
DC DRIVE - PRODUCT INFORMATION

Quick start-up guide

PROFIBUS DP - DCS880 and FPBA-01

Connection of DCS880 via FPBA-01 with PROFIBUS DP

Table of contents

General Information	1
Related documents	1
Firmware version	1
Use the “Other...” function	2
DCS880 configuration as fieldbus device	3
Configuration of the fieldbus adapter	3
Parameter group 50	3
Parameter Group 51/54.....	5
Communication profile for PROFIBUS.....	6
Communication protocol for PROFIBUS.....	6
Cyclic message types.....	7
Data in and out configuration.....	8
Status-, control word and reference handling	10
Control word.....	10
Command location.....	10
References	10
Status word	10
Actual values.....	11
Scaling and profile selection	11
Example configuration PLC – ABB AC500	13
Network configuration for PROFIBUS DP	13

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 drive and the module must be set-up.

The detailed procedure of activating the module for PROFIBUS DP communication with the drive depends on the drive type. The PROFIBUS parameters in the device requires setting to establish the communication to the PLC. The following manual gives DCS880 specific start-up instructions.

Once communication between the drive and the adapter module has been established, several configuration parameters are shown to the user. These parameters are listed in chapter [DCS880 configuration as fieldbus device](#) and must be checked first and adjusted wherever 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 [DCS880 List of all 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 DCS880 and compatible fieldbus communication adapters as well as example parameter files for FPBA-01 configuration of the DCS880 can be found in [DCS880 fieldbus options FW 2.05 and later](#) or directly be downloaded here – [FPBA-01 default parameter set DCS880 3ADW000591](#).

Firmware version

2.05.0.0 and higher.

Use the “Other...” function

E. g. connect 06.88 FBA A profile status word to 50.09 FBA A SW transparent source.

In 50.09 FBA A SW transparent source choose Other...

50. Fieldbus adapter (FBA)					
1	FBA A enable	Option slot 1	NoUnit		Disable
2	FBA A comm loss func		No action	NoUnit	No action
3	FBA A comm loss timeout		300	ms	0 32500 300
9	FBA A SW transparent source		NoUnit		Not selected
10	FBA A act1 transparent source		Other...		Not selected
11	FBA A act2 transparent source		Not s...		Not selected

Open group 6 and choose parameter 06.88:

Set pointer parameter

Old value : Not selected

New value : Not selected

Other

3 Input references

4 Warnings and faults

5 Diagnostics

6 Control and status words

1 Main control word

2 Application control word

3 FBA A transparent control word

4 FBA B transparent control word

5 EFB transparent control word

6 MCW Source

OK

Cancel

Set pointer parameter

Old value : Not selected

New value : 6.88[16]

16 bit

Other

81 Drive logic status word

82 Drive logic auxiliary status word

86 FBA A generic control word

87 FBA B generic control word

88 FBA A profile status word

89 FBA B profile status word

100 User control word 1

101 User control word 2

110 DDCS control word

OK

Cancel

Choose 16 bit and press Ok:

Set pointer parameter

Old value : Not selected

New value : 6.88[16]

16 bit

Other

81 Drive logic status word

82 Drive logic auxiliary status word

86 FBA A generic control word

87 FBA B generic control word

88 FBA A profile status word

89 FBA B profile status word

100 User control word 1

101 User control word 2

110 DDCS control word

OK

Cancel

Set pointer parameter

Old value : Not selected

New value : 6.88[16]

16 bit

Other

81 Drive logic status word

82 Drive logic auxiliary status word

86 FBA A generic control word

87 FBA B generic control word

88 FBA A profile status word

89 FBA B profile status word

100 User control word 1

101 User control word 2

110 DDCS control word

OK

Cancel

Now the connection is established:

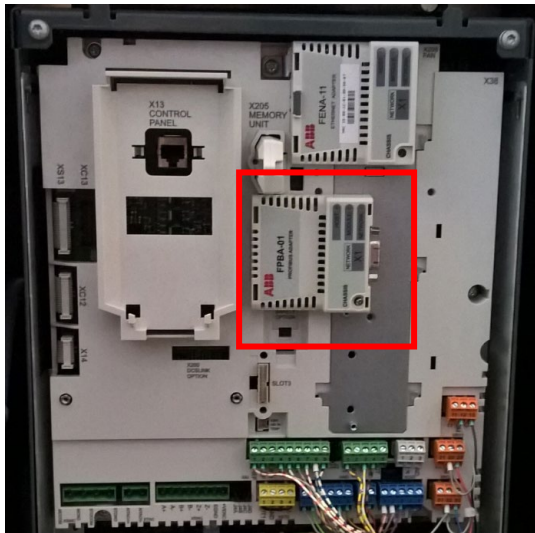
50. Fieldbus adapter (FBA)					
9	FBA A SW transparent sou...		6.88[16]	NoUnit	Not selected

DCS880 configuration as fieldbus device

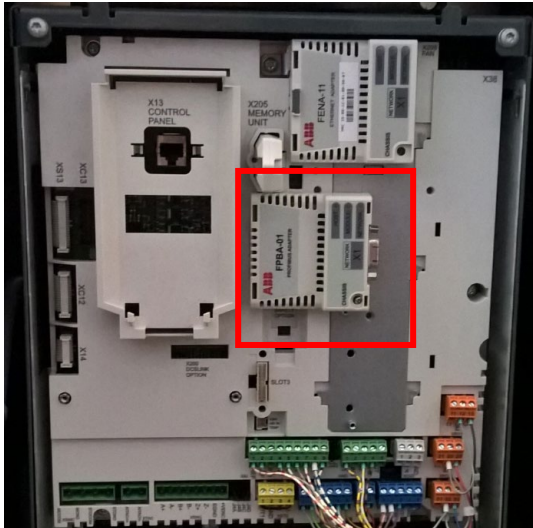
Configuration of the fieldbus adapter

Parameter group 50

To configure the DCS880 as a fieldbus device, the fieldbus adapter requires parameter configuration. In a DCS880 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	0: Disable; 1: Option slot1; 2: Option slot2; here selected. 3: Option slot3; 
50.02 FBA A comm loss func	0: No action; 1: Fault; occurs only when the device 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.
50.03 FBA A comm loss timeout	300 ms. (default)
50.29 FBA A Profile	0: ABB Drive profile; in case 51.02 Protocol/Profile = Trans16. 1: DCP; in case 51.02 Protocol/Profile = ABB Drives/PROFIdrive Note: More information see chapter Communication profile.
	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	0: Disable; 1: Option slot1; 2: Option slot2; here selected. 3: Option slot3; 
50.32 FBA A comm loss func	0: No action; 1: Fault; occurs only when the device 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.
50.33 FBA A comm loss timeout	300 ms.
50.59 FBA A Profile	0: ABB Drive profile; in case 51.02 Protocol/Profile = Trans16. 1: DCP; in case 51.02 Protocol/Profile = ABB Drives/PROFIdrive Note: More information see chapter Communication profile.
	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 drive 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 DP: PROFIdrive ; in case 50.29 FBA A profile = DCP . ABB DRIVES ; not recommended. Trans16 ; in case 50.29 FBA A profile = ABB Drive profile . 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 drive 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 DC drive.

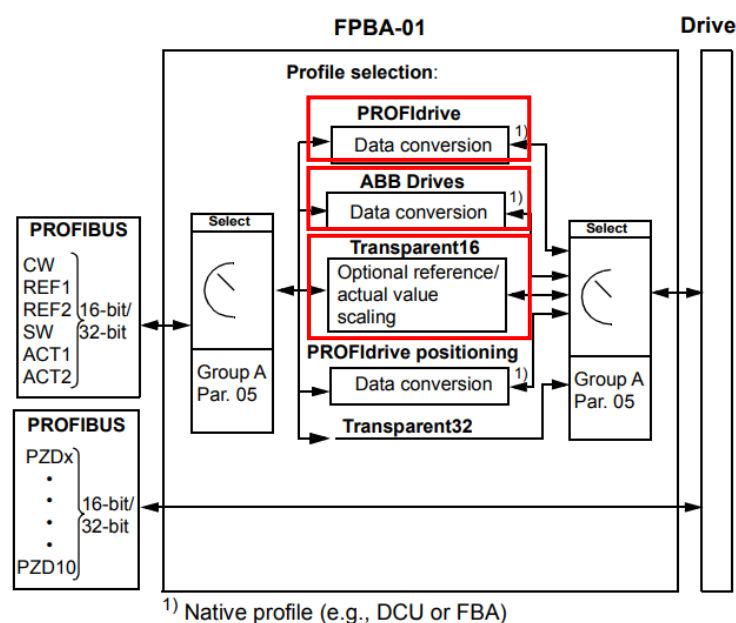
For DCS880 and PROFIBUS the following profiles are available:

Transparent 16 (for ABB drives profile)

PROFIdrive.

ABB Drives.

Attention: To use the typical ABB Drives profile for DCS880, the communication profile requires Transparent 16 setting. It is adapted to the ABB Drives profile (see table below) via the DC specific data conversion using parameter 50.29.



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

DCS880 settings profile dependent:

ABB Drives Profile	50.29 FBA A Profile: ABB Drives profile	50.59 FBA B Profile: ABB Drives profile
	51.02 FBA A Protocol/Profile: Trans16	54.02 FBA B Protocol/Profile: Trans16
ABB Drives Profile	50.29 FBA A Profile: DCP	50.59 FBA B Profile: DCP
	51.02 FBA A Protocol/Profile: ABB DRIVES	54.02 FBA B Protocol/Profile: ABB DRIVES
PROFIdrive	50.29 FBA A Profile: DCP	50.59 FBA B Profile: DCP
	51.02 FBA A Protocol/Profile: PROFIdrive	54.02 FBA B Protocol/Profile: PROFIdrive

The following example will explain the configuration for the ABB Drives Profile via Trans16 which is always recommended to use. For more information about different profile selection, please refer to the Fieldbus adapter manual for [FPBA-01](#).

Communication protocol for PROFIBUS

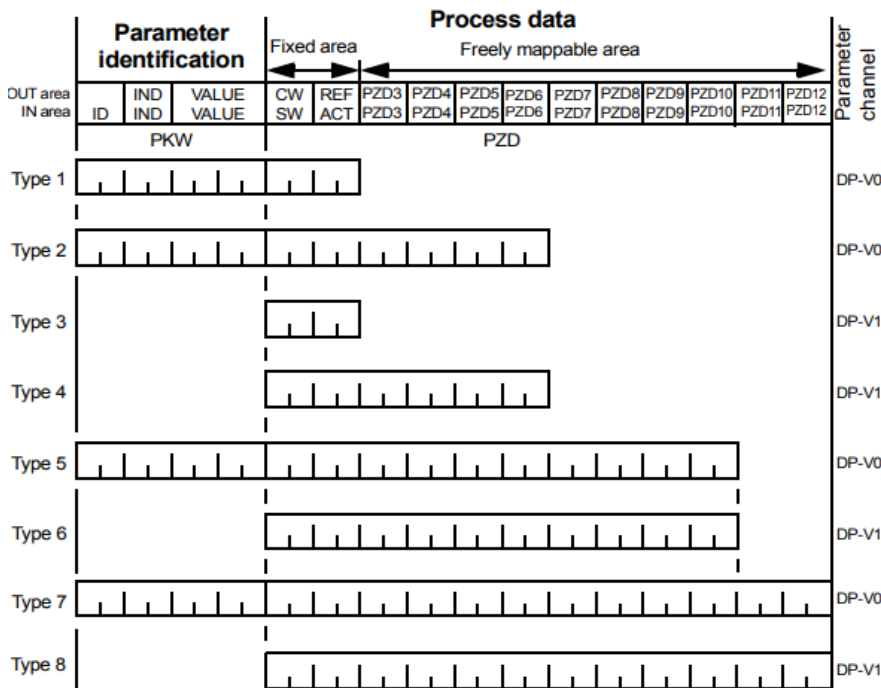
PROFIBUS DP-V0 and DP-V1 is supported with FPBA-01. The FPBA-01 adapter uses PPOs (parameter/process data objects) for cyclic communications.

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. Vendor-specific features can be used, for example, in the ABB Drives communication profile. The PROFIdrive profile supports a set of services described in the PROFIdrive specification which can be found in the [FPBA-01 user manual](#).

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 ABB Drives profile (50.29: ABB Drives profile & 51.02 Trans16).

The following table shows the bytes send by the DCS880 drive to the PLC with the above example configuration:

01	02	03	04	05	06	07	08	...	...	23	24
Status Word	Speed feedback		Torque reference		Actual value 4		...		Actual value 11		

Data out configuration

	Setting of parameters 52.01 ... 52.03 see above drawing. Do not use Other... CW/SW/ACT/REF are fixed by the communication protocol.
	For parameters 52.04 ... 52.12 only mapping Other... is valid.
	Different mappings like SW 16bit, Act1 16bit or Act2 16bit are not allowed.

Defining the reference values in group 53: PLC ⇒ DCS880.			
PZD	Pointer	Setting	Remarks
1	53.01	1: CW 16bit;	For 50.29 FBA A profile = ABB Drive profile or DCP . Control Word, visible in 06.03 FBA A transparent control word. Selected by 06.08 Main control word source = FBA A .
2	53.02	2: Ref1 16bit;	For 50.29 FBA A profile = ABB Drive profile set: Scaling by 50.04 FBA A ref1 type = Auto (default). 51.19 T16 scale = 99 ; sets the multiplier (multiplier = 51.19 + 1). Reference value 1, visible in 03.05 FBA A reference 1. Selected e. g. by 22.11 Speed reference 1 source = FBA A reference 1 . For 50.29 FBA A profile = DCP set: Reference value 1, visible in 03.05 FBA A reference 1. Selected e. g. by 22.11 Speed reference 1 source = FBA A reference 1 .
3	53.03	3: Ref2 16bit;	For 50.29 FBA A profile = ABB Drive profile set: Scaling by 50.05 FBA A ref2 type = Auto (default). Reference value 2; visible in 03.06 FBA A reference 2. Selected e. g. by 26.11 Torque reference 1 source = FBA A reference 2 . For 50.29 FBA A profile = DCP set: Reference value 2; visible in 03.06 FBA A reference 2. Selected e. g. by 26.11 Torque reference 1 source = FBA A reference 2 .
4	53.04	Other...;	53.04 FBA data out4 = Other... = 06.10[16] , for, e. g. 06.10 Auxiliary control word 1 (reference value 3). Scaling depends on parameter.
...	...	...	...
12	53.12	Other...;	53.12 FBA 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 received by the DCS880 drive from the PLC with the above example configuration:

01	02	03	04	05	06	07	08	...	...	23	24
Control Word	Speed reference		Torque reference		Reference value 4		...		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				
8	Main control word source	FBA A	NoUnit	None

Command location

To switch on the DCS880 via the control word from the PLC, the command location must be mapped to the PLC control word. This can be done via parameter group **20. Start/Stop/Direction**:

20. Start/Stop/Direction				
1	Command location	Main control word	NoUnit	Local I/O

References

The reference for the speed or torque controller of the DCS880 can be send individually. In this example speed reference is send form PLC to the DC drive via FBA A Ref 1.

22. Speed reference selection				
11	Speed reference 1 source	FBA B reference 1	NoUnit	AI1 scaled

The operation mode of the drive can be checked via Actual operation mode 19.01:

19. Operation mode				
1	Actual operation mode	Speed	NoUnit	Speed

Status word

The status word can be mapped directly to the communication profile via parameter 50.09 FBA SW transparent source. Here as example the 06.15 Main status word is transmitted to the PLC.

6. Control and status words				
15	Main status word	0x0331	NoUnit	0x0000 0xffff 0x0000

For the transparent 16 profile (51.02 or 54.02 = **Trans16**) the control and status word are visible in parameters 06.86 to 06.89:

6. Control and status words				
86	FBA A generic control word	0x0476	NoUnit	0x0000 0xffff ffff 0x0000
87	FBA B generic control word	0x0000	NoUnit	0x0000 0xffff ffff 0x0000
88	FBA A profile status word	0x0331	NoUnit	0x0000 0xffff 0x0000
89	FBA B profile status word	0x0000	NoUnit	0x0000 0xffff 0x0000

Actual values

For the Transparent 16 profile – which is used to achieve ABB Drives Profile via DC specific conversion parameter 50.29, the parameters 50.09, 50.10 and 50.11 can be used to select the required actual values for sending them to the PLC.

50. Fieldbus adapter (FBA)				
9	FBA A SW transparent sou...	6.15[16]	NoUnit	Not selected
10	FBA A act1 transparent so...	1.1[16]	NoUnit	Not selected
11	FBA A act2 transparent so...	1.17[16]	NoUnit	Not selected

Scaling and profile selection

For ABB Drives Profile via Transparent 16 profile or PROFIdrive profile the scaling can be selected via the following parameters. The Transparent 16 profile and reference/actual value scaling and can be adapted with 51.19 or 54.19 – T16 scaling according to the description shown in chapter [Parameter Group 51/54](#). Reference and actual value scaling depend on profile- and parameter selection.

All reference values are scaled to ± 10.000 (decimal), this equal ± 100.00 %. The exception is speed. The scaling value of 46.02 M1 speed scaling actual corresponds to 20.000 speed units.

Parameter	Setting
50.04 FBA A ref1 type	0: Auto ; automatic type and scaling according to which reference chain the incoming reference is connected to. If the reference is not connected to any chain, setting Transparent is applied. 1: Transparent ; no scaling is applied (1 = 1.00). 2: General ; generic reference with a scaling of 100 = 1 (e. g. integer and two decimals). 3: Torque ; the scaling is defined by 46.04 M1 torque scaling actual. 4: Speed ; the scaling is defined by 46.02 M1 speed scaling actual. 5: Current ; the scaling is in percent of 99.11 M1 nominal current: 100 = 1 %.
50.05 FBA A ref2 type	
50.07 FBA A act1 type	
50.08 FBA A act2 type	

The automatic type and scaling selection of parameters **50.04 & 50.05 FBA A reference 1 & 2** depends on the mapping of the reference to the source:

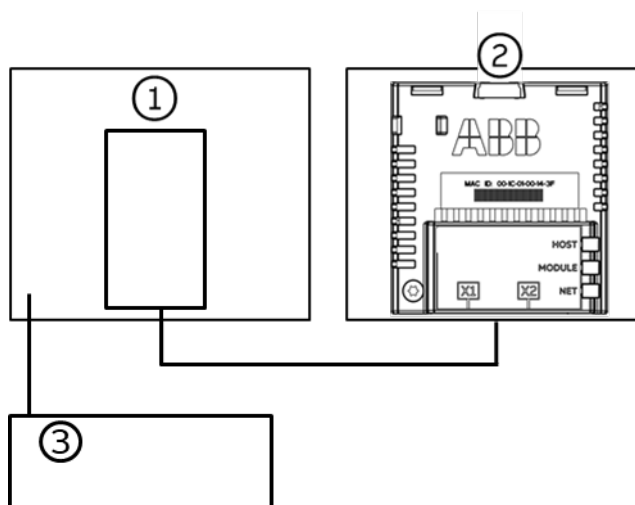
Setting	of Parameter	Auto type and scaling
FBA A reference 1 FBA A reference 2 or FBA B reference 1 FBA B reference 2	22.11 Speed reference 1 source	Speed
	22.12 Speed reference 2 source	
	23.32 Direct speed reference	
	26.11 Torque reference 1 source	Torque
	26.12 Torque reference 2 source	
	27.22 Current reference source	Current
	28.18 EMF reference source	General
	28.20 EMF voltage correction source	
	28.29 Flux correction source	

The automatic type and scaling the selection of parameters **50.07 & 50.08 actual values 1 & 2** depends on the reference selection – e.g., if **50.04 FBA ref1 type: Speed** and **50.07 FBA act1 type: Auto** FBA act1 is value 24.02 Used speed reference. The following table shows the mapping and the correlation between the settings:

FBA act type setting	Act value mapping
Speed	24.02 Used speed feedback
Torque	26.05 Motor torque unfiltered
Current	27.05 Motor current
Transparent	See parameter 50.10 or 50.11

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.



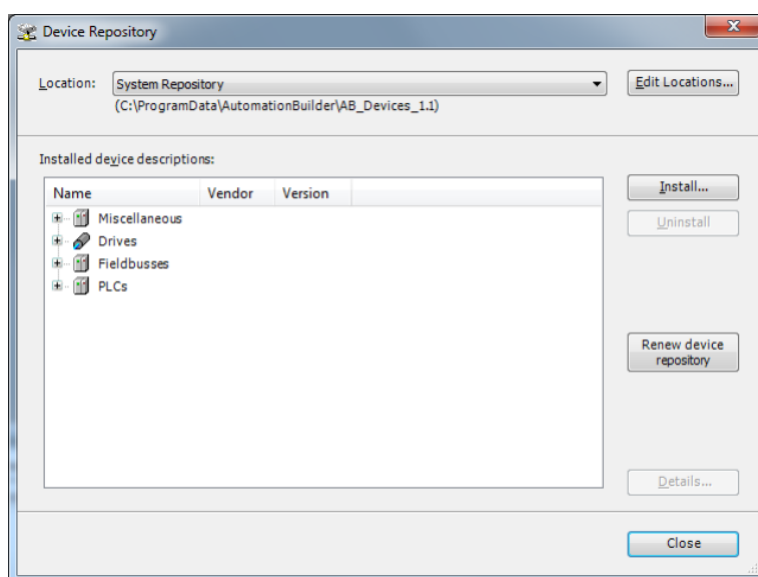
- 1) ABB AC500 PLC PROFIBUS interface
- 2) FPBA-01 connected to a DCS880
- 3) Commissioning PC

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.

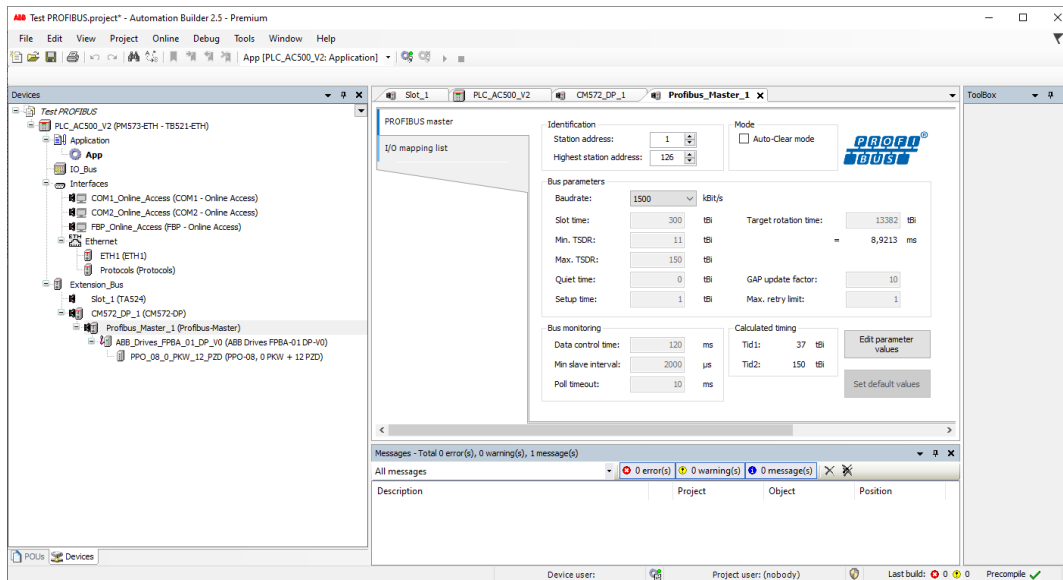
Before you start, make sure that you have downloaded the FPBA-01 GSD file from the Document library.

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.

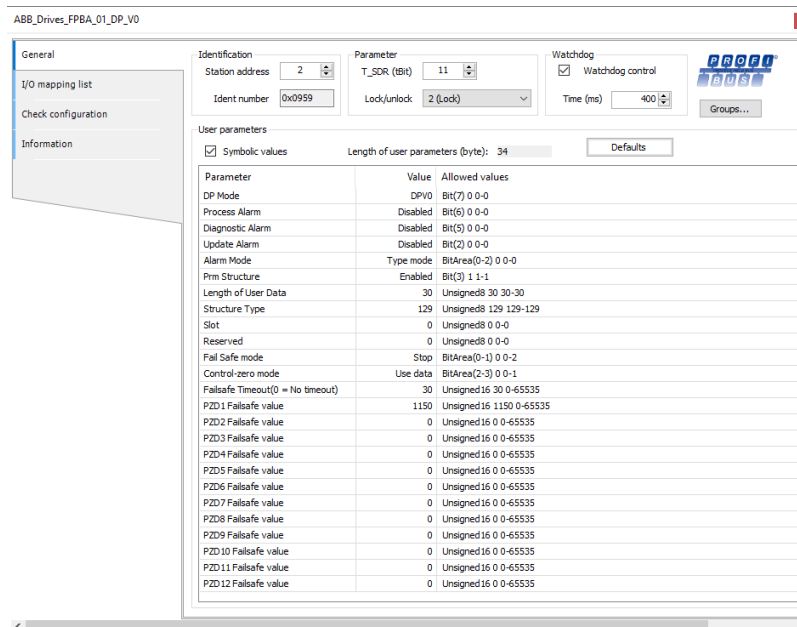


4. Open or create the PLC project that is used to control the drive.

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.

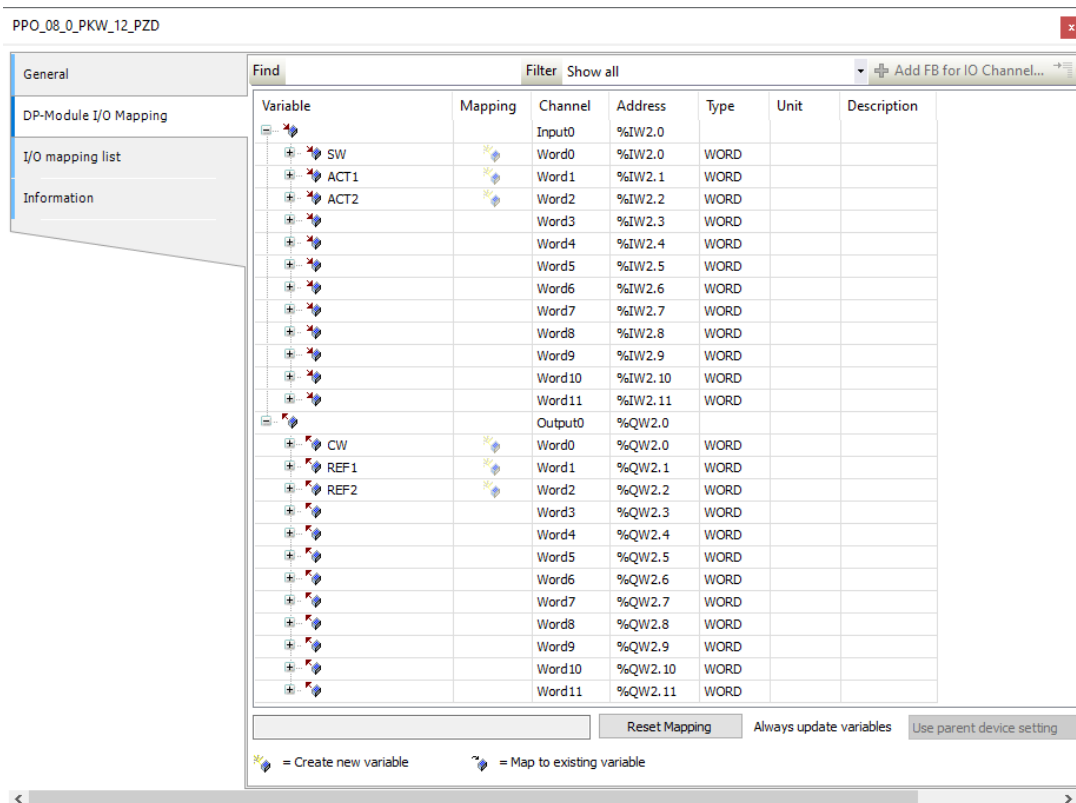


9. Define the adapter module properties: On the FPBA identification tab, select the station address.



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

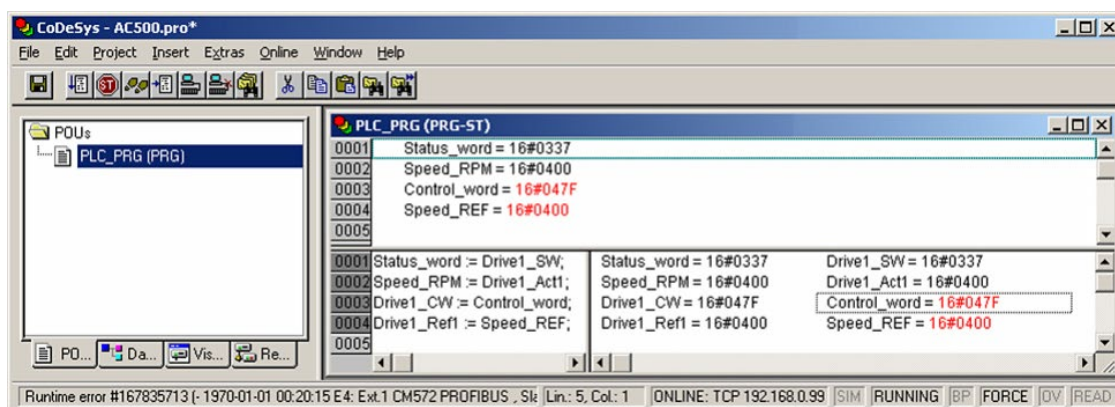
- On the **DP-Module I/O Mapping** tab, type names for the variables that refer to the drive's signals in the PLC program.



11. Open the PLC program and create a program that controls the drive.

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

13. **Note:** Make sure that the variable names defined for the drive's 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



ABB AG

Wallstadter-Straße 59

68526 Ladenburg • Germany

Tel: +49 (0) 6203-71-0

Mail: dc-drives@de.abb.com

Web: new.abb.com/drives/dc