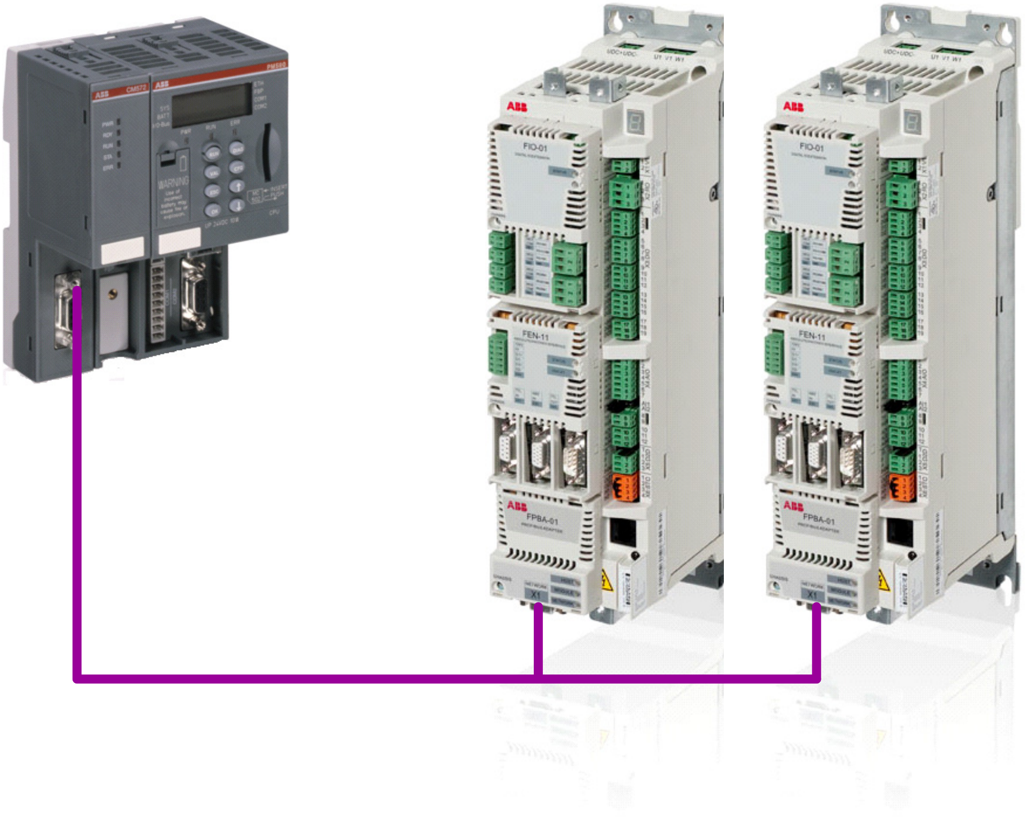
ACSM1

Application Guide
Fieldbus Control with FPBA-01 PROFIBUS DP Adapter Module and ABB AC500 PLC



ACSM1 Drive Manuals

DRIVE HARDWARE MANUAL*

ACSM1-04 Drive Modules (0.75 to 45 kW) Hardware Manual – 3AFE68797543 (English)

ACSM1-04 Drive Modules (55 to 110 kW) Hardware Manual – 3AFE68912130 (English)

ACSM1-04Lx Liquid-cooled Drive Modules (55 to 160 kW) Hardware Manual – 3AUA0000022083 (English)

DRIVE FIRMWARE MANUALS

ACSM1 Speed and Torque Control Program Firmware Manual – 3AFE68848261 (English)
For drives of type ACSM1-04xS…

ACSM1 Motion Control Program Firmware Manual – 3AFE68848270 (English)
For drives of type ACSM1-04xM…

DRIVE PC TOOLS MANUALS

DriveStudio User Manual – 3AFE68749026 (English)

DriveSPC User Manual – 3AFE68836590 (English)

APPLICATION GUIDES

Safe Torque Off Function for ACSM1, ACS850 and ACQ810 Drives Application Guide – 3AFE68929814 (English)

System Engineering Manual – 3AFE68978297 (English)

ACSM1 Fieldbus Control with FPBA-01 PROFIBUS DP Adapter Module and ABB AC500 PLC; Application Guide – 3AUA0000049359 (English)

OPTION MANUALS

FIO-01 Digital I/O Extension User's Manual* – 3AFE68784921 (English)

FIO-11 Analog I/O Extension User's Manual* – 3AFE68784930 (English)

FEN-01 TTL Encoder Interface User's Manual* – 3AFE68784603 (English)

FEN-11 Absolute Encoder Interface User's Manual* – 3AFE68784841 (English)

FEN-21 Resolver Interface User's Manual* – 3AFE68784859 (English)

FEN-31 HTL Encoder Interface User's Manual* – 3AUA0000031044 (English)

ACSM1 Control Panel User's Guide – 3AUA0000020131 (English)

*A multilingual quick installation guide is included with the delivery.

AC500 manuals can be found in the CoDeSys online help. Press F1 in the CoDeSys software.

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Application Guide

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Introduction to the manual

What this chapter contains

This chapter describes the target audience, purpose and contents of this manual.

Applicability

The manual is compatible with ACSM1-04 and ACSM1-04LC drive modules of frame sizes from A to E.

Safety instructions

Follow the safety instruction given in *ACSM1-04 Drive Modules (0.75 to 45 kW) Hardware Manual* (3AFE68797543 [English]). The main instructions are repeated below.

WARNING! Ignoring the following instructions can cause physical injury or death, or damage to the equipment.

- **Only qualified electricians are allowed to install and maintain the drive.**

- Never work on the drive, motor cable or motor when main power is applied. After disconnecting the input power, always wait for 5 min to let the intermediate circuit capacitors discharge before you start working on the drive, motor or motor cable.

  Always ensure by measuring with a multimeter (impedance at least 1 Mohm) that:

  1. voltage between drive input phases U1, V1 and W1 and the frame is close to 0 V.

  2. voltage between terminals UDC+ and UDC- and the frame is close to 0 V.

  3. voltage between terminals R+ and R- and the frame is close to 0 V.

- Do not work on the drive when the permanent magnet motor is rotating. Also, when the supply power is switched off and the inverter is stopped, a rotating permanent magnet motor feeds power to the intermediate circuit of the drive and the supply connections become live. See the hardware manual for precautions before installation and maintenance work on the drive.

- Do not work on the control cables when power is applied to the drive or to the external control circuits. Externally supplied control circuits may cause dangerous voltages inside the drive even when the main power on the drive is switched off.

Target audience

This manual is intended for people who plan the drive application control, commission, use, and service the drive with fieldbus communication. Read the ACSM1 firmware and hardware manuals before working on the drive.

You are expected to know the fundamentals of electricity, wiring and electrical components as well as drive control methods, fieldbus communication concepts and function block programming.

Purpose of the manual

The purpose of this manual is to show how to configure fieldbus communication with the drive control program parameters and, as an example, to show how the drive can be controlled through fieldbus by using the ABB AC500 programmable logic controller with PS551 Control Builder.

Contents of the manual

The chapters of this manual are briefly described below.

Introduction to the manual introduces this manual.

Fieldbus control description describes how the drive can be controlled by external devices over a communication network.

Starting up the FPBA-01 adapter for different communication profiles presents the steps to take during the start-up of the FPBA-01 PROFIBUS DP Adapter Module with the drive.

Starting up fieldbus communication and programming the ABB PLC (one-drive system) presents the steps to take during the start-up of the drive fieldbus control with ABB AC500 PLC and PROFIBUS DP adapter module. A system with one drive is set up.

Starting up fieldbus communication and programming the ABB PLC (multi-axis systems) presents the additional steps compared to the ones in the previous chapter that you must take during the start-up of the drive fieldbus control with ABB AC500 PLC and PROFIBUS DP adapter module in a multi-axis system. A system with two drives is set up.

Example program for a two-axis loading machine presents an example sequence program which controls a loading machine with two axes.

Appendix A - How to find out the serial communication parameter values of your PC? instructs how to find out the serial communication parameter values of your PC.

Related manuals

- *ACSM1-04 Drive Modules Hardware Manual* (3AFE68797543 [English])
- *ACSM1-04LC Drive Modules Hardware Manual* (3AUA0000022083 [English])
- *ACSM1 Motion Control Program Firmware Manual* (3AFE68848270 [English])

- *ACSM1 Speed and Torque Control Program Firmware Manual* (3AFE68848261 [English])
- *PROFIBUS DP Adapter Module FPBA-01 User's Manual* (3AFE68573271 [English])
- *User Manual for PS551-MC (Motion Control library for ABB PLC AC500) according to Technical Specification PLCopen – Technical Committee 2 – Task Force; Function Blocks for motion control*
- *User Manual for PLC Programming with CoDeSys 2.3* by 3S – Smart Software Solutions GmbH
- ABB AC500 scalable programmable logic controller manuals

Terms and abbreviations

Term/Abbreviation	**Explanation**
CM572	Profibus DP Master communication module for AC500
CM575	DeviceNet Master communication module for AC500
CM578	CANopen Master communication module for AC500
CPU	Central Processing Unit
FCAN-0x	Optional CANopen adapter
FDNA-0x	Optional DeviceNet adapter
FPBA-0x	Optional PROFIBUS DP adapter
Frame (size)	Size of the drive module.
GSD	Generic Station Description. A GSD file contains a description of the PROFIBUS DP/PA device and is provided by the device manufacturer. GSD files provide a way for an open configuration tool to automatically get the device characteristics.
PLCopen	Vendor- and product-independent worldwide association for resolving topics related to control programming to support the use of international standards in this field. For more information, see http://www.plcopen.org/
PLCopen Motion Control Function Blocks	Technical Committee 2 – Task Force Motion Control – of PLCopen defines libraries of Function Blocks, like the Motion Control Specification.
PROFIBUS DP	PROFIBUS version for Decentralized Periphery. PROFIBUS is an open serial communication standard that enables data exchange between all kinds of automation components.
PROFIBUS PA	PROFIBUS version for Process Automation.

Standards

IEC 61131-3:2003, Programmable controllers – Part 3: Programming languages.

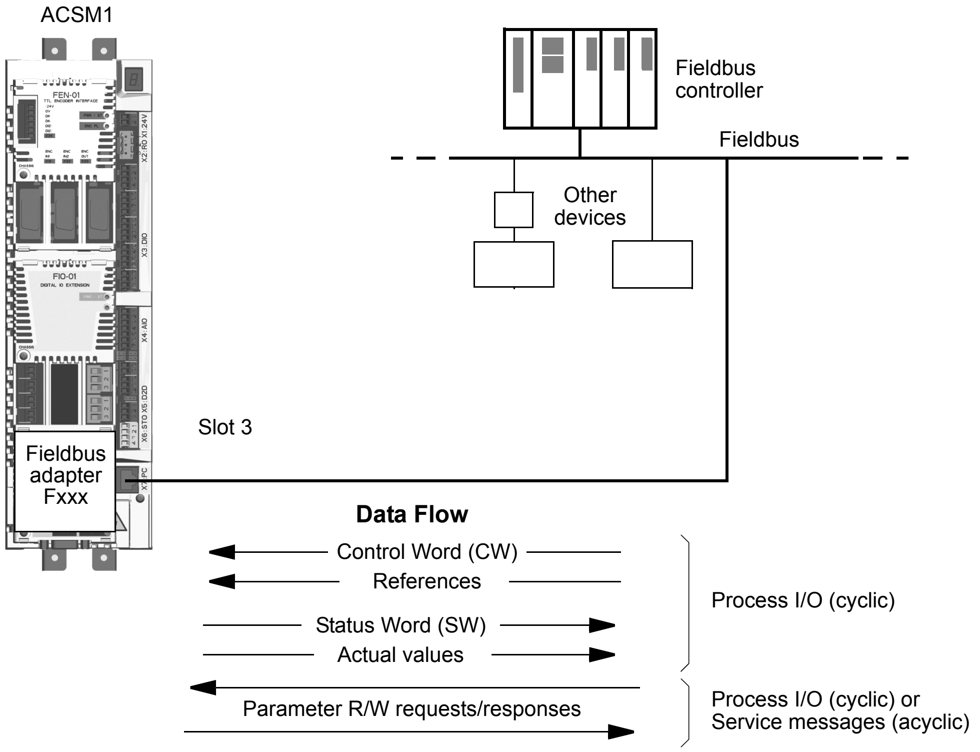
Fieldbus control description

What this chapter contains

The chapter describes how the drive can be controlled by external devices over a communication network.

System overview

The drive can be connected to a fieldbus controller via a fieldbus adapter module. The adapter module is connected to drive Slot 3.



The drive can be set to receive all of its control information through the fieldbus interface, or the control can be distributed between the fieldbus interface and other available sources, for example digital and analogue inputs.

The drive can communicate with a fieldbus controller through a fieldbus adapter using one of the following serial communication protocols:

- PROFIBUS DP (FPBA-01 adapter)
- CANopen (FCAN-01 adapter)
- DeviceNet^{TM} (FDNA-01 adapter).
- Modbus/RTU (FSCA-01 adapter) or Modbus/TCP (FENA-01 adapter)
- Ethernet/IP^{TM} (FENA-01 adapter)
- EtherCAT (FECA-01 adapter)

Setting up communication through a fieldbus adapter module

Before configuring the drive for fieldbus control, the adapter module must be mechanically and electrically installed according to the instructions given in the User’s Manual of the appropriate fieldbus adapter module.

The communication between the drive and the fieldbus adapter module is activated by setting parameter 50.01 FBA ENABLE to (1) ENABLE. The adapter-specific parameters must also be set. See the table below.

Parameter	Setting for fieldbus control	Function/Information
COMMUNICATION INITIALISATION AND SUPERVISION		
50.01 FBA ENABLE	(1) ENABLE	Initialises communication between drive and fieldbus adapter module.
50.02 COMM LOSS FUNC	(0) NO (1) FAULT (2) SPD REF SAFE (3) LAST SPEED	Selects how the drive reacts in a fieldbus communication break.
50.03 COMM LOSS T OUT	0.3…6553.5 s	Defines the time between communication break detection and the action selected with parameter 50.02 COMM LOSS FUNC.
50.04 FBA REF1 MODESEL and 50.05 FBA REF2 MODESEL	(0) RAW DATA (1) TORQUE (2) SPEED (3) POSITION * (4) VELOCITY * (5) AUTO	Defines the fieldbus reference scaling. When (0) RAW DATA is selected, see also parameters 50.06…50.11. * in Motion Control Program only
ADAPTER MODULE CONFIGURATION		
51.01 FBA TYPE	–	Displays the type of the fieldbus adapter module.
51.02 FBA PAR2	These parameters are adapter module-specific. For more information, see the User’s Manual of the fieldbus adapter module. Note that not all of these parameters are necessarily used.	
• • •		
51.26 FBA PAR26		
51.27 FBA PAR REFRESH	(0) DONE (1) REFRESH	Validates any changed adapter module configuration parameter settings.
51.28 PAR TABLE VER	–	Displays the parameter table revision of the fieldbus adapter module mapping file stored in the memory of the drive.
51.29 DRIVE TYPE CODE	–	Displays the drive type code of the fieldbus adapter module mapping file stored in the memory of the drive.
51.30 MAPPING FILE VER	–	Displays the fieldbus adapter module mapping file revision stored in the memory of the drive.
51.31 D2FBA COMM STA	–	Displays the status of the fieldbus adapter module communication.
51.32 FBA COMM SW VER	–	Displays the common program revision of the adapter module.
51.33 FBA APPL SW VER	–	Displays the application program revision of the adapter module.
Note: In the User’s Manual of the fieldbus adapter module, the parameter group number is 1 or A for parameters 51.01…51.26.		

Parameter	Setting for fieldbus control	Function/Information
TRANSMITTED DATA SELECTION		
52.01 FBA DATA IN1 … 52.12 FBA DATA IN12	0 4…6 14…16 101…9999	Defines the data transmitted from drive to fieldbus controller. **Note:** If the selected data is 32 bits long, two parameters are reserved for the transmission.
53.01 FBA DATA OUT1 … 53.12 FBA DATA OUT12	0 1…3 11…13 1001…9999	Defines the data transmitted from fieldbus controller to drive. **Note:** If the selected data is 32 bits long, two parameters are reserved for the transmission.
Note: In the User's Manual of the fieldbus adapter module, the parameter group number is 3 or C for parameters 52.01…52.12 and 2 or B for parameters 53.01…53.12.		

After the module configuration parameters have been set, the drive control parameters (see section Drive control parameters) must be checked and adjusted when necessary.

The new settings will take effect when the drive is powered up the next time (before powering off the drive, wait at least 1 minute), or when parameter 51.27 FBA PAR REFRESH is activated.

Drive control parameters

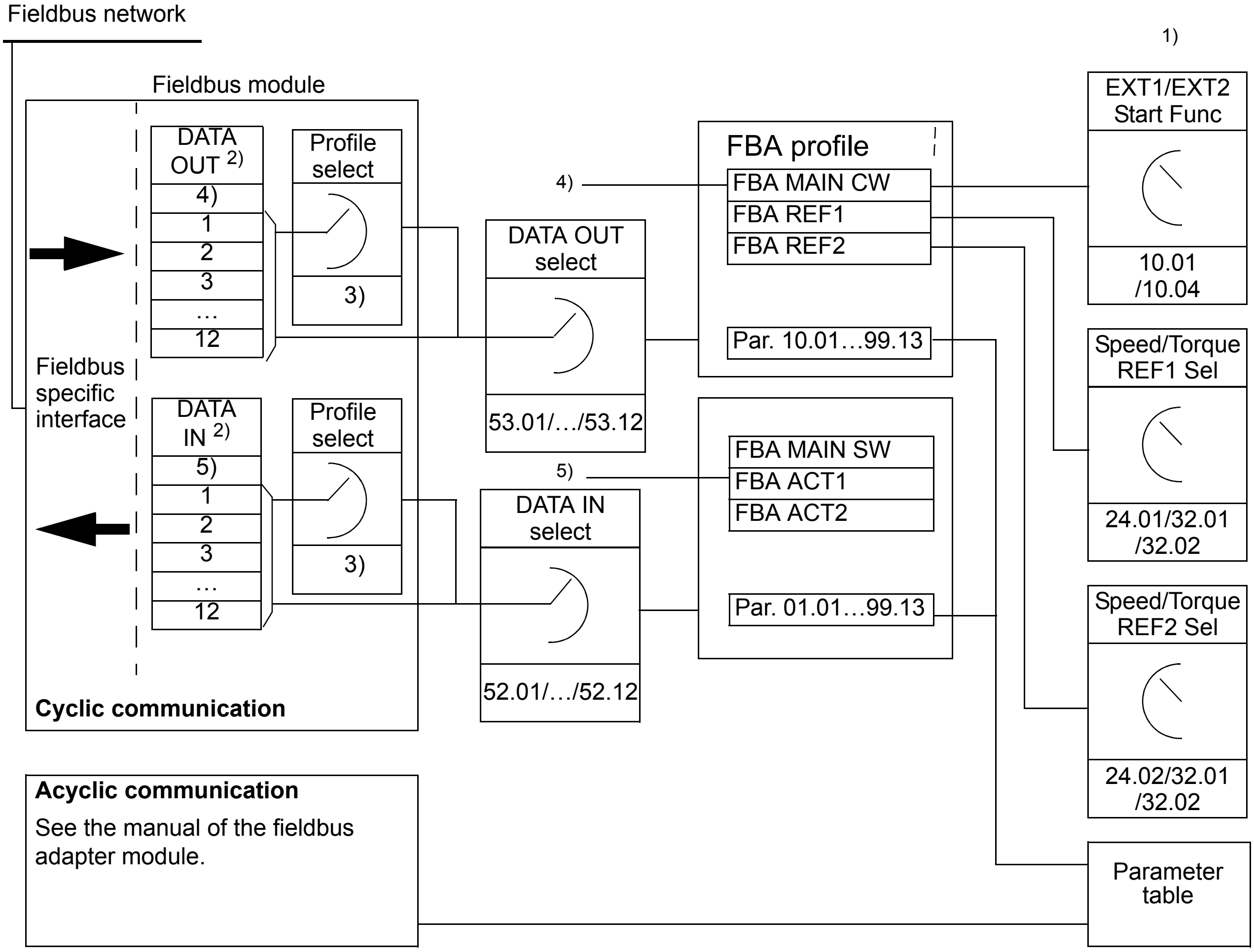
The Setting for fieldbus control column gives the value to use when the fieldbus interface is the desired source or destination for that particular signal. The Function/Information column gives a description of the parameter.

Parameter	Setting for fieldbus control	Function/Information
CONTROL COMMAND SOURCE SELECTION		
10.01 EXT1 START FUNC	(3) FBA	Selects fieldbus as the source for the start and stop commands when EXT1 is selected as the active control location.
10.04 EXT2 START FUNC	(3) FBA	Selects fieldbus as the source for the start and stop commands when EXT2 is selected as the active control location.
24.01 SPEED REF1 SEL	(3) FBA REF1 (4) FBA REF2	Fieldbus reference REF1 or REF2 is used as speed reference 1.
24.02 SPEED REF2 SEL	(3) FBA REF1 (4) FBA REF2	Fieldbus reference REF1 or REF2 is used as speed reference 2.
32.01 TORQ REF1 SEL	(3) FBA REF1 (4) FBA REF2	Fieldbus reference REF1 or REF2 is used as torque reference 1.
32.02 TORQ REF ADD SEL	(3) FBA REF1 (4) FBA REF2	Fieldbus reference REF1 or REF2 is used for torque reference addition.
SYSTEM CONTROL INPUTS		
16.07 PARAM SAVE	(0) DONE (1) SAVE	Saves parameter value changes (including those made through fieldbus control) to permanent memory.

The fieldbus control interface

The cyclic communication between a fieldbus system and the drive consists of 16/32-bit input and output data words. The drive supports at the maximum the use of 12 data words (16-bit) in each direction.

Data transmitted from the drive to the fieldbus controller is defined by parameters 52.01…52.12 (FBA DATA IN) and data transmitted from the fieldbus controller to the drive is defined by parameters 53.01…53.12 (FBA DATA OUT).



1) See also other parameters which can be controlled by the fieldbus.
2) The maximum number of used data words is protocol-dependent.
3) Profile/instance selection parameters. Fieldbus module specific parameters. For more information, see the User’s Manual of the appropriate fieldbus adapter module.
4) With DeviceNet the control part is transmitted directly.
5) With DeviceNet the actual value part is transmitted directly.

The Control Word and the Status Word

The Control Word (CW) is the principal means of controlling the drive from a fieldbus system. The Control Word is sent by the fieldbus controller to the drive. The drive switches between its states according to the bit-coded instructions of the Control Word.

The Status Word (SW) is a word containing status information, sent by the drive to the fieldbus controller.

Actual values

Actual values (ACT) are 16/32-bit words containing information on selected operations of the drive.

FBA communication profile

The FBA communication profile is a state machine model which describes the general states and state transitions of the drive. The State diagram on page 19 presents the most important states (including the FBA profile state names). The FBA Control Word (2.12 FBA MAIN CW) commands the transitions between these states and the FBA Status Word (2.13 FBA MAIN SW) indicates the status of the drive.

Fieldbus adapter module profile (selected by adapter module parameter) defines how the control word and status word are transmitted in a system which consists of fieldbus controller, fieldbus adapter module and drive. With transparent modes, control word and status word are transmitted without any conversion between the fieldbus controller and the drive. With other profiles (e.g. PROFIdrive for FPBA-01, AC/DC drive for FDNA-01, DS-402 for FCAN-01 and ABB Drives profile for all fieldbus adapter modules) fieldbus adapter module converts the fieldbus-specific control word to the FBA communication profile and status word from FBA communication profile to the fieldbus-specific status word.

For descriptions of other profiles, see the *User's Manual* of the appropriate fieldbus adapter module.

Fieldbus references

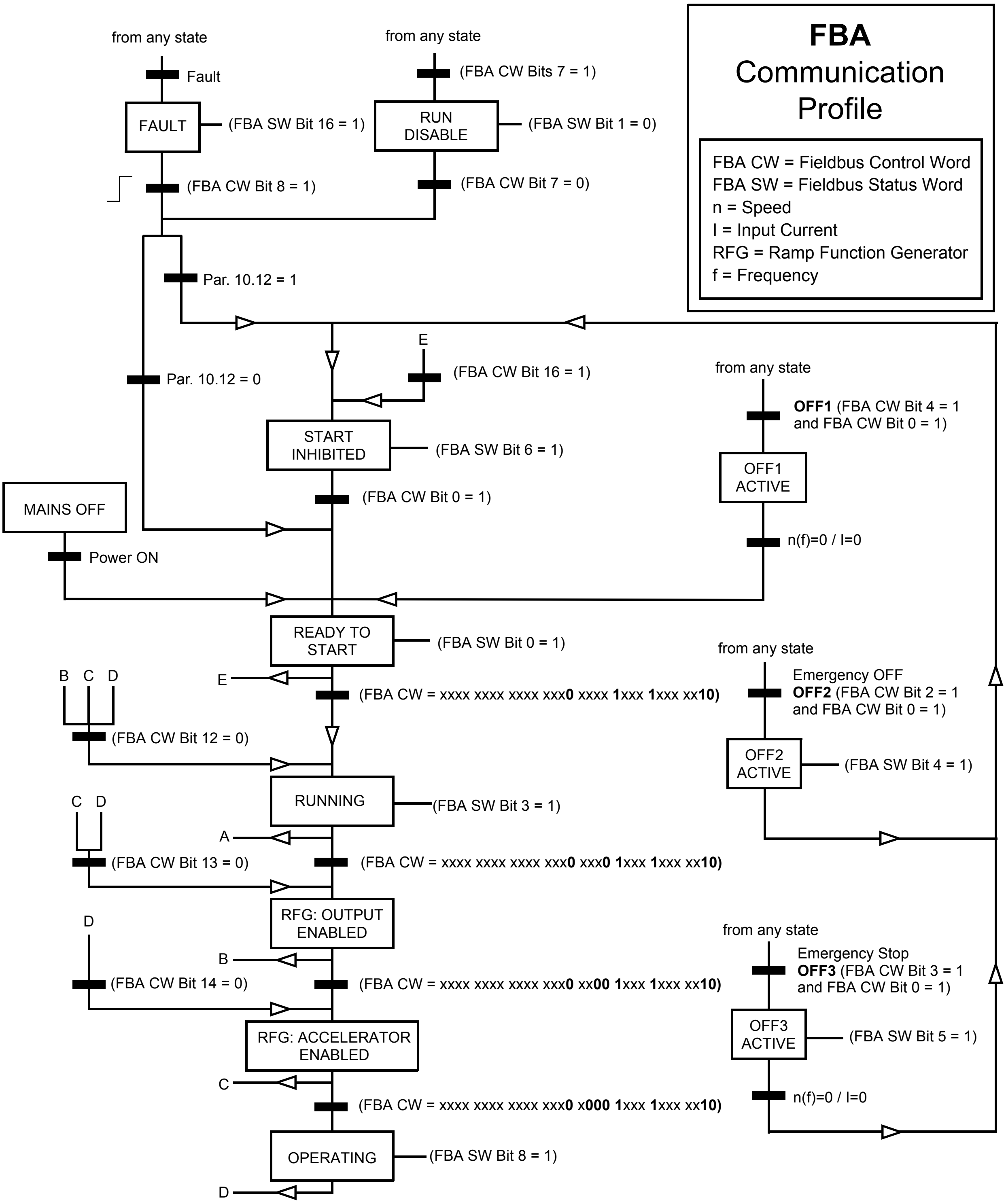
References (FBA REF) are 16/32-bit signed integers. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference value. The contents of each reference word can be used as torque or speed reference.

When torque or speed reference scaling is selected (by parameter 50.04 FBA REF1 MODESEL / 50.05 FBA REF2 MODESEL), the fieldbus references are 32-bit integers. The value consists of a 16-bit integer value and a 16-bit fractional value. The speed/torque reference scaling is as follows:

Reference	Scaling	Notes
Torque reference	FBA REF / 65536 (value in%)	Final reference is limited by parameters 20.06 MAXIMUM TORQUE and 20.07 MINIMUM TORQUE.
Speed reference	FBA REF / 65536 (value in rpm)	Final reference is limited by parameters 20.01 MAXIMUM SPEED, 20.02 MINIMUM SPEED and 24.12 SPEED REFMIN ABS.
Position reference	See parameter group 60 POS FEEDBACK.	
Velocity reference		

State diagram

The following presents the state diagram for the FBA communication profile. For other profiles, see the *User’s Manual* of the appropriate fieldbus adapter module.



Starting up the FPBA-01 adapter for different communication profiles

Overview

This chapter presents the steps to take during the start-up of the FPBA-01 PROFIBUS DP Adapter Module with the drive. For more detailed information, see *PROFIBUS DP Adapter Module FPBA-01 User's Manual* (3AFE68573271 [English]).

WARNING! Follow the safety instructions given in this manual and in the hardware manual of the drive.

Mechanical and electrical installation

- Insert the FPBA-01 into its specified slot in the drive.
- Fasten the screw.
- Plug the fieldbus connector to the module.

Drive configuration

- Power up the drive.
- A parameter must be adjusted to activate the communication: set parameter 50.01 FBA ENABLE to ENABLE.
- Parameter group 51 shows the status of the FPBA configuration parameters.
- At minimum, set the required node address at parameter 50.02 NODE ADDRESS and the communication profile at 5105 PROFILE. Finally, validate the settings with 51.27 FBA PAR REFRESH.

Cyclic data handling

With the FPBA-01, both data-consistent and non-consistent communication can be used, data-consistent meaning that the whole cyclic data frame is transmitted during a single program cycle. Some PLCs handle this internally, but others must be programmed to transmit data-consistent telegrams (for more information, see *PROFIBUS DP Adapter Module FPBA-01 User's Manual* (3AFE68573271 [English]) chapter *Commmunication)*.

Parameter setting examples

This section gives the recommended drive parameter settings for different communication profiles. For more information on the communicaton profiles used in the communication between the PROFIBUS network, the FPBA-01 module and the drive, such as the contents of the Control Word and Status Word and the state machines of the profiles, refer to *PROFIBUS DP Adapter Module FPBA-01 User's Manual* (3AFE68573271 [English]): chapter *Communication profiles*.

PROFIdrive communication profile (Speed Control Mode) with PPO Type 1

The start/stop commands and reference are according to the PROFIdrive profile *Speed Control Mode*.

A reference value of ±16384 (4000h) corresponds to parameter 25.02 SPEED SCALING in forward and reverse directions.

Direction	PZD1	PZD2
Out	Control Word	Speed reference
In	Status Word	Speed actual value

The table below gives the recommended drive parameter settings.

Drive parameter	Name	Value	Description
50.01	FBA ENABLE	ENABLE	Communication enable between the drive and fieldbus module
50.04	FBA REF1 MODESEL	SPEED	Fieldbus reference 1 mode selection
10.01	EXT1 START FUNC	FBA	External 1 control source selection
24.01	SPEED REF1 SEL	FBA REF 1	Fieldbus reference 1 is the source for speed reference 1.
34.03	EXT1 CTRL MODE 1	SPEED	External 1 control mode 1: Speed
51.01	FBA TYPE	PROFIBUS DP*	Displays the type of the fieldbus adapter module.
51.02	NODE ADDRESS	3**	Profibus node address of the fieldbus module
51.03	BAUDRATE	12000*	Displays current baud rate on the Profibus network.
51.04	TELEGRAM TYPE	1 (= PPO1)*	Displays telegram type selected by PLC configuration tool.
51.05	PROFILE	0 (= PROFIdrive)	Control word according to the PROFIdrive Speed mode
52.01	FBA DATA IN1	4*	Virtual address for Status Word (PZD 1)
52.02	FBA DATA IN2	5	Virtual address for actual value 1 (PZD 2)
53.01	FBA DATA OUT2	1*	Virtual address for Control Word (PZD 1)
53.02	FBA DATA OUT2	2	Virtual address for reference 1 (PZD 2)
51.27	FBA PAR REFRESH	REFRESH	Refreshing parameter settings of the module

*Read-only or automatically detected/set

**Example

The Control Word is used to send commands from a master to a slave unit. The start sequence for the parameter example above is given below.

Control Word:

47Eh (1150 decimal) => READY TO SWITCH

47Fh (1151 decimal) => OPERATING.

ABB DRIVES communication profile (Speed/Torque Control Mode) with PPO Type 4

The start/stop commands and reference are according to the ABB DRIVES profile Speed Control Mode.

When Reference 1 (REF1) is used, a reference value of ±20000 (4E20h) corresponds to the reference set by parameter 25.02 SPEED SCALING in the forward and reverse directions.

When Reference 2 (REF2) is used, a reference value of ±10000 (2710h) corresponds to the reference set by parameter 32.04 TORQUE REF 1 MAX in the forward and reverse directions.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control Word	Speed reference	Torque reference	Not used		
In	Status Word	Speed actual value	Torque actual	Not used		

The table below gives the recommended drive parameter settings.

Drive parameter	Name	Setting	Description
50.01	FBA ENABLE	ENABLE	Communication enable between the drive and the fieldbus module
50.04	FBA REF1 MODESEL	SPEED	Fieldbus reference 1 mode selection
50.05	FBA REF2 MODESEL	TORQUE	Fieldbus reference 2 mode selection
10.01	EXT1 START FUNC	FBA	External 1 control source selection
10.04	EXT2 START FUNC	FBA	External 2 control source selection
24.01	SPEED REF1 SEL	FBA REF 1	Fieldbus reference 1 is the source for speed reference 1
32.02	TORQ REF1 SEL	FBA REF 2	Fieldbus reference 2 is the source for Torque reference 1
34.01	EXT1/EXT2 SEL	C.False	External 1 / External 2 selection from fieldbus only (bit 11 in the fieldbus Control Word)
34.03	EXT1 CTRL MODE 1	SPEED	External 1 control mode 1: Speed
34.05	EXT2 CTRL MODE 1	TORQUE	External 2 control mode 1: Torque
51.01	FBA TYPE	PROFIBUS DP*	Displays the type of the fieldbus adapter module.
51.02	NODE ADDRESS	3**	Profibus node address of the fieldbus module.
51.03	BAUDRATE	12000*	Displays current baud rate on the Profibus network.
51.04	TELEGRAM TYPE	4 (= PPO4)*	Displays telegram type selected by the PLC configuration tool.
51.05	PROFILE	1(= ABB Drives)	Control Word according to the ABB Drives profile.
52.01	FBA DATA IN1	4*	Status Word (PZD 1)
52.02	FBA DATA IN2	5	Actual value 1
52.03	FBA DATA IN3	6	Actual value 2
53.01	FBA DATA OUT2	1*	Control Word

53.02	FBA DATA OUT2	2	Reference 1
53.03	FBA DATA OUT3	3	Reference 2
51.27	FBA PAR REFRESH	REFRESH	Refreshing parameter settings of the module

*Read-only or automatically detected/set

**Example

The start sequence for the parameter example above is given below.

Control Word:

47Eh (1150 decimal) => READY TO SWITCH ON
47Fh (1151 decimal) => OPERATING (Speed mode)
C7Fh (3199 decimal)=> OPERATING (Torque mode).

PROFIdrive communication profile (Positioning Mode) with PPO Type 4

The start/stop commands and reference are according to the PROFIdrive profile *Positioning Mode*. The Position setpoint and velocity reference are defined as 32-bit integer values; both are scaled as defined by drive parameter settings.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control Word (STW1)	Position setpoint		Velocity reference		N/A
In	Status Word (ZSW1)	Position actual value		Velocity actual value		N/A

The table below gives the recommended drive parameter settings.

Drive parameter	Name	Value	Description
50.01	FBA ENABLE	ENABLE	Communication enable between the drive and the fieldbus module
50.04	FBA REF1 MODESEL	POSITION	Fieldbus reference 1 mode selection
50.05	FBA REF2 MODESEL	VELOCITY	Fieldbus reference 2 mode selection
10.01	EXT1 START FUNC	FBA	External 1 control source selection
22.01	SPEED FB SEL	ENC1 SPEED**	Speed feedback selection
34.02	EXT1 MODE 1/2SEL	P.FBA MAIN CW.26	External 1 control mode selection. Selection is done by START_HOMING bit (bit 11 in Profibus Control Word). Mode 1: Position, Mode 2: Homing
34.03	EXT1 CTRL MODE 1	POSITION	External 1 control mode 1:Position
34.04	EXT1 CTRL MODE 2	HOMING	External 1 control mode 2: Homing
62.01	HOMING METHOD	CAN Methodxx	Selects the homing mode. Select the appropriate CAN Method.
62.03	HOMING START	C.False	Homing start from fieldbus only
65.01	POS REFSOURCE	FIELDBUS	Position reference and speed are read from fieldbus.
65.03	POS START 1	C.False	Position start 1 from fieldbus only
65.04	POS 1 REF SEL	FBA REF 1	FBA reference 1 is the position reference source.
65.11	POS START 2	C.False	Position start 2 from fieldbus only.
65.22	PROF VEL REF SEL	FBA REF2	FBA reference 2 is the velocity reference source.
66.05	POS ENABLE	C.False	Position reference generator is enabled by fieldbus only.
70.03	POS REF ENA	C.False	Position reference enable command from fieldbus only
51.01	FBA TYPE	PROFIBUS DP*	Displays the type of the fieldbus adapter module.
51.02	NODE ADDRESS	3**	Profibus node address of the fieldbus module
51.03	BAUDRATE	12000*	Displays current baud rate on the Profibus network.
51.04	TELEGRAM TYPE	4 (= PPO4)*	Displays telegram type selected by PLC configuration tool.

51.05	PROFILE	4 (= PROFIdrive Positioning)	Control Word according to the PROFIdrive Positioning mode
52.01	FBA DATA IN1	4*	Status Word
52.02	FBA DATA IN2	15	Actual value 1
52.04	FBA DATA IN4	16	Actual value 2
53.01	FBA DATA OUT2	1*	Control Word
53.02	FBA DATA OUT2	12	Reference 1
53.04	FBA DATA OUT4	13	Reference 2
51.27	FBA PAR REFRESH	REFRESH	Refreshing parameter settings of the module

*Read-only or automatically detected/set

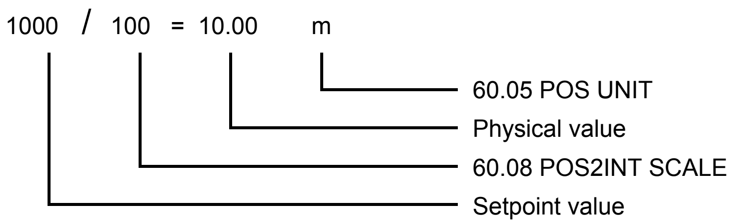
Note: By default, fieldbus is not the only control source. See actual signal 2.12 FBA MAIN CW in *ACSM1 Motion Control Program Firmware Manual* for details.

The position setpoint is scaled as follows:

Drive parameter	Setting
60.05 POS UNIT (Position unit)	m**
60.08 POS2INT SCALE	100**

**Example

The position setpoint and actual values are scaled with the above example values as follows:

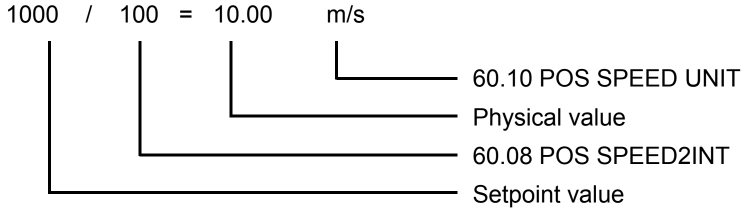


Example for velocity setpoint scale:

Drive parameter	Name	Value	Description
60.10	POS SPEED UNIT	u/s**	Unit/s (in this case m/s)
60.11	POS SPEED2INT	100**	Scales position speed values to integer values. Selections: 1/10/100/1000/10000/100000

**Example

The velocity setpoint and actual values are scaled with the above example values as follows:



Pay attention to the following parameters:

Group	Description
90	Encoder selection
91/92/93	Settings of the encoder

The start sequence for above parameter example is given below:

Control word:

406h (1150 decimal) => READY TO SWITCH ON
40Fh (1039 decimal) => OPERATING
43Fh (1087 decimal)=> OPERATING (Do reject traversing task with no intermediate stop.)
47Fh (1151 decimal)=> OPERATING (Activate traversing task.)
C0Fh (3087 decimal)=> OPERATING (Start homing procedure.)

Starting up fieldbus communication and programming the ABB PLC (one-drive system)

What this chapter contains

This chapter presents the steps to take during the start-up of the drive fieldbus control with ABB AC500 PLC and PROFIBUS DP adapter module. A system with one drive is set up. For a system where two drives are controlled simultaneously, see also chapter *Starting up fieldbus communication and programming the ABB PLC (multi-axis systems)*, page *105.*

For more information on the fieldbus adapter module, such as

- mechanical and electrical installation
- PROFIBUS specific parameters
- components
- protocols

see *PROFIBUS DP Adapter Module FPBA-01 User's Manual* (3AFE68573271 [English]).

For more information on the PLC, see ABB AC500 PLC manuals.

Safety

WARNING! Follow the safety instructions given in this manual and in the drive hardware manual.

Equipment and programs

Equipment used in the examples:

- **ACSM1-04 demosuitcase** (order code 68836808) containing two ACSM1-04AM-02A5-4 drives with FPBA-01 PROFIBUS DP Adapter Modules

- **AC500 demosuitcase TA510-CASE**: AC500 PLC *) equipped with a CPU of type PM571 and a communications module, CM572-DP, for communication over PROFIBUS DP field.

Programs used in the examples:

- ACSM1 Motion Control Program version UMFI1480
- ABB DriveStudio PC tool
- AC500 Control Builder PS501 *). Code of the installation CD: 1SAP 190 100 R0002 C2 V1.3.0 / 11.2008
- PS551-MC PLCopen Motion Control Library *) for AC500. Single license 1SAP190600R0001. Multiple license 1SAP190600R0101.

*) Manufacturer ABB STOTZ-KONTAKT GmbH, http://www.abb.de/stotz-kontakt

Start-up flowchart

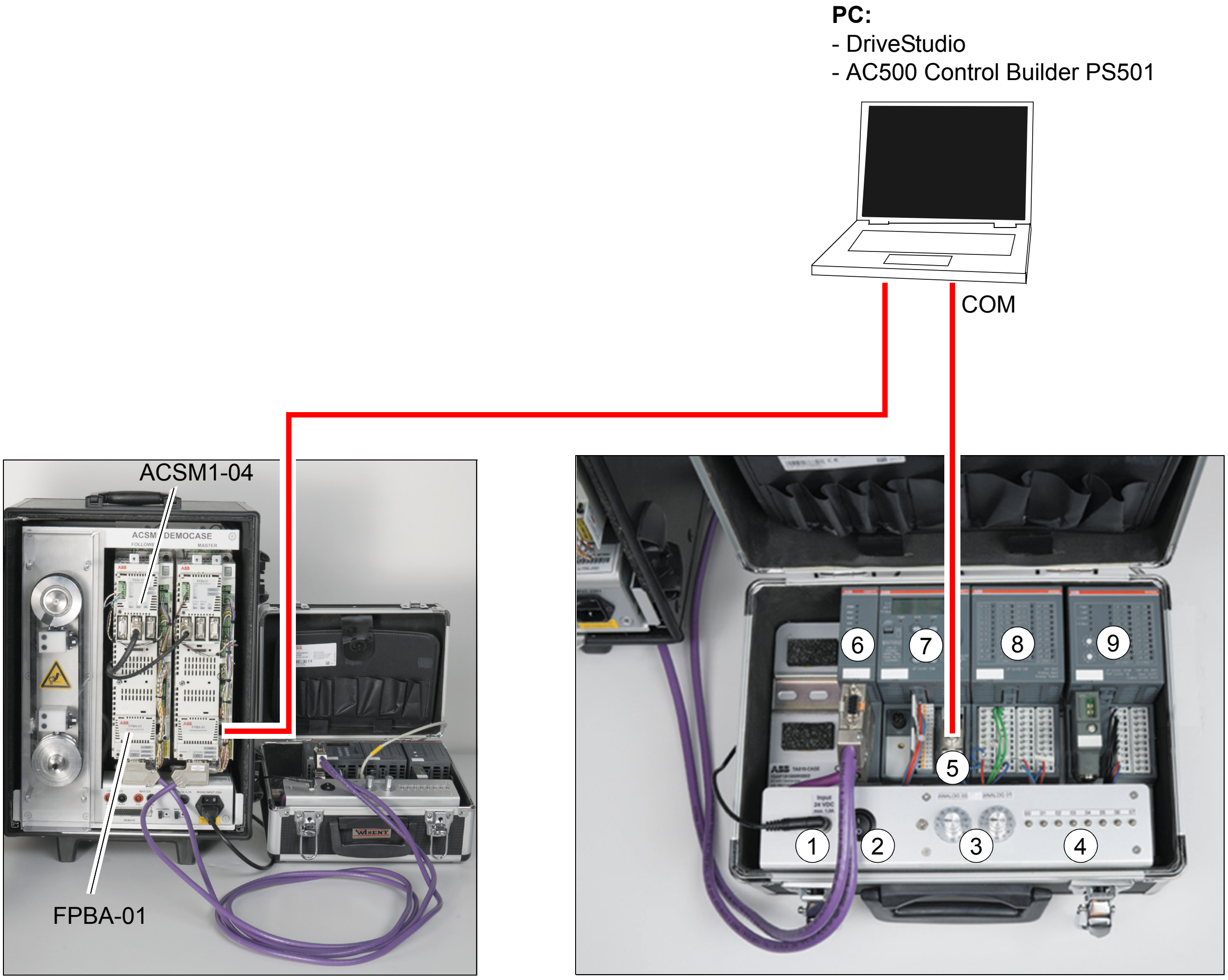
The steps of the start-up procedure are presented below. Perform the steps from first to last.

No.	Task	Description / See instruction
ELECTRICAL INSTALLATION		In this section, you wire the equipment used in this programming example.
1	Connect the PC RJ-45 cable to drive terminal X7.	*ACSM1-04 Drive Modules Hardware Manual* (3AFE68797543 [English]) Page *34*
2	Connect the PLC fieldbus master (CM572-DP) to the fieldbus adapter module (FPBA-01) of the drive.	*Installation of the TA510-CASE*, page *34*
3	Connect the PC serial port (COM) to the PLC programming port. OR: Connect the PC Ethernet port to the PLC Ethernet port with an RJ-45 Ethernet cable. OR: Connect the PLC serial port to the PC USB port with a TK503 programming cable	*Installation of the TA510-CASE*, page *34* TK503 programming cable order code: 1TN968901R1100
SOFTWARE INSTALLATION		In this section, you install the programming tools.
1	Install the DriveStudio PC tool if not yet installed.	*Installing the DriveStudio PC tool*, page *35*
2	Install the AC500 Control Builder PS501 software.	*Installing the AC500 Control Builder PS501 software*, page *35*
3	Install the PS551-MC Motion Control library.	*Installing the PS551-MC Motion Control Library*, page *37*
4	If needed, install additional GSD files and libraries.	*Installing additional GSD files and libraries*, page *38*
PROGRAMMING		In this section, you set up the communication between the drive and the PLC and make the PLC program that controls the drive through fieldbus.
– – – ONE-DRIVE SYSTEM – – –		
1	Set the drive control program parameters.	In this section you set the drive parameters needed for communication with the FPBA-01 fieldbus adapter module. *Setting the drive control program parameters*, page *40*

No.	Task	Description / See instruction
2	Set up the communication.	In this section, you configure communication between the PLC and the drive. ***Setting up the communication***, page *45* • *Create a new project*, page *45* • *Configure communication with the SYCON fieldbus configurator*, page *50*
3	Program the main program to the PLC.	In this section, you program function blocks for communication and basic drive control. ***Setting up the communication***, page 45 • *Create a new project*, page *45* • *Configure communication with the SYCON fieldbus configurator*, page *50* ***Programming the PLC main program***, page *63* • *Load additional libraries for programming assistance*, page *63* • *Add function block ACSM1_ACCESS_dc*, page *66* • *Add function block MC_ReadStatus*, page *72* • *Add function block MC_ReadActualPosition*, page *72* • *Add function block MC_ReadAxisError*, page *72* • *Add function block MC_Reset*, page *73* • *Add function block MC_Power*, page *73* • *The complete main program is shown here*, page *74*
4	Program actions to the PLC program.	In this section, you program function blocks for motion control. ***Programming actions***, page *77* • *How to create actions*, page *77* • *Program velocity (MC_MoveVelocity)*, page *80* • *Program stopping (MC_Stop)*, page *81* • *Program positiong (MC_MoveAbsolute)*, page *82* • *Program relative movement (MC_MoveRelative)*, page *83* • Program homing (MCA_Home), page 84 • Program toggling between two positions, page 84 • *Call the actions into the main program*, page *87*
5	Program the visualization.	In this section, you program function blocks for visualizing the motion control. ***Programming visualizations***, page *89* • *Create an empty visualization field*, page *90* • *Create buttons*, page *91* • *Create indicators*, page *95* • *Create visuaization elements*, page *96*
6	Run and test the program.	In this section, you run and test the program that you have made. ***Running and testing the program***, page *99* • *Load the program to the controller*, page *99* • *Test the program*, page *102*

No.	Task	Description / See instruction
	– – – TWO - DRIVE SYSTEM – – –	
	Set up the communication. Program the main program to the PLC. Program actions to the PLC program. Program the visualization. Run and test the program.	In this section, you program additional function blocks for the second drive for communication and basic drive control, and program additional actions and visualizations, and run and test the program. ***Setting up the communication***, page 105 • *Configure communication with the SYCON fieldbus configurator*, page *106* ***Programming the PLC main program***, page *116* ***Programming actions***, page *120* ***Programming visualizations***, page *123* ***Running and testing the program***, page *124*

Connections



Connections for the setup in section Starting up fieldbus communication and programming the ABB PLC (multi-axis systems), page 105

Note: Both drives are followers/slaves for the communication module of the PLC.

Installation of the TA510-CASE

1	24 V DC input socket
2	24 V DC on/off switch
3	Analog potentiometer
4	Digital switches
5	Programming port
6	CM572-DP communication module
7	CPU unit PM571
8	Analog module AX522
9	Remote digital I/O module DC505-FBP

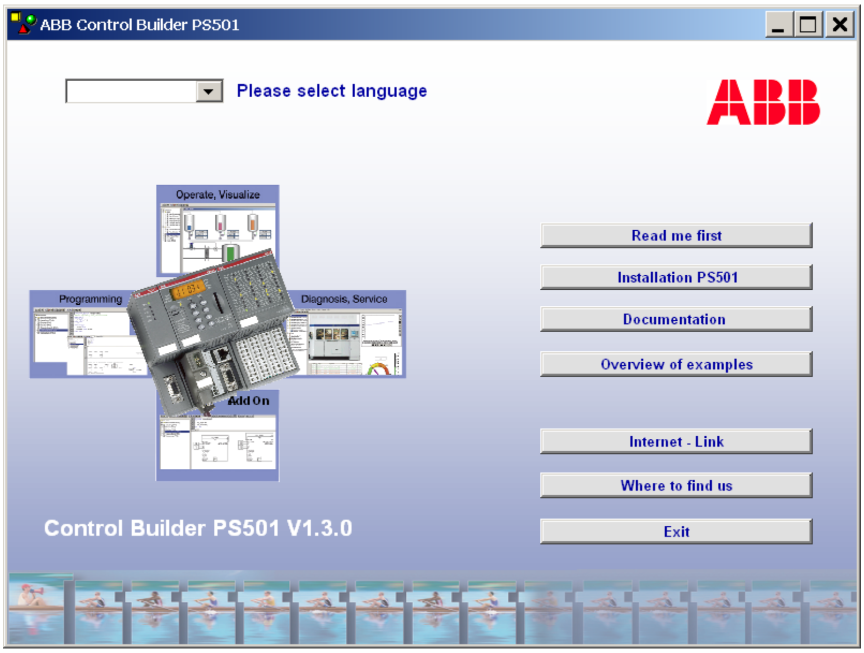
Installing the DriveStudio PC tool

Insert the DriveStudio installation CD into the CD drive of your the PC. Follow the instructions given by the installation program.

For more information, see DriveStudio online Help folder DriveStudio: Installing and uninstalling.

Installing the AC500 Control Builder PS501 software

1. Insert the AC500 Control Builder PS501 installation CD into the CD drive of your PC. Click the **Read me first** button and read the instructions.
2. Click the **Installation PS501** button.



3. Click the **Read me for installation** button and read the instructions.

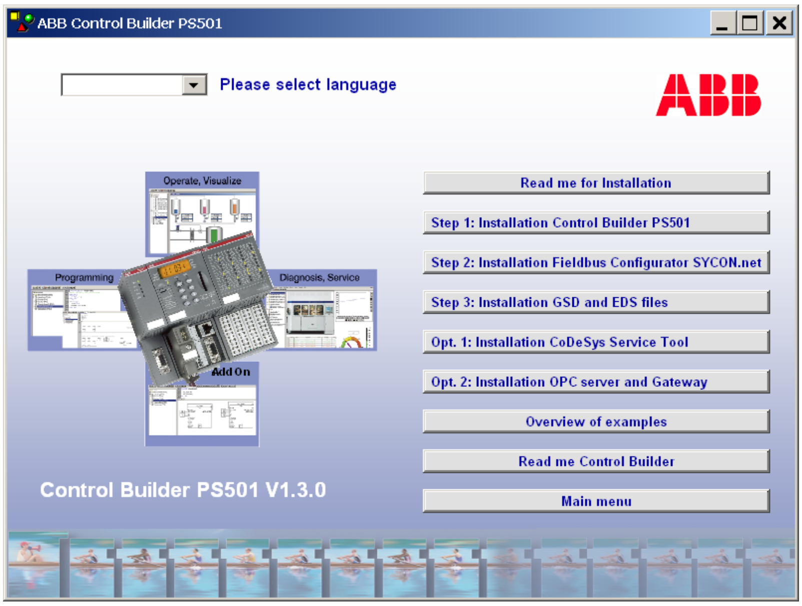
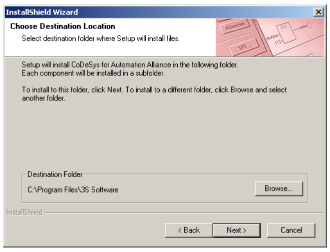


ABB Control Builder PS501
Please select language
ABB
Operate, Visualize
Programming
Diagnosis, Service
Add On
Control Builder PS501 V1.3.0
Read me for Installation
Step 1: Installation Control Builder PS501
Step 2: Installation Fieldbus Configurator SYCON.net
Step 3: Installation GSD and EDS files
Opt. 1: Installation CoDeSys Service Tool
Opt. 2: Installation OPC server and Gateway
Overview of examples
Read me Control Builder
Main menu

4. Click the **Step 1: Installation Control Builder PS501** button. Follow the instructions.



InstallShield Wizard

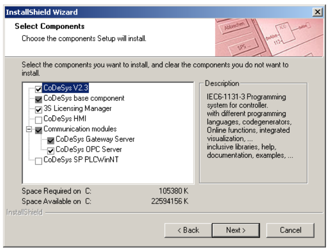
Choose Destination Location

Select destination folder where Setup will install files.

Setup will install CoDeSys for Automation Alliance in the following folder.
Each component will be installed in a subfolder.

To install to this folder, click Next. To install to a different folder, click Browse and select another folder.

Destination Folder: C:\Program Files\3S Software



InstallShield Wizard

Select Components

Choose the components Setup will install.

Select the components you want to install, and clear the components you do not want to install.

- ☑ CoDeSys V2.3
- ☑ CoDeSys base component
- ☑ 3S Licensing Manager
- □ CoDeSys HMI
- ☑ Communication modules
  - ☑ CoDeSys Gateway Server
  - ☑ CoDeSys OPC Server
- □ CoDeSys SP PLCWinNT

Description: IEC6-1131-3 Programming system for controller. with different programming languages, codegenerators, Online functions, integrated visualization, ... inclusive libraries, help, documentation, examples, ...

Space Required on C: 105380 K
Space Available on C: 22594156 K

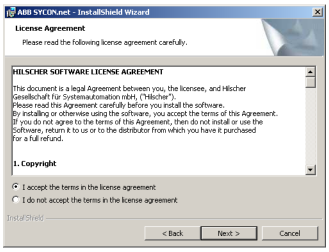


ABB SYCON.net - InstallShield Wizard

License Agreement

Please read the following license agreement carefully.

HILSCHER SOFTWARE LICENSE AGREEMENT

This document is a legal Agreement between you, the licensee, and Hilscher Gesellschaft für Systemautomation mbH, ("Hilscher").
Please read this Agreement carefully before you install the software.
By installing or otherwise using the software, you accept the terms of this Agreement.
If you do not agree to the terms of this Agreement, then do not install or use the Software, return it to us or to the distributor from which you have it purchased for a full refund.

1. Copyright

● I accept the terms in the license agreement
○ I do not accept the terms in the license agreement

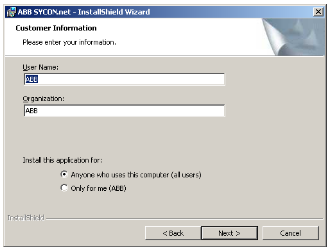


ABB SYCON.net - InstallShield Wizard

Customer Information

Please enter your information.

User Name: ABB

Organization: ABB

Install this application for:
● Anyone who uses this computer (all users)
○ Only for me (ABB)

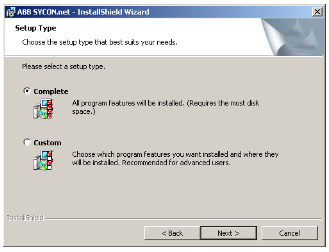


ABB SYCON.net - InstallShield Wizard

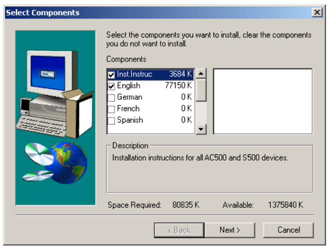
Setup Type

Choose the setup type that best suits your needs.

Please select a setup type.

● **Complete**
All program features will be installed. (Requires the most disk space.)

○ **Custom**
Choose which program features you want installed and where they will be installed. Recommended for advanced users.



Select Components

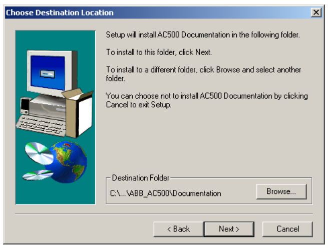
Select the components you want to install, clear the components you do not want to install.

Components

☑ Inst.Instruc	3684 K
☑ English	77150 K
□ German	0 K
□ French	0 K
□ Spanish	0 K

Description: Installation instructions for all AC500 and S500 devices.

Space Required: 80835 K Available: 1375840 K



Choose Destination Location

Setup will install AC500 Documentation in the following folder.

To install to this folder, click Next.

To install to a different folder, click Browse and select another folder.

You can choose not to install AC500 Documentation by clicking Cancel to exit Setup.

Destination Folder: C:\...\ABB_AC500\Documentation

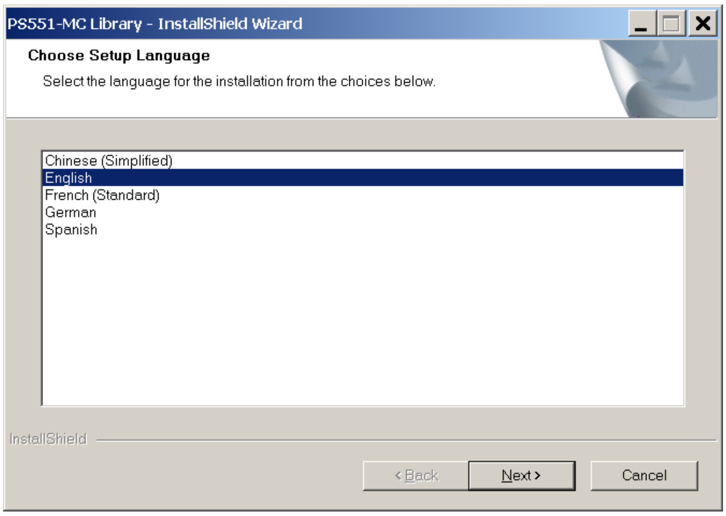
5. Click the **Step 2: Installation Fieldbus Configuration SYCON.net** button. Follow the instructions.

6. Click the **Installation GSD and ESD files** button. Follow the instructions.

7. Click the **Opt. 1: Installation CodeSys Service Tool.**

Installing the PS551-MC Motion Control Library

Insert the *PS551-MC Motion Control Library for AC500* (code: 1SAP190600R0001) installation CD into the CD drive of your the PC. If the installation does not start automatically, double-click setup.exe.


PS551-MC Library - InstallShield Wizard

Choose Setup Language

Select the language for the installation from the choices below.

Chinese (Simplified)
English
French (Standard)
German
Spanish

Installing additional GSD files and libraries

The GSD file DP-V0 for the FPBA-01 fieldbus adapter module (ABB0959.gsd) is included in the *PS551-MC Motion Control Library* CD and was installed in the previous step.

The GSD files DP-V0 and DP-V1 for FPBA-01 can also be found at the manufacturer’s website. Go to www.abb.com and select Product Guide / Drives / Drive Options / Fieldbus Options. From the Please select category list, select “..FPBA - PROFIBUS (3)”.

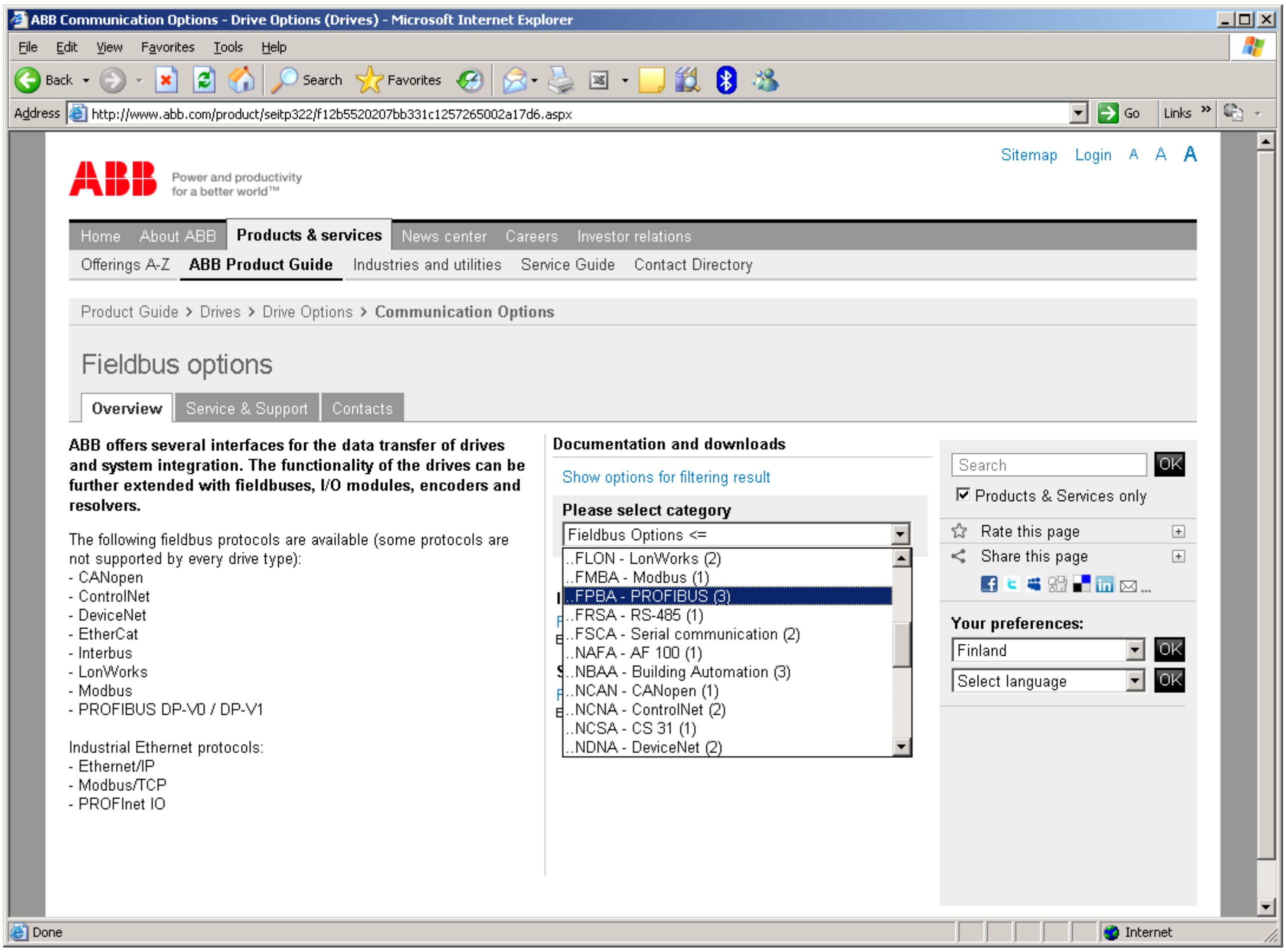


ABB Communication Options - Drive Options (Drives) - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://www.abb.com/product/seitp322/f12b5520207bb331c1257265002a17d6.aspx
Go Links
Sitemap Login A A A
Power and productivity for a better world™
Home About ABB Products & services News center Careers Investor relations
Offerings A-Z ABB Product Guide Industries and utilities Service Guide Contact Directory
Product Guide > Drives > Drive Options > Communication Options
Overview Service & Support Contacts
Search OK
Rate this page
Share this page
OK
OK
Done
Internet

Fieldbus options

ABB offers several interfaces for the data transfer of drives and system integration. The functionality of the drives can be further extended with fieldbuses, I/O modules, encoders and resolvers.

The following fieldbus protocols are available (some protocols are not supported by every drive type):
- CANopen
- ControlNet
- DeviceNet
- EtherCat
- Interbus
- LonWorks
- Modbus
- PROFIBUS DP-V0 / DP-V1

Industrial Ethernet protocols:
- Ethernet/IP
- Modbus/TCP
- PROFInet IO

Documentation and downloads

Show options for filtering result

Please select category

Fieldbus Options <=
..FLON - LonWorks (2)
..FMBA - Modbus (1)
..FPBA - PROFIBUS (3)
..FRSA - RS-485 (1)
..FSCA - Serial communication (2)
..NAFA - AF 100 (1)
..NBAA - Building Automation (3)
..NCAN - CANopen (1)
..NCNA - ControlNet (2)
..NCSA - CS 31 (1)
..NDNA - DeviceNet (2)

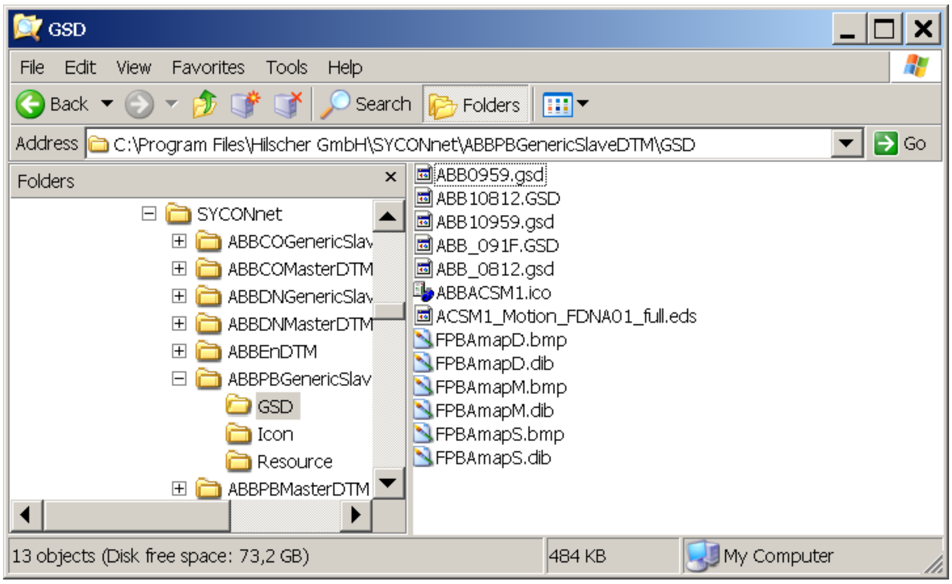
☑ Products & Services only

Your preferences:

Finland

Select language

If needed, copy additional GSD files to the following folder in your PC: C:\Program Files\Hilscher GmbH\SYCONnet\ABBPBGenericSlaveDTM\GSD.



Address: C:\Program Files\Hilscher GmbH\SYCONnet\ABBPBGenericSlaveDTM\GSD

ABB0959.gsd
ABB10812.GSD
ABB10959.gsd
ABB_091F.GSD
ABB_0812.gsd
ABBACSM1.ico
ACSM1_Motion_FDNA01_full.eds
FPBAmapD.bmp
FPBAmapD.dib
FPBAmapM.bmp
FPBAmapM.dib
FPBAmapS.bmp
FPBAmapS.dib

13 objects (Disk free space: 73,2 GB) | 484 KB

Step

Setting the drive control program parameters

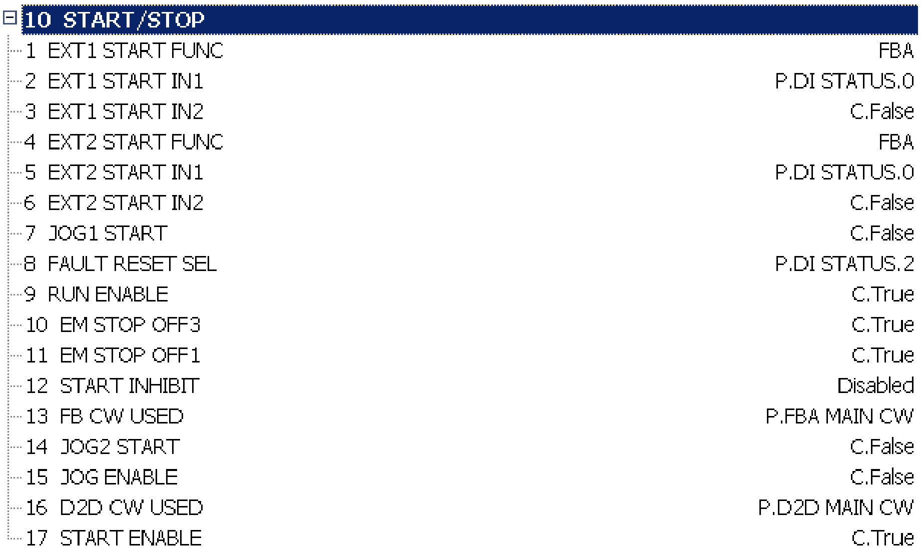
This section lists the ACSM1 Motion Control Program parameter settings that you need to do for successful communication with the FPBA-01 fieldbus adapter module. If needed, set also other parameters to meet the application needs.

For more information on the parameters, refer to *ACSM1 Motion Control Program Firmware Manual* (3AFE68848270 [English]).

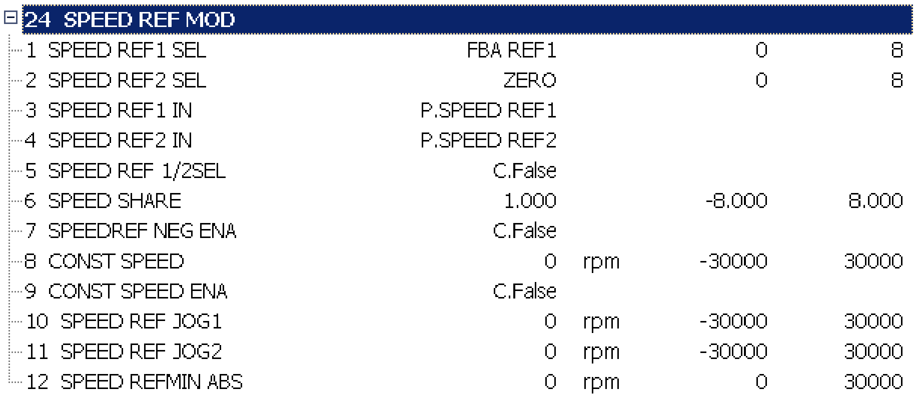
For advice on using the DriveStudio, refer to the DriveStudio online Help.

1. Open the DriveStudio.

2. Set the parameters as shown below.

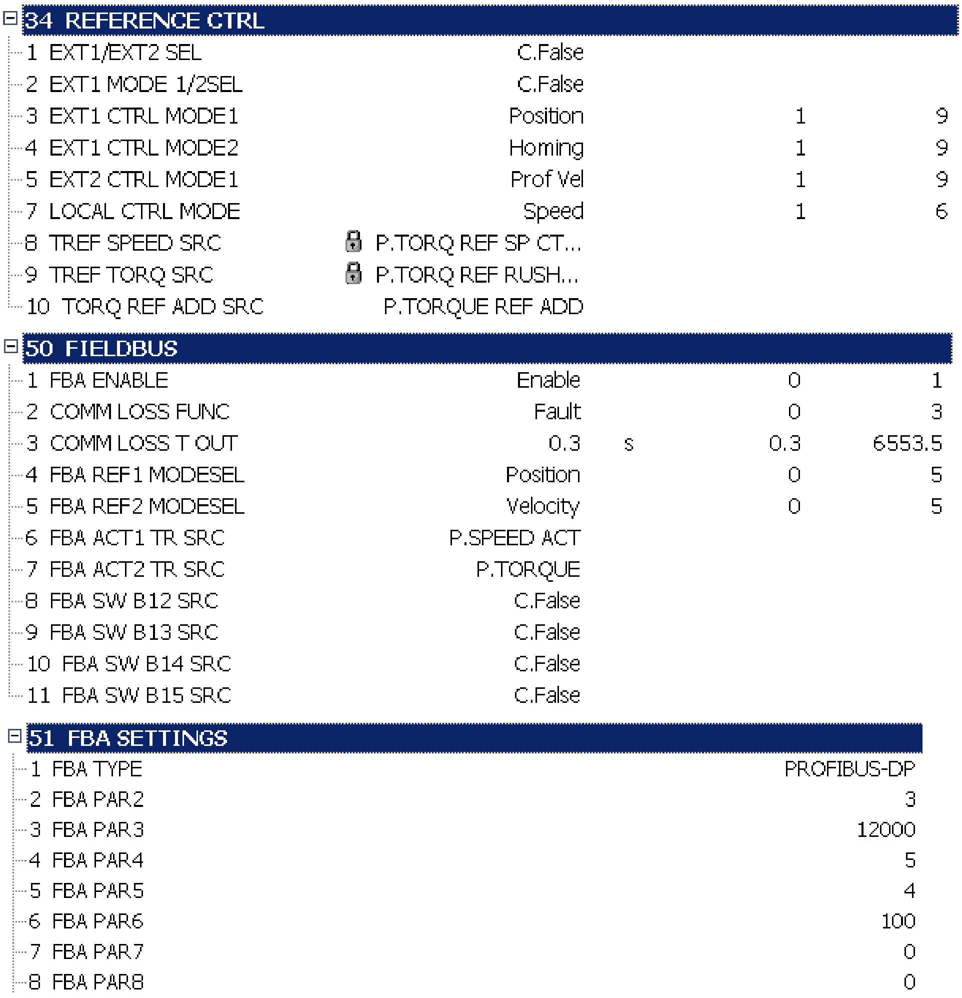


10 START/STOP	
1 EXT1 START FUNC	FBA
2 EXT1 START IN1	P.DI STATUS.0
3 EXT1 START IN2	C.False
4 EXT2 START FUNC	FBA
5 EXT2 START IN1	P.DI STATUS.0
6 EXT2 START IN2	C.False
7 JOG1 START	C.False
8 FAULT RESET SEL	P.DI STATUS.2
9 RUN ENABLE	C.True
10 EM STOP OFF3	C.True
11 EM STOP OFF1	C.True
12 START INHIBIT	Disabled
13 FB CW USED	P.FBA MAIN CW
14 JOG2 START	C.False
15 JOG ENABLE	C.False
16 D2D CW USED	P.D2D MAIN CW
17 START ENABLE	C.True



24 SPEED REF MOD				
1 SPEED REF1 SEL	FBA REF1		0	8
2 SPEED REF2 SEL	ZERO		0	8
3 SPEED REF1 IN	P.SPEED REF1			
4 SPEED REF2 IN	P.SPEED REF2			
5 SPEED REF 1/2SEL	C.False			
6 SPEED SHARE	1.000		-8.000	8.000
7 SPEEDREF NEG ENA	C.False			
8 CONST SPEED	0	rpm	-30000	30000
9 CONST SPEED ENA	C.False			
10 SPEED REF JOG1	0	rpm	-30000	30000
11 SPEED REF JOG2	0	rpm	-30000	30000
12 SPEED REFMIN ABS	0	rpm	0	30000

Step	Setting the drive control program parameters

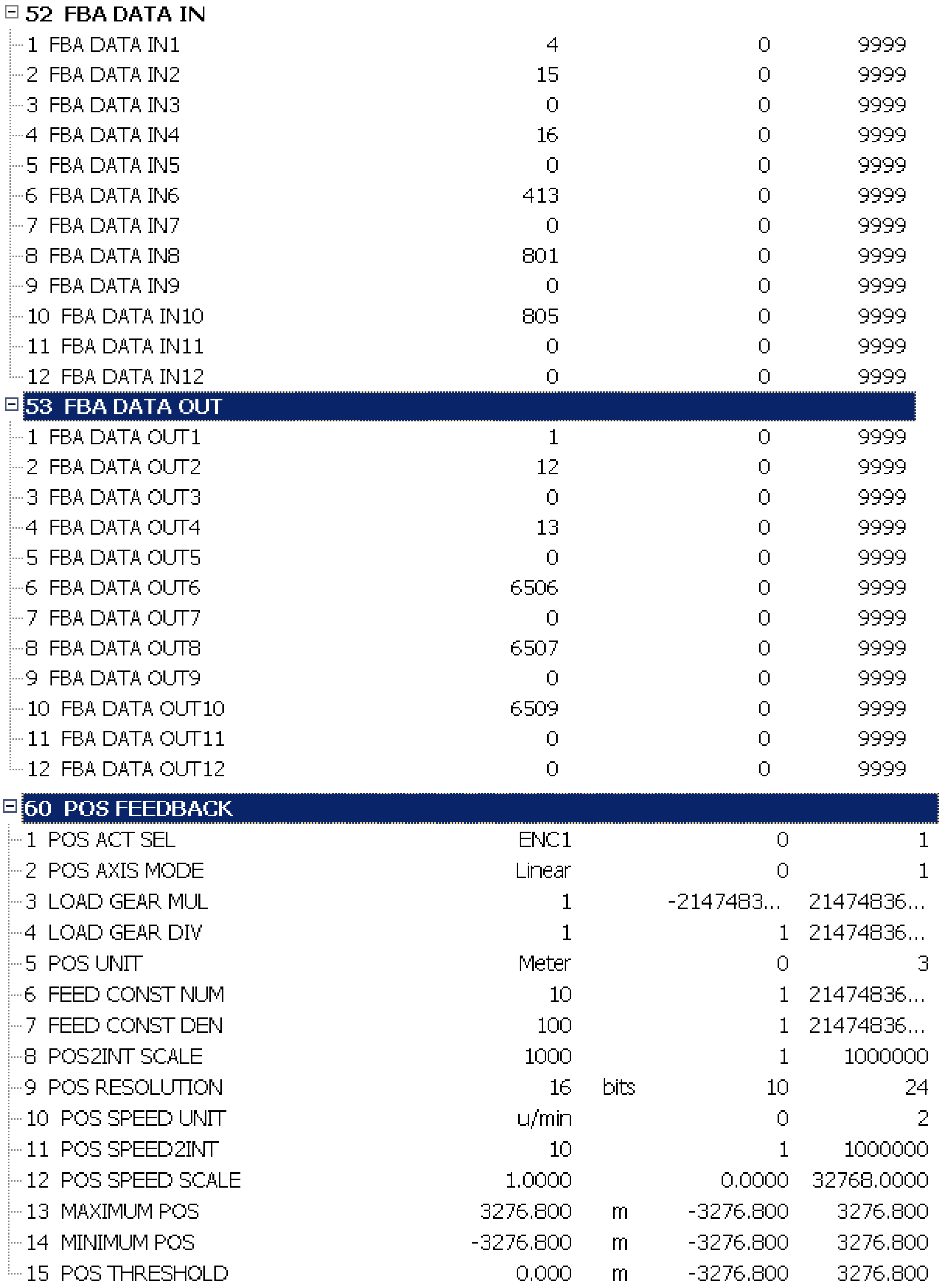


34 REFERENCE CTRL				
1 EXT1/EXT2 SEL	C.False			
2 EXT1 MODE 1/2SEL	C.False			
3 EXT1 CTRL MODE1	Position		1	9
4 EXT1 CTRL MODE2	Homing		1	9
5 EXT2 CTRL MODE1	Prof Vel		1	9
7 LOCAL CTRL MODE	Speed		1	6
8 TREF SPEED SRC	🔒 P.TORQ REF SP CT...			
9 TREF TORQ SRC	🔒 P.TORQ REF RUSH...			
10 TORQ REF ADD SRC	P.TORQUE REF ADD			

50 FIELDBUS				
1 FBA ENABLE	Enable		0	1
2 COMM LOSS FUNC	Fault		0	3
3 COMM LOSS T OUT	0.3	s	0.3	6553.5
4 FBA REF1 MODESEL	Position		0	5
5 FBA REF2 MODESEL	Velocity		0	5
6 FBA ACT1 TR SRC	P.SPEED ACT			
7 FBA ACT2 TR SRC	P.TORQUE			
8 FBA SW B12 SRC	C.False			
9 FBA SW B13 SRC	C.False			
10 FBA SW B14 SRC	C.False			
11 FBA SW B15 SRC	C.False			

51 FBA SETTINGS	
1 FBA TYPE	PROFIBUS-DP
2 FBA PAR2	3
3 FBA PAR3	12000
4 FBA PAR4	5
5 FBA PAR5	4
6 FBA PAR6	100
7 FBA PAR7	0
8 FBA PAR8	0

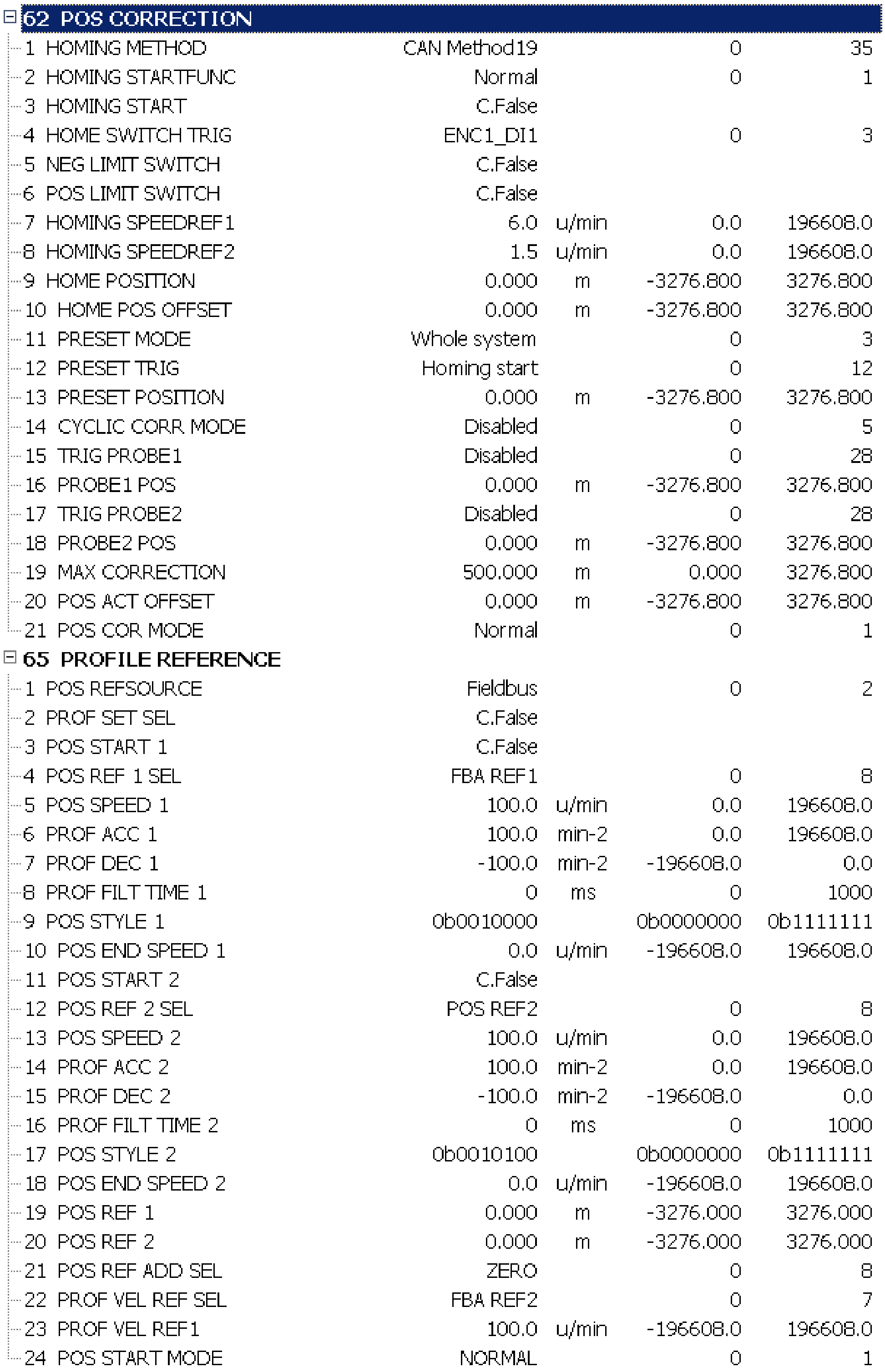
Step	Setting the drive control program parameters



52 FBA DATA IN			
1 FBA DATA IN1	4	0	9999
2 FBA DATA IN2	15	0	9999
3 FBA DATA IN3	0	0	9999
4 FBA DATA IN4	16	0	9999
5 FBA DATA IN5	0	0	9999
6 FBA DATA IN6	413	0	9999
7 FBA DATA IN7	0	0	9999
8 FBA DATA IN8	801	0	9999
9 FBA DATA IN9	0	0	9999
10 FBA DATA IN10	805	0	9999
11 FBA DATA IN11	0	0	9999
12 FBA DATA IN12	0	0	9999
53 FBA DATA OUT			
1 FBA DATA OUT1	1	0	9999
2 FBA DATA OUT2	12	0	9999
3 FBA DATA OUT3	0	0	9999
4 FBA DATA OUT4	13	0	9999
5 FBA DATA OUT5	0	0	9999
6 FBA DATA OUT6	6506	0	9999
7 FBA DATA OUT7	0	0	9999
8 FBA DATA OUT8	6507	0	9999
9 FBA DATA OUT9	0	0	9999
10 FBA DATA OUT10	6509	0	9999
11 FBA DATA OUT11	0	0	9999
12 FBA DATA OUT12	0	0	9999

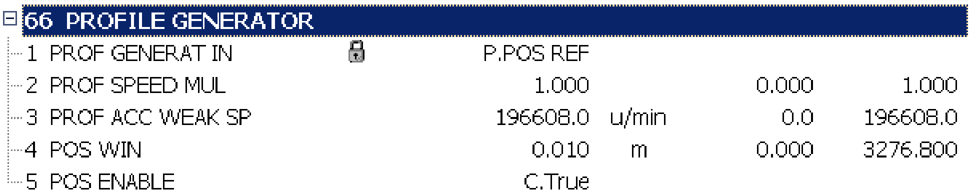
60 POS FEEDBACK				
1 POS ACT SEL	ENC1		0	1
2 POS AXIS MODE	Linear		0	1
3 LOAD GEAR MUL	1		-2147483...	21474836...
4 LOAD GEAR DIV	1		1	21474836...
5 POS UNIT	Meter		0	3
6 FEED CONST NUM	10		1	21474836...
7 FEED CONST DEN	100		1	21474836...
8 POS2INT SCALE	1000		1	1000000
9 POS RESOLUTION	16	bits	10	24
10 POS SPEED UNIT	u/min		0	2
11 POS SPEED2INT	10		1	1000000
12 POS SPEED SCALE	1.0000		0.0000	32768.0000
13 MAXIMUM POS	3276.800	m	-3276.800	3276.800
14 MINIMUM POS	-3276.800	m	-3276.800	3276.800
15 POS THRESHOLD	0.000	m	-3276.800	3276.800

Step Setting the drive control program parameters



62 POS CORRECTION				
1 HOMING METHOD	CAN Method19		0	35
2 HOMING STARTFUNC	Normal		0	1
3 HOMING START	C.False			
4 HOME SWITCH TRIG	ENC1_DI1		0	3
5 NEG LIMIT SWITCH	C.False			
6 POS LIMIT SWITCH	C.False			
7 HOMING SPEEDREF1	6.0	u/min	0.0	196608.0
8 HOMING SPEEDREF2	1.5	u/min	0.0	196608.0
9 HOME POSITION	0.000	m	-3276.800	3276.800
10 HOME POS OFFSET	0.000	m	-3276.800	3276.800
11 PRESET MODE	Whole system		0	3
12 PRESET TRIG	Homing start		0	12
13 PRESET POSITION	0.000	m	-3276.800	3276.800
14 CYCLIC CORR MODE	Disabled		0	5
15 TRIG PROBE1	Disabled		0	28
16 PROBE1 POS	0.000	m	-3276.800	3276.800
17 TRIG PROBE2	Disabled		0	28
18 PROBE2 POS	0.000	m	-3276.800	3276.800
19 MAX CORRECTION	500.000	m	0.000	3276.800
20 POS ACT OFFSET	0.000	m	-3276.800	3276.800
21 POS COR MODE	Normal		0	1
65 PROFILE REFERENCE				
1 POS REFSOURCE	Fieldbus		0	2
2 PROF SET SEL	C.False			
3 POS START 1	C.False			
4 POS REF 1 SEL	FBA REF1		0	8
5 POS SPEED 1	100.0	u/min	0.0	196608.0
6 PROF ACC 1	100.0	min-2	0.0	196608.0
7 PROF DEC 1	-100.0	min-2	-196608.0	0.0
8 PROF FILT TIME 1	0	ms	0	1000
9 POS STYLE 1	0b0010000		0b0000000	0b1111111
10 POS END SPEED 1	0.0	u/min	-196608.0	196608.0
11 POS START 2	C.False			
12 POS REF 2 SEL	POS REF2		0	8
13 POS SPEED 2	100.0	u/min	0.0	196608.0
14 PROF ACC 2	100.0	min-2	0.0	196608.0
15 PROF DEC 2	-100.0	min-2	-196608.0	0.0
16 PROF FILT TIME 2	0	ms	0	1000
17 POS STYLE 2	0b0010100		0b0000000	0b1111111
18 POS END SPEED 2	0.0	u/min	-196608.0	196608.0
19 POS REF 1	0.000	m	-3276.000	3276.000
20 POS REF 2	0.000	m	-3276.000	3276.000
21 POS REF ADD SEL	ZERO		0	8
22 PROF VEL REF SEL	FBA REF2		0	7
23 PROF VEL REF1	100.0	u/min	-196608.0	196608.0
24 POS START MODE	NORMAL		0	1

Step	Setting the drive control program parameters



66 PROFILE GENERATOR

1 PROF GENERAT IN 🔒	P.POS REF			
2 PROF SPEED MUL	1.000		0.000	1.000
3 PROF ACC WEAK SP	196608.0	u/min	0.0	196608.0
4 POS WIN	0.010	m	0.000	3276.800
5 POS ENABLE	C.True			

Tool/Step

Setting up the communication

For setting up communication between the PLC and the drive, first, create a new project. After that, you can open the SYCON.net configuring tool and configure the communication.

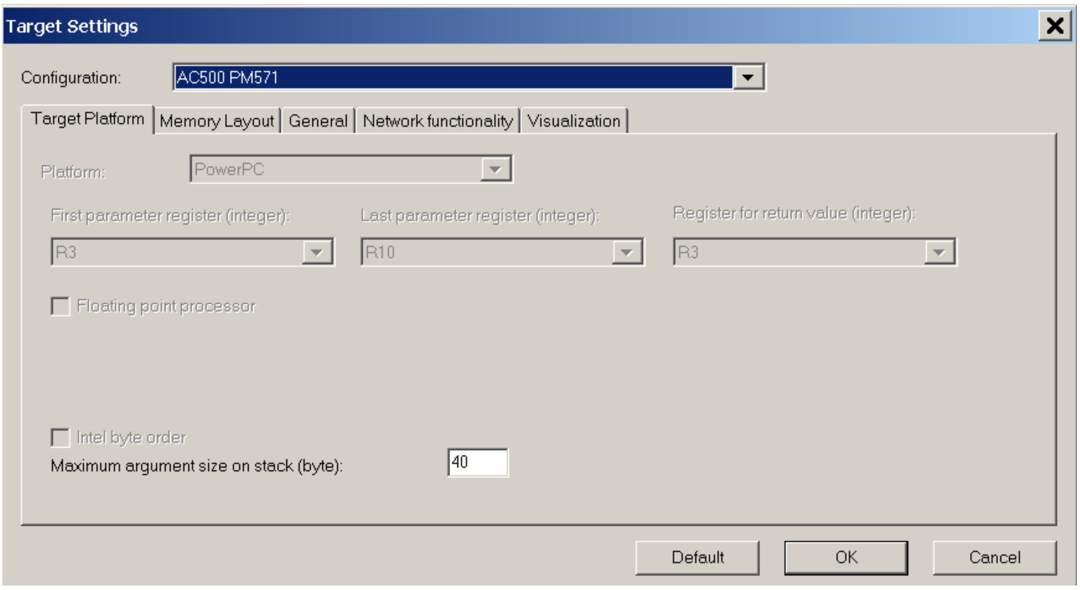
CoDeSys

Create a new project

1. Open the AC500 Control Builder PS501 programming tool by double-clicking the icon:

Installation path:
C:\Program Files\3S Software\CoDeSys V2.3\Codesys.exe

2. Select from the **File** menu **New**. -> Dialog box **Target settings** opens.
3. In the **Configuration:** box, select AC500 PM571. Click **OK**.



Configuration: AC500 PM571

Platform: PowerPC

First parameter register (integer): R3

Last parameter register (integer): R10

Register for return value (integer): R3

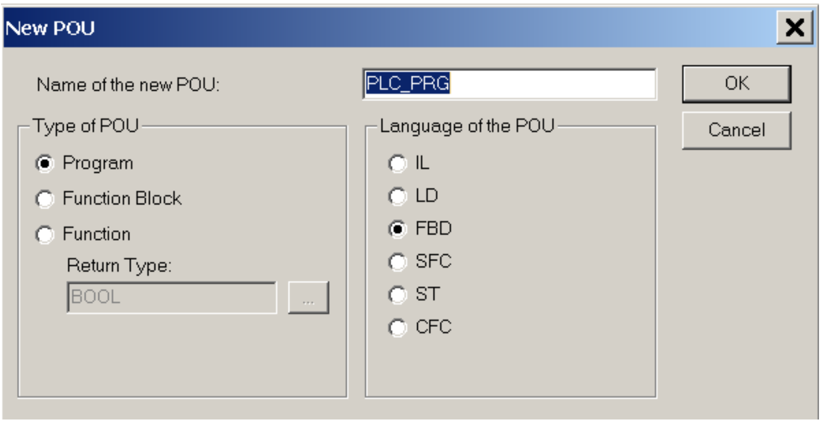
□ Floating point processor

□ Intel byte order

Maximum argument size on stack (byte): 40

Tool/Step	Setting up the communication

4. In the **New POU** dialog box, select as shown below.



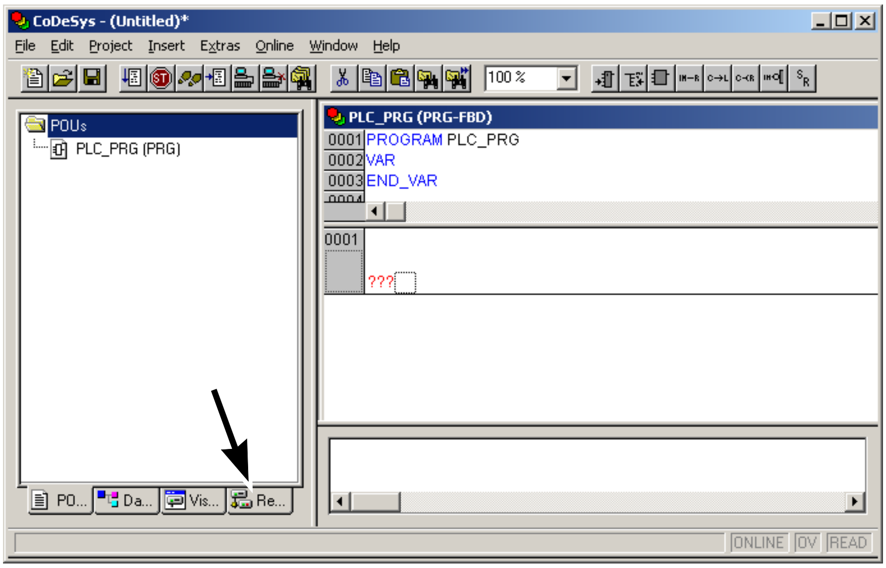
Name of the new POU: PLC_PRG

Type of POU
- ● Program
- ○ Function Block
- ○ Function

Return Type: BOOL

Language of the POU
- ○ IL
- ○ LD
- ● FBD
- ○ SFC
- ○ ST
- ○ CFC

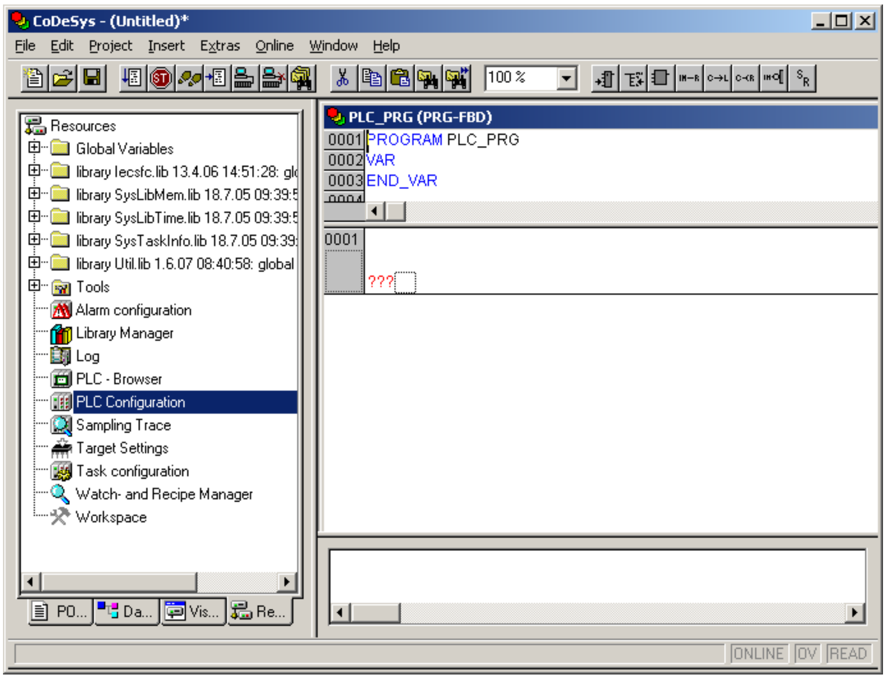
5. -> The programming view opens. Open the **Resources** field by clicking its tab.



```
0001 PROGRAM PLC_PRG
0002 VAR
0003 END_VAR
```

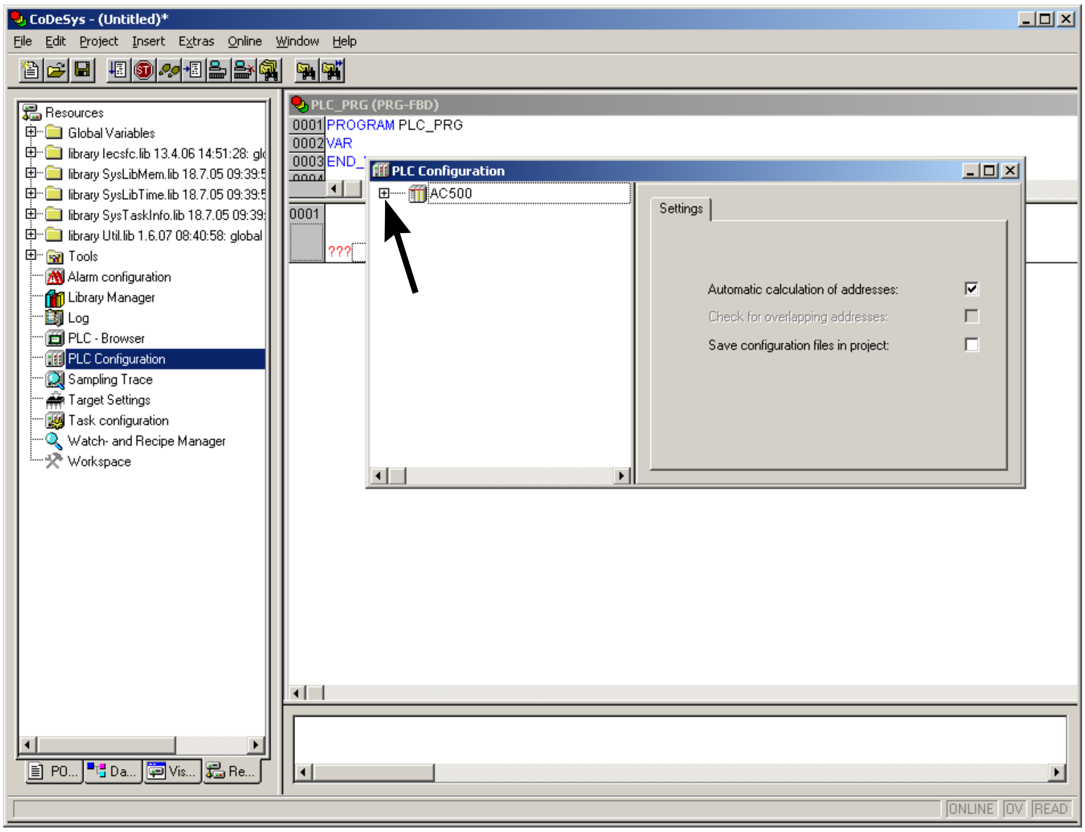
Tool/Step	Setting up the communication

6. In the **Resources** folder, double-click PLC Configuration.


CoDeSys - (Untitled)*
File Edit Project Insert Extras Online Window Help
100 %
Resources
Global Variables
library Iecsfc.lib 13.4.06 14:51:28: gl
library SysLibMem.lib 18.7.05 09:39:5
library SysLibTime.lib 18.7.05 09:39:5
library SysTaskInfo.lib 18.7.05 09:39:
library Util.lib 1.6.07 08:40:58: global
Tools
Alarm configuration
Library Manager
Log
PLC - Browser
PLC Configuration
Sampling Trace
Target Settings
Task configuration
Watch- and Recipe Manager
Workspace
PO... Da... Vis... Re...
PLC_PRG (PRG-FBD)
ONLINE OV READ

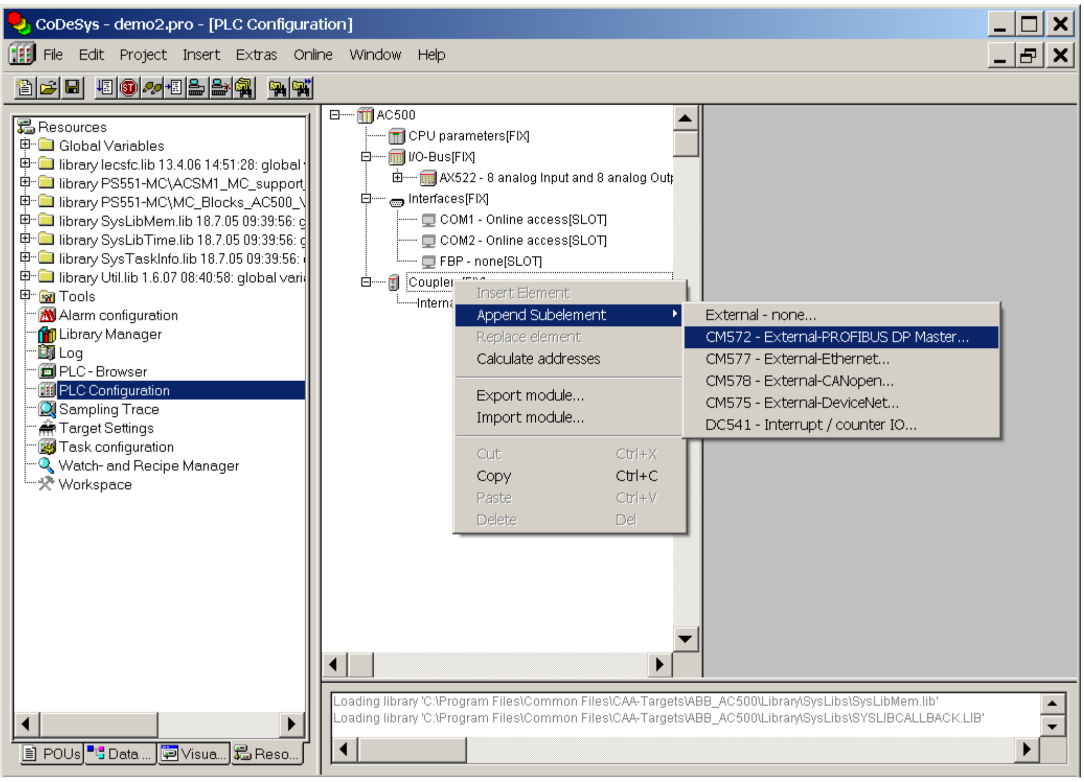
```
PROGRAM PLC_PRG
VAR
END_VAR
```

7. In the **PLC Configuration** dialog box, click the plus sign to open the AC500 folder.


CoDeSys - (Untitled)*
File Edit Project Insert Extras Online Window Help
Resources
Global Variables
library Iecsfc.lib 13.4.06 14:51:28: gl
library SysLibMem.lib 18.7.05 09:39:5
library SysLibTime.lib 18.7.05 09:39:5
library SysTaskInfo.lib 18.7.05 09:39:
library Util.lib 1.6.07 08:40:58: global
Tools
Alarm configuration
Library Manager
Log
PLC - Browser
PLC Configuration
Sampling Trace
Target Settings
Task configuration
Watch- and Recipe Manager
Workspace
PO... Da... Vis... Re...
PLC_PRG (PRG-FBD)
PLC Configuration
AC500
Settings
ONLINE OV READ

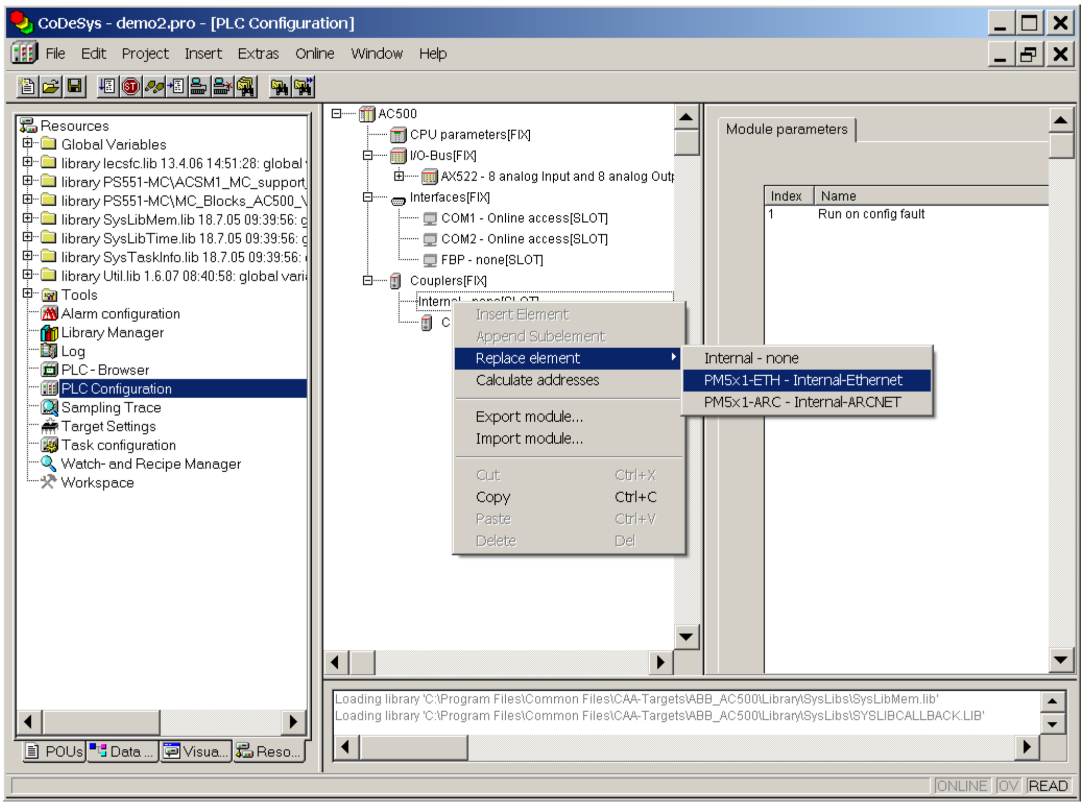
Automatic calculation of addresses: ☑
Check for overlapping addresses: □
Save configuration files in project: □

Tool/Step	Setting up the communication
8.	Right-click the Couplers[FIX] folder. Select **Append Subelement** and **CM572 - External-PROFIBUS DP Master…**.


CoDeSys - demo2.pro - [PLC Configuration]
File Edit Project Insert Extras Online Window Help
Resources
Global Variables
library Iecsfc.lib 13.4.06 14:51:28: global
library PS551-MC\ACSM1_MC_support
library PS551-MC\MC_Blocks_AC500_\
library SysLibMem.lib 18.7.05 09:39:56: g
library SysLibTime.lib 18.7.05 09:39:56: g
library SysTaskInfo.lib 18.7.05 09:39:56:
library Util.lib 1.6.07 08:40:58: global vari
Tools
Alarm configuration
Library Manager
Log
PLC - Browser
PLC Configuration
Sampling Trace
Target Settings
Task configuration
Watch- and Recipe Manager
Workspace
POUs
Data ...
Visua...
Reso...
AC500
CPU parameters[FIX]
I/O-Bus[FIX]
AX522 - 8 analog Input and 8 analog Out
Interfaces[FIX]
COM1 - Online access[SLOT]
COM2 - Online access[SLOT]
FBP - none[SLOT]
Coupler
Interna
Insert Element
Append Subelement
Replace element
Calculate addresses
Export module...
Import module...
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Delete Del
External - none...
CM572 - External-PROFIBUS DP Master...
CM577 - External-Ethernet...
CM578 - External-CANopen...
CM575 - External-DeviceNet...
DC541 - Interrupt / counter IO...

```
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysLibMem.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SYSLIBCALLBACK.LIB'
```

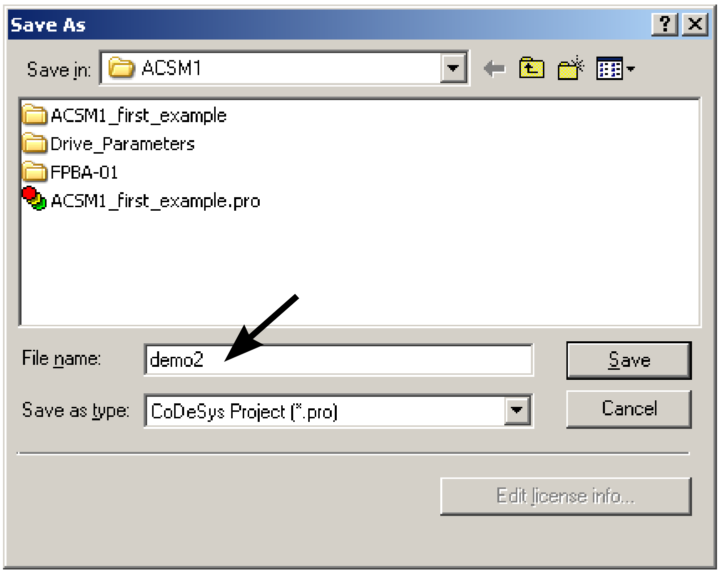
Tool/Step	Setting up the communication
9.	In the Couplers[FIX] folder, right-click the Internal - none[SLOT] file and select **Replace element** and **PM5x1-ETH - Internal-Ethernet**.


CoDeSys - demo2.pro - [PLC Configuration]
File Edit Project Insert Extras Online Window Help
Resources
Global Variables
library Iecsfc.lib 13.4.06 14:51:28: global
library PS551-MC\ACSM1_MC_support
library PS551-MC\MC_Blocks_AC500_\
library SysLibMem.lib 18.7.05 09:39:56: g
library SysLibTime.lib 18.7.05 09:39:56: g
library SysTaskInfo.lib 18.7.05 09:39:56:
library Util.lib 1.6.07 08:40:58: global vari
Tools
Alarm configuration
Library Manager
Log
PLC - Browser
PLC Configuration
Sampling Trace
Target Settings
Task configuration
Watch- and Recipe Manager
Workspace
POUs
Data ...
Visua...
Reso...
AC500
CPU parameters[FIX]
I/O-Bus[FIX]
AX522 - 8 analog Input and 8 analog Out
Interfaces[FIX]
COM1 - Online access[SLOT]
COM2 - Online access[SLOT]
FBP - none[SLOT]
Couplers[FIX]
Internal - none[SLOT]
Insert Element
Append Subelement
Replace element
Calculate addresses
Export module...
Import module...
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Delete Del
Internal - none
PM5x1-ETH - Internal-Ethernet
PM5x1-ARC - Internal-ARCNET
Module parameters
ONLINE OV READ

Index	Name
1	Run on config fault

```
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysLibMem.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SYSLIBCALLBACK.LIB'
```

10.	From the **File** menu, select **Save as** and name the project. Click **Save**.



File name: demo2

Save as type: CoDeSys Project (*.pro)

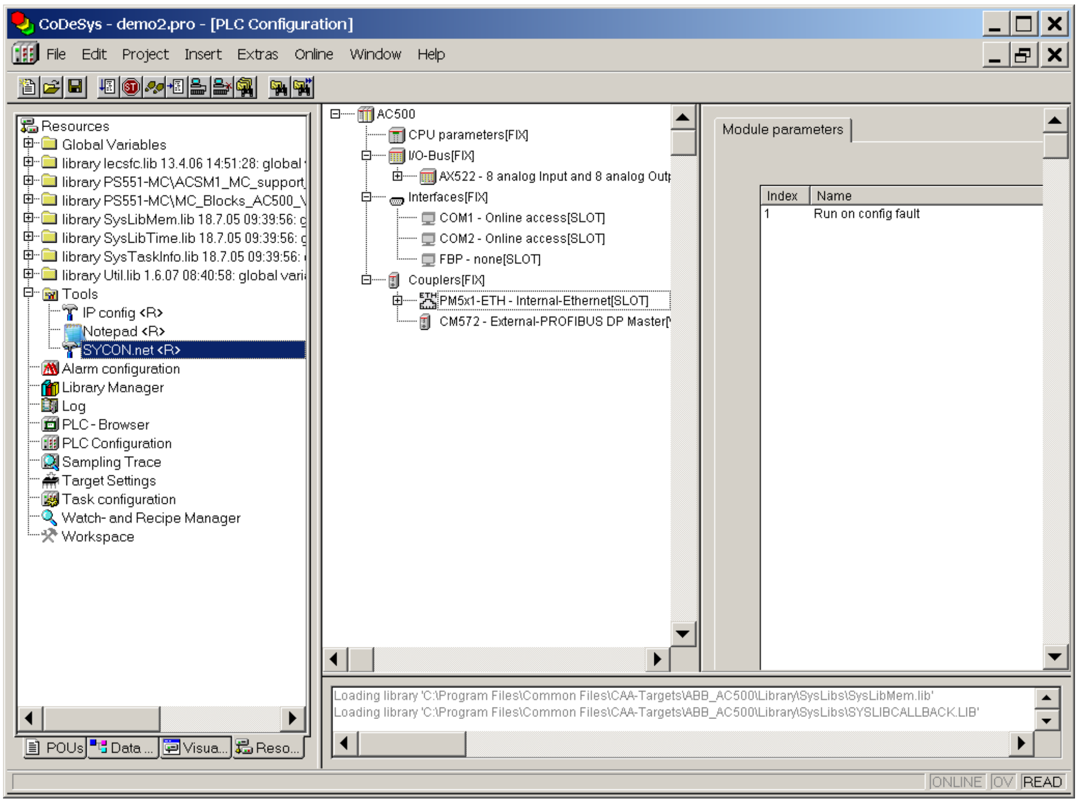
CoDeSys

Tool/Step

Setting up the communication

Configure communication with the SYCON fieldbus configurator

1. Open the project that you created.
2. Click the **Resources** tab to show the Resources folders.
3. Under **Tools**, double-click SYCON.net <R>.


CoDeSys - demo2.pro - [PLC Configuration]
File Edit Project Insert Extras Online Window Help
Resources
Global Variables
library Iecsfc.lib 13.4.06 14:51:28: global
library PS551-MC\ACSM1_MC_support
library PS551-MC\MC_Blocks_AC500_\
library SysLibMem.lib 18.7.05 09:39:56: g
library SysLibTime.lib 18.7.05 09:39:56: g
library SysTaskInfo.lib 18.7.05 09:39:56:
library Util.lib 1.6.07 08:40:58: global vari
Tools
IP config <R>
Notepad <R>
SYCON.net <R>
Alarm configuration
Library Manager
Log
PLC - Browser
PLC Configuration
Sampling Trace
Target Settings
Task configuration
Watch- and Recipe Manager
Workspace
POUs
Data ...
Visua...
Reso...
AC500
CPU parameters[FIX]
I/O-Bus[FIX]
AX522 - 8 analog Input and 8 analog Outp
Interfaces[FIX]
COM1 - Online access[SLOT]
COM2 - Online access[SLOT]
FBP - none[SLOT]
Couplers[FIX]
PM5x1-ETH - Internal-Ethernet[SLOT]
CM572 - External-PROFIBUS DP Master[
Module parameters
ONLINE
OV
READ

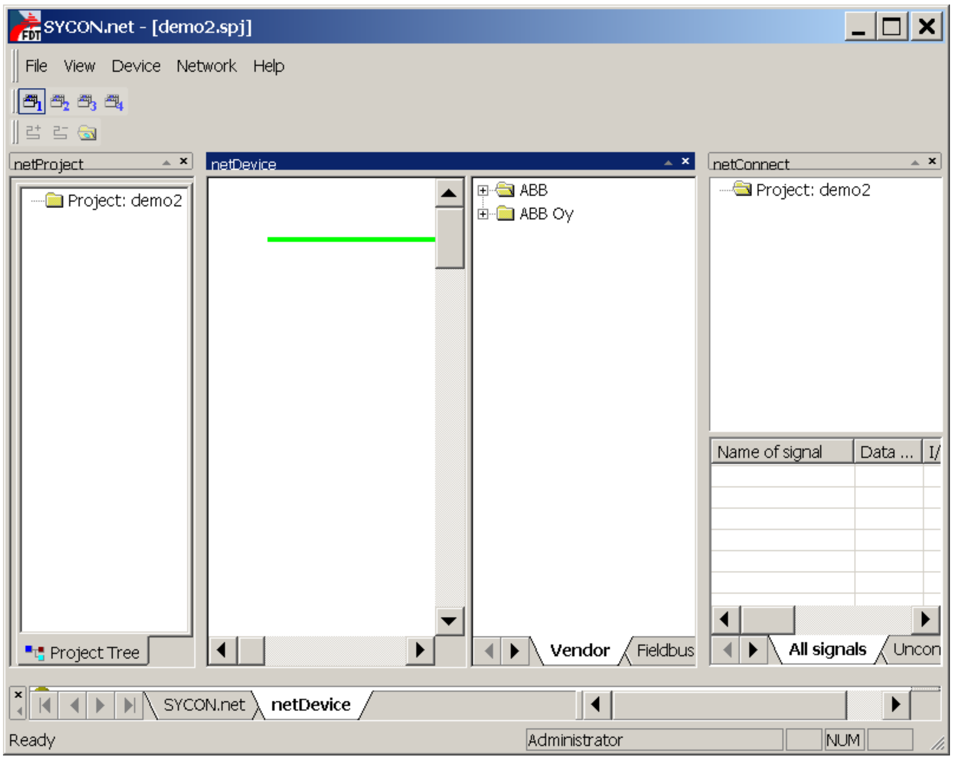
Index	Name
1	Run on config fault

```
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysLibMem.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SYSLIBCALLBACK.LIB'
```

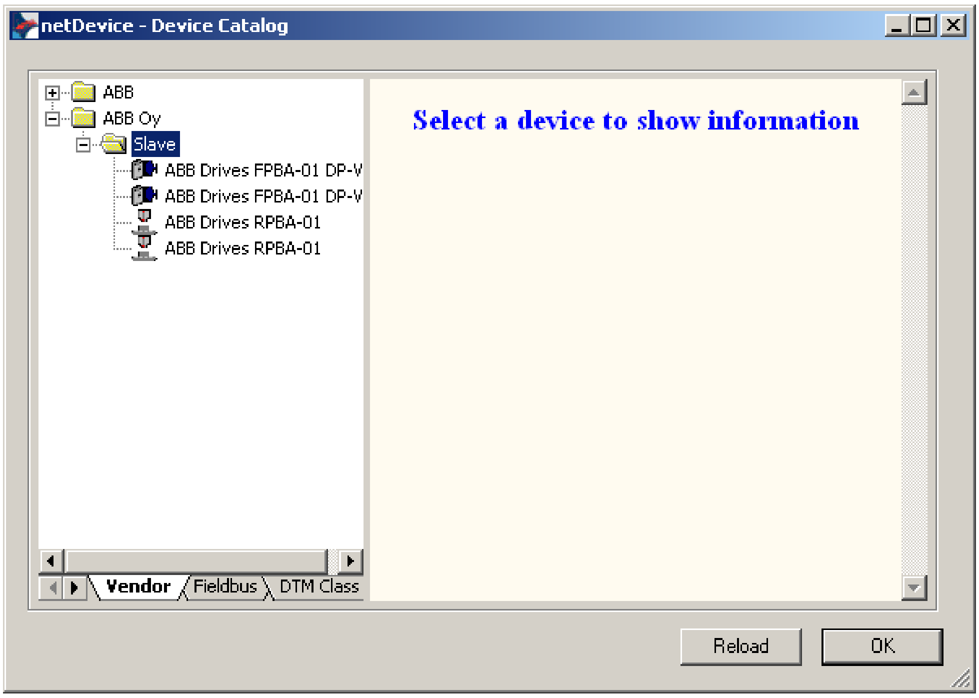
Tool/Step	Setting up the communication

SYCON.net

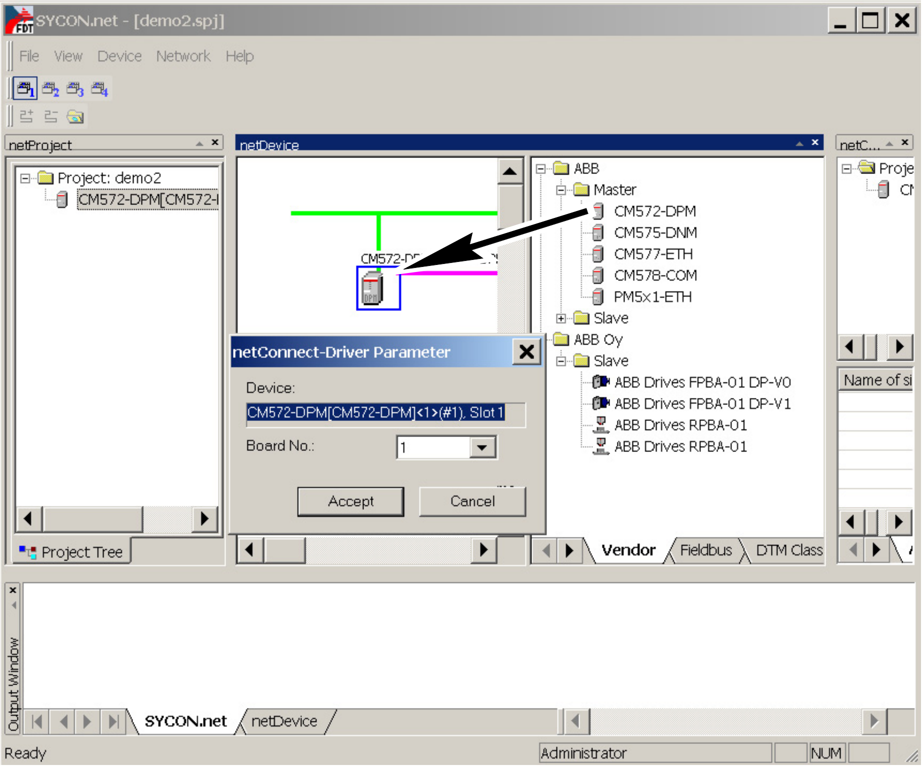
4. -> The SYCON.net tool opens:



5. From the **Network** menu, select the **Device Catalog…** command. Click the **Reload** button. -> PROFIBUS options appear in the ABB Oy folder. Click **OK**.



Tool/Step	Setting up the communication
6.	Drag and drop CM572-DPM on the green line. In the **netConnect-Driver Parameter** dialog box, select 1 for the **Board no:** box. This is because the CM572-DP communications module is installed next to the CPU on the left-hand side in the installation example of this manual.



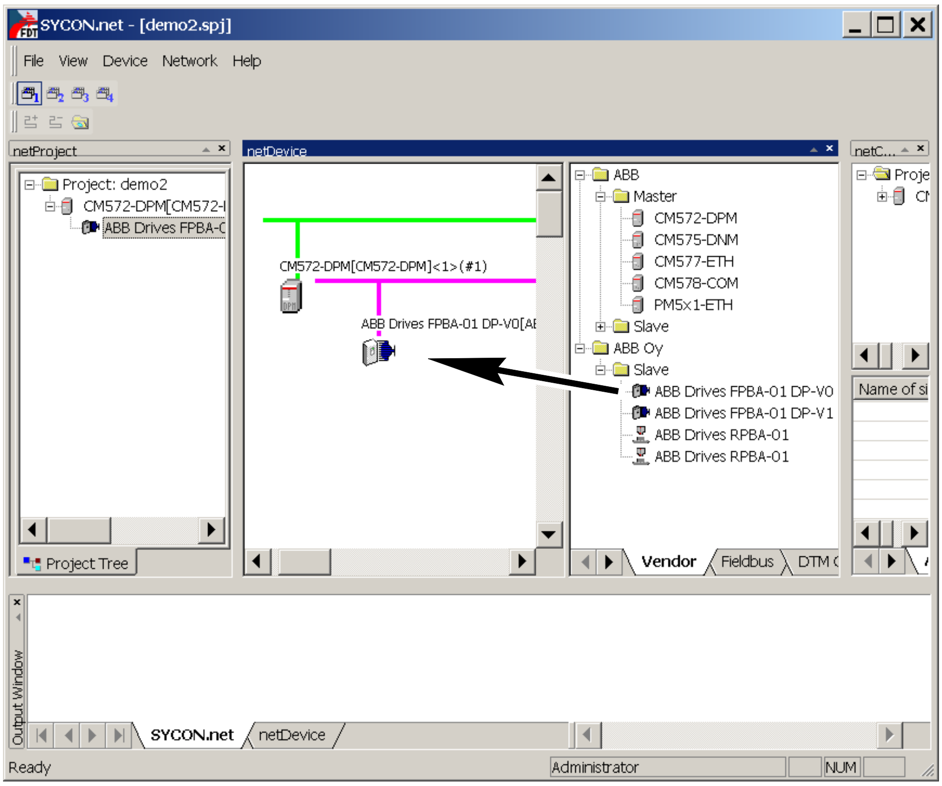
netConnect-Driver Parameter

Device: CM572-DPM[CM572-DPM]<1>(#1), Slot 1

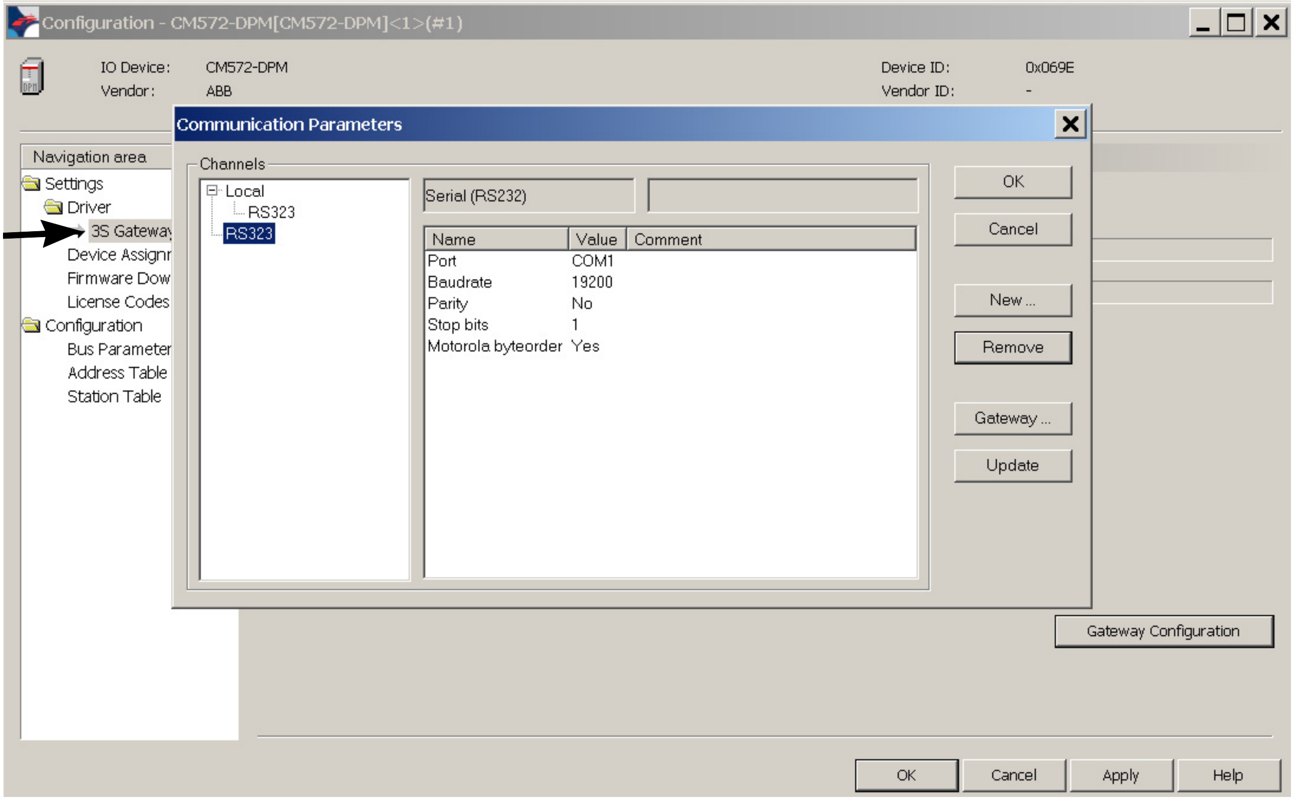
Board No.: 1

Accept Cancel

Tool/Step	Setting up the communication
7.	Drag and drop the FPBA-01 DP-V0 on the purple line.



Tool/Step	Setting up the communication
8.	In the **netDevice** field, right-click the CM572-DPM icon. Select **Configuration**. In the **Navigation area** field, click 3S Gateway Driver. Click the **Gateway Configuration** button.


Configuration - CM572-DPM[CM572-DPM]<1>(#1)

IO Device: CM572-DPM
Vendor: ABB
Device ID: 0x069E
Vendor ID: -

Communication Parameters

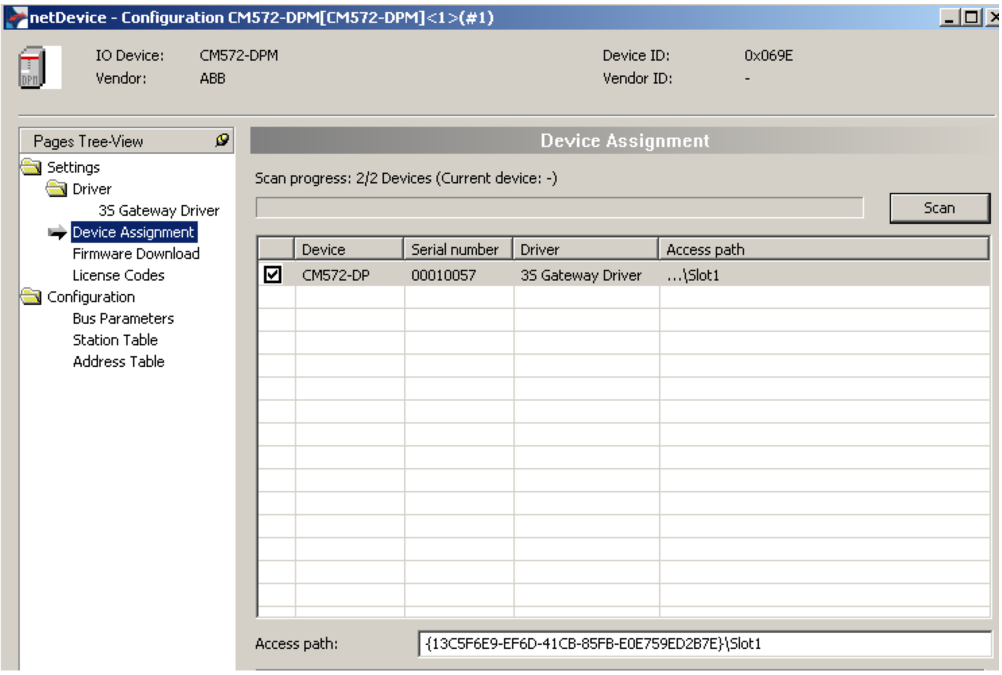
Channels: Local / RS323 / RS323

Serial (RS232)

Name	Value	Comment
Port	COM1	
Baudrate	19200	
Parity	No	
Stop bits	1	
Motorola byteorder	Yes	

9. In the **Communication Parameters** dialog box, set the communication parameters according to the serial port of your PC. See *Appendix A - How to find out the serial communication parameter values of your PC?*.

Tool/Step	Setting up the communication
10.	In the **Pages Three-View**, click Device Assingnment. Activate the device by ticking it.



netDevice - Configuration CM572-DPM[CM572-DPM]<1>(#1)

IO Device: CM572-DPM
Vendor: ABB
Device ID: 0x069E
Vendor ID: -

Pages Tree-View
- Settings
  - Driver
    - 3S Gateway Driver
  - Device Assignment
  - Firmware Download
  - License Codes
- Configuration
  - Bus Parameters
  - Station Table
  - Address Table

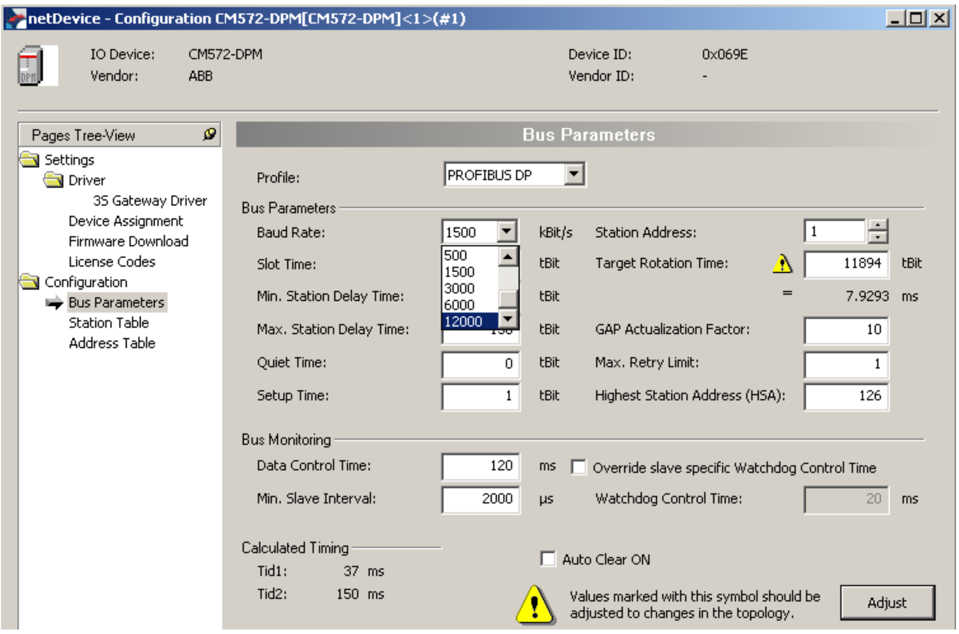
Device Assignment

Scan progress: 2/2 Devices (Current device: -)

	Device	Serial number	Driver	Access path
☑	CM572-DP	00010057	3S Gateway Driver	...\Slot1

Access path: {13C5F6E9-EF6D-41CB-85FB-E0E759ED2B7E}\Slot1

11.	In the **Pages Tree-view**, click Configuration / Bus Parameters. In the **Bus Parameters** dialog box, set the Baud Rate. If there is warning sign, click the **Adjust** button and set the other timing parameters.



netDevice - Configuration CM572-DPM[CM572-DPM]<1>(#1)

IO Device: CM572-DPM
Vendor: ABB
Device ID: 0x069E
Vendor ID: -

Pages Tree-View
- Settings
  - Driver
    - 3S Gateway Driver
  - Device Assignment
  - Firmware Download
  - License Codes
- Configuration
  - Bus Parameters
  - Station Table
  - Address Table

Bus Parameters

Profile: PROFIBUS DP

Bus Parameters

Baud Rate:	1500	kBit/s	Station Address:		1	
Slot Time:		tBit	Target Rotation Time:	⚠	11894	tBit
Min. Station Delay Time:		tBit		=	7.9293	ms
Max. Station Delay Time:	150	tBit	GAP Actualization Factor:		10	
Quiet Time:	0	tBit	Max. Retry Limit:		1	
Setup Time:	1	tBit	Highest Station Address (HSA):		126	

Bus Monitoring

Data Control Time:	120	ms	☐ Override slave specific Watchdog Control Time		
Min. Slave Interval:	2000	µs	Watchdog Control Time:	20	ms

Calculated Timing

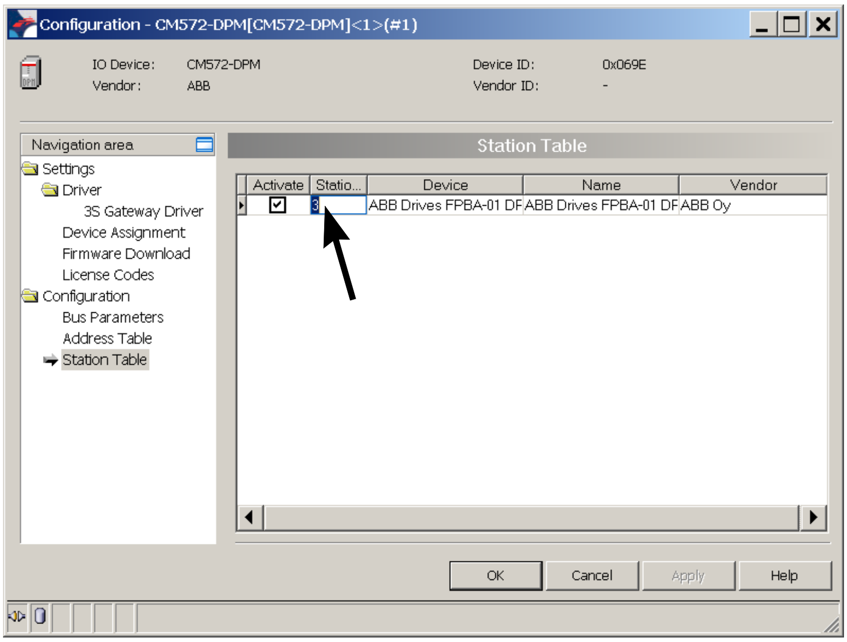
Tid1: 37 ms
Tid2: 150 ms

☐ Auto Clear ON

⚠ Values marked with this symbol should be adjusted to changes in the topology.

Tool/Step Setting up the communication

12. In the **Pages Tree-view**, click Station Table under Configuration. Set the station address for the FPBA-01. Click the **Apply** button and then **OK**.
Note: The station address here must be the same as the value of Parameter 51.02 FBA PAR2 in the drive control program. Set parameter Parameter 51.02 FBA PAR2 with DriveStudio.

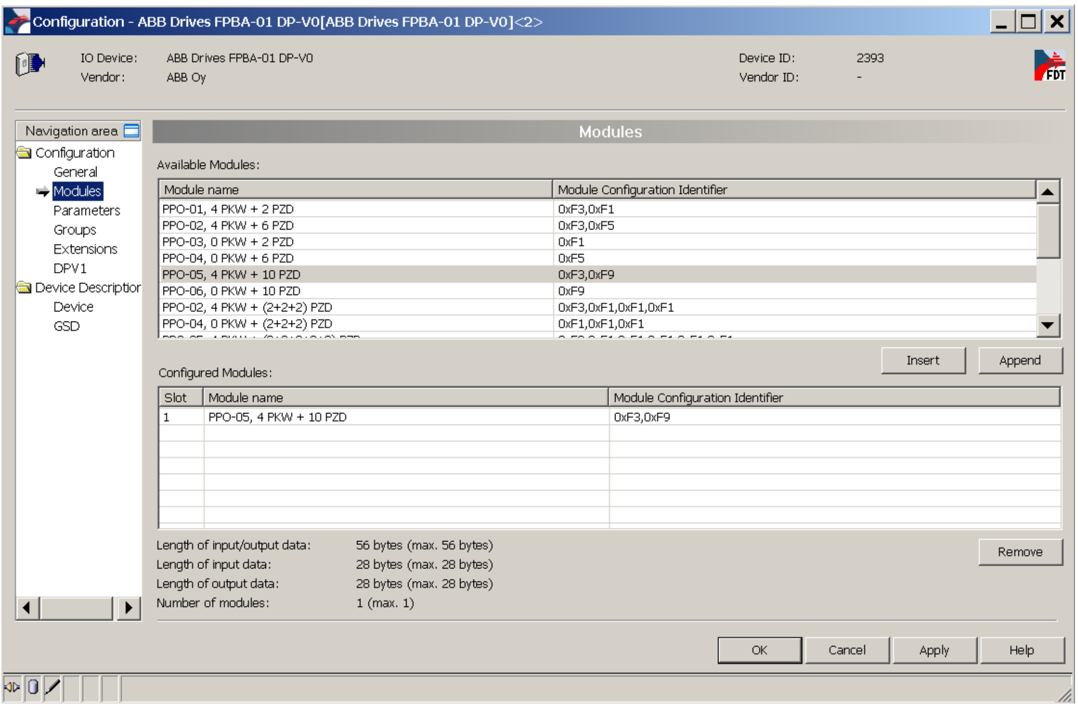


IO Device: CM572-DPM
Vendor: ABB
Device ID: 0x069E
Vendor ID: -

Station Table

Activate	Statio...	Device	Name	Vendor
☑	3	ABB Drives FPBA-01 DF	ABB Drives FPBA-01 DF	ABB Oy

Tool/Step	Setting up the communication
13.	Right-click the ABB Drives FPBA-01 icon connected to the purple line in the netDevice field. In the Navigation area field, click Modules in the Configuration folder. In the Available modules: box, select PPO-05. Click the **Insert** button and then **Apply** and **OK**.



IO Device: ABB Drives FPBA-01 DP-V0
Vendor: ABB Oy
Device ID: 2393
Vendor ID: -

Available Modules:

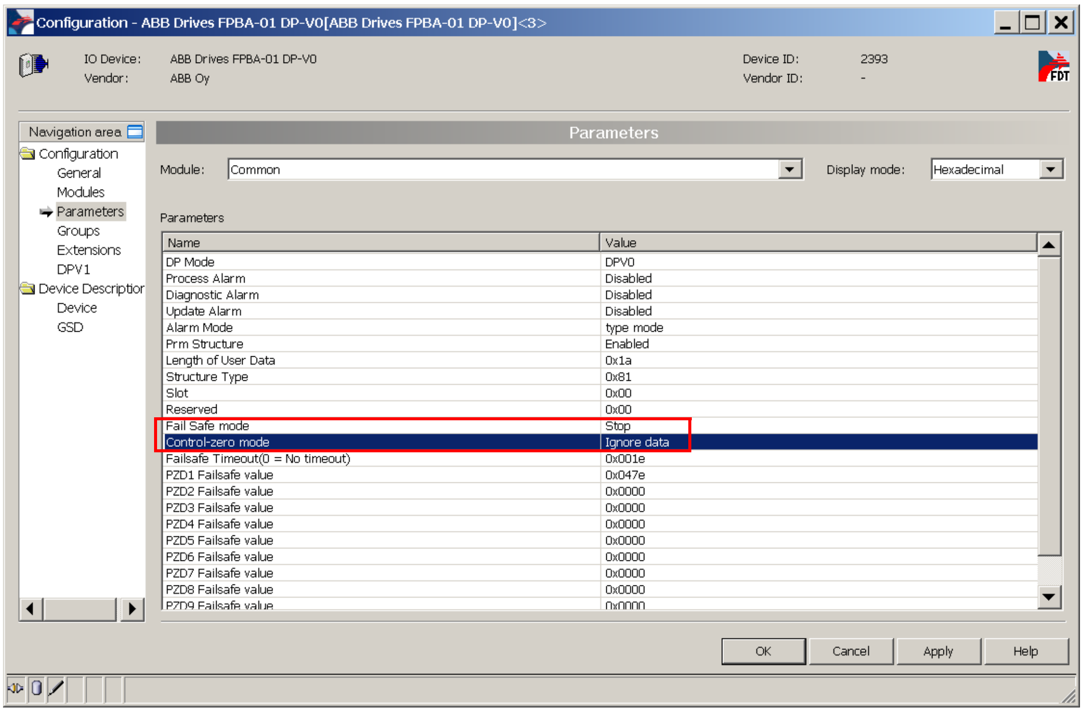
Module name	Module Configuration Identifier
PPO-01, 4 PKW + 2 PZD	0xF3,0xF1
PPO-02, 4 PKW + 6 PZD	0xF3,0xF5
PPO-03, 0 PKW + 2 PZD	0xF1
PPO-04, 0 PKW + 6 PZD	0xF5
PPO-05, 4 PKW + 10 PZD	0xF3,0xF9
PPO-06, 0 PKW + 10 PZD	0xF9
PPO-02, 4 PKW + (2+2+2) PZD	0xF3,0xF1,0xF1,0xF1
PPO-04, 0 PKW + (2+2+2) PZD	0xF1,0xF1,0xF1

Configured Modules:

Slot	Module name	Module Configuration Identifier
1	PPO-05, 4 PKW + 10 PZD	0xF3,0xF9

Length of input/output data: 56 bytes (max. 56 bytes)
Length of input data: 28 bytes (max. 28 bytes)
Length of output data: 28 bytes (max. 28 bytes)
Number of modules: 1 (max. 1)

Tool/Step	Setting up the communication
14.	In the Configuration folder, click Parameters. Set the values of parameters Fail Safe mode and Control-zero mode as shown below.



Configuration - ABB Drives FPBA-01 DP-V0[ABB Drives FPBA-01 DP-V0]<3>

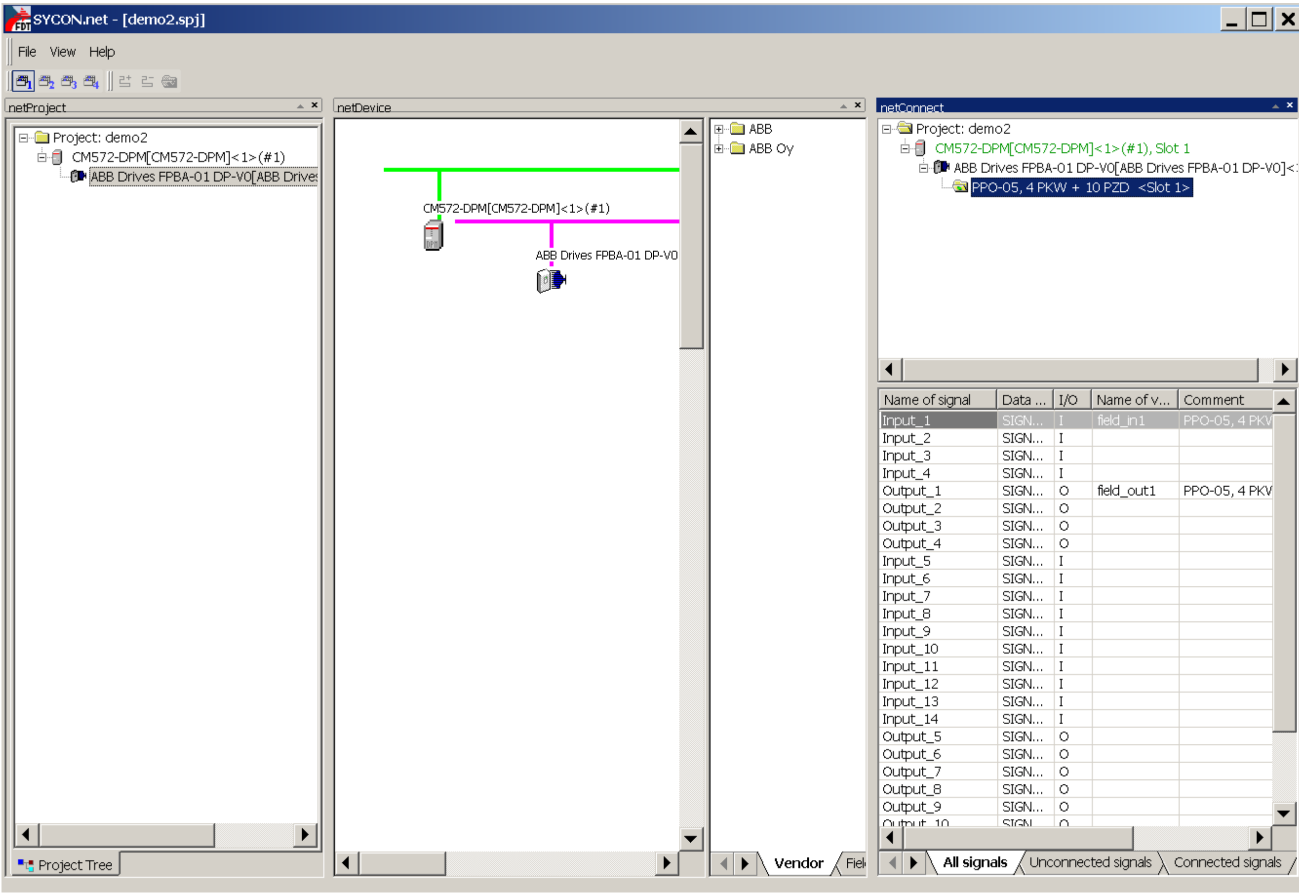
IO Device: ABB Drives FPBA-01 DP-V0
Vendor: ABB Oy
Device ID: 2393
Vendor ID: -

Module: Common
Display mode: Hexadecimal

Parameters

Name	Value
DP Mode	DPV0
Process Alarm	Disabled
Diagnostic Alarm	Disabled
Update Alarm	Disabled
Alarm Mode	type mode
Prm Structure	Enabled
Length of User Data	0x1a
Structure Type	0x81
Slot	0x00
Reserved	0x00
Fail Safe mode	Stop
Control-zero mode	Ignore data
Failsafe Timeout(0 = No timeout)	0x001e
PZD1 Failsafe value	0x047e
PZD2 Failsafe value	0x0000
PZD3 Failsafe value	0x0000
PZD4 Failsafe value	0x0000
PZD5 Failsafe value	0x0000
PZD6 Failsafe value	0x0000
PZD7 Failsafe value	0x0000
PZD8 Failsafe value	0x0000
PZD9 Failsafe value	0x0000

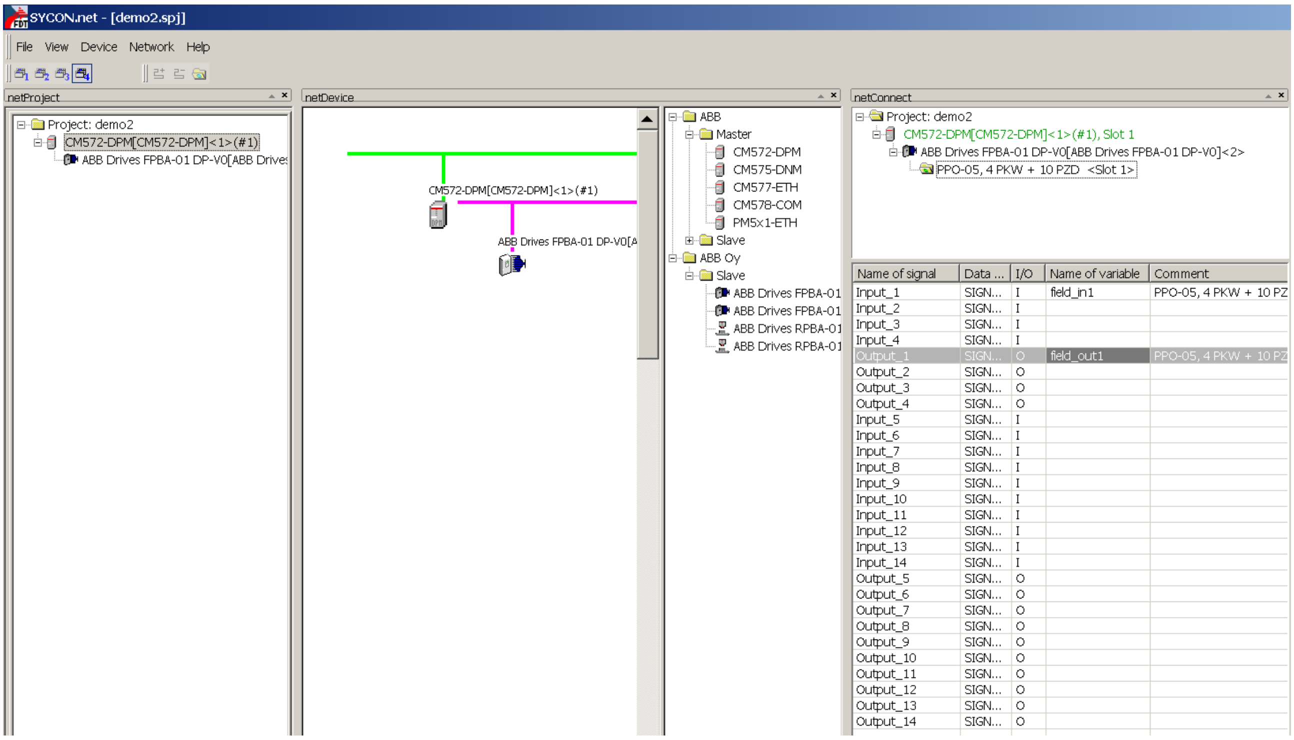
Tool/Step	Setting up the communication
15.	In the **netConnect** field, click PPO-5, 4PKW + 10 PZD <Slot 1>. -> A list of inputs and outputs appears.


SYCON.net - [demo2.spj]
File
View
Help
netProject
Project: demo2
CM572-DPM[CM572-DPM]<1>(#1)
ABB Drives FPBA-01 DP-V0[ABB Drives
Project Tree
netDevice
CM572-DPM[CM572-DPM]<1>(#1)
ABB Drives FPBA-01 DP-V0
ABB
ABB Oy
Vendor
Fiel
netConnect
Project: demo2
CM572-DPM[CM572-DPM]<1>(#1), Slot 1
ABB Drives FPBA-01 DP-V0[ABB Drives FPBA-01 DP-V0]<
PPO-05, 4 PKW + 10 PZD <Slot 1>
All signals
Unconnected signals
Connected signals

Name of signal	Data ...	I/O	Name of v...	Comment
Input_1	SIGN...	I	field_in1	PPO-05, 4 PKV
Input_2	SIGN...	I		
Input_3	SIGN...	I		
Input_4	SIGN...	I		
Output_1	SIGN...	O	field_out1	PPO-05, 4 PKV
Output_2	SIGN...	O		
Output_3	SIGN...	O		
Output_4	SIGN...	O		
Input_5	SIGN...	I		
Input_6	SIGN...	I		
Input_7	SIGN...	I		
Input_8	SIGN...	I		
Input_9	SIGN...	I		
Input_10	SIGN...	I		
Input_11	SIGN...	I		
Input_12	SIGN...	I		
Input_13	SIGN...	I		
Input_14	SIGN...	I		
Output_5	SIGN...	O		
Output_6	SIGN...	O		
Output_7	SIGN...	O		
Output_8	SIGN...	O		
Output_9	SIGN...	O		
Output_10	SIGN...	O		

Tool/Step	Setting up the communication

16. Name the signals. In this example configuration, Input 1 is named field_in1 and Output 1 field_out1.
Note: You can name all signals here and they will be automatically in use in the Control Builder.

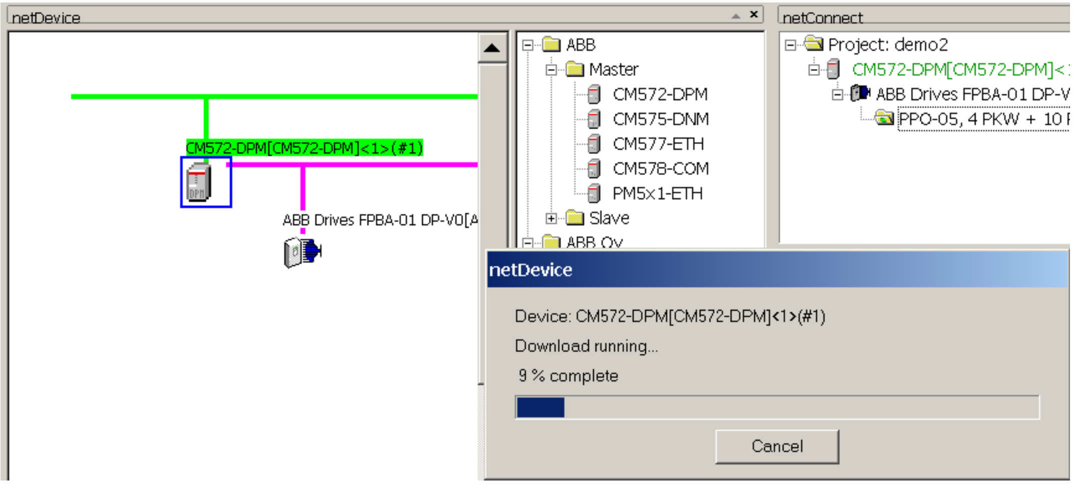

SYCON.net - [demo2.spj]
File View Device Network Help
netProject
Project: demo2
CM572-DPM[CM572-DPM]<1>(#1)
ABB Drives FPBA-01 DP-V0[ABB Drives
netDevice
CM572-DPM[CM572-DPM]<1>(#1)
ABB Drives FPBA-01 DP-V0[A
ABB
Master
CM572-DPM
CM575-DNM
CM577-ETH
CM578-COM
PM5x1-ETH
Slave
ABB Oy
Slave
ABB Drives FPBA-01
ABB Drives FPBA-01
ABB Drives RPBA-01
ABB Drives RPBA-01
netConnect
Project: demo2
CM572-DPM[CM572-DPM]<1>(#1), Slot 1
ABB Drives FPBA-01 DP-V0[ABB Drives FPBA-01 DP-V0]<2>
PPO-05, 4 PKW + 10 PZD <Slot 1>

Name of signal	Data ...	I/O	Name of variable	Comment
Input_1	SIGN...	I	field_in1	PPO-05, 4 PKW + 10 PZ
Input_2	SIGN...	I		
Input_3	SIGN...	I		
Input_4	SIGN...	I		
Output_1	SIGN...	O	field_out1	PPO-05, 4 PKW + 10 PZ
Output_2	SIGN...	O		
Output_3	SIGN...	O		
Output_4	SIGN...	O		
Input_5	SIGN...	I		
Input_6	SIGN...	I		
Input_7	SIGN...	I		
Input_8	SIGN...	I		
Input_9	SIGN...	I		
Input_10	SIGN...	I		
Input_11	SIGN...	I		
Input_12	SIGN...	I		
Input_13	SIGN...	I		
Input_14	SIGN...	I		
Output_5	SIGN...	O		
Output_6	SIGN...	O		
Output_7	SIGN...	O		
Output_8	SIGN...	O		
Output_9	SIGN...	O		
Output_10	SIGN...	O		
Output_11	SIGN...	O		
Output_12	SIGN...	O		
Output_13	SIGN...	O		
Output_14	SIGN...	O		

17. Check that the PLC is in the Stop state (Stop in the display).

    Note: The downloading is not possible if the PLC is in the Run state.

18. Download the communication configuration to the PLC: first, right-click the CM572-DPM icon and, then click **Download**.



Device: CM572-DPM[CM572-DPM]<1>(#1)

Download running...

9 % complete

CoDeSys

Tool/Step

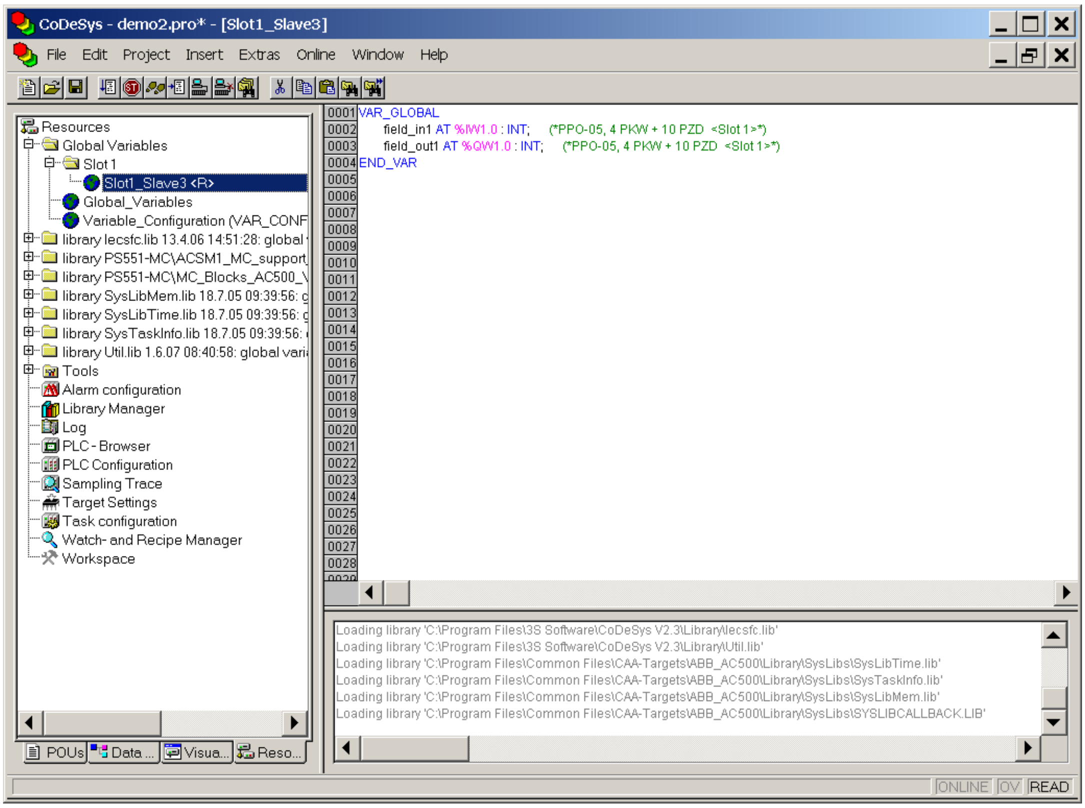
Setting up the communication

19. When the downloading is completed, right-click the CM572-DPM icon and then click **Disconnect**.

20. Save the project with the **Save** command under the **File** menu.

21. Close the SYCON.net tool.

22. Variables field_in1 and field_out1 are now found in the Resources sheet, under Global variables.


CoDeSys - demo2.pro* - [Slot1_Slave3]
File
Edit
Project
Insert
Extras
Online
Window
Help
Resources
Global Variables
Slot 1
Slot1_Slave3 <R>
Global_Variables
Variable_Configuration (VAR_CONF
library Iecsfc.lib 13.4.06 14:51:28: global
library PS551-MC\ACSM1_MC_support
library PS551-MC\MC_Blocks_AC500_\
library SysLibMem.lib 18.7.05 09:39:56: g
library SysLibTime.lib 18.7.05 09:39:56: g
library SysTaskInfo.lib 18.7.05 09:39:56:
library Util.lib 1.6.07 08:40:58: global vari
Tools
Alarm configuration
Library Manager
Log
PLC - Browser
PLC Configuration
Sampling Trace
Target Settings
Task configuration
Watch- and Recipe Manager
Workspace
POUs
Data ...
Visua...
Reso...
ONLINE
OV
READ

```
VAR_GLOBAL
	field_in1 AT %IW1.0 : INT;	(*PPO-05, 4 PKW + 10 PZD  <Slot 1>*)
	field_out1 AT %QW1.0 : INT;	(*PPO-05, 4 PKW + 10 PZD  <Slot 1>*)
END_VAR
```

```
Loading library 'C:\Program Files\3S Software\CoDeSys V2.3\Library\Iecsfc.lib'
Loading library 'C:\Program Files\3S Software\CoDeSys V2.3\Library\Util.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysLibTime.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysTaskInfo.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysLibMem.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SYSLIBCALLBACK.LIB'
```

Tool/Step

Programming the PLC main program

In this section, you program the PLC main program which contains function blocks for communication and basic drive control.

For detailed function block descriptions, refer to

- CoDeSys Help (Press F1 in CoDeSys software)
- *User Manual for PLC Programming with CoDeSys 2.3* by 3S – Smart Software Solutions GmbH

For ACSM1 PLCopen function blocks, refer to

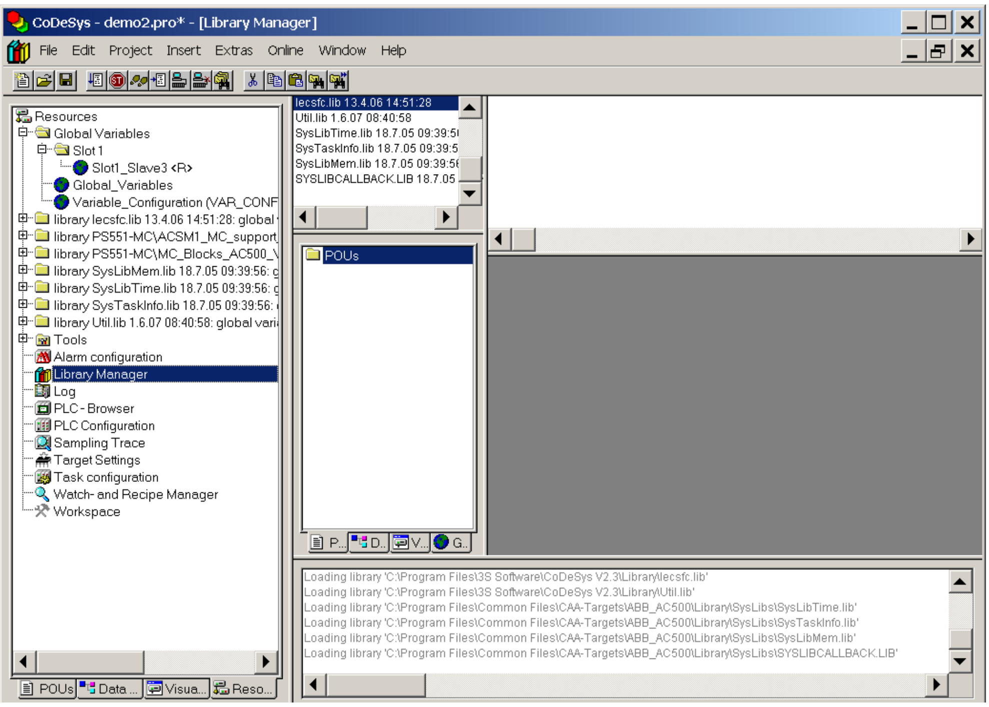
- *User Manual for PS551-MC (Motion Control library for ABB PLC AC500) according to Technical Specification PLCopen – Technical Committee 2 – Task Force; Function Blocks for motion control.*

CoDeSys

Load additional libraries for programming assistance

It is necessary to load additional libraries to make additional function blocks active.

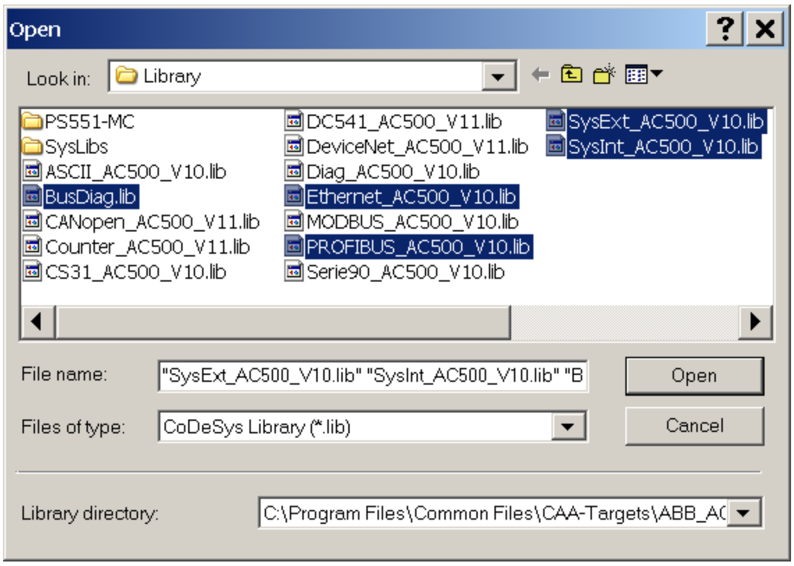
1. Click the Resoures tab. Double-click the Library Manager.


CoDeSys - demo2.pro* - [Library Manager]
File
Edit
Project
Insert
Extras
Online
Window
Help
Resources
Global Variables
Slot 1
Slot1_Slave3 <R>
Global_Variables
Variable_Configuration (VAR_CONF
library lecsfc.lib 13.4.06 14:51:28: global
library PS551-MC\ACSM1_MC_support
library PS551-MC\MC_Blocks_AC500_\
library SysLibMem.lib 18.7.05 09:39:56: g
library SysLibTime.lib 18.7.05 09:39:56: g
library SysTaskInfo.lib 18.7.05 09:39:56:
library Util.lib 1.6.07 08:40:58: global vari
Tools
Alarm configuration
Library Manager
Log
PLC - Browser
PLC Configuration
Sampling Trace
Target Settings
Task configuration
Watch- and Recipe Manager
Workspace
lecsfc.lib 13.4.06 14:51:28
Util.lib 1.6.07 08:40:58
SysLibTime.lib 18.7.05 09:39:5
SysTaskInfo.lib 18.7.05 09:39:5
SysLibMem.lib 18.7.05 09:39:5
SYSLIBCALLBACK.LIB 18.7.05
POUs
P...
D..
V...
G..
POUs
Data ...
Visua...
Reso...

```
Loading library 'C:\Program Files\3S Software\CoDeSys V2.3\Library\lecsfc.lib'
Loading library 'C:\Program Files\3S Software\CoDeSys V2.3\Library\Util.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysLibTime.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysTaskInfo.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysLibMem.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SYSLIBCALLBACK.LIB'
```

2. From the **Insert** menu, select **Additional libraries….**

Tool/Step	Programming the PLC main program
3.	Select the following libraries and click **Open**.



Open

Look in: Library

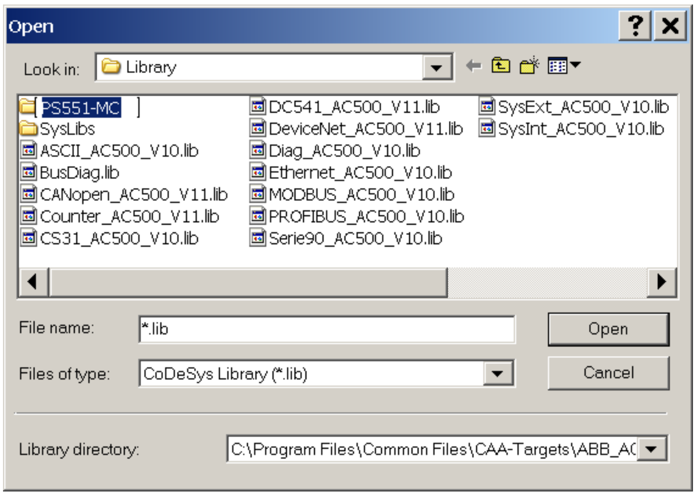
PS551-MC
SysLibs
ASCII_AC500_V10.lib
BusDiag.lib
CANopen_AC500_V11.lib
Counter_AC500_V11.lib
CS31_AC500_V10.lib
DC541_AC500_V11.lib
DeviceNet_AC500_V11.lib
Diag_AC500_V10.lib
Ethernet_AC500_V10.lib
MODBUS_AC500_V10.lib
PROFIBUS_AC500_V10.lib
Serie90_AC500_V10.lib
SysExt_AC500_V10.lib
SysInt_AC500_V10.lib

File name: "SysExt_AC500_V10.lib" "SysInt_AC500_V10.lib" "B

Files of type: CoDeSys Library (*.lib)

Library directory: C:\Program Files\Common Files\CAA-Targets\ABB_A(

Tool/Step	Programming the PLC main program
4.	Double-click the PS551-MC folder and select the following libraries. Click **Open**.

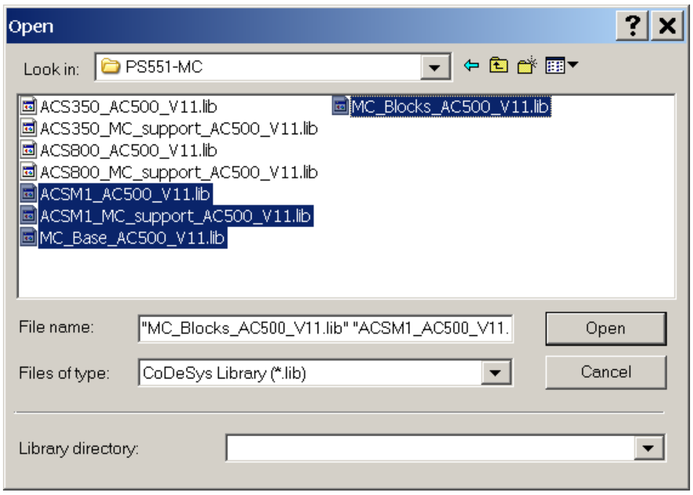


Look in: Library

File name: *.lib

Files of type: CoDeSys Library (*.lib)

Library directory: C:\Program Files\Common Files\CAA-Targets\ABB_AC



Look in: PS551-MC

File name: "MC_Blocks_AC500_V11.lib" "ACSM1_AC500_V11.

Files of type: CoDeSys Library (*.lib)

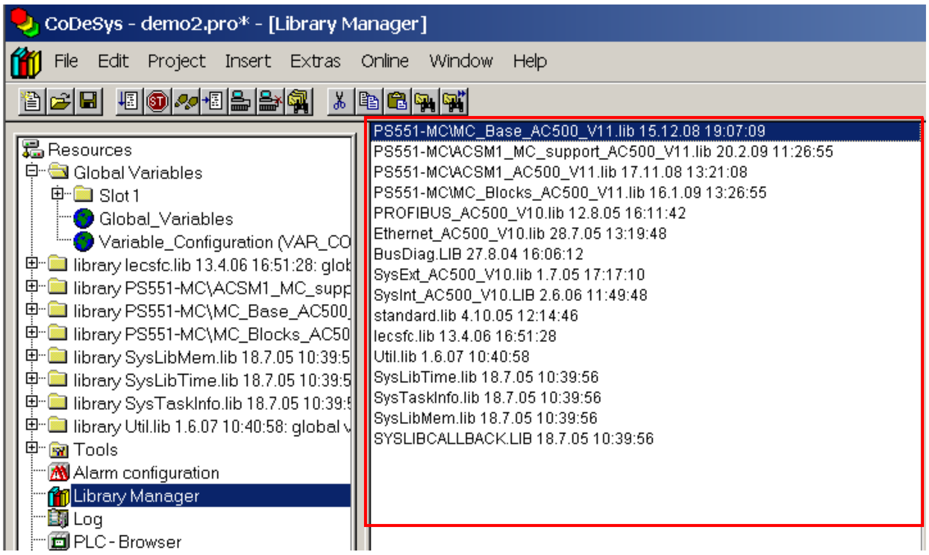
Library directory:

Note: If you cannot see the PS551-MC folder, you have copied the motion control libraries to another folder, or you have not copied them at all. Go to the location where you have pasted the libraries, or copy the libraries from the installation CD to the following folders:

C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library
C:\Program Files\Common Files\CAA-Targets\ABB_AC500\AC500_V12\Library

Tool/Step Programming the PLC main program

5. In this example, the following libraries were inserted.

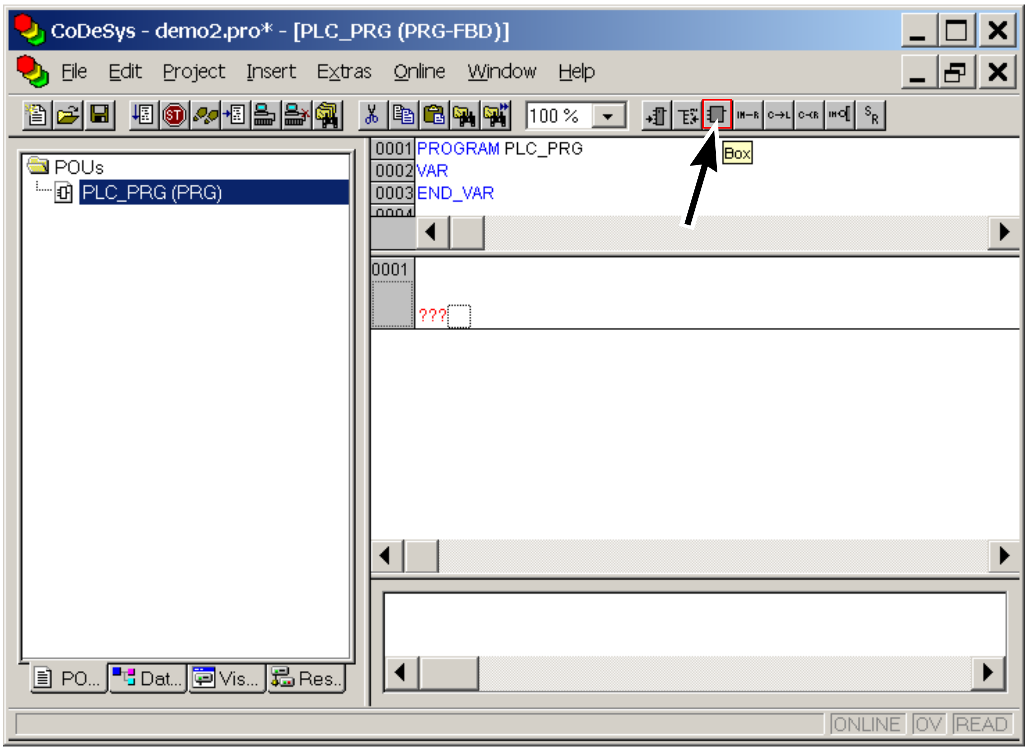

CoDeSys - demo2.pro* - [Library Manager]
File Edit Project Insert Extras Online Window Help
Resources
Global Variables
Slot 1
Global_Variables
Variable_Configuration (VAR_CO
library lecsfc.lib 13.4.06 16:51:28: glol
library PS551-MC\ACSM1_MC_supp
library PS551-MC\MC_Base_AC500_
library PS551-MC\MC_Blocks_AC50
library SysLibMem.lib 18.7.05 10:39:5
library SysLibTime.lib 18.7.05 10:39:5
library SysTaskInfo.lib 18.7.05 10:39:5
library Util.lib 1.6.07 10:40:58: global v
Tools
Alarm configuration
Library Manager
Log
PLC - Browser

```
PS551-MC\MC_Base_AC500_V11.lib 15.12.08 19:07:09
PS551-MC\ACSM1_MC_support_AC500_V11.lib 20.2.09 11:26:55
PS551-MC\ACSM1_AC500_V11.lib 17.11.08 13:21:08
PS551-MC\MC_Blocks_AC500_V11.lib 16.1.09 13:26:55
PROFIBUS_AC500_V10.lib 12.8.05 16:11:42
Ethernet_AC500_V10.lib 28.7.05 13:19:48
BusDiag.LIB 27.8.04 16:06:12
SysExt_AC500_V10.lib 1.7.05 17:17:10
SysInt_AC500_V10.LIB 2.6.06 11:49:48
standard.lib 4.10.05 12:14:46
Iecsfc.lib 13.4.06 16:51:28
Util.lib 1.6.07 10:40:58
SysLibTime.lib 18.7.05 10:39:56
SysTaskInfo.lib 18.7.05 10:39:56
SysLibMem.lib 18.7.05 10:39:56
SYSLIBCALLBACK.LIB 18.7.05 10:39:56
```

Add function block ACSM1_ACCESS_dc

ACSM1_ACCESS_dc is an interface block that converts the PLC commands to the control word format of the ACSM1. The control word is in PROFIdrive positioning mode.

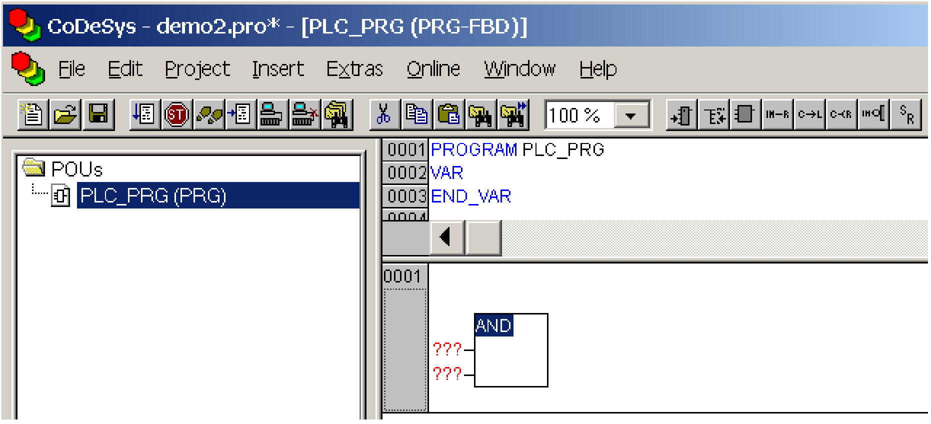
1. Click the POUs tab. In the POUs field, double-click PLC_PRG(PRG). -> The Box tool for adding function blocks appears in the tool bar. Click the Box button.


CoDeSys - demo2.pro* - [PLC_PRG (PRG-FBD)]
File Edit Project Insert Extras Online Window Help
100 %
Box
POUs
PLC_PRG (PRG)
PO...
Dat...
Vis...
Res...
0001
???
ONLINE
OV
READ

```
PROGRAM PLC_PRG
VAR
END_VAR
```

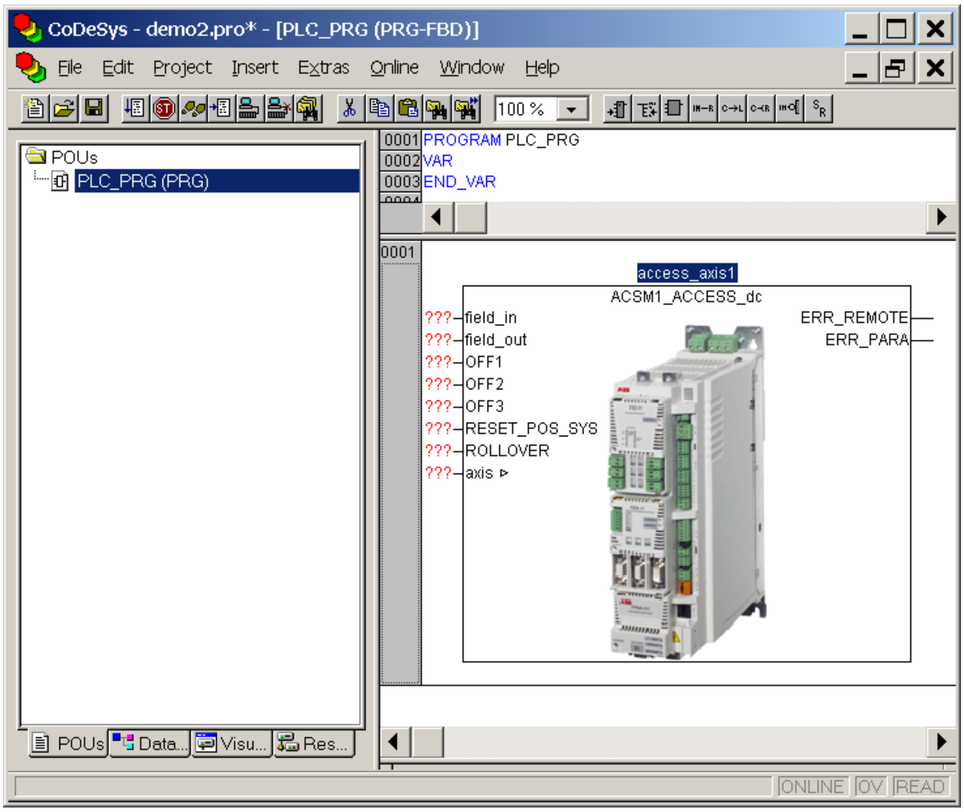
Tool/Step Programming the PLC main program

2. Replace the default text AND with text acsm1_access_dc. Now, the CoDeSys program recognizes the function block and the block appearance changes automatically.


CoDeSys - demo2.pro* - [PLC_PRG (PRG-FBD)]
File Edit Project Insert Extras Online Window Help
100 %
POUs
PLC_PRG (PRG)
AND
???
???

```
PROGRAM PLC_PRG
VAR
END_VAR
```

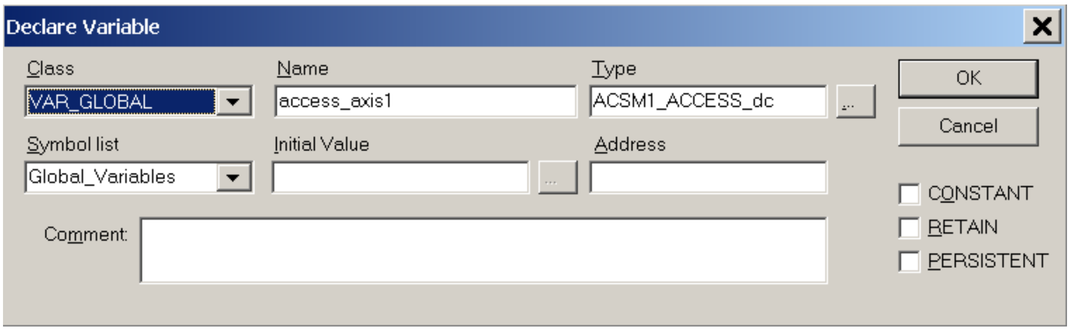
3. Name the function block access_axis1 and press **Enter**.



```
PROGRAM PLC_PRG
VAR
END_VAR
```

Tool/Step	Programming the PLC main program

4. -> The Declare Variable assistant appears. In the Class dialog box, select VAR_GLOBAL which denotes global variables. The content of box Type is configured automatically to ACSM1_ACCESS_dc. Click **OK**.


Declare Variable

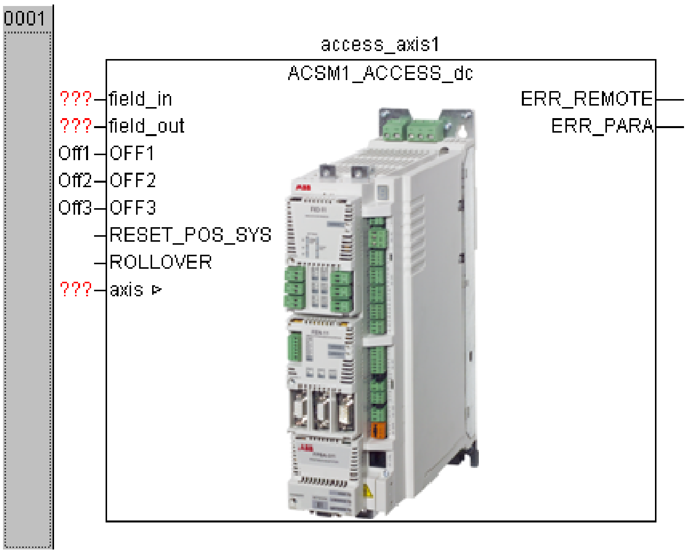
Class: VAR_GLOBAL
Name: access_axis1
Type: ACSM1_ACCESS_dc
Symbol list: Global_Variables
Initial Value:
Address:
Comment:

□ CONSTANT
□ RETAIN
□ PERSISTENT

Note 1: If you want to call Declare Variable assistant again, click on the demanded variable and press **Shift+F2**.

Note 2: When defining inputs, you can use help of Input assistant. Click on the demanded input and press **F2**.

5. Configure inputs OFF1, OFF2 and OFF3. Name the fields Off1, Off2 and Off3 and press **Enter**. The program configures the Type of these inputs automatically to BOOL and the Class to VAR. Click **OK**. Inputs RESET_POS_SYS and ROLLOVER are left blank.


0001

access_axis1
ACSM1_ACCESS_dc

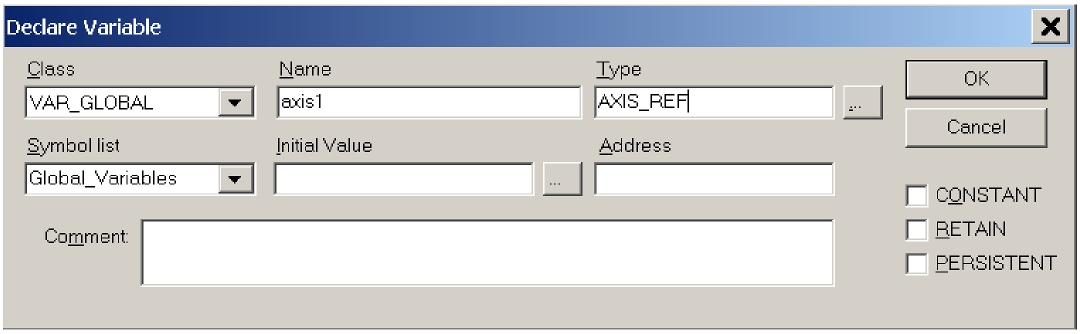
???–field_in
???–field_out
Off1–OFF1
Off2–OFF2
Off3–OFF3
–RESET_POS_SYS
–ROLLOVER
???–axis ⊳

ERR_REMOTE–
ERR_PARA–

Tool/Step

Programming the PLC main program

6. Configure input axis. Name it axis1 and press **Enter**. Class: VAR_GLOBAL. Type: AXIS_REF. **Note:** AXIS_REF is not configured automatically, you must type it. Click **OK**.



Declare Variable

Class: VAR_GLOBAL

Name: axis1

Type: AXIS_REF

Symbol list: Global_Variables

Initial Value:

Address:

Comment:

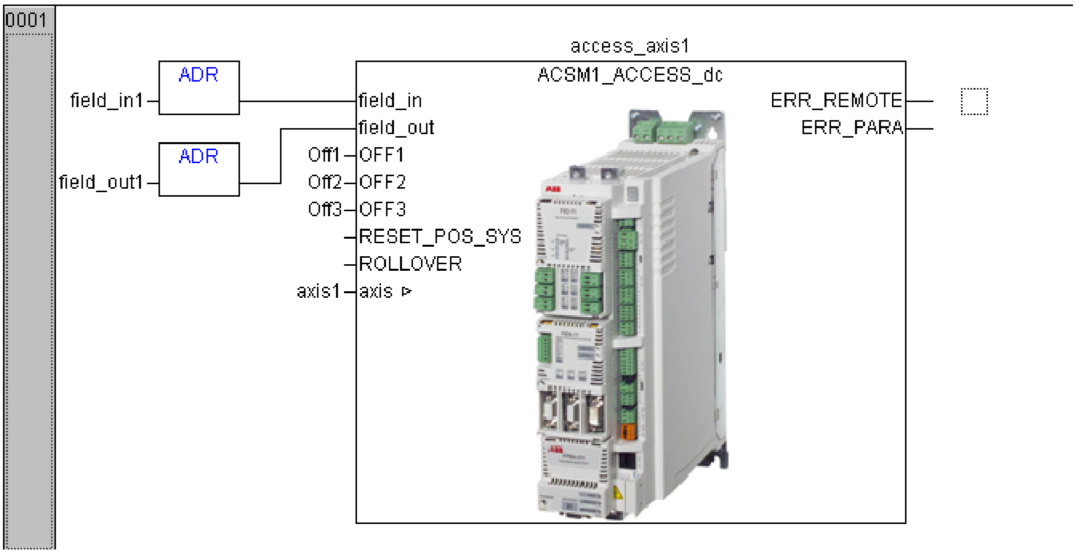
□ CONSTANT

□ RETAIN

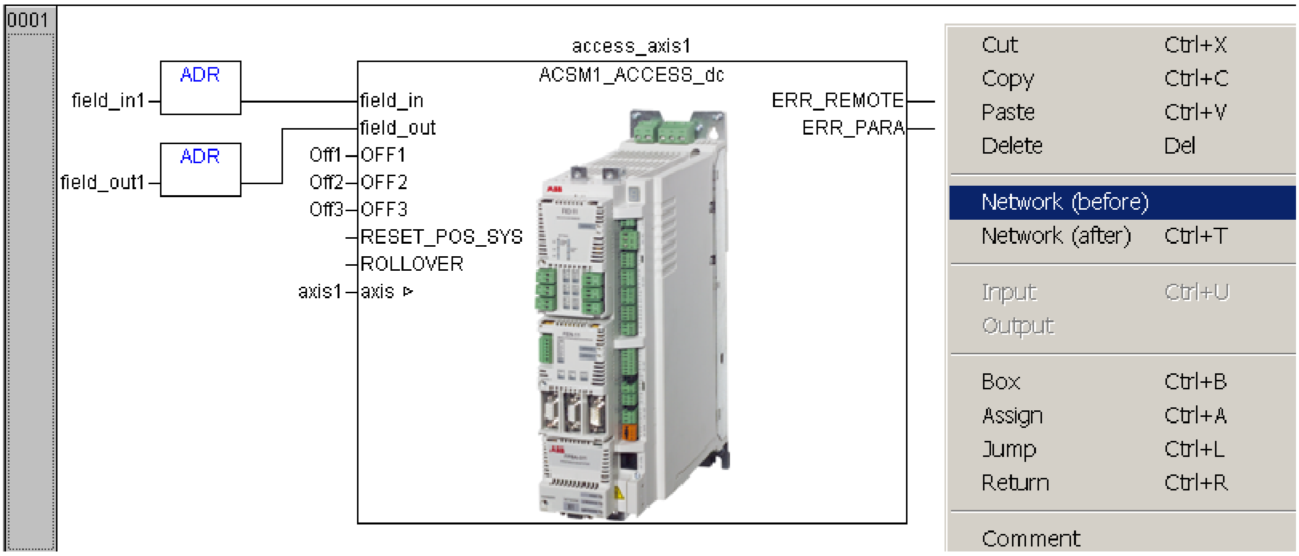
□ PERSISTENT

7. Select the left-hand side of input field_in. Click the Box button in the tool bar. Name the new function block ADR which denotes address. Press **Enter**. Repeate the same for input field_out.

Note: Inputs field_in1 and field_out1 were configured with SYCON.net on page *60*.



Tool/Step	Programming the PLC main program
8.	In this section a new program row is made before the access_axis1 block. This is because the state of input switches Off1, Off2 and Off3 must be TRUE before starting block access_axis1 when the program is run.
	Right-click somewhere in the blank area to open the following menu and select **Network (before)**. -> A new programmable area (program row 0001) is made.

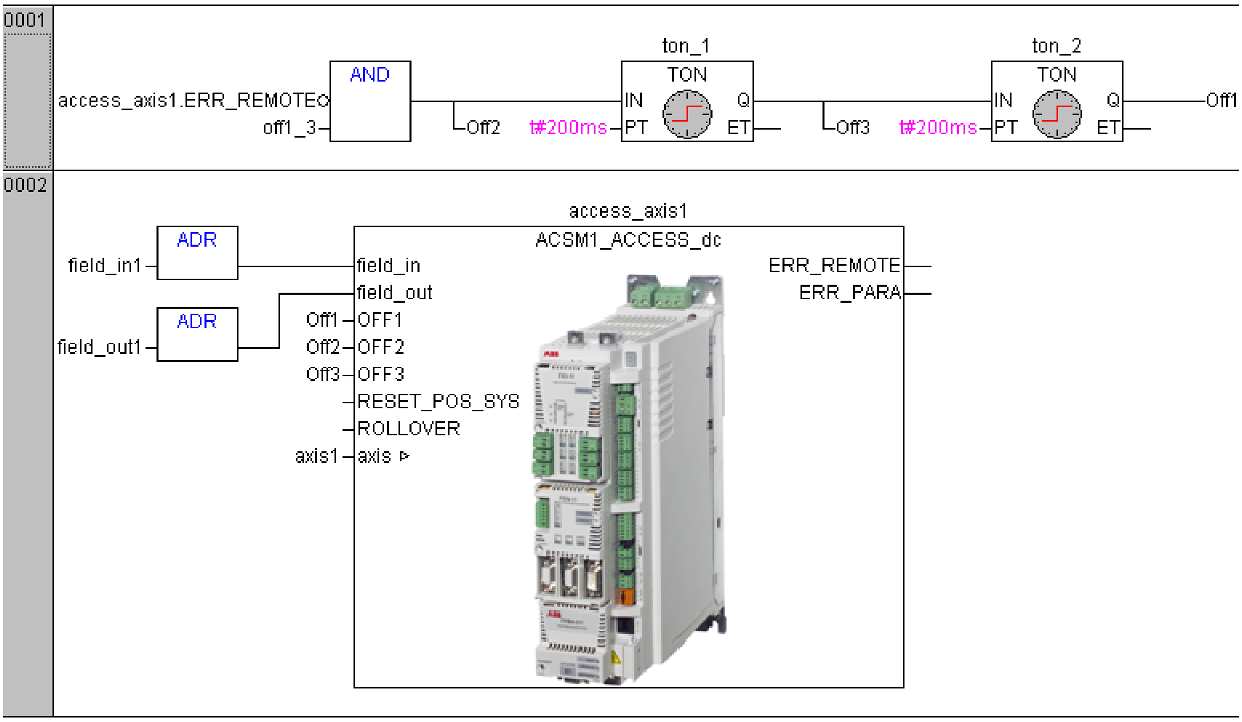


The switches have to go to the TRUE state in the following order: Off2, Off3 and Off1. They cannot turn on immediately, one after another, so add delay function blocks (TON) with a delay time of 200 ms.

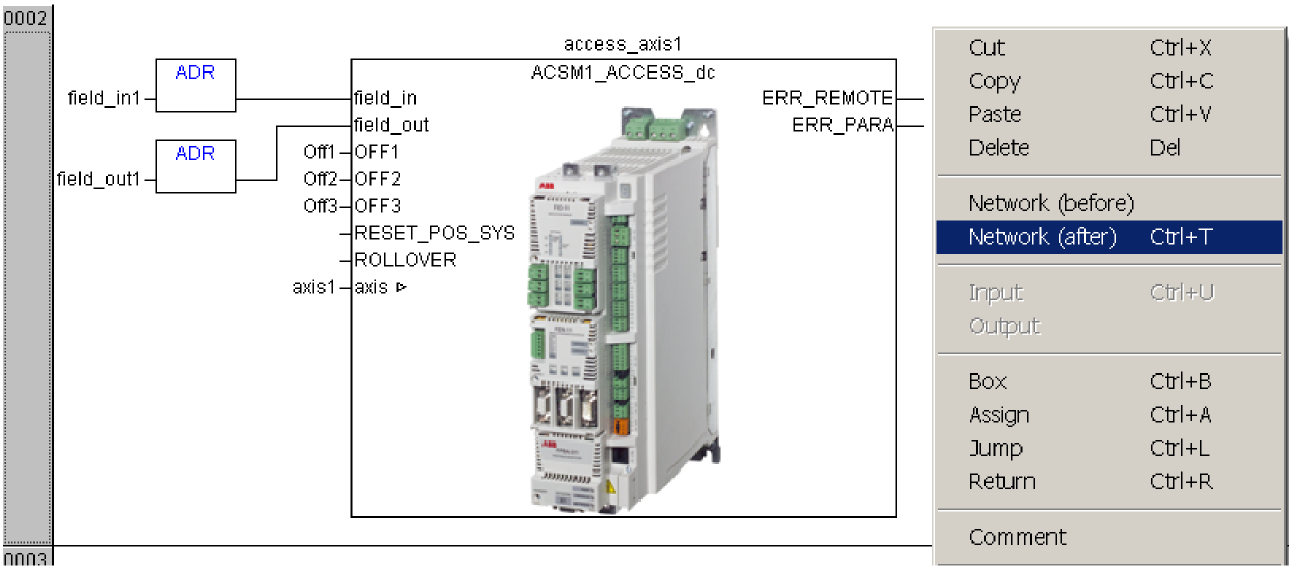
In case of errors, output ERR_REMOTE has to be evaluated before start. This is done by block AND with an inverted input. To invert the input, right-click on the input and select **Negate**.

Off1_3 is a switch which is later used starting the drive when the program is run. It is a global variable (Class: VAR_GLOBAL; Type: BOOL).

Tool/Step	Programming the PLC main program
	The program made so far is shown below.



Right-click in the blank area and select **Network (after)** from the menu. Add the following blocks to the main program: MC_ReadStatus, MC_ReadActualPosition, MC_ReadAxisError, MC_Reset, MC_Power. Configuring the blocks is described below.



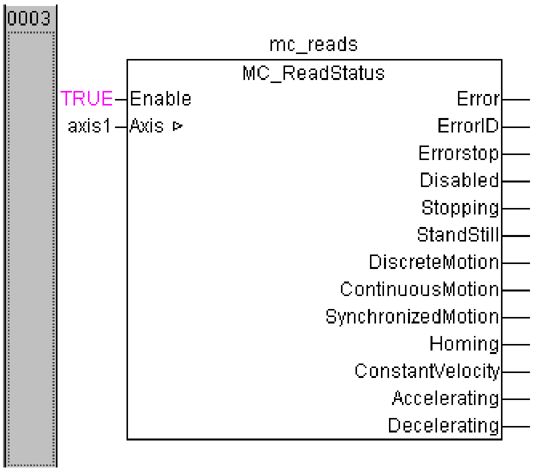
Tool/Step

Programming the PLC main program

Add function block MC_ReadStatus

This function block returns in detail the status of the axis with respect to the motion currently in progress.

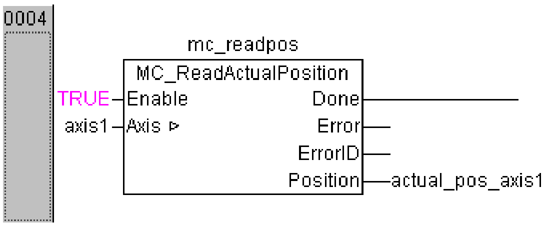
Name the block mc_reads. Press **Enter**. Class: VAR; Type: MC_ReadStatus. The block must be enabled all the time -> name input Enable TRUE. Name input Axis axis1 which is already configured.



Add function block MC_ReadActualPosition

This function block returns the actual position.

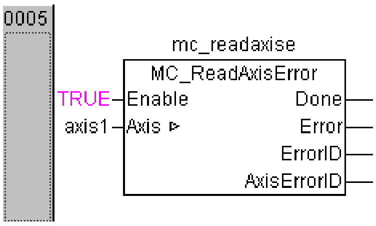
Name the block mc_readpos. Press **Enter**. Class: VAR; Type: MC_ReadActualPosition. The block must be enabled all the time -> name input Enable TRUE. Add global variable actual_pos_axis1 for later use in visualization, Class: VAR_GLOBAL, Type: LREAL.



Add function block MC_ReadAxisError

This function block describes general axis errors not related to the function blocks.

Class: VAR, Type: MC_ReadAxisError.



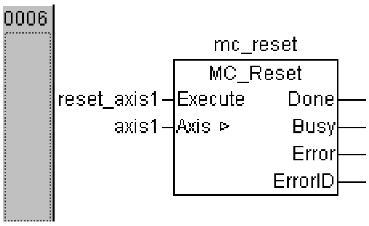
Tool/Step

Programming the PLC main program

Add function block MC_Reset

This function block makes the transition from state ErrorStop to STANDSTILL by resetting all internal axis-related errors. It does not affect the output of the function block instances.

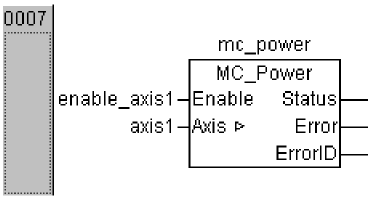
Class: VAR, Type: MC_Reset. Add global variable reset_axis1 for switching purposes, because the reset block cannot be active constantly,
Class: VAR_GLOBAL, Type: BOOL.



Add function block MC_Power

This function block controls the power stage on or off.

Class: VAR, Type: MC_Power. Add global variables enable_axis1 and power_status_axis1 for start-up and visualization, Class: VAR_GLOBAL, Type: BOOL.

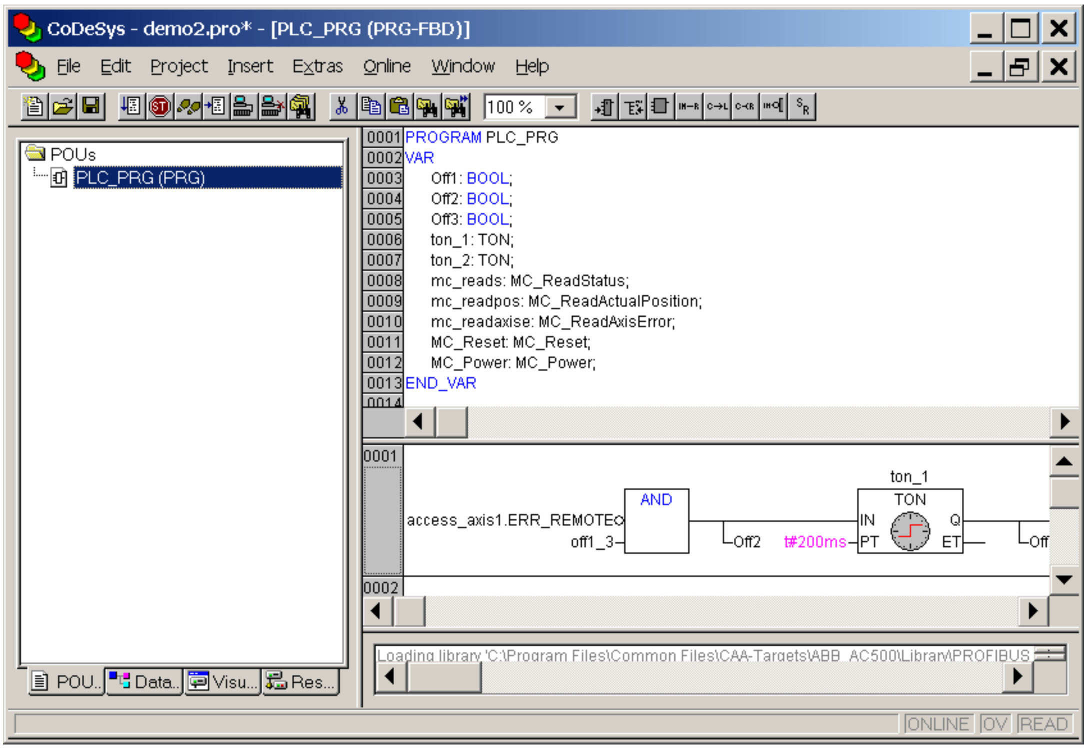


Tool/Step

Programming the PLC main program

The complete main program is shown here

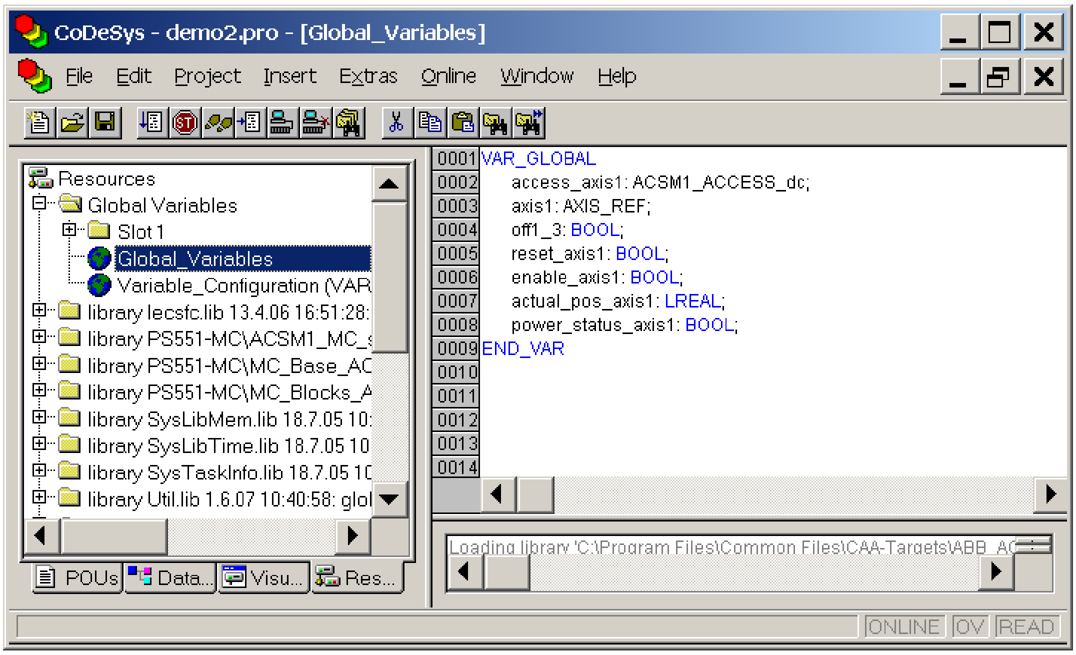
The complete program is shown below. The local variables are shown in the right-hand-side top field.



```
PROGRAM PLC_PRG
VAR
    Off1: BOOL;
    Off2: BOOL;
    Off3: BOOL;
    ton_1: TON;
    ton_2: TON;
    mc_reads: MC_ReadStatus;
    mc_readpos: MC_ReadActualPosition;
    mc_readaxise: MC_ReadAxisError;
    MC_Reset: MC_Reset;
    MC_Power: MC_Power;
END_VAR
```

Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\PROFIBUS

The global variables are shown below when the Resources field is clicked open.


CoDeSys - demo2.pro - [Global_Variables]
File Edit Project Insert Extras Online Window Help
Resources
Global Variables
Slot 1
Global_Variables
Variable_Configuration (VAR
library Iecsfc.lib 13.4.06 16:51:28:
library PS551-MC\ACSM1_MC_
library PS551-MC\MC_Base_AC
library PS551-MC\MC_Blocks_A
library SysLibMem.lib 18.7.05 10:
library SysLibTime.lib 18.7.05 10
library SysTaskInfo.lib 18.7.05 10
library Util.lib 1.6.07 10:40:58: glol
POUs
Data...
Visu...
Res...
ONLINE
OV
READ

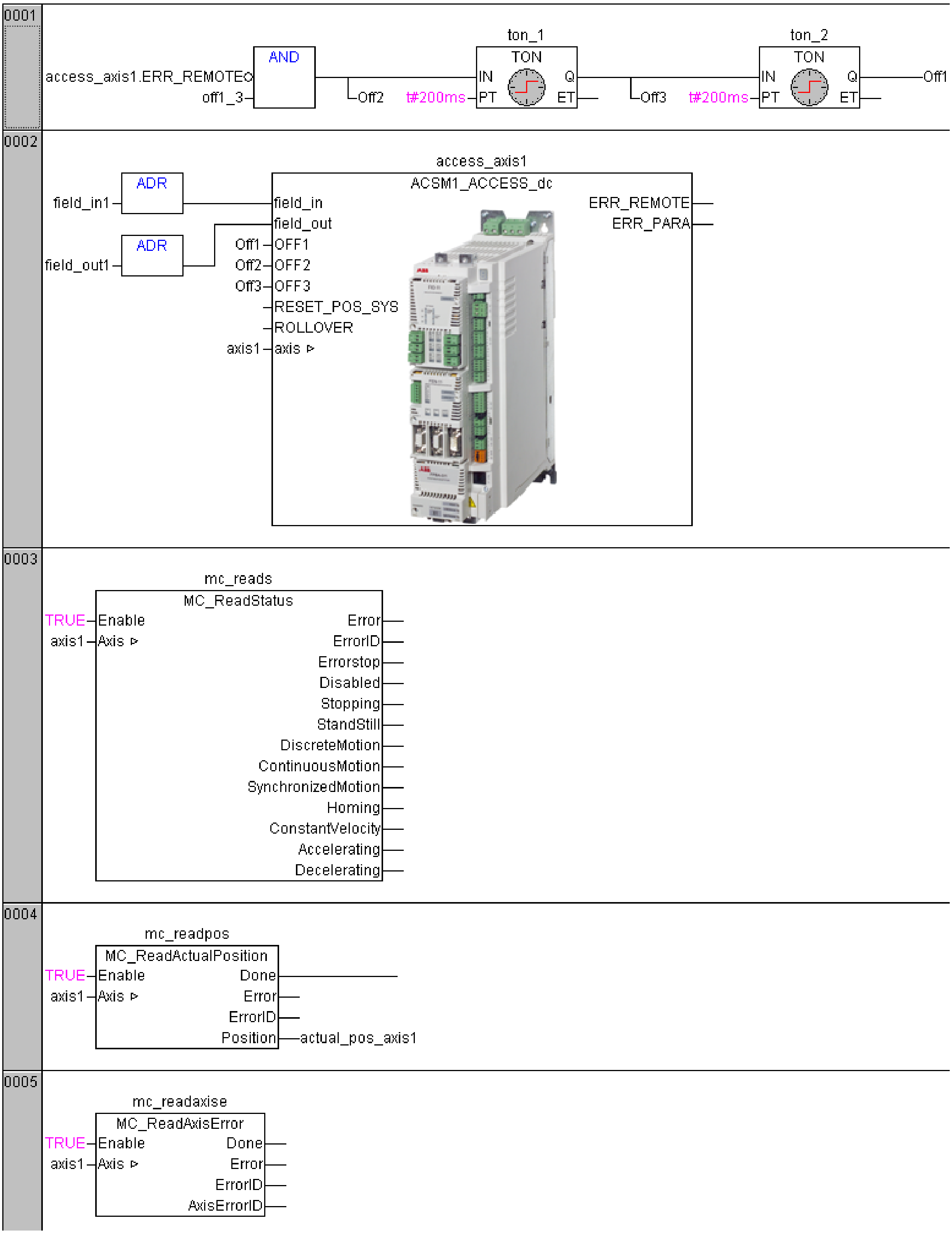
```
VAR_GLOBAL
    access_axis1: ACSM1_ACCESS_dc;
    axis1: AXIS_REF;
    off1_3: BOOL;
    reset_axis1: BOOL;
    enable_axis1: BOOL;
    actual_pos_axis1: LREAL;
    power_status_axis1: BOOL;
END_VAR
```

Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC

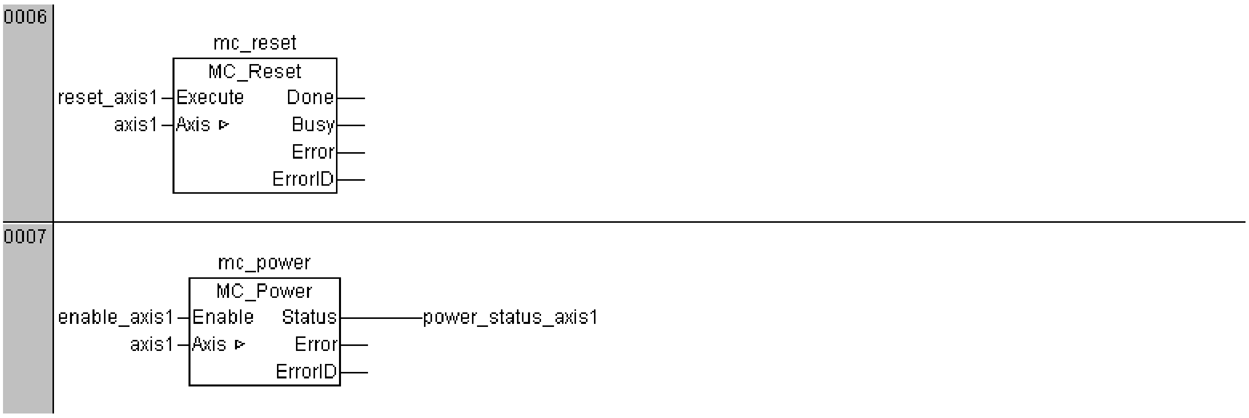
Tool/Step

Programming the PLC main program

View of the main program rows:



Tool/Step Programming the PLC main program



Tool/Step

Programming actions

In this section, you program actions and add them to the PLC main program. Actions are needed for controlling the motor movement. PLCopen library offers many simple and very useful functions for the ACSM1.

For detailed function block descriptions, refer to

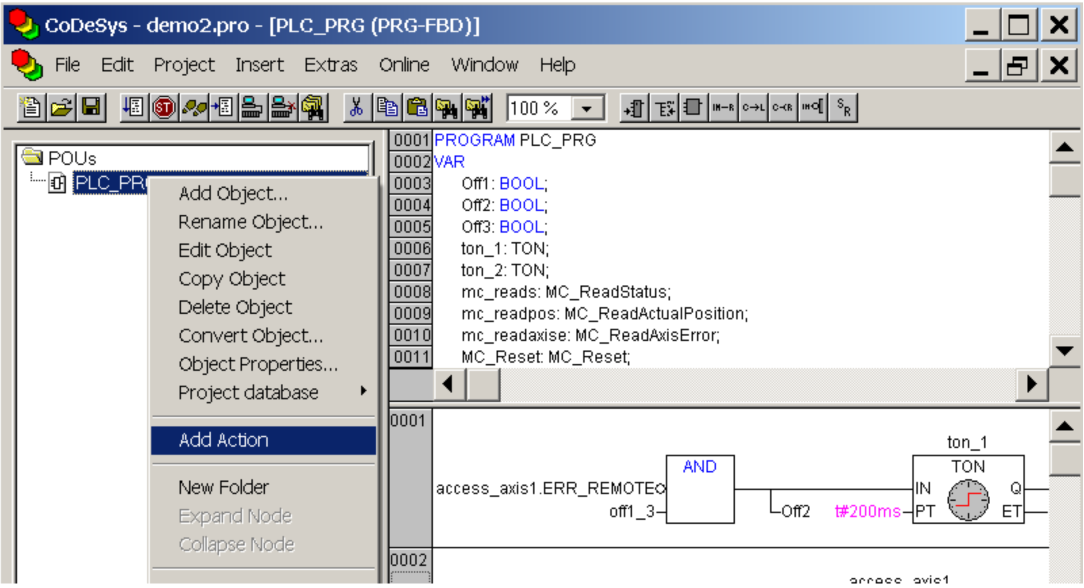
- CoDeSys Help (Press F1 in CoDeSys software)
- *User Manual for PLC Programming with CoDeSys 2.3* by 3S – Smart Software Solutions GmbH

For ACSM1 PLCopen function blocks, refer to

- *User Manual for PS551-MC (Motion Control library for ABB PLC AC500) according to Technical Specification PLCopen – Technical Committee 2 – Task Force; Function Blocks for motion control.*

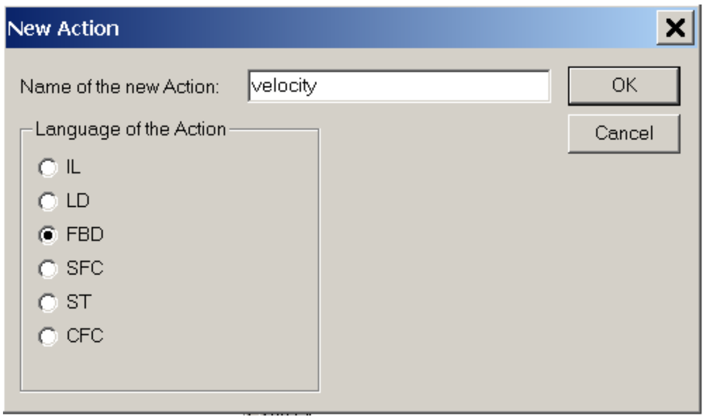
How to create actions

1. In the POUs field, right-click PLC_PROG(PRG) and select **Add Action**.



```
PROGRAM PLC_PRG
VAR
    Off1: BOOL;
    Off2: BOOL;
    Off3: BOOL;
    ton_1: TON;
    ton_2: TON;
    mc_reads: MC_ReadStatus;
    mc_readpos: MC_ReadActualPosition;
    mc_readaxise: MC_ReadAxisError;
    MC_Reset: MC_Reset;
```

Tool/Step	Programming actions
2.	Name the action for example velocity. Select FBD for the programming language. Click **OK**.



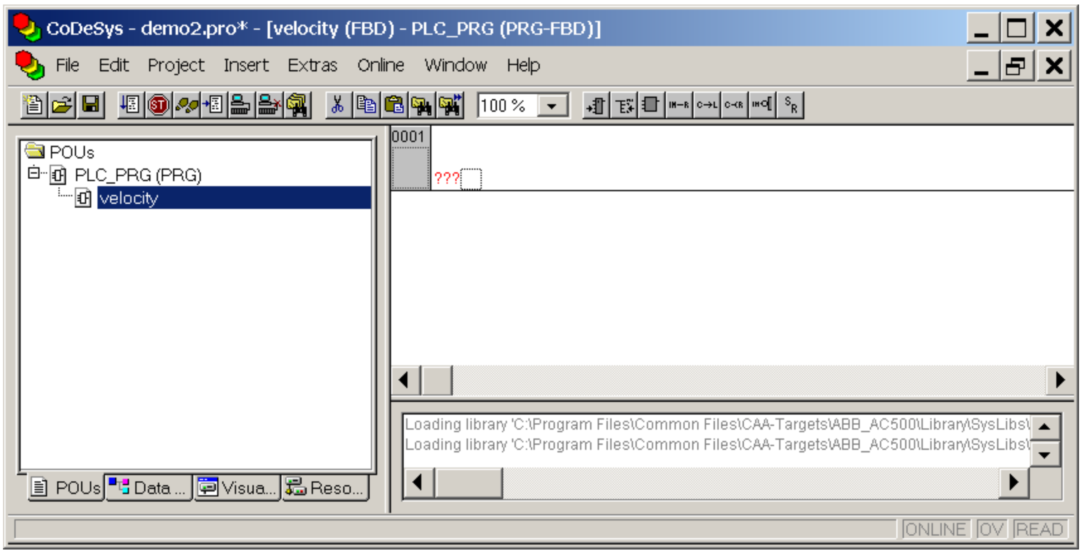
New Action

Name of the new Action: velocity

Language of the Action

○ IL
○ LD
● FBD
○ SFC
○ ST
○ CFC

3. -> An empty programming space appears.

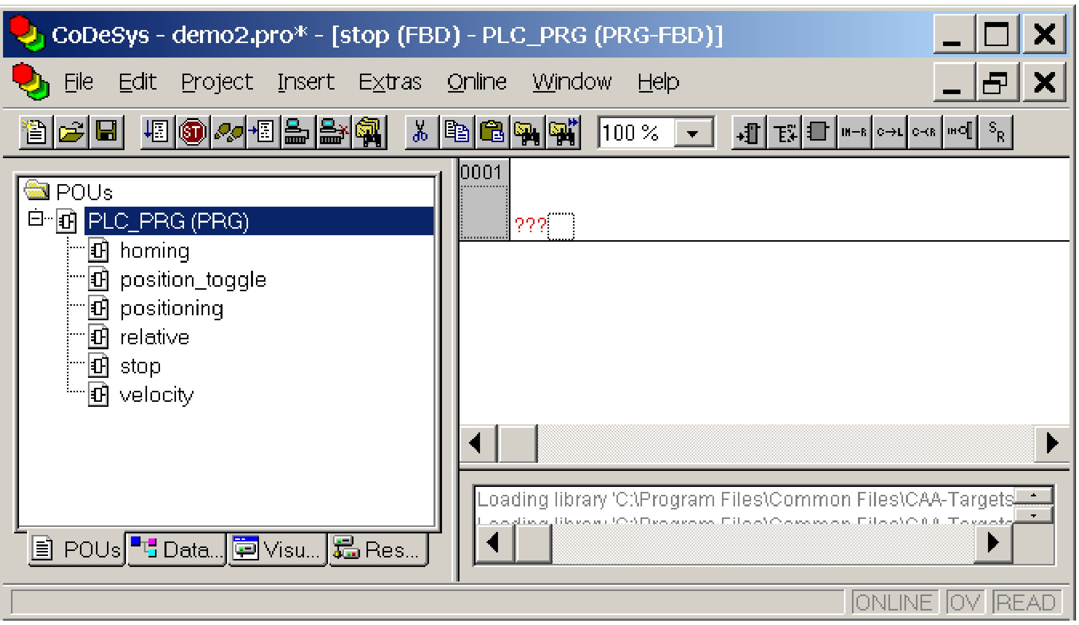


CoDeSys - demo2.pro* - [velocity (FBD) - PLC_PRG (PRG-FBD)]

```
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\
```

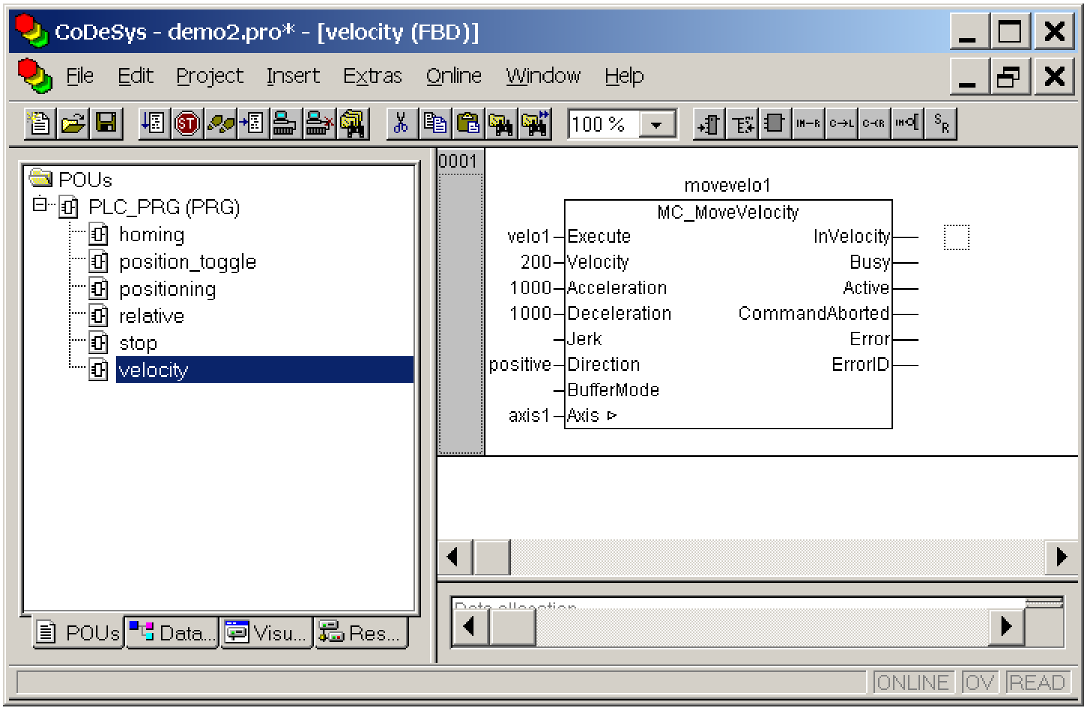
Tool/Step **Programming actions**

4. Create separate actions which are needed in the program for example homing, position_toggle, positioning, relative, stop and velocity.


CoDeSys - demo2.pro* - [stop (FBD) - PLC_PRG (PRG-FBD)]
File Edit Project Insert Extras Online Window Help
100 %
POUs
PLC_PRG (PRG)
homing
position_toggle
positioning
relative
stop
velocity
POUs Data... Visu... Res...
0001
???
ONLINE OV READ

Loading library 'C:\Program Files\Common Files\CAA-Targets

5. Program the actions in the same way as you programmed the function blocks in the main program. For example, under action velocity there will be function block MC_MoveVelocity. For programming the blocks, see the next steps.



Tool/Step

Programming actions

Program velocity (MC_MoveVelocity)

This Function Block commands a never ending controlled motion at a specific velocity.

By clicking the Box tool button, insert a new box. Replace the default text AND with MC_MoveVelocity. Name the block, for example, movevelo1, Class: VAR, Type: MC_MoveVelocity. Name the Execute input velo1, Class: VAR_GLOBAL, Type: BOOL.

Define inputs Velocity, Acceleration and Deceleration with numeric values as shown in the window below, or declare them static values in the main program local variable list by writing, for example, the following lines to the list.

Acceleration: LREAL:=1000;

Deceleration: LREAL:=1000;

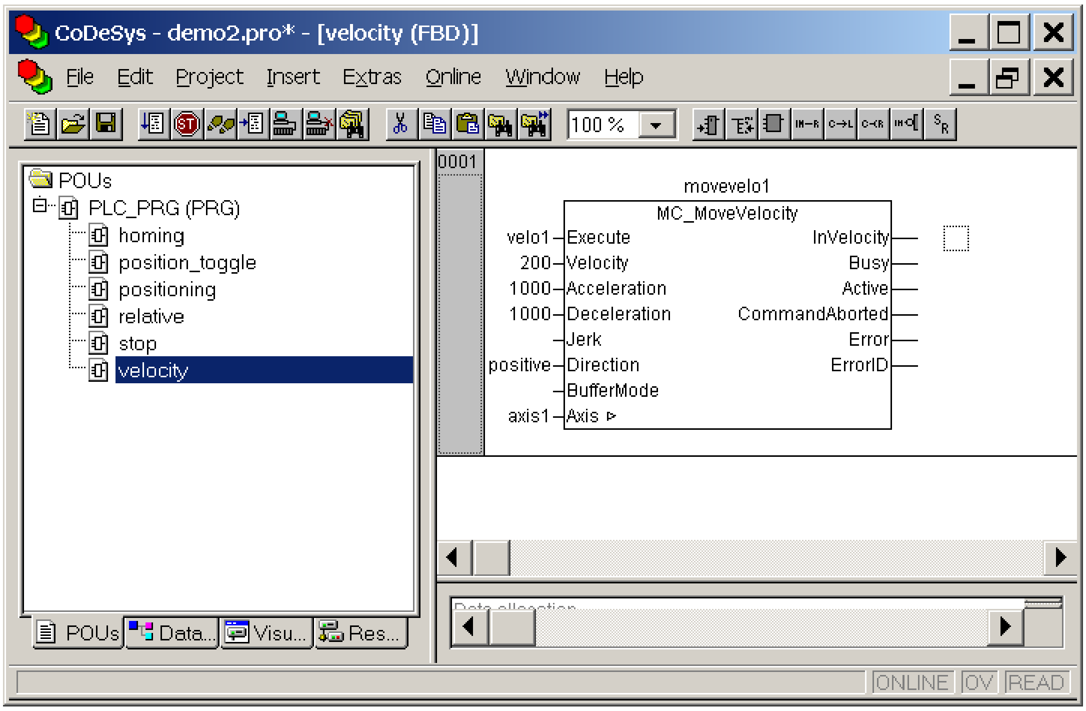
Velocity1: LREAL:=200;

(Note: For editing the variable list, double-clicking PLC_PROG(PRG) in the POUs field, see page 74.)

Name Direction either POSITIVE or NEGATIVE.

Leave Jerk and BufferMode blank.

Input Axis defines the controlled axis. Name it axis1.



```
                  movevelo1
                MC_MoveVelocity
    velo1 -Execute              InVelocity-
      200 -Velocity                   Busy-
     1000 -Acceleration             Active-
     1000 -Deceleration   CommandAborted-
          -Jerk                      Error-
 positive -Direction               ErrorID-
          -BufferMode
    axis1 -Axis ⊳
```

See the next page.

Tool/Step **Programming actions**

The block in the previous picture runs axis1 constantly at velocity 200.

The speed and position scaling is defined by setting drive control program parameters of group 60 POS FEEDBACK, see page *42*. With the settings on page *42,* a speed reference of 1000 corresponds to a speed of 1000 rpm that means 1000 motor axis rotations per minute.

Program stopping (MC_Stop)

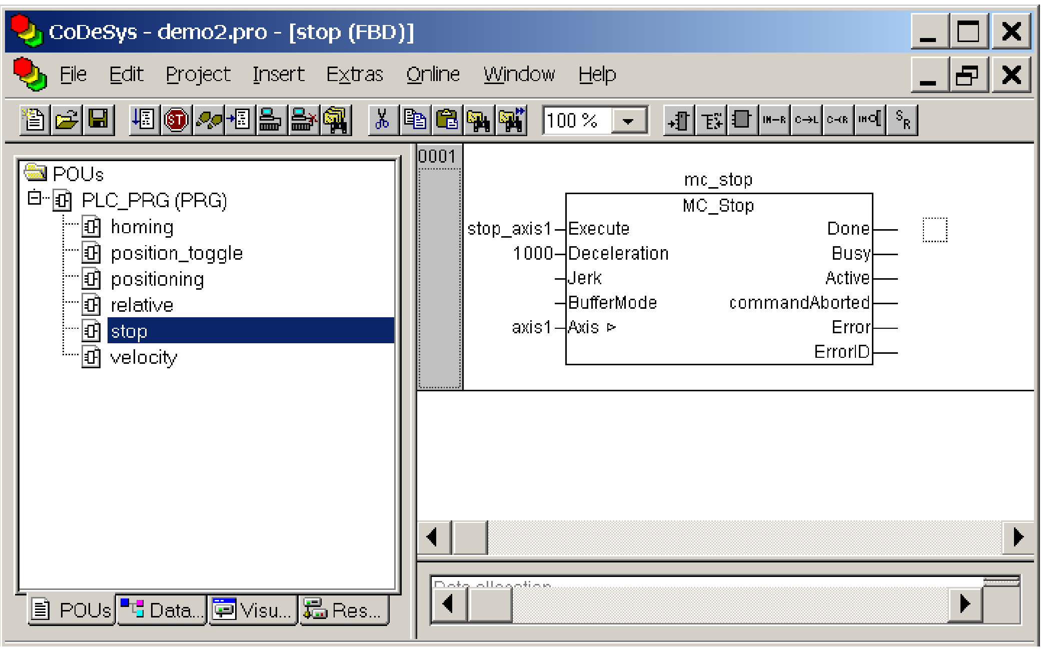
This function block commands a controlled motion stop and transfers the axis to the STOPPING state. The block aborts any ongoing function block execution. While the axis is in the STOPPING state, no other function block can perform any motion on the same axis. After the axis has reached the zero velocity, the Done output is set to TRUE immediately. The axis remains in the STOPPING state as long as the Execute input remains TRUE or the zero velocity is not yet reached. As soon as output Done is set and input Execute is FALSE, the axis goes to the STANDSTILL state. For the states, refer to the state machine (Axis StateMachine) on page *102*.

By clicking the Box tool button, insert a new box. Replace the default text AND with MC_Stop. Name the block, for example, stop1, Class: VAR, Type: MC_Stop. Name input Execute stop_axis1, Class: VAR_GLOBAL, Type: BOOL.

Define input Deceleration with a numeric value.

Leave Jerk and BufferMode blank.

Input Axis defines the controlled axis. Name it axis1.



Tool/Step

Programming actions

Program positioing (MC_MoveAbsolute)

This function block commands a controlled motion to a specified absolute position.

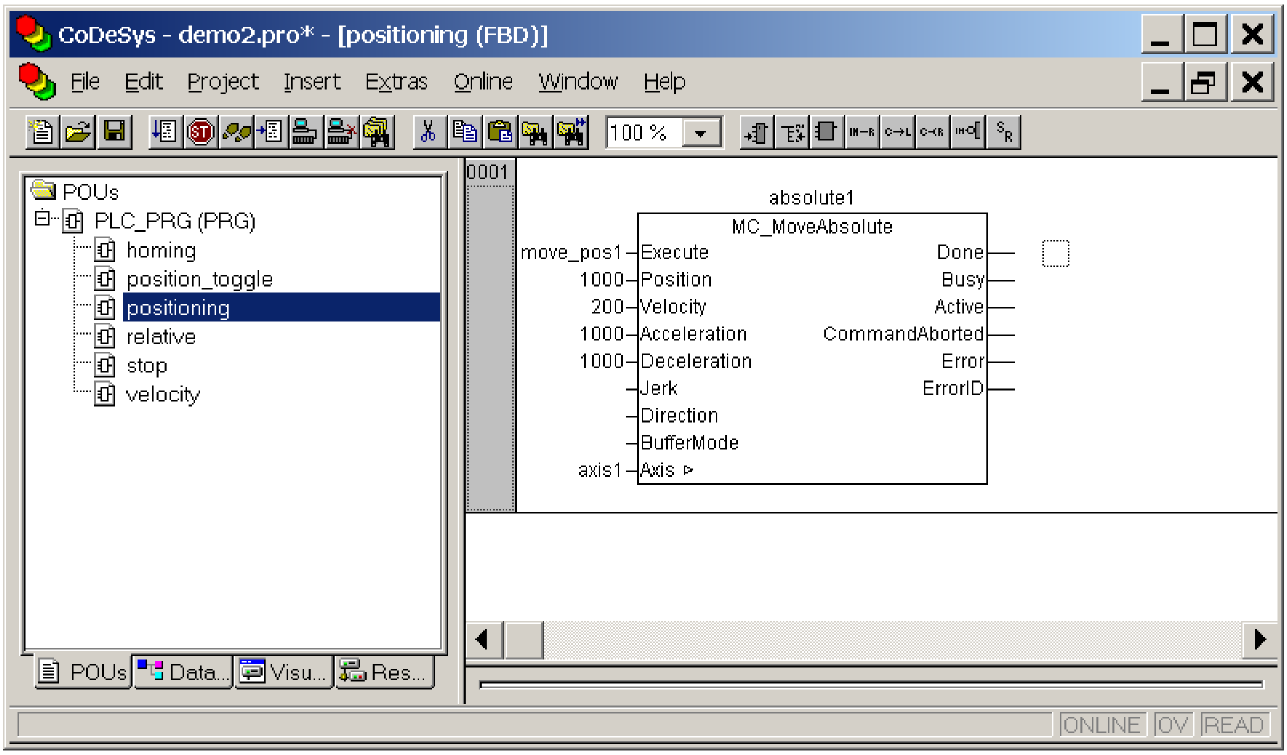
By clicking the Box tool button, insert a new box. Replace the default text AND with MC_MoveAbsolute. Name the block, for example, absolute1, Class: VAR, Type: MC_ MoveAbsolute. Name input Execute move_pos1, Class: VAR_GLOBAL, Type: BOOL.

Define inputs Position, Velocity, Acceleration and Deceleration with numeric values.

Leave Direction, Jerk and BufferMode blank.

Input Axis defines the controlled axis. Name it axis1.

The following block drives axis1 to position 1000.



```
                absolute1
            MC_MoveAbsolute
move_pos1 —Execute                  Done—
     1000—Position                  Busy—
      200—Velocity                Active—
     1000—Acceleration  CommandAborted—
     1000—Deceleration             Error—
          —Jerk                   ErrorID—
          —Direction
          —BufferMode
    axis1—Axis ⊳
```

Tool/Step	Programming actions
■	**Program relative movement (MC_MoveRelative)**
	This function block commands a controlled motion of a specified distance relative to the actual position at the time of the execution.

By clicking the Box tool button, insert a new box. Replace the default text AND with MC_MoveRelative. Name the block, for example, relative1, Class: VAR, Type: MC_ MoveRelative.

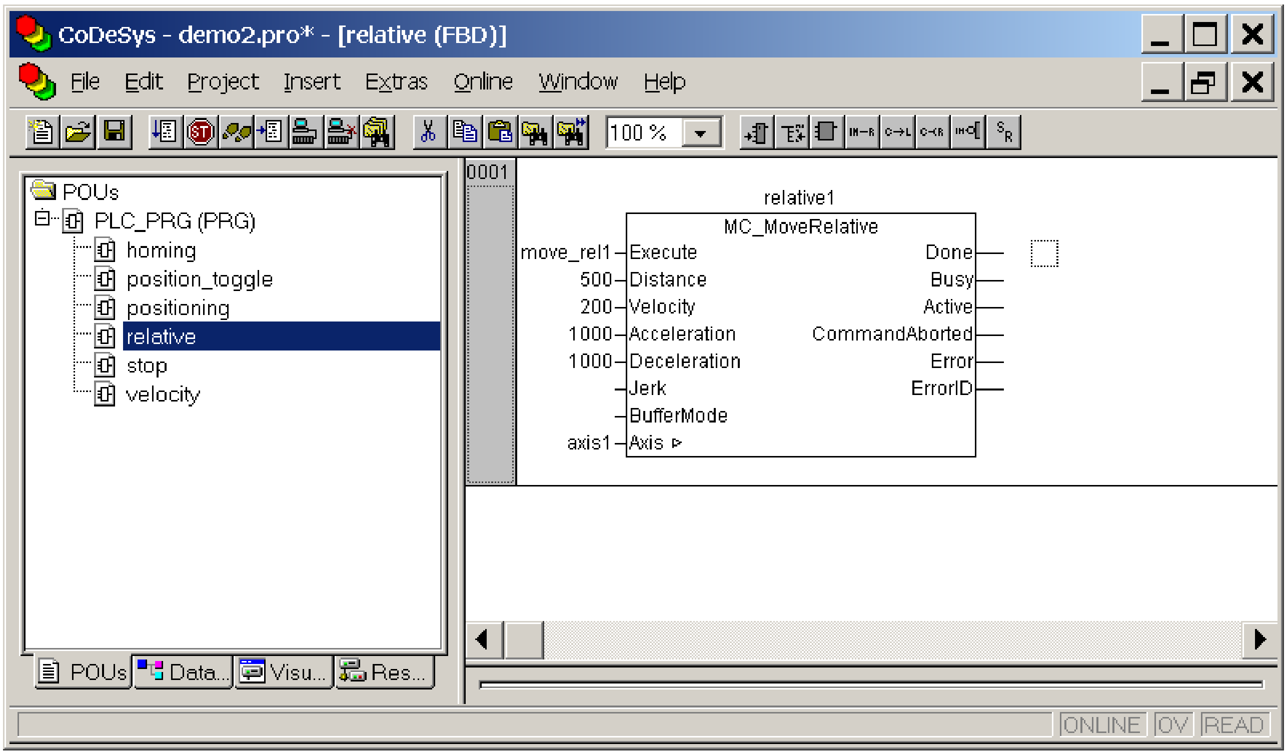
Name the Excecute input move_rel1, Class: VAR_GLOBAL, Type: BOOL.

Define inputs Position, Velocity, Acceleration and Deceleration with numeric values.

Leave Jerk and BufferMode blank.

Input Axis defines the controlled axis. Name it axis1.

Name input Direction either POSITIVE or NEGATIVE.


CoDeSys - demo2.pro* - [relative (FBD)]
File Edit Project Insert Extras Online Window Help
100 %
POUs
PLC_PRG (PRG)
homing
position_toggle
positioning
relative
stop
velocity
POUs Data... Visu... Res...
0001
ONLINE OV READ

```
                relative1
              MC_MoveRelative
move_rel1 -Execute                    Done-
      500-Distance                    Busy-
      200-Velocity                  Active-
     1000-Acceleration      CommandAborted-
     1000-Deceleration               Error-
          -Jerk                     ErrorID-
          -BufferMode
    axis1 -Axis ▹
```

Tool/Step

Programming actions

Program homing (MCA_Home)

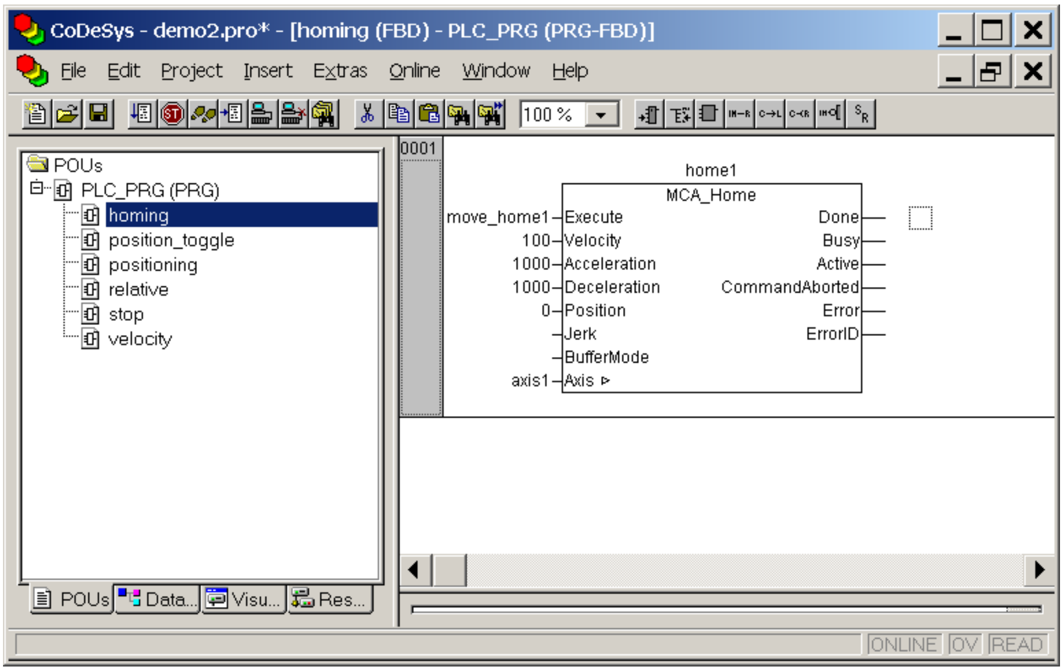
This function block commands the axis to perform the Search home sequence. The details of this sequence depend on the drive manufacturer and can be set by the axis parameters. The Position input is used to set the absolute position when a reference signal is detected. The execution of this function block comes to an end at the STANDSTILL state.

By clicking the Box tool button, insert a new box. Replace the default text AND with MCA_Home. Name the block, for example, home1, Class: VAR, Type: MC_ MoveRelative.

Name the Excecute input move_home1, Class: VAR_GLOBAL, Type: BOOL.

Input Axis defines the controlled axis. Name it axis1.

Note 1: This function block is not working with FPBA-01 version 200D or older.



CoDeSys - demo2.pro* - [homing (FBD) - PLC_PRG (PRG-FBD)]

0001

home1

MCA_Home

move_home1 – Execute
100 – Velocity
1000 – Acceleration
1000 – Deceleration
0 – Position
– Jerk
– BufferMode
axis1 – Axis

Done –
Busy –
Active –
CommandAborted –
Error –
ErrorID –

Program toggling between two positions

This section presents an example of a function block program for toggling between two positions. At the page 81, action position_toggle was created. Write the program below into the action position_toggle.

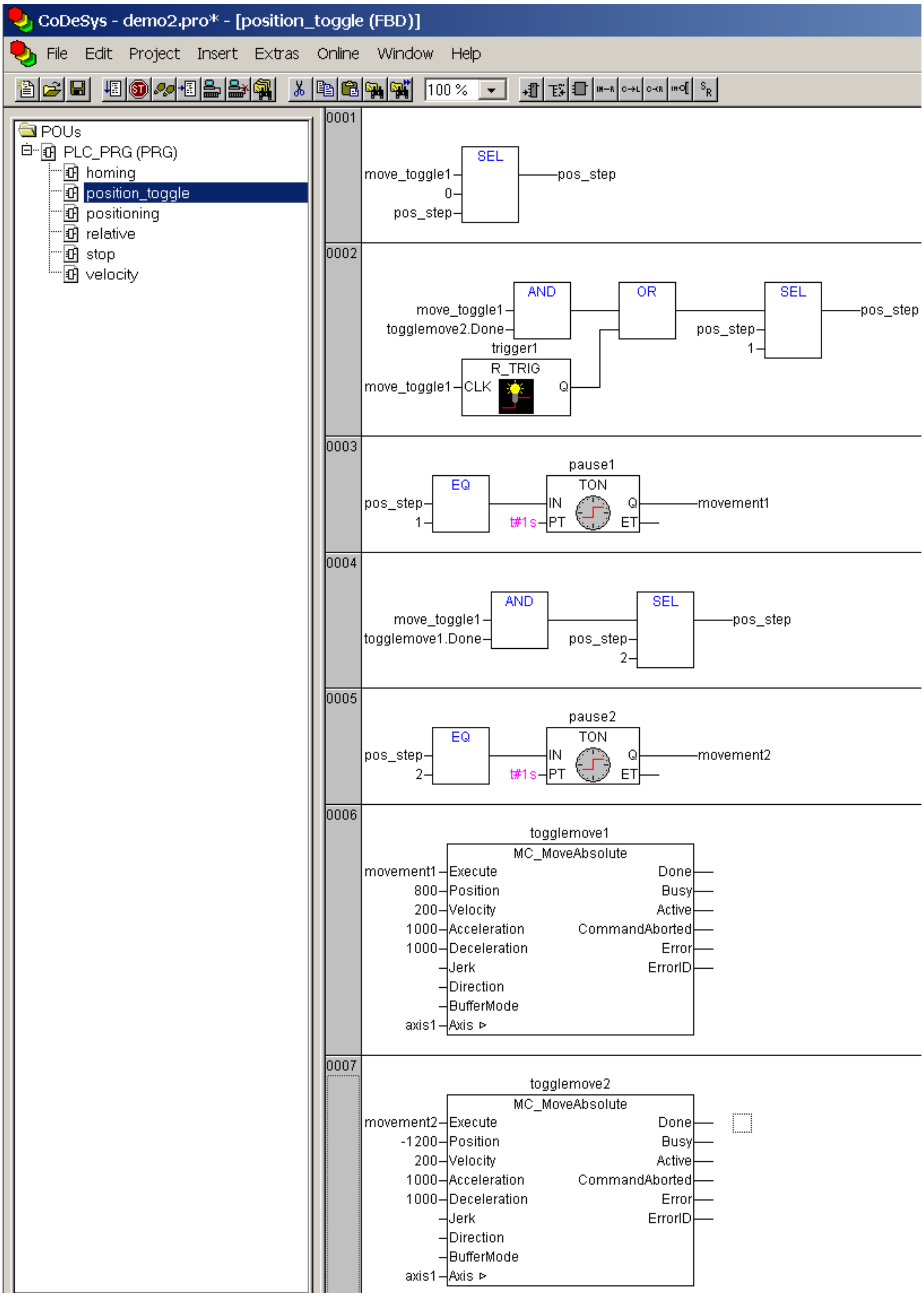
Name the Excecute input move_toggle1, Class: VAR_GLOBAL, Type: BOOL.

Name variable pos_step, Class: VAR, Type: WORD.

See the next page for the descriptions of the program rows.

Tool/Step

Programming actions



Tool/Step	Programming actions

Row 0001

This section is the main switch. When the drive needs to be stopped, function block SEL sets the value of output pos_step to 0. Otherwise the value of output pos_step remains unchanged and the program keeps running.

Row 0002

This section starts up the whole program sequence and repeats it as long as the value of input move_toggle1 is TRUE.

Block trigger2 is needed for the first start-up. The block triggers one time when the value of input move_toggle1 turns to TRUE.

The output of block OR is TRUE, when the trigger block output is TRUE. In this case, block SEL selects value 1 to output pos_step.

Row 0003

This section compares the value of input pos_step with 1. When the values match, block EQ returns the value of its output to TRUE.

TON block pause1 sets its output movement1 to TRUE with a delay of one second.

The program runs through sections 4 and 5, there is nothing to do.

Row 0006

This section executes MC_MoveAbsolute block togglemove1. The block moves axis1 to position 800. After the movement, the value of output togglemove1.Done is TRUE.

Now the program runs through sections from 7 to 3, there is nothing to do.

Section 4 is executed.

Row 0004

The values of inputs move_toggle1 and togglemove1.Done in the AND block are TRUE. Block SEL sets the value of its output pos_step to 2.

Row 0005

This section is similar to section 3. Block EQ compares the value of its input pos_step with 2. Now, the values match and the output of block EQ returns to TRUE.

TON block pause2 sets its output movement2 to TRUE with a delay of one second

The program runs through section 6, there is nothing to do.

Row 0007

This block executes MC_MoveAbsolute block togglemove2. The block moves axis1 to position -1200. After the movement, the value of output togglemove2.Done is TRUE.

The program starts the whole sequence again from row 0002. The toggling is continuous as long as the value of input move_toggle1 is TRUE.

Tool/Step

Programming actions

■

Call the actions into the main program

To activate the actions that you created, call them into the main program:

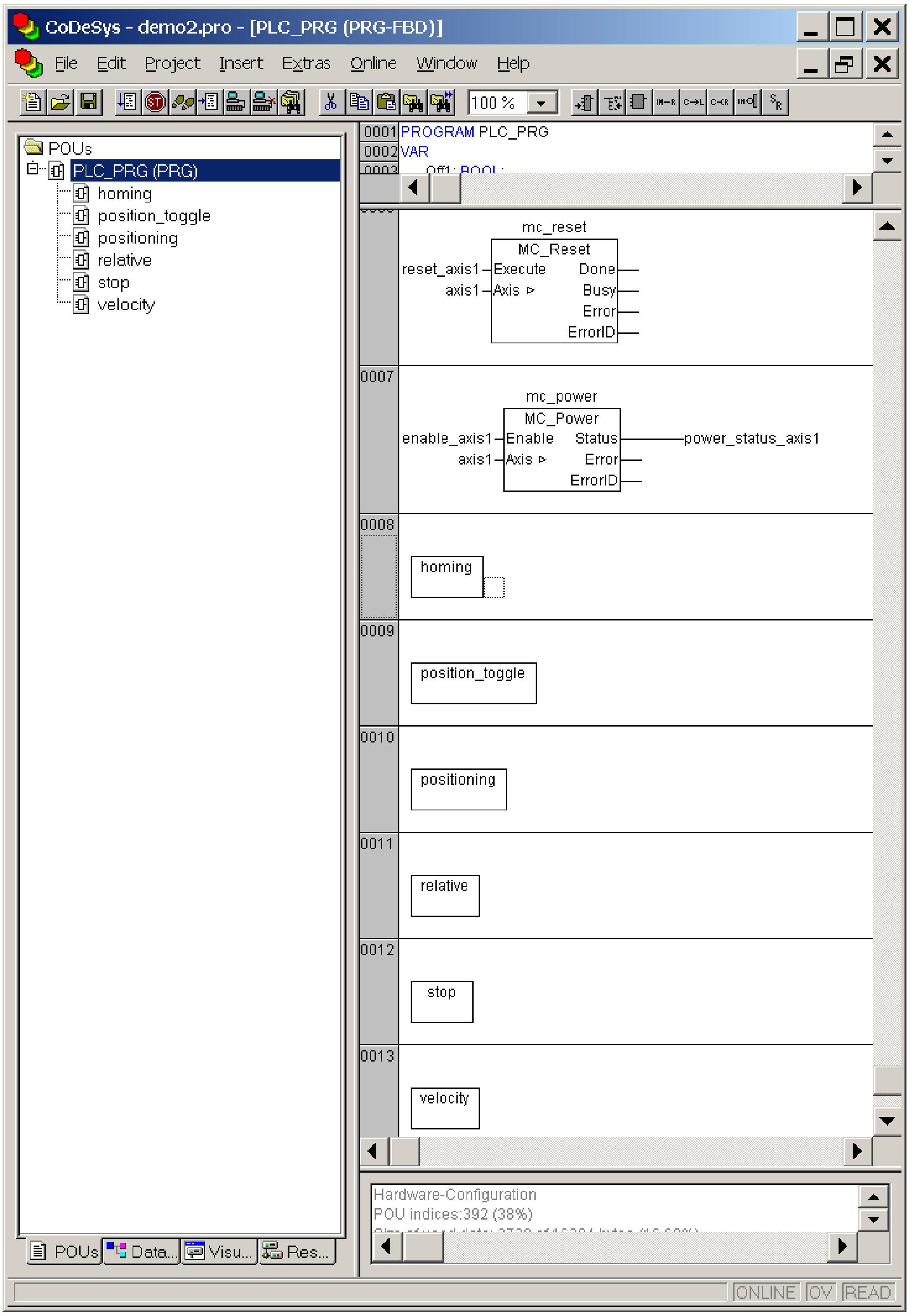
- In the POUs field, double-click PLC_PRG(PRG).
- Right-click and select **Network (after)** from the opening menu.
- Click the Box tool button and name the appearing box homing.
- Repeat the procedure for the other actions and give the boxes the same names as in the configuring steps before.

See the next page for the program rows.

Tool/Step

Programming actions

The action boxes are shown at the end of the main program as follows.



```
PROGRAM PLC_PRG
VAR
    Off1: BOOL;
```

Hardware-Configuration
POU indices:392 (38%)

Tool/Step

Programming visualizations

CoDeSys

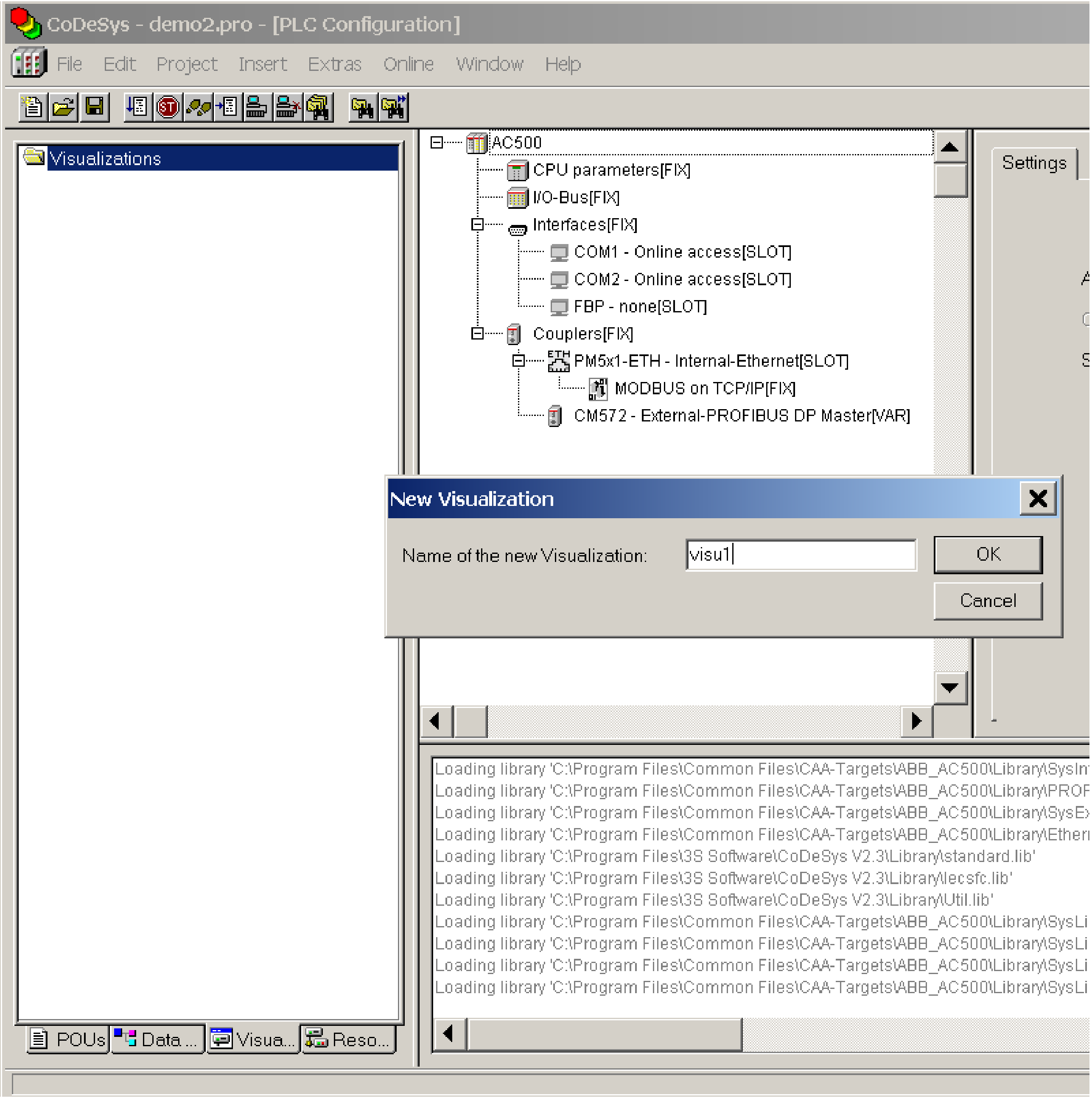
In this section, you program visualizations. By visualizations, you create the user interface for the PLC program: buttons, switches and indicators for measuring, viewing and controlling the movement. The PS551-MC Motion Control Library for ABB PLC AC500 also contains ready-made visualization elements for the ACSM1, for example, the ACSM1 MainControlWord and Axis StateMachine.

Tool/Step

Programming visualizations

Create an empty visualization field

Click the Visualization tab. Right-click the Visualizations folder. From the menu opening, select **Add Object…**. Name the New Visualization, for example, visu1 and click **OK**.


CoDeSys - demo2.pro - [PLC Configuration]
File Edit Project Insert Extras Online Window Help
Visualizations
AC500
CPU parameters[FIX]
I/O-Bus[FIX]
Interfaces[FIX]
COM1 - Online access[SLOT]
COM2 - Online access[SLOT]
FBP - none[SLOT]
Couplers[FIX]
PM5x1-ETH - Internal-Ethernet[SLOT]
MODBUS on TCP/IP[FIX]
CM572 - External-PROFIBUS DP Master[VAR]
Settings
New Visualization
OK
Cancel
POUs
Data ...
Visua...
Reso...

Name of the new Visualization: visu1

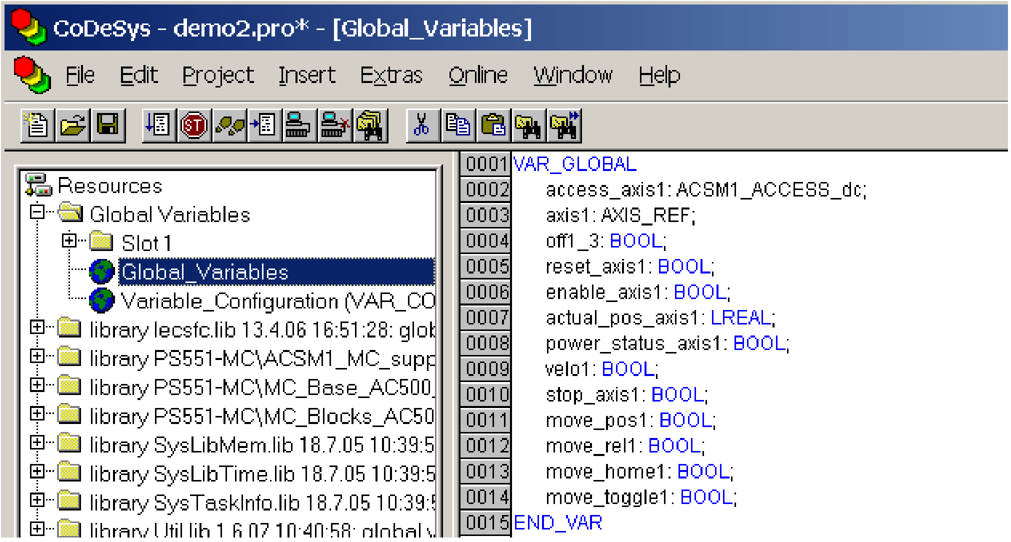
```
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysIn
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\PROF
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysEx
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\Etheri
Loading library 'C:\Program Files\3S Software\CoDeSys V2.3\Library\standard.lib'
Loading library 'C:\Program Files\3S Software\CoDeSys V2.3\Library\Iecsfc.lib'
Loading library 'C:\Program Files\3S Software\CoDeSys V2.3\Library\Util.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLi
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLi
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLi
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLi
```

Tool/Step

Programming visualizations

Create buttons

Create buttons for the needed switches, for example, for each global variable:

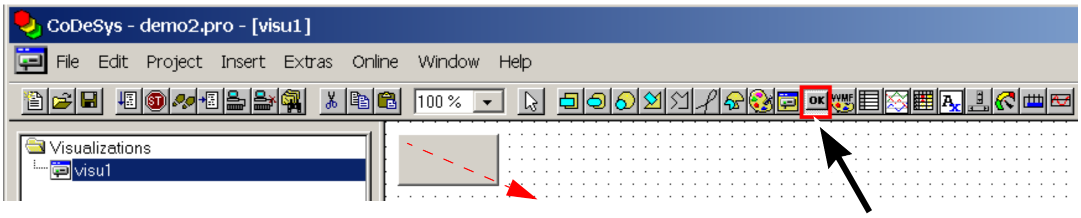

CoDeSys - demo2.pro* - [Global_Variables]
File Edit Project Insert Extras Online Window Help
Resources
Global Variables
Slot 1
Global_Variables
Variable_Configuration (VAR_CO
library Iecsfc.lib 13.4.06 16:51:28: glob
library PS551-MC\ACSM1_MC_supp
library PS551-MC\MC_Base_AC500_
library PS551-MC\MC_Blocks_AC50
library SysLibMem.lib 18.7.05 10:39:5
library SysLibTime.lib 18.7.05 10:39:5
library SysTaskInfo.lib 18.7.05 10:39:5
library Util.lib 1.6.07 10:40:58: global v

```
VAR_GLOBAL
    access_axis1: ACSM1_ACCESS_dc;
    axis1: AXIS_REF;
    off1_3: BOOL;
    reset_axis1: BOOL;
    enable_axis1: BOOL;
    actual_pos_axis1: LREAL;
    power_status_axis1: BOOL;
    velo1: BOOL;
    stop_axis1: BOOL;
    move_pos1: BOOL;
    move_rel1: BOOL;
    move_home1: BOOL;
    move_toggle1: BOOL;
END_VAR
```

In our example, buttons are made for off1_3, enable_axis1, reset_axis1, velo1, stop_axis1, move_pos1, move_home_axis1, move_rel1 and move_toggle1.

How to create and configure a button

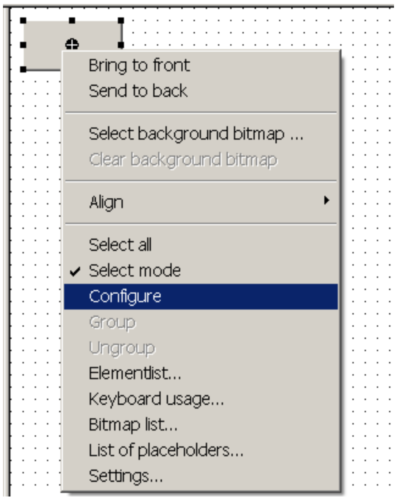
1. In the upper tool bar, click the OK button and drag with the cursor a rectangle in visualization field.


CoDeSys - demo2.pro - [visu1]
File Edit Project Insert Extras Online Window Help
100 %
OK
Visualizations
visu1

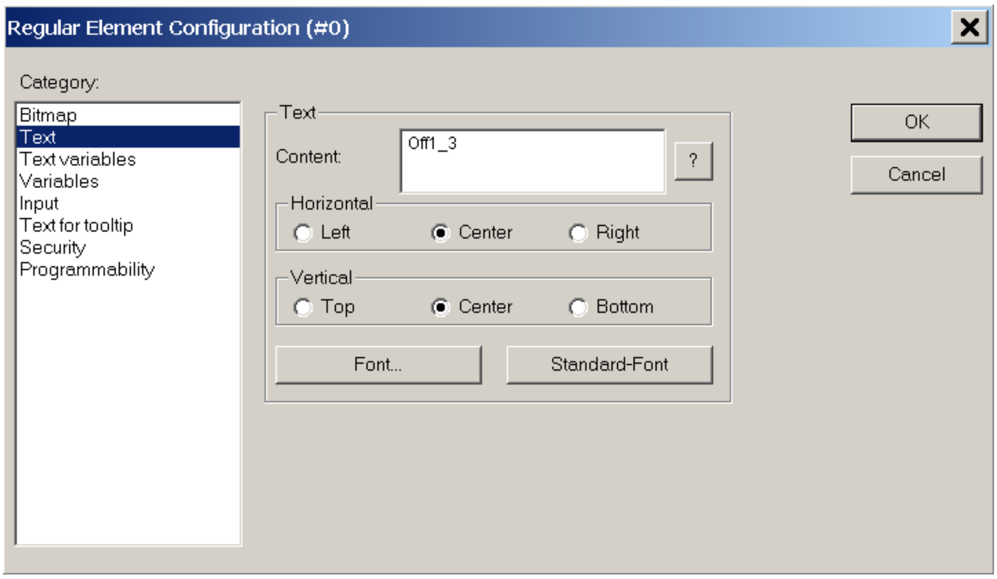
Tool/Step

Programming visualizations

2. Configure the button as follows. Right-click the button. From the menu opening, select **Configure**.



3. In the **Category:** dialog box, select **Text**. To the Text Content: dialog box, write the name for the button, for example, Off1_3 which indicates the action the button will perform.


Regular Element Configuration (#0)

Category: Text

Text

Content: Off1_3

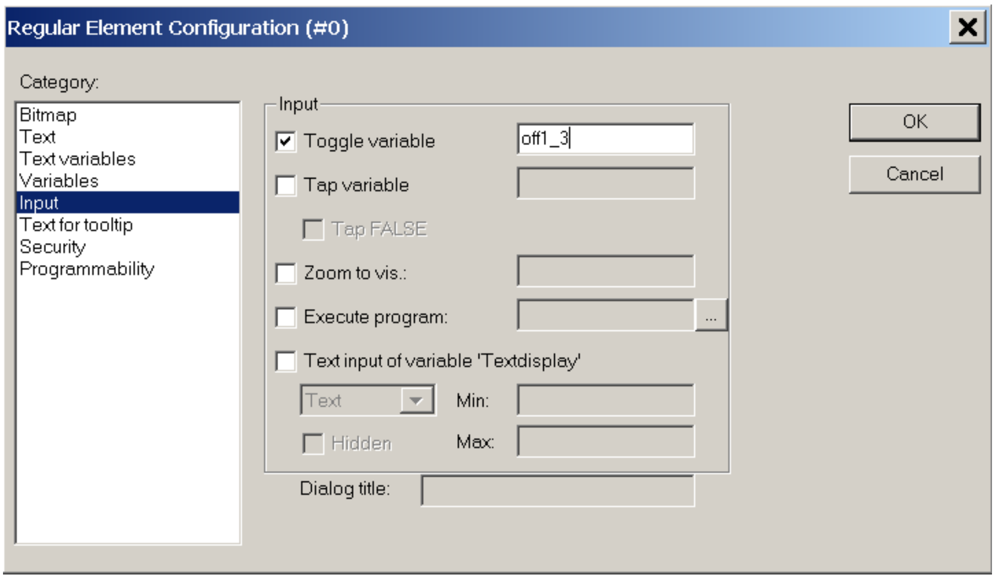
Horizontal: ○ Left ● Center ○ Right

Vertical: ○ Top ● Center ○ Bottom

Tool/Step Programming visualizations

4. In the **Category:** dialog box, select **Input**. Under Input, tick Toggle variable and write the name of the input to the dialog box, in this case global variable off1_3. Click **OK**.

   Note: When defining inputs, you can use help of Input assistant. Click on Toggle variable field and press **F2**.



Regular Element Configuration (#0)

Category:

- Bitmap
- Text
- Text variables
- Variables
- Input
- Text for tooltip
- Security
- Programmability

Input

☑ Toggle variable off1_3

☐ Tap variable

☐ Tap FALSE

☐ Zoom to vis.:

☐ Execute program:

☐ Text input of variable 'Textdisplay'

Text ▾ Min:

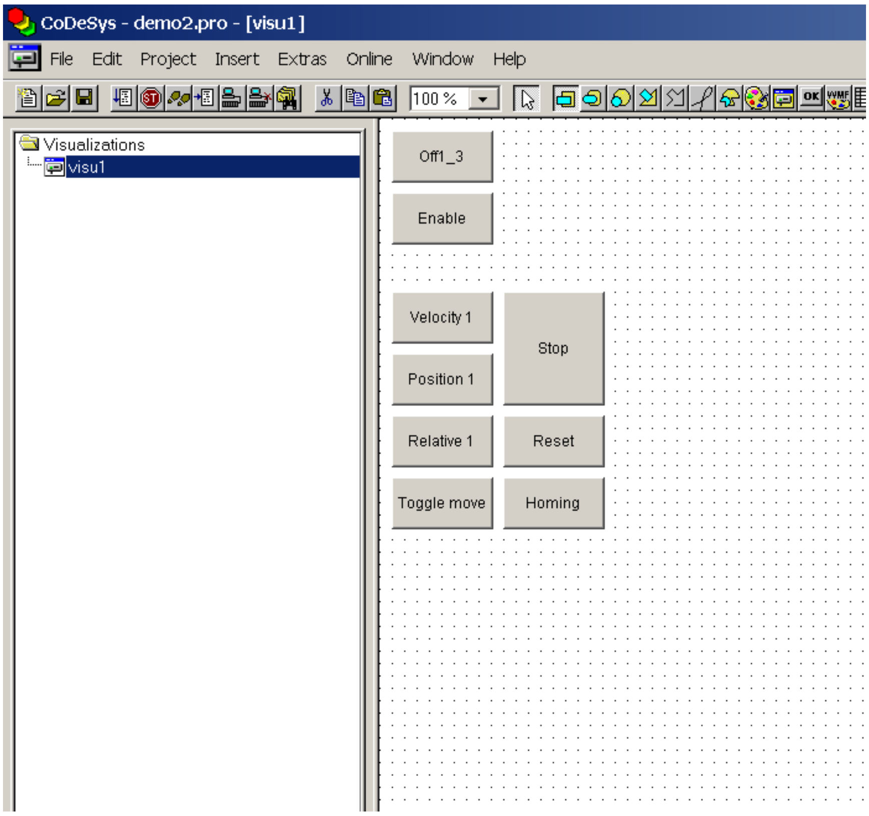
☐ Hidden Max:

Dialog title:

Now, you have created a button with which you can switch the value of global variable off1_3 between FALSE and TRUE.

Tool/Step	Programming visualizations

5. After making all buttons, the visualization field looks like this. Table below indicates the buttons and variables to which the buttons must be toggled.



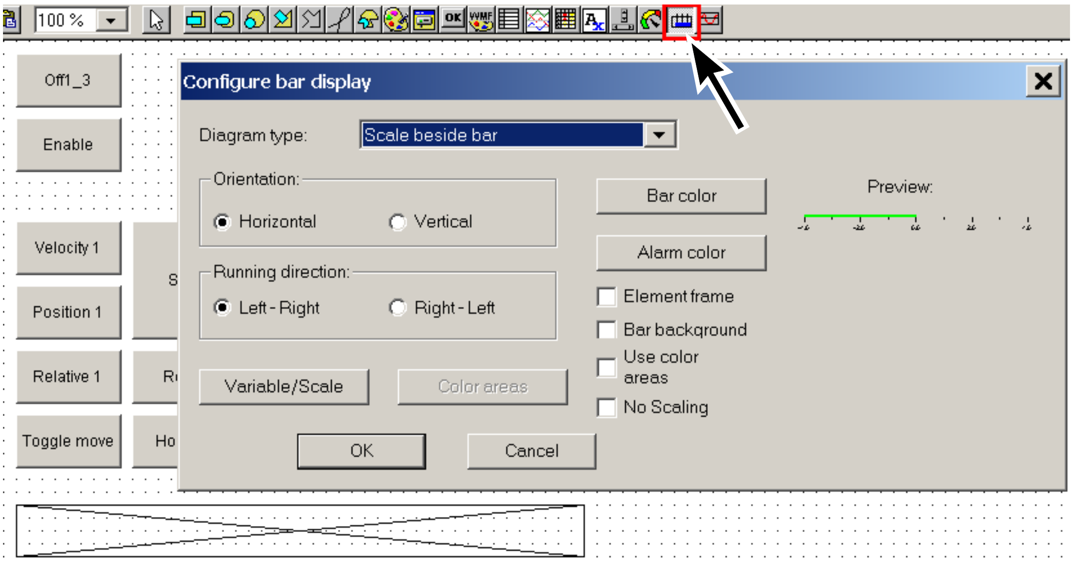
Button	Toggle variable
Off1_3	off1_3
Enable	enable_axis1
Velocity 1	velo1
Position 1	move_pos1
Relative 1	move_rel1
Toggle move	move_toggle1
Stop	stop_axis1
Reset	reset_axis1
Homing	move_home1

Tool/Step

Programming visualizations

Create indicators

1. In the upper tool bar, click the Bar display button and drag with the cursor a bar in visualization field. -> Configure bar display dialog box opens. Click the **Varible/ Scale** button.



Configure bar display

Diagram type: Scale beside bar

Orientation: ● Horizontal ○ Vertical

Running direction: ● Left - Right ○ Right - Left

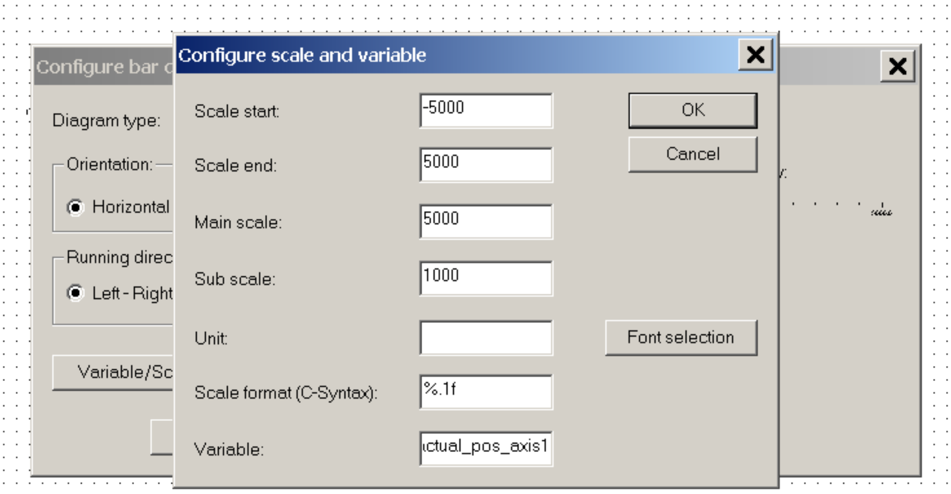
□ Element frame

□ Bar background

□ Use color areas

□ No Scaling

2. Set the scale. Write the name of the indicated variable (actual_pos_axis1 in this case) in the Variable: box. Click **OK** and **OK**. -> The indicator has been created.



Configure scale and variable

Scale start: -5000

Scale end: 5000

Main scale: 5000

Sub scale: 1000

Unit:

Scale format (C-Syntax): %.1f

Variable: ıctual_pos_axis1

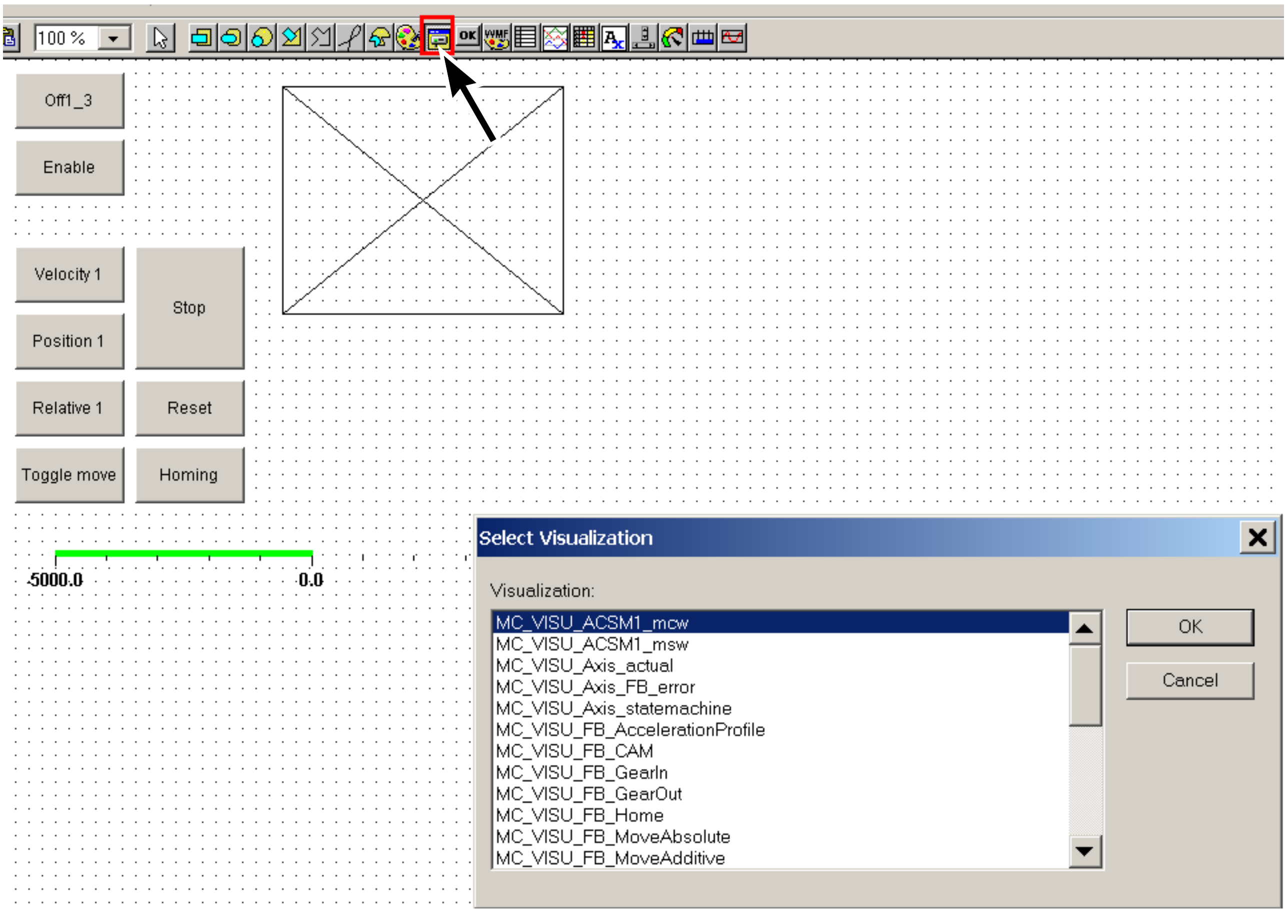
Tool/Step

Programming visualizations

Create visuaization elements

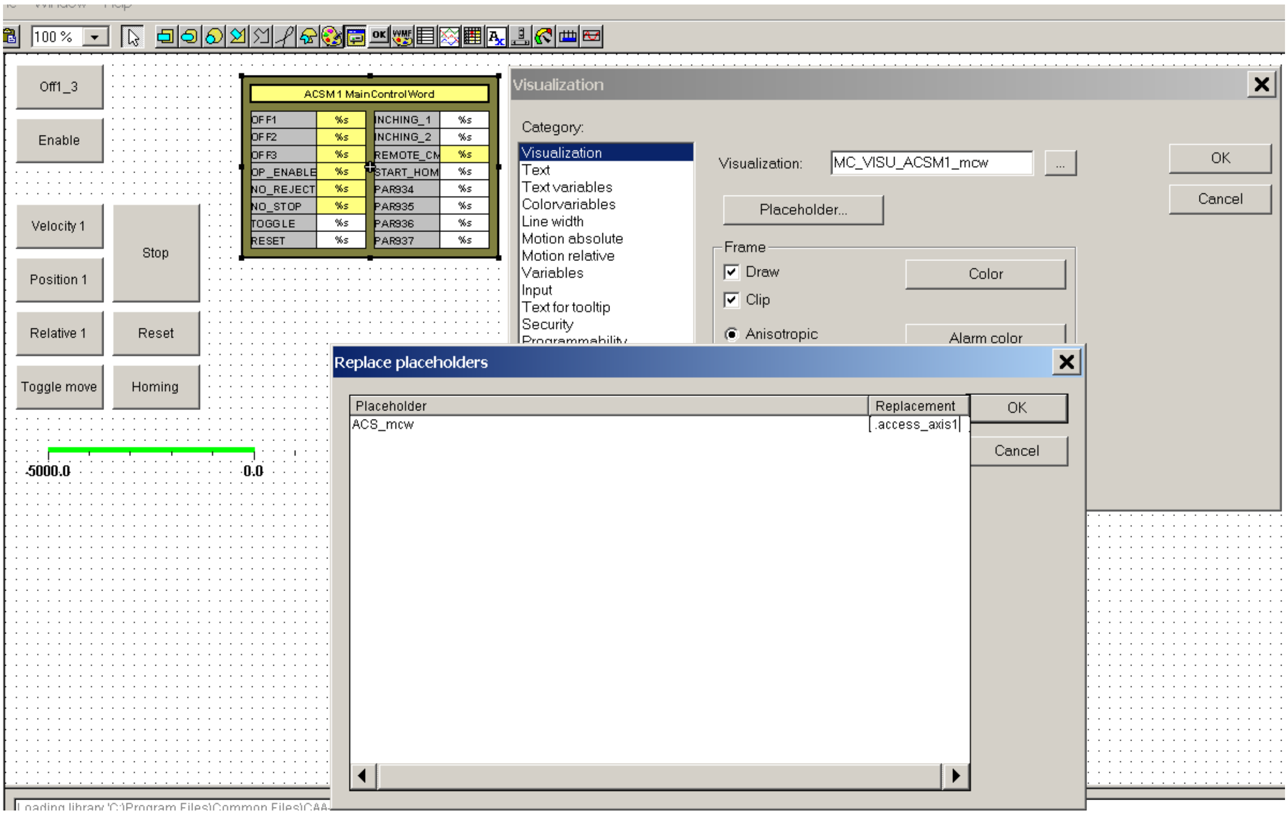
1. Visualization elements are ready-made visualization components.

In the upper tool bar, click the Visualization button and with the cursor drag a rectangle in the visualization field. In the opening Select Visualization dialog box, select the visualization, MC_VISU_ACSM1_mcw, in this case. Click **OK**.



MC_VISU_ACSM1_mcw
MC_VISU_ACSM1_msw
MC_VISU_Axis_actual
MC_VISU_Axis_FB_error
MC_VISU_Axis_statemachine
MC_VISU_FB_AccelerationProfile
MC_VISU_FB_CAM
MC_VISU_FB_GearIn
MC_VISU_FB_GearOut
MC_VISU_FB_Home
MC_VISU_FB_MoveAbsolute
MC_VISU_FB_MoveAdditive

Tool/Step	Programming visualizations
2.	Double-click the created element. In the Visualization dialog box that opens, click the **Placeholder…** button. In the Replace placeholders dialog box, write .access_axis1 to the Replacement field. This points to the access_axis1 function block. Click **OK** and **OK**.



ACSM 1 Main Control Word

OFF1	%s	INCHING_1	%s
OFF2	%s	INCHING_2	%s
OFF3	%s	REMOTE_CM	%s
OP_ENABLE	%s	START_HOM	%s
NO_REJECT	%s	PAR934	%s
NO_STOP	%s	PAR935	%s
TOGGLE	%s	PAR936	%s
RESET	%s	PAR937	%s

Visualization: MC_VISU_ACSM1_mcw

☑ Draw

☑ Clip

● Anisotropic

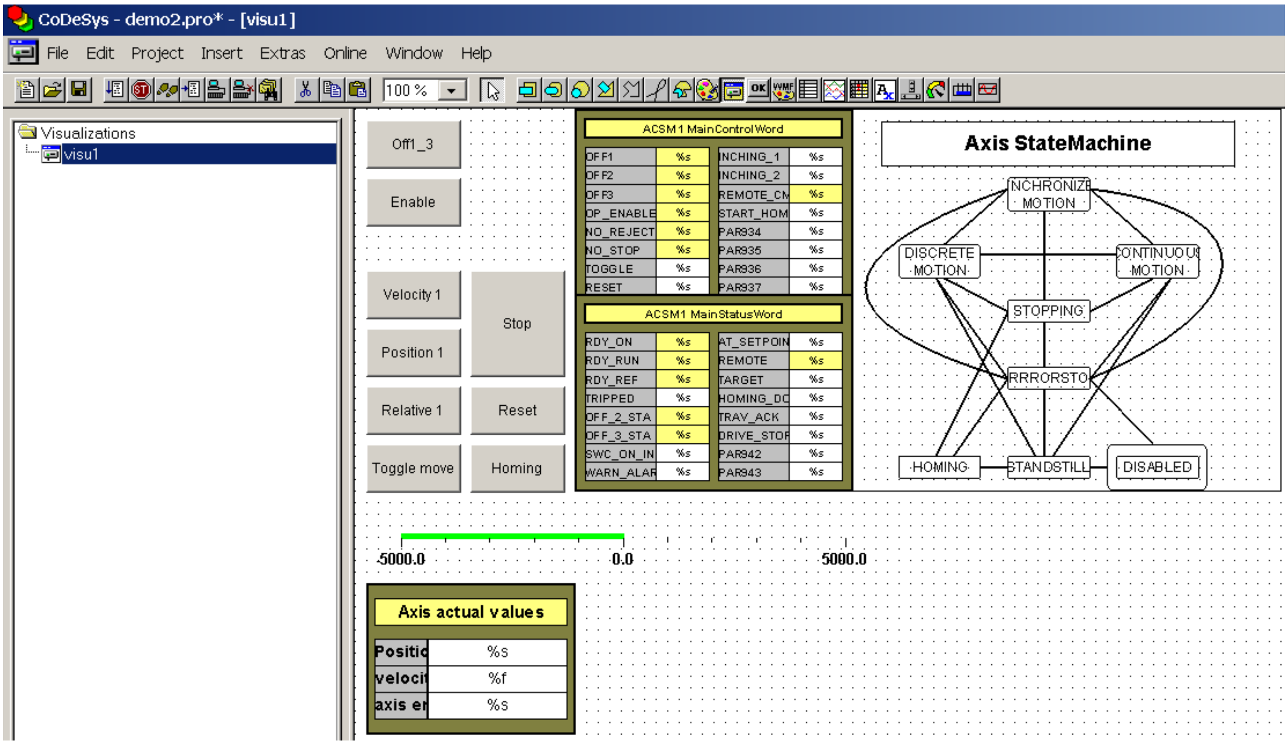
Placeholder	Replacement
ACS_mcw	.access_axis1

Tool/Step	Programming visualizations

3. Add other elements in the same way as described above.

Note: In the Replacement field, write .access_axis1 for the ACSM1 main control word and main status word visualizations. Write .axis1 for the Axis actual values and Axis state machine values visualizations. The replacement points always to the values that the visualization is presenting.

Here is an example of the finished visualization.



ACSM1 MainControlWord

OFF1	%s	INCHING_1	%s
OFF2	%s	INCHING_2	%s
OFF3	%s	REMOTE_CM	%s
OP_ENABLE	%s	START_HOM	%s
NO_REJECT	%s	PAR934	%s
NO_STOP	%s	PAR935	%s
TOGGLE	%s	PAR936	%s
RESET	%s	PAR937	%s

ACSM1 MainStatusWord

RDY_ON	%s	AT_SETPOIN	%s
RDY_RUN	%s	REMOTE	%s
RDY_REF	%s	TARGET	%s
TRIPPED	%s	HOMING_DO	%s
OFF_2_STA	%s	TRAV_ACK	%s
OFF_3_STA	%s	DRIVE_STOF	%s
SWC_ON_IN	%s	PAR942	%s
WARN_ALAR	%s	PAR943	%s

Axis actual values

Positio	%s
velocit	%f
axis er	%s

Tool/Step

Running and testing the program

CoDeSys

In this section, you download the program to the PLC. Thereafter, you can run the program and test it.

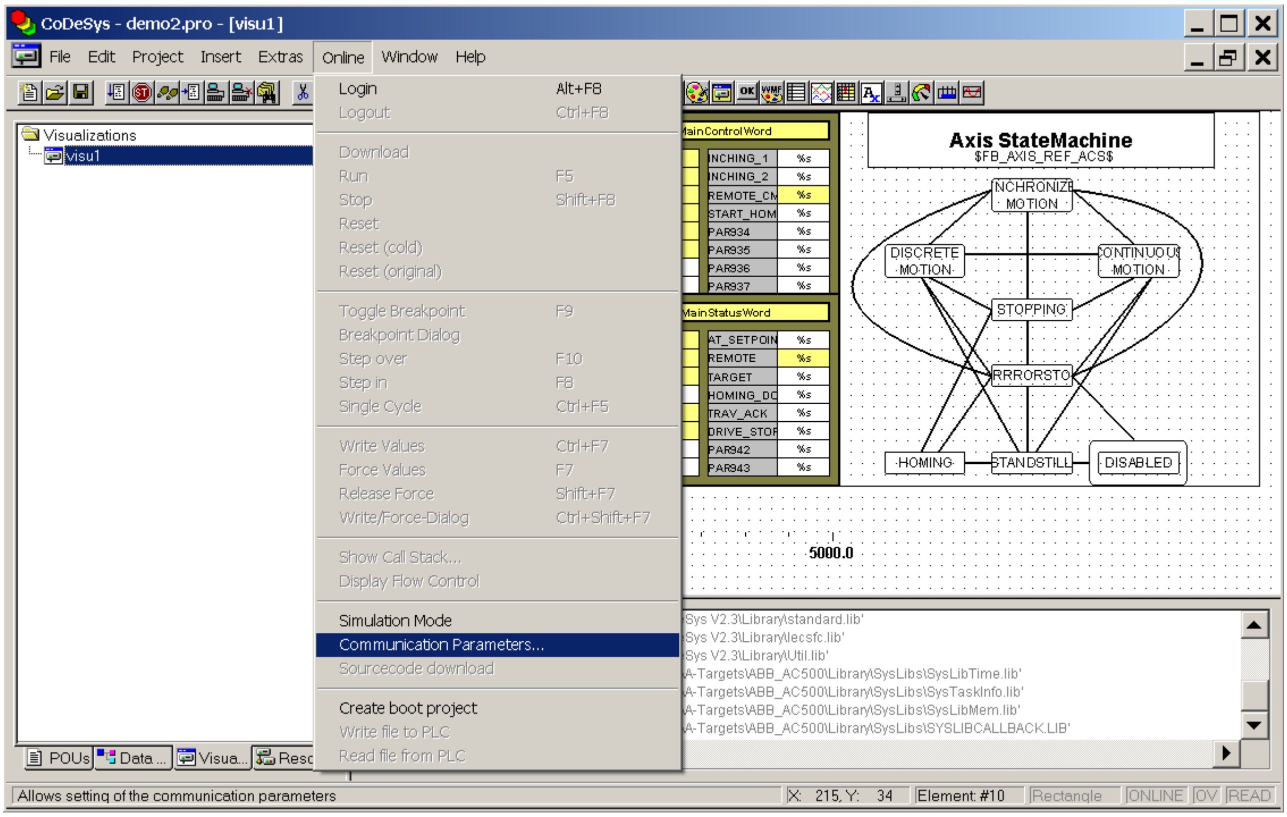
🟦 Load the program to the controller

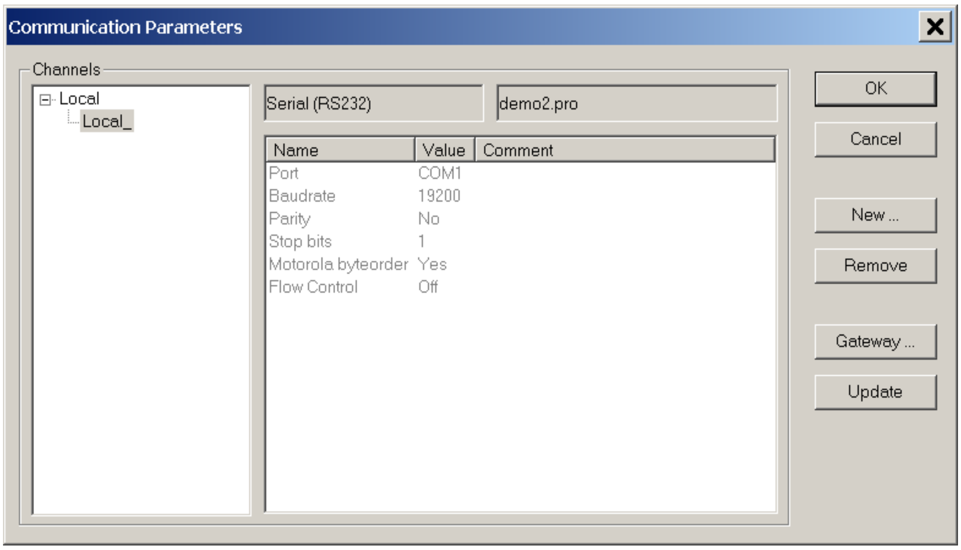
1. Turn the drive on with the I/O switch of the demosuitcase.

2. Turn the PLC on with the on/off switch in its demosuitcase. For the location of the on/off switch, refer to the photo on page *34*.

Tool/Step	Running and testing the program

3. From the **Online** menu, select **Communication Parameters…**. Check that the communication parameters correspond to the serial port of your PC (see *Appendix A - How to find out the serial communication parameter values of your PC?*).





Serial (RS232) demo2.pro

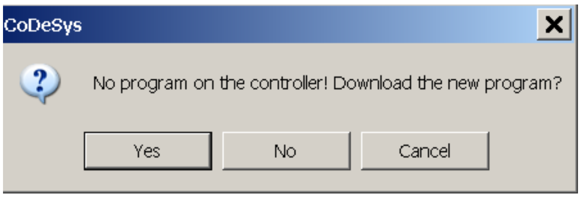
Name	Value	Comment
Port	COM1	
Baudrate	19200	
Parity	No	
Stop bits	1	
Motorola byteorder	Yes	
Flow Control	Off	

4. Open the AC500 Control Builder PS501 programming tool by double-clicking the CoDeSys icon in the desktop of your computer.

5. Click the Visualization tab.

Tool/Step Running and testing the program

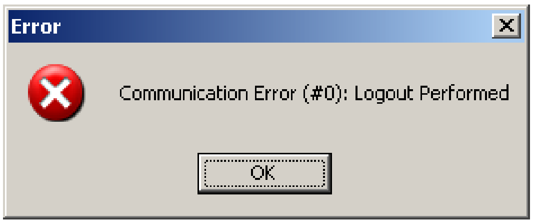
6. From the **Online** menu, click **Login**. The program asks you to download the program to the controller. Click **Yes**.



CoDeSys

No program on the controller! Download the new program?

If you get a communication error message,



Error

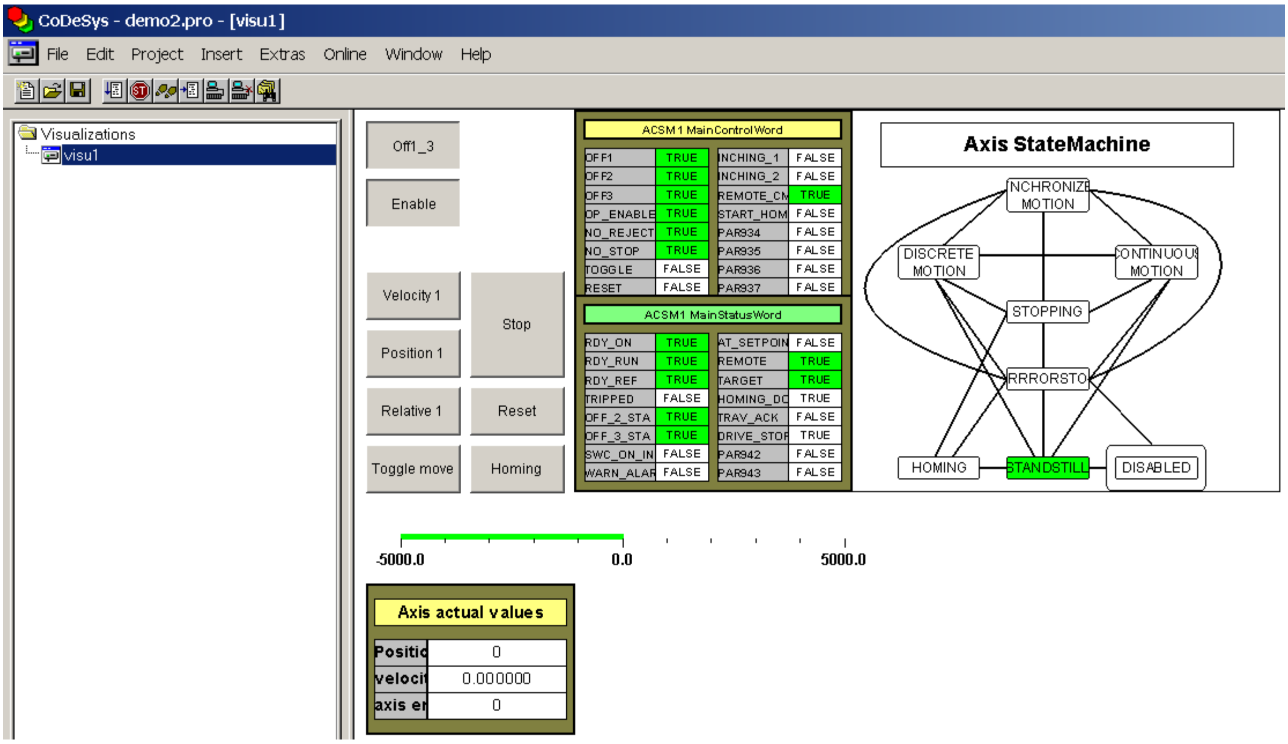
Communication Error (#0): Logout Performed

Check the cables and connections. From the **Online** menu, select **Communication Parameters…** and remove irrelevant communication parameters. Configure the communication with the SYCON.net again and download the configuration as described above. To find out the communication parameter values of your PC, see *Appendix A - How to find out the serial communication parameter values of your PC?*.

7. From the **Online** menu, click **Run**. -> Now, your program is active and you can run the functions.

Tool/Step	Running and testing the program
■	**Test the program**

1. Start the drive by clicking the **Off1_3** button and, after that, the **Enable** button.
-> The drive should start and the values of the first six ACSM1 MainControlWord bits should change to TRUE.



ACSM1 MainControlWord

OFF1	TRUE	INCHING_1	FALSE
OFF2	TRUE	INCHING_2	FALSE
OFF3	TRUE	REMOTE_CM	TRUE
OP_ENABLE	TRUE	START_HOM	FALSE
NO_REJECT	TRUE	PAR934	FALSE
NO_STOP	TRUE	PAR935	FALSE
TOGGLE	FALSE	PAR936	FALSE
RESET	FALSE	PAR937	FALSE

ACSM1 MainStatusWord

RDY_ON	TRUE	AT_SETPOIN	FALSE
RDY_RUN	TRUE	REMOTE	TRUE
RDY_REF	TRUE	TARGET	TRUE
TRIPPED	FALSE	HOMING_DC	TRUE
OFF_2_STA	TRUE	TRAV_ACK	FALSE
OFF_3_STA	TRUE	DRIVE_STOF	TRUE
SWC_ON_IN	FALSE	PAR942	FALSE
WARN_ALAR	FALSE	PAR943	FALSE

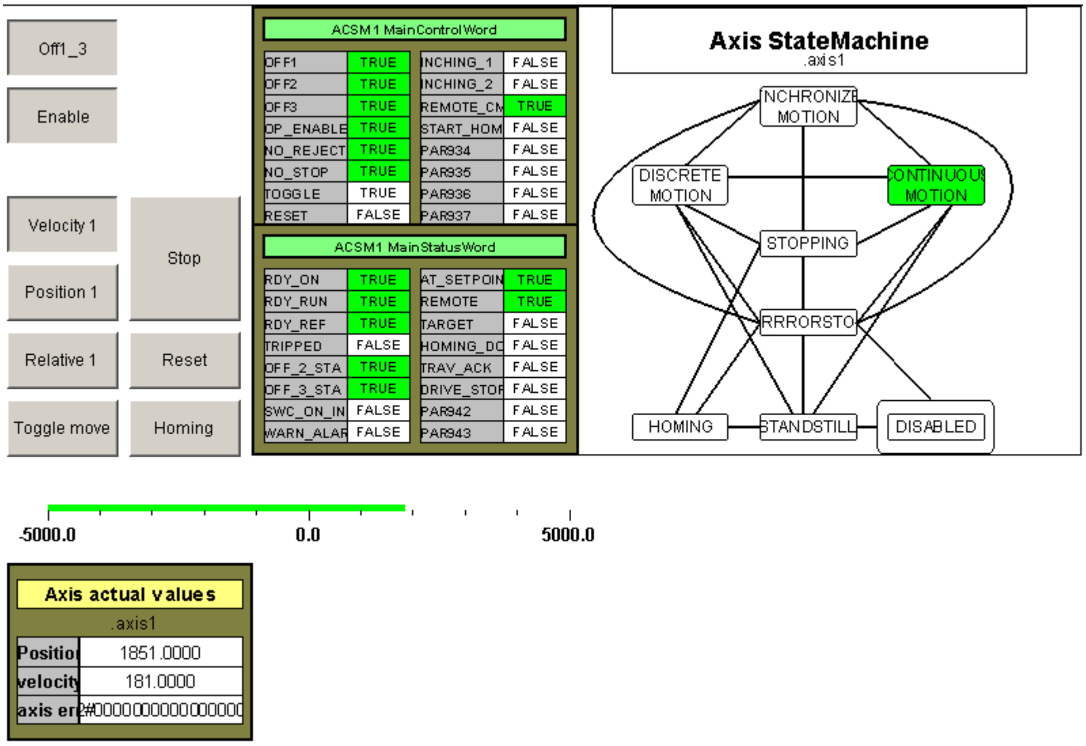
Axis actual values

Positio	0
velocit	0.000000
axis er	0

Tool/Step

Running and testing the program

2. Test the other actions that you have made by clicking the action buttons. Velocity 1 is running in the following picture.



ACSM1 MainControlWord

OFF1	TRUE	INCHING_1	FALSE
OFF2	TRUE	INCHING_2	FALSE
OFF3	TRUE	REMOTE_CM	TRUE
OP_ENABLE	TRUE	START_HOM	FALSE
NO_REJECT	TRUE	PAR934	FALSE
NO_STOP	TRUE	PAR935	FALSE
TOGGLE	TRUE	PAR936	FALSE
RESET	FALSE	PAR937	FALSE

ACSM1 MainStatusWord

RDY_ON	TRUE	AT_SETPOIN	TRUE
RDY_RUN	TRUE	REMOTE	TRUE
RDY_REF	TRUE	TARGET	FALSE
TRIPPED	FALSE	HOMING_DC	FALSE
OFF_2_STA	TRUE	TRAV_ACK	FALSE
OFF_3_STA	TRUE	DRIVE_STOF	FALSE
SWC_ON_IN	FALSE	PAR942	FALSE
WARN_ALAR	FALSE	PAR943	FALSE

Axis actual values

.axis1

Positio	1851.0000
velocity	181.0000
axis er	2#0000000000000000

Starting up fieldbus communication and programming the ABB PLC (multi-axis systems)

What this chapter contains

This chapter presents the additional steps compared to the ones in the previous chapter that you must take during the start-up of the drive fieldbus control with ABB AC500 PLC and PROFIBUS DP adapter module in a multi-axis system. A system with two drives is set up here.

Equipment and programs

The equipment and programs used in this chapter are the same as in the previous chapter of this manual. They are listed under *Equipment and programs*, page *30*.

Tool/Step

Setting up the communication

Proceed in the start-up as described earlier in this manual up to page *50*.

Tool/Step

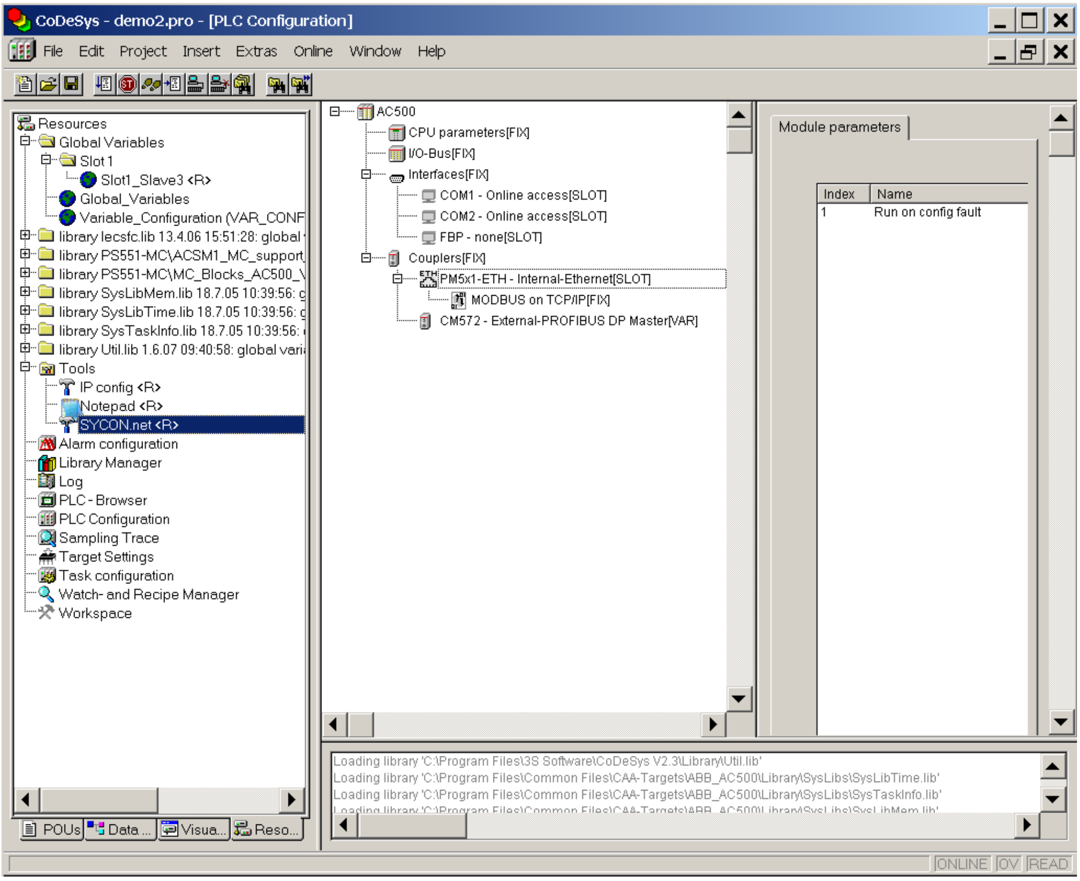
Setting up the communication

Configure communication with the SYCON fieldbus configurator

1. Open the project that you created.

2. Click the **Resources** tab to show the Resources folders.

3. Under **Tools**, double-click SYCON.net <R>.


CoDeSys - demo2.pro - [PLC Configuration]
File Edit Project Insert Extras Online Window Help
Resources
Global Variables
Slot 1
Slot1_Slave3 <R>
Global_Variables
Variable_Configuration (VAR_CONF
library Iecsfc.lib 13.4.06 15:51:28: global
library PS551-MC\ACSM1_MC_support
library PS551-MC\MC_Blocks_AC500_\
library SysLibMem.lib 18.7.05 10:39:56:
library SysLibTime.lib 18.7.05 10:39:56:
library SysTaskInfo.lib 18.7.05 10:39:56:
library Util.lib 1.6.07 09:40:58: global vari
Tools
IP config <R>
Notepad <R>
SYCON.net <R>
Alarm configuration
Library Manager
Log
PLC - Browser
PLC Configuration
Sampling Trace
Target Settings
Task configuration
Watch- and Recipe Manager
Workspace
POUs
Data ...
Visua...
Reso...
AC500
CPU parameters[FIX]
I/O-Bus[FIX]
Interfaces[FIX]
COM1 - Online access[SLOT]
COM2 - Online access[SLOT]
FBP - none[SLOT]
Couplers[FIX]
PM5x1-ETH - Internal-Ethernet[SLOT]
MODBUS on TCP/IP[FIX]
CM572 - External-PROFIBUS DP Master[VAR]
Module parameters
ONLINE
OV
READ

Index	Name
1	Run on config fault

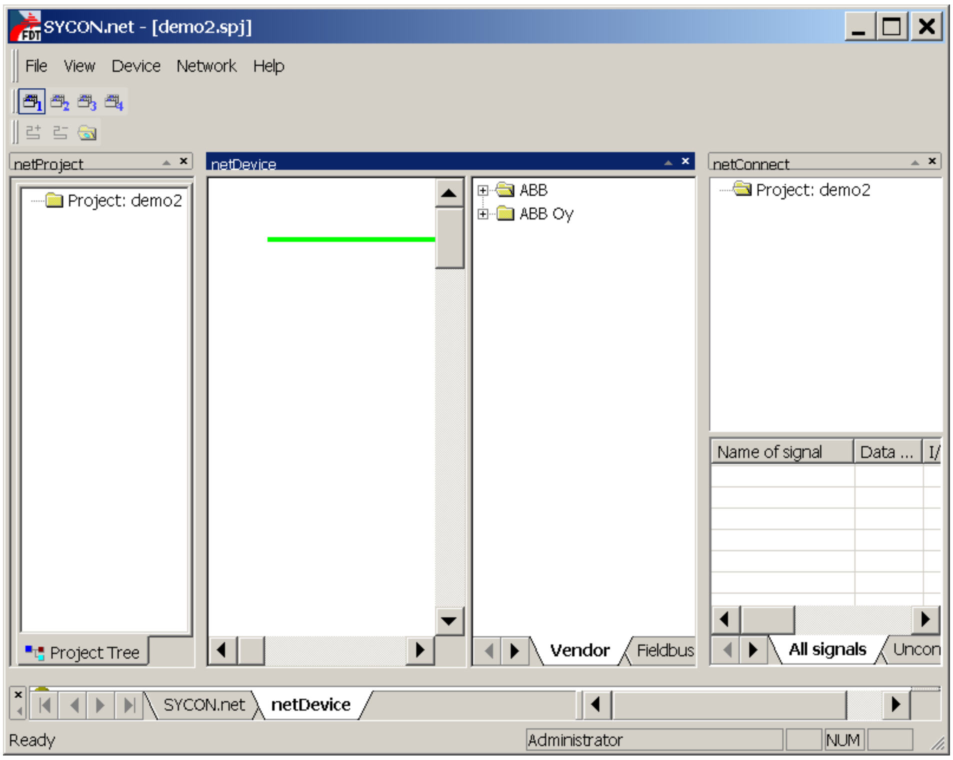
```
Loading library 'C:\Program Files\3S Software\CoDeSys V2.3\Library\Util.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysLibTime.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysTaskInfo.lib'
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\SysLibs\SysLibMem.lib'
```

Tool/Step

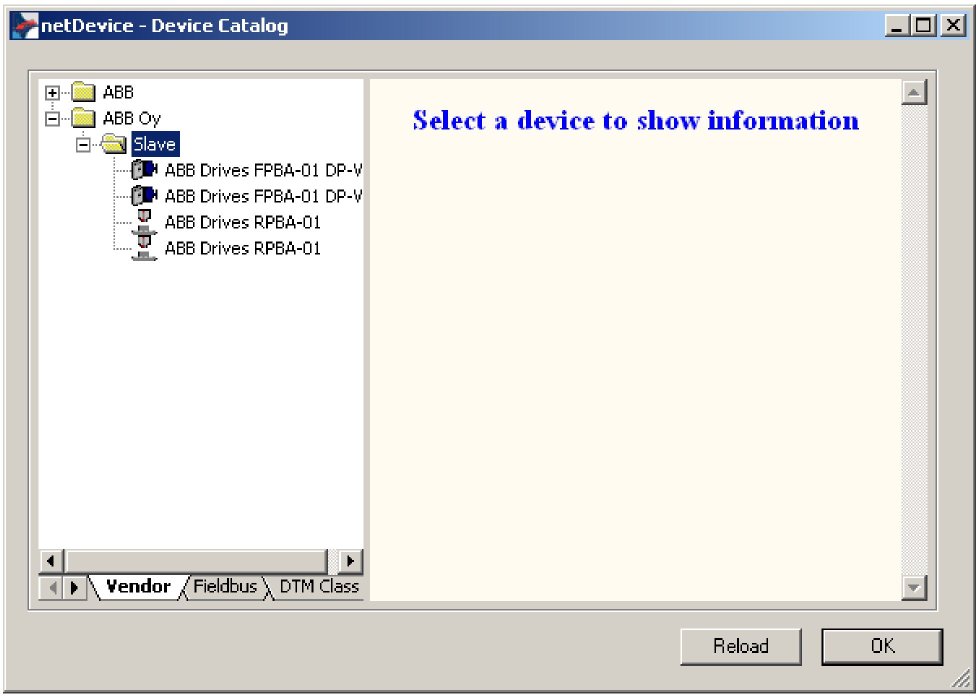
Setting up the communication

SYCON.net

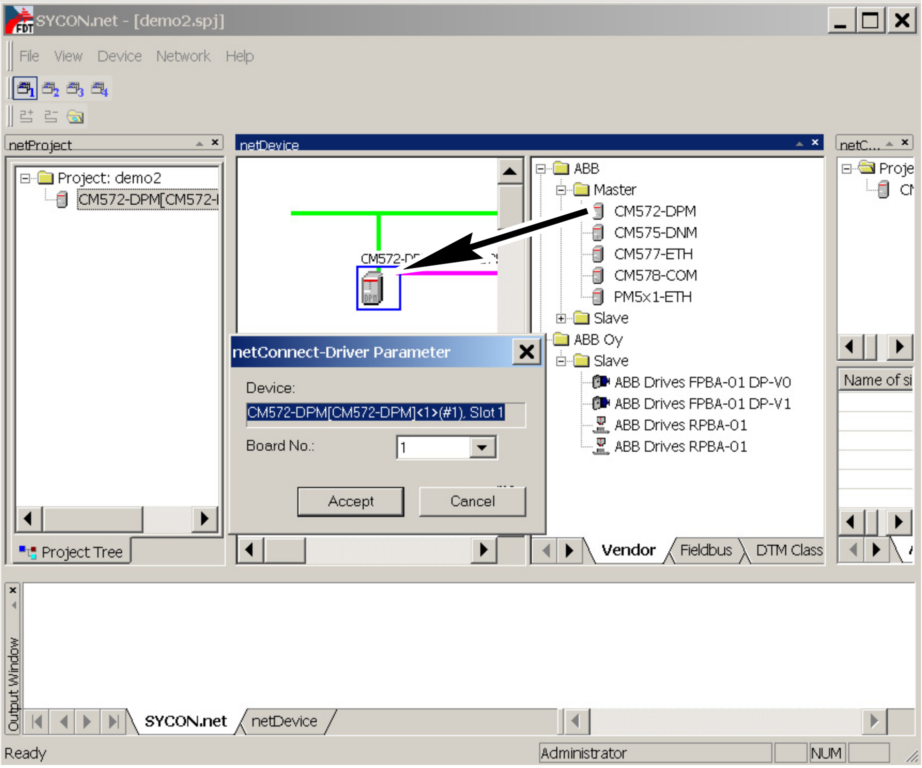
4. -> The SYCON.net tool opens:



5. From the **Network** menu, select the **Device Catalog…** command. Click the **Reload** button. -> PROFIBUS options appear in the ABB Oy folder. Click **OK**.



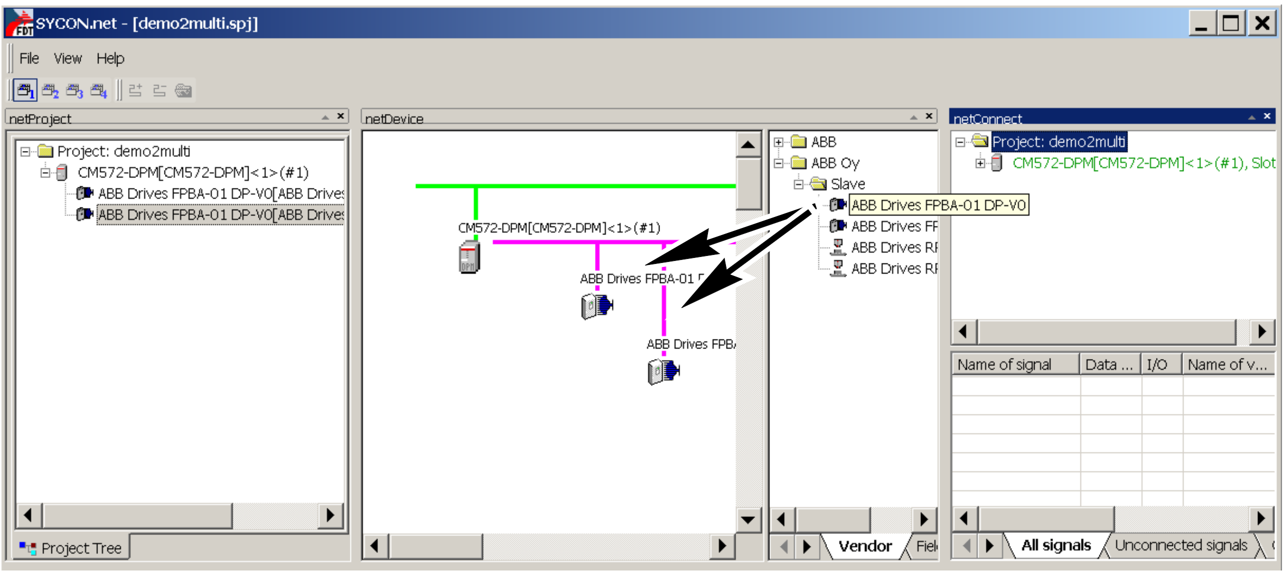
Tool/Step	Setting up the communication
6.	Drag and drop CM572-DPM on the green line. In the **netConnect-Driver Parameter** dialog box, select 1 for the **Board no:** box. This is because the CM572-DP communications module is installed next to the CPU on the left-hand side in the installation example of this manual.


netConnect-Driver Parameter

Device: CM572-DPM[CM572-DPM]<1>(#1), Slot 1

Board No.: 1

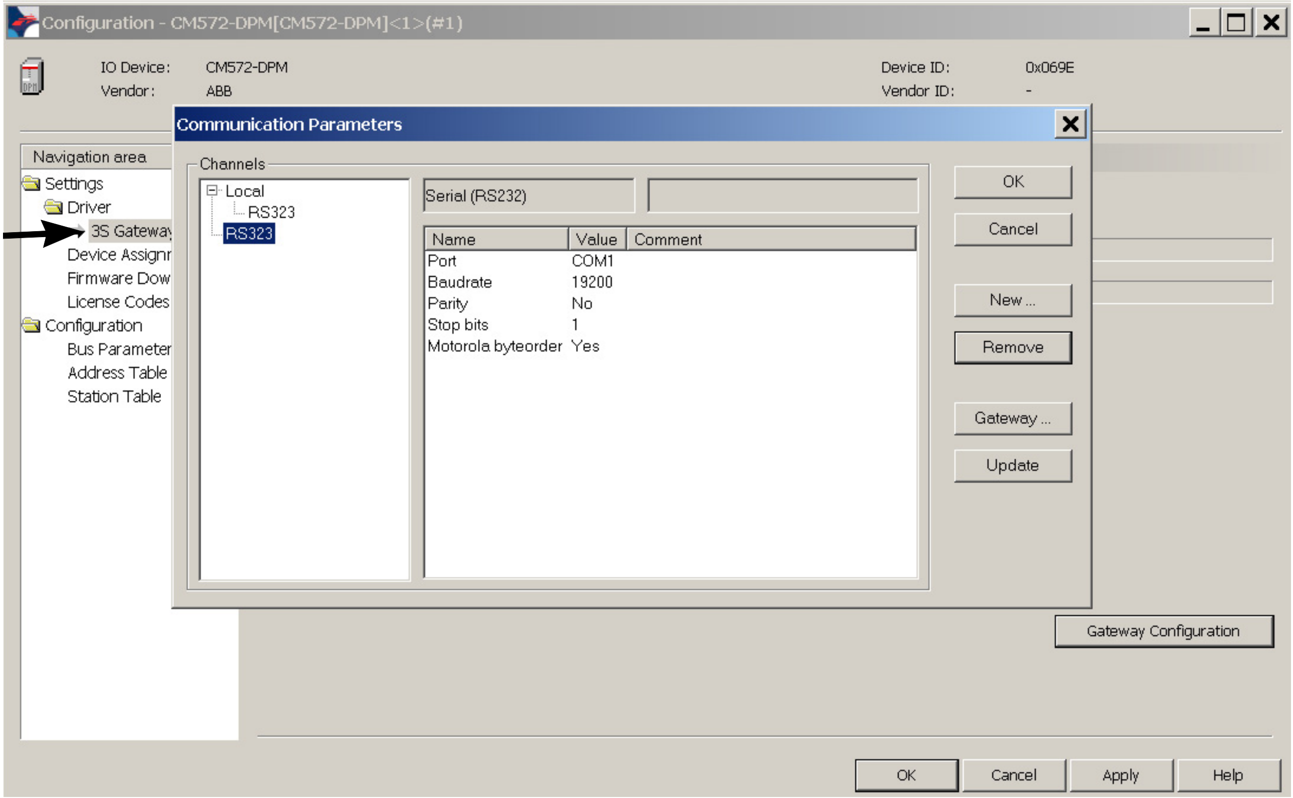
7. Drag and drop the FPBA-01 DP-V0 two times on the purple line.



Tool/Step

Setting up the communication

8. In the **netDevice** field, right-click the CM572-DPM icon. Select **Configuration**. In the **Navigation area** field, click 3S Gateway Driver. Click the **Gateway Communication** button.



Configuration - CM572-DPM[CM572-DPM]<1>(#1)

IO Device: CM572-DPM
Vendor: ABB
Device ID: 0x069E
Vendor ID: -

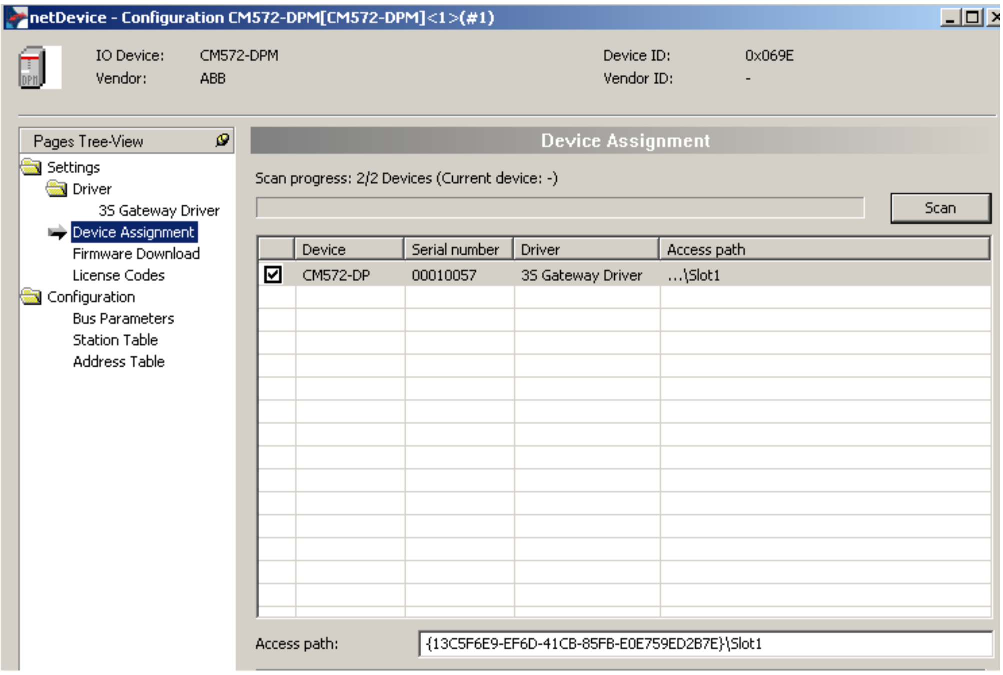
Communication Parameters

Channels: Serial (RS232)

Name	Value	Comment
Port	COM1	
Baudrate	19200	
Parity	No	
Stop bits	1	
Motorola byteorder	Yes	

9. In the **Communication Parameters** dialog box, set the communication parameters according to the serial port of your PC. See *Appendix A - How to find out the serial communication parameter values of your PC?*.

Tool/Step	Setting up the communication
10.	In the **Pages Three-View**, click Device Assignment. Activate the device by ticking it.



netDevice - Configuration CM572-DPM[CM572-DPM]<1>(#1)

IO Device: CM572-DPM
Vendor: ABB
Device ID: 0x069E
Vendor ID: -

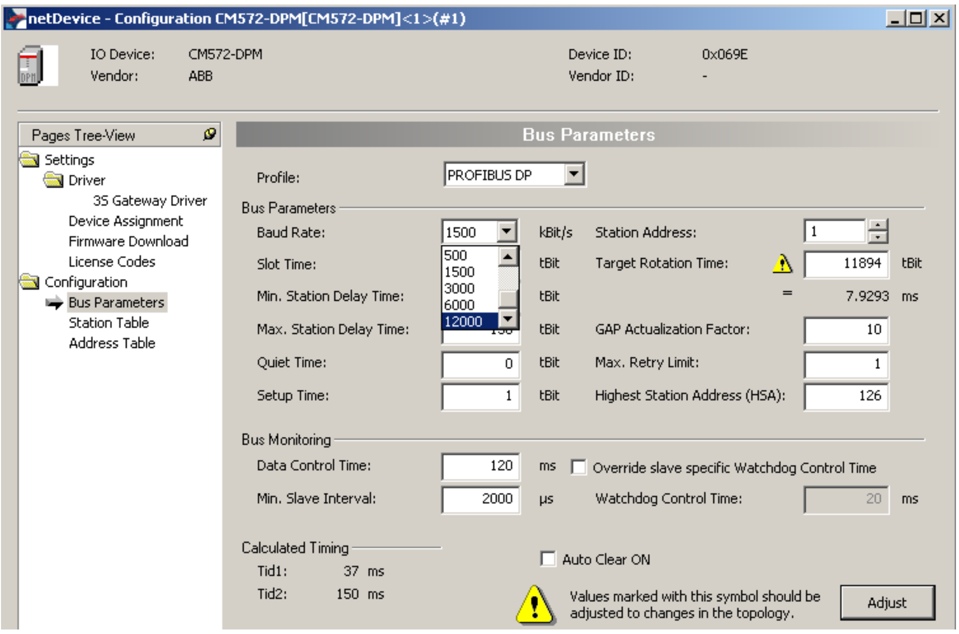
Device Assignment

Scan progress: 2/2 Devices (Current device: -)

	Device	Serial number	Driver	Access path
☑	CM572-DP	00010057	3S Gateway Driver	...\Slot1

Access path: {13C5F6E9-EF6D-41CB-85FB-E0E759ED2B7E}\Slot1

11.	In the **Pages Tree-view**, click Configuration / Bus Parameters. In the **Bus Parameters** dialog box, set the Boud Rate. If there is warning sign, click the **Adjust** button and set the other timing parameters.



netDevice - Configuration CM572-DPM[CM572-DPM]<1>(#1)

IO Device: CM572-DPM
Vendor: ABB
Device ID: 0x069E
Vendor ID: -

Bus Parameters

Profile: PROFIBUS DP

Bus Parameters

Baud Rate: 1500 kBit/s

Slot Time: tBit
Min. Station Delay Time: tBit
Max. Station Delay Time: tBit
Quiet Time: 0 tBit
Setup Time: 1 tBit
Station Address: 1
Target Rotation Time: ⚠ 11894 tBit
= 7.9293 ms
GAP Actualization Factor: 10
Max. Retry Limit: 1
Highest Station Address (HSA): 126

Bus Monitoring

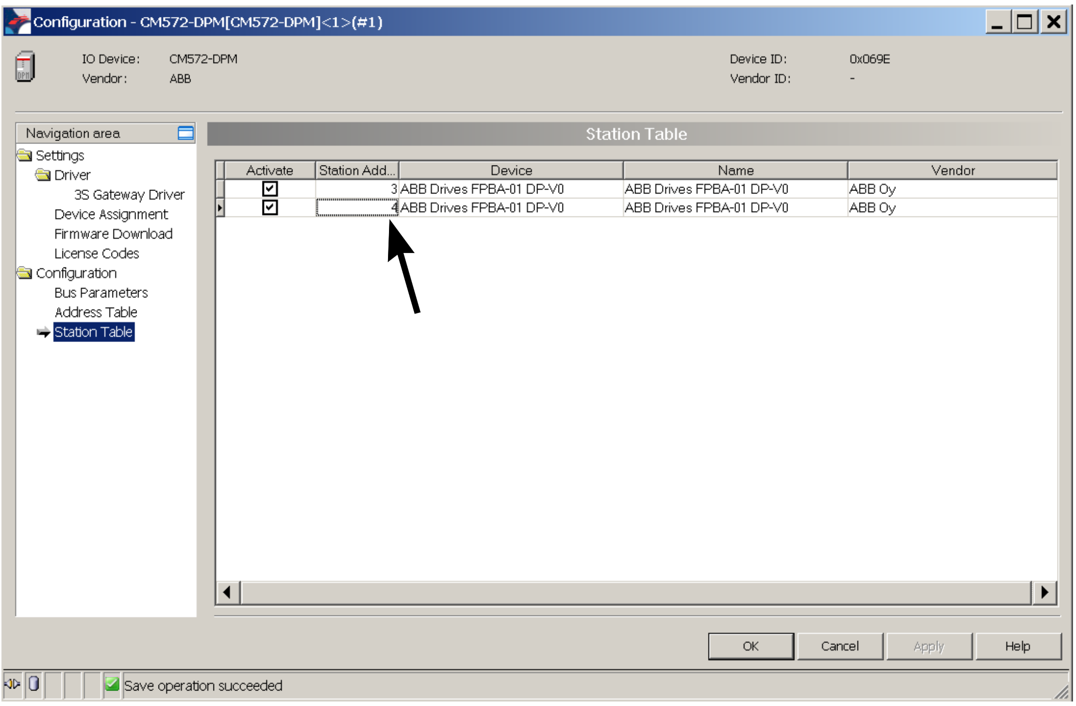
Data Control Time: 120 ms
Min. Slave Interval: 2000 µs
☐ Override slave specific Watchdog Control Time
Watchdog Control Time: 20 ms

Calculated Timing
Tid1: 37 ms
Tid2: 150 ms

☐ Auto Clear ON

⚠ Values marked with this symbol should be adjusted to changes in the topology.

Tool/Step	Setting up the communication
12.	In the **Pages Tree-view**, click Station Table under Configuration. Set the station address for the FPBA-01 fieldbus adapter modules. Click the **Apply** button and then **OK**. **Note:** The station addresses here must be the same as the value of Parameter 51.02 FBA PAR2 in the drive control program. Set parameter Parameter 51.02 FBA PAR2 with DriveStudio.



Configuration - CM572-DPM[CM572-DPM]<1>(#1)

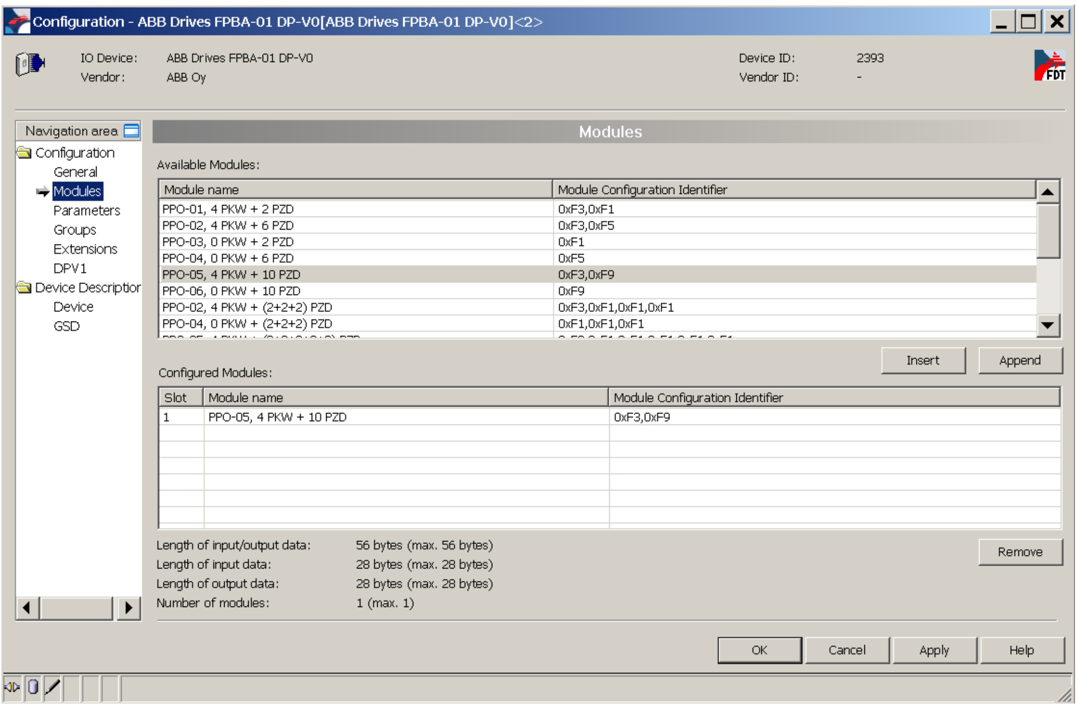
IO Device: CM572-DPM
Vendor: ABB
Device ID: 0x069E
Vendor ID: -

Station Table

Activate	Station Add...	Device	Name	Vendor
☑	3	ABB Drives FPBA-01 DP-V0	ABB Drives FPBA-01 DP-V0	ABB Oy
☑	4	ABB Drives FPBA-01 DP-V0	ABB Drives FPBA-01 DP-V0	ABB Oy

Save operation succeeded

Tool/Step	Setting up the communication
13.	Right-click the ABB Drives FPBA-01 icon connected to the purple line in the netDevice field. In the Navigation area field, click Modules in the Configuration folder. In the Available modules: box, select PPO-05. Click the **Insert** button and then **Apply** and **OK**. Do this for the both FPBA-01 units.



Configuration - ABB Drives FPBA-01 DP-V0[ABB Drives FPBA-01 DP-V0]<2>

IO Device: ABB Drives FPBA-01 DP-V0
Vendor: ABB Oy
Device ID: 2393
Vendor ID: -

Modules

Available Modules:

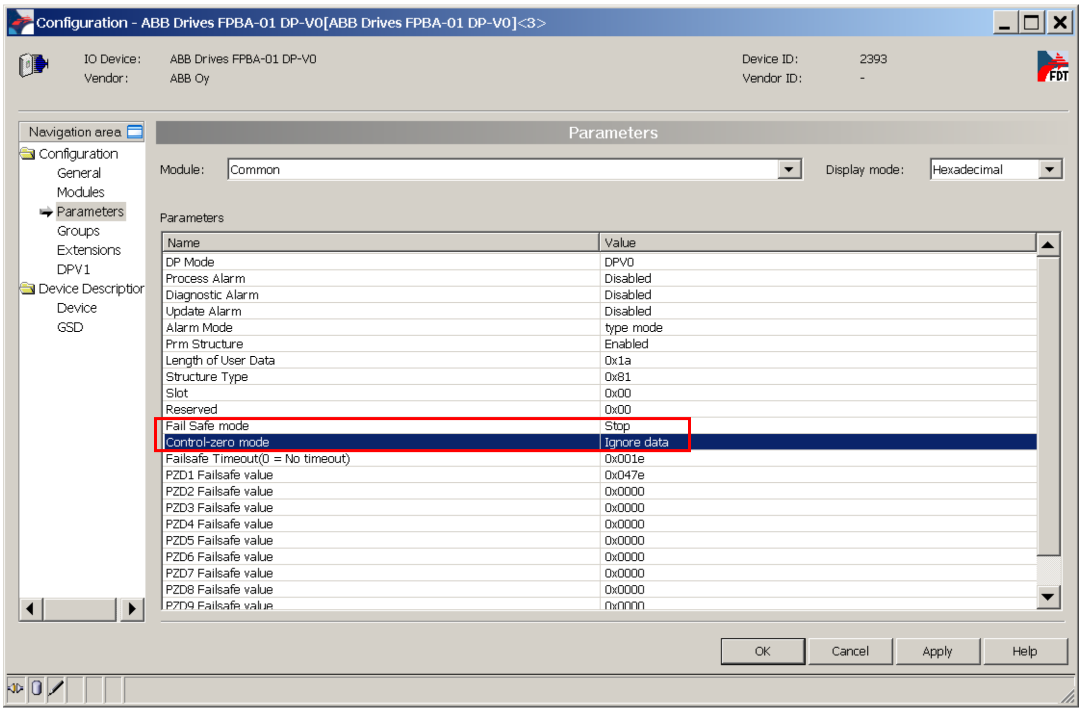
Module name	Module Configuration Identifier
PPO-01, 4 PKW + 2 PZD	0xF3,0xF1
PPO-02, 4 PKW + 6 PZD	0xF3,0xF5
PPO-03, 0 PKW + 2 PZD	0xF1
PPO-04, 0 PKW + 6 PZD	0xF5
PPO-05, 4 PKW + 10 PZD	0xF3,0xF9
PPO-06, 0 PKW + 10 PZD	0xF9
PPO-02, 4 PKW + (2+2+2) PZD	0xF3,0xF1,0xF1,0xF1
PPO-04, 0 PKW + (2+2+2) PZD	0xF1,0xF1,0xF1
PPO-05, 4 PKW + (2+2+2+2+2) PZD	0xF3,0xF1,0xF1,0xF1,0xF1,0xF1

Configured Modules:

Slot	Module name	Module Configuration Identifier
1	PPO-05, 4 PKW + 10 PZD	0xF3,0xF9

Length of input/output data: 56 bytes (max. 56 bytes)
Length of input data: 28 bytes (max. 28 bytes)
Length of output data: 28 bytes (max. 28 bytes)
Number of modules: 1 (max. 1)

Tool/Step	Setting up the communication
14.	In the Configuration folder, click Parameters. Set the values of parameters Fail Safe mode and Control-zero mode as shown below.



Configuration - ABB Drives FPBA-01 DP-V0[ABB Drives FPBA-01 DP-V0]<3>

IO Device: ABB Drives FPBA-01 DP-V0
Vendor: ABB Oy
Device ID: 2393
Vendor ID: -

Module: Common
Display mode: Hexadecimal

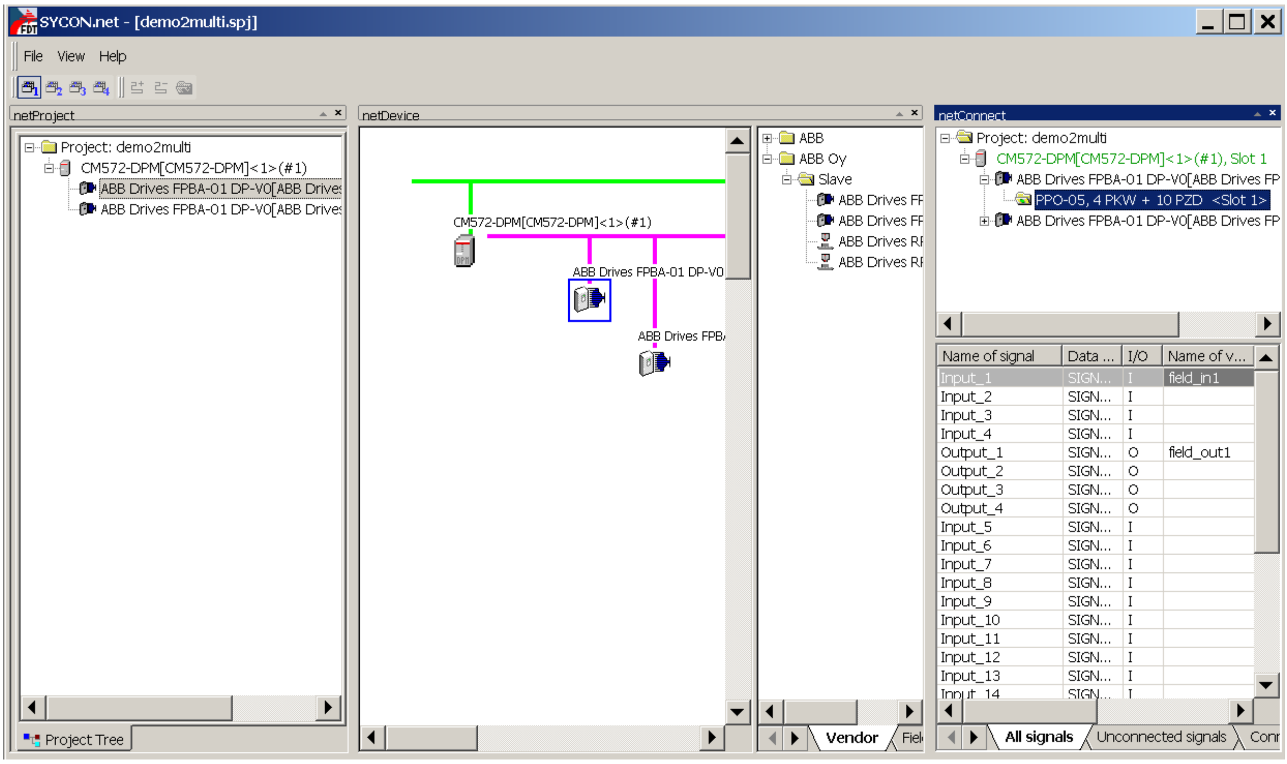
Parameters

Name	Value
DP Mode	DPV0
Process Alarm	Disabled
Diagnostic Alarm	Disabled
Update Alarm	Disabled
Alarm Mode	type mode
Prm Structure	Enabled
Length of User Data	0x1a
Structure Type	0x81
Slot	0x00
Reserved	0x00
Fail Safe mode	Stop
Control-zero mode	Ignore data
Failsafe Timeout(0 = No timeout)	0x001e
PZD1 Failsafe value	0x047e
PZD2 Failsafe value	0x0000
PZD3 Failsafe value	0x0000
PZD4 Failsafe value	0x0000
PZD5 Failsafe value	0x0000
PZD6 Failsafe value	0x0000
PZD7 Failsafe value	0x0000
PZD8 Failsafe value	0x0000
PZD9 Failsafe value	0x0000

Tool/Step Setting up the communication

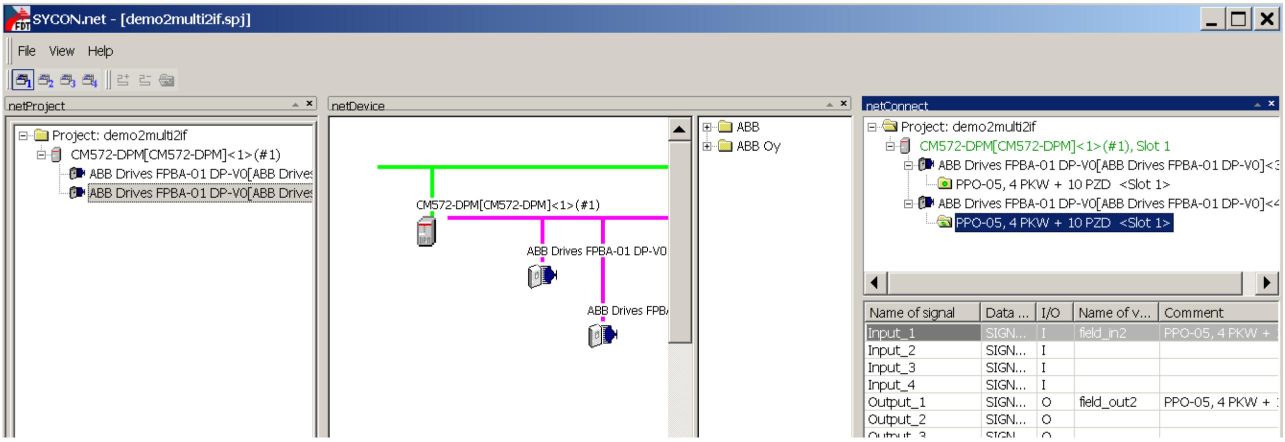
15. In the **netConnect** field, click PPO-5, 4PKW + 10 PZD <Slot 1>. -> A list of inputs and outputs appears.

Name the signals. In this example configuration, Input_1 is named field_in1 and Output_1 field_out1.
Note: You can name all signals here and they will be automatically in use in the Control Builder.


SYCON.net - [demo2multi.spj]
File View Help
netProject
Project: demo2multi
CM572-DPM[CM572-DPM]<1>(#1)
ABB Drives FPBA-01 DP-V0[ABB Drives
ABB Drives FPBA-01 DP-V0[ABB Drives
Project Tree
netDevice
CM572-DPM[CM572-DPM]<1>(#1)
ABB Drives FPBA-01 DP-V0
ABB Drives FPB/
ABB
ABB Oy
Slave
ABB Drives FF
ABB Drives FF
ABB Drives RF
ABB Drives RF
Vendor
Fiel
netConnect
Project: demo2multi
CM572-DPM[CM572-DPM]<1>(#1), Slot 1
ABB Drives FPBA-01 DP-V0[ABB Drives FP
PPO-05, 4 PKW + 10 PZD <Slot 1>
ABB Drives FPBA-01 DP-V0[ABB Drives FP
All signals
Unconnected signals
Conr

Name of signal	Data ...	I/O	Name of v...
Input_1	SIGN...	I	field_in1
Input_2	SIGN...	I	
Input_3	SIGN...	I	
Input_4	SIGN...	I	
Output_1	SIGN...	O	field_out1
Output_2	SIGN...	O	
Output_3	SIGN...	O	
Output_4	SIGN...	O	
Input_5	SIGN...	I	
Input_6	SIGN...	I	
Input_7	SIGN...	I	
Input_8	SIGN...	I	
Input_9	SIGN...	I	
Input_10	SIGN...	I	
Input_11	SIGN...	I	
Input_12	SIGN...	I	
Input_13	SIGN...	I	
Input_14	SIGN...	I	

16. Name the signals in the same way for the second drive: Input_1 for field_in2 and Output_1 field_out2.


SYCON.net - [demo2multi2if.spj]
File View Help
netProject
Project: demo2multi2if
CM572-DPM[CM572-DPM]<1>(#1)
ABB Drives FPBA-01 DP-V0[ABB Drives
ABB Drives FPBA-01 DP-V0[ABB Drives
netDevice
CM572-DPM[CM572-DPM]<1>(#1)
ABB Drives FPBA-01 DP-V0
ABB Drives FPB/
ABB
ABB Oy
netConnect
Project: demo2multi2if
CM572-DPM[CM572-DPM]<1>(#1), Slot 1
ABB Drives FPBA-01 DP-V0[ABB Drives FPBA-01 DP-V0]<3
PPO-05, 4 PKW + 10 PZD <Slot 1>
ABB Drives FPBA-01 DP-V0[ABB Drives FPBA-01 DP-V0]<4
PPO-05, 4 PKW + 10 PZD <Slot 1>

Name of signal	Data ...	I/O	Name of v...	Comment
Input_1	SIGN...	I	field_in2	PPO-05, 4 PKW + 1
Input_2	SIGN...	I		
Input_3	SIGN...	I		
Input_4	SIGN...	I		
Output_1	SIGN...	O	field_out2	PPO-05, 4 PKW + 1
Output_2	SIGN...	O		
Output_3	SIGN...	O		

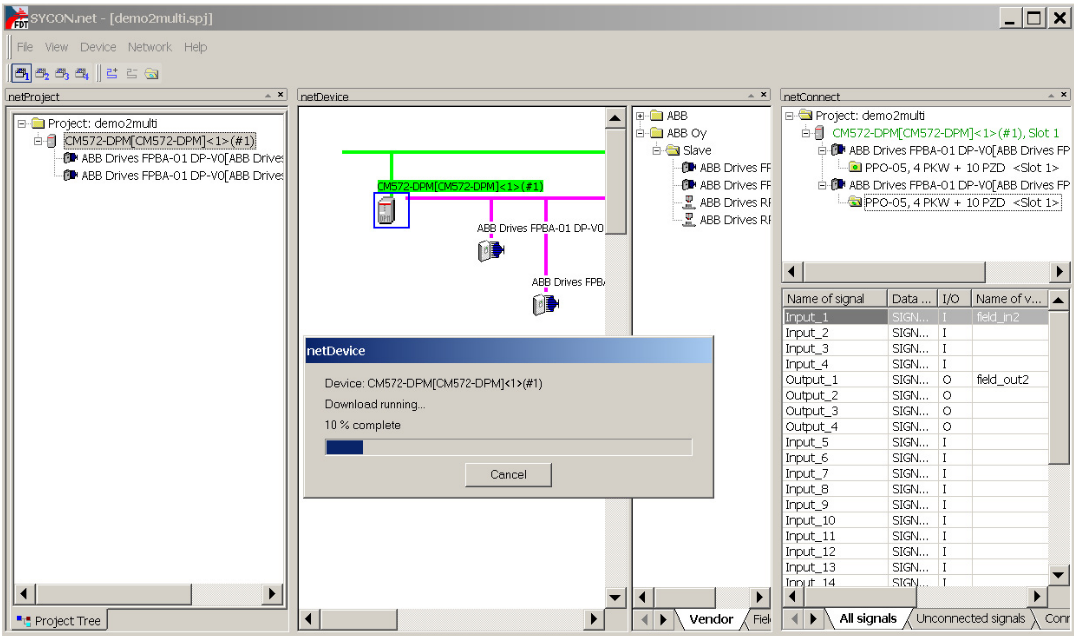
Tool/Step

Setting up the communication

17. Check that the PLC is in the Stop state (Stop in the display).

    Note: The downloading is not possible if the PLC is in the Run state.

18. Download the communication configuration to the PLC: first, right-click the CM572-DPM icon and, then click **Download**.


SYCON.net - [demo2multi.spj]
File
View
Device
Network
Help
netProject
Project: demo2multi
CM572-DPM[CM572-DPM]<1>(#1)
ABB Drives FPBA-01 DP-V0[ABB Drives
ABB Drives FPBA-01 DP-V0[ABB Drives
Project Tree
netDevice
CM572-DPM[CM572-DPM]<1>(#1)
ABB Drives FPBA-01 DP-V0
ABB Drives FPB/
ABB
ABB Oy
Slave
ABB Drives FP
ABB Drives FP
ABB Drives RF
ABB Drives RF
Vendor
Fiel
netConnect
Project: demo2multi
CM572-DPM[CM572-DPM]<1>(#1), Slot 1
ABB Drives FPBA-01 DP-V0[ABB Drives FP
PPO-05, 4 PKW + 10 PZD <Slot 1>
ABB Drives FPBA-01 DP-V0[ABB Drives FP
PPO-05, 4 PKW + 10 PZD <Slot 1>
All signals
Unconnected signals
Conn

netDevice

Device: CM572-DPM[CM572-DPM]<1>(#1)

Download running...

10 % complete

Cancel

Name of signal	Data ...	I/O	Name of v...
Input_1	SIGN...	I	field_in2
Input_2	SIGN...	I	
Input_3	SIGN...	I	
Input_4	SIGN...	I	
Output_1	SIGN...	O	field_out2
Output_2	SIGN...	O	
Output_3	SIGN...	O	
Output_4	SIGN...	O	
Input_5	SIGN...	I	
Input_6	SIGN...	I	
Input_7	SIGN...	I	
Input_8	SIGN...	I	
Input_9	SIGN...	I	
Input_10	SIGN...	I	
Input_11	SIGN...	I	
Input_12	SIGN...	I	
Input_13	SIGN...	I	
Input_14	SIGN...	I	

19. When the downloading is completed, right-click the CM572-DPM icon and then click **Disconnect**.

20. Save the project with the **Save** command from the **File** menu.

21. Close the SYCON.net tool.

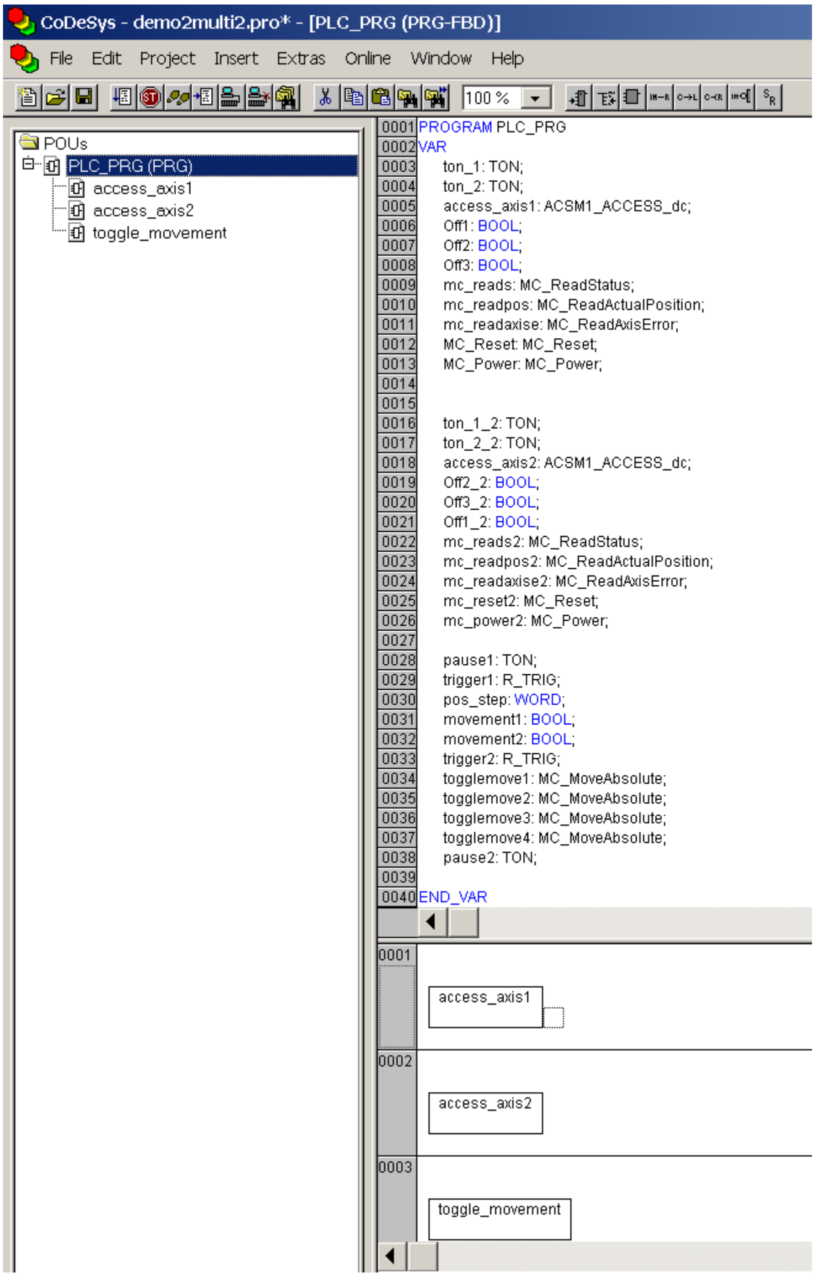
Tool/Step

Programming the PLC main program

Programming of the PLC main program is described earlier in this manual beginning from page 63. For a system with two drives, program similar function blocks for both drives. In this case, main program for both drives is programmed inside actions, this is done to achieve more clear presentation of the program.

Note: Name every function block uniquely, otherwise the program will not work correctly.

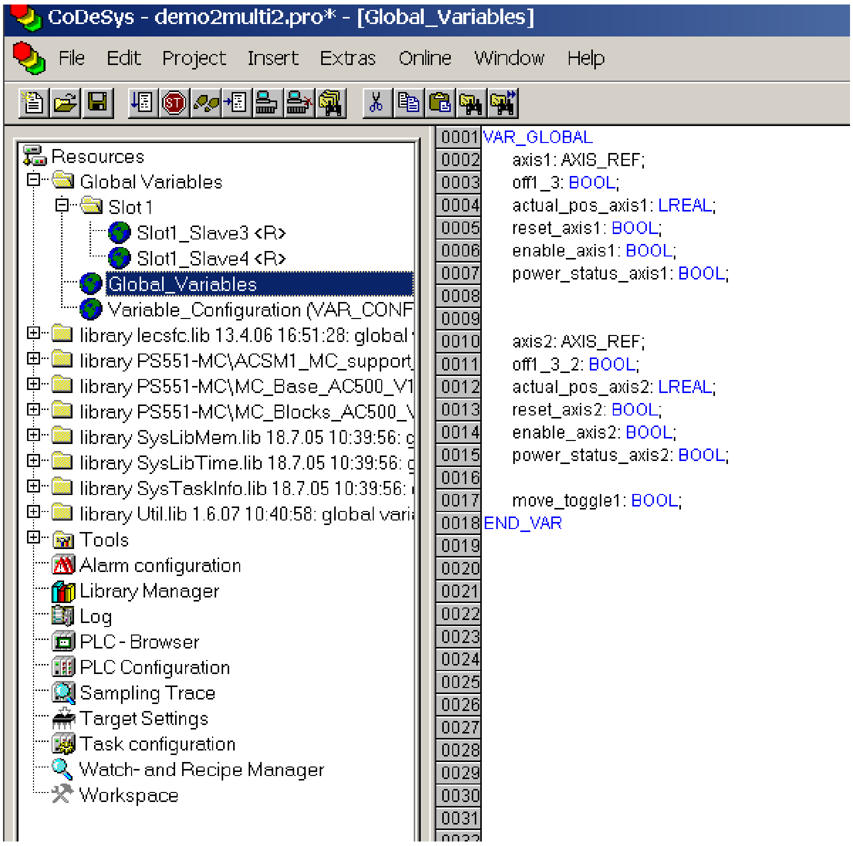
A list of the Local variables is shown below.



```
PROGRAM PLC_PRG
VAR
    ton_1: TON;
    ton_2: TON;
    access_axis1: ACSM1_ACCESS_dc;
    Off1: BOOL;
    Off2: BOOL;
    Off3: BOOL;
    mc_reads: MC_ReadStatus;
    mc_readpos: MC_ReadActualPosition;
    mc_readaxise: MC_ReadAxisError;
    MC_Reset: MC_Reset;
    MC_Power: MC_Power;


    ton_1_2: TON;
    ton_2_2: TON;
    access_axis2: ACSM1_ACCESS_dc;
    Off2_2: BOOL;
    Off3_2: BOOL;
    Off1_2: BOOL;
    mc_reads2: MC_ReadStatus;
    mc_readpos2: MC_ReadActualPosition;
    mc_readaxise2: MC_ReadAxisError;
    mc_reset2: MC_Reset;
    mc_power2: MC_Power;

    pause1: TON;
    trigger1: R_TRIG;
    pos_step: WORD;
    movement1: BOOL;
    movement2: BOOL;
    trigger2: R_TRIG;
    togglemove1: MC_MoveAbsolute;
    togglemove2: MC_MoveAbsolute;
    togglemove3: MC_MoveAbsolute;
    togglemove4: MC_MoveAbsolute;
    pause2: TON;

END_VAR
```

Tool/Step — Programming the PLC main program

A list of the Global variables is shown below.

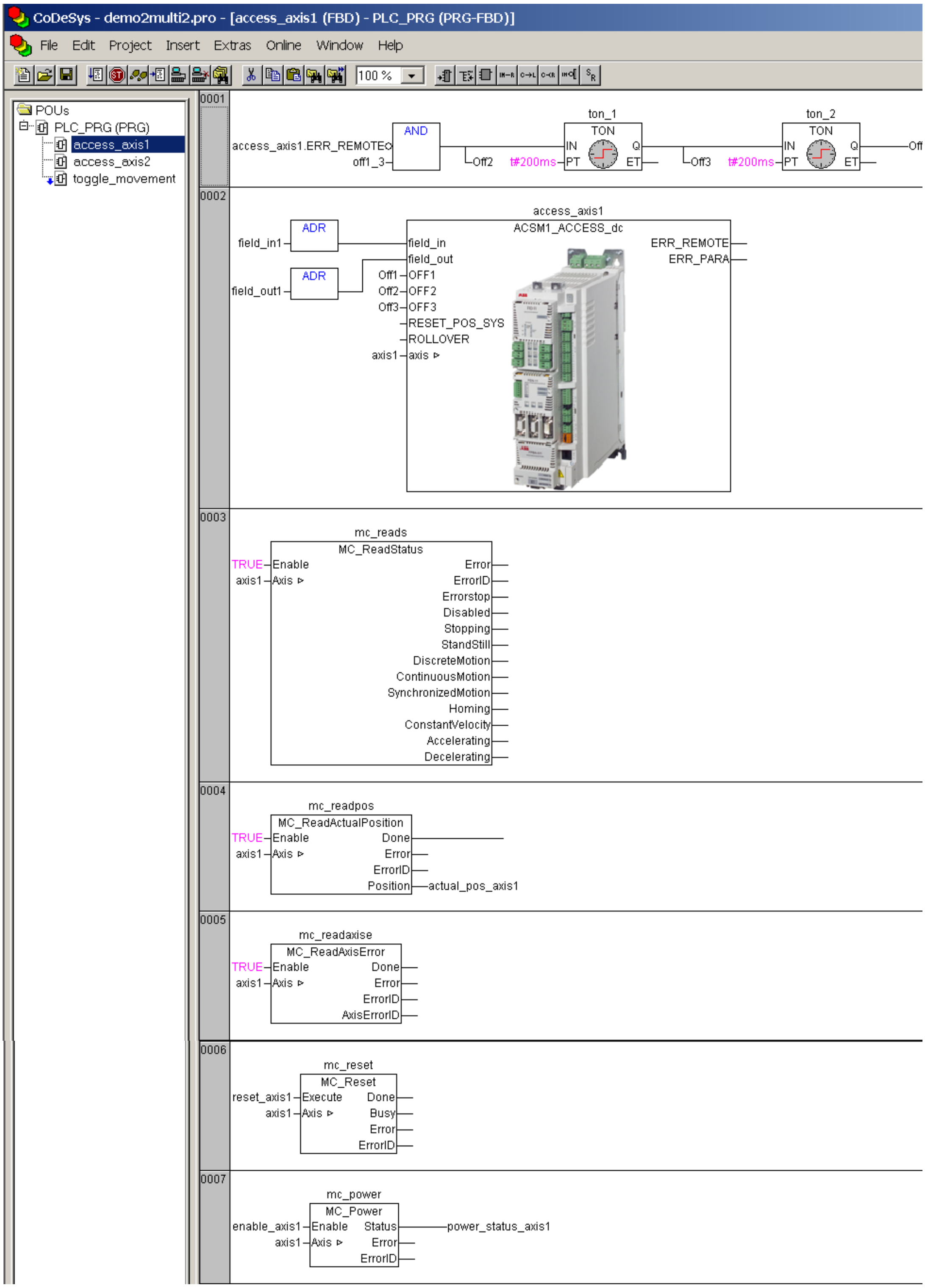

CoDeSys - demo2multi2.pro* - [Global_Variables]
File Edit Project Insert Extras Online Window Help
Resources
Global Variables
Slot 1
Slot1_Slave3 <R>
Slot1_Slave4 <R>
Global_Variables
Variable_Configuration (VAR_CONF
library Iecsfc.lib 13.4.06 16:51:28: global
library PS551-MC\ACSM1_MC_support
library PS551-MC\MC_Base_AC500_V1
library PS551-MC\MC_Blocks_AC500_\
library SysLibMem.lib 18.7.05 10:39:56: g
library SysLibTime.lib 18.7.05 10:39:56: g
library SysTaskInfo.lib 18.7.05 10:39:56:
library Util.lib 1.6.07 10:40:58: global vari
Tools
Alarm configuration
Library Manager
Log
PLC - Browser
PLC Configuration
Sampling Trace
Target Settings
Task configuration
Watch- and Recipe Manager
Workspace

```
VAR_GLOBAL
    axis1: AXIS_REF;
    off1_3: BOOL;
    actual_pos_axis1: LREAL;
    reset_axis1: BOOL;
    enable_axis1: BOOL;
    power_status_axis1: BOOL;


    axis2: AXIS_REF;
    off1_3_2: BOOL;
    actual_pos_axis2: LREAL;
    reset_axis2: BOOL;
    enable_axis2: BOOL;
    power_status_axis2: BOOL;

    move_toggle1: BOOL;
END_VAR
```

Tool/Step

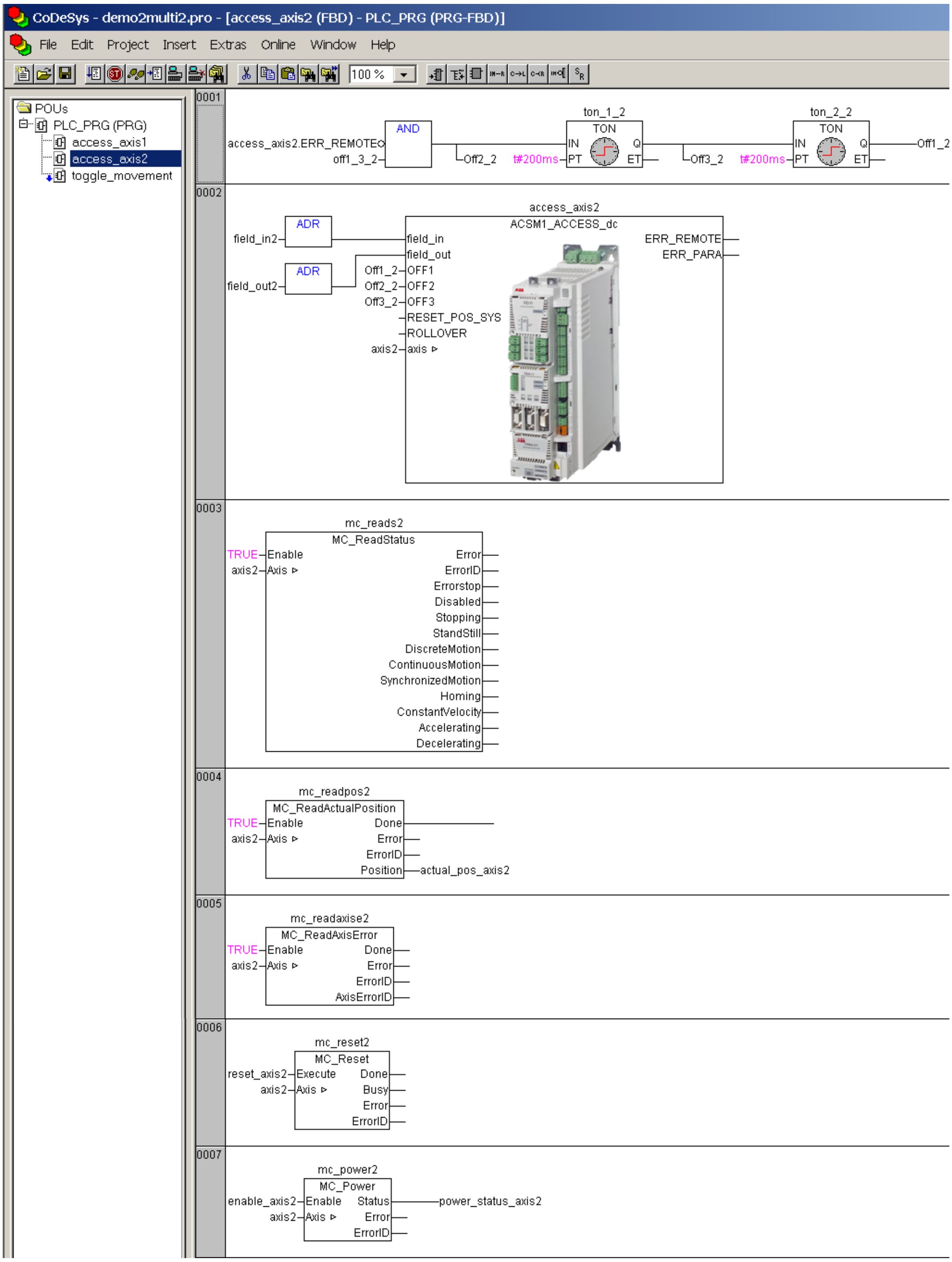
Programming the PLC main program

The finished main program is shown below.



Tool/Step

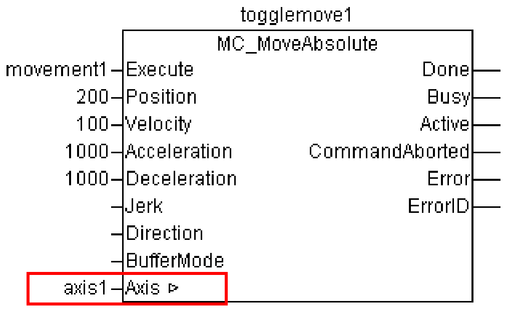
Programming the PLC main program



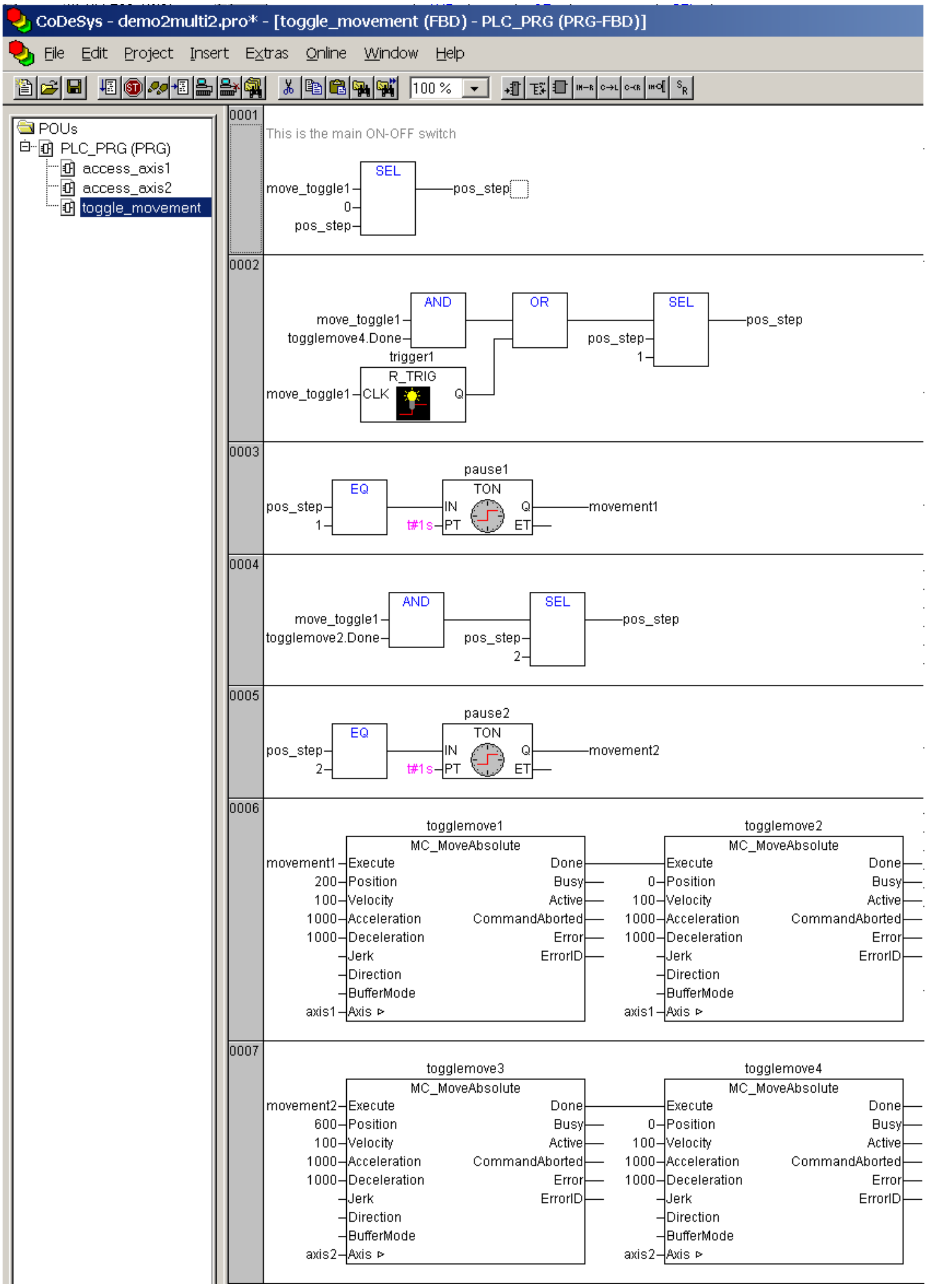
Tool/Step

Programming actions

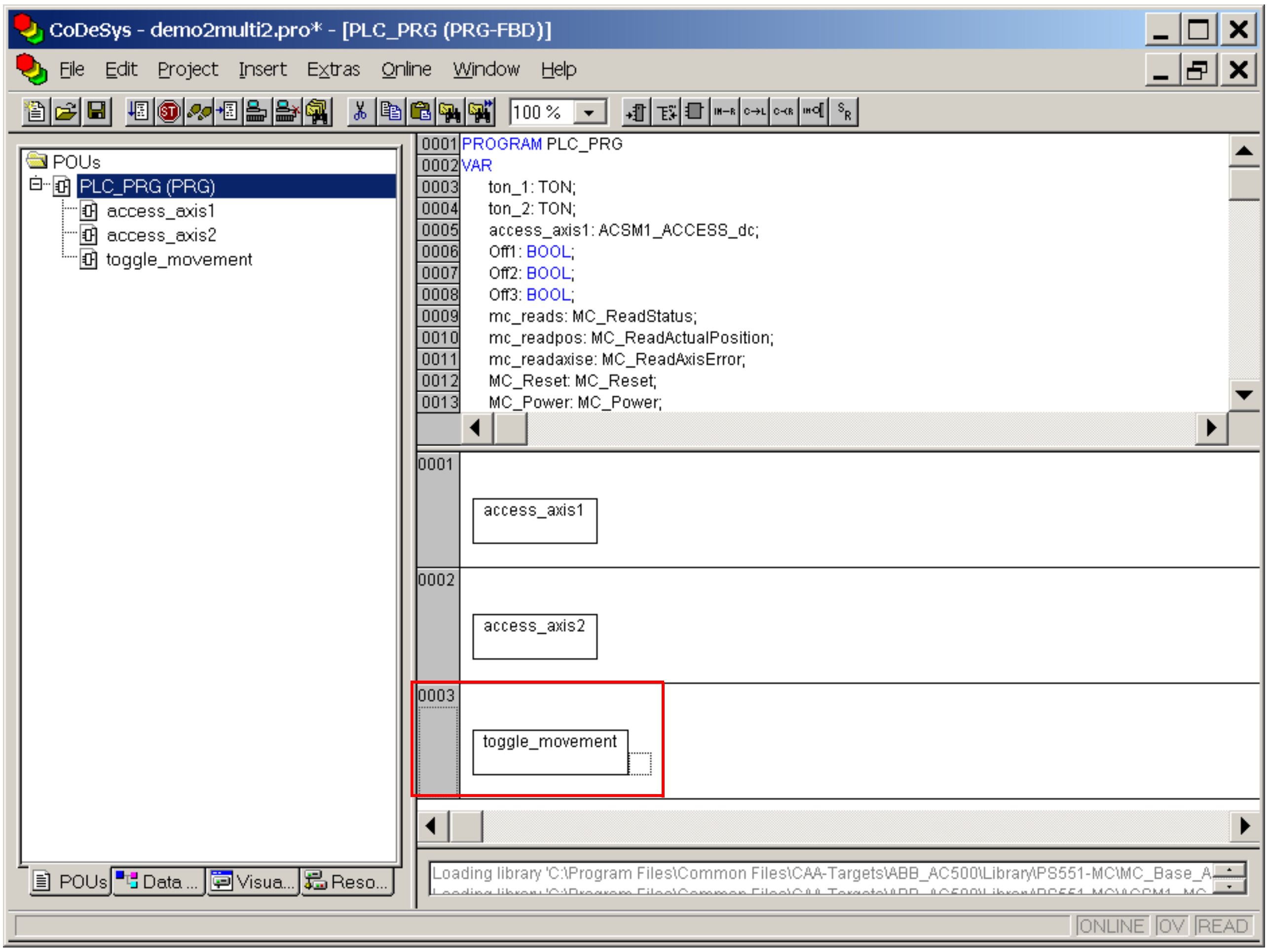
Programming of the actions is described earlier in this manual beginning from page 77. For a system with two drives, program similar actions for the both axes: axis1 and axis2.



Tool/Step	Programming actions
	The program shown below controls a two-axis toggle movement. For a description of the toggle movement, refer to section *Program toggling between two positions*, page *84*.



Tool/Step	Programming actions
	Add the action block toggle_movement to the main program.



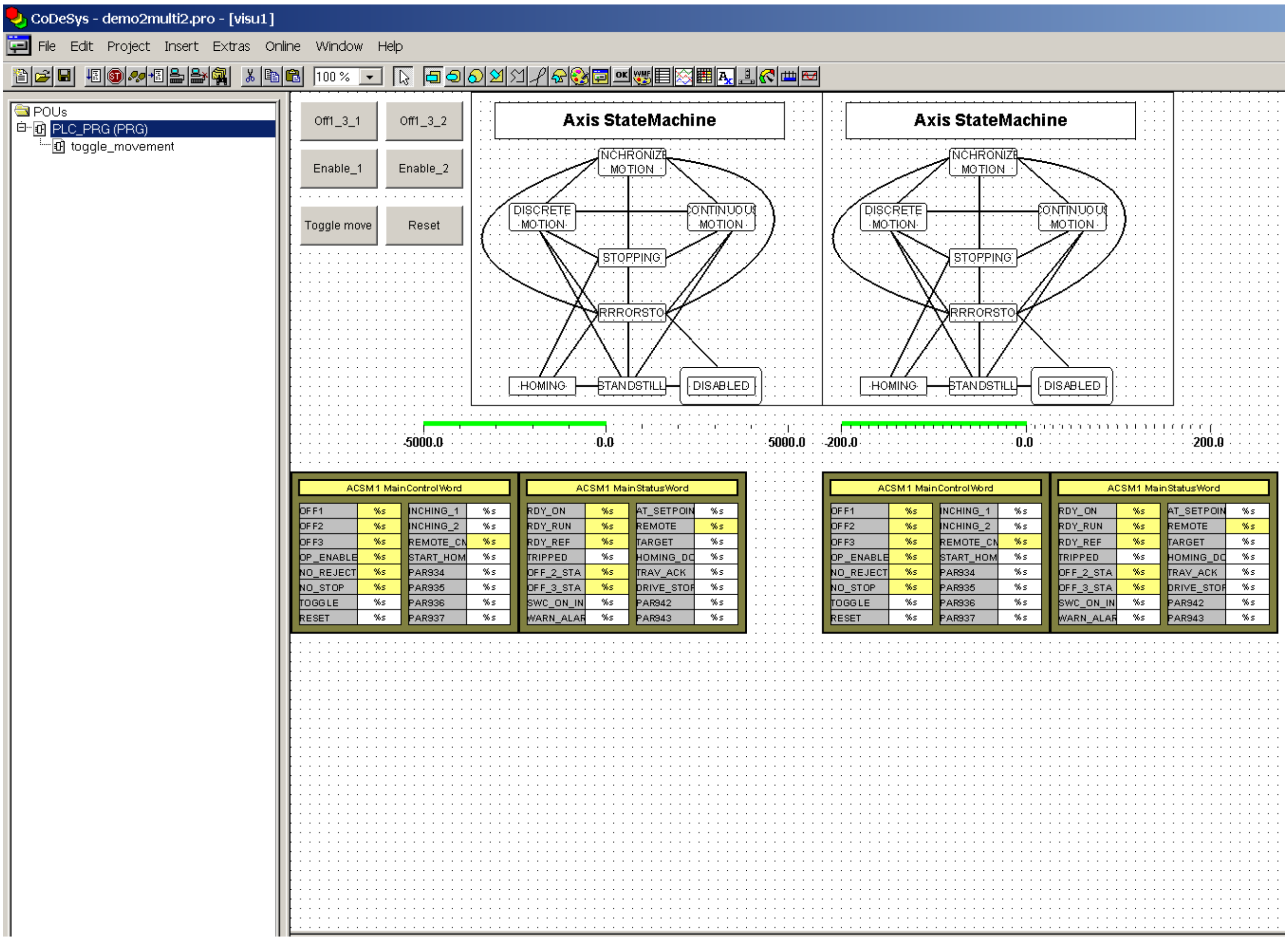
```
PROGRAM PLC_PRG
VAR
    ton_1: TON;
    ton_2: TON;
    access_axis1: ACSM1_ACCESS_dc;
    Off1: BOOL;
    Off2: BOOL;
    Off3: BOOL;
    mc_reads: MC_ReadStatus;
    mc_readpos: MC_ReadActualPosition;
    mc_readaxise: MC_ReadAxisError;
    MC_Reset: MC_Reset;
    MC_Power: MC_Power;
```

```
Loading library 'C:\Program Files\Common Files\CAA-Targets\ABB_AC500\Library\PS551-MC\MC_Base_A
```

Tool/Step

Programming visualizations

Programming of the visualizations is described earlier in this manual beginning from page 89. An example visualization is shown below.



ACSM1 MainControlWord

OFF1	%s	INCHING_1	%s
OFF2	%s	INCHING_2	%s
OFF3	%s	REMOTE_CN	%s
OP_ENABLE	%s	START_HOM	%s
NO_REJECT	%s	PAR934	%s
NO_STOP	%s	PAR935	%s
TOGGLE	%s	PAR936	%s
RESET	%s	PAR937	%s

ACSM1 MainStatusWord

RDY_ON	%s	AT_SETPOIN	%s
RDY_RUN	%s	REMOTE	%s
RDY_REF	%s	TARGET	%s
TRIPPED	%s	HOMING_DC	%s
OFF_2_STA	%s	TRAV_ACK	%s
OFF_3_STA	%s	DRIVE_STOF	%s
SWC_ON_IN	%s	PAR942	%s
WARN_ALAR	%s	PAR943	%s

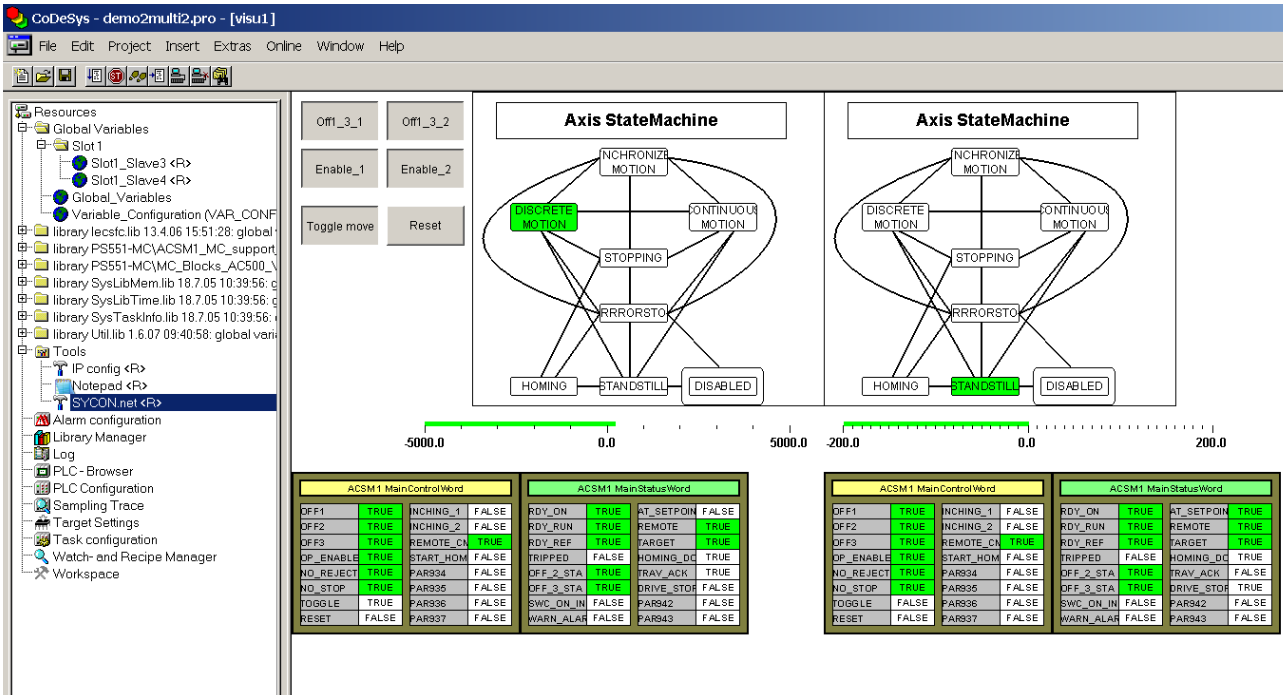
ACSM1 MainControlWord

OFF1	%s	INCHING_1	%s
OFF2	%s	INCHING_2	%s
OFF3	%s	REMOTE_CN	%s
OP_ENABLE	%s	START_HOM	%s
NO_REJECT	%s	PAR934	%s
NO_STOP	%s	PAR935	%s
TOGGLE	%s	PAR936	%s
RESET	%s	PAR937	%s

ACSM1 MainStatusWord

RDY_ON	%s	AT_SETPOIN	%s
RDY_RUN	%s	REMOTE	%s
RDY_REF	%s	TARGET	%s
TRIPPED	%s	HOMING_DC	%s
OFF_2_STA	%s	TRAV_ACK	%s
OFF_3_STA	%s	DRIVE_STOF	%s
SWC_ON_IN	%s	PAR942	%s
WARN_ALAR	%s	PAR943	%s

Tool/Step	Running and testing the program
CoDeSys	Load and test the program as described earlier in this manual beginning from page 99. Clicking order: Click first both Off1_3 buttons and the both Enable buttons. -> The drives should start. Click the Toggle move button. -> The toggle movement should start.



ACSM1 MainControlWord

OFF1	TRUE	INCHING_1	FALSE
OFF2	TRUE	INCHING_2	FALSE
OFF3	TRUE	REMOTE_CN	TRUE
OP_ENABLE	TRUE	START_HOM	FALSE
NO_REJECT	TRUE	PAR934	FALSE
NO_STOP	TRUE	PAR935	FALSE
TOGGLE	TRUE	PAR936	FALSE
RESET	FALSE	PAR937	FALSE

ACSM1 MainStatusWord

RDY_ON	TRUE	AT_SETPOIN	FALSE
RDY_RUN	TRUE	REMOTE	TRUE
RDY_REF	TRUE	TARGET	TRUE
TRIPPED	FALSE	HOMING_DC	TRUE
OFF_2_STA	TRUE	TRAV_ACK	TRUE
OFF_3_STA	TRUE	DRIVE_STOF	FALSE
SWC_ON_IN	FALSE	PAR942	FALSE
WARN_ALAR	FALSE	PAR943	FALSE

ACSM1 MainControlWord

OFF1	TRUE	INCHING_1	FALSE
OFF2	TRUE	INCHING_2	FALSE
OFF3	TRUE	REMOTE_CN	TRUE
OP_ENABLE	TRUE	START_HOM	FALSE
NO_REJECT	TRUE	PAR934	FALSE
NO_STOP	TRUE	PAR935	FALSE
TOGGLE	FALSE	PAR936	FALSE
RESET	FALSE	PAR937	FALSE

ACSM1 MainStatusWord

RDY_ON	TRUE	AT_SETPOIN	TRUE
RDY_RUN	TRUE	REMOTE	TRUE
RDY_REF	TRUE	TARGET	TRUE
TRIPPED	FALSE	HOMING_DC	TRUE
OFF_2_STA	TRUE	TRAV_ACK	FALSE
OFF_3_STA	TRUE	DRIVE_STOF	TRUE
SWC_ON_IN	FALSE	PAR942	FALSE
WARN_ALAR	FALSE	PAR943	FALSE

Example program for a two-axis loading machine

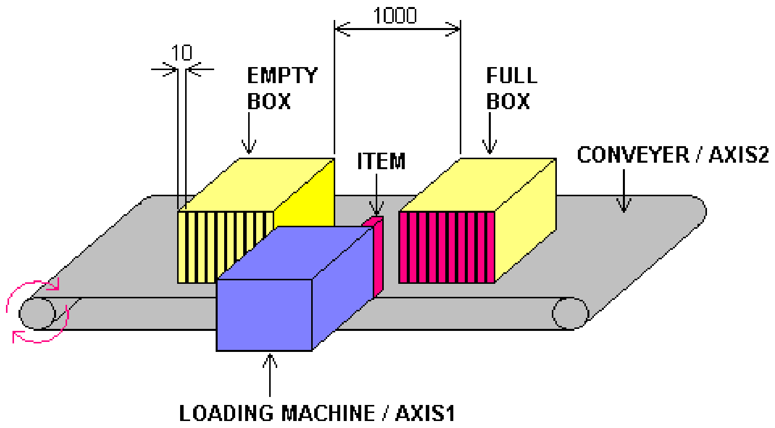
What this chapter contains

This chapter presents an example sequence program which controls a loading machine with two axes.

Description of the machine

The machine loads boxes. The first axis loads ten items to each box and the second axis moves the filled boxes forward on a conveyor.

Diagram of the system



Description of the program

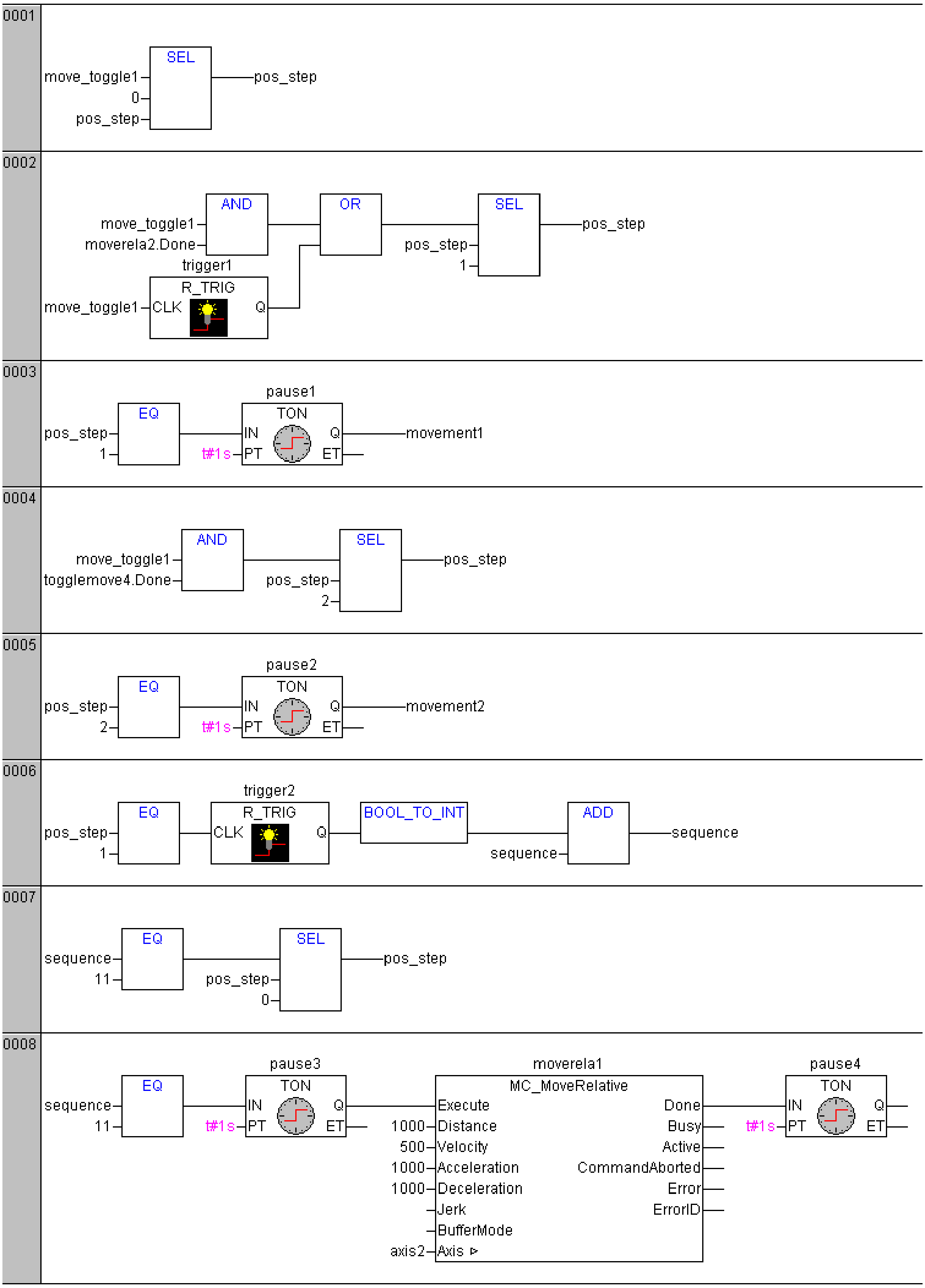
Loading sequence

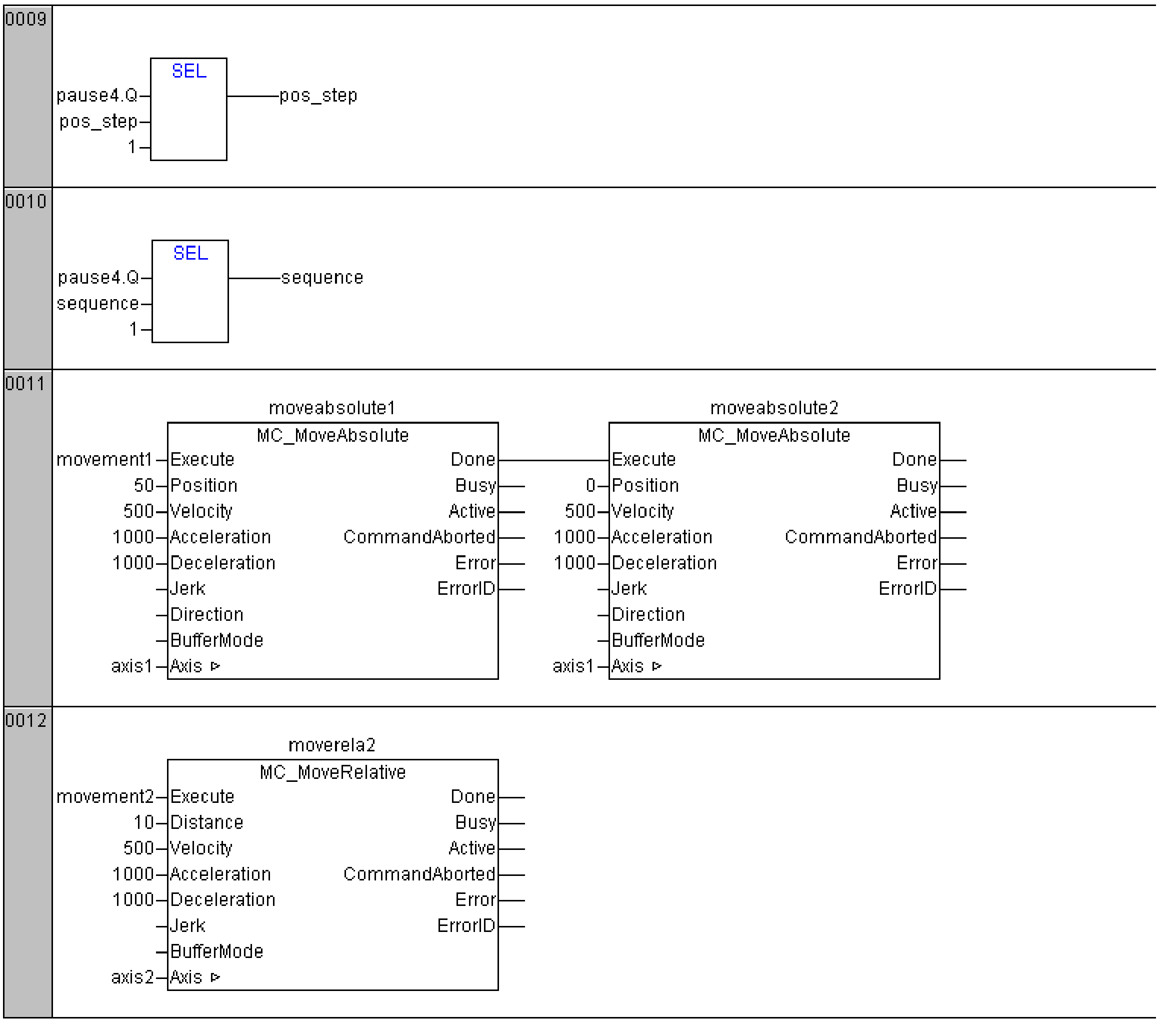
The first axis toggles between positions 50 and 0. Every time when it does a forthward movement, it pushes one item to a box. Thereafter, the axis moves backwards. When the first axis has finished one forward-backward movement, the second axis makes a movement of distance 10, and the next empty slot in the box comes in front of the machine's loading point. This way, the machine fills the 10 slots of the box.

When the loading sequence has repeated 10 times, the box is full. The program, then, moves the box a distance of 1000. This is the distance between the boxes. After this, the sequence starts again and fills the next box.

Program

The program for the toggle movement control is shown below.




0009
SEL
pause4.Q
pos_step
1
pos_step
0010
SEL
pause4.Q
sequence
1
sequence
0011
moveabsolute1
MC_MoveAbsolute
movement1
Execute
Done
50
Position
Busy
500
Velocity
Active
1000
Acceleration
CommandAborted
1000
Deceleration
Error
Jerk
ErrorID
Direction
BufferMode
axis1
Axis ▹
moveabsolute2
MC_MoveAbsolute
Execute
Done
0
Position
Busy
500
Velocity
Active
1000
Acceleration
CommandAborted
1000
Deceleration
Error
Jerk
ErrorID
Direction
BufferMode
axis1
Axis ▹
0012
moverela2
MC_MoveRelative
movement2
Execute
Done
10
Distance
Busy
500
Velocity
Active
1000
Acceleration
CommandAborted
1000
Deceleration
Error
Jerk
ErrorID
BufferMode
axis2
Axis ▹

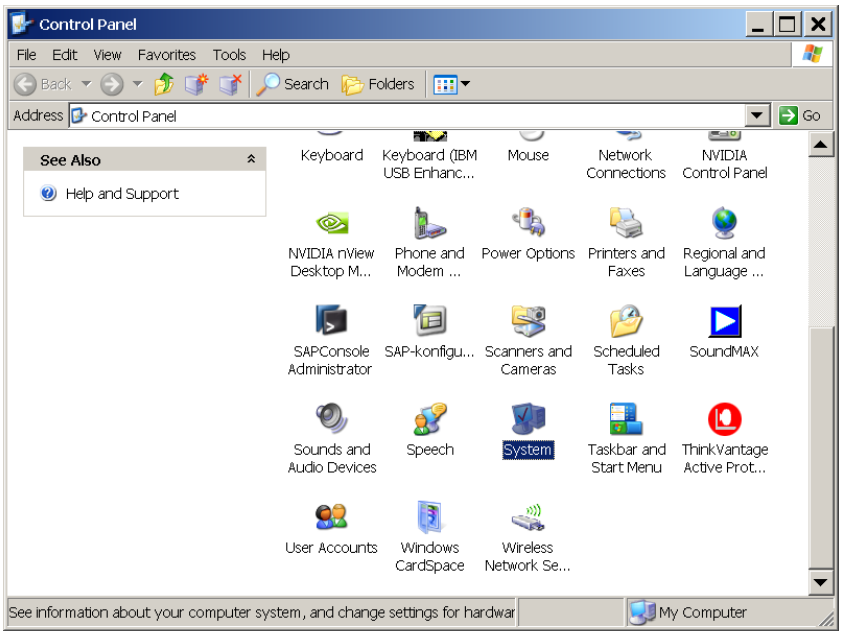
Appendix A - How to find out the serial communication parameter values of your PC?

What this chapter contains

This chapter instructs how to find out the serial communication parameter values of your PC.

Tool/Step	How to find out the serial communication parameter values of your PC?
1.	Go to Windows Control Panel and click the **System** icon.

Microsoft Windows

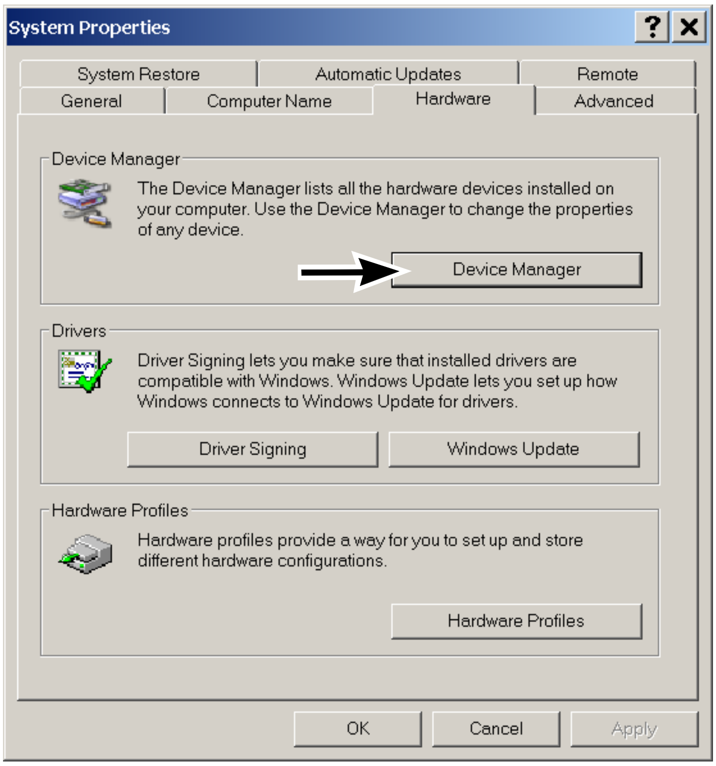


See information about your computer system, and change settings for hardwar

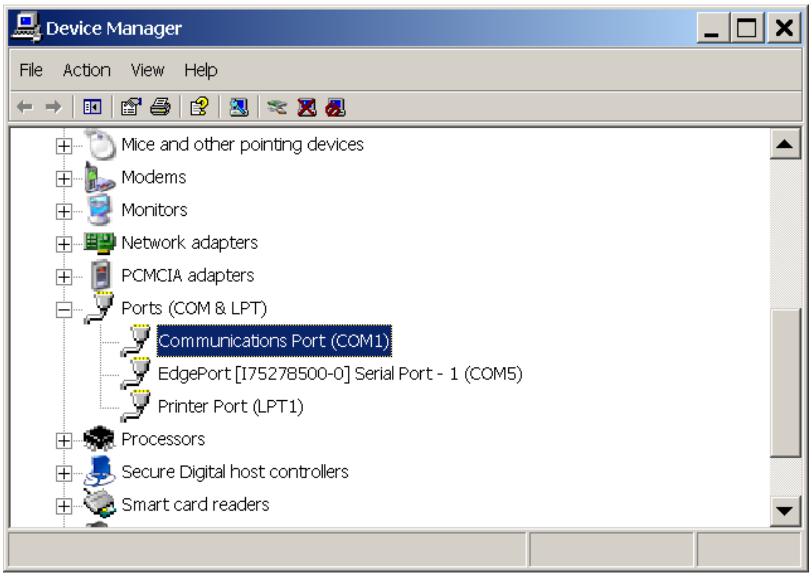
Tool/Step

How to find out the serial communication parameter values of your PC?

2. Click the **Hardware** tab and then the **Device Manager** button.


System Properties
System Restore
Automatic Updates
Remote
General
Computer Name
Hardware
Advanced
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Device Manager
Drivers
Driver Signing lets you make sure that installed drivers are compatible with Windows. Windows Update lets you set up how Windows connects to Windows Update for drivers.
Driver Signing
Windows Update
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles
OK
Cancel
Apply

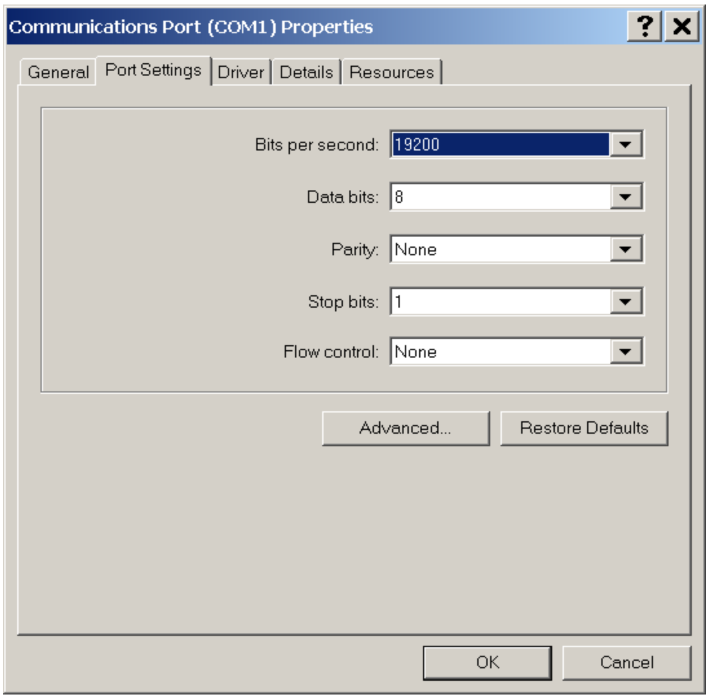
3. In the Ports (COM & LPT) folder, click Communications Port, which is connected to AC500, in this case port (COM1).



Tool/Step

How to find out the serial communication parameter values of your PC?

4. The communication port settings are shown.



Communications Port (COM1) Properties

Bits per second: 19200

Data bits: 8

Parity: None

Stop bits: 1

Flow control: None

Further information

Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to www.abb.com/drives and selecting *Sales, Support and Service network*.

Product training

For information on ABB product training, navigate to www.abb.com/drives and select *Training courses*.

Providing feedback on ABB Drives manuals

Your comments on our manuals are welcome. Go to www.abb.com/drives and select *Document Library – Manuals feedback form (LV AC drives)*.

Document library on the Internet

You can find manuals and other product documents in PDF format on the Internet. Go to www.abb.com/drives and select *Document Library*. You can browse the library or enter selection criteria, for example a document code, in the search field.

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