

SINAMICS S120

Getting Started · 11/2009

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S120 Getting Started

Getting Started

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Valid as of firmware version 4.3 SP1

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
⚠ WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
⚠ CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.
CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.
NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation for the specific task, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

Purpose of the document

Purpose of this document

This documentation is aimed at beginners who want to find out more about the SINAMICS S120 drive system. The document offers a brief guide to commissioning a sample project with a simple SINAMICS S120 drive train. By following the instructions in this document, a beginner will need only a few minutes to engineer and configure the sample project and start up the motor.

Technical Support

Internet address for SINAMICS

<http://www.siemens.com/sinamics>.

EC Declaration of Conformity

EC Declaration of Conformity

The EC Declaration of Conformity can be found at:

- <http://support.automation.siemens.com>
 - for the EMC Directive under the Product/Order No. 15257461
 - for the Low-Voltage Directive under the Product/Order No. 22383669
- The relevant Siemens office of the I DT MC Business Unit of Siemens AG

Safety notices

DANGER

- Commissioning is absolutely prohibited until it has been completely ensured that the machine, in which the components described here are to be installed, is in full compliance with the provisions of the EC Machinery Directive.
- SINAMICS devices and AC motors must only be commissioned by suitably qualified personnel.
- The personnel must take into account the information provided in the technical customer documentation for the product, and be familiar with and follow the specified danger and warning notices.
- When electrical equipment and motors are operated, the electrical circuits automatically conduct a dangerous voltage.
- When the machine or system is operated, hazardous axis movements can occur.
- All of the work carried-out on the electrical machine or system must be carried-out with it in a no-voltage condition.
- SINAMICS devices with three-phase motors must only be connected to the power supply via an AC-DC residual-current-operated device with selective switching once verification has been provided that the SINAMICS device is compatible with the residual-current-operated device in accordance with IEC 61800-5-1, Section 5.2.11.2.

WARNING

- The successful and safe operation of this equipment and motors is dependent on correct transport, proper storage, installation and mounting as well as careful operator control, service and maintenance.
- For special versions of the drive units and motors, information and data in the Catalogs and quotations additionally apply.
- In addition to the danger and warning information provided in the technical customer documentation, the applicable national, local, and plant-specific regulations and requirements must be taken into account.
- Only protective extra-low voltages (PELV, DVC-A) that comply with EN 60204-1:2006 can be connected to the connections and terminals between 0 V and 48 V.

CAUTION

- The motors can have surface temperatures of over +80 °C.
- This is the reason that temperature-sensitive components, e.g. cables or electronic components may neither be in contact nor be attached to the motor.
- When attaching the connecting cables, you must ensure that:
 - they are not damaged
 - they are not under tension
 - they cannot come into contact with any rotating parts

CAUTION

- As part of routine tests, SINAMICS devices are subject to a voltage test in accordance with EN 61800-5-1. Before the voltage test is performed on the electrical equipment of industrial machines to EN 60204-1:2006, Section 18.4, all connectors of SINAMICS equipment must be disconnected/unplugged to prevent the equipment from being damaged.
- Motors should be connected-up according to the circuit diagram provided. otherwise they can be destroyed.

Note

When operated in dry areas, SINAMICS devices with three-phase motors conform to the Low-Voltage Directive 2006/95/EC.

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SINAMICS S120 drive system

1

1.1 Overview

This manual provides instructions on how to commission a simple SINAMICS S120 drive train based on a sample project. By way of introduction, this chapter of the manual gives you a brief overview of the SINAMICS S120 drive system.

It describes the following steps required to create a sample project:

Step	Action
1	Definition of requirements
2	Establishment of communication between the PG/PC and Control Unit
3	Creation of the sample project with the help of a Wizard
4	Automatic configuration of the sample project
5	Operation of the PG/PC control panel for driving the motor

1.2 SINAMICS S120 system overview

The SINAMICS S120 drive system consists of a variety of different modules. It is constructed of infeeds, filters, motor power units, modules for additional functions, Control Units plus standard and special versions of rotating and linear motors.

SINAMICS S120 drive system

Line-side components
 Line reactors
 Line filters
 Active Interface Modules



Line Modules
 Basic Line Modules
 Smart Line Modules
 Active Line Modules



Power supply
 For applicable 24 V device, see Catalog KT 10.1



DC link components
 Braking Module
 Braking resistors
 Capacitor Module
 Control Supply Module



Control Units
 CU310
 CU320



Control Units SIMOTION
 D410
 D425
 D435
 D445
 CX32



Motor Modules
 Single Motor Modules
 Double Motor Modules




Sensor Modules
Terminal Modules
DRIVE-CLiQ Hub



Power Modules




Load-side components
 Motor reactors
 Sinusoidal filters




AC motors

Synchronous motors
 1FT6 motors
 1FT7 motors
 1FK7 motors
 1FS6 motors
 1FW3 torque motors
 Gear units
 Geared motors
 Linear motors




Asynchronous motors
 1PH7 motors
 1PL6 motors
 1PH4 motors



Connection system

MOTION-CONNECT
 Power cables
 Signal cables



G_D211_EN_00077

2

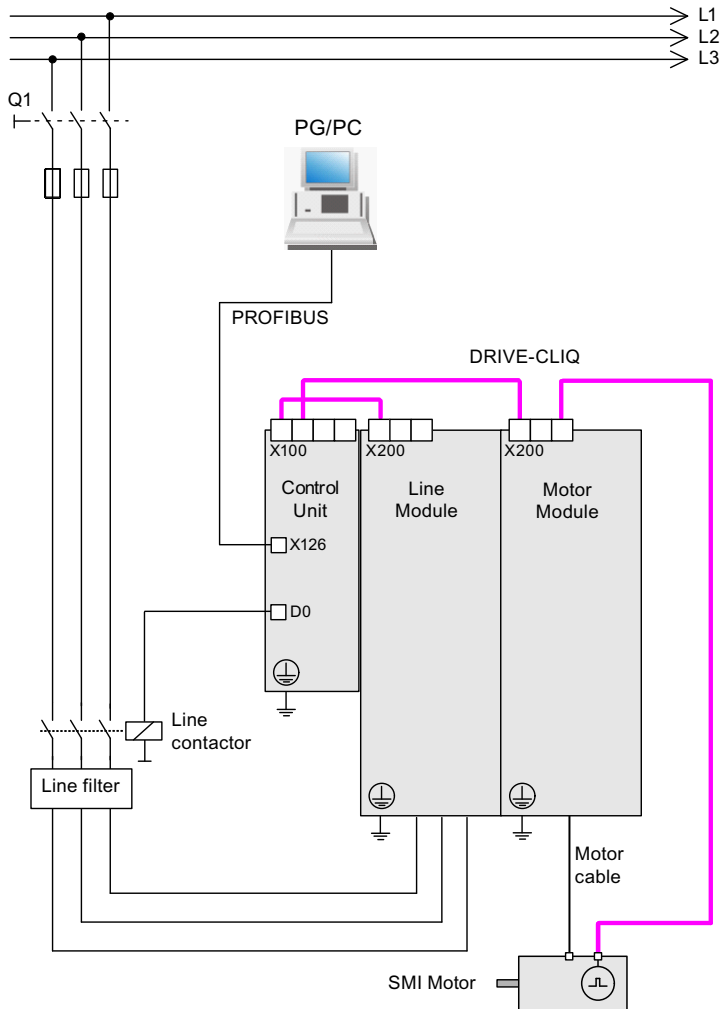
Requirements

2.1 Hardware and software components

- A CU320-2 DP Control Unit, firmware version 4.3 SP1 or higher, with integrated PROFIBUS interface
- A Line Module
- A line filter
- A Motor Module
- A motor with built-on encoder evaluation unit with DRIVE-CLiQ interface (SMI motor)
- A standard PC with Windows XP as programming device (PG/PC), with pre-installed STARTER commissioning tool (firmware version 4.1.5 HF5 or higher)
- Motor and power cables
- DRIVE-CLiQ cables
- PROFIBUS interface CP5511 installed in the PG/PC
- PROFIBUS connection between the PG/PC and the Control Unit

2.2 Wiring the components

The assembly and wiring of components according to the sample project depicted below must always be undertaken by qualified specialists. For the purpose of commissioning this sample project, it is not permissible to connect other components or drive loads to the motor.



Note

For information about assembling and wiring the components of the sample project, please refer to the relevant chapters in the SINAMICS S120 Equipment Manual GH2.

Creating a drive project

This chapter explains how to create a new drive project. You set up a sample project using the STARTER commissioning tool. You then transfer the sample project to the Control Unit of the real drive over a communications interface.

PROFIBUS has been selected as the data exchange system between the programming device (PG/PC) and the Control Unit (CU).

3.1 Setting the communications interface

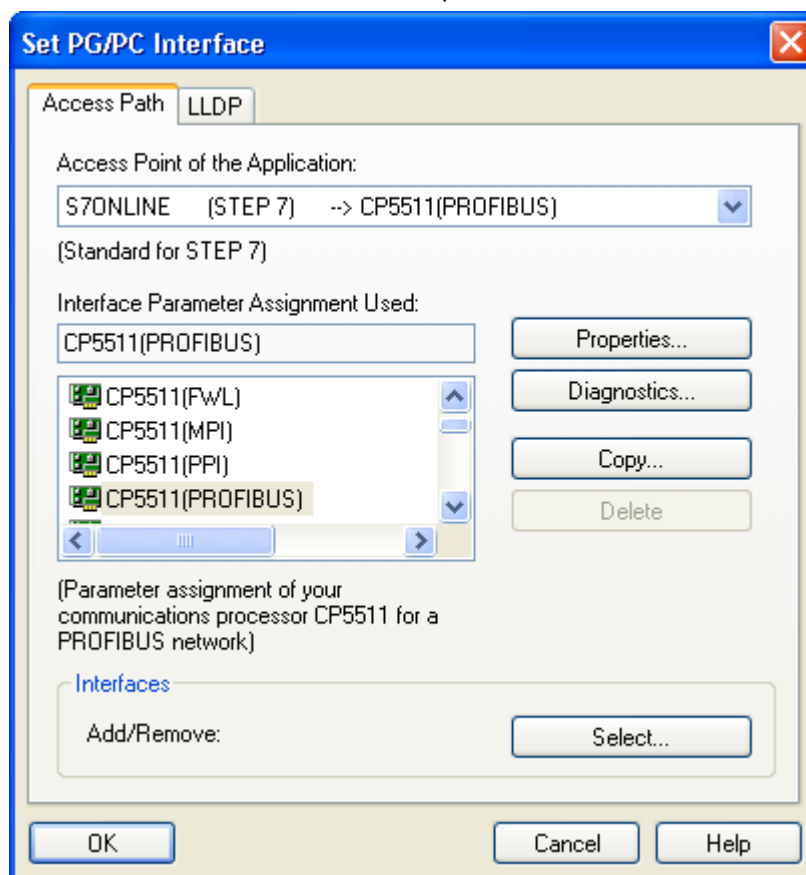
1. Double-click on the icon to launch the STARTER commissioning tool:



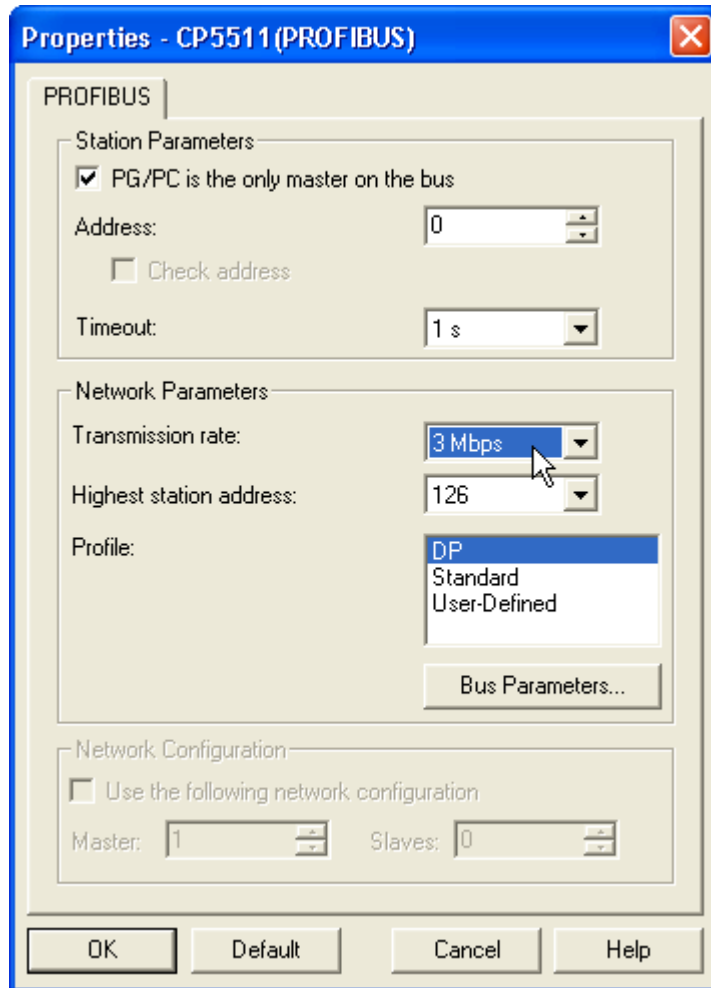
The main window of the STARTER application is displayed.

2. Click on menu command **Options > Set PG/PC Interface**.

The "Set PG/PC Interface" window opens:



3. In the dropdown list "Access Point of the Application", select entry "DRIVES (STARTER, SCOUT) --> CP5511(PROFIBUS)".
4. Click on button "Properties" in order to set the interface.
The "Properties - CP5511(PROFIBUS)" window opens as well.



5. Set the address to "0".
A data transmission rate of 1.5 Mbit/s or above is recommended.
6. Click on "OK".
The "Properties" window closes.

7. Click on button "Diagnosis" in the "Set PG/PC interface" window.

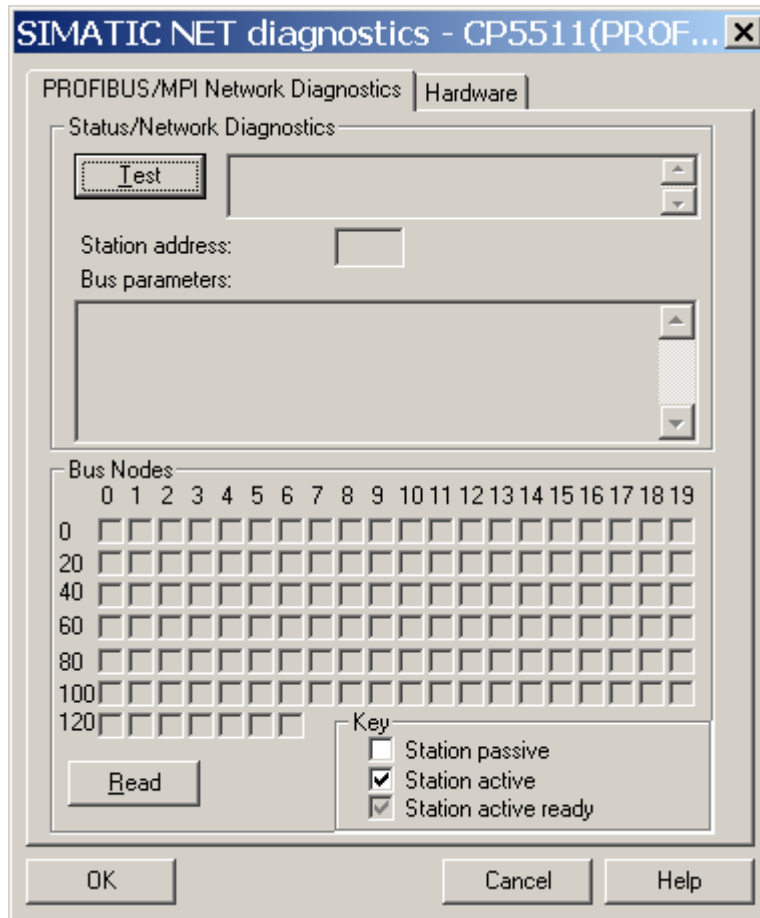
The diagnosis window opens as well. Check the function and settings of the interface in this window.

8. Click on button "Test".

The status of the PROFIBUS interface is displayed.

9. Click on "Read".

The status of the connected stations is displayed according to the legend.



10. Click on "OK" in order to close the diagnosis window.

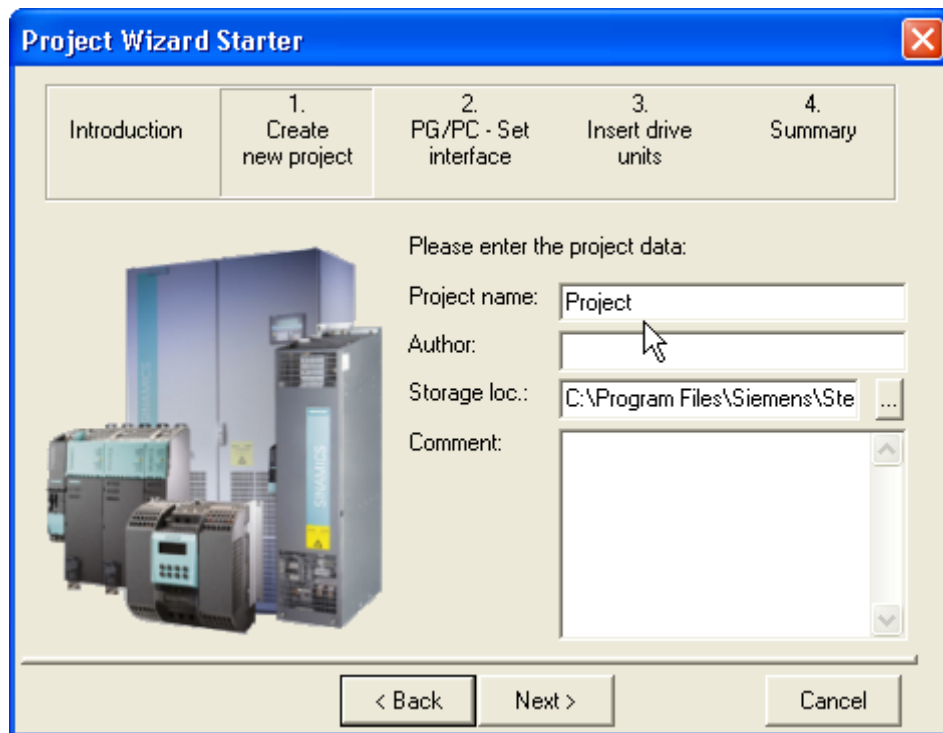
11. Click on "OK" to exit from the "Set PG/PC interface" window.

3.2 Creating a new drive project

The project wizard will guide you through all the steps necessary to create and set up a new drive project.

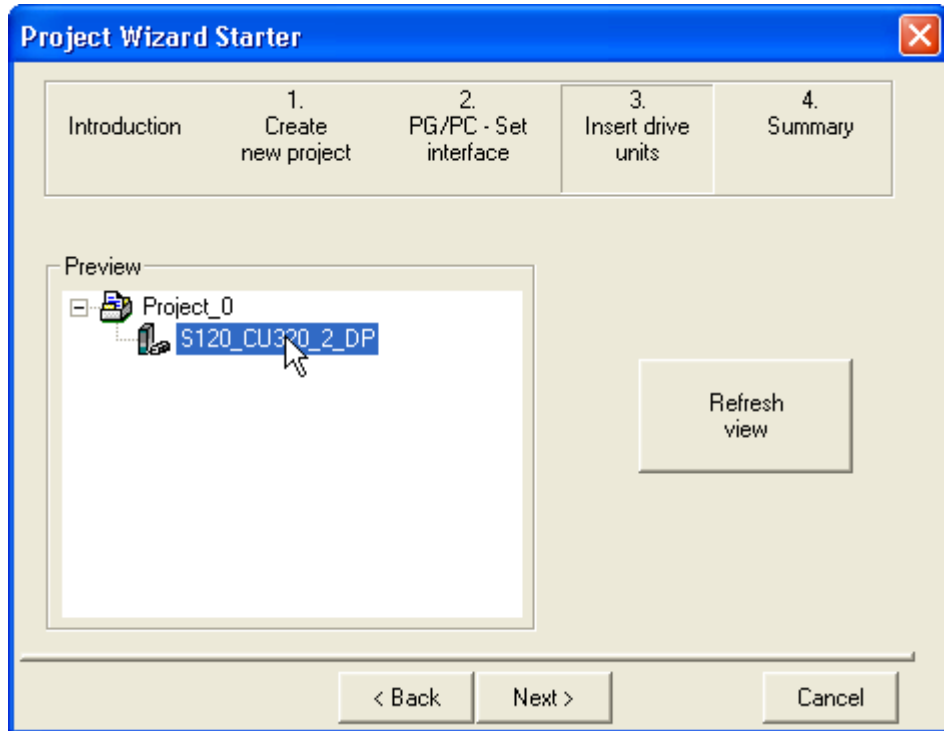
Sequence

1. Click on menu option **Project > New with Wizard**.
The main screen (Introduction) of the project wizard is displayed.
2. Click on button "Find drive units online...".
The project wizard continues to step 1 "Create new project".
3. Enter a name for your project, e.g. "Sample Project", in the project name field.



4. Click on "Continue >".
The project wizard continues to step 2 "PG/PC - Set interface".

5. Click on "Continue >".
The project wizard continues to step 3 to search for drive units. The drive units found are displayed in the preview box.



6. Select the drive unit "S120_CU320_2_DP".
7. Click on "Continue >".
The project wizard continues to step 4 to display a summary of your project settings.
8. Click on button "Complete".
The project wizard closes the window. The project navigator opens and lists the detected drive unit under the sample project.

Configuring your drive project

4.1 Restoring the factory settings

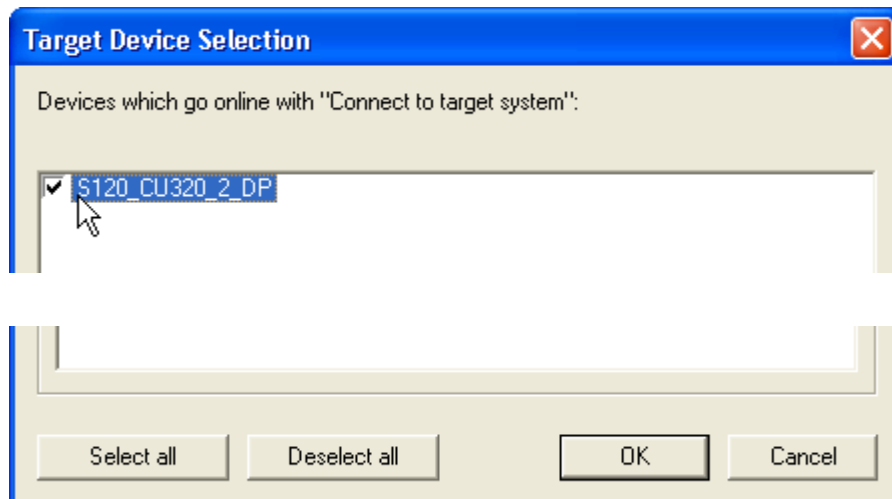
In order to restore the drive to a defined state, it is recommended that you reset the drive parameters to their "factory settings" or defaults before the drive is commissioned.

Sequence

1. Select the menu command **Project > Connect to target system**.

The window "Target Device Selection" opens and displays a list of the detected drive units.

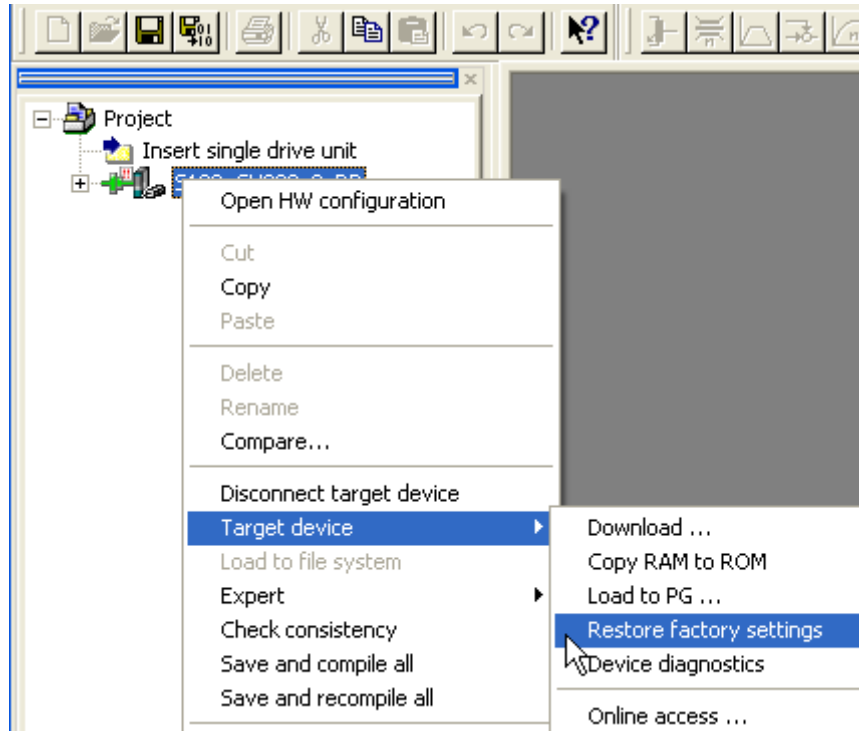
2. Activate the check box " S120_CU320_2_DP " and click on "OK".



The PG/PC establishes the link to the Control Unit. It then performs an "Online/offline comparison". The result is displayed in a window.

3. Click on the "Close" button in the results window.

4. Select drive object S120_CU320_2_DP with the right-hand mouse button and select command **Target device > Restore factory settings** in the context menu.



5. Click on "OK" to confirm the prompt.

The PG/PC sets the drive parameters to their factory settings. The new status is transferred to the memory card of the CU320_2_DP Control Unit.

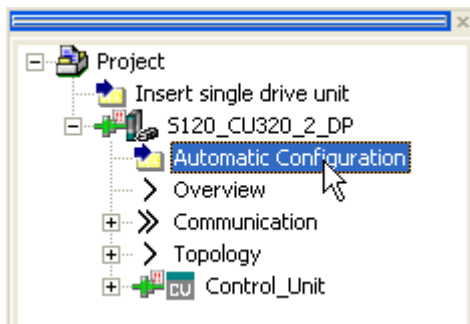
The factory settings are now restored and the drive is in a defined state.

4.2 Configuring the drive units

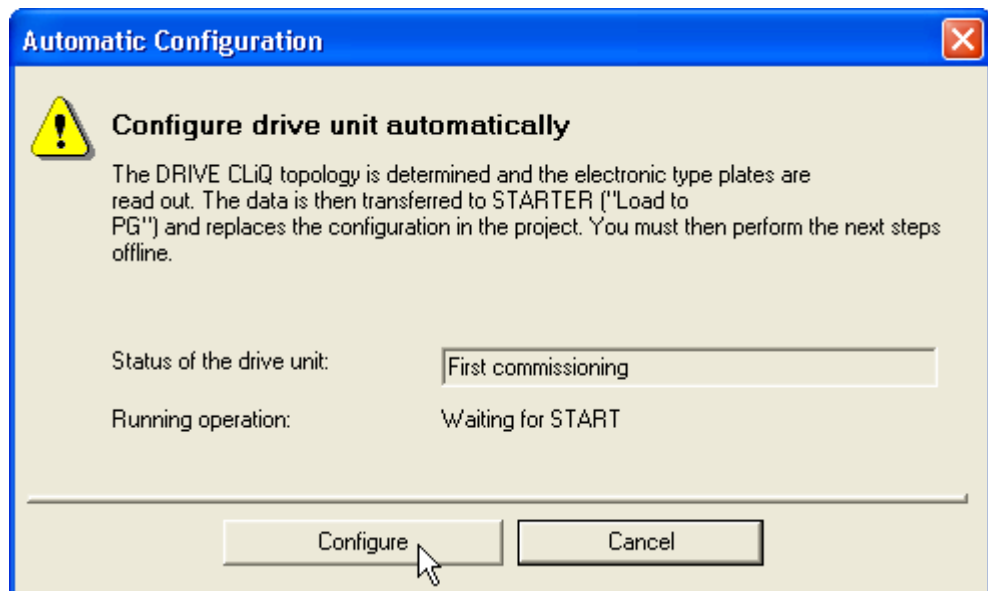
In this chapter, a link is established between the connected drive unit and the S120_CU320_2_DP, and the drive unit is configured for operation.

Sequence

1. In the project navigator, click on the "+" symbol before the entry "S120_CU320_2_DP".
A list of the drive units in this drive train is displayed.

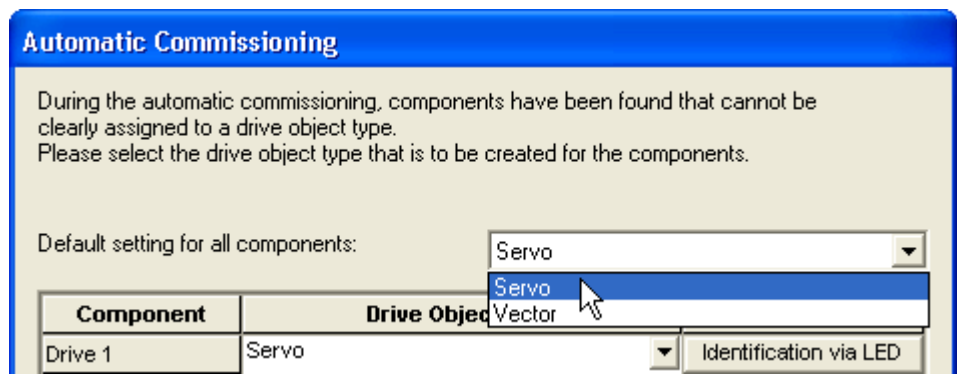


2. Double-click on option "Automatic configuration" in the project navigator.
The following information window is displayed:

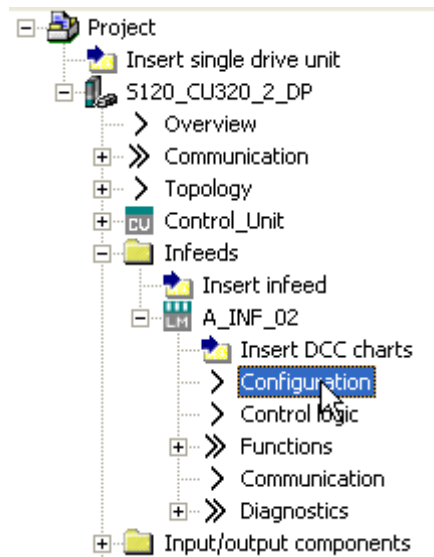


3. Click on button "Configure".

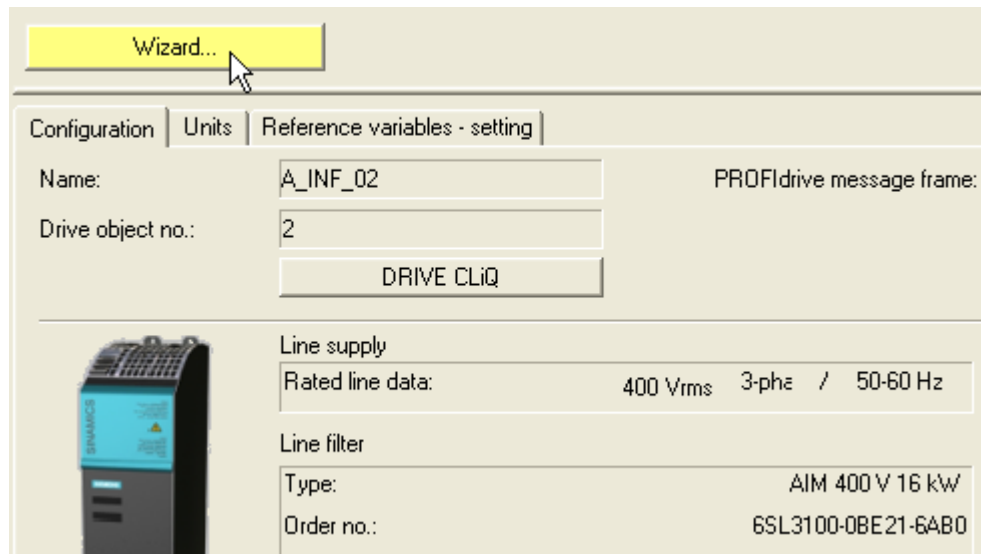
The Control Unit searches for connected drive units over the DRIVE-CLiQ interface and finds a drive in the sample project.



4. Select the entry "Servo" from the dropdown list "Default setting for all components".
The drive in the sample project will now be controlled as a servo drive.
5. Click on button "Create".
The automatic configuration process commences. When the process is complete, the window "Automatic configuration completed" is displayed.
6. To continue configuration, click on button "Go OFFLINE".
7. In order to select the line filter, double-click on option "Infeeds > Infeed_1 > Configuration" in the project navigator.



The window for infeed configuring is displayed:



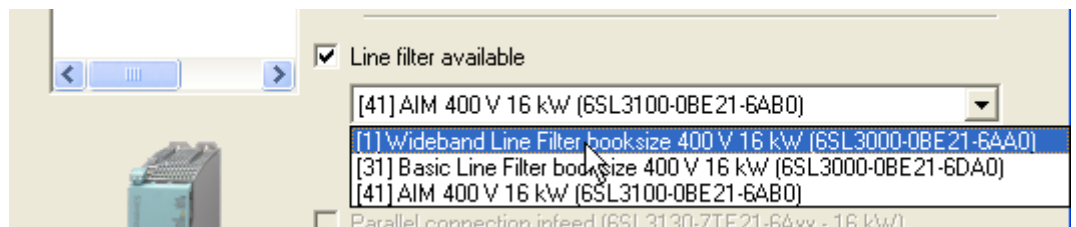
8. Click on button "Wizard..."

The window "Configuration - S120_CU320_2_DP - infeed drive object" is displayed.

9. Click "Continue >".

The window "Configuration - S120_CU320_2_DP - infeed drive object - additional data" is displayed.

10. In the dropdown list under the check box "Line filter available", select option "[1] Wideband Line Filter ...".



11. Click "Continue >".

The window "Configuration - S120_CU320_2_DP - process data exchange ..." is displayed.

Note:

Don't change anything!

12. Click on "Continue >".

The summary view opens.

13. Click "Complete".

You will now exit the wizard.

14. In order to transfer the manually changed data to the drive system, select menu command **Target system > Download > Project to target system**.

The data are copied to the Control Unit.

You have now completed configuring the infeed.

4.3 Configuring the Motor Module

The Control Unit has detected the connected Motor Module and the SMI motor during the automatic configuration process. The device data have been transferred to the Control Unit. The Control Unit has automatically entered the correct device data into the parameters required to operate the components.

The sample project is now ready to commission.

Commissioning a drive

5

Control panel functions

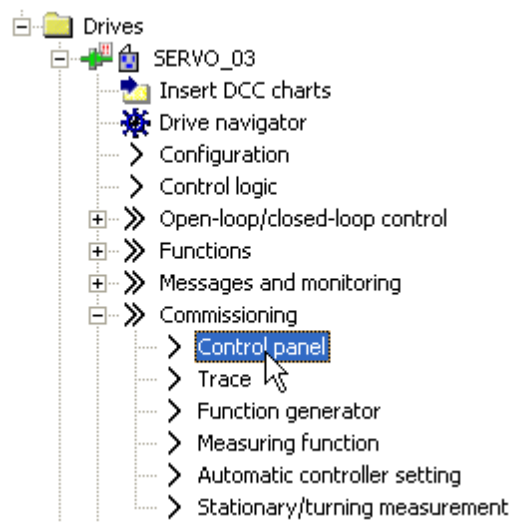
The control panel allows you to perform basic tasks for operating, monitoring, and testing the drive. Virtual START/STOP and JOG keys are provided for operation of the drive, along with various diagnostic functions.

References

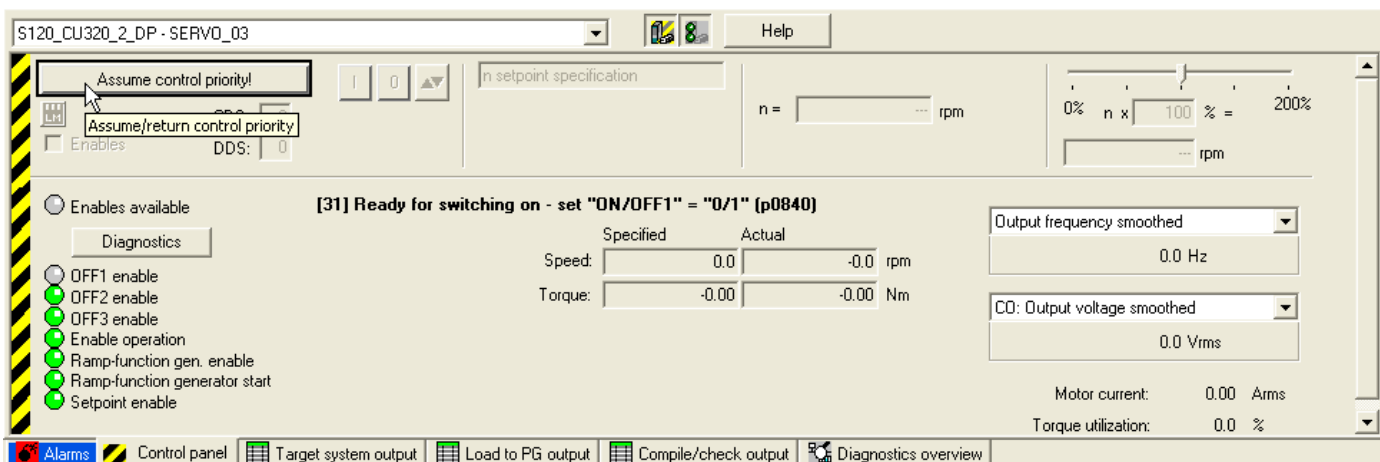
For more information about these functions, refer to the SINAMICS S120 Function Manual.

Operation with the virtual control panel

1. Double-click on option "S120_CU320_2_DP > Drives > Servo_03 > Commissioning > Control Panel" in the project navigator:

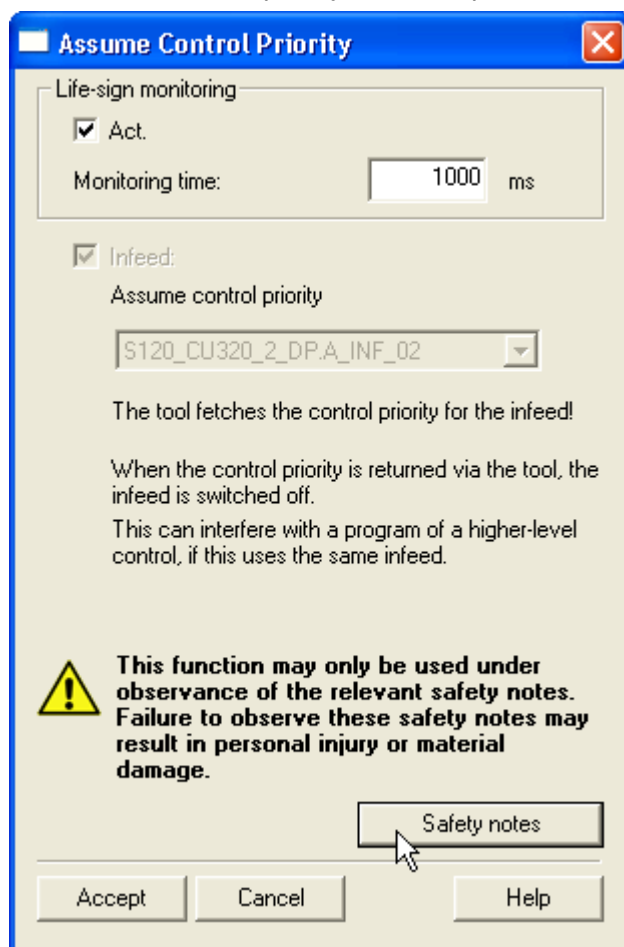


The control panel window is displayed.



2. Click on button "Assume control priority".

The "Assume control priority" window opens in addition.

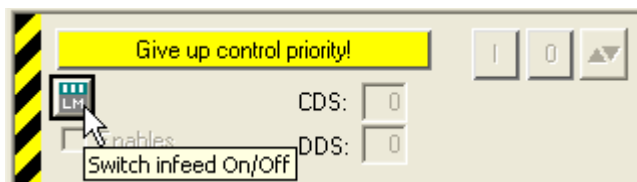


3. Click on button "Safety notes".

Another window containing the safety notes is displayed.

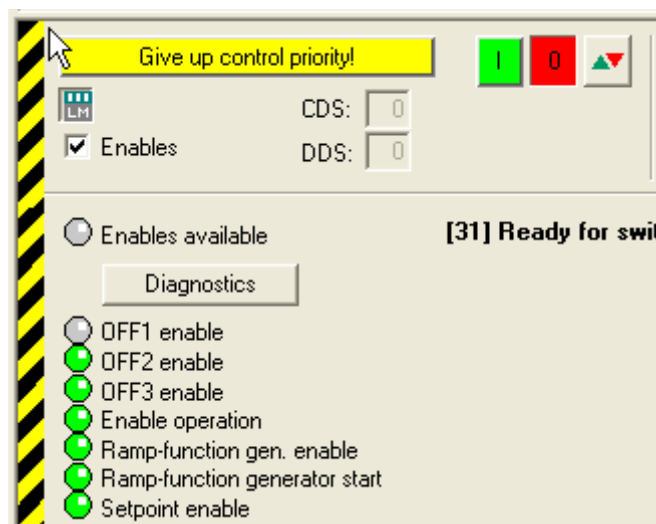


4. Read the notes and then close the window by clicking on the "Close" button.
5. In the "Assume control priority" window, click on button "Accept".
The window is closed and the control panel is activated.
6. Click on button "LM" (Line Module).



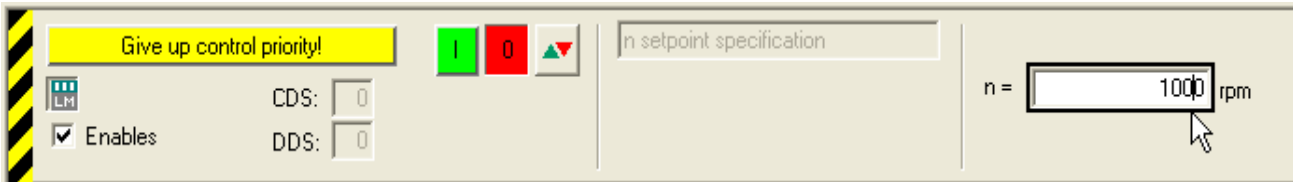
The infeed charges the DC link. A window with progress bar indicates the charging status. The drive is enabled as soon as the DC link is fully charged. The check box "Enables" then becomes available for selection.

7. Activate the check box "Enable signals".

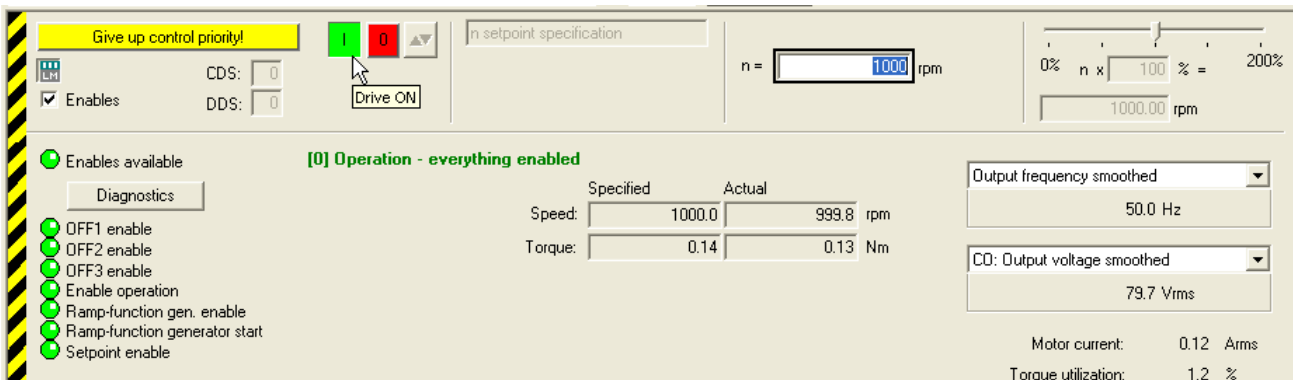


Buttons "I" and "O" become available for selection.

8. Enter a suitable speed for the motor in input field "n = ", e.g. 1000.



9. Click on button "I".



The motor accelerates to the selected example speed, i.e. to 1000 rpm.

10. To shut the motor down, click on the "O" button or hit the space bar on the keyboard.

The drive coasts to a standstill.

11. By clicking on button "Give up control priority !", you relinquish control priority.

12. By selecting menu command **Project > Disconnect from target system**, you sever the communication link between the PG/PC and the Control Unit.

13. Save the sample project to the local hard disk of the PG/PC by selecting menu command **Project > Save**.

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