

SIEMENS

SINUMERIK

SINUMERIK 828D Software and hardware

Service Manual

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Valid for:
SINUMERIK 828D PPU 27x.4
SINUMERIK 828D PPU 290.4

CNC system software V4.95

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Legal information

Warning notice system

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

DANGER

indicates that death or severe personal injury will result if proper precautions are not taken.
--

WARNING
--

indicates that death or severe personal injury may result if proper precautions are not taken.

CAUTION
--

indicates that minor personal injury can result if proper precautions are not taken.
--

NOTICE

indicates that property damage can result if proper precautions are not taken.
--

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

WARNING
--

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

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Disclaimer of Liability

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

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Introduction

1.1 About SINUMERIK

From simple, standardized CNC machines to premium modular machine designs – the SINUMERIK CNCs offer the right solution for all machine concepts. Whether for individual parts or mass production, simple or complex workpieces – SINUMERIK is the highly dynamic automation solution, integrated for all areas of production. From prototype construction and tool design to mold making, all the way to large-scale series production.

Visit our website for more information SINUMERIK (<https://www.siemens.com/sinumerik>).

1.2 About this documentation

SINUMERIK documentation

The SINUMERIK documentation is organized into the following categories:

- General documentation/catalogs
- User documentation
- Manufacturer/service documentation

Target group

This publication is intended for Maintenance and service personnel.

Benefits

The Service Manual enables the addressed target group to perform the servicing and maintenance in a technically correct and safe manner.

Standard scope

This documentation only describes the functionality of the standard version. This may differ from the scope of the functionality of the system that is actually supplied. Please refer to the ordering documentation only for the functionality of the supplied drive system.

It may be possible to execute other functions in the system which are not described in this documentation. This does not, however, represent an obligation to supply such functions with a new control or when servicing.

For reasons of clarity, this documentation cannot include all of the detailed information on all product types. Further, this documentation cannot take into consideration every conceivable type of installation, operation and service/maintenance.

The machine manufacturer must document any additions or modifications they make to the product themselves.

Websites of third-party companies

This document may contain hyperlinks to third-party websites. Siemens is not responsible for and shall not be liable for these websites and their content. Siemens has no control over the information which appears on these websites and is not responsible for the content and information provided there. The user bears the risk for their use.

1.3 Documentation on the internet

Comprehensive documentation about the functions provided in SINUMERIK 828D Version 4.8 SP4 and higher is provided in the 828D documentation overview (<https://support.industry.siemens.com/cs/ww/en/view/109766724>).



You can display documents or download them in PDF and HTML5 format.

The documentation is divided into the following categories:

- User: Operating
- User: Programming
- Manufacturer/Service: Configuring
- Manufacturer/Service: Commissioning
- Manufacturer/Service: Functions
- Manufacturer/Service: Safety Integrated
- SINUMERIK Integrate/MindApp
- Info & Training

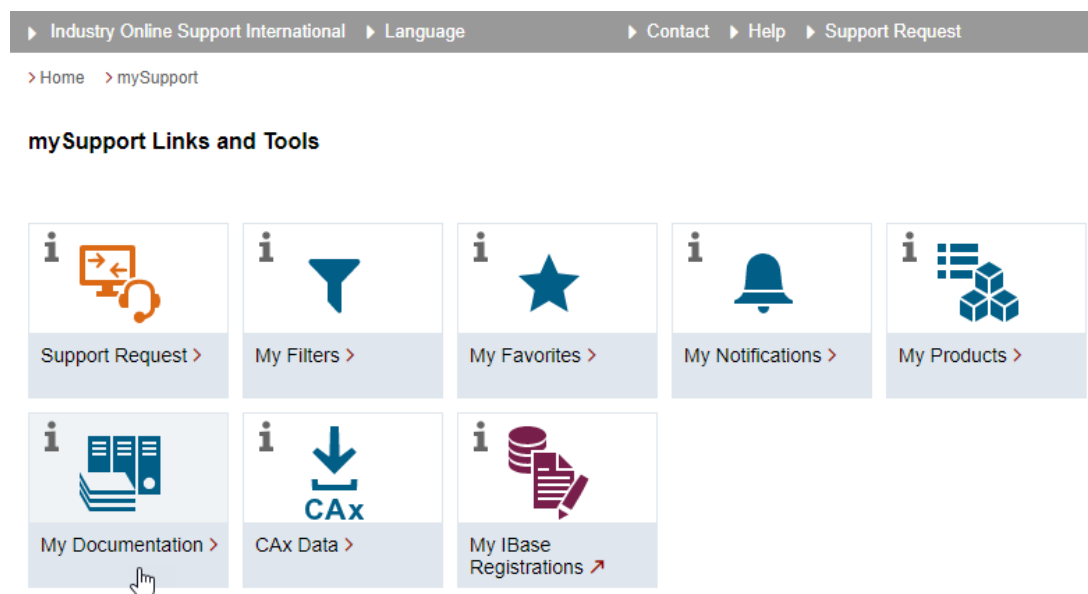
1.4 Feedback on the technical documentation

If you have any questions, suggestions or corrections regarding the technical documentation which is published in the Siemens Industry Online Support, use the link "Provide feedback" which appears at the end of the entry.

1.5 mySupport documentation

With the "mySupport documentation" web-based system you can compile your own individual documentation based on Siemens content, and adapt it for your own machine documentation.

To start the application, click on the "My Documentation" tile on the mySupport homepage (<https://support.industry.siemens.com/cs/ww/en/my>):



The configured manual can be exported in RTF, PDF or XML format.

Note

Siemens content that supports the mySupport documentation application can be identified by the presence of the "Configure" link.

1.6 Service and Support

Product support

You can find more information about products on the internet:

Product support (<https://support.industry.siemens.com/cs/ww/en/>)

The following is provided at this address:

- Up-to-date product information (product announcements)
- FAQs
- Manuals
- Downloads
- Newsletters with the latest information about your products
- Global forum for information and best practice sharing between users and specialists
- Local contact persons via our Contacts at Siemens database (→ "Contact")
- Information about field services, repairs, spare parts, and much more (→ "Field Service")

Technical support

Country-specific telephone numbers for technical support are provided on the internet at address (<https://support.industry.siemens.com/cs/ww/en/sc/4868>) in the "Contact" area.

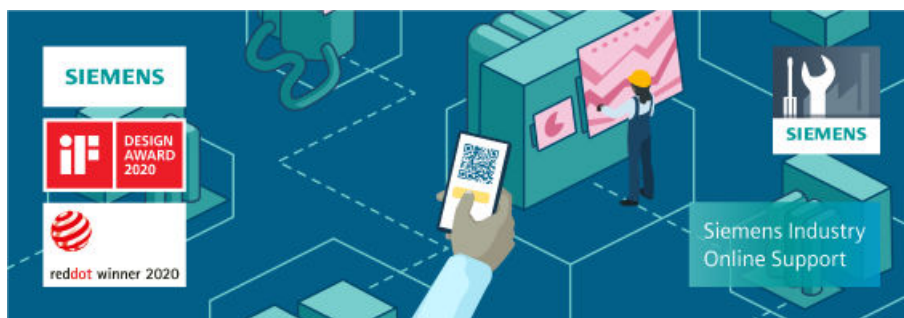
If you have any technical questions, please use the online form in the "Support Request" area.

Training

You can find information on SITRAIN at the following address (<https://www.siemens.com/sitrain>).

SITRAIN offers training courses for automation and drives products, systems and solutions from Siemens.

Siemens support on the go





With the award-winning "Siemens Industry Online Support" app, you can access more than 300,000 documents for Siemens Industry products – any time and from anywhere. The app can support you in areas including:

- Resolving problems when implementing a project
- Troubleshooting when faults develop
- Expanding a system or planning a new system

Furthermore, you have access to the Technical Forum and other articles from our experts:

- FAQs
- Application examples
- Manuals
- Certificates
- Product announcements and much more

The "Siemens Industry Online Support" app is available for Apple iOS and Android.

Data matrix code on the nameplate

The data matrix code on the nameplate contains the specific device data. This code can be read with a smartphone and technical information about the device displayed via the "Industry Online Support" mobile app.

1.7 Important product information

Using OpenSSL

This product can contain the following software:

- Software developed by the OpenSSL project for use in the OpenSSL toolkit
- Cryptographic software created by Eric Young.
- Software developed by Eric Young

You can find more information on the internet:

- OpenSSL (<https://www.openssl.org>)
- Cryptsoft (<https://www.cryptsoft.com>)

Compliance with the General Data Protection Regulation

Siemens observes standard data protection principles, in particular the data minimization rules (privacy by design).

For this product, this means:

The product does not process or store any personal data, only technical function data (e.g. time stamps). If the user links this data with other data (e.g. shift plans) or if he/she stores person-related data on the same data medium (e.g. hard disk), thus personalizing this data, he/she must ensure compliance with the applicable data protection stipulations.

Fundamental safety instructions

2.1 General safety instructions



WARNING

Electric shock and danger to life due to other energy sources

Touching live components can result in death or severe injury.

- Only work on electrical devices when you are qualified for this job.
- Always observe the country-specific safety rules.

Generally, the following steps apply when establishing safety:

1. Prepare for disconnection. Notify all those who will be affected by the procedure.
2. Isolate the drive system from the power supply and take measures to prevent it being switched back on again.
3. Wait until the discharge time specified on the warning labels has elapsed.
4. Check that there is no voltage between any of the power connections, and between any of the power connections and the protective conductor connection.
5. Check whether the existing auxiliary supply circuits are de-energized.
6. Ensure that the motors cannot move.
7. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems, or water. Switch the energy sources to a safe state.
8. Check that the correct drive system is completely locked.

After you have completed the work, restore the operational readiness in the inverse sequence.



WARNING

Electric shock due to connection to an unsuitable power supply

When equipment is connected to an unsuitable power supply, exposed components may carry a hazardous voltage. Contact with hazardous voltage can result in severe injury or death.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV- (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.



WARNING

Electric shock due to equipment damage

Improper handling may cause damage to equipment. For damaged devices, hazardous voltages can be present at the enclosure or at exposed components; if touched, this can result in death or severe injury.

- Ensure compliance with the limit values specified in the technical data during transport, storage and operation.
- Do not use any damaged devices.



WARNING

Electric shock due to unconnected cable shields

Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.

- As a minimum, connect cable shields and the cores of cables that are not used at one end at the grounded housing potential.



WARNING

Electric shock if there is no ground connection

For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury.

- Ground the device in compliance with the applicable regulations.

NOTICE

Damage to equipment due to unsuitable tightening tools.

Unsuitable tightening tools or fastening methods can damage the screws of the equipment.

- Be sure to only use screwdrivers which exactly match the heads of the screws.
- Tighten the screws with the torque specified in the technical documentation.
- Use a torque wrench or a mechanical precision nut runner with a dynamic torque sensor and speed limitation system.

 WARNING**Spread of fire from built-in devices**

In the event of fire outbreak, the enclosures of built-in devices cannot prevent the escape of fire and smoke. This can result in serious personal injury or property damage.

- Install built-in units in a suitable metal cabinet in such a way that personnel are protected against fire and smoke, or take other appropriate measures to protect personnel.
- Ensure that smoke can only escape via controlled and monitored paths.

 WARNING**Unexpected movement of machines caused by radio devices or mobile phones**

Using radio devices or mobile telephones in the immediate vicinity of the components can result in equipment malfunction. Malfunctions may impair the functional safety of machines and can therefore put people in danger or lead to property damage.

- Therefore, if you move closer than 20 cm to the components, be sure to switch off radio devices or mobile telephones.
- Use the "SIEMENS Industry Online Support app" only on equipment that has already been switched off.

 WARNING**Fire due to inadequate ventilation clearances**

Inadequate ventilation clearances can cause overheating of components with subsequent fire and smoke. This can cause severe injury or even death. This can also result in increased downtime and reduced service lives for devices/systems.

- Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

NOTICE**Overheating due to inadmissible mounting position**

The device may overheat and therefore be damaged if mounted in an inadmissible position.

- Only operate the device in admissible mounting positions.



WARNING

Unexpected movement of machines caused by inactive safety functions

Inactive or non-adapted safety functions can trigger unexpected machine movements that may result in serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have guaranteed that the functions relevant to safety are running correctly.

Note

Important safety notices for Safety Integrated functions

If you want to use Safety Integrated functions, you must observe the safety notices in the Safety Integrated manuals.



WARNING

Malfunctions of the machine as a result of incorrect or changed parameter settings

As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect the parameterization against unauthorized access.
- Handle possible malfunctions by taking suitable measures, e.g. emergency stop or emergency off.

2.2 Equipment damage due to electric fields or electrostatic discharge

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.



NOTICE

Equipment damage due to electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g. conductive foam rubber or aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
 - Wearing an ESD wrist strap
 - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

2.3 Warranty and liability for application examples

Application examples are not binding and do not claim to be complete regarding configuration, equipment or any eventuality which may arise. Application examples do not represent specific customer solutions, but are only intended to provide support for typical tasks.

As the user you yourself are responsible for ensuring that the products described are operated correctly. Application examples do not relieve you of your responsibility for safe handling when using, installing, operating and maintaining the equipment.

2.4 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit

<https://www.siemens.com/industrialsecurity> (<https://www.siemens.com/industrialsecurity>).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under

<https://www.siemens.com/industrialsecurity> (<https://new.siemens.com/global/en/products/services/cert.html#Subscriptions>).

Further information is provided on the Internet:

Industrial Security Configuration Manual (<https://support.industry.siemens.com/cs/ww/en/view/108862708>)



WARNING

Unsafe operating states resulting from software manipulation

Software manipulations, e.g. viruses, Trojans, or worms, can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Keep the software up to date.
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.
- Make sure that you include all installed products into the holistic industrial security concept.
- Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.
- On completion of commissioning, check all security-related settings.

2.5 Residual risks of power drive systems

When assessing the machine- or system-related risk in accordance with the respective local regulations (e.g., EC Machinery Directive), the machine manufacturer or system installer must take into account the following residual risks emanating from the control and drive components of a drive system:

1. Unintentional movements of driven machine or system components during commissioning, operation, maintenance, and repairs caused by, for example,
 - Hardware and/or software errors in the sensors, control system, actuators, and cables and connections
 - Response times of the control system and of the drive
 - Operation and/or environmental conditions outside the specification
 - Condensation/conductive contamination
 - Parameterization, programming, cabling, and installation errors
 - Use of wireless devices/mobile phones in the immediate vicinity of electronic components
 - External influences/damage
 - X-ray, ionizing radiation and cosmic radiation
2. Unusually high temperatures, including open flames, as well as emissions of light, noise, particles, gases, etc., can occur inside and outside the components under fault conditions caused by, for example:
 - Component failure
 - Software errors
 - Operation and/or environmental conditions outside the specification
 - External influences/damage
3. Hazardous shock voltages caused by, for example:
 - Component failure
 - Influence during electrostatic charging
 - Induction of voltages in moving motors
 - Operation and/or environmental conditions outside the specification
 - Condensation/conductive contamination
 - External influences/damage
4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, etc., if they are too close
5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly
6. Influence of network-connected communication systems, e.g. ripple-control transmitters or data communication via the network

For more information about the residual risks of the drive system components, see the relevant sections in the technical user documentation.

System description

3.1 System overview

Configuration with four axes (basic configuration)

The following configuration shows a typical example with SINAMICS S120 booksize:

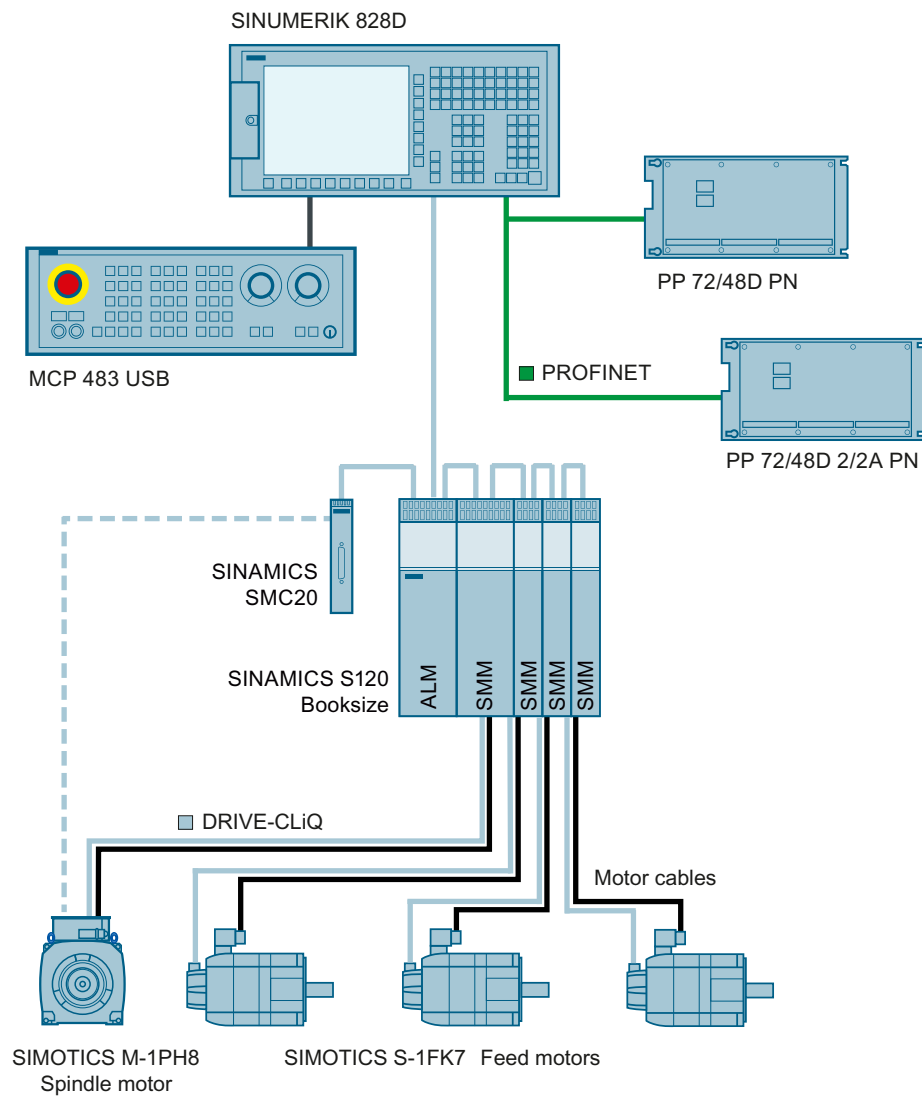


Figure 3-1 Configuration example 1: Basic configuration with four axes

Configuration with 4 axes and 2 auxiliary axes

The following configuration shows an example with 2 auxiliary axes:

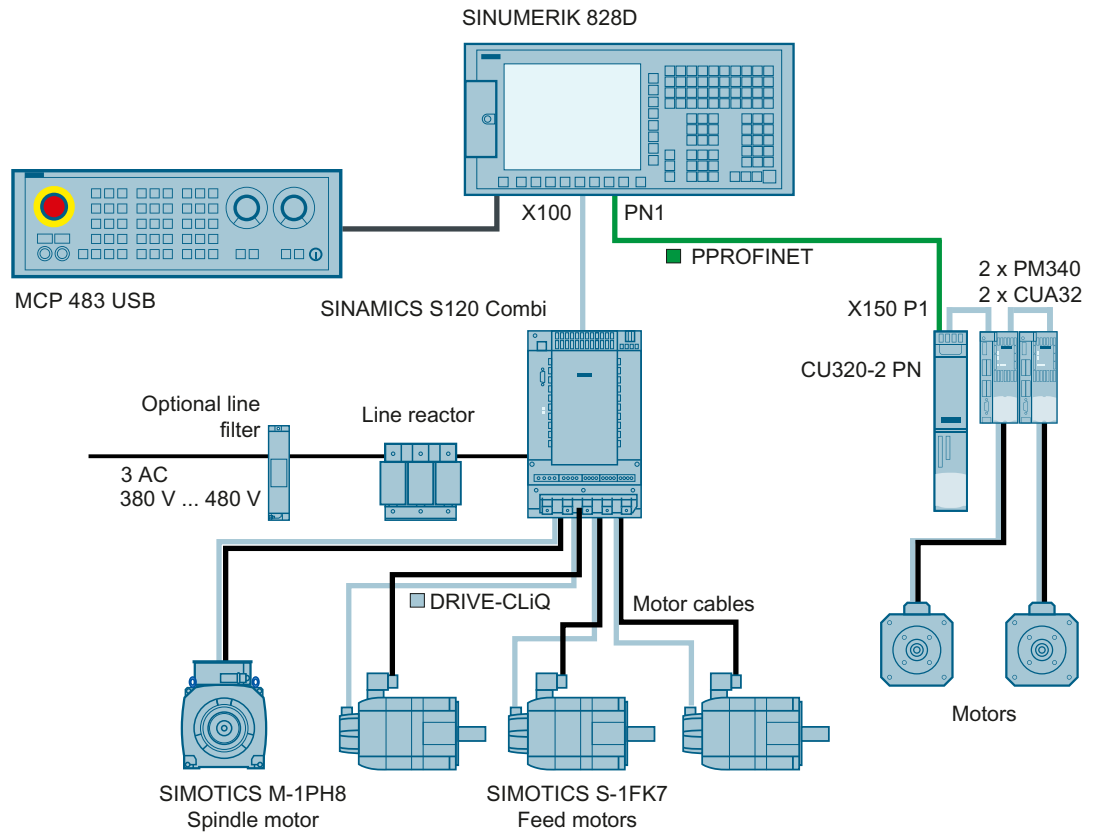


Figure 3-2 Configuration example 2: Basic expansion stage with 4 axes and 2 auxiliary axes

Configuration with 6 axes (maximum expansion stage) and Safety Integrated

The following configuration shows the maximum expansion stage with SINAMICS S120 Combi:

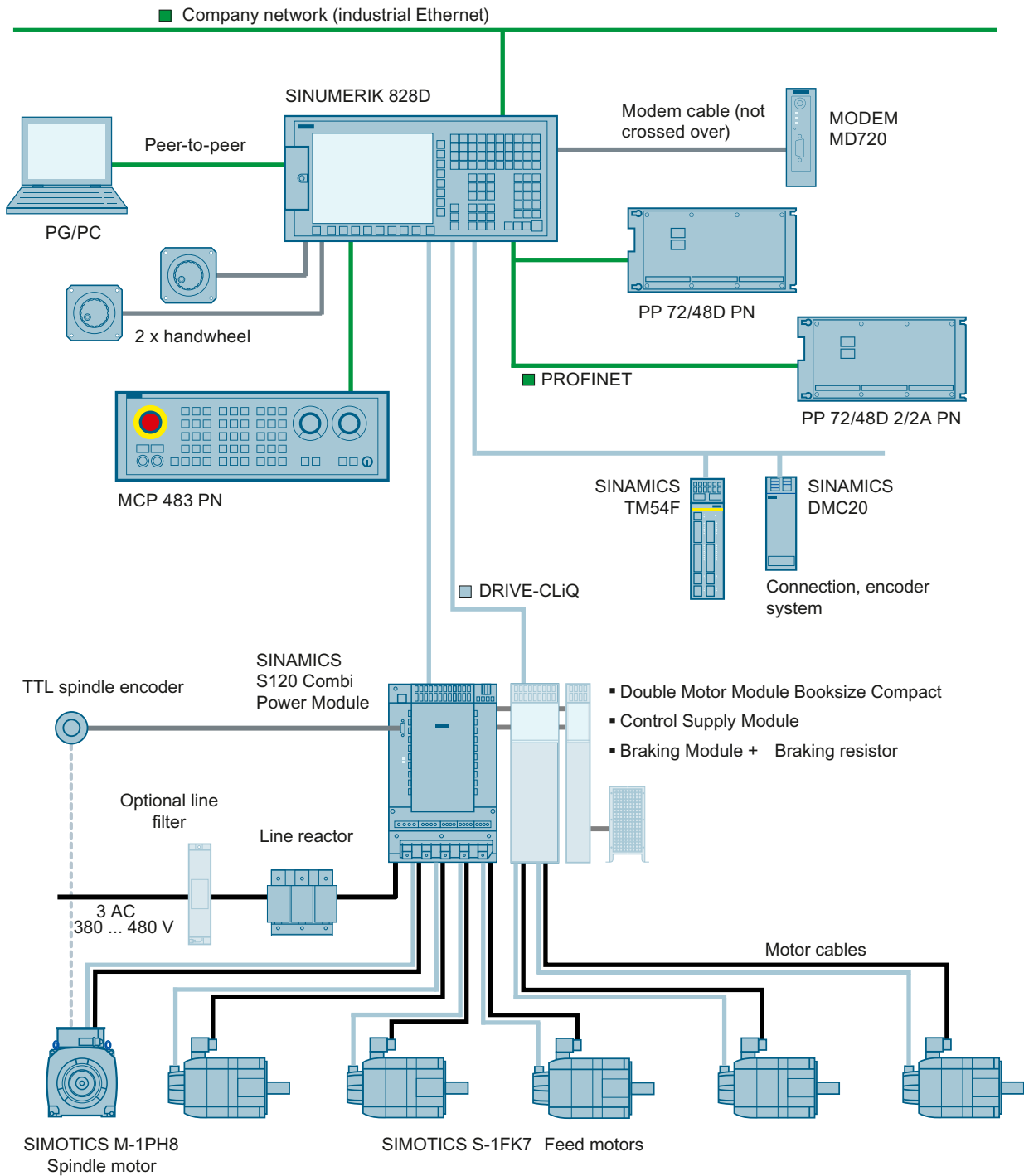
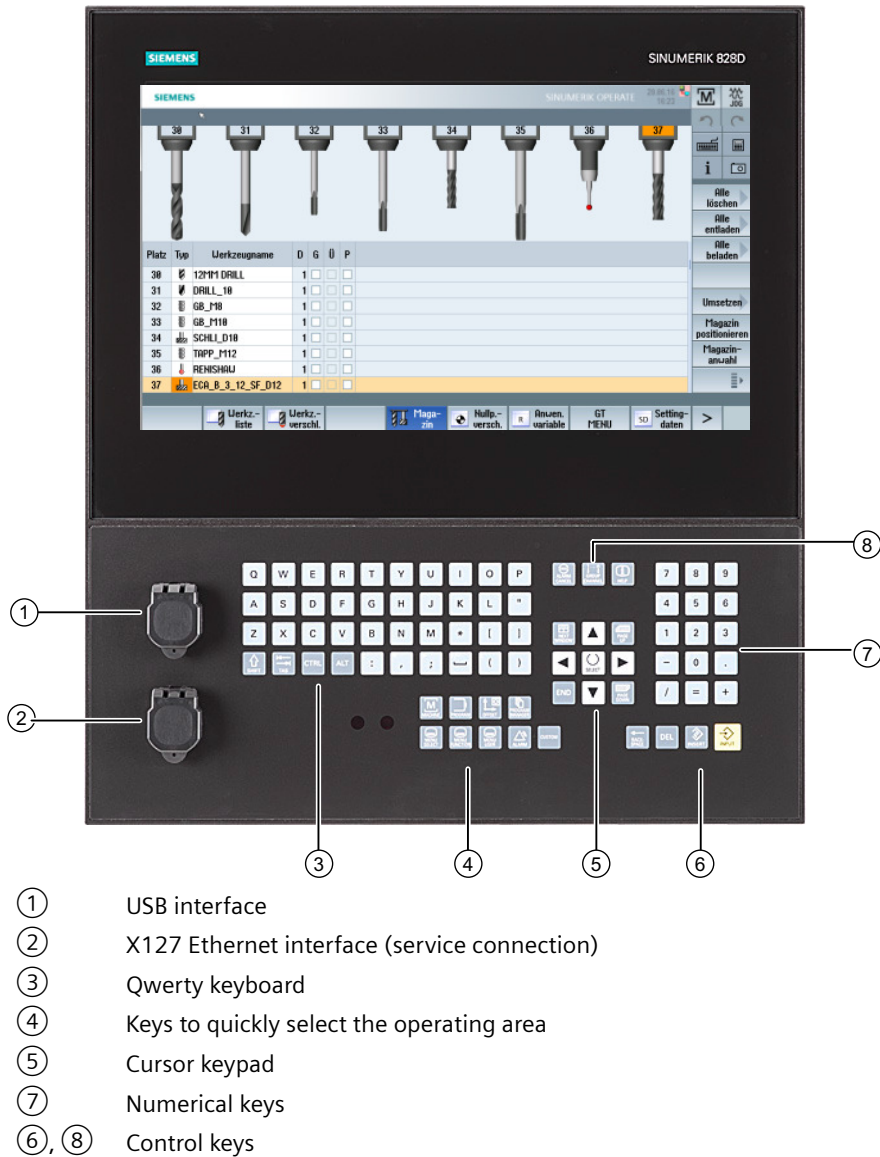


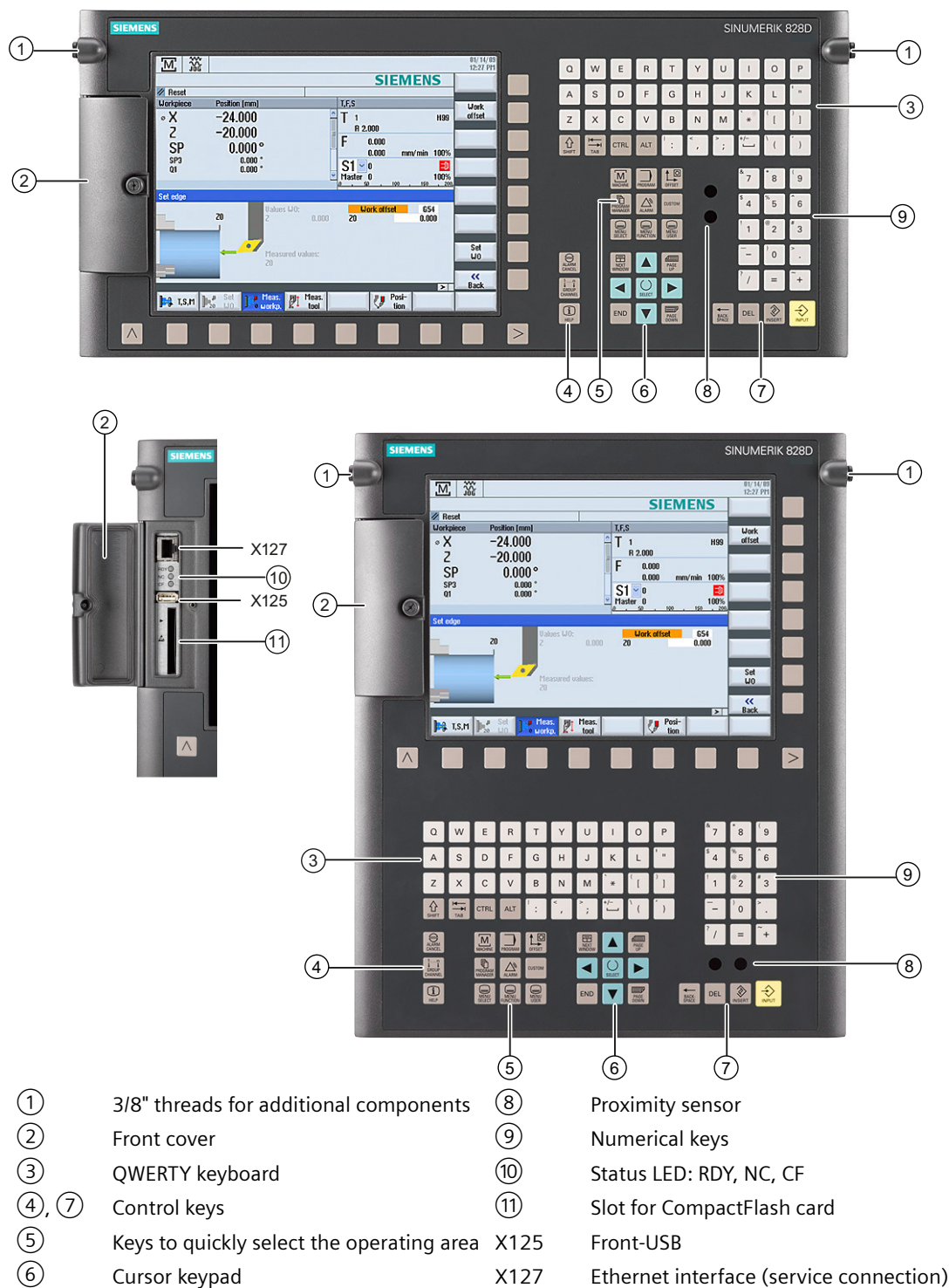
Figure 3-3 Configuration example 3: Maximum expansion stage with 6 axes and with Safety Integrated

3.2 PPU versions

Front of the PPU 290.4



Front of the PPU 27x.4



Rear of the PPU

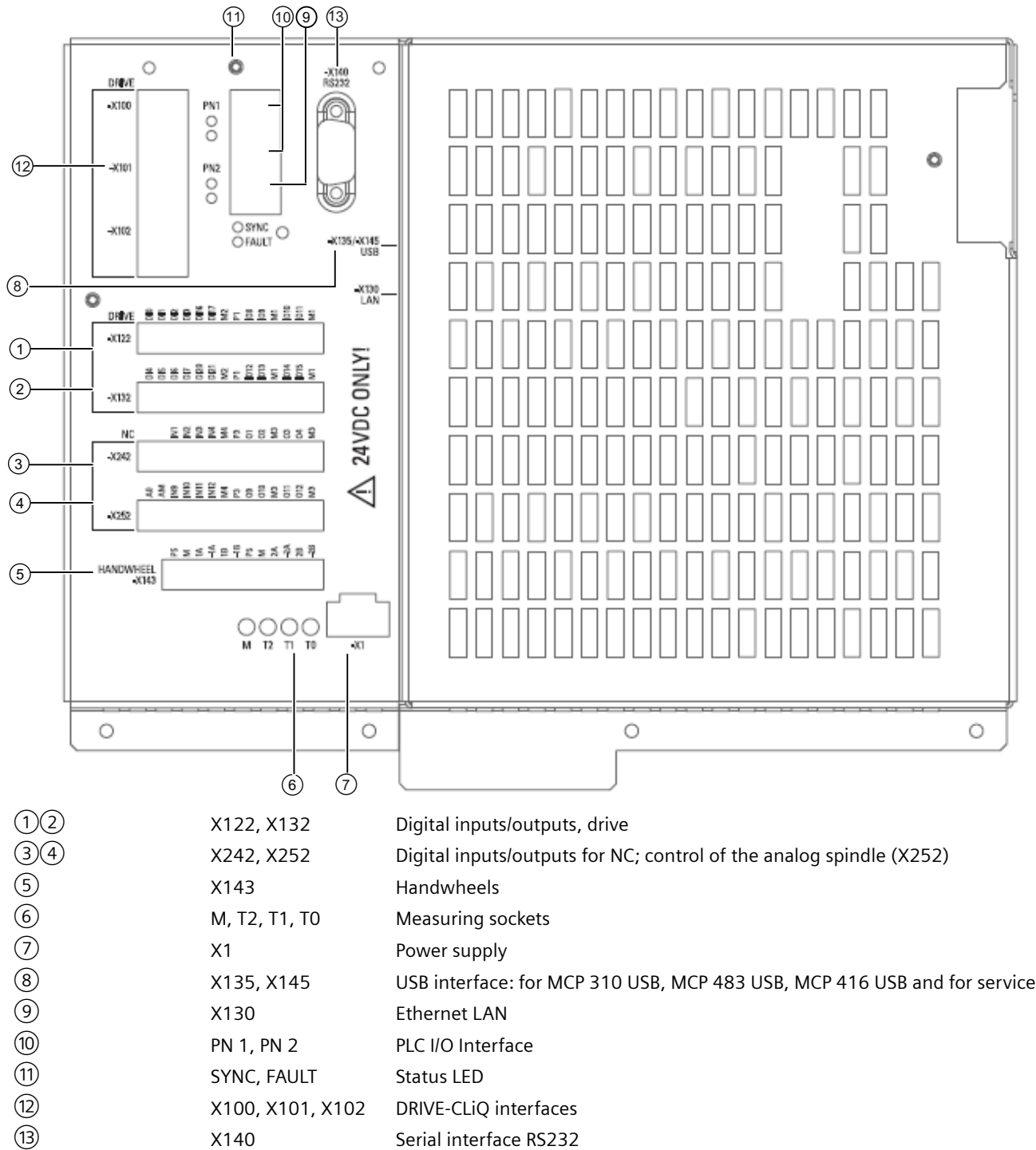


Figure 3-4 Interfaces at the rear of the PPU

Service cases - software

Service tools

The current versions of the software tools should be used for the subsequently described service activities and for backing up the system and user data. These tools are supplied in the SINUMERIK 828D toolbox DVD:

- SINUMERIK 828D boot system → configuration data
- Access MyMachine /P2P (incl. Lock MyCycles)
- PLC programming tool
- SINUMERIK Commissioning from CNC software V4.7

Backing up log files

If system problems occur, then it is necessary to backup all of the existing log files in order to provide these to the hotline for diagnostics. There is a special shortcut key for this function:



This function generates a directory on the user CompactFlash card or on the USB flash drive (front). If both are available, then the directory is created in both storage media.

The directory name has the following structure: LOG_date_time

Example:

LOG_091102_083615 stands for a directory generated on 02.11.2009 at 8:36:15.

This therefore ensures that a directory is not overwritten by pressing CTRL + ALT + D several times. The directory contains all of the logbook and debug information available in the system.

Contact Technical Support

Contact to technical support:

www.siemens.com/sinumerik/help (www.siemens.com/sinumerik/help)



To ensure fast processing, please provide the following information:

- Alarm number with alarm text
- Description of the operator action/operating mode prior to the alarm message
- Generate log files with the key shortcut: CTRL + ALT + D

Field service, services and local contacts:

www.siemens.com/sinumerik/contact (<http://www.siemens.com/sinumerik/contact>)



SINUMERIK documentation:

www.siemens.com/sinumerik/docu (<http://www.siemens.com/sinumerik/docu>)



Further information:

www.siemens.com/sinumerik/support (<http://www.siemens.com/sinumerik/support>)



Siemens Industry Online Support provides further information, such as FAQs, product information, forum contributions.

Remote Support

For a more detailed technical problem analysis, for example, during a request to Technical Support (service request), it is possible to ask for remote assistance on-site for a Siemens expert.

The free "FastViewer" software is used for this.

For more information on establishing a connection via "Fastviewer", can be found here:

Entry type: FAQ, Entry ID: 106665159, Entry date: 09/07/2020

How do you run a remote session together with Siemens Industry Technical Support?

<https://support.industry.siemens.com/cs/document/106665159> (<https://support.industry.siemens.com/cs/document/106665159>)

Requirements:

- Fastviewer software (provided by Siemens Technical Support on a case-by-case basis)
- Installed Service tools, at least Access MyMachine /P2P (see point Service tools above)
- Engineering PC with connection to the machine and Internet connection via a second interface or routed network connection

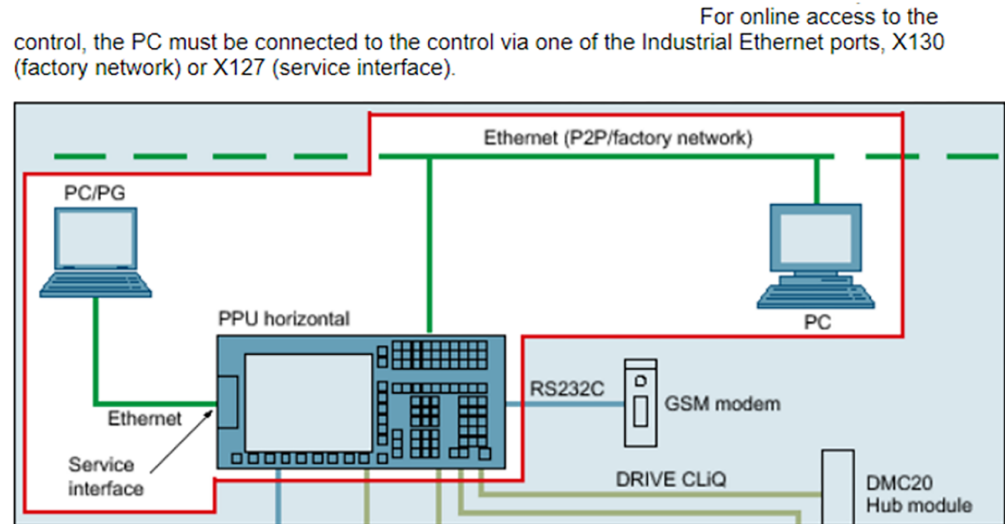


Figure 4-1 <https://support.industry.siemens.com/cs/ww/en/view/109763231105080966411>

Establishing a connection to the control system:

1. Direct connection (peer-to-peer Ethernet) Direct connection involves connecting the PG/PC to the control system's X127 interface directly. You can establish this type of connection if you are where the control system is located.
2. Network connection: A network connection is a connection between the PG/PC and the control system X130 via a local area network (LAN). This type of connection is also possible if the control system is at another location.

References

Establishing a connection to the control system with Access MyMachine and Programming Tool is described in following manuals.

Entry type: Manual, Entry ID: 109782751, Entry date: 10/20/2020

SINUMERIK Access MyMachine /P2P (PC)

- Connection to the control
- Activate remote control for the VNC Viewer

<https://support.industry.siemens.com/cs/ww/en/view/109782751> (<https://support.industry.siemens.com/cs/ww/en/view/109782751>)

Entry type: Manual, Entry ID: 109763231, Entry date: 01/11/2019

SINUMERIK 840D sl basic functions

PLC Programming Tool

<https://support.industry.siemens.com/cs/ww/en/view/109763231/105080966411> (<https://support.industry.siemens.com/cs/ww/en/view/109763231/105080966411>)

See also

<https://support.industry.siemens.com/cs/ww/en/view/10666515959> (<https://support.industry.siemens.com/cs/ww/en/view/10666515959>)

4.1 Backing up user data

4.1.1 This is how you backup user data

Application

A backup of the NC data memory is generated using the "Save data" function.

The NC data backup must be performed for every control that has been commissioned in order to be able to quickly restore the control system in the case of data loss. If the "Create software backup" function is used when starting up, then it is essential to backup the memory data. With the data backup, a copy of the limited buffered memory is stored in the permanent memory. Backup of selected data (e.g. only machine data and no workpiece programs) is not possible. Data can be backed up without a password: i.e. always!

NOTICE

Data backup

The following procedure is recommended in order to avoid losing data.

- After making important changes, immediately backup data, e.g. after the 1st commissioning and the 2nd commissioning.
- While the data is being backed up, the control system must neither be operated, nor turned off.

Data backup using the "Save data" softkey

Preconditions:

- The control system has powered up.
- The power supply voltage is guaranteed during the data backup.

Proceed as follows to generate the internal data backup:

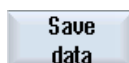
1. Press the <MENU SELECT> key.



2. Select the "Setup" operating area.



3. Press the "Save data" softkey.



4. This is followed by the "Query" to backup data:

The screenshot shows a software interface for machine configuration. At the top, there is a toolbar with a wrench icon and an 'AUTO' button. The date and time '04/21/09 11:06 AM' are displayed in the top right corner. The main area is titled 'Machine configuration' and contains a table with the following columns: Machine Index, Axis Name, Type, Drive No., Drive Identifier, Motor Type, and Channel. The table lists seven machine axes. A blue dialog box with the title 'Query' and the text 'Do you want to save the data?' is overlaid on the table. On the right side of the screen, there are several buttons: a 'Cancel' button with a red 'X' icon and an 'OK' button with a green checkmark icon. At the bottom, it says 'Current access level: Manufacturer'.

Machine Index	Axis Name	Type	Drive No.	Drive Identifier	Motor Type	Channel
1	MX1	Linear				CHAN1
2	MZ1	Linear				CHAN1
3	MSP1					CHAN1
4	MSP2					CHAN1
5	MB1					CHAN1
6	MSP3					CHAN1
7	MQ1					CHAN1

Query

Do you want to save the data?

Cancel

OK

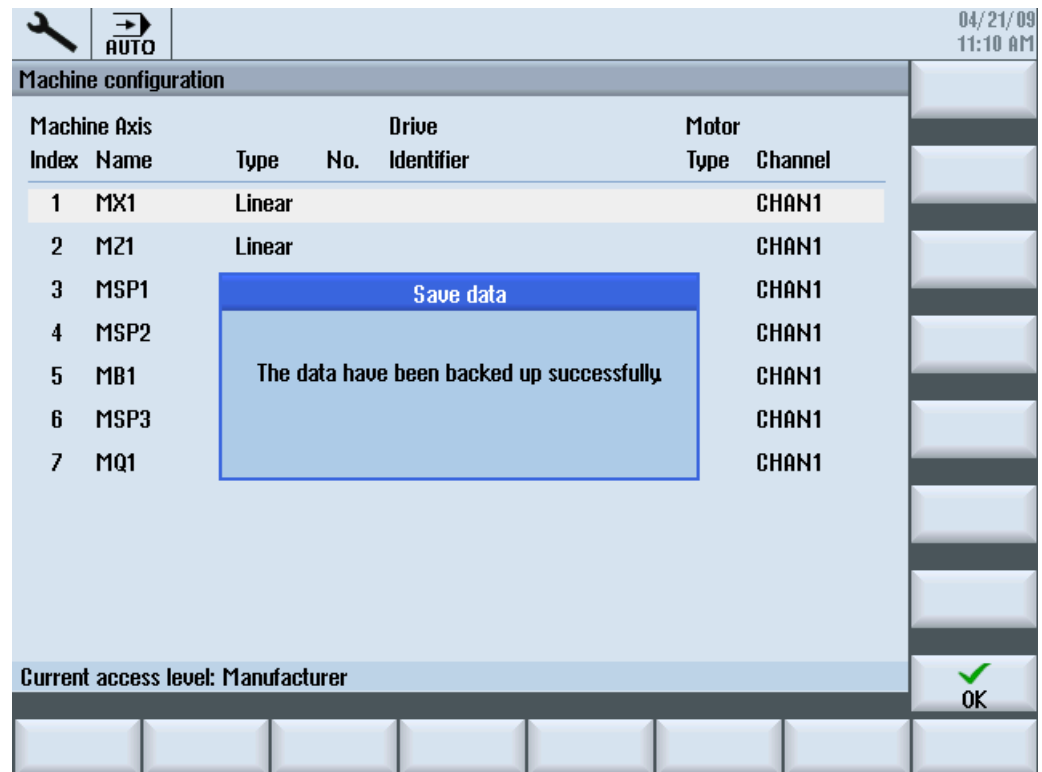
Current access level: Manufacturer

5. Press the "OK" softkey to backup the data.



A progress indicator indicate the status of the data backup.

After the data backup has been successfully completed, the following message is output:



6. Confirm this message with "OK".



An archive is created that contains the version-dependent commissioning data from the NC and PLC and is then stored under the following directory on the system CompactFlash card: /siemens/sinumerik/sys_cache/archive/savedata.ard

The archive is overwritten with a new version every time the "Save data" button is pressed.

Automatic data backup

As opposed to the "Save data" function, which has to be triggered manually, a backup of the NC data memory is generated automatically every time the NC restarts. This automatic backup is performed after the following actions:

- The "Reset (po)" softkey is pressed
- The control is switched off and on

4.1 Backing up user data

The automatic data backup is loaded in the following cases:

1. New hardware components are identified when the software is started up again following a hardware replacement, such as if the system CompactFlash card is operated in a replacement PPU.
2. The automatic data backup is loaded following the installation of a Software backup (Page 62).

NOTICE
Loading the most recent data backup
If the manual data backup is more recent than the automatic data backup, then the manual data backup is loaded instead of the automatically created data backup. The system only attempts to load an existing manual data backup if no valid automatic data backup is available. If this process also fails, then the "NCK default data" are loaded.

4.1.2 This is how you load the user data backup

Note

If this function is activated, the actual system data is replaced by the data backup.

Procedure

To load the manual data backup (via the "Back up data" softkey), proceed as follows:

1. The following display is shown when booting after power-on:



Press SELECT key to enter setup menu

2. To start the Startup menu press the <SELECT> key.

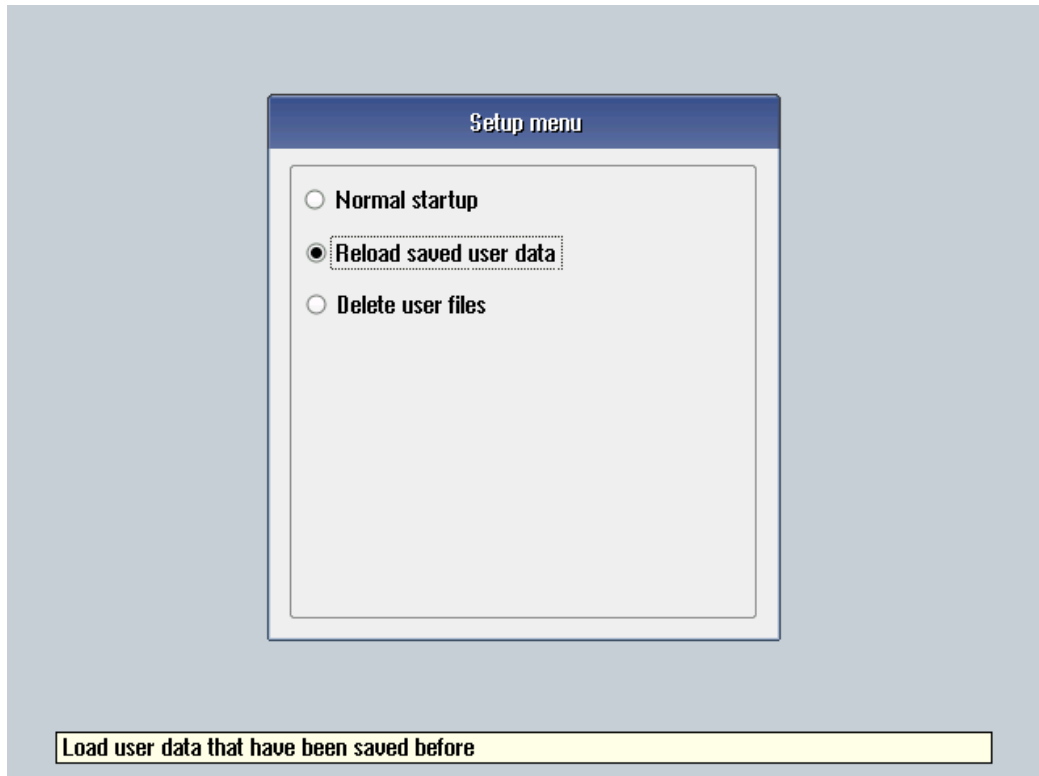


You now go to the Startup menu:



4.1 Backing up user data

- Using the arrow key, select the menu item "Reload saved user data".



- Confirm that the backup is loaded by pressing the key <INPUT>.



- Confirm the confirmation prompt by pressing the <INPUT> key.
Are you sure you want to reload saved user data?"



Note

Booting

If data is lost from the buffer memory, the data saved in the permanent memory will automatically be reloaded to the memory at POWER ON.

If the control boots with the backed-up data, the following message is displayed:

"4062 Data backup copy has been loaded".

4.1.3 Automatic save data archive

4.1.3.1 This is how you configure automatic save data archive

Configuration

Procedure:

1. Power on the machine.
2. Select the "Setup" operating area.



3. Click "Setup archive" softkey.



Note

The "Setup archive" option is only visible for the Manufacturer access level.

4. On the Setup screen, select "Configure data backup" option from the operating area. A schedule window opens

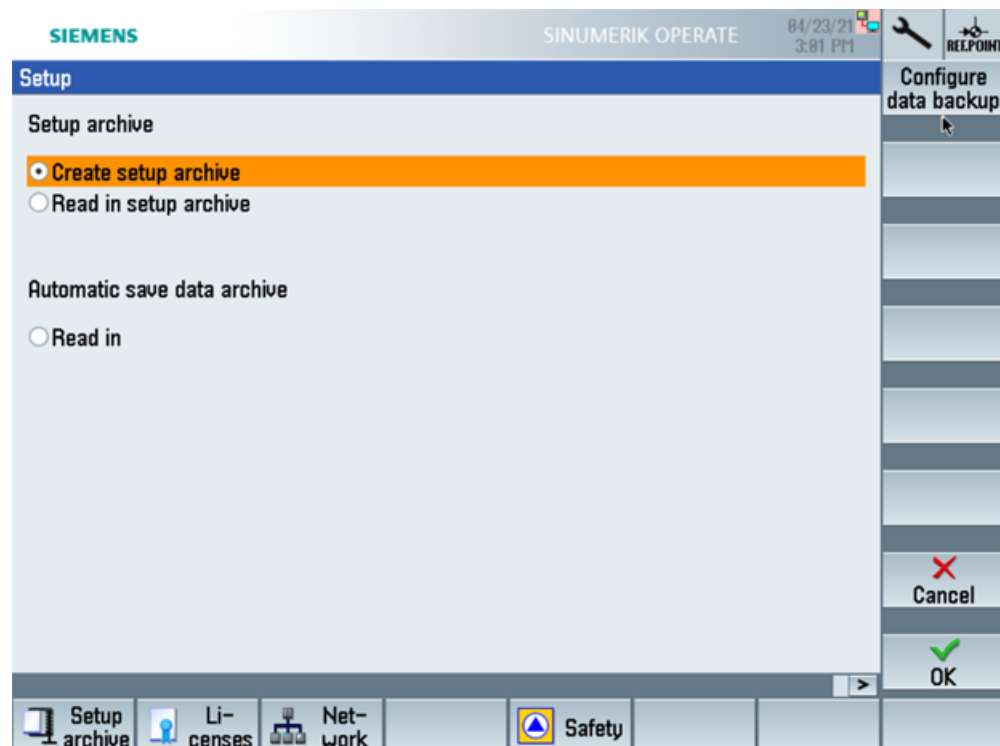


Figure 4-2 Setup screen

5. Set up the schedule to initiate automatic save data functionality.

Note

The option "on startup" is selected by default and grayed out. It indicates that each time when the machine is switched on, the data is archived. It is indicated by a popup window that displays the progress bars of the peripherals from which the data is being auto archived.

6. To set the schedule,
 - Select the occurrence, day, and time from the drop-down.
For example, on selecting the options, every "bi-weekly" on "Tuesday" at "23:00:00" – the Automatic save data archive functionality is initiated once in two weeks on Tuesday at 11pm. Another example is displayed on the screen below:

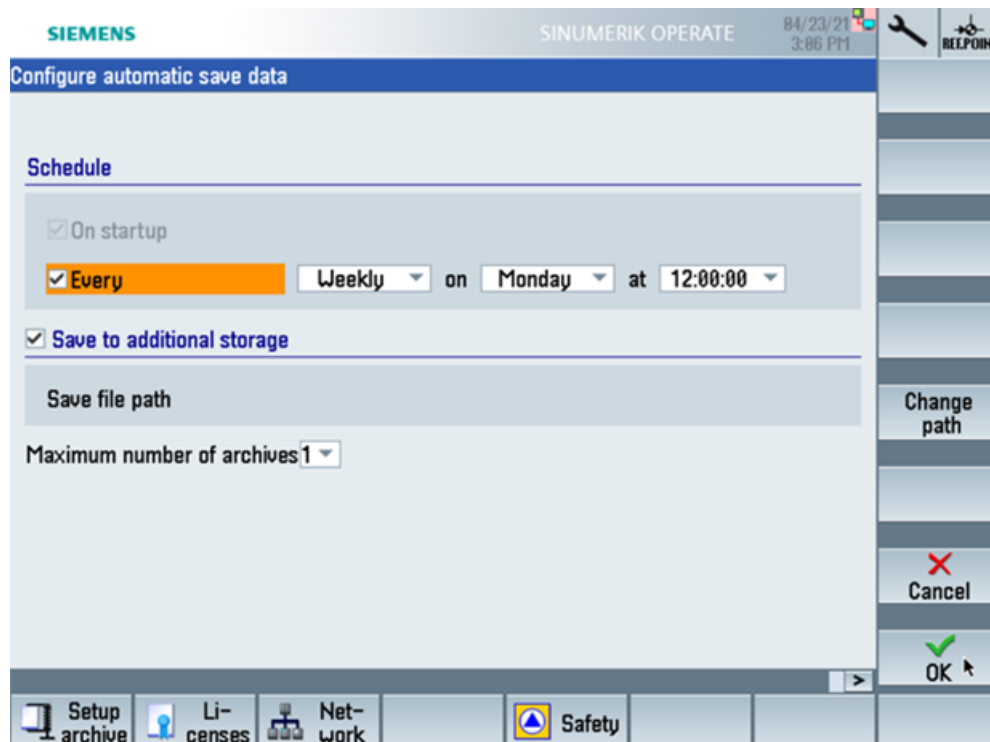


Figure 4-3 Schedule screen

7. To save the archives,
 - Select "Save to additional storage" option
 - Click "Change path" softkey and provide an additional path to save the archive in "Save file path".
 - Click "OK" softkey to save the archives.



Note

The archives are saved in a default location, `/oem/sinumerik/data/AutoSave/`, if a specific path is not provided.

The default path can only be viewed and changed by the OEM.

The archives are of the extension `.asd`.

A popup message appears after successfully saving the archives in the required path.

Note

If you do not acknowledge the popup message within 10 seconds, the system acknowledges it automatically and the message disappears.

8. Set the "Maximum number of archives" from the drop-down.
For example, if the "Maximum number of archives" value is set to "2", then the subsequent archives overwrite the old files in the mentioned location.
9. Click "OK" softkey to save the schedule.



Whenever you power on the machine, this functionality archives the data automatically.

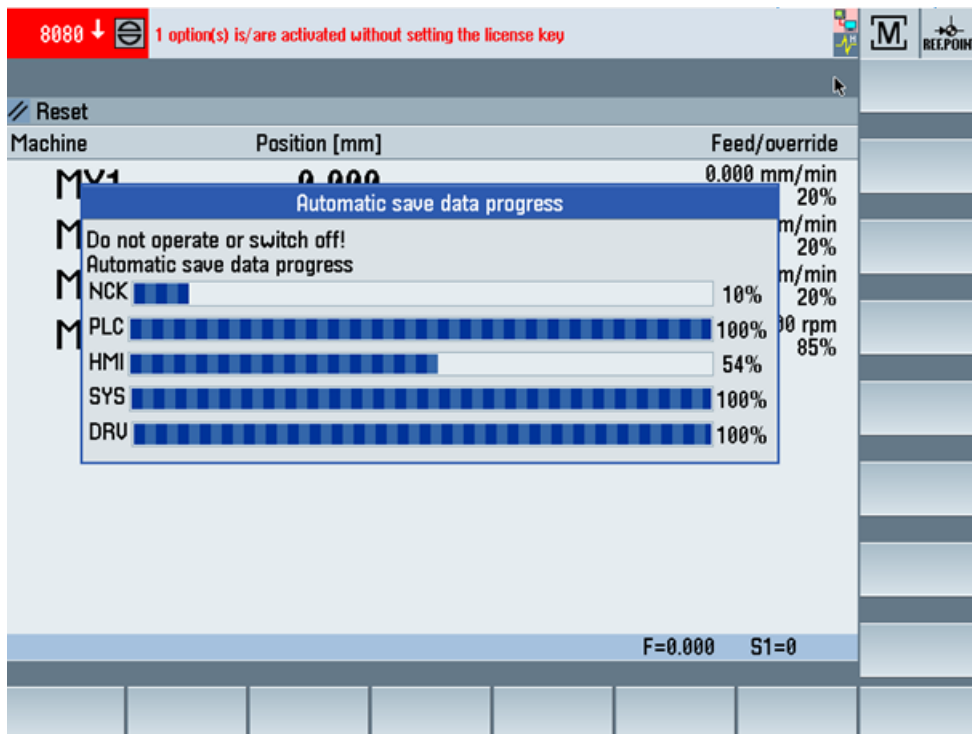


Figure 4-4 Automatic save data archive in progress

Note

Automatic save data has to be enabled in order to archive the data automatically when you power on the machine.

See also

This is how you install a software backup (Page 62)

4.1.3.2 This is how you read the archives

Read the automatic save data archives

Procedure:

1. Power on the machine
2. Select the "Setup" operating area



3. Select the "Setup archive" softkey.



4. On the Setup screen, select "Read in" from the "Automatic save data archive" option
5. Click "OK" to display the saved archives.



A popup window displays the data archive paths.

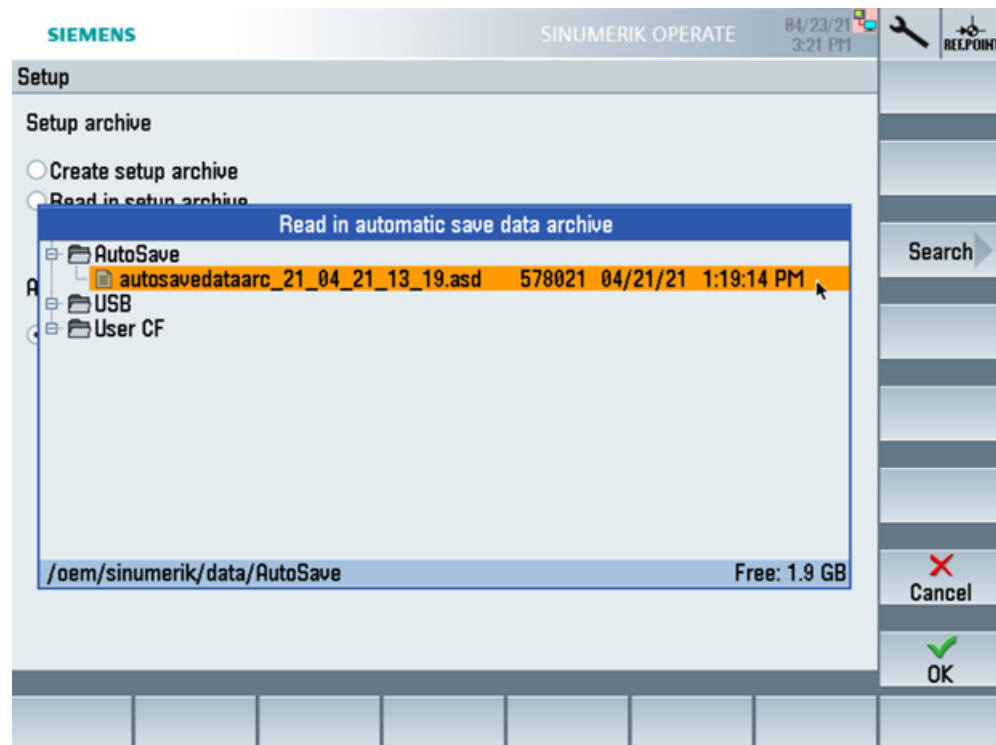


Figure 4-5 Read in automatic save data archive

Note

The archives files are of the extension .asd.

4.1 Backing up user data

6. Select the required archive.
7. Click "OK" to read in the archive.



A popup windows displays the progress bars of the archive

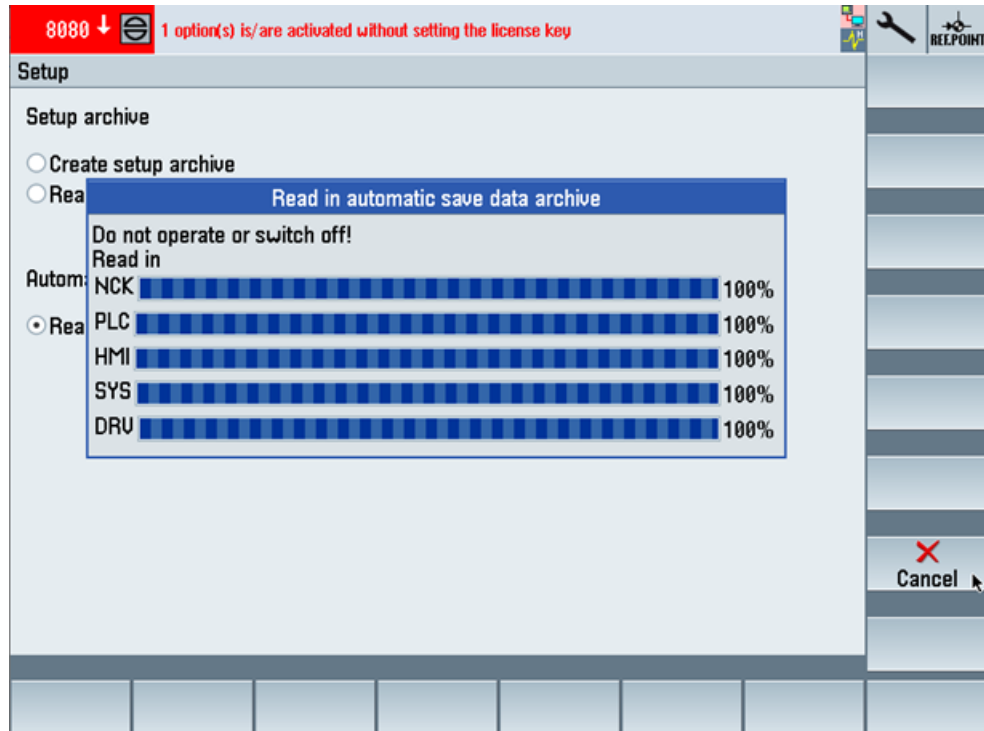


Figure 4-6 Read in automatic save data archive

Once the read in process is complete, a popup window displays the message of successful completion of the process.

Alarms and other conditions

- A message appears on the header 10 minutes before the automatic save data process starts, and it reappears once every two minutes until the process starts.



Figure 4-7 message before the automatic save data archive on the header

- When the automatic save data process is complete, a message is displayed on the screen indicating that the automatic save data process is successfully created. If the automatic save data fails due to another program running on the machine, then the alarm 150413 appears on the header, indicating that the system will reinitiate the automatic save data process after 24 hours.

4.1 Backing up user data

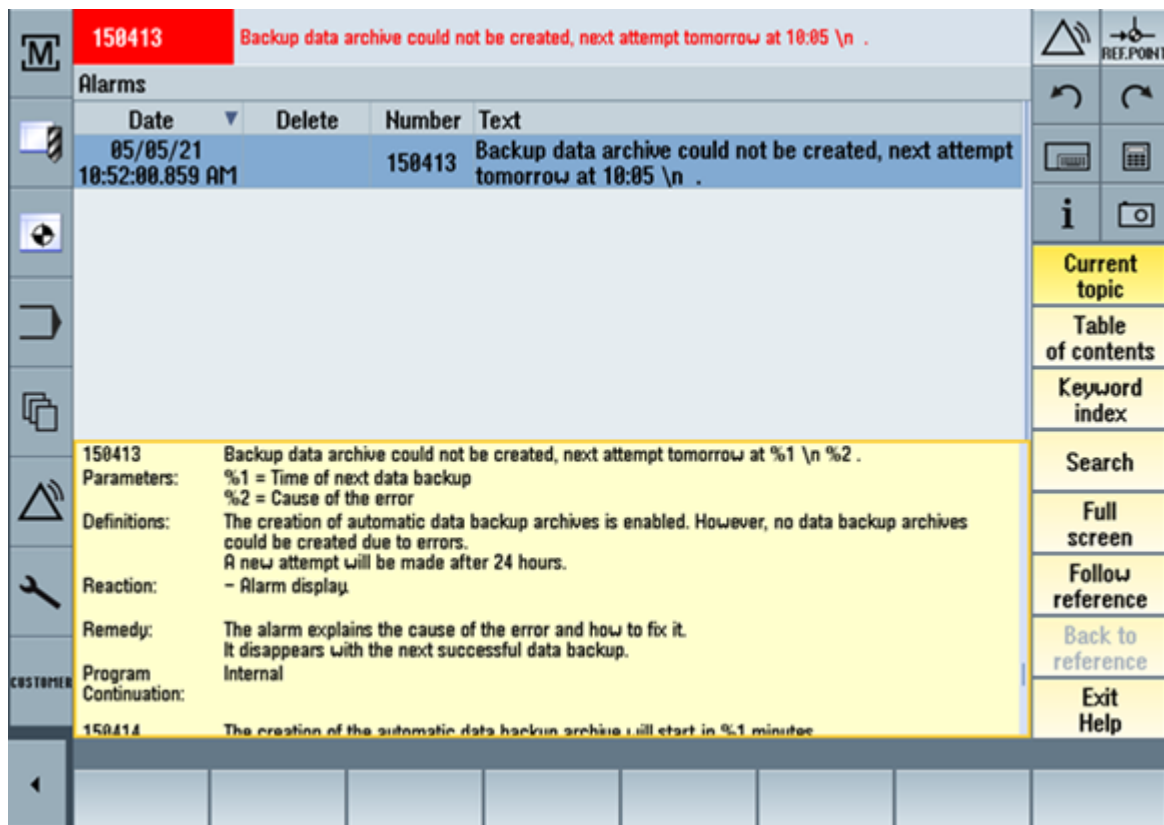


Figure 4-8 Backup data archive could not be created

Note

Ensure that another program is not running on the machine when the automatic save data process is reinitiated after 24 hours.

All channels must be in reset mode.

4.1.3.3 This is how you disable automatic save data archive

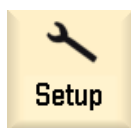
Disable automatic save data archive

Procedure:

1. Power on the machine
2. Select "General MD" softkey, the General machine data window appears.
3. Select the field "\$ENABLE_AUTO_SAVE_DATA_ARCHIVE" and change the value from "1" to "0"
4. Select "Exit"

Perform the following steps to verify the above procedure.

1. Select "Setup" operating area



2. Select "Setup archive" softkey



Now, the "Setup" screen does not display the automatic save data option. Hence this feature is disabled..

4.2 Generating a commissioning archive

Overview

A commissioning archive is used to completely backup all of the data required for the machine function.

Note

Data must always be backed up before a machine is delivered. Only then can it be ensured that in the case of service, the delivery condition of the machine can be restored.

In addition, it may be necessary to generate a commissioning archive before service activities are started. This means that it can be guaranteed that the actual state of the machine can be restored after the activities have been completed.

A commissioning archive can be generated on an external data carrier, e.g. USB flash drive or CompactFlash card at the front panel of the control as well as on the system CompactFlash Card.

Note

Memory size of the data storage medium that can be connected

The memory size of the data storage medium that can be connected is not restricted. It is only important that these are FAT, FAT16 or FAT32 types. Only the first partition is used.

With its own formatting tool, Windows can only format data storage medium up to 32 GB in FAT32. In these cases (> 32 GB), in order to achieve compatibility with SINUMERIK 828D, other tools or operating systems should be used to format data storage medium in the FAT32 file format.

ExFAT and NTFS are not supported.

4.2.1 This is how you generate a setup archive on an external data storage medium

Generating an archive on an external data carrier

Procedure:

1. Select the "Startup" operating area.



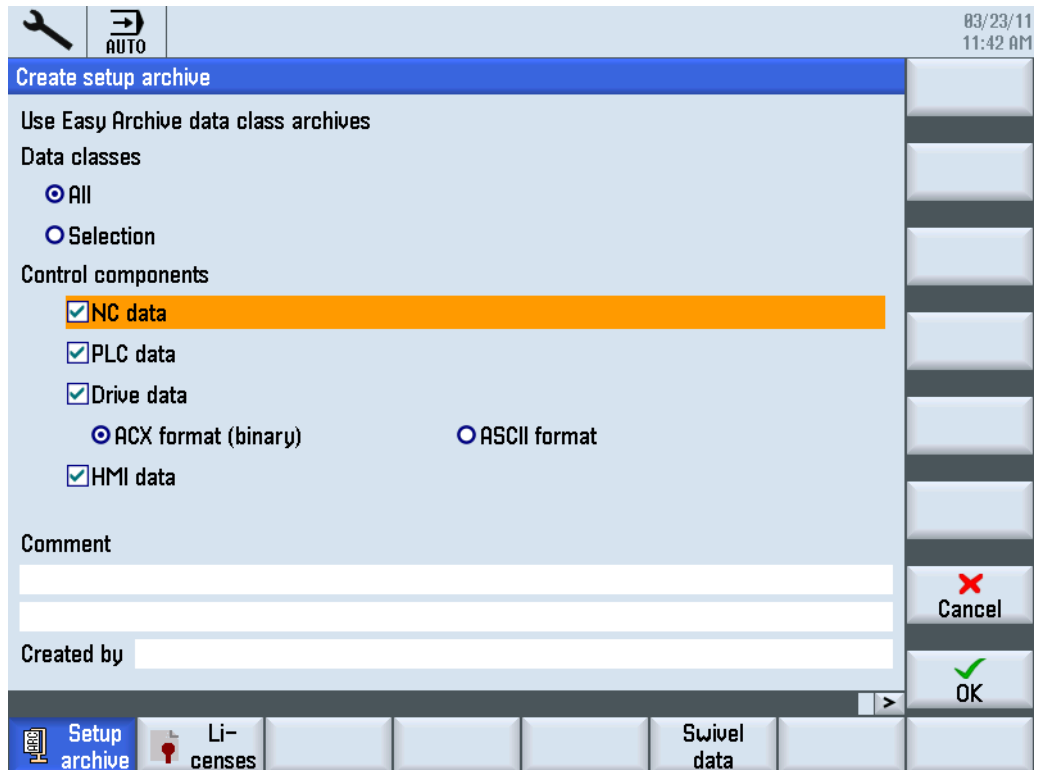
2. Press the menu forward key.



3. Press the "Setup archive" softkey.



4. Activate "Create setup archive".
The "Create setup archive" window opens.



5. Select the desired control components.

Note

Easy Archive

- Select all of the components, unless it is known that individual components do not deviate from the Siemens standard.
- Select all data classes, unless only certain data (e.g. INDIVIDUAL) are to be backed up.

6. Press the "OK" softkey to create the archive.



The "Create Archive: Select Archive" window opens.

7. Select the storage location of the archive:
 - USER USB: USB-FlashDrive in slot X125 at the front
 - User CF: CompactFlash Card in the slot at the front

4.2 Generating a commissioning archive

8. Select a directory.

Example: User CF

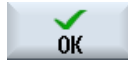
- OR -

9. Press the "New directory" softkey to generate a new directory.



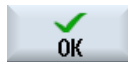
The "New Directory" window opens.

10. Enter the required name and confirm with "OK."



The directory is created subordinate to the selected folder.

11. Press the "OK" softkey.

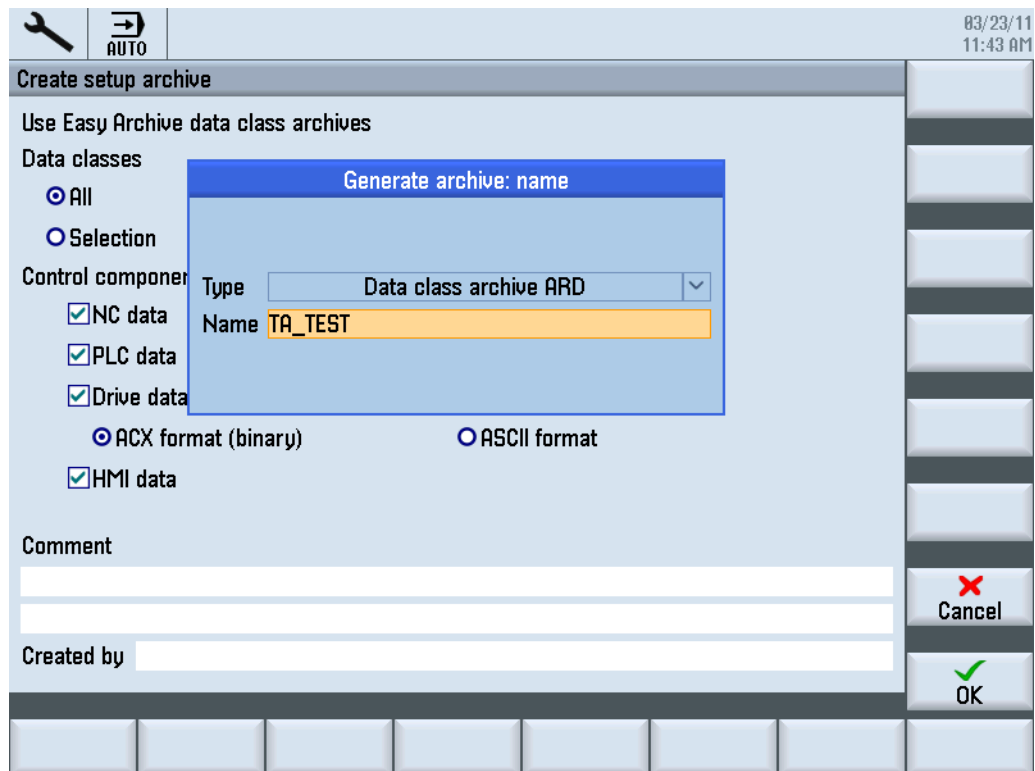


The "Create archive: Name" window opens.

12. Enter the required name and confirm with "OK."



A file with format type *.ard is saved in the selected directory:



4.2.2 This is how you read a setup archive from an external data storage medium

Reading in an archive from an external data carrier

Procedure:

1. Select the "Startup" operating area.



2. Press the menu forward key.



3. Press the "Setup archive" softkey.



4. Press "OK".



The "Startup" window opens.

5. Activate "Read in setup archive".
6. Press "OK".

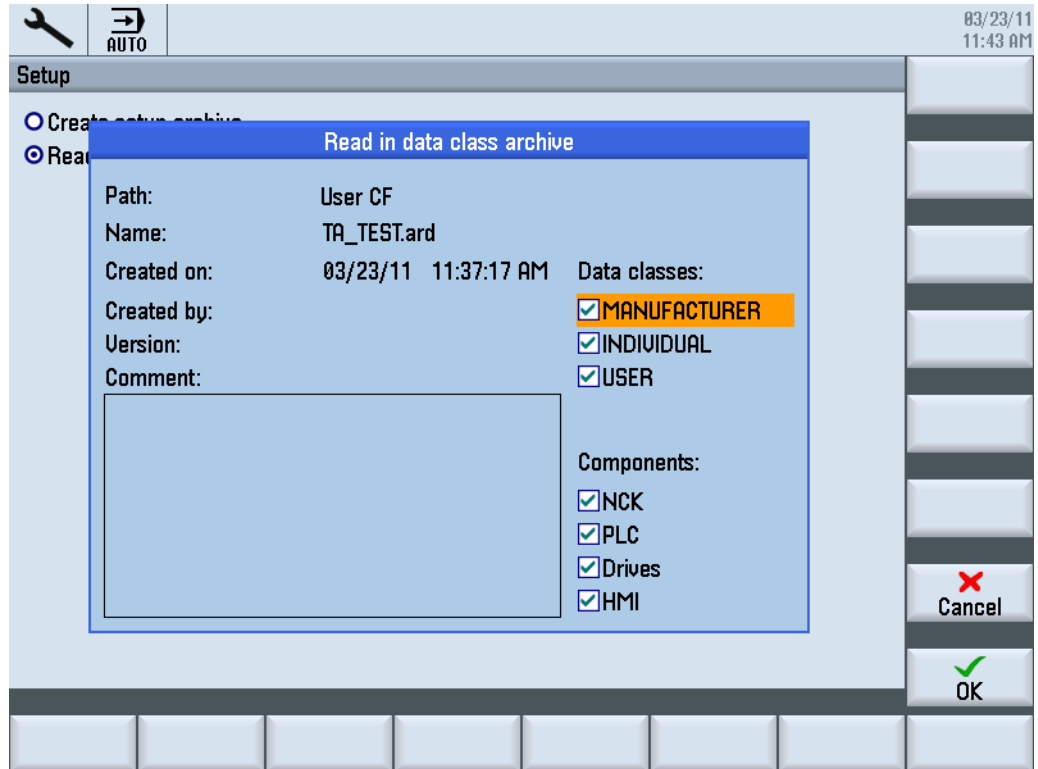


The "Select Setup archive" window opens and the data tree is displayed.

4.2 Generating a commissioning archive

7. Select the required setup archive (ARD).

Example: User CF



8. Press "OK".



A query is displayed, here you can see the most important data of the selected archive to be certain that it is OK.

9. Data is read in when pressing "OK".



10. In the case of errors or problems, import can be terminated by pressing the "Cancel" softkey.



4.2.3 This is how you generate a setup archive on the system CompactFlash card

Generating an archive on the system CompactFlash Card

Procedure:

1. Select the "Startup" operating area.



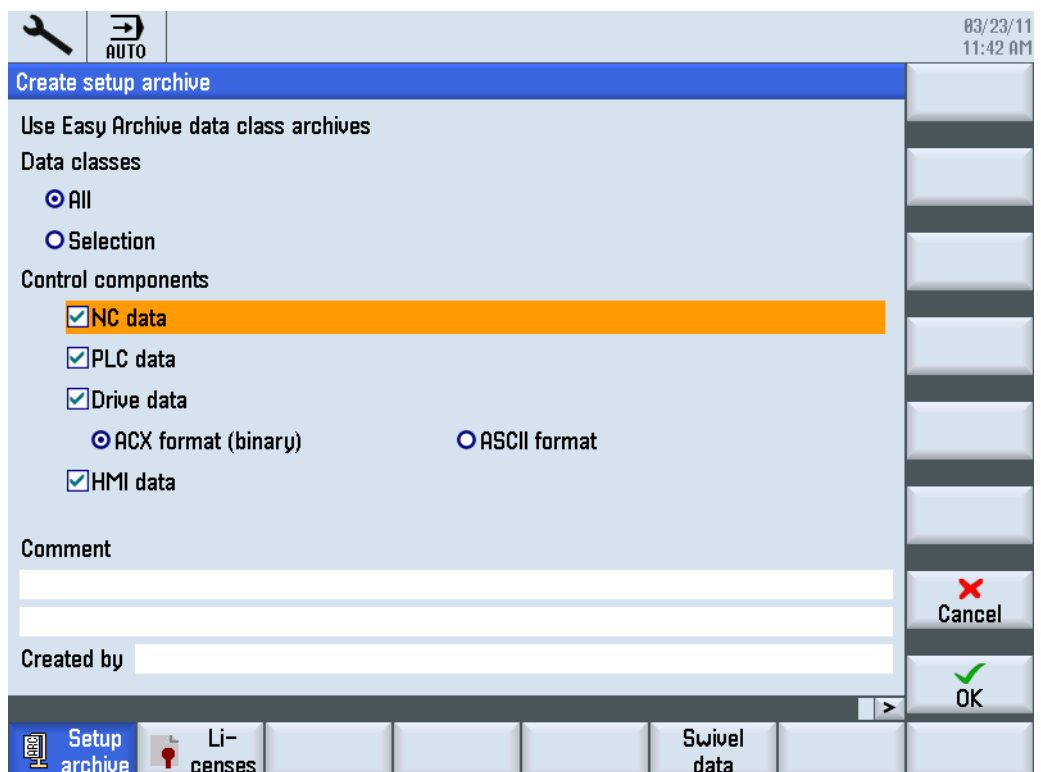
2. Press the menu forward key.



3. Press the "Setup archive" softkey.



4. Activate "Create setup archive".
The "Create setup archive" window opens.



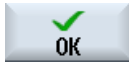
4.2 Generating a commissioning archive

5. Select the desired control components.

Note**Easy Archive**

- Select all of the components, unless it is known that individual components do not deviate from the Siemens standard.
 - Select all data classes, unless only certain data (e.g. INDIVIDUAL) are to be backed up.
-

6. Press the "OK" softkey to create an archive.



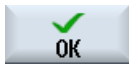
The "Create archive: Select Archive" window opens.

7. Select the storage location of the archive:
"Archives": Internal memory on the CompactFlash Card system
8. Select a directory.
Example: "Archives" → "Manufacturer"
- OR -
9. Press the "New directory" softkey to generate a new directory.



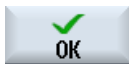
The "New Directory" window opens.

10. Enter the required name and confirm with "OK."



The directory is created subordinate to the selected folder.

11. Press the "OK" softkey.



The "Create archive: Name" window opens.

12. Enter the required name and confirm with "OK."



A file with the ARD format type is saved in the selected directory.

4.2.4 This is how you read in a setup archive from the system CompactFlash card

Reading in an archive from the system CompactFlash Card

A description is provided here how you read in a series setup archive in order to be able to restore the previous state of the machine.

Procedure:

1. Select the "Startup" operating area.



2. Press the menu forward key.



3. Press the "Setup archive" softkey.



4. Press "OK".



The "Create setup archive" window opens.

5. Activate "Read in setup archive".

6. Press "OK".

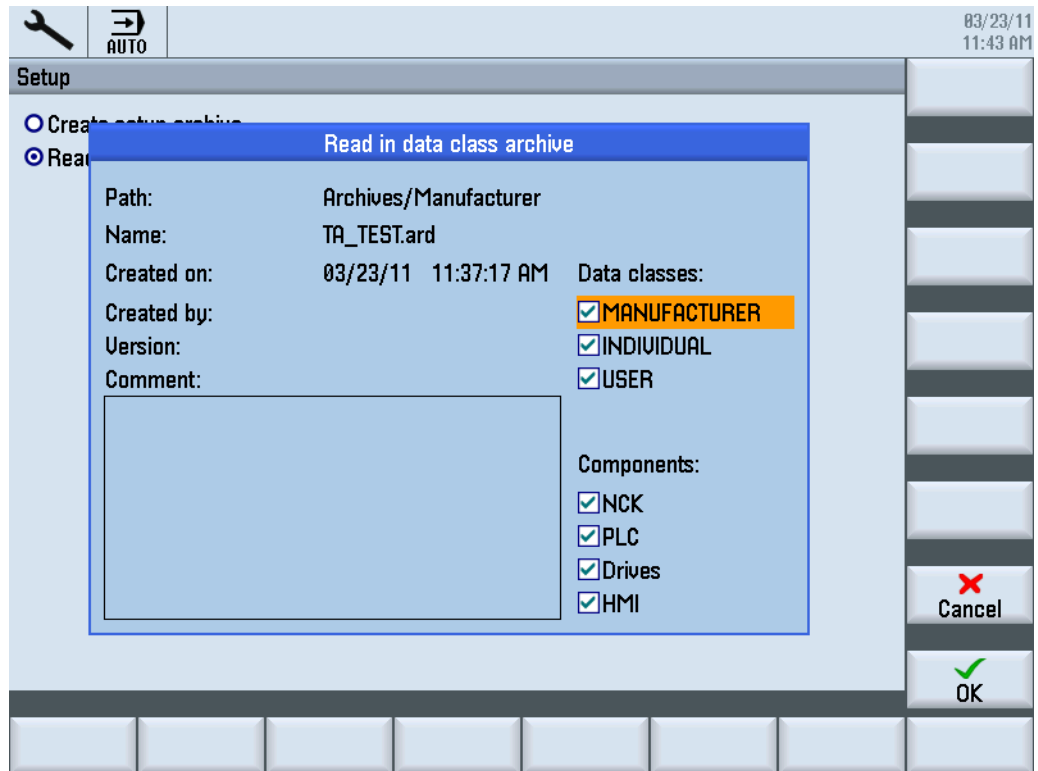


The "Select Setup archive" window opens and the data tree is displayed.

4.2 Generating a commissioning archive

7. Select the required setup archive (ARD).

Example: "Archives" → "Manufacturer"



8. Press "OK".



A window with the data of the selected archive is displayed.

9. Data is read in when pressing "OK".



10. In the case of errors or problems, import can be terminated by pressing the "Cancel" softkey.



4.3 Software backup

4.3.1 This is how you generate a software backup

Overview

With "Create software backup", a function is provided to generate a backup of the system software including all of the user data saved on the system card. This backup represents the "Backup" of the machine.

Note

Memory size: At least 2 GB

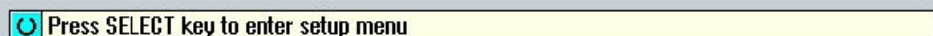
The backup does not contain a license key, in order to guarantee use for series production.

To generate the backup of the system software ("clone"), a storage medium (CompactFlash card or USB flash drive) with a minimum memory size of 2 GB is required. Other data carriers are not permissible.

Generating the system software backup ("clone")

Procedure:

1. Switch the control on.
2. Perform an internal data backup (see also: This is how you backup user data (Page 35)).
A correct, complete backup is only generated using the internal data backup.
3. Switch the control off.
4. Switch-on the control again, as the backup can only be generated when the control boots.
After the control has been switched-on, the following display appears:



Press SELECT key to enter setup menu

4.3 Software backup

1. Press the <SELECT> key, "Normal startup" is the default setting.
2. To call the "Startup menu", press the following keys in succession:



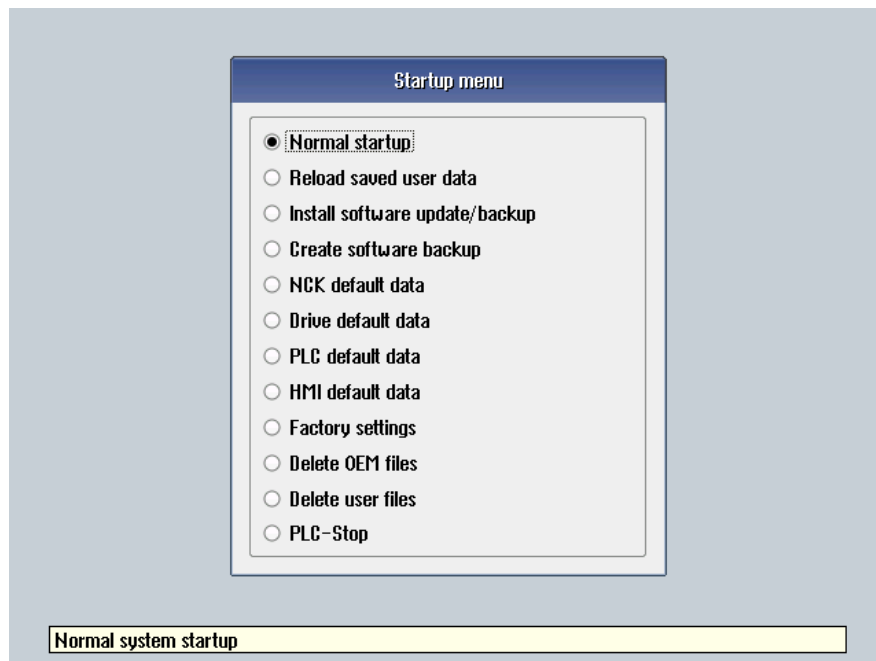
Menu reset key, **HSK2** (horizontal SK2), **VSK2** (vertical SK2)

Note

PPU with touch operation

To call the startup menu when powering up, there is an additional shortcut for all PPU: "8" → "2" → "8"

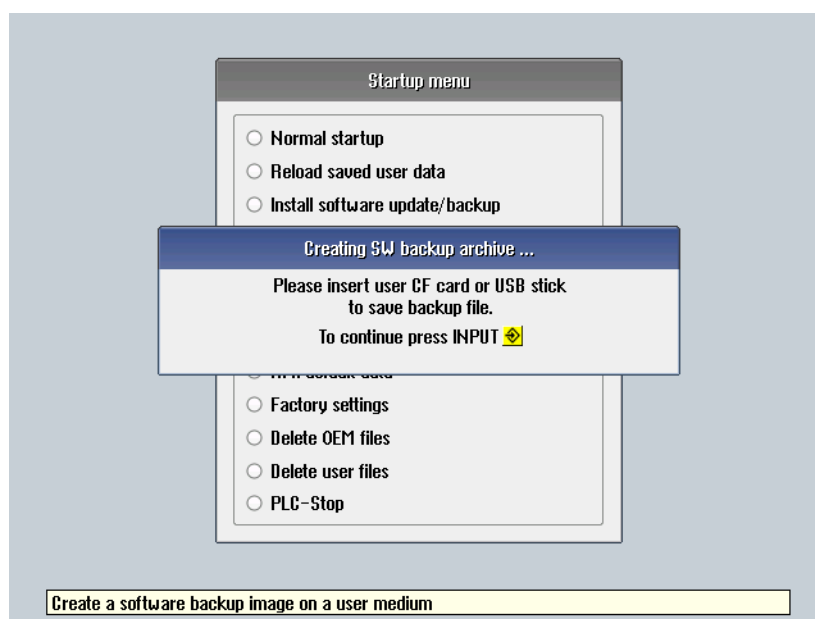
3. The Startup menu is displayed:



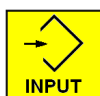
4. Using the cursor keys, select the menu item "Create software backup".
5. Press the <INPUT> key to confirm your selection:



6. Insert a storage medium into the slot on the front panel.

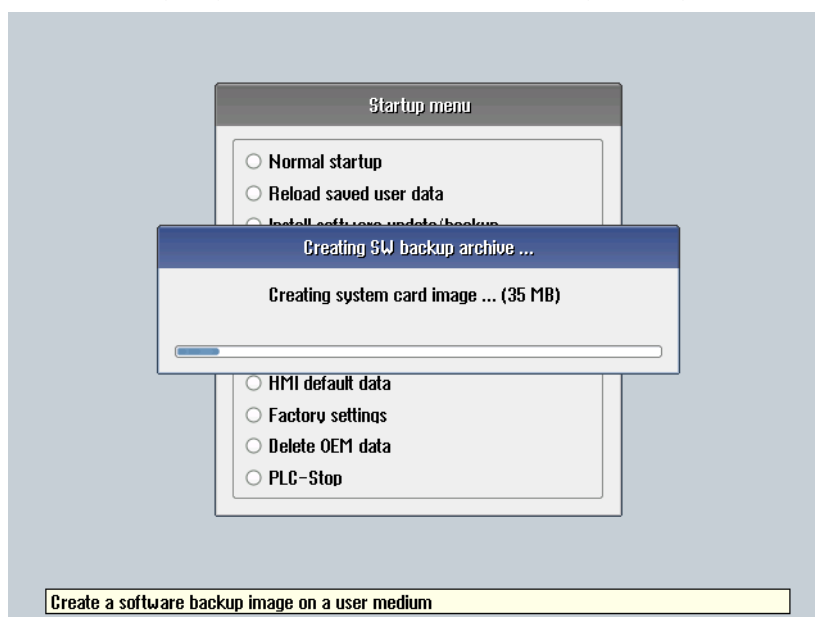


1. Press the <INPUT> key to start the backup.



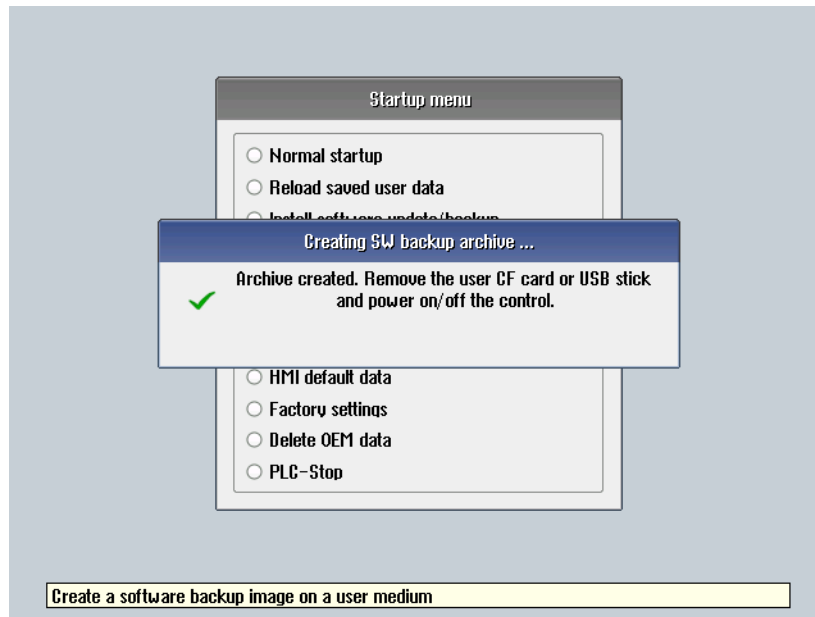
The software first checks whether a backup was already generated on the card and outputs a message. The backup can now be overwritten or the process interrupted by making the appropriate operator action.

2. When starting to generate a backup, the following message is output:



4.3 Software backup

3. Wait until the following message is displayed:



4. Withdraw the storage medium from the slot at the front panel of the control.
5. Switch the control off.
6. Switch the control on.
7. The control boots normally.

Note

Note that when the system software is transferred, no license key for the software of the CNC options is transferred.

4.3.2 This is how you install a software backup

Overview

A backup previously generated is loaded into the control using the function "Install software update/backup". All system and user data are overwritten with the software backup image.

Note

Licenses

The backup does not include a license key, and is not installed with the software update.

As an alternative, the license key for an already licensed card can be obtained through the Internet: see also This is how you display the actual license key (Page 84)

When replacing a defective system CompactFlash Card, the license key must be requested again: see also Licensing after replacing the system CompactFlash Card (Page 78)

Installing the software backup

Procedure:

1. Switch-on the control again, as the backup can only be generated when the control boots. After the control has been switched-on, the following is displayed:

 Press SELECT key to enter setup menu

1. Press the <SELECT> key, "Normal startup" is the default setting.
2. To call the "Startup menu", press the following keys in succession:



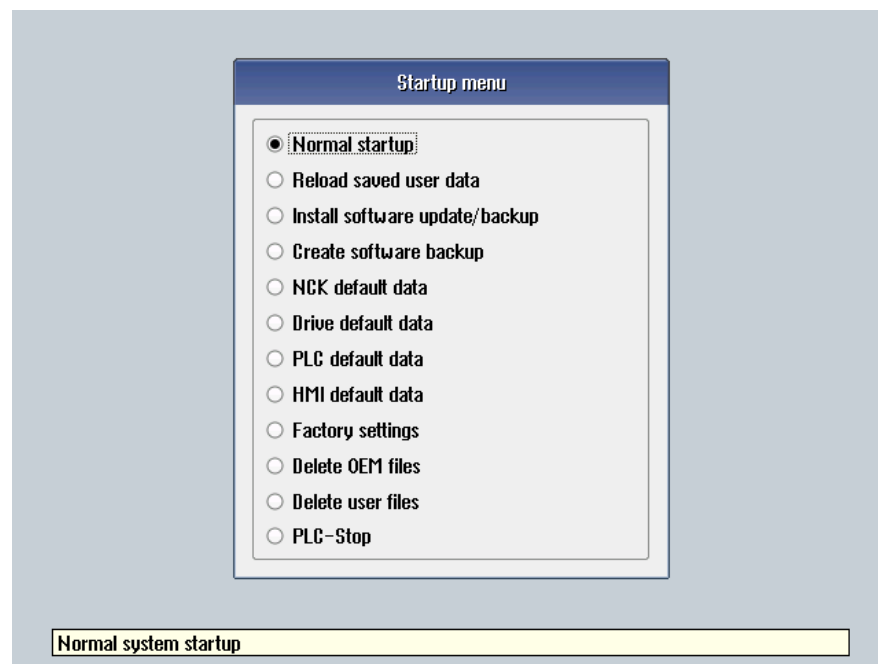
Menu reset key, **HSK2** (horizontal SK2), **VSK2** (vertical SK2)

Note

PPU with touch operation

To call the startup menu when powering up, there is an additional shortcut for all PPU's: "8" → "2" → "8"

3. The Startup menu is displayed:



4.3 Software backup

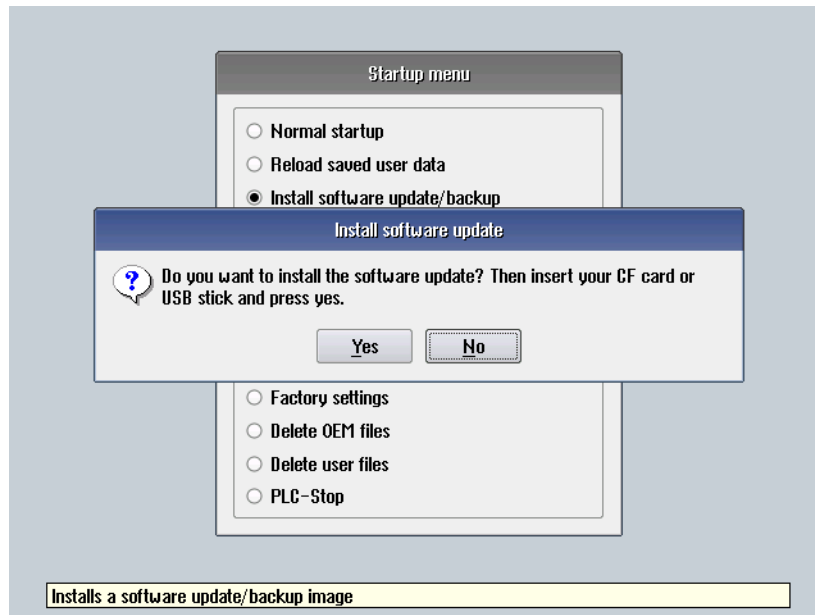
- Using the cursor keys, select the menu item "Install software update/backup".



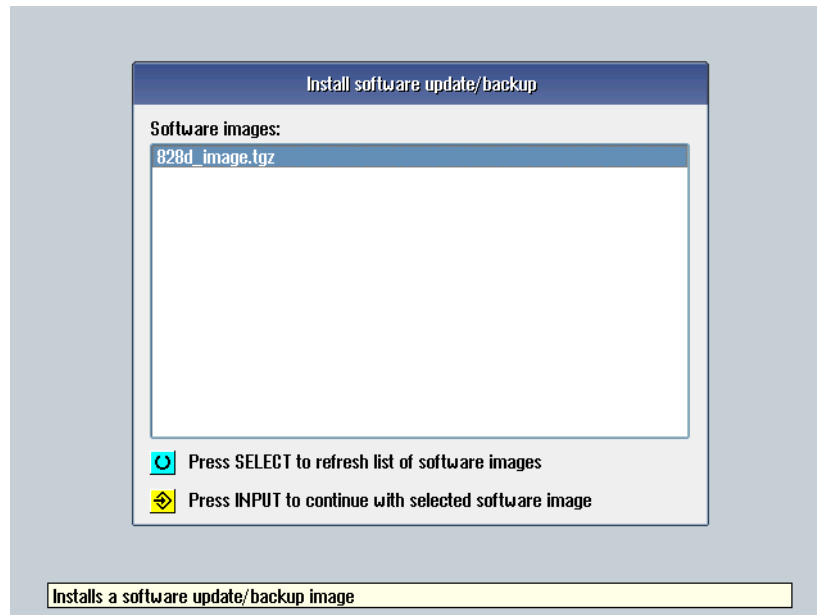
- Press the <INPUT> key to confirm your selection:



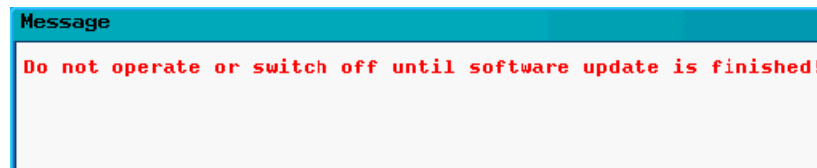
- Insert the storage medium with the backup in the slot and confirm with "Yes" by using the cursor keys to make the selection:



7. Select the valid backup using the cursor keys.



8. Press the <Input> key to confirm your selection.
9. The following message briefly appears: "Starting software update"
Then the screen goes dark for several seconds.
10. If a valid backup has been found, the following message is output:



If a valid backup was not selected, then the upgrade is canceled with the following message:
"Image file is corrupt!"
In this case, switch-off the control, withdraw the data carrier and repeat the procedure by selecting a valid backup image.

11. Wait until the following message appears:



12. Switch the control off.
13. Withdraw the storage medium from the slot at the front panel of the control.

4.3 Software backup

14. Switch the control on.

15. The control boots normally.

Note

If the procedure is interrupted, then it must be restarted.

If the system CompactFlash Card is no longer identified as a bootable CompactFlash Card, then a boot system must be generated on this card. (see also: This is how you create a boot system (Page 72))

In this case, the license key of the system CompactFlash Card should be transferred to the control.

4.4 Updating the software

Data backup

If a system update is necessary, then the system data must be backed up so that no data is lost in the case of a problem.

In this case, we recommend to perform two types of data backup.

1. Generate an image of the system CompactFlash Card ("clone", see also: This is how you generate a software backup (Page 59)).
A backup is generated just in case an error occurs during the update. This means that it is then possible to restore the "old system".
2. Generate an archive for series startup (see This is how you generate a setup archive on an external data storage medium (Page 50)), in order to restore the machine-specific data.
The control is booted using a *.tgz file on the storage medium (CompactFlash Card or USB-FlashDrive) in the slot at the front panel of the control.

Note

Backup and archive the data of the control system to an external data carrier before booting. Observe the information in the update instructions.

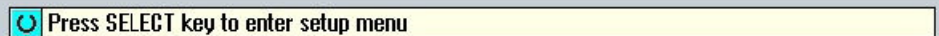
Updating the control

Preconditions:

- The control system is switched off.
- The image for the update is saved on the CompactFlash card.
- The CompactFlash card is inserted in the slot on the front panel of the control.

Procedure:

1. Switch-on the control again, as the image can only be generated when booting. After the control has been switched-on, the following display appears:



Press SELECT key to enter setup menu

4.4 Updating the software

1. Press the <SELECT> key, "Normal startup" is the default setting.
2. To call the "Startup menu", press the following keys in succession:



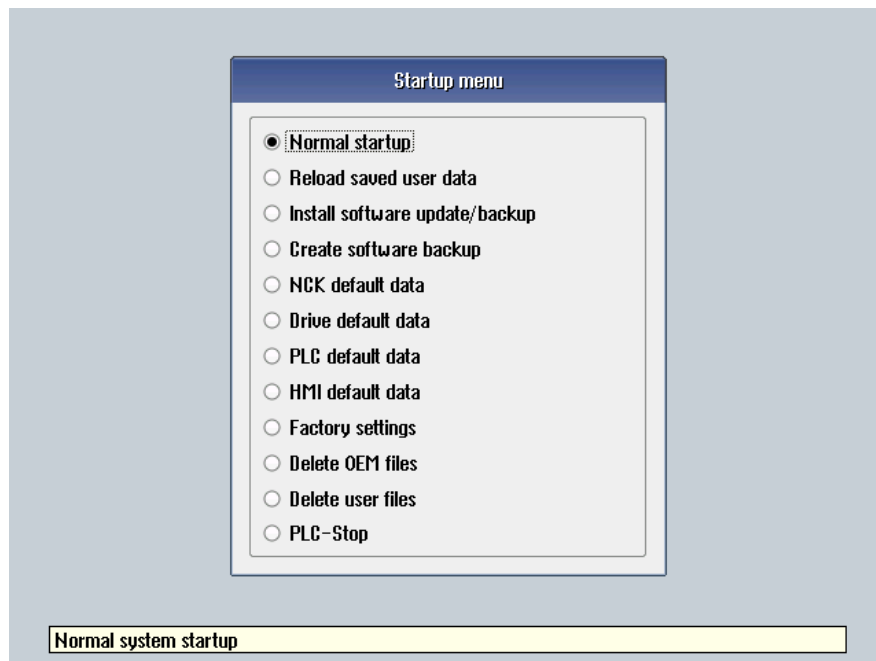
Menu reset key, **HSK2** (horizontal SK2), **VSK2** (vertical SK2)

Note

PPU with touch operation

To call the startup menu when powering up, there is an additional shortcut for all PPUs: "8" → "2" → "8"

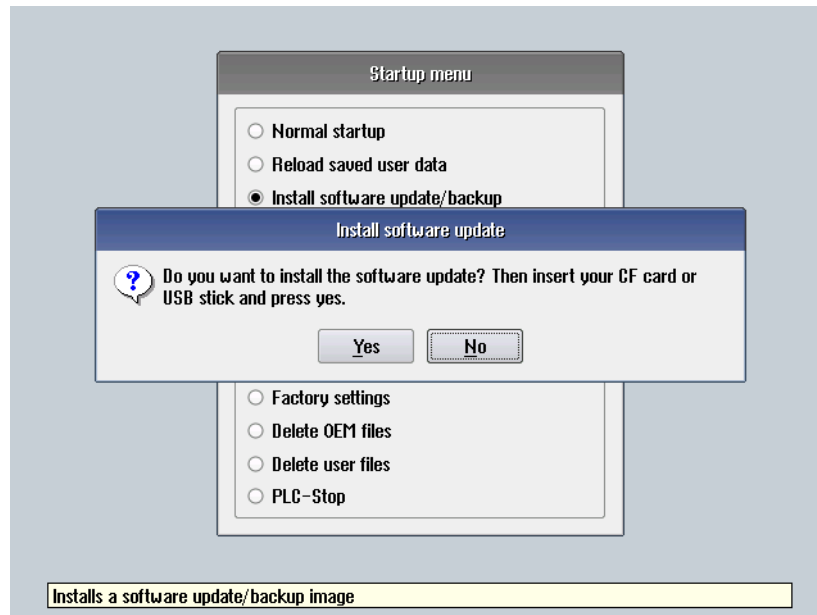
3. The Startup menu is displayed:



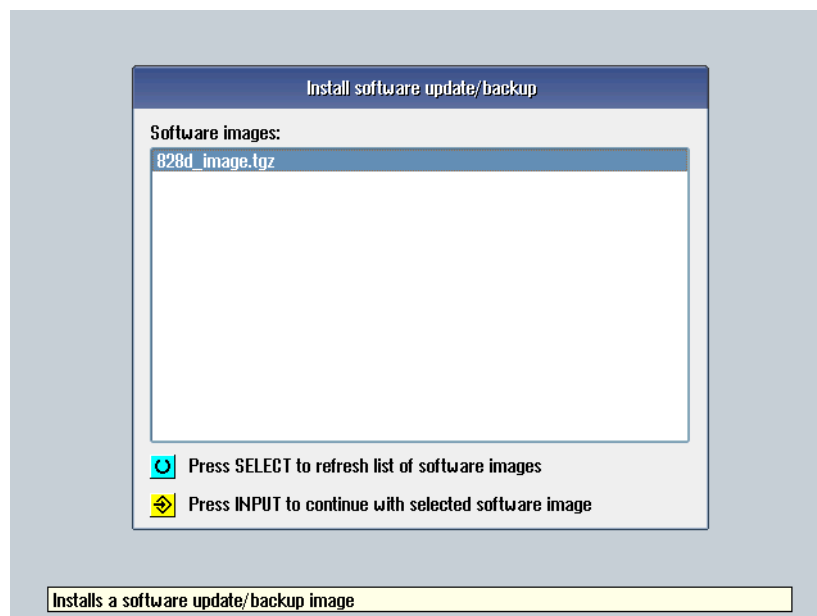
4. Using the cursor keys, select the menu item "Install software update/backup".
5. Press the <INPUT> key to confirm your selection.



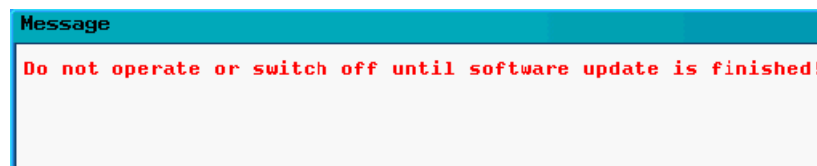
6. Use the cursor keys to select "Yes".



7. Select the update image (*.tgz) on the storage medium and confirm with <INPUT>.

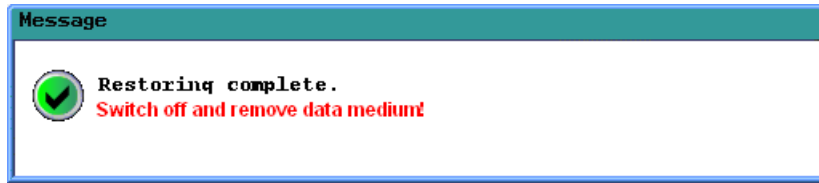


8. The software update is started: The following message appears while the update is running:



4.4 Updating the software

9. Wait until the following message is output:



10. Withdraw the storage medium from the slot.
11. Switch the control off.
12. Switch the control on.
13. The control boots normally.

Note

If the update is interrupted, then it must be restarted.

If the system CompactFlash Card is no longer identified as bootable system, then a boot system must be generated on this card (see also: This is how you create a boot system (Page 72)).

In this case, the license key of the system CompactFlash Card should be transferred to the control.

4.4.1 This is how you use the AutoUpdate feature

AutoUpdate

As opposed to the manual update, the control system software can be updated automatically.

Note

The AutoUpdate feature is possible only on PPU 2XX.4

Procedure:

1. Copy the "SINUMERIK828_AutoUpdate_All.usz" file on a blank user data medium.

Note

User data medium can either be a CompactFlash Card or a USB-stick.

2. Insert the user data medium into the control and switch it on.
The PPU screen displays that a backup of the system CompactFlash Card and an archive of the current configuration of the system will be created.

Note

Do not switch off the control or remove the user data medium during backup.

3. Once the backup and the setup archive process is complete, the CNC software screen displays that the CNC-software update has started .

Note

Do not switch off the control or remove the user data medium when the CNC-software update is running on the system.

4. The PPU is rebooted automatically.

Note

Do not remove the user data medium when the PPU is rebooting.

5. Now, the screen displays that the read-in of the archive on the user data medium has started.

Note

Do not switch off the control or remove the user data medium during read in.

6. A popup screen "Create MyConfig Shield" appears with the following message, "Package execution has been completed. Please remove the USB medium if necessary".
7. Click "OK" and remove the user data medium and switch off the control.
8. You now have the new software update on the control. All the commissioning data from the old software version is restored.

Restore the previous software version

To restore the previous version of the software perform the following steps:

1. Insert the user data medium again into the control and switch it on.
2. Now, select the option to restore previous version of the software.

Note

The user data medium now contains the original software and the updated software version.

3. Select the previous version and follow the instructions to install the software.

4.5 Generating a boot system on the CompactFlash card

Application

If the system CompactFlash Card hardware is defective, then it must be replaced. The replacement card is an empty CompactFlash Card without any system software and without any user software and cannot be used as system CompactFlash Card as it is without any additional preparation.

Mini boot system image

"Configuration data" is supplied on the toolbox CD of the SINUMERIK 828D, which in the scope of delivery includes a boot system image:

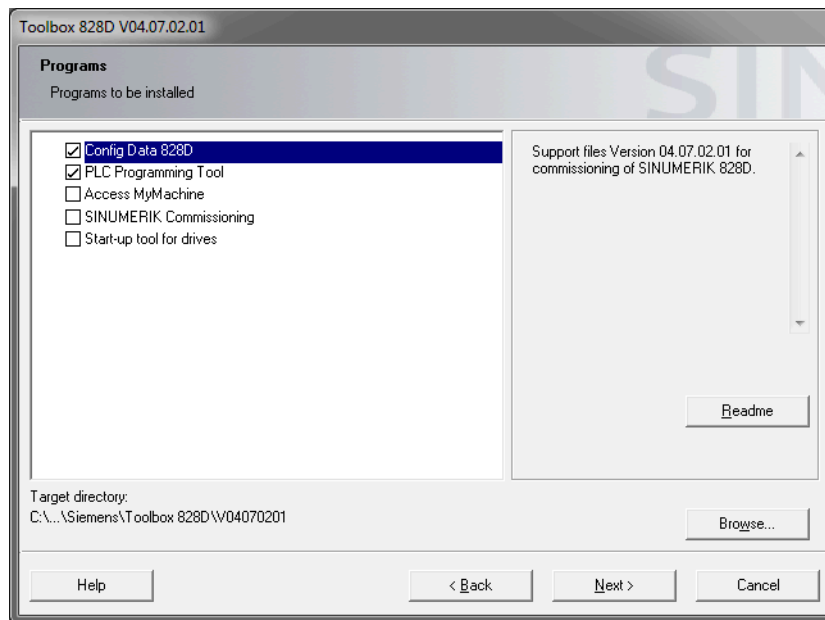


Figure 4-9 Toolbox selection

This program must be installed in order that the image of the boot system is installed on the PC/PG.

4.5.1 This is how you create a boot system

Precondition

The default path to install the boot system is:

C:\Program Files (x86)\Siemens\Toolbox 828D\V04070xx00\RecoverySys

The file name of the boot system is: minsys.img

With SINUMERIK Integrate Access MyMachine /P2P, the minsys.img file is copied to an empty replacement card.

Precondition to write:

- SINUMERIK Integrate Access MyMachine /P2P is installed.
- SW package: Configuration data from the Toolbox has been installed.
- CompactFlash card is a replacement card.

Installing the boot system on an empty card

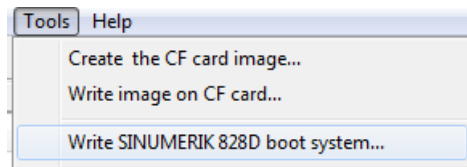
Procedure:

1. Insert the CompactFlash Card into the card reader.
2. Start the program via "Start" → "Programs" → "SINUMERIK" → "Tools" → "Access MyMachine P2P".
3. Press "Cancel" if you are prompted to establish the connection.

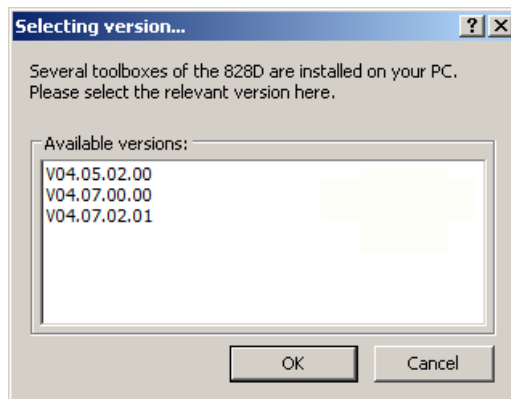
Note

An online connection to the control is not required to generate the boot system.

4. In the ""Options" menu, select the menu item "Write SINUMERIK 828D boot system...":

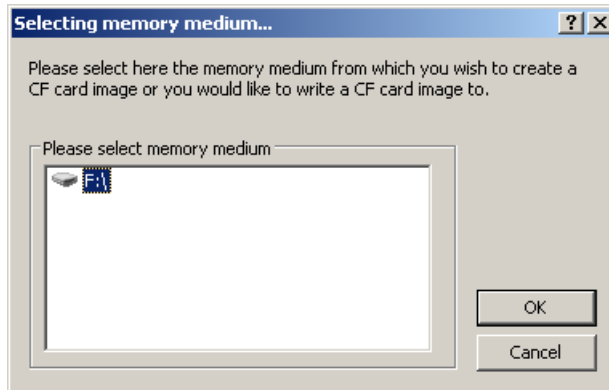


5. If several versions of the toolbox are installed on the PC, you obtain the following selection:

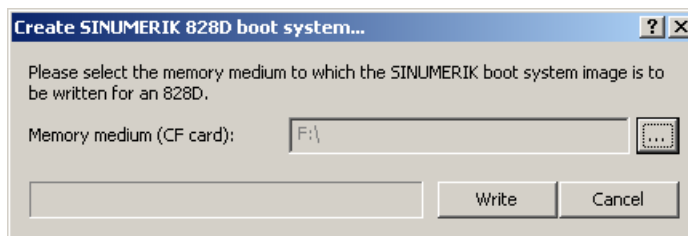


4.5 Generating a boot system on the CompactFlash card

6. All of the identified interchangeable drives are displayed, here in the example, the CompactFlash Card is identified as drive F:\.

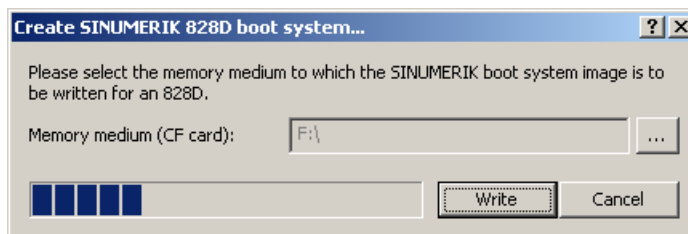


7. Confirm the selection of the target drive with "OK". By pressing the "Write" button, the image is transferred to the target drive.

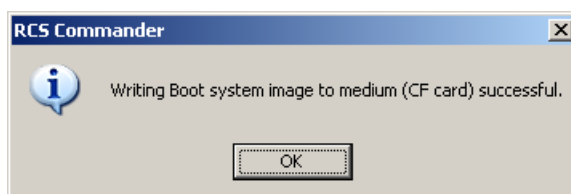
**Note**

While the data is being transferred, do not switch-off the PC and do not remove the CompactFlash Card.

Data transfer is displayed using a progress bar:



8. The following message is output if data transfer was successfully completed:



9. In order to ensure that there are no read and write access operations to the CompactFlash Card, when you remove the CompactFlash Card from the interchangeable drive, select the Windows function "Safely remove hardware".

4.5.2 This is how you install a software backup using the boot system

Overview

If a CompactFlash Card with a boot system is used as system CompactFlash Card, the system software or a previously generated software backup must still be transferred.

Note

Licenses

The boot system does not contain a license key; a valid license key must be transferred to the control. When replacing a system CompactFlash Card, this must be requested again (see also: This is how you license a CNC option (Page 78)).

All system data and user data are overwritten with the system image.

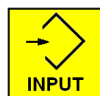
Updating the software

After you have inserted the CompactFlash Card with the boot system as new system CompactFlash card (see Replacing the system CompactFlash Card (Page 104)) proceed as follows:

1. Switch the control on. When booting, the following display appears:

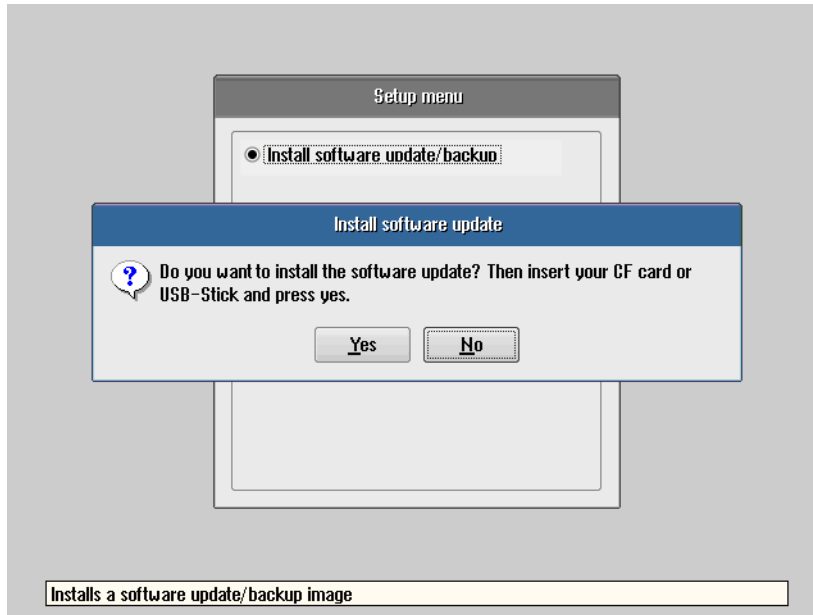


2. Press the <INPUT> key to confirm your selection.

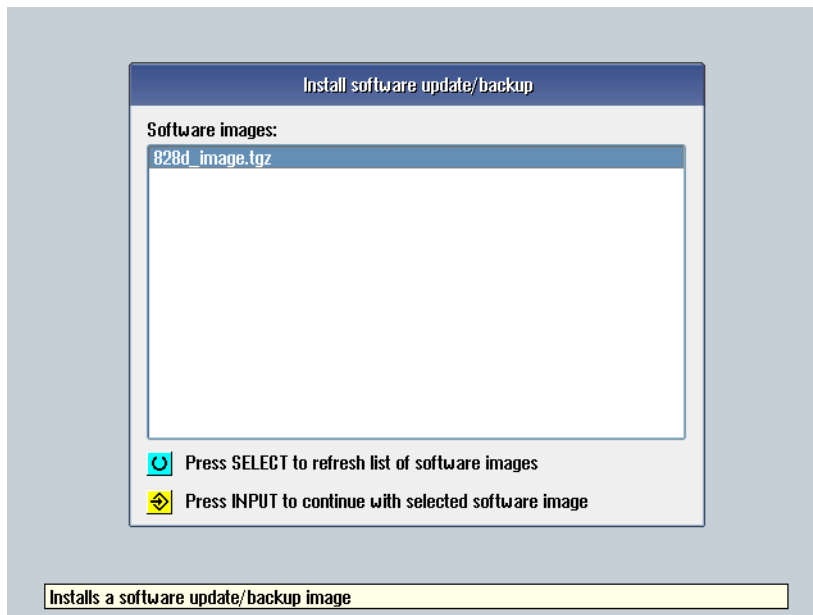


4.5 Generating a boot system on the CompactFlash card

3. Confirm the question with "Yes".



4. Insert the CompactFlash Card or a USB-FlashDrive with the image into the slot on the front panel of the control.

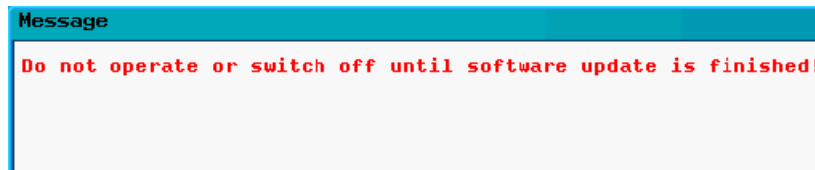


5. Confirm the selection with the <INPUT> key.



6. The following message briefly appears: "Starting software update" Then the screen goes dark for several seconds.

7. If a valid image has been found, the following message is output:



8. Wait until the following message is displayed:



9. Switch the control off.
10. Switch the control system back on again: The control boots normally.

Note

If the system was booted using a boot system, there is no valid license key on the system CompactFlash Card. This must be transferred again.

Result

The following cases are possible:

- The control boots and is ready for operation if, when generating the system image, the internal data backup and also a startup (commissioning) file were generated.
- If a valid image is not found, the update is interrupted with the following message:
Image file is corrupt!
In this case, switch-off the control, withdraw the data carrier and carry out the procedure again by selecting a valid file.

4.6 Licensing

4.6.1 Licensing after replacing the system CompactFlash Card

Application

The license key of the SINUMERIK 828D is linked with the system CompactFlash Card. If the system CompactFlash Card is replaced for a SINUMERIK 828D, the license key loses its validity and the system is only ready with some significant restrictions.

This situation can occur for a defective hardware of the system CompactFlash Card.

For more information see FAQ: "SINUMERIK 828: Replacing a defective system CompactFlash card": (<https://support.industry.siemens.com/cs/ww/en/view/109481359>) Order an empty SIEMENS replacement CF card (2GB): 6FC5315-5AG00-0AA2.

Validity of the license key

The following data is required in order to obtain a valid license key after replacing the system CompactFlash Card: **the serial number of the defective and the new CompactFlash card.**

Note

- Only empty CompactFlash cards that have been released as replacement part can be used. Only these CompactFlash cards are known in the licensing database.
 - When you change a CompactFlash card from one PPU to another PPU, the second PPU must be factory reset, for the hardware information to be updated.
-

In order to obtain a valid license key for the new, empty CompactFlash Card, contact the SINUMERIK Hotline specifying the serial numbers of the two CompactFlash cards. The hotline will immediately provide you with a new license key.

4.6.2 This is how you license a CNC option

Precondition

You require at least one authorization to set or reset a CNC option:

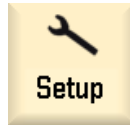
Access level 1 (password: Manufacturer).

Licensing CNC options

If an additional CNC option is to be activated at a SINUMERIK 828D, then this CNC option must be licensed at the machine and is only valid for this CompactFlash Card.

Proceed as follows to access the "licenses" dialog box:

1. Select the "Startup" operating area.



2. Press the menu forward key.



3. Press the "Licenses" softkey.



The "Licensing" window opens. Using the vertical softkeys, you can execute the following actions:

- Display a serial number: "Overview"
- "Display all options"
- Display "Missing licenses"
- "Exp. license requirement"
- "Read in the license key"

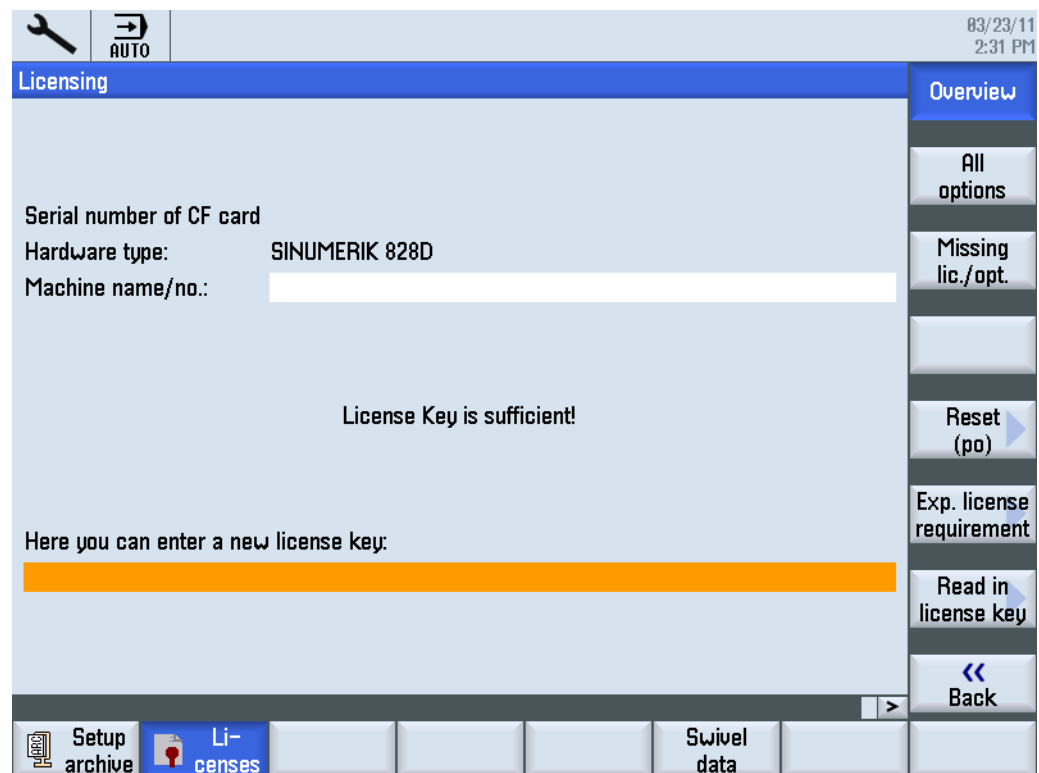


Figure 4-10 Licensing

4.6 Licensing

Web License Manager

Licenses that are purchased are assigned via the Internet.

By using the Web License Manager, you can assign licenses to hardware in a standard Web browser. To conclude the assignment, the license key must be entered at the control via the user interface.

See also

The license database administered by Siemens can only be accessed using the Web License Manager (<http://www.siemens.com/automation/license>).

Note

The NC start function is suppressed if a CNC option, for which no valid license key has been entered, is additionally activated. This means that the machine can only operate on a severely restricted basis if an attempt is made to use an unlicensed CNC option.

4.6.3 This is how you determine missing licenses/options

Determining the license requirement

Procedure:

1. Press the "All options" softkey to list all the options that can be selected for this control.
2. Activate or deactivate the required options in the "Set" column:
 - Mark the checkbox
 - Enter the number of options

- Press the "Missing lic./opt." softkey in order to display all options that are licensed. In the "Set" column, you can deselect the options that you do not require.

Option	Set	Licensed
Additional 1 axis/spindle 6FC5800-0AC20-0YB0	2	2
Additional 1 positioning axis/auxiliary spindle 6FC5800-0AC30-0YB0	0	0
drive based SI-axis/spindle add. 1 axis/spindle 6FC5800-0AC50-0YB0	0	0
Travel to a fixed stop with force control 6FC5800-0AM01-0YB0	☐	☒
Contour handwheel 6FC5800-0AM08-0YB0	☐	☒
TRANSMIT and peripheral surface transformation 6FC5800-0AM27-0YB0	☒	☒
Bidirectional compensation 6FC5800-0AM54-0YB0	☒	☒
Sag compensation, multi-dimensional 6FC5800-0AM55-0YB0	☐	☒
Generic Coupling 'CP-STATIC' 6FC5800-0AM75-0YB0	☐	☐
Replacement tools for tool management 6FC5800-0AM78-0YB0	☒	☒
Network drive management	☐	☐

Figure 4-11 Licensing (example)

- Press the softkey "Set option according to license", to activate all of the options contained in the license key. Confirm the following confirmation prompt with "OK".
- To activate new selected options, press the "Reset (po)" softkey. A safety prompt appears.
 - Press the "OK" softkey to trigger a warm restart.
- OR -
 - Press the "Cancel" softkey to cancel the process.

4.6.4 This is how you generated a new license key

Assigning the license to hardware

In order to simplify licensing for the technician, licenses are assigned to the hardware in a Standard Web Browser using the Web License Manager .

To conclude the assignment, the license key must be entered manually on the control via the user interface.

As a consequence, a valid license key can be generated at any time worldwide for options that have been additionally purchased.

Preconditions

The following preconditions must be met in order to assign a license to a piece of hardware via direct access and user interface:

- Hardware serial number
- A PC/PG with Internet connection and browser is available.
- The login data for direct access (e.g. per CoL (Certificate of License)) is available:
 - License number
 - Delivery note number

Note

Hardware serial number

Ensure that the serial number of the hardware displayed is the one you want to make the assignment for. The assignment of a license to a piece of hardware cannot be reversed via the Web License Manager .

Generating a license key

Procedure:

1. Select the "Start-up" operating area.



2. Press the menu forward key.



3. Press the "Licenses" softkey.

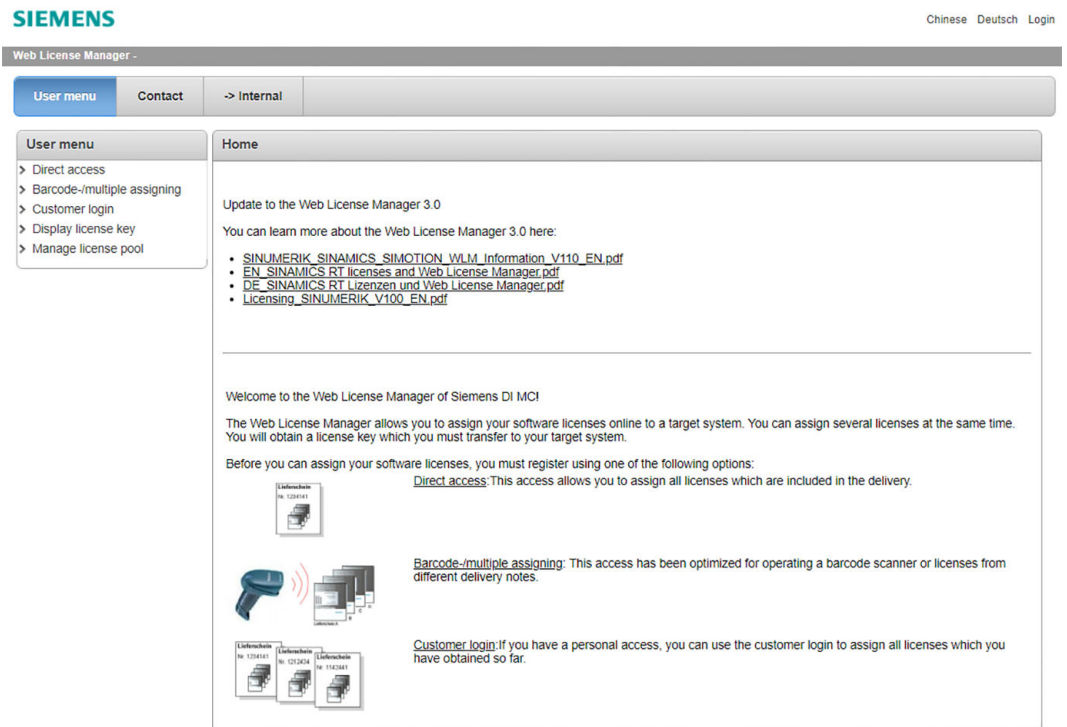


4. Press the "Overview" softkey and note down the serial number of the system CompactFlash Card.



5. At your PG/PC, establish a connection to the Web License Manager (<http://www.siemens.com/automation/license>)

- Log on via "Direct access".
Follow additional instructions in the Web License Manager:



- After completing the assignment process, enter the license key displayed in the Web License Manager into the "Licensing" dialog box in SINUMERIK Operate.

Note

License key via e-mail

If you have an e-mail address, you have the option (checkbox) of receiving the license key by e-mail.

Entering the license key

The newly purchased license key is entered into the control.

Procedure:

- Select the "Start-up" operating area.



- Press the menu forward key.



4.6 Licensing

3. Press the "Licenses" softkey.

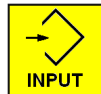


4. Press the "Overview" softkey.



If you receive the license key via the Web License Manager, enter the license key manually in the field "You can enter a new license key here".

5. Press the <INPUT> key.



If the license key is valid, the message "License key set" is displayed.

4.6.5 This is how you display the actual license key

Overview

The following options are available to display the actual license of the control:

- Directly at the SINUMERIK control
- Without control, in the Internet
You require the serial number of the system CompactFlash Card in order to display the actual key in the Internet. This is displayed at the control in the "Licenses" dialog box - or can be read from the system CompactFlash Card.

Displaying the actual license key at the control

Proceed as follows to display the license key at the control:

1. Select the "Start-up" operating area.



2. Press the menu forward key.



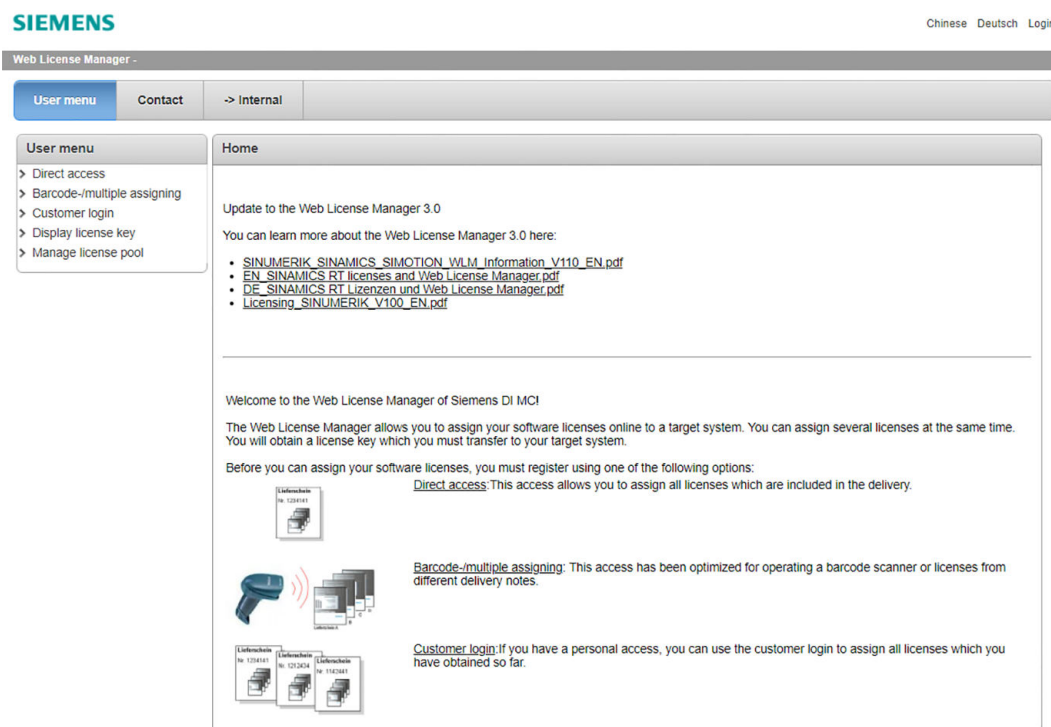
3. Press the "Licenses" softkey to display the control licenses.



Displaying the actual license key in the Internet

In order to view the actual license key of the control, using the serial number, it is possible display the license key via the Internet. The serial number is on the system CompactFlash Card - or can be displayed at the control as described above.

1. Go to the Internet page of the Web License Manager:



2. Press the menu item "Display license key".

3. A window with the license key opens:

Show License Key

Pressing the button will show you the current License Key. At least one license must have been assigned yet.

Please enter a search string!

Please select

Get License Key



4.6 Licensing

- In the menu, select "Hardware serial number" and enter the serial number of the system CompactFlash Card.

Show License Key

Pressing the button will show you the current License Key. At least one license must have been assigned yet.

Please enter a search string!

Please select

20060613009E2DC6

Get License Key

up

- Press the "Display license key" softkey.
- The actual license key is displayed as follows:

Show License Key

Pressing the button will show you the current License Key. At least one license must have been assigned yet.

Hardware serial number

20060613009E2DC6

Get License Key

Current License Key **VT5X-SATL-AF**

Additionally you can get a License Report by email summarizing all assigned licenses.

Email address

Request for License Report

The license key can be saved in a file:

[Save license key as textfile \(for usage with the SINUMERIK-Controller\)](#)

(Note: The "Save as..." - Dialog is shown after doing a right click on the above hyperlinks)

up

4.7 Machine registration

Overview

The machine registration contains:

- Notification of the startup date (e.g. start of production)
- Notification of where the machine is located (final destination)
- Notification regarding the Siemens components and software versions installed
- Name of the machine OEM, the machine type and the machine number

This is how you register a machine:

- Create a machine logbook
- Create a new entry in the logbook
- Save the machine identity
- Send the machine identity

On-site service (OSS)

SINUMERIK 828D and the associated drive, motor and accessories from Siemens include an on-site service (local service) for 24 months. The on-site service time is extended to 36 months by registering the machine.

You can obtain additional information about the on-site service here SIOS_OSS (www.siemens.com/automation/oss).

Precondition

To change the end user final destination data, the following access rights must be available:

- Softkey "Manufacturer" : Access level 1 (password: Manufacturer)
- Softkey "Dealer" : Access level 2 (password: Service)
- Softkey "End user": Access level 3 (password: User)

4.7.1 This is how you generate the machine logbook

Machine data

The following data are saved in the control in the "Machine logbook":

- Contact data of the manufacturer (OEM)
- Contact data of the dealer (if available)
- Contact data of the end customer
- Log of the service and diagnostic procedures that have already been carried out.

During a service call, the data should be checked as to whether it is correct.

Open the "Machine identity" dialog box

Procedure:

1. Select the "Diagnostics" operating area using the following key:



2. Press the "Version" softkey to open the "Version data" dialog box.



3. Press the "Details" softkey.



The data associated with the machine are displayed in the "Machine logbook":

Machine logbook				Change
No.	Date Time	Name Company/department	Error diagnostics/measure	
Machine name/no.		MILLING 300		New entry
Machine type		TYP 4711		
Manufacturer				
Dealer				
End user				
				Startup complete
				Machine installed
				Back

Alarm list
Mes-sages
Alarm log
NC/PLC variab.

Remote diag.
Version

4. Press the "Change" softkey to open the "Machine identity" dialog box.
5. Select, for example, the "End user" softkey to check and complete the contact data of the end user.

The screenshot shows the 'Machine identity' dialog box. The top bar includes a signal icon, an 'AUTO' button, and the date/time '12/14/09 2:42 PM'. The main area is divided into two sections. The top section has 'Machine name/no.' with the value 'MILLING 300' and 'Machine type' with a dropdown menu showing 'TYP 4711'. The bottom section is a list of contact data fields: 'Customer number' (highlighted in orange), 'Manufacturer's name', 'Street', 'Post code / zip code', 'Town', 'Country' (with a dropdown showing 'Please select:'), 'State/county', 'Contact', 'Phone', 'Fax', 'Email', and 'WEB address'. To the right of these fields are buttons for 'Import data', 'Manufacturer', 'Dealer', 'End user', 'Cancel', and 'OK'. The bottom navigation bar contains icons for 'Alarm list', 'Messages', 'Alarm log', 'NC/PLC variab.', 'Remote diag.', and 'Version'.

Note

Contact data

Using the "Import data" softkey, templates with contact data can be imported to simplify data entry; these templates are available through Siemens sales partners.

4.7.2 This is how you make a new entry in the logbook

Generating a new logbook entry

In order to log service and diagnostic procedures at the machine, make an entry in the machine logbook. The activities performed should be documented here after each service call.

4.7 Machine registration

To make a logbook entry, proceed as follows:

1. Select the "Diagnostics" operating area using the following key:



2. Press the "Version" softkey.



3. Press the "Logbook" softkey.



4. Press the "New entry" softkey in order to make an entry in the logbook.



Complete the fields for the new logbook entry:

5. Press the "OK" softkey to save an entry in the logbook.



For the following activities, two additional softkeys are available, which generate pre-configured logbook entries:



1st Commissioning completed (commissioning at the machine OEM's facility)



2nd commissioning completed (commissioning at the company operating the machine/end user)

Note

Once saved, data can no longer be changed.

4.7.3 This is how you save the machine identity

Saving the machine identity

Note

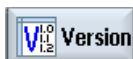
Ensure that the machine identity that has been entered is correct before saving in order that no incorrect information is saved.

In order to save the machine identity (address data, version data and logbook) externally on a data carrier, proceed as follows:

1. Select the "Diagnostics" operating area using the following key:



2. Press the "Version" softkey.



3. Press the "Save" softkey.



The "Save version information: Select Archive" window opens. Select a directory.

4. Press the "OK" softkey.



The data are pre-assigned so that a change is not necessary.

The "Name" text field is pre-assigned as follows:

<Machine name/Number>+<Number of the CompactFlash Card>

You now have the opportunity of changing this name.

You can enter a comment in the "Comments" text field.

Select the following options:

- "Version data (.TXT)": Output of the version data in the text format
- "Configuration data (.XML)": All information about the machine identity

5. Press the "OK" softkey to start saving the data.



4.7.4 This is how you send the machine identity

Overview

To complete, transfer the configuration file (address data, logbook data, version data) of the control to the final destination database via an Internet connection.

This means that the service organization has the possibility of obtaining a profile about the history of the control without having to go to the machine. Therefore, service can be more effectively carried-out as all of the relevant information is available.

Note

On-site service

The machine is registered by sending the machine identity. Only then is the full on-site service period effective.

Send the machine identity

Preconditions:

- The commissioning status is saved in the logbook.
- The addresses data are entered/updated in the machine.
- The machine identity was saved and is available on the PC/PG.
- The PC/PG is connected with the Internet.

Please proceed as follows:

1. Open the Internet Browser on your PC/PG.
 2. Go to the Internet page for the registration (<http://www.siemens.com/sinumerik/register>).
- You can find instructions on how to transfer data on this Internet page. Follow these instructions.

Note

Contact persons worldwide

If it was not possible to transfer the file, then please contact your local Siemens contact person (<http://www.automation.siemens.com/partner>) in sales.

4.8 Service and diagnostics

4.8.1 Backing up log data for service case

4.8.1.1 Overview

If system problems occur, it is necessary to back up all of the existing log files to provide them to the hotline for diagnostics. There are two options available to you:

- Backing up log data to USB
- Backing up log data as ZIP file

4.8.1.2 Backing up log data to USB

Backing up all log data using a special key combination:

<CTRL> + <ALT> + <D>

This function generates a directory on the USB flash drive/CF card. If a USB flash drive or CF card is available, the directory is created on the storage medium. The directory name has the following structure:

LOG_date_time

Example

LOG_171102_083615 stands for a directory created on 02/11/2017 at 8:36:15. This therefore ensures that a directory is not overwritten by pressing <CTRL> + <ALT> + <D> several times. The directory contains all of the logbook and debug information available in the system.

4.8.1.3 Backing up log data as ZIP file

Backing up all log data using a special softkey in the Diagnostics operating area:

"Diagnostics" → "Alarm list" → "Save diag. data"

This function collects all available LOG files of the operating software and stores them as a ZIP file in the following directory:

\\user\\sinumerik\\didac\\out_<Date-Time>.7z

In there is a problem with the system, you can send the ZIP file to the SINUMERIK hotline to help with the analysis of the problem.

Service cases - hardware

Components in the control cabinet

The sequence in the chapter of the hardware components corresponds to the following systematics:

- Components at the machine
- Components in the control cabinet



Figure 5-1 Components in the control cabinet



Figure 5-2 Supplementary components in the electrical cabinet

References

Information about the cause of faults and how they can be resolved can be found in the following references:

- SINUMERIK 828D/SINAMICS S120 Diagnostics Manual "Alarms"
- SINUMERIK 828D/SINAMICS S120 List Manual "Parameter description"
- "EMC Installation Guideline" Configuration Manual.
- "Industrial security" Configuration Manual

5.1 Safety instructions for the hardware

WARNING

Danger to life if the fundamental safety instructions and remaining risks are not carefully observed

The non-observance of the fundamental safety instructions and residual risks stated in Chapter 1 can result in accidents with severe injuries or death.

- Comply with the fundamental safety instructions.
- When assessing the risk, take into account residual risks.



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

As a result of the DC link capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off.

Contact with live parts results in death or serious injury.

- Do not open the protective cover of the device until 5 minutes have elapsed.
- Before starting any work, check that the system is in a completely no-voltage condition by measuring all poles/phases, also to ground.
- Ensure that the associated warning plate in the appropriate language is attached.



WARNING

Danger to life through electric shock due to incorrectly installed DC link clips

Incorrectly installed DC link clips **at the left-hand end of the drive line-up** can cause an electric shock.

- For all 50 mm wide modules (exception: Smart Line Module) remove the DC link clips, including the bolts. Do not tighten the screws without the DC link clips.
- For all components that are 75 mm wide or wider, it is not permissible that the DC link clips are moved to the left or removed.



WARNING

Danger to life through electric shock due to missing DC link side covers

There is a danger of an electric shock through contact when the side covers of the DC link are missing.

- Mount the side covers that are provided on the first and last component in the drive line-up.
- Order any missing side covers (order number: 6SL3162-5AA00-0AA0).



NOTICE

Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber or aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
 - Wearing an ESD wrist strap
 - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

NOTICE

Damage caused by loose plug connections and screw connections

Loose plug connections and screw connections can release themselves in operation.

- Ensure that all of the connectors and screws are correctly tightened or latched and inserted.

NOTICE

Damage caused by excessively low cooling clearances

Higher temperatures can occur if heat-generating components have excessively low cooling clearances. This can damage the hardware.

- Ensure that the specified cooling clearances are complied with.

5.2 PPU 27x.4

5.2.1 PPU status displays

Status displays front side

On the front side of the PPU, the following status displays provide information about the module state:

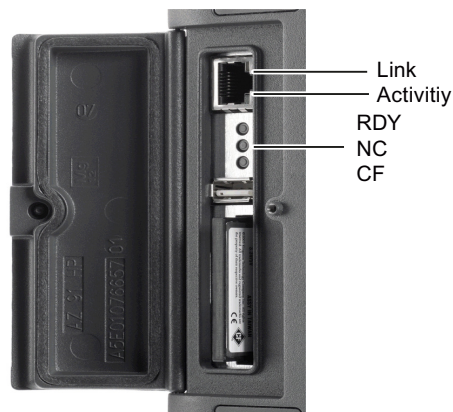


Figure 5-3 Vertical flap (detail)

LEDs and the slots for the CompactFlash card are not available on the front of the PPU 27x.4.

The three LEDs located behind the front flap at the front of the PPU have the following significance:

Name	Color	State	Meaning
RDY	Green	Is lit	NC Ready and PLC in run mode.
	Yellow	Is lit	PLC in stop mode
		Flashing	Booting
	Red	Is lit	NC in stop mode: - When booting, if NC Ready is not yet available - Critical fault (power off/on necessary)
NC	Yellow	Cyclic flashing	NC operation
CF	Yellow	Is lit	User CompactFlash Card being accessed

NOTICE

Damage to the CompactFlash card when it is withdrawn in operation

The CompactFlash card can be destroyed if it is withdrawn or inserted in operation. Therefore, do not withdraw the CompactFlash card if an LED is lit.

The RJ45 socket is equipped with one green and one yellow LED. As a consequence, the following information of the PLC I/O interface is displayed based on PROFINET:

Name	Color	State	Meaning
Link	Green	ON	100 MBit link available
		OFF	Missing or faulty link
Activity	Yellow	ON	Sending or receiving data
		OFF	No activity

Status displays, rear

At the rear of the PPU, the following status displays provide information about the module state:

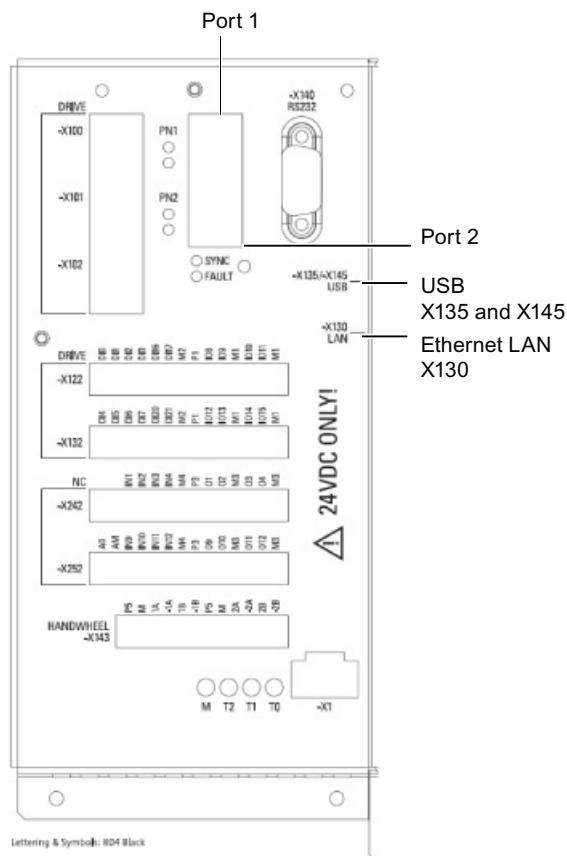


Figure 5-4 Rear of the PPU

For diagnostic purposes, the RJ45 sockets, port 1 and port 2 are each equipped with a green and a yellow LED. As a consequence, the following connection information of the PLC I/O interface is displayed based on PROFINET:

Name	Color	State	Meaning
Link	Green	ON	100 MBit link available
		OFF	Missing or faulty link

Name	Color	State	Meaning
Activity	Yellow	ON	Sending or receiving
		OFF	No activity

There are 2 additional LEDs "FAULT" and "SYNC" next to port 1, which apply to both ports:

Name	Color	State	Meaning
FAULT	Red	OFF	For the maximum expansion level of the PLC I/O: The data exchange to all configured IO devices runs without errors.
		Is lit	Bus fault: - No physical connection to a subnet/switch - Incorrect transmission rate - Full duplex transmission is not activated.
		Flashing (2 Hz)	If the PN fault LED flashes red, there is no fault. The maximum expansion level of the PLC I/O is not being used.
SYNC *)	Green	OFF	Task system of the SINUMERIK 828D is not synchronized to the send clock of the PLC I/O interface based on PROFINET IO. An internal substitute clock of the same size as the send clock will be generated.
		Is lit	Task system of the SINUMERIK 828D has synchronized to the clock of the PLC I/O interface based on PROFINET IO, data is being exchanged.
		Flashing (0.5 Hz)	Task system of the SINUMERIK 828D has synchronized to the clock of the PLC I/O interface based on PROFINET IO, data is being cyclically exchanged.

See also

Additional connections at the rear of the PPU (Page 28).

5.2.2 This is how you remove the PPU

Precondition

For this description, it is assumed that the PPU has been completely connected.

Removing

This description applies to both versions (vertical/horizontal).

Procedure:

1. Switch off the complete system, carefully checked that it is in a no-voltage condition and lock it out so that it cannot be switched on without the appropriate authorization.
2. Access the control panel/control cabinet where the PPU is installed.
3. Use a multimeter to check that the system really is in a no-voltage condition (isolated from the supply).

4. Label all connectors/cables that are inserted in the module. Only then, can it be ensured that the cables are not interchanged.
5. Withdraw the power supply X1.
6. Withdraw the digital input/output terminals X122, X132, X142.
7. Withdraw the handwheel terminal X143.
8. Withdraw the RS232 cable, X140.
9. Withdraw the connected DRIVE-CLiQ cables X100 - X102.
10. Withdraw the connected Ethernet cable X130.
11. Withdraw the connected PROFINET cables PN1, PN2.
12. Remove the ground connection by releasing the grounding screw.
13. If required, release the strain relief.
14. Release the clips to remove the PPU from the operator panel. For the PPU 290.4, also release the upper snap mechanism.
Please note that when removing the last upper clip, the PPU must be held from the front so that it doesn't fall out of the mounting cutout!
15. Remove the system CompactFlash card from the control.
(refer to Chapter This is how you remove the system CompactFlash Card (Page 104))

5.2.3 This is how you install the PPU

Boundary condition

When replacing the PPU, then the MAC address of Ethernet interface X130 changes: Tell the customer or the system administrator the new MAC address.

Installing

NOTICE

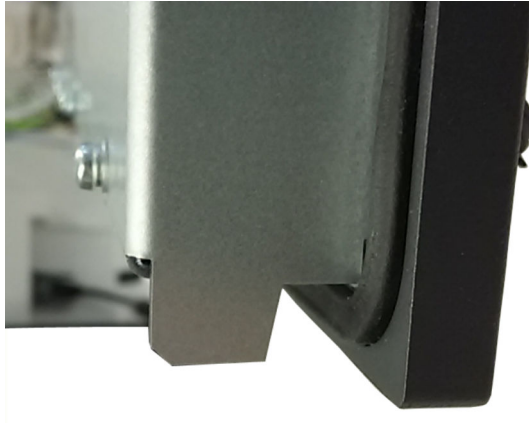
Installing the PPU

The following points must be carefully observed to correctly install the PPU:

- The maximum permissible tightening torque for the tensioning screws is 0.5 Nm - and must not be exceeded.
- It is important that the seal is not damaged when installing so that the maximum degree of protection that can be achieved is fulfilled. Therefore, center the PPU in the installation cutout.
- Do not use suction grippers to lift the glass front to avoid damaging the glass front (only for PPU 290.4).

Procedure:

1. Now, install the system CompactFlash Card into the new PPU.
(refer to Chapter This is how you insert the system CompactFlash Card (Page 105))
2. Insert the PPU into the installation cutout from the front.



3. Tilt the PPU and press the snap mechanism to fit the device into the cutout (only for PPU 290.4)



Make sure that the PPU sits firmly in the installation cutout and cannot fall out before you secure the PPU at the rear using the tension jacks.

4. Fix the PPU in the installation cutout from the rear using the tension jacks by tightening the setscrews:
5. Connect the ground connections and tighten.
6. Insert the PN1, PN2 interfaces that were withdrawn.
7. Insert the Ethernet cable that was withdrawn at X130.
8. Insert the DRIVE-CLiQ cable that was withdrawn at X100 – X102
9. Insert the handwheel terminal that was withdrawn at X143.
10. Insert the digital input/output terminals that were withdrawn at X122, X132, X142.
11. Reconnect power supply X1.
12. Retighten the strain relief assemblies.
13. Close the cabinet and switch-on the system again.
14. Read-in the available data backup.

5.3 Replacing the system CompactFlash Card

5.3.1 This is how you remove the system CompactFlash Card

Overview

If service is required, it may be necessary to replace the system CompactFlash Card of the control. This is the case if, e.g. the system CompactFlash Card or the PPU is defective. For a PPU as replacement part (spare part), a system CompactFlash Card is not supplied.

NOTICE

Damage to the CompactFlash card when it is withdrawn or inserted under voltage

The system CompactFlash card can be damaged if it is withdrawn or inserted under voltage.

- Switch-off the control power supply before inserting or removing the CompactFlash card.
- Before you touch the CompactFlash card, discharge yourself at the cabinet or at the ground terminal.

Removing the system CompactFlash Card

Note

When removing the system CompactFlash Card, carefully ensure that neither the screw nor the system CompactFlash Card falls into the PPU housing or the machine.

Procedure:

1. Switch-off the power supply of the control and the control cabinet.
2. Release the screw (M3).



3. Move the metal cover to the side and remove it.



4. Remove the system CompactFlash Card from the side.



5. First, guide the metal cover at the rear into the rabbet and fix to the housing using the screw.

5.3.2 This is how you insert the system CompactFlash Card

Precondition

The control cabinet and the PPU are in a no-voltage condition or the PPU has already been removed.

NOTICE

Damage to the CompactFlash card when it is withdrawn or inserted under voltage

The system CompactFlash card can be damaged if it is withdrawn or inserted under voltage.

- Switch-off the control power supply before inserting or removing the CompactFlash card.
- Before you touch the CompactFlash card, discharge yourself at the cabinet or at the ground terminal.

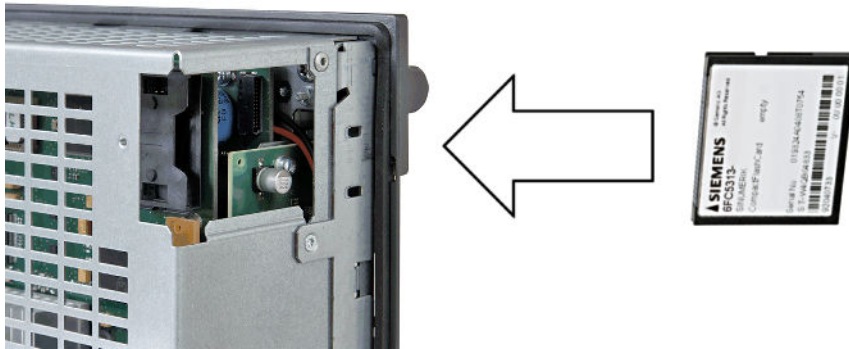
Inserting the system CompactFlash Card

Note

When inserting the system CompactFlash Card, carefully ensure that neither the screw nor the system CompactFlash Card falls into the PPU or the machine.

Procedure:

1. Release the screw (M3), and swing the metal cover to the side to remove it.
2. Gently insert the system CompactFlash Card into the slot until it clicks into place.



3. First, guide the metal cover at the rear into the rabbet and then tilt it into the end position.



4. Attach the metal cover to the housing using the screw.



5.4 Replacing the front cover

5.4.1 This is how you remove the front cover

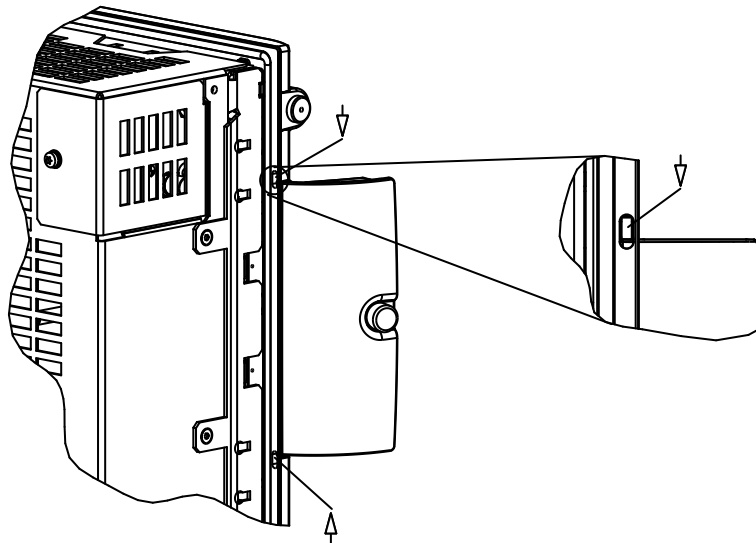
Precondition

You must first remove the PPU before you remove the front cover, see This is how you remove the PPU (Page 101).

Removing the front cover

Procedure:

1. Open the front cover.
2. Press the holding pins of the front cover through the openings at the rear. The tool that you use may have a maximum width of 2 mm.



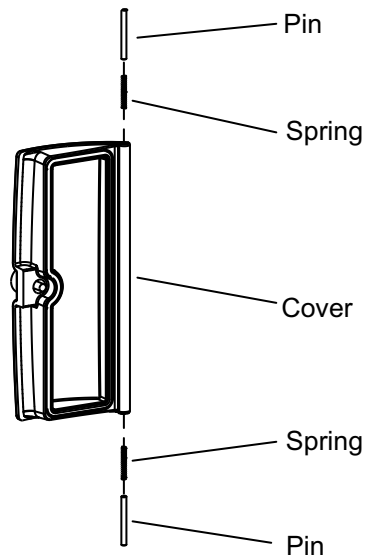
3. Remove the front cover.

5.4.2 This is how you install the front cover

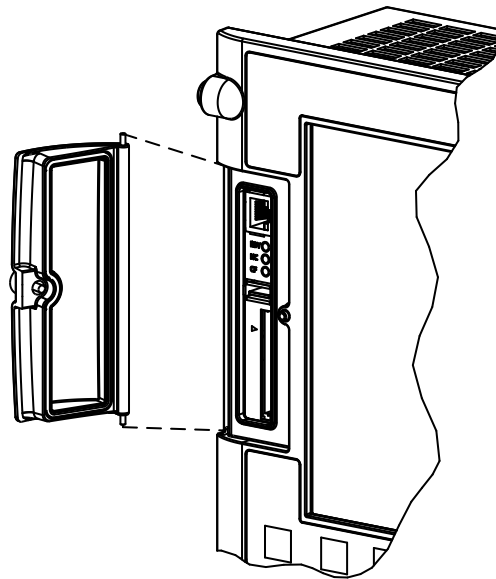
Installing the front cover

Procedure:

1. Insert the springs and pins into the front cover.



2. Press in the pins and mount the front cover. The pins must snap into the PPU housing.



After you have installed the front cover, you can also possibly reinstall the PPU, see [This is how you install the PPU \(Page 102\)](#).

5.5 Machine control panels

5.5.1 This is how you remove MCP 483 USB/MCP 310 USB/MCP 416 USB

Removing

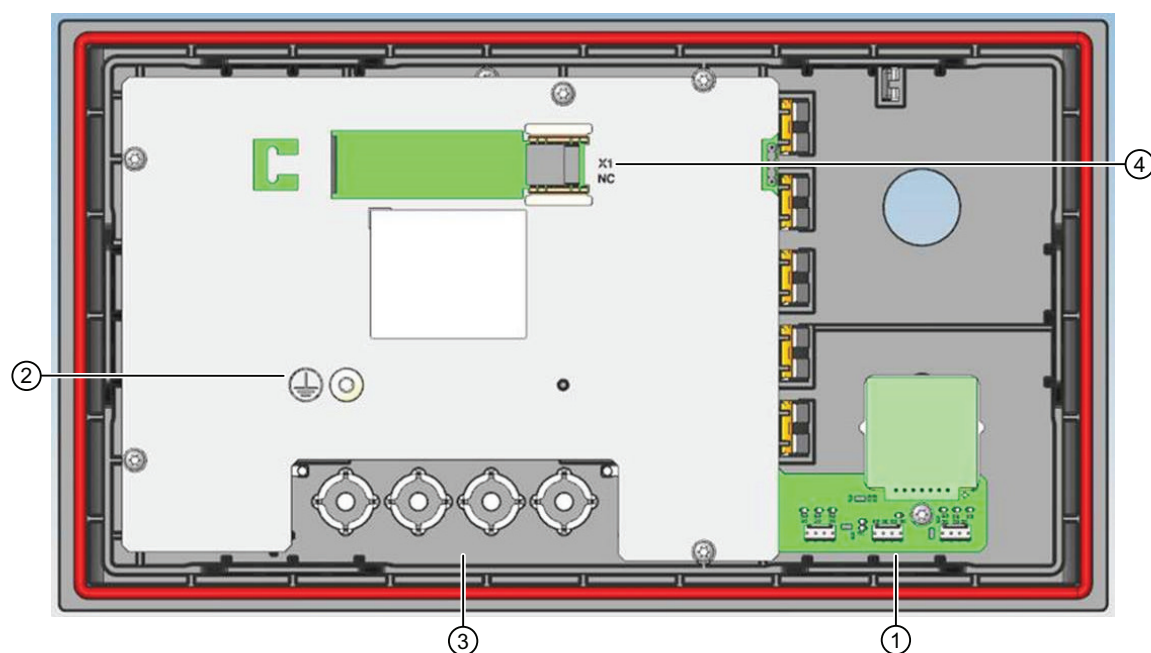
If the machine control panel has a hardware defect, then it must be replaced by an identical replacement part.

Precondition: The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the operator panel/control cabinet in which the machine control panel is located.
3. Use a multimeter to check that the system really is in a no-voltage condition (isolated from the supply).
4. If it has not already been done, label all connectors that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
5. Remove the USB cable
6. Release other cables (e.g. the Emergency Stop cable or from other command devices), if available.
7. Remove the ground connection by releasing the grounding screw
8. Release the tension jacks of the machine control panel to remove it from the control panel.

5.5 Machine control panels



- ① Interface X51, X52, X55
- ② Protective conductor connection
- ③ Slots for control devices (d = 16 mm)
- ④ USB connection for communication with the PPU

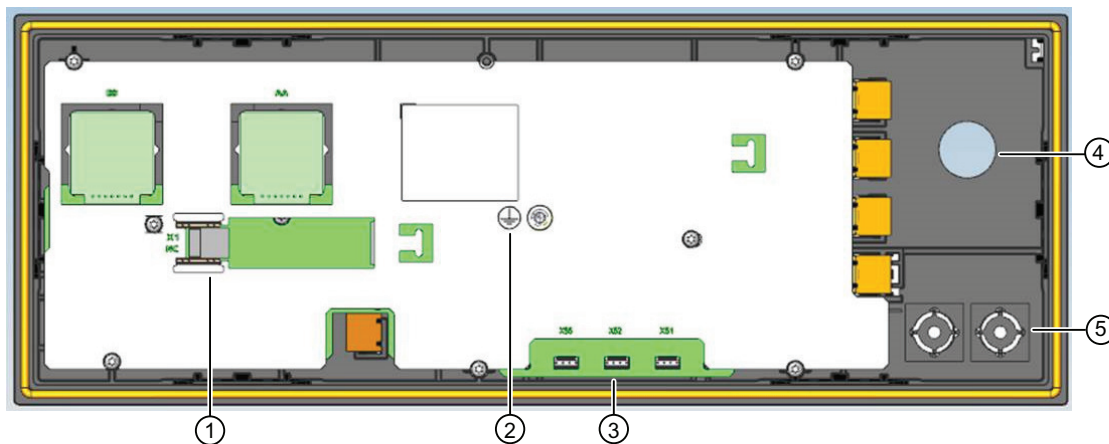
Figure 5-5 MCP 310 USB interfaces



MCP 483 USB

- ① USB connection for communication with the PPU
- ② Protective conductor connection
- ③ Slots for control devices (d = 16 mm)
- ④ Interface X51, X52, X55

Figure 5-6 MCP 483 USB interfaces



- ① USB connection for communication with the PPU
- ② Protective conductor connection
- ③ Interface X51, X52, X55
- ④ Slot for the Emergency Stop button
- ⑤ Slots for control devices (d = 16 mm)

Figure 5-7 MCP 416 USB interfaces

5.5.2 This is how you install the MCP 483 USB/MCP 310 USB/MCP 416 USB

Installing

Procedure:

1. Attach the tension jacks to fix the machine control panel and tighten them.
2. Connect the ground connection
3. Reconnect other cables (e.g. the Emergency Stop cable or from other command devices), if available.
4. Re-insert the USB cable into the USB port
5. Close the cabinet and switch-on the system again.

5.5.3 Status display MCP interface PN

LEDs for status display

For the MCP interface PN, the following LEDs provide information about the module status:

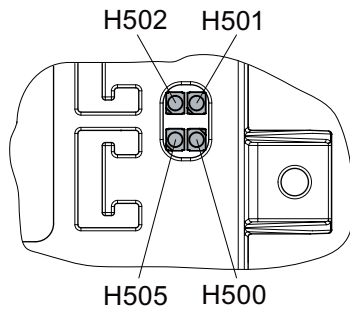


Figure 5-8 Status display

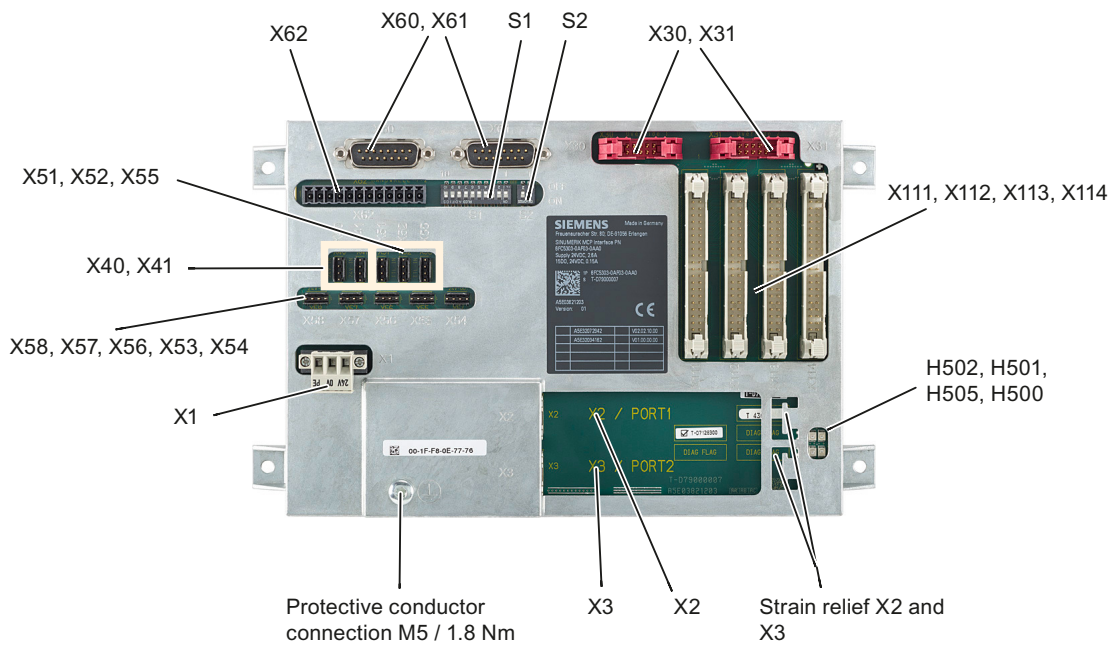
Meaning of the LED	H500 (green) PowerOK	H501 (green) PN Sync	H502 (red) PN fault	H505 (red) OVTemp
Power OFF	OFF	OFF	OFF	OFF
Power ON (voltage is stable)	ON	OFF	OFF	OFF
Boot software runs and the system software is loaded	ON	ON	ON	OFF
The system software is booting	ON	OFF	OFF	OFF
The system software is running, no communication to the controller	ON	OFF	OFF	OFF
STOP state: The system software is running, communication to the controller	ON	ON	OFF	OFF
RUN state: The system software is running, communication to the controller	ON	Flashes at 0.5 Hz	OFF	OFF
Overtemperature alarm	--	--	--	ON

5.5.4 This is how you remove the MCP interface PN

Removing

If the module has a hardware defect, then it must be replaced by an identical part.

Precondition: The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.



X1	24 VDC power supply
X2 / X3	PROFINET interfaces
X30	Interface for rotary switch feed override
X31	Interface for rotary switch spindle override
X40/X41	Digital inputs (24 V)
X51 / X52 / X55	Digital inputs (TTL)
X58 / X57 / X56 / X53 / X54	Digital outputs (24 V)
X60 / X62	Handwheel
X61	Reserved
X111 / X112 / X113 / X114	Key and LED interfaces
H500 / H501 / H502 / H505	LEDs for status display
S1	DIP switch for the MCP IP address
S2	DIP switch to transfer the handwheel pulse signals

Figure 5-9 MCP Interface PN interfaces

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the operator panel or control cabinet in which the machine control panel is located.
3. If it has not already been done, label all connectors that are inserted in the module now. Only then, can it be ensured that the cables are not interchanged.
4. Release the screw connection for power supply X1 and remove this.

5. Release the strain relief of the Ethernet cables.
6. Remove the Ethernet cables from interface X2/X3 (port 1/port 2).
7. Release other cables (e.g. rotary switch cable or cables for digital inputs and outputs), if available.
8. Remove the ground connection by releasing the grounding screw.
9. Release the machine control panel by removing the 4 standard Torx screws T20/M4.
10. Note the set address of DIL switch S1.
11. Note the settings of the handwheel pulses at DIL switch S2.

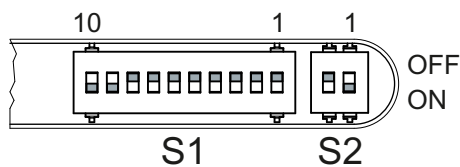
5.5.5 This is how you install the MCP interface PN

Installing

Procedure:

1. Set DIL switches S1 and S2 of the new module to what you previously noted down.
2. Mount the new machine control panel using the 4 standard Torx screws T20/M4.
3. Connect the ground connection to the grounding screw.
4. Reconnect other cables (e.g. for the rotary switch and for the digital inputs and outputs).
5. Reinsert the Ethernet cables at interface X2/X3 (port 1/port 2)
6. Re-establish the strain relief for the Ethernet cables.
7. Reconnect power supply X1.
8. Close the cabinet and switch-on the system again.

Switches S1, S2



The switches S1-1 to S1-8 define the PROFINET address of the machine control panel. In SINUMERIK 828D, the address "64" must always be assigned to the MCP.

Switches S1-9 and S1-10 must be set to "ON".

1	2	3	4	5	6	7	8	9	10	Meaning
OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	ON	PROFINET address "64"

The handwheel signal transfer type is set using switch S2-1.

S2-1	Meaning
ON	Differential connection
OFF	TTL interface

Note

Switch S2-2 is reserved for test purposes.

5.5.6 Status displays, MCP 483C PN

LED status displays

For the MCP 483C PN there are 3 LEDs in a row (H1 - H3), which provide information about the module state:

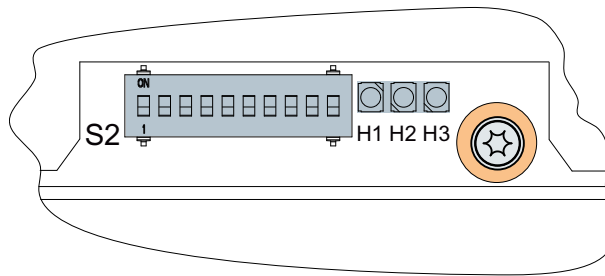


Figure 5-10 Status displays

LED	H1 (green) PowerOK	H2 (green) PN Sync	H3 (red) PN Fault
Power OFF	OFF	OFF	OFF
Power ON (voltage is stable)	ON	OFF	OFF
Boot software runs and loads the system software.	ON	ON	ON
System software runs.	ON	OFF	OFF
System software runs, no communication to the controller.	ON	OFF	OFF
System software runs, communication to the controller, STOP state	ON	ON	OFF
System software runs, communication to the controller, RUN state	ON	Flashes at 0.5 Hz	OFF

5.5.7 This is how you remove the MCP 483C PN

Overview

The activities that must be taken into account when replacing a machine control panel are subsequently described.

If the machine control panel has a hardware defect, then it must be replaced by an identical replacement part.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

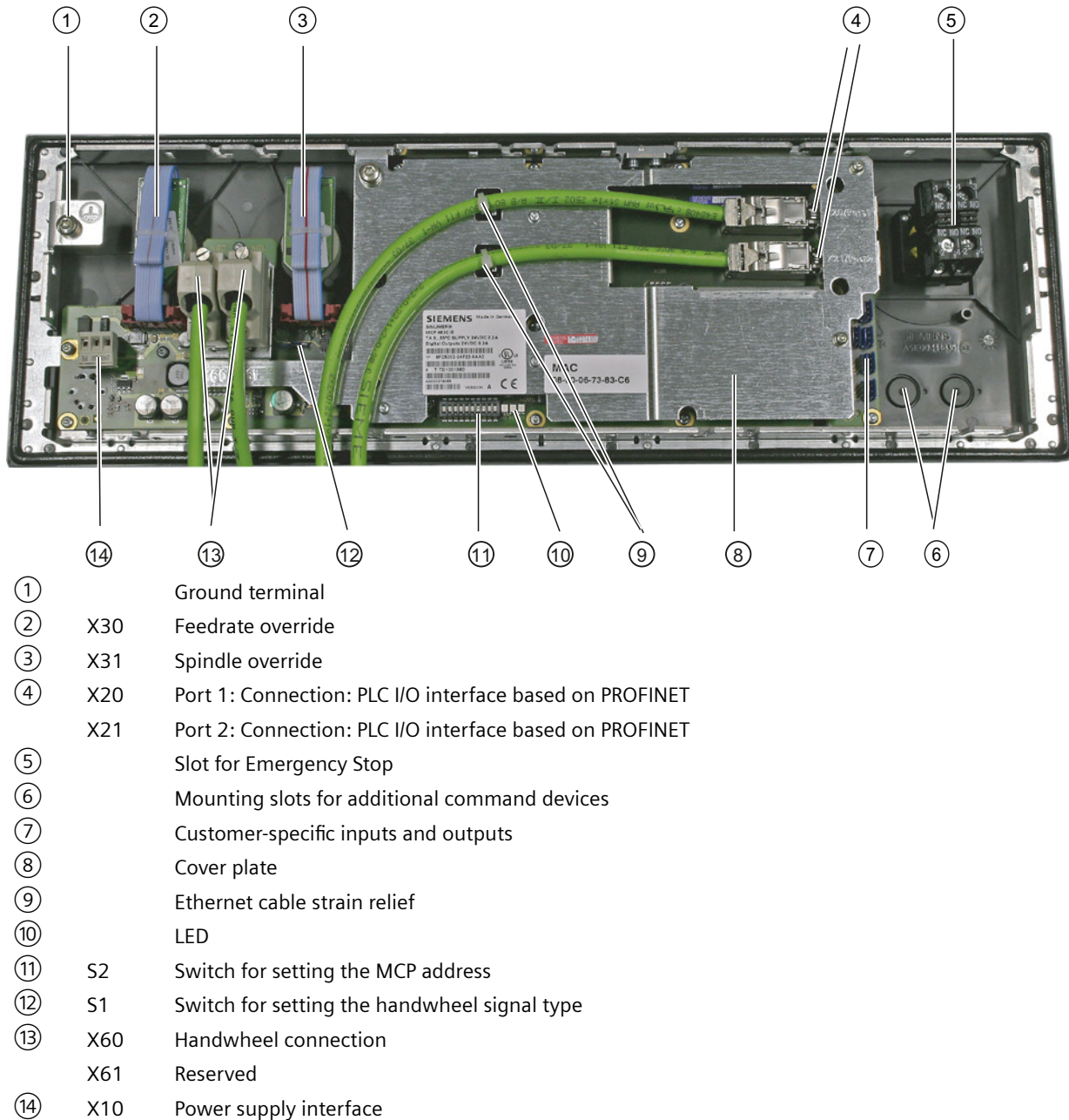


Figure 5-11 MCP 483C PN rear side

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the operator panel/control cabinet in which the machine control panel is located.
3. Using a multimeter, check the X10 power supply to ensure that the system really is in a no-voltage condition.

5.5 Machine control panels

4. If it has not already been done, label all connectors that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
5. Withdraw the power supply X10 (⑭).
6. Release the strain relief of the Ethernet cable (⑨).
7. Remove the Ethernet cables from the X20 / X21 interface (port 1 / port 2) (④).
8. Release other cables (e.g. the Emergency Stop cable or the button from the mini handheld unit or from other command devices), if available.
9. Remove the ground connection by releasing the grounding screw (①).
10. Release the machine control panel from the control panel by releasing the clips.
11. Note down the address set with DIP switch S1 (⑫) on the defective module.
12. Note down the setting of DIP switch S2 (⑪) on the defective module.

5.5.8 This is how you install the MCP 483C PN

Installing

Procedure:

1. Set switch S1 (⑫) on the new module as you previously noted down.
2. Set DIL switch S2 (⑪) of the new module to what you previously noted down.
3. Installing a new machine control panel.
4. Secure the clips to retain the machine control panel and tighten them.
5. Connect the ground connection (①).
6. Reconnect the other cables (e.g. the Emergency Stop cable or the button from the mini handheld unit or from other command devices), if available.
7. Reinsert the Ethernet cables at the X20/X21 interface (port 1/port 2) (④).
8. Re-establish the strain relief for the Ethernet cables (⑨).
9. Reconnect the power supply X10 (⑭).
10. Close the cabinet and switch-on the system again.

Switch S2

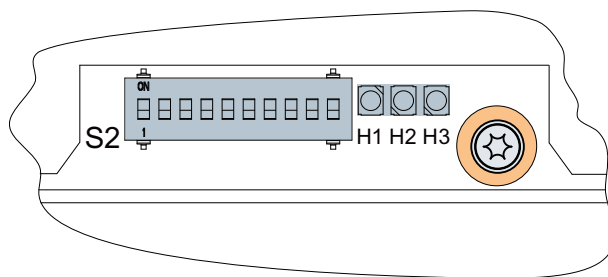


Figure 5-12 Switch S2

Switch S2 defines the IP address of the machine control panel:

1	2	3	4	5	6	7	8	9	10	Device name
						ON		ON	ON	
OFF	OFF	OFF	OFF	OFF	OFF		OFF			PROFINET address "64"

For SINUMERIK 828D, the IP address = 192.168.214.64 must always be assigned to the MCP.

5.5.9 Status displays MCP 310C PN

LEDs for status display

For the MCP 310C PN there are 3 LEDs in a row (H1-H3), which provide information about the module state:

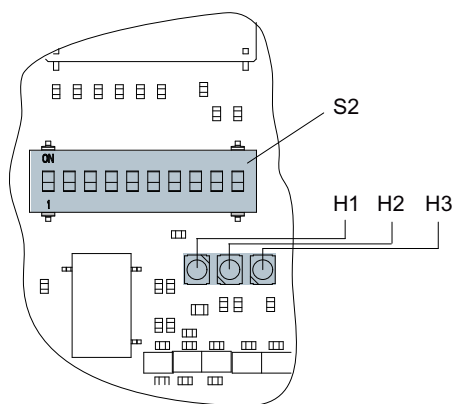


Figure 5-13 Status displays

LED	H1 (green) PowerOK	H2 (green) PN Sync	H3 (red) PN Fault
Power OFF	OFF	OFF	OFF
Power ON (voltage is stable)	ON	OFF	OFF
Boot software runs and loads the system software	ON	ON	ON

LED	H1 (green) PowerOK	H2 (green) PN Sync	H3 (red) PN Fault
System software starts	ON	OFF	OFF
System software runs, no communication to the controller	ON	OFF	OFF
System software runs, communication to the controller, STOP state	ON	ON	OFF
System software runs, communication to the controller, RUN state	ON	Flashes at 0.5 Hz	OFF

5.5.10 This is how you remove the MCP 310C PN

Overview

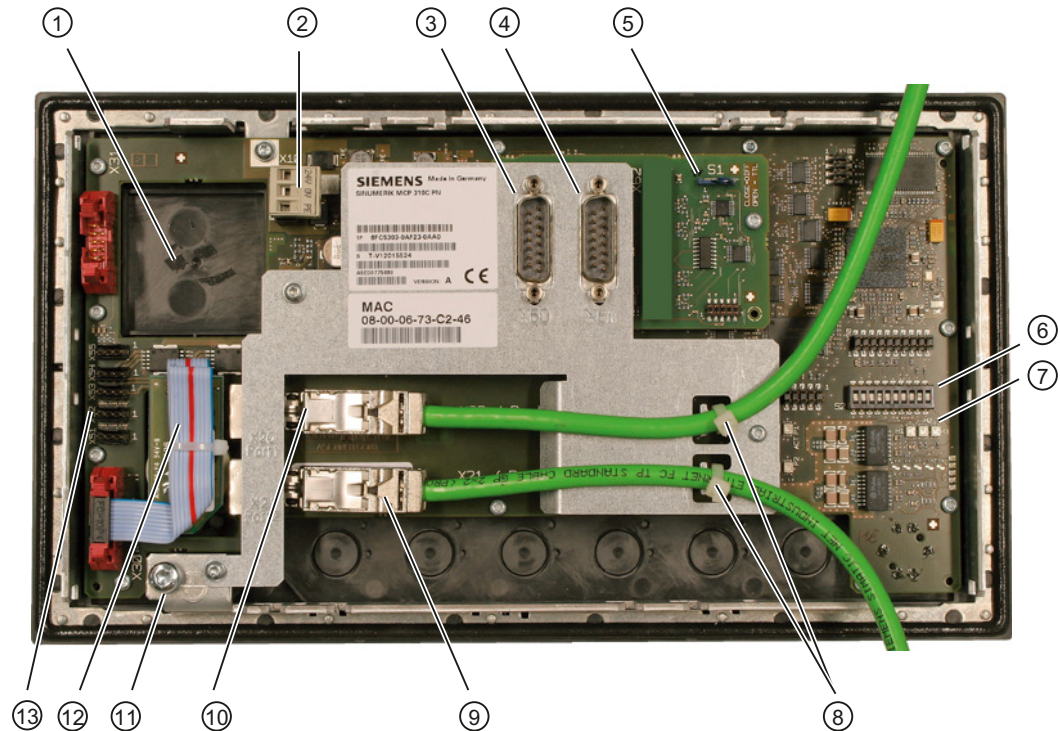
The activities that must be taken into account when replacing a machine control panel are subsequently described.

If the machine control panel has a hardware defect, then it must be replaced by an identical replacement part.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing



- ① Slot for Emergency Stop button or spindle override
- ② X10 Power supply interface
- ③ X60 Handwheel connection
- ④ X61 Reserved
- ⑤ S1 Switch for setting the handwheel signal type
- ⑥ S2 Switch for setting the MCP address
- ⑦ LED
- ⑧ Ethernet cable strain relief
- ⑨ X21 Port 2: PLC I/O interfaces based on PROFINET
- ⑩ X20 Port 1: PLC I/O interfaces based on PROFINET
- ⑪ Equipotential bonding
- ⑫ Feedrate override
- ⑬ Customer-specific inputs and outputs

Figure 5-14 MCP 310C PN rear side

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the operator panel or control cabinet in which the machine control panel is located.
3. Using a multimeter, check the X10 power supply to ensure that the system really is in a no-voltage condition.

5.5 Machine control panels

4. If it has not already been done, label all connectors that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
5. Withdraw the power supply X10 (②).
6. Release the strain relief of the Ethernet cable (⑧).
7. Remove the Ethernet cables from the X20/X21 interface (port 1/port 2) (⑨, ⑩).
8. Release other cables (e.g. the Emergency Stop cable or the button from the mini handheld unit or from other command devices), if available.
9. Remove the ground connection by releasing the grounding screw (⑪).
10. Release the machine control panel from the control panel by releasing the clips.
11. Note down the address set with DIP switch S1 (⑤) on the defective module.
12. Note down the setting of DIP switch S2 (⑥) on the defective module.

5.5.11 This is how you install the MCP 310C PN

Installing

Procedure:

1. Set switch S1 on the new module as you previously noted down.
2. Set DIP switch S2 of the new module to what you previously noted down.
3. Install the new machine control panel.
4. Secure the clips to retain the machine control panel and tighten them.
5. Connect the ground connection (⑪).
6. Reconnect the other cables (e.g. the Emergency Stop cable or the button from the mini handheld unit or from other command devices), if available.
7. Reinsert the Ethernet cables at the X20/X21 interface (port 1/port 2) (⑨, ⑩).
8. Re-establish the strain relief for the Ethernet cables (⑧).
9. Reconnect the power supply X10 (②).
10. Close the cabinet and switch-on the system again.

Switch S2

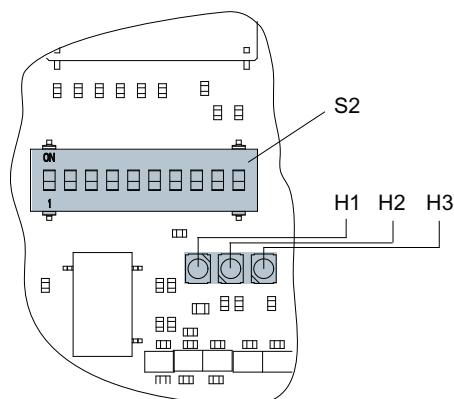


Figure 5-15 Switch S2

Switch S2 defines the IP address of the machine control panel:

1	2	3	4	5	6	7	8	9	10	Device name
						ON		ON	ON	
OFF	OFF	OFF	OFF	OFF	OFF		OFF			PROFINET address "64"

For SINUMERIK 828D, the IP address = 192.168.214.64 must always be assigned to the MCP.

5.5.12 This is how you replace the rotary switch

Overview

For MCP 310C PN and MCP 483C PN machine control panels, you can replace a defective rotary switch by a new one. The following rotary switches are installed in the machine control panels:

- Rotary switch for the spindle control, rotary switch with 16 positions
- Rotary switch for the feedrate control, rotary switch with 23 positions

The activities that must be taken into account when replacing a rotary switch are subsequently described.

Preconditions when replacing a rotary switch:

- The rotary switch is defective and must be replaced.
- The system is in a no voltage condition.

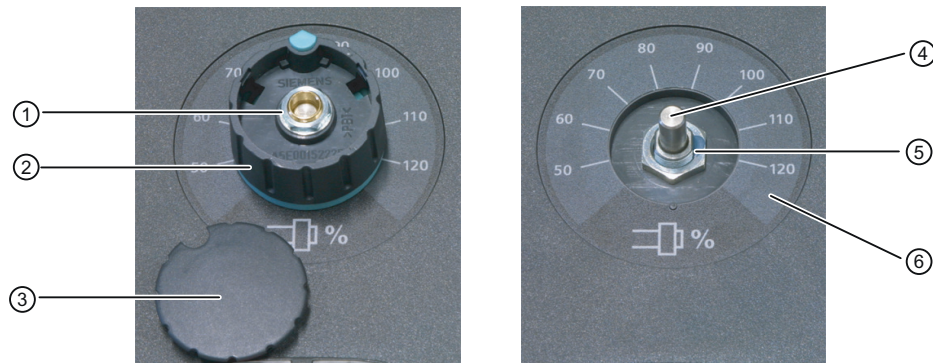
Note

For the machine control panel, use only electronic rotary switches.

Removing a rotary switch

Procedure:

1. Pry off the cap ③ from the knob ② (snap on connection!).
2. Remove the nut of collet ① with a wrench (size 10).
3. Remove the complete knob ②.
4. Remove the lock nut ⑤ on the shaft of the rotary switch ④ with a wrench (size 14).
5. Remove the connector at the end of the rotary switch cable from the socket.
6. Remove the rotary switch.



- ① Nut of the collet
- ② Knob
- ③ Cap
- ④ Rotary switch shaft
- ⑤ Fastening nut
- ⑥ Scale

Figure 5-16 Removing a rotary switch

Installing a rotary switch

Procedure:

1. Push the O-ring ① onto the shaft of the new rotary switch as a seal.
2. Insert the rotary switch into the front cutout so that pressure is applied to the O-ring.
3. Screw the lock nut ④ onto the rotary switch shaft from the front with a wrench (size 14) (tightening torque: 3 Nm).
4. Connect the arrow ring ③ and knob ⑤.
5. Slide both parts onto the shaft of the rotary switch.
6. Align the arrow point on the ring with position "0" on the scale.
7. Tighten the collet nut of the knob by hand and using a torque wrench tighten to a torque of 2 Nm.

8. Place the cap ② on the knob and snap it into position.
9. Fold and fasten the connecting cable ⑦ as shown in the diagram on the right.

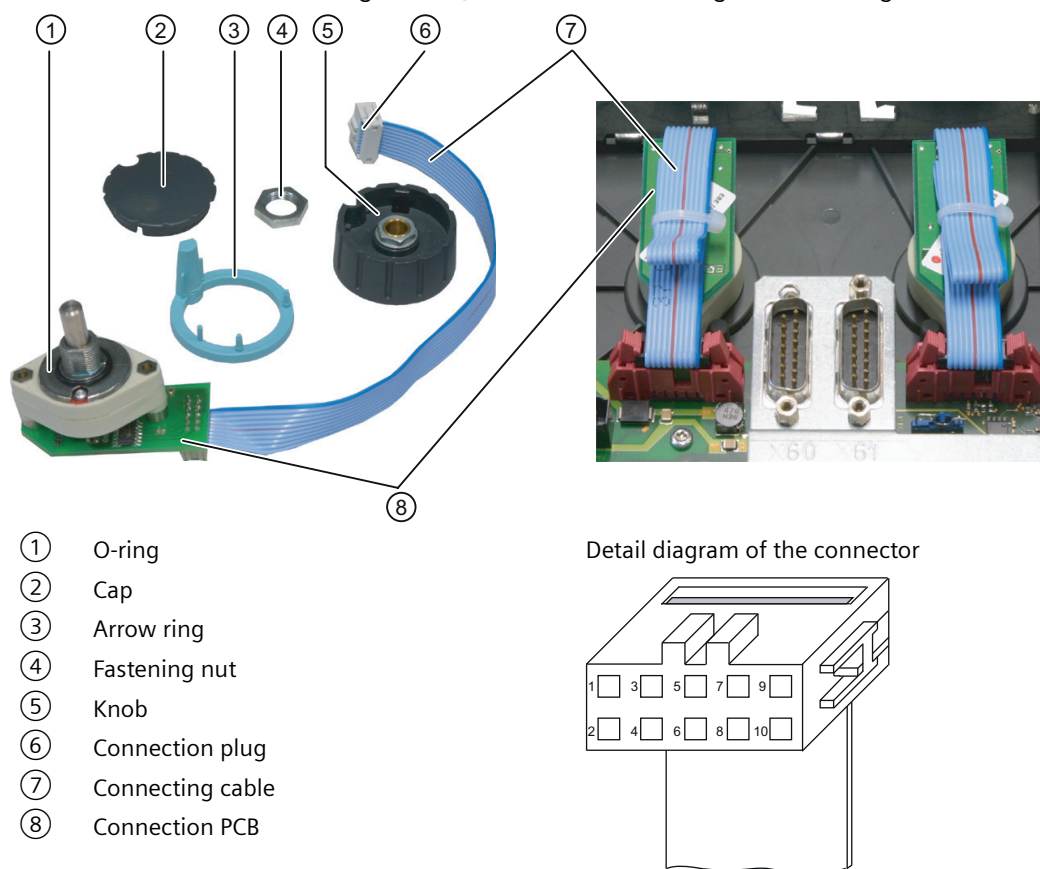


Figure 5-17 Installing a rotary switch

Note

It is essential that the specified tightening torques are complied with.

5.6 I/O modules

5.6.1 Status displays PP 72/48D PN

LEDs for status display

The following LEDs on the I/O module provide information about the module state:

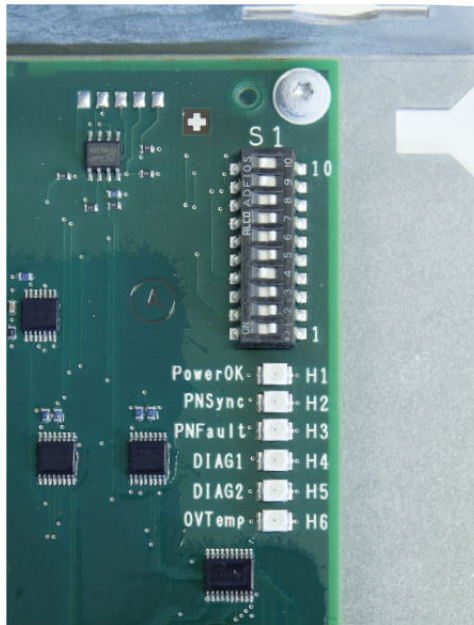


Figure 5-18 Switch S1 and LEDs H1 to H6

	H1 (green) PowerOK	H2 (green) PN Sync	H3 (red) PN Fault	H4 (green) Diag1	H5 (green) Diag2	H6 OVTemp
Power OFF	OFF	OFF	OFF	OFF	OFF	OFF
Power ON (voltage is stable)	ON	OFF	OFF	OFF	OFF	OFF
Boot software runs and loads the system software.	ON	ON	ON	ON	ON	OFF
System software starts	ON	OFF	OFF	OFF	OFF	OFF
System software runs, no communication to the controller.	ON	OFF	OFF	OFF	OFF	OFF
System software runs, communication to the controller, STOP state	ON	ON	OFF	OFF	OFF	OFF
System software runs, communication to the controller, RUN state	ON	Flashes at 0.5 Hz	OFF	OFF	OFF	OFF
Overtemperature alarm	--	--	--	--	--	ON

LEDs at port 1 and port 2

There are 2 LEDs at port 1 and port 2 for diagnostics of the PLC I/O interfaces based on PROFINET.

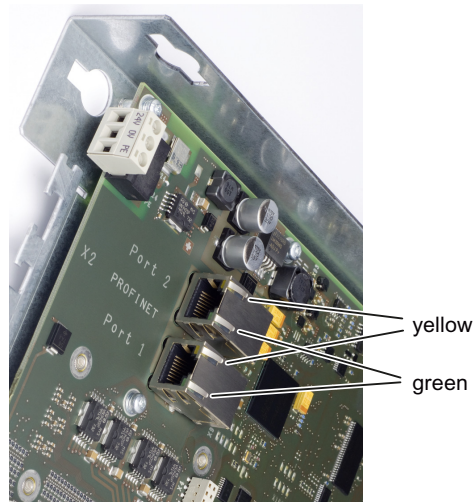


Figure 5-19 Port 1 and port 2

LED for communication at the RJ45 connector.

Name	Color	State	Meaning
Link	Green	ON	100 MBit link available
		OFF	Missing or faulty link
Activity	Yellow	ON	Sending or receiving
		OFF	No activity

5.6.2 This is how you remove the PP 72/48D PN

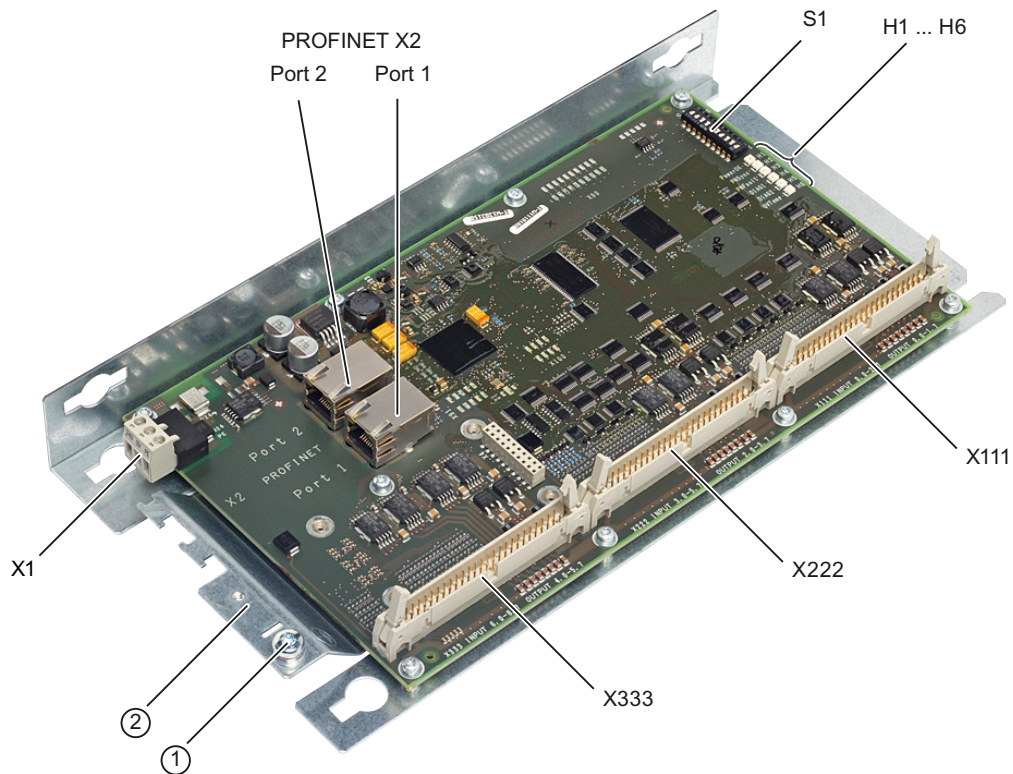
Overview

The activities necessary to replace the PP72/48D PN I/O module are described in the following. If the PP 72/48D PN has a hardware defect, then this must be replaced by an identical module.

Preconditions:

- The I/O module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing



- ① Protective conductor connection
- ② Shield support

Figure 5-20 PP 72/48D PN interfaces

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the module is located.
3. Using a multimeter, check the X1 power supply to ensure that the system really is in a no-voltage condition.
4. If it has not already been done, label all connectors that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
5. Withdraw the power supply X1.
6. Release the connectors of the ribbon cables (X111, X222, X333) on the module that are used to connect the digital inputs and outputs.
7. Remove the strain relief of the PROFINET cables of interfaces X2.
8. Remove the PROFINET cables from interface X2 (port 1 and port 2).
9. Remove the shield support ②, if available.
10. Release the grounding screw ①, to remove the protective conductor.

11. To remove the I/O module, release the fixing screws.
12. Note down the address set with DIP switch S1 on the defective module.

5.6.3 This is how you install the PP 72/48D PN

Installing

Procedure:

1. Set DIP switch S1 of the new module as you previously noted down.
2. Install the new I/O module.
3. Connect the ground connection.
4. Connect the communication cables at interface X2 (port 1 and port 2).
5. Re-establish the strain relief for the communication cables.
6. Re-insert the connectors of the ribbon cables (X111, X222, X333) on the module that are used to connect the digital inputs and outputs.
7. Reconnect power supply X1.
8. Close the cabinet and switch-on the system again.

DIP switch S1

Setting of switch S1:

1	2	3	4	5	6	7	8	9	10	Device name
								ON	ON	
ON	OFF	OFF	ON	OFF	OFF	OFF	OFF			pp72x48pn9
OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF			pp72x48pn8
ON	ON	ON	OFF	OFF	OFF	OFF	OFF			pp72x48pn7
OFF	ON	ON	OFF	OFF	OFF	OFF	OFF			pp72x48pn6
ON	OFF	ON	OFF	OFF	OFF	OFF	OFF			pp72x48pn5

The switch positions 9 and 10 guarantee the PROFINET functionality of the module and must always be switched "ON".

Note

A new address only becomes effective after voltage OFF → ON.

5.6.4 Status displays PP 72/48D 2/2A PN

LEDs for status display

The following LEDs on the I/O module provide information about the module state:

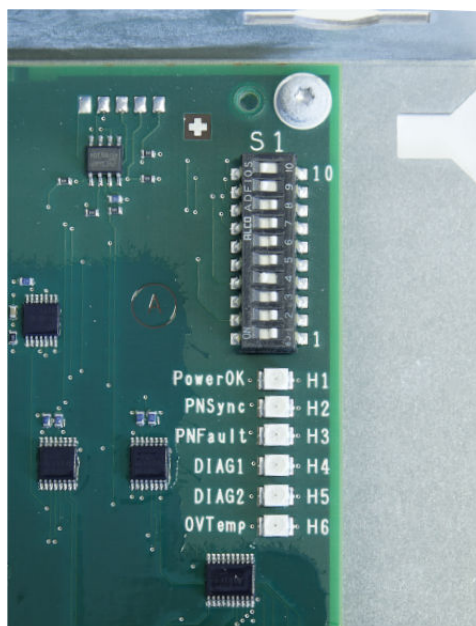


Figure 5-21 Switch S1 and LEDs H1 to H6

	H1 (green) PowerOK	H2 (green) PN Sync	H3 (red) PN Fault	H4 (green) Diag1	H5 (green) Diag2	H6 OVTemp
Power OFF	OFF	OFF	OFF	OFF	OFF	OFF
Power ON (voltage is stable)	ON	OFF	OFF	OFF	OFF	OFF
Boot software runs and loads the system software.	ON	ON	ON	ON	ON	OFF
System software starts	ON	OFF	OFF	OFF	OFF	OFF
System software runs, no communication to the controller.	ON	OFF	OFF	OFF	OFF	OFF
System software runs, communication to the controller, STOP state	ON	ON	OFF	OFF	OFF	OFF
System software runs, communication to the controller, RUN state	ON	Flashes at 0.5 Hz	OFF	OFF	OFF	OFF
Overtemperature alarm	--	--	--	--	--	ON

LEDs at port 1 and port 2

There are 2 LEDs at port 1 and port 2 for diagnostics of the PLC I/O interfaces based on PROFINET.

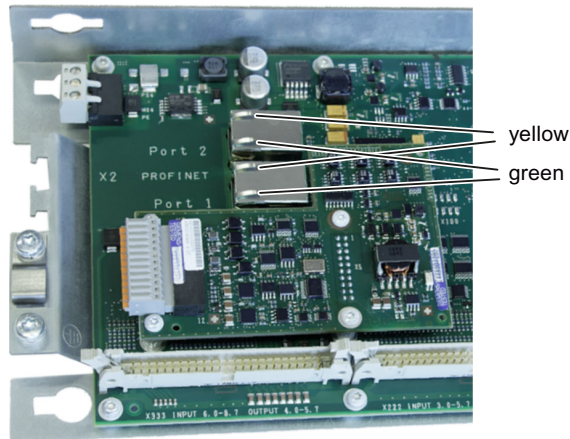


Figure 5-22 Port 1 and port 2

LED for communication at the RJ45 connector.

Name	Color	State	Meaning
Link	Green	ON	100 MBit link available
		OFF	Missing or faulty link
Activity	Yellow	ON	Sending or receiving
		OFF	No activity

5.6.5 This is how you remove the PP 72/48D 2/2A PN

Overview

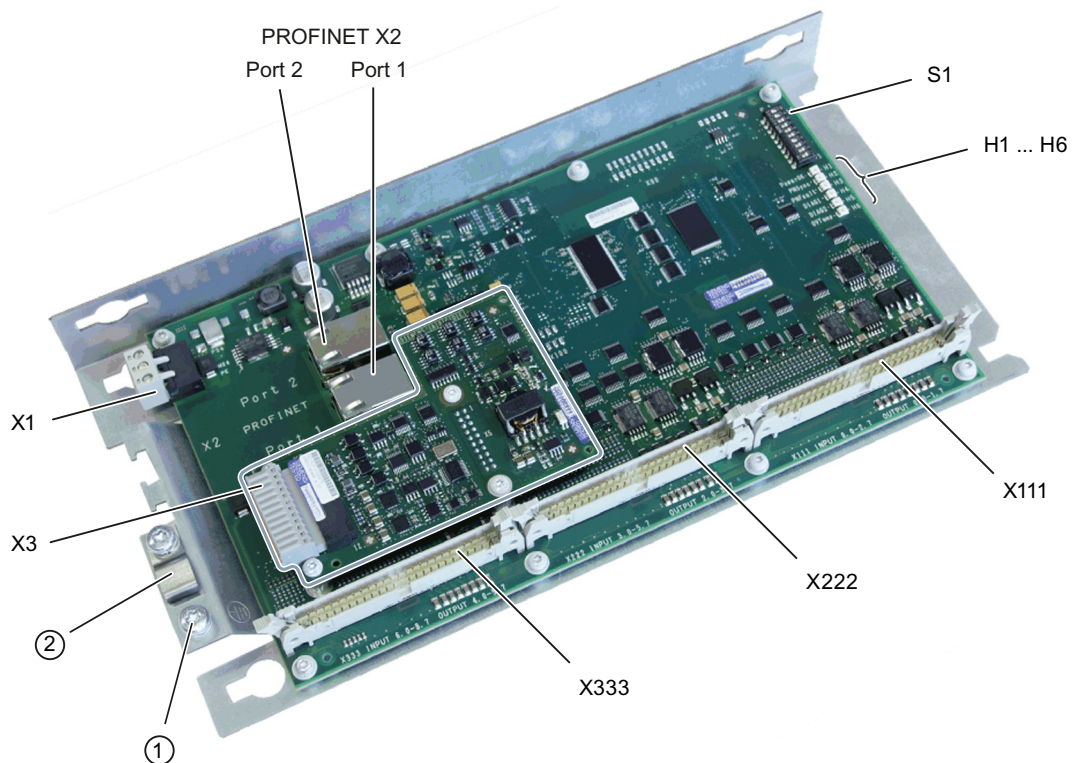
The activities necessary when replacing the PP 72/48D 2/2A PN I/O module are described in the following.

If the PP 72/48D 2/2A PN has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The I/O module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing



- ① Protective conductor connection
- ② Shield support

Figure 5-23 PP 72/48D 2/2A PN interfaces

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the module is located.
3. Using a multimeter, check the X1 power supply to ensure that the system really is in a no-voltage condition.
4. If it has not already been done, label all connectors that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
5. Withdraw the power supply X1.
6. Insert connector X3 for the analog inputs/outputs.
7. Release the connectors of the ribbon cables (X111, X222, X333) on the module that are used to connect the digital inputs and outputs.
8. Remove the strain relief of the PROFINET cables of interfaces X2.
9. Remove the PROFINET cables from interface X2 (port 1 and port 2).
10. Remove the shield support ②, if available.

11. Release the grounding screw ①, to remove the protective conductor.
12. To remove the I/O module, release the fixing screws.
13. Note down the address set with DIP switch S1 on the defective module.

5.6.6 This is how you install the PP 72/48D 2/2A PN

Installing

Procedure:

1. Set DIP switch S1 of the new module as you previously noted down.
2. Install the new I/O module.
3. Connect the ground connection.
4. Connect the communication cables at interface X2 (port 1 and port 2).
5. Re-establish the strain relief for the communication cables.
6. Re-insert the connectors of the ribbon cables (X111, X222, X333) on the module that are used to connect the digital inputs and outputs.
7. Reconnect power supply X1.
8. Close the cabinet and switch-on the system again.

DIP switch S1

Setting of switch S1:

1	2	3	4	5	6	7	8	9	10	Device name
								ON	ON	
ON	OFF	OFF	ON	OFF	OFF	OFF	OFF			pp72x48pn9
OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF			pp72x48pn8
ON	ON	ON	OFF	OFF	OFF	OFF	OFF			pp72x48pn7
OFF	ON	ON	OFF	OFF	OFF	OFF	OFF			pp72x48pn6
ON	OFF	ON	OFF	OFF	OFF	OFF	OFF			pp72x48pn5

The switch positions 9 and 10 guarantee the PROFINET functionality of the module and must always be switched "ON".

Note

A new address only becomes effective after voltage OFF → ON.

5.7 Expansion modules NX10.3 / NX15.3

5.7.1 NX10.3 / NX15.3 status displays

Status displays

The following status displays on the NX10.3 / NX15.3 provide information about the module state:

LED	Color	State	Description
RDY, H1	-	OFF	Electronics power supply outside the permissible tolerance range.
	Green	Continuous light	Component is ready.
		Flashing light 2 Hz	Writing to CompactFlash Card.
	Red	Continuous light	There is at least one fault (e.g., RESET, watchdog monitoring, basic system fault). NX10.3 / NX15.3 is presently booting.
		Flashing light 0.5 Hz	Error when booting: e.g. the firmware cannot be loaded into the RAM.
	Yellow	Continuous light	Firmware is being loaded into the RAM
		Flashing light 0.5 Hz	Firmware cannot be loaded into the RAM.
		Flashing light 2 Hz	Firmware CRC error.
	-	OFF	Electronics power supply outside the permissible tolerance range. NX10.3 / NX15.3 is not ready for operation.
DP1, CU_LINK, H2	Green	Continuous light	CU_LINK is ready for communication and cyclic communication is running.
		Flashing light 0.5 Hz	CU_LINK is ready for communication and no cyclic communication is running.
	Red	Continuous light	At least one CU_LINK fault is present. CU_LINK is not ready for operation (e.g., after switching on).

5.7.2 NX10.3 / NX15.3 connections

Connections

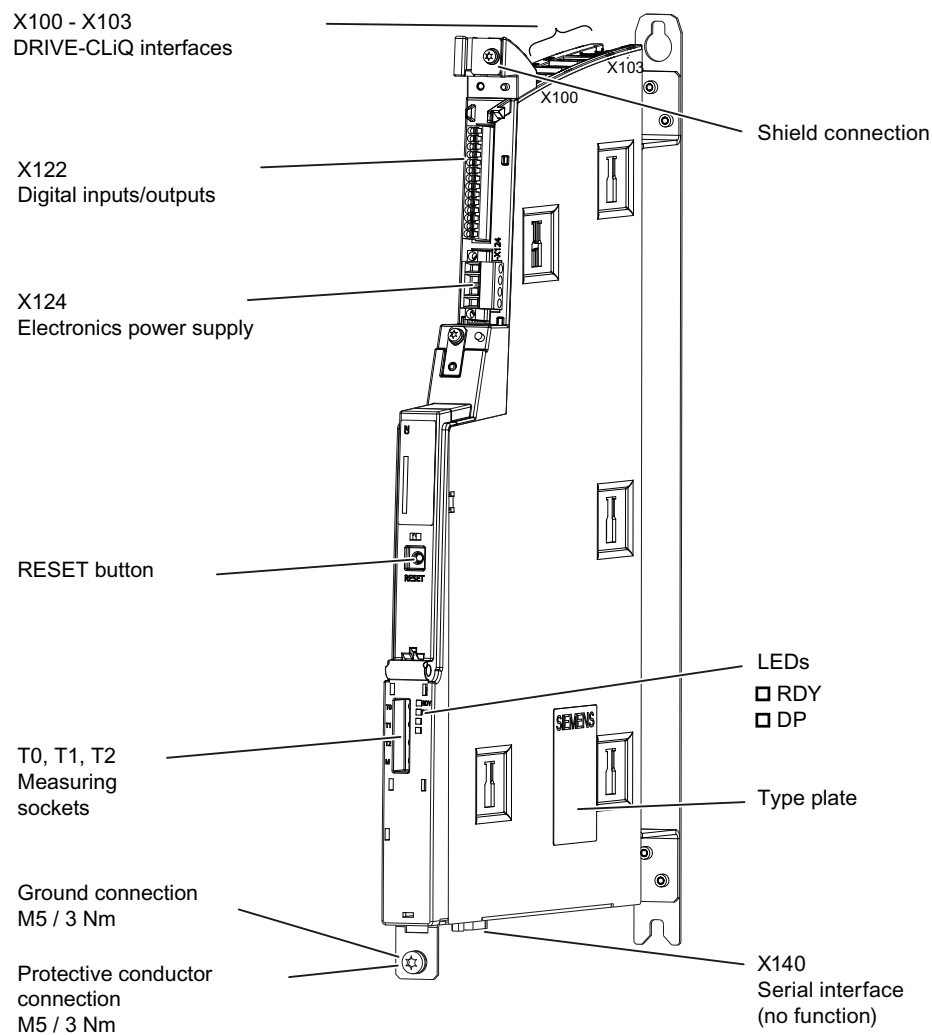


Figure 5-24 NX10.3 / NX15.3 connections

5.7.3 This is how you remove the NX10.3 / NX15.3

Preconditions

The activities that are required when replacing an NX10.3 / NX15.3 are subsequently described. If the NX10.3 / NX15.3 has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

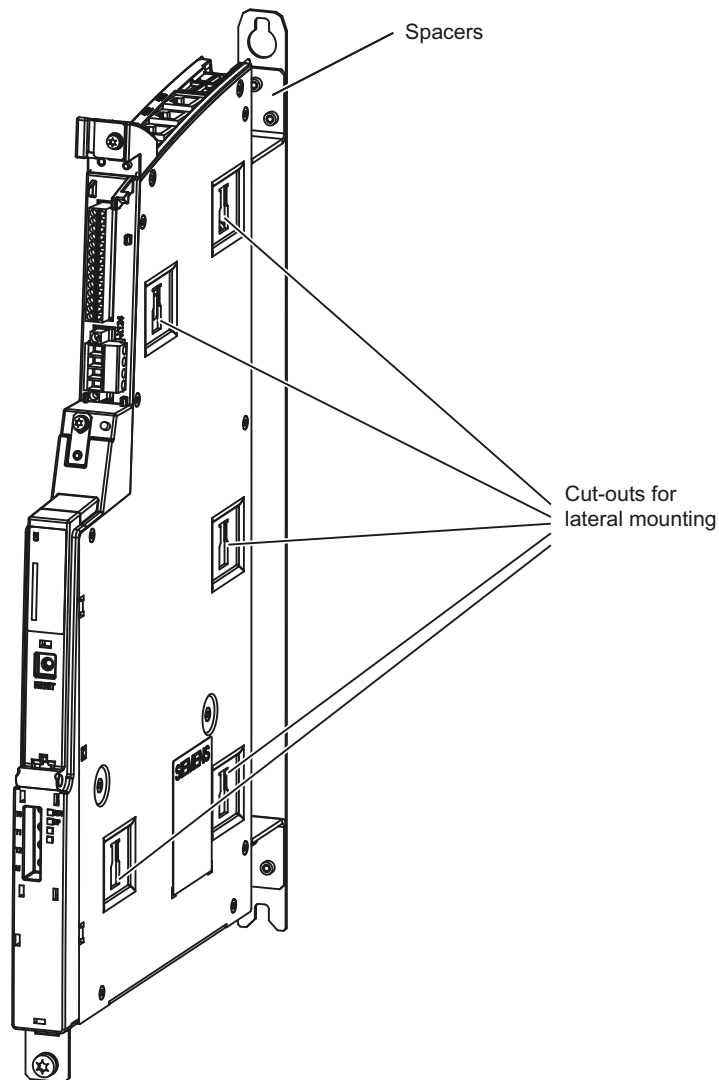


Figure 5-25 Mounting aids

Procedure:

1. Switch off the complete system, carefully checked that it is in a no-voltage condition and lock it out so that it cannot be switched on without the appropriate authorization.
2. Access the control cabinet where the NX10.3 / NX15.3 is located.
3. Use a multimeter to check that the NX module really is in a no-voltage condition.
4. Open the cover of the NX module.

5. If it has not already been done, label all connectors and cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
6. Withdraw the electronics power supply X124.
7. Withdraw the digital input/output terminal X122.
8. Withdraw any connected DRIVE-CLiQ cables X100 - X103.
9. Remove the protective conductor connection of the NX10.3 / NX15.3.
10. Release the screws attaching the NX10.3 / NX15.3 to the mounting plate.
– OR –
11. If the module is located to the left of the infeed, remove the module by first pulling it upwards and then removing it towards the left.

5.7.4 This is how you install the NX10.3 / NX15.3

Installing

Procedure:

1. Screw the new NX10.3 / NX15.3 to the mounting plate.
– OR –
2. If the module was located to the left of the infeed, re-attach it here by first introducing the NX10.3 / NX15.3 into the holder to the right and then press it down slightly to retain it.
3. Reconnect the protective conductor connection of the NX10.3 / NX15.3.
4. Insert the DRIVE-CLiQ cables that were previously withdrawn into sockets X100-X103.
5. Insert the digital input/output terminal X122 into the NX10.3 / NX15.3.
6. Reconnect the electronics power supply X124.
7. Now check that all of the cables have been reconnected.
8. Now close the cover of the NX10.3 / NX15.3.
9. Close the cabinet and switch-on the system again.

5.8 Installing SINAMICS components

5.8.1 Releasing with a screwdriver

The new protective covers for the DC link on the SINAMICS S120 components feature a new interlock mechanism, which is really easy to operate using a slot-head screwdriver (1 x 5.5).

Table 5-1 Opening the protective cover for the DC link using a screwdriver

		
Protective cover with new interlock mechanism	To open the protective cover, use the screwdriver to turn the interlock screw a little, in the direction of the arrow (counter-clockwise)	Opened protective cover

To lock, press the protective cover back on until you hear the interlock engage.

5.8.2 Protective conductor connection and shield contact

Shield contact and productive conductor connection

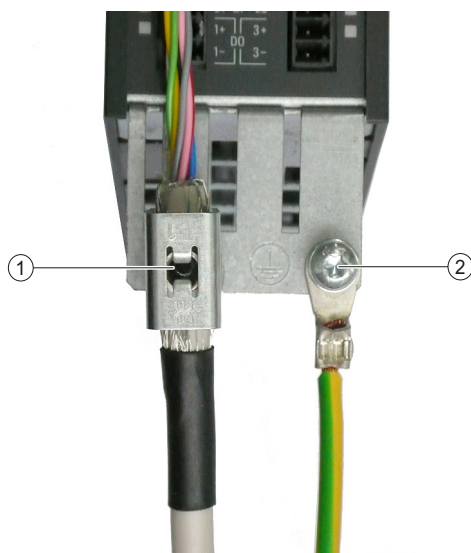
It is always advisable to use shielded wiring for the digital inputs and outputs.

NOTICE

Incorrect machine operation as a result of incorrect shielding or inadmissible cable lengths

If the described shielding procedures and the specified cable lengths are not observed, the machine may not operate properly.

The following figure shows a 50 mm component as an example:



- ① Shield contact
- ② Protective conductor connection

Figure 5-26 Example: Connections

Shield connection terminal (<http://www.weidmueller.com/int/home>) from Weidmüller

Type: KLBLUE CO 1

Article No.: 17533 11001

Note

Only use screws with a permissible insertion length of 4–6 mm.

5.9 Control Unit CU320-2 PN and CU310-2 PN

5.9.1 CU320-2 PN status displays

Module status displays

Three LEDs at the front of the CU320-2 PN provide information about the state of the module. They indicate the states when powering up and in operation:

- If an error occurs, the power-up is terminated and the LEDs indicate the cause of the error.
- At the end of an error-free power-up, all LEDs are switched off briefly.
- After power-up, the LEDs are controlled via the loaded software.

Response of the LEDs when powering up – loading software

LED			State	Remark
RDY	PN	OPT		
Red	Orange	Orange	Reset	Hardware reset RDY LED lights up red, all other LEDs light up orange
Red	Red	Off	BIOS loaded	–
Red flash- ing light 2 Hz	Red	Off	BIOS error	• An error occurred while loading the BIOS
Red flash- ing light 2 Hz	Red Flashing light 2 Hz	Off	File error	• Memory card not inserted or faulty • Software on memory card not present or corrupted
Red	Orange flashing light	Off	FW loading	RDY LED lights up red, PN LED flashes orange without fixed frequency
Red	Off	Off	FW loaded	–
Off	Red	Off	FW checked (no CRC error)	–
Red flash- ing light 0.5 Hz	Red flash- ing light 0.5 Hz	Off	FW checked (CRC error)	• CRC error

Response of the LEDs when powering up – firmware

LED			State	Remark
RDY	PN	OPT		
Orange	Off	Off	Initializing	–
Alternating			Running	See the table below

Response of the LEDs in operation

LED	Color	State	Description, cause	Remedy
RDY (READY)	–	OFF	Electronics power supply is missing or outside permissible tolerance range.	Check power supply
	Green	Continuous light	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
		Flashing light 0.5 Hz	Commissioning/reset	–
		Flashing light 2 Hz	Writing to the memory card	–
	Red	Flashing light 2 Hz	General error	Check parameterization/configuration
	Red/green	Flashing light 0.5 Hz	Control Unit is ready for operation. However, there are no software licenses.	Obtain licenses
	Orange	Flashing light 0.5 Hz	Updating the firmware of the connected DRIVE-CLiQ components	–
		Flashing light 2 Hz	DRIVE-CLiQ component firmware update complete. Wait for POWER ON for the components in question.	Perform a POWER ON of the affected component
	Green/Orange or Red/Orange	Flashing light 2 Hz	Component detection via LED is activated (p0124[0]). Note: Both options depend on the LED status when component recognition is activated via p0124[0] = 1.	–
PN PROFIdrive cyclic operation	–	Off	Cyclic communication has not (yet) taken place. Note: PROFIdrive is ready for communication when the Control Unit is ready (see LED RDY).	–
	Green	Continuous light	Cyclic communication is taking place.	–
		Flashing light 0.5 Hz	Full cyclic communication is not yet taking place. Possible causes: - The controller is not transferring any setpoints. - During isochronous operation, no global control (GC) or a faulty global control (GC) is transferred by the controller. "Shared Device" is selected (p8929=2) and only one controller connected.	–
	Red	Flashing light 0.5 Hz	Bus fault, incorrect parameter assignment/configuration.	Adapt configuration between controller and devices
		Flashing light 2 Hz	Cyclic bus communication has been interrupted or could not be established.	Correct the fault

5.9 Control Unit CU320-2 PN and CU310-2 PN

LED	Color	State	Description, cause	Remedy
OPT (OPTION)	–	Off	Electronics power supply is missing or outside permissible tolerance range. Component is not ready. Option board not installed or no associated drive object has been created.	Check power supply and/or component
	Green	Continuous light	Option Board is ready.	–
		Flashing light 0.5 Hz	Depends on the option board used.	–
	Red	Flashing light 2 Hz	At least one fault is present on this component. Option Board not ready (e.g. after switch-on).	Remove the fault and acknowledge
RDY and PN	Red	Flashing light 2 Hz	Bus fault – communication has been interrupted	Correct the fault
RDY and OPT	Orange	Flashing light 0.5 Hz	Firmware update in progress for connected Option Board CBE20.	–

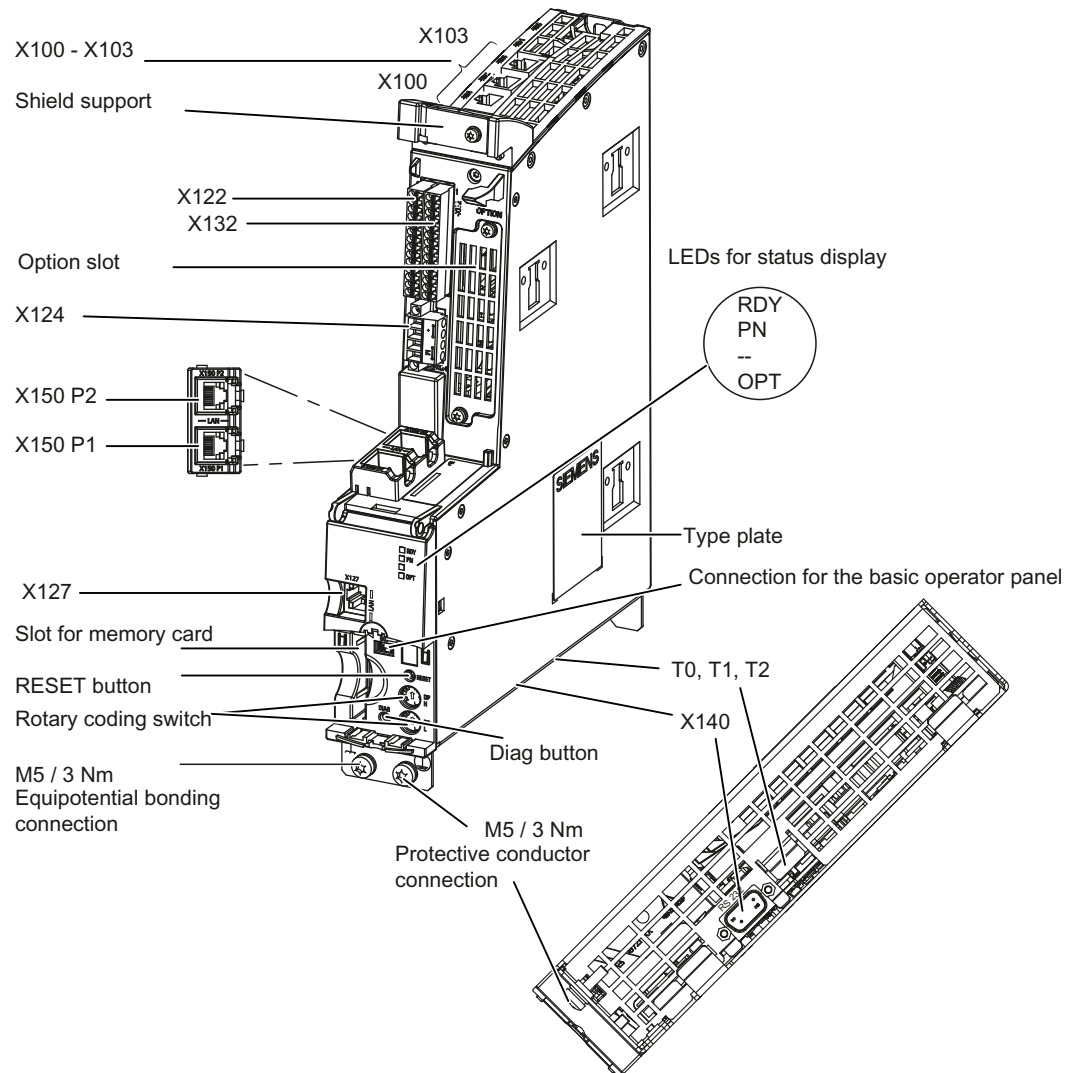
Status displays of Ethernet interfaces

The RJ45 sockets are equipped with one green and one yellow LED. As a consequence, the following information of the PLC I/O interface is displayed based on PROFINET and the LAN interface:

Name	Color	State	Meaning
Link	Green	Continuous light	10 or 100 Mbit link available
		Off	Missing or faulty link
Activity	Yellow	Flashing light	Sending or receiving data
		Off	No activity

5.9.2 CU320-2 PN connections

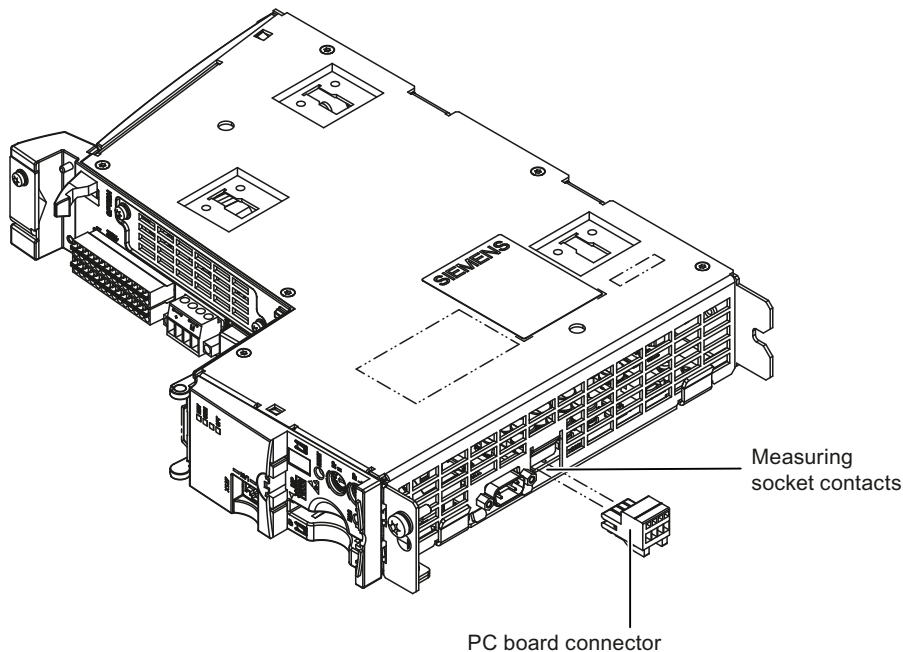
Connections



X100 ... X102	DRIVE-CLiQ interfaces
X122, X132	Digital inputs/outputs
X124	Electronics power supply
X127	Ethernet (LAN)
X150 P1, X150 P2	PROFINET interfaces
X140	Serial interface (lower side)
T0, T1, T2	Measuring sockets (lower side)
Figure 5-27	CU320-2 PN interface overview

PC board connector

Mounting a PC board connector in the measuring socket:



The PC board connector can be purchased from: Phoenix Contact (<https://www.phoenixcontact.com/online/portal/pc>)

5.9.3 This is how you remove the CU320-2 PN

Overview

The activities that are required when replacing a CU320-2 PN are subsequently described. If the CU320-2 PN has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

Procedure:

1. Switch off the complete system, carefully checked that it is in a no-voltage condition and lock it out so that it cannot be switched on without the appropriate authorization.
2. Access the control cabinet where the CU320-2 PN is located.
3. Open the cover of the CU320-2 PN.

4. Use a multimeter to check that the CU320-2 PN really is in a no-voltage condition.
5. If it has not already been done, label all connectors and cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
6. Withdraw the electronics power supply X124.
7. Withdraw the DRIVE-CLiQ cables X100 - X103.
8. Withdraw the Profinet cable.
9. Withdraw all other cables, if available.
10. Remove the protective conductor connection of the CU320-2 PN.
11. Release the screws attaching the CU320-2 PN to the mounting plate.
12. Remove the CompactFlash card.

5.9.4 This is how you install the CU320-2 PN

Installing

Procedure:

1. Screw the new CU320-2 PN onto the mounting plate.
2. Reconnect the protective conductor connection of the CU320-2 PN.
3. First insert the PROFINET cable that was previously withdrawn.
4. Insert the DRIVE-CLiQ cables that were previously withdrawn into sockets X100-X103.
5. Insert all other cables, if available.
6. Reconnect the electronics power supply X124.
7. Now check that all of the cables have been reconnected.
8. Insert the CompactFlash card.
9. Close the cover of the CU320-2 PN.
10. Close the cabinet and switch-on the system again.

5.9.5 CU310-2 PN status displays

Module status displays

Four LEDs at the front of the CU310-2 PN provide information about the state of the module. They indicate the states when powering up and in operation:

- If an error occurs, the power-up is terminated and the LEDs indicate the cause of the error.
- At the end of an error-free power-up, all LEDs are switched off briefly.
- After power-up, the LEDs are controlled via the loaded software.

Response of the LEDs when powering up – loading software

LED				State	Remark
RDY	COM	OUT>5V	MOD		
Orange	Orange	Orange	Orange	POWER ON	All LEDs light up for approx. 1 s
Red	Red	Off	Off	Hardware reset	After pressing the RESET button the LEDs light up for approx. 1 s
Red	Red	Off	Off	BIOS loaded	-
Red Flashing light 2 Hz	Red	Off	Off	BIOS error	An error occurred while loading the BIOS
Red Flashing light 2 Hz	Red Flashing light 2 Hz	Off	Off	File error	Memory card not inserted or faulty Software on memory card not present or corrupted

Response of the LEDs when powering up – firmware

LED				State	Remark
RDY	COM	OUT>5V	MOD		
Red	Orange	Off	Off	Firmware loading	COM-LED flashing without fixed flashing frequency
Red	Off	Off	Off	Firmware loaded	-
Off	Red	Off	Off	Firmware check (no CRC error)	-
Red Flashing light 0.5 Hz	Red Flashing light 0.5 Hz	Off	Off	Firmware check (CRC error)	CRC is incorrect
Orange	Off	Off	Off	Firmware initialization	-

Response of the LEDs in operation

LED	Color	State	Description / cause	Remedy
RDY (READY)	-	Off	Electronics power supply is missing or outside permissible tolerance range.	Check the power supply
	Green	Continuous light	The unit is ready for operation. Cyclic DRIVE-CLiQ communication is in progress.	-
		Flashing light 0.5 Hz	Commissioning/reset	-
		Flashing light 2 Hz	Writing to the memory card.	-
	Red	Flashing light 2 Hz	General error	Check parameter assignment/configuration
	Red/green	Flashing light 0.5 Hz	The Control Unit is ready for operation, but there are no software licenses.	Install the missing licenses.
	Orange	Flashing light 0.5 Hz	Updating the firmware of the DRIVE-CLiQ components.	-
		Flashing light 2 Hz	DRIVE-CLiQ component firmware update completed. Waiting for POWER ON of the corresponding component.	Switch on the component.
	Green/ Orange or Red/Orange	Flashing light 2 Hz	Recognition of the component via LED is activated (see SINAMICS S120/S150 List Manual.) Note: Both options depend on the LED status when component recognition is activated.	-
COM	-	Off	Cyclic communication has not (yet) taken place. Note: PROFIdrive is ready for communication when the Control Unit is ready (see LED: RDY).	-
	Green	Continuous light	Cyclic communication is taking place.	-
		Flashing light 0.5 Hz	Full cyclic communication is not yet taking place. Possible causes: - The controller is not transferring any setpoints. - During isochronous operation, no GC (Global Control) or a faulty GC is transferred by the controller.	-
	Red	Flashing light 0.5 Hz	The PROFIBUS master is sending a faulty parameter assignment or the configuration file is corrupted.	Modify the configuration between master/controller and Control Unit.
		Flashing light 2 Hz	Cyclic bus communication has been interrupted or could not be established.	Rectify the bus communication fault.
MOD	-	Off	-	-
OUT > 5 V	-	Off	-	-
	Orange	Continuous light	The voltage of the electronics power supply for the measuring system is 24 V. ¹⁾	

¹⁾ Make sure that the encoder connected is designed for a 24 V supply. Connecting a 5 V encoder to a 24 V supply can destroy the encoder electronics.

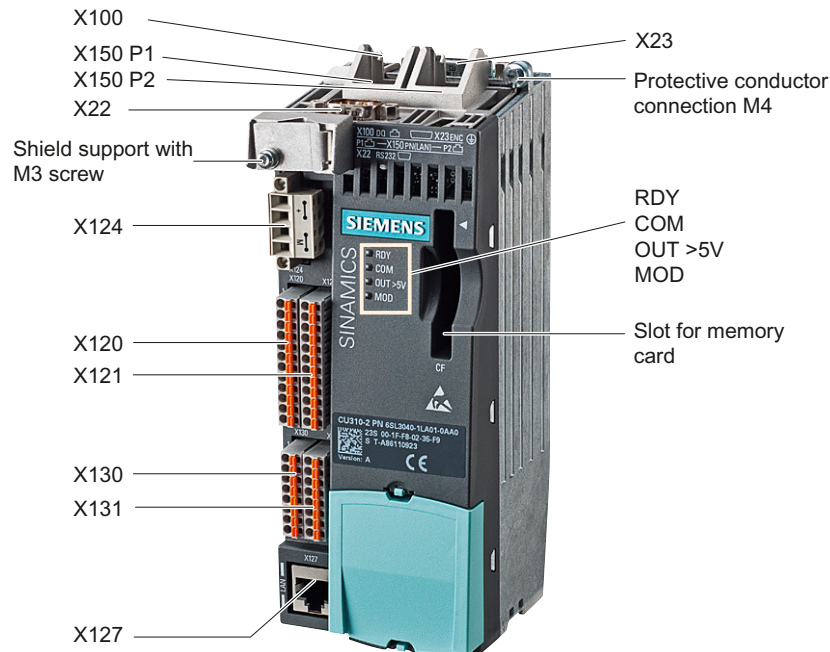
Status displays of PROFINET interfaces

The RJ45 sockets are equipped with one green and one yellow LED. As a consequence, the following information of the PLC I/O interfaces is displayed based on PROFINET:

Name	Color	State	Meaning
Link	Green	Continuous light	10 or 100 Mbit link available
		Off	Missing or faulty link
Activity	Yellow	Flashing light	Sending or receiving data
		Off	No activity

5.9.6 CU310-2 PN connections

Connections



X22	Serial interface
X23	Encoder interface HTL/TTL/SSI
X100	DRIVE-CLiQ interface
X120	Fail-safe digital inputs/connection for the temperature sensor
X121	Digital inputs/digital outputs
X124	Electronics power supply
X127	LAN (Ethernet)
X130	Digital input/fail-safe digital output
X131	Digital input/output/analog input
X150 P1	PROFINET interfaces
X150 P2	

Figure 5-28 Interface overview of the CU310-2 PN

Note

The PROFIBUS address switch on the CU310-2 PN has no function.

5.9.7 This is how you remove the CU310-2 PN

Overview

The activities that are required when replacing a CU310-2 PN are subsequently described.

If the CU310-2 PN has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

Procedure:

1. Switch off the complete system, carefully checked that it is in a no-voltage condition and lock it out so that it cannot be switched on without the appropriate authorization.
2. Access the control cabinet where the CU310-2 PN is located.
3. Use a multimeter to check that the CU310-2 PN really is in a no-voltage condition.
4. If it has not already been done, label all connectors and cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
5. Withdraw the electronics power supply X124.
6. Withdraw the DRIVE-CLiQ cable X100.
7. Withdraw all other cables, if available.
8. Remove the protective conductor connection of the CU310-2 PN.

9. Press the blue locking latch downward (see arrow).

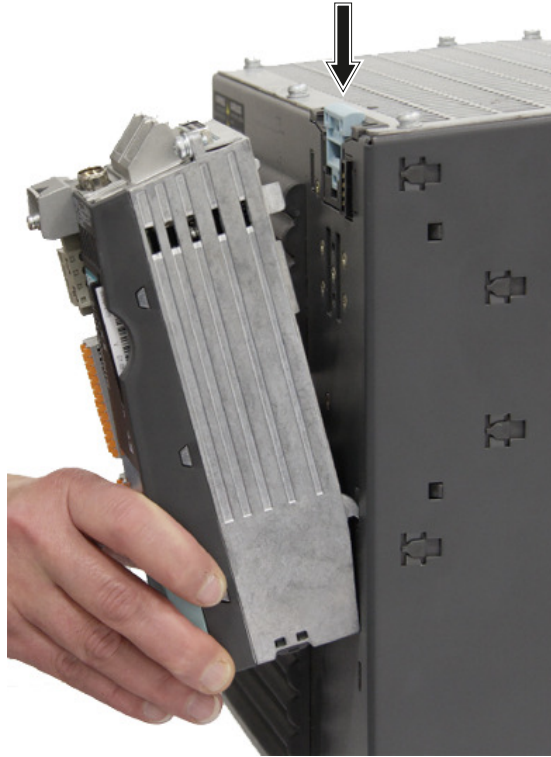


Figure 5-29 Removing the CU310-2 PN from the PM340

10. Remove the Control Unit toward the front.
11. Remove the CompactFlash card.

5.9.8 This is how you install the CU310-2 PN

Installing

Procedure:

1. Place the Control Unit on the PM340.

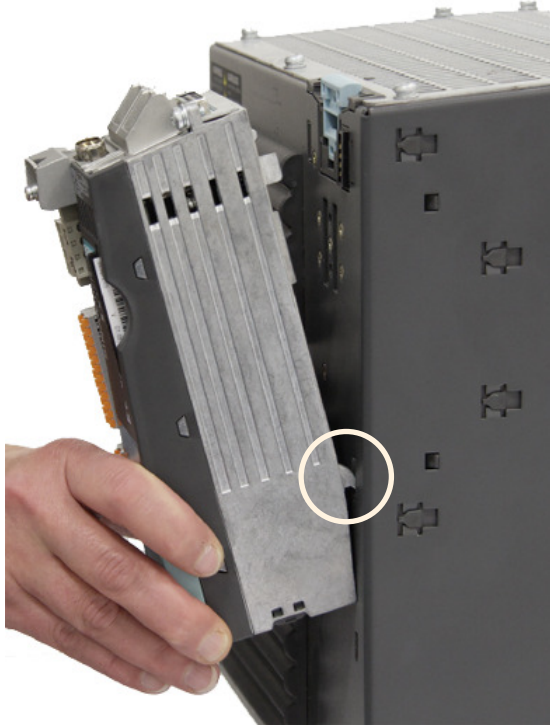


Figure 5-30 Mounting the CU310-2 PN on the PM340

2. Push the Control Unit back until it latches in the blue locking latch.
3. Reconnect the protective conductor connection of the CU310-2 PN.
4. Insert the DRIVE-CLiQ cable that was previously withdrawn into socket X100.
5. Insert all other cables, if available.
6. Reconnect the electronics power supply X124.
7. Now check that all of the cables have been reconnected.
8. Insert the CompactFlash card.
9. Close the cabinet and switch-on the system again.

5.10 SINAMICS S120 Combi

5.10.1 S120 Combi status displays

Status displays

The SINAMICS S120 Combi has two LEDs to display the status of the components. The software assigns a priority to the status signals from the individual components. The most important and most informative status is output for the complete S120 Combi.

The status is immediately output if any component develops a fault. The ready to run indication is only issued if all of the components have signaled that they are ready to run.

The LED statuses for the S120 Combi are described in the following table. The status display always refers to the entire module.

State		Description, cause	Remedy
RDY	DC LINK		
Off	Off	Electronics power supply is missing or outside permissible tolerance range.	Connect/test the electronics power supply
Green	Off	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	-
	Orange	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is present.	-
	Red	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is too high.	Check the line supply voltage.
Orange	Orange	DRIVE-CLiQ communication is being established.	-
Red	-	This component has at least one fault. Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove the fault and acknowledge
Green/Red (0.5 Hz)	-	Firmware is being downloaded.	
Green/Red (2 Hz)	-	Firmware has been downloaded. Wait for POWER ON.	Carry out a POWER ON
Green/Orange or Red/Orange	-	Component recognition using LED is activated (p0124) Note: Both options depend on the LED status when module recognition is activated via p0124 = 1.	-



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

Hazardous DC link voltages may be present at any time regardless of the state of the "DC LINK" LED. The warning information on the components must be carefully observed!

5.10.2 Connections, 3-axis module

Connections

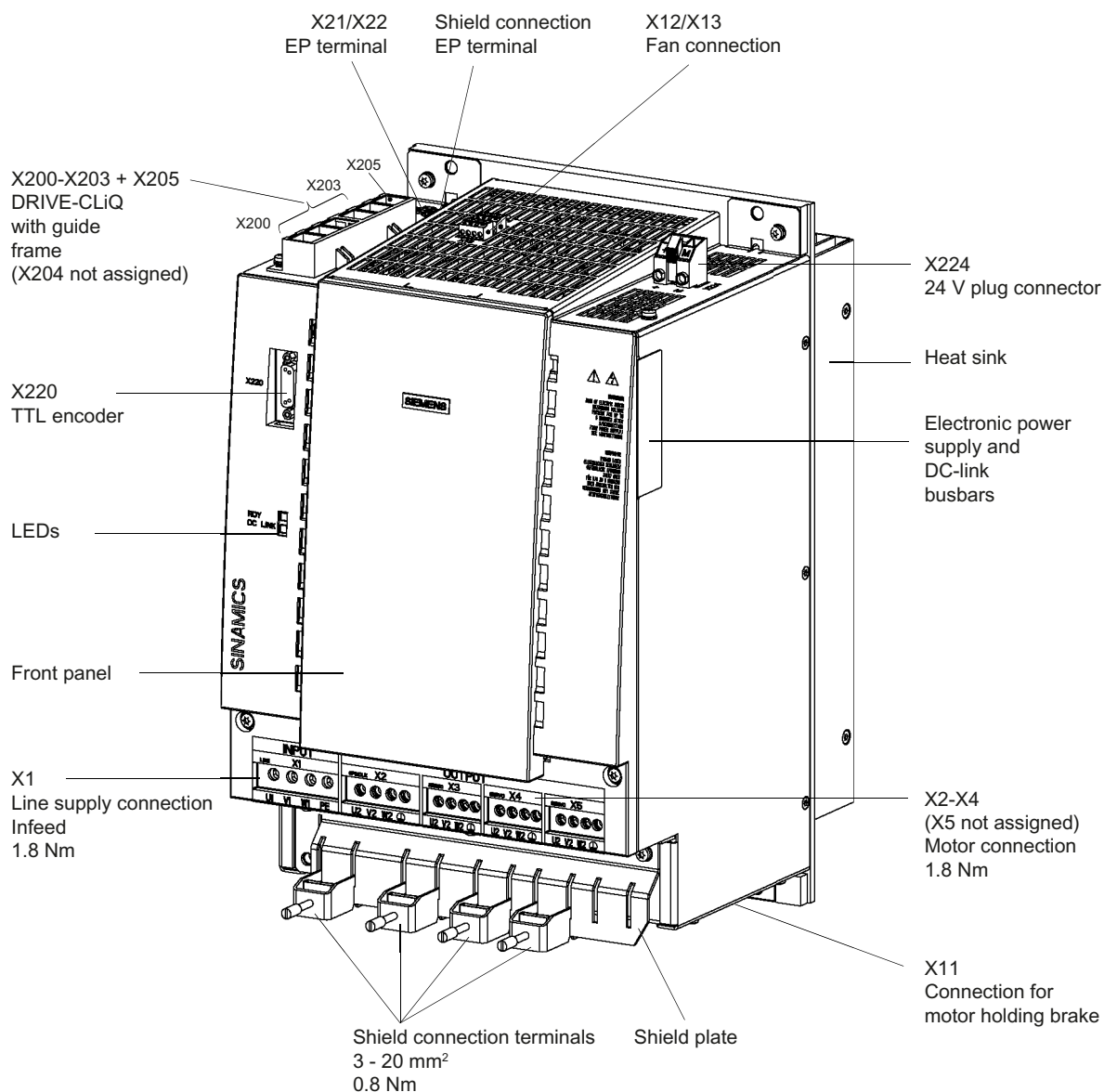
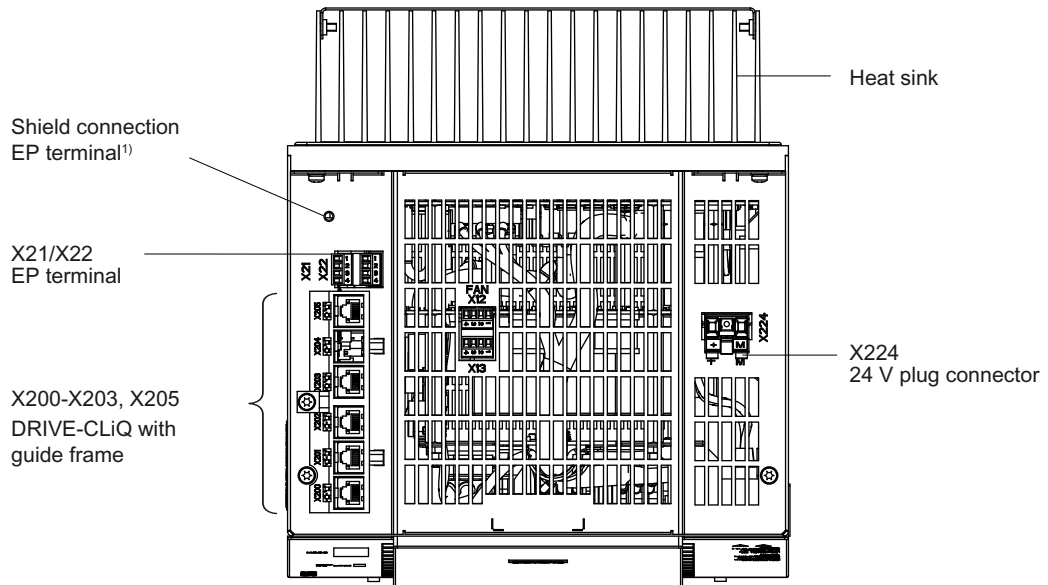


Figure 5-31 S120 Combi 3 axis Power Module

View from the top



1) The shield connection terminal is included in the accessories pack (Weidmüller, type KLBÜ 3-8 SC).

Figure 5-32 S120 Combi 3 axis Power Module

View from below

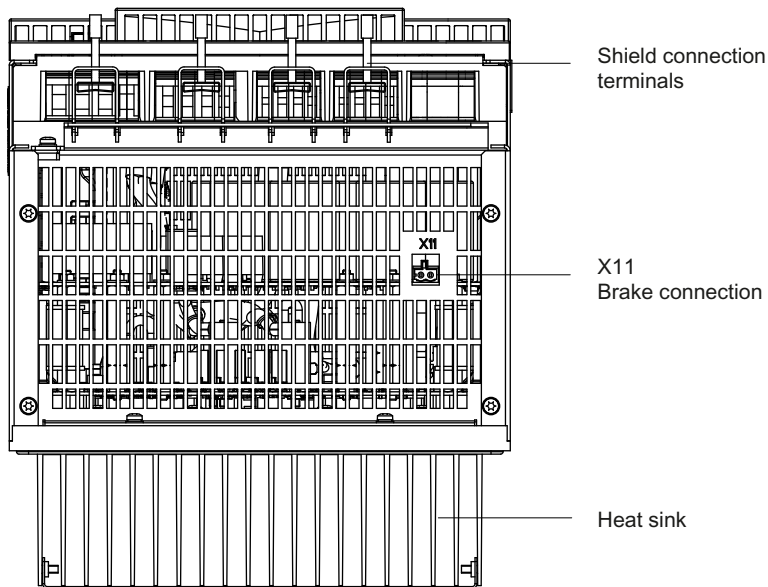
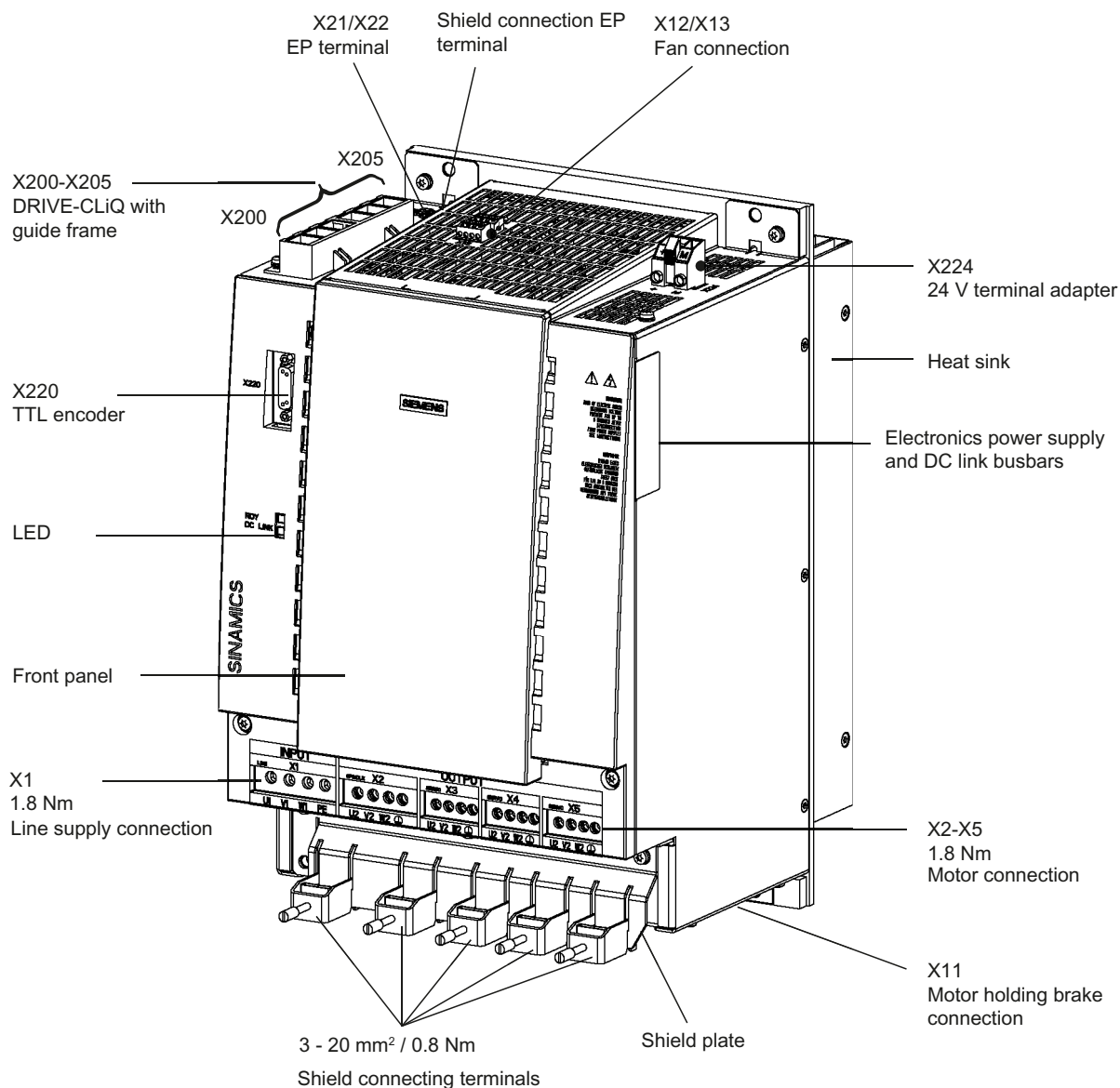


Figure 5-33 S120 Combi 3 axis Power Module

5.10.3 Connections, 4-axis module

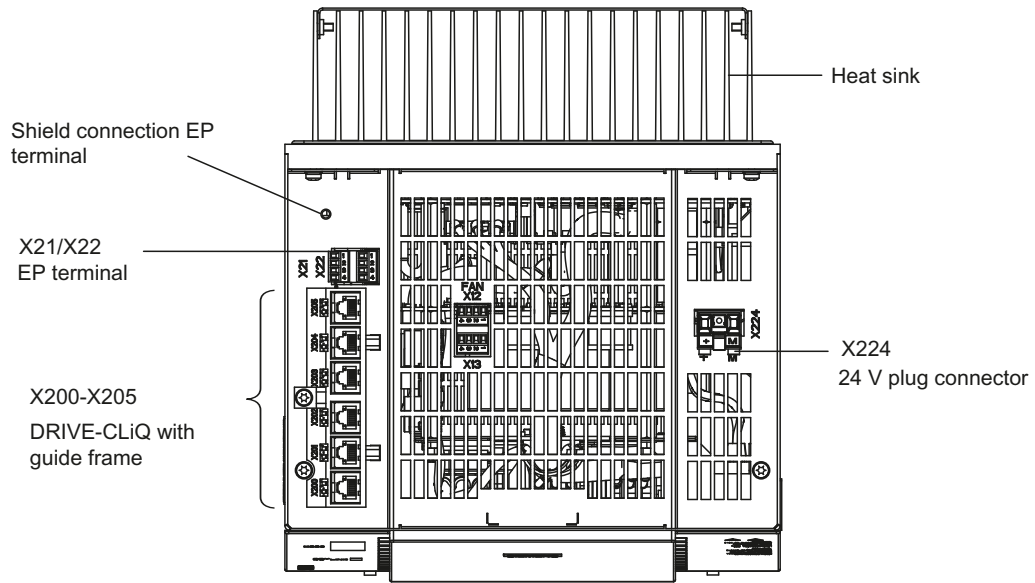
Connections, S120 Combi with 4 axes



EP terminal The shield support is included in the accessories pack (Weidmüller, type KLBÜ 3-8 SC).

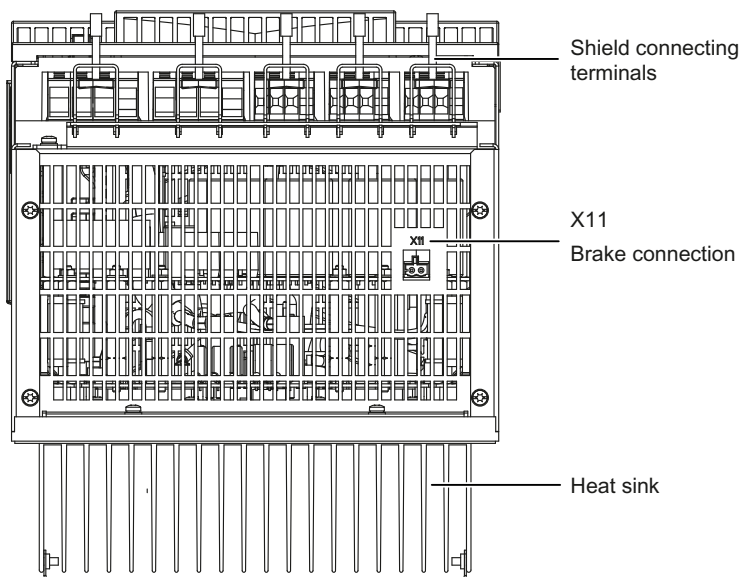
Figure 5-34 S120 Combi 4 axis Power Module

View from the top



The shield support is included in the accessories pack (Weidmüller, type KLBÜ 3-8 SC).

View from below



5.10.4 How to mount an S120 Combi Power Module

Precondition

The reinforcement plates are installed in order to mount an S120 Combi Power Module.

Mounting

Procedure:

1. Mount the self-clinching flush head studs M6.
2. Position the S120 Combi Power Module and initially tighten the M6 nuts by hand with 0.5 Nm.
3. Then tighten the nuts in the specified sequence 1 to 4 with 10 Nm.

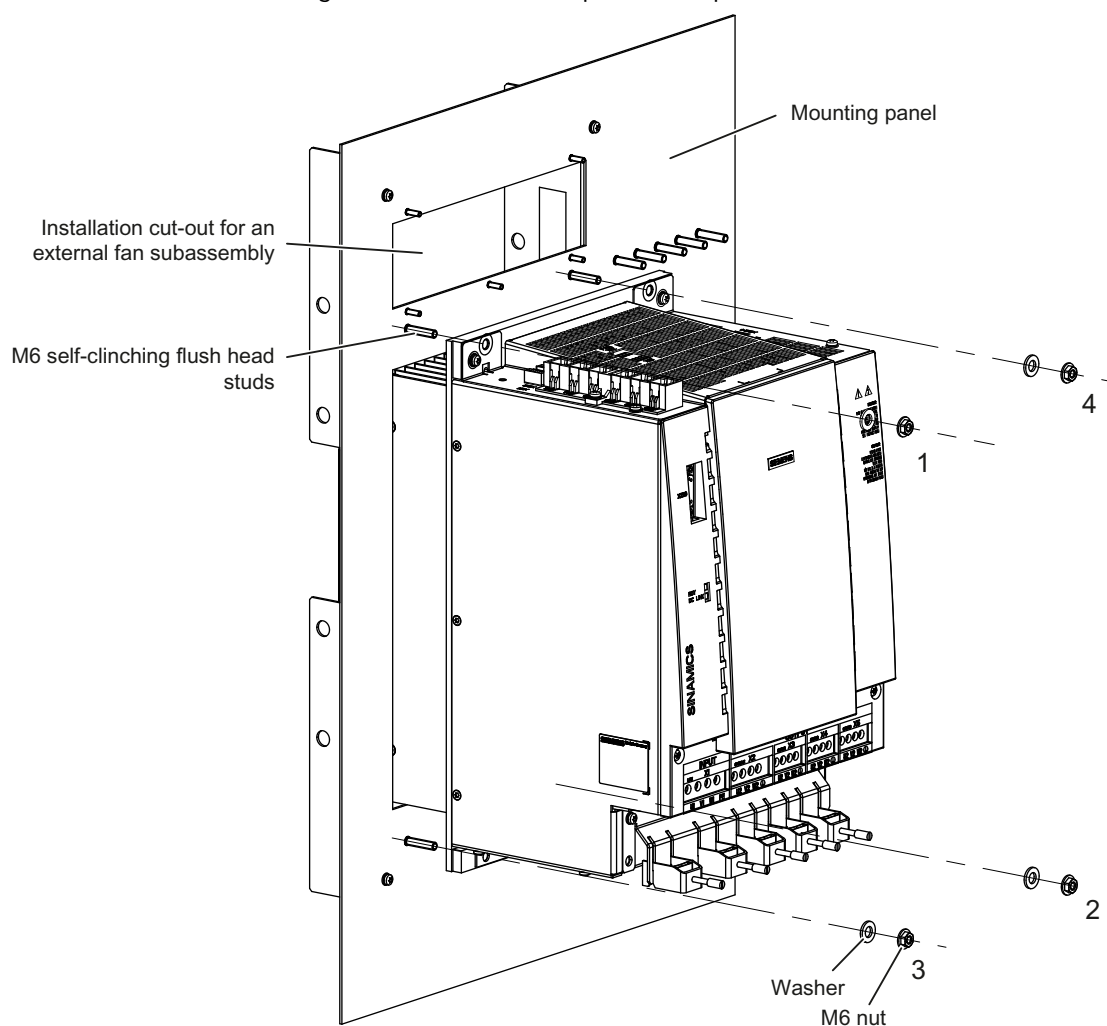


Figure 5-35 Installing an S120 Combi Power Module

4. Connect the protective conductor.
See also: Protective conductor connection and shield contact (Page 139)
5. Connect the following connections with the associated screw-type terminals:
X1: Line supply connection
X2 to X4: Motor connection for the S120 Combi with 3 axes
X2 to X5: Motor connection for the S120 Combi with 4 axes

5.10.5 This is how you attach the drip protection

Attaching the drip protection

To prevent liquids from dripping into the module from the top, a drip protection assembly is available; this is provided as standard in the scope of supply for the 4-axis version. For the other S120 Combi Power Modules, drip protection assembly can be ordered as Spare parts and accessories (Page 253).

Attach the drip protection assembly to the top of the S120 Combi Power Module:

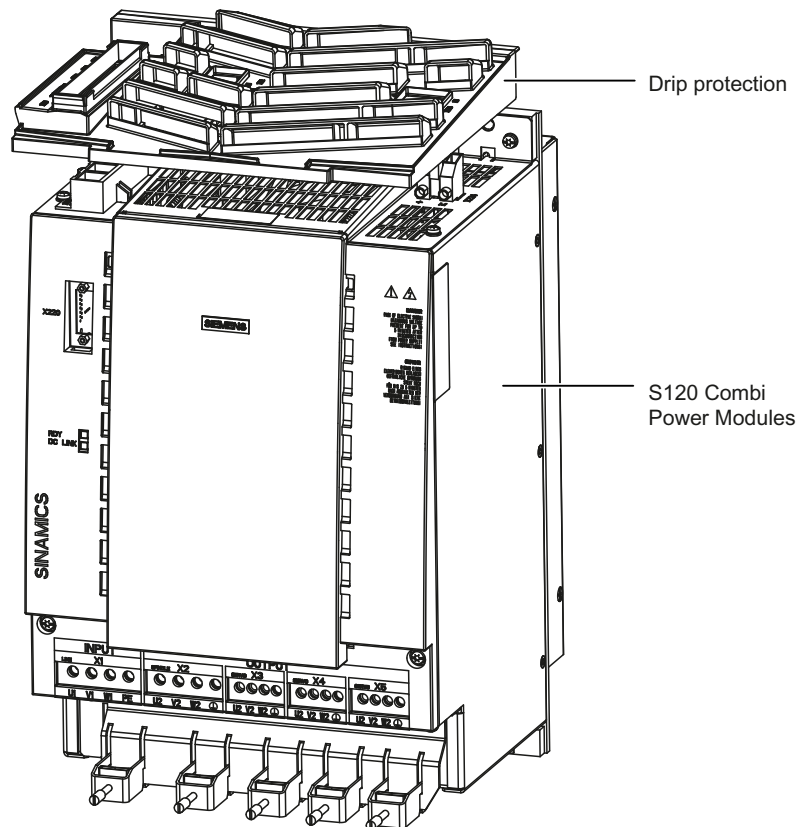


Figure 5-36 S120 Combi Power modules with drip protection

5.10.6 This is how you remove the front panel

Removing the front plate of the S120 Combi

To electrically connect additional components, the front cover of the S120 Combi must be removed.



! DANGER

Danger to life through electric shock

A hazardous voltage is still present for up to 5 minutes after the power supply has been switched off.

- Remove the front plate only after 5 minutes have passed.

Procedure:

1. Use a Torx T20 or slotted 1.2 x 6 screwdriver as tool.
2. Remove the two Torx-slotted screws at the front.



3. Release the front cover by slightly pressing upwards



4. Remove the front plate.



5.10.7 This is how you open the DC link cover

Opening the DC link cover

To electrically connect additional components, the front cover of the S120 Combi must already have been removed.

The DC link busbars are located under the DC link cover.



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

As a result of the DC link capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off.

Contact with live parts results in death or serious injury.

- Do not open the protective cover of the device until 5 minutes have elapsed.
- Before starting any work, check that the system is in a completely no-voltage condition by measuring all poles/phases, also to ground.
- Ensure that the associated warning plate in the appropriate language is attached.

Procedure:

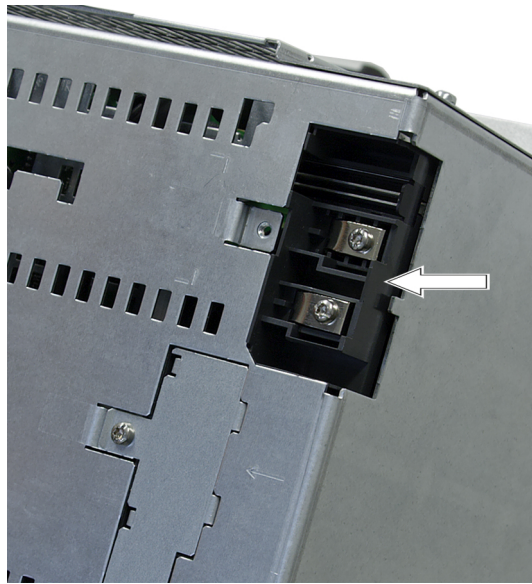
1. Remove the Torx-slotted screw of the DC link cover.



2. Remove the DC link cover.



3. Remove the DC link side cover.



5.10.8 This is how you connect the DC link busbars and 24 V busbars

Connecting additional components

The following steps are necessary to connect a component to the DC link and the 24 V busbars of the S120 Combi.

Note

When commissioning a drive line-up the following must be observed

The following points must be complied with before commissioning the drive line-up:

- The outer DC link side cover is inserted at the connected component.
- The protective cover of the connected component is closed.
- The front cover of the S120 Combi has been reinstalled.

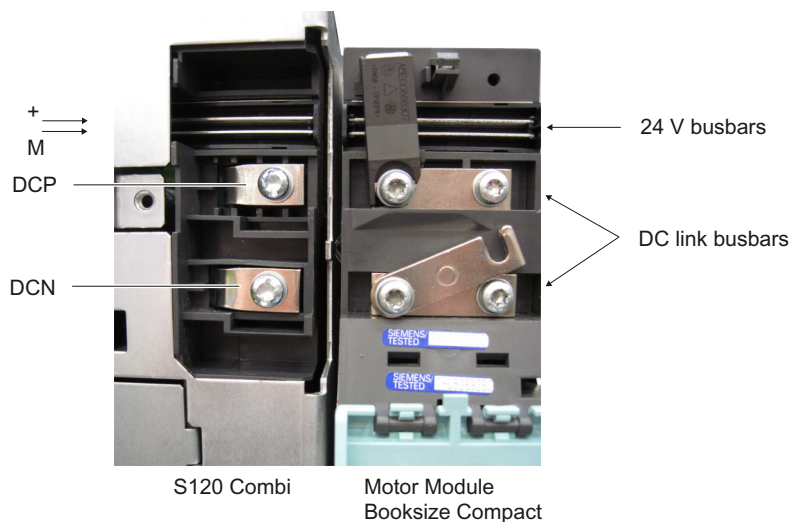
Note

Attach the touch protection for the DC link busbars

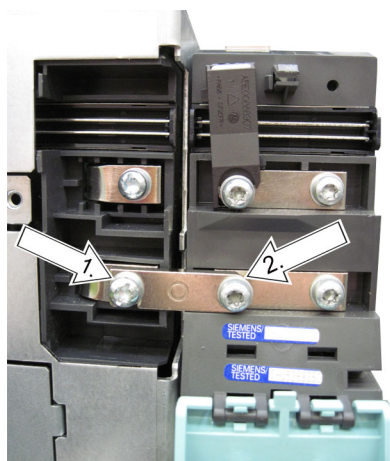
After removing the additional components, before recommissioning the system, the touch protection of the DC link busbars on the S120 Combi power module must be reinstalled. The touch protection can be ordered as a spare part.

5.10 SINAMICS S120 Combi

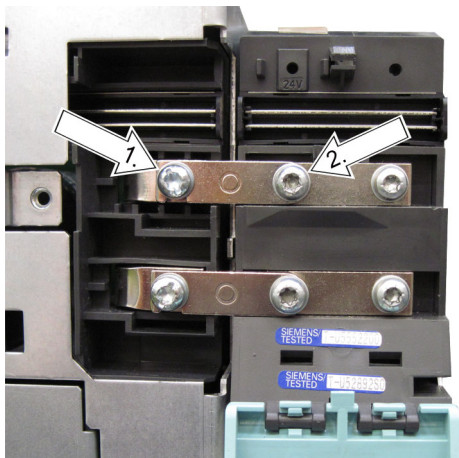
1. Use a suitable tool to open the protective cover of the component to be connected
2. Remove the DC link side cover at the connection location.



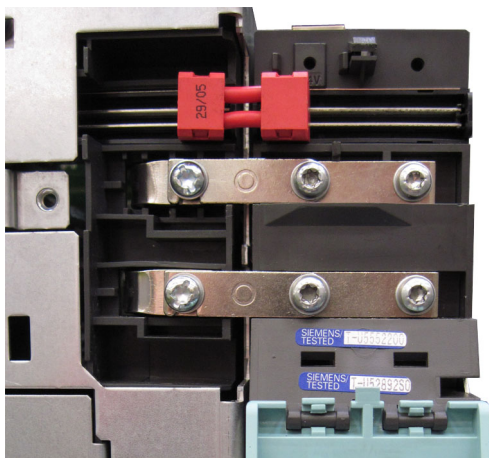
3. Use the following tool to install the DC link busbar:
Screwdriver: Torx T20 or slotted 1.2 x 6
Tightening torque: 1.8 Nm
4. Install the lower DC link busbar as shown in the following diagram:



5. Install the upper DC link busbar as shown in the following diagram:



- Release the screws
 - Remove the plastic cap on the DC link bridge
 - Turn over the DC link bridge.
 - Observe the sequence when tightening the screws!
6. Install the red 24 V connectors in accordance with the supplied description of the component to be connected.



7. Close the protective cover of the connected component.
8. Mount the front plate on the S120 Combi.

5.10.9 To connect the second component

Connecting a second component

A second component is connected as follows to the DC link busbars and the 24 V busbars:

Note

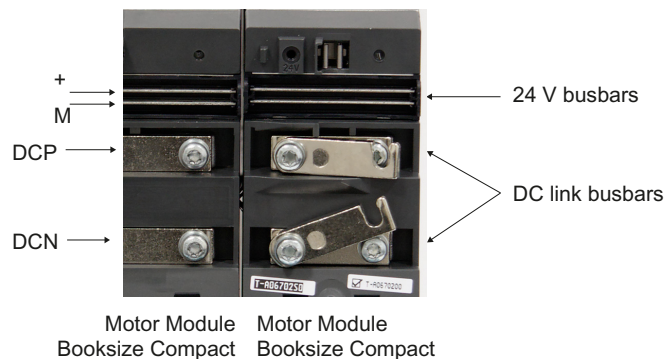
Before commissioning a drive line-up the following must be observed

The following points must be complied with before commissioning the drive line-up:

- The DC link side cover is inserted at the outer component (touch protection).
 - The protective covers of the connected components are closed.
-

Procedure:

1. Use a suitable tool to open the protective cover of the component to be connected
2. Remove the DC link side covers of both components at the connection location



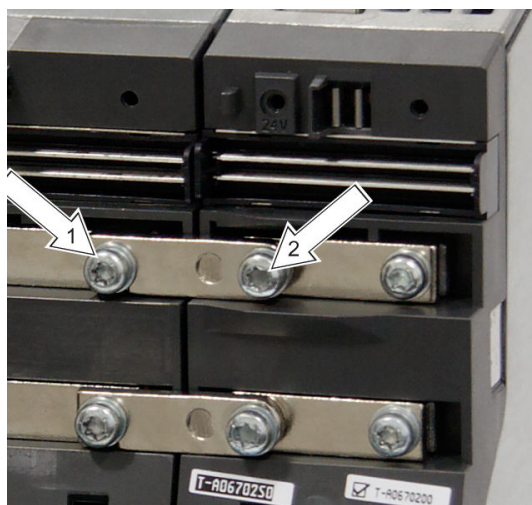
3. To connect the DC link busbars you will need the following tool:
Screwdriver: Torx T20
Tightening torque: 1.8 Nm

4. Install the lower DC link busbar:



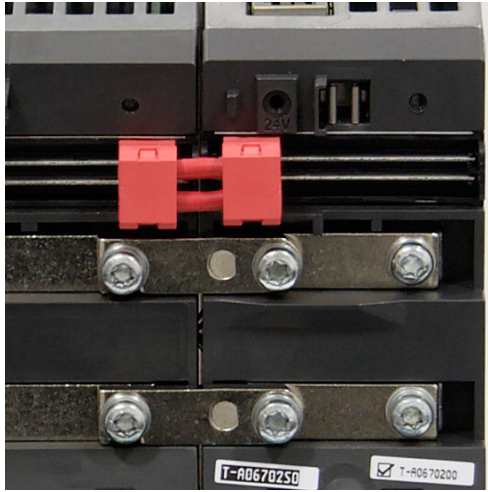
- Release the screws
- Turn over the DC link bridge.
- Observe the sequence when tightening the screws

5. Install the upper DC link busbar:



- Release the screws
- Turn over the DC link bridge.
- Observe the sequence when tightening the screws

6. Install the red 24 V connectors in accordance with the supplied description of the component to be connected.



7. Close the protective covers of both components.

5.10.10 This is how you remove the internal fan

Removing the internal fan

Note

When replacing the fan, you must observe the ESD regulations.

Only qualified personnel are permitted to install spare parts!



⚠ DANGER

Danger to life through live parts and components

Death or serious injury can result when live parts are touched.

- Switch off the power supply before replacing the fan (400 V AC). A hazardous voltage is still present for up to 5 minutes after the power supply has been switched off.
- Before removing the component, carefully ensure that it is in a no-voltage condition.

Procedure:

1. Remove the S120 Combi front cover (see also: This is how you remove the front panel (Page 161)).
2. Remove the Torx-slotted screw of the fan cover.



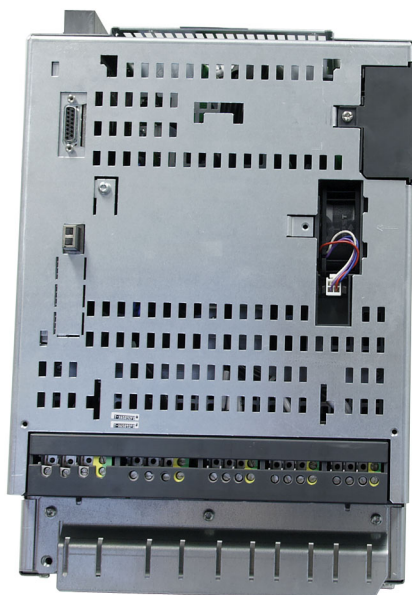
3. Remove the fan cover,



4. Remove the cable connector by gently pressing the interlock and connector together.



Opened fan compartment:



5. Withdraw the fan.

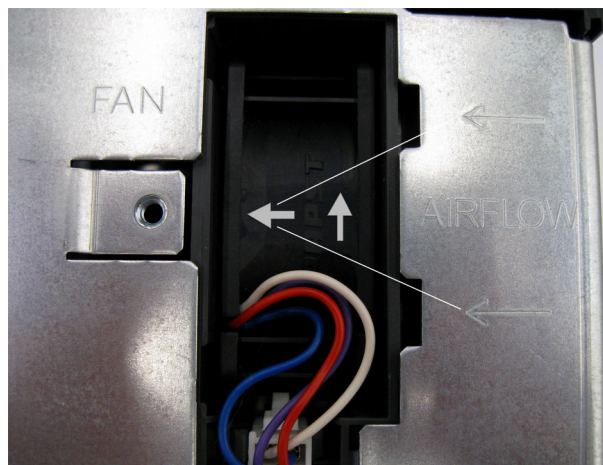


5.10.11 This is how you install the internal fan

Installing a new internal fan

Procedure:

1. Before installing the fan, note the direction of the airflow:
The arrows on the fan must match the following diagram!



The arrows on the fan show the direction of the airflow.

2. Insert the fan: The connecting cables must not be crushed!
3. Insert the plug connector: The connector must audibly click into place.
4. Close the fan cover.

5. Attach the Torx-slotted screw to the fan cover.
6. Install the front panel and tighten the front screws.
(see Chapter: This is how you remove the front panel (Page 161))

5.10.12 This is how you install the external fan

Preparation

The external fan unit is always installed above the S120 Combi in the control cabinet.

Make an installation cut-out in the control cabinet panel. The position depends on the installation cut-out for the S120 Combi (see Chapter:How to mount an S120 Combi Power Module (Page 158)).

Mounting accessories

Number	Designation	Specification
5	Self-clinching flush head studs	M4, steel, strength class 8.8, zinc-plated, length: 15 mm
5	Nut	M4, steel, strength class 8, zinc-plated

Installing

Procedure:

1. Mount the self-clinching flush head studs - position 1) in the following part of the diagram:
The zero line shown runs at the height of the upper bolts used to mount the S120 Combi.

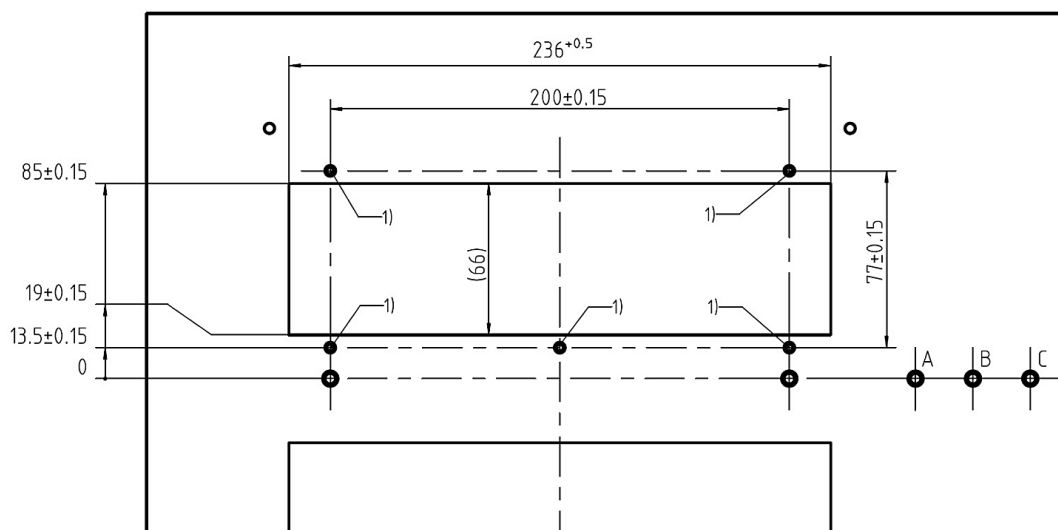


Figure 5-37 Section from the drilling pattern and installation cut-out for the external fan unit

2. Connect the power supply cables of the fan unit to the S120 Combi Power Module.
 - Cable A to terminal X12
 - Cable B to terminal X13

3. Mount the fan module in the specified sequence (step ① to step ④):

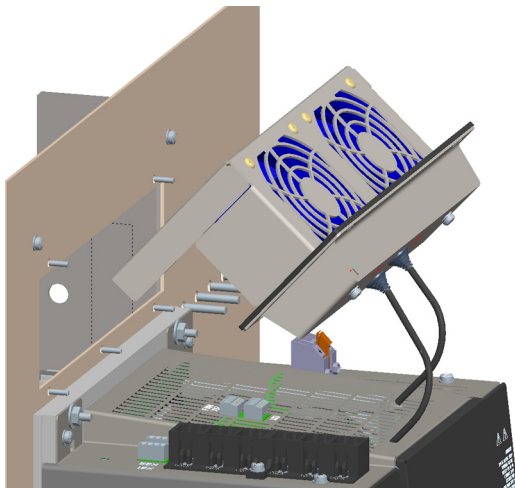


Figure 5-38 Step ①

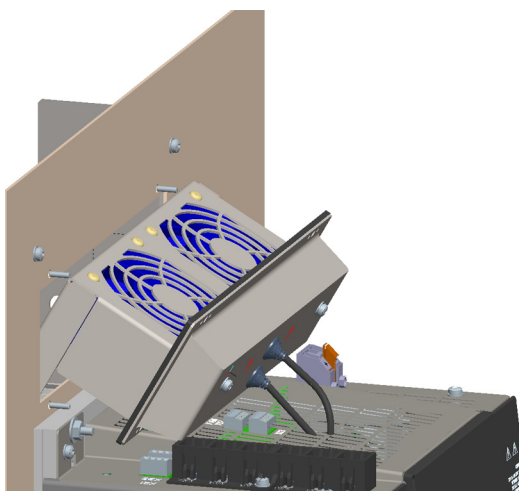


Figure 5-39 Step ②

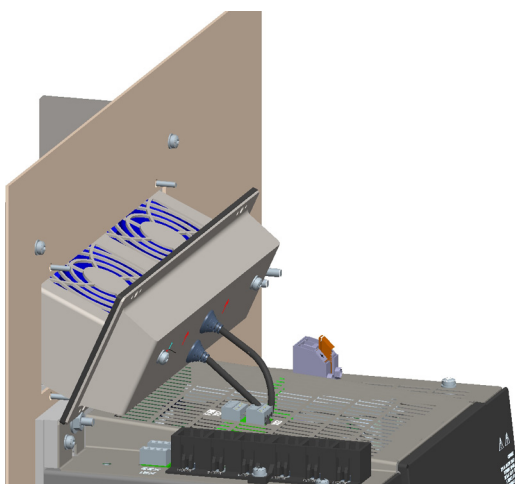


Figure 5-40 Step ③

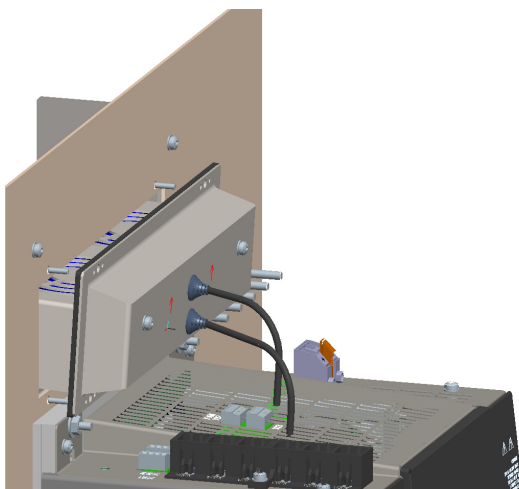
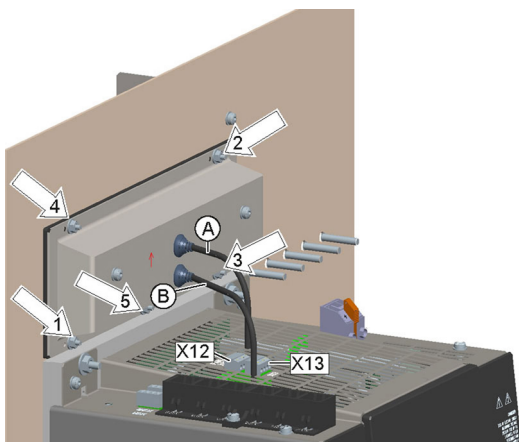


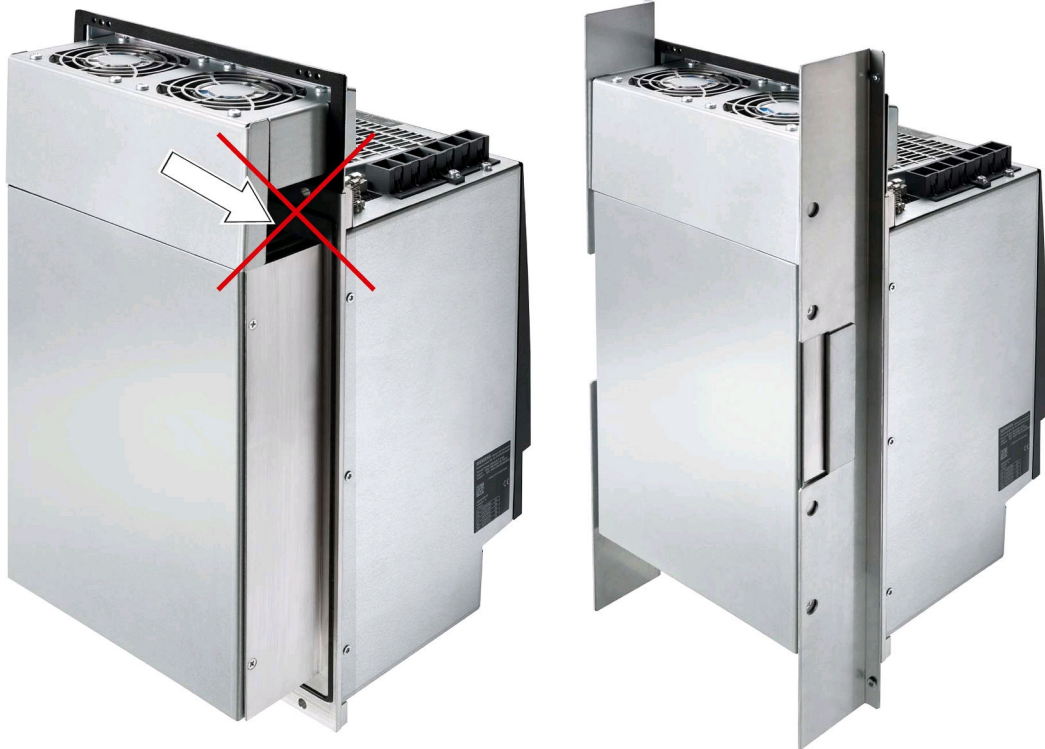
Figure 5-41 Step ④

4. Initially tighten the nuts by hand with 0.5 Nm.
5. Then tighten the nuts with a tightening torque of 1.8 Nm in the specified sequence (arrow 1 to arrow 5):



Boundary condition

It is important that the reinforcement plates must always be installed when operating the S120 Combi with the external fan unit:



WRONG:

S120 Combi and external fan unit without reinforcement plates

CORRECT:

S120 Combi and external fan unit with installed reinforcement plates

Note

Shutdown as a result of excessively high temperature if the reinforcement plates are missing

Operation without the reinforcement plates is not permissible.

If the reinforcement plates are incorrectly fixed, this can result in an excessively high heat sink temperature and cause the S120 Combi to prematurely trip.

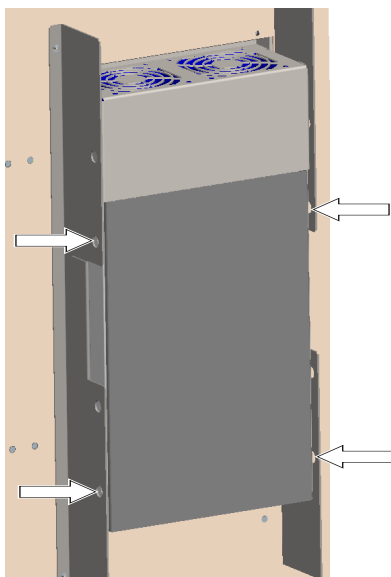
5.10.13 This is how you clean the heat sink of the S120 Combi

Cleaning the heat sink

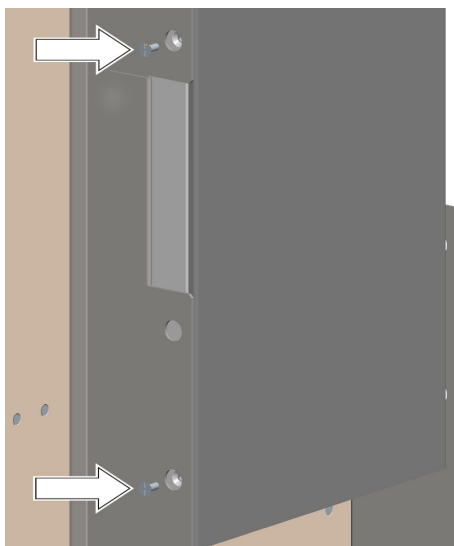
The S120 Combi heat sink should be cleaned at regular intervals using either compressed air or high-pressure water jets. To clean the heat sink, the air baffle plate at the rear of the S120 Combi must be removed.

Procedure:

1. The screws are accessible from the rear.

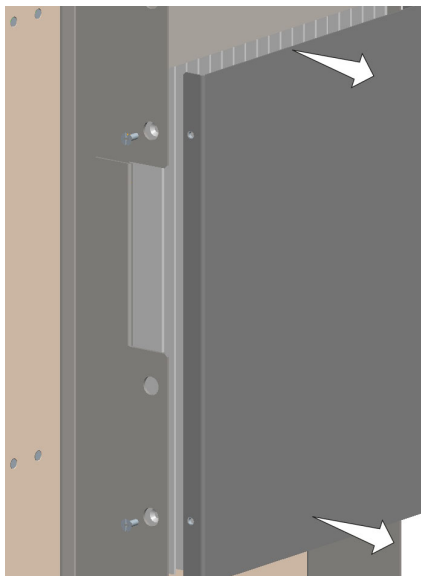


2. To remove the air baffle plate on the S120 Combi, release the fixing screws through the holes in the reinforcement plates.

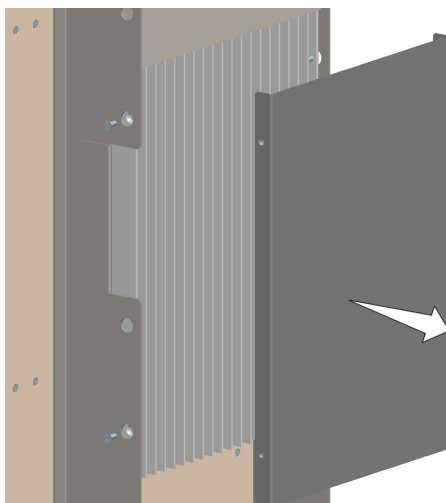


Screws: Slotted or cross slot M4 x 10, DIN EN ISO 7046-1/2

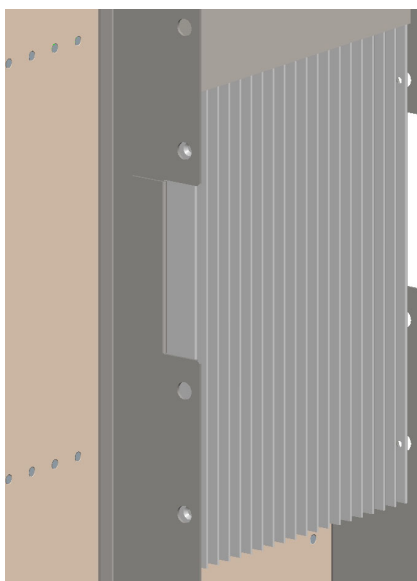
3. Remove the air baffle plate in the direction of the arrow.



The air baffle plate has been removed.



The heat sink can now be cleaned:



4. After cleaning the heat sink, the air baffle plate is reinstalled in the reverse sequence. **Tightening torque** for the screws: 1.8 Nm.

5.11 Motor Module Booksize Compact format

5.11.1 Motor Module Booksize Compact status displays

Status displays

The Motor Module has the following status displays, which provide information about the module state:

LED state		Description, cause	Remedy
RDY	DC LINK		
OFF	OFF	Electronics power supply is missing or outside permissible tolerance range.	--
Green	---	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	--
	Orange	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is present.	--
	Red	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is too high.	Check the line supply voltage.
Orange	Orange	DRIVE-CLiQ communication is being established.	--
Red	--	This component has at least one fault. Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove the fault and acknowledge
Green / Red (0.5 Hz)	--	Firmware is being downloaded.	--
Green / Red (2 Hz)	--	Firmware download has been completed. Wait for POWER ON.	Carry out a POWER ON
Green/Orange or Red/Orange	--	Component recognition via LED is activated (p0124). Note: Both options depend on the LED status when module recognition is activated via p0124 = 1.	--



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

Hazardous DC link voltages may be present at any time regardless of the state of the "DC LINK" LED. The warning information on the components must be carefully observed!

5.11.2 Motor Module connections

Single Motor Module connections

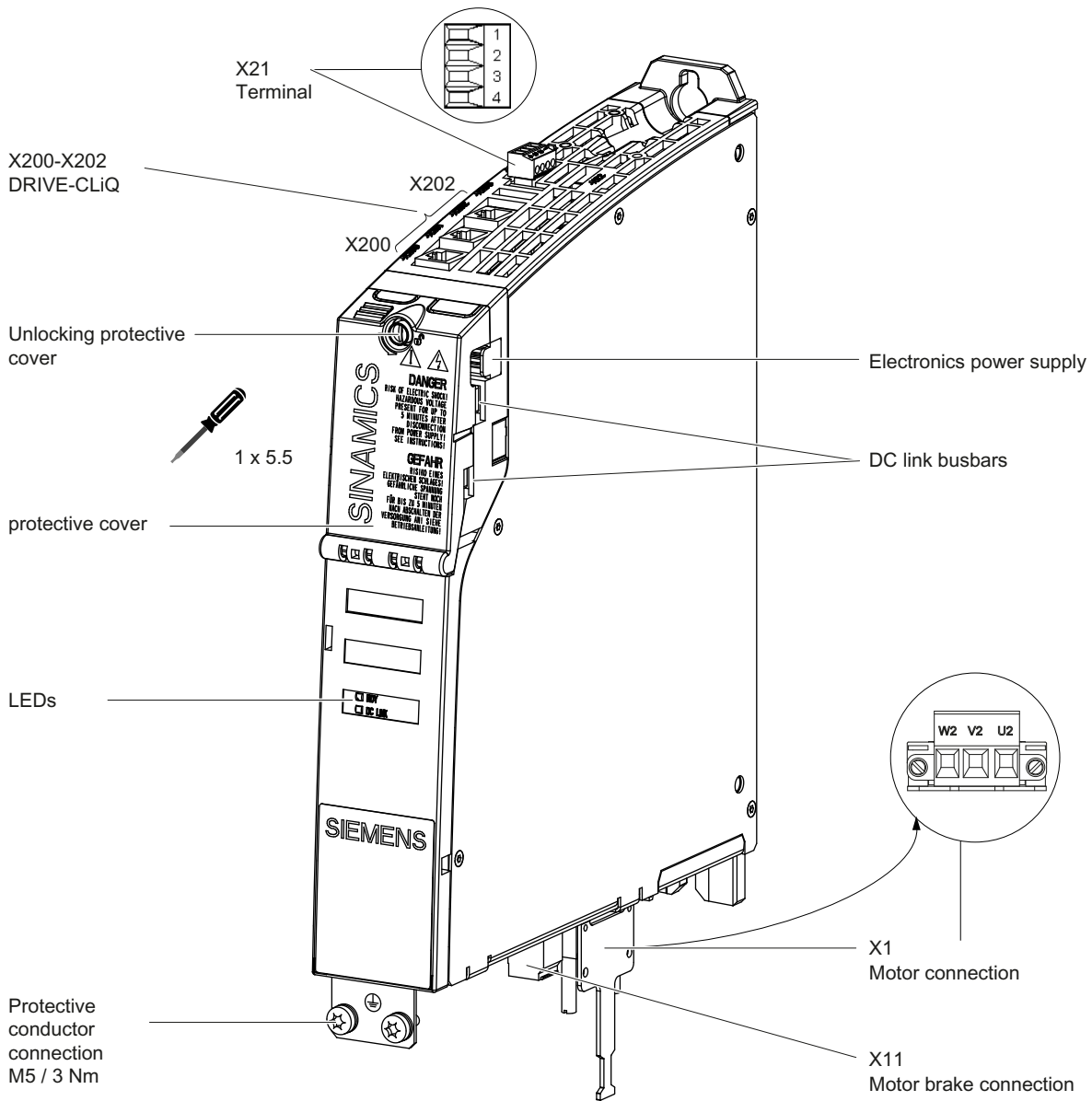


Figure 5-42 SMM Booksize Compact format (example 5 A)

Double Motor Module connections

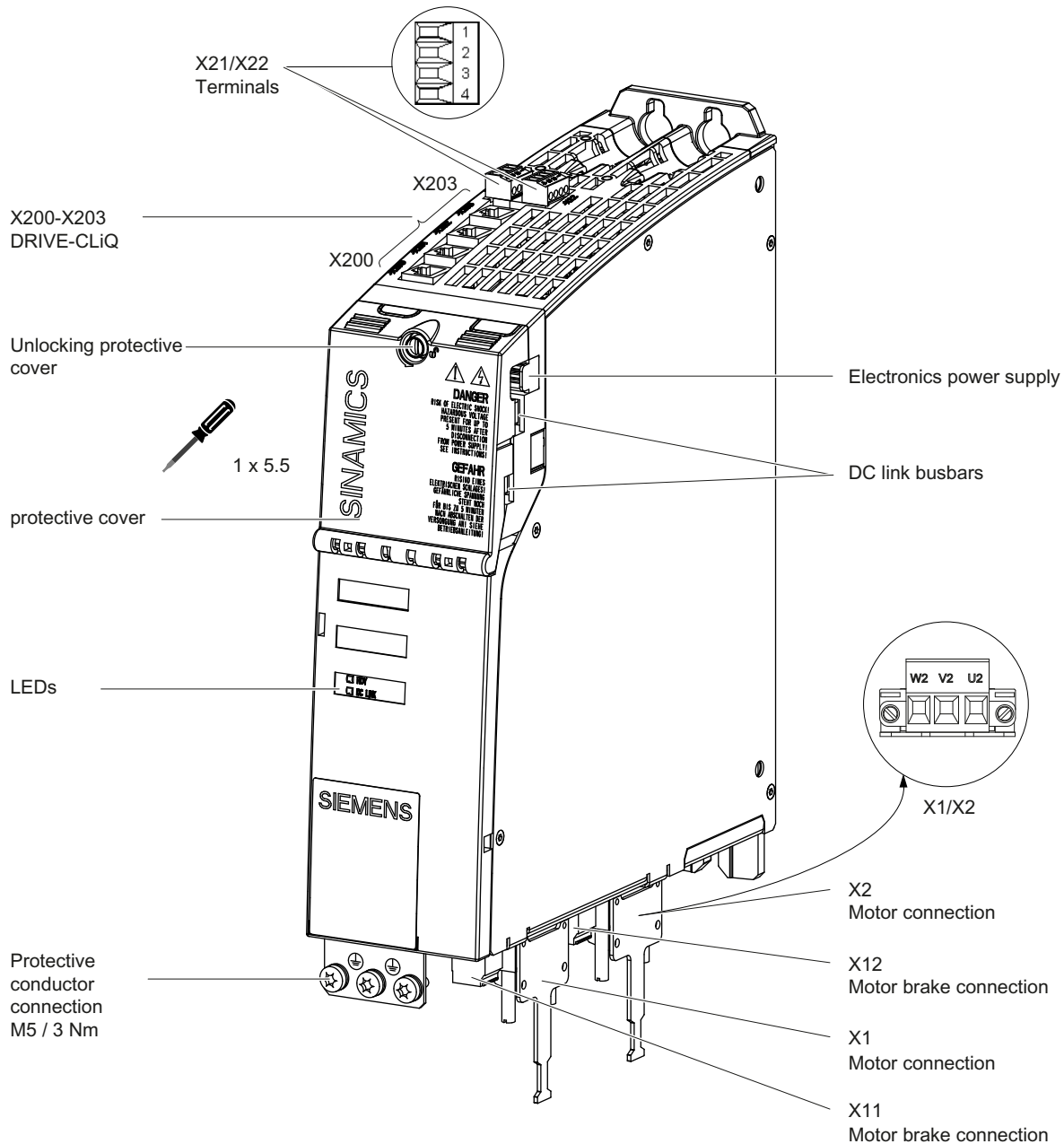


Figure 5-43 DMM Booksize Compact format (example 2 x 5 A)

5.11.3 This is how you mount a Motor Module Booksize Compact

Installing

Note the **tightening torques** for hexagonal combination screws or hexagon screws with spring lock washer and flat washer.

Procedure:

1. Initially tighten the screws by hand with 0.5 Nm.
2. Tighten the screws in the specified sequence 1 to 4 with 6 Nm.

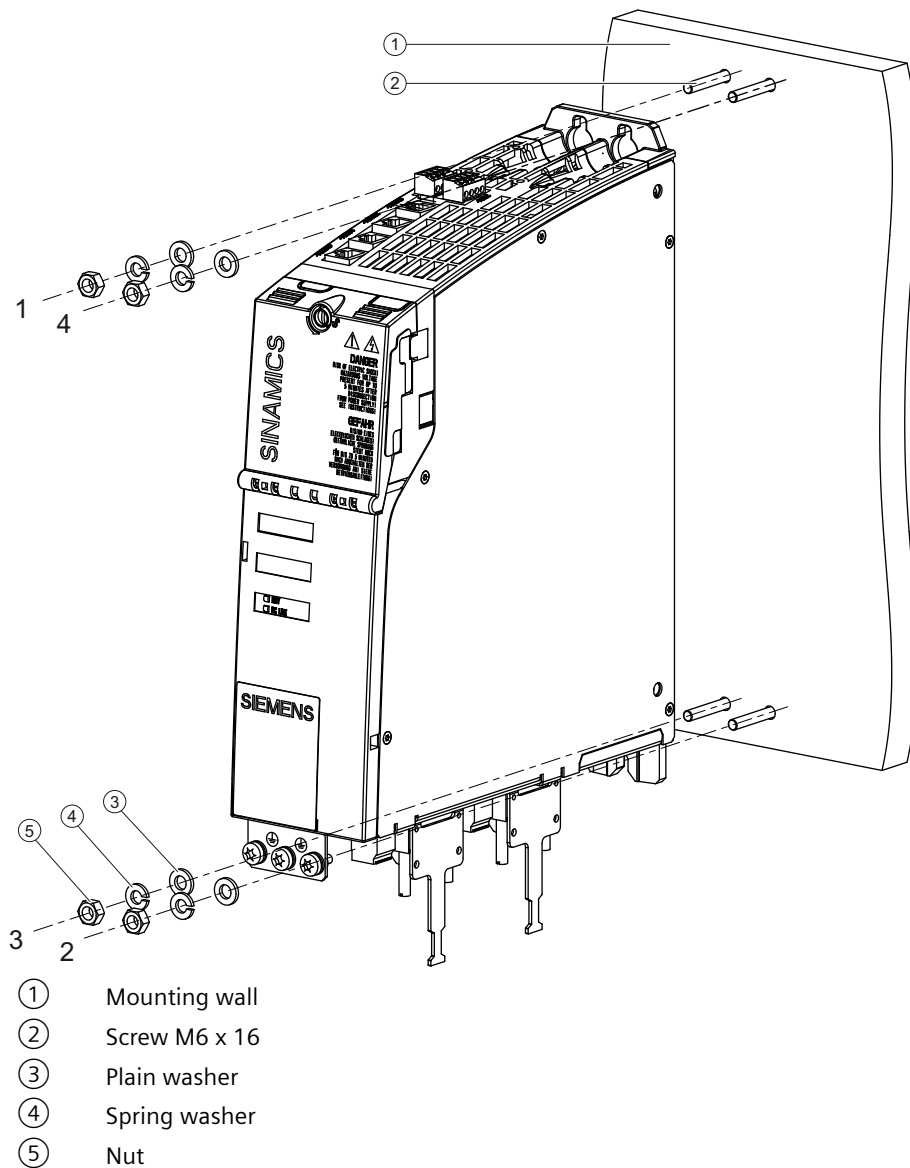


Figure 5-44 Motor Module Booksize Compact

5.11.4 This is how you replace the fan on a Motor Module Booksize Compact

Removing the fan

The instructions are valid for a module width of 50 mm.

Note

When replacing the fan, you must observe the ESD regulations.

Only qualified personnel are permitted to install spare parts!



DANGER

Danger to life through live parts and components

Death or serious injury can result when live parts are touched.

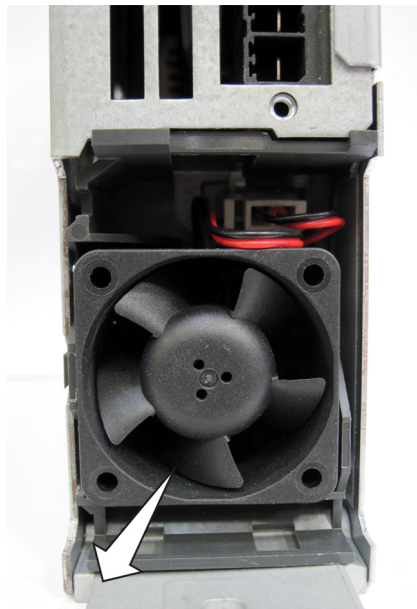
- Switch off the power supply before replacing the fan (400 V AC). A hazardous voltage is still present for up to 5 minutes after the power supply has been switched off.
- Before removing the component, carefully ensure that it is in a no-voltage condition.

Procedure:

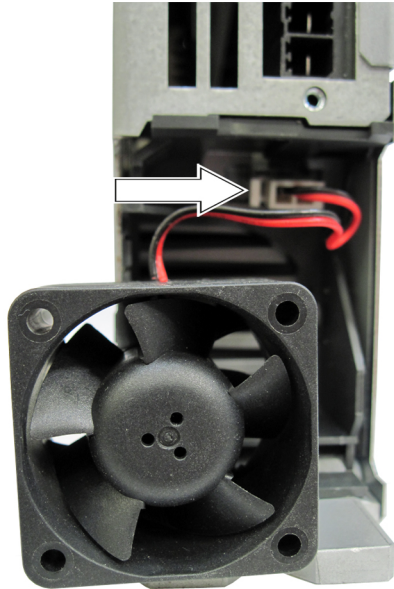
1. Remove the Motor Module from the drive line-up.



2. Remove the fan cover at the lower side of the Motor Module by releasing the snap hooks.



3. Carefully withdraw the fan.

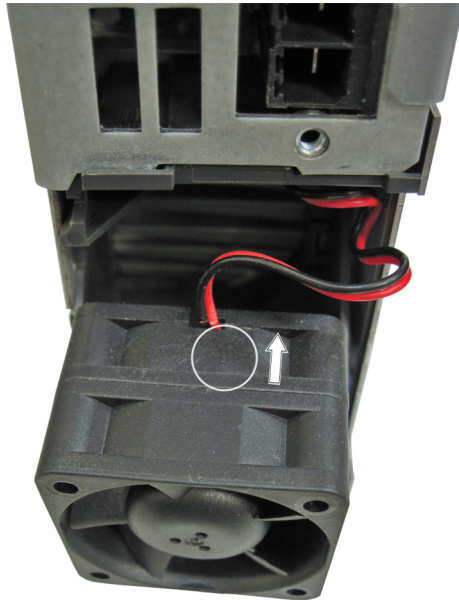


4. Release the connector before you withdraw it.

Installing the fan

Procedure:

1. Before installing the fan, observe the direction of the airflow: The arrow on the fan must point toward the cooling ribs.



2. Insert the cable connector until it latches into place.

3. Install the fan.
Notice! Do not crush the connection cables!
4. Attach the fan cover.

5.12 Single Motor Modules

5.12.1 SMM status displays

Status displays

The Motor Module has the following status displays, which provide information about the module state:

LED state		Description, cause	Remedy
RDY	DC LINK		
OFF	OFF	The electronics power supply is missing or outside the permissible tolerance range.	–
Green	OFF	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is present.	–
	Red	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is too high.	Check the line supply voltage.
Orange	Orange	DRIVE-CLiQ communication is being established.	–
Red	–	This component has at least one fault. Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove the fault and acknowledge.
Green/red (0.5 Hz)	–	Firmware is being downloaded.	–
Green/red (2 Hz)	–	Firmware download has been completed. Wait for POWER ON.	Carry out a POWER ON.
Green/orange or red/orange	–	Component recognition via LED is activated (p0124). Note: Both options depend on the LED status when module recognition is activated via p0124 = 1.	–



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

Hazardous DC link voltages may be present at any time regardless of the state of the "DC Link" LED. The warning information on the components must be carefully observed!

5.12.2 SMM connections

Connections

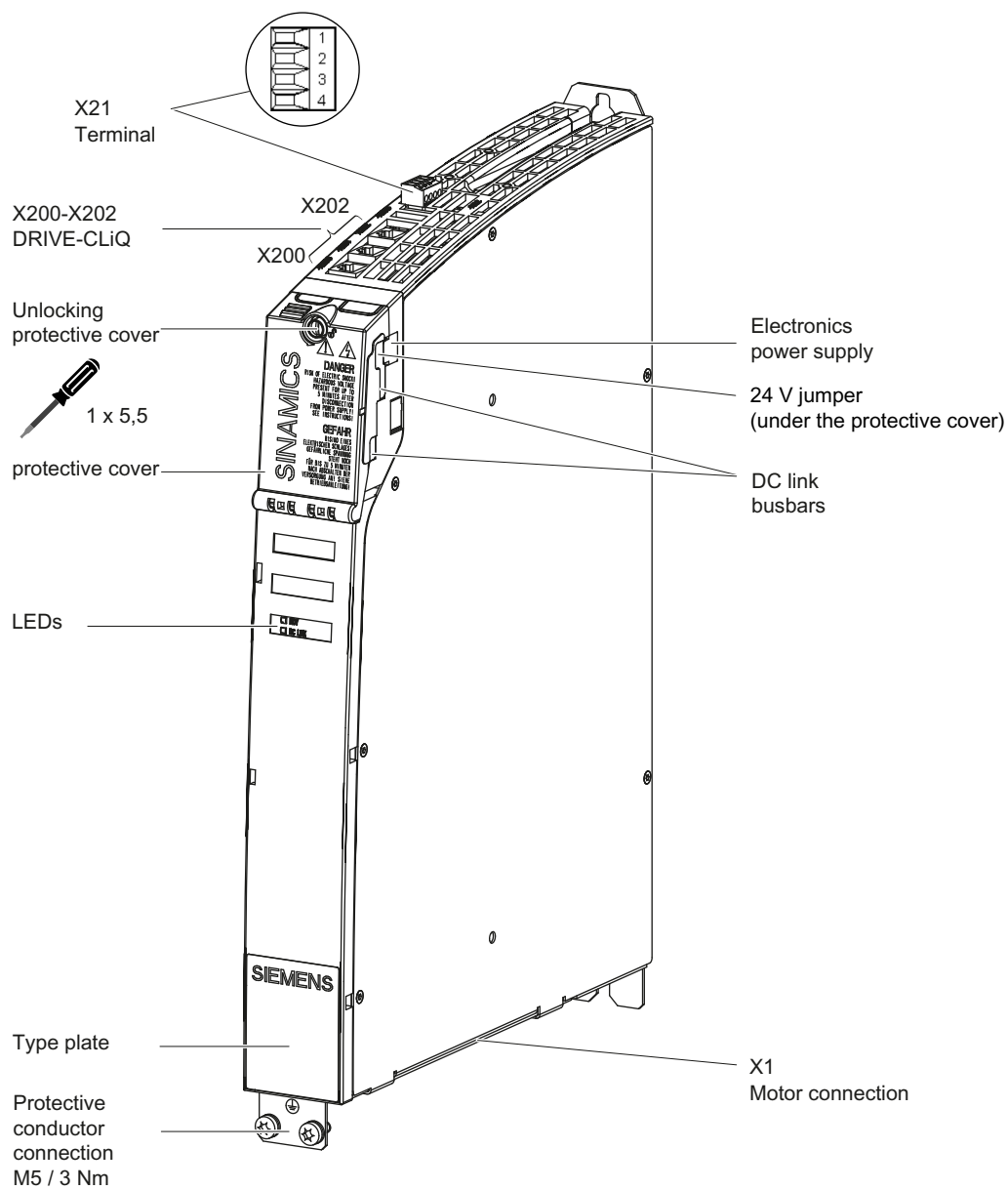


Figure 5-45 Single Motor Module (SMM)

5.12.3 This is how you remove a Motor Module

Overview

The activities required when replacing a Motor Module are subsequently described.

If a Motor Module has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the infeed module is located.
3. If it has not already been done, label all connectors and cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
4. Withdraw the enable terminals X21 (and X22 if available).
5. Withdraw the connected DRIVE-CLiQ cables X200 - X202.
6. Release the fixing screw (Torx) and remove the motor connection X1 (and X2 - if available).



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

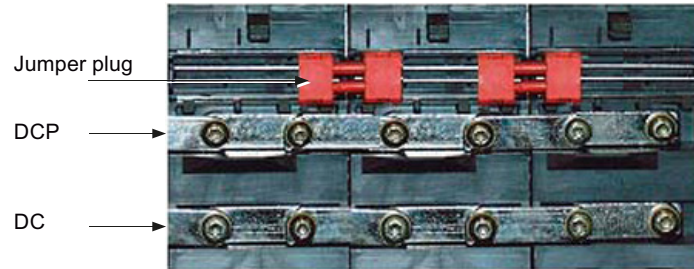
As a result of the DC link capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off.

Contact with live parts results in death or serious injury.

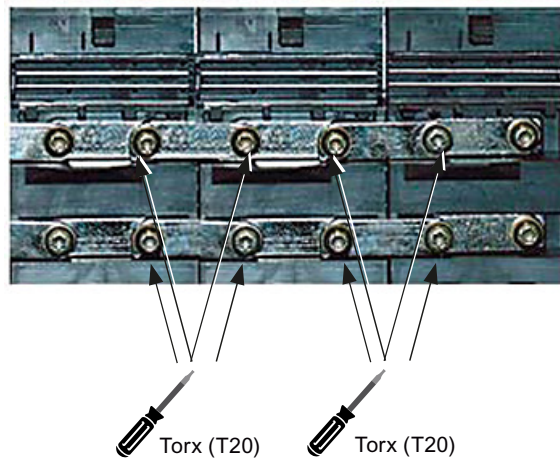
- Do not open the protective cover of the device until 5 minutes have elapsed.
- Before starting any work, check that the system is in a completely no-voltage condition by measuring all poles/phases, also to ground.
- Ensure that the associated warning plate in the appropriate language is attached.

1. Open the protective cover of the DC link voltage of the defective module as well as the adjacent module - if available - using a suitable tool (e.g. a screwdriver).
2. Withdraw the 24 V terminal adapter.

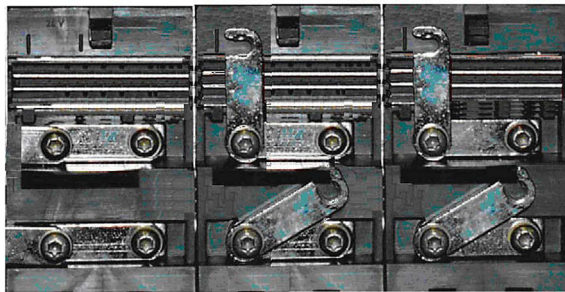
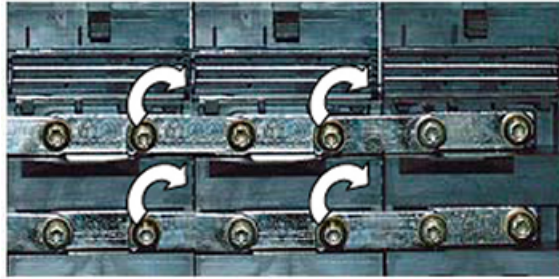
3. Using a multimeter (set the measuring range to 1000 V DC) at the points DCP/DCN, check that the DC link voltage is in a no-voltage condition.
Only continue with the work when it has been absolutely ensured that no voltage is present (a no-voltage condition has been established).



4. Withdraw the red 24 V jumper plug.
5. Release the Torx screws of the DC link.



6. Open the DC link busbars of the two modules.



7. Release the screws that are used to retain the motor module to the mounting plate.
8. Remove the protective conductor connection of the Motor Module.
9. Remove the Motor Module from the control cabinet.

5.12.4 This is how you install a Motor Module

Installing



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

As a result of the DC link capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off.

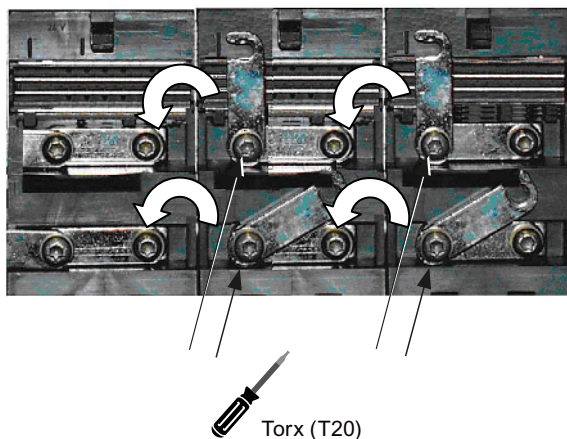
Contact with live parts results in death or serious injury.

- Do not open the protective cover of the device until 5 minutes have elapsed.
- Before starting any work, check that the system is in a completely no-voltage condition by measuring all poles/phases, also to ground.
- Ensure that the associated warning plate in the appropriate language is attached.

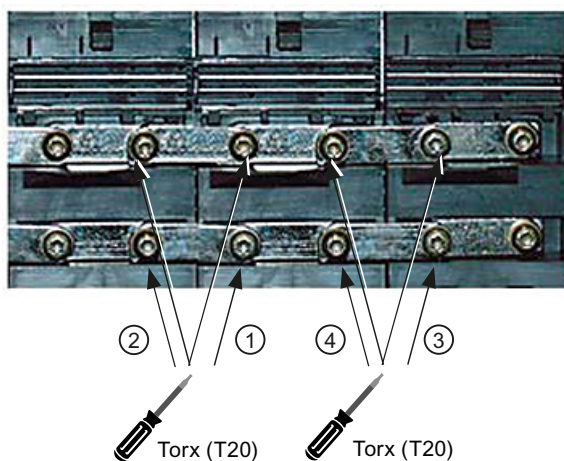
Procedure:

1. Screw the new Motor Module to the mounting plate.
2. Reconnect the protective conductor connection of the Motor Module.
3. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).

4. Release the Torx screws and connect the DC link busbar.



5. Tighten the Torx screws of the DC link busbars, observe the correct sequence.



6. Place the red jumper plug on the electronics busbar until it clicks into place.



7. Place the 24 V terminal adapter on the electronics power supply busbar until it clicks into place.
8. Close the protective cover of the DC link voltage.
9. Reconnect motor connections X1 and X2 - if available - to the module.
10. Insert the DRIVE-CLiQ cables that were previously withdrawn into sockets X200 - X202.

5.12 Single Motor Modules

11. Reinsert the enable terminals X21 and X22 - if available - into the module.
12. Check whether all of the cables have been re-connected.
13. Close the cabinet and switch-on the system again.

5.13 Double Motor Modules

5.13.1 DMM status displays

Status displays

The Motor Module has the following status displays, which provide information about the module state:

LED state		Description, cause	Remedy
RDY	DC LINK		
OFF	OFF	The electronics power supply is missing or outside the permissible tolerance range.	–
Green	OFF	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is present.	–
	Red	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is too high.	Check the line supply voltage.
Orange	Orange	DRIVE-CLiQ communication is being established.	–
Red	–	This component has at least one fault. Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove the fault and acknowledge
Green/red (0.5 Hz)	–	Firmware is being downloaded.	–
Green/red (2 Hz)	–	Firmware download has been completed. Wait for POWER ON.	Carry out a POWER ON.
Green/orange or red/orange	–	Component recognition via LED is activated (p0124). Note: Both options depend on the LED status when module recognition is activated via p0124 = 1.	–



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

Hazardous DC link voltages may be present at any time regardless of the state of the "DC Link" LED. The warning information on the components must be carefully observed!

5.13.2 DMM connections

Connections

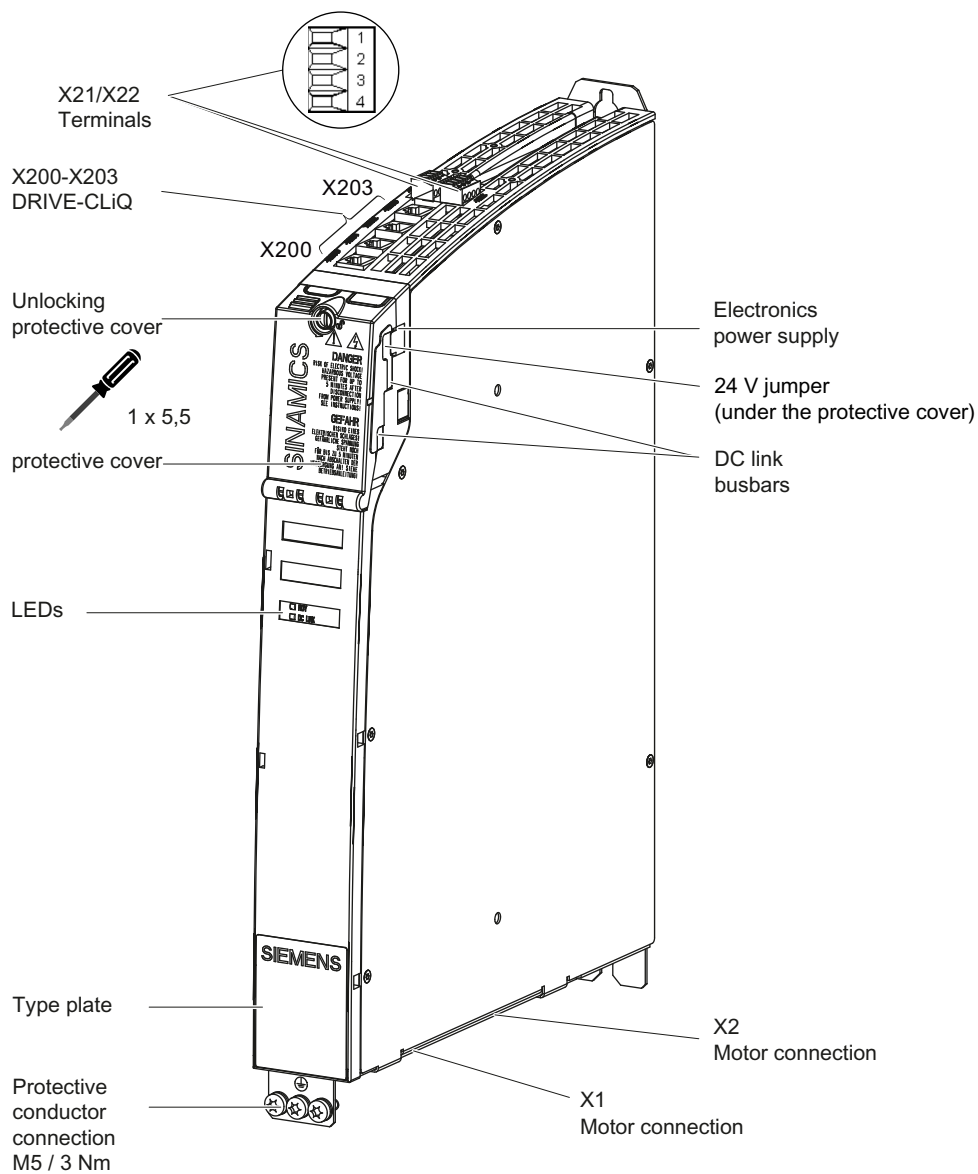


Figure 5-46 Double Motor Module (DMM)

5.13.3 This is how you remove a Motor Module

Overview

The activities required when replacing a Motor Module are subsequently described.

If a Motor Module has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the infeed module is located.
3. If it has not already been done, label all connectors and cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
4. Withdraw the enable terminals X21 (and X22 if available).
5. Withdraw the connected DRIVE-CLiQ cables X200 - X202.
6. Release the fixing screw (Torx) and remove the motor connection X1 (and X2 - if available).



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

As a result of the DC link capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off.

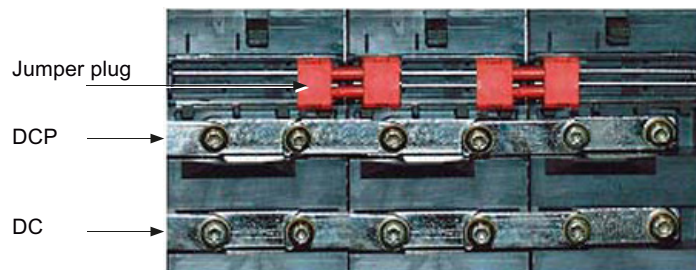
Contact with live parts results in death or serious injury.

- Do not open the protective cover of the device until 5 minutes have elapsed.
- Before starting any work, check that the system is in a completely no-voltage condition by measuring all poles/phases, also to ground.
- Ensure that the associated warning plate in the appropriate language is attached.

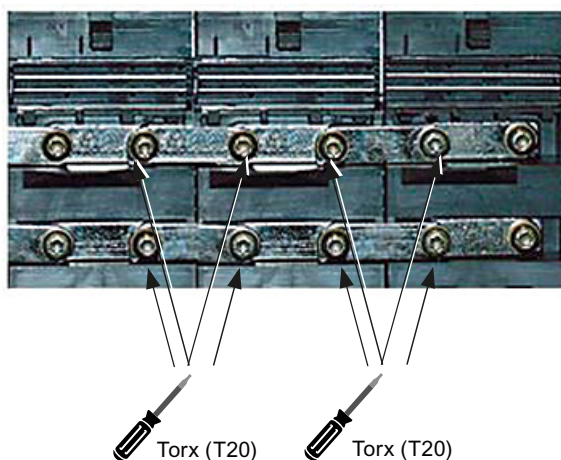
1. Open the protective cover of the DC link voltage of the defective module as well as the adjacent module - if available - using a suitable tool (e.g. a screwdriver).
2. Withdraw the 24 V terminal adapter.

5.13 Double Motor Modules

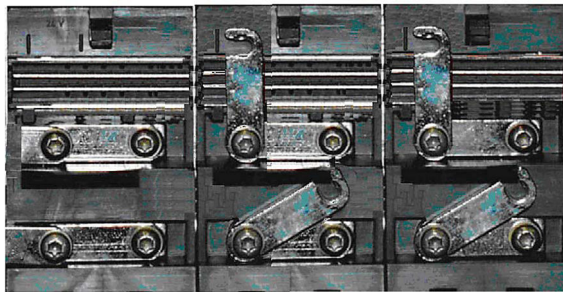
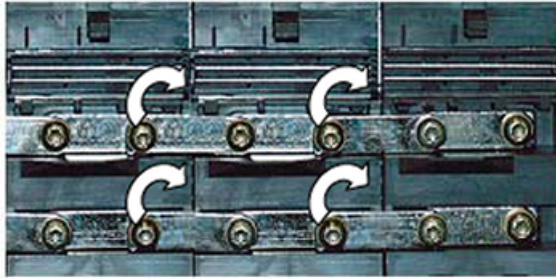
3. Using a multimeter (set the measuring range to 1000 V DC) at the points DCP/DCN, check that the DC link voltage is in a no-voltage condition.
Only continue with the work when it has been absolutely ensured that no voltage is present (a no-voltage condition has been established).



4. Withdraw the red 24 V jumper plug.
5. Release the Torx screws of the DC link.



6. Open the DC link busbars of the two modules.



7. Release the screws that are used to retain the motor module to the mounting plate.
8. Remove the protective conductor connection of the Motor Module.
9. Remove the Motor Module from the control cabinet.

5.13.4 This is how you install a Motor Module

Installing



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

As a result of the DC link capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off.

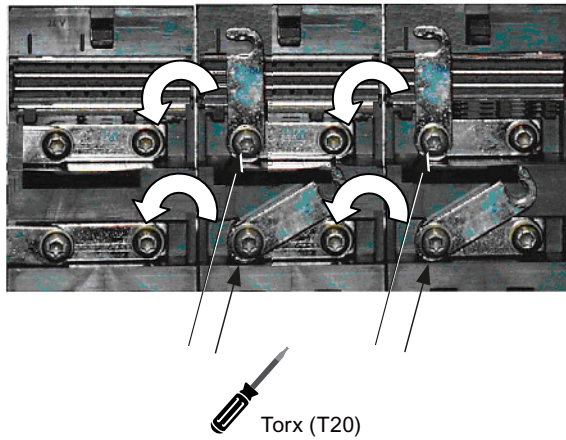
Contact with live parts results in death or serious injury.

- Do not open the protective cover of the device until 5 minutes have elapsed.
- Before starting any work, check that the system is in a completely no-voltage condition by measuring all poles/phases, also to ground.
- Ensure that the associated warning plate in the appropriate language is attached.

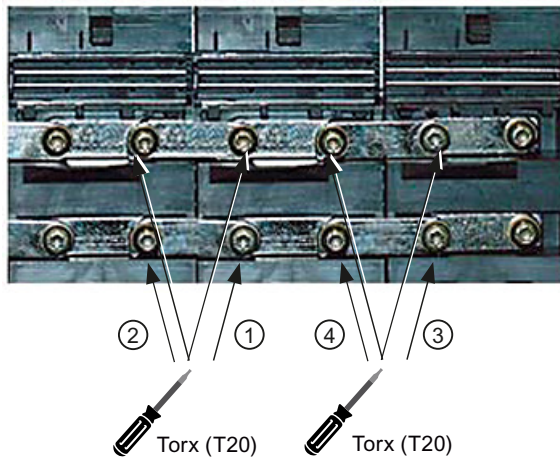
Procedure:

1. Screw the new Motor Module to the mounting plate.
2. Reconnect the protective conductor connection of the Motor Module.
3. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).

4. Release the Torx screws and connect the DC link busbar.



5. Tighten the Torx screws of the DC link busbars, observe the correct sequence.



6. Place the red jumper plug on the electronics busbar until it clicks into place.



7. Place the 24 V terminal adapter on the electronics power supply busbar until it clicks into place.
8. Close the protective cover of the DC link voltage.
9. Reconnect motor connections X1 and X2 - if available - to the module.
10. Insert the DRIVE-CLiQ cables that were previously withdrawn into sockets X200 - X202.

11. Reinsert the enable terminals X21 and X22 - if available - into the module.
12. Check whether all of the cables have been re-connected.
13. Close the cabinet and switch-on the system again.

5.14 Smart Line Modules

5.14.1 SLM (< 16 kW) status displays

Status displays

The 5 kW and 10 kW Smart Line Modules have the following status displays, which provide information about the module state:

LED state		Description, cause	Remedy
RDY	DC LINK		
--	OFF	Electronics power supply is missing or outside permissible tolerance range.	--
Continuous green light	--	Component is ready.	--
Continuous yellow light	--	Precharging not yet complete. Bypass relay has dropped-out. EP terminals are not supplied with 24 V DC.	--
Continuous red light	--	Overcurrent trip due to overtemperature.	Diagnose fault via output terminals and acknowledge via input terminal:
--	Continuous yellow light	DC link voltage in the permissible tolerance range.	--
--	Continuous red light	Line supply faults: DC link voltage outside the permissible tolerance range.	Check the line supply voltage.



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

Hazardous DC link voltages may be present at any time regardless of the state of the "DC LINK" LED. The warning information on the components must be carefully observed!

5.14.2 SLM (< 16 kW) connections

Connections

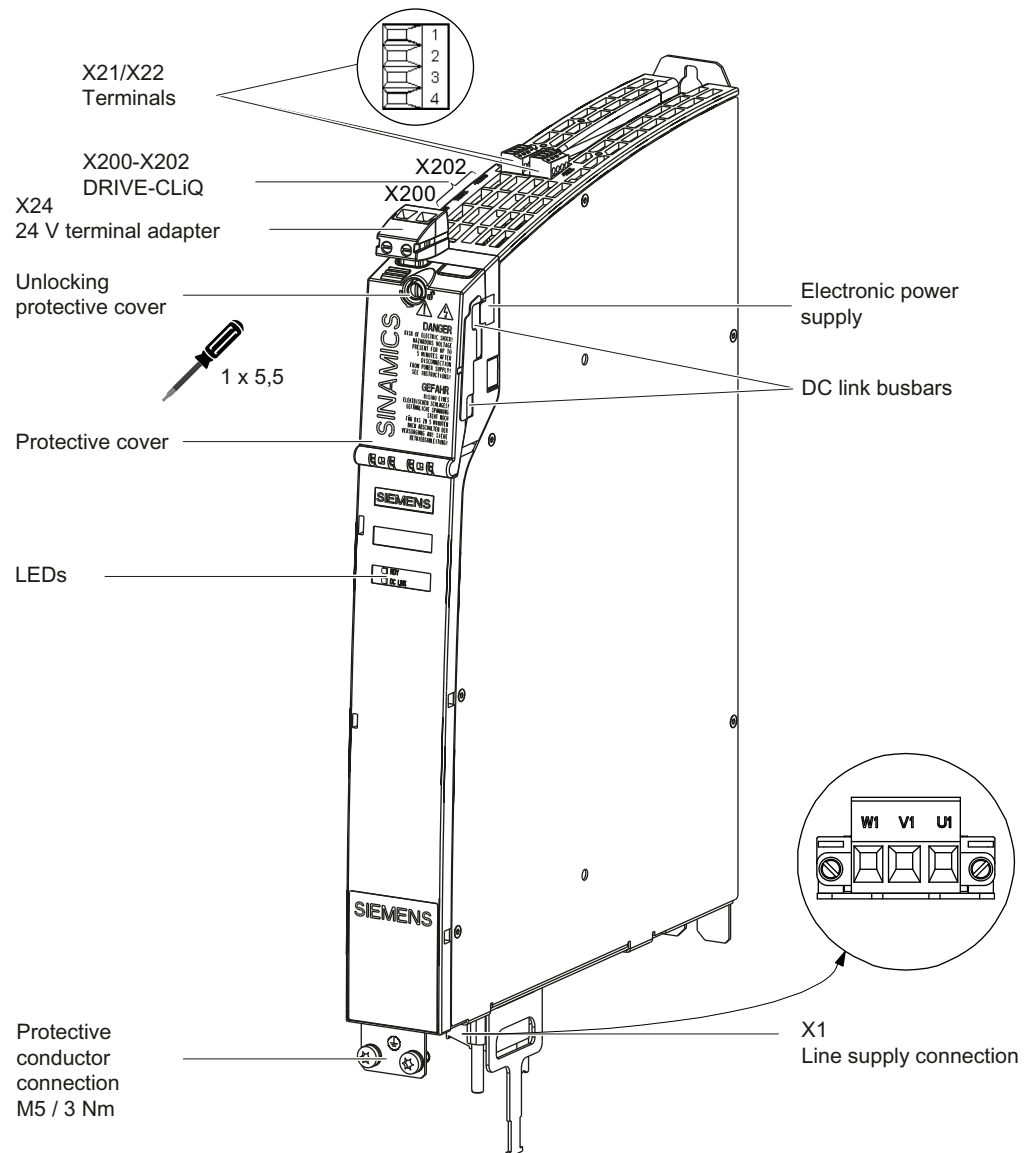


Figure 5-47 SLM connections

5.14.3 SLM (16 kW and higher) status displays

Status displays

The Smart Line Modules ≥ 16 kW have the following status displays, which provide information about the module state:

LED state		Description, cause	Remedy
RDY	DC LINK		
OFF	OFF	Electronics power supply is missing or outside permissible tolerance range.	–
Green	OFF	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
		The DC link voltage is present.	
	Red	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is too high.	Check the line supply voltage.
Orange	Orange	DRIVE-CLiQ communication is being established.	–
Red	–	This component has at least one fault. Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove the fault and acknowledge
Green/red (0.5 Hz)	–	Firmware is being downloaded.	–
Green/red (2 Hz)	–	Firmware download has been completed. Wait for POWER ON.	Carry out a POWER ON
Green/orange or Red/orange	–	Component recognition via LED is activated (p0124). Note: Both options depend on the LED status when module recognition is activated via p0124 = 1.	–



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

Hazardous DC link voltages may be present at any time regardless of the state of the "DC LINK" LED. The warning information on the components must be carefully observed!

5.14.4 SLM (16 kW and higher) connections

Connections

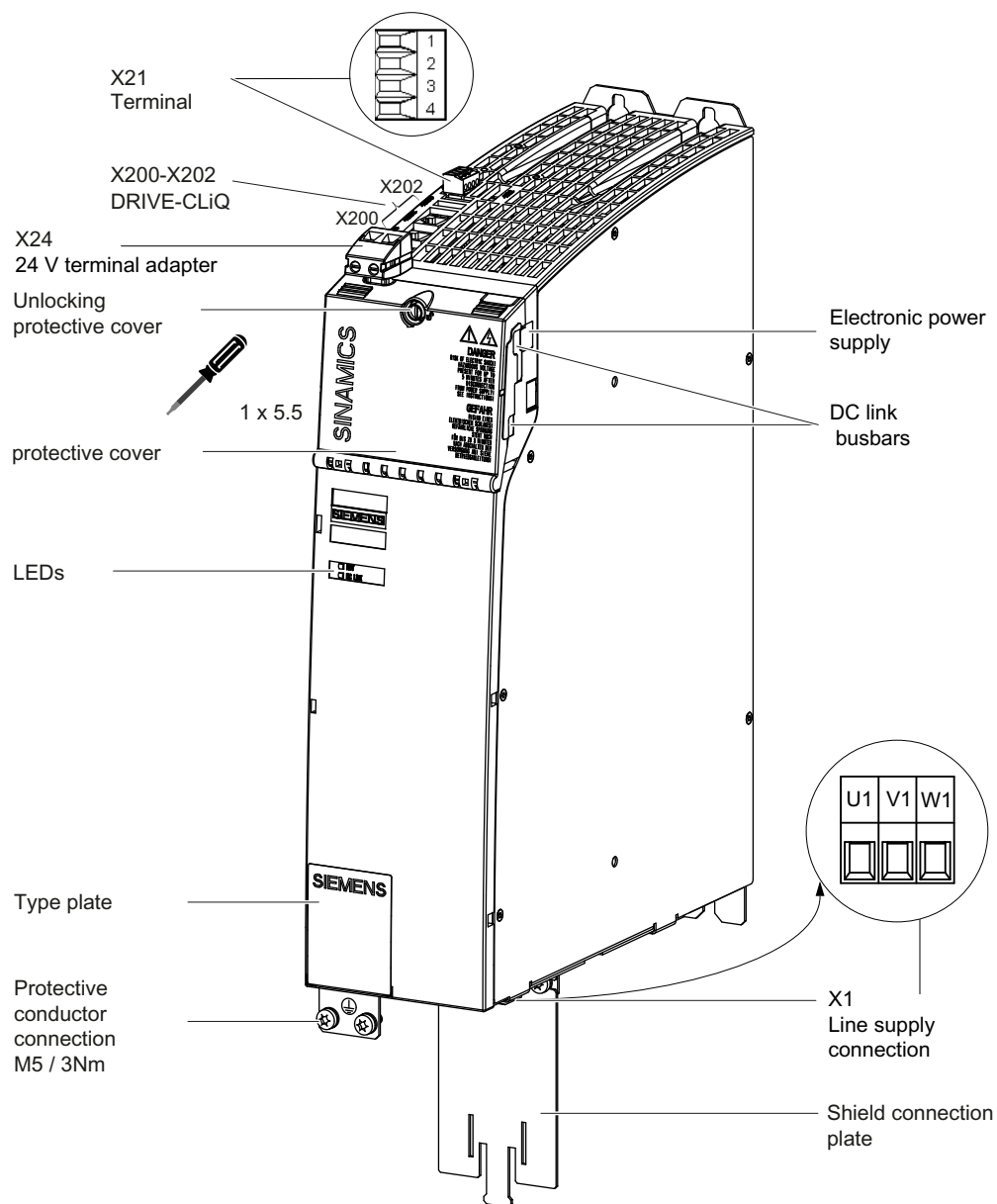


Figure 5-48 Connections, SLM ≥ 16 kW

5.14.5 This is how you remove an SLM

Overview

The activities that must be taken into account when replacing a Smart Line Module (SLM) are subsequently described.

If a module has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the infeed module is located.
3. If it has not already been done, label all connectors/cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
4. Withdraw the enable terminals X21.
5. Withdraw the connected DRIVE-CLiQ cables X200 - X202.
6. Withdraw the line supply connection X1.



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

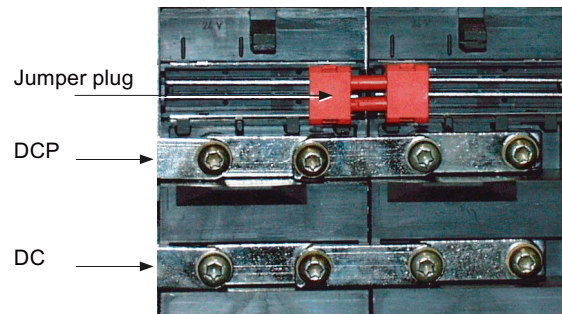
As a result of the DC link capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off.

Contact with live parts results in death or serious injury.

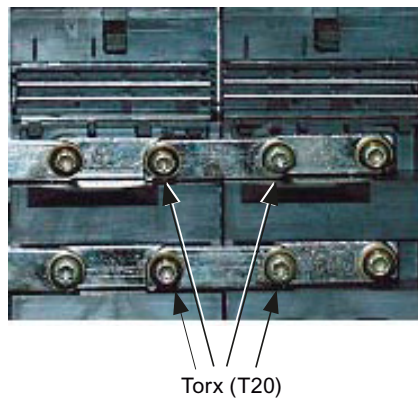
- Do not open the protective cover of the device until 5 minutes have elapsed.
- Before starting any work, check that the system is in a completely no-voltage condition by measuring all poles/phases, also to ground.
- Ensure that the associated warning plate in the appropriate language is attached.

1. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).
2. Withdraw the 24 V terminal adapter.

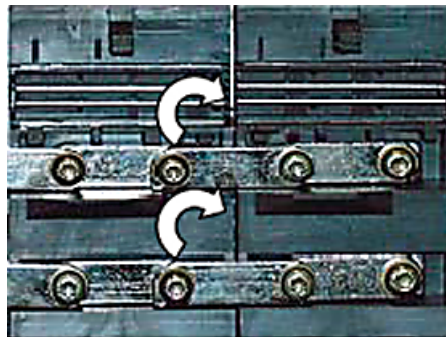
3. Using a multimeter (set the measuring range to 1000 V DC) at the points DCP/DCN, check that the DC link voltage is in a no-voltage condition. Only continue with the work when it has been absolutely ensured that no voltage is present (no-voltage condition has been established).



4. Withdraw the red 24 V jumper plug.
5. Release the Torx screws of the DC link.



6. Open the DC link busbars of the two modules.



7. Release the screws that are used to retain the module to the mounting plate.
8. Remove the protective conductor connection of the module.
9. Remove the module from the control cabinet.

5.14.6 This is how you install an SLM

Installing



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

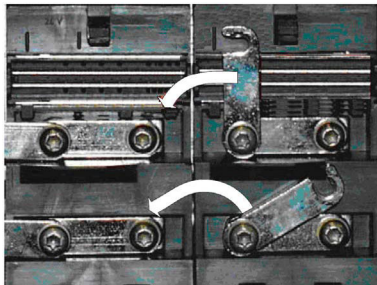
As a result of the DC link capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off.

Contact with live parts results in death or serious injury.

- Do not open the protective cover of the device until 5 minutes have elapsed.
- Before starting any work, check that the system is in a completely no-voltage condition by measuring all poles/phases, also to ground.
- Ensure that the associated warning plate in the appropriate language is attached.

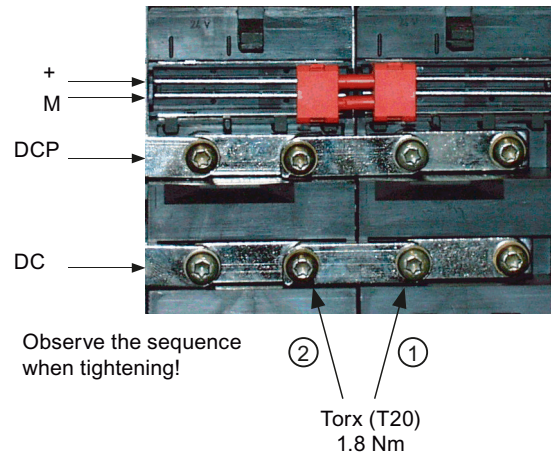
Procedure:

1. Screw the new module to the mounting plate.
2. Reconnect the protective conductor connection of the module.
3. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).
4. Release the Torx screws and connect the DC link busbar.



5. Tighten the Torx screws of the DC link busbars, observe the correct sequence.

6. Place the red jumper plug on the electronics busbar until it clicks into place.



7. Place the 24 V terminal adapter on the electronics power supply busbar until it clicks into place.
8. Close the protective cover of the DC link voltage.
9. Reconnect the line supply connection X1 at the module.
10. Insert the DRIVE-CLiQ cables that were previously withdrawn into sockets X200 - X202.
11. Reinsert the enable terminals X21 at the module.
12. Check whether all of the cables have been re-connected.
13. Close the cabinet and switch-on the system again.

5.15 Active Line Modules

5.15.1 ALM status displays

Status displays

The Active Line Module (ALM) has the following status displays, which provide information about the module status:

LED state		Description, cause	Remedy
RDY	DC LINK		
OFF	OFF	Electronics power supply is missing or outside permissible tolerance range.	–
Green	OFF	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is present.	–
	Red	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is too high.	Check the line supply voltage.
Orange	Orange	DRIVE-CLiQ communication is being established.	–
Red	–	This component has at least one fault. Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove the fault and acknowledge.
Green/red (0.5 Hz)	-	Firmware is being downloaded.	–
Green/red (2 Hz)	-	Firmware download has been completed. Wait for POWER ON.	Carry out a POWER ON.
Green/orange or red/orange	–	Component recognition via LED is activated (p0124). Note: Both options depend on the LED status when module recognition is activated via p0124 = 1.	–



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

Hazardous DC link voltages may be present at any time regardless of the state of the "DC LINK" LED. The warning information on the components must be carefully observed!

5.15.2 ALM connections

Connections

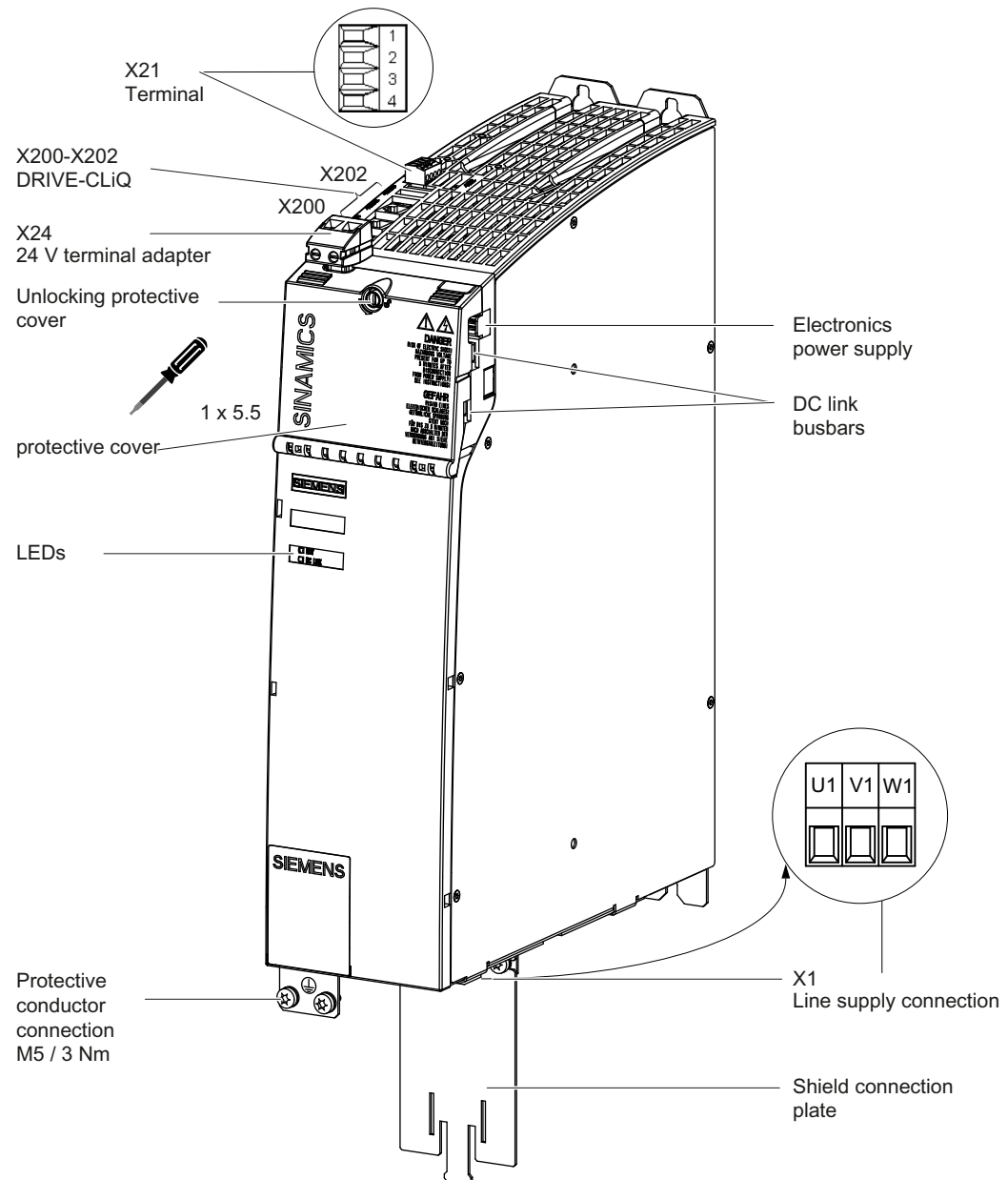


Figure 5-49 ALM connections

5.15.3 This is how you remove an ALM

Overview

The activities that must be taken into account when replacing an Active Line Module (ALM) are subsequently described.

If a module has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the infeed module is located.
3. If it has not already been done, label all connectors/cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
4. Withdraw the enable terminals X21.
5. Withdraw the connected DRIVE-CLiQ cables X200 - X202.
6. Withdraw the line supply connection X1.



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

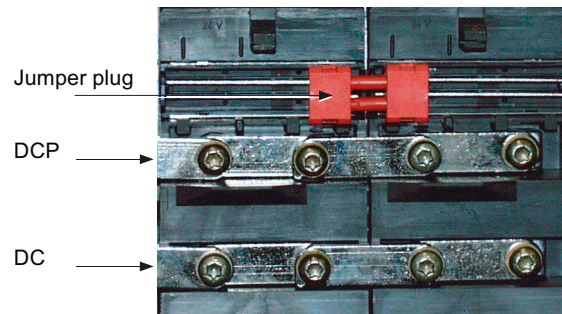
As a result of the DC link capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off.

Contact with live parts results in death or serious injury.

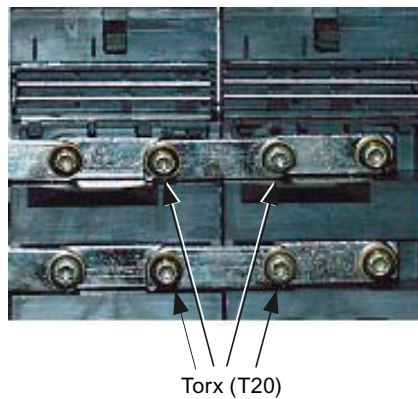
- Do not open the protective cover of the device until 5 minutes have elapsed.
- Before starting any work, check that the system is in a completely no-voltage condition by measuring all poles/phases, also to ground.
- Ensure that the associated warning plate in the appropriate language is attached.

1. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).
2. Withdraw the 24 V terminal adapter.

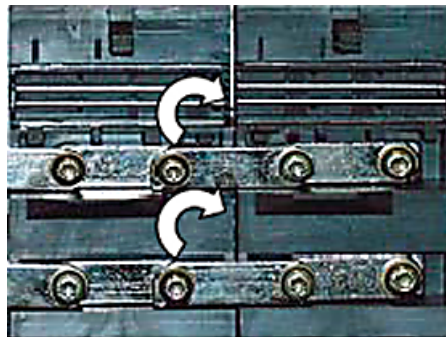
3. Using a multimeter (set the measuring range to 1000 V DC) at the points DCP/DCN, check that the DC link voltage is in a no-voltage condition. Only continue with the work when it has been absolutely ensured that no voltage is present (no-voltage condition has been established).



4. Withdraw the red 24 V jumper plug.
5. Release the Torx screws of the DC link.



6. Open the DC link busbars of the two modules.



7. Release the screws that are used to retain the module to the mounting plate.
8. Remove the protective conductor connection of the module.
9. Remove the module from the control cabinet.

5.15.4 This is how you install an ALM

Installing



DANGER

Danger to life through electric shock due to the residual charge of the DC link capacitors

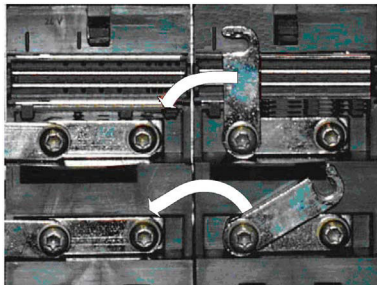
As a result of the DC link capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off.

Contact with live parts results in death or serious injury.

- Do not open the protective cover of the device until 5 minutes have elapsed.
- Before starting any work, check that the system is in a completely no-voltage condition by measuring all poles/phases, also to ground.
- Ensure that the associated warning plate in the appropriate language is attached.

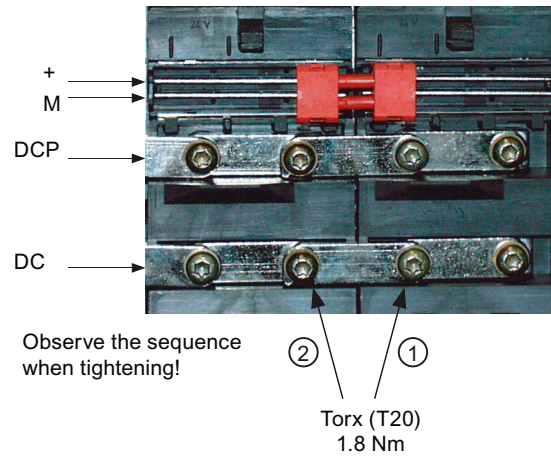
Procedure:

1. Screw the new module to the mounting plate.
2. Reconnect the protective conductor connection of the module.
3. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).
4. Release the Torx screws and connect the DC link busbar.



5. Tighten the Torx screws of the DC link busbars, observe the correct sequence.

6. Place the red jumper plug on the electronics busbar until it clicks into place.



7. Place the 24 V terminal adapter on the electronics power supply busbar until it clicks into place.
8. Close the protective cover of the DC link voltage.
9. Reconnect the line supply connection X1 at the module.
10. Insert the DRIVE-CLiQ cables that were previously withdrawn into sockets X200 - X202.
11. Reinsert the enable terminals X21 at the module.
12. Check whether all of the cables have been re-connected.
13. Close the cabinet and switch-on the system again.

5.16 Sensor Modules Cabinet

5.16.1 SMC10/SMC20 status displays

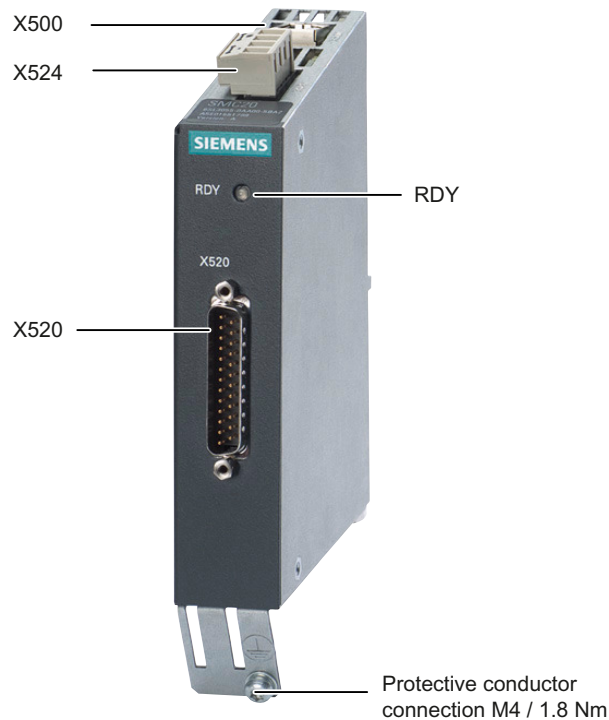
Status displays

Sensor Modules Cabinet-Mounted SMC10 and SMC20 have the following status displays, which provide information about the module state:

LED	Color	State	Description, cause	Remedy
RDY	-	OFF	Electronics power supply is missing or outside permissible tolerance range.	–
	Green	Continuous light	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	Continuous light	DRIVE-CLiQ communication is being established.	–
	Red	Continuous light	This component has at least one fault. Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove and acknowledge fault.
	Green/red	Flashes at 0.5 Hz	Firmware is being downloaded.	–
		Flashes at 2 Hz	Firmware download has been completed. Wait for POWER ON	Carry out a POWER ON.
	Green/orange or red/orange	Flashing	Component recognition via LED is activated (p0144)	–
			Note: Both options depend on the LED status when module recognition is activated via p0144 = 1.	

5.16.2 SMC10/SMC20 connections

Connections



X500 DRIVE-CLiQ

X520 Encoder system interface

X524 Electronics power supply

Figure 5-50 SMC10/SMC20 connections

5.16.3 This is how you remove an SMC10/SMC20

Overview

The activities that must be taken into account when replacing an SMC10 or SMC20 are subsequently described.

If the SMC10 or SMC20 has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

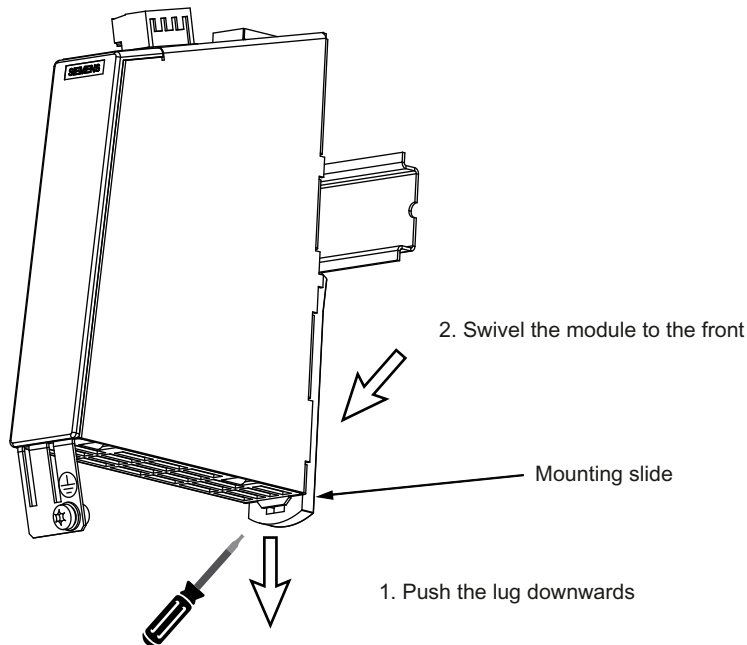


Figure 5-51 Removing the SMC10/SMC20

Procedure:

1. Withdraw the electronics power supply connector X524 and label.
2. Unscrew the encoder connecting cable at X520 or X521 / X531, if required, also the shield connection.
3. Withdraw the DRIVE-CLiQ cable X500 and write the slot designation on the cable.
4. Release the protective conductor connection and write the position designation on the cable.
5. Push the lug downwards.
6. Swivel the module to the front.

Note

The 50 mm ventilation clearances above and below the components must be observed.

5.16.4 This is how you install an SMC10/SMC20

Installing

Procedure:

1. Place the component on the mounting rail.
2. Then, swivel the component on the mounting rail so that the mounting catches click into place at the rear.
3. Slide the component along the mounting rail to either the left or right up to its final position.
4. Screw on the protective conductor connection.
5. Screw on the encoder connecting cable to X520 and X521 / X531, if required, also the shield connection.
6. Insert the DRIVE-CLiQ cable at X500.
7. Insert connector X524 for the electronics power supply.

Note

The 50 mm ventilation clearances above and below the components must be observed.

5.16.5 SMC30 status displays

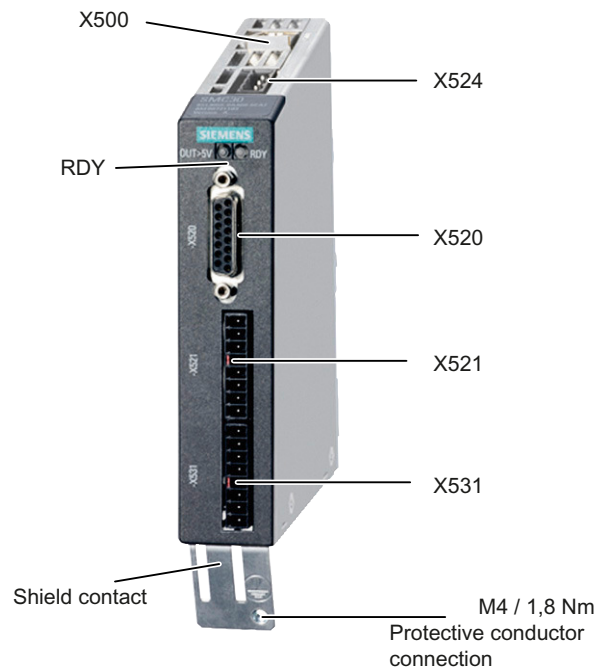
Status displays

The Sensor Module Cabinet-Mounted SMC30 has the following status displays, which provide information about the module state:

LED	Color	State	Description, cause	Remedy
RDY	-	OFF	Electronics power supply is missing or outside permissible tolerance range.	–
	Green	Continuous light	The component is ready and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	Continuous light	DRIVE-CLiQ communication is being established.	–
	Red	Continuous light	This component has at least one fault. Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove and acknowledge fault.
	Green/red	Flashes at 0.5 Hz	Firmware is being downloaded.	–
		Flashes at 2 Hz	Firmware download has been completed. Wait for POWER ON	Carry out a POWER ON.
	Green/orange or red/orange	Flashing	Component recognition via LED is activated (p0144) Note: Both options depend on the LED status when module recognition is activated via p0144 = 1.	–
OUT > 5 V	-	OFF	Electronics power supply is missing or outside permissible tolerance range. Power supply ≤ 5 V	-
	Orange	Continuous light	Electronics power supply for measuring system available. Power supply >5 V.	-
			Notice:	
			It must be ensured that it is permissible to operate the connected encoder with a 24 V power supply. If an encoder that is designed for a 5 V supply is operated with a 24 V supply, this can destroy the encoder electronics.	

5.16.6 SMC30 connections

Connections



X500	DRIVE-CLiQ
X524	Electronics power supply
X520, X521, X531	Encoder system interfaces: HTL, TTL, with track monitoring SSI

Figure 5-52 Connections SMC30

5.16.7 This is how you remove an SMC30

Overview

The activities that must be taken into account when replacing an SMC30 are subsequently described.

If an SMC30 has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

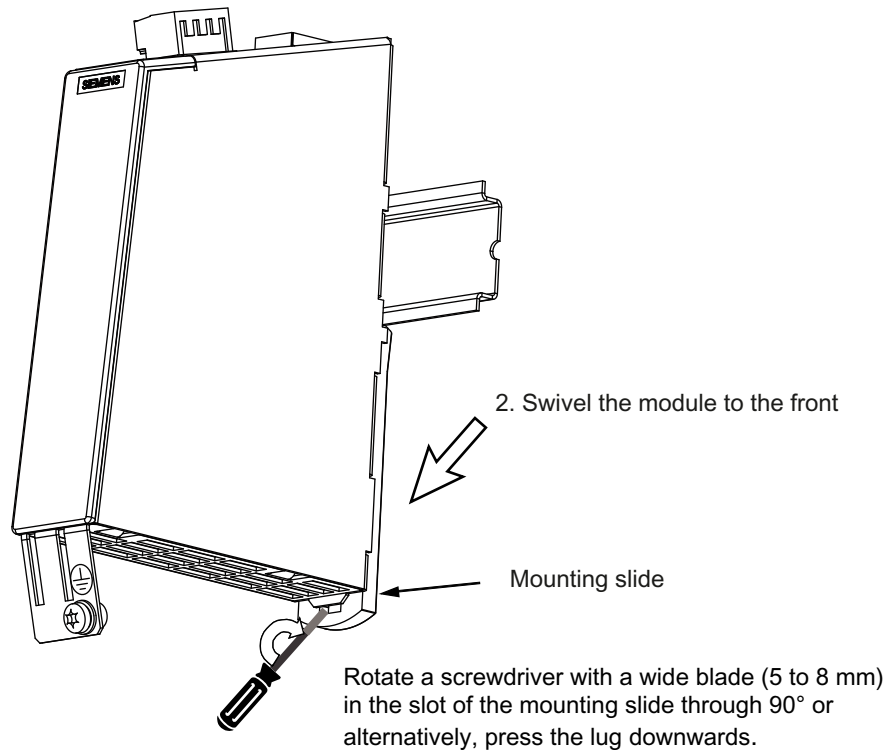


Figure 5-53 SMC30 removal

Procedure:

1. Before withdrawing it, label the connector X524 for the electronics power supply.
2. Screw on the encoder connecting cable to X520 or X521 / X531, if required, also the shield connection.
3. Release the protective conductor connection and write the position designation on the cable.
4. Slide the lug downwards.
5. Swivel the module to the front to remove it.

Note

The 50 mm ventilation clearances above and below the components must be observed.

5.16.8 This is how you install an SMC30

Installing

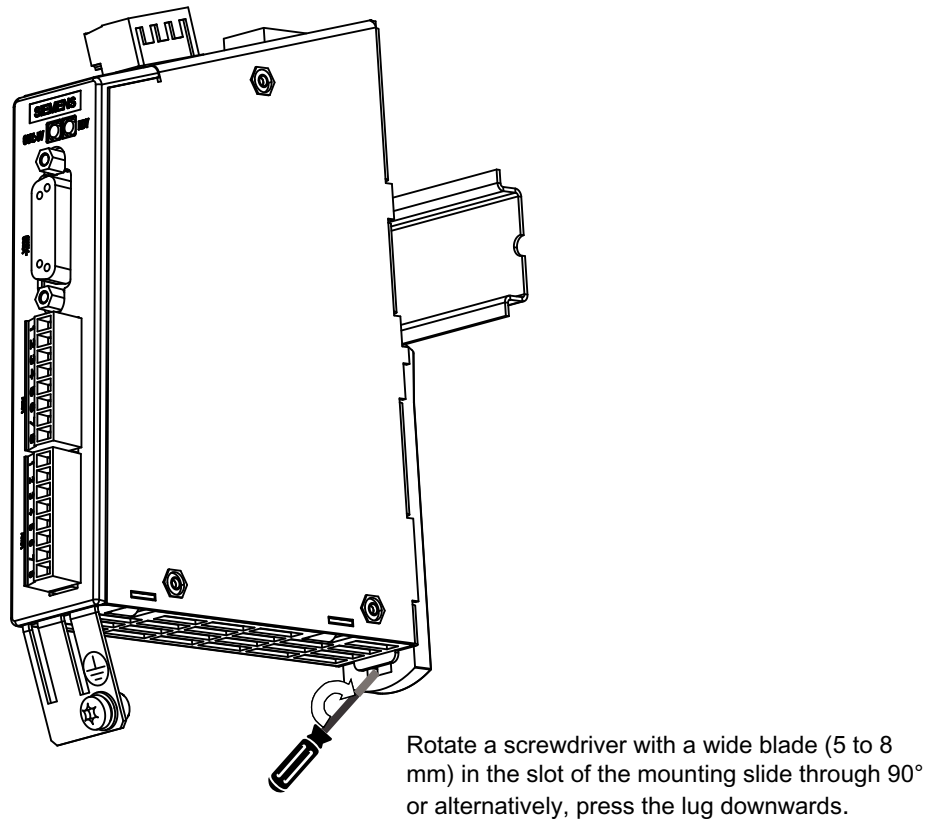


Figure 5-54 Installing SMC30

Procedure:

1. Place the component on the mounting rail.
2. Then, swivel the component on the mounting rail so that the mounting catches click into place at the rear.
3. Slide the component along the mounting rail to either the left or right up to its final position.
4. Screw on the protective conductor connection.
5. Screw on the encoder connecting cable to X520 or X521 / X531, if required, also the shield connection.
6. Insert the DRIVE-CLiQ cable at X500.
7. Insert connector X524 for the electronics power supply.

Note

The 50 mm ventilation clearances above and below the components must be observed.

5.16.9 SMC40 status displays

Status displays

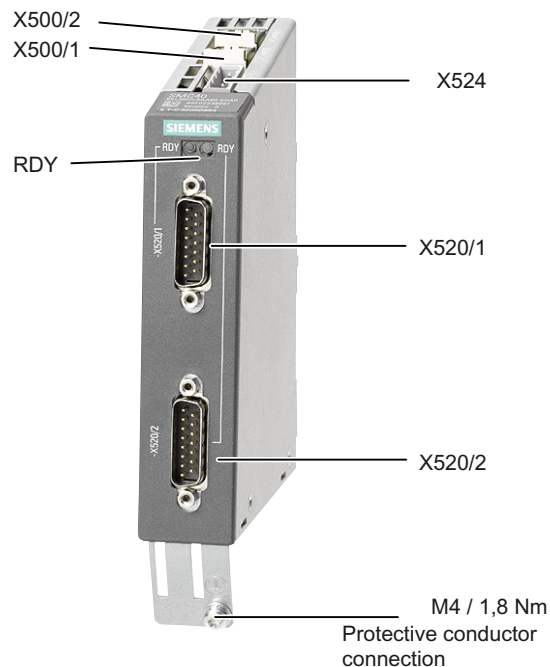
The Sensor Module Cabinet-Mounted SMC40 has the following status displays, which provide information about the module state:

LED	Color	State	Description, cause	Remedy
RDY READY	–	Off	Electronics power supply is missing or outside permissible tolerance range.	–
	Green	Continuous light	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	Continuous light	DRIVE-CLiQ communication is being established.	–
	Red	Continuous light	At least one fault is present in this component. Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	Remedy and acknowledge fault
	Green/red	Flashing light 2 Hz	Firmware download has been completed. Wait for POWER ON.	Carry out a POWER ON
	Green/ orange or Red/ orange	Flashing light	Component recognition via LED is activated (p0144) Note: Both options depend on the LED status when module recognition is activated via p0144 = 1.	–

Each channel has a multifunction LED.

5.16.10 SMC40 connections

Connections



X500/1, X500/2	DRIVE-CLiQ
X520/1, X520/2	Encoder system interfaces with multifunction LED per channel
X524	Electronics power supply

Figure 5-55 Connections SMC40

5.16.11 This is how you remove an SMC40

Overview

The activities that must be taken into account when replacing an SMC40 are subsequently described.

If an SMC40 has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

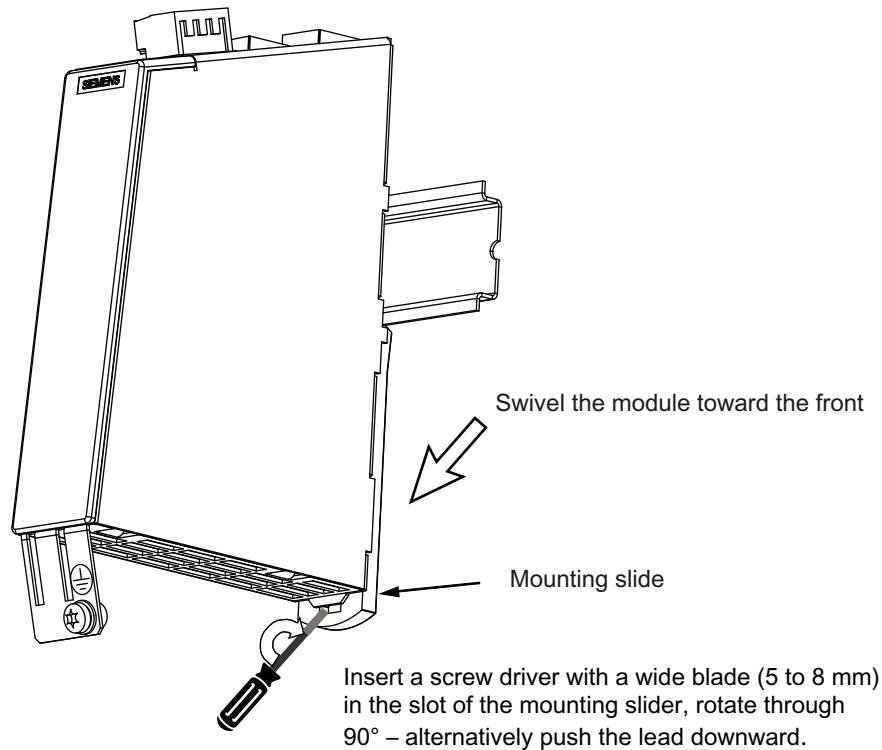


Figure 5-56 SMC40 removal

Procedure:

1. Before withdrawing it, label the connector X524 for the electronics power supply.
2. Unscrew the encoder connecting cables X520/x.
3. Label the DRIVE-CLiQ cables X500/x and withdraw them.
4. Release the protective conductor connection and write the position designation on the cable.
5. Slide the lug downwards.
6. Swivel the module to the front to remove it.

Note

The 50 mm ventilation clearances above and below the components must be observed.

5.16.12 This is how you install an SMC40

Installing

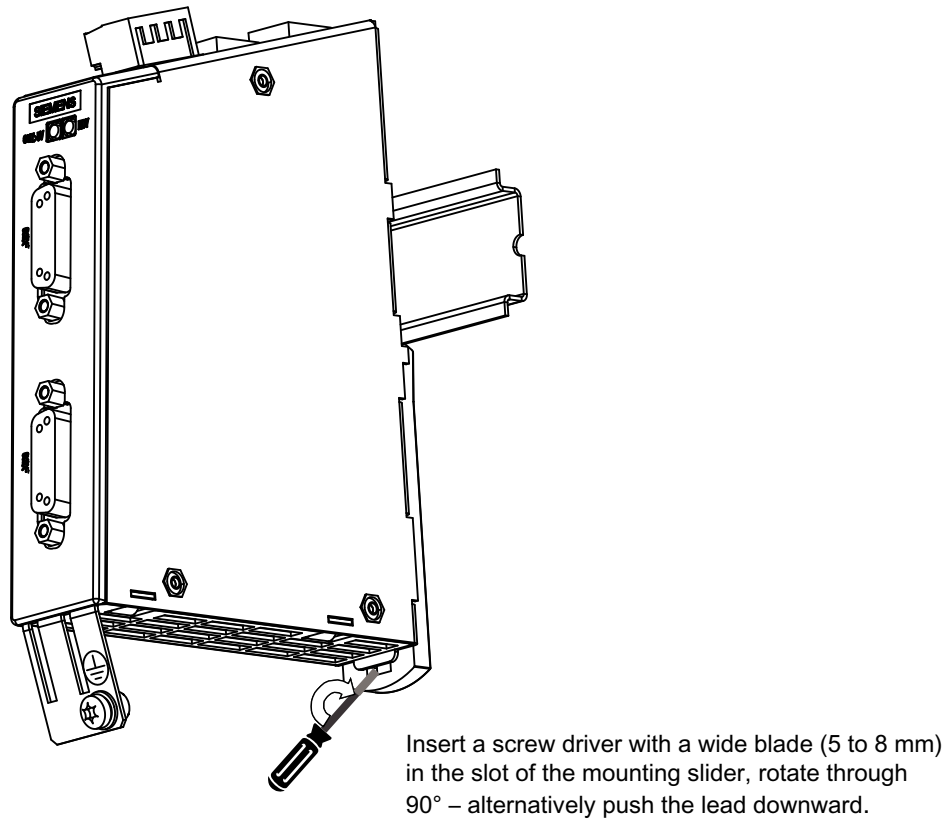


Figure 5-57 SMC40 installation

Procedure:

1. Place the component on the mounting rail.
2. Then, swivel the component on the mounting rail so that the mounting catches click into place at the rear.
3. Slide the component along the mounting rail to either the left or right up to its final position.
4. Screw on the protective conductor connection.
5. Screw on the encoder connecting cables X520/x.
6. Insert the DRIVE-CLiQ cables at X500/x.
7. Insert connector X524 for the electronics power supply.

Note

The 50 mm ventilation clearances above and below the components must be observed.

5.17 Sensor Modules External

5.17.1 SME20 connections

Connections

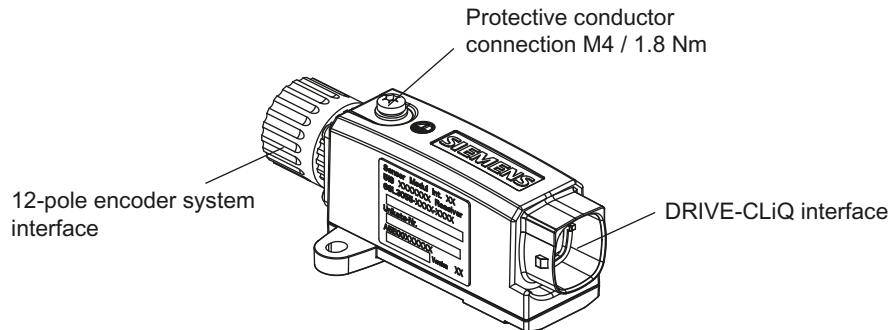


Figure 5-58 Connections SME20

5.17.2 This is how you remove an SME20 and install it again

Overview

The activities that must be taken into account when replacing an SME20 are subsequently described.

If an SME20 has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

Procedure:

1. Release the encoder connecting cable of the SME20.
2. Withdraw the DRIVE-CLiQ cable from the SME20.
3. Release the protective conductor connection of the SME20.
4. Remove the defective SME20.

Installing

Procedure:

1. Now install the new SME20.
2. Screw on the protective conductor connection.
3. Reconnect the encoder connecting cable.
4. Connect the DRIVE-CLiQ cable.

Note

Connections/cables

Only measuring systems where the measuring system power supply is not grounded may be connected.

The maximum DRIVE-CLiQ cable length is 100 m.

The maximum encoder cable length is 3 m.

In order to guarantee the degree of protection, all of the plug connectors must be correctly screwed into place or snapped into place.

5.17.3 SME25 connections

Connections

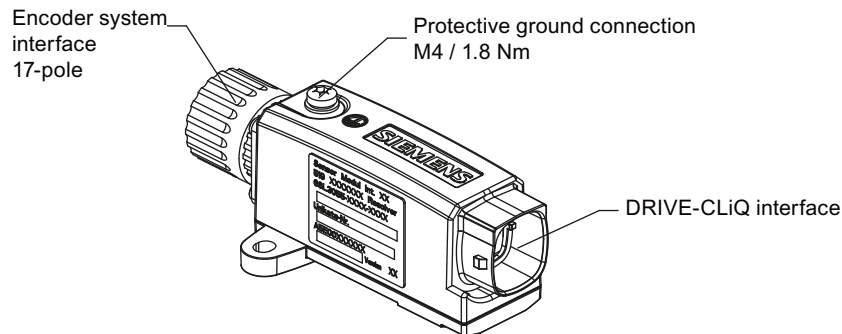


Figure 5-59 Connections SME25

5.17.4 This is how you remove an SME25 and install it again

Overview

The activities that must be taken into account when replacing an SME25 are subsequently described.

If an SME25 has a hardware defect, then it must be replaced by an identical module.

5.17 Sensor Modules External

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

Procedure:

1. Release the encoder connecting cable of the SME25.
2. Withdraw the DRIVE-CLiQ cable from the SME25.
3. Release the protective conductor connection of the SME25.
4. Remove the defective SME25.

Installing

Procedure:

1. Now install the new SME25.
2. Screw on the protective conductor connection.
3. Reconnect the encoder connecting cable.
4. Connect the DRIVE-CLiQ cable.

Note

Connections/cables

The maximum DRIVE-CLiQ cable length is 100 m.

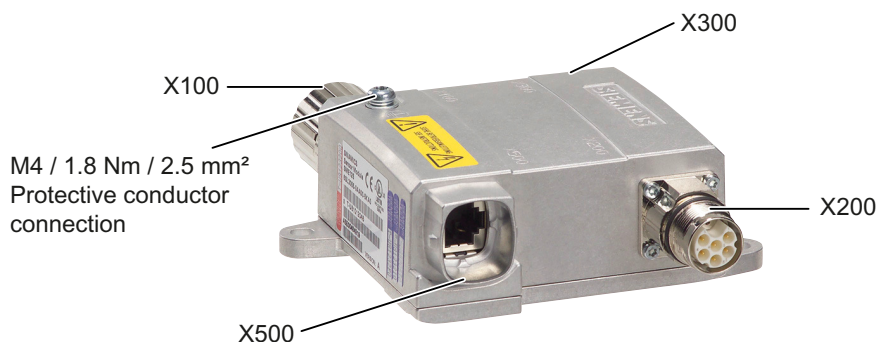
The maximum encoder cable length is 3 m.

In order to guarantee the degree of protection, all of the plug connectors must be correctly screwed into place or snapped into place.

5.17.5 SME120 connections

Connections

Requirements: The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.



X100 Encoder system interfaces, tightening torque: 3.5 Nm

X200 Temperature sensor input, tightening torque: 2 Nm

X300 Hall sensor input, tightening torque: 3.5 Nm

X500 DRIVE-CLiQ

Figure 5-60 SME120 connections

5.17.6 This is how you remove an SME120 and install it again

Removing

Procedure:

1. Release the encoder connecting cable X100 of the SME120.
2. Withdraw the DRIVE-CLiQ cable from X500 of the SME120.
3. Release the Hall sensor input X300 of the SME120.
4. Release the temperature sensor input X200 of the SME120.
5. Release the protective conductor connection of the SME120.
6. Remove the defective SME120 module.

Installing

Procedure:

1. Now install the new SME120 module.
2. Screw on the protective conductor connection.
3. Reconnect the temperature sensor at X200.

5.17 Sensor Modules External

4. Reconnect the Hall sensor at X300.
5. Reconnect the encoder connecting cable.
6. Connect the DRIVE-CLiQ cable.

Note

Connections/cables

The maximum DRIVE-CLiQ cable length is 100 m.

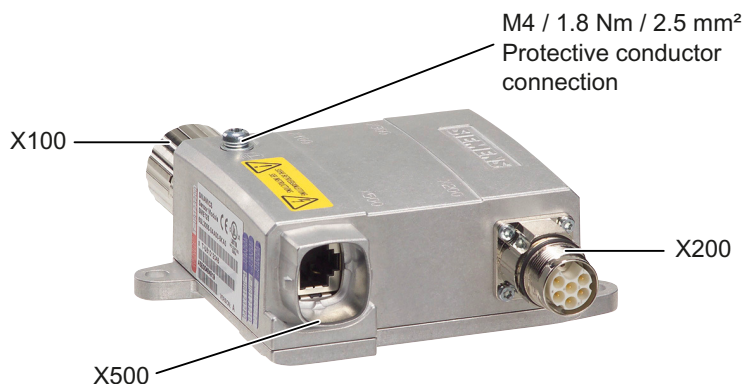
The maximum encoder cable length is 3 m.

In order to guarantee the degree of protection, all of the plug connectors must be correctly screwed and snapped into place.

5.17.7 SME125 connections

Connections

Requirements: The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.



X100 Encoder system interfaces, tightening torque: 3.5 Nm

X200 Temperature sensor input, tightening torque: 2 Nm

X500 DRIVE-CLiQ

Figure 5-61 SME125 connections

5.17.8 This is how you remove an SME125 and install it again

Removing

Procedure:

1. Release the encoder connecting cable X100 of the SME125
2. Withdraw the DRIVE-CLiQ cable from X500 of the SME125.

3. Release the temperature sensor input X200 of the SME125.
4. Release the protective conductor connection of the SME125.
5. Remove the defective SME125 module.

Installing

Procedure:

1. Now install the new SME125 module.
2. Screw on the protective conductor connection.
3. Reconnect the temperature sensor at X200.
4. Reconnect the encoder connecting cable.
5. Connect the DRIVE-CLiQ cable.

Note

Connections/cables

The maximum DRIVE-CLiQ cable length is 100 m.

The maximum encoder cable length is 3 m.

In order to guarantee the degree of protection, all of the plug connectors must be correctly screwed and snapped into place.

5.18 Terminal Modules

5.18.1 TM54F status displays

Status displays

The Terminal Module TM54F has the following status displays, which provide information about the module state:

State			Description, cause	Remedy
RDY	L1+, L2+	L3+		
Off	--	--	Electronics power supply is missing or outside permissible tolerance range.	--
Continuous green light	--	--	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	--
Orange continuous light	--	--	DRIVE-CLiQ communication is being established.	--
Continuous red light	--	--	At least one fault is present in this component. Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove and acknowledge fault.
Green / red flashing light 0.5 Hz	--	--	Firmware is being downloaded.	--
Flashing light 2 Hz	--	--	Firmware download has been completed. Wait for POWER ON	Carry out a POWER ON.
Green/ orange Flashing light - OR - Red/orange Flashing light	--	--	Component recognition via LED is activated (p0154). Note: Both options depend on the LED status when activated via p0154 = 1.	--
--	On	--	The sensor power supply that can be dynamized is functioning fault-free.	--
--	Continuous red light	--	There is a fault in the sensor power supply that can be dynamized.	--
--	--	On	The sensor power supply is operating fault-free.	--
--	--	Continuous red light	There is a fault in the sensor power supply.	--

Fail-safe inputs / double inputs

LED state			Description, cause	Remedy
F_DI z (Input x, (x+1)+, (x+1)-)				
Continuous light –	LED x – –	LED x+1 Red –	NC contact / NC contact ¹⁾ : (z = 0..9, x = 0, 2, ..18) Different signal states at inputs x and x+1 No signal at input x and no signal at input x+1	–
Continuous light –	– –	Red –	NC contact / NO contact ¹⁾ : (z = 0..9, x = 0, 2, ..18) Identical signal states at inputs x and x+1 No signal at input x and a signal at input x+1	
Continuous light Continuous light	LED x Green Green	LED x+1 Green Green	NC contact / NC contact ¹⁾ : (z = 0..9, x = 0, 2, ..18) One signal at input x and one signal at input x+1 NC contact / NO contact ¹⁾ : (z = 0..9, x = 0, 2, ..18) A signal at input x and no signal at input x+1	–

¹⁾ Inputs x+1 (DI 1+, 3+, .. 19+) can be set individually via parameter p10040 (TM54F).

p10040 (TM54F) = 0: Input x+1 is an NC contact.

p10040 (TM54F) = 1: Input x+1 is an NO contact.

Factory setting: p10040 (TM54F) = 0 for all inputs x+1.

Single digital inputs, not fail-safe

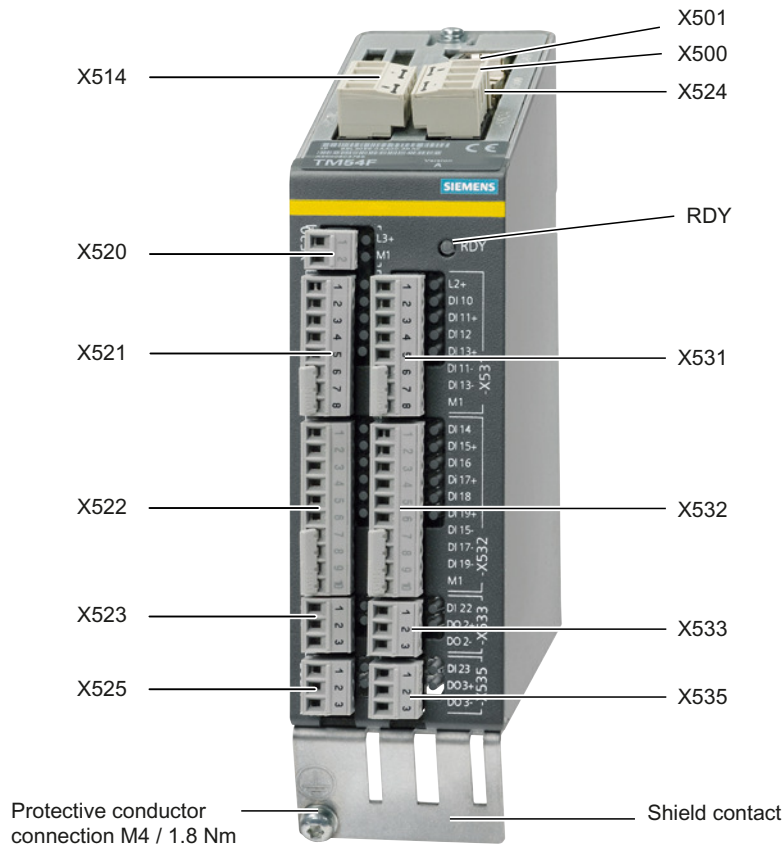
LED state		Description, cause	Remedy
DI x			
–	Off	No signal at digital input x (x = 20..23)	–
Green	Continuous light	Signal at digital input x	–

Fail-safe digital outputs with associated readback channel

LED state		Description, cause	Remedy
F_DO y (0+..3+, 0-..3-)			
Green	Continuous light	Output y (y=0 .. 3) has a signal	–
Read back input DI 2y for output F_DO y (y = 0..3) for test stop. The state of the LEDs depends on the type of external circuit.			
DI 2y			
–	Off	One of the two output lines y+ or y- or both lines of output y have a signal	–
Green	Continuous light	Both output lines y+ and y- have no signal	–

5.18.2 TM54F connections

Connections



X501, X500	DRIVE-CLiQ interfaces
X524	Electronics power supply
RDY	LEDs for status display
X521, X531	Fail-safe digital inputs DI and dynamic power supply
X522, X532	Fail-safe digital inputs DI
X523, X525, X533, X535	Fail-safe digital outputs DO
X520	Sensor power supply
X514	Power supply for digital outputs and sensors

Figure 5-62 TM54F connections

5.18.3 This is how you remove an TM54F

Overview

The activities that must be taken into account when replacing an TM54F are described below. If a TM54F has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

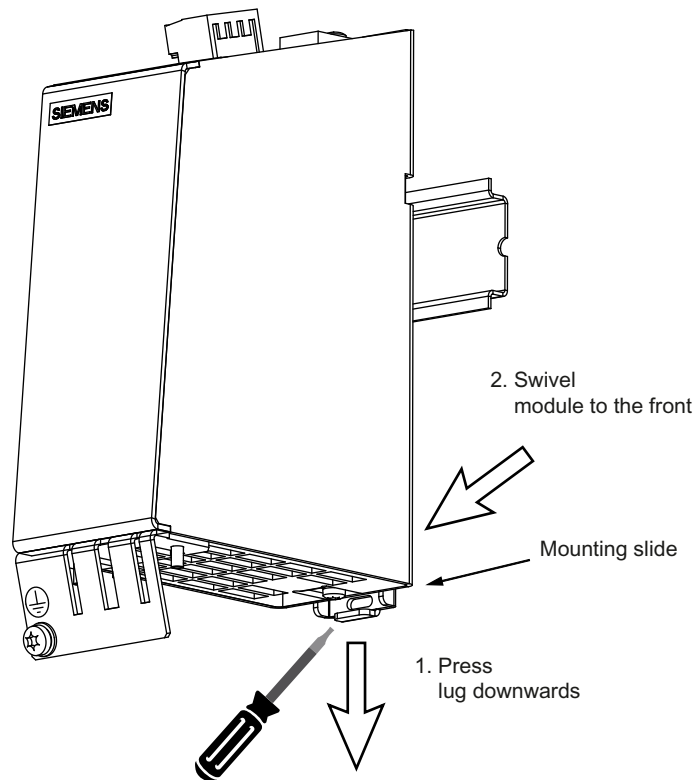


Figure 5-63 TM54F removal

Procedure:

1. Label connectors X514 and X524 for the sensor and electronics power supply prior to withdrawing them.
2. Withdraw the connected DRIVE-CLiQ cables X500 and X501 and write the slot designation on the cable.
3. Label the connected connectors X520 - X535 for digital inputs and outputs prior to withdrawing them.
4. Release the protective conductor connection and write the position designation on the cable.

5. Remove the shield contact. See also: Protective conductor connection and shield contact (Page 139)
6. Slide the lug downwards and swivel the module to the front in order to remove it.

Note

The 50 mm ventilation clearances above and below the components must be observed.

5.18.4 This is how you install a TM54F

Installing

Procedure:

1. Place the component on the mounting rail.
2. Then, swivel the component on the mounting rail so that the mounting catches click into place at the rear.
3. Slide the component along the mounting rail to either the left or right up to its final position.
4. Screw on the protective conductor connection.
5. If necessary, screw on the shield connection.
6. Insert the connectors for the digital inputs and outputs at X520 - X535.
7. Insert the DRIVE-CLiQ cables at X500 and X501.
8. Insert the connectors for the sensor and electronics power supply at X514 and X524.

Note

The 50 mm ventilation clearances above and below the components must be observed.

5.18.5 TM120 status displays

Status displays

The Terminal Module TM120 has the following status displays, which provide information about the module state:

State		Description, cause	Remedy
RDY			
-	Off	Electronics power supply is missing or outside permissible tolerance range.	Check the power supply.
Green	Continuous light	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	--
Orange	Continuous light	DRIVE-CLiQ communication is being established.	--

State		Description, cause	Remedy
RDY			
Red	Continuous light	At least one fault is present in this component. Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove and acknowledge fault.
Green/red	Flashing light 0.5 Hz	Firmware is being downloaded.	--
	Flashing light 2 Hz	Firmware download has been completed. Wait for POWER ON	Carry out a POWER ON.
Green/ orange or red/ orange	Flashing light 2 Hz	Component recognition via LED is activated (p0154). Note: Both options depend on the LED status when activated via p0154 = 1.	--

5.18.6 TM120 safety instructions

Note

The 50 mm ventilation clearances above and below the components must be observed.

Note

Shielding

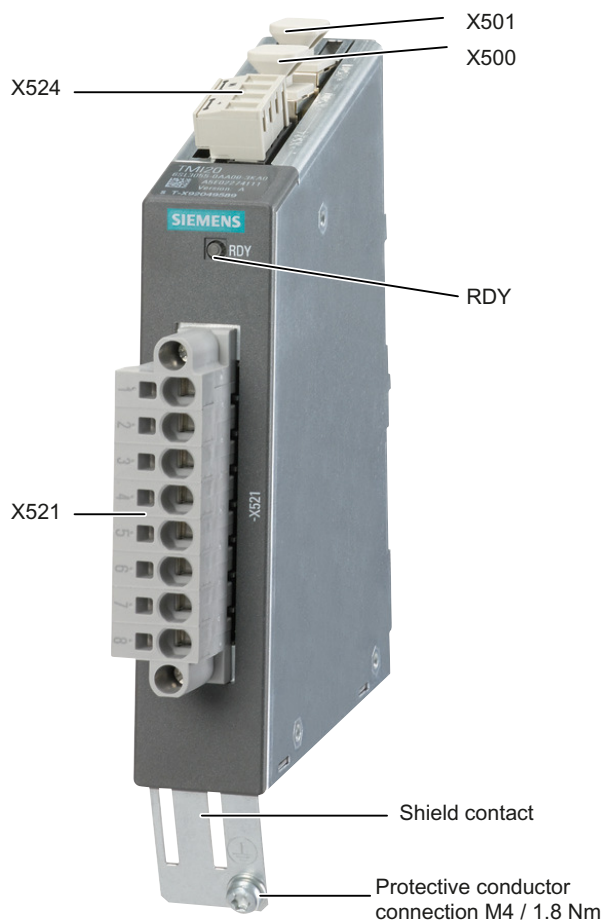
Connecting cables to temperature sensors must always be installed with shielding. The cable shield must be connected to the ground potential at both ends over a large surface area. Temperature sensor cables that are routed together with the motor cable must be twisted in pairs and shielded separately.

Note

If sensors other than those specified are connected, this may result in incorrect measured values.

5.18.7 TM120 connections

Connections



X500, X501	DRIVE-CLiQ interfaces
RDY	LEDs for status display
X521	Inputs for the temperature sensor
X524	Electronics power supply
Figure 5-64	TM120 connections

5.18.8 This is how you remove a TM120 and install it again

Removing

Procedure:

1. First shift the mounting slide downward at the lug to release the interlocking with the mounting rail.
2. Then swivel the component toward the front so that you can remove it upward from the mounting rail.

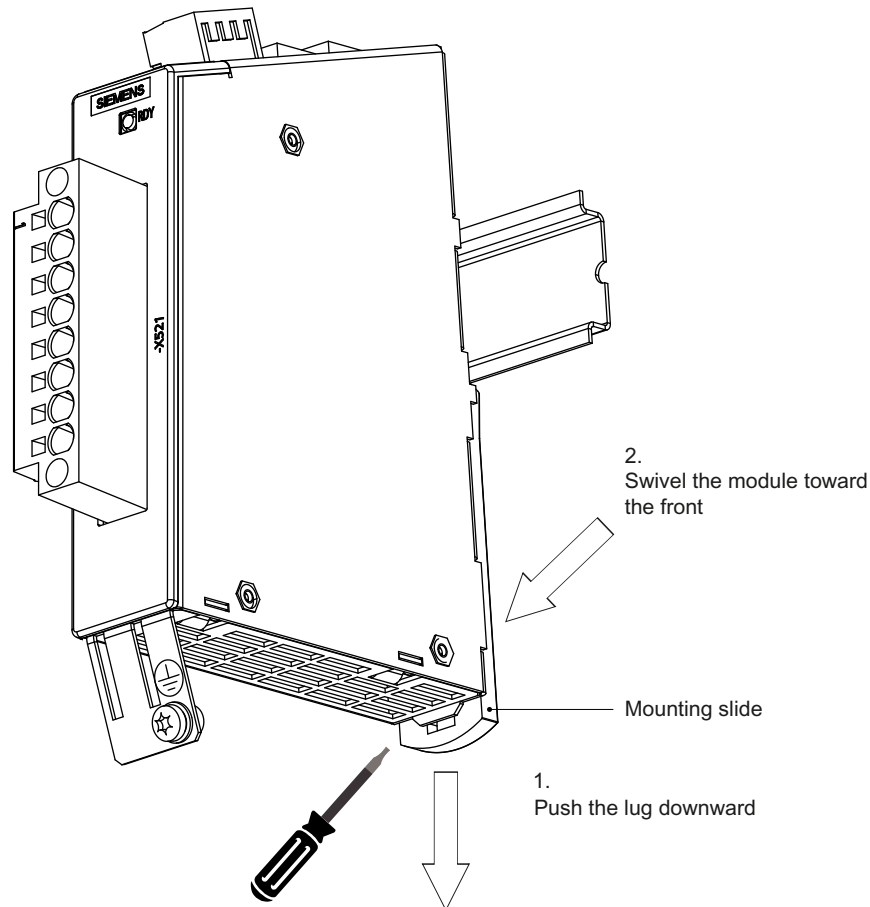


Figure 5-65 Removing the TM120

Installing

Procedure:

1. Slightly tilt the component backward and attach it to the mounting rail using the catch.
2. Swivel the component on the mounting rail until you hear the mounting slide at the rear latch into position.
3. Slide the component along the mounting rail to either the left or right up to its final position.

5.19 Hub Modules

5.19.1 DMC20 status displays

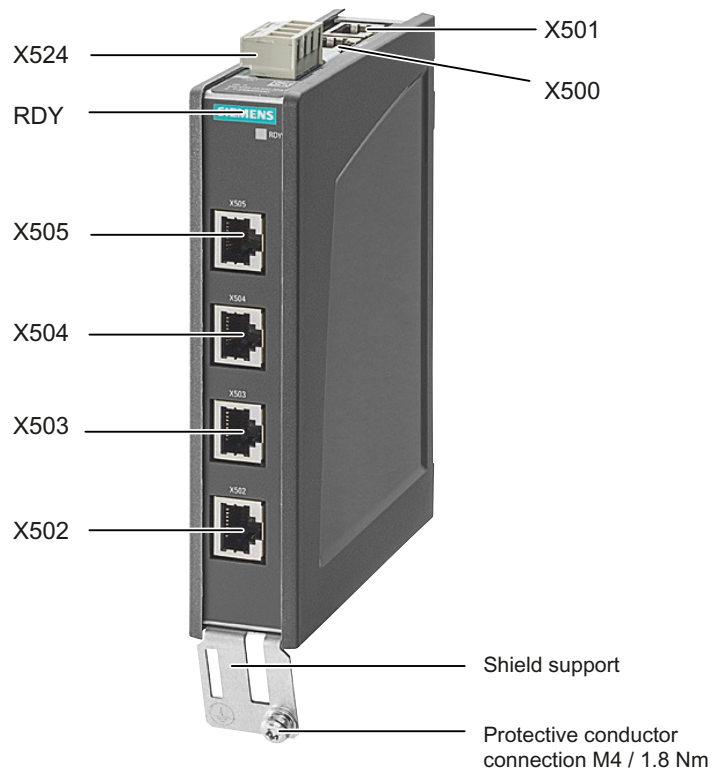
Status displays

The DRIVE-CLiQ Hub Module DMC20 has the following status displays, which provide information about the module state:

LED	Color	State	Description, cause	Remedy
RDY	-	Off	Electronics power supply is missing or outside permissible tolerance range.	–
	Green	Continuous light	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	Continuous light	DRIVE-CLiQ communication is being established.	–
	Red	Continuous light	This component has at least one fault.	Remove and acknowledge fault.
			Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	
	Green/red	Flashes at 0.5 Hz	Firmware is being downloaded.	–
		Flashes at 2 Hz	Firmware download has been completed. Wait for POWER ON	Carry out a POWER ON.
	Green/orange or red/orange	Flashing	Component recognition via LED is activated (p0154).	–
			Note: Both options depend on the LED status when activated via p0154 = 1.	

5.19.2 DMC20 connections

Connections



X500 ... X505 DRIVE-CLiQ interfaces
 X524 Electronics power supply
 Figure 5-66 Connections DMC20

5.19.3 This is how you remove a DMC20

Removing

Precondition: The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Procedure:

1. Before withdrawing it, label the connector X524 for the electronics power supply.
2. Withdraw the connected DRIVE-CLiQ cables X500 – X505 and write the slot designation on the cable.
3. Release the protective conductor connection and write the position designation on the cable.

4. First shift the mounting slide downwards at the lug ① to release the interlocking with the mounting rail.

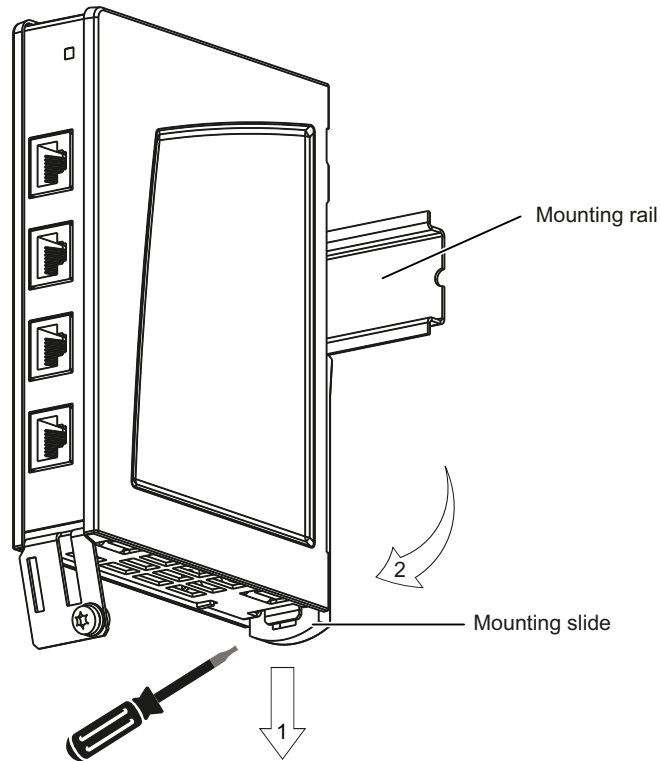


Figure 5-67 Removing the DMC20

5. Swivel the module to the front to remove it from the mounting rail ②.

5.19.4 This is how you install a DMC20

Installing

Note

The 50 mm clearances above and below the components must be maintained.

Procedure:

1. Place the component on the mounting rail.
2. Then, swivel the component on the mounting rail so that the mounting catches click into place at the rear.
3. Slide the component along the mounting rail to either the left or right up to its final position.
4. Screw on the protective conductor connection.
5. Screw on the encoder connecting cable to X520.

6. Insert the DRIVE-CLiQ cable at X500 – X505.
7. Insert connector X524 for the electronics power supply.

5.19.5 DME20 connections

Connections

The component has degree of protection IP67 and is especially suitable for applications which require DRIVE-CLiQ nodes to be removed in groups, without interrupting the DRIVE-CLiQ line and therefore the data exchange.



X500 ... X505 DRIVE-CLiQ interfaces
X524 Electronics power supply
Figure 5-68 DME20 connections

5.19.6 This is how you mount a DME20

Mounting

Procedure:

1. Place the drilling pattern on the mounting surface.
The mounting surfaces must be bare metal.

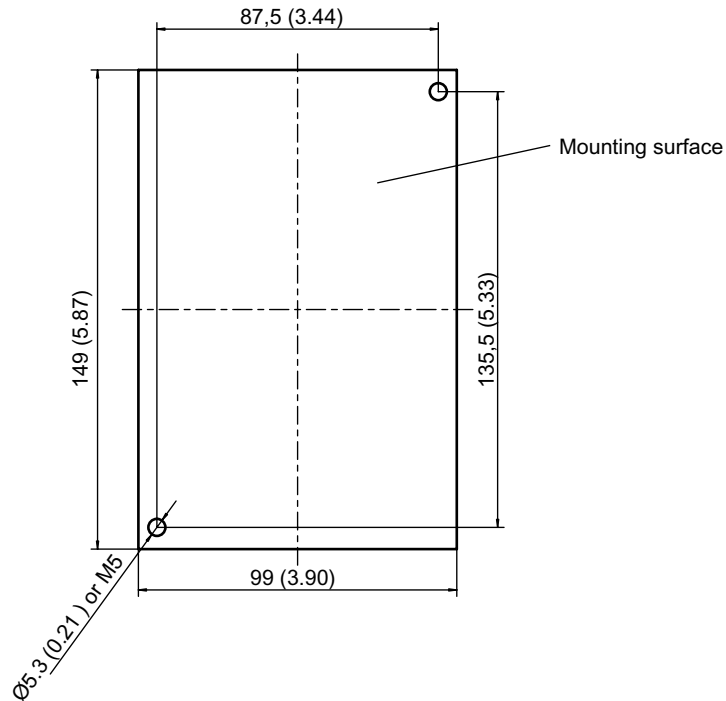


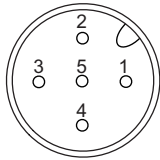
Figure 5-69 DME20 dimensions

2. Drill the holes with Ø5.3 or M5 threads.
3. Tighten the component with a tightening torque of 6.0 Nm.

5.19.7 Connection to X524 electronics power supply

Secondary conditions for DMC20 with UL approval

Pin assignment of the cable for connection to X524:

	Pin	Designation	Technical specifications
	1 (brown)	Electronics power supply	The supply voltage of 20.4 V – 28.8 V refers to the terminal voltage at the DME20.
	2 (white)	Electronics power supply	
	3 (black)	Electronics ground	The cable cross-section and the power supply cable length should be observed:
	4 (blue)	Electronics ground	
	5 (gray)	Not connected	
			• Pins 1 and 2 are internally jumpered. • Pins 3 and 4 are internally jumpered.

Address where the cables can be sourced

The following cables can be sourced through: Phoenix Contact (<https://www.phoenixcontact.com/online/portal/pc>)

Pre-assembled cables	Cables to be assembled by the user
Sensor/actuator cable, 5-pole, free cable end at the M12-SPEEDCON straight socket Length of cable: 2, 5, 10, 15 m (up to 100 m on request) SAC-5P-xxx-186/FS SCO	Cable ring, PUR/PVC black, 5-pole Conductor colors: brown/white/blue/black/gray Cable length: 100 m Conductor cross-section: 5 x 0.75 mm ² SAC-5P-100.0-186/0.75 Article number: 1535590
	Connector: Sensor/actuator connector, socket, straight, 5-pin, M12, A-coded Screw connection, metal knurl, Pg9 cable gland SACC-M12FS-5CON-PG9-M Article number: 1681486

5.20 MODEM MD720

5.20.1 Status displays MODEM MD720

LED status

The modem has three LEDs, which provide information about the operating state:

MODEM MD720	LED	State	Meaning
	All in common	Flash on and off in a fast sequence Slow flashing in synchronism Flash on and off in a slow sequence Fast flashing in synchronism	Device starts Service mode Loading a firmware file Error
	STATUS	Slow flashing Fast flashing	Waiting for PIN input PIN error/ SIM error
	QUALITY	Slow flashing Flashes 1 time with interval Flashes 2 times with interval Flashes 3 times with interval ON OFF	Logging into a GSM network Field strength inadequate Field strength adequate Field strength good Field strength very good Waiting for PIN
	CONNECT	Flashing	Terminal mode activated

Reference

You can find information about the MODEM MD720 (Article number: 6NH9720-3AA01-0XX0) at: SIOS_Modem_MD720 (<https://support.industry.siemens.com/cs/de/en/view/73513752>)

5.20.2 Replace SIM card

Removing the modem

To remove the module, proceed as follows:

1. Ensure that the module has been disconnected from the power supply.
2. Remove the MODEM MD720 from the mounting rail.

Replace SIM card

Use a mini SIM card, 15 x 25 mm.

Proceed as follows to replace the SIM card:

1. Release the slide for the SIM card at the rear of the MODEM MD720 by gently pressing the release button.

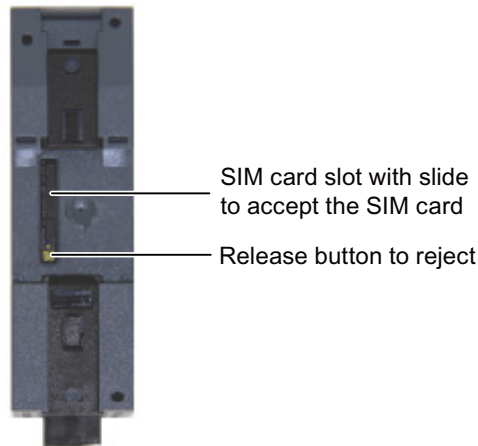


Figure 5-70 MODEM MD720, rear side

2. Withdraw the slide from the housing and remove the SIM card.
3. Insert the new SIM card into the slide.
4. Move the slide into the housing until it gently latches into place.
5. Mount the MODEM MD720 on the mounting rail.

Note

Replacing the SIM card and PIN

When changing the SIM card, do not forget to change the PIN in your control.

If you are using a lot of SIM cards, it may make sense to set all SIM cards, e.g. with one cellular phone to the same PIN.

The device also operates with SIM cards, where the PIN prompt is deactivated. In this case, when establishing a connection, the prompt to enter a PIN is skipped.

5.20.3 This is how you load the factory settings

Restoring the factory settings

If you press the SET key for longer than 4 seconds until the LED "CONNECT" lights up, then the MODEM MD720 configuration is reset to the default values set in the factory.

When resetting, the consequences are as follows:

- An established connection is interrupted.
- The MODEM MD720 is restarted.
- The SIM card PIN is cleared. It is no longer possible to read out the logbook.

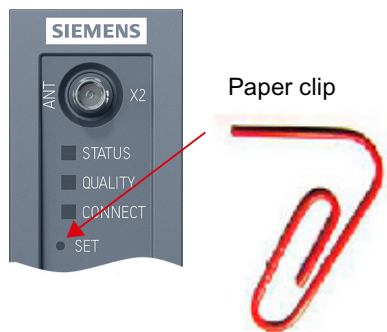


Figure 5-71 MODEM MD720: SET key

Spare parts and accessories

Order data for accessories

The following accessories are available:

Component	Article number
USB flash drive 16 GB, bootable USB 3.0 	6ES7648-0DC60-0AA0
CompactFlash card 8 GB, empty as user memory	6FC5313-6AG00-0AA0
CompactFlash Card 2 GB, empty	6FC5313-5AG00-0AA2

Compatibility of CompactFlash cards

For SINUMERIK 828D, only the memory card (2 GB) with Article number 6FC5313-5AG00-0AA2 is permitted.

SINUMERIK control system supports the file systems FAT16 and FAT32 for CompactFlash cards. You may need to format the memory card if you want to ensure the compatibility of the memory card with the SINUMERIK, or if you wish to use a memory card from another device. Formatting the memory card will permanently delete all data on it.

- If you cannot use a memory card with SINUMERIK, then it possibly involves a memory card that has not been formatted for this control system (e.g. Ext3 Linux file system), or a memory card with a defective file system or an incorrect memory card type.
- Insert the memory card carefully and the right way round into the memory card slot (observe indicators such as arrow or similar). This way you avoid mechanical damage to the memory card or the device.
- Do not remove the memory card while it is being accessed. This can damage the memory card and the SINUMERIK as well as the data on the memory card.

Only use memory cards that have been approved by Siemens for use with SINUMERIK. Even though SINUMERIK follows general industry standards for memory cards, it is possible that memory cards from some manufacturers will not function perfectly in this device or are not completely compatible with it (you can obtain information on compatibility from the memory card manufacturer or supplier).

Ordering data for S120 Combi spare/replacement parts

An overview of the available S120 Combi spare parts is provided in the table below:

Component	Article number
S120 Combi front cover	6SL3161-3GP00-0AA0
S120 Combi guide frame for DRIVE-CLiQ cables	6SL3161-3EP00-0AA0
S120 Combi DC link lateral cover	6SL3161-3AP00-0AA0
S120 Combi internal fan with holder and data sheet	6SL3161-0JP00-0AA0
S120 Combi external fan module	6SL3161-0EP00-0AA0
S120 Combi drip protection For the S120 Combi with 4 axes, this is provided in the pack of accessories when shipped from the factory; for all other S120 Combi versions this must be ordered and retrofitted.	6SL3161-3DP00-0AA0
S120 Combi set of connecting terminals /Terminal Kit • 24 V plug connector • Terminal for the motor holding brake • 4 DRIVE-CLiQ blanking covers • 2 terminals (4-pole) for X12/X13 • 2 terminals (4-pole) for X21/X22 • 5 shield connecting terminals for motor cables • Shield connection terminal for EP signal cables	6SL3161-8AP00-0AA0

Spare parts and accessories - MCP USB

Qty.	Description	Article number
1	Feed/rapid traverse override rotary switch	6FC5347-0AF11-0AA0
1	Spindle/rapid traverse override rotary switch	6FC5347-0AF11-1AA0

Ordering address

You can find accessories and spare parts for the components in the Internet at: Siemens Spares on Web (<https://www.sow.siemens.com/?lang=en>)

Appendix

A.1 Abbreviations

ALM	Active Line Module
ASIC	Application Specific Integrated Circuit
AWG	American Wire Gauge
BERO	Proximity limit switch
CAT5	Quality class (category) for shielded twisted pair network cables. Class 5 states that these cables have a particularly low damping factor, making them suitable for 100 Mbit/s-FastEthernet networks.
CE	The CE marking (Conformité Européenne, which means "compliance with EU directives") for products is a marking according to EU law in relation to product safety.
CNC	Computerized Numerical Control Computerized numerical control
CRC	Cyclic redundancy check: Checksummenprüfung
cULus	Approval (see CE) for Canada and USA (UL = Underwriters Laboratories)
DIN	Deutsche Industrie Norm (German Industry Standard)
DIP	Dual In-Line Package: Dual in-line arrangement
DMC	DRIVE-CLiQ Hub Module
DP	Distributed I/O
DRAM	Dynamic Random Access Memory
DRIVE-CLiQ	Drive Component Link with IQ
EMC	Electromagnetic compatibility
EN	European standard
ESD	Electro-Static Discharge: elektrostatische Entladung
GSM	Global System for Mobile Communications: Worldwide standard for wireless transmission of voice, data, fax and text messages (SMS).
LEDs	Light-emitting diode light-emitting-diode display
MAC	Media Access Control
MCP	Machine control panel: Machine control panel
MLFB	Machine-Readable Product Code
MPI	Multi-Point Interface Multi-point interface
N.C.	Not connected: Connection unassigned
NCK	Numerical Control Kernel: NC kernel with block preparation, traversing range, etc.
NX	Numerical eXtension (axis extension module)
OLP	Optical Link Plug: Fiber-optic bus connector
OP	Operator Panel : Operator panel front
PCU	PC Unit: Computer unit
PG	Programming device
PLC	Programmable Logic Control: Programmable logic control (component of the CNC controller)
PN	PROFINET
QWERTY	keyboard assignment: American keyboard layout, the first six letters in the top row of letters, read from left to right.

RAM	Random Access Memory: Program memory which can be read and written into
SI	Safety Integrated
SLM	Smart Line Module
SMC	Cabinet-mounted sensor modules
SME	Sensor Module External
S/R	Steps per revolution: Pulses per revolution
SRAM	Static Random Access Memory: Static memory (battery-backed)
NV SRAM	Non-Volatile Static Random Access Memory: Non-volatile memory
USB	Universal Serial Bus: Bus system for connecting additional devices to a computer
VDE	Association of Electrical Engineering, Electronics and Information Technology (Germany)

A.2 Information about third-party software used

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QLocale's data is based on Common Locale Data Repository v1.6.1.

Note

You can find additional information on the product DVD in the Readme_OSS file about the third-party software used.

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