

Interface description DP/DP COUPLER

Version 1-0-0

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2 Basics of description

2.1 Siemens manual

The manual of Siemens is the basic of this discription. It can be found in the appendix. It's content should be read and understood (see 6.1 Handbuch / Manual).

2.2 Definition data width

For a better understanding the definitions of "bit", "nibble", "byte" and "word" must be known. Basically, the Table 2-1: Definition of data width applies.

Data width	Unit
4 Bit = ½ Byte	Nibble
8 Bit = 1 Byte	Byte
16 Bit = 2 Byte	Word
32 Bit = 4 Byte	Double Word

Table 2-1: Definition of data width

2.3 Definition High- and Low-activ

High-activ: The event has occurred, when a logical 1 is present.

Low-activ: The event has occurred, when a logical 0 is present.

2.4 Subject DP/DP Coupler

This description is based on the following hardware (see 3.1 DP1/DP2 Connectors of the DP/DP Coupler Reversed). The data sheet of the used hardware, can be found in the appendix (see 6.3 Datenblatt / Datasheet) During the test by team has been found out, that the entry 3.1 DP1/DP2 Connectors of the DP/DP Coupler Reversed does not apply.

Manufacturer: Siemens

Name of item: DP/DP Coupler

Part number: 6ES7 158-0AD01-0XA0

3 Error sources and Notes

3.1 DP1/DP2 Connectors of the DP/DP Coupler Reversed

The attached post (see 6.2 Siemens Beitrag / Entry ID 4351685) should find compliance, if an other Hardware than the one, which was given to the Team GmbH, will be used in the final implementation. In addition, it should be read when a fault occurs in the coupler or it is replaced by an older version.

3.2 Single power supply

If the DP/DP coupler is connected only to one voltage supply, the supply via PS2 should be preferred. It is electrically isolated from the logic.

3.3 Data validity indication

When "DIA" is in "ON" position, you may not use the first bit in the LSB of the first configured input byte for normal input data! We advise you not to use the first byte of the input data for the inputs when using the data validity indication function! (see 5.1.2 DIL-Switch „DIA“).

4 Data Interface

4.1 Containted Data

The interface contains the information summaries in the following tables.

Name	Measuring range	Unit
Thickness	1,00...1,50	kg/dm ³
Sandpump velocity	0,00...10,00	m/sek
Sandpump frequenzy target	167,00...838,00	U/min
Sandpump applied pressure	0,00...10,00	bar
Suction tube depth	0,00...20,03	m
Sandpump seal water pressure	0,00...10,00	bar
Sandpump Power	0,00...300,00	kW
Jetdruck	0,00...16,00	bar
Vakuum actual value	0,00...-1,00	bar

Table 4-1: Analog measurement INA Dredger

Name	Measuring range	Unit
Boosterpump Frequenzy target	0,00...1430,00	U/min
Boosterpump primary pressure	0,00...16,00	bar
Boosterpump Applied pressure	0,00...16,00	bar
Boosterpump seal water pressure	0,00...10,00	bar
Sealwaterpump primary pressure	0,00...10,00	bar
Sealwaterpump Velocity	0,00...3,00	m/sek

Table 4-2: Analog measurement Booster station

Aggregat	Signal	High/Low active
Boosterpump Sealwaterpump	Operating signal	1=Pump is operating
Boosterpump Sealwaterpump	Fault signal	1=Pump is faulted
Jetpumpe	Operating signal	1=Pump is operating
Jetpumpe	Fault signal	1=Pump is faulted
Sandpump	Operating signal	1=Pump is operating
Sandpump	Fault signal	1=Pump is faulted

Table 4-3: Digital signals INA Dredger

4.2 Summary of the data in the memory area

The interface on the coupler includes 16 slots. The configuration described in table Table 4-4: is written out of Beckhoff control the point of view.

Slot	Signalname	Address	Data width
1	Thickness	Word 0	2 Byte Output
2	Sandpump velocity	Word 1	2 Byte Output
3	Sandpump frequenzy target	Word 2	2 Byte Output
4	Sandpump applied pressure	Word 3	2 Byte Output
5	Suction tube depth	Word 4	2 Byte Output
6	Sandpump seal water pressure	Word 5	2 Byte Output

7	Sandpump Power	Word 6	2 Byte Output
8	Jetdruck	Word 7	2 Byte Output
9	Vakuum actual value	Word 8	2 Byte Output
10	Sandpump Sealwaterpump Operating signal	Word 9 Bit 0	2 Byte Output
	Sandpump Sealwaterpump Fault signal	Word 9 Bit 1	
	Jetpump Operating signal	Word 9 Bit 2	
	Jetpump Fault signal	Word 9 Bit 3	
	Sandpump Operating signal	Word 9 Bit 4	
	Sandpump Fault signal	Word 9 Bit 5	
	Reserve Bit	Word 9 Bit 6	
	Reserve Bit	Word 9 Bit 7	
	Reserve Bit	Word 9 Bit 8	
	Reserve Bit	Word 9 Bit 9	
	Reserve Bit	Word 9 Bit 10	
	Reserve Bit	Word 9 Bit 11	
	Reserve Bit	Word 9 Bit 12	
	Reserve Bit	Word 9 Bit 13	
	Reserve Bit	Word 9 Bit 14	
	Reserve Bit	Word 9 Bit 15	
11	Boosterpump Frequenzy target	Word 10	2 Byte Output
12	Boosterpump primary pressure	Word 11	2 Byte Output
13	Boosterpump Applied pressure	Word 12	2 Byte Output
14	Boosterpump seal water pressure	Word 13	2 Byte Output
15	Sealwaterpump primary pressure	Word 14	2 Byte Output
16	Sealwaterpump Velocity	Word 15	2 Byte Output

Table 4-4: Interface definition

4.3 Scalingfactors

The Table 4-5: Scalingfactors summerieses the Scalingfactors. In the remark column are noted on a simplified calculation. The colors mentioned are only a.

Signalname	Transmission range		Displayrange		Remark
	From	To	From	To	
Thickness	0 _{INT}	10000 _{INT}	1,00	1,50	0,01% per digit
Sandpump velocity	0 _{INT}	10000 _{INT}	0,00	10,00	0,01% per digit
Sandpump frequenzy target	0 _{INT}	32767 _{INT}	167,00	838,00	0,025597 rpm per digit
Sandpump applied pressure	0 _{INT}	10000 _{INT}	0,00	10,00	0,01% per digit
Suction tube depth	0 _{INT}	32767 _{INT}	0,00	327,67	0,01m per digit
Sandpump seal water pressure	0 _{INT}	32767 _{INT}	0,00	32,77	0,01% per digit
Sandpump Power	0 _{INT}	10000 _{INT}	0,00	300,00	0,01% per digit
Jetdruck	0 _{INT}	10000 _{INT}	0,00	16,00	0,01% per digit

Vakuum actual value	0 _{INT}	32767 _{INT}	0,00	32,77	1mbar per digit
Sandpump Sealwaterpump Operating signal	False	True	Grey	Green	
Sandpump Sealwaterpump Fault signal	False	True	Grey	Red	
Jetpump Operating signal	False	True	Grey	Green	
Jetpump Fault signal	False	True	Grey	Red	
Sandpump Operating signal	False	True	Grey	Green	
Sandpump Fault signal	False	True	Grey	Red	
Reserve Bit	False	True	0	1	
Reserve Bit	False	True	0	1	
Reserve Bit	False	True	0	1	
Reserve Bit	False	True	0	1	
Reserve Bit	False	True	0	1	
Reserve Bit	False	True	0	1	
Reserve Bit	False	True	0	1	
Reserve Bit	False	True	0	1	
Reserve Bit	False	True	0	1	
Boosterpump Frequenzy target	0 _{INT}	15619 _{INT}	0,00	1430,00	0,091536 rpm per digit
Boosterpump primary pressure	0 _{INT}	10000 _{INT}	0,00	16,00	0,01% per digit
Boosterpump Applied pressure	0 _{INT}	10000 _{INT}	0,00	16,00	0,01% per digit
Boosterpump seal water pressure	0 _{INT}	10000 _{INT}	0,00	10,00	0,01% per digit
Sealwaterpump primary pressure	0 _{INT}	10000 _{INT}	0,00	10,00	0,01% per digit
Sealwaterpump Velocity	0 _{INT}	10000 _{INT}	0,00	3,00	0,01% per digit

Table 4-5: Scalingfactors

5 Parameterization of the DP/DP Coupler

5.1 DIL Switch Position

The DIP switches must be set as follows.

5.1.1 DIL-Switch „PS“

The “PS” DIL switch setting tells the DP/DP Coupler to which of its inlets the power supply is connected. This also allows the diagnostic function to report failures of the power supply. (see dazu auch 3.2 Single power supply)

⇒ *During the Test by Team was used a unilateral power supply. Therefore the DIL-Switch on DP1-Side is „OFF“ and on DP2-Side is „ON“*

5.1.2 DIL-Switch „DIA“

The “DIA” DIL switch function allows you to validate I/O data.

⇒ *In the present interface configuration the DIL-Switch has to be set to „OFF“*

5.1.3 DIL-Switch „ADDR“

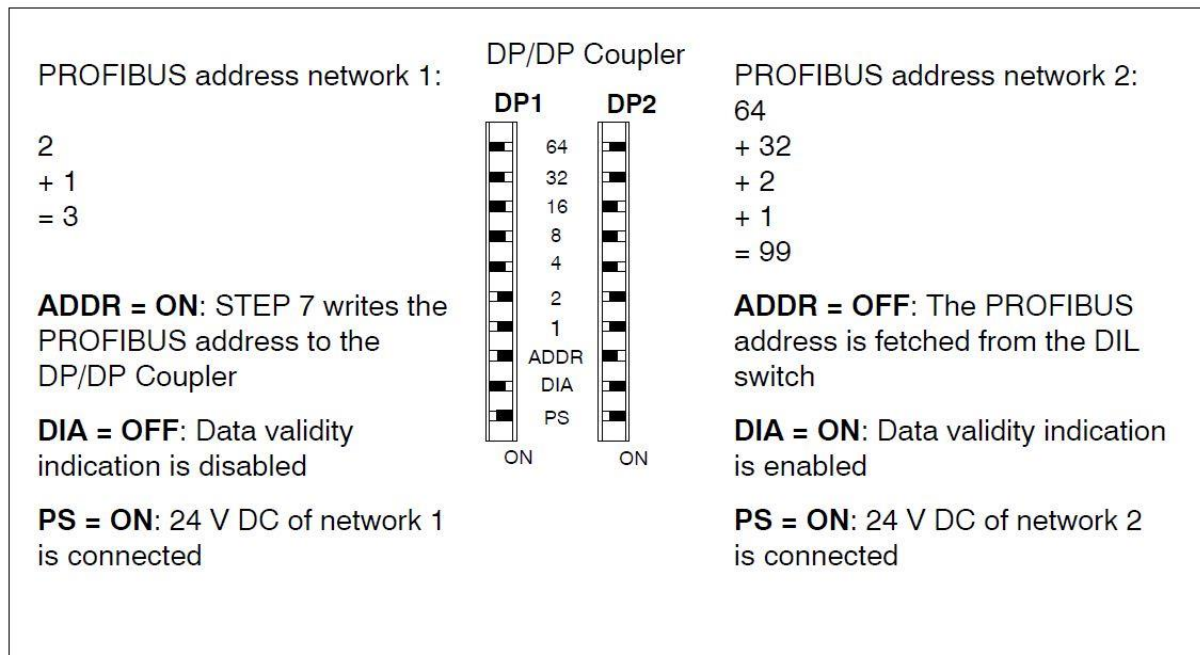
The position of this switch determines whether the PROFIBUS address is set directly on the DP/DP Coupler, or whether it is assigned via PROFIBUS DP in the STEP 7 program..

⇒ *In the communication between Beckhoff and ABB, this switch must be set to "OFF" if no Siemens Simatic Step7 programming environment is available*

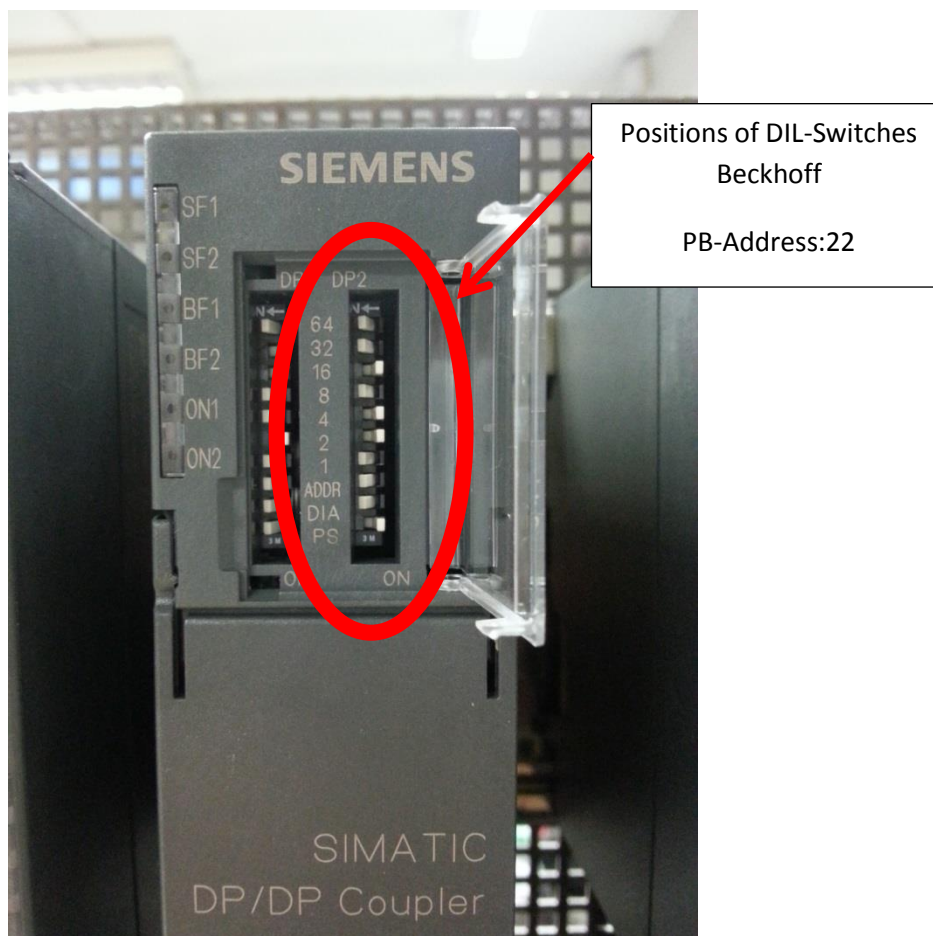
5.1.4 DIL-Switch for setting the PROFIBUS address

Each bus node must receive a PROFIBUS address so that it can be uniquely identified on PROFIBUS-DP. The PROFIBUS address is set separately for both PROFIBUS DP networks directly on the DIL switches of the DP/DP Coupler.

⇒ *In the pictures Picture 5-1: Setting the Address via DIL-Switch and Picture 5-2: DIL Switch for Beckhoff site is shown, how to set the PB-Address. On the Beckhoff Profibus side, the address must be set to the specified value.*



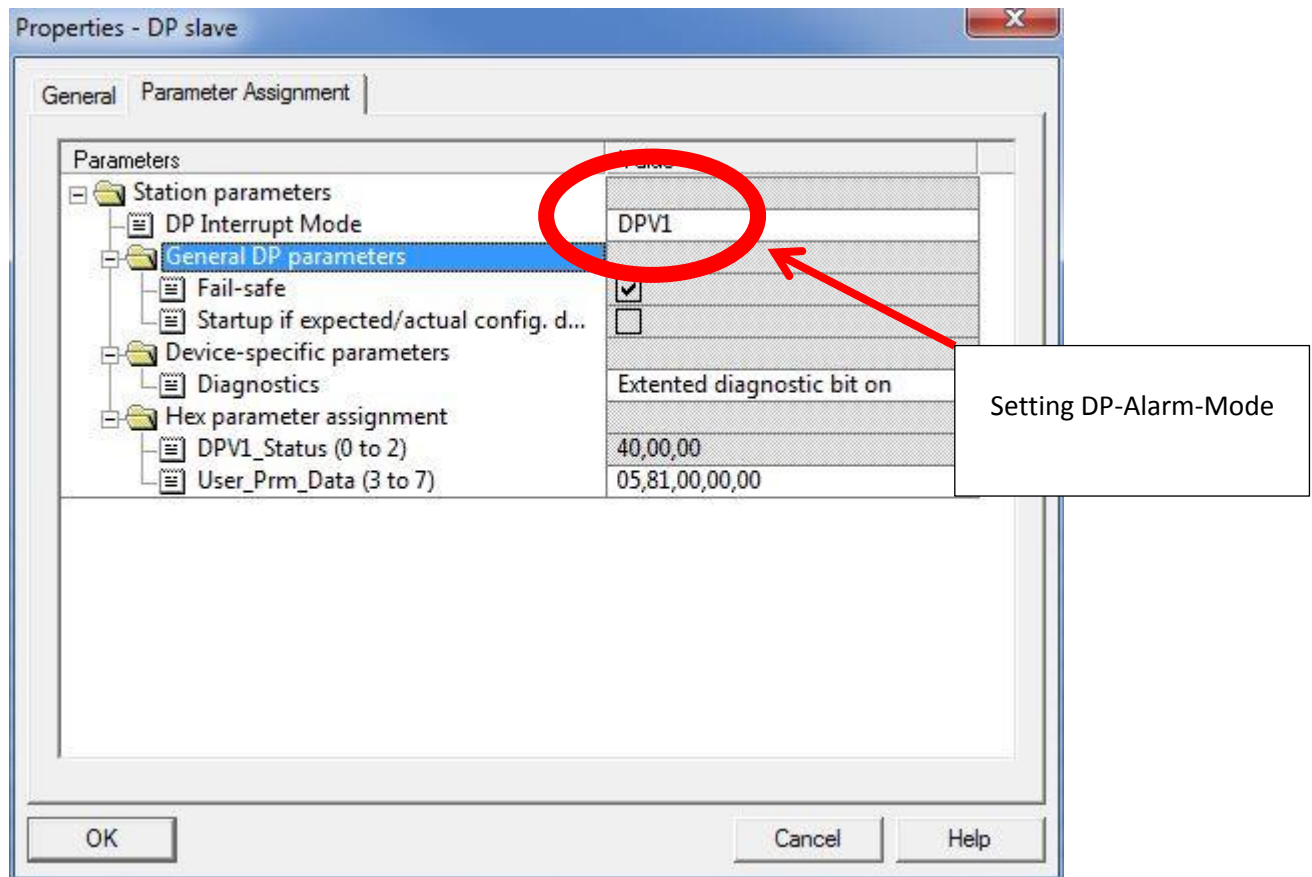
Picture 5-1: Setting the Address via DIL-Switch



Picture 5-2: DIL Switch for Beckhoff site

5.1.5 DP-Alarm-Mode (DPV1)

The Beckhoff Soft-PLC uses the DPV1 standard. Accordingly, the DP / DP Coupler should be set



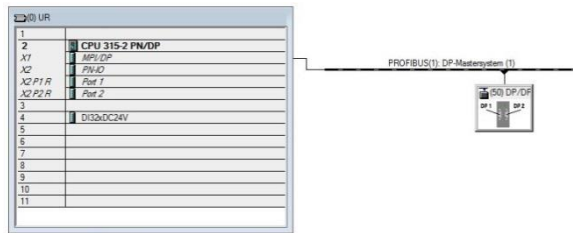
Picture 5-3: Properties DP/DP Coupler (DPV1)

5.2 Example for configuration

In this example is show the hardware configuration in the Siemens environment.

5.2.1 Hardware Environment

The Hardware Environment, shown in Picture 5-4: Hardware Environment, was used in the test by Team.



Slot	DP ID	Order Number / Designation	I Address	Q Address	Comment
1	145	2 Bytes Input consistent	4...5		
2	145	2 Bytes Input consistent	6...7		
3	145	2 Bytes Input consistent	8...9		
4	145	2 Bytes Input consistent	10...11		
5	145	2 Bytes Input consistent	12...13		
6	145	2 Bytes Input consistent	14...15		
7	145	2 Bytes Input consistent	16...17		
8	145	2 Bytes Input consistent	18...19		
9	145	2 Bytes Input consistent	20...21		
10	145	2 Bytes Input consistent	22...23		
11	145	2 Bytes Input consistent	24...25		
12	145	2 Bytes Input consistent	26...27		
13	145	2 Bytes Input consistent	28...29		
14	145	2 Bytes Input consistent	30...31		
15	145	2 Bytes Input consistent	32...33		
16	145	2 Bytes Input consistent	34...35		

Picture 5-4: Hardware Environment

The coupler can be viewed as a standalone hardware. About the network structure of the coupled Profibus Side no information needs to be available.

5.2.2 Slot configuration

As described in 4.2 Summary of the data in the memory area, in the hardware configuration 16 slots were "2 byte input consistent" occupied. The addresses are not mandatory. The addresses can be freely assigned to any of the Profibus networks.

Slot	DP ID	Order Number / Designation	I Address	Q Address	Comment
1	145	2 Bytes Input consistent	4...5		
2	145	2 Bytes Input consistent	6...7		
3	145	2 Bytes Input consistent	8...9		
4	145	2 Bytes Input consistent	10...11		
5	145	2 Bytes Input consistent	12...13		
6	145	2 Bytes Input consistent	14...15		
7	145	2 Bytes Input consistent	16...17		
8	145	2 Bytes Input consistent	18...19		
9	145	2 Bytes Input consistent	20...21		
10	145	2 Bytes Input consistent	22...23		
11	145	2 Bytes Input consistent	24...25		
12	145	2 Bytes Input consistent	26...27		
13	145	2 Bytes Input consistent	28...29		
14	145	2 Bytes Input consistent	30...31		
15	145	2 Bytes Input consistent	32...33		
16	145	2 Bytes Input consistent	34...35		

Picture 5-5: Slotkonfiguration

It must be important to ensure that the input and output areas of both networks are coordinated. This refers to the memory width, the parameter as input or output and on the composition of the

storage area(see Table 5-1 und Table 5-2) There are shown two examples. One for a right and a wrong for a configuration.

Correct:

DP1 Netz			DP2 Netz		
Slot	Designation	Address	Slot	Designation	Address
1	2 Byte Input consistent	4..5	1	2 Byte Output consistent	10..11
...					

Table 5-1: Correct Slot configuration

Incorrect:

DP1 Netz			DP2 Netz		
Slot	Designation	Address	Slot	Designation	Address
1	2 Byte Input consistent	4..5	1	1 Word Output	10..11
...					

Table 5-2: Incorrect Slot configuration

⇒ Although a word contains two bytes, and thus the memory width is the same, it will come to a error(SF-LED) on the coupler.

6 Appendix

6.1 Handbuch / Manual

Deutsch: [DP_DP_Koppler_Handbuch_DE_6ES7158-0AD01-0XA0.pdf](#)

URL: https://cache.automation.siemens.com/dnl/DQ/DQyMjA5AAAA_1179382_HB/dpdpk_d.pdf

Englisch: [DP_DP_Coupler_Manual_EN_6ES7158-0AD01-0XA0.pdf](#)

URL: https://cache.automation.siemens.com/dnl/DU/DU4ODUzAAAA_1179382_HB/dpdpk_e.pdf

6.2 Siemens Beitrag / Entry ID 4351685

Deutsch: [Siemens_Beitrag_ID_4351685_DE.pdf](#)

URL: Siemens Industry Online Support ([Beitrags-ID: 4351685](#), Datum:1999-08-09)

Englisch: [Siemens_Entry_ID_4351685_EN.pdf](#)

URL: Siemens Industry Online Support ([Entry-ID: 4351685](#), Date:1999-09-07)

6.3 Datenblatt / Datasheet

Deutsch: [DP_DP_Koppler_Datenblatt_DE_6ES7158-0AD01-0XA0.pdf](#)

URL: Siemens Industry Mall ([6ES7158-0AD01-0XA0](#))

Englisch: [DP_DP_Coupler_DataSheet_EN_6ES7158-0AD01-0XA0.pdf](#)

URL: Siemens Industry Mall ([6ES7158-0AD01-0XA0](#))