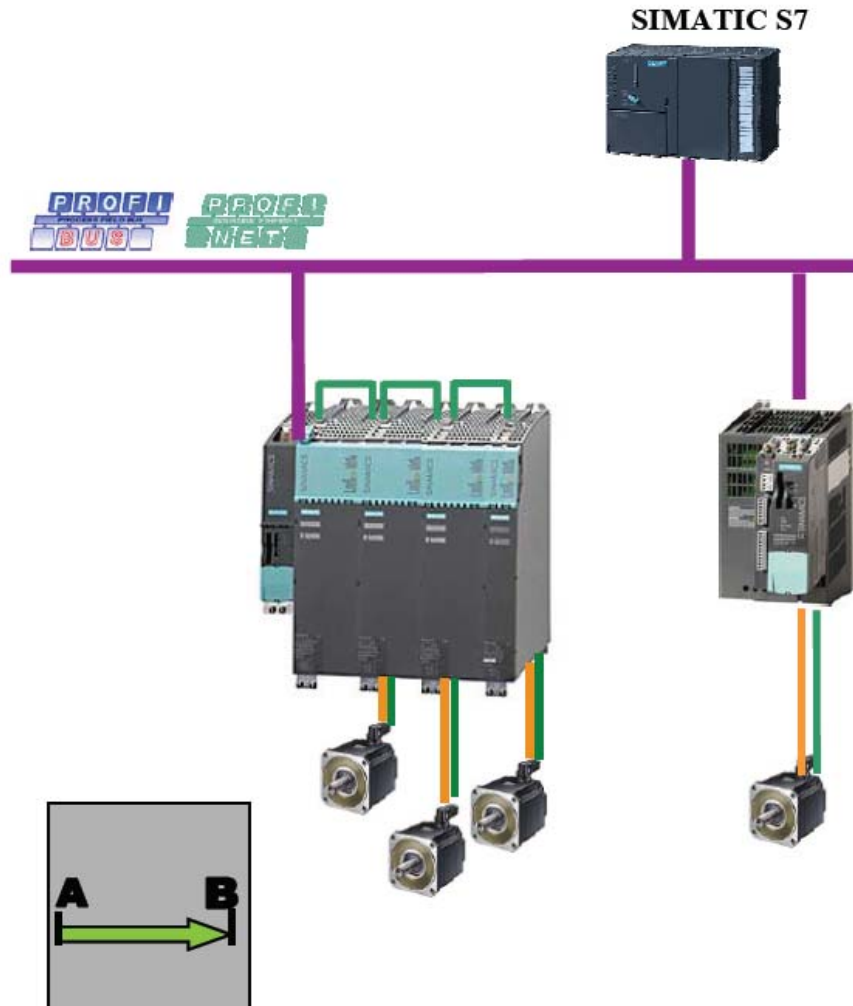


Profibus Mapping of S120 Basic Speed FB115



Basic Information**Qualified personnel**

In the sense of this documentation qualified personnel are those who are knowledgeable and qualified to mount / install, commission, operate and service/maintain the products which are being used. He or she must have the appropriate qualifications to carry-out these activities:

Trained and authorized to energize and de-energize, ground and tag circuits and equipment according to applicable safety standards.

Trained or instructed according to the latest safety standards in the care and use of the appropriate safety equipment.

Trained and certified in rendering first aid.

There is no explicit warning information in this documentation. However, reference is made to warning information and instructions in the Operating Instructions for the particular product.

Objective of the application

Training material is provided for the application in other material. This note serves as reference to programming and understanding the S7 communication to and from a Sinamics S120 drive using the Basic Speed Block.

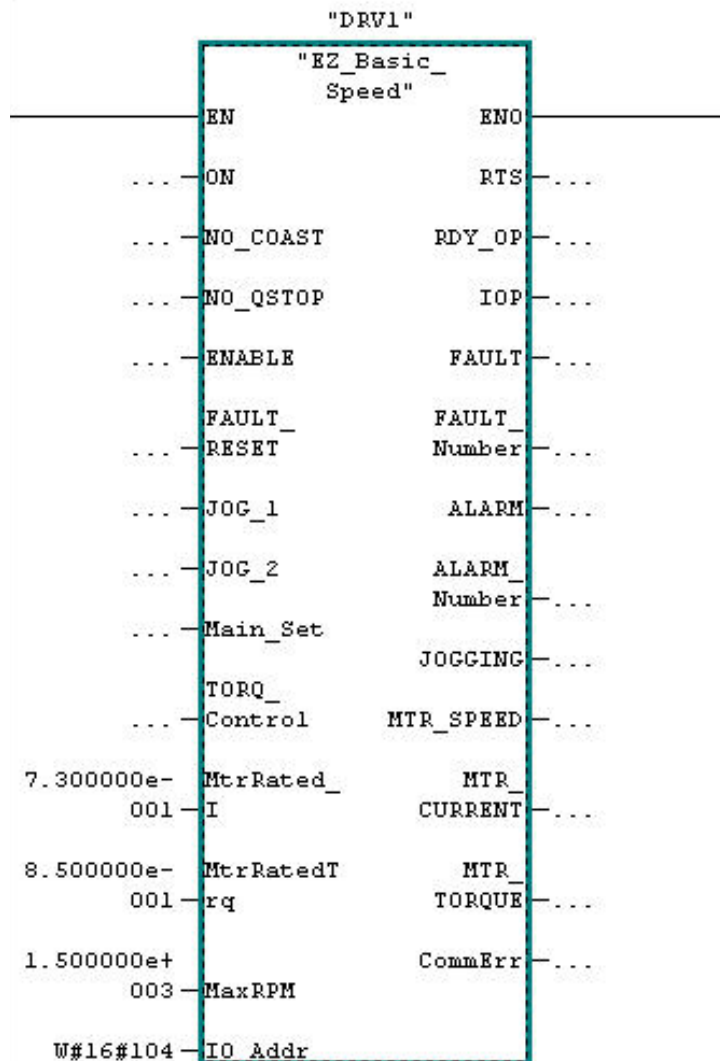
Core contents of this application

1. Introduction to S120 Basic Speed Function Block.
2. Explanation of the parameterization of the Function Block for ease of programming.
3. Profibus / Profinet Control and Status mapping to and from the S120 drive using the EZ Basic Speed Block.

Block View of S120_Basic_Speed

From the block view you see the most commonly used Inputs and outputs to the drive. The left side of the block has the commonly used inputs such as; ON, NO_Coast, Enable, and JOG. The Right side contains commonly used Feedback from the drive such as RTS (Ready to Start), IOP (In Operation), and Motor_Speed. The left side contains normalization data needed as well as commonly used commands to the drive. This normalization data contains Motor current, Torque, and RPM. Typically for speed control the current and torque are nameplate data and the RPM is dependent on machine speed. The starting address peripheral address is on the bottom left side of the block. This is a hex value and can be found in decimal format in the hardware configuration of the S7 Hardware Configuration program. In this example the starting address for the drive was "260" so the address in the block is W#16#104.

Fig. 3.0 S120 Basic Block View



Instance Data Block of S120_Basic_Speed

Naming the Instance DB

Each instance DB used can be a specific name. This makes it easy to identify the axis as you are programming in S7. For example, the name of the block could be “DRV1” as in the example or it could be the Axis name – such as “Roughing Mill 1”. This way all of the DB bits and words specific to this drive are automatically named in an easy to understand format.

Common Drive Block Control Inputs

Table 4.0 (Block Inputs –Commonly used and Normalization)

Address	Declaration	Name	Type	Initial Value	Comment
0.0	In	ON	BOOL	False	1=OFF1
0.1	In	NO_COAST	BOOL	False	1=OFF2
0.2	In	NO_QStop	BOOL	False	1=OFF3
0.3	In	ENABLE	BOOL	False	1=Enable
0.4	In	FAULT_RESET	BOOL	False	Fault Reset
0.5	In	JOG_1	BOOL	False	Jog1 Speed
0.6	In	JOG_2	BOOL	False	Jog2 Speed
2.0	In	Main_Set	INT.	0	Main n Set
4.0	In	Torg_Control	BOOL	False	1= Torq Control
6.0	In	MtrRated_1	REAL	100.0	For Amps Display
10.0	In	MtrRatedTrq	REAL	100.0	For Trq Display
14.0	In	MaxRPM	REAL	100.0	For n Act Display
18.0	In	IO_Adr	Word	W#16#0	Hex Address

Common Drive Block Status Outputs

Note that CommErr is an integer value that can be used to diagnose communication problems with Profibus using SFC14 and SFC15. These SFCs are called by the Function Block. The most common error is that the input / output address on the block is not the same as the one in the Hardware Configuration in S7 Simatic Manager and subsequently the PLC.

Table 4.1 (Block Outputs –Commonly used, and Communication Error)

Address	Declaration	Name	Type	Initial Value	Comment
20.0	Out	RTS	BOOL	False	Ready to Start
20.1	Out	RDY_OP	BOOL	False	Ready for Operation
20.2	Out	IOP	BOOL	False	In Operation
20.3	Out	FAULT	BOOL	False	Fault Present
22.0	Out	FAULT_Number	INT.	False	Fault Number
24.0	Out	ALARM	BOOL	False	Alarm Present
26.0	Out	ALARM_Number	INT.	False	Alarm Number
28.0	Out	JOGGING	BOOL	0	Jogging Active
30.0	Out	MTR_SPEED	REAL	False	Speed in RPM
34.0	Out	MTR_CURRENT	REAL	100.0	Motor ABS Amps
38.0	Out	MTR_TORQUE	REAL	100.0	Motor Torque
42.0	Out	CommErr	INT.	0	Int. value of Error

Telegram to the Drive using the S120_Basic_Speed

This section shows the Bits and words sent to the Sinamics drive using the instance DB. This is the actual telegram to the drive. The commonly used bits in the previous section are internally mapped to the most used bits for convenience. Note that High and Low bytes are swapped when sending words to the drive. The order shown is as the telegram is received in the drive. Drive Folder refers to the section or folder in under the Drive Object in the Program Starter or Scout. Most control bits can be found in this folder, but some other folders are mentioned as they are the output of the control bits.

Word 1: Control Word 1

Control Word 1 is a basic drive Control word for enabling of operation and speed setpoint functions.

Address	Drive Folder	Name	Type	Initial Value	Comment
57.0	Control Logic	CW1.ON	BOOL	False	OFF1
57.1	Control Logic	CW1.NoOff2	BOOL	False	OFF2
57.2	Control Logic	CW1.NoOff3	BOOL	False	OFF3
57.3	Control Logic	CW1.Enable	BOOL	False	Enable
57.4	Control Logic	CW1.EnRFG	BOOL	True	Enable RFG
57.5	Control Logic	CW1.StRFG	BOOL	True	Release RFG
57.6	Control Logic	CW1.EnSpeedSet	BOOL	True	Enable Speed Setpoint
57.7	Control Logic	CW1.AknFault	BOOL	False	Clear fault
56.0		CW1.Spare	BOOL	False	Spare
56.1		CW1.Spare	BOOL	False	Spare
56.2	Control Logic	CW1.LB	BOOL	False	PLC Control
56.3	Speed Setpoint	CW1.Rev_Direction	BOOL	False	Reverse n Set
56.4	Speed Setpoint	CW1.JOG1	BOOL	False	Run - Jog 1 Speed
56.5	MOP Setpoint	CW1.MOPRaise	BOOL	False	Raise MOP
56.6	MOP Setpoint	CW1.MOPLower	BOOL	False	Lower MOP
56.7	Speed Setpoint	CW1.JOG2	BOOL	False	Run - Jog 2 Speed

Word 2: Main Speed Setpoint

Word 2 is Main Speed Setpoint and is the primary speed setpoint to the drive.

Address	Drive Folder	Name	Type	Initial Value	Comment
58.0	Speed Setpoint	MainSpeedSet	INT.	0	Main Speed Setpoint

Word 3: Control Word 2

Control word 2 is an additional Control Word for added features like Fixed Setpoints and Torque Control. Droop enable is only used in the drive objects that are Vector Control and have Droop Control activated.

Address	Drive Folder	Name	Type	Initial Value	Comment
61.0	Fixed Setpoints	CW2.FixedSetBit0	BOOL	False	Fixed Setpoint Bit 0
61.1	Fixed Setpoints	CW2.FixedSetBit1	BOOL	False	Fixed Setpoint Bit 1
61.2	Fixed Setpoints	CW2.FixedSetBit2	BOOL	False	Fixed Setpoint Bit 2
61.3	Fixed Setpoints	CW2.FixedSetBit3	BOOL	False	Fixed Setpoint Bit 3
61.4	Speed Setpoint	CW2.NoNegDir	BOOL	False	Enable RFG
61.5	Speed Setpoint	CW2.NoPosDir	BOOL	False	Release RFG
61.6		CW2.Spare 6	BOOL	False	Spare
61.7		CW2.Spare 7	BOOL	False	Spare
60.0		CW2.Spare 8	BOOL	False	Spare
60.1		CW2.Spare 9	BOOL	False	Spare
60.2		CW2.Spare 10	BOOL	False	PLC Control
60.3	Setpoint Addition	CW2.DroopEn	BOOL	False	Enable Droop on VC

60.4	Torque Setpoints	CW2.TorqControl	BOOL	False	Switch to Torque Control
60.5		CW2.Spare 13	BOOL	False	Spare
60.6		CW2.Spare 14	BOOL	False	Spare
60.7		CW2.Spare 15	BOOL	False	Spare

Word 4: **Additional Setpoint**

The additional Speed Setpoint can be scaled in the drive and used as trim setpoint if needed.

Address	Drive Folder	Name	Type	Initial Value	Comment
62.0	Speed Setpoint	AddSetpoint	INT.	0	Additional Speed Setpoint

Word 5: **Torque Setpoint**

The Torque Setpoint is switched via the Torque Control Bit is Control Word 2. See the Speed Setpoint Folder after the drive Script is written for more control information. Note that the Servo drive Torque Setpoint Folder is somewhat different but has similar function.

Address	Drive Folder	Name	Type	Initial Value	Comment
64.0	Torque Setpoint	TorqueSet	INT.	0	Torque Setpoint from PLC

Word 6: **Spare Word**

This is a spare word and can be used in the drive as needed. A good example may be to use this word for Torque Limitation in the Torque Limiting Folder.

Address	Drive Folder	Name	Type	Initial Value	Comment
66.0		SpareWord6	INT.	0	Spare Word

Telegram from the Drive using the S120_Basic_Speed

This section shows the Bits and words sent from the Sinamics drive to the instance DB. This is the actual telegram to the PLC. The commonly used bits in the Common Block Output section are internally mapped to the most used bits for convenience. Note that High and low bytes are swapped when sending words to or from the drive. The order shown is as the telegram is sent from the drive. Drive Folder refers to the section or folder in under the Drive Object in the Program Starter or Scout.

Word 1: **Status Word 1**

Status Word 1 is a basic drive Status word giving feedback on the status of enabling of operation and speed setpoint functions.

Address	Drive Folder	Name	Type	Initial Value	Comment
45.0	Control Logic	SW1.RdyToPwr	BOOL	False	Drive Ready to Power
45.1	Control Logic	SW1.RdyToOP	BOOL	False	Drive Ready to Operate
45.2	Control Logic	SW1.IOP	BOOL	False	Drive In Operation
45.3	Control Logic	SW1.Fault	BOOL	False	Drive faulted
45.4	Control Logic	SW1.NoOff2Act	BOOL	True	1= Coast to Stop Inactive
45.5	Control Logic	SW1.NoOff3Act	BOOL	True	1= Quick Stop Inactive
45.6	Control Logic	SW1.PowInhibit	BOOL	True	Missing Enables
45.7	Control Logic	SW1.Alarm	BOOL	False	Drive has Alarm
44.0	Speed Messages	SW1.nDeviationOK	BOOL	False	Speed Deviation is OK
44.1	Control Logic	SW1.LB_CR	BOOL	False	Drive has PLC Life Bit
44.2	Speed Messages	SW1.ReachedSpeed	BOOL	False	Speed Value Reached
44.3	Control Logic	SW1.T_I_LimOK	BOOL	False	T or I Limit not Reached

44.4	Brake Control	SW1.OpenBrake	BOOL	False	Brake is Open
44.5	Control Logic	SW1.MtrTempOK	BOOL	False	Motor Temp. is Good
44.6	Speed Messages	SW1.FWD_Dir	BOOL	False	1= Forward Direction
44.7	Control Logic	SW1.DrvTempOK	BOOL	False	Drive Temperature OK

Word 2: Actual Speed

Word 2 is Actual Speed of the drive's motor. Use Reference Parameter Tab in Drive Configuration Folder to normalize this value – P2000.

Address	Drive Folder	Name	Type	Initial Value	Comment
46.0	Profibus	ActualSpeed	INT.	0	Actual Speed

Word 3: Actual Motor Current

Word 3 is Actual Current of the drive's Motor. Use Reference Parameter Tab in Drive Configuration Folder to normalize this value – P2002.

Address	Drive Folder	Name	Type	Initial Value	Comment
48.0	Profibus	ActualCurrent	INT.	0	ABS Filtered Motor I

Word 4: Actual Motor Torque

Word 4 is Actual Torque of the drive's Motor. Use Reference Parameter Tab in Drive Configuration Folder to normalize this value – P2003

Address	Drive Folder	Name	Type	Initial Value	Comment
50.0	Profibus	ActualTorque	INT.	0	Filtered Motor Torque

Word 5: Drive Alarm Number

Word 5 shows any active Alarm number from the drive

Address	Drive Folder	Name	Type	Initial Value	Comment
52.0	Profibus	Alarm	INT.	0	The Alarm Number

Word 6: Drive Alarm Number

Word 6 shows any active Fault number from the drive

Address	Drive Folder	Name	Type	Initial Value	Comment
52.0	Profibus	Fault	INT.	0	The Fault Number