FAQ about Drive Technology

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SIEMENS

Technology CPU
FAQ

Operation of SINAMICS S120 (Firmware V2.2)
with the Technology CPU (S7 Technology V2.0 SP1)

Entry ID: 21767896

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Question

How can the SINAMICS S120 drive system be commissioned with the configuration tools of the technology CPU?

Answer

The instructions and notes listed in this document provide a detailed answer to this question.

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Requirements

Contents

This document presents and explains all requirements necessary for operating a SINAMICS S120 with a technology CPU.

Note

For this document, the procedures for commissioning the **SINAMICS S120 training case** were determined with the technology CPU.

Notes and versions referring to characteristic features of the SINAMICS S120 training case are explicitly mentioned in the text.

1 Setup of the SINAMICS S120 Training Case

You are provided with information on…

the setup and wiring of the SINAMICS S120 training case used for the development of this document.

1.1 General setup

This document is based on the following SINAMICS S120 training case:

SINAMICS S120 training case

2-axis version

MLFB: 6ZB2480-0BA00

The SINAMICS S120 training case contains a fully functional SINAMICS S120 drive system including two servo motors and an operator box for direct control of the drive system.

1.2 Components of the SINAMICS S120 training case

The SINAMICS S120 training case used for this document includes the following components:

Table 1-1 Components of the SINAMICS S120 training case

Component	MLFB	Note
CU320 control unit	6SL3040-0MA00-0AA1	Central closed-loop control module of the SINAMICS S120 drive system.
TB30 terminal board	6SL3055-0AA00-2TA0	Terminal expansion board which can be plugged in the control unit
SLM smart line module	6SL3130-6AE15-0AA0	Module for generating a non-stabilized DC-link voltage for the supply of the motor modules. Special design for 230V with deactivated feedback function.
Double motor module	6SL3120-2TE13-0AA0	Inverter for connecting the servo motors to the DC-link.
SMC20 sensor module cabinet	6SL3055-0AA00-5BA1	Module for evaluating encoder signals for transfer of the data via the DRIVE-CLiQ connection.
Servo motor	1FK7022-5AK71-1LG0	1FK7 synchronous motor with DRIVE-CLiQ interface and absolute value encoder (encoder resolution: 512)
Servo motor	1FK7022-5AK71-1AG3	1FK7 synchronous motor with incremental encoder (encoder resolution: 2048)

All further components included in the SINAMICS S120 training case are not relevant for this document and are consequently not listed at this point.

The listed MLFBs are required for a manual configuration of the drive system in S7T Config.

1.3 Interconnecting the DRIVE-CLiQ components

To enable the use of the automatic topology detection during commissioning the SINAMICS S120 drive system, it is required to follow a number of rules which are briefly explained in the following:

Rules which must followed during the DRIVE-CLiQ wiring:

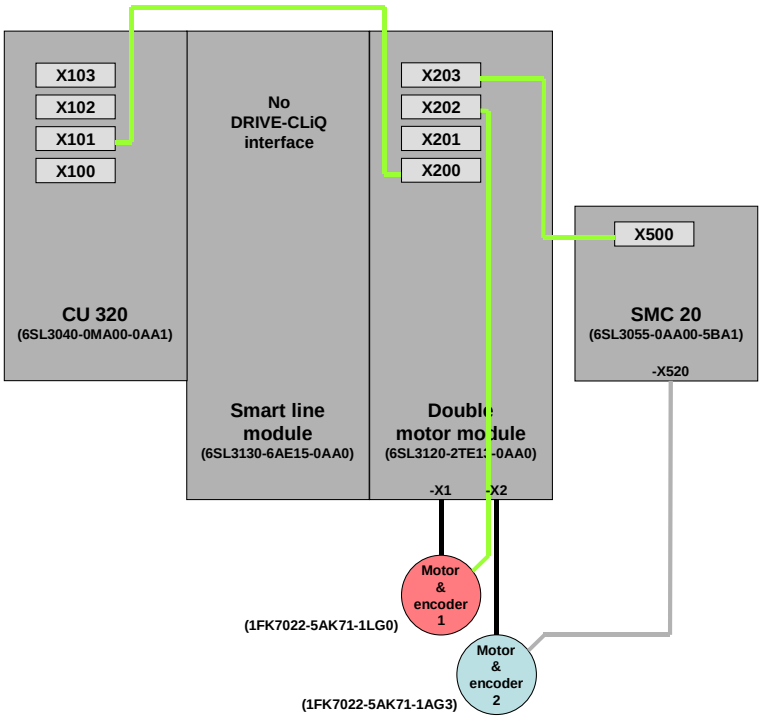
- Observing the maximum number of stations
- No double wiring
- No ring wiring

For detailed information on these rules, please refer to the documentation of the SINAMICS S120 drive system.

Recommendations for the use of the automatic topology detection:

- Always connect active line modules (ALM) to port X100 of CU320
- Always connect motor modules to port X101 of CU320 and subsequently cascade, i.e. next motor module to port X201 of the current motor module, etc.
- Always connect the first motor encoder to X202 of the motor module to which the respective motor is connected.
  When using double motor modules, connect the first encoder of the second motor to port X203.
- Connect further encoders to the respective next available port.

Figure 1-1 DRIVE-CLiQ wiring at the SINAMICS S120 training case



Smart line modules do not feature a DRIVE-CLiQ interface; for this reason, port X100 at the CU320 control unit (as at the SINAMICS S120 training case) is not used in this case.

1.4 Hardware wiring of the components

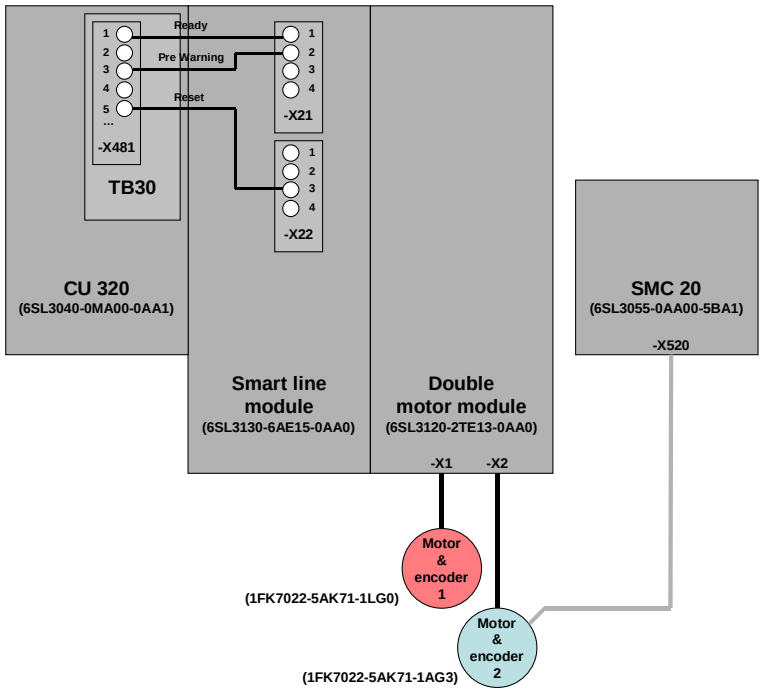
Since the smart line module does not feature a DRIVE-CLiQ interface for connection to the CU320 control unit, it is required to connect the signals of this module to the control unit via the hardware wiring.

The following signals are to be wired between the smart line module (SLM) and the CU320 control unit; interfacing at the SINAMICS S120 training case is performed via the TB30 terminal board:

Table 1-2 Hardware wiring between smart line module and control unit

Signal	SLM		TB30	Comment
SLM Ready	DO: X21.1	→	DI: X481.1	SLM ready for operation
Overtemperature Prewarning	DO: X21.2	→	DI: X481.3	Prewarning overtemperature
Reset	DI: X22.3	←	DO: X481.5	Reset failures

Figure 1-2 Hardware wiring at the SINAMICS S120 training case



The wiring shown above refers to the SINAMICS S120 training case. Alternatively to the wiring via the digital inputs of the TB30 terminal board, the wiring can also be performed directly to the digital inputs of the CU320 control unit.

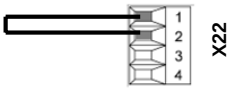
Deactivating feedback at the SINAMICS S120 training case

To take into account the special operating conditions of the smart line module (SLM) at the SINAMICS S120 training case, the feedback of the smart line module was deactivated in the training case.

This ensures that no energy is fed back to the network from the DC-link. However, a braking module and a braking resistor are not required at the SINAMICS S120 training case, since the connected motors are operated with small load and consequently only little braking energy has to be processed by the smart line module.

To deactivate the feedback at the smart line module, it is required to install a jumper between the terminals X22.1 and X22.2 of the module.

Figure 1-3 Jumper for deactivation of the feedback at SLM



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2 Supported Firmware Versions of SINAMICS S120

You are provided with information on…

the firmware versions of SINAMICS S120 authorized for operation with the technology CPU and supported by the configuration tools of the technology CPU.

2.1 Characteristic features during the operation of SINAMICS S120

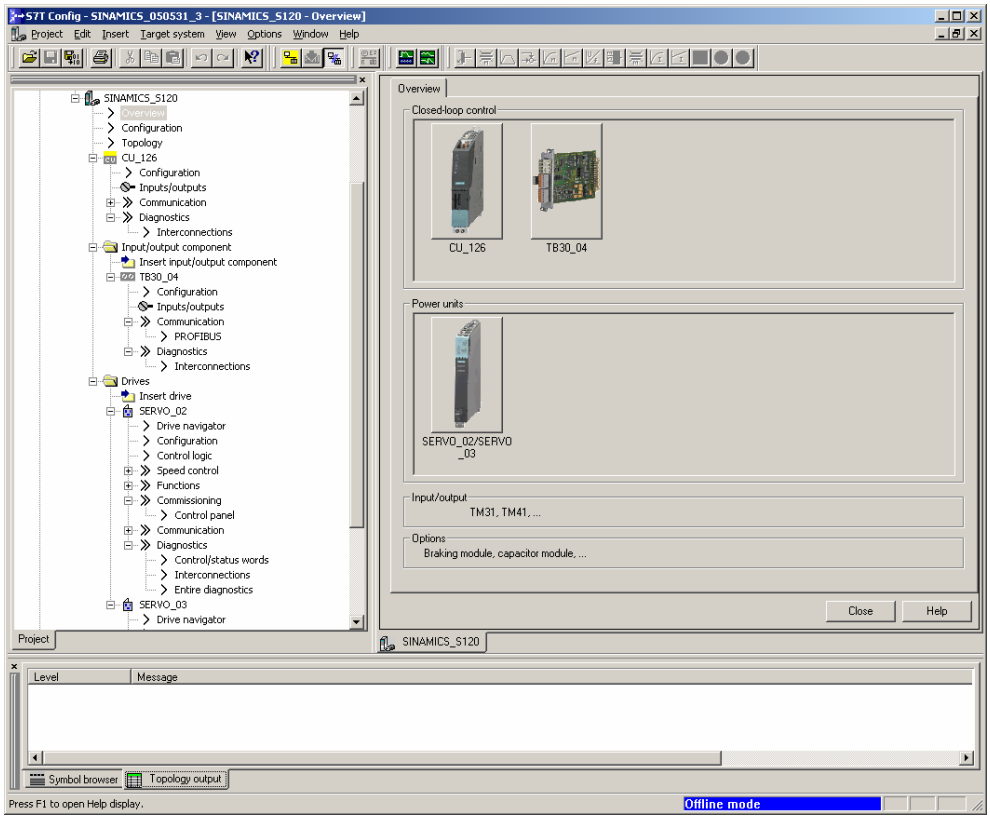
When operating the SINAMICS S120 drive system with the technology CPU, several characteristic features have to be observed:

Configuration of SINAMICS S120

SINAMICS S120 is configured using the S7T Config configuration tool to the technology CPU.

When selecting the firmware version of SINAMICS S120 it has to be made sure that the used firmware is supported by S7T Config and that SINAMICS S120 can thus be configured and commissioned using this tool.

Figure 2-1 Configuration of SINAMICS S120 via S7T Config



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Use of the STARTER configuration tool

The STARTER configuration tool associated to SINAMICS S120 is integrated in the S7T Config configuration software for the technology CPU.

The installation of the “stand alone” version of STARTER together with S7T Config on a shared partition of the development computer is not possible.

2.2 Firmware versions supported by S7T Config

The STARTER configuration and commissioning tool integrated in S7T Config supports the respective firmware versions of the SINAMICS S120 drive system up to a specific version.

If SINAMICS S120 is to be configured and commissioned via S7T Config, the drive system has to be equipped with the respective firmware version suitable for S7T Config.

Note A manual for updating the respective firmware version of SINAMICS S120 is included in the respective firmware software or can be downloaded from the internet together with the firmware software.

Supported firmware versions

The respective version of the S7 Technology program package supports the configuration and the commissioning of the SINAMICS S120 drive system up to the following firmware version:

Table 2-1 Supported firmware versions

S7 Technology version	Firmware version SINAMICS S120
S7 Technology V2.0	≤ FW 2.1
S7 Technology V2.0 SP1	≤ FW 2.2

This documentation describes the commissioning of SINAMICS S120 with **firmware version 2.2** via **S7 Technology V2.0 SP1**. If other firmware combinations are used, the described processes may deviate from the activities to be performed.

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3 Connection Establishment to SINAMICS S120

You are provided with information on…

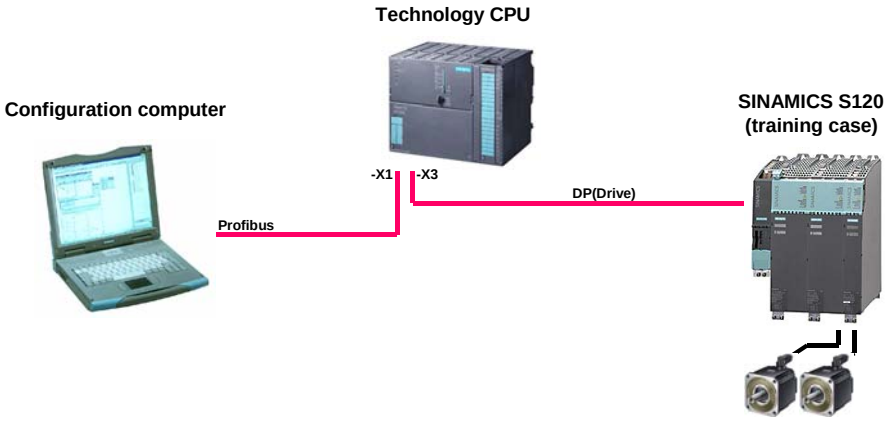
how to access SINAMICS S120 online via the S7T Config configuration tool.

3.1 Connecting the hardware components

Interfacing SINAMICS S120 to the S7T Config configuration tool is always performed via the technology CPU.

SINAMICS S120 is connected to the technology CPU via the DP(Drive) interface. The configuration computer, however, is connected to the CPU via the Profibus interface. A direct connection between configuration computer and SINAMICS S120 for configuration via S7T Config is not possible.

Figure 3-1 Hardware configuration



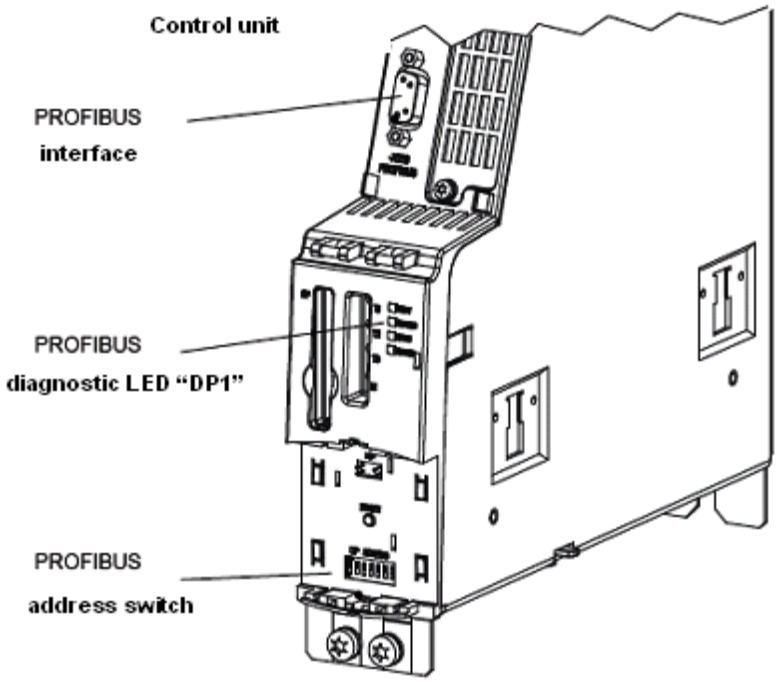
3.2 Setting the Profibus address

Basically, we recommend setting a fixed Profibus address directly at SINAMICS S120 via the DIP switches for the operation of SINAMICS S120 with the technology CPU.

The DIP switches for setting the Profibus address are located below the cover plate at the lower end of the control unit.

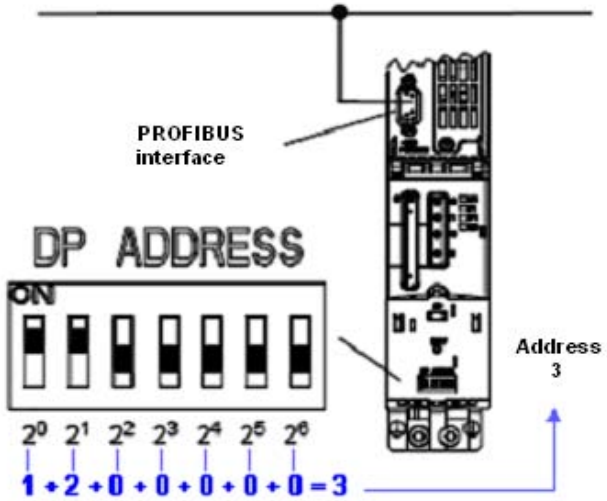
The Profibus address is entered via the DIP switches in binary coded form in the range of 1…126. When setting the values 0 (all switches OFF) or 127 (all switches ON), the Profibus address set in the **parameter p0918** is used for the communication.

Figure 3-2 DIP switches for setting the Profibus address



The Profibus address can be set according to the following diagrammatic representation:

Figure 3-3 Setting the Profibus address (address 3)



Note

As default setting of the Profibus address, **address 126** is set in the **parameter p0918** of SINAMICS S120. To avoid access problems caused by an unknown Profibus address during commissioning, the address should be preset via DIP switches prior to commissioning (e.g.: address 3).

3.3 Establishing online connection

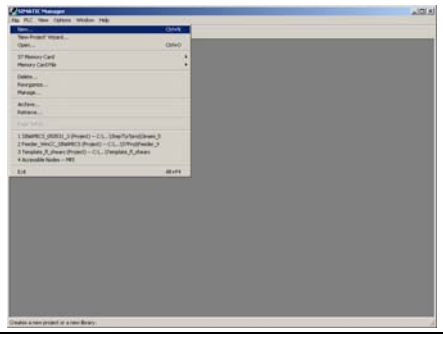
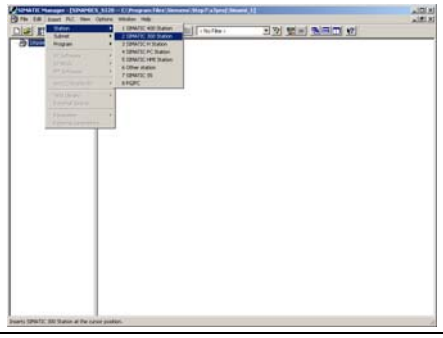
The online connection to SINAMICS S120 can only be established via a STEP 7 project when operated with the technology CPU and when using the S7T Config configuration tool.

The steps required to establish this online connection will be explained in the following.

3.3.1 Creating a STEP 7 project in the SIMATIC Manager

For recommissioning SINAMICS S120 or for data backup, it would be best to create a new STEP 7 project in the SIMATIC Manager which can be used for the online connection to SINAMICS S120.

Table 3-1 Creating a new STEP 7 project

No.	Instruction	Note
1.		Create a new project in the SIMATIC Manager.
2.		Create a SIMATIC 300 station in the new project.

3.3.2 Basic configuration of SINAMICS S120 in HW Config

After creating a new STEP 7 project, you have to create and configure the existing hardware components in HW Config of the STEP 7 project.

Since the online connection to SINAMICS S120 is to be established via the technology CPU, at least these two hardware components are to be created in HW Config.

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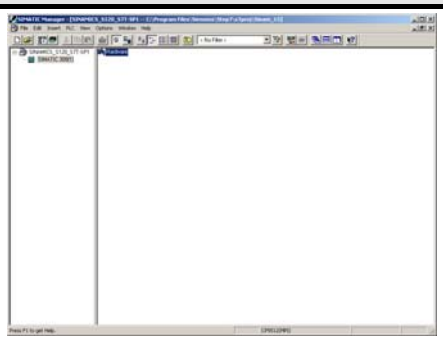
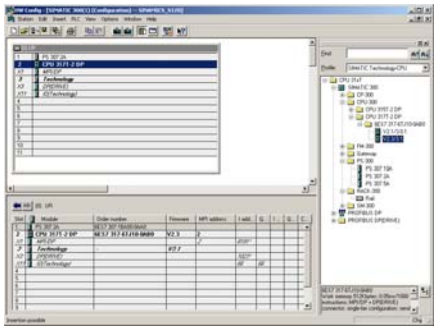
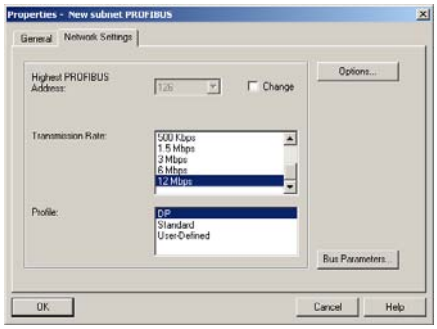
Table 3-2 Configuration of the hardware components in HW Config

No.	Instruction	Note
1.		In the STEP 7 project, open the HW Config configuration tool.
2.		In the module catalog, select the **SIMATIC Technology-CPU** profile and insert a **Rack**, optionally a **power supply** and explicitly a **Technology CPU** into your project.
3.		Acknowledge the message on the baud rate by clicking **OK**.
4.		**Address 2** is assigned to the CPU. Create a new DP(Drive) subnet using the **New** button.
5.		Set a transmission rate of **12 MBaud** for the DP(Drive) and set the **DP** profile. Subsequently select further settings for the DP(Drive) using the **Options…** button.

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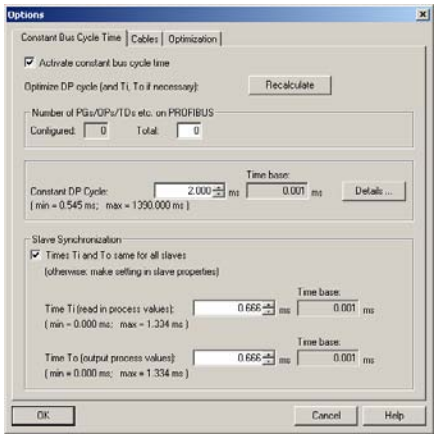
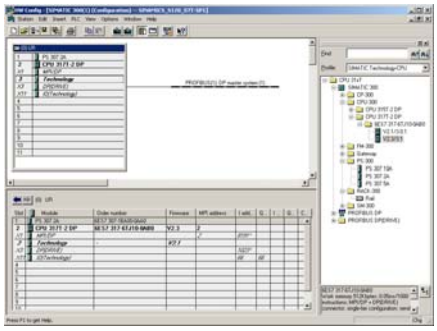
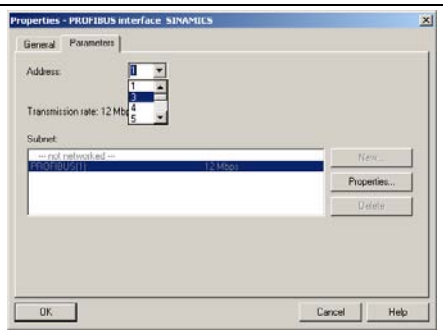
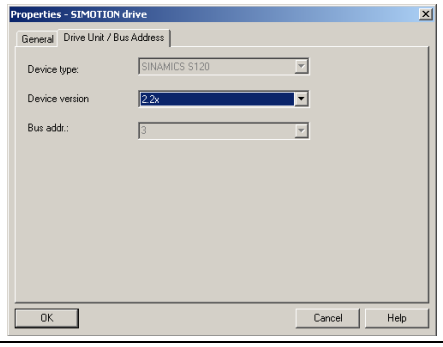
No.	Instruction	Note
6.		Activate the **constant bus cycle time** and set a bus cycle time, e.g. **2 ms**. Activate **Slave Synchronization** to specify identical time values for all connected slaves.
7.		Now integrate a **SINAMICS S120** drive from the module catalog for **PROFIBUS DP(DRIVE)** and connect this drive to DP(Drive).
8.		Set **Profibus address 3** for SINAMICS S120 Click the **Properties…** button to open the settings for the Profibus properties and check the settings. Close the windows by clicking **OK**, until you reach the window Properties – SIMOTION drive.
9.		In the drop-down list of **Device version**, set the firmware version of SINAMICS S120 to the used firmware version. Select for example version **2.2x**. Close the window by clicking **OK**.

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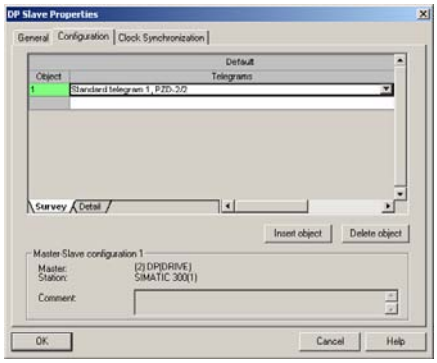
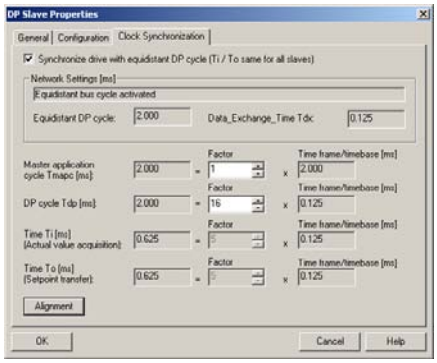
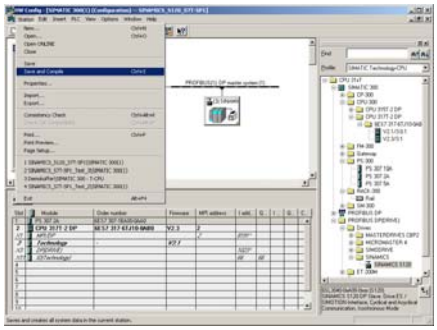
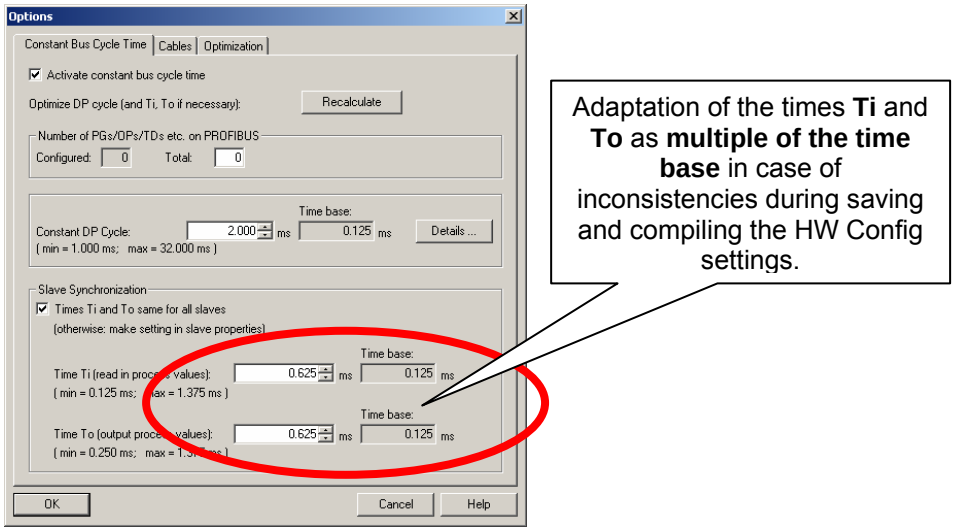
No.	Instruction	Note
10.		Leave the settings for **Default Telegram** at the default settings.
11.		Set the **equidistant Profibus cycle** for SINAMICS S120 and possibly apply the suggested settings. Click the **Alignment** button to transfer the suggested settings to the Profibus nodes.
12.		**Save and compile** the configuration by clicking the respective button and exit HW Config.

Note If a message indicating inconsistency is displayed during **saving and compiling** the configuration, you have to set the times **Ti** and **To** to values which are a **multiple of the time base** in the **slave synchronization** of the **constant bus cycle time** of **Profibus**.

Figure 3-4 Adapting the times Ti and To in case of inconsistency

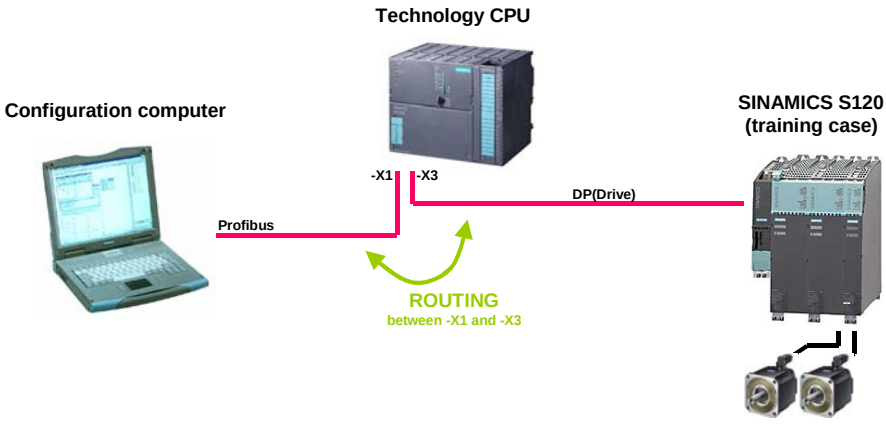


3.3.3 Activating “Capability of SIMATIC PC station routing” in NetPro

To be able to establish an online connection between the configuration computer and the SINAMICS S120 drive system, “Capability of SIMATIC PC station routing” has to be activated in NetPro.

When using SINAMICS S120 with the technology CPU, the configuration computer is connected to the Profibus of the technology CPU whereas SINAMICS S120 is connected to the DP(Drive) of the technology CPU.

Figure 3-5 Routing between –X1 and –X3 of the technology CPU



To enable online access to SINAMICS S120 from the configuration computer, routing has to occur between Profibus and DP(Drive) through the technology CPU.

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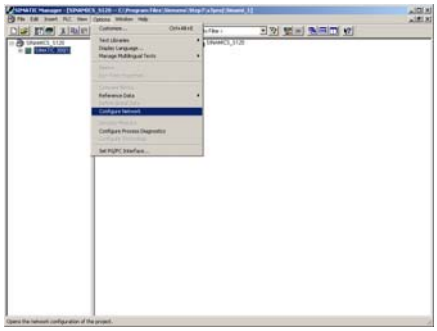
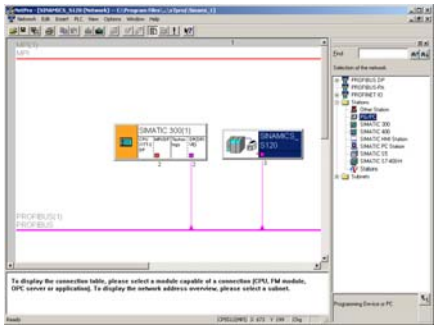
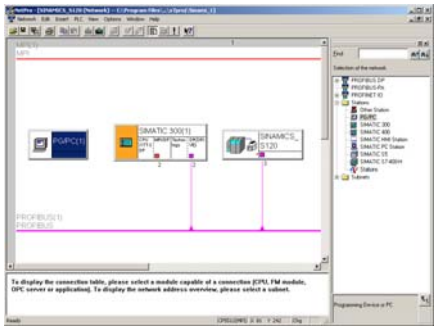
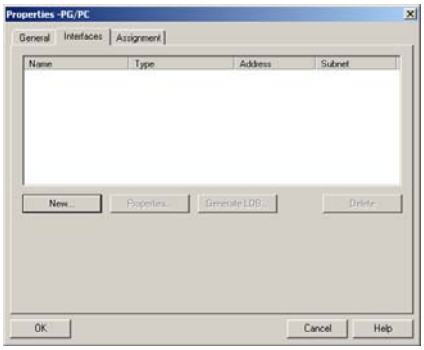
This requires the following settings in NetPro:

Table 3-3 Activating “Capability of SIMATIC PC station routing” in NetPro

No.	Instruction	Note
1.		Open NetPro by selecting **Configure Network**.
2.		From the module tree, insert a **PG/PC** station in **Stations**.
3.		Open the properties of the **PG/PC** station.
4.		Insert a new interface by clicking the **New** button.

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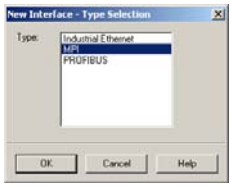
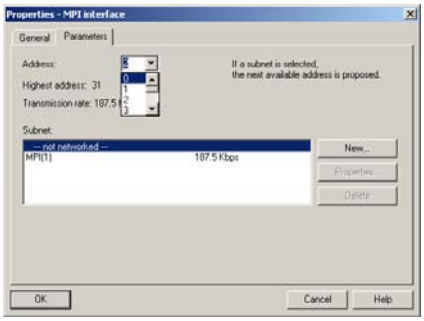
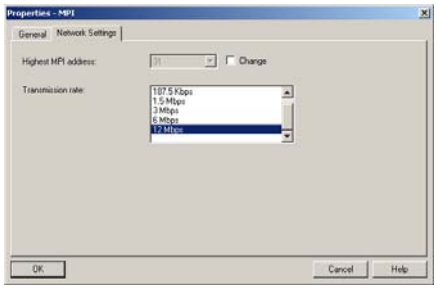
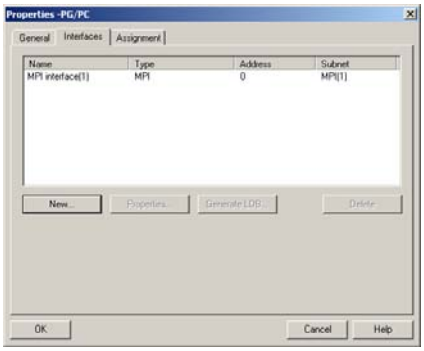
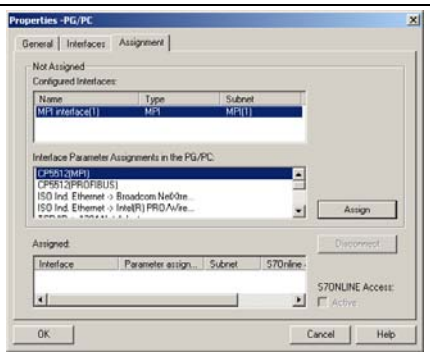
No.	Instruction	Note
5.		Select **Type MPI**.
6.		Set **MPI address 0** for the configuration computer.
7.		Select **Subnet MPI(1)** and set the **Transmission Rate** to **12 MBaud** using the **Properties** button.
8.		Close all windows until **Properties – PG/PC** is displayed.
9.		In the **Assignment** tab, select the interface of the configuration computer (e.g. CP5512 MPI) and click the **Assign** button.

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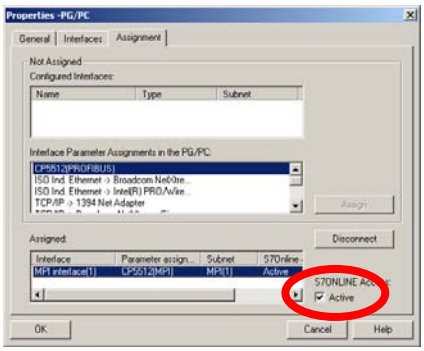
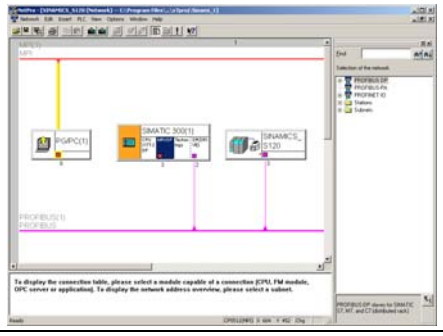
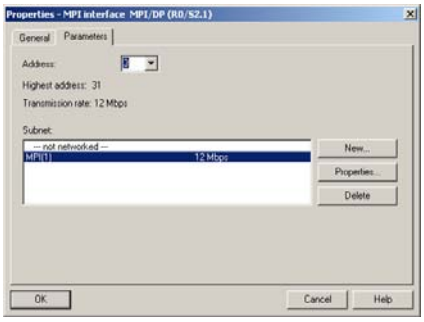
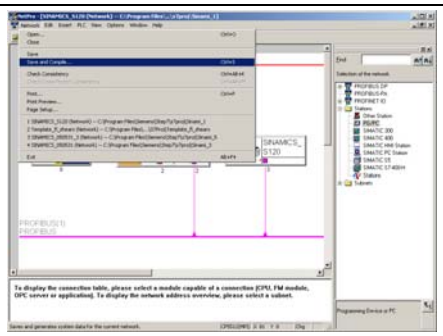
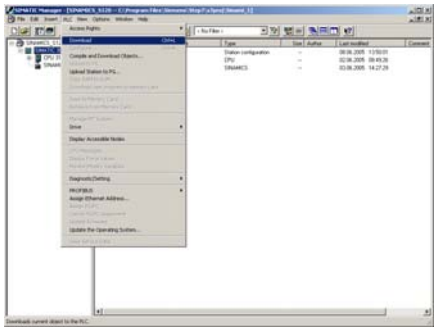
No.	Instruction	Note
10.		The interface is entered and activated in the lower section of the window. Check the set checkmark of the **Active** setting if the interface is selected in the lower window.
11.		Now open the properties of the **MPI** of the CPU in NetPro.
12.		Connect the MPI of the CPU to the MPI subnet by selecting the MPI connection **MPI(1)** in the Subnet window. **Check the set address after closing the window. MPI address 2 must be set for the CPU.**
13.		Now **save and compile** the settings by selecting the corresponding menu item. Select the **Compile and Check everything** function to compile and check all data. Close NetPro using the menu item **exit**.

No.	Instruction	Note
14.		Finally download all settings in the SIMATIC Manager to the CPU by selecting **Download**.

3.3.4 Establishing the online connection to SINAMICS S120

After meeting all requirements for the online connection to SINAMICS S120 and after downloading the configuration steps to the CPU, the online connection can be established.

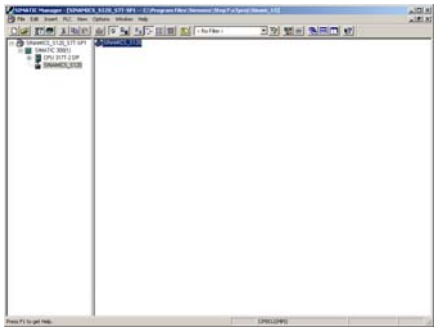
Note

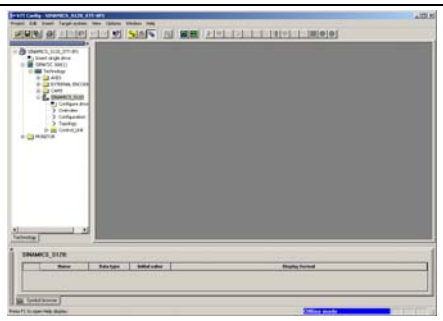
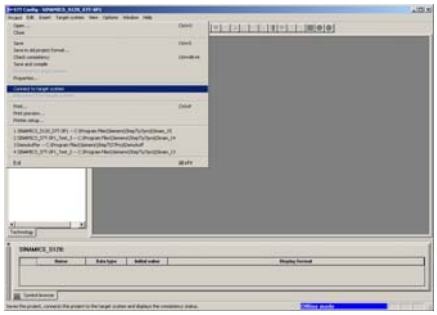
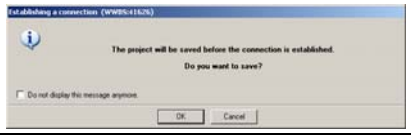
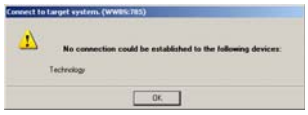
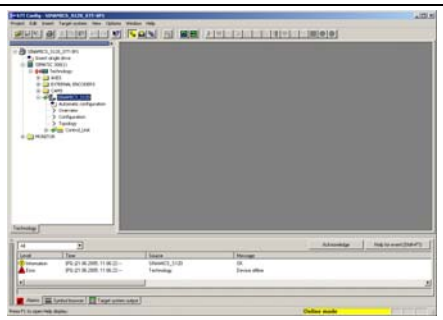
During establishing the online connection to SINAMICS S120, a message indicating that a connection to the technology cannot be established may be displayed.

This message is displayed if no system data were generated for the technology of the technology CPU in HW Config and can be ignored.

To establish the online connection, proceed as follows:

Table 3-4 Establishing the online connection

No.	Instruction	Note
1.		In the SIMATIC Manager, select **SINAMICS_S120** and **double-click** this component **in the right window**. This starts S7T Config for SINAMICS S120.

2.		In the overview tree of S7T Config in the left window, select the **node SINAMICS_S120**.
3.		In the **Project** menu, establish the online connection to SINAMICS S120 by selecting the menu item **Connect to target system**.
4.		Acknowledge the message for saving the project by clicking **OK**.
5.		Possibly a message is displayed which indicates that a connection to the technology cannot be established. At this point, the message can be ignored.
6.		A functional online connection to SINAMICS S120 is signaled by the **green connection** in the S7T Config overview tree in the left window in front of the **component SINAMICS_S120**.

4 Data Backup of SINAMICS S120

You are provided with information on…

how to back up data at SINAMICS S120 before recommissioning.

4.1 Basics of data management at SINAMICS S120

The complete data management of SINAMICS S120 with parameter data and BICO interconnection is stored on the compact flash card plugged in the CU320 control unit.

During startup of the CU320 control unit, the data are loaded from the compact flash card to the RAM of the control unit.

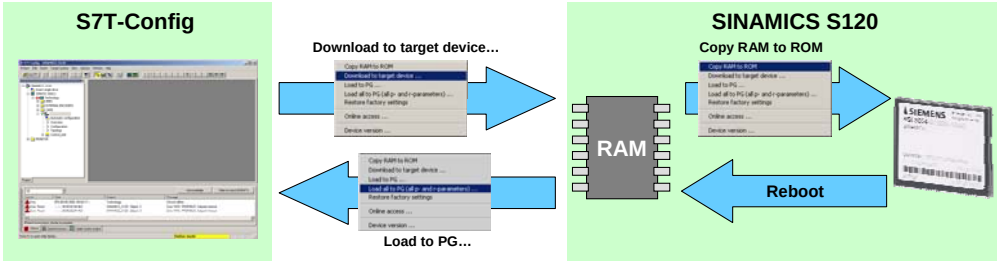
Figure 4-1 SINAMICS S120 – compact flash card

4.2 Data access via the S7T Config configuration tool

If an online connection to SINAMICS S120 is currently established via the S7T Config configuration tool or if parameter data or BICO interconnections are loaded to the drive via the S7T Config configuration tool, these data are stored in the RAM of the drive.

The data of SINAMICS S120 displayed online in the S7T Config configuration tool are also located in the RAM of the CU320 control unit.

Figure 4-2 Data transfer between S7T Config and SINAMICS S120



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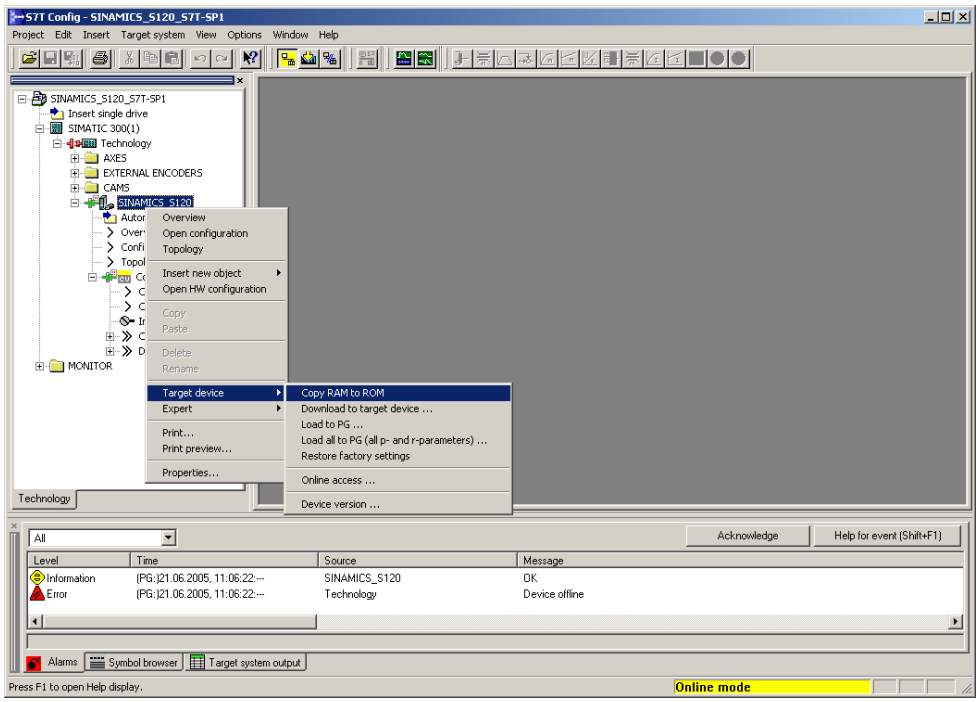
To permanently back up changes in the parameter data or in the BICO interconnection in SINAMICS S120, it is required to additionally copy the data from the RAM to the compact flash card from where they are loaded back to the CU320 control unit during the next startup of the drive system.

The data are backed up from the RAM of the control unit to the compact flash card using the **Copy RAM to ROM** command from the context menu of SINAMICS S120 in S7T Config.

Figure 4-3 Backing up data on compact flash card – Copy RAM to ROM



Note

In the overview tree of S7T Config, several context menus are available for the data download. However, two different downloads exist: Global download to SINAMICS S120 and partial download to the respective component of SINAMICS S120.

For the data download to SINAMICS S120, please consider the respective indicated context menu to ensure that the required volume of data is transferred to the drive system.

4.3 Backing up data at SINAMICS S120

There are two options for backing up the data of SINAMICS S120:

- Storing the data on the compact flash card of the control unit
- Uploading the data to a STEP 7 project and storing the data with this project.

4.3.1 Data backup on the compact flash card

Via the **parameter p977**, a data backup of the parameters and BICO interconnections can be initiated on the compact flash card.

Selecting the parameter files for data backup

The parameter files 10, 11 and 12 on the compact flash card are available to the customer.

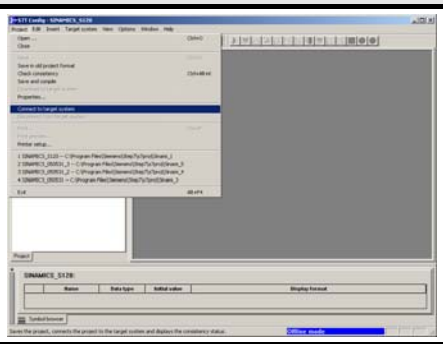
The following applies:

- P977 = 10 : Data backup in parameter file 10
- P977 = 11 : Data backup in parameter file 11
- P977 = 12 : Data backup in parameter file 12

Backing up the data

To back up the data, proceed as follows:

Table 4-1 Backing up the drive data on the compact flash card

No.	Instruction	Note
1.		In the **Project** menu, establish the online connection to SINAMICS S120 by selecting the menu item **Connect to target system**.

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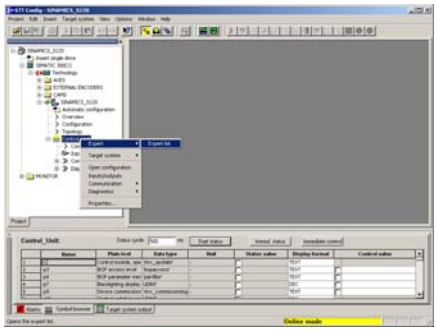
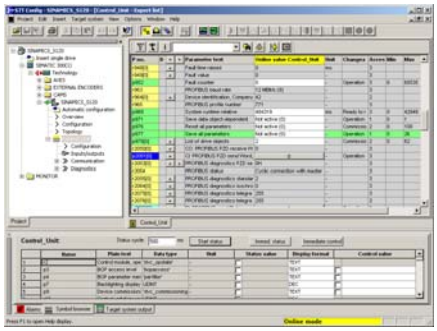
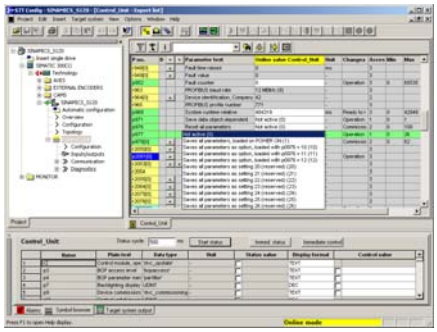
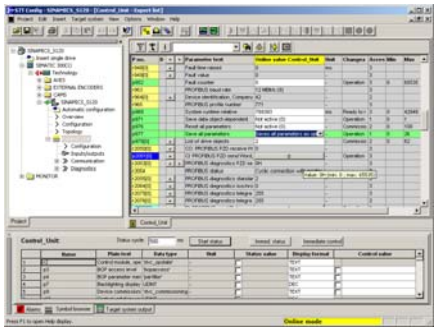
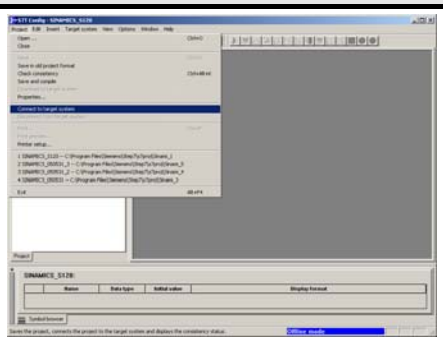
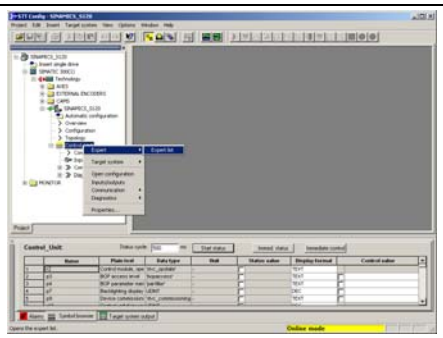
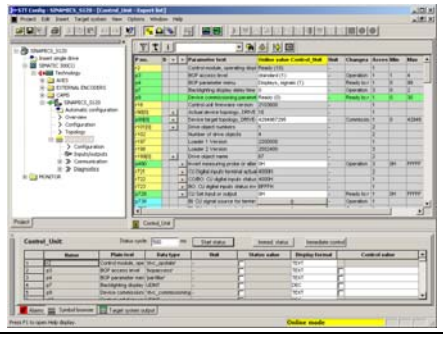
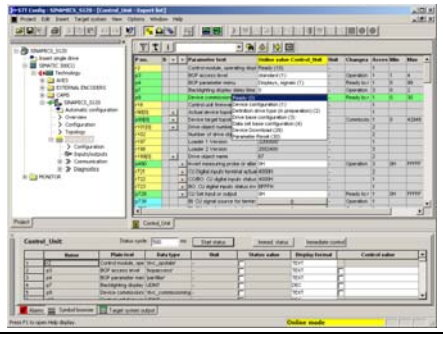
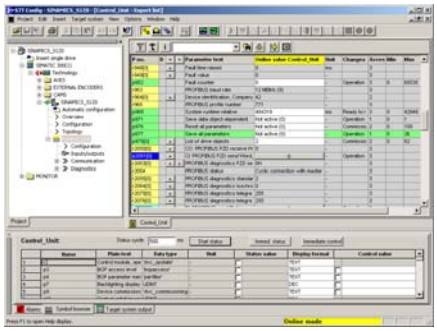
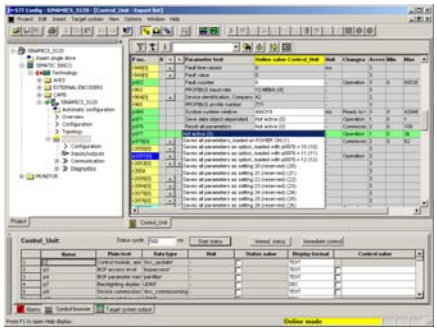
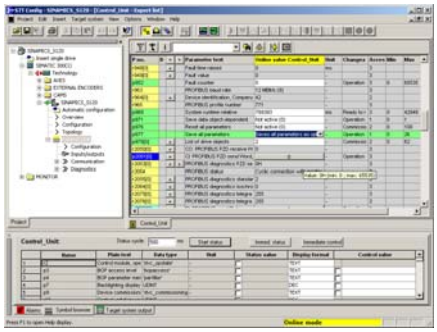
No.	Instruction	Note
2.		Via the context menu of the CU320 control unit, call the **Expert list** of the parameters of SINAMICS S120.
3.		In the expert list, select **parameter p977**.
4.		**Click** in the input box for the parameter value to call the list for the input options. Select the desired backup file 10, 11 or 12.
5.		Acknowledge your selection with the enter key. The data backup is started and the text **Saves all parameters as option** is displayed in the parameter field. The data backup is completed as soon as the text **Not active (0)** is displayed in the parameter field.

Recovery of the backed up data

The data backed up in one of the three parameter files can be loaded back to the RAM of SINAMICS S120 analog to the data backup using the parameters p9 and p976.

Table 4-2 Loading the backed up drive data from the compact flash card

No.	Instruction	Note
1.		In the **Project** menu, establish the online connection to SINAMICS S120 by selecting the menu item **Connect to target system**.
2.		Via the context menu of the CU320 control unit, call the **Expert list** of the parameters of SINAMICS S120.
3.		In the expert list, select **parameter p9**.
4.		**Click** in the input box for the parameter value to call the list for the input options. Select the **Parameter Reset (30)** setting.

No.	Instruction	Note
5.		In the expert list, select **parameter p976**.
6.		**Click** in the input box for the parameter value to call the list for the input options. Select the desired backup file 10, 11 or 12.
7.		Acknowledge your selection with the enter key. The data backup is started and the text **Start loading parameters saved with p977=xx** is displayed in the parameter field. Loading the data is completed as soon as the text **Not active (0)** is displayed in the in the parameter field of **parameter p976** and the text **Ready (0)** appears in the parameter field of **parameter p9** .

To ensure that the recovered data are loaded back to the SINAMICS S120 drive system during the next reboot, these data finally have to be copied from RAM to ROM via the context menu of SINAMICS S120 from where they are loaded during the next startup of SINAMICS S120.

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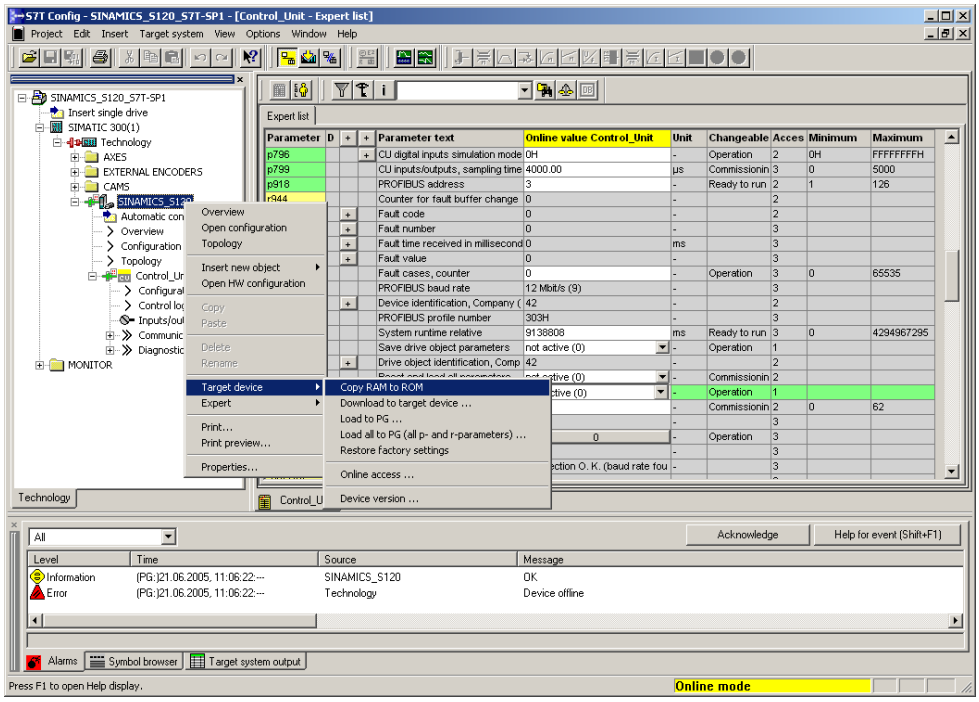
Figure 4-4 Permanent storing of the loaded data – Copy RAM to ROM



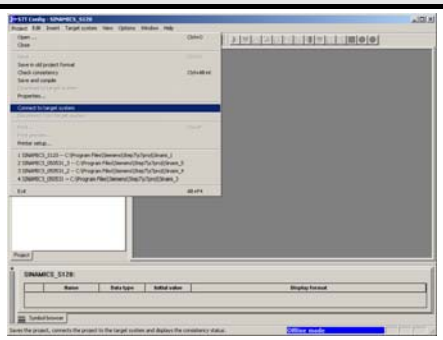
4.3.2 Data backup in a STEP 7 project

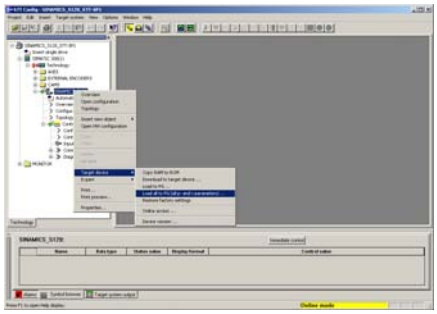
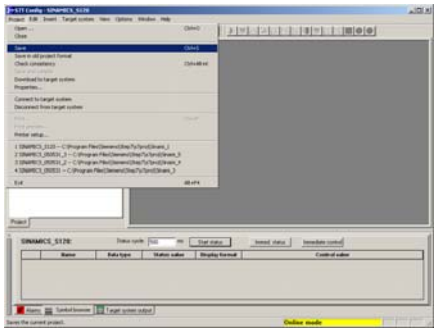
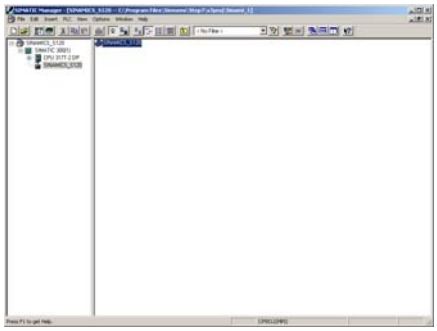
All parameters and BICO interconnections can also be backed up and archived in a STEP 7 project. This requires that the data are loaded from SINAMICS S120 to the STEP 7 project.

Backing up the data

To back up the data, proceed as follows:

Table 4-3 Backup of the drive data

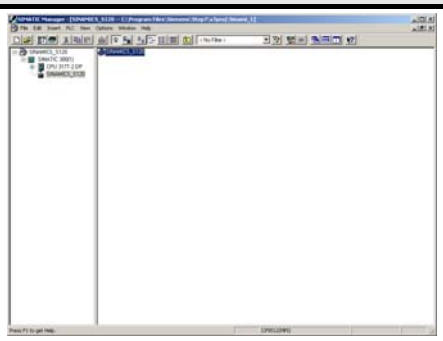
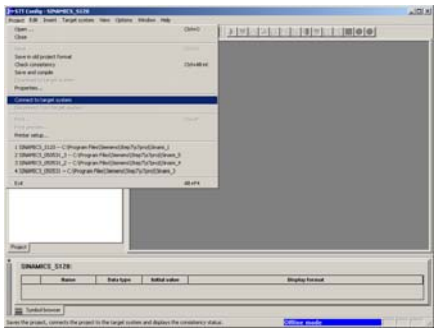
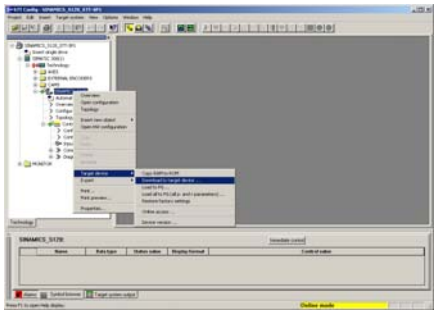
No.	Instruction	Note
1.		In the **Project** menu, establish the online connection to SINAMICS S120 by selecting the menu item **Connect to target system**.

No.	Instruction	Note
2.		Via the **Load to PG** context menu of SINAMICS_S120, load all parameters and BICO interconnections to the configuration computer.
3.		Save the data using S7T Config in your STEP 7 project by selecting the menu item **Save**.
4.		Via the SIMATIC Manager, the data can now be archived together with the STEP 7 project.

Recovery of the backed up data

For recovery of the data backed up in a STEP 7 project, open the S7T Config configuration tool in this STEP 7 project and load the data included in the project to SINAMICS S120 via the context menu.

Table 4-4 Recovery of the backed up drive data

No.	Instruction	Note
1.		In the SIMATIC Manager, select **SINAMICS_S120** and **double-click** this component **in the right window**. This starts S7T Config for SINAMICS S120.
2.		In the **Project** menu, establish the online connection to SINAMICS S120 by selecting the menu item **Connect to target system**.
3.		Via the **Download to target device…** context menu of SINAMICS_S120, load all parameters and BICO interconnections to the configuration computer.

To permanently store the data, it is required to subsequently copy the data from RAM to ROM, i.e. to again store the data on the compact flash card.

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Commissioning SINAMICS S120

Contents

The procedure required for commissioning SINAMICS S120 with the technology CPU is described and characteristic features of this procedure are explained.

5 Preparing SINAMICS S120

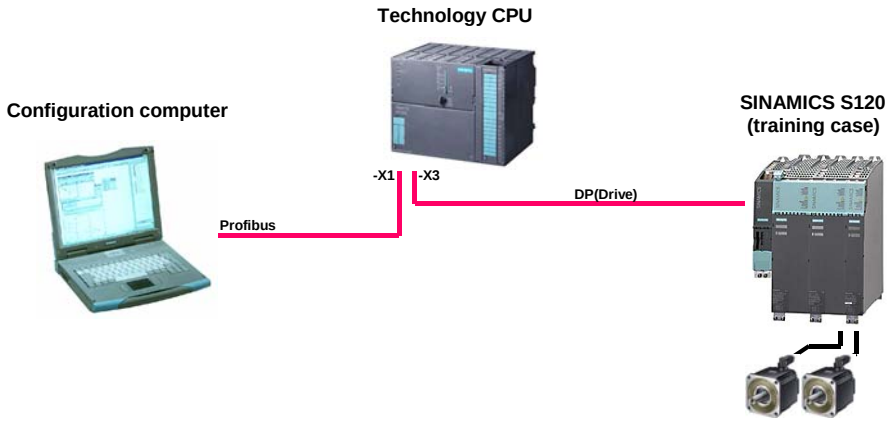
You are provided with information on…

the preparations with the S7T Config configuration tool of the technology CPU required for commissioning SINAMICS S120.

5.1 Connecting hardware components

Connect the hardware components as shown in the figure below:

Figure 5-1 Connecting hardware components



When using the S7T Config configuration software, SINAMICS S120 cannot be directly connected to the configuration computer.

5.2 Establishing online connection

Establish a functional connection between SINAMICS S120 and the configuration computer using the S7T Config configuration software.

For more detailed information, please refer to Chapter **3.3 Establishing online connection**.

5.3 Restoring factory settings

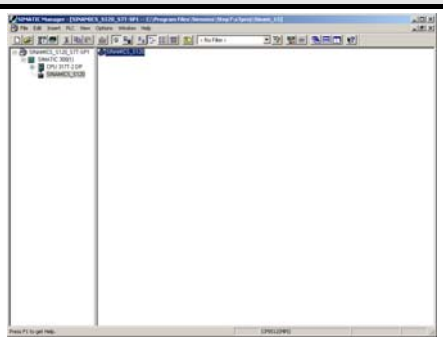
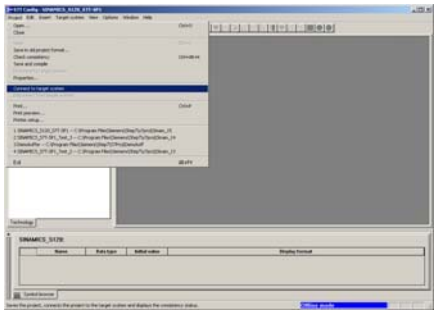
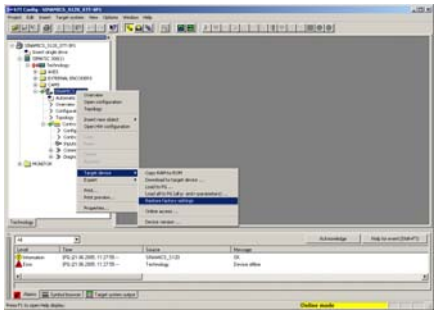
To create a safe initial situation for commissioning SINAMICS S120, the drive system has to be reset to factory settings.

Attention

Before restoring the factory settings, it is useful to back up the data at SINAMICS S120 to be able to possibly restore the initial state.

To restore the factory settings, open your project with the configured SINAMICS S120 in the SIMATIC Manager and proceed as follows:

Table 5-1 Restoring the factory settings

No.	Instruction	Note
1.		In the SIMATIC Manager, select **SINAMICS_S120** and **double-click** this component **in the right window**. This starts S7T Config for SINAMICS S120.
2.		In the **Project** menu, establish the online connection to SINAMICS S120 by selecting the menu item **Connect to target system**.
3.		Start restoring the factory settings via the **Restore factory settings** context menu of SINAMICS_S120.

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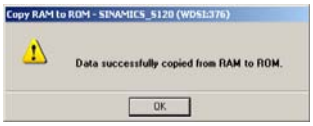
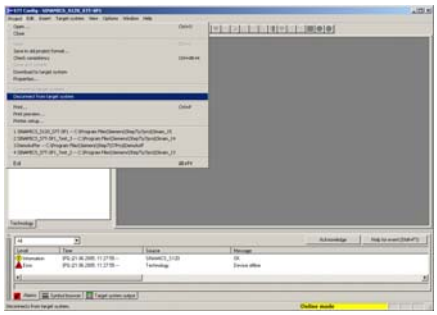
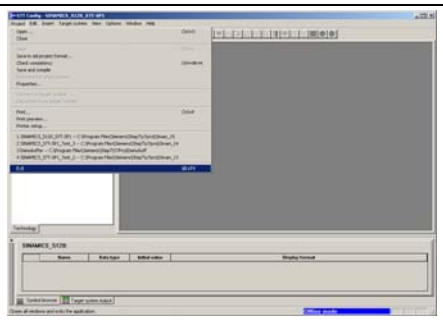
No.	Instruction	Note
4.		Acknowledge the query by clicking **OK**. The **Save factory settings to ROM** function has to be set. If it is not set, the **Copy RAM to ROM** function must be activated after loading the factory settings to the RAM!
5.		Successful restoring of the factory settings is indicated by the **The factory settings have been restored** message.
6.		The opposite message indicates the permanent storage of the settings on the compact flash card.
7.		Terminate the online connection by selecting the menu item **Disconnect from target system**.
8.		Close the S7T Config configuration tool by clicking **Exit**.

SINAMICS S120 is now again in the delivery status and all parameters and BICO interconnections are reset to factory settings.

The connected modules of SINAMICS S120 are now no longer included in the configuration and have to be recommissioned.

6 Commissioning SINAMICS S120

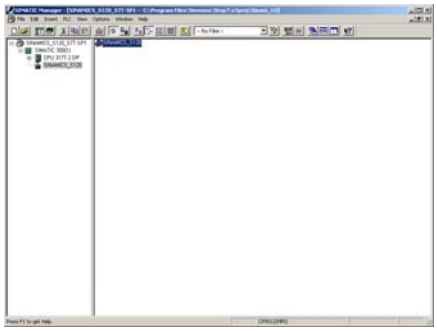
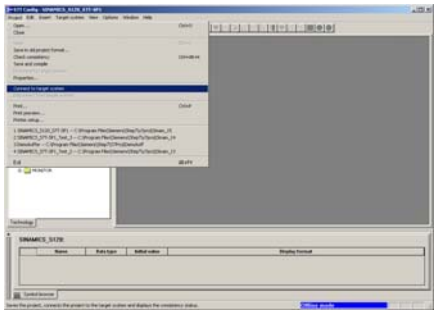
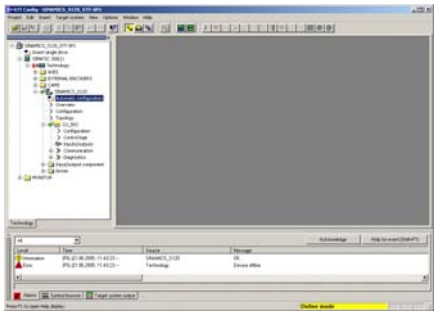
You are provided with information on…

how you can recommission SINAMICS S120 and which steps are required for recommissioning.

6.1 Automatic configuration of the DRIVE-CLiQ components

All DRIVE-CLiQ components at SINAMICS S120 are now to be automatically configured by reading the electronic rating plates using S7T Config.

Table 6-1 Automatic configuration of the DRIVE-CLiQ components

No.	Instruction	Note
1.		In the SIMATIC Manager, select **SINAMICS_S120** and **double-click** this component **in the right window**. This starts S7T Config for SINAMICS S120.
2.		In the **Project** menu, establish the online connection to SINAMICS S120 by selecting the menu item **Connect to target system**.
3.		In the component **SINAMICS_S120**, double-click **Automatic Configuration** to start the automatic configuration of the DRIVE-CLiQ components.

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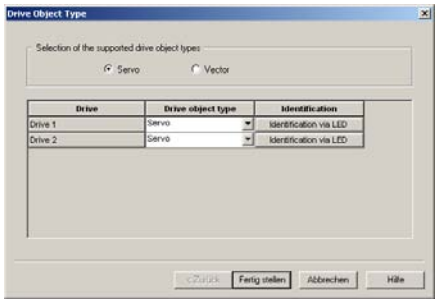
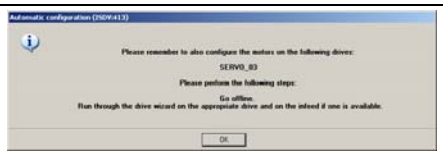
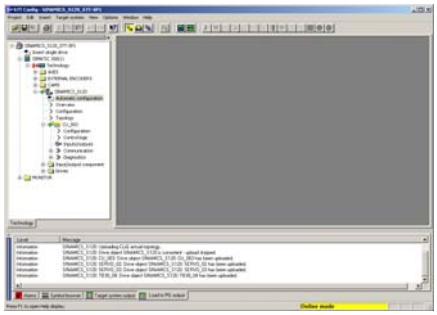
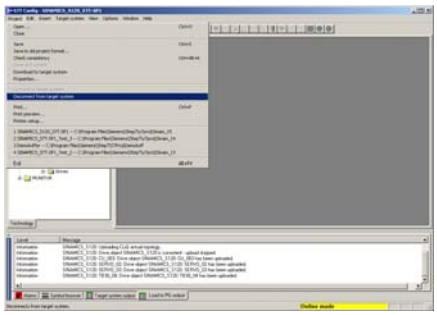
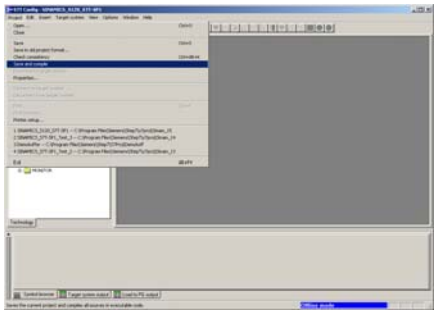
No.	Instruction	Note
4.		Click the **Start automatic configuration** button to start the automatic configuration.
5.		Select the **Servo** type for the **Drive Object Type** via the radio buttons. All settings in the table are then set to this type.
6.		Acknowledge the message on the manual configuration of the component SERVO_03 by clicking the **OK** button.
7.		After successful upload, **Running operation** reports the status **Automatic configuration is completed**. Close the message window by clicking **Close**.
8.		The automatic configuration of the DRIVE-CLiQ components is now completed.
9.		Switch to offline mode by selecting the menu item **Disconnect from target system**.

No.	Instruction	Note
10.		**Save and compile** the new configuration by clicking the corresponding menu item.

Components which do not feature a DRIVE-CLiQ interface are not detected during the automatic configuration and have to be manually configured.

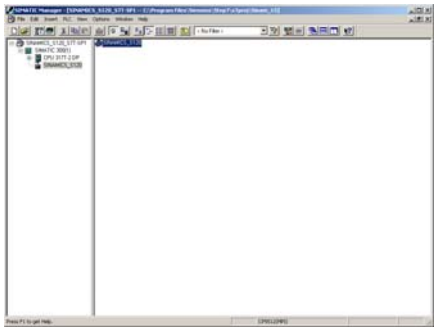
Note Using the automatic configuration of the DRIVE-CLiQ components, also hardware components with DRIVE-CLiQ interface can be configured which are not included in the lists for the manual configuration and for which manual configuration is very difficult.

6.2 Manual configuration of the additional components

The second servo motor of the SINAMICS S120 training case is not equipped with a DRIVE-CLiQ interface. This motor is connected to the SINAMICS S120 drive system via the SMC20 sensor module cabinet.

In S7T Config, manually configure these not automatically configured components, in this case the drive **SERVO_03**, as follows:

Table 6-2 Manual configuration of the drive SERVO_03

No.	Instruction	Note
1.		In the SIMATIC Manager, select **SINAMICS_S120** and **double-click** this component **in the right window**. This starts S7T Config for SINAMICS S120. **For manual configuration, leave S7T Config in offline mode!**

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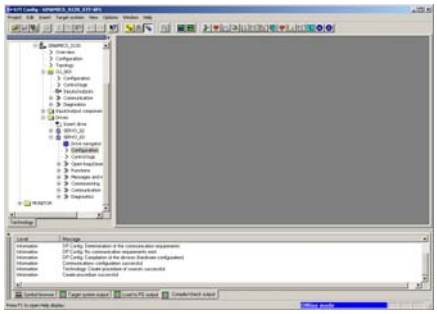
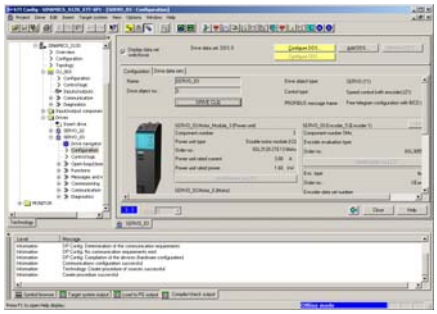
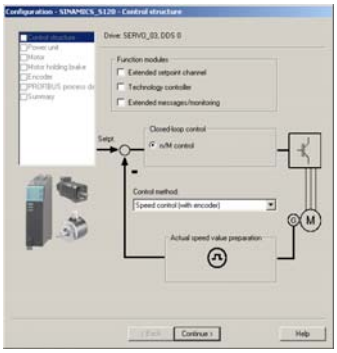
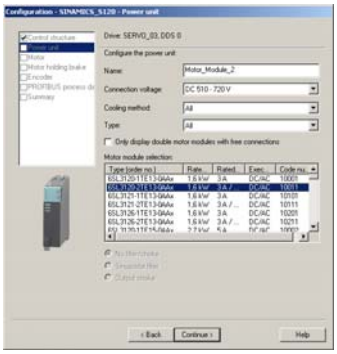
No.	Instruction	Note
2.		In the component **SERVO_03**, double-click **Configuration** to open it.
3.		For manual configuration of the drive, click the **Configure DDS...** button in the upper part of the window.
4.		Select the suitable setting for **Control Method**, e.g. **Speed Control (with Encoder)**.
5.		The **Power Unit** has already been detected and is now displayed. Check the information and click the **Continue** button. For the respective MLFB, please refer to **Chapter 1.2 Components of the SINAMICS S120 training case**.
6.		Acknowledge the message on hardware wiring of the Ready to run signal of the smart line modules by clicking **OK**.

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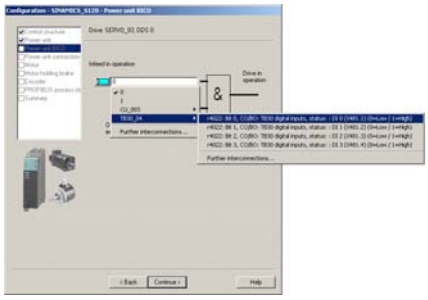
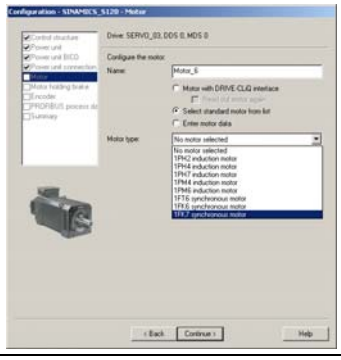
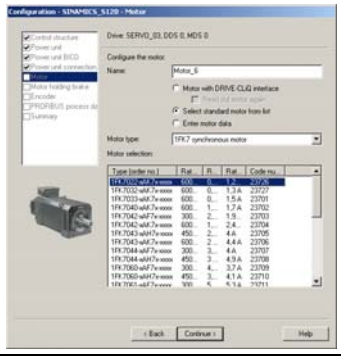
No.	Instruction	Note
7.		For the internal wiring of the signal via the BICO technology at the **TB30 terminal board**, select the **digital input DI0** which corresponds to the **parameter r4022 Bit 0**.
8.		Only **Connection X2** can be selected for the **Power Unit Connection**, since the first motor of the two-axis module has already been configured at connection X1 of the double motor module.
9.		Activate the **Select standard motor from list** function and the respective **Motor type** (**1FK7 synchronous motor**).
10.		Select the correct motor from the **Motor selection** list. The MLFB of the required motor is listed in **Chapter 1.2 Components of the SINAMICS S120 training case**.

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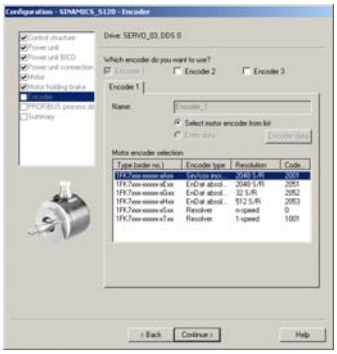
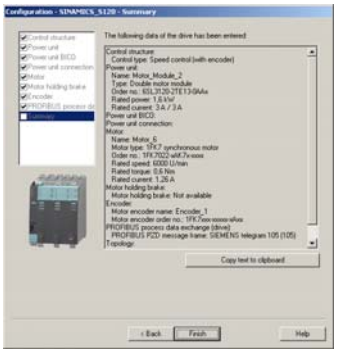
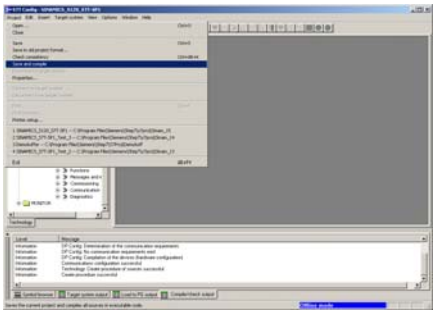
No.	Instruction	Note
11.		Since the motor does not feature a holding brake, select **Without holding brake**.
12.		Select the correct encoder type from the **Motor encoder selection** list. The MLFB of the required motor is listed in **Chapter 1.2 Components of the SINAMICS S120 training case**.
13.		Select **SIEMENS telegram 105 (105)** as **PROFIBUS PZD mess. fr.**
14.		Complete the configuration by clicking the **Finish** button.

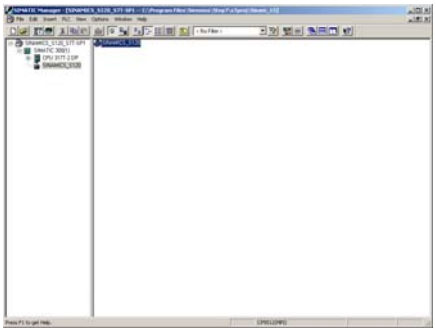
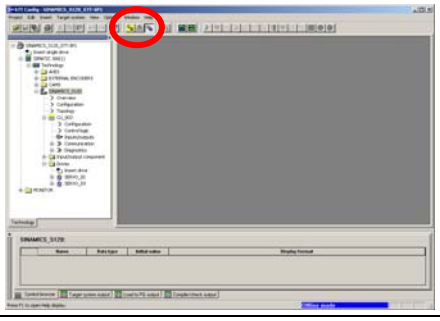
No.	Instruction	Note
15.		**Save and compile** the new configuration by clicking the corresponding menu item.

6.3 Implementing the necessary BICO interconnections

A part of the hardware signals at the SINAMICS S120 demonstration box listed in **Chapter 1.4 Hardware wiring of the components** is already interconnected in SINAMICS S120 via the BICO technology.

The missing interconnection of the Ready signal of the **smart line module** for the **drive SERVO_02** of the double motor module configured via the automatic configuration of the DRIVE-CLiQ components now has to be performed.

Table 6-3 Implementing the BICO interconnection at the drive SERVO_02

No.	Instruction	Note
1.		In the SIMATIC Manager, select **SINAMICS_S120** and **double-click** this component **in the right window**. This starts S7T Config for SINAMICS S120.
2.		Establish the online connection to SINAMICS S120 using the Speed button. **Attention:** At this point, activating the online connection via the menu is <u>not</u> possible!

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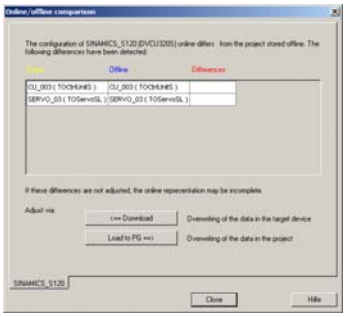
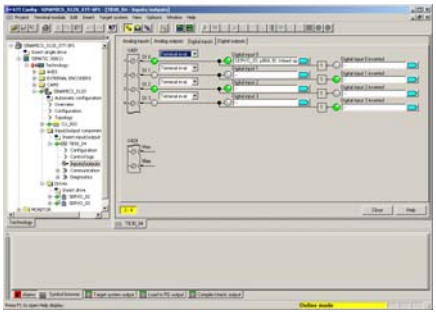
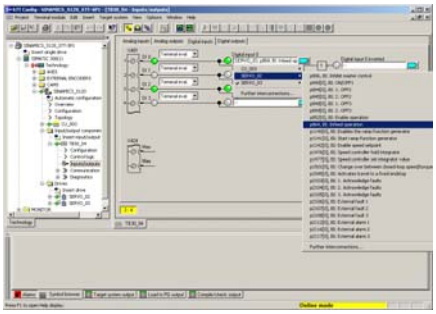
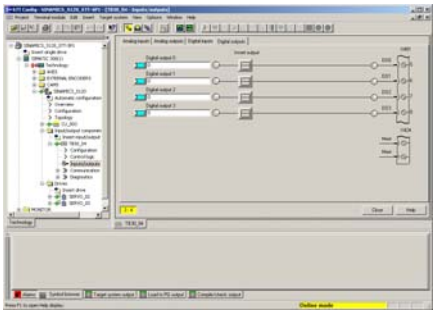
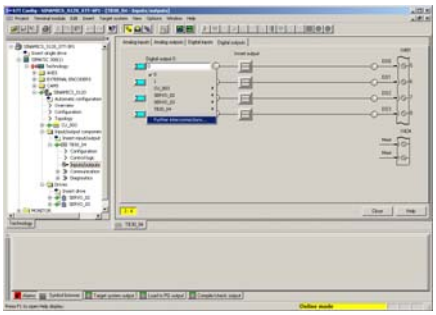
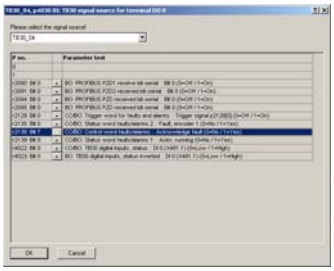
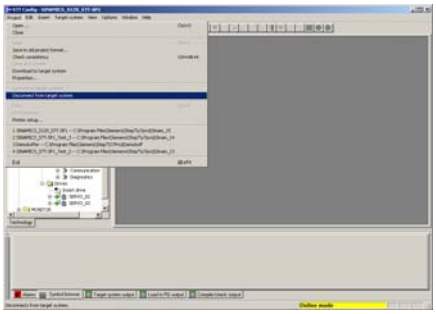
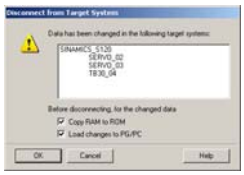
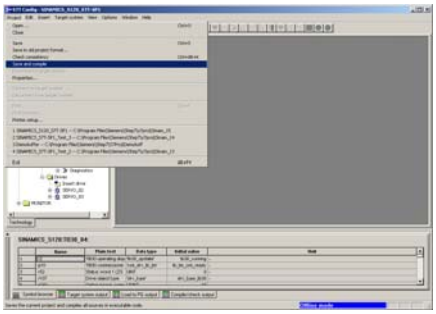
No.	Instruction	Note
3.		In **Online/Offline Comparison**, load the settings made in S7T Config (manual configuration of SERVO_03) to SINAMICS S120 by clicking the **<== Download** button.
4.		In the component **TB30_04**, double-click **Inputs/Outputs** to open it. Select the **Digital inputs** section.
5.		Configure the parameter **p864** of the drive **SERVO_02 – Infeed operation** to **Digital Input** 0 to which the Ready signal of the SLM is applied. The parameter **p864** of the drive **SERVO_03** is already configured!
6.		In the component TB30_04, select the **Digital outputs** section.
7.		For the first output **Digital output 0**, select the **Further interconnections…** command from the context menu.

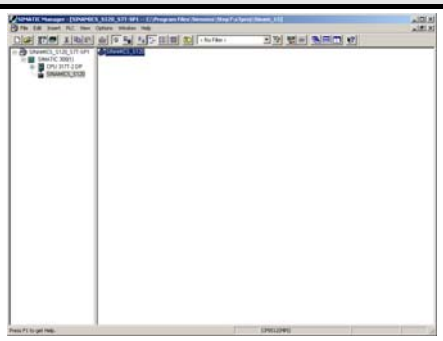
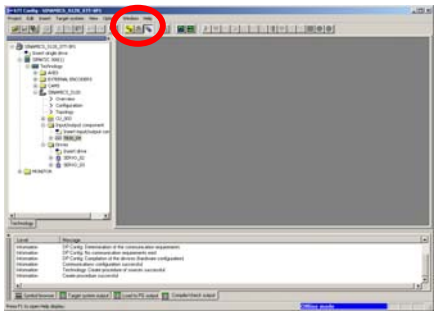
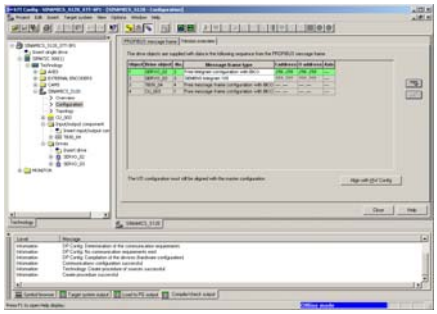
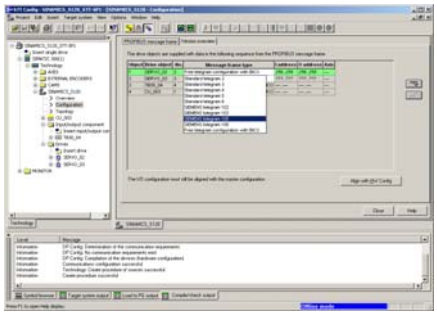
No.	Instruction	Note
8.		Select the parameter **r2138 Bit 7** as control signal for a reset of the SLM via the TM30 terminal module.
9.		Terminate the online connection by selecting the menu item **Disconnect from target system**.
10.		In the message window, select the functions **Copy RAM to ROM** and **Load changes to PG/PC** to save the changes in SINAMICS S120 and in S7T Config and click **OK**.
11.		**Save and compile** the configuration by clicking the corresponding menu item.

6.4 Adapting the message type

It is now required to adapt the Profibus message frame for the **drive SERVO_02**, which was configured via the automatic configuration of the DRIVE-CLiQ components, to enable communication with the drives from the controller.

The Profibus message frame for the drive SERVO_03 has already been adapted during the manual configuration of this drive via the configuration wizard.

Table 6-4 Adapting the message type

No.	Instruction	Note
1.		In the SIMATIC Manager, select **SINAMICS_S120** and **double-click** this component **in the right window**. This starts S7T Config for SINAMICS S120.
2.		Establish the online connection to SINAMICS S120 using the Speed button. **Attention:** At this point, activating the online connection via the menu is <u>not</u> possible!
3.		In the component **SINAMICS_S120**, select and double-click **Configuration** to open it.
4.		In the list, set the message type **SIEMENS Telegram 105** for the drive **SERVO_02**. Check the setting for the drive **SERVO_03**. The message type **SIEMENS Telegram 105** should be set for both drives.

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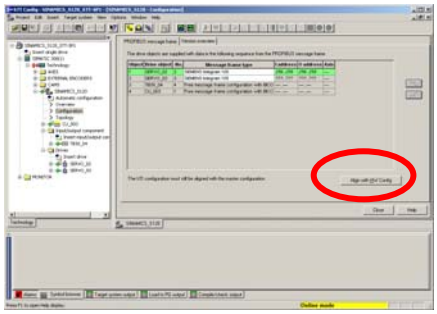
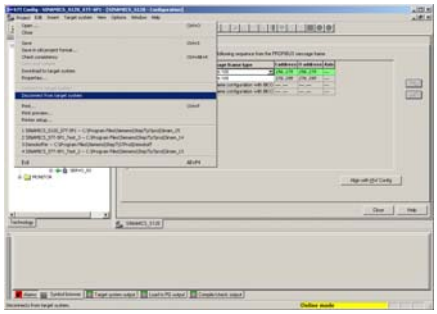
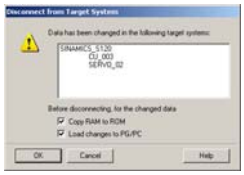
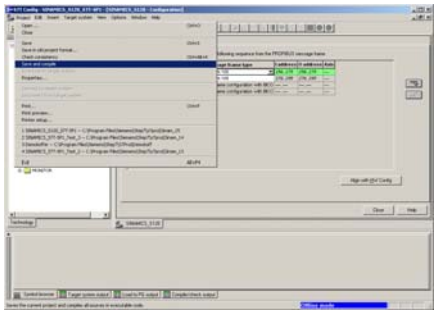
No.	Instruction	Note
5.		**Align with HW Config** by clicking the respective button.
6.		Acknowledge the opposite dialog box by clicking **Yes**.
7.		Terminate the online connection by selecting the menu item **Disconnect from target system**.
8.		In the message window, select the functions **Copy RAM to ROM** and **Load changes to PG/PC** to save the changes in SINAMICS S120 and in S7T Config and click **OK**.
9.		**Save and compile** the configuration by clicking the corresponding menu item.

7 Control of SINAMICS S120

You are provided with information on…

how to control and operate SINAMICS S120 via the technology CPU.

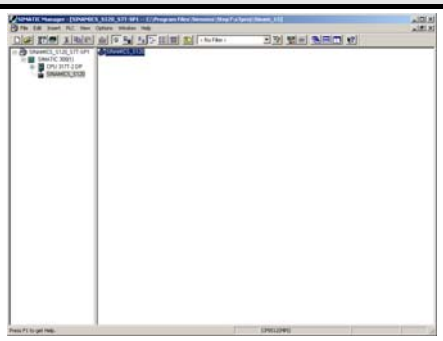
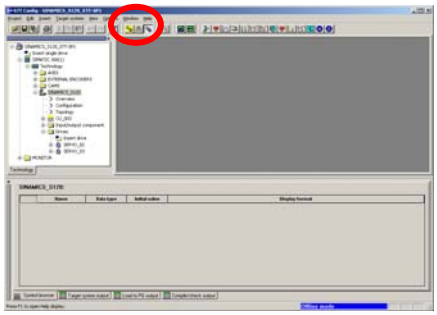
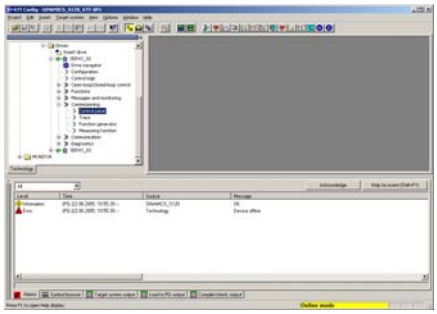
7.1 Manual control of the drive via the control panel

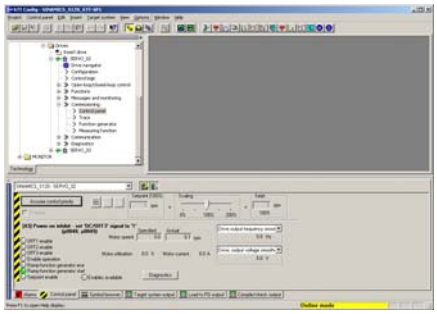
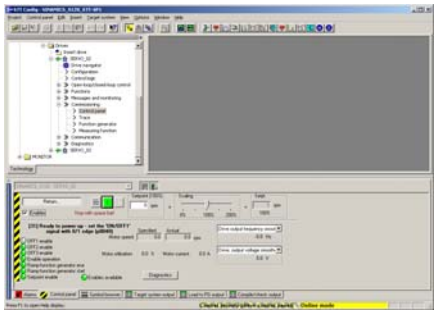
After commissioning SINAMICS S120, the drives can be controlled from S7T Config via the control panel for the SINAMICS S120 drive system for a first test.

7.1.1 Call of the control panel in S7T Config

The control panel for the operation of the drives of SINAMICS S120 is called as follows:

Table 7-1 Call of the control panel for SINAMICS S120 in S7T Config

No.	Instruction	Note
1.		In the SIMATIC Manager, select **SINAMICS_S120** and **double-click** this component **in the right window**. This starts S7T Config for SINAMICS S120.
2.		Establish the online connection to SINAMICS S120 using the Speed button. **Attention:** At this point, activating the online connection via the menu is not possible!
3.		In the **Commissioning** section, call **Control Panel** for the drive **SERVO_02** or **SERVO_03**.

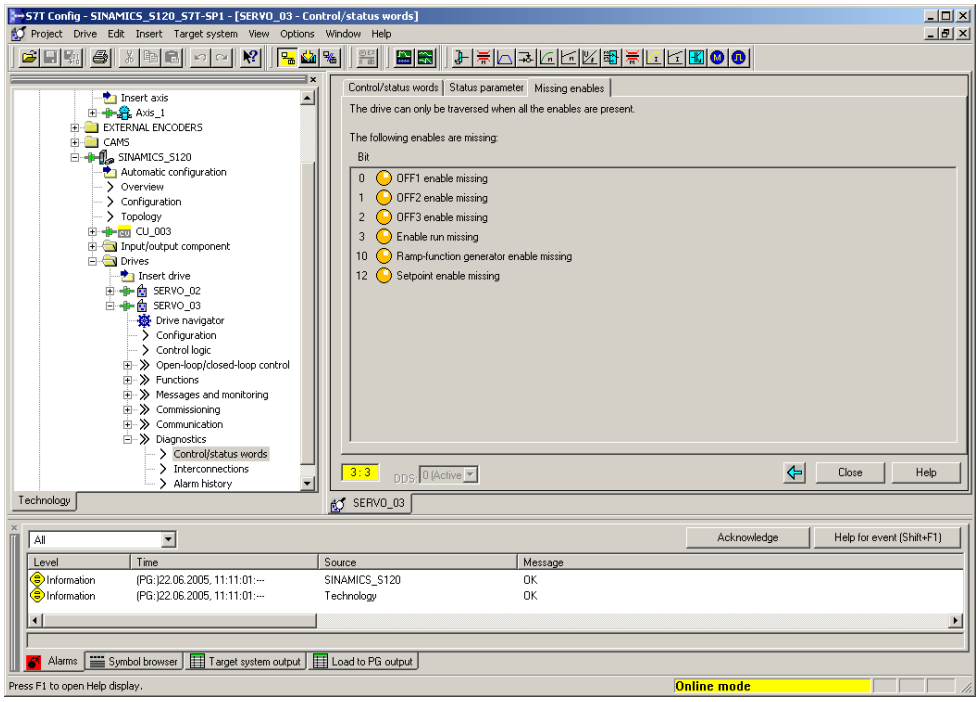
No.	Instruction	Note
4.		Clicking the **Assume Control priority** button transfers the control priority to S7T Config.
5.		**Check** the safety note and acknowledge the note by clicking the **Accept** button.
6.		Now set the enable by checking the **Enables** setting.

7.1.2 Diagnostics of missing signals and enables

If not all signals are set by the control panel during setting the enables at the drive, the missing enables can be checked via a diagnostics display in S7T Config.

The diagnostics display is available under the respective drive **SERVO_02** or **SERVO_03** in the **Diagnostics** section, **Control/Status words** tab. The **missing enables** can be directly read in the respective section.

Figure 7-1 Checking the missing enables at the drive

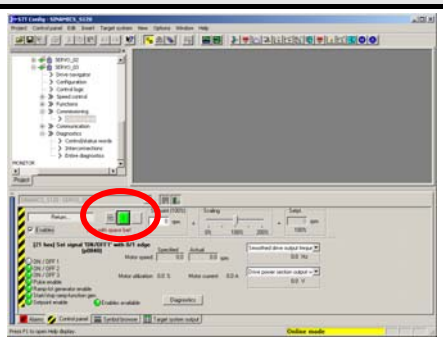


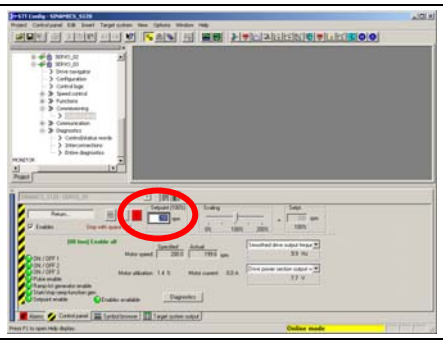
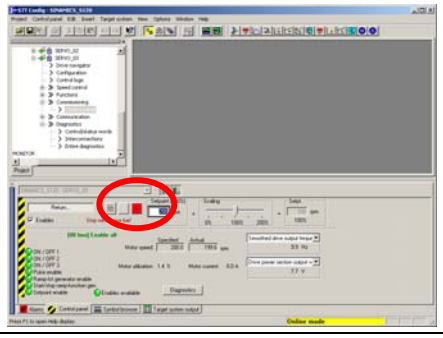
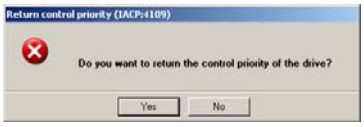
In case of missing enables, check the hardware wiring and the BICO interconnection whether all signals are relayed to the respective location and whether the wiring has been performed correctly.

7.1.3 Operation of the drive via the control panel

If all enables exist, the drive can be controlled via the control panel of SINAMICS S120 as follows:

Table 7-2 Operation of the drive via the control panel

No.	Instruction	Note
1.		Start the drive by clicking the **green ON button**.

2.		Set the desired speed in the input box. The motor should now start moving at the set speed.
3.		Stop the drive by clicking the **red OFF button**.
4.		Return the control priority to the higher-level controller by clicking the **Return** button and acknowledge the query with **Yes**.

You can now perform this test also for the second drive of the SINAMICS S120 training case and thus check the functionality of your configuration.

7.2 Control via the technology CPU

The control of SINAMICS S120 via the technology CPU is performed via the respective technology objects of the technology CPU.

Note

For further information on the configuration and use of the technology objects of an axis, please refer to the application examples on the technology CPU which are available on the internet (see appendix: **Internet links**).

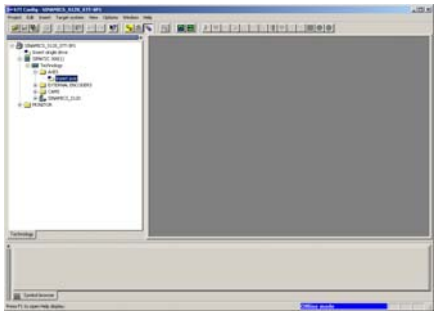
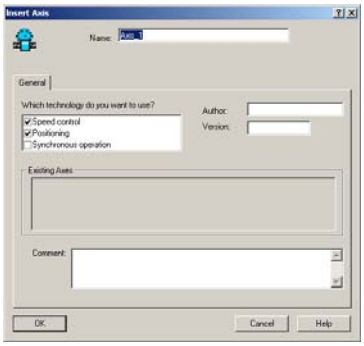
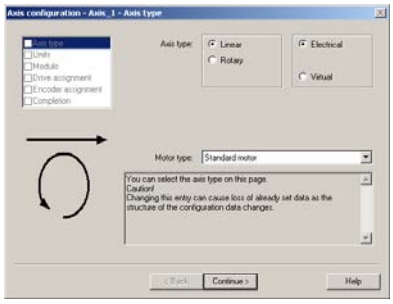
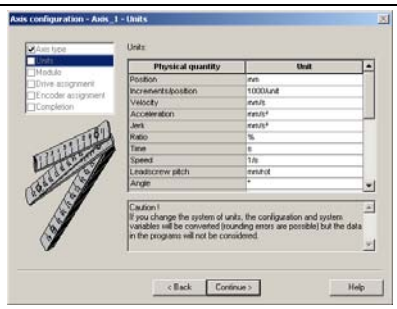
7.2.1 Creating an axis in S7T Config

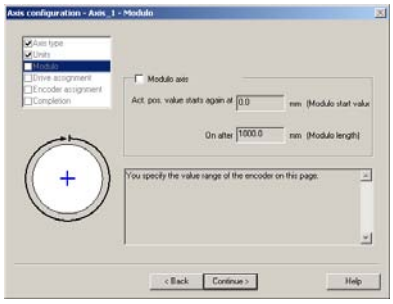
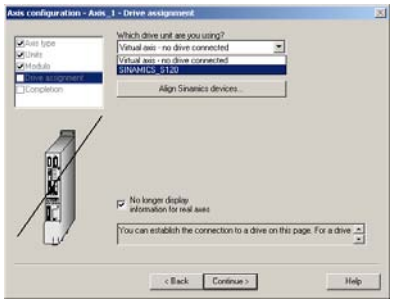
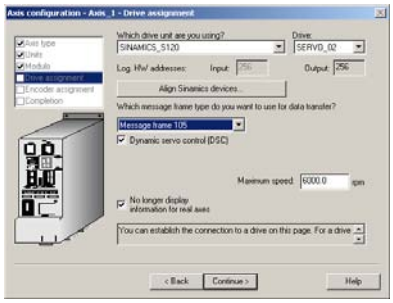
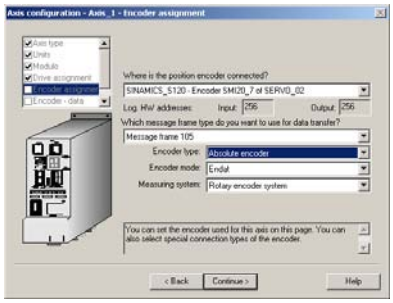
The respective drive of SINAMICS S120 has to be created as axis in the S7T Config configuration tool of the technology CPU. The respective settings are made for this axis and assigned to the desired drive of SINAMICS S120.

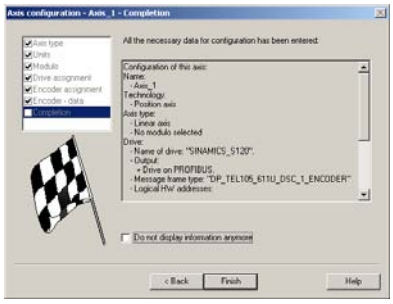
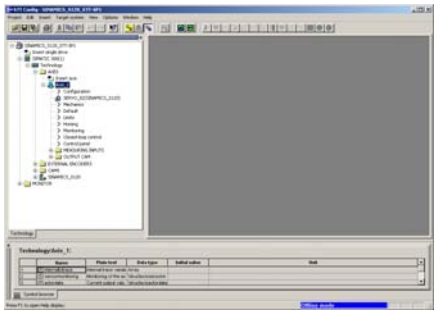
Note

Save and Compile, **Download** and **Generate technology system data** is not content of this explanation and is seen as a basic requirement.

Table 7-3 Creating an axis in S7T Config

No.	Instruction	Note
1.		In the object tree in S7T Config, select **Axes** in **Technology** and double-click **Insert Axis**.
2.		Enter a suitable **name** for the technology object axis in the respective box, select **Technology** and click the **OK** button.
3.		Select **axis type** and **motor type**. Then click the **Continue** button.
4.		If required, set the system of units in **Units** and subsequently click **Continue**.

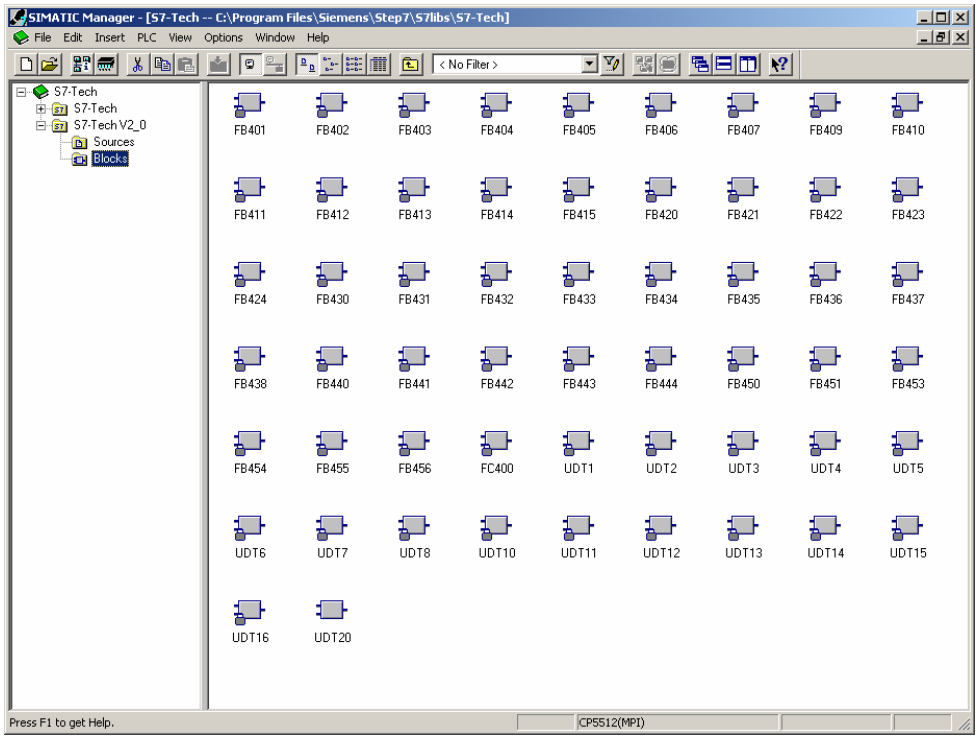
5.		In **Modulo axis**, specify whether the axis is a modulo axis and click **Continue** to display the next input mask.
6.		Select the SINAMICS_S120 drive system as **Drive unit**.
7.		In **Drive**, select the desired axis and set Message frame 105 as **Message frame type**. If required, activate the **DSC** function.
8.		In the **Encoder assignment** dialog box, set the parameters of the used encoder system.
9.		In this dialog box, set additional parameters of the encoder system such as **Encoder pulses per revolution** or **Number of data bits**.

10.		Finish the creation of the axis by clicking the **Finish** button.
11.		The technology object **Axis** is now completely created and can be used and addressed in the controller.

7.2.2 Control of the axis from the STEP 7 program

After creating the axis in the S7T Config configuration tool and after loading the configuration to the technology CPU, this axis can be activated via the respective technology function blocks from the S7 Tech block library in the STEP 7 program.

Figure 7-2 S7 Tech V2.0 block library

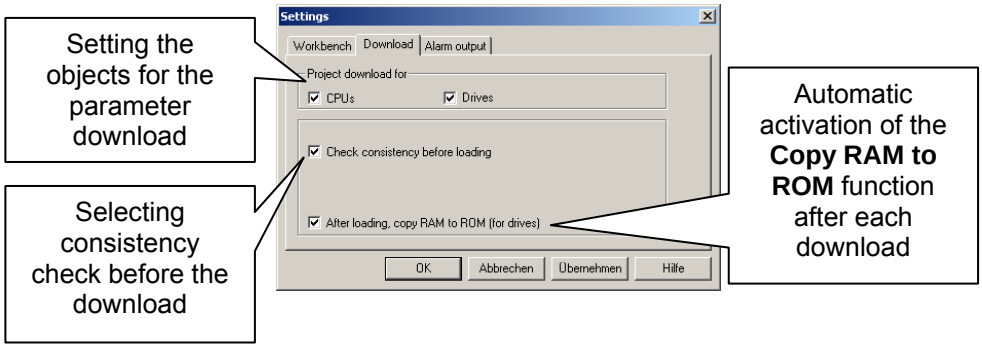


8 Appendix and Literature

8.1 Setting options in S7T Config for the parameter download

For the parameter download and handling of the individual objects displayed in S7T Config, the following special settings can be made:

Figure 8-1 Download settings in S7T Config



To display the window for setting these values, select **Options** in the main menu and subsequently select **Settings…**

8.2 Parameter download via S7T Config

Different options are available for downloading the parameter data from S7T Config, which also depend on the settings listed in **Chapter 8.1 Setting options in S7T Config for the parameter download**.

It has to be observed that the SINAMICS S120 drive system and the technology part of the technology CPU are two separate objects and that the parameters have to be loaded to the respective object.

Download to the SINAMICS S120 drive system

In S7T Config, the context menu of the SINAMICS_S120 object is to be used for the partial download of parameters and configurations to the SINAMICS S120 drive system. This ensures that the data are only transferred to the desired drive system.

After downloading, the data should be backed up via the context menu on the compact flash card of the drive or the setting for the automatic activation of the **Copy RAM to ROM** function should be activated.

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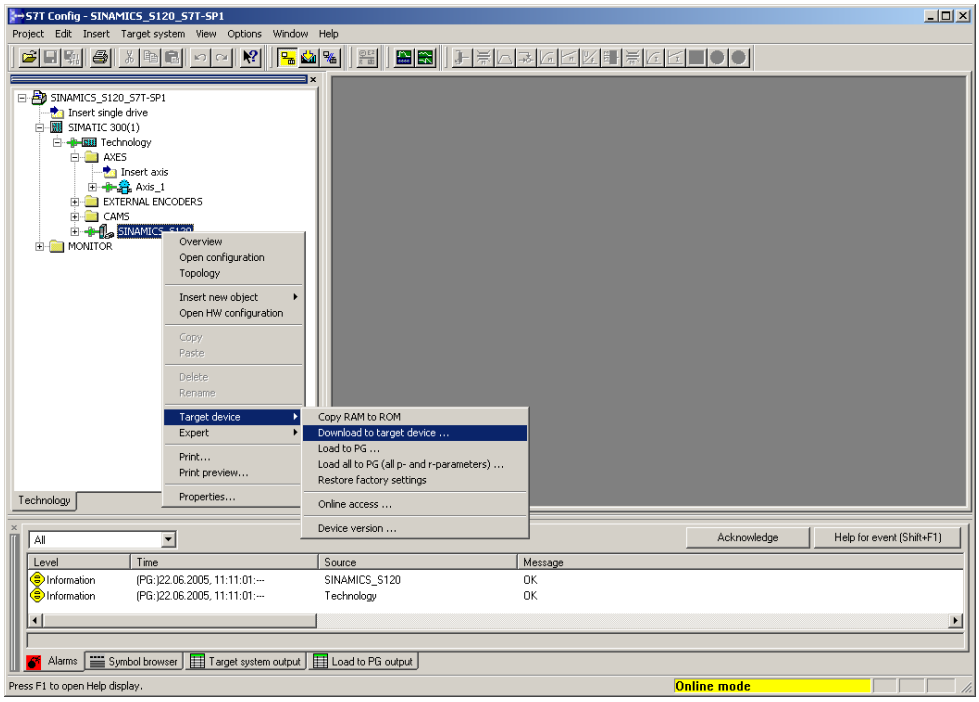
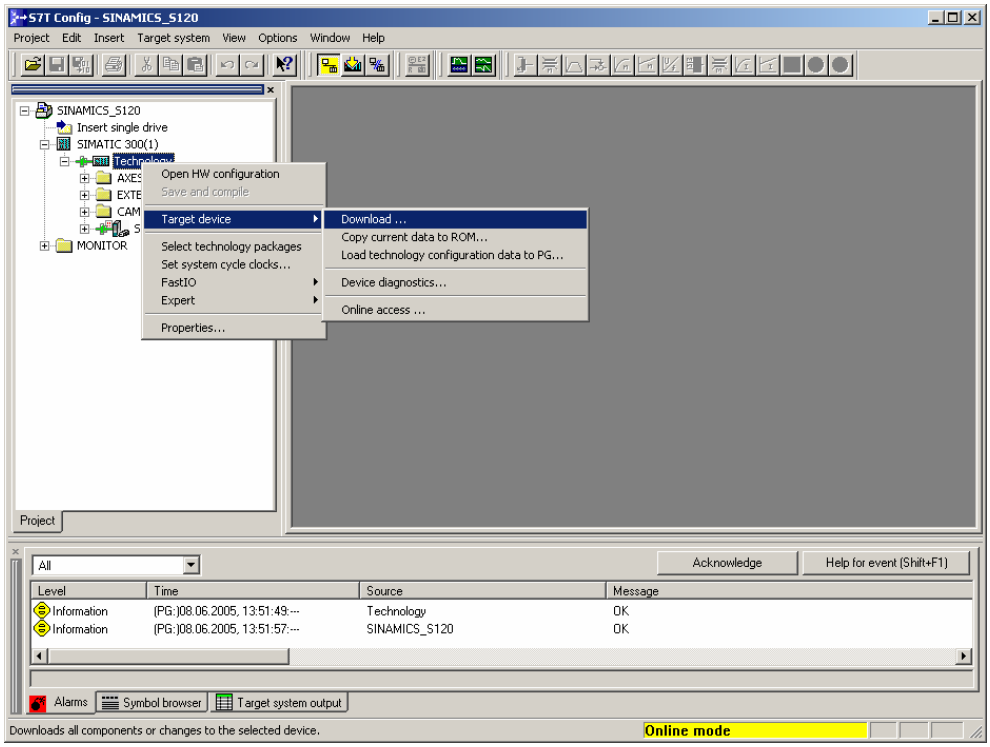
Figure 8-2 Download to the SINAMICS S120 drive system



Download to the technology part of the technology CPU

Figure 8-3 Download to the technology part of the technology CPU



Proceed accordingly for the partial download of parameters and configurations to the technology part of the technology CPU.

Ensure a subsequent data backup using the **Copy current data to ROM** command.

8.3 Special setting at the SINAMICS S120 training case

Special operation of the SINAMICS S120 training case at a 230V mains socket-outlet requires a special parameter setting at the connected drives different from the factory settings.

The smart line module and the motor module of the SINAMICS S120 training case are specially modified for operation at the 230V mains. For this reason, the setting of the **parameter p210** of the connected drives must differ from the factory settings and has to be set as follows:

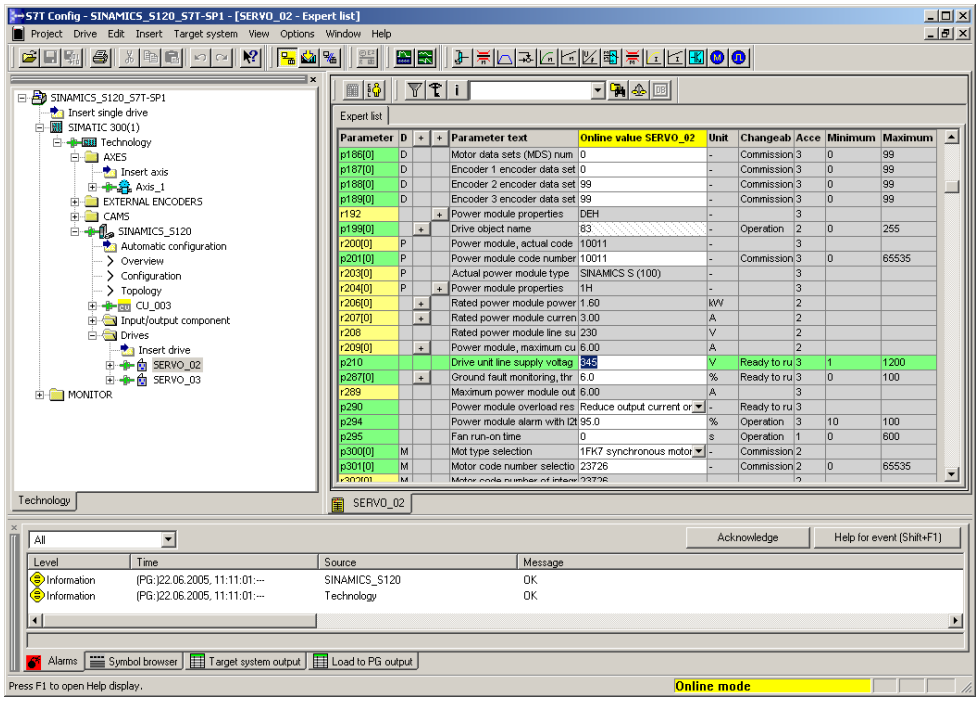
p210 = 345 V Device supply voltage SERVO/VECTOR

This setting is to be made in the expert list of the drives of the SINAMICS S120 training case and the parameter has to be set in the **Expert List** of the drive **SERVO_02** as well as of **SERVO_03**.

Note

The setting of the **parameter p210 = 345V** cannot be calculated and is preset for correct operation of the SINAMICS S120 training case at the 230V mains. **For this reason, the listed setting has to be applied as described!**

Figure 8-4 Special parameter setting at the SINAMICS S120 training case



9 Literature

9.1 Bibliographic references

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

Table 9-1

	Topic	Title
/1/	Technology CPU	SIMATIC – S7-300 CPU Data: CPU 317T-2DP Siemens Manual Edition 11/2004 MLFB: A5E00251769-03
/2/	Technology CPU	SIMATIC – CPU 317T Technology Functions Siemens Manual Edition 11/2004 MLFB: A5E00251797-03
/3/	SINAMICS S120	SINAMICS S120 – Installation and Start-Up Manual (IH1) Manufacturer / Service Documentation Edition 12/2004 MLFB: 6SL3 097-2AF00-0AP2
/4/	SINAMICS S120	SINAMICS S120 – Equipment Manual (GH1) Control Units and Additional System Components Edition 12/2004 MLFB: 6SL3097-2AH00-0AP1
/5/	SINAMICS S120	SINAMICS S120 – Equipment Manual (GH2) Booksize Power Sections Edition 12/2004 MLFB: 6SL3097-2AC00-0AP1
/6/	SINAMICS S120	SINAMICS S – List Manual (LH1) Manual Edition 12/2004 MLFB: 6SL3 097-2AP00-0AP2
/7/	SINAMICS S120	SINAMICS S120 – Function Manual (FH1) Function Manual Drive Functions Manufacturer / Service Documentation Edition 12/2004 MLFB: 6SL3 097-2AB00-0AP0

9.2 Internet links

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

Table 9-2

	Topic	Title
\1\	Reference to the entry	http://support.automation.siemens.com/WW/view/en/21767896
\2\	Siemens A&D Customer Support	www.ad.siemens.de/support
\3\	Siemens A&D Applications & Tools	http://support.automation.siemens.com/WW/view/en/20208582
\4\	Application examples on the technology CPU (a selection)	Palletizer with simply interpolating axes: http://support.automation.siemens.com/WW/view/en/21062269 Flying shears with print-mark synchronization: http://support.automation.siemens.com/WW/view/en/21063352 Feeder for a press: http://support.automation.siemens.com/WW/view/en/21363677
\5\	Manual Technology-CPU	http://www.ad.siemens.de/support Choose Product support Open the following directories: • Automation systems • SIMATIC Industrial Automation Systems • PLC • SIMATIC S7 • S7-300/S7-300F • CPUs See **Manuals** or choose one of these links: Technology Functions: http://support.automation.siemens.com/WW/view/en/17994112 CPU-Data 317T-2 DP: http://support.automation.siemens.com/WW/view/en/17993483 CPU-Data 315T-2 DP: http://support.automation.siemens.com/WW/view/en/21362915 CPU 317T-2 DP Commissioning: http://support.automation.siemens.com/WW/view/en/17992253

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	Topic	Title
\6\	Manuals SINAMICS S120	http://www.ad.siemens.de/support Choose Product support Open the following directories: • Drive technology • AC-Converter • Low-Voltage converters • Built-in and cabinet system SINAMICS S120 See **Manuals** or choose one of these links: http://www.automation.siemens.com/doconweb/content.asp?item=&cd=sinamics_0905_e&scope=all bzw. http://www.automation.siemens.com/doconweb