BA01643O/09/EN/01.16
No.: 71342003
Firmware version
ENU000A, V2.01.xx

Additional instructions

Advanced Data Manager ORSG45

PROFIBUS DP slave

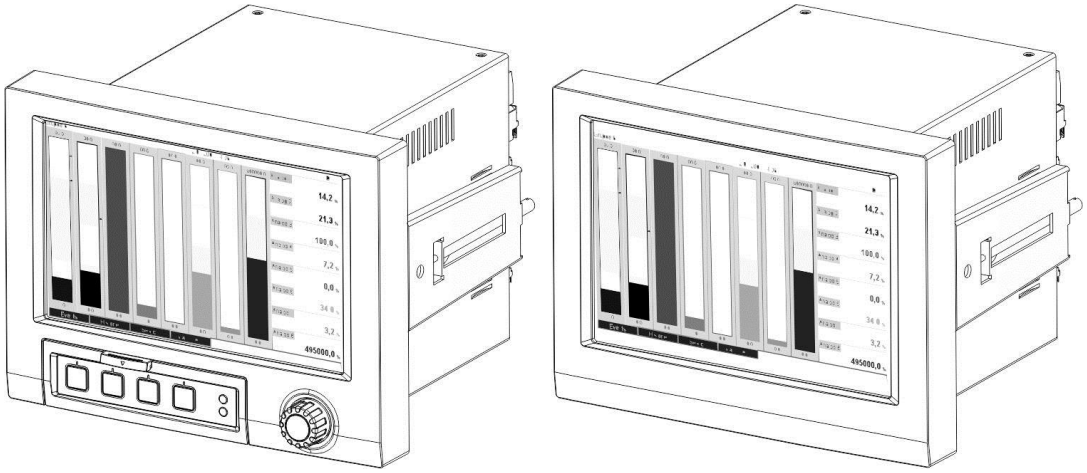


Table of contents:

1 General information

Information symbols:

NOTICE

Notice
Failure to observe this information can result in a device defect or malfunction!

Tip
Indicates additional information.

1.1 Firmware history

Overview of unit software history:

Unit software version / date	(Software) modification	PROFIBUS-DP Slave Operating Instructions
V2.01.04 / 06.2016	Original software	BA01643O/09/en/01.16

NOTICE

This functionality is possible only with a Profibus module from version V2.15.

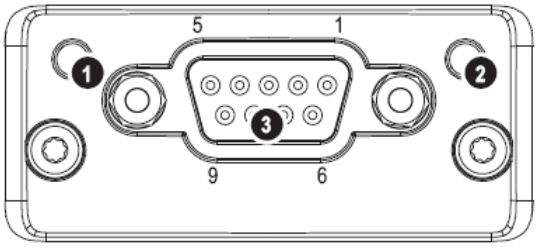
1.2 Scope of delivery

This manual provides an additional description of a special software option.

This additional manual does **not** replace the relevant Operating Instructions!
Detailed information can be found in the Operating Instructions and the other documentation.

The GSD file suitable for the device can be found on the CD-ROM included in the scope of delivery, in the "GSD_GSDXML" directory.

1.3 Connections

1	Operating mode LED	
2	Status LED	
3	PROFIBUS connector DB9F	

Tab. 1: View of the Profibus DP connection on the rear of the device

1.3.1 Operating mode LED

Operating mode LED	Indicator for
Off	Not online/no voltage
Green	Online, data transfer active
Flashing green	Online, data transfer stopped
Flashing red (1 flash)	Configuration error
Flashing red (2 flashes)	PROFIBUS configuration error

Tab. 2: Functional description of operating mode LED

1.3.2 Status LED

Status LED	Indicator for
Off	No voltage or not initialized
Green	Initialized
Flashing red	Initialized, diagnostics available
Red	Exception error

Tab. 3: Functional description of status LED

1.3.3 PROFIBUS connector (DB9F)

Pin	Signal	Description
1	-	Shield protective ground
2	-	-
3	B-Line	Positive RxD/TxD, RS485 level
4	-	-
5	GND bus	Reference potential (isolated)
6	+5V output1	+5V voltage for termination (isolated, max. 10 mA)
7	-	-
8	A-Line	Negative RxD/TxD, RS485 level
9	-	-
Housing	Functional ground	Internally connected with ground via cable protection filter as per PROFIBUS standard

Tab. 4: Pin assignment of PROFIBUS connector

[1] Any current drawn from this pin will affect the total power consumption of the module.

1.4 Terminating resistors

The Profibus module has no internal terminating resistors. However, pin 6 provides isolated 5V voltage for external termination.

The 9-pin D-Sub connector with integrated bus terminating resistors, as recommended by IEC 61158 / EN 50170, is recommended for connection to the PROFIBUS:

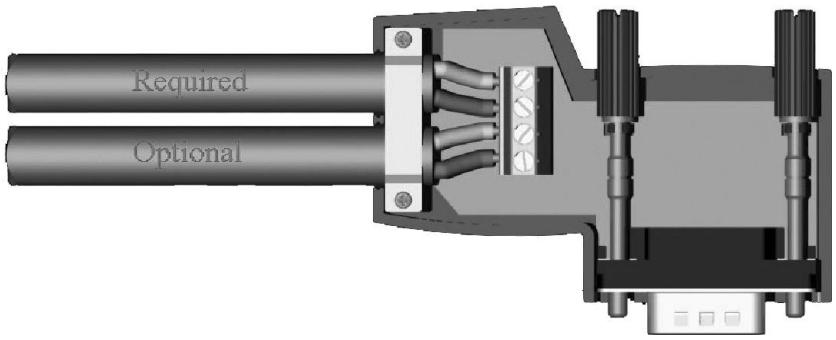


Fig. 1: Profibus connector as per IEC 61158 / EN 50170

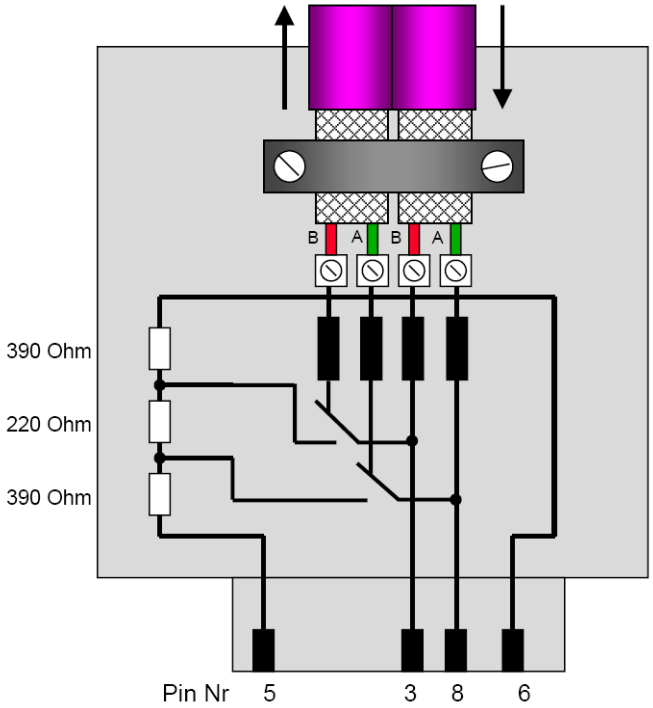


Fig. 2: Terminating resistors in the Profibus connector

PROFIBUS DP terminal assignment (in accordance with Fig. 2):

Pin no.	Signal	Meaning
Housing	Shield	Functional ground
3	B-Line	RxTx (+)
5	GND	Reference potential
6	+5V output	Supply to terminating resistors
8	A-Line	RxTx (-)

Tab. 5: Terminal assignment, Profibus connector

1.5 Functional description

The Profibus module allows the device to be connected to PROFIBUS DP, with the functionality of a DP slave for cyclic data traffic.

Baud rates supported: 9.6k, 19.2k, 45.45k, 93.75k, 187.5k, 500k, 1.5M, 3M, 6M, 12MBaud

1.6 Checking whether the Profibus module is present

You can check whether a Profibus module is being used under **"Main menu/ Diagnostics/ Device information / Device options"**.

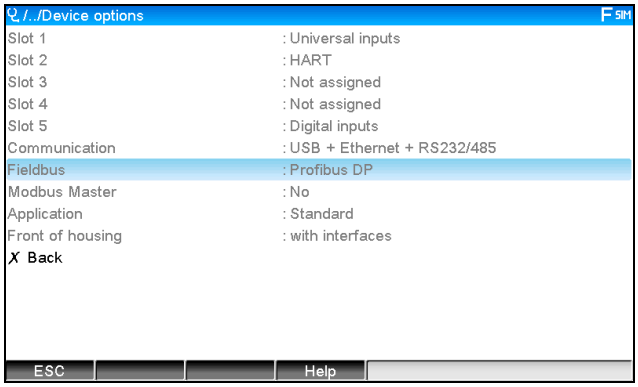


Fig. 3: Checking whether the Profibus module is present

Additional information is available under **"Main menu / Diagnostics / Device information / Hardware"**.

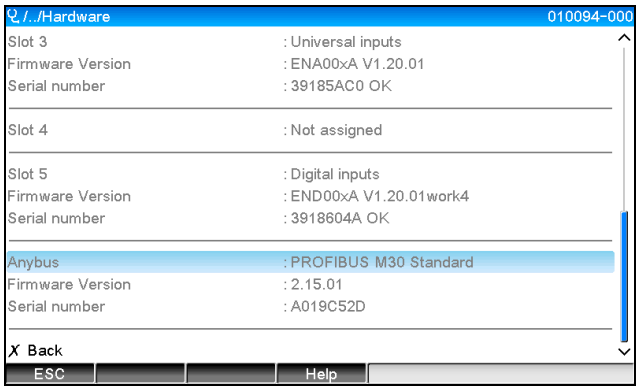


Fig. 4: Additional information on Profibus module

2 Data transmission

2.1 General information

The following can be transferred by the **Profibus master to the device**:

- Analog values (instantaneous values)
- Digital status.

The following can be transferred from the **device to the Profibus master**:

- Analog values (instantaneous values)
- Totalized analog values
- Mathematics channels (result of status, instantaneous value, operating time, totalizer)
- Totalized mathematics channels
- Digital status

- Pulse counter (totalizer)
- Operating times
- Operating times with digital status.

2.2 Settings in the Setup

NOTICE

If a change is made to the setup (configuration) in the device that affects the transmission setup, the Profibus module is reinitialized.

Result: The Profibus module withdraws from the DP bus only to register again seconds later. This generates an "assembly rack failure" in the PLC. Taking the example of the Simatic S7, the PLC switches to STOP mode and must be manually reset to RUN mode. By transmitting the assembly rack failure OB 86 to the PLC, it is now possible to hold off the interruption. As a result, the PLC does not switch to STOP mode, the red LED lights up only briefly, and the PLC continues to operate in RUN mode.

The **slave address** is selected under **"Setup / Advanced setup / Communication / Profibus DP“**.
Please configure a slave address that is lower than **126** in order to assign a fixed address.
If slave address **126** is configured, the address must be assigned by the Profibus master. When the device is switched on and each time the slave address is changed by the Profibus master, the address is archived in the event list.

The baud rate is determined automatically.

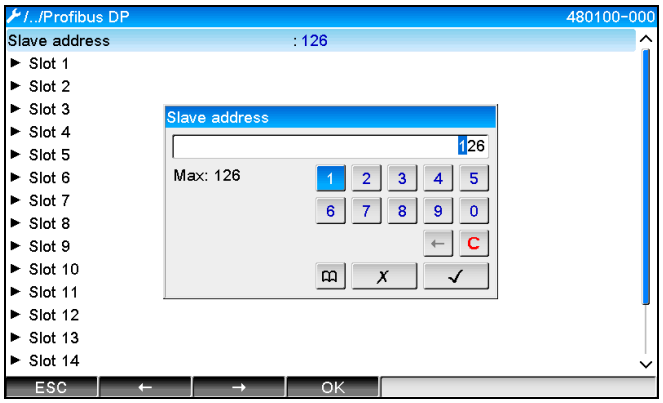


Fig. 5: Entering the slave address

NOTICE

All universal inputs and digital inputs are enabled and can be used as Profibus DP inputs even if they are not actually available as plug-in cards.

2.3 Analog channels

Profibus master -> device:
The **Signal** parameter is set to **Profibus DP** under **"Setup / Advanced setup / Inputs / Universal inputs / Universal input X"**.
The analog channel configured in this way can be selected for cyclic data transfer (module x AO-PA), as described in section 2.6.

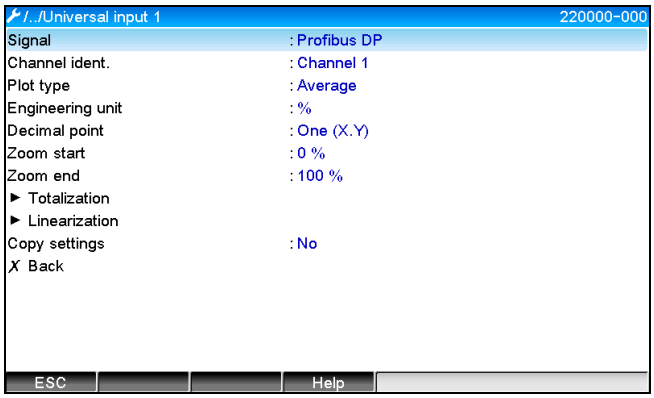


Fig. 6: Universal input x set to "Profibus DP" signal

Device -> Profibus master:
To transmit an analog channel to the Profibus master, the channel simply needs to be configured as described in section 2.6.1 (module x AI-PA).

2.4 Mathematics channels

Device -> Profibus master:
Mathematics channels are optionally available under **"Setup / Advanced setup /Application / Maths / Maths x"**. The results can be transmitted to the Profibus master, as explained in section 2.6.

2.5 Digital channels

Profibus master -> device:

Under "**Setup / Advanced setup / Inputs / Digital inputs / Digital input X**" the **Function** parameter is set to **Profibus DP**.

The digital channel configured in this way can be selected for cyclic data transfer (module 8 DO), as described in section 2.6.

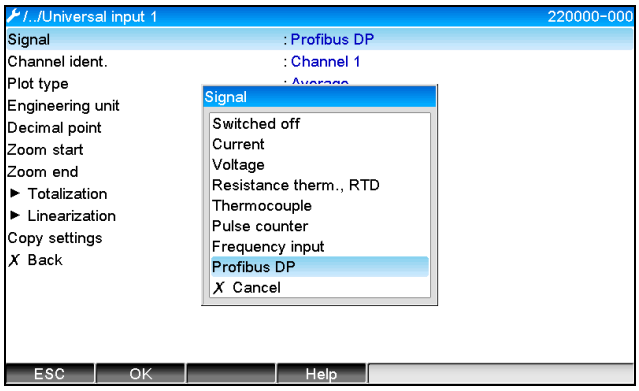


Fig. 7: Setting the digital channel x to the "Profibus DP" function

The digital status transmitted by the Profibus master has the same functionality in the device as the status of a digital channel that is actually present.

Device -> Profibus master:

Functionality of control input or on/off event

The digital status of the digital channel configured in this way can be selected for cyclic data transfer (module 8 DI), as described in section 2.6.1.

Functionality of pulse counter or operating time

The totalizer or the total operating time of the digital channel configured in this way can be selected for cyclic data transfer (module x AI-PA).

Functionality of event + operating time

The digital status and the totalizer of the digital channel configured in this way can be selected for cyclic data transfer (module 8 DI and x AI-PA).

Functionality of quantity from time

The digital status and the totalizer of the digital channel configured in this way can be selected for cyclic data transfer (module 8 DI and x AI-PA).

2.6 Structure of the data for cyclic data transfer

The structure of the data for cyclic transfer can be configured under **"Setup / Advanced setup / Communication / Profibus DP / Slot x"**. 16 slots are available for selection, each of which can contain one module.

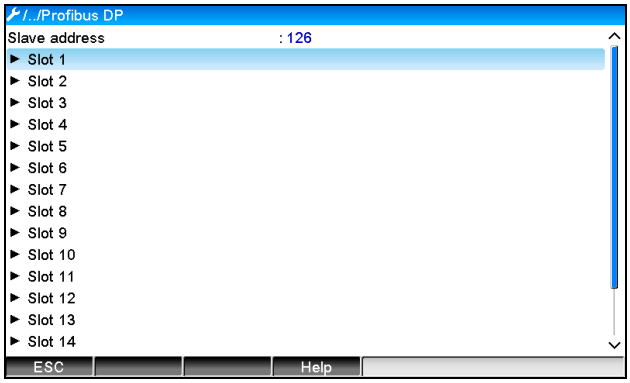


Fig. 8: Slot overview

Modules can be selected depending on the data volume and content.

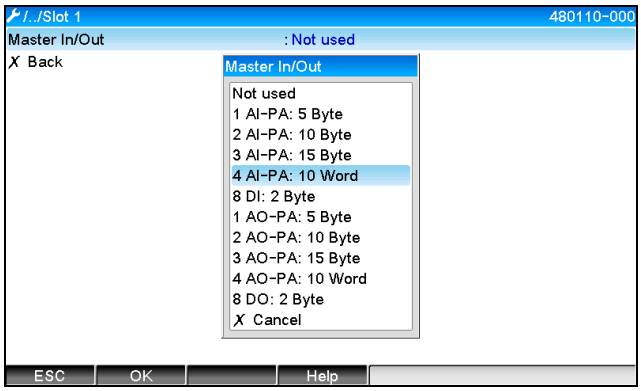


Fig. 9: Selecting modules

NOTICE

The name refers to the read/write direction of the Profibus master and is identical to the module names in the GSD file.

Description of module name:

- The number refers to the number of values to be transmitted.
- AI/DI: Master In (device -> Profibus master)
- AO/DO: Master Out (Profibus master -> Device)
- AI/AO: Transfer of floating point number + status
- DI/DO: Transfer of digital status
- The PA suffix means that the data structure consists of 4 bytes for the floating point number (MSB first) and then 1 byte for the status of the measured value.
- The length of the module is given at the end.

Modules	Use
AI-PA 5 Byte AI-PA 10 Byte AI-PA 15 Byte AI-PA 10 Word	Analog channel (instantaneous value, totalization), Math channel (result: instantaneous value, counter, operating time) Digital channel (control input, pulse counter, (event +) operating time, quantity from time)
DI 2 Byte	Maths channel (result: status) Digital channel (on/off event, event (+ operating time))

AO-PA 5 Byte AO-PA 10 Byte AO-PA 15 Byte AO-PA 10 Word	Analog channel (instantaneous value)
DO 2 Byte	Digital channel (control input, on/off event , pulse counter, operating time, event + operating time, quantity from time)

Tab. 6: Description of Profibus modules

2.6.1 Device -> Profibus master data transmission

Analog channel, totalizer or operating time

Under **"Setup / Advanced setup / Communication / Profibus DP / Slot x"**, the **Master In/Out** parameter is set to one of the **AI-PA** modules e.g. **4 AI-PA**.

Once the byte address has been selected within the module, the desired analog channel is selected. If totalization is activated in the universal input, the user can choose between the instantaneous value and the totalizer (totalization):

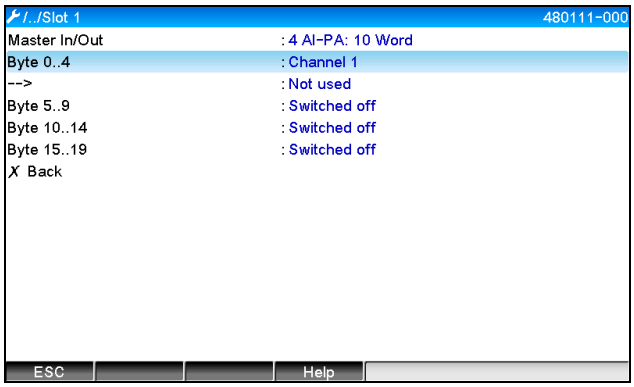


Fig. 10: Selecting the desired channel (device -> Profibus master)

Digital channel

Under **"Setup / Advanced setup / Communication / Profibus DP / Slot x"**, the **Master In/Out** parameter is set to the **8 DI** module.

Once the bit address has been selected within the module, the desired digital channel is selected.

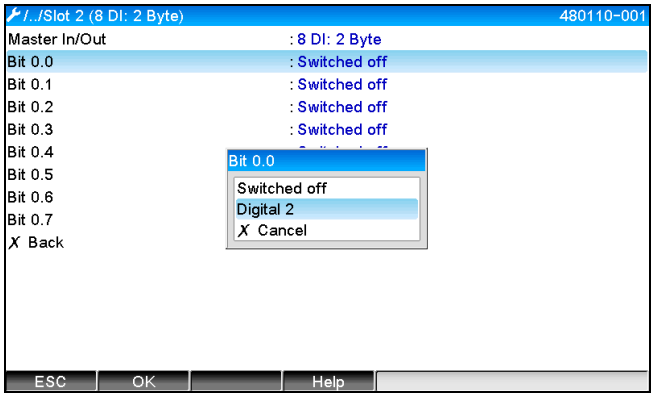


Fig. 11: Selecting the desired module and digital channel (device -> Profibus master)

2.6.2 Profibus master -> device data transmission

Analog channel

Under **"Setup / Advanced setup / Communication / Profibus DP / Slot x"**, the **Master In/Out** parameter is set to one of the **AO-PA** modules e.g. **4 AO-PA**.

Once the byte address has been selected within the module, the analog channel to be used is selected. The type (instantaneous value or totalizer (totalization)) is then selected.

NOTICE

Possible only with analog channels which have been assigned the Profibus DP signal type (see section 2.3).

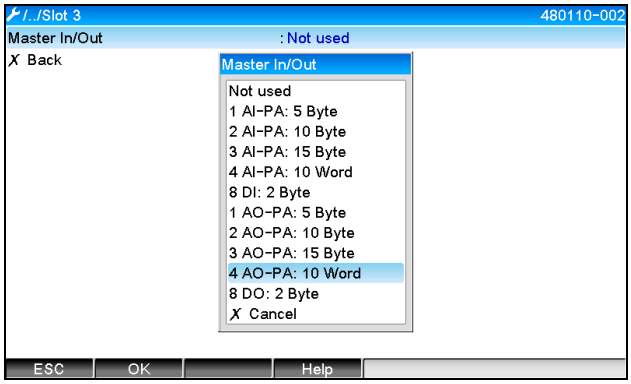


Fig. 12: Selecting the desired module (Profibus master -> device)

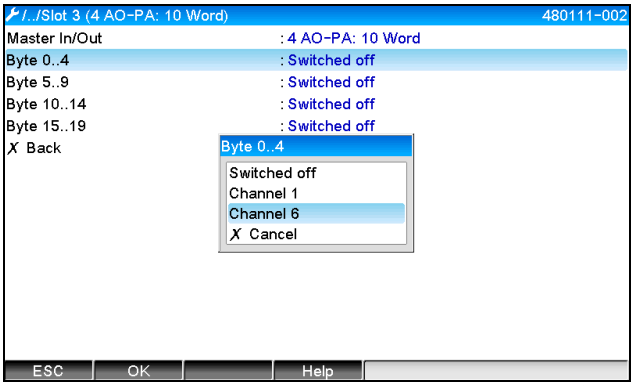


Fig. 13: Selecting the analog channel (Profibus master -> device)

Digital channel

Under **"Setup / Advanced setup / Communication / Profibus DP / Slot x"**, the **Master In/Out** parameter is set to the **8 DO** module.

Once the bit address has been selected within the module, the desired digital channel is selected.

NOTICE

Possible only with digital channels which have been assigned the Profibus DP function type (see section 2.5).

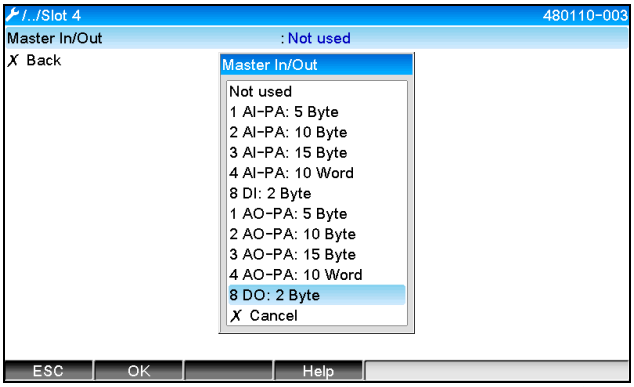


Fig. 14: Selecting the desired module (Profibus master -> device)

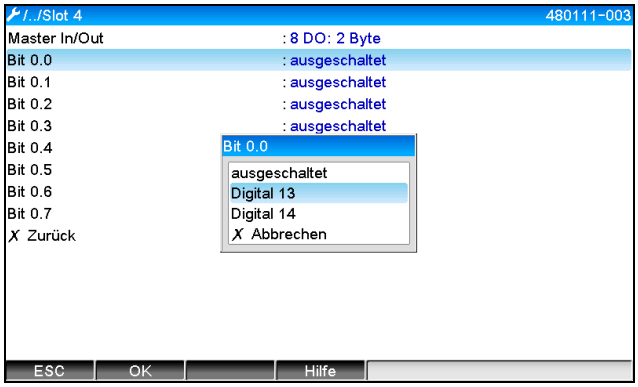


Fig. 15: Selecting the digital channel (Profibus master -> device)

2.6.3 Slot overview

For verification purposes, the module names are listed with information on how they are to be configured in the Profibus master:

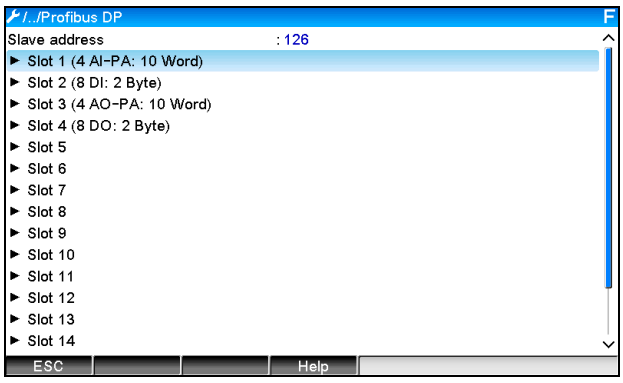


Fig. 16: Overview of slots after modification

NOTICE

Empty slots are ignored and do not generate any configuration bytes.

2.6.4 Structure of the individual process values

Device -> Profibus master:

Value	Interpretation	Bytes
Analog value 1-20	32-bit floating point number (IEEE-754) + status	5
Analog value 1-40, totalized	32-bit floating point number (IEEE-754) + status	5
Maths channel 1-8 Result of instantaneous value, totalizer, operating time	32-bit floating point number (IEEE-754) + status	5
Maths channel 1-8, totalized	32-bit floating point number (IEEE-754) + status	5
Digital pulse counter	32-bit floating point number (IEEE-754) + status	5
Digital operating time	32-bit floating point number (IEEE-754) + status	5
Digital status	8 bit + status	2
Maths channel Status result	8 bit + status	2

Tab. 7: Structure of the individual measured values (device -> Profibus master)

Profibus master -> device:

Value	Interpretation	Bytes
Analog value 1-40	32-bit floating point number (IEEE-754) + status	5
Digital status	8 bit + status	2

Tab. 8: Structure of the measured values (Profibus-Master -> device)

32-bit floating point number (IEEE-754)

Octet	8	7	6	5	4	3	2	1
0	Sign	(E) 2^{7}	(E) 2^{6}					(E) 2^{1}
1	(E) 2^{0}	(M) 2^{-1}	(M) 2^{-2}					(M) 2^{-7}
2	(M) 2^{-8}							(M) 2^{-15}
3	(M) 2^{-16}							(M) 2^{-23}

Sign = 0: Positive number

Sign = 1: Negative number
E = Exponent, M = Mantissa

$$Zahl = -1^{VZ} \cdot (1 + M) \cdot 2^{E-127}$$

Example: 40 F0 00 00 h = 0100 0000 1111 0000 0000 0000 0000 0000 b

Value $= -1^{0} \cdot 2^{129-127} \cdot (1 + 2^{-1} + 2^{-2} + 2^{-3})$

$= 1 \cdot 2^{2} \cdot (1 + 0{,}5 + 0{,}25 + 0{,}125)$

$= 1 \cdot 4 \cdot 1{,}875 = 7{,}5$

Status of floating point number

Device -> Profibus master

10H = e.g. cable open circuit, do not use value
11H = Value below valid range
12H = Value above valid range
18H = Value undefined, do not use

48H = Value uncertain or replacement value
49H = Value uncertain or replacement value, lower limit value or decreasing gradient
4AH = Value not certain or replacement value, upper limit value or increasing gradient
4BH = Value not certain or replacement value, upper and lower limit value or increasing/decreasing gradient

80H = Value OK
81H = Value OK, lower limit value or decreasing gradient
82H = Value OK, upper limit value or gradient increasing
83H = Value OK, upper and lower limit value or increasing/decreasing gradient

Profibus master -> device

80H to FFH: Value OK
40H to 7FH: Value uncertain, value is used, but an error is displayed
00H to 3FH: Do not use value (invalid)

It is possible to display and check the status directly at the device (see section 4.1 Tab. 9: Solutions to problems Checking the measured value status (Profibus master → device)).

2.6.4.1 Digital status

A digital status is described by two bits in two bytes.

Byte 0 bit x = 0: "Low" status
= 1: "High" status
Byte 1 bit x = 0: not active
= 1: active

Example:

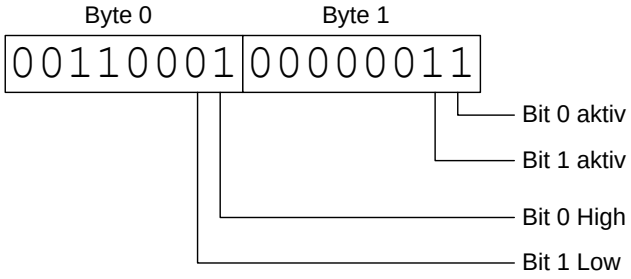


Fig. 17: Structure of the two bytes transmitted in the digital status

Only bit 0 and 1 are valid here (byte 1).
The statuses for this are bit 0 = high and bit 1 = low (byte 0).

2.7 Acyclic data transfer

2.7.1 Transferring texts

Texts can be saved in the device's events list. The maximum length is 40 characters.
The texts must be written via **Slot 0 Index 0** (see section 3.4 Acyclic access).

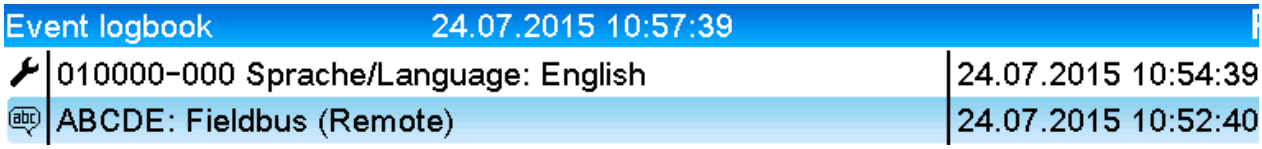


Fig. 18: Text entry into event log

2.7.2 Batch data

Batches can be started and stopped. The batch name, batch designation, batch number and preset counter can also be configured for stopping the batch. The texts (ASCII) can have a maximum length of 30 characters.

The functions and parameters must be written via **Slot 0 Index 1** (see section 3.4 Acyclic access).

Function	Description	Data
0x01	Start batch	Batch 1...4, ID, name
0x02	Stop batch	Batch 1...4, ID, name
0x03	Batch designation	Batch 1...4, text (max. 30 characters)
0x04	Batch name	Batch 1...4, text (max. 30 characters)
0x05	Batch number	Batch 1...4, text (max. 30 characters)
0x06	Preset counter	Batch 1...4, text (max. 8 characters)

2.7.2.1 Starting a batch

If the user administration function is enabled, an ID (max. 8 characters) and a name (max. 20 characters) must be transmitted, separated by a ';'.

Example: Start batch 2

Byte	0	1
	Func	no.
	1	2

The entry "Batch 2 started" is saved in the event list. This message also appears on the screen for a few seconds.

2.7.2.2 Ending a batch

If the user administration function is enabled, an ID (max. 8 characters) and a name (max. 20 characters) must be transmitted, separated by a ';'.

Example: End batch 2, user administration enabled (ID: "IDSPS", name: "RemoteX")

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Func	no.	49	44	53	50	53	3B	52	65	6D	6F	74	65	58
	2	2	'I'	'D'	'S'	'P'	'S'	,;'	'R'	'e'	'm'	'o'	't'	'e'	'X'

The entry "Batch 2 terminated" and "Remote (IDSPS)" is saved in the event list. This message also appears on the screen for a few seconds.

2.7.2.3 Setting the batch designation

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device settings (direct access 490005)

Example: Batch designation "Identifier" for batch 2

Byte	0	1	2	3	4	5	6	7	8	9	10	11
	Func	no.	49	64	65	6E	74	69	66	69	65	72
	3	2	'I'	'd'	'e'	'n'	't'	'i'	'f'	'i'	'e'	'r'

2.7.2.4 Setting the batch name

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device settings (Direct access 490006).

Example: Batch name "Name" for batch 2

Byte	0	1	2	3	4	5
	Func	no.	4E	61	6D	65
	4	2	'N'	'a'	'm'	'e'

2.7.2.5 Setting the batch number

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device settings (Direct access 490007).

Example: Batch number "Num" for batch 2

Byte	0	1	2	3	4
	Func	no.	4E	75	6D
	5	2	'N'	'u'	'm'

2.7.2.6 Setting the preset counter

Can only be set if the batch has not yet been started. It does not have to be set if it is not required by the device settings (Direct access 490008).

- Maximum 8 characters (including '.')
- Exponential function permitted, e.g. "1.23E-2"
- Only positive numbers

Example: Preset counter to 12.345 for batch 2

Byte	0	1	2	3	4	5	6	7
	Func	no.	31	32	2E	33	34	35
	6	2	'1'	'2'	,.'	'3'	'4'	'5'

2.7.2.7 Reading out the batch status

This can be used to read out the status of every batch and the last communication status.
Slot 0, Index 1 6 byte must be read out.

Example: Batch 2 started, communication status "OK"

Byte	0	1	2	3	4	5
		Comm. Status	Status batch 1	Status batch 2	Status batch 3	Status batch 4
	0	0	0	1	0	0

If, for example, a batch number is set even though the batch is already running, byte 1 would have the 0x03 value.

Communication status:
0: OK
1: Not all the necessary data were transmitted (mandatory entries)
2: User responsible not logged on
3: Batch already running
4: Batch not configured
5: Batch controlled via control input
7: Automatic batch number active
9: Error, text contained characters that cannot be displayed, text too long, incorrect batch number Function number out of range

2.7.3 Setting relays

Relays can be set if they were set to "Remote" in the device settings. Parameters must be written via **Slot 0 Index 2** (see section 3.4 Acyclic access).

2.7.3.1 Setting relays

Example: Setting relay 6 to the active state

Byte	0	1
	RelNo	Status
	6	1

2.7.3.2 Reading out the relay status

This reads out the status of every relay. Bit 0 corresponds to relay 1.
Slot **0, Index 2 2** Byte must be read out.

Example: Relay 1 and relay 6 in an active state

Byte	0	1
	Relays 12-9 (hex)	Relays 1-8 (hex)
	0	0x21

2.7.4 Changing limit values

Limit values can be changed. The functions and parameters must be written via **Slot 0 Index 3** (see section 3.4 Acyclic access).

Function	Description	Data
1	Initialization	
2	Accept limit values	
3	Change limit value	Limit value number, value [;dt] Limit value number;value; time span for gradient;delay;value2
5	Specify reason	Text specifying the reason

The procedure described here must be followed when changing limit values:
1. Initializing a change to limit values
2. Changing limit values
3. State reason for the change, if possible
4. Accept limit values

Any changes since the last initialization can be discarded when a subsequent limit value change is initialized.

2.7.4.1 Initializing limit value changes

This prepares the device for changes to the limit values.

Byte	0	1
	Func	Fill byte
	1	2A

2.7.4.2 Changing limit values

Here, a limit value in the device is changed but is not yet accepted.

Examples:

Func	Limit value	Data	Meaning
3	1	5.22;;60	Limit value 1 to 5.22, no span, 60 s delay
3	2	5.34	Limit value 2 to 5.34
3	3	;;10	Limit value 3, delay to 10 seconds
3	4	20;;;50	Limit value 4, in/outband lower limit value 20, upper limit value 50

Example: Changing limit value 1 (upper limit value for universal input) to 90.5

Byte	0	1	2	3	4	5
	Func	Limit value	39	30	2E	35
	3	1	'9'	'0'	,.'	'5'

Example: Changing limit value 3 (gradient for universal input) to 5.7 within 10 seconds

Byte	0	1	2	3	4	5	6	7
	Func	Limit value	35	2E	37	3B	31	30
	3	3	'5'	,.'	'7'	,;'	'1'	'0'

2.7.4.3 Specifying a reason for changing the limit values

Before saving the change to limit values, a reason can be specified and saved in the events list. If no reason is specified, the "Limit values have been changed" entry is made in the events list.

Texts (as per ASCII table) can be transferred. The maximum length is 30 characters.

Byte	0	1	2..n
	Func	Fill byte	Text
	5	2A	

2.7.4.4 Accept limit values

Here, the modified limit values are accepted in the device and stored in the device settings.

Byte	0	1
	Func	Fill byte
	2	2A

2.7.4.5 Reading out the communication status

This can be used to read out the status of the last limit value function performed.
It must be read out via Slot 0 Index 3 1 byte.

Example: Incorrect function addressed

Byte	0
	Comm. status
	1

Communication status:
0: OK
1: Incorrect function number or limit value number
2: Missing data
3: Limit value not active
4: Gradient → two values
5: Function currently not possible
9: Error

3 Integration into Simatic S7

3.1 Network overview

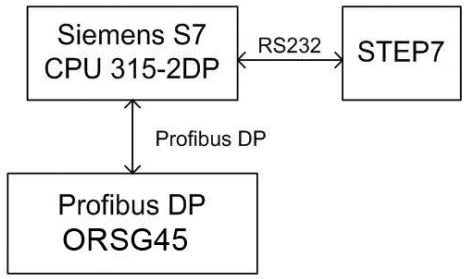


Fig. 19: Network overview

3.2 Hardware planning

3.2.1 Installation and preparation

3.2.1.1 GSD file

In hardware configuration:
Installation is performed either via "**Options/Install GSD file**" in HW config or by copying the GSD and BMP files to the STEP 7 software directory provided.
e.g.: c:\...\Siemens\Step7\S7data\GSD
c:\...\ Siemens\Step7\S7data\NSBMP

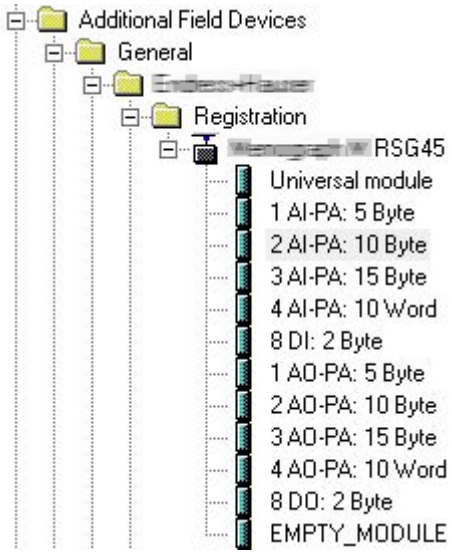


Fig. 20: View of device in the hardware catalog

3.2.2 Configuring the device as a DP slave

In HW config:

1. Drag the device from the Catalog->PROFIBUS DP->Additional field devices->General to the PROFIBUS DP network
2. Assign the user address.

Result:

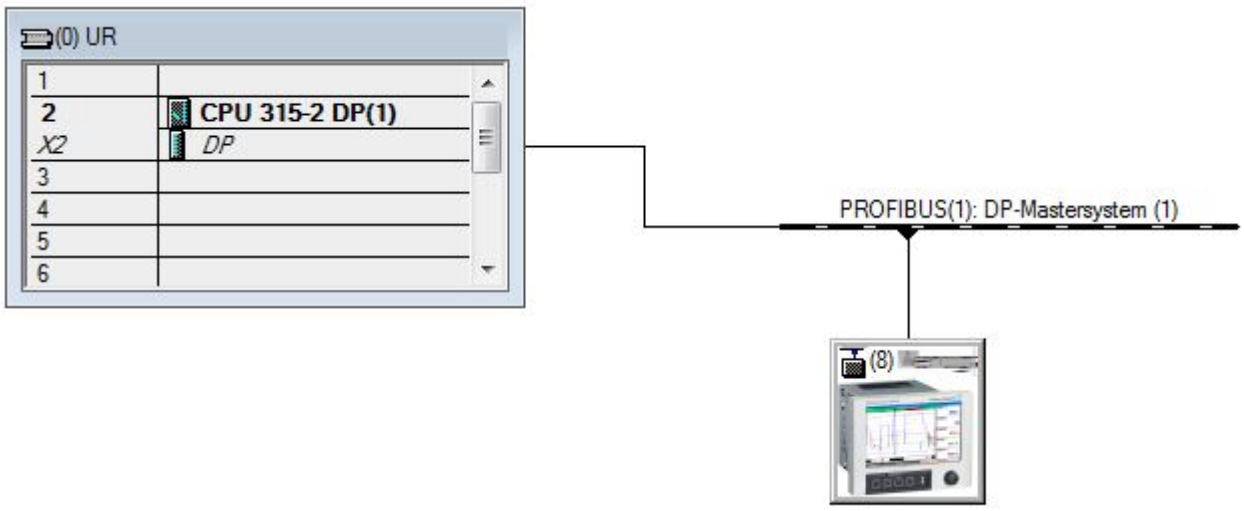


Fig. 21: Device connected to the Profibus DP network

NOTICE

The configured slave address must match the hardware address actually configured.

The module names and sequence must be assigned in accordance with the device parameters.

(8) RSG45

Slot	DP ID	...	Order Number / Designation	I Address	Q Address	Comment
1	164		1 AO-PA: 5 Byte		10...14	
2	169		2 AO-PA: 10 Byte		15...24	
3	174		3 AO-PA: 15 Byte		25...39	
4	233		4 AO-PA: 10 Word		40...59	
5	161		8 DO: 2 Byte		60...61	
6	217		4 AI-PA: 10 Word	256...275		
7	164		1 AO-PA: 5 Byte		256...260	
8	153		2 AI-PA: 10 Byte	276...285		

Fig. 22: Slots populated with modules

3.2.3 Transmitting the configuration

1. Save and compile the configuration.
2. Transmit the configuration to the control system via the **PLC -> Upload** menu item.

If the information matches, the  symbol appears in the top right-hand corner and alternates with the SD display.

If the "BUSF" LED of the PLC lights up after transmitting the configuration, the configured network does not match the network that is physically present. Check the configuration for irregularities.

The following message is output if the configuration does not match:

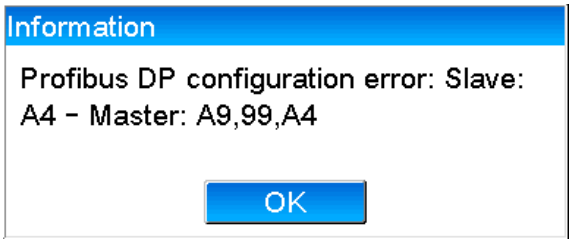


Fig. 23: Message on device in the event of a configuration error

This example shows that the first two modules have the same configuration bytes but that the master has defined one module less than required.

3.3 Sample program

The following shows the program lines that are needed to record and output the values.
The SFC14 and SFC15 modules are used because the data are consistent.

```
// Reading out four floating point numbers from module 4 AI-PA 10 Word

    CALL „DPRD_DAT“                  // SFC 14
     LADDR   :=W#16#107              // input address 263
     RECORD  :=P#M 22.0 BYTE 20      // read out 20 bytes
     RET_VAL :=MW20

// Writing a floating point number to module 1 AO-PA 5 byte

    CALL "DPWR_DAT"                  // SFC 15
     LADDR   :=W#16#100              // output address 256
     RECORD  :=P#M 44.0 BYTE 5       // write 5 bytes
     RET_VAL :=MW42

// Reading out digital statuses

      L     EB     261                 // digital statuses
      T     MB     0                   // transfer after flag 0
      L     EB     262                 // get validity of statuses
      T     MB     1                   // status after flag 1

// Writing digital statuses

      L     MB     2                   // digital statuses
      T     AB     261                 // transfer after output byte 261
      L     MB     3                   // get validity of statuses
      T     AB     262                 // transfer after output byte 262
```

3.4 Acyclic access

Taking the example of a CPU315-2 DP (315-2AG10-0AB0), the text below describes acyclic access for transmitting a text via Slot 0, Index 0 (see 2.7.1) and for reading out the relay status via Slot 0, Index 2 (see 2.7.3).

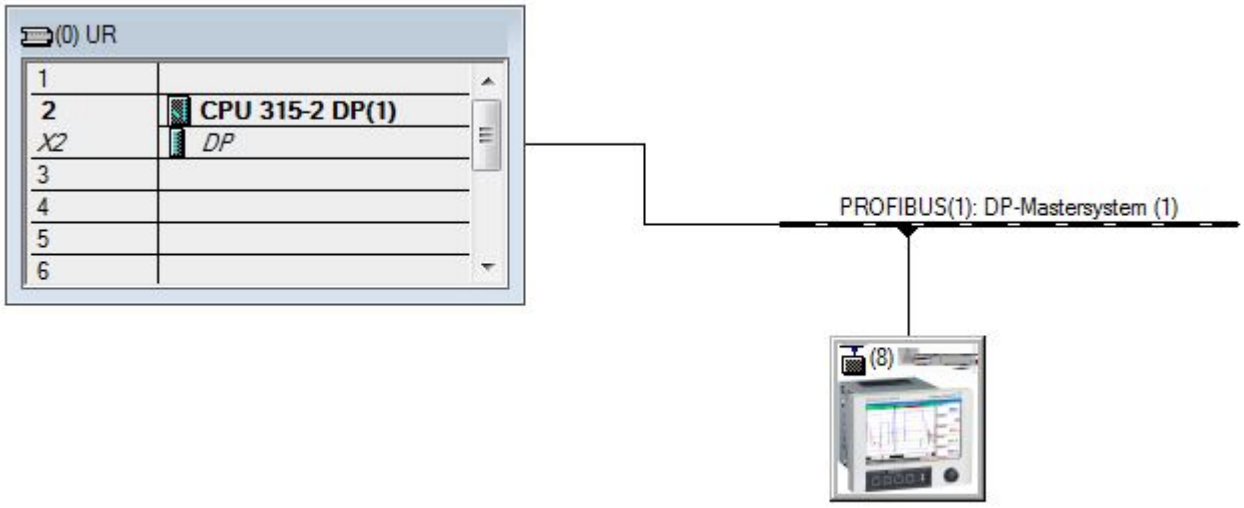


Fig. 24: Integrating the device into the Profibus network

The diagnostic address, here **2046** , is determined under "Properties / General" of the DP slave:

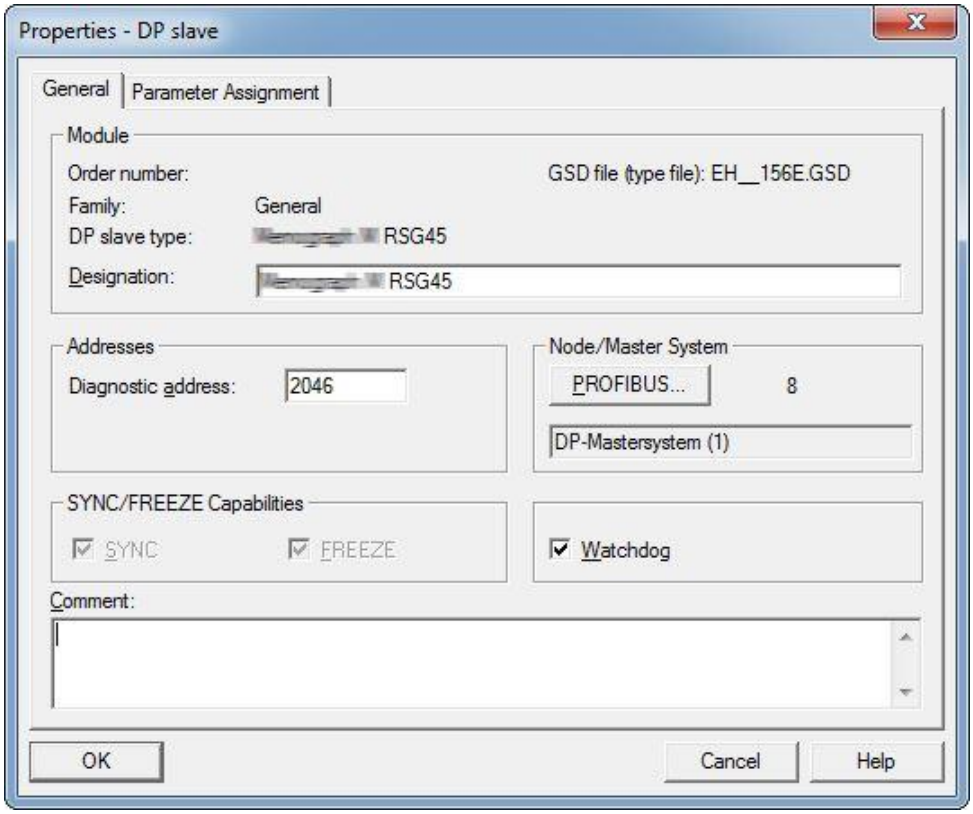


Fig. 25: Determining the diagnostic address

DPV1 is set under Properties/Parameter Assignment of the DP slave:

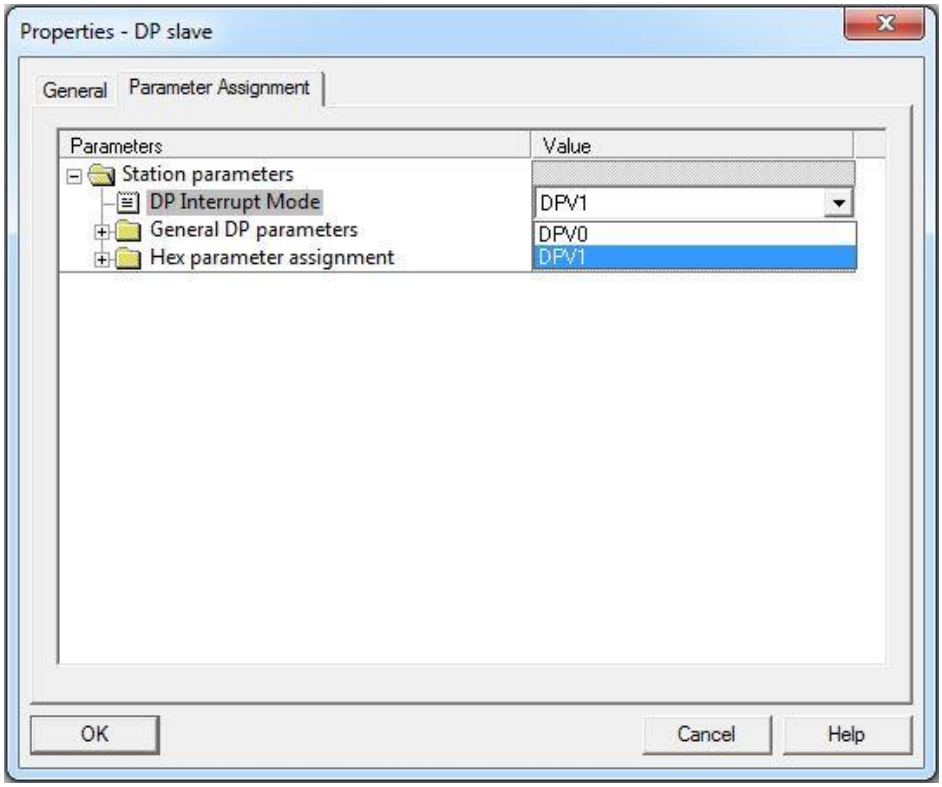


Fig. 26: Settings for DPV1

3.4.1 Transmitting a text via Slot 0, Index 0 (see 2.7.1)

A DB50 data module with a "WRREC_DB" structure is created:

DB50 -- "WRREC_DB" -- S7_Pro3\SIMATIC 300 Station\CPU 315-2 DP\...\DB50

Adresse	Name	Typ	Anfangswert	Kommentar
0.0		STRUCT		
+0.0	REQ	BOOL	FALSE	Datensatzübertragung durchführen
+2.0	ID	DWORD	DW#16#0	Log. Adresse Slave
+6.0	INDEX	INT	0	Datensatznummer
+8.0	LEN	INT	10	Länge
+10.0	DONE	BOOL	FALSE	Datensatz wurde übertragen
+10.1	BUSY	BOOL	FALSE	Schreibvorgang noch nicht beendet
+10.2	ERROR	BOOL	FALSE	Schreibvorgang Fehler
+12.0	STATUS	DWORD	DW#16#0	Aufrufkennung / Fehlercode
+16.0	RECORD	ARRAY[0..39]	B#16#0	Datensatz
*1.0		BYTE		
=56.0		END_STRUCT		

Fig. 27: DB50 data module

The text to be transmitted can be entered online in the data block from RECORD[0]:

@DB50 -- "WRREC_DB" -- S7_Pro3\SIMATIC 300 Station\CPU 315-2 DP\...\DB50 ONLINE

Adresse	Name	Typ	Anfangswert	Aktualwert	Kommentar
0.0	REQ	BOOL	FALSE	FALSE	Datensatzübertragung durchführen
2.0	ID	DWORD	DW#16#0	DW#16#0000000	Log. Adresse Slave
6.0	INDEX	INT	0	0	Datensatznummer
8.0	LEN	INT	10	10	Länge
10.0	DONE	BOOL	FALSE	FALSE	Datensatz wurde übertragen
10.1	BUSY	BOOL	FALSE	FALSE	Schreibvorgang noch nicht beendet
10.2	ERROR	BOOL	FALSE	FALSE	Schreibvorgang Fehler
12.0	STATUS	DWORD	DW#16#0	DW#16#0070000	Aufrufkennung / Fehlercode
16.0	RECORD[0]	BYTE	B#16#0	B#16#30	Datensatz
17.0	RECORD[1]	BYTE	B#16#0	B#16#31	
18.0	RECORD[2]	BYTE	B#16#0	B#16#32	
19.0	RECORD[3]	BYTE	B#16#0	B#16#33	
20.0	RECORD[4]	BYTE	B#16#0	B#16#34	
21.0	RECORD[5]	BYTE	B#16#0	B#16#35	
22.0	RECORD[6]	BYTE	B#16#0	B#16#36	
23.0	RECORD[7]	BYTE	B#16#0	B#16#37	
24.0	RECORD[8]	BYTE	B#16#0	B#16#38	
25.0	RECORD[9]	BYTE	B#16#0	B#16#39	
26.0	RECORD[10]	BYTE	B#16#0	B#16#40	
27.0	RECORD[11]	BYTE	B#16#0	B#16#00	
28.0	RECORD[12]	BYTE	B#16#0	B#16#00	
29.0	RECORD[13]	BYTE	B#16#0	B#16#00	

Fig. 28: DB50 data module online

In OB1 the command for the SFB53 "WRREC" is implemented which can be used to write a data record to the module addressed.

```
U     M     11.0              // Trigger for writing record
UN    M     11.1              // helpflag
=     M     11.2              // edgeflag

U     M     11.0
=     M     11.1

CALL  "WRREC" , DB53
 REQ   :=M11.2                // Edgeflag
 ID    :=MD20                 // Diagnostic address of slave (2046)->Slot 0
 INDEX :=MW24                 // Index 0
 LEN   :="WRREC_DB".LEN
 DONE  :="WRREC_DB".DONE
 BUSY  :="WRREC_DB".BUSY
 ERROR :="WRREC_DB".ERROR
 STATUS:="WRREC_DB".STATUS
 RECORD:="WRREC_DB".RECORD
```

This SFB command writes the data record ("WRREC_DB“.RECORD DB50) with the length 10 ("WRREC_DB“.LEN) to the slave with the diagnostic address 0x7FE (2046).

The following VAT is used to start communication:

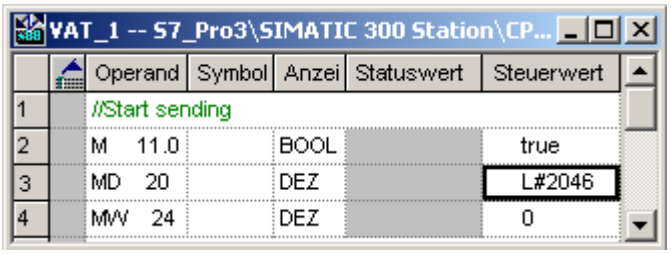


Fig. 29: Table of variables

To start transmission, M11.0 is set to "true". Transmission begins.
Before another transmission process can be started, M11.0 must be reset to "false".

```
SD2    2->5    SRD_LOW    DPV1_Write_Req    Req    51->51    14    5F 00 00 0A 30 31 32 33 34 35 36 37 38 39
SD2    2->5    SRD_LOW    DPV1_Poll         Req    51->51    0
SD2    2->5    SRD_LOW    DPV1_Poll         Req    51->51    0
SD2    2->5    SRD_LOW    DPV1_Poll         Req    51->51    0
SD2    2->5    SRD_LOW    DPV1_Poll         Req    51->51    0
SD2    2->5    SRD_LOW    DPV1_Poll         Req    51->51    0
SD2    2->5    SRD_LOW    DPV1_Poll         Req    51->51    0
SD1    2<-5    Passive                      Res
SD2    2->5    SRD_LOW    DPV1_Poll         Req    51->51    0
SD2    2->5    SRD_LOW    DPV1_Poll         Req    51->51    0
SD2    2->5    SRD_LOW    DPV1_Poll         Req    51->51    0
SD2    2->5    SRD_LOW    DPV1_Poll         Req    51->51    0
SD2    2->5    SRD_LOW    DPV1_Poll         Req    51->51    0
SD2    2<-5    DL         DPV1_Write_Res    Res    51<-51    4    5F 00 00 0A
```

Fig. 30: Communication cycle of the acyclic service

3.4.2 Reading out the relay status via Slot 0, Index 2 (see 2.7.3)

To start the read-out process, M12.0 is set to "true". Transmission begins.
Before another read-out can be started, M12.0 must be reset to "false".

```
U     M     12.0          // Trigger for reading data record
UN    M     12.1          // helpflag
=     M     12.2          // edgeflag

U     M     12.0
=     M     12.1

CALL  SFB   52 , DB52     // RDREC
 REQ   :=M12.2            // Edgeflag
 ID    :=DW#16#7FE        // Diagnosis address slave (2046)->Slot 0
 INDEX :=2                // Index 2
 MLEN  :=2                // Maximum length of the bytes to be read
 VALID :=M100.1           // VALID data record has been received and is valid
 BUSY  :=M100.2           // BUSY=1: The reading operation is not completed yet
 ERROR :=M100.3           // ERROR=1: An error has occurred while reading
 STATUS:=MD101            // STATUS
 LEN   :=MW110            // Length of data record information read
 RECORD:=MW120            // Target area for the data record read
```

The target area must at least be large enough to accept the previously defined data (MLEN).
In MW 120, W#16#0008 appears after the reading operation, which means that relay 4 is active.

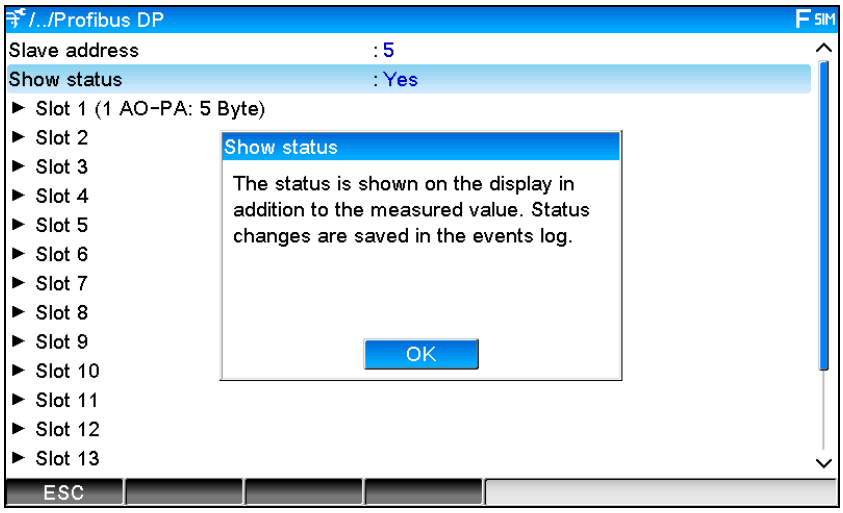
4 Troubleshooting

Problem	Cause	Remedy
The BUSF LED on the PLC is lit.	Configuration of device and Profibus master not identical.	Check with the aid of the slot overview (see section 2.6.3 Slot overview)
	Slave address not identical	Check the slave address, see: 2.2 Settings in the Setup 2.6.3 Slot overview 3.2.2 Configuring the device as a DP slave

Tab. 9: Solutions to problems

4.1 Checking the measured value status (Profibus master → device)

Under **"Expert / Communication / Profibus DP"** it is possible to activate the function for displaying and monitoring the measured value status. This function should be used for test purposes only since status changes are also saved in the events log in addition to the displayed value:



The status is then displayed in hexadecimal format after the measured value:

The status changes are saved in the events log (in English):

DP 1:60h Uncertain simulated value
DP 1:A0h Good initiate fail safe
DP 1:08h Bad not connected
DP 1:90h Good unackn. update ev...
DP 1:42h Uncertain non-specific
DP 1:41h Uncertain non-specific
DP 1:01h Bad non-specific
DP 1:41h Uncertain non-specific
DP 1:80h Good ok

5 Profibus DP troubleshooting

Problem	Cause	Remedy
The BUSF LED on the PLC is lit.	Configuration of device and Profibus master not identical.	Check with the aid of the slot overview (see section 2.6.3 Slot overview)
	Slave address not identical	Check the slave address, see: 2.2 Settings in the Setup 2.6.3 Slot overview, web browser 3.2.2 Configuring the device as a DP slave

Tab. 10: Solutions to problems

6 List of abbreviations/glossary of terms

Profibus module: The PROFIBUS DP slave plug-in module that is plugged into the rear of the device.

Profibus master: All equipment, such as the PLC and PC plug-in boards, that have a PROFIBUS DP master function.

7 Index