

Quickstart Guide

ABB PLC and drives integration using PROFINET



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Introduction

This guide will take you through the configuration of ABB Drives and PLC (AC500) in order to prepare for PROFINET control and Drive Manager handling. ABB-specific ready-made function blocks and visualizations from the PS553-DRIVES library will be used for the control of the drives.

Drive Manager is an integrated tool in Control Builder Plus, which for instance include online parameter handling of ABB drives.

This guide is built up in “modules” and can be useful even if all “modules” are not used. For instance, Drive Manager may be used separately and does not require use of the PS553-DRIVES library. In the same way, the PS553-DRIVES library may be used independently from Drive Manager.

Safety instructions

Follow all safety instructions delivered with the used components:

- Read the complete safety instructions for the used drive before you install, commission or use the drive. The complete safety instructions are given at the beginning of the drives user’s manual (e.g. for ACS355: 3AUA0000066143 [English]).
- Read all safety and installation instructions of the used PLC. See the online help in CoDeSys (Help → Contents → Target System → AC500 / S500 → Introduction → Overview → Regulations).

Limitations

The following limitations are valid for this guide:

- For all use
 - All instructions in this guide are based on default settings in PLC and drives
 - PS501 Control Builder Plus version 2.2 or later
 - The PLC must be equipped with a CM579 PROFINET interface module
 - The drive must be equipped with a PROFINET adapter
- Function block and visualization library PS553-DRIVES compatibility
 - PROFINET Communication profile: ABB drives
 - Drive types: All PROFINET-compatible ABB drives
 - Application types: Speed/Frequency control or Torque control
- Drive Manager compatibility
 - Drive types: ACS355, ACS850, ACS880, ACSM1 Speed, ACSM1 Motion (Note! More drive types, such as ACS550, will be added in the near future).
 - Application types: Speed/Frequency control, Torque control or Motion control.

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Setup

Drive Manager

AC500 PLC

Control Builder Plus

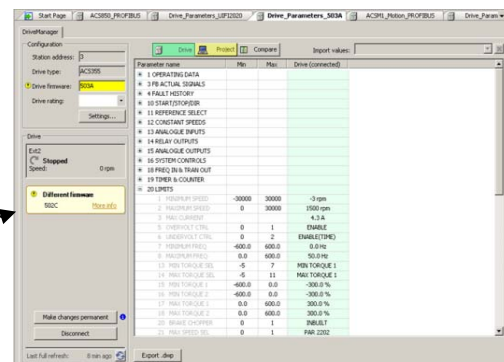
PROFINET
interface
module

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Ethernet connection
between switch and
PLC/switch and PC.

ABB PROFINET
modules

ABB Drives



Hardware physical connection

In the following chapter, physical connection of the hardware will be explained briefly.

AC500 and CM579 PROFINET Master

The PROFINET coupler (CM579) is inserted to the lower part of the terminal base, then clicked in above, in the coupler slot to the left next to the CPU.

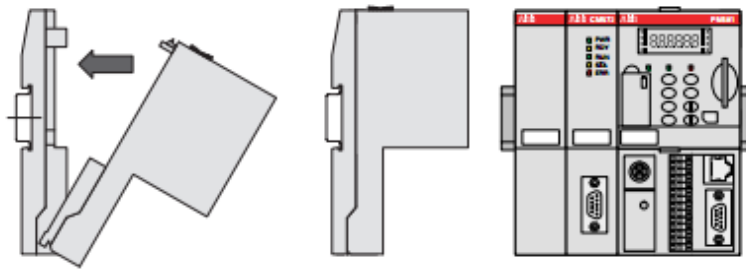
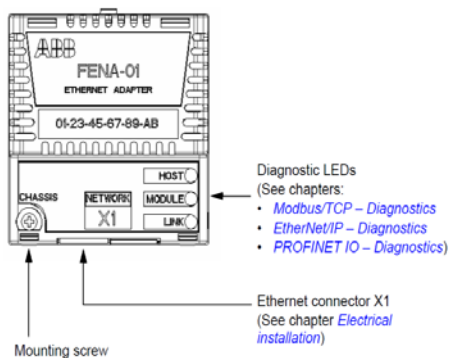
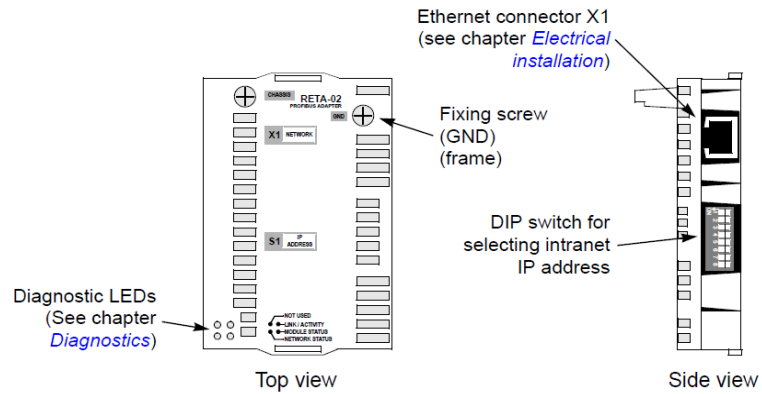


ABB Drive and PROFINET adapter

Depending on drive type, a FENA-01/11 or RETA-02 PROFINET adapter is used. The adapter is mounted in one of the drive slots (slot number depends on drive type).





PROFINET connection

See the following table for connection of the PROFINET link.

Compatible devices	Ethernet Standard IEEE 802.3 and IEEE 802.3u devices
Medium	10BASE-TX or 100Base-TX with Auto-negotiation and Auto-MDIX (Auto-crossover) <ul style="list-style-type: none">• Wiring: CAT5/6 UTP, CAT5/6 FTP, CAT5/6 STP• Connector: RJ-45• Termination: Internal• Maximum segment length: 100 m / 328 ft
Topology	Star
Transfer rate	10 Mbps or 100 Mbps
Serial communication type	Half or full duplex
Protocol	Modbus/TCP, EtherNet/IP, PROFINET IO

Drive configuration

The drive needs to be equipped with PROFINET adapter according to actual drive type.

The following drive configuration steps will adapt the drive to PROFINET control based on ABB-specific drives library PS553-DRIVES as well as prepare the drive for Drive Manager handling.

Drive parameters can be set from the drive's control panel or from drive-specific pc tool (*DriveWindow Light* for ACS355 and ACS550, *DriveStudio* for ACS850 and ACSM1, *Drive Composer* for ACS880 and *DriveWindow* for ACS800). It is also possible to do most of the settings from Drive Manager, see chapter "Drive Manager".

Note! All parameter settings are based on drive default settings. If the drive has been parameterized previously, return to default settings before continuing. It can be done by:

- Changing macro (and then changing back again) in parameter **99.02** for ACS355 and ACS550.
- Setting parameter **99.03** *APPLIC RESTORE* to **YES** in ACS800.
- Setting parameter **16.04** *Param restore* to **Restore defs** in ACS850 and ACSM1.
- Setting parameter **96.06** *Parameter restore* to **Restore defaults** in ACS880.

Starting up ACS355 drives

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter **98.02 COMM PROT SEL** to **EXT FBA**.
3. Set the FENA-01/-11 configuration parameters in group 51. At the minimum, select the communication protocol and profile with parameter **51.02** and configure the network settings with parameters **51.03...51.13**.
4. With parameter **30.18 COMM FAULT FUNC**, select how the drive reacts to a fieldbus communication break.
5. With parameter **30.19 COMM FAULT TIME**, define the time between communication break detection and the selected action.
6. Define the process data transferred to and from the drive in parameter groups 54 and 55.
Note! The adapter module sets the Status word and actual value automatically in parameters **54.01** and **54.02**, and Control word and reference in parameters **55.01** and **55.02**.
7. Validate the settings made in parameter groups 51, 54 and 55 by setting parameter **51.27 FBA PAR REFRESH** to **REFRESH**.
8. Set the relevant drive control parameters to control the drive according to the application.

ACS355 Minimum required parameter settings (based on factory default settings)

Parameter	Description	Setting	Comment
98.02	COMM PROT SEL	EXT FBA	Activates fieldbus module
51.02	PROTOCOL/PROFILE	11 (PNIO ABB Pro)	PROFINET Communication profile "ABB Drives"
51.04	IP CONFIGURATION	0 (Static IP)	PROFINET IP configuration type. Note! Only recommendation.
51.05...51.08	IP ADDRESS	[IP address]	PROFINET IP address
51.09	SUBNET CIDR	[Subnet mask, 24 = 255.255.255.0]	PROFINET Subnet mask
54.01	FBA DATA IN1	4	Status Word as Data Word 1 from drive
54.02	FBA DATA IN2	5	Actual Speed as Data Word 2 from the drive (+/- 20.000)
55.01	FBA DATA OUT1	1	Control Word as Data Word 1 to drive
55.02	FBA DATA OUT2	2	Speed reference as Data Word 2 to the drive (+/- 20.000)

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51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (groups 51 to 55)
10.01	EXT 1 COMMANDS	COMM	Fieldbus interface as source for start and stop
11.02	EXT1/EXT2 SEL	COMM	Fieldbus interface as source to switch to EXT2
11.03	REF1 SELECT	COMM	Fieldbus interface as source for speed reference
16.04	FAULT RESET SEL	COMM	Fieldbus interface as source for fault reset
(11.05)	REF1 MAX	[Scale max]	Max speed/frequency scaling value (used in function block/visualization input "SPEED_REF_MAX"). Must be less or equal to drive parameter max speed/frequency.

ACS355 More actual values or parameters to be read from drive to PLC (optional)

Parameter	Description	Setting	Comment
54.03 .. 54.10	Actual value or parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 0104 = actual current; 0145 = motor temp
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (groups 51 to 55)

ACS355 More parameters to be written from PLC to drive (optional)

Parameter	Description	Setting	Comment
55.03 .. 55.10	Parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 2202 = acceleration time 1
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (groups 51 to 55)

Starting up ACS850 drives

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter **50.01** *FBA enable* to **Enable**.
3. With parameter **50.02** *Comm loss func*, select how the drive reacts to a fieldbus communication break. Note that this function monitors both communication between the fieldbus master and the adapter module and communication between the adapter module and the drive.
4. With parameter **50.03** *Comm loss t out*, define the time between communication break detection and the selected action.
5. Select application-specific values for parameters **50.04...50.11**. Examples of appropriate values are shown in the tables below.
6. Set the FENA-01/11 configuration parameters in group 51. At the minimum, select the communication protocol and profile with parameter **51.02** and configure the network settings with parameters **51.03...51.13**.
7. Define the process data transferred to and from the drive in parameter groups 52 and 53.
Note! The adapter module automatically sets the communication profile-specific virtual address for the Status word in parameter **52.01** and for the Control word in parameter **53.01**.
8. Validate the settings made in parameter groups 51, 52 and 53 by setting parameter **51.27** *FBA par refresh* to **Refresh**.
9. Set the relevant drive control parameters to control the drive according to the application.

ACS850 Minimum required parameter settings (based on factory default settings)

Parameter	Description	Setting	Comment
50.01	Fba enable	Enable	Activates fieldbus module
51.02	PROTOCOL/PROFILE	11 (PNIO ABB Pro)	PROFINET Communication profile "ABB Drives"
51.04	IP CONFIGURATION	0 (Static IP)	PROFINET IP configuration type. Note! Only recommendation.
51.05...51.08	IP ADDRESS	[IP address]	PROFINET IP address
51.09	SUBNET CIDR	[Subnet mask, 24 = 255.255.255.0]	PROFINET Subnet mask
52.01	FBA data in1	4	Status Word as Data Word 1 from drive
52.02	FBA data in2	5	Actual Speed as Data Word 2 from the drive (+/- 20.000)

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53.01	FBA data out1	1	Control Word as Data Word 1 to drive
53.02	FBA data out2	2	Speed reference as Data Word 2 to the drive (+/- 20.000)
51.27	FBA par refresh	Refresh	Updates fieldbus settings (groups 50 to 53)
10.01	Ext1 start func	FB	Fieldbus interface as source for start and stop
12.01	EXT1/EXT2 SEL	P.02.22 bit 15	Fieldbus interface as source to switch to EXT2
21.01	Speed ref1 sel	FBA ref1	Fieldbus interface as source for speed reference
10.10	Fault reset sel	P.02.22 bit 8	Fieldbus interface as source for fault reset
(19.01)	Speed scaling	[Scale max]	Max speed/frequency scaling value (used in function block/visualization input "SPEED_REF_MAX"). Must be less or equal to drive parameter max speed/frequency.

ACS850 More actual values or parameters to be read from drive to PLC (optional)

Parameter	Description	Setting	Comment
52.03 .. 52.12	Actual value or parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 0104 = actual current; 0117 = motor temp 1
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (groups 50 to 53)

ACS850 More parameters to be written from PLC to drive (optional)

Parameter	Description	Setting	Comment
53.03 .. 53.12	Parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 2202 = acceleration time 1
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (groups 50 to 53)

Starting up ACS880 drives

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter **50.01 FBA A Enable** to **Enable**.
3. With parameter **50.02 FBA A comm loss func**, select how the drive reacts to a fieldbus communication break. Note that this function monitors both communication between the fieldbus master and the adapter module and communication between the adapter module and the drive.
4. With parameter **50.03 FBA A comm loss t out**, define the time between communication break detection and the selected action.
5. Select application-specific values for the rest of the parameters in group 50, starting from **50.04**. Examples of appropriate values are shown in the tables below.
6. Set the FENA-11 configuration parameters in group 51. At the minimum, select the communication protocol and profile with parameter **51.02 Protocol/Profile** and configure the network settings with parameters **51.03...51.13**.
7. Define the process data transferred to and from the drive in parameter groups 52 and 53. **Note!** The adapter module automatically sets the communication profile-specific virtual address for the Status word in parameter **52.01** and for the Control word in parameter **53.01**.
8. Validate the settings made in parameter groups 51, 52 and 53 by setting parameter **51.27 FBA par refresh** to **Refresh**.
9. Set the relevant drive control parameters to control the drive according to the application.

ACS880 Minimum required parameter settings (based on factory default settings)

Parameter	Description	Setting	Comment
50.01	FBA A Enable	Enable	Activates fieldbus module
51.02	PROTOCOL/PROFILE	11 (PNIO ABB Pro)	PROFINET Communication profile "ABB Drives"
51.04	IP CONFIGURATION	0 (Static IP)	PROFINET IP configuration type. Note! Only recommendation.
51.05...51.08	IP ADDRESS	[IP address]	PROFINET IP address
51.09	SUBNET CIDR	[Subnet mask, 24 = 255.255.255.0]	PROFINET Subnet mask
52.01	FBA data in1	4	Status Word as Data Word 1 from drive

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52.02	FBA data in2	5	Actual Speed as Data Word 2 from the drive (+/- 20.000)
53.01	FBA data out1	1	Control Word as Data Word 1 to drive
53.02	FBA data out2	2	Speed reference as Data Word 2 to the drive (+/- 20.000)
51.27	FBA par refresh	Configure	Updates fieldbus settings (groups 50 to 57)
19.11	Ext1/Ext2 selection	Mcw Bit11 (06.01)	Fieldbus interface as source to switch to EXT2 control location
20.01	Ext1 commands	Fieldbus A	Fieldbus interface as source for start and stop
20.02	Ext1 start trigger	Level	To directly restart after Coast Stop (Off3)
22.11	Speed ref1 selection	FB A ref1	Fieldbus interface as source for speed reference
31.11	Fault reset selection	P.06.01 bit 7	Fieldbus interface as source for fault reset
(46.01)	Speed scaling	[Scale max]	Max speed/frequency scaling value (used in function block/visualization input "SPEED_REF_MAX"). Must be less or equal to drive parameter max speed/frequency.

ACS880 More actual values or parameters to be read from drive to PLC (optional)

Parameter	Description	Setting	Comment
52.03 .. 52.12	Actual value or parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 0107 = actual current; 3501 = motor est. temp
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (groups 50 to 57)

ACS880 More parameters to be written from PLC to drive (optional)

Parameter	Description	Setting	Comment
53.03 .. 53.12	Parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 2312 = acceleration time 1
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (groups 50 to 57)

Starting up ACSM1 drives

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter **50.01 FBA ENABLE** to **Enable**.
3. With parameter **50.02 COMM LOSS FUNC**, select how the drive reacts to a fieldbus communication break. Note that this function monitors both communication between the fieldbus master and the adapter module and communication between the adapter module and the drive.
4. With parameter **50.03 COMM LOSS T OUT**, define the time between communication break detection and the selected action.
5. Select application-specific values for parameters **50.04...50.11**. Examples of appropriate values are shown in the tables below.
6. Set the FENA-11 configuration parameters in group 51. At the minimum, select the communication protocol and profile with parameter **51.02** and configure the network settings with parameters **51.03...51.13**.
7. Define the process data transferred to and from the drive in parameter groups 52 and 53. **Note!** The adapter module automatically sets the communication profile-specific virtual address for the Status word in parameter **52.01** and for the Control word in parameter **53.01**.
8. Validate the settings made in parameter groups 51, 52 and 53 by setting parameter **51.27 FBA PAR REFRESH** to **REFRESH**.
9. Set the relevant drive control parameters to control the drive according to the application.

ACSM1 Minimum required parameter settings (based on factory default settings)

Parameter	Description	Setting	Comment
50.01	FBA ENABLE	Enable	Activates fieldbus module
51.02	PROTOCOL/PROFILE	11 (PNIO ABB Pro)	PROFINET Communication profile "ABB Drives"
51.04	IP CONFIGURATION	0 (Static IP)	PROFINET IP configuration type. Note! Only recommendation.
51.05...51.08	IP ADDRESS	[IP address]	PROFINET IP address
51.09	SUBNET CIDR	[Subnet mask, 24 = 255.255.255.0]	PROFINET Subnet mask
52.01	FBA DATA IN1	4	Status word as Data Word 1 from the drive

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52.02	FBA DATA IN2	5	Actual speed as Data Word 2 from the drive (+/- 20.000)
53.01	FBA DATA OUT1	1	Control word as Data Word 1 to the drive
53.02	FBA DATA OUT2	2	REF1 – Speed reference as Data Word 2 to the drive (+/- 20.000)
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (groups 50 to 53)
10.01	EXT1 START FUNC	FBA	Fieldbus interface as source for start and stop
34.01	EXT1/EXT2 SEL	P.02.12 bit 15	Fieldbus interface as source to switch to EXT2 control location
24.01	SPEED REF1 SEL	FBA REF1	Fieldbus interface as source for speed reference
10.08	FAULT RESET SEL	P.02.12 bit 8	Fieldbus interface as source for fault reset
(25.02)	SPEED SCALING	[Scale max]	Max speed/frequency scaling value (used in function block/visualization input "SPEED_REF_MAX"). Must be less or equal to drive parameter max speed/frequency.

ACSM1 More actual values or parameters to be read from drive to PLC (optional)

Parameter	Description	Setting	Comment
52.03 .. 52.12	Actual value or parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 0104 = actual current; 0117 = motor temp
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (groups 50 to 53)

ACSM1 More parameters to be written from PLC to drive (optional)

Parameter	Description	Setting	Comment
53.03 .. 53.12	Parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 2503 = acceleration time
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (groups 50 to 53)

Starting up ACS550 drives (supported by Drive Manager from CBP version 2.3)

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter **98.02 COMM PROT SEL** to **EXT FBA**.
3. With parameter **30.18 COMM FAULT FUNC**, select how the drive reacts to a fieldbus communication break.
4. With parameter **30.19 COMM FAULT TIME**, define the time between communication break detection and the selected action.
5. Set the RETA-02 configuration parameters in group 51. At the minimum, set the required IP address in parameters **51.04...51.07**, Subnet mask in parameters **51.08...51.11** and **51.16** Protocol to **1 (PROFINET IO)**.
6. Define the process data transferred to and from the drive in the RETA-02 configuration parameter group 51.
Note! The Status Word, Actual Speed, Control Word and Speed Reference are fixed in ACS550 and not necessary to set.
7. Validate the settings made in parameter group 51 by setting parameter **51.27 FBA PAR REFRESH** to **REFRESH**.
8. Set the relevant drive control parameters to control the drive according to the application.

ACS550 Minimum required parameter settings (based on factory default settings)

Parameter	Description	Setting	Comment
98.02	COMM PROT SEL	EXT FBA	Activates fieldbus module
51.03	DHCP	0 (DHCP disabled)	Dynamic Host Configuration Protocol. Note! Only recommendation.
51.04...51.07	IP address	[IP address]	PROFINET IP address
51.08...51.11	Subnet mask	[Subnet mask]	PROFINET Subnet mask
51.16	Protocol	1 (PROFINET IO)	PROFINET communication
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (group 51)
10.01	EXT 1 COMMANDS	COMM	Fieldbus interface as source for start and stop
11.02	EXT1/EXT2 SEL	COMM	Fieldbus interface as source to switch to EXT2
11.03	REF1 SELECT	COMM	Fieldbus interface as source for speed reference
16.04	FAULT RESET SEL	COMM	Fieldbus interface as source for fault reset
(11.05)	REF1 MAX	[Scale max]	Max speed/frequency scaling value (used in function block/visualization input "SPEED_REF_MAX"). Must be less or equal to drive parameter max speed/frequency.

ACS550 More actual values or parameters to be read from drive to PLC (optional)

Parameter	Description	Setting	Comment
51.06,51.08,,51.20	Actual value or parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 0104 = actual current; 0145 = motor temp
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (group 51)

ACS550 More parameters to be written from PLC to drive (optional)

Parameter	Description	Setting	Comment
51.05,51.07,,51.19	Parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 2202 = acceleration time 1
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (group 51)

Starting up ACS800 drives (not supported by Drive Manager)

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter **98.02 COMM. MODULE LINK** to **FIELD BUS**.
3. With parameter **30.18 COMM FLT FUNC**, select how the drive reacts to a fieldbus communication break.
4. With parameter **30.19 MAIN REF DS T-OUT**, define the time between communication break detection and the selected action.
5. Set the RETA-02 configuration parameters in group 51. At the minimum, set the required IP address in parameters **51.04...51.07**, Subnet mask in parameters **51.08...51.11** and **51.16** Protocol to **1 (PROFINET IO)**.
6. Define the process data transferred to and from the drive in the RETA-02 configuration parameter group 51.
Note! The Status Word, Actual Speed, Control Word and Speed Reference are fixed in ACS550 and not necessary to set.
7. Validate the settings made in parameter group 51 by setting parameter **51.27 FBA PAR REFRESH** to **REFRESH**.
8. Set the relevant drive control parameters to control the drive according to the application.

ACS800 Minimum required parameter settings (based on factory default settings)

Parameter	Description	Setting	Comment
98.02	COMM. MODULE LINK	FIELD BUS	Activates fieldbus module
98.07	COMM PROFILE	ABB DRIVES	Communication profile "ABB Drives"
51.03	DHCP	0 (DHCP disabled)	Dynamic Host Configuration Protocol. Note! Only recommendation.
51.04...51.07	IP address	[IP address]	PROFINET IP address
51.08...51.11	Subnet mask	[Subnet mask]	PROFINET Subnet mask
51.16	Protocol	1 (PROFINET IO)	PROFINET communication
51.02	NODE ADDRESS	[PB NODE]	PROFIBUS DP node address of the drive
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (groups 51 to 55)
10.01	EXT 1 STRT/STP/DIR	COMM.CW	Fieldbus interface as source for start and stop

11.02	EXT1/EXT2 SELECT	COMM.CW	Fieldbus interface as source to switch to EXT2 control location
11.03	EXT REF1 SELECT	COMM.REF	Fieldbus interface as source for speed reference
16.04	FAULT RESET SEL	COMM.CW	Fieldbus interface as source for fault reset
(11.05)	EXT REF1 MAXIMUM	[Scale max]	Max speed/frequency scaling value (used in function block/visualization input "SPEED_REF_MAX"). Must be less or equal to drive parameter max speed/frequency.

ACS800 More actual values or parameters to be read from drive to PLC (optional)

Parameter	Description	Setting	Comment
51.06,51.08,51.20	Actual value or parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 0104 = actual current; 0145 = motor temp
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (group 51)

ACS800 More parameters to be written from PLC to drive (optional)

Parameter	Description	Setting	Comment
51.05,51.07,51.19	Parameter of drive	GGii	GG = parameter group, ii = parameter index e.g. 2202 = acceleration time 1
51.27	FBA PAR REFRESH	REFRESH	Updates fieldbus settings (group 51)

Control Builder Plus for PLC and Drives

Start the “Control Builder Plus” PC tool for PLC configuration and Drive Manager handling and go through the following steps.

Install PS553-Drives library

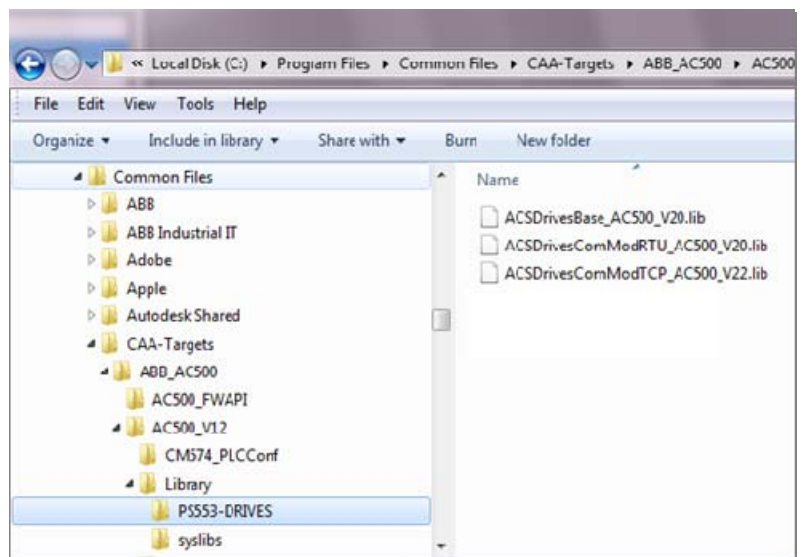
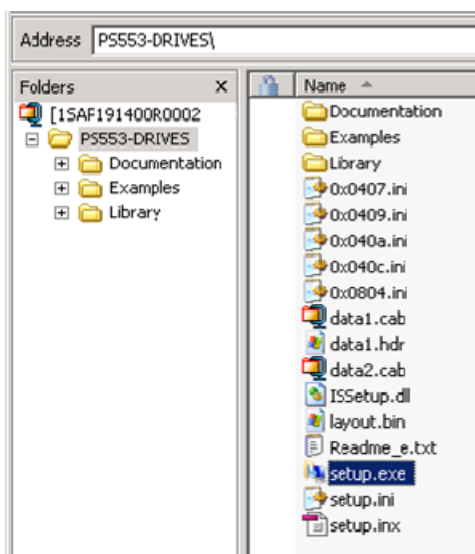
Note! In Control Builder Plus V2.3 and later, the ACSDrivesBase library is already installed. You can find it in the subfolder “PS553-DRIVES” of the default library folder (see right picture below)

Note! The version of the library can differ, nevertheless the name will stay the same! Creation date and main changes can be seen in the library manager of CODESYS only.

For older Versions of Control Builder Plus you can download the installation package in the following way from:

- www.abb.com/PLC:
- On right side menu under heading "Your preferences": Select "English" as language ... (country doesn't matter).
- On right side menu under "More Info Links" : Click on "PS501 Updates".
- Select "PS501-UPDA: PS553-DRIVES..." to download *.zip file.

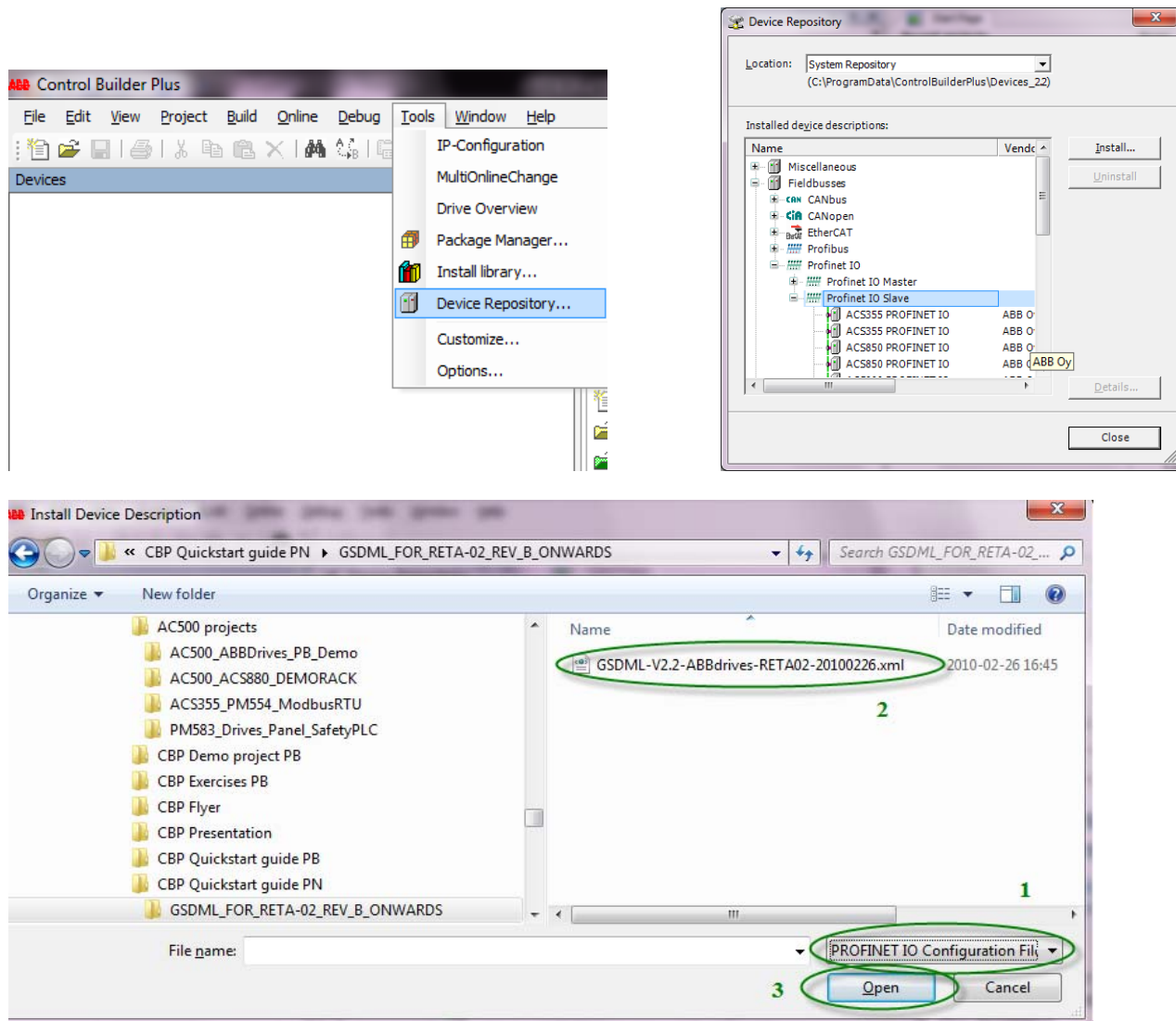
Install the drives library “PS553-DRIVES” with ready-made function blocks and visualization objects by unzipping to a temporary directory and clicking on the file “setup.exe” (see left picture below).



Install GSDML files

In the installation of Control Builder Plus version 2.2.0 and later, GSD files for the ABB PROFINET module FENA-01/11 are included. However, for RETA-02 PROFINET modules (used in drives ACS550 and ACS800) you need to install the GSD file manually (RETA-02 GSD files are included in this package, however we recommend you to search the ABB web for the latest versions). Use GSD file according to RETA-02 version. In later versions of Control Builder Plus, also GSD files for RETA-02 will be included in the installation.

To install a GSD file, open Control Builder Plus and choose “Device Repository” from the “Tools” menu. Click “Install”, choose to display PROFINET IO objects (1), select the GSD file included in this package (2) and click “Open”. Close the Device Repository window and check that the question marks have disappeared from ACS550 and ACS800 in the Control Builder Plus device tree.

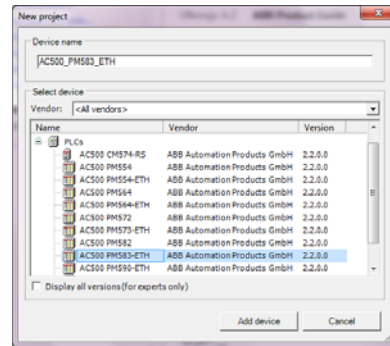
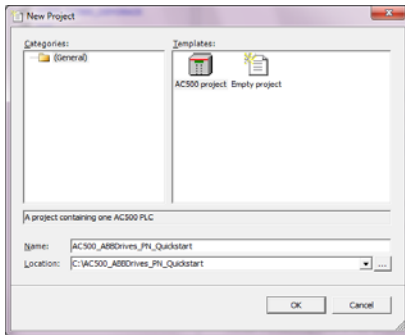


Quickstart Guide

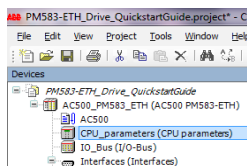
ABB PLC and drives integration using PROFINET

Hardware configuration

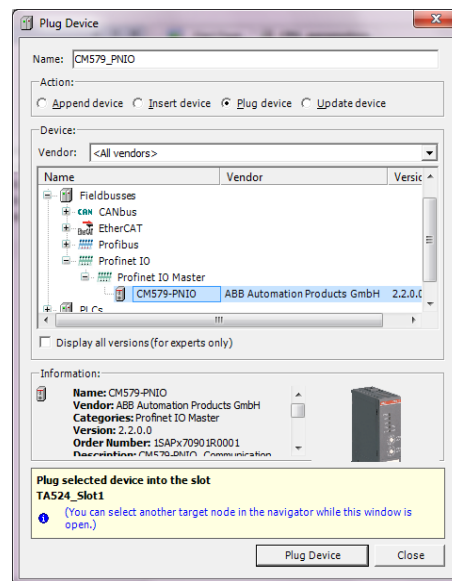
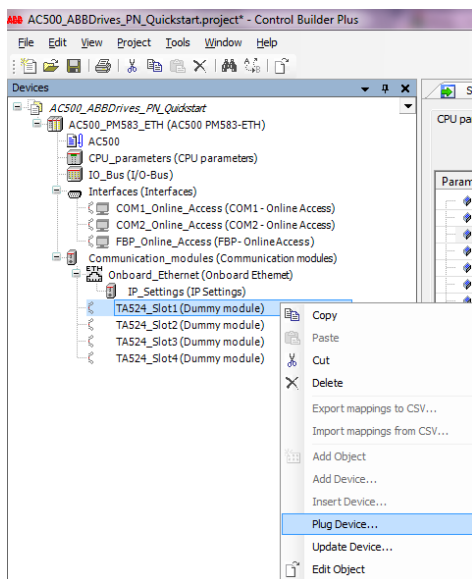
File → New Project → Choose “AC500 project” and name the project. Choose PLC device according to your equipment and then “Add device”.



Double-click “CPU_parameters” and configure according to your application. Set for instance “Check battery” = “Off” if your CPU does not have a battery installed.



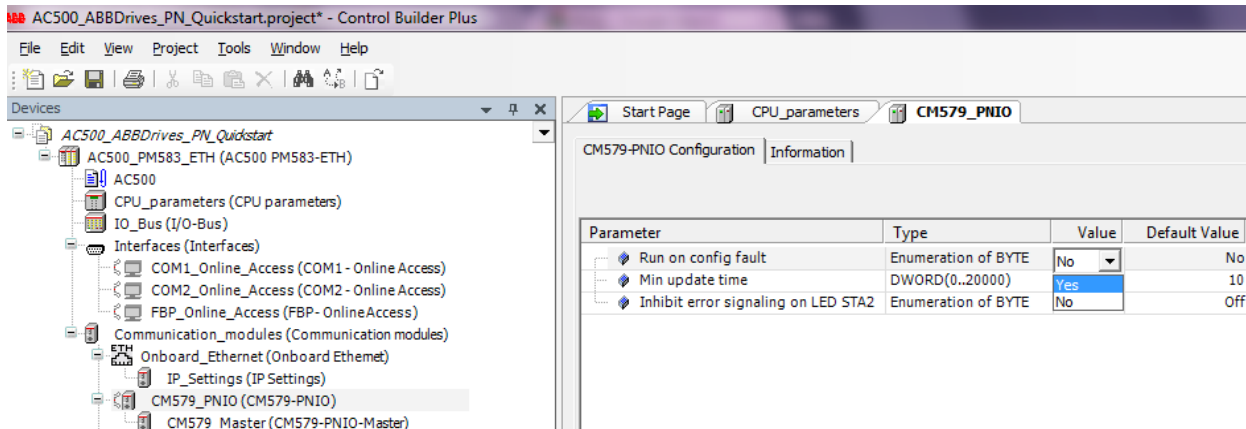
Add a PROFINET communication interface (PROFINET Master). Right-click “TA524_Slot1” under “Communication modules” and click “Plug Device”. Choose “Fieldbusses → Profinet IO → Profinet IO Master → CM579-PNIO” and “Plug Device”, then “Close”.



To keep the PLC in “Run” mode even when a PROFINET slave is missing (unconnected for instance), double-click “CM579_PNIO” and set “Run on config fault” = “Yes”.

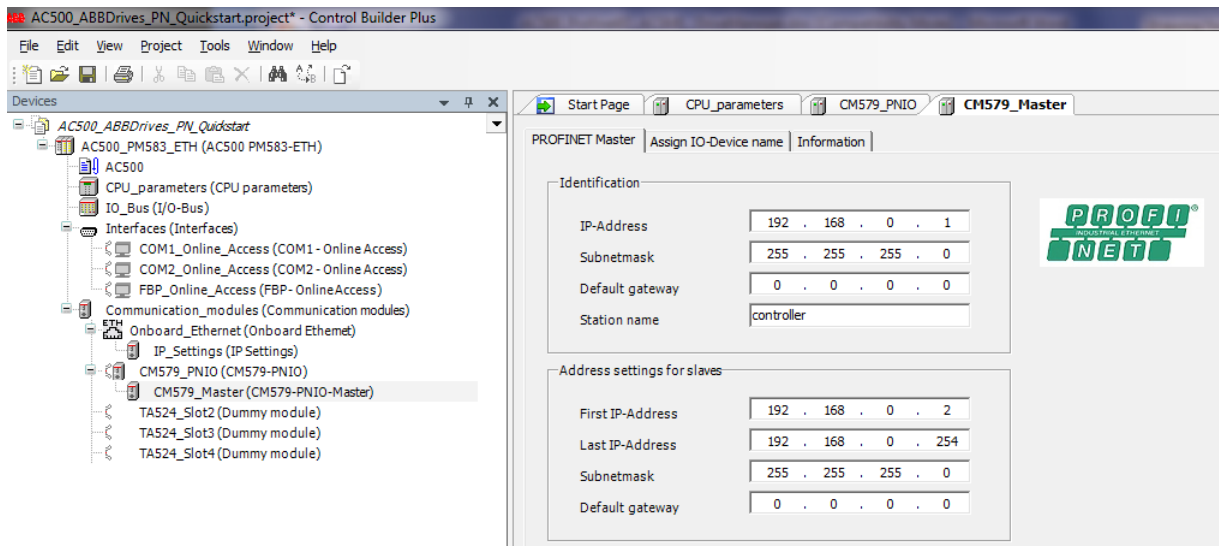
Quickstart Guide

ABB PLC and drives integration using PROFINET



Double-click “CM579_Master (CM579-PNIO-Master)” to configure the CM579 PROFINET module.

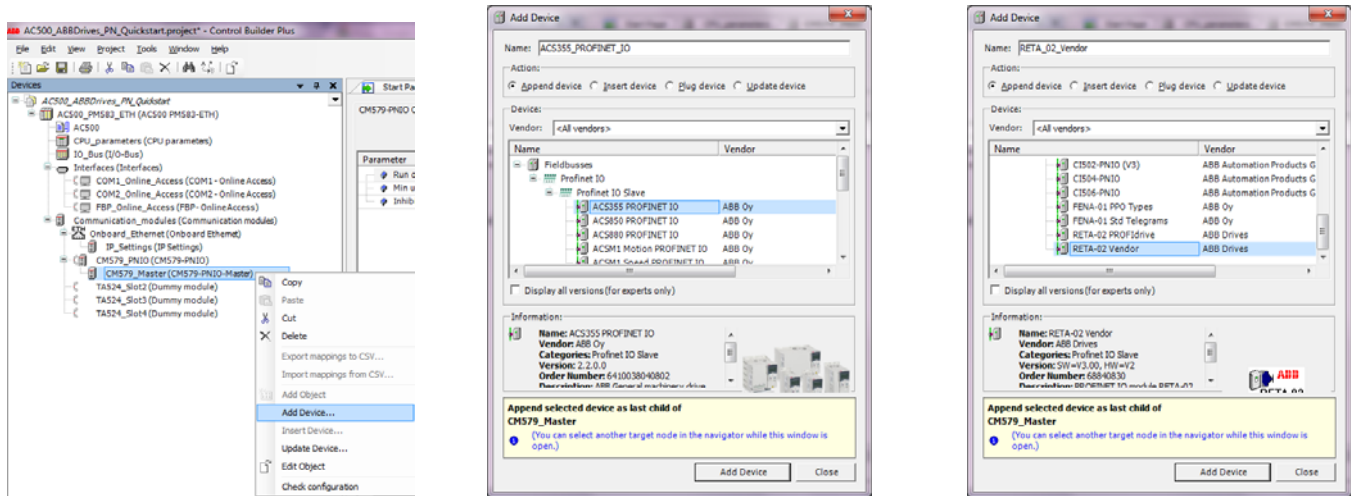
Define the network settings for the PROFINET master in the “Identification” section of the “PROFINET Master” tab. The section “Address settings for slaves” defines the address range for a network scan for PROFINET slave devices. The IP address range should include the IP address you have set in the drive configuration.



Quickstart Guide

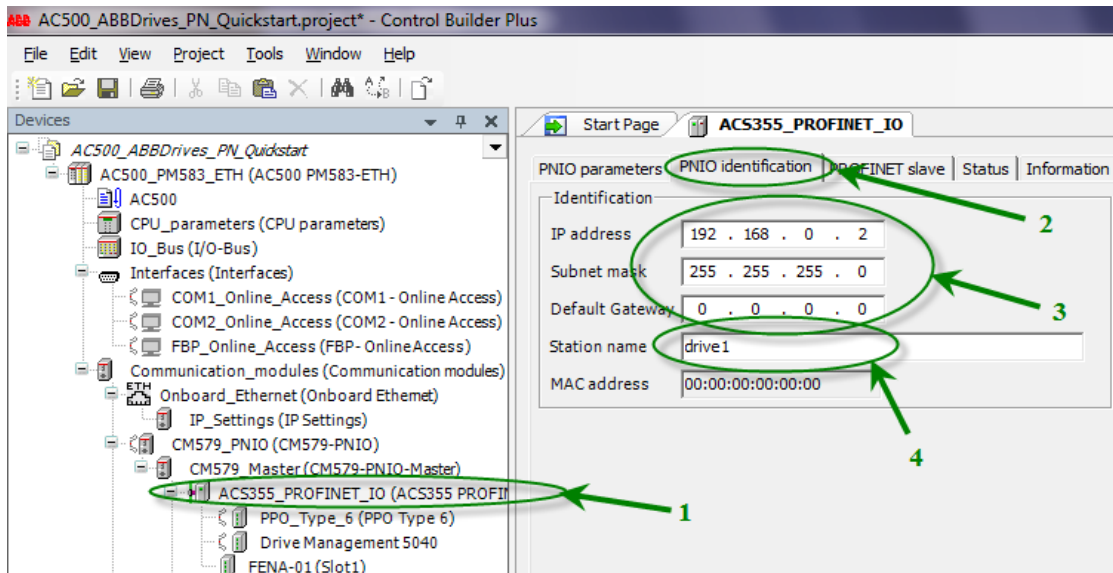
ABB PLC and drives integration using PROFINET

Add a drive to the PROFINET line. Right-click “CM579_Master” and click “Add Device”. Choose PROFINET IO Slave according to actual drive type and click “Add Device”. For RETA-02 modules (ACS550 and ACS800), “RETA-02 Vendor” is recommended since it corresponds to communication profile “ABB Drives” which is supported by the function blocks in the PS553-DRIVES library. Add more drives if needed and then click “Close”.



Double-click the drive (1) and open the tab “PNIO identification” (2) to view or modify the network settings (3) of the drive. Give the drive a suitable “Station name” (4).

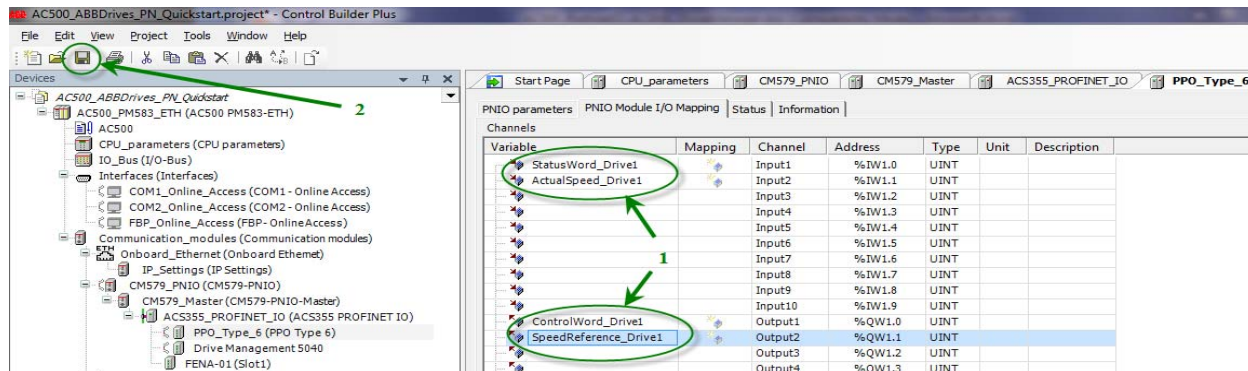
Note! Only lower case (small) letters, numbers and “-” are allowed in “Station name”!



Quickstart Guide

ABB PLC and drives integration using PROFINET

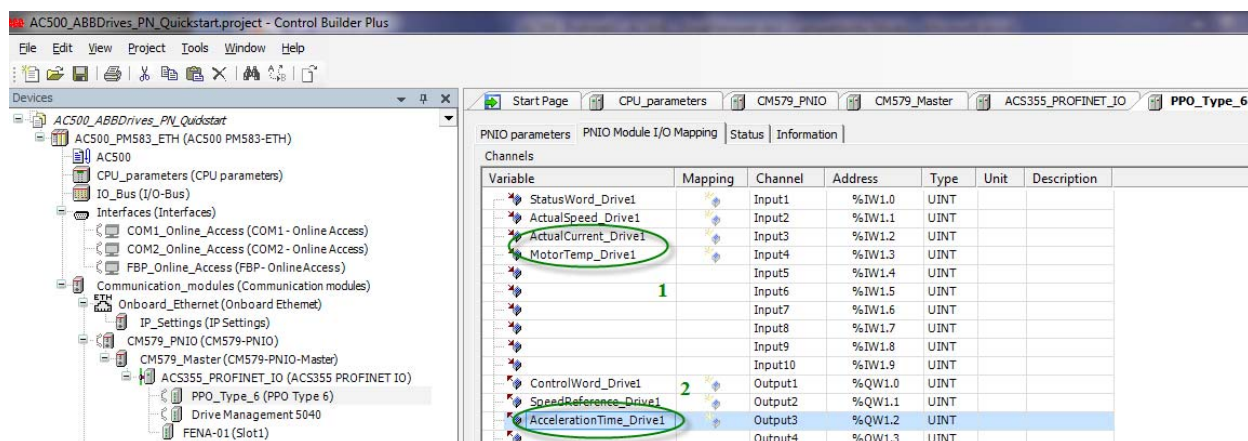
Create global variables connected to the Process Data of actual drive. Double-click “PPO_XX_.....” under actual drive and open the “PNIO Module I/O Mapping” tab. Give suitable names at least to the Status Word, Actual Speed, Control Word and Speed Reference (1), see example in the picture below. The variables you create are global and the names must be **unique** within the whole project. Then save the project (2).



More process data between PLC and drive (optional)

If you want to add more process data between PLC and drive, see example in the picture below where actual current, motor temp have been added to Inputs and acceleration time has been added to Outputs. This “extra” communication also needs specific drive parameter settings, see chapter “Drive configuration”.

Note! Variables which will be written from the PLC to the drive will set the parameter in the drive to zero if they are not set somewhere in the program.

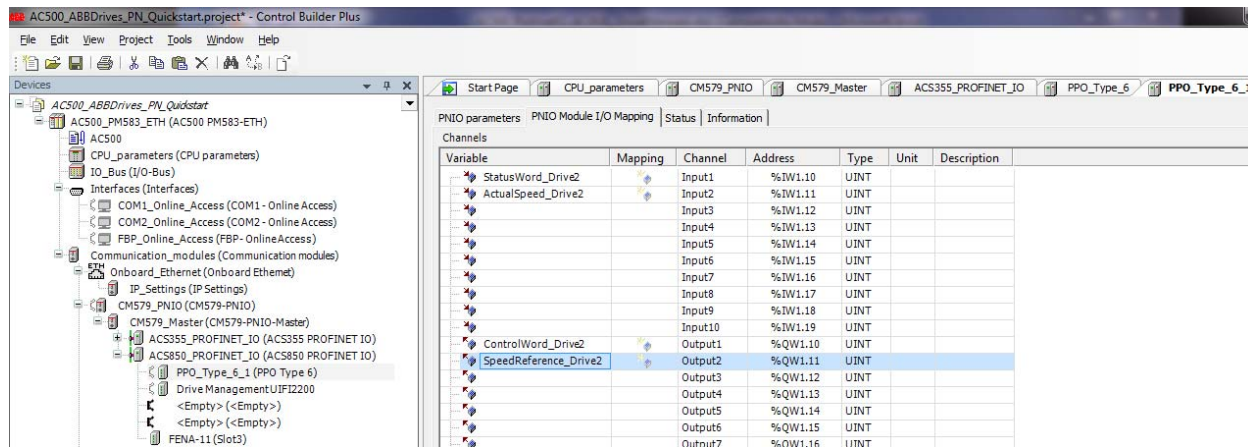


Quickstart Guide

ABB PLC and drives integration using PROFINET

Add more drives (optional)

If you want to add more drives to the project, follow the same procedure as above. When the hardware is added, a unique “IP address” has been given to the drive and drive global variables have been added in PNIO Module I/O Mapping according to earlier instruction, then save the project.



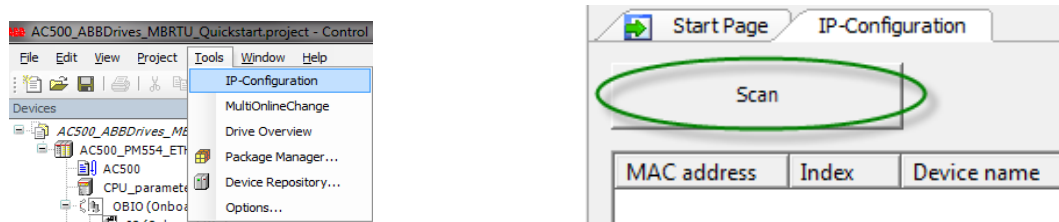
Continue to add as many drives as you need.

IP configuration of CPU (for Ethernet connection between PC and PLC)

If the CPU has an Ethernet port and the CPU IP address has not already been configured, follow the steps below.

De-activate the firewall of the PC, or allow the connection if question comes up. Connect an Ethernet cable between PC and PLC (or via a switch).

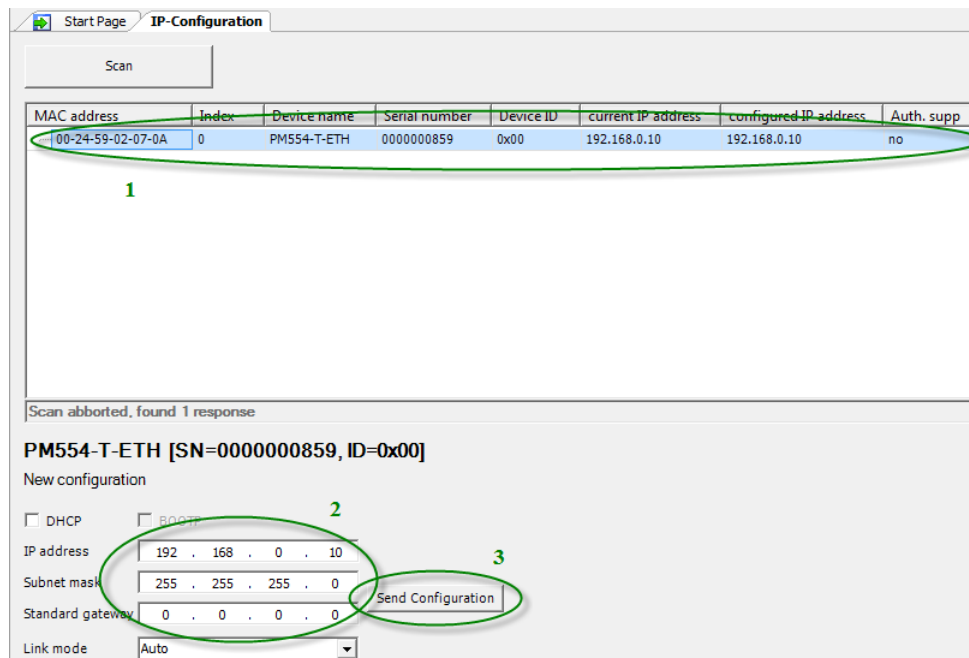
Open the IP configuration tool from the “Tools” menu and press the “Scan” button.



Select actual PLC from the scanned objects (1), make your network settings (2) and press the “Send Configuration” button. This needs to be done the first time you connect to the PLC even if the IP address is already correct.

Note! The PLC needs to be in “STOP” mode for IP configuration.

After the new configuration was sent the PLC will automatically reboot.



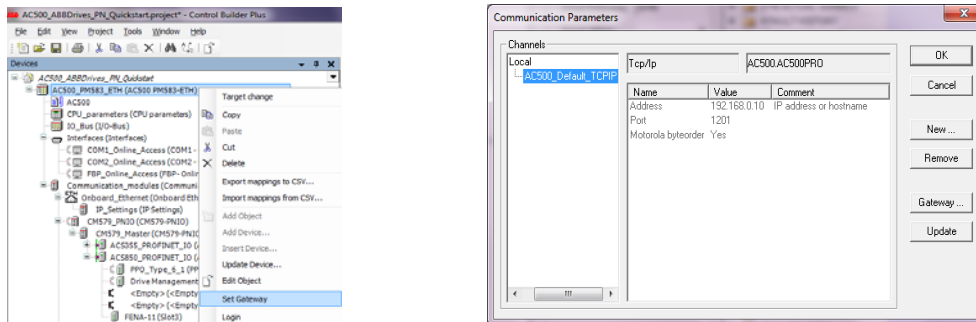
Quickstart Guide

ABB PLC and drives integration using PROFINET

Assign I/O-Device names

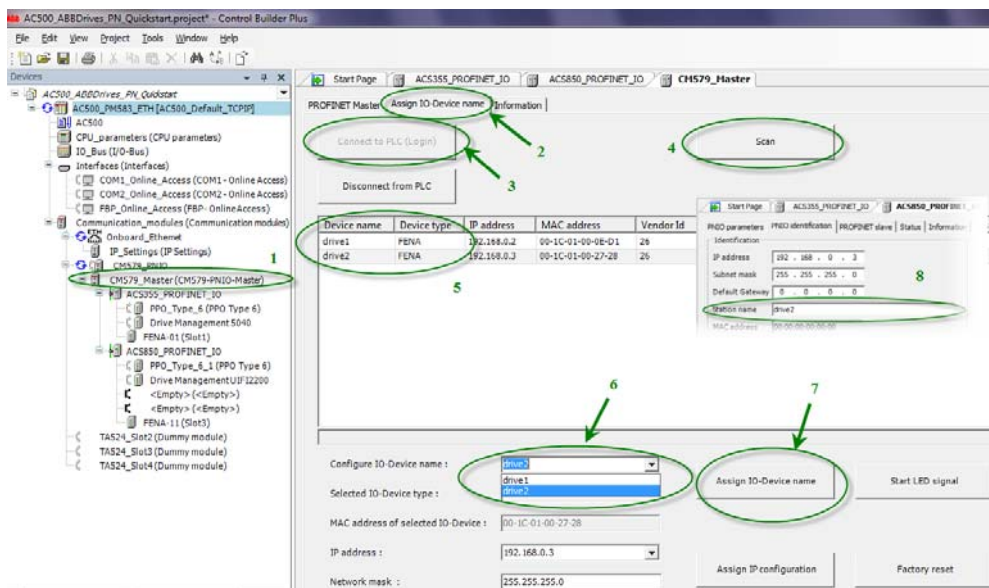
Connect the CM579 PROFINET interface and all the drives physically to the PROFINET network.

Set Gateway for connection to PLC and drives. Right-click the target line and choose “Set Gateway”, see picture below. Choose the correct communication parameters, see example below for Ethernet connection to an AC500 with default settings (IP address 192.168.0.10). If Ethernet is used, make sure the Ethernet port of your PC belongs to the same subnet as the PLC (192.168.0.XXX), see also description in chapter “Download program to PLC”.



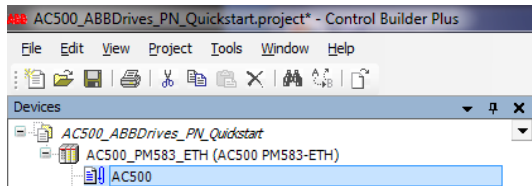
Double-click “CM579_Master (1) and open the “Assign IO-Device name” tab (2). Click the “Connect to PLC (Login)” button (3) and then the “Scan” button (4) to display a list of all connected drives. For each drive, select the drive in the Device list (5), select name in the “Configure IO-Device name:” field (6) and click the “Assign I/O-Device name” button (7).

Note! The IO-Device name must correspond to the “Station name” (8) previously given to the drive in the “PNIO identification” tab of the drive.



CODESYS

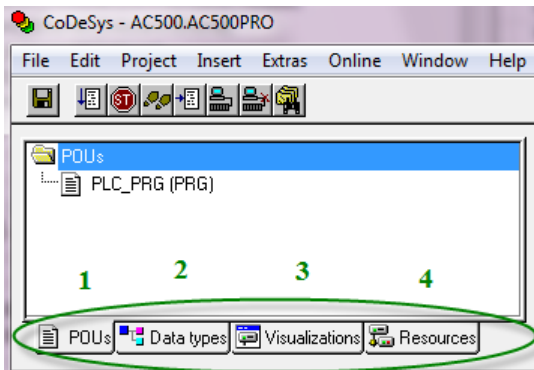
Double-click “AC500” from the Device tree in the Control Builder Plus project to open CODESYS.



CODESYS tabs

In CODESYS there are four different tabs for programming, configuration, etc.

1. POU (Program Organization Units): This tab contains your Functions, Function blocks and Programs.
2. Data types: In this tab, along with the standard data types you can define your own user-specific data types.
3. Visualizations: In this tab you can create your own or use predefined visualizations so that you can display your project variables. In Online mode, these can then change their form/color/text/position/output in response to specified variable values.
4. Resources: In this tab you can configure and organize your project. It includes Global variables, Library manager, etc.

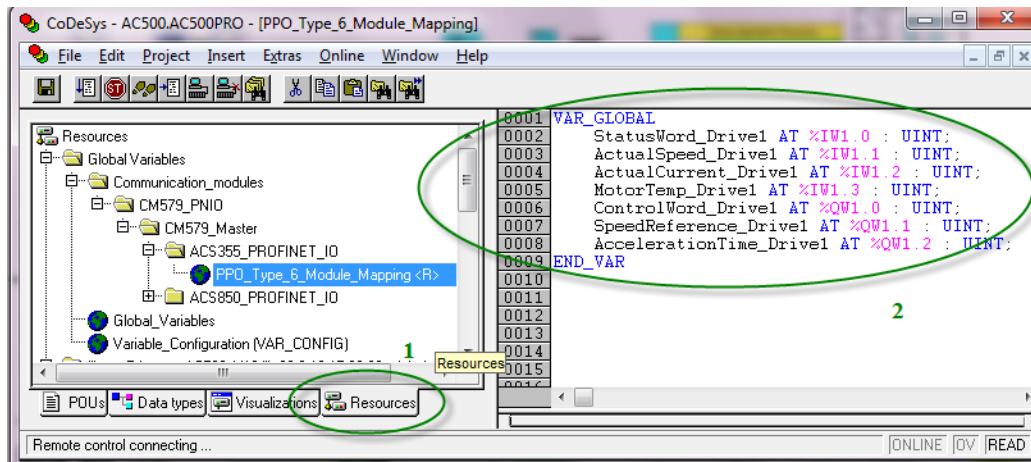


Global variables

In the “Resources” tab (1), check that “Global variables” for actual drive/drives have been created (2).

Note! The variables “ActualCurrent_Drive1”, “MotorTemp_Drive1” and “AccelerationTime_Drive1” are optional (example) and not needed for basic functionality.

Note! All global variables can be used anywhere in the program. Variables which will be written from the PLC to the drive will set the parameter in the drive to zero if they are not set somewhere in the program. See “AccelerationTime_Drive1” in the example below.

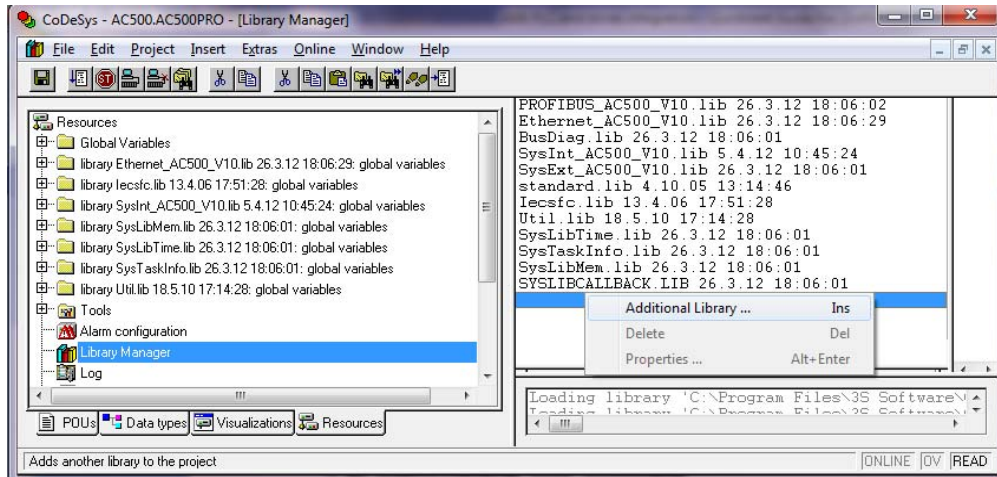


Quickstart Guide

ABB PLC and drives integration using PROFINET

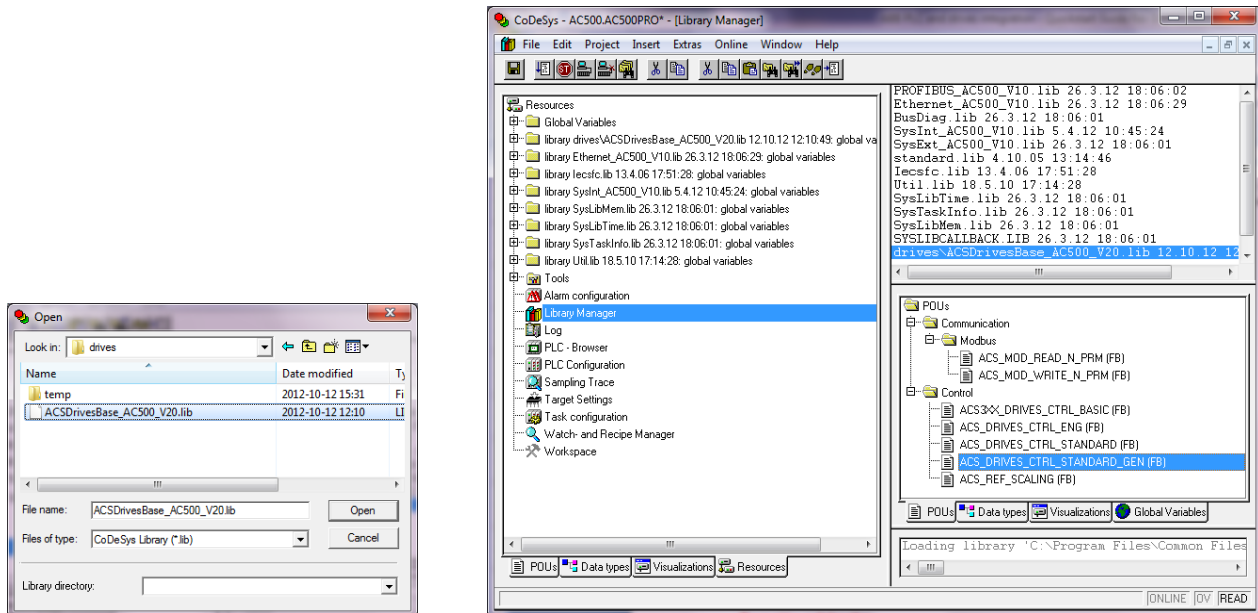
Library Manager

Open the Library Manager by double-clicking “Library Manager” from the “Resources” tab. Right-click in the library field and choose “Additional Library”.



Find your “ACSDrivesBase” library file and click “Open”. The library is added to the project.

Note! When copying projects, the used libraries must be found on the same library path as on the original PC. Otherwise a warning will show that a library cannot be found. If so, this red marked library has to be deleted and added newly from the now different path to the project.



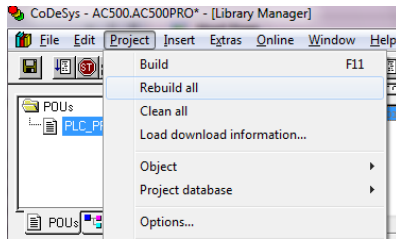
Quickstart Guide

ABB PLC and drives integration using PROFINET

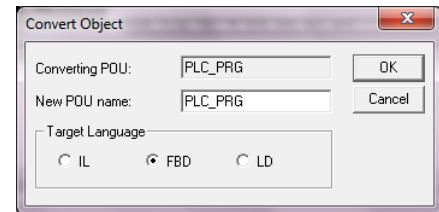
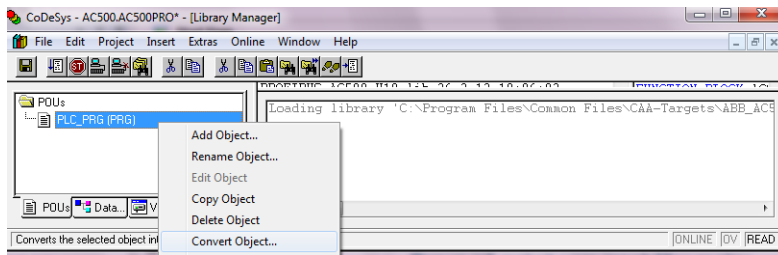
PLC logic

The following program handles a Speed control drive application.

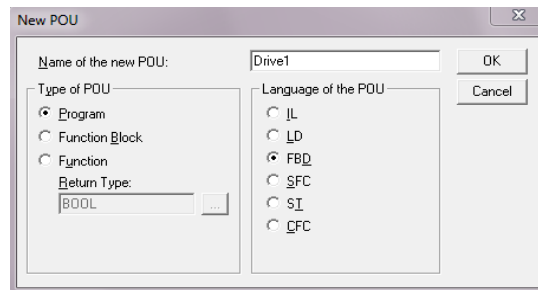
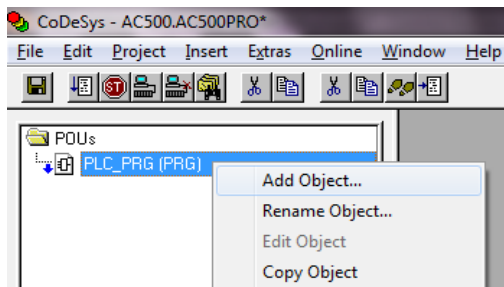
Compile your project, choose “Rebuild all” from the “Project” menu.



Right-click “PLC_PRG” in the “POUs” tab and choose “Convert Object”. Choose Target Language “FBD” and click “OK”.



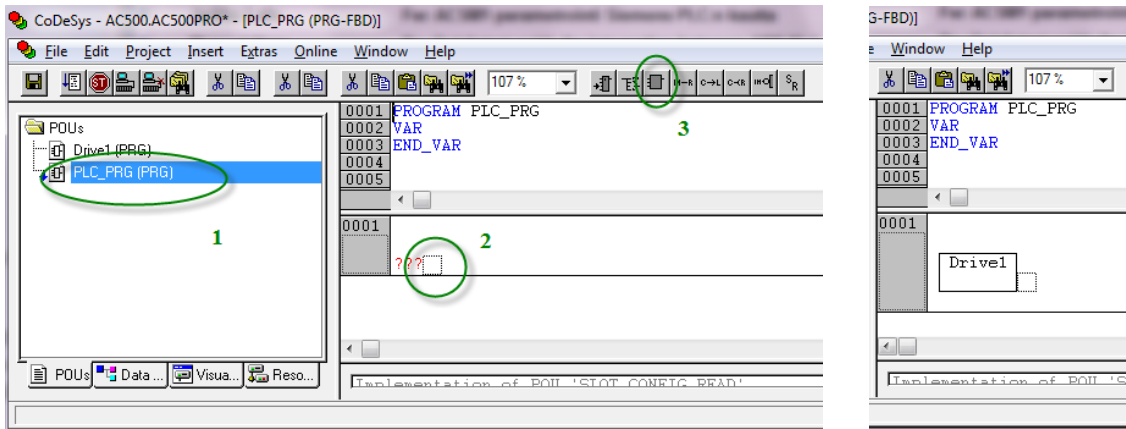
Right-click in the POU's field and choose “Add Object”. Set Type of POU to “Program” and Language of the POU to “FBD”, give the new Program a suitable name and click “OK”.



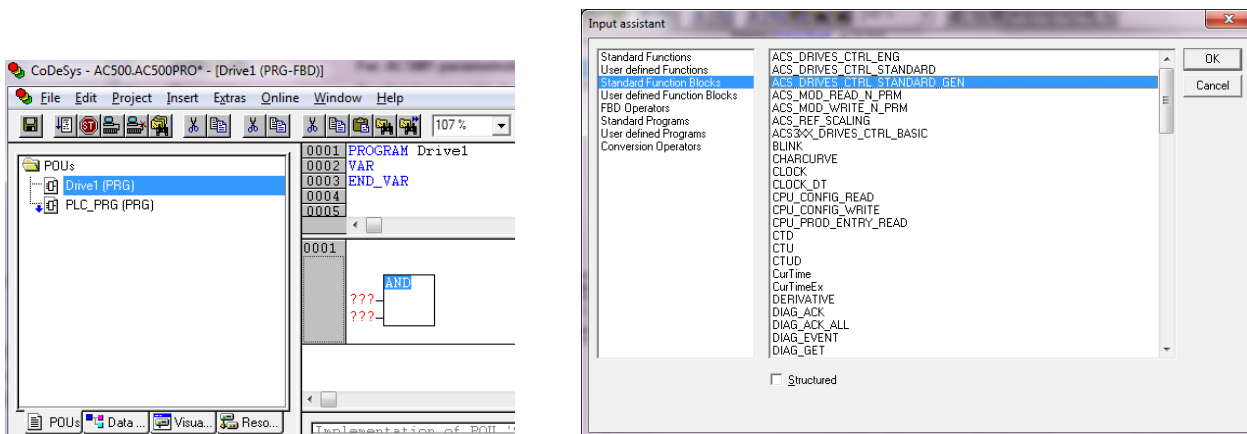
Double-click “PLC_PRG” (1) to open the main program. Select the marked box (2) in Network 0001 and insert a box (3). Write the name of your new Program (PRG) to call for it from the main program.

Quickstart Guide

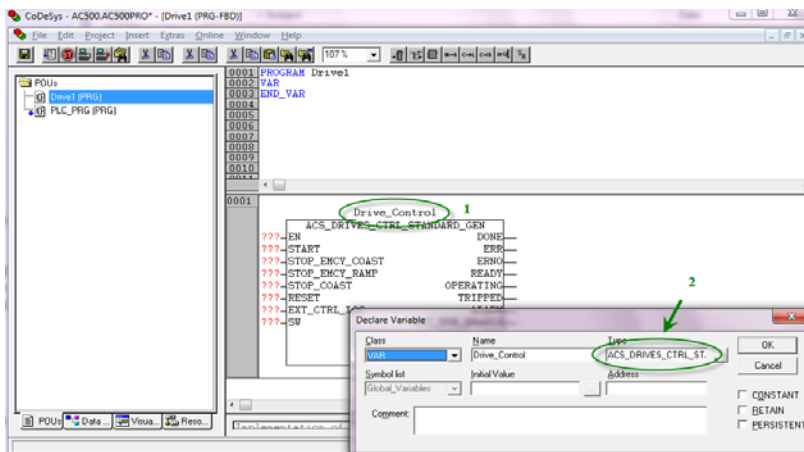
ABB PLC and drives integration using PROFINET



Double-click your new program and add a box as described above. This time, press F2 while the block title is selected and choose “ACS_DRIVES_CTRL_STANDARD_GEN” from “Standard Function Blocks”, then click “OK” (Tip: untick the “Structured” box in the Input assistant).



Give the instance of the drive control block a suitable name (1) and declare the variable of type “ACS_DRIVES_CTRL_STANDARD_GEN” (2) (automatic suggestion).



Quickstart Guide

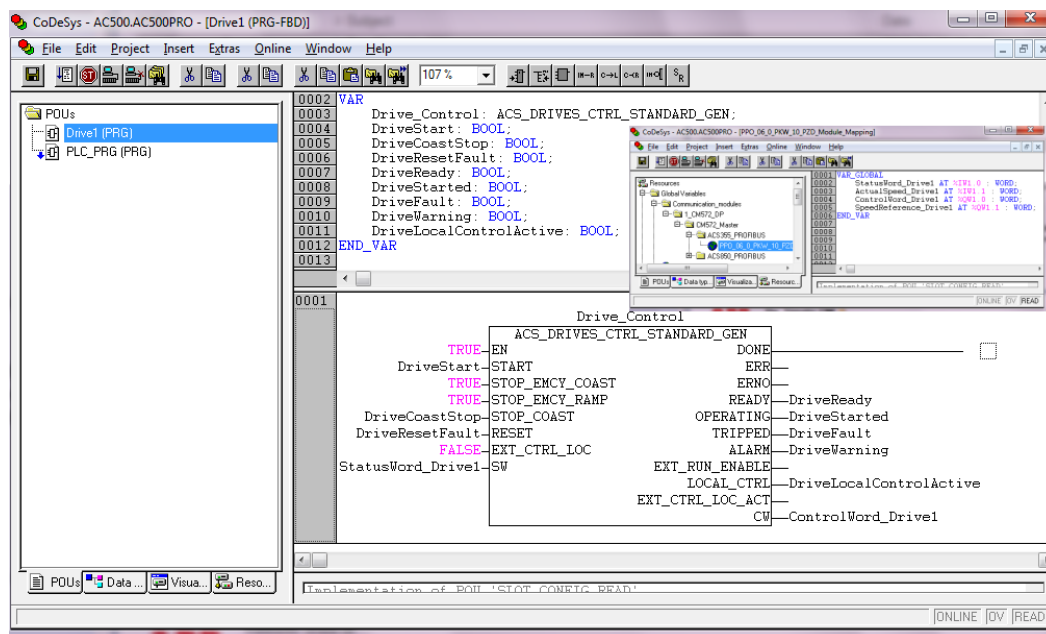
ABB PLC and drives integration using PROFINET

Connect the function block inputs and outputs according to your needs. In the example below, the block will always be enabled, emergency stop functions are not used, the drive is started by the variable “DriveStart”, ramp stop by setting “DriveStart” = FALSE, coast stop by setting “DriveCoastStop” = TRUE, fault reset by setting “DriveResetFault” = TRUE (positive edge).

The variables declared between “VAR” and “END_VAR” in the picture below are local variables and can only be accessed from the actual program (PRG) or from the Visualization objects (see chapter “Visualizations”).

Note! The variables connected to block inputs “SW” (Status Word) and “CW” (Control Word) must be the Global variables that belong to actual drive, see chapter “Global variables”.

Tip! Click inside the name of the function block and press F1 to open the description of the block in the online help.

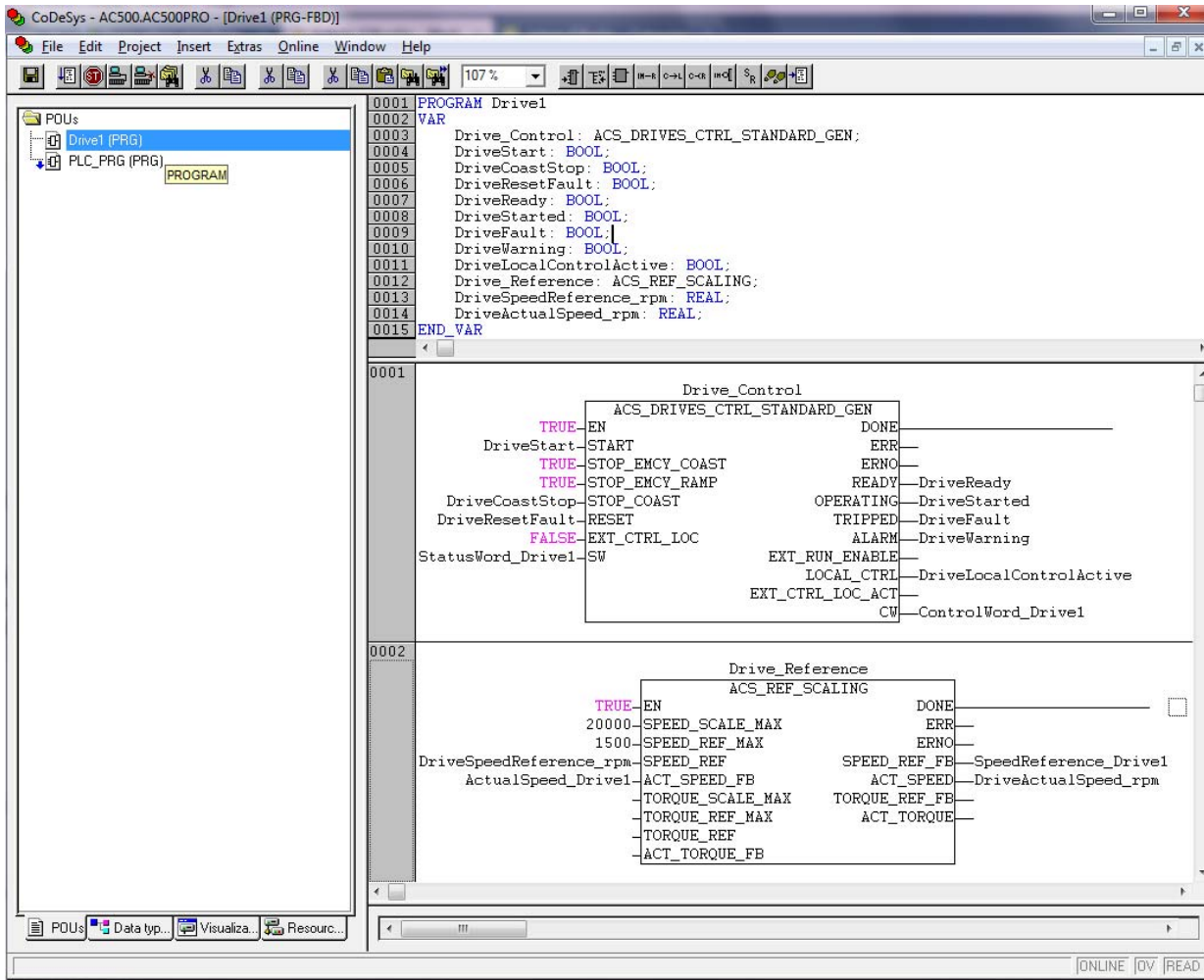


Create a second network (Ctrl +T) in the same program and add the block “ACS_REF_SCALING” in the same way as for “ACS_DRIVES_CTRL_STANDARD_GEN”. Connect the function block inputs and outputs according to your needs. In the example below, the block will always be enabled, “SPEED_SCALE_MAX” = 20000 for the ABB drives communication profile, “SPEED_REF_MAX” is set to the same value as the reference scaling parameter in the drive (for instance P11.05 in ACS355) and “DriveSpeedReference_rpm” is the variable used for setting the speed reference.

Note! The variables connected to “ACT_SPEED_FB” and “SPEED_REF_FB” must be the Global variables that belong to actual drive, see chapter “Global variables”.

Quickstart Guide

ABB PLC and drives integration using PROFINET

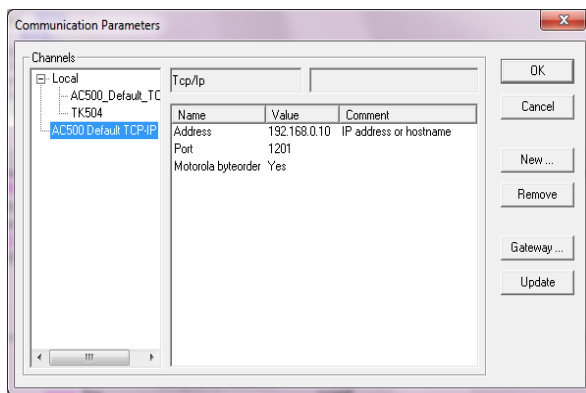
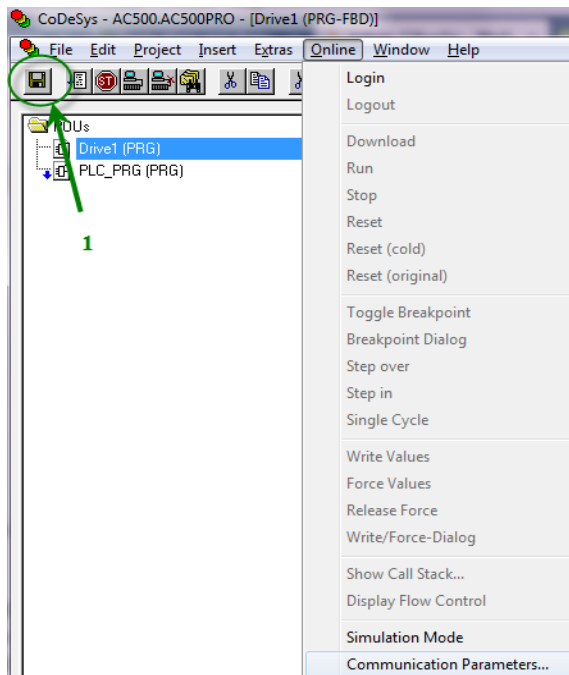


Quickstart Guide

ABB PLC and drives integration using PROFINET

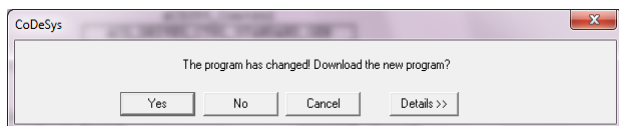
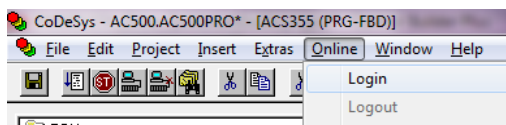
Download program to PLC

Save the program and choose “Communication Parameters” from the “Online” menu. Set communication Parameters according to your online connection. In the example below, the “Address” 192.168.0.10 corresponds to the IP address of actual CPU and is also the default IP address of AC500 CPUs. Note that in case of Ethernet connection, the IP address of your PC port or Ethernet adapter should belong to the same subnet as the CPU, 192.168.0.XXX (XXX between 1 and 255).



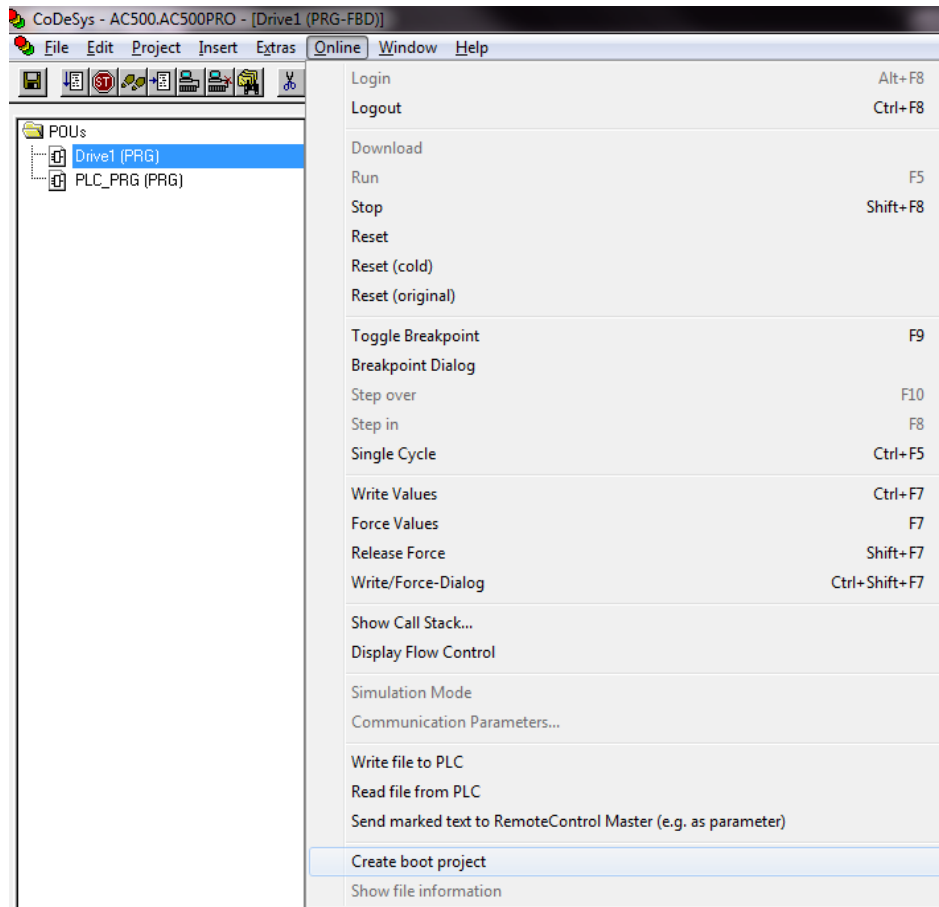
Choose “Login” from the “Online” menu and in the following pop-up window, click “Yes”. Then choose “Run” from the “Online” menu to start the PLC. Check that the CPU display shows “run”.

Note! If the display still shows “stop” you might have some PLC errors that you need to reset first. You can do that either by pressing the “DIAG” button on the PLC itself followed by the “OK” button until all errors are reset. You can also do it in online mode by using the “diagreset” command from the “PLC Browser” in the CODESYS “Resources” tab.



Create boot project

In “online” mode (Login), choose “Create boot project” from the “Online” menu. With this command, the compiled project is stored to the flash in such a way that the PLC will load it automatically when restarted.

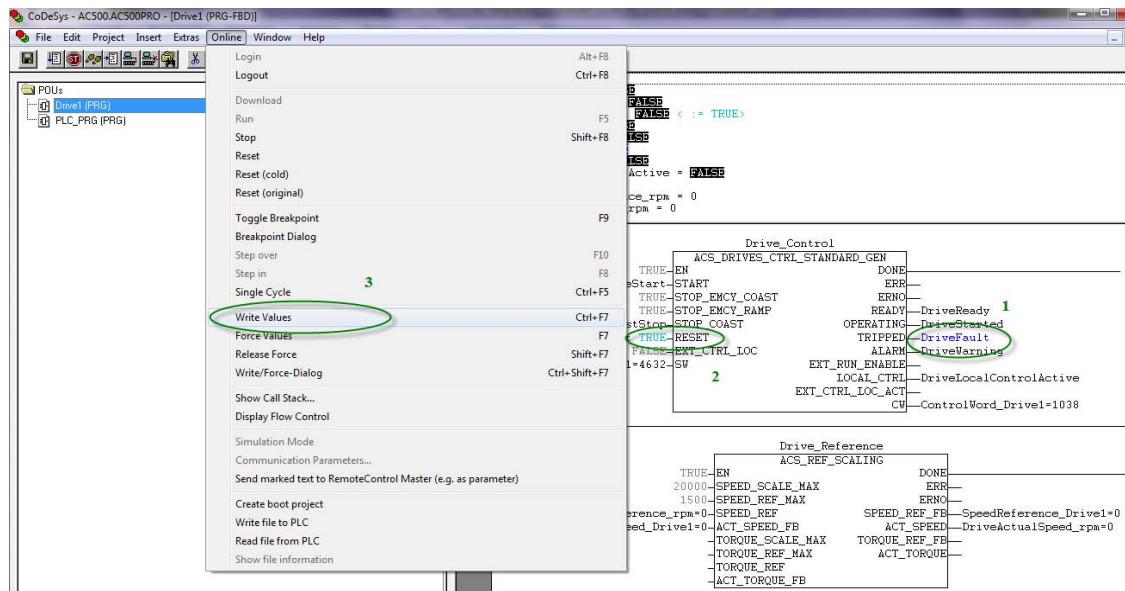


Quickstart Guide

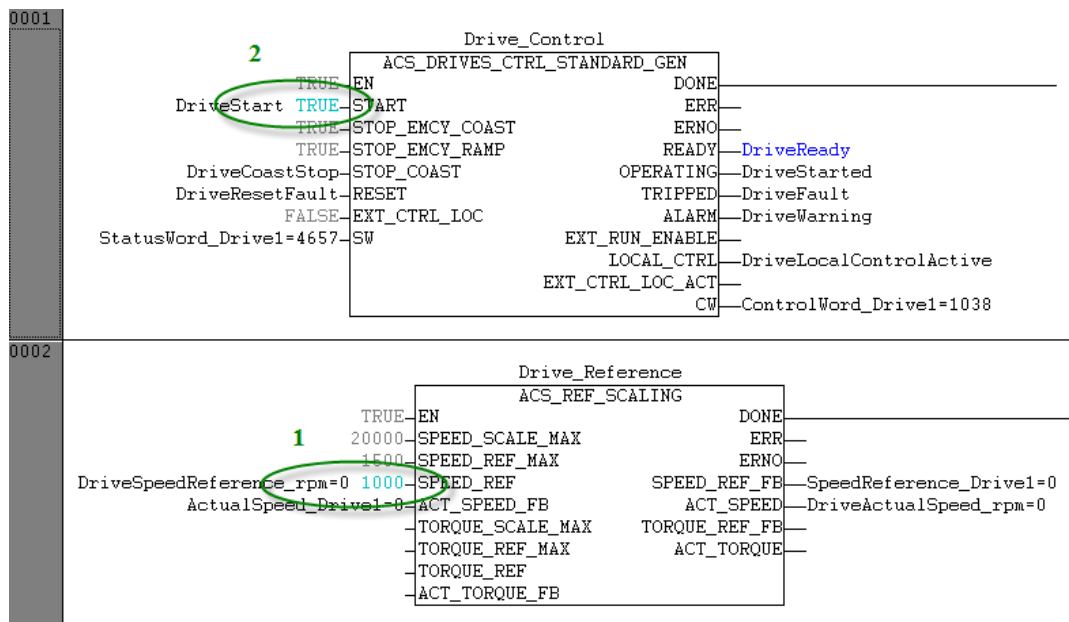
ABB PLC and drives integration using PROFINET

Test the program

Test your program. If the drive has an active fault ("TRIPPED" output is colored blue) (1), then try to reset by setting the "RESET" input = TRUE (2). Double-click the input variable and choose "Write Values" from the "Online" menu (3).



When the "READY" output is TRUE (blue), then set the "SPEED_REF" input (1) to desired speed (rpm value in this example) and set "START" input = TRUE (2). Write values from the Online menu or Ctrl+F7. Check that the drive starts and follows the given speed reference.

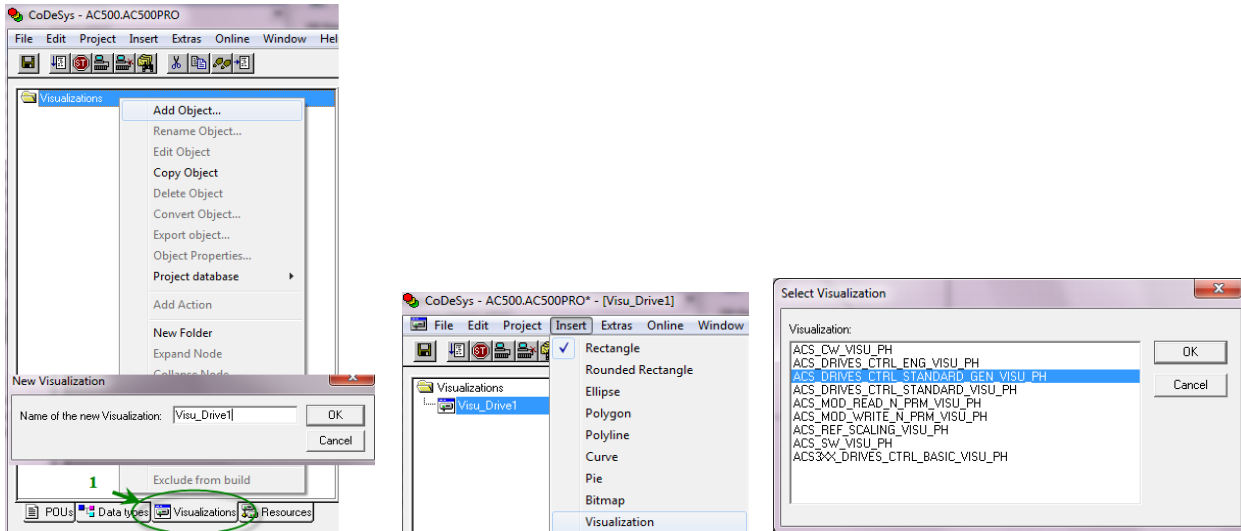


Quickstart Guide

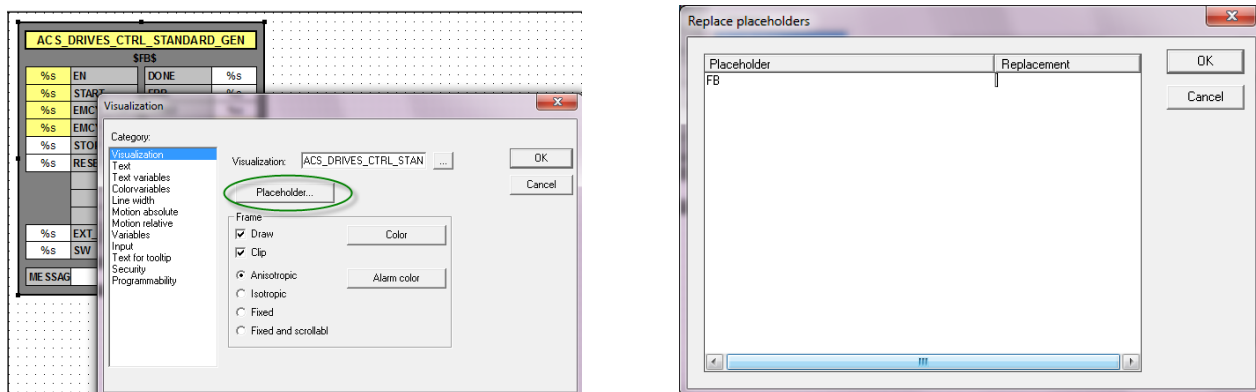
ABB PLC and drives integration using PROFINET

Visualizations

Visualizations are **optional** and can be a good way to test the communication between PLC and drive. Right-click “Visualizations” in the “Visualizations” tab (1) and choose “Add Object”, give the visualization page a suitable name. From the new page, choose “Visualization” from the “Insert” menu and draw a box. Select Visualization “ACS_DRIVES_CTRL_STANDARD_GEN_VISU_PH”.



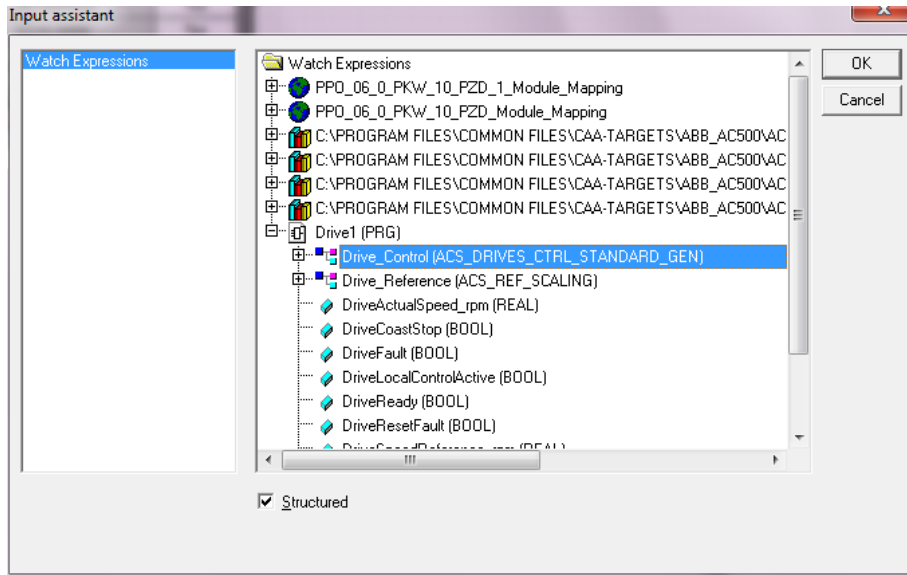
Double-click the new visualization object for Settings and click “Placeholder”. Select the “Replacement” field and press F2.



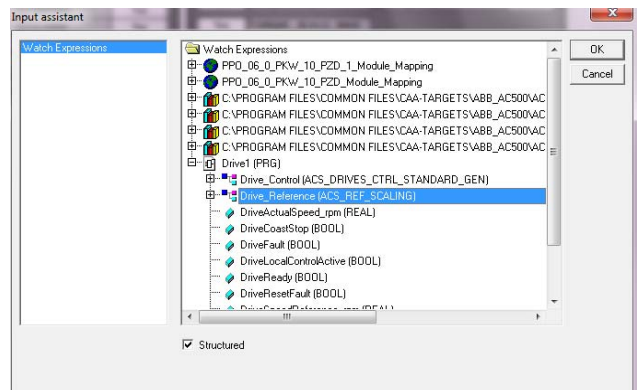
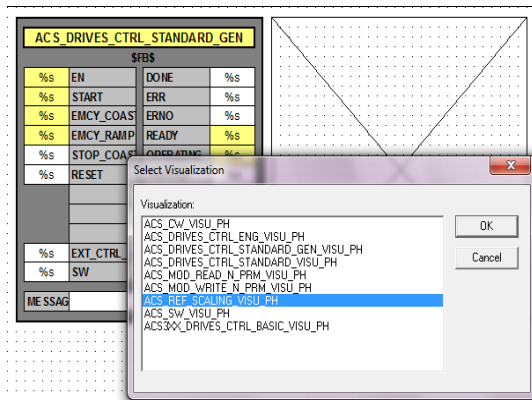
Quickstart Guide

ABB PLC and drives integration using PROFINET

To make a connection to the instance of the function block “ACS_DRIVES_CTRL_STANDARD_GEN”, choose the instance from actual program (PRG) and click “OK” until all pop-up windows are closed. **Tip!** Tick the “Structured” box in the Input assistant window for a better overview.



On the same page, create a visualization window for the speed reference and actual speed. Insert → Visualization → Select “ACS_REF_SCALING_VISU_PH” → double-click the new object and click “Placeholder” → Press F2 from the “Replacement” field → Choose the instance of function block “ACS_REF_SCALING” → click “OK” until all pop-up windows are closed.



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Go online again by choosing “Login” from the “Online” menu and then “Run” from the same menu (if the PLC is not already in run mode).

The status of the function block inputs and outputs are now displayed in the visualization window. Block inputs which have not been connected to the function blocks in the program “PRG” can be changed from the visualization window.

Note! In this example all block inputs have already been connected to the function blocks, so they cannot be changed from the visualization view.

Some examples of what can be seen in the visualization:

- SW field: actual 16-bit Status Word from the drive.
- CW field: actual 16-bit Control Word sent from the PLC to the drive.
- SPEED_REF: speed reference, in this case in rpm.
- SPEED_REF_FB: unscaled speed reference sent from the PLC to the drive.
- ACT_SPEED_FB: unscaled value of the drive actual speed.
- ACT_SPEED: scaled value of the drive actual speed, in this case 1003 rpm.
- MESSAGE field: information about the actual state, e.g. “Operation” or “Wait for rising edge of START”.

The screenshot shows the CoDeSys software interface with two visualization windows. The left window, titled 'ACS_DRIVES_CTRL_STANDARD_GEN', displays the 'Drive1.Drive_Control' status. The right window, titled 'ACS_REF_SCALING', displays the 'Drive1.Drive_Reference' status. Both windows show a table of inputs and outputs with their current values and states.

ACS_DRIVES_CTRL_STANDARD_GEN			
Drive1.Drive_Control			
TRUE	EN	DONE	TRUE
TRUE	START	ERR	FALSE
TRUE	EMCY_COAST	ERNO	0
TRUE	EMCY_RAMP	READY	TRUE
FALSE	STOP_COAST	OPERATING	TRUE
FALSE	RESET	TRIPPED	FALSE
		ALARM	FALSE
		EXT_RUN_EN	TRUE
		LOCAL_CTRL	FALSE
FALSE	EXT_CTRL_LOC	EXT_CTRL_LOC	FALSE
4919	SW	CW	1151
MESSAGE		Operation	

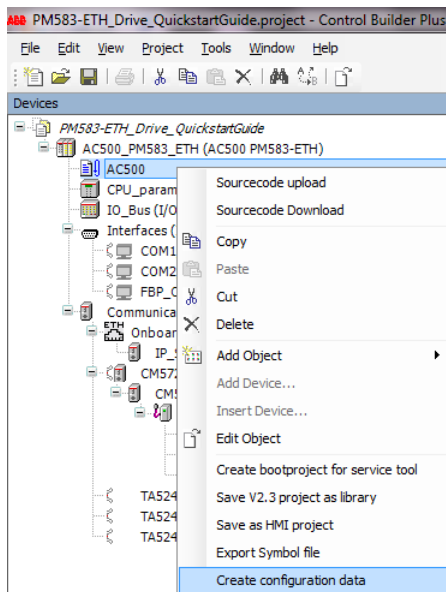
ACS_REF_SCALING			
Drive1.Drive_Reference			
TRUE	EN	DONE	TRUE
		ERR	FALSE
		ERNO	0
20000	SPEED_SCALE_MAX		
1500	SPEED_REF_MAX		
1000.00	SPEED_REF	SPEED_REF_FB	13333
13382	ACT_SPEED_FB	ACT_SPEED	1003.65
10000	TORQUE_SCALE_MAX		
100	TORQUE_REF_MAX		
0.00	TORQUE_REF	TORQUE_REF_FB	0
0	ACT_TORQUE_FB	ACT_TORQUE	0.00

Go offline by choosing “Logout” from the “Online” menu.

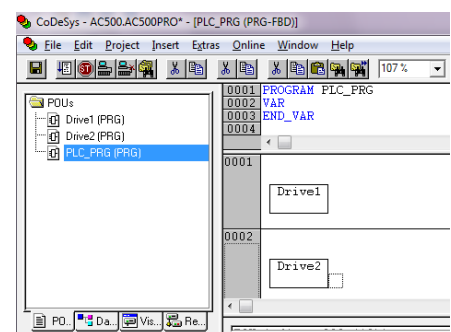
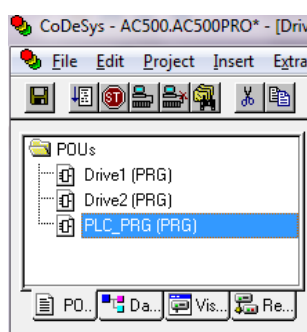
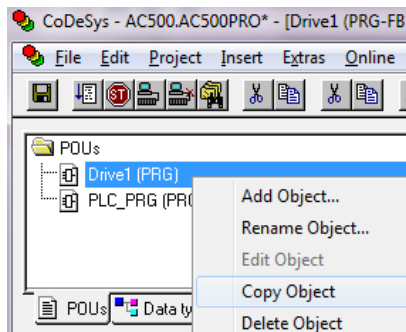
Add more drives (optional)

If you have not already added the additional drives to the hardware, then follow the instructions in chapter “Hardware configuration” → “Add more drives”.

When the new drives are added, right-click the “AC500” symbol and choose “Create configuration data” to update Global variables. This must be done in offline mode so make sure to Logout from the “Online” menu in CODESYS before.



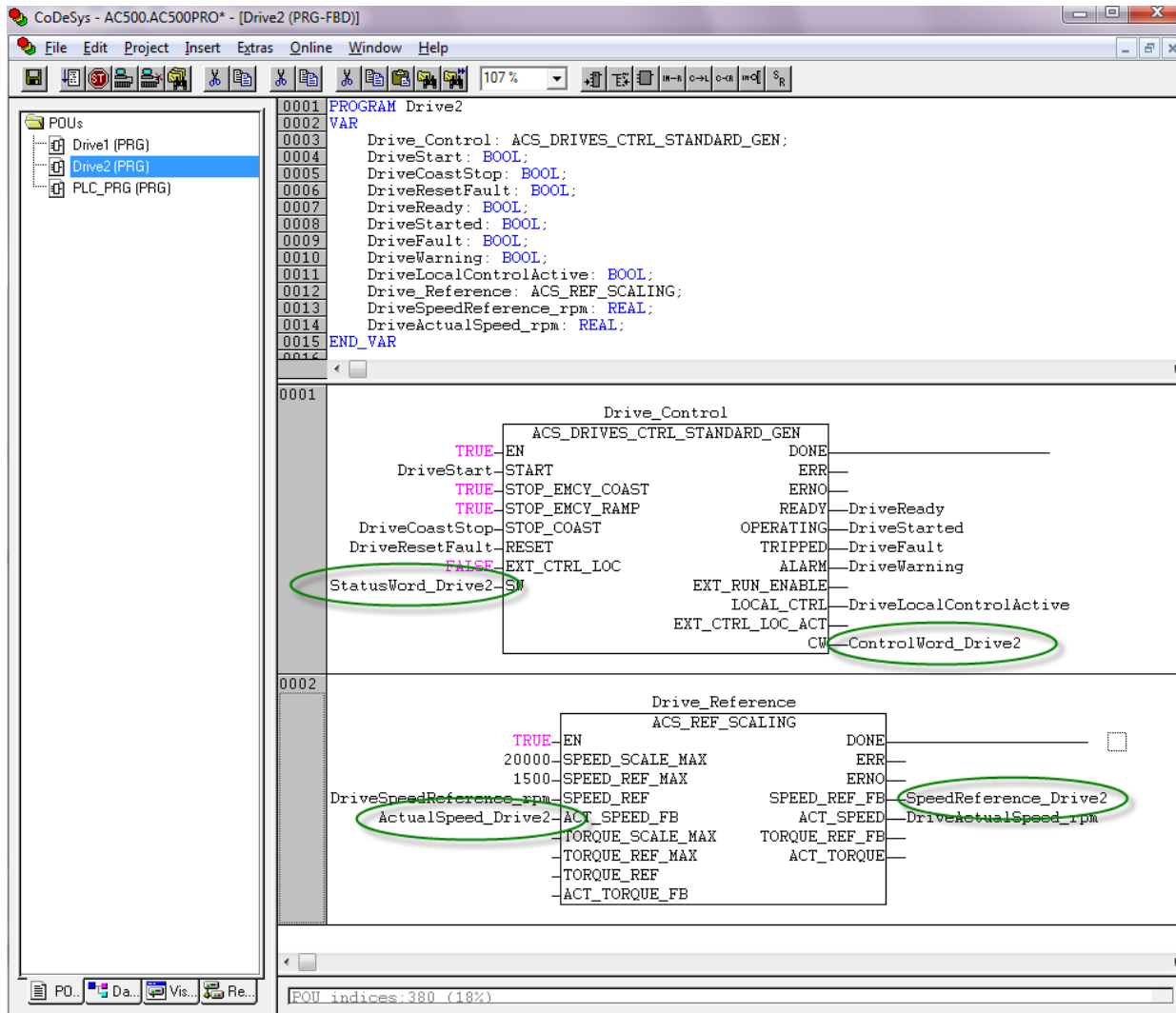
In the CODESYS “POUs” tab, right-click the program for your earlier drive and choose “Copy Object”, give the new program a suitable name and double-click “PLC_PRG”. Add the new program to the main program by copying Network 0001 to Network 0002 and rename the block in Network 0002 to according to your new program.



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Double-click and open the new program. The variables connected to block inputs/outputs “SW”, “CW”, “ACT_SPEED_FB” and “SPEED_REF_FB” are global (do not belong only to this program) and must be changed according to the “new” drive in the Global variable list.



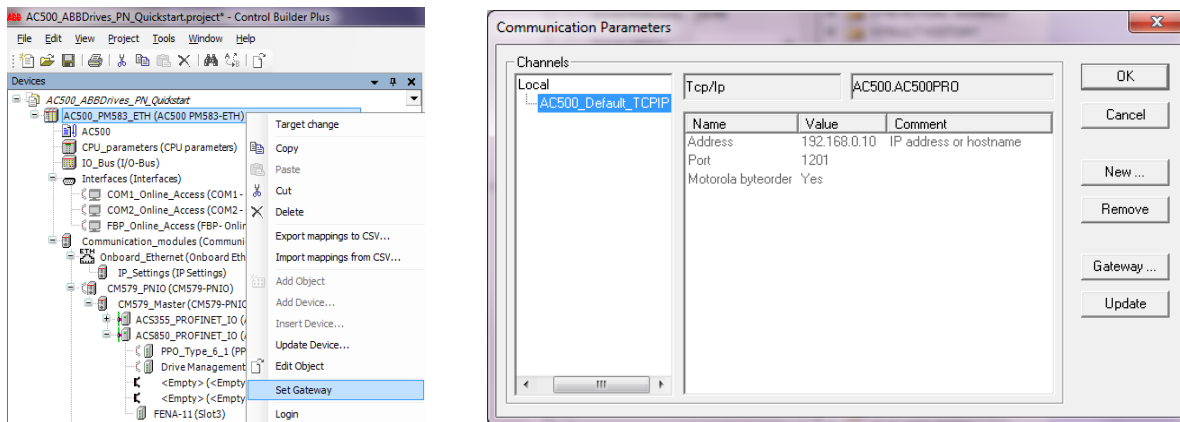
Continue to add as many drives as you need. If you want to create visualization pages/objects for the additional drives, make sure that you connect the Placeholders to the function block instances for the correct program (PRG), “Drive2” in this example.

Drive Manager

The following steps need to be fulfilled before connection to the drive can be established from Drive Manager (see also chapter “Drive configuration”):

1. Activate the drive fieldbus module from drive parameters (activate fieldbus module, set correct IP address and update fieldbus settings).
2. Download the Control Builder Plus project to the PLC from CODESYS (Online → Login).
3. Set the PLC in “Run” mode from CODESYS (Online → Run).

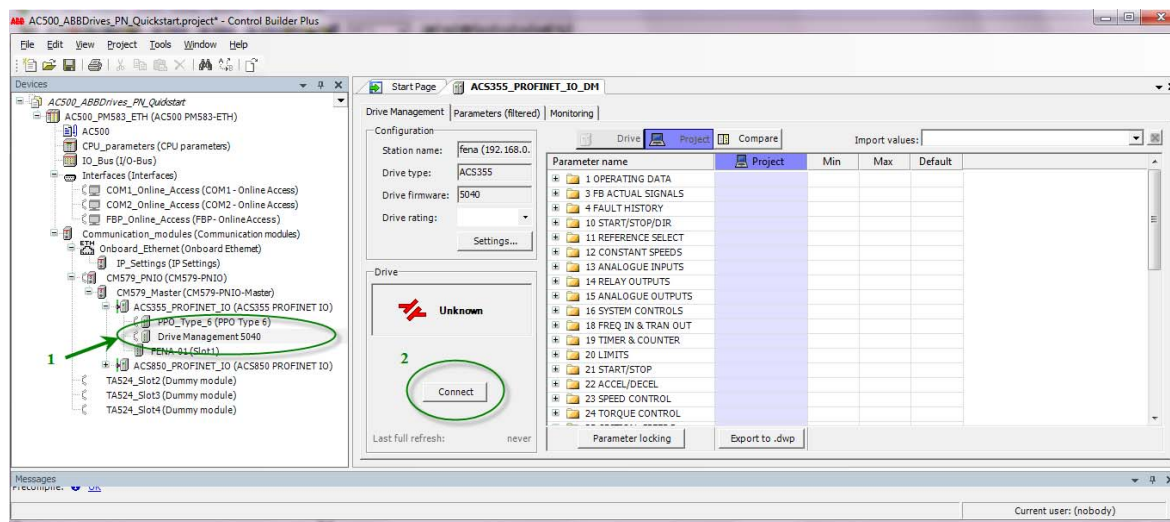
Set Gateway for connection to PLC and drives. Right-click the target line and choose “Set Gateway”, see picture below. Choose the correct communication parameters, see example below for Ethernet connection to an AC500 with default settings (IP address 192.168.0.10). If Ethernet is used, make sure the Ethernet port of your PC belongs to the same subnet as the PLC (192.168.0.XXX), see also description in chapter “Download program to PLC”.



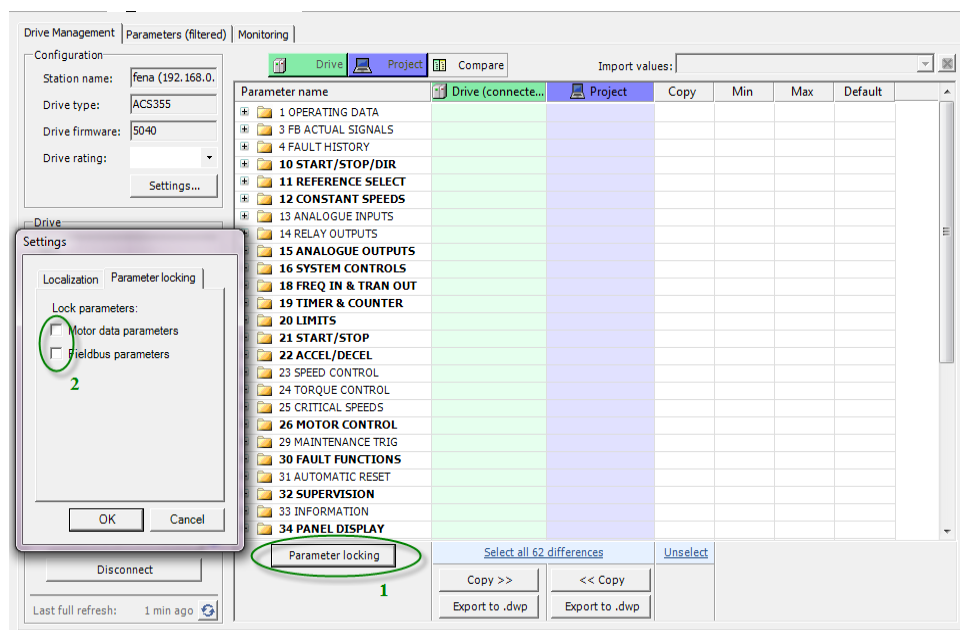
Start Drive Manager by double-clicking “Drive Management XXXX” (1) under actual drive and click the “Connect” button (2).

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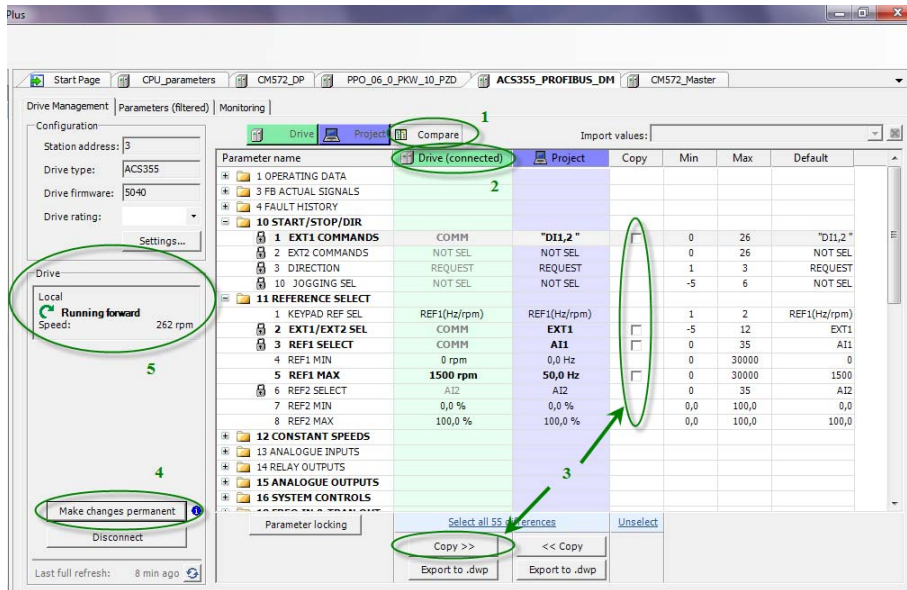
To allow settings in “Motor data parameters” and “Fieldbus parameters”, click the “Parameter locking” button (1) and untick the boxes (2) in the “Parameter locking” tab.



Open the “Compare” view (1) and make your online drive parameter settings in the “Drive (connected)” column (2). If you want to copy the online parameter values to your complete project, tick the boxes for the parameters you want to copy in the “Copy” column and then click “Copy →→” (3). Parameters in **bold** indicate that there are differences in parameter settings between the online drive and the project file. To save your parameter settings to the flash memory of the drive (keep settings even after power down), click the “Make changes permanent” button (4). The “Drive” field shows the drive’s actual status (5).

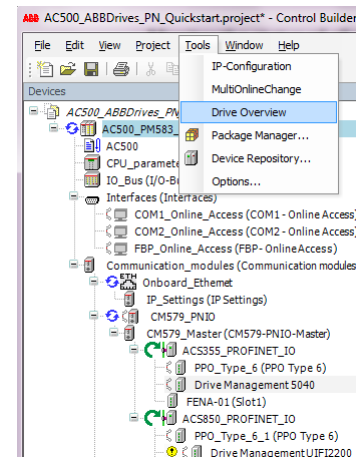
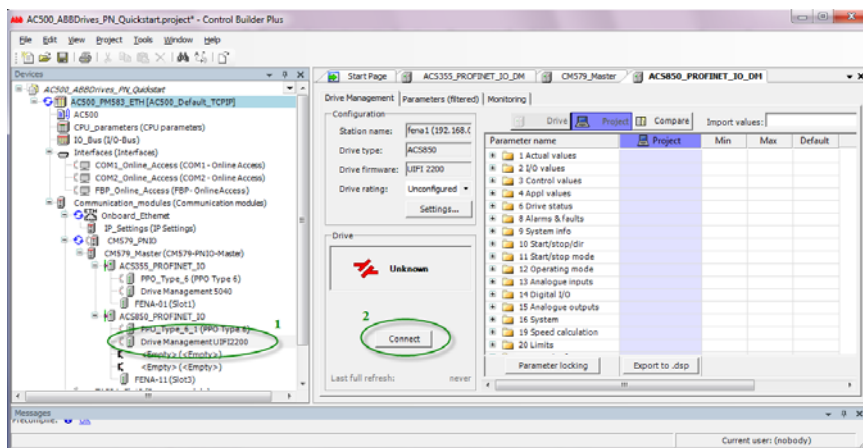
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General Drive Manager tips

Monitor the status of all your drives in a single view. Connect the drives you want to see one by one by double-clicking “DriveManagement” (1) and then “Connect” (2) for actual drives. Then choose “Drive Overview” from the “Tools” menu.



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The screenshot displays the ABB Control Builder Plus software interface for the project 'ACS500_ABBDrives_PN_Quickstart'. The left pane shows a hierarchical tree of the project configuration, including the ACS500 CPU, I/O bus, interfaces, communication modules, and specific drive configurations like CM579_PNIO, CM579_Master, and ACS355_PROFINET_IO. The right pane, titled 'Drive overview', provides a summary of the configured drives.

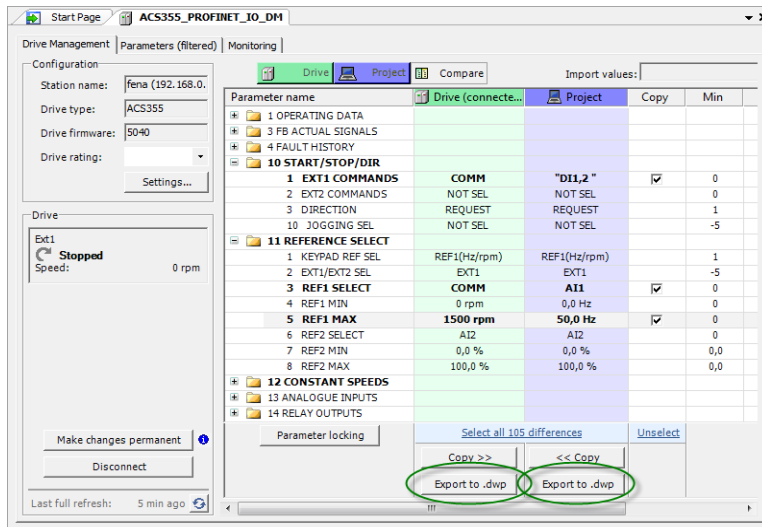
Drive Name	Drive Type	Firmware Version	Status	Speed
ACS850_PROFINET_IO	ACS850 PROFINET IO	UIFI2200	🔄	750
ACS355_PROFINET_IO	ACS355 PROFINET IO	5040	🔄	1000

At the bottom of the right pane, there are buttons for 'Refresh', 'Connect', and 'Disconnect'.

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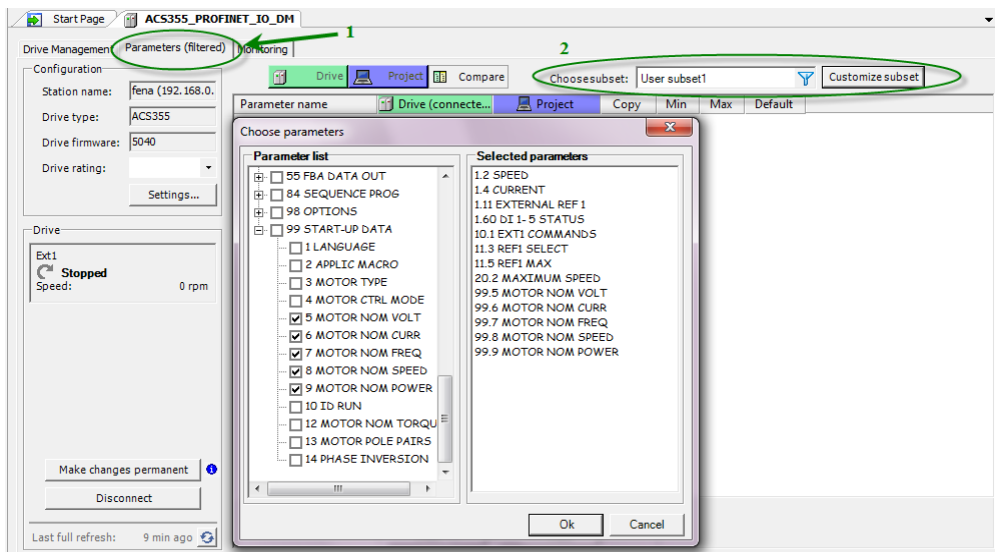
ABB PLC and drives integration using PROFINET

Export your Online (Drive (connected)) or Project parameter file to drive-specific pc tool format. For example “.dwp” (ACS355), “.dsp” (ACS850, ACSM1) or “.dcpparamsbak” (ACS880). These files will be possible to open from *DriveWindow Light* (ACS355), *DriveStudio* (ACS850, ACSM1) or *DriveComposer* (ACS880).



Open a predefined parameter subset for a list with only the most common parameters from the “Parameters (filtered)” tab and choose “Default subset” from the “Choose subset” menu.

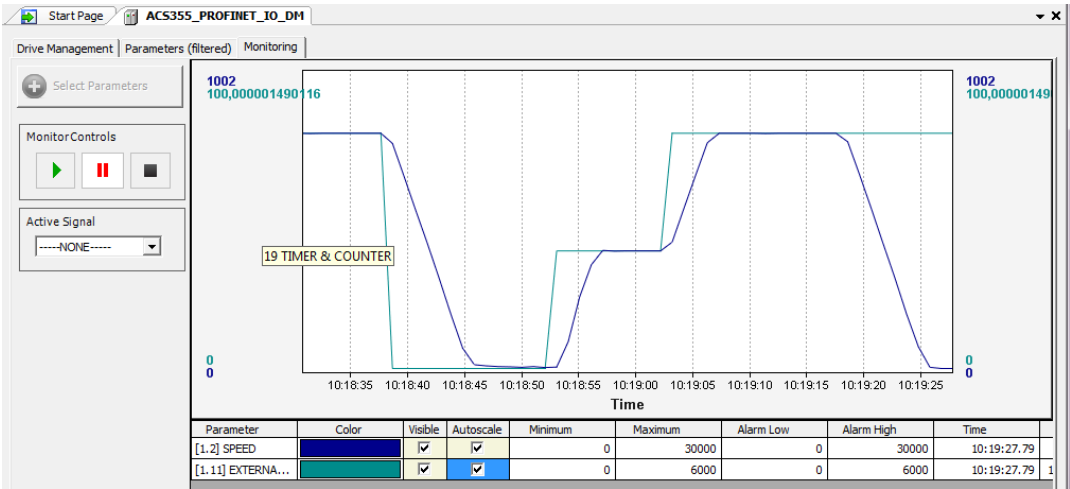
Or create your own parameter subset for a list with your preferred parameters. From the “Parameters (filtered)” tab, choose one of the User subsets from the “Choose subset” menu and click “Customize subset”. Then add parameters of your choice.



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Monitor drive signals from the “Monitoring” tab.



Check out more tips in Control Builder Plus → Help → Contents → Drive Manager.

Other useful documentation

- ABB Configurator Help (Contents → Control Builder Plus → Drive Manager)
- CODESYS Help (Contents → Target system → AC500 / S500 → ACS Drives Libraries)

- User's manual FENA-01/11 Ethernet adapter module [3AUA0000093568]
- User's manual Ethernet Adapter Module RETA-02 [3AFE68895383]

- User's manual ACS355 drives [3AUA0000066143]
- ACS850 Firmware Manual Standard Control Program [3AUA0000045497]
- Firmware manual ACS880 primary control program [3AUA0000085967]
- ACSM1 Firmware Manual Speed and Torque Control [3AFE68848270]
- ACSM1 Firmware Manual Motion Control [3AFE68848270]
- User's Manual ACS550-01 Drives [3AUA0000001418]
- Firmware Manual ACS800 Standard Control Program [3AFE64527592]

Revision

Rev	Page (P) Chap (C)	Description	Date
A	-	New document	2012-11-26
B	-	New Safety Instructions, Update (C) Starting up ACSxxx	2013-02-01
C	-	Update (C) Starting up ACSxxx Update (C) Install PS553-Drives library	2013-03-22
D	P 17	Corrections ACS550 Minimum Parameters	2013-05-13
E	P 16	Correction for ACSM1: Ext1/2 to Par34.01	2013-07-15

For more information please contact your local ABB
representative or visit:
www.abb.com/drives
www.abb.com/drivespartners

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