

Application description • 11/2014

SINAMICS G: Speed control of a G110M, G120, G120C, G120D or G120P using S7-300/400 (STEP 7 V5) with PROFNET, Safety Integrated and HMI

SINAMICS G110M / G120 / G120C / G120D / G120P (with FW \geq 4.6)
SIMATIC S7-300/400

Warranty and liability

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1 Task

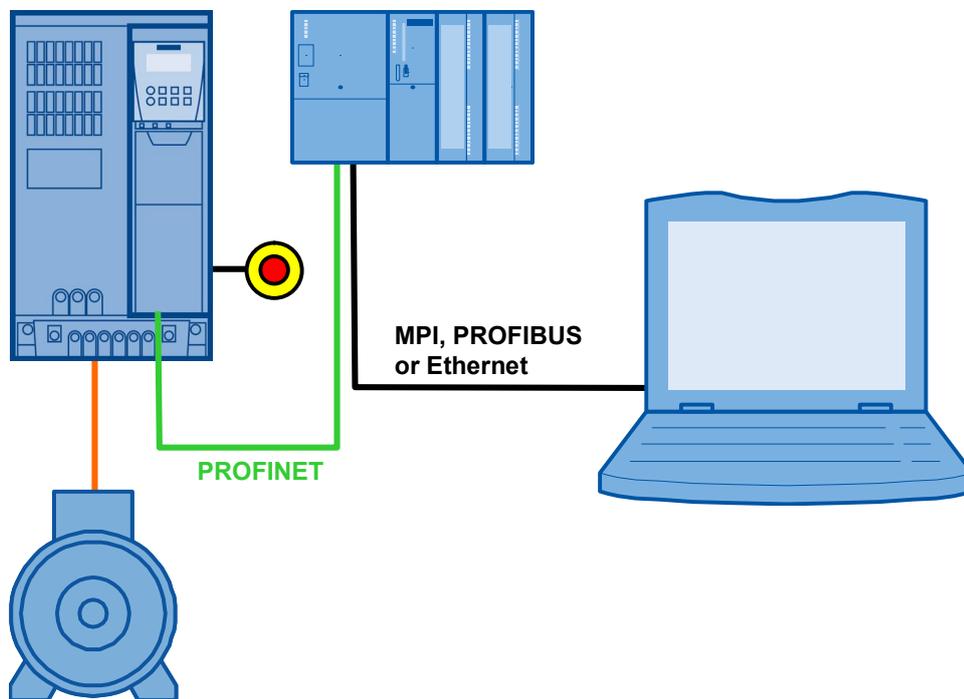
The SIMATIC S7 300/400 can be operated as a PROFINET controller. A SINAMICS G110M, G120, G120C, G120D or G120P can be used here as PROFINET device and be controlled by the SIMATIC S7-300/400.

This application example illustrates how to configure SINAMICS G110M/G120/G120C/G120D/G120P and SIMATIC S7-300/400, start it up, and access process data and parameters.

Overview of the automation task

The following figure gives an overview of the automation task:

Figure 1-1



Requirements for the automation task

Table 1-1

Requirement	Explanation
Access to process data	The SINAMICS G shall be switched on and off via the control word, and the speed value is to be specified as fast as possible.
Access to parameters	Read and write access from/to the parameters in the SINAMICS G by the SIMATIC S7-300/400 (in this example: ramp-up and ramp-down time) should be possible and be performed using as few resources as possible, i.e. small communication load.
Safety function of the SINAMICS G	The SINAMICS G converters have the option of performing a fail-safe shutdown (e.g. emergency-stop).

2 Solution

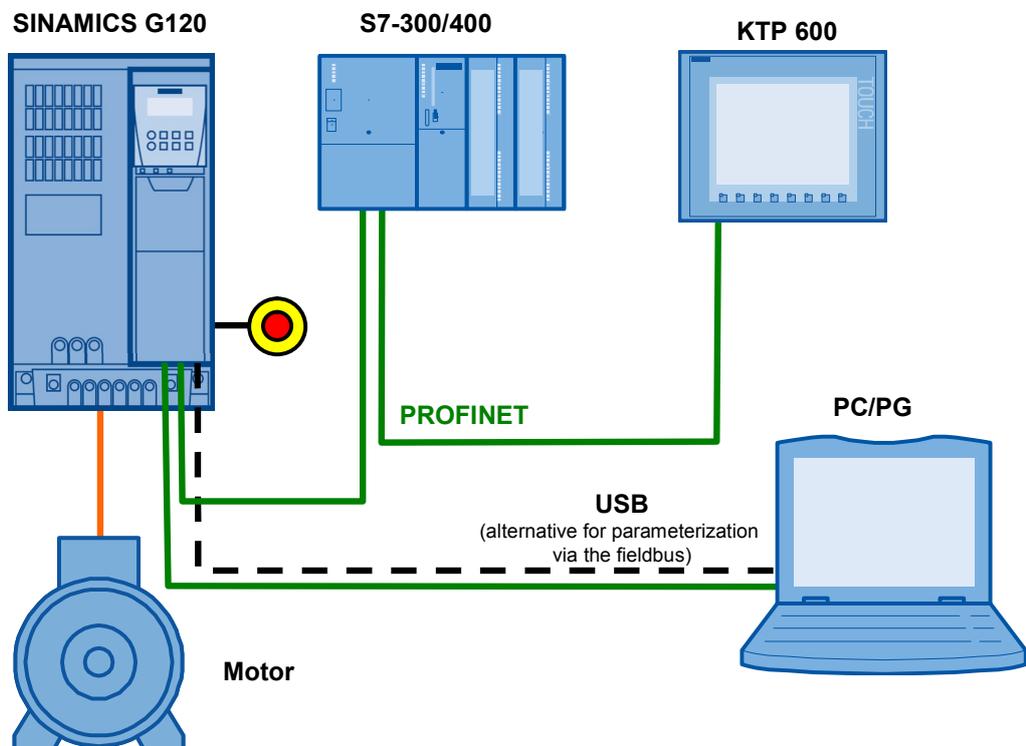
This application example gives an example of how to connect a SINAMICS G110M, G120, G120C, G120D or G120P to a SIMATIC S7-300. It uses blocks which can be directly applied to your own application.

2.1 Overview of the general solution

Schematic layout

The following figure gives a schematic overview of the most important components of the solution:

Figure 2-1



The example shows you how ...

- ...the SIMATIC S7-300/400 controller is configured.
- ...the communication is programmed in the SIMATIC S7-300/400 controller.
- ...the SINAMICS G converter is configured using STARTER.

NOTICE

This example is only valid for frequency converter SINAMICS G110M with FW4.7 and SINAMICS G110M, G120, G120C, G120D and G120P as of FW4.6.

2.2 Description of the core functionality

2.2.1 Configuring the communication

TIA (Totally Integrated Automation)

The program for SIMATIC S7-300/400 and the configuration of the SINAMICS G are centrally stored in a STEP 7. The respectively required editors are called up via the STEP 7 Manager.

SIMATIC S7-300/400

SIMATIC S7-300/400 in this example is programmed with STEP 7 V5.

In HW Config, the SIMATIC S7 the stations connected via PROFINET, such as SINAMICS G, are configured, and the communication is defined. One of several message frame types can be selected here for the data exchange. It is important that the same message frame type is selected here as for the SINAMICS G configuration.

When inserting SINAMICS G into the SIMATIC project, the I/O addresses used by the SIMATIC S7-300/400 for accessing the SINAMICS G are also specified.

SINAMICS G

The configuration of SINAMICS G is performed using the STARTER commissioning tool.

For SINAMICS G one of several message frame types can be selected for the data exchange. This defines which data is transmitted or received in which order. It is important that the same message frame type is selected when configuring the SIMATIC S7-300/400.

2.2.2 Data exchange

Data exchange between SINAMICS G and SIMATIC S7-300/400 occurs in two areas:

- Process data,
i.e. control word(s) and setpoint(s), or status word(s) and real value(s)
- Parameter area,
i.e. reading/writing of parameter values

Note

The two areas, process data and parameters, are independent from each other and can also be used individually.

Cyclic process data exchange

Process data is transferred cyclically, which means in each bus cycle, in order for it to be transferred as quickly as possible.

The SIMATIC S7-300/400 sends the control word and the setpoint value to SINAMICS G and in return receives the status word and the actual value.

Depending on the message frame type, two further setpoint or real values, or extended control or status words can be transferred respectively. The available message frame types are listed in [chapter 7.4.1](#) of the SINAMICS G120C operating instructions ([/7/](#)), for example.

- On the SIMATIC S7-300/400 side, the process data is supplied as I/O input or output words.
- In the SINAMICS G, the configuration specifies which bits of the control word are used and which data is transmitted to the SIMATIC S7-300/400.

Acyclic data exchange (parameter access)

To be able to transfer parameters, message frame types were also defined where additionally four words are provided for a parameter transfer. Since these four words, like the process data, are always transmitted, a permanent communication load is produced even though the parameters themselves are generally only rarely transferred.

PROFINET also provides the option of using an acyclic data exchange in addition to the cyclic data exchange, which is only inserted on demand.

This makes it possible to transfer the parameter area acyclically on demand, without creating a permanent communication load. The acyclic transfer takes clearly longer than the cyclic transfer of the process data.

In this example an acyclic data exchange is used for parameter access.

- In the SIMATIC S7-300/400, parameter jobs are sent to the SINAMICS G by writing data record 47, and the response of the SINAMICS G is read in by reading data record 47.
- No particular action is required on the SINAMICS G side.

Note

When using a CP342-1, the parameters of the SINAMICS G cannot be accessed with the acyclic data exchange.

2.3 Hardware and software components used

The application document was generated using the following components:

General hardware components

Table 2-1 Hardware components

Component	Qty.	Order number	Note
CPU 315-2 DP/PN	1	6ES7315-2EH14-0AB0	or other S7-300/400 CPU with PPOFIBUS, which supports data record routing, see /9/
MMC 128kB	1	6ES7953-8LG30-0AA0	or larger MMC
SM 323	1	6ES7323-1BH01-0AA0	or another module with DIs
SIMATIC Panel KTP600 Basic color PN	1	6AV6647-0AD11-3AX0	This panel is optional.
SINAMICS IOP oder SINAMICS BOP-2	1	6SL3255-0AA00-4JA1 6SL3255-0AA00-4CA1	This SINAMICS operator panel is optional.
SINAMICS G120 PC converter connection kit -3.28yd	1	6SL3255-0AA00-2CA0	Includes STARTER on DVD and USB cable. As an alternative, the SW can be downloaded (/6/) and a standard micro USB cable be used.
PROFINET connector plug	4	6GK1901-1BB10-2AA0	Two for the PG/PC connection with the S7-CPU and two for the optional connection between S7-CPU and HMI.
PROFINET line		6XV1840-2AH10	
Motor	1	1LA7083-4AA60	

Hardware components when using a SINAMICS G110M

Table 2-2 Hardware components

Component	Qty.	Order number	Note
SINAMICS G110M	1	6SL3517-1BE12-3AM0 (PM240M)	oder any other G110M power module
	1	6SL3544-0TB02-1FA0 (CU240M PN)	oder any other G110M PROFINET control unit
PROFINET connector plug M12	2	6GK1901-0DB20-6AA0 or 3RK1902-2DA00	straight or angled
Connector and cable for network and motor connections		see /10/	

2 Solution

2.3 Hardware and software components used

Hardware components when using a SINAMICS G120

Table 2-3 Hardware components

Component	Qty.	Order number	Note
SINAMICS G120	1	6SL3244-0BB12-1FA0 (CU 240E-2 PN) und	or CU250S-2 PN (6SL3246-0BA22-1FA0)
	1	6SL3224-0BE22-2UA0 (PM240)	
PROFINET connector plug	2	6GK1901-1BB10-2AA0	Two additional ones, to connect the SINAMICS G120 with S7-300/400 and HMI

Hardware components when using a SINAMICS G120C

Table 2-4 Hardware components

Component	Qty.	Order number	Note
SINAMICS G120C	1	6SL3210-1KE14-3UF1	or any other SINAMICS G120C PN
PROFINET connector plug	2	6GK1901-1BB10-2AA0	Two additional ones, to connect the SINAMICS G120 with S7-300/400 and HMI

Hardware components when using a SINAMICS G120D

Table 2-5 Hardware components

Component	Qty.	Order number	Note
SINAMICS G120D	1	6SL3544-0FB20-1FA0 (CU 240D-2 PN) and	or any other PM250D power unit
	1	6SL3525-0PE21-5AA1 (PM250D)	
PROFINET connector plug M12	2	6GK1901-0DB20-6AA0 or 3RK1902-2DA00	straight or angled
Connector and cable for network and motor connections		see /10/ .	

Hardware components when using a SINAMICS G120P

Table 2-6 Hardware components

Component	Qty.	Order number	Note
SINAMICS G120P	1	6SL3243-0BB30-1FA0 (CU 230P-2 PN) and	or any other PM230 power unit
	1	6SL3223-0DE21-1BA0 (PM230)	
PROFINET connector plug	2	6GK1901-1BB10-2AA0	Two additional ones, to connect the SINAMICS G120 with S7-300/400 and HMI

2 Solution

2.3 Hardware and software components used

Software components

Table 2-7 Software components

Component	Qty.	Order number	Note
SIMATIC STEP 7 V5.5 SP4	1	Floating License 6ES7810-4CC10-0YA5	
STARTER V4.4	1	6SL3072-0AA00-0AG0	Free download: see /6/
WinCC flexible Version: 2008 SP3	1	6AV6613-0AA51-3CA5	

Sample files and projects

The following list includes all files and projects used in this example [/4/](#).

The project files only differ in the SINAMICS drives configured in it. The documentations apply for all types of the SINAMICS drives projected.

Table 2-8 Sample files and projects

Component	Note
58820849_SINAMICS_G110M_at_S7-300400-PN_CODE_v23.zip	STEP 7 project with SINAMICS G110
58820849_SINAMICS_G120_E_at_S7-300400-PN_CODE_vnn.zip ¹	STEP 7 project with SINAMICS G120 and CU240E-2 PN
58820849_SINAMICS_G120_EF_at_S7-300400-PN_CODE_vnn.zip ¹	STEP 7 project with SINAMICS G120 and CU240E-2 PN F
58820849_SINAMICS_G120_S_at_S7-300400-PN_CODE_vnn.zip ¹	STEP 7 project with SINAMICS G120 and CU250S-2 PN
58820849_SINAMICS_G120C_at_S7-300400-PN_CODE_vnn.zip ¹	STEP 7 project with SINAMICS G120C
58820849_SINAMICS_G120D_CU240D_at_S7-300400-PN_CODE_vnn.zip ¹	STEP 7 project with SINAMICS G120D and CU240D-2 PN
58820849_SINAMICS_G120D_CU240DF_at_S7-300400-PN_CODE_vnn.zip ¹	STEP 7 project with SINAMICS G120D and CU240D-2 PN
58820849_SINAMICS_G120P_at_S7-300400-PN_CODE_vnn.zip ¹	STEP 7 project with SINAMICS G120P
58820849_SINAMICS_G120_at_S7-300400_SHORT-DOKU_v23_en.pdf	Short documentation for experienced users
58820849_SINAMICS_G120_at_S7-300400-PN_DOKU_v23_en.pdf	This document
¹ nn = 22: for SINAMICS G120 with FW 4.6 nn = 23: for SINAMICS G120 with FW 4.7	

CAUTION The example projects have been designed for usage with the example components listed in Table 2-1. Converter and/or motor can be damaged or destroyed if a SINAMICS G with a different output or a different motor is connected, without adjusting the respective parameters.

3 Setting up and Commissioning the Application

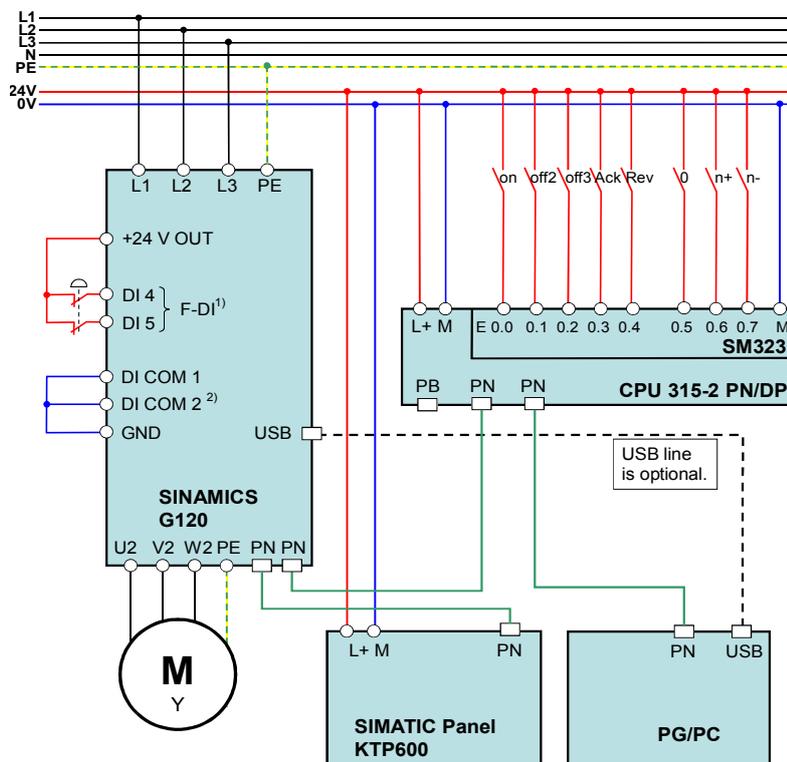
Notes

In the screenshots and graphics below, a general project name “G120_at_S7-300400”, or “SINAMICS G120” respectively, is used. In example projects, the respectively used SINAMICS type is specified.

3.1 Wiring

The figure below shows the hardware setup of the application.

Figure 3-1



- 1) F-DI not for CU230P-2 PN
- 2) For CU250S-2: DI5-

Notes

- The setup guidelines in the SINAMICS G manual (see [/7/](#)) and SIMATIC must generally be followed.

3.2 IP addresses and PN names

The following IP addresses and device names are used in the sample projects:

Table 3-1

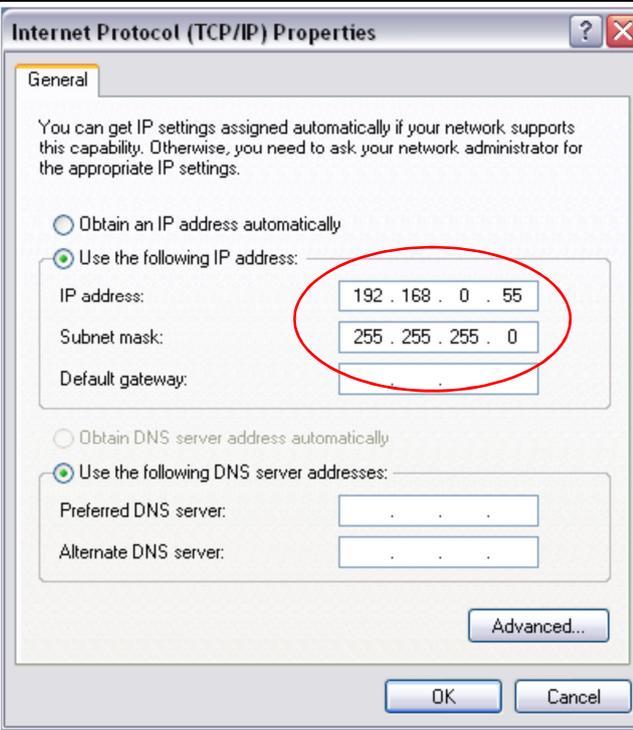
IP	Component	Device Name
192.168.0.1	S7-CPU	S7-CPU
192.168.0.2	G110M CU230P-2 PN CU240E-2 PN CU240E-2 PN F CU240S-2 PN CU240D-2 PN CU240D-2 PN F G120C PN	G110M G120xCU230Px2 G120xCU240Ex2 G120xCU240Ex2xF G120xCU250Sx2xV G120xCU240Dx2 G120xCU240Dx2xF G120C
192.168.0.3	KTP600	KTP600
192.168.0.200	PG/PC	

By default STEP 7 enters the device's Short Description for the device name. But the user can modify it as needed. The device name is not case sensitive.

The network mask is always 255.255.255.0 and no router is used.

3.3 Settings on PG/PC

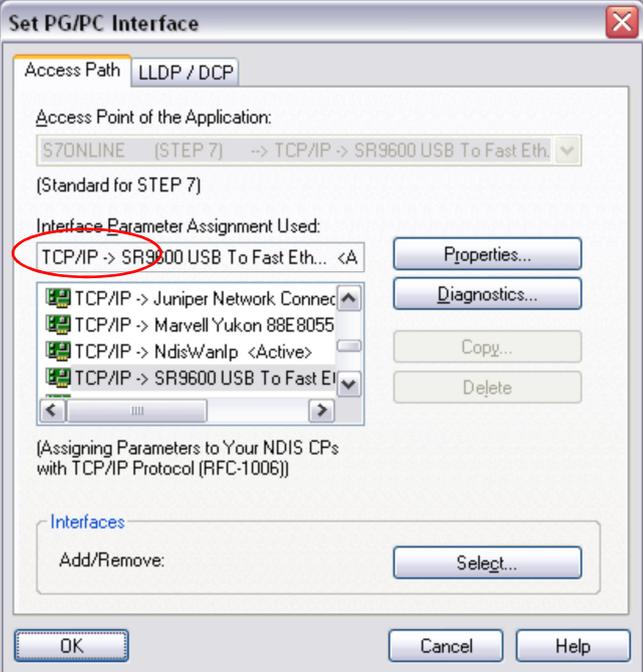
Table 3-2

Action	Screenshots / Remarks
Set the fixed TCP/IP address 192.168.0.200 and the network mask 255.255.255.0 in the Windows settings for the network card to be used. You may also enter any other IP address (192.168.0.x).	

3.4 Downloading the SIMATIC program

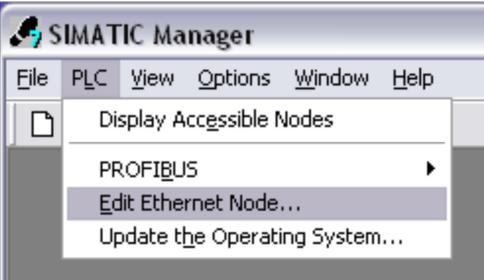
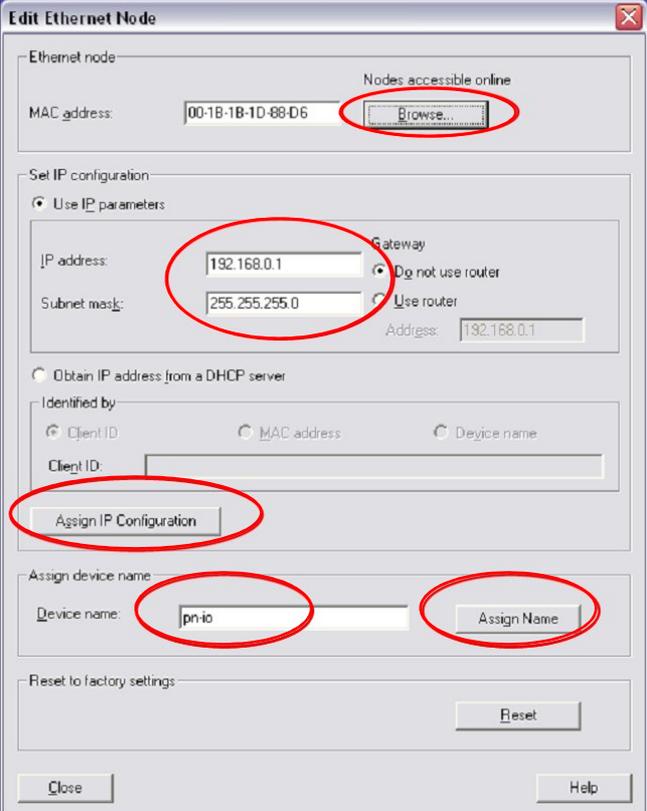
This chapter describes the steps for the installation of the example code.

Table 3-3

No.	Action	Screenshots / Remarks
1.	Connect the controller with the SIMATIC S7-300/400 using a network cable.	You can connect both devices directly or via a switch.
2.	Start STEP 7.	
3.	<p>Via "Extras > Set PG/PC Interface..." you open the settings of the online interface.</p> <p>Select the "TCP/IP network card" with the network card used by you.</p>	

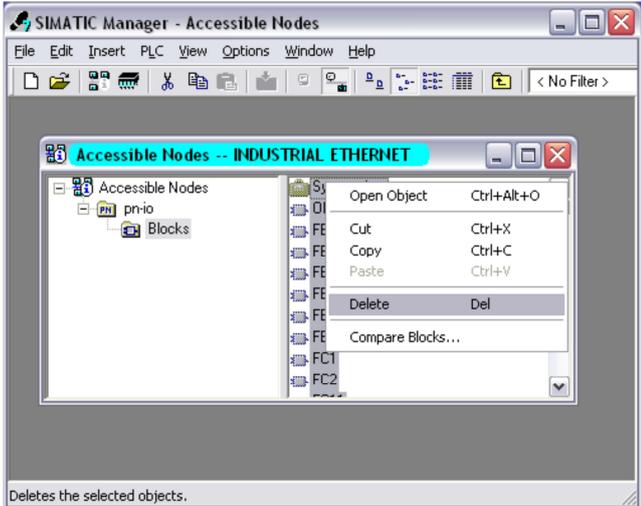
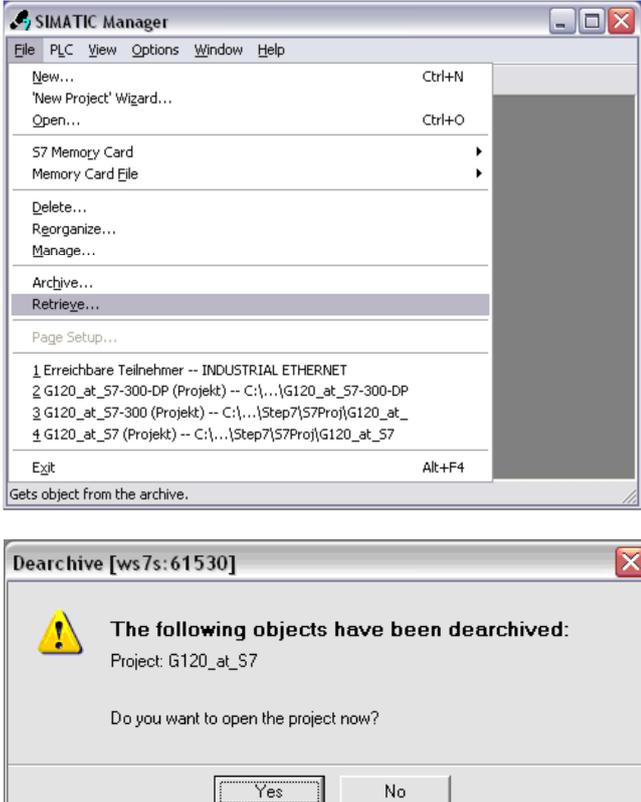
3 Setting up and Commissioning the Application

3.4 Downloading the SIMATIC program

No.	Action	Screenshots / Remarks
4.	Call up the "Edit Ethernet Node..." dialog.	 <p>The screenshot shows the SIMATIC Manager application window. The 'View' menu is open, and the 'Edit Ethernet Node...' option is highlighted. Other menu items include 'Display Accessible Nodes', 'PROFIBUS', and 'Update the Operating System...'.</p>
5.	<ul style="list-style-type: none"> Click on "Browse..." Select the CPU and click OK. Enter the IP address 192.168.0.1 and the subnet mask 255.255.255.0, and click on "Assign IP Configuration". Enter the device name "s7-cpu" and click on "Assign Name". Exit the dialog by clicking "Close".	 <p>The screenshot shows the 'Edit Ethernet Node' dialog box. The 'Browse...' button in the 'Nodes accessible online' section is circled in red. In the 'Set IP configuration' section, the 'IP address' field (192.168.0.1) and 'Subnet mask' field (255.255.255.0) are circled in red. The 'Assign IP Configuration' button is also circled in red. In the 'Assign device name' section, the 'Device name' field (pn-io) and the 'Assign Name' button are circled in red. Other elements include the 'Reset' button and 'Close'/'Help' buttons at the bottom.</p>
6.	Click on "Accessible Nodes".	 <p>The screenshot shows the SIMATIC Manager application window with the title 'SIMATIC Manager - G120_at_S7-300-DP'. The toolbar is visible, and the 'Accessible Nodes' icon (represented by a network symbol) is highlighted with a mouse cursor. A tooltip labeled 'Accessible Nodes' is displayed below the icon.</p>

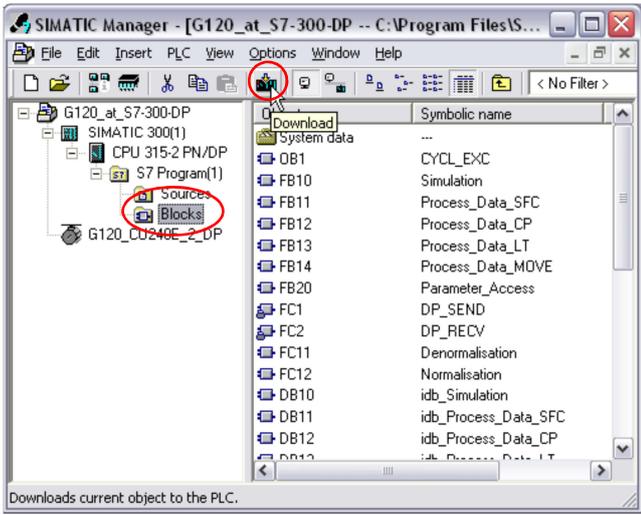
3 Setting up and Commissioning the Application

3.4 Downloading the SIMATIC program

No.	Action	Screenshots / Remarks
7.	<ul style="list-style-type: none"> Mark all of the blocks in the CPU with <STRG><A> and delete them. Acknowledge that system blocks and system data cannot be deleted. 	 <p>Deletes the selected objects.</p>
8.	<p>If you have not yet dearchived the project, select a project file in "File > Retrieve...", and dearchive it.</p>	 <p>Gets object from the archive.</p>

3 Setting up and Commissioning the Application

3.5 Downloading the SINAMICS configuration

No.	Action	Screenshots / Remarks
9.	<ul style="list-style-type: none"> Open the project, select the "Blocks" folder and click on "Download" or "Blocks" respectively. Also download the system data! 	 <p>The screenshot shows the SIMATIC Manager interface. In the project tree on the left, the 'Blocks' folder is selected and circled in red. In the main window, the 'Download' button in the menu bar is also circled in red. The right pane shows a list of system data objects with their symbolic names.</p>
10.	Restart the CPU after downloading.	
11.	If you want to use the HMI, assign the address 192.168.0.3 and load it in the HMI configuration.	

3.5 Downloading the SINAMICS configuration

This chapter describes the steps for downloading the example configuration.

This can be performed via the network (LAN) connection, or directly via a USB connection of the PG/PC.

Notes

- Should you use a different SINAMICS G or motor you need to perform your own configuration. Follow the instructions in chapter 6 "Configuration and Settings", especially steps 13 and 14.
- In the screenshots below, a SINAMICS G is used. In the instruction texts deviating names of the other SINAMICS G converter types might be mentioned.
- The SIMATIC S7-300/400 CPU must support data record routing. (CPU 31x with FW3.x or CPU 41x with FW5.1 or newer), see [/9/](#)

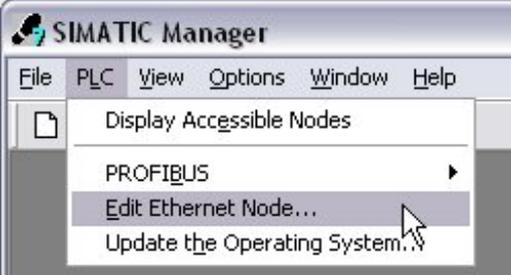
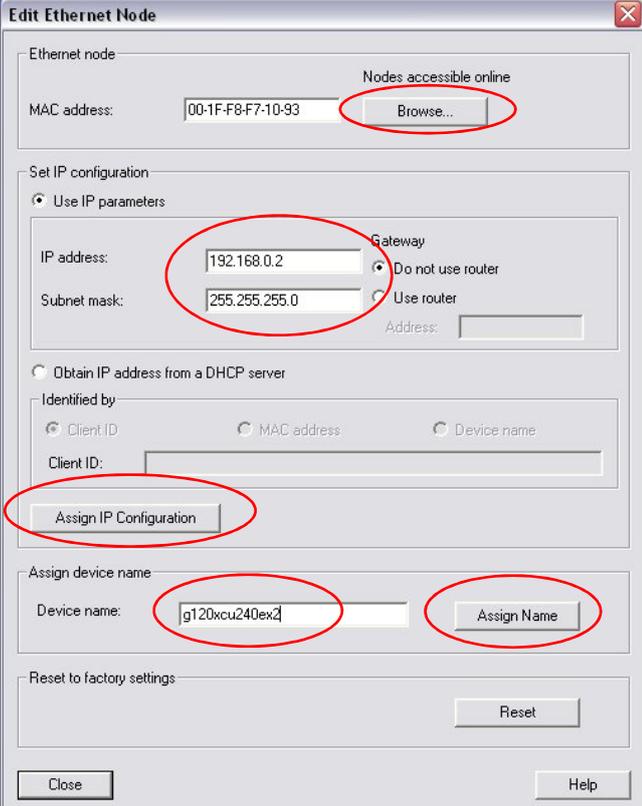
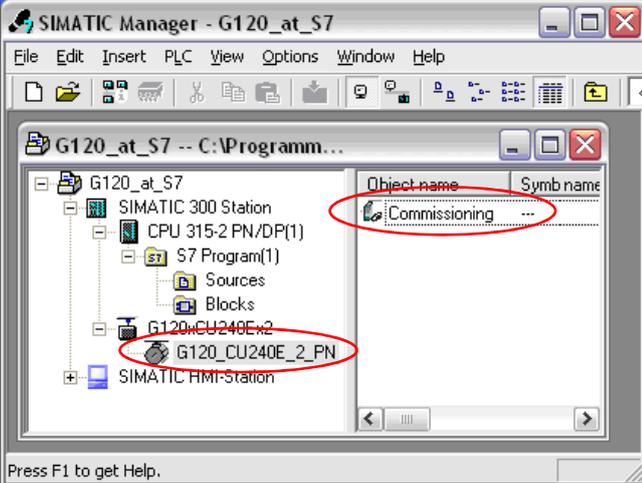
3.5.1 Preparation for using the network connection of the PG/PC

Table 3-4

No.	Action	Screenshots / Remarks
1.	Connect the CU 240E-2 PN of the SINAMICS G120 to the PG/PC.	You can connect both devices directly or via a switch.
2.	Unless the SIMATIC program is currently loaded, please perform steps 1 to 3 from Table 3-3 .	

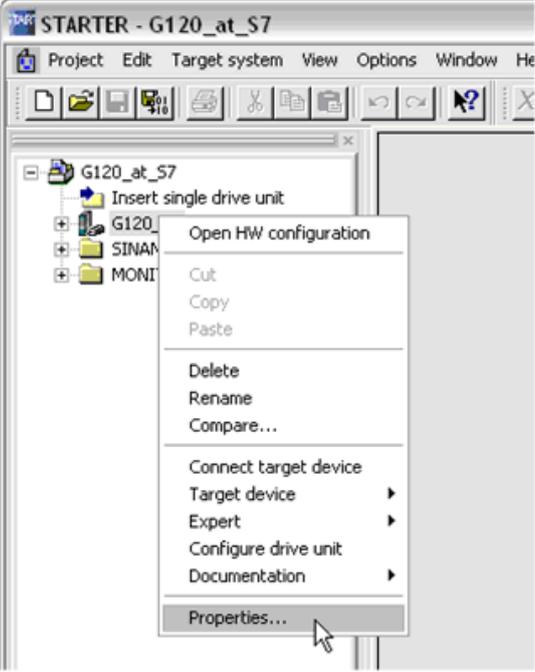
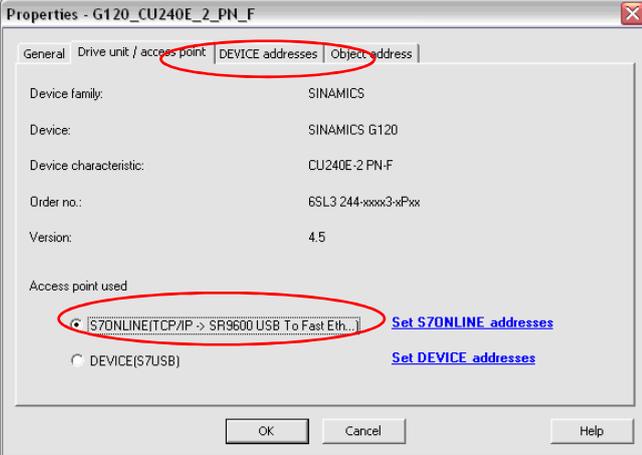
3 Setting up and Commissioning the Application

3.5 Downloading the SINAMICS configuration

No.	Action	Screenshots / Remarks
3.	Call up the "Edit Ethernet Node..." dialog.	
4.	<ul style="list-style-type: none"> • Click on "Browse..." • Select the SINAMICS G and click on OK. • Enter the IP address 192.168.0.2 and the subnet mask 255.255.255.0, and click on "Assign IP Configuration". • Enter the device name of your CU and click on "Assign Name" (please observe the note). <ul style="list-style-type: none"> - G110M - G120xCU230Px2 - G120xCU240Ex2 - G120xCU240Ex2xF - G120xCU250Sx2xV - G120xCU240Dx2 - G120xCU240Dx2xF - G120C • Exit the dialog by clicking "Close". <p>Note: The device name must match the one given in the Properties of SINAMICS G in HW Config.</p>	
5.	<ul style="list-style-type: none"> • Click on SINAMICS G. Depending on the used project, the SINAMICS G is called... <ul style="list-style-type: none"> - G110M_PN - G120_CU230P_2_PN - G120_CU240E_2_PN - G120_CU240E_2_PN_F - G120_CU250S_2_V_PN - G120_CU240D_2_PN - G120_CU240D_2_PN_F - G120C_PN • Click 2x on "Commissioning". This opens the STARTER with the project. 	 <p>The picture shows the example of a SINAMICS G120 with CU 240E-2 PN.</p>

3 Setting up and Commissioning the Application

3.5 Downloading the SINAMICS configuration

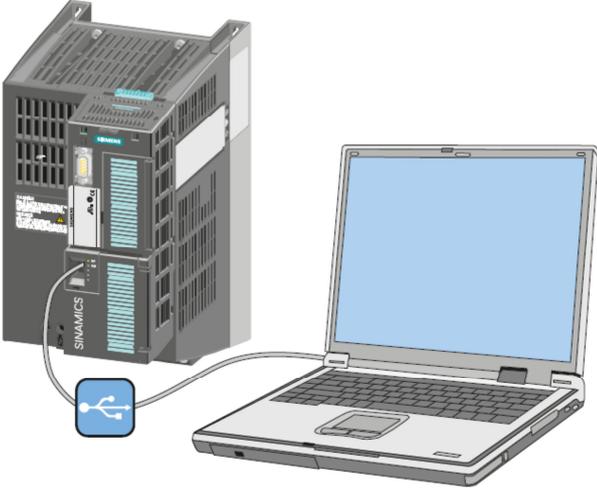
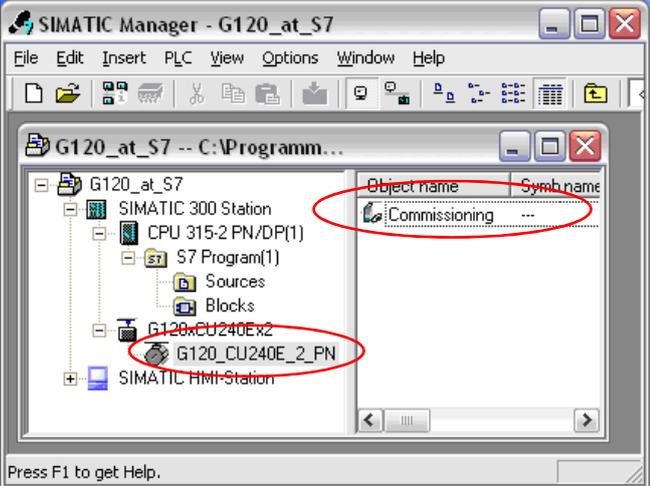
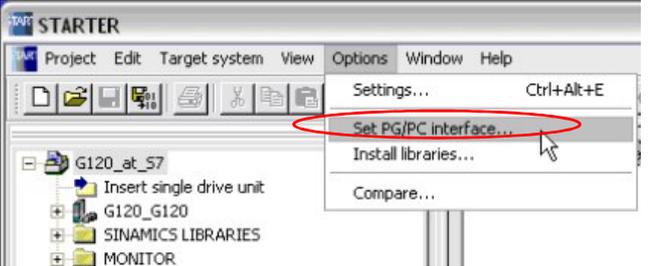
No.	Action	Screenshots / Remarks
6.	After the STARTER has opened, select the SINAMICS G and open its properties by clicking on the right mouse button.	 <p>The screenshot shows the 'STARTER - G120_at_S7' application window. A tree view on the left shows the project structure with folders for 'G120_at_S7', 'Insert single drive unit', 'G120', 'SINAMICS', and 'MONITOR'. A context menu is open over the 'SINAMICS' folder, listing options such as 'Open HW configuration', 'Cut', 'Copy', 'Paste', 'Delete', 'Rename', 'Compare...', 'Connect target device', 'Target device', 'Expert', 'Configure drive unit', 'Documentation', and 'Properties...'. A mouse cursor is pointing at the 'Properties...' option.</p>
7.	Select "S7ONLINE(TCP/IP->Network card)" and click on "OK".	 <p>The screenshot shows the 'Properties - G120_CU240E_2_PN_F' dialog box. The 'General' tab is active, and the 'DEVICE addresses' sub-tab is selected. The dialog displays the following information: Device family: SINAMICS; Device: SINAMICS G120; Device characteristic: CU240E-2 PN-F; Order no.: 6SL3 244-xxxx3-xPxx; Version: 4.5. Under the 'Access point used' section, the radio button for 'S7ONLINE(TCP/IP->SR9600 USB To Fast Eth...)' is selected, and the radio button for 'DEVICE(S7USB)' is unselected. There are links for 'Set S7ONLINE addresses' and 'Set DEVICE addresses'. The 'OK', 'Cancel', and 'Help' buttons are at the bottom.</p>
8.	Proceed with the instructions in chapter 3.5.3.	

3 Setting up and Commissioning the Application

3.5 Downloading the SINAMICS configuration

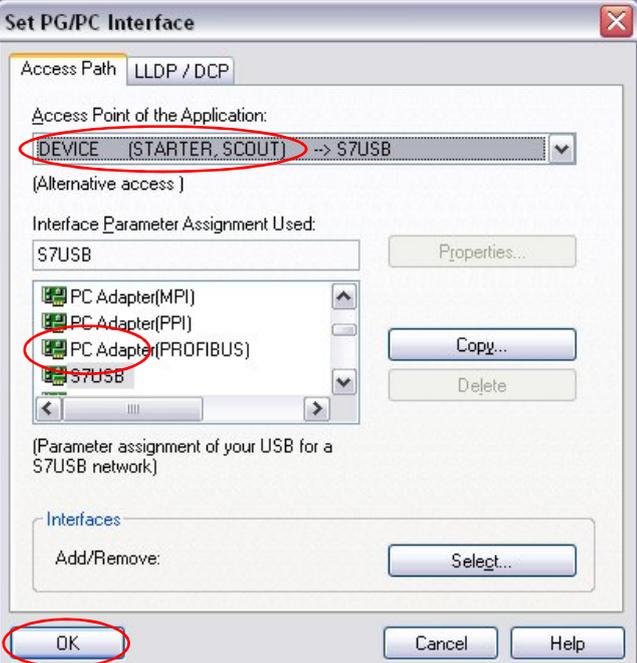
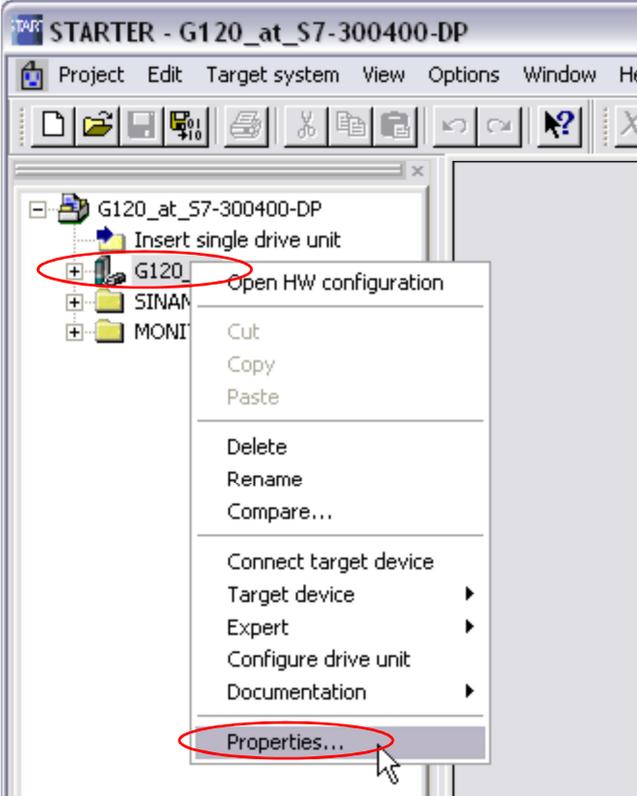
3.5.2 Preparations for using the USB connection of the PG/PC

Table 3-5

No.	Action	Screenshots / Remarks
1	<p>Connect the SINAMICS G with the PG/PC using a USB cable.</p> <p>Wait until Windows has recognized the SINAMICS G (USB Mass Storage Device).</p>	
2	<ul style="list-style-type: none"> Click on SINAMICS G. Depending on the used project, the SINAMICS G is called... <ul style="list-style-type: none"> - G110M_PN - G120_CU230P_2_PN - G120_CU240E_2_PN - G120_CU240E_2_PN_F - G120_CU250S_2_V_PN - G120_CU240D_2_PN - G120_CU240D_2_PN_F - G120C_PN Click 2x on "Commissioning". This opens the STARTER with the project. 	 <p>The picture shows the example of a SINAMICS G120 with CU 240E-2 PN.</p>
3	<p>Open "Set PG/PC interface".</p>	

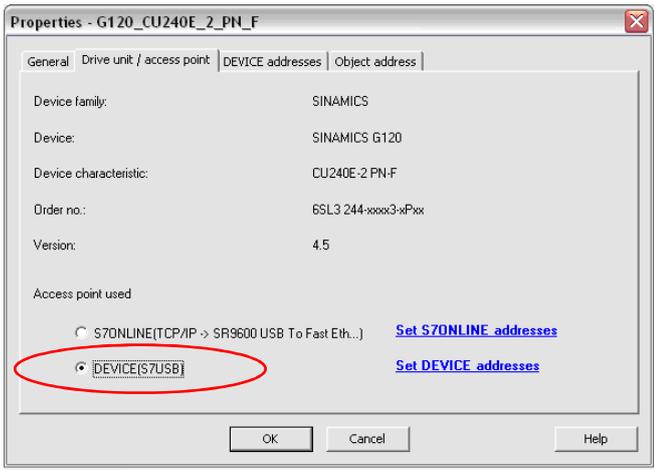
3 Setting up and Commissioning the Application

3.5 Downloading the SINAMICS configuration

No.	Action	Screenshots / Remarks
3	Ensure that interface "S7USB" has been programmed for the "DEVICE (STARTER,SCOUT)" access point and acknowledge with OK.	
4	Mark the SINAMICS G and open its Properties with the right mouse button.	

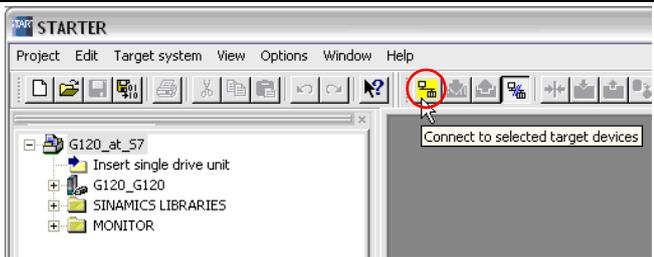
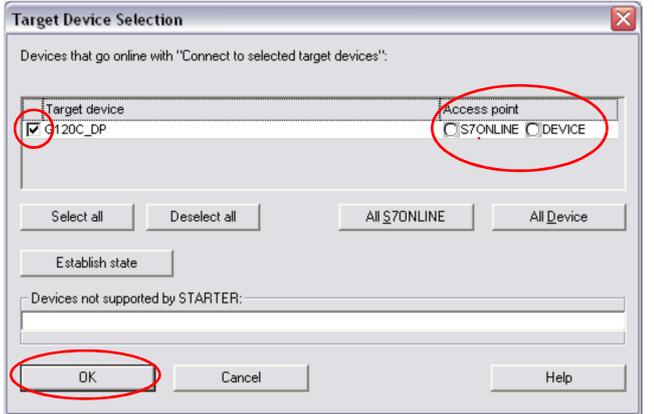
3 Setting up and Commissioning the Application

3.5 Downloading the SINAMICS configuration

No.	Action	Screenshots / Remarks
5	Select "DEVICE (S7USB)" and click "OK".	
6	Proceed with the instructions in chapter 3.5.3.	

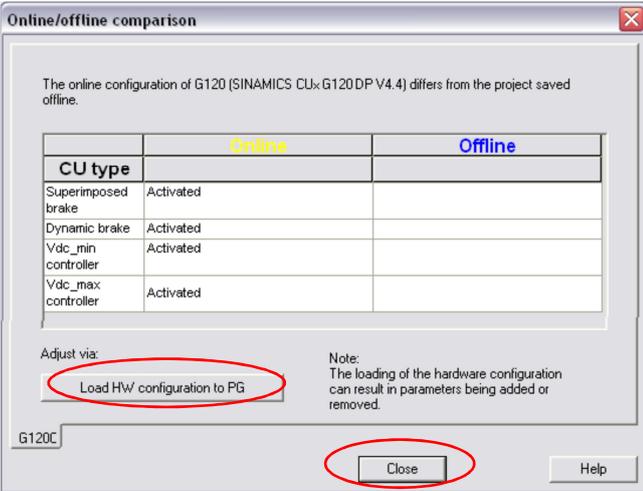
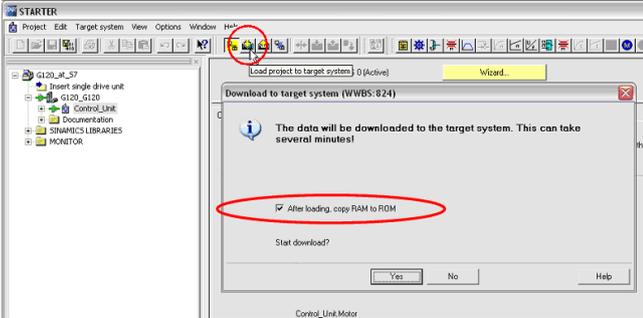
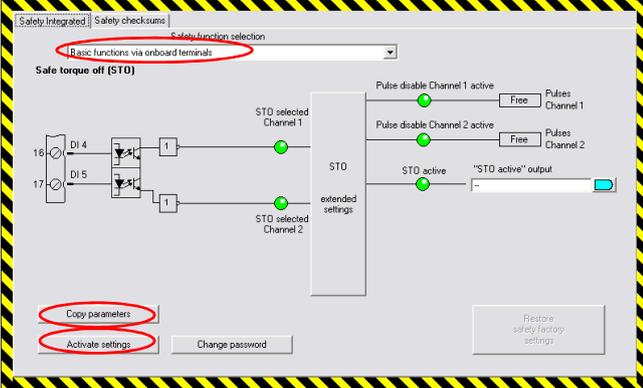
3.5.3 Downloading the configuration into the SINAMICS G

Table 3-6

No.	Action	Screenshots / Remarks
1.	Go online.	
2.	If the "Target Device Selection" window opens, <ul style="list-style-type: none"> set the checkmark at SINAMICS G, select the desired access point (S7Online for the network and DEVICE for the USB interface) and click on "OK". 	

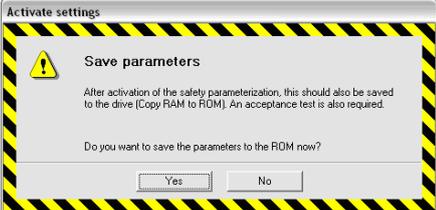
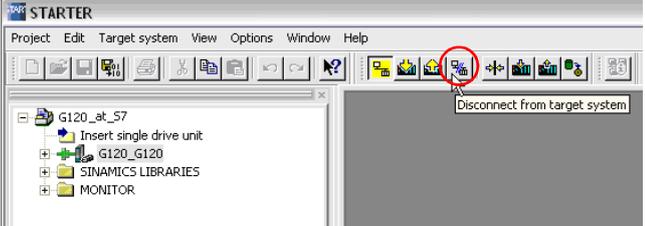
3 Setting up and Commissioning the Application

3.5 Downloading the SINAMICS configuration

No.	Action	Screenshots / Remarks															
3.	If the “Online/offline comparison” window opens, click on “Load HW Configuration to PG”	 <p>The online configuration of G120 (SINAMICS CUx G120 DP V4.4) differs from the project saved offline.</p> <table border="1"> <thead> <tr> <th>CU type</th> <th>Online</th> <th>Offline</th> </tr> </thead> <tbody> <tr> <td>Superimposed brake</td> <td>Activated</td> <td></td> </tr> <tr> <td>Dynamic brake</td> <td>Activated</td> <td></td> </tr> <tr> <td>Vdc_min controller</td> <td>Activated</td> <td></td> </tr> <tr> <td>Vdc_max controller</td> <td>Activated</td> <td></td> </tr> </tbody> </table> <p>Adjust via: <input type="button" value="Load HW configuration to PG"/> </p> <p>Note: The loading of the hardware configuration can result in parameters being added or removed. </p> <p>G120C <input type="button" value="Close"/> <input type="button" value="Help"/></p>	CU type	Online	Offline	Superimposed brake	Activated		Dynamic brake	Activated		Vdc_min controller	Activated		Vdc_max controller	Activated	
CU type	Online	Offline															
Superimposed brake	Activated																
Dynamic brake	Activated																
Vdc_min controller	Activated																
Vdc_max controller	Activated																
4.	<p>Start the download and tick “After loading, copy RAM to ROM”.</p> <p>Should you receive a note which indicates different parameters for the power unit, you need to make your own configuration. Follow the instructions in chapter 6 “Configuration and Settings”, especially steps 13 and 14.</p> <p>If you have a CU without safety functions (e.g. a CU240B-2PN), continue with step 8.</p>	 <p>Download to target system (WWBS: 824)</p> <p>The data will be downloaded to the target system. This can take several minutes!</p> <p><input checked="" type="checkbox"/> After loading, copy RAM to ROM</p> <p>Start download? <input type="button" value="Yes"/> <input type="button" value="No"/> <input type="button" value="Help"/> </p>															
5.	Open “Functions>Safety Integrated” in the tree and click on “Change settings” first, then on “Copy Parameters” and then on “Activate settings”.	 <p>Safety Integrated Safety checklists Safety function selection</p> <p>Basic functions via onboard terminals</p> <p>Safe torque off (STO)</p> <p>STO selected Channel 1</p> <p>STO selected Channel 2</p> <p>extended settings</p> <p>STO active</p> <p>“STO active” output</p> <p><input type="button" value="Copy parameters"/> <input type="button" value="Activate settings"/> <input type="button" value="Change password"/> <input type="button" value="Restore safety factory settings"/></p>															
6.	Enter a password (e.g. “12345”) and click on “OK”.	 <p>Change Password</p> <p>Enter the current password: (default password: 0)</p> <p>Enter the new password:</p> <p>Repeat your entry:</p> <p><input type="button" value="OK"/> <input type="button" value="Cancel"/> <input type="button" value="Help"/></p>															

3 Setting up and Commissioning the Application

3.5 Downloading the SINAMICS configuration

No.	Action	Screenshots / Remarks
7.	Choose "Yes", to save the parameters in ROM.	 <p>The screenshot shows a dialog box titled "Activate settings" with a yellow warning triangle icon. The main heading is "Save parameters". Below it, a note states: "After activation of the safety parameterization, this should also be saved to the drive (Copy RAM to ROM). An acceptance test is also required!". The question asks, "Do you want to save the parameters to the ROM now?". At the bottom, there are two buttons: "Yes" and "No". The "Yes" button is circled in red.</p>
8.	Go offline.	 <p>The screenshot shows the SIMATIC STARTER software interface. The menu bar includes "Project", "Edit", "Target system", "View", "Options", "Window", and "Help". The toolbar contains various icons, with the "Disconnect from target system" icon (a red square with a white diagonal line) circled in red. The project tree on the left shows a project named "G120_at_57" containing "Insert single drive unit", "G120_G120", "SINAMICS LIBRARIES", and "MONITOR". A tooltip for the circled button reads "Disconnect from target system".</p>
9.	Perform a power reset.	Switch off all supply voltages of SINAMICS G, wait until all LEDs are off, and then switch back on.

4 Operation of the Application

4.1 Prerequisites

To be able to switch on the SINAMICS G via the SIMATIC S7-300/400 inputs, the following points must be fulfilled:

- If the safety functions of the SINAMICS G has been activated, then 24V must be supplied at terminals 16 and 17 (DI 4 and 5) of the SINAMICS G; otherwise, the STO safety function is active, the yellow "SAFE" LED at the SINAMICS G is blinking and the SINAMICS G cannot be switched on.
For the SINAMICS G120D, these are terminals X9.2 and X9.4 .
- 24V must not be supplied at terminal 8 (DI 3) of the SINAMICS G120, otherwise the command data record is switched over (at standard configuration).
For SINAMICS G120D this is terminal X8.2.
- When using an IOP, please check that the network icon () is displayed on the top right. If the hand icon () is displayed there, press the Hand/Auto button () .
- When using a BOP-2, please check whether the hand icon () is displayed. If yes, press the Hand/Auto button () .

4.2 Operation of the Application

SINAMICS G is exclusively moved via digital inputs. The HMI is then only used for monitoring.

Table 4-1

Terminal	Name	Function
E 0.0	ON	Switching SINAMICS G on/off, (Off2 and Off3 =1 must apply for the operation)
E 0.1	OFF2	0= Motor immediately switched off, drive spins out
E 0.2	OFF3	0= Fast stop, motor is decelerated with Off3 ramp down time (P1135) until it stops
E 0.3	Ack	Rising edge acknowledges a pending error in the SINAMICS G
E 0.4	Rev	Reversed direction, the polarity of the setpoint value is negated
E 0.5	0	The setpoint value is set to 0.
E 0.6	n+	The setpoint value is increased
E 0.7	n-	The setpoint value is decreased

4 Operation of the Application

4.2 Operation of the Application

To switch on SINAMICS G, please perform the steps below:

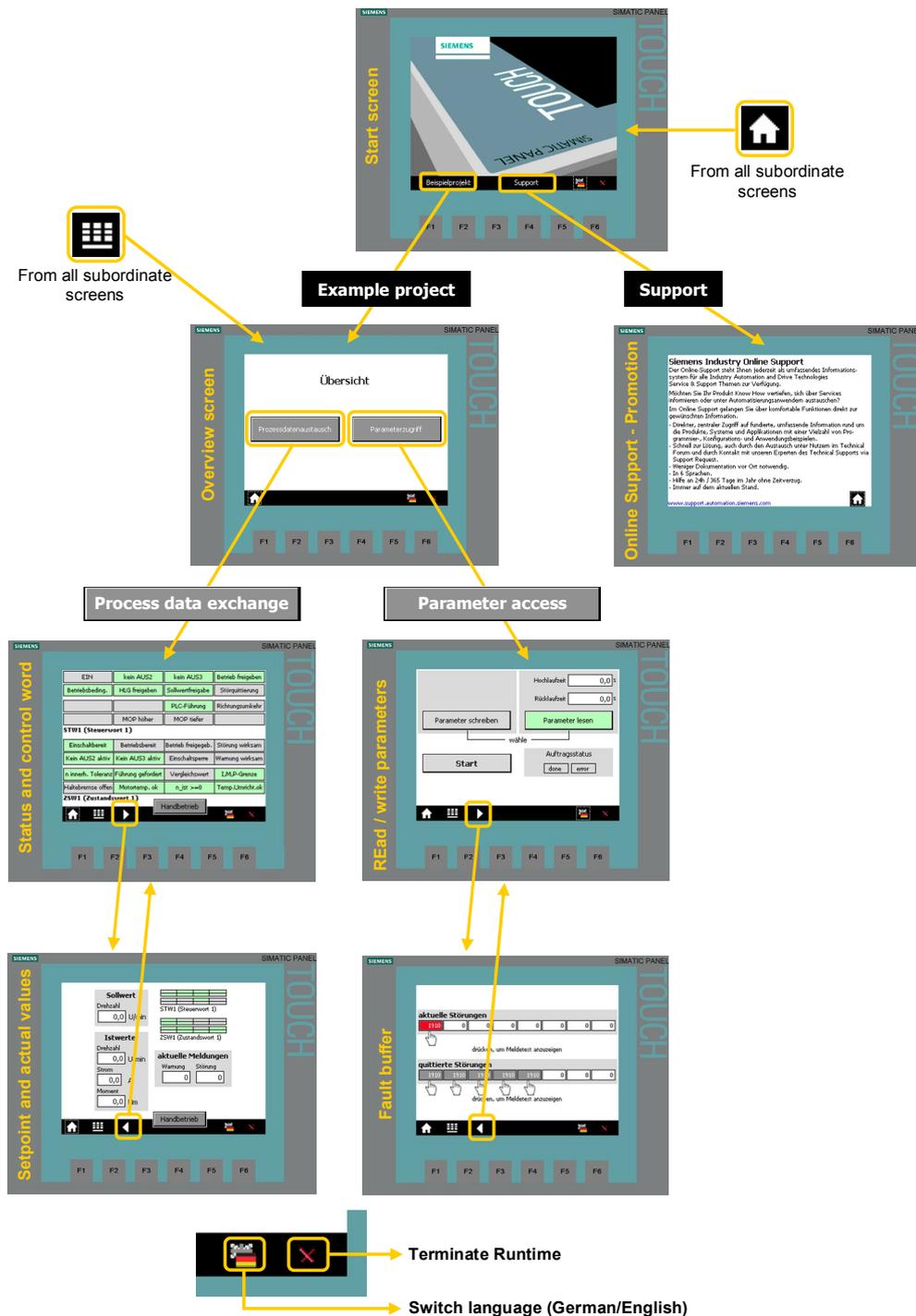
Table 4-2

Step	Action	Note / Result
1.	Apply 24V to OFF2(E0.1) and OFF3(E0.2).	The further required control bits for the operation are permanently set to 1 by the program.
2.	Enter a pulse (switching on and back off) to Ack (E0.3).	This acknowledges a possibly pending error message.
3.	Enter a pulse (switching on and back off) to 0 (E0.5).	The setpoint is set to 0.
4.	Apply 24V to ON(E0.0).	The drive switches on.
5.	Change the setpoint value with inputs n+ (E 0.6), n- (E0.7) and 0 (E0.5).	The speed of the motor changes.
6.	Detach the 24V from ON(E0.0).	The drive switches back off.

4.3 Monitoring and parameter access via operator panel

4.3.1 Screens and screen navigation

Figure 4-1



4.3.2 Process data exchange

Both screens for the process data exchange access the idb_Process_Data data block (DB11).

Control and status word

Figure 4-2



The bit commands, which you can partially specify via the digital input module, are displayed in the 16 bit wide control word.

The current state of the SINAMICS G is given via the also 16 bit wide status word.

Manual mode

Using the “Manual mode” button enables activating the manual mode of the block. Instead of switching to the control signals pending at the block, in this example to the digital inputs, this mode switches to an internal control word specified via HMI, for example. Also, an internal value is used instead of the pending setpoint value.

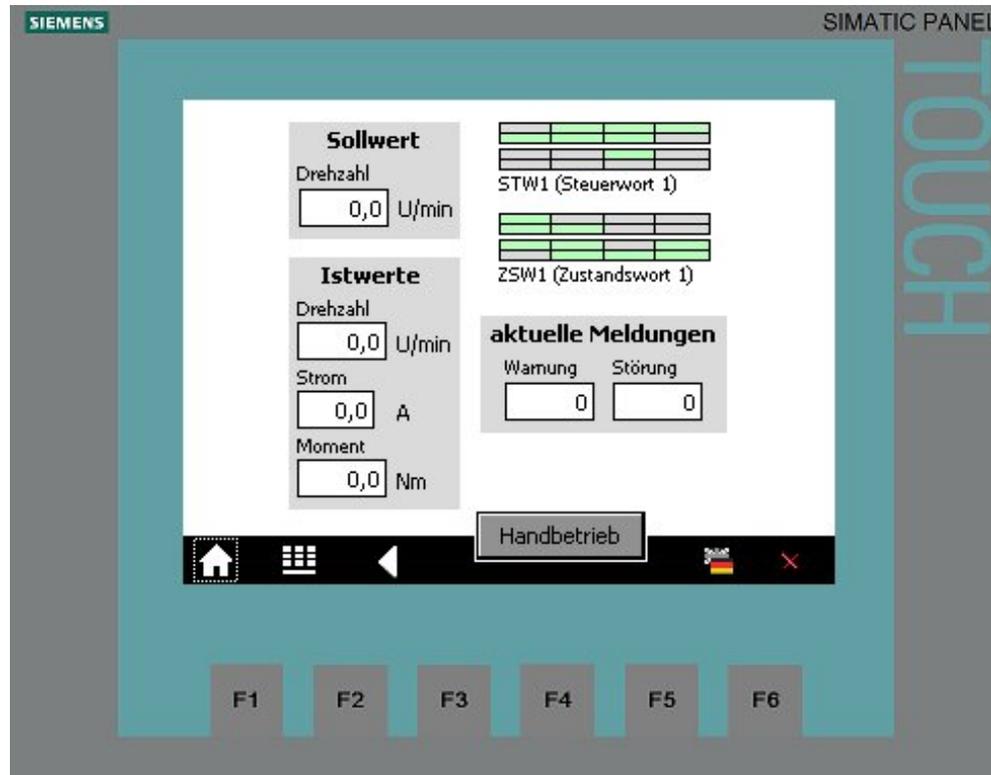
This enables a simple manual/automatic switch-over.

 DANGER	<p>When (de-)activating the manual mode, the control word and the setpoint value are not adjusted. It is therefore possible when switching over that SINAMICS G automatically starts up or changes the speed.</p>
-------------------	--

In this example, this enables switching from the digital inputs to manual operation via HMI. The set control word bits are then displayed yellow.

Setpoint and actual values

Figure 4-3



Setpoint speed value:

Here, the setpoint speed value is displayed which in this example, is set via the digital inputs E0.4 to E0.7 (see Table 4-1). In manual mode, the speed setpoint value is directly specified via HMI, the input field is then shaded yellow.

 DANGER	<p>When (de-)activating the manual mode, the control word and the setpoint value are not adjusted. It is therefore possible when switching over that SINAMICS G automatically starts up or changes the speed.</p>
--	--

Actual values:

The current actual values for speed, electrical current and torque are displayed below the speed setpoint value input.

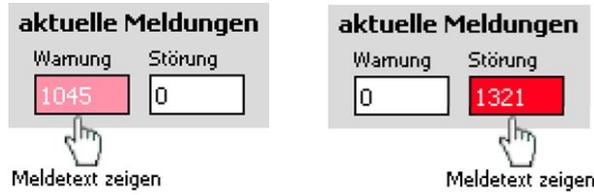
Control and status word:

To keep an eye on control word and status word, without switching to the respective screen, they are also given here as a miniature display.

Current messages:

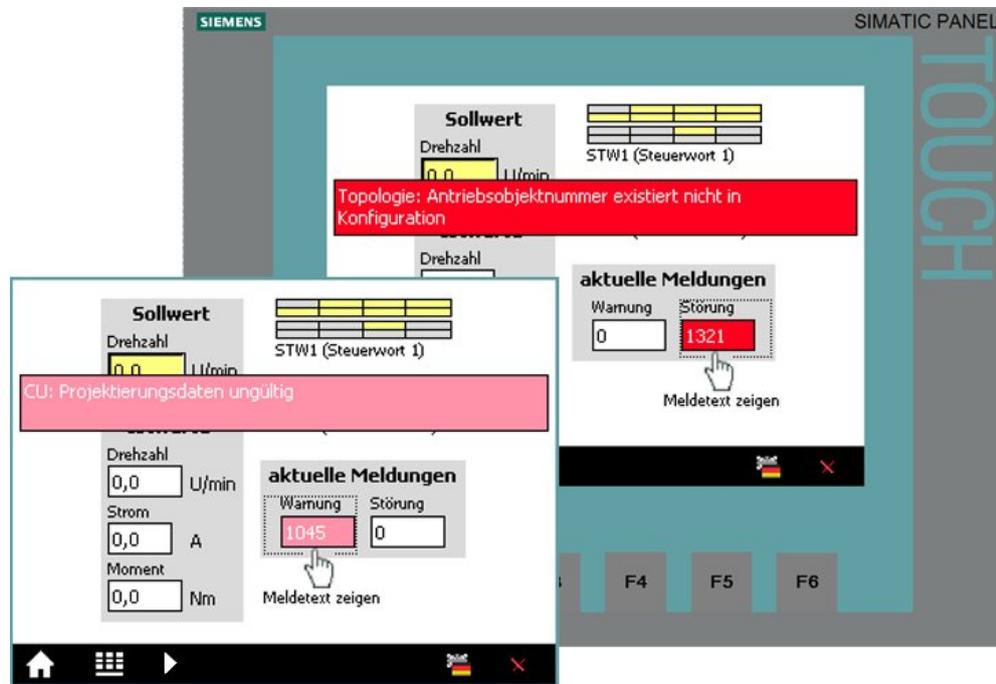
Current faults and warnings are displayed with a respective number. A "0" means that no fault or alarm exists. If a message is pending it is displayed according to Figure 4-4.

Figure 4-4



Tap or click on the message number to display the respective message text.

Figure 4-5



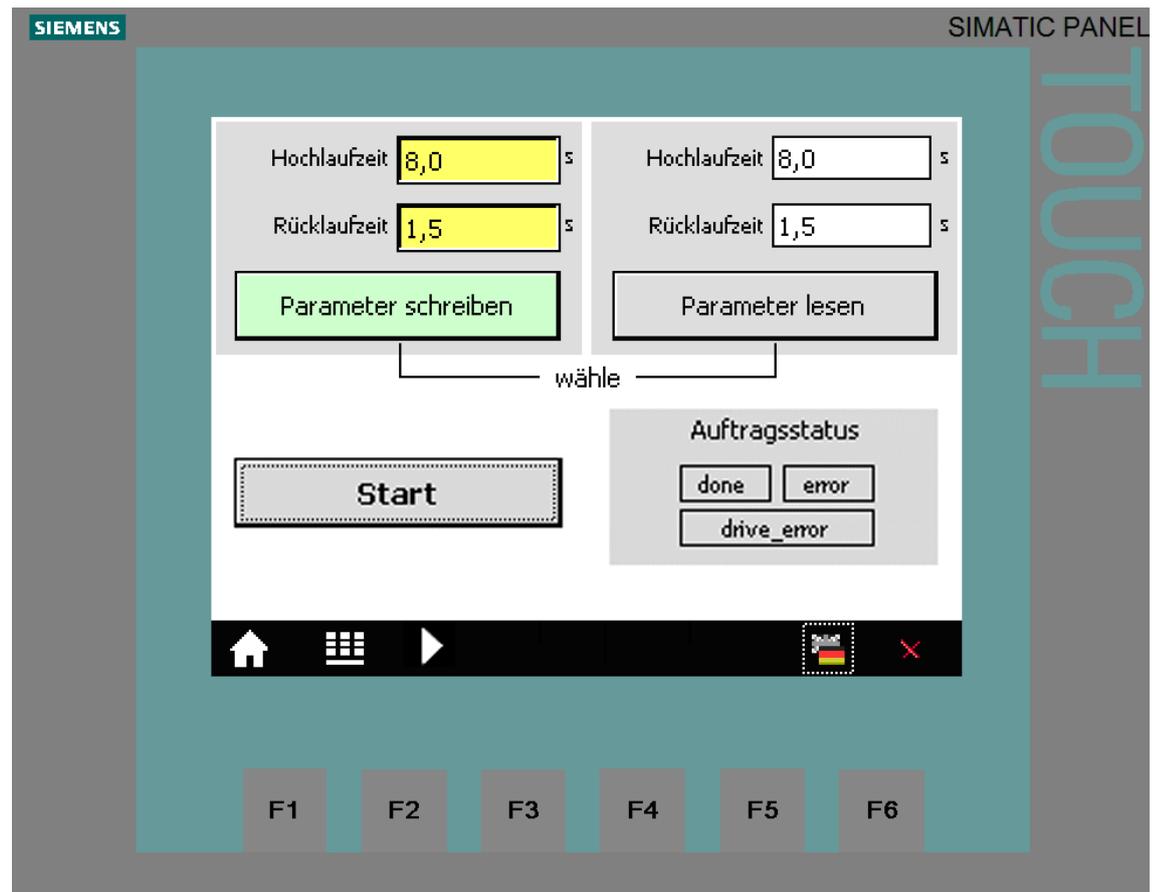
The message text is displayed as long as the message number is pressed.

4.3.3 Parameter access

Both screens for the process data exchange access the idb_Parameter_Access data block (DB11).

Reading/writing parameters

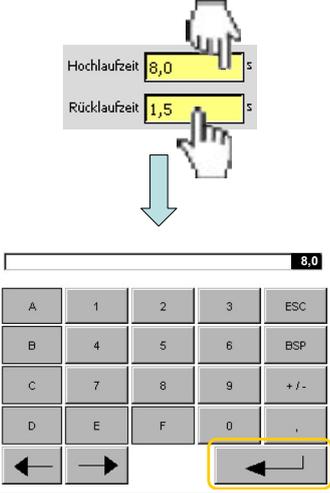
Figure 4-6



4 Operation of the Application

4.3 Monitoring and parameter access via operator panel

Table 4-3

	Action	Comment
1.	Select the access type with the "Read parameters" and "Write parameters" buttons.	The selected access type is displayed via a bright green button.
2.	<p><u>Read parameters:</u> Proceed with point 3 in the table.</p> <p><u>Write parameters:</u> When tapping or clicking the yellow input field for the rampup/rampdown time, a keyboard mask for the value input opens. Close your input with the Return key.</p>	
3.	Start the write or read job with the "Start" button.	<p>The job status specifies how the job was completed:</p> <p>done = completed without error error = job cancelled with error</p> <p>The status refers to processing the system function blocks SFB 52 "RDREC" and SFB 53 "WRREC" in STEP7 code. For error diagnosis see /3/.</p> <p>done and drive_error means that the job was transferred without error, however, SINAMICS G could not or only partially process the job.</p> <p>The error codes are available in chapter 6.1.5.1 "Configuring the fieldbus, PROFIdrive profile for PROFIBUS and PROFINET, acyclic communication" in the operating instruction (/7/).</p>
4.	Click "Start" again to terminate the transmission requirement.	The bits of the job status are deleted as soon as the transmission requirement is no longer pending.

Note

If you wish to check the parameters after a write job, you must trigger an additional read job.

Fault buffer

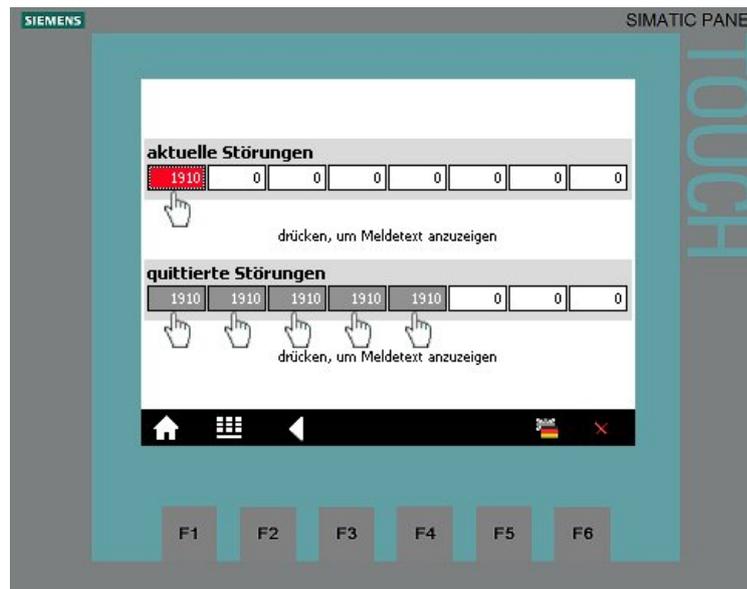
The screen displays the fault codes of eight current and eight acknowledged faults, which are saved in the SINAMICS G.

Note

The values are read by SINAMICS G via the “Read parameters” function in Figure 4-6 and saved in the SIMATIC S7-300/400.

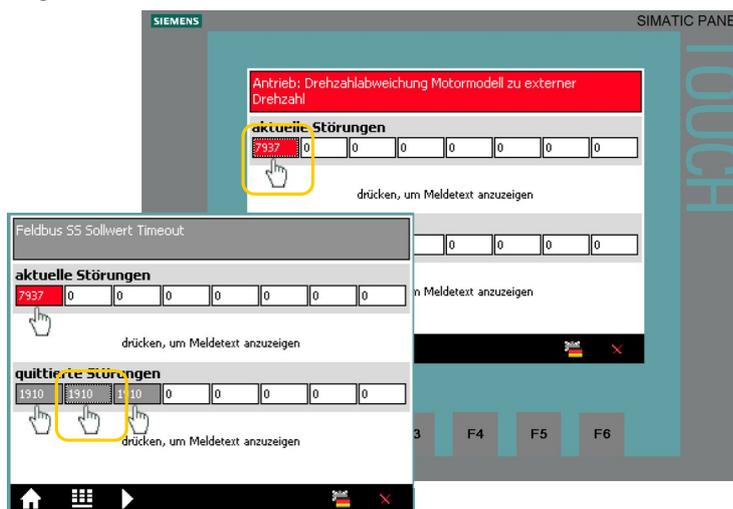
When the “Fault buffer” screen comes up, the data stored in SIMATIC S7-300/400 is displayed and may therefore be out of date.

Figure 4-7



Tap or click on the message number to display the respective message text.

Figure 4-8

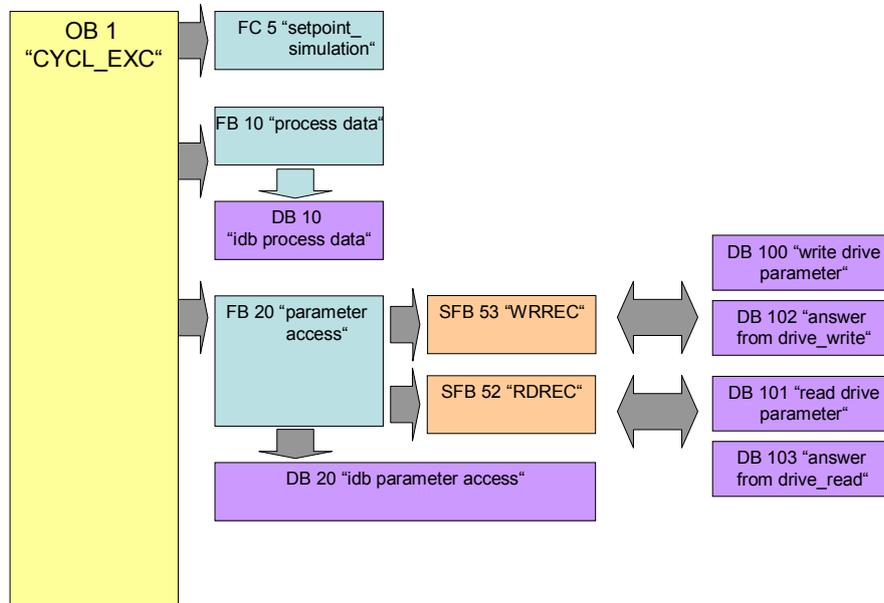


The message text is displayed as long as the message number is pressed.

5 Functional Mechanisms of the Application

Program overview

Figure 5-1



The SIMATIC S7-300/400 program consists of three areas:

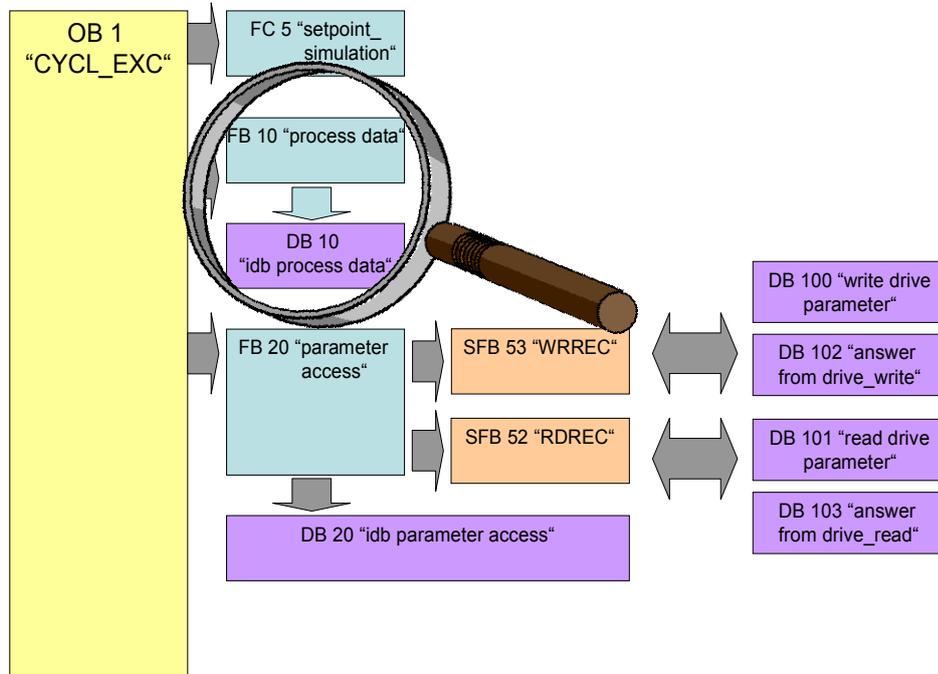
- Setpoint value simulation
In this area a user program is simulated and a speed value generated with the digital inputs.
- Process data exchange
In this area, the process data for the SINAMICS G is transmitted (e.g. one command and setpoint) or received (status and actual values)
- Parameter access
In this area, the parameters SINAMICS G are accessed.

Note

The two communication areas, process data and parameter access, are independent from each other and can each also be used individually.

5.1 Functionality of process data exchange

Figure 5-2



The process data contains values which are regularly exchanged between SIMATIC S7-300/400 and SINAMICS G. These values are at least the control and status word as well as the setpoint and actual value. Selecting the message frame type specifies the exact length and structure.

The "Siemens Telegram 352, PZD 6/6" message frame type used in the example exchanges 6 words in both directions, which are:

Table 5-1 Structure of Siemens "Telegram 352, PZD 6/6"

Send direction (viewed from SIMATIC)	Receive direction (viewed from SIMATIC)
Control word	Status word
Setpoint speed value	Current speed (actual speed value)
(not used)	Current electrical current
(not used)	Current torque
(not used)	Current warning
(not used)	Current fault

5.1 Functionality of process data exchange

5.1.1 **Accessing process data in the user program of the SIMATIC S7-300/400**

At the start of the cycle, the operating system of SIMATIC S7-300/400 stores the (user) data received by the SINAMICS G in the I/O input area of the SIMATIC CPU and transmits the data stored in the I/O output area to the SINAMICS G at the end of the cycle. In the user program, the data can be accessed by reading from or writing to the I/O area. The address areas used are defined when specifying the hardware configuration. See step 16 in Table 6-1.

If the I/O is accessed with the SFC 14/15 system functions, the consistency is ensured across the entire data; hence, these functions are used in the example program.

5.1.2 **Standardizing the setpoint and actual values**

The setpoint and actual values are transferred as standards. The reference values are stored in parameters P2000 to P2006 of the SINAMICS G.

FB20 "Parameter_Access" takes on entirely the conversion of setpoint and actual values. The reference values for speed current, torque stored in parameters P2000, P2003 and P2004 of SINAMICS must also be entered at the block input.

16384dec = 4000hex = 100% applies here, with 100% referring to the reference value for the transferred variable.

Example:

If P2000 (reference speed or reference frequency) is 1500 1/min and if a speed of 500 1/min shall be run, then 33% or 5461dec must be transferred.

5.1.3 Control and status word

The control and status word has already been defined. The subsequent figures illustrate the control and status word when selecting the “Siemens Telegram 352, PZD 6/6” message frame type.

Figure 5-3: Control word of the “Siemens Telegram 352, PZD 6/6” message frame type

Bit	Value	Significance	Comments
0	0	OFF1	Motor brakes with the ramp-down time p1121 at standstill ($f < f_{min}$) the motor is switched off.
	1	ON	With a positive edge, the inverter goes into the "ready" state, with additionally bit 3 = 1, the inverter switches on the motor.
1	0	OFF2	Switch off motor immediately, motor coasts to a standstill.
	1	No OFF2	---
2	0	Quick stop (OFF3)	Quick stop: Motor brakes with the OFF3 ramp-down time p1135 down to standstill.
	1	No quick stop (OFF3)	---
3	0	Disable operation	Immediately switch-off motor (cancel pulses).
	1	Enable operation	Switch-on motor (pulses can be enabled).
4	0	Lock ramp-function generator	The ramp-function generator output is set to 0 (quickest possible deceleration).
	1	Operating condition	Ramp-function generator can be enabled
5	0	Stop ramp-function generator	The output of the ramp-function generator is "frozen".
	1	Ramp-function generator enable	
6	0	Inhibit setpoint	Motor brakes with the ramp-down time p1121.
	1	Enable setpoint	Motor accelerates with the ramp-up time p1120 to the setpoint.
7	1	Acknowledging faults	Fault is acknowledged with a positive edge. If the ON command is still active, the inverter switches to "closing lockout" state.
8		Not used	
9		Not used	
10	0	PLC has no master control	Process data invalid, "sign of life" expected.
	1	Master control by PLC	Control via fieldbus, process data valid.
11	1	Direction reversal	Setpoint is inverted in the inverter.
12		Not used	
13	1	MOP up	The setpoint stored in the motorized potentiometer is increased.
14	1	MOP down	The setpoint stored in the motorized potentiometer is decreased.
15	1	Not used	Changes over between settings for different operation interfaces (command data sets).

Note

A control word for which all bits are 0 is rejected as invalid by the SINAMICS G. Therefore, at least bit 10 must always be set.

5 Functional Mechanisms of the Application

5.1 Functionality of process data exchange

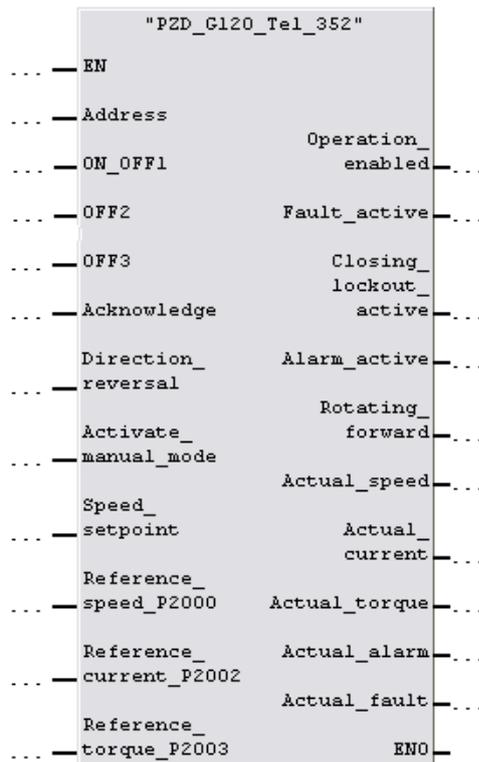
Figure 5-4 Status word of the “Siemens Telegram 352, PZD 6/6” message frame type

Bit	Value	Significance	Comments
0	1	Ready for switching on	Power supply switched on; electronics initialized; pulses locked.
1	1	Ready for operation	Motor is switched on (ON1 command present), no active fault, motor can start as soon as "enable operation" command is issued. See control word 1, bit 0.
2	1	Operation enabled	Motor follows setpoint. See control word 1, bit 3.
3	1	Fault present	The inverter has a fault.
4	1	OFF2 inactive	Coast to standstill not activated (no OFF2)
5	1	OFF3 inactive	No fast stop active
6	1	Closing lockout active	The motor is only switched on after a further ON1 command
7	1	Alarm active	Motor remains switched on; acknowledgement is not required; see r2110.
8	1	Speed deviation within tolerance range	Setpoint/actual value deviation within tolerance range.
9	1	Control requested	The automation system is requested to assume control.
10	1	Comparison speed reached or exceeded	Speed is greater than or equal to the corresponding maximum speed.
11	0	I, M or P limit reached	Comparison value for current, torque or power has been reached or exceeded.
12	1	Holding brake open	Signal to open and close a motor holding brake.
13	0	Alarm motor overtemperature	--
14	1	Motor rotates forwards	Internal inverter actual value > 0
	0	Motor rotates backwards	Internal inverter actual value < 0
15	1	No alarm, thermal power unit overload	

5.1.4 FB 10 “PZD_G120_Tel_352”

This FB takes on the transmission of the process data from and to the SINAMICS G. It copies the main control and status bits and converts the setpoint and actual values. It can therefore be used as interface with SINAMICS G in own applications.

Figure 5-5 FB 10 “PZD_G120_Tel_352“



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Table 5-2 Interfaces of FB 10 “PZD_G120_Tel_352”

Parameter	Data type	Initial value	Description
Input parameters			
Address	INT	0	IO address of SINAMICS G Here, the IO address must be specified which was assigned for message frame 352 of SINAMICS in HW Config. Input and output address must be identical to be able to use this block.
ON_OFF1	BOOL	FALSE	SINAMICS is switched on with a rising edge at ON_OFF1. Requirements: <ul style="list-style-type: none"> OFF2 and OFF3 must already be TRUE beforehand No error must be pending
OFF2	BOOL	TRUE	Immediate STOP (motor coasts)
OFF3	BOOL	TRUE	Fast stop (with ramp down time in P1153)

5 Functional Mechanisms of the Application

5.1 Functionality of process data exchange

Parameter	Data type	Initial value	Description
Acknowledge	BOOL	FALSE	Pending errors are acknowledged with rising edge.
Direction_reversal	BOOL	FALSE	With this input, the polarity of the setpoint value can be changed.
Activate_manual_mode	BOOL	FALSE	Switches the block between manual and automatic mode. For FALSE, the control word and the setpoint value are formed of the signals pending at the block, for TRUE, control word and setpoint value from tags in the instance DB are used and can be specified via HMI, for example.
Speed_setpoint	REAL	0.0	Setpoint speed value in U/min Negative values change the direction
Reference_speed_P2000	REAL	1500.0	Reference speed Here, the same value must be specified as in parameter P2000 of SINAMICS G.
Reference_current_P2002	REAL	0.0	Reference current Here, the same value must be specified as in parameter P2002 of SINAMICS G.
Reference_torque_P2003	REAL	0.0	Reference torque Here, the same value must be specified as in parameter P2003 of SINAMICS G.
Output parameters			
Operation_enabled	BOOL		Drive is switched on, motor follows the setpoint value.
Closing_lockout_active	BOOL		On-inhibit active. To cancel it, ON_OFF1 must be set to FALSE and possibly pending errors be acknowledged.
Alarm_active	BOOL		The SINAMICS G outputs a warning.
Fault_active	BOOL		The SINAMICS G outputs a fault.
Rotating_forward	BOOL		Rotational direction of the motor. Output is TRUE, if the motor rotates forward.
Actual_speed	REAL		Current speed in U/min. Negative values mean that the motor rotates backwards.
Actual_current	REAL		Current motor current in A
Actual_torque	REAL		Current motor torque in Nm Negative values mean that the motor decelerates.
Actual_alarm	REAL		Code of the currently pending error
Actual_fault	REAL		Code of the currently pending warning

NOTICE To switch on SINAMICS G, OFF2 and OFF3 must initially be TRUE, then SINAMICS G can be switched on with a positive edge (i.e. the signal changes from FALSE to TRUE) at ON/OFF1.

Manual/automatic switchover (manual mode)

This function enables selecting whether SINAMICS G shall be controlled with the values pending at the block inputs, or whether internal values shall be used and the block inputs be ignored.

The internal values are located in the instance DB (“internal_Control_word” and “internal_Status_word”) and can be specified by a visualization.

This enables realizing a switch-over between the values supplied by SIMATIC S7 (automatic) and the specification via a visualization (manual).

Independent of these settings, the bits of the status word and the actual values are always output.

 **DANGER** When switching over (activating or deactivating the manual mode), the control word and the setpoint value are not adjusted. It is therefore possible when switching over that SINAMICS G automatically starts up or changes the speed.

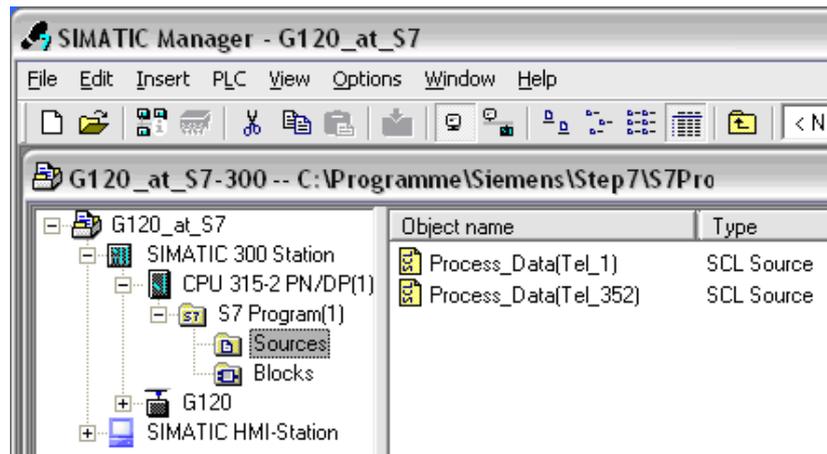
SCL language

FB 10 “PZD_G120_Tel_352” was created in SCL. During compilation in the block folder, the SCL editor generates a function block created in STL. It can be copied into your own projects and used without installed SCL.

SCL source “Process_Data(Tel_352)” is located in the “Sources” subfolder of the S7 program.

The SCL source can be exported via the context menu and then be viewed with any text editor.

Figure 5-6

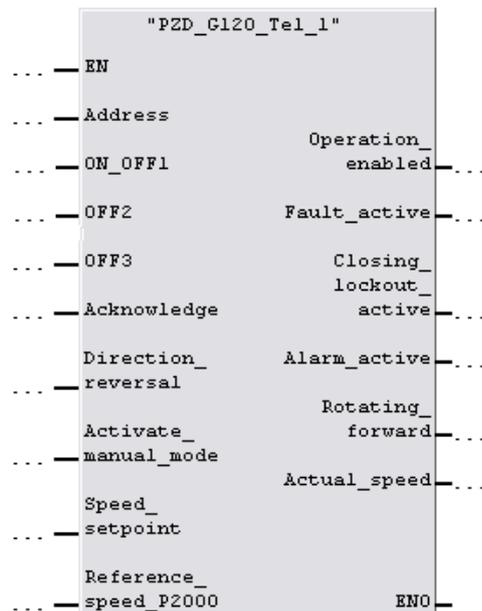


5.2 Change-over to "Siemens Telegram 1" (with FB11)

FB11 "PZD_G120_Tel_1" is, like FB10 "PZD_G120_Tel_352", intended for transmission of process data, however, it expects message frame "Siemens Telegram 1" instead of "Siemens Telegram 352".

The "Telegram 1" message frame only transfers two words in any direction: control word and setpoint value or status word and actual value.

Figure 5-7

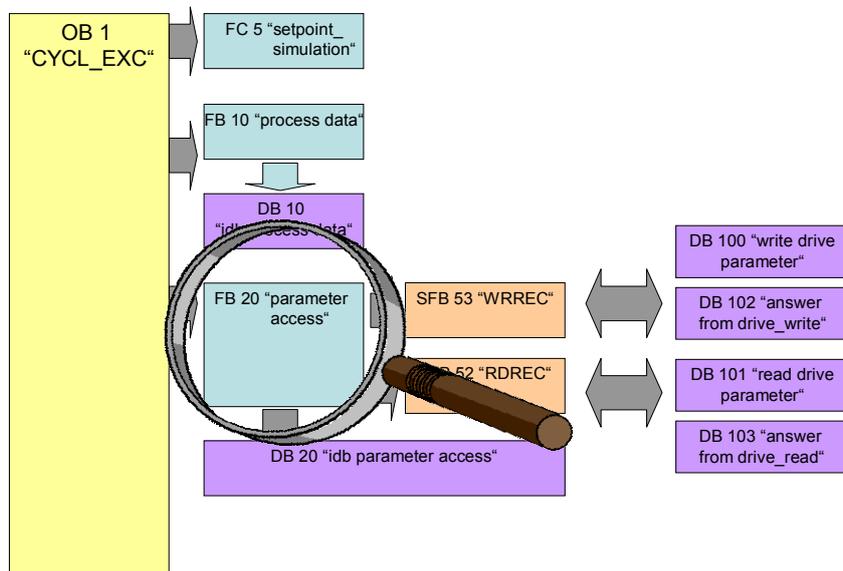


To switch over to message frame "Telegram 1", you have to:

- select message frame "Telegram 1" for SINAMICS G in HW Config,
- call FB11 "PZD_G120_Tel_1" in OB1 instead of FB10 "PZD_G120_Tel_352",
- load the program folder into the CPU again (inc. system data, see Tab. 3.4 step 9),
- change the interface configuration of SINAMICS G to message frame "Telegram 1" in the Starter, see Tab. 6.2 step 15) and
- adjust the HMI.

5.3 Parameter access functionality

Figure 5-8



Acyclic parameter access occurs parallel to the cyclic process data exchange. This saves resources, since this connection is only established on demand, i.e. when accessing a parameter.

In SIMATIC S7-300/400, the "Write data record" and "Read data record" functions must be used. Data record 47 must always be used.

Writing data record 47 sends a job to the SINAMICS G which performs the job and provides a response. Reading data record 47 makes the response of SINAMICS G available in SIMATIC S7-300/400 and can be evaluated.

For reading and writing data records, the system function blocks SFB 53 "WRREC" and SFB 52 "RDREC" are used in SIMATIC S7-300/400.

For the Data record 47 please refer to [chap. 3.1.2](#) in the function manual Fieldbus systems ([Manuals](#)).

Note

Since SFB 53 "WRREC" and SFB 52 "RDREC" are not used with CP341-1, the parameter access is not possible when using this CP.

5.3.1 FB 20 “Parameter_Access”

The parameters are accessed in FB 20 “Parameter_Access”. It is called cyclically in OB 1. The block was created so they can simply be used in own applications.

Figure 5-9

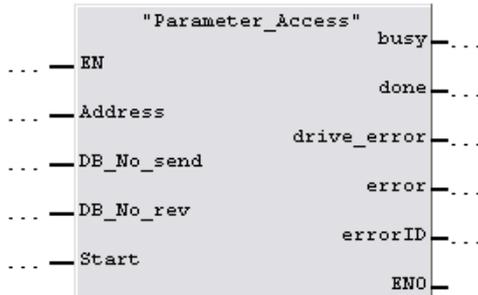


Table 5-3 Interfaces of FB 20 “Parameter_Access”

Parameter	Data type	Initial value	Description
Input parameters			
Address	INT	0	IO address of SINAMICS G. Here, the IO address must be specified which was assigned for message frame Telegram 352 of SINAMICS in HW Config. Input and output address must be identical to be able to use this block.
DB_No_send	INT	0	Number of the DB in which the data record to be sent is stored.
DB_No_rev	INT	0	Number of the DB in which the response of SINAMICS G is to be stored.
START	BOOL	FALSE	The transmission is started with a rising edge at START.
Output parameters			
Busy	BOOL		Transmission active
Done	BOOL		Job successfully transferred.
Drive_Error	BOOL		Job successfully transferred, however, the job could not or only partially be completed by SINAMICS G. The response contains the error detection.
Error	BOOL		Access aborted with transmission error
ErrorID	WORD		Cause of the abort (see subsequent error list)

Error list

The FB 20 “Parameter_Access” can output the following error codes:

Table 5-4

Error number	Description	Note
0	No error	☺
8000	DB_No_send and DB_No_rev are identical.	Check the parameters of FB 20 "Parameter_Access".
8001	DB_No_rev or DB_No_send is zero.	
8002	SFC53 "WEREC" outputs errors	In the instance DB, the error code of the SFC is stored in #WD_REC_STATUS.
8003	SFC53 "WEREC" outputs errors	In the instance DB, the error code of the SFC is stored in #RD_REC_STATUS.
8004	Send DB is empty (length 0), non existent or faulty.	In the instance DB, the error code of the SFC24 "TEST_DB" is stored in #TEST_DB_1_STATUS. If the code is 0, the DB is empty or write protected.
8005	Receive DB is empty (length 0), non existent or faulty.	In the instance DB, the error code of the SFC24 "TEST_DB" is stored in #TEST_DB_2_STATUS. If the code is 0, the DB is empty or write protected.

Drive error

If during processing a job in SINAMICS G an error occurred, and the error detection was set in the response, the response DB must be analyzed to find out the cause of the error.

Function

FB 20 "Parameter_Access" only transfers the selected DBs to or from SINAMICS G and checks, whether the transmission was successful. It is also checked, whether the error detection was set in the response of the SINAMICS G.

The structure of the error detection is available in chapter [chapter 6.1.5.1](#) "Configuring the fieldbus, PROFIdrive profile for PROFIBUS and PROFINET, acyclic communication" in the operating instruction ([71](#))

Structure

The "Parameter" FB consists of three parts:

- Checking the DB_No_xx input parameters
Network 1
- A step chain which controls the sequence of the parameter access.
Networks 2 to 10
- Call of the system functions "Read data record" or "Write data record".
Network 11

Checking the DB_No_xx input parameters

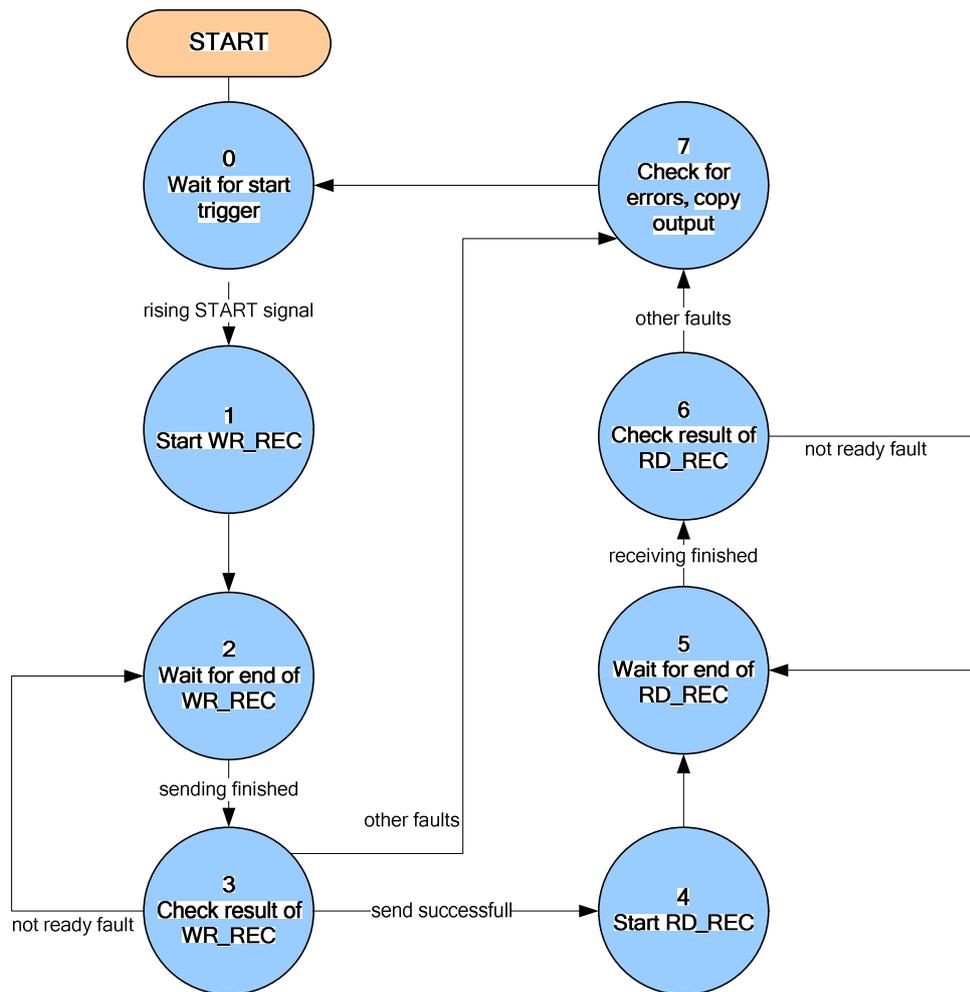
It is checked, whether input parameters DB_No_send and DB_No_rev are equal or if they were parameterized with "0". One respective error message is output.

Note Network 1 with checking the DB_No_xx input parameters can be deleted to save computing time and storage space without affecting the other functions of the block.

Step chain

The step chain of FB 20 “Parameter_access” is represented in the following graphic. The possible transitions between the individual steps are also displayed there.

Figure 5-10 Step chain



In the individual states of the step chain, the following functions are executed:

Table 5-5: Function of the states of FB 20 “Parameter_access”

State		Function
0	Wait for start trigger	Waiting for a rising edge of the “START” signal. If it is detected, all output signals will be deleted, “BUSY” will be set and step 1 will be activated.
1	Start WR_REC	The “REQ” signal of SFB 53 “WRREC” is set and step 2 is activated.

5.3 Parameter access functionality

State		Function
2	Wait for end of WR_REC	Waiting until the "busy" signal of SFB 53 "WRREC" becomes 0 again. Then step 3 is activated.
3	Check result of WR_REC	It is checked whether the data record was written successfully. If so, the "REQ" signal of SFB 53 "WRREC" will be deleted again and step 4 will be activated. If SFB 53 "WRREC" reports the error 16#DF80_B500 (peer not ready), step 3 will be activated again and SFB 53 "WRREC" will repeat the job. If a different error has occurred, the "REQ" signal of SFB 53 "WRREC" will be deleted, an internal error bit will be set and step 7 will be activated.
4	Start RD_REC	The "REQ" signal of FB "RDREC" is set and step 5 is activated.
5	Wait for end of RD_REC	It is waited until the "busy" signal of FB "RDREC" becomes 0 again. Then step 6 is activated.
6	Check result of RD_REC	Check whether the data record has been read successfully. If so, the "REQ" signal of SFB 52 "RDREC" will be deleted again and step 7 will be activated. If SFB 52 "RDREC" reports the error 16#DE80_B500 (peer not ready), step 5 will be activated again and FB "RDREC" will repeat the job. If a different error has occurred, the "REQ" signal of SFB 52 "RDREC" will be deleted, an internal error bit will be set and step 7 will be activated.
7	Check for errors, copy outputs	It is checked whether one of the internal error bits has been set. If an error bit has been set, <ul style="list-style-type: none"> - the "ERROR" signal will be set, - the "BUSY" signal deleted, - step 0 activated. If no error bit has been set, the read times will be output, the "BUSY" will be deleted, the "DONE" will be set and step 0 will be activated.

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Call of the "Read data record" or "Write data record" system functions

After the currently required control bits were set in the sequence chart of FB 20 "Parameter_access", the "Write data record" and "Read data record" system functions (SFB 53 "WRREC" and SFB 52 "RDREC") are called in network 10.

It is initially checked, whether the DB to be used exists in the SIMATIC S7-CPU and how long it is. This creates an ANY pointer which references the data to be send/received and calls the SFC.

5.3.2 The DBs "read/write_drive_parameters" and "answer_from_drive"

To access the parameters, a given job structure must be kept. The response of SINAMICS G also contains a given response structure.

5.3 Parameter access functionality

Job and response structure

The structure of the jobs and responses are available in [Chapter 7.3.2.1](#) “Configuring the fieldbus, PROFIdrive profile for PROFIBUS and PROFINET, acyclic communication” in the operating instruction ([17](#))

Note

Since the structure of the data record to be sent or received depends on the number of jobs and their number format, a generally valid structure cannot be used.

FB 20 “Parameter_Access” is therefore limited to sending and receiving the data record. The DBs for the data record to be send and received must be set by the user.

The job to access a parameter consists of at least 10 words. Therefore, the job should be assembled in a DB. The response by the SINAMICS G also consists of several words.

A job may contain the access to several parameters. Since the length of the data to be transferred per job depends on the number and data types of the SINAMICS G parameters, no generally valid structure can be devised.

In this example, only the ramp up and ramp down times (P1120 and P1121) and a part of the fault memory (P945.x) is accessed. The job of writing the parameters is stored in DB 100 “write_drive_parameters” and the job to read the parameters in DB 101 “read_drive_parameters”.

The response of the SINAMICS G is copied to DB 102 “answer_from_drive_write” or DB 103 “answer_from_drive_read”. The structure contained therein corresponds to the structure for a successful writing/reading of the parameters.

Figure 5-11 DB 100 for writing the ramp up and ramp down time (in the picture: 10s and 15 s)

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	H_Reference	BYTE	B#16#0	HEAD: Reference number
+1.0	H_Request_ID	BYTE	B#16#2	HEAD: Request ID: 1=read, 2=write
+2.0	H_Axis	BYTE	B#16#1	HEAD: Always 1 for SINAMICS G120
+3.0	H_Number_of_parameters	BYTE	B#16#2	HEAD: Number of parameters to transfer
+4.0	A_1_Attribute	BYTE	B#16#10	Address: 16#10= parameter value
+5.0	A_1_Number_of_indices	BYTE	B#16#0	Address: Number of elements (0 to 234)
+6.0	A_1_Parameter_number	INT	1120	Address: Parameter number
+8.0	A_1_Index	INT	0	Address: Index number
+10.0	A_2_Attribute	BYTE	B#16#10	Address: 16#10= parameter value
+11.0	A_2_Number_of_indices	BYTE	B#16#0	Address: Number of elements (0 to 234)
+12.0	A_2_Parameter_number	INT	1121	Address: Parameter number
+14.0	A_2_Index	INT	0	Address: Index number
+16.0	V_1_Format	BYTE	B#16#8	Value: Format of parametr value
+17.0	V_1_Number_of_index_valu	BYTE	B#16#1	Value: Number of index values
+18.0	V_1_Value	REAL	1.000000e+001	Value: Parameter value
+22.0	V_2_Format	BYTE	B#16#8	Value: Format of parametr value
+23.0	V_2_Number_of_index_valu	BYTE	B#16#1	Value: Number of index values
+24.0	V_2_Value	REAL	1.500000e+001	Value: Parameter value
=28.0		END_STRUCT		

5 Functional Mechanisms of the Application

5.3 Parameter access functionality

Figure 5-12 DB 102 for the response to the write job

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	H_Reference	BYTE	B#16#0	HEAD: Reference number (mirrored)
+1.0	H_Response_ID	BYTE	B#16#0	HEAD: Response ID: 8xh=error, 0xh=ok
+2.0	H_Axis	BYTE	B#16#0	HEAD: Always 1 for SINAMICS G120
+3.0	H_Number_of_parameters	BYTE	B#16#0	HEAD: Number of parameters to transfer
+4.0	Value_01	BYTE	B#16#0	
+5.0	Value_02	BYTE	B#16#0	
+6.0	Value_03	BYTE	B#16#0	
+7.0	Value_04	BYTE	B#16#0	
+8.0	Value_05	BYTE	B#16#0	
+9.0	Value_06	BYTE	B#16#0	
+10.0	Value_07	BYTE	B#16#0	
+11.0	Value_08	BYTE	B#16#0	
+12.0	Value_09	BYTE	B#16#0	
+13.0	Value_010	BYTE	B#16#0	
+14.0	Value_011	BYTE	B#16#0	
+15.0	Value_012	BYTE	B#16#0	
+16.0	Value_013	BYTE	B#16#0	
+17.0	Value_014	BYTE	B#16#0	
+18.0	Value_015	BYTE	B#16#0	
+19.0	Value_016	BYTE	B#16#0	
=20.0		END_STRUCT		

Figure 5-13 DB 101 for reading the ramp up and ramp down time and 16 values of the fault memory

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	H_Reference	BYTE	B#16#0	HEAD: Reference number
+1.0	H_Request_ID	BYTE	B#16#1	HEAD: Request ID: 1=read, 2=write
+2.0	H_Axis	BYTE	B#16#1	HEAD: Always 1 for SINAMICS G120
+3.0	H_Number_of_parameters	BYTE	B#16#3	HEAD: Number of parameters to transfer
+4.0	A_1_Attribute	BYTE	B#16#10	Address: 16#10= parameter value
+5.0	A_1_Number_of_indices	BYTE	B#16#0	Address: Number of elements (0 to 234)
+6.0	A_1_Parameter_number	INT	1120	Address: Parameter number
+8.0	A_1_Index	INT	0	Address: Index number
+10.0	A_2_Attribute	BYTE	B#16#10	Address: 16#10= parameter value
+11.0	A_2_Number_of_indices	BYTE	B#16#0	Address: Number of elements (0 to 234)
+12.0	A_2_Parameter_number	INT	1121	Address: Parameter number
+14.0	A_2_Index	INT	0	Address: Index number
+16.0	A_3_Attribute	BYTE	B#16#10	Address: 16#10= parameter value
+17.0	A_3_Number_of_indices	BYTE	B#16#16	Address: Number of elements (0 to 234)
+18.0	A_3_Parameter_number	INT	945	Address: Parameter number
+20.0	A_3_Index	INT	0	Address: Index number
=22.0		END_STRUCT		

5 Functional Mechanisms of the Application

5.3 Parameter access functionality

Figure 5-14: DB 103 for the response of the read job

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	H_Reference	BYTE	B#16#0	HEAD: Reference number (mirrored)
+1.0	H_Response_ID	BYTE	B#16#0	HEAD: Response ID: 8xh=error, 0xh=ok
+2.0	H_Axis	BYTE	B#16#0	HEAD: Always 1 for SINAMICS G120
+3.0	H_Number_of_parameters	BYTE	B#16#0	HEAD: Number of parameters to transfer
+4.0	V_1_Format	BYTE	B#16#0	Value: Format of parameter value (4h=error)
+5.0	V_1_Number_of_index_valu	BYTE	B#16#0	Value: Number of index values
+6.0	V_1_Value	REAL	0.000000e+000	Value: Parameter value
+10.0	V_2_Format	BYTE	B#16#0	Value: Format of parameter value
+11.0	V_2_Number_of_index_valu	BYTE	B#16#0	Value: Number of index values
+12.0	V_2_Value	REAL	0.000000e+000	Value: Parameter value
+16.0	V_3_Format	BYTE	B#16#0	Value: Format of parameter value
+17.0	V_3_Number_of_index_valu	BYTE	B#16#0	Value: Number of index values
+18.0	V_3_Value_00	WORD	W#16#0	Value: Parameter value
+20.0	V_3_Value_01	WORD	W#16#0	Value: Parameter value
+22.0	V_3_Value_02	WORD	W#16#0	Value: Parameter value
+24.0	V_3_Value_03	WORD	W#16#0	Value: Parameter value
+26.0	V_3_Value_04	WORD	W#16#0	Value: Parameter value
+28.0	V_3_Value_05	WORD	W#16#0	Value: Parameter value
+30.0	V_3_Value_06	WORD	W#16#0	Value: Parameter value
+32.0	V_3_Value_07	WORD	W#16#0	Value: Parameter value
+34.0	V_3_Value_08	WORD	W#16#0	Value: Parameter value
+36.0	V_3_Value_09	WORD	W#16#0	Value: Parameter value
+38.0	V_3_Value_10	WORD	W#16#0	Value: Parameter value
+40.0	V_3_Value_11	WORD	W#16#0	Value: Parameter value
+42.0	V_3_Value_12	WORD	W#16#0	Value: Parameter value
+44.0	V_3_Value_13	WORD	W#16#0	Value: Parameter value
+46.0	V_3_Value_14	WORD	W#16#0	Value: Parameter value
+48.0	V_3_Value_15	WORD	W#16#0	Value: Parameter value
=50.0		END_STRUCT		

Note

Since the structure of the data record to be sent or received depends on the number of jobs and their number format, a generally valid structure cannot be used.

5.4 Function of the further blocks in the example projects

Apart from FB10 and FB20 further blocks are contained in the example projects which are necessary to make the examples runnable.

These tables are:

Table 5-6

Block	Function
OB86	If the connection to a PROFIBUS station is interrupted or restored, the SIMATIC S7-CPU calls these error organization blocks. If this OB does not exist in the SIMATIC S7-CPU, it goes to STOP instead. In this OB, the user can program a reaction to a failed or restored station, in this example it is empty.
FC5	Function for generating a speed setpoint value using the digital inputs. The setpoint value is stored in MD0. This block is not intended for use in your own projects.
VAT_Process_Data	Value tables for monitoring and control of FB10 and FB20.
VAT_Parameter_Access	

6 Configuration and Settings

Note

If you only wish to download and commission the example program, please follow the instructions in chapter 3 “Setting up and Commissioning the Application”.

The step tables below describe what you have to do if you do not want to or cannot use the sample code and you want to or have to configure SINAMICS G and SIMATIC S7 CPU yourself.

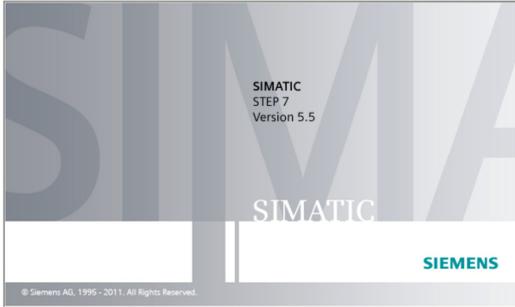
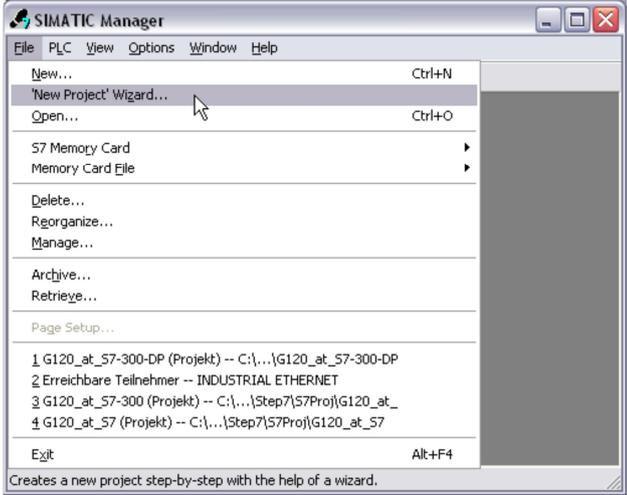
6.1 Configuring the SIMATIC S7-300/400 controller

This chapter describes how the SIMATIC S7-300/400 must be configured for the example program. This chapter does not discuss integrating the operator panel or programming the SIMATIC S7-300/400.

Note

The screenshots below use a general STEP 7 project name: “G120_at_S7”.

Table 6-1

No.	Action	Screenshots / Remarks
1.	Start STEP 7 V5.5	 <p>The screenshot shows the SIMATIC STEP 7 Version 5.5 splash screen. It features a large 'SIMATIC' logo in the background, the text 'SIMATIC STEP 7 Version 5.5' in the center, and the 'SIEMENS' logo at the bottom right. A copyright notice at the bottom left reads '© Siemens AG, 1995 - 2011. All Rights Reserved.'</p>
2.	Start the “New project” wizard.	 <p>The screenshot shows the SIMATIC Manager application window with the 'New Project' Wizard dialog box open. The menu bar includes 'File', 'PLC', 'View', 'Options', 'Window', and 'Help'. The 'New Project' Wizard dialog box has the following options: 'New...' (Ctrl+N), 'New Project' Wizard...' (highlighted), 'Open...' (Ctrl+O), 'S7 Memory Card' (with a right-pointing arrow), 'Memory Card File' (with a right-pointing arrow), 'Delete...', 'Reorganize...', 'Manage...', 'Archive...', and 'Retrieve...'. Below these options is a 'Page Setup...' button. A list of project files is shown at the bottom of the dialog box: <ul style="list-style-type: none"> 1 G120_at_S7-300-DP (Projekt) -- C:\...\G120_at_S7-300-DP 2 Erreichbare Teilnehmer -- INDUSTRIAL ETHERNET 3 G120_at_S7-300 (Projekt) -- C:\...\Step7\S7Proj\G120_at_ 4 G120_at_S7 (Projekt) -- C:\...\Step7\S7Proj\G120_at_S7 The 'Exit' button is at the bottom right (Alt+F4). A note at the bottom of the dialog box states: 'Creates a new project step-by-step with the help of a wizard.'</p>

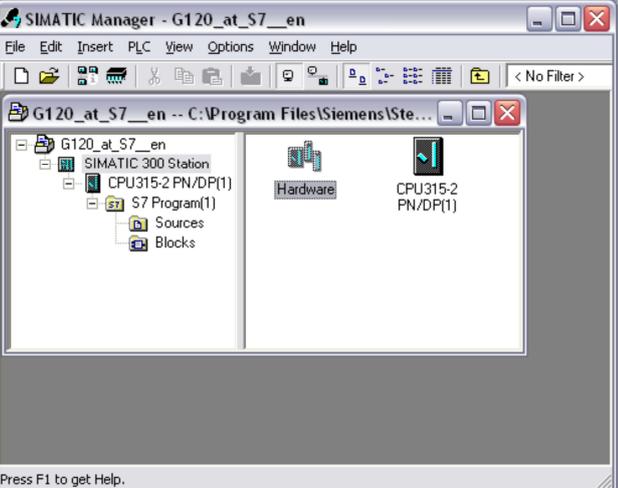
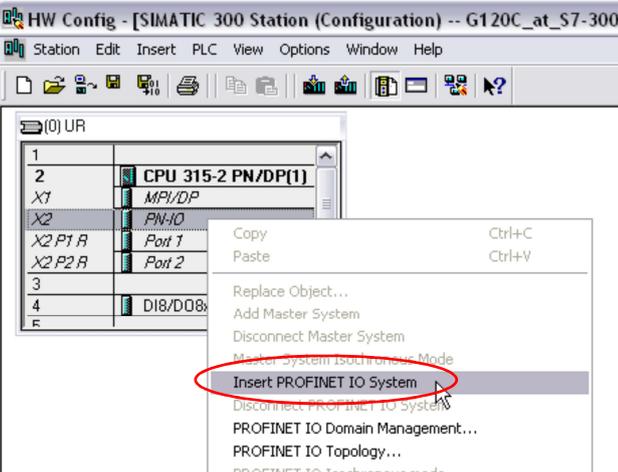
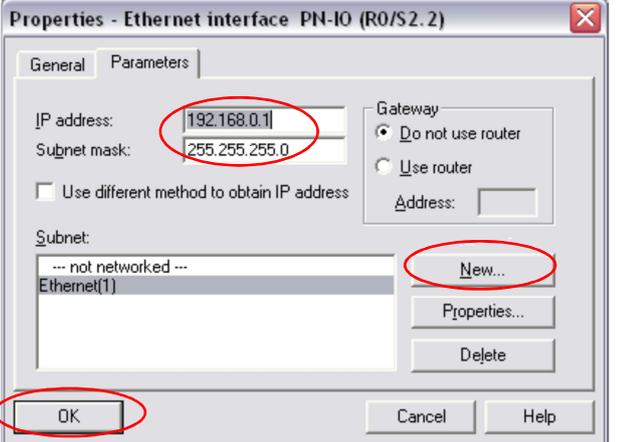
6 Configuration and Settings

6.1 Configuring the SIMATIC S7-300/400 controller

No.	Action	Screenshots / Remarks
3.	Select CPU 315-2DP/PN, or another CPU, which supports data record routing, see 9/ .	<p>The screenshot shows the 'STEP 7 Wizard: "New Project"' dialog box at step 2(4) titled 'Which CPU are you using in your project?'. It features a table with columns 'CPU Type' and 'Order No'. The table lists several CPU models, with 'CPU315-2 PN/DP' selected. Below the table, there are fields for 'CPU name' (set to 'CPU315-2 PN/DP(1)') and 'MPI address' (set to '2'). A 'Preview>>' button is located at the bottom right of the dialog.</p>
4.	In this screen you click "Continue >".	<p>The screenshot shows the 'STEP 7 Wizard: "New Project"' dialog box at step 3(4) titled 'Which blocks do you want to add?'. It features a table with columns 'Block Name' and 'Symbolic Name'. The table lists several block types, with 'OB1' selected. Below the table, there are checkboxes for 'Select All' and 'Help on OB'. There are also radio buttons for 'Language for Selected Blocks' with 'STL' selected. A 'Preview>>' button is located at the bottom right of the dialog.</p>
5.	Assign a name for the project (e.g. "G120_at_S7-300").	<p>The screenshot shows the 'STEP 7 Wizard: "New Project"' dialog box at step 4(4) titled 'What do you want to call your project?'. It features a text field for 'Project name' containing 'G120_at_S7'. Below it is a list box for 'Existing projects' containing 'G120_at_S7', 'G120_at_S7-300', and 'G120_at_S7-300-DP'. A 'Preview>>' button is located at the bottom right of the dialog.</p>

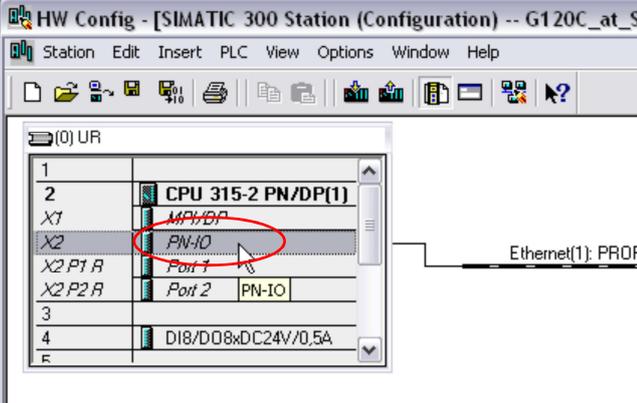
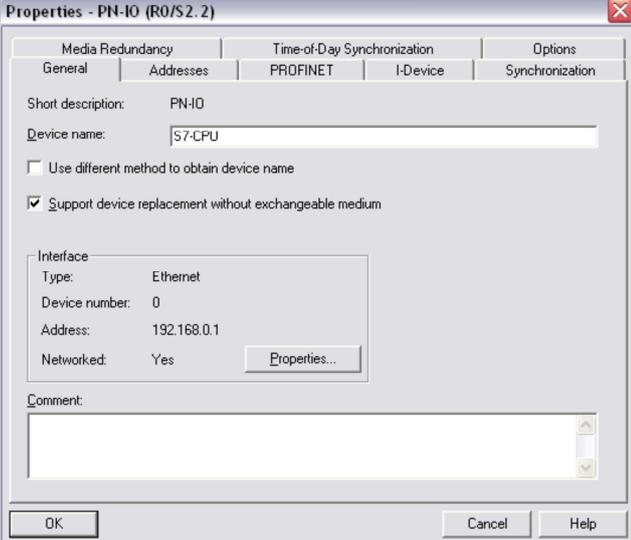
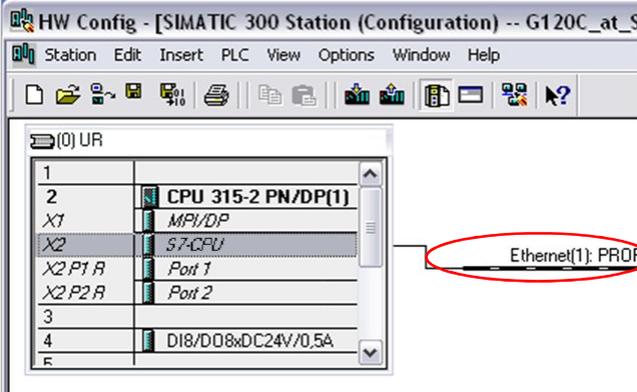
6 Configuration and Settings

6.1 Configuring the SIMATIC S7-300/400 controller

No.	Action	Screenshots / Remarks
6.	<ul style="list-style-type: none"> Click on the S7-300 station Double-click the “Hardware” icon to open the hardware configuration. 	 <p>The screenshot shows the SIMATIC Manager interface. On the left, a tree view displays the project structure: G120_at_S7_en > SIMATIC 300 Station > CPU315-2 PN/DP(1) > S7 Program(1). The 'Hardware' icon is highlighted in the main workspace.</p>
7.	<p>Select the PROFINET interface of the CPU and choose “Insert PROFINET IO System” from the context menu (right mouse button)</p>	 <p>The screenshot shows the HW Config window for a SIMATIC 300 Station. A context menu is open over the 'CPU 315-2 PN/DP(1)' component. The 'Insert PROFINET IO System' option is highlighted with a red circle.</p>
8.	<ul style="list-style-type: none"> Ensure that address 192.168.0.1 and network mask 255.255.255.000 have been assigned. Click on the “New” button and create an Ethernet network. The CPU will automatically be connected to it. Click OK Click on OK in the higher-level mask 	 <p>The screenshot shows the 'Properties - Ethernet interface PN-IO (R0/S2.2)' dialog box. The 'Parameters' tab is active. The IP address field contains '192.168.0.1' and the Subnet mask field contains '255.255.255.0'. The 'New...' button is highlighted with a red circle. The 'OK' button at the bottom left is also highlighted with a red circle.</p>

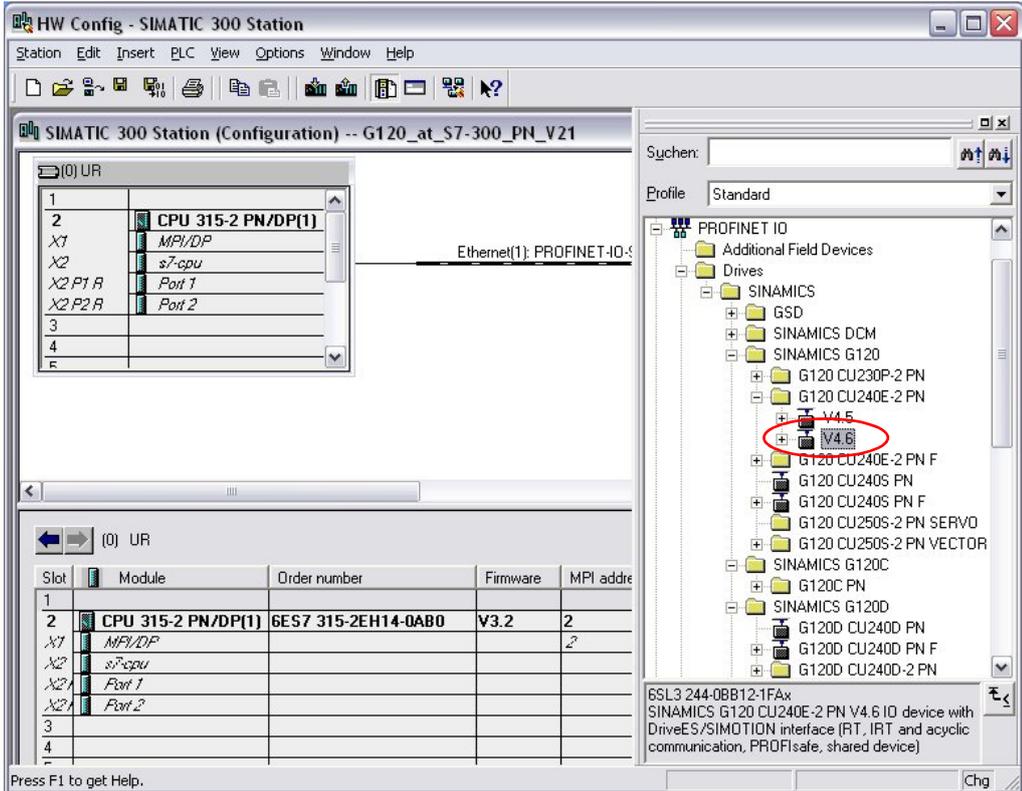
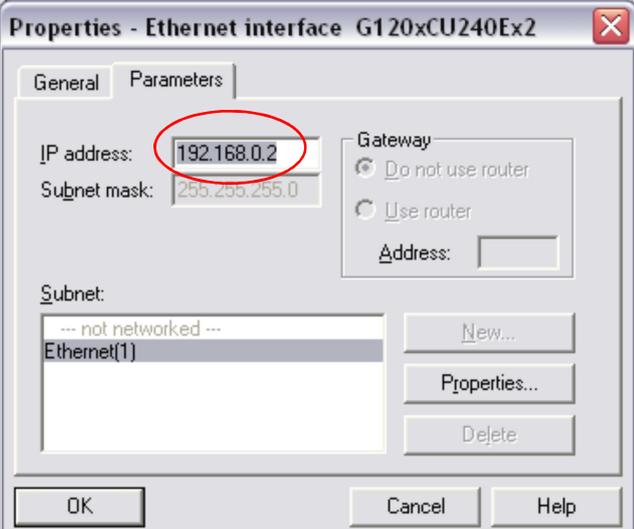
6 Configuration and Settings

6.1 Configuring the SIMATIC S7-300/400 controller

No.	Action	Screenshots / Remarks
9.	Double-click on the PN/IO interface of the CPU.	 <p>The screenshot shows the HW Config window for a SIMATIC 300 Station. The CPU 315-2 PN/DP(1) is selected, and its PN/IO interface is highlighted with a red circle. A mouse cursor is pointing at the PN/IO interface. The Ethernet(1): PROFNET network is visible on the right side of the interface.</p>
10.	Change the device name to "S7-CPU" (or the respective name assigned during node initiation (step 4 in Table 3-3)).	 <p>The screenshot shows the Properties dialog box for the PN-IO interface. The device name is set to "S7-CPU". The interface type is Ethernet, and the address is 192.168.0.1. The "Support device replacement without exchangeable medium" checkbox is checked.</p>
11.	Ensure that the PROFINET network is displayed.	 <p>The screenshot shows the HW Config window after the device name change. The PN/IO interface is now labeled "S7-CPU". The Ethernet(1): PROFNET network is displayed and circled in red.</p>

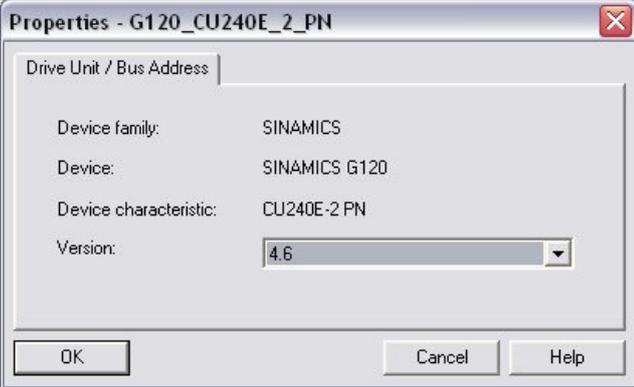
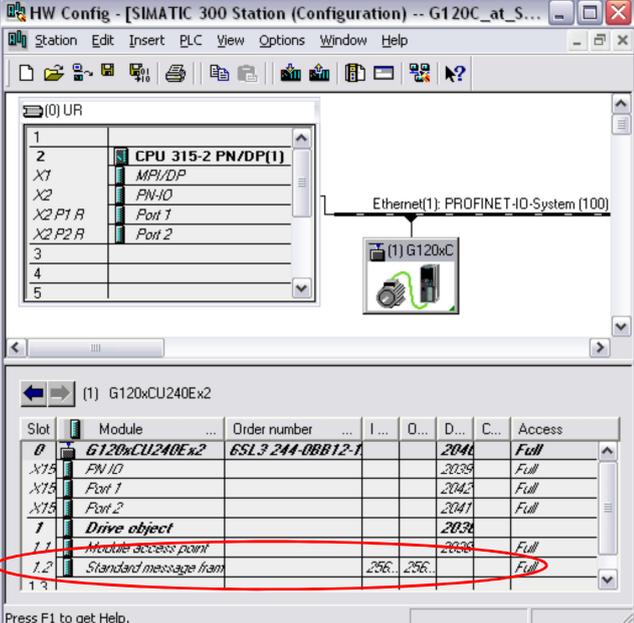
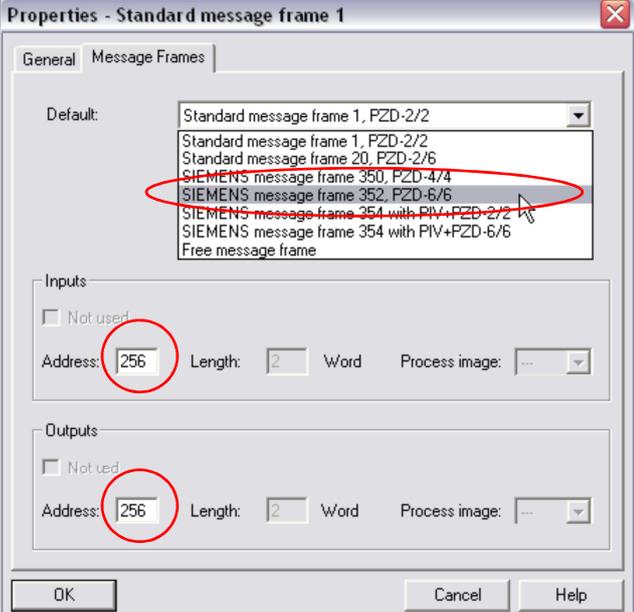
6 Configuration and Settings

6.1 Configuring the SIMATIC S7-300/400 controller

No.	Action	Screenshots / Remarks
12.	<p>Search your SINAMICS G in the catalog. The path in the catalog is:</p> <p style="text-align: right;">> PROFINET IO > Drives > SINAMICS > SINAMICS G110M G120 G120C G120D</p> <p>Then select the used CU (Control Unit).</p> <p>Note: For CU 230P-2 PN look in the G120 folder.</p>	 <p>The screenshot shows the HW Config interface for a SIMATIC 300 Station. The left pane shows the hardware rack configuration with a CPU 315-2 PN/DP(1) in slot 2. The right pane shows the catalog tree under PROFINET IO > Drives > SINAMICS > SINAMICS G120 > G120 CU240E-2 PN. The V4.6 sub-item is circled in red. Below the catalog tree, the selected device is identified as '6SL3 244-0BB12-1FAx SINAMICS G120 CU240E-2 PN V4.6 ID device with DriveES/SIMOTION interface (RT, IRT and acyclic communication, PROFIsafe, shared device)'.</p> <p>The picture shows the example of a selected SINAMICS G120 with CU 240E-2 PN.</p>
13.	<ul style="list-style-type: none"> • Drag the selected CU onto the PROFINET line and release the mouse button. <p>The window for selecting the Ethernet interface opens automatically:</p> <ul style="list-style-type: none"> • Select address 192.168.0.2 for SINAMICS G. • Click the OK button. 	 <p>The screenshot shows the 'Properties - Ethernet interface G120xCU240Ex2' dialog box. The 'Parameters' tab is active. The 'IP address' field is set to 192.168.0.2 and is circled in red. The 'Subnet mask' is 255.255.255.0. The 'Gateway' section has 'Do not use router' selected. The 'Subnet' list shows 'Ethernet(1)' selected.</p>

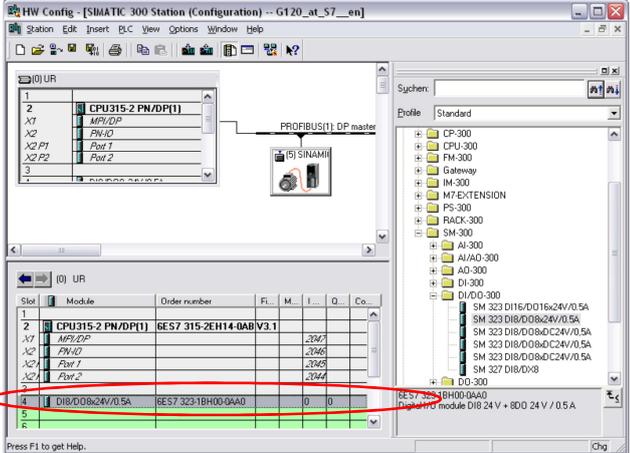
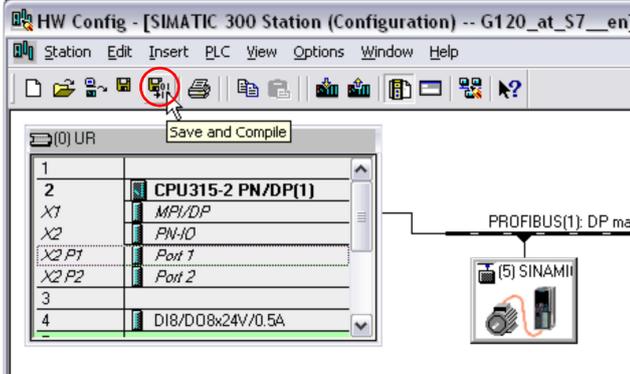
6 Configuration and Settings

6.1 Configuring the SIMATIC S7-300/400 controller

No.	Action	Screenshots / Remarks																																																																
14.	Confirm or select the firmware you use..																																																																	
15.	Double-click slot 1.2 of SINAMICS G, so its properties are displayed.	 <table border="1" data-bbox="719 1104 1353 1317"> <thead> <tr> <th>Slot</th> <th>Module</th> <th>Order number</th> <th>I...</th> <th>O...</th> <th>D...</th> <th>C...</th> <th>Access</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>G120xCU240Ex2</td> <td>6SL3 244-0BB12-1</td> <td></td> <td></td> <td>2046</td> <td></td> <td>Full</td> </tr> <tr> <td>X15</td> <td>PN IO</td> <td></td> <td></td> <td></td> <td>2035</td> <td></td> <td>Full</td> </tr> <tr> <td>X15</td> <td>Port 1</td> <td></td> <td></td> <td></td> <td>2045</td> <td></td> <td>Full</td> </tr> <tr> <td>X15</td> <td>Port 2</td> <td></td> <td></td> <td></td> <td>2047</td> <td></td> <td>Full</td> </tr> <tr> <td>1</td> <td>Drive object</td> <td></td> <td></td> <td></td> <td>2034</td> <td></td> <td>Full</td> </tr> <tr> <td>1.1</td> <td>Module access point</td> <td></td> <td></td> <td></td> <td>2036</td> <td></td> <td>Full</td> </tr> <tr> <td>1.2</td> <td>Standard message frame</td> <td></td> <td>256..</td> <td>256..</td> <td></td> <td></td> <td>Full</td> </tr> </tbody> </table>	Slot	Module	Order number	I...	O...	D...	C...	Access	0	G120xCU240Ex2	6SL3 244-0BB12-1			2046		Full	X15	PN IO				2035		Full	X15	Port 1				2045		Full	X15	Port 2				2047		Full	1	Drive object				2034		Full	1.1	Module access point				2036		Full	1.2	Standard message frame		256..	256..			Full
Slot	Module	Order number	I...	O...	D...	C...	Access																																																											
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1	Drive object				2034		Full																																																											
1.1	Module access point				2036		Full																																																											
1.2	Standard message frame		256..	256..			Full																																																											
16.	<ul style="list-style-type: none"> Go to the "Message Frames" tab. Select "Siemens message frame 352, PZD 6/6" Ensure that the I-address and the Q-address are both 256 respectively. Click OK to close the dialog box 																																																																	

6 Configuration and Settings

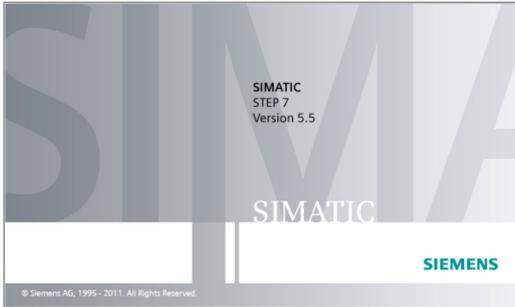
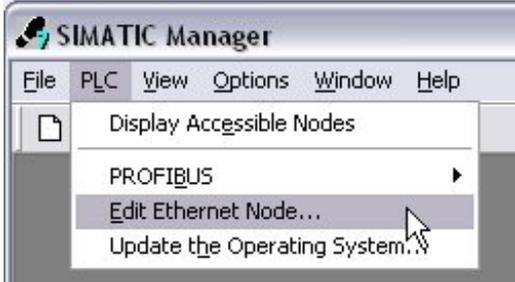
6.1 Configuring the SIMATIC S7-300/400 controller

No.	Action	Screenshots / Remarks																																																								
17.	<p>Enter a DI or DI/DO module (e.g. 6ES323-1BH01-0AA0) on slot 4 of the central rack.</p> <p>Please ensure that the I-address is 0.</p>	 <p>The screenshot shows the HW Config window for a SIMATIC 300 station. The rack configuration table is as follows:</p> <table border="1"> <thead> <tr> <th>Slot</th> <th>Module</th> <th>Order number</th> <th>FI</th> <th>M</th> <th>I</th> <th>Q</th> <th>Co.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>CPU315-2 PN/DP(1)</td> <td>6ES7 315-2EH14-0AB V3.1</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>X1</td> <td>MPV/DP</td> <td></td> <td></td> <td></td> <td>304</td> <td></td> <td></td> </tr> <tr> <td>X2</td> <td>PN-IO</td> <td></td> <td></td> <td></td> <td>306</td> <td></td> <td></td> </tr> <tr> <td>X2 P1</td> <td>Port 1</td> <td></td> <td></td> <td></td> <td>308</td> <td></td> <td></td> </tr> <tr> <td>X2 P2</td> <td>Port 2</td> <td></td> <td></td> <td></td> <td>310</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>DI8/DO8x24V/0.5A</td> <td>6ES7 323-1BH00-0AA0</td> <td>0</td> <td>0</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>The module in slot 4 is highlighted with a red circle. The rack diagram shows the module connected to the PROFIBUS network.</p>	Slot	Module	Order number	FI	M	I	Q	Co.	1	CPU315-2 PN/DP(1)	6ES7 315-2EH14-0AB V3.1						X1	MPV/DP				304			X2	PN-IO				306			X2 P1	Port 1				308			X2 P2	Port 2				310			4	DI8/DO8x24V/0.5A	6ES7 323-1BH00-0AA0	0	0			
Slot	Module	Order number	FI	M	I	Q	Co.																																																			
1	CPU315-2 PN/DP(1)	6ES7 315-2EH14-0AB V3.1																																																								
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X2 P2	Port 2				310																																																					
4	DI8/DO8x24V/0.5A	6ES7 323-1BH00-0AA0	0	0																																																						
18.	<p>Thus, the hardware configuration is completed.</p> <p>Click "Save and compile"</p>	 <p>The screenshot shows the HW Config window with the 'Save and Compile' button highlighted in the toolbar. The rack configuration table is the same as in the previous screenshot.</p>																																																								

6.2 Configuring the SINAMICS G drive

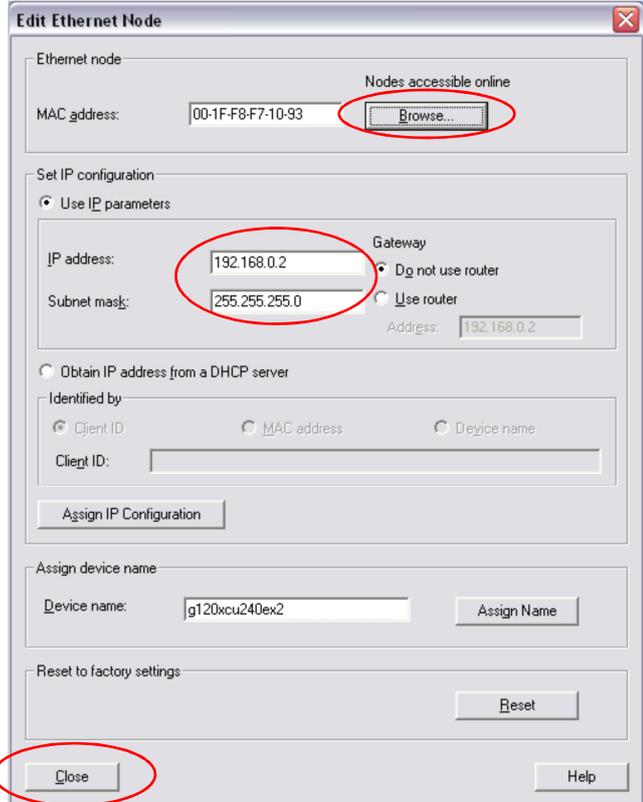
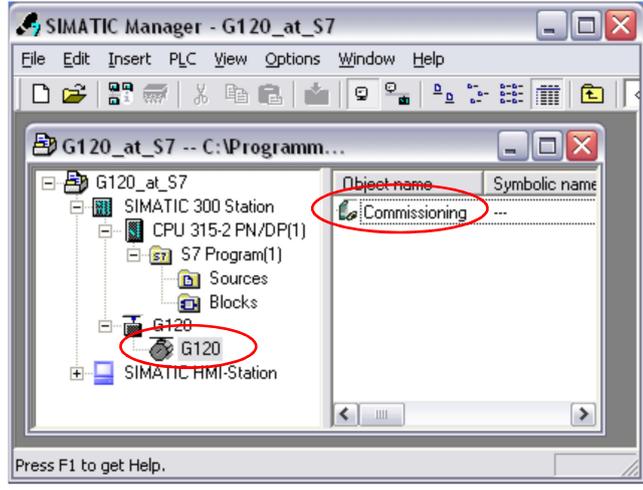
The subsequent configuration instruction assumes that the SINAMIC G is to be accessed via routing.

Table 6-2

No.	Action	Screenshots / Remarks
1.	If still unsuccessful, install the STARTER commissioning software (see /6/).	
2.	Connect SINAMICS G and SIMATIC S7-300 via network cables.	<p>SINAMICS G120 S7-300/400</p> <p style="text-align: center; color: green;">Ethernet</p>
3.	Start the SIMATIC Manager and open the project created in chapter 6.1.	 <p>The screenshot shows the SIMATIC Manager splash screen. It features the 'SIMATIC' logo in large, semi-transparent letters, with 'SIMATIC STEP 7 Version 5.5' and the 'SIEMENS' logo below it. A copyright notice '© Siemens AG, 1995 - 2011. All Rights Reserved.' is visible at the bottom.</p>
4.	Call up the “Edit Ethernet Node...” dialog.	 <p>The screenshot shows the SIMATIC Manager application window. The menu bar includes 'File', 'PLC', 'View', 'Options', 'Window', and 'Help'. The 'File' menu is open, showing options: 'Display Accessible Nodes', 'PROFIBUS', 'Edit Ethernet Node...', and 'Update the Operating System...'. A mouse cursor is pointing at the 'Edit Ethernet Node...' option.</p>

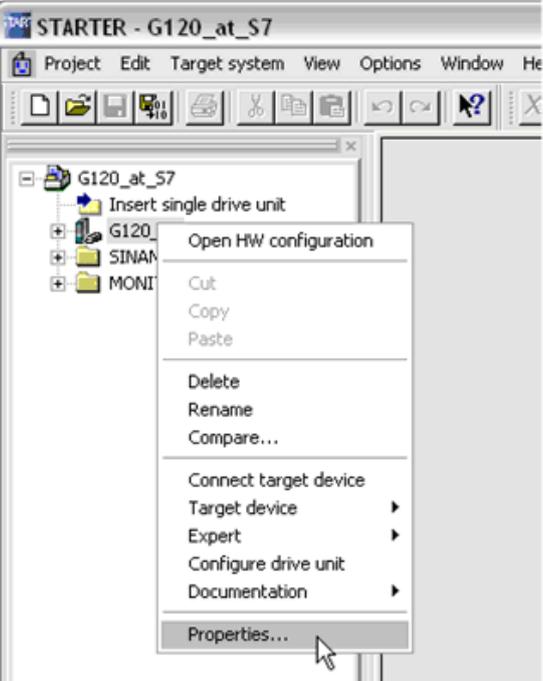
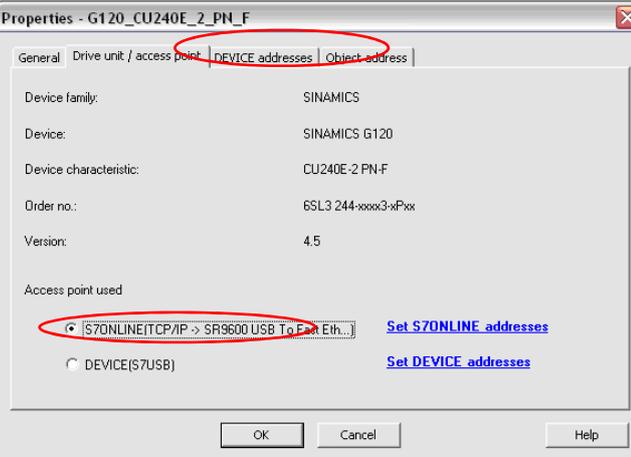
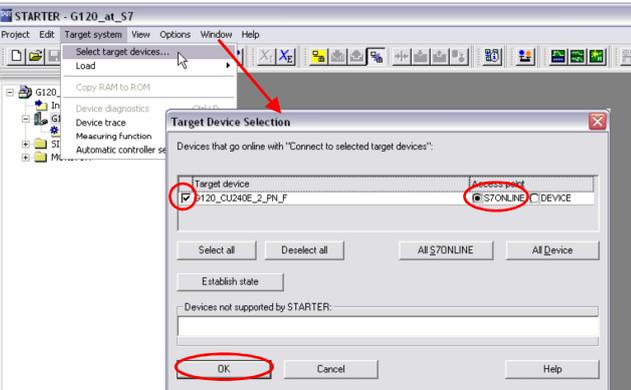
6 Configuration and Settings

6.2 Configuring the SINAMICS G drive

No.	Action	Screenshots / Remarks
5.	<ul style="list-style-type: none"> Click on "Browse..." Select the SINAMICS G and click on OK. Enter the IP address 192.168.0.2 and the subnet mask 255.255.255.0, and click on "Assign IP Configuration". Enter the device name of your CU and click on "Assign Name" (please observe the note). <ul style="list-style-type: none"> G110M G120xCU230Px2 G120xCU240Ex2 G120xCU240Ex2xF G120xCU250Sx2xV G120xCU240Dx2 G120xCU240Dx2xF G120C Exit the dialog by clicking "Close". <p>Note: The device name must match the one given in the Properties of SINAMICS G in HW Config.</p>	
6.	<ul style="list-style-type: none"> Click on SINAMICS G. Depending on the used project, the SINAMICS G is called... <ul style="list-style-type: none"> G110M_PN G120_CU230P_2_PN G120_CU240E_2_PN G120_CU240E_2_PN_F G120_CU250S_2_V_PN G120_CU240D_2_PN G120_CU240D_2_PN_F G120C_PN <p>Click 2x on "Commissioning". This opens the STARTER with the project.</p>	

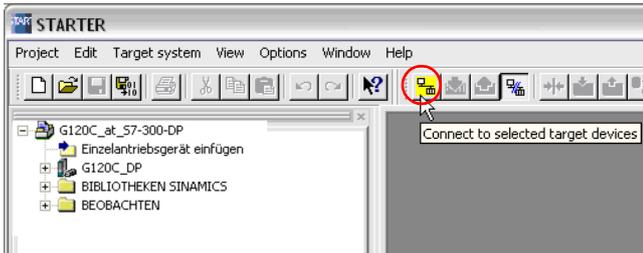
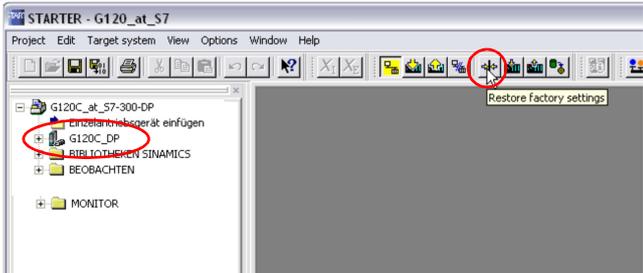
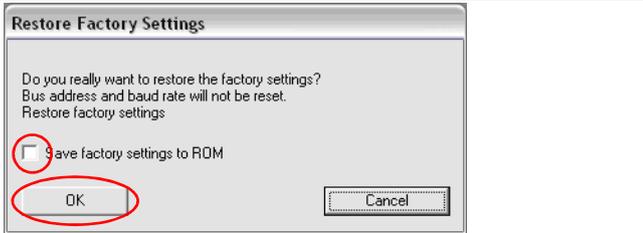
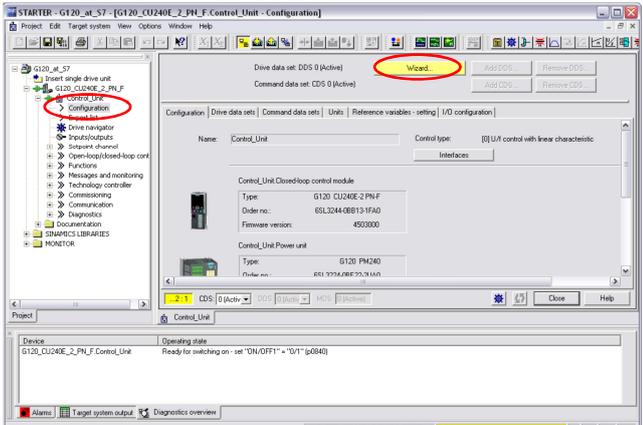
6 Configuration and Settings

6.2 Configuring the SINAMICS G drive

No.	Action	Screenshots / Remarks
7.	After the STARTER has opened, select the SINAMICS G and open its properties by clicking on the right mouse button.	
8.	Select "S7ONLINE(TCP/IP->Network card)" and click on "OK".	
9.	Call up the "Target Device Selection" dialog in the STARTER via "Target system > Select target device...". Select the CU and the "S7ONLINE" access point and then click on OK.	

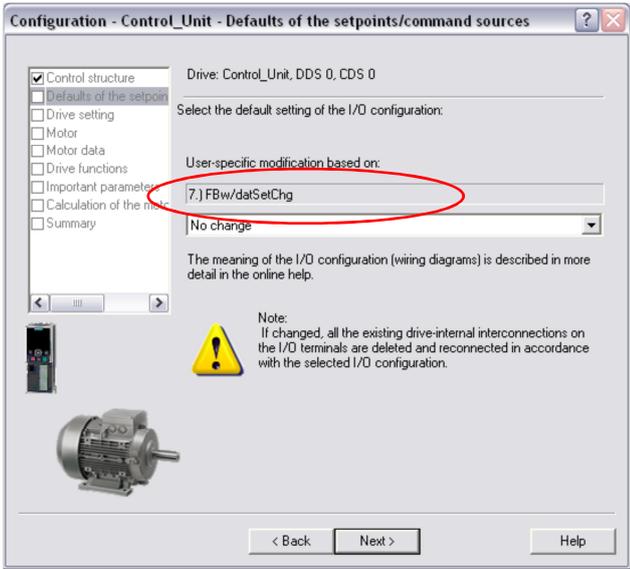
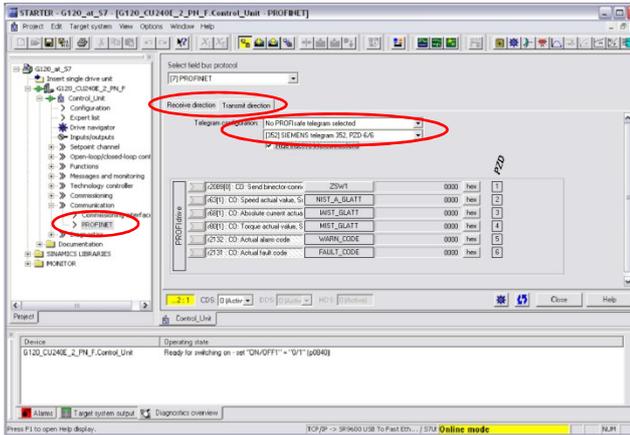
6 Configuration and Settings

6.2 Configuring the SINAMICS G drive

No.	Action	Screenshots / Remarks
10.	Go online.	
11.	Select the SINAMICS G in the tree and then press "Restore factory settings".	
12.	Remove the checkmark for "Save factory settings to ROM" and then click "OK".	
13.	Expand the tree and click on "Configuration". Then call up the wizard.	

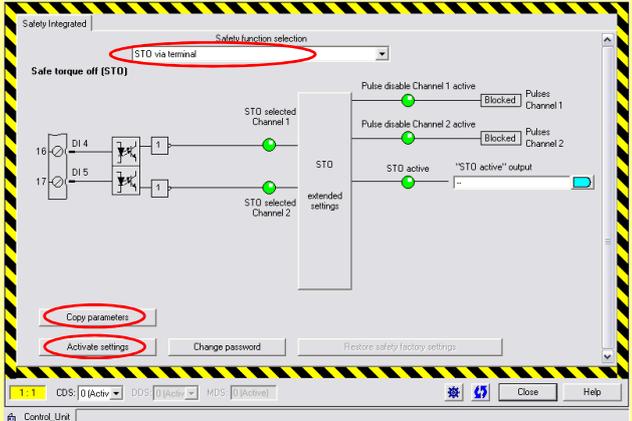
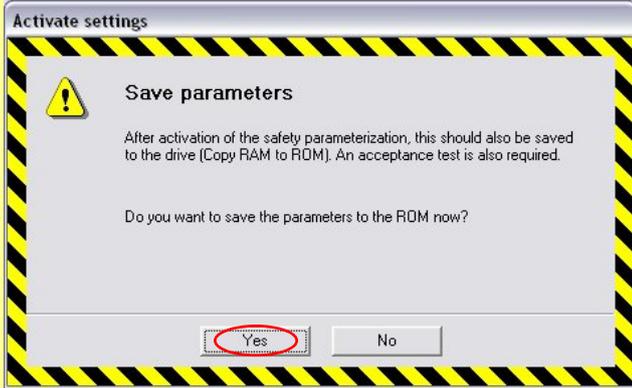
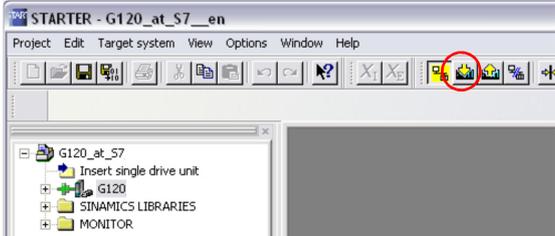
6 Configuration and Settings

6.2 Configuring the SINAMICS G drive

No.	Action	Screenshots / Remarks
14.	<p>Run the wizard and enter the data you need.</p> <p>If you have no specific requirements, use the respective default values, apart from the following exceptions</p> <ul style="list-style-type: none"> Ensure that the field bus is selected in the “Defaults of the setpoint/command sources” step. In the “Motor” step you enter the data of the connected motor. 	 <p>Configuration - Control_Unit - Defaults of the setpoints/command sources</p> <p>Drive: Control_Unit, DDS 0, CDS 0</p> <p>Select the default setting of the I/O configuration:</p> <p>User-specific modification based on: 7.) FBw/dalSetChg</p> <p>No change</p> <p>The meaning of the I/O configuration (wiring diagrams) is described in more detail in the online help.</p> <p>Note: If changed, all the existing drive-internal interconnections on the I/O terminals are deleted and reconnected in accordance with the selected I/O configuration.</p> <p>< Back Next > Help</p>
15.	<p>After the wizard has been run through completely, double-click on “Communication > PROFINET” in the tree, select one of the “Receive” or “Send direction” tabs, and select</p> <ul style="list-style-type: none"> if the PROFIsafe selection is available, “No PROFIsafe telegram selected” and “Siemens telegram 352, PZD 6/6”. <p>Note: The message frame type and the address match the example. It is decisive here that the same message frame and the same address are selected as for the hardware configuration in STEP 7.</p>	 <p>STARTER - G120_at_S7 - [G120_CU240E_2_PFL_Control_Unit - PROFINET]</p> <p>Select field bus protocol: PROFINET</p> <p>Receive direction: Terminal direction</p> <p>Telegram selection: No PROFIsafe telegram selected SIEMENS telegram 352, PZD 6/6</p> <p>PROFINET</p> <p>Device: G120_CU240E_2_PFL_Control_Unit Operating state: Ready for switching on - set "ON/OFF1" = "01" (p0940)</p> <p>Press F1 to open help display. ICP IP -> SINAMICS USB To Fast Eth... STU Online mode</p>
16.	<p>If you do not wish to use any safety functions or have a CU without safety functions (e.g. a CU230P-2 PN), continue with step 21.</p>	<p>When using an F-CPU you can also call the safety functions via the field bus. However, this is not part of this example.</p> <p>More information on this subject can be found in the Safety Integrated (17) function manual for the SINAMICS G, or in the example with PROFIsafe (18).</p>
17.	<p>Open “Safety Integrated” in the tree and click on “Change settings”.</p>	 <p>STARTER - G120_at_S7_en - [G120_CU240E_2_IP_Control_Unit - Safety Integrated]</p> <p>Safety Integrated</p> <p>Safety function selection: No Safety Integrated</p> <p>Change settings Change password Restore safety factory settings</p> <p>1.1.1 CDS 0 (Active) DDS 0 (Active) MDS 0 (Active)</p> <p>Control_Unit</p> <p>Press F1 to open help display. BICO server Diagnostics overview STUSB / STUSB Online mode</p>

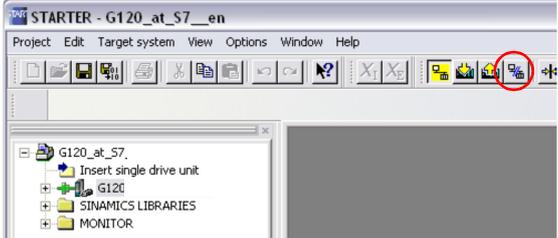
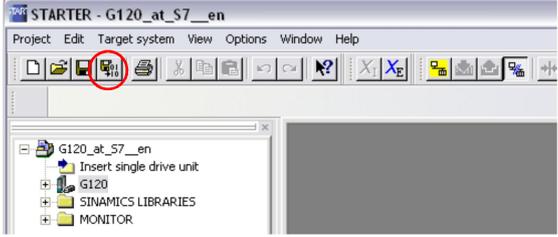
6 Configuration and Settings

6.2 Configuring the SINAMICS G drive

No.	Action	Screenshots / Remarks
18.	Select the "STO via terminal", click on "Copy parameters" and then on "Activate settings".	
19.	Enter a password and then click on "Activate settings again". (The password used in this example is "12345")	
20.	Choose "Yes", to save the parameters in ROM. Proceed with step 22.	
21.	Select the SINAMICS G in the tree and then press "Copy RAM to ROM".	
22.	Load the configuration created online into the PG.	

6 Configuration and Settings

6.2 Configuring the SINAMICS G drive

No.	Action	Screenshots / Remarks
23.	Go offline.	 <p>The screenshot shows the SIMATIC Manager interface for project 'STARTER - G120_at_S7_en'. The 'Go offline' button in the toolbar is circled in red. The project tree on the left shows 'G120_at_S7' expanded, with sub-items: 'Insert single drive unit', 'G120', 'SINAMICS LIBRARIES', and 'MONITOR'.</p>
24.	Save the project on your hard disc.	 <p>The screenshot shows the SIMATIC Manager interface for project 'STARTER - G120_at_S7_en'. The 'Save' button in the toolbar is circled in red. The project tree on the left shows 'G120_at_S7_en' expanded, with sub-items: 'Insert single drive unit', 'G120', 'SINAMICS LIBRARIES', and 'MONITOR'.</p>

7 Links & Literature

The following list is by no means complete and only provides a selection of appropriate sources.

Table 7-1

	Topic	Title / link
/1/	STEP7 SIMATIC S7- 300/400	Automating with STEP 7 in STL and SCL Author: Hans Berger Publisher: Publicis Publishing ISBN: 978-3-89578-412-5
/2/		Automating with STEP 7 in LAD and FBD Author: Hans Berger Publisher: Publicis Publishing ISBN: 978-3-89578-410-1
/3/		Reference Manual System and Standard Functions for S7-300 and S7400 Volume 1/2 http://support.automation.siemens.com/WW/view/en/44240604
/4/	Link to this document	http://support.automation.siemens.com/WW/view/en/58820849
/5/	Siemens Industry Online Support	http://support.automation.siemens.com
/6/	STARTER	STARTER Software http://support.automation.siemens.com/WW/view/en/26233208
/7/	SINAMICS G110M Manuals	Operating instructions (V4.7): http://support.automation.siemens.com/WW/view/de/102316337 List manual (V4.7) (parameters and error list): http://support.automation.siemens.com/WW/view/de/99684082 Function manual Safety Integrated (V4.7): http://support.automation.siemens.com/WW/view/en/94003326 Function manual Fieldbus systems (V4.7): http://support.automation.siemens.com/WW/view/en/99685159
	SINAMICS G120 Manuals	Operating instructions (V4.7): http://support.automation.siemens.com/WW/view/en/94020562 List manual (V4.7) (parameters and error list): http://support.automation.siemens.com/WW/view/en/99683523 Function manual Safety Integrated (V4.7): http://support.automation.siemens.com/WW/view/en/94003326 Function manual Fieldbus systems (V4.7): http://support.automation.siemens.com/WW/view/en/99685159
	SINAMICS G120C Manuals	Operating instructions (V4.7): http://support.automation.siemens.com/WW/view/en/99710404 List manual (V4.7) (parameters and error list): http://support.automation.siemens.com/WW/view/en/99683780 Function manual Safety Integrated (V4.7): http://support.automation.siemens.com/WW/view/en/99683780 Function manual Fieldbus systems (V4.7): http://support.automation.siemens.com/WW/view/en/99685159

	Topic	Title / link
	SINAMICS G120D Manuals	Operating instructions CU240D-2 (V4.7): http://support.automation.siemens.com/WW/view/en/99711357 List manual (V4.7) (parameters and error list): http://support.automation.siemens.com/WW/view/en/99684194 Function manual Safety Integrated (4.7): http://support.automation.siemens.com/WW/view/en/94003326 Function manual Fieldbus systems (V4.7): http://support.automation.siemens.com/WW/view/en/99685159
	SINAMICS G120P Manuals	Operating instructions (V4.7): http://support.automation.siemens.com/WW/view/en/94020570 List manual (V4.7) (parameters and error list): http://support.automation.siemens.com/WW/view/en/99683691 Function manual Fieldbus systems (V4.7): http://support.automation.siemens.com/WW/view/en/99685159
/8/	Application example with PROFIsafe	SINAMICS G: Speed Control for G110M, G120, G120C or G120D using S7-300/400F (in STEP 7 V5) via PROFINET/PROFIBUS with Safety Integrated and HMI http://support.automation.siemens.com/WW/view/en/60441457
/9/	FAQ for data record routing	http://support.automation.siemens.com/WW/view/en/7000978 http://support.automation.siemens.com/WW/view/en/50037141
/10/	FAQ for supplementary products	SINAMICS G110D/G110M/G120D, SIMATIC ET 200pro/ET 200pro FC, SIRIUS M200D: Listing of supplementary products (cables, connectors and accessories) for distributed frequency converter and motor starters. http://support.automation.siemens.com/WW/view/en/65355810

8 History

Table 8-1

Version	Date	Revisions
V1.0	07/2012	First issue
V2.0	08/2012	Complete revision with focus on easy usability of the blocks in own projects Expansion by SINAMICS G120C, G120D and G120P
V2.1	04/2013	Extended by CU250S-2 PN
V2.1a	04/2013	Corrected used STARTER version in chap. 2.3
V2.2	04/2014	Update FB10 (initialize the input buffer with 0, when SFC14 shows error) Use of STARTER V4.3.3
V2.3	11/2014	Extended by SINAMICS G120 with FW 4.7 and STARTER V4.4.