frequency. – Incorrect encoder – P1005 does not correspond to the no. of encoder pulses – Encoder defective – Motor cable defective or not properly attached – Shield on motor encoder cable is not connected – Defective control module
Remedy	– Enter correct encoder data/replace encoder – Check the encoder pulse number (P1005) – Attach motor cable correctly or replace – Connect the motor encoder cable screen – Reduce the speed setpoint input (P1401) – Replace control module
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

610 Rotor position identification has failed

Cause

if P1075=1 (technique based on saturation)
A rotor position could not be determined from the measurement signals (motor current), as no significant saturation effects occurred.
Also refer to parameter P1734 for detailed diagnostics.
if P1075=3 (motion-based technique)
1. Current increase too low.
2. Maximum permissible duration exceeded.
3. No clear rotor position found.

Remedy

if P1075=1
– Increase current via P1019
– Check armature inductance (P1116) and if required, increase
– Check the connecting cable, motor/drive converter (phase missing)
– Check the motor contactor
– DC link voltage present?
– Check the DC link busbar (check that the screws are tight)
– Use monitoring function in the power section has responded (RESET by powering off/powering on)
– Replace the power section or control module
if P1075=3
To 1.
– The motor is not correctly connected
– The motor power connection must be checked
To 2.
– Remove disturbing external forces (e.g. axis couplings which are not released)
– Identification technique must remain stable (P1076 must be reduced)
– Use an encoder with higher resolution
– Improve the encoder mounting (it is not stiff enough)
To 3.
– Remove disturbing external forces (e.g. axis couplings which are not released)
– The axis must be able to freely move (e.g. the motor rotor may not be locked)
– Reduce the high axis friction (increase P1019)

Acknowledgement

RESET FAULT MEMORY

Stop response

parameterizable

611 Illegal motion during rotor position identification

Cause
During the rotor position identification (motor current measurement), the motor rotated more than the value entered in P1020. The rotation could be caused by having powered on with the motor already rotating, or caused by the identification routine itself.

Remedy
if P1075=1
– If the interchange was caused by the identification itself and if the error occurs again, then reduce P1019 or increase P1020.
– Lock the motor rotor during the identification routine.
if P1075=3
– Increase the parameterized load mass (P1076)
– Check the maximum permissible motion (P1020) and if required, increase
– Reduce the current, rotor position identification (P1019)
If the current and speed controller clock cycle have low values (62.5 microseconds), then it maybe necessary to increase P1019.

Acknowledgement
RESET FAULT MEMORY

Stop response
parameterizable

612 Illegal current during rotor position identification

Cause
1. Current was >= 1.2 * 1.05 * P1107 while rotor position identification was active
2. Current was >= P1104 while rotor position identification was active

Remedy
With the rotor position identification (P1011.12 and P1011.13) activated, if required, check and reduce P1019 (current, rotor position identification)

Acknowledgement
RESET FAULT MEMORY

Stop response
parameterizable

613 Shutdown limit, motor overtemperature (P1607) exceeded

Cause
The motor temperature (sensed via the temperature sensor KTY 84 and fed to the module via the motor encoder cable) has exceeded the temperature limit in P1607.

Remedy
– Avoid many acceleration and braking operations which follow one another quickly.
– Motor overload?
– Check whether the motor output is sufficient for the drive, otherwise use a more powerful motor, possibly together with a higher-rating power section.
– Check the motor data. The current could be too high due to incorrect motor data.
– Check the temperature sensor.
– Check the motor fan.
– Check the motor encoder cable.
– Motor encoder defective?
– Check and possibly reduce P1230 or P1235.
The motor temperature monitoring can be disabled with
P1601 bit 13 = 1.
For linear motors:
– Check the parameters for the motor temperature monitoring
P1602 (alarm threshold, motor overtemperature) = 120 degrees C
P1603 (timer, motor temperature alarm) = 240 s
P1607 (shutdown limit, motor temperature) = 155 degrees C
P1608 (fixed temperature) = 0 degrees C
P1608 = 0 —> Temperature sensing active
P1608 > 0 —> Fixed temperature active
– If the temperature monitoring is exclusively realized using an external PLC, a fixed temperature must be entered into P1608 (e. g. 80 degrees C). This disables the drive temperature monitoring.
– Check the power connector at the motor
– Check the connection of the temperature sensor coupling cable at the end of the power cable; approximately 580 ohm must be measured at 20 degrees C
– With the measuring system connectors withdrawn (X411), are approximately 580 ohm measured between PIN 13 and PIN 25 of the encoder cable at 20 degrees C?
– Check that the measuring system connector is correctly located at the drive (X411)
– Only KTY may be connected for drives connected in parallel
– If the temperature switch and temperature sensor are connected in series, the temperature sensor (NC contact) may have responded, or the temperature switch is defective

Acknowledgement
RESET FAULT MEMORY

Stop response
parameterizable

7

614 Delayed shutdown for motor overtemperature (P1602/P1603)

Cause

The motor temperature (sensed via the temperature sensor KTY 84 and fed to the module via the motor encoder cable) has exceeded the temperature in P1602 for a time longer than in P1603.

Remedy

– Avoid many acceleration and braking operations which follow one another quickly.
– Motor overload?
– Check whether the motor output is sufficient for the drive, otherwise use a more powerful motor, possibly together with a higher-rating power section.
– Check the motor data. The current could be too high due to incorrect motor data.
– Check the temperature sensor.
– Check the motor fan.
– Check the motor encoder cable.
– Motor encoder defective?
– Check and possibly reduce P1230 or P1235.

The motor temperature monitoring can be disabled
with P1601 bit 14 = 1.
For linear motors:
– Check the parameters for the motor temperature monitoring
P1602 (alarm threshold, motor overtemperature) = 120 degrees C
P1603 (timer, motor temperature alarm) = 240 s
P1607 (shutdown limit, motor temperature) = 155 degrees C
P1608 (fixed temperature) = 0 degrees C
P1608 = 0 temperature sensing active
P1608 > 0 fixed temperature active
– If the temperature monitoring is exclusively realized using an external PLC, a fixed temperature must be entered into P1608 (e. g. 80 degrees C). This disables the drive temperature monitoring.
– Check the power connector at the motor
– Check the connection of the temperature sensor coupling cable at the end of the power cable; approximately 580 ohm must be measured at 20 degrees C
– With the measuring system connectors withdrawn (X411), are approximately 580 ohm measured between PIN 13 and PIN 25 of the encoder cable at 20 degrees C?
– Check that the measuring system connector is correctly located at the drive (X411)
– Only KTY may be connected for drives connected in parallel
– If the temperature switch and temperature sensor are connected in series, the temperature sensor (NC contact) may have responded, or the temperature switch is defective

Acknowledgement: RESET FAULT MEMORY

Stop response: parameterizable

615 DM encoder limiting frequency exceeded

Cause	The speed actual value of the direct measuring system exceeds the permissible encoder limiting frequency. – Incorrect encoder – P1007 does not coincide with the encoder pulse number – Encoder defective – Defective encoder cable or not correctly retained – Encoder cable shield is not connected – Defective control module
Remedy	– Enter correct encoder data/replace encoder – Check encoder pulse number (P1007) – Correctly retain encoder cable/replace – Connect encoder cable shield – Reduce speed setpoint input – Replace control module
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

616 DC link undervoltage

Cause	The DC link voltage has exceeded the permissible lower limit P1162.
Remedy	– Check whether the line supply voltage is available – Check whether the pulsed resistor is overloaded
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

617 DC link overvoltage

Cause	The DC link voltage has exceeded the permissible upper limit P1163.
Remedy	– Check whether the line supply voltage is available – Reduce load duty cycle – Check P1163
Acknowledgement	RESET FAULT MEMORY
Stop response	parameterizable

680 Illegal motor code number

Cause	A motor code was entered in P1102 for which no data is available.
Remedy	Start-up again and enter the correct motor code number (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

681 Illegal power section code number

Cause
A power section code was entered in P1106, for which no data is available.

Remedy
– Enter the correct power module code into P1106.
– For power modules with automatic identification, upgrade firmware.

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

682 Illegal encoder code number in P\%u

Cause
An encoder code was entered in P1006 or P1036, for which there is no data.
The direct measuring system (P0250/P0879.12) is activated, although an encoder was not specified in P1036.

Remedy
Enter the correct encoder code or the code for third-party encoders (99) in P1006 or P1036.
De-activate direct measuring system (P0250/P0879.12).

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

683 Calculate controller data was unsuccessful at first start-up (\%d)

Cause
An error occurred at the first start-up with ”calculate controller data”. Under fault conditions, the parameters for the current controller, flux controller and speed controller could not be optimally assigned.

Remedy
Read out the detailed error cause from P1080 and remove the cause. Then initiate ”calculate controller data” again with P1080 = 1. Repeat this operation, until no error is displayed in P1080. Then save in the FEPROM and execute a POWER ON-RESET.
Error coding in the supplementary info and P1080:
–15 magnetizing reactance (P1141) = 0
–16 leakage reactance (P1139/P1140) = 0
–17 rated motor frequency (P1134) = 0
–18 rotor resistance (P1138) = 0
–19 motor moment of inertia (P1117) = 0
–21 threshold speed for field weakening (P1142) = 0
–22 motor standstill current (P1118) = 0
–23 The ratio between the maximum motor current (P1104) and the motor stall current (P1118) is greater than the maximum value for the torque limit (P1230) and the power limit (P1235).
–24 The ratio between the rated motor frequency (P1134) and the rated motor speed (P1400) is inadmissible (pole pair number).

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

703 **Invalid current controller cycle**

Cause: An illegal value was entered in P1000.

Remedy: Enter a valid value in P1000.
Permissible values for P1000 are:
2 (62.5 μs) for single-axis positioning or for speed setpoint input
4 (125 μs) in each operating mode

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

704 **Invalid speed controller cycle**

Cause: An illegal value was entered in P1001.

Remedy: Enter a valid value in P1001.
Permissible values for P1001 are 2 (62.5 us), 4 (125us), 8 (250us), 16 (500us).
Setting 2 (62.5us) is only permissible for single-axis operation.
Further, P1001 must be >= P1000.

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

705 **Invalid position controller cycle**

Cause: The monitoring function identified a position controller cycle (P1009) outside the permissible limits.

Remedy: Enter a valid value in P1009.
Permissible values for P1009 lie between 32 (1 ms) and 128 (4ms).
Further, the position control cycle must be a integral multiple of the speed control cycle.

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

706 **Invalid interpolation cycle**

Cause: The monitoring has identified an interpolation cycle (P1010) outside the permissible limits, or an illegal ratio between the interpolation cycle and the position controller cycle (P1009).

Remedy: Enter a valid value in P1010 or correct P1009.
Permissible values for P1010 lie between 128 (4ms) and 640 (20ms) or, only for the 1-axis version, also 64 (2ms) if P1009 is also 64 (2ms).
Further, the interpolation cycle must be an integral multiple of the position controller cycle.

Acknowledgement: POWER ON

Stop response: STOP II (SRM, SLM) STOP I (ARM)

708 Axial deviations in current controller cycle

Cause	On a 2-axis module, the current controller cycle is different for both axes.
Remedy	Check P1000 and set the input values the same for both drives.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

709 Axial deviations in speed controller cycle

Cause	On a 2-axis module, the speed controller cycle is different for both axes.
Remedy	Check P1001 and set the input values the same for both drives.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

710 Axial deviations in position controller or interpolation cycle

Cause	For a 2-axis module, the position controller clock cycle (P1009) or the interpolation clock cycle (P1010) is different for the two axes.
Remedy	Check P1009/P1010 and set the input values for both drives the same.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

716 Invalid torque constant

Cause	The ratio between the rated torque and rated current (torque constant [Nm/A]) in P1113 is incorrect (less than/equal to zero) or the ratio P1113/P1112 is greater than 70.
Remedy	Enter the valid torque/current ratio for the motor used in P1113 or enter a permissible ratio of P1113/P1112. Third-party motor: The torque constant should be determined from the motor data sheet. Siemens motor: The torque constant is defined by the motor code (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

719 Motor not parameterized for delta operation

Cause	When the star-delta changeover is activated using P1013, the motor is not parameterized for delta operation (motor 2).
Remedy	Check and enter the parameters for delta operation (motor 2).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

720 Invalid maximum motor speed

Cause	Due to the high maximum motor speed in P1401 and the speed controller cycle in P1001, high partial speeds can occur which can result in a format overflow.
Remedy	Check and correct P1401 and P1001. The drive software is designed for large reserve margins, so that the displayed alarm can only occur as a result of a parameterizing error. Example: For a speed controller cycle time of 125 microseconds, a motor speed of 480 000 RPM can still be processed correctly!
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

721 Spindle speed too high

Cause	The modulo value can no longer be correctly calculated as a result of the high spindle speed and the interpolation clock cycle (P1010).
Remedy	Shorten the interpolation clock cycle. If possible, increase the modulo range of the rotary axis (P0242). Calculating the spindle speed limit [RPM] = 7 / IPO clock cycle[ms] x 60 x 1000 (for the modulo range, 360 degrees = 1 spindle revolution) Example: IPO clock cycle = 4ms, for max. 7 revolutions (up to 7 x modulo range) per IPO clock cycle a maximum spindle speed of 105000/min is obtained.
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

723 Axial deviations in STS configuration

Cause	On a 2-axis module, the gating unit configuration (P1003) is different for the two gating units.
Remedy	Check P1003 and set the bits for the two module axes the same (do not change the standard setting, this represents the optimum configuration).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

7

724	**Invalid motor pole pair number**
Cause	Synchronous motors: – The pole pair number in P1112 is zero or negative. – Encoder with CD track (P1027.6 = 0): The pole pair number in P1112 is greater than 6. – Encoder without CD track or with Hall sensors (P1027.6 = 1): The motor pole pair number is dependent on the encoder pulse number (max. 4096 for P1005 >= 32768). Induction motors: – An invalid pole pair number was determined from P1134 and P1400. Motor with resolver: – The maximum motor pole pair number for the modules 6SN1118–*NK01–0AA0 or 6SN1118–*NJ01–0AA0 is 64, otherwise 4 or 6.
Remedy	Synchronous motors: – Check P1112, P1027 and P1014. Induction motors: – Determine and correctly enter rated speed and/or rated frequency.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
725	**Invalid encoder pulse number**
Cause	The encoder pulse number of the motor measuring system (P1005) is set to zero.
Remedy	Harmonize the encoder pulse number of the motor measuring system in P1005 to the encoder used. The indirect motor measuring system must always be configured for synchronous and induction motors (exception: Induction motor operation). Standard setting: 2 048 increments/revolution
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
726	**Invalid voltage constant**
Cause	The voltage constant of the motor in P1114 is set to zero.
Remedy	Determine the voltage constant of the motor used, and enter in P1114. The voltage constant is measured as induced voltage (EMF) under no-load conditions at n = 1 000 RPM as RMS valued at the motor terminals (phase to phase). Third-party motor: The voltage constant should be determined from a motor data sheet. Siemens motor: The voltage constant is determined from the motor code (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

727 Invalid combination of power section and synchronous motor

Cause	The power module has not been released for synchronous motors.
Remedy	– Check configuring – Use a valid power section
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

728 Torque/current adaptation factor too high

Cause	The adaptation factor between the setpoint torque and the torque generating current (Iq) in the speed controller is too high.
Remedy	Check P1103, P1107 and P1113 and if required, enter correct values. Third-party motor: The values should be determined from a motor data sheet. Siemens motor: The values are determined from the motor code (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

729 Invalid motor stall current

Cause	The motor stall current (P1118) is less than or equal to zero.
Remedy	Determine the stall current of the motor used and enter in P1118. Third-party motor: The stall current should be determined from a motor data sheet. Siemens motor: The stall current is determined from the motor code (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

731 Invalid rated output

Cause	The rated motor output (P1130) of the motor is less than or equal to zero.
Remedy	Determine the rated motor output of the motor used and enter in P1130. Third-party motor: The rated motor output should be determined from a motor data sheet. Siemens motor: The rated motor output is determined from the motor code (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

732	**Invalid rated speed**
Cause	The rated motor speed (P1400) of the motor is less than or equal to zero.
Remedy	Determine the rated motor speed of the motor used and enter in P1400. Third-party motor: The rated motor speed should be determined from a motor data sheet. Siemens motor: The rated motor speed is determined from the motor code (P1102).
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
738	**Incorrect mode, analog input for the equalization controller**
Cause	If the equalization controller is parameterized with P1490 = 1 –> then P0612 must be parameterized with the value 3
Remedy	– P0612=3 or – P1490 not equal to 1
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
739	**Incorrect axis number, equalization controller**
Cause	If the equalization controller is parameterized with P1490 = 2 –> two active axes must be available on the module.
Remedy	– P1490 equal to 1 (coupling via analog terminals) or – Activate the 2nd axis or – Use a 2-axis module
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)
742	**V/f operation: Drive frequency, motor \%d not permissible**
Cause	In V/f operation, only drive converter frequencies of 4 or 8 kHz are permissible.
Remedy	Change P100 or cancel V/f operation (P1014). When operating with several motors/motor data sets, also set P2100/P3100/P4100 to 4 or 8 kHz.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

743 Function not possible with this control module

Cause ”

Remedy ”

Acknowledgement POWER ON

Stop response STOP II (SRM, SLM) STOP I (ARM)

744 Motor changeover only permissible for the closed-loop speed controlled mode

Cause Motor changeover (P1013) may only be activated in the closed-loop speed controlled mode (P0700 = 1).

Remedy
– Inhibit motor changeover (P1013 = 0)
– Change over into the closed-loop speed controlled mode (P0700 = 1)

Acknowledgement POWER ON

Stop response STOP I

749 Speed measuring range is not sufficient

Cause The maximum speed which can be achieved with speed feedback cannot be measured using the module.

Remedy
– Parameterize the encoder type corresponding to the type of motor and the control module.
– Synchronous motor: P1147 * resolver pole pair number must be less than the limiting frequency of the control module (12 bit: 25402 RPM; 14 bit: 6350 RPM).
Induction motor : min (P1146, P1465) * resolver pole pair number must be less than the limiting frequency of the control module (12 bit: 25402 RPM; 14 bit: 6350 RPM).

Acknowledgement POWER ON

Stop response STOP II (SRM, SLM) STOP I (ARM)

751 Speed controller gain too high

Cause P gain, speed controller for the lower speed range (P1407) and the upper speed range (1408) were selected to be too high.

Remedy Reduce the P gain of the speed controller.
Only optimized with the adaption disabled (P1413 = 0). The P gain (P1407) is then effective over the complete speed range. After the optimum setting has been found, adaption can be re-enabled (P1413 = 1) and the P gain optimized for the upper speed range (P1408).

Acknowledgement RESET FAULT MEMORY

Stop response STOP II (SRM, SLM) STOP I (ARM)

753 Current, rotor position identification less than the min. value

Cause
A current was parameterized in P1019 (current, rotor position identification) which is less than the minimum value permissible for the motor.

Remedy
Enter a current in P1019, which is not less than the permissible minimum value for the motor (40% for third-party synchronous linear motor). It may be necessary to use a larger power module.
If permissible for the motor used, suppress the fault by setting P1012, bit 5.
Caution:
For motors with weak saturation effects (e.g. 1FN3 linear motors), as a result of the low identification current, orientation may be erroneous, thus resulting in uncontrolled motion.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

756 Invalid speed hysteresis of the current setpoint smoothing

Cause
The hysteresis of the speed for the current setpoint smoothing (P1246) may not be greater than the threshold speed of the hysteresis (P1245), as otherwise a ”negative” lower speed would be obtained.

Remedy
P1246 (standard value: 50 [RPM]) must be entered lower than the threshold for the speeddependent setpoint smoothing (P1245, standard value: 4 000 [RPM]).

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

757 PZD config.: illegal frame no. in P0922

Cause
The frame number set in P0922 is illegal or impermissible for the operating mode currently selected via P0700.

Remedy
Check P0922 and enter valid value.

Acknowledgement
POWER ON

Stop response
STOP II

758 Setpoint source incorrectly parameterized. Supplementary info \%u

Cause
The selected setpoint source in P0891 is invalid.
1 Internal coupling not possible for POSMO or single-axis module
2 Internal coupling not possible for drive A
3 Coupling via PROFIBUS-DP or the bus interface selected, but the matching option module is not inserted

Remedy
Check P891 and enter a valid value.

Acknowledgement
POWER ON

Stop response
STOP II

759 Encoder/motor types do not match

Cause	A linear motor was selected, and no linear scale configured (P1027.4 = 0). A rotating motor was selected and a linear scale configured (P1027.4 = 1). A resolver has been selected the pole pair number (P1018) of which is illegal. A pole pair number =1 or the pole pair number of the motor (P1112) is admissible. The maximum speed (P1146) cannot be measured with the resolver. The required resolution (1011[2]=1 or 1030[2]=1, resolver evaluation) cannot be set using this module. For this setting, either 6SN1118–*NK01–0AA0 or 6SN1118–*NJ01–0AA0 is required.
Remedy	– Parameterize the encoder type corresponding to the type of motor and the control module. – Use the required (6SN1118–*NK01–0AA0 or 6SN1118–*NJ01–0AA0) control module.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

760 Pole pair width/scale graduations cannot be represented internally

Cause	For linear motors, the equivalent (internal) pole pair number and (internal) encoder pulse number are calculated from the pole pair width and grid division. In this case, the encoder pulse number must be an integer multiple of one or x pole pair widths. This error message is output if the pole pair width/grid division * x (up to x=4096) is not an integer multiple or if an internal encoder pulse number which was calculated is too high. A result with a tolerance of +/– 0.001 absolute is interpreted to be an integer.
Remedy	Long travel paths: A linear measuring system with an encoder mark number that is an integral divisor of x* pole pair widths should be used. Short travel paths: For short travel, only a low error can accumulate which has hardly any effect on the maximum achievable force and on the temperature rise, if the encoder pulse number fits with a deviation of more than +/–0.001 in the pole pair width. We then recommend that the pole pair width is slightly changed.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

7

761 P0892 cannot be used with this measuring system

Cause	The following settings are permitted (Order No.[MLFB] 6SN1118–....): Incremental measuring systems (7 bit) with sin/cos 1 Vpp without EnDat interface (..*NH00–0AA*, ..*NH10–0AA*) : 0 Incremental measuring systems (7 bits) with sin/cos 1 Vpp with EnDat interface (..*NH00–0AA*, ..*NH10–0AA*) : 0,1,2,3 Incremental measuring systems (11 bit) with sin/cos 1 Vpp (..*NH01–0AA*, ..*NH11–0AA*) : 0,1,2,3,4 resolver (12 bit) (..*NK00–0AA0 or ..*NJ00–0AA0) : 0,1,2,3 Resolver (12 bit) (..*NK01–0AA0 or ..*NJ01–0AA0) with 12-bit resolution (1011[2]=0 or 1030[2]=0) : 0,1,2,3,4,5 Resolver (14 bit) (..*NK01–0AA0 or ..*NJ01–0AA0) with 14 bit resolution (1011[2]=1 or 1030[2]=1) : –2,–1,0,1,2,3
Remedy	Set P0892 (factor, angular encoder pulse number/encoder pulse number) to a valid value.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

762 P0893 cannot be used with this measuring system

Cause	For incremental measuring systems with sin/cos 1 Vpp without EnDat interface and for linear measuring systems with sin/cos 1 Vpp with EnDat interface, a zero pulse offset cannot be set via P0893.
Remedy	Set P0893 (angular encoder zero pulse offset) to 0.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

764 Multiple assignment of terminal A or B (P0890)

Cause	When selecting 3 in P0890, from drive A or B (setpoint at terminal A and actual value at terminal B), it was identified, that terminal A or B were already being used by another drive. Thus, this configuration is not possible.
Remedy	Check the configuration of terminals A and B in P0890 and eliminate multiple assignments of both drives.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

765 P0890 and P0891 configure both setpoint inputs

Cause	An actual value coupling is switched in (P0891 = 1) for drive B. Simultaneously, for the same drive, terminal A or B is parameterized as position setpoint input (P0890 = 2 or 3).
Remedy	Check the configuration of terminals A and B in P0890, compare with P0891 and eliminate multiple setpoint sources.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

766 Blocking frequency > Shannon frequency

Cause	The bandstop frequency of a speed setpoint filter is greater than the Shannon sampling frequency from the sampling theorem.
Remedy	The bandstop frequency for P1514, filter 1 or P1517 for filter 2 must be less than the inverse value of two speed controller clock cycles 1/ (2 * P1001 * 31.23 microseconds).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

767 Natural frequency > Shannon frequency

Cause	The natural frequency of a speed setpoint filter is greater than the Shannon sampling frequency from the sampling theorem.
Remedy	The natural frequency of a speed setpoint filter must be lower than the reciprocal of two speed controller cycles. Speed setpoint filter 1: P1520 * 0.01 * P1514 < 1 / (2 * P1001 * 31.25 microseconds) Speed setpoint filter 2: P1521 * 0.01 * P1517 < 1 / (2 * P1001 * 31.25 microseconds)
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

768 Numerator bandwidth > twice the blocking frequency

Cause	The numerator bandwidth of a current or speed setpoint filter is greater than twice the bandstop frequency. This alarm is only generated for the general bandstop, if the following is valid: Speed setpoint filter 1: P1516 > 2 * P1514 or P1520 <> 100.0 Speed setpoint filter 2: P1519 > 0.0 or P1521 <> 100.0 Current setpoint filter 1: P1212 > 0.0 Current setpoint filter 2: P1215 > 0.0 Current setpoint filter 3: P1218 > 0.0 Current setpoint filter 4: P1221 > 0.0
Remedy	The numerator bandwidth must be less than twice the bandstop frequency. Current setpoint filter 1: P1212 <= 2 * P1210 Current setpoint filter 2: P1215 <= 2 * P1213 Current setpoint filter 3: P1218 <= 2 * P1216 Current setpoint filter 4: P1221 <= 2 * P1219 Speed setpoint filter 1: P1516 <= 2 * P1514 Speed setpoint filter 2: P1519 <= 2 * P1517
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

769 Denominator bandwidth > twice the natural frequency

Cause
The denominator bandwidth of a current or speed setpoint filter is greater than twice the natural frequency.
This alarm is only generated for the general bandstop, if the following is valid:
Speed setpoint filter 1: P1516 > 2 * P1514 or P1520 <> 100.0
Speed setpoint filter 2: P1519 > 0.0 or P1521 <> 100.0
Current setpoint filter 1: P1212 > 0.0
Current setpoint filter 2: P1215 > 0.0
Current setpoint filter 3: P1218 > 0.0
Current setpoint filter 4: P1221 > 0.0

Remedy
The denominator bandwidth of a current or speed setpoint filter must be less than twice the natural frequency.
Speed setpoint filter 1: P1515 <= 2 * P1514 * 0.01 * P1520
Speed setpoint filter 2: P1518 <= 2 * P1517 * 0.01 * P1521
Current setpoint filter 1: P1211 <= 2 * P1210
Current setpoint filter 2: P1214 <= 2 * P1213
Current setpoint filter 3: P1217 <= 2 * P1216
Current setpoint filter 4: P1220 <= 2 * P1219

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

770 Format error

Cause
The calculated bandstop filter coefficients cannot be represented in the internal format.

Remedy
Change filter setting.

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

771 Induction motor oper.: drive converter frequency motor \%d not permissible

Cause
In induction motor operation (selected by P1465 < P1146), drive converter frequencies of 4 or 8 kHz are permissible.

Remedy
– Change P1100
– Cancel induction motor operation (P1465 > P1146)

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

772 Induction motor oper.: speed controller gain, motor \%d too high

Cause
The P gain of the speed controller (P1451) is too high.

Remedy
For the speed controller, enter a lower value for the P gain (P1451).

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

773 Not permissible to active analog input

Cause	For this particular hardware version, it is not permissible to activate the analog input.
Remedy	– Set P0607 to 0 and P0612 to 0 or – Use the ”SIMODRIVE 611 universal” control module.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

774 Induction motor oper.: changeover speed motor \%d not permissible

Cause	For mixed operation (with/without encoder) P1465 > 0, only closed-loop controlled induction motor operation is permissible (P1466 <= P1465).
Remedy	Eliminate error by selecting pure induction motor operation (P1465 = 0) or by canceling induction motor open-loop controlled operation (P1465 > P1466).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

775 SSI encoder incorrectly parameterized. Supplementary info \%u

Cause	Incorrect parameterization of the SSI absolute value encoder. Supplementary info = 0x1, 0x11 (indirect, direct measuring system): —> The single-turn resolution cannot be 0. Supplementary info = 0x2, 0x12 (indirect, direct measuring system): —> The number of parameterized bits is greater than the telegram length. Supplementary info = 0x3, 0x13 (indirect, direct measuring system): —> For linear encoders, it is not possible to have multi-turn resolution.
Remedy	For supplementary info 1 or 11: Check P1022 and P1032 For supplementary info 2 or 12: Check P1021, P1022, P1027.12 and P1027.14 with respect to P1028 and check P1031, P1032, P1037.12 and P1037.14 with respect to P1041 For supplementary info 3 or 13: Check P1021 and P1031
Acknowledgement	POWER ON
Stop response	STOP I

776 TTL encoder not possible for older basic module

Cause	For an old basic module, which does not support TTL encoders, a TTL encoder was selected as motor measuring system.
Remedy	Use a new basic module or incremental measuring system with sin/cos 1 Vpp.
Acknowledgement	POWER ON
Stop response	STOP I

7

777 Current for the rotor position identification too high

Cause	A current was parameterized in P1019, which is greater than the current which is permissible for the motor and the power section used.
Remedy	Reduce the current via P1019.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

778 Impermissible converter frequency for rotor position ID

Cause	When selecting the rotor position identification (P1019), drive converter frequencies (P1100) of 4 or 8 kHz are permissible.
Remedy	Change the drive converter frequency or cancel the rotor position identification.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

779 Motor moment of inertia, motor \%d invalid

Cause	The motor moment of inertia (P1117) is incorrect (less than/equal to zero).
Remedy	Enter the valid motor moment of inertia for the motor used, in P1117. Third-party motor: The motor moment of inertia should be determined from a motor data sheet. Siemens motor: The characteristic motor data should be determined from the motor code (P1102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

780 No-load current, motor > rated motor current (motor \%d)

Cause	The motor no-load current (P1136) has been parameterized greater than the rated motor current (P1103).
Remedy	Enter the valid currents for the motor used in P1136 and P1103. Third-party motor: The required currents should be determined using a motor data sheet. Siemens motor: The currents are determined using the motor code (P1102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

781 No-load current, motor \%d > rated power section current

Cause
The motor no-load current (P1136) has been set to higher values than the rated power section current.
before SW 2.4 the following is valid: Rated power section current = P1111
from SW 2.4 the following is valid: Rated power section current = P1111 * P1099

Remedy
– Enter the valid current for the motor used in P1136.
Third-party motor:
The required currents should be determined using a motor data sheet.
Siemens motor:
The currents are determined using the motor code (P1102).
– Reduce the power section pulse frequency P1100.
– Use a higher-rating power section (re-commission).

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

782 Reactance motor \%d invalid

Cause
The stator leakage reactance (P1139) or the rotor leakage reactance (P1140) or the magnetizing reactance (P1141) of the motor is incorrect (less than/equal to zero).

Remedy
Determine the stator, rotor leakage reactance and magnetizing reactance of the motor used and enter in P1139, P1140 and P1141.
Third-party motor:
The values should be determined from a motor data sheet.
Siemens motor:
The values are determined from the motor code (P1102).

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

783 Rotor resistance, motor \%d invalid

Cause
The rotor resistance (P1138, cold) of the motor is zero or there was a format overflow for an internal conversion.

Remedy
The following parameters can have incorrect values:
P1001 (speed controller cycle)
P1134 (rated motor frequency)
P1138 (rotor resistance)
P1139 (leakage stator reactance)
P1140 (leakage rotor reactance)
P1141 (magnetizing field reactance)
Check the parameter, and if required, correct using the motor data sheet.
The following condition must be fulfilled:
16 * P1001 * 0.00003125 * P1138 * 2PI * P1134 / (P1140 + P1141) < 1

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

7

784	**No-load voltage, motor \%d invalid**
Cause	Error in no-load voltage P1135: – P1135 <= 0 or – P1135 > P1132 or – P1135 * P1142 / P1400 + Vser.react. > 450V. With Vser.react. = 0.181 * P1136 * P1142 * P1119
Remedy	Determine the no-load voltage of the installed motor and enter this in P1135. Third-party motor: The following parameters may have incorrect values: P1119 (inductance of the series reactor) P1132 (rated motor voltage) P1135 (no-load motor voltage) P1400 (rated motor speed) P1142 (threshold speed for field weakening) P1136 (no-load motor current) Check parameters and if required correct using a motor data sheet. Siemens motor: The no-load voltage is determined from the motor code (P1102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)
785	**No-load current, motor \%d invalid**
Cause	The no-load current (P1136) of the motor (ARM) is incorrect (less than/ equal to zero).
Remedy	Determine the no-load current of the motor used (ARM) and enter into P1136. Third-party motor: The no-load current should be determined from a motor data sheet. Siemens motor: The no-load current is determined from the motor code (P1102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)
786	**Field-weakening speed, motor \%d invalid**
Cause	The threshold speed for field weakening for induction motors (P1142) is incorrect (less than/equal to zero).
Remedy	Determine the threshold speed for field weakening for the motor used and enter in P1142. Third-party motor: The field weakening speed should be determined from a motor data sheet. Siemens motor: The field weakening speed is determined from the motor code (P1102).
Acknowledgement	RESET FAULT MEMORY
Stop response	STOP II (SRM, SLM) STOP I (ARM)

787 Induction motor oper.: feedforward control gain motor \%d cannot be displayed

Cause
The feedforward control gain for induction motors cannot be represented in the internal numerical format if the motor moment of inertia and rated motor torque were unfavorably selected.

Remedy
Operation without encoder:
Reduce the encoder pulse number (P1005), as this is used in the internal numerical format.
Operation with encoder:
Reduce the speed controller cycle (P1001).

Acknowledgement
RESET FAULT MEMORY

Stop response
STOP II (SRM, SLM) STOP I (ARM)

788 P0891 for drive B only

Cause
An actual-value link has been activated (P0891 = 1) for drive A. The hardware does not permit this setting.

Remedy
Set P0891 to 0 for drive A.

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

789 Setpoint transfer SimoCom U ==> drive interrupted

Cause
The setpoint transfer from SimoCom U to the drive was interrupted, i.e. there is no longer an online connection. The Master Control was returned to the drive.
Communication between the two communication partners was faulty. When traversing the drive via SimoCom U, other functions were executed on the PG/PC (e.g. open online help, open file), so that the drive can only be irregularly supplied from SimoCom U.

Remedy
– Check whether SimoCom U is still operating correctly, if required, re-start
– Check whether the communication connection is OK, if required, replace the connecting cable
– When in the online mode, do not select any time-intensive functions

Acknowledgement
POWER ON

Stop response
STOP II (SRM, SLM) STOP I (ARM)

790 Illegal operating mode. Supplementary info: \%u

Cause	The selected operating mode (P0700) is not permitted for this module or axis. Supplementary info = 0x1: Operating mode ==0 selected on the 1st axis Supplementary info = 0x2: ”Positioing” operating mode selected for the Nset control module Supplementary info = 0x3: Operating mode is not possible with this firmware release Supplementary info = ”External position reference value” operating mode no longer possible.
Remedy	For supplementary info 1: Select valid operating mode (P0700 > 0) For supplementary info 2: Select Nset operating mode or use a positioning module. For supplementary info 3: Use a firmware release which supports this operating mode. For supplementary info 4: Select ”Positioning” operating mode.
Acknowledgement	POWER ON
Stop response	STOP I

791 TTL encoder interface incorrectly parameterized

Cause	The TTL encoder interface may only be parameterized as follows for this particular hardware version: Drive A: P0890 = 0 or 4, 0: Interface inactive, 4: TTL encoder input Drive B: P0890 = 0
Remedy	Set P0890 to permissible value.
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

792 **Direct measuring system incorrectly parameterized. Supplementary info: \%u**

Cause
It is not permitted to parameterize the direct measuring system.
Supplementary info = 0x1:
A direct measuring system cannot be used using this board.
Supplementary info = 0x2:
The direct measuring system cannot be simultaneously operated with drive B.
Supplementary info = 0x3:
The direct measuring system is active and drive A is set for encoderless operation (P1027 bit 5 = 1).

Remedy
For supplementary info 1:
Use the required board.
For supplementary info 2:
– De-activate the direct measuring system for drive A (P0250/P0879.12 = 0)
or
– Switch drive B inactive (P0700 = 0)
For supplementary info 3:
– De-activate the direct measuring system for drive A (P0250/P0879.12 = 0)
or
– Commission the motor measuring system for drive A

Acknowledgement POWER ON

Stop response STOP I

793 **Angular encoder signal waveform different for drive A and B**

Cause
The input signal waveform for the angular encoder interface must be set the same for the drives.

Remedy Check P0894 for both drives and set the same

Acknowledgement POWER ON

Stop response STOP II (SRM, SLM) STOP I (ARM)

794 **P0890 = 3 not permitted for drive B**

Cause This angular encoder interface setting is not permitted for drive B.

Remedy Check P0890 for drive B and set to a permissible value

Acknowledgement POWER ON

Stop response STOP II (SRM, SLM) STOP I (ARM)

795 Ang. encoder, pos. ref. value normalization factor too large. Suppl. info: \%u

Cause	The position reference value normalization for the angular encoder interface is not permissible. Supplementary info = 1 —> Condition P0401 * P0895 < 8388608 violated = 2 —> Condition P0402 * P0896 < 8388608 violated
Remedy	Check parameterization via P0401, P0402, P0895 and P0896. It may be possible to achieve the conditions above by shortening the numerator P0401 * P0895 with the denominator P0402 * P0896.
Acknowledgement	POWER ON
Stop response	STOP II

797 Error in center frequency measurement

Cause	The speed was too high during the center frequency measurement (current calibration). The center frequency is measured automatically at run-up, or when the pulses are inhibited.
Remedy	Power up the drive converter if the motor runs at a reduced speed.
Acknowledgement	POWER ON
Stop response	STOP I

798 Measured value memory active

Cause	The measured-value memory was active during power-up.
Remedy	Run up again.
Acknowledgement	POWER ON
Stop response	STOP I

799 FEPROM backup and HW Reset required

Cause	Parameters were re-calculated. Parameters must be saved and the module run up again after this new calculation.
Remedy	The newly calculated data should be saved in the FEPROM. The new parameters become effective the next time that the module runs up!
Acknowledgement	POWER ON
Stop response	STOP II (SRM, SLM) STOP I (ARM)

800 Minus hardware limit switch

Cause	A 1/0 edge was identified at the ”Minus hardware limit switch” input signal.
Remedy	– In the pos mode: Return the drive to the traversing range using jog key 1 or 2. – In the n-set mode: Enter a setpoint that opposes the approach direction.
Acknowledgement	not required
Stop response	STOP VII

801	**Plus hardware limit switch**
Cause	A 1/0 edge was identified at the ”Plus hardware limit switch” input signal.
Remedy	– In the pos mode: Return the drive to the traversing range using jog key 1 or 2. – In the n-set mode: Enter a setpoint that opposes the approach direction.
Acknowledgement	not required
Stop response	STOP VII
802	**Drive rotates in response to angular encoder output parameters**
Cause	The drive was not stationary as the zero pulse offset was programmed on the angular encoder interface. Low speeds are not critical, but the inaccuracy of the zero pulse position increases in proportion to speed.
Remedy	Ensure that the drive is at a standstill, or take into account a higher inaccuracy of the zero pulse.
Acknowledgement	not required
Stop response	STOP VII
804	**Controller enable or on/off 1(edge) or on/off 2/3 missing**
Cause	When starting a traversing block, the controller enable has not been set, or the controller enable is missing during a traversing program when re-starting the axis from standstill. Controller enable missing, i.e. one of the following signals missing: – PROFIBUS control signals (STW1.0: ON/OFF 1 (signal edge), STW1.1: OC/OFF2, STW1.2: OC/OFF 3, STW1.3: Enable inverter/pulse inhibit) and the appropriate signals of the bus interface – PC enable (SimoCom U) – Terminal 64 – Terminal 65.x
Remedy	Set the missing signal, and re-start the traversing block or enter a signal edge via PROFIBUS.
Acknowledgement	not required
Stop response	STOP VII

7

805 **Pulse enable missing**

Cause	When starting a traversing block, the pulse enable is not set, or the pulse enable is missing during a traversing program when re-starting the axis from standstill. Pulse enable missing, i.e. one of the following signals missing: – PROFIBUS control signals (STW1.1: OC/OFF 2, STW1.3: Enable inverter/pulse inhibit) or the appropriate signals of the bus interface – Terminal 48 (NE module) – Terminal NS1/NS2 (NE module) – Terminal 63 (NE module) – Terminal 663 (control module)
Remedy	Set the missing enable signal and then re-start the traversing block.
Acknowledgement	not required
Stop response	STOP VII

806 **OC/reject traversing task missing**

Cause	When starting a traversing block, the ”operating condition/reject traversing task” input signal is not set.
Remedy	Set the ”operating condition/reject traversing task” input signal and then re-start the traversing block.
Acknowledgement	not required
Stop response	STOP VII

807 **OC/intermediate stop missing**

Cause	When starting a traversing block the ”operating condition/intermediate stop” input signal is not set.
Remedy	Set the ”operating condition/intermediate stop” input signal and then re-start the traversing block.
Acknowledgement	not required
Stop response	STOP VII

808 **Reference point not set**

Cause	When starting a traversing block, a reference point is not set.
Remedy	Execute referencing or set a reference point using the ”set reference point” input signal.
Acknowledgement	not required
Stop response	STOP VII

809 Parking axis selected

Cause
When starting a traversing block or when starting referencing, the ”parking axis” function is selected.

Remedy
Cancel the ”parking axis” function and then re-start the required function.

Acknowledgement
not required

Stop response
STOP VII

814 Motor temperature, pre-alarm

Cause
The motor temperature is sensed via a temperature sensor (KTY84) and evaluated on the drive side. This alarm is output if the motor temperature reaches the alarm threshold motor overtemperature (P1602).

Remedy
– Avoid many acceleration and braking operations which follow one another quickly.
– Check whether the motor output is sufficient for the drive, otherwise use a higher output motor, possibly in conjunction with a higher-rating power section.
– Check the motor data. The motor current could be too high due to incorrect motor data.
– Check the temperature sensor.
– Check the motor fan.

Acknowledgement
not required

Stop response
STOP VII

815 Power module temperature, pre-alarm

Cause
The heatsink temperature of the power section is sensed using a thermosensor on the main heatsink. If the overtemperature condition remains, then the drive shuts down after approx. 20 s.

Remedy
Improve the drive module cooling, e.g. using:
– Higher airflow in the switching cabinet, possibly cool the ambient air of the drive modules
– Avoid many acceleration and braking operations which follow quickly one after the other
– Check that the power section for the axis/spindle is adequate, otherwise use a higher-rating module
– Ambient temperature too high (refer to the Configuration Manual)
– Permissible installation altitude exceeded (refer to the Configuration Manual)
– Pulse frequency too high (refer to the Configuration Manual)
– Check fan, if required, replace
– Maintain the minimum clearance above and below the power section (refer to the Configuration Manual)

Acknowledgement
not required

Stop response
STOP VII

816 Resolver sensing at its limit

Cause	At run-up, the speed with an existing resolver evaluation was extremely high. It is possible that this was not the actual speed, and that the resolver was not connected to the measuring circuit input.
Remedy	Insert the measuring circuit connector and enter a reset.
Acknowledgement	not required
Stop response	STOP VII

820 Power module in i2t limiting

Cause	The power module is being operated too long above the permissible load limit.
Remedy	– Avoid many acceleration and braking operations which follow quickly one after the other – Check that the power section for the axis/spindle is adequate, otherwise use a higher-rating module – Pulse frequency too high (refer to the Configuration Manual) – Check P1260 and P1261
Acknowledgement	not required
Stop response	STOP VII

827 Fieldbus is not in the data exchange state

Cause	The bus interface is still not in the data exchange state or data exchange was interrupted. Causes: – The master has not yet run up, or has not yet established a connection to the slave. – The bus addresses differ in the master configuring and slave parameterization. – The bus connection has been physically interrupted. – The master is still in the clear condition. – An illegal parameterization or configuration was received. – A BUS address was assigned several times.
Remedy	Master, check the assignment of bus addresses and bus connection.
Acknowledgement	not required
Stop response	STOP VII

828 Fieldbus is not in clock-cycle synchronism to the master

Cause

The bus interface is in the data exchange state and was selected using the parameterizing telegram of the clock-cycle synchronous operation. It was not possible to synchronize to the clock cycle specified by the master and to the master sign of life.
Causes:
– The master does not send an equidistant global control frame although clock synchronism has been selected via the bus configuration.
– The master uses another equidistant DP clock cycle than was transferred to the slave in the parameterizing telegram.
– The master does not increment its sign-of-life in the configured time grid Tmapc.

Remedy

Check master application and bus configuration
Check the consistency between the clock cycle input for the slave configuring and the clock cycle setting at the master.
If the master (e.g. SIMATIC S7) does not transfer a sign-of-life, the sign-of-life evalution can also be suppressed using P0879 bit 8.

Acknowledgement

not required

Stop response

STOP VII

7

829 PROFIBUS: Illegal parameterization received. Reason: \%u

Cause

An illegal parameterizing frame was received via PROFIBUS. Cyclic data transfer cannot start.
Reasons:
8 = The parameterizing telegram has an illegal length
9 = The length data in the equidistant block is illegal
10 = A block header has an unknown ID.
11 = The basis time Tbasedp is not permissible (not equal to 125 us).
12 = The DP clock cycle Tdp is not permissible (less than 1ms or greater than 32ms).
13 = The time Tmapc is less than 1*Tdp or greater than 14*Tdp.
14 = The base time Tbaseio is not permissible (not equal to 125us).
15 = Time Ti is greater than the DP clock cycle (Tdp).
16 = Time To is greater than the DP clock cycle (Tdp).
17 = For active Data Exchange, a new parameterization was received with different contents.
18 = Clock cycle synchronous operation was selected without a suitable option module having been activated (refer to P0875).
19 = IsoM_Req (state 3, bit 4) is requested in the DPV1 header without there being an isochron block (ID 0x04).
20 = Fail_Safe (state 1, bit 6), IsoM_Req (state 3, bit 4) or Prm_Structure (state 3, bit3) missing in the DPV1 header although an isochron block (ID 0x04) is available.
21 = The time Tdx is greater than (To – 125us) or greater than (Tdp – 250us).
22 = The time Tpllw is greater than 1us.
23 = Slave-to-slave communication access target address and length do not conform to word boundary.
24 = Maximum number (3 external + 1 internal) of slave-to-slave communication links has been exceeded.
25 = Maximum number (8) of accesses per link has been exceeded.
26 = Unknown version ID in the slave-to-slave communications block.
27 = The maximum overall length of the filter table has been exceeded.
31 = The permitted maximum length of the parameterizing telegram for the option module has been exceeded.
32 = The option module firmware does not support slave-to-slave communications

Remedy

Check the bus configuration at the master, and if required correct the parameterization.
If required, insert (reason 18) a suitable option module and activate.
If required, (reason 31 or reason 32) upgrade the option module firmware to a version greater than or equal to 04.01.

Acknowledgement not required

Stop response STOP VII

830 PROFIBUS: Illegal configuration received. Reason: \%u

Cause

An illegal configuration frame was received via PROFIBUS. Cyclic data transfer cannot start.
Reasons:
1 = In the master, more axes are configured than are physically present in the power module.
2 = The number of the axes configured in the master is not equal to the number axes where the PROFIBUS DP option module is switched active via P0875. Note: Communications with axis B are not automatically de-activated even when switching axis B into a passive state.
3 = Configuration incomplete (too short) for one of the PPL types (only for vor P875 = 2).
4 = No PPO type detected (only for P875 = 2).
5 = Length calculation different between firmware and option module.
6 = For active data exchange, a new configuration was received with different length.
7 = Configuration contained unknown S7 ID.
19 = More PZD’s have been configured than the maximum permissible.
20 = The configurtion contains an unknown special character (only axis separators are permitted).
22 = Target offset of slave-to-slave communications access exceeds the maximum number of PZDs
28 = Number of slave-to-slave communication IDs differs from the number of accesses in the parameterizing telegram.
29 = Setpoint PZDs are not uniformly supplied by the master or slave (drive) publisher.
30 = The permitted maximum length of the configuration telegram for the option module has been exceeded.

Remedy

Check the bus configuring at the master and if required correct.
If required, using P875, activate the option module PROFIBUS-DP, which are previously configured in the PROFIBUS Master for the number of axes involved.

Acknowledgement

not required

Stop response

STOP VII

831 PROFIBUS is not in the data transfer condition

Cause
The PROFIBUS is not in a data transfer status (data exchange) or data transfer was interrupted.
Causes:
– The master has not yet run up, or has not yet established a connection to the slave.
– The bus addresses differ in the master configuring and slave parameterization.
– The bus connection has been physically interrupted.
– The master is still in the clear condition.
– An illegal parameterization or configuration was received.
– A PROFIBUS address was assigned several times.

Remedy
Master, check the assignment of bus addresses and bus connection.

Acknowledgement
not required

Stop response
STOP VII

832 PROFIBUS not clock-synchronous with the master

Cause
The PROFIBUS is in a data transfer status (data exchange) and has been selected via the parameterizing frame of synchronous operation. It could not yet be synchronized to the clock preset by the master resp. to the master sign-of-life.
Causes:
– The master does not send an equidistant global control frame although clock synchronism has been selected via the bus configuration.
– The master uses another equidistant DP clock cycle than was transferred to the slave in the parameterizing telegram.
– The master increments its sign-of-life (STW2 Bits 12–15) not in the configured time frame Tmapc.

Remedy
Check master application and bus configuration
Check the consistency between the clock cycle input for the slave configuring and the clock cycle setting at the master.
If the master (e.g. SIMATIC S7) does not transfer a sign-of-life, the sign-of-life evalution can also be suppressed using P0879 bit 8.

Acknowledgement
not required

Stop response
STOP VII

833 PROFIBUS: No connection to the publisher \%u

Cause	Cyclic data transfer between this slave and a slave-to-slave communications publisher was still not started or was interrupted. Examples: – Bus connection interrupted – Publisher failure – Master runs up again – The response monitoring (Watchdog) for this slave was de-activated via the parameterizing telegram (SetPrm) (Diagnostics: P1783:1 bit 3 = 0). Supplementary info: PROFIBUS address of the publisher
Remedy	Check the publisher and bus connections to the publisher, to the master and between the master and publisher. if the watchdog is de-activated, activate the response monitoring for this slave via Drive ES.
Acknowledgement	not required
Stop response	STOP VII

840 Teach-in for running traversing program

Cause	Teach-in was requested during a running traversing program.
Remedy	Exit the traversing program and re-request teach-in.
Acknowledgement	not required
Stop response	STOP VII

841 Teach-in for relative block

Cause	The traversing block as ”teach in block” is relative instead of absolute.
Remedy	Change the traversing block mode ”teach in block” from relative to absolute.
Acknowledgement	not required
Stop response	STOP VII

842 Teach-in for a relative standard block

Cause	The traversing block as ”teach in standard set”, is relative instead of absolute.
Remedy	Change the traversing block mode ”teach in standard block” from relative to absolute.
Acknowledgement	not required
Stop response	STOP VII

843 Search velocity too high

Cause	The search velocity for spindle positioning is too high for the selected maximum deceleration.
Remedy	Reduce search velocity P0082:64 or increase the maximum deceleration P0104.
Acknowledgement	not required
Stop response	STOP VII

845 Jogging not effective for active coupling

Cause	Jogging is not possible while a coupling is closed.
Remedy	Release the coupling and re-activate jogging.
Acknowledgement	not required
Stop response	STOP VII

849 PLUS software limit switch actuated

Cause	For a block with the ENDLOS_POS command, the axis has actuated the plus software limit switch (P0316) for absolute or relative positioning. The behavior for software limit switch reached, can be set using P0118.0.
Remedy	– Move away in the negative direction, jogging. – Move away in the negative direction using the traversing block.
Acknowledgement	not required
Stop response	STOP VII

850 MINUS software limit switch actuated

Cause	For a block with the ENDLOS_NEG command, the axis has actuated the minus software limit switch (P0315) for absolute or relative positioning The behavior for software limit switch reached, can be set using P0118.0.
Remedy	– Move away in the positive direction, jogging. – Move away in the positive direction using the traversing block.
Acknowledgement	not required
Stop response	STOP VII

864 Parameterization error in speed controller adaptation

Cause	The upper adaption speed (P1412) was parameterized with a lower value than the lower adaption speed (P1411).
Remedy	P1412 must contain a higher value than P1411.
Acknowledgement	not required
Stop response	STOP VII

865 Invalid signal number

Cause
The signal number for the analog output is not permissible.
An analog value can be output for diagnostic, service and optimization tasks
Term. 75.x/15, 16.x/15, DAC1, DAC2

Remedy
Enter valid signal number
(refer to the Description of Functions SIMODRIVE 611 universal)

Acknowledgement
not required

Stop response
STOP VII

866 Parameterizing error, current controller adaption

Cause
For the current controller adaption, the upper current limit (P1181) was parameterized with a lower value than the lower current limit (P1180).
Adaption is de-activated when the parameterizing error is output.

Remedy
P1181 must contain a higher value than P1180.

Acknowledgement
not required

Stop response
STOP VII

867 Generator mode: Response voltage > shutdown threshold

Cause
The sum of the values in P1631 + P1632 is greater than the value in P1633.

Remedy
Appropriately change P1631, P1632 and P1633.
Note:
P1631 to P1633 being prepared

Acknowledgement
not required

Stop response
STOP VII

868 Generator mode: Response voltage > monitoring threshold

Cause
The input value for the threshold voltage (P1631) is greater than the value in P1630.

Remedy
Change the drive parameters.
Note:
P1630 and P1631 being prepared

Acknowledgement
not required

Stop response
STOP VII

7

869 Reference point coordinate limited to modulo range

Cause	The reference point coordinate is internally limited to the modulo range.
Remedy	Enter a value in P0160 which lies within the modulo range (P0242).
Acknowledgement	not required
Stop response	STOP VII

870 Jerk: jerk time is limited

Cause	When calculating the jerk time T from the acceleration a and the jerk r, the result was an excessively high jerk time, so that the time is limited internally. The following is valid: T = a/r, where a: Acceleration (higher value from P0103 and P0104) r: Jerk (P0107)
Remedy	– Increase jerk (P0107) – Reduce maximum acceleration (P0103) or maximum deceleration (P0104)
Acknowledgement	not required
Stop response	STOP VII

871 Induction motor operation: drive converter frequency motor not permissible

Cause	In induction motor operation (selected by P1465 < P1146), drive converter frequencies of 4 or 8 kHz are permissible.
Remedy	– Change P1100 – Cancel induction motor operation (P1465 > P1146)
Acknowledgement	not required
Stop response	STOP VII

872 PARAMETERIZING ERROR: P gain, equalization controller too high

Cause	PARAMETERIZING ERROR: P gain, equalization controller does not fit into the format.
Remedy	– Change P1491
Acknowledgement	not required
Stop response	STOP VII

875 Axial deviations in fixed voltage

Cause
For the axes of a drive module, an unequal fixed voltage (P1161) has been set.
As a fixed voltage <> 0 replaces the DC link voltage measured value, but the DC link voltage is only measured once for all drives of a drive module, the fixed voltage on all module axes must be equal, before it is accepted.

Remedy
Set the same fixed voltage (P1161) on all module axes.

Acknowledgement
not required

Stop response
STOP VII

876 Terminal function \%u in the actual mode illegal

Cause
The function number, used as input terminal or distributed input (P0888) may not be used in the actual mode.

Remedy
Change P0700 (operating mode) or enter a suitable function number in P0888 or P0660, P0661 etc.

Acknowledgement
not required

Stop response
STOP VII

877 Output function \%u not permissible in the actual operating mode

Cause
The function number, used as output, may not be used in the actual operating mode.

Remedy
Change P0700 (operating mode) or enter a suitable function number in P0680, P06981, etc.

Acknowledgement
not required

Stop response
STOP VII

878 Input I0.x not parameterized as equivalent zero mark

Cause
When entering an external signal as equivalent zero mark (P0174 = 2), input I0.x must be assigned ”equivalent zero mark” function (Fct. No.:79).
if a direct measuring system is used, input I0.B must be assigned the ”equivalent zero mark” function (Fct. No.: 79).

Remedy
– Motor measuring system: P0660 = 79
– Direct measuring system: P0672 = 79

Acknowledgement
not required

Stop response
STOP VII

879 Time constant deadtime, speed feedforward control (P0205:\%u) too high

Cause	P0205:8 may not be greater than two position controller clock cycles. Higher values are internally limited.
Remedy	Reduce P0205:8 to max. two position controller clock cycles (P1009). Parameterize an addition delay via P0206:8.
Acknowledgement	not required
Stop response	STOP VII

881 PZD configuring: Signal number in P0915:\%u invalid

Cause	An undefined or illegal signal number in the current operating mode (P0700) was identified for the process data software. The process data for encoder 1 has been configured although encoder-less operation is activated (P1011.5). The process data for encoder 2 were configured although the direct measuring system is not activated (P0879.12).
Remedy	Correct P0915:17
Acknowledgement	not required
Stop response	STOP VII

882 PZD configuring: Double word signal number in P0915:\%u invalid

Cause	For signals with double words (length = 32 bits), the corresponding signal identifier must be configured twice for adjacent process data. The following subparameter must therefore also be parameterized with the same signal number.
Remedy	Correct P0915:17
Acknowledgement	not required
Stop response	STOP VII

883 PZD configuring: Signal number in P0916:\%u invalid

Cause	An undefined or illegal signal number in the current operating mode (P0700) was identified for the process data software. The process data for encoder 1 has been configured although encoder-less operation is activated (P1011.5). The process data for encoder 2 were configured although the direct measuring system is not activated (P0879.12).
Remedy	Correct P0916:17
Acknowledgement	not required
Stop response	STOP VII

884	**PZD configuring: Double word signal number in P0916:\%u ivalid**
Cause	For signals with double words (length = 32 bits), the corresponding signal identifier must be configured twice for adjacent process data. The following subparameter must therefore also be parameterized with the same signal number.
Remedy	Correct P0916:17
Acknowledgement	not required
Stop response	STOP VII
885	**P1261 greater than 100.0 % not permissible**
Cause	P1261 greater than 100.0 % is not permissible for permanent-magnet synchronous motors with field weakening (PE spindle, P1015 = 1). It is internally limited to 100.0 %.
Remedy	Set P1261 to max. 100.0 %.
Acknowledgement	not required
Stop response	STOP VII
886	**Pre-tensioning torque greater than 16x rated torque**
Cause	The parameterized pre-tensioning torque (P1493) is greater than 16x the standstill torque (SRM), rated motor torque (ARM) and standstill force (SLM) of the motor. Note: refer to the index entry ”Limits”
Remedy	Reduce pre-tensioning torque (P1493)
Acknowledgement	not required
Stop response	STOP VII
889	**Fixed endstop, axis has not reached the clamping torque**
Cause	The axis has reached the fixed endstop, but was not able to establish the programmed clamping torque.
Remedy	Check the parameters for the limits.
Acknowledgement	not required
Stop response	STOP VII
890	**Acceleration – deceleration override incorrect**
Cause	The acceleratino override or the deceleration override is not in the range from 1% to 100%. if the value > 100%, then it is limited to 100%. If the value < 1%, then limited to 1%. The traversing block is not interrupted.
Remedy	Check the programming of the acceleration override and deceleration override.
Acknowledgement	not required
Stop response	STOP VII

7

891 PLUS software limit switch actuated coupled

Cause	With the actual master drive velocity, this coupling axis will probably reach or pass the PLUS software limit switch. This warning is output if the coupled axis has fallen below 200% of the braking travel up to the PLUS software limit switch.
Remedy	Traverse the master drive so that this coupling axis goes into the permissible traversing range.
Acknowledgement	not required
Stop response	STOP VII

892 MINUS software limit switch actuated coupled

Cause	With the actual master drive velocity, this coupling axis will probably reach or pass the MINUS software limit switch. This warning is output if the coupled axis has fallen below 200% of the braking travel up to the MINUS software limit switch.
Remedy	Traverse the master drive so that this coupling axis goes into the permissible traversing range.
Acknowledgement	not required
Stop response	STOP VII

893 Function 73 only effective at terminal I0.x

Cause	The terminal function 73 ”Coupling on I0” is only effective at terminal I0.x.
Remedy	Assign terminal I0.x to function 73.
Acknowledgement	not required
Stop response	STOP VII

894 Inputs, optional TERMINAL module assigned twice

Cause	The input terminals on the optional TERMINAL module can only be used by one drive.
Remedy	Check and correct P0676 (A) and P0676 (B).
Acknowledgement	not required
Stop response	STOP VII

895 Outputs, optional TERMINAL module assigned twice

Cause	Only one drive can use the output terminals on the optional TERMINAL module.
Remedy	Check and correct P0696 (A) and P0696 (B).
Acknowledgement	not required
Stop response	STOP VII

7.4 Commissioning functions

Overview

The commissioning functions and support tools help during start–up, during service, when optimizing the drive, and troubleshooting.

The ”SIMODRIVE 611 universal” control board has the following commissioning and help functions:

- Function generator (FG) refer to Chapter 7.4.1
- Trace function (refer to Chapter 7.4.2)
- Test sockets (DAU1, DAU2) refer to Chapter 7.4.3
- Measuring function (refer to Chapter 7.4.4)

Caution

Setpoints entered via analog inputs (e.g. via terminals 56.x/14.x and/or 24.x/20.x) or speeds entered via PROFIBUS–DP are added when the function generator starts.

Note:
The analog inputs can be disabled via P0607 = 0 (for terminal 56.x/14.x) or P0612 = 0 (for terminal 24.x/20.x).

Note

For a ”SIMODRIVE 611 universal” control board, only **1 function generator or 1 measuring function** can be started at the same time, i.e. either for drive A or B.

Start–up (commissioning) functions and ”SimoCom U” tool

The SimoCom U parameterization and start–up tool can, in the online mode, start the commissioning functions ”function generator” and ”measuring function” with the control authority for PG/PC.

Note

If online operation between SimoCom U and ”SIMODRIVE 611 universal” is interrupted while a start–up function is being executed, then this start–up function is exited, and an appropriate fault is displayed on the display unit.

7

7.4.1 Function generator (FG)

Overview

Using the function generator:

- The influence of the higher–level control loops can be specifically disabled
- The dynamic performance can be compared for coupled drives
- A simple characteristic (traversing profile) can be selected as setpoint and repeated, without having to program a traversing program

The function generator generates various types of setpoints (squarewave, staircase, delta, PRBS or sinusoidal), and enters this setpoint, corresponding to the selected mode, as current setpoint, disturbing torque or as speed setpoint.

Danger

If the function generator is active, then traversing motion is not monitored.

Starting the function generator

The following must be observed when starting the function generator:

- The function generator is started as follows
  - Setting P1800 = 1
    The function generator is immediately started.
  - Setting P1800 = 2 (from SW 8.1)
    The function generator is started in synchronism – e.g. for gantry axes if, in the n–set mode, the PROFIBUS control word STW1.8=1.
- The following starting conditions and enable signals must be available:

Table 7-5 Starting conditions for the function generator

Starting conditions	Operating mode, FG P1804 = 1 = 3 (only V/Hz operation)	Operating mode FG P1804 = 2 = 3 (without V/Hz operation)
Speed controlled operation on		x
Controller enable	x	x
Pulse enable	x	x
Internal regenerative stop inactive	x	x
Ramp–function generator enabled	x	x
x: Start condition must be fulfilled		

Fault

If a fault is identified when starting or during operation, then the function generator is exited, and the reason for the fault is displayed by entering a negative value in P1800.

Stopping the function generator

The function generator can be stopped as follows:

- Stopped via P1800 = 1 → 0

  If the function generator is stopped using this parameter, then the drive is braked with the deceleration set in P1813.

- Stopped via STW1.8=0 for P1800 = 2 (from SW 8.1)

  If the function generator is stopped using this PROFIBUS control word, then the drive is braked with the deceleration set in P1813.

- Abort

  As soon as one of the function generator starting conditions is no longer fulfilled, the drive is braked along the current limit or ”coasts down” when the pulse enable is withdrawn.
  Further, the function generator is stopped, if erroneous parameterization is executed during operation.

Note

The control structure of the drive is re–established each time that the function generator is stopped or aborted.
While the function generator runs, e.g. in the mode ”current setpoint” (P1804 = 1), all of the higher–level control loops are open. The control loops are re–closed when the function generator is either stopped or canceled.

Parameter overview

The following parameters are used to parameterize the function generator:

Table 7-6 Parameters for the function generator

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1800	Function generator control	–40	0	2	–	Immediately
	... starts, exits the function generator and if a fault/error is present, displays the reason. = 2 Synchronous start of the function generator (from SW 8.1) = 1 Starts the function generator. The FG is again terminated with P1800 = 1 → 0. = 0 Function generator is inactive = –1 Commissioning–function was started; but was possibly already running on another drive = –2 Inadmissible mode or the mode was changed while the FG was active = –4 The period is 0 or too high = –6 The absolute amplitude is too high = –7 The offset lies outside the permitted range = –8 The limit is greater than permitted = –9 Incorrect waveform or the waveform was changed while the FG was active = –10 The pulse width is negative or greater than the period = –11 The bandwidth is less than 1 Hz or greater than the maximum possible bandwidth (for a sampling time of 0.125 ms, the maximum possible bandwidth is 4000 Hz) = –15 The 2nd amplitude for the ”staircase” waveform is too high = –16 The commissioning function was not started or was aborted due to an active internal regenerative stop = –17 The commissioning function was not started or was aborted due to the missing pulse enable = –18 The commissioning function was not started or was aborted due to the missing speed controller enable = –19 The commissioning function was not started or was aborted due to the missing ”speed controlled mode” enable = –20 The commissioning function was not started or was aborted due to a missing ramp–function generator enable signal = –21 The commissioning function was not started due to a traversing axis (e.g. active traversing block) =–23 The commissioning function was canceled because the synchronous start enable was withdrawn					

Table 7-6 Parameters for the function generator, continued

Parameters						
No.	Description	Min.	Standard	Max.	Units	Effective
1804	Function generator operating mode	1	3	5	–	Immediately
	... specifies at which input the generated setpoint is entered. = 1 Current setpoint The current control loop is closed, all of the higher–level control loops are open. The function generator output is the current setpoint in the current controller clock cycle. = 2 Disturbing torque The speed control loop is closed, all of the higher–level control loops are open. The function generator output is the current setpoint in the speed controller clock cycle. When starting and stopping, the acceleration/deceleration is limited by the ramp–function generator of the function generator. = 3 Speed setpoint The speed control loop is closed, all of the higher–level control loops are open. The function generator output is the speed setpoint in the speed controller clock cycle. When starting and stopping, the acceleration/deceleration is limited by the ramp–function generator of the function generator. = 4 Disturbing torque with the ramp–function generator (from SW 2.4) The speed control loop is closed and all of the higher–level control loops are open. The function generator output is the current setpoint in the speed controller clock cycle. When starting and stopping, the acceleration/deceleration is limited by the ramp–function generator of the function generator as well as by the ramp–function generator in the speed setpoint channel. The maximum value from the ramp–up/ramp–down time (P1256/P1257) of the RFG in the speed setpoint channel and the time of the ramp–function generator of the function generator (P1813) is always used. = 5 Speed setpoint with the ramp–function generator (from SW 2.4) The speed control loop is closed and all of the higher–level control loops are open. The function generator output is the speed setpoint in the controller clock cycle. When starting and stopping, the acceleration/deceleration is limited by the ramp–function generator of the function generator as well as by the ramp–function generator in the speed setpoint channel. The maximum value from the ramp–up/ramp–down time (P1256/P1257) of the RFG in the speed setpoint channel and the time of the ramp–function generator of the function generator (P1813) is always used. When moving along the characteristic, the ramp–up and ramp–down time of the ramp–function generator in the speed setpoint channel is taken into account. **Note:** When a parameter is changed with the function generator active, this causes the system to crash.					

7

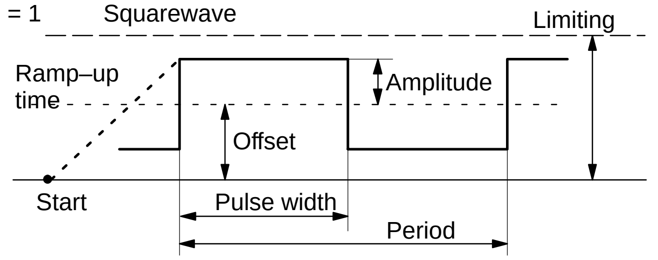
Table 7-6 Parameters for the function generator, continued

Parameters						
No.	Description	Min.	Stan-dard	Max.	Units	Effective
1805	Function generator, waveform	1	1	5	–	Immedi-ately

... specifies which function generator waveform should be output.

Note: When a parameter is changed with the function generator active, this causes the system to crash.

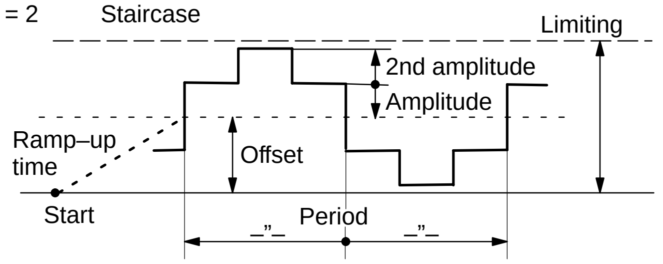
= 1 Squarewave



Parameter list

Offset:	P1807
Amplitude:	P1806
Pulse width:	P1811
Period:	P1810
Limit:	P1808
Ramp–up time:	P1813

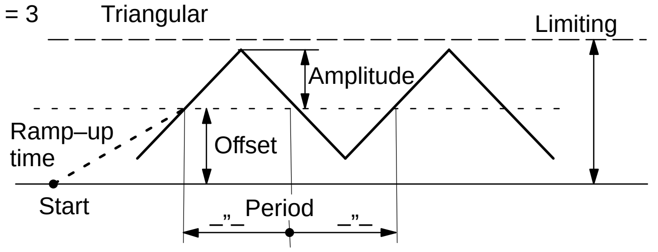
= 2 Staircase



Parameter list

Offset:	P1807
Amplitude:	P1806
2. amplitude:	P1809
Period:	P1810
Limit:	P1808
Ramp–up time:	P1813

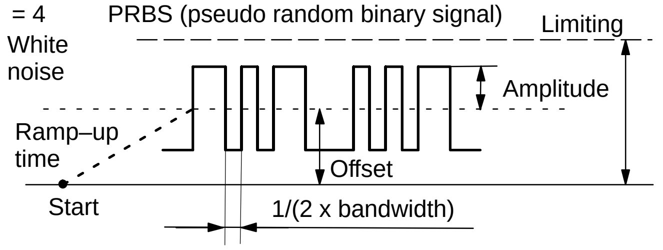
= 3 Triangular



Parameter list

Offset:	P1807
Amplitude:	P1806
Period:	P1810
Limit:	P1808
Ramp–up time:	P1813

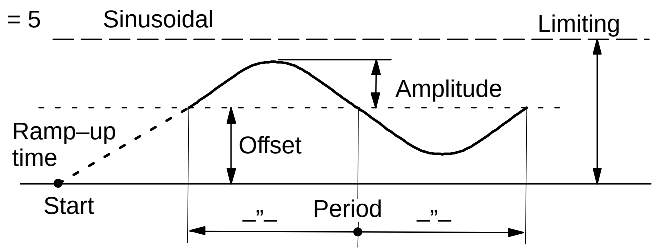
= 4 PRBS (pseudo random binary signal)



Parameter list

Offset:	P1807
Amplitude:	P1806
Bandwidth:	P1812
Limit:	P1808
Ramp–up time:	P1813

= 5 Sinusoidal



Parameter list

Offset:	P1807
Amplitude:	P1806
Period:	P1810
Limit:	P1808
Ramp–up time:	P1813

Table 7-6 Parameters for the function generator, continued

Parameters						
No.	Description	Min.	Stan-dard	Max.	Units	Effective
1806	Start–up function, amplitude	–1 600.0	5.0	1 600.0	%	Immedi-ately
	... specifies the amplitude of the signal to be output. The units are dependent on P1804. if then P1804 = 1, 2 the units are referred to P1103 (rated motor current) P1804 = 3 the units are referred to P1400 (rated motor speed)					
1807	Start–up function, offset	–1 600.0	0.0	1 600.0	%	Immedi-ately
	... defines the offset of the signal to be output. The units are dependent on P1804. if then P1804 = 1 the unit is referred to P1103 (rated motor current) P1804 = 2, 3 the units are referred to P1400 (rated motor speed) **Note:** For P1804 = 2 (”fault torque” mode), the offset does not affect the current setpoint, but the speed setpoint, to compensate for the effects of backlash (play).					
1808	Function generator limiting	0.0	100.0	1 600.0	%	Immedi-ately
	... defines the limit of the signal to be output. The units are dependent on P1804. if then P1804 = 1, 2 the units are referred to P1103 (rated motor current) P1804 = 3 the units are referred to P1400 (rated motor speed) **Note:** The limit is effective, symmetrically around the zero point. For P1804 = 2 (”disturbance torque” mode), the limit only acts on the current setpoint, but not on the speed setpoint (= offset).					
1809	Function generator 2nd amplitude (only for P1805 = 2, staircase)	–1 600.0	7.0	1 600.0	%	Immedi-ately
	... specifies the 2nd amplitude for the ”staircase” waveform. The units are dependent on P1804. if then P1804 = 1, 2 the units are referred to P1103 (rated motor current) P1804 = 3 the units are referred to P1400 (rated motor speed)					
1810	Function generator period (not for P1805 = 4, PRBS)	1	1 000	65 535	ms	Immedi-ately
	... defines the period of the signal to be output.					
1811	Function generator pulse width (only for P1805 = 1, squarewave)	0	500	65 535	ms	Immedi-ately
	... defines the pulse width of the ”squarewave” waveform.					
1812	Start–up function, bandwidth (FFT) (only for P1805 = 4, PRBS)	1	4 000	8 000	Hz	Immedi-ately
	... defines the bandwidth in the PRBS mode.					

7

Table 7-6 Parameters for the function generator, continued

Parameters						
No.	**Description**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1813	Start–up function, ramp–up time at P1400 (only for P1804 = 2, 3 —> closed speed control loop)	0.0	32.0	100 000.0	ms	Immediately
	... specifies the time in which the drive accelerates or decelerates (brakes) to the required speed. In this case, the parameter refers to P1400 (rated speed). The following applies: $P1813 = \frac{P1400}{\text{required speed}} \cdot \text{required ramp–up time}$ Example: Rated speed n_{rated} = 3000 RPM (P1400) The drive should accelerate up to 500 RPM in 20 ms —> P1813 = (3000 / 500) • 20 ms = 120 ms					

Additional waveforms

Additional waveforms are available using the appropriate parameterization.
Example:
For the ”triangular” waveform, a triangular waveform without peak is obtained by appropriately parameterizing the limit.

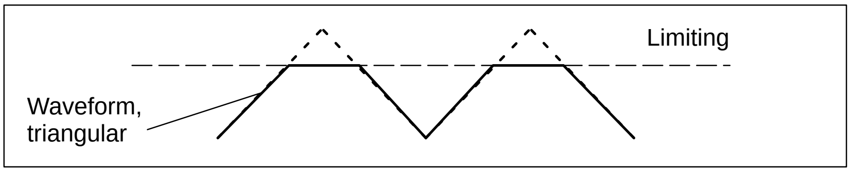


Fig. 7-5 ”Triangular” waveforms with no peak

Details of the ”staircase” waveform

The ”staircase” waveform is especially significant when optimizing the speed controller.
Depending on how the amplitude is parameterized, the following interesting possibilities are obtained:

- Amplitude = 0 (P1806 = 0)

  Benefits:

  – Reversing is possible

  – The axis stops at the end points

  Disadvantages:

  – There is play and stiction if there is no offset

  – With offset, the axis continually distances itself from the starting point

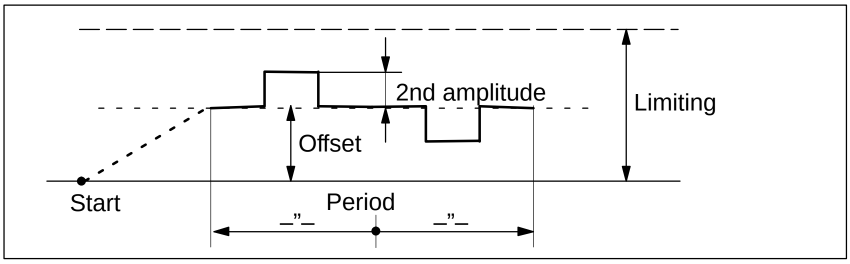


Fig. 7-6 ”Staircase” waveform with amplitude = 0 and offset > amplitude 2

- Amplitude ≠ 0 (P1806 ≠ 0)

  Benefits:

  – Reversing is possible

  – A higher (2nd amplitude) is selected from a basic velocity (amplitude)

  – The traversing profile periodically repeats itself.
  This means that when optimizing the control loop, the effect can be immediately monitored, e.g. using an oscilloscope connected to test sockets DAU1/DAU2.

  – The axis always moves through the same distance in each direction

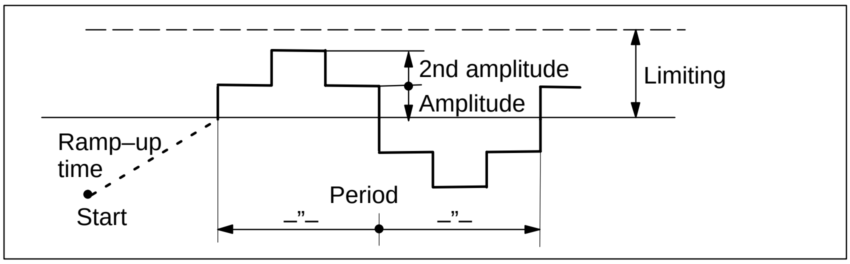


Fig. 7-7 ”Staircase” waveform with amplitude > 0 and offset = 0

7.4.2 Trace function

Description

Selected measuring quantities in the drive can be measured correspon- ding to the specified measuring parameters, using the trace function and graphically displayed using SimoCom U.

Function overview

The trace function has the following properties and features:

- 4 trace buffers with up to 2048 measured values

  The actual number of possible measured values is dependent on whether the measuring signal is 24 or 48 bit.

- Freely–selectable measuring signals

  The required signal is selected from a signal selection box.

- Triggering
  - without triggering (the trace starts immediately after START)
  - with triggering to an additional trigger signal with signal edge/signal level/bit pattern triggering and trigger delay/pre–trigger
  - trigger is initiated by a change in the bit mask (from SW 5.1)
    A trigger is initiated as soon as one of the bits in the bit mask changes.

- X/Y scaling: Automatic and selectable

  Using the scaling, a sub–range can be specified for the abscissa (x axis) and ordinate (y axis), so that a section can be displayed.
  It is possible to zoom in using an appropriately set scaling factor.

- Signal measurement via cursor

  This means that the signals can be analyzed using the X cursor (time axis) and/or Y cursor.

- From SW 5.1, individual bits of a signal can be evaluated.

  One or several bits can be selected in the ”SimoCom U” in the ”trace” input mask using the ”bit masking” button. The bit masking can be set, independently for each channel and can be recognized by the units of the associated signal.

Reader’s note

The trace function can only be used together with the SimoCom U parameterizing and start–up tool, i.e. SimoCom U is used to control the trace function and to display the measured values.

Additional information on the trace function is provided in the online help for SimoCom U.

7.4.3 Test sockets, DAU1, DAU2

Description

For ”SIMODRIVE 611 universal”, there are two test sockets to output analog signals, with the following features:

- Resolution of the DAU — 8 bit
- Voltage range — 0 V to +5 V
- Measurement clock cycle — Speed controller clock cycle
- Shift factor (refer to Figs. 7-8 and 7-9)

  The resolution is 8 bit. Thus, only an 8 bit section can be output from a 24/48 bit signal. The shift factor defines how finely the selected signal is quantized.
- Module–specific

  The test sockets are provided for each module, i.e. they can be activated and de–activated from each drive.
  Only one drive can output one value at a test socket.
- Signal selection list

  The signals which can be output via the test sockets, can be taken from the signal selection list for analog outputs (refer to Chap. 6.7).

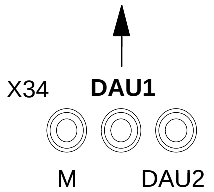
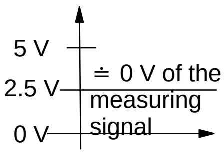
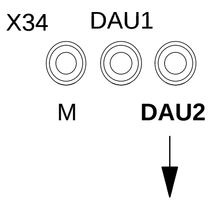
Note

The test sockets are only provided for test purposes during commissioning or for service.

Parameter overview

The assignment between the test sockets and parameters is as follows:

Table 7-7 Overview of the test sockets

Test sockets	Parameters						
	No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
Speed actual value, motor drive A (standard)  	1820	Signal number, test socket 1	0	8	530	–	Immediately
		... defines which signal is output via the DAU (D/A converter). The signal number from the signal selection list must be entered for analog output (refer to Chapter 6.7 under Table 6-56).					
	1821	Shift factor, test socket 1	0	6	47	–	Immediately
		... defines the shift factor, with which the output signal is manipulated. Only an 8 bit output window can be output from a 24/48 bit signal due to the 8–bit resolution. The shift factor can be used to define which eight of the 24/38 bits are located in the output window and should be output.					
	1822	Offset, test socket 1	–128	0	127	–	Immediately
		... specifies the offset, which is added to the 8–bit output signal. The signal to be output is shifted by 5/256 V (19.5 mV) by changing the offset by 1 digit. P1822 = –128 ≐ 0 V, P1822 = 0 ≐ +2.5 V, P1822 = 127 ≐ +5V					
	1826	Status, test socket 1	0	1	1	–	Immediately
		... defines the status of the test socket for this drive. = 0 Test socket is inactive = 1 Test socket is active As always only one drive can output one value at a test socket, when changing the parameter in one drive, the parameter in the other drive is automatically adapted. **Note:** For a 2–axis module, the test sockets are preset as follows after the first start–up: Drive A / Drive B Test socket 1: active (P1826 = 1) / inactive (P1826 = 0) Test socket 2: inactive (P1836 = 0) / active (P1836 = 1)					
 Active power drive B (as standard)	1830	Signal number, test socket 2	0	14	530	–	Immediately
		Description, refer to that for P1820.					
	1831	Shift factor, test socket 2	0	12	47	–	Immediately
		Description, refer to that for P1821.					
	1832	Offset, test socket 2	–128	0	127	–	Immediately
		Description, refer to that for P1822.					
	1836	Status, test socket 2	0	1	1	–	Immediately
		Description, refer to that for P1826.					

Shift factor

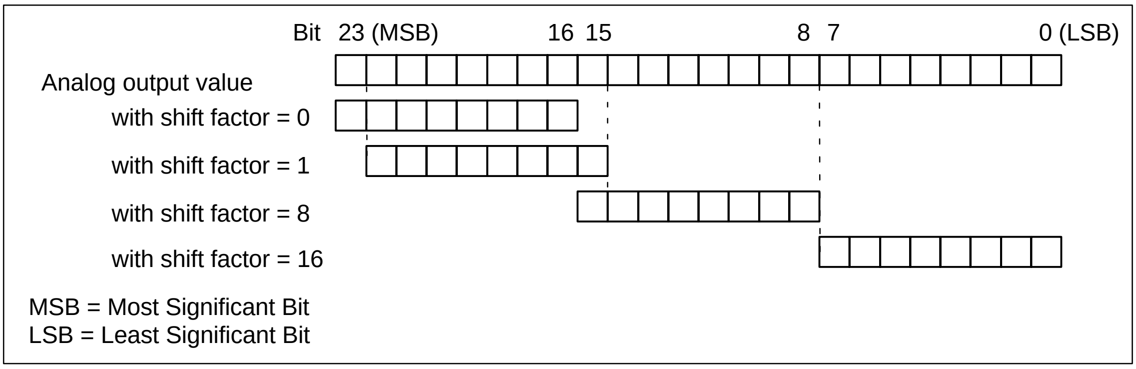


Fig. 7-8 Shift factor for analog output of 24–bit signals

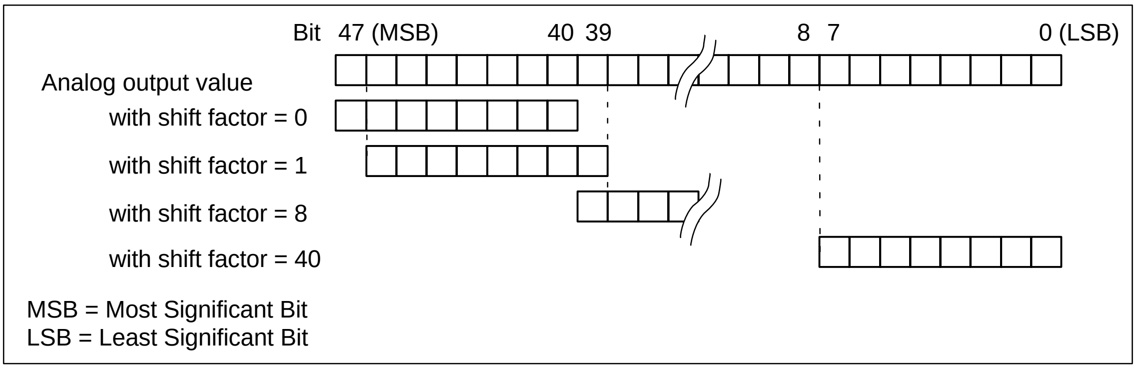


Fig. 7-9 Shift factor for analog output of 48–bit signals

7

Voltage range

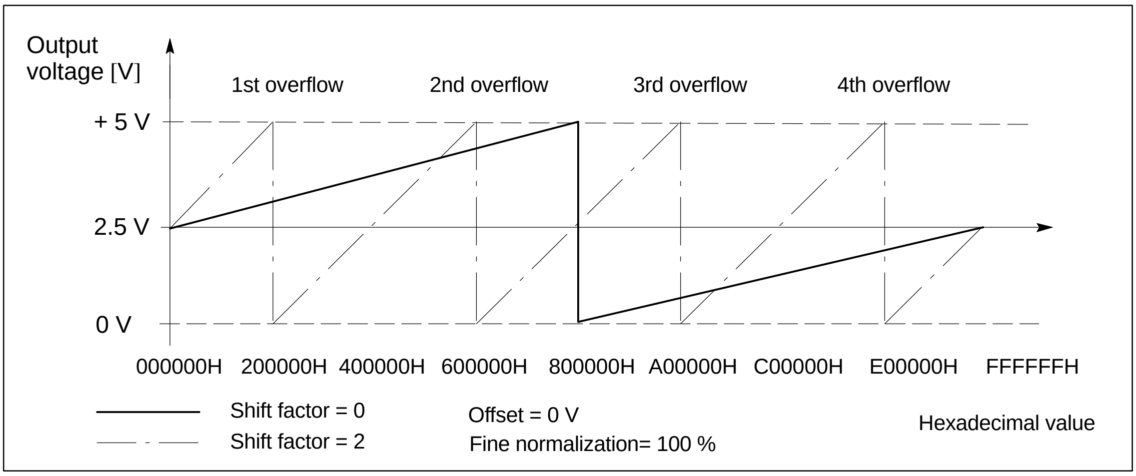


Fig. 7-10 Voltage range for test sockets

7.4.4 Measurement function

Overview

Using the measuring function, by using simple parameterization, the influence of higher–level control circuits can be disabled and the dynamic performance of the individual drives can be displayed without using any external measuring equipment.
This means that it is possible to evaluate and analyze important quantities of the current and speed control loop in the time and frequency domains.

Measuring principle

Test signals with a selectable time interval are input into the drives to determine the measured values for graphic display of the time and frequency characteristics of drives and closed–loop control functions.

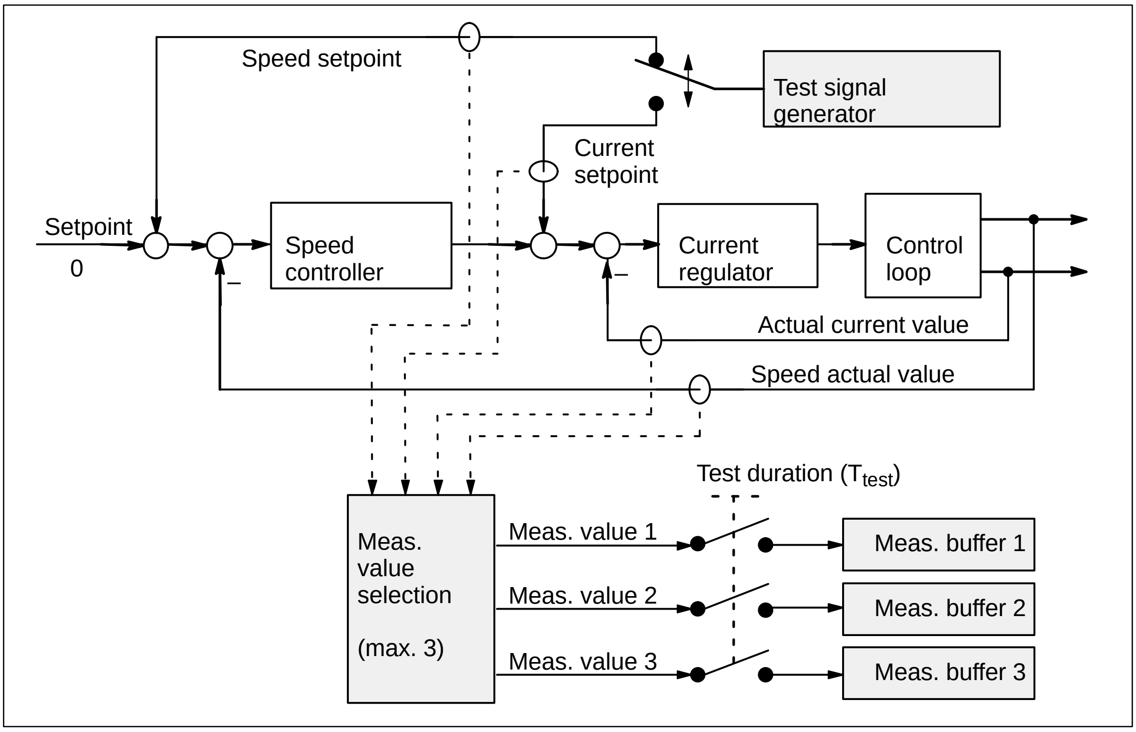


Fig. 7-11 Block diagram of the drive optimization (schematic)

Reader's note

The trace function can only be used together with the SimoCom U parameterizing and start–up tool, i.e. SimoCom U is used to control the trace function and to display the measured values.

Additional information on the measuring functions is provided in the online help for SimoCom U.

7.5 V/Hz operation (diagnostics function)

Description

V/Hz operation allows the following motors to be used:

- Induction motors without encoder evaluation
- 1FK6/1FT6 feed motors without encoder evaluation

Note

The V/Hz operation is exclusively provided for diagnostics purposes for synchronous (SRM) and induction motors (ARM).

V/Hz operation may only be used with converter switching frequencies (P1100) of 4 or 8 kHz. After changing P1100, "calculate controller data" must be re–executed.

For operation with encoder, the speed actual value from the measuring system is displayed, and for operation without encoder, a calculated speed actual value.

7.5.1 V/Hz operation with induction motors (ARM)

Commissioning

For V/Hz operation, it is first necessary to carry–out the standard commissioning for an induction motor with motor selection to obtain practical pre–assignment values (default values) for all of the parameters.
If a motor measuring system is not used, then "no encoder" must be selected as the encoder type.

As "unlisted motors" are generally used, for simple sensorless (no encoder) operation, the rating plate data should be entered and **the "calculate equivalent circuit diagram data"** and **"calculate controller data" functions** executed.

V/Hz operation is then activated using P1014 = 1.

Parameters for V/Hz operation with induction motors (ARM)

For V/Hz operation with induction motors, the following parameters are available:

Table 7-8 Parameters for V/Hz operation with ARM

Parameters	Name
P1014	Activates V/Hz operation
P1125	Ramp–up time 1 for V/Hz operation
P1127	Voltage at f = 0, V/Hz operation
P1132	Rated motor voltage

Table 7-8 Parameters for V/Hz operation with ARM, continued

Parameters	Name
P1134	Rated motor frequency
P1146	Maximum motor speed
P1103	Rated motor current
P1238	Current limit value
P1400	Rated motor speed
P1401	Speed for the max. useful motor speed
P1405	Monitoring speed, motor

V/Hz characteristic ARM

The speed setpoint is converted into the frequency to be used as reference, taking into account the pole pair number, which is determined from the rated motor frequency and rated motor speed.
This means the synchronous frequency, associated with the speed setpoint, is output (no slip compensation)

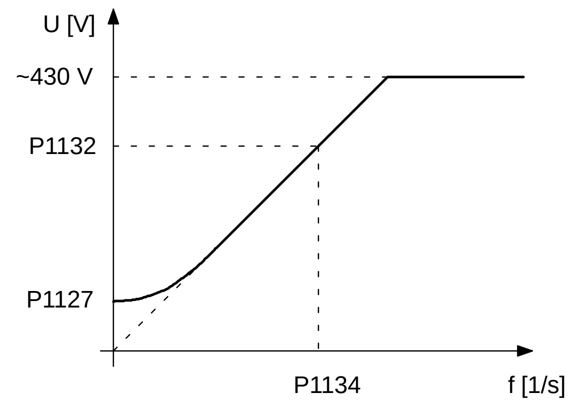


Fig. 7-12 V/Hz characteristic ARM

Ramp–up time

The ramp–up time can be set via P1125.

7.5.2 V/Hz operation with synchronous motors (SRM)

Commissioning

For synchronous motors, V/Hz operation is only used for diagnostic purposes.

In this case, the standard commissioning must first be executed with motor selection, to obtain practical pre–assignment values for all of the motor data.

V/Hz operation is then activated using P1014 = 1.

Parameters for V/Hz operation with synchronous motors (SRM)

For V/Hz operation with synchronous motors, the following parameters are available:

Table 7-9 Parameter V/Hz operation with 1FK6/1FT6 motors (SRM)

Parameters	Name
P1014	Activates V/Hz operation
P1104	Maximum motor current
P1105	Reduced maximum motor current
P1112	Motor pole pair number
P1114	Voltage constant
P1125	Ramp–up time 1 for V/Hz operation
P1400	Rated motor speed
P1401	Speed for the max. useful motor speed
P1405	Monitoring speed, motor

V/Hz characteristic SRM

The speed setpoint conversion into the frequency to be used as reference is obtained from the pole pair number.

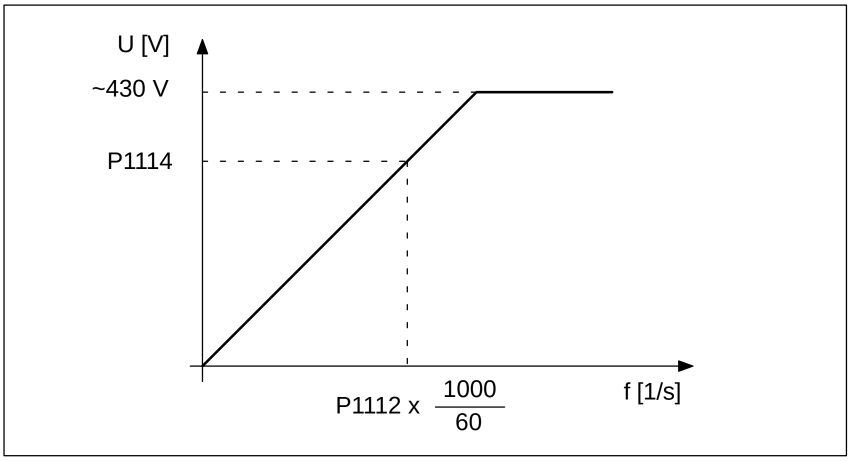


Fig. 7-13 V/Hz characteristic SRM

Generally, only speeds up to approx. 25% of the rated speed can be reached due to the strong tendency for synchronous motors to oscillate in the V/Hz mode.

Ramp–up times

The ramp–up time can be set via P1125.

7.5.3 Parameters for V/Hz operation

Parameter overview

The following parameters are available for V/Hz operation

Table 7-10 Parameter overview for V/Hz operation

Parameters						
No.	**Name**	**Min.**	**Standard**	**Max.**	**Units**	**Effective**
1014	Activates V/Hz operation	0	0	1	–	PO
	... V/Hz operation for this drive is activated/de–activated. = 1 V/Hz operation is activated = 0 V/Hz operation is de–activated					
1125	Ramp–up time 1 for V/Hz operation	0.01	5.0	100.0	s	Immediately
	When V/Hz operation is activated, this is the time in which the speed setpoint is changed from 0 to the maximum motor speed (P1146).					
1127	Voltage at f = 0 V/Hz operation (ARM)	0.0	2.0	20.0	V(pk)	Immediately
	When V/Hz operation is activated, and at 0 frequency, the voltage which is output is increased by the value in this parameter. **Note:** The parameter is preset when carrying–out the "calculate controller data" function.					

7.6 Spare parts

Table 7-11 Terminals for SIMODRIVE 611 universal

Designation	Terminals	Item number	Order No. [MLFB]
X421	AS1, AS2	GWE–000000590513	6SY9907
X431	P24, M24,9 663,19	GWE–000000588343	6SY9908
X451, X452 X461, X462 (10 pin)	56.x, 14.x, 24.x, 20.x, ... A+.x, A–.x, B+.x, B–.x	GWE–000000588293	6SY9910
X461, X462 (11 pin) X453, X454	A+.x, A–.x, B+.x, B–.x A+.x, A–.x, B+.x, ...0	A5E0009717	6SY9913
X441	75.x. 16.x, 15	GWE–000000588277	6SY9911
X422, X432	I4...I11, O4...O11	GWE–000000588285	6SY9912
Power connector, motor connection			6SY9904
Power connector, pulsed resistor			6SY9905

■

Lists

A

A.1 Parameter list

Reader's note

The parameters listed in the following are valid for all of the software releases of "SIMODRIVE 611 universal".

The complete list is updated corresponding to the edition of this documentation (refer to the edition in the header lines) and corresponds here to the documented software releases of "SIMODRIVE 611 universal".
The parameters are designated depending on the particular software release.

General information on the parameter list

The parameters are listed as follows:

Significance of the parameter numbers (examples)

(refer under the index entry "Parameters – ...)

P1400 Parameter 1400 with sub–parameters
P1401:8 Parameter 1401 with 8 sub–parameters
P0081:64 Parameter 0081 with 64 sub–parameters

Valid for ... motors

none all
SRM rotating synchronous
ARM rotating induction
SLM synchronous linear

Parameter numbers — Parameter text — Motor dependency — Software release

Software release
no data:
... available from SW 2.1

xxxx word_word word_word word_word (yyy) (–> x.y)

Min	Standard	Max	Units	Data type	Effective	(yyy)
xx	xx	xx	yy	zz	uu	

e.g.: –> 2.4 :
... available from SW 2.4

Units

- MSR: Dimension system grid

  1 MSR = 0.001 mm for P0100 = 1
  1 MSR = 0.0001 inch for P0100 = 2
  1 MSR = 0.001 degrees for P0100 = 3

- c * MSR

  c = 1: for a dimension system mm or inch
  c = 10: for a dimension system, degrees

Example:

P0082:64 = 50 000 [c*MSR/min]

	Dimens. system	Significance
—>	mm	50 mm/min
—>	inch	5 inch/min
—>	degrees	500 degrees/min

- RO (Read Only)
  can only be read
- immed. is effective immediately when changed
- PO POWER ON
  when changed, becomes effective after POWER ON
- PrgE End of program is
  effective if none of the programs (block processing) are active
- Vsoll_0 Velocity setpoint zero
  Effective for a velocity setpoint = 0

Information on effective
In order that a parameter "immediately" becomes effective after a change, it may be necessary to execute the associated function (e.g. P0160 (reference point coordinates) a reference point approach must be carried out).

Fig. A-1 Parameter list

Parameter list The following parameters are available for the ”SIMODRIVE 611 universal” control board:

Version: 08.03.07

0001 Actual traversing block – block number

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Integer16	RO

... in the ”Positioning” mode and for the ”spindle positioning” function it specifies the block number of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0080:64

0002 Actual traversing block – position

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... in the ”Positioning” mode and for the ”spindle positioning” function it specifies the programmed position of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0081:64

0003 Actual traversing block – velocity

Min	Standard	Max	Unit	Data type	Effective
–	–	–	c*MSR/min	Unsigned32	RO

... in the ”Positioning” mode and for the ”spindle positioning” function it specifies the programmed velocity of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0082:64

0004 Actual traversing block – acceleration override

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Unsigned16	RO

... in the ”Positioning” mode and for the ”Spindle positioning” function it specifies the programmed acceleration override of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0083:64

0005 Actual traversing block – deceleration override

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Unsigned16	RO

... in the ”Positioning” mode and for the ”Spindle positioning” function it specifies the programmed deceleration override of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0084:64

0006 Actual traversing block – command

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... in the ”Positioning” mode specifies the programmed command of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0085:64

0007 Actual traversing block – command parameter

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... in the ”Positioning” mode specifies the programmed command parameter of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0086:64

0008 Actual traversing block – mode

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... in the ”Positioning” mode and for the ”Spindle positioning” function it specifies the programmed mode of the traversing block being processed.
Note: refer to the index entry ”Traversing blocks” or P0087:64

0020 Position setpoint

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual absolute reference position.

0021 Position actual value

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual system deviation (reference value – actual difference) at the absolute actual position.

0022 Distance to go

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the distance to go.
The distance to go is the difference up to the end of the actual traversing block (P0001).

0023 Velocity setpoint

Min	Standard	Max	Unit	Data type	Effective
–	–	–	c*MSR/min	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual system deviation (reference value – actual difference) at the actual setpoint – traversing velocity.

0024 Actual velocity

Min	Standard	Max	Unit	Data type	Effective
–	–	–	c*MSR/min	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual traversing velocity.

0025 Effective override

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... in the ”Positioning” mode displays the actual, effective velocity override.
Note:
The currently effective override can differ from the specified override due to limits (e. g. P0102 (maximum velocity)).

0026 Position actual value, external block change (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... displays, in the ”Positioning” mode, the position actual value displayed when an edge is detected at the ”External block change” input signal.
Note:
The parameter is reset when starting a traversing block with the block change enable CONTINUE EXTERNAL.
refer to the index entry ”block step enable – CONTINUE EXTERNAL”

0029 Following error

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual following error.
The following error is the difference between the position setpoint (before the position setpoint filter, interpolator output) and the position actual value.
Note: refer to the index entry ”Kv factor” or ”Analog signals for the position control loop”

0030 Control deviation, position controller input

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actual system deviation (reference value – actual difference) at the position controller input.
Note: refer to the index entry ”Kv factor” or ”Analog signals for the position control loop”

0031 Actual Kv factor (position loop gain)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	1000/min	Floating Point	RO

... in the ”positioning” mode and for the ”Spindle positioning” function, displays the actually available (measured) Kv factor.
Example:
A kv factor = 1 has been set in P0200:8.
When traversing the axis, the current (measured) Kv factor is calculated and displayed in this parameter.
Note:
The actual Kv factor display (P0031) can have large values at low velocities due to the rounding-off errors.
At standstill, the selected (required) Kv factor (P0200:8) is displayed.

0032 Position reference value, external (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... displays the externally entered position reference value.
Note:
The quantities of P0895 to P0897 are incorporated in P0032.
refer under the index entry ”axis couplings”

A

0079 Reformat memory

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... the memory can be reformated for the traversing blocks, i.e. re-segmented.
0 inactive, initial status
0 –> 1 Re-format memory is initiated
Advantages of a re-formatted memory:
When displaying the blocks via SimoCom U or via the display unit on the front panel, the blocks are located at the beginning of the memory, are sorted according to increasing block numbers, and there are no gaps.
Note:
The parameter is automatically reset to 0 when reformating has been completed.

0080:64 Block number

Min	Standard	Max	Unit	Data type	Effective
–1	–1	63	–	Integer16	PrgE

A traversing block must be assigned a valid block number, so that it can be started.
–1 invalid block number
0 to 63 valid block number
The block change enable itself is saved in the traversing block in P0087:64 (mode block change enable).
Several blocks (e. g. for blocks with the block step enable CONTINUE FLYING) are processed in the increasing sequence of the block numbers.
The block number must be unique over all traversing blocks.
Note: refer to the index entry ”Traversing blocks”

0081:64 Position

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	PrgE

... specifies the target position in the traversing block.
The target position is approached dependent on P0087:64 (mode positioning mode).
Note: refer to the index entry ”Traversing blocks”

0082:64 Velocity

Min	Standard	Max	Unit	Data type	Effective
1000	600000	2000000000	c*MSR/min	Unsigned32	PrgE

... defines the velocity, with which the target position is approached.
Note: refer to the index entry ”Traversing blocks”

0083:64 Acceleration override

Min	Standard	Max	Unit	Data type	Effective
1	100	100	%	Unsigned16	PrgE

... specifies which override has an effect on the maximum acceleration (P0103).
Note: refer to the index entry ”Traversing blocks”

0084:64 Deceleration override

Min	Standard	Max	Unit	Data type	Effective
1	100	100	%	Unsigned16	PrgE

... specifies which override has an effect on the maximum deceleration (P0104).
Note: refer to the index entry ”Traversing blocks”

0085:64 Command

Min	Standard	Max	Unit	Data type	Effective
1	1	10	–	Unsigned16	PrgE

Each traversing block must contain precisely one command for execution.

Value	Command
1	POSITIONING
2	ENDLESSTRAVERSING_POS
3	ENDLESSTRAVERSING_NEG
4	WAIT
5	GOTO
6	SET_O
7	RESET_O
8	FIXED ENDSTOP (from SW 3.3)
9	COUPLING_ON (from SW 3.3)
10	COUPLING_OFF (from SW 3.3)

Depending on the command, additional block information is required in a traversing block.
Note:
refer to the index entry ”Traversing blocks” or ”Command-dependent block information”

0086:64 Command parameter

Min	Standard	Max	Unit	Data type	Effective
0	1	65535	–	Unsigned16	PrgE

... specifies the supplementary block information required for the following commands.

Command	Additional information
WAIT	Waiting time in ms
GOTO	Block number
SET_O	1, 2, 3: Set direct output 1, 2 or 3 (both signals)
RESET_O	1, 2, 3: Reset direct output 1, 2 or 3 (both signals)
FIXED ENDSTOP (from SW 3.3)	Clamping torque or clamping force Rotary drive: 1 – 65 535 [0.01 Nm] Linear drive: 1 – 65 535 [N]

Note:
refer to the index entry ”Traversing blocks” or ”Command-dependent block information”

A

0087:64 Mode

Min	Standard	Max	Unit	Data type	Effective
0	0	1331	Hex	Unsigned16	PrgE

... specifies the following additional information for several commands.
P0087:64 = UVWX
U
Bit 0 Target position source for spindle positioning (from SW 5.1)
= 0 Target position via traversing block (P0081)
= 1 Target position via PROFIBUS (STW XSP, being prepared)
V Block step enable function
= 0 END (standard)
= 1 CONTINUE WITH STOP
= 2 CONTINUE FLYING
= 3 CONTINUE EXTERNAL (from SW 3.1)
W Positioning mode
= 0 ABSOLUTE (standard)
= 1 RELATIVE
= 2 ABS_POS (only for modulo rotary axis, from SW 2.4)
= 3 ABS_NEG (only for modulo rotary axis, from SW 2.4)
X Identifications
= 1 Suppress block
Note: refer to the index entry ”Traversing blocks”

0091 MDI position (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	Vsoet_0

... specifies the target position in the MDI traversing block.
The value, entered here, is used if the position is not entered as cycle process data (refer to P0915) via PROFIBUS.
The target position is approached dependent on P0097 (mode – positioning modoe).
Note:
The parameter is not effective for Vset_0 if P0110=3 and P0097=U3WX are set. The parameter becomes effective when the signal edge of the digital input signal ”external block change” changes and if MDI is not entered via PROFIBUS-DP control words (STW).
refer under the index entry ”traversing blocks”

0092 MDI velocity (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
1000	3000	2000000000	c*MSR/min	Unsigned32	Vsoet_0

... defines the velocity with which the MDI target position is approached.
The value, entered here, is used if the velocity is not entered as cycle process data (refer to P0915) via PROFIBUS.
Note:
The parameter is not effective for Vset_0 if P0110=3 and P0097=U3WX are set. The parameter becomes effective when the signal edge of the digital input signal ”external block change” changes and if MDI is not entered via PROFIBUS-DP control words (STW).
refer under the index entry ”traversing blocks”

0093 MDI acceleration override (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
1	100	100	%	Unsigned16	Vsoet_0

... specifies which override is effective for the MDI block at the maximum acceleration (P0103). The value, entered here, is used if the acceleration override is not entered as cycle process data (refer to P0915) via PROFIBUS
Note:
The parameter is not effective for Vset_0 if P0110=3 and P0097=U3WX are set. The parameter becomes effective when the signal edge of the digital input signal ”external block change” changes and if MDI is not entered via PROFIBUS-DP control words (STW).
refer under the index entry ”traversing blocks”

0094 MDI deceleration override (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
1	100	100	%	Unsigned16	Vsoet_0

... specifies which override is effective for the MDI block at the maximum deceleration (P0103). The value, entered here, is used if the acceleration override is not entered as cycle process data (refer to P0915) via PROFIBUS
Note:
The parameter is not effective for Vset_0 if P0110=3 and P0097=U3WX are set. The parameter becomes effective when the signal edge of the digital input signal ”external block change” changes and if MDI is not entered via PROFIBUS-DP control words (STW).
refer under the index entry ”traversing blocks”

0097 MDI mode (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
0	310	330	Hex	Unsigned16	Vsoet_0

... for several commands, for the MDI block it provides the following additional information.
P0097 = VMX
V Block step enable function
= 0 END
= 3 CONTINUE EXTERNAL (Standard)
W Positioning mode
= 0 ABSOLUTE
= 1 RELATIVE (standard)
= 2 ABS_POS (only for modulo rotary axis)
= 3 ABS_NEG (only for modulo rotary axis)
X Identifications
not relevant
Note: refer to the index entry ”Traversing blocks”

0100 Dimension system

Min	Standard	Max	Unit	Data type	Effective
1	1	3	–	Unsigned16	PO

... specifies the measuring system grid pattern (MSR) which is being used.
1 —> 1 MSR = 1/1000 mm
2 —> 1 MSR = 1/10000 inch
3 —> 1 MSR = 1/1000 degrees
Example: P0100 = 1 —> 345123 MSR = 345.123 mm
Note: refer to the index entry ”Dimension system”

0101 Actual dimension system

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... displays the currently active measuring system.
If at POWER ON it is identified that P0100 is not equal to P0101, then a measuring system changeover is automatically executed.
Note: refer to the index entry ”Dimension system”

0102 Maximum motor velocity

Min	Standard	Max	Unit	Data type	Effective
1000	30000000	2000000000	c*MSR/min	Unsigned32	immed.

... defines the maximum traversing velocity of the axis, in the mode ”Positioning” and ”n-set, when selecting spindle positioning”
Note: Refer under the index entry ”Closed-loop position control” and ”Spindle positioning ”

0103 Maximum acceleration

Min	Standard	Max	Unit	Data type	Effective
1	100	999999	1000MSR/s^2	Unsigned32	Vsoet_0

... defines the maximum acceleration acting on the axis/spindle when approaching.
The effective acceleration can be programmed in the traversing block via an override (P0083:64).
Note: refer to the index entry ”Position control”

0104 Maximum deceleration

Min	Standard	Max	Unit	Data type	Effective
1	100	999999	1000MSR/s^2	Unsigned32	Vsoet_0

... defines the maximum deceleration on the axis/spindle when braking.
The effective deceleration can be programmed in the traversing block via an override (P0084:64).
Note: refer to the index entry ”Position control”

0107 Jerk limiting (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	100000000	1000MSR/s^2	Unsigned32	Vsoet_0

... defines an increase (jerk) in the form of a ramp for acceleration and deceleration, so that approach and deceleration are ”smooth” (jerk-limited).
The duration of the acceleration ramp (jerk time) is calculated from the higher value of maximum acceleration (P0103) resp. maximum deceleration (P0104) and the jerk limitation set (P0107).
0 Jerk limiting off
> 0 Jerk limiting on, the set value is effective
Note:
– The calculated jerk time which is currently effective is displayed in P1726 (calculated jerk time).
– The jerk time is limited internally to 200 ms.
– Refer to the index entry ”jerk limitation”.

0108 Velocity setpoint jog 1

Min	Standard	Max	Unit	Data type	Effective
–2000000000	–300000	2000000000	c*MSR/min	Integer32	immed.

... defines which setpoint is used for jogging 1.
Note: refer to the input signal ”Jog 1 ON/Jog 1 OFF”

0109 Velocity setpoint jog 2

Min	Standard	Max	Unit	Data type	Effective
–2000000000	300000	2000000000	c*MSR/min	Integer32	immed.

... defines which setpoint is used for jogging 2.
Note: refer to the input signal ”Jog 2 ON/Jog 2 OFF”

0110 Configuration, external block change (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	3	–	Unsigned16	PrgE

... defines the behavior of the ”external block change”.

0
If the signal is not available up to start of braking, then the axis stops in front of the target position and a fault is output (standard).
1
If the signal is not available up to the start of braking, then a flying block change is executed.
2
A signal is only expected at the end of block, and a block change is only made after this has been identified.
3
If the signal is not present up to the end of the block, then the system waits for the signal and when this is identified, the block is changed (from SW 5.1).

Note:
A change made to P0110 is not accepted after v_set=0, but only at the end of the program when the traversing program is restarted.
refer to the index entry ”block step enable – CONTINUE EXTERNAL”

0111 Normalization voltage, override

Min	Standard	Max	Unit	Data type	Effective
5.0	10.0	12.5	V(pk)	Floating Point	immed.

... defines at which input voltage at terminal 56.x/14.x, the override in P0112 is reached.
Prerequisite:
– position setpoint interface (P0700 = 2) or positioning (P0700 = 3) selected
– P0607 = 2 (override)
Example:
P0111 = 10, P0112 = 100 —> for 10 V at terminal 56.x/14.x, the override is 100 percent
Note: refer to the index entry ”Override”

A

0112 Normalization of override

Min	Standard	Max	Unit	Data type	Effective
0	100	255	%	Integer16	immed.

... defines which override is reached when connecting the voltage in P0111 at terminal 56.x/14.x.
Prerequisite:
– Position setpoint interface (P0700 = 2) or positioning (P0700 = 3) selected
– P0607 = 2 (override)
Example:
P0111 = 10, P0112 = 100 —> for 10 V at terminal 56.x/14.x, the override is 100 percent
Note:
refer to the index entry ”Override”

0113 Fixed endstop, configuration 1 (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	3	–	Unsigned16	immed.

... defines the behavior for fixed end stop/clamping torque not reached.

Bit 0 Behavior for fixed end stop not reached
Bit 0 = 1 Block change is executed
The torque limiting is automatically withdrawn. The block step enable is realized as programmed in the block.
Bit 0 = 0 Fault 145 is signaled
The axis is braked and stops in front of the programmed target position.

Bit 1 Characteristics for the clamping torque not reached
Bit 1 = 1 Warning 889 is signaled and a block change executed
The block step enable is realized as programmed in the block.
Bit 1 = 0 Warning 889 is signaled
The block step enable changes as programmed in the block only when the clamping torque has been reached.

Note:
Fault 145 (fixed endstop not reached)
Warning 889 (fixed endstop, axis has not reached the clamping torque)
refer to the index entry ”Travel to endstop”

0114 Fixed endstop, configuration 2 (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... defines how the system can switch into the status ”fixed endstop”.

0 Above following error
The status is automatically reached if the following error exceeds the value set in P0115:8.

1 via input signal
The status is only reached, if it is identified via the input signal ”Fixed endstop sensor”.

Note:
refer to the index entry ”Travel to endstop”

0115:8 Fixed endstop, maximum following error (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	1000	200000000	MSR	Integer32	immed.

... defines at which following error the ”fixed endstop reached” status is recognized.
The ”fixed endstop reached” status is automatically reached, if the following error exceeds the theoretically calculated following error by the value entered in P0115:8.

Note:
Prerequisite: P0114 = 0
refer to the index entry ”Travel to endstop”

0116:8 Fixed endstop, monitoring window (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	100	200000000	MSR	Integer32	immed.

... Defines the monitoring window for the ”fixed endstop reached” status. If the axis exits the positioning window an appropriate fault is signaled.
Note:
refer to the index entry ”Travel to endstop”

0118 Software limit switch configuration (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... defines which fault/warning is signaled if the axis comes to a standstill precisely at the software limit switch.

Bit 0 Behavior for software limit switch reached
Bit 0 = 1 Software limit switch reached with warning 849/850
Move away jogging in the opposite direction or via a traversing block
Bit 0 = 0 Software limit switch reached with fault 119/120
Move away in the opposite direction jogging, and acknowledge the fault.

0120 Teach-in block (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–1	–1	63	–	Integer16	immed.

... specifies whether the block number for the teach in block is entered via input signals or via P0120.
–1 Enter a block number via input signals
0 to 63 Enter the block number via P0120
Note:
refer under the index entry ”Teach-in”

0121 Teach-in standard block (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–1	–1	63	–	Integer16	immed.

... specifies which traversing block is used as teach in in the standard block
The standard block contains additional block data, which are not contained for teach-in.
–1 Not a standard block
Only the position value is transferred into the teach-in block.
0 to 63 Standard block
This block is transferred into the teach-in block and the position value overwritten.
Note:
refer under the index entry ”Teach-in”

0122 Jogging 1 increments (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	1000	200000000	MSR	Integer32	immed.

... specifies the number of increments traversed for incremental jogging 1.
Note:
refer under the index entry ”Jogging – incremental”

0123 Jogging 2 increments (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	1000	200000000	MSR	Integer32	immed.

... specifies the number of increments traversed for incremental jogging 2.
Note:
refer under the index entry ”Jogging – incremental”

0124 Teach-in configuration (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	3	Hex	Unsigned16	immed.

... specifies in which mode teach in is executed.

Bit 0 Automatic block change enable
In this mode, after each successful ”teach-in”, the teach-in block in P0120 is automatically increased.
Bit 0 = 1 On
Bit 0 = 0 Off

Bit 1 Automatic block search
In this mode at ”teach-in” a search is made for the block in P0120.
Bit 1 = 1 On
The block, entered in P0120 or the block selected via the input signals, is re-generated.
Bit 1 = 0 Off
A fault is initiated if the block in P0120 or the block selected via the input signals is not available.

Note:
refer under the index entry ”Teach-in”

0125 Spindle positioning active (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	PO

... switches the ”spindle positioning” function into the mode ”n-set” on/off.
0 De-activate spindle positioning
1 Activate spindle positioning
Note:
refer under the index entry ”Spindle positioning”

0126 Spindle positioning, zero mark tol. window (BERO) (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	7200	360000	MSR	Unsigned32	immed.

... specifies the zero tolerance window in degrees, which is monitored by the spindle positioning, in order to secure, in conjunction with a BERO, the zero mark consistency. If the zero mark is not recognized, or if uneven zero mark clearances are measured which are outside the tolerance, then alarm message 186 or 193 is output, e.g. if the encoder cable is, for example, interrupted.
0 De-activate zero mark monitoring
>0 Zero mark monitoring is activated
Note:
refer under the index entry ”Spindle positioning”

0127 Spindle positioning, setting the internal zero mark (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Integer16	immed.

By setting bit 0 to 1, the zero mark offset to the hardware zero mark is entered into P0128. After this, 0 is written back into P0127.
Note:
refer under the index entry ”Spindle positioning”

0128 Spindle positioning offset, zero (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
–2147483647	0	2147483647	MSR	Integer32	immed.

Difference to the hardware zero mark is entered and displayed in degrees

0129 Spindle positioning, tolerance search velocity (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	1000000	2147483647	c*MSR/min	Unsigned32	immed.

This means that a tolerance in degrees/min (+/–) is specified, which must be reached in order to synchronize or to change-over to closed-loop position control
Note:
refer under the index entry ”Spindle positioning”

0130 Spindle positioning, lowest search velocity (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	100	100	%	Unsigned16	immed.

... is used to enter a percentage value referred to the specified minimum search velocity (P0082), which must be reached, so that the spindle can be positioned.
Note:
refer under the index entry ”Spindle positioning”

0131 Spindle positioning, motion window (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	2000	20000	MSR	Unsigned32	immed.

If the spindle is pushed out of this positioning window in degrees with the controller inhibited, after the controller is enabled, the axis is re-positioned (as defined in the traversing block). If the spindle remains in the positioning window, it is positioned through the shortest distance.
Note:
refer under the index entry ”Spindle positioning”

0132 Spindle positioning, zero mark difference (BERO) (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

... indicates the clearance between two consecutive BERO zero marks in degrees.
Note:
refer under the index entry ”Spindle positioning”

A

0133 Spindle positioning, max. search velocity (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
1000	36000000	2147483647	c*MSR/min	Unsigned32	immed.

... defines the maximum reference velocity in degrees/min.
Note:
refer under the index entry ”Spindle positioning”

0134 Spindle positioning, positioning window reached (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	2000	20000	MSR	Unsigned32	immed.

... defines the tolerance range in degrees for the ”Spindle position reached” output signal (Fct. No. 59 or PROFIBUS-DP MeldW.15). The position reference value is compared with the position actual value.
Note:
refer under the index entry ”Spindle positioning”

0136 Spindle positioning active/inative (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... indicates whether the ”spindle positioning” function is active or inactive.
0 Spindle positioning is not active
1 Spindle positioning is active
Note:
refer under the index entry ”Spindle positioning”

0137 Spindle positioning status (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... indicates the actual status for spindle positioning.
0 Spindle positioning is not activated
1 Status after the spindle positioning command
2 reserved
3 Approach to search velocity, if necessary, the zero mark is searched for
4 Position controller is switched-in
5 Positioning starts
6 Target position is reached
7 Pulse inhibit
Note:
refer under the index entry ”Spindle positioning”

0160 Reference point coordinate

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	immed.

... specifies the position value which is set as the actual axis position after referencing or adjustment.
Note:
The range for an absolute value encoder is limited to +–2048 revolutions. The value which was entered into P0160, is limited to this value and after POWER ON is overwritten with another value (remainder of division by 2048).
refer under the index entry ”Referencing/adjusting”

0161 Stopping at marks (–> 8.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PrgE

... defines the behavior when stopping at marks.
0 The reference point approach (homing) is not interrupted at marks (standard).
1 The reference point approach (homing) remains stationary if the first or, for distance-coded measuring systems, the second zero mark was found.

0162 Reference point offset

Min	Standard	Max	Unit	Data type	Effective
–200000000	–2000	200000000	MSR	Integer32	PrgE

For incremental measuring systems, after the reference zero pulse has been detected, the axis is moved through this distance. At this position the axis has reached the reference point and accepts the reference points coordinates (P0160) as new actual value.
Note: refer to the index entry ”Reference point approach”

0163 Reference point approach velocity

Min	Standard	Max	Unit	Data type	Effective
1000	5000000	2000000000	c*MSR/min	Unsigned32	PrgE

The axes moves with this velocity after starting reference point approach, towards the reference cam.
The velocity must be set, so that after the reference cam has been reached, and subsequent braking, the following conditions are fulfilled:
– the axis must come to a standstill direct at the reference cam
– when braking it is not permissible that the HW limit switch is reached
Note: refer to the index entry ”Reference point approach”

0164 Reference point creep speed

Min	Standard	Max	Unit	Data type	Effective
1000	300000	2000000000	c*MSR/min	Unsigned32	PrgE

Between identifying the reference cam and synchronization with the first zero pulse, the axis moves with this velocity (zero reference pulse).
Note: refer to the index entry ”Reference point approach”

0165 Reference point entry velocity

Min	Standard	Max	Unit	Data type	Effective
1000	300000	2000000000	c*MSR/min	Unsigned32	PrgE

Between synchronizing with the first zero pulse (zero reference pulse) and reaching the reference point, the axis moves with this velocity.
Note: refer to the index entry ”Reference point approach”

0166 Reference cam approach direction

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PrgE

... defines in which direction the reference cam (for axes with reference cams, P0173 = 0) or the zero pulse (for axes without reference cams, P0173 = 1) is approached/searched.
1 Negative direction
0 Positive direction
Note: refer to the index entry ”Reference point approach”

0167 Invert, reference cams

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... the switching characteristics of the reference cam signal (input terminal with function number 78) is adapted.
1 Inverted
0 Not inverted
Note: refer to the index entry ”Reference point approach” and ”Invert reference cam signal”

0170 Maximum distance to the reference cam

Min	Standard	Max	Unit	Data type	Effective
0	10000000	200000000	MSR	Unsigned32	PrgE

... specifies the max. distance the axis can travel from starting the reference point approach in order to find the reference cam.
Note: refer to the index entry ”Reference point approach”

0171 Max. distance up to the zero pulse

Min	Standard	Max	Unit	Data type	Effective
0	20000	200000000	MSR	Unsigned32	PrgE

... specifies the maximum distance that the axis can traverse from leaving the reference (homing) cam or from the start, in order to find the zero pulse.
Note: refer to the index entry ”Reference point approach”

0172 Distance up to the zero pulse

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Unsigned32	RO

... the distance moved from leaving the reference cam or from the start up to reaching the zero pulse is entered.
The parameter supports, at stars-up, reference cam adjustments.
Note: refer to the index entry ”Reference point approach” and ”Reference cam adjustment”

0173 Reference point approach without reference cams

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PrgE

0 Reference cam available
1 No reference cam available
Note: refer to the index entry ”Reference point approach”

0174 Referencing mode, position measuring system

Min	Standard	Max	Unit	Data type	Effective
1	1	2	–	Unsigned16	immed.

1 Incremental measuring system available
2 Incremental measuring system with equivalent zero mark available
(e. g. BERO at input terminal I0.x)
Note: refer to the index entry ”Referencing/adjustment”

0175 Adjustment status – absolute position measuring system

Min	Standard	Max	Unit	Data type	Effective
0	0	4	–	Integer16	immed.

... displays the status when adjusting the absolute value encoder.
–1 Error occured when adjusting
0 Absolute value encoder is not adjusted (pre-setting at the first stars-up)
1 Absolute value encoder has not yet been adjusted (encoder adjustment has been initiated)
2 Absolute encoder is adjusted (before SW 3.1)
3 Absolute value encoder IM is adjusted (from SW 3.1)
4 Absolute encoder DM is adjusted (from SW 3.3)
Note: refer to the index entry ”Adjusting the absolute value encoder”

0179 Mode, passive referencing (–> 5.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	immed.

... specifies the mode for passive referencing.
0 Accept reference point coordinate (P0160)
1 Initiate start-up help for passive referencing
2 Value after initiating the start-up help
Move through the offset (P0162) and accept the reference point coordinate (P0160)
Note:
For a rigid mechanical coupling between the master and slave axis, it is not permissible that P0179 is set to 2 if the slave drive is equipped with an absolute value encoder. Otherwise, the slave drive would move to an absolute position as specified in P0160.
refer to the index entry ”Passive referencing”

0200:8 Kv factor (position loop gain)

Min	Standard	Max	Unit	Data type	Effective
0.0	1.0	300.0	1000/min	Floating Point	immed.

... defines at which traversing velocity of the axis/spindle which following error is obtained.
Kv factor Significance
Low: Slow response to a setpoint-actual value difference, following error is high
High: Fast response to a setpoint-actual value difference, following error is low
Note:
The following diagnostic parameters are available:
– P0029 (following error)
– P0030 (system deviation, position controller input)
– P0031 (actual Kv factor (position loop gain))
refer to the index entry ”Kv factor” or ”Diagnostics of the motion status”

0201 Backlash compensation

Min	Standard	Max	Unit	Data type	Effective
–20000	0	20000	MSR	Integer32	immed.

... switches the backlash compensation in/out and defines the backlash amount for a positive or negative backlash.
0 Backlash compensation is disabled
> 0 Positive backlash (normal case)
< 0 Negative backlash
Note: refer to the index entry ”Backlash compensation”

0203 Speed feedforward control mode

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

1 Speed feedforward control active
0 Feedforward control inactive
Note: refer to the index entry ”speed feedforward control”

0204:8 Speed feedforward control factor

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed.

... the additionally entered speed setpoint is weighted.
If the axis control loop has been optimally set, and the equivalent time constant of the speed control loop has been precisely determined, the pre-control factor is 100%.
Note: refer to the index entry ”speed feedforward control”

A

0205:8 Balancing filter, speed feedforward control (deadtime)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	10.0	ms	Floating Point	immed.

... allows the time characteristics of the closed speed control loop to be simulated using a deadtime.
The entered value is limited to two position controller cycles (P1009).
Note: refer to the index entry ”speed feedforward control”

0206:8 Balancing filter, speed feedforward control (PT1)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100.0	ms	Floating Point	immed.

... permits, in addition to P0205:8, the closed speed control loop to be simulated using a PT1 filter (low pass).
Note: refer to the index entry ”speed feedforward control”

0210:8 Time constant, position setpoint filter

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	1000.0	ms	Floating Point	immed.

... is the time constant of the PT1 position setpoint filter.
The effective Kv factor (position loop gain) can be reduced using the filter.
Note: refer to the index entry ”speed feedforward control”

0231 Position actual value inversion

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO

... the control sense of the position controller is established.
1 Position actual value inversion
0 No position actual value inversion
If the position controller control sense is not OK, then the position actual value must be inverted.
The direction of motion is set using P0232 (position setpoint inversion).
Note: refer to the index entry ”Direction adaptation”

0232 Position setpoint inversion

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO

... the required motion direction is set.
1 Position setpoint inversion
0 No position setpoint inversion
Note:
The control direction of the position controller remains unaffected, i.e. it is internally taken into account (refer to the index entry ”Direction adaptation”).

0236 Spindle pitch

Min	Standard	Max	Unit	Data type	Effective
1	10000	8388607	MSR/rev	Unsigned32	PO

Note: refer to the index entry ”Encoder adaptation”

0237:8 Encoder revolutions

Min	Standard	Max	Unit	Data type	Effective
1	1	8388607	–	Unsigned32	PO

... specifies the ratio (Ü) between the encoder and load.
Ü = P0237:8 / P0238:8
Note: refer to the index entry ”Encoder adaptation”

0238:8 Load revolutions

Min	Standard	Max	Unit	Data type	Effective
1	1	8388607	–	Unsigned32	PO

... specifies the ratio (Ü) between the encoder and load.
Ü = P0237:8 / P0238:8
Note: refer to the index entry ”Encoder adaptation”

0239 Re-reference or re-adjust only if necessary (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

0 Referencing or adjustment is withdrawn when changing the parameter set (standard)
1 Referencing or adjustment is only withdrawn when the parameter set is changed if the mechanical ratio (Ü = P0237:8 / P0238:8) changes.
Note: refer under the index entry ”Referencing or adjustment”

0241 Activating, modulo conversion, rotary axis (SRM ARM) (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO (SRM ARM)

1 Modulo conversion activated, modulo correction is executed according to P0242
0 Modulo conversion de-activated
Note:
refer to the index entry ”rotary axis with modulo offset”

0242 Modulo range, rotary axis (SRM ARM) (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
1	360000	100000000	MSR	Unsigned32	PO (SRM ARM)

... defines the modulo range of the rotary axis.
Practical modulo range values are: n * 360 degrees with n = 1, 2, ...
Note:
refer to the index entry ”rotary axis with modulo offset”

0250 Activate direct measuring system (SRM ARM) (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO (SRM ARM)

... the direct measuring system at X412 is activated/deactivated for drive A.
1 Direct measuring system activated (only drive A)
0 Direct measuring system deactivated
Note:
refer to the index entry ”Direct measuring system”

0310 Cam switching position 1

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	immed.

... the cam switching position 1 is set.
Note: refer to the index entry ”Position-related switching signals (cams)”

0311 Cam switching position 2

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	immed.

... the cam switching position 2 is set.
Note: refer to the index entry ”Position-related switching signals (cams)”

A

0314 Activating software limit switch

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PrgE

1 Software limit switch active
0 Software limit switch inactive (e.g. necessary for a rotary axes)
Note:
With P0314=0, for a linear axis, the software limit switch monitoring remains active. Only the limits are set to +–200000000.

0315 Minus software limit switch

Min	Standard	Max	Unit	Data type	Effective
–200000000	–200000000	200000000	MSR	Integer32	PrgE

... the position for the software limit switch is set to minus.
Note:
P0315 (minus software limit switch) < P0316 (plus software limit switch)

0316 Plus software limit switch

Min	Standard	Max	Unit	Data type	Effective
–200000000	200000000	200000000	MSR	Integer32	PrgE

... the position for the software limit switch is set to plus.
Note:
P0315 (minus software limit switch) < P0316 (plus software limit switch)

0318:8 Dynamic following error monitoring tolerance

Min	Standard	Max	Unit	Data type	Effective
0	1000	200000000	MSR	Unsigned32	immed.

... defines the maximum deviation between the measured and the calculated position actual value before an error is output.
>= 1 The dynamic following error monitoring is active with this value
0 Monitoring is de-activated
Note: refer to the index entry ”Dynamic following error monitoring”

0320 Position monitoring time

Min	Standard	Max	Unit	Data type	Effective
0	1000	100000	ms	Floating Point	immed.

... defines the time after which the following error must be within the positioning window (P0321).
Note: refer to the index entry ”Positioning monitoring”

0321 Positioning window

Min	Standard	Max	Unit	Data type	Effective
0	40	20000	MSR	Unsigned32	immed.

... defines the positioning window, within which the position actual value must be located after the position monitoring time has expired (P0320).
>= 1 The position monitoring is active with this value
0 Monitoring is de-activated
Note: refer to the index entry ”Positioning monitoring”

0325 Standstill monitoring time

Min	Standard	Max	Unit	Data type	Effective
0	400	100000	ms	Floating Point	immed.

... defines the time after which the following error must be within the standstill window (P0326).
Note: refer to the index entry ”Standstill monitoring”

0326 Standstill window

Min	Standard	Max	Unit	Data type	Effective
0	200	20000	MSR	Unsigned32	immed.

... defines the standstill window, in which the position actual value must be after the standstill monitoring time has expired (P0325).

>= 1 The standstill monitoring is active with this value

0 Monitoring is de-activated

Note: refer to the index entry ”Standstill monitoring”

0338 Fault response, illegal input signals (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
0	1	2	Hex	Unsigned16	immed.

... defines the fault response which is initiated for an illegal combination of input signals.

Example: When starting a traversing block, the input signal ”Operating conditions/reject traversing task” is not set.

0 No output

1 A warning is output

2 Fault 196 is output with the warning number as supplementary information

This involves signal combinations, which result in warnings 804,805,806,807,808,809,840,845.

0400 Reference point coordinates, master drive (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	immed.

... defines the reference point coordinates of the master drive.

0401 Coupling factor, master drive revolutions (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
1	1	8388607	–	Unsigned32	PO

... defines the coupling factor between the master and slave drive.

0402 Coupling factor slave drive revolutions (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
1	1	8388607	–	Unsigned32	PO

... defines the coupling factor between the master and slave drive.

0410 Configuration, coupling which can be switched-in (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
1	1	8	–	Unsigned16	PO

... defines the switch-on and type coupling.
1 Coupling via digital input signal, speed-synchronous
2 Coupling via digital input signal, position-synchronous + P0412
3 Coupling via traversing program, speed-synchronous
4 Coupling via traversing program, position-synchronous +P0412
5 Coupling via traversing program with queue functionality speed-synchronous (being prepared)
6 Coupling via traversing program with queue functionality position synchronous + P0412 (being prepared)
7 Coupling via digital input signal to absolute position of the master drive + P0412 (from SW 4.1)
8 Coupling via traversing program to absolute position of the master drive + P0412 (from SW 4.1)
Note:
For P0410 = 7 or 8, it is necessary to signal the absolute position P0400 of the master drive to the slave drive using the input signal ”set setpoint, master drive”.
refer under the index entry ”axis couplings”

0412 Synchronous offset position (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	immed.

... defines an offset between the slave drive and the synchronous position to the master drive.
Note:
If P0412 is changed, it becomes effective the next time that the coupling is switched-in.
refer under the index entry ”axis couplings”

0413 Offset, synchronous velocity (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
1000	30000000	2000000000	MSR	Integer32	immed.

... defines with which additional velocity the slave drive corrects the following error, built-up during the synchronization phase, and the synchronous offset position P0412.
Note:
refer under the index entry ”axis couplings”

0420 Pos. differ., meas. probe to the zero point, slave drive (–> 3.5)

Min	Standard	Max	Unit	Data type	Effective
–200000000	0	200000000	MSR	Integer32	PO

... for couplings with queue functionality, specifies the clearance between the measuring probe and the zero point of the slave drive.
Note:
refer under the index entry ”axis couplings”

0425:16 Coupling positions (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	Integer32	RO

The following is valid for couplings without queue functionality:
The position of the master drive, at which the coupling was requested, is located in P0425:0.
For couplings with queue functionality (from SW 3.5) the following is valid:
The measured distances to the actual slave drive position are entered into P0425:16.
Note:
refer under the index entry ”axis couplings”

0599 Active motor data set (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... displays whether the motor changeover has been enabled, and which motor data set is active.
0 Motor changeover inhibited (P1013 = 0)
1 Motor data set 1 (P1xxx) active
2 Motor data set 2 (P2xxx) active
3 Motor data set 3 (P3xxx) active
4 Motor data set 4 (P4xxx) active
Note: refer to the index entry ”Motor changeover”

0600 Operating display

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... displays the actual operating status of the unit.
Note:
refer to the index entry ”Operating display” for the significance of the segments on the display unit.

0601 Motor speed setpoint (ARM SRM) Velocity setpoint, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	m/min	Floating Point	RO	(SLM)
–	–	–	rpm	Floating Point	RO	(SRM ARM)

... is used to display the unfiltered summed setpoint for speed or velocity of the motor.

0602 Actual motor speed (ARM SRM) Velocity actual value, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	m/min	Floating Point	RO	(SLM)
–	–	–	rpm	Floating Point	RO	(SRM ARM)

... is used to display the unfiltered actual value for speed or velocity of the motor.

0603 Motor temperature

Min	Standard	Max	Unit	Data type	Effective
–	–	–	°C	Integer16	RO

... displays the motor temperature measured via the temperature sensor.
Note:
The display is invalid if a fixed temperature was entered in P1608.

0604 Utilization, motor

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

This parameter is used to display the motor utilization.
The ratio between the ”Torque setpoint M” and ”Actual torque limit Mmax” or ”Force setpoint F” and ”Actual force limit Fmax” is displayed.
Values of less than 100% indicate the system reserve.
Note:
The motor utilization display is smoothed using a PT1 filter (P1251).

0606 Voltage at term. 56.x/14.x

Min	Standard	Max	Unit	Data type	Effective
–	–	–	V(pk)	Floating Point	RO

... displays the analog voltage presently available at this input terminal.

A

0607 Analog setpoint term. 56.x/14.x

Min	Standard	Max	Unit	Data type	Effective
0	1	2	–	Unsigned16	immed.

... defines whether and how the analog setpoint is used at this analog input.
0 off
1 n-set/M-set operation (speed or torque setpoint interface, refer to Note)
2 Override (position setpoint interface and positioning)
Note:
It is always possible to toggle between n-set/M-set operation using the "Open-loop torque-controlled operation" input signal.
Analog setpoint for n-set/M-set —-> refer to the index entry "Analog inputs"
Analog setpoint for velocity override —-> refer to the index entry "Override"

0608 Inversion term. 56.x/14.x

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

An inversion inverts the polarity of the analog setpoint at this terminal internally.
1 Inverted
0 Not inverted

0609 Smoothing time, terminal 56.x/14.x

Min	Standard	Max	Unit	Data type	Effective
0.0	3.0	1000.0	ms	Floating Point	immed. (ARM)
0.0	0.0	1000.0	ms	Floating Point	immed. (SRM SLM)

This allows the output value of the A/D converter to be smoothed using a PT1 filter.

0610 Drift/offset correction term. 56.x/14.x

Min	Standard	Max	Unit	Data type	Effective
–9999.9	0.0	9999.9	mV(pk)	Floating Point	immed.

If the motor erroneously rotates when a speed setpoint of 0 V is entered, a voltage offset can be applied to set the analog input to zero using this parameter.

0611 Voltage at term. 24.x/20.x

Min	Standard	Max	Unit	Data type	Effective
–	–	–	V(pk)	Floating Point	RO

... displays the analog voltage presently available at this input terminal.

0612 Analog setpoint term. 24.x/20.x

Min	Standard	Max	Unit	Data type	Effective
0	0	3	–	Unsigned16	immed.

... defines whether and how the analog setpoint is used at this analog input.
0 off
1 n-set/M-set operation (refer to Note)
2 M-red operation
3 Equalization controller operation
Note:
It is always possible to toggle between n-set/M-set operation using the "Open-loop torque controlled mode" input signal.
Analog setpoint for n-set/M-set/M-red —-> refer to the index entry "Analog inputs"
Analog setpoint for velocity override —-> refer to the index entry "Override"

0613 Inversion term. 24.x/20.x

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

An inversion inverts the polarity of the analog setpoint at this terminal internally.
1 Inverted
0 Not inverted

0614 Smoothing time, terminal 24.x/20.x

Min	Standard	Max	Unit	Data type	Effective
0.0	3.0	1000.0	ms	Floating Point	immed. (ARM)
0.0	0.0	1000.0	ms	Floating Point	immed. (SRM SLM)

This allows the output value of the A/D converter to be smoothed using a PT1 filter.

0615 Drift/offset correction term. 24.x/20.x

Min	Standard	Max	Unit	Data type	Effective
–9999.9	0.0	9999.9	mV(pk)	Floating Point	immed.

If the motor erroneously rotates when a speed setpoint of 0 V is entered, a voltage offset can be applied to set the analog input to zero using this parameter.

0616:8 Ramp-function generator ramp-up time

Min	Standard	Max	Unit	Data type	Effective
0.0	2.0	600.0	s	Floating Point	immed. (ARM)
0.0	0.0	600.0	s	Floating Point	immed. (SRM SLM)

During ramp-up, the setpoint is increased from zero to the maximum permissible actual speed.
Note:
Max. permissible actual speed for synchronous motors: Minimum from 1.2 x P1400 and P1147
Max. permissible actual speed for induction motors: Minimum from P1146 and P1147
refer to the index entry ”Ramp-function generator”.
From SW 2.4, this parameter is replaced by P1256:8 (P0616:8 = P1256:8).

0617:8 Ramp-function generator ramp-down time

Min	Standard	Max	Unit	Data type	Effective
0.0	2.0	600.0	s	Floating Point	immed. (ARM)
0.0	0.0	600.0	s	Floating Point	immed. (SRM SLM)

During ramp-down, the setpoint is reduced from the maximum permissible actual speed to zero.
Note:
Max. permissible actual speed for synchronous motors: Minimum from 1.2 x P1400 and P1147
Max. permissible actual speed for induction motors: Minimum from P1146 and P1147
refer to the index entry ”Ramp-function generator”.
From SW 2.4 this parameter is replaced by P1257:8 (P0617:8 = P1257:8).

A

0618 Normalization voltage, speed setpoint

Min	Standard	Max	Unit	Data type	Effective
5.0	9.0	12.5	V(pk)	Floating Point	immed.

This defines at which input voltage at terminal 56.x/14.x and/or terminal 24.x/20.x, the maximum useful motor speed (P1401:8, dependent on the motor data set) is reached for closed-loop speed controlled operation.

Example:
SRM: P0618 = 9, P1401:8 = 2000 –> at 9 V, the motor speed is 2000 RPM
SLM: P0618 = 9, P1401:8 = 120 –> at 9 V, the motor velocity is 120 m/min

0619 Normalization voltage, torque setpoint (ARM SRM) Normalization voltage, force setpoint (SLM)

Min	Standard	Max	Unit	Data type	Effective
5.0	10.0	12.5	V(pk)	Floating Point	immed.

This defines at which input voltage at terminal 56.x/14.x and/or terminal 24.x/20.x for open-loop torque controlled operation, the normalization of the torque setpoint (P1241:8) is reached.

Example:
SRM: P0619 = 10, P1241:8 = 10 Nm –> at 10 V, the torque is 10 Nm
SLM: P0619 = 10, P1241:8 = 1720 N –> at 10 V, the force is 1720 N

0620 Normalization voltage, torque/power reduction. (ARM SRM) Normalization voltage, force/power reduction (SLM)

Min	Standard	Max	Unit	Data type	Effective
5.0	10.0	12.5	V(pk)	Floating Point	immed.

The parameter defines at which input voltage of terminal 24.x/20.x, the normalization, torque reduction (P1243:8, motor data set-dependent) is reached.

0623 DAC normalization, actual speed (ARM SRM) DAC normalization, motor actual velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
–200.0	100.0	200.0	%	Floating Point	immed.

If signal number 34 (actual motor speed, finely normalized) is selected for the analog output, when the maximum speed is reached, the following voltage is output as a function of parameter P0623:
P0623 = 100% –> 1.0 * 10 V = +10 V
P0623 = 50% –> 0.5 * 10 V = +5 V
The following is valid for the maximum speed:
Max. permissible actual speed for synchronous motors: Minimum from 1.2 x P1400 and P1147
Max. permissible actual speed for induction motors: Minimum from P1146 and P1147

0624 DAC normalization, motor utilization

Min	Standard	Max	Unit	Data type	Effective
–200.0	100.0	200.0	%	Floating Point	immed.

If signal number 35 (utilization, finely-normalized) is selected for the analog output, then when the motor is utilized to 100%, the following voltage is output dependent on P0624:
P0624 = 100% –> 1.0 * 10 V = +10 V
P0624 = 50% –> 0.5 * 10 V = +5 V
Note:
Motor utilization —> refer to P0604

0625 DAC normalization, torque setpoint (ARM SRM) DAC normalization, force setpoint (SLM)

Min	Standard	Max	Unit	Data type	Effective
–200.0	100.0	200.0	%	Floating Point	immed.

If the signal number 36 (torque setpoint, finely-normalized) is selected for the analog output, then at twice the rated torque, the following voltage is output dependent on P0625:
P0625 = 100% –> +10 V
P0625 = 50% –> +5 V
Note: Signal No. 36 is output signed.

0626 Signal number analog output term. 75.x/15

Min	Standard	Max	Unit	Data type	Effective
0	34	530	–	Unsigned16	immed.

... defines which signal is output via terminal 75.x/15.
In this case the appropriate signal number must be entered from the ”Signal selection list for analog output”.
Note: refer to the index entry ”Analog outputs”

0627 Shift factor analog output term. 75.x/15

Min	Standard	Max	Unit	Data type	Effective
0	0	47	–	Unsigned16	immed.

... defines the shift factor, with which the analog signal is manipulated.
An 8 bit window of the 24/48 bit signal can be represented via the DAC. Thus, the shift factor must be used to define which window of the internal 24/48 bit is to be displayed.
Note: refer to the index entry ”Analog outputs”

0628 Offset analog output term. 75.x/15

Min	Standard	Max	Unit	Data type	Effective
–128	0	127	–	Integer16	immed.

... specifies an offset for the 8-bit output signal.
Note: refer to the index entry ”Analog outputs”

0629 Segment address analog output term. 75.x/15

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	immed.

Note: Internal Siemens

0630 Offset address analog output term. 75.x/15

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note: Internal Siemens

0631 Bias protection, analog output, term. 75.x/15

Min	Standard	Max	Unit	Data type	Effective
0	1	1	–	Unsigned16	immed.

... switches the bias protection on or off.
1 bias protection on
The bits above the 8-bit window result in an output of +10 V or –10 V, i. e. the output cannot be over-modulated.
0 bias protection off
The bits above the 8-bit window are ignored.
The analog value is defined exclusively by the 8-bit value, i.e. the output can be overmodulated.
Note: refer to the index entry ”Analog outputs”

0632 Smoothing time, analog output, terminal 75.x/15

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	1000.0	ms	Floating Point	immed.

... smooths the output signal with a 1st order proportional element (PT1 element, low pass filter).
0.0 filter is inactive
Note: refer to the index entry ”Analog outputs”

A

0633 Signal number analog output term. 16.x/15

Min	Standard	Max	Unit	Data type	Effective
0	35	530	–	Unsigned16	immed.

Note: refer to the description of P0626 for terminal 75.x/15

0634 Shift factor analog output term. 16.x/15

Min	Standard	Max	Unit	Data type	Effective
0	0	47	–	Unsigned16	immed.

Note: refer to the description of P0627 for terminal 75.x/15

0635 Offset analog output term. 16.x/15

Min	Standard	Max	Unit	Data type	Effective
–128	0	127	–	Integer16	immed.

Note: refer to the description of P0628 for terminal 75.x/15

0636 Segment address analog output term. 16.x/15

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	immed.

Note: Internal Siemens

0637 Offset address analog output term. 16.x/15

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note: Internal Siemens

0638 Bias protection, analog output, term. 16.x/15

Min	Standard	Max	Unit	Data type	Effective
0	1	1	–	Unsigned16	immed.

Note: refer to the description of P0631 for terminal 75.x/15

0639 Smoothing time, analog output, terminal 15.x/15

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	1000.0	ms	Floating Point	immed.

Note: refer to the description of P0632 for terminal 75.x/15

0641:16 Fixed speed setpoint (ARM SRM) Fixed velocity setpoint (SLM) (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
–100000.0	0.0	100000.0	m/min	Floating Point	immed. (SLM)
–100000.0	0.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

... is used to set the fixed speed setpoints 1 to 15. The required fixed setpoint is selected via the ”fixed speed setpoint 1st to 4th input” input signals.

The following is valid:

P0641:0	no meaning
P0641:1	Fixed setpoint 1, selection via input signals
P0641:2	Fixed setpoint 2, selection via input signals, etc.

0649 Delete parameters, drives A and B (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO

... all parameters (user data) can be erased in the memory module FEPROM. After the FEPROM has been erased, the control board is in the condition when it was originally supplied.

0 Standard value
1 All of the parameters are to be erased (establish the status when initially supplied)

Proceed as follows to delete all of the parameters:
– Disable pulse and controller enable (e.g. via terminal 663, 65.A and 65.B)
– Remove write protection (P0651 = 10 hex, only for operator control and display unit)
– Activate erasion of all parameters in the FEPROM (P0649 = 1)
– Starting writing into the FEPROM (P0652 = 1)
– Execute a HW POWER-ON RESET
After run-up, the board is set to the status when it was first supplied.

0651 Read and write protection

Min	Standard	Max	Unit	Data type	Effective
0	0	10	Hex	Unsigned16	immed.

This defines which parameters can be read (visible) and which can be written into.
0 Parameters can be read for standard installation & startup (operator prompting)
1 Parameters for standard installation & startup (operator prompting) can be read and written into
2 All parameters can be read
4 All parameters can be read and written to
(Exception: motor data parameters cannot be written into)
8 Motor data parameters can be read and written into
10 All parameters (including the motor data) can be read and written into
Note:
The read and write protection is significant when parameterizing via the display and operator control unit.

0652 Transfer to FEPROM

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... the parameter values from the RAM can be transferred into the FEPROM.
0 –> 1 The values in the RAM are written into the FEPROM
1 Data backup runs, other parameters cannot be selected
Note:
The parameter is automatically set to 0 at the end of data backup.

A

0653 Image, input signals, Part 1

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected input signals (terminal and PROFIBUS signals).
Bit 0 ON/OFF 1
Bit 1 Operating condition/OFF 2
Bit 2 Operating condition/OFF 3
Bit 3 Enable inverter/pulse inhibit
Bit 4 Ramp-function generator enable <—> operating condition/reject traversing task
Bit 5 Start ramp-function generator/stop <—> operating condition/intermediate stop
Bit 6 Enable setpoint <—> activate traversing task (edge)
Bit 7 Reset fault memory
Bit 8 Jog 1 ON/OFF
Bit 9 Jog 2 ON/OFF
Bit 10 Control requested/no control requested
Bit 11 Start referencing/cancel referencing
Bit 12 Open holding braking as test/do no open
Bit 13 Ramp-up time zero for controller enable <—> external block change
Bit 14 Torque-controlled operation
Bit 15 Spindle positioning on <—> request passive referencing
Bit 16 Signal status, terminal 65.x
Bit 17 Supply infeed module, signal status terminal 64
Bit 18 Signal status terminal 663
Bit 19 Line supply infeed module signal status terminal 63/terminal 48
Bit 21 Equivalent zero mark
Bit 22 Flying measurement/length measurement
Note:
<—>: Signal in ”speed/torque setpoint” <—> in ”positioning”
/: 1 signal/0 signal

0654 Image, input signals, Part 2

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected input signals (terminal and PROFIBUS signals).

Bit 0 Parameter set changeover, 1st input
Bit 1 Parameter set changeover, 2nd input
Bit 2 Parameter set changeover, 3rd input
Bit 3 First speed setpoint filter out
Bit 4 Ramp-up time zero
Bit 5 Reserved for Siemens (smooth running monitoring)
Bit 6 Integrator inhibit, speed controller
Bit 7 Select parking axis
Bit 8 Suppress fault 608
Bit 9 Motor data set changeover, 1st input
Bit 10 Motor data set changeover, 2nd input
Bit 11 Motor changed-over
Bit 12 Tracking operation
Bit 13 Set reference point
Bit 14 Reference cams
Bit 15 Fixed end stop, sensor
Bit 16 Hardware limit switch, plus
Bit 17 Hardware limit switch, minus
Bit 18 Fixed speed setpoint, 1st input <—> block selection, 1st input
Bit 19 Fixed speed setpoint, 2nd input <—> block selection, 2nd input
Bit 20 Fixed speed setpoint, 3rd input <—> block selection, 3rd input
Bit 21 Fixed speed setpoint, 4th input <—> block selection, 4th input
Bit 22 Block selection, 5th input
Bit 23 Block selection, 6th input

Note:
<—>: Signal in ”speed/torque setpoint” <—> in ”positioning”

0655 Image, input signal Part 3 (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected input signals (terminal and PROFIBUS signals).

Bit 0 Activate coupling
Bit 1 Jogging incremental
Bit 2 Activate teach-in
Bit 3 Invert input pulses, angular encoder interface
Bit 11 angular incremental encoder handwheel evaluation, bit 0 (from SW 8.1)
Bit 12 angular incremental encoder handwheel evaluation, bit 1 (from SW 8.1)
Bit 13 activate angular incremental encoder handwheel (from SW 8.1)
Bit 17 Activate MDI (from SW 7.1)
Bit 21 Activate coupling via I0.x
Bit 22 Set position reference value

A

0656 Image, output signals, Part 1

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected output signals (terminal and PROFIBUS signals).
Bit 0 Ready to power-on/not ready to power-on
Bit 1 Ready or no fault
Bit 2 Status controller enable
Bit 3 Fault present/fault not present
Bit 4 No OFF 2 present/OFF 2 present
Bit 5 No OFF 3 present/OFF 3 present
Bit 6 Power-on inhibit/no power-on inhibit
Bit 7 Alarm present/no alarm present
Bit 8 n_set = n_act <—> no following error/following error
Bit 9 Control request/control not possible
Bit 10 Comparison value reached <—> reference position reached
Bit 11 Reference point set/no reference point set
Bit 12 Setpoint acknowledgement (edge)
Bit 13 Function generator active <—> drive stationary/drive moves
Bit 14 Torque-controlled operation <—> External block change
Bit 15 Spindle positioning on <—> request passive referencing
Note:
<—>: Signal in ”speed/torque setpoint” <—> in ”positioning”
/: 1 signal/0 signal

0657 Image, output signals, Part 2

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected output signals (terminal and PROFIBUS signals).
Bit 0 Status, parameter set, 1st output
Bit 1 Status parameter set, 2nd output
Bit 2 Status parameter set, 3rd output
Bit 3 First speed setpoint filter inactive
Bit 4 Ramp-function generator inactive
Bit 5 Open holding brake
Bit 6 Integrator inhibit, speed controller
Bit 7 Parking axis selected
Bit 8 Suppress fault 608 active
Bit 9 Actual motor, 1st signal
Bit 10 Actual motor, 2nd signal
Bit 11 Motor being changed-over <—> angular incremental encoder handwheel evaluation, bit 0 (from SW 8.1)
Bit 12 Angular incremental encoder handwheel evaluation, bit 1 (from SW 8.1)
Bit 13 Angular incremental encoder handwheel active (from SW 8.1)
Bit 14 Block processing inactive
Bit 17 MDI active (from 7.1)
Bit 18 Status, block selection, 1st output
Bit 19 Status block selection, 2nd output
Bit 20 Status, block selection, 3rd output
Bit 21 Status, block selection, 4th output
Bit 22 Status block selection, 5th output
Bit 23 Status, block selection, 6th output
Note:
<—>: Signal in ”speed/torque setpoint” <—> in ”positioning”

0658 Image, output signals, Part 3

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... is an image of selected output signals (terminal and PROFIBUS signals).
Bit 0 Ramp-up completed
Bit 1 |M| < M_x (P1428:8, P1429)
Bit 2 |n_act| < n_min (P1418:8)
Bit 3 |n_act| < n_x (P1417:8)
Bit 4 V_DC link < V_x (P1604)
Bit 5 Variable signaling function
Bit 6 Motor temperature alarm (P1602)
Bit 7 Heatsink temperature pre-alarm
Bit 8 n_set = n_act (P1426, P1427)
Bit 9 Fixed end stop reached
Bit 10 Fixed end stop, clamping torque reached
Bit 11 Traverse to fixed endstop active
Bit 12 Tracking mode active
Bit 13 Velocity limiting active
Bit 14 Setpoint is zero
Bit 15 Synchronized
Bit 16 Axis moves forwards
Bit 17 Axis moves backwards
Bit 18 Minus software limit switch actuated
Bit 19 Plus software limit switch actuated
Bit 20 Cam switching signal 1
Bit 21 Cam switching signal 2
Bit 22 Direct output 1 via traversing block
Bit 23 Direct output 2 via traversing block
Bit 25 Power module current not limited
Bit 28 Pulses enabled
Bit 29 Position reached
Bit 30 Spindle position 2 reached
Bit 31 Teach In executed

0659 Bootstrap loading

Min	Standard	Max	Unit	Data type	Effective
0	0	4	–	Unsigned16	PO

... it is possible to toggle between the initialization and normal condition.
0 Establish initialized condition
0 –> 1 Initialize
1 Normal condition
2, 3, 4 Internal Siemens
Note:
Only the most important parameters can be selected and changed (e.g. motor code, power section code) in the initialized condition.
In the normal condition, the motor code and power section code are write-protected.
When starting-up for the first time using ”Load file”, P0659 remains at 2 (internal siemens).

A

0660 Function of input terminal I0.x

Min	Standard	Max	Unit	Data type	Effective
0	35	86	–	Unsigned16	immed. (ARM)
0	0	86	–	Unsigned16	immed. (SRM SLM)

... defines the function of input terminal I0.x on the control module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I0.x to I3.x” or ”List of the input signals”

0661 Function of input terminal I1.x

Min	Standard	Max	Unit	Data type	Effective
0	7	86	–	Unsigned16	immed. (ARM)
0	0	86	–	Unsigned16	immed. (SRM SLM)

... defines the function of input terminal I1.x on the control module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I0.x to I3.x” or ”List of the input signals”

0662 Function of input terminal I2.x

Min	Standard	Max	Unit	Data type	Effective
0	3	86	–	Unsigned16	immed.

... defines the function of input terminal I2.x on the control module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I0.x to I3.x” or ”List of the input signals”

0663 Function of input terminal I3.x

Min	Standard	Max	Unit	Data type	Effective
0	4	86	–	Unsigned16	immed.

... defines the function of input terminal I3.x on the control module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I0.x to I3.x” or ”List of the input signals”

0664 Function of input terminal I4

Min	Standard	Max	Unit	Data type	Effective
0	60	86	–	Unsigned16	immed.

... defines the function of input terminal I4 on the optional TERMINAL module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I4 to I11” or ”List of the input signals”

0665 Function of input terminal I5

Min	Standard	Max	Unit	Data type	Effective
0	59	86	–	Unsigned16	immed.

... defines the function of input terminal I5 on the optional TERMINAL module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I4 to I11” or ”List of the input signals”

0666 Function of input terminal I6

Min	Standard	Max	Unit	Data type	Effective
0	58	86	–	Unsigned16	immed.

... defines the function of input terminal I6 on the optional TERMINAL module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I4 to I11” or ”List of the input signals”

0667 Function of input terminal I7

Min	Standard	Max	Unit	Data type	Effective
0	50	86	–	Unsigned16	immed.

... defines the function of input terminal I7 on the optional TERMINAL module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I4 to I11” or ”List of the input signals”

0668 Function of input terminal I8

Min	Standard	Max	Unit	Data type	Effective
0	51	86	–	Unsigned16	immed.

... defines the function of input terminal I8 on the optional TERMINAL module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I4 to I11” or ”List of the input signals”

0669 Function of input terminal I9

Min	Standard	Max	Unit	Data type	Effective
0	52	86	–	Unsigned16	immed.

... defines the function of input terminal I9 on the optional TERMINAL module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I4 to I11” or ”List of the input signals”

0670 Function of input terminal I10

Min	Standard	Max	Unit	Data type	Effective
0	53	86	–	Unsigned16	immed.

... defines the function of input terminal I10 on the optional TERMINAL module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I4 to I11” or ”List of the input signals”

0671 Function of input terminal I11

Min	Standard	Max	Unit	Data type	Effective
0	54	86	–	Unsigned16	immed.

... defines the function of input terminal I11 on the optional TERMINAL module.
The function number from the ”List of input signals” is entered.
Note:
refer to the index entry ”Terminals term. I4 to I11” or ”List of the input signals”

0672 Function, input terminal I0.B (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	86	–	Unsigned16	immed.

... defines the function of input terminal I0.B, drive B for the direct measuring system of drive A.
Note:
The function number from the ”List of input signals” is entered.
Prerequisite: P0250 = 1 (direct measuring system)
The following functions can be executed via I0.B:
– External block change (function number 67)
– Flying measurement/length measurement (function number 80)
– Equivalent zero mark (function number 79)

0676 Assignment, inputs: Optional TERMINAL module (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	3	–	Unsigned16	immed.

... defines which input terminals on the optional TERMINAL module are assigned to this drive.
0 none
1 Input terminal I4 to I7
2 Input terminals I8 to I11
3 Input terminals I4 to I11
Note:
The terminals can only be assigned to a drive once.
Prerequisite for the assignment: P0875 = 1
Assignment, outputs: Refer to P0696

0678 Image of the input terminals

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The signal statuses of the input terminals are displayed using these parameters.
bit 15 (t. 63/t. 48), bit 14 (t. 663), bit 13 (t. 64), bit 12 (t. 65.x),
bit 11 (t. I11), bit 10 (t. I10), bit 9 (t. I9), bit 8 (t. I8),
bit 7 (t. I7), bit 6 (t. I6), bit 5 (t. I5), bit 4 (t. I4),
bit 3 (t. I3.x), bit 2 (t. I2.x), bit 1 (t. I1.x), bit 0 (t. I0.x)

Bit x = ”1” —> input terminal has signal status ”1”
Bit x = ”0” —> input terminal has signal status ”0”

Example: P0678 = F004 —> Term. 63/Term. 48, Term. 663, Term. 64, Term. 65.x and Term. I2.x have signal status ”1”
Note:
Non-assigned bits are displayed with ”0”.
Terminal I4 to terminal I11 are on the optional TERMINAL module.

0680 Signaling function of output terminal O0.x

Min	Standard	Max	Unit	Data type	Effective
0	33	87	–	Unsigned16	immed.

... defines the function of output terminal O0.x on the control module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O0.x to O3.x” or ”List of the output signals”

0681 Signaling function of output terminal O1.x

Min	Standard	Max	Unit	Data type	Effective
0	2	87	–	Unsigned16	immed.

... defines the function of output terminal O1.x on the control module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O0.x to O3.x” or ”List of the output signals”

0682 Signaling function of output terminal O2.x

Min	Standard	Max	Unit	Data type	Effective
0	1	87	–	Unsigned16	immed.

... defines the function of output terminal O2.x on the control module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O0.x to O3.x” or ”List of the output signals”

0683 Signaling function of output terminal O3.x

Min	Standard	Max	Unit	Data type	Effective
0	5	87	–	Unsigned16	immed.

... defines the function of output terminal O3.x on the control module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O0.x to O3.x” or ”List of the output signals”

0684 Signaling function, output terminal O4

Min	Standard	Max	Unit	Data type	Effective
0	72	87	–	Unsigned16	immed.

... defines the function of output terminal O4.x on the optional TERMINAL module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O4 to O11” or ”List of the output signals”

0685 Signaling function, output terminal O5

Min	Standard	Max	Unit	Data type	Effective
0	60	87	–	Unsigned16	immed.

... defines the function of output terminal O5 on the optional TERMINAL module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O4 to O11” or ”List of the output signals”

0686 Signaling function, output terminal O6

Min	Standard	Max	Unit	Data type	Effective
0	62	87	–	Unsigned16	immed.

... defines the function of output terminal O6 on the optional TERMINAL module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O4 to O11” or ”List of the output signals”

0687 Signaling function, output terminal O7

Min	Standard	Max	Unit	Data type	Effective
0	50	87	–	Unsigned16	immed.

... defines the function of output terminal O7 on the optional TERMINAL module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O4 to O11” or ”List of the output signals”

0688 Signaling function, output terminal O8

Min	Standard	Max	Unit	Data type	Effective
0	51	87	–	Unsigned16	immed.

... defines the function of output terminal O8 on the optional TERMINAL module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O4 to O11” or ”List of the output signals”

0689 Signaling function, output terminal O9

Min	Standard	Max	Unit	Data type	Effective
0	52	87	–	Unsigned16	immed.

... defines the function of output terminal O9 on the optional TERMINAL module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O4 to O11” or ”List of the output signals”

0690 Signaling function, output terminal O10

Min	Standard	Max	Unit	Data type	Effective
0	53	87	–	Unsigned16	immed.

... defines the function of output terminal O10 on the optional TERMINAL module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O4 to O11” or ”List of the output signals”

0691 Signaling function, output terminal O11

Min	Standard	Max	Unit	Data type	Effective
0	54	87	–	Unsigned16	immed.

... defines the function of output terminal O11 on the optional TERMINAL module.
The function is entered from the ”List of output signals”.
Note:
refer to the index entry ”Terminals term. O4 to O11” or ”List of the output signals”

0696 Assignment, optional TERMINAL module outputs (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	3	–	Unsigned16	immed.

... defines which output terminals on the TERMINAL option module are assigned to this drive.
0 none
1 Output terminal 04 to 07
2 Output terminals 08 to 011
3 Output terminals O4 to O11
Note:
The terminals can only be assigned to a drive once.
Prerequisite for the assignment: P0875 = 1
Assignment, inputs: Refer to P0676

0698 Image of the output terminals

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The signal statuses of the output terminals are displayed using these parameters.
bit 11 (t. O11), bit 10 (t. O10), bit 9 (t. O9), bit 8 (t. O8),
bit 7 (t. O7), bit 6 (t. O6), bit 5 (t. O5), bit 4 (t. O4),
bit 3 (T. O3.x), bit 2 (T. O2.x), bit 1 (T. O1.x), bit 0 (T. O0.x)

Bit x = ”1” —> output terminal has signal status ”1”
Bit x = ”0” —> output terminal has signal status ”0”

Example: P0698 = 0006 —> Term. O2.x and O1.x have signal status ”1”
Note:
Non-assigned bits are displayed with ”0”.
Terminals O4 to O11 are on the optional TERMINAL module.

0699 Inversion output terminal signals

Min	Standard	Max	Unit	Data type	Effective
0	0	FFF	Hex	Unsigned16	immed.

This parameter is used to define which output terminal signals are to be output inverted.
bit 11 (t. O11), bit 10 (t. O10), bit 9 (t. O9), bit 8 (t. O8),
bit 7 (t. O7), bit 6 (t. O6), bit 5 (t. O5), bit 4 (t. O4),
bit 3 (T. O3.x), bit 2 (T. O2.x), bit 1 (T. O1.x), bit 0 (T. O0.x)

Bit x = ”1” —> output terminal is inverted
Bit x = ”0” —> output terminal is not inverted

Example: P0699 = 0003 —> Term. O1.x and O0.x are output inverted
Note:
Non-assigned bits are displayed with ”0”.
Terminals O4 to O11 are on the optional TERMINAL module.

0700 Operating mode

Min	Standard	Max	Unit	Data type	Effective
0	1	3	–	Unsigned16	PO

0 Drive inactive (only drive B)
This means a double-axis module can only be operated with a single axis.
Should there be no communication with the inactive drive B via PROFIBUS?
If yes, then communication must be disabled with P0875=0.

1 Speed/torque setpoint
The drive can be operated as follows in this operating mode:
– Closed-loop speed controlled operation (n-set operation)
– Open-loop torque controlled mode (M setpoint operation)
– Torque reduction (M reduction)
Note:
Operation is possible via terminals, via PROFIBUS-DP or both together.

2 External position reference value (from SW 3.3)
No longer available from SW 4.1. Select ”Positioning” mode.

3 Positioning (from SW 2.1)
The drive can be operated as follows in this operating mode:
– Programming, selecting and starting traversing blocks
– Enter velocity override
– Torque reduction (M reduction)
Note:
Operation is possible via terminals, via PROFIBUS-DP or both together.

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0701 Actual operating mode

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

0 Drive inactive (only drive B)
1 Speed/torque setpoint
– Closed-loop speed controlled operation (n-set operation)
– Open-loop torque controlled mode (M setpoint operation)
– Torque reduction (M reduction)
2 External position reference value (from SW 3.3)
No longer available from SW 4.1.
3 Positioning (from SW 2.1)

0730:700 Saved parameters (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

...includes all of the parameters taken into account when saving the drive configuration (save parameter in a file).
The following steps are necessary for a series start-up without using the SimoCom U start-up tool:
1. Signal the motor type (write into P1102 = motor code)
2. Writing 4 into P0659 (drive carries-out defaults)
3. Write into all of the parameters listed in parameter P0731
4. Write 2 into P0659 (pre-assign motor/ LT data, calculate controller data)
5. Write into all parameters listed in parameter P0730 (minus the parameters listed in P0731)

0731:250 Parameters required before start-up (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

...contains all parameters which must be written into before commissioning.
The following steps are necessary for a series start-up without using the SimoCom U start-up tool:
1. Signal the motor type (write into P1102 = motor code)
2. Writing 4 into P0659 (drive carries-out defaults)
3. Write into all of the parameters listed in parameter P0731
4. Write 2 into P0659 (pre-assign motor/ LT data, calculate controller data)
5. Write into all parameters listed in parameter P0730 (minus the parameters listed in P0731)

0801 Changeover RS232/RS485

Min	Standard	Max	Unit	Data type	Effective
–1	0	1	–	Integer16	PO

The serial interface (X471) is set to RS232 or to RS485 using this parameter.
1 Interface is set to RS485
0 Interface is set to RS232
–1 reserved
Note:
The interface can be changed over from both drives. As the interface is either set to RS232 or to RS485, when changing the parameter in a drive, the parameter in the other drive is appropriately adapted.
The RS486 interface works only on control modules with the following hardware version:
– Order no. (MLFB): 6SN1118–_N_00–0AA0 —> RS485 is not operable
– From order no. (MLFB): 6SN1118–_N_00–0AA1 —> RS485 is operable
refer to the index entry ”SimoCom U – via serial interface”.

0802 Drive number for RS485

Min	Standard	Max	Unit	Data type	Effective
0	0	31	–	Unsigned16	PO

In an RS485 group, each drive must be assigned a unique drive number for addressing using this parameter.
0 The drive is not available in the RS485 group
1 to 31 The drive has this valid drive number
Note:
The drive number must be unique within the complete group
refer to the index entry ”SimoCom U – via serial interface”.

0803 Adjacent drive number

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

This parameter is set to display the drive number of the adjacent axis on a 2-axis module.
The adjacent drive number of drive A is the drive number of drive B.
The adjacent drive number of drive B is the drive number of drive A.

0828:128 Warning value (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

The supplementary information of the warnings, displayed using P0953 – P0960, is entered in this parameter.
The following is valid:
P0828:0 Supplementary information, warning 800 (P0953 bit 0)
P0828:1 Supplementary information, warning 801 (P0953 bit 1)
...
P0828:127 Supplementary information, warning 927 (P0960 bit 15)

A

0850 Activate brake control

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

... activates/de-actives the brake sequence control for this axis.
1 Brake sequence control is activated
0 Brake sequence control is de-activated
Note:
The pulse suppression control via P1403 (creep speed pulse suppression) and P1404 (timer pulse suppression) is ineffective when the motor holding brake is activated.
refer to the index entry ”Motor holding brake”

0851 Brake release time

Min	Standard	Max	Unit	Data type	Effective
10.0	600.0	10000.0	ms	Floating Point	immed.

The setpoint transfer after ”Controller enable” is delayed by this time.
During this time, the speed control is internally already active with n-set = 0, so that the axis does not move while the brake is opening.
After the time has expired, the closed-loop speed control is active and setpoints can be transferred.
Note: refer to the index entry ”Motor holding brake”

0852 Speed, close holding brake (ARM SRM)
Motor velocity, close holding brake (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	500.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

Note: refer to P0853

0853 Brake delay time

Min	Standard	Max	Unit	Data type	Effective
10.0	400.0	600000.0	ms	Floating Point	immed.

P0852 and P0853 form the criterion for withdrawing the output signal ”Open holding brake” to close the motor holding brake.
After ”Controller enable” is withdrawn, the drive brakes with n-set = 0.
With the brake sequence control active, the ”open holding brake” output signal is reset, if:
– |n-act| < n holding brake (P0852)
or
– The brake delay time (P0853) has expired
Note: refer to the index entry ”Motor holding brake”

0854 Controller disable time

Min	Standard	Max	Unit	Data type	Effective
10.0	600.0	10000.0	ms	Floating Point	immed.

If the output signal ”Open holding brake” is withdrawn, then the drive is controlled, until the controller inhibit time has expired (P0854) with n-set = 0 active (internal controller enable).
In order that the brake has time to close, the closing time is bypassed to prevent a hanging axis, for example, from sagging. The pulses are only canceled after this time.
Note: refer to the index entry ”Motor holding brake”

0868 Baud rate selection, CAN bus (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	255	–	Unsigned16	PO

... is used to set the baud rate for the CAN option module (Robox company).

0	1000 kbit/s
1	800 kbit/s
2	500 kbit/s
3	250 kbit/s
4	125 kbit/s
5	100 kbit/s
6	50 kbit/s
7	20 kbit/s
8	10 kbit/s
>8	Reserved

0870 Module type

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays the control module type and firmware.

P0870 = UVWX

U	= 0	Drive type is ”SIMODRIVE 611 universal”
	= x	Reserved for another drive type (x = 1 to 15)
V	= 0	Firmware for speed control
	= 1	Firmware for positioning
W		reserved
X	= 1	Module, 2-axis for resolvers
	= 2	Module, 2-axis for encoders with sin/cos 1 Vpp
	= 3	Module, 1-axis for resolvers
	= 4	Module ”SIMODRIVE 611 universal E”, 2-axis for encoders with sin/cos 1 Vpp
	= 5	Module HR, 2-axis for encoders with sin/cos 1 Vpp
	= 7	Module HR, 2-axis for resolvers
	= 8	Module HR, 1-axis for resolvers
	= 9	Module HR ”SIMODRIVE 611 universal E”, 2-axis for encoders with sin/cos 1 Vpp

Note: The module version is displayed in P0871.

0871 Module version

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... displays the version of the particular module.

0872 Option module type

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... displays which option module was identified when the control module was powered-up.

0 no option module
1 Optional TERMINAL module, Order No. (MLFB): 6SN1114–0NA00–0AA0
2 Option module PROFIBUS-DP1
with PROFIBUS-ASIC SPC3, Order No. (MLFB): 6SN1114–0NB00–0AA0
3 Option module PROFIBUS-DP2 (from SW 3.1)
with PROFIBUS ASIC DPC31 without PLL, Order No. (MLFB): 6SN1114–0NB00–0AA1
4 Option module PROFIBUS-DP3 (from SW 3.1)
with PROFIBUS ASIC DPC31 with PLL, Order No. (MLFB): 6SN1114–0NB01–0AA0
253 CAN – option module, Robox company
255 Third-party module corresponding to the published interface spec. (from SW 4.1)

0873 Option module version

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... displays the version of the respective option module.

0875 Expected option module type

Min	Standard	Max	Unit	Data type	Effective
0	0	255	–	Unsigned16	PO

... displays which option module is expected due to the parameters set.
During first startup, the parameter is automatically set according to P0872 (option module type).

Note:
Disable the communication or the ”DP slave 611U”:
1-axis module
—> with P0875 = 0 from drive A, the ”DP slave 611U” is disabled
2-axis module
—> with P0875 = 0 from drive B, communication with drive B is disabled
—> with P0875 = 0 in both drives, the ”DP slave 611U” is disabled
This allows, for example, ”disturbing” slaves to be temporarily disabled when commissioning other nodes (refer to the index entry ”Commissioning PROFIBUS-DP”).

0878 PROFIdrive configuration (–> 8.2)

Min	Standard	Max	Unit	Data type	Effective
0	0	7	Hex	Unsigned16	immed.

... several behavioral features are activated in order to achieve conformance with the PROFI-drive profile.

Bit 0 Axis addressing according to PROFIdrive
Bit 0 = 0 For a non-cyclic access via the DPV1 parameter channel axis A is addressed with index 1 (this is in conformance with the profile)
Bit 0 = 0 For a non-cyclic access via the DPV1 parameter channel axis A is addressed with index 0 (this is not in conformance with the profile)

Bit 1 P915/P916 cannot be changed for P922 > 0
Bit 1 = 0 P915/P916 cannot be written into if P922 is greater than 0 (this is in conformance with the profile)
Bit 1 = 0 P915/P916 can also be written into if P922 is greater than 0 (this is not in conformance with the profile)

Bit 2 No. of Value = Length for string variables
Bit 2 = 1 For string variables, in the ”DPV1 parameter response” the length of bytes is transferred under ”No. of Values” (in conformance with the profile)
Bit 2 = 0 For string variables, in the ”DPV1 parameter response” the number of values are transferred under ”No. of Values” (this is not in conformance with the profile)

Note:
The following parameters should be set to ensure conformance with the PROFIdrive profile:
P878 Bit 0 = 1, Bit 1 = 1, Bit 2 = 1
P879 Bit 0 = 1, Bit 1 = 0, Bit 2 = 0, Bit 9 = 1
P1012 Bit 12 = 1, Bit 13 = 1, Bit 14 = 0

A

0879 PROFIBUS configuration (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
0	1	FFFF	Hex	Unsigned16	PO

... defines several types of behavior for operation with PROFIBUS-DP.

Bit 2, 1, 0 Permissible sign-of-life error
... specifies in how many subsequent cycles (Tmapc) a sign-of-life error may occur without a fault being signaled.

Bit 8	Operation with/without master sign-of-life monitoring
Bit 8 = 1	Without sign-of-life monitor Starting (synchronization) and operation of the clock cycle synchronous PROFIBUS is realized without monitoring the master sign-of-life. The master must still change the sign-of-life in STW1–12 tp STW2–15. of Tmapc > Tdp.
Bit 8 = 0	With sign-of-life monitor
Bit 9	Data types, profile parameters according to PROFIdrive
Bit 9 = 1	For PROFIdrive profile parameters, data types are interpreted as they are implemented in the drive
Bit 9 = 0	For PROFIdrive profile parameters, data types are interpreted according to PROFIdrive
Bit 10	reserved
Bit 11	PKW area: Subindex in the high/low byte from IND (from SW 3.3)
Bit 11 = 1	Sub-index in the high byte (compatible to PROFIdrive)
Bit 11 = 0	Sub-index in the low byte (standard for SIMODRIVE)
Bit 12	Activate direct measuring system (encoder 2) for the encoder interface (from SW 3.3)
Bit 13	Incr. motor measuring system with/without equivalent zero mark
Bit 13 = 1	Incremental motor measuring system with equivalent zero mark available (e. g. BERO at input terminal I0.x)
Bit 13 = 0	Incremental motor measuring system available
Bit 14	Incr. direct measuring system with/without equivalent zero mark (from SW 3.3)
Bit 14 = 1	Incremental direct measuring system with equivalent zero mark available It is necessary to additionally parameterize using P0672. (e. g. BERO at input terminal I0.x)
Bit 14 = 0	Incremental direct measuring system available
Bit 15	reserved

0880 Speed evaluation, PROFIBUS (ARM SRM)
Motor velocity evaluation, PROFIBUS (SLM)

Min	Standard	Max	Unit	Data type	Effective
–100000.0	16384.0	100000.0	m/min	Floating Point	immed. (SLM)
–100000.0	16384.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

... defines the normalization of the speed or velocity when using PROFIBUS-DP. When entering a negative value, in addition, the motor direction of rotation is inverted.
Note:
4000hex or 16384dec in control word NSET_A corresponds to the speed or velocity in P0880.
refer to the index entry ”Control words NSET_A or NSET_B”

0881 Eval. torque/power reduction PROFIBUS (ARM SRM) Evaluation force/power reduction PROFIBUS (SLM) (–> 3.7)

Min	Standard	Max	Unit	Data type	Effective
0.0	16384.0	16384.0	%	Floating Point	immed. (SLM)
0.0	16384.0	16384.0	%	Floating Point	immed. (SRM ARM)

... defines the normalization of the torque/power de-rating or the force/power de-rating when traversing with PROFIBUS-DP.
Note:
4000Hex or 16384 dec in the MomRed control board corresponds to a reduction of the percentage specified in P0881.
refer under the index entry ”Control word MomRed”

0882 Evaluation, torque setpont PROFIBUS (ARM SRM) Evaluation, force setpoint PROFIBUS (SLM) (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–16384.0	800.0	16384.0	%	Floating Point	immed. (SLM)
–16384.0	800.0	16384.0	%	Floating Point	immed. (SRM ARM)

... defines the normalization of the torque and force setpoint when using PROFIBUS-DP.
Note:
P0882 is a percentage value referred to the rated motor torque. The parameter affects the process data MsetExt (external torque setpoint in the input direction) and Mset (torque setpoint in the output direction).
4000Hex or 16384 dec in the control word corresponds to the percentage entered in P0882.

refer under the index entry ”control word MsollExt”, ”Status word Msoll”

0883 Override evaluation PROFIBUS (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
0.0	16384.0	16384.0	%	Floating Point	immed.

... defines the normalization of the override when entered via PROFIBUS-DP.
Note:
4000Hex or 16384dec in the PROFIBUS-PPO corresponds to the override in P0883 (refer under the index entry ”control word over”).

0884 Position output evaluation PROFIBUS – no. of increm. (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
1	10000	8388607	–	Unsigned32	PO

... together with P0896, defines the format for the output of positions via PROFIBUS-DP.
Note:
refer to P0896
refer under the index entry ”axis couplings”

A

0888:16 Function, distributed input (PROFIBUS) (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	83	–	Unsigned16	immed.

... defines which function a signal has which is read-in via the PROFIBUS-PZD for distributed inputs (DezEing).
The function number from the ”list of input signals” is entered. The following applies for the individual indices of P0888:
:0 Function DezEing bit 0
:1 Function DezEing bit 1
:2 etc.

0890 Activate angular encoder/encoder interface

Min	Standard	Max	Unit	Data type	Effective
0	0	4	–	Unsigned16	PO

... defines how the angular encoder interface and encoder interface are operated.
– Angular encoder interface (X461, X462 for ”SIMODRIVE 611 universal”)
– Encoder interface (X472 for ”SIMODRIVE 611 universal E”)
0 Angular encoder interface or encoder interface switched-out
1 Angular encoder interface switched-in as output for incremental position actual value
2 Angular encoder interface switched-in as input for incremental position reference value (from SW 3.3)
3 Angular encoder interface switched-in for drive A as input for the incremental position reference value. The incremental position actual value from drive A is output at the angular encoder interface from drive B, if P0890 (B) is 0. P0890 = 3 is only possible for drive A. (from SW 3.3)
4 Encoder interface enabled as input for TTL encoders (encoder 3, from SW 3.1)
Note:
The terminating resistor must be set for the angular encoder interface —> switch S1
When entering signals at the angular encoder interface, it should be ensured that the interface is not parameterized as output. Otherwise, internal and external drivers will operate against each other and could destroy each other.
refer to the index entry ”Angular encoder interface” or ”Encoder interface”

0891 Source, external position reference value (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
–1	–1	4	–	Integer16	PO

... defines the source for the external position reference value.
–1 not an external position reference value
0 Angular encoder interface
1 Motor encoder, drive A (only drive B in double-axis modules)
(only for compatibility, recommended value = 2)
2 Position actual value drive A (only drive B in double-axis modules, from SW 4.1)
3 Position reference value drive A (only drive B in double-axis modules, from SW 4.1)
4 PROFIBUS DP (from SW 4.1)
Note:
refer under the index entry ”axis couplings”

0892 No. of angular encoder marks/no. of encoder pulses factor

Min	Standard	Max	Unit	Data type	Effective
–2	0	5	–	Integer16	PO

Resolver:
... defines the encoder pulse number via the angular encoder interface.
Resolver, 12 bit module (6SN1118–*NK00–0AA0 or 6SN1118–*NJ00–0AA0):
0 P*1024
1 P*512
2 P*256
3 P*128
Resolver 14 bit module (6SN1118–*NK01–0AA0 or 6SN1118–*NJ01–0AA0), 12 bit setting (1011[2]=0 or 1030[2]=0):
0 P*1024
1 P*512
2 P*256
3 P*128
4 P*64
5 P*32
Resolver 14 bit module (6SN1118–*NK01–0AA0 or 6SN1118–*NJ01–0AA0), 14 bit setting (1011[2]=1 or 1030[2]=1):
–2 P*4096
–1 P*2048
0 P*1024
1 P*512
2 P*256
3 P*128
Encoder with sin/cos 1Vpp:
... defines the factor by which the encoder resolution is reduced (encoder pulse number or measuring length/grid spacing), before the signals (quadrature signals) are visible via the angular encoder output.
0 1:1 scale
1 1:2 scale
2 1:4 scale
3 1:8 scale
4 Doubling (from SW 5.1, with SIMODRIVE 611 universal HR)
Note:
P —> Resolver pole pair number
The values –2,–1,4,5 for a resolver should only be set there where it is not intended to change over from 12 >< 14 bit resolution.
If, for example, high precision is not required for the position control, but however, high speeds, then the encoder pulse number, output via the angular incremental encoder interface can be less than then the encoder pulse number of the motor measuring system.
refer to the index entry ”Angular encoder interface”

A

0893 Angular encoder zero pulse offset

Min	Standard	Max	Unit	Data type	Effective
–360.0	0.0	360.0	Degree	Floating Point	PO

... shifts the zero pulse of an encoder.
The zero pulses for the angular encoder interface are generated in the encoder hardware. For encoders with sin/cos 1 Vpp, there is 1 zero pulse per mechanical revolution. For resolvers, there is 1 zero pulse for each electrical revolution, i.e. for a resolver with pole pair number = 3, there are 3 zero pulses per mechanical revolution.
Note:
In order that the zero pulse offset is correctly taken into account, the drive must remain stationary while the control module is running up.
refer to the index entry ”Angular encoder interface”

0894 Angular encoder input signal waveform (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	PO

... defines the input signal shape for the angular encoder interface.
0 Quadrature signal
1 Pulse/direction signal
2 Forwards/reverse signal
Note:
refer to the index entry ”Angular encoder interface”

0895 External position reference value – no. of increments (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
1	10000	8388607	–	Unsigned32	PO

... together with P0896, defines, for couplings, the ratio between the input increments and dimension system grids.
Note:
—> P0895 input pulses at the angular encoder correspond to P0896 MSR
—> Setpoint input from P0895 corresponds to P0896 MSR
refer to P0896
refer under the index entry ”axis couplings”

0896 Ext. position ref. value – no. of dimension system grids (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
1	10000	8388607	MSR	Unsigned32	PO

... together with P0895, defines for couplings, the ratio between the input pulse periods (or input bit) and the measuring system grid.
Note:
refer to P0895
refer under the index entry ”axis couplings”

0897 Invert external position reference value (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO

... defines whether the position reference value is entered externally and therefore the direction should be inverted.
1 position setpoint inversion
0 Not inverted
Note:
refer under the index entry ”axis couplings”

0898 Modulo range master drive (–> 3.5)

Min	Standard	Max	Unit	Data type	Effective
0	0	100000000	MSR	Unsigned32	PO

... informs the slave drive about the selected modulo range for the master drive.
Note:
The following applies: P0242 (master drive) = P0898 (slave drive)
The value 0 switches-out the modulo correction.
refer under the index entry ”axis couplings”

0899:8 Enter angular incremental encoder direction (–> 8.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	immed.

... defines in which direction the angular incremental encoder interface pulses are permitted.
0 positive and negative direction
1 only the positive direction
2 only the negative direction
Note:
refer to the index entry ”Angular encoder interface”

0900:4 Angular incremental encoder, handwheel evaluation (–> 8.1)

Min	Standard	Max	Unit	Data type	Effective
1	1	10000	–	Unsigned16	immed.

... defines the factor with which the handwheel pulses are evaluated.
Note:
refer to the index entry ”Angular encoder interface”

A

0915:17 PZD setpoint value assignment PROFIBUS (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	immed.

... serves for allocating the signals to the process data in the setpoint frame.

The following applies:

P0915:0	no meaning
P0915:1	PZD1, unable to configure (standard setting)
P0915:2	PZD2, Configuring and display of the signal ID (refer to P0922)
P0915:3	PZD3, etc.

ID	Significance (abbreviation) (comments)
0	No signal (NIL)
50001	Control word 1 (STW1) (assignment n-set operation)
50001	Control word 1 (STW1) (assignment pos operation)
50003	Control word 2 (STW2)
50005	Speed setpoint A (NSET_A, nset-h) (n-set operation)
50007	Speed setpoint B (NSET_B, nset-(h+l)) (n-set operation)
50009	Encoder 1, control word (G1_STW) (n-set operation)
50013	Encoder 2 control word (G2_STW) (n-set operation, from SW 3.3)
50017	Encoder 3 control word (G3_STW) (n-set operation)
50025	System deviation DSC (XERR) (n set operation, from SW 4.1)
50026	Position controller gain factor DSC (KPC) (n set operation, from SW 4.1)
50101	Torque reduction (MomRed)
50103	Analog output, T. 75.x/15 (DAU1)
50105	Analog output T. 16.x/15 (DAU2)
50107	Digital outputs, T. O0.x to O3.x (DIG_OUT)
50109	Target position for spindle positioning (XSP) (n set operation, from SW 5.1)
50111	Distributed inputs (DezEing) (from SW 4.1)
50113	External torque setpoint (MsollExt) (n set operation, from SW 4.1)
50117	Control word, slave-to-slave communications (QStw) (pos operation, from SW 4.1)
50201	Block selection (SatzAnw)
50203	Positioning control word (PosStw) (pos operation)
50205	Override (over) (pos operation)
50207	External position reference value (Xext) (pos operation, from SW 4.1)
50209	Correction, external position reference value (XcorExt) (pos operation, from SW 4.1)
50221	MDI position (MDIPos) (pos mode, from SW 7.1)
50223	MDI velocity (MDIVel) (pos mode, from SW 7.1)
50225	MDI acceleration override (MDIAcc) (pos mode, from SW 7.1)
50227	MDI deceleration override (MDIDec) (pos mode, from SW 7.1)
50229	MDI mode (MDIMode) (pos mode, from SW 7.1)

Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
Operating mode not specified —> possible in every operating mode
refer to the index entry ”Configuring the process data”

0916:17 PZD actual value assignment PROFIBUS (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	immed.

... serves for allocating the signals to the process data in the actual value frame.

The following applies:

P0916:0	no meaning
P0916:1	PZD1, unable to configure (standard setting)
P0916:2	PZD2, Configuring and display of the signal ID (refer to P0922)
P0916:3	PZD3, etc.

ID	Significance (abbreviation) (comments)
0	No signal (NIL)
50002	Status word 1 (ZSW1) (assignment, n-set operation)
50002	Status word 1 (ZSW1) (assignment pos operation)
50004	Status word 2 (ZSW2)
50006	Speed actual value A (NACT_A, nact-h)
50008	Speed actual value B (NACT_B, nact-(h+l))
50010	Encoder 1 status word (G1_ZSW) (n-set operation)
50011	Encoder 1 position actual value 1 (G1_XACT1) (n-set operation)
50012	Encoder 1 position actual value 2 (G1_XACT2) (n-set operation)
50014	Encoder 2 status word (G2_ZSW) (n-set operation, from SW 3.3)
50015	Encoder 2 position actual value 1 (G2_XACT1) (n-set operation, from SW 3.3)
50016	Encoder 2 position actual value 2 (G2_XACT2) (n-set operation, from SW 3.3)
50018	Encoder 3 status word (G3_ZSW) (n-set operation)
50019	Encoder 3 position actual value 1 (G3_XACT1) (n-set operation)
50020	Encoder 3 position actual value 2 (G3_XACT2) (n-set operation)
50102	Message word (MeldW)
50104	Analog input T. 56.x/14 (ADU1)
50106	Analog input T. 24.x/20 (ADU2)
50108	Digital inputs, T. I0.x to I3.x (DIG_IN)
50110	Utilization (util)
50112	Active power (Pactive)
50114	Smoothed torque setpoint (Mset)
50116	Smoothed torque-generating current Iq (IqGl)
50118	Status word, slave-to-slave communications (QZsw) (pos operation, from SW 4.1)
50119	DC link voltage (VDClink1) (from SW 8.3)
50202	Currently selected block (AktSatz)
50204	Positioning status word (PosZsw) (pos operation)
50206	Position actual value (positioning operation) (XistP) (pos operation)
50208	Position reference value (positioning operation) (XsollP) (pos operation, from SW 4.1)
50210	Correction position reference value (Xcor) (pos opertion, from SW 4.1)

Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
Operating mode not specified —> possible in every operating mode
refer to the index entry ”Configuring the process data”

A

0918 PROFIBUS node address

Min	Standard	Max	Unit	Data type	Effective
0	0	126	–	Unsigned16	PO

... specifies the address of the drive as DP slave on PROFIBUS.
Note:
There is only one node address for the control module, although it is designed for two drives. When changing the parameters in one drive, the parameters in the other drive are automatically modified.
Every node connected to PROFIBUS must have a unique address.

0922 PROFIBUS frame selection (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
0	101	110	–	Unsigned16	PO

... serves for setting the free configurability or for selecting a standard frame.
0 The frame can be freely configured (see P0915:17, P0916:17)
1 standard frame 1, n-set interface 16 bits
2 Standard frame 2, n-set interface 32 bits without encoder
3 Standard telegram 3, n set interface 32 bit with encoder 1
4 Standard telegram 4, n-set interface 32 bit with encoder 1 and encoder 2 (from SW 3.3)
5 Standard telegram 5, n set interface 32 bit with DSC and encoder 1 (from SW 4.1)
6 Standard telegram 6, n set interface 32 bit with DSC and encoder 1 and encoder 2 (from SW 4.1)
101 The frame has the same structure as in SW 2.4
102 Standard frame 102, n-set interface with encoder 1
103 Standard telegram 103, speed setpoint interface with encoder 1 and encoder 2 (from SW 3.3)
104 Standard frame 104, n-set interface with encoder 1 and encoder 3
105 Standard telegram 105, n-set interface with DSC and encoder 1 (from SW 4.1)
106 Standard telegram 106, n-set interface with DSC and encoder 1 and encoder 2 (from SW 4.1)
107 Standard telegram 107, n-set interface with DSC and encoder 1 and encoder 3 (from SW 4.1)
108 Standard telegram 108, master drive for the position reference value coupling (from SW 4.1)
109 Standard telegram 109, slave drive for the position reference value coupling (from SW 4.1)
110 Standard telegram 110, positioning in the MDI mode (from SW 7.1)
Note: refer to the index entry ”Process data configuring”

0923:300 List of PROFIBUS standard signals

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

This parameter can be read in order to define which PROFIdrive standard signals (signals 1...99) and manufacturer-specific signals are supported and which device-specific signal ID this signal represents.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0930 PROFIBUS selector switch operating mode

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

This parameter cannot be changed and corresponds to P0700.
0 Drive inactive
1 Closed-loop speed controlled operation
0x8000 positioning mode

0944 Fault message counter (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

This parameter corresponds to the fault message counter. It is incremented each time that the fault buffer changes.
This means that it can be ensured that the fault buffer can be consistently read-out
Note:
This parameter is reset at POWER ON.
refer to the index entry ”PROFIBUS-DP – evaluate faults”.

0945:65 Fault code

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

The fault code, i. e. the number of the fault which occurred, is entered in this parameter.
The faults which occurred are entered as follows into the fault buffer:
first fault which has occurred —> parameter with index 1 (with index 0 for the PROFIdrive profile)
To
eighth fault which has occurred—> parameter with index 8 (with index 7 for the PROFIdrive profile)
Note:
The following is associated with a fault: Fault code (P0945:65), fault number (P0947:65), fault time (P0948:65) and fault value (P0949:65).
For ”reset fault memory” the fault code, previously entered into P0945, is shifted by 8 indices.
The description of the faults, how they can be acknowledged as well as a list of all the faults is provided in Section ”Fault handling/diagnostics”.
This parameter is reset at POWER ON.
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
refer to the index entry ”PROFIBUS-DP – evaluate faults”.

A

0946:901 Fault code list (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

This parameter contains the fault code list.
In the fault code list, every fault code, defined in the unit, is assigned a fault number.
Note:
The fault number is a consecutive number. The actual value is coded in the fault code to indicate which fault has occurred.
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
This means that here, the fault code (e. g. 130) cannot be found in the sub-index (in the example 64) corresponding to the fault number, but instead in the following sub-index (in the example 65).
refer to the index entry ”PROFIBUS-DP – evaluate faults”.

0947:65 Fault number

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

The fault number is entered into this parameter.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
refer to the index entry ”PROFIBUS-DP – evaluate faults”.

0948:65 Fault time

Min	Standard	Max	Unit	Data type	Effective
–	–	–	ms	Unsigned32	RO

This parameter specifies at which relative system time the fault occurred.
Note:
This parameter is set to zero at POWER ON, and the time is then started.
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
refer to the index entry ”PROFIBUS-DP – evaluate faults”.

0949:65 Fault value

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

The supplementary information about a fault which has occurred is entered into this parameter.
Note:
The description of the faults, how they can be acknowledged as well as a list of all the faults is provided in Section ”Fault handling/diagnostics”.
This parameter is reset at POWER ON.
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
refer to the index entry ”PROFIBUS-DP – evaluate faults”.

0951:301 Fault number list (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

Note: This parameter has no significance.

0952 Number of faults

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

The parameter specifies the number of faults which occurred after POWER ON.
Note:
This parameter is reset at POWER ON.
refer to the index entry ”PROFIBUS-DP – evaluate faults”.

0953 Warnings 800–815

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 815) ... Bit 0 (warning 800)
Note:
Bit x = 1 Alarm yyy present
Bit x = 0 The alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”.

0954 Warnings 816–831

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 831) ... Bit 0 (warning 816)
Note:
Bit x = 1 Alarm yyy present
Bit x = 0 The alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”.

0955 Warnings 832–847

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 847) ... Bit 0 (warning 832)
Note:
Bit x = 1 Alarm yyy present
Bit x = 0 The alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”.

0956 Warnings 848–863

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 863) ... Bit 0 (warning 848)
Note:
Bit x = 1 Alarm yyy present
Bit x = 0 The alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”.

0957 Warnings 864–879

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 879) ... Bit 0 (warning 864)
Note:
Bit x = 1 Alarm yyy present
Bit x = 0 The alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”.

0958 Warnings 880–895

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 895) ... Bit 0 (warning 880)
Note:
Bit x = 1 Alarm yyy present
Bit x = 0 The alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”.

0959 Warnings 896–911

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 911) ... Bit 0 (warning 896)
Note:
Bit x = 1 Alarm yyy present
Bit x = 0 The alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”.

0960 Warnings 912–927

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter displays which warning(s) is(are) present.
Bit 15 (warning 927) ... Bit 0 (warning 912)
Note:
Bit x = 1 Alarm yyy present
Bit x = 0 The alarm assigned to the bit, is not present
refer to the index entry ”PROFIBUS-DP – evaluate warnings”.

0963 Baud rate PROFIBUS (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... contains the actual PROFIBUS baud rate.

0	9.6 kbit/s
1	19.2 kbit/s
2	93.75 kbit/s
3	187.5 kbit/s
4	500 kbit/s
6	1500 kbit/s
7	3000 kbit/s
8	6000 kbit/s
9	12000 kbit/s
10	31.25 kbit/s
11	45.45 kbit/s

0964:11 Equipment identification (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... includes all data for the device identification and provides this to the Identify Utility.
Indices:

1	Company	Siemens = 42d
2	Drive type	Product type
3	Firmware version	xxyy (without patch number)
4	Firmware date (year)	yyyy (decimal)
5	Firmware date (day/month)	ddmm (decimal)
6	No. of axes	
7	Patch number of the FW version	

Product type:

1101	SIMODRIVE 611 universal 2 axis with 1Vpp encoder, n-set
1102	SIMODRIVE 611 universal 2 axis with 1 Vpp encoder, positioning
1103	SIMODRIVE 611 universal 2 axis with resolver, n-set
1104	SIMODRIVE 611 universal 2 axis with resolver, positioning
1105	SIMODRIVE 611 universal 1 axis with resolver, n-set
1106	SIMODRIVE 611 universal 1 axis with resolver, positioning
1111	SIMODRIVE 611 universalE 2 axis with 1Vpp encoder, n-set
1112	SIMODRIVE 611 universalE HR 2-axis with 1Vpp encoder, positioning
1120	SIMODRIVE 611 universal HR 2-axis with 1Vpp encoder, n-set
1121	SIMODRIVE 611 universal HR 2-axis with 1Vpp encoder, positioning
1122	SIMODRIVE 611 universal HR 2-axis with resolver, n-set
1123	SIMODRIVE 611 universal HR 2-axis with resolver, positioning
1124	SIMODRIVE 611 universal HR 1-axis with resolver, n-set
1125	SIMODRIVE 611 universal HR 1-axis with resolver, positioning
1126	SIMODRIVE 611 universal HR 1-axis with 1Vpp encoder, n-set
1127	SIMODRIVE 611 universal HR 1-axis with 1Vpp encoder, positioning

0965 Profile number, PROFIdrive (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... the profile ID is saved here. Byte 1 contains profile number 3.
The bits 0 to 3 from byte 2 identify versions 1 to 15.

0967 PROFIBUS control word

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

The parameter is the image of control word STW1.
Note:
Bit assignment, refer to Section ”Communications via PROFIBUS-DP”

0968 PROFIBUS status word

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

This parameter is the image of status word ZSW1.
Note:
Bit assignment, refer to Section ”Communications via PROFIBUS-DP”

0969 Current time difference

Min	Standard	Max	Unit	Data type	Effective
0	0	0	ms	Unsigned32	immed.

... contains the relative system time since the last time that the drive was powered-up or the last reset of the parameter or since the last counter overflow.
Note:
This parameter can only be read and reset, i.e. only a value of 0 can be written into it.

0972 Request POWER-ON RESET (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	immed.

... a POWER-ON RESET can be requested on the control board.
0 Output status
1 Request POWER-ON RESET
2 Request preparation for POWER-ON RESET
The DP master can check as follows, whether the power-on reset was executed:
– write 2 into P0972 and read-back the value
– write 1 into P0972 —> POWER-ON RESET is requested
Read P0972 after communications have been established:
P0972 = 0? —> the POWER-ON RESET was executed
P0972 = 2? —> the POWER-ON RESET was not executed
Note:
After P0972=1, the link between the drive and SimoComU is interrupted with the following message: ”Reading from the interface was interrupted due to time overflow”. The link is re-established when SimoCom U is re-started.

0979:32 Encoder format

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

... specifies the encoder properties.
Sub-indices:

1	Header
2	Encoder type (encoder 1)
3	Encoder resolution (encoder 1)
4	Shift factor for signal G1_XIST1 (encoder 1)
5	Shift factor for absolute values in G1_XIST2 (encoder 1)
6	Resolution can be parameterized (encoder 1)
7 to 11	reserved
12	Encoder type (encoder 2)
13	Encoder resolution (encoder 2)
14	Shift factor for signal G2_XIST1 (encoder 2)
15	Shift factor for absolute values in G2_XIST2 (encoder 2)
16	Resolution can be parameterized (encoder 2)
17 to 21	reserved
22	Encoder type (encoder 3)
23	Encoder resolution (encoder 3)
24	Shift factor for signal G3_XIST1 (encoder 3)
25	Shift factor for absolute values in G3_XIST2 (encoder 3)
26	Resolution can be parameterized (encoder 3)
27 to 31	reserved

Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.
Refer under the index entry ”Encoder interface”

0980:999 Number list_1 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0981:2 Number list_2 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

A

0982:2 Number list_3 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0983:2 Number list_4 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0984:2 Number list_5 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0985:2 Number list_6 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0986:2 Number list_7 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0987:2 Number list_8 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0988:2 Number list_9 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

0989:2 Number list_10 (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

All of the parameter numbers defined in the drive are saved in parameters 980 – 989 from sub-index 1. The arrays are assigned consecutively without any gaps. If a sub-index contains a zero, then this is the end of the list of defined parameters. If a sub-index contains the parameter number of the next list parameter, then the list continues there.
Note:
If this parameter is read via non-cyclic communication (PROFIdrive), then the indices have been shifted. Index 1 corresponds to Index 0 (etc.) in the description of the PROFIdrive profile.

A

1000 Current controller cycle

Min	Standard	Max	Unit	Data type	Effective
2	4	4	31.25µs	Unsigned16	PO

Current controller clock cycle = P1000 x 31.25 microseconds
Note:
refer to the index entry ”Clock cycles”

1001 Speed controller cycle

Min	Standard	Max	Unit	Data type	Effective
2	4	16	31.25µs	Unsigned16	PO

Speed controller cycle = P1001 x 31.25 microseconds
Note:
Current controller clock cycle <= speed controller clock cycle
refer to the index entry ”Clock cycles”

1004 Structure configuration

Min	Standard	Max	Unit	Data type	Effective
0	100	315	Hex	Unsigned16	PO

... allows the closed-loop control structure to be configured.

Bit 4	Integrator control
Bit 4 = 1	Integrator control in the speed controller inactive The integrator is not held, but its absolute value is limited to twice the torque limit.
Bit 4 = 0	Integrator control in the speed controller active The integrator is held, if the speed controller, current controller or the voltage has reached its limit.
Bit 8	Fine interpolation in positioning mode (P0700 = 3) (from SW 3.1)
Bit 8 = 1	The fine interpolation type II is active (standard from SW 3.1)
Bit 8 = 0	Fine interpolation, type I is active (standard before SW 3.1)
Bit 9	Deadtime adjustment position ref. value coupling via PROFIBUS-DP (from SW 4.1)
Bit 9 = 1	Same deadtime behavior as the slave drive (standard from SW 4.1) Prerequisite: Drive is not a slave drive (P891 = –1) Output of position reference value XsollP (50208).
Bit 9 = 0	Minimum deadtime behavior (standard before SW 4.1)

1005 IM encoder pulse number (SRM ARM)

Min	Standard	Max	Unit	Data type	Effective	
0	2048	65535	–	Unsigned16	PO	(SRM ARM)

Note:
IM —> Indirect measuring system (motor encoder)
If the encoder pulse number cannot be divided by 10 or 16 without a remainder, the zero mark monitoring is internally disabled.

1006 IM encoder code number

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	PO

The encoder number defines the connected measuring system.
Note:
IM —> Indirect measuring system (motor encoder)
refer to the index entry ”Encoder code”

1007 DM encoder pulse number (SRM ARM) (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective	
0	0	8388607	–	Unsigned32	PO	(SRM ARM)

Note:
DM —> Direct measuring system
Encoder pulses for indirect measuring system (IM, motor encoder) —> refer to P1005
If the encoder pulse number cannot be divided by 10 or 16 without a remainder, the zero mark monitoring is internally disabled.

1008 IM encoder phase error correction

Min	Standard	Max	Unit	Data type	Effective
–20.0	0.0	+20.0	Degree	Floating Point	immed.

Phase position of track A with respect to track B can be corrected using this parameter.
Note:
IM —–> Indirect measuring system (motor encoder)
Track A must have a 90 degree offset to track B

1009 Position controller cycle

Min	Standard	Max	Unit	Data type	Effective
32	32	128	31.25µs	Unsigned16	PO

Position controller clock cycle time (TLR) = P1009 x 31.25 microseconds
Note:
The position controller clock cycle must be an integer multiple of the speed controller clock cycle.
refer to the index entry ”Clock cycles”

1010 Interpolation cycle

Min	Standard	Max	Unit	Data type	Effective
64	128	640	31.25µs	Unsigned16	PO

Interpolation clock cycle time (TIPO) = P1010 x 31.25 microseconds
Note:
The interpolation clock cycle must be an integer multiple of the position controller clock cycle.
refer to the index entry ”Clock cycles”

A

1011 IM configuration, actual value sensing

Min	Standard	Max	Unit	Data type	Effective
0	0	F003	Hex	Unsigned16	PO

... allows the actual value sensing to be configured for an indirect measuring system.

Bit 0 Invert speed actual value
Bit 0 = 1 Inversion, speed actual value
Bit 0 = 0 No inversion

Bit 1 Encoder phase failure correction
Bit 1 = 1 Encoder phase failure correction
Bit 1 = 0 No encoder phase error compensation

Bit 2 Resolver resolution
Bit 2 = 1 Resolver resolution, 14 bits
Bit 2 = 0 Resolver resolution, 12 bits
Note:
14 bit resolver resolution can only be set with ”SIMODRIVE 611 universal HR”, otherwise error 759 is output.

Bit 12 Coarse position identification
Bit 12 = 2 Identify rough position
Bit 12 = 0 No coarse position identification
Note:
This bit has no significance for EnDat encoders.
For encoders without hall sensors and without C/D track (e. g. ERN 1387), the rotor position identification replaces the coarse synchronization. The zero mark must still be adjusted (shift or via P1017).

Bit 13 Fine position identification
Bit 13 = 1 Identify fine position
Bit 13 = 0 No fine position identification
Note:
This bit has no significance for EnDat encoders.
The rotor position identification replaces the coarse synchronization using Hall sensors or a C/D track. The zero mark neither has to be present nor does it have to be adjusted.
If the rotor position identification does not offer satisfactory results, then the zero mark must be adjusted.

Bit 14 Data transfer rate EnDat, bit 0

Bit 15 Transmission rate EnDat, Bit 1
Note:
Bits 14 and 15 are set as follows in the factory:
Bit 15, 14 = 00 —> 100 kHz (standard)
Bit 15, 14 = 01 —> 500 kHz (setting possible)
Bit 15, 14 = 10 —> 1 MHz (setting, Siemens-internal)
Bit 15, 14 = 11 —> 10 MHz (setting, Siemens-internal)

IM —> Indirect measuring system (motor encoder)
refer to the index entry ”List of encoders”

1012 Function switch

Min	Standard	Max	Unit	Data type	Effective
0	2185	71F5	Hex	Unsigned16	immed. (ARM)
0	2105	71F5	Hex	Unsigned16	immed. (SRM SLM)

... allows the closed-loop control functions to be activated/de-activated.
Note:
Standard value for an activated PROFIBUS option module:
3185 (ARM)

3105 (SRM SLM)

Bit 0 Ramp-function generator tracking
Bit 0 = 1 active
Bit 0 = 0 inactive
Note: refer to the index entry ”Ramp-function generator”

Bit 2 Ready or no fault (at the output signal)
Bit 2 = 1 ”Ready” signal
Bit 2 = 0 ”No fault” message
Note: refer to the index entry ”output signal ready or no fault”

Bit 5 Suppress fault 753

Bit 7 IM speed actual value after pulse inhibit
Bit 7 = 1 Speed actual value is zero
The drive brakes the motor towards 0 speed and accelerates to the setpoint speed present.
Bit 7 = 0 Speed actual value is the speed setpoint
The drive direct accelerates the motor to the setpoint speed present.

Bit 8 Average value filter, speed setpoint
Bit 8 = 1 Average value filter on
The avg.val.filter to adapt the pos.contr.clock cyc. to the sp. contr. clock cyc. is active in the speedsetpoint branch.
Bit 8 = 0 Average value filter off
The avg.val.filter to adapt the pos.contr.clock cyc. to the sp. contr. clock cyc. is inactive in the speedsetpoint branch.

Bit 12 Power-on inhibit for alarm and OFF2/OFF3
Bit 12 = 1 Power-on inhibit for alarm or AUS2/AUS3 or terminal 63/663 de-energized
Note:
The power-on inhibit is removed again by withdrawing the controller enable via terminal 65.x or PROFIBUS control signal STW1.0 (ON/OFF1).
Bit 12 = 0 No power-on inhibit

Bit 13 Status signals (ZSW1) according to the PROFIdrive profile (only PROFIBUS operation)
Bit 13 = 1 Power-on inhibit signal is formed independently of the status of the ready signal (PROFIdrive definition)
The power-up inhibit signal is only set when the pulses have been cancelled after the braking phase.
The ready signal remains set during OFF1 and OFF3 until the pulses have been cancelled after the braking phase
The ready to power-up signal remains set during OFF3 until the pulses have been cancelled after the braking phase
Bit 13 = 0 The power-on inhibit signal is only set from 0 to 1 if the ready signal is set
The power-up inhibit signal is also set if the pulses have still not been deleted while the drive is braking.
The ready signal is immediately cancelled at OFF1 or OFF3, even if the drive is still braking
The ready to power-up signal is immediately deleted for OFF3, even if the drive is still braking
Note: The power-up inhibit is only effective for bit 12 = 1

Bit 14 No power-on inhibit with simultaneous enable signals
Bit 14 = 1 Deviating from the PROFIdrive profile, a power-on inhibit is not initiated if OFF2/OFF3 and OFF are simultaneously withdrawn
Bit 14 = 0 The power-on inhibit is generated when OFF2/OFF3 and OFF1 are simultaneously withdrawn
Note: Bit 14 is only effective for bit 13 = 1

A

1013 Enable motor changeover (ARM) (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
0	0	3	–	Unsigned16	PO (ARM)

... the motor changeover is enabled or the motor changeover type is set.
0 Motor changeover inhibited
1 Motor changeover with pulse suppression
2 Motor changeover without pulse suppression (data set changeover)
3 Motor changeover with speed thresholds (P1247, P1248)
Note:
It is only possible to enable motor changeover in the "Speed/torque setpoint" mode (P0700 = 1) (refer to the index entry "Motor changeover").

1014 Activate V/f operation

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO

... the V/f operation is activated/de-activated for this drive.
1 V/f operation is activated
0 V/f operation is de-activated
Note: refer to the index entry "V/f operation"

1015 Activate PE-MSD (SRM)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	PO (SRM)

... the permanently excited spindle (PE spindle, 1FE1 motor) is activated/de-activated for this drive.
1 Permanently excited spindle is activated
0 PE spindle is de-activated
Note: refer to the index entry "Permanently excited spindle"

1016 Commutation angle offset (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
–360.0	0.0	360.0	Degree	Floating Point	PO (SRM SLM)

... provides information about the rotor position.
To electrically commutate a synchronous motor, the closed-loop drive control must have data regarding the absolute rotor position (position of the magnets with respect to the stator or secondary part). This data (commutation angle) is determined at synchronization.
Incremental measuring system:
... specifies the offset for a zero mark.
Note:
If the zero mark to the rotor position was already adjusted in the factory, a 0 is located in P1016.
Absolute measuring system (EnDat encoder):
... specifies the angular offset to the position actual value of the EnDat encoder.
Note:
The angular offset is read out each time the drive runs up.

1017 Start-up support (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
–1	0	1	–	Integer16	immed. (SRM SLM)

1: Determine the commutation angular offset
0: Function is de-activated (normal status)
–1: EnDat encoder: Serial numbers are read-in in P1025/P1026
The angular commutation offset is automatically determined during start-up:
Incremental measuring system with a zero mark:
– Set P1017 to 1
– Move the axis over the zero mark (e. g. with inching 1)
– –> the angular offset is automatically entered into P1016
– –> fault 799 (save parameters in FEPROM and HW-RESET required) is displayed
– Save parameters in the FEPROM (P0652 = 1)
– Carry-out a HW_RESET
Absolute measuring system (EnDat encoder) (also 1FN3 linear motors, if P1075=3)
– De-activate controller and pulse enable
– Set P1017 to 1 (note: If, for 1FN1, the EnDat serial number, read from the measuring system, is not equal to P0125/P1026, P1017 is automatically set to 1.)
– Switch in the controller and pulse enable
– –> The angular offset is automatically entered into P1016 and the encoder serial number of the encoder into P1025 and P1026
– –> Fault 799 (save parameters in FEPROM and HW-RESET required) is displayed
– Save parameters in the FEPROM and carry out a HW-RESET
Absolute measuring system (EnDat encoder) with 1FN3 linear motor if a rotor position identification technique is not used:
– Determine the rotor position difference between the normalized electrical rotor position and EMF_V using the appropriate measuring techniques.
– Add rotor position difference to P1016
– Set P1017 to –1
– –> fault 799 (save parameters in FEPROM and HW-RESET required) is displayed
– Save parameters in the FEPROM and carry out a HW-RESET

Note: refer under the index entry ”Rotor position identification”, ”PE spindle” or ”linear motor”

1018 IM pole pair number, resolver

Min	Standard	Max	Unit	Data type	Effective
0	1	64	–	Unsigned16	PO

... specifies the pole pair number of the resolver used.
Examples:
Resolver (pole pair number)
2p = 1 (1 speed)
2p = 2 (2 speed)
2p = 3 (3 speed)
2p = 4 (4 speed)
Note:
IM —> Indirect measuring system (motor encoder)

A

1019 Current, rotor position ID (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	12.0	100.0	%	Floating Point	immed. (SRM SLM)

... defines the current with which the rotor position identification is executed. P1019 refers to the maximum motor current (P1104) and only represents an approximate value, which is exceeded or fallen short off during the identification, dependent on the iron saturation and the accuracy of P1116 (armature inductance).
If a value is entered in P1019 which is too low, then the rotor position identification routine is incorrect (fault 610). If the value is too high, the maximum permissible current can be exceeded (fault 501 or 612) or an inadmissibly high movement can occur (refer to P1020 and fault 611).
The optimum setting for P1019 can be determined by starting the function several times as test via P1736.
Note: Also refer under the index entry ”PE spindle” or ”Linear motor”

1020 Maximum rotation, rotor position identification (SRM) Maximum movement, rotor position identification (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	5.0	30.0	mm	Floating Point	immed. (SLM)
0.0	10.0	90.0	Degree	Floating Point	immed. (SRM)

... defines the distance which has been traveled during rotor position identification without a fault being signaled.
Note:
If the distance is greater than the value entered in P1020, fault 611 is signaled (illegal movement during rotor position identification).

1021 IM multi-turn resolution, absolute value encoder

Min	Standard	Max	Unit	Data type	Effective
0	4096	65535	–	Unsigned16	PO

Number of revolutions which can be resolved.
Note:
IM —> Indirect measuring system (motor encoder)

1022 IM single-turn resolution, absolute value encoder

Min	Standard	Max	Unit	Data type	Effective
0	8192	4294967295	–	Unsigned32	PO

Resolution of the absolute value encoder in measuring pulses per revolution.
Note:
IM —> Indirect measuring system (motor encoder)

1023 IM diagnostics

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

Bit 0 Light source failed
Bit 1 Signal amplitude too low
Bit 2 Code connection erroneous
Bit 3 Overvoltage
Bit 4 Undervoltage
Bit 5 Overcurrent
Bit 6 Battery must be changed
Bit 7 Control check error
Bit 8 EnDat encoder cannot be used
Bit 9 CD track for ERN1387 encoder erroneous or
EQN encoder connected, or
incorrectly parameterized (not on EQN, P1027.3)
Bit 10 Protocol cannot be exited
Bit 11 No encoder connected, or
incorrect encoder cable
Bit 12 TIMEOUT for measured value read
Bit 13 CRC error or parity error
Bit 15 Defective measuring encoder

Note:
IM —> Indirect measuring system (motor encoder)
Bit 7 and 13 = 1 —> Incremental and absolute track do not match
ERN: incremental encoder system
EQN: absolute encoder system

1024 IM grid spacing (SLM)

Min	Standard	Max	Unit	Data type	Effective
0	20000	8388607	nm	Unsigned32	PO (SLM)

Note:
IM —> Indirect measuring system (motor encoder)

1025 IM serial number, low part (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO (SRM SLM)

Note:
IM —> Indirect measuring system (motor encoder)

1026 IM serial number, high part (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO (SRM SLM)

Note:
IM —> Indirect measuring system (motor encoder)

1027 IM configuration, encoder

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO

... allows the encoder evaluation to be configured for an indirect measuring system.
Bit 2 TTL encoder
Bit 3 Absolute encoder (EnDat interface)
Bit 4 Linear measuring system
Bit 5 Operation without motor measuring system
Bit 6 Coarse synchronous track, electrical revolution
Bit 7 Distance-coded measuring system (from SW 4.1)
Bit 8 Zero mark selection, fine synchronization using the position controller
Note:
IM —> Indirect measuring system (motor encoder)

1029 Delayed measurem., rotor pos. identific. (SRM SLM) (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100.0	ms	Floating Point	immed. (SRM SLM)

... determines the additional delay time between the individual 60 measuring pulses for rotor position identification.
Note: Also refer under the index entry ”PE spindle” or ”Linear motor”

1030 DM actual value sensing configuration (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO

... allows the actual value sensing to be configured for a direct measuring system.

Bit 2 Resolver resolution
Bit 2 = 1 Resolver resolution, 14 bits
Bit 2 = 0 Resolver resolution, 12 bits

Bit 14 Data transfer rate EnDat, bit 0

Bit 15 Transmission rate EnDat, Bit 1
Note:
Bits 14 and 15 are set as follows in the factory:
Bit 15, 14 = 00 —> 100 kHz (standard)
Bit 15, 14 = 01 —> 500 kHz (setting possible)
Bit 15, 14 = 10 —> 1 MHz (setting, Siemens-internal)
Bit 15, 14 = 11 —> 10 MHz (setting, Siemens-internal)

DM —> Direct measuring system (motor encoder)
refer to the index entry ”List of encoders”

1031 DM multi-turn resolution, absolute value encoder (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	PO

Number of revolutions which can be resolved.
Note:
DM —> Direct measuring system
Revolutions which can be resolved for indirect measuring system (IM, motor encoder) —> refer to P1021

1032 DM single-turn resolution, absolute value encoder (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	4294967295	–	Unsigned32	PO

Resolution of the absolute value encoder in measuring pulses per revolution.
Note:
DM —–> Direct measuring system
Single-turn resolution for indirect measuring system (IM, motor encoder) —–> refer to P1022

1033 DM diagnostics (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

Bit 0 Light source failed
Bit 1 Signal amplitude too low
Bit 2 Code connection erroneous
Bit 3 Overvoltage
Bit 4 Undervoltage
Bit 5 Overcurrent
Bit 6 Battery must be changed
Bit 7 Control check error
Bit 8 EnDat encoder cannot be used
Bit 9 CD track for ERN1387 encoder erroneous or
EQN encoder connected, or
incorrectly parameterized (not on EQN, P1027.3)
Bit 10 Protocol cannot be exited
Bit 11 No encoder connected, or
incorrect encoder cable
Bit 12 TIMEOUT for measured value read
Bit 13 CRC error, parity bit
Bit 15 Defective measuring encoder
Note:
DM —–> Direct measuring system
Diagnostics for indirect measuring system (IM, motor encoder) —–> refer to P1023
Bit 7 and 13 = 1 —–> Incremental and absolute track do not match
ERN: incremental encoder system
EQN: absolute encoder system

A

1034 DM grid spacing (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	20000	4294967295	nm	Unsigned32	PO

Note:
DM —–> Direct measuring system

1036 DM encoder code number (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	PO

The encoder number defines the connected measuring system.
Note:
DM —–> Direct measuring system
Encoder code for indirect measuring system (IM, motor encoder) —–> refer to P1006
refer to the index entry ”Encoder code”

1037 DM encoder configuration (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO

... allows the encoder evaluation to be configured for a direct measuring system.
Bit 2 TTL encoder
Bit 3 Absolute encoder (EnDat interface)
Bit 4 Linear measuring system
Bit 5 Operation without direct measuring system
Bit 7 Distance-coded measuring system (from SW 4.1)

Note:
DM —> Direct measuring system
Configuration of the indirect measuring system (IM, motor encoder) —> refer to P1027

1038 DM serial number, low part (SRM SLM) (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO (SRM SLM)

Note:
DM —> Direct measuring system

1039 DM serial number, high part (SRM SLM) (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	PO (SRM SLM)

Note:
DM —> Direct measuring system

1040 DM pole pair number, resolver (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	1	64	–	Unsigned16	PO

... specifies the pole pair number of the resolver used.
Examples:

Resolver	(pole pair number)
2p = 1	(1 speed)
2p = 2	(2 speed)
2p = 3	(3 speed)
2p = 4	(4 speed)

Note:
DM —> Direct measuring system
Pole pair number for indirect measuring system (IM, motor encoder) —> refer to P1018

1042 Encoder 1 fine resolution G1_XIST1 (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	11	11	–	Unsigned16	PO

... defines how many fine resolution bits are transferred for the PROFIBUS encoder interface.
This parameter applies for the following:
– Fine resolution for process data G1_XIST1
– Fine resolution for G1_XIST2 for reference mark or flying measurement

1043 Encoder 1 fine resolution, absolute track G1_XIST2 (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	9	11	–	Unsigned16	PO

... defines how many fine resolution bits are transferred for the PROFIBUS encoder interface. This parameter applies for the fine resolution of process data G1_XIST2 when reading the absolute value.
Note:
The parameter is only valid for the absolute track of the absolute value encoder.
The fine resolution for the value display for reference mark or flying measurement is defined in P1042.

1044 Encoder 2 fine resolution G2_XIST1 (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	11	11	–	Unsigned16	PO

... defines how many fine resolution bits are transferred for the PROFIBUS encoder interface. This parameter applies for the following:
– Fine resolution for process data G2_XIST1
– Fine resolution for G2_XIST2 for reference mark or flying measurement

1045 Encoder 2 fine resolution, absolute track G2_XIST2 (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	9	11	–	Unsigned16	PO

... defines how many fine resolution bits are transferred for the PROFIBUS encoder interface. This parameter applies for the fine resolution of process data G2_XIST2 when reading the absolute value.
Note:
The parameter is only valid for the absolute track of the absolute value encoder.
The fine resolution for the value display for reference mark or flying measurement is defined in P1044.

1050 IM reference mark clearance for distance-coded scales (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	20000	4294967295	µm	Unsigned32	PO

...specifies the basic clearance between two fixed reference marks. If the closed-loop identifies that the distance between each second reference mark is different and is therefore incorrect, the axis remains stationary. Fault 508 (zero mark monitoring, motor measuring system) is signaled.
Note:
IM —> Indirect measuring system (motor encoder)
This monitoring is only activated if P1050/P1024*1000 can either be divided by 16 or by 10.

A

1051 IM ref. mark clearance for distance-coded rotary enc. (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	20000	4294967295	mDegree	Unsigned32	PO

...specifies the basic clearance between two fixed reference marks. If the closed-loop identifies that the distance between each second reference mark is different and is therefore incorrect, the axis remains stationary. Fault 508 (zero mark monitoring, motor measuring system) is signaled.
Note:
IM —> Indirect measuring system (motor encoder)
This monitoring is only activated, if P1051/1000*P1005/360 can either be divided by 16 or by 10.

1052 DM reference mark distance for distance-coded scales (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	20000	4294967295	µm	Unsigned32	PO

...specifies the basic clearance between two fixed reference marks. If the closed-loop identifies that the distance between each second reference mark is different and is therefore incorrect, the axis remains stationary. Fault 514 (zero mark monitoring, direct measuring system) is signaled.
Note:
DM —> Direct measuring system
This monitoring is only activated, if P1052/P1034*1000 can either be divided by 16 or by 10.

1053 DM ref. mark distance for distance-coded rotary enc. (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
0	20000	4294967295	mDegree	Unsigned32	PO

... specifies the basic distance between two fixed reference marks. If the control recognizes that the distance between each second reference mark differs, and is therefore incorrect, the axis remains stationary. Fault 514 (zero mark monitoring, direct measuring system) is signaled.
Note:
This monitoring is only activated, if P1053/1000*P1007/360 can either be divided by 16 or by 10.

1054 IM difference for distance-coded encoders (–> 8.3)

Min	Standard	Max	Unit	Data type	Effective	
0	20	500000	µm	Unsigned32	PO	(SLM)
0	20	450000	mDegree	Unsigned32	PO	(SRM ARM)

... specifies the distance between two reference marks for distance-coded encoders, indirect measuring system (motor measuring system).

1055 DM difference for distance-coded encoders (–> 8.3)

Min	Standard	Max	Unit	Data type	Effective	
0	20	500000	µm	Unsigned32	PO	(SLM)
0	20	450000	mDegree	Unsigned32	PO	(SRM ARM)

... specifies the distance between two reference marks for distance-coded encoders, direct measuring system.

1075 Rotor position identification technique (SRM SLM) (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
1	1	3	–	Unsigned16	immed. (SRM SLM)

...defines the rotor position identification technique.
1 Rotor position identification based on the saturation technique
3 Rotor position identification using the motion-based technique
P1075 is pre-assigned as follows at each ”calculate controller data”:
—> 1FN3 motors: P1075=3
—> all other motors: P1075=1
If the rotor position identification is successful, the contents of P1075 are copied into P1734 for diagnostics.
Note:
P1075 is immediately effective. However, if the drive waits for the enable signals in order to carry-out a rotor position identification, then if P1075 is changed, it only becomes effective at the next attempt (the identification already runs in the wait state)..

1076 Load moment of inertia RLI (SRM) Load mass RLI (SLM) (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	10000.0	kg	Floating Point	immed. (SLM)
0.0	0.0	500.0	kgm^2	Floating Point	immed. (SRM)

...defines the additional moment of inertia (SRM) or additional mass (SLM) which is used to set the controller parameters for the motion-based rotor position identification.

1077 Integral action time, RLI controller (SRM SLM) (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
0.0	3.7	500.0	ms	Floating Point	immed. (SRM SLM)

...defines the integral action time of the controller for the rotor position identification. If P1077 is set to 0, then the I component of the controller is displayed. For ”Calculate controller data”, P1077 is re-calculated and pre-assigned.

1078 Max. duration, rotor position identification. (SRM SLM) (–> 6.1)

Min	Standard	Max	Unit	Data type	Effective
100.0	800.0	10000.0	ms	Floating Point	immed. (SRM SLM)

...defines the maximum time of an individual measurement for the rotor position identification. If this time is exceeded for an individual measurement, then fault 610 (rotor position identification not successful) is signaled and P1734 is set to –6.

1080 Calculate controller data

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Integer16	immed.

Suitable settings for the control parameters are calculated from the motor parameters and several other parameters using this function.

0 –> 1 Controller data are being calculated, function is active
0 Function inactive or completed correctly

Error codes
–15 Magnetizing reactance (P1141) = 0
–16 Leakage reactance (P1139/P1140) = 0
–17 Rated motor frequency (P1134) = 0
–18 Rotor resistance (P1138) = 0
–19 Moment of inertia (P1117+P1123) <= 0
–21 threshold speed for field weakening (P1142) = 0
–22 Motor stall current (P1118) = 0
–23 The ratio between the maximum motor current (P1104) and the motor stall current (P1118) is greater than the maximum value for the torque limit (P1230) and the power limit (P1235).
–24 The ratio between the rated motor frequency (P1134) and the rated motor speed (P1400) is inadmissible (pole pair number)

Note:
Recommendation: Execute this function using SimoCom U because the calculated parameters are displayed and are only accepted and overwritten after confirmation.
At the end of the calculation, the parameters are automatically reset to 0 or an error code is written into it.
When an error occurs, the parameters for the current controller, flux controller and speed controller could not be optimally pre-assigned. The standard values were entered.
After the cause of the error is resolved, the function can be re-started.

1081 Calculate equivalent circuit diagram data (ARM)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Integer16	immed. (ARM)

Procedure for third-party motor:
– Select ”third-party motor” for the first start-up (refer to the index entry ”Motor code”)
– Enter all rating plate data
– calculate the equivalent circuit diagram data via P1081 = 1

Note:
After the ”Calculate equivalent circuit diagram data”, a ”Calculate third-party motor” should be carried out (P1082).
A 0 or another error code is automatically written into the parameter at the end of the calculation.

0 –> 1 Equivalent circuit diagram data are being calculated, function is active
0 Function inactive or completed correctly

Error codes
–51 Rated motor output (P1130) = 0
–52 Rated motor voltage (P1132) = 0
–53 Rated motor current (P1103) = 0
–54 Cos phi (P1129) = 0 or > 0.996
–55 The ratio between the rated motor frequency (P1134) and the rated motor speed (P1400) is inadmissible (pole pair number)
–56 Warning: The threshold speed for field weakening (P1142) < rated motor speed (P1400)
–57 The function is only permissible for third-party motors (P1102 = 99)

Note:
In the case of an error, no equivalent circuit diagram data were changed (exception: code –56).

1082 Calculate third-party motor

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Integer16	immed.

... the ”Calculate unlisted motor” function is started. Parameters P1105 (only SRM), P1147, P1241, P1401 are pre-assigned, the ”calculate controller data” function executed and the appropriate unlisted motor code entered into P1102.
By entering the third-party motor code in P1102, at the next POWER ON, possibly changed motor data will no longer be overwritten by the catalog motor data (previous motor code).
0 –> 1 Third-party motor is being calculated, function is active
0 Function in inactive
Procedure for third-party motor:
Are all of the equivalent circuit diagram data known?
– if no: Calculate the equivalent circuit diagram data via P1081
– if yes: Enter all of the equivalent circuit diagram data and set P1082 to 1
Note:
At the end of the calculation, the parameter is automatically reset to 0 or an error code is written into it (refer to P1080).

1083 Function selection, motor data optimization (ARM)

Min	Standard	Max	Unit	Data type	Effective
1	1	4	–	Unsigned16	immed. (ARM)

... the function number for motor data optimization is entered.
1 Calculate leakage inductance and rotor resistance
2 Calculate no-load current and magnetizing reactance
3 Calculate field-weakening speed
4 Calculate moment of inertia

Perform motor data optimization:
Step 1
P1083 = 1 and start with P1084 = 1 (if it is not 0, evaluate error code)
Calculated and written parameters: P1136, P1137, P1138, P1139, P1140, P1141
Step 2
P1083 = 2 and start with P1084 = 1 (if it is not 0, evaluate error code)
Calculated and written parameters: P1136, P1141
Step 3
P1083 = 3 and start with P1084 = 1 (if it is not 0, evaluate error code)
Calculated and written parameters: P1142
Step 4
P1083 = 4 and start with P1084 = 1 (if it is not 0, evaluate error code)
Calculated and written parameters: P1117
Note:
For a detailed description, please refer to the index entry ”Motor data optimization”.

A

1084 Start motor data optimization (ARM)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Integer16	immed. (ARM)

The function is selected with P1083 and started by setting P1084 = 1.
A 0 or another error code is automatically written into the parameter at the end of the calculation.

1 Function is active
0 Function inactive or completed correctly

Error codes
–2 Pulse frequency (P1100) of 4 kHz or 8 kHz required
–3 Controller/pulse enable missing
–4 Speed setpoint <> 0
–5 Motor changeover is currently active
–6 Error when determining the leakage inductance (result < 0)
–7 V/f operation is active
–8 The incorrect motor was selected by the motor changeover
–9 Parameterized maximum speed is too low for the measurement
–10 Power-up inhibit
–11 Changeover speed open-loop/closed-loop control is too large (P1466)
–12 Speed range too low (P1466 or P1160 too large)
–13 Ramp-function generator enable missing
–14 Open-loop torque-controlled operation is selected
–15 Motor data optimization for catalog motor illegal (from SW 3.3)
–16 If the current is too high, it is limited by the i2t power module model

1099 Limiting factor, power section currents (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... displays the limiting factor for the power section currents (P1108, P1109, P1111) as a function of the pulse frequency (P1100).
Note: refer to the index entry ”Power section currents”

1100 Pulse width modulation frequency

Min	Standard	Max	Unit	Data type	Effective	
2000.0	3200.0	8000.0	Hz	Floating Point	PO	(ARM)
2000.0	4000.0	8000.0	Hz	Floating Point	PO	(SRM SLM)

... defines the clock frequency of the inverter.
We recommend the following frequencies: 2000, 2666, 3200, (4000), 5333, 6400 and (8000) Hz
It is practical to increase the switching frequency for low leakage or higher-speed third-party motors (motor frequency > 500 Hz).
Further, it may make sense to change the switching frequency to reduce motor noise.
Note:
The frequencies specified in brackets are preferred values – intermediate values can be set..
For IM operation (ARM without encoder), only frequencies 4000 and 8000 Hz are permissible.
The current rating of the drive converter is reduced when the frequency is increased. This must already be taken into account when dimensioning the power section (refer to the de-rating characteristic).

1101 Calc. deadtime current control loop

Min	Standard	Max	Unit	Data type	Effective
0	1	124	µs	Integer16	PO

Note: Internal Siemens
(Firmware checks the setting at run-up and is automatically changed)

1102 Motor code number

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	PO

The motor code number describes the connected motor according to a table.
Note:
refer to the index entry ”Motor code”

1103 Rated motor current

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	A(rms)	Floating Point	PO

1104 Maximum motor current (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.04	500.0	A(rms)	Floating Point	PO (SRM SLM)

1105 Reduction in maximum motor current (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0	100	100	%	Integer16	immed. (SRM SLM)

... reduces the maximum motor current (P1104) to the specified percentage.
Note:
If the motor current is at its limit, the monitoring intervenes with P1605/1606.

1106 Power section code number

Min	Standard	Max	Unit	Data type	Effective
0	0	65535	–	Unsigned16	PO

The power section code number defines the power section used.

Power section without automatic identification:
The module code must be selected from a table, and at first start-up, entered into P1106 (refer under index entry ”power section code”).

Power section with automatic identification:
At the first start-up, the power section code of the power section used is automatically entered in P1106.
if the value in P1106 and the value of the detected power section in P1110 differ when the drive runs-up, then an appropriate fault is output.

Power mod. Ord. No. [MLFB]	Power module code
6SN112x–1Ax0x–0HAx	1
6SN112x–1Ax0x–0AAx	2
6SN112x–1Ax0x–0BAx	4
6SN112x–1Ax0x–0CAx	6
6SN112x–1Ax0x–0DAx	7
6SN112x–1Ax0x–0GAx	8 (only for PE spindle)
6SN112x–1Ax0x–0EAx	9
6SN112x–1Ax0x–0FAx	10
6SN112x–1Ax0x–0JAx	11 (only for PE spindle)
6SN112x–1Ax0x–0KAx	12
6SN112x–1Ax0x–0LAx	13 (only for PE spindle)

A

1107 Transistor limiting current

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A(pk)	Floating Point	RO

... specifies the maximum transistor limiting current of the power section as peak value.
Important:
This parameter is used as normalization basis for the current actual value sensing.
Note: refer to the index entry "Power section currents"

1108 Limiting current, power section (RMS)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A(rms)	Floating Point	RO

before SW 2.4, the following is valid:
... displays the limiting current of the power section (I-max in A RMS) at the selected pulse frequency (P1100).
from SW 2.4 the following is valid:
... displays the power section limiting current (I max in A RMS) for the standard pulse frequency setting (P1100). The reduction factor for higher pulse frequencies is displayed in P1099.
Note: refer to the index entry "Power section currents"

1109 Limiting current, power section S6 (RMS)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A(rms)	Floating Point	RO

before SW 2.4, the following is valid:
... displays the limiting current of the power section in S6 duty (I-S6 in A RMS) at the selected pulse frequency (P1100).
from SW 2.4 the following is valid:
... displays the power section limiting current in S6 duty (I-S6 in A RMS) for the standard pulse frequency setting (P1100). The reduction factor for higher pulse frequencies is displayed in P1099.
Note: refer to the index entry "Power section currents"

1110 Power section version

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... displays which power section was identified at run-up.

0
Power section without automatic identification
> 0
Power section with automatic identification
The code of the identified power section is in P1110 and must coincide with the code entered into P1106 (power section code number).
Note: Assignment, power module code number, refer to P1106

1111 Rated current, power section (RMS)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A(rms)	Floating Point	RO

before SW 2.4, the following is valid:
... displays the rated current of the power section (i-rated in A RMS) at the selected pulse frequency (P1100).
from SW 2.4 the following is valid:
... displays the rated current of the power section (i-rated in A RMS) for the standard pulse frequency setting (P1100). The reduction factor for higher pulse frequencies is displayed in P1099.
Note: refer to the index entry ”Power section currents”

1112 No. of pole pairs of motor (SRM)

Min	Standard	Max	Unit	Data type	Effective
0	0	4096	–	Unsigned16	PO (SRM)

1113 Torque constant (SRM) Force constant (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	2000.0	N/A	Floating Point	PO (SLM)
0.0	0.0	300.0	Nm/A	Floating Point	PO (SRM)

SRM:
The torque constant (kT) is the quotient of rated torque/rated current (RMS) for synchronous motors with permanent excitation.
SLM:
The force constant is the quotient of the rated force/rated current (RMS) for linear permanent-magnet synchronous motors.

1114 Voltage constant (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	10000.0	Vs/m	Floating Point	PO (SLM)
0.0	0.0	10000.0	V(RMS)	Floating Point	PO (SRM)

SRM:
The voltage constant is measured as induced voltage (EMF) under no load conditions at n = 1000 RPM as RMS value between the motor terminals (phase-to-phase).
SLM:
The voltage constant is measured as induced voltage (EMF) under no load conditions at v = 1 m/s as RMS value between the motor terminal and star point (phase).

1115 Armature resistance (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	999.999	Ohm	Floating Point	PO (SRM SLM)

... specifies the ohmic resistance of the armature winding (phase value) of a phase at 20 degrees.
The winding is in the star circuit configuration.

1116 Armature inductance (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	300.0	mH	Floating Point	PO (SRM SLM)

... specifies the three-phase inductance of the armature.
L(rotating field) = 1.5 x L(phase)

A

1117 Moment of inertia of motor (ARM SRM) Motor mass (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.001	9.99999	kgm^2	Floating Point	immed. (ARM)
0.0	0.0	500.0	kg	Floating Point	immed. (SLM)
0.0	0.0	9.99999	kgm^2	Floating Point	immed. (SRM)

SRM, ARM: Moment of inertia of the motor rotor
SLM: Weight of the primary section

1118 Motor zero-speed current (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	A(rms)	Floating Point	PO (SRM SLM)

... corresponds to the thermally permissible continuous current when the motor is at a standstill with an overtemperature (temperature rise) of 100 Kelvin.

1119 Series reactor inductance (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	65.0	mH	Floating Point	PO (ARM)

1120 Current controller P gain

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	10000.0	U/A	Floating Point	immed.

1121 Current controller reset time

Min	Standard	Max	Unit	Data type	Effective
0.0	3000.0	8000.0	µs	Floating Point	immed. (ARM)
0.0	2000.0	8000.0	µs	Floating Point	immed. (SRM SLM)

1122 Motor current limit (SRM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.04	500.0	A(rms)	Floating Point	PO (SRM)

1123:8 Load moment of inertia (ARM SRM) Load weight (SLM) (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	kg	Floating Point	immed. (SLM)
0.0	0.0	9.99999	kgm^2	Floating Point	immed. (SRM ARM)

Additional moment of inertia (SRM, ARM) and additional weight (SLM), which is caused by coupling a load to the motor. The contents of P1123:8 are added to the contents of P1117 for the speedtorque feedforward control in induction motor operation and for the ”calculate controller data” function.

1124 Symmetrizing reference model current

Min	Standard	Max	Unit	Data type	Effective
0.0	0.5	1.0	–	Floating Point	immed.

Note: Internal Siemens

1125 Ramp-up time 1 for V/f operation

Min	Standard	Max	Unit	Data type	Effective
0.01	5.0	100.0	s	Floating Point	immed.

When V/f operation is selected (P1014), this is the time, in which the speed setpoint is changed from 0 to the maximum motor speed (P1146).

1127 Voltage at f = 0 V/f operation (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	2.0	20.0	V(pk)	Floating Point	immed. (ARM)

1128 Optimum load angle (SRM) (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
90.0	90.0	135.0	Degree	Floating Point	immed. (SRM)

For synchronous motors with non-symmetrical rotors in the rotational axis, the additional reluctance torque can be used to increase the torque.
The optimum load angle specifies at which load angle the torque reaches its maximum value at 150% rated current.
Note:
Refer to P1149 (reluctance torque constant)
Synchronous motors with non-symmetrical rotor in the rotational axis: e.g. 1FE motors
Traverse with reluctance torque: P1128 and P1149 not equal to the standard value
Traverse without reluctance torque: P1128 and P1149 equal to the standard value

1129 Cosine Phi power factor (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.8	1.0	–	Floating Point	PO (ARM)

1130 Rated motor power (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	1500.0	kW	Floating Point	PO (ARM)

1132 Rated motor voltage (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	380.0	5000.0	V(RMS)	Floating Point	PO (ARM)

1134 Rated motor frequency (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	50.0	3000.0	Hz	Floating Point	PO (ARM)

1135 Motor no-load voltage (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	V(RMS)	Floating Point	immed. (ARM)

1136 Motor no-load current

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	A(rms)	Floating Point	immed.

P1136 (motor short-circuit current) —> this is the parameter name for SRM
P1136 (no-load motor current) —> this is the parameter name for ARM

1137 Stator resistance cold (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	120.0	Ohm	Floating Point	immed. (ARM)

1138 Rotor resistance cold (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	120.0	Ohm	Floating Point	immed. (ARM)

1139 Stator leakage reactance (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100.0	Ohm	Floating Point	immed. (ARM)

1140 Rotor leakage reactance (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100.0	Ohm	Floating Point	immed. (ARM)

A

1141 Magnetizing reactance (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	999.999	Ohm	Floating Point	immed. (ARM)

1142 Threshold speed field weakening (ARM SRM) Motor threshold speed for field weakening (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	0.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

1145 Stall torque reduction factor

Min	Standard	Max	Unit	Data type	Effective
5.0	100.0	1000.0	%	Floating Point	immed.

1146 Maximum motor speed (ARM SRM) Maximum motor velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	1500.0	100000.0	rpm	Floating Point	PO (ARM)
0.0	0.0	100000.0	m/min	Floating Point	PO (SLM)
0.0	0.0	100000.0	rpm	Floating Point	PO (SRM)

... specifies the maximum motor speed/maximum motor velocity defined by the motor manufacturer.
Note:
Refer under the index entry ”Limits”

1147 Speed limitation (ARM SRM) Velocity limiting, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	8000.0	100000.0	rpm	Floating Point	immed. (ARM)
0.0	120.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	7000.0	100000.0	rpm	Floating Point	immed. (SRM)

... specifies the maximum permissible motor speed or motor velocity (refer under the index entry ”Limits”).

1148 Threshold speed stall power (ARM)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	rpm	Floating Point	RO (ARM)

The rated output is reduced from the ”Threshold speed of the stall power”.

1149 Reluctance torque constant (SRM) (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	300.0	mH	Floating Point	immed. (SRM)

For synchronous motors with non-symmetrical rotors in the rotational axis, the additional reluctance torque can be used to increase the torque.
The reluctance torque constant, multiplied by the torque- and field-generating current, gives the torque increase due to the reluctance torque.
Note:
Refer to P1128 (optimum load angle)
Synchronous motors with non-symmetrical rotor in the rotational axis: e.g. 1FE motors
Traverse with reluctance torque: P1128 and P1149 not equal to the standard value
Traverse without reluctance torque: P1128 and P1149 equal to the standard value

1150 P gain flux controller (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	400.0	99999.9	A/Vs	Floating Point	immed. (ARM)

1151 Reset time flux controller (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	500.0	ms	Floating Point	immed. (ARM)

1160 Threshold speed flux sensing (ARM)

Min	Standard	Max	Unit	Data type	Effective
200.0	1500.0	100000.0	rpm	Floating Point	immed. (ARM)

1161 Fixed DC link voltage

Min	Standard	Max	Unit	Data type	Effective
0	0	700	V(pk)	Unsigned16	immed.

... a fixed DC link voltage can be entered.
> 0 Fixed DC link voltage, the measurement in P1701 (DC link voltage) is inactive
0 The measurement in P1701 is active
The fixed DC link reference is calculated in instead of the measurement:
– DC link adaption
– Flux sensing (ARM)
– Field weakening and stall torque (ARM)
Note:
The DC link is measured in the I/R module, and is transferred as analog signal to the "SIMODRIVE 611 universal" via the unit bus for evaluation.

1162 Min. DC link voltage

Min	Standard	Max	Unit	Data type	Effective
0	0	800	V(pk)	Unsigned16	immed.

... defines the permissible DC link voltage lower limit. Fault 616 is output if this limit is fallen below.

1163 Max. DC link voltage

Min	Standard	Max	Unit	Data type	Effective
0	800	800	V(pk)	Unsigned16	immed.

... defines the permissible DC link voltage upper limit. Fault 617 is output if this limit is exceeded.

1164 Hysteresis, DC link monitoring (–> 8.1)

Min	Standard	Max	Unit	Data type	Effective
0	50	600	V(pk)	Unsigned16	immed.

... defines the hysteresis for the DC link voltage monitoring. This parameter refers to parameter 1162..

1170 Pole pair width (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	72.0	1000.0	mm	Floating Point	PO (SLM)

The pole pair width of a linear drive corresponds to the length from a north and south pole of the magnet.

1180 Lower current limit adaption (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100.0	%	Floating Point	immed. (SRM SLM)

The P gain of the current controller (P1120) can be reduced as a function of the current, using the current controller adaption (P1180, P1181, P1182).
P1180 defines the lower current value, from which the adaption linearly decreases the P gain up to the upper current value (P1181). The adaption straight line is defined, in addition to current values P1180 and P1181, by P1182. (current controller adaption factor).
The following value pairs are obtained:
First value pair: P1180/100%
Second value pair: P1181/P1182
Note:
P1180, P1181—> Percentage values referred to P1104 (maximum current)
P1182 —> Percentage value, referred to P1120 (P gain, current controller)
The following is valid: P1180 (lower current limit adaption) < P1181 (upper current limit adaption)
(refer under the index entry ”Current controller adaption”)

1181 Upper current limit adaption (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	100.0	100.0	%	Floating Point	immed. (SRM SLM)

Note: Description, refer to P1180.

1182 Factor, current controller adaption (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed. (SRM SLM)

Note: Description, refer to P1180.

1185 Start-up factor P_IREG (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	100.0	10000.0	%	Floating Point	PO (ARM)

P1185 was introduced for 1PM4/1PM6 motors. For ”calculate controller data” the current controller P gain is multiplied by the factor in P1185 and entered into P1120.

1200:8 No. of current setpoint filters

Min	Standard	Max	Unit	Data type	Effective
0	1	4	–	Unsigned16	immed.

... specifies the number of current setpoint filters.
The filter type (bandstop or low pass) is set using P1201:8.
0 No current setpoint value filter
1 Filter 1 active
2 Filters 1 and 2 active
3 Filters 1, 2 and 3 active
4 Filters 1, 2, 3 and 4 active
Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1201:8 Current setpoint filter type

Min	Standard	Max	Unit	Data type	Effective
0	0	800F	Hex	Unsigned16	immed.

... specifies the type of the 4 current setpoint filters.

Bit 0 Filter 1
= 1 Bandstop (filter parameters: P1210:8, P1211:8, P1212:8)
= 0 Low pass (filter parameters: P1202:8, P1203:8)
Bit 1 Filter 2
= 1 Bandstop (filter parameters: P1213:8, P1214:8, P1215:8)
= 0 Low pass (filter parameters: P1204:8, P1205:8)
Bit 2 Filter 3
= 1 Bandstop (filter parameters: P1216:8, P1217:8, P1218:8)
= 0 Low pass (filter parameters: P1206:8, P1207:8)
Bit 3 Filter 4
= 1 Bandstop (filter parameters: P1219:8, P1220:8, P1221:8)
= 0 Low pass (filter parameters: P1208:8, P1209:8)
Bit 15 Bandstop, transformation type (from SW 3.3)
= 1 Z transformation
= 0 Bilinear transformation (standard)

Note:
Before parameterizing the filter type, the appropriate filter parameters must be assigned.
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1202:8 Natural frequency current setp. filter 1

Min	Standard	Max	Unit	Data type	Effective
0.0	2000.0	8000.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1203:8 Damping, current setp. filter 1

Min	Standard	Max	Unit	Data type	Effective
0.05	0.7	5.0	–	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1204:8 Natural frequency current setp. filter 2

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	8000.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1205:8 Damping, current setp. filter 2

Min	Standard	Max	Unit	Data type	Effective
0.05	1.0	5.0	–	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1206:8 Natural frequency current setp. filter 3

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	8000.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1207:8 Damping, current setp. filter 3

Min	Standard	Max	Unit	Data type	Effective
0.05	1.0	5.0	–	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1208:8 Natural frequency current setp. filter 4

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	8000.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1209:8 Damping, current setp. filter 4

Min	Standard	Max	Unit	Data type	Effective
0.05	1.0	5.0	–	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1210:8 Blocking freq. current setp. filter 1

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1211:8 Bandwidth, current setp. filter 1

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1212:8 Numerator, bandwidth current setpoint filter 1

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1213:8 Blocking freq. current setp. filter 2

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1214:8 Bandwidth, current setp. filter 2

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1215:8 Numerator, bandwidth current setpoint filter 2

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1216:8 Blocking freq. current setp. filter 3

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1217:8 Bandwidth, current setp. filter 3

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1218:8 Numerator, bandwidth current setpoint filter 3

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1219:8 Blocking freq. current setp. filter 4

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1220:8 Bandwidth, current setp. filter 4

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1221:8 Numerator, bandwidth current setpoint filter 4

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1222:8 BSF natural frequency, current setpoint filter 1 (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1223:8 BSF natural frequency, current setpoint filter 2 (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1224:8 BSF natural frequency, current setpoint filter 3 (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1225:8 BSF natural frequency, current setpoint filter 4 (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	100.0	%	Floating Point	immed.

Note:
The current setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1230:8 1st torque limit value (ARM SRM)
1st force limit value (SLM)

Min	Standard	Max	Unit	Data type	Effective
5.0	100.0	900.0	%	Floating Point	immed.

The parameter value refers to the stall torque (SRM), rated motor torque (ARM) and stall force (SLM) of the motor.
Note: refer to the index entry ”Limits”

1233:8 Generative limitation

Min	Standard	Max	Unit	Data type	Effective
5.0	100.0	100.0	%	Floating Point	immed.

The setting refers to the parameter value in P1230.

1235:8 1st power limit

Min	Standard	Max	Unit	Data type	Effective
5.0	100.0	900.0	%	Floating Point	immed.

The parameter value refers to the motor output (SRM) and the rated motor output (ARM).
Note: refer to the index entry ”Limits”

1237 Maximum generative power

Min	Standard	Max	Unit	Data type	Effective
0.1	100.0	500.0	kW	Floating Point	immed.

... allows the regenerative power for the rectifier/regenerative feedback module to be limited. An appropriately lower value must be entered here especially when using a non-controlled NE module.
Note: refer to the index entry ”Limits”

1238 Current limit value (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	150.0	400.0	%	Floating Point	immed. (ARM)

The parameter value refers to the rated motor current (P1103).
Note: refer to the index entry ”Limits”

1240:8 Torque setpoint offset (speed-contr.) (ARM SRM) Force setpoint offset (speed-contr.) (SLM)

Min	Standard	Max	Unit	Data type	Effective
–50000.0	0.0	50000.0	N	Floating Point	immed. (SLM)
–50000.0	0.0	50000.0	Nm	Floating Point	immed. (SRM ARM)

This parameter value is added to the torque setpoint and force setpoint (SLM) if the closed-loop speed control is active (pos operation and nset operation with speed setpoint input). The parameter has no effect if, in the nset mode, open-loop torque controlled operation was selected.
Note: refer under the index entry ”weight compensation”

1241:8 Normalization of torque setpoint (ARM SRM) Normalization of force setpoint (SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	10.0	50000.0	N	Floating Point	immed. (SLM)
1.0	10.0	50000.0	Nm	Floating Point	immed. (SRM ARM)

... defines the normalization for the torque setpoint and force setpoint (SLM) for open-loop torque controlled operation at the analog input terminals 56.x/14.x and/or terminals 24.x/20.x and displays the reference value for P0619.
Note: refer to the index entry ”Open-loop torque controlled operation”

1242:8 Torque setpoint offset (torque-contr.) (ARM SRM) Offset, force setpoint (torque-controlled) (SLM)

Min	Standard	Max	Unit	Data type	Effective
–50000.0	0.0	50000.0	N	Floating Point	immed. (SLM)
–50000.0	0.0	50000.0	Nm	Floating Point	immed. (SRM ARM)

The value is added to the torque setpoint or the force setpoint (SLM).
Note: refer to the index entry ”Open-loop torque controlled operation”

1243:8 Normalization, torque/power reduction. (ARM SRM) Normalization, force/power reduction. (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	100.0	100.0	%	Floating Point	immed.

Note: refer to the index entry ”Torque/power reduction”

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1244 Characteristic type, torque/power reduction (ARM SRM) Characteristic type, force/power reduction (SLM)

Min	Standard	Max	Unit	Data type	Effective
1	1	2	–	Unsigned16	immed.

... defines whether reduction is realized with a negative or a positive characteristic.
1 Negative characteristic
2 Positive characteristic
Note: refer to the index entry ”Torque/power reduction”

1245 Threshold, speeddependent M_set smoothing (ARM SRM) Threshold, velocity-dependent F_set smoothing (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	0.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

Note:
... is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1246 Hysteresis, speeddependent M_set smoothing (ARM SRM) Hysteresis, velocity-dependent F_set smoothing (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	3.0	1000.0	m/min	Floating Point	immed. (SLM)
0.0	50.0	1000.0	rpm	Floating Point	immed. (SRM ARM)

Note:
... is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1247 Speed threshold, motor changeover 1/2 (ARM) (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
100.0	100000.0	100000.0	rpm	Floating Point	immed. (ARM)

... the speed threshold for the motor changeover is defined with speed threshold (P1013 = 3) to change over the motor data sets P1xxx to P2xxx.
Note: refer to the index entry ”Motor changeover”

1248 Speed threshold, motor changeover 3/4 (ARM) (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
100.0	100000.0	100000.0	rpm	Floating Point	immed. (ARM)

... the speed threshold for the motor changeover is defined with the speed threshold (P1013 = 3) to change over the motor data sets P3xxx to P4xxx.
Note: refer to the index entry ”Motor changeover”

1249 External contactor control, motor changeover (ARM) (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed. (ARM)

... specifies whether the contactor control for the motor changeover is defined by the drive or from an external control.
1 Motor changeover via external control
The contactor control for motor changeover is determined via an external control via the ”Motor changed over” input signal (STW2.11).
= Motor changeover via the drive
The contactor control for motor changeover is determined by the drive via output terminals with function numbers 11, 12, 13 and 14.

Note:
refer to the index entry ”Motor changeover”
The contactors for motor changeover must be switched to a no-current condition. If motor changeover is executed using an external control, and changed over with ”Fault” (e. g. with drive pulses present), the power/supply infeed module could be destroyed.
Recommendation:
Change over the motor using the drive output terminals (P1249=0).
The output terminals 11, 12, 13 and 14 are not energized if P1249 = 1.

1250 Frequency limit, act. current smoothing

Min	Standard	Max	Unit	Data type	Effective
0.0	100.0	8000.0	Hz	Floating Point	immed.

PT1 filter for the current actual value display
The parameter is used to smooth the following displays:
– P1708 (torque-generating current Iq)
– P1718 (torque-generating current Iq (A)), from SW 3.1
– PROFIBUS status word IqGl (smoothed, torque-generating current Iq) from SW 3.1
Note:
< 1 Hz —> the filter is inactive
This parameter has no effect on the closed-loop control.

1251 Time constant (smoothing) motor utilization

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	1000.0	ms	Floating Point	immed.

Smoothing to display the motor utilization (P0604).

A

1252 Frequency limit, torque setpoint smoothing (ARM SRM) Frequency limit, force setpoint smoothing (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	100.0	8000.0	Hz	Floating Point	immed.

PT1 filter for the torque setpoint display (smoothing for P1716, analog output of signal number 36).
Note:
< 1 Hz —> the filter is inactive
This parameter has no effect on the closed-loop control.

1254 Time constant current monitoring

Min	Standard	Max	Unit	Data type	Effective
0.0	0.5	2.0	ms	Floating Point	immed.

Note: Internal Siemens

1256:8 Ramp-function generator ramp-up time (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
0.0	2.0	600.0	s	Floating Point	immed. (ARM)
0.0	0.0	600.0	s	Floating Point	immed. (SRM SLM)

During ramp-up, the setpoint is increased from zero to the maximum permissible actual speed.
Note:
Max. permissible actual speed for synchronous motors: Minimum from 1.1 (1.05 from SW 7.1 with ”SIMODRIVE 611 universal HR”, resolver) x P1400 and P1147
Max. permissible actual speed for induction motors: Minimum from P1146 and P1147
Max. permissible actual speed for linear motors: From P1147
refer to the index entry ”Ramp-function generator”.

1257:8 Ramp-function generator ramp-down time (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
0.0	2.0	600.0	s	Floating Point	immed. (ARM)
0.0	0.0	600.0	s	Floating Point	immed. (SRM SLM)

During ramp-down, the setpoint is reduced from the maximum permissible actual speed to zero.
Note:
Max. permissible actual speed for synchronous motors: Minimum from 1.1 (1.05 from SW 7.1 with ”SIMODRIVE 611 universal HR”, resolver) x P1400 and P1147
Max. permissible actual speed for induction motors: Minimum from P1146 and P1147
Max. permissible actual speed for linear motors: From P1147
refer to the index entry ”Ramp-function generator”.

1259 Torque/power reduction mot./gen. (ARM SRM) Force/power reduction mot./gen. (SLM) (–> 3.7)

Min	Standard	Max	Unit	Data type	Effective
0	0	3	Hex	Unsigned16	immed.

... defines if the torque/power de-rating or force/power de-rating depends on whether the drive is motoring/generating.

Bit 0	Torque/power reduction, only when motoring
Bit 0 = 1	Reduction is only effective when motoring
Bit 0 = 0	Reduction is effective when motoring and regenerating
Bit 1	Motoring/regenerating limiting dependent on Nset
Bit 1 = 1	The torque limits when motoring are used if the product of torque and speed setpoint is positive and the speed setpoint is not equal to 0
Bit 1 = 0	The torque limits when motoring are used if the product of torque and speed actual value is positive or the absolute speed actual value is less than 10 RPM

P1259 valid for input via PROFIBUS and analog input.
Note: refer to the index entry ”Torque/power reduction”

1260 i2t limiting, limit current, power section S6 (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
25.0	100.0	100.0	%	Floating Point	immed.

... for the i2t power section limiting, it defines the limiting characteristic referred to i-S6.
Note:
I-S6 = P1109 (limiting power section current S6) x P1099 (limiting factor, power section currents)
refer to the index entry ”i2t power section limiting”

1261 i2t limiting, rated current power section current (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
25.0	100.0	100.0	%	Floating Point	immed. (ARM)
25.0	110.0	110.0	%	Floating Point	immed. (SRM SLM)

... for the i2t power section limiting, it defines the limiting characteristic referred to i-n.
Note:
i-n = P1111 (rated power section current) x P1099 (limiting factor, power section currents)
refer to the index entry ”i2t power section limiting”

1262 i2t time in limiting (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	s	Floating Point	RO

... for the i2t power section limit, this is used to display the time during which the power section is being limited.
Note:
The parameter is reset for value overflow and for POWER ON.
refer to the index entry ”i2t power section limiting”

1263 i2t actual limiting factor (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... for the i2t power section limit, this is used to display the actual current limit referred to i-max.
Note:
i-max = P1108 (limiting power section current) x P1099 (limiting factor, power section currents)
refer to the index entry ”i2t power section limiting”

1264 i2t actual utilization factor (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... is used for the i2t power section limiting to display the actual utilization. The difference to 100 % specifies how much reserve is available. The current limit is reduced for a utilization of 100%.
Note:
refer to the index entry ”i2t power section limiting”

1400 Rated motor speed (ARM SRM)
Rated motor velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective	
0.0	1450.0	100000.0	rpm	Floating Point	PO	(ARM)
0.0	0.0	100000.0	m/min	Floating Point	PO	(SLM)
0.0	0.0	100000.0	rpm	Floating Point	PO	(SRM)

1401:8 Speed for max. useful motor speed (ARM SRM)
Velocity for max. useful motor velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
–100000.0	0.0	100000.0	m/min	Floating Point	immed. (SLM)
–100000.0	0.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

The parameter specifies the maximum useful motor speed and the useful motor velocity in closed-loop speed controlled operation, and represents the setpoint for P0618.
Note:
The maximum useful motor speed, set via P1401:8, is not exceeded, independent of whether the setpoint is entered via terminal or PROFIBUS.
refer to the index entry ”speed-controlled operation”

1403 Creep speed pulse suppression (ARM SRM) Creep speed, pulse suppression (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	6.0	7200.0	rpm	Floating Point	immed. (ARM)
0.0	0.0	7200.0	m/min	Floating Point	immed. (SLM)
0.0	0.0	7200.0	rpm	Floating Point	immed. (SRM)

After withdrawing the controller enable (e.g. via terminal, or in an error/fault case), the drive brakes along the torque limit.
If the absolute speed actual value or the absolute velocity value falls below the specified shut-down speed or creep speed, during the power-off sequence, the pulse enable is withdrawn, and the drive ”coasts down”.
The pulses are previously cancelled if the timer stage, set in P1404 has expired. When the ramp-function generator is active, the timer stage only starts to run when a speed setpoint of zero is reached at the ramp-function generator output.
0 P1403 is inactive, pulses are exclusively canceled via P1404
Note:
The functionality of P1403 is required, if an overshoot occurring when reaching zero speed has to be suppressed, after withdrawing the controller enable.
The pulse suppression control via P1403 and P1404 is ineffective when the motor holding brake is activated (P0850 = 1)

1404 Timer pulse suppression

Min	Standard	Max	Unit	Data type	Effective
0.0	5000.0	100000.0	ms	Floating Point	immed. (ARM)
0.0	100.0	100000.0	ms	Floating Point	immed. (SRM SLM)

After the controller enable has been withdrawn and after this delay, the gating pulses of the power transistors are canceled on the drive side. If the ramp-function generator is active, the delay only starts when zero speed setpoint has been reached at the ramp-function generator output.
Note:
The pulses will be canceled beforehand, if the threshold, set in P1403, is fallen short off.
The pulse suppression control via P1403 and P1404 is ineffective when the motor holding brake is activated (P0850 = 1)

1405:8 Monitoring speed, motor (ARM SRM) Monitoring velocity, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective
100.0	110.0	110.0	%	Floating Point	immed.

Percentage input of the maximum permissible setpoint referred to P1401.
Note:
If the setpoint is exceeded, the value in P1405 is used as limit.

1407:8 Speed controller P gain (ARM SRM) Velocity controller P gain (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	2000.0	999999.0	Ns/m	Floating Point	immed. (SLM)
0.0	0.3	999999.0	Nm*s/rad	Floating Point	immed. (SRM ARM)

Note: refer to the index entry ”Speed controller optimization”

1408:8 P gain, upper adaption speed (ARM SRM) P gain, upper adaption velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	2000.0	999999.0	Ns/m	Floating Point	immed. (SLM)
0.0	0.3	999999.0	Nm*s/rad	Floating Point	immed. (SRM ARM)

Note: Refer under the index entry ”Speed controller adaption”

1409:8 Speed controller reset time (ARM SRM) Velocity controller reset time (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	500.0	ms	Floating Point	immed.

Note: refer to the index entry ”Speed controller optimization”

1410:8 Integral action time, upper adaption speed (ARM SRM) Integral action time, upper adaption velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	10.0	500.0	ms	Floating Point	immed.

Note: Refer under the index entry ”Speed controller adaption”

1411 Lower adaptation speed (ARM SRM) Lower adaption velocity, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	0.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

Note: Refer under the index entry ”Speed controller adaption”

1412 Upper adaptation speed (ARM SRM) Upper adaption speed, motor (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	0.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

Note: Refer under the index entry ”Speed controller adaption”

1413 Select speed controller adaptation (ARM SRM) Select velocity control adaption (SLM)

Min	Standard	Max	Unit	Data type	Effective
0	1	1	–	Unsigned16	immed. (ARM)
0	0	1	–	Unsigned16	immed. (SRM SLM)

Note: Refer under the index entry ”Speed controller adaption”

1414:8 Natural frequency, reference model speed (ARM SRM) Natural frequency, reference model velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	8000.0	Hz	Floating Point	immed.

Note:
The reference model is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

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1415:8 Damping, reference model speed (ARM SRM) Damping, reference model velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.5	1.0	5.0	–	Floating Point	immed.

Note:
The reference model is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1416 Balancing, reference model, speed (ARM SRM) Balancing, reference model, velocity (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	1.0	–	Floating Point	immed.

Note:
The reference model is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1417:8 n_x for ’n_act < n_x’ signal

Min	Standard	Max	Unit	Data type	Effective
0.0	120.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	6000.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

The threshold speed or the threshold velocity (SLM) for the output signal ”n_act < n_x” is defined using this parameter.

1418:8 n_min for ’n_act < n_min’ signal

Min	Standard	Max	Unit	Data type	Effective
0.0	0.3	100000.0	m/min	Floating Point	immed. (SLM)
0.0	5.0	100000.0	rpm	Floating Point	immed. (SRM ARM)

The threshold speed or the threshold velocity (SLM) for the output signal ”n_act < n_min” is defined using this parameter.

1421:8 Time constant, integrator feedback (n controller)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	1000.0	ms	Floating Point	immed.

The integrator of the speed controller is re-parameterized via a feedback element to a PT1 filter (1st order lowpass characteristics). The PT1 filter time constant can be set via P1421.
The following is valid:
P1421 < 1.0 —> the PT1 filter is not active, the pure integrator is effective
P1421 >= 1.0 —> the PT1 filter is active and has replaced the pure integrator
Applications:
Movement at zero setpoint with a dominant stiction can be suppressed but with the disadvantage that a setpoint-actual value difference remains. This can result in, for example, an oscillation of a position-controlled axis at standstill (stick-slip effect) or overshoot with micrometer steps.
Prevents excessive stress for axes which are mechanically rigidly coupled (e.g. for synchronous spindles, master-slave axes).

1426:8 Toler.bandwidth f.’n_set = n_act’ signal

Min	Standard	Max	Unit	Data type	Effective
0.0	1.0	10000.0	m/min	Floating Point	immed. (SLM)
0.0	20.0	10000.0	rpm	Floating Point	immed. (SRM ARM)

The tolerance bandwidth for the ”n_set = n_act” output signal is defined using this parameter.

1427 Delay time ’n_set = n_act’ signal

Min	Standard	Max	Unit	Data type	Effective
0.0	200.0	500.0	ms	Floating Point	immed.

The parameter defines the time which is started if the speed actual value or the velocity actual value (SLM) has reached the tolerance bandwidth around the setpoint.
The time is used for the output signal ”Ramp-function generator ended” and for the output signal ”n_set = n_act”.
Note:
refer to the index entry ”Output signal ramp-up completed” or ”Output signal n_set is equal to n_act”

1428:8 Threshold torque M_x (ARM SRM) Threshold force F_x (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	90.0	100.0	%	Floating Point	immed.

The threshold torque or the threshold force (SLM) for the output signal ”M < M_x” is defined using this parameter.
Note: refer to the index entry ”Output signal M less than M_x”

1429 Delay time ’M < M_x’ signal (ARM SRM) Delay time ’F < F_x’ signal (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	800.0	1000.0	ms	Floating Point	immed.

The parameter defines the time after which the evaluation for the output signal ”M < M_x” is started after run-up.
Note: refer to the index entry ”Output signal M less than M_x”

1451:8 P gain speed controller AM (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.3	9999.999	Nm*s/rad	Floating Point	immed. (ARM)

... the P gain of the speed controller is set in IM operation (operation without encoder).

1453:8 Reset time speed controller AM (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	140.0	6000.0	ms	Floating Point	immed. (ARM)

... the integral action time of the speed controller in IM operation (operation without encoder).

1458 Current setpoint, controlled range IM (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	90.0	150.0	%	Floating Point	immed. (ARM)

Current setpoint for the currentfrequency open-loop control referred to the rated motor current.

1459 Torque smoothing time constant IM (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	4.0	100.0	ms	Floating Point	immed. (ARM)

Torque setpoint smoothing (initial rounding-off).

1465 Switching speed MSD/AM (ARM)

Min	Standard	Max	Unit	Data type	Effective
0.0	100000.0	100000.0	rpm	Floating Point	immed. (ARM)

Threshold speed for the changeover from the MSD to induction motor (IM) control.

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1466 Changeover speed, open-loop/closed-loop control IM (ARM)

Min	Standard	Max	Unit	Data type	Effective
150.0	300.0	100000.0	rpm	Floating Point	immed. (ARM)

Threshold speed for changing over between closed-loop and open-loop control for induction motor operation.

1490 Activate equalization controller (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	PO

...can activate the anti-backlash controller (equalization controller).

0 no source or no equalization controller
1 active, source is terminal 24/20
2 active, source is the adjacent drive (double-axis module)

1491 P gain equalization controller (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.1	10000.0	rad/s/Nm	Floating Point	immed.

1492 Integral action time equalization controller (–> 7.1)

Min	Standard	Max	Unit	Data type	Effective
0.0	20.0	8000.0	ms	Floating Point	immed. (ARM)
0.0	10.0	8000.0	ms	Floating Point	immed. (SRM SLM)

1493 Pre-tensioning torque, equaliz. controller (ARM SRM) (–> 7.1) Pre-tensioning force, equalization controller (SLM)

Min	Standard	Max	Unit	Data type	Effective
–200.0	0.0	200.0	N	Floating Point	PO (SLM)
–200.0	0.0	200.0	Nm	Floating Point	PO (SRM ARM)

... enters a pre-tension torque (or pre-tension force (SLM)) which acts with switch-in delay via a PT1 element (P1494)

1494 Time const., pre-tens. torque, equal. cntr. (ARM SRM) (–> 7.1) Time constant, pre-tensioning force, equalization contr. (SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	1.0	1000.0	ms	Floating Point	immed.

... enters the time constant for the PT1 element which ensures a soft, gentle increase of the pre-tensioning torque (P1493) when activating the equalization controller.

1495 Torque weighting, equaliz. contr. – master (ARM SRM) (–> 7.1) Force weighting equalization controller – master (SLM)

Min	Standard	Max	Unit	Data type	Effective
–100.0	100.0	100.0	%	Floating Point	immed.

... enters a weighting for the torque setpoint (or force for the force setpoint (SLM)) of the master axis for the equalization controller.

1496 Torque weighting, equaliz. contr. – slave (ARM SRM) (–> 7.1) Force weighting equalization controller – slave (SLM)

Min	Standard	Max	Unit	Data type	Effective
0	100.0	100.0	%	Floating Point	immed.

... enters a weighting fo the torque setpoint (or force for the force setpoint (SLM)) of the slave axis for the equalization controller.

1500:8 No. of speed setpoint filters (ARM SRM) No. of velocity setpoint filters (SLM)

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	Unsigned16	immed.

... specifies the number of speed setpoint filters.
The filter type (bandstop or low pass PT1/PT2) is set using P1501:8.
0 No speed setpoint filter active
1 Filter 1 active
2 Filters 1 and 2 active
Note:
If filter 1 is parameterized as low pass filter, (PT1 or PT2, P1501:8), it can be switched out/switched in using the ”First speed setpoint filter off” input signal. When parameterized as bandstop filter, the input signal has no effect.
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1501:8 Type of speed setpoint filter (ARM SRM) Type of velocity setpoint filter (SLM)

Min	Standard	Max	Unit	Data type	Effective
0	0	8303	Hex	Unsigned16	immed.

... specifies the type of the 2nd speed setpont filter
Bit 0 Filter 1: Low pass/bandstop
= 1 Bandstop (filter parameters: P1514:8, P1515:8, P1516:8)
= 0 Low pass (filter parameters: P1502:8, P1506:8, P1507:8)
Bit 1 Filter 2: Low pass/bandstop
= 1 Bandstop (filter parameters: P1517:8, P1518:8, P1519:8)
= 0 Lowpass (filter parameters: P1503:8, P1508:8, P1509:8)
Bit 8 Filter 1: Low pass PT1/PT2
= 1 PT1 low pass (filter parameter: P1502:8)
= 0 PT2 low pass (filter parameters: P1506:8, P1507:8)
Bit 9 Filter 2: Low pass PT1/PT2
= 1 PT1 low pass (filter parameter: P1503:8)
= 0 PT2 low pass (filter parameter: P1508:8, P1509:8)
Bit 15 Bandstop, transformation type (from SW 3.3)
= 1 Z transformation
= 0 Bilinear transformation (standard)
Note:
Before parameterizing the filter type, the appropriate filter parameters must be assigned.
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1502:8 Time constant, speed setpoint filter 1 (ARM SRM) Time constant, velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	ms	Floating Point	immed.

Note:
The filter can be switched out/switched in via the ”First speed setpoint filter off” input signal.
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

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1503:8 Time constant, speed setpoint filter 2 (ARM SRM) Time constant, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	ms	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1506:8 Natural frequency, speed setpoint filter 1 (ARM SRM) Natural frequency, velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
10.0	2000.0	8000.0	Hz	Floating Point	immed.

Note:
The filter can be switched out/switched in via the ”First speed setpoint filter off” input signal.
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1507:8 Damping, speed setpoint filter 1 (ARM SRM) Damping, velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.2	0.7	5.0	–	Floating Point	immed.

Note:
The filter can be switched out/switched in via the ”First speed setpoint filter off” input signal.
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1508:8 Natural frequency, speed setpoint filter 2 (ARM SRM) Natural frequency, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
10.0	2000.0	8000.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1509:8 Damping, speed setpoint filter 2 (ARM SRM) Damping, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.2	0.7	5.0	–	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1514:8 Blocking frequency, speed setpoint filter 1 (ARM SRM) Blocking frequency, velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1515:8 Bandwidth, speed setpoint filter 1 (ARM SRM) Bandwidth, velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1516:8 Numerator, bandwidth speed setpoint filter 1 (ARM SRM) Numerator, bandwidth velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1517:8 Blocking frequency, speed setpoint filter 2 (ARM SRM) Blocking frequency, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	3500.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1518:8 Bandwidth, speed setpoint filter 2 (ARM SRM) Bandwidth, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
5.0	500.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1519:8 Numerator, bandwidth speed setpoint filter 2 (ARM SRM) Numerator, bandwidth velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	7999.0	Hz	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1520:8 BSP natural frequency, speed setpoint filter 1 (ARM SRM) BSF natural frequency velocity setpoint filter 1 (SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	141.0	%	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

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1521:8 BSP natural frequency, speed setpoint filter 2 (ARM SRM) BSP natural frequency, velocity setpoint filter 2 (SLM)

Min	Standard	Max	Unit	Data type	Effective
1.0	100.0	141.0	%	Floating Point	immed.

Note:
The speed setpoint filters are described in:
References: /FBA/, Description of Functions, Drive Functions, Section DD2

1522 Time constant, speed actual value filter (PT1) (ARM SRM) Time constant, velocity actual value filter (PT1) (SLM)

Min	Standard	Max	Unit	Data type	Effective
0.0	0.0	500.0	ms	Floating Point	immed.

Encoder with sin/cos 1 Vpp: Default corresponding to the appropriate encoder
– Single absolute value encoder (EQI, 32 pulses/revolution): 1 ms
– Toothed-wheel encoder (SIZAG 2, 256/512 pulses/revolution): 1 ms
– Absolute value encoder for SRM
(shaft height 28/26, 512 pulses/revolution): 1 ms
– Absolute value encoder (EQN, 2048 pulses/revolution): 0 ms
– Incremental encoder (ERN, 2048 pulses/revolution): 0 ms
Note: refer to the index entry ”Encoder adaptation”
Resolver: Default, 12 bit resolution
– ARM: 2 ms
– SRM/SLM: 0.8 ms
Default, 14 bit resolution
– ARM: 2 ms
– SRM/SLM: 0.2 ms

1600 Suppressible faults 1

Min	Standard	Max	Unit	Data type	Effective
0	0	7FFF	Hex	Unsigned16	immed.

The following faults can be suppressed using these bits.
Bit 4 measuring circuit, motor measuring system (fault 504)
Bit 5 monitoring absolute track (fault 505)
Bit 7 synchronizing error, rotor position (fault 507)
Bit 8 zero mark monitoring, motor measuring system (fault 508)
Bit 9 converter limiting frequency too high (fault 509)
Bit 12 Measuring circuit, direct measuring system (Fault 512)
Bit 13 Monitoring, absolute track, direct measuring system (fault 513)
Bit 14 Zero mark monitoring, direct measuring system (fault 514)
Note:
When suppressing the zero mark monitoring with P1600.8 or P1600.14, only faults 508 or 514 are suppressed; however, the internal monitoring functions still remain active.
Bit x = ”1” —> Fault is suppressed, i.e. de-activated
Bit x = ”0” —> Fault is activated

1601 Suppressible faults 2

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	immed.

The following faults can be suppressed using these bits.
Bit 1 AD conversion error, terminal 56/14 or terminal 24/20 (fault 601)
Bit 5 Position controller output limited (fault 605)
Bit 6 flux controller at its limit (fault 606)
Bit 7 currrent controller at its limit (fault 607)
Bit 8 speed controller at its limit (fault 608)
Bit 9 Encoder limiting frequency exceeded (fault 609)
Bit 13 Immediate shutdown for motor overtemperature (P1607) (fault 613)
Bit 14 delayed shutdown for motor overtemperature (P1602 and P1603) (fault 614)
Bit 15 Direct measuring system, encoder limiting frequency exceeded (fault 615)
Note:
Bit x = ”1” —> Fault is suppressed, i.e. de-activated
Bit x = ”0” —> Fault is activated

1602 Alarm threshold, motor overtemperature

Min	Standard	Max	Unit	Data type	Effective
0	120	200	°C	Unsigned16	immed.

... specifies the thermal steady-state permissible motor temperature and is appropriately pre-assigned when the motor code is entered.
Note:
When this temperature alarm threshold is exceeded, ”only” an appropriate alarm is output which disappears when the temperature threshold is fallen short off.
If the overtemperature condition remains longer than the time set in P1603, then this results in fault 614.
The monitoring function can be enabled/disabled via P1601.14.
The temperature monitoring functions with/without pre-alarm (P1602 + P1603 or P1607) are not mutually restricted, i. e. P1607 < P1602 is permissible.
Refer under the index entry ”Monitoring functions”.

1603 Motor temperature alarm timer

Min	Standard	Max	Unit	Data type	Effective
0	240	600	s	Unsigned16	immed.

When the temperature alarm threshold (P1602) is exceeded, this timer is started. If the timer expires, and the temperature has not fallen below alarm threshold, fault 614 is output.
Note:
The monitoring function can be enabled/disabled via P1601.14.
Refer under the index entry ”Monitoring functions”.

1604 DC link undervoltage warning threshold

Min	Standard	Max	Unit	Data type	Effective
0	200	680	V(pk)	Unsigned16	immed.

... defines the alarm threshold for the DC link monitoring.
The ”V_dc link > V_x (P1604)” output signal (DC link voltage greater than the DC link undervoltage alarm threshold) is set, if the DC link voltage is greater than the selected alarm threshold.
Note:
The output terminal signals can be inverted via parameter P0699 ”Inversion, output terminal signals”.

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1605 Timer n controller at stop

Min	Standard	Max	Unit	Data type	Effective
20.0	200.0	10000.0	ms	Floating Point	immed.

... specifies how long the speed controller or velocity controller output can be at its limit without fault 608 being output.
Important:
If P1605 < P1404, then regenerative braking can be exited with fault 608, whereby the drive then ”coasts down”.
Note: refer to the index entry ”Monitoring functions”

1606 Threshold n controller at stop

Min	Standard	Max	Unit	Data type	Effective
0.0	30.0	100000.0	rpm	Floating Point	immed. (ARM)
0.0	500.0	100000.0	m/min	Floating Point	immed. (SLM)
0.0	90000.0	100000.0	rpm	Floating Point	immed. (SRM)

... specifies up to which speed or velocity the torque setpoint or force setpoint monitoring is active, i. e. up to this value, fault 608 can be output (speed controller at the endstop).
Note:
In the case of PE spindles (P1015=1), the standard assignment will be as with ARM (30.0 rpms).
refer under index entry ”Monitoring functions”

1607 Shutdown limit motor temperature

Min	Standard	Max	Unit	Data type	Effective
0	155	200	°C	Unsigned16	immed.

... defines the shutdown limit for the motor temperature monitoring without pre-alarm.
When this temperature threshold is exceeded, the drive is shut down, the pulses canceled and fault 613 output.
Note:
The monitoring function can be enabled/disabled via P1601.13.
The temperature monitoring functions with/without pre-alarm (P1602 + P1603 or P1607) are not mutually restricted, i. e. P1607 < P1602 is permissible.
Refer under the index entry ”Monitoring functions”.

1608 Fixed temperature

Min	Standard	Max	Unit	Data type	Effective
0	0	200	°C	Unsigned16	immed.

If a value > 0 is entered, then the rotor resistor is adapted, temperature-dependent, with this fixed temperature.
Note:
The measured temperature is then no longer monitored and parameters 1602, 1603 and 1607 are then no longer effective.
A fixed temperature can, e. g. be required, if a motor does not have a temperature sensor.
Thus, e.g. the temperature monitoring of linear motors is disabled for the case where the monitoring is realized via an external PLC.
Refer under the index entry ”Monitoring functions”.

1610 Diagnostic functions

Min	Standard	Max	Unit	Data type	Effective
0	1	3	Hex	Unsigned16	PO (ARM)
0	0	3	Hex	Unsigned16	PO (SRM SLM)

Note: Internal Siemens

1611 Response threshold dn/dt

Min	Standard	Max	Unit	Data type	Effective
0	300	1600	%	Unsigned16	immed.

Note: Internal Siemens

1612 Shutdown response, faults 1 (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	83B2	FFFF	Hex	Unsigned32	immed. (ARM)
0	3B2	FFFF	Hex	Unsigned32	immed. (SRM SLM)

... defines how the system responds to the listed faults.
Bit 1 Measuring circuit fault, absolute current (fault 501)
Bit 4 Measuring circuit fault, motor measuring system (fault 504)
Bit 5 Measuring circuit fault, motor measuring system, absolute track (fault 505)
Bit 7 Synchronizing error, rotor position (fault 507)
Bit 8 Zero mark monitoring, motor measuring system (fault 508)
Bit 9 Drive converter limiting frequency exceeded (fault 509)
Bit 12 Measuring circuit error, direct measuring system (fault 512)
Bit 13 Measuring circuit fault, direct measuring system absolute track (fault 513)
Bit 14 Zero mark monitoring, direct measuring system (fault 514)
Bit 15 Heatsink temperature exceeded (fault 515)

Note:
Bit x = ”1” —> STOP 1 is executed (internal pulse cancellation)
Bit x = ”0” —> STOP II is executed (internal controller inhibit)
If bit 1 is disabled, then this can destroy the power module (SIMODRIVE 611).

1613 Shutdown response, faults 2 (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
0	7FCE	3FFFF	Hex	Unsigned32	immed. (ARM)
0	100	3FFFF	Hex	Unsigned32	immed. (SRM SLM)

... defines how the system responds to the listed faults.
Bit 1 AD conversion error, terminal 56/14 or terminal 24/20 (fault 601)
Bit 2 Open-loop torque controlled operation w/o encoder not permissible (fault 602)
Bit 3 Changeover to a non-parameterized motor data set (fault 603)
Bit 5 Position controller output limited (fault 605)
Bit 6 Flux controller output limited (fault 606)
Bit 7 Current controller output limited (Fault 607)
Bit 8 Speed controller output limited (fault 608)
Bit 9 Encoder limiting frequency exceeded (fault 609)
Bit 10 Rotor position identification has failed (Fault 610)
Bit 11 Illegal motion during rotor position identification (fault 611)
Bit 12 Illegal current during rotor position identification (fault 612)
Bit 13 Shutdown limit, motor overtemperature (P1607) exceeded (fault 613)
Bit 14 Delayed shutdown for motor overtemperature (P1602 and P1603) (fault 614)
Bit 15 Direct measuring system, encoder limiting frequency exceeded (fault 615)
Bit 16 DC link undervoltage (Fault 616)
Bit 17 DC link overvoltage (Fault 617)
Note:
Bit x = ”1” —> STOP 1 is executed (internal pulse cancellation)
Bit x = ”0” —> STOP II is executed (internal controller inhibit)

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1615 Tolerance rotational accuracy monitor

Min	Standard	Max	Unit	Data type	Effective
0.0	0.2	100.0	m/min	Floating Point	immed. (SLM)
0.0	2.0	100.0	rpm	Floating Point	immed. (SRM ARM)

Note: Internal Siemens

1616 Diagnosis, actual speed value

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

When continuously increased by several increments, there is an increased noise level (the speed actual value is faulty).

1620 Bits for variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	7	Hex	Unsigned16	immed.

... defines the behavior of variable message function.

Bit 0 Variable message function
Bit 0 = 1 Active
Bit 0 = 0 Inactive

Bit 1 Segment, variable message function
Bit 1 = 1 Address space Y
Bit 1 = 0 Address space X

Bit 2 Comparison, signed
Bit 2 = 1 Comparison with sign
Bit 2 = 0 Comparison without sign

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1621 Signal number, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	530	–	Unsigned16	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1622 Address, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1623 Threshold, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
FF000001	0	FFFFFF	Hex	Integer32	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1624 Hysteresis, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1625 Pull-in delay, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	10000	ms	Unsigned16	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1626 Drop-out delay, variable signaling function

Min	Standard	Max	Unit	Data type	Effective
0	0	10000	ms	Unsigned16	immed.

Note:
Parameterize ”variable message function” in the selection box with SimoCom U.
Refer under the index entry ”Variable message function”

1650 Diagnostics control

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	Unsigned16	immed.

... allows the diagnostic functions to be configured.

Bit 0 Min/max memory
Bit 0 = 1 Enable the ”Min/Max memory” function
Bit 0 = 0 Disable the ”min/max memory” function

Bit 1 Segment, min/max memory
Bit 1 = 1 Segment Y: (min/max memory)
Bit 1 = 0 Segment X: (Min/Max memory)

Bit 2 Comparison, signed
Bit 2 = 1 Comparison signed (min/max memory)
Bit 2 = 0 Comparison unsigned (absolute value)(Min/Max memory)

Bit 15 Cyclically display the parameter number
Bit 15 = 1 Cyclic display is inactive
Bit 15 = 0 Cyclic display is active (seven-segment display)
While a parameter value is being displayed, the associated parameter number or subparameter number is displayed every 10 seconds for one second.

1651 Signal number, min/max memory

Min	Standard	Max	Unit	Data type	Effective
0	0	530	–	Unsigned16	immed.

Note: refer to the index entry ”Signal selection list for analog output”

1652 Memory location min/max memory

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note: Internal Siemens

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1653 Minimum value Min/Max memory

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

Displays the min. value in the min/max memory.

1654 Maximum value Min/Max memory

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

Displays the max. value in the min/max memory.

1655 Segment memory location monitor

Min	Standard	Max	Unit	Data type	Effective
0	0	1	Hex	Unsigned16	immed.

Select the segment for the monitor function.
0 Segment X: (Monitor)
1 Segment Y: (Monitor)

1656 Address memory location monitor

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Select the address for the monitor function.

1657 Value display monitor

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned32	RO

Displays the contents of the address in P1655/P1656.

1658 Value input monitor

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note: Internal Siemens

1659 Value acceptance monitor

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

Note: Internal Siemens

1701 DC link voltage

Min	Standard	Max	Unit	Data type	Effective
–	–	–	V(pk)	Unsigned16	RO

... is used for continuous display (measurement) of the DC link voltage.
Note:
If a value > 0 V is in P1161 (fixed DC link voltage), then this display is not valid.
The DC link voltage is centrally measured at the NE module. This means that the DC link connection to the drive modules cannot be checked using P1701.

1703 Lead time, motor measuring system conversion

Min	Standard	Max	Unit	Data type	Effective
–	–	–	µs	Unsigned16	RO

Note: Internal Siemens

1705 Voltage setpoint (rms)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	V(RMS)	Floating Point	RO

Displays the phase-to-phase voltage.

1708 Torque-generating current Iq

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... displays the torque-generating current Iq RMS.
Note:
The display of the torque generating current actual value is smoothed using a PT1 filter (P1250).
The smoothed current actual value is displayed as an absolute percentage, where 100 % corresponds to the maximum power module current (e. g. for an 18/36 A power module —> 100 % = 36 A RMS).

1709 Significance, voltage representation

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Floating Point	RO

Note: Internal Siemens

1710 Significance, current representation

Min	Standard	Max	Unit	Data type	Effective
–	–	–	µA(pk)	Floating Point	RO

Note: Internal Siemens

1711 Significance, speed representation (ARM SRM) Significance, velocity representation (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	m/min	Floating Point	RO	(SLM)
–	–	–	rpm	Floating Point	RO	(SRM ARM)

Note: Internal Siemens

1712 Significance, rotor flux representation (ARM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	µVs	Floating Point	RO	(ARM)

Note: Internal Siemens

1713 Significance torque representation (ARM SRM) Significance, force representation (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	µN	Floating Point	RO	(SLM)
–	–	–	µNm	Floating Point	RO	(SRM ARM)

Note: Internal Siemens

1716 Torque setpoint (ARM SRM) Force setpoint (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	N	Floating Point	RO	(SLM)
–	–	–	Nm	Floating Point	RO	(SRM ARM)

... displays the actual torque setpoint or force setpoint (SLM).
Note:
The torque/force setpoint display is smoothed using a PT1 filter (P1252).

A

1717 Limiting factor for torque/power (ARM SRM) Limiting factor for force/power (SLM)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Floating Point	RO

... displays the actual limiting factor for torque/power or force/power (SLM).
Note:
refer to the index entry ”Torque/power reduction”

1718 Torque-generating current Iq (A) (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A(rms)	Floating Point	RO

... displays the torque-generating current Iq as RMS value.
Note:
The display of the torque-generating current actual value is smoothed using a PT1 filter (P1250).

1719 Actual absolute current (rms)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A(rms)	Floating Point	RO

Displays the motor phase current RMS.

1723 Diagnosis, ramp-up time

Min	Standard	Max	Unit	Data type	Effective
–	–	–	ms	Unsigned16	RO

Note: Internal Siemens

1724 Diagnosis, rotational accuracy monitor

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

Note: Internal Siemens

1725 Normalization of torque setpoint (ARM SRM) Normalization of force setpoint (SLM) (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	N	Floating Point	RO	(SLM)
–	–	–	Nm	Floating Point	RO	(SRM ARM)

... specifies the reference value for the status word Mset for PROFIBUS.
The following applies before SW 4.1: The value corresponds to 800% of the rated motor torque.
From SW 4.1 the following applies: The value corresponds to P0882 * rated motor torque.

1726 Calculated jerk time (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	ms	Floating Point	RO

... displays the calculated jerk time which is currently effective.
Note: refer to the index entry ”Jerk limitation”

1729 Actual rotor position (electrical) (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Degree	Floating Point	RO

...displays the actual electrical rotor position.

1731 Image ZK1_PO register

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

Note: Internal Siemens

1732 Image ZK1_RES register

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

Note: Internal Siemens

1733 NPFK diagnosis counter

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

Note: Internal Siemens

1734 Diagnostics, rotor position identification (SRM SLM) (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	–	Integer16	RO	(SRM SLM)

... indicates the result of the last rotor position identification. When a fault condition occurs, negative values indicate the fault cause.

0 Function was not selected or was not exited
1, 2 Function was successfully executed (saturation-based technique)
3 Function was successfully executed (motion-based traversing, from SW 6.1)

Error codes
–1 Measurement has not provided any significant result
Remedy: Increase current (P1019)
–2 Current was not able to be reduced again in time during the measurement
Remedy: Check armature inductance (P1116) and if required, increase
–3 The motor moved during the measurement more than permitted in P1020
Remedy: Increase permissible rotation (P1020) or reduce current (P1019)
–4 Current rise is too low, the motor is possibily not correctly connected
Remedy: Check motor terminals
–5 The current limit of the motor or the power module was exceeded
Remedy: Check current limits or reduce armature inductance (P1116)
–6 Longest permissible time RLI exceeded. Within the permissible time, no continuous rotor position value was achieved (from SW 6.1).
Remedy: refer under the index entry ”Rotor position identification”
—> ”Parameterization for motion-based traversing”
–7 No clear rotor position found. It appears that the motor cannot be freely moved (e.g. it is locked, at its end stop).
Remedy: refer under the index entry ”Rotor position identification”
—> ”Parameterization for motion-based traversing”

Note:
refer to P1736 or under the index entry ”Rotor position identification”, ”PE spindle” or ”Linear motor”

1735 Processor utilization

Min	Standard	Max	Unit	Data type	Effective
–	–	–	%	Unsigned16	RO

... continuously displays (online) the processor utilization and provides information about the available computation time reserves of the processor.
The processor utilization is essentially dependent on the number of axes, operating mode and cycle setting.
P1735 > 90 %
If, after start-up (optimization), this is displayed as ”normal status”, then there is a high danger that if additional computation time-intensive functions are selected, the processor will be overloaded (e.g. measuring function).
Note:
If processor utilization is too high it can be reduced by increasing the clock cycles (refer to the index entry ”cycles”).
P1735 < 90 %
From experience, there are no problems here, so that later (e.g. when troubleshooting), supplementary functions (e.g. measuring functions, trace functions) can be temporarily activated.

1736 Test, rotor position identification (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed. (SRM SLM)

To check the rotor position identification, using this test function, the difference between the calculated rotor position angle, and that currently used by the control, can be determined.
1 The rotor position identification test has been activated
—> the difference is entered in P1737
0 The test has been completed (initial status)
Note:
refer under the index entry ”Rotor position identification”, ”PE spindle” or ”Linear motor”

1737 Difference, rotor position identification (SRM SLM)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Degree	Floating Point	RO (SRM SLM)

Note:
also referfor P1736 and under the index entry ”PE spindle” or ”linear motor”
The rotor position identification is described in:
References: /FBA/, Description of Functions, Drive Functions, Section DM1

1738 No. of data backup operations in the FEPROM

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

Note: Internal Siemens

1739 You must save in the FEPROM

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... displays that at least one parameter was written into and the value was not yet saved in the non-volatile memory (FEPROM).
1 Must be saved in the FEPROM because parameters have been changed
0 Need not be saved in the FEPROM

1740 Significance, abs. speed act. value repres. (fine) (ARM SRM) Significance, abs.velocity act.value representation(fine) (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	m/min	Floating Point	RO	(SLM)
–	–	–	rpm	Floating Point	RO	(SRM ARM)

Note: Internal Siemens

1741 Significance, utilization representation (fine)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	%	Floating Point	RO	(SLM)
–	–	–	%	Floating Point	RO	(SRM ARM)

Note: Internal Siemens

1742 Significance, torque setpoint representation (fine) (ARM SRM) Significance, force setpoint representation (fine) (SLM)

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	µN	Floating Point	RO	(SLM)
–	–	–	µNm	Floating Point	RO	(SRM ARM)

Note: Internal Siemens

1743 Significance, velocity representation

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	c*MSR/min	Floating Point	RO	(SLM)
–	–	–	c*MSR/min	Floating Point	RO	(SRM ARM)

Note: Internal Siemens

1744 Weighting, velocity representation, external

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	c*MSR/min	Floating Point	RO	(SLM)
–	–	–	c*MSR/min	Floating Point	RO	(SRM ARM)

Note: Internal Siemens

1745 Weighting following error representation DSC

Min	Standard	Max	Unit	Data type	Effective	
–	–	–	mm	Floating Point	RO	(SLM)
–	–	–	Degree	Floating Point	RO	(SRM ARM)

Note: Internal Siemens

1781:17 Setpoint source, process data PROFIBUS (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... indicates the source of the process data received via PROFIBUS.
The high byte includes a reference to the source device (0xFF for the master, DP address for a Publisher) and the low byte, the offset within the telegram
(Counting in bytes, starting with 1).
The following is valid:

P1781:0 Number of valid entries
P1781:1 Source of process data 1 (STW1)
P1781:2 Source of process data 2 (PZD2), etc.

Note: refer to the index entry ”Process data”

A

1782:17 Target offset PROFIBUS process data (–> 4.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... indicates which offset the process data have in the telegrams sent to the master or the subscribers via the PROFIBUS
(Counting in bytes, starting with 1).
The following is valid:
P1782:0 Number of valid entries
P1782:1 Target offset, process data 1 (ZSW1)
P1782:2 Target offset, process data 2 (PZD2), etc.
Note: refer to the index entry ”Process data”

1783:97 PROFIBUS parameterization data received (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the parameterizing data received by the DP slave.
The sub-parameter
with index 0 contains the number of valid bytes of the parameterization frame
= 0 —> no parameterizing data available
with index 1, the 1st byte includes the parameterizing data
with index 2, the 2nd byte includes the parameterizing data, etc.

1784:97 PROFIBUS configuration data received (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the configuration data received by the DP slave.
The sub-parameter
with index 0 contains the number of valid bytes of the configuration frame
= 0 —> no configuration data available
with index 1, the 1st byte includes the configuration data
with index 2, the 2nd byte includes the configuration data, etc.

1785:13 Expanded PROFIBUS diagnostics (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... contains diagnostic information for PROFIBUS operation. For the individual indices of P1785, the following applies:
:0 Error, master sign-of-life since POWER ON
:1 Clock cycle-synchronous operation selected
:2 Interpolation clock cycle (Tipo) in µs
:3 Position controller clock cycle (Tlr) in µs
:4 Master application cycle time (Tmapc) in µs
:5 DP cycle time (Tdp) in µs
:6 Data Exchange time (Tdx) in µs
:7 Instant of the setpoint sensing (To) in µs
:8 Instant of the actual value sensing (Ti) in µs
:9 PLL window (Tpllw) in 1/12 µs
:10 PLL delay time (Tplld) in 1/12 µs
:11 External slave-to-slave communication links
:12 Internal slave-to-slave communication links

1786:5 PKW data received, PROFIBUS (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the PKW data received by the DP slave.
The sub-parameter
with index 0 contains the number of valid words
= 0 —> no PKW data available
= 4 —> PKW data available
with index 1 of the PKE word (PKE: Parameter identification)
with index 2 of the IND word (IND: Sub-index, sub-parameter number, array index)
with index 3 of the most significant PWE word (PWE: Parameter value)
with index 4 of the least-significant PWE word
Note: refer to the index entry ”PKW area”

1787:5 PKW data sent, PROFIBUS (–> 2.4)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the PKW data sent to the DP master.
The sub-parameter
with index 0 contains the number of valid words
= 0 —> no PKW data available
= 4 —> PKW data available
with index 1 of the PKE word (PKE: Parameter identification)
with index 2 of the IND word (IND: Sub-index, sub-parameter number, array index)
with index 3 of the most significant PWE word (PWE: Parameter value)
with index 4 of the least-significant PWE word
Note: refer to the index entry ”PKW area”

1788:17 Processed data received via PROFIBUS

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the process data received by the DP slave (control words).
The sub-parameter
with index 0 contains the number of valid words,
with index 1, the process data 1 (control word 1), with index 2, the process data 2 (PZD2), ...
Note: refer to the index entry ”Process data”

1789:17 Process data sent via PROFIBUS

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	Unsigned16	RO

... is an image of the process data sent to the DP master (status words).
The sub-parameter
with index 0 contains the number of valid words,
with index 1, process data 1 (status word 1), with index 2, process data 2 (PZD2), ...
Note: refer to the index entry ”Process data”

1790 Meas. circ. type indirect meas. system

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Integer16	RO

... displays which measuring system type is used.
0 Encoder with sin/cos 1 Vpp signals
7 TTL encoder (new basic module HR)
11 Encoder with sin/cos 1 Vpp voltage signals with a higher resolution
13 Resolver with higher resolution (14 bit)
14 Resolver (12 bit)
16 EnDat encoder (absolute value encoder)
27 EnDat encoder (absolute value encoder) with higher incremental track resolution

1792 Active measuring system (–> 3.3)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned16	RO

... indicates the measuring system which the drive control uses.
0 No measuring system
1 Motor measuring system
2 Direct measuring system

1794 Option mod. (PROFIBUS): Version initial progr. loader (–> 3.1)

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

... indicates which version of the initializer is on the option module.
Example: P1794 = 10104 —> V01.01.04 is available

1795 Option module (PROFIBUS): Version firmware

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

... displays the firmware version on the option module.
Example: P1795 = 10104 —> V01.01.04 is available

1796 Initializer version

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

... displays which version of the initializer is available on the memory module.
Example: P1796 = 10104 —> V01.01.04 is available

1798 Firmware date

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

Internal Siemens
... displays when the firmware release (P1799) was generated.
Note: yyyymmdd —> yyyy = year, mm = month, dd = day

1799 Firmware version

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	Unsigned32	RO

... displays the firmware version on the memory module.
Example: P1799 = 10103 —> V01.01.03 is available

1800 Function generator control

Min	Standard	Max	Unit	Data type	Effective
–40	0	2	–	Integer16	immed.

Note: refer to the index entry ”Function generator”

1804 Function generator operating mode

Min	Standard	Max	Unit	Data type	Effective
1	3	5	–	Unsigned16	immed.

Note: refer to the index entry ”Function generator”

1805 Function generator curve shape

Min	Standard	Max	Unit	Data type	Effective
1	1	5	–	Unsigned16	immed.

Note: refer to the index entry ”Function generator”

1806 Start-up function amplitude

Min	Standard	Max	Unit	Data type	Effective
–1600.0	5.0	1600.0	%	Floating Point	immed.

Note: refer to the index entry ”Function generator”

1807 Start-up function offset

Min	Standard	Max	Unit	Data type	Effective
–1600.0	0.0	1600.0	%	Floating Point	immed.

Note: refer to the index entry ”Function generator”

1808 Function generator limitation

Min	Standard	Max	Unit	Data type	Effective
0.0	100.0	1600.0	%	Floating Point	immed.

Note: refer to the index entry ”Function generator”

1809 Function generator 2nd amplitude (staircase)

Min	Standard	Max	Unit	Data type	Effective
–1600.0	7.0	1600.0	%	Floating Point	immed.

Note: refer to the index entry ”Function generator”

1810 Function generator period

Min	Standard	Max	Unit	Data type	Effective
1	1000	65535	ms	Unsigned16	immed.

Note: refer to the index entry ”Function generator”

1811 Function generator, pulse width (squarewave)

Min	Standard	Max	Unit	Data type	Effective
0	500	65535	ms	Unsigned16	immed.

Note: refer to the index entry ”Function generator”

1812 Start-up function, bandwidth (FFT)

Min	Standard	Max	Unit	Data type	Effective
1	4000	8000	Hz	Unsigned16	immed.

Note: refer to the index entry ”Function generator”

1813 Start-up function, ramp-up time to P1400

Min	Standard	Max	Unit	Data type	Effective
0.0	32.0	100000.0	ms	Floating Point	immed.

Note: refer to the index entry ”Function generator”

1814 Measuring function meas. type

Min	Standard	Max	Unit	Data type	Effective
1	1	8	–	Unsigned16	immed.

Note: refer to the index entry ”Measuring function”

1815 Measuring function meas. period (step change)

Min	Standard	Max	Unit	Data type	Effective
1	100	2000	ms	Unsigned16	immed.

Note: refer to the index entry ”Measurement function”

1816 Measuring function settling time

Min	Standard	Max	Unit	Data type	Effective
0	100	65535	ms	Unsigned16	immed.

Note: refer to the index entry ”Measurement function”

1817 Measuring function no. of averaging ops. (FFT)

Min	Standard	Max	Unit	Data type	Effective
1	16	1000	–	Unsigned16	immed.

Note: refer to the index entry ”Measurement function”

1820 Signal number test socket 1

Min	Standard	Max	Unit	Data type	Effective
0	8	530	–	Unsigned16	immed.

The parameter defines which signal is output via test socket 1.
The signal number from the signal selection list for analog outputs must be entered.
Note: refer to the index entry ”Test sockets”

1821 Shift factor test socket 1

Min	Standard	Max	Unit	Data type	Effective
0	6	47	–	Unsigned16	immed.

... defines the shift factor, with which the analog signal is manipulated.
An 8 bit window of the 24/48 bit signal can be represented via the test socket, thus, the shift factor must be used to define which window of the internal 24/48 bits is to be displayed.

1822 Offset test socket 1

Min	Standard	Max	Unit	Data type	Effective
–128	0	127	–	Integer16	immed.

The parameter specifies the offset value which is added to the 8-bit output signal.
Note: refer to the index entry ”Test sockets”

1823 Segment address test socket 1

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

Note: Internal Siemens

1824 Offset address test socket 1

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note: Internal Siemens

1826 Status test socket 1

Min	Standard	Max	Unit	Data type	Effective
0	1	1	–	Unsigned16	immed.

This parameter defines the status of test socket 1 for this drive.

0 test socket is inactive

1 test socket is active

As always only one drive can output one value at a test socket, when changing the parameter in one drive, the parameter in the other drive is appropriately changed.

Note:

On a 2-axis module, the test sockets are pre-set as follows after the first start-up:

Drive A: Test socket 1 = active (P1826 = 1) and test socket 2 = inactive (P1836 = 0)

Drive B: Test socket 1 = inactive (P1826 = 0) and test socket 2 = active (P1836 = 1)

(refer to the index entry ”Test sockets”)

1830 Signal number test socket 2

Min	Standard	Max	Unit	Data type	Effective
0	14	530	–	Unsigned16	immed.

Description, refer to that for P1820.

1831 Shift factor test socket 2

Min	Standard	Max	Unit	Data type	Effective
0	12	47	–	Unsigned16	immed.

Description, refer to that for P1821.

1832 Offset test socket 2

Min	Standard	Max	Unit	Data type	Effective
–128	0	127	–	Integer16	immed.

Description, refer to that for P1822.

1833 Segment address test socket 2

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	Unsigned16	immed.

Note: Internal Siemens

1834 Offset address test socket 2

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFFFF	Hex	Unsigned32	immed.

Note: Internal Siemens

1836 Status test socket 2

Min	Standard	Max	Unit	Data type	Effective
0	1	1	–	Unsigned16	immed.

Description, refer to that for P1826.

A

A.2 Power module list

Power module Order No. and code

A power module is defined by its Order No. (MLFB) and internally by its code number.

Table A-1 Power module Order No. and code

Order No. (MLFB)	Power module code P1106	No. of axes	Current rating: Transistor current [A(pk)] P1107	Current rating: Motor[1)] 1FT6, 1FK6, 1FNx I_n/I_{max} [A(rms)] P1111/P1108	Current rating: Motor[1)] 1PHx, 1FE1 (from SW 3.1) $I_n/I_{S6}/I_{max}$ [A(rms)] P1111/P1109/P1108
6SN112x–1Ax0x–0HAx	1	1/2	8	3/6	3/3/3
6SN112x–1Ax0x–0AAx	2	1/2	15	5/10	5/5/8
6SN112x–1Ax0x–0BAx	4	1/2	25	9/18	8/10/16
6SN112x–1Ax0x–0CAx	6	1/2	50	18/36	24/32/32
6SN112x–1Ax0x–0DAx	7	1	80	28/56	30/40/51
6SN112x–1Ax0x–0LAx	13[2)]	1	108	42/64	45/60/76
6SN112x–1Ax0x–0GAx	8[2)]	1	120	42/64	45/60/76
6SN112x–1Ax0x–0EAx	9	1	160	56/112	60/80/102
6SN112x–1Ax0x–0FAx	10	1	200	70/140	85/110/127
6SN112x–1Ax0x–0JAx	11[2)]	1	300	100/100	120/150/193
6SN112x–1Ax0x–0KAx	12	1	400	140/210	200/250/257

Note:

rms: rms value
pk: Peak value
x: Space retainer for the Order No.
I_n: Continuous current
I_{S6}: Current for max. 4 min. for S6 load duty cycle
I_{max}: Peak current

1) At higher pulse frequencies (P1100) I_n, I_{max} and I_{S6} must be reduced to protect the power module.
The following applies before SW 2.4:
The display using P1108, P1109 and P1111 depends on the pulse frequency.
The reduction factor is already calculated into this parameter.
The displayed values only correspond to the values in the table for the standard setting of the pulse frequency (P1100).

The following applies from SW 2.4:
The display using P1108, P1109 and P1111 corresponds to the values in this table.
The limiting factor is displayed in P1099 (limiting factor, power module currents).
Example:

P1111 = 9 A, P1099 = 80 % —> reduced rated current I_n = 9 A • 80 % = 7.2 A

2) from SW 8.2 onwards (only for PE spindles)

Reader's note

Additional information about the power modules can be found in

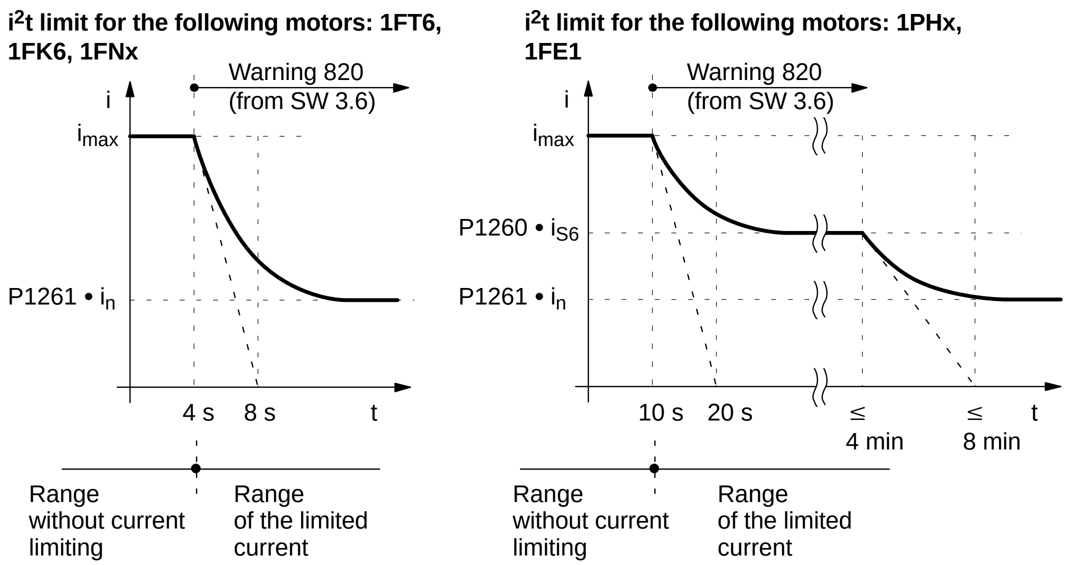
Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter "Power modules"

i^2t power module limiting (from SW 3.1)

This limit protects the power module from continuous overload.

The power module current is limited according to a characteristic if the drive converter operates for an excessive time above the permissible load limit. The load limit is set per parameter.

The limit is removed step–by–step if the power module is no longer being operated above the load limit.



Note:

i_{max} = P1108 (current limit, power module) • P1099 (limit factor, power module currents)

i_{S6} = P1109 (current limit, power module S6) • P1099 (limit factor, power module currents)

i_n = P1111 (rated current, power module) • P1099 (limit factor, power module currents)

Fig. A-2 Behavior when operation is continued at the current limit

Output signals (refer to Chapter 6.4.5 and 6.4.6)

The following signals are available for the "i^{2}t power module limit" function:

- Output terminal signal —> function number 37 (power module current not limited)
- PROFIBUS status signal —> MeldW.10 (power module current not limited)

Parameter overview (refer to Chapter A.1)

The following parameters are available for the "i^{2}t power module limiting" function:

- Parameters which have to be set:
  - P1260 i2t limiting, limit current power module S6
  - P1261 i2t limiting, rated power module current

  These parameters are preset to protect the power module. It may be possible to protect the motor against continuous overload by reducing the parameter values.
- Parameters used for diagnostics:
  - P1262 i2t time in limiting
  - P1263 actual i2t limit factor
  - P1264 i2t actual utilization factor (from SW 4.1)

  Interrelationship between parameters:

P1262	Constant	Running
P1263	100 %	<100 %
P1264	<100 %	100 %
—> Limiting?	No	Yes

A.3 List of motors

Reader's note

Information about the motors can be found in

Reference: /PJM/ SIMODRIVE, Configuration Manual,
AC Motors for
Feed and Main Spindle Drives

A.3.1 List of the rotating synchronous motors

Motor code for rotating synchronous motors (SRM)

Table A-2 Motor code for rotating synchronous motors (SRM)

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_0 (100 K) [A(rms)]
1FK6032–6AK7x–xxxx	2401	6000	1.1	1.70
1FK6033–7AK7x–xxxx	2315	6000	1.3	2.20
1FK6040–6AK7x–xxxx	2402	6000	1.6	2.80
1FK6042–6AF7x–xxxx	2201	3000	3.2	2.80
1FK6043–7AH7x–xxxx	2311	4500	3.1	4.50
1FK6043–7AK7x–xxxx	2314	6000	3.1	6.40
1FK6044–7AF7x–xxxx	2211	3000	4.0	4.50
1FK6044–7AH7x–xxxx	2312	4500	4.0	6.30
1FK6060–6AF7x–xxxx	2202	3000	6.0	4.30
1FK6061–7AF7x–xxxx	2212	3000	6.4	6.10
1FK6061–7AH7x–xxxx	2313	4500	6.4	8.00
1FK6063–6AF7x–xxxx	2203	3000	11.0	7.90
1FK6064–7AF7x–xxxx	2213	3000	12.0	11.00
1FK6064–7AH7x–xxxx	2214	4500	12.0	15.00
1FK6080–6AF7x–xxxx	2204	3000	8.0	5.80
1FK6082–7AF7x–xxxx	2215	3000	14.0	10.60
1FK6083–6AF7x–xxxx	2205	3000	16.0	10.40
1FK6085–7AF7x–xxxx	2216	3000	22.0	22.50
1FK6100–8AF7x–xxxx	2206	3000	18.0	12.20
1FK6101–8AF7x–xxxx	2207	3000	27.0	17.50
1FK6103–8AF7x–xxxx	2208	3000	36.0	23.50

Table A-2 Motor code for rotating synchronous motors (SRM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_0 (100 K) [A(rms)]
1FK7022–5AK7x–xxxx	2538	6000	0.85	1.80
1FK7032–5AK7x–xxxx	2539	6000	1.15	1.70
1FK7033–7AK7x–xxxx	2560	6000	1.3	2.20
1FK7040–5AK7x–xxxx	2540	6000	1.6	2.25
1FK7042–5AF7x–xxxx	2500	3000	3.0	2.20
1FK7042–5AK7x–xxxx	2541	6000	3.0	4.40
1FK7043–7AH7x–xxxx	2561	4500	3.1	4.50
1FK7043–7AK7x–xxxx	2562	6000	3.1	6.40
1FK7044–7AF7x–xxxx	2563	3000	4.0	4.50
1FK7044–7AH7x–xxxx	2564	4500	4.0	6.30
1FK7060–5AF7x–xxxx	2501	3000	6.0	4.50
1FK7060–5AH7x–xxxx	2520	4500	6.0	6.20
1FK7061–7AF7x–xxxx	2565	3000	6.4	6.10
1FK7061–7AH7x–xxxx	2566	4500	6.4	8.00
1FK7063–5AF7x–xxxx	2502	3000	11.0	8.00
1FK7063–5AH7x–xxxx	2521	4500	11.0	12.00
1FK7064–7AF7x–xxxx	2567	3000	12.0	11.00
1FK7064–7AH7x–xxxx	2568	4500	12.0	15.00
1FK7080–5AF7x–xxxx	2503	3000	8.0	4.80
1FK7080–5AH7x–xxxx	2522	4500	8.0	7.40
1FK7082–7AF7x–xxxx	2569	3000	14.0	10.60
1FK7083–5AF7x–xxxx	2504	3000	16.0	10.40
1FK7083–5AH7x–xxxx	2523	4500	16.0	15.00
1FK7085–7AF7x–xxxx	2570	3000	22.0	22.50
1FK7100–5AF7x–xxxx	2505	3000	18.0	11.20
1FK7101–5AF7x–xxxx	2506	3000	27.0	19.00
1FK7103–5AF7x–xxxx	2507	3000	36.0	27.50
1FK7105–5AC7x–xxxx	2508	2000	48.0	20.00
1FK7105–5AF7x–xxxx	2509	3000	48.0	31.00
1FT6021–6AK7x–xxxx	1411	6000	0.4	1.25
1FT6024–6AK7x–xxxx	1412	6000	0.8	1.25
1FT6031–xAK7x–xxxx	1401	6000	1.0	1.40
1FT6034–xAK7x–xxxx	1402	6000	2.0	2.60

Table A-2 Motor code for rotating synchronous motors (SRM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_0 (100 K) [A(rms)]
1FT6041–xAF7x–xxxx	1201	3000	2.6	1.90
1FT6041–xAK7x–xxxx	1403	6000	2.6	3.00
1FT6044–xAF7x–xxxx	1202	3000	5.0	3.00
1FT6044–xAK7x–xxxx	1404	6000	5.0	5.90
1FT6061–xAC7x–xxxx	1101	2000	4.0	1.90
1FT6061–xAF7x–xxxx	1203	3000	4.0	2.70
1FT6061–xAH7x–xxxx	1301	4500	4.0	4.00
1FT6061–xAK7x–xxxx	1405	6000	4.0	5.00
1FT6062–xAC7x–xxxx	1102	2000	6.0	2.70
1FT6062–xAF7x–xxxx	1204	3000	6.0	4.10
1FT6062–xAH7x–xxxx	1302	4500	6.0	5.70
1FT6062–xAK7x–xxxx	1406	6000	6.0	7.60
1FT6062–xWF7x–xxxx	1270	3000	10.2	6.90
1FT6062–xWH7x–xxxx	1370	3000	10.2	9.70
1FT6062–xWK7x–xxxx	1470	6000	10.2	12.90
1FT6064–xAC7x–xxxx	1103	2000	9.5	4.20
1FT6064–xAF7x–xxxx	1205	3000	9.5	6.10
1FT6064–xAH7x–xxxx	1303	4500	9.5	9.00
1FT6064–xAK7x–xxxx	1407	6000	9.5	12.00
1FT6064–xWF7x–xxxx	1272	3000	16.2	10.30
1FT6064–xWH7x–xxxx	1372	4500	16.2	15.40
1FT6064–xWK7x–xxxx	1472	6000	16.2	20.50
1FT6081–xAC7x–xxxx	1104	2000	8.0	3.90
1FT6081–xAF7x–xxxx	1206	3000	8.0	5.80
1FT6081–xAH7x–xxxx	1304	4500	8.0	8.60
1FT6081–xAK7x–xxxx	1408	6000	8.0	11.10
1FT6082–xAC7x–xxxx	1105	2000	13.0	6.60
1FT6082–xAF7x–xxxx	1207	3000	13.0	9.60
1FT6082–xAH7x–xxxx	1305	4500	13.0	14.80
1FT6082–xAK7x–xxxx	1409	6000	13.0	17.30
1FT6084–xAC7x–xxxx	1106	2000	20.0	8.80
1FT6084–xAF7x–xxxx	1208	3000	20.0	13.20
1FT6084–xAH7x–xxxx	1306	4500	20.0	19.80
1FT6084–xAK7x–xxxx	1410	6000	20.0	24.10

Table A-2 Motor code for rotating synchronous motors (SRM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_0 (100 K) [A(rms)]
1FT6084–xSF7x–xxxx	1258	3000	26.0	18.20
1FT6084–xSH7x–xxxx	1356	4500	26.0	26.00
1FT6084–xSK7x–xxxx	1460	6000	26.0	35.00
1FT6084–xWF7x–xxxx	1283	3000	35.0	24.50
1FT6084–xWH7x–xxxx	1381	4500	35.0	37.00
1FT6084–xWK7x–xxxx	1485	6000	35.0	47.00
1FT6086–xAC7x–xxxx	1107	2000	27.0	11.30
1FT6086–xAF7x–xxxx	1209	3000	27.0	16.40
1FT6086–xAH7x–xxxx	1307	4500	27.0	23.30
1FT6086–xSF7x–xxxx	1259	3000	35.0	25.00
1FT6086–xSH7x–xxxx	1357	4500	35.0	38.00
1FT6086–xSK7x–xxxx	1461	6000	35.0	44.00
1FT6086–xWF7x–xxxx	1284	3000	47.0	34.00
1FT6086–xWH7x–xxxx	1382	4500	47.0	52.00
1FT6086–xWK7x–xxxx	1486	6000	47.0	59.00
1FT6102–xAB7x–xxxx	1001	1500	27.0	8.70
1FT6102–xAC7x–xxxx	1108	2000	27.0	12.10
1FT6102–xAF7x–xxxx	1210	3000	27.0	16.90
1FT6102–xAH7x–xxxx	1308	4500	27.0	24.10
1FT6105–xAB7x–xxxx	1002	1500	50.0	16.00
1FT6105–xAC7x–xxxx	1109	2000	50.0	21.40
1FT6105–xAF7x–xxxx	1211	3000	50.0	32.00
1FT6105–xSB7x–xxxx	1139	1500	65.0	21.90
1FT6105–xSC7x–xxxx	1159	2000	65.0	30.00
1FT6105–xSF7x–xxxx	1261	3000	65.0	42.00
1FT6105–xSH7x–xxxx	1351	4500	65.0	59.00
1FT6105–xWC7x–xxxx	1184	2000	85.0	58.00
1FT6105–xWF7x–xxxx	1286	3000	85.0	83.00
1FT6108–xAB7x–xxxx	1003	1500	70.0	22.30
1FT6108–xAC7x–xxxx	1110	2000	70.0	29.00
1FT6108–xAF7x–xxxx	1213	3000	70.0	41.00
1FT6108–xSB7x–xxxx	1140	1500	90.0	31.00
1FT6108–xSC7x–xxxx	1160	2000	90.0	41.00
1FT6108–xSF7x–xxxx	1260	3000	90.0	62.00

Table A-2 Motor code for rotating synchronous motors (SRM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_0 (100 K) [A(rms)]
1FT6108–xWB7x–xxxx	1078	1500	119.0	43.00
1FT6108–xWC7x–xxxx	1185	2000	119.0	57.00
1FT6108–xWF7x–xxxx	1288	3000	119.0	86.00
1FT6132–xAB7x–xxxx	1004	1500	75.0	21.60
1FT6132–xAC7x–xxxx	1111	2000	75.0	29.00
1FT6132–xAF7x–xxxx	1212	3000	75.0	43.00
1FT6132–xSB7x–xxxx	1142	1500	110.0	36.00
1FT6132–xSC7x–xxxx	1161	2000	110.0	47.00
1FT6132–xSF7x–xxxx	1262	3000	110.0	69.00
1FT6132–xWB7x–xxxx	1273	1500	155.0	58.00
1FT6132–xWD7x–xxxx	1274	2500	155.0	92.00
1FT6134–xAB7x–xxxx	1005	1500	95.0	27.00
1FT6134–xAC7x–xxxx	1112	2000	95.0	36.00
1FT6134–xSB7x–xxxx	1143	1500	140.0	44.00
1FT6134–xSC7x–xxxx	1162	2000	140.0	58.00
1FT6134–xSF7x–xxxx	1263	3000	140.0	83.00
1FT6134–xWB7x–xxxx	1275	1500	200.0	73.00
1FT6134–xWD7x–xxxx	1276	2500	200.0	122.00
1FT6136–xAB7x–xxxx	1006	1500	115.0	34.00
1FT6136–xAC7x–xxxx	1113	2000	115.0	42.00
1FT6136–xSB7x–xxxx	1144	1500	175.0	55.00
1FT6136–xSC7x–xxxx	1163	2000	175.0	77.00
1FT6136–xSF7x–xxxx	1264	3000	175.0	110.00
1FT6136–xWB7x–xxxx	1277	1500	240.0	92.00
1FT6136–xWD7x–xxxx	1278	2500	240.0	158.00
1FT6138–xWB7x–xxxx	1279	1500	300.0	112.00
1FT6138–xWD7x–xxxx	1280	2500	300.0	167.00
Unlisted motors	2000	–	–	–

Note:
x: Space retainer for the Order No.

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Parameters for unlisted motors (SRM)

Table A-3 Parameters for unlisted motors (SRM)

Parameters			
No.	Name	Units	Value
1102	Motor code number	–	1999
1103	Rated motor current	A(rms)	
1104	Maximum motor current	A(rms)	
1112	Motor pole pair number	–	
1113	Torque constant	Nm/A	
1114	Voltage constant	V(rms)	
1115	Armature resistance	Ω	
1116	Armature inductance	mH	
1117	Motor moment of inertia	kgm^2	
1118	Motor standstill current	A(rms)	
1122	Motor limiting current	A(rms)	
1128	Optimum load angle	Degr.	
1136	No–load motor current (this is only relevant for SRM with field weakening)	A(rms)	
1142	Speed at the start of field weakening (is only relevant for SRM with field weakening)	RPM	
1145	Stall torque reduction factor (is only relevant for SRM with field weakening)	%	
1146	Maximum motor speed	RPM	
1149	Reluctance torque constant	mH	
1180	Lower current limit, current controller adaptation	%	
1181	Upper current limit, current controller adaptation	%	
1182	Factor, current controller adaptation	%	
1400	Rated motor speed	RPM	

A.3.2 List of permanent–magnet synchronous motors with field weakening (1FE1, 2SP1, PE spindle)

Motor code for permanent–magnet synchronous motors with field weakening

Table A-4 Motor code for 1FE1/2SP1 motors (PE spindle)

Order No. (MLFB)	Motor code P1102	n_{max} [RPM]	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_{rated} (100 K) [A(rms)]
1FE1051–4WN11–xxxx	2875	30000	9500	6.5	13.0
1FE1051–6WK10–xxxx	2876	15000	8000	10.0	20.0
1FE1051–6WN00–xxxx	2877	12000	6000	7.5	11.0
1FE1051–6WN10–xxxx	2804	12000	6000	10.0	15.0
1FE1051–6WN20–xxxx	2817	12000	6000	7.5	11.0
1FE1051–6WN30–xxxx	2818	12000	6000	10.0	15.0
1FE1051–4WL11–xxxx	2813	30000	10300	6.5	13.5
1FE1051–4WL51–xxxx	2814	30000	10300	6.5	13.5
1FE1052–4WK11–xxxx	2807	30000	12500	13.0	30.0
1FE1052–4WN11–xxxx	2806	30000	8000	13.0	20.0
1FE1052–4WN51–xxxx	2819	30000	8000	13.0	20.0
1FE1052–6LK00–xxxx	2808	12000	9000	12.0	22.0
1FE1052–6WK10–xxxx	2809	15000	7500	18.0	37.0
1FE1052–6WN00–xxxx	2811	12000	6000	16.0	22.0
1FE1052–6WN10–xxxx	2805	12000	5500	20.0	30.0
1FE1052–6WY10–xxxx	2812	6000	3000	18.0	13.5
1FE1053–4WN11–xxxx	2824	30000	7900	20.0	29.0
1FE1054–6LR00–xxxx	2815	8500	5000	24.0	24.0
1FE1054–6WN10–xxxx	2810	12000	6000	37.0	60.0
1FE1054–6WQ10–xxxx	2816	9500	4500	42.0	54.0
1FE1055–6LU00–xxxx	2878	6000	4000	9.0	8.0
1FE1055–6LX00–xxxx	2879	4200	2300	9.0	4.5
1FE1061–6LW00–xxxx	2880	7000	4100	8.0	8.0
1FE1061–6WY10–xxxx	2839	5000	3000	13.0	8.0
1FE1064–6LQ00–xxxx	2881	5000	2000	40.0	29.0
1FE1064–6WN11–xxxx	2840	12000	4300	56.0	56.0
1FE1072–4WH11–xxxx	2882	24000	9700	28.0	64.0
1FE1072–4WL11–xxxx	2883	24000	6800	28.0	45.0

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Table A-4 Motor code for 1FE1/2SP1 motors (PE spindle), continued

Order No. (MLFB)	Motor code P1102	n_{max} [RPM]	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_{rated} (100 K) [A(rms)]
1FE1072–4WN01–xxxx	2884	24000	5500	25.0	29.0
1FE1072–4WN11–xxxx	2822	24000	5500	28.0	36.0
1FE1072–4WN31–xxxx	2841	24000	5500	28.0	36.0
1FE1073–4WN01–xxxx	2885	24000	6800	39.0	54.0
1FE1073–4WN11–xxxx	2823	24000	6800	42.0	65.0
1FE1073–4WR01–xxxx	2886	20000	4600	39.0	38.0
1FE1073–4WT11–xxxx	2887	14000	3200	45.0	30.0
1FE1073–4WT31–xxxx	2906	14000	3200	45.0	30.0
1FE1074–4WM11–xxxx	2888	20000	7700	60.0	97.0
1FE1074–4WN11–xxxx	2826	20000	7000	56.0	91.0
1FE1074–4WN51–xxxx	2907	30000	7000	56.0	91.0
1FE1082–4WN01–xxxx	2889	20000	4000	37.0	35.0
1FE1082–4WN11–xxxx	2825	20000	3500	42.0	42.0
1FE1082–4WN51–xxxx	2908	12000	3500	42.0	42.0
1FE1082–4WP11–xxxx	2809	15000	2700	42.0	30.0
1FE1082–4WR11–xxxx	2890	11000	2000	42.0	24.0
1FE1082–4WR31–xxxx	2910	11000	2000	42.0	24.0
1FE1082–6WP10–xxxx	2891	8500	5000	65.0	65.0
1FE1082–6WQ11–xxxx	2911	9000	4300	65.0	60.0
1FE1082–6WS10–xxxx	2912	6000	3600	65.0	45.0
1FE1082–6WS30–xxxx	2913	6000	3600	65.0	45.0
1FE1082–6WW11–xxxx	2914	9000	2200	65.0	30.0
1FE1083–4WN01–xxxx	2892	20000	4200	55.0	66.0
1FE1083–4WN11–xxxx	2827	20000	4200	63.0	77.0
1FE1084–4WN11–xxxx	2829	20000	4300	84.0	105.0
1FE1084–4WN31–xxxx	2915	20000	4300	84.0	105.0
1FE1084–4WQ11–xxxx	2917	18000	3400	84.0	83.0
1FE1084–4WQ51–xxxx	2918	18000	3400	84.0	83.0
1FE1084–4WT11–xxxx	2919	15000	3000	84.0	60.0
1FE1084–4WT51–xxxx	2920	15000	3000	84.0	60.0
1FE1084–6LN00–xxxx	2830	5000	2000	90.0	58.0
1FE1084–6WN11–xxxx	2831	7000	3400	130.0	85.0
1FE1084–6WR11–xxxx	2832	9000	2300	130.0	60.0
1FE1084–6WX11–xxxx	2942	4500	1100	130.0	30.0
1FE1085–4WN11–xxxx	2828	18000	3500	105.0	105.0

Table A-4 Motor code for 1FE1/2SP1 motors (PE spindle), continued

Order No. (MLFB)	Motor code P1102	n_{max} [RPM]	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_{rated} (100 K) [A(rms)]
1FE1085–4WQ11–xxxx	2833	16000	3000	105.0	85.0
1FE1085–4WT11–xxxx	2834	12000	2200	105.0	60.0
1FE1091–6WN10–xxxx	2801	7000	3500	28.0	24.0
1FE1091–6WN30–xxxx	2921	7000	3500	28.0	24.0
1FE1091–6WS10–xxxx	2835	4000	2000	30.0	15.0
1FE1092–4WV11–xxxx	2837	10000	2000	50.0	24.0
1FE1092–6WN00–xxxx	2838	7000	4000	58.0	50.0
1FE1092–6WN10–xxxx	2836	7000	3500	66.0	58.0
1FE1092–6WN30–xxxx	2922	7000	3500	66.0	58.0
1FE1092–6WR11–xxxx	2923	7000	3200	66.0	41.0
1FE1093–4WF01–xxxx	2842	16000	6000	66.0	85.0
1FE1093–4WH11–xxxx	2870	18000	4500	75.0	83.0
1FE1093–4WK01–xxxx	2843	16000	4400	65.0	60.0
1FE1093–4WM11–xxxx	2924	18000	3500	75.0	64.0
1FE1093–4WN01–xxxx	2844	16000	3800	65.0	51.0
1FE1093–4WN10–xxxx	2825	6500	3300	75.0	60.0
1FE1093–4WN11–xxxx	2820	16000	3300	75.0	60.0
1FE1093–6WN10–xxxx	2802	7000	3500	100.0	83.0
1FE1093–6WS10–xxxx	2846	4000	2000	100.0	53.0
1FE1093–6WS30–xxxx	2926	4000	2000	100.0	53.0
1FE1093–6WV11–xxxx	2847	7000	1600	100.0	43.0
1FE1093–6WV31–xxxx	2927	7000	1600	100.0	43.0
1FE1093–7LN00–xxxx	2845	7000	3500	75.0	60.0
1FE1094–4LW01–xxxx	2848	9000	2500	72.0	30.0
1FE1094–4WK11–xxxx	2869	18000	4400	100.0	108.0
1FE1094–4WL11–xxxx	2867	18000	3800	100.0	90.0
1FE1094–4WS11–xxxx	2849	13000	2500	100.0	60.0
1FE1094–4WU11–xxxx	2803	10000	1800	95.0	45.0
1FE1095–4WN11–xxxx	2868	18000	3500	125.0	108.0
1FE1095–6LT01–xxxx	2850	7000	1500	160.0	60.0
1FE1096–4WK10–xxxx	2851	10000	5000	150.0	180.0
1FE1096–4WN11–xxxx	2821	16000	3300	150.0	120.0
1FE1103–4WN01–xxxx	2863	16000	4200	80.0	65.0
1FE1103–4WN31–xxxx	2928	16000	3600	102.0	84.0
1FE1103–4WN11–xxxx	2871	16000	3600	102.0	84.0

Table A-4 Motor code for 1FE1/2SP1 motors (PE spindle), continued

Order No. (MLFB)	Motor code P1102	n_{max} [RPM]	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_{rated} (100 K) [A(rms)]
1FE1103–4WQ01–xxxx	2852	15000	3600	80.0	60.0
1FE1103–4WQ11–xxxx	2929	15000	3300	100.0	68.0
1FE1103–4WT01–xxxx	2853	12000	2700	80.0	45.0
1FE1103–4WT11–xxxx	2930	12000	2500	100.0	53.0
1FE1103–4WU01–xxxx	2854	10000	2700	80.0	45.0
1FE1104–4WN11–xxxx	2872	16000	3800	136.0	120.0
1FE1105–4WN01–xxxx	2856	16000	3000	148.0	102.0
1FE1105–4WN11–xxxx	2873	16000	3000	170.0	120.0
1FE1105–4WQ01–xxxx	2857	10000	2560	150.0	85.0
1FE1105–4WQ11–xxxx	2931	10000	2600	170.0	95.0
1FE1106–4WN11–xxxx	2874	16000	3400	204.0	159.0
1FE1106–4WS11–xxxx	2932	12500	2700	200.0	120.0
1FE1106–4WY11–xxxx	2858	6000	1200	200.0	60.0
1FE1112–6LW01–xxxx	2893	7000	1800	70.0	29.0
1FE1113–6LU01–xxxx	2894	7000	1800	105.0	43.0
1FE1114–6LU11–xxxx	2859	6500	1500	135.0	45.00
1FE1114–6WR11–xxxx	2860	6500	2000	200.0	108.0
1FE1114–6WR31–xxxx	2933	6500	2000	200.0	108.0
1FE1114–6WT10–xxxx	2861	3300	1400	200.0	84.0
1FE1114–6WT11–xxxx	2855	6500	1400	200.0	84.0
1FE1114–6WT31–xxxx	2934	6500	1400	200.0	84.0
1FE1114–6WT51–xxxx	2935	6500	1400	200.0	84.0
1FE1114–6WW11–xxxx	2895	6000	1000	200.0	58.0
1FE1114–6WW31–xxxx	2936	6000	1000	200.0	58.0
1FE1116–6LS01–xxxx	2864	5000	1000	210.0	60.0
1FE1116–6LT01–xxxx	2865	5600	1000	270.0	75.0
1FE1116–6WR11–xxxx	2866	6500	1200	300.0	109.0
1FE1116–6WT11–xxxx	2862	5500	900	300.0	84.0
1FE1116–6WW11–xxxx	2943	4000	700	300.0	60.0
1FE1116–6WY11–xxxx	2937	3000	550	300.0	45.0
1FE1124–4WN11–xxxx	2896	14000	3000	200.0	135.0
1FE1125–4WN11–xxxx	2897	14000	3000	250.0	162.0
1FE1125–4WP11–xxxx	2898	12500	2500	250.0	147.0
1FE1126–4WN11–xxxx	2899	14000	3000	300.0	200.0
1FE1126–4WP11–xxxx	2900	12500	2500	300.0	180.0

Table A-4 Motor code for 1FE1/2SP1 motors (PE spindle), continued

Order No. (MLFB)	Motor code P1102	n_{max} [RPM]	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_{rated} (100 K) [A(rms)]
1FE1126–4WQ11–xxxx	2901	10000	2000	300.0	147.0
1FE1144–4WT10–xxxx	2941	1700	900	430.0	85.0
1FE1145–8WN11–xxxx	2902	8000	1700	585.0	200.0
1FE1145–8WS11–xxxx	2903	5000	1100	585.0	130.0
1FE1145–8WQ11–xxxx	2938	6000	1300	585.0	150.0
1FE1147–8WN11–xxxx	2904	5500	1200	820.0	200.0
1FE1147–8WS11–xxxx	2905	3500	750	820.0	130.0
1FE1147–8WQ11–xxxx	2939	4200	950	820.0	158.0
1FE1147–8WQ31–xxxx	2940	4200	950	820.0	158.0
1FE1147–8WS11–xxxx	2905	3500	750	820.0	130.0
2SP1202–1HAxx–xxxx	2954	15000	2700	42.0	30.0
2SP1202–1HBxx–xxxx	2955	18000	3500	42.0	42.0
2SP1204–1HAxx–xxxx	2956	15000	3000	84.0	60.0
2SP1204–1HBxx–xxxx	2957	18000	4300	78.0	79.0
2SP1253–1xAxx–xxxx	2950	10000	2500	100.0	53.0
2SP1253–1xBxx–xxxx	2951	15000	3300	100.0	68.0
2SP1255–1xAxx–xxxx	2952	10000	2600	170.0	95.0
2SP1255–1xBxx–xxxx	2953	15000	3000	170.0	120.0
Unlisted motors	1999	–	–	–	–
Note: x Space retainer for the Order No.					

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Parameters for unlisted motors (PE spindle)

Table A-5 Unlisted motor: Parameters for permanent–magnet synchronous motors with field weakening

Parameters			
No.	**Name**	**Units**	**Value**
1015	Activate PE–MSD 1 = activated, 0 = de–activated	–	1
1102	Motor code number	–	1999
1103	Rated motor current	A(rms)	
1104	Maximum motor current	A(rms)	
1112	Motor pole pair number	–	
1113	Torque constant	Nm/A	
1114	Voltage constant	V(rms)	
1115	Armature resistance (phase value) (rotating field inductance: $L_{rotating\ field} = 1.5 \bullet L_{phase}$)	Ω	
1116	Armature inductance	mH	
1117	Motor moment of inertia	kgm^2	
1118	Motor standstill current	A(rms)	
1122	Motor limiting current	A(rms)	
1128	Optimum load angle (from SW 3.3)	Degr.	
1136	Motor short–circuit current	A(rms)	
1142	Speed at the start of field weakening	RPM	
1145	Stall (standstill) torque reduction factor	%	
1146	Maximum motor speed	RPM	
1149	Reluctance torque constant (from SW 3.3)	mH	
1180	Lower current limit, current controller adaptation	%	
1181	Upper current limit, current controller adaptation	%	
1182	Factor, current controller adaptation	%	
1400	Rated motor speed	RPM	

A.3.3 List of permanent–magnet synchronous motors without field weakening, build–in torque motors (1FW6, from SW 6.1)

Motor code for permanent–magnet synchronous motors without field weakening (1FW6)

Table A-6 Motor code for 1FW6 motors (build–in torque motors)

Order No. (MLFB)	Motor code P1102	n_{max} [RPM]	n_{rated} [RPM]	M_0 (100 K) [Nm]	I_{rated} (100 K) [A(rms)]
1FW6190–xxB07–2Axx	1862	59	59	732.0	17.8
Unlisted motors	1999	–	–	–	–
Note: x: Space retainer for the Order No.					

Parameters for unlisted motors (1FW6l)

Table A-7 Unlisted motor: Parameters for permanent–magnet synchronous motors without field weakening

Parameters			
No.	**Name**	**Units**	**Value**
1102	Motor code number	–	1999
1103	Rated motor current	A(rms)	
1104	Maximum motor current	A(rms)	
1112	Motor pole pair number	–	
1113	Torque constant	Nm/A	
1114	Voltage constant	V(rms)	
1115	Armature resistance (phase value) (rotating field inductance: $L_{rotating\ field} = 1.5 \bullet L_{phase}$)	Ω	
1116	Armature inductance	mH	
1117	Motor moment of inertia	kgm^2	
1118	Motor standstill current	A(rms)	
1122	Motor limiting current	A(rms)	
1128	Optimum load angle	Degr.	
1136	Motor short–circuit current	A(rms)	

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Table A-7 Unlisted motor: Parameters for permanent–magnet synchronous motors without field weakening, continued

Parameters			
No.	**Name**	**Units**	**Value**
1142	Speed at the start of field weakening	RPM	
1145	Stall (standstill) torque reduction factor	%	
1146	Maximum motor speed	RPM	
1180	Lower current limit, current controller adaptation	%	
1181	Upper current limit, current controller adaptation	%	
1182	Factor, current controller adaptation	%	
1400	Rated motor speed	RPM	

A.3.4 List of linear synchronous motors

Motor code for linear synchronous motors (SLM)

Table A-8 Motor code for linear synchronous motors (SLM)

Order No. (MLFB)	Motor code P1102	v_{max} [m/min]	F_{max} [N]
1FN1124–5xC7x–xxxx	3001	145	4850
1FN1184–5xC7x–xxxx	3002	145	7920
1FN1122–5xC7x–xxxx	3003	145	3250
1FN1126–5xC7x–xxxx	3004	145	6500
1FN1186–5xC7x–xxxx	3005	145	10600
1FN1244–5xC7x–xxxx	3006	145	10900
1FN1246–5xC7x–xxxx	3007	145	14500
1FN1122–5xF7x–xxxx	3021	200	3250
1FN1126–5xF7x–xxxx	3022	200	6500
1FN1124–5xF7x–xxxx	3023	200	4850
1FN1184–5xF7x–xxxx	3024	200	7920
1FN1186–5xF7x–xxxx	3025	200	10600
1FN1244–5xF7x–xxxx	3026	200	10900
1FN1246–5xF7x–xxxx	3027	200	14500
1FN1072–3xF7x–xxxx	3031	200	1720
1FN1076–3xF7x–xxxx	3032	200	3450
2 • 1FN1124–5AC7x–xxxx	3201	145	9700
2 • 1FN1184–5AC7x–xxxx	3202	145	15840
2 • 1FN1122–5xC7x–xxxx	3203	145	6500
2 • 1FN1126–5xC7x–xxxx	3204	145	13000
2 • 1FN1186–5xC7x–xxxx	3205	145	21200
2 • 1FN1244–5xC7x–xxxx	3206	145	21800
2 • 1FN1246–5xC7x–xxxx	3207	145	29000
2 • 1FN1122–5xF7x–xxxx	3221	200	6500
2 • 1FN1126–5xF7x–xxxx	3222	200	13000
2 • 1FN1124–5xF7x–xxxx	3223	200	9700
2 • 1FN1184–5xF7x–xxxx	3224	200	15840
2 • 1FN1186–5xF7x–xxxx	3225	200	21200
2 • 1FN1244–5xF7x–xxxx	3226	200	21800
2 • 1FN1246–5xF7x–xxxx	3227	200	29000
2 • 1FN1072–3xF7x–xxxx	3231	200	3440

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Table A-8 Motor code for linear synchronous motors (SLM), continued

Order No. (MLFB)	Motor code P1102	v_{max} [m/min]	F_{max} [N]
2 • 1FN1076–3xF7x–xxxx	3232	200	6900
1FN3100–2WC0x–xxxx	3402	297	1100
1FN3100–2WE0x–xxxx	3403	497	1100
1FN3100–3WE0x–xxxx	3404	497	1650
1FN3100–4WC0x–xxxx	3405	297	2200
1FN3100–4WE0x–xxxx	3406	497	2200
1FN3100–5WC0x–xxxx	3407	255	2750
1FN3150–1WC0x–xxxx	3408	282	825
1FN3150–1WE0x–xxxx	3409	534	825
1FN3150–2WC0x–xxxx	3410	282	1650
1FN3150–3WC0x–xxxx	3411	282	2470
1FN3150–4WC0x–xxxx	3412	282	3300
1FN3150–5WC0x–xxxx	3413	282	4120
1FN3300–2WB0x–xxxx	3414	176	3450
1FN3300–2WC0x–xxxx	3415	297	3450
1FN3300–2WG0x–xxxx	3416	805	3450
1FN3300–3WC0x–xxxx	3417	297	5170
1FN3300–3WG0x–xxxx	3418	836	5170
1FN3300–4WB0x–xxxx	3419	176	6900
1FN3300–4WC0x–xxxx	3420	297	6900
1FN3450–2WC0x–xxxx	3421	275	5180
1FN3450–2WE0x–xxxx	3422	519	5180
1FN3450–3WB0x–xxxx	3423	164	7760
1FN3450–3WB5x–xxxx	3424	217	7760
1FN3450–3WC0x–xxxx	3425	275	7760
1FN3450–3WE0x–xxxx	3426	519	7760
1FN3450–4WB0x–xxxx	3427	164	10350
1FN3450–4WB5x–xxxx	3428	217	10350
1FN3450–4WC0x–xxxx	3429	275	10350
1FN3450–4WE0x–xxxx	3430	519	10350
1FN3600–3WB0x–xxxx	3431	155	10350
1FN3600–3WC0x–xxxx	3432	254	10350
1FN3600–4WB0x–xxxx	3433	155	13800
1FN3600–4WB5x–xxxx	3434	215	13800
1FN3600–4WC0x–xxxx	3435	254	13800

Table A-8 Motor code for linear synchronous motors (SLM), continued

Order No. (MLFB)	Motor code P1102	v_{max} [m/min]	F_{max} [N]
1FN3900–2WB0x–xxxx	3436	160	10350
1FN3900–2WC0x–xxxx	3437	253	10350
1FN3900–4WB0x–xxxx	3438	160	20700
1FN3900–4WB5x–xxxx	3439	203	20700
1FN3900–4WC0x–xxxx	3440	253	20700
2 • 1FN3100–2WC0x–xxxx	3602	297	2200
2 • 1FN3100–2WE0x–xxxx	3603	497	2200
2 • 1FN3100–3WE0x–xxxx	3604	497	3300
2 • 1FN3100–4WC0x–xxxx	3605	297	4400
2 • 1FN3100–4WE0x–xxxx	3606	497	4400
2 • 1FN3100–5WC0x–xxxx	3607	255	5500
2 • 1FN3150–1WC0x–xxxx	3608	282	1650
2 • 1FN3150–1WE0x–xxxx	3609	534	1650
2 • 1FN3150–2WC0x–xxxx	3610	282	3300
2 • 1FN3150–3WC0x–xxxx	3611	282	4940
2 • 1FN3150–4WC0x–xxxx	3612	282	6600
2 • 1FN3150–5WC0x–xxxx	3613	282	8240
2 • 1FN3300–2WB0x–xxxx	3614	176	6900
2 • 1FN3300–2WC0x–xxxx	3615	297	6900
2 • 1FN3300–2WG0x–xxxx	3616	805	6900
2 • 1FN3300–3WC0x–xxxx	3617	297	10340
2 • 1FN3300–3WG0x–xxxx	3618	836	10340
2 • 1FN3300–4WB0x–xxxx	3619	176	13800
2 • 1FN3300–4WC0x–xxxx	3620	297	13800
2 • 1FN3450–2WC0x–xxxx	3621	275	10360
2 • 1FN3450–2WE0x–xxxx	3622	519	10360
2 • 1FN3450–3WB0x–xxxx	3623	164	15520
2 • 1FN3450–3WB5x–xxxx	3624	217	15520
2 • 1FN3450–3WC0x–xxxx	3625	275	15520
2 • 1FN3450–3WE0x–xxxx	3626	519	15520
2 • 1FN3450–4WB0x–xxxx	3627	164	20700
2 • 1FN3450–4WB5x–xxxx	3628	217	20700
2 • 1FN3450–4WC0x–xxxx	3629	275	20700
2 • 1FN3450–4WE0x–xxxx	3630	519	20700
2 • 1FN3600–2WB0x–xxxx	3631	155	20700

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Table A-8 Motor code for linear synchronous motors (SLM), continued

Order No. (MLFB)	Motor code P1102	v_{max} [m/min]	F_{max} [N]
2 • 1FN3600–3WC0x–xxxx	3632	254	20700
2 • 1FN3600–4WB0x–xxxx	3633	155	27600
2 • 1FN3600–4WB5x–xxxx	3634	215	27600
2 • 1FN3600–4WC0x–xxxx	3635	254	27600
2 • 1FN3900–2WB0x–xxxx	3636	160	20700
2 • 1FN3900–2WC0x–xxxx	3637	253	20700
2 • 1FN3900–4WB0x–xxxx	3638	160	41400
2 • 1FN3900–4WB5x–xxxx	3639	203	41400
2 • 1FN3900–4WC0x–xxxx	3640	253	41400
Unlisted motors	3999	–	–

Note:
x: Space retainer for the Order No.
2 • 1FN ... There are two motors, connected in parallel to a power module

Parameters for unlisted motors (SLM)

The following applies for two ”identical” linear motors connected in parallel:
The value for the individual motor is handled, as specified in column ”2 (parallel)” thus obtaining the value for the parallel circuit.

Table A-9 Parameters for unlisted motors (SLM)

Parameters				No. of motors	
No.	**Name**	**Units**	**Value**	**1**	**2 (parallel)**
1102	Motor code number	–	3999	–	–
1103	Rated motor current	A(rms)		I_0	$2 \bullet I_0$
1104	Maximum motor current	A(rms)		I_{max}	$2 \bullet I_{max}$
1113	Force constant	N/A		F	$2 \bullet F$
1114	Voltage constant	Vs/m		k_E	k_E
1115	Armature resistance	Ω		R_A	$0.5 \bullet R_A$
1116	Armature inductance	mH		L_A	$0.5 \bullet L_A$
1117	Motor weight	kg		m_M	$2 \bullet m_M$
1118	Motor standstill current	A(rms)		I_0	$2 \bullet I_0$
1146	Maximum motor velocity	m/min		v_{max}	v_{max}
1170	Pole pair width	mm		$2\tau_p$	$2\tau_p$
1180	Lower current limit, current controller adaptation	%		%	%
1181	Upper current limit, current controller adaptation	%		%	%
1182	Factor, current controller adaptation	%		%	%
1400	Rated motor velocity	m/min		v_0	v_0

Danger

It is only permissible to connect temperature sensor cables with PELV or SELV voltage (refer to EN 60204–1 Chapter 6.4)

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A.3.5 List of induction motors

Motor code for rotating induction motors (ARM)

Table A-10 Motor code for rotating induction motors (ARM)

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	P_{rated} [kW]	I_{rated} [A(rms)]
1PH2092–4WG4x–xxxx	326	2000	4.7	22.0
1PH2093–6WF4x–xxxx	320	1500	7.5	24.0
1PH2095–6WF4x–xxxx	321	1500	10.1	30.0
1PH2096–4WG4x–xxxx	327	2000	10.1	43.0
1PH2113–6WF4x–xxxx	322	1500	15.1	56.0
1PH2115–6WF4x–xxxx	323	1500	16.5	55.0
1PH2117–6WF4x–xxxx	324	1500	18.0	60.0
1PH2118–6WF4x–xxxx	325	1500	23.0	82.0
1PH2123–4WF4x–xxxx	328	1500	11.5	57.0
1PH2127–4WF4x–xxxx	329	1500	21.0	85.0
1PH2128–4WF4x–xxxx	330	1500	25.0	101.0
1PH2143–4WF4x–xxxx	331	1500	30.0	101.0
1PH2147–4WF4x–xxxx	332	1500	38.0	116.0
1PH2182–6WC4x–xxxx	333	750	11.8	37.0
1PH2184–6WP4x–xxxx	334	600	14.5	56.0
1PH2186–6WB4x–xxxx	335	500	18.3	65.0
1PH2188–6WB4x–xxxx	336	500	23.6	78.0
1PH2254–6WB4x–xxxx	337	500	28.8	117.0
1PH2256–6WB4x–xxxx	338	500	39.3	119.0
1PH4103–4NF2x–xxxx	300	1500	7.5	26.0
1PH4105–4NF2x–xxxx	302	1500	11.0	38.0
1PH4107–4NF2x–xxxx	304	1500	14.0	46.0
1PH4133–4NF2x–xxxx	306	1500	15.0	55.0
1PH4135–4NF2x–xxxx	308	1500	22.0	73.0
1PH4137–4NF2x–xxxx	310	1500	27.0	85.0
1PH4138–4NF2x–xxxx	312	1500	30.0	102.0
1PH4163–4NF2x–xxxx	314	1500	37.0	107.0
1PH4167–4NF2x–xxxx	316	1500	46.0	120.0
1PH4168–4NF2x–xxxx	318	1500	52.0	148.0
1PH6101–4NF4x–xxxx	101	1500	3.7	13.0

Table A-10 Motor code for rotating induction motors (ARM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	P_{rated} [kW]	I_{rated} [A(rms)]
1PH6101–4NG4x–xxxx	102	2000	4.7	14.5
1PH6103–4NG4x–xxxx	104	2000	7.0	20.0
1PH6103–xNF4x–xxxx	103	1500	5.5	18.5
1PH6105–4NF4x–xxxx	105	1500	7.5	24.0
1PH6105–4NG4x–xxxx	106	2000	9.5	26.0
1PH6105–4NZ4x–xxxx	140	3000	12.0	29.0
1PH6107–4NC4x–xxxx	131	750	5.0	24.0
1PH6107–4NG4x–xxxx	108	2000	11.5	31.0
1PH6107–xNF4x–xxxx	107	1500	9.0	28.0
1PH6131–4NF4x–xxxx	109	1500	9.0	28.5
1PH6131–4NG4x–xxxx	110	2000	12.0	33.5
1PH6131–4NZ0x–xxxx	141	1500	8.0	24.0
1PH6133–4NB4x–xxxx	132	500	4.25	27.0
1PH6133–4NB8x–xxxx–Y	200	500	4.25	17.0
1PH6133–4NB8x–xxxx–D	201	500	4.2	17.0
1PH6133–4NF0x–xxxx	111	1500	11.0	29.0
1PH6133–4NF4x–xxxx	112	1500	11.0	33.0
1PH6133–4NG0x–xxxx	136	2000	14.5	33.0
1PH6133–4NG4x–xxxx	113	2000	14.5	40.0
1PH6135–4NF0x–xxxx	114	1500	15.0	38.0
1PH6135–4NG4x–xxxx	116	2000	20.0	53.0
1PH6135–xNF4x–xxxx	115	1500	15.0	44.0
1PH6137–4NB4x–xxxx	133	525	7.5	46.0
1PH6137–4NB8x–xxxx–Y	202	525	7.5	27.0
1PH6137–4NB8x–xxxx–D	203	1250	7.5	27.0
1PH6137–4NF4x–xxxx	117	1500	18.5	53.0
1PH6137–4NG0x–xxxx	137	2000	24.0	52.0
1PH6137–4NG4x–xxxx	118	2000	24.0	61.0
1PH6137–4NZ0x–xxxx	143	750	11.0	45.0
1PH6138–4NF4x–xxxx	120	1500	22.0	65.0
1PH6138–4NG4x–xxxx	121	2000	28.0	71.0
1PH6138–xNF0x–xxxx	119	1500	22.0	55.0
1PH6161–4NF4x–xxxx	123	1500	22.0	64.0
1PH6161–4NG4x–xxxx	124	2000	28.0	72.0

Table A-10 Motor code for rotating induction motors (ARM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	P_{rated} [kW]	I_{rated} [A(rms)]
1PH6161–xNF0x–xxxx	122	1500	22.0	57.0
1PH6163–4NB4x–xxxx	134	500	11.5	68.0
1PH6163–4NB8x–xxxx–Y	204	500	11.5	43.0
1PH6163–4NB8x–xxxx–D	205	1250	11.5	43.0
1PH6163–4NF0x–xxxx	125	1500	30.0	77.0
1PH6163–4NF4x–xxxx	126	1500	30.0	91.0
1PH6163–4NG4x–xxxx	127	2000	38.0	87.0
1PH6163–4NZ0x–xxxx	139	950	19.0	58.0
1PH6167–4NB4x–xxxx	135	500	14.5	81.0
1PH6167–4NB8x–xxxx–Y	206	500	14.5	49.5
1PH6167–4NB8x–xxxx–D	207	1250	14.5	50.0
1PH6167–4NF4x–xxxx	129	1500	37.0	102.0
1PH6167–4NG0x–xxxx	138	2000	45.0	89.0
1PH6167–4NG4x–xxxx	130	2000	45.0	97.0
1PH6167–xNF0x–xxxx	128	1500	37.0	85.0
1PH6168–4NF0x–xxxx	142	1500	40.0	85.0
1PH6186–4NB4x–xxxx	160	500	22.0	66.0
1PH6206–4NB4x–xxxx	162	500	32.0	96.0
1PH6186–xNE4x–xxxx	163	1250	42.0	84.0
1PH6186–4NF4x–xxxx	164	1500	50.0	100.0
1PH6206–xNE4x–xxxx	165	1250	63.0	122.0
1PH6206–4NF4x–xxxx	166	1500	76.0	154.0
1PH6186–4NB9x–xxxx	167	700	30.8	67.0
1PH6226–xNF4x–xxxx	168	1500	100.0	188.0
1PH6186–4NB8x–xxxx–Y	208	500	22.0	55.0
1PH6186–4NB8x–xxxx–D	209	1250	22.0	55.0
1PH6206–4NB8x–xxxx–Y	210	500	32.0	78.0
1PH6206–4NB8x–xxxx–D	211	1250	32.0	78.0
DMR160.80.6RIF–Y	212	200	12.6	60.0
DMR160.80.6RIF–D	213	200	12.6	60.0
1PH6226–4NB8x–xxxx–Y	214	500	42.0	95.0
1PH6226–4NB8x–xxxx–D	215	1250	42.0	95.0
1PH7131–xNF4x–xxxx	406	1500	11.0	23.1
1PH7133–xND4x–xxxx	408	1000	12.0	28.0

Table A-10 Motor code for rotating induction motors (ARM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	P_{rated} [kW]	I_{rated} [A(rms)]
1PH7133–xxGxx–xxxx	409	2000	20.0	43.0
1PH7137–xxDxx–xxxx	411	1000	17.0	40.7
1PH7137–xxGxx–xxxx	412	2000	28.0	58.6
1PH7163–xxDxx–xxxx	414	1000	22.0	52.7
1PH7163–xxFxx–xxxx	415	1500	30.0	70.3
1PH7167–xxFxx–xxxx	417	1500	37.0	77.8
1PH7184–xxExx–xxxx	418	1250	40.0	85.0
1PH7186–xxExx–xxxx	420	1250	60.0	120.0
1PH7224–xxFxx–xxxx	422	1500	100.0	188.0
1PH7224–xxCxx–xxxx	423	700	55.0	117.0
1PH7184–xxTxx–xxxx	424	500	21.5	76.0
1PH7186–xxTxx–xxxx	425	500	29.6	106.0
1PH7101–xxFxx–xxxx	426	1500	3.7	10.0
1PH7103–xxGxx–xxxx	427	2000	7.0	17.5
1PH7105–xxFxx–xxxx	428	1500	7.0	17.5
1PH7107–xxFxx–xxxx	429	1500	9.0	22.5
1PH7103–xxDxx–xxxx	430	1000	3.7	9.6
1PH7103–xxFxx–xxxx	431	1500	5.5	13.0
1PH7107–xxDxx–xxxx	432	1000	6.3	17.1
1PH7107–xxGxx–xxxx	433	2000	10.5	24.8
1PH7133–xxFxx–xxxx	434	1500	15.0	33.0
1PH7133–xxFxx–xxxx	435	1500	18.5	39.8
1PH7137–xxFxx–xxxx	436	1500	22.0	54.0
1PH7163–xxBxx–xxxx	437	500	12.0	28.2
1PH7163–xxGxx–xxxx	438	2000	36.0	82.3
1PH7167–xxBxx–xxxx	439	500	16.0	35.5
1PH7167–xxDxx–xxxx	440	1000	28.0	68.3
1PH7167–xxGxx–xxxx	441	2000	41.0	88.8
1PH7184–xxDxx–xxxx	442	1000	39.0	90.0
1PH7184–xxFxx–xxxx	443	1500	51.0	120.0
1PH7184–xxLxx–xxxx	444	2500	78.0	171.0
1PH7186–xxDxx–xxxx	445	1000	51.0	116.0
1PH7101–xxFxx–xLxx	460	1500	3.7	10.0
1PH7103–xxDxx–xLxx	461	1000	3.7	9.6

Table A-10 Motor code for rotating induction motors (ARM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	P_{rated} [kW]	I_{rated} [A(rms)]
1PH7103–xxFxx–xLxx	462	1500	5.5	13.0
1PH7103–xxGxx–xLxx	463	2000	7.0	17.5
1PH7105–xxFxx–xLxx	464	1500	7.0	17.5
1PH7107–xxDxx–xLxx	465	1000	6.3	17.1
1PH7107–xxFxx–xLxx	466	1500	9.0	22.5
1PH7107–xxGxx–xLxx	467	2000	10.5	24.8
1PH7131–xxFxx–xLxx	468	1500	11.0	23.1
1PH7133–xxDxx–xLxx	469	1000	12.0	28.0
1PH7133–xxFxx–xLxx	470	1500	15.0	33.0
1PH7133–xxGxx–xLxx	471	2000	20.0	43.0
1PH7135–xxFxx–xLxx	472	1500	18.5	39.8
1PH7137–xxDxx–xLxx	473	1000	17.0	40.7
1PH7137–xxFxx–xLxx	474	1500	22.0	54.0
1PH7137–xxGxx–xLxx	475	2000	28.0	58.6
1PH7163–xxBxx–xLxx	476	500	12.0	28.2
1PH7163–xxDxx–xLxx	477	1000	22.0	52.7
1PH7163–xxFxx–xLxx	478	1500	30.0	70.3
1PH7163–xxGxx–xLxx	479	2000	36.0	82.3
1PH7167–xxBxx–xLxx	480	500	16.0	35.5
1PH7167–xxDxx–xLxx	481	1000	28.0	68.3
1PH7167–xxFxx–xLxx	482	1500	37.0	77.8
1PH7167–xxGxx–xLxx	483	2000	41.0	88.8
1PH7224–xxDxx–xxxx	484	1000	71.0	161.0
1PM4101–xxF8x–xxxx–Y	600	1500	3.7	13.0
1PM4101–xxF8x–xxxx–D	601	4000	3.7	13.5
1PM4101–xxW2x–xxxx	620	1500	5.0	18.0
1PM4105–xxF8x–xxxx–Y	602	1500	7.5	23.0
1PM4105–xxF8x–xxxx–D	603	4000	7.5	24.0
1PM4105–xxW2x–xxxx	621	1500	11.0	38.0
1PM4133–xxF8x–xxxx–Y	604	1500	11.0	41.0
1PM4133–xxF8x–xxxx–D	605	4000	11.0	41.0
1PM4133–xxW2x–xxxx	618	1500	15.0	55.0
1PM4137–xxF8x–xxxx–Y	606	1500	18.5	56.0
1PM4137–xxF8x–xxxx–D	607	4000	18.5	56.0

Table A-10 Motor code for rotating induction motors (ARM), continued

Order No. (MLFB)	Motor code P1102	n_{rated} [RPM]	P_{rated} [kW]	I_{rated} [A(rms)]
1PM4137–xxW2x–xxxx	619	1500	27.0	85.0
1PM6101–xxF8x–(L37)	623	4000	3.7	13.5
1PM6101–xxF8x–(L37)	622	1500	3.7	13.0
1PM6101–xxF8x–xxxx–Y	608	1500	3.7	13.0
1PM6101–xxF8x–xxxx–D	609	4000	3.7	13.5
1PM6105–xxF8x–xxxx–Y	610	1500	7.5	23.0
1PM6105–xxF8x–xxxx–D	611	4000	7.5	24.0
1PM6133–xxF8x–xxxx–Y	612	1500	11.0	41.0
1PM6133–xxF8x–xxxx–D	613	4000	11.0	41.0
1PM6137–xxF8x–xxxx–Y	614	1500	18.5	56.0
1PM6137–xxF8x–xxxx–D	615	4000	18.5	56.0
1PM6138–xxF8x–xxxx–Y	616	1500	22.0	58.0
1PM6138–xxF8x–xxxx–D	617	4000	22.0	57.0
2SP1253–8xAxx–0xxx	340	4000	13.2	29.0
2SP1253–8xAxx–0xxx	341	1800	13.2	28.0
2SP1253–8xAxx–1xxx	342	1800	13.2	28.0
2SP1253–8xAxx–1xxx	343	4000	13.2	29.0
2SP1255–8xAxx–0xxx	344	800	11.7	30.0
2SP1255–8xAxx–0xxx	345	1800	11.7	28.0
2SP1255–8xAxx–1xxx	346	1800	11.7	28.0
2SP1255–8xAxx–1xxx	347	800	11.7	30.0
Unlisted motors	99	–	–	–

Note:
x: Space retainer for the Order No.

A

Parameters for unlisted motors (ARM)

Table A-11 Parameters for unlisted motors (ARM)

Parameters			
No.	**Name**	**Units**	**Value**
1102	Motor code	–	99
1103	Rated motor current	A(rms)	
1117	Motor moment of inertia	kgm^2	
1119	Inductance of the series reactor	mH	
1129	cos phi power factor	–	
1130	Rated motor power	kW	
1132	Rated motor voltage	V	
1134	Rated motor frequency	Hz	
1135	Motor no–load voltage	V	
1136	Motor no–load current	A(rms)	
1137	Stator resistance, cold	Ω	
1138	Rotor resistance, cold	Ω	
1139	Stator leakage reactance	Ω	
1140	Rotor leakage reactance	Ω	
1141	Magnetizing reactance	Ω	
1142	Speed at the start of field weakening	RPM	
1146	Maximum motor speed	RPM	
1400	Rated motor speed	RPM	

A.4 Encoder list

A.4.1 Encoder code

The motor encoder being used is identified by its encoder code in P1006.
If encoder systems are used, which are not marketed by SIEMENS (third–party encoder, encoder code = 99), then additional parameters must be ”manually” set corresponding to the measuring system manufacturer’s data (refer to Table A-12).

A

Table A-12 Encoder code for motor encoders

Rough classification		**Encoder code P1006**	**Motor The Order No. (MLFB) defines the encoder code**	**Encoders**	**Additional parameters**
Encoder with sin/cos 1Vpp	Incremental encoders integrated	1	1PH4xxx–xxxxx–xNxx[1] 1PH6xxx–xxxxx–xNxx 1PH7xxx–xxxxx–xNxx	ERN 1381/ERN 1387[2] Voltage signals sin/cos 1Vpp 2048 pulses/revolution	–
		2	1FT6xxx–xxxxx–xAxx 1FK6xxx–xxxxx–xAxx	ERN 1387[2] Voltage signals sin/cos 1Vpp 2048 pulses/revolution C/D track	–
	Incremental encoders mounted	30	1PH2 1FE1	SIZAG 2 6FX2001–8RA03–1B/–1C/–1F[3] Voltage signals sin/cos 1Vpp 256 pulses/revolution	P1011 P1008
		31	1PH2 1FE1	SIZAG 2 6FX2001–8RA03–1D/–1E/–1G[3] Voltage signals sin/cos 1Vpp 512 pulses/revolution	P1011 P1008
		32	1PH2 1FE1	SIMAG H 6FX2001–6RB01–4xx0[3] Voltage signals sin/cos 1Vpp 256 pulses/revolution	P1011 P1008
		33	1PH2 1FE1	SIMAG H 6FX2001–6RB01–5xx0[3] Voltage signals sin/cos 1Vpp 400 pulses/revolution	P1011 P1008
		34	1PH2 1FE1	SIMAG H 6FX2001–6RB01–6xx0[3] Voltage signals sin/cos 1Vpp 512 pulses/revolution	P1011 P1008
	Absolute value encoders integrated	10	1FT6xxx–xxxxx–xExx 1FK6xxx–xxxxx–xExx	EQN 1325[2] Voltage signals sin/cos 1Vpp EnDat, 2048 pulses/revolution, 4096 revolutions which can be differentiated between	–
		15 (from SW 3.3)	1FK6xxx–xxxxx–xGxx	EQI 1324[2] Voltage signals sin/cos 1Vpp EnDat, 32 pulses/revolution, 4096 revolutions which can be differentiated between	–

Table A-12 Encoder code for motor encoders, continued

Rough classification			Encoder code P1006	Motor The Order No. (MLFB) defines the encoder code	Encoders	Additional parameters
Resolvers	Incremental encoders integrated		20	1FT6xxx–xxxxx–xTxx 1FK6xxx–xxxxx–xTxx	Resolver 2p (1–speed)	–
			21	1FT6xxx–4xxxx–xSxx Special design	Resolver 4p (2–speed)	–
			22	1FT6xxx–6xxxx–xSxx Special design	Resolver 6p (3–speed)	–
			23	1FT6xxx–8xxxx–xSxx Special design	Resolver 8p (4–speed)	–
Special cases	Without encoder		98	1LAx	–	–
	Unlisted encoder with sin/cos 1Vpp		99	–	–	P1011 P1005 P1027
	Unlisted encoder with TTL signal[4]			1LAx 1PHx	e.g. 1XP8001–2	P1011 P1005 P1027
	Unlisted resolver			–	Resolver 2p (1–speed) to resolver 12p (6–speed)	P1011 P1018 P1027
	Linear encoders	Incremental		1FN1 1FN3	e.g. LS 186/LS 484[2]	P1011 P1024 P1027
		Absolute			e.g. LC 181[1]	
	Distance–coded measuring system			–	e.g. ERA 780C/RON 785C[2]	P1027 P1037 P1050 P1051 P1052 P1053

1) x: Space retainer for the Order No.
2) Heidenhain is the manufacturer.
Compatible encoders from other measuring system (encoder) manufacturers can be used.
3) Order No. (MLFB) of the measuring wheel, as this is decisive for the number of pulses/revolution.
4) Only with control board, Order No. 6SN1118–□NH01–0AA□, from SW 8.1

Reader's note

Additional information on encoder systems is provided in:

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter "Indirect and direct position sensing"

A.4.2 Encoder adaptation

Encoder types

The following encoder types are supported:

- Incremental encoder with sin/cos 1Vpp
- Absolute value encoder with EnDat protocol and incremental tracks with sin/cos 1Vpp
- Resolver with pole pair numbers 1 to 6 and 1 to 64 from SW 7.1 with ”SIMODRIVE 611 universal HR”
- Incremental encoders with TTL signal from SW 8.1 mounted on induction motors – only with ”SIMODRIVE 611 universal HR” (Order No. 6SN1118–□NH01–0AA□)

Resolution, resolver

From SW 6.1 for ”SIMODRIVE 611 universal HR”, it is possible to set the resolver resolution.

- Resolver resolution: 14 bit
  - P1011.2=1 (indirect measuring system)
  - P1030.2=1 (direct measuring system)
- Resolver resolution: 12 bit
  - P1011.2=0 (indirect measuring system)
  - P1030.2=0 (direct measuring system)

Fault message 749 (from SW 7.1) is output, if the following conditions are not fulfilled:

- A 14–bit resolution was set for ”SIMODRIVE 611 universal” —> only a 12–bit resolution is possible
- Synchronous motor (SRM): 1
  —> (max. encoder frequency/resolver pole pair number • 60 • 0.98) > P1147
- Induction motor (ARM): 1

  —> (max. encoder frequency/resolver pole pair number • 60 • 0.98) > min (P1146, P1465)
- Max. encoder frequency:
  —> 12 bit: 432 Hz
  —> 14 bit: 108 Hz

Note

If P1146, P1147 or P1465 are changed during operation so that the set limits are exceeded, then fault message 749 is output.

If the condition 1 is not violated, then when the system is re–commissioned, the 14–bit resolution is preset and the speed actual value smoothing (P1522) is selected.

If the resolver resolution is manually changed, then it is also necessary to change the presetting of P1522 (refer to the parameter list Attachment A.1).

Parameterizing indirect measuring systems

An indirect measuring system is commissioned by entering a code number into P1006. If an encoder is used which is not saved in the firmware, then the data according to Table 4-14 must be entered.

Refer to the parameter overview Chapter A.1 for the significance of parameters P1005, P1021, P1022 and P1024.

Parameterizing a direct measuring system

For "SIMODRIVE 611 universal" when a direct measuring system is used, it must be appropriately parameterized.

The direct measuring system is commissioned by entering a code number into P1036. If an encoder is used which is not saved in the firmware, then the data according to Table 4-14 must be entered and P1036 set to 99.

Parameters for unlisted encoders

Table A-13 Unlisted encoders: Which data are required for which encoder type?

Parameter		Name	Encoder pulse number	Absolute encoder (EnDat–SS)	Linear measuring system	Data transmission rate	Multiturn resolution, abs. encoder	Single–turn resolution, abs. enc.	Grid spacing
Parameter		**for indirect measuring system (IM)**	P1005	P1027.3	P1027.4	P1027.14/15	P1021	P1022	P1024
Parameter		**for direct measuring system (DM) (from SW 3.3)**	P1007	P1037.3	P1037.4	P1037.14/15	P1031	P1032	P1034
Encoder type	Incremental	Rotary	x	0	0	–	–	–	–
		Linear	–	0	1	–	–	–	x
	Absolute (EnDat)	Rotary	A	1	0	x	A	A	–
		Linear	–	1	1	x	–	A	–

Note:
x: Input required
–: No input required
A: Display
0 or 1: The parameter bit must be set like this
For an absolute value encoder (P1037.3 = 1), the drive can automatically detect the protocol being used (EnDatI).

Note for the reader

Additional information on encoder systems is provided in:

Reference: /PJU/ SIMODRIVE 611,
Configuration Manual, Drive Converters
Chapter ”Indirect and direct position sensing”

■

List of Abbreviations

B

ABS	Absolute
ADC	Analog–Digital converter
AIE	Angular incremental encoder
AO	Analog output
ASCII	American Standard Code for Information Interchange
Available soon	Available soon: This feature is presently not available
CE	Controller enable
ChkCfg	Abbreviation for the configuration telegram (Check Config.): this is sent from the master to the slave when the establishing the bus
COM	Communications module
CPU	Central Processing Unit
CTS	Clear To Send: Signal that it is clear to send for serial data interfaces
DAC	Digital/Analog Converter
DAU	Digital/Analog Converter
DC link	DC link
DM	Direct measuring system (encoder 2)
DP	Distributed Periphery (I/O)
DPC31	DP controller with integrated 8031 core
DPMC1, DPMC2	DP master, Class 1 or Class 2
DPR	Dual port RAM
DRAM	Dynamic memory (non–buffered)
DRF	Differential Resolver Function
DRIVE ES Basic	Software, which is linked in to the HW Config engineering tool of SIMATIC S7 for a special slave.
DSC	Dynamic servo control
DSP	Digital Signal Processor
DSR	Dynamic Servo Control (DSC)

DSR	Data Send Ready: Signals that data is ready to be sent from the serial data interfaces
DXB	Data eXchange Broadcast: DXB request is a task (request) which initiates a slave (publisher) to send its actual values as broadcast
EMC	Electromagnetic Compatibility
EMF	Electromotive force
EnDat	Encoder–Data–Interface: Bidirectional synchronous–serial interface
EPROM	Program memory with fixed program
ESD	Modules/components that can be destroyed by electrostatic discharge
ET200	Peripheral devices (I/O) from the SIMATIC range which can be coupled via PROFIBUS
FD	Feed drive
FEPROM	Flash EPROM: Memory which can be read and written into
FFT	Fast Fourier Transformation
FG	Function generator
FIPO	Fine InterPOlator
FR+	Enable voltage +24 V
FR–	Reference for the enable voltage
GC	Global–Control–Telegramm (Broadcast–Telegramm)
GSD	Master device file: describes the features of a DP slave
Hardware	Hardware
HEX	Abbreviation for a hexadecimal number
HWE	Hardware limit switches
I	Input
IBN	Commissioning
Id	Field–generating current
IF	Pulse enable
IM	Induction motor without encoder (IM operation)
IM	Rotating induction motor
IM	Indirect measuring system (motor measuring system)
IND	Sub–index, sub–parameter number array index: Part of a PKW
IPO	Interpolator
Iq	Torque–generating current

I/R	Infeed/regenerative feedback module
Kv	Position loop gain (Kv factor)
LED	Light Emitting Diode
LSB	Least Significant Bit
MAV	Main actual value: Part of the PZD
MPI	Multi Point Interface: Multi–point serial interface
MS	Main setpoint: Part of the PZD
MSB	Most Significant Bit
MSCY_C1	Master Slave Cycle Class 1: Cyclic communications between the master (Class 1) and the slave
MSD	Main Spindle Drive
MSR	Dimension system grid: Smallest position unit
nact	Speed actual value
NC	Numerical Control
NE	Line supply infeed
NIL	Not in List
nset	Speed setpoint
O	Output
OC	Operating condition
OLP	Optical Link Plug Bus connector for fiber–optic cables
Order No. [MLFB]	Machine Readable Product Designation: Order No.
P	Parameter
PCMCIA	Personal Computer Memory Card International Association
PEH	Position reached and stop
PELV	Protective extra low voltage
PG	Programming device
PKE	Parameter identification: Part of a PKW
PKW	Parameter identification value: Parameterizing part of a PPO
PLC	Programmable logic controller
PLL	Phase Locked Loop: Module for clock cycle synchronous operation
PNO	PROFIBUS User Organization
PO	POWER ON

PosAnw	Position selection
PosZsw	Positioning status word
PPO	Parameter process data object: Cyclic data telegram when transferring data with PROFIBUS–DP and the ”variable–speed drives” profile
PRBS	Pseudo Random Binary Signal: White noise
PROFIBUS	Process Field Bus: Serial data bus
PTP	Point To Point
PWE	Parameter value: Part of a PKW
PWM	Pulse Width Modulation
PZD	Process data: Process data section of a PPO
RAM	Program memory which can be read and written into
REL	Relative
RF	Controller enable
RFG	Ramp–function generator
RO	Read Only
SERCOS	Standard bus system for drives
SetPrm	Abbreviation for the parameterizing telegram (set param): this is sent from the master to the slave when establishing the bus
SF	Shift factor
SLM	Synchronous linear motor
Software	Software
SPC3	Siemens PROFIBUS Controller 3
SRM	Rotating synchronous motor
SS	Interface
SSI	Synchronous serial interface
STS	Gating unit
STW	Control word: Part of a PZD
SWE	Software limit switch
Term.	Terminals
UI	Uncontrolled infeed
VDI	Verein Deutscher Ingenieure [Association of German Engineers]
VPM	VP module, module to limit the DC link voltage when a fault condition occurs (VPM: Voltage Protection Module)

Vpp	Peak–to–peak voltage
WZM	Machine tools
xact	Position actual value
xset	Position setpoint value
ZSW	Status word: Part of a PZD

■

B

Space for your notes

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C

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DS1	Current Control Loop
DÜ1	Monitoring Functions/Limits

/FBU/ SIMODRIVE **611 universal**
SIMODRIVE **611 universal E**
Description of Functions (10.04 Edition)
Order No.: 6SN1 197–0AB20–1BP1

/PFT5/ SIMODRIVE 611 (05.03 Edition)
Configuration Manual **Synchronous Servomotors 1FT5**
Order No.: 6SN1 197–0AD01–0BP0

/PFT6/ SIMODRIVE 611, MASTERDRIVES MC (01.04 Edition)
Configuration Manual **Synchronous Servomotors 1FT6**
Order No.: 6SN1 197–0AD02–0BP0

/PFK6/ SIMODRIVE 611, MASTERDRIVES MC (05.03 Edition)
Configuration Manual **Synchronous Servomotors 1FK6**
Order No.: 6SN1 197–0AD05–0BP0

/PFK7/ SIMODRIVE 611, MASTERDRIVES MC (01.03 Edition)
Configuration Manual **Synchronous Servomotors 1FK7**
Order No.: 6SN1 197–0AD06–0BP0

/PJAL/ SIMODRIVE 611 MASTERDRIVES MC (01.04 Edition)
Configuration Manual **Synchronous Servomotors**
General Section for 1FT/1FK Motors
Order No.: 6SN1 197–0AD07–0BP1

/PJAS/ SIMODRIVE 611, MASTERDRIVES VC/MC (06.04 Edition)
Configuration Manual **Induction Motors**
Contents: **General Section 1PH2, 1PH4, 1PH7, 1PL6**
Order No.: 6SN1 197–0AC61–0BP0

/PJFE/ SIMODRIVE (03.04 Edition)
Configuration Manual **Build–in Synchronous Motors 1FE1**
AC Motors for Main Spindle Drives
Order No.: 6SN1 197–0AC00–0BP5

/PJLM/ SIMODRIVE (06.02 Edition)
Configuration Manual **Linear Motors 1FN1, 1FN3**
ALL General Information on Linear Motors
1FN1 Linear Motors 1FN1
1FN3 Three–phase Linear Motors 1FN3
CON Connection System
Order No.: 6SN1 197–0AB70–0BP4

/PJM2/ SIMODRIVE 611, MASTERDRIVES MC (03.04 Edition)
Configuration Manual **Synchronous Servomotors**
Contents: **General Section, 1FT5, 1FT6, 1FK6, 1FK7, 1FS6**
Order No.: 6SN1 197–0AC20–0BP0

/PJTM/ SIMODRIVE (03.04 Edition)
Configuration Manual **Build–in Torque Motors 1FW6**
Order No.: 6SN1 197–0AD00–0BP1

/PJU/ SIMODRIVE (10.04 Edition)
Configuration Manual **Drive Converters**
Order No.: 6SN1 197–0AA00–0BP7

/PMS/ SIMODRIVE (03.04 Edition)
Configuration Manual **ECO Motor Spindles**
for Main Spindle Drives 2SP1
Order No.: 6SN1 197–0AD04–0BP1

/POS3/ SIMODRIVE **POSMO SI/CD/CA** (10.04 Edition)
User Manual
Order No.: 6SN2197–0AA20–0BP7

/POS4/ SIMODRIVE **POSMO SI** (08.03 Edition)
Installation Guide (included with every SIMODRIVE POSMO SI)
Order No.: A5E00282739 aa

/POS5/ SIMODRIVE **POSMO CD/CA** (08.03 Edition)
Installation Guide (included with every SIMODRIVE POSMO CD/CA)
Order No.: A5E00257954 aa

/PPM/ SIMODRIVE (11.01 Edition)
Configuration Manual
Hollow–Shaft Motors for Main Spindle Drives **1PM4 and 1PM6**
Order No.: 6SN1 197–0AD03–0BP0

/SP/ SIMODRIVE 611–A/611–D,
SimoPro 3.1
Program for Configuring Machine Tool Drives
Order No.: 6SC6 111–6PC00–0AA□
Ordering location: WK Fürth

/S7H/ SIMATIC S7–300 (2002 Edition)
Installation Manual **Technological Functions**
– Reference Manual: **CPU Data** (HW Description)
Order No.: 6ES7 398–8AA03–8AA0

/S7HT/ SIMATIC S7–300 (03.97 Edition)
Manual: STEP 7, **Fundamentals**, V. 3.1
Order No.: 6ES7 810–4CA02–8AA0

/S7HR/ SIMATIC S7–300 (03.97 Edition)
Manual: STEP 7, **Reference Manuals**, V. 3.1
Order No.: 6ES7 810–4CA02–8AR0

/ET200X/ **SIMATIC** (05.01 Edition)
Distributed ET 200X
Manual EWA 4NEB 780 6016–01 04
Part of the package with Order No.
6ES7 198–8FA01–8AA0

■

Certificates

D

Note

An excerpt is provided from the certification of the PROFIBUS User Organization e.V. and the certification of the ”Safe Standstill” function

The complete certification for the ”Safe standstill” function can be found as follows:

Reference: /PJU/ SIMODRIVE 611
Configuration Manual, Drive Converters

PROFI PROCESS FIELD BUS BUS

ZERTIFIKAT

Die PROFIBUS Nutzerorganisation e.V. erteilt der

Siemens AG, A&D MC E21
Frauenauracher Str. 80; D-91056 Erlangen
das Zertifikat Nr.: **Z00531**
für folgendes Produkt:

Name: **SIMODRIVE 611U MC, POSMO SI/CA/CD**
Modell: **Antrieb**
Version: **04.00; SW: V4.01**

Das Zertifikat bestätigt, daß das oben genannte Produkt die Prüfungen auf Konformität für PROFIBUS-DP Slave-Geräte erfolgreich bestanden hat.

Die Prüfungen erfolgten gemäß „Test Specifications for PROFIBUS-DP Slaves, Version 2.0 from February 2000“ in dem von der PNO autorisierten Prüflabor bei der Siemens AG in Fürth. Prüfumfang und Prüfergebnis sind im Prüfbericht Nr. 249-3 protokolliert.

Dieses Zertifikat wird erteilt aufgrund der PNO-Richtlinie für Prüfen und Zertifizieren (PRZ) vom 1.1.1993 und ist gültig für einen Zeitraum von 3 Jahren bis zum 08. August 2004.

Karlsruhe, den 23.08.2001

(Bearbeiter)

Der Vorstand der PROFIBUS Nutzerorganisation:

(Prof. K. Bender) (K.-P. Lindner)

Fig. D-1 Certificate, PROFIBUS

Fachausschuß Eisen und Metall II
Prüf- und Zertifizierungsstelle
im BG-PRÜFZERT

Hauptverband der gewerblichen
Berufsgenossenschaften

BG-Prüfbescheinigung

01007
Bescheinigungs-Nummer

Name und Anschrift des Bescheinigungsinhabers: (Auftraggeber)	Siemens AG Automatisierungs- und Antriebstechnik Frauenauracher Str. 80, D-91056 Erlangen
Name und Anschrift des Herstellers:	siehe oben

Zeichen des Auftraggebers:	Zeichen der Prüf- und Zertifizierungsstelle:	Ausstellungsdatum:
	612.17-EM II	28.09.2001

Produktbezeichnung:	Anlaufsperre für Antriebsregelgeräte		
Typ:	SIMODRIVE 611 U		
Bestimmungsgemäße Verwendung:	Verhinderung von unerwartetem Anlauf. Kraftlos schalten des Antriebs		
Prüfgrundlage:	DIN EN 60204-1	"Elektrische Ausrüstung von Maschinen-Teil 1: Allgemeine Anforderungen"	11.98
	DIN EN 954-1	Sicherheit von Maschinen - Sicherheitsbezogene Teile von Steuerungen Teil 1 - Allgemeine Gestaltungsleitsätze	03.97
	Nr. I	Grundsätze für die Prüfung und Zertifizierung von Be- und Verarbeitungsmaschinen	05.01
Bemerkungen:	Prüfbericht Nr.: 3012-4/01 Die Anlaufsperre für Antriebsregelgeräte genügt den Anforderungen von DIN EN 954-1, Kat. 3 und kann in Verbindung mit Maschinensteuerungen, die Kat. 3 genügen, eingesetzt werden.		

Das geprüfte Baumuster entspricht der oben angegebenen Prüfgrundlage.
Der Bescheinigungsinhaber ist berechtigt, das umseitig abgebildete BG-PRÜFZERT-Zeichen an den mit dem geprüften Baumuster übereinstimmenden Produkten anzubringen, und zwar mit dem unter 'Bemerkungen' genannten Hinweis.
Diese Bescheinigung wird spätestens ungültig am:

30.09.2006

Weiteres über die Gültigkeit, eine Gültigkeitsverlängerung und andere Bedingungen regelt die Prüf- und Zertifizierungsordnung vom Oktober 1997.

Unterschrift (Körner)

Postadresse:	Hausadresse:	
Postfach 37 80	Wilh Theodor-Römheld-Str. 15	Tel: 06131/802-0
55027 Mainz	55130 Mainz	Fax: 06131/802-220

PZB08
12.98

Fig. D-2 Certificate, ”Safe standstill” function (German, Zertifikat Funktion ”Sicherer Halt”)

D

Fachausschuß Eisen und Metall II
Prüf- und Zertifizierungsstelle
im BG-PRÜFZERT

Hauptverband der gewerblichen
Berufsgenossenschaften

Translation

BG Test Certificate

01007
no. of certificate

Name and address of the holder of the certificate: (customer)	Siemens AG Automatisierungs- und Antriebstechnik Frauenauracher Str. 80, D-91056 Erlangen
Name and address of the manufacturer:	see above

Ref. of customer:	Ref. of Test and Certification Body:	Date of Issue:
	612.17-EM II	28.09.2001

Product designation:	Anlaufsperre für Antriebsregelgeräte (Starting inhibit circuit for drives)
Type:	SIMODRIVE 611 U
Intended purpose:	Prevention of unexpected start-up. De-energizing of drives

Testing based on:	EN 60 204-1	„Electrical equipment of machines Part 1- General requirements"	1997
	EN 954-1	„Safety of machinery – Safety related parts of control systems – Part 1 General principles for design"	1996
	No. I	Test principles for the testing and certification of machine tools and processing machinery	05.01

Remarks: Test report no.: 3012-4/01
The starting inhibit circuit for drives is in compliance with the requirements of EN 954-1, cat. 3 and may be applied with category 3 machine control systems

The type tested complies with the test basis specified above.
The holder of the certificate is entitled to affix the BG-PRÜFZERT mark shown overleaf to the products complying with the type tested, including the specification given under the heading 'remarks'.
The present certificate will become invalid at the latest on:

30.09.2006

Further provisions concerning the validity, the extension of the validity and other conditions are laid down in the Rules of Procedure for Testing and Certification of October 1997.

....
Signature (Körner)

PZB08e
12.98

Postal adress:	Office:	Phone: 06131/802-0
Postfach 37 80	Wilh Theodor-Römheld-Str. 15	Fax: 06131/802-220
55027 Mainz	55130 Mainz	

In any case, the German original shall prevail.

Fig. D-3 Certificate, "Safe standstill" function (English)

EC Declaration of Conformity

Note

Attached is an excerpt from the EC Declaration of Conformity for SIMODRIVE 611 universal.

The complete EC Declaration of Conformity can be found as follows:

Reference: /EMC/ EMC Configuring Guidelines

SIEMENS

EG-Konformitätserklärung
EC Declaration of Conformity

No. E002 Version 02/01/10

Hersteller: *Manufacturer:* SIEMENS AG

Anschrift: *Address:* SIEMENS AG; A&D MC
Frauenauracherstraße 80
91056 Erlangen

Produkt-bezeichnung: *Product description*
SINUMERIK 802D, 802S, 805, 805SM-P, 805SM-TW, 810, 810D 820, 840C, 840CE, 840D, 840DE, 840Di, FM NC
SIMOTION C230, C230-2, P350
SIMATIC FM 353, FM 354, FM 357
SIROTEC RCM1D, RCM1P
SIMODRIVE 610, 611, MCU, FM STEPDRIVE, POSMO A / SI / CA / CD

Die bezeichneten Produkte stimmen in den von uns in Verkehr gebrachten Ausführungen mit den Vorschriften folgender Europäischer Richtlinie überein:

The products described above in the form as delivered is in conformity with the provisions of the following European Directives:

89/336/EWG Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit
(geändert durch 91/263/EWG, 92/31/EWG, 93/68/EWG und 93/97/EWG).

Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility (amended by 91/263/EEC, 92/31/EEC, 93/68/EEC and 93/97/EEC).

Die Einhaltung dieser Richtlinie setzt einen EMV-gerechten Einbau der Produkte gemäß EMV-Aufbau-richtlinie für SINUMERIK, SIROTEC, SIMODRIVE (Best. Nr. 6FC 5297-0AD30-0AP0) in die Gesamtanlage voraus. Anlagenkonfigurationen, bei der die Einhaltung dieser Richtlinie nachgewiesen wurde, sowie angewandte Normen, siehe:

For keeping the directive, it is required to install the products according to "EMC Mounting regulation for SINUMERIK, SIROTEC, SIMODRIVE" (Order No. 6FC 5297-0AD30-0BP0). For details of the system configurations, which meet the requirements of the directives, as well as for the standards applied see:

- **Anhang A (Anlagenkonfigurationen)** - *Annex A (system configurations)* : **Version 02/01/10**
- **Anhang B (Komponenten)** - *Annex B (components)* : **Version 00/01/14**
- **Anhang C (Normen)** - *Annex C (standards)* : **Version 00/11/27**

Erlangen, den / *the* 10.01.2002

Siemens AG

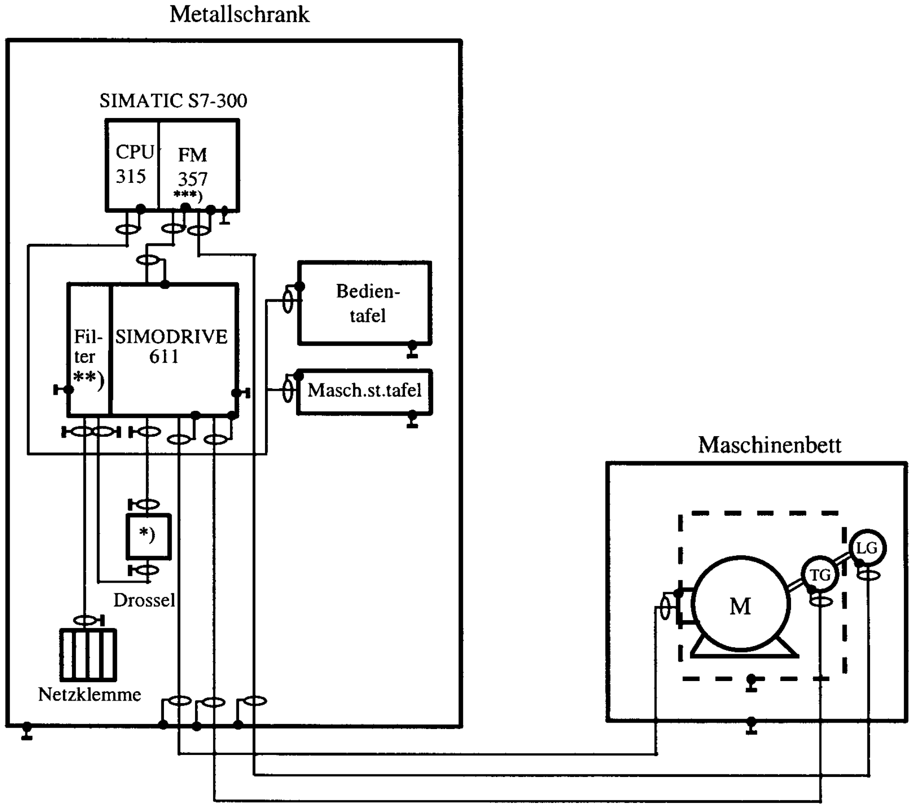
R. Müller Entwicklungsleitung	K. Krause Qualitätsmanagement
Name, Funktion / *Name, function* — Unterschrift / *signature*	Name, Funktion / *Name, function* — Unterschrift / *signature*

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften.
Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity to the specified directives but contains no assurance of properties.
The safety documentation accompanying the product shall be considered in detail.

Fig. D-4 EC Declaration of Conformity

Anhang A zur EG-Konformitätserklärung Nr. E002

**A17: Typische Anlagenkonfiguration
SIMODRIVE 611 mit Regelungseinschub SIMODRIVE 611U (universal) und
SIMATIC FM 357 (SINUMERIK FM NC)**



*) bei E/R-Modul und UE-Modul 28kW
**) Filter im Modulverband oder separat
***) oder FM NC

- Alle Komponenten, die gemäß Bestellunterlage für den Anlagenverbund von SIMODRIVE 611 zugelassen sind, erfüllen im Verbund die Richtlinie 89/336/EWG
- Normenkonformität siehe Anhang C

Hinweis:

In der Skizze der Anlagenkonfiguration werden nur die grundsätzlichen Maßnahmen zur Einhaltung der Richtlinie 89/336/EWG einer typischen Anlagenkonfiguration aufgezeigt. Zusätzlich, besonders bei Abweichung von dieser Anlagenkonfiguration, sind die Installationshinweise für EMV-gerechten Anlagenaufbau der Produktdokumentation und der EMV-Aufbaurichtlinie für SINUMERIK; SIROTEC, SIMODRIVE (Bestell Nr.:6FC 5297-0AD30-0APX) zu beachten.

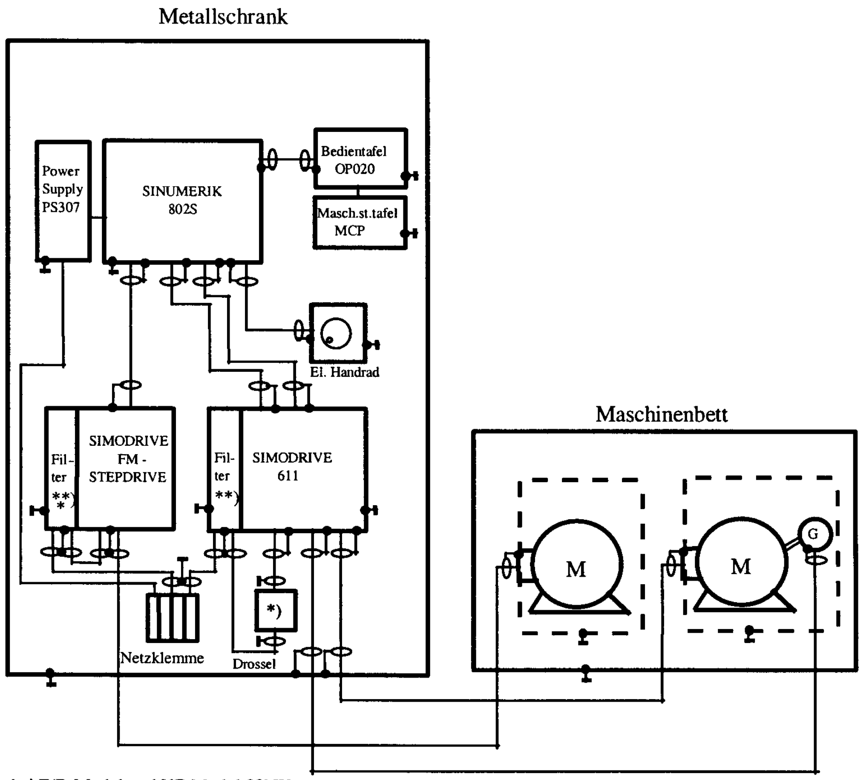
 Version 02/01/10
konf/erkl/002/anh_a A-17/23

Fig. D-5 Annex A17 to the Declaration of Conformity (excerpt)

D

Anhang A zur EG-Konformitätserklärung Nr. E002

A18: Typische Anlagenkonfiguration
SINUMERIK 802S und SIMODRIVE 611 mit Regelungseinschub
SIMODRIVE 611U ECOLINE



*) bei E/R-Modul und UE-Modul 28kW
**) Filter im Modulverband oder separat
**) entfällt bei STEPDRIVE C/C+

- Alle Komponenten, die gemäß Bestellunterlage für den Anlagenverbund von SINUMERIK 802S zugelassen sind, erfüllen im Verbund die Richtlinie 89/336/EWG
- Normenkonformität siehe Anhang C

Hinweis:

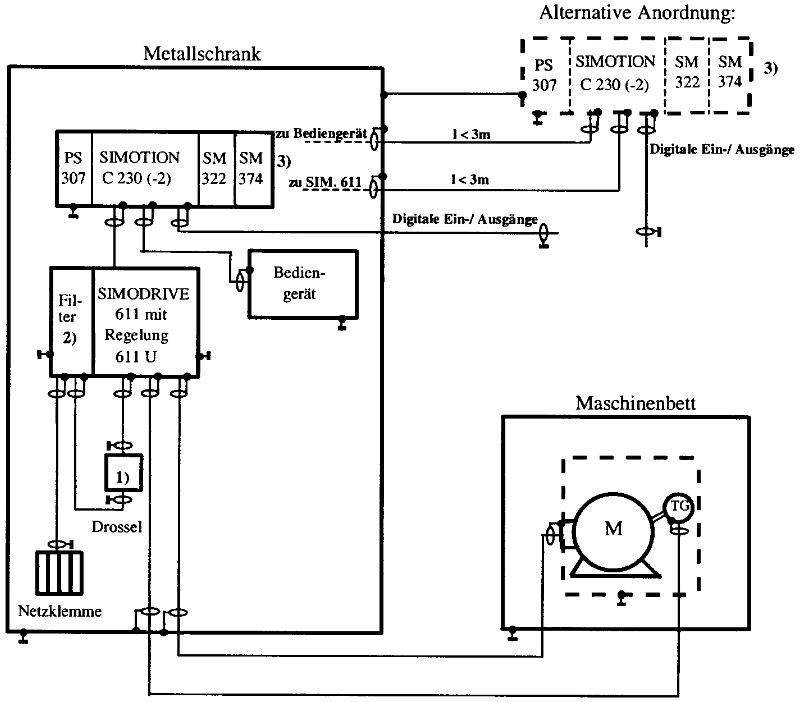
In der Skizze der Anlagenkonfiguration werden nur die grundsätzlichen Maßnahmen zur Einhaltung der Richtlinie 89/336/EWG einer typischen Anlagenkonfiguration aufgezeigt. Zusätzlich, besonders bei Abweichung von dieser Anlagenkonfiguration, sind die Installationshinweise für EMV-gerechten Anlagenaufbau der Produktdokumentation und der EMV-Aufbaurichtlinie für SINUMERIK; SIROTEC, SIMODRIVE (Bestell Nr.:6FC 5297-0AD30-0APX) zu beachten.

 Version 02/01/10
konf/erkl/002/anh_a A-18/23

Fig. D-6 Annex A18 to the Declaration of Conformity (excerpt)

Anhang A zur EG-Konformitätserklärung Nr. E002

A21: Typische Anlagenkonfiguration
SIMOTION C230 und C230-2 / SIMODRIVE 611 mit Regelung 611U



1) bei E/R-Modul und UE-Modul 28kW
2) Filter im Modulverband oder separat
3) Bei Verwendung von SIMOTION C230 / C230-2 und Nachfolgekomponenten ist die Anordnung der Komponenten auch außerhalb des Schrankes zulässig (Leitungslänge zwischen Schrank und externen Komponenten < 3m).

- Alle Komponenten, die gemäß Bestellunterlage für den Anlagenverbund von SIMOTION C 230 / C230-2 zugelassen sind, erfüllen im Verbund die Richtlinie 89/336/EWG
- Normenkonformität siehe Anhang C

Hinweis:

In der Skizze der Anlagenkonfiguration werden nur die grundsätzlichen Maßnahmen zur Einhaltung der Richtlinie 89/336/EWG einer typischen Anlagenkonfiguration aufgezeigt. Zusätzlich, besonders bei Abweichung von dieser Anlagenkonfiguration, sind die Installationshinweise für EMV-gerechten Anlagenaufbau der Produktdokumentation und der EMV-Aufbaurichtlinie für SINUMERIK; SIROTEC, SIMODRIVE (Bestell Nr.:6FC 5297-0AD30-0APX) zu beachten.

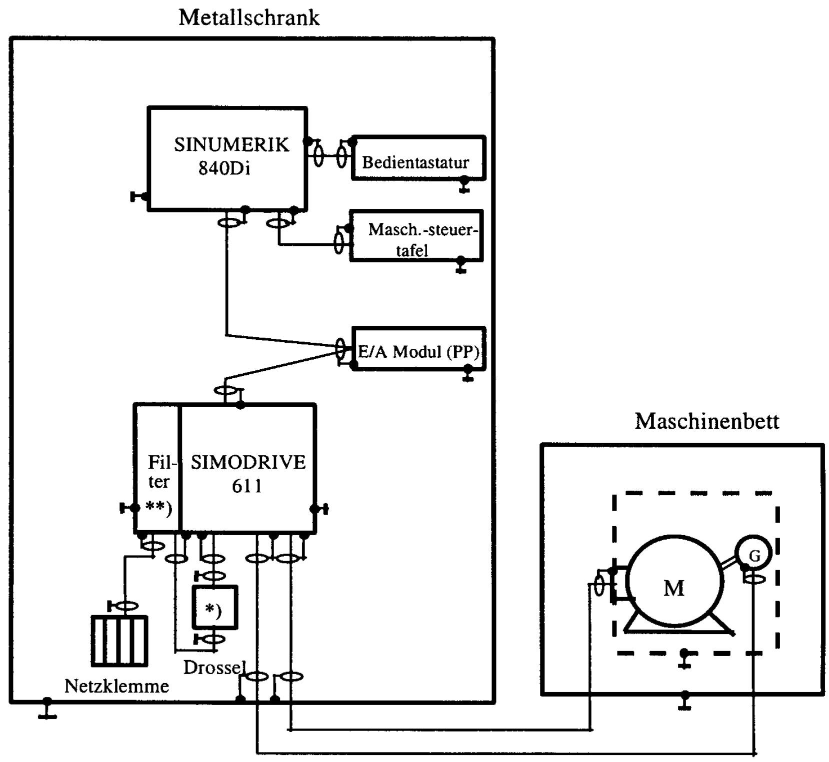
 Version 02/01/10
konf/erkl/002/anh_a A-21/23

Fig. D-7 Annex A21 to the Declaration of Conformity (excerpt)

D

Anhang A zur EG-Konformitätserklärung Nr. E002

A22: Typische Anlagenkonfiguration
SINUMERIK 840Di mit SIMODRIVE 611 mit Regelung SIMODRIVE 611U



*) bei E/R-Modul und UE-Modul 28kW
**) Filter im Modulverband oder separat

- Alle Komponenten, die gemäß Bestellunterlage für den Anlagenverbund von SIMODRIVE 611 mit Regelung 611U zugelassen sind, erfüllen im Verbund die Richtlinie 89/336/EWG
- Normenkonformität siehe Anhang C

Hinweis:

In der Skizze der Anlagenkonfiguration werden nur die grundsätzlichen Maßnahmen zur Einhaltung der Richtlinie 89/336/EWG einer typischen Anlagenkonfiguration aufgezeigt. Zusätzlich, besonders bei Abweichung von dieser Anlagenkonfiguration, sind die Installationshinweise für EMV-gerechten Anlagenaufbau der Produktdokumentation und der EMV-Aufbaurichtlinie für SINUMERIK; SIROTEC, SIMODRIVE (Bestell Nr.:6FC 5297-0AD30-0APX) zu beachten.

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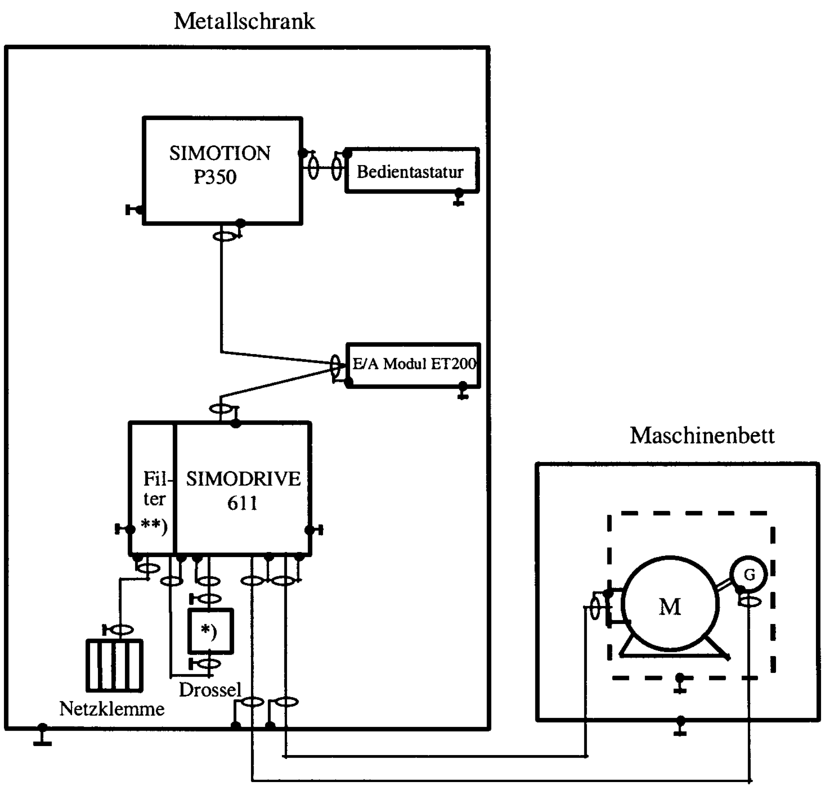
Fig. D-8 Annex A22 to the Declaration of Conformity (excerpt)

Anhang A zur EG-Konformitätserklärung Nr. E002

A23: Typische Anlagenkonfiguration
SIMOTION P350 / SIMODRIVE 611 mit Regelung SIMODRIVE 611U



*) bei E/R-Modul und UE-Modul 28kW
**) Filter im Modulverband oder separat

- Alle Komponenten, die gemäß Bestellunterlage für den Anlagenverbund von SIMOTION P350 zugelassen sind, erfüllen im Verbund die Richtlinie 89/336/EWG
- Normenkonformität siehe Anhang C

Hinweis:

In der Skizze der Anlagenkonfiguration werden nur die grundsätzlichen Maßnahmen zur Einhaltung der Richtlinie 89/336/EWG einer typischen Anlagenkonfiguration aufgezeigt. Zusätzlich, besonders bei Abweichung von dieser Anlagenkonfiguration, sind die Installationshinweise für EMV-gerechten Anlagenaufbau der Produktdokumentation und der EMV-Aufbaurichtlinie für SINUMERIK; SIROTEC, SIMODRIVE (Bestell Nr.:6FC 5297-0AD30-0APX) zu beachten.

 Version 02/01/10
konf/erkl/002/anh_a A-23/23

Fig. D-9 Annex A23 to the Declaration of Conformity (excerpt)

D

Annex C to the EC Declaration of Conformity No. E002

Die Übereinstimmung der Produkte mit der Richtlinie des Rates 89 / 336 / EWG inklusive Änderungen 91 / 263 / EWG, 92 / 31 / EWG, 93 / 68 / EWG und 93 / 97 / EWG wurde durch Überprüfung gemäß nachfolgender Produktnorm, Fachgrundnormen und der darin aufgelisteten Grundnormen nachgewiesen. Für die Produktkategorien SINUMERIK, SIMOTION, SIMATIC, SIROTEC und SIMODRIVE gelten unterschiedliche Normenanforderungen.

C1 Produktkategorie SINUMERIK (außer 810D), SIMOTION, SIMATIC, SIROTEC:

Fachgrundnorm Störaussendung / Industriebereich: EN 50081-2 1)

Grundnormen:	Prüfthema:
EN 55011 + A1 + Bbl. 1	2) Funkstörungen

Fachgrundnorm Störfestigkeit / Industriebereich: EN 61000-6-2 3)

Grundnormen:	Prüfthema:
EN 61000-4-2 + A1	4) Statische Entladung
EN 61000-4-3 +A1	5) Hochfrequente Einstrahlung (amplitudenmoduliert)
EN 61000-4-4	6) Schnelle Transienten (Burst)
EN 61000-4-6	7) HF-Bestromung auf Leitungen
EN 61000-4-8	8) Magnetfelder mit energietechnischen Frequenzen
EN 61000-4-11	9) Spannungseinbrüche und Spannungsunterbrechungen

C2 Produktkategorie SIMODRIVE, SINUMERIK 810D:

Produktnorm:	Prüfthema:
EN 61800-3 + A11	10) Drehzahlveränderbare elektrische Antriebe; EMV-Produktnorm einschließlich spezieller Prüfverfahren

C3 Miterfüllte Normen:

1)	VDE 0839 Teil 81-2	6)	VDE 0847 Teil 4-4 IEC 61000-4-4
2)	VDE 0875 Teil 11 + Bbl. 1 IEC / CISPR 11 + A1 + 28	7)	VDE 0847 Teil 4-6 IEC 61000-4-6
3)	VDE 0839 Teil 6-2 IEC 61000-6-2	8)	VDE 0847 Teil 4-8 IEC 61000-4-8
4)	VDE 0847 Teil 4-2 +A1 IEC 61000-4-2 + A1	9)	VDE 0847 Teil 4-11 IEC 61000-4-11
5)	VDE 0847 Teil 4-3 IEC 61000-4-3 + A1	10)	VDE 0160 Teil 100 IEC 61800-3

 Version 00/11/27

konf/erkl/002/anh_c C-1/1

Fig. D-10 Annex C to the EC Declaration of Conformity (excerpt)

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To SIEMENS AG A&D MC BMS Postfach 3180 D–91050 Erlangen Tel./Fax: +49 (0)180 / 5050 – 222 [Hotline] Fax: +49 (0)9131 / 98 – 2176 email: motioncontrol.docu@erlf.siemens.de	**Suggestions** **Corrections** For Publication/Manual: SIMODRIVE 611 universal SIMODRIVE 611 universal E Control Components for Closed–Loop Speed Control and Positioning Manufacturer/Service Documentation
From Name Company/Department Address Postal code: City: Telephone: / Telefax: /	Description of Functions Order No.: 6SN1197–0AB20–1BP2 Edition: 04.05 Should you notice any printing errors when reading this publication, please notify us on this sheet. Suggestions for improvement are also welcome.

Suggestions and/or corrections

Overview of Documentation for SIMODRIVE 611 universal

General Documentation

SINUMERIK
SIMODRIVE

Catalog NC 60 • 2002
Automation Systems for Processing Machines

Catalog DA 65.4 • 2001
SIMODRIVE 611 universal and POSMO

SINUMERIK
SIROTEC
SIMODRIVE
Options

SL 01 System Solutions

IKPI Industrial Communications and Field Devices

CA 01 Components for Automation & Drives

Catalog

KT 10.1 Power Supplies SITOP power
ST 70 SIMATIC
ST 80 SIMATIC HMI

Manufacturer/Service Documentation

SIMODRIVE
611

Configuration Manual

Drive Converters

SIMODRIVE

Configuration Manual

AC Servomotors

1FT5, 1FT6, 1FK6, 1FK7

SIMODRIVE

Configuration Manual

AC Induction Motors for Main Spindle Drives

1PH2, 1PH4, 1PH7

SIMODRIVE

Configuration Manual

Hollow–Shaft Motors for Main Spindle Drives

1PM6 and 1PM4

Manufacturer/Service Documentation

SIMODRIVE

Configuration Manual

AC Motors for Main Spindle Drives

Synchronous Build–in Motors 1FE1

SIMODRIVE

Configuration Manual

Linear Motors
1FN1, 1FN3

SINUMERIK
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EMC Design Guidelines

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SIMODRIVE
611 universal

Description of Functions

SIMODRIVE 611 universal
SIMODRIVE 611 universal E

Control Components for Closed–Loop Speed Control and Positioning

Electronic Documentation

SINUMERIK
SIMODRIVE
840D/810D/
FM–NC/611/
Motors

DOC ON CD

The SINUMERIK System

SINUMERIK
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840C

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