

Interface description DP/DP COUPLER

Version 1-0-0

TEAM GmbH

Westerholter Straße 781
D-45701 Herten

Tel.: +49 (0) 23 66 / 95 97 -0
Fax: +49 (0) 23 66 / 95 97 99
E-Mail: info@teamtec.de
Internet: www.teamtec.de

Writer: CM, WW, BW

Link: M:\1151.Sibelco_Heerlen_Ina_mit_Boosterstation\03_Dokumentation\05_Handbücher
EXTERN\Schnittstellen Beschreibung Profibus-DP_V1-0-0_EN.docx

1 Summary

| | | |
|-------|--|----|
| 1 | Summary..... | 3 |
| 2 | Basics of description..... | 4 |
| 2.1 | Siemens manual | 4 |
| 2.2 | Definition data width..... | 4 |
| 2.3 | Definition High- and Low-activ..... | 4 |
| 2.4 | Subject DP/DP Coupler..... | 4 |
| 3 | Sources of errors and details..... | 5 |
| 3.1 | DP1/DP2 Connectors of the DP/DP Coupler Reversed | 5 |
| 3.2 | Unilateral power supply | 5 |
| 3.3 | Data validity indication..... | 5 |
| 4 | Data Interface..... | 6 |
| 4.1 | Containted Data | 6 |
| 4.2 | Summary of the data in the memory area | 6 |
| 4.3 | Scalingfactors | 7 |
| 5 | Parameterization of the DP/DP Coupler | 9 |
| 5.1 | DIL Switch Position | 9 |
| 5.1.1 | DIL-Switch „PS“..... | 9 |
| 5.1.2 | DIL-Switch „DIA“..... | 9 |
| 5.1.3 | DIL-Switch „ADDR“ | 9 |
| 5.1.4 | DIL-Switch for setting the PROFIBUS address | 9 |
| 5.1.5 | DP-Alarm-Mode (DPV1)..... | 11 |
| 5.2 | Example for configuration..... | 11 |
| 5.2.1 | Hardware Environment | 11 |
| 5.2.2 | Slot configuration | 12 |
| 6 | Appendix..... | 14 |
| 6.1 | Handbuch / Manual..... | 14 |
| 6.2 | Siemens Beitrag / Entry ID 4351685..... | 14 |
| 6.3 | Datenblatt / Datasheet..... | 14 |

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 Frequency 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 frequency 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 Frequency 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. Therefor 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“

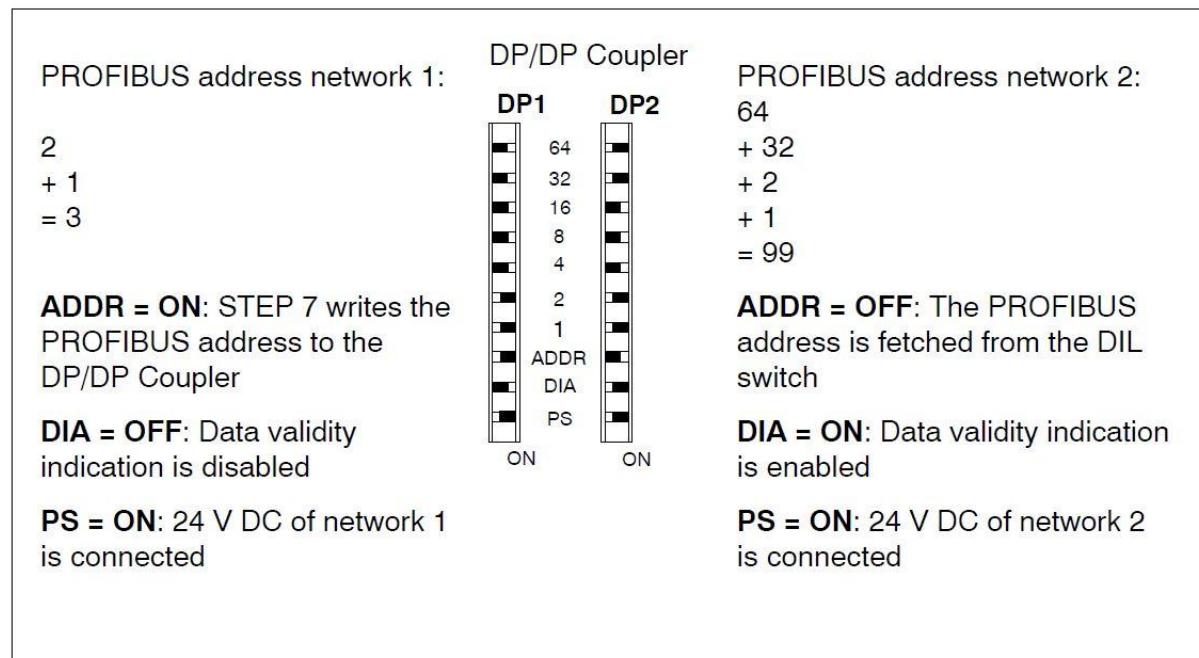
The position of this switch determines whether the PROFIBUS address is set directly on the DP/DP Coupler, or whether it is assigned via PROFIBUS DP in the STEP 7 program..

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

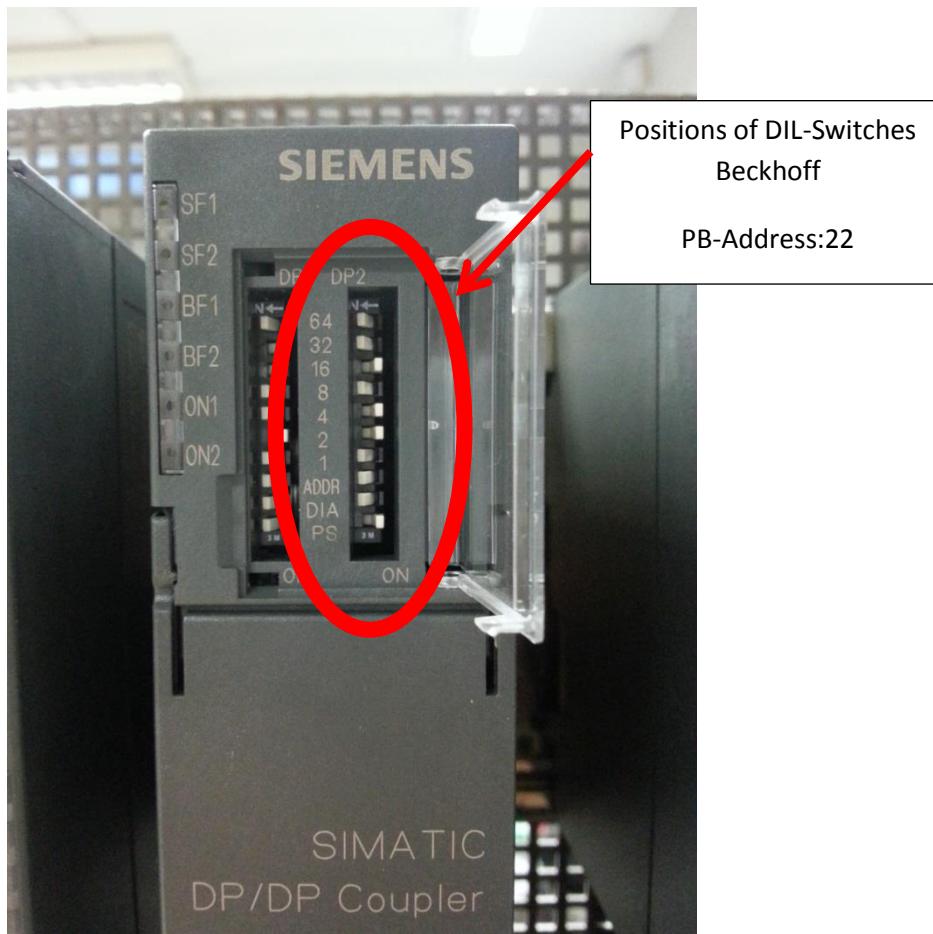
5.1.4 DIL-Switch for setting the PROFIBUS address

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.*



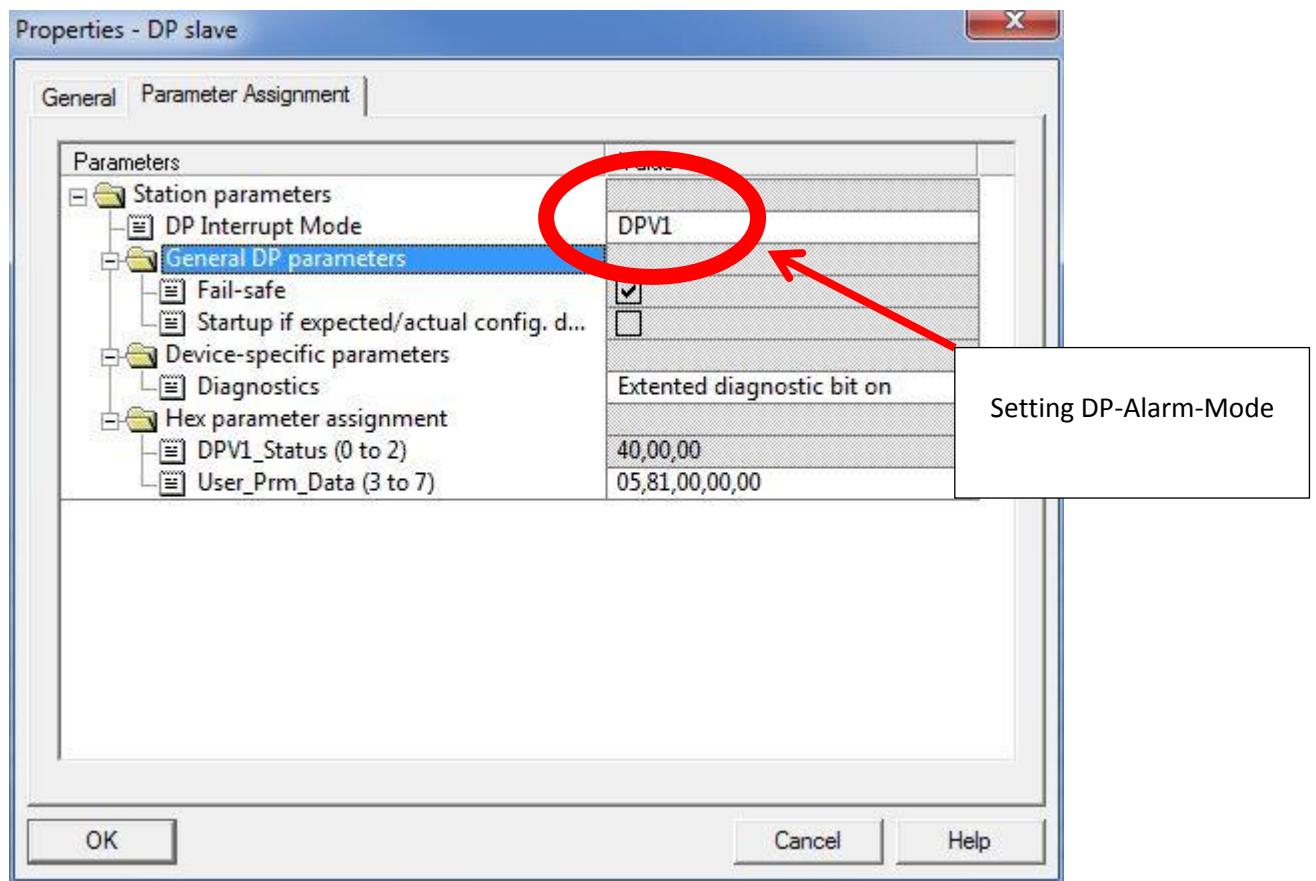
Picture 5-1: Setting the Address via DIL-Switch



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



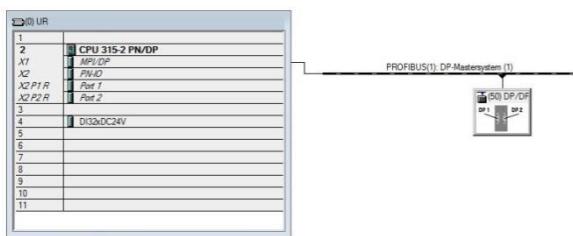
Picture 5-3: Properties DP/DP Coupler (DPV1)

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.



| (50) DP/DP-Koppler, Ausgabest | | | | | |
|-------------------------------|-------|----------------------------|-----------|-----------|---------|
| 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.

| (50) DP/DP-Koppler, Ausgabest | | | | | |
|-------------------------------|-------|-----|----------------------------|-----------|-----------|
| Slot | DP ID | ... | Order Number / Designation | I Address | Q Address |
| 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](#))