

SIMATIC

Distributed I/O System ET 200S

Operating Instructions



The following supplement is part of this documentation:

No.	Product Information	Drawing number	Edition
1	Use of subassemblies/modules in a Zone 2 Hazardous Area	A5E00352937-03	12/2006
2	Wiring the interface module with PROFINET I/O interface (electrical)	A5E00734296-02	01/2006
3	General corrections; Analog Electronic Modules 2 AI U HS, 2 AI/2/4 WIRE HF, 2 AO U HF	A5E00743001-02	12/2006
4	Mounting Color Identification Labels; Wiring an IM with PROFINET IO interface; Response times	A5E00784327-01	06/2006
5	IM 151-3 PN FO (6ES7151-3BB21-0AB0)	A5E00903188-01	08/2006
6	Elektronic module 8DI / 8DO (6ES7131-4BF00-0AA0 / 6ES7132-4BF00-0AA0)	A5E00847859-01	09/2006
7	Cycle synchronization and Option handling on the PROFIBUS DP IM 151-1 HIGH FEATURE (6ES7151-1BA02-0AB0)	A5E00744801-01	12/2006

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Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.



Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.



Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.



Caution

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:



Warning

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

Purpose of the manual

The information in this manual is intended to enable you to operate the ET 200S Distributed I/O System

- on the PROFIBUS DP as DP Slave
- as a PROFINET IO device on PROFINET

Required level of knowledge

To understand this manual, you should have general experience in the field of automation engineering.

Manual's Range of Validity

This manual applies to the *order numbers* for the components of the ET 200S distributed I/O system as specified in the appendix.

This manual contains a description of the components which were valid at the time the manual was published. We reserve the right to enclose a Product Information bulletin containing up-to-date information regarding new components and new versions of components.

Changes in comparison to the previous version

The following changes/additions have been made since the previous version of the manual:

- IM151-3 PN HIGH FEATURE included
- Potential distributor module 4POTDIS included

Approvals

See chapter *Technical data > Standards and certifications*.

CE certification

See chapter *Technical data > Standards and certifications*.

Certification Mark for Australia (C-Tick Mark)

See chapter *Technical data > Standards and certifications*.

Standards

See chapter *Technical data > Standards and certifications*.

Position in the information landscape

The following table shows a summary of the manuals for the ET 200S:

Manual	Table of Contents
ET 200S Distributed I/O System (operating instructions)	<ul style="list-style-type: none"> • Installing and wiring ET 200S • Commissioning and diagnostics of ET 200S • Functions • Technical specifications of <ul style="list-style-type: none"> – Interface modules – COMPACT modules • Order numbers for the ET 200S
ET 200S Distributed I/O System (manual)	<ul style="list-style-type: none"> • Technical specifications of <ul style="list-style-type: none"> – Terminal modules – Power modules – Digital electronic modules – Analog electronic modules – 4 IQ-SENSE
SIMATIC ET 200S motor starters Fail-safe motor starters Safety-Integrated SIGUARD System	<ul style="list-style-type: none"> • Installing and wiring of motor starters • Commissioning and diagnostics of motor starters • Technical specifications of motor starters • Fail-safe motor starters • Safety-Integrated SIGUARD System • Order numbers for motor starters
PROFINET System Description	<ul style="list-style-type: none"> • Basic principles of PROFINET • Network components and structures • Data exchange and communication • PROFINET engineering
From PROFIBUS DP to PROFINET IO	<ul style="list-style-type: none"> • Differences • Blocks • System status lists • Diagnostics
ET 200S interface module IM151-7 CPU and Operations List	<ul style="list-style-type: none"> • Addressing of IM151-7 CPU • ET 200S with IM151-7 CPU in the PROFIBUS network • Commissioning and diagnostics of IM151-7 CPU • Technical specifications of the IM151-7 CPU
ET 200S FC Frequency Converter Operating Instructions	<ul style="list-style-type: none"> • Installation • Commissioning • Control and regulation techniques • Protection and monitoring functions • Technical specifications
ET 200S FC Frequency Converter List Manual ²	<ul style="list-style-type: none"> • Parameter list • Function block diagrams • Alarm and fault messages

Manual	Table of Contents
Positioning ET 200S	<ul style="list-style-type: none"> • 1STEP 5 V/204 kHz • 1POS INC/Digital • 1POS INC/Analog • 1POS SSI/Digital • 1POS SSI/Analog • 1POS UNIVERSAL/Digital
Technological Functions ET 200S	<ul style="list-style-type: none"> • 1COUNT 24 V/100 kHz • 1COUNT 5 V/500 kHz • 1SSI • 2PULSE
Serial Interface Modules ET 200S	<ul style="list-style-type: none"> • 1SI 3964/ASCII • 1SI MODBUS/US\$
Fail-safe Modules	<ul style="list-style-type: none"> • 4/8 F-DI 24 VDC PROFIsafe • 4 F-DO DC24/2A PROFIsafe
Weighing technology for the ET 200S	<ul style="list-style-type: none"> • SIWAREX CS ¹ <ul style="list-style-type: none"> – Hardware design and installation – Weighing functions – Instructions – Reports and diagnostics – Programming with <i>STEP 7</i> • SIWAREX CS ² <ul style="list-style-type: none"> – Hardware design and installation – Measuring function – Programming with <i>STEP 7</i>
<p>The manuals are available on the Internet in German, English, French, Spanish and Italian (see Service & Support on the Internet).</p> <p>¹ only German, English and French</p> <p>² only German and English</p>	

Guide

The manual contains the following guides which provide quick access to the specific information you need:

- At the beginning of the manual you will find a complete table of contents and a list of the figures and tables that appear in the manual.
- A heading indicating the contents of each section is provided in the left-hand column on each page of each chapter.
- Following the appendix, you will find a glossary in which important technical terms used in the manual are defined.
- Finally, a comprehensive index allows quick access to information on specific subjects.

Special note

In addition to this manual you also need the manual of your DP master or PROFINET IO controller.

Note

You will find a detailed listing of the contents of the ET 200S manuals in the preface to these operating instructions under "Position in the information landscape". We recommend that you begin by reading this section so as to find out which parts of which manuals are most relevant to you in helping you to do what you want to do.

Recycling and disposal

Thanks to the fact that it is low in contaminants, the ET 200S is recyclable. For environmentally compliant recycling and disposal of your electronic waste, please contact a company certified for the disposal of electronic waste.

Contacts

See product information *Technical Support, Contacts and Training*.

You will find information on this in the product information on the intranet at:

<http://www.siemens.com/automation/service>

Search for the entry with the number 19293011.

Training

See product information *Technical Support, Contacts and Training*.

SIMATIC Technical Support

See product information *Technical Support, Contacts and Training*.

Service & Support on the Internet

See product information *Technical Support, Contacts and Training*.

See also

Order numbers for ET 200S accessories (Page A-5)

Order numbers for ET 200S network components (Page A-6)

Order numbers for ET 200S spare parts (Page A-7)

Order numbers for connecting cables for 4 IQ-SENSE electronic module (Page A-7)

Standards and approvals (Page 9-1)

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Description

1.1 What are distributed I/O systems?

Distributed IO systems

When a system is set up, it is common for the inputs to and outputs from the process to be incorporated centrally in the automation system.

If the inputs/outputs are located at greater distances from the automation system, the wiring can become very extensive and complex, and electromagnetic interference can impair reliability.

Distributed I/O systems are suitable for these types of installations:

- The controller CPU is located centrally.
- The I/O systems (inputs and outputs) operate decentrally on-site
- The powerful PROFIBUS DP with its high data transmission rates ensures smooth communication between the controller CPU and the I/O systems.

What is PROFIBUS DP?

PROFIBUS DP is an open bus system based on *IEC 61784-1:2002 Ed1 CP 3/1* with the "DP" transmission protocol (DP stands for distributed peripherals).

Physically, PROFIBUS DP is either an electrical network based on a shielded two-wire line or an optical network based on a fiber-optic cable.

The "DP" transmission protocol enables a rapid, cyclic exchange of data between the controller CPU and the distributed I/O systems.

What is a DP master and what are DP slaves?

The DP master links the controller CPU with the distributed I/O systems. The DP master exchanges data with the distributed I/O systems via PROFIBUS DP and monitors the PROFIBUS DP.

The distributed I/O systems (= DP slaves) prepare the sensor and actuator data on-site so that they can be transmitted to the controller CPU via PROFIBUS DP.

Which devices can be connected to PROFIBUS DP?

An extremely wide range of devices can be connected on the PROFIBUS DP as a DP master or as DP slaves, provided their behavior complies with the *IEC 61784-1:2002 Ed1 CP 3/1* standard. Devices of the following product families that can be used include:

- SIMATIC S7/C7
- SIMATIC PD/PC
- SIMATIC HMI (operator panel (OP), operator station (OS), and text display (TD) operator control and monitoring devices)
- Devices from other manufacturers

Structure of a PROFIBUS DP network

The figure below illustrates a typical PROFIBUS DP network structure. The DP masters are integrated in the relevant device. For example, the S7-400 has a PROFIBUS DP interface. The DP slaves are the distributed I/O systems, which are connected to the DP masters by means of PROFIBUS DP.

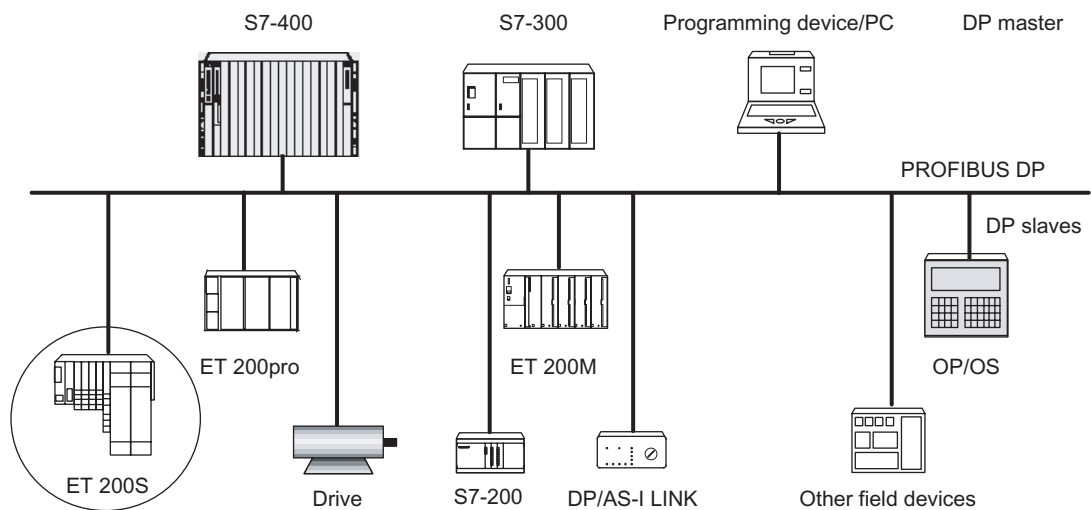


Figure 1-1 The typical structure of a PROFIBUS DP network

1.2 What is PROFINET IO?

Definition

PROFINET IO is an open transmission system with real-time functionality defined in accordance with the PROFINET standard. This standard defines a manufacturer-independent communication, automation and engineering model.

Accessories for wiring the PROFINET components are available in industrial quality.

- PROFINET does not deploy the hierarchical PROFIBUS master/slave principle. A provider/consumer principle is used instead. The planning process specifies which modules of an IO device will be subscribed to an IO controller.
- The data volume has been extended to 256 bytes.
- The transmission rate amounts to 100 Mbps full duplex.
- The user's configuration interface is generally the same as that on PROFIBUS DP (configuration in STEP7 → HW CONFIG.)
- Possibility of structuring a linear network structure
- Switch functionality

Structure of a PROFINET IO network

The figure below illustrates the typical layout of a PROFIBUS DP network. Existing PROFIBUS slaves can be integrated by using an IE/PB link.

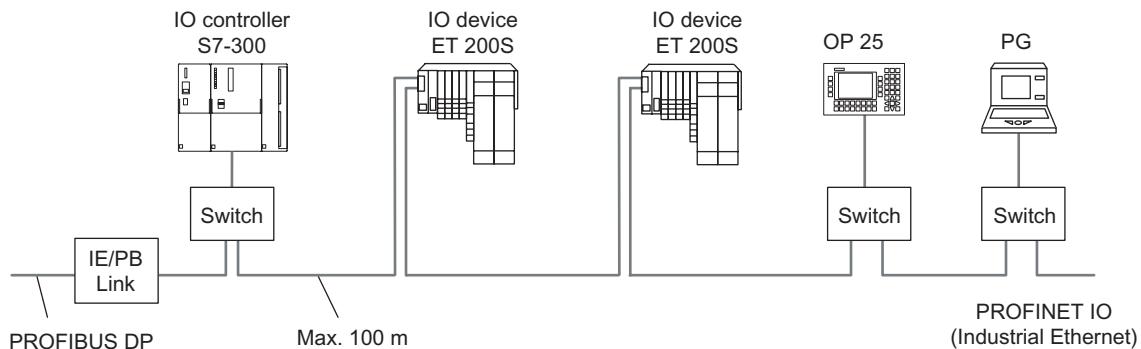


Figure 1-2 Typical structure of a PROFINET IO network

Further information about structuring a PROFINET IO network is available in the *PROFINET System Description* system manual.

1.3 What is the ET 200S distributed I/O system?

Definition

The ET 200S distributed I/O system is a discretely modular, highly flexible DP slave for connection to process signals on a central controller or a field bus. ET 200S supports field bus types PROFIBUS DP and PROFINET IO. ET 200S has protection class IP 20.

Applications

You can connect virtually any number of I/O modules in virtually any combination right next to the interface module that transfers the data to the central controller. You can thus set the focus of your configuration on local requirements.

Depending on the interface module, each ET 200S can consist of up to 63 modules - for example, power modules, I/O modules, and motor starters.

The fact that motor starters can be integrated (switching and protecting any three-phase load up to 7.5 kW) ensures that the ET 200S can be quickly adapted to suit virtually any process-related use of your machine.

The fail-safe modules of the ET 200S ensure the fail-safe reading and output of data to safety category 4 (EN 954-1)

Terminal modules and electronic modules

The ET 200S distributed I/O system is

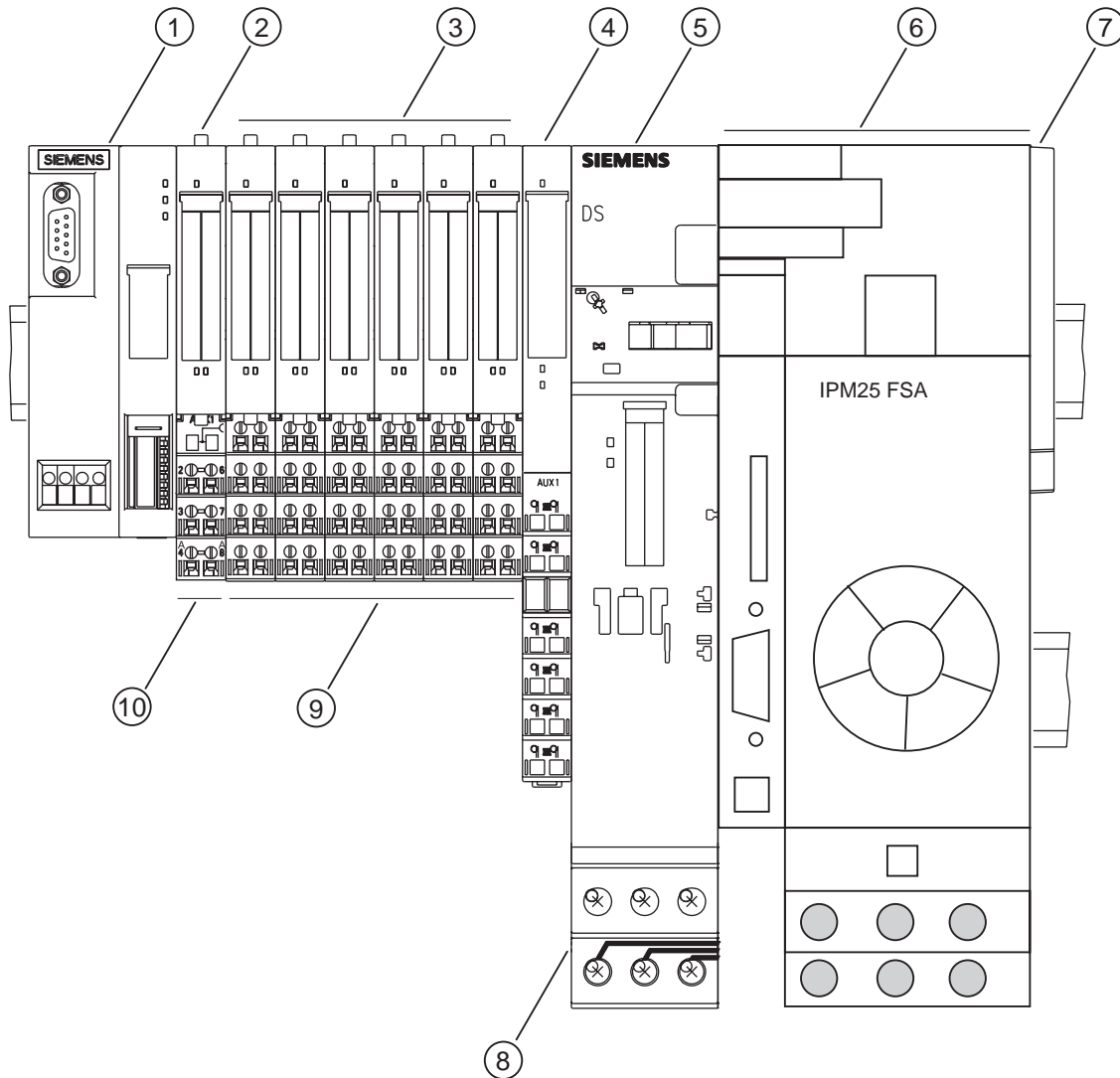
- Connected to PROFIBUS DP by means of a cable connector for PROFIBUS DP at the IM151-1 or 1M151-1 COMPACT interface module and
- Connected to PROFINET IO at the IM151-3PN interface module by a plug connector for PROFINET IO

Every ET 200S peripheral system is

- A DP slave on the PROFIBUS DP or
- An IO device on the PROFINET IO.

View

The figure below shows an example configuration of an ET 200S.




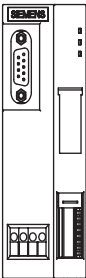
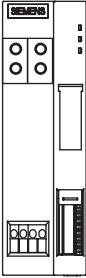
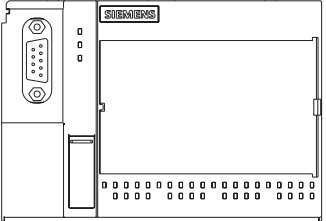
- ① ET 200S interface module IM151-1
- ② PM-E power module for electronic modules
- ③ Electronic modules
- ④ Power module for PM-D motor starters
- ⑤ Direct starter
- ⑥ Frequency converter
- ⑦ Terminating module
- ⑧ Power bus
- ⑨ TM-E terminal modules for electronics modules
- ⑩ TM-P terminal modules for power modules

1.3 What is the ET 200S distributed I/O system?

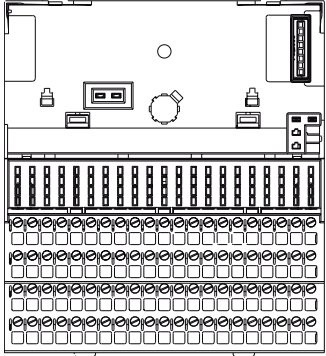
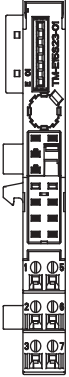
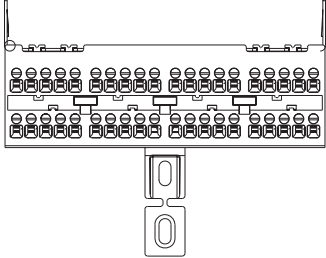

ET 200S components

The following table provides you with an overview of the most important components of the ET 200S:

Table 1-1 ET 200S components



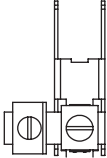
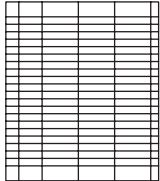

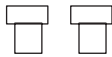
Components	Function	View
DIN rail according to EN 50022	...carries the ET 200S. You mount the ET 200S on the rail.	
Interface module <ul style="list-style-type: none"> • IM151-1 BASIC • IM151-1 STANDARD • IM151-1 HIGH FEATURE 	...connects the ET 200S with the DP master and prepares the data for the electronic modules and motor starters.	with RS485 interface: 
<ul style="list-style-type: none"> • IM151-1 FO STANDARD 		with fiber-optic interface: 
COMPACT modules <ul style="list-style-type: none"> • IM151-1 COMPACT 32DI 24 VDC • IM151-1 COMPACT 16DI/16DO 24 VDC/0.5 A 	...connects the ET 200S with the DP master and prepares the data for the integrated peripherals as well as for any electronic modules and motor starters.	with RS485 interface: 

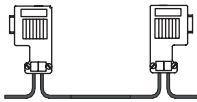
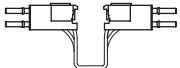
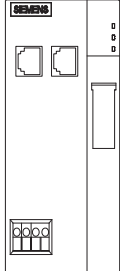
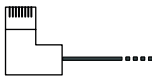
1.3 What is the ET 200S distributed I/O system?

Components	Function	View
Terminal module for COMPACT modules	...carries the wiring and accommodates COMPACT modules. Terminal modules versions available: <ul style="list-style-type: none"> • With screw-type terminal • With spring-loaded terminal 	
Terminal module for power and electronic modules	...provides the electrical and mechanical connection to the ET 200S module. Terminal modules versions available: <ul style="list-style-type: none"> • For power modules • For electronic modules • With screw-type terminal • With spring-loaded terminal • With Fast Connect (quick connection method, no stripping required) 	
Additional terminal for <ul style="list-style-type: none"> • Terminal module for COMPACT modules • Any terminal modules with a width of 120 mm 	...extends the terminal block and enables the connection of sensors / actuators for the individual channels in 3 or 4 conductor technology Additional terminals are available in the following variants: <ul style="list-style-type: none"> • With screw-type terminal • With spring-loaded terminal 	
Power module	...monitors the voltage for all the electronic modules in the voltage group. The following power modules are available: <ul style="list-style-type: none"> • For a 24 VDC supply with diagnostics • For a 24 VDC supply with diagnostics • For a 24 VDC to 48 VDC, 24 VAC to 230 VAC supply with diagnostics and fuse 	

Description

1.3 What is the ET 200S distributed I/O system?

Components	Function	View
Electronic module	<p>...is inserted onto the terminal module and determines the function:</p> <ul style="list-style-type: none"> • Digital output modules with 24 VDC, 120 /230 VAC and NAMUR • Digital output modules with 24 VDC and 120/230 VAC • Relay modules • Analog input modules with voltage, current, and resistance measurement, thermoresistor and thermocouple elements • Analog output modules for voltage and current • Technological modules • Weighing modules SIWAREX CS and SIWAREX CF • Fail-safe modules • RESERVE modules 	
Terminating module	<p>...terminates the ET 200S and can be used to carry 6 reserve fuses (5 mm x 20 mm).</p>	
Shield contact	<p>...is a pluggable mount for 3 x 10 mm standard power busbars and enables a low-impedance cable shielding to be applied with minimal installation time.</p>	
Labeling sheet (DIN A4, perforated, foil)	<p>...for machine labeling or printing</p> <ul style="list-style-type: none"> • 80 strips per labeling sheet for interface modules and electronic modules • 10 strips per labeling sheet for COMPACT modules 	
Slot number plates	<p>...used to identify the slots of the terminal module.</p>	
Color identification labels	<p>...permit customer- and country-specific identification of the terminals on the terminal module</p>	

Components	Function	View
PROFIBUS cable with bus terminal connector	... connects nodes of a PROFIBUS DP configuration with one another.	
Fiber-optic duplex cable with simplex plug (in the plug adaptor for IM151- 1 FO STANDARD)	... connects nodes of a PROFIBUS DP configuration with one another.	
Interface module <ul style="list-style-type: none"> IM151-3 PN IM151-3 PN HIGH FEATURE 	...connects the ET 200S with PROFINET IO controllers and prepares the data for the electronic modules and motor starters.	With 2 PROFINET interfaces: 
PROFINET connector as per the specifications in the <i>PROFINET Installation Guide</i> and Industrial Ethernet FC installation lines	... connects nodes of a PROFIBUS IO configuration with one another.	

Characteristics and advantages of the ET 200S

The table below presents the properties and benefits of ET 200S.

Table 1-2 Characteristics and advantages of the ET 200S

Characteristics	Advantages
About the structure	
Discretely modular design <ul style="list-style-type: none"> 1/2/4-channel electronic modules Power modules Integrated motor starters 32-channel COMPACT modules 	<ul style="list-style-type: none"> Function-oriented, cost-optimized station design Significant reduction of cost and effort for configuration and documentation Space saving due to the ability to string modules together in random order
Extensive range of electronic modules	Broad area of application
ET 200S FC frequency converter	<ul style="list-style-type: none"> Speed control Fail-safe technology: Safe braking ramp, safe speed reduction Regeneration into grid when motor in generator mode No grid commutation reactor required

Description

1.3 What is the ET 200S distributed I/O system?

Characteristics	Advantages
Communication-capable, system-integrated motor starters: Direct and reversing starter up to 7.5 kW	PLC inputs and outputs, terminal blocks, circuit breakers and contactors in a plug-in module save space and the effort involved in wiring
Permanent wiring due to the separation of mechanical and electronic components	<ul style="list-style-type: none"> • Prewiring possible • Module replacement during operation of the ET 200S ("hot swapping")
Individual connection of power modules to common potential	<ul style="list-style-type: none"> • Individual formation of voltage groups (identifiable by color coding of the TM-P terminal modules for power modules) • Simple load interruption
Robust structure for rough industrial conditions (5 g vibration resistance)	High operating reliability when mounted directly on the machine, high availability
Connection system	
Integrated voltage buses	Reduced effort required for wiring
Power bus up to 50 A for motor starters	Minimization of wiring in 400 V range
Screw-type terminals, spring-loaded terminals, and Fast Connect	A change in terminal connection method is not necessary
<ul style="list-style-type: none"> • 2- and 3-conductor connection or • 2-, 3- and 4-conductor connection 	Optimal selection in terms of space and cost
Fast Connect	<ul style="list-style-type: none"> • Connection method with no stripping required • Time saving during wiring
Replaceable terminal box in the terminal module	No need to remove the terminal module in the event of terminal damage
Automatic coding of the I/O modules	Quick and reliable module replacement
Large label plate	Adequate space for clear labeling
High data transmission speed of up to 12 Mbps on PROFIBUS DP and 100 Mbps on PROFINET IO	Short response times
Integrated safety functions For motor starters up to safety category 4 according to EN 954-1	Savings on time-consuming safety engineering
Fail-safe modules	For detecting and outputting fail-safe signals via PROFIBUS (PROFIsafe) up to Safety Category 4 (EN 954-1)

Brief instructions on commissioning ET 200S

2.1 Commissioning on PROFIBUS DP

2.1.1 Introduction

Introduction

Using the following simple examples, you will learn how to commission the ET 200S on the PROFIBUS DP step by step:

- ET 200S installation and wiring up
- Configuring ET 200S in the SIMATIC manager
- Creating a user program
- Switching on ET 200S
- Evaluating diagnostic messages:
 - Removing and inserting of modules
 - Switching off the load voltage on the power module
 - Wire break in the actuator wiring on the digital output module

Requirements

- You have set up an S7 station consisting of a power supply component and a DP master (e. g. CPU 315-2 DP). A CPU 315-2 DP is used as a DP master for this example. Any other DP master (IEC 61784-1:2002 Ed1 CP 3/1) standard can of course also be used.
- *STEP 7* (starting V5.0 with ServicePack 3) is completely installed on you PD. You have *STEP 7* knowledge.
- The PD must be connected to the DP master.

2.1 Commissioning on PROFIBUS DP

Required components

The following figure shows you which ET 200S components you require for the example on the PROFIBUS DP:

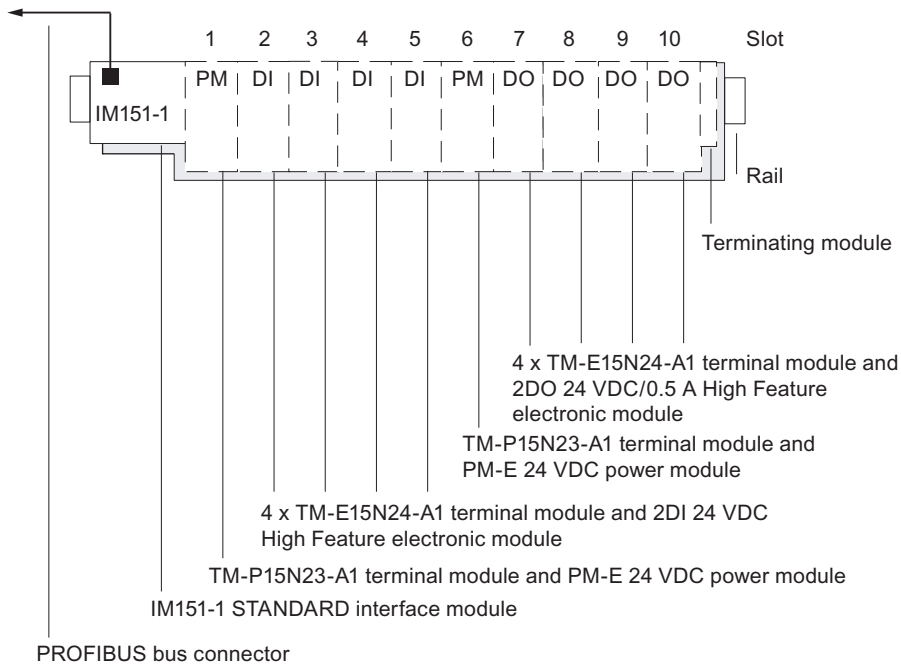


Figure 2-1 Components for the example on the PROFIBUS DP

Order numbers for example configuration on the PROFIBUS DP

Quantity	Ordering data	Order number
1 ×	Standard DIN rails 35 mm (e. g. length 483 mm)	6ES5710-8MA11
1 ×	IM151-1 STANDARD interface module and terminating module, 1 unit	6ES7151-1AA04-0AB0
2 ×	TM-P15N23-A1 Fast Connect terminal module, 1 unit	6ES7193-4CC70-0AA0
2 ×	TM-E15N24-A1 Fast Connect terminal module, 5 units	6ES7193-4CA70-0AA0
2 ×	PM-E 24 VDC, 1 unit	6ES7138-4CA01-0AB0
1 ×	2DI 24 VDC HF, 5 units	6ES7131-4BB01-0AB0
1 ×	2DO 24 VDC/0.5 A HF, 5 units	6ES7132-4BB01-0AB0
1 ×	Bus connector	6ES7972-0BA12-0XA0

2.1.2 Install the ET 200S

Procedure

1. Install the rail (35 mm x 7.5 mm or 15 mm) with a length of at least 210 mm on a firm base.
2. Start from the left with the installation of the individual modules on the DIN rail (hook in - swivel in - slide to left). Adhere to the following sequence:
 - Interface module IM151-1 STANDARD
 - TM-P15N23-A1 terminal module
 - 4 x TM-E15N24-A1 terminal module
 - TM-P15N23-A1 terminal module
 - 4 x TM-E15N24-A1 terminal module
 - Terminating module
3. Set PROFIBUS address 3 on the IM 151-1 STANDARD interface module.

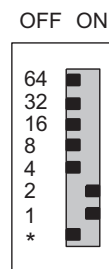


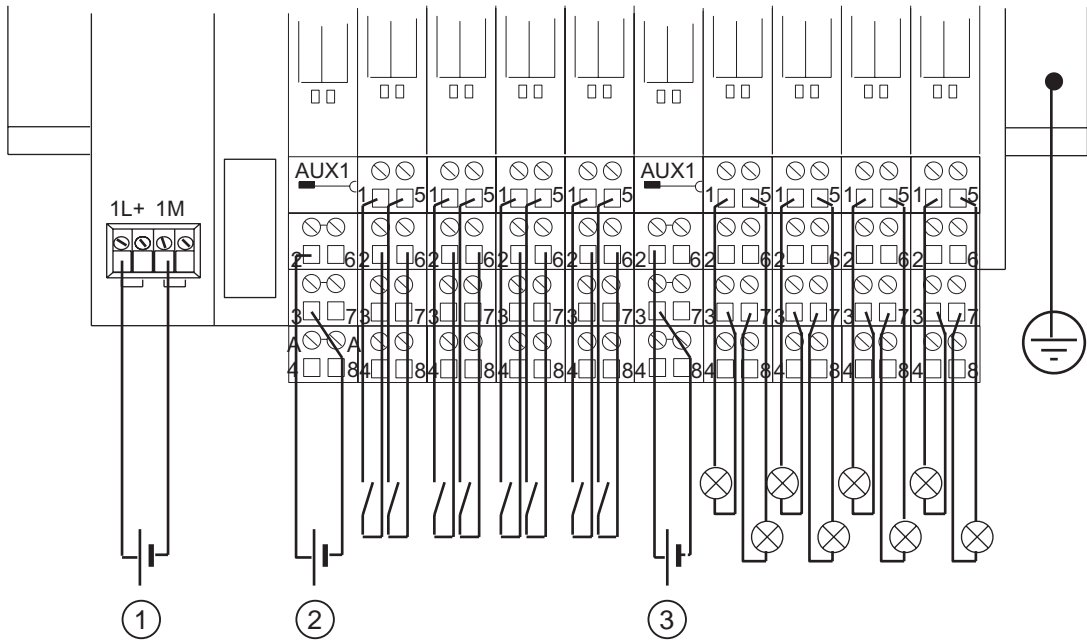
Figure 2-2 Setting PROFIBUS address 3

* Intended for future enhancements. Switch must be in OFF position.

2.1.3 Wiring and assembling ET 200S

Procedure

1. Wire the ET 200S as shown below:



- (1) 24 VDC electronic power supply
- (2) 24 VDC sensor supply voltage group^o1
- (3) 24 VDC load supply voltage group 2

1. Use the PROFIBUS bus connector to connect the DP master with the ET 200S. The PROFIBUS DP interface is located on the IM 151-1 STANDARD.
2. Insert the power and electronic modules into the terminal modules.
3. Switch on the power supply for the DP master.
4. Observe the status LEDs on the DP master.

CPU 315-2 DP:

- DC 5V → lights up
- SF DP → off
- BUSF → off

2.1.4 Configuring ET 200S in the SIMATIC manager

Procedure

1. Start SIMATIC Manager, and create a new project with a DP master (e. g., CPU315-2 DP). Create OB 1, OB 82 and OB 122 for the project.
2. Create the PROFIBUS subnet.
3. Connect the PROFIBUS subnet with the DP master in HW Config.
4. Take the ET 200S from the hardware catalog and put it on the PROFIBUS.
5. Set the PROFIBUS address 3 for the ET200S.
6. Drag the individual ET 200S modules from the hardware catalog to the configuration table.
7. Mark the electronic modules in the configuration table, and click the "Pack addresses" button.

Table 2-1 Configuration table in HW Config for PROFINET IO

Module/ DP identification	Order number	I address	Q address	Comment
1	6ES7138-4CA01-0AA0 PM-E 24 VDC			Power module
2	6ES7131-4BB01-0AB0 2DI 24 VDC	0		bytes 0.0 and 0.1
3	6ES7131-4BB01-0AB0 2DI 24 VDC			bytes 0.2 and 0.3
4	6ES7131-4BB01-0AB0 2DI 24 VDC			bytes 0.4 and 0.5
5	6ES7131-4BB01-0AB0 2DI 24 VDC			bytes 0.6 and 0.7
6	6ES7138-4CA01-0AA0 PM-E 24 VDC			Power module
7	6ES7132-4BB01-0AB0 2DO 24 VDC		0	bytes 0.0 and 0.1
8	6ES7132-4BB01-0AB0 2DO 24 VDC			bytes 0.2 and 0.3
9	6ES7132-4BB01-0AB0 2DO 24 VDC			bytes 0.4 and 0.5
10	6ES7132-4BB01-0AB0 2DO 24 VDC			bytes 0.6 and 0.7

1. Set the following parameters:
 - In the DP slave properties dialog box for ET 200S:
 - Startup for set- <> actual configuration: enable
 - In the DP slave properties dialog box for the PM-E 24 VDC, Module/DP ID 1 (in the configuration table)
 - Diagnostics: Missing load voltage
 - In the DP slave properties dialog box for the 2 DO 24 VDC, Module/DP ID 7 (in the configuration table)
 - Diagnostics: wire break A0
2. Save the configuration.

2.1.5 Creating a user program

Procedure

1. Create the user program in the LAD/STL/FBD editor in OB 1.

Example 1: Reading an input and controlling an output:

```
STL
A E 0.0      If input byte 0.0 and
A M 2.0      memory bit 2.0 is set, then
S A 0.0      set output byte 0.0
```

Example 2: Transferring an input byte to an output byte:

```
STL
L PEB 0      Load I/O input byte 0 in the accumulator
              (bytes 0.0 to 0.7)
T PAB 0      Transferring the accumulator content to
              I/O output byte 0 (bytes 0.0 to 0.7)
```

1. Save the project in SIMATIC Manager.
2. Download the configuration to the DP master.

2.1.6 Switching on ET 200S

Procedure

1. Switch on all the power supplies on the ET 200S.
2. Observe the status LEDs on the DP master and ET 200S.
 - CPU 315-2 DP:
 - DC 5V: lights up
 - SF DP: off
 - BUSF: off
 - ET 200S:
 - SF: off
 - BF: off
 - ON: lights up

2.1.7 Evaluating diagnostic messages

Introduction

In this example, you generate diagnostic messages by provoking errors on the ET 200S. In the event of an error, OB 82 is started. You evaluate the start information in OB 82.

Hint: Call SFC13 in OB 82, and evaluate the diagnostic frame.

Removing and inserting the 2 DI 24 VDC HF digital electronic module

1. Remove the 2 DI 24 VDC HF electronic module from the terminal module during operation.

2. Observe the status LEDs on the IM 151-1 STANDARD:

- SF: lights up → a diagnostic message is pending.
- BF: off
- ON: lights up

Result: The ET 200S continues to run error-free.

3. Evaluate the diagnostic information:

Result:

- Station status 1 (byte 0): Bit 3 is set → external diagnostic
- ID-related diagnostics: Byte 7.1 is set → Slot 2
- Module status: bytes 19.2 / 19.3: 11_B → no module

4. Reinsert the removed electronic module into the terminal module.

Result:

- Status LED on the IM 151-1 STANDARD:
 - SF: off
 - BF: off
 - ON: lights up
- The diagnostic message is deleted.

Switching off load voltage on the power module

1. Switch off the load voltage on the PM-E 24 VDC (slot 1).
2. Observe the status LEDs.

IM151-1 STANDARD:

- SF: lights up

Power module:

- PWR: off → No load voltage available on the power module
- SF: lights up → a diagnostic message is pending.

I/O modules in the voltage group:

- LEDs: light up

3. Evaluate the diagnostics.

Result:

- Station status 1 (byte 0): Bit 3 is set → external diagnostic
- ID-related diagnostics: Byte 7.0 is set → Slot 1
- Channel-specific diagnostics:
Bytes 35.0 to 35.5: 000000_B → Slot 1
Bytes 37.0 to 37.4: 10001_B → sensor or load voltage missing

4. Switch on the load voltage on the power module again, and reevaluate the diagnostics.

Result:

- Status LED on the IM 151-1 STANDARD:
SF: off
- Status LEDs on power module:
PWR: on
SF: off
- Status LEDs on I/O modules:
LEDs: off
- The diagnostic message is deleted.

Simulating a wire break in the actuator wiring

1. Remove the cable from terminal 1 on the 2DO 24 VDC/0.5 A HF electronic module (slot 7)
2. Observe the status LEDs:
IM151-1 STANDARD:
 - SF: lights upElectronic module 2DO 24 VDC/0.5 A High Feature:
 - SF: lights up → a diagnostic message is pending.
 - 1: off → output is not activated
3. Evaluate the diagnostic information:
Result:
 - Station status 1 (byte 0): Bit 3 is set → external diagnostic
 - ID-related diagnostics: byte 7.6 is set → Slot 7
 - Channel-specific diagnostics:
 - bytes 35.0 to 35.5: 000110_B → slot 7
 - bytes 36.0 to 35.5: 000000_B → channel 0
 - bytes 37.0 to 37.4: 00110_B → line break
4. Reattach the cable to the actuator on terminal 1, and reevaluate the diagnostics:
 - Status LED on the IM 151-1 STANDARD:
 - SF: off
 - Status LEDs electronic module 2DO 24 VDC/0.5 A HF:
 - SF: off
 - 1: off/on
 - The diagnostic message is deleted.

See also

Diagnostics readout (Page 8-21)

2.2 Commissioning on PROFINET IO

2.2.1 Introduction

Introduction

The following simple example teaches you step by step how to commission the ET 200S on PROFINET IO:

- Installing and wiring the ET 200S
- Configuration with STEP 7 using the device database file
- Transferring device names to the IO device
- Integrating into the user program
- Switching the ET 200S on
- Evaluating the interrupts and diagnostics:
 - Removing and inserting of modules
 - Switching off the load voltage on the power module
 - Wire break in the actuator wiring on the digital output module

Prerequisites

- You have set up an S7 station consisting of a power supply module and an IO controller (e. g., CPU 317-2 PN/DP). In this example a CPU 317-2 PN/DP is used as the IO controller with firmware version V2.3 and higher.
- *STEP 7* V 5.3 + ServicePack 1 or higher is installed on your PG. You know how to work with *STEP 7*.
- The programming device connected to the PROFINET IO.

Components required

The figure below shows which ET 200S components you require for the example on the PROFINETIO:

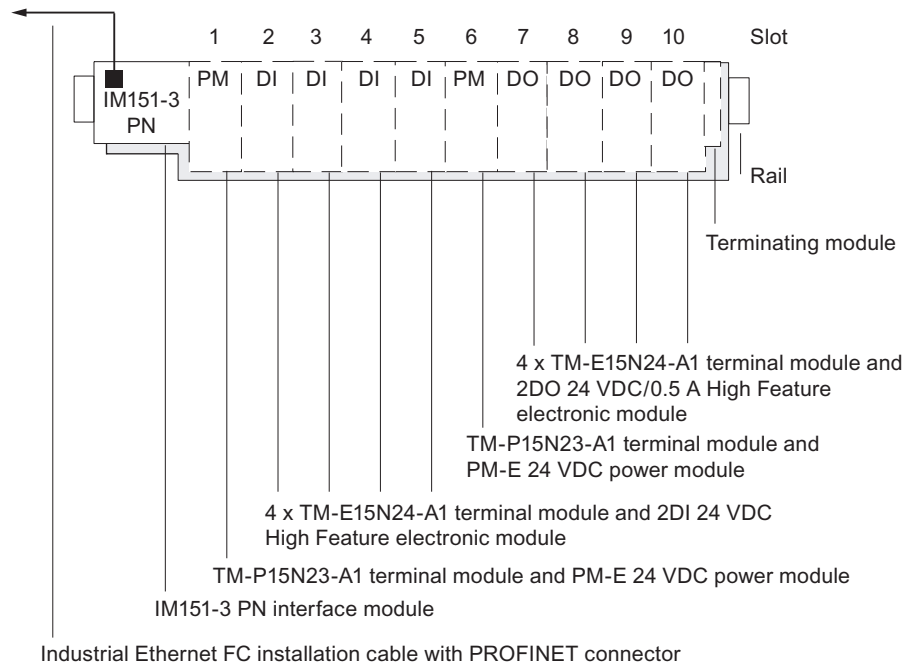


Figure 2-3 Components for the example on PROFIBUS IO

Order numbers for the example on PROFINET IO

Quantity	Ordering data	Order number:
1 ×	Standard mounting rail 35 mm (length = 483 mm, for example)	6ES5710-8MA11
1 ×	IM151-3 PN interface module and terminating module, 1 unit	6ES7151-3AA20-0AB0
1 ×	SIMATIC Micro Memory Card (e. g. 64k)	6ES7953-8LF11-0AA0
2 ×	Fast Connect terminal module TM-P15N23-A1, 1 piece	6ES7193-4CC70-0AA0
2 ×	Fast Connect terminal module TM-P15N23-A1, 5 pieces	6ES7193-4CA70-0AA0
2 ×	PM-E 24 VDC, 1 unit	6ES7138-4CA01-0AA0
1 ×	2DI 24 VDC HF, 5 units	6ES7131-4BB01-0AA0
1 ×	2DO 24 VDC/0.5 A HF, 5 units	6ES7132-4BB01-0AB0
	PROFINET connector (according to the specifications in the <i>PROFINET Installation Guide</i>)	
	Appropriate installation cables: <ul style="list-style-type: none"> • FC Standard Cable • FC Trailing Cable • FC Marine Cable 	6XV1 840-2AH10 6XV1 840-3AH10 6XV1 840-4AH10

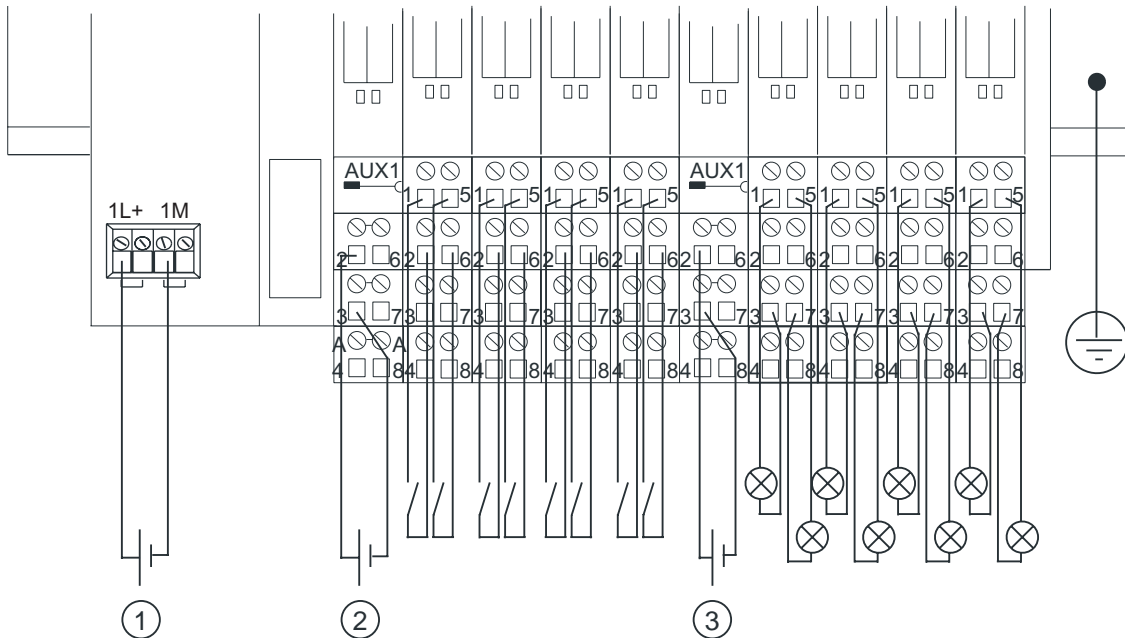
2.2.2 ET 200S assembling and wiring up

Installing the DIN rail

1. Install the DIN rail (35 x 7.5 mm or 15 mm, length = at least 210 mm) on a solid surface.
2. Start from the left with the installation of the individual modules on the DIN rail (hook in - swivel in - slide to left). Adhere to the following sequence:
 - Interface module IM151-3 PN
 - TM-P15N23-A1 terminal module
 - 4 x TM-E15N24-A1 terminal module
 - TM-P15N23-A1 terminal module
 - 4 x TM-E15N24-A1 terminal module
 - Terminating module

Wiring and assembling ET 200S

1. Wire the ET 200S as shown below:



- ① 24 VDC electronic power supply
- ② 24 VDC sensor supply voltage group 1
- ③ 24 VDC load supply voltage group 2

1. Use the PROFINET connector to connect the ET 200S (IO device) to the IO controller via a switch. The PROFINET interface is located on the IM 151-3 PN interface module.
2. Insert the power and electronic modules into the terminal modules.
3. Switch on the power supply for the IO controller.
4. Observe the status LEDs on the IO controller.

CPU 317-2 PN/DP:

- 5 VDC → lights up
- SF → off
- BF2 → off

2.2.3 Configuring ET 200S in the SIMATIC manager

Procedure

1. Start SIMATIC Manager and create a new project with an IO controller (e.g., CPU 317-2 PN/DP). For this project, create the OB 1, the OB 82, the OB 83 and the OB 122.
2. Open the "Properties - Ethernet Interface" window in the HW Config and create a subnet e.g. Ethernet(1).
3. Take the IM151-3 PN from the ET 200S catalog of the hardware catalog and insert it on Ethernet(1):PROFINET IO System (100).
4. Drag the individual ET 200S modules from the hardware catalog to the configuration table.

Table 2-2 Configuration table in HW Config for PROFINET IO

Module	Order number:	I address	Q address	Comment
0	6ES7151-3AA10-0AB0 IM151-3 PN			
1	6ES7 138-4CA01-0AA0 PM-E 24 VDC			Power module
2	6ES7 131-4BB01-0AB0 2DI 24 VDC	0		Byte 0.0 and 0.1
3	6ES7 131-4BB01-0AB0 2DI 24 VDC	1		Byte 1.0 and 1.1
4	6ES7 131-4BB01-0AB0 2DI 24 VDC	2		Byte 2.0 and 2.1
5	6ES7 131-4BB01-0AB0 2DI 24 VDC	3		Byte 3.0 and 3.1
6	6ES7 138-4CA01-0AA0 PM-E 24 VDC			Power module
7	6ES7 132-4BB01-0AB0 2DO 24 VDC		0	Byte 0.0 and 0.1
8	6ES7 132-4BB01-0AB0 2DO 24 VDC		1	Byte 1.0 and 1.1
9	6ES7 132-4BB01-0AB0 2DO 24 VDC		2	Byte 2.0 and 2.1
10	6ES7 132-4BB01-0AB0 2DO 24 VDC		3	Byte 3.0 and 3.1

1. Set the following parameters:
 - In the IO device properties dialog box for the PM-E 24 VDC, module 1 (in the configuration table)
 - Diagnostics: Missing load voltage
 - In the IO device properties dialog box for the 2 DO 24 VDC, Module 7 (in the configuration table)
 - Diagnostics: Wire break A0
2. Compile and save the configuration.

2.2.4 Assigning device names for the IO device

Procedure

1. Insert the SIMATIC Micro Memory Card in the IM151-3 PN.
2. Switch on the power supply for the IM151-3 PN interface module.
3. Open the "Properties - IM151-3 PN" window in the HW Config and enter the device name for the IO device there.
4. An online PROFINET connection from the programming device to the IO device via a switch is required for in order to transfer the name to the IM151-3 PN interface module.

The device name is transferred to the IM151-3 PN using "PLC > Ethernet > Assign Device Name." To do so, activate the "Assign name" button in the "Assign device name" window. The device name is stored on the SIMATIC Micro Memory Card in the interface module IM151-3 PN.

Once the name is assigned, it appears in the window.

2.2.5 Creating a user program

Procedure

1. Create the user program in the LAD/STL/FBD editor in OB 1.

Example 1: Reading an input and controlling an output:

STL	
A E 0.0	If input byte 0.0 and
A M 2.0	memory bit 2.0 is set, then
S A 0.0	set output byte 0.0

Example 2: Transferring an input byte to an output byte:

STL	
L PEB 0	Load I/O input byte 0 in the accumulator (bytes 0.0 to 0.7)
T PAB 0	Transfer the accumulator content to I/O output byte 0 (bytes 0.0 to 0.7)

1. Save the project in SIMATIC Manager.
2. Download the configuration to the IO controller.

2.2.6 Switching on ET 200S

Procedure

1. Switch on all the power supplies of the ET 200S.
2. Observe the status LEDs on the IO controller, ET 200S, and switch.
 - CPU 317-2 PN/DP:
 - 5 VDC: lights up
 - SF: off
 - BF2: off
 - LINK: lights up
 - ET 200S:
 - SF: off
 - BF: off
 - ON: lights up
 - LINK: lights up
 - Switch:
 - LINK: lights up
 - 100MB: lights up

2.2.7 Evaluating diagnostic messages

Introduction

In this example, you generate diagnostic messages by provoking errors in the ET 200S.

In the event of an error, OB 83 is started. Evaluate the start information in OB 83.

Hint: Call up the SFB 52 within the OB 83 and evaluate the E002_H diagnostic telegram.

Removing and inserting the 2 DI 24 VDC High Feature digital electronic module

1. Remove the 2 DI 24 VDC High Feature electronic module from the terminal module (e.g., from slot 2) during operation.
2. Observe the status LEDs on the IM 151-3 PN interface module:
 - SF: lights up → a diagnostic message is pending.
 - BF: off
 - ON: lights up

Result: The ET 200S continues to run error-free.
3. In the event of a remove interrupt, OB 83 is started. Start the SFB 52 in OB 83. Evaluate the E002_H diagnostic data record.

Byte	Table of Contents	Meaning
Header information		
0 and 1	8104 _H	Data record with discrepancies between the preset and actual configurations
2 and 3	0014 _H	20 bytes follow
4 and 5	0100 _H	Version 1.0
6 and 7	0001 _H	0001 _H if the preset configuration deviates from the actual configuration
IO device header information		
8 and 9	0000 _H	steady
10 and 11	0000 _H	steady
12 and 13	0001 _H	Number of slots in which there is a discrepancy between the preset configuration and the actual configuration
Configuration data of slots		
14 and 15	0002 _H	Slot number of the slot with a discrepancy between the preset and actual configurations
16 to 19	XXXXXXXX _H	Identification of the inserted module
20 and 21	0000 _H	No module inserted
22 and 23	0000 _H	Number of submodule slots with a discrepancy between the preset and actual configurations. Because the content is 0000 _H , no additional submodule data follow.

1. Reinsert the removed electronic module into the terminal module.

Result:

- Status LEDs on the IM151-3 PN interface module:
 - SF: off
 - BF: off
 - ON: lights up
- Once the module is inserted, diagnostic data record E002_H no longer indicates a discrepancy between the preset and actual configurations for any slot.

2.2.8 Evaluating diagnostic messages

Introduction

In this example, you generate diagnostic messages by provoking errors in the ET 200S.

In the event of an error, OB 83 or OB 82 is started. Evaluate the start information in OB 83.

Hint: Call up the SFB 52 within the OB 83 and evaluate the C00A_H diagnostic telegram.

Removal/Insertion Interrupt

1. Remove the 2 DI 24 VDC High Feature electronic module from the terminal module (e.g., from slot 2) during operation.
2. Observe the status LEDs on the IM 151-3 PN interface module:
 - SF: lights up → a diagnostic message is pending.
 - BF: off
 - ON: lights up

Result: The ET 200S continues to run error-free.

- In the event of a remove interrupt, OB 83 is started. Start SFB 52 in OB 1. Evaluate the E002 diagnostic data record_H.

Byte	Table of Contents	Meaning
Header information		
0 and 1	8104 _H	Data record with discrepancies between the preset and actual configurations
2 and 3	0014 _H	20 bytes follow
4 and 5	0100 _H	Version 1.0
6 and 7	0001 _H	0001 _H if the preset configuration deviates from the actual configuration
IO device header information		
8 and 9	0000 _H	steady
10 and 11	0000 _H	steady
12 and 13	0001 _H	Number of slots in which there is a discrepancy between the preset configuration and the actual configuration
Configuration data of slots		
14 and 15	0002 _H	Slot number of the slot with a discrepancy between the preset and actual configurations
16 to 19	XXXXXXXX _H	Identification of the inserted module
20 and 21	0000 _H	No module inserted
22 and 23	0000 _H	Number of submodule slots with a discrepancy between the preset and actual configurations. Because the content is 0000 _H , no additional submodule data follow.

- Reinsert the removed electronic module into the terminal module.

Result:

- Status LEDs on the IM151-3 PN interface module:
 - SF: off
 - BF: off
 - ON: lights up
- Once the module is inserted, diagnostic data record E002_H no longer indicates a discrepancy between the preset and actual configurations for any slot.

Switching off load voltage on the power module

- Switch off the load voltage on the PM-E 24 VDC (slot 1).
- Observe the status LEDs.

IM151-3 PN:

- SF: lights up

Power module:

- PWR: off → No load voltage available on the power module

- SF: lights up → a diagnostic message is pending.

I/O modules in the voltage group:

- LEDs: light up

3. Evaluate diagnostic data record C00AH.

Hint: Call up the SFB 52 within the OB 1 or OB 82 and evaluate the diagnostic message.

Byte	Table of Contents	Meaning
Header information		
0 and 1	0010 _H	Data record with channel diagnostics
2 and 3	0012 _H	18 bytes follow
4 and 5	0100 _H	Version 1.0
Channel diagnostic data		
6 and 7	0001 _H	Slot 1
8 and 9	0001 _H	Submodule slot 1
10 and 11	8000 _H	Error on submodule
12	08 _H	Incoming error
13	00 _H	Reserved
14 and 15	8000 _H	Submodule diagnostic is pending
Channel diagnostic data record 0 with detailed information on the fault		
16 and 17	0000 _H	Channel 0
18	08 _H	Incoming error
19	00 _H	Free data format
20 and 21	0011 _H	Sensor or load voltage missing

1. Switch on the load voltage on the power module again, and reevaluate the diagnostics.

Result:

- Status LEDs on the IM151-3 PN interface module:

SF: off

- Status LEDs on power module:

PWR: on

SF: off

- Status LEDs on I/O modules:

LEDs: off

- The diagnostic message is deleted.

Simulating a wire break in the actuator wiring

1. Remove the cable from terminal 1 on the 2DO 24 VDC/0.5 A; HF electronic module (slot 7)
2. Observe the status LEDs:
 - IM151-3 PN:
 - SF: lights up
 - Electronic module 2DO 24 VDC/0.5 A High Feature:
 - SF: lights up → a diagnostic message is pending.
 - 1: off → output is not activated
3. Evaluate diagnostic data record C00A_H.

Byte	Table of Contents	Meaning
Header information		
0 and 1	0010 _H	Data record with channel diagnostics
2 and 3	0012 _H	18 bytes follow
4 and 5	0100 _H	Version 1.0
Channel diagnostic data		
6 and 7	0007 _H	Slot 7
8 and 9	0001 _H	Submodule slot 1
10 and 11	8000 _H	Error on submodule
12	08 _H	incoming error
13	00 _H	Reserved
14 and 15	8000 _H	Submodule diagnostic is pending
Channel diagnostic data record 0 with detailed information on the fault		
16 and 17	0000 _H	Channel 0
18	48 _H	Incoming error on an output
19	01 _H	Data type: 1 bit
20 and 21	0006 _H	Wire break

1. Reattach the cable to the actuator in terminal 1, and reevaluate the diagnostics:
 - Status LEDs on the IM151-3 PN interface module:
 - SF: off
 - Status LEDs electronic module 2DO 24 VDC/0.5 A HF:
 - SF: off
 - 1: off/on
 - The diagnostic message is deleted.

Application planning

3.1 Switching on the ET 200S

Simply put your ET 200S together yourself. A configuration tool supports you in doing so. You will find the tool on the intranet at:

https://www2.automation.siemens.com/simatic/dp/html_00/produkte/et200s.htm

Application of electronic modules

The following table shows which electronic modules match your application.

Table 3-1 Electronic modules and the applications for which they are suitable

Electronic module	Applications	
2DI 24 VDC ST 2DI 24 VDC HF 4DI 24 VDC ST 4DI 24 VDC HF 4DI 24 VDC/SRC ST IM151-1 COMPACT 32DI	<ul style="list-style-type: none"> Evaluating switches, proximity switches (BEROs), sensors, and encoders 	24 VDC
4DI 24 ..48 VUC HF		24 to 48 VUC
4DI NAMUR	<ul style="list-style-type: none"> Evaluating NAMUR sensors Evaluating wired, unwired mechanical sensors 	4 input channels
2DI 120 VAC ST	<ul style="list-style-type: none"> Evaluating switches, proximity switches (BEROs), sensors, and encoders 	AC 120 V
2DI 230 VAC ST		AC 230 V
IM151-1 COMPACT 16DI/16DO	<ul style="list-style-type: none"> Evaluating switches, proximity switches (BEROs), sensors, and encoders Switching solenoid valves, DC and AC contactors, indicator lights, actuators 	24 VDC
		24 VDC to 0.5 A

Electronic module	Applications	
2DO 24 VDC/0.5 A ST 2DO 24 VDC/0.5 A HF 4DO 24 VDC/0.5 A ST	<ul style="list-style-type: none"> Switching solenoid valves, DC and AC contactors, indicator lights, actuators 	24 VDC to 0.5 A
2DO 24 VDC/2A ST 2DO 24 VDC/2A HF 4DO 24 VDC/2A ST		24 VDC to 2 A
2DO 24 VAC to 230 VAC/1 A		120 /230 VAC to 1 A
2RO NO 24 VDC to 120 VAC/5 A 24 VAC to 230 VAC/5 A		DC to 120 V/AC to 230 V to 5 A
2RO NO/NC 24 VDC to 48 VDC/5 A 24 VAC to 230 VAC/5 A		DC to 48 VAC to 230 V to 5 A
2AI U ST		<ul style="list-style-type: none"> Measuring voltages
2AI U HF	<ul style="list-style-type: none"> Measuring voltages with high resolution 	$\pm 10 \text{ V} / \pm 5 \text{ V} / 1 \text{ to } 5 \text{ V}$
2AI U HS	<ul style="list-style-type: none"> Time-critical measuring of voltages 	$\pm 10 \text{ V} / \pm 5 \text{ V} / \pm 2.5 \text{ V} / 1 \text{ to } 5 \text{ V}$
2AI I 2WIRE ST 4AI I 2WIRE ST	<ul style="list-style-type: none"> Measuring currents with 2-wire measuring transducers 	4 mA to 20 mA
2AI I 2WIRE HS	<ul style="list-style-type: none"> Time critical measuring currents with 2-wire measuring transducers 	4 mA to 20 mA 0 mA to 20 mA
2AI I 4WIRE ST	<ul style="list-style-type: none"> Measuring currents with 4-wire measuring transducers 	$\pm 20 \text{ mA} / 4 \text{ to } 20 \text{ mA}$
2AI I 2/4WIRE HF	<ul style="list-style-type: none"> Measuring currents with 2-wire, 4-wire measuring transducers and high resolution 	$\pm 20 \text{ mA} / 4 \text{ to } 20 \text{ mA}$
2AI I 4WIRE HS	<ul style="list-style-type: none"> Time critical measuring currents with 4-wire measuring transducers 	4 to 20 mA 0 to 20 mA $\pm 20 \text{ mA}$
2AI RTD ST	<ul style="list-style-type: none"> for connection in 4 conductor technology Measuring temperatures with thermoresistors and resistors Measuring reference junction temperatures in thermocouple elements applications 	Pt100/ Ni100 150 Ω / 300 Ω / 600 Ω
2AI RTD HF	<ul style="list-style-type: none"> for connection in 2, 3 and 4 conductor technology Measuring temperatures with thermoresistors and resistors Measuring reference junction temperatures in thermocouple elements applications Evaluating switching temperature of PTC High degree of accuracy Temperature coefficient can be assigned 	Pt100/ Ni100/ Pt 200/ Ni 120/ Pt 500/ Ni 500/ Pt 1000/ Ni 1000 150 Ω / 300 Ω / 600 Ω / PTC
2AI TC ST	<ul style="list-style-type: none"> Measuring temperatures with thermocouple elements and voltages 	Type E/N/J/K/L/S/R/B/T $\pm 80 \text{ mV}$
2AI TC HF	<ul style="list-style-type: none"> Measuring temperatures with thermocouple elements and voltages Internal reference junction in connection with TM-E15S24-AT 	Type E/N/J/K/L/S/R/B/T/C $\pm 80 \text{ mV}$
2AO U ST	<ul style="list-style-type: none"> Outputting of voltages 	$\pm 10 \text{ V} / 1 \text{ to } 5 \text{ V}$

Electronic module	Applications	
2AO U HF	<ul style="list-style-type: none"> Measuring voltages with high resolution 	± 10 V/ 1 to 5 V
2AO I ST	<ul style="list-style-type: none"> Outputting of currents 	± 20 mA/ 4 V to 20 V
2AO I HF	<ul style="list-style-type: none"> Measuring voltages with high resolution 	± 20 mA/ 4 to 20 V
4 IQ-SENSE	<ul style="list-style-type: none"> Photoelectric proximity switch 	Retro-reflective sensor and diffuse sensor with IQ-SENSE
4POTDIS	<ul style="list-style-type: none"> Distribution of potentials to 4 channels 	24 to 48 VDC 24 to 230 VAC
1COUNT 24V/100kHz	<ul style="list-style-type: none"> Counting of pulses, measurement of frequency, rotational speed, or period duration by means of incremental encoders 	24 V signals up to 100 kHz
1COUNT 5V/500kHz		5 V signals up to 500 kHz
1SSI	<ul style="list-style-type: none"> Detecting and evaluating of paths with absolute encoders (SSI) Simple positioning tasks 	Absolute encoder: 13 bits/ 21 bits/ 25 bits
1STEP 5V/204kHz	<ul style="list-style-type: none"> Control of stepper motor power sections Positioning of stepper motors 	5 V signals up to 204 kHz
2PULSE	<ul style="list-style-type: none"> Outputting of pulses in 4 different operating modes 	Minimum pulse duration of 200 µs
1POS INC/Digital	<ul style="list-style-type: none"> Controlled positioning, incremental encoder 5 V differential signals 	Drive controlled by means of digital outputs: backwards, forwards, rapid traverse/creep speed
1POS INC/Analog		Drive triggered via analog output ±10V
1POS SSI/Digital	<ul style="list-style-type: none"> Controlled positioning, SSI encoder 	Drive controlled by means of digital outputs: backwards, forwards, rapid traverse/creep speed
1POS SSI/Analog		Drive triggered via analog output ± 10 V
1POS UNIVERSAL/Digital	<ul style="list-style-type: none"> Drive controlled by means of digital outputs: backwards, forwards, rapid traverse/creep speed; incremental encoder with 5V differential signals or 24 V signals, SSI encoder 	Drive triggered via digital outputs: Drive minus / rapid Drive plus / creep Rapid / creep mode / drive plus/minus
1SI 3964/ASCII	<ul style="list-style-type: none"> Serial data transfer RS-232C/ RS-422/ RS-485 	ASCII and 3964(R) protocol
1SI Modbus/USS		Protocol mode and USS
RESERVE	<ul style="list-style-type: none"> Reservation of a slot for any electronic module 	Width 15 mm Width 30 mm
SIWAREX CS	<ul style="list-style-type: none"> Measuring weights and strength values Calibration ability 	Signals from DMS sensors or weighing cells
SIWAREX CF	<ul style="list-style-type: none"> Measuring strength values 	Signals from DMS sensors
ET 200S FC	<ul style="list-style-type: none"> Frequency inverter for controlling motors up to 4kW 	Input voltage 3 AC 400 V 50/60 Hz

3.1 Switching on the ET 200S

Electronic module	Applications	
Direct starter, soft starter (1 direction of rotation) Oscillating starter (2 directions of rotation)	<ul style="list-style-type: none"> Three-phase switches and contactors 	Rated operating voltage up to 500 V Rated operational current up to 16 A
4/8 F-DI 24 VDC PROFIsafe	<ul style="list-style-type: none"> Detecting signal states for fail-safe sensors 	24 VDC
4 F-DO 24 VDC/2A PROFIsafe	<ul style="list-style-type: none"> Realizing shutdown procedures with short-circuit and cross-circuit monitoring. 	24 VDC

Using power and electronic modules in terminal modules

Depending on the selected terminal module, various signals are available on the terminals. You will find further information about this in the *Distributed I/O ET 200S* manual under the description of the relevant I/O module.

The TM-P and TM-E terminal modules are mixable in the ET 200S configuration.

The following table describes which electronic modules you can use with the different terminal and power or electronic modules:

Table 3-2 Assignment of TM-P terminal modules and power modules

Power modules	Terminal modules TM-P for power modules				
	15S23-A1	15S23-A0	15S22-01	30S44-A0	F30S47-F1
screw-type terminal					
Order number 6ES7193	...4CC20-0AA0	...4CD20-0AA0	...4CE00-0AA0	...4CK20-0AA0	3RK1 903-3AA00
Spring terminal					
Order number 6ES7193	...4CC30-0AA0	...4CD30-0AA0	...4CE10-0AA0	...4CK30-0AA0	---
Fast Connect					
Order number 6ES7193	...4CC70-0AA0	...4CD70-0AA0	...4CE60-0AA0	---	---
PM-E 24VDC	•	•	•		
PM E 24..48VDC	•	•	•		
PM-E 24 ..48 VDC/ 24 ..230 VAC	•	•	•		
PM-E F pm 24 VDC PROFIsafe*				•	
PM-E F pp 24 VDC PROFIsafe*				•	
PM-D F 24 VDC PROFIsafe*					•
* see <i>ET 200S Fail-Safe Modules</i> manual					

Table 3-3 Assignment of TM-E terminal modules and electronic modules

Electronic modules	Terminal modules TM-E for electronic modules						
screw-type terminal	15S26-A1	15S24-A1	15S24-01	15S23-01	15S24-AT	30S44-01	30S46-A1
Order number 6ES7193	...4CA40-0AA0	...4CA20-0AA0	...4CB20-0AA0	...4CB00-0AA0	...4CL20-0AA0	...4CG20-0AA0	...4CF40-0AA0
Spring terminal	15C26-A1	15C24-A1	15C24-01	15C23-01	15C24-AT	30C44-01	30C46-A1
Order number 6ES7193	...4CA50-0AA0	...4CA30-0AA0	...4CB30-0AA0	...4CB10-0AA0	...4CL30-0AA0	...4CG30-0AA0	...4CF50-0AA0
Fast Connect	15N26-A1	15N24-A1	15N24-01	15N23-01	---	---	---
Order number 6ES7193	...4CA80-0AA0	...4CA70-0AA0	...4CB70-0AA0	...4CB60-0AA0			
2DI 24 VDC ST	•	•	•	•			
2DI 24 VDC HF							
4DI 24 VDC ST							
4DI 24 VDC HF							
4DI 24 VDC SRC ST							
4DI 24 VUC to 48 VUC HF	•	•	•	•			
4DI NAMUR	•	•	•	•			
2DI 120 VAC ST	•	•	•	•			
2DI 230 VAC ST	•	•	•	•			
2DO 24 VDC/0.5 A ST	•	•	•	•			
2DO 24 VDC/0.5 A HF							
4DO 24 VDC/0.5 A ST							
2DO 24 VDC/2 A ST	•	•	•	•			
2DO 24 VDC/2 A HF							
4DO 24 VDC/2 A ST							
2DO 24 VAC to 230 VAC/2 A	•	•	•	•			
2RO NO 24 VDC to 120 VDC/5 A 24 VAC to 230 VAC/5 A	•	•	•	•			
2RO NO/NC 24 VDC to 48 VDC/5 A 24 VAC to 230 VAC/5 A							
2AI U ST, 2AI U HF, 2AI U HS	•	•	•	•			
2AI I 2WIRE ST, 2AI I 2WIRE HS	•	•	•	•			
4AI I 2WIRE ST	•		•				
2AI I 2/4WIRE HF	•		•				
2AI I 4WIRE ST 2AI I 4WIRE HS	•		•				
2AI RTD ST	•		•				
2AI RTD HF	•	•	•	•			
2AI TC ST	•	•	•	•			

Electronic modules	Terminal modules TM-E for electronic modules						
screw-type terminal	15S26-A1	15S24-A1	15S24-01	15S23-01	15S24-AT	30S44-01	30S46-A1
Order number 6ES7193	...4CA40-0AA0	...4CA20-0AA0	...4CB20-0AA0	...4CB00-0AA0	...4CL20-0AA0	...4CG20-0AA0	...4CF40-0AA0
Spring terminal	15C26-A1	15C24-A1	15C24-01	15C23-01	15C24-AT	30C44-01	30C46-A1
Order number 6ES7193	...4CA50-0AA0	...4CA30-0AA0	...4CB30-0AA0	...4CB10-0AA0	...4CL30-0AA0	...4CG30-0AA0	...4CF50-0AA0
Fast Connect	15N26-A1	15N24-A1	15N24-01	15N23-01	---	---	---
Order number 6ES7193	...4CA80-0AA0	...4CA70-0AA0	...4CB70-0AA0	...4CB60-0AA0			
2AI TC HF	• ¹	• ¹	• ¹	• ¹	•		
2AO U ST	•		•				
2AO U HF							
2AO I ST	•	•	•	•			
2AO I HF							
4 IQ-SENSE	•		•				
1COUNT 24V/100kHz	•		•				
1COUNT 5V/500kHz						•	
1SSI	•		•				
1STEP 5V/204kHz	•		•				
2PULSE	•		•				
1POS INC/Digital						•	
1POS SSI/Digital						•	
1POS INC/Analog						•	
1POS SSI/Analog						•	
1SI 3964/ASCII	•		•				
1SI Modbus/US\$	•		•				
4/8 F-DI 24 VDC PROFIsafe*						•	•
4 F-DO 24 VDC/2A PROFIsafe*						•	•
RESERVE (width 15 mm)	•	•	•	•	•		
RESERVE (width 30 mm)						•	•
4POTDIS	•	•	•	•			
¹ if no temperature compensation required * see <i>ET 200S Fail-Safe Modules</i> manual							

Usage of COMPACT modules on terminal modules

Depending on the selected terminal module, various signals are available on the terminals. You will find further information relating to this topic in the *COMPACT-Module* chapter under the description of the relevant COMPACT module.

The terminal module TM-C must always be connected at the start of an ET 200S configuration. Additional terminal modules TM-E or TM-P are to be connected to the right of terminal module TM-C.

The following table describes which combinations of terminal and COMPACT modules can be used.

Table 3-4 Assignment of terminal modules TM-C and COMPACT modules

COMPACT modules	Assignment of terminal modules TM-C and COMPACT modules
screw-type terminal	120S
Order number 6ES7193	...4DL10-0AA0
Spring terminal	120C
Order number 6ES7193	...4DL00-0AA0
32DI	•
16DI/16DO	•

3.2 Use of the ET 200S in a redundant system

Properties

The ET 200S is integrated in a redundant DP system as DPV0 or DPV1 slave via the Y switching.

Requirements

DPV0	DPV1
<ul style="list-style-type: none"> possible with all interface modules from STEP 7 V5.3 SP3 GSD file 	<ul style="list-style-type: none"> IM151-1 HIGH FEATURE (from 6ES7151-1BA01-0AB0) from STEP 7 V5.3 SP3

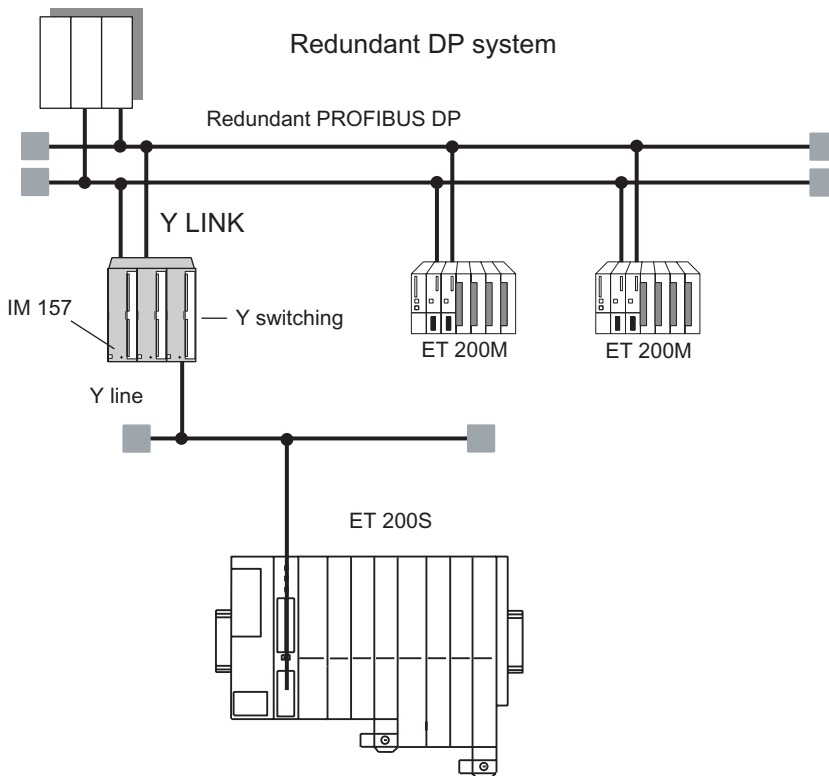


Figure 3-1 ET 200S and Y switching

Procedure

1. Configuration of the redundant DP system (redundant DP master, PROFIBUS DP, slaves)
2. Configure the ET 200S with *STEP 7*

Reference

You can find further information in the documentation for Y switching (manual or product information).

3.3 Limitation of connectable modules/maximum configuration

Principles

- Number of modules:
 - ET 200S with IM151-1 BASIC or IM151-1 COMPACT: Max. 12 modules.
 - ET 200S with IM151-1 STANDARD; IM151-1 FO STANDARD; IM151-1 HIGH FEATURE; IM151-3 PN; IM151-3 PN HIGH FEATURE: Max. 63 modules.

This includes power modules, electronic modules, RESERVE modules, and motor starters.

Note

Reduction of the maximum number of connectable peripheral modules

For every 2DO 24..230VAC module used in an ET 200S, the number of connectable peripheral modules in this station is reduced by one module.

This applies to IM151-1 STANDARD, IM151-1 FO STANDARD and IM151-1 HIGH FEATURE.

- Bus length of the ET 200S:
 - Max. 2 m: For IM151-1 BASIC, IM151-1 COMPACT
 - Max. 2 m: (configurable): For IM151-1 STANDARD; IM151-1 FO STANDARD; IM151-1 HIGH FEATURE
- Parameter length:
 - For PROFIBUS DP: Depending on the DP master used (max. 244 bytes)
For configurations from *STEP 7* V5.3 SP3, it is possible to operate IM151-1 HIGH FEATURE from 6ES7151-1BA01-0AB0 with more than 244 bytes of parameter data. A configuration per GSD file does not offer this possibility. Also see the note below.
 - For PROFINET IO: Not relevant for maximum configuration.

Table 3-5 Parameter length in bytes

Module	Parameter length per module
IM151-1 BASIC	19 bytes
IM151-1 STANDARD IM151-1 FO STANDARD	27 bytes
IM151-1 HIGH FEATURE ⁶	27 bytes 56 bytes ¹
IM151-3 PN	Not relevant
IM151-3 PN HIGH FEATURE	Not relevant
IM151-1 COMPACT 32DI	23 bytes
IM151-1 COMPACT 16DI/16DO	26 bytes
PM-E 24VDC PM E 24 ..48 VDC PM-E 24 ..48 VDC/24 ..230 VAC	3 bytes
2DI 24 VDC HF	3 bytes
4DI 24 VDC HF	3 bytes
2DI 24 VDC ST 4DI 24 VDC ST 4DI 24 VDC SRC ST	1 byte
4DI NAMUR	12 bytes
2DI 120 VAC ST	3 bytes
2DI 230 VAC ST	3 bytes
2DO 24 VDC/0.5 A HF	3 bytes
2DO 24 VDC/0.5 A ST 4DO 24 VDC/0.5A ST	1 byte
2DO 24 VDC/2 A HF	3 bytes
2DO 24VDC/2A ST 4DO 24 VDC/2A ST	1 byte
2DO 24 V..230 VAC/1 A	3 bytes
2RO NO 24..120VDC/5A 24..230VAC/5A	3 bytes
2AI U ST 2AI U HF	4 bytes
2AI U HS	12 bytes (4 bytes ⁴)
RESERVE	---
2AI I 2WIRE ST 4AI I 2WIRE ST	4 bytes 7 bytes
2AI I 2WIRE HS	12 bytes (4 bytes ³)
2AI I 4WIRE ST 2AI I 2/4WIRE HF	4 bytes
2AI I 4WIRE HS	12 bytes (4 bytes ⁵)
2AI RTD ST	4 bytes

3.3 Limitation of connectable modules/maximum configuration

Module	Parameter length per module
2AI RTD HF	7 bytes (4 bytes ²⁾)
2AI TC ST 2AI TC HF	4 bytes
2AO U ST 2AO U HF	7 bytes
2AO I ST 2AO I HF	7 bytes
1COUNT 24V/100kHz	16 bytes
1COUNT 5V/500kHz	16 bytes
1SSI	8 bytes
1STEP 5V/204kHz	7 bytes
2PULSE	16 bytes
1POS INC/Digital 1POS SSI/Digital 1POS INC/Analog 1POS SSI/Analog	16 bytes
1SI 3964/ASCII 1SI Modbus/USS	4/8 bytes
4 IQ-SENSE	16 bytes
Motor starter STANDARD	3 bytes
Motor starter HIGH FEATURE	12 bytes
1) Cycle synchronization is activated 2) For application as 2AI RTD ST 3) For application as 6ES7 134-4GB50-0AB0 4) For application as 6ES7 134-4FB50-0AB0 5) For application as 6ES7 134-4GB60-0AB0 6) Is not relevant as from 6ES7151-1BA01-0AB0	

Note

With the IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0) you have the possibility to configure more than 244 byte parameter data in *STEP 7* in DPV1 mode. If the parameter length is greater than 244 bytes, an increase in the startup time is to be expected.

3.3 Limitation of connectable modules/maximum configuration

- Address space:
 - on the PROFIBUS DP** (depends on the DP master)
 - IM151-1 BASIC interface module supports a maximum of 88 input bytes or 88 output bytes.
 - Interface module IM151-1 COMPACT supports maximum 100 input bytes or 100 output bytes.
 - interface modules IM151-1 STANDARD and IM151-1 FO STANDARD supported
 - Maximum 128 input bytes or 128 output bytes
(up to 6ES7151-1AA03-0AB0 or 6ES7151-1AB02-0AB0)
 - Maximum 244 input bytes or 244 output bytes
(from 6ES7151-1AA04-0AB0)
 - The IM151-1 HIGH FEATURE interface module supports a maximum of 244 input bytes or 244 output bytes.
 - on PROFINET IO**
 - The IM151-3 PN or IM151-3 PN HIGH FEATURE interface module supports a maximum of 256 input bytes or 256 output bytes.
- Power modules / COMPACT modules: Maximum configuration per voltage group

Table 3-6 Maximum configuration per voltage group

Power modules / COMPACT modules:	Maximum current-carrying capacity	Connectable modules
Power module PM-E 24 VDC	10 A	The number of modules that can be connected depends on the total current of all the modules in this voltage group. This must not exceed the maximum current-carrying capacity in total. The total current is governed in large part by the digital output modules: <ul style="list-style-type: none"> • 2DO 24 VDC/0.5 A ST • 2DO 24 VDC/0.5 A HF • 4DO 24 VDC/0.5A ST • 4DO 24 VDC/0.5A HF • 2DO 24 VDC/2A ST • 2DO 24 VDC/2 A HF • 4DO 24 VDC/2A ST • 4DO 24 VDC/2A HF • 2DO 24 ...230 VAC/2A
Power module PM-E 24 ..48 VDC	10 A	
Power module PM-E 24 ..48 VDC/24 ...230 VAC	10 A (24 VDC) 8 A (120 /230 VAC)	
IM151-1 COMPACT <ul style="list-style-type: none"> • 32DI • 16DI/16DO 	5 A ¹	
¹ This value applies to I/O modules connected after IM151-1 COMPACT.		

- Number of identifiers: Per module one identifier (max. 63 identifiers)
- You can use the ET 200S with DP masters with a diagnostic frame length of 32 bytes because you can set the length of the diagnostic frame in all the interface modules.

Assembling

4.1 Basic principles of installation



Warning**Open components**

Modules of an ET 200S are open components. This means that you may only install the ET200S in cases, cabinets or electrical plant rooms where they will only be accessible with a key or a tool. Only trained or authorized personnel are allowed access to such cubicles, cabinets or electrical operating rooms.

Simple installation

The ET 200S distributed I/O system is designed for simple installation.

Installation rules

- The ET 200S distributed I/O system starts
 - with an interface module or
 - with a TM-C terminal module with COMPACT module.
- A power module comes after the interface module or at the beginning of each voltage group.
- After a power module come digital, analog, technological, or RESERVE modules.
- After a COMPACT module, digital, analog, technological, or RESERVE modules may follow. If necessary, power modules may also be deployed.
- The ET 200S distributed I/O system ends with the terminating module.
- The maximum configuration of the distributed I/O system is as follows:
 - IM151-1 BASIC: max. 13 modules (including interface module). The length of the bus is not relevant.
 - IM151-1 COMPACT: max. 13 modules (including COMPACT module). The length of the bus is not relevant.
 - IM151-1 STANDARD / IM151-1 FO STANDARD / IM151-1 HIGH FEATURE / IM151-3 PN / IM151-3 PN HIGH FEATURE:
Max. 64 modules (including interface module) or max 2 m bus length.

Installation position

Preferably, the ET 200S is mounted horizontally on a vertical wall. All other positions are possible, although there are certain restrictions regarding the ambient temperature.

DIN rail

The distributed I/O system ET 200S is installed on a galvanized DIN rail according to EN 50022 (35 x 7.5 mm or 35 x 15 mm).

Note

If the ET 200S distributed IO device is exposed to increased vibrations and shock, we recommend that you screw the DIN rail to the mounting surface at intervals of 200 mm.

To prevent the ET 200S distributed I/O system from slipping sideways, we recommend that you apply a mechanical hold-down (e. g. with grounding terminal, 8WA2 011-1PH20) at both ends of the device.

If you install the rail on grounded, zinc-plated mounting plates, there is no need to ground the rail separately.

Minimum clearances for installation, wiring, and ventilation

When installing the ET 200S in a housing, ensure that the distance to the lid of the housing or the front door is at least 1 mm.

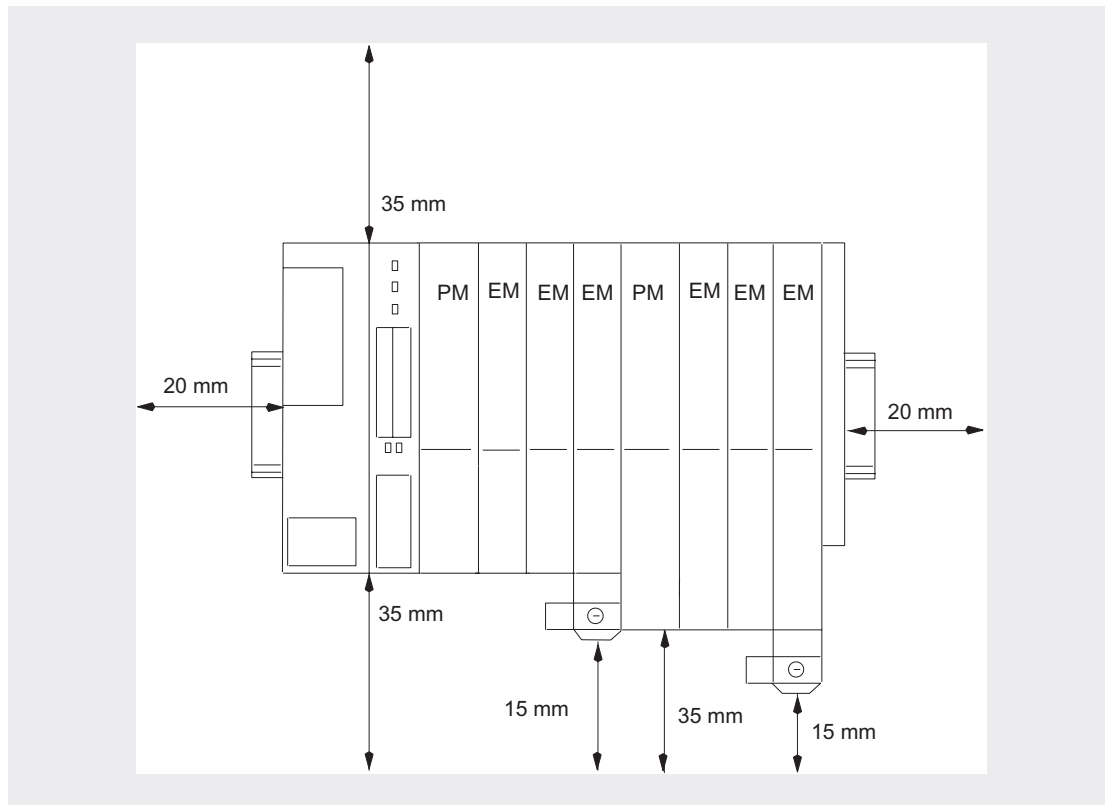


Figure 4-1 Minimum clearances

4.2 Installing the interface module

Introduction

- The interface module connects the ET 200S with the PROFIBUS DP.
- The interface module transfers data between the higher-level controller and the I/O modules.

Requirements

- The DIN rail is installed.
- All terminal modules are installed to the right of the interface module. The maximum configuration of the ET 200S distributed I/O system is 12/63 modules.

Required tools

3-mm screwdriver

Installing the interface module

1. Hang the interface module onto the rail.
2. Tip the interface module back until you hear the locking mechanism engage.

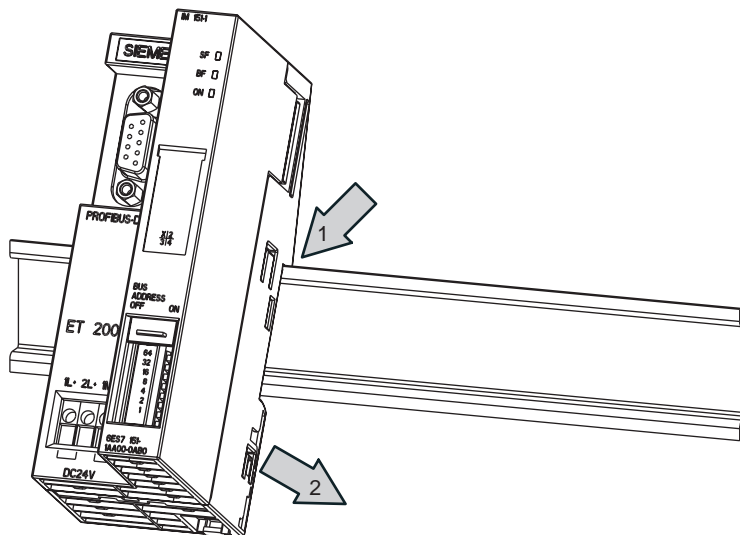


Figure 4-2 Installing the interface module

Removing the interface module

The interface module is wired, and the terminal modules are on the right:

1. Switch off the supply voltage on the interface module.
2. Disconnect the wiring and the bus connector on the interface module.
3. Use a screwdriver to push the locking mechanism on the interface module down until the mechanism stops, and move the interface module to the left.

Note: The locking mechanism is beneath the interface module.

4. With the locking mechanism depressed, pivot the interface module so that it comes off the DIN rail.

4.3 Installing the TM-P and TM-E terminal modules

Introduction

- The terminal modules serve to receive the I/O modules and power modules.
- The terminal modules can be prewired (without I/O modules).
- All the terminal modules must be installed to the right of the interface module.

Requirements

- The DIN rail is installed.

Required tools

3-mm screwdriver

Installing the terminal module

1. Fit the terminal module onto the rail.
2. Push in the terminal module at the bottom until you can hear the catch lock.
3. Move the terminal module to the left until you hear it snap into place at the previous interface module (if already installed) or the terminal module.

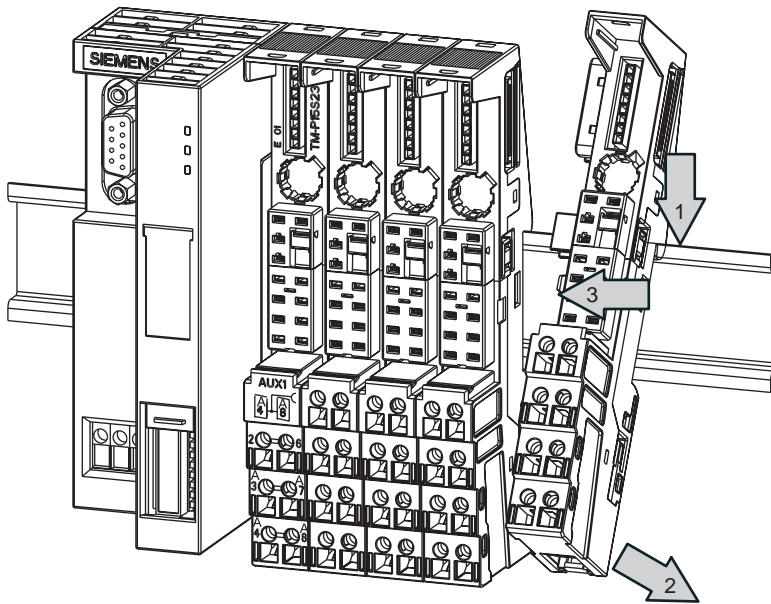


Figure 4-3 Installing the terminal module

Removing the terminal module

The terminal module is wired, and there are other terminal modules on the right and left.

A terminal module in the ET 200S distributed I/O system can only be removed when there is a clearance of approx. 8 mm to the adjacent terminal modules (you achieve this clearance by moving the adjacent modules).

1. Switch off the supply voltage on the terminal module and, if applicable, the power module.
2. Disconnect the wiring on the terminal module.

3. Removing the terminal module (from the right):

Use a screwdriver to push the locking mechanism on the previous (left hand) terminal module / interface module down until the mechanism stops, and move the interface module to the right.

Removing the terminal module (from the right):

Use a screwdriver to push the locking mechanism on the terminal module down until the mechanism stops, and move the interface module to the left.

Note: The locking mechanism is beneath the terminal module.

4. With the locking mechanism depressed, pivot the interface module so that it comes off the DIN rail.

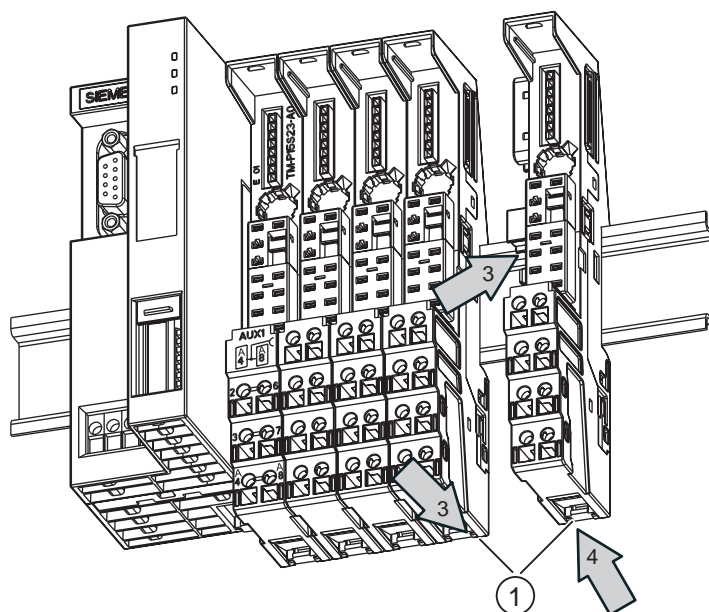


Figure 4-4 Removing the terminal module (from the right)

(1) Locking mechanism

Note

It is not necessary to remove the terminal module in order to replace the terminal box.

4.4 Installing terminal modules TM-C for COMPACT modules

Introduction

- The terminal modules serve to receive COMPACT modules.
- The terminal modules can be prewired (without COMPACT modules).
- All additional modules are to be mounted to the right, next to the terminal module for COMPACT modules.

Requirements

- The DIN rail is installed.

Required tools

3-mm screwdriver

Terminal module for COMPACT modules

1. Hook the terminal module for COMPACT modules onto the DIN rail (on the left hand side).
2. Push in the terminal module at the bottom until you can hear the catch lock.

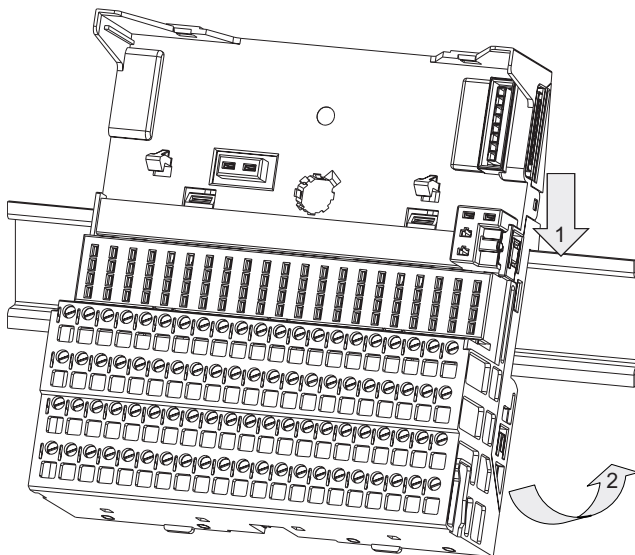


Figure 4-5 Terminal module for COMPACT modules

Removing terminal module for COMPACT modules

The terminal module is wired, and there are other terminal modules to the right.

The terminal module for COMPACT modules can only be removed when there is approximately 8 mm clearance to the adjacent terminal module (you achieve this distance by moving the adjacent modules).

1. Switch off the supply voltage on the terminal module for COMPACT modules and, if applicable, the power module.
2. Disconnect the wiring on the terminal module for COMPACT modules.
3. Use a screwdriver to push the locking mechanism on the terminal module for COMPACT modules down until the mechanism stops, and move the terminal module to the left.

Note:

- The locking mechanism is beneath the terminal module.
 - This step is not required if there are no additional terminal modules to the right of the terminal module for COMPACT modules.
4. With the locking mechanism depressed, pivot the interface module so that it comes off the DIN rail.

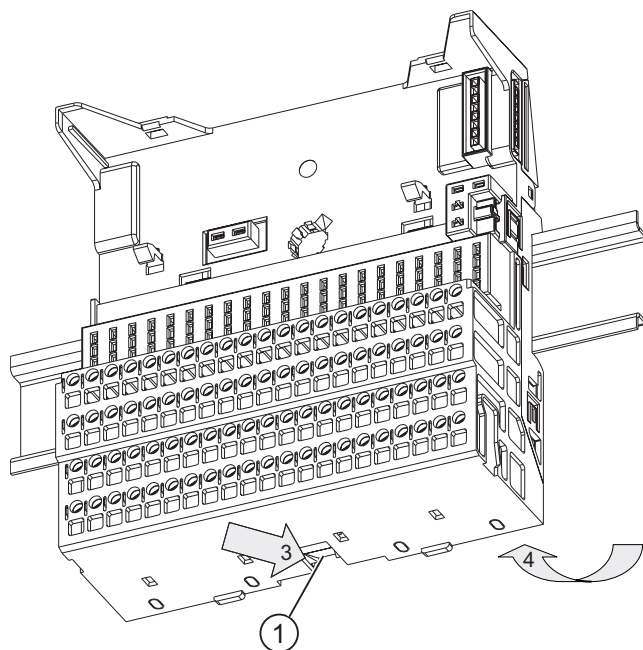


Figure 4-6 Removing terminal module for COMPACT modules

(1) Locking mechanism

Note

It is not necessary to remove the terminal module for COMPACT modules in order to replace the terminal box.

4.5 Installing additional terminals

Introduction

- The additional terminals expand the function of the terminal modules for ET 200S.
The additional terminals can be used to load additional potentials (e.g. for the connection of sensors and actuators in 3 and 4 conductor technology for IM151-1 COMPACT).
The additional terminals can be cascaded if additional potentials are required.
- The terminal modules and additional terminals can be prewired (without COMPACT modules or I/O modules).
- Various voltage groups can be created on the additional terminals by means of pluggable bridges.

Requirements

- The DIN rail is installed.
- The terminal module for COMPACT modules is mounted or the terminal modules TM-P and TM-E are mounted to a width of 120 mm.

Note

Requirements for installing the additional terminals under terminal modules TM-P and TM-E

Both "outer" terminal modules must be the same height. No terminal modules of a greater height may be plugged between these two terminal modules.

Required tools

4-mm screwdriver

Installing additional terminals

1. Slide the additional terminal from underneath onto the terminal module for COMPACT modules or the TM-P and TM-E terminal modules.

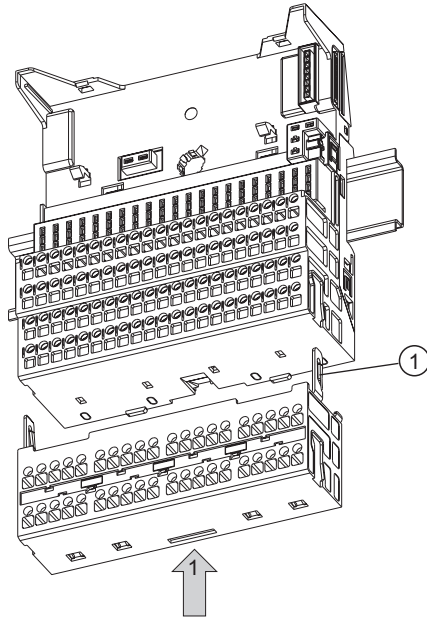


Figure 4-7 Installing additional terminals

(1) Catch

If your ET 200S modules are exposed to shocks or vibrations, the additional terminals can be stabilized by means of the included fixing bracket.

1. Slide the fixing bracket into the slot in the underside of the additional terminal.
2. Screw the fixing bracket firmly onto the base.

The under part of the fixing bracket can be snapped off and used to compensate for a possible gap between the additional terminal and base by placing under the bracket (as a spacer).

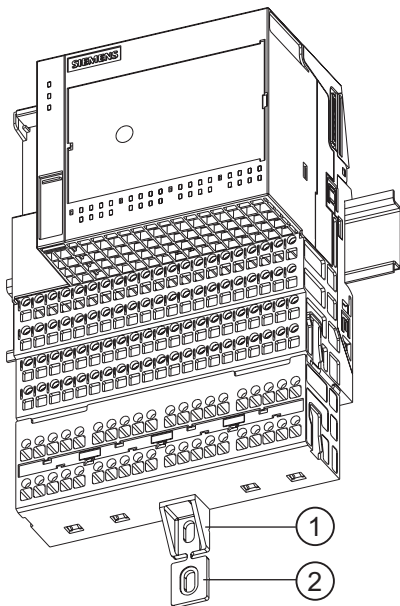


Figure 4-8 Stabilize additional terminal with fixing bracket

- (1) Mounting bracket
- (2) Spacer

Removing additional terminals

The additional terminal is wired up.

1. Switch off the supply voltage on the additional terminal, the terminal module for COMPACT modules and, if applicable, the power module.
2. If you have stabilized the additional terminal by means of a fixing bracket, loosen it from the base and pull it out of the additional terminal.
3. Remove the wiring from the additional terminal.
4. Place the screwdriver in the right hand slot between the terminal module and the additional terminal. Turn the screwdriver. By pushing the additional terminal away, the catch will release from its anchorage.
5. Repeat this procedure and turn the screwdriver on the left-hand slot.
6. Then pull the additional terminal downwards and out of the terminal module / terminal modules.

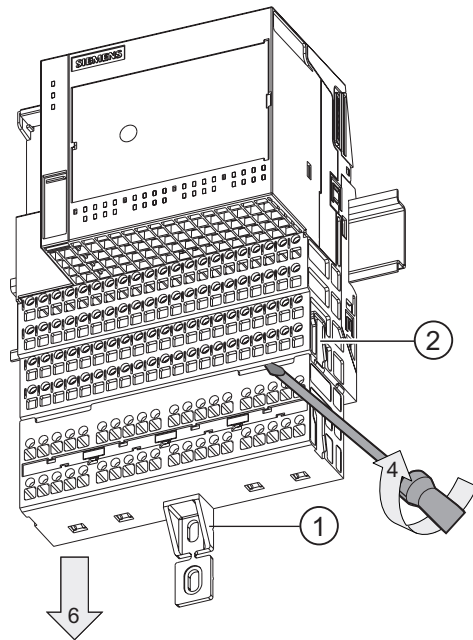


Figure 4-9 Removing additional terminals

- (1) Mounting bracket
- (2) Catch

4.6 Remove / mount pluggable bridges for additional terminals

Introduction

The additional terminal is equipped with 3 pluggable bridges from factory.

With the 3 plugged bridges, all terminals on the additional terminal have the same potential. If additional potentials are required, various potentials can be achieved by removing the pluggable bridges. Detailed information pertaining to the expansion of voltage groups can be found in the device manual in the chapter entitled *Terminal modules > Additional terminals TE-U120S4x10 and TE-U120C4x10 (6ES7193-4FLx0-0AA0)*.

Requirements

- The DIN rail is installed.

Required tools

3-mm screwdriver

Remove pluggable bridges

1. Remove the labels from the additional terminals.
2. Insert the screwdriver from the side, underneath the pluggable bridge that is to be removed.
3. Loosen the bridge and pull the bridge out.
4. If necessary, repeat steps 2 and 3.
5. Replace the labeling strips.

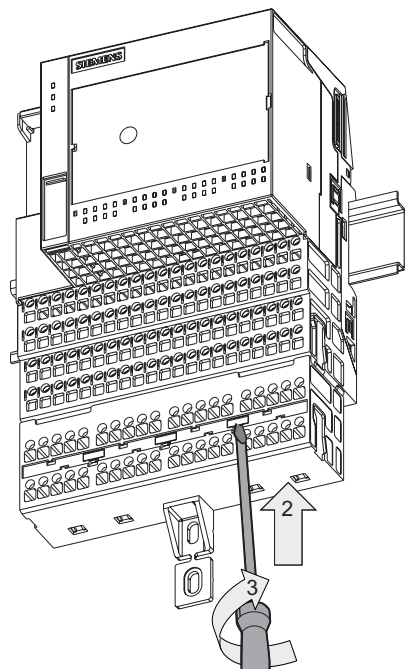


Figure 4-10 Remove bridge

Mount pluggable bridge

1. Remove the labels from the additional terminals.
2. Position the pluggable bridge between both voltage groups that are to be connected.
3. If necessary, repeat step 2.
4. Replace the labeling strips.

You can see which bridges are plugged by means of the inserted labeling strip.

4.7 Replacing the terminal box on the terminal module

Introduction

The terminal box is part of the terminal module. If necessary, you can replace the terminal box. It is not necessary to remove the terminal module.

Requirements

- The terminal module is installed, wired, and assembled with a COMPACT module, power module or electronic module.

Required tools

3-mm screwdriver

Procedure

1. Switch off the supply voltage on the terminal module and, if applicable, the power module.
2. Disconnect the wiring on the terminal module.
3. Simultaneously press
 - the upper and lower release buttons of the electronic module or power module, and remove it from the terminal module.
 - The above positioned release button of the COMPACT module and pull it out of the terminal module.
4. Insert the screwdriver from below at an angle into the small opening underneath the slot number plate, and at the same time pull the terminal box downward until it stops. Then pull the terminal box upward and out of the terminal module.
5. Replace the terminal box, and insert the new one into the terminal module from above (see figure). Then push the terminal box upward until it snaps into place.
6. Insert the COMPACT module, power module or electronic module into the terminal module.
7. Wire the terminal module.
8. Switch on the supply voltage on the terminal module and, if applicable, the power module.

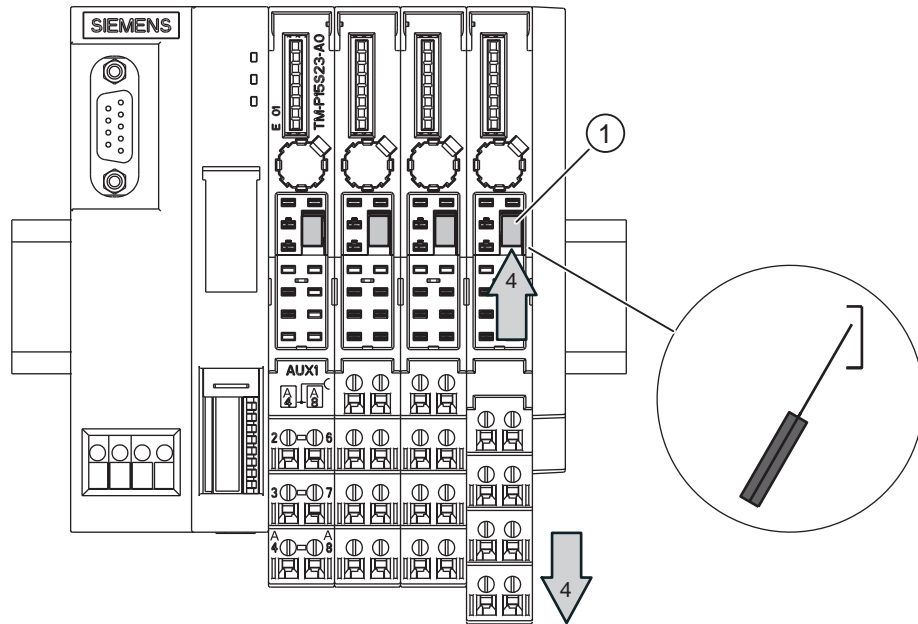


Figure 4-11 Replacing the terminal box on the terminal module

- (1) Slot number label

4.8 Installing the bus terminating module

Introduction

The terminating module on the right end of the ET 200S terminates the ET 200S distributed I/O system. If you have not inserted a terminating module, the ET 200S is not ready for operation.

Requirements

The last terminal module must be installed.

Installing the bus terminating module

1. Hook the bus terminating module onto the rail to the right of the last terminal module.
2. Pivot the terminating module backwards onto the DIN rail.
3. Push the bus terminating module to the left until you hear it lock into the last terminal module.

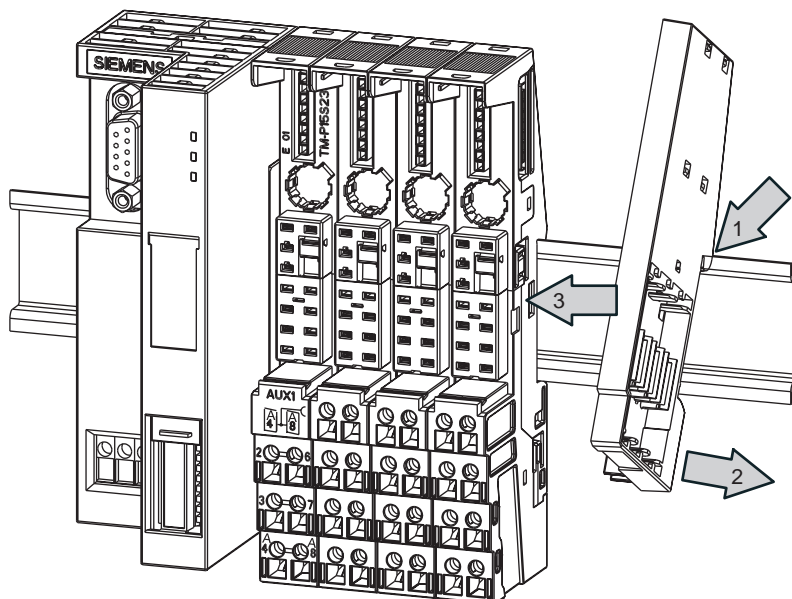


Figure 4-12 Installing the bus terminating module

Removing the Bus Terminating Module

1. Use a screwdriver to push the locking mechanism on the last terminal module down until the mechanism stops, and move the terminating module to the right.
2. Pivot the terminating module so that it comes off the DIN rail.

Note

If

- the terminating module of the ET 200S is removed and remounted under voltage, or
- the ET 200S backplane bus is interrupted during operation, e. g. at a terminal module, and then restored to function,

the complete power supply of the ET 200S must be switched off and on again in order to achieve a defined station status.

4.9 Installing the shield contact

Introduction

- The shield connection is needed for applying cable shields (e.g., analog electronic modules, 1COUNT 24V/100kHz electronic modules, and 1SSI electronic modules).
- Fit the shield connection on the terminal module.
- The shield connection consists of a shield connection element, a power bus (3 x 10 mm), a shield clamp, and a grounding terminal.

Requirements

- The terminal modules are installed.

Required tools

- 3-mm screwdriver
- Metal-cutting saw

Procedure

1. Push the shield connection element onto the first terminal module from below.
2. Push the shield connection element onto the last terminal module from below.
In order to stabilize the conductor rail between two shield connection elements during installation, you must connect an additional shield connection element after every 6th terminal module (given a width of 15 mm).
3. Saw off a piece of power bus of the appropriate size. The length of the power bus should be equal to the distance between the shield connection elements + 45 mm.
4. Push the conductor rail into the shield connection element. The power bus must be sized in such a way that it protrudes from the shield connection element by 15 mm on the left or right, depending on the installation.
5. Attach the shield terminals to the power bus (between the shield connection elements).
6. Attach the ground connection terminal to the protruding power bus.

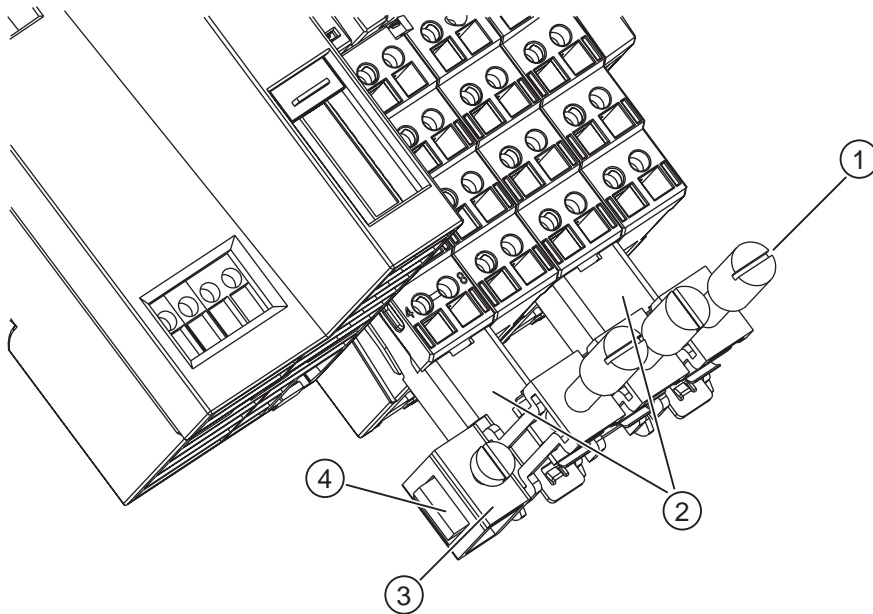


Figure 4-13 Installing the shield contact

- (1) Shielding terminals
- (2) shield connection elements
- (3) Ground connection terminal
- (4) Power bus

4.10 Applying slot number labels and color identification labels

Introduction

- The slot number labels identify the individual I/O modules with a slot (1 to 63).
- The color identification plates enable an individual color coding of the terminals in accordance with company or national conventions. The color-coding plates are available in white, red, blue, brown, yellow, yellow-green, and turquoise. Each terminal on the terminal module can be fitted with a color identification label.
- The slot number labels and color identification labels are applied onto the terminal modules.
 - Position of the slot number plate: below the coding element on the terminal module.
 - Position of the color-coding plates: directly next to each terminal on the terminal box.

Requirements

- The terminal modules are installed.
- You can only fit the slot number labels when no electronic modules are installed.
- The terminal modules should not be wired when you apply the color identification labels.

Required tools

3 mm screwdriver (for removal only)

Applying slot number labels and color identification labels

Applying slot number plates:

1. Break the slot number label (1 to 63) off the strip.
2. Use your finger to press the slot number label into the terminal module.

Applying color-coding plates:

1. You can twist off the color-coding plates directly from the strip onto the opening provided for them next to the terminal.
2. Use your finger to press the color identification labels into the terminal module.

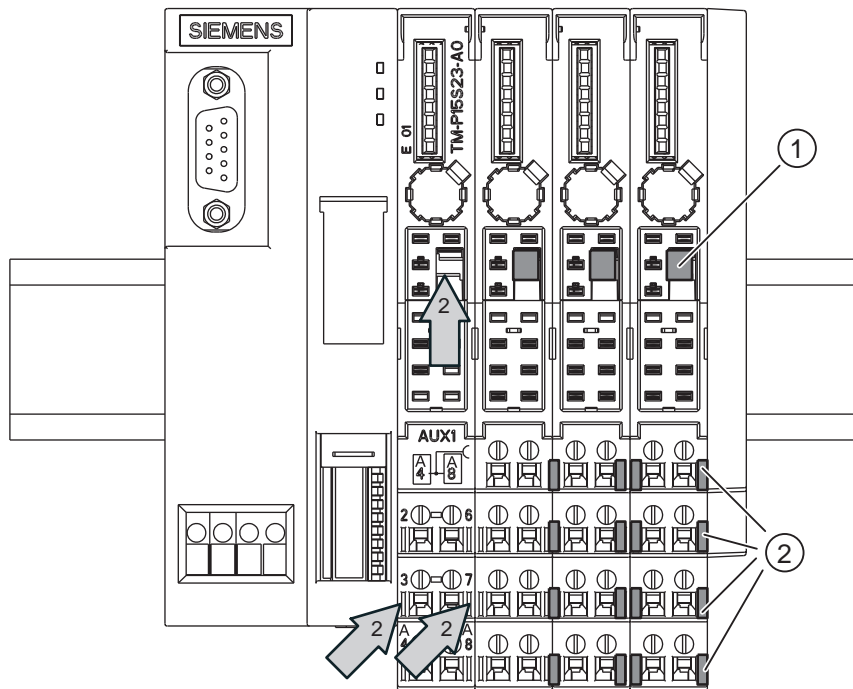


Figure 4-14 Applying slot number labels and color identification labels

- (1) Slot number label
- (2) Color identification labels

Removing slot number labels and color identification labels

Removing slot number plates:

1. Remove the electronic module from the terminal module.
2. Lever the slot number label out of its mount.

Removing color-coding plates:

Use a screwdriver to lever the color-coding plates from their mounts.

Wiring and assembly

5.1 General rules and regulations for operating the ET 200S

Introduction

When operating the ET 200S distributed I/O system as part of a plant or system, special rules and regulations have to be followed depending on the field of application.

This chapter provides an overview of the most important rules you have to observe when integrating the ET 200S distributed I/O system in a plant or system.

Specific application

Observe the safety and accident prevention regulations for specific applications, e. g. the machine protection directives.

Emergency stop devices

Emergency stop devices as defined in IEC 204 (corresponds to DIN VDE 113) must remain effective in all operating modes of the plant or system.

System Startup after Certain Events

The following table identifies situations you must pay attention to when the system starts up after the occurrence of certain events.

If there is ...	then ...
Startup follows a power dip or a power failure Startup of the ET 200S follows an interruption of the bus communication	Dangerous operating states must not occur. If necessary, force an emergency stop!
Startup follows unlocking of the emergency stop device	There must not be an uncontrolled or undefined startup.

Line voltage

The following table identifies requirements to be observed for the line voltage.

With...	Requirements...
Stationary plants or systems without all-pole line voltage disconnect switch	There must be a line voltage disconnect switch or a fuse in the building installation.
load power supplies, power supply modules	The set rated voltage range must match the local line voltage.
All circuits of the ET 200S distributed I/O system	Any fluctuation/deviation of the line voltage from the rated value must be within the permitted tolerances

24 VDC supply

The following table identifies requirements you must observe for the 24 VDC supply.

With ...	you need to observe ...	
Buildings	External lightning protection	Take lightning protection precautions
24 VDC power supply cables, signal cables	internal lightning protection	(for example, lightning protection elements)
24 VDC supply	Safe (electrical) isolation of extra-low voltage	

Protection against external electrical influences

The table below shows how you must protect your system against electrical interference or faults.

With ...	Make sure that ...
all plants or systems in which the ET 200S is integrated,	the plant or system is connected to a protective conductor for diverting electromagnetic interference.
power supply, signal, and bus cables	the cable routing and installation is correct.
Signal and bus cables	A cable or wire break must not lead to undefined states in the plant or system.

See also

Mechanical and Climatic Ambient Conditions (Page 9-7)

5.2 Operating the ET 200S on a grounded incoming supply

Introduction

In this section, you will find information on the overall configuration of an ET 200S distributed I/O system on a grounded incoming supply (TN-S system). The specific subjects discussed are:

- Disconnecting devices, short-circuit and overload protection to VDE 0100 and VDE 0113
- Load voltage supplies and load circuits.

Grounded incoming supply

In grounded incoming supplies, the neutral conductor of the supply line is grounded. A single fault between a live conductor and ground or a grounded part of the installation results in tripping of the protective devices.

Safety isolation

Safe electrical isolation must be provided for:

- Modules that require supply with voltages ≤ 60 VDC or ≤ 25 VAC.
- 24 VDC load circuits

Configuring the ET 200S with ungrounded reference potential

From IM151-1 BASIC (6ES7151-1CA00-0AB0), IM151-1 STANDARD (6ES7151-1AA02-0AB0), IM151-1 FO STANDARD (6ES7151-1AB01-0AB0), IM151-1 HIGH FEATURE (6ES7151-1BA00-0AB0), IM151-3 PN, IM151-3 PN HIGH FEATURE and IM151-1 COMPACT, the ground M of the nominal supply voltage of the IM151-x is connected to the DIN rail (grounding conductor) via an RC combination thus making a ground-free installation is possible.

To divert interference current, the reference potential of the IM1511 is connected internally to the rail (protective conductor) via an RC combination ($R = 10 \text{ M}\Omega / C = 22 \text{ nF}$). High-frequency interference currents are thus discharged, and static charge is prevented.

Components and protective measures

Various components and protective measures are specified for assembling a full installation. The type of components and the binding character of protective measures depends on which DIN regulation applies to your plant. The following table refers to the figure below.

Compare ...	Refer to figure	DIN VDE 0100	DIN VDE 0113
Disconnection element for control system, sensors, and actuators	①	... Part 460: Main switch	... Part 1: Disconnecter
Short-circuit / overload protection: In groups for sensors and actuators	②	... Part 725: Single-pole protection of circuits	... Part 1: <ul style="list-style-type: none"> • With grounded secondary circuit: unipolar • otherwise: fuse all poles
	③		
Load current PS for AC power circuits with more than five items of electromagnetic apparatus	②	Isolation by transformer recommended	Isolation by transformer recommended
	③		

ET 200S in the overall configuration

The figure below shows the ET 200S distributed I/O system in the overall configuration (load voltage supply and grounding concept) with incoming supply from a TN-S system.

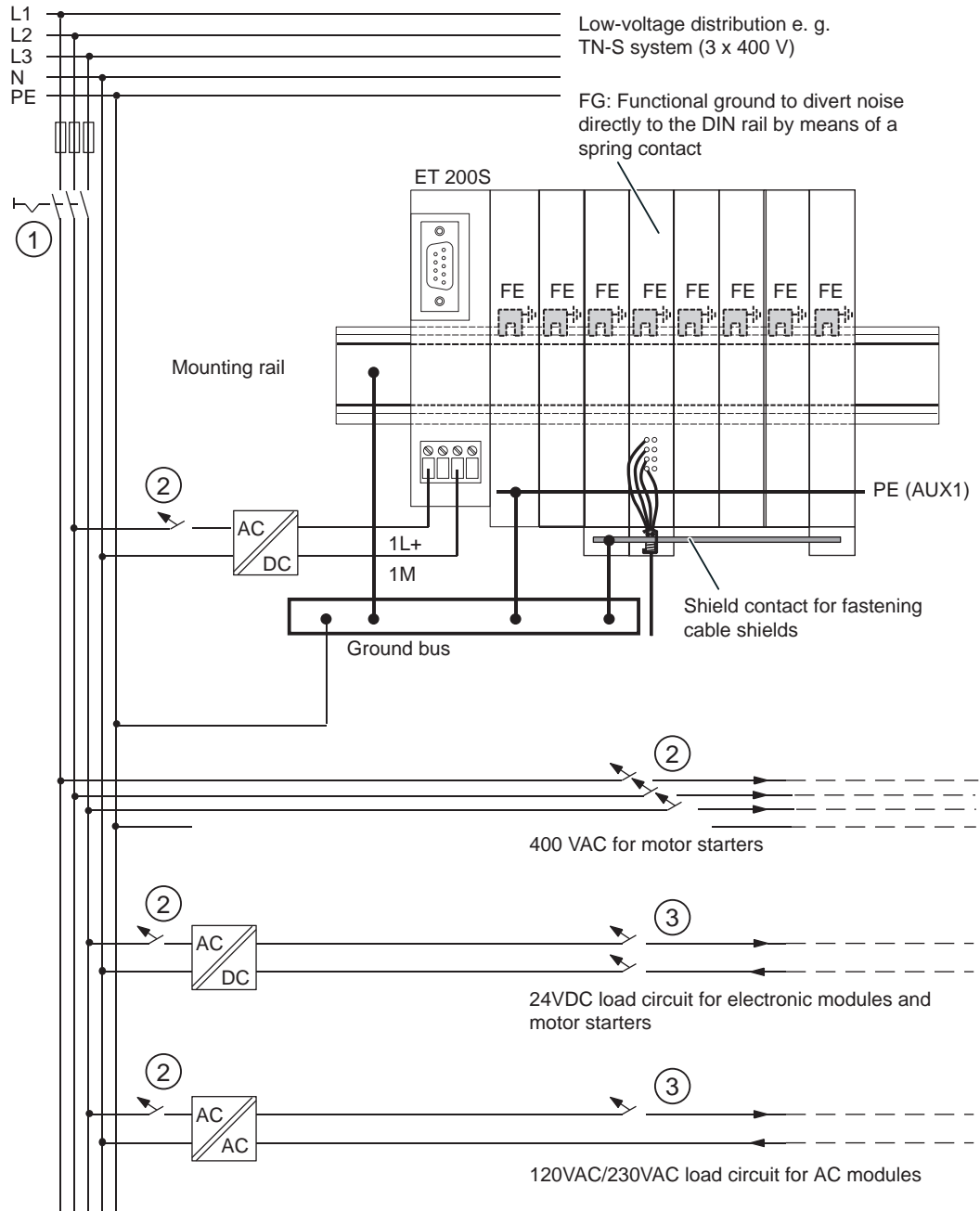


Figure 5-1 Operation of ET 200S with grounded reference potential

5.3 Electrical configuration of the ET 200S

Electrical isolation

In the ET 200S, isolation exists between:

- The load circuits/process and all other circuit components of the ET 200S
- The PROFIBUS DP interface in the interface module and all other circuit components
- The PROFINET interface in the IM151-3 PN interface module and all other circuit components

The figure below shows the voltage ratios for ET 200S with IM151-1. Only the primary components are shown in the figure.

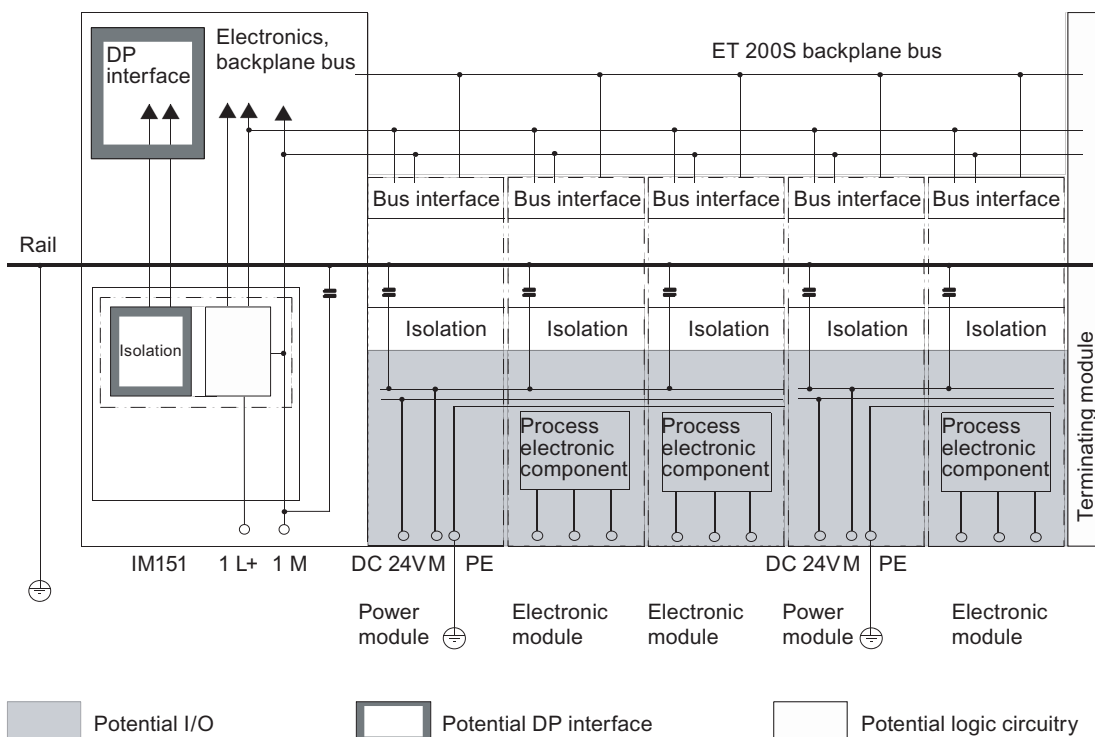


Figure 5-2 Potentials of the ET 200S with IM151-1

5.4 Wiring the ET 200S

5.4.1 Wiring rules for the ET 200S

Wiring rules

Wiring rules for ...		Interface module (supply voltage)	Terminal modules (spring and screw terminals)	Terminal modules (Fast Connect)
Connectable wire cross-sections for solid wires		No	0.14 mm to 2.5 mm ²	0.5 mm to 1.5 mm ²
permitted cross-sections of flexible conductors	Without end sleeve	0.25 mm to 2.5 mm ²	0.14 mm to 2.5 mm ²	0.5 mm to 1.5 mm ²
	With end sleeve	0.25 mm to 1.5 mm ²	0.14 mm to 1.5 mm ²	---
Number of wires per connection		1 or a combination of 2 conductors up to 1.5 mm ² (total) in a common end sleeve		1
Maximum external diameter of the wire insulation		Ø 3.8 mm	Ø 3.1 mm at 1.5 mm ² Ø 3.8 mm at 2.5 mm ²	Ø 3.2 mm at 1.5 mm ²
Stripped wire length		11 mm		---
End sleeves in accordance with DIN 46228	Without insulating collar	Form A, 8 to 12 mm long	Form A, up to 12 mm long	---
	with insulating collar 0.25 to 1.5 mm ²	Form E, up to 12 mm long		---

5.4.2 Wiring a terminal module with screw-type terminals

Introduction

In terminal modules with screw-type terminals, the individual wires are screwed into the terminal.

Requirements

- Adhere to the wiring rules.
- No end sleeves are required

Required tools

3-mm screwdriver

Procedure

1. Strip 11 mm of insulation from the wires.
2. Insert the wires into the terminal.
3. Screw the ends of the individual wires onto the terminal module (torque of 0.4 to 0.7 Nm).

5.4.3 Wiring a terminal module with spring terminals

Introduction

When wiring terminal modules with spring terminals, the wires are secured in the terminal simply by inserting them into the terminal.

Requirements

Follow the wiring rules.

Required tools

3-mm screwdriver

Procedure

1. Strip 11 mm of insulation from the wires.
2. Insert the screwdriver in the upper (round) opening of the terminal.
3. Insert the wire until it stops in the lower (square) opening of the terminal.
4. Release the terminal by pushing the screwdriver into the opening.

5. Push the wire into the released spring terminal, and pull the screwdriver out.

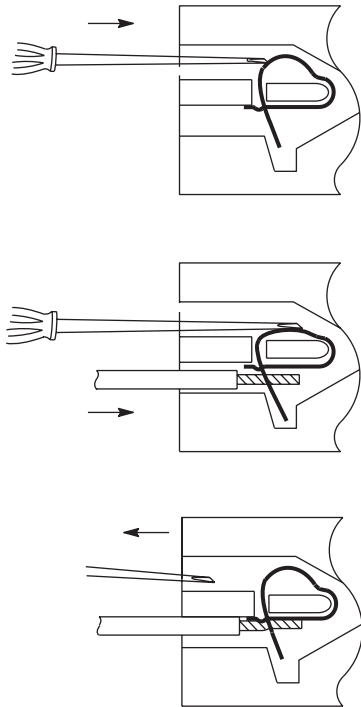
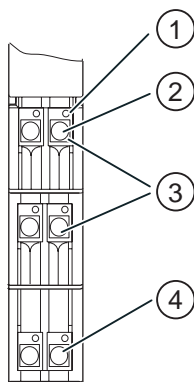


Figure 5-3 Wiring with spring terminals

5.4.4 Wiring terminal modules with Fast Connect

Introduction

- In the case of terminal modules with Fast Connect, the individual wires are attached using a quick connection method that requires no stripping.
- Fast Connect is a connection method that requires no conductor preparation (i. e., the conductor insulation does not have to be stripped).
- Each terminal of the terminal module with Fast Connect has a test opening (e. g. measuring the voltage). The test opening is suitable for probes with a maximum diameter of \varnothing 1.5 mm.
- End sleeves are not permitted.
- Diagram of the Fast Connect terminal module



- (1) Opening for measuring, checking: max. \varnothing 1.5 mm
- (2) Opening for 1 conductor: 0.5 ...1.5 mm²
- (3) Locking mechanism open (the wire can be inserted)
- (4) Locking mechanism closed (the wire is connected)

Requirements

- Follow the wiring rules.

Required tools

3-mm screwdriver

Connectable wires

You can connect solid and flexible wires with PVC insulation with a wire cross-section of 0.5 mm² up to 1.5 mm² (max. external diameter 3.2 mm). If the conductor cross-section is the same, they can be connected fifty times. You can find a list of the tested conductors at: <http://www.idc2.de>

UL-compliant cables and connections

Wiring range for insulating piercing connection 22 -16 AWG solid/stranded PVC insulated conductors, UL style no. 1015 only.

Procedure

1. Insert the unstripped wire into the round opening **to the end stop** (the insulation and conductor must form a flat surface).
2. Insert the screwdriver into the opening above the locking mechanism **to the end stop**.
3. Press the screw driver downward until the locking mechanism reaches its end position.

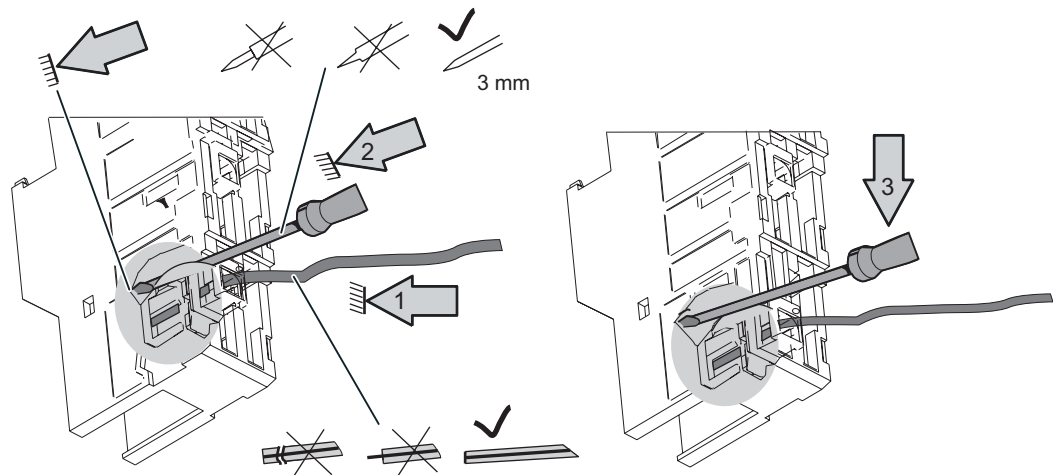


Figure 5-4 Wiring terminal modules with Fast Connect

Result: The wire is connected.

Note

If you want to reconnect a wire that was connected previously, you must first cut it off.

Releasing the wiring from the terminal module with Fast Connect

1. Insert the screwdriver into the opening below the locking mechanism to the end stop.
2. Using the screwdriver, lift and press the locking mechanism upward.
3. The wiring is released: Remove the wire.

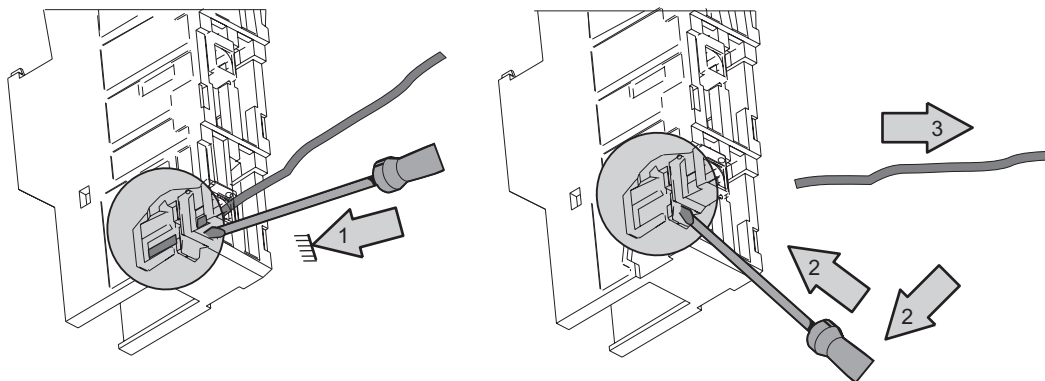


Figure 5-5 Releasing the wiring from the terminal module with Fast Connect

Removing any conductor remnants (if necessary)

To remove any conductor remnants (insulation), you can remove disassemble the locking mechanism from the terminal module (see Step 3). To do this, the locking mechanism must be open (upper position). You can only insert the locking mechanism in the upper position (see Step 4).

1. Insert the screwdriver in the opening below the locking mechanism (the tip of the screwdriver is on the lip of the locking mechanism).
2. Press the screwdriver downward until you lift the locking mechanism from the terminal module.
3. Remove the locking mechanism from the terminal module. Remove any remnants of the conductor from the locking mechanism.
4. Use your fingers to press the locking mechanism back into the opening. Caution: Insert the locking mechanism in the correct position or you could damage the terminal point.

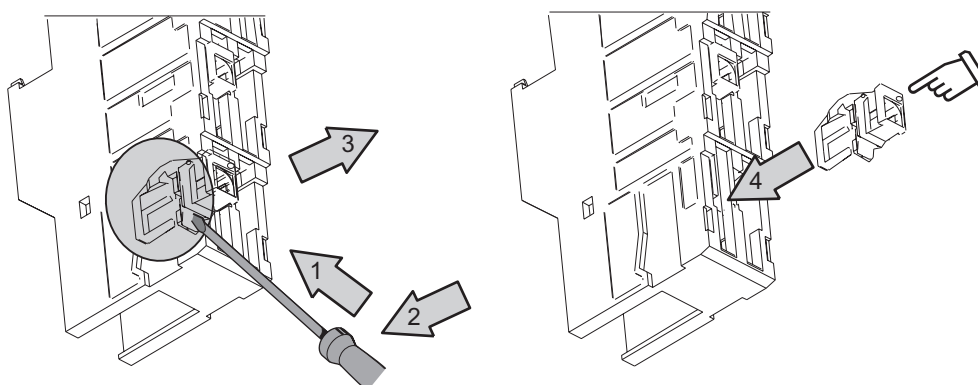


Figure 5-6 Removing the locking mechanism from the terminal module

5.4.5 Wiring terminal modules

Introduction

The ET 200S distributed I/O system incorporates terminal modules both for power modules, electronic modules and COMPACT modules:

- In the case of the terminal modules for power modules, you connect the supply/load voltage for the respective voltage group.
- Terminal modules for electronic modules connect the ET 200S with the process.
- With the terminal modules for electronic modules you can connect cable shielding by means of a shield connection.
- For terminal modules for COMPACT modules, connect:
 - the supply voltage for the interface part
 - the load voltage for the relevant voltage group
 - the connections for the integrated peripherals with the process (with the help of additional terminals for 3 and 4 conductor technology)

Requirements

- You must wire the terminal modules with the supply/load voltage switched off at the power module and the load voltage switched off at the electronic module.
- For terminal modules for COMPACT modules with you must wire up with the supply voltage for the interface part switched off and the supply/load voltage switched off for the voltage groups.
- Follow the wiring rules.

Required tools

3-mm screwdriver

Wiring terminal modules for power modules

The terminal assignment of the terminal module depends on which power module is inserted. You can find information regarding the terminal and power modules in the *ET 200S* device manual.

Wiring terminal modules for digital, analog, and technological modules

The terminal assignment of the terminal module depends on which electronic module is inserted. You can find information regarding the terminal and electronic modules in the *ET 200S* device manual. You can find information about technological modules in the *Technological Functions* manual.

Wiring terminal modules for COMPACT modules

The terminal assignment of the terminal module depends on which COMPACT module is inserted. You can find information regarding the terminal and COMPACT modules in the chapter entitled *COMPACT Modules* and in the *ET 200S* device manual.

Connecting the Cable Shielding

We recommend that you use the shield connection to connect cable shielding (e. g. in the case of analog electronic modules, the 1COUNT 24V/100kHz electronic module and the 1SSI electronic module.).

1. Remove the insulation material from the area around the shield terminal, and clamp the cable shield in the shield terminal (above the conductor rail). The shield clamp is suitable for one cable with a maximum diameter of \varnothing 8 mm or two cables with a maximum diameter of \varnothing 4 mm each.
2. Tighten the shield terminal (approximately 0.5 Nm)
3. Repeat steps 1 and 2 if you want to connect additional cable shields.
4. Strip the insulation from the ground wire (from 6 mm to 25 mm²), and insert it in the ground connection terminal (under the conductor rail). Tighten the ground connection terminal (2 Nm to 2.5 Nm).
5. Attach the other end to the ground bus.

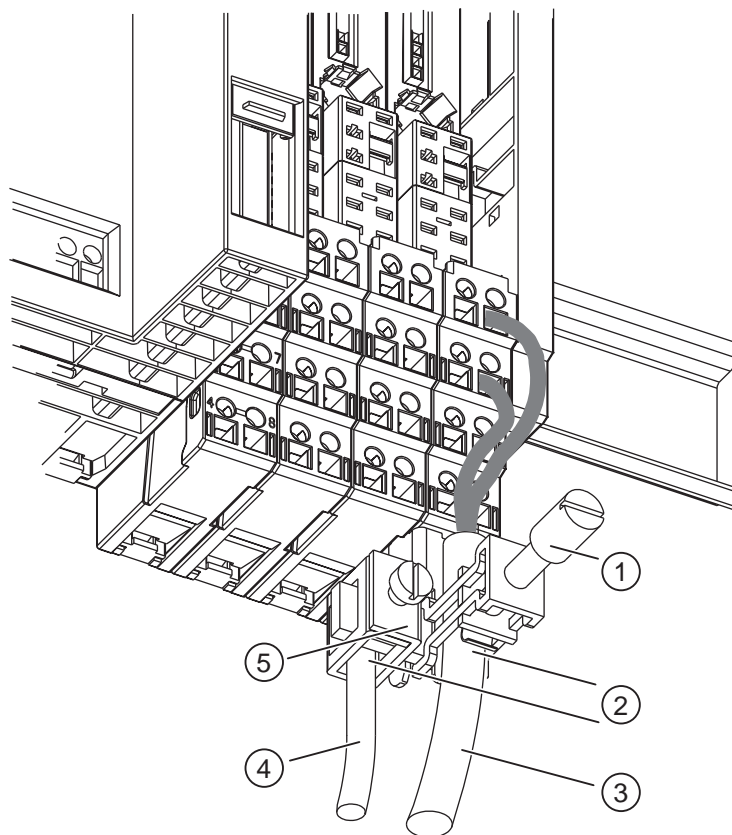


Figure 5-7 Connecting the Cable Shielding

- ① Shield terminal
- ② Insulation material removed
- ③ Cable to the sensor
- ④ Cable to the ground bus
- ⑤ Ground connection terminal

Note

To stabilize the shield connection, you must mount and screw in at least one shield terminal above the shield connection element.

5.4.6 Wiring an interface module with PROFIBUS DP interface (electrically)

Introduction

The supply voltage and the bus connector (RS 485) are connected at the IM151-1 BASIC, IM151-1 STANDARD, and IM151-1 HIGH FEATURE interface modules.

Requirements

- Wire the interface module with the supply voltage switched off.
- Follow the wiring rules.

Required tools

3-mm screwdriver

Procedure

1. Connecting the supply voltage:
 - Strip the insulation from the wires for the supply voltage of the interface module.
 - Secure the individual wires in the screw-type terminal.
2. Connecting PROFIBUS DP:
 - Insert the bus connector onto the PROFIBUS DP connection.
 - Tighten the screws of the bus connector.

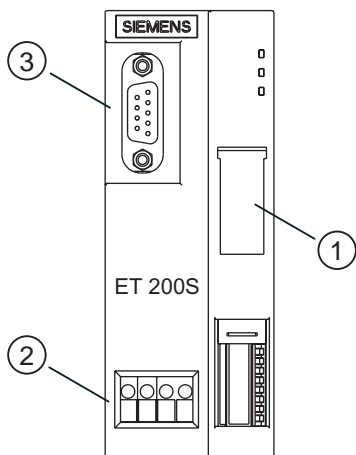


Figure 5-8 Wiring IM151-1 BASIC, IM151-1 STANDARD, and IM151-1 HIGH FEATURE

- ① Labeling strip
- ② Supply voltage (1L+, 2L+, 1M, 2M)
- ③ PROFIBUS DP

See also

Wiring rules for the ET 200S (Page 5-7)

5.4.7 Wiring an interface module with PROFIBUS DP interface (optically)

Introduction

The supply voltage and the fiber-optic cable are connected at the IM151-1 FO STANDARD interface module via a simplex connector.

Requirements

- Wire the interface module with the supply voltage switched off.
- Follow the wiring rules.

Required tools

3-mm screwdriver

Required accessories

- Package with simplex connectors and polishing sets (6GK1901-0FB00-0AA0)
- Package with plug adapters (6ES7 195-1BE00-0XA0)

- Fiber optic duplex cable see catalog IK PI

Rules for configuring a fiber optic cable network with IM151-1 FO STANDARD

In fiber-optic networks with participants with integrated fiber-optic interfaces:

- The fiber-optic network can only be configured as a line.
- If you remove the fiber-optic cable from an integrated fiber-optic interface or the supply voltage to the IM151-1 FO STANDARD fails, all subsequent nodes will no longer be accessible.

Example configuration of a fiber-optic cable network with IM151-1 FO STANDARD

The figure below presents an example of how to set up a fiber-optic cable network with the ET 200S and the IM151-1 FO STANDARD interface module.

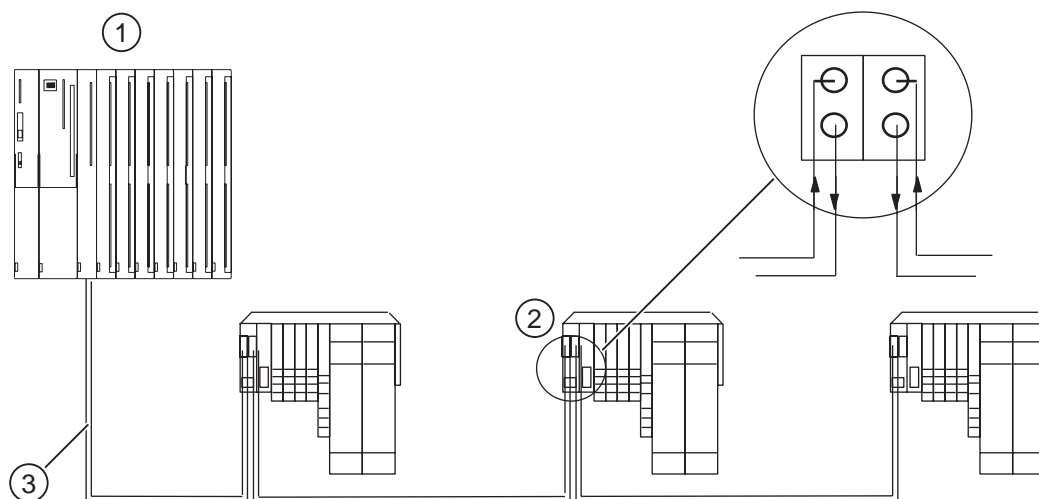


Figure 5-9 Fiber-optic cable network with IM151-1 FO STANDARD

- ① S7-400H automation system with IM 467 FO as the DP master
- ② ET 200S Distributed I/O with IM151-1 FO STANDARD
- ③ Fiber-optic duplex cable

Installing simplex connectors

Note

The fiber-optic duplex cable may have the following maximum lengths:

- PROFIBUS Plastic Fiber Optic standard cable 50 m
 - PROFIBUS PCF Fiber Optic standard cable 300 m
-

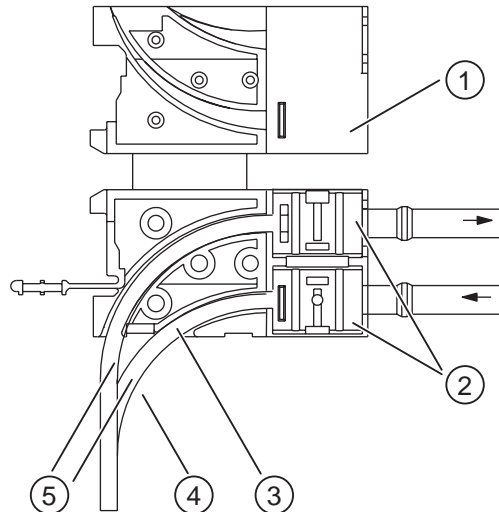
1. Remove approximately 30 cm of the jacket of the fiber-optic duplex cable.
2. Attach the fiber-optic duplex cable with the associated simplex plugs. You can find detailed installation instructions in the *SIMATIC NET- PROFIBUS Networks* manual.

Hint: Do not click the 2 simplex plugs closed individually, click them closed together so that they complete a "duplex plug". In this manner you will achieve a better hold in the plug adapter.

IMPORTANT: The smoothed and polished surface of the plastic fibers must be absolutely flat and even. Likewise, the plastic jacket must not protrude or be cut unevenly. Every irregularity causes strong attenuation of the light signal via the fiber-optic cable!

3. Place the simplex connectors into the plug adapter for the IM151-1 FO STANDARD interface module and the fiber-optic cable into the designated cable ducts. Snap the plug adapter closed until you can hear clearly that the side panels have engaged.

When inserting the plug in the plug adaptor, pay attention to the correct position:
Transmitter always up and receiver always down!



- ① Plug adapter for IM151-1 FO STANDARD
- ② Snap the two simplex connectors closed together such that you obtain a "duplex connector."
- ③ Hint: Cut the lower wire approx. 10 mm shorter than the upper wire to achieve a better arrangement of the wiring.
- ④ Maximum 30 mm bending radius!
- ⑤ Fiber-optic duplex cable

Bending radius for the fiber-optic cable

When placing the fiber-optic duplex core into the plug adapter and routing the cable, be sure not to exceed the permissible bending radius of 30 mm. Refer also to the installation guidelines for fiber-optic cable in the *ET 200 Distributed I/O System* or *SIMATIC NET - PROFIBUS Networks* manual.

Reusing fiber-optic cable

Note

If you insert previously used fiber-optic cable into the plug adapter, you must shorten both fiber-optic cores by the amount of the curved lengths and reinstall the simplex connectors. This will prevent any attenuation losses caused by re-bent, heavily-stressed portions of the fiber-optic duplex core.

Wiring interface module IM151-1 FO STANDARD

1. Connecting the supply voltage:
 - Strip the insulation from the wires for the supply voltage of the interface module.
 - Secure the individual wires in the screw-type terminal.
2. Connecting PROFIBUS DP:
 - Insert the fiber-optic cable with the mounted plug adapters into the IM151-1 FO STANDARD.
 - Fold the protruding plug adapter grip upward.

Pay attention to the correct position: The transmitter fiber optic cable is inserted into the receiver female connector and the receiver fiber optic cable into the transmitter female connector of the fiber optic cable interface of the IM151-1 FO STANDARD.

If the IM151-1 FO STANDARD interface module is the last node of the fiber-optic cable network, the unoccupied fiber-optic cable interface must be blanked off (blanking plug inserted in IM151-1 FO STANDARD, as supplied).



Caution

Do not look directly into the opening of the optical transmit diodes. The emitted light beam could damage your eyes.

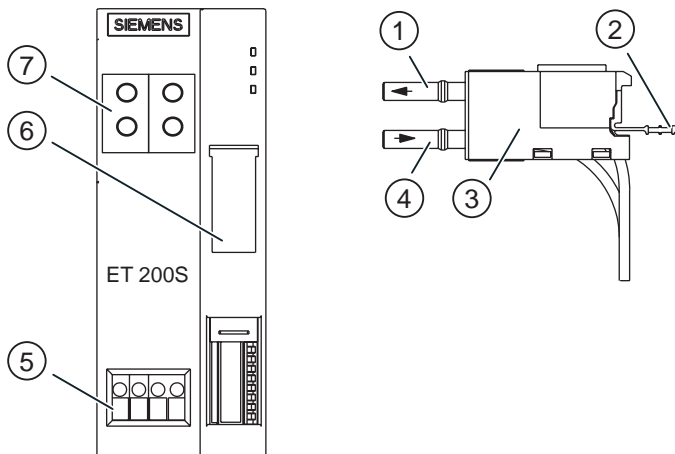


Figure 5-10 Wiring IM151-1 FO STANDARD

- ① Transmitter
- ② Grip
- ③ Simplex connectors
- ④ Receiver
- ⑤ Supply voltage (1L+, 2L+, 1M, 2M)
- ⑥ Labeling strip
- ⑦ PROFIBUS DP (fiber-optic cable)

See also

Wiring rules for the ET 200S (Page 5-7)

5.4.8 Wiring an interface module with PROFINET IO interface (electrically)

Introduction

Connect the supply voltage and the bus connectors to the interface module IM151-3 PN.

Prerequisites

- Wire the interface module with the supply voltage switched off.
- Follow the wiring rules.

Tools required

- Screwdriver with 3 mm blade
- Industrial Ethernet Fast Connect stripping tool (6GK1 901-1GA00) (stripping tool for Industrial Ethernet Fast Connect installation cables)

Required accessories

- PROFINET connector (according to the specifications in the *PROFINET Installation Guide*)
- Industrial Ethernet Fast Connect installation cables

The following are suitable:

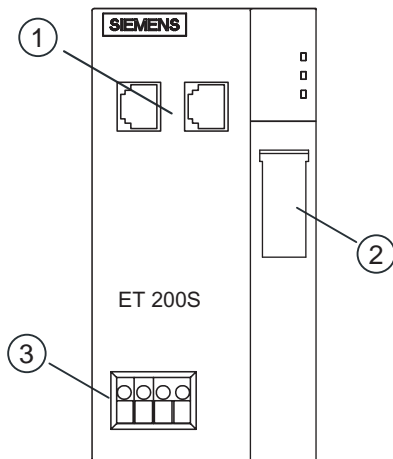
Fast Connect standard cable	6XV1840-2AH10
Fast Connect trailing cable	6XV1840-3AH10
Fast Connect marine cable	6XV1840-4AH10

Installing a bus connector

Install the PROFINET connector according to the specifications in the *PROFINET Installation Guide*.

Procedure

1. Connecting the supply voltage:
 - Strip the insulation from the wires for the supply voltage of the interface module.
 - Secure the individual wires in the screw-type terminal.
2. Connectinging PROFINET:
 - Insert the bus connector into the PROFINET connection.



- ① 2-port switch (switched hub) for PROFINET
- ② Labeling strip
- ③ Supply voltage (1L+, 2L+, 1M, 2M)

5.5 Plugging and removing electronic modules and COMPACT modules

5.5.1 Plug and label electronic or COMPACT modules

Introduction

- The electronic modules or COMPACT modules are inserted in the terminal modules.
- A labeling strip allows you to identify the electronic modules or COMPACT modules.
- Electronic and COMPACT modules are:
 - Self-coding
 - Type-coded

The first time you insert an electronic or COMPACT module, a coding key engages on the terminal module. This mechanically prevents the wrong electronic module from being inserted.

Requirements

Observe the rules regarding inserting electronic modules as detailed in the *Application Planning* chapter.

Insert electronic or COMPACT modules

1. Insert the electronic module or COMPACT module into the terminal module until you hear it snap into place.
2. For identification purposes, pull the labeling strip
 - upward out of the electronic module.
 - to the right out of the COMPACT module.
The labeling strip must be pulled to the right over the slot (with a 3-mm screwdriver).
3. Subsequently, reinsert the labeling strip back into the electronic module or COMPACT module.

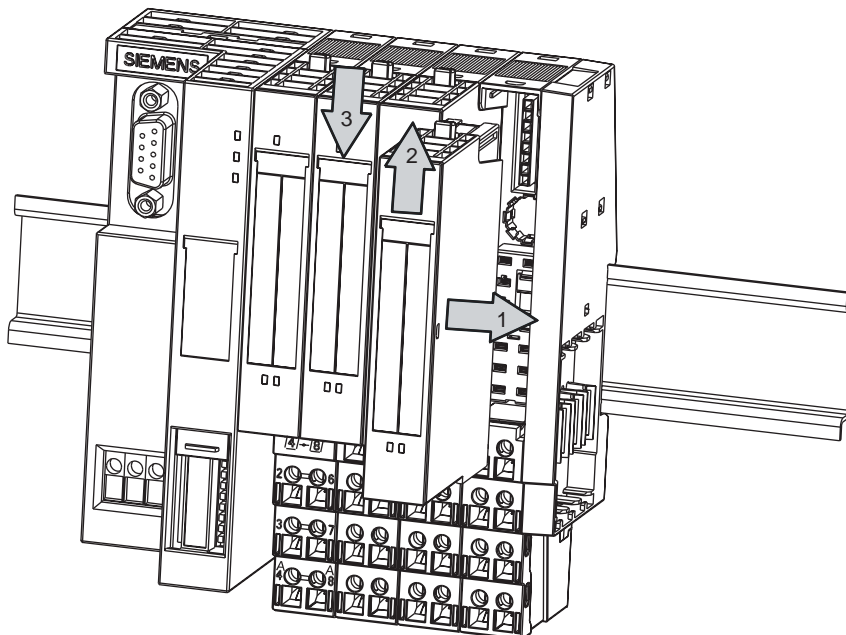


Figure 5-11 Inserting and labeling the electronic modules

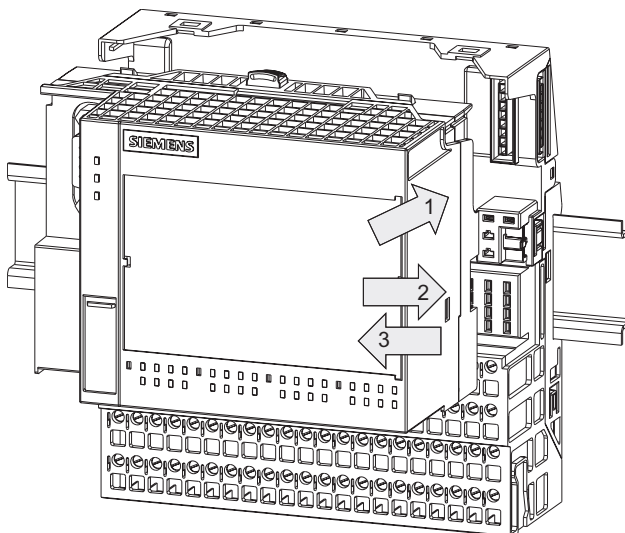


Figure 5-12 Insert and identify COMPACT module

Removing electronic or COMPACT modules

Caution

An electronic or COMPACT module may only be removed if the associated load voltage has been switched off.

1. Simultaneously press
 - the two release buttons on the top and bottom of the electronic module.
 - the release button positioned at the top of the COMPACT module.
2. Pull the electronic or COMPACT module forward out of the terminal module.

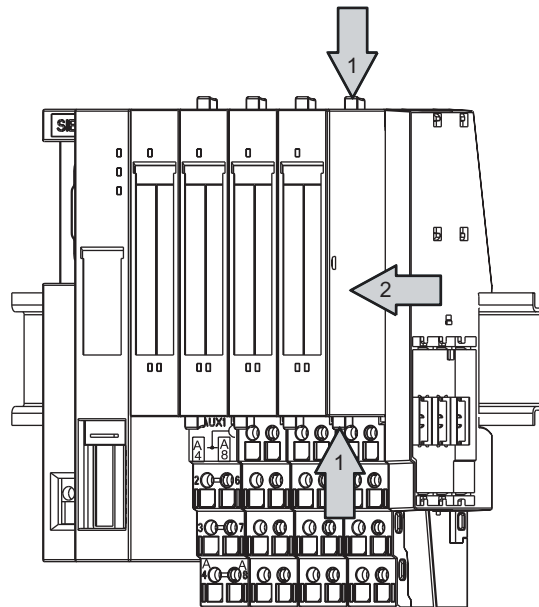


Figure 5-13 Removing electronic modules

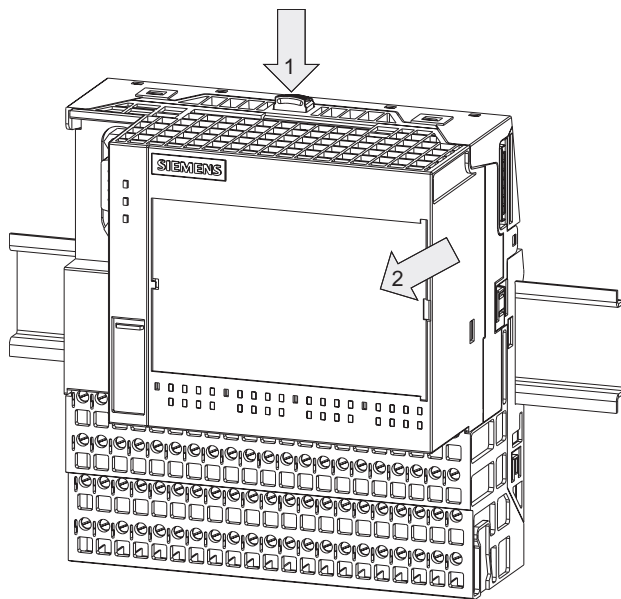


Figure 5-14 Removing COMPACT modules

Implementing an electronic module or COMPACT module type change

You have already removed the electronic module or COMPACT module:

1. Use a screwdriver to push the code element out of the terminal module.
2. Reinsert the coding key onto the used electronic module or COMPACT module.
3. Insert the electronic module or COMPACT module (type change) into the terminal module until you hear it snap into place.
4. Label the new electronic module or COMPACT module.

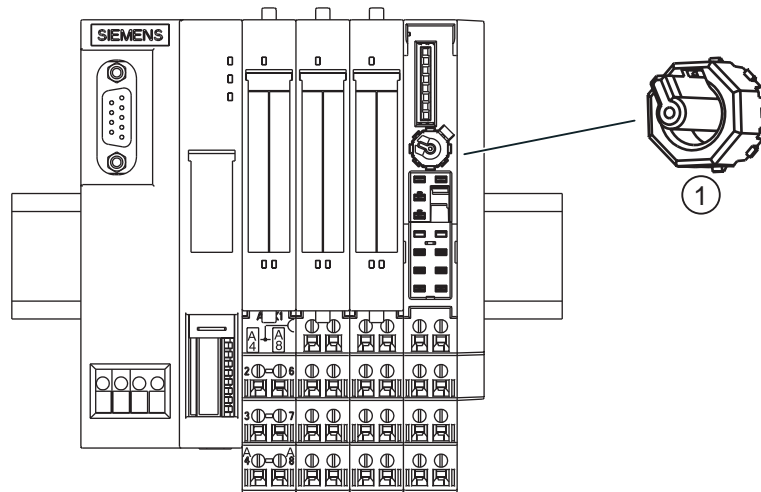


Figure 5-15 Removing the code element

① coding element



Warning

Changes to the coding element can result in dangerous plant conditions.

Replacing a defective electronic module or COMPACT module

You have already removed the electronic module or COMPACT module:

1. Remove the coding element from the underside of the new electronic module or COMPACT module.
2. Insert the new electronic module or new COMPACT module (same type) into the terminal module until you hear it snap into place.
3. Label the new electronic module or COMPACT module.

See also

Incorrect configuration states of ET 200S on PROFIBUS DP (Page 8-50)

Switching on the ET 200S (Page 3-1)

5.5.2 Removing and inserting modules during operation

Introduction

ET 200S supports the removal and insertion of modules during operation (RUN mode). The ET 200S remains in RUN mode when an electronic module is removed. The protective conductor connections of the ET 200S are not interrupted.

Rules

- You cannot remove and insert modules during operation unless the corresponding parameters have been assigned.
- You can remove and insert modules during operation with IM151-1 BASIC, IM151-1 COMPACT, IM151-1 STANDARD (6ES7151-1AA01-0AB0 or higher), IM151-1 FO STANDARD, IM151-1 HIGH FEATURE, IM151-3 PN and IM151-3 PN HIGH FEATURE.
- If **one** module is missing (gap) and the ET 200S POWER ON is switched, the station will **not** start up.
- The removal and insertion of modules affects the cycle synchronization (constant bus cycle time).
- When replacing more than one module, make sure that **only one** gap occurs.

Principle

The following table indicates which modules you can remove and insert under which conditions:

Table 5-1 Removing and inserting electronic modules

Module	Removing and inserting	Conditions
Interface module	No	---
IM151-1 COMPACT	No	---
Power modules	Yes	The load voltage must be switched off!
Potential distributor module 4POTDIS	Yes	The load voltage must be switched off!
Digital electronic modules (input)	Yes	---
Digital electronic modules (output)	Yes	The load voltage must be switched off by means of an external switch/fuse!
Analog electronic modules	Yes	---
4 IQ-SENSE	Yes	The sensors can also be replaced during operation. The electronic module then assigns parameters automatically to these sensors.

Module	Removing and inserting	Conditions
1COUNT 24V/100kHz	Yes	The load voltage must be switched off by means of an external switch/fuse!
1COUNT 5V/500kHz		
1SSI		
1STEP 5V/204kHz		
2PULSE		
1POS INC/Digital		
1POS SSI/Digital		
1POS INC/Analog		
1POS SSI/Analog		
1SI 3964/ASCII		
1SI Modbus/US\$	Yes	---
RESERVE	Yes	---

See also

Incorrect configuration states of ET 200S on PROFIBUS DP (Page 8-50)

Incorrect configuration states of the ET 200S on the PROFINET IO (Page 8-61)

Commissioning

6.1 Safety tests prior to commissioning

Performing tests

Note

You must ensure the safety of your facility. Before a system undergoes final commissioning, you should perform a complete function test and the necessary safety tests.

Incorporate foreseeable errors when planning the tests. In this way, you can avoid exposing your personnel or property to danger during operation.

6.2 Commissioning on PROFIBUS DP

6.2.1 Configuring ET 200S on PROFIBUS DP

6.2.1.1 Basic principles of configuration for the ET 200S on PROFIBUS DP

Introduction

Configuration involves configuring and assigning parameters to the ET 200S.

- Configuration: The systematic arrangement of the different ET 200S modules (setup).
- Assigning parameters: Defining the ET 200S parameters with the configuration software.

Note

The ET 200S is included in the hardware catalog of HW Config:

- IM151-1 BASIC: *STEP 7* V5.2 and higher
- IM151-1 COMPACT: f*STEP 7* V5.3 and higher with Service Pack 3 + HSP "ET 200S/COMPACT"
- IM151-1 STANDARD: *STEP 7* V5.0 and higher with Service Pack 3
- IM151-1 FO STANDARD *STEP 7* V5.1 and higher with Service Pack 1
- IM151-1 HIGH FEATURE from *STEP 7* V5.1 and higher with Service Pack 3

You will not need a GSD file. Advantages:

- Simplified summary of the devices (via the "Pack addresses" button in HW Config)
- Validity checking of parameters

You can find further information about the procedure in the *STEP 7* Online Help.

DPV1 operation

If you are using IM151-1 STANDARD (6ES7151-1AA04-0AB0 or higher) in DPV1 mode on an S7 CPU that does not support an insert/remove module interrupt, you must not enable the "Operation at preset <> actual configuration" parameter in *STEP 7*. Otherwise, the removal of a module (module failure) always results in a station failure (OB 86).

If it is imperative that you enable "Operation at preset <> actual configuration", you must either select DPV0 mode or configure IM151-1/FO STANDARD using the GSD file (under "Additional field devices - I/O" in the *STEP 7* hardware catalog). "Operation at preset <> actual configuration" is then possible even when the insert/remove module interrupt is disabled.

However, the S7-CPU does not register an insertion or removal (module failure). You can detect such events only by cyclically reading the diagnostic frame and evaluating the module status.

Configuring by means of the GSD file

You configure the ET 200S distributed I/O system using the GSD file. The ET 200S is linked as norm slave in your system via the GSD file. You can download the GSD file for ET 200S on the Internet at the following address:

<http://support.automation.siemens.com/WW/view/de/652154>

The following GSD files are available:

- IM151-1 BASIC: "SIEM80F3.GSx"
- IM151-1 STANDARD:
 - to 6ES7151-1AA02-0AB0: "SIEM806A.GSx"
 - to 6ES7151-1AA03-0AB0: "SI03806A.GSx"
- IM151-1 FO STANDARD "SI03806B.GSx"
- IM151-1 HIGH FEATURE
 - to 6ES7151-1BA00-0AB0: "SI0180E0.GSx"
 - to 6ES7151-1BA01-0AB0: "SI0280E0.GSx"
- IM151-1 COMPACT 32DI: "SIEM8201.GSx"
- IM151-1 COMPACT 16DI/16DO: "SIEM8200.GSx"

6.2.1.2 Grouping modules for the configuration

You can only combine digital modules or motor starters with useful data amounting to less than 1 byte.

Introduction

The ET 200S has a maximum address area of:

- IM151-1 BASIC: up to 88 bytes for inputs and 88 bytes for outputs.
- IM151-1 COMPACT: up to 100 bytes for inputs and 100 bytes for outputs.
- IM151-1 STANDARD (up to 6ES7151-1AA03-0AB0), IM151-1 FO STANDARD (up to 6ES7151-1AB02-0AB0) up to 128 bytes for inputs and 128 bytes for outputs.
- IM151-1 STANDARD (from 6ES7151-1AA04-0AB0), IM151-1 HIGH FEATURE: up to 244 bytes for inputs and 244 bytes for outputs.

To better utilize the available address space of the DP master and reduce data exchange between the ET 200S and the DP master, you can group several electronic modules/load feeders within one byte in the input or output area of the process image. This is achieved by the systematic arrangement and designation of the ET 200S electronic modules/motor starters.

A list of the address space requirements for the individual modules is to be found in the appendix.

You can combine the following device types within one byte:

- Digital input modules
- Digital output modules
- Motor starters (direct starters and reversing starters)

Procedure

1. Integrate the GSD file in your configuration software.

Result: You can identify combinable devices in the hardware catalog of your configuration software by the fact that they are twice present. The devices differ only by a "*" in the name.

2. Configure the ET 200S setup, adhering to the following rules:

- The modules that you can group within a byte must be of the same module type (see above).
- **Interface module IM151-1 STANDARD, 6ES7151-1AA00-0AB0 with product version 1 to 4:**The devices that can be combined within one byte must be inserted directly next to one another. Only power modules are permitted between the electronic modules. Power modules do not open a new byte.
- **After Interface module IM151-1 BASIC; IM151-1 STANDARD, 6ES7151-1AA00-0AB0 with creation state 5, 6ES7151-1AA01-0AB0; IM151-1 FO STANDARD and IM151-1 HIGH FEATURE:**Other devices may be connected between modules that can be combined.
- There can be a total of no more than 8 channels (1 byte).

Note

In STEP 7 applications, if you combine the modules for IM151-1 STANDARD, IM 151-1 FO STANDARD or IM151-1 HIGH FEATURE in the DPV1 mode:

- No insert/remove module interrupts (OB83) are triggered for these modules. In this case, you can recognize that a module has been removed by evaluating the module status in the diagnostic frame in the cyclic user program.
 - Each grouped module then receives its own diagnostic address.
-

3. Select the module designation without "*" from the hardware catalog of your configuration software.

Result: You open a byte and store the first module there.

4. Select the module designation with "*" from the hardware catalog of your configuration software.

Result: You store other modules in the opened byte until all bits are occupied.

5. If a byte is filled, you must configure a module again (that is, open a new byte without "*").

Note

Configuring by means of the GSD file: The configuration software does not check the correct combination of the devices. If you configure more than 8 channels in a byte, the modules that exceed the byte limit are reported as improperly configured in the diagnostics:

Module status → 10_B: wrong module; invalid user data

These modules are not addressed.

No grouping

If you do not want to group digital input modules, digital output modules, or motor starters within a byte when configuring the ET 200S distributed I/O system, use only those module designations without "*" from the hardware catalog of your configuration software.

Each individual electronic module/motor starter will then occupy one byte in the input or output area of the process image.

See also

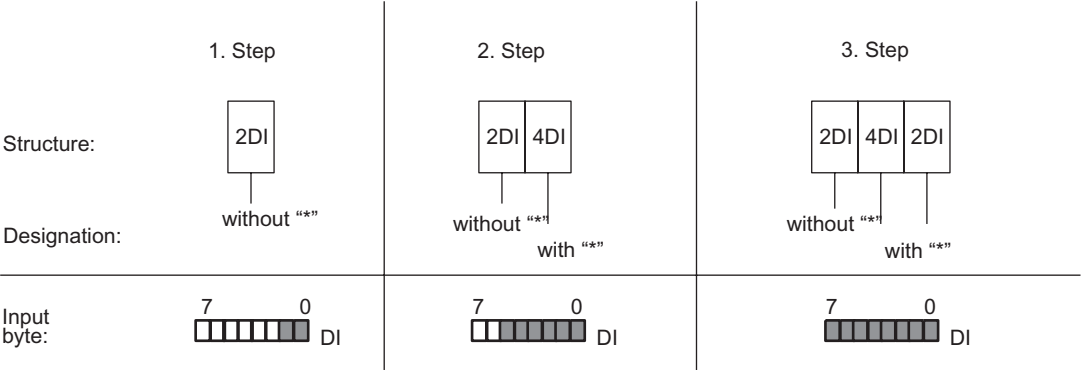
IO address space (Page C-1)

6.2.1.3 Grouping digital input modules

Principle

The figure below illustrates schematically the grouping of digital input modules.

IM151-1 STANDARD, 6ES7 151-1AA00-0AB0 with product version 1 to 4



As of IM151-1 BASIC; IM151-1 COMPACT; IM151-1 STANDARD, 6ES7 151-1AA00-0AB0 with product version 5, 6ES7 151-1AA01-0AB0, IM151-1 FO STANDARD und IM151-1 HIGH FEATURE

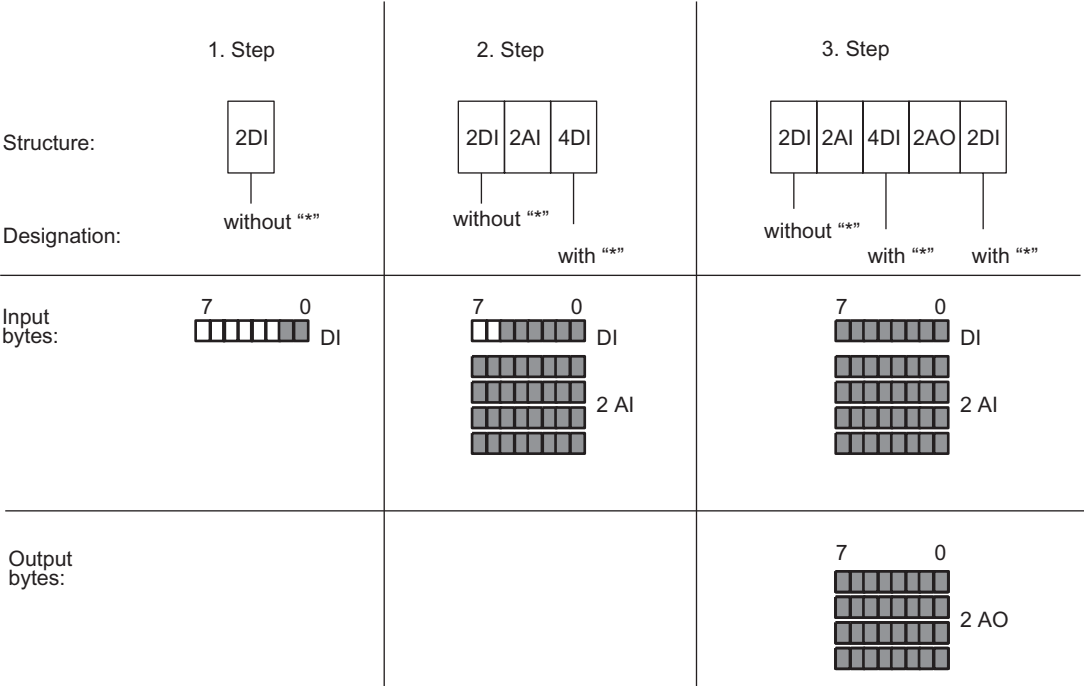


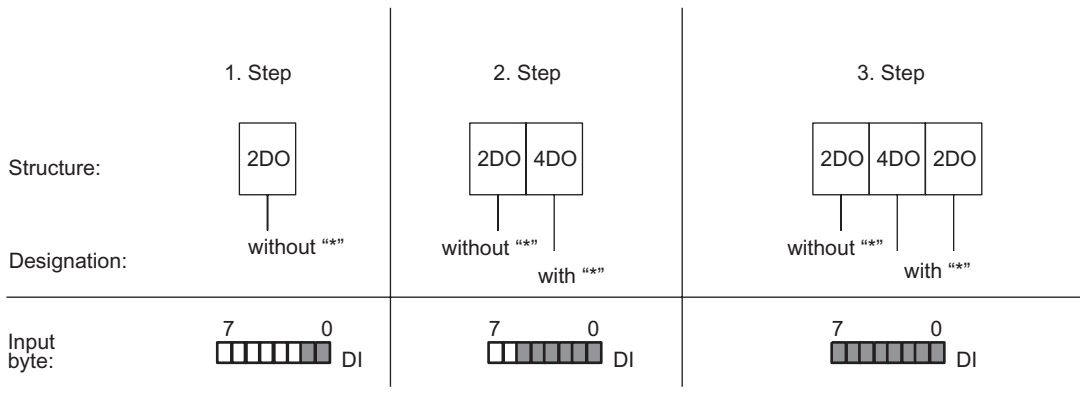
Figure 6-1 Grouping of digital input modules in a single byte

6.2.1.4 Grouping digital output modules

Principle

The figure below illustrates schematically the grouping of digital output modules.

IM151-1 STANDARD, 6ES7 151-1AA00-0AB0 with product version 1 to 4



As of IM151-1 BASIC; IM151-1 COMPACT; IM151-1 STANDARD, 6ES7 151-1AA00-0AB0 with product version 5, 6ES7 151-1AA01-0AB0, IM151-1 FO STANDARD and IM151-1 HIGH FEATURE

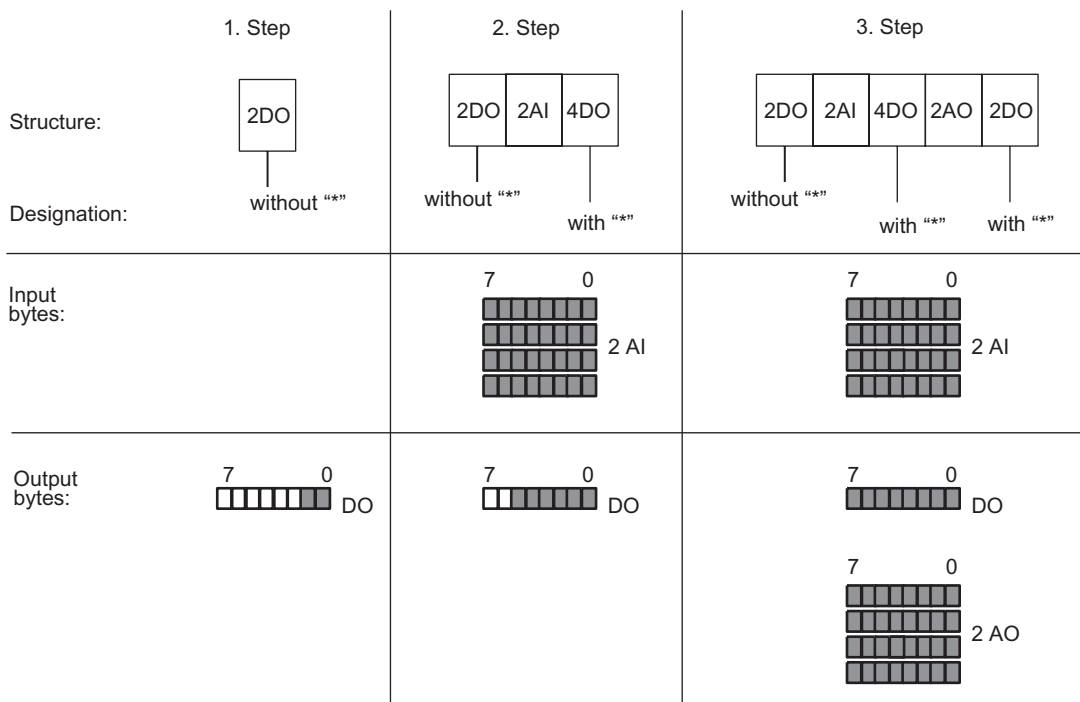


Figure 6-2 Grouping of digital output modules in a single byte

6.2.1.5 Grouping motor starters

Principle

The figure below illustrates schematically motor starter grouping.

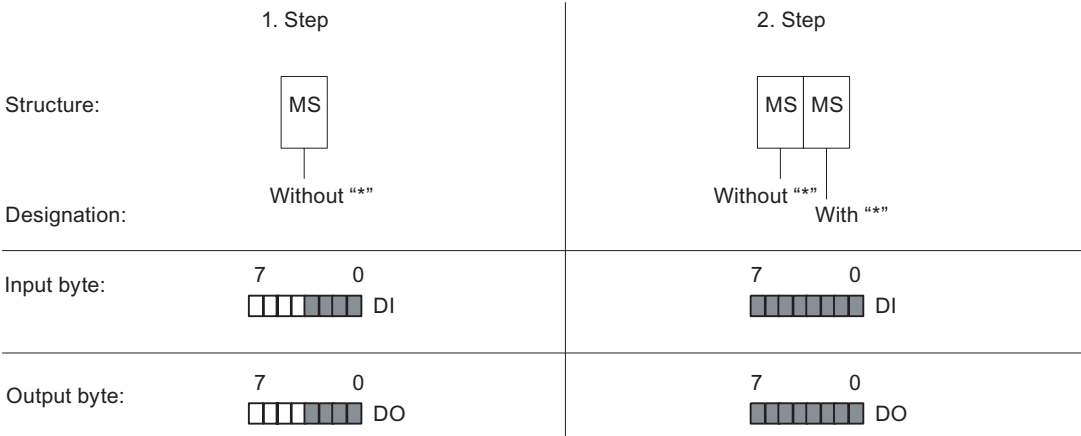


Figure 6-3 Grouping of motor starters within a byte

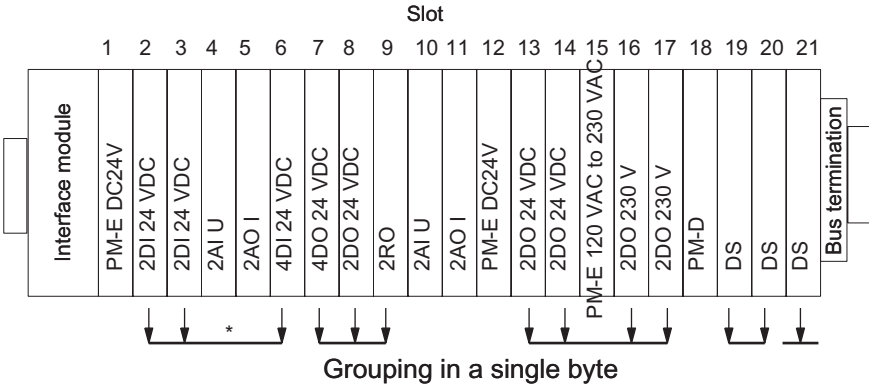
6.2.1.6 Example of a Configuration

Introduction

The following example describes how to design an ET 200S configuration:

Configuration of ET 200S

An example design of an ET 200S configuration is shown in the following figure:



* As of IM151-1 BASIC; IM151-1 COMPACT; IM151-1 STANDARD, 6ES7 151-1AA00-0AB0 with Product version 5, 6ES7 151-1AA01-0AB0, IM151-1 FO STANDARD and IM151-1 HIGH FEATURE

Figure 6-4 Configuration of ET 200S

Configuration table and address space

The user is free to select the byte addresses of the inputs and outputs (if the configuration software supports this). The bit addresses result automatically from the sequence of the grouped modules.

The following table shows which modules have been grouped and the corresponding address space.

Table 6-1 Configuration table and address space

Slot	Module	Grouping	I/O address	
			Inputs	Outputs
1	6ES7 138-4CA01-0AA0 PM-E 24 VDC	---	---	---
2	6ES7131-4BB01-0AB0 2DI 24 VDC	Yes	0.0 to 0.1	
3	6ES7131-4BB01-0AB0* 2DI 24 VDC		0.2 to 0.3	
4	6ES7134-4FB01-0AB0 2AI U	No	1 to 4	
5	6ES7135-4GB01-0AB0 2AO I	No		0 to 3
6	6ES7131-4BD01-0AA0* 4DI 24 VDC	Yes	0.4 to 0.7	
7	6ES7132-4BD01-0AA0 4DO 24 VDC	Yes		4.0 to 4.3
8	6ES7132-4BB01-0AB0* 2DO 24 VDC		4.4 to 4.5	
9	6ES7132-4HB01-0AB0* 2DO Rel.		4.6 to 4.7	
10	6ES7134-4FB01-0AB0 2AI U	No	5 to 8	
11	6ES7135-4GB01-0AB0 2AO I	No		5 to 8
12	6ES7138-4CA01-0AA0 PM-E 24 VDC	---	---	---
13	6ES7132-4BB31-0AB0 2DO 24 VDC	Yes		9.0 to 9.1
14	6ES7132-4BB31-0AB0* 2DO 24 VDC	Yes		9.2 to 9.3
15	6ES7138-4CB11-0AB0 PM-E AC230	---	---	---
16	6ES7132-4FB01-0AB0* 2DO 230V	Yes		9.4 to 9.5
17	6ES7132-4FB01-0AB0* 2DO 230V	Yes		9.6 to 9.7
18	3RK1903-0BA00 PM-D	---	---	---
19	3RK1301-xxB00-0AA0 DS	Yes	9.0 to 9.3	10.0 to 10.3
20	3RK1301-xxB00-0AA0 *DS		9.4 to 9.7	10.4 to 10.7
21	3RK1301-xxB00-0AA0 DS	Yes	10.0 to 10.3	11.0 to 11.3

6.2.2 Commissioning and startup of ET 200S on PROFIBUS DP

6.2.2.1 Setting the PROFIBUS Address

Introduction

The PROFIBUS address is used to specify the address of the ET 200S distributed I/O system on PROFIBUS DP.

- The PROFIBUS DP address for the ET 200S is set on the interface module or COMPACT module by means of DIP switches. The DIP switches are to be found on the front of the interface module, protected by a sliding window.
- Valid PROFIBUS DP addresses are 1 to 125.
- Each address can be assigned only once on PROFIBUS DP.

Requirements

Address setting is not yet assigned on PROFIBUS DP.

Required tools

3-mm screwdriver

Setting the PROFIBUS DP address

1. Slide the window
 - upwards on the interface module.
 - downwards on the COMPACT module.

Caution

When open, the window protrudes out from underneath the COMPACT module case. This can cause it to be easily broken off.

2. Use a screwdriver to set the desired PROFIBUS DP address via the DIP switch.
3. Close the window.

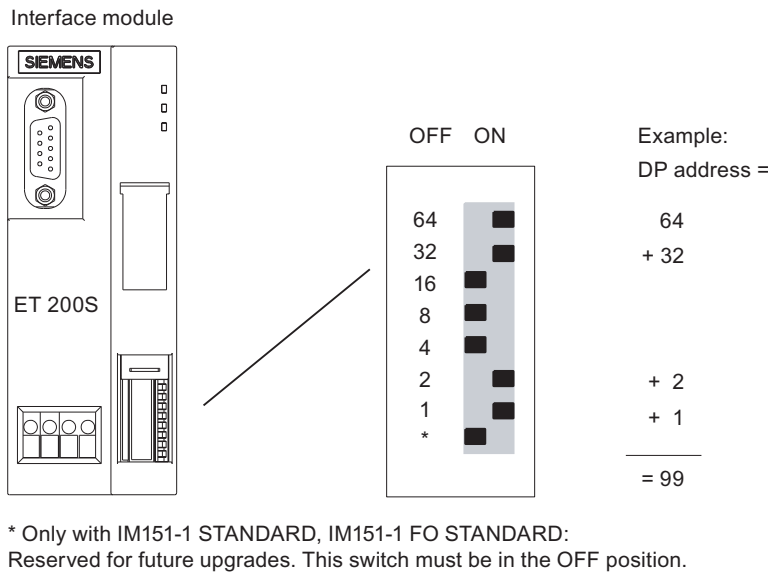


Figure 6-5 Setting the PROFIBUS address

Setting the PROFIBUS DP address

You change the PROFIBUS DP address in exactly the same way as you set it. **A change in the PROFIBUS DP address becomes valid for the ET 200S after a POWER ON at the interface module / COMPACT module.**

6.2.2.2 Commissioning ET 200S on PROFIBUS DP

Software Requirements

The table below details the software requirements for commissioning on PROFIBUS DP.

Table 6-2 Software requirements for commissioning on PROFIBUS DP

Configuration software used	Version	Notes
STEP 7	from Version 5.0 and ServicePack 3	You use HW Config. With Service Pack 3 or higher the ET 200S is included in the hardware catalog.
Configuration software for a different DP master used		You need the GSD file of ET 200S.

Requirements for commissioning

The following additional requirements must be satisfied for commissioning the ET 200S on PROFIBUS DP:

- DP slave installed
- DP slave wired up
- DP slave is configured (configured and parameters assigned)
- Supply voltage for the DP master is switched on (see manual for the DP master)
- DP master is switched to RUN mode (see manual for the DP master)

Procedure

To commission the DP slave, proceed as follows:

1. Switch on the power supply for the DP slave.
2. If necessary, switch on the supply voltage for the load.

See also

Basic principles of configuration for the ET 200S on PROFIBUS DP (Page 6-1)

Basic principles of installation (Page 4-1)

Setting the PROFIBUS Address (Page 6-9)

Wiring rules for the ET 200S (Page 5-7)

6.2.2.3 Startup of the ET 200S on PROFIBUS DP

Flow diagram for startup of the ET 200S

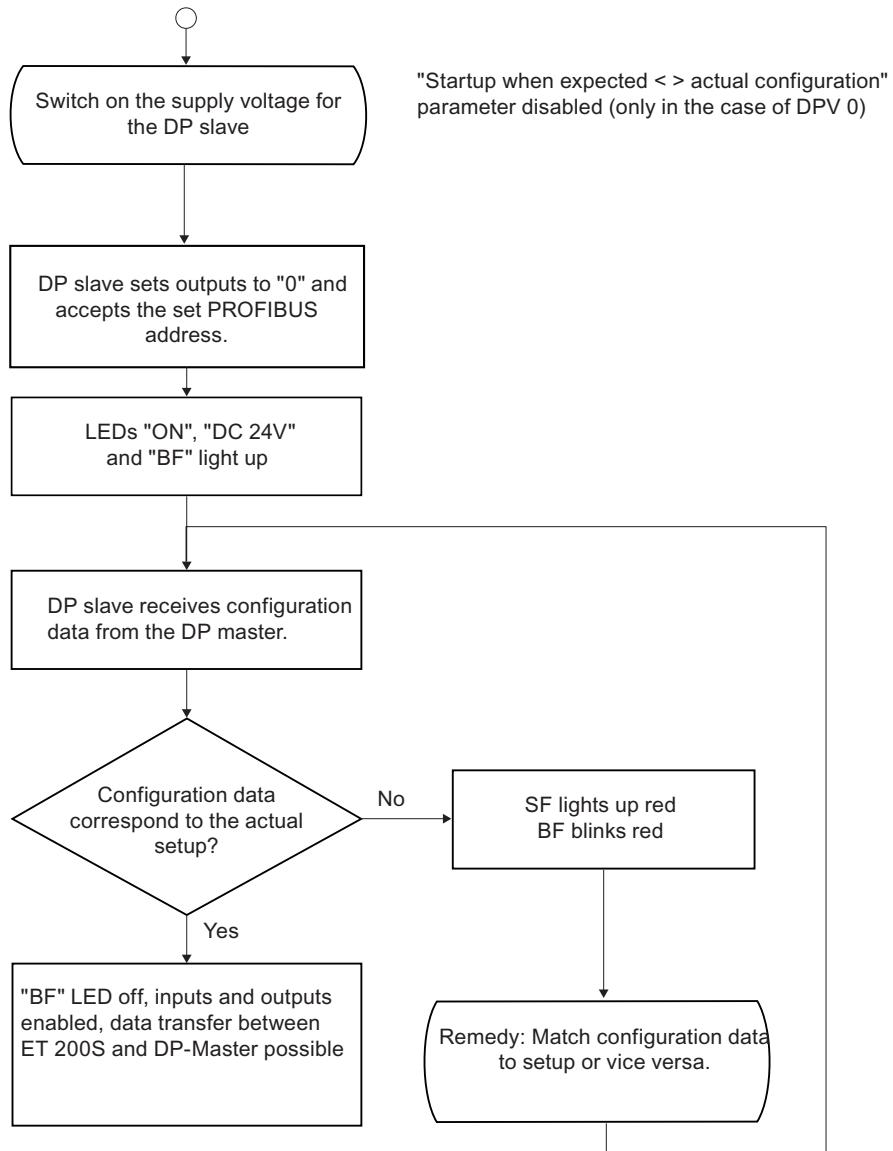


Figure 6-6 Startup of the ET 200S on PROFIBUS DP

Note

All interface modules support the default startup. In other words, configuration using the GSD file or HW Config is not necessary.

The following conditions then apply:

- Preset parameters are used.
 - AKF (general identifier format in compliance with the PROFIBUS standard) in the configuration frame
 - Grouping (packing) of the electronic modules is not possible without parameterization.
 - All supply voltages on the power modules must be switched on.
 - It is not possible to remove or insert modules during operation.
-

Reference

You can find information regarding the parameter assignment of electronic modules in the *Device Manual ET 200S* in the chapters *Digital* or *Analog electronic Modules* in each case under "Parameter for ...".

6.3 Commissioning on PROFINET IO

6.3.1 Configuring the ET 200S on the PROFINET IO

Introduction

The interface module IM151-3 requires a unique device name in order to operate at an IO controller (refer to the following chapter).

This chapter describes how to configure and assign parameters to the ET 200S.

- Configuring the project: The systematic arrangement of the different ET 200S modules (setup).
- Assigning parameters: Defining the ET 200S parameters with the configuration software.

Note

The ET 200S can be operated with *STEP 7*V5.3 Service Pack 3 and higher.

GSD file

You configure the ET 200S using the GSD file. This file is used to integrate the ET 200S in your system as an IO device. You can download the GSD file for ET 200S at the following address:

<http://support.automation.siemens.com/WW/view/de/19699080>

The following GSD file is available for the IM151-3 interface module:

GSDML-V1.0-Siemens-ET200S-"Date in yyyyymmdd".xml

You can find further information about the procedure in the *STEP 7* Online Help.

6.3.2 Assigning device names to the I/O device

Introduction

Each PROFINET IO device is assigned a unique device ID by the manufacturer (MAC address).

For configuration and in the user program, each ET 200S IO device is addressed with its device name.

For detailed information on addressing in PROFINET IO, refer to the *PROFINET System Description*.

Requirements

- IM151-3 Interface Module
- SIMATIC Micro Memory Card 64k and higher
- The PD must be online on PROFINET to the IO device to let you assign a device name to the interface module.
- The IO device is configured in HW Config and assigned an IP address.

Assigning a device name

1. Insert an empty SIMATIC Micro Memory Card into the module slot in the front of the IM151-3.
2. Switch on the power supply for the IM151-3 PN.
3. Open the **Properties - IM151-3 PN** or **Properties - IM151-3 PN HIGH FEATURE** window in the HW Config and enter the device name for the IO device there and confirm with **OK**. You can use any device name except for "noname" (not case-sensitive).

Transfer the device name to the interface module.

1. In HW Config select **PLC > Ethernet > Assign Device Name**.
2. Click the **Assign name** button in the **Assign device name** window.

Result

The device name is stored on the SIMATIC Micro Memory Card in the interface module IM151-3.

Forwarding the device name when the interface module is replaced

The device name of the IO device is saved to the SIMATIC Micro Memory Card.

To transfer the device name when exchanging the interface module IM151-3, pull the SIMATIC Micro Memory Card out of the "old" IM151-3 and insert it in the "new one".

The IO device adopts the device name from the SIMATIC Micro Memory Card after switching the power supply off/on. Then the station is addressable again and functions the same as before the exchange.

Station flash test

If you are using multiple IO devices, multiple IO devices are also indicated in the "Assign device name" dialog. In this case, you should compare the MAC address of the device with the indicated MAC address and select the proper IO device.

The identification of IO devices in a system is facilitated by a station flash test. The flash test is activated as follows:

1. In the "Assign device name" dialog, select one of the indicated IO devices.
2. Select a flash duration.
3. Click the "Flash on" button.

The LINK LED on the selected IO device flashes (open the flaps on the front cover of the IM151-3!)

6.3.3 Grouping modules for the configuration

Introduction

The IM151 has a maximum address area of 256 bytes for inputs and 256 bytes for outputs.

For a better utilization of the available address space of the IO controller, you can group multiple electronic modules/ load branches within a byte in the input or output area of the process image. This is achieved by the systematic arrangement and designation of the ET 200S electronic modules/motor starters.

Note

Grouping is only possible with the IM151-3 PN after 6ES7151-3AA10-0AB0 and *STEP 7* V5.3 SP 3.

A list of the address space requirements for the individual modules is to be found in the appendix.

You can group the following device types within one byte:

- Digital input modules
- Digital output modules
- Motor starters (direct starters and reversing starters)

Other modules may be connected between the modules that can be combined.

The procedure is identical to that for PROFIBUS DP.

Modules are grouped during configuration. By selecting a module label without "*", you open a byte. By selecting a module with "*", you fill the byte until all bits are occupied.

The generation of interrupts results in the following behavior:

Interrupts at removed DO modules

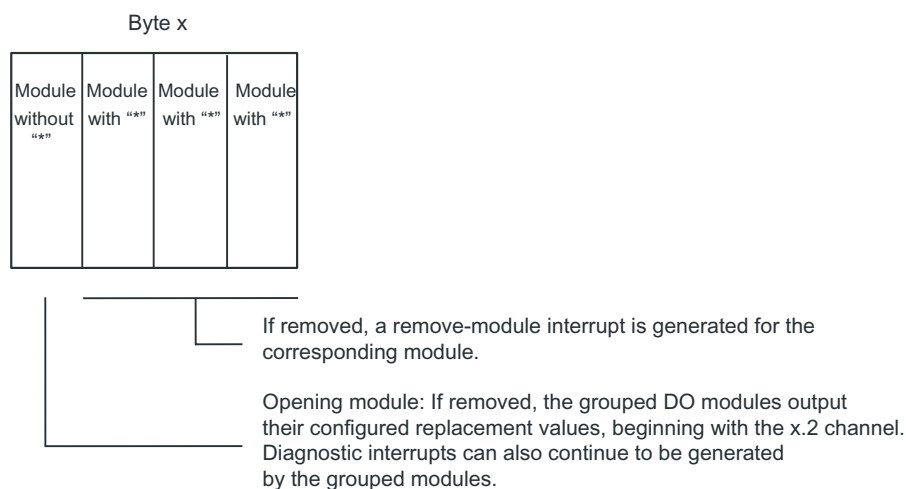


Figure 6-7 Interrupts at removed DO modules

Interrupts at removed DI modules

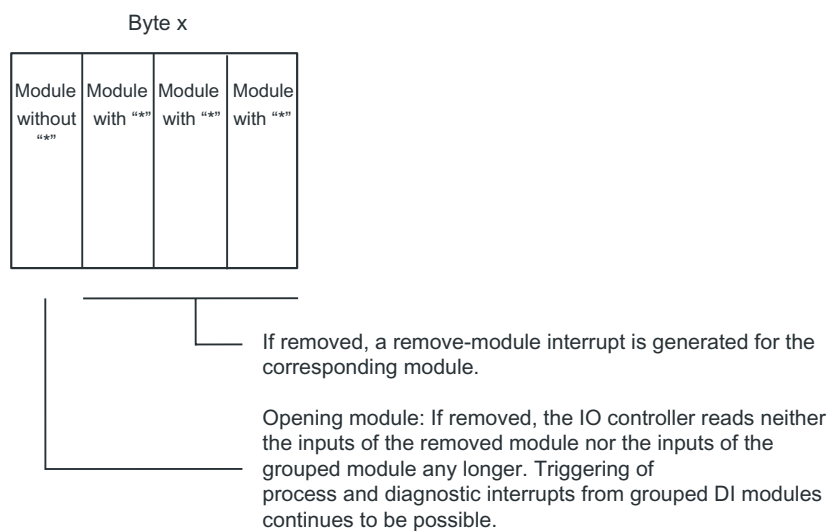


Figure 6-8 Interrupts at removed DI modules

Additional information

You can find further information on combining modules for the configuration in the chapter *ET 200S configuration on the PROFIBUS DP*.

6.3.4 Commissioning and startup of ET 200S on PROFINET IO

Software Requirements

Table 6-3 Software requirements for commissioning on PROFINET IO

Configuration software used	Version	Notes
STEP 7	<ul style="list-style-type: none"> • Version 5.3 and higher and ServicePack 1 for IM151-3 PN (6ES7151-3AA00-0AB0) • Version 5.3 and higher and ServicePack 3 for IM151-3 PN (6ES7151-3AA10-0AB0 and higher) and IM151-3 PN HIGH FEATURE (6ES7151-3BA20-0AB0 and higher) 	You use HW Config and the supplied GSD file.
Configuration software for a different IO controller		You need the GSD file of ET 200S.

Requirements for commissioning

The following additional requirements must be satisfied for commissioning the ET 200S on PROFIBUS IO:

- IO device installed
- IO device wired up
- IO device provided with device name
- Supply voltage for the DP master is switched on (see manual for the IO controller)
- IO controller is switched to RUN mode (see manual for the IO controller)

Commissioning the ET 200S

To commission the IO device, proceed as follows:

1. Switch on the power supply for the IO device.
2. If necessary, switch on the supply voltage for the load.

Startup of the ET 200S

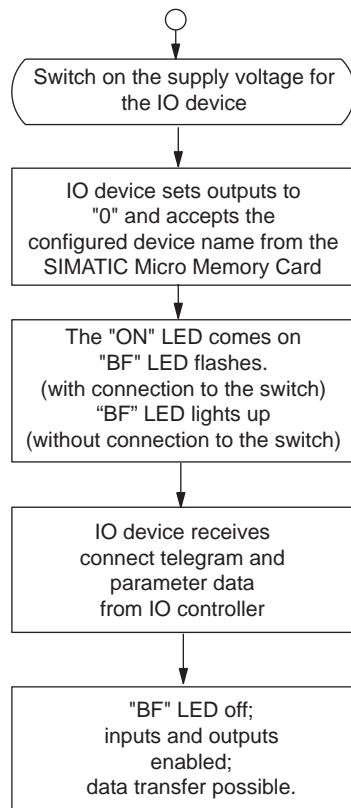


Figure 6-9 Startup of ET 200S on PROFINET IO

Note

The interface modules IM151-3 PN and IM151-3 PN HIGH FEATURE support the default startup.

The following conditions then apply:

- The preset parameters are used (refer to parameters for the electronic modules).
 - All supply voltages on the power modules must be switched on.
-

Functions

7.1 Direct data exchange on PROFIBUS DP

Introduction

The ET 200S can be used as the sender (publisher) for direct data exchange (data exchange broadcast). The DP master you are using must, of course, also support direct data exchange. You will find information on this in the description of the DP master.

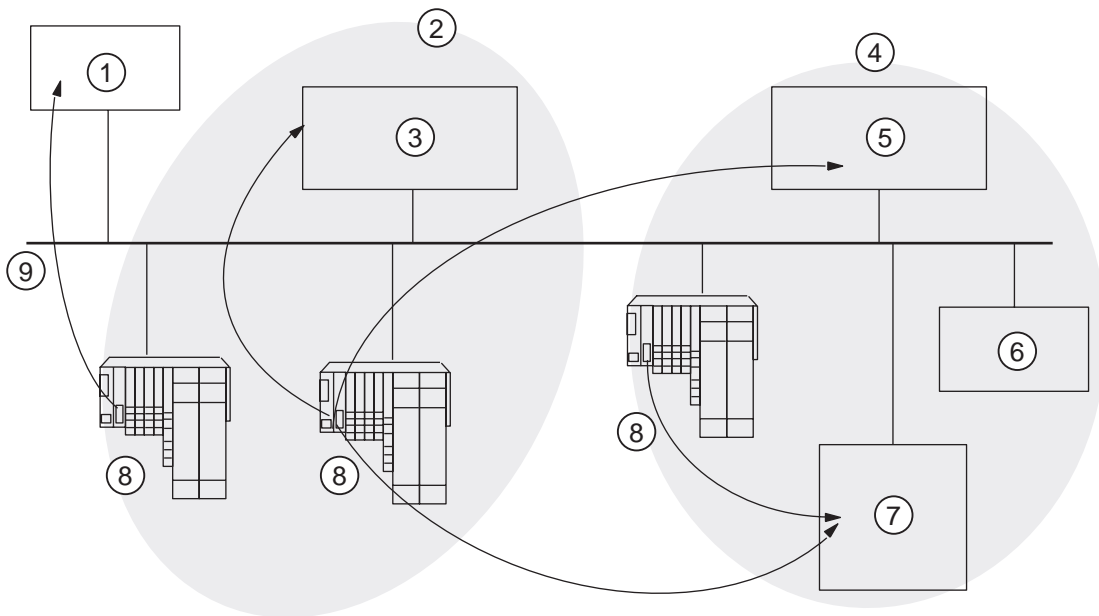
Principle

Direct data exchange (slave to slave communication) is characterized by the fact that PROFIBUS DP nodes "listen in" on which data a DP slave is returning to its DP master. This mechanism enables the node that is "listening in" (receiver / subscriber) to directly access changes to the input data of remote DP slaves.

During configuration in *STEP 7* use the respective I/O input addresses to specify the address area of the receiver where the sender's data are to be placed.

Example: Direct data exchange with IM151-1 HIGH FEATURE

The figure below gives an example of the direct data exchange relationships you can configure with an ET 200S as the sender and the nodes that can "listen in" as possible receivers.



- | | | | |
|-----|--------------------------|-----|-----------------------|
| (1) | CPU 31x-2 | (6) | DP slave |
| (2) | DP master system 1 | (7) | CPU 31x-2 as DP slave |
| (3) | CPU 31x-2 as DP master 1 | (8) | ET 200S |
| (4) | DP master system 2 | (9) | PROFIBUS DP |
| (5) | CPU 31x-2 as DP master 2 | | |

Note

The IM 151-1 High Feature supports the security-oriented I-slave-slave-communication via PROFIBUS DP for the fail-safe modules 6ES7151-1BA01-0AB0 and higher. You can find the description of this function in the *S7 Distributed Safety Configuration and Programming* manual.

7.2 Cycle synchronization on the PROFIBUS DP

7.2.1 Basics

Properties

Reproducible response times (i. e., of equal length) are achieved in SIMATIC with an constant DP bus cycle, synchronization of the user program on the DP bus cycle, and the isochronous transfer of I/O data to the I/O modules. The isochronous portions of the user program are processed synchronously with the DP bus cycle by means of synchronous cycle interrupts (OB 61 to OB 64). The I/O data are transferred at defined and constant (isochronous) intervals via the backplane bus of the DP slave to the I/O modules and switched through isochronously up to the "terminal."

In other words, isochronous operation results in the synchronization of all of the hitherto free-running single cycles. These include the user program in the CPU, the DP cycle on the PROFIBUS subnet, the cycle in the DP slave, and, finally, the cycle in the I/O modules of the DP slaves.

The maximum jitter for the IM151-1 amounts to 10 μ s. The jitter of the peripheral devices of the ET 200S cannot be accounted for due to the existing diversity.

Requirements

- Cycle synchronization is possible with the IM 151-1 HIGH FEATURE with modules, that support cycle synchronization. You can see whether a module supports cycle synchronization in the device description or HW Config. Other modules in the ET 200S setup are possible. However, these do not support cycle synchronization.
- The transmission rate of the PROFIBUS DP is at least 1.5 Mbps (shorter constant bus cycle times can be achieved with higher transmission rates).
- The maximum constant bus cycle time is 32 ms.
- The constant bus cycle time master (Class 1) must be a class 1 DP master. In other words, a programming device or PC cannot be an constant bus cycle time master.
- In constant bus cycle time operation, only one DP master (Class 1) can be active on the PROFIBUS DP. PDs or PCs (Class 2) can also be connected.
- The cycle synchronization can only then be activated on the ET 200S if the constant bus cycle on the DP master system was activated.
- Isochronous operation (constant bus cycle time) of the ET 200S is not guaranteed during removal or insertion of electronic modules.

If asynchronous results like "Switch on power module" or "Read/Write data set" are to cause no cycle injury, a sufficiently large gap between T_o and T_i must be ensured, i.e. T_{dp} is to be increased.

- In constant bus cycle time operation, the ET 200S requires a startup time of approximately 150 DP cycles to ensure isochronous operation right through to the terminals.
- The bus length must amount to less than 1 m.

Optimizing the constant bus cycle time

- The longest delays for the digital input/output modules (assignable in the case of inputs) are the critical factor in determining the length of the constant DP cycle. Hint: Pay attention to equal input delay of all digital modules in the ET 200S station for cycle synchronization.
- The shorter the input delays you set for the HIGH FEATURE digital input modules, the shorter the constant bus cycle times that can be achieved. Hint: For the digital input modules HIGH FEATURE, if possible, set an input delay of at least 0.1 ms.
- The processing time of the modules should be taken into account in the case of modules that support isochronous operation.
- The minimum constant bus cycle time depends on the number of modules in the ET 200S. Hint: Use at least 4-channel digital input modules HIGH FEATURE to reduce the number of modules.

Lower constant bus cycle times can be achieved if you distribute the modules of an ET 200S (with a high module count) over two ET 200S stations.

- The constant bus cycle time is reduced if you increase the transmission rate.
Hint: Set the highest possible baud rate.

Further information

Further information pertaining to cycle synchronization can be found in the online help function of *STEP 7* and in the *Cycle Synchronization* manual.

7.2.2 Assigning the parameters for cycle Synchronization on the PROFIBUS DP

Procedure

1. CPU settings:
"Object properties" of the CPU > Register "Cycle synchronization alarms"
 - CPU - Set cycle synchronization alarm
 - Select the DP master system used
 - Select the desired sub-process image

Memory	Interrupts	Interrupts	Cyclic interrupts	Diagnostics/clock	Time-of-day interrupts
General information	Startup	Clocked interrupts	Cycle / clock memory	Retentivity	
OB 61:	Priority: <input type="text" value="25"/>	DP master-systemno.: <input type="text" value="1"/> ▼	Partial process image(s) (e. g.: 1.4): <input type="text" value="1"/>	Time lag: <input type="text" value="3.000"/> ms	<input type="button" value="Default"/>

Figure 7-1 Dialog box cycle synchronization alarms

2. DP master system settings:

DP master "Object properties" > "General" tab > "Properties" button > "Parameter" tab > "Properties" button > "Network settings" tab > "Options" button

- Activate constant bus cycle time on the DP master system
- Set the length of the constant bus DP cycle (max. 32 ms)
- Set "Times Ti and To for all DP slaves equal" (causes a synchronization of the I/O data of the various DP slaves)
- Times Ti and To can be set separately. Recommendation: Recommendation: accept the standard settings Ti and To.

Figure 7-2 Dialog box options

Note

The "recalculate" button enables you to recalculate a value for the constant DP cycle from STEP 7 that takes the current PROFIBUS DP configuration into account. This value is then automatically entered in the fields "Constant DP bus cycle time", "Time Ti (...)" and "Time To (...)".

3. DP slave settings:

DP slave "Object properties" > "Cycle synchronization" tab

- Activate "Synchronize DP slave to constant DP cycle".
- Enter times T_i and T_o (if "Times T_i and T_o for all DP slave equal" was not set on the DP master). Recommendation: Recommendation: accept the standard settings T_i and T_o .
- Select the electronic modules to be synchronized, and assign them on the "Addresses" tab to the sub-process image defined in the CPU.

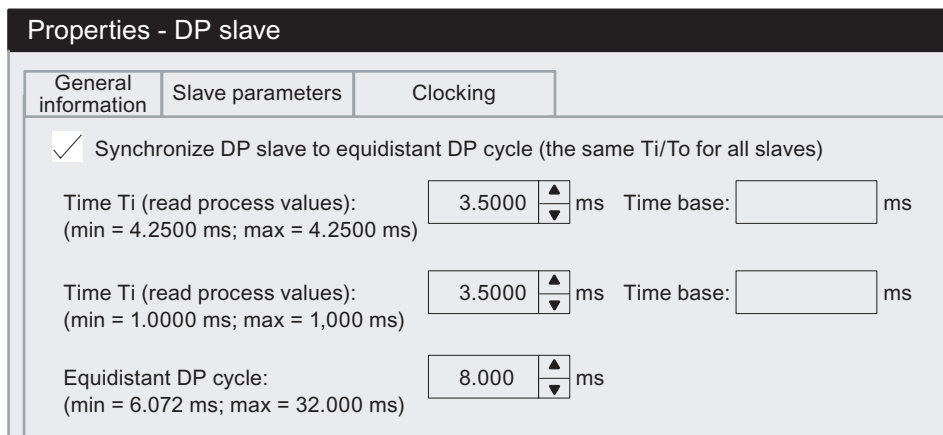


Figure 7-3 DP slave properties dialog box

Note

If you click on "Cycle synchronization" in the "Edit" menu, a configuration overview of the cycle-synchronized devices is displayed.

4. Create user program:

- Creating the OB 61.
- At the start of the OB 61, the SFC 126 has to call up the inputs to update the sub-process image.
- At the end of the OB 61, the SFC 127 has to call up the inputs to update the sub-process image.
- The sub-process image to be used is the sub-process image parameterized in the CPU ("Cycle synchronization alarms" tab).

7.2.3 Fault correction during isochronous operation on PROFIBUS DP

Event	Cause	Action
Station failure of the ET 200S	Faulty isochronous operation (10 or more clock failures or clock violations).	Check the parameter assignment.
The obtainable constant bus cycle times are too long.	The input delays of the HIGH FEATURE digital input modules are not optimally set.	Decrease the input delay of the HIGH FEATURE digital input modules.
No isochronous signal detection/output	Wrong sub-process image used. Negative RET_VAL in the case of SFCs 126/127	Check whether the same sub-process image was used in the user program of OB 61 (or up to OB 64) when SFCs 126/127 are called and in the configuration of the DP master/DP slave.

7.3 Option handling on PROFIBUS DP

7.3.1 Basic principles of option handling on PROFIBUS DP

Principle

Option handling enables you to set up the ET 200S for future expansions (options). Option handling means that you install, wire, configure, and program the planned maximum configuration of the ET 200S. The electronic modules required for this are merely replaced with inexpensive RESERVE modules, which you can easily replace later with the planned electronic modules.

This means that the ET 200S can be completely prewired ("master cabling") because the RESERVE module is not connected to the terminals of the terminal module and therefore is not connected to the process.

The RESERVE modules for future expansion at the right-hand end of the station are optional. In this case, preparatory installation and wiring are possible but not a prerequisite.

See also

Removing and inserting modules during operation (Page 5-28)

7.3.2 Principle of operation of option handling

Principle

With option handling, the configuration of slots 2 to 63 of the ET 200S is checked. If the check is enabled for a slot, the RESERVE module (option) or a configured electronic module can occupy this slot without a diagnostic being signaled. If the check is disabled, only a configured electronic module can be located in this slot. Any other module will trigger a diagnosis. You can also control the configuration of slots 2 to 63 and monitor the configuration of slots 1 to 63 using the control and feedback interface in the process input image (PII) and process output image (PIQ).

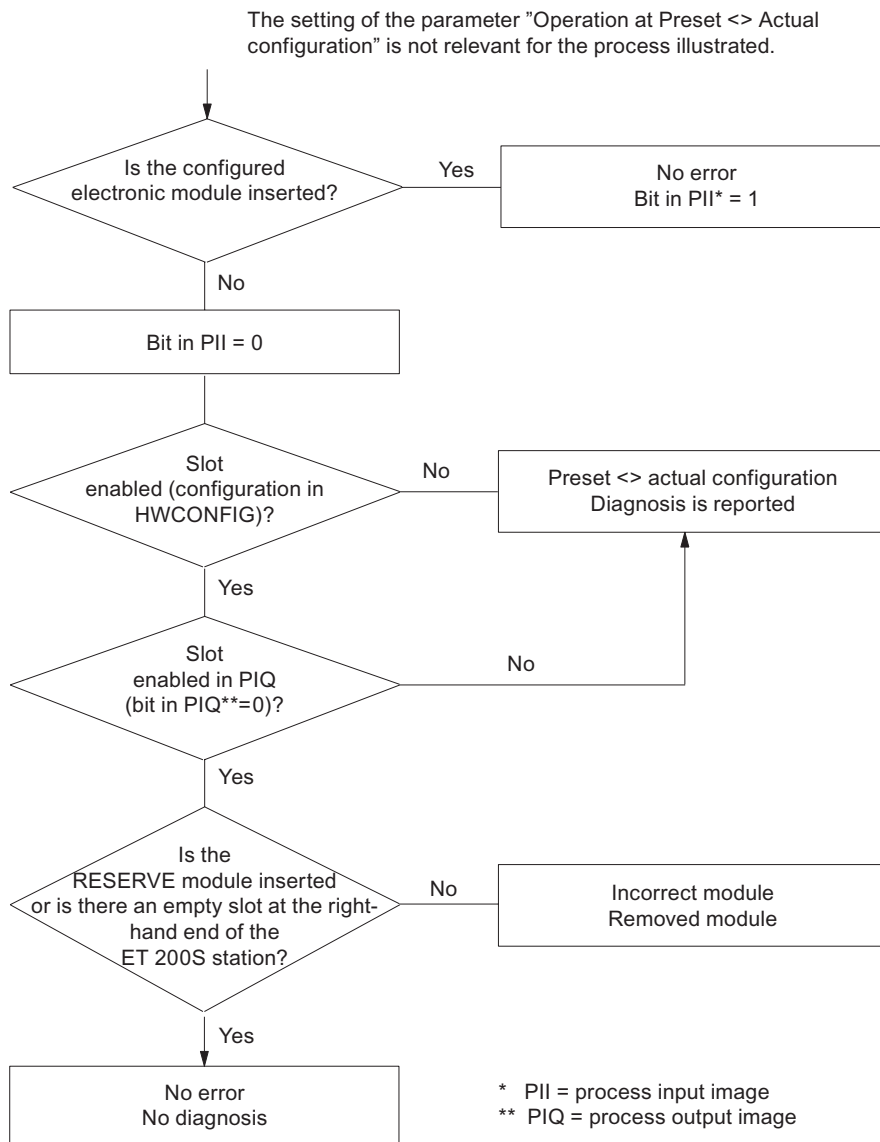


Figure 7-4 How option handling works

7.3.3 Requirements for option handling

Requirements

The following is required for option handling:

- Interface module IM151-1 STANDARD (from 6ES7151-1AA03-0AB0), IM151-1 FO STANDARD (6ES7151-1AB02-0AB0 and higher) or IM 151-1 HIGH FEATURE (6ES7151-1BA01-0AB0)
- for configuration, the GSD file (see table below)

	DPV0 operation		DPV0/DPV1 operation	DPV0/DPV1 operation
	SI02806A.GSx	SI02806B.GSx	SI03806A.GSx	SI280E0.GSx
	from 07/2003 (V1.0 and higher)			from 08/2005 (V2.0 and higher)
6ES7151-1AA03-0AB0	X	-	-	-
6ES7151-1AB02-0AB0	-	X	-	-
6ES7151-1AA04-0AB0	X	-	X	-
6ES7151-1BA01-0AB0	-	-	-	X

Note

You do not require a GSD file for option handling in *STEP 7* if you are using both of the following:

- IM 151-1 STANDARD / FO
 - from STEP 7 V5.3 SP 2 and
 - the current HW update for the interface and power modules. Link the HW Update in the HW Config via the "Tools > install HW updates" menu command. You can download the HW updates on the Internet at Customer Support.
- IM 151-1 HIGH FEATURE
 - from STEP 7 V5.3 SP 3

You can find the options handling description in the STEP 7 Online Help.

- Power module PM E-24 ..48 VDC or PM E- 24..48 VDC/24 ..230 VAC
One of these power modules must be included in the configuration at least once.
- RESERVE modules as a substitute for the future electronic modules

Note

If the actual configuration of an ET 200S station does not match the preset configuration, a diagnostic is signaled if the check for the relevant slots is not enabled for option handling.

7.3.4 Example for the usage of RESERVE modules

Configuration variants

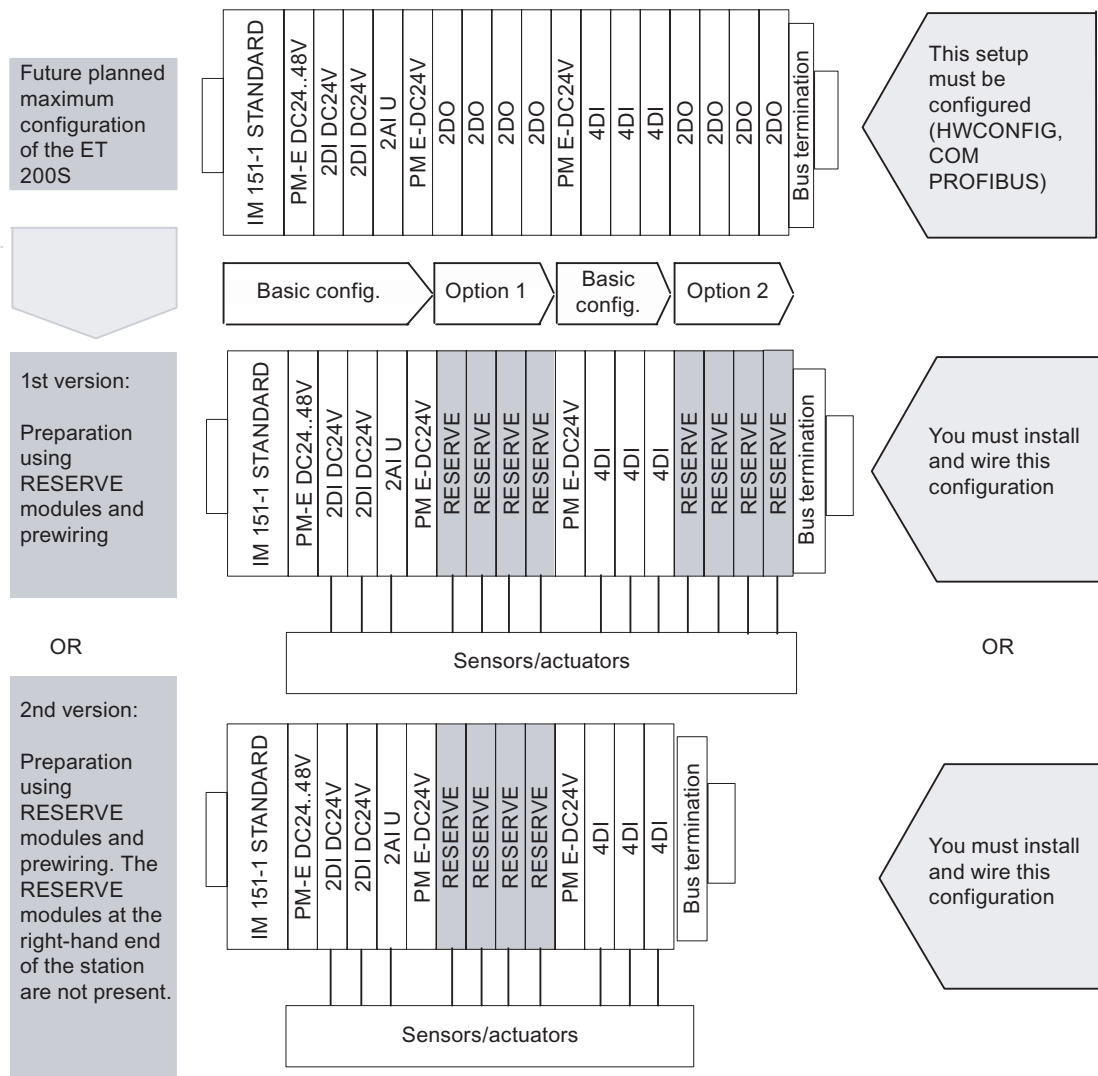


Figure 7-5 Example for the usage of RESERVE modules

7.3.5 Assigning parameters for option handling

Introduction

In *STEP 7* or *COM PROFIBUS*, you assign the parameters for the electronic module that you would like to use for future applications e. g. 4DI HF on the RESERVE module slots (or the expansions on the right end of the station):

- Drag the electronic module to the configuration table
- Assign the parameters

Procedure

1. Drag a PM-E 24 ..48 VDC or PM-E 24 ..48 VDC/24 ..230 VAC power module with one of the following entries to the configuration table:
 - ...O (option handling) or
 - ...SO (status byte + option handling)

Note

Entry of the power module with the ending ...O or ...SO can only be made **once** in the ET 200S configuration!

2. Assign parameters to the interface module as follows:

Interface module	Parameter	Setting	Description
IM 151-1 STANDARD	Option handling, general	enable	Option handling is enabled for the entire ET 200S.
or IM 151-1 FO STANDARD or IM 151-1 HIGH FEATURE	Option handling: Slots 2 to 63	Enable (all slots on which RESERVE modules can be located)	There are RESERVE modules or a configured electronic module on the slot. A diagnostic is not signaled.

Note

For parameter assignment "Operation for set < > actual installation" blocked,

- The ET 200S does not start up if a module is missing or if an incorrect module is inserted. The diagnostic "No module" or "Incorrect module" is signaled.
 - The ET 200S starts up if you enable option handling for the slot of an inserted RESERVE module. A diagnostic is not signaled.
-

Substitute values

If you have assigned an electronic module for the RESERVE module, the following substitute values are signaled:

- Digital input modules: 0
- Analog input modules: 7FFF_H
- Function module: 0

7.3.6 Controlling and monitoring options

Introduction

You can use the control interface (PIQ) and feedback interface (PII) to control and monitor options by means of the user program.

Recommendation: Before you work with the optional enhancements of the ET 200S, check via the feedback interface (see table further below) whether all configured electronic modules are plugged in.

Note

The use of SFCs 14/15 enables consistent accesses to the control and feedback interface.

Principle

The control and feedback interface is in the process output and input image of the PM-E 24 ..48 VDC or PM E-24 ..48 VDC/24 ..230 VAC power modules. It is only available if you have selected the entries ending in ...O or ...SO for the relevant power module in the configuration software.

There is one bit for each slot of the electronic or RESERVE modules of the ET 200S.

- Control interface: Slot 2 to 63
- Feedback interface: Slot 1 to 63

	7	6	5	4	3	2	1	0	Bit no.
IB/QB x	7	6	5	4	3	2	1	*	
IB/QB x+1	15	14	13	12	11	10	9	8	
IB/QB x+2	23	22	21	20	19	18	17	16	
IB/QB x+3	31	30	29	28	27	26	25	24	
IB/QB x+4	39	38	37	36	35	34	33	32	
IB/QB x+5	47	46	45	44	43	42	41	40	
IB/QB x+6	55	54	53	52	51	50	49	48	
IB/QB x+7	63	62	61	60	59	58	57	56	

* Not applicable

Figure 7-6 Control interface (PIQ) and feedback interface (PII)

Control interface PIQ (AB x to AB x+7):

You can use these bytes (8 bytes) to control the diagnostic behavior of the slots that you enabled for option handling in HW Config.

Only the bits of the slots you enabled for option handling during parameter assignment are evaluated (they are marked with "0").

Table 7-1 Control interface

Slot	Value of the bit	Reaction
2 to 63	0	Parameter assignment for option handling applies. RESERVE modules are allowed: <ul style="list-style-type: none"> • The station is engaged in data exchange. • A diagnostic is not signaled. • The SF LED on the interface module is off.
	1	Parameter assignment for option handling is cancelled. RESERVE modules are not accepted on this slot: <ul style="list-style-type: none"> • The station is engaged in data exchange. • The diagnostic "Incorrect module" is signaled. • The SF LED on the interface module is on.

Feedback interface PII (EB x to EB x+7):

The feedback interface (8 bytes) tells you which module is actually on each slot.

All slots are reported. This includes slots that you have not enabled for option handling.

Table 7-2 Feedback interface

Slot	Value of the bit	Reaction
1 to 63	0	The RESERVE module, an incorrect module, or a removed module is on the slot.
	1	The configured module is on the slot.

7.3.7 Troubleshooting for option handling

Troubleshooting for option handling

Table 7-3 Troubleshooting option handling

Event	Cause	Action
ET 200S does not start up; configuration error	There are multiple entries of power modules ending in ...O or ...SO in the ET 200S configuration.	Check and correct the configuration in HW Config.
	There are no entries of power modules ending in ...O or ...SO in the ET 200S configuration.	Use a power module entry ending in ...O or ...SO in HW Config.

7.3.8 Address area for option handling and status byte

Address area for option handling and status byte

You can control and monitor option handling, and evaluate the status byte of the power module using the control (PIQ) and feedback interface (PII).

The address range of the control (PIQ) and feedback interface (PII) depends on the configuration or selection of the corresponding entry in the configuration software.

This table shows the PII feedback interface and the PIQ control interface for different entries.

Table 7-4 PII feedback interface and PIQ control interface

In STEP 7/HW Config or COM PROFIBUS or other configuration software	Feedback interface PII		Control interface PIQ	
	Address	Content	Address	Content
Usual entry for the power module	---		---	
Ends in ...S	Ebx	Status byte	---	
Ends in ...O	EBx	Option handling	ABx	Option handling
	... EBx+7		... ABx+7	
Ends in ...SO	EBx	Option handling	ABx	Option handling
	... EBx+7		... ABx+7	
	EBx+8	Status byte	ABx+8	not relevant

Option handling in PIQ/PII

	7	6	5	4	3	2	1	0
AB/EB x	7	6	5	4	3	2	1	*
AB/EB x+1	15	14	13	12	11	10	9	8
AB/EB x+2	23	22	21	20	19	18	17	16
AB/EB x+3	31	30	29	28	27	26	25	24
AB/EB x+4	39	38	37	36	35	34	33	32
AB/EB x+5	47	46	45	44	43	42	41	40
AB/EB x+6	55	54	53	52	51	50	49	48
AB/EB x+7	63	62	61	60	59	58	57	56

Figure 7-7 Option handling in PIQ/PII

(*) not relevant

PIQ: AB x to AB x+7		
Slot 2 to 63:	0	Parameter assignment for option handling applies. RESERVE modules are allowed: <ul style="list-style-type: none"> The station is engaged in data exchange. A diagnostic is not signaled. The SF LED on the interface module is off.
	1	Parameter assignment for option handling is cancelled. RESERVE modules are not accepted on this slot: <ul style="list-style-type: none"> The station is engaged in data exchange. A diagnostic is not signaled. The SF LED on the interface module is off.
PII: EB x to EB x+7		
Slot 1 to 63:	0	The RESERVE module, an incorrect module, or a removed module is on the slot.
	1	The configured module is on the slot.

7.4 Identification Data

Definition

Identification data are data that are stored in a module for assisting the user in:

- Checking the system configuration
- Locating hardware modifications in a system
- Correcting errors in a system

Identification data enable modules to be uniquely identified online. This data is available on the ET 200S for IM151-1 STANDARD (from 6ES7151-1AA04-0AB0) and IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0 and higher).

In *STEP 7*, the identification data are displayed in the "Module Information - IM 151" and "Properties - DP Slave" tabs (see *STEP 7* online help).

Reading of identification data

The user can access particular identification data with **Read data record**. This requires a two-stage access:

1. A data record containing the associated data record numbers for the various indices is stored in data record 248 (see table below).

Table 7-5 Structure of DS 248 for ET 200S

Table of Contents	Length (bytes)	Coding (hex)
Header information		
ID of content directory	2	00 01
Index of content directory	2	00 00
Length of subsequent blocks in bytes	2	00 08
Number of blocks	2	00 05
Block information for identification data		
SSL	2	F1 11
Associated data record number	2	00 E7
Length of data record	2	00 40
Index	2	00 01
SSL	2	F1 11
Associated data record number	2	00 E8
Length of data record	2	00 40
Index	2	00 02
SSL	2	F1 11
Associated data record number	2	00 E9
Length of data record	2	00 40
Index	2	00 03
SSL	2	F1 11
Associated data record number	2	00 EA
Length of data record	2	00 40
Index	2	00 04
8 bytes of block information for additional data record objects		
	Σ: 48	

1. The portion of the identification data assigned to the respective index is located below the associated data record number (see table on identification data further down).
 - All data records with identification data have a length of 64 bytes.
 - The data records are structured according to the principle shown in the table below.

Table 7-6 Basic structure of data records with identification data

Table of Contents	Length (bytes)	Coding (hex)
Header information		
SSL	2	F1 11
Index	2	00 0x
Length of identification data	2	00 38
Number of blocks with identification data	2	00 01
Identification Data		
Index	2	00 0x
Identification data for the respective index (see table below)	54	

The identification data are assigned to the indices corresponding to the table below.

The data structures in data records 231 to 234 correspond to the specifications of PROFIBUS Guideline - Order no. 3.502, Version 1.1, May 2003.

Table 7-7 Identification Data

Identification Data	Access	Default setting	Explanation
Identification data 0: Index 1 (Data record 231)			
MANUFACTURER_ID	Read (2 bytes)	2A hex (= 42 dec)	The name of the manufacturer is stored here. (42 dec = SIEMENS AG)
ORDER_ID	Read (20 bytes)	depends on the module	Order number of the module
SERIAL_NUMBER	Read (16 bytes)	not relevant	
HARDWARE_REVISION	Read (2 bytes)	not relevant	
SOFTWARE_REVISION	Read (4 bytes)	Firmware version	Provides information on the firmware version of the module.
REVISION_COUNTER	Read (2 bytes)	-	Provides information on the assigned changes on the module.
PROFILE_ID	Read (2 bytes)	F600 hex	Generic Device
PROFILE_SPECIFIC_TYPE	Read (2 bytes)	0005 hex	on interface modules
IM_VERSION	Read (2 bytes)	0101 hex	Provides information on the version of the identification data (0101 hex = Version 1.1)
IM_SUPPORTED	Read (2 bytes)	000E hex	Provides information on the available identification data (Index 2 to 4)
Maintenance data 1: Index 2 (Data record 232)			
TAG_FUNCTION	Read/write (32 bytes)	-	Enter a system-wide unique identifier for the module here.
TAG_LOCATION	Read/write (22 bytes)	-	Enter the installation location of the module here.

Functions

7.4 Identification Data

Identification Data	Access	Default setting	Explanation
Maintenance data 2: Index 3 (data record 233)			
INSTALLATION_DATE	Read/write (16 bytes)	-	Enter the installation date of the module here.
RESERVED	Read/write (38 bytes)	-	Reserved
Maintenance data 3: Index 4 (data record 234)			
DESCRIPTOR	Read/write (54 bytes)	-	Enter a comment on the module here.

Alarm, error and system messages

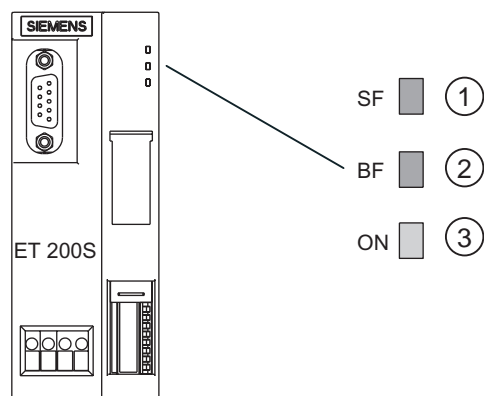
8.1 Alarm, error and system messages on PROFIBUS DP

8.1.1 Diagnostics using LED display

8.1.1.1 LED displays on the interface module

Interface module

LED displays on the interface module:



- (1) Group error (red)
- (2) Bus fault (red)
- (3) Supply voltage (green)

Status and error displays using LEDs on IM151-1 BASIC / IM151-1 STANDARD / IM151-1 FO STANDARD / IM151-1 HIGH FEATURE

Status and error displays using LEDs on IM151-1 BASIC / IM151-1 STANDARD / IM151-1 FO STANDARD / IM151-1 HIGH FEATURE

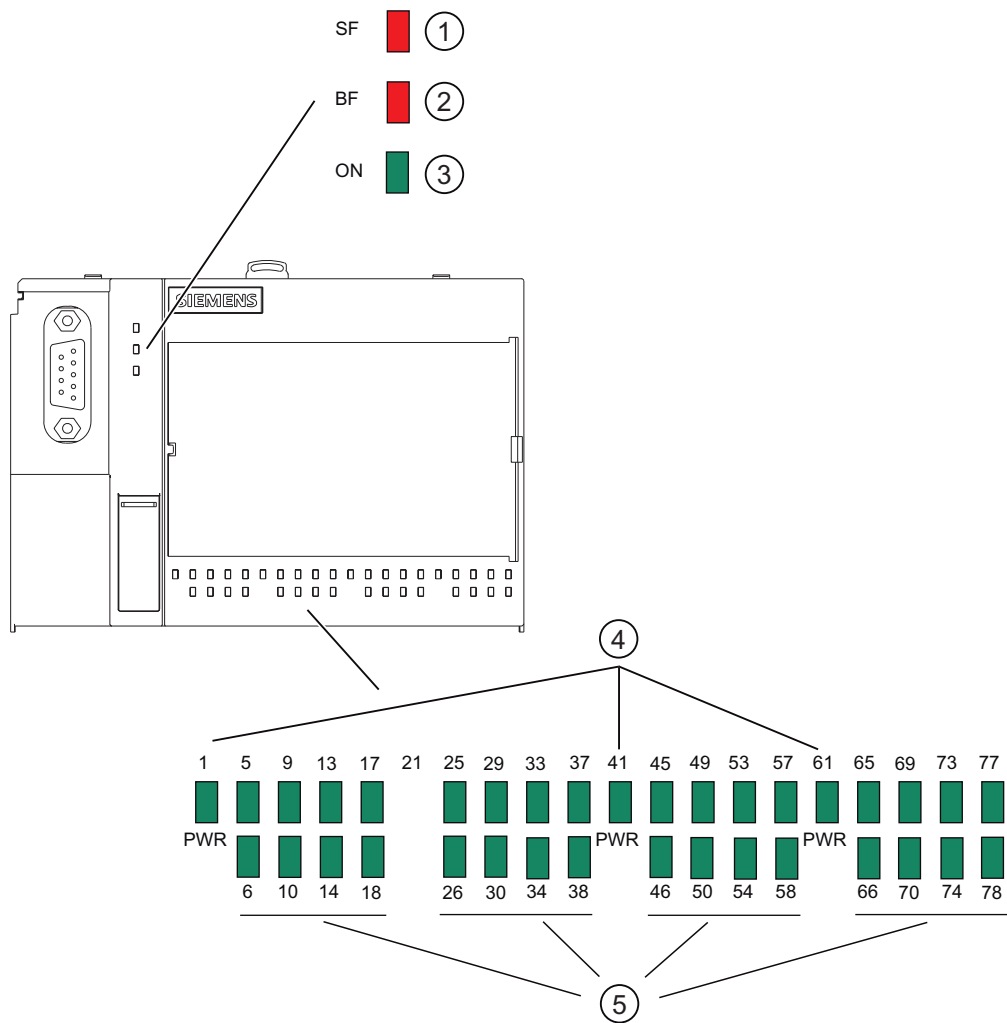
Table 8-1 Status and error displays on IM151-1 BASIC / IM151-1 STANDARD / IM151-1 FO STANDARD / IM151-1 HIGH FEATURE

Event (LEDs)			Cause	Action
SF	BF	ON		
off	off	off	There is no voltage at the interface module, or the interface module has a hardware defect.	Switch on the power supply voltage 24 VDC on the interface module.
*	*	on	There is voltage at the interface module.	---
*	Flashing	on	The interface module is not configured or is configured incorrectly. No data exchange is taking place between the DP master and the interface module. Causes: <ul style="list-style-type: none"> • The PROFIBUS address is incorrect. • Configuration error • Parameter assignment error 	<ul style="list-style-type: none"> • Check the interface module. • Check the configuration and parameter assignment. • Check the PROFIBUS address.
*	on	on	Transmission rate detection, illegal PROFIBUS address, or lowermost DIP switch (PROFIBUS address) not in the OFF position. Causes: <ul style="list-style-type: none"> • The response monitoring has elapsed. • Bus communication with the interface module via PROFIBUS DP has been interrupted. 	Set a valid PROFIBUS address (1 to 125) at the interface module, or check the bus configuration. <ul style="list-style-type: none"> • Check that the bus connector is correctly inserted. • Check whether the bus cable to the DP master has been disconnected. • Switch the 24 VDC supply voltage off and on again at the interface module.
on	*	on	The designed configuration of the ET 200S does not match its actual configuration.	Check the configuration of the ET 200S to determine whether a module is missing or defective or whether an unconfigured module is inserted. Check the configuration (e. g., using COM PROFIBUS or STEP 7), and correct the parameter assignment error.
			There is an error in an I/O module, or the interface module is defective.	Replace the interface module, or contact your Siemens representative.
off	off	on	Data exchange is taking place between the DP master and the ET 200S. The preset configuration and actual configuration of the ET 200S match.	---
* not relevant				

8.1.1.2 LED displays on COMPACT modules

COMPACT modules

LED displays on COMPACT modules:



- (1) Group error (red)
- (2) Bus fault (red)
- (3) Supply voltage (green)
- (4) Load voltage group n available (green)
- (5) Status display for input/output status (green)

Status and error displays by means of LEDs on COMPACT modules

The table below shows the status and error displays on the IM151-1 COMPACT module.

8.1 Alarm, error and system messages on PROFIBUS DP

Table 8-2 Status and error displays on the IM151-1 COMPACT (interface part)

Event (LEDs)			Cause	Action
SF	BF	ON		
off	off	off	No supply voltage available on COMPACT module. Hardware defect on COMPACT module.	Switch on the power supply voltage 24 VDC on the COMPACT module.
*	*	on	Supply voltage available on COMPACT module.	---
*	Flashing	on	The COMPACT module is not configured or is configured incorrectly. No data exchange is taking place between the DP master and the COMPACT module. Causes: <ul style="list-style-type: none"> • The PROFIBUS address is incorrect. • Configuration error • Parameter assignment error 	<ul style="list-style-type: none"> • Check the COMPACT module. • Check the configuration and parameter assignment. • Check the PROFIBUS address.
*	on	on	Transmission rate detection, illegal PROFIBUS address, or lowermost DIP switch (PROFIBUS address) not in the OFF position. Causes: <ul style="list-style-type: none"> • The response monitoring has elapsed. • Bus communication with the COMPACT module via PROFIBUS DP has been interrupted. 	Set a valid PROFIBUS address (1 to 125) at the COMPACT module, or check the bus configuration. <ul style="list-style-type: none"> • Check that the bus connector is correctly inserted. • Check whether the bus cable to the DP master has been disconnected. • Switch the 24 VDC supply voltage off and on again at the COMPACT module.
on	*	on	The designed configuration for the IM151-1 COMPACT (ET 200S) does not match the actual configuration of the station. There is an error in an I/O module, or the COMPACT module is defective.	Check the configuration of the ET 200S to determine whether a module is missing or defective or whether an unconfigured module is inserted. Check the configuration (e. g., using COM PROFIBUS or STEP 7), and correct the parameter assignment error. Replace the COMPACT module, or contact your Siemens representative.
on	off	on	<ul style="list-style-type: none"> • Parameter assignment incorrect • Hardware defect in the COMPACT module's integrated I/O. • Short circuit in the sensor supply of the digital inputs or in the load voltage for the digital outputs. 	<ul style="list-style-type: none"> • Check the parameter assignment. • Exchange the COMPACT module. • Check the supply lines.

Event (LEDs)			Cause	Action
SF	BF	ON		
off	off	on	Data exchange is taking place between the DP master and the IM151-1 COMPACT. The preset configuration and actual configuration of the IM151-1 COMPACT (ET 200S) match.	----
* not relevant				

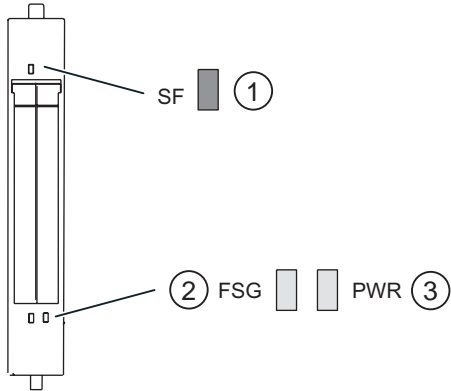
Table 8-3 Status and error displays on the IM151-1 COMPACT (integrated periphery)

SF	Event (LEDs)													Cause	
	1	41	61	5	6	9	:::	38	45	46	49	:::	78		
on															No configuration or incorrect module plugged in. There is a diagnostic message. Check the parameter assignment. Evaluate the diagnostics.
	on														Load voltage voltage group 0 available.
		on													Load voltage voltage group 2 available.
			on												Load voltage voltage group 3 available.
				on											Input on channel 0 activated.
					on										Input on channel 1 activated.
						on									Input on channel 2 activated.
							:::								:::
								on							Input on channel 15 activated.
									on						Input/output on channel 16 activated.
										on					Input/output on channel 17 activated.
											on				Input/output on channel 18 activated.
												:::			:::
													on		Input/output on channel 31 activated.

8.1.1.3 LED displays on the power module

Power module

LED displays on the power module:



- ① Group error (red)
- ② Fuse (green) – only in the case of PM-E 24 .. 48 VDC/120 .. 230 VAC)
- ③ Supply voltage (green)

Status and error displays by means of LEDs on power modules

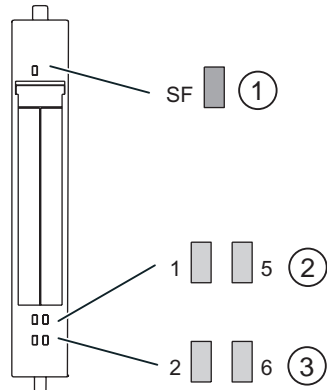
The table below shows the status and error displays on the power module.

Event (LEDs)			Cause	Action
SF	FSG	PWR		
on			No configuration or incorrect module plugged in. There is a diagnostic message.	Check the parameter assignment. Evaluate the diagnostics.
	off		The fuse in the power module has tripped.	Replace the fuse.
		off	There is no load voltage at the power module.	Check the load voltage.

8.1.1.4 LED displays on digital electronic modules

Digital electronic modules

LED displays on digital electronic modules:



- ① Group error (red) - only for 2DI 24 VDC HF, 4DI 24 VDC HF, 2DO 24 VDC/0.5 A HF, 2DO 24 VDC/2A HF and 4DI NAMUR
- ② Status display for input/output status (green)
- ③ Status display for status of the inputs/outputs (green) - only for 4DI 24 VDC ST, 4DI 24 VDC HF, 4DO 24 VDC/0.5 A ST, 4DO 24 VDC/2A ST, 4DI 24 ..48 VUC HF and 4DI NAMUR

Status and error displays by means of LEDs on digital electronic modules

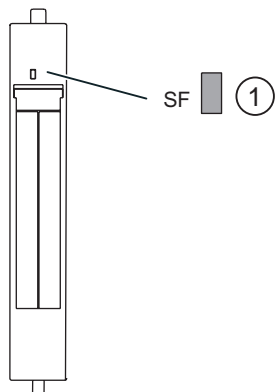
The table below shows the status and error displays on the digital electronic modules.

Event (LEDs)					Cause	Action
SF	1	5	2	6		
on					No configuration or incorrect module plugged in. There is a diagnostic message.	Check the parameter assignment. Evaluate the diagnostics.
	on				Input/output on channel 0 active.	
		on			Input/output on channel 1 active.	
			on		Input/output on channel 2 (only for 4DI/DO) activated.	
				on	Input/output on channel 3 (only for 4DI/DO) activated.	

8.1.1.5 LED displays on analog electronic modules

Analog electronic modules

LED displays on analog electronic modules:



① Group error (red)

Status and error displays by means of LEDs on analog electronic modules

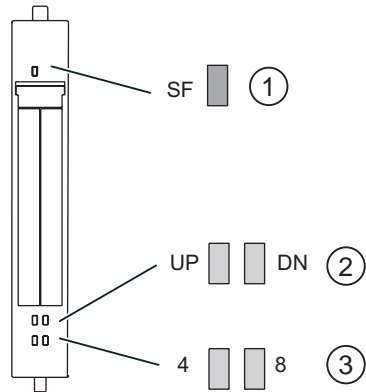
The table below shows the status and error displays on the analog electronic modules.

Event (LED)	Cause	Action
SF		
on	No configuration or incorrect module plugged in. No load voltage present. There is a diagnostic message.	Check the parameter assignment. Check the load voltage. Evaluate the diagnostics.

8.1.1.6 LED displays on the 1COUNT 24V/100kHz

1COUNT 24V/100kHz

LED displays on the 1COUNT 24V/100kHz:



- ① Group error (red)
- ② Status display for counting direction (green)
- ③ Status display for digital input/digital output (green)

Status and error displays by means of LEDs on 1COUNT 24V/100kHz

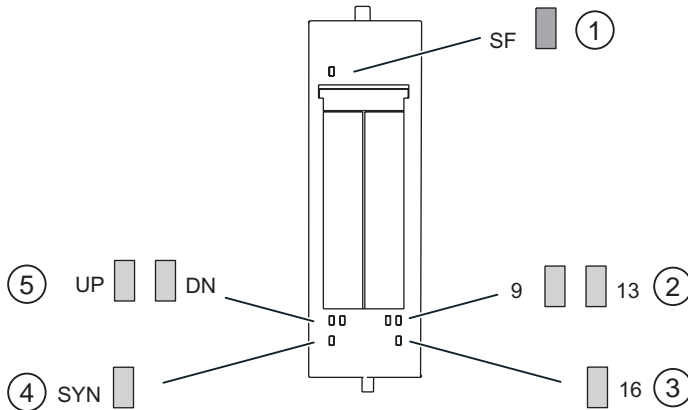
The table below shows the status and error displays on the 1COUNT 24V/100kHz.

Event (LEDs)					Cause	Action
SF	UP	DN	4	8		
on					No configuration or incorrect module plugged in. There is a diagnostic message.	Check the parameter assignment. Evaluate the diagnostics.
	on				Status of the low-order bits of the counter, if the counter counts up.	
		on			Status of the inverse low-order bits of the counter in case the counter counts down.	
			on		DO (direct control, comparator output) activated.	
				on	DI (HW gate, synchronization, latch) activated.	

8.1.1.7 LED displays on the 1COUNT 5V/500kHz

1COUNT 5V/500kHz

LED displays on the 1COUNT 5V/500kHz:



- ① Group error (red)
- ② Status display for the digital output (green)
- ③ Status display for digital input (green)
- ④ Status display for synchronization (green)
- ⑤ Status display for counting direction (green)

Status and error displays by means of LEDs on 1COUNT 5V/500kHz

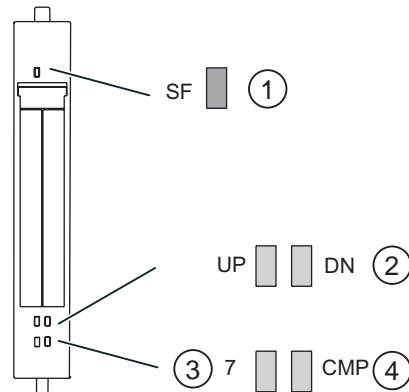
The table below shows the status and error displays on the 1COUNT 5V/500kHz.

Event (LEDs)							Cause	Action
SF	UP	DN	SYN	9	13	16		
on							No parameter assignment. There is a diagnostic message.	Check the parameter assignment. Evaluate the diagnostics.
	on						Status of the low-order bits of the counter, if the counter counts up.	
		on					Status of the inverse low-order bits of the counter, if the counter counts down.	
			on				Synchronization is performed (only in counting modes; image of STS_SYN acknowledgement bit).	
				on			DO 1 is activated.	
					on		DO 2 is activated.	
						on	DI is activated.	

8.1.1.8 LED displays on the 1SSI

1SSI

LED displays on the 1SSI:



- ① Group error (red)
- ② Status display for change in sensor value (green)
- ③ Status display for digital input (green)
- ④ Status display for result of comparison

Status and error displays by means of LEDs on 1SSI

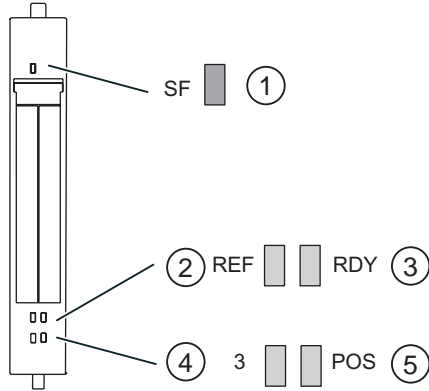
The table below shows the status and error displays on the 1SSI.

Event (LEDs)					Cause	Action
SF	UP	DN	7	CMP		
on					No parameter assignment. There is a diagnostic message.	Check the parameter assignment. Evaluate the diagnostics.
	on				At value change from smaller to larger sensor values (including zero-crossing)	
		on			At value change from larger to smaller sensor values (including zero-crossing)	
			on		DI (latch) is activated.	
				on	Set for comparison result CMP 1	

8.1.1.9 LED displays on the 1STEP 5V/204kHz

1STEP 5V/204kHz

LED displays on the 1STEP 5V/204kHz:



- ① Group error (red)
- ② Status display for digital input REF (green)
- ③ Ready for positioning job (green)
- ④ Status display for digital input (green)
- ⑤ Positioning underway (green)

Status and error displays by means of LEDs on 1STEP 5V/204kHz

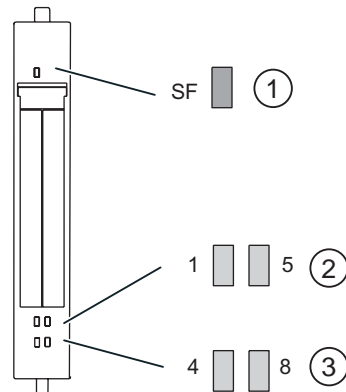
The table below shows the status and error displays on the 1STEP 5V/204kHz.

Event (LEDs)					Cause	Action
SF	REF	RDY	3	POS		
on					No configuration or incorrect module plugged in. There is a diagnostic message.	Check the parameter assignment. Evaluate the diagnostics.
	on				REF activated.	
		on			If parameters were assigned to the module correctly and pulse enable has been activated	
			on		DI activated.	
				on	If a positioning operation is running	

8.1.1.10 LED displays on the 2PULSE

2PULSE

LED displays on the 2PULSE:



- ① Group error (red)
- ② Status display for digital input (green)
- ③ Status display for the digital output (green)

Status and error displays by means of LEDs on 2PULSE

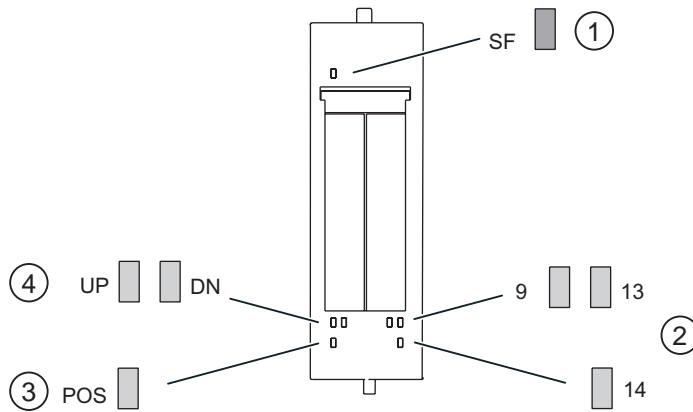
The table below shows the status and error displays on the 2PULSE.

Event (LEDs)					Cause	Action
SF	1	5	4	8		
on					No parameter assignment. There is a diagnostic message.	Check the parameter assignment. Evaluate the diagnostics.
	on				Input on channel 0 activated.	
		on			Input on channel 1 activated.	
			on		Output on channel 0 activated.	
				on	Output on channel 1 activated.	

8.1.1.11 LED displays on the 1POS INC/Digital, 1POS SSI/Digital, 1POS INC/Analog, and 1POS SSI/Analog

1POS INC/Digital, 1POS SSI/Digital, 1POS INC/Analog, 1POS SSI/Analog

LED displays on the 1POS INC/Digital, 1POS SSI/Digital, 1POS INC/Analog, and 1POS SSI/Analog:



- ① Group error (red)
- ② Status displays for digital inputs (green)
- ③ Positioning underway (green)
- ④ Status display for a change in an actual value (green)

Status and error displays by means of LED displays on the 1POS INC/Digital, 1POS SSI/Digital, 1POS INC/Analog, and 1POS SSI/Analog

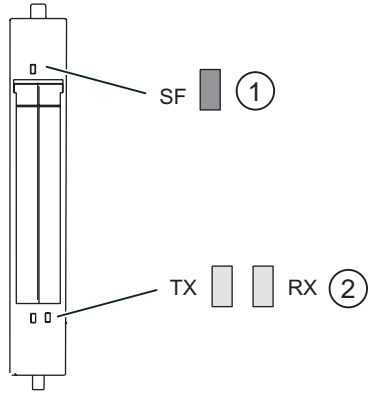
The following table shows the status and error displays on the 1POS INC/Digital, 1POS SSI/Digital, 1POS INC/Analog, and 1POS SSI/Analog.

Event (LEDs)							Cause	Action
SF	UP	DN	POS	9	13	14		
on							No parameter assignment. There is a diagnostic message.	Check the parameter assignment. Evaluate the diagnostics.
	on						In the case of actual value change from lower to higher values	
		on					In the case of actual value change from higher to lower values	
			on				Digital: positioning is running and one of the 3 digital outputs is set. Analog: positioning is running and on the analog output a voltage not equal to 0 V is output.	
				on			DI 0 is activated.	
					on		DI 1 is activated.	
						on	DI 2 is activated.	

8.1.1.12 LED displays on the 1SI 3964/ASCII and 1SI Modbus/US\$ serial interface modules

1SI 3964/ASCII and 1SI Modbus/US\$ serial interface modules

LED displays on the 1SI 3964/ASCII and 1SI Modbus/US\$:



- ① Group error (red)
- ② Status displays for digital inputs (green)

Status and error displays by means of LEDs on the 1SI 3964/ASCII and 1SI Modbus/US\$

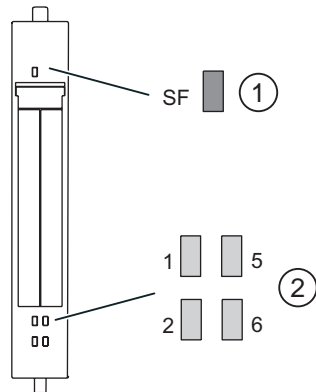
The table shows the status and error displays on the 1SI 3964/ASCII and 1SI Modbus/US\$.

Event (LEDs)			Cause	Action
SF	TX	RX		
on			Hardware fault Firmware error	Check the module.
			Parameter assignment error	Check the parameter assignment. Evaluate the diagnostics.
			Wire break or loose cable between the module and the communication peer ¹	Check the wiring.
			Communication error	Check the communication settings.
	on		The module is sending data via the interface.	
		on	The module is receiving data via the interface.	
¹ Only detected in the case of RS-422 interface connections when the default for the receive line is set to R(A) 5 V/R(B) 0 V.				

8.1.1.13 LED displays on the 4 IQ-SENSE

4 IQ-SENSE

LED displays on the 4 IQ-SENSE electronic module:



- ① Group error (red)
- ② Status display for input status (green)

Status and error displays by means of LEDs on 4 IQ-SENSE

The table below shows the status and error displays on the 4 IQ-SENSE.

Event (LEDs)					Cause	Action
SF	1	5	2	6		
on					No parameter assignment.	Check the parameter assignment.
					There is a diagnostic message.	Evaluate the diagnostics.
					Underrange of function reserve.	Adjust the reflection light barrier. Clean the optical system. Replace the sensor.
					Teach-in operation is underway.	Terminate the teach-in operation.
	on				Input on channel 0 activated.	
		on			Input on channel 1 activated.	
			on		Input on channel 2 activated.	
				on	Input on channel 3 activated.	

8.1.2 Diagnostic messages of the electronic modules or COMPACT modules

Actions Following a Diagnostic Message in DPV0 mode

The error is entered in the channel-related diagnostic information in the diagnostic frame:

- The SF LED on the interface module lights up.
- Several simultaneous diagnostic messages are possible. .

Actions Following a Diagnostic Message in DPV1 mode

Each diagnostic message leads to the following actions:

- Diagnostics can be reported as diagnostic interrupts in DPV1 mode.
- After a diagnostic message is signaled, the message is:
 - Entered in the diagnostic frame as a diagnostic interrupt block (always limited to one interrupt)
 - written to the diagnostics buffer of the CPU
- The SF LED of the interface module is lit.
- OB 82 is called. If OB 82 is not available, the CPU goes into STOP.
- Acknowledgment of the diagnostic interrupt (following this a new interrupt is possible).

See also

Channel-specific diagnostics (Page 8-31)

8.1.3 Evaluating the interrupts of the ET 200S

Introduction

In the case of certain process states/errors, the DP slave saves one interrupt block for each process state or error containing relevant information in the diagnostic frame (DPV1 interrupt mechanism). Independent of this, the diagnostic status of the DP slave is maintained in the identifier-related diagnostics, the module status, and the channel-related diagnostics.

Interrupts in DPV0 mode

For DPV0 mode, no interrupts are defined based on the PROFIBUS standard. Thus, interface modules do not trigger an interrupt in DPV0 mode.

Interrupts in DPV1 mode

The ET 200S supports the following interrupts:

- Diagnostic interrupts
- Process interrupts
- Insert/remove interrupts

Requirements: Interrupts are only supported if you operate the ET 200S with interface modules IM151-1 STANDARD (6ES7151-1AA04-0AB0 and higher) (in the DPV1 mode) and IM151-1 HIGH FEATURE (in the DPV1 mode).

In case of an interrupt, interrupt OBs are automatically executed in the CPU of the DP master (see information on program design in the *System Software for S7-300/S7-400* programming manual).

Triggering of a diagnostic interrupt

When an incoming or outgoing event (e.g. wire break) is registered, the module triggers a diagnostic interrupt if "Enable: Diagnostic interrupt" is set.

The CPU interrupts the processing of the user program and processes the OB 82 diagnostics block. The event that caused the interrupt to be triggered is entered in the start information of OB 82.

Evaluating hardware interrupts with *STEP 7*

When a process interrupt occurs, the CPU interrupts the processing of the user program and processes the OB 40 hardware interrupt block instead.

The module channel that triggered the process interrupt is entered in the start information of OB 40 in the OB 40_POINT_ADDR variable. The figures below present the assignment to the bits of the local data double word 8.

Process interrupts for 2DI 24 VDC High Feature and 4DI 24 VDC High Feature electronic modules:

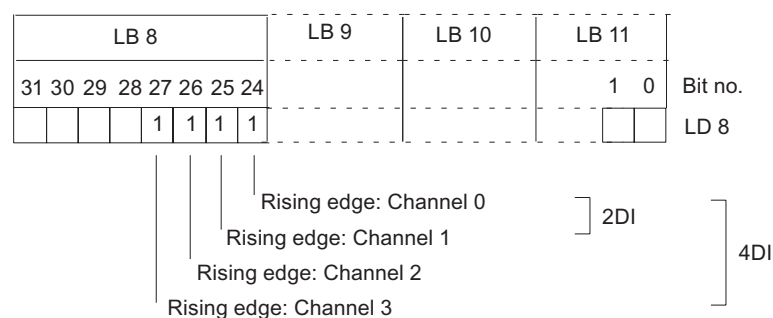


Figure 8-1 Start information of the OB 40: which event has triggered process interrupt for digital input modules

Process interrupts for 2AI U HS, 2AI I 2WIRE HS und 2AI I 4WIRE HS electronic modules:

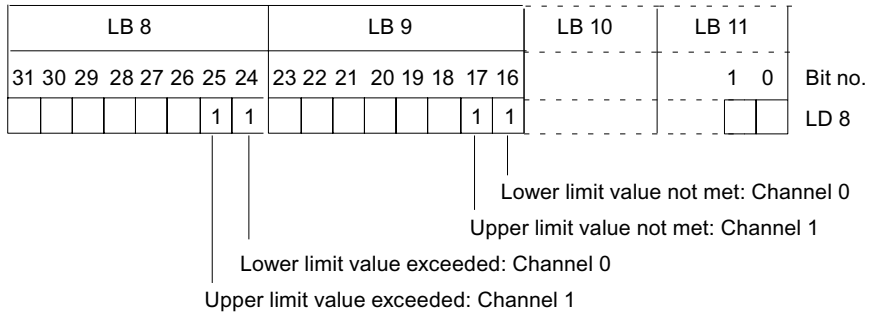


Figure 8-2 Start information of the OB 40: which event has triggered process interrupt for analog input modules

You will find a description of OB 40 in the *System and Standard Functions* reference manual.

Triggering of an insert/remove-module interrupt

Insert/remove-module interrupts are supported in DPV1 mode. The CPU interrupts processing of the user program and processes the OB 83 diagnostic block instead. The result that caused the interrupt to be triggered is entered in the start information of OB 83.

8.1.4 Diagnostics with STEP 7

8.1.4.1 Diagnostics readout

Introduction

The slave diagnostics comply with IEC 61784-1:2002 Ed1 CP 3/1. Depending on the DP master, slave diagnostics can be read out with *STEP 7* for all DP slaves that comply with the standard.

Length of the diagnostics frame

- The maximum frame length for the ET 200S is as follows:
 - IM151-1 BASIC: 43 bytes
 - IM151-1 COMPACT: 44 bytes
 - IM151-1 STANDARD, IM151-1 FO STANDARD, IM151-1 HIGH FEATURE (DPV0 mode): 64 bytes
 - IM151-1 STANDARD, IM151-1 FO STANDARD (DPV1 mode): 110 bytes
 - IM151-1 HIGH FEATURE (DPV1 mode): 128 bytes
- The minimum frame length is
 - 6 bytes (identifier-related diagnostics, module status, and channel-specific diagnostics disabled via parameter assignment).

Options for reading out the diagnostics

The table below shows the options for reading out the diagnostics with *STEP 7* on PROFIBUS DP.

Table 8-4 Reading out the diagnostics with STEP 7 on PROFIBUS DP

Automation system with DP master	Block or tab in <i>STEP 7</i>	Application	Reference
SIMATIC S7/M7	"DP Slave Diagnostics" tab	Slave diagnostics in plain text on the STEP 7 user interface	"Diagnosing hardware" in <i>STEP 7</i> online help
	SFC 13 "DP NRM_DG"	Reading out slave diagnostics (store in data area of the user program)	SFC see <i>Online Help in STEP 7</i>
	SFC 59 "RD_REC"	Reading out data records of the S7 diagnostics (store in the data area of the user program)	See the system and standard functions reference manual
	SFB 52 "RDREC"	Read data records from the DP slave	SFB see <i>Online Help in STEP 7</i> (system functions/system function blocks)

8.1 Alarm, error and system messages on PROFIBUS DP

Automation system with DP master	Block or tab in STEP 7	Application	Reference
	SFB 54 "RALRM" ¹	Receiving interrupts from the interrupt OBs	SFB see <i>Online Help in STEP 7</i> (system functions/system function blocks)
¹ only for S7-400 from V3.0 and CPU 318 from V3.0			

Example of reading out S7 diagnostics using SFC 13 "DP NRM_DG"

Here, you will find an example of how to use SFC 13 to read out the slave diagnostics for a DP slave in the STEP 7 user program.

The following assumptions apply to this STEP 7 user program:

- The diagnostic address of the ET 200S is 1022 (3FE_H).
- The slave diagnostic information is to be stored in DB 82: from address 0.0, length 64 bytes.
- The slave diagnostics consist of a maximum 64 bytes (IM151-1 STANDARD in DPV0 mode).

STEP 7 user program

STL	Explanation
CALL SFC 13	
REQ :=TRUE	Read request
LADDR :=W#16#3FE	Diagnostic address of the ET 200S
RET_VAL :=MW0	RET_VAL of SFC 13
RECORD :=P#DB82.DBX 0.0 BYTE 64	Data record for the diagnostic information in DB82
BUSY :=M2.0	The read process iterates through several OB 1 cycles

8.1.4.2 Structure of the slave diagnostics

Structure of the slave diagnostics

The figure below shows the structure of the slave diagnostics.

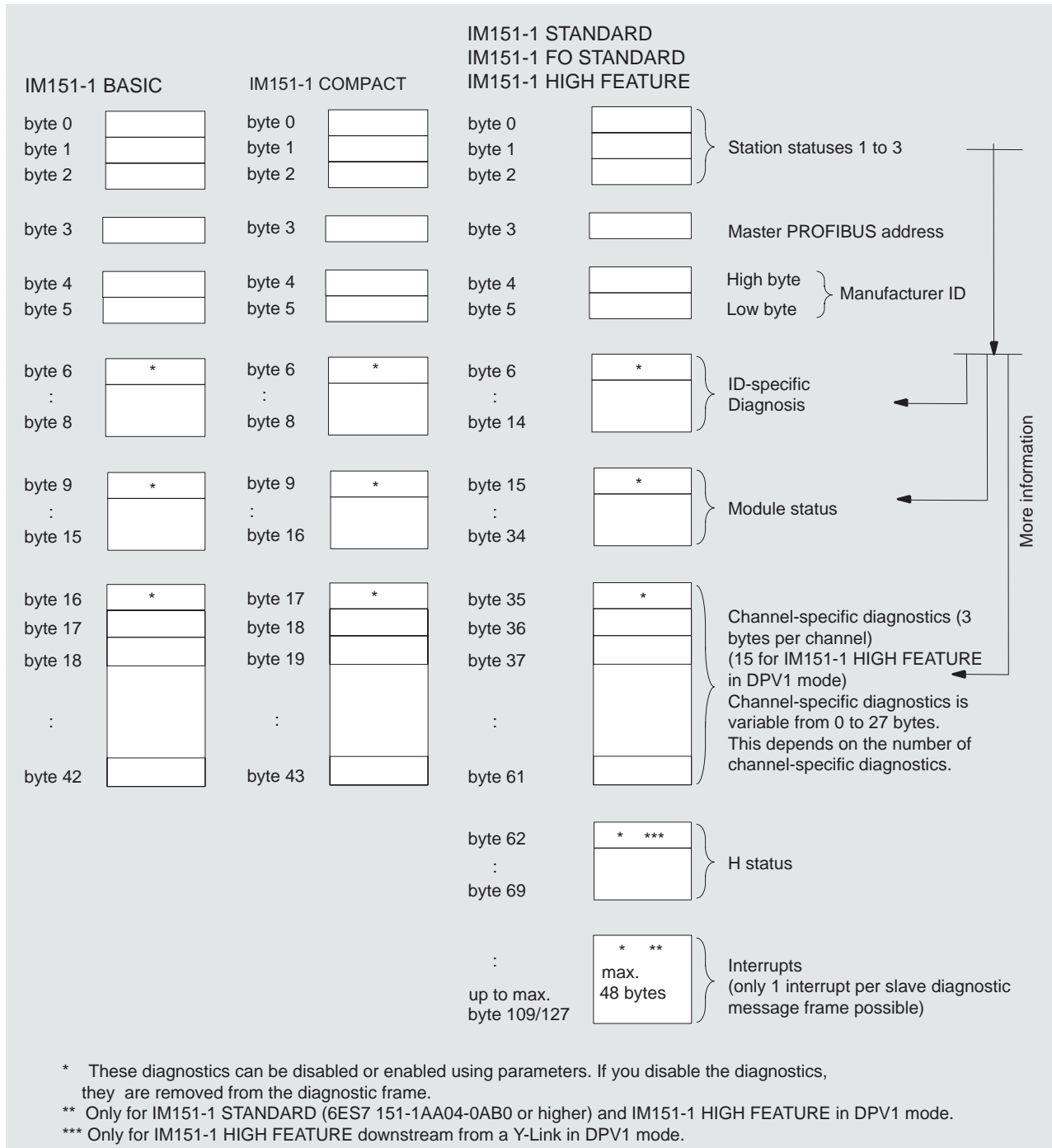


Figure 8-3 Structure of the slave diagnostics

Note

The length of the diagnostic frame varies:

- For IM151-1 BASIC, between 6 and 43 bytes.
- For IM151-1 COMPACT, between 6 and 44 bytes.
- For the IM151-1 STANDARD, IM151-1 FO STANDARD and IM 151-1 HIGH FEATURE (depending on the parameterization)
 - Between 6 and 62 bytes in DPV0 mode
 - Between 6 and 110 bytes in DPV1 mode (STANDARD)
 - Between 6 and 128 bytes in DPV1 mode (HIGH FEATURE)

You can see the length of the last received diagnostic frame in: *STEP 7* from the parameter RET_VAL des SFC 13.

8.1.4.3 Station statuses 1 to 3

Definition

Station statuses 1 to 3 provide an overview of the status of a DP slave.

Structure of station status 1 (byte 0)

Table 8-5 Structure of station status 1 (byte 0)

Bit	Meaning	Cause/remedy
0	1: The DP slave cannot be accessed by the DP master.	<ul style="list-style-type: none"> • Is the correct PROFIBUS address set on the DP slave? • Is the bus connector plugged in? • Voltages on DP slave? • RS 485 repeater set correctly? • DP slave reset?
1	1: The DP slave is not yet ready to exchange data.	<ul style="list-style-type: none"> • Wait, the DP slave is currently starting up.
2	1: The configuration data transferred from the DP master to the DP slave do not match the slave configuration.	<ul style="list-style-type: none"> • Correct station type or correct configuration of the DP slave entered in the configuration software?
3	1: External diagnostic information exists. (Group diagnostic display)	<ul style="list-style-type: none"> • Evaluate the channel-related diagnostic information, the module status and/or the channel-related diagnostic information. As soon as all errors have been eliminated, bit 3 will be reset. The bit will be set again when there is a new diagnostic message in the bytes of the aforementioned diagnostics.
4	1: The required function is not supported by the DP slave (for example, changing the PROFIBUS address by means of software).	<ul style="list-style-type: none"> • Check the configuration.

Bit	Meaning	Cause/remedy
5	1: The DP master cannot interpret the response of the DP slave.	<ul style="list-style-type: none"> Check the bus configuration.
6	1: The DP slave type does not match the software configuration.	<ul style="list-style-type: none"> Correct station type entered in the configuration software?
7	1: Parameters have been assigned to the DP slave by a different DP master (not the one that currently has access to the DP slave).	<ul style="list-style-type: none"> The bit is always 1, for example, if you access the DP slave with the programming device or another DP master. The PROFIBUS address of the DP master that assigned parameters to the DP slave is located in the "master PROFIBUS address" diagnostic byte.

Structure of station status 2 (byte 1)

Table 8-6 Structure of station status 2 (byte 1)

Bit	Meaning
0	1: Parameters have to be reassigned to the DP slave.
1	1: A diagnostic message exists. The DP slave will not operate until the problem is eliminated (static diagnostic message).
2	1: The bit on the DP slave is always "1".
3	1: The watchdog is activated for this DP slave.
4	1: The DP slave has received the "FREEZE" control command ¹ .
5	1: The DP slave has received the "SYNC" control command ¹ .
6	0: Bit is always "0".
7	1: The DP slave is disabled, that is, it has been removed from the processing in progress.

¹ The bit is updated only if another diagnostic message changes, too.

Structure of station status 3 (byte 2)

Table 8-7 Structure of station status 3 (byte 2)

Bit	Meaning
0 to 6	0: Bits are always "0".
7	1: <ul style="list-style-type: none"> There are more diagnostic messages than the DP slave can store. The DP master cannot enter all the diagnostic messages sent by the DP slave in its diagnostic buffer (channel-specific diagnostics).

8.1.4.4 Master PROFIBUS address

Definition

The diagnostic byte master PROFIBUS address contains the PROFIBUS address of the DP master:

- that assigned parameters to the DP slave and
- that has read and write access to the DP slave.

The master PROFIBUS address is in byte 3 of the slave diagnostic information.

8.1.4.5 Manufacturer ID

Structure

The manufacturer ID contains a code that describes the type of the DP slave.

The table below shows the structure of the manufacturer ID (bytes 4, 5).

Table 8-8 Structure of the manufacturer ID (bytes 4, 5)

byte 4	byte 5	Manufacturer ID for
80 _H	F3 _H	ET 200S with IM151-1 BASIC
80 _H	6A _H	ET 200S with IM151-1 STANDARD
80 _H	6B _H	ET 200S with IM151-1 FO STANDARD
80 _H	E0 _H	ET 200S with IM151-1 HIGH FEATURE
82 _H	01 _H	ET 200S with IM151-1 COMPACT 32DI
82 _H	00 _H	ET 200S with IM151-1 COMPACT 16DI/16DO

8.1.4.6 Identifier-related diagnostics

Definition

The identifier-related diagnostics indicate whether or not modules of the ET 200S have errors/faults. The identifier-related diagnostics start at byte 6 and comprise:

- 3 bytes in the case of IM151-1 BASIC or COMPACT modules.
- 9 bytes in the case of IM151-1 STANDARD, IM151-1 FO STANDARD, and IM151-1 HIGH FEATURE.

Structure of the identifier-related diagnostics

The identifier-related diagnostics for ET 200S is structured as follows for the IM151-1 BASIC or COMPACT interface modules:

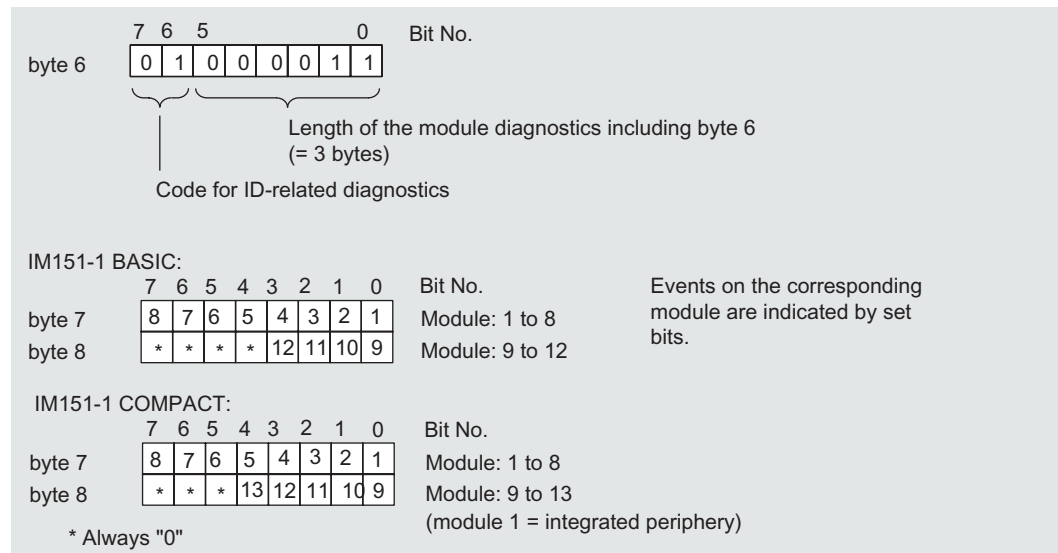


Figure 8-4 Structure of the identifier-related diagnostics for ET 200S with IM151-1 BASIC or COMPACT modules

The identifier-related diagnostics for ET 200S is structured as follows for the IM151-1 STANDARD, IM151-1 FO STANDARD, and IM151-1 HIGH FEATURE interface modules:

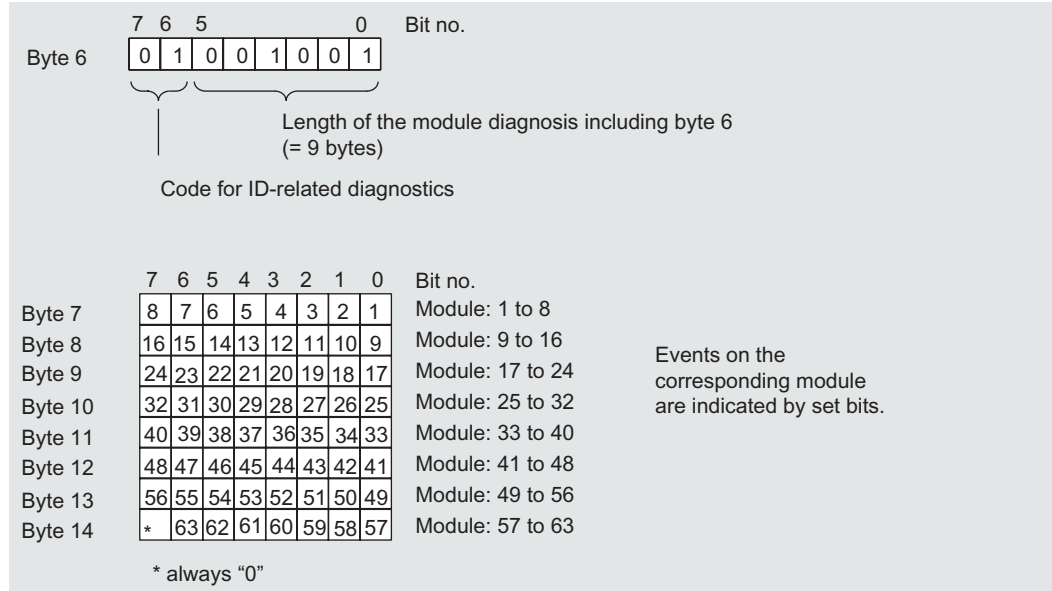


Figure 8-5 Structure of the identifier-related diagnostics for ET 200S with IM151-1 STANDARD, IM151-1 FO STANDARD, and IM151-1 HIGH FEATURE

8.1.4.7 Module status

Definition

The module status indicates the status of the configured modules and expands on the identifier-related diagnostics with regard to the configuration. The module status begins after the identifier-related diagnostics and comprises:

- 7 bytes in the case of the IM151-1 BASIC
- 8 bytes in the case of the IM151-1 COMPACT
- 20 bytes in the case of IM151-1 STANDARD, IM151-1 FO STANDARD, and IM151-1 HIGH FEATURE.

Structure of the module status

The module status for ET 200S is structured as follows for the IM151-1 BASIC or COMPACT interface modules:

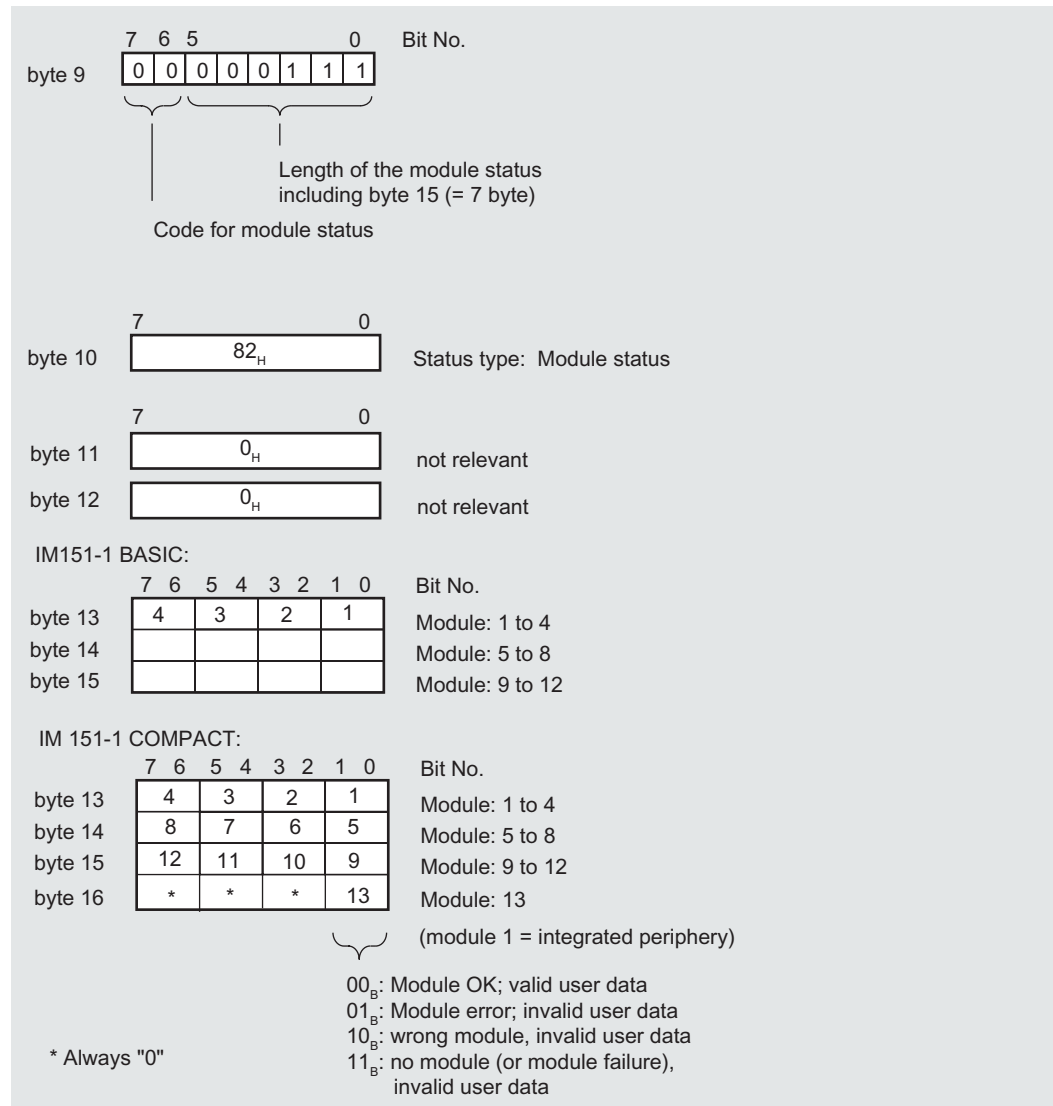


Figure 8-6 Structure of the module status for ET 200S with IM151-1 BASIC or COMPACT modules

The module status for ET 200S is structured as follows for the IM151-1 STANDARD, IM151-1 FO STANDARD, and IM151-1 HIGH FEATURE interface modules:

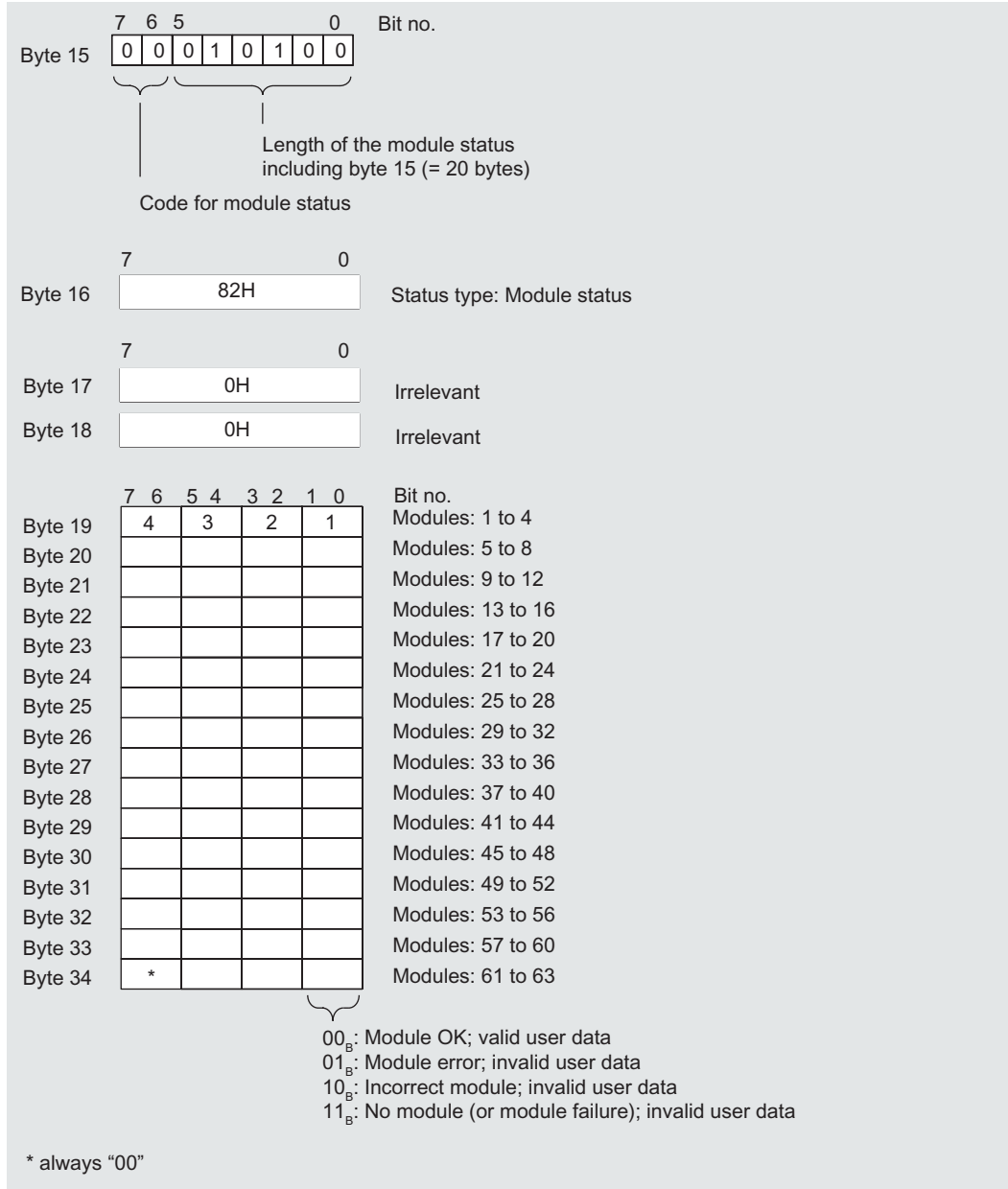


Figure 8-7 Structure of the module status for ET 200S with IM151-1 STANDARD, IM151-1 FO STANDARD, and IM151-1 HIGH FEATURE

8.1.4.8 Channel-specific diagnostics

Definition

Channel-specific diagnostics provides information about channel errors of modules and provides details of the ID-related diagnostics. The channel-specific diagnostics start after the module status (if parameters are preset accordingly). The maximum length is limited by the maximum total length of the slave diagnostics of 43/44/62 bytes in DPV0 mode or 110/128 bytes in DPV1 mode. The channel-specific diagnostics do not affect the module status.

A maximum of 9 (in DPV0/DPV1 mode) or 15 (in DPV1 mode with IM 151-1 HIGH FEATURE) channel-specific diagnostic messages are possible.

Structure of the channel-specific diagnostics

The identifier-related diagnostics for ET 200S is structured as follows for the IM151-1 BASIC or COMPACT interface modules:

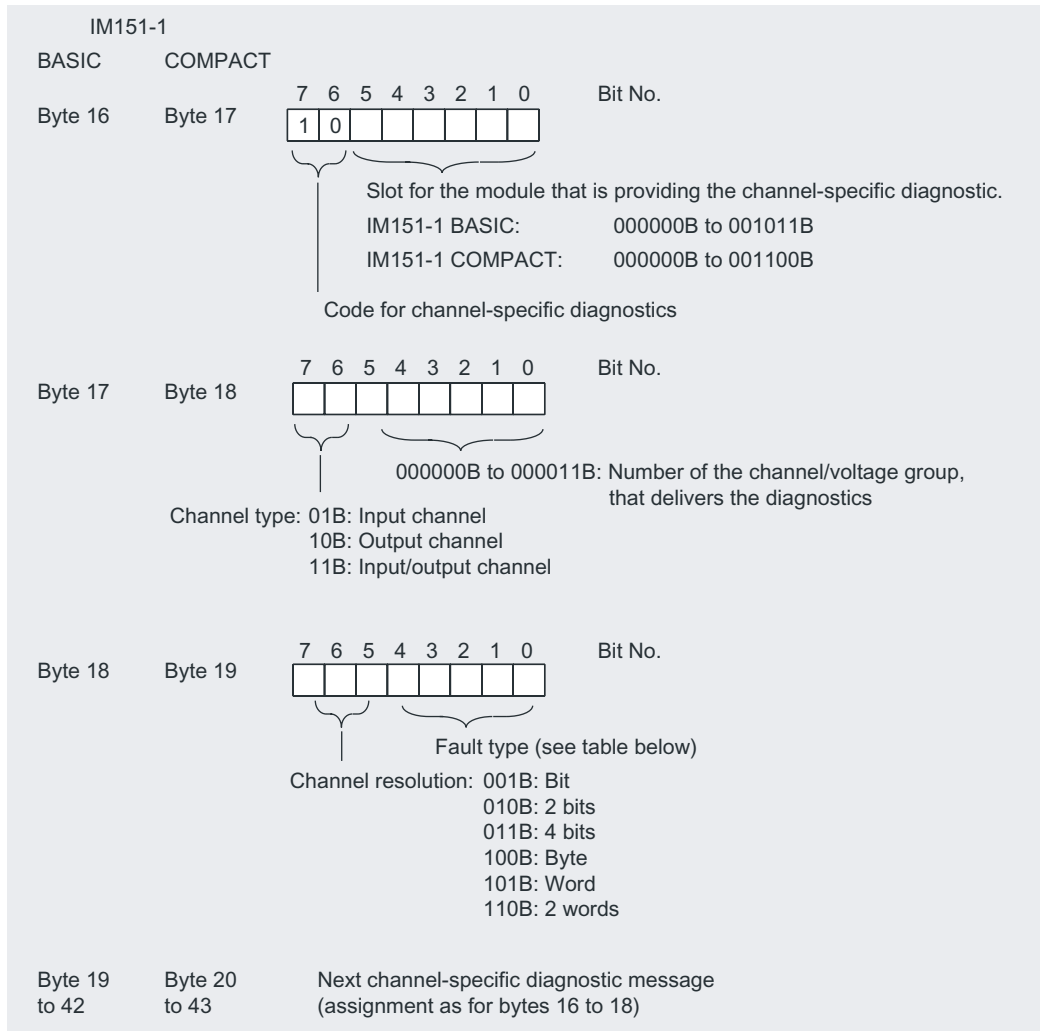


Figure 8-8 Structure of the channel-related diagnostics for ET 200S with IM151-1 BASIC or COMPACT modules

The identifier-related diagnostics for ET 200S is structured as follows for the IM151-1 STANDARD, IM151-1 FO STANDARD and IM151-1 HIGH FEATURE interface modules:

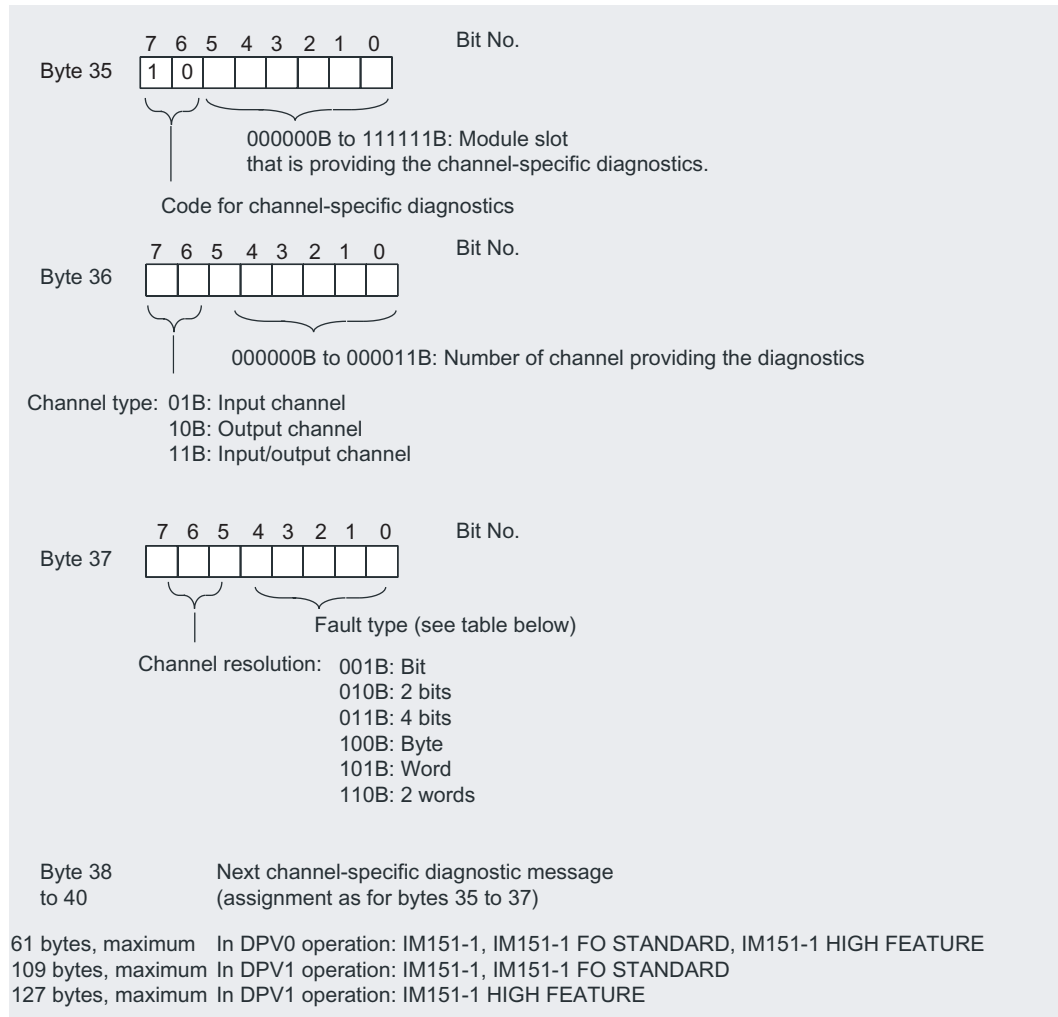


Figure 8-9 Structure of the channel-related diagnostics for ET 200S with IM151-1 STANDARD, IM151-1 FO STANDARD, and IM151-1 HIGH FEATURE

Note

The module slot is encrypted in Byte 16/17/35, Bit 0 to 5. The following applies: Displayed number +1 $\hat{=}$ Slot of the module (0 $\hat{=}$ Slot 1; 1 $\hat{=}$ Slot 2; 3 $\hat{=}$ Slot 4, etc.)

In Byte 17 / 18 / 36, Bit 6/7, 00_B is output if a power module reports a channel-specific diagnostic.

Power module error types

The diagnostic message is reported on channel 0 and applies to the whole module.

The table below shows the error types on power modules

Table 8-9 Power module error types

Power module electronic modules		Error class		Meaning	Remedy
PM-E 24 ..48 VDC/ 120 ..230 VAC	PM-E 24VDC PM E 24 ..48 VDC	17 _D	10001: Sensor or load voltage missing	Power supply voltage not present or too low.	Correct the process wiring. Check the supply voltage.
	---	18 _D	10010: Fuse defective	The fuse in the power module has tripped.	Replace the fuse.

COMPACT modules error types

The table below shows the error types on COMPACT modules.

Table 8-10 COMPACT modules error types

COMPACT modules	Error class		Meaning	Remedy
32DI	17 _D	10001: Load voltage missing	Load voltage not available (due to wire break or short circuit) or too low. Diagnostic message is issued for the relevant voltage group.	Correct the process wiring. Check the load voltage.
	1 _D	00001: Short circuit	Short circuit of the sensor supply. Diagnostic message is issued for the relevant voltage group.	Correct the process wiring (sensor wiring).
16DI/16DO	17 _D	10001: Load voltage missing	Load voltage not available (due to wire break or short circuit) or too low. Diagnostic message is issued for the relevant voltage group.	Correct the process wiring. Check the load voltage.
	1 _D	00001: Short circuit	Short circuit of the sensor supply. Diagnostic message is issued for the relevant voltage group.	Correct the process wiring (sensor wiring).

Digital electronic module error types

The table below shows the error types on digital electronic modules.

Table 8-11 Digital electronic module error types

Digital electronic modules	Error class	Meaning	Remedy
2DI 24 VDC HF	1D	00001: Short circuit	Short circuit of the sensor supply. The diagnostic message is issued on Channel 0 and applies to the whole module. Correct the process wiring (sensor wiring).
4DI 24 VDC HF	1D	00001: Short circuit (in conjunction with IM151-1 BASIC / IM151-1 COMPACT / IM151-1 STANDARD, 6ES7151-1AA02-0AB0 and higher, IM151-1 FO STANDARD, 6ES7151-1AB01-0AB0 and higher) or IM151-1 HIGH FEATURE	Short circuit of the sensor supply. The diagnostic message is issued on Channel 0 and applies to the whole module. Correct the process wiring (sensor wiring).
	26D	11010: External error (in conjunction with IM151-1 STANDARD, to 6ES7151-1AA01-0AB0 or IM151-1 FO STANDARD, to 6ES7151-1AB00-0AB0)	
4DI 24 VUC..48 VUC HF	26D	11010: External error	Line to the actuator interrupted. Correct the process wiring.
			Power supply voltage not present or too low. Correct the process wiring. Check the supply voltage.
			Fuse triggered. Replace the fuse.
2DO 24 VDC/0.5 A HF 2DO 24 VDC/2 A HF	1D	00001: Short circuit	Short circuit of actuator supply after M. Correct the process wiring.
	6D	00110: Wire break	

Digital electronic modules	Error class		Meaning	Remedy
4DI NAMUR	1 _D	00001: Short circuit (only NAMUR changeover contacts and NAMUR sensors)	Short circuit in signaling line to sensor	Correct the process wiring.
			Sensor is defective.	Replace the sensor.
			Wrong sensor type assigned.	Correct the parameter assignment.
		Load impedance too low	Use an encoder with higher impedance	
	6 _D	00110: Wire break	Signal line to a sensor interrupted.	Correct the process wiring.
			Sensor is defective.	Replace the sensor.
			Wrong sensor type assigned.	Correct the parameter assignment.
			Load impedance too low	Use an encoder with higher impedance
	9 _D	01001: Fault	Internal module error occurred.	Replace the module.
			Sensor signal flutters.	Eliminate cause of error.
	16 _D	10000: Parameter assignment error	Faulty parameter assignment	Correct the parameter assignment.
	26 _D	11010: External error	Sensor error.	Replace the sensor.
Changeover contact fault.			Correct the process wiring.	

Analog input module error types

The table below shows the error types on power modules

Table 8-12 Analog input module error types

Analog input modules			Error class		Meaning	Remedy
2AI U HS	2AI U ST 2AI U HF 2AI I 2WIRE ST 4AI I 2WIRE ST 2AI I 2WIRE HS 2AI I 4WIRE ST 2AI I 2/4WIRE HF 2AI I 4WIRE HS 2AI RTD ST 2AI RTD HF	2AI TC ST 2AI TC HF	16 _D	10000: Parameter assignment error	Module cannot use the parameter for the channel: Inserted module does not match the one configured. Faulty parameter assignment.	Correct the configuration (align actual and preset configuration). Correct the parameter assignment (diagnostics wire break only for the allowed measuring range parameterized).
			9 _D	01001: Fault	Internal module error (diagnostics message at channel 0 applies to the entire module)	Replace the module.
			7 _D	00111: Violation of higher limit	Value is above the overrange.	Correct the module/actuator tuning.
			8 _D	01000: Lower value limit fallen below	Value is below the underrange. Short-circuit at module 2AI RDT HF with configuration of the PTC channel.	Correct the module/actuator tuning.
			6 _D	00110: Wire break ¹	Line to the sensor interrupted.	Correct the process wiring.
---	---	---	21 _D	10101: Reference channel error ²	Error on the reference channel	Check the reference module (2AI RTD Standard).
<p>¹ In the case of the 2AI RTD High Feature, a wire break is reported for the measuring and constant-current lines of the sensor.</p> <p>² The following applies for the modules 2AI TC ST and 2AI TC HF: Reference channel error is not reported if the RTD module is not parameterized in the GSD file with the PT100 climate. This applies to IM151-1 HIGH FEATURE (6ES7151-1BA00-0AB0 or higher), IM151-7 CPU and IM151-3 PROFINET IO 6ES7151-3AA00-0AB0 or higher).</p>						

Analog output module error types

The table below shows the error types on power modules

Table 8-13 Analog output module error types

Analog output modules		Error class		Meaning	Remedy
2AO U ST 2AO U HF	2AO I ST 2AO I HF	16 _D	10000: Parameter assignment error	Module cannot use the parameter for the channel: Inserted module does not match the one configured. Faulty parameter assignment.	Correct the configuration (align actual and preset configuration). Correct the parameter assignment (diagnostics wire break only for the allowed measuring range parameterized).
		9 _D	01001: Fault	Internal module error has occurred (diagnostic message on channel 0 applies to the whole module).	Replace the module.
	---	1 _D	00001: Short circuit	Short circuit of the actuator supply.	Correct the process wiring.
---	2AO I ST 2AO I HF	6 _D	00110: Wire break	Line to the actuator interrupted.	Correct the process wiring.

1SSI error types

The table below shows the error types on 1SSI.

Table 8-14 1SSI error types

Error class		Meaning	Remedy
1 _D	00001: Short circuit	Short circuit of the supply to the absolute encoder.	Correct the process wiring.
9 _D	01001: Fault	Internal module error occurred. Load voltage from the power module is too low.	Replace the module. Correct the process wiring. Check the load voltage.
16 _D	10000: Parameter assignment error	Parameters have not been assigned to the module.	Correct the parameter assignment.
26 _D	11010: External error	Start/Stop bit error (error absolute encoder): Wire break in the sensor cable, or sensor cable is not connected. Sensor type, transmission rate, and monoflop time do not correspond to the sensor connected; programmable sensors do not correspond to the settings on the EM 1SSI electronic module. Sensor is defective or there are faults.	Replace the sensor; correct the process wiring. Correct the parameter assignment.

1COUNT 24V/100kHz error types

The table below shows the error displays on the 1COUNT 24V/100kHz.

Table 8-15 1COUNT 24V/100kHz error types

Error class		Meaning	Remedy
1D	00001: Short circuit	Short circuit of the sensor supply or the actuator.	Check the wiring to the sensor. Correct the process wiring.
5D	00101: Excess temperature	Digital output is overloaded.	Correct the process wiring.
6D	00110: Wire break	Line to the actuator interrupted.	Correct the process wiring.
9D	01001: Fault	Internal module error occurred.	Replace the module.
		Load voltage from the power module is too low.	Correct the process wiring. Check the load voltage.
16D	10000: Parameter assignment error	Parameters have not been assigned to the module.	Correct the parameter assignment.

1COUNT 5V/500kHz error types

The table below shows the error displays on the 1COUNT 5V/500kHz.

Table 8-16 1COUNT 5V/500kHz error types

Error class		Meaning	Remedy
1D	00001: Short circuit	Short circuit of the sensor supply or the actuator.	Check the wiring to the sensor. Correct the process wiring.
5D	00101: Excess temperature	Digital output is overloaded.	Correct the process wiring.
6D	00110: Wire break	Line to the actuator interrupted.	Correct the process wiring.
9D	01001: Fault	Internal module error occurred.	Replace the module.
16D	10000: Parameter assignment error	Parameters have not been assigned to the module.	Correct the parameter assignment.
26D	11010: External error	Wire break/short circuit of the 5 V sensor signals: A, /A, B, /B, N, /N,	Correct the parameter assignment.

1STEP 5V/204kHz error types

The table below shows the error displays on the 1STEP 5V/204kHz.

Table 8-17 1STEP 5V/204kHz error types

Error class		Meaning	Remedy
1D	00001: Short circuit	Short circuit of the sensor supply.	Check the wiring to the switches. Correct the process wiring.
9D	01001: Fault	Internal module error occurred.	Replace the module.
16D	10000: Parameter assignment error	Parameters have not been assigned to the module.	Correct the parameter assignment.

2PULSE error types

The table below shows the error types on 2PULSE.

Table 8-18 2PULSE error types

Error class		Meaning	Remedy
1 _D	00001: Short circuit	Short circuit of the sensor supply or the actuator.	Check the wiring to the momentary-contact switches and the actuators. Correct the process wiring.
9 _D	01001: Fault	Internal module error occurred.	Replace the module.
16 _D	10000: Parameter assignment error	Parameters have not been assigned to the module.	Correct the parameter assignment.

1POS INC/Digital, 1POS SSI/Digital, 1POS INC/Analog, 1POS SSI/Analog error types

The following table shows the error displays on the 1POS INC/Digital, 1POS SSI/Digital, 1POS INC/Analog, and 1POS SSI/Analog.

Table 8-19 1POS INC/Digital, 1POS SSI/Digital, 1POS INC/Analog, 1POS SSI/Analog error types

Error class		Meaning	Remedy
1 _D	00001: Short circuit	Short circuit of the sensor supply.	Check the wiring to the sensor. Correct the process wiring.
16 _D	10000: Parameter assignment error	Parameters have not been assigned to the module.	Correct the parameter assignment.
17 _D	10001: Load voltage 2L + missing	Only valid for 1POS INC/Digital und 1POS SSI/Digital: Power supply voltage not present or too low.	Correct the process wiring. Check the supply voltage.
26 _D	11010: External error	Wire break/short circuit of the sensor signals. Wire break in the sensor cable, or sensor cable is not connected. Sensor is defective or there are faults. Sensor type, transmission rate, and monoflop time do not correspond to the sensor connected; programmable sensors do not correspond to the settings on the module.	Correct the process wiring. Correct the parameter assignment. Replace the sensor.

1SI 3964/ASCII and 1SI Modbus/USS serial interface modules

The table below shows the status and error displays on the 1SI 3964/ASCII and 1SI Modbus/USS.

Table 8-20 1SI 3964/ASCII, 1SI Modbus/USS error types

Error class		Meaning	Remedy
6 _D	00110: Wire break	Wire broken or disconnected.	Check the wiring to the terminals. Check the cable to the partner.
7 _D	00111: Violation of higher limit	Buffer overflow; message length overflow	The P_RCV FB must be called more frequently.
8 _D	01000: Lower value limit fallen below	Message of length 0 sent ¹	Check why the communication partner is sending frames without user data.
9 _D	01001: Fault	Internal module error occurred.	Replace the module.
16 _D	10000: Parameter assignment error	Parameters have not been assigned to the module.	Correct the parameter assignment.
22 _D	10110: Message error	Frame error, parity error	Check the communication settings.

¹ EM 1SI: Only with 3964(R)

4 IQ-SENSE error types

The table below shows the error displays on the 4 IQ-SENSE.

Table 8-21 4 IQ-SENSE error types

Error class		Meaning	Remedy
1 _D	00001: Short circuit	Short circuit of the lines between the electronic module and sensor	Check the wiring to the sensor. Correct the process wiring.
6 _D	00110: Wire break	Line to the sensor interrupted. No sensor connected. Sensor does not respond.	Correct the process wiring. Connect the sensor. Replace the sensor.
8 _D	01000: Lower value limit fallen below	Maintenance requirement (signal quality < 130%, excess gain), sensor-dependent	Adjust the reflection light barrier. Clean the optical system.
9 _D	01001: Fault	Communication error between the electronic module and sensor	Replace the electronic module or the sensor. Check the wiring.
16 _D	10000: Parameter assignment error	Faulty parameter assignment Inserted module does not match the one configured. Teach-in error (a new value could not be determined/obtained) Inserted sensor does not match configured sensor.	Correct the parameter assignment. Correct the configuration (align actual and preset configuration). Repeat <i>Teach-in</i> . Correct the configuration, or insert a different sensor type.
26 _D	11010: External error	Excess gain lower limit violated (signal quality < 110%) or sensor error, sensor-dependent	Adjust the reflection light barrier. Clean the optical system. Replace the sensor.

Error class		Meaning	Remedy
27 _D	11011: Unclear error	<i>Teach-in</i> operation is running. Alignment tool is active.	Terminate the <i>Teach-in</i> operation. Close the alignment tool.

8.1.4.9 H status

Requirements

The H status in the diagnostic frame supplies the IM151-1 HIGH FEATURE only when operated behind a Y link (e. g. IM 157) in DPV1 mode. This block can be ignored when evaluating the diagnostic frame. The configuration is described in the following section.

Structure of the H status

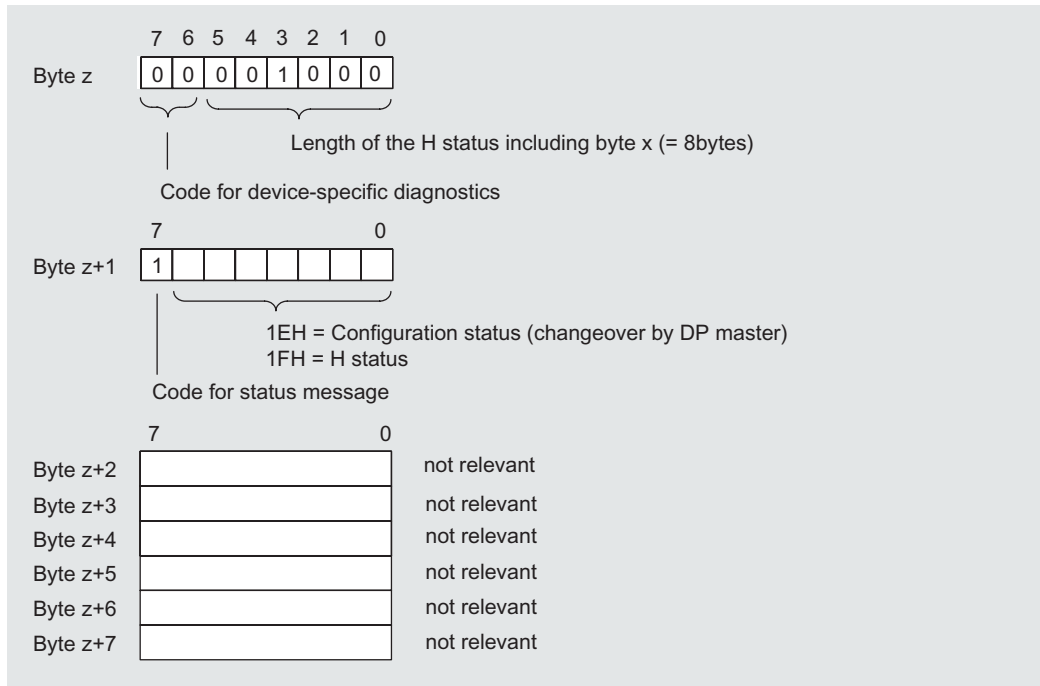


Figure 8-10 Structure of the H status of the IM151-1 HIGH FEATURE

8.1.4.10 Interrupts

The information in this chapter applies to IM151-1 STANDARD (6ES7151-1AA04-0AB0 and higher) and IM151-1 HIGH FEATURE.

Definition

The interrupt section of the slave diagnostics provides information on the interrupt type and the cause that led to the triggering of the interrupt. The interrupt section comprises of a maximum 48 bytes.

Position in the diagnostic frame

The interrupt section comes after the channel-specific diagnostics (only in DPV1 mode).

Example: If 3 channel-specific diagnostics are pending, then the interrupt section starts at byte 44.

Data record

The diagnostic data of a module can be up to 44 bytes in length and is located in data records 0 and 1:

- Data 0 contains 4 bytes of diagnostic data describing the current status of a programmable logic controller. DS0 is part of the header information of OB 82 (local data bytes 8 to 11).
- Data record 1 contains the 4 bytes of diagnostic data that are also contained in data record 0 and, in addition, up to 40 bytes of module-specific diagnostic data.

You can read out DS0 and DS1 by means of SFC 59 "RD_REC".

Table of Contents

The contents of the interrupt function depend on the interrupt type:

- In the case of diagnostic interrupts, diagnostic data record 1 (up to 44 bytes) is sent as the interrupt status information (starting at byte x+4).
- In the case of process interrupts, the interrupt status information is 4 bytes in length.
- For insert/remove interrupt, the length of the interrupt information is
 - 5 bytes for IM151-1 HIGH FEATURE (6ES7151-1BA00-0AB0)
 - 0 bytes for IM151-1 STANDARD (6ES7151-1AA04-0AB0 or higher), and IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0 or higher)

Structure of interrupts

If the configuration was performed with *STEP 7*, the interrupt data are evaluated and transferred to the appropriate organization blocks (OBs).

The interrupt section for the ET 200S is structured as follows:

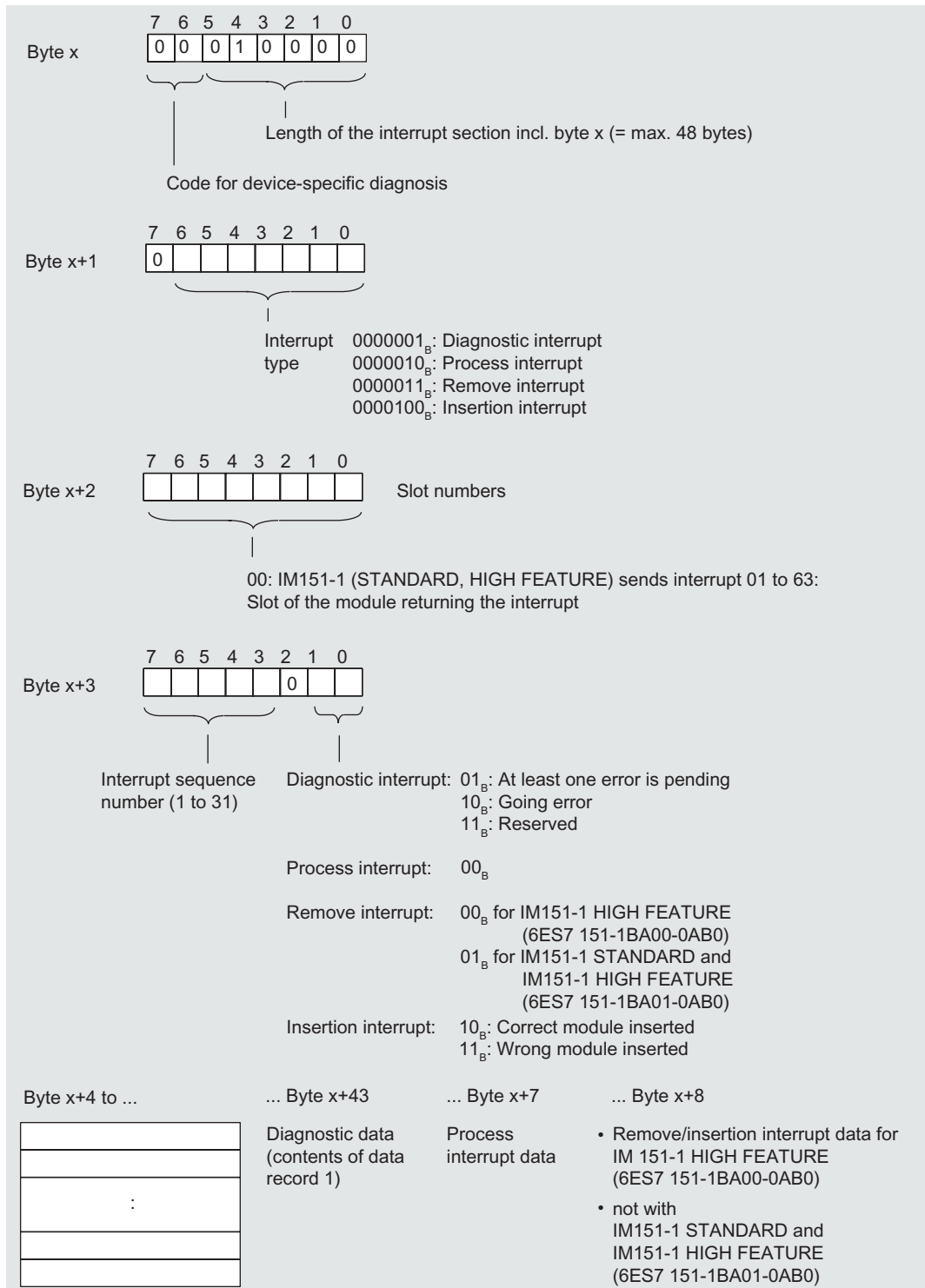


Figure 8-11 Structure of the interrupt status of the interrupt section

Diagnostic interrupt, byte x+4 to x+7

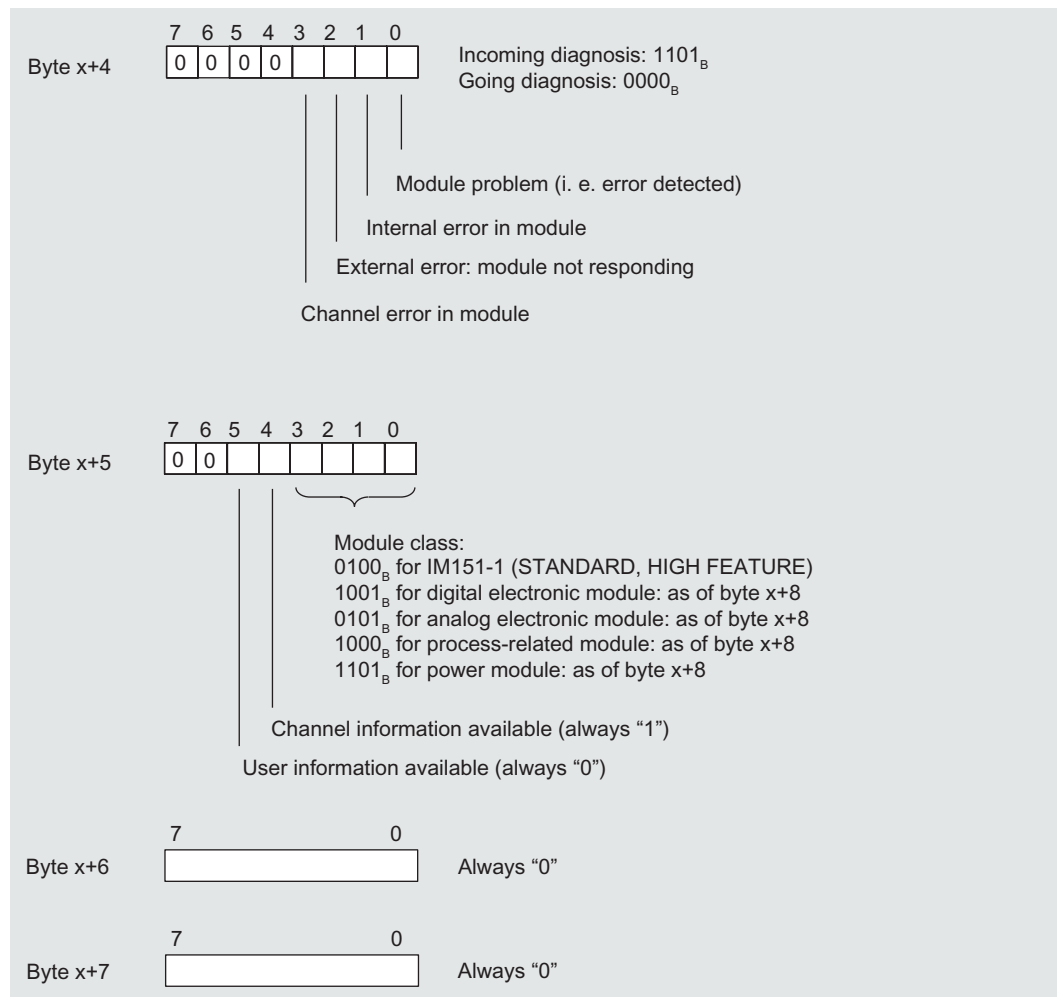


Figure 8-12 Structure of bytes x+4 to x+7 for diagnostic interrupt

Diagnostic interrupt of the modules

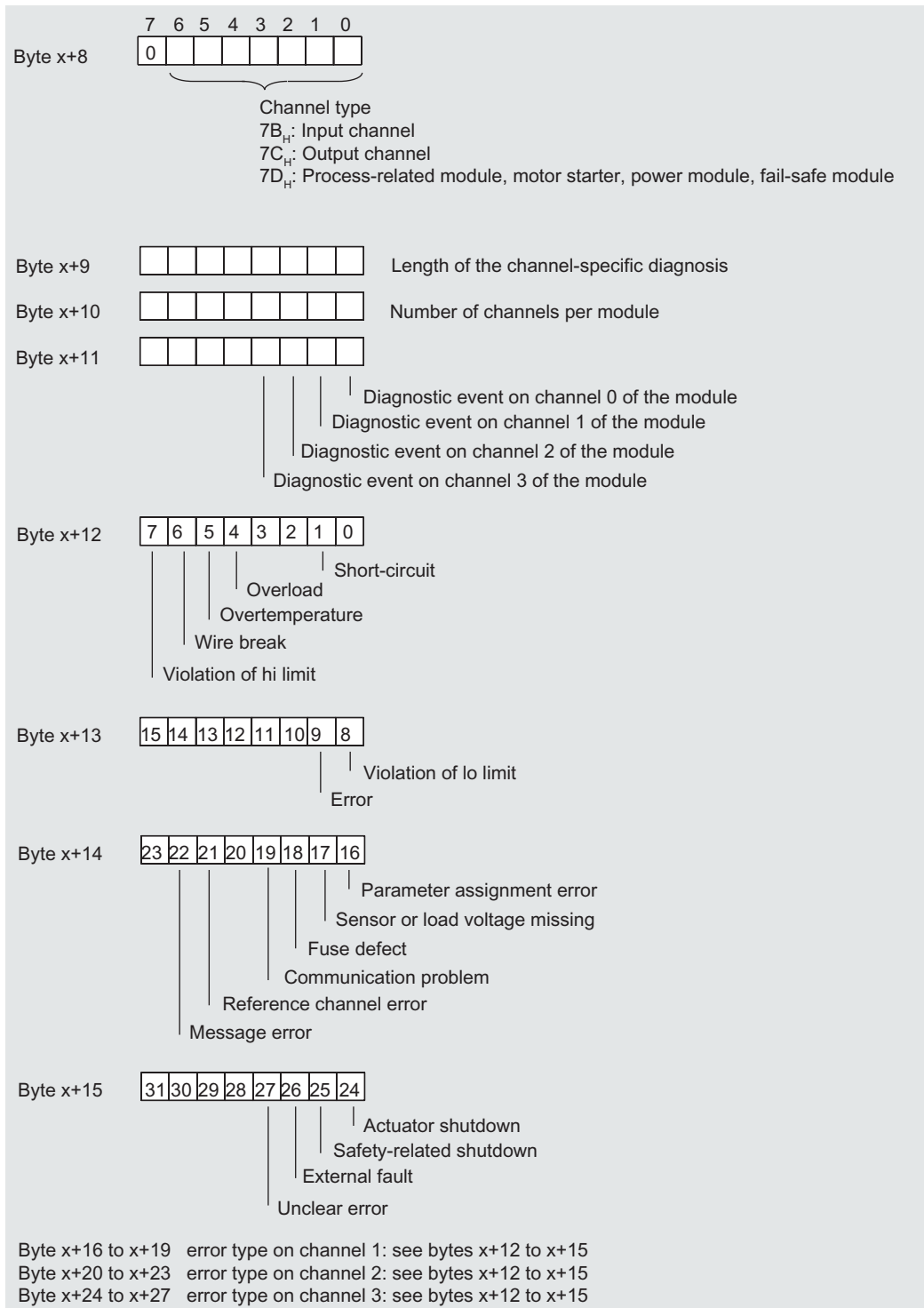


Figure 8-13 Structure starting at byte x+8 for diagnostics frame

Example of a diagnostic interrupt

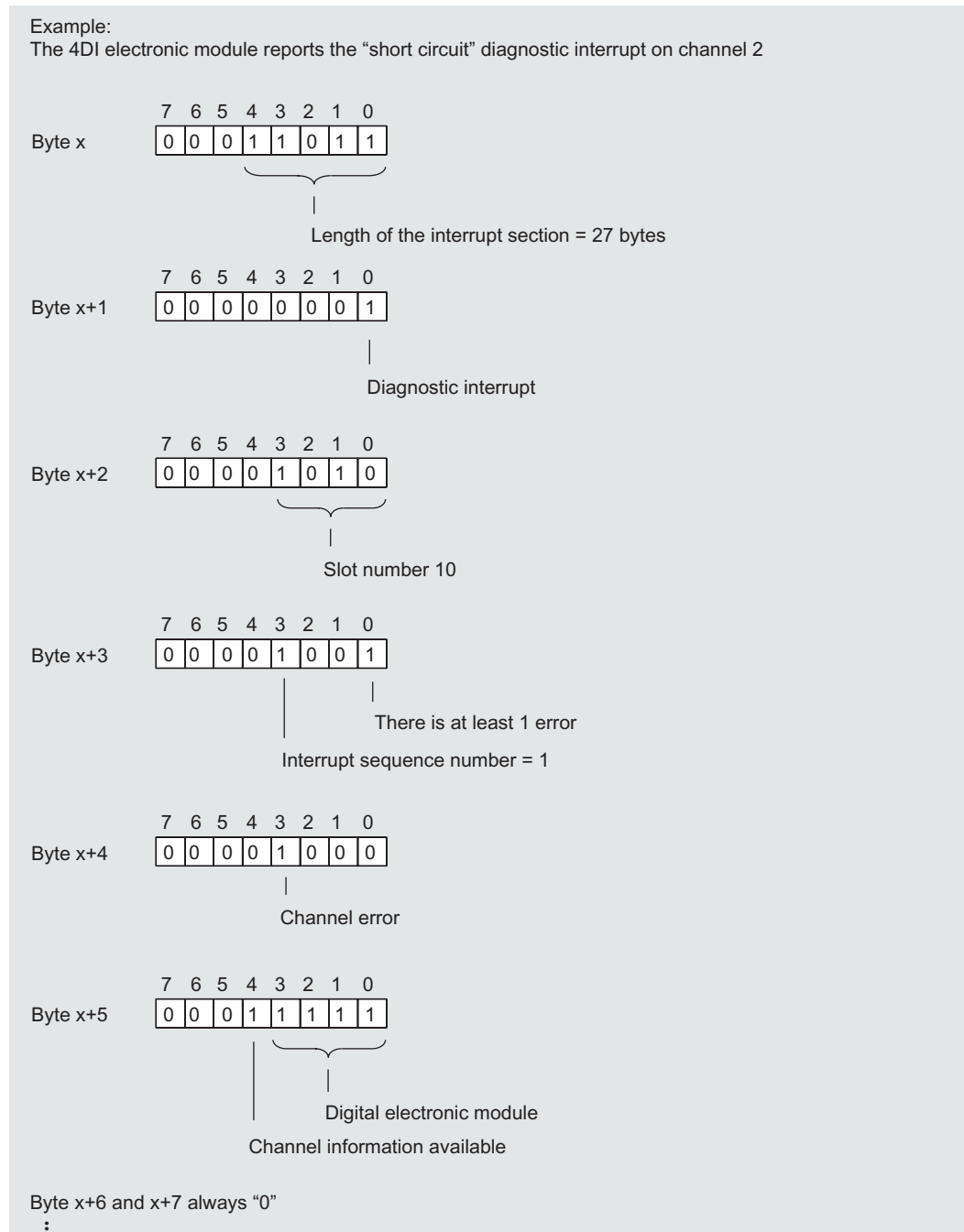


Figure 8-14 Structure for diagnostic interrupt (part 1)

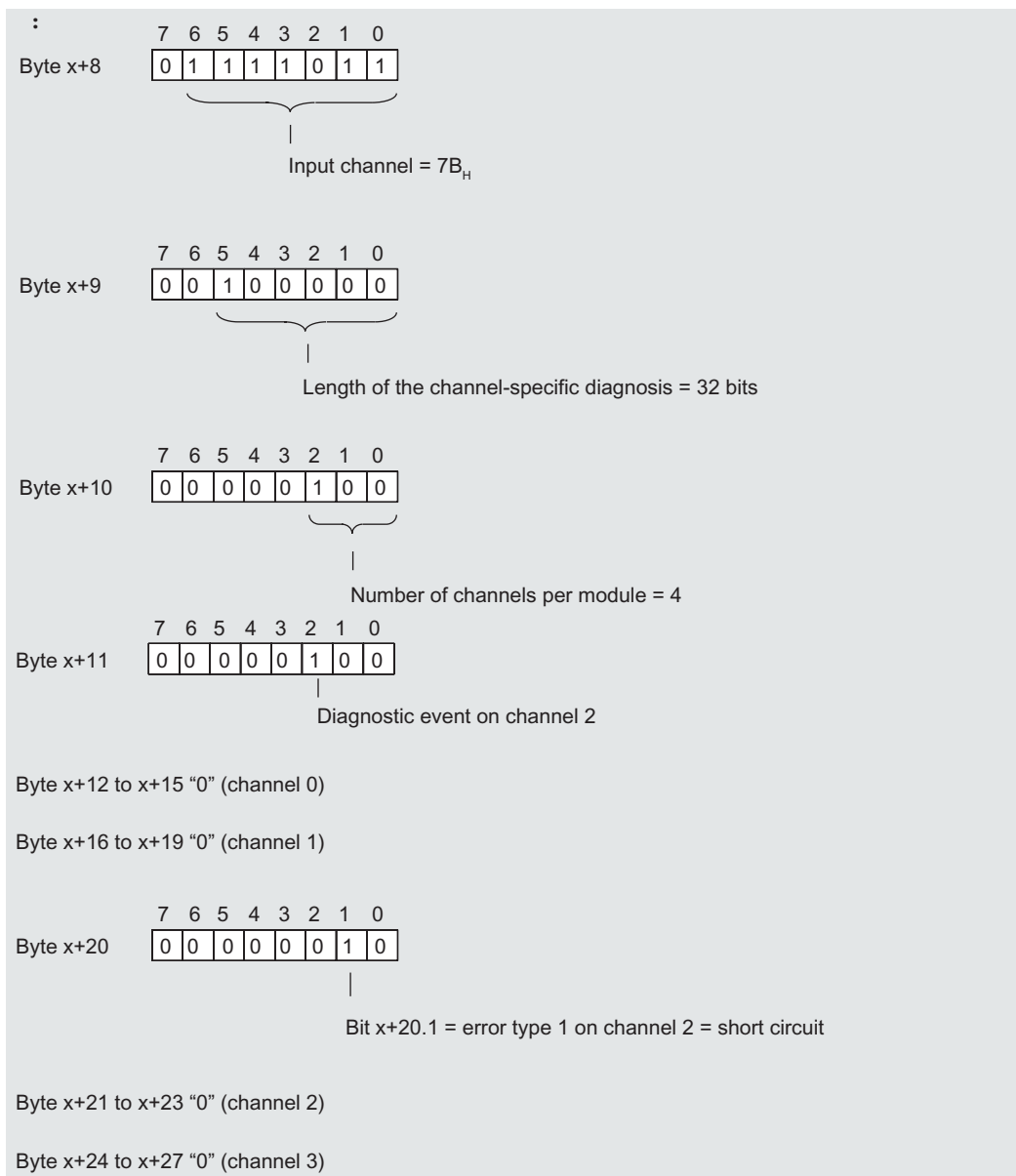


Figure 8-15 Example of a diagnostic interrupt (part 2)

Process interrupt of digital input modules

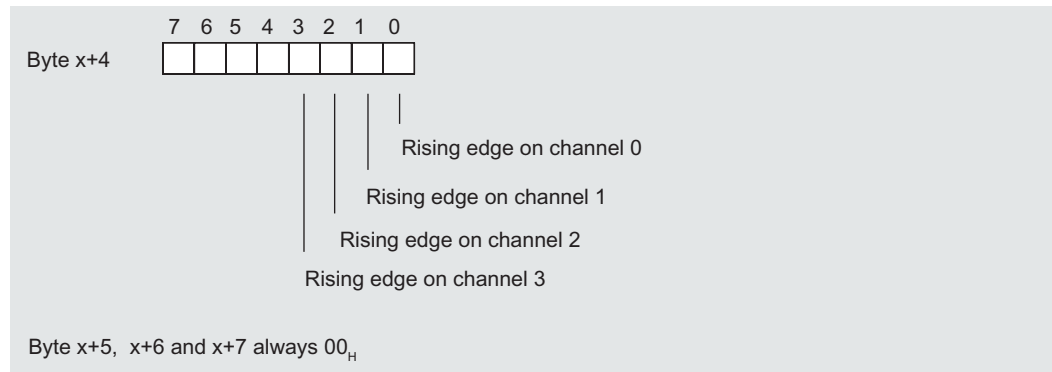


Figure 8-16 Structure starting at byte x+4 for process interrupt (digital input)

Process interrupt of analog input modules

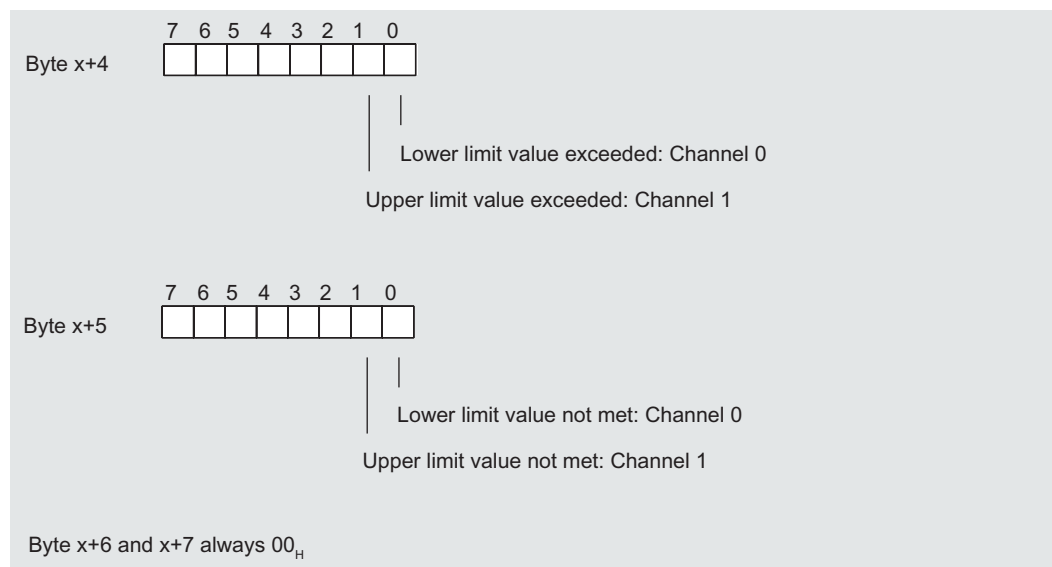


Figure 8-17 Structure starting at byte x+4 and byte x+5 for process interrupt (analog input)

Insert/remove-interrupt from IM151-1 HIGH FEATURE (only 6ES7151-1BA00-0AB0)

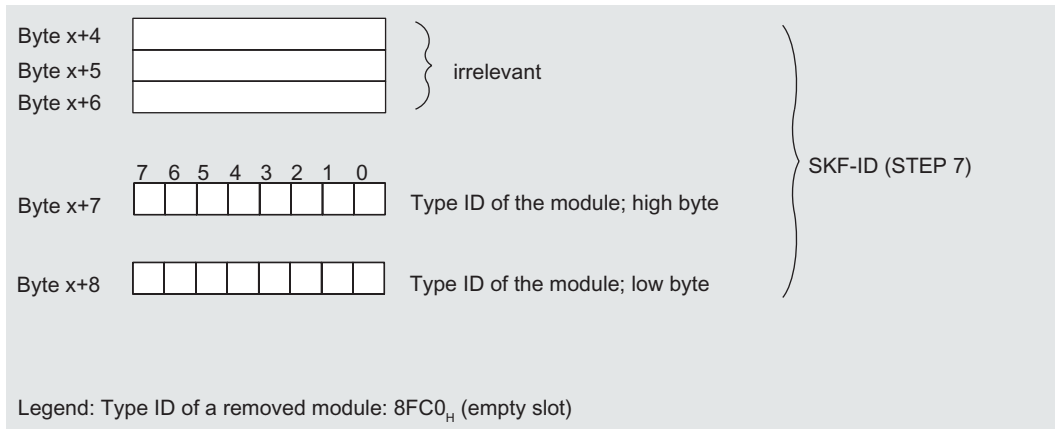


Figure 8-18 Structure Starting at byte x+4 for remove/insert Interrupts

Byte x+4 to x+8 contains the identifier of the module that has been removed or inserted. The interrupt type in byte x+1 indicates whether the modules have been removed or inserted.

8.1.4.11 Incorrect configuration states of ET 200S on PROFIBUS DP

Incorrect configuration states

The following invalid configuration states of the ET 200S lead to station failure of the ET 200S or prevent data exchange from occurring. These responses occur irrespective of whether the IM parameters "Operation at preset <> actual configuration", "Replace modules during operation", and "Startup when expected <> actual configuration" have been enabled.

- Two missing modules
- Terminating module missing
- Number of modules exceeds the maximum configuration
- Module missing in slot 1 (in the case of IM151-1 STANDARD, 6ES7151-1AA00-0AB0)
- Faulty backplane bus (for example, terminal module is defective)

Note

Starting at IM151-1 BASIC / IM151-1 STANDARD (6ES7151-1AA01-0AB0), IM151-1 FO STANDARD and IM151-1 HIGH FEATURE: If **one** module is missing (gap) and the ET 200S is switched on POWER ON, the station will not start up.

Diagnostics

The following diagnostics can be used to identify all invalid configuration states:

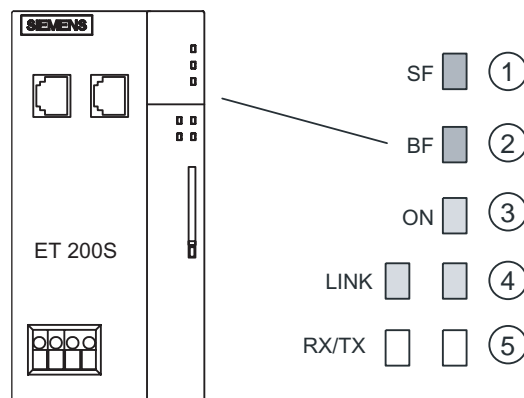
Interface module	Identifier-related diagnostics	Module status
IM151-1 BASIC	All 12 bits set	<ul style="list-style-type: none"> 01B: "Module error, invalid reference data" for all modules (slots) up to cause of the malfunction 11B: "no module, invalid user data" after the cause of the malfunction
IM151-1 COMPACT	All 13 bits set	
IM151-1 STANDARD IM151-1 FO STANDARD IM151-1 HIGH FEATURE	All 63 bits set	

8.2 Alarm, error and system messages on PROFINET IO

8.2.1 Diagnostics using LED display

Interface module

LED display at the interface module IM151-3 (front door opened):



- ① Group error (red)
- ② Bus fault (red)
- ③ Power supply (green)

Under the front door:

- ④ Connection to a switch or IO controller (green), per interface
- ⑤ Data exchange (yellow), per interface

Status and error displays by means of LEDs on the IM151-3

Table 8-22 Status and error messages on the IM151-3

LEDs			Meaning	Remedy
SF	BF	ON		
Off	Off	Off	There is no voltage at the interface module, or the interface module has a hardware defect.	<ul style="list-style-type: none"> Switch on the 24 VDC supply voltage at the interface module.
*	*	On	There is voltage at the interface module.	–
*	Flashing 0.5 Hz ¹⁾	On	<p>Faulty or no connect frame - no data transfer between the IO controller and the interface module (IO device), although the device is physically connected to the switch.</p> <p>Causes:</p> <ul style="list-style-type: none"> Incorrect device name Configuration error Parameter assignment error There is an error in an I/O module, or the bus cable to the controller is missing. 	<ul style="list-style-type: none"> Check the interface module. Check the configuration and parameter assignment. Check the device name. Assign a valid device name to the interface module. Check the IO controller
*	On	On	The IO device is not connected to a switch	<ul style="list-style-type: none"> Establish a connection to the IO controller (via a switch). Assign a valid device name to the interface module. Check the bus configuration. Check that the bus connector is correctly inserted. Check whether the bus cable to the I/O controller is interrupted.
On	*	On	<p>The configured setup of the ET 200S does not match the actual setup of the ET 200S.</p> <ul style="list-style-type: none"> There is an error in an I/O module, or the interface module is defective. Incoming diagnostic 	<ul style="list-style-type: none"> Check the setup of the ET 200S, whether a module is missing or defective, or whether an unconfigured module is inserted. Check the configuration (using <i>STEP 7</i>, for example), and correct the faulty parameters. Replace the interface module, or contact your Siemens representative.
On	Off	On	<ul style="list-style-type: none"> No S7 program on the SIMATIC Micro Memory Card No SIMATIC Micro Memory Card is inserted. The SIMATIC Micro Memory Card is out of memory, or can not provide sufficient memory for the device name. No suitable SIMATIC Micro Memory Card is inserted (i. e. no SIMATIC Micro Memory Card from Siemens). <p>In this state, the IO device cannot be accessed.</p>	<ul style="list-style-type: none"> Format the SIMATIC Micro Memory Card Before switching on the power supply voltage, insert an empty SIMATIC Micro Memory Card in the IM151-3 PN.

LEDs			Meaning	Remedy
SF	BF	ON		
On	On	On	A brand new SIMATIC Micro Memory Card is being formatted.	<ul style="list-style-type: none"> Wait until the formatting sequence is complete. This may take several minutes. The formatting sequence is completed when the SF LED goes out.
Off	Off	On	Data exchange is taking place between the IO controller and the ET 200S. The target configuration and actual configuration of the ET 200S match.	–
On	On	Off	FW update busy	
Off	Flashing 0.5 Hz	Off	FW update successfully completed	
On	Flashing 0.5 Hz	Off	External error during FW update (incorrect FW, for example)	<ul style="list-style-type: none"> Use the correct FW for update.
On	Flashing 2 Hz	Off	Internal error during FW update (read/write error, for example)	<ul style="list-style-type: none"> Repeat the FW update.
LINK	RX/TX			
Off	Off		No connection to switch/IO controller.	<ul style="list-style-type: none"> No uniform transmission rate
On	*		Connection to switch/IO controller.	–
On	On		Transmission/reception is in progress	–
* Not relevant 1 2 Hz at 6ES7151-3AA00-0AB0				

Power module, electronic module, technology module

The LED diagnostic display for power modules, electronic modules and technology modules correspond to those for ET 200S with PROFIBUS DP.

8.2.2 Diagnostic messages of the electronic modules

Actions after a diagnosis message

Each diagnostic message leads to the following actions:

- The SF LED of the interface module is lit.
- Several simultaneous diagnostic messages are possible.
- Diagnostics are reported as diagnostic interrupts and can be read from data records.
- Following a diagnostic message, they are saved to the diagnostics buffer of the I/O controller.
- The OB 82 is called. If OB 82 is not available, the I/O controller goes into STOP.
- Acknowledgment of the diagnostic interrupt (following this a new interrupt is possible).

Causes of faults and corrective measures

The causes of faults and corrective measures for the diagnosis messages are described in this manual in the chapter entitled "Channel diagnostics" under "Interrupt, cause and system messages to the PROFIBUS DP".

8.2.3 Evaluating the interrupts of the ET 200S

Introduction

Interrupts are triggered by the IO device when certain errors occur. The Interrupt evaluation occurs dependent on the IO controller used.

Evaluating interrupts with IO controller

The ET 200S supports the following interrupts

- Diagnostic interrupts
- Process interrupts
- Insert/remove module interrupts

In case of an interrupt, interrupt OBs are automatically executed in the CPU of the IO controller (see information on program design in the *System Software for S7-300/ S7-400* programming manual).

You can obtain information on the cause of the error and the error type using the OB number and the start information.

You can obtain detailed information on the error event in the error OB with SFB 54 RALRM (read supplementary interrupt information).

Triggering of a diagnostic interrupt

When an incoming or outgoing event (e. g. wire break) is registered, the module triggers a diagnostic interrupt: if "Enable: Diagnostic interrupt" is set.

The CPU interrupts the processing of the user program and processes the OB 82 diagnostics block. The event that caused the interrupt to be triggered is entered in the start information of OB 82.

Triggering of a process interrupt

The CPU interrupts processing of the user program and processes the OB 40 diagnostics module. The event that caused the interrupt to be triggered is entered in the start information of OB 40.

Triggering of an insert/remove-module interrupt

The CPU interrupts processing of the user program and processes OB 83 diagnostic block. The event that caused the interrupt to be triggered is entered in the start information of OB 83.

Diagnosis "Process interrupt lost"

For the modules

- 2DI 24 VDC HF (6ES7131-4BB01-0AB0),
- 4DI 24 VDC HF (6ES7131-4BD01-0AB0) and
- 4DI UC24..48V HF (6ES7131-4CD00-0AB0)

the diagnostic "Process interrupt lost" is not available at present.

Note

Process interrupts should not be used for technological purposes (e.g. cyclical generation of process interrupts).

If more than 90 process interrupts are generated per second, process interrupts may be lost.

8.2.4 Differences in the replacement value behavior

Replacement value behavior station granular with 6ES7151-3AA00-0AB0

If you use an interface module 6ES7151-3AA00-0AB0 in the IO device, the following replacement value behavior is displayed:

- All output modules output their parameterized replacement values or "0" on their outputs.

Replacement value behavior slot granular from 6ES7151-3AA10-0AB0 or 6ES7151-3BA20-0AB0

If you use an interface module 6ES7151-3AA10-0AB0 or 6ES7151-3BA20-0AB0 in the IO device, the following replacement value behavior is displayed:

- All outputs whose reference data companion are "Bad", output their parameterized replacement values or "0" on their outputs.

8.2.5 Diagnostics with STEP 7

8.2.5.1 Diagnostics readout

Options for reading out the diagnostics

Table 8-23 Reading out the diagnostics with STEP 7

Automation system with IO controller	Block or tab in <i>STEP 7</i>	Application	Reference
SIMATIC S7	In HW Config via "Station > Open ONLINE"	Device diagnostics in form of plain text on STEP 7 interface (in the Quick View, Diagnostics View, or Module Information windows)	"Diagnosing hardware" in <i>STEP 7 online help</i>
	SFB 52 "RDREC"	Read data records from the IO device	SFB see <i>STEP 7 online help</i> (system functions/system function blocks)
	SFB 54 "RALRM"	Receiving interrupts from the IO device	SFB see <i>STEP 7 online help</i> (system functions/system function blocks)

8.2.5.2 Channel diagnostics

Definition

Channel diagnostics returns information about channel errors in modules

Channel errors are mapped as channel diagnoses in I/O diagnostics data records. Each data record has a length of 10 bytes.

You can read all diagnostics data of a submodule slot, or of a slot, or of a device slots assigned to the I/O controller, or of an IO device. The distinction is made based on the data record number:

800A _H	Channel diagnostics for a submodule slot
800B _H	Vendor-specific channel diagnostics for a submodule slot (incoming)
800C _H	Vendor-specific channel diagnostics for a submodule slot (incoming and outgoing)
C00B _H	Vendor-specific channel diagnostics for a slot (incoming)
C00C _H	Vendor-specific channel diagnostics for a slot (incoming and outgoing)
E002 _H	Deviation of the set configuration from the actual configuration of an IO controller assigned IO device
E00A _H	Channel diagnostics for the channels assigned to an IO controller in an IO device
E00B _H	Vendor-specific channel diagnostics for the IO device channels assigned to an IO controller (incoming)
E00C _H	Vendor-specific channel diagnostics for the channels assigned to an IO controller in an IO device (incoming and outgoing)
F00A _H	Channel diagnostics for an IO device
F00B _H	Vendor-specific channel diagnostics for an IO device (incoming)
F00C _H	Vendor-specific channel diagnostics for an IO device (incoming and outgoing)
AFF0 _H to AFFF _H	Manufacturer, order number, product version, version, etc.

The data record is read with the SFB 52 RDREC (read data record).

Note

Spare-part application of an IM151-3 PN (6ES7151-3AA10-0AB0)

If a spare part is required, you can replace an IM151-3 PN (6ES7151-3AA10-0AB0) by an IM151-3 PN (6ES7151-3AA20-0AB0) if you adapt the queries of the following diagnostics records in your existing user program:

- 0x800A, 0x800B, 0800C, 0xC00B, 0xC00C, 0xF00A, 0XF00B and 0XF00C

You will find further information in the *From PROFIBUS DP to PROFINET IO* programming manual, Version 01/2006.

Structure of diagnostic data records

You can find the diagnostic data records structure and examples for programming in the *From PROFIBUS DP to PROFINET IO* programming manual.

Data records supported by ET 200S are based on PROFINET IO - Application Layer Service Definition V2.0.

You can download the standard at <http://www.profibus.com> at no cost.

Channel diagnostics

The channel diagnostics for the ET 200S with the IM151-3 are structured as follows:

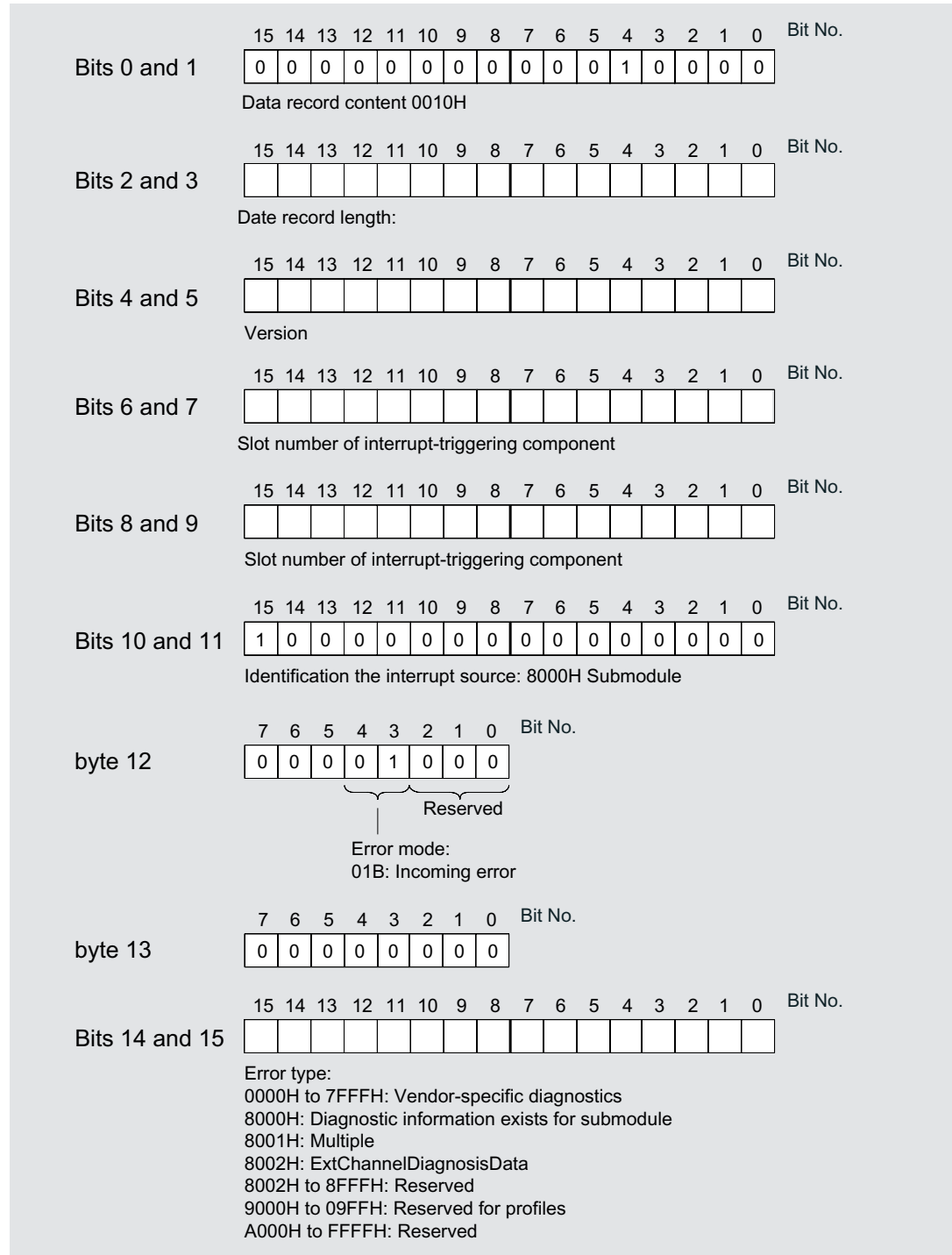


Figure 8-19 Structure of the channel diagnostics for ET 200S with IM151-3 (Part 1)

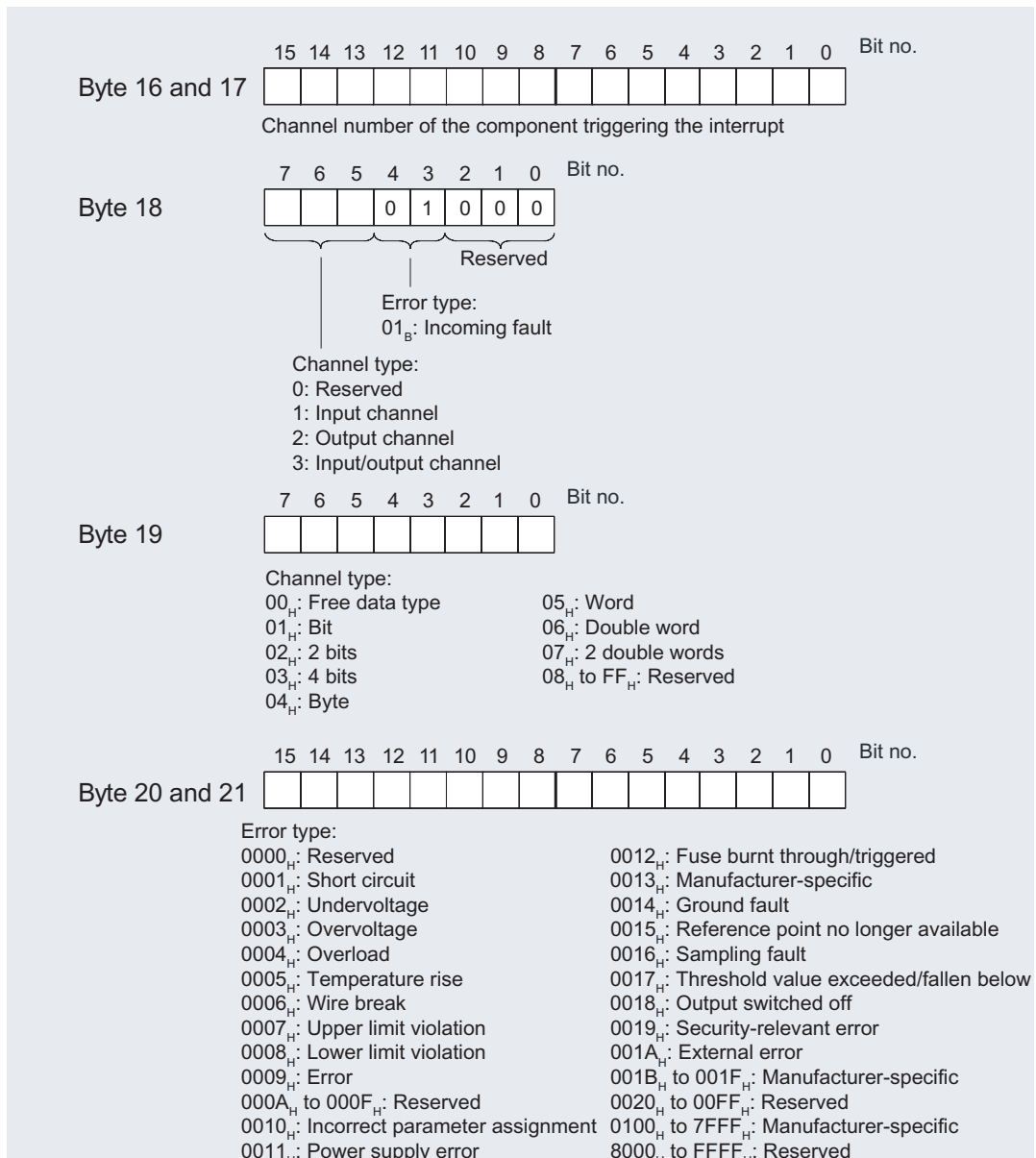


Figure 8-20 Structure of the channel diagnostics for ET 200S with IM151-3 (Part 2)

Bytes 16 to 21 are allocated to each further error reported in this diagnostics message.

Error types of the further modules

The error types of the power modules, digital electronic modules, analog electronic and the technological modules are the same as for ET 200S with PROFIBUS DP.

8.2.5.3 Incorrect configuration states of the ET 200S on the PROFINET IO

Incorrect configuration states

The following incorrect structure states of the ET 200S lead to a malfunction of the IO device ET 200S or prevent the entry in the data exchange:

- Starting with 2 missing modules
- Terminating module missing
- Number of modules exceeds the maximum configuration
- Faulty backplane bus (e. g. terminal module is defective)

Note

If **one** module is missing (gap) and the ET 200S is switched on POWER ON, the IO device will not start up.

8.2.5.4 Interruption of the ET 200S backplane bus

Separate diagnostics of bus interruption

If the ET 200S does not start up, this may have the following causes:

- One or several missing modules
- Terminating module missing
- Number of modules exceeds maximum configuration
- Backplane bus fault (for example, defective terminal module)

If the data exchange is interrupted, it may have the following causes:

- At least two modules (compared to a missing module, this is no longer a gap, but rather a loose backplane bus)
- Terminating module missing
- Backplane bus fault (for example, defective terminal module)

ET 200S backplane bus interruptions do not trigger an interrupt. The information must be read out explicitly by the user. The data record, index F00BH, provides the relevant information. You can read this data record with STEP 7 in the SIMATIC manager via available participant in the module status window. To this end, the PD must be available in the PROFINET sub-net.

Grouping of diagnostics for bus interruption

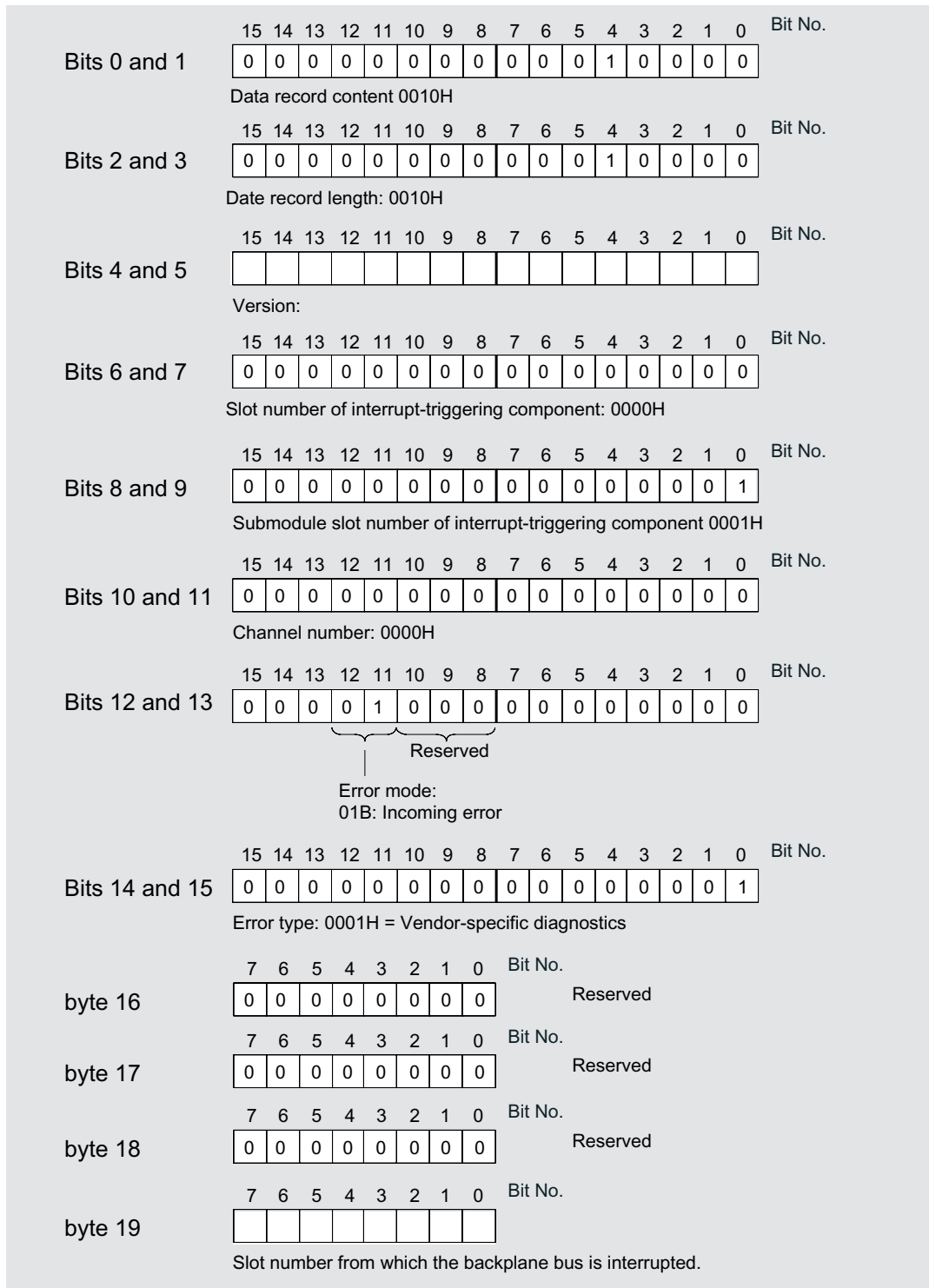


Figure 8-21 Structure of diagnostics of the bus interrupt for ET 200S with IM151-3 on the PROFINET IO

8.2.5.5 Failure of the load voltage from the power module

Load voltage failure

If there is a failure of the load voltage of the power module, electronic modules with their own controller (i. e. analog and technological modules) exhibit the following behavior:

- If such a module is removed during a load voltage failure, a remove-module interrupt is triggered.
- If such a module is removed during a load voltage failure, a remove-module interrupt is triggered.

Note

If the parameters of an electronic module with its own controller have been changed, the data with the new parameters is no longer available after the load voltage is restored.

8.2.5.6 STOP of the IO controller and recovery of the IO device

Diagnostics events triggered by a STOP of the IO controller

If diagnostics are reported by the IO device while the IO controller is in STOP mode, the corresponding organization blocks are not started after startup of the IO controller. To obtain an overview of the device state, call OB 100 yourself.

Diagnostics after recovery of the IO device

After the recovery of an IO device, you have to call SFB 52 to read data record E00C_H. There, you will find complete diagnostics for the slots in a device that are assigned to an IO controller.

General technical specifications

9.1 Standards and approvals

Introduction

The general technical specifications comprise the standards and test values met by the ET 200S distributed I/O system, as well as the criteria used to test the ET 200S distributed I/O system.

CE certification



The ET 200S distributed I/O system fulfills the requirements and protection targets of the following EC directives and matches the harmonized European standards (EN) that were published for the memory-programmable controllers in the official journals of the European Community.

- 73/23/EEC "Electrical Equipment for Use within Fixed Voltage Ranges" (Low-Voltage Directive)
- 89/336/EEC "Electromagnetic Compatibility" (EMC Directive)
- 94/9/EC "Equipment and protective systems intended for use in potentially explosive atmospheres" (Explosion Protection Directive)

The EU conformity certificates are available for the relevant authorities and are kept at the following address:

Siemens Aktiengesellschaft
Automation and Drives
A&D AS RD ST Type Test
P.O. Box 1963
D-92209 Amberg

UL approval



Underwriters Laboratories Inc. in accordance with

- UL 508 (Industrial Control Equipment)

CSA approval



Canadian Standards Association in accordance with

- C22.2 no. 142 (Process control Equipment)



or

Underwriters Laboratories Inc. in accordance with

- UL 508 (Industrial Control Equipment)
- CSA C22.2 no. 142 (Industrial Control Equipment)



HAZ. LOC.

or

Underwriters Laboratories Inc. in accordance with

- UL 508 (Industrial Control Equipment)
- CSA C22.2 no. 142 (Process Control Equipment)
- UL 1604 (Hazardous Location)
- CSA-213 (Hazardous Location)

APPROVED for use in
Class I, Division 2, Group A, B, C, D Tx;
Class I, Zone 2, Group IIC Tx

The motor starters ET 200S have no cULus for HAZ. LOC approval

Note

You can find the currently valid certificates and approvals on the type plate of each module.

FM approval



Factory Mutual Research (FM) according
Approval Standard Class Number 3611, 3600, 3810
APPROVED for use in Class I, Division 2, Group A, B, C, D Tx;
Class I, Zone 2, Group IIC Tx

The ET 200S motor starters do not possess FM approval. All other modules of the ET 200S are FM approved.



In accordance with EN 50021 (Electrical apparatus for potentially explosive atmospheres; type of protection "n")

II 3 G EEx nA II T4 to T5



Warning

Personal injury and property damage can occur.

Personal injury and property damage can occur in hazardous areas if you disconnect plug-in connections while an ET 200S is in operation.

In hazardous areas, always deenergize the ET 200S before disconnecting plug-in connections.



Warning

Explosion Hazard

If you exchange components suitability for Class I, Div. 2. may be invalidated



Warning

This equipment is suitable for use in Class I, Div. 2, Group A, B, C, D or in non-hazardous locations only.

Mark for Australia



The distributed I/O system ET 200S fulfills the requirements the AS/NZS 2064 (Class A) standard.

IEC 61131

The ET 200S distributed I/O system fulfills the requirements and criteria of the IEC 61131-2 standard, part 2 (memory programmable controllers: equipment requirements and verifications).

PROFIBUS standard

The ET 200S distributed I/O system is based on the *IEC 61784-1:2002 Ed1 CP 3/1* standard.

Marine type approval

Classification organizations:

- ABS (American Bureau of Shipping)
- BV (Bureau Veritas)
- DNV (Det Norske Veritas)
- GL (Germanischer Lloyd)
- LRS (Lloyds Register of Shipping)
- Class NK (Nippon Kaiji Kyokai)

Use in industrial environment

SIMATIC products are designed for use in industrial environment.

Table 9-1 Use in industrial environment

Area of application	Requirement for	
	Emitted interference	Interference immunity
Industry	EN 61000-6-4 : 2001	EN 61000-6-2 : 2001

Use in residential areas

If you use the ET 200S in residential areas, you must ensure limit class B in accordance with EN 55011 with respect to emission of radio interference.

Suitable measures for achieving a limit class B radio interference level are:

- Installation of the ET 200S in grounded control cabinets/control boxes
- Use of filters in supply lines

9.2 Electromagnetic compatibility

Definition

Electromagnetic compatibility refers to the capability of electrical equipment to reliably perform its dedicated function in an electromagnetic environment, without causing interference in the same environment.

The ET 200S distributed I/O system meets the requirements of the European Union's EMC law, for example. This requires that the ET 200S distributed I/O system meets the specifications and directives concerning electrical installation.

Pulseshaped Interferences

The following table shows the electromagnetic compatibility of the ET 200S distributed I/O system compared to pulse-shaped interferences.

Pulse-shaped interference	tested with	corresponds with degree of severity
Electrostatic discharge according to IEC 61000-4-2	8 kV 4 kV	3 (air discharge) 2 (contact discharge)
Burst pulse (fast transient interferences) complying with IEC 61000-4-4	2 kV (supply line) 2 kV (signal line)	3 3
High-energy single pulse (surge) according to IEC 61000-4-5 Only with lightning protection elements (see the DP master manual and the description of <i>SIMATIC NET PROFIBUS Networks</i>)		3
<ul style="list-style-type: none"> asymmetrical coupling 	2 kV (supply line) 2 kV (signal / data line)	
<ul style="list-style-type: none"> symmetrical coupling 	1 kV (supply line) 1 kV (signal / data line)	

Sinusoidal Interferences

The following table shows the electromagnetic compatibility of the ET 200S distributed I/O system compared to sinusoidal interferences.

HF radiation according to IEC 61000-4-3 Electromagnetic HF field		HF coupling according to IEC 61000-4-6
amplitude modulated	pulse modulated	
80 to 1000 MHz	900 MHz ± 5 MHz	0.15 to 80 MHz
10 V/m		10 V _{eff} unmodulated
80 % AM (1 kHz)	50 % ED	80 % AM (1 kHz)
	200 Hz repetition frequency	150 Ω source impedance

Emission of radio interferences

Emitted interference of electromagnetic fields in accordance with EN 55011: Limit class A, group 1 (measured at a distance of 10 m.)

Frequency	Emitted interference
from 30 to 230 MHz	< 40 dB (μ V/m)Q
from 230 to 1000 MHz	< 47 dB (μ V/m)Q

9.3 Transport and storage conditions

Transport and storage conditions

The ET 200S distributed I/O system surpasses the transport and storage requirements of IEC 61131-2. The following specifications apply to modules that are transported and stored in their original packaging.

Type of condition	Permitted range
Free fall	≤ 1 m
Temperature	from -40 °C to +70 °C
Temperature change	20 K/h
Air pressure	from 1080 to 660 hPa (corresponds to a height of -1000 to 3500 m)
Relative humidity	From 5 % to 95 %, without condensation

9.4 Mechanical and Climatic Ambient Conditions

Climatic ambient conditions

The following climatic ambient conditions apply:

Ambient conditions	Areas of application	Remarks
Temperature	From 0 to 60 °C	For horizontal installation
	From 0 to 40 °C	For all other mounting positions
	From 0°C to 55/50 °C (see restrictions below)*	For vertical installation
Temperature change	10 K/h	
Relative humidity	From 15 to a maximum of 95%	Without condensation
Air pressure	from 1080 hPa to 795 hPa	Corresponds to an altitude of -1000 m to 2000 m
Contaminant concentration	SO ₂ : < 0.5 ppm; rel. humidity < 60 %, no condensation H ₂ S: < 0.1 ppm; rel. humidity < 60 %, no condensation	Test: 10 ppm; 4 days 1 ppm; 4 days

*** Restrictions for area of application: 0 to 55/50 °C, vertically mounted**

This area of application of **0 to 55 °C** (vertically-mounted) is permitted for the following modules only:

- IM151-1 STANDARD: 6ES7151-1AA02-0AB0
- PM-E 24 VDC: 6ES7138-4CA01-0AA0
- 2DI 24 VDC ST: 6ES7131-4BB01-0AA0
- 2DI 24 VDC HF: 6ES7131-4BB01-0AB0
- 4DI 24 VDC ST: 6ES7131-4BD01-0AA0
- 4DI 24 VDC HF: 6ES7131-4BD01-0AB0
- 2DO 24 VDC/0.5 A ST: 6ES7132-4BB01-0AA0
- 2DO 24 VDC/0.5 A HF: 6ES7132-4BB01-0AB0
- 4DO 24 VDC/0.5 A: 6ES7132-4BD01-0AA0
- 2DO 24 VDC/2A ST: 6ES7132-4BB31-0AA0
- 2DO 24 VDC/2A HF: 6ES7132-4BB31-0AB0
- 4DO 24 VDC/2A ST: 6ES7132-4BD31-0AA0
- 2RO NO 24 ..120 VDC/5A 24 ..230 VAC/5A: 6ES7132-4HB01-0AB0

9.4 Mechanical and Climatic Ambient Conditions

This area of application of **0 to 50 °C** (vertically-mounted) is permitted for the following modules only:

- 2AI U ST: 6ES7134-4FB01-0AB0
- 2AI I 2WIRE ST: 6ES7134-4GB01-0AB0
- 2AI I 4WIRE ST: 6ES7134-4GB11-0AB0
- 2AI I 2/4WIRE HF: 6ES7134-4MB00-0AB0
- 2AI RTD ST: 6ES7134-4JB50-0AB0
- 2AI TC ST: 6ES7134-4JB00-0AB0
- 2AO U ST: 6ES7135-4FB01-0AB0
- 2AO I ST: 6ES7135-4GB01-0AB0

Note

None of the supply and load voltages of the ET 200S are permitted to exceed 24 VDC. This voltage limit must be ensured.

Mechanical ambient conditions

The mechanical ambient conditions are shown in the following table in the form of sinusoidal vibrations.

ET 200S modules	Frequency range	Constant	Intermittent
All modules except motor starters	10 ≤ f ≤ 58 Hz	0.15 mm amplitude	0.35 mm amplitude
	58 ≤ f ≤ 150 Hz	2 g constant acceleration	5 g constant acceleration

Testing mechanical ambient conditions

The following table provides information on the type and extent of tests for mechanical ambient conditions.

Test for ...	Test standard	Terminal modules and electronic modules
Vibrations	Vibration test in accordance with IEC 60068-2-6	Type of vibration: Frequency sweeps with a rate of change of 1 octave/minute. 10 Hz ≤ f ≤ 58 Hz, constant amplitude of 0.35 mm 58 Hz ≤ f ≤ 150 Hz, constant acceleration of 5 g Duration of vibration: 20 frequency sweeps per axis in each of the 3 mutually vertical axes
Shock	Shock, tested in accordance with IEC 60068-2-27	Type of shock: Half-sine Strength of shock: 15 g peak value, 11 ms duration Direction of shock: 3 shocks each in +/- direction in each of the 3 mutually vertical axes

9.5 Data on dielectric tests, protection class, type of protection, and rated voltage of the ET 200S

Test for ...	Test standard	Terminal modules and electronic modules
Repetitive shock	Shock, tested in accordance with IEC 60068-29	Type of shock: Half-sine Strength of shock: 25 g peak value, 6 ms duration Direction of shock: 1000 shocks each in +/- direction in each of the 3 mutually vertical axes

9.5 Data on dielectric tests, protection class, type of protection, and rated voltage of the ET 200S

Test voltage

Insulation resistance is demonstrated during the type test with the following test voltage in accordance with IEC 61131-2:

Circuits with a rated voltage of U_e relative to other circuits or ground	Test voltage
< 50 V	500 VDC
< 150 V	2500 VDC
< 250 V	4000 VDC

Degree of Pollution / Overvoltage category according to IEC 61131

- Pollution level 2
- Overvoltage category
 - When $U_N = AC\ 120/230\ V$: III
 - When $U_N = 24\ VDC$: II

Protection class

Protection class I in accordance with IEC 60536

Protection class IP 20

Protection class IP 20 in accordance with IEC 60529 for all ET 200S modules, that is:

- Protection against touch with standard test fingers
- Protection against foreign bodies with a diameter greater than 12.5 mm
- No specific protection against water

Rated operational voltage

The ET 200S distributed I/O system works with the rated voltage and corresponding tolerances shown in the following table.

ET 200S modules	Rated voltage	Tolerance range
Everything except motor starters	24 VDC	20.4 to 28.8 VDC ¹
		18.5 to 30.2 VDC ²
	120 VAC	93 to 132 VAC (47 to 63 Hz)
	230 VAC	187 to 264 VAC(47 to 63 Hz)
¹ Static value: Generation as functional extra-low voltage with safety isolation in accordance with IEC 60364-4-41 ² Dynamic value: Including ripple, e.g., at three-phase bridge rectifier		

9.6 Variations in general technical specifications for the ET 200S FC frequency converter

Variations in general technical specifications

The table below presents the variations in the general technical specifications for the ET 200S FC frequency converter compared to the ET 200S.

Table 9-2 Variations in general technical specifications for the ET 200S FC frequency converter

Section	Variations
Standards and approvals	The frequency converter has no approval for <ul style="list-style-type: none"> • cULus for HAZ.LOC. • FM (Factory Mutual Research) • Marine
Transport and storage conditions	Free fall: ≤ 0.35 m
Climatic environmental conditions	Temperature for horizontal installation: from 0 to 60 °C
	Temperature for horizontal installation: from 0 to 40 °C
Mechanical ambient conditions	See operating instructions for ET 200S FC Frequency Converter (6SL3 298-0CA12-0xP0)
Rated operational voltage	
Use in Zone 2	The ET 200S FC frequency converter is not approved for use in hazardous area Zone 2

9.7 Use of the ET 200S in hazardous area zone 2

See product information *Use of subassemblies/modules in a zone 2 hazardous area.*

Interface modules

10.1 Configuration options of the interface modules

Which interface module matches your application:

Table 10-1 The allocation of an interface module and application

Interface module	Applications	
IM151-1 BASIC	<ul style="list-style-type: none"> Connecting the PROFIBUS DP via the RS485 interface Operation as a DPV0 slave Direct data exchange Bus length of the ET 200S: Max. 2 m Number of pluggable modules: Max. 12 Module types: All except fail-safe modules 	Transmission rates: 9.6; 19.2; 45.45; 93.75; 187.5; 500 kBaud, 1.5; 3; 6; 12 Mbps
IM151-1 STANDARD	<ul style="list-style-type: none"> Connecting the PROFIBUS DP via the RS485 interface Operation as a DPV0 or DPV1 slave Direct data exchange Bus length of the ET 200S: Max. 2 m (parameterizable) Number of pluggable modules: Max. 63 Module types: All except fail-safe modules Option handling and status byte for power modules Identification data Firmware update via PROFIBUS DP 	Transmission rates: 9.6; 19.2; 45.45; 93.75; 187.5; 500 kBaud, 1.5; 3; 6; 12 Mbps
IM 151-1 FO STANDARD	<ul style="list-style-type: none"> Connecting the PROFIBUS DP via fiber-optic cable (2x Simplex plug) Operation as a DPV0 slave Direct data exchange Bus length of the ET 200S: Max. 2 m (parameterizable) Number of pluggable modules: Max. 63 Module types: All except fail-safe modules Option handling and status byte for power modules 	Transmission rates: 9.6; 19.2; 45.45; 93.75; 187.5; 500 kBaud, 1.5; 12 Mbps
IM151-1 HIGH FEATURE	<ul style="list-style-type: none"> Connecting the PROFIBUS DP via the RS485 interface Operation as a DPV0 or DPV1 slave Direct data exchange Bus length of the ET 200S: Max. 2 m (parameterizable) Number of pluggable modules: Max. 63 Module types: All, including fail-safe modules Cycle synchronization from 1.5 Mbps up 	Transmission rates: 9.6; 19.2; 45.45; 93.75; 187.5; 500 kBaud, 1.5; 3; 6; 12 Mbps

10.1 Configuration options of the interface modules

Interface module	Applications	
	<ul style="list-style-type: none"> • Option handling and status byte for power modules • Identification data • The firmware can be updated via PROFIBUS DP using HWCONFIG. • Safety-related I-slave-slave-communication via PROFIBUS DP • Safety-related I-slave-slave-communication for fail-safe modules • Operation as DPV1-slave on the Y switching 	
IM151-3 PN	<ul style="list-style-type: none"> • Connection of the PROFINET IO via 2 RJ45 connectors • Operation as an I/O device • Bus length of the ET 200S: Max. 2 m (parameterizable) • Number of pluggable modules: Max. 63 • Module types: All except fail-safe modules • Status byte for power modules • Firmware update • Summary of modules within one byte (packing) • Slot granular replacement value behavior • Records for IO modules • Structuring of linear network structures (2-port switch) 	Transmission rate: 100 Mbps
IM151-3 PN HIGH FEATURE	<ul style="list-style-type: none"> • Connection of the PROFINET IO via 2 RJ45 connectors • Operation as an I/O device • Bus length of the ET 200S: Max. 2 m (parameterizable) • Number of pluggable modules: Max. 63 • Status byte for power modules • Firmware update • Summary of modules within one byte (packing) • Slot granular replacement value behavior • Records for IO modules • Structuring of linear network structures (2-port switch) • Use of fail-safe modules 	Transmission rate: 100 Mbps

10.2 Parameters for interface modules

10.2.1 Parameters for interface module IM151-1 BASIC

Table 10-2 Parameters for interface module IM151-1 BASIC

IM151-1 BASIC	Value range	Default setting	Applicability
Operation at set < > actual configuration	disable/enable	disable	ET 200S
Identifier-related diagnostics	disable/enable	enable	ET 200S
Module status	disable/enable	enable	ET 200S
Channel-specific diagnostics	disable/enable	enable	ET 200S
Analog-value format ¹	SIMATIC S7/ SIMATIC S5	S7	ET 200S
Interference frequency suppression	50 Hz / 60 Hz	50 Hz	ET 200S
Reference junction slot	None / 2 to 12	None	ET 200S
Reference junction input	RTD on channel 0/ RTD on channel 1	0	ET 200S
¹ The parameter is only available for configurations with the GSD file.			

10.2.2 Parameter for interface module IM151-1 STANDARD and IM151-1 HIGH FEATURE

Table 10-3 Parameter for interface module IM151-1 STANDARD and IM151-1 HIGH FEATURE

IM151-1 STANDARD/ IM151-1 HIGH FEATURE	Value range	Default setting ⁵	Applicability
DP interrupt mode	DPV0/DPV1	DPV0	ET 200S
Bus length	≤ 1 m / > 1 m	≤ 1 m	ET 200S
Operation at set <> actual configuration ¹	disable/enable	Disable	ET 200S
Diagnostic interrupt ³	disable/enable	disable	ET 200S
Hardware interrupt ³	disable/enable	disable	ET 200S
Remove/insert module interrupt ^{2 3}	disable/enable	disable	ET 200S
Identifier-related diagnostics	disable/enable	enable	ET 200S
Module status	disable/enable	enable	ET 200S
Channel-specific diagnostics	disable/enable	enable	ET 200S
Option handling, general	disable/enable	disable	ET 200S
Option handling: Slots 2 to 63	disable/enable	Disable	Module

10.2 Parameters for interface modules

IM151-1 STANDARD/ IM151-1 HIGH FEATURE	Value range	Default setting ⁵	Applicability
Analog-value format ⁴	SIMATIC S7/ SIMATIC S5	S7	ET 200S
Interference frequency suppression	50 Hz / 60 Hz	50 Hz	ET 200S
Reference junction slot	None /2 to 63	None	ET 200S
Reference junction input	RTD on channel 0/ RTD on channel 1	0	ET 200S
Synchronize slave on DP cycle ⁶	disable/enable	disable	ET 200S
Time Ti (read in process values) ⁶	Minimum/Maximum	Standard value	ET 200S
Time Ti (output process values) ⁶	Minimum/Maximum	Standard value	ET 200S
¹ See also the "option handling" parameter. ² The default setting of the parameter in the GSD file is "disable". ³ Only parameterizable in DPV1 operation. ⁴ The parameter is only available for configuration with the GSD file. ⁵ The default settings apply for the default start-up (if no other parameters have been assigned by the DP master). ⁶ Only IM151-1 HIGH FEATURE and frp, <i>STEP 7</i> V5.1 with SP 3			

See also

Assigning parameters for option handling (Page 7-11)

10.2.3 Parameters for interface module IM151-1 FO STANDARD

Parameterize register

Table 10-4 Parameters for interface module IM151-1 FO STANDARD

IM151-1 FO STANDARD	Value range	Default setting ³	Applicability
Bus length	≤ 1 m / > 1 m	≤ 1 m	ET 200S
Operation at set <> actual configuration ¹	disable/enable	Disable	ET 200S
Option handling, general	disable/enable	disable	ET 200S
Option handling: Slots 2 to 63	disable/enable	disable	Module
Analog-value format ²	SIMATIC S7 / SIMATIC S5	S7	ET 200S
Interference frequency suppression	50 Hz / 60 Hz	50 Hz	ET 200S
Reference junction slot	None /2 to 63	None	ET 200S
Reference junction input	RTD on channel 0/ RTD on channel 1	0	ET 200S
¹ See also the "option handling" parameter. ² The parameter is only available for configurations with the GSD file. ³ The default settings apply for the default start-up (if no other parameters have been assigned by the DP master).			

See also

Assigning parameters for option handling (Page 7-11)

10.2.4 Parameters for the IM151-3 interface module

Table 10-5 Parameters for the IM151-3 interface module

IM151-3	Value range	Default setting	Applicability
Bus length	≤ 1 m / > 1 m	≤1 m	ET 200S
Interference frequency suppression	50 Hz/60 Hz	50 Hz	ET 200S
Reference junction slot	None /2 to 63	None	ET 200S
Reference junction input	RTD on channel 0/ RTD on channel 1	0	ET 200S

10.3 Parameter description for the interface modules**10.3.1 DP interrupt mode****Note**

This parameter only used for IM151-1 STANDARD (6ES7151-1AA04-0AB0 or higher), and IM151-1 HIGH FEATURE.

This parameter allows you to enable or disable DPV1 operation of the ET 200S. If DPV1 operation is enabled, data records and interrupts are supported (can be assigned parameters) by means of Class 1 and Class 2 services.

Requirements:

- The DP master must also supports DPV1.

10.3.2 Bus length

≤ 1 m: Default setting - the maximum bus length is 1 m.

> 1 m: The bus length of the ET 200S is > 1 m up to a maximum of 2 m. This setting will, however, increase the response time of the ET 200S.

10.3.3 Enable startup for set <> actual configuration

When this parameter is enabled, and

- modules are removed and plugged during operation, then a station failure of ET 200S will not occur.
- The actual configuration differs from the expected configuration, the ET 200S remains engaged in data transfer with the DP master.

When this parameter is disabled, and

- modules are removed and inserted during operation, this leads to a station failure of the ET 200S.
- The actual configuration differs from the expected configuration, there is no data transfer between the DP master and the ET 200S.
Exception: option handling with RESERVE modules.

10.3.4 Option handling, general

Using this parameter you can enable or disable the option handling for the entire ET 200S.

10.3.5 Option handling: Slot 2 to 63

Using this parameter you can enable or disable the checking of the configuration.

- Slots 2 to 63 are enabled: Instead of the configured electronic module you can also insert a RESERVE module in the relevant slot without diagnostics being reported.
- Slots 2 to 63 are disabled: Only the configured module can be located on the relevant slot. RESERVE modules are treated as incorrect modules. Depending on the setting of the "Operation at Preset <> Actual Configuration" parameter, the ET 200S will either fail or remain in data exchange.

10.3.6 Diagnostic interrupt

This parameter allows you to enable or disable diagnostic interrupts. Diagnostic interrupts are supported

- On PROFIBUS DP, when the ET 200S is in DPV1 mode.
- On PROFINET IO.

10.3.7 Process interrupt

This parameter allows you to enable or disable process interrupts. Process interrupts are supported

- On PROFIBUS DP, when the ET 200S is in DPV1 mode.
- On PROFINET IO.

10.3.8 Insert/remove-module interrupt

This parameter allows you to enable or disable insert/remove-module interrupts. Insert/remove-module interrupts are supported

- On PROFIBUS DP, when the ET 200S is in DPV1 mode.
- On PROFINET IO.

10.3.9 Analog-value format

Here you set the number format for all analog electronic modules.

10.3.10 Interference frequency suppression

The frequency of your AC power system can interfere with the measured value, particularly when measuring in low voltage ranges and using thermocouples. Here, enter the mains frequency in your system (50 Hz or 60 Hz).

The interference frequency suppression parameter applies to all analog electronic modules. With this parameter, you also specify the integration and conversion time of the various modules. See the technical data for the analog electronic modules.

10.3.11 Reference junction slot

This parameter allows you to assign a slot (none, 2 to 12 or 2 to 63) where the channel for measuring the reference temperature is located (calculation of the compensation value).

Reference

You can find information regarding connecting thermocouples in the *ET 200S Device Manual* under *Analog Electronic modules > Basics of analog value processing*.

10.3.12 Reference junction input

This parameter allows you to set the channel (0/1) for measuring the reference temperature (calculation of the compensation value) for the assigned slot.

Reference

You can find information regarding connecting thermocouple elements in the *ET 200S Device Manual* under *Analog Electronic modules > Basics of analog value processing*.

10.3.13 Synchronize DP slave with DP cycle

You can use this parameter to enable or disable isochronous operation.

If you enable isochronous operation, the I/O of the ET 200S are synchronized with the global control frame of the master (as an constant bus cycle time).

10.3.14 Time T_i (read in process values)

This value can only be set provided you have enabled the "Synchronize DP slave with DP cycle" parameter.

T_i is the time reserved for reading in the input data at the ET 200S. At the beginning of T_i , the input data is converted at the terminals and stored in an interim buffer via the backplane bus of the ET 200S. T_i ends at the beginning of the next, constant DP cycle (i.e. with the global control frame).

At this point, the most recent, most up-to-date input data must be available to be read in on the PROFIBUS subnet. The time T_i must take into account the processing and delay times in the modules and in the backplane bus of the ET 200S and, in the case of modular slaves, is therefore dependent on the configuration.

The time T_i can only be set in the specified increments between the minimum and maximum values. Normally, the default values should be accepted.

10.3.15 Time To (output process values)

This value can only be set provided you have enabled the "Synchronize DP slave with DP cycle" parameter.

This value can only be set provided you have enabled the "Synchronize DP slave with DP cycle" parameter. The time To includes the following:

- Distribution of the output data via the PROFIBUS DP bus system to the slaves (= cyclic master- slave data exchange)
- Distribution of the output data to the modules via the backplane bus of the slave
- Conversion and transfer of the output data to the output terminals of the module

To starts with the arrival of the global control frame. The time Ti can only be set in the specified increments between the minimum and maximum values. Normally, you should accept the default values.

10.4 IM151-1 BASIC interface module (6ES7151-1CA00-0AB0)

Properties

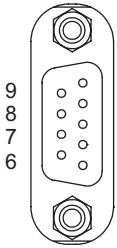
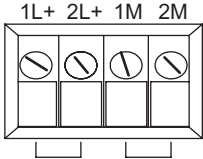
The IM151-1 BASIC interface module has the following features:

- It connects the ET 200S with PROFIBUS DP via the RS485 interface.
- The maximum parameter length is 244 bytes.
- The maximum address space is 88 bytes for inputs and 88 bytes for outputs.
- Operation as a DPV0 slave
- A maximum of 12 modules can be operated with the IM151-1 BASIC.
- The maximum bus length is 2 m.

Pin assignment

The following table shows the terminal assignment of the IM151-1 BASIC interface module for the 24 VDC voltage supply and PROFIBUS DP:

Table 10-6 Terminal assignment of the IM151-1 BASIC interface module

View	Signal name	Designation	
	1	-	
	2	-	
	3	RxD/TxD-P	Data line B
	4	RTS	Request To Send
	5	M5V2	Data reference potential (station)
	6	P5V2	Supply plus (station)
	7	-	-
	8	RxD/TxD-N	Data line A
	9		
	1L+	24 VDC	
	2L+	24 VDC (for loop through)	
	1M	Ground	
	2M	Ground (for loop through)	

Block diagram

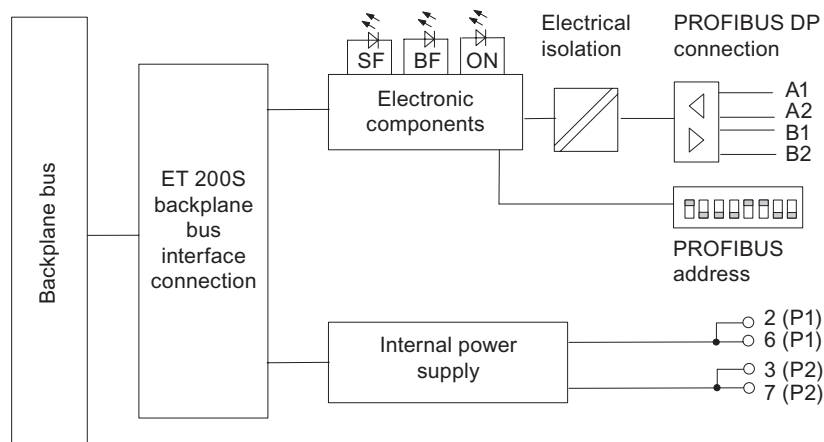


Figure 10-1 Block diagram for the IM151-1 BASIC interface module

Technical data IM151-1 BASIC (6ES7151-1CA00-0AB0)

Dimensions and weight	
Dimension W x H x D (mm)	45 x 119.5 x 75
Weight	Approx 150 g
Module-specific data	
Transmission rate	9.6; 19.2; 45.45; 93.75; 187.5; 500 kBaud, 1.5; 3; 6; 12 Mbit/s
Bus protocol	PROFIBUS DP
Interface	RS 485
SYNC capability	Yes
FREEZE capability	Yes
Manufacturer ID	80F3H
Direct data exchange	Yes
Isochronous operation	No
Parameter length	19 bytes
Address space	88 bytes I/O
Option handling	No
I&M data	No
Firmware update	No
Max. output current of the PROFIBUS DP interface (5, 6)	80 mA

10.5 Interface module IM151-1 STANDARD (6ES7151-1AA04-0AB0)

Voltages, currents, potentials	
Rated supply voltage of the electronic components (1L+)	24 VDC
• Reverse polarity protection	Yes
• Power failure bypass	No
Isolation	
• Between the backplane bus and electronic components	No
• Between the PROFIBUS DP and electronic components	Yes
• Between the supply voltage and electronic components	No
Permitted potential difference (to the rail)	75 VDC, 60 VAC
Insulation test voltage	500 VDC
Current consumption from rated supply voltage (1L+)	Approx. 70 mA
Power dissipation of the module	Typically 1.5 W
Status, interrupts, diagnostics	
Interrupts	None
Diagnostic function	Yes
• Group error	Red "SF" LED
• PROFIBUS DP bus monitoring	red "BF" LED
• Monitoring of the power supply voltage of the electronics	Green "ON" LED

10.5 Interface module IM151-1 STANDARD (6ES7151-1AA04-0AB0)

Properties

The IM151-1 STANDARD interface module has the following features:

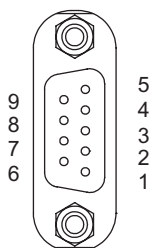
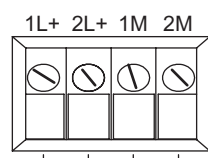
- It connects the ET 200S with PROFIBUS DP via the RS485 interface.
- The maximum parameter length is 244 bytes.
- The maximum address space is 244 bytes for inputs and 244 bytes for outputs.
- Operation as a DPV0 or DPV1 slave
- A maximum of 63 modules can be operated with the IM151-1 STANDARD.
- The maximum bus length is 2 m.
- Supports option handling and status byte for power modules.
- Firmware update via PROFIBUS DP
- Identification Data

Interface module IM151-1 STANDARD (6ES7151-1AA04-0AB0) replaces the previous interface module 6ES7151-1AA00-0AB0 to 6ES7151-1AA03-0AB0 compatible.

Pin assignment

The following table shows the terminal assignment of the IM151-1 STANDARD interface module for the 24 VDC voltage supply and PROFIBUS DP:

Table 10-7 Terminal assignment of the IM151-1 STANDARD interface module

View	Signal name	Designation	
	1	-	-
	2	-	-
	3	RxD/TxD-P	Data line B
	4	RTS	Request To Send
	5	M5V2	Data reference potential (station)
	6	P5V2	Supply plus (station)
	7	-	-
	8	RxD/TxD-N	Data line A
	9		
	1L+		24 VDC
	2L+		24 VDC (for loop through)
	1M		Ground
	2M		Ground (for loop through)

Block diagram

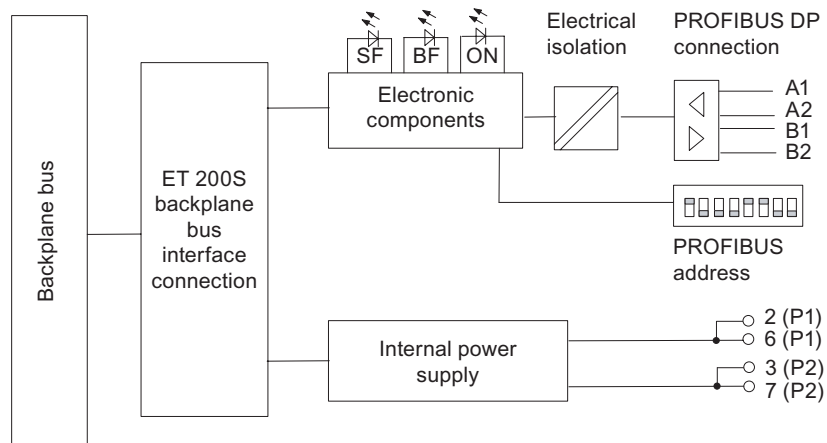


Figure 10-2 Block diagram for the IM151-1 STANDARD interface module

Technical data IM151-1 STANDARD (6ES7151-1AA04-0AB0)

Dimensions and weight	
Dimension W x H x D (mm)	45 x 119.5 x 75
Weight	Approx 150 g
Module-specific data	
Transmission rate	9.6; 19.2; 45.45; 93.75; 187.5; 500 kBaud, 1.5; 3; 6; 12 Mbit/s
Bus protocol	PROFIBUS DP
Interfaces	RS 485
SYNC capability	Yes
FREEZE capability	Yes
Manufacturer ID	806A _H
Direct data exchange	Yes
Isochronous operation	No
Parameter length	27 bytes
Address space	244 bytes I/O
Option handling	Yes
I&M data	Yes
Firmware update	via PROFIBUS DP
Max. output current of the PROFIBUS DP interface (5, 6)	80 mA
Voltages, currents, potentials	
Rated supply voltage of the electronic components (1L+)	24 VDC
<ul style="list-style-type: none"> • Reverse polarity protection 	Yes
<ul style="list-style-type: none"> • Power failure bypass 	min. 20 ms
Isolation	
<ul style="list-style-type: none"> • Between the backplane bus and electronic components 	No
<ul style="list-style-type: none"> • Between the PROFIBUS DP and electronic components 	Yes
<ul style="list-style-type: none"> • Between the supply voltage and electronic components 	No
Permitted potential difference (to the rail)	75 VDC, 60 VAC
Insulation test voltage	500 VDC
Current consumption from rated supply voltage (1L+)	Approx. 200 mA
Power dissipation of the module	Typically 3.3 W
Status, interrupts, diagnostics	
Interrupts	Yes
Diagnostic function	Yes
<ul style="list-style-type: none"> • Group error • PROFIBUS DP bus monitoring 	red LED "SF" Red "BF" LED
<ul style="list-style-type: none"> • Monitoring of the power supply voltage of the electronics 	Green "ON" LED

Updating the firmware of the IM151-1 STANDARD

With *STEP 7*V5.1, Service Pack 3 and higher, you can update the firmware of the IM151-1 STANDARD (via accessible nodes).

To update the firmware you receive files (*.UPD) with the current firmware.

The following prerequisites must be fulfilled:

- The IM151-1 STANDARD in the station whose firmware is to be updated must be accessible online.
- The files with the current firmware version must be available in the file system of your programming device (PG)/PC.

You can find further information about the procedure in the *STEP 7* Online Help.

10.6 Interface module IM151-1 FO STANDARD (6ES7151-1AB02-0AB0)

Properties

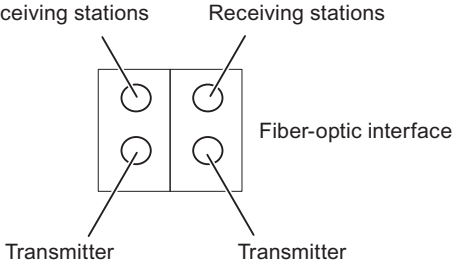
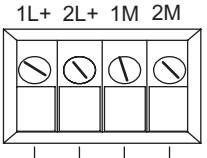
The IM151-1 STANDARD interface module has the following features:

- It connects the ET 200S with PROFIBUS DP via the fiber-optic interface.
- The maximum parameter length is 244 bytes.
- The maximum address space is 128 bytes for inputs and 128 bytes for outputs.
- Operation as a DPV0 slave
- A maximum of 63 modules can be operated with the IM151-1 FO STANDARD.
- The maximum bus length is 2 m.
- Supports option handling and status byte for power modules.

Pin assignment

The following table shows the terminal assignment of the IM151-1 STANDARD interface module for the 24 VDC voltage supply and PROFIBUS DP with fiber-optic interface:

Table 10-8 Terminal assignment of the IM151-1 FO STANDARD interface module

View	Signal name	Designation
		
	1L+	24 VDC
	2L+	24 VDC (for loop through)
	1M	Ground
	2M	Ground (for loop through)

Block diagram

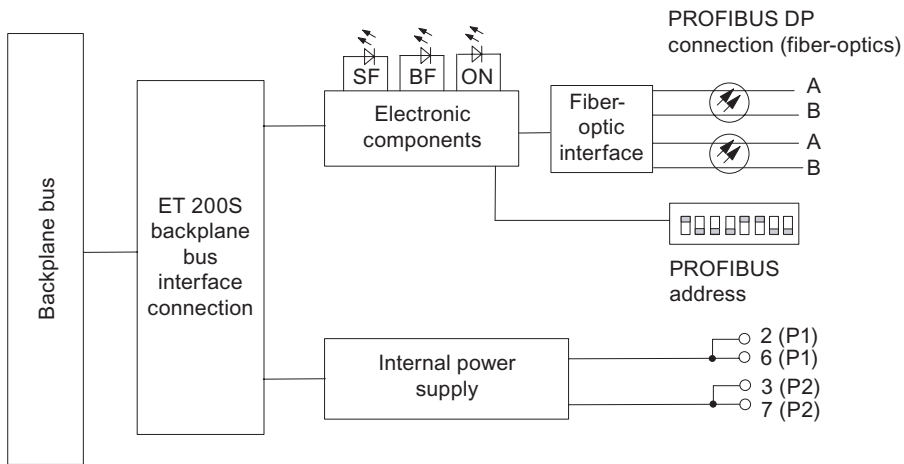


Figure 10-3 Block diagram for the IM151-1 FO STANDARD interface module

Technical data for IM151-1 FO STANDARD (6ES7151-1AB02-0AB0)

Dimensions and weight	
Dimensions W x H x D (mm)	45 × 119.5 × 75
Weight	Approx 150 g
Module-specific data	
Transmission rate	9.6; 19.2; 45.45; 93.75; 187.5; 500 kBaud, 1.5; 12 Mbit/s
Bus protocol	PROFIBUS DP
Interfaces	Fiber-optic cable
SYNC capability	Yes
FREEZE capability	Yes
Manufacturer ID	806B _H
Direct data exchange	Yes
Isochronous operation	No
Parameter length	27 bytes
Address space	128 bytes I/O
Option handling	Yes
Voltages, currents, potentials	
Rated supply voltage of the electronic components (1L+)	24 VDC
<ul style="list-style-type: none"> Reverse polarity protection 	Yes
<ul style="list-style-type: none"> Power failure bypass 	min. 20 ms
Isolation	
<ul style="list-style-type: none"> Between the backplane bus and electronic components 	No
<ul style="list-style-type: none"> Between the supply voltage and electronic components 	No
Current consumption from rated supply voltage (1L+)	Approx. 200 mA
Power dissipation of the module	Typically 3.3 W
Status, interrupts, diagnostics	
Interrupts	None
Diagnostic function	Yes
<ul style="list-style-type: none"> Group error PROFIBUS DP bus monitoring 	Red "SF" LED red "BF" LED
<ul style="list-style-type: none"> Monitoring of the power supply voltage of the electronics 	Green "ON" LED

10.7 Interface module IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0)

Properties

The IM151-1 HIGH FEATURE interface module has the following features:

- It connects the ET 200S with PROFIBUS DP via the RS485 interface.
- There is no restriction on the maximum parameter length for SIMATIC S7, otherwise it amounts to 244 bytes.
- The maximum address space is 244 bytes for inputs and 244 bytes for outputs.
- Operation as a DPV0 or DPV1 slave
- A maximum of 63 modules can be operated with the IM151-1 HIGH FEATURE.
- The maximum bus length on the backplane bus is 2 m.
- Supports option handling and status byte for power modules.
- synchronizable with the DP cycle (cycle synchronization).
- Firmware update via PROFIBUS DP with HW Config possible.
- Security-oriented I-slave-slave-communication via PROFIBUS DP. You can find the description of this function in the *S7 Distributed Safety Configuration and Programming* manual.
- Identification Data
- Operation as DPV1 slave on the Y switching
- Use of fail-safe modules

Restrictions when operating the modules with the IM-151 HIGH FEATURE

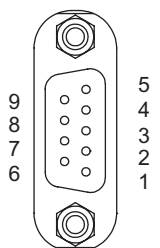
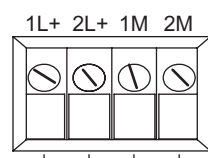
The following modules cannot be used with the IM-151 HIGH FEATURE:

Module	Up to order number	Up to product version
1COUNT 24V/100kHz	6ES7138-4DA02-0AB0	1
1COUNT 5V/500kHz	6ES7138-4DE00-0AB0	1
1SSI	6ES7138-4DB00-0AB0	3
1STEP 5V/204kHz	6ES7138-4DC00-0AB0	3
1SI serial interface module	6ES7138-4DF00-0AB0	1
Modbus/USS serial interface module	6ES7138-4DF10-0AB0	1
2AI U; HIGH FEATURE	6ES7134-4LB00-0AB0	1
2AI I 2/4DMU; HIGH FEATURE	6ES7134-4MB00-0AB0	1
2AO U; HIGH FEATURE	6ES7135-4LB00-0AB0	1

Pin assignment

The following table shows the terminal assignment of the IM151-1 HIGH FEATURE interface module for the 24 VDC voltage supply and PROFIBUS DP:

Table 10-9 Terminal assignment of the IM151-1 HIGH FEATURE interface module

View	Signal name	Designation	
	1	-	
	2	-	
	3	RxD/TxD-P	Data line B
	4	RTS	Request To Send
	5	M5V2	Data reference potential (station)
	6	P5V2	Supply plus (station)
	7	-	-
	8	RxD/TxD-N	Data line A
	9		
	1L+	24 VDC	
	2L+	24 VDC(for loop through)	
	1M	Ground	
	2M	Ground (for loop through)	

Block diagram

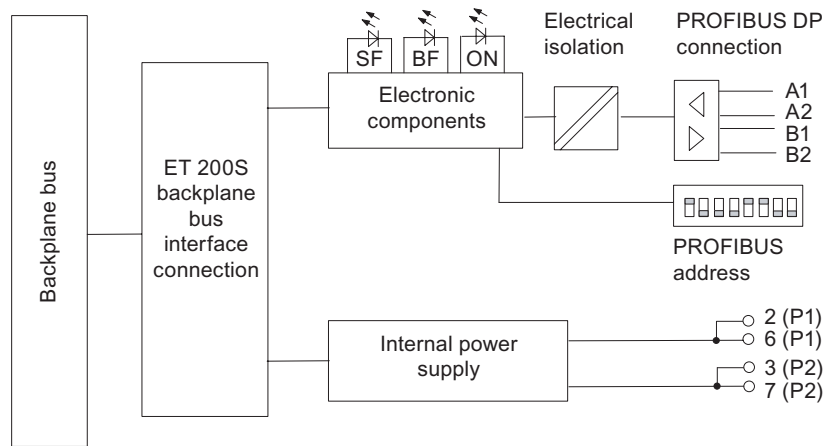


Figure 10-4 Block diagram for the IM151-1 HIGH FEATURE interface module

Interface module IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0)

Dimensions and weight	
Dimensions W x H x D (mm)	45 × 119.5 × 75
Weight	Approx. 150 g
Module-specific data	
Transmission rate	9.6; 19.2; 45.45; 93.75; 187.5; 50 kBaud, 1.5; 3; 6; 12 Mbit/s
Bus protocol	PROFIBUS DP
Interfaces	RS 485
SYNC capability	Yes
FREEZE capability	Yes
Manufacturer ID	80E0 _H
Direct data exchange	Yes
Isochronous operation	Yes ¹
Parameter length	27 bytes 56 bytes, if cycle synchronization is active
Address space	244 bytes I/O
Option handling	No
I&M data	Yes
Firmware update	via PROFIBUS DP with HW Config
Max. output current of the PROFIBUS DP interface (5, 6)	80 mA
Voltages, currents, potentials	
Rated supply voltage of the electronic components (1L+)	24 VDC
<ul style="list-style-type: none"> • Reverse polarity protection 	Yes
<ul style="list-style-type: none"> • Power failure bypass 	min. 20 ms
Isolation	
<ul style="list-style-type: none"> • Between the backplane bus and electronic components 	No
<ul style="list-style-type: none"> • Between the PROFIBUS DP and electronic components 	Yes
<ul style="list-style-type: none"> • Between the supply voltage and electronic components 	No
Permitted potential difference (to the rail)	75 VDC, 60 VAC
Insulation test voltage	500 VDC
Current consumption from rated supply voltage (1L+)	Approx. 200 mA
Power dissipation of the module	Typically 3.3 W
Status, interrupts, diagnostics	
Interrupts	Yes
Diagnostic function	Yes
<ul style="list-style-type: none"> • Group error • PROFIBUS DP bus monitoring 	red LED "SF" Red "BF" LED
<ul style="list-style-type: none"> • Monitoring of the power supply voltage of the electronics 	Green "ON" LED
¹ from 1.5 Mbits/s	

Updating firmware for IM151-1 HIGH FEATURE

With *STEP 7*V5.1, Service Pack 3 and higher, you can update the firmware of the IM151-1 STANDARD.

To update the firmware you receive files (*.UPD) with the current firmware.

The following prerequisites must be fulfilled:

- The IM151-1 HIGH FEATURE in the station whose firmware is to be updated must be accessible online.
- The files with the current firmware version must be available in the file system of your programming device (PG)/PC.

You can find further information about the procedure in the *STEP 7* Online Help.

Note

Be sure to use the correct firmware version for the interface module you are using for the update. An interface module with an older issue date can not be updated with the firmware version for an interface module with a newer issue date and vice versa.

10.8 Interface module IM151-3 PN (6ES7151-3AA20-0AB0)

10.8.1 Properties of the IM151-3 PN interface module

Characteristics

The IM151-3 PN interface module has the following characteristics:

- It connects the ET 200S with PROFINET IO
- It prepares the data for the electronic modules and motor starters that are fitted
- It supplies the backplane bus
- Transfer and backup of the device name on SIMATIC Micro Memory Card
- Firmware update using a SIMATIC Micro Memory Card
- The reference potential M of the rated supply voltage of the IM151-3 PN to the rail (protective conductor) is connected by means of an RC combination, thus permitting an ungrounded configuration.
- Supported Ethernet services
 - ping
 - arp
 - Net diagnostics (SNMP) / MIB-2
- Interrupts
 - Diagnostic interrupts
 - Process interrupts
 - Insert/remove module interrupts
- The maximum address scope amounts to 256 bytes I/O data.
- A maximum of 63 modules can be operated with the IM151-3 PN.
- The maximum bus length at the backplane bus is 2 m.
- Grouping of modules within one byte (packing).
- Records for IO modules

Compatibility of the IM151-3 PN interface module (6ES7151-3AA10-0AB0 and higher)

Note

Firmware version of the controller used

To be able to operate the IM -3151 PN (6ES7 151-3AA10-0AB0 and higher) interface module on a controller, operate the latter using one of the firmware versions listed below. You can utilize the interface module IM151-3 PN (6ES7151-3AA00-0AB0) independently of the controller firmware version.

The following firmware versions are compatible with the interface module IM 151-3 PN (6ES7151-3AA10-0AB0 and higher):

	CPU	CP		SOFTNET PNIO
Controller	315-2 PN/DP 317-2 PN/DP	443-1	343-1	SIMATIC NET-CD
Firmware version	≥ V2.3.2	≥ V2.2	≥2.0	V 6.3 Hotfix 1

Note

Spare-part application of an IM151-3 PN (6ES7151-3AA10-0AB0)

If a spare part is required, you can replace an IM151-3 PN (6ES7151-3AA10-0AB0) by an IM151-3 PN (6ES7151-3AA20-0AB0) if the following conditions are fulfilled:

- 15 mm free space to the left of the IM151-3 PN
- STEP7 V5.3 ServicePack 3
- The user program is adapted in accordance with the "From PROFIBUS DP to PROFINET IO" programming manual, Version 01/06.

Restrictions when operating the modules with the IM151-3 PN

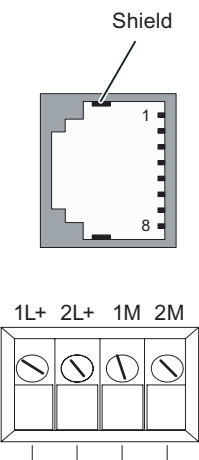
The following modules cannot be used with the IM151-3 PN:

Module	Up to order number	Up to product version
2AO U; HIGH FEATURE	6ES7135-4LB01-0AB0	3
2AO I; HIGH FEATURE	6ES7135-4MB01-0AB0	3
1SI serial interface module	6ES7138-4DF00-0AB0	4
Modbus/USS serial interface module	6ES7138-4DF10-0AB0	4

Terminal assignment

The following table shows the terminal assignment of the IM151-3 PN interface module for the 24 VDC voltage supply and of the RJ45 interfaces for PROFINET IO:

Table 10-10 Properties of the IM151-3 PN interface module

View	Signal name	Name	
	1	TD	Transmit Data +
	2	TD_N	Transmit Data -
	3	RD	Receive Data +
	4	GND	Ground
	5	GND	Ground
	6	RD_N	Receive Data -
	7	GND	Ground
	8	GND	Ground
	1L+		24 VDC
	2L+		24 VDC (for loop through)
	1M		Chassis ground
	2M		Ground (for loop through)

Block diagram

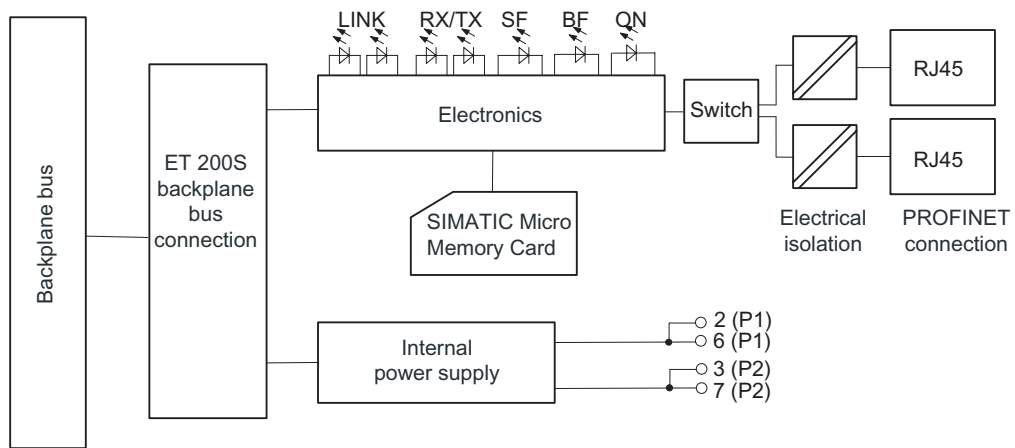


Figure 10-5 Block diagram for the IM151-3 PN interface module

Technical specifications IM151-3 PN (6ES7151-3AA20-0AB0)

Dimensions and Weight	
Dimensions W x H x D (mm)	60 x 119.5 x 75
Weight	Approx. 150 g
Module-specific data	
Data transmission rate	<ul style="list-style-type: none"> • 10 Mbps for Ethernet services • 100 Mbps full duplex for PROFINET IO
Transmission procedure	100BASE-TX
Autonegotiation	Yes
Autocrossing	Yes
Bus protocol	PROFINET IO + TCP/IP
Supported Ethernet services	<ul style="list-style-type: none"> • ping • arp • Net diagnostics (SNMP) / MIB-2
PROFINET interface	2x RJ45
Manufacturer ID (vendor ID)	002A _H
Device ID (DeviceID)	0301 _H
Voltages, currents, potentials	
Rated supply voltage of the electronic components (1L+)	24 V DC
<ul style="list-style-type: none"> • Reverse battery protection 	Yes
<ul style="list-style-type: none"> • Power failure bypass 	Min. 20 ms
Electrical isolation	
<ul style="list-style-type: none"> • Between the backplane bus and electronic components 	No
<ul style="list-style-type: none"> • Between Ethernet and electronic components 	Yes
<ul style="list-style-type: none"> • Between the supply voltage and electronic components 	No
Permitted potential difference (to the rail)	75 VDC / 60 VAC
Insulation test voltage	500 V DC
Current consumption from rated supply voltage (1L+)	Approx. 200 mA
Power dissipation of the module	Approx. 2 W
Status, alarms, diagnostics	
Interrupts	Yes
Diagnostic function	Yes
<ul style="list-style-type: none"> • General fault • Bus monitoring PROFINET IO 	Red LED "SF" Red "BF" LED
<ul style="list-style-type: none"> • Monitoring of the power supply voltage of the electronics 	Green "ON" LED
<ul style="list-style-type: none"> • Existing connection to network 	One green LED "LINK" per interface
<ul style="list-style-type: none"> • Transmitting / receiving data on the network 	One green LED "RX/TX" per interface

See also

Channel diagnostics (Page 8-57)

10.8.2 SNMP

The IM151-3 PN supports the Ethernet service SNMP. MIB-2 (RFC1213) is supported. R/W objects are changeable using SNMP tools and are stored in the device.

Remanent stored SNMP parameters are reset to default settings (*STEP 7*V5.3 SP 3 and higher) in HW Config dialog "Target system > Ethernet > Edit Ethernet nodes" "Reset" button under "Reset to default settings". If the module has a station name (stored on a SIMATIC Micro Memory Card), this will not be deleted. The device name on the SIMATIC Micro Memory Card is not deleted since the SIMATIC Micro Memory Card does not form part of the IM151-3 PN. Likewise, the IP address, which is only available when the module is switched on, is not erased. As a security measure this service is only enabled when the IO device is not in data exchange mode.

10.8.3 SIMATIC Micro Memory Card for IM151-3 PN

Insertion of the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as storage medium for the IM151-3 PN.

The following data are saved on the SIMATIC Micro Memory Card.

- Technology data (device names)
- Data for a firmware update

Note

On **one** SIMATIC Micro Memory Card, you can save **either** technology data **or** update data.

Service life of a SIMATIC Micro Memory Card

The life of an SIMATIC Micro Memory Card depends substantially on the following factors:

- Number of deletion or programming operations
- External factors, such as ambient temperature

At an ambient temperature up to 60 °C, a SIMATIC Micro Memory Card has a useful life of 10 years at maximum 100,000 write/delete operations.

**Caution****Possible data loss**

If the maximum number of write/delete operations is exceeded, data loss is possible.

Applicable SIMATIC Micro Memory Cards

The following memory modules are available for use:

Table 10-11 Available SIMATIC Micro Memory Cards

Type	Order numbers
SIMATIC Micro Memory Card 64k	6ES7953-8LF11-0AA0
SIMATIC Micro Memory Card 128k	6ES7953-8LG11-0AA0
SIMATIC Micro Memory Card 512k	6ES7953-8LJ11-0AA0
SIMATIC Micro Memory Card 2M	6ES7953-8LL11-0AA0
SIMATIC Micro Memory Card 4M	6ES7953-8LM11-0AA0
SIMATIC Micro Memory Card 8M	6ES7953-8LP11-0AA0

For storage of the device name, a SIMATIC Micro Memory Card 64k sufficient. For a firmware update the SIMATIC Micro Memory Cards with 2 MB or higher are required.

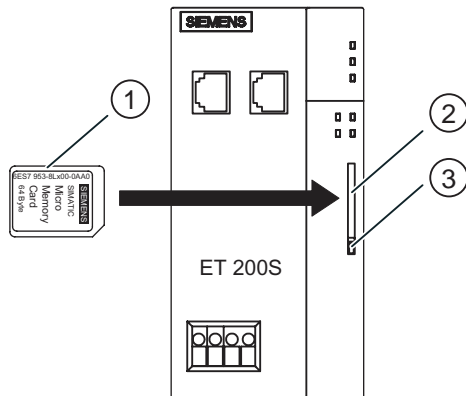
Inserting/replacing the card

The SIMATIC Micro Memory Card designed so that it can also be removed and inserted under power. The beveled corner of the SIMATIC Micro Memory Card prevents it from being inserted the wrong way around (reverse polarity protection).

The module slot on the IM 151-3 PN is located behind the front door. The front door has a protruding edge for opening.

The socket of the module slot has an ejector enabling you to remove the card. To eject the card, push in the ejector with a suitable object (such as a small screwdriver or ball-point pen).

Position of the module slot for the SIMATIC Micro Memory Card on the IM151-3 PN:



- ① SIMATIC Micro Memory Card
- ② Module slot
- ③ Ejector

10.8.4 Updating the firmware of the IM151-3 PN

Prerequisites

In order to update the firmware of an IM151-3 PN you require:

- STEP 7 as from Version 5.3, Service Pack 1
- A SIMATIC Micro Memory Card with at least 2 MB memory
- A PC or programming device with a device for writing to a SIMATIC Micro Memory Card

Procedure

The firmware update is carried out in two steps:

1. Transferring the update files to a SIMATIC Micro Memory Card.
2. Carrying out the firmware update of an IM151-3 PN.

Transferring the update files to a SIMATIC Micro Memory Card

1. Use the Windows Explorer to create a new directory.
2. Download the required update file from the Internet into this directory.
3. Unpack this update file into this directory. This directory contains three files with the extension UPD.
4. Insert a SIMATIC Micro Memory Card (≥ 2 MB) into the programming device or writing device.
5. Delete the SIMATIC Micro Memory Card in the SIMATIC Manager by using the "File > S7 Memory Card > Delete" menu command.
6. In the SIMATIC Manager, select the "PLC > Update operating system" menu command.
7. Select the directory containing the UPD files in the displayed dialog box.
8. Double-click one of the UPD files. The data are written to the SIMATIC Micro Memory Card.

The update files are now contained on the SIMATIC Micro Memory Card.

Carrying out the firmware update

1. Switch off the power to the IM151-3 PN and insert the SIMATIC Micro Memory Card with the firmware update into the slot.
2. Switch on the power supply for the IM151-3 PN interface module.

The IM151-3 PN recognizes the SIMATIC Micro Memory Card with the firmware update automatically and starts the module update. The SF and BF LEDs are lit, and the ON LED is dark while the system is updating.

When the update has been completed, the BF LED flashes at 0.5 Hz.

3. Switch off the power to the IM151-3 PN and insert the SIMATIC Micro Memory Card with firmware update.
4. Insert the SIMATIC Micro Memory Card with the device names and switch on the power supply again.

The IM 151-3 PN powers up with the new firmware and is now ready for operation.

10.9 Interface module IM151-3 PN HIGH FEATURE (6ES7151-3BA20-0AB0)

10.9.1 Properties of the IM151-3 PN HIGH FEATURE interface module

Characteristics

The IM151-3 PN HIGH FEATURE interface module has the following characteristics:

- It connects the ET 200S with PROFINET IO
- It prepares the data for the electronic modules and motor starters that are fitted
- It supplies the backplane bus
- Transfer and backup of the device name on SIMATIC Micro Memory Card
- Firmware update using a SIMATIC Micro Memory Card
- The reference potential M of the rated supply voltage of the IM151-3 PN HIGH FEATURE to the rail (protective conductor) is connected by means of an RC combination, thus permitting an ungrounded configuration.
- Supported Ethernet services
 - ping
 - arp
 - Net diagnostics (SNMP) / MIB-2
- Interrupts
 - Diagnostic interrupts
 - Process interrupts
 - Insert/remove module interrupts
- Records for IO modules
- The maximum address scope amounts to 256 bytes I/O data.
- A maximum of 63 modules can be operated with the IM151-3 PN HIGH FEATURE.
- The maximum bus length at the backplane bus is 2 m.
- Grouping of modules within one byte (packing).
- Use of fail-safe modules

Compatibility of the interface module IM151-3 PN HIGH FEATURE (6ES7151-3BA20-0AB0)

Note

Firmware version of the controller used

To be able to operate the IM -3151 PN HIGH FEATURE (6ES7151-3BA20-0AB0) interface module on a controller, operate the latter using one of the firmware versions listed below.

The following firmware versions are compatible with the interface module IM 151-3 PN HIGH FEATURE (6ES7151-3BA20-0AB0):

Controller	CPU		CP			SOFTNET PNIO
	315-2 PN/DP 317-2 PN/DP	317F-2 PN/DP	443-1 Advanced	343-1	343-1 Advanced	SIMATIC NET-CD
Firmware version	≥ V2.3.2	≥ V2.3.3	≥ V2.3 ¹	≥1.1 ²	≥1.0 ²	V 6.3 Hotfix 1

¹ For IM151-3 HIGH FEATURE V2.3 is required for the use of fail-safe PROFIsafe modules at the IM151-3 HIGH FEATURE.

² For IM151-3 STANDARD and HIGH FEATURE. An operation of fail-safe PROFIsafe modules with IM151-3 HIGH FEATURE is *not* possible via the CP343.

SNMP

The IM151-3 PN HIGH FEATURE supports the Ethernet service SNMP. MIB-2 (RFC1213) is supported. R/W objects are changeable using SNMP tools and are stored in the device.

Remanent stored SNMP parameters are reset to default settings (STEP 7 V5.3 SP 3 and higher) in HW Config dialog "Target system > Ethernet > Edit Ethernet nodes" "Reset" button under "Reset to default settings".

After exchange for a factory-new device, the R/W objects in the IM151-3 PN HIGH FEATURE are set to default settings.

Restrictions when operating the modules with the IM 151-3 PN HIGH FEATURE

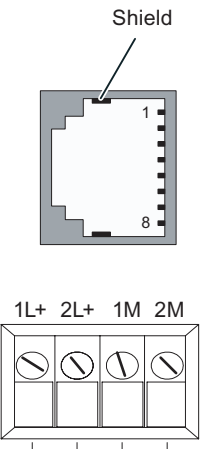
The following modules cannot be used with the IM-151 HIGH FEATURE:

Module	Up to order number	Up to product version
2AO U; HIGH FEATURE	6ES7135-4LB01-0AB0	3
2AO I; HIGH FEATURE	6ES7135-4MB01-0AB0	3
1SI serial interface module	6ES7138-4DF00-0AB0	4
Modbus/USS serial interface module	6ES7138-4DF10-0AB0	4

Terminal assignment

The following table shows the terminal assignment of the IM151-3 PN HIGH FEATURE interface module for the 24 VDC voltage supply and of the RJ45 interfaces for PROFINET IO:

Table 10-12 Terminal assignment of the IM151-3 PN HIGH FEATURE interface module

View	Signal name	Name	
	1	TD	Transmit Data +
	2	TD_N	Transmit Data -
	3	RD	Receive Data +
	4	GND	Ground
	5	GND	Ground
	6	RD_N	Receive Data -
	7	GND	Ground
	8	GND	Ground
	1L+		24 VDC
	2L+		24 VDC (for loop through)
	1M		Chassis ground
	2M		Ground (for loop through)

Block diagram

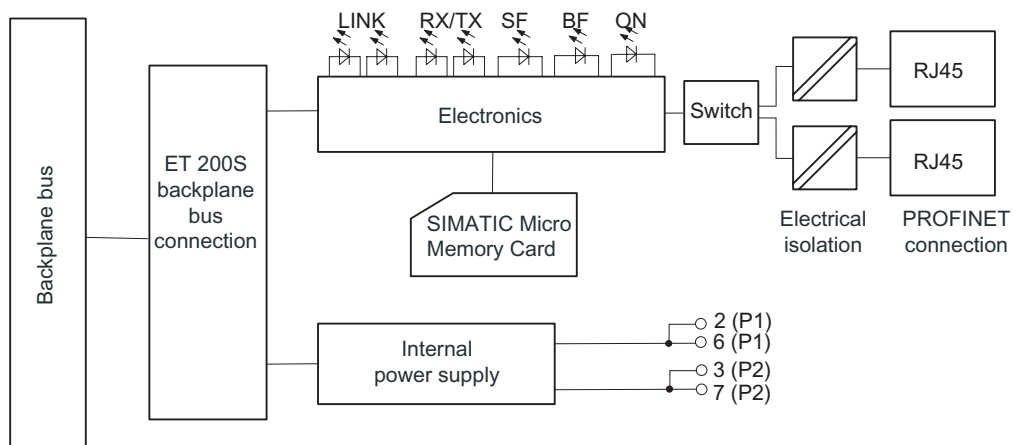


Figure 10-6 Block diagram for the IM151-3 PN HIGH FEATURE interface module

Technical specifications IM151-3 PN HIGH FEATURE (6ES7151-3BA20-0AB0)

Dimensions and Weight	
Dimensions W x H x D (mm)	60 x 119.5 x 75
Weight	Approx. 150 g
Module-specific data	
Data transmission rate	<ul style="list-style-type: none"> • 10 Mbps for Ethernet services • 100 Mbps full duplex for PROFINET IO
Transmission procedure	100BASE-TX
Autonegotiation	Yes
Autocrossing	Yes
Bus protocol	PROFINET IO TCP/IP
Supported Ethernet services	<ul style="list-style-type: none"> • ping • arp • Net diagnostics (SNMP) / MIB-2
PROFINET interface	2x RJ45
Manufacturer ID (vendor ID)	002A _H
Device ID (DeviceID)	0301 _H
Voltages, currents, potentials	
Rated supply voltage of the electronic components (1L+)	24 V DC
<ul style="list-style-type: none"> • Reverse battery protection 	Yes
<ul style="list-style-type: none"> • Power failure bypass 	Min. 20 ms
Electrical isolation	
<ul style="list-style-type: none"> • Between the backplane bus and electronic components 	No
<ul style="list-style-type: none"> • Between Ethernet and electronic components 	Yes
<ul style="list-style-type: none"> • Between the supply voltage and electronic components 	No
Permitted potential difference (to the rail)	75 VDC / 60 VAC
Insulation test voltage	500 V DC
Current consumption from rated supply voltage (1L+)	Approx. 200 mA
Power dissipation of the module	Approx. 2 W
Status, alarms, diagnostics	
Interrupts	Yes
Diagnostic function	Yes
<ul style="list-style-type: none"> • General fault • Bus monitoring PROFINET IO 	Red LED "SF" Red "BF" LED
<ul style="list-style-type: none"> • Monitoring of the power supply voltage of the electronics 	Green "ON" LED
<ul style="list-style-type: none"> • Existing connection to network 	One green LED "LINK" per interface
<ul style="list-style-type: none"> • Transmitting / receiving data on the network 	One green LED "RX/TX" per interface

10.9.2 SNMP

The IM151-3 PN HIGH FEATURE supports the Ethernet service SNMP. MIB-2 (RFC1213) is supported. R/W objects are changeable using SNMP tools and are stored in the device.

Remanent stored SNMP parameters are reset to default settings (*STEP 7* V5.3 SP 3 and higher) in HW Config dialog "Target system > Ethernet > Edit Ethernet nodes" "Reset" button under "Reset to default settings". If the module has a station name (stored on a SIMATIC Micro Memory Card), this will not be deleted. The device name on the SIMATIC Micro Memory Card is not deleted since the SIMATIC Micro Memory Card does not form part of the IM151-3 PN HIGH FEATURE. Likewise, the IP address, which is only available when the module is switched on, is not erased. As a security measure this service is only enabled when the IO device is not in data exchange mode.

10.9.3 SIMATIC Micro Memory Card for IM151-3 PN HIGH FEATURE

Insertion of the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card (MMC) is used as the memory medium for IM151-3 PN HIGH FEATURE.

The following data are saved on the SIMATIC Micro Memory Card.

- Technology data (device names)
- Data for a firmware update

Note

On **one** SIMATIC Micro Memory Card, you can save **either** technology data **or** update data.

Service life of a SIMATIC Micro Memory Card

The life of an SIMATIC Micro Memory Card depends substantially on the following factors:

- Number of deletion or programming operations
- External factors, such as ambient temperature

At an ambient temperature up to 60 °C, a SIMATIC Micro Memory Card has a useful life of 10 years at maximum 100,000 write/delete operations.



Caution

Possible data loss

If the maximum number of write/delete operations is exceeded, data loss is possible.

Applicable SIMATIC Micro Memory Cards

The following memory modules are available for use:

Table 10-13 Available SIMATIC Micro Memory Cards

Type	Order numbers
SIMATIC Micro Memory Card 64k	6ES7953-8LF11-0AA0
SIMATIC Micro Memory Card 128k	6ES7953-8LG11-0AA0
SIMATIC Micro Memory Card 512k	6ES7953-8LJ11-0AA0
SIMATIC Micro Memory Card 2M	6ES7953-8LL11-0AA0
SIMATIC Micro Memory Card 4M	6ES7953-8LM11-0AA0
SIMATIC Micro Memory Card 8M	6ES7953-8LP11-0AA0

For storage of the device name, a SIMATIC Micro Memory Card 64k sufficient. For a firmware update the SIMATIC Micro Memory Cards with 2 MB or higher are required.

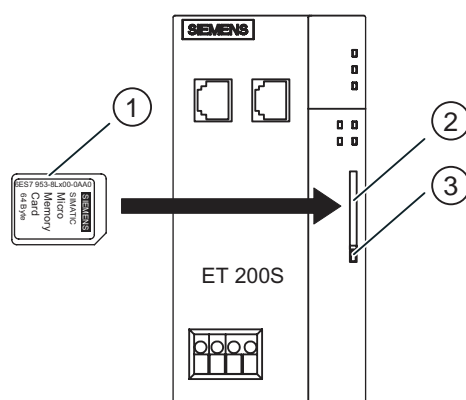
Inserting/replacing the card

The SIMATIC Micro Memory Card designed so that it can also be removed and inserted under power. The beveled corner of the SIMATIC Micro Memory Card prevents it from being inserted the wrong way around (reverse polarity protection).

The module slot on the IM 151-3 PN HIGH FEATURE is located behind the front door. The front door has a protruding edge for opening.

The socket of the module slot has an ejector enabling you to remove the card. To eject the card, push in the ejector with a suitable object (such as a small screwdriver or ball-point pen).

Position of the module slot for the SIMATIC Micro Memory Card on the IM151-3 PN HIGH FEATURE:



- ① SIMATIC Micro Memory Card
- ② Module slot
- ③ Ejector

10.9.4 Updating the firmware of the IM151-3 PN HIGH FEATURE

Prerequisites

In order to update the firmware of an IM151-3 PN HIGH FEATURE you require:

- *STEP 7* as from Version 5.3, Service Pack 1
- A SIMATIC Micro Memory Card with at least 2 MB memory
- A PC or programming device with a device for writing to a SIMATIC Micro Memory Card

Procedure

The firmware update is carried out in two steps:

1. Transferring the update files to a SIMATIC Micro Memory Card.
2. Carrying out the firmware update of an IM151-3 PN HIGH FEATURE.

Transferring the update files to a SIMATIC Micro Memory Card

1. Use the Windows Explorer to create a new directory.
2. Download the required update file from the Internet into this directory.
3. Unpack this update file into this directory. This directory contains three files with the extension UPD.
4. Insert a SIMATIC Micro Memory Card (≥ 2 MB) into the programming device or writing device.
5. Delete the SIMATIC Micro Memory Card in the SIMATIC Manager by using the "File > S7 Memory Card > Delete" menu command.
6. In the SIMATIC Manager, select the "PLC > Update operating system" menu command.
7. Select the directory containing the UPD files in the displayed dialog box.
8. Double-click one of the UPD files. The data are written to the SIMATIC Micro Memory Card.

The update files are now contained on the SIMATIC Micro Memory Card.

Carrying out the firmware update

1. Switch off the power to the IM151-3 PN HIGH FEATURE and insert the SIMATIC Micro Memory Card with the firmware update into the slot.

2. Switch on the power supply for the IM151-3 PN HIGH FEATURE interface module.

The IM151-3 PN HIGH FEATURE recognizes the SIMATIC Micro Memory Card with the firmware update automatically and starts the module update. The SF and BF LEDs are lit, and the ON LED is dark while the system is updating.

When the update has been completed, the BF LED flashes at 0.5 Hz.

3. Switch off the power to the IM151-3 PN HIGH FEATURE and insert the SIMATIC Micro Memory Card with firmware update.

4. Insert the SIMATIC Micro Memory Card with the device names and switch on the power supply again.

The IM 151-3 PN HIGH FEATURE powers up with the new firmware and is now ready for operation.

COMPACT modules

11.1 What do COMPACT modules offer?

COMPACT modules combine the functions of an interface module with the functions of a digital electronic module. In combination with a terminal module TM-C and a terminating module, the IM151-1 COMPACT constitutes a complete slave.

Characteristics of the COMPACT module

- The familiar ET 200S handling also applies to COMPACT modules (mounting, wiring, equipping and configuring).
- Also, an ET 200S configuration with only one COMPACT module must be connected to the right with the terminating module.
- The IM151-1 COMPACT can be expanded with up to 12 peripheral modules, with the exception of fail-safe modules.

The expansion can be undertaken without additional power modules, if the maximum load in the final voltage groups is not exceeded. The peripheral modules are supplied via the backplane bus from the final voltage group. The total current may not exceed 5 A.

- The terminal module for COMPACT modules can be expanded with additional terminals for connecting additional potentials. This means that connection to 3 and 4 conductor technology is possible.

11.2 Configuration options of the COMPACT modules

Which COMPACT module matches your application:

Table 11-1 Assignment of COMPACT modules and applications

COMPACT modules	Applications	
IM151-1 COMPACT	<ul style="list-style-type: none"> • Connecting the PROFIBUS DP via the RS485 interface • Operation as a DPV0 slave • Direct data exchange • Bus length of the ET 200S: not relevant • Integrated periphery: <ul style="list-style-type: none"> – 32DI: Digital inputs – 16DI/16DO: Digital inputs/outputs • Number of additional modules: max. 12 • Module types: all except fail-safe modules 	Transfer rates: 9.6; 19.2; 45.45; 93.75; 187.5; 500 kBaud, 1.5; 3; 6; 12 Mbit/s

11.3 Parameters and parameter descriptions for COMPACT modules

11.3.1 Parameters for IM151-1 COMPACT

Table 11-2 Parameters for IM151-1 COMPACT

IM151-1 COMPACT	Value range	Default setting	Applicability
Operation at set <> actual configuration	disable/enable	Disable	Slave station
Identifier-related diagnostics	disable/enable	enable	Slave station
Module status	disable/enable	enable	Slave station
Channel-specific diagnostics	disable/enable	enable	Slave station
Analog-value format ¹	SIMATIC S7/ SIMATIC S5	S7	Slave station
Interference frequency suppression	50 Hz / 60 Hz	50 Hz	Slave station
Reference junction slot	None /2 to 13	None	Slave station
Reference junction input	RTD on channel 0/ RTD on channel 1	0	Slave station

IM151-1 COMPACT	Value range	Default setting	Applicability
Integrated periphery 32DI			
Diagnostics: Short-circuit sensor supply voltage group n	disable/enable	disable	Voltage group
Diagnostics: load voltage missing voltage group n	disable/enable	Disable	voltage group
Integrated periphery 16DI/16DO			
Diagnostics: Short-circuit sensor supply voltage group 0	disable/enable	Disable	Voltage group
Diagnostics: load voltage missing voltage group n	disable/enable	Disable	Voltage group
Behavior in event of CPU/master STOP	Switch substitution value / hold last value	Switch substitution value	Module
Substitution value ²	"0"/ "1"	"0"	Channel
¹ The parameter only exists when configuring via the GSD file. ² If the supply voltage to the COMPACT module fails, the digital outputs will not supply a substitute value. Output value = 0			

11.3.2 Enable startup for set <> actual configuration

When this parameter is enabled, and

- modules next to IM151-1 COMPACT are removed and plugged during operation, then a station failure of ET 200S will not occur.
- The actual configuration differs from the expected configuration, the ET 200S remains engaged in data transfer with the DP master.

When this parameter is disabled, and

- modules next to IM151-1 COMPACT are removed and plugged during operation, then a station failure of ET 200S will occur.
- The actual configuration differs from the expected configuration, there is no data transfer between the DP master and the ET 200S.

11.3.3 Analog-value format

Here you set the number format for all analog electronic modules positioned next to the IM151-1 COMPACT.

11.3.4 Interference frequency suppression

The frequency of your AC power system can interfere with the measured value, particularly when measuring in low voltage ranges and using thermocouple elements. You can enter the mains frequency for your system here (50 Hz or 60 Hz).

The interference frequency suppression parameter applies to all analog electronic modules. With this parameter, you also specify the integration and conversion time of the various modules. See the technical data for the analog electronic modules.

11.3.5 Reference junction slot

This parameter allows you to assign a slot (none, 2 to 13) where the channel for measuring the reference temperature is located (calculation of the compensation value).

Reference

You can find information regarding connecting thermocouples in the *ET 200S Device Manual* under *Analog Electronic modules > Basics of analog value processing*.

11.3.6 Reference junction input

This parameter allows you to set the channel (0/1) for measuring the reference temperature (calculation of the compensation value) for the assigned slot.

Reference

You can find information regarding connecting thermocouples in the *ET 200S Device Manual* under *Analog Electronic modules > Basics of analog value processing*.

11.4 IM151-1 COMPACT 32DI 24 VDC (6ES7151-1CA00-1BL0)

Properties

The COMPACT-module IM151-1 COMPACT 32DI 24 VDC has the following features:

- It connects the ET 200S with PROFIBUS DP via the RS485 interface.
- The maximum parameter length is 244 bytes.
- The maximum address space is 100 bytes for inputs and 100 bytes for outputs.
- Operation as a DPV0 slave
- A maximum of 12 additional modules can be operated on the IM151-1 COMPACT 32DI 24 VDC.
- The maximum bus length is not relevant.

Integrated periphery:

- 32 digital inputs
- Nominal input voltage 24 VDC
- Diagnostics: Short circuit of the sensor supply.
- Diagnostics: missing load voltage
- Suitable for switches and proximity switches (BEROs)

Pin assignment for PROFIBUS DP

The following table shows the terminal assignment of the IM151-1 COMPACT 32DI 24 VDC for PROFIBUS DP:

Table 11-3 Terminal assignment of the IM151-1 COMPACT 32DI 24 VDC for PROFIBUS DP

View	Signal name	Designation	
	1	-	-
	2	-	-
	3	RxD/TxD-P	Data line B
	4	RTS	Request To Send
	5	M5V2	Data reference potential (station)
	6	P5V2	Supply plus (station)
	7	-	-
	8	RxD/TxD-N	Data line A
	9		

Terminal assignment of TM-C120x for IM151-1 COMPACT 32DI 24 VDC

Terminal	Assignment	Explanation
Supply voltage		
1L+	L+	24 VDC
2L+	L+	24 VDC (for loop through)
1M	M	Ground
2M	M	Ground (for loop through)
Digital inputs		
1, 2	L+	Load voltage 24 VDC for voltage group 0
3, 4	M	Ground for voltage group 0
5, 6, 9, 10, 13, 14, 17, 18, 25, 26, 29, 30, 33, 34, 37, 38	DI ₀ , DI ₁ , DI ₂ , DI ₃ , DI ₄ , DI ₅ , DI ₆ , DI ₇ , DI ₈ , DI ₉ , DI ₁₀ , DI ₁₁ , DI ₁₂ , DI ₁₃ , DI ₁₄ , DI ₁₅	DI _n : Input signal, channel n

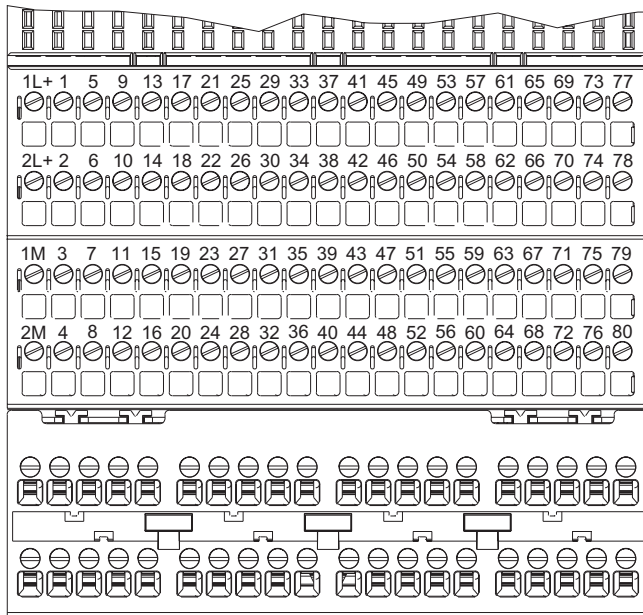
11.4 IM151-1 COMPACT 32DI 24 VDC (6ES7151-1CA00-1BL0)

Terminal	Assignment	Explanation
7, 8, 11, 12, 15, 16, 19, 20, 27, 28, 31, 32, 35, 36, 39, 40	L+	Sensor power supply 24 VDC
41, 42	L+	Load voltage 24 VDC for voltage group 2
43, 44	M	Ground for voltage group 2
45, 46, 49, 50, 53, 54, 57, 58, 65, 66, 69, 70, 73, 74, 77, 78	DI ₁₆ , DI ₁₇ , DI ₁₈ , DI ₁₉ , DI ₂₀ , DI ₂₁ , DI ₂₂ , DI ₂₃ , DI ₂₄ , DI ₂₅ , DI ₂₆ , DI ₂₇ , DI ₂₈ , DI ₂₉ , DI ₃₀ , DI ₃₁	DI _n : Input signal, channel n
47, 48, 51, 52, 55, 56, 59, 60, 67, 68, 71, 72, 75, 76, 79, 80	L+	Sensor power supply 24 VDC
21, 22, 23, 24, 61, 62, 63, 64	n. c.	Not connected (max. 30 VDC connectable)

Usable terminal modules

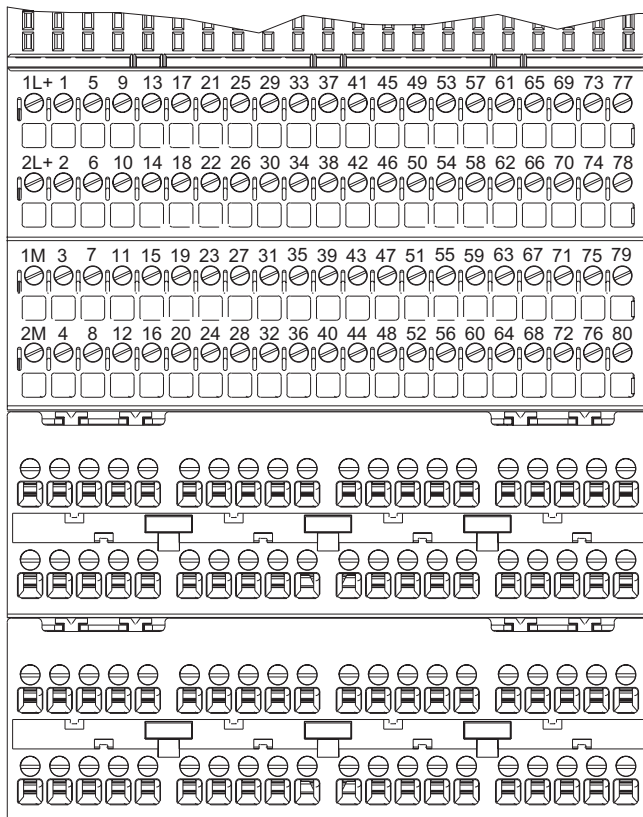
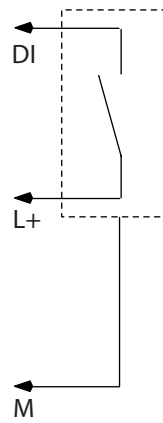
Usable terminal modules for IM151-1 COMPACT 32DI (6ES7151-1CA00-1BL0)	
TM-C120C (6ES7193-4DL00-0AA0)	← Spring terminal
TM-C120S (6ES7193-4DL10-0AA0)	← Screw-type terminal
	<p>Sample connection</p> <p>2-wire</p>

Usable terminal modules for IM151-1 COMPACT 32DI (6ES7151-1CA00-1BL0)



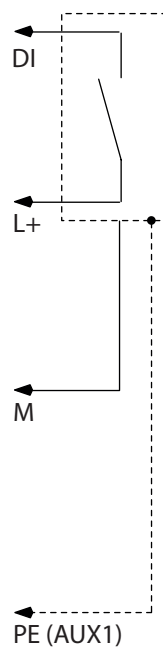
Sample connection

3-wire



Sample connection

4-wire



Block diagram

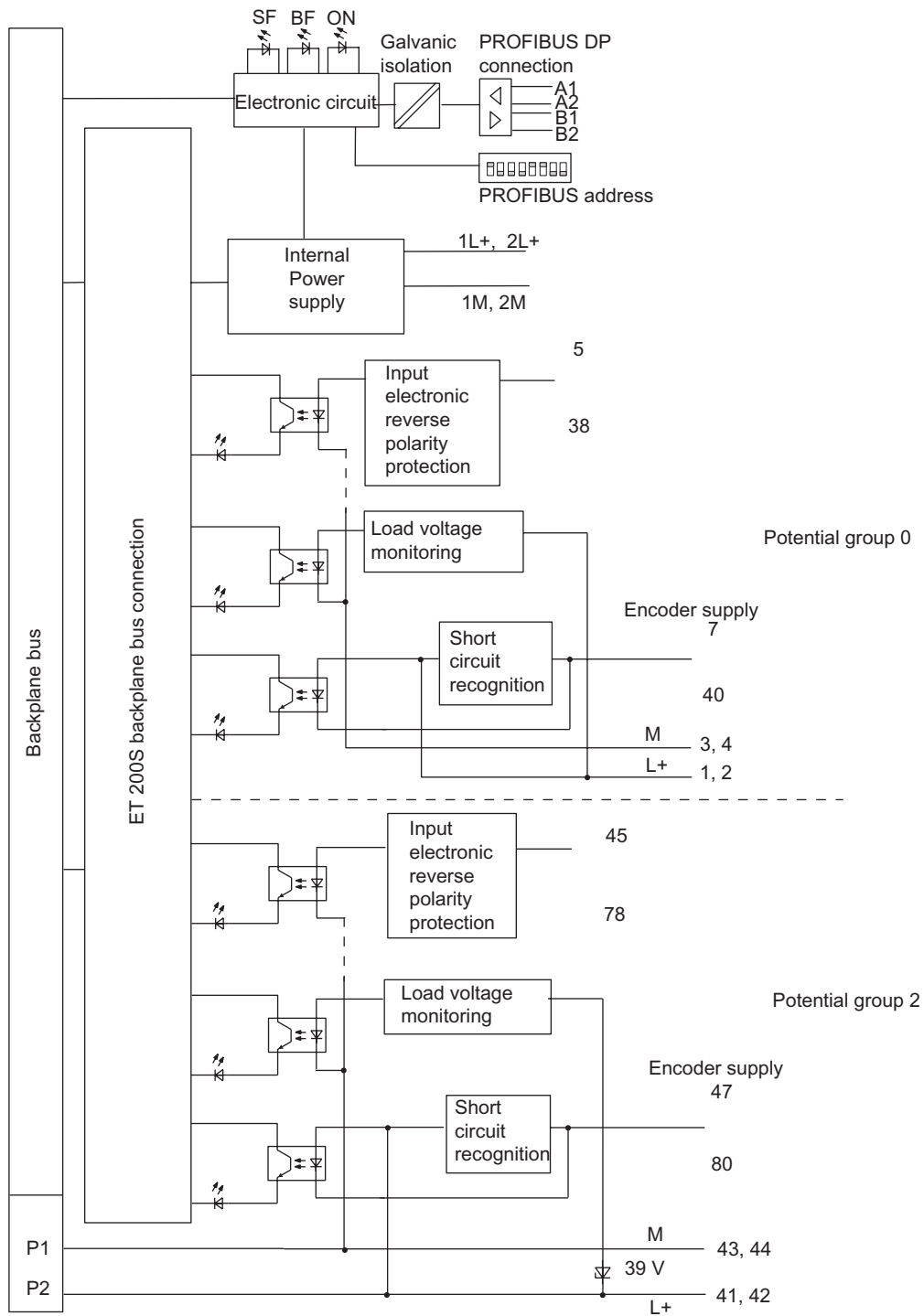


Figure 11-1 Block diagram for IM151-1 COMPACT 32DI 24 VDC

Technical data IM151-1 COMPACT 32DI 24 VDC (6ES7151-1CA00-1BL0)

Dimensions and weight	
Dimension W x H x D (mm)	120 x 81 x 58
Weight	Approx 230 g
Module-specific data	
Transmission rate	9.6; 19.2; 45.45; 93.75; 187.5; 500 kBaud, 1.5; 3; 6; 12 Mbit/s
Bus protocol	PROFIBUS DP
Interfaces	RS 485
SYNC capability	Yes
FREEZE capability	Yes
Manufacturer ID	8201 _H
Direct data exchange	Yes
Isochronous operation	No
Parameter length	23 bytes
Address space	100-byte inputs / 100-byte outputs
Option handling	No
I&M data	No
Firmware update	No
Max. output current of the PROFIBUS DP interface (5, 6)	80 mA
Power dissipation of the module	Typically 3 W
Voltages, currents, potentials	
Rated supply voltage of the electronic components (1L+)	24 VDC
<ul style="list-style-type: none"> Reverse polarity protection 	Yes
<ul style="list-style-type: none"> Power failure bypass 	No
Isolation	
<ul style="list-style-type: none"> Between the backplane bus and electronic components 	No
<ul style="list-style-type: none"> Between the PROFIBUS DP and electronic components 	Yes
<ul style="list-style-type: none"> Between the supply voltage and electronic components 	No
Permitted potential difference (to the rail)	75 VDC, 60 VAC
Insulation test voltage	500 VDC
Current consumption from rated supply voltage (1L+)	Approx. 100 mA
Status, interrupts, diagnostics	
Interrupts	None
Diagnostic functions (for PROFIBUS DP)	Yes
Diagnostic functions (for internal periphery)	module granular (A peripheral fault will not cause the station to fail.)
<ul style="list-style-type: none"> Group error PROFIBUS DP bus monitoring 	Red "SF" LED red "BF" LED
<ul style="list-style-type: none"> Monitoring of the power supply voltage of the electronics 	Green "ON" LED

Integral I/O	
Number of inputs	32 DI
Cable lengths	
• Unshielded	max. 600 m
• Shielded	max. 1000 m
Integrated periphery (voltages, currents, potentials)	
Rated load voltage	24 VDC
• Reverse polarity protection	Yes
Isolation	
• Between the channels	No
• Between the channels and backplane bus	Yes
Permissible potential difference	
• Between the different circuits	75 VDC, 60 VAC
Insulation test voltage	500 VDC
Current consumption	
• from load voltage	depends on sensor
Integrated peripherals (status, interrupts, diagnostics)	
Status display	green LED per channel
Diagnostic functions	Yes <ul style="list-style-type: none"> • Short-circuit at sensor supply • missing load voltage
Sensor supply outputs	
Output voltage	
• With load	min. L+ (-0.5 V)
Output current	
• Rated value	500 mA
• Permitted range	0 to 500 mA
Short-circuit protection	yes, electronic ¹
Data for selecting a sensor	
Input voltage	
• Rated value	24 VDC
• For signal "1"	15 to 30 V
• For signal "0"	-30 to 5 V
Input current	
• At signal "1"	type 3 mA (at 24 V)
Input delay	
• At "0" after "1"	type 3 ms (1.2 to 4.8 ms)
• At "1" after "0"	type 3 ms (1.2 to 4.8 ms)
Input characteristic curve	According to IEC 61131, type 1
Connection of two-wire BEROs	Possible
• Permitted quiescent current	max. 1.5 mA
¹ per voltage group	

11.5 IM151-1 COMPACT 16DI/16DO 24 VDC/0.5 A (6ES7151-1CA00-3BL0)

Properties

The COMPACT-module M151-1 COMPACT 16DI/16DO 24 VDC/0.5 A has the following features:

- It connects the ET 200S with PROFIBUS DP via the RS485 interface.
- The maximum parameter length is 244 bytes.
- The maximum address space is 100 bytes for inputs and 100 bytes for outputs.
- Operation as a DPV0 slave
- A maximum of 12 additional modules can be operated on the M151-1 COMPACT 16DI/16DO 24 VDC/0.5 A.
- The maximum bus length is not relevant.

Integrated peripherals:

- **16 digital inputs**
 - Nominal input voltage 24 VDC
 - Diagnostics: Short circuit of the sensor supply.
 - Diagnostics: missing load voltage
 - Suitable for switches and proximity switches (BEROs)
- **16 digital outputs**
 - Output voltage 0.5 A per output
 - Rated load voltage 24 VDC
 - Diagnostics: missing load voltage
 - Suitable for solenoid valves, DC contactors, and indicator lights
 - Substitute value behavior configurable

Pin assignment for PROFIBUS DP

The following table shows the terminal assignment of the IM151-1 COMPACT 16DI/16DO 24 VDC/0.5 A for PROFIBUS DP:

Table 11-4 Terminal assignment of the IM151-1 COMPACT 16DI/16DO 24 VDC/0.5 A for PROFIBUS DP

View	Signal name	Designation	
	1	-	
	2	-	
	3	RxD/TxD-P	Data line B
	4	RTS	Request To Send
	5	M5V2	Data reference potential (station)
	6	P5V2	Supply plus (station)
	7	-	-
	8	RxD/TxD-N	Data line A
	9		

Terminal assignment of TM-C120x for IM151-1 COMPACT 16DI/16DO 24 VDC/0.5 A

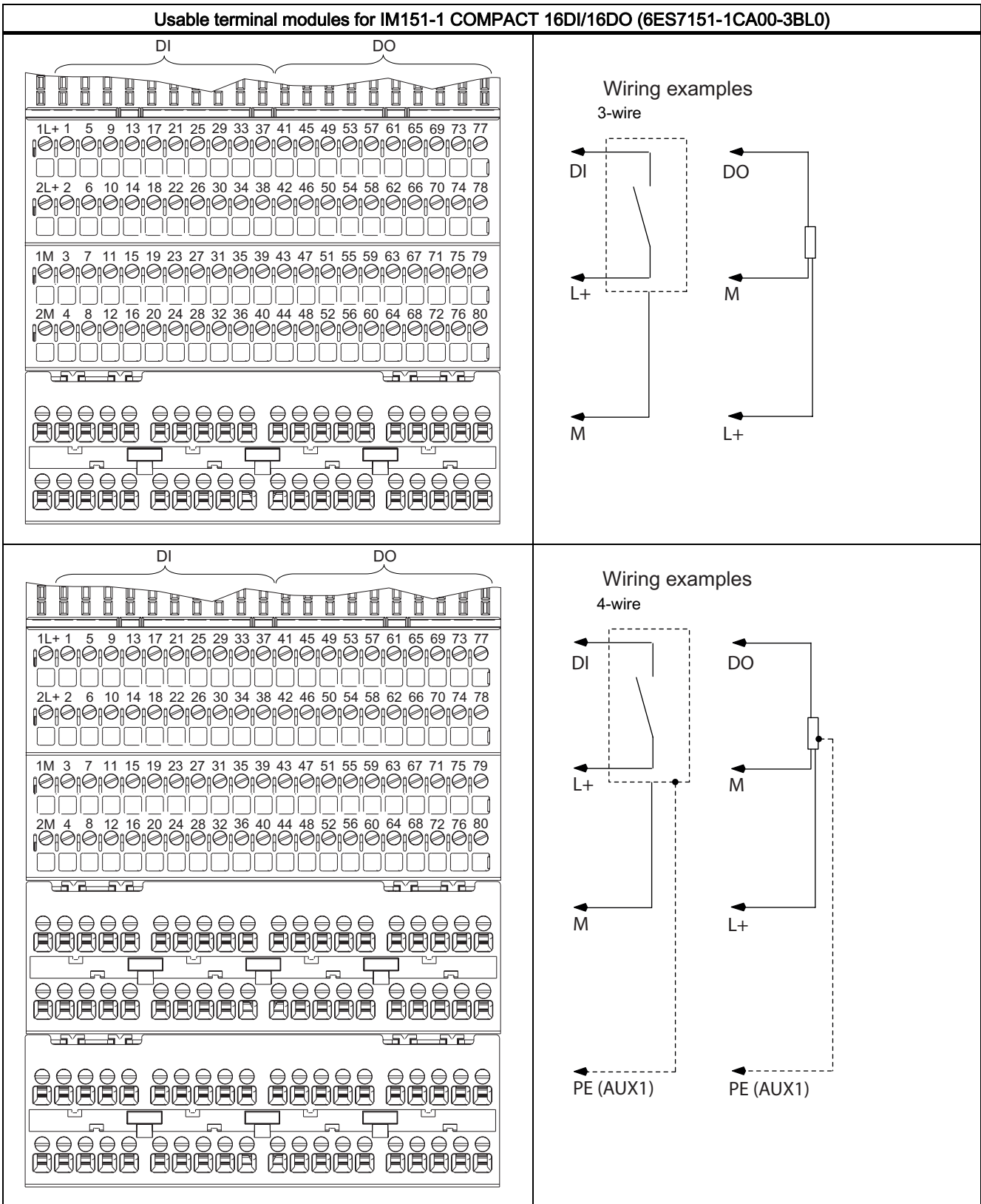
Terminal	Assignment	Explanation
Supply voltage		
1L+	L+	24 VDC
2L+	L+	24 VDC (for loop through)
1M	M	Ground
2M	M	Ground (for loop through)
Digital inputs		
1, 2	L+	Load voltage 24 VDC for voltage group 0
3, 4	M	Ground for voltage group 0
5, 6, 9, 10, 13, 14, 17, 18, 25, 26, 29, 30, 33, 34, 37, 38	DI ₀ , DI ₁ , DI ₂ , DI ₃ , DI ₄ , DI ₅ , DI ₆ , DI ₇ , DI ₈ , DI ₉ , DI ₁₀ , DI ₁₁ , DI ₁₂ , DI ₁₃ , DI ₁₄ , DI ₁₅	DI _n : Input signal, channel n
7, 8, 11, 12, 15, 16, 19, 20, 27, 28, 31, 32, 35, 36, 39, 40	L+	Sensor power supply 24 VDC
21, 22, 23, 24	n. c.	Not connected (max. 30 VDC connectable)

11.5 IM151-1 COMPACT 16DI/16DO 24 VDC/0.5 A (6ES7151-1CA00-3BL0)

Terminal	Assignment	Explanation
Digital outputs		
41, 42	L+	Load voltage 24 VDC for voltage group 2
61, 62	L+	Load voltage 24 VDC for voltage group 3
43, 44	M	Ground for voltage group 2
63, 64	M	Ground for voltage group 3
45, 46, 49, 50, 53, 54, 57, 58, 65, 66, 69, 70, 73, 74, 77, 78	DO ₀ , DO ₁ , DO ₂ , DO ₃ , DO ₄ , DO ₅ , DO ₆ , DO ₇ , DO ₈ , DO ₉ , DO ₁₀ , DO ₁₁ , DO ₁₂ , DO ₁₃ , DO ₁₄ , DO ₁₅	DO _n : Output signal, channel n
47, 48, 51, 52, 55, 56, 59, 60, 67, 68, 71, 72, 75, 76, 79, 80	M	Ground

Usable terminal modules

Usable terminal modules for IM151-1 COMPACT 16DI/16DO (6ES7151-1CA00-3BL0)	
TM-C120C (6ES7193-4DL00-0AA0)	← Spring terminal
TM-C120S (6ES193-4DL10-0AA0)	← Screw-type terminal
<p>The diagram shows a terminal block with four rows of terminals. The top row is labeled 1L+ and contains terminals 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 45, 49, 53, 57, 61, 65, 69, 73, 77. The second row is empty. The third row is labeled 2L+ and contains terminals 2, 6, 10, 14, 18, 22, 26, 30, 34, 38, 42, 46, 50, 54, 58, 62, 66, 70, 74, 78. The bottom row is labeled 1M and contains terminals 3, 7, 11, 15, 19, 23, 27, 31, 35, 39, 43, 47, 51, 55, 59, 63, 67, 71, 75, 79. Below this row, terminals 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80 are also shown. Brackets indicate that terminals 1-41 are for DI and terminals 42-80 are for DO.</p>	<p>Wiring examples 2-wire</p> <p>The diagram shows two wiring examples. The first is for a DI module, showing a switch connected between terminal DI and terminal L+. The second is for a DO module, showing a load connected between terminal DO and terminal M.</p>



Block diagram

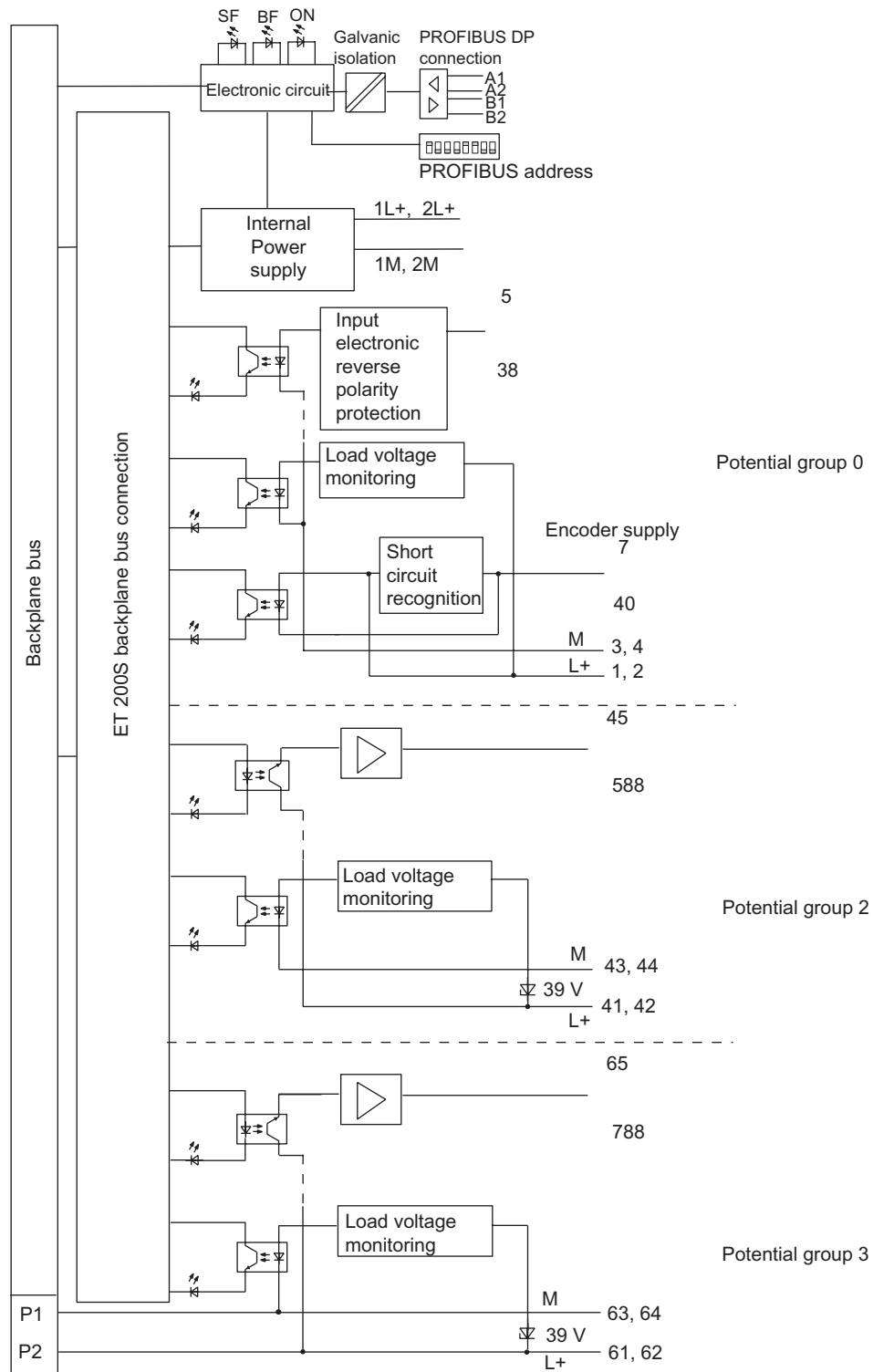


Figure 11-2 Block diagram for IM151-1 COMPACT 16DI/16DO 24 VDC/0.5 A

Technical data for IM151-1 COMPACT 16DI/16DO DC24V/0.5 A (6ES7151-1CA00-3BL0)

Dimensions and weight	
Dimension W x H x D (mm)	120 x 81 x 58
Weight	Approx 230 g
Module-specific data	
Transmission rate	9.6; 19.2; 45.45; 93.75; 187.5; 500 kBaud, 1.5; 3; 6; 12 Mbit/s
Bus protocol	PROFIBUS DP
Interfaces	RS 485
SYNC capability	Yes
FREEZE capability	Yes
Manufacturer ID	8200 _H
Direct data exchange	Yes
Isochronous operation	No
Parameter length	26 bytes
Address space	100-byte inputs / 100-byte outputs
Option handling	No
I&M data	No
Firmware update	No
Max. output current of the PROFIBUS DP interface (5, 6)	80 mA
Power dissipation of the module	Typically 3 W
Voltages, currents, potentials	
Rated supply voltage of the electronic components (1L+)	24 VDC
<ul style="list-style-type: none"> • Reverse polarity protection 	Yes
<ul style="list-style-type: none"> • Power failure bypass 	No
Isolation	
<ul style="list-style-type: none"> • Between the backplane bus and electronic components 	No
<ul style="list-style-type: none"> • Between the PROFIBUS DP and electronic components 	Yes
<ul style="list-style-type: none"> • Between the supply voltage and electronic components 	No
Permitted potential difference (to the rail)	75 VDC, 60 VAC
Insulation test voltage	500 VDC
Current consumption from rated supply voltage (1L+)	Approx. 100 mA

11.5 IM151-1 COMPACT 16DI/16DO 24 VDC/0.5 A (6ES7151-1CA00-3BL0)

Status, interrupts, diagnostics	
Interrupts	None
Diagnostic functions (for PROFIBUS DP)	Yes
Diagnostic functions (for internal periphery)	module granular (A peripheral fault will not cause the station to fail.)
<ul style="list-style-type: none"> Group error PROFIBUS DP bus monitoring 	Red "SF" LED red "BF" LED
<ul style="list-style-type: none"> Monitoring of the power supply voltage of the electronics 	Green "ON" LED
Integral I/O	
Number of inputs / outputs	16 / 16
Cable lengths	
<ul style="list-style-type: none"> Unshielded 	max. 600 m
<ul style="list-style-type: none"> Shielded 	max. 1000 m
Integrated peripherals - inputs (voltages, currents, potentials)	
Rated load voltage	24 VDC
<ul style="list-style-type: none"> Reverse polarity protection 	Yes
Isolation	
<ul style="list-style-type: none"> Between the channels 	No
<ul style="list-style-type: none"> Between the channels and backplane bus 	Yes
Permissible potential difference	
<ul style="list-style-type: none"> Between the different circuits 	75 VDC, 60 VAC
Insulation test voltage	500 VDC
Current consumption	
<ul style="list-style-type: none"> from load voltage 	depends on sensor
Integrated peripherals - inputs (status, interrupts, diagnostics)	
Status display	green LED per channel
Diagnostic functions	Yes <ul style="list-style-type: none"> Short-circuit at sensor supply missing load voltage
Sensor supply outputs	
Output voltage	
<ul style="list-style-type: none"> With load 	min. L+ (-0.5 V)
Output current	
<ul style="list-style-type: none"> Rated value Permitted range 	500 mA 0 to 500 mA
Short-circuit protection	yes, electronic ¹

Data for selecting a sensor	
Input voltage	
• Rated value	24 VDC
• For signal "1"	15 to 30 V
• For signal "0"	-30 to 5 V
Input current	
• At signal "1"	Typically 3 mA (at 24 V)
Input delay	
• at "0" after "1"	Type 3 ms (1.2 to 4.8 ms)
• At "1" after "0"	Type 3 ms (1.2 to 4.8 ms)
Input characteristic curve	According to IEC 61131, type 1
Connection of 2-wire BEROs	Possible
• Permitted quiescent current	max. 1.5 mA
Integrated peripherals - outputs (voltages, currents, potentials)	
Rated load voltage L+	24 VDC
• Reverse polarity protection	Yes
Total current for outputs (per voltage group)	
• Horizontal assembly	
– up to 30 °C	max. 4 A
– Up to 40 °C	max. 3 A
– up to 60 °C	max. 2 A
• Vertical assembly	
– up to 55 °C	Max. 2 A
Isolation	
• Between the channels	Yes, each in groups of up to 8
• Between the channels and backplane bus	Yes
Permissible potential difference	
• Between the different circuits	75 VDC, 60 VAC
Insulation tested	500 VDC
Current consumption	
• From load voltage L+ (without load)	max. 5 mA per voltage group
Integrated peripherals - outputs (status, interrupts, diagnostics)	
Status display	green LED per channel
Diagnostic functions	Yes
	• missing load voltage

Data for selecting an actuator	
Output voltage	
• At signal "1"	min. L+ (-0.8 V)
Output current	
• At signal "1"	
– Rated value	0.5 A
– Permitted range	7 mA up to 0.6 A
• With signal "0" (residual current)	max. 0.5 mA
Output delay (for resistive load)	
• At "0" after "1"	max. 500 µs
• At "1" after "0"	max. 1.3 ms
Load resistor range	48 Ω to 4 kΩ
Lamp load	max. 5 W
Connecting two outputs in parallel	
• For redundant triggering of a load	yes (per voltage group)
• To increase performance	No
Control of a digital input	Yes
Switching frequency	
• For resistive load	100 Hz
• on inductive load	2 Hz
• For lamp load	10 Hz
Limitation (internal) of inductive shutdown voltage	type L+ (-55 to -60 V)
Reverse voltage proof	yes, when using the same load voltage as on the voltage group infeed
Short-circuit protection of the output	Yes ²
• Response threshold	0.7 to 1.9 A
¹ per voltage group	
² per channel	

Order numbers

A.1 Module order numbers

Interface modules

The table shows the order numbers for interface modules-

Table A-1 Interface module order numbers

Name	Order number:
IM151-1 BASIC interface module and terminating module, 1 unit	6ES7151-1CA00-0AB0
IM151-1 STANDARD interface module and terminating module 1 unit	6ES7151-1AA04-0AB0
IM151-1 FO STANDARD interface module and terminating module 1 unit	6ES7151-1AB02-0AB0
IM151-1 HIGH FEATURE interface module and terminating module 1 unit	6ES7151-1BA01-0AB0
IM151-3 PN interface module and terminating module 1 unit	6ES7151-3AA20-0AB0
IM151-3 PN HIGH FEATURE interface module and terminating module 1 unit	6ES7151-3AA20-0AB0

COMPACT modules

The table shows the order numbers for COMPACT modules.

Table A-2 COMPACT module order numbers

Name	Order number:
IM151-1 COMPACT 32DI 24 VDC, 1 unit	6ES7151-1CA00-1BL0
IM151-1 COMPACT 16DI/16DO 24 VDC/0.5 A, 1 unit	6ES7151-1CA00-3BL0

Terminal modules

Explanation of the abbreviated designation

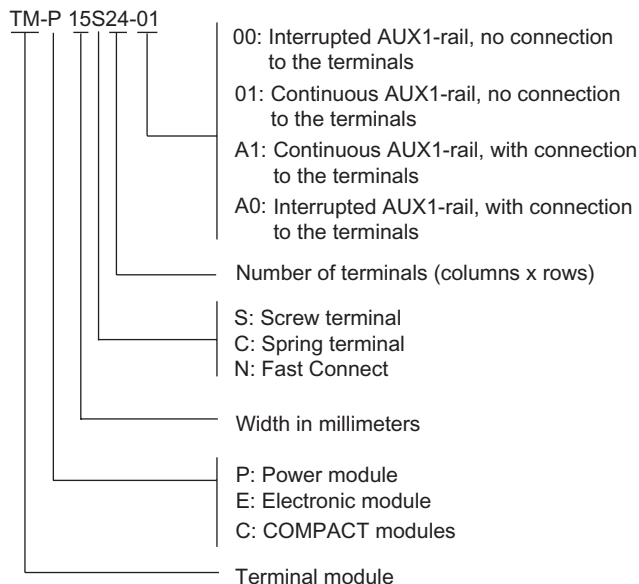


Figure A-1 Explanation of the abbreviated designation

The table shows the order numbers for terminal modules.

Table A-3 Terminal modules order numbers

Name	Order number:
TM-P15S23-A1 (screw-type terminal), 1 unit	6ES7193-4CC20-0AA0
TM-P15C23-A1 (spring terminal), 1 unit	6ES7193-4CC30-0AA0
TM-P15N23-A1 (Fast Connect), 1 unit	6ES7193-4CC70-0AA0
TM-P15S23-A0 (screw-type terminal), 1 unit	6ES7193-4CD20-0AA0
TM-P15C23-A0 (spring terminal), 1 unit	6ES7193-4CD30-0AA0
TM-P15N23-A0 (Fast Connect), 1 unit	6ES7193-4CD70-0AA0
TM-P15S22-01 (screw-type terminal), 1 unit	6ES7193-4CE00-0AA0
TM-P15C22-01 (screw-type terminal), 1 unit	6ES7193-4CE10-0AA0
TM-P15N22-01 (screw-type terminal), 1 unit	6ES7193-4CE60-0AA0
TM-P30S44-A0 (screw-type terminal), 1 unit	6ES7193-4CK20-0AA0
TM-P30C44-A0 (spring terminal), 1 unit	6ES7193-4CK30-0AA0
TM-P30S47-F1 (screw-type terminal), 1 unit	3RK1903-3AA00
TM-E15S26-A1 (screw-type terminal), 5 units	6ES7193-4CA40-0AA0
TM-E15C26-A1 (spring terminal), 5 units	6ES7193-4CA50-0AA0
TM-E15N26-A1 (Fast Connect), 5 units	6ES7193-4CA80-0AA0
TM-E15S24-A1 (screw-type terminal), 5 units	6ES7193-4CA20-0AA0
TM-E15C24-A1 (spring terminal), 5 units	6ES7193-4CA30-0AA0
TM-E15N24-A1 (Fast Connect), 5 units	6ES7193-4CA70-0AA0
TM-E15S24-01 (screw-type terminal), 5 units	6ES7193-4CB20-0AA0
TM-E15C24-01 (spring terminal), 5 units	6ES7193-4CB30-0AA0
TM-E15N24-01 (Fast Connect), 5 units	6ES7193-4CB70-0AA0
TM-E15S23-01 (screw-type terminal), 5 units	6ES7193-4CB00-0AA0

Name	Order number:
TM-E15C23-01 (spring terminal), 5 units	6ES7193-4CB10-0AA0
TM-E15N23-01 (Fast Connect), 5 units	6ES7193-4CB60-0AA0
TM-E15S24-AT (screw-type terminal), 1 unit	6ES7193-4CL20-0AA0
TM-E15C24-AT (spring terminal), 1 unit	6ES7193-4CL30-0AA0
TM-E30S44-01 (screw-type terminal), 1 unit	6ES7193-4CG20-0AA0
TM-E30C44-01 (screw-type terminal), 1 unit	6ES7193-4CG30-0AA0
TM-E30S46-A1 (screw-type terminal), 1 unit	6ES7193-4CF40-0AA0
TM-E30C46-A1 (spring terminal), 1 unit	6ES7193-4CF50-0AA0
TM-C120S (screw-type terminal), 1 unit	6ES7193-4DL10-0AA0
TM-C120S (spring terminal), 1 unit	6ES7193-4DL00-0AA0

Power modules

The table shows the order numbers for power modules.

Table A-4 Power module order numbers

Name	Order number:
PM-E 24 VDC, 1 unit	6ES7138-4CA01-0AA0
PM-E 24 ..48 VDC/24 ..230 VAC, 1 unit	6ES7138-4CB11-0AB0
PM-E 24..48VDC, 1 unit	6ES7138-4CA50-0AB0

Digital electronic modules

The table shows the order numbers for digital electronic modules.

Table A-5 Digital electronic module order numbers

Name	Order number:
2DI 24 VDC ST, 5 units	6ES7131-4BB01-0AA0
4DI 24 VDC ST, 5 units	6ES7131-4BD01-0AA0
4DI 24 VDC/SRC ST, 5 units	6ES7131-4BD51-0AA0
2DI 24 VDC HF, 5 units	6ES7131-4BB01-0AA0
4DI 24 VDC HF, 5 units	6ES7131-4BD01-0AB0
4DI 24..48 VUC HF, 5 units	6ES7131-4CD00-0AB0
4DI NAMUR, 1 unit	6ES7131-4RD00-0AB0
2DI 120 VAC ST, 5 units	6ES7131-4EB01-0AB0
2DI 230 VAC ST, 5 units	6ES7131-4FB01-0AB0
2DO 24 VDC/0.5 A ST, 5 units	6ES7132-4BB01-0AA0
4DO 24 VDC/0.5 A ST, 5 units	6ES7132-4BD01-0AA0
2DO 24 VDC/0.5 A HF, 5 units	6ES7132-4BB01-0AB0
2DO 24 VDC/2 A ST, 5 units	6ES7132-4BB31-0AA0
4DO 24 VDC/2 A ST, 5 units	6ES7132-4BD31-0AA0
2DO 24 VDC/2 A HF, 5 units	6ES7132-4BB31-0AB0
2DO 24..230 VAC/2 A, 5 units	6ES7132-4FB01-0AB0
2RO NO 24..120 VDC/5 A, 24..230 VAC/5 A, 5 units	6ES7132-4HB01-0AB0
2RO NO/NC 24..48 VDC/5 A, 24..230 VAC/5 A, 5 units	6ES7132-4HB10-0AB0
4 IQ-SENSE, 5 units	6ES7138-4GA00-0AB0

Analog electronic modules

The table shows the order numbers for analog electronic modules.

Table A-6 Analog electronic module order numbers

Name	Order number:
2AI U ST, 1 unit	6ES7134-4FB01-0AB0
2AI U HF, 1 unit	6ES7134-4LB00-0AB0
2AI U HS, 1 unit	6ES7134-4FB51-0AB0
2AI I 2WIRE ST, 1 unit	6ES7134-4GB01-0AB0
4AI I 2WIRE ST, 1 unit	6ES7134-4GD00-0AB0
2AI I 2WIRE HS, 1 unit	6ES7134-4GB51-0AB0
2AI I 4WIRE ST, 1 unit	6ES7134-4GB11-0AB0
2AI I 2/4WIRE HF, 1 unit	6ES7134-4MB00-0AB0
2AI I 4WIRE HS, 1 unit	6ES7134-4GB61-0AB0
2AI RTD ST, 1 unit	6ES7134-4JB50-0AB0
2AI RTD HF, 1 unit	6ES7134-4NB51-0AB0
2AI TC ST, 1 unit	6ES7134-4JB00-0AB0
2AI TC HF, 1 unit	6ES7134-4NB01-0AB0
2AO U ST, 1 unit	6ES7135-4FB01-0AB0
2AO U HF, 1 unit	6ES7135-4LB01-0AB0
2AO I ST, 1 unit	6ES7135-4GB01-0AB0
2AO I HF, 1 unit	6ES7135-4MB01-0AB0

Technological modules

The table shows the order numbers for technological modules.

Table A-7 Technological modules order numbers

Name	Order number:
1COUNT 24V/100kHz, 1 unit	6ES7138-4DA04-0AB0
1COUNT 5V/500kHz, 1 unit	6ES7138-4DE02-0AB0
1 SSI, 1 unit	6ES7138-4DB02-0AB0
1STEP 5 V/204 kHz, 1 unit	6ES7138-4DC00-0AB0
2PULSE, 1 unit	6ES7138-4DD00-0AB0
1POS INC/Digital, 1 unit	6ES7138-4DG00-0AB0
1POS SSI/Digital, 1 unit	6ES7138-4DH00-0AB0
1POS INC/Analog, 1 unit	6ES7138-4DJ00-0AB0
1POS SSI/Analog, 1 unit	6ES7138-4DK00-0AB0
Serial interface module 1SI 3964/ASCII, 1 unit	6ES7138-4DF01-0AB0
Serial interface module 1SI Modbus/US\$, 1 unit	6ES7138-4DF11-0AB0
SIWAREX CS weighing module, 1 unit	7MH4910-0AA01

RESERVE modules

The table shows the order numbers for reserve modules.

Table A-8 Reserve module order numbers

Name	Order number:
RESERVE (width 15 mm), 5 unit	6ES7138-4AA01-0AA0
RESERVE (width 30 mm), 1 unit	6ES7138-4AA11-0AA0

A.2 Order numbers for ET 200S accessories

The table shows the order numbers for ET 200S accessories.

Table A-9 Order numbers for ET 200S accessories

Designation	Order number
Shield contact:	
Shield contact element, 5 units	6ES7193-4GA00-0AA0
Power rail, 1 unit à 1 m, 3 x 10 mm	8WA2842
Shield terminal, 5 units	6ES7193-4GB00-0AA0
Grounding terminal, 1 unit	8WA2868
Additional terminal	
• TE-U120S4x10 (screw-type terminal), 1 unit	6ES7193-4FL10-0AA0
• TE-U120C4x10 (screw-type terminal), 1 unit	6ES7193-4FL00-0AA0
Labeling sheet for interface modules and electronic modules; DIN A4 10 units	
• beige	6ES7193-4BA00-0AA0
• red	6ES7193-4BD00-0AA0
• yellow	6ES7193-4BB00-0AA0
• Petrol	6ES7193-4BH00-0AA0
Labeling sheet for COMPACT modules; DIN A4 10 units	
• beige	6ES7193-4BA10-0AA0
• red	6ES7193-4BD10-0AA0
• yellow	6ES7193-4BB10-0AA0
• petrol	6ES7193-4BH10-0AA0
Color identification labels (60 strips each containing 20 units in each color)	
• white	6ES7193-4LA11-0AA0
• red	6ES7193-4LD11-0AA0
• yellow	6ES7193-4LB11-0AA0
• green	6ES7193-4LC11-0AA0
• brown	6ES7193-4LG11-0AA0
• blue	6ES7193-4LF11-0AA0
• turquoise	6ES7193-4LH11-0AA0
Slot number labels, 10 x (1 to 20), 200 units	8WA8861-0AB
Slot number labels, 5 x (1 to 40), 200 units	8WA8861-0AC
Terminating module, 1 unit	6ES7193-4BA00-0AA0

A.3 Order numbers for ET 200S network components

The tables below list all the network components for the ET 200S distributed I/O system that you may require to use the ET 200S.

Table A-10 Network components (PROFIBUS DP) for ET 200S order numbers

Designation	Order number
RS 485-Repeater, PROFIBUS DP, IP 20	6ES7972-0AA01-0XA0
PROFIBUS bus connector (12 Mbaud) <ul style="list-style-type: none"> Anthracite (without PD plug) Anthracite (with PD plug) 	6ES7972-0BA12-0XA0 6ES7972-0BB12-0XA0
Bus cable <ul style="list-style-type: none"> normal Drum cable Direct-buried cable 	6XV1830-0EH10 6XV1830-3BH10 6XV1830-3AH10
Repeater adapter	6GK1510-1AA00
Active RS485 terminating element	6ES7972-0DA00-0AA0
Optical link modules for glass fiber-optic cables	6GK1502-2CB10 6GK1502-3CB10
PROFIBUS connecting cable	6ES7901-4BD00-0XA0
Fiber-Optic cable <ul style="list-style-type: none"> PROFIBUS plastic fiber-optic, duplex core (50 m ring) 	6XV1821-2AN50
<ul style="list-style-type: none"> SIMATIC NET PROFIBUS plastic fiber-optic, standard cable <ul style="list-style-type: none"> Sold by the meter 50 m ring 100 m ring 	6XV1821-0AH10 6XV1821-0AN50 6XV1821-0AT10
<ul style="list-style-type: none"> SIMATIC NET PROFIBUS PCF PCF fiber-optic, standard cable, various lengths from 100 m to 300 m 	6XV1821-1BTxx
Plugs for fiber-optic cable <ul style="list-style-type: none"> Package of 100 simplex connectors and 5 polishing sets Package of 50 plug adapters 	6GK1901-0FB00-0AA0 6ES7195-1BE00-0XA0

Table A-11 Network components (PROFIBUS IO) for ET 200S order numbers

Designation	Order number
Industrial Ethernet FC RJ45 Plug 90 (RJ45 plug for Industrial Ethernet with robust metal housing and integrated cutting/clamping contacts for connecting the Industrial Ethernet FC installation cables; with 90° cable outlet) <ul style="list-style-type: none"> 1 unit 10 units 50 units 	6GK1901-1BB20-2AA0 6GK1901-1BB20-2AB0 6GK1901-1BB20-2AE0
Industrial Ethernet Fast Connect installation cables <ul style="list-style-type: none"> Fast Connect standard cable Fast Connect trailing cable Fast Connect marine cable 	6XV1840-2AH10 6XV1840-3AH10 6XV1840-4AH10
Industrial Ethernet Fast Connect stripping tool	6GK1901-1GA00

A.4 Order numbers for ET 200S spare parts

The table below shows the order numbers for the fuses for the digital input and power modules.

Table A-12 Fuse for digital input module and power module

Designation	Order number
Fuse for 4DI 24..48 VUC HF <ul style="list-style-type: none"> ET200S Spare Fuse Kit 1 A, (10 units) 	6ES7193-4KA00-0AA0
Fuse for PM-E 24..48VDC/24..230VAC <ul style="list-style-type: none"> ET200S Spare Fuse Kit 10 A, (10 units) 	6ES7193-4KA10-0AA0

A.5 Order numbers for connecting cables for 4 IQ-SENSE electronic module

The following table contains the connecting cables for the sensors on the 4 IQ-SENSE electronic module. These connecting cables are also to be found in the FS 10 catalog (chapter on BERO approximation switches, accessories).

Table A-13 Connecting cables for 4 IQ-SENSE electronic module

Designation	Order number
M 12 cable box for screw-type attachment with 5 m PUR connecting cable 3 x 0.34 mm ²	3RX1533
M 12 cable box for screw-type attachment with 5 m PUR connecting cable 4 x 0.34 mm ²	3RX1536

Order numbers

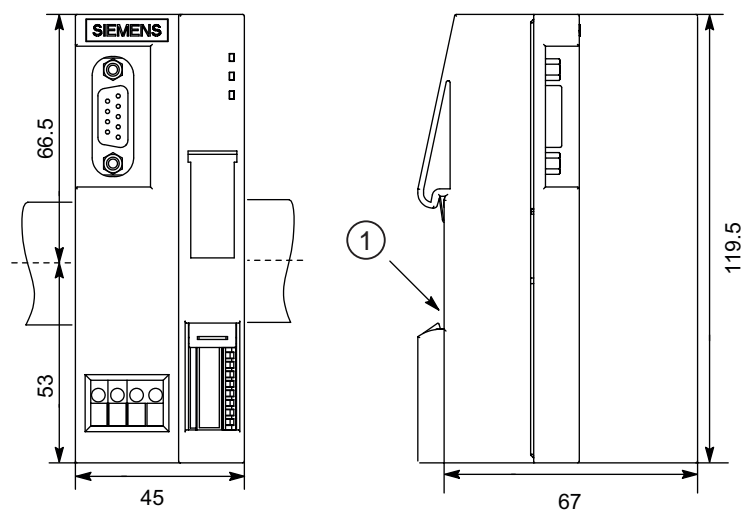
A.5 Order numbers for connecting cables for 4 IQ-SENSE electronic module

Dimensional drawings

B.1 Interface modules

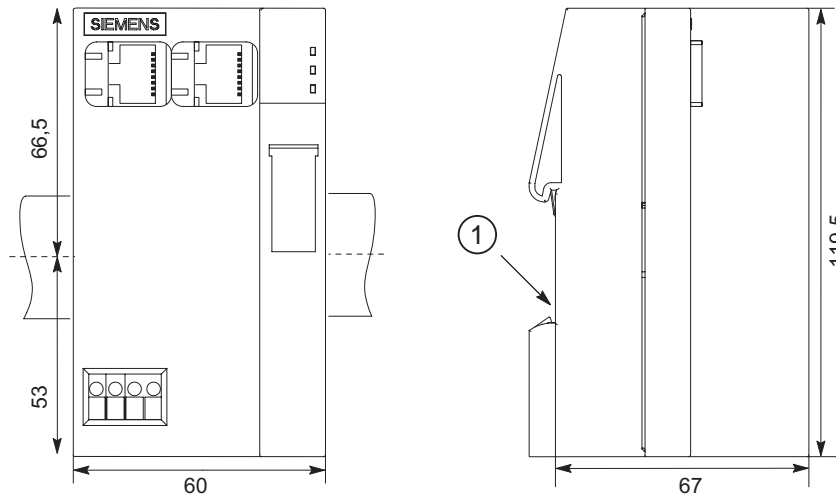
Interface module

Dimensional drawing IM151-1 interface module (dimensions in mm):



① Rail support

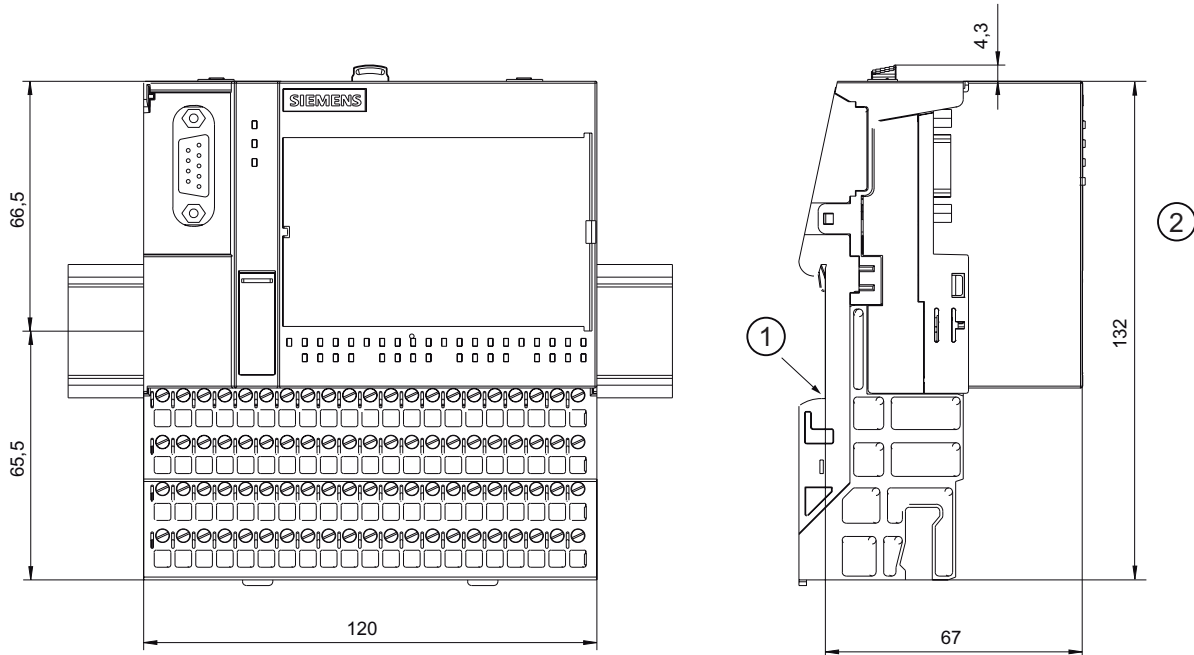
Dimensional drawing IM151-3 PN / IM151-3 PN HIGH FEATURE interface module
(dimensions in mm):



① Rail support

B.2 Terminal module for COMPACT module with COMPACT module inserted

Dimensional drawing of terminal modules for COMPACT modules with COMPACT module inserted

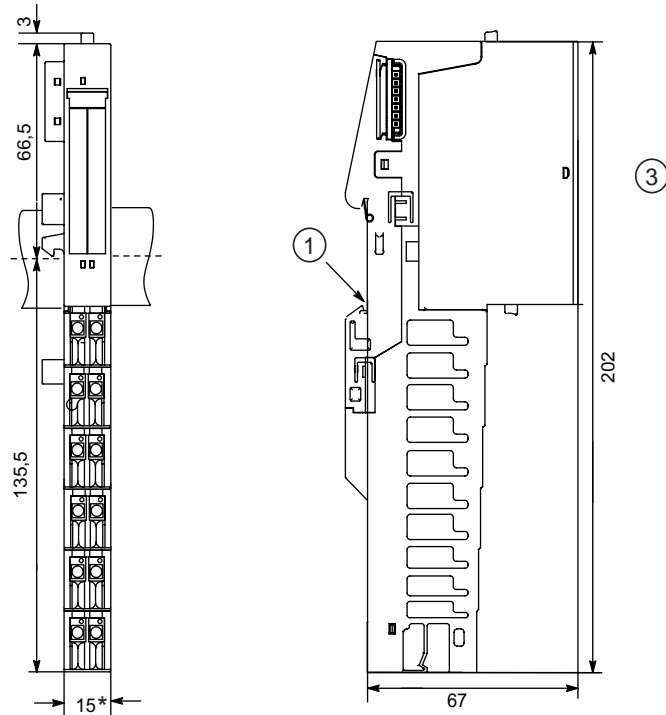
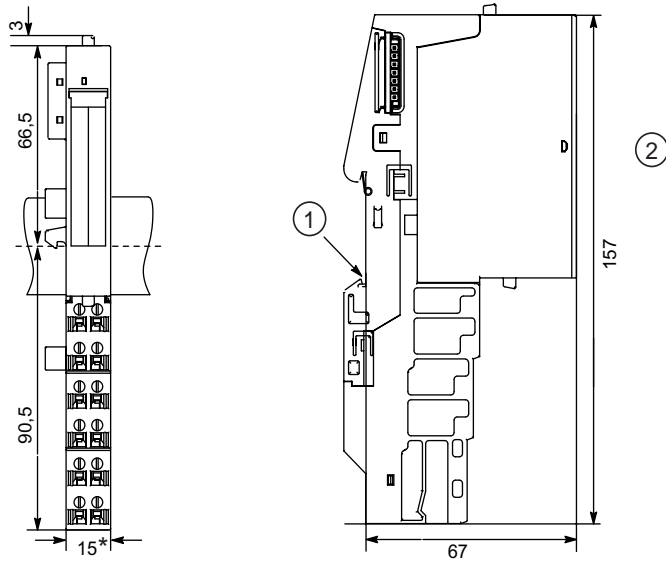


- ① Rail support
- ② with spring terminal / screw-type terminal

B.3 Terminal modules with an electronic module inserted

The dimensions of the terminal modules with inserted power module are identical to those with inserted electronic module.

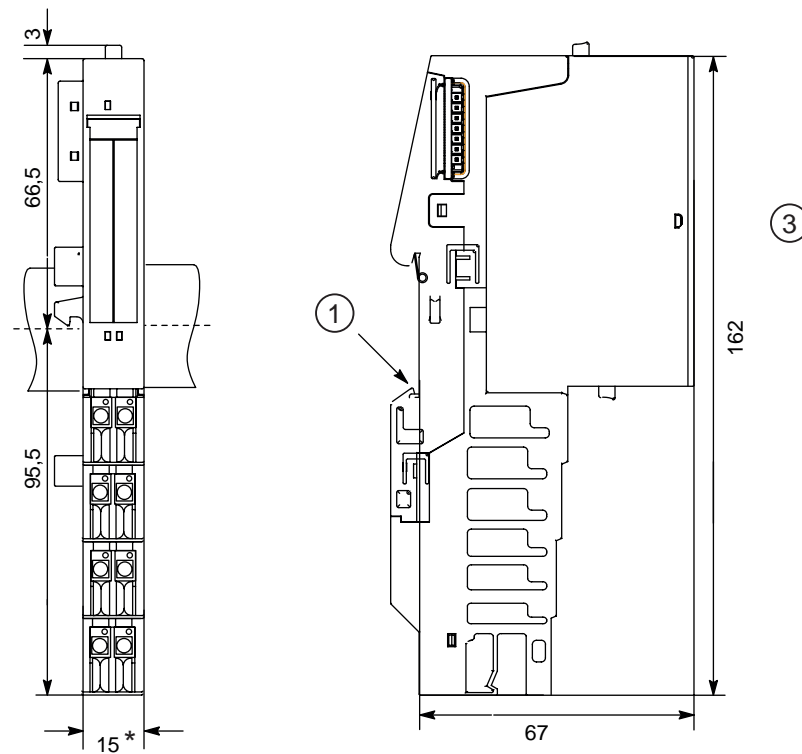
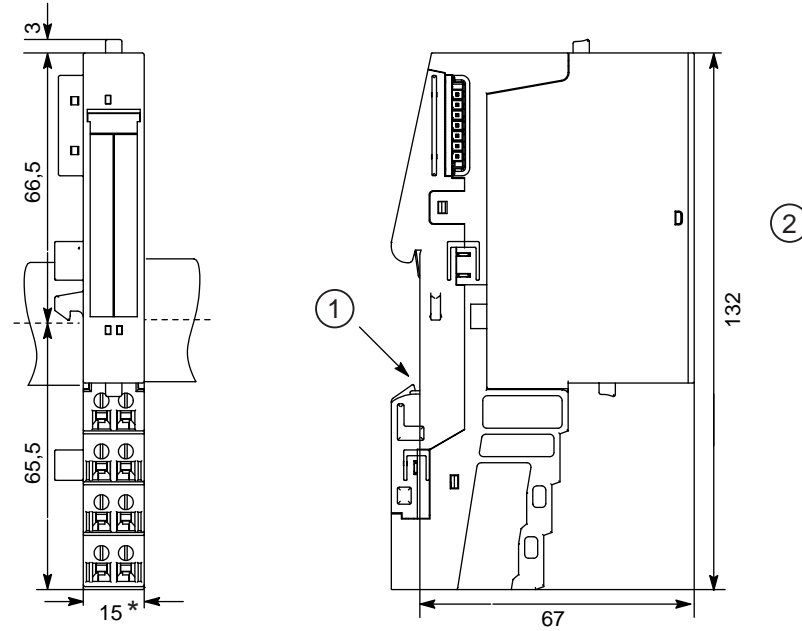
Dimensional drawing of terminal module (6 terminals) in rows with inserted electronic module:



- ① Rail support
- ② with spring terminal / screw-type terminal
- ③ with Fast Connect

* 30 mm for double-width modules

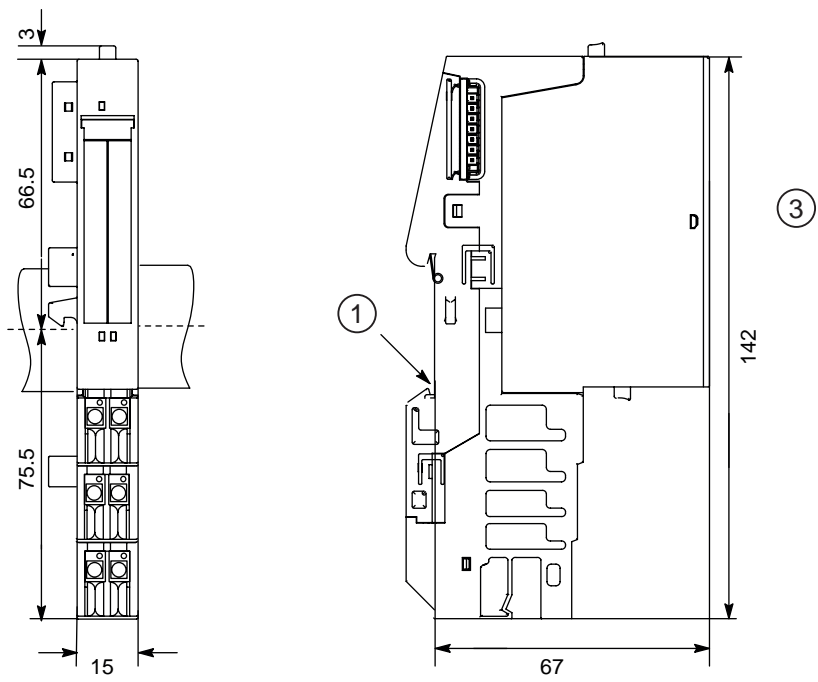
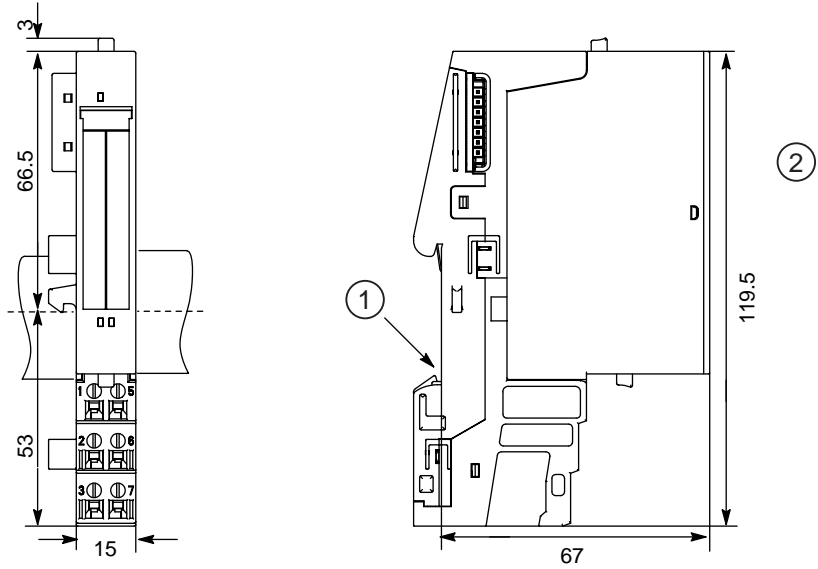
Dimensional drawing of terminal module (4 terminals) in rows with inserted electronic module:



- ① Rail support
- ② with spring terminal / screw-type terminal
- ③ with Fast Connect

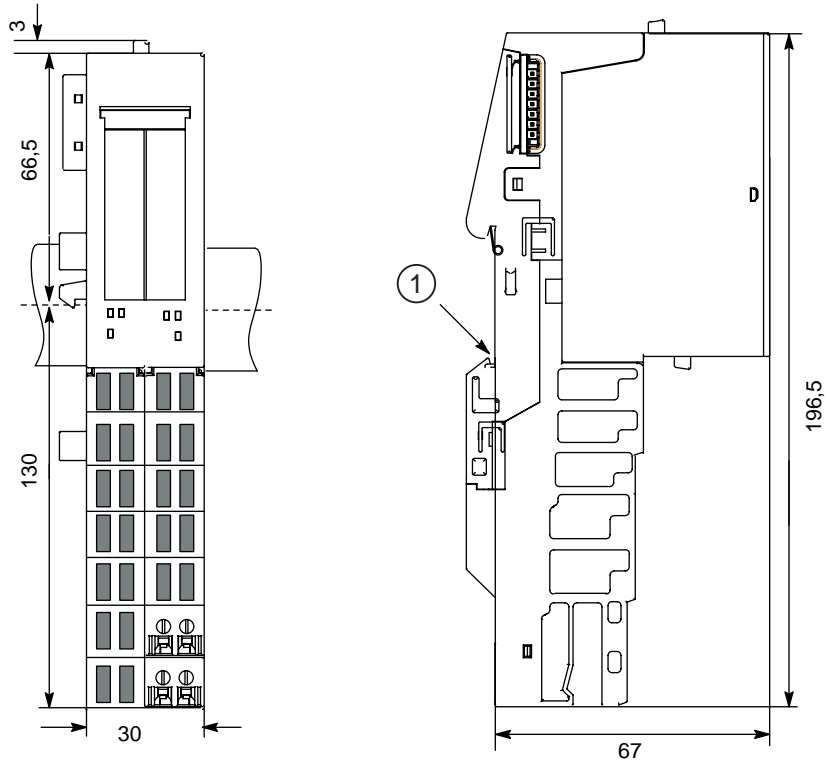
* 30 mm for double-width modules

Dimensional drawing of terminal module (3 terminals) in rows with inserted electronic module:



- ① Rail support
- ② with spring terminal / screw-type terminal
- ③ with Fast Connect

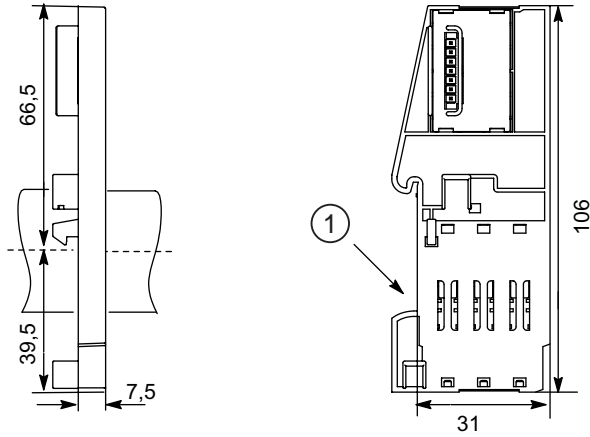
Dimensional drawing of terminal module (screw-type terminal) with inserted power module:



① Rail support

B.4 Terminating module

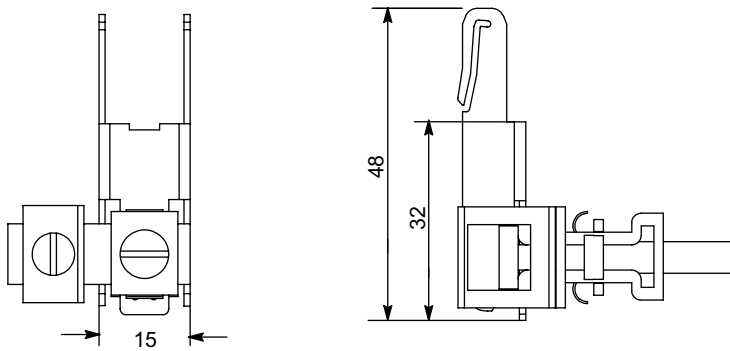
Dimensional drawing of the terminating module:



① Rail support

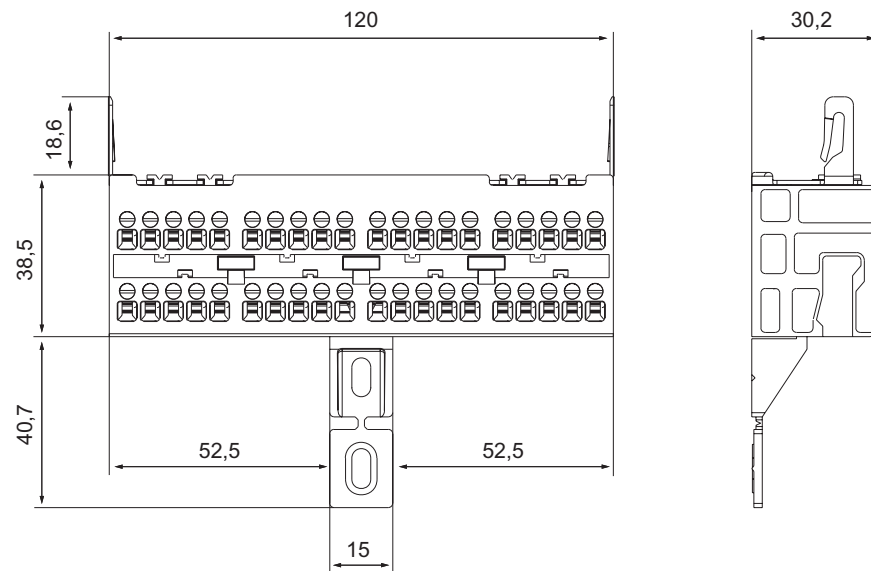
B.5 Shield connection

Dimensional drawing of the shield contact:



B.6 Additional terminal

Dimensional drawing of the additional terminal:



IO address space

Address space of the modules

The following table shows the address spaces of the IO of the ET 200S.

Table C-1 Address spaces of the IO for the ET 200S

Module	Address space of the inputs		Address space of the outputs	
	without grouping	with grouping ¹	without grouping	with grouping ¹
Power modules				
• with status byte (S) ²	1 byte		---	
• with option handling (O) ²	8 bytes		8 bytes	
• with status byte and option handling (SO) ²	9 bytes		9 bytes (9th byte not relevant)	
Digital input modules	1 byte	2 bits (2DI) 4 bits (4DI)	---	---
4DI NAMUR	2 bytes		---	
IM151-1 COMPACT 32DI	4 bytes		---	
IM151-1 COMPACT 16DI/16DO	2 bytes		2 bytes	
Digital output modules	---	---	1 byte	2 bit (2DO) 4 bits (4DO)
4 IQ-SENSE (Standard)	1 byte	---	---	
4 IQ-SENSE (Enhanced)	4 bytes		4 bytes	
Analog Input Modules	4 bytes (2AI) 8 bytes (4AI)		---	
Analog Output Modules	---		4 bytes	
1COUNT 24V/100kHz	8 bytes		8 bytes	
1COUNT 5V/500kHz	8 bytes		8 bytes	
1SSI	8 bytes		8 bytes	
1SSI fast	4 bytes		---	
1STEP 5V/204kHz	8 bytes		8 bytes	
2PULSE	8 bytes		8 bytes	
1POS INC/Digital	8 bytes		8 bytes	
1POS SSI/Digital	8 bytes		8 bytes	
1POS INC/Analog	8 bytes		8 bytes	

	Address space of the inputs	Address space of the outputs
1POS SSI/Analog	8 bytes	8 bytes
1SI 3964/ASCII serial interface module	4 / 8 bytes	4 / 8 bytes
1SI Modbus/US\$ serial interface module	4 / 8 bytes	4 / 8 bytes
ET 200S FC frequency converter	8 bytes	8 bytes
¹ See chapter <i>Commissioning > commissioning on PROFIBUS DP > configuring ET 200S on PROFIBUS DP</i> .		
² further optional entries you can select from the GSD file.		

Response times

D.1 Overview

The figure below shows the various response times between DP Master and ET 200S.

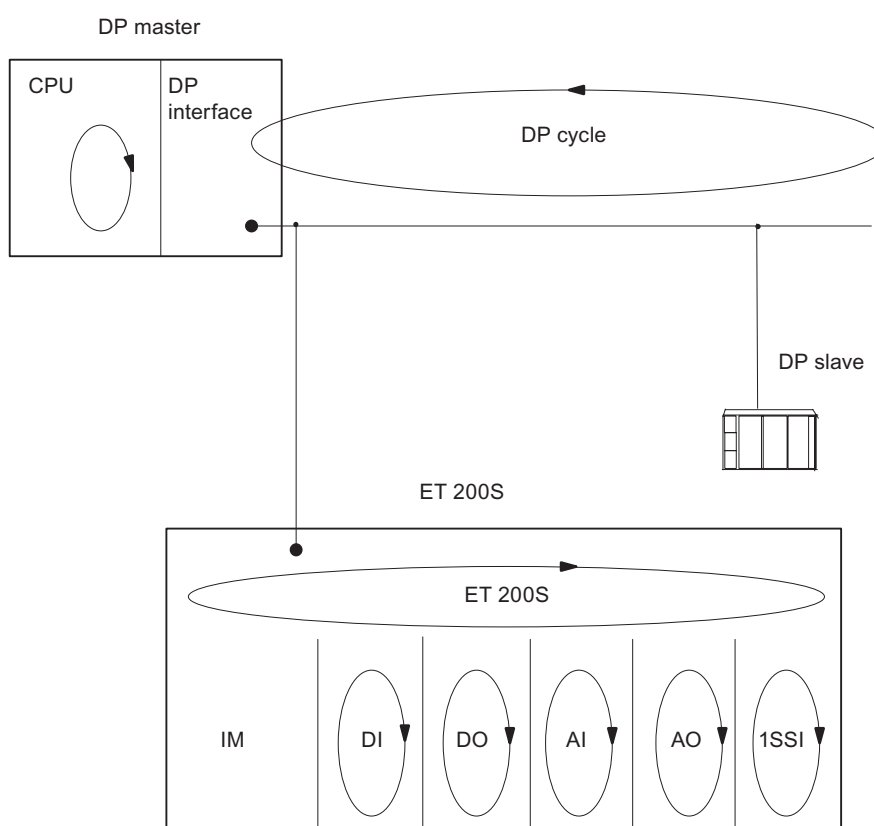


Figure D-1 Response times between DP Master and ET 200S

D.2 Response times at the DP master

You will find information on the response times in the manual for the DP master.

D.3 Response times for the ET 200S

Calculation of the response time for IM151-1 BASIC

The following equation enables you to make an approximate calculation of the ET 200S response time:

$$\text{Response time } [\mu\text{s}] = 156 \cdot m + 33 \cdot do + 486 \cdot ai + 374 \cdot ao + 1633 \cdot t + 934$$

Explanation of the parameters:

- **m**: Total number of all modules (power modules, digital electronic modules, analog electronic modules, 4 IQ-SENSE electronic modules, 4POTDIS potential distribution module, RESERVE module, technological modules and motor starters)
- **do**: Sum total of all digital output modules
- **ai**: Sum total of all analog input modules and 1SSI fast electronic modules
- **ao**: Sum total of all analog output modules
- **t**: Number of all technological modules (except 1SSI fast)

Example for calculating the ET 200S response time for IM151-1 BASIC

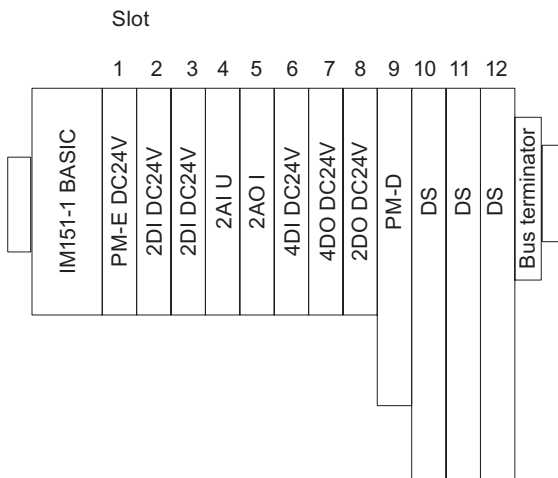


Figure D-2 Example set-up for calculating the response time for IM151-1 BASIC

Calculation method:

$$m = 12; do = 2; ai = 1; ao = 1; t = 0$$

$$\text{Response time} = 156 \cdot m + 33 \cdot do + 486 \cdot ai + 374 \cdot ao + 1633 \cdot t + 934$$

$$\text{Response time} = 156 \cdot 12 + 33 \cdot 2 + 486 \cdot 1 + 374 \cdot 1 + 1633 \cdot 0 + 934$$

$$\text{Response time} = \mathbf{3732 \mu\text{s}}$$

Calculation of the response time for IM151-1 COMPACT 32DI

The following equation enables you to make an approximate calculation of the ET 200S response time:

$$\text{Response time } [\mu\text{s}] = 156 \cdot m + 33 \cdot do + 486 \cdot ai + 374 \cdot ao + 1633 \cdot t + 1576$$

Parameters: as for IM151-1 BASIC

Calculation of the response time for IM151-1 COMPACT 16DI/16DO

The following equation enables you to make an approximate calculation of the ET 200S response time:

$$\text{Response time } [\mu\text{s}] = 156 \cdot m + 33 \cdot do + 486 \cdot ai + 374 \cdot ao + 1633 \cdot t + 1664$$

Parameters: as for IM151-1 BASIC

The example of the calculation of the ET 200S response time for IM151-1 BASIC applies analogously for the COMPACT modules.

Calculation of the response time for IM151-1 STANDARD and IM151-1 FO STANDARD

The following formula enables you to make an approximate calculation of the ET 200S response time:

$$\text{Response time } [\mu\text{s}]^* = 55 \cdot m + 110 \cdot a + 400 \cdot t + 190$$

* Bus length parameter > 1 m: The response time increases by an additional 40%

Explanation of the parameters:

- **m**: Total number of all modules (power modules, digital electronic modules, analog electronic modules, 4 IQ-SENSE electronic modules, 4POTDIS potential distribution module, RESERVE module, technological modules and motor starters)
- **a**: Sum total of all analog electronic modules, 4 IQ-SENSE and 1SSI fast electronic modules
- **t**: Number of all technological modules (except 1SSI fast)

Note

The formula specified applies to cyclic data transfer. The following prerequisites must be fulfilled:

- No diagnostics are reported.
 - No modules are removed and inserted.
-

Example for calculating the ET 200S response time for IM151-1 STANDARD and IM151-1 FO STANDARD

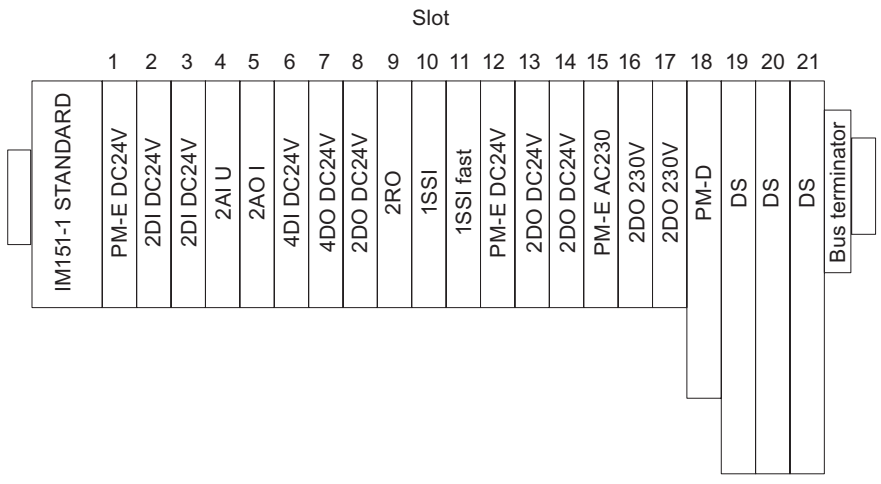


Figure D-3 Example set-up for calculating the reaction time for the IM151-1 STANDARD, IM 151-1 FO STANDARD

Calculation method:

$m = 21; a = 3; t = 1$

Response time = $55 \cdot m + 110 \cdot a + 400 \cdot t + 190$

Response time = $55 \cdot 21 + 110 \cdot 3 + 400 \cdot 1 + 190$

Response time = **2075 μ s**

Calculation of the response time for the IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0)

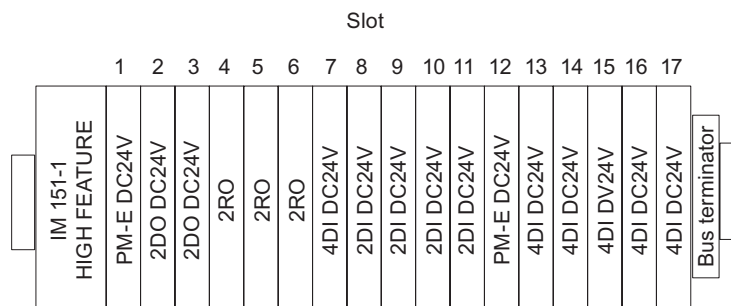
The following equation enables you to make an approximate calculation of the ET 200S response time:

Response time [μ s] = $22 \cdot m + 14 \cdot b + 213$

Explanation of the parameters:

- **m**: Sum total of all configured modules
- **b**: Sum total of all input and output bytes (without bit granular modules)

Example for the calculation of the ET 200S response time for the IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0)



Example set-up for the calculation of the response time for the IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0)

Calculation method:

$$m = 17; b = 0$$

$$\text{Response time } [\mu\text{s}] = 22 \cdot m + 14 \cdot b + 213$$

$$\text{Response time } [\mu\text{s}] = 22 \cdot 17 + 14 \cdot 0 + 213$$

$$\text{Response time } [\mu\text{s}] = \mathbf{587 \mu\text{s}}$$

D.4 Response time for digital input modules

Input delay

The reaction times of the digital input modules depend on the input delay.

Reference

Information on the input delays of the respective digital electronic modules are to be found in the *ET 200S device manual* in the Technical Data of the relevant modules.

D.5 Response time for digital output modules

Output delay

The response times correspond to the output delay.

Reference

Information on the output delays of the respective digital electronic modules are to be found in the *ET 200S device manual* in the Technical Data of the relevant modules.

D.6 Response time for analog input modules

Conversion time

The conversion time comprises the basic conversion time and the processing time for wire break check diagnostics.

In integrative conversion processes, the integration time is included directly in the conversion time.

Cycle time

The analog/digital conversion and the transfer of the digitized measured values to memory or to the backplane bus take place sequentially. In other words, the analog input channels are converted one after the other. The cycle time, that is, the time until an analog output value is converted again, is the sum of the conversion times of all the activated analog output channels of the analog input modules. You should deactivate unused analog input channels during parameter assignment in order to reduce the cycle time. The conversion and integration time for a deactivated channel is 0.

The following figure gives you an overview of what the cycle time for an n-channel analog input module comprises.

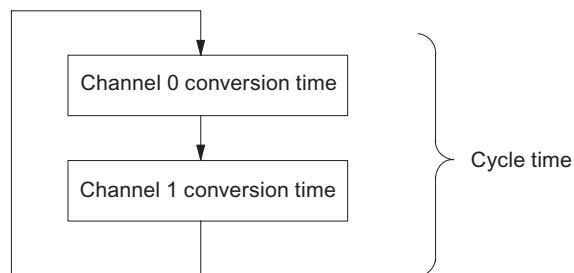


Figure D-4 Cycle time of the analog input module

Reference

Information on the input delays of the respective analog electronic modules is to be found in the *ET 200S device manual* in the Technical Data of the relevant modules.

D.7 Reaction times of analog output modules

Conversion time

The conversion time of the analog output channels comprises the time for the transfer of the digitized output values from internal memory and the digital/analog conversion.

Cycle time

The conversion of the analog output channels for the module takes place with a processing time and sequentially with a conversion time for channels 0 and 1.

The cycle time, i.e. the time until an analog output value is converted again, is the sum of the conversion times of all the activated analog output channels and of the processing time of the analog output module.

The following figure provides you with an overview of what makes up the cycle time for an analog output module.

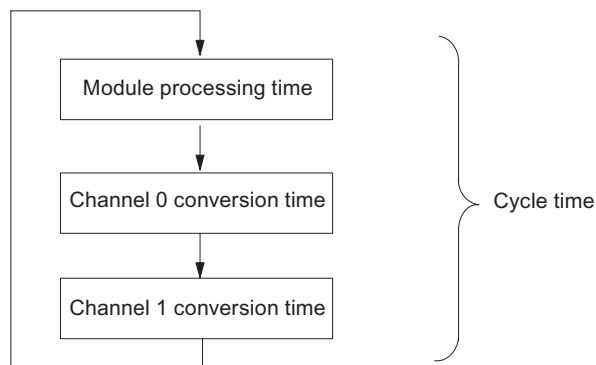


Figure D-5 Cycle time of the analog output module

Settling time

The settling time (t_2 to t_3) i.e. the time from the application of the converted value until the specified value is obtained at the analog output - depends on the load. A distinction must be drawn between resistive, capacitive, and inductive loads.

Response time

The response time (t_1 to t_3) i.e., the time from the application of the digital output values in internal memory until the specified value is obtained at the analog output - is, in the most unfavorable case, the sum of the cycle time and the settling time. The most unfavorable case is when the analog channel is converted shortly before the transfer of a new output value and is not converted again until after the conversion of the other channels (cycle time).

This figure shows the response time of an analog output channel:

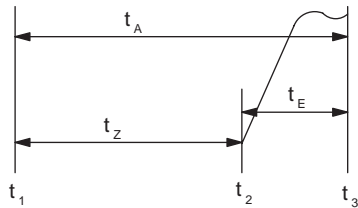


Figure D-6 Response time of an analog output channel

t_A	Response time
t_z	Cycle time, corresponding to the processing time of the module and the conversion time of the channel
t_E	Settling time
t_1	new digital value applied
t_2	output value transferred and converted
t_3	specified output value obtained

Reference

Information on the input delays of the respective analog electronic modules is to be found in the *ET 200S device manual* in the Technical Data of the relevant modules.

D.8 Response times for a 4 IQ-SENSE electronic module

The response time of the 4 IQ-SENSE electronic module is specified as a cycle time in the Technical Data.

D.9 Response times for technology modules

The response times of the technology modules are specified as response time or update rate in the Technical Data. See *ET 200S Technological Functions Manual*.

D.10 Response times of PROFINET IO

The response time of PROFINET IO essentially corresponds to the response time of PROFIBUS DP DPV1 which has a 1.5 Mbaud transmission rate.

Depending on the setup of the ET 200S, the device cycle is prolonged by approximately 25 % to 100 % with IM151-3 PN (6ES7151-3AA00-0AB0) compared to an ET 200S with IM151- 1 HIGH FEATURE (6ES7151-1BA00-0AB0).

Compared to a 6ES7151-3AA00-0AB0 an IM151-3 PN (6ES7151-3AA10-0AB0 and higher) has 25% to 30% better performance. The fluctuation range of the cycle in the IM151-3 PN (6ES7151-3AA10-0AB0 and higher) is approximately 50% smaller than with 6ES7151-3AA00-0AB0.

Leakage resistance

E.1 Establishing the leakage resistance of an ET 200S station

Ohmic resistance

When establishing the leakage resistance for an ET 200S station (e.g. for a ground-fault detector) you must take the ohmic resistance from the RC combination of the relevant module into account:

Module	Ohmic resistance from RC network
Interface module	10 MΩ (± 5 %)
IM151-1 COMPACT	10 MΩ (±10 %)
Power Module PM-E 24 VDC	10 MΩ (±5 %)
PM-E 24 VDC/120 /230 VAC power module	---

Formula

With the following formula you can calculate the leakage resistance of an ET 200S station if you protect all the aforementioned modules with one ground-fault detector:

$$R_{ET200S} = \frac{R_{Module}}{N}$$

$R_{ET 200S}$ = Leakage resistance of the ET 200S station

R_{module} = Leakage resistance of a module

N = Number of power modules and the interface module in the ET 200S station

$R_{IM 151}$ = $R_{PM-E 24 VDC} = R_{module} = 9.5 M\Omega$

$R_{IM 151}$ = Leakage resistance of the IM151-1 interface module

$R_{PM-E 24 VDC}$ = Leakage resistance of power module PM-E 24 VDC

If you protect the modules within an ET 200S station listed above with several ground-fault detectors, you must determine the leakage resistance for every single ground-fault detector.

Example

In the setup of an ET 200S there is one IM151-1 STANDARD and two PM-E DC24V power modules and various input and output modules. The entire ET 200S station is protected by **one** ground-fault detector:

$$R_{\text{ET 200S}} = \frac{9.5 \text{ M}\Omega}{3} = 3.17 \text{ M}\Omega$$

Figure E-1 Calculation example for the leakage resistance

Interference-free operation

F.1 Special Measures for Interference-Free Operation

Inductive voltages

Overvoltage occurs when sources of inductance are switched off. Examples of this are relay coils and contactors.

Integrated overvoltage protection

The digital output modules of the ET 200S have an integrated overvoltage protection device.

Additional overvoltage protection

Inductance must only be connected to additional overvoltage protective devices in the following cases:

- If digital output circuits can be switched off by additionally installed contacts (e. g. relay contacts).
- If the inductance cannot be controlled by digital output modules.

Note: Inquire about how the respective overvoltage protective devices must be dimensioned from your inductance supplier.

Example

The following diagram shows an output circuit which makes additional overvoltage protection devices necessary.

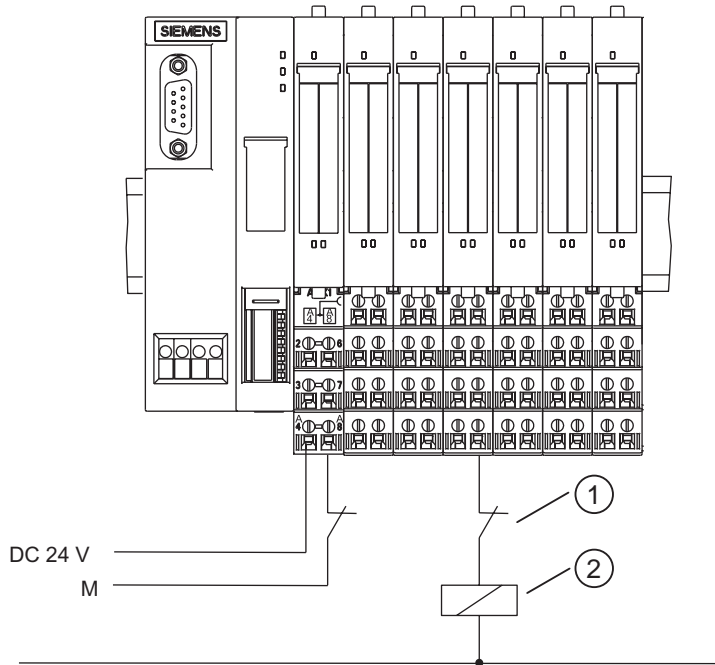
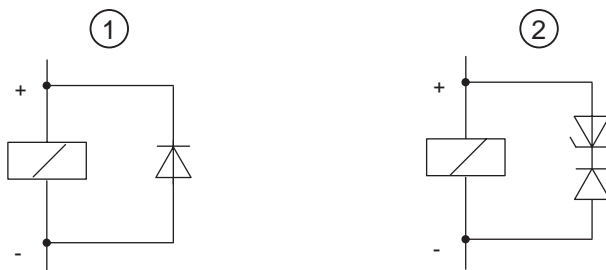


Figure F-1 Relay contact for Emergency OFF in the output circuit.

- ① Contact in the output circuit
- ② Inductance requires a circuit (see figures below)

Wiring of DC-operated coils

The figure below shows DC-operated coils wired with diode or Zener diode circuits



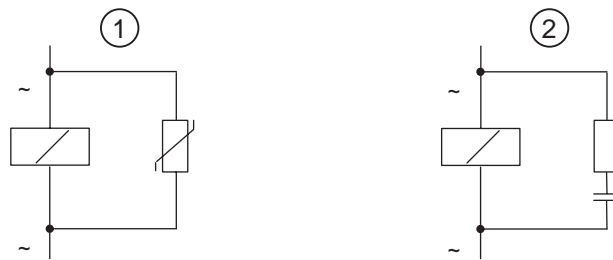
- ① with diode
- ② with Zener diode

Diode/Zener diode circuits have the following properties:

- Switch off surge voltage can be totally avoided.
Zener diode has higher switch off voltage.
- High switch-off delay (6 to 9 times higher than without protective circuit).
Zener diode switches off faster than diode circuit

Wiring of DC-operated coils

AC-operated coils are wired with varistors or RC elements as illustrated in the following diagram.



- ① with varistor
② with RC element

A circuit with varistors has the following properties:

- The amplitude of the switch off surge voltage is limited, but not dampened.
- The gradient of the overvoltage remains the same.
- The switch-off delay is small.

The properties of RC circuits are:

- Amplitude and gradient of the switch-off power surge are reduced.
- The switch-off delay is small.

Glossary

Aggregate current

Total of all currents of all output channels of a digital output module.

Automation system

An automation system is a programmable control system, consisting of at least one CPU, various input and output modules as well as operating and monitoring devices.

AUX1 bus

Power modules permit you to connect any additional potential (up to 230 VAC), which you can apply by means of the AUX(iliary) bus. You can use the AUX(iliary) bus as required:

- As a protective conductor bar
- For additional voltage when required

Backplane bus

The backplane bus is a serial data bus via which the interface module IM 151-1 communicates with the electronic modules/motor starters and supplies them with the necessary voltage. The connection between the individual modules is established by means of the terminal modules.

Baud rate

The Baud rate is the speed at which data is transmitted and specifies the number of bits transmitted per second (Baud rate = bit rate).

In the case of the ET 200S, baud rates of 9.6 kBaud to 12 MBaud are possible.

Bus

A common transfer route connecting all nodes and having two defined ends.

In the case of the ET 200, the bus is a two-wire or fiber-optic cable.

Bus connector

A physical connection between the bus node and the bus line.

Configuration

The systematic arrangement of the different ET 200S modules (setup).

Connecting to common potential

The opening of a new voltage group by a power module. This enables individual connection of the sensor and load supply to common potential.

Device names

Before an IO device can be addressed by an IO controller, it must have a device name. This procedure was selected for PROFINET because names are easier to handle than complex IP addresses.

Assignment of a device name for a concrete IO device can be compared with the setting of the PROFIBUS address for a DP slave.

An IO device does not have a device name upon delivery. An IO device can only be addressed by an IO controller - i.e., for transferring configuration data (including the IP address) during startup or for user data exchange during cyclic operation - after it has been assigned a device name with the programming device/PC.

Diagnostics

Diagnostics involves the identification, localization, classification, display, and further evaluation of errors, faults, and messages.

Diagnostics provides monitoring functions that run automatically while the system is in operation. This increases the availability of systems by reducing setup times and downtimes.

Direct starter

A direct starter is a → motor starter that switches a motor on and off directly. It consists of a circuit breaker and a contactor.

Distributed IO systems

are input/output units which are not deployed in the central device, but which are set up decentrally at a greater distance from the CPU, e. g.:

- ET 200M, ET 200X, ET 200L, ET 200S
- DP/AS-I Link
- Other DP slaves either from Siemens or other manufacturers

The distributed IO systems are connected to the DP master by means of PROFIBUS DP.

DP master

A → master that acts in compliance with the IEC 61784-1:2002 Ed1 CP 3/1 standard is termed DP master.

DP slave

A → slave, which is operated with the PROFIBUS DP protocol and acts according to the Norm IEC 61784-1:2002 Ed1 CP 3/1, is known as a DP slave.

DP standard

DP standard is the bus protocol of the ET 200 distributed I/O system according to the IEC 61784-1:2002 Ed1 CP 3/1 standard.

Electronic module

Electronic modules make inputs and outputs available for process signals. There are digital and analog electronic modules.

Equipotential Bonding

Electrical connection (equipotential bonding conductor) that brings the conductive parts of electrical equipment and other conductive parts to the same or approximately the same potential in order to prevent troublesome or dangerous voltages arising between these parts.

ET 200

The ET 200 distributed IO system with the PROFIBUS DP protocol enables distributed IO devices to be connected to a CPU or an appropriate DP master. ET 200 is distinguished by fast response times, since only few data (bytes) are transferred.

ET 200 is based on the IEC 61784-1:2002 Ed1 CP 3/1 standard.

The ET 200 works on the master/slave principle. A DP master can be for example the master switch-on system IM308-C or the CPU, 315-2 DP.

DP slaves can be the distributed IO system ET 200M, ET 200X, ET 200L, ET 200S or DP slaves from Siemens or other manufacturers.

Firmware update

Updating the firmware of the interface module

After (compatible) extensions of functions or improvements to performance, the interface module can be updated to the most recent firmware version.

FREEZE

This is a control command of the DP master to a group of DP slaves.

When a DP slave receives the FREEZE control command, it freezes the current status of the **inputs** and transfers them cyclically to the DP master.

After each new FREEZE control command, the DP slave freezes the status of the **inputs** again.

The input data is not transferred from the DP slave to the DP master again cyclically until the DP master sends the UNFREEZE control command.

Frequency converter

The frequency converter implements infinite control of the speed of asynchronous motors. It controls both simple drive tasks (frequency control) and more sophisticated ones (vector control). It can also be used to control torque.

Ground

The conductive mass of earth, the electrical potential of which can be set equivalent to zero at all points. In the vicinity of grounding electrodes, the potential may not be zero. The term "reference ground" is often used in this case.

The ground refers to all the interconnected inactive parts of a piece of equipment that, even in the event of a fault, cannot pick up voltage that is dangerous to the touch.

Grounding

Grounding means connecting an electrically conductive part to a grounding electrode by means of a grounding system.

GSD file

The properties of a PROFINET device are described in a GSD file (General Station Descriptor), which contains all the information required for configuration.

Just as with PROFIBUS you can integrate a PROFINET device via a GSD file in STEP 7.

In PROFINET IO, the GSD file is always in XML format. The structure of the GSD file corresponds to ISO 15734, the worldwide standard for device descriptions.

In the case of PROFIBUS the GSD file is available in the ASCII format (in compliance with the IEC 61784-1:2002 Ed1 CP 3/1 standard).

Hot swapping

This is the removal and insertion of modules while the ET 200S is in operation.

Identification Data

Identification data are data that are stored in a module for assisting the user in:

- Checking the system configuration
- Locating hardware modifications in a system
- Correcting errors in a system

Identification data enable modules to be uniquely identified online.

IO modules

IO modules include all modules of an ET 200S inserted after the interface module. These include power modules, electronic modules, technological modules, motor starters, frequency converters.

Isolated

In the case of isolated input/output modules the reference potentials of the control circuit and the load current circuit are galvanically isolated; e.g. by means of optocouplers, relays or transformers. Input/output circuits can be grouped.

MAC address

Each PROFINET device has a factory-assigned worldwide unique device identification. This 6-byte device identification is the MAC address.

The MAC address consists of:

- 3-byte manufacturer ID
- 3-byte device ID (serial number)

As a rule the MAC is placed legibly on the front of the device
e. g.: 08-00-06-6B-80-C0

Master

When it has a token, a master can send data to and request data from other nodes (= active participants). Examples of DP masters are the CPU 315-2 DP or the IM308-C.

Motor starter (MS)

Motor starter is the generic term for → direct and → reversing starters. The startup and direction of rotation of a motor are determined by motor starters.

Node

Device which can send, receive or enhance data via the bus,
e. g. DP-Master, DP-Slave, RS 485-Repeater.

Non-isolated

In the case of non-isolated input/output modules, the reference potentials of the control and load circuits are electrically connected.

Parameter assignment

Parameter assignment is the transfer of slave parameters from the DP master to the DP slave.

PELV

Protective **Extra Low Voltage** = extra low voltage with safe isolation

Power buses (P1/ P2)

Two internal buses (P1 and P2) that supply the electronic modules with voltage. The power buses are fed by the power module and connected by means of the terminal modules.

Power modules

Power modules monitor the voltage supply for all electronic modules within the voltage group. The supply voltage for the voltage group is fed in via the terminal module TM-P

Prewiring

The wiring of the terminal modules before the electronic modules are inserted.

Process image

The process image is a component of the system memory of the DP master. The signal states of the input modules are transferred to the process-image inputs at the beginning of the cyclic program. At the end of the cyclic program, the values of the process-image outputs are transferred to the DP slave as the signal states.

PROFIBUS

PROcess Field BUS, Process and fieldbus standard, defined in the IEC 61784-1:2002 Ed1 CP 3/1 standard. It defines functional, electrical, and mechanical properties for a bit-serial field bus system.

PROFIBUS is available with the protocols DP (= distributed peripherals, that is, distributed or remote IO), FMS (= field bus message specification), PA (= process automation), or TF (= technological functions).

PROFIBUS address

Each bus node must receive a PROFIBUS address to identify it uniquely on the PROFIBUS.

The PC/programming device has the PROFIBUS address "0".

PROFIBUS addresses 1 to 125 are permissible for the ET 200S distributed IO system

PROFINET

Within the context of Totally Integrated Automation (TIA), PROFINET is the systematic continuation of the following systems:

- PROFIBUS DP, the established field bus
- Industrial Ethernet, the communication bus for the cell level

Experiences from both systems have been and are being integrated in PROFINET.

As an Ethernet-based automation standard of PROFIBUS International (formerly PROFIBUS user organization, registered society) PROFINET thus defines a communication, automation and engineering model valid for all manufacturers.

PROFINET components

A PROFINET component includes all data of the hardware configuration, the parameters of the modules, and the associated user program. The PROFINET component comprises the following elements:

- Technological function

The (optional) technological (software) function includes the interface to other PROFINET components as interconnectable inputs and outputs.

- Device

The device represents the physical automation device or field device, including the IO, sensors and actuators, mechanical system, and device firmware.

PROFINET device

A PROFINET device always has at least one Industrial Ethernet connection. Additionally, a PROFINET device can have a PROFIBUS connection: as master with proxy functions. In exceptional cases the PROFINET device can have several PROFIBUS connections (e. g. CP 5614).

PROFINET IO controller

Device by means of which connected IO devices are addressed. This means the IO controller exchanges input and output signals with assigned field devices. The IO controller is often the controller in which the automation program is executed.

PROFINET IO

Within the context of PROFINET, PROFINET IO is a communication concept for implementing modular, distributed applications.

With PROFINET IO, you can create automation solutions using the trusted and familiar methods of PROFIBUS.

Implementation of PROFINET IO is effected on the one hand via the PROFINET standard for automation devices and, on the other by means of the engineering tool, STEP 7.

This means that in STEP 7 you have the same application view irrespective of whether you are configuring PROFINET or PROFIBUS devices. The programming of your user program is identical for PROFINET IO and PROFIBUS DP if you are using the blocks and system status lists which have been extended for PROFINET IO.

PROFINET IO Device

Distributed field device assigned to one of the IO controllers (e.g. remote IO, valve islands, frequency converters, switches).

Provider-consumer principle

By contrast with PROFIBUS DP, both partners on the PROFINET IO are independent providers in the sending of data.

Real time

Real time means that a system processes external events within a defined time.

Determinism means that a system responds in a predictable (deterministic) manner.

Both requirements are important for industrial networks. PROFINET satisfies these requirements. Thus, as a deterministic real-time network, PROFINET is designed as follows:

- The transfer of time-critical data between different nodes via a network is guaranteed within a defined interval of time.
- To this end, PROFINET has an optimized communication channel for real time communication: Real time
- The time of transfer can be accurately determined.(forecast).
- This ensures that unimpeded communication can take place via other standard protocols in the same network, e.g. industrial communication for PD/PC.

Reference potential

Potential from which the voltages of the circuits involved can be observed and/or measured.

Reversing starter

A reversing starter is a → motor starter which defines the rotary direction of a motor. It consists of a circuit breaker and two contactors.

Segment

The bus line between two terminating resistors forms a segment. A segment contains 0 to 32 → bus nodes Segments can be coupled via RS 485 repeaters.

SELV

Protective Extra Low Voltage = extra low voltage with safe isolation

Slave

A slave may only exchange data with a → master if called upon to do so by the latter. Slaves are, for example all DP slaves such as ET 200X, ET 200M, ET 200S etc.

SNMP

SNMP (Simple Network Management Protocol) is the standardized protocol, for diagnosing and also configuring the Ethernet network infrastructure.

In the office setting and in automation engineering, devices from many different manufacturers support SNMP on the Ethernet.

SNMP-based applications can be operated on the same network in parallel to applications with PROFINET.

The scope of the supported functions differs depending on the device type. For example, a switch has more functions than a CP 1616.

SSI

The transfer of path information takes place synchronously according to the SSI protocol (Synchronous Serial Interface). The SSI protocol is used with absolute position sensors.

SSL (System Status List)

The System Status List SSL describes the current status of the automation system: It gives an overview of the setup, the current parameter settings, the actual statuses and processes in the CPU and the assigned modules.

The data of the SSL can only be read and not modified.

Stationary wiring

All the wiring-carrying elements (terminal modules) are mounted on a rail. The power and electronic modules are plugged onto the terminal modules.

Switch

PROFIBUS is a linear network. The communication nodes are connected with one another by means of a passive line - the bus.

By contrast, the Industrial Ethernet consists of point-to-point connections: each communication node is directly connected to exactly one communication node.

If a communication node is connected with several communication nodes, this communication node is connected to the port of an active network component - the switch. Additional communication nodes (including switches) can now be connected to the other ports of the switch. The connection between a communication node and the switch remains a point-to-point connection.

A switch also has the task of regenerating and distributing received signals. The switch "learns" the Ethernet address(es) of a connected PROFINET device or other switches and only forwards signals, which are destined for the connected PROFINET device or the connected switch.

A switch has a specific number of ports. You connect at most one PROFINET device or additional switch to each port.

SYNC

This is a control command of the DP master to a group of DP slaves.

With the SYNC control command the DP master prompts the DP slave to freeze the statuses of the outputs at the value at that moment. With the subsequent frames, the DP slave stores the output data, but the statuses of the outputs remain unchanged.

After each new SYNC control command, the DP slave sets the outputs that it has stored as output data. The outputs are not cyclically updated again until the DP master sends the UNSYNC control command.

Technological modules

Modules which are equipped with technological functions, e.g. counting pulses, positioning functions, control of step-action motor power sections.

Terminal modules

Terminal modules implement the electrical and mechanical connection of the distributed IO modules with the interface module and the terminating module.

The inserted distributed IO module determines the signals on the terminals of the terminal module. Depending on the terminal module which has been selected, only certain terminals are available.

Terminating module

The terminating module completes the ET 200S distributed IO system. If you have not inserted a terminating module, the ET 200S is not ready for operation.

User data qualifier

Each IO module is assigned a value in the input or output data message; this value makes a statement on the quality of this user datum. For example, outputs of a specific module can be switched off by means of this without affecting other modules.

Voltage group

A group of electronic modules supplied by a power module.

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SIMATIC

Product Information

01/2005

Use of subassemblies/modules in a Zone 2 Hazardous Area

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Deutsch	Einsatz der Baugruppen/Module im explosionsgeschützten Bereich Zone 2	3
English	Use of subassemblies/modules in a Zone 2 Hazardous Area	5
Français	Utilisation des modules / coupleurs dans la zone à risque d'explosion 2	7
Español	Aplicación de los módulos / tarjetas en áreas con peligro de explosión, zona 2	9
Italiano	Impiego delle unità/moduli nell'area a pericolo di esplosione zona 2	11
Nederlands	Gebruik van de componenten/modulen in het explosief gebied zone 2	13
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Estnisch	Sõlmede/moodulite kasutamise plahvatusohtliku piirkonna tsoonis 2	27
Latviski	Ierīču/moduļu pielietojums sprādzienbīstamas teritorijas zonā 2	29
Lietuviška	Konstrukcinių grupių/modulių panaudojimas sprogiroje 2 zonos aplinkoje	31
Magya	A főegység/modulok alkalmazása a 2. zóna robbanásveszélyes környezetben	33
Malti	Tqegħid tal-Komponenti / Modules fiż-Zona 2, fejn hemm Riskju ta' Splużjoni	35
Polski	Zastosowanie grup konstrukcyjnych / modułów w 2 strefie zagrożenia wybuchem	37
Slovensky	Použitie konštrukčných skupín / modulov v prostredí s nebezpečenstvom výbuchu zóny 2	39
Slovensko	Uporaba sklopov/modulov v eksplozivno ogroženem območju cone 2	41
Türkçe	Patlama tehlikesi olan Alan 2 bölgesinde ünite gruplarının/modüllerin kullanılması	43

Einsatz der Baugruppen/Module im explosionsgefährdeten Bereich Zone 2

Zone 2

Explosionsgefährdete Bereiche werden in Zonen eingeteilt. Die Zonen werden nach der Wahrscheinlichkeit des Vorhandenseins einer explosionsfähigen Atmosphäre unterschieden.

Zone	Explosionsgefahr	Beispiel
2	explosive Gasatmosphäre tritt nur selten und kurzzeitig auf	Bereiche um Flanschverbindungen mit Flachdichtungen bei Rohrleitungen in geschlossenen Räumen
sicherer Bereich	nein	<ul style="list-style-type: none"> • außerhalb der Zone 2 • Standardanwendungen von dezentraler Peripherie

Nachfolgend finden Sie wichtige Hinweise für die Installation der Baugruppen/Module im explosionsgefährdeten Bereich.

Weitere Informationen

Weitere Informationen zu den Baugruppen/Modulen finden Sie im dazugehörigen Handbuch.

Fertigungsort / Zulassung



II 3 G EEx nA II T3 .. T6 nach EN 50021 : 1999

Prüfnummer: *siehe Tabelle*

Fertigungsort	Baugruppen/Module	Prüfnummer
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S ET 200S Fehlersichere Module	KEMA 01 ATEX 1238X
	S7-300 ET 200M Buskopplung DP/PA Diagnoserepeater S7-300 Fehlersichere Baugruppen	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Hinweis

Baugruppen/Module mit der Zulassung II 3 G EEx nA II T3 .. T6 dürfen nur in SIMATIC-Systemen der Gerätekategorie 3 eingesetzt werden.

Instandhaltung

Für eine Reparatur müssen die betroffene Baugruppen/Module an den Fertigungsort geschickt werden. Nur dort darf die Reparatur durchgeführt werden.

Besondere Bedingungen

1. Baugruppen/Module müssen in einen Schaltschrank oder ein metallisches Gehäuse eingebaut werden. Diese müssen mindestens die Schutzart IP 54 (nach EN 60529) gewährleisten. Dabei sind die Umgebungsbedingungen zu berücksichtigen, in denen das Gerät installiert wird. Für das Gehäuse muss eine Herstellererklärung für Zone 2 vorliegen (gemäß EN 50021).
2. Wenn am Kabel bzw. an der Kabeleinführung dieses Gehäuses unter Betriebsbedingungen eine Temperatur > 70 °C erreicht wird oder wenn unter Betriebsbedingungen die Temperatur an der Aderverzweigung > 80 °C sein kann, müssen die Temperatureigenschaften der Kabel mit den tatsächlich gemessenen Temperaturen übereinstimmen.
3. Die eingesetzten Kabeleinführungen müssen der geforderten IP-Schutzart und dem Abschnitt 7.2 (gemäß EN 50021) entsprechen.
4. Alle Geräte, einschließlich Schalter etc., die an den Ein- und Ausgängen von SIMATIC-Systemen angeschlossen werden, müssen für den Explosionsschutz Typ EEx nA oder EEx nC genehmigt sein.
5. Es müssen Maßnahmen getroffen werden, dass die Nennspannung durch Transienten um nicht mehr als 40 % überschritten werden kann.
6. Umgebungstemperaturbereich: 0° C bis 60° C
7. Innerhalb des Gehäuses ist an einem nach dem Öffnen gut sichtbaren Platz ein Schild mit folgender Warnung anzubringen:



Warnung

Das Gehäuse darf nur kurze Zeit geöffnet werden, z. B. für visuelle Diagnose. Betätigen Sie dabei keine Schalter, ziehen oder stecken keine Baugruppen und trennen keine elektrischen Leitungen (Steckverbindungen). Diese Warnung kann unberücksichtigt bleiben, wenn bekannt ist, dass keine explosionsgefährdete Atmosphäre herrscht.

Liste der zugelassenen Baugruppen/Module

Die Liste mit den zugelassenen Baugruppen/Module finden Sie im Internet:

<http://www4.ad.siemens.de/view/cs/>

unter der Beitrags-ID 13702947.

Use of subassemblies/modules in a Zone 2 Hazardous Area

Zone 2

Hazardous areas are divided up into zones. The zones are distinguished according to the probability of the existence of an explosive atmosphere.

Zone	Explosion Hazard	Example
2	Explosive gas atmosphere occurs only seldom and for a short time	Areas around flange joints with flat gaskets in pipes in enclosed spaces
Safe area	No	<ul style="list-style-type: none"> • Outside zone 2 • Standard distributed I/O applications

Below you will find important information on the installation of the subassemblies/modules in a hazardous area.

Further Information

You will find further information on the subassemblies/modules in the corresponding manual.

Production Location / Certification



II 3 G

EEx nA II T3 .. T6

to EN 50021 : 1999

Test number: *see table below*

Production Location	Subassemblies/Modules	Test Number
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET-200S ET 200S fault-tolerant modules	KEMA 01 ATEX 1238X
	S7-300 ET-200M DP/PA bus interface Diagnostics repeater S7-300 fault-tolerant modules	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Note

Subassemblies/modules with II 3 G EEx nA II T3 .. T6 certification can only be used in SIMATIC systems rated as category 3 equipment.

Maintenance

If repair is necessary, the affected subassemblies/modules must be sent to the production location. Repairs can only be carried out there.

Special Conditions

1. Subassemblies/modules must be installed in a cabinet or metal housing. These must comply with the IP 54 degree of protection as a minimum. The environmental conditions under which the equipment is installed must be taken into account. There must be a manufacturer's declaration for zone 2 available for the housing (in accordance with EN 50021).
2. If a temperature of $> 70\text{ }^{\circ}\text{C}$ is reached in the cable or at the cable entry of this housing under operating conditions, or if a temperature of $> 80\text{ }^{\circ}\text{C}$ can be reached at the junction of the conductors under operating conditions, the temperature-related properties of the cables must correspond to the temperatures actually measured.
3. The cable entries used must comply with the required IP degree of protection and Section 7.2 (in accordance with EN 50021).
4. All devices (including switches, etc.) that are connected to the inputs and outputs of SIMATIC systems must be approved for EEx nA or EEx nC explosion protection.
5. Steps must be taken to ensure that the rated voltage through transients cannot be exceeded by more than 40 %.
6. Ambient temperature range: 0°C to 60°C
7. A sign containing the following warning must be put up inside the housing in an easily visible position when the housing is opened:



Warning

The housing can only be opened for a short time (e.g. for visual diagnostics). If you do this, do not operate any switches, remove or install any modules or disconnect any electrical cables (plug-in connections). You can disregard this warning if you know that the atmosphere is not hazardous (i.e. there is no risk of explosion).

List of Approved Subassemblies/Modules

You will find the list of approved subassemblies/modules under the ID 13702947 on the Internet:

<http://www4.ad.siemens.de/view/cs/>.

Utilisation des modules / coupleurs dans la zone à risque d'explosion 2

Zone 2

Les environnements à risque d'explosion sont répartis en zones. Les zones se distinguent par la probabilité de présence d'une atmosphère explosive.

Zone	Risque d'explosion	Exemple
2	Formation rare et brève d'une atmosphère gazeuse explosive	Environnement de raccords à joints plats dans le cas de conduites dans des locaux fermés
Zone sûre	Non	<ul style="list-style-type: none"> • A l'extérieur de la zone 2 • Utilisation standard de périphérie décentralisée

Vous trouverez ci-après des remarques importantes pour l'installation de la station de périphérie décentralisée des modules / coupleurs dans la zone à risque d'explosion.

Informations complémentaires

Des informations complémentaires sur les modules / cartouches se trouvent dans le manuel correspondant.

Lieu de fabrication / Homologation



II 3 G

EEx nA II T3 .. T6

selon EN 50021 : 1999

Numéro de contrôle : voir tableau

Lieu de fabrication	Modules / coupleurs	Numéro de contrôle
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S Modules à sécurité intrinsèque ET 200S	KEMA 01 ATEX 1238X
	S7-300 ET 200M Couplage de bus DP/PA Répéteur de diagnostic Modules à sécurité intrinsèque S7-300	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Nota

Les modules / coupleurs homologués  II 3 G EEx nA II T3 .. T6 ne peuvent être utilisés que dans des systèmes SIMATIC de catégorie 3.

Entretien

Si une réparation est nécessaire, le module / coupleur concerné doit être expédié au lieu de production. La réparation ne doit être effectuée qu'en ce lieu.

Conditions particulières

1. Les modules / coupleurs doivent être installés dans une armoire ou un boîtier métallique. Ceux-ci doivent assurer au moins l'indice de protection IP 54. Il faut alors tenir compte des conditions d'environnement dans lesquelles l'appareil est installé. Le boîtier doit faire l'objet d'une déclaration de conformité du fabricant pour la zone 2 (selon EN 50021).
2. Si dans les conditions d'exploitation, une température > 70 °C est atteinte au niveau du câble ou de l'entrée du câble dans ce boîtier, ou bien si la température au niveau de la dérivation des conducteurs peut être > 80 °C, les capacités de résistance thermique des câbles doivent correspondre aux températures effectivement mesurées.
3. Les entrées de câbles utilisées doivent avoir le niveau de protection IP exigé et être conformes au paragraphe 7.2 (selon EN 50021).
4. Tous les appareillages (y compris les interrupteurs, etc.) raccordés aux entrées et sorties de systèmes SIMATIC doivent être homologués pour la protection antidéflagrante type EEx nA ou EEx nC.
5. Il faut prendre des mesures pour que la tension nominale ne puisse pas être dépassée de plus de 40% sous l'influence de transitoires.
6. Plage de température ambiante : 0° C à 60° C
7. A l'intérieur du boîtier, il faut placer, à un endroit bien visible après ouverture, une plaquette comportant l'avertissement suivant :



Avertissement

Ouvrir le boîtier le moins longtemps possible, par exemple pour effectuer un diagnostic visuel. Ce faisant, n'actionnez aucun commutateur, ne déconnectez aucun module et ne débanchez pas de câbles électriques (connexions). Le respect de cet avertissement n'est pas impératif s'il est certain que l'environnement ne présente pas de risque d'explosion.

Liste des modules / coupleurs homologués

Vous trouverez sur Internet la liste des modules / coupleurs homologués :

<http://www4.ad.siemens.de/view/cs/>

référence ID 13702947.

Aplicación de los módulos / tarjetas en áreas con peligro de explosión, zona 2

Zona 2

Las áreas con peligro de explosión se clasifican en zonas. Las zonas se diferencian según la probabilidad de la existencia de una atmósfera capaz de sufrir una explosión.

Zona	Peligro de explosión	Ejemplo
2	La atmósfera explosiva de gas sólo se presenta rara vez y muy brevemente	Áreas alrededor de uniones abridadas con juntas planas en tuberías en locales cerrados
Área segura	no	<ul style="list-style-type: none"> fuera de la zona 2 Aplicaciones estándar de la periferia descentralizada

A continuación encontrará importantes informaciones para la instalación de los módulos / tarjetas en áreas con peligro de explosión.

Otras informaciones

Encontrará otras informaciones relativas a los módulos / tarjetas en el Manual correspondiente.

Lugar de fabricación / Homologación



II 3 G


EEx nA II T3 .. T6

según norma EN 50021 : 1999

Número de comprobación: véase tabla

Lugar de fabricación	Módulos / tarjetas	Número de comprobación
Siemens AG, Bereich A&D Werner-von-Siemens- Straße 50 92224 Amberg Germany	ET 200S Grupos ET 200S a prueba de fallos	KEMA 01 ATEX 1238 X
	S7-300 ET 200M Acoplamiento de bus DP/PA Repetidor de diagnóstico Grupos S7-300 a prueba de fallos	KEMA 02 ATEX 1096 X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125 X
	S7-300 CP TS Adapter	KEMA 03 ATEX 1228 X
	SIMATIC NET	KEMA 03 ATEX 1226 X

Nota

Los módulos / tarjetas con la homologación  II 3 G EEx nA II T3 .. T6 pueden utilizarse únicamente en los sistemas SIMATIC de la categoría de equipo 3.

Mantenimiento

Para una reparación se ha de remitir el módulo / tarjeta afectado al lugar de fabricación. Sólo allí se puede realizar la reparación.

Condiciones especiales

1. Los módulos / tarjetas se han de montar en un armario eléctrico de distribución o en una carcasa metálica. Éstos deben garantizar como mínimo el grado de protección IP 54 (conforme a EN 60529). Para ello se han de tener en cuenta las condiciones ambientales, en las cuales se instala el equipo. La caja deberá contar con una declaración del fabricante para la zona 2 (conforme a EN 50021).
2. Si durante la operación se alcanzara una temperatura > 70° C en el cable o la entrada de cables de esta caja o bien una temperatura > 80° C en la bifurcación de hilos, deberán adaptarse las propiedades térmicas de los cables a las temperaturas medidas efectivamente.
3. Las entradas de cable utilizadas deben cumplir el grado de protección IP exigido y lo expuesto en el apartado 7.2 (conforme a EN 50021).
4. Todos los dispositivos –inclusive interruptores, etc.– conectados a las entradas y salidas de sistemas SIMATIC deben estar homologados para la protección contra explosiones del tipo EEx nA o EEx nC.
5. Es necesario adoptar las medidas necesarias para evitar que la tensión nominal pueda rebasar en más del 40 % debido a efectos transitorios.
6. Margen de temperatura ambiente: 0° C hasta 60° C
7. Dentro de la caja deberá colocarse en un lugar perfectamente visible tras su apertura un rótulo con la siguiente advertencia:



Precaución

Abrir la caja sólo brevemente, p.ej. para el diagnóstico visual. Durante este tiempo Ud. no deberá activar ningún interruptor, desenchufar o enchufar módulos ni separar conductores eléctricos (conexiones enchufables). Esta advertencia puede ignorarse si Ud. sabe que en la atmósfera existente no hay peligro de explosión.

Lista de los módulos / tarjetas homologados

En la internet hallará Ud. una lista con los módulos / tarjetas homologados:

<http://www4.ad.siemens.de/view/cs/>

bajo el ID de asignación 13702947.

Impiego delle unità/moduli nell'area a pericolo di esplosione zona 2

Zona 2

Le aree a pericolo di esplosione vengono suddivise in zone. Le zone vengono distinte secondo la probabilità della presenza di un'atmosfera esplosiva.

Zona	Pericolo di esplosione	Esempio
2	L'atmosfera esplosiva si presenta solo raramente e brevemente	Aree intorno a collegamenti a flange con guarnizioni piatte nelle condotte in ambienti chiusi
Area sicura	No	<ul style="list-style-type: none"> Al di fuori della zona 2 Applicazioni standard di periferia decentrata

Qui di seguito sono riportate delle avvertenze importanti per l'installazione delle unità/moduli nell'area a pericolo di esplosione.

Ulteriori informazioni

Ulteriori informazioni sulle unità/moduli si trovano nel corrispondente manuale.

Luogo di produzione / Omologazione



II 3 G


EEx nA II T3 .. T6

secondo EN 50021 : 1999

Numero di controllo: *vedi tabella*

Luogo di produzione	Unità/moduli	Numero di controllo
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S Unità ad elevata sicurezza ET 200S	KEMA 01 ATEX 1238X
	S7-300 ET 200M Accoppiamento di bus DP/PA Repeater di diagnostica Unità ad elevata sicurezza S7-300	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Avvertenza

Le unità/moduli con l'omologazione  II 3 G EEx nA II T3 .. T6 possono essere impiegati solo nei sistemi SIMATIC della categoria di apparecchiature 3.

Manutenzione

Per una riparazione, le unità/i moduli interessati devono essere inviati al luogo di produzione. La riparazione può essere effettuata solo lì.

Condizioni particolari

1. Le unità/i moduli devono essere montati in un armadio elettrico o in un contenitore metallico. Questi devono assicurare almeno il tipo di protezione IP 54. In questo caso bisogna tenere conto delle condizioni ambientali nelle quali l'apparecchiatura viene installata. Per il contenitore deve essere presente una dichiarazione del costruttore per la zona 2 (secondo EN 50021).
2. Se nei cavi o nel loro punto di ingresso in questo contenitore viene raggiunta in condizioni di esercizio una temperatura > 70 °C o se in condizioni di esercizio la temperatura nella derivazione dei fili può essere > 80 °C, le caratteristiche di temperatura dei cavi devono essere conformi alla temperatura effettivamente misurata.
3. Gli ingressi dei cavi usati devono essere conformi al tipo di protezione richiesto e alla sezione 7.2 (secondo EN 50021).
4. Tutte le apparecchiature, inclusi interruttori, ecc. che vengono collegati agli ingressi/uscite di sistemi SIMATIC, devono essere stati omologati per la protezione da esplosione tipo EEx nA o EEx nC.
5. Devono essere prese delle misure per evitare che la tensione nominale possa essere superata per più del 40% da parte di transienti.
6. Campo termico ambientale: da 0° C a 60° C
7. All'interno del contenitore va apportata, in un luogo ben visibile dopo l'apertura, una targhetta con il seguente avvertimento:



Attenzione

Il contenitore può rimanere aperto solo per breve tempo, ad esempio per una diagnostica a vista. In tal caso non azionare alcun interruttore, non disinnestare o innestare unità e non staccare connessioni elettriche (connettori). Non è necessario tenere conto di questo avvertimento se è noto che non c'è un'atmosfera a rischio di esplosione

Elenco delle unità/moduli omologati

L'elenco con le unità/moduli omologati si trova in Internet al sito:

<http://www4.ad.siemens.de/view/cs/>

all'ID di voce 13702947.

Gebruik van de componenten/modulen in het explosief gebied zone 2

Zone 2

Explosieve gebieden worden ingedeeld in zones. Bij de zones wordt onderscheiden volgens de waarschijnlijkheid van de aanwezigheid van een explosieve atmosfeer.

Zone	Explosiegevaar	Voorbeeld
2	Een explosieve gasatmosfeer treedt maar zelden op en voor korte duur	Gebieden rond flensverbindingen met pakkingen bij buisleidingen in gesloten vertrekken
Veilig gebied	neen	<ul style="list-style-type: none"> Buiten de zone 2 Standaardtoepassingen van decentrale periferie

Hierna vindt u belangrijke aanwijzingen voor de installatie van de componenten/modulen in het explosief gebied.

Verdere informatie

In het bijhorende handboek vindt u verdere informatie over de componenten/modulen

Productieplaats / Vergunning



II 3 G


EEx nA II T3 .. T6

conform EN 50021 : 1999

Keuringsnummer: zie tabel

Productieplaats	Componenten/modulen	Keuringsnummer
Siemens AG, Bereich A&D Werner-von-Siemens- Strasse 50 92224 Amberg Germany	ET 200S ET 200S tegen fouten beveiligde componenten	KEMA 01 ATEX 1238X
	S7-300 ET 200 M Buskoppeling DP/PA Diagnoserepeater S7-300 tegen fouten beveiligde componenten	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Opmerking

Componenten/modulen met de vergunning  II 3 G EEx nA II T3 .. T6 mogen slechts worden gebruikt in SIMATIC-systemen van de apparaatcategorie 3.

Instandhouding

Voor een reparatie moeten de betreffende componenten/modulen naar de plaats van vervaardiging worden gestuurd. Alleen daar mag de reparatie worden uitgevoerd.

Speciale voorwaarden

1. Componenten/modulen moeten worden ingebouwd in een schakelkast of in een behuizing van metaal. Deze moeten minstens de veiligheidsgraad IP 54 waarborgen. Hierbij dient rekening te worden gehouden met de omgevingsvoorwaarden waarin het apparaat wordt geïnstalleerd. Voor de behuizing dient een verklaring van de fabrikant voor zone 2 te worden ingediend (volgens EN 50021).
2. Als aan de kabel of aan de kabelinvoering van deze behuizing onder bedrijfsomstandigheden een temperatuur wordt bereikt > 70 °C of als onder bedrijfsomstandigheden de temperatuur aan de adervertakking > 80 °C kan zijn, moeten de temperatureigenschappen van de kabel overeenstemmen met de werkelijk gemeten temperaturen.
3. De aangebrachte kabelinvoeringen moeten de vereiste IP-veiligheidsgraad hebben en in overeenstemming zijn met alinea 7.2 (volgens EN 50021).
4. Alle apparaten, schakelaars enz. inbegrepen, die worden aangesloten op de in- en uitgangen van SIMATIC-systemen, moeten zijn goedgekeurd voor de explosiebeveiliging type EEx nA of EEx nC.
5. Er dienen maatregelen te worden getroffen, zodat de nominale spanning door transiënten met niet meer dan 40 % kan worden overschreden.
6. Omgevingstemperatuurbereik: 0° C tot 60° C
7. Binnen de behuizing dient op een na het openen goed zichtbare plaats een bord te worden aangebracht met de volgende waarschuwing:



Waarschuwing

De behuizing mag slechts voor korte tijd worden geopend, bijv. voor een visuele diagnose. Bedien hierbij geen schakelaar, trek of steek geen modules en ontkoppel geen elektrische leidingen (steekverbindingen). Deze waarschuwing kan buiten beschouwing blijven, indien bekend is dat er geen explosieve atmosfeer heerst.

Lijst van de toegelaten componenten/modulen

De lijst met de toegelaten componenten/modulen vindt u in het internet:

<http://www4.ad.siemens.de/view/cs/>

onder de bijdrage-ID 13702947.

Brug af komponenter/moduler i det eksplosionsfarlige område zone 2

Zone 2

Eksplionsfarlige områder inddeles i zoner. Zonerne adskiller sig indbyrdes efter hvor sandsynligt det er, at der er en eksplosiv atmosfære.

Zone	Eksplionsfare	Eksempel
2	Eksplions gasatmosfære optræder kun sjældent og varer kort	Områder rundt om flangeforbindelser med flade pakninger ved rørledninger i lukkede rum
Sikkert område	Nej	<ul style="list-style-type: none"> • Uden for zone 2 • Standardanvendelser decentral periferi

I det følgende findes vigtige henvisninger vedr. installation af komponenter/moduler i det eksplosionsfarlige område.

Yderligere informationer

Yderligere informationer om komponenterne/modulerne findes i den pågældende manual.

Produktionssted / Godkendelse



II 3 G

EEx nA II T3 .. T6

efter EN 50021 : 1999

Kontrolnummer: se tabel

Produktionssted	Komponenter/moduler	Kontrolnummer
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S ET 200S fejlsikre komponenter	KEMA 01 ATEX 1238X
	S7-300 ET 200M Buskobling DP/PA Diagnoserepeater S7-300 fejlsikre komponenter	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Bemærk

Komponenter/moduler med godkendelsen II 3 G EEx nA II T3 .. T6 må kun monteres i SIMATIC-systemer for udstyrskategori 3.

Vedligeholdelse

Hvis de pågældende komponenter/moduler skal repareres, bedes De sende dem til produktionsstedet. Reparation må kun udføres der.

Særlige betingelser

1. Komponenterne/modulerne skal monteres i et kontrolskab eller et metalkabinet. Disse skal mindst kunne sikre beskyttelsesklasse IP 54. I denne forbindelse skal der tages højde for de omgivelsestemperaturer, i hvilke udstyret er installeret. Der skal være udarbejdet en erklæring fra fabrikanten for kabinettet for zone 2 (iht. EN 50021).
2. Hvis kablet eller kabelindføringen på dette hus når op på en temperatur på $> 70\text{ °C}$ under driftsbetingelser eller hvis temperaturen på åreforegningen kan være $> 80\text{ °C}$ under driftsbetingelser, skal kablernes temperaturegenskaber stemme overens med de temperaturer, der rent faktisk måles.
3. De benyttede kabelindføringer skal være i overensstemmelse med den krævede IP-beskyttelsestype og afsnittet 7.2 (iht. EN 50021).
4. Alle apparater, inkl. kontakter osv., der forbindes med ind- og udgangene til SIMATIC-systemerne, skal være godkendt til eksplosionsbeskyttelse af type EEx nA eller EEx nC.
5. Der skal træffes foranstaltninger, der sørger for, at den nominelle spænding via transienter ikke kan overskrides mere end 40 %.
6. Omgivelsestemperaturområde: 0 °C til 60 °C
7. I kabinettet skal der anbringes et skilt, der skal kunne ses, når kabinettet åbnes. Dette skilt skal have følgende advarsel:



Advarsel

Kabinettet må kun åbnes i kort tid, f.eks. til visuel diagnose. Tryk i denne forbindelse ikke på kontakter, træk eller isæt ikke komponenter og afbryd ikke elektriske ledninger (stikforbindelser).

Der skal ikke tages højde for denne advarsel, hvis man ved, at der ikke er nogen eksplosionsfarlig atmosfære.

Liste over godkendte komponenter/moduler

Listen med de godkendte komponenter/moduler findes på internettet:

<http://www4.ad.siemens.de/view/cs/>

under bidrags-ID 13702947.

Rakenneryhmien/moduulien käyttö räjähdysvaarannetuilla alueilla, vyöhyke 2

Vyöhyke 2

Räjähdysvaarannetut alueet jaetaan vyöhykkeisiin. Vyöhykkeet erotellaan räjähdyskelpoisen ilmakehän olemassa olon todennäköisyyden mukaan.

Vyöhyke	Räjähdysvaara	Esimerkki
2	Räjähävä kaasuilmakehä ilmaantuu vain harvoin ja lyhytaikaisesti	Alueet putkistojen lattatiivisteillä varustetuilla laippaliitoksilla suljetuissa tiloissa
turvallinen alue	ei	<ul style="list-style-type: none"> vyöhykkeen 2 ulkopuolella Hajautetun ulkopiirin vakiosovellukset

Seuraavasta löydätte tärkeitä ohjeita rakenneryhmien/moduulien asennukseen räjähdysvaarannetuilla alueilla.

Lisätietoja

Lisätietoja rakenneryhmiin/moduuleihin löydätte niihin kuuluvista ohjekirjasta.

Valmistuspaikka / Hyväksyntä



II 3 G

EEx nA II T3 .. T6

EN 50021 mukaan: 1999

Tarkastusnumero: katso taulukko

Valmistuspaikka	Rakenneryhmät/moduulit	Tarkastusnumero
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S ET 200S läpi-iskuvarmat rakenneryhmät	KEMA 01 ATEX 1238X
	S7-300 ET 200M Väyläkytkin DP/PA Dignositoistin S7-300 läpi-iskuvarmat rakenneryhmät	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Ohje

Rakenneryhmät/moduulit hyväksynnän II 3 G EEx nA II T3 .. T6 kanssa saadaan käyttää ainoastaan laitekategorian 3 SIMATIC-järjestelmissä.

Kunnossapito

Korjausta varten täytyy kyseinen rakenneryhmä/moduuli lähettää valmistuspaikkaan. Korjaus voidaan suorittaa ainoastaan siellä.

Erityiset vaatimukset

1. Rakenneryhmät/moduulit täytyy asentaa kytkentäkaappiin tai metalliseen koteloon. Näiden täytyy olla vähintään kotelointiluokan IP 54 mukaisia. Tällöin on huomioitava ympäristöolosuhteet, johon laite asennetaan. Kotelolle täytyy olla valmistajaselvitys vyöhykettä 2 varten (EN 50021 mukaan).
2. Kun johdolla tai tämän kotelon johdon sisäänviennillä saavutetaan $> 70\text{ °C}$ lämpötila tai kun käyttöolosuhteissa lämpötila voi pihajajaotuksella olla $> 80\text{ °C}$, täytyy johdon lämpötilaominaisuuksien vastata todellisesti mitattuja lämpötiloja.
3. Käytettyjen johtojen sisäänohjauksien täytyy olla vaaditun IP-kotelointiluokan ja kohdan 7.2 (EN 50021 mukaan) mukaisia.
4. Kaikkien laitteiden, kytkimet jne. mukaan lukien, jotka liitetään SIMATIC-järjestelmien tuloille ja lähdöille, täytyy olla hyväksytyjä tyyppin EEx nA tai EEx nC räjähdysuojausta varten.
5. Toimenpiteet täytyy suorittaa, ettei nimellisjännite voi transienttien kautta ylittyä enemmän kuin 40 %.
6. Ympäristölämpötila-alue: $0\text{ °C} \dots 60\text{ °C}$
7. Kotelon sisälle, avauksen jälkeen näkyvälle paikalle, on kiinnitettävä kilpi, jossa on seuraava varoitus:



Varoitus

Kotelo saadaan avata ainoastaan lyhyeksi ajaksi, esim. visuaalista diagnoosia varten. Älä tällöin käytä mitään kytkimiä, vedä tai liitä mitään rakenneryhmiä, äläkä erota mitään sähköjohtoja (pistoliittimiä). Tätä varoitusta ei tarvitse huomioida, kun on tiedossa, että minkäänlaista räjähdysvaarannettua ilmakehää ei ole olemassa.

Hyväksytyjen rakenneryhmien/moduulien lista

Lista hyväksytyistä rakennesarjoista/moduuleista löytyy internetistä osoitteesta:

<http://www4.ad.siemens.de/view/cs/>

käyttäjätunnuksella 13702947.

Användning av komponentgrupperna/modulerna i explosionsriskområde zon 2

Zon 2

Explosionsriskområden delas in i zoner. Zonerna delas in enligt sannolikheten att en atmosfär med explosionsfara föreligger.

Zon	Explosionsfara	Exempel
2	Explosiv gasatmosfär uppstår endast sällan eller kortvarigt	Områden kring flänsförbindelser med packningar vid rörledningar i slutna utrymmen
Säkert område	Nej	<ul style="list-style-type: none"> • Utanför zon 2 • Standardanvändning av decentral periferi

Nedan följer viktiga anvisningar om installationen av komponentgrupperna/modulerna i ett explosionsriskområde.

Ytterligare information

Ytterligare information om komponentgrupperna/modulerna finner du i tillhörande handbok.

Tillverkningsort / Godkännande



II 3 G


EEx nA II T3 .. T6

enligt EN 50021 : 1999

Kontrollnummer: *se tabell*

Tillverkningsort	Komponentgrupper/ moduler	Kontrollnummer
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S ET 200S Felsäkra komponentgrupper	KEMA 01 ATEX 1238X
	S7-300 ET 200M Busskoppling DP/PA Diagnosrepeater S7-300 Felsäkra komponentgrupper	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Anvisning

Komponentgrupper/moduler med godkännande  II 3 G EEx nA II T3 .. T6 får endast användas i SIMATIC-system i apparatgrupp 3.

Underhåll

Vid reparation måste den aktuella komponentgrupperna/modulerna insändas till tillverkaren. Reparationer får endast genomföras där.

Särskilda villkor

1. Komponentgrupperna/modulerna måste monteras i ett kopplingskåp eller metallhus. Dessa måste minst vara av skyddsklass IP 54. Därvid ska omgivningsvillkoren där enheten installeras beaktas. För kåpan måste en tillverkardeklaration för zon 2 föreligga (enligt EN 50021).
2. Om en temperatur på > 70°C uppnås vid husets kabel resp kabelinföring under driftvillkor eller om temperaturen vid trådförgreningen kan vara > 80°C under driftvillkor, måste kabelns temperaturegenskaper överensstämja med den verkliga uppmätta temperaturen.
3. De använda kabelinföringarna måste uppfylla kraven i det krävda IP-skyddsutförandet och i avsnitt 7.2 (enligt EN 50021).
4. Alla apparater, inklusive brytare osv, som ansluts till in- och utgångarna på SIMATIC-system, måste vara godkända för explosionsskydd av typ EEx nA eller EEx nC.
5. Åtgärder måste vidtas så, att märkspänningen ej kan överskridas med mer än 40 % genom transienter.
6. Omgivningstemperatur: 0° C till 60° C
7. När huset öppnats ska en skylt med följande varning monteras på ett tydligt synligt ställe huset:



Varning

Huset får endast öppnas under kort tid, t ex för visuell diagnos. Använd därvid inga brytare, lossa eller anslut inga enheter och frånskilj inga elektriska ledningar (insticksanslutningar). Ingen hänsyn måste tas till denna varning om det är säkert att det inte råder någon explosionsfarlig atmosfär.

Lista över godkända komponentgrupper/moduler

Lista över godkända komponentgrupper/moduler finns på Internetadressen:

<http://www4.ad.siemens.de/view/cs/>

under bidrags-ID 13702947.

Uso de grupos construtivos/módulos em área exposta ao perigo de explosão 2

Zona 2

As áreas expostas ao perigo de explosão são divididas em zonas. As zonas são diferenciadas de acordo com a probabilidade da existência de uma atmosfera explosiva.

Zona	Perigo de explosão	Exemplo
2	Só raramente e por um breve período de tempo surgem atmosferas explosivas	Áreas em torno de ligações flangeadas com vedações chatas em tubulações em recintos fechados
Área segura	não	<ul style="list-style-type: none"> • fora da zona 2 • Aplicações descentralizadas de periferia descentralizada

A seguir, o encontrará avisos importantes para a instalação de grupos construtivos/ módulos em área exposta ao perigo de explosão.

Mais informações

Para obter mais informações sobre grupos construtivos/módulos, consulte o respectivo manual.

Local de produção / Licença



II 3 G


EEx nA II T3 .. T6

seg. EN 50021 : 1999

Número de ensaio: veja a tabela

Local de produção	Grupos construtivos/módulos	Nº de ensaio
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Alemanha	ET 200S ET 200S Grupos construtivos protegidos contra erro	KEMA 01 ATEX 1238X
	S7-300 ET 200M Acoplador bus DP/PA Repetidor de diagnóstico S7-300 Grupos construtivos protegidos contra erro	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Alemanha	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Aviso

Os grupos construtivos/módulos com a licença  II 3 G EEx nA II T3 .. T6 só podem ser aplicados em sistemas SIMATIC da categoria de aparelho 3.

Reparo

Os grupos construtivos/módulos em questão devem ser remetidos para o local de produção a fim de que seja realizado o reparo. Apenas lá deve ser efetuado o reparo.

Condições especiais

1. Os grupos construtivos/módulos devem ser montados em um armário de distribuição ou em uma caixa metálica. Estes devem garantir no mínimo o tipo de protecção IP 54. Durante este trabalho deverão ser levados em consideração as condições locais, nas quais o aparelho será instalado. Para a caixa deverá ser apresentada uma declaração do fabricante para a zona 2 (de acordo com EN 50021).
2. Caso no cabo ou na entrada do cabo desta carcaça sob as condições operacionais seja atingida uma temperatura de > 70 °C, ou caso sob condições operacionais a temperatura na ramificação do fio poderá atingir > 80 °C, as características de temperatura deverão corresponder às temperaturas realmente medidas.
3. As entradas de cabo utilizadas devem corresponder ao tipo exigido de protecção IP e à seção 7.2 (de acordo com o EN 50021).
4. Todos os aparelhos, inclusive as chaves, etc., que estejam conectadas em entradas e saídas dos sistemas SIMATIC devem possuir a licença para a protecção de explosão do tipo EEx nA ou EEx nC.
5. Precisam ser tomadas medidas para que a tensão nominal através de transitórios não possa ser ultrapassada em mais que 40 %.
6. Área de temperatura ambiente: 0° C até 60° C
7. No âmbito da carcaça deve ser colocada, após a abertura, em um ponto bem visível uma placa com a seguinte advertência:



Advertência

A carcaça deve ser aberta apenas por um breve período de tempo, por ex. para diagnóstico visual. Não acione nenhum interruptor, não retire ou conecte nenhum módulo e não separe nenhum fio elétrico (ligações de tomada). Esta advertência poderá ser ignorada caso se saiba que não há nenhuma atmosfera sujeita ao perigo de explosão.

Lista dos grupos construtivos/módulos autorizados

A lista com os grupos construtivos/módulos autorizados encontram-se na Internet:

<http://www4.ad.siemens.de/view/cs/>

sob o número de ID 13702947.

Χρήση των δομικών συγκροτημάτων/μονάδων σε επικίνδυνη για έκρηξη περιοχή, ζώνη 2

Ζώνη 2

Οι επικίνδυνες για έκρηξη περιοχές χωρίζονται σε ζώνες. Οι ζώνες διαφέρουν σύμφωνα με την πιθανότητα ύπαρξης ενός ικανού για έκρηξη περιβάλλοντος.


Ζώνη	Κίνδυνος έκρηξης	Παράδειγμα
2	Εκρηκτικό περιβάλλον αερίου παρουσιάζεται μόνο σπάνια και για σύντομο χρονικό διάστημα	Περιοχές γύρω από φλαντζωτές συνδέσεις με τσιμούχες σε σωληνώσεις σε κλειστούς χώρους
Ασφαλής περιοχή	όχι	<ul style="list-style-type: none"> Εκτός της ζώνης 2 Τυπικές εφαρμογές αποκεντρωμένης περιφέρειας

Στη συνέχεια θα βρείτε σημαντικές υποδείξεις για την εγκατάσταση των δομικών συγκροτημάτων/μονάδων σε επικίνδυνη για έκρηξη περιοχή.

Επιπλέον πληροφορίες

Επιπλέον πληροφορίες για τα δομικά συγκροτήματα/μονάδες θα βρείτε στο αντίστοιχο εγχειρίδιο.


Τόπος κατασκευής / Άδεια

 II 3 G EEx nA II T3 .. T6 σύμφωνα με το πρότυπο EN 50021 : 1999

Αριθμός ελέγχου: βλέπε πίνακα

Τόπος κατασκευής	Δομικά συγκροτήματα/μονάδες	Αιθμ. ελέγχου
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S ET 200S Ασφαλή σε περίπτωση βλάβης δομικά συγκροτήματα	KEMA 01 ATEX 1238X
	S7-300 ET 200M Σύζευξη διαύλου DP/PA Επαναλήπτης διάγνωσης S7-300 Ασφαλή σε περίπτωση βλάβης δομικά συγκροτήματα	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Υπόδειξη

Τα δομικά συγκροτήματα/οι μονάδες με την άδεια  II 3 G EEx nA II T3 .. T6 επιτρέπεται να τοποθετηθούν μόνο σε συστήματα αυτοματισμού SIMATIC της κατηγορίας συσκευής 3.

Συντήρηση

Για μια επισκευή πρέπει να σταλούν τα αντίστοιχα δομικά συγκροτήματα/μονάδες στον τόπο κατασκευής. Μόνο εκεί επιτρέπεται να γίνει η επισκευή.

Ιδιαίτερες προϋποθέσεις

1. Τα δομικά συγκροτήματα/μονάδες πρέπει να ενσωματωθούν σε ένα ερμάριο ζεύξης ή σε ένα μεταλλικό περίβλημα. Αυτά πρέπει να εξασφαλίζουν το λιγότερο το βαθμό προστασίας IP 54 (κατά EN 60529). Σε αυτήν την περίπτωση πρέπει να ληφθούν υπόψη οι περιβαλλοντικές συνθήκες, στις οποίες θα εγκατασταθεί η συσκευή. Για το περίβλημα πρέπει να προβλέπεται δήλωση του κατασκευαστή για τη ζώνη 2 (σύμφωνα με το πρότυπο EN 50021).
2. Εάν στο καλώδιο ή στην είσοδο του καλωδίου αυτού του περιβλήματος κάτω από συνθήκες λειτουργίας η θερμοκρασία ξεπεράσει τους 70 °C ή όταν κάτω από συνθήκες λειτουργίας η θερμοκρασία στη διακλάδωση του σύρματος μπορεί να είναι μεγαλύτερη από 80 °C, πρέπει οι θερμοκρασιακές ιδιότητες των καλωδίων να ταυτίζονται με τις πραγματικά μετρημένες θερμοκρασίες.
3. Οι χρησιμοποιούμενες εισόδους καλωδίων πρέπει να συμμορφώνονται με το βαθμό προστασίας IP 54 στην ενότητα 7.2 (σύμφωνα με το πρότυπο EN 50021).
4. Όλες οι συσκευές, συμπεριλαμβανομένων διακοπών κ.α., που συνδέονται στις εισόδους και εξόδους των συστημάτων SIMATIC, πρέπει να φέρουν εγκριμένη προστασία κατά έκρηξης τύπου EEx nA ή EEx nC.
5. Πρέπει να ληφθούν μέτρα, να μην μπορεί να γίνει υπέρβαση της ονομαστικής τάσης μέσω αιφνίδιας μεταβολής της τάσης πάνω από 40 %.
6. Περιοχή θερμοκρασίας περιβάλλοντος: 0° C έως 60° C
7. Πρέπει να τοποθετηθεί μέσα στο περίβλημα σε ευδιάκριτο σημείο μετά το άνοιγμα μία πινακίδα με την ακόλουθη προειδοποίηση:



Προειδοποίηση

Το περίβλημα επιτρέπεται να ανοίγει μόνο για μικρό χρονικό διάστημα, π.χ. για τη διενέργεια οπτικής διάγνωσης. Μην κάνετε χρήση διακοπών, μην τραβάτε ή εμβυσατώνετε δομικά συγκροτήματα και μη διαχωρίζετε ηλεκτροφόρους αγωγούς (εμβυσατώσιμες συνδέσεις).

Η προειδοποίηση αυτή δε χρειάζεται να ληφθεί υπ' όψιν, εάν είναι γνωστό ότι δεν υφίσταται ατμόσφαιρα παρουσιάζουσα κίνδυνο έκρηξης.

Κατάλογος των εγκεκριμένων δομικών συγκροτημάτων/μονάδων

Η λίστα με τα εγκεκριμένα δομικά συγκροτήματα/μονάδες υπάρχει στο διαδίκτυο:

<http://www4.ad.siemens.de/view/cs/>

με τον κωδικό συνδρομής 13702947.

Použití konstrukčních skupin / modulů v prostředí s nebezpečím výbuchu Zóna 2

Zóna 2

Oblasti s nebezpečím výbuchu jsou rozděleny do zón. Zóny jsou rozlišeny podle pravděpodobnosti výskytu explozivní atmosféry.

Zóna	Nebezpečí exploze	Příklad
2	Explosivní plynová atmosféra se vyskytuje pouze zřídka a krátkodobě	Oblasti kolem přírubových spojů s plochým těsněním u potrubí v uzavřených prostorech
Bezpečná oblast	není	<ul style="list-style-type: none"> Mimo zónu 2 Standardní aplikace necentrálních periferií

Dále naleznete důležité pokyny pro instalaci konstrukčních skupin/modulů v oblastech s nebezpečím výbuchu.

Další informace

Další informace ke konstrukčním skupinám/modulům naleznete v příslušné příručce.

Místo výroby / Registrace



II 3 G EEx nA II T3 .. T6 dle EN 50021 : 1999

Zkušební číslo: viz tabulka

Místo výroby	Konstrukční skupiny/Moduly	Kontrolní číslo
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S ET 200S Konstrukční skupiny odolné proti chybám	KEMA 01 ATEX 1238X
	S7-300 ET 200M Spojka sběrnice DP/PA Diagnostické translační relé S7-300 Konstrukční skupiny odolné proti chybám	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Upozornění

Konstrukční skupiny/Moduly s osvědčením (Ex) II 3 G EEx nA II T3 .. T6 smějí být použity pouze v systémech SIMATIC, přístrojové kategorie 3.

Údržba

K opravě musí být příslušné konstrukční skupiny/moduly zaslány do výrobního místa. Oprava smí být provedena pouze zde.

Zvláštní podmínky

1. Konstrukční skupiny/moduly musí být zabudovány v rozvaděči nebo kovovém krytu. Ty musí minimálně zajišťovat druh ochrany IP 54 (dle EN 60529). Přitom je nutno respektovat okolní podmínky, v nichž je přístroj instalován. Pro kryt musí být k dispozici prohlášení výrobce pro zónu 2 (dle EN 50021).
2. Pokud je na kabelu popř. kabelovém vedení tohoto krytu dosaženo za provozních podmínek teploty > 70 °C, nebo když za provozních podmínek může být na kabelových větvích teplota > 80 °C, musí teplotní vlastnosti kabelu souhlasit se skutečně naměřenými teplotami.
3. Použité kabelové přírůdky musí odpovídat požadovanému druhu ochrany IP a odstavci 7.2 (dle EN 50021).
4. Všechny přístroje, včetně spínačů atd. napojených na vstupy a výstupy systému SIMATIC, musí mít osvědčení vůči výbuchu typu EEx nA nebo EEx nC.
5. Musí být provedena opatření k zamezení přechodného překročení jmenovitého napětí, nepřesahující více než 40 %.
6. Rozsah teploty okolí: 0° C do 60° C
7. Uvnitř krytu je nutno na dobře viditelném místě po otevření připevnit štítek s následujícím varováním:



Varování

Kryt smí být otevřen pouze krátce, např. pro vizuální diagnostiku. Nepoužívejte přitom žádný spínač, nevytahujte ani nezasunujte žádné konstrukční skupiny a neoddělujte žádná elektrická vedení (konektorové spoje). Toto varování nemusíte respektovat, pokud je známo, že se na místě nevyskytuje explozivní atmosféra.

Seznam konstrukčních skupin/modulů s osvědčením

Seznam konstrukčních skupin/modulů s osvědčením naleznete na Internetu:

<http://www4.ad.siemens.de/view/cs/>

pod identifikací příspěvku ID 13702947.

Sõlmede/moodulite kasutamine plahvatusohtliku piirkonna tsoonis 2

Tsoon 2

Plahvatusohtlikud piirkonnad jagatakse tsoonideks. Tsoone eristatakse vastavalt plahvatusohtliku keskkonna esinemise tõenäosusele.

Tsoon	Plahvatusoht	Näide
2	üldine plahvatav keskkond esineb ainult harva ja lühiajaliselt	Piirkonnad lamedate rõngastihenditega torustike äärikliidete ümbruses suletud ruumides
ohutu piirkond	ei	<ul style="list-style-type: none"> väljaspool tsooni 2 Mitttsentraalse välisseadme standardsed rakendused

Järgnevalt leiate Te olulisi juhiseid sõlmede/moodulite paigaldamiseks plahvatusohtlikus piirkonnas.

Täiendav info

Üksikasjalik info sõlmede/moodulite kohta on toodud seadme juurde kuuluvas käsiraamatus.

Valmistamiskoht / Kasutusluba



II 3 G

EEx nA II T3 .. T6

vastavalt standardile EN 50021 : 1999

Katsetusnumber: vaadake tabelit

Valmistamiskoht	Sõlmed/moodulid	Katsetusnumber
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S ET 200S Rikkekindlad sõlmed	KEMA 01 ATEX 1238X
	S7-300 ET 200M Siinühendus DP/PA Diagnostikarepiiter S7-300 Rikkekindlad sõlmed	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Juhis

Sõlmi/moduleid kasutusloaga II 3 G EEx nA II T3 .. T6 tohib kasutada ainult SIMATIC-süsteemides, mille seadmeklass on 3.

Korrashoid

Parandamiseks tuleb sõlmed/moodulid saata valmistamiskohta. Parandustöid tohib teha ainult seal.

Eritingimused

1. Sõlmed/moodulid tuleb monteerida jaotuskarpi või metallkorpusesse. Need peavad tagama kaitseastme vähemalt IP 54 (vastavalt standardile EN 60529). Seejuures peab arvesse võtma seadme paigaldamise keskkonna tingimusi. Korpuse jaoks peab tsooni 2 jaoks olema tootja juhis (vastavalt standardile EN 50021).
2. Kui selle korpuse kaabli juures või kaabelvaheliku (kaabelsisestuse) juures töötingimustes saavutatakse temperatuur > 70 °C või, kui töötingimustes temperatuur soone hargnemiskoha juures võib olla > 80 °C, peavad kaabli termilised omadused olema vastavuses tegelikult mõõdetud temperatuuridega.
3. Kasutatavad kaabelvahelikud (kaabelsisestused) peavad vastama nõutud IP-kaitseastmele ja osas 7.2 toodud nõuetele (vastavalt standardile EN 50021).
4. Kõik seadmed, kaasa arvatud lülitid, jt., mis SIMATIC-süsteemide sisendite ja väljundite külge ühendatakse, peavad võimaldama plahvatuskaitse tüüpi EEx nA või EEx nC.
5. Peab rakendama abinõusid, et nimipinget üleminekute tõttu ei saaks ületatada üle 40 %.
6. Ümbritseva keskkonna temperatuurivahemik: 0° C kuni 60° C
7. Korpuse sisse tuleb sellisesse kohta, mis pärast avamist on hästi nähtav, panna silt järgmise hoiatusega:



Ettevaatust

Korpust tohib avada ainult lühikeseks ajaks, näiteks visuaalse diagnostika jaoks. Seejuures ärge kasutage ühtegi lülitit ega võtke välja ega pange sisse ühtegi sõlme ega lahutage ühtegi elektrijuhet (pistikühendused). Seda hoiatust võib mitte arvesse võtta, kui on teada, et ei esine mingit plahvatusohtlikku keskkonda.

Lubatud sõlmede/moodulite loetelu

Lubatud sõlmede/modulite loetelu leiate Te internetist:

<http://www4.ad.siemens.de/view/cs>

lisas-ID 13702947.

Ierīču/moduļu pielietojums sprādzienbīstamas teritorijas zonā 2

Zona 2

Sprādzienbīstamās teritorijas ir sadalītas zonās. Šīs zonas atšķir pēc sprādzienbīstamas atmosfēras pastāvēšanas iespējamības.

Zona	Sprādzienbīstamība	Piemērs
2	eksplozīva gāzes atmosfēra izveidojas reti un uz īsu laiku	Teritorijas ap atloku savienojumiem ar plakaniem blīvējumiem uz cauruļvadiem slēgtās telpās
droša teritorija	nē	<ul style="list-style-type: none"> Ārpus zonas 2 Decentralizētas perifērijas ierīces standartlietojumi

Turpmāk atrodamas svarīgas norādes par ierīču/moduļu uzstādīšanu sprādzienbīstamajā zonā.

Turpmāka informācija

Turpmāka informācija par ierīcēm/moduļiem ir atrodama attiecīgajā rokasgrāmatā.

Izgatavošanas vieta / Atļauja



II 3 G


EEx nA II T3 .. T6

saskaņā ar EN 50021 : 1999

Pārbaudes numurs: *skatīt tabulu*

Izgatavošanas vieta	Ierīces/moduļi	Pārbaudes numurs
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S	KEMA 01 ATEX 1238X
	S7-300 ET 200M Kopnes savienotājs DP/PA Diagnostikas atkārtotājs S7-300 Pret kļūdām aizsargātas ierīces	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Norāde

Ierīces/moduļi ar atļauju  II 3 G EEx nA II T3 .. T6 var tikt pielietotas tikai 3.kategorijas SIMATIC sistēmās.

Tehniskā apkope

Attiecīgu ierīču/moduļu remontam tie ir jānosūta ražotājam. Remontu drīkst veikt tikai tur.

Īpaši apstākļi

1. Ierīces/moduļi jāiebūvē sadales skapī vai metāla korpusā. Tiem jānodrošina aizsardzības līmenis ne mazāks kā IP 54 (saskaņā ar EN 60529). Turklāt, ierīces uzstādīšanā jāievēro apkārtējas vides apstākļi. Korpusam ir nepieciešams izgatavotāja apliecinājums zonai 2 (saskaņā ar EN 50021).
2. Ja uz kabeļa vai šī korpusa kabeļu ievades ekspluatācijas apstākļos tiek sasniegta temperatūra > 70 °C vai ja ekspluatācijas apstākļos uz kabeļa atzariem var būt temperatūra > 80 °C, kabeļu temperatūras īpašībām jāatbilst faktiski nomērītām temperatūrām.
3. Pielietojamām kabeļu ievadēm jāatbilst nepieciešamajam aizsardzības veidam IP un sadaļai 7.2 (saskaņā ar EN 50021).
4. Visām ierīcēm, ieskaitot pārslēgus utt., kas tiek pieslēgti pie SIMATIC sistēmu ievadēm un izvadēm, jābūt atļaujām EEx nA vai EEx nC tipa sprādzienaizsardzībai.
5. Nepieciešams veikt pasākumus, lai pārejas spriegums nepārsniegtu nominālo spriegumu vairāk kā par 40 %.
6. Apkārtējas temperatūras diapazons: 0° C līdz 60° C
7. Korpusa iekšpusē, vietā, kas ir labi redzama, atverot to, ir jāizvieto plāksne ar sekojošo brīdinājumu:

**Brīdinājums**

Korpusu var atvērt tikai īslaicīgi, piemēram, vizuālai diagnostikai. Pie tam nenospiediet nekādus slēdžus, neievietojiet un neizņemiet nekādas ierīces un nepārtrauciet elektriskās līnijas (spraudsavienojumus). Šis brīdinājums var tikt neņemts vērā, ja ir zināms, ka nepastāv sprādzienbīstama atmosfēra.

Pieļaujamo ierīču/moduļu saraksts

Pieļaujamo ierīču/moduļu saraksts ir atrodams Internetā:

<http://www4.ad.siemens.de/view/cs/>

zem datu ID 13702947.

Konstruktinių grupių/modulių panaudojimas sprogioje 2 zonos aplinkoje

Zona 2

Sprogi aplinka yra apibūdinama keliomis zonomis. Zonos skirstomos pagal galimos sprogios terpės atsiradimo tikimybę.

Zona	Sprogimo pavojus	Pavyzdys
2	sprogi atmosfera būna retai ir trumpai	Uždarų patalpų vamzdynuose - flanšo su tarpikliais sujungimų vietose
saugioji sritis	nėra	<ul style="list-style-type: none"> ne zonoje 2 Standartinė periferinė sistema

Toliau pateikiama informacija apie konstrukcinių grupių ir modulių montavimą sprogioje aplinkoje.

Papildoma informacija

Papildomos informacijos apie konstrukcines grupes/modulius rasite eksploatacijos vadove.

Pagaminimo vieta / Saugos reikalavimai




II 3 G EEx nA II T3 .. T6 pagal EN 50021 : 1999

Patikros numeris: žiūr. lentelėje

Pagaminimo vieta	Konstruktinės grupės/moduliai	Patikros numeris
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Ambergas Vokietija	ET 200S ET 200S nuo trukdžių apsaugotos konstrukcinės grupės	KEMA 01 ATEX 1238X
	S7-300 ET 200M Magistralinė jungtis DP/PA Diagnozės retransliatorius S7-300 nuo trukdžių apsaugotos konstrukcinės grupės	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Vokietija	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Nuoroda

Konstruktines grupės/modulius, kurių leidimas eksploatuoti yra  II 3 G EEx nA II T3 .. T6 galima naudoti tik 3 kategorijos sistemose "SIMATIC".

Priežiūra

Esant gedimams, konstrukcinę grupę/modulį išsiųskite gamintojui. Tik jis gali kvalifikuotai suremontuoti įtaisą.

Specialiosios sąlygos

1. Konstrukcines grupes/modulius montuokite jungimo spintoje arba metaliniame korpuse. Korpuso ar jungimo spintos saugos klasė turi būti mažiausiai "IP 54" (pagal EN 60529). Būtina atsižvelgti į kitas aplinkos sąlygas. Norint korpusą eksploatuoti zonoje 2, būtinas gamintojo pažymėjimas (pagal EN 50021).
2. Jei korpuso kabelio arba kabelio prijungimo temperatūra pakyla daugiau nei 70 °C arba laidų atšakoje temperatūra padidėja daugiau nei 80 °C, reikia naudoti kabelius, kurių terminės savybės atitinka išmatuotas temperatūros vertes.
3. Kabelių sujungimai turi būti saugos klasės IP ir atitikti 7.2 skyriaus (pagal EN 50021) reikalavimus.
4. Visi prietaisai, įskaitant ir jungiklius, jungiami sistemų "SIMATIC" įeigose ir išeigose, turi būti tipo "EEx nA" arba "EEx nC" - apsaugoti nuo sprogių.
5. Būtina imtis priemonių, kad pereinamųjų grandžių vardinė įtampa neviršytų 40 %.
6. Leistina aplinkos temperatūra: 0° C iki 60° C
7. Atidarę korpusą, jo viduje gerai matomoje vietoje, įtaisykite lentelę su įspėjimu:



Įspėjimas

Korpusą atidaryti tik trumpam laikui, pvz., patikrai. Neliesti jungiklių, konstrukcinių grupių neištraukti ir nekišti, neatjungti elektrinių sujungimų (kištukinių sujungimų).

Šio įspėjimo galima nepaisyti, kai yra žinoma, jog darbinė aplinka yra nesprogi.

Leistinių konstrukcinių grupių/modulių sąrašas

Leistinių konstrukcinių grupių/modulių sąrašą rasite interneto puslapyje:

<http://www4.ad.siemens.de/view/cs/>

įvedę kodą 13702947.

A főegységek/modulok alkalmazása a 2. zóna robbanásveszélyes környezetben

2. zóna

A robbanásveszélyes környezeteket zónákba sorolják be. A robbanásveszélyes légkör előfordulásának valószínűsége alapján különböztetik meg a zónákat.

Zóna	Robbanásveszély	Példa
2	robbanásveszélyes gázot tartalmazó légkör csak ritkán és rövid ideig lép fel	zárt helyiségekben elhelyezett csővezetékeknél a lapos tömítéssel rendelkező karimás kötések környezetében
biztonságos környezet	nem	<ul style="list-style-type: none"> a 2. zónán kívül a decentralis periféria készülékek standard alkalmazásai

A következőkben fontos utasításokat talál a főegységek/modulok telepítéséhez a robbanásveszélyes környezetbe.

További információk

A további információkat a főegységekhez/modulokhoz megtalálja a hozzátartozó kézikönyvben.

Gyártási hely / Engedélyezés




II 3 G EEx nA II T3 .. T6 az EN 50021 : 1999 szerint

Ellenőrző szám: lásd a táblázatot

Gyártási hely	Főegységek/modulok	Ellenőrző szám
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S ET 200S hibabiztos főegységek	KEMA 01 ATEX 1238X
	S7-300 ET 200M DP/PA buszcsatló Diagnózisrepeater S7-300 hibabiztos főegységek	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Utasítás

 Az II 3 G EEx nA II T3 .. T6 engedélyezéssel rendelkező főegységeket/modulokat alkalmazhatja csak a 3. felszerelés-kategóriába tartozó SIMATIC rendszerekbe.

Karbantartás

Javítás esetén küldje az érintett főegységeket/modulokat a gyártási helyre. Csak itt hajthatják végre a javítást.

Különleges feltételek

1. A főegységeket/modulokat egy kapcsolószekrénybe vagy egy fém házba kell beszerelni. Ezeknek kell biztosítaniuk legalább az IP 54 védeettségi fokozatot (EN 60529 szerint). Itt figyelembe kell venni azokat a környezeti feltételeket, amelyek fellépnek a készülék telepítésekor. A házhoz meg kell legyen a gyártói nyilatkozat a 2. zónához (az EN 50021 szerint).
2. Ha a jelen ház kábelén ill. kábelvezetésen üzemi feltételek mellett a hőmérséklet > 70 °C, vagy ha az üzemi feltételek mellett a hőmérséklet > 80 °C az érelágazásokon, akkor meg kell egyezzenek a kábel hőmérsékleti tulajdonságai a ténylegesen mért hőmérsékletekkel.
3. Az alkalmazott kábelvezetések meg kell feleljenek a követelt IP védeettségi fokozatnak és a 7.2. bekezdésnek (EN 50021 szerint).
4. Minden készülék, kapcsolót stb. beleértve, amelyeket a SIMATIC rendszerek be- és kimeneteire csatlakoztattak, engedélyezve kell legyen az EEx nA vagy EEx nC típusú robbanásvédelemhez.
5. Intézkedéseket kell hozni, hogy a tranziensek ne lépjék túl a névleges feszültséget több mint 40 %-al.
6. Környezeti hőmérséklet tartomány: 0° C ... 60° C
7. A házon belül -a nyitáskor jól látható helyen- helyezzen el egy táblát a következő figyelmeztetéssel:



Figyelmeztetés

A házat csak rövid ideig szabad nyitani, pl. optikai diagnózishoz. Eközben ne működtessen egy kapcsolót sem, ne húzzon ki vagy dugjon be egy főegységet sem és ne válasszon le villamos vezetőkeket (dugós csatlakozók). Ez a figyelmeztetés mellőzhető, ha tudott, hogy nem áll fenn robbanásveszélyes légkör.

A megengedett főegységek/modulok listája

A megengedett főegységek/modulok listáját megtalálja az interneten:

<http://www4.ad.siemens.de/view/cs/>

a 13702947 cikk azonosító szám alatt.

Tqeghid tal-Komponenti / Modules fiż-Żona 2, fejn hemm Riskju ta' Splużjoni

Żona 2

Sezzjonijiet fejn hemm riskju ta' splużjoni jitqassmu f'żoni. Tagħmel distinzjoni bejn żona u oħra skond il-probabbiltà li jkun hemm ambjent li jista' jwassal għal splużjoni.

Żona	Periklu ta' Splużjoni	Eżempju
2	ambjent gassuż li jista' jisplodi jfeġġ rament u għal żmien qasir	Żoni madwar flang ġojnts b'gaskits ċatti f'kanni ġewwa spazji magħluqin
żona ż-żgura	le	<ul style="list-style-type: none"> barra miż-żona 2 użu normali ta' <i>devices</i> periferali deċentralizzati

Issib hawn taft indikazzjonijiet importanti għall-installazzjoni ta' komponenti / *modules* fiż-żona fejn hemm riskju ta' splużjoni.

Aktar Tagħrif

Aktar tagħrif fuq il-komponenti / *modules* jinstab fil-manwal ikkonċernat.

Post ta' Manifattura / Approvazzjoni



II 3 G EEx nA II T3 .. T6 skond EN 50021 : 1999

Numru taċ-Ċertifikat: ara t-tabella

Post ta' Manifattura	Komponenti / Modules	Numru taċ-Ċertifikat
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S ET 200S <i>modules</i> ma jistgħux ifallu	KEMA 01 ATEX 1238X
	S7-300 ET 200M <i>bus coupling</i> DP/PA Ripetitur ta' dijanjosi S7-300 <i>modules</i> ma jistgħux ifallu	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Nota

Komponenti / *modules* bl-approvazzjoni II 3 G EEx nA II T3 .. T6 jistgħu jintużaw biss ġewwa sistemi SIMATIC tal-kategorija 3.

Manutenzjoni

Fil-każ li jkun hemm bżonn ta' tiswija, il-komponenti / *modules* ikkonċernati għandhom jintbagħtu fil-post ta' manifattura. It-tiswijiet jistgħu jsiru biss f'dan il-post.

Kundizzjonijiet Speċjali

1. Komponenti / *modules* għandhom jiġu mmontati ġewwa swiċċ kabinett jew kaxxa tal-metall. Dawn iridu jggarantixxu protezzjoni mill-inqas tat-tip IP 54 (skond EN 60529). Inti u tagħmel hekk, trid taħseb għall-kundizzjonijiet ambjentali ta' waqt l-installazzjoni tad-*device*. Irid ikun hemm dikjarazzjoni tal-manifatturier għall-kaxxa għaž-żona 2 (skond EN 50021).
2. Jekk fil-kejbil, jew fil-kaxxa mad-daħla għall-kejbil, tintlaħaq temperatura ta' aktar minn 70 °C taħt kundizzjonijiet ta' ħidma, jew jekk fil-post fejn jinfirdu l-wajers jista' jkun li hemm temperatura ta' aktar minn 80 °C, il-kejbil irid ikollu proprjetajiet ta' temperatura xierqa għat-temperaturi tabilhaqq imkejlin.
3. Id-daħliet għall-kejbil li jintużaw iridu jikkonformaw mat-tip ta' protezzjoni IP mitlub u t-taqsima 7.2 (skond EN 50021).
4. Id-*devices* kollha, swiċċijiet etc. inkluzi, li jitqabbdur ma' l-*inputs* u l-*outputs* ta' sistemi SIMATIC, iridu jkunu approvati għal protezzjoni kontra splużjoni tat-tip EEx nA jew EEx nC.
5. Iridu jittieħdu miżuri biex il-vultaġġ nominali ma jitqabbiżx b'aktar minn 40% minħabba transitorji.
6. Varjazzjoni tat-temperatura ambjentali: 0° C sa 60° C
7. Għandha titqiegħed tabella bit-twissija li ġejja ġewwa l-kaxxa, f'post li jidher sew wara li tinfetaħ il-kaxxa:



Twissija

Il-kaxxa tista' tinfetaħ biss għal żmien qasir, per eżempju għal dijanjosi viżwali. Inti u tagħmel hekk, ma tista' tmiss l-ebda swiċċ, ddaħħal jew tneħħi l-ebda *module* u tneħħi l-ebda kejbil elettriku (konnessjonijiet li tipplaggjahom).

Tista' ma tagħtix każ ta' din it-twissija meta taf li m'hemmx riskju ta' splużjoni fl-ambjent.

Lista ta' Komponenti / *Modules* Approvati

Issib il-lista ta' komponenti / *modules* approvati fl-internet:

<http://www4.ad.siemens.de/view/cs/>

bin-numru ta' identifikazzjoni 13702947.

Zastosowanie grup konstrukcyjnych / modułów w 2 strefie zagrożenia wybuchem

Strefa 2

Otoczenie zagrożone wybuchem dzielone jest na strefy. Strefy dzielą się ze względu na stopień prawdopodobieństwa powstania atmosfery stwarzającej możliwość powstania wybuchu.

Strefa	Niebezpieczeństwo eksplozji	Przykład
2	atmosfera gazowa z zagrożeniem wybuchem występuje rzadko i na krótki okres czasu	miejsca wokół łącz w kanałach technicznych z opaskami przy przewodach instalacyjnych w pomieszczeniach zamkniętych
obszar bezpieczny	nie	<ul style="list-style-type: none"> poza 2 strefą standardowe zastosowanie decentralnych urządzeń peryferyjnych

Dalej znajdują Państwo informacje dotyczące instalacji grup konstrukcyjnych / modułów w otoczeniu zagrożonym wybuchem.

Pozostałe informacje

Dalsze informacje dotyczące grup konstrukcyjnych / modułów znajdują Państwo w odpowiedniej instrukcji.

Miejsce produkcji / Rejestracja



II 3 G


EEx nA II T3 .. T6

stosownie do EN 50021 : 1999

Nr testu: zobacz tabela

Miejsce produkcji	Grupy konstrukcyjne / moduły	Nr testu
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Niemcy	ET 200S ET 200S grupy konstrukcyjne odporne na uszkodzenia	KEMA 01 ATEX 1238X
	S7-300 ET 200M Zbierające łącze sprzężające DP/PA powtarzacz diagnozy S7-300 grupy konstrukcyjne odporne na uszkodzenia	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Niemcy	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Uwaga

Grupy konstrukcyjne / moduły zarejestrowane jako  II 3 G EEx nA II T3 .. T6 wolno stosować jedynie w systemach SIMATIC o 3 kategorii urządzenia.

Konserwacja

W celu naprawy należy odpowiednie grupy konstrukcyjne / moduły przesać do miejsca produkcji. Jedynie serwis producenta jest upoważniony do dokonywania napraw.

Warunki szczególne

1. Grupy konstrukcyjne / moduły muszą zostać zamontowane do skrzynki ochronnej lub metalowej puszkii ochronnej. Muszą one spełniać wymagania co najmniej stopnia IP 54 (stosownie do EN 60529). Należy brać pod uwagę warunki otoczenia, w którym urządzenie będzie instalowane. Należy posiadać oświadczenie producenta dopuszczające puszkę do użytku w strefie 2 (stosownie do EN 50021).
2. W przypadku, gdyby na przewodzie tej puszkii podczas pracy temperatura mogła przekroczyć > 70 °C, lub żyła przewodu mogłaby osiągnąć temperaturę > 80 °C, właściwości cieplne przewodu muszą zostać dobrane do takich wartości.
3. Wszystkie stosowane przewody muszą odpowiadać właściwemu stopniowi ochrony IP oraz warunkom określonym w punkcie 7.2 (stosownie do EN 50021).
4. Wszystkie urządzenia włączając w to przełączniki itp., które podłączane są do wejść lub wyjść systemów SIMATIC muszą być dopuszczone do ochrony przeciw wybuchom typu EEx nA lub EEx nC.
5. Muszą zostać spełnione takie warunki, aby napięcie miana w przejściach nie mogło przekroczyć więcej niż 40 %.
6. Temperatura otoczenia: od 0° C do 60° C
7. W puszcze w dobrze widocznym po otwarciu miejscu należy umieścić ostrzeżenie następującej treści:

**Uwaga**

Puszkę wolno otworzyć jedynie na krótki okres czasu na przykład w celu kontroli optycznej. Nie wolno przy tym naciskać na żaden z przełączników, nie wolno wyciągać ani montować żadnej grupy konstrukcyjnej ani też odłączać żadnych przewodów elektrycznych (łącza wsuwkowe). Powyższego ostrzeżenia nie trzeba przestrzegać jeśli wiadomo jest, iż na miejscu nie ma zagrożenia wybuchem.

Lista dopuszczonych grup konstrukcyjnych / modułów

Wykaz dopuszczonych grup konstrukcyjnych / modułów znajduje się na stronie internetowej:

<http://www4.ad.siemens.de/view/cs/>

w części ID 13702947.

Použitie konštrukčných skupín / modulov v prostredí s nebezpečenstvom výbuchu zóny 2

Zóna 2

Prostredia s nebezpečenstvom výbuchu sa rozdeľujú do zón. Zóny sa rozlišujú podľa pravdepodobnosti prítomnosti atmosféry so schopnosťou výbuchu.

Zóna	Nebezpečenstvo explózie	Príklad
2	plynová atmosféra s nebezpečenstvom výbuchu sa vyskytuje len zriedka a krátkodobo	priestory okolo prírubových spojov s plochými tesneniami pri potrubných vedeniach v uzavretých priestoroch
bezpečná oblasť	nie	<ul style="list-style-type: none"> • mino zóny 2 • štandardné použitia decentralnej periferie

Ďalej nájdete dôležité pokyny pre inštaláciu konštrukčných skupín / modulov v prostredí s nebezpečenstvom výbuchu.

Ďalšie informácie

Ďalšie informácie ku konštrukčným skupinám / modulom nájdete v príslušnej príručke.

Miesto vyhotovenia / Osvedčenie




II 3 G EEx nA II T3 .. T6 podľa EN 50021 : 1999

Číslo skúšky : pozri tabuľka

Miesto vyhotovenia	Konštrukčné skupiny / moduly	Číslo skúšky
Siemens AG, divízia A&D Werner-von-Siemens-Straße 50 92224 Amberg Nemecko	ET 200S ET 200S konštrukčné skupiny odolné voči poruchám	KEMA 01 ATEX 1238X
	S7-300 ET 200M Zbernicový väzbový člen DP/PA opakovač diagnózy S7-300 konštrukčné skupiny odolné voči poruchám	KEMA 02 ATEX 1096X
Siemens AG, divízia A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Nemecko	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Upozornenie

Konštrukčné skupiny / moduly s osvedčením  II 3 G EEx nA II T3 .. T6 sa smú používať len v systémoch SIMATIC kategórie zariadenia 3.

Údržba

Za účelom opravy sa musia príslušné konštrukčné skupiny / moduly zaslať na miesto vyhotovenia. Oprava sa smie vykonávať len na tomto mieste !

Špeciálne podmienky

1. Konštrukčné skupiny / moduly sa musia vmontovať do spínacej skrine alebo do kovového puzdra schránky. Tie musia zabezpečovať druh ochrany minimálne IP 54 (podľa EN 60529). Pritom je potrebné zohľadniť podmienky prostredia, do ktorého sa bude zariadenie inštalovať. V prípade puzdra musí existovať vyhlásenie výrobcu pre zónu 2 (podľa EN 50021).
2. V prípade, že na kábli, prípadne na káblovom prívode tohto puzdra presiahne teplota pri prevádzkových podmienkach hodnotu > 70 °C, alebo ak na vetve žily môže byť pri prevádzkových podmienkach teplota > 80 °C, musia tepelné vlastnosti kábla vyhovovať skutočne nameraným hodnotám.
3. Všetky použité káblové prívody musia zodpovedať požadovanému druhu ochrany IP a odseku 7.2 (podľa EN 50021).
4. Všetky zariadenia, vrátane prepínača, atď., ktoré sa pripoja na vstupy a výstupy systémov SIMATIC, musia byť schválené pre ochranu voči výbuchu typu EEx nA alebo EEx nC.
5. Musia sa splniť také opatrenia, aby sa menovité napätie cez prechody nemohlo prekročiť o viac ako 40 %.
6. Rozsah okolitých teplôt: 0° C až 60° C
7. V puzdre je na dobre viditeľné miesto po otvorení potrebné umiestniť štítok s nasledovnou výstrahou:



Výstraha

Puzdro sa môže otvoriť len počas krátkej doby, napríklad pre vizuálnu diagnózu. Nestlačte pritom žiadny prepínač, nevytiahnite alebo nezasuňte žiadnu konštrukčnú skupinu a neoddeľte žiadne elektrické vedenia (zástrčkové spojenia).

Túto výstrahu si nemusíte všímať v takom prípade, ak je známe, že sa na mieste nevyskytuje atmosféra s nebezpečenstvom výbuchu.

Zoznam dovolených konštrukčných skupín / modulov

Zoznam dovolených konštrukčných skupín / modulov sa nachádza na internete :

<http://www4.ad.siemens.de/view/cs/>

v článku ID 13702947.

Uporaba sklopov/modulov v eksplozivno ogroženem območju cone 2

Cona 2

Eksplozivno ogrožena območja se delijo na cone. Cone se ločijo po verjetnosti prisotnosti eksplozivne atmosfere.

Cona	Nevarnost eksplozije	Primer
2	eksplozivna zmes plinov v atmosferi je redka in traja le kratko.	Območja okoli prirobnih spojev z ploskimi tesnili pri cevni napeljavah v zaprtih prostorih.
sigurno območje	ne	<ul style="list-style-type: none"> izven cone 2 Standardna uporaba decentralne periferije.

Sledijo pomembni napotki o inštalaciji sklopov/modulov v eksplozivno ogroženem območju.

Nadaljnje informacije

Nadaljnje informacije o sklopih/modulih najdete v priloženem priročniku.

Mesto izdelave / Dovoljenje - Atest



II 3 G

EEx nA II T3 .. T6

po EN 50021 : 1999

kontrolna številka: *glej tabelo*

Mesto izdelave	Sklopi/moduli	kontrolna številka:
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S ET 200S Sklopi varovani proti okvari	KEMA 01 ATEX 1238X
	S7-300 ET 200M bus vezava DP/PA Diagnostni repeater S7-300 Sklopi varovani proti okvari	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Opozorilo

Sklopi/moduli z dovoljenjem II 3 G EEx nA II T3 .. T6 se lahko uporabijo samo v SIMATIC-Sistemih kategorije 3 .

Vzdrževanje

V primeru popravila pošljete sklope/module na kraj izdelave. Popravila lahko izvajajo samo na tem naslovu!

Posebni pogoji

1. Sklopi/module se morajo vgraditi v elektro omaro ali metalno ohišje. Omara/ohišje mora zadostiti varovanju IP 54 (po EN 60529). Pri tem je potrebno upoštevati tudi pogoje okolice, v kateri se naprava nahaja. Ohišje mora imeti izjavo (atest) proizvajalca za uporabo v coni 2 (po EN 50021).
2. Če na kablu oz. uvodnici tega ohišja v režimu obratovanja temperatura doseže vrednost $> 70\text{ }^{\circ}\text{C}$ ali če doseže na razcepah vodnikov v obratovanju temperatura vrednost $> 80\text{ }^{\circ}\text{C}$, se morajo temperaturne lastnosti kablov skladati z dejansko namerjenimi.
3. Uporabljene uvodnice morajo ustrezati predpisani IP zaščiti in poglavju 7.2 (po EN 50021).
4. Vse naprave, vključno s stikali itd., ki so priklopljene na vhodih oz. izhodih sistemov SIMATIC, morajo biti odobrene za zaščito proti eksplozijam tipa EEx nA ali EEx nC.
5. Zagotoviti se mora, da nazivna napetost ne prekorači več kot 40% pri tranziencah (preklopih, vklopih,...).
6. Temperaturno območje okolice: 0°C do 60°C
7. V notranjosti ohišja, na odprtem dobro vidljivem mestu, se pritrdi napis z naslednjim opozorilom:



Opozorilo

Ohišje se lahko odpre samo za kratek čas, npr. za vizualno diagnozo. Pri tem ne vklaplajte/izklaplajte stikal, sklopov ali električnih vodnikov (vtičnih spojev). Opozorilo ne velja, kadar je znano, da ni eksplozivne atmosfere.

Seznam dovoljenih sklopov/modulov

Seznam dovoljenih sklopov/modulov najdete na internetu na spletni strani:

<http://www4.ad.siemens.de/view/cs/>

pod ID prispevka 13702947.

Patlama tehlikesi olan Alan 2 bölgesinde ünite gruplarının/modüllerin kullanılması

Alan 2

Patlama tehlikesi olan bölgeler alanlara ayrılır. Alanlar, patlayabilecek atmosfere sahip ortam ihtimaline göre farklı derecelere ayrılır.

Alan	Patlama tehlikesi	Örnek
2	Patlayıcı gaz atmosferi sadece nadir ve kısa bir süre için söz konusu	Kapalı alanlardaki boru bağlantılarında yassı contalı flanş bağlantıları civarındaki bölgeler
Güvenli bölge	hayır	<ul style="list-style-type: none"> Alan 2 haricinde Merkezi olmayan periferi standart uygulamaları

Aşağıda, ünite gruplarının/modüllerin patlama tehlikesi olan bölgelerde kurulması için önemli bilgiler bulacaksınız.

Daha başka bilgiler

Ünite grupları/modüller hakkında daha fazla bilgi için ilgili kılavuza bakınız.

İmalat yeri / Lisans



II 3 G

EEx nA II T3 .. T6

EN 50021 standartına göre: 1999

Test numarası: bkz. Tablo

İmalat yeri	Ünite grupları/Modüller	Kontrol numarası
Siemens AG, Bereich A&D Werner-von-Siemens-Straße 50 92224 Amberg Germany	ET 200S ET 200S Hataya karşı emniyetli ünite grupları	KEMA 01 ATEX 1238X
	S7-300 ET 200M Bus kplajı DP/PA Diyagnoz repeater ünitesi S7-300 Hataya karşı emniyetli ünite grupları	KEMA 02 ATEX 1096X
Siemens AG, Bereich A&D Östliche Rheinbrückenstr. 50 76187 Karlsruhe Germany	S7-400	KEMA 03 ATEX 1125X
	S7-300 CP TS Adapter II	KEMA 03 ATEX 1228X
	SIMATIC NET	KEMA 03 ATEX 1226X

Bilgi

Ⓔ II 3 G EEx nA II T3 .. T6 lisanslı ünite grupları/modüller sadece 3 numaralı cihaz kategorisine ait SIMATIC sistemlerine kullanılabilir.

Bakım ve koruma

Bir onarım gerekli olması halinde, ilgili ünite grupları/modüller imalat yerine gönderilmelidir. Onarım sadece orada yapılabilir ve yapılmalıdır.

Özel koşullar

1. Ünite grupları/modüller bir şalter dolabı içine veya metal kasa içine monte edilmelidir. Bu kasalar en az IP 54 (EN 60529 standartına göre) koruma türüne ait olmalıdır. Burada, cihazın kurulduğu çevre koşulları dikkate alınmalıdır. Kullanılacak kasa için, alan 2 için geçerli bir üretici beyanı mevcut olmalıdır (EN 50021 standartına istinaden).
2. Kabloda ya da bu kasanın kablo girişindeki işletme koşullarında sıcaklık > 70 °C oluyorsa veya işletme koşullarında kablo telleri (damarları) ayrılma noktasında sıcaklık > 80 °C olma ihtimali varsa, kablonun sıcaklık ile ilgili özellikleri, gerçekten ölçülmüş sıcaklıklara uygun olmalıdır.
3. Kullanılmış olan kablo girişleri, talep edilen IP koruma türüne ve bölüm 7.2 (EN 50021 standartına göre) dahilindeki taleplere uygun olmalıdır.
4. SIMATIC sistemlerinin giriş ve çıkışlarına bağlanan tüm cihazlar (şalterler vs. dahil) için, EEx nA veya EEx nC patlamaya karşı koruma tipine istinaden izin alınmış olmalıdır.
5. Nominal gerilimin transiyentlerden (hatlardaki dalgalanmalardan dolayı ani gerilim ve akım değişiklikleri) dolayı azami %40 aşılması için gerekli önlemler alınmalıdır.
6. Çevre sıcaklığı aralığı: 0° C ile 60° C arasında
7. Kasa dahilinde, açıldıktan sonra iyi görülebilen bir yere aşağıdaki uyarı takılmalıdır:



İkaz

Kasa sadece kısa bir süre açılmalıdır, örn. görsel diyagnoz için. Herhangi bir şaltere basmayınız, herhangi bir ünite grubunu çekip çıkarmayınız veya takmayınız, elektrik hatlarını (soket bağlantıları) ayırmayınız. Eğer patlama tehlikesi söz konusu olan bir atmosfer olmadığı biliniyorsa, işbu ikaz göz ardı edilebilir.

İzin verilmiş olan ünite gruplarının/modüllerin listesi

İzin verilmiş olan ünite gruplarının/modüllerin listesi için internete bakınız:

<http://www4.ad.siemens.de/view/cs/>

Doküman ID 13702947.

SIEMENS

Introduction

1

Operating instructions

2

SIMATIC

Distributed I/O system ET 200S

Product Information

Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.



Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.



Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.



Caution

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:



Warning

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of contents

- 1 Introduction..... 1-1
- 2 Operating instructions..... 2-1

Introduction

This product information describes corrections and amendments to the *ET 200S I/O Distributed I/O System operating instructions* (A5E00515770-03), release 12/2005.

The chapter numbers specified in this product information refer to the chapters in the *ET 200S I/O Distributed I/O System operating instructions*(A5E00515770-03), release 12/2005.

Operating instructions

5.4.8 Wiring the interface module with PROFINET I/O interface (electrical)

Note

Guideline for setting up modules with PROFINET I/O interfaces

You may only operate modules with PROFINET I/O interfaces in LAN networks if all connected users are equipped with SELV/PELV power supplies (or have equivalent protection).

For linking up to the WAN a data transfer point is prescribed that guarantees this degree of safety.

Note

When using a CPU 315-2 PN/DP or CPU 317-2 PN/DP an industrial-quality switch must be placed directly on the CPU to which the downstream I/O devices must be connected.

10.8.1 Properties of the IM151-3 PN interface module

Restrictions when operating the modules with the IM151-3 PN

The following modules cannot be used with the IM151-3 PN:

Module	up to order number	up to product status
2AO U; HIGH FEATURE	6ES7135-4LB01-0AB0	3
2AO I; HIGH FEATURE	6ES7135-4MB01-0AB0	3
1SI serial interface module	6ES7138-4DF00-0AB0	4
Modbus/USS serial interface module	6ES7138-4DF10-0AB0	4
2PULSE	6ES7138-4DD00-0AB0	
1COUNT 24V/100kHz (for 6ES7151-3AA00-0AB0)		

10.9.1 Properties of the IM151-3 PN HIGH FEATURE interface module

Restrictions when operating the modules with IM151-3 PN HIGH FEATURE

The following modules cannot be used with the IM151-3 PN HIGH FEATURE:

Module	up to order number	up to product status
2AO U; HIGH FEATURE	6ES7135-4LB01-0AB0	3
2AO I; HIGH FEATURE	6ES7135-4MB01-0AB0	3
1SI serial interface module	6ES7138-4DF00-0AB0	4
Modbus/USS serial interface module	6ES7138-4DF10-0AB0	4
2PULSE	6ES7138-4DD00-0AB0	

SIEMENS

SIMATIC

Distributed I/O system ET 200S

Product Information

Introduction

1

New Information About the
"ET 200S Distributed I/O
System Operating
Instructions"

2

New Information About the
"ET 200S Distributed I/O
System Manual"

3

Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.



Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.



Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.



Caution

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:



Warning

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

This product information describes supplements to the *ET 200S Distributed I/O System Operating Instructions* (A5E00515770-03), release 12/2005 and to the *ET 200S Distributed I/O System Manual* (A5E00514526-03), release 12/2005.

The chapter number mentioned in this product information refer to the chapters in the *ET 200S Distributed I/O System Operating Instructions* (A5E00515770-03), release 12/2005 and to the *ET 200S Distributed I/O System Manual* (A5E00514526-03), release 12/2005.

New Information About the "ET 200S Distributed I/O System Operating Instructions"

2

Introduction

This information is new and replaces the information in Sections 7.4, 8.1.3, 8.2.3 and 8.1.4.10 in the *ET 200S Distributed I/O System Operating Instructions* (A5E00515770-03), release 12/2005.

2.1 Identification Data

7.4 Identification Data

Reading of identification data

Table 2-1 Identification Data

Identification Data	Access	Default setting	Explanation
Identification data 0: Index 1 (Data record 231)			
MANUFACTURER_ID	Read (2 bytes)	2A hex (= 42 dec)	The name of the manufacturer is stored here. (42 dec = SIEMENS AG)
ORDER_ID	Read (20 bytes)	Depends on the module	Order number of the module
SERIAL_NUMBER	Read (16 bytes)	not relevant	
HARDWARE_REVISION	Read (2 bytes)	not relevant	
SOFTWARE_REVISION	Read (4 bytes)	Firmware version	This indicates the firmware version of the module.
REVISION_COUNTER	Read (2 bytes)	-	Provides information on parameter modifications on the module.
PROFILE_ID	Read (2 bytes)	F600 hex	Generic Device
PROFILE_SPECIFIC_TYPE	Read (2 bytes)	0003 hex 0005 hex	On electronic modules on interface modules
IM_VERSION	Read (2 bytes)	0101 hex	Provides information on the ID data version (0101 hex = version 1.1)
IM_SUPPORTED	Read (2 bytes)	000E hex	Provides information on existing identification data (index 2 to 4)

2.2 Evaluating the Interrupts of the ET 200S

Identification Data	Access	Default setting	Explanation
Maintenance data 1: Index 2 (Data record 232)			
TAG_FUNCTION	Read/write (32 bytes)	-	Define a unique identifier for the module in this record.
TAG_LOCATION	Read/write (22 bytes)	-	Enter the installation location of the module here.
Maintenance data 2: Index 3 (data record 233)			
INSTALLATION_DATE	Read/write (16 bytes)	-	Enter the installation date of the module here.
RESERVED	Read/write (38 bytes)	-	Reserved
Maintenance data 3: Index 4 (data record 234)			
DESCRIPTOR	Read/write (54 bytes)	-	Enter a comment on the module here.

2.2 Evaluating the Interrupts of the ET 200S

8.1.3 Evaluating the Interrupts of the ET 200S

"Process interrupt lost" Diagnostics

The "Process interrupt lost" diagnostics is not available for modules at present.

Note

Process interrupts should not be used for technological purposes (e.g. cyclical generation of process interrupts).

If more than approximately 90 process interrupts are generated per second, process interrupts may be lost.

2.3 Evaluating the Interrupts of the ET 200S

8.1.3 Evaluating the Interrupts of the ET 200S

"Process interrupt lost" Diagnostics

The "Process interrupt lost" diagnostics is not available for modules at present.

Note

Process interrupts should not be used for technological purposes (e.g. cyclical generation of process interrupts).

If more than approximately 90 process interrupts are generated per second, process interrupts may be lost.

2.4 Interrupts

8.1.4.10 Interrupts

Process interrupt of analog input modules

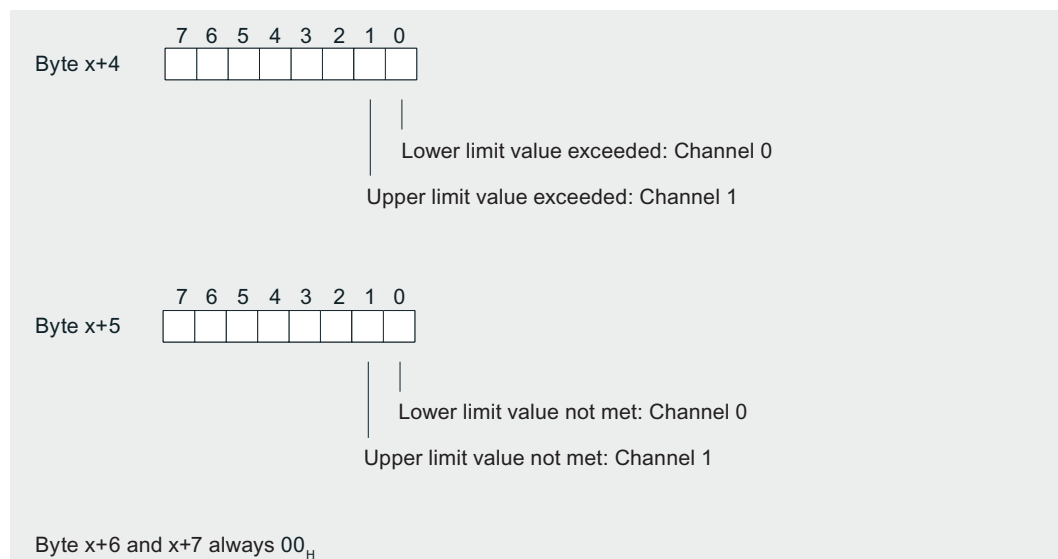


Figure 2-1 Structure as of Byte x+4 and Byte x+5 for process interrupt (analog input)

New Information About the "ET 200S Distributed I/O System Manual"

3

Introduction

This information is new and replaces the information in Sections 4.5.2, 4.5.6, 4.7, 4.13, 4.20 and 4.22 in the *ET 200S I/O Distributed I/O System Manual* (A5E00514526-03), release 12/2005.

3.1 Parameters for Analog Electronic Modules 2AI U High Feature and 2AI I 2/4WIRE High Feature

4.5.2 Parameters for Analog Electronic Modules 2AI U High Feature and 2AI I 2/4WIRE High Feature

Table 3-1 Parameters for analog electronic input modules U, I High Feature

2AI U High Feature	2AI I 2/4WIRE High Feature	Value range	Default setting	Range of efficiency
Group diagnostics (parameter assignment error, internal error)		<ul style="list-style-type: none"> • Disable • Enable 	Disable	Module
Diagnostics: Overflow/underflow		<ul style="list-style-type: none"> • Disable • Enable 	Disable	Module
Interference frequency suppression ³		<ul style="list-style-type: none"> • Disable • Enable 	Disable	Module
Diagnostics: Wire break ²	Diagnostics: Wire break ¹	<ul style="list-style-type: none"> • Disable • Enable 	Disable	Channel
Smoothing ³		<ul style="list-style-type: none"> • None • Weak • Medium • Strong 	None	Channel
Type/range of measurement	---	<ul style="list-style-type: none"> • De-activated • ± 5 V • 1 V to 5 V • ± 10 V 	± 10 V	Channel
---	Type/range of measurement	<ul style="list-style-type: none"> • De-activated • 4 mA to 20 mA, 2DMU • 4 mA to 20 mA, 4DMU • ± 20 mA 	4 mA to 20 mA, 4DMU	Channel
¹ Only in the measuring range 4 mA to 20 mA ² Only in the measuring range 1 V to 5 V ³ Not at isochronous operation				

3.2 Parameters for Analog Electronic Modules 2AO U ST, 2AO U High Feature and 2AO I ST, 2AO I High Feature

3.2 Parameters for Analog Electronic Modules 2AO U ST, 2AO U High Feature and 2AO I ST, 2AO I High Feature

4.5.6 Parameters for Analog Electronic Modules 2AO U ST, 2AO U High Feature and 2AO I ST, 2AO I High Feature

Table 3-2 Parameters for analog output modules U, I

2AO U ST, 2AO U High Feature	2AO I ST, 2AO I High Feature	Value range	Default setting	Range of efficiency
Group diagnostics (parameter assignment error, internal error)		<ul style="list-style-type: none"> • Disable • Enable 	Disable	Module
Behavior in event of CPU/master STOP		<ul style="list-style-type: none"> • No output current and voltage • Switch substitution value • Keep last value 	No output current and voltage	Module
Diagnostics: Short-circuit to M ¹	---	<ul style="list-style-type: none"> • Disable • Enable 	Disable	Channel
---	Diagnostics: Wire break ¹	<ul style="list-style-type: none"> • Disable • Enable 	Disable	Channel
Type/range of output	---	<ul style="list-style-type: none"> • De-activated • 1 V to 5 V • ± 5V • ± 10 V 	± 10 V	Channel
---	Type/range of output	<ul style="list-style-type: none"> • De-activated • 4 mA to 20 mA • ± 20 mA 	4 mA to 20 mA	Channel
Substitute value ²		To 65535 (value range must be within the nominal range)	± 10 V: 0 V ± 20 mA: 0 mA 4 mA to 20 mA: 4 mA 1 V to 5 V: 1 V	Channel

¹ No diagnostics recognition between -0.296 V and +0.296 V or -1.1852 mA and +1.1852 mA

² If there is no voltage going to the interface module or COMPACT module but the supply to the analog output modules continues, the substitute values that have been assigned parameters are output. Substitute values must lie within the nominal range. You can assign values from -27648 to +27648 as parameters (in the case of parameter assignment by means of the device database (GSD) file).

3.3 2AI U High Feature Analog Electronic Module (6ES7134-4LB02-0AB0)

4.7 2AI U High Feature Analog Electronic Module (6ES7134-4LB02-0AB0)

Properties

- 2 inputs for measuring voltage
- Input ranges:
 - ± 5 V, resolution 15 bits + sign
 - ± 10 V, resolution 15 bits + sign
 - 1 V to 5 V, resolution 15 bits
- Isolated from the load voltage L+
- Permitted common-mode voltage between the channels 100 VAC
- Supports isochronous operation
 - Minimum time for the synchronous DP cycle (T_{DPmin}): 0.7 ms
 - Minimum conversion time of the input modules: (T_{WEmin}): 0.5 ms
- Supports I&M functions

General terminal assignment

Note

Terminals 4, 8, A4, A8, A3 and A7 are only available at specified terminal modules.

Terminal assignment for 2AI U High Feature (6ES7134-4LB02-0AB0)				
Terminal	Assignment	Terminal	Assignment	Notes
1	M ₀₊	5	M ₁₊	<ul style="list-style-type: none"> • M_{n+}: Input signal "+", channel n • M_{n-}: Input signal "-", channel n • n.c.: Not connected (max. 30 VDC can be connected) • AUX1: Protective-conductor terminal or potential bus (freely usable up to 230 VAC)
2	M ₀₋	6	M ₁₋	
3	n.c.	7	n.c.	
4	n.c.	8	n.c.	
A4	AUX1	A8	AUX1	
A3	AUX1	A7	AUX1	

Usable terminal modules

Usable terminal modules for 2AI U High Feature (6ES7134-4LB02-0AB0)				
TM-E15C26-A1 (6ES7193-4CA50-0AA0)	TM-E15C24-A1 (6ES7193-4CA30-0AA0)	TM-E15C24-01 (6ES7193-4CB30-0AA0)	TM-E15C23-01 (6ES7193-4CB10-0AA0)	← Spring terminal
TM-E15S26-A1 (6ES7193-4CA40-0AA0)	TM-E15S24-A1 (6ES7193-4CA20-0AA0)	TM-E15S24-01 (6ES7193-4CB20-0AA0)	TM-E15S23-01 (6ES7193-4CB00-0AA0)	← Screw terminal
TM-E15N26-A1 (6ES7193-4CA80-0AA0)	TM-E15N24-A1 (6ES7193-4CA70-0AA0)	TM-E15N24-01 (6ES7193-4CB70-0AA0)	TM-E15N23-01 (6ES7193-4CB60-0AA0)	← Fast Connect
				<p>Wiring examples</p>

Block diagram

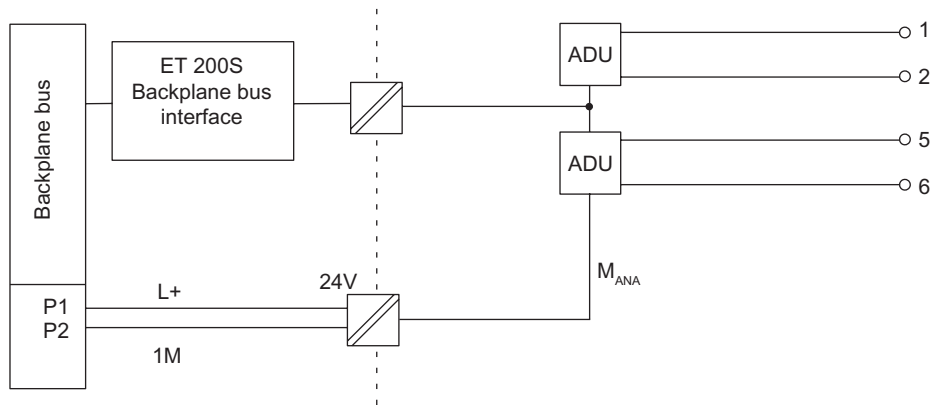


Figure 3-1 Block diagram of the 2AI U High Feature

2AI U High Feature Technical Specifications (6ES7134-4LB02-0AB0)

Dimensions and Weights	
Dimensions W × H × D (mm) (the total dimensions depend on the selected terminal module)	15 x 81 x 52
Weight	Approx. 45 g

Data for specific modules	
Supports isochronous operation *	Yes
Supports I&M functions	Yes
Number of inputs	2
Cable length	
• Shielded	Max. 200 m
Parameter length	12 bytes
Analog value representation	S5 and S7 format
* Is supported if no interference frequency suppression or smoothing is configured.	

Voltages, Currents, Potentials	
Rated load voltage L+ (from the power module)	24 VDC
• Reverse polarity protection	Yes
• Supply of the measuring transducers	No
Galvanic isolation	
• Between the channels and backplane bus	Yes
• Between the modules and load voltage L+	Yes
• Between the channels and PE	Yes
• Between the channels	No
Permissible potential difference	
• Between the channels	140 VDC / 100 VAC
Insulation tested	500 VDC
Current consumption	
• From load voltage L+	55 mA max.
Power dissipation of the module	Typically 0.85 W

Status, interrupts, diagnostics	
Diagnostics functions	
• Group error	Red "SF" LED
• Diagnostics functions readable	Yes
• Process interrupts *	Configurable, violation of upper and lower limits
* Process interrupts are only sent if the process interrupt mechanism is not overloaded.	

Analog value generation			
Measuring principle	Sigma-Delta		
Conversion and cycle time			
• Integration time can be assigned parameters	Yes		
• Interference frequency suppression in Hz	60	50	None
• Conversion time in ms (per channel)	17	20	0,04
• Cycle time in ms (per module)	18	21	0,5
Resolution (including overrange)	± 10 V / 15 bits + sign ± 5 V / 15 bits + sign 1 V to 5 V / 15 bits		

Suppression of interference, error limits	
Interference voltage suppression for $f = n \times (f_1 \pm 0.5 \%)$, ($f_1 =$ interference frequency)	
• Common-mode interference (U_{SS})	Min. 100 dB
• Series-mode interference (peak interference value < rated value of input range)	Min. 90 dB
• Crosstalk between the inputs	Min. -100 dB
Operational limit (in the entire temperature range, with reference to the input range)	± 0.1% with interference frequency suppression ± 0.2% without interference frequency suppression
Basic error limit (operation limit at 25°C)	± 0.05% with interference frequency suppression ± 0.1% without interference frequency suppression
Temperature error (with reference to the input range)	± 0.003 %/K
Linearity error (with reference to the input range)	± 0,01 %
Repeatability (in steady state at 25 °C with reference to the input range)	± 0,01 %

Sensor selection data		
Input range (rated value) / input resistance		
• Voltage	± 10 V / min. 0.8 MΩ ± 5 V / min. 0.8 MΩ 1 V to 5 V / min. 0.8 MΩ	
Permitted input voltage (destruction limit)	35 V continuous 75 V for 1 ms max., pulse duty factor 1: 20	
Smoothing of the measured values	Yes, parameters can be assigned in 4 steps by means of digital filtering	
	Step None Weak Medium Strong	Time constant 1 x cycle time 4 x cycle time 16 x cycle time 32 x cycle time

I&M functions

Reading of the I&M data from the module is possible with interface modules as from a higher order number (MLFB) or as from a higher firmware/product version than described in the following table:

Interface module	Order no.	Firmware version	Product version
IM151-1 HIGH FEATURE	6ES7151-1BA01-0AB0	V2.0	02
IM151-3 PN	6ES7151-3AA20-0AB0	V4.0	01
IM151-3 PN HIGH FEATURE	6ES7151-3BA20-0AB0	V4.0	01
IM151-3 PN FO	6ES7151-3BB21-0AB0	V4.0	01

3.4 2AI I 2/4WIRE High Feature Analog Electronic Module (6ES7134-4MB02-0AB0)

4.13 2AI I 2/4WIRE High Feature Analog Electronic Module (6ES7134-4MB02-0AB0)

Properties

- 2 inputs for measuring current
- Input ranges:
 - ± 20 mA, resolution 15 bits + sign
 - 4 mA to 20 mA, resolution 15 bits
- Isolated from the load voltage L+
- Permitted common-mode voltage between the channels 100 VAC
- Supports two-wire or four-wire measuring transducers
- Supports isochronous operation
 - Minimum time for the synchronous DP cycle (T_{DPmin}): 0.7 ms
 - Minimum conversion time of the input modules: (T_{WEmin}): 0.5 ms
- Supports I&M functions

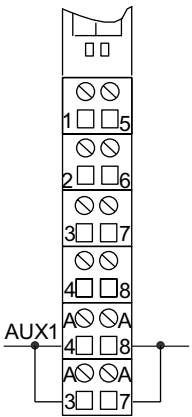
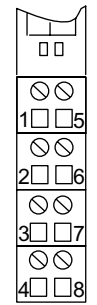
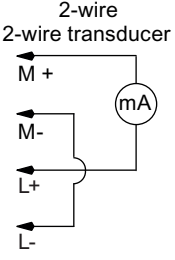
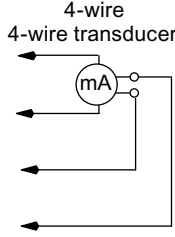
General terminal assignment

Note

Terminals 4, 8, A4, A8, A3 and A7 are only available at specified terminal modules.

Terminal assignment for 2AI I 2/4WIRE High Feature (6ES7134-4MB02-0AB0)				
Terminal	Assignment	Terminal	Assignment	Notes
1	M ₀₊	5	M ₁₊	2-wire transducer: <ul style="list-style-type: none"> • M_{n+}: Input signal "-", channel n • M_{n-}: connect to L- • L+ Input signal "+", channel n • AUX1: Protective-conductor terminal or potential bus (freely usable up to 230 VAC) 4-wire transducer: <ul style="list-style-type: none"> • M_{n+}: Input signal "+", channel n • M_{n-}: Input signal "-", channel n • L+ Power supply for four-wire measuring transducer • L-: Return circuit for measuring transducer supply • AUX1: Protective-conductor terminal or potential bus (freely usable up to 230 VAC)
2	M ₀₋	6	M ₁₋	
3	L+	7	L+	
4	L-	8	L-	
A4	AUX1	A8	AUX1	
A3	AUX1	A7	AUX1	

Usable terminal modules

Usable terminal modules for 2AI I 2/4WIRE High Feature (6ES7134-4MB02-0AB0)		
TM-E15C26-A1 (6ES7193-4CA50-0AA0)	TM-E15C24-01 (6ES7193-4CB30-0AA0)	← Spring terminal
TM-E15S26-A1 (6ES7193-4CA40-0AA0)	TM-E15S24-01 (6ES7193-4CB20-0AA0)	← Screw terminal
TM-E15N26-A1 (6ES7193-4CA80-0AA0)	TM-E15N24-01 (6ES7193-4CB70-0AA0)	← Fast Connect
		<p style="text-align: center;">Wiring examples</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>2-wire 2-wire transducer</p>  </div> <div style="text-align: center;"> <p>4-wire 4-wire transducer</p>  </div> </div>

Block diagram

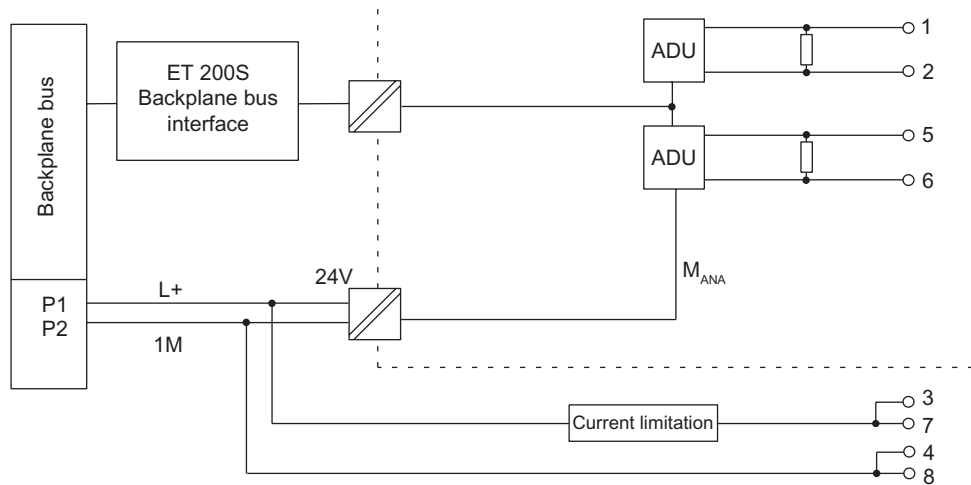


Figure 3-2 Block diagram of the 2AI I 2/4WIRE High Feature

2AI I 2/4WIRE High Feature Technical Specifications (6ES7134-4MB02-0AB0)

Dimensions and weight	
Dimensions W x H x D (mm) (the total dimensions depend on the selected terminal module)	15 x 81 x 52
Weight	Approx. 45 g

Data for specific modules	
Supports isochronous operation *	Yes
Supports I&M functions	Yes
Number of inputs	2
Cable length	
• Shielded	Max. 200 m
Parameter length	12 bytes
Analog value representation	S5 and S7 format
* Is supported if no interference frequency suppression or smoothing is configured.	

Voltages, currents, potentials	
Rated load voltage L+ (from the power module)	24 VDC
• Reverse polarity protection	Yes
Power supply of the transmitters	Yes
• Short-circuit protection	Yes, 60 mA (for both channels)
Galvanic isolation	
• Between the channels and backplane bus	Yes
• Between the modules and load voltage L+	No at 2-wire Yes at 4-wire
• Between the channels and PE	Yes
• Between the channels	No
• Permissible potential difference	
• Between the channels	140 VDC/100 VAC (with isolated power supply for the measuring transducer)
• Insulation tested	500 VDC
• Current consumption	
• From the load voltage L+ (no sensor supply)	48 mA max.
• Power dissipation of the module	Typically 1.2 W

Status, interrupts, diagnostics	
Diagnostics functions	
• Group error	Red "SF" LED
• Diagnostics functions readable	Yes
• Process interrupts *	Configurable, violation of upper and lower limits
* Process interrupts are only sent if the process interrupt mechanism is not overloaded.	

Analog value generation			
Measuring principle	Sigma-Delta		
Conversion and cycle time			
Integration time can be assigned parameters	Yes		
• Interference frequency suppression in Hz	60	50	None
• Conversion time in ms (per channel)	17	20	0,04
• Cycle time of the module in ms (per module)	18	21	0,5
Resolution	± 20 mA / 15 bits + sign 4 mA to 20 mA / 15 bits		

Suppression of interference, error limits	
Interference voltage suppression for $f = n \times (f_1 \pm 0.5 \%)$, ($f_1 =$ interference frequency)	
• Common-mode interference (U_{SS}) • Series-mode interference (peak interference value < rated value of input range)	Min. 100 dB Min. 90 dB
Crosstalk between the inputs	Min. -100 dB
Operational limit (in the entire temperature range, with reference to the input range)	± 0.1% with interference frequency suppression ± 0.2% without interference frequency suppression
Basic error limit (operation limit at 25°C)	± 0.05% with interference frequency suppression ± 0.1% without interference frequency suppression
Temperature error (with reference to the input range)	± 0.003 %/K
Linearity error (with reference to the input range)	± 0,01 %
Repeatability (in steady state at 25 °C with reference to the input range)	± 0,01 %

Sensor selection data		
Input range (rated value) / measurement resistance		
• Current	Approx. 44 Ω	
Permissible input current	Approx. 50 mA (can be limited electronically)	
Load of the two-wire transmitter:	max. 750 Ω	
Smoothing of the measured values	Yes, parameters can be assigned in 4 steps by means of digital filtering	
	Step None Weak Medium Strong	Time constant 1 x cycle time 4 x cycle time 16 x cycle time 32 x cycle time

I&M functions

Reading of the I&M data from the module is possible with interface modules as from a higher order number (MLFB) or as from a higher firmware/product version than described in the following table:

Interface module	Order no.	Firmware version	Product version
IM151-1 HIGH FEATURE	6ES7151-1BA01-0AB0	V2.0	02
IM151-3 PN	6ES7151-3AA20-0AB0	V4.0	01
IM151-3 PN HIGH FEATURE	6ES7151-3BA20-0AB0	V4.0	01
IM151-3 PN FO	6ES7151-3BB21-0AB0	V4.0	01

3.5 2AO U High Feature Analog Electronic Module (6ES7135-4LB02-0AB0)

4.20 2AO U High Feature Analog Electronic Module (6ES7135-4LB02-0AB0)

Properties

- 2 outputs for voltage output
- Output range:
 - ± 5 V, resolution 15 bits + sign
 - ± 10 V, resolution 15 bits + sign
 - 1 V to 5 V, resolution 15 bits
- Isolated from the load voltage L+
- Supports isochronous operation
 - Minimum time for the synchronous DP cycle (T_{DPmin}): 0.7 ms
 - Minimum conversion time of the output modules: (T_{WAmin}): 0.5 ms
- Supports I&M functions

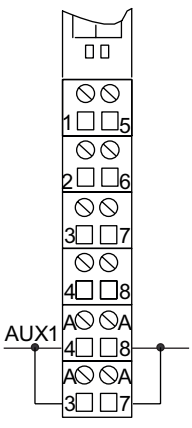
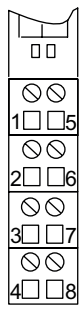
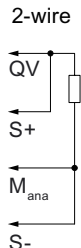
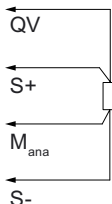
General terminal assignment

Note

Terminals 4, 8, A4, A8, A3 and A7 are only available at specified terminal modules.

Terminal assignment for 2AO U High Feature (6ES7135-4LB02-0AB0)				
Terminal	Assignment	Terminal	Assignment	Notes
1	QV ₀	5	QV ₁	<ul style="list-style-type: none"> QV_n: Analog output voltage, channel n S_{n+}: tracer line positive, channel n S_{n-}: tracer line negative, channel n M_{ana}: Ground of the module AUX1: Protective-conductor terminal or potential bus (freely usable up to 230 VAC)
2	S ₀₊	6	S ₁₊	
3	M _{ana}	7	M _{ana}	
4	S ₀₋	8	S ₁₋	
A4	AUX1	A8	AUX1	
A3	AUX1	A7	AUX1	

Usable terminal modules

Usable terminal modules for 2AO U High Feature (6ES7135-4LB02-0AB0)		
TM-E15C26-A1 (6ES7193-4CA50-0AA0)	TM-E15C24-01 (6ES7193-4CB30-0AA0)	← Spring terminal
TM-E15S26-A1 (6ES7193-4CA40-0AA0)	TM-E15S24-01 (6ES7193-4CB20-0AA0)	← Screw terminal
TM-E15N26-A1 (6ES7193-4CA80-0AA0)	TM-E15N24-01 (6ES7193-4CB70-0AA0)	← Fast Connect
		<p style="text-align: center;">Wiring examples</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>2-wire</p>  </div> <div style="text-align: center;"> <p>4-wire</p>  </div> </div>

Block diagram

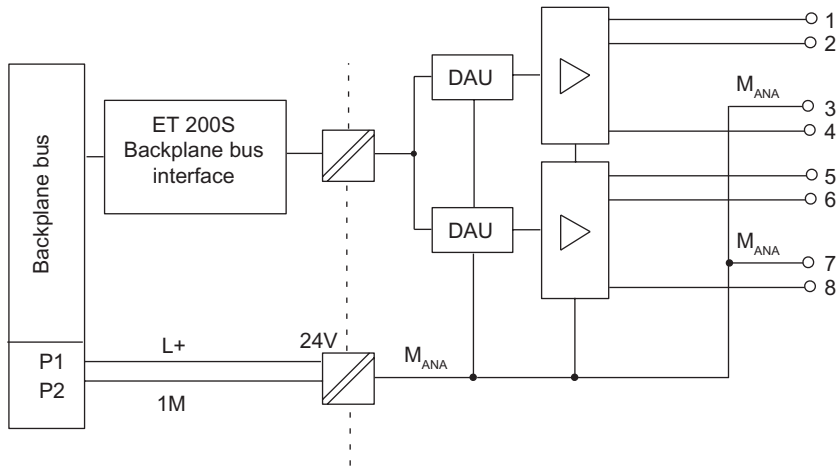


Figure 3-3 Block diagram of the 2AO U High Feature

2AO U High Feature Technical Specifications (6ES7135-4LB02-0AB0)

Dimensions and weight	
Dimensions W x H x D (mm) (the total dimensions depend on the selected terminal module)	15 x 81 x 52
Weight	Approx. 40 g

Data for specific modules	
Supports isochronous operation	Yes
Supports I&M functions	Yes
Number of outputs	2
Cable length	
<ul style="list-style-type: none"> Shielded 	Max. 200 m Max. 100 m at $T_{WA} < 2$ ms
Analog value representation	S5 and S7 format
Parameter length	7 bytes

Voltages, currents, potentials	
Rated load voltage L+ (from the power module)	24 VDC
<ul style="list-style-type: none"> Reverse polarity protection 	Yes
Galvanic isolation	
<ul style="list-style-type: none"> Between the channels and backplane bus 	Yes
<ul style="list-style-type: none"> Between the modules and load voltage L+ 	Yes
<ul style="list-style-type: none"> Between the channels 	No

Voltages, currents, potentials	
Permissible potential difference	
<ul style="list-style-type: none"> • Between M_{ANA} and M_{internal} 	75 VDC / 60 VAC
Insulation tested	500 VDC
Current consumption	
<ul style="list-style-type: none"> • From load voltage L+ 	Max. 80 mA
Power dissipation of the module	Max. 1.2 W

Status, interrupts, diagnostics	
Diagnostics functions	
<ul style="list-style-type: none"> • Group error display 	Red "SF" LED
<ul style="list-style-type: none"> • Diagnostic information readable 	Yes
Substitute values can be applied	Yes, parameterizable

Analog value generation	
Cycle time per module	0.5 ms
Resolution (including overrange)	± 5 V / 15 bits + sign ± 10 V / 15 bits + sign 1 V to 5 V / 15 bits
Settling time	
<ul style="list-style-type: none"> • For resistive load 	0.3 ms
<ul style="list-style-type: none"> • For capacitive load 	0.5 ms
<ul style="list-style-type: none"> • For inductive load 	0.5 ms

Suppression of interference, error limits	
Crosstalk between the outputs	min. -60 dB
Operational limit (in the entire temperature range, with reference to the output range)	± 0,1 %
Basic error limit (operational limit at 25 °C, with reference to the output range)	± 0,05 %
Temperature error (with reference to the output range)	± 0.003 %/K
Linearity error (with reference to the output range)	± 0,01 %
Repeatability (in steady state at 25 °C with reference to output range)	± 0,01 %

Actuator Selection Data	
Output range (rated value)	± 5 V ± 10 V 1 V to 5 V
Load impedance (in the rated range of the output) • At voltage outputs capacitive load	Min. 1.0 kΩ Max. 0.5 μF
• Voltage output • Short-circuit protection • Short-circuit voltage	Yes Approx. 25 mA
Destruction limit against voltages/currents applied from outside	
• Voltage at the outputs to M _{ANA}	Max. 15 V continuous; 75 V for max. 1 ms (sampling ratio 1:20)
Connection of actuators • Voltage output 2-wire connection 4-wire connection	Possible, without compensation of the line resistances Possible

I&M functions

Reading of the I&M data from the module is possible with interface modules as from a higher order number (MLFB) or as from a higher firmware/product version than described in the following table:

Interface module	Order no.	Firmware version	Product version
IM151-1 HIGH FEATURE	6ES7151-1BA01-0AB0	V2.0	02
IM151-3 PN	6ES7151-3AA20-0AB0	V4.0	01
IM151-3 PN HIGH FEATURE	6ES7151-3BA20-0AB0	V4.0	01
IM151-3 PN FO	6ES7151-3BB21-0AB0	V4.0	01

Note

Use of the module after an IM151-7 CPU

If the module is positioned after an IM151-7 CPU, it outputs the last values before a RUN-STOP transition, provided no values were output by the user program after the STOP-RUN transition.

Take this into account when programming the start-up of the control function (OB100 or OB1).

3.6 2AO I High Feature Analog Electronic Module (6ES7135-4MB02-0AB0)

4.22 2AO I High Feature Analog Electronic Module (6ES7135-4MB02-0AB0)

Properties

- 2 outputs for current output
- Output range:
 - ± 20 mA, resolution 15 bits + sign
 - 4 mA to 20 mA, resolution 15 bits
- Isolated from the load voltage L+
- Supports isochronous operation
 - Minimum time for the synchronous DP cycle (T_{DPmin}): 0.7 ms
 - Minimum conversion time of the output modules: (T_{WAmin}): 0.5 ms
- Supports I&M functions

General terminal assignment

Note

Terminals 4, 8, A4, A8, A3 and A7 are only available at specified terminal modules.

Terminal assignment for 2AO I High Feature (6ES7135-4MB02-0AB0)				
Terminal	Assignment	Terminal	Assignment	Notes
1	QI ₀	5	QI ₁	<ul style="list-style-type: none"> • QI_n: Current analog output, channel n • M_{ana}: Ground of the module • n.c.: Not connected (max. 30 VDC can be connected) • AUX1: Protective-conductor terminal or potential bus (freely usable up to 230 VAC)
2	n.c.	6	n.c.	
3	M _{ana}	7	M _{ana}	
4	n.c.	8	n.c.	
A4	AUX1	A8	AUX1	
A3	AUX1	A7	AUX1	

Usable terminal modules

Usable terminal modules for 2AO I High Feature (6ES7135-4MB02-0AB0)				
TM-E15C26-A1 (6ES7193-4CA50-0AA0)	TM-E15C24-A1 (6ES7193-4CA30-0AA0)	TM-E15C24-01 (6ES7193-4CB30-0AA0)	TM-E15C23-01 (6ES7193-4CB10-0AA0)	← Spring terminal
TM-E15S26-A1 (6ES7193-4CA40-0AA0)	TM-E15S24-A1 (6ES7193-4CA20-0AA0)	TM-E15S24-01 (6ES 193-4CB20-0AA0)	TM-E15S23-01 (6ES7193-4CB00-0AA0)	← Screw terminal
TM-E15N26-A1 (6ES7193-4CA80-0AA0)	TM-E15N24-A1 (6ES7193-4CA70-0AA0)	TM-E15N24-01 (6ES7193-4CB70-0AA0)	TM-E15N23-01 (6ES7193-4CB60-0AA0)	← Fast Connect
				<p>Sample connection</p>

Block diagram

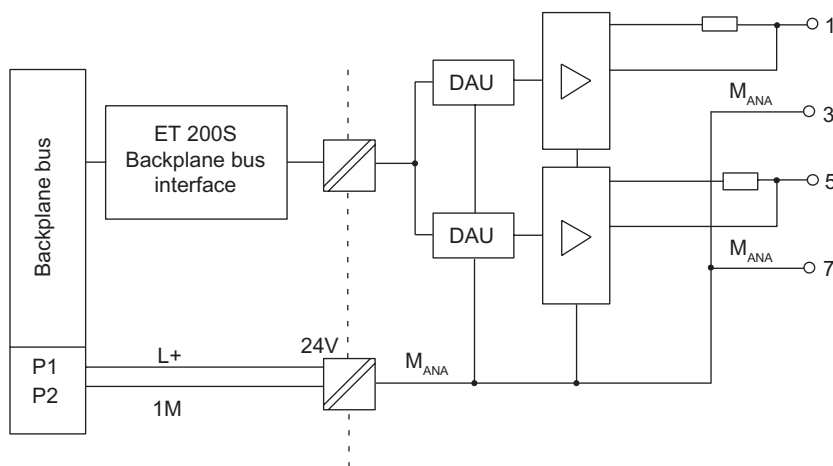


Figure 3-4 Block diagram of the 2AO I High Feature

2AO I High Feature Technical Specifications (6ES7135-4MB02-0AB0)

Dimensions and weight	
Dimensions W x H x D (mm) (the total dimensions depend on the selected terminal module)	15 x 81 x 52
Weight	Approx. 40 g

Data for specific modules	
Supports isochronous operation	Yes
Supports I&M functions	Yes
Number of outputs	2
Cable length	
<ul style="list-style-type: none"> • Shielded 	Max. 200 m Max. 100 m at $T_{WA} < 2$ ms
Parameter length	7 bytes
Analog value representation	S5 and S7 format

Voltages, currents, potentials	
Rated supply voltage of the electronics L+	24 VDC
<ul style="list-style-type: none"> • Reverse polarity protection 	Yes
Galvanic isolation	
<ul style="list-style-type: none"> • Between the channels and backplane bus 	Yes
<ul style="list-style-type: none"> • Between modules and power supply of the electronics 	Yes
<ul style="list-style-type: none"> • Between the channels 	No
Permissible potential difference	
<ul style="list-style-type: none"> • Between M_{ANA} and $M_{internal}$ 	75 VDC / 60 VAC
Insulation tested	500 VDC
Current consumption	Max. 80 mA
<ul style="list-style-type: none"> • From the power supply L+ 	
Power dissipation of the module	Max. 1.2 W

Status, interrupts, diagnostics	
Diagnostics functions	
<ul style="list-style-type: none"> • Group error display 	Red "SF" LED
<ul style="list-style-type: none"> • Diagnostic information readable 	Yes
<ul style="list-style-type: none"> • Wire break diagnostics 	Yes, at input range 4 mA to 20 mA
Substitute values can be applied	Yes, parameterizable

Analog value generation	
Resolution (including overrange)	± 20 mA / 15 bits + sign 4 mA to 20 mA / 15 bits
Cycle time (per module)	Max. 0.5 ms
Settling time	
• For resistive load	0.3 ms
• For capacitive load	1.0 ms
• For inductive load	0.5 ms

Suppression of interference, error limits	
Crosstalk between the outputs	< - 60 dB
Operational limit (in the entire temperature range, with reference to the output range)	± 0,1 %
Basic error limit (operational limit at 25 °C, with reference to the output range)	± 0,05 %
Temperature error (with reference to the output range)	± 0.003 %/K
Linearity error (with reference to the output range)	± 0.01% (for resistive load)
Repeatability (in steady state at 25 °C with reference to output range)	± 0,01 %

Measuring Transducer Selection Data	
Output range (rated value)	± 20 mA 4 to 20 mA
Load impedance (in the rated range of the output)	
• For current outputs	Max. 500 Ω
• For inductive load	1 mH
Current output	
• Open circuit voltage	18 V
Destruction limit against voltages/currents applied from outside	
• Voltage at the outputs to M _{ANA}	Max. 15 V continuous; 75 V for max. 1 ms (sampling ratio 1:20)
• Current	Max. 50 mA DC
Connection of actuators	
• Current output two-wire connection	Yes

I&M functions

Reading of the I&M data from the module is possible with interface modules as from a higher order number (MLFB) or as from a higher firmware/product version than described in the following table:

Interface module	Order no.	Firmware version	Product version
IM151-1 HIGH FEATURE	6ES7151-1BA01-0AB0	V2.0	02
IM151-3 PN	6ES7151-3AA20-0AB0	V4.0	01
IM151-3 PN HIGH FEATURE	6ES7151-3BA20-0AB0	V4.0	01
IM151-3 PN FO	6ES7151-3BB21-0AB0	V4.0	01

Note

Use of the module after an IM151-7 CPU

If the module is positioned after an IM151-7 CPU, it outputs the last values before a RUN-STOP transition, provided no values were output by the user program after the STOP-RUN transition.

Take this into account when programming the start-up of the control function (OB100 or OB1).

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SIEMENS

Introduction

1

New Information About the
"ET 200S Distributed I/O
System Operating
Instructions"

2

SIMATIC

Distributed I/O system ET 200S

Product information

Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.



Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.



Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.



Caution

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:



Warning

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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-----------	---------------------------------------------	-----

Introduction

This product information describes amendments to the *ET 200S I/O Distributed I/O System Operating Instructions* (A5E00515770-03), release 12/2005.

New Information About the "ET 200S Distributed I/O System Operating Instructions"

2

Introduction

This information is new and supplements the *ET 200S I/O Distributed I/O System Operating Instructions* (A5E00515770-03), release 12/2005.

Section 4.11 is new.

The "Requirements" section in Section 5.4.8 has been supplemented.

The "Color identification labels" section has been replaced in the "Order Numbers for ET 200S accessories" table in Appendix A.2.

In Appendix D.3 the "Calculation of the response time for the IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0), as of Version 3 or firmware V2.1.x" section has been supplemented. The previous section "Calculation of the response time for the IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0)" applies up to and including Version 2 with firmware V2.0.x.

2.1 Mounting Color Identification Labels for ET 200S and ET 200S COMPACT

Characteristics

- Color identification plates allow terminals to be identified in the colors white, red, blue, yellow, yellow-green, and turquoise.
- Color identification plates can be used at the terminal modules TM-E, TM-P and TM-C of the ET 200S and ET 200S COMPACT.
- The packaging unit encompasses 200 color identification plates (10 star-shaped mounts with 20 piece each).

Introduction

You can provide every terminal at a terminal module with a color identification plate. The color identification plates are mounted on the terminal module. Color identification plates are positioned directly next to the terminal.

Requirement

The terminal module should not be wired in order to make mounting of the color identification labels easier.

Tools required

Screwdriver with 3.5 mm blade

Mounting Color Identification Labels

1. Press the point of the color identification label using the screwdriver into the provided opening of the terminal module.
2. Hold the color identification label during the following steps.
3. Bend the star-shaped mount upwards by approx. 30° to 40°.
4. Detach the color identification label from the mount by moving the mount back and forth sideways.

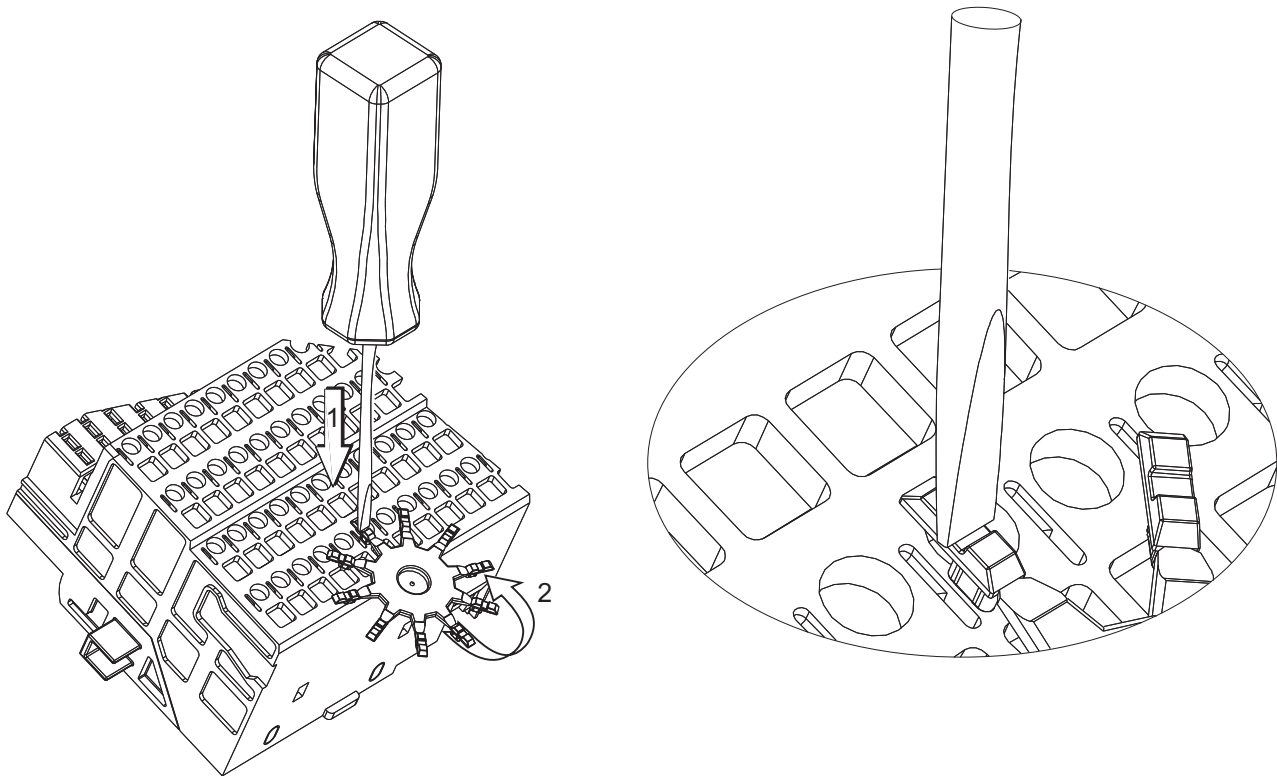


Figure 2-1 Mounting Color Identification Labels

Removing Color Identification Labels

Use a screwdriver to lever the color identification labels from their mounts.

Note

Ensure that the color identification labels do not fall into the terminal openings. Color identification labels can only be removed from terminal opening after the COMPACT module has been dismantled.

2.2 Wiring an interface module with PROFINET IO interface (electrically)

Requirements

Note

Provide a suitable strain relief for the PROFINET connecting cable.

2.3 Order numbers for ET 200S accessories

Table 2-1 Order numbers for ET 200S accessories

Designation	Order number
Per packaging unit 200 color identification labels (10 strips each containing 20 units in each color)	
• White	6ES7193-4LA20-0AA0
• Red	6ES7193-4LD20-0AA0
• Yellow	6ES7193-4LB20-0AA0
• Yellow-green	6ES7193-4LC20-0AA0
• Brown	6ES7193-4LG20-0AA0
• Blue	6ES7193-4LF20-0AA0
• Turquoise	6ES7193-4LH20-0AA0

2.4 Response times for the ET 200S

Calculation of the response time for the IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0), as of Version 3 or firmware V2.1.x

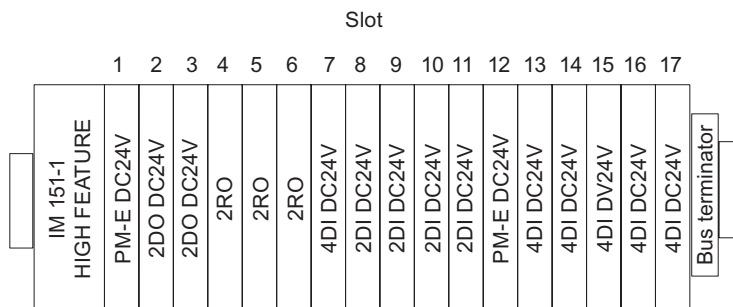
The following equation enables you to make an approximate calculation of the ET 200S response time:

$$\text{Response time } [\mu\text{s}] = 16 + m + 9 + b + 160$$

Explanation of the parameters:

- **m**: Sum total of all configured modules
- **b**: Sum total of all input and output bytes (without bit granular modules)

Example of the calculation of the ET 200S response time for the IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0), as of Version 3 or firmware V2.1.x



Example set-up for the calculation of the response time for the IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0), as of Version 3 or firmware V2.1.x

Calculation method:

$$m = 17; b = 0$$

$$\text{Response time } [\mu\text{s}] = 16 + m + 9 + b + 160$$

$$\text{Response time } [\mu\text{s}] = 18 + 17 + 9 + 0 + 160$$

$$\text{Response time } [\mu\text{s}] = \mathbf{432 \mu\text{s}}$$

SIEMENS

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Distributed I/O System ET 200S

Product Information

Introduction

Interface module
IM151-3 PN FO
(6ES7151-3BB21-0AB0)

1

Connection

2

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3

Alarm, error and system
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4

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A

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Response times

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Introduction

Introduction

This product information describes amendments to the *ET 200S distributed I/O device* operating instructions (A5E00515771-03), release 12/2005.

Contents of this Product Information

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1	Interface module IM151-3 PN FO (6ES7151-3BB21-0AB0)	supplement to chapter 10
2	Connection	supplement to chapter 5.4
3	Functions	supplement to chapter 7.4
4	Alarm, error and system messages	supplement to chapter 8.1.1
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Interface module IM151-3 PN FO (6ES7151-3BB21-0AB0)

1

1.1 Features

Features

The IM151-3 PN FO interface module has the following features:

- It interconnects ET 200S with PROFINET IO via fiber-optic cable.
- It prepares the data for the electronic modules and motor starters that are fitted.
- It supplies the backplane bus.
- Integrated interfaces for plastic fiber-optic cable (POF)
- Transfer and backup of the device name on SIMATIC Micro Memory Card
- Updating firmware
 - via SIMATIC Micro Memory Card
 - via PROFINET IO
- The reference potential M of the rated supply voltage of the IM151-3 PN FO to the mounting rail (protective conductor) is connected by means of an RC combination, thus permitting an ungrounded configuration.
- Supported Ethernet services: ping, arp, Net diagnostics (SNMP) / MIB-2
- Interrupts
 - Diagnostic interrupts
 - Process interrupts
 - Insert/remove module interrupts
 - Maintenance alarms
- Port diagnostics
- Records for IO modules
- Identification data
- The maximum address space is 256 bytes I/O data.
- A maximum of 63 modules can be operated with the IM151-3 PN FO.
- Maximum distance between two PROFINET FO interfaces when using plastic fiber-optic cables (POF): 50 m.
- The maximum bus length at the backplane bus is 2 m.
- Summary of modules within one byte (packing)
- Use of fail-safe modules (PROFIsafe V2 or higher)
- Enhanced performance: Startup time and response time

Compatibility of the interface module IM151-3 PN FO (6ES7151-3BB21-0AB0)

Note**Firmware version of the controller used**

To be able to operate the IM151-3 PN FO (6ES7151-3BB21-0AB0) interface module on a controller, operate the latter using a CPU 400, firmware version \geq V5.0.

SNMP

The IM151-3 PN FO supports the Ethernet service SNMP. MIB-2 (RFC1213) is supported. R/W objects can be changed using SNMP tools and are stored in the module.

After exchange for a factory-new device, the R/W objects in the IM151-3 PN FO are set to default settings.

Operational constraints

The following modules cannot be used with the IM151-3 PN FO:

Module	Up to order number	Up to product version
2AO U; HIGH FEATURE	6ES7135-4LB01-0AB0	3
2AO I; HIGH FEATURE	6ES7135-4MB01-0AB0	3
1SI 3964(R) / ASCII	6ES7138-4DF00-0AB0	4
1SI Modbus / USS	6ES7138-4DF10-0AB0	4
2PULSE	6ES7138-4DD00-0AB0	4
1Count24V/100kHz	6ES7138-4DA02-0AB0	

Pin assignment

The following table shows the pin assignment of the IM151-3 PN FO interface module for the 24 VDC voltage supply and of the SC RJ interfaces for PROFINET IO:

Table 1-1 Pin assignment of the IM151-3 PN FO interface module

View	Signal name	Name	
	①	Receiver / receive data	
	②	Sender / transmit data	
	1L+	24 VDC	
	1L+	24 VDC	
	M	Ground	
	M	Ground	

Block diagram

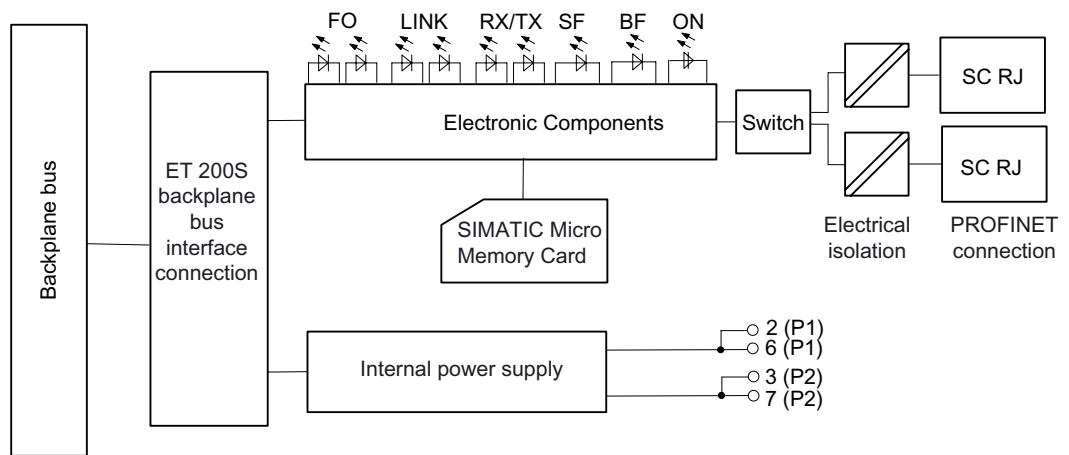


Figure 1-1 Block diagram for the IM151-3 PN FO interface module

1.1 Features

Technical data IM151-3 PN FO (6ES7151-3BB21-0AB0)

Dimensions and Weight	
Dimensions W x H x D (mm)	60 x 119.5 x 75
Weight	Approx. 150 g
Module-specific specifications	
Data transmission rate	<ul style="list-style-type: none"> • 100 Mbps for Ethernet services • 100 Mbps full duplex for PROFINET IO
Transmission procedure	100BASE-FX
Autonegotiation	yes; half duplex, full duplex
Autocrossing	No
Bus protocol	PROFINET UDP / IP
Supported Ethernet services	<ul style="list-style-type: none"> • ping • arp • Net diagnostics (SNMP) / MIB-2
PROFINET interface	2x SC RJ
Manufacturer ID (vendor ID)	002A _H
Device ID (DeviceID)	0301 _H
Voltages, currents, potentials	
Rated supply voltage of the electronic components (1L+)	24 VDC
<ul style="list-style-type: none"> • Incorrect polarity protection 	yes
<ul style="list-style-type: none"> • Power failure bypass 	Min. 20 ms
Galvanic isolation	
<ul style="list-style-type: none"> • Between the backplane bus and electronic components 	No
<ul style="list-style-type: none"> • Between Ethernet and electronic components 	yes
<ul style="list-style-type: none"> • Between the supply voltage and electronic components 	No
Permitted potential difference (to the rail)	75 VDC / 60 VAC
Insulation test voltage	500 VDC
Current consumption from rated supply voltage (1L+)	Approx. 200 mA
Power dissipation of the module	Approx. 3 W
Status, alarms, diagnostics	
Interrupts	yes
Diagnostic function	yes
<ul style="list-style-type: none"> • Batch error 	Red LED "SF"
<ul style="list-style-type: none"> • Bus monitoring PROFINET IO 	Red "BF" LED
<ul style="list-style-type: none"> • Monitoring of the power supply voltage of the electronics 	Green "ON" LED
<ul style="list-style-type: none"> • Diagnosis 	One yellow LED "FO" per port
<ul style="list-style-type: none"> • Existing connection to network 	One green LED "LINK" per port
<ul style="list-style-type: none"> • Transmitting / receiving data on the network 	One yellow LED "RX/TX" per port

1.2 SNMP

The IM151-3 PN FO supports the Ethernet service SNMP. MIB-2 (RFC1213) is supported. R/W objects can be changed using SNMP tools and are stored in the module.

Reset to default settings

"Reset to default settings" is only possible if the IO device is not exchanging data with a controller.

Remanent stored SNMP parameters are reset to default settings (*STEP 7*V5.3 SP 3 and higher) in HW Config dialog "Target system > Ethernet > Edit Ethernet nodes" "Reset" button under "Reset to default settings".

The following data is **not** deleted when resetting:

- The device name is saved to the SIMATIC Micro Memory Card.
- The MAC address
- I&M data

Note

Deleting the device name

To prevent a new module with a "strange" device name from starting, delete the device name from the SIMATIC Micro Memory Card.

Open the properties dialog box of the interface module in HW Config. Confirm the properties dialog box without entering a device name in the "Assign device name" field.

1.3 SIMATIC Micro Memory Card

Insertion of the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as storage medium for the IM151-3 PN FO.

The following data is saved on the SIMATIC Micro Memory Card.

- Technology data (device names)
- Data for a firmware update

Note

On **one** SIMATIC Micro Memory Card, you can save **either** technology data **or** update data.

Service life of a SIMATIC Micro Memory Card

The life of an SIMATIC Micro Memory Card essentially depends on the following factors:

- Number of deletion or programming operations
- External factors, such as ambient temperature

At an ambient temperature up to 60 ° C a SIMATIC Micro Memory Card has a useful life of 10 years at maximum 100,000 write/delete sequences.



Caution

Possible data loss

If the maximum number of write/delete operations is exceeded, data loss is possible.

Applicable SIMATIC Micro Memory Cards

The following memory modules are available for use:

Table 1-2 Available SIMATIC Micro Memory Cards

Type	Order Numbers
SIMATIC Micro Memory Card 64k	6ES7953-8LF11-0AA0
SIMATIC Micro Memory Card 128k	6ES7953-8LG11-0AA0
SIMATIC Micro Memory Card 512k	6ES7953-8LJ11-0AA0
SIMATIC Micro Memory Card 2M	6ES7953-8LL11-0AA0
SIMATIC Micro Memory Card 4M	6ES7953-8LM11-0AA0
SIMATIC Micro Memory Card 8M	6ES7953-8LP11-0AA0

A SIMATIC Micro Memory Card 64k is sufficient for storing the name of the device. The SIMATIC Micro Memory Cards with at least 2 MB of storage capacity are required when conducting a firmware update.

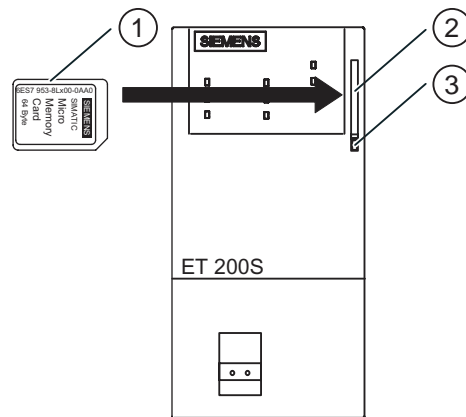
Inserting/replacing the card

The SIMATIC Micro Memory Card is designed so that it can also be removed and inserted while current is flowing. The beveled corner of the SIMATIC Micro Memory Card prevents it from being inserted backwards (reverse polarity protection).

The module slot on the IM 151-3 PN FO is located behind the front door. The front door has a protruding edge for opening.

The socket of the module slot has an ejector enabling you to remove the card. To eject the card, push in the ejector with a suitable object (such as a small screwdriver or ball-point pen).

Position of the module slot for the SIMATIC Micro Memory Card on the IM151-3 PN FO:



- ① SIMATIC Micro Memory Card
- ② Module slot
- ③ Ejector

1.4 Updating firmware

Introduction

The firmware of an IM151-3 PN FO can be updated:

- Using the SIMATIC Micro Memory Card (see the following description)
- Using PROFINET IO, e.g. with HW Config or in the SIMATIC Manager via "Target System > Display Accessible Nodes" (see STEP 7 online help)

Preconditions

To update the firmware using the SIMATIC Micro Memory, you need:

- *STEP 7* as from Version 5.3, Service Pack 1
- A SIMATIC Micro Memory Card with at least 2 MB memory
- A PC or programming device with a device for writing to a SIMATIC Micro Memory Card

Proceed as follows

The firmware update is carried out in two steps:

1. Transferring the update files to a SIMATIC Micro Memory Card.
2. Performing the firmware update.

Transferring the update files to a SIMATIC Micro Memory Card

1. Use the Windows Explorer to create a new directory.
2. Download the required update file from the Internet into this directory.
3. Unpack this update file into this directory. This directory contains three files with the extension UPD.
4. Insert a SIMATIC Micro Memory Card (≥ 2 MB) into the programming device or writing device.
5. In the SIMATIC Manager, select the "PLC > Update operating system" menu command.
6. If necessary, confirm that the SIMATIC Micro Memory Card is cleared.
7. Select the directory containing the UPD files in the displayed dialog box.
8. Double-click one of the UPD files. The data are written to the SIMATIC Micro Memory Card.

The update files are now contained on the SIMATIC Micro Memory Card.

Performing the firmware update

1. Switch off the power to the interface module and insert the SIMATIC Micro Memory Card with the firmware update into the slot.
2. Switch on the power supply for the interface module.

The interface module recognizes the SIMATIC Micro Memory Card with the firmware update automatically and starts the module update. The SF and BF LEDs are lit and the ON LED is off while the system is updating.

When the update has been completed, the BF LED flashes at 0.5 Hz, the SF LED and ON LED are off.

3. Switch off the power to the interface module and insert the SIMATIC Micro Memory Card with firmware update.
4. Insert the SIMATIC Micro Memory Card with the device names and switch on the power supply again.

The interface module starts up with the new firmware and is then ready for operation.

Connection

2.1 Connecting interface module IM151-3 PN FO with PROFINET IO interface (optical)

Introduction

Connect the supply voltage to the interface module IM151-3 PN FO using a 2-pin connector and the fiber-optic cable for the PROFINET connection using SC RJ connectors.

Preconditions

- Wire the interface module with the supply voltage switched off.
- Follow the wiring rules.

Tools required

3 mm screwdriver

Required accessories (see *Order numbers*)

- Connectors for PROFINET connection: IE SC RJ POF Plug
- Fiber-optic cable:
 - IE POF standard cable
 - IE POF trailing cable

Rules for configuring a fiber-optic cable network with IM151-3 PN FO

In fiber-optic networks with nodes with integrated fiber-optic interfaces:

- The fiber-optic network can only be configured as a line.
- If you remove the fiber-optic cable from an integrated fiber-optic interface or the supply voltage to the IM151-3 PN FO fails, all subsequent nodes will no longer be accessible.
- The fiber-optic cable may have the following maximum lengths:
 - IE POF standard cable: 50 m
 - IE POF trailing cable: 50 m

2.1 Connecting interface module IM151-3 PN FO with PROFINET IO interface (optical)

Preparing fiber-optic cables with connectors

Prepare the IE POF cable with the connectors IE SC RG POF plug.

Complete instructions are available in the *POF Fiber-Optic Cables with Connectors IE SC RJ POF Plug* (A5E00351141) installation instructions.

Bending radius for the fiber-optic cable

When installing the fiber-optic cable, ensure that the permissible bending radius is not exceeded:

- IE POF standard cable: 150 mm
- IE POF trailing cable: 60 mm

Refer also to the installation guidelines for fiber-optic cable in the *ET 200 Distributed I/O System* or *SIMATIC NET - PROFIBUS Networks* manual.

Reusing fiber-optic cable

Note

If reusing fiber-optic cable, you must shorten both fiber-optic cores by the amount of the curved lengths and reinstall the connectors. This will prevent any attenuation losses caused by re-bent, heavily-stressed portions of the fiber-optic core.

Connecting interface module IM151-3 PN FO to PROFINET IO

1. Remove the blind plugs of the PROFINET connections.
2. Hold the preassembled connector by the **housing** and push it into the PROFINET socket until it audibly engages. The connectors are coded to ensure safe connection.

If the IM151-3 PN FO is the last node of the fiber-optic cable network, then you have to connect the unused fiber-optic interface with a blind plug. The blind plugs go into the PROFINET sockets of the IM151-3 PN FO in the delivery condition.



Caution

Do not look directly into the opening of the optical transmit diodes. The emitted light beam can damage your eyes.

2.2 Connecting the voltage supply

Introduction

The voltage supply is over a connecting plug. The connecting plug is plugged into the voltage supply connection on the IM151-3 PN FO in delivery condition.

The connecting plug makes it possible to loop the voltage supply uninterrupted.

Tools required

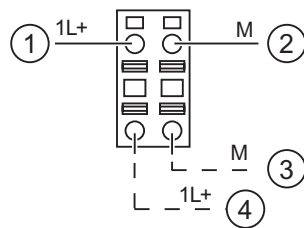
3 mm screwdriver

Power supply unit

You must only use PELV-type power supply units with protective extra-low voltage with safe electrical isolation (\leq DC 60 V).

Connector for power supply

The voltage supply connection for the 24V voltage supply is located on the front of the IM151-3 PN FO. The maximum cross-section of the connection is 2.5 mm². The connections have the following functions:



- ① + 24V DC (red)
- ② Ground (blue)
- ③ Ground (blue)
- ④ + 24V DC (red)

Procedure

1. Strip the wire to a length of 10 mm.
2. Insert the wire as far as it will go into the round opening of the connecting plug. Insert the connecting plug in delivery condition into the voltage supply connection.
3. Insert the wired connecting plug into the voltage supply connection on the IM151-3 PN FO.
4. Please ensure that there is sufficient strain relief.

Functions

3.1 Identification data for PROFINET IO

Definition

Identification data are data that are stored in a module for assisting the user in:

- checking the system configuration
- locating modified system hardware
- troubleshooting a system

Identification data enable modules to be uniquely identified online.

In *STEP 7*, the identification data are displayed in the "Module Information - IM 151" and "Properties - DP Slave" tabs (see *STEP 7* online help).

Reading of identification data

You can directly access specific identification data by selecting **Read data record**. Obtain the corresponding part of the identification data under the associated data record index.

The data records are structured as follows:

Table 3-1 Basic structure of data records with identification data for PROFINET IO

Contents	Length (bytes)	Coding (hex)
Header information		
BlockType	2	I&M0: 0020 I&M1: 0021 I&M2: 0022 I&M3: 0023
BlockLength	2	I&M0: 0038 I&M1: 0038 I&M2: 0012 I&M3: 0038
BlockVersionHigh	1	01
BlockVersionLow	1	00
Identification data		
Identification data (see table below)	I&M0: 54 I&M1: 54 I&M2: 16 I&M3: 54	

The data structures in the data records correspond to the PROFINET IO definitions.

Functions

3.1 Identification data for PROFINET IO

Table 3-2 Identification data for PROFINET IO

Identification data	Access	Default	Description
Identification data 0: (data record index AFF0 hex)			
VendorIDHigh	read (1 bytes)	00 hex	The name of the manufacturer is stored here. (42 dec = SIEMENS AG)
VendorIDLow	read (1 bytes)	2A hex	
Order_ID	read (20 bytes)		Order number of the module
IM_SERIAL_NUMBER	read (16 bytes)	-	Serial number (device specific)
IM_HARDWARE_REVISION	read (2 bytes)	1	Corresponding hardware version
IM_SOFTWARE_REVISION	read	Firmware version	Indicates the firmware version of the module.
• SWRevisionPrefix	(1 byte)	V, R, P, U, T	
• IM_SWRevision_Functional_Enhancement	(1 byte)	00 - FF hex	
• IM_SWRevision_Bug_Fix	(1 byte)	00 - FF hex	
• IM_SWRevision_Internal_Change	(1 byte)	00 - FF hex	
IM_REVISION_COUNTER	read (2 bytes)	-	Provides information on parameter modifications on the module.
IM_PROFILE_ID	read (2 bytes)	0000	Generic device
IM_PROFILE_SPECIFIC_TYPE	read (2 bytes)	0005 hex	on interface modules
IM_VERSION	read	0101 hex	Provides information on the identification data version (0101 hex = version 1.1)
• IM_Version_Major	(1 byte)		
• IM_Version_Minor	(1 byte)		
IM_SUPPORTED	read (2 bytes)	000E hex	Provides information on existing identification data (I&M1 to I&M3)
Maintenance data 1: (data record index AFF1 hex)			
IM_TAG_FUNCTION	Read / write (32 bytes)	-	Define a unique identifier for the module in this record.
IM_TAG_LOCATION	Read / write (22 bytes)	-	Define the installation location of the module.
Maintenance data 2: (data record index AFF2 hex)			
IM_DATE	Read / write (16 bytes)	YYYY-MM-DD HH:MM	Enter the installation date of the module here.
Maintenance data 3: (data record index AFF3 hex)			
IM_DESCRIPTOR	Read / write (54 bytes)	-	Define a comment describing the module in this record.

3.2 Configuring port 1 and port 2

Introduction

The interface module IM151-3 PN FO can diagnose 2 ports: X1 P1 and X1 P2.

Precondition

- The ports must be configured in HW Config.
- The port diagnostics must be released.

Configuring the ports in HW Config

Configure both ports in HW Config in the "Properties of the IM151-3 PN port...":

- Addresses tab: Diagnostic address of the respective port.
- Topology tab:
Select the fiber-optic cables in "Port Interconnection" under "Cable Designation": POF Standard Cable GP or POF Trailing Cable.
- Options tab:
To release the port diagnostics, select "Automatic Settings (monitor)" at "Connection" under "Transmission Medium / Duplex".

Reference

See *STEP 7* online help.

See also

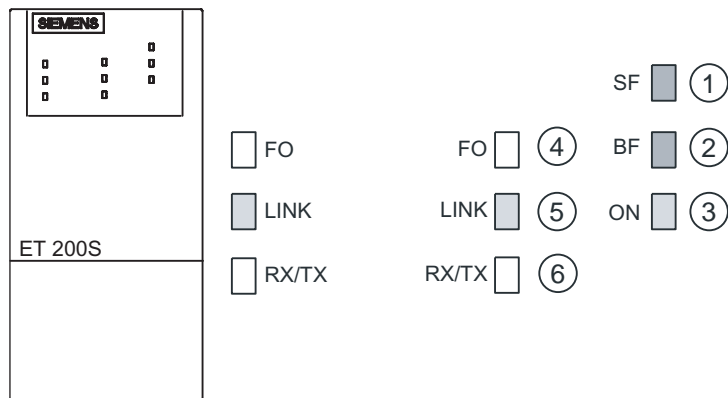
Maintenance alarms (Page 4-4)

Alarm, error and system messages

4.1 Diagnostics using LED display

Interface module

LED display on interface module IM151-3 PN FO:



- ① Batch error (red)
- ② Bus fault (red)
- ③ Power supply (green)
- ④ Status of the FO path (yellow), per port
- ⑤ Connection to a switch or IO controller (green), per port
- ⑥ Data exchange (yellow), per port

Status and error displays by means of LEDs on the IM151-3 PN FO

Table 4-1 Status and error displays of the IM151-3 PN FO

LEDs			Meaning	Remedy
SF	BF	ON		
off	off	off	There is no voltage at the interface module, or the interface module has a hardware defect.	<ul style="list-style-type: none"> Switch on the 24 VDC supply voltage at the interface module.
*	*	values	There is voltage at the interface module.	–
*	Flashing 0.5 Hz	values	Faulty or no connect message frame - no data transfer between the IO controller and the interface module (IO device), although the device is physically connected to the switch. Causes: <ul style="list-style-type: none"> Incorrect device name Configuration error Configuration error There is an error in an I/O module, or the bus cable to the controller is missing. 	<ul style="list-style-type: none"> Check the interface module. Check the configuration and parameter assignment. Check the device name. Assign a valid device name to the interface module. Check the IO controller
*	values	values	The IO device is not connected to a switch.	<ul style="list-style-type: none"> Establish a connection to the IO controller (via a switch). Assign a valid device name to the interface module. Check the bus configuration. Check that the bus connector is correctly inserted. Check whether the bus cable to the I/O controller is interrupted.
*	one	values	<ul style="list-style-type: none"> The prefabrication of the FO cable is bad. The fiber-optic cable attenuate too much. 	<ul style="list-style-type: none"> Check the firm fit of the FO connector. Check the cable prefabrication. Replace the fiber-optic cable.
values	*	values	The configured setup of the ET 200S does not match the actual setup of the ET 200S.	<ul style="list-style-type: none"> Check the structure of the ET 200S for missing or defective modules or whether an unconfigured module is inserted. Check the configuration (using STEP 7, for example), and correct the faulty parameters.
			<ul style="list-style-type: none"> There is an error in an I/O module, or the interface module is defective. Incoming diagnostic 	<ul style="list-style-type: none"> Replace the interface module, or contact your Siemens representative.

LEDs			Meaning	Remedy
SF	BF	ON		
values	off	one	<ul style="list-style-type: none"> No S7 program on the SIMATIC Micro Memory Card No SIMATIC Micro Memory Card is inserted. The SIMATIC Micro Memory Card is out of memory, or can not provide sufficient memory for the device name. No suitable SIMATIC Micro Memory Card is inserted (i. e. no SIMATIC Micro Memory Card from Siemens). <p>In this state, the IO device cannot be accessed.</p>	<ul style="list-style-type: none"> Format the SIMATIC Micro Memory Card. Before switching on the power supply voltage, insert an empty SIMATIC Micro Memory Card in the IM151-3 PN FO.
values	values	values	A brand new SIMATIC Micro Memory Card is being formatted.	<ul style="list-style-type: none"> Wait until the formatting sequence is complete. This may take several minutes. The formatting sequence is completed when the SF LED goes out.
off	off	values	Data exchange is taking place between the IO controller and the ET 200S. The target configuration and actual configuration of the ET 200S match.	–
values	values	off	FW update busy	
off	Flashing 0.5 Hz	off	FW update successfully completed	
values	Flashing 0.5 Hz	off	External error during FW update (incorrect FW, for example)	<ul style="list-style-type: none"> Use the correct FW for the update.
values	Flashing 2 Hz	off	Internal error during FW update (possible read/write error)	<ul style="list-style-type: none"> Repeat the FW update.
*) not relevant				

LEDs			Meaning	Remedy
FO	LINK	RX/TX		
*	off	off	No connection to switch/IO controller.	<ul style="list-style-type: none"> Check the fiber-optic cable.
*	one	*	Connection to switch/IO controller.	–
*	values	values	Transmission/reception is in progress.	–
one	*	*	Maintenance demanded / maintenance required: Attenuation through the fiber-optic cable is too high making operation no longer possible.	<p>Check the affected data transmission link for the following causes:</p> <ul style="list-style-type: none"> Damage to the fiber-optic cable Correct installation of the PROFINET connector / PROFINET connection Adherence to the max. length of 50 m for POF cables Check the firm fit of the FO connector.

Power module, electronic module, technology module

The LED diagnostic display for power modules, electronic modules and technology modules correspond to those for ET 200S with PROFIBUS DP.

4.2 Maintenance alarms

Introduction

The PROFINET interfaces of the IM151-3 PN FO support the diagnostic and maintenance concept in PROFINET in accordance with IEC 61158-6-10. The goal is early detection and correction of potential errors.

Maintenance alarms for the fiber-optic cables

For the IM151-3 PN FO, maintenance alarms signal to the user when a fiber-optic cable must be checked or replaced. This depends on the increase of the attenuation value on the PROFINET interface.

The IM151-3 PN FO reports to the higher-level diagnostics unit:

Maintenance alarms	Limits	Message / Meaning	LEDs
Level 1: Maintenance required	After a system reserve of 2 dB	The affected transmission link must be checked. Up until a total failure, there remains a foreseeable period for replacing the fiber-optic cable.	FO-LED illuminates
Level 2: Maintenance demanded	After a system reserve of 0 dB	The affected fiber-optic cable must be immediately replaced to prevent total failure of the PROFINET devices.	FO-LED illuminates

Limits

- The following limits apply to POF cables (Polymer Optical Fiber Cable):
 - Maintenance required: 2 dB
 - Maintenance demanded: 0 dB

System alarms in *STEP 7*

The maintenance information is generated in *STEP 7* with the following system alarms:

- Maintenance required, identified by a yellow wrench per port.
- Maintenance demanded, identified by an orange wrench per port.

See also

Configuring port 1 and port 2 (Page 3-3)

Order numbers

A.1 Order numbers

Interface modules

Table A-1 Interface module order numbers

Description	Order Number
IM151-3 PN FO interface module and terminating module 1 unit	6ES7151-1BB21-0AB0

Accessories for fiber-optic cable technology

Table A-2 Order numbers of accessories

Description	Order Number
IE Termination Kit SC RJ POF Plug Assembly case for on-site installation of SC RJ POF connectors; consisting of stripping tool, Kevlar scissors, SC RJ grinding disk, grinding paper, grinding base and microscope	6GK1 900-0ML00-0AA0
IE SC RJ POF plug Cable connector (20 units)	6GK1 900-0MB00-0AC0
SC RJ Refill Set POF Refill Set for Termination Kit SC RJ POF Plug consisting of grinding paper and grinding disk (5 units)	6GK1 900-0MN00-0AC0
IE POF Standard Cable GP 980/1000, cut-to-length	6XV1874-2A
IE POF Trailing Cable 980/1000, cut-to-length	6XV1874-2B

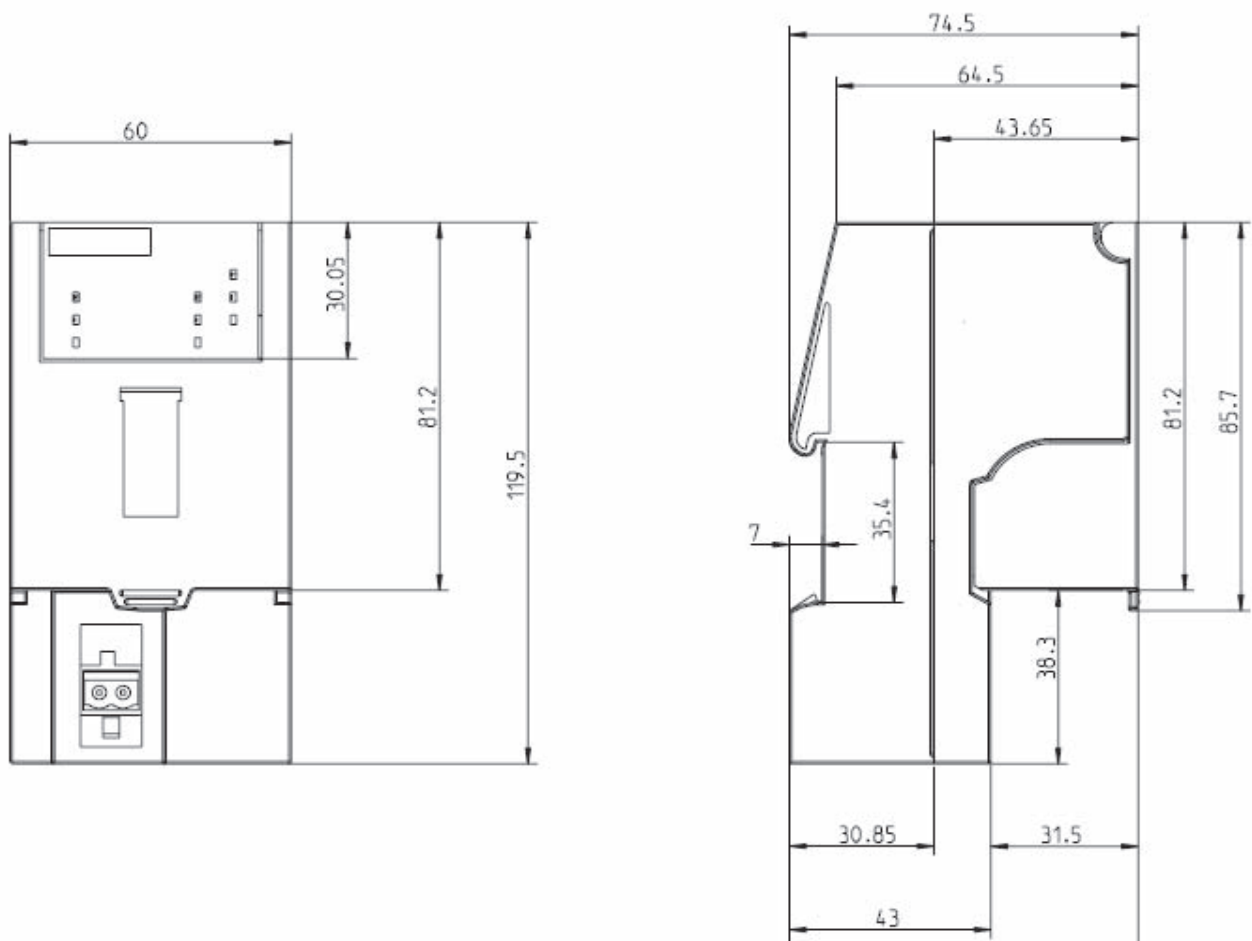
For the technical data of the fiber-optic cables, please refer to IKPI 2006.

Dimension Drawings

B.1 Interface modules

Interface module IM151-3 PN FO

Dimensional drawing IM151-3 PN FO interface module (dimensions in mm):



Response times

C.1 Response times of PROFINET IO

The response time of PROFINET IO essentially corresponds to the response time of PROFIBUS DP DPV1 which has a 12 MBaud transmission rate.

Calculation of the response time for IM151-3 PN FO (6ES7151-3BB21-0AB0)

The following equation enables you to make an approximate calculation of the ET 200S response time:

Response time [μ s]: 113

+ Maximum out (400 + 8m + 10mo) or (22m + 38ai + 75t)

+ Maximum out (130 + 8m) or (22 + 8do + 36ao + 75t)

- m Total number of all modules (power modules, digital electronic modules, analog electronic modules, 4 IQ-SENSE electronic modules, technological modules and motor starters)
- mo Sum total of all output modules (digital and analog)
- do Sum total of all digital output modules
- ao Sum total of all analog output modules
- ai Sum total of all analog input modules and 1SSI fast electronic modules
- t Number of all technology modules (except 1SSI fast)

Note

The formula specified applies to cyclic data transfer. The following prerequisites must be fulfilled:

- No diagnostics are reported.
 - No modules are removed and inserted.
-

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SIEMENS

Introduction

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Product Information

2

SIMATIC

Distributed I/O System ET 200S

Product Information

Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.



Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.



Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.



Caution

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:



Warning

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

1.1 Introduction

This product information describes supplements to the *ET 200S Distributed I/O System Operating Instructions* (A5E00515771-03), release 12/2005 and to the *ET 200S Distributed I/O System Manual* (A5E00514527-03), release 12/2005.

The chapter number mentioned in this product information refer to the chapters in the ET 200S Distributed I/O System Operating Instructions (A5E00515771-03), release 12/2005 and to the ET 200S Distributed I/O System Manual (A5E00514527-03), release 12/2005.

Contents of this Product Information

The product spectrum of the ET 200S is supplemented by the 8-channel digital electronic modules 8DI DC24V and 8DO DC24V 0.5A.

Section	Contents of this Product Information	Manual
2.1	Interrupt, error and system messages at 8DI / 8DO	Supplements Chapter 8 of the operating instructions
2.2	Digital electronic module 8DI DC24V	Supplements Chapter 3 in the manual
2.3	Digital electronic module 8 DO DC 24V/0.5A	

Prerequisites for Operating the Digital Electronic Modules with the Interface Modules

Operation of the digital electronic modules 8DI DC24V/ 8DO DC24V 0.5A is possible with the following interface modules from the specified order numbers (or firmware version). There are no limitations at the interface modules listed in the table.

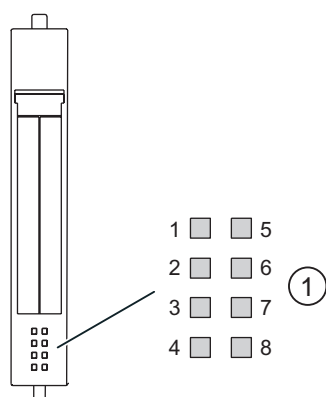
Interface module	As of Order Number	As of Firmware Version
IM 151-1 STANDARD	6ES7151-1AA03-0AB0	---
IM 151-1 FO STANDARD	6ES7151-1AB02-0AB0	---
IM 151-1 HIGH FEATURE	6ES7151-1BA01-0AB0	V2.1.3
IM 151-3 PN	6ES7151-3AA20-0AB0	V4.0.1
IM 151-3 PN HIGH FEATURE	6ES7151-3BA20-0AB0	
IM 151-3 PN FO	6ES7151-3BB21-0AB0	

Product Information

2.1 Interrupt, Error and System Messages at 8DI / 8DO

Digital electronic modules 8DI DC24V, 8DO DC24V 0.5A

LED display at 8DI DC24V, 8DO DC24V 0.5A:



① Status display for input/output status (green)

Status and error displays by means of LEDs at 8DI DC24V, 8DO DC24V 0.5A

The table below shows the status and error displays at the digital electronic modules.

Event (LEDs)								Cause	Remedy
1	5	2	6	3	7	4	8		
On								Input/output on channel 0 active.	---
	On							Input/output on channel 1 active.	---
		On						Input/output at Channel 2 active.	---
			On					Input/output at Channel 3 active.	---
				On				Input/output at Channel 4 active.	---
					On			Input/output at Channel 5 active.	---
						On		Input/output at Channel 6 active.	---
							On	Input/output at Channel 7 active.	---

2.2 Digital Electronic Module 8DI DC24V (6ES7131-4BF00-0AA0)

Properties

- Digital electronic module with eight inputs
- Nominal input voltage 24 VDC
- Suitable for connecting 2-wire sensors
- Isochronous mode supported

General terminal assignment

Note

Terminals A4, A8, A3 and A7 are only available at specified terminal modules.

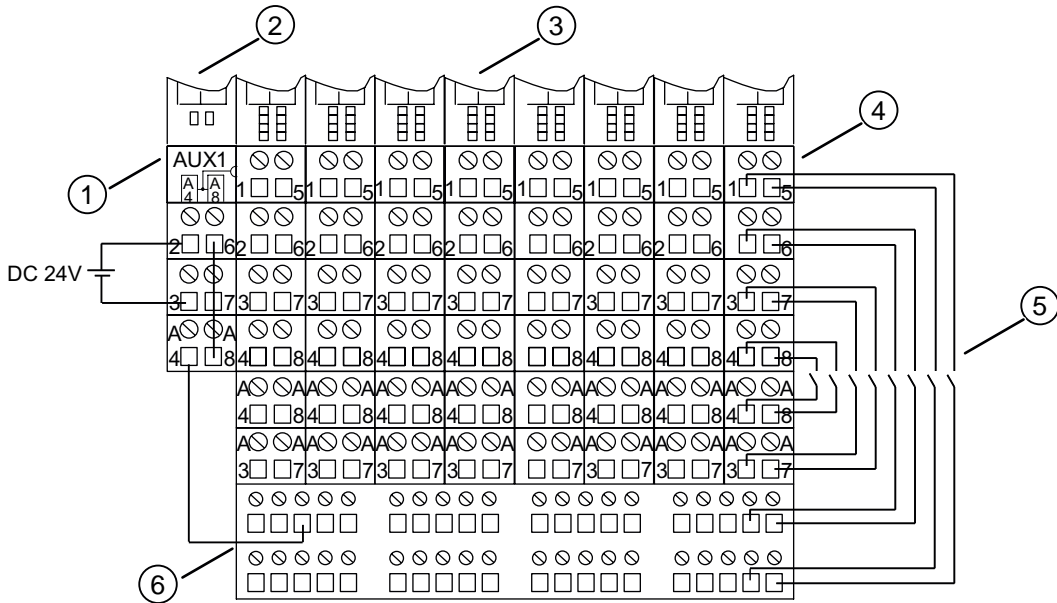
Pin assignment for 8DI DC24V (6ES7131-4BF00-0AA0)				
Terminal	Assignment	Terminal	Assignment	Notes
1	DI ₀	5	DI ₁	<ul style="list-style-type: none">• DI_n: Input signal, Channel n• AUX1: Sensor power supply 24 VDC (for example from power module) or potential bus (can be used freely up to 230 VAC)
2	DI ₂	6	DI ₃	
3	DI ₄	7	DI ₅	
4	DI ₆	8	DI ₇	
A4	AUX1	A8	AUX1	
A3	AUX1	A7	AUX1	

Usable terminal modules

Usable terminal modules for 8DI DC24V (6ES7131-4BF00-0AA0)		
TM-E15C26-A1 (6ES7193-4CA50-0AA0)	TM-E15C24-01 (6ES7193-4CB30-0AA0)	← Spring terminal
TM-E15S26-A1 (6ES7193-4CA40-0AA0)	TM-E15S24-01 (6ES7193-4CB20-0AA0)	← Screw-type terminal
TM-E15N26-A1 (6ES7193-4CA80-0AA0)	TM-E15N24-01 (6ES7193-4CB70-0AA0)	← Fast Connect

2-wire connection

The following configuration example shows a 2-wire connection with the electronic modules 8DI DC24V. You require further terminals so that sufficient terminals are available for the 24 VDC sensor power supply when the TM-E15S26-A1 terminal modules are used. In the example this is implemented by the add-on terminal TE-U120S4x10. Per add-on terminal, terminal modules of the same height must exist across a minimum width of 120 mm. You can naturally also use other terminals for this configuration (for example, ET 200S potential distribution module 4POTDIS).



- ① Terminal module TM-P15S23-A0
- ② Power module PM-E 24 VDC
- ③ Electronic modules 8DI DC24V
- ④ Terminal modules TM-E15S26-A1
- ⑤ Sensor in 2-wire connection
- ⑥ Add-on terminal TE-U120S4x10

Block Diagram

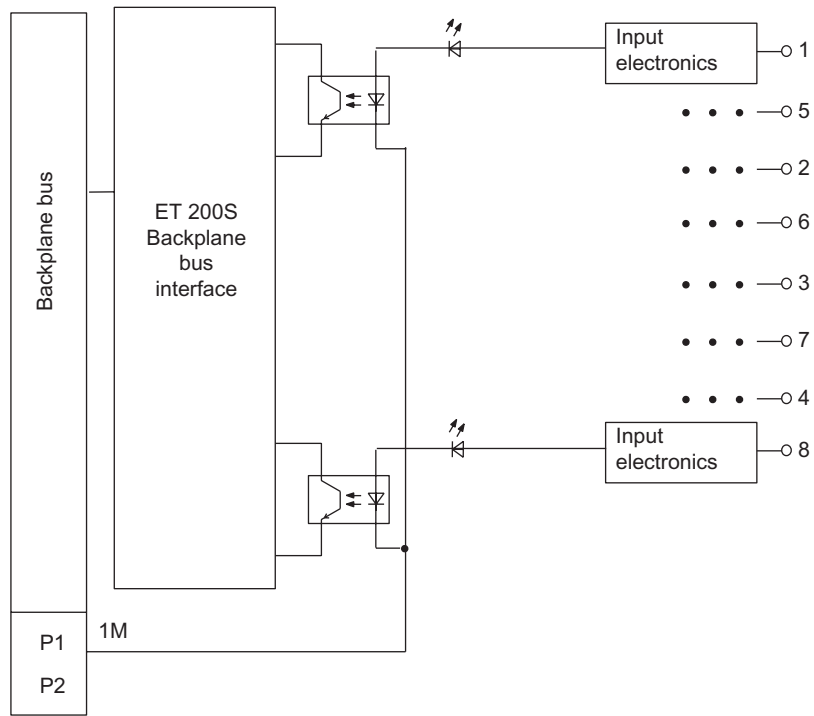


Figure 2-1 Block diagram of the 8DI DC24V

Technical Specifications 8DI DC24V (6ES7131-4BF00-0AA0)

Dimensions and weight	
Dimensions W × H × D (mm) (the total dimensions depend on the selected terminal module)	15 × 81 × 52
Weight	Approx. 35 g
Module-specific data	
Supports isochronous operation	Yes
Number of inputs	8
Length of cable	
• Unshielded	600 m, maximum
• Shielded	1000 m, maximum
Parameter length	3 bytes
Voltages, currents, potentials	
Rated supply voltage (from the power module)	24 VDC
• Reverse polarity protection	Yes
Electrical isolation	
• Between the channels	No
• Between the channels and backplane bus	Yes
Permissible potential difference	
• Between the different circuits	75 VDC / 60 VAC
Insulation test voltage	500 VDC
Current consumption	
• From supply voltage	Dependent on the sensor
Power dissipation of the module	Typically 1.2 W
Status, interrupts, diagnostics	
Status display	Green LED per channel
Diagnostics function	No
Data for selecting a sensor	
Input voltage	
• Rated value	24 VDC
• For signal "1"	15 V to 30 V
• For signal "0"	-30 V to 5 V
Input current	
• At signal "1"	Typ. 7 mA (for 24 V)
Input delay	
• At "0" to "1"	Typ. 3 ms (2.0 to 4.5 ms)
• At "1" to "0"	Typ. 3 ms (2.0 to 4.5 ms)
Input characteristic curve	According to IEC 61131, Type 1
Connection of 2-wire BEROs	Supported
• Permitted bias current	Max. 1.5 mA

2.3 Digital Electronic Module 8DO DC24V/0.5A (6ES7132-4BF00-0AA0)

Properties

- Digital electronic module with eight outputs
- Output current 0.5 A per output, aggregate current 4 A
- Rated load voltage 24 VDC
- Short-circuit protection
- Suitable for solenoid valves, DC contactors, and indicator lights
- Isochronous mode supported

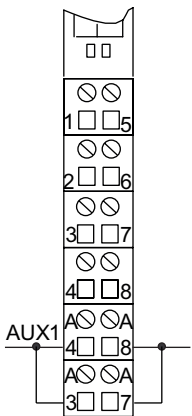
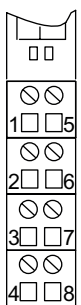
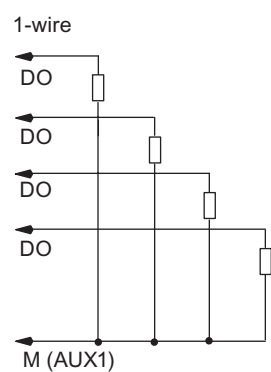
General terminal assignment

Note

Terminals A4, A8, A3 and A7 are only available at specified terminal modules.

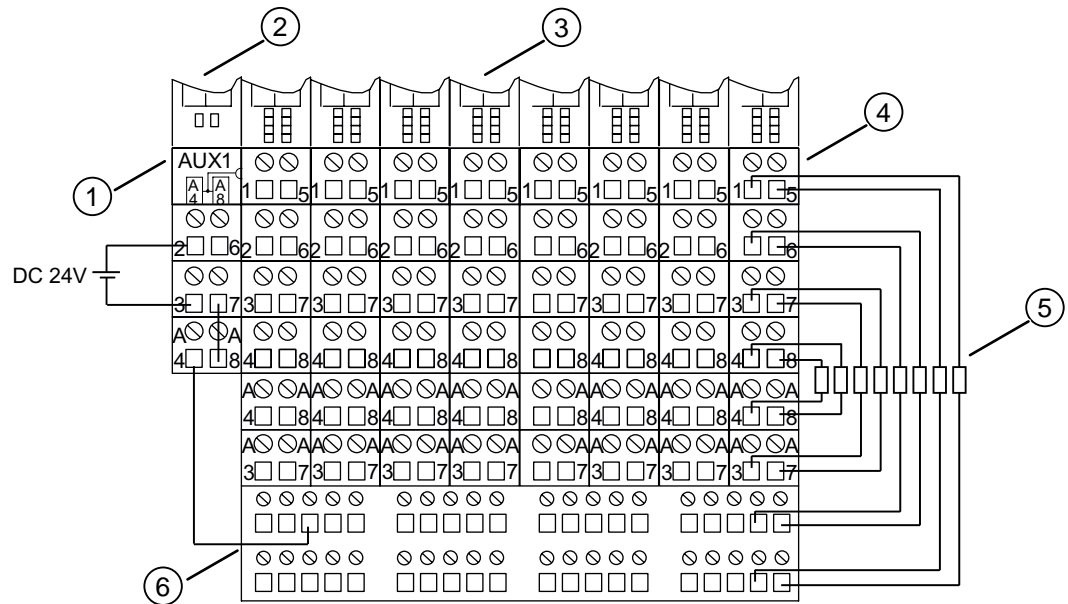
Pin assignment for 8DO DC24V/0.5A (6ES7132-4BF00-0AA0)				
Terminal	Assignment	Terminal	Assignment	Notes
1	DO ₀	5	DO ₁	<ul style="list-style-type: none"> • DO_n: Input signal, Channel n • AUX1: M chassis ground (from power module) or potential bus (freely usable up to 230 VAC)
2	DO ₂	6	DO ₃	
3	DO ₄	7	DO ₅	
4	DO ₆	8	DO ₇	
A4	AUX1	A8	AUX1	
A3	AUX1	A7	AUX1	

Usable Terminal Modules

Usable terminal modules for 8DO DC24V/0.5A (6ES7132-4BF00-0AA0)		
TM-E15C26-A1 (6ES7193-4CA50-0AA0)	TM-E15C24-01 (6ES7193-4CB30-0AA0)	← Spring terminal
TM-E15S26-A1 (6ES7193-4CA40-0AA0)	TM-E15S24-01 (6ES7193-4CB20-0AA0)	← Screw-type terminal
TM-E15N26-A1 (6ES7193-4CA80-0AA0)	TM-E15N24-01 (6ES7193-4CB70-0AA0)	← Fast Connect
		<p>Wiring examples</p> <p>1-wire</p> 

2-wire connection

The following configuration example shows a 2-wire connection with the electronic modules 8DO DC24V. You require further terminals so that sufficient terminals are available for the chassis ground connection M when the TM-E15S26-A1 terminal modules are used. In the example this is implemented by the add-on terminal TE-U120S4x10 that can be mounted as from a width of 120 mm (8 EMs). You can naturally also use other terminals for this configuration (for example, ET 200S potential distribution module 4POTDIS).



- ① Terminal module TM-P15S23-A0
- ② Power module PM-E 24 VDC
- ③ Electronic modules 8DI DC24V
- ④ Terminal modules TM-E15S26-A1
- ⑤ Actuators in 2-wire connection
- ⑥ Add-on terminal TE-U120S4x10

Block Diagram

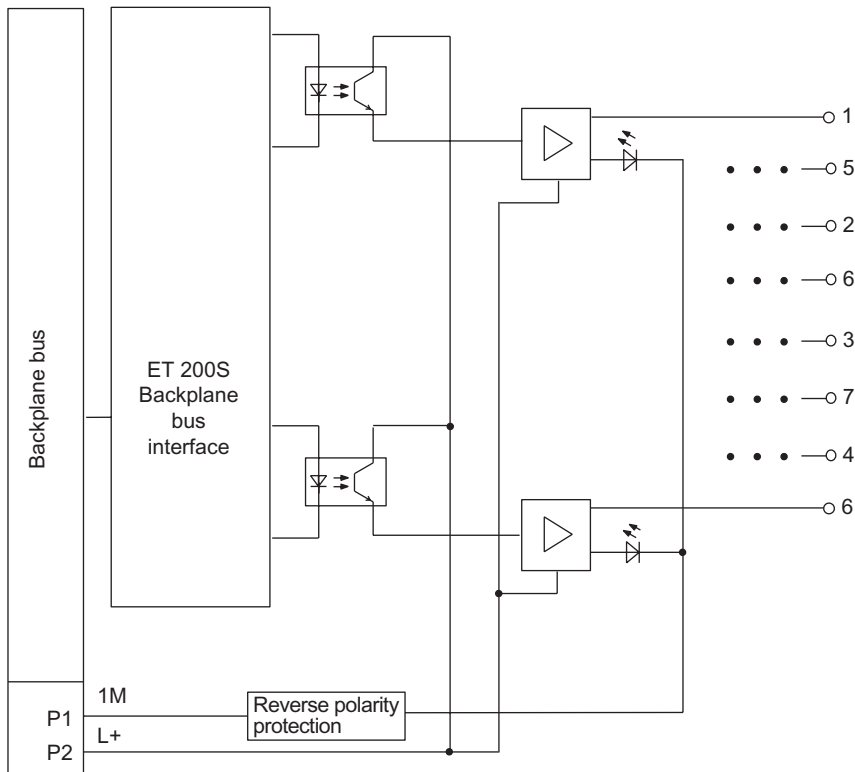


Figure 2-2 Block diagram of the 8 DO DC 24V/0.5A

Technical specifications 8DO DC24V/0.5A (6ES7132-4BF00-0AA0)

Dimensions and weight	
Dimensions W × H × D (mm) (the total dimensions depend on the selected terminal module)	15 × 81 × 52
Weight	Approx. 40 g
Module-specific data	
Supports isochronous operation	Yes
Number of outputs	8
Length of cable	
• Unshielded	600 m, maximum
• Shielded	1000 m, maximum
Parameter length	3 bytes

Voltages, currents, potentials	
Rated load voltage L+ (from the power module)	24 VDC
• Reverse polarity protection	Yes ¹
Total current of the outputs (per module)	4 A
Electrical isolation	
• Between the channels	No
• Between the channels and backplane bus	Yes
Permissible potential difference	
• Between the different circuits	75 VDC / 60 VAC
Insulation tested	500 VDC
Current consumption	
• From the rated load voltage L+ (no load)	Max. 5 mA per channel
Power dissipation of the module	Typically 1.5 W
Status, interrupts, diagnostics	
Status display	Green LED per channel
Diagnostics function	No
Data for selecting an actuator	
Output voltage	
• At signal "1"	Min. L+ (-1 V)
Output current	
• At signal "1"	
– Rated value	0.5 A
– Permitted range	7 mA to 0.6 A
• With signal "0" (leakage current)	0.3 mA max.
Output delay (for resistive load)	
• At "0" to "1"	max. 300 µs
• At "1" to "0"	max. 600 µs
Load resistor range	48 Ω to 3.4 kΩ
Lamp load	Max. 5 W
Connecting two outputs in parallel	
• For redundant triggering of a load	Yes (per module)
• To increase performance	No
Control of a digital input	Yes
Switch rate	
• For resistive load	100 Hz
• On inductive load	2 Hz
• For lamp load	10 Hz
Limitation (internal) of the voltage induced on circuit interruption	Typically L+ (-55 V to -60 V)
Reverse-voltage proof	Yes, if using the same load voltage as at the power module
Short-circuit protection of the output	Yes ²
• Threshold on	Typically 1.5 A
¹ Polarity reversal can lead to the digital outputs being connected through.	
² Per channel	

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SIEMENS

SIMATIC

Distributed I/O System ET 200S

Product Information

Introduction

1

Cycle synchronization on the
PROFIBUS DP

2

Option handling on the
PROFIBUS DP

3

Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.



Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.



Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.



Caution

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:



Warning

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

This information is new and replaces Sections 7.2 and 7.3 in the *ET 200S Distributed I/O System Operating Instructions* (A5E00515771-03), Release 12/2005.

Cycle synchronization on the PROFIBUS DP

2.1 Basics

Properties

Reproducible response times (i.e., of equal length) are achieved in SIMATIC with a constant DP bus cycle, synchronization of the user program on the DP bus cycle, and the isochronous transfer of I/O data to the I/O modules. The isochronous sections of the user program are processed synchronously with the DP bus cycle by means of synchronous cycle interrupts (OB 61 to OB 64). The I/O data are transferred at defined and constant (isochronous) intervals via the backplane bus of the DP slave to the I/O modules and switched through isochronously up to the "terminal".

In other words, isochronous operation results in the synchronization of all hitherto free-running single cycles. These include the user program in the CPU, the DP cycle on the PROFIBUS subnet and the cycle in the DP slave right up to the cycle in the I/O modules of the DP slaves.

The maximum jitter for the IM151-1 is 10 μ s. The jitter of the ET 200S I/O modules cannot be considered due to the existing diversity.

Requirements

- Cycle synchronization is possible with the IM151-1 HIGH FEATURE with modules which support cycle synchronization. You can see whether a module supports cycle synchronization in the device description or HW Config. Other modules can be used in the ET 200S setup, but they do not support cycle synchronization.
- The transmission rate of the PROFIBUS DP is at least 1.5 Mbps (shorter equidistance times can be achieved with higher transmission rates).
- The maximum constant bus cycle time is 32 ms.
- The constant bus cycle time master (class 1) must be a class 1 DP master. This means a programming device/PC cannot be a constant bus cycle time master.
- Only one DP master (class 1) may be active on the PROFIBUS DP during equidistant mode. Programming devices or PCs (class 2) can also be connected.
- The isochronous mode can only be activated on the ET 200S if the constant bus cycle is enabled on the DP master system.
- Isochronous operation (constant bus cycle time) of the ET 200S is not possible during removal or insertion of electronic modules.

In order to ensure that asynchronous results such as "Switch on power module" or "Read/Write data record" do not cause cycle violation, a sufficiently large gap between T_o and T_i must be provided, i.e. T_{dp} must be increased.

- In constant bus cycle time operation, the ET 200S requires a starting time of approx. 150 DP cycles to guarantee isochronous operation up to the terminals.
- The bus length must be less than 1 meter.

Note

Isochronous operation is only possible without interference frequency suppression and without smoothing.

Optimizing the constant bus cycle time

- Ensure equal input delay of all the digital input modules in the ET 200S station for cycle synchronization.
If the settings differ, the lowest input delay is used to calculate the DP cycle time. Changes at the inputs of modules with a higher input delay are recorded with a corresponding time offset.
This also applies to the digital output modules. Choose modules with the same conversion time TWA here.
- The shorter the input delays you set for the HIGH FEATURE digital input modules, the shorter the constant bus cycle times that can be achieved.
Hint: Set an input delay as close to 0.1 ms as possible for the HIGH FEATURE digital input modules.
- The processing time of the modules should be taken into account in the case of modules that support isochronous operation.
- The minimum constant bus cycle time depends on the number of modules in the ET 200S.
Hint: Always try to use 4-channel digital input HIGH FEATURE modules to reduce the number of modules required.
Shorter constant bus cycle times can be achieved by distributing the modules of an ET 200S (with a high module count) over two ET 200S stations.
- The constant bus cycle time is reduced if you increase the transmission rate.
Hint: Set the highest possible baud rate.
- Interface module 151-1 HIGH FEATURE, 6ES7151-1BA02-0AB0 and higher: An optimization of the periods for the constant bus cycle can be achieved through the correct plugging sequence of the electronic modules:
 - Plug the output modules with the longest processing time on the left in the ET 200S.
 - Plug the input modules with the longest processing time on the right in the ET 200S.The processing times (= TWE or TWA) can be found in the technical data for the module concerned.

Use of the analog input modules

We recommend that you always use the HIGH FEATURE modules (HF) instead of the older HIGH SPEED modules (HS) as analog input devices in an isochronous structure. You can achieve shorter response times with HIGH FEATURE modules.

HIGH FEATURE modules:

- 2AI 2/4WIRE HF: 6ES7 134-4MB02-0AB0
- 2AI U HF: 6ES7 134-4LB02-0AB0

If you do use HIGH SPEED modules and operate the IM151-1 isochronously, you have to activate the "isochronous mode" for the modules listed below in STEP7. This is the only method of ensuring reliable operation of these modules with the shorter cycle times of the IM151-1 (6ES7151-1BA02-0AB0) that can then be achieved.

HIGH-SPEED modules:

- 2AI U HS: 6ES7 134-4FB51-0AB0
- 2AI I 2WIRE HS: 6ES7 134-4GB51-0AB0
- 2AI I 4WIRE HS: 6ES7 134-4GB61-0AB0

Further information

For further information regarding cycle synchronization, please refer to the *STEP 7* Online Help and the *Isochronous Mode* manual.

Overlapping of Ti and To with IM151-1 HIGH FEATURE (6ES7151-1BA02-0AB0 and higher)

A reduction of the system reaction time is attained with the overlapping of Ti and To, meaning that the time from the occurrence and detection of an event via the processing up to outputting of a response at the outputs is reduced.

This function is only possible with the interface modules IM151-1 HIGH FEATURE (6ES7151-1BA02-0AB0 and higher).

Preconditions for constant bus cycle time ≥ 0.5 ms

The following requirements must be fulfilled:

- Interface module IM151-1 HIGH FEATURE (6ES7151-1BA02-0AB0 and higher)
- *STEP 7 V5.4 SP1* and higher

2.2 Assigning the parameters for cycle Synchronization on the PROFIBUS DP

Procedure

1. CPU settings:
 - "Object properties" of the CPU > Register "Cycle synchronization alarms"
 - CPU - Set cycle synchronization alarm
 - Select the DP master system being used
 - Select the desired sub-process image

Memory	Interrupts	Interrupts	Cyclic interrupts	Diagnostics/clock	Time-of-day interrupts
General information	Startup	Clocked interrupts	Cycle / clock memory	Retentivity	
OB 61:	Priority: <input type="text" value="25"/>	DP master-systemno.: <input type="text" value="1"/> ▼	Partial process image(s) (e. g.: 1.4): <input type="text" value="1"/>	Time lag: <input type="text" value="3.000"/> ms	
				<input type="button" value="Default"/>	

Figure 2-1 Dialog box cycle synchronization alarms

2. DP master system settings:

DP master "Object properties" > "General" tab > "Properties" button > "Parameter" tab > "Properties" button > "Network settings" tab > "Options" button

- Activate constant bus cycle time on the DP master system
- Set the length of the constant bus DP cycle (max. 32 ms)
- Set "Times Ti and To identical for all slaves" (effects a synchronization of the I/O data of the various DP slaves)
- Times Ti and To can be set separately. Recommendation: Accept the standard settings for Ti and To.

Figure 2-2 Dialog box options

Note

With the "Calculate again" button you can calculate a value for the constant buy DP cycle from STEP 7 that takes into account the current PROFIBUS DP configuration. This value is then automatically entered in the "Equidistant DP cycle", "Time Ti (...)," and "Time To (...)" boxes.

3. DP slave settings:

DP slave "Object properties" > "Cycle synchronization" tab

- Activate "Synchronize DP slave to equidistant DP cycle".
- Enter the times T_i and T_o (if "Times T_i and T_o identical for all slaves" has not been set on the DP master system). Recommendation: Accept the standard settings for T_i and T_o .
- Select the electronic modules to be synchronized and assign them in the "Addresses" tab to the sub-process image defined in the CPU. For further information, please refer to the *Isochronous Mode* Function Manual.

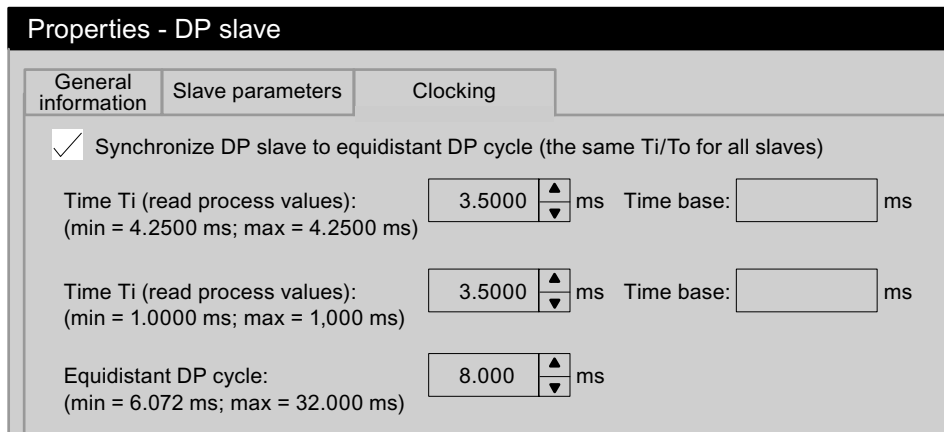


Figure 2-3 DP slave properties dialog box

Note

If you click on "Cycle synchronization" in the "Edit" menu, a configuration overview of the cycle-synchronized modules appears.

4. Create user program:

- Creating the OB 61.
- At the start of the OB 61, the SFC 126 must be called in order to update the sub-process image of the inputs.
- At the end of the OB 61, the SFC 127 must be called in order to update the sub-process image of the outputs.
- The sub-process image to be used is the sub-process image parameterized in the CPU ("Cycle synchronization alarms" tab).

Configure Ti and To overlap with IM151-1 HIGH FEATURE (6ES7151-1BA02-0AB0 and higher)

With IM 151-1 HIGH FEATURE in isochronous mode, you can also configure an overlap of Ti and To.

Parameter assignment with STEP 7:

Parameter assignment takes place as described above. In addition you can configure an overlap of Ti and To.

An Ti/To overlap is given if $T_i + T_o > T_{dp}$. *STEP 7* checks the values you have entered for feasibility.

Further information

For further information about the isochronous mode please refer to the *STEP 7* Online Help and the *Isochronous Mode* Function Manual.

You will find the Function Manual on the Internet at:

<http://support.automation.siemens.com>

Search for the entry with the ID number 15218045.

2.3 Fault correction during isochronous operation on PROFIBUS DP

Event	Cause	Action
Station failure of the ET 200S	Faulty cycle synchronization (more than 25 lost or violated cycles).	Check the parameter assignment.
The obtainable constant bus cycle times are too long.	The input delays of the HIGH FEATURE digital input modules are not optimally set.	Decrease the input delay of the HIGH FEATURE digital input modules.
No isochronous signal detection/output	Wrong sub-process image used. Negative RET_VAL in the case of SFCs 126/127	Check whether the same sub-process image was used in the OB 61 user program (or up to OB 64) when SFCs 126/127 are called and in the configuration of the DP master/DP slave.

Option handling on the PROFIBUS DP

3.1 Basic principles of option handling on PROFIBUS DP

Principle

Option handling enables you to set up the ET 200S for future expansions (options). Option handling means that you install, wire, configure, and program the planned maximum configuration of the ET 200S.

You can choose between two option handling variants, according to your requirements:

- Option handling *with* RESERVE modules
- Option handling *without* RESERVE modules

The two option handling variants are mutually exclusive.

Option handling *with* RESERVE modules

The optional electronic modules are initially replaced with inexpensive RESERVE modules which are then later exchanged with the planned electronic modules.

This means that the ET 200S can be completely prewired ("master cabling") since the RESERVE module is not connected to the terminal module terminals and therefore not to the process.

The RESERVE modules for future expansions at the right-hand end of the station do not have to be mounted. In this case, preparatory installation and wiring are possible but not a prerequisite.

Option handling *without* RESERVE modules

With this variant, the use of RESERVE modules is not necessary. The modules are mounted side-by-side without gaps. Preparatory mounting and wiring are not required for the optional electronic modules.

Note

Mark the modules in your installation with the slot numbers from your configuration.

3.2 Option handling with RESERVE modules

3.2.1 Principle of operation of option handling with RESERVE modules

Principle

With option handling with RESERVE modules, the configuration of ET 200S Slots 2 to 63 is checked. If a slot is enabled for option handling, the RESERVE module (option) can occupy this slot instead of the configured electronic module without triggering a diagnostic interrupt. If the slot is disabled, only the configured electronic module can occupy this slot. Any other module will trigger a diagnosis. You can also control the configuration of Slots 2 to 63 and monitor the configuration of Slots 1 to 63 using the control and feedback interface in the process input image (PII) and process output image (PIQ).

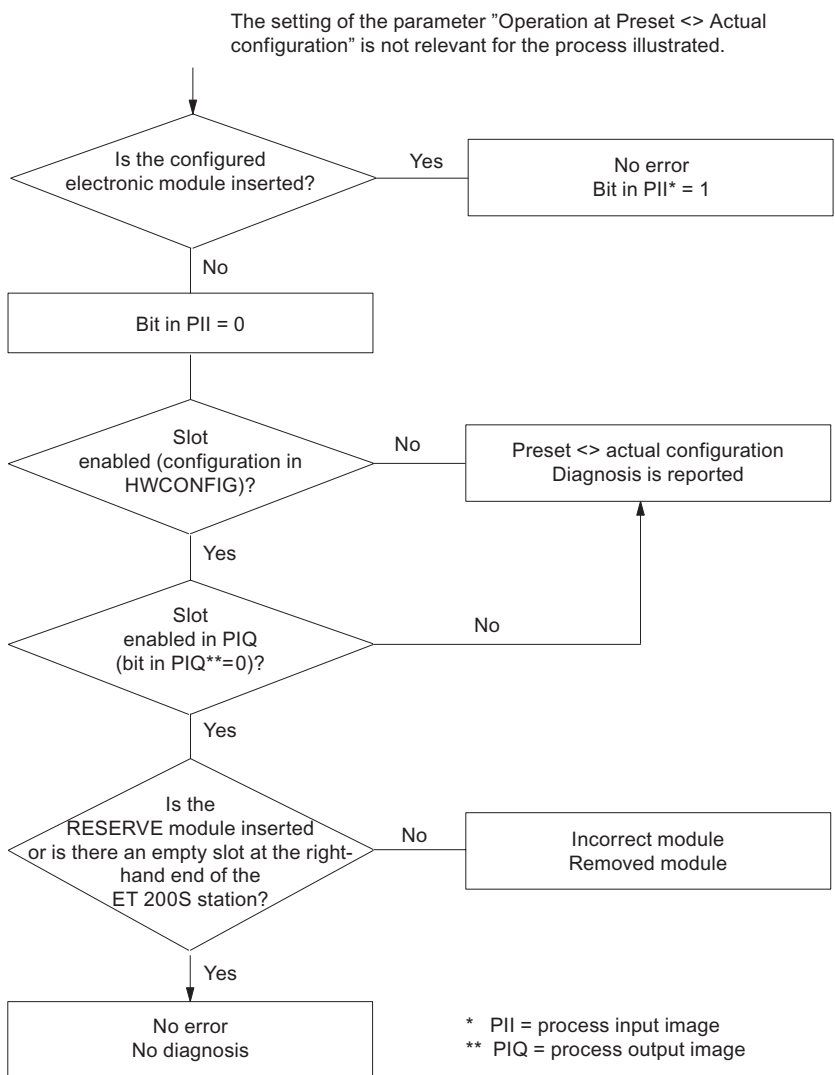


Figure 3-1 Principle of operation of option handling with RESERVE modules

3.2.2 Prerequisites for option handling with RESERVE modules

Prerequisites

For option handling with RESERVE modules you require:

- Interface module IM151-1 STANDARD (6ES7151-1AA03-0AB0 and higher), IM151-1 FO STANDARD (6ES7151-1AB02-0AB0 and higher) or IM151-1 HIGH FEATURE (6ES7151-1BA01-0AB0 and higher)
- Power module PM-E 24..48 VDC (6ES7138-4CB50-0AB0 and higher) or PM-E 24..48 VDC/24..230 VAC (6ES7138-4CB10-0AB0 and higher)

Note

One of these power modules must be included in the configuration at least once, together with one of the above-mentioned interface modules.

- RESERVE modules as replacements for future electronic modules
- For configuration, the GSD file in accordance with the table below:

	DPV0 operation		DPV0/DPV1 operation	DPV0/DPV1 operation
	SI02806A.GSx	SI02806B.GSx	SI03806A.GSx	SI0280E0.GSx
	from 07/2003 (V1.0 and higher)			from 08/2005 (V2.0 and higher)
6ES7151-1AA03-0AB0	X	–	–	–
6ES7151-1AB02-0AB0	–	X	–	–
6ES7151-1AA04-0AB0	X	–	X	–
6ES7151-1BA01-0AB0	–	–	–	X

Note

You do not require a GSD file for option handling in *STEP 7* with:

- IM151-1 STANDARD / FO
 - from STEP 7 V5.3 SP 2 and
 - the current HW update for the interface and power modules. Use the menu command "Options > Install HW updates" in the HW Config to link the HW update. The HW updates can be downloaded from Customer Support on the Internet.
- IM151-1 HIGH FEATURE
 - from STEP 7 V5.3 SP 3

You can find the options handling description in the STEP 7 Online Help.

Note

If the actual configuration of an ET 200S station does not match the preset configuration, a diagnostics report is generated if the check for the relevant slots is not enabled for option handling.

3.2.3 Example for using RESERVE modules

Configuration variants

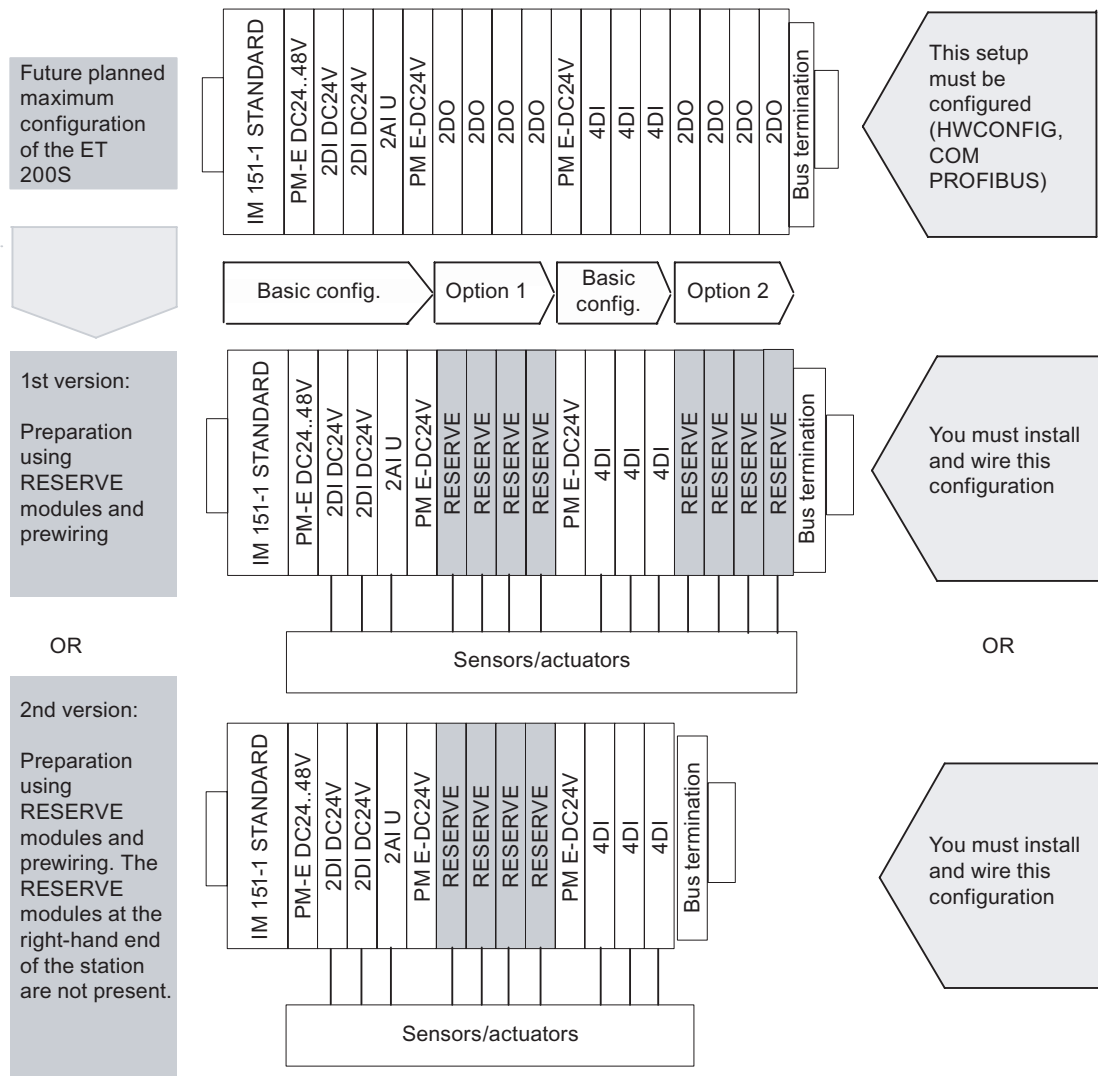


Figure 3-2 Example for using RESERVE modules

3.2.4 Assigning parameters for option handling with RESERVE modules

Introduction

In *STEP 7* or *COM PROFIBUS* you assign the parameters for the electronic modules which you want to use in future applications, e.g. 4DI H, on the RESERVE module slots (or the expansion modules on the right-hand end of the station):

- Drag the electronic module to the configuration table
- Assign the parameters

Procedure

1. Drag a PM-E 24..48 VDC or PM-E 24..48 VDC/24..230 VAC power module with one of the following entries into the configuration table:
 - ...O (option handling) or
 - ...SO (status byte + option handling)

Note

Entry of the power module with the ending ...O or ...SO can only be made **once** in the ET 200S configuration!

2. Assign parameters to the interface module as follows:

Interface module	Parameter	Setting	Description
IM151-1 STANDARD	Option handling, general	enable	Option handling is activated for the entire ET 200S.
<i>or</i> IM151-1 FO STANDARD	Option handling: Slots 2 to 63	Enable (all the slots where RESERVE modules can be located)	There are RESERVE modules or a configured electronic module on the slot. A diagnostic is not signaled.
<i>or</i> IM151-1 HIGH FEATURE	Option handling: With/without RESERVE modules	With RESERVE modules	Selects option handling with RESERVE modules

Note

If "Operation for set < > actual installation" is blocked for parameter assignment,

- the ET 200S does not start up if a module is missing or if an incorrect module is plugged in. The diagnostic "No module" or "Incorrect module" is signaled.
 - The ET 200S starts up if you enable option handling for the slot where a RESERVE module is plugged in. A diagnostic is not signaled.
-

Substitute values

If you have assigned an electronic module for the RESERVE module, the following substitute values are signaled:

- Digital input modules: 0
- Analog input modules: 7FFF_H
- Function module: 0

3.2.5 Controlling and monitoring options with RESERVE modules

Introduction

You can use the control interface (PIQ) and feedback interface (PII) to control and monitor options by means of the user program.

Recommendation: Before working with the ET 200S optional enhancements, check whether all the configured electronic modules are plugged in using the feedback interface (refer to the table below).

Note

SFCs 14/15 can be used to consistently access the control and feedback interface.

Principle

The control and feedback interface is located in the input and output process image of the PM-E 24..48 VDC or PM-E 24..48 VDC/24..230 VAC power module. It can only be accessed if entries ending in ...O or ...SO for that power module were selected in the configuration software.

One bit is available for each ET 200S electronic or RESERVE module slot.

- Control interface: Slot 2 to 63
- Feedback interface: Slot 1 to 63

	7	6	5	4	3	2	1	0
EB/AB x	7	6	5	4	3	2	1	*
EB/AB x+1	15	14	13	12	11	10	9	8
EB/AB x+2	23	22	21	20	19	18	17	16
EB/AB x+3	31	30	29	28	27	26	25	24
EB/AB x+4	39	38	37	36	35	34	33	32
EB/AB x+5	47	46	45	44	43	42	41	40
EB/AB x+6	55	54	53	52	51	50	49	48
EB/AB x+7	63	62	61	60	59	58	57	56

Figure 3-3 Control (PIQ) and feedback interface (PII)

(*) not relevant

Control interface PIQ (AB x to AB x+7):

You can use these bytes (8 bytes) to control the diagnostic behavior of the slots that you enabled for option handling in the HW Config.

Only the slot bits enabled at parameter assignment for option handling are evaluated. They are marked with "0".

Table 3-1 Control interface

Slot	Value of the bit	Reaction
2 to 63	0	Parameter assignment for option handling applies. RESERVE modules are allowed: <ul style="list-style-type: none"> • The station is engaged in data exchange. • A diagnostic is not signaled. • The SF LED on the interface module is off.
	1	Parameter assignment for option handling is cancelled. RESERVE modules are not accepted on this slot: <ul style="list-style-type: none"> • The station is engaged in data exchange. • The diagnostic "Incorrect module" is signaled. • The SF LED on the interface module is on.

Feedback interface PII (EB x to EB x+7):

The feedback interface (8 bytes) tells you which module is actually located on which slot.

All slots are reported. Even slots that were not enabled for option handling.

Table 3-2 Feedback interface

Slot	Value of the bit	Reaction
0	0	Option handling is inactive
	1	Option handling is active
1 to 63	0	The RESERVE module, an incorrect module, or a removed module is on the slot.
	1	The configured module is on the slot.

3.2.6 Troubleshooting for option handling with RESERVE modules

Troubleshooting for option handling

Table 3-3 Troubleshooting option handling

Event	Cause	Action
ET 200S does not start up; configuration error	There are multiple entries in the ET 200S configuration for power modules ending in ...O or ...SO.	Check and correct the configuration in HW Config.
	There are no entries of power modules ending in ...O or ...SO in the ET 200S configuration.	Use a power module entry ending in ...O or ...SO in HW Config.

3.2.7 Address area for option handling and status byte with RESERVE modules

Address area for option handling and status byte

You can control and monitor option handling and evaluate the status byte of the power module using the control (PIQ) and feedback (PII) interface.

The address range in the control (PIQ) and feedback interface (PII) depends on the configuration, i.e. the selection of the corresponding entry in the configuration software.

This table shows the PII feedback interface and the PIQ control interface for various entries.

Table 3-4 PII feedback interface and PIQ control interface

In STEP 7/HW Config or COM PROFIBUS or other configuration software	Feedback interface PII		Control interface PIQ	
	Address	Content	Address	Content
Usual entry for the power module	---		---	
Ends in ...S	lBx	Status byte	---	
Ends in ...O	lBx	Option handling	oBx	Option handling
	... lBx+7		... oBx+7	
Ends in ...SO	eBx	Option handling	aBx	Option handling
	... eBx+7		... aBx+7	
	lBx+8	Status byte	oBx+8	Not applicable

Option handling in PIO/PII

	7	6	5	4	3	2	1	0
AB/EB x	7	6	5	4	3	2	1	*
AB/EB x+1	15	14	13	12	11	10	9	8
AB/EB x+2	23	22	21	20	19	18	17	16
AB/EB x+3	31	30	29	28	27	26	25	24
AB/EB x+4	39	38	37	36	35	34	33	32
AB/EB x+5	47	46	45	44	43	42	41	40
AB/EB x+6	55	54	53	52	51	50	49	48
AB/EB x+7	63	62	61	60	59	58	57	56

Figure 3-4 Option handling in PIQ/PII

(*) Not applicable

PIO: OB x to OB x+7		
Slot 2 to 63:	0	Parameter assignment for option handling applies. RESERVE modules are allowed: <ul style="list-style-type: none"> The station is engaged in data exchange. A diagnostic is not signaled. The SF LED on the interface module is off.
	1	Parameter assignment for option handling is canceled. RESERVE modules are not accepted on this slot: <ul style="list-style-type: none"> The station is engaged in data exchange. A diagnostic is not signaled. The SF LED on the interface module is off.
PII: IB x to IB x+7		
Slot 1 to 63:	0	The RESERVE module, an incorrect module, or a removed module is on the slot.
	1	The configured module is on the slot.

3.3 Option handling without RESERVE modules

3.3.1 Principle of operation of option handling without RESERVE modules

Principle

In the case of option handling without RESERVE modules, the configuration data are insufficient to compare the preset configuration with the actual configuration. In addition, information about the existing options is still required. This must be sent via the user data to the IM151-1. In order to be able to receive the user data, the IM151-1 initially goes formally into cyclic data exchange after the configuration data have been received. However, direct I/O access does not yet take place. Output data are rejected, the input data are zero. The IM151-1 only responds to the output data that you have to connect to a power module (O or SO). A preset-actual test isn't possible until this option information is available. Only after this can the I/O devices be operated.

Since the option information is stored retentively in the IM151-1, this intermediate state only exists during the first commissioning or reconfiguration/retrofitting.

Please note the following:

Notice

In this operating mode, the IM151-1 may not be operated as a subscriber (F-data exchange broadcast) on the PROFIBUS.

- Data record requests to option slots that do not exist induce a fault (80B0).
- If the IM151-1 is operated without configuration or without a CPU (DP master), it supplies the configuration as it exists. This is relevant for wiring test tools, since the actual slot numbers, without gaps from 1 to n, are used there for status/control.
- In isochronous operation, the designed configuration applies for the time calculation (Ti, To, Tdp).
- There are no limitations when "packing" digital modules. Theoretically, the module to which the byte address is assigned in the preset configuration can be missing in the structure.

Note

The configured slot numbers (slot numbers in data records, and for events such as diagnostics and interrupts) always apply for slot addressing.

3.3.2 Prerequisites for option handling without RESERVE modules

Prerequisites

For option handling without RESERVE modules you require:

- Interface module IM151-1 HIGH FEATURE (6ES7151-1BA02-0AB0 and higher)
- Power module PM E-24 ..48 VDC or PM E- 24..48 VDC/24 ..230 VAC
One of these power modules must be included in the configuration at least once.
- For configuring the GSD file SI0380E0.GSx as from 10/2006.

Note

You do not require a GSD file for option handling in *STEP 7* as from:

- STEP 7 V5.3 SP 3 with HSP0102

You can find the description for option handling in the STEP 7 Online Help.

3.3.3 Example for use without RESERVE modules

Configuration variants

Below is an example of the use of option handling without RESERVE modules.

Note: A "0" in the control interface means that this slot number is deactivated in the configuration and thus does not exist.

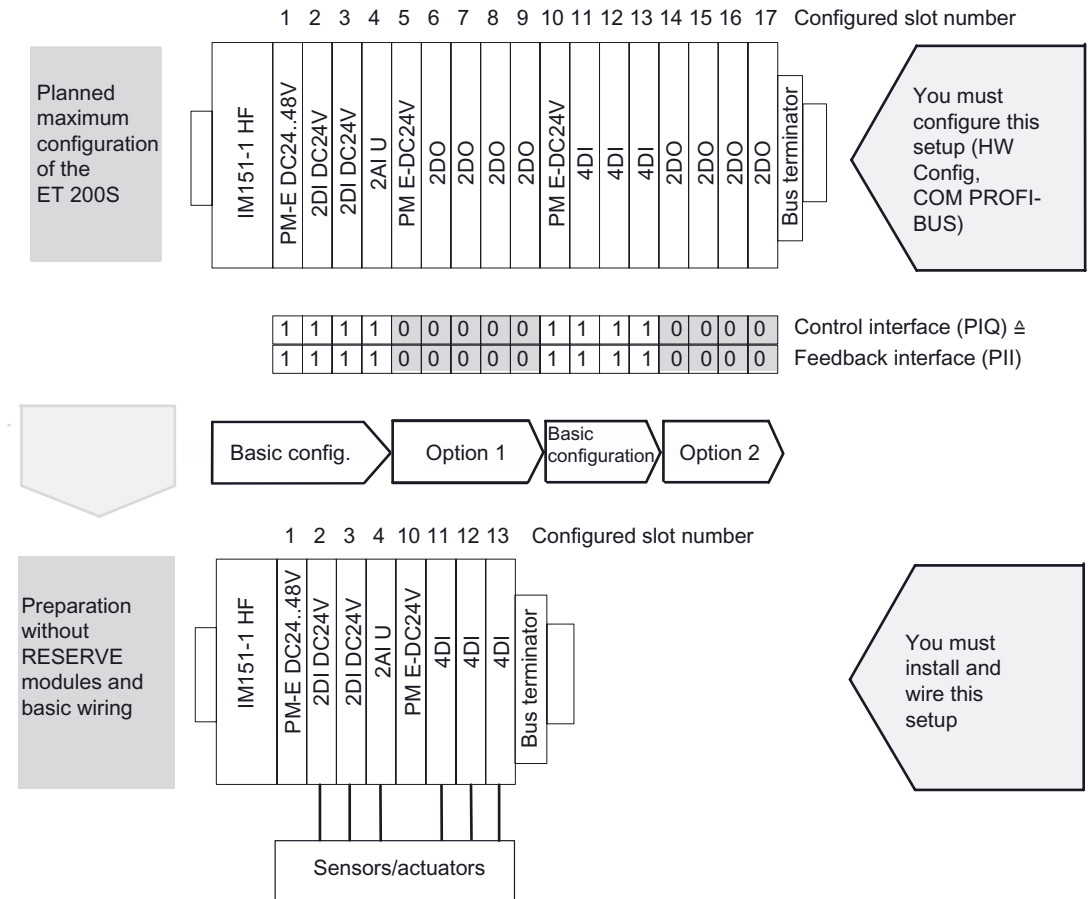


Figure 3-5 Example for use without RESERVE modules

3.3.4 Configuring option handling without RESERVE modules

Introduction

You configure option handling without RESERVE modules as described below.

Procedure

1. Drag a PM-E 24..48 VDC or PM-E 24..48 VDC/24..230 VAC power module with one of the following entries into the configuration table:
 - ...O (option handling) or
 - ...SO (status byte + option handling)

Note

You may only enter the power module with the ending ...O or ...SO **once** in the ET 200S configuration!

2. Assign parameters to the interface module as follows:

Interface module	Parameter	Setting	Description
IM151-1 HIGH FEATURE	Option handling, general	Enable	Option handling is activated for the entire ET 200S.
(6ES7151-1BA02-0AB0 and higher)	Option handling: With/without RESERVE modules	Without RESERVE modules	Selects option handling without RESERVE modules

Note

If "Operation for set < > actual installation" is blocked for parameter assignment, the ET 200S does not start up if a module is missing or if an incorrect module is plugged in. The diagnostic "No module" or "Incorrect module" is signaled.

If the IM151-1 does not start up in this state, the SF LED lights up at the IM151-1 and at the deactivated electronic module of the ET 200S.

Note

In the case of option handling without RESERVE modules, incorrect filling in of the control interface can result in too many plugged modules with a slot number greater than 63 are reported from the point of view of the interface module. Since there is only room for 63 modules in the diagnostics message (module status), the highest-value bit is set in the "Identifier-related diagnostics" in this case. This produces the following results:

- The SF LED on the IM lights up
 - Bit 3 in status byte 1 of the diagnostics message is set (external diagnosis exists)
 - The "Slot 64 faulty" error message is indicated in STEP7.
-

Behavior during the first start-up

In the case of option handling without RESERVE modules, the IM151-1 always goes into cyclic data exchange during the first start-up. However, the I/O device input/output is not activated until valid information about the options is available from the module. No fault is indicated externally in this state (BF LED does not light up). The input/output of the I/O devices is not active in this state. Evaluate the data of the feedback interface in order to assess this state.

Behavior during a warm restart

Valid information about the options is stored retentively in the IM151-1. During the warm restart, the IM151-1 goes into cyclic data exchange and the input/output of the I/O devices is activated immediately. If the configuration has changed since the last start-up (for example incorrect module plugged or information about options is incorrect), the input/output of the I/O devices is deactivated until the real configuration agrees again with the configured one.

3.3.5 Controlling and monitoring options without RESERVE modules

Introduction

You can use the control interface (PIQ) and feedback interface (PII) to control and monitor options by means of the user program.

Recommendation: Before working with the ET 200S optional enhancements, check whether all the required electronic modules are plugged in using the feedback interface (refer to the table below). The contents of the feedback interface have to agree with the specifications of the control interface.

Note

The use of SFCs 14/15 enables consistent access to the control and feedback interface.

Principle

The control and feedback interface is located in the input and output process image of the PM-E 24..48 VDC or PM-E 24..48 VDC/24..230 VAC power modules. It can only be accessed if entries ending in ...O or ...SO for that power module were selected in the configuration software.

One bit is available for each ET 200S electronic module slot:

- Control interface: Slots 1 to 63
- Feedback interface: Slots 1 to 63

	7	6	5	4	3	2	1	0
EB/AB x	7	6	5	4	3	2	1	0
EB/AB x+1	15	14	13	12	11	10	9	8
EB/AB x+2	23	22	21	20	19	18	17	16
EB/AB x+3	31	30	29	28	27	26	25	24
EB/AB x+4	39	38	37	36	35	34	33	32
EB/AB x+5	47	46	45	44	43	42	41	40
EB/AB x+6	55	54	53	52	51	50	49	48
EB/AB x+7	63	62	61	60	59	58	57	56

Figure 3-6 Control (PIQ) and feedback interface (PII)

Control interface PIQ (AB x to AB x+7):

You must inform the IM151-1 via the control interface about which modules actually exist and which slots have been left out. The IM151-1 cannot evaluate the configuration until it has received this information.

Table 3-5 Control interface

Slot	Value of the bit	Reaction
0	0	Content of the bitspur is not relevant
	1	Bitspur is valid
1 to 63	0	Slot does not exist in the actual configuration
	1	Slot exists in the actual configuration

Feedback interface PII (EB x to EB x+7):

The feedback interface (8 bytes) tells you which module is actually located on which slot.

Table 3-6 Feedback interface

Slot	Value of the bit	Reaction
0	0	Option handling is inactive
	1	Option handling is active
1 to 63	0	Slot belongs to an option that does not exist or the module status is not OK
	1	Slot exists and is OK

If the feedback result of the feedback interface is identical with the specification of the control interface, the configuration is correct.

Procedure

In order to start testing the options, set Bit0=1 in the first byte (AB x).

Proceed as follows in order to ensure the consistency of the 8 bytes:

- Write the first byte (AB x) last (for direct access with T PAB)

or

- First write the complete information of the control interface in the first byte (AB x) with Bit0=0 and then set Bit0=1 in this byte in the subsequent OB1 cycle.

Alternatively you can use the SFC15 in order to achieve consistent transfer.

Note

Whenever any change in the 8 bytes of the control interface takes place, this information is stored and used, even if non-relevant bits were changed (bits outside the preset configuration).

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