
DC DRIVE - PRODUCT INFORMATION

Quick start-up guide

PROFIBUS DP - DCT880 and FPBA-01

Connection of DCT880 via FPBA-01 with PROFIBUS DP

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General Information

After the adapter module FPBA-01 has been mechanically and electrically installed according to the instructions in chapters Mechanical installation and Electrical installation of the fieldbus adapter manual, which is used ([see Related documents](#)), the communication between the thyristor power controller and the module must be set-up.

The detailed procedure of activating the module for PROFIBUS DP communication with the power controller depends on the product type. The PROFIBUS parameters in the device requires setting to establish the communication to the PLC. The following manual gives DCT880 specific start-up instructions.

Once communication between the power controller and the adapter module has been established, several configuration parameters are shown to the user. These parameters are listed in chapter [DCT880 configuration as fieldbus device](#) and must be checked first and adjusted where necessary. Parameters can be adjusted via the control panel or by Drive Composer.

Note: The new parameter settings take effect only when power is cycled or when the fieldbus adapter refresh parameter (51.27 or 54.27) is used.

Related documents

A list of related manuals is provided in the [DCT880 Thyristor power controller Manuals](#). Additionally the FPBA-01 user manual provides further information regarding the communication profiles and parameter settings [FPBA-01 PROFIBUS adapter module User manual](#).

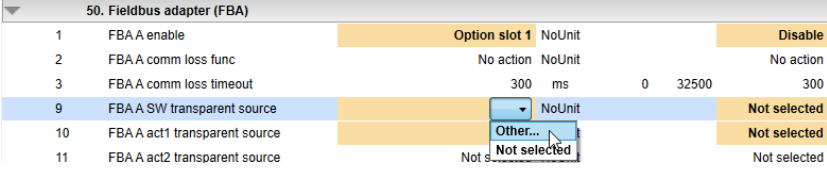
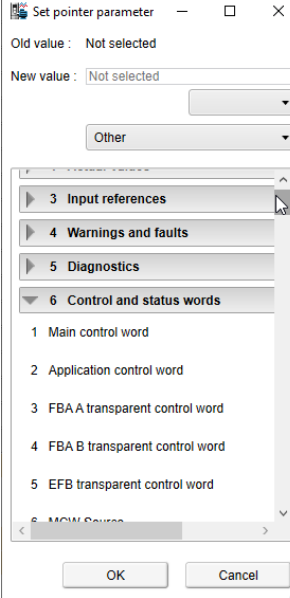
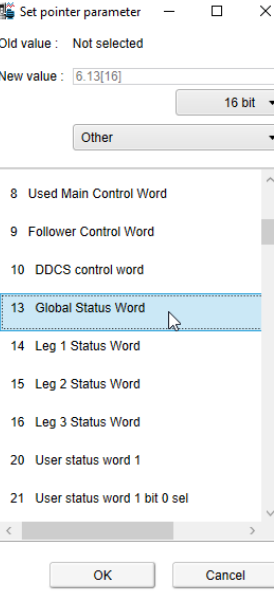
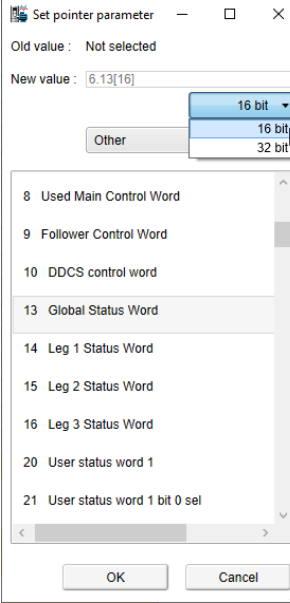
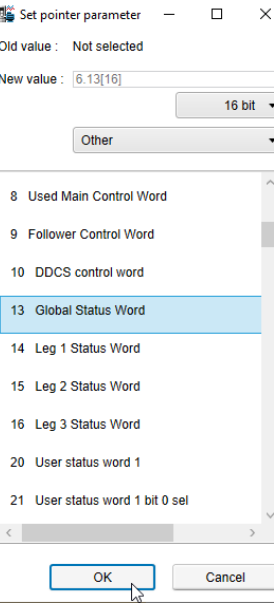
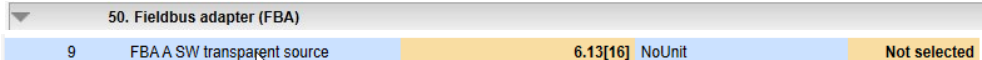
All information regarding DCT880 and compatible fieldbus communication adapters as well as example parameter files for FPBA-01 configuration of the DCT880 can be found in [DCT880 fieldbus options FW 2.01 and later](#) or directly be downloaded here – [FPBA-01 default parameter set DCT880 3ADW000834](#).

Firmware version

2.05.0.0 and higher.

Use the “Other...” function

E. g. connect 06.13 Global status word to 50.09 FBA A SW transparent source.

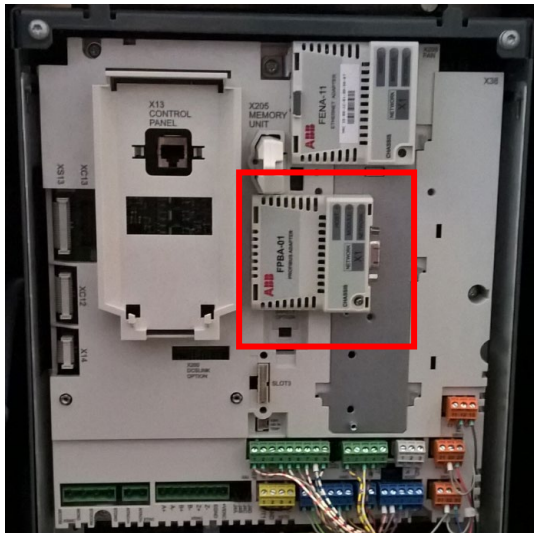

<p>In 50.09 FBA A SW transparent source choose Other...</p>			
<p>Open group 6 and choose parameter 06.13:</p>			
<p>Choose 16 bit and press Ok:</p>			
<p>Now the connection is established:</p>			

DCT880 configuration as fieldbus device

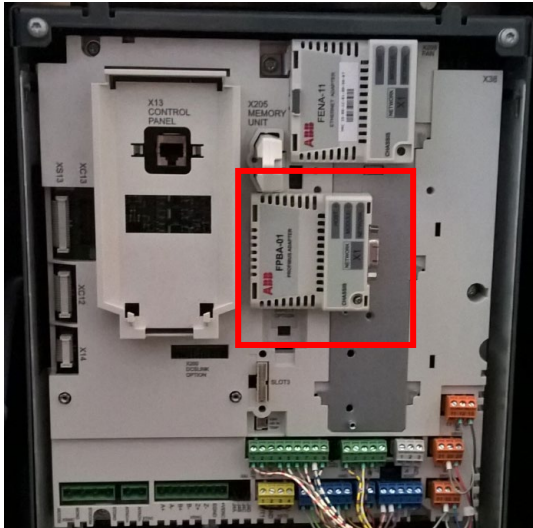

Configuration of the fieldbus adapter

Parameter group 50

To configure the DCT880 as a fieldbus device, the fieldbus adapter requires parameter configuration. In a DCT880 up to two fieldbus adapters can be configured. One as fieldbus adapter A (FBA A) and the other as fieldbus adapter B (FBA B). The following settings in Parameter group 50 will enable an FBA according to the installed slot and will read the F-series adapter information to adapt the parameter groups 51 FBA A settings or 54 FBA B setting accordingly.

Parameter	Setting
50.01 FBA A enable	<p>0: Disable; 1: Option slot1; 2: Option slot2; here selected. 3: Option slot3;</p> 
50.02 FBA A comm loss func	<p>0: No action; 1: Fault; occurs only when the thyristor power controller is controlled from the fieldbus. 2: Warning; 3: Last speed; 4: Speed reference safe; 5: Fault always; occurs even though no control is expected from the fieldbus.</p>
50.03 FBA A comm loss timeout	300 ms. (default)
	Each change in parameter groups 50, 51, 52 and 53 must be validated using 51.27 FBA A par refresh = Refresh or for FBA B configuration 54.27 FBA B par refresh = Refresh.

Same is applicable for the FBA B configuration:

Parameter	Setting
50.31 FBA B Enable	<p>0: Disable; 1: Option slot1; 2: Option slot2; here selected. 3: Option slot3;</p> 
50.32 FBA B comm loss func	<p>0: No action; 1: Fault; occurs only when the thyristor power controller is controlled from the fieldbus. 2: Warning; 3: Last speed; 4: Speed reference safe; 5: Fault always; occurs even though no control is expected from the fieldbus.</p>
50.33 FBA B comm loss timeout	300 ms.
	Each change in parameter groups 50, 51, 52 and 53 must be validated using 51.27 FBA A par refresh = Refresh or for FBA B configuration 54.27 FBA B par refresh = Refresh.

Parameter Group 51/54

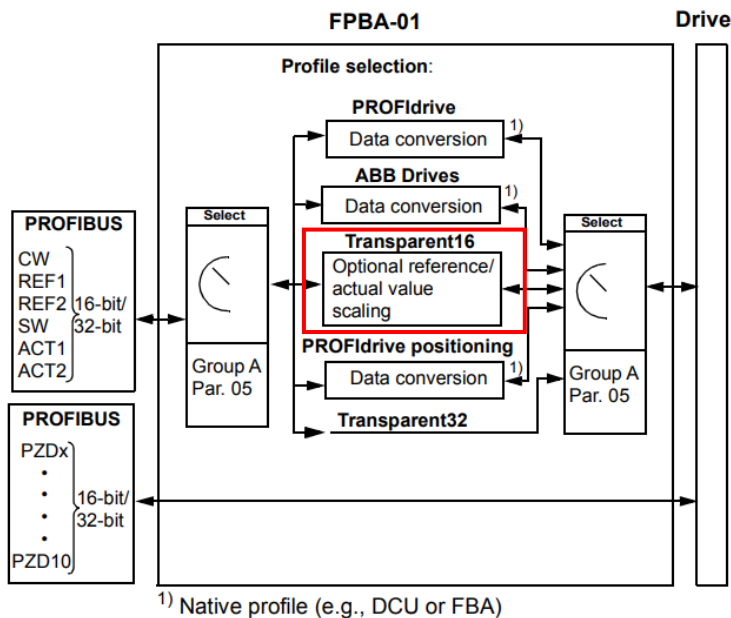
Depending on the selected fieldbus adapter parameters (FBA A or FBA B) the communication settings for PROFIBUS DP must be configured in parameter group 51 for FBA A or parameter group 54 for FBA B. The below example shows the settings for PROFIBUS DP configured as FBA A in combination with the F-Series adapter FPBA-01.

Parameter	Setting
51.01 FBA A type	FPBA ; signal thus, read-only.
51.02 Node address	Each device on the PROFIBUS network must have a unique node number. This parameter defines a node number for the thyristor power controller the module is connected to.
51.03 Baud rate	Read-only. Indicates the detected communication speed in kbit/s. Default value is 0 if there is no connection.
51.04 MSG type	1: PPO1; 2: PPO2; 3: PPO3; 4: PPO4; 5: PPO5; 6: PPO6; 7: ST1; not recommended. 8: ST2; not recommended. 9: PPO7; 10: PPO8; example. 20: ST20; not recommended.
51.05 Profile	Available profiles for PROFIBUS: PROFIdrive ; not supported. ABB DRIVES ; not supported. Trans16 ; recommended. Trans32 ; not recommended. PROFIdrive P ; NOT supported.
51.06 T16 scale	99: Defines the scaling for reference 1 and actual 1 only with 51.02 Protocol/Profile = Trans16 . Ref type = Transparent FBA_A/B_Ref1 = Ref1_from_PLC * (T16_Scale + 1) Here example 99 → (99 + 1) * Ref_from_PLC.
51.27 FBA A par refresh	Validates any changed adapter module configuration parameter settings. After refreshing, the value reverts automatically to 0 = Done. Note: This parameter cannot be changed while the thyristor power controller is running.
51.32 FBA A comm SW ver	Read-only. Displays firmware patch and build number of the adapter module in the xxyy format, where: xx = patch number/yy = build number.
51.33 FBA A appl SW ver	Read-only. Displays firmware version of the adapter module in xxyy format, where: xx = major revision number/yy = minor revision number.

Communication profile for PROFIBUS

Communication profiles are ways of conveying control commands (control word, status word, references, and actual values) between the master station and the thyristor power controller.

For DCT880 and PROFIBUS the following **Transparent 16** profile is available.



Note: The diagram is applicable only when PPO messaging is used. If Standard Telegrams (ST) are used, the communication profile is selected automatically.

Communication protocol for PROFIBUS

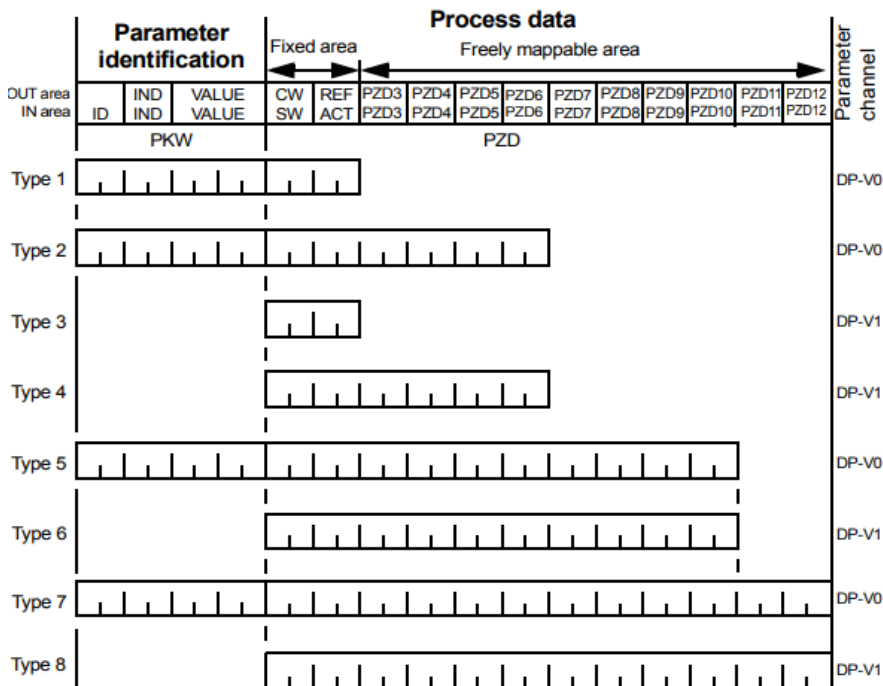
PROFIBUS DP-V0 and DP-V1 is supported with FPBA-01. The FPBA-01 adapter uses PPOs (parameter/process data objects) for cyclic communications.

The properties and services of a PROFIBUS device are described in a GSD file. The GSD file describes the vendor specific and PROFIdrive specific features of the adapter module.

The **GSD** file can be downloaded for [FPBA-01](#) (Link to webpage) or via this direct download link [FPBA-01 GSD file download link](#).

Cyclic message types

In this guide the cyclic communication of PROFIBUS will be used. For further information regarding the PROFIBUS protocol and profile types, please refer to the according manuals. The following picture shows the PPO-types and the process data mapping according to the selected type.



OUT area – Data sent from master to slave (control data)

IN area – Data sent from slave to master (actual data)

Parameter identification:

ID – Parameter identification

IND – Index for arrays

VALUE – Parameter value (Max. 4 bytes)

PKW – Parameter ID/value

Process data:

CW – Control word

SW – Status word

REF – Reference


ACT – Actual value

PZD – Process data (application-specific)


DW – Data word

In this configuration example the PPO-type PPO - 08 (parameter 51.20: PPO - 08) is used in combination with the PROFIBUS Transparent16 profile (51.02 Trans16).

Data in configuration

	Setting of parameters 52.01 is fixed by the PROFIBUS DP protocol, see above diagram. Do not use Other... for parameters 52.01.		
	For parameters 52.02 ... 52.12 mapping Other... is valid. Different mappings like Act1 16bit or Act2 16bit are allowed.		


Defining the actual values in group 52: PLC ⇐ DCT880.			
PZD	Pointer	Setting	Remarks
1	52.01	4: SW 16bit ;	50.09 FBA A SW transparent source = Other... = 06.13[16] , for e.g., 06.13 Global Status Word.
2	52.02	5: ACT1 16bit ;	50.10 FBA A act1 transparent source = Other... = 01.92[16] , for e.g., 01.92 3ph Power Full Wave Fix Cycle actual relative. 51.19 T16 scale = 99 ; sets the divisor (divisor = 51.19 + 1).
3	52.03	6: ACT2 16bit ;	50.11 FBA A act2 transparent source = Other... = 01.57[16] , for e.g., 01.57 3ph Power relative actual. 51.19 T16 scale = 99 ; sets the divisor (divisor = 51.19 + 1).
4	52.04	Other... ;	52.04 FBA A data in4 = Other... = 06.14[16] , for e.g., 06.14 Leg1 status word (actual value 3). Scaling depends on signal/parameter.

12	52.12	Other... ;	52.12 FBA A data in12 (actual value 11). Scaling depends on signal/parameter.
	Each change in parameter groups 50, 51, 52 and 53 must be validated using 51.27 FBA A par refresh = Refresh.		

The following table shows the bytes send by the DCT880 to the PLC with the above example configuration:

01	02	03	04	05	06	07	08	...	...	23	24
Status Word	3ph Power Full Wave		3ph Power relative		Actual value 4		...		Actual value 11		

Data out configuration with one reference

	Setting of parameters 53.01 is fixed by the PROFIBUS DP protocol see above table. Do not use Other... for parameters 53.01 CW/SW are fixed by the communication protocol.		
	For parameters 53.02 ... 53.12 only mapping Other... is valid. Different mappings like Ref1 16bit or Ref2 16bit are allowed.		

Defining the reference values in group 53: PLC ⇒ DCT880.			
PZD	Pointer	Setting	Remarks
1	53.01	1: CW 16bit ;	Control Word, visible in 06.03 FBA A transparent control word. Select by 06.08 Main control word source = FBA A .
2	53.02	2: Ref1 16bit ;	Reference value 1, visible in 03.05 FBA A reference 1. Select e. g., by 22.15 Leg 1 Cha A Main Ref Selector = FBA A reference 1 (03.05) . 51.19 T16 scale = 99 ; sets the multiplier (multiplier = 51.19 + 1).
3	53.03	0: None ;	Reference value 2; not used.
4	53.04	Other... ;	53.04 FBA A data out4 = Other... = e. g. 21.11 Ext reference 1 Scaling depends on parameter.

12	53.12	Other... ;	53.12 FBA A data out12 (reference value 11). Scaling depends on parameter.



Each change in parameter groups 50, 51, 52 and 53 must be validated using 51.27 FBA A par refresh = Refresh.

The following table shows the bytes send by the DCT880 power controller to the PLC with the above example configuration:

01	02	03	04	05	06	07	08	...	...	23	24
Control Word		Reference 1		Not used		Reference value 3		...		Reference value 11	

Data out configuration with three references



Setting of parameters 53.01 is fixed by the PROFIBUS DP protocol see above table. Do **not** use **Other...** for parameters 53.01 CW/SW are fixed by the communication protocol.
For parameters 53.02 ... 53.12 only mapping **Other...** is valid.
Different mappings like Ref1 16bit or Ref2 16bit are allowed.

Defining the reference values in group 53: PLC ⇒ DCT880.			
PZD	Pointer	Setting	Remarks
1	53.01	1: CW 16bit ;	Control Word, visible in 06.03 FBA A transparent control word. Select by 06.08 Main control word source = FBA A .
2	53.02	0: None ;	Reference value 1; not used.
3	53.03	0: None ;	Reference value 2; not used.
4	53.04	Other... ;	53.04 FBA A data out4 = Other... = 21.11 Ext reference 1. Select e.g., by 22.15 Leg 1 Cha A Main Ref Selector = External reference 1 (21.11) . Scaling depends on parameter.
5	53.05	Other... ;	53.05 FBA A data out5 = Other... = 21.12 Ext reference 2. Select e.g., by 24.15 Leg 2 Cha A Main Ref Selector = External reference 2 (21.12) . Scaling depends on parameter.
5	53.06	Other... ;	53.06 FBA A data out6 = Other... = 21.13 Ext reference 3. Select e.g., by 26.15 Leg 3 Cha A Main Ref Selector = External reference 3 (21.13) . Scaling depends on parameter.
...
12	53.12	Other... ;	53.12 FBA A data out12 (reference value 11). Scaling depends on parameter.
Each change in parameter groups 50, 51, 52 and 53 must be validated using 51.27 FBA A par refresh = Refresh.			

The following table shows the bytes send by the DCT880 power controller to the PLC with the above example configuration:

01	02	03	04	05	06	07	08	09	10	11	12	...	...	23	24
Control Word		Not used		Not used		Ext ref 1		Ext ref 2		Ext ref 3		...		Reference value 11	

Status-, control word and reference handling

After configuration of the fieldbus adapter and setting the communication profile, the correct control mode and reference handling is required.

Control word

Therefore, the main control word (MCW) source should be linked to the receiving control word (CW):

6. Control and status words				
6	MCW Source	FBA A (06.03)	NoUnit	None

To switch on the DCT880 via the control word from the PLC, the command location for each leg must be defined. This can be done via parameter group **19. Start/Stop Mode**:

Command location

With one reference

19. Start/Stop Mode				
10	Leg 1 Command Location Selector	MCW (06.01)	NoUnit	Hardware DI
11	Leg 2 Command Location Selector	Hardware DI	NoUnit	Hardware DI
12	Leg 3 Command Location Selector	Hardware DI	NoUnit	Hardware DI

With three references

19. Start/Stop Mode				
10	Leg 1 Command Location Selector	MCW (06.01)	NoUnit	Hardware DI
11	Leg 2 Command Location Selector	MCW (06.01)	NoUnit	Hardware DI
12	Leg 3 Command Location Selector	MCW (06.01)	NoUnit	Hardware DI

Reference handling (one reference)

In this example leg 2 and leg 3 follow leg 1, see Leg 1/2/3 control mode 99.10/99.25/99.40. Thus, only one reference is required for all legs of the DCT880. Therefore, only data out2 [16] is used to send the reference from the PLC to the power controller:

53. FBA A data out				
1	FBA data out1	CW 16bit	NoUnit	None
2	FBA data out2	Ref1 16bit	NoUnit	None
3	FBA data out3	None	NoUnit	None

In this example the input reference is **automatically** mapped to 03.05 FBA A reference 1. Via 22.15 Leg 1 Cha A Main Ref Selector the external reference can be mapped like this:

22. Leg 1 Reference Chain				
15	Leg 1 Cha A Main Ref Selector	FBA A reference 1 (03.05)	NoUnit	AI1 scaled (12.12)
16	Leg 1 Cha A Main Ref Mux	Close	NoUnit	Close

Reference handling (three references)

In this example leg 1, leg 2 and leg 3 are independent controlled, see Leg 1/2/3 control mode 99.10/99.25/99.40. Thus, three individual references are required for the legs of the DCT880. Therefore, data out2 [16], data out3 [16] and data out4 [16] are used to send the three references from the PLC to the power controller:

53. FBA A data out				
1	FBA data out1	CW 16bit	NoUnit	None
2	FBA data out2	21.11[16]	NoUnit	None
3	FBA data out3	21.12[16]	NoUnit	None
4	FBA data out4	21.13[16]	NoUnit	None

In this example all input references are **manually** mapped to parameters in reference parameter group 21:

- 53.02 FBA A data out2 to 21.11 Ext reference 1.
- 53.03 FBA A data out3 to 21.12 Ext reference 2.
- 53.04 FBA A data out4 to 21.13 Ext reference 3.

Via the individual Leg x Cha A Main Ref Selector the external references can be mapped like this:

22. Leg 1 Reference Chain				
15	Leg 1 Cha A Main Ref Selector	External reference 1 (21.11)	NoUnit	AI1 scaled (12.12)
24. Leg 2 Reference Chain				
15	Leg 2 Cha A Main Ref Selector	External reference 2 (21.12)	NoUnit	AI1 scaled (12.12)
26. Leg 3 Reference Chain				
15	Leg 3 Cha A Main Ref Selector	External reference 3 (21.13)	NoUnit	AI1 scaled (12.12)

Status word

The status word can be mapped directly to the communication profile via parameter 50.09 FBA A SW transparent source. Here as example the parameter 06.13 Global status word is transmitted to the PLC.

50. Fieldbus adapter (FBA)				
9	FBA A SW transparent sou...	6.13[16]	NoUnit	Not selected

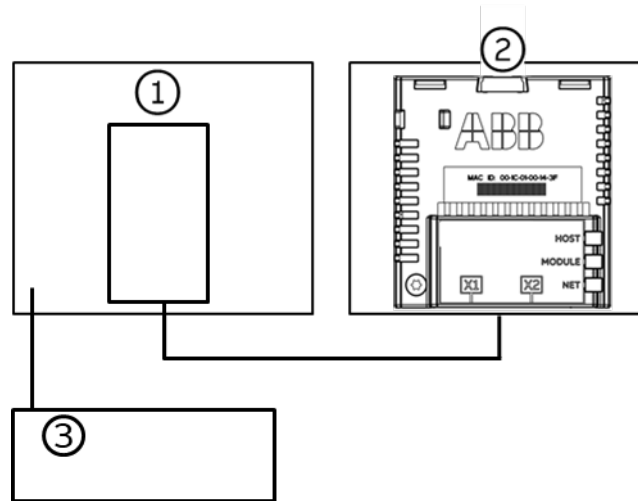
Actual values

Similar to the references, the values that are required for the PLC can be mapped directly via parameter group 52 FBA A data in:

52. FBA A data in				
1	FBAA data in1	SW 16bit	NoUnit	None
2	FBAA data in2	Act1 16bit	NoUnit	None
3	FBAA data in3	Act2 16bit	NoUnit	None
4	FBAA data in4	1.1[16]	NoUnit	None
5	FBAA data in5	1.2[16]	NoUnit	None
6	FBAA data in6	1.3[16]	NoUnit	None

Example configuration PLC – ABB AC500

In this configuration example the following topology is used. The ABB AC500 PLC and the PC for PLC configuration, in this example shown here, are connected directly.



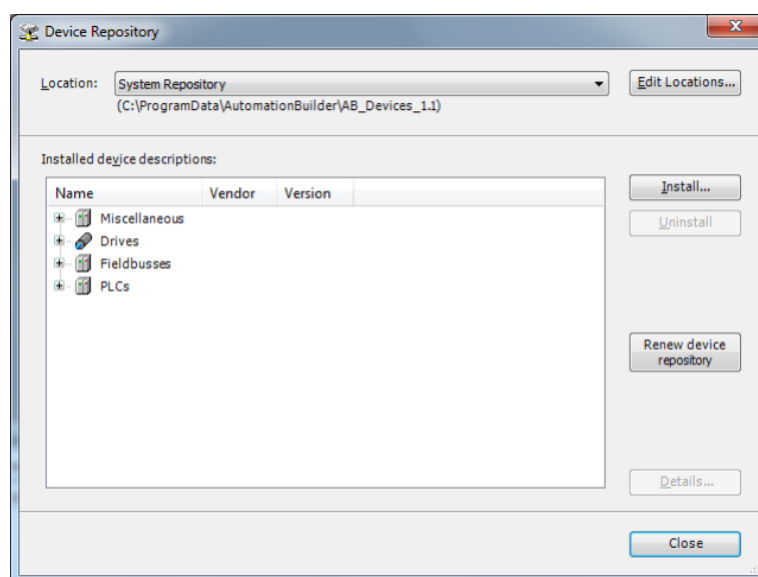
- 1) ABB AC500 PLC PROFIBUS interface
- 2) FPBA-01 connected to a DCT880
- 3) Commissioning PC

Network configuration for PROFIBUS DP

This example shows how to configure PROFIBUS DP communication between an ABB AC500 PLC and the adapter module FPBA-01 using Automation builder.

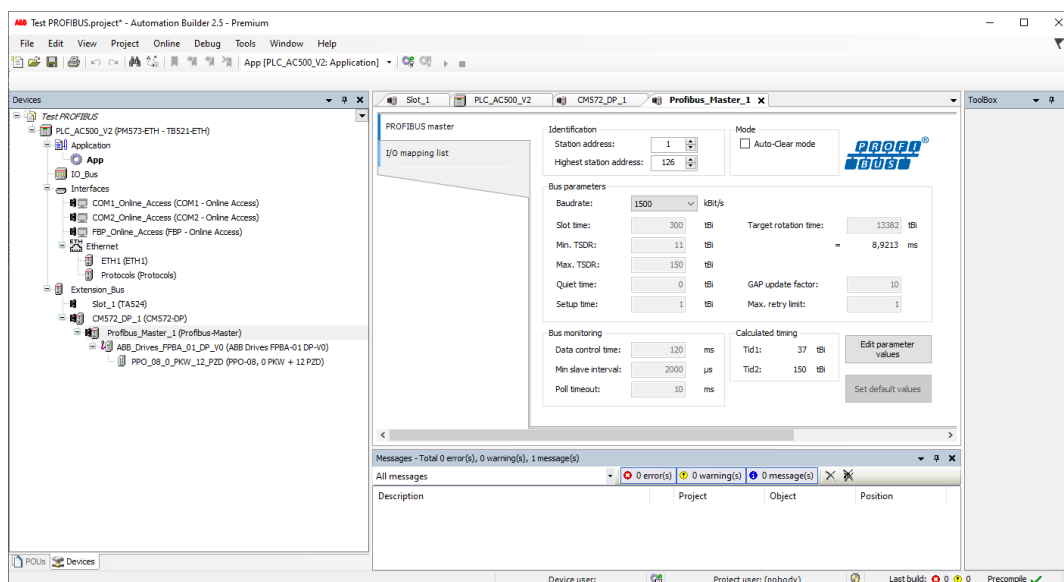
Before you start, make sure that you have downloaded the FPBA-01 GSD file from the Document library.

1. Start the Automation Builder software.
2. On the Tools menu, select Device Repository.
3. In the window that opens, click Install... and browse for the GSD-file.

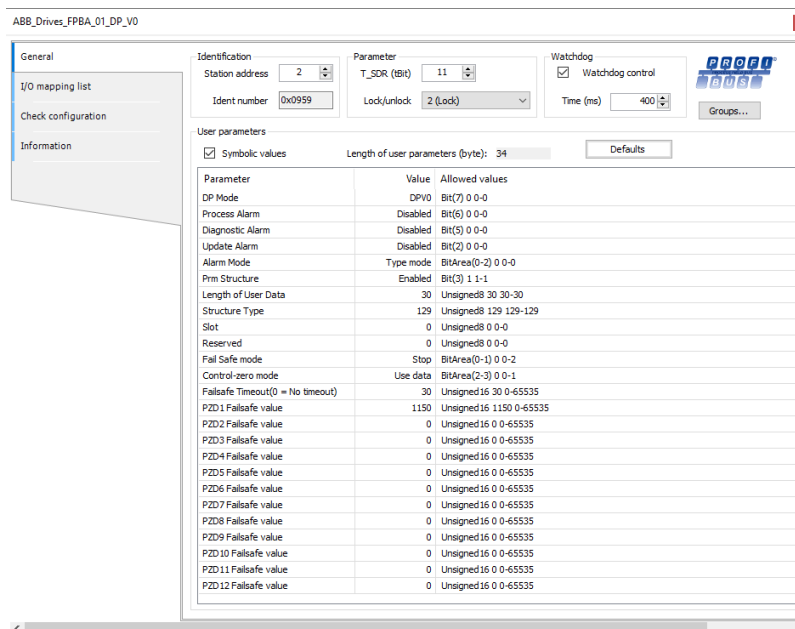


4. Open or create the PLC project that is used to control the thyristor power controller.

5. Add the CM572-DP PROFIBUS master device to the PLC project, if necessary.
6. Add the adapter module to the PROFIBUS network.
7. Add the I/O module, for example, PPO Type 8 to the adapter module to define cyclical communication between the module and the PLC.
8. Define the CM572-DP master properties, such as the station address, address settings for slaves and Baud rate.

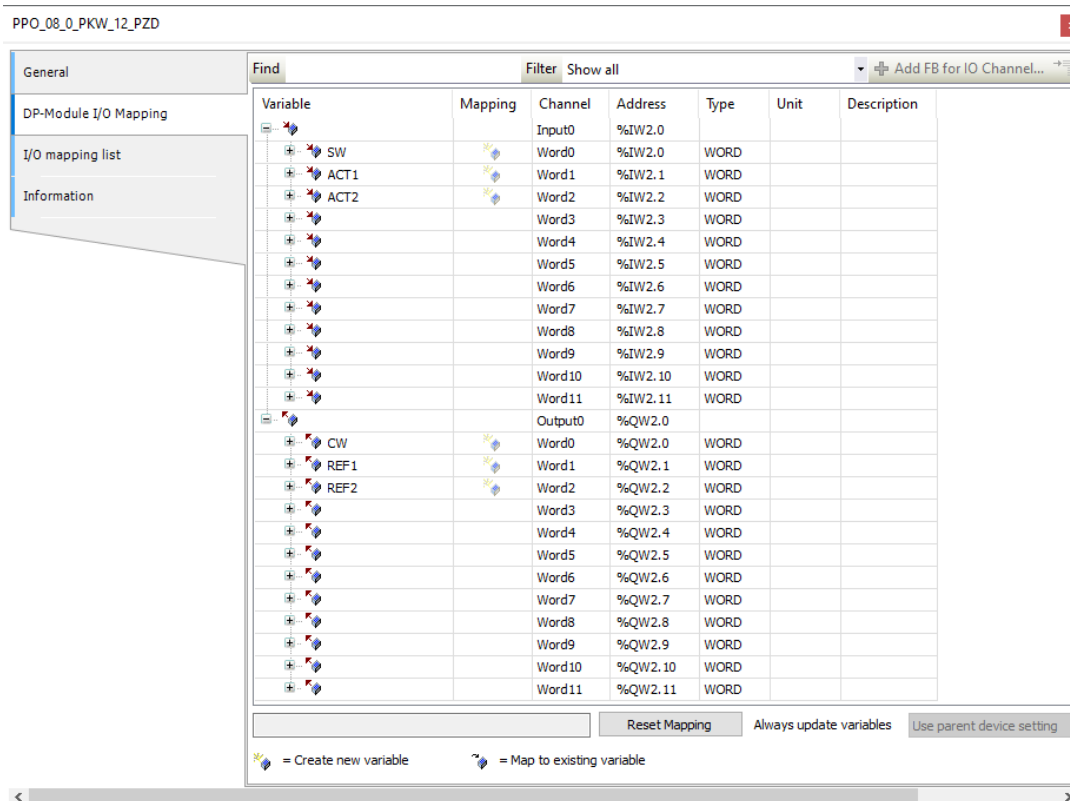


9. Define the adapter module properties: On the FPBA identification tab, select the station address.



10. Define the I/O module properties of the PPO-08 type:

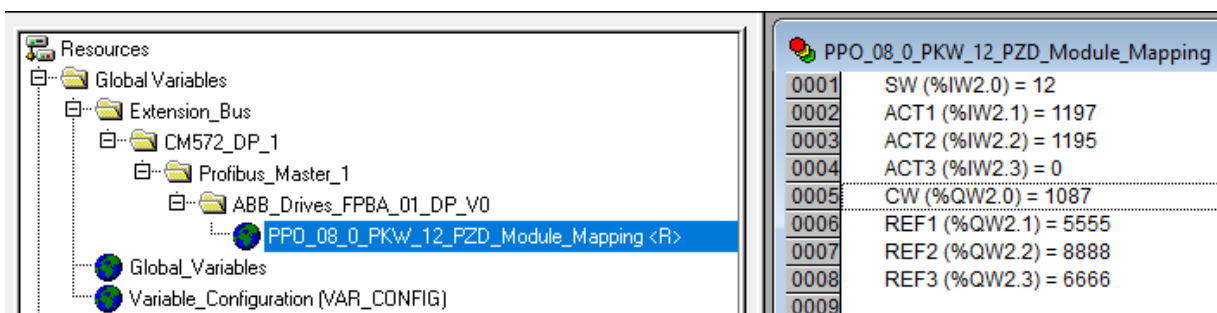
- On the **DP-Module I/O Mapping** tab, type names for the variables that refer to the device signals in the PLC program.



11. Open the PLC program and create a program that controls the thyristor power controller.

12. Compile the project and download it to the PLC.

13. **Note:** Make sure that the variable names defined for the device signals are used in the PLC program, too. Otherwise, the communication will not work.



DCS Family



DCS550-S modules The compact drive for machinery application

20 ... 1,000 A_{DC}
0 ... 610 V_{DC}
230 ... 525 V_{AC}
IP00

- Compact
- Robust design
- Adaptive and winder program
- High field exciter current



DCS880 modules For safe productivity

20 ... 5,200 A_{DC}
0 ... 1,500 V_{DC}
230 ... 1,200 V_{AC}
IP00

- Safe torque off (STO) built in as standard
- Compact and robust
- Single drives, 20 A_{DC} to 5,200 A_{DC}, up to 1,500 V_{DC}
- IEC 61131 programmable
- Intuitive control panel and PC tool with USB connection and start up assistant
- Wide range of options to serve any DC motor application



DCS880-A enclosed converters Complete drive solutions

20 ... 20,000 A_{DC}
0 ... 1,500 V_{DC}
230 ... 1,200 V_{AC}
IP21 – IP54

- Suitable for motoric and non motoric applications (e.g. electrolysis & hydrogen production)
- Individually adaptable to customer requirements
- User-defined accessories like external PLC or automation systems can be included
- High power solutions in 6- and 12-pulse up to 20,000 A_{DC}, 1,500 V_{DC}
- In accordance to usual standards
- Individually factory load tested
- Detailed documentation



DCT880 modules Thyristor power controller

20 ... 4,200 A_{AC}
110 ... 990 V_{AC}
IP00

- Precise power control in industrial heating applications
- Two or three phase devices
- Power optimizer for peak load reduction
- Built on ABB's all-compatible drives architecture
- Intuitive control panel and PC tool with USB connection and start up assistant
- Application control programs and drive application programming with IEC 61131 programming



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