APPLICATION EXAMPLE PROFIBUS DP

Revision 1

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1 General information

This operating instructions serves to start up a WANDFLUH Electronic card with Profibus DP interface (Wandfluh DP-Slave). The following points are described step by step

- Wiring of the Wandfluh DP-Slave with a Profibus DP Master and may be other DP-Slaves

- Preferences on the Wandfluh DP-Slave via PASO

- Integration of the Wandfluh DP-Slave in a PLC system ()

- Data exchange via a PLC system (as an example with a Siemens CPU and Step 7 with Wandfluh Program blocks)

- Error detection and diagnostics during operation

It is assumed that basic knowledge about the Profibus DP are available. Also some knowledge concerning the Siemens CPU and Step 7 should be available.

Full details about the functionality from the Wandfluh DP slave are available in the corresponding operating instructions (www.wandfluh.com/en/downloads/accompanying documents for electornics).

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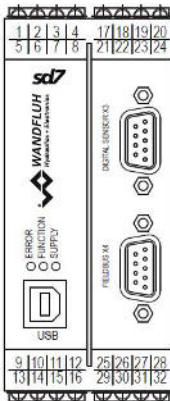# 2 Wiring

2.1 Connection on Wandfluh DP-Slave

Wandfluh DP-Slave = SD7:

On the Wandfluh DP-Slave SD7 the Profibus DP connection is made with the 9-pole D-Sub receptacle (female) X4 direct on the front plate.
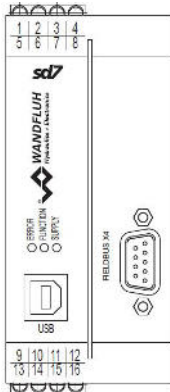
D-Sub receptacle Profibus DP (female) X4

SD7 Amplifier und
SD7 Controller Basic

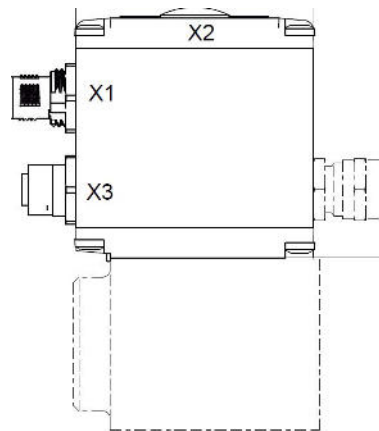D-Sub receptacle Profibus DP (female) X4

SD7 Controller Enhanced

The pin assignment is as follows:

D-Sub receptacle (female) 9-pole:	RS485 galvanic separated
	• Pin 1 = Reserved
	• Pin 2 = Reserved
	• Pin 3 = RxD/TxD-P (receive-/transmit data positive, B-line)
	• Pin 5 = DGND (Ground for data signals and VP)
	• Pin 6 = VP (Power supply for the terminating resistors 5VDC)
	• Pin 7 = Reserved
	• Pin 8 = RxD/TxD-N (receive-/transmit data negative, A-line)
	• Pin 9 = Reserved

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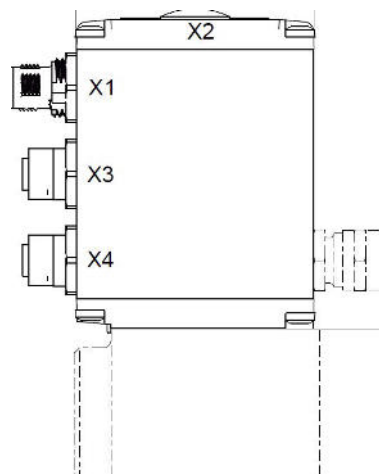
Wandfluh DP-Slave = DSV:

On the Wandfluh DP-Slave DSV the Profibus DP connection is made with the 5-pole M12 receptacle (female) B-coded X3 direct on the housing.

M12 receptacle Profibus DP (female) X3

DSV Amplifier

M12 receptacle Profibus DP (female) X3

DSV Controller

The pin assignment is as follows:

M12 receptacle (female) 5-pole:	RS485 galvanic separated • Pin 1 = VP (Power supply for the terminating resistors 5VDC) • Pin 2 = RxD/TxD-N (receive-/transmit data negative, A-line) • Pin 3 = DGND (Ground for data signals and VP) • Pin 4 = RxD/TxD-P (receive-/transmit data positive, B-line) • Pin 5 = Shield

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2.2   Profibus DP connection

2.2.1   Profibus DP cable

As a Profibus DP cable only the cable type A should be used. During installation the cable should not be bent or injured. In particular the Profibus DP cable should not be stretched or compressed and the minimum bend radius (typically 75mm for wire cables and 45 - 65mm for strand cables) is always observed.

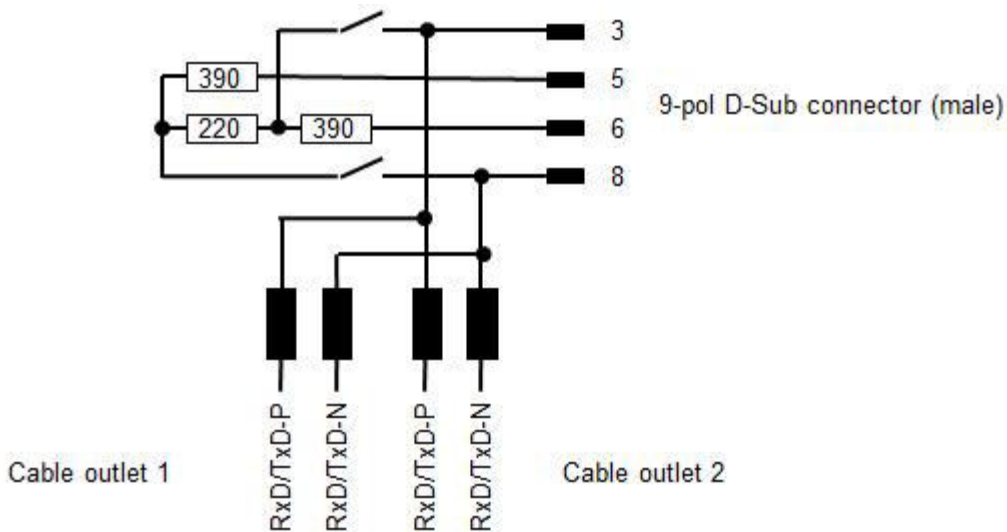The max. cable length depends on the transmission rate and should not exceed the following values:

Baud rate in kbit/s	max. cable length in m
9.6	1200
19.2	1200
45.45	1200
93.75	1200
187.5	1000
500.0	400
1500.0	200
3000.0	100
6000.0	100
12000.0	100

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2.2.2   D-Sub connector

The 9-pole D-Sub connector with one cable outlet should have the following structure:
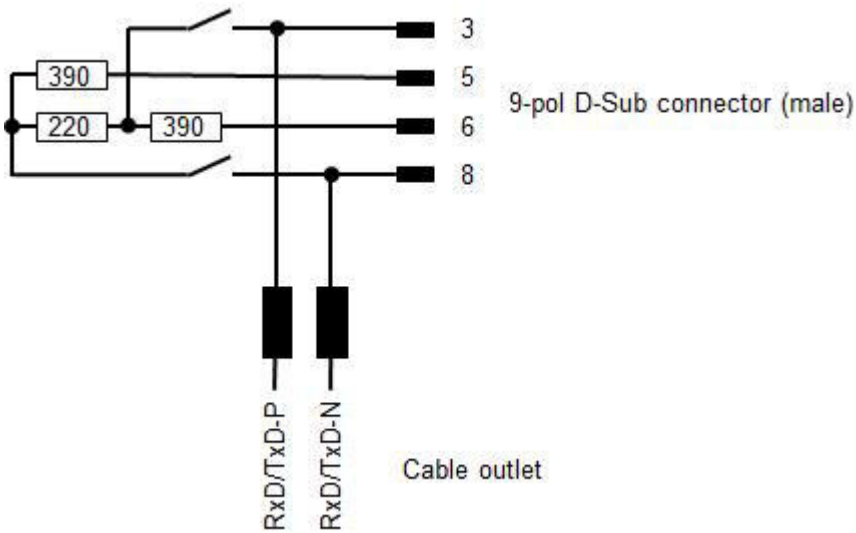
The 9-pole D-Sub connector with an additional cable outlet should have the following structure:

Start and end of the line must be terminated!

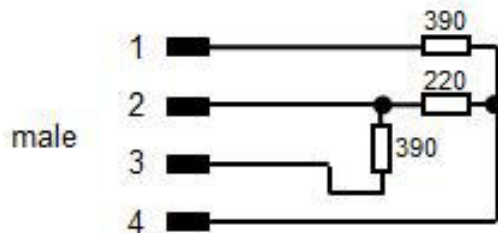*Wandfluh AG* *Tel: +41 33 672 72 72* *Email: sales@wandfluh.com* *Page 7*
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2.2.3 M12 T-connector

The 4-pole M12 T-connector should have the following structure:
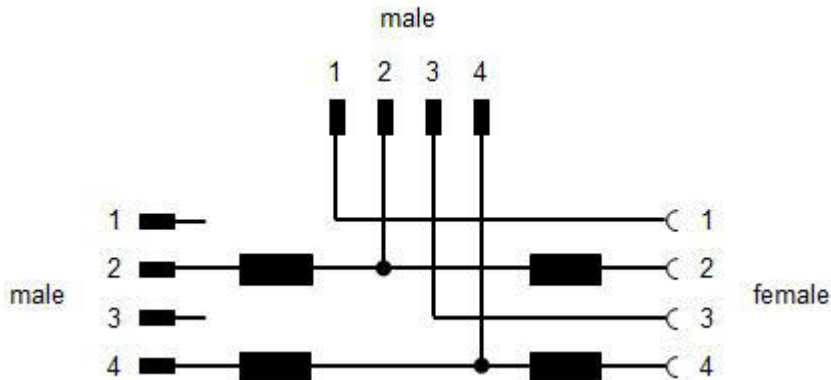
Pin 5 (Shield) is not performed on the T-connector.

2.2.4 M12 terminating resistor (Termination)

The 4-pole M12 terminating resistor should have the following structure:

Start and end of the line must be terminated!

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2.3 Connection to Profibus DP-Master

If the Wandfluh DP-Slave is the only device on the Profibus network, the connection is made as follows

Wandfluh DP-Slave = SD7:

Wandfluh DP-Slave = DSV:

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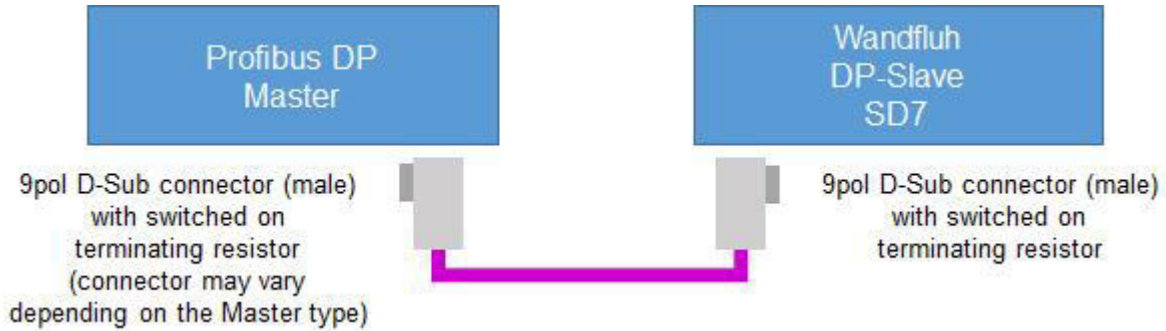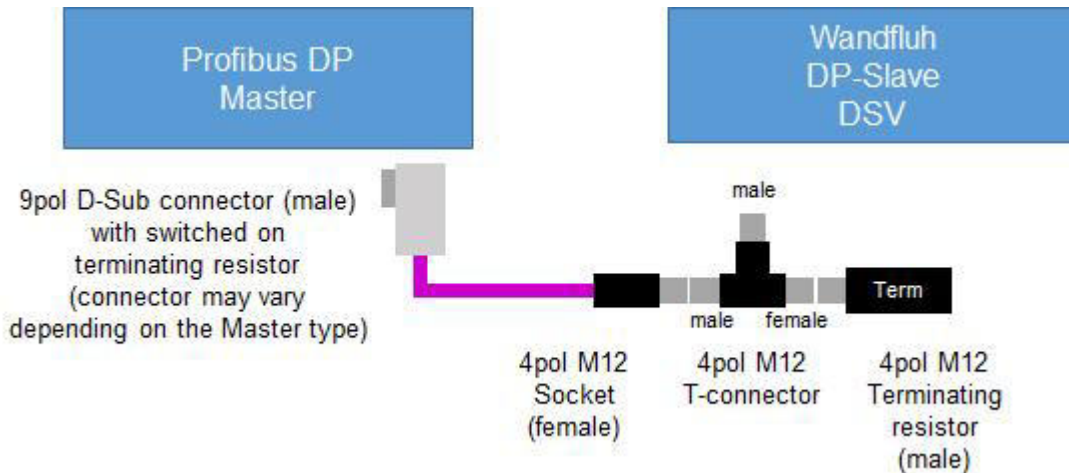
2.4 Connection with several Profibus DP-Slaves

If there are several slaves (Wandfluh DP-Slaves or other participants) on the Profibus network, the connection is made as follows

Wandfluh DP-Slave = SD7:

Connection with connectors with a second cable outlet:

Wandfluh DP-Slave = DSV:

Connection with T-connectors:

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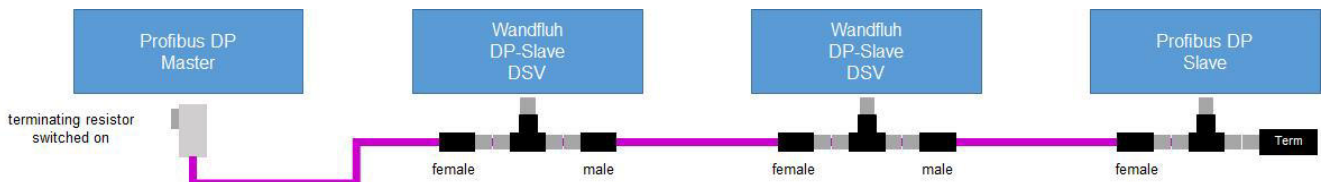
3   Preferences on the Wandfluh DP-Slave

3.1   Fieldbus Parameter

Parameters on the Wandfluh DP-Slave can be changed via the parameterisation software PASO.
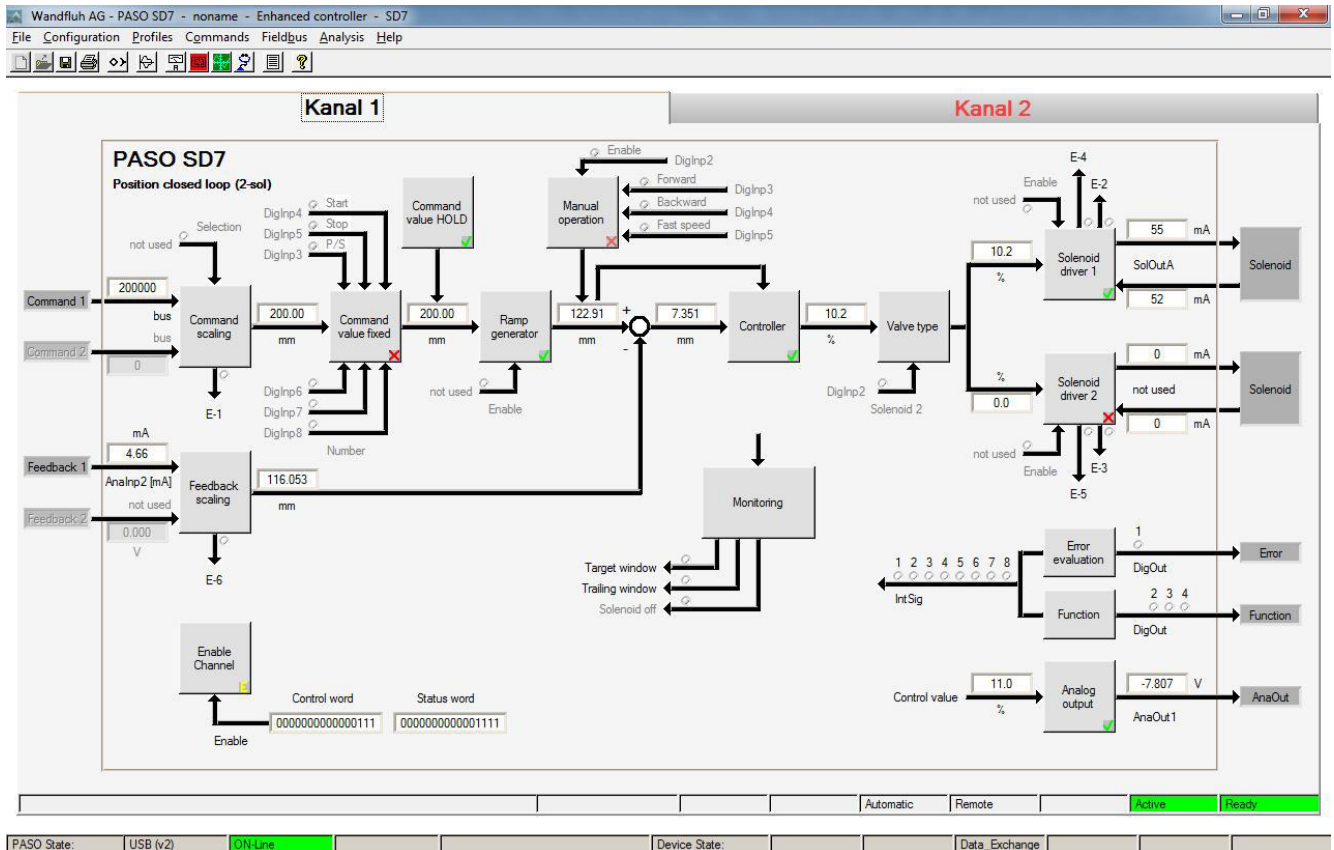
The parameterisation software PASO serves for the parameterising and diagnosing of all Electronic cards of the WANDFLUH AG company. The software provides a user interface, through which by means of a keyboard or a mouse all adjustments and settings can easily be carried out. The communication with the digital card takes place through a USB-interface. The PASO software can be downloaded via the Internet free of charge (www.wandfluh.com/downloads/software).

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The following parameters must be set on the Wandfluh DP-Slave before the first start:

Bus Node Address

Each Slave in the Profibus DP network has its one address. The adjusted address must correspond to the settings on the DP-Master (refer to section "Establish a Profibus DP connection 15 ").

The Bus Node Address is set in the menu "Fieldbus - Info"
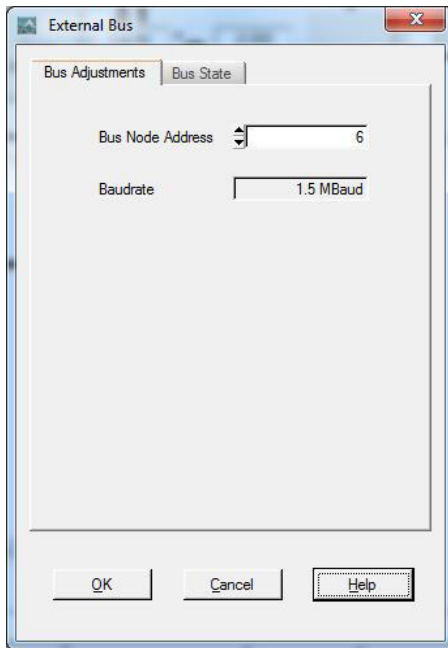
Telegram type

Normally, the DP-Master determines which telegram type is used. In this case, the selected telegram type on the DP-Slave will be overwritten.

However, there are simple DP-Master which send no configuration data to the DP-Slave. In this case, the desired telegram type must be adjusted on the DP-Slave.

The telegram types set in the menu "Fieldbus - Parameters".
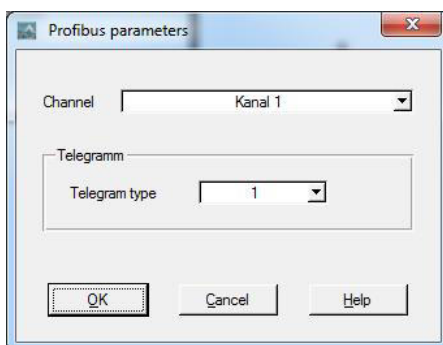
For more information about the telegram types please refer to section "Telegram selection 18 ".

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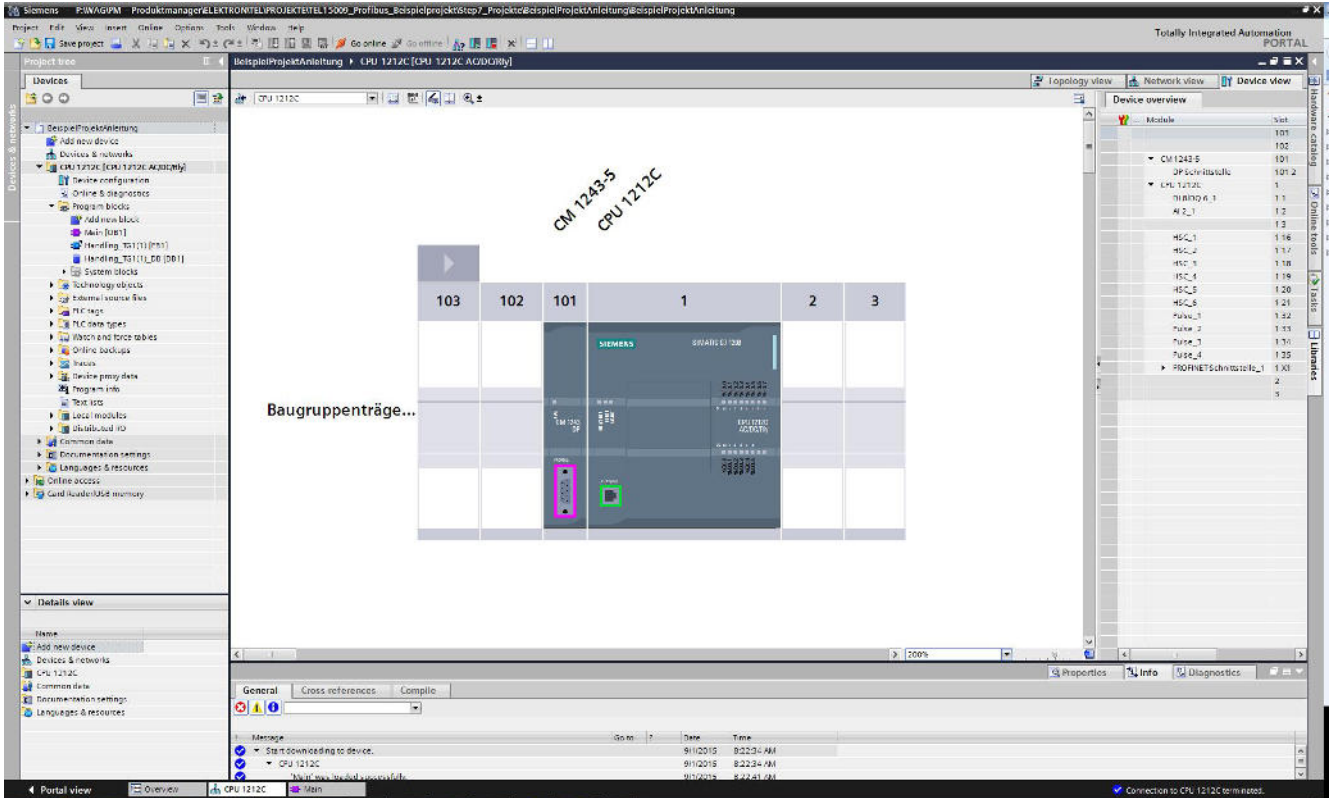
4 Configuration DP Master

4.1 Siemens device configuration

The used Siemens CPU (in the example CPU 1212C) must be configured in the Step 7.

In addition a Profibus DP communication module CM1243-5 must be present.
IMPORTANT: Because all Wandfluh Electronic cards with Profibus DP interface are slaves, a master communication module must be used!

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4.2 Insert Wandfluh DP-Slave

The Wandfluh DP slave is inserted via the corresponding GSD file. In the example the GSD file of the Wandfluh SD7 card is inserted.

The following step are necessary:

1. Download the corresponding GSD file at www.wandfluh.com/downloads/application

2. Open in the Step 7 the menu "Options - Manage general station description files (GSD)"

3. Select at "Source path" the previously downloaded GSD file and click to "Install"

4. Activate the view "Devices & networks" and activate on the right side (Taskcards) the selection "Hardware catalog"

5. At "Other field devices - PROFIBUS DP - PLC - Wandfluh AG - SD7 Electronic" the selection "SD7Electronic" appears
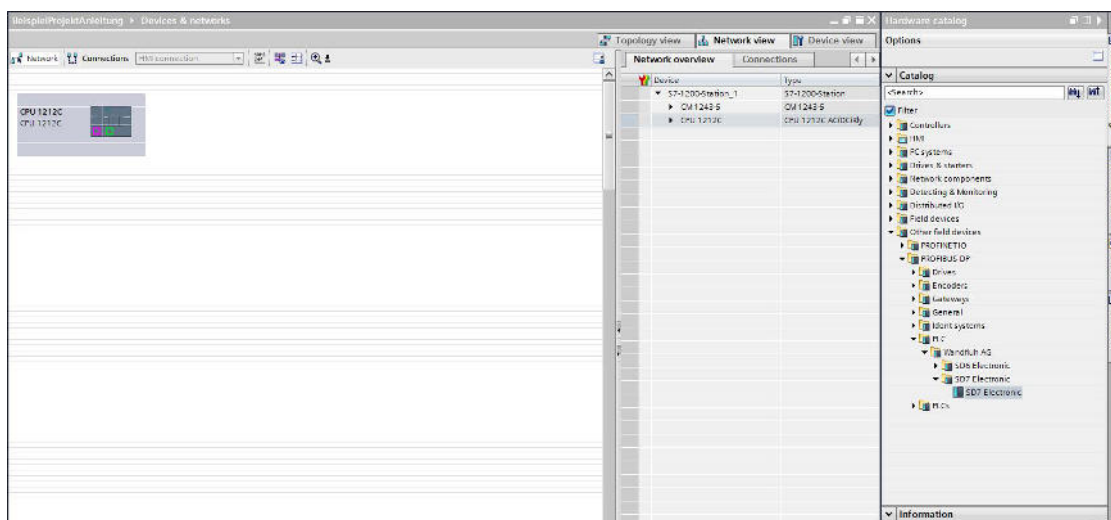
6. Click with the left mouse button on "SD7 Electronic", hold button and drag next to CPU
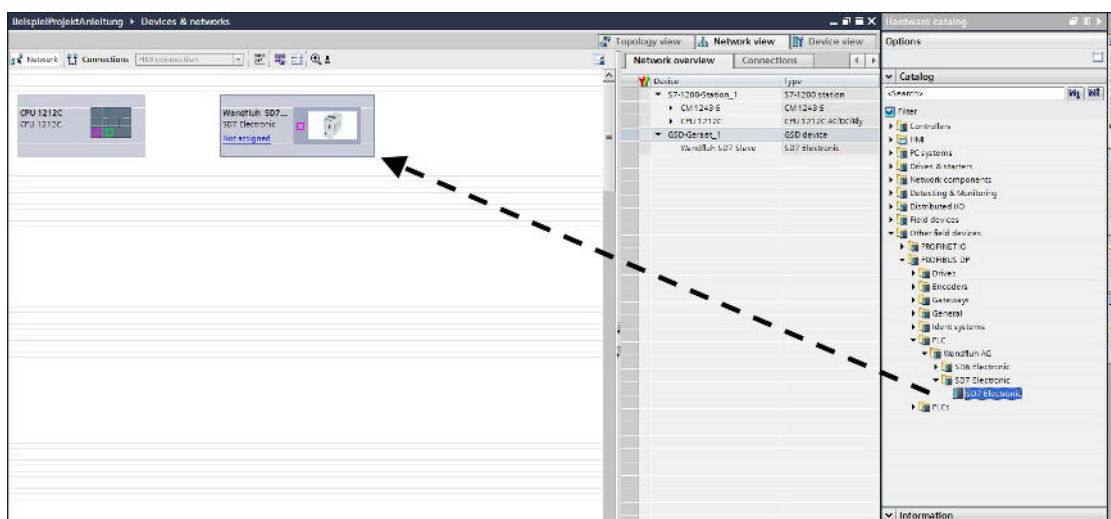
7. The Wandfluh DP-Slave is now inserted in the project

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4.3   Establish a Profibus DP connection

The inserted Wandfluh DP slave now needs to be connected to the Siemens DP-Master:

1. Click with the left mouse button on the Profibus DP interface from the Siemens DP-Master (red rectangle), hold button and drag to the Profibus DP interface from the Wandfluh DP-Slave (red rectangle)
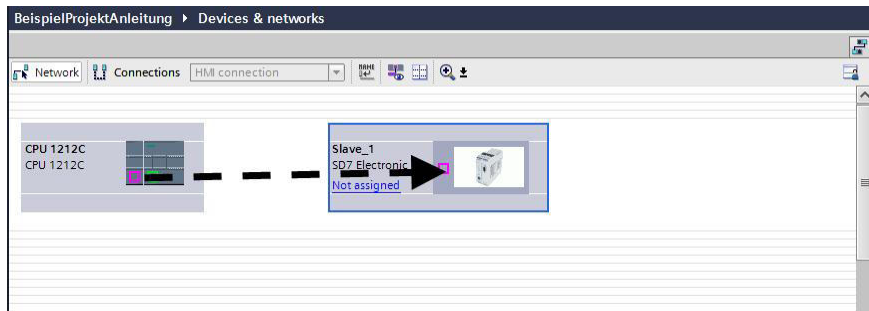
2. Alternatively the text "Not assigned" can be activated and then click to "Select master: CPU xxxx,CM1243-5.DP-Schnittstelle"
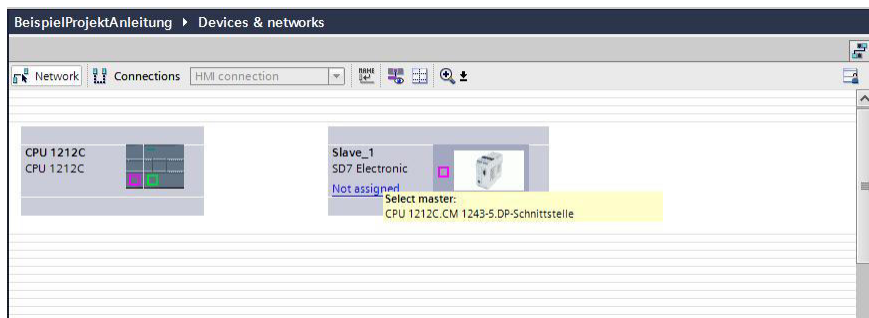
3. The created connection is displayed as follows:
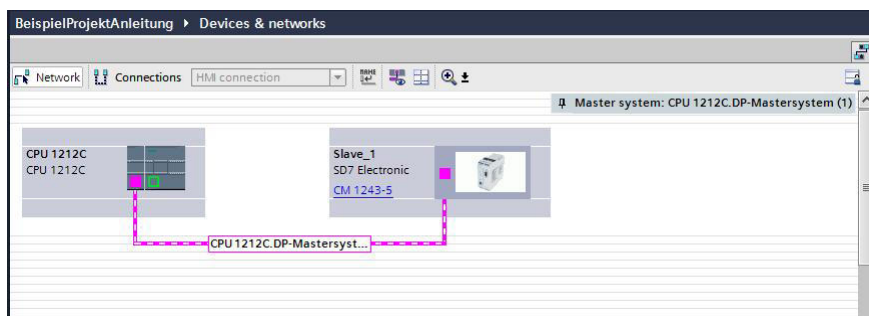
4. Click with the left mouse button on the connection (CPUxxx.DP-Mastersystem) and activate below (Inspector window) the selection "Properties" and "PROFIBUS"

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5. Select the desired transmission speed
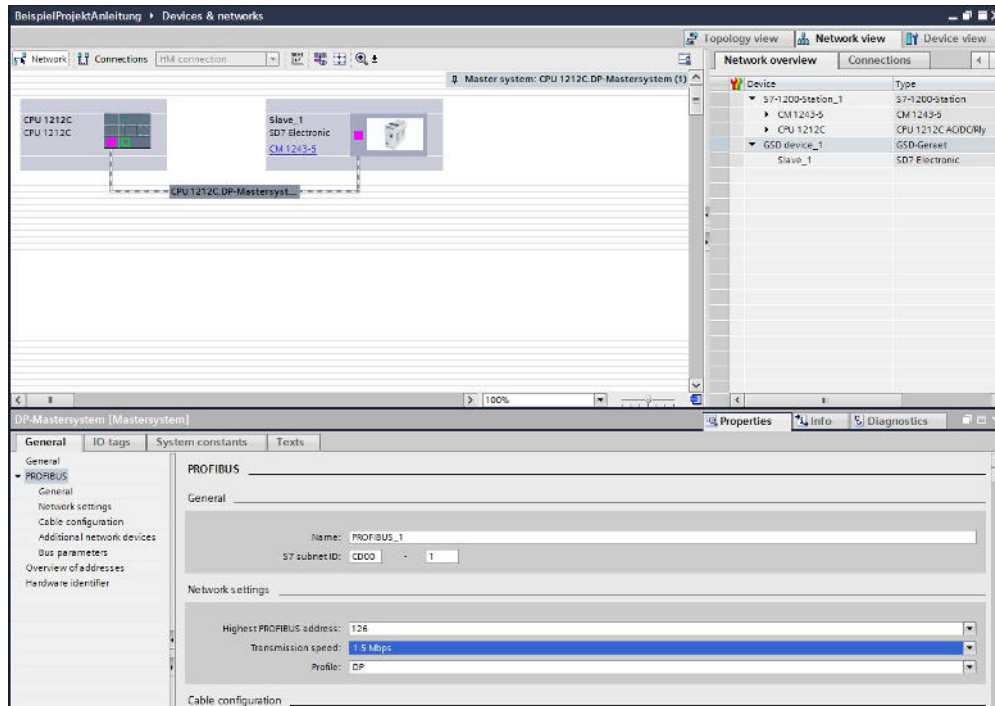
6. Click with the left mouse button on the Profibus DP interface from the Wandfluh DP-Slave (red rectangle) and activate below (Inspector window) the selection "Properties" and "PROFIBUS address"

7. Select the desired address.
   This address must also be set on the Wandfluh DP-Slave via PASO (refer to section "Preferences on the Wandfluh DP-Slave 11")
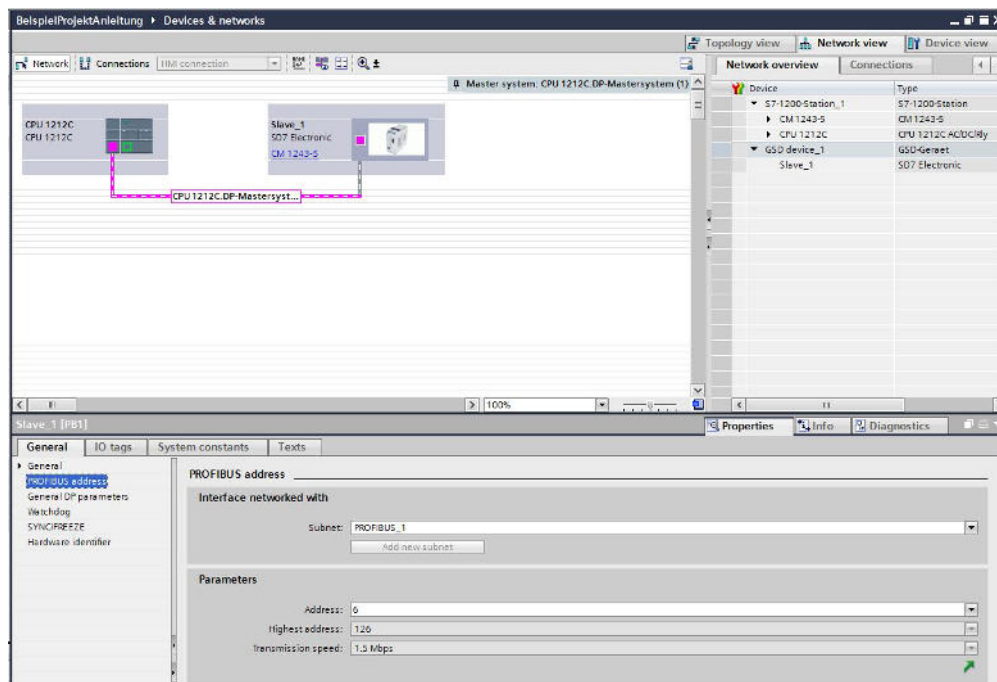
8. Activate below (Inspector window) the section "Watchdog"

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Postfach　　　　　　　Fax:+41 33 672 72 12　　　　　Internet: www.wandfluh.com　　　　　Editon 15 40
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9. Enable the watchdog if desired. If the watchdog is not enabled, the Wandfluh DP-Slave recognizes a missing Profibus DP connection not as an error (refer to section "Possible errors on the DP-Slave 48 ").

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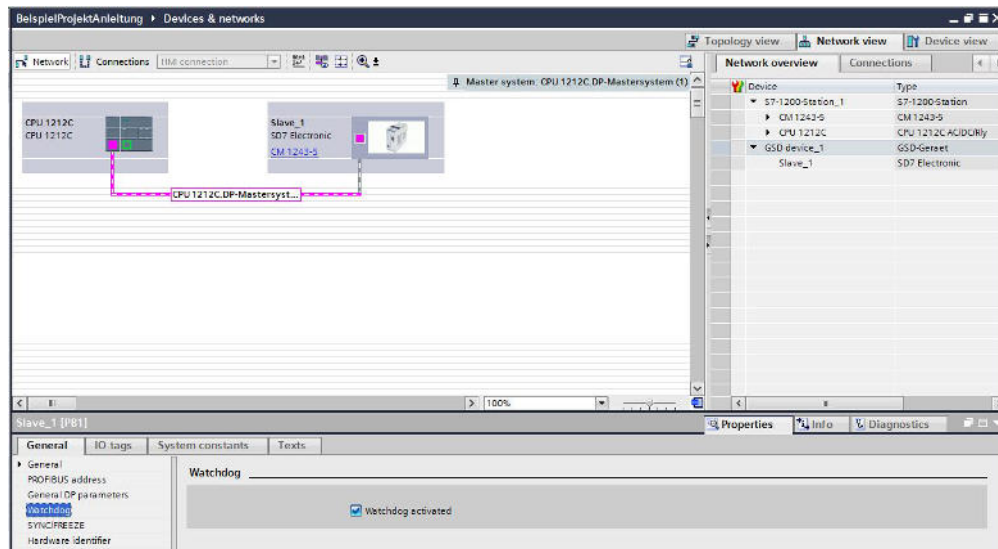
4.4 Telegram selection

The communication via Profibus DP is carried out by means of telegrams. For this, the telegram type must be defined. The information about the supported telegrams from the Wandfluh DP-Slave are included in the GSD file.

The telegram type is defined by

- card type (Amplifier / Controller)
- controller mode (e.g. pressure / flow / position - open loop / closed loop)
- with / without parameter channel PKW

The following telegram types are available on the Wandfluh DP-Slave:

- Data exchange **with** parameter channel
  with 4 words for parameters and 3 words for data exchange → telegram type 1

- Data exchange **without** parameter channel
  with 3 words for data exchange → telegram type 2

- Data exchange **with** parameter channel
  with 4 words for parameters and 2 words for data exchange → telegram type 3

- Data exchange **without** parameter channel
  with 2 words for data exchange → telegram type 4

- Data exchange **with** parameter channel
  with 4 words for parameters and 7 words for data exchange
  DP-Slave SD7) → telegram type 103 (only Wandfluh

- Data exchange **without** parameter channel
  with 7 words for data exchange
  DP-Slave SD7) → telegram type 101 (only Wandfluh

	Controller mode						
	1 (Spool valve open loop)	3 (Pressure/flow valve open loop)	4, -5 (Pressure/flow valve closed loop)	6 (Position open loop)	7 (Speed control closed loop)	9 (Position closed loop)	-6, -7, -8 (n-point controller)
Telegram type	3 / 4	3 / 4	3 / 4 / 101 / 103	1 / 2	1 / 2 / 101 / 103	1 / 2 / 101 / 103	1 / 2
Profibus Amplifier	selectable		not selectable				
Profibus Controller	selectable						

A detailed description of all telegrams is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section "Cyclical process data exchange (PZD)". This document can be downloaded at www.wandfluh.com/downloads/accompanying documents for electronics

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1. Double click in the network view on the Wandfluh DP-Slave. The device view appears
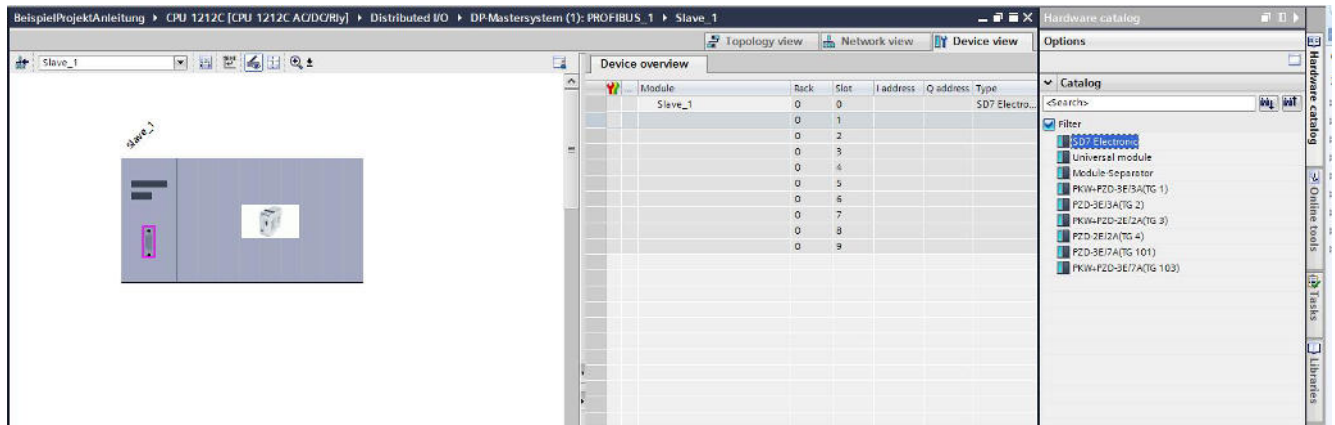
2. On the right side the telegram selection read from the GSD file appears..

3. Click with the left mouse button on the desired telegram type (in the example "PKW+PZD-3E/3A(TG1)", hold button and drag into the table "Device overview - Module". Make sure that there are no blank lines in the table.
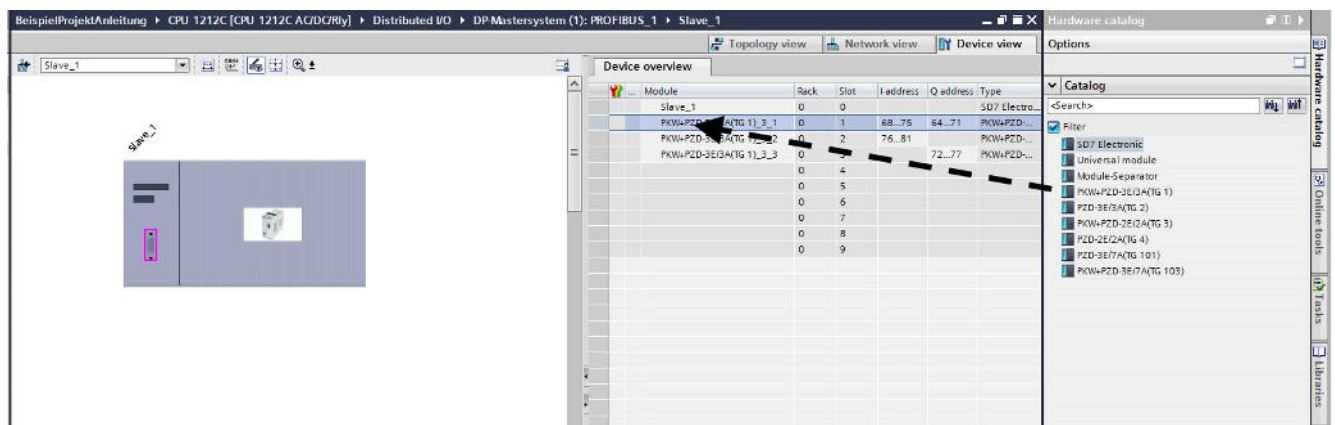
4. If you work with two channels on the Wandfluh DP-Slave, a separate telegram for each channel must be inserted. There can be separate telegram types for each channel. As a separation between the two telegrams, the "Module-Separator" must be inserted.

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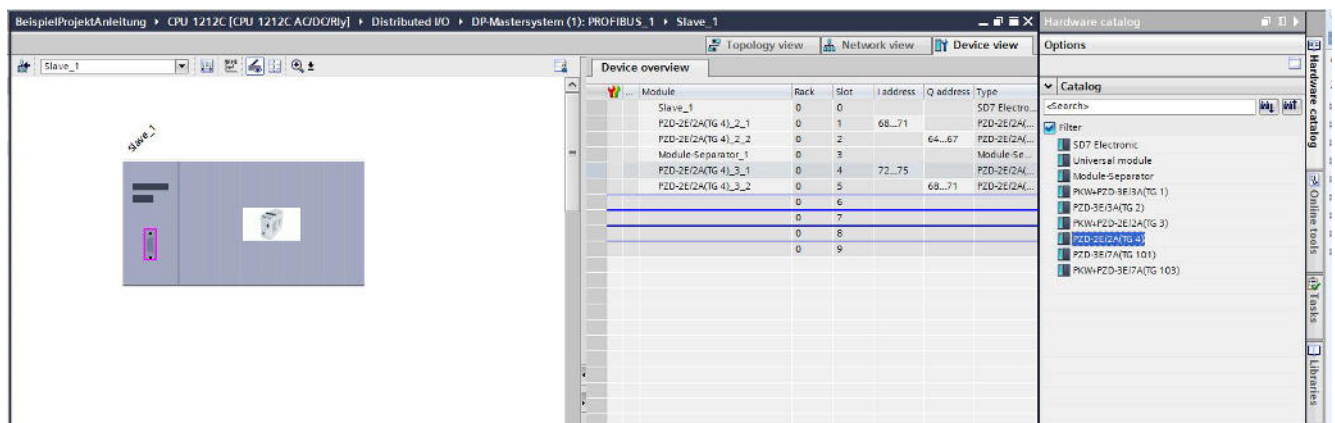
4.5 Load hardware configuration to the Siemens DP-Master

The set configuration must now be downloaded to the Siemens DP-Master.

1. Click on the left side (Project navigator) with the right mouse button on "CPI xxx" and select "Download to device - Hardware configuration"
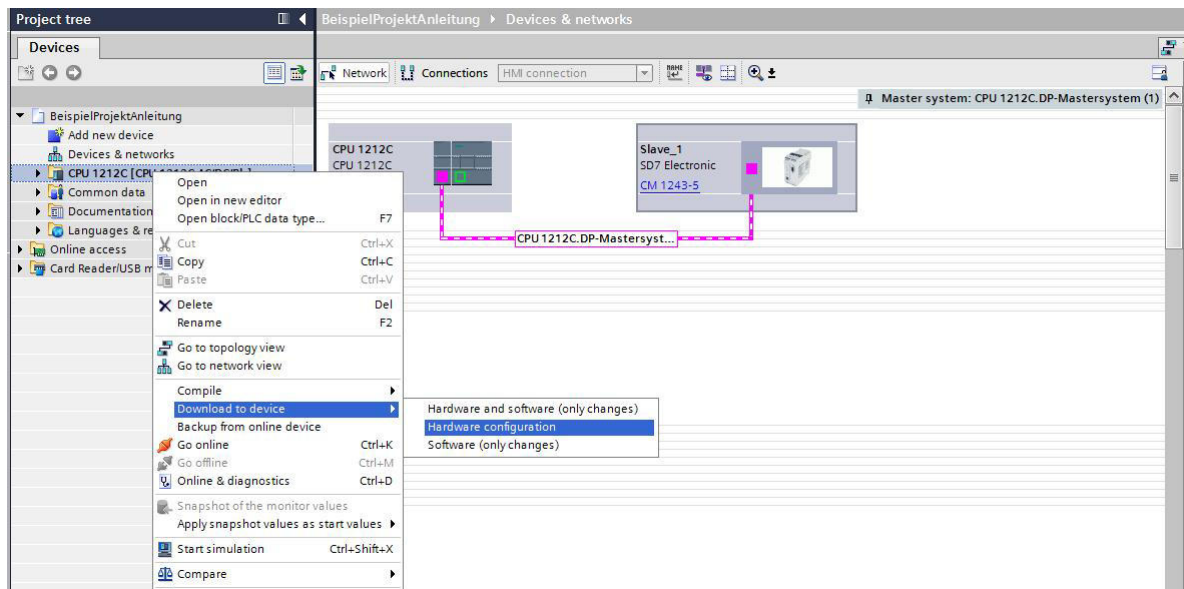
2. On the first connect to the Siemens DP-Master the following window appears:
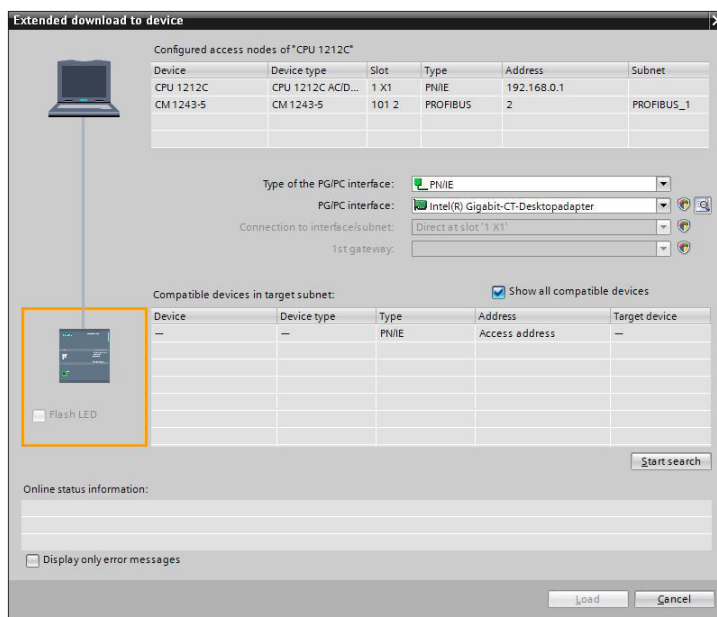
3. Click to "Start search" and then to "Load"

4. The following windows may look different depending on the state of the Siemens DP-Master (download first time, a program is already running, etc).

5. In the window "Load preview" the desired action can be selected. It is important that "Stop all" and "Download to device" is selected.
   ATTENTION: An already running program is stopped and overwritten!

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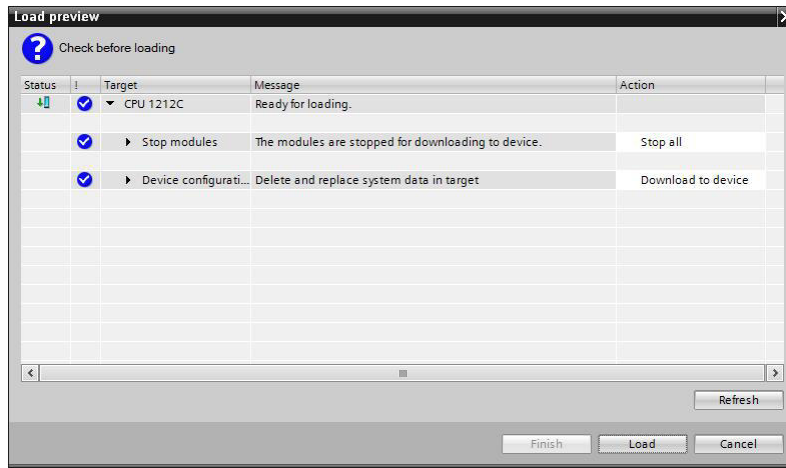
Click to "Load".

6. After successfully loading, the Siemens DP-Master must be started. It is important that "Start all" is selected. Click to "Finish".

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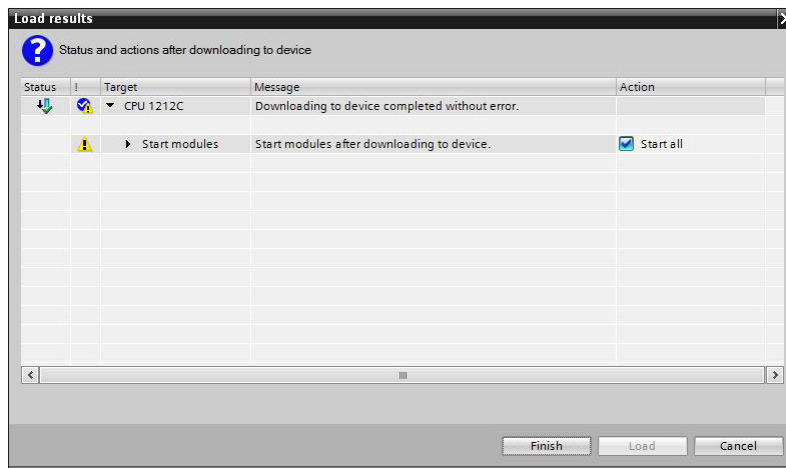
7. Now a green LED "RUN" should light on the Siemens DP-Master and the Wandfluh DP-Slave should be in the DP-State "Data Exchange" and in the TG-State "2" (TG-State 2 correspond to the number of the selected telegram). Select the menu item "Fieldbus - Info - Bus State" in the PASO for check this states.

External Bus

Bus Adjustments | Bus State

Bustype	Profibus-DP
ID-Number	0B8EH
WD-State	DP_Mode
DP-State	Data_Exchange
TG-State	2,-

OK   Cancel   Help

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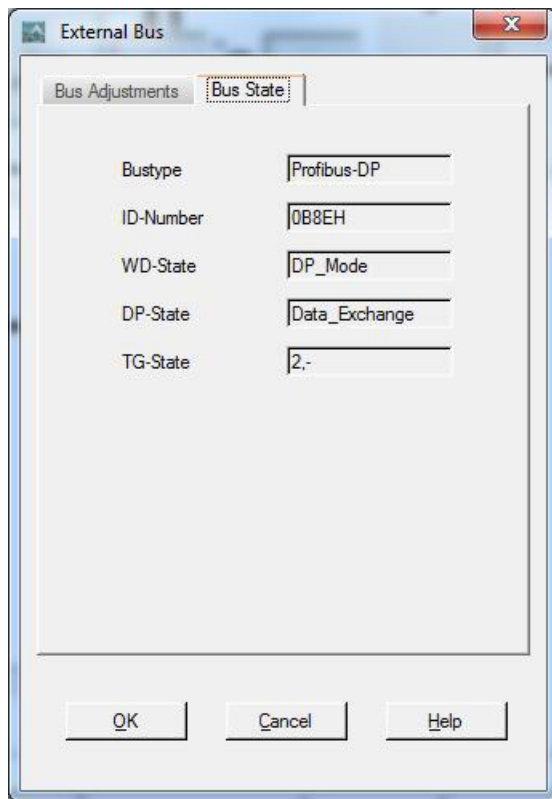
5 Using the Wandfluh program blocks

5.1 Introduction

This section describes the use of Wandfluh program blocks.

With these program blocks, the effort for programming the communication via the Profibus DP in Step 7 is limited to the call of the desired module with corresponding parameter transfer. The whole handling with the assignment to the right word in the telegram is made automatically in the program block. Also the conversion to the little-endian format (low-byte resp. low-word before high-byte resp. high-word) is made direct in the program block.

For each telegram type (refer to section "Telegram selection 18 ") has an own program block. In order to work with the program blocks, the global library "Wandfluh Profibus DP Step 7" must be integrated into the Step 7 project.

5.2 Insert the Wandfluh library

In order to work with the program blocks, the global library "Wandfluh Profibus DP Step 7" must be integrated into the Step 7 project.

The following step are necessary:

1. Download the Wandfluh library "Wandfluh Profibus DP Step 7" on www.wandfluh.com/downloads/application

2. Activate on the right side (Task cards) the selection "Libraries"

3. Click in the section "Global libraries" on "Open global library"

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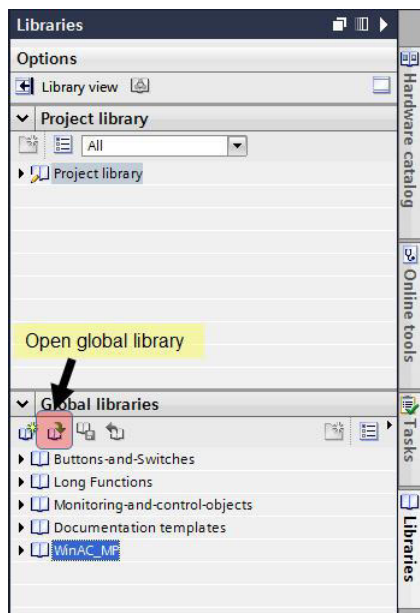
4. Select the previously downloaded library and click to "Open"
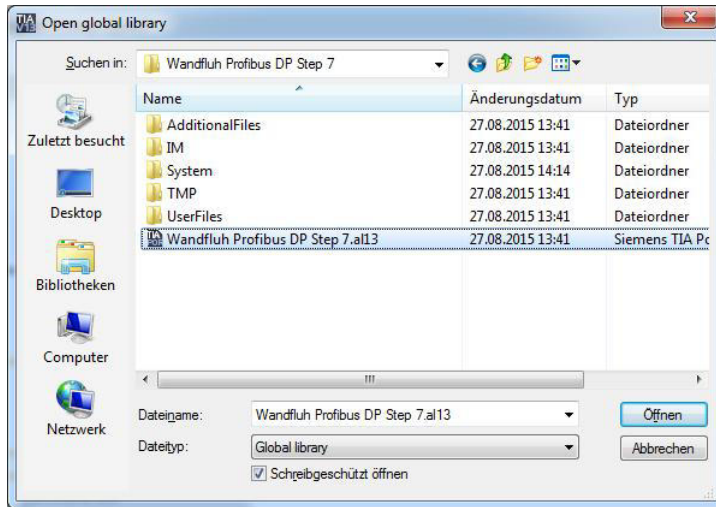
5. The Wandfluh library is now inserted and can be used

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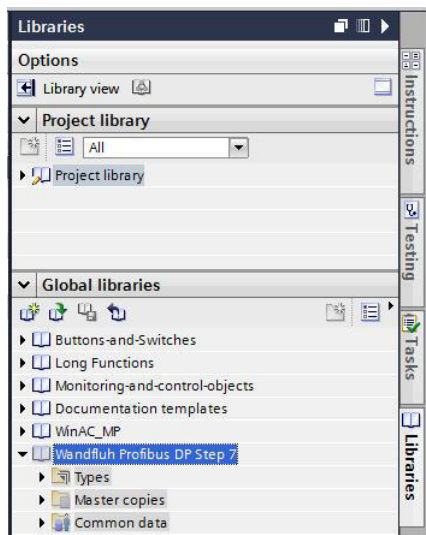
5.3 Wandfluh program blocks

5.3.1 Insert

The Wandfluh program block is inserted in the Step 7 project in the desired organization- or function block (e.g. Main [OB1])

The following step are necessary:

1. Open the view of the block where the Wandfluh program block should be inserted (in this example "Main [OB1]")
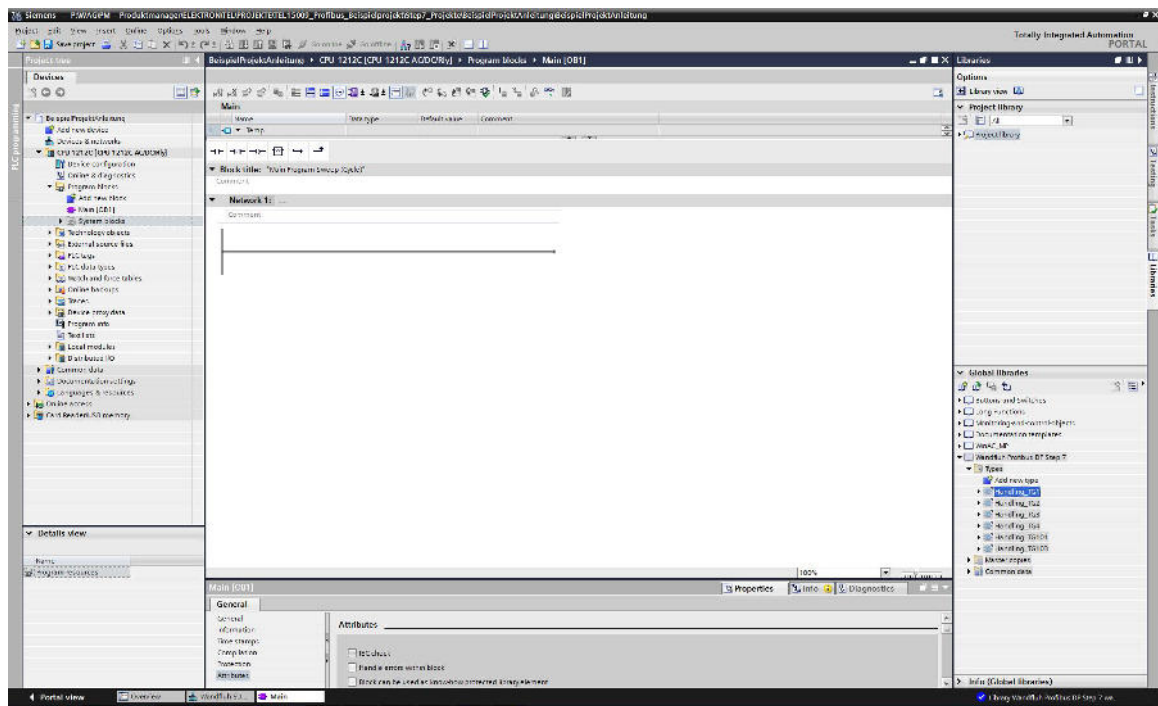
2. Click on the right side (Task cards) on the selection "Libraries"

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3. Click with the left mouse button on the desired Wandfluh program block, hold button and drag into the desired network (in the example "Network 1")

IMPORTANT:
The program block must correspond to the selected telegram type (refer to section "Telegram selection⌐18⌐").
In the example selected telegram type = "PKW+PZD-3E/3A(TG1)" => program block = "Handling_TG1"
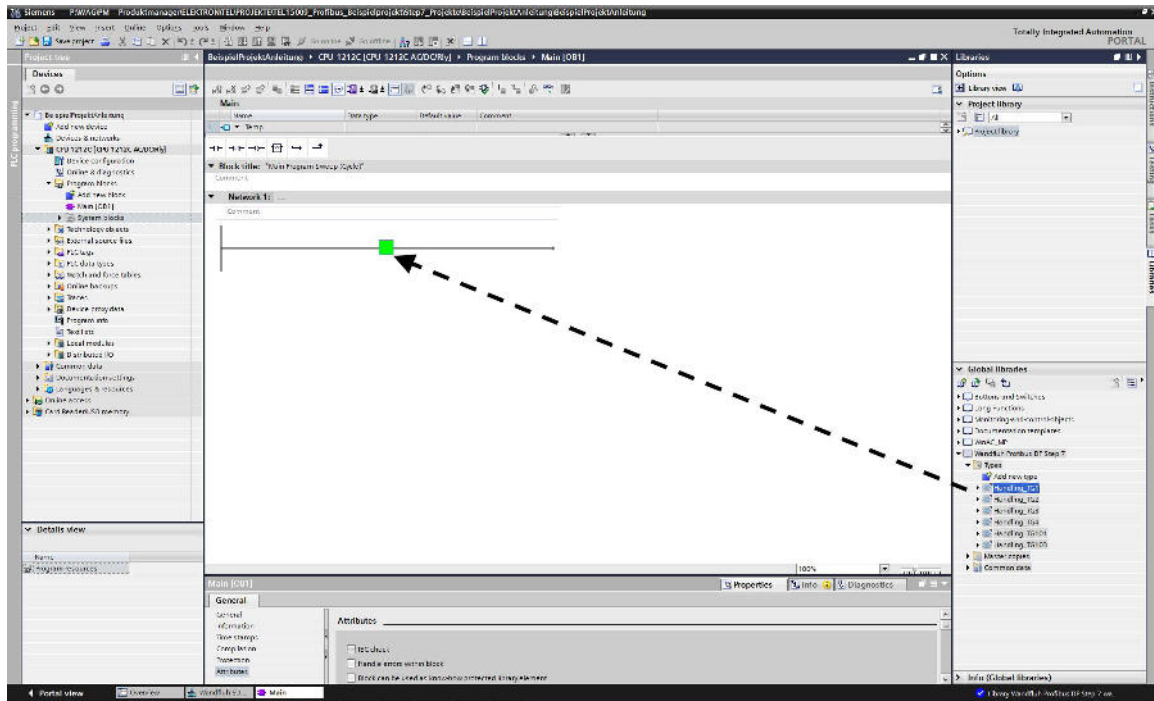
4. For each Wandfluh program block a corresponding data block is created. In this data block all transfer parameters are stored. Enter the name and click to OK.
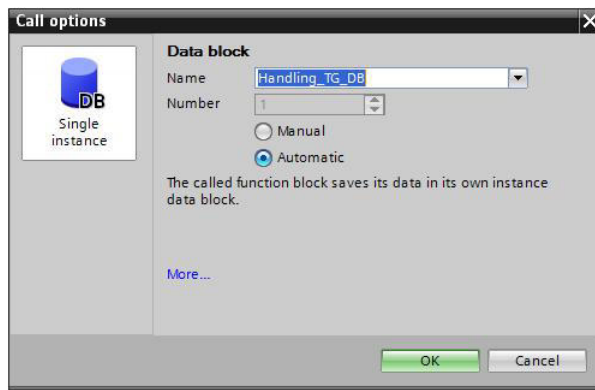
5. Several program blocks can be inserted. When working with two channels on the Wandfluh DP-Slave (two telegram types are inserted, refer to section "Telegram selection⌐18⌐") or several Wandfluh DP-Slaves are available, it is mandatory to insert a program block for each channel or Slave. Each program block has his own data block.

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6. The Wandfluh program block is now inserted and can be used. The transfer parameters must be passed resp. analysed in accordance with the user program. The values must be entered in normal format. The conversion to the little-endian format (low-byte resp. low-word before high-byte resp. high-word) is made automatically in the program block.

For example, if the Wandfluh DP-Slave should be enabled, the control word must be written with the value 00007 (hex).

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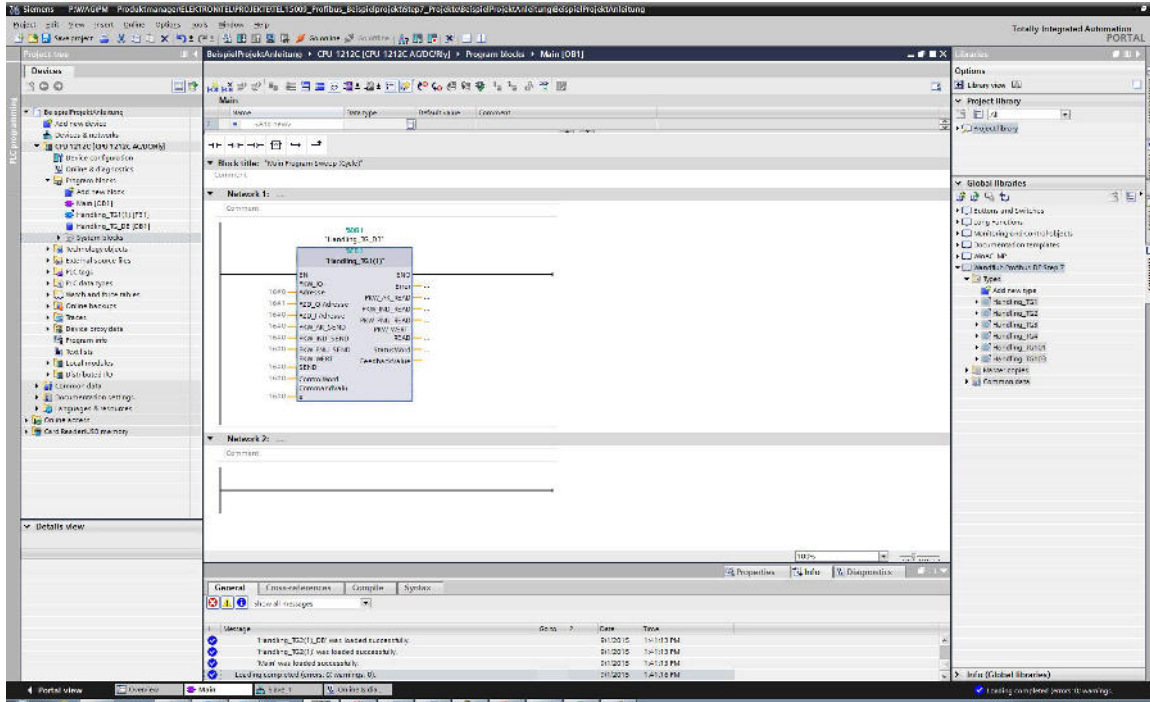
5.3.2 Transmission

All Wandfluh DP-Slaves communicate with the transmission protocol DPV0. With this protocol, all data are always transmitted cyclically. Thus, the Wandfluh program block sends or reads permanently data on or from the Profibus DP, even if the program block is called only once.
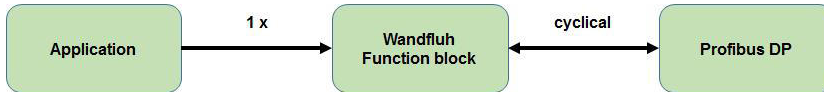
Thus the Wandfluh DP-Slave does not to have constantly update PKW data, the transfer parameter PKW_AK_SEND (refer to section "PKW_AK_SEND 38 ") should be set to 0 after a successful PKW transfer. With an AK value of 0, the Wandfluh DP-Slaves mirrored only the previous PKW values.

Thus, the following procedure is recommended for the PKW transfer:

1. First describe the block number (PKW_IND_SEND 38), parameter number (PKW_PNU_SEND 38) and parameter value (PKW_VALUE_SEND 38) of the desired parameter

2. Afterwards describe the instruction signature (PKW_AK_SEND 38) corresponding to the parameter

3. As soon as the program block returns the suitable response signature (PKW_AK_READ 41) as well as the read block number (PKW_IND_SEND 38) and parameter number (PKW_PNU_SEND 38) correspond to the sent values, the PKW transfer is successfully completed and the instruction signature (PKW_AK_SEND 38) should set to 0.

4. A detailed description about the instruction and response signature is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section " Cyclical parameter data exchange (PKW)".

5. Example: Parameter Imin should be written with 150mA:

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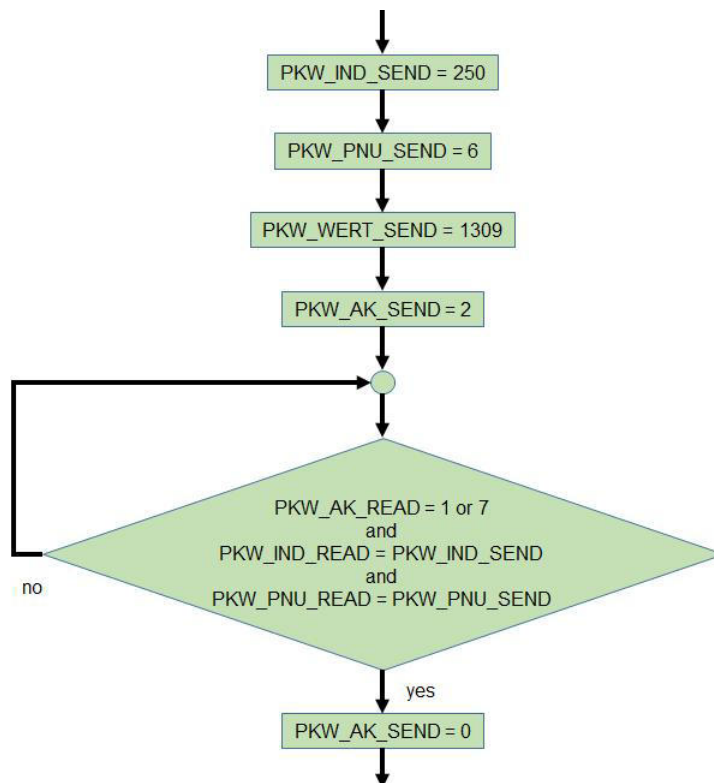
5.3.3   Handling_TG1

Communication via standard telegram 1

Input parameter		Output parameter	
PKW_IO_Address [35]	HW_IO (Word)	Error [40]	Int
PZD_Q_Address [36]	HW_IO (Word)	PKW_AK_READ [41]	Byte
PZD_I_Address [37]	HW_IO (Word)	PKW_IND_READ [41]	Byte
PKW_AK_SEND [38]	Byte	PKW_PNU_READ [41]	Byte
PKW_IND_SEND [38]	Byte	PKW_VALUE_READ [41]	DWord
PKW_PNU_SEND [38]	Byte	StatusWord [42]	Word
PKW_VALUE_SEND [38]	DWord	FeedbackValue [42]	DWord
ControlWord [39]	Word		
CommandValue [39]	DWord		

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5.3.4 Handling_TG2

Communication via standard telegram 2

Input parameter		Output parameter	
PZD_Q_Address [36]	HW_IO (Word)	Error [40]	Int
PZD_I_Address [37]	HW_IO (Word)	StatusWord [42]	Word
ControlWord [39]	Word	FeedbackValue [42]	DWord
CommandValue [39]	DWord		

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5.3.5 Handling_TG3

Communication via standard telegram 3

Input parameter			Output parameter		
PKW_IO_Address [35]	HW_IO (Word)		Error [40]		Int
PZD_Q_Address [36]	HW_IO (Word)		PKW_AK_READ [41]		Byte
PZD_I_Address [37]	HW_IO (Word)		PKW_IND_READ [41]		Byte
PKW_AK_SEND [38]	Byte		PKW_PNU_READ [41]		Byte
PKW_IND_SEND [38]	Byte		PKW_VALUE_READ [41]		DWord
PKW_PNU_SEND [38]	Byte		StatusWord [42]		Word
PKW_VALUE_SEND [38]	DWord		FeedbackValue [42]		Word
ControlWord [39]	Word				
CommandValue [39]	Word				

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5.3.6 Handling_TG4

Communication via standard telegram 4
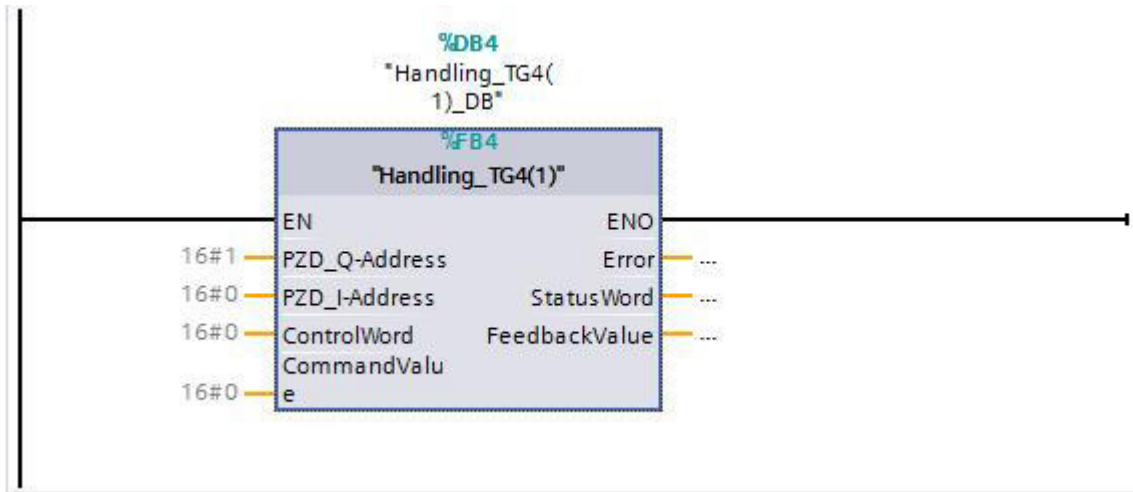
Input parameter		Output parameter	
PZD_Q_Address 36	HW_IO (Word)	Error 40	Int
PZD_I_Address 37	HW_IO (Word)	StatusWord 42	Word
ControlWord 39	Word	FeedbackValue 42	Word
CommandValue 39	Word		

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5.3.7 Handling_TG103

Communication via device telegram 103

Input parameter		Output parameter	
PKW_IO_Address [35]	HW_IO (Word)	Error [40]	Int
PZD_Q_Address [36]	HW_IO (Word)	PKW_AK_READ [41]	Byte
PZD_I_Address [37]	HW_IO (Word)	PKW_IND_READ [41]	Byte
PKW_AK_SEND [38]	Byte	PKW_PNU_READ [41]	Byte
PKW_IND_SEND [38]	Byte	PKW_VALUE_READ [41]	DWord
PKW_PNU_SEND [38]	Byte	StatusWord [42]	Word
PKW_VALUE_SEND [38]	DWord	FeedbackValue [42]	DWord
ControlWord [39]	Word		
CommandValue [39]	DWord		
Velocity [39]	DWord		
Acceleration [39]	Word		
Decelration [40]	Word		

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5.3.8   Handling_TG101
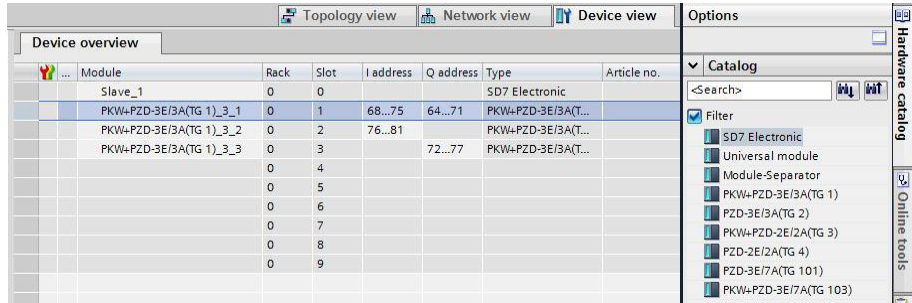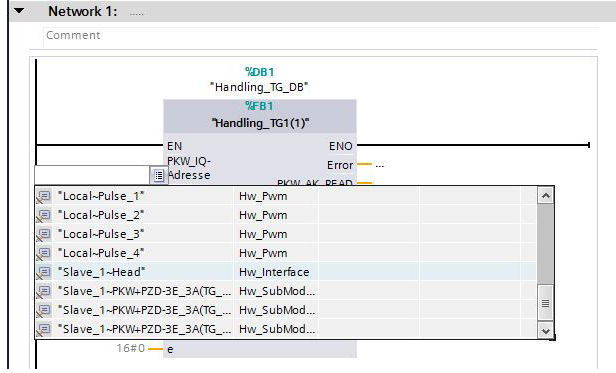
Communication via device telegram 101
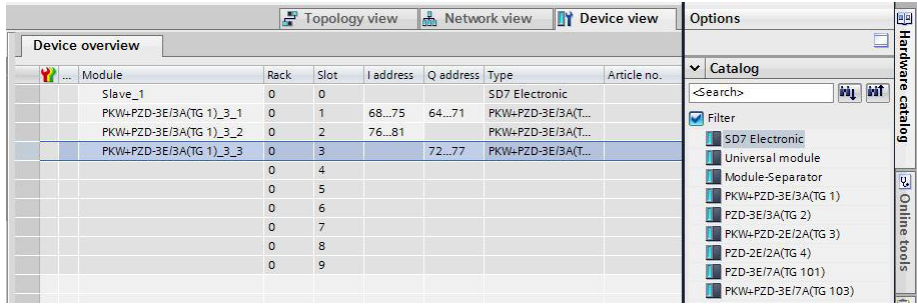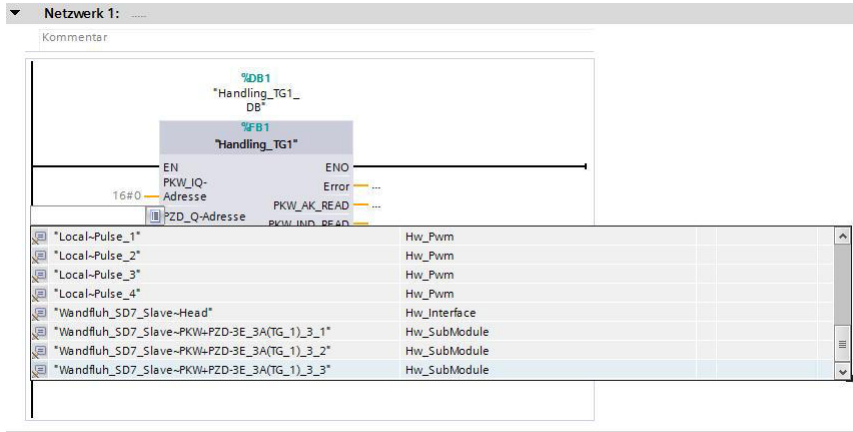
Input parameter		Output parameter	
PZD_Q_Address [36]	HW_IO (Word)	Error [40]	Int
PZD_I_Address [37]	HW_IO (Word)	StatusWord [42]	Word
ControlWord [39]	Word	FeedbackValue [42]	DWord
CommandValue [39]	DWord		
Velocity [39]	DWord		
Acceleration [39]	Word		
Decelration [40]	Word		

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5.3.9 Transfer parameter
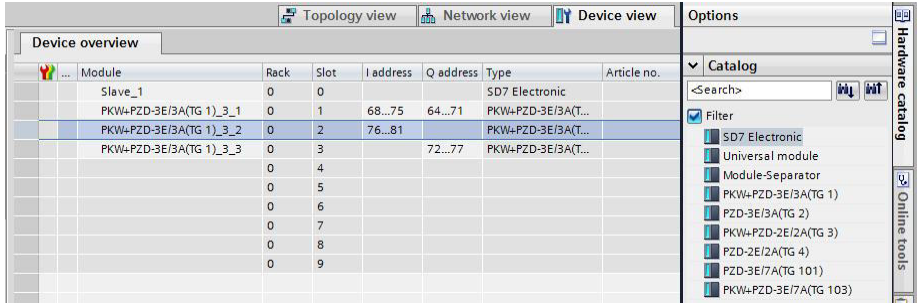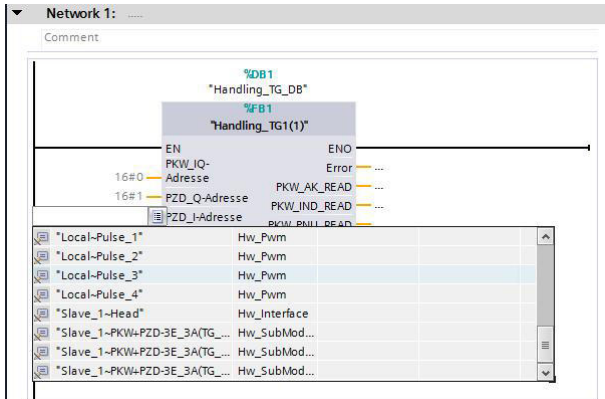
5.3.9.1 PKW_IQ_Address

Type:	Input
Data type:	HW_IO (Word)
Program blocks:	Handling_TG1, Handling_TG3, Handling_TG103
Description:	Corresponds to the start address from the PKW range of the selected telegram type.
	The PKW range corresponds to the first row in the table "Device overview - Device view - Module"
	To insert click with the left mouse button on the left side of "PKW_IQ_Address" and select the right selection (in the example "Wandfluh_SD7_Slave~PKW+PZD-3E-3A(TG1)_3_**1**")

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5.3.9.2 PZD_Q_Address

Type:	Input
Data type:	HW_IO (Word)
Program blocks:	all
Description:	Corresponds to the start address from the PZD output range (Q address) of the selected telegram type. The PZD output range correspond to the third row in the table "Device overview - Device view - Module" To insert click with the left mouse button on the left side of "PZD_Q_Address" and select the right selection (in the example "Wandfluh_SD7_Slave~PKW+PZD-3E-3A(TG1)_3_**3**")

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5.3.9.3 PZD_I_Address

Type:	Input
Data type:	HW_IO (Word)
Program blocks:	all
Description:	Corresponds to the start address from the PZD input range of the selected telegram type. The PZD input range corresponds to the second row in the table "Device overview - Device view - Module" To insert click with the left mouse button on the left side of "PKW_I_Address" and select the right selection (in the example "Wandfluh_SD7_Slave~PKW+PZD-3E-3A(TG1)_3_**2**")

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5.3.9.4 PKW_AK_SEND

Type:	Input (value is sent to the Wandfluh DP-Slave)
Data type:	Byte
Program blocks:	Handling_TG1, Handling_TG3, Handling_TG103
Description:	Corresponds to the AK (instruction signature) of the PKW. A detailed description about the PKW is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section " Cyclical parameter data exchange (PKW)".

5.3.9.5 PKW_IND_SEND

Type:	Input (value is sent to the Wandfluh DP-Slave)
Data type:	Byte
Program blocks:	Handling_TG1, Handling_TG3, Handling_TG103
Description:	Corresponds to the IND (block number) of the PKW. A detailed description about the PKW is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section " Cyclical parameter data exchange (PKW)".

5.3.9.6 PKW_PNU_SEND

Type:	Input (value is sent to the Wandfluh DP-Slave)
Data type:	Byte
Program blocks:	Handling_TG1, Handling_TG3, Handling_TG103
Description:	Corresponds to the PNU (parameter number) of the PKW. A detailed description about the PKW is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section " Cyclical parameter data exchange (PKW)".

5.3.9.7 PKW_VALUE_SEND

Type:	Input (value is sent to the Wandfluh DP-Slave)
Data type:	DWord
Program blocks:	Handling_TG1, Handling_TG3, Handling_TG103
Description:	Corresponds to the PWE (parameter value) of the PKW. A detailed description about the PKW is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section " Cyclical parameter data exchange (PKW)".

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5.3.9.8   ControlWord

Type:	Input (value is sent to the Wandfluh DP-Slave)
Data type:	Word
Program blocks:	all
Description:	Corresponds to the control word of the PZD receive data.
	A detailed description about the PZD and the telegram types is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section "Cyclical process data exchange (PZD)".

5.3.9.9   CommandValue

Type:	Input (value is sent to the Wandfluh DP-Slave)
Data type:	DWord (Handling_TG1, Handling_TG1, Handling_TG103, Handling_TG2) Word (Handling_TG3, Handling_TG4)
Program blocks:	all
Description:	Corresponds to the command value of the PZD receive data.
	A detailed description about the PZD and the telegram types is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section "Cyclical process data exchange (PZD)".

5.3.9.10   Velocity

Type:	Input (value is sent to the Wandfluh DP-Slave)
Data type:	DWord
Program blocks:	Handling_TG103, Handling_TG101
Description:	Corresponds to the velocity of the PZD receive data.
	A detailed description about the PZD and the telegram types is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section "Cyclical process data exchange (PZD)".

5.3.9.11   Acceleration

Type:	Input (value is sent to the Wandfluh DP-Slave)
Data type:	Word
Program blocks:	Handling_TG103, Handling_TG101
Description:	Corresponds to the acceleration of the PZD receive data.
	A detailed description about the PZD and the telegram types is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section "Cyclical process data exchange (PZD)".

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5.3.9.12 Deceleration

Type:	Input (value is sent to the Wandfluh DP-Slave)
Data type:	Word
Program blocks:	Handling_TG103, Handling_TG101
Description:	Corresponds to the deceleration of the PZD receive data. A detailed description about the PZD and the telegram types is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section "Cyclical process data exchange (PZD)".

5.3.9.13 Error

Type:	Output
Data type:	Int
Program blocks:	all
Description:	Error code

Following errors can occur:

0000	no error
8090	Following cases are possible: • for the specified logical base address no module is configured • the restriction on the length of consistent data was ignored • the start address (PKW_IQ_Address, PZD_Q_Address or PZD_I_Address) has not been entered in hex format
8093	There is no Profibus DP module available with the start address (PKW_IQ_Address, PZD_Q_Address or PZD_I_Address)
80A0	When accessing the I/O devices, an access error was detected (Error while reading)
80A1	When accessing the I/O devices, an access error was detected (Error while sending)
80B0	Wandfluh DP-Slave failure
80C0	The data have not been read by the DP-Slave (error only when reading)
80C1	The data have not been sent to the DP-Slave (error only when sending)

For more details about the errors, please refer to the documentation for the Siemens Step 7.

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5.3.9.14 PKW_AK_READ

Type:	Output (value is read from the Wandfluh DP-Slave)
Data type:	Byte
Program blocks:	Handling_TG1, Handling_TG3, Handling_TG103
Description:	Corresponds to the AK (response signature) of the PKW. A detailed description about the PKW is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section " Cyclical parameter data exchange (PKW)".

5.3.9.15 PKW_IND_READ

Type:	Output (value is read from the Wandfluh DP-Slave)
Data type:	Byte
Program blocks:	Handling_TG1, Handling_TG3, Handling_TG103
Description:	Corresponds to the IND (block number) of the PKW. A detailed description about the PKW is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section " Cyclical parameter data exchange (PKW)".

5.3.9.16 PKW_PNU_READ

Type:	Output (value is read from the Wandfluh DP-Slave)
Data type:	Byte
Program blocks:	Handling_TG1, Handling_TG3, Handling_TG103
Description:	Corresponds to the PNU (parameter number) of the PKW. A detailed description about the PKW is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section " Cyclical parameter data exchange (PKW)".

5.3.9.17 PKW_VALUE_READ

Type:	Output (value is read from the Wandfluh DP-Slave)
Data type:	DWord
Program blocks:	Handling_TG1, Handling_TG3, Handling_TG103
Description:	Corresponds to the PWE (parameter value) of the PKW. A detailed description about the PKW is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section " Cyclical parameter data exchange (PKW)".

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5.3.9.18 StatusWord

Type:	Output (value is read from the Wandfluh DP-Slave)
Data type:	Word
Program blocks:	all
Description:	Corresponds to the status word of the PZD transmit data.
	A detailed description about the PZD and the telegram types is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section "Cyclical process data exchange (PZD)".

5.3.9.19 FeedbackValue

Type:	Output (value is read from the Wandfluh DP-Slave)
Datatype:	DWord (Handling_TG1, Handling_TG1, Handling_TG103, Handling_TG2) Word (Handling_TG3, Handling_TG4)
Program blocks:	all
Description:	Corresponds to the feedback value of the PZD transmit data.
	A detailed description about the PZD and the telegram types is located in the document "XXX-PROFIBUS DP-Protocol" (XXX represents the corresponding Wandfluh card type) in the section "Cyclical process data exchange (PZD)".

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6 Error detection and diagnostics

6.1 Error indication on the DP Master

6.1.1 Introduction

On the Siemens DP-Master (in the example Siemens CPU 1212C) an existing error is displayed with a flashing red LED.
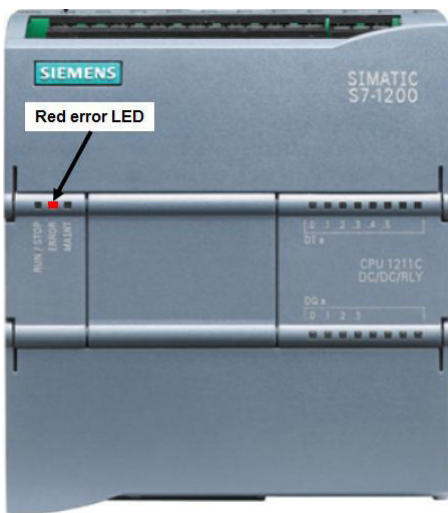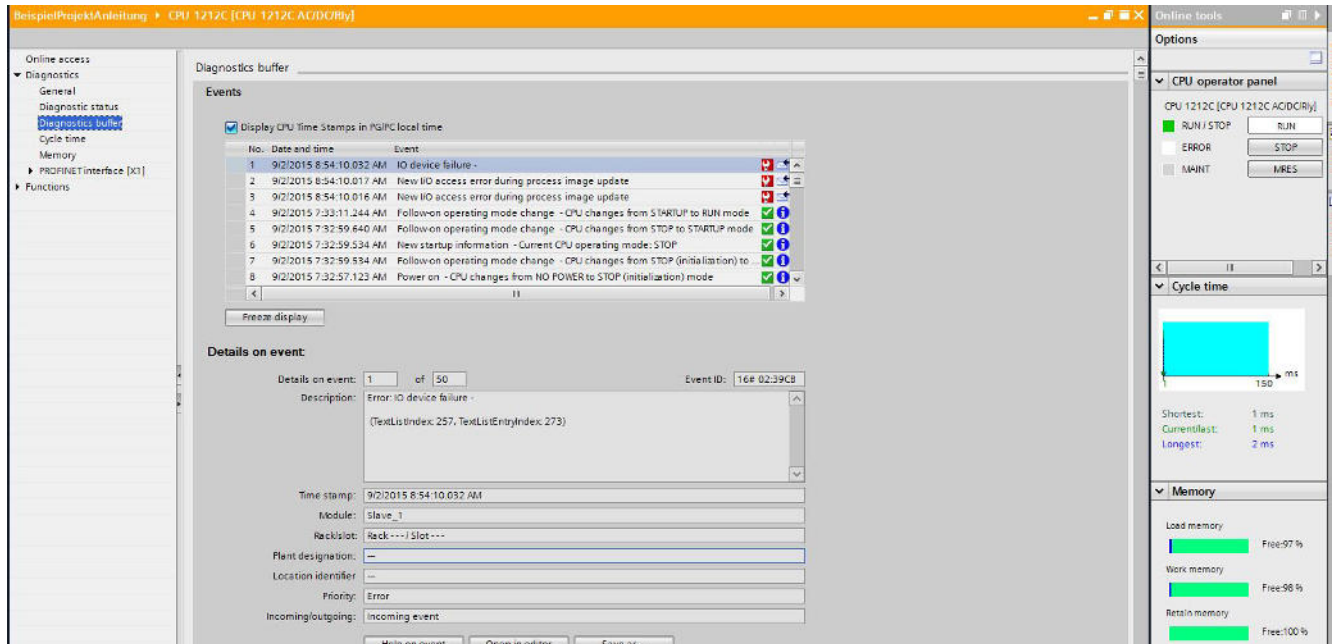
By means of the Step 7 software, the diagnostic buffer can be read out. The following steps are necessary:

1. Open the menu item "Online - Go online"

2. Change to the "Network view"

3. Double click on the diagnostics icon on the image of the Siemens DP-Master (in the example CPU 1212C)

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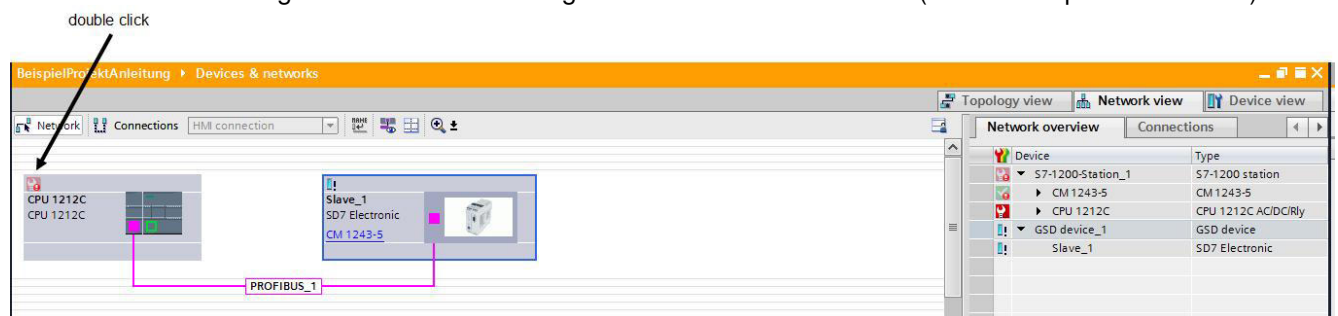
4. The diagnostics window appears. In the section "Diagnostic buffer" the details about the error can be displayed.

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6.1.2 Possible errors on the DP-Master

Wrong bus node address:

Error description:	**Details on event:** Details on event: 1 of 50 Event ID: 16# 02:39B4 Description: CPU error: New I/O access error during process image update output 72 (6 Bytes) will temporarily not be updated as part of process image PIP 0 PKW+PZD-3E/3A(TG 1)_3_3 Time stamp: 9/2/2015 9:06:11.876 AM Module: Slave_1 / PKW+PZD-3E/3A(TG 1)_3_3 Rack/slot: Rack 0 / Slot 3 Plant designation: — Location identifier: — Priority: Error Incoming/outgoing: Incoming event [Help on event] [Open in editor] [Save as...]
Possible causes:	The set node address on the Siemens DP-Master must correspond to the set node address on the Wandfluh DP-Slave. If the node address on the DP-Master is wrong, these error message appears.
Trouble shooting:	To fix the error, set the correct node address on the Siemens DP-Master (refer to section "Establish a Profibus DP connection 15").

Missing Profibus DP connection:

Error description:	**Details on event:** Details on event: 1 of 50 Event ID: 16# 02:39CB Description: Error: IO device failure - Slave_1 Time stamp: 9/2/2015 9:32:13.700 AM Module: Slave_1 Rack/slot: Rack - - - / Slot - - - Plant designation: — Location identifier: — Priority: Error Incoming/outgoing: Incoming event [Help on event] [Open in editor] [Save as...]
Possible causes:	If no or a faulty connection is available between the Siemens DP-Master and the Wandfluh DP-Slave, these error message appears
Trouble shooting:	To fix the error, the connection between the Siemens DP-Master and the Wandfluh DP-Slave must be checked (refer to section "Establish a Profibus DP connection 15").

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6.2 Error indication on the DP Slave

6.2.1 Introduction

On the Wandfluh DP-Slave SD7 an existing error is displayed with a flashing red LED (5x flashing) and the active digital out "Error".
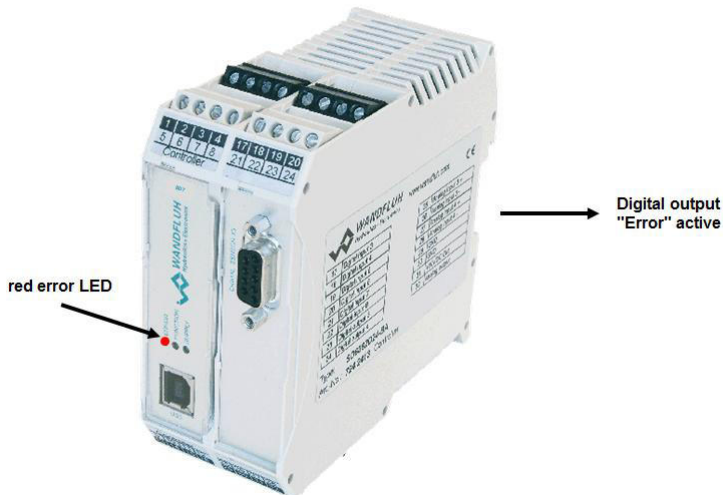
On the Wandfluh DP-Slave DSV an existing error is displayed with the active digital out "Error".
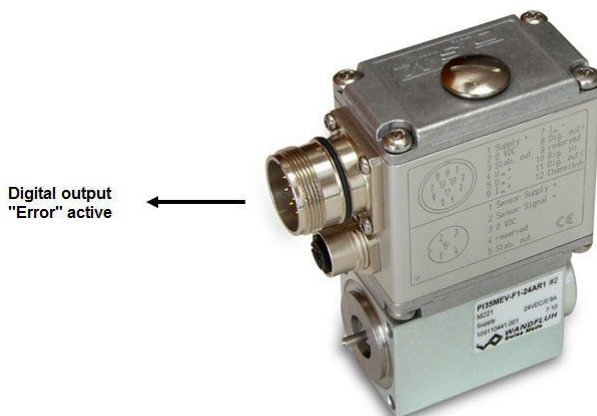
By means of the parameterisation software PASO, a detailed error description can be displayed. The following steps are necessary:

1. Open the menu item "Analysis - Diagnostics"

2. The diagnostics window with the corresponding error description appears

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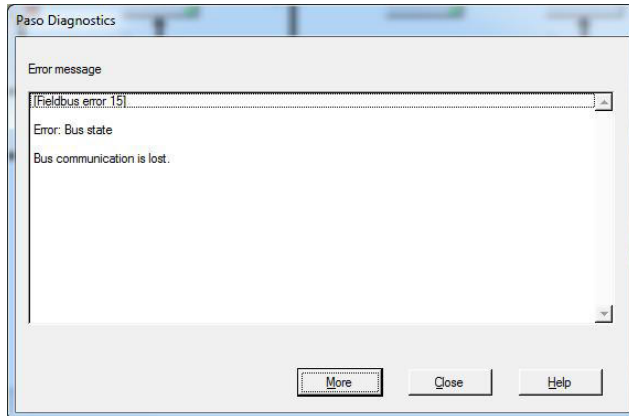
3. Furthermore with the menu item "Fieldbus - Info - Bus state" the current Profibus DP state can be displayed
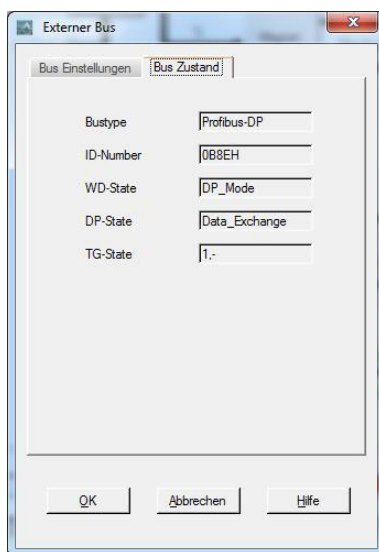
4. The following DP-states are possible:

Wait_Prm:
After the start-up, the Wandfluh DP-Slave is waiting for a parameter telegram. No data exchange is possible.
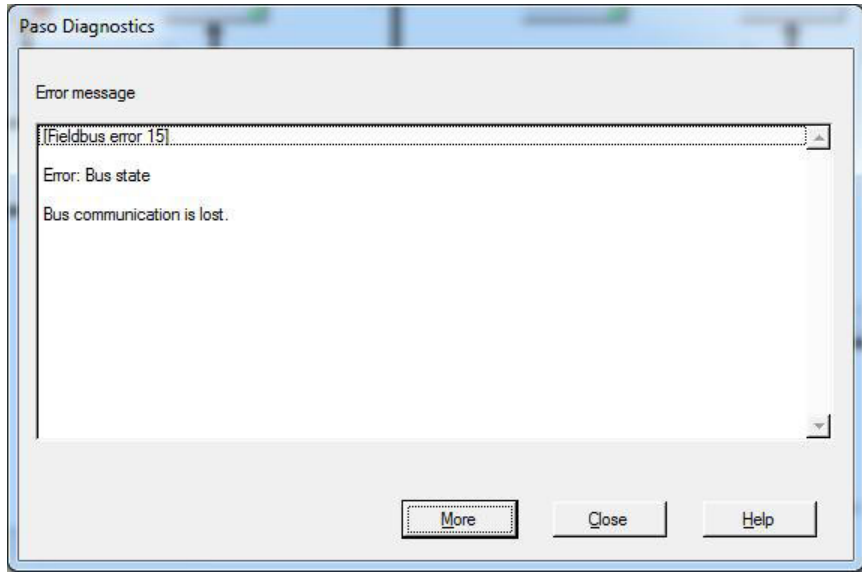
Wait_Cfg:
The Wandfluh DP-Slave is waiting for a configuration telegram. No data exchange is possible
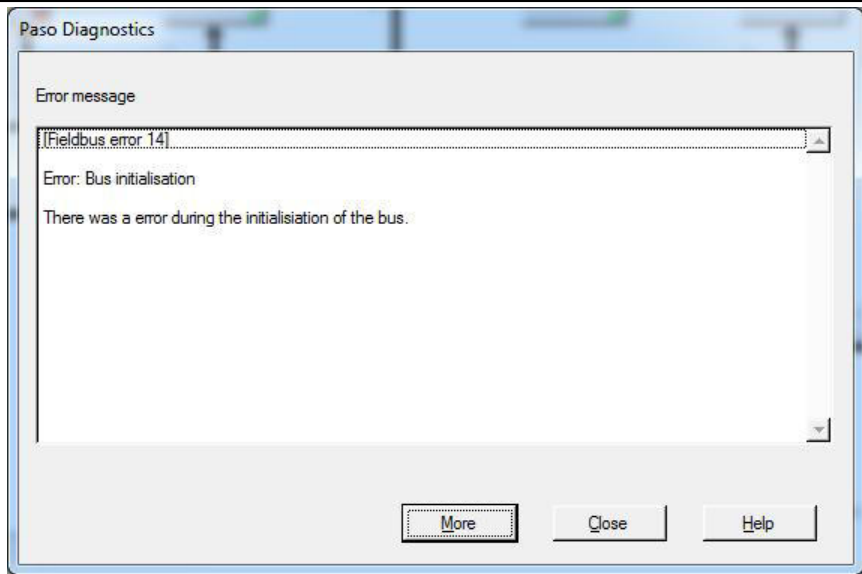
Data_Exchange:
The data exchange via the Profibus DP is enable and possible.

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6.2.2 Possible errors on the DP-Slave

Missing Profibus DP connection:

Error description:	
	This error can only be detected if the watchdog on the Siemens DP-Master is enabled (refer to section "Establish a Profibus DP connection 15 ").
Possible causes:	If no or a faulty connection is available between the Siemens DP-Master and the Wandfluh DP-Slave, these error message appears
Trouble shooting:	To fix the error, the connection between the Siemens DP-Master and the Wandfluh DP-Slave must be checked (refer to section "Establish a Profibus DP connection 15 ").

Bus initialisation error:

Error description:	
Possible causes:	The Profibus DP node on the Wandfluh DP-Slave cannot be started.
Trouble shooting:	This errorcan not be resolved by the user. Please contact sales@wandfluh.com

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6.3 Other errors

6.3.1 Introduction

If there is no error indicated neither on the Siemens DP-Master nor on the Wandfluh DP-Slave, the communication via the Profibus DP is correct. By means of the parameterisation software PASO the values sent by the DP-Master can be displayed. The following steps are necessary:

1. Open menu item "Analysis - Show values"

2. The values transmitted via the Profibus DP are displayed directly in the main window:
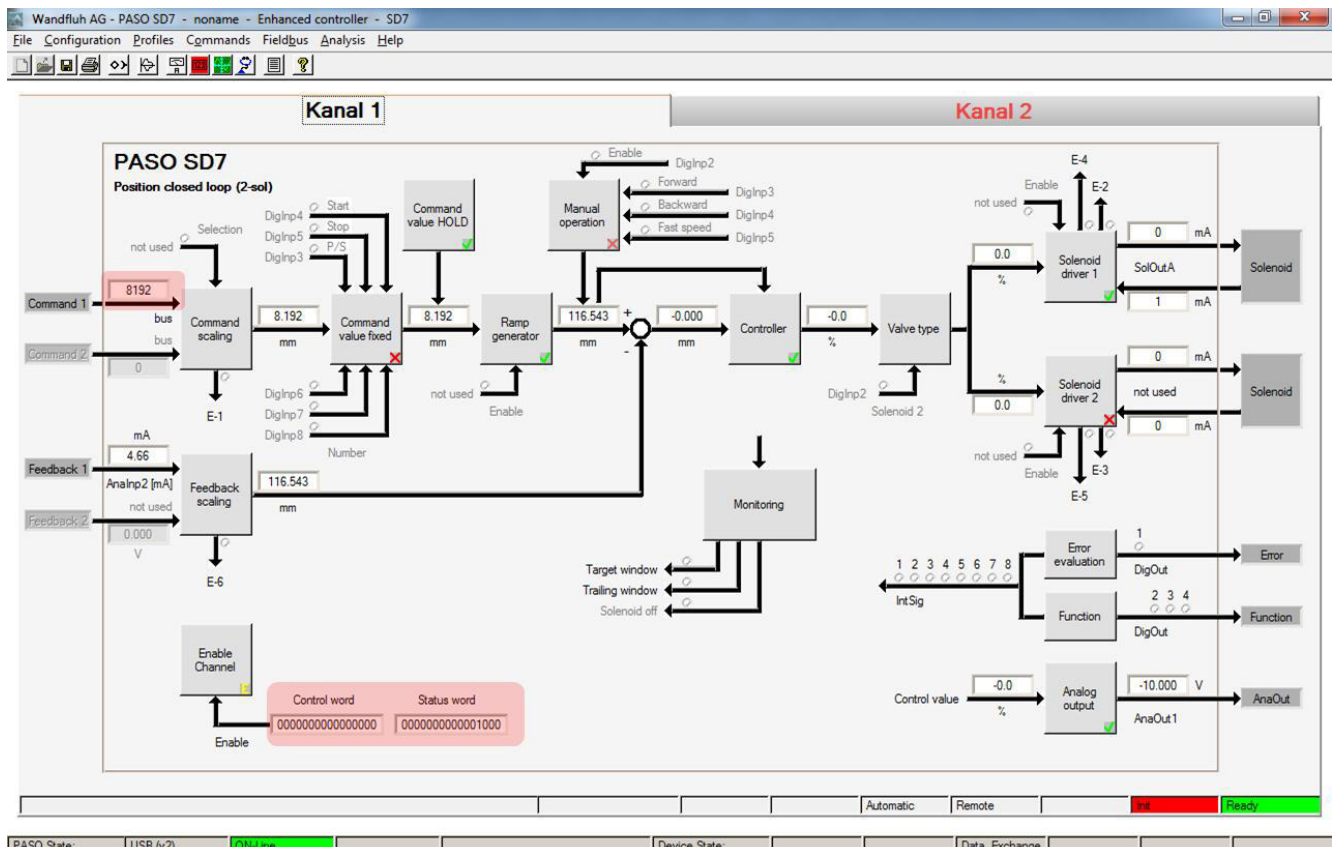
3. If in the Siemens DP-Master a command value from e.g. 8192 $_{(dez)}$ is entered, this value must be displayed in the PASO

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6.3.2 Possible errors

The data sent by the Siemens DP-Master do not arrive on the Wandfluh DP-slave:

Error description:	The data sent by the Siemens DP-Master are not displayed in the PASO
Possible causes:	The values pass to the Wandfluh program block are not correct
Trouble shooting:	Check the values that are passed to the Wandfluh program block. Double click in the Siemens Step 7 on the data block associated with program block (refer to section "Wandfluh program blocks - Insert 25 ") and open the menu item "Online - Go online":

		Handling_TG_DB								
		Name	Data type	Start value	Monitor value	Retain	Accessible f...	Visible in ...	Setpoint	Comment
1		▼ Input				☐	☐	☐	☐	
2		PKW_IQ-Adresse	HW_IO	16#0	16#0114	☐	☑	☑	☐	
3		PZD_Q-Adresse	HW_IO	16#1	16#0116	☐	☑	☑	☐	
4		PZD_I-Adresse	HW_IO	16#0	16#0115	☐	☑	☑	☐	
5		PKW_AK_SEND	Byte	16#0	16#00	☐	☑	☑	☐	
6		PKW_IND_SEND	Byte	16#0	16#00	☐	☑	☑	☐	
7		PKW_PNU_SEND	Byte	16#0	16#00	☐	☑	☑	☐	
8		PKW_WERT_SEND	DWord	16#0	16#0000_0000	☐	☑	☑	☐	
9		ControlWord	Word	16#0	16#0007	☐	☑	☑	☐	
10		CommandValue	DWord	16#0	16#0000_2000	☐	☑	☑	☐	
11		▼ Output				☐	☐	☐	☐	
12		Error	Int	0	0	☐	☑	☑	☐	
13		PKW_AK_READ	Byte	16#0	16#00	☐	☑	☑	☐	
14		PKW_IND_READ	Byte	16#0	16#00	☐	☑	☑	☐	
15		PKW_PNU_READ	Byte	16#0	16#00	☐	☑	☑	☐	
16		PKW_WERT_READ	DWord	16#0	16#0000_0000	☐	☑	☑	☐	
17		StatusWord	Word	16#0	16#000F	☐	☑	☑	☐	
18		FeedbackValue	DWord	16#0	16#0001_C73F	☐	☑	☑	☐	
19		InOut				☐	☐	☐	☐	
20		▼ Static				☐	☐	☐	☐	
21		Ret_Error	Int	0	0	☐	☐	☐	☐	

In the section "Input" all values passed to the Wandfluh program block are displayed.

important: The values must be displayed in normal format, this means LSB (Least Significant Bit) on the right side and MSB (Most Significant Bit) on the left side!

Example:

Activate the DP-Slave => control word = 0000 0000 0000 0111 (bin) => display = 0007 (hex)

Set command value to 8192 => command value = 8192 (dez) => display = 0000 2000 (hex)

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The data sent by the Siemens DP-Master do arrive on the Wandfluh DP-slave in a wrong way:

Error description:	The data sent by the Siemens DP-Master are displayed in the PASO in a wrong way
Possible causes:	The transfer does not take place in the little-endian format (Low-Byte resp. Low-Word before High-Byte resp. High-Word). The assignment to the bytes resp. words is wrong. When working with the Wandfluh program blocks, this error cannot occur.
Trouble shooting:	Open the data block with the word array of the read values resp. the word array with the sent values and open the menu item "Online - Go online". **When working with the Wandfluh program blocks, this word array cannot be opened!** The following pictures show the correct assignment to the bytes resp. words:

PKW write (Master => Slave) and read (Slave => Master)

	Name	Datentyp	Startwert	Beobachtungswert	Remanenz	Erreichbar a..	Sichtbar i...	Einstellwert
1	▼ Static				☐	☐	☐	☐
2	▼ WR_PKW	Array[0..3] o...			☐	☑	☑	☐
3	WR_PKW[0]	Word	16#0	16#0620	☐	☑	☑	☐
4	WR_PKW[1]	Word	16#0	16#00FA	☐	☑	☑	☐
5	WR_PKW[2]	Word	16#0	16#1D05	☐	☑	☑	☐
6	WR_PKW[3]	Word	16#0	16#0000	☐	☑	☑	☐

Write parameter Imin with 150mA:

AK = 2 $_{(dez)}$ and PNU = 6 $_{(dez)}$ = 2006 $_{(hex)}$ => display = 0620 $_{(hex)}$ (member 0)

IND = 250 $_{(dez)}$ = 00FA $_{(hex)}$ => display = 00FA $_{(hex)}$ (member 1)

value = 1309 $_{(dez)}$ = 051D $_{(hex)}$ => display = 1D05 $_{(hex)}$ (member 2) / 0000 $_{(hex)}$ (member 3)

PZD write (Master => Slave)

	Name	Datentyp	Startwert	Beobachtungswert	Remanenz	Erreichbar a..	Sichtbar i...	Einstellwert
1	▼ Static				☐	☐	☐	☐
2	▼ WR_Data	Array[0..2] o...			☐	☑	☑	☐
3	WR_Data[0]	Word	16#0	16#0700	☐	☑	☑	☐
4	WR_Data[1]	Word	16#0	16#0020	☐	☑	☑	☐
5	WR_Data[2]	Word	16#0	16#0000	☐	☑	☑	☐

Control word = Aktiv = 0007 $_{(hex)}$ => display = 0700 $_{(hex)}$ (member 0)

Command value = 8192 $_{(dez)}$ = 0000 0200 $_{(hex)}$ => display = 0020 $_{(hex)}$ (member 1) / 0000 $_{(hex)}$ (member 2)

PZD read (Slave => Master)

	Name	Datentyp	Startwert	Beobachtungswert	Remanenz	Erreichbar a..	Sichtbar i...	Einstellwert
1	▼ Static				☐	☐	☐	☐
2	▼ RD_Data	Array[0..2] o...			☐	☑	☑	☐
3	RD_Data[0]	Word	16#0	16#0F10	☐	☑	☑	☐
4	RD_Data[1]	Word	16#0	16#381E	☐	☑	☑	☐
5	RD_Data[2]	Word	16#0	16#0000	☐	☑	☑	☐

display = 0F10 $_{(hex)}$ (member 0) => Status word = 100F $_{(hex)}$ = active, ready and target window reached

display = 381E $_{(hex)}$ (member 1) / 0000 $_{(hex)}$ (member 2) => feedback 0000 1E38 $_{(hex)}$ = 7736 $_{(dez)}$

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7   Example project

The complet project "ExampleProjectProfibusDPStep7" for the Siemens Step 7 software can be downloaded at www.wandfluh.com/downloads/application.   This project demonstrates with a concrete example, how the Wandfluh program blocks are integrated in a Step 7 project. In addition, the project shows how the corresponding values can be inputted resp. outputted via an HMI.

The project is only an example, any user can modify it to suit his needs.

The following hardware configuration is the example project basis:
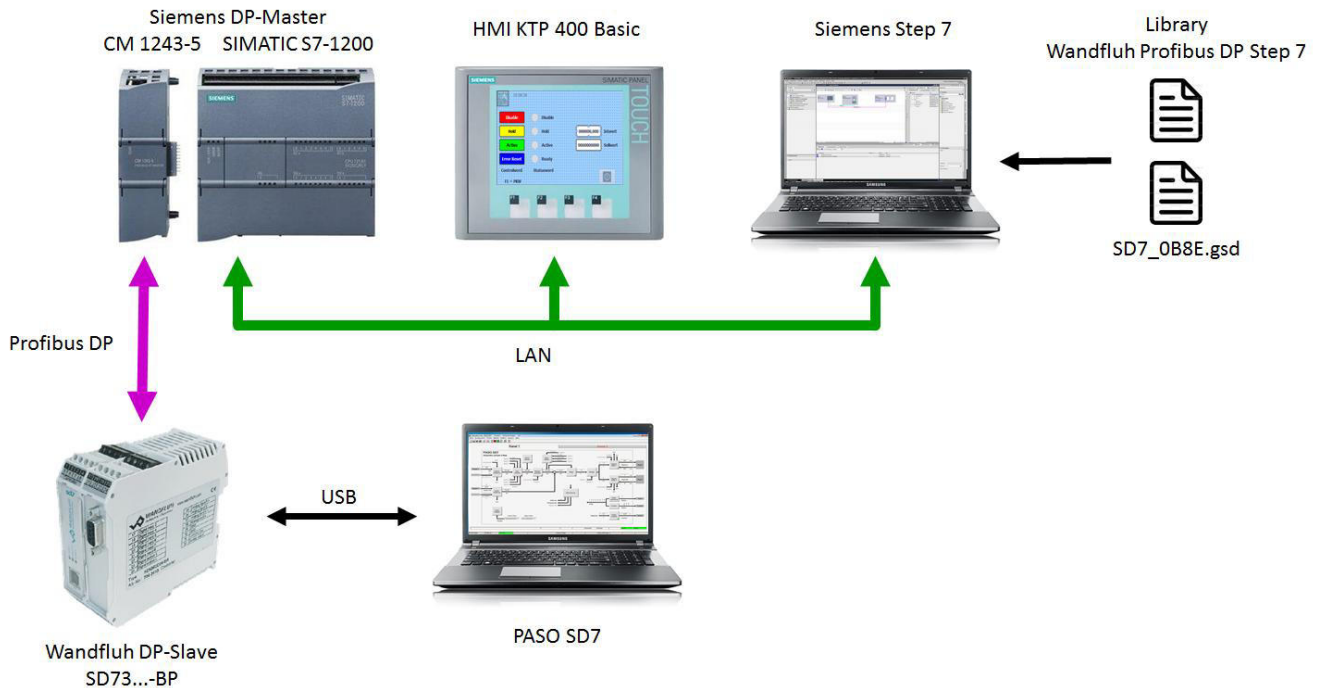
The following settings have to be made on the Wandfluh DP slave SD7:

- "Fieldbus - Info - Bus Adjustments - Bus Node Address" = 6
- "Controller - Controller mode" = Position closed loop (2-sol)
- "Enable Channel - Operating mode" = bus
- "Command scaling - Command value mode" = bus
- "Command scaling - min bus interface" = 0
- "Command scaling - max bus interface" = 100000
- "Command scaling - min reference" = 0.00 mm
- "Command scaling - max reference" = 100.00 mm

Using the HMI, the following functions can be performed:

- describe the control word via PZD (Disable, Hold, Active, Error Reset)
- display the Statusword via PZD (Disable, Hold, Active, Ready)
- describe the command value via PZD (input 0 ... 100000 = 0.000 ... 100.000 mm)
- display the feedback value via PZD
- write resp. read of PKW value
- switching between the PZD and the PKW window is done using the F1 button

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