SEW EURODRIVE

Manual

MOVI-C® CONTROLLER progressive UHX65A

Edition 02/2019

28514688/EN

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1 General information

1.1 About this documentation

The manual is part of the product and contains important information on operation and service. The manual is written for all employees who assemble, install, start up, and service the product.

The manual must be accessible and legible. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the manual carefully and understood it. If you are unclear about any of the information in this documentation or require further information, please contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of the signal words

The following table shows the grading and meaning of the signal words for safety notes.

Signal word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent hazard	Severe or fatal injuries
⚠ **WARNING**	Possible dangerous situation	Severe or fatal injuries
⚠ **CAUTION**	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the product or its environment
INFORMATION	Useful information or tip: Simplifies handling of the product.	

1.2.2 Structure of the section safety notes

Section safety notes do not apply to a specific action but to several actions pertaining to one subject. The symbols used either indicate a general hazard or a specific hazard.

This is the formal structure of a section safety note:

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

1.2.3 Structure of the embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous action.

This is the formal structure of a safety instruction:

- **SIGNAL WORD** Type and source of hazard.

  Possible consequence(s) if disregarded.

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– Measure(s) to prevent the hazard.

1.3 Decimal separator in numerical values

In this document, a period is used to indicate the decimal separator.

Example: 30.5 kg

1.4 Right to claim under warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the documentation. Therefore, read the manual before you start operating the device.

Make sure that the manual is available to persons responsible for the system and its operation, as well as to persons who work independently on the unit. You must also ensure that the documentation is legible.

1.5 Other applicable documentation

Observe the corresponding documentation for all further components.

1.6 Product names and trademarks

The brands and product names in this documentation are trademarks or registered trademarks of the respective titleholders.

1.6.1 Trademark of Beckhoff Automation GmbH

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

1.7 Copyright notice

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2 Safety notes

2.1 Preliminary information

The following general safety notes serve the purpose of preventing injury to persons and damage to property. They primarily apply to the use of products described in this documentation. If you use additional components, also observe the relevant warning and safety notes.

2.2 Duties of the user

As the user, you must ensure that the basic safety notes are observed and complied with. Make sure that persons responsible for the machinery and its operation as well as persons who work on the device independently have read through the documentation carefully and understood it.

As the user, you must ensure that all of the work listed in the following is carried out only by qualified specialists:

- Setup and installation
- Installation and connection
- Startup
- Maintenance and repairs
- Shutdown
- Disassembly

Ensure that the persons who work on the product pay attention to the following regulations, conditions, documentation, and information:

- National and regional safety and accident prevention regulations
- Warning and safety signs on the product
- All other relevant project planning documents, installation and startup instructions, and wiring diagrams
- Do not assemble, install or operate damaged products
- All system-specific specifications and conditions

Ensure that systems in which the product is installed are equipped with additional monitoring and protection devices. Observe the applicable safety regulations and legislation governing technical work equipment and accident prevention regulations.

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2.3 Target group

Specialist for mechanical work

Any mechanical work may only be performed by adequately qualified specialists. Specialists in the context of this documentation are persons familiar with the design, mechanical installation, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualification in the mechanical area in accordance with the national regulations
- Familiarity with this documentation

Specialist for electrotechnical work

Any electrotechnical work may only be performed by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualification in the electrotechnical area in accordance with the national regulations
- Familiarity with this documentation

Additional qualification

In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation. The persons must have the express authorization of the company to operate, program, parameterize, label, and ground units, systems, and circuits in accordance with the standards of safety technology.

Instructed persons

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately. The purpose of the instruction is that the persons are capable of performing the required tasks and work steps in a safe and correct manner.

2.4 Designated use

The product is intended for control cabinet installation in electrical plants or machines.

In case of installation in electrical systems or machines, startup of the product is prohibited until it is determined that the machine meets the requirements stipulated in the local laws and directives. For Europe, Machinery Directive 2006/42/EC as well as the EMC Directive 2014/30/EU apply. Observe EN 60204-1 (Safety of machinery -– electrical equipment of machines).

Technical data and information on the connection conditions are provided on the nameplate and in chapter "Technical data" in the documentation. Always comply with the data and conditions.

Unintended or improper use of the product may result in severe injury to persons and damage to property.

2.4.1 Hoist applications

To avoid danger of fatal injury by falling hoists, observe the following points when using the product in lifting applications:

- Use mechanical protection devices.
- Perform a hoist startup.

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2.5 Functional safety technology

The product must not perform any safety functions without a higher-level safety system, unless explicitly allowed by the documentation.

2.6 Transport

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product is damaged, it must not be assembled, installed or started up.

Observe the following notes when transporting the device:

- Ensure that the product is not subject to mechanical impact.

If necessary, use suitable, sufficiently dimensioned handling equipment.

Observe the information on climatic conditions in chapter "Technical data" of the documentation.

2.7 Installation/assembly

Ensure that the product is installed and cooled according to the regulations in the documentation.

Protect the product from strong mechanical strain. The product and its mounting parts must never protrude into the path of persons or vehicles. Ensure that components are not deformed and insulation spaces are not changed, particularly during transportation and handling. Electric components must not be mechanically damaged or destroyed.

Observe the notes in chapter Mechanical installation in the documentation.

2.7.1 Restrictions of use

The following applications are prohibited unless the device is explicitly designed for such use:

- Use in potentially explosive atmospheres
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation
- Operation in applications with impermissibly high mechanical vibration and shock loads in excess of the regulations stipulated in EN 61800-5-1
- Use at an elevation of more than 3800 m above sea level

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2.8 Electrical installation

Ensure that all of the required covers are correctly attached after carrying out the electrical installation.

Make sure that preventive measures and protection devices comply with the applicable regulations (e.g. EN 60204-1 or EN 61800-5-1).

2.8.1 Required preventive measure

Make sure that the product is correctly attached to the ground connection.

2.9 Network security and access protection

A bus system makes it possible to adapt electronic drive technology components to the particulars of the machinery within wide limits. There is a risk that a change of parameters that cannot be detected externally may result in unexpected but not uncontrolled system behavior and may have a negative impact on operational safety, system availability, or data security.

Ensure that unauthorized access is prevented, especially with respect to Ethernet-based networked systems and engineering interfaces.

Use IT-specific safety standards to increase access protection to the ports. For a port overview, refer to the respective technical data of the device in use.

2.10 Short designation

The following short designations are used in this documentation.

Type designation	Short designation
MOVI-C® CONTROLLER progressive UHX65A	MOVI-C® CONTROLLER

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3 Introduction

3.1 General information

3.1.1 Content of this manual

This manual describes:

- The installation of the MOVI-C® CONTROLLER
- The interfaces and LEDs of the MOVI-C® CONTROLLER
- The engineering access to the MOVI-C® CONTROLLER
- Use of CFast memory cards
- The interfaces of the MOVI-C® CONTROLLER used in connection with CFast memory card
- The first boot process of the Windows operating system

3.1.2 Additional documentation

To be able to configure and startup the MOVI-C® CONTROLLER simply and effectively, you should also order the following documentation in addition to this manual:

- "Automation with MOVI-C® CONTROLLER" manual
- "MOVIDRIVE® modular application inverter" product manual
- "MOVIDRIVE® system application inverter" product manual

When using the CFast memory card with a Windows operating system:

- Observe the Microsoft documentation exclusively for the configuration and operation of the Windows operating system.

Always use the latest edition of documentation and software.

The SEW-EURODRIVE website (www.sew-eurodrive.com) provides a wide selection of documents for download in various languages. If required, you can also order printed and bound copies of the documentation from SEW-EURODRIVE.

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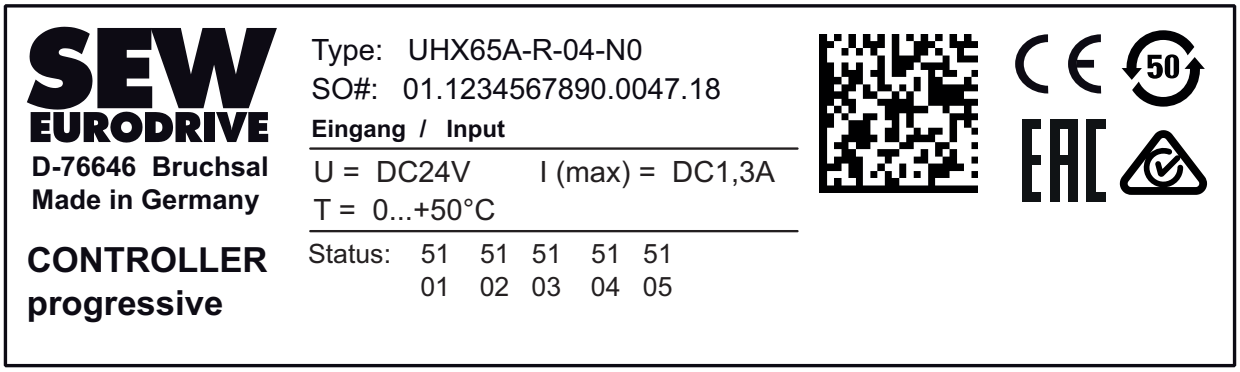
3.2 MOVI-C® CONTROLLER

The MOVI-C® CONTROLLER in the performance class "progressive" is a motion and logic controller for demanding automation tasks. The real-time operating system guarantees very short response times as well as a high-performance connection of system buses from SEW-EURODRIVE and standard fieldbuses. Demanding visualization solutions can be realized via the Windows operating system that is running in parallel.

The MOVI-C® CONTROLLER "progressive" performance class is suitable for automating machines and cells for up to 16 interpolating axes and 16 auxiliary axes depending on the application program. It is suitable as a module controller for complex motion functions such as electronic cams and robotics, as well as for the complete automation of machines and systems.

3.2.1 Nameplate

The following graphic shows the nameplate of the MOVI-C® CONTROLLER as an example:



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3.2.2 Type code

The following table shows of the type code structure:

Example: UHX65A-R-04-N0		
Product name	**UHX**	MOVI-C® CONTROLLER
Series	**65**	Progressive
Version	**A**	Version status A
Designs	**R**	• 0 = No fieldbus interface • R = With EtherNet/IP™ fieldbus interface, Modbus TCP, and PROFINET IO for slave connection
Performance	**04**	• 01 = E3815 CPU (1 Core) • 02 = E3825 CPU (2 Cores) • 04 = E3845 CPU (4 Cores with TPM[1)])
Additional option	**N0**	• N0 = Retain memory available

1) Trusted Platform Module – Additional safety functions

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3.2.3 Device variants

MOVI-C® CONTROLLER is available in the following device variants:

Device variant	Fieldbus interface
UHX65A-0-04-N0	MOVI-C® CONTROLLER without a fieldbus interface and with E3845 CPU
UHX65A-R-04-N0	MOVI-C® CONTROLLER with EtherNet/IP™, Modbus TCP, and PROFINET IO CPU fieldbus interfaces and E3845 CPU
UHX65A-0-02-N0	MOVI-C® CONTROLLER without a fieldbus interface and with E3825 CPU
UHX65A-R-02-N0	MOVI-C® CONTROLLER with EtherNet/IP™, Modbus TCP, and PROFINET IO CPU fieldbus interfaces and E3825 CPU
UHX65A-0-01-N0	MOVI-C® CONTROLLER without a fieldbus interface and with E3815 CPU
UHX65A-R-01-N0	MOVI-C® CONTROLLER with EtherNet/IP™, Modbus TCP, and PROFINET IO CPU fieldbus interfaces and E3815 CPU

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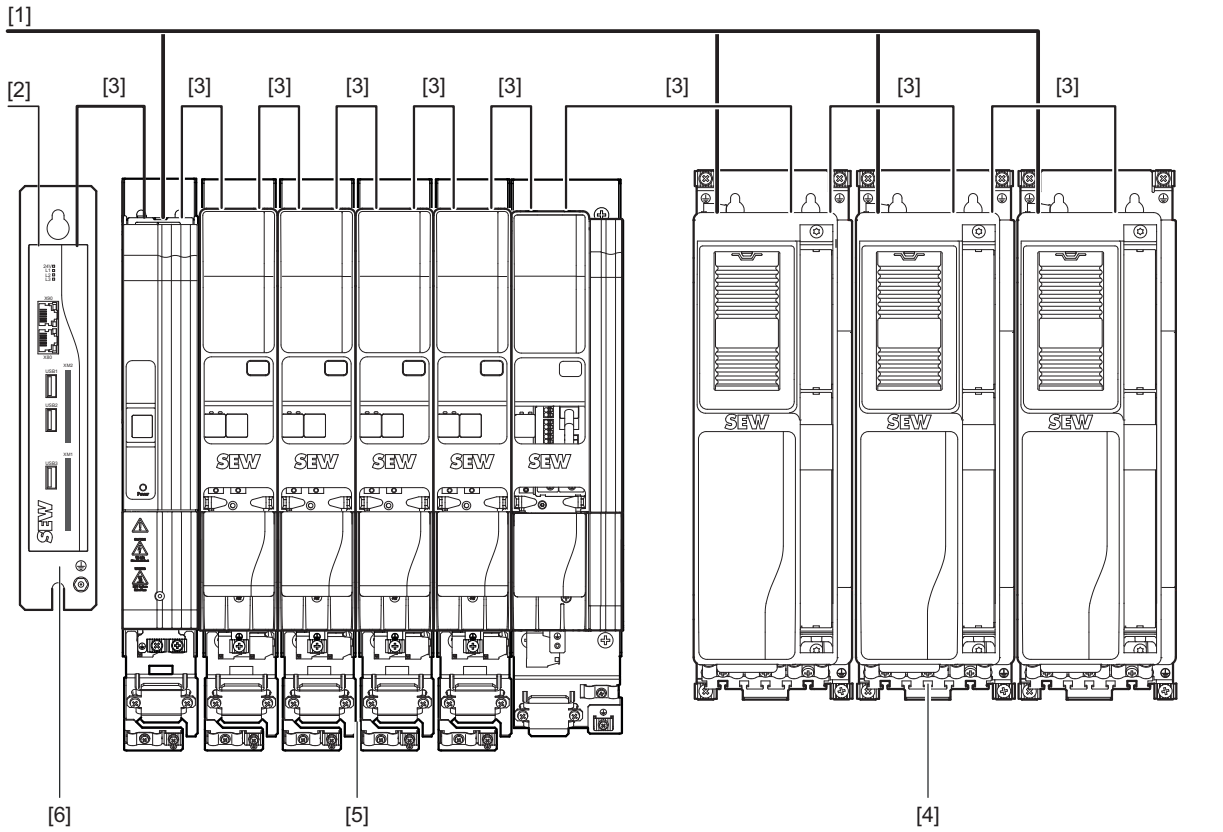
3.2.4 Overview of communication interfaces

MOVI-C® CONTROLLER has the following communication interfaces:

- The Ethernet communication interfaces allow for engineering purposes for the MOVI-C® CONTROLLER, for connecting an operator panel as well as for communication with other Ethernet nodes (e.g. with a PLC).
- The EtherCAT®/SBus^{PLUS} interface is used to control drive inverters, I/O modules and other EtherCAT® slave components.
- The Windows operating system provides USB interfaces for connecting a mouse, a keyboard, or a touchpad. A monitor can be connected via the DisplayPort interface.



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[1] Line voltage
[2] Engineering connection
[3] EtherCAT®/SBus^{PLUS} connection
[4] MOVIDRIVE® system
[5] MOVIDRIVE® modular axis system
[6] MOVI-C® CONTROLLER

Ethernet communication interface (X90)

The Ethernet communication interface(X90) is assigned to the Windows section of the MOVI-C® CONTROLLER. The interface is only available if the CFast memory card with Windows operating system is installed. The following functions can be realized via this interface:

- Access to the Windows operating system via remote desktop connection
- Connection of a visualization system
- Connection to master level

Ethernet communication interface (X80, X82)

The Ethernet communication interface (X80, X82) is assigned to the control section (real-time operating system) of the MOVI-C® CONTROLLER. The following functions can be realized via this interface:

- Engineering of the MOVI-C® CONTROLLER
- PC visualization (e.g. OPC interface)
- Connection to master level

The engineering of the MOVI-C® CONTROLLER comprises the following activities:

- Configuration
- Parameterization
- Programming

Engineering is carried out using the MOVISUITE® engineering software. The software has a number of useful features for startup and diagnostics of all connected SEW-EURODRIVE devices.

EtherCAT®/SBus^{PLUS} interface (X30)

The following devices can be connected to the MOVI-C® CONTROLLER via the EtherCAT®/SBus^{PLUS} interface (X30):

- MOVIDRIVE® modular application inverter
- MOVIDRIVE® system application inverter
- MOVI-PLC® I/O system C
- Third-party components with ESI project planning file

The maximum number of application inverters that can be connected to the MOVI-C® CONTROLLER is: 32.

Virtual network card (VNET)

The virtual network can only be used if the OMW CFast memory card with Windows operating system is installed. For further information, refer to the chapters "OMW CFast memory card" (→ 🗎 17) and "Virtual network card (VNET)" (→ 🗎 23).

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3.2.5 OMH CFast memory cards

The OMH CFast memory card (card for UHX65A: OMH65A-C1) is required for operation of the MOVI-C® CONTROLLER and contains the firmware, the IEC program and user data (e.g. recipes). You can use the memory card for data backup and automatic parameterization in the event of an axis replacement. The CFast memory card is plugged into the XM1 card slot of the MOVI-C® CONTROLLER. See chapter "Inserting memory card" (→ 🗎 29).

3.2.6 OMW CFast memory card

The OMW CFast memory card extends the MOVI-C® CONTROLLER with a Windows operating system and can be used e.g. for plant visualization. The OMW CFast memory card is plugged into the card slot XM2 of the MOVI-C® CONTROLLER. See chapter "Inserting memory cards" (→ 🗎 29).

The memory card is available in various designs. The various features lead to the following structure of the type code of the memory card:

Example: OMW62A-2-C2		
Product name	**OM**	MOVI-C® CONTROLLER memory card
	W	GPOS
Design	**62**	• 62 = 32 GB • 63 = 64 GB
Version	**A**	Version status A
Technology	**2**	• 0 = SLC (Single-Level Cell) 70 °C – Service life ≈ 100 000 – 300 000 erase cycles – Memory card for applications with large amounts of data. • 2 = MLC (Multi-Level Cell) 85 °C – Service life: ≈ 10 000 erase cycles – Alternative for applications with smaller amounts of data.
Image	**C2**	• C2 = Operating system Windows 10 IoT Enterprise (EN)

For a Windows operating system, the MOVI-C® CONTROLLER with the type designation UHX65A-R-04, for example, makes the following hardware available:

- Intel Atom E3845 (Windows 10 IoT Enterprise uses 2 kernels)
- 4 GB RAM
- 1 × Ethernet 10 MBaud/100 MBaud/1000 MBaud (X90)
- 1 × virtual Ethernet to the control section
- 3 × USB 2.0 (USB 1, 2, 3)
- 1 × DisplayPort

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4 Installation notes

4.1 Installation accessories

The following accessories can be ordered using the specific part number:

4.1.1 System bus cable

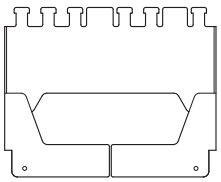
Cable for connecting MOVI-C® CONTROLLER and other automation components (such as MOVIDRIVE® modular/system application inverters)

Designation	Length	Connector	Part number
			
4-pole system bus cable, system bus EtherCAT®/SBus^{PLUS}	• 0.75 m • 1.5 m • 3 m • 5 m • 10 m	2 × RJ45	• 18167039 • 18179975 • 18167047 • 18179983 • 18179991

For further information, refer to the chapter "System bus cable" (→ 🗎 28).

4.1.2 Accessories cable routing

Accessories for securing and stabilizing cable routing and the connections to the MOVI-C® CONTROLLER terminals.

Designation	Part number
	
Accessories cable routing **In detail:** • 1 × cable retainer (see figure) • 2 × screw • 6 × cable tie	28260708

For information on assembly, refer to chapter "Accessories cable routing" (→ 🗎 30).

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4.2 Mechanical installation

⚠ CAUTION

Risk of injury to persons and damage to property.

Never install defective or damaged MOVI-C® CONTROLLERs.

- Before installation, check the device for external damage. Replace any damaged device.

4.2.1 Minimum clearance and mounting position

MOVI-C® CONTROLLER is installed in the control cabinet. Observe the following for installation:

- Install the device with the provided carrier plate to the metal bare back of the control cabinet.
- To ensure unobstructed cooling of the MOVI-C® CONTROLLER, leave a minimum clearance of 100 mm above and below the device's housing as well as 20 mm to the right and left. Make sure air circulation in the clearance is not impaired by cables or other installation equipment. The preferred mounting position is left of the axis system.
- Ensure unobstructed cooling air supply and make sure that the MOVI-C® CONTROLLER is not exposed to the warm exhaust air from other devices.
- Only install the device vertically. Do not install the devices horizontally, tilted or upside down.

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4.3 Electrical installation

INFORMATION

Installation with protective separation.

The device meets all requirements for protective separation of power and electronics connections in accordance with EN 61800-5-1. The connected signal circuits have to meet the requirements according to SELV (**S**afe **E**xtremely **L**ow **V**oltage) or PELV (**P**rotective **E**xtra **L**ow **V**oltage) to ensure protective separation. The installation must meet the requirements for protective separation.

4.3.1 Shielding and routing bus cables

NOTICE

Danger of flowing compensating currents due to the incorrect cable type, inadequate shielding, and/or the incorrect routing of bus cables.

Possible damage to property.

- In the event of fluctuations in the ground potential, a compensating current may flow via the bilaterally connected shield that is also connected to the protective earth (PE). Make sure you always supply adequate equipotential bonding in accordance with the relevant IEC regulations.

Only use shielded cables and connection elements that meet the requirements of category 5, class D as per IEC 11801 edition 2.0.

You can take the following measures to minimize electrical interference:

- Manually tighten the mounting screws on the connectors, modules, and equipotential bonding conductors.
- Use only connectors with a metal housing or a metalized housing.
- Connect the shielding in the connector over a wide surface area.
- Apply the shielding of the bus cable on both ends.
- Always route the signal and bus cables spatially separated from power cables (motor leads) and, whenever possible, in separate cable ducts.
- Use metallic, grounded cable racks in industrial environments.
- Route the signal cable and the corresponding equipotential bonding close to each other using the shortest possible route.
- Avoid using plug connectors to extend bus cables.
- Route the bus cables closely along existing grounding surfaces.

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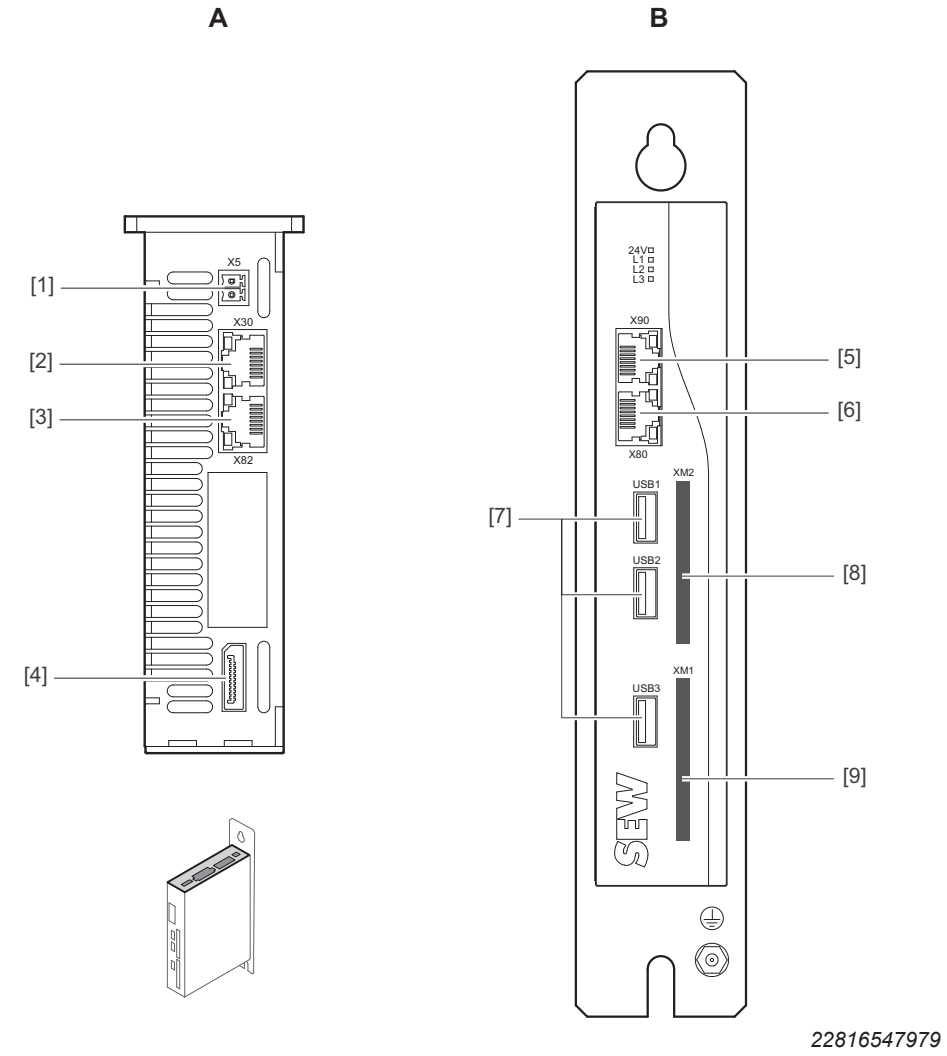
4.3.2 Description of terminal functions



A: View from top **W: View from front**

No.	Designation	Terminal	Function
[1]	Connection of DC 24 V voltage supply (−)	X5: PIN1	Voltage supply DC 24 V
	Connection of DC 24 V voltage supply (+)	X5: PIN2	
[2]	EtherCAT®/SBus^{PLUS} interface (RJ45 socket)	X30	EtherCAT®/SBus^{PLUS} master connection
[3]	Engineering interface (RJ45 socket)	X82	Engineering interface for the control section
[4]	DisplayPort interface	DP	Monitor connection
[5]	Engineering interface (RJ45 socket)	X90	Engineering interface for the Windows section
[6]	Engineering interface (RJ45 socket)	X80	Engineering interface for the control section

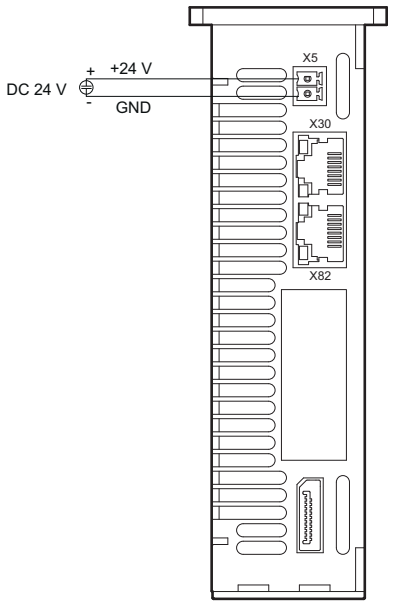
No.	Designation	Terminal	Function
[7]	USB interface	USB1	USB interfaces for the Windows section
	USB interface	USB2	
	USB interface	USB3	
[8]	CFast card slot	XM2	Card slot for OMW CFast memory card (Windows section)
[9]	CFast card slot	XM1	Card slot for OMH CFast memory card (Control section)

4.3.3 Voltage supply

An external DC 24 V power supply unit (power consumption P_{max} = 30 W) has to be used for the voltage supply of the MOVI-C® CONTROLLER.

The maximum permitted length of the DC 24 V supply cable is 30 m.

Wiring diagram



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4.3.4 Connection to Ethernet network

To connect the MOVI-C® CONTROLLER to the Ethernet network, connect one of the Ethernet communication interfaces X80, X82 or X90 (RJ45 plug connector) to the other network stations using a category 5, class D shielded twisted-pair cable in accordance with IEC 11801 edition 2.0.

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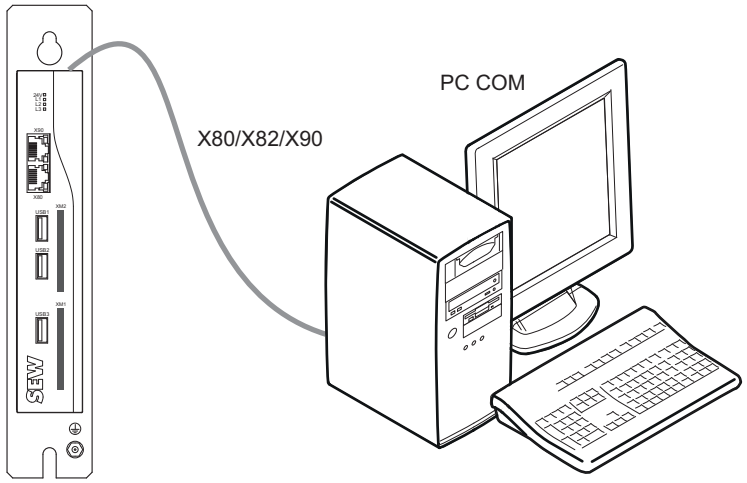
You can connect an engineering PC or other network stations (e.g. visualization systems) to the Ethernet communication interfaces. The Ethernet communication interface X90 is only available in combination with the OMW CFast memory card on a Windows operating system.



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4.3.5 Virtual network card (VNET)

Apart from the hardware communication connections of the MOVI-C® CONTROLLER, the Windows operating system is also provided with a virtual network card (VNET).

VNET allows for a very simple addressing of the control section of the MOVI-C® CONTROLLER. The virtual network card behaves like a real network card and you can directly address the control section via the engineering software using the address 192.168.2.2 set as default in delivery state.

If you do not use the virtual network card (VNET), you have to interconnect the real network connections of the Windows section (X90) and of the control section (X80, X82) via a network switch.

INFORMATION

The virtual network card (VNET) does not support DHCP operation.

Setting the network address of the Windows section

INFORMATION

Setting the network address is only required if you want to use a network address other than the default value. The network address (`192.168.2.1`) used in following instructions is initially set as default value for the Windows section.

Set the network addresses of the Windows section with the corresponding settings menus in the Windows operating system.

Proceed as follows:

1. Open the start menu and click on the "Settings" icon.
2. Click on the "Network and Internet" tile and open the "Ethernet" submenu.

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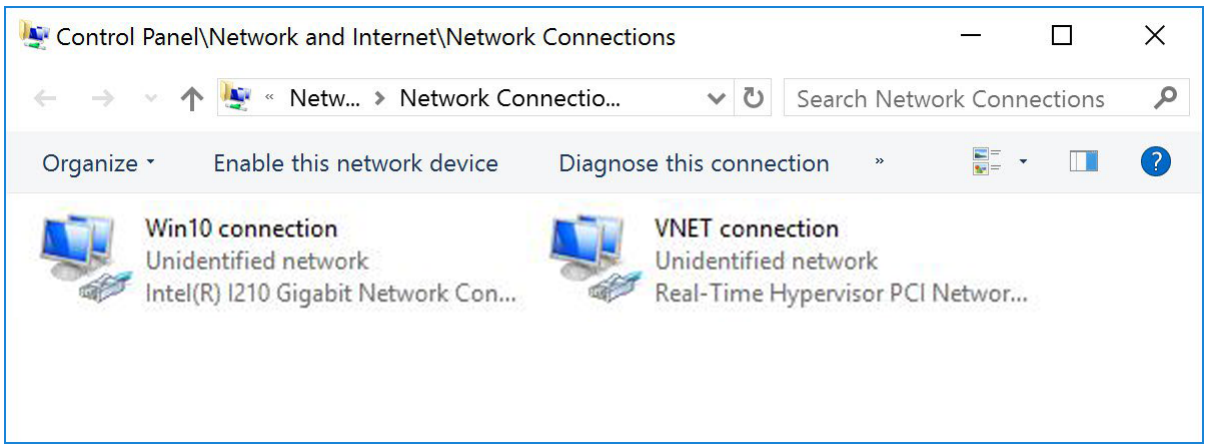
3. In the "Ethernet" menu, click on the "Change adapter options" link at the right side of the screen.

   ⇨ The current network connections are displayed.



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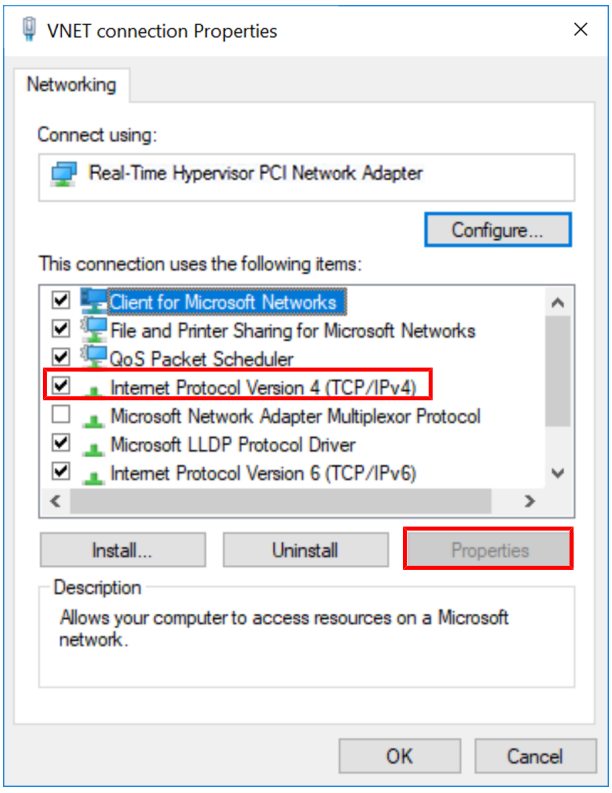
4. Open the context menu of the "VNET connection" network connection and select "Properties".

   ⇨ The "VNET connection Properties" dialog opens.

5. On the "Networking" tab, select the entry "Internet Protocol Version 4" in the group "This connection uses the following items" and then click on [Properties].



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   ⇨ The "Internet Protocol Version 4 Properties" window is displayed.

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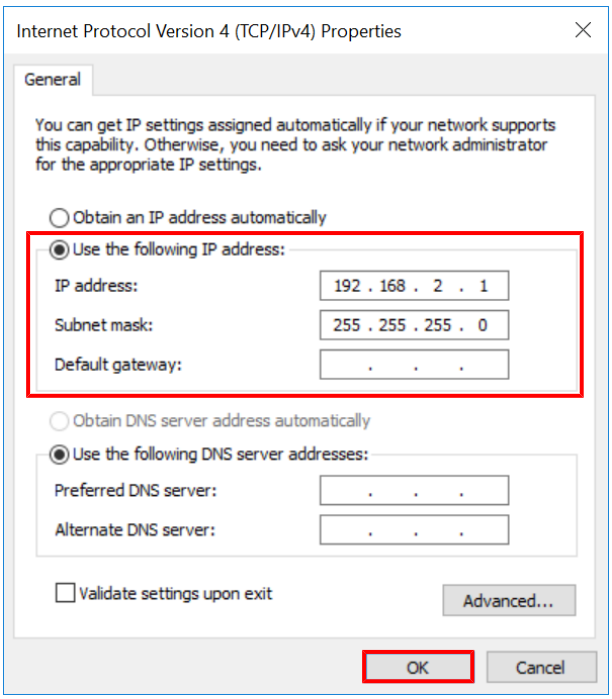
6. Select the option "Use the following IP address" and enter the values for the IP address and the subnet mask.



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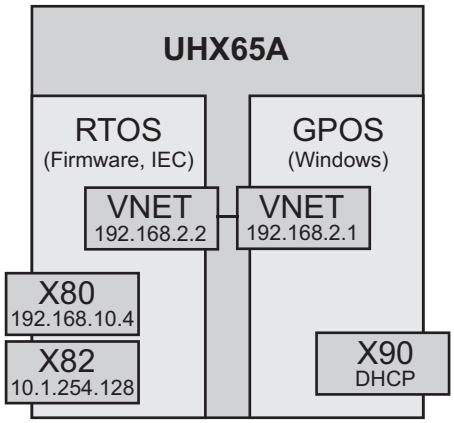
7. Confirm your entries with [OK].

Connection between the Windows section and the control section

Connecting via a virtual network card (VNET)

The internal connection between the Windows section and the control section is available as standard and does not require any additional hardware such as network cables, for example.



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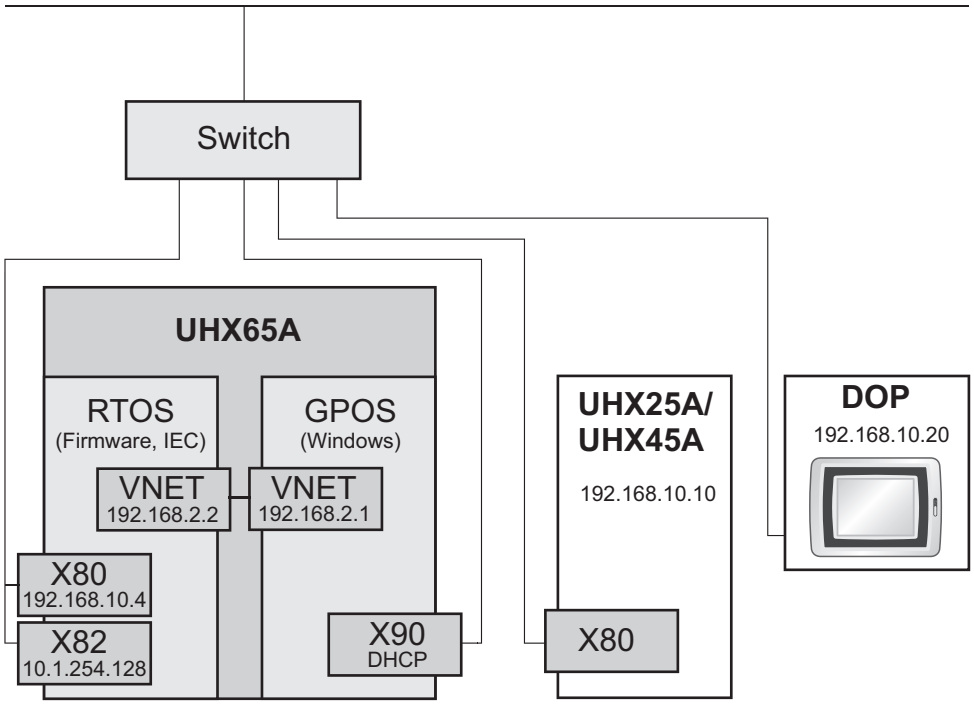
Connecting via an external network

A network switch can be used to connect an external network to the Windows section (X90), the control section (X80, X82) of the MOVI-C® CONTROLLER, and another external **UHX25A/UHX45A** MOVI-C® CONTROLLER **(terminal: X80)**. This connection option also allows you to connect external devices, e.g. a keypad.



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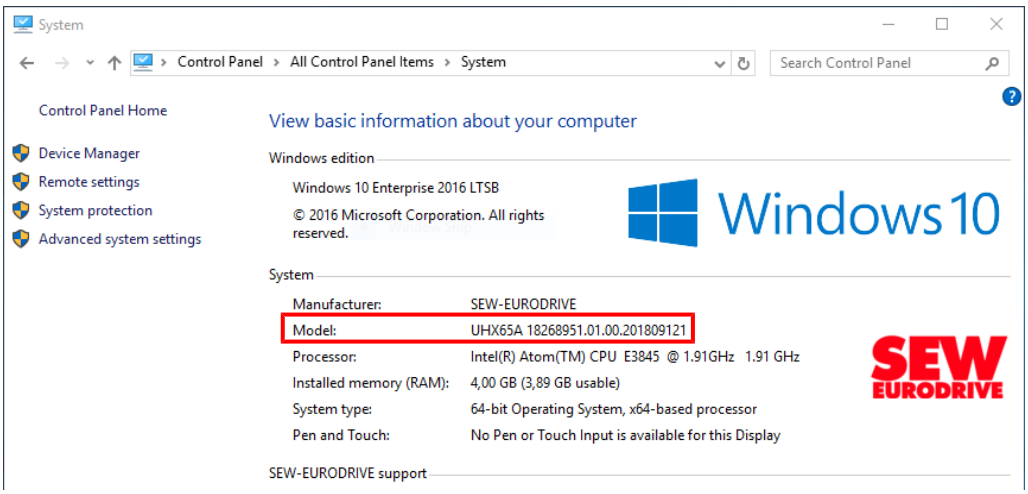
Reading out the version number of the software package

You can view the version number of the software package installed on the "OMW CFast memory card" (→ 🗎 17) via the Windows settings.

Proceed as follows:

1. Open the start menu and type "Control Panel" into the search field.
2. In the result list, click on the app entry [Control Panel].
3. Select the "System and Security" submenu and click on "System".
   ⇨ The "View basic information about your computer" window opens.



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   ⇨ The version number of the software package is displayed in the "Model" line in the "System" section.

4.3.6 EtherCAT®/SBus^{PLUS} connection

The MOVI-C® CONTROLLER serves as EtherCAT®/SBus^{PLUS} master for the lower-level application inverters (EtherCAT®/SBus^{PLUS} slaves). The communication takes place via the EtherCAT®-based, fast system bus SBus^{PLUS} (X30).

EtherCAT®/SBus^{PLUS} bus topology

EtherCAT®/SBus^{PLUS} is designed for linear bus structure with RJ45 connectors. The EtherCAT®/SBus^{PLUS} slave devices are connected via a shielded twisted-pair cable.

INFORMATION

According to IEEE 802.3, 200 Edition, the maximum cable length for 10 MBaud/100 MBaud Ethernet (10BaseT/100BaseT) between 2 EtherCAT®/SBus^{PLUS} stations is 100 m.

For an example of a EtherCAT®/SBus^{PLUS} bus topology, refer to chapter Overview of communication interfaces.

System bus cable

A 4-core system bus cable is used between the MOVI-C® CONTROLLER and the other automation components (such as MOVIDRIVE® modular/system application inverters). For connecting the EtherCAT®/SBus^{PLUS} system bus, SEW-EURODRIVE recommends using only prefabricated cables from SEW-EURODRIVE listed in chapter "Installation accessories" (→ 🗎 18).

NOTICE

Use of wrong cables

Damage to automation components.

If incorrect cables are used, malfunctions or failures may occur at the connected devices.

INFORMATION

The mounting plates on which the axis systems are mounted must have a sufficiently large ground connection, e.g., a ground strap.

Bus termination

Bus termination (for example with bus terminating resistors) is not necessary. The system detects automatically if there is no subsequent device connected to a device.

Station address

EtherCAT®/SBus^{PLUS} devices from SEW-EURODRIVE do not have an address that can be set for the device. The devices are detected by their position in the bus structure and are assigned an address by the EtherCAT®/SBus^{PLUS} master.

4.3.7 Connecting USB interfaces

The USB interfaces USB1, USB2, and USB3 are assigned to the Windows operating system (OMW CFast memory card). You can use those USB interfaces to connect a keyboard, a mouse, or a touchpad for maintenance purposes.

4.3.8 DisplayPort interface connection

The DisplayPort interface assigned to the Windows operating system (OMW CFast memory card) is used for connecting a monitor to the MOVI-C® CONTROLLER.

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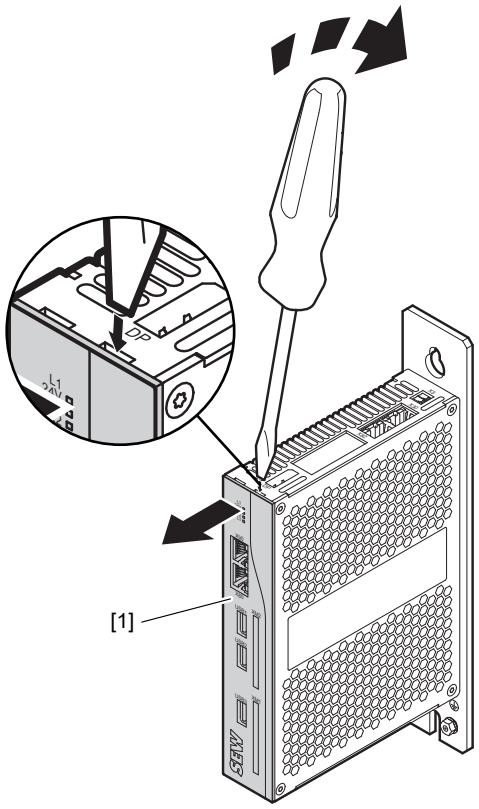
4.3.9 Inserting memory cards

1. Lift the magnetically fixed front panel [1] from the MOVI-C® CONTROLLER. Use the intended recess and a screwdriver as lever.



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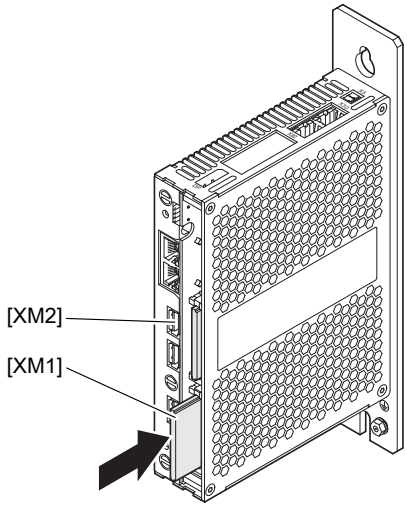
2. Plug the OMH CFast memory cards into the slot marked with XM1.
3. Plug the OMW CFast memory cards into the slot marked with XM2.



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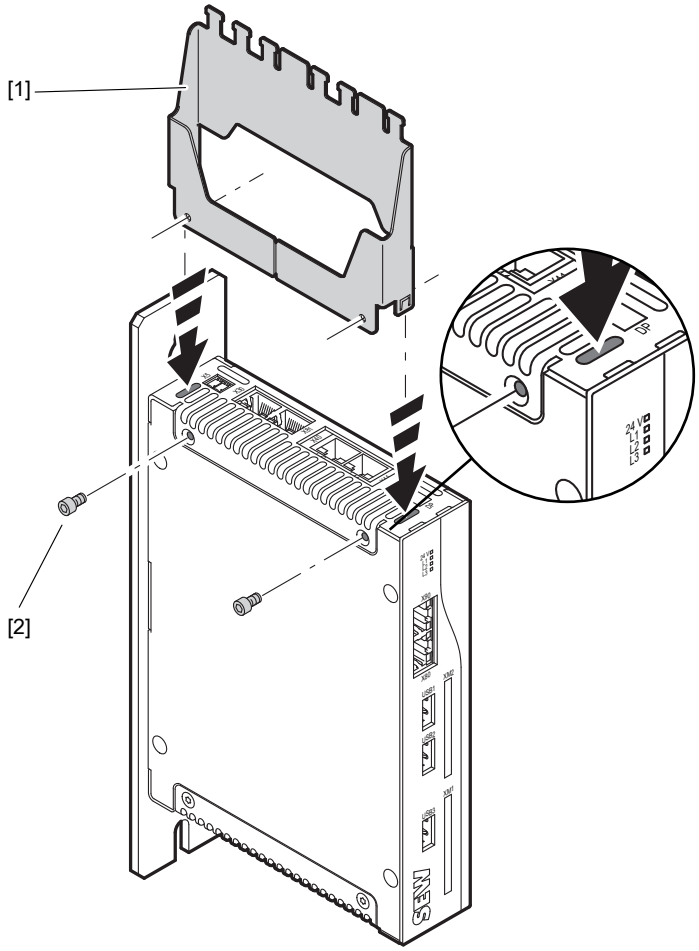
4.4 Installing options and accessories

4.4.1 Accessories cable routing

Installing cable retainers

1. Loosen the screws [2] of the MOVI-C® CONTROLLER.



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2. Insert the cable retainer [1] to the MOVI-C® CONTROLLER as shown in the figure.
3. Insert the screws contained in the "Accessories cable routing" (→ 🗎 18) instead of the removed screws [2] and tighten the screws.

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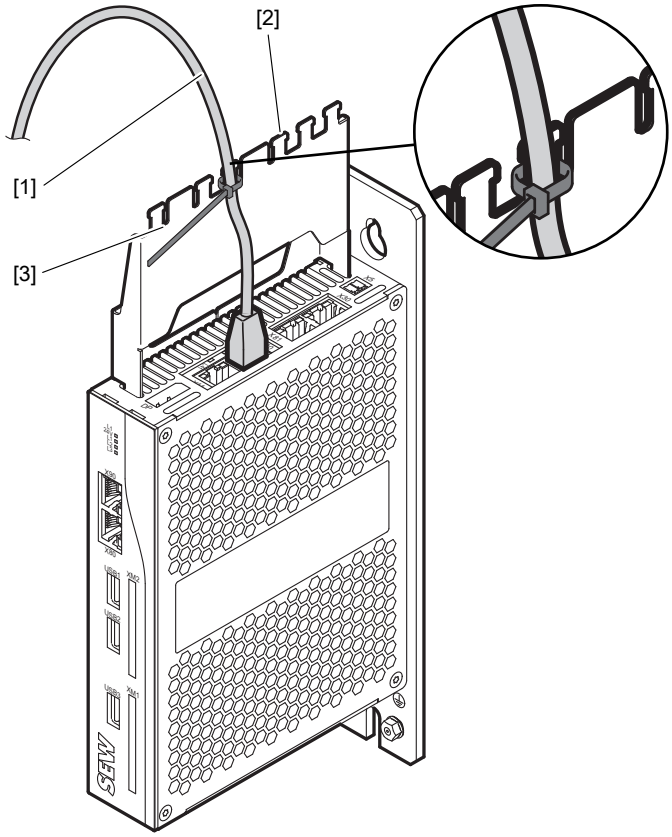
Install cable in cable retainer

1. Route the cables [1] connected to the MOVI-C® CONTROLLER to the upper end of the cable retainer [2].



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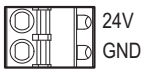
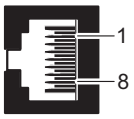
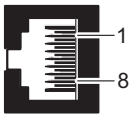
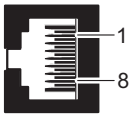
2. Attach the cable to the cable retainer with a cable tie [3] each as shown on the figure.

4.5 Terminal assignment

INFORMATION

The assignment "Reserved" means that no cable may be connected to this connection.

Representation	Terminal	Connection		Brief description	
	X5:24 V	V_I24 V		DC 24 V supply voltage	
	X5:GND	GND		Reference potentials inside the device (connected to PE internally)	
	X30			Fast system bus SBus^{PLUS} based on EtherCAT®	
		10/100 BaseT	**1000 BaseT**	**10/100 BaseT**	**1000 BaseT**
	X80/X82:1	TX+	DA+	Transmit line (+)	Bidirectional pair A
	X80/X82:2	TX-	DA-	Transmit line (-)	Bidirectional pair A
	X80/X82:3	RX+	DB+	Receive line (+)	Bidirectional pair B
	X80/X82:4	Reserved	DC+	–	Bidirectional pair C
	X80/X82:5	Reserved	DC-	–	Bidirectional pair C
	X80/X82:6	RX-	DB-	Receive line (-)	Bidirectional pair B
	X80/X82:7	Reserved	DD+	–	Bidirectional pair D
	X80/X82:8	Reserved	DD-	–	Bidirectional pair D
		10/100 BaseT	**1000 BaseT**	**10/100 BaseT**	**1000 BaseT**
	X90:1	TX+	DA+	Transmit line (+)	Bidirectional pair A
	X90:2	TX-	DA-	Transmit line (-)	Bidirectional pair A
	X90:3	RX+	DB+	Receive line (+)	Bidirectional pair B
	X90:4	Reserved	DC+	–	Bidirectional pair C
	X90:5	Reserved	DC-	–	Bidirectional pair C
	X90:6	RX-	DB-	Receive line (-)	Bidirectional pair B
	X90:7	Reserved	DD+	–	Bidirectional pair D
	X90:8	Reserved	DD-	–	Bidirectional pair D

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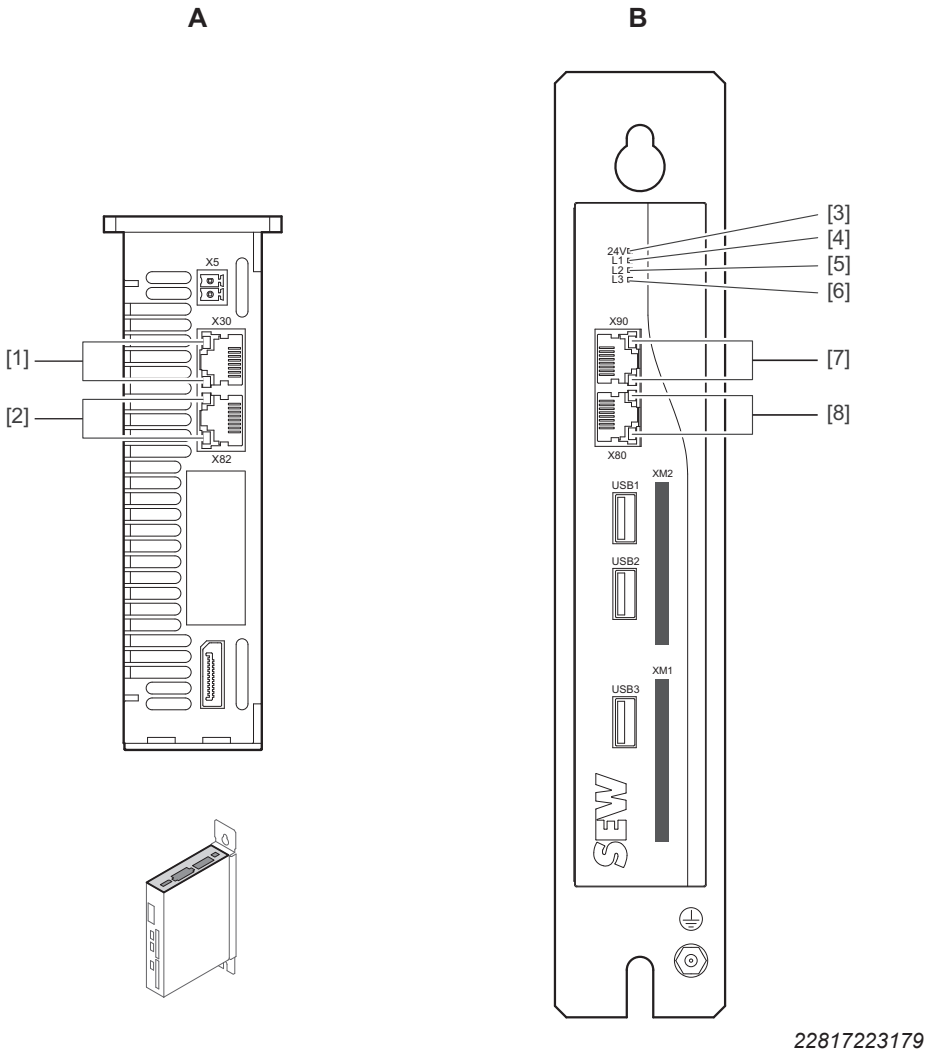
4.6 Status LEDs



A: View from top **W: View from front**

[1] L/A: Status of the EtherCAT®/SBus^{PLUS} connection (X30)
Speed: Speed of the EtherCAT®/SBus^{PLUS} connection (X30)
[2] L/A: Status of the engineering connection (X82)
Speed: Speed of the engineering connection (X82)
[3] 24V: 24 V voltage supply status
[4] L1: Firmware status
[5] L2: Status of the IEC program
[6] L3: Reserved
[7] L/A: Status of the engineering connection (X90)
Speed: Speed of the engineering connection (X90)
[8] L/A: Status of the engineering connection (X80)
Speed: Speed of the engineering connection (X80)

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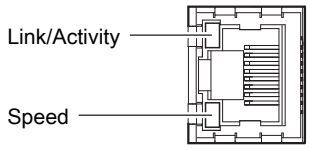
4.6.1 Status LED "Link/Activity" (L/A) and "Speed"



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Status LED "Link/Activity" (L/A)

Status	Meaning	Measure
Green	There is an Ethernet connection.	–
Green, flashing	Data is currently being exchanged via Ethernet.	–
Off	There is no Ethernet connection.	–

Status LED "Speed"

Status	Meaning	Measure
Orange	Current exchange rate of the data via Ethernet is 1000 MBit/s (1 GBit/s).	–
Off	Current exchange rate of data via Ethernet is 10 MBit/s or 100 MBit/s or there is no Ethernet connection.	–

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4.6.2 Status LED "24V"

Status	Meaning	Measure
Green	The voltage supply of the device is OK.	–
Off	Device has no voltage supply.	Check the voltage supply at the respective terminal.

4.6.3 Status LED "L1"

Indicates the status of the firmware during the boot phase and during operation.

During boot phase

Status	Meaning	Measure
Orange, flashing with 0.5 Hz	Firmware of the device starts properly.	–

During operation

Status	Meaning	Measure
Green, flashing with 0.5 Hz	Firmware of the device is running properly.	–
Red, flashing with 0.5 Hz	The firmware of the device is faulty.	Contact SEW-EURODRIVE service.

4.6.4 Status LED "L2"

Indicates the status of the IEC program.

Status	Meaning	Measure
Off	No IEC program loaded.	Load an IEC program on the device.
Orange, flashing with 0.5 Hz	Program has stopped running.	Start the IEC program.
Red, flashing with 0.5 Hz	The IEC program is faulty.	Check and correct the IEC program.
Green, flashing with 0.5 Hz	IEC program is running correctly.	–

4.6.5 Status LED "L3"

Status	Meaning	Measure
–	Reserved	–

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5 Startup

5.1 Configuration of the EtherCAT®/SBus^{PLUS} stations

In the project example, the following devices are EtherCAT®/SBus^{PLUS} stations:

- The MOVI-C® CONTROLLER serves as EtherCAT®/SBus^{PLUS} master.
- The application inverters serve as EtherCAT®/SBus^{PLUS} slaves.

The configuration of the devices is performed in the MOVISUITE® engineering software.

The EtherCAT®/SBus^{PLUS} stations are configured in several process steps:

1. "Establishing a connection between engineering PC and MOVI-C® CONTROLLER" (→ 🗎 36)
2. "Scanning the network for devices" (→ 🗎 38)
3. "Applying MOVI-C® devices to MOVISUITE®" (→ 🗎 39)

5.1.1 Establishing a connection between engineering PC and MOVI-C® CONTROLLER

To ensure that the engineering PC can communicate via the engineering interface X80, X82 with the MOVI-C® CONTROLLER via Ethernet, both the devices must be connected in the same local network. For this purpose, the IP address parameters of the engineering PC must be set to the local network.

INFORMATION

In delivery state, the engineering interface X80, X82 of the MOVI-C® CONTROLLER has the following IP address parameters: Standard IP address 192.168.10.4, subnet mask 255.255.255.0

Proceed as follows:

1. Select the network settings in the Windows control panel.
2. Double-click on the adapter that is physically connected to the engineering interface X80, X82 of the MOVI-C® CONTROLLER.

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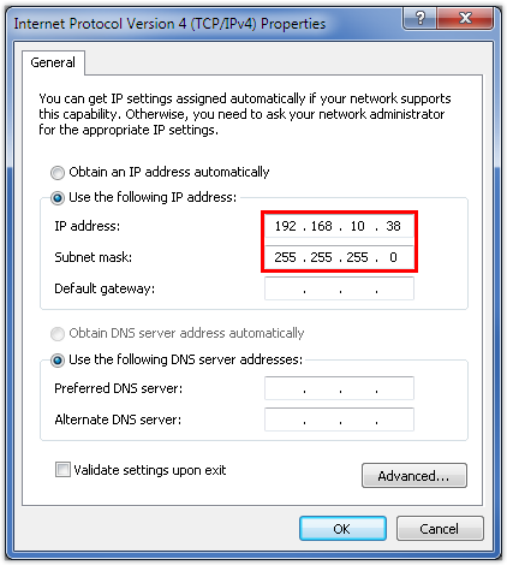
3. Select the Internet protocol version 4 "TCP/IPv4" in the adapter properties.
4. Enter the IP address parameters of the engineering PC in the Internet protocol properties. Note that the IP address of the engineering PC is different from the IP address of all other network stations and thus is unique. The network address (here the first 3 address blocks) for all network stations must be identical and the station address (here the last address block) of the engineering PC must be different from the network address of all other stations.



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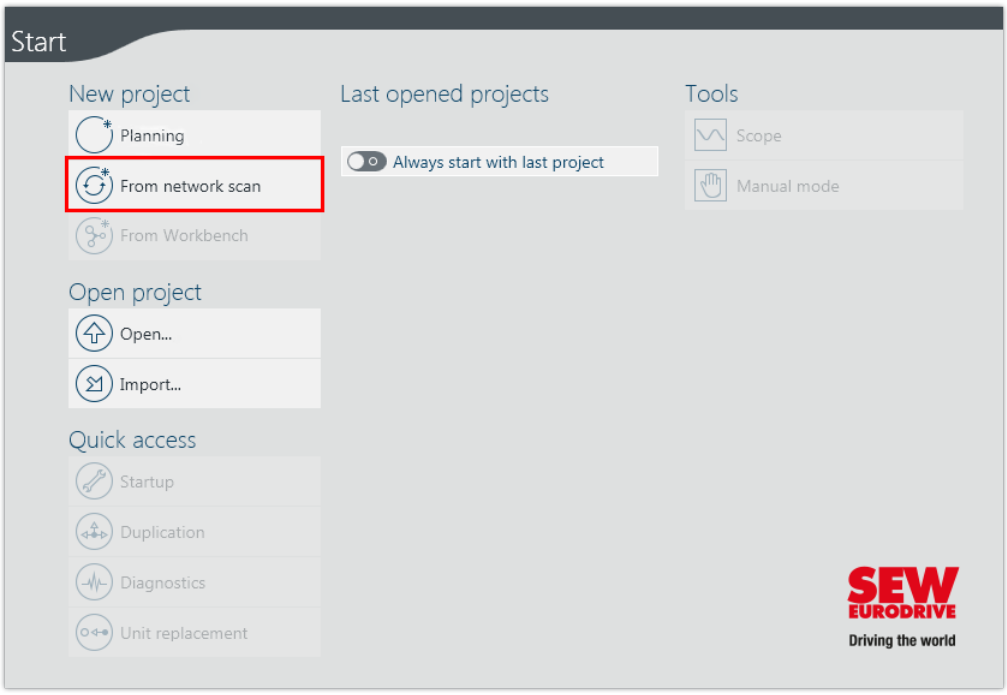
⇨ In this example, the IP address of the engineering PC is: 192.168.10.38

5.1.2 Scanning the network for devices

Proceed as follows:

✓ The connection between the engineering PC and MOVI-C® CONTROLLER is established via the engineering interface.

1. Start MOVISUITE®.
2. Create a new MOVISUITE® project from a network scan.



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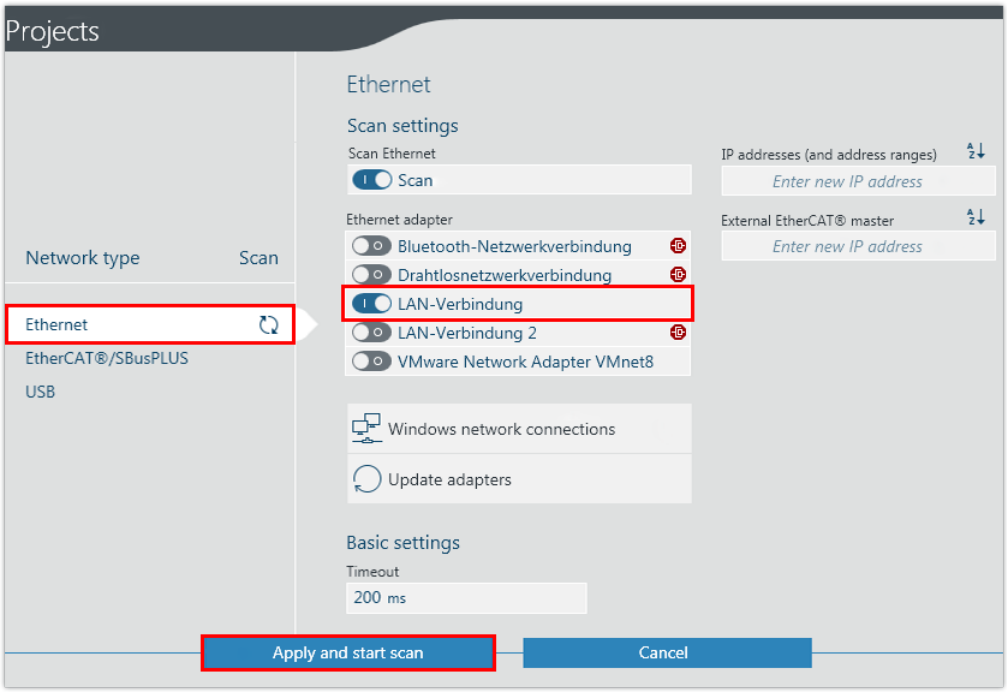
3. Select the network type (Ethernet) and activate the configured adapter (LAN connection). Apply the settings and perform the network scan.



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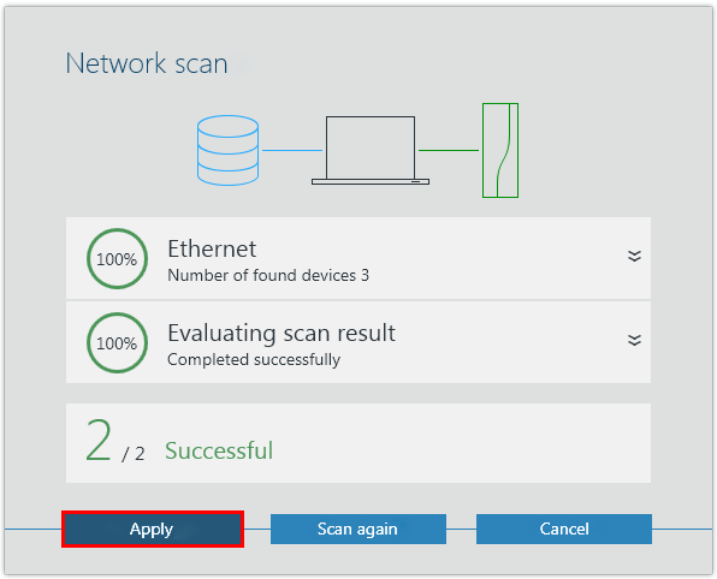
5.1.3 Applying MOVI-C® devices to MOVISUITE®

The MOVI-C® devices are detected during the network scan.

Proceed as follows:

✓ You started a network scan.

1. Apply the scanned devices to MOVISUITE®.



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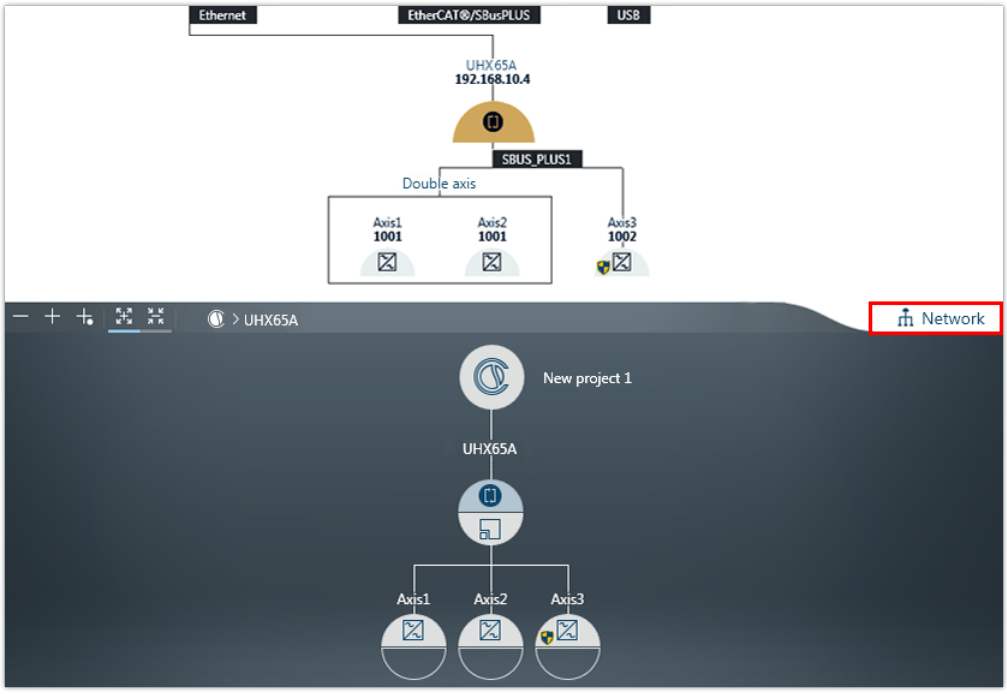
2. If necessary, load the device data into the MOVISUITE® project. Confirm the message stating that the device data has been successfully transferred.
   - ⇨ The devices are displayed in one of the MOVISUITE® views. The display depends on the view you used when closing MOVISUITE® for the last time:
   - ⇨ The combined network and function view shows all connected devices detected during the network scan.



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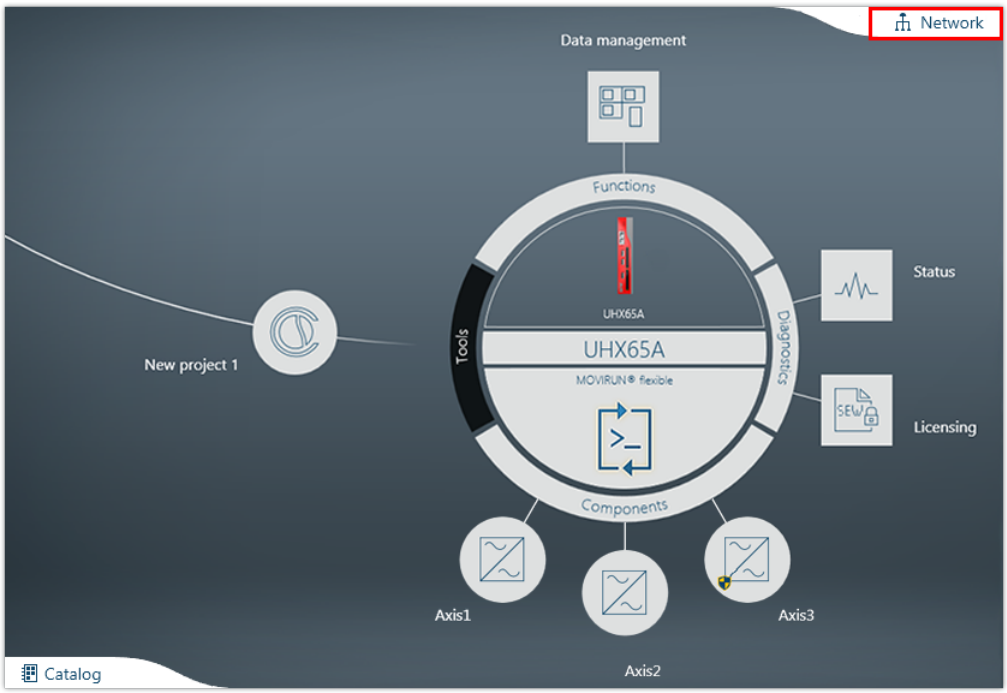
⇨ The function view has 2 views. The tree view shows an overview of the entire project. The circle view shows the current node as a large circle in the center of the working area.



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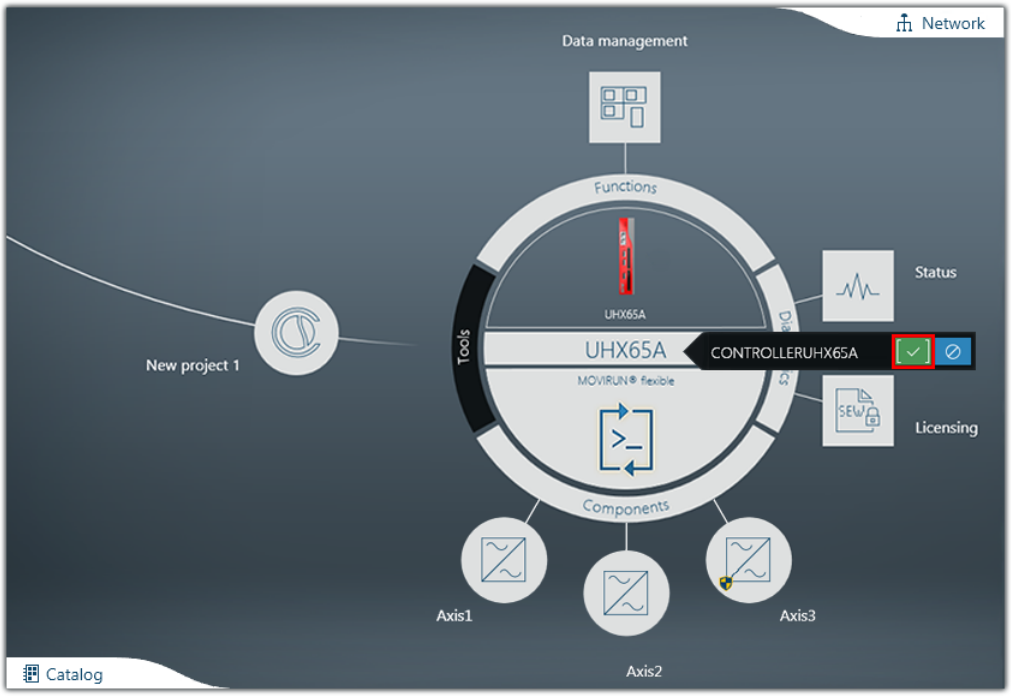
3. To switch between the MOVISUITE® views, click the "Network" tab.
4. Enter a name for the MOVI-C® CONTROLLER. The device is shown in the MOVISUITE® project under this name.



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⇨ The MOVI-C® CONTROLLER has the following device name in this example: CONTROLLERUHX65A

5. Save the MOVISUITE® project.

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6 Configuration and startup with Windows 10 IoT Enterprise

6.1 General information

INFORMATION

- The operating system Windows 10 IoT Enterprise on the OMW memory card is only available in English.
- If you want to use a Windows remote desktop connection, you have to use a user password.

6.2 Initial start of the Windows operating system after delivery

The initial start process of the Windows 10 IoT Enterprise operating system includes several setup screens that allow you to adjust the operating system to your requirements. Among other points, you will be prompted to confirm the system time and set the user name. The conventional Windows dialogs allow you to adjust, for example, the currency and date format to your region.

6.3 Switch-off and reboot behavior of the MOVI-C® CONTROLLER

If the MOVI-C® CONTROLLER is operated with the OMW CFast memory card and the OMH CFast memory card, it represents a combined device. The MOVI-C® CONTROLLER comprises a control section as well as a Windows section. In this case, the Windows switch-off and reboot behavior is different to normal desktop PCs.

- Windows reboot

  Windows reboots. The control section keeps running as normal without a reboot.
- Windows shutdown

  Windows and the control section are shut down. To switch the system back on, switch the voltage supply of the MOVI-C® CONTROLLER off and back on.

INFORMATION

SEW-EURODRIVE recommends that you should shut down Windows 10 IoT Enterprise properly before you switch off the supply voltage of the MOVI-C® CONTROLLER.

6.4 Creating a data backup

You can use the tools provided by Windows create a backup image of the OMW CFast memory card. SEW-EURODRIVE strongly recommends creating a data backup.

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6.5 Application examples – operation of the Windows operating system

Various typical application cases for the operation of the Windows section are described below

INFORMATION

- SEW-EURODRIVE provides the non-exhaustive application examples as a general reference and does not assume corresponding liability.
- SEW-EURODRIVE does not offer support for setting up your Windows system.

6.5.1 Setting a remote desktop connection

You can use a remote desktop connection for remote maintenance purposes.

INFORMATION

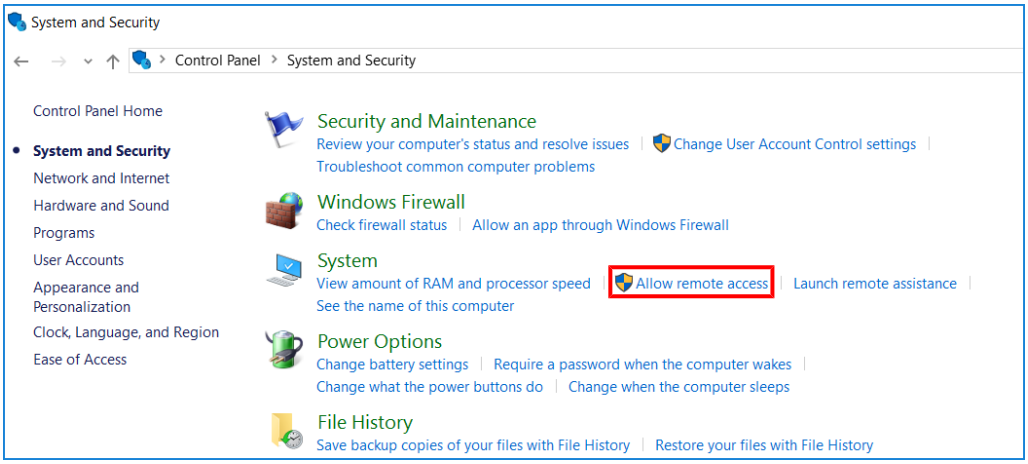
Note that remote maintenance does not allow you to monitor the state of the system on-site.

Proceed as follows:

✓ There is a network connection between your PC and the Windows section of the MOVI-C® CONTROLLER.

✓ You are working on the MOVI-C® CONTROLLER with a password-protected user account.

1. Open the start menu and type "Control Panel" into the search field.
2. In the result list, click on the app entry [Control Panel].
3. Select the "System and Security" submenu and then call up the "Allow remote access" menu in the "System" group.



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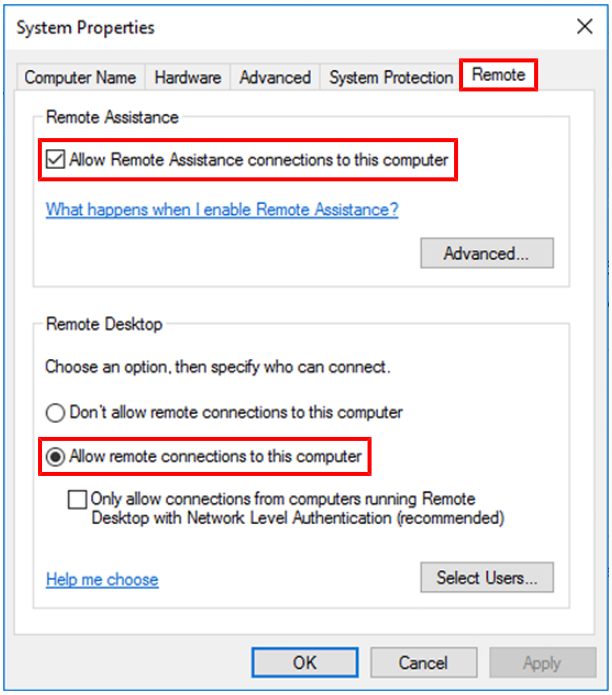
4. On the "Remote" tab, select the "Allow remote assistance connections to this computer" check box in the "Remote Assistance" section.
5. In the "Remote Desktop" section, select the "Allow remote connections to this computer" radio button and confirm your entry with [OK].



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6.5.2 Using a touchscreen monitor

On-screen keyboard

You can use the on-screen keyboard if you are working with a touchscreen monitor without keyboard and mouse.

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You can call up the on-screen keyboard either via the Windows Start menu (search for "On-screen keyboard") or with the icon at the bottom left of the Windows login screen.

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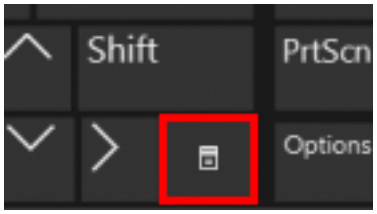
Right mouse button

You can also simulate a right click via the on-screen keyboard. Use the following button of the on-screen keyboard.



6.5.3 Activating the Windows swap file

For a high workload on the MOVI-C® CONTROLLER (e.g. during startup of a visualization), it is beneficial to activate the Windows swap file. Due to the Windows swap file, there is more RAM available for applications.

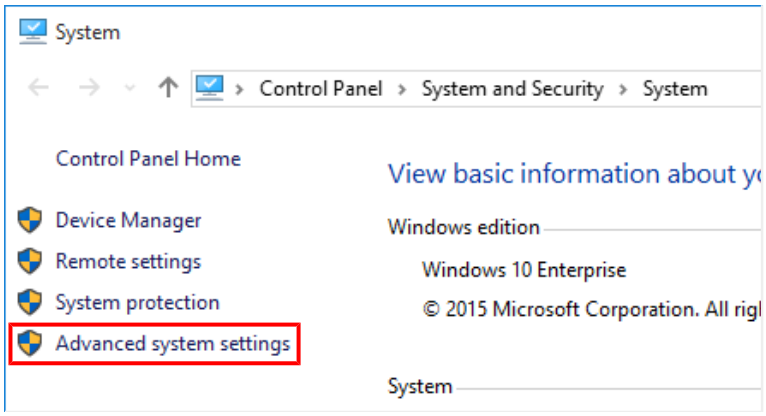
Once the application is started up successfully, deactivate the Windows swap file. By deactivating the Windows swap file, you make sure that the system does not perform unnecessary write operations on the CFast OMW memory card.

INFORMATION

Switching off the MOVI-C® CONTROLLER, make sure that the system controlled by the control section is in a safe state.

Proceed as follows:

1. Open the start menu and type "Control Panel" into the search field.
2. In the result list, click on the app entry [Control Panel].
3. Select the "System and Security" submenu and click on "System".
   ⇨ The "View basic information about your computer" window opens.
4. Select "Advanced system settings" on the left.



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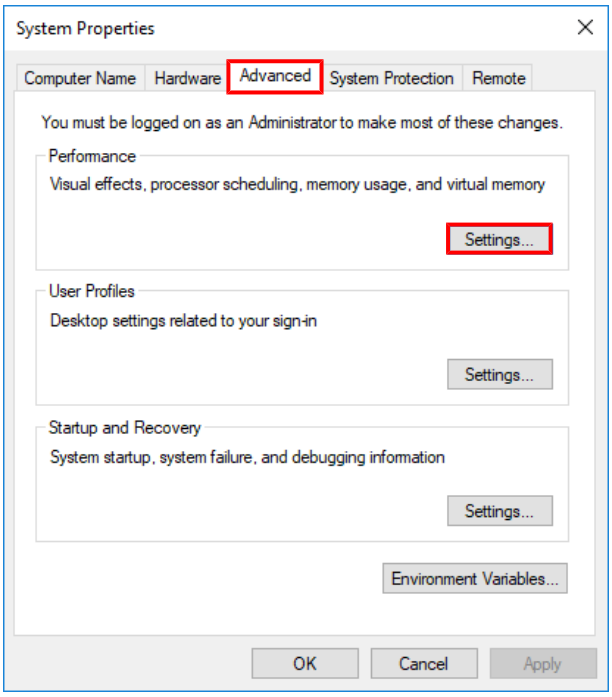
⇨ The "System Properties" window opens.

5. On the "Advanced" tab, click on the [Settings] button in the "Performance" section.



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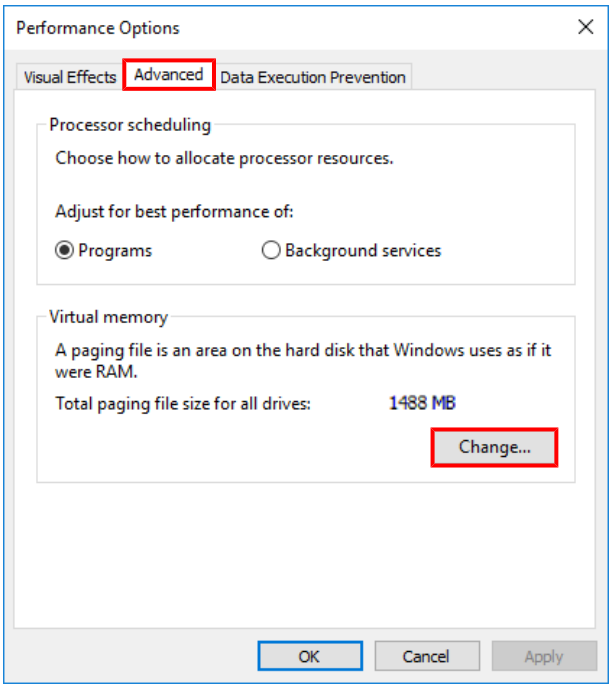
⇨ The "Performance Options" window opens.

6. On the "Advanced" tab, click on the [Change...] button in the "Virtual memory" section.



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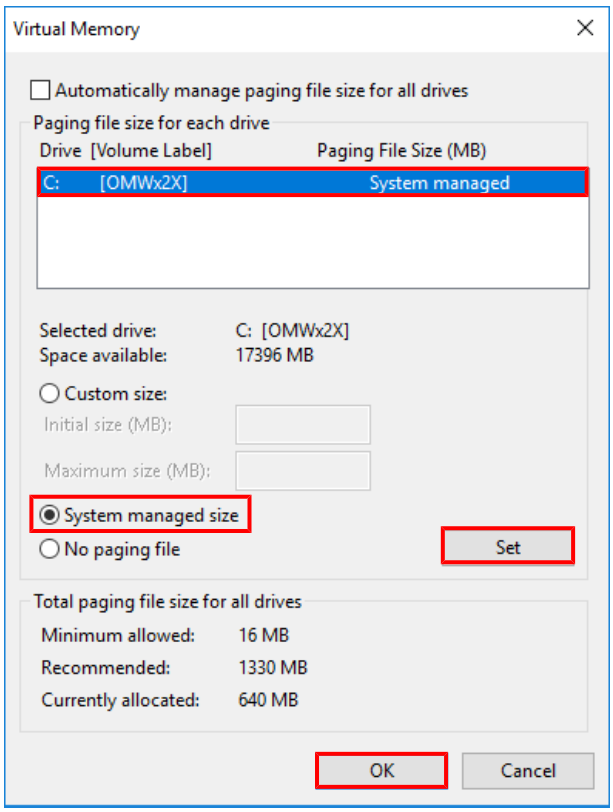
⇨ The "Virtual Memory" window opens.

7. Activate the "System managed size" radio button and then click on [Set]. Then click [OK] to confirm your entry.



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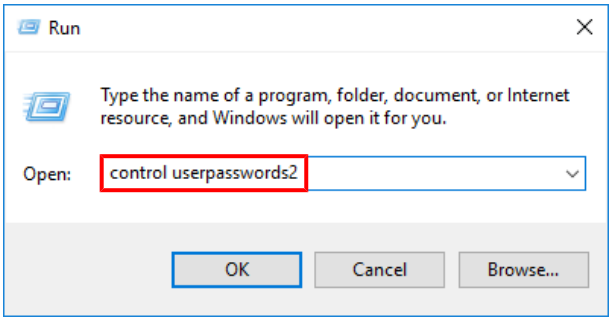
⇨ The swap file is activated.

6.5.4 Setting an automatic system startup

After startup, you can configure the system to boot automatically e.g. to directly start the with a previously generated visualization.

Proceed as follows:

1. Open the start menu and type "Run" into the search field.
2. In the result list, click on the app entry [Run].
   ⇨ The "Run" window is displayed.
3. In the "Open" edit box, enter the command "`control userpasswords2`" and confirm with [OK].



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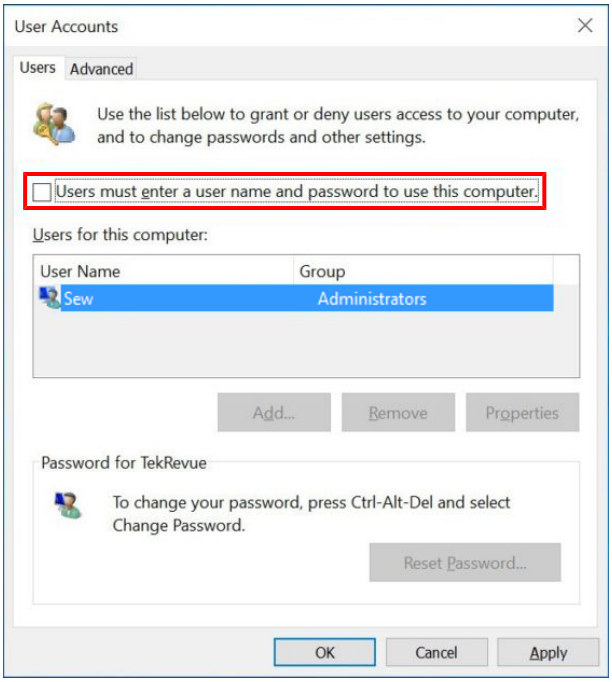
   ⇨ The "User Accounts" window opens.
4. Deactivate the "Users must enter a user name and password to use this computer" check box for the user who is planned to log in automatically.



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5. Confirm deactivation of the option with [OK].
   ⇨ You are prompted to enter the user password.
6. Enter your password and then confirm with [OK].
7. To start a visualization automatically, create a shortcut in the "Startup" section in the Windows start menu.

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7 Device replacement

When replacing a MOVI-C® CONTROLLER, note the chapter "Installation notes" (→ 🗎 18). Insert the OMH CFast memory card of the MOVI-C® CONTROLLER to be exchanged into the new MOVI-C® CONTROLLER.

The variable values stored permanently on the MOVI-C® CONTROLLER are not stored on the OMH CFast memory card by default. Select one of the following procedures to store the variable values on the OMH CFast memory card:

- Program a corresponding IEC program.
- Load the data backup into the engineering software MOVISUITE® via the project management (in preparation).

INFORMATION

For information on replacing the drives, refer to the manual of the corresponding application inverter.

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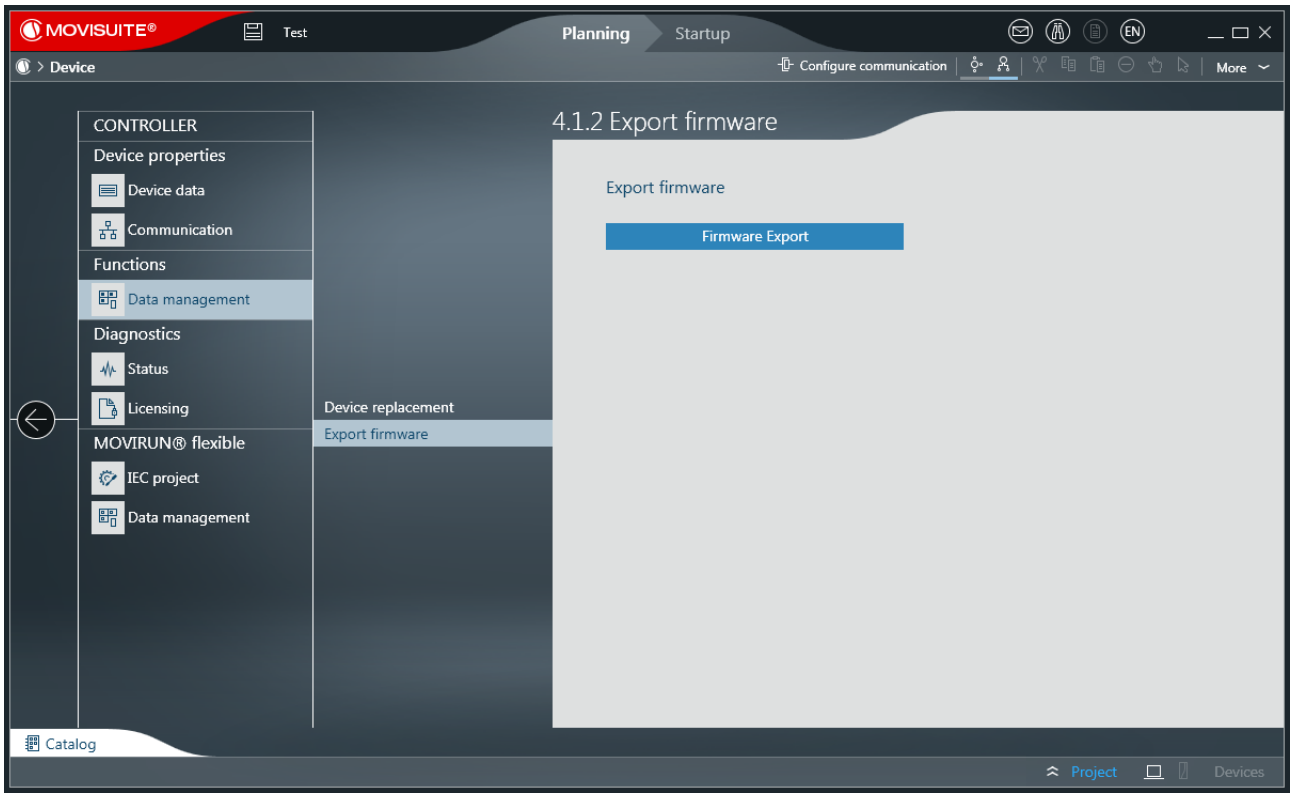
8 Procedure while updating firmware

Perform the steps described in the following chapters to update the firmware of the MOVI-C® CONTROLLER.

8.1 Exporting a firmware image

1. Create a new project in MOVISUITE® via "Planning" in the "Start" menu.
2. In the function view of the MOVISUITE® project, add the required MOVI-C® CONTROLLER in the required version.
3. Select the MOVI-C® CONTROLLER in the MOVISUITE® project.
   ⇨ The configuration menu of the MOVI-C® CONTROLLER opens.
4. In the "Functions" section, open the "Data management" sub-menu and the "Export firmware" menu.



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5. Click the [Firmware export] button in the "Export firmware" menu.
   ⇨ A dialog opens where you can select the export directory.
6. Navigate to the export directory and confirm your selection by clicking [OK].

⇨ In the selected export directory, the firmware of the MOVI-C® CONTROLLER is stored as zip-file (file name: FS.zip).

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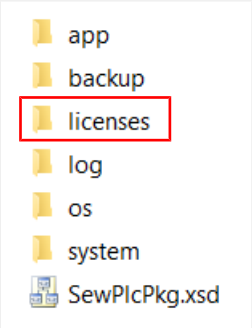
8.2 Copying a firmware image to the OMH memory card

1. Remove the OMH memory card from the MOVI-C® CONTROLLER. The insertion mechanism of the OMH memory card is described in the chapter "Inserting memory cards" (→ 🗎 29).
2. To read the data stored on the OMH memory card, insert the card in a card reader connected to your PC. You can also used a suitable interface of your PC.
3. Use the file explorer on your PC to open the content of the OMH memory card.



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INFORMATION

The "licenses" directory on the OMH memory card contains your license files. To ensure that the purchased licenses remain valid, the directory must be stored onto the OMH memory card again after the firmware update.

4. Copy the "licenses" directory with your licenses onto your PC.
5. Delete all files on the OMH memory card.
6. Unzip the zip archive of the required firmware image onto the OMH memory card. For more information on the export, refer to chapter "Exporting a firmware image" (→ 🗎 50).
7. Copy the "license" directory stored on your PC to the OMH memory card.

INFORMATION

After you deleted it from your OMH memory card, you can restore the "licenses" directory using the MOVISUITE® License Manager. For this purpose, carry out the following steps:

✓ Engineering PC and MOVI-C® CONTROLLER are connected.

✓ The engineering PC is connected to the Internet.

- Insert the OMH memory card into the MOVI-C® CONTROLLER. See chapter "Inserting memory cards" (→ 🗎 29).
- Open the License Manager via the context menu of the MOVI-C® CONTROLLER in the MOVISUITE® menu "Tools".
- Click on [Transfer licenses to the MOVIC® CONTROLLER].

⇨ The firmware update was completed. You can create a new MOVISUITE® project.

9 Service

9.1 Waste disposal

Dispose of the product and all parts separately in accordance with their material structure and the national regulations. Put the product through a recycling process or contact a specialist waste disposal company. If possible, divide the product into the following categories:

- Iron, steel or cast iron
- Stainless steel
- Magnets
- Aluminum
- Copper
- Electronic parts
- Plastics

The following materials are hazardous to health and the environment. These materials must be collected and disposed of separately.

- Oil and grease

  Collect used oil and grease separately according to type. Ensure that the used oil is not mixed with solvent. Dispose of used oil and grease correctly.
- Screens
- Capacitors
- Rechargeable batteries
- Batteries

This product contains batteries or accumulators. Dispose this product and the batteries or accumulators separately from the municipal waste according to the national regulations.

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10 Technical data

10.1 General

General technical data	
Interference immunity	Meets EN 61800-3; Environment 2
Interference emission	Limit value category C2 to EN 61800-3
Ambient temperature ϑ_{amb}	0 °C – +50 °C
Type of cooling	Convection cooling and heat conduction

Environmental conditions	
Climatic conditions	• Extended storage: EN 60721-3-1 class 1K2 temperature -25 °C to +70 °C • Transport: EN 60721-3-2 class 2K3 temperature -25 °C to +70 °C • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3K3 temperature 0 °C to +50 °C
Chemically active substances	• Extended storage: EN 60721-3-1 class 1C2 • Transport: EN 60721-3-2 class 2C2 • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3C2
Mechanically active substances	• Extended storage: EN 60721-3-3 class 1S1 • Transport: EN 60721-3-3 class 2S1 • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3S1
Vibration testing	• 3M5 in accordance with EN 60721-3-3 • 5M1 in accordance with EN 60721-3-5

Degree of protection	
IP degree of protection	IP20 according to EN 60529
Pollution class	2 in accordance with IEC 60664-1
Overvoltage category	III in accordance with IEC 60664-1
Installation altitude	Maximum 3800 m (above sea level)

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10.2 Technical data

MOVI-C® CONTROLLER progressive UHX65A	
Electrical supply	• Power consumption: P_{max} = 30 W • Supply voltage U = DC 24 V in accordance with IEC 61131-2 • Current consumption I_{max} = 1.3 A (with DC 24 V supply voltage) • The MOVI-C® CONTROLLER has to be supplied by an external voltage source.
Memory	• Retain data: 32 kB • Retain persistent: 2 kB • Program memory: 64 MB for application, including IEC libraries • Data memory: 64 MB
CFast memory card Windows section (card slot XM2): OMW62A (32 GB) OMW63A (64 GB)	• Software package: – Operating system Windows 10 IoT Enterprise (-C2)
CFast memory card control section (Card slot XM1): OMH65A-C1	• PC-readable • Contents: – Firmware – IEC program – Application data • 2 GB memory
X5 DC 24 V supply voltage connection (2-pin connection)	Connection type: Plug connector • 1 core: 0.25 mm² – 2.5 mm² • 2 cores: 0.5 mm² – 1.5 mm² (TWIN-AEH[1)])
X30 EtherCAT®/SBus^{PLUS} interface (RJ45 socket)	Fast system bus SBus^{PLUS} based on EtherCAT® for master connection
X80, X82 Engineering interface (RJ45 socket)	• TCP/IP • Possible connections: Engineering PC, visualization, other controller • Engineering for all SEW-EURODRIVE components connected to the MOVI-C® CONTROLLER can be performed via the MOVI-C® CONTROLLER.
X90	Engineering interface for the Windows section
USB 1-3	USB interfaces assigned to the Windows operating system

1) AEH: Conductor end sleeve

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10.3 Port overview

10.3.1 Interface description

The Ethernet interfaces of the MOVI-C® CONTROLLER have the following functions:

- X30 – EtherCAT®/SBus^{PLUS} interface for master connection
- X80/X82 – Engineering interface for the control section
- X90 – Engineering interface for the Windows section

10.3.2 Engineering interface

Port	TCP/ UDP	Function	Authorization
21	TCP	FTP	Reading from and writing to the file system
23	TCP	Telnet	Reading OEM diagnostic data
310	TCP/ UDP	Data Streaming	Reading and writing of all indexed parameters
11740 – 11743	TCP	CODESYS engineering	Read and write
1740 - 1743	UDP	CODESYS engineering	Read and write

10.3.3 Windows interface

Depending on the installation and configuration of the Windows operating system and of additionally installed software components, the following ports are available, among others:

Port	TCP/UDP	Function
7	TCP/UDP	Echo
9	TCP/UDP	Discard
13	TCP/UDP	Daytime
17	TCP/UDP	Quote of the day
19	TCP/UDP	Character generator protocol
135	TCP	Microsoft EPMAP (End Point Mapper)/DCE/RPC Locator Service
139	TCP	Microsoft EPMAP (End Point Mapper)/DCE/RPC Locator Service
161	UDP	SNMP
300	TCP/UDP	SMLP
445	TCP	Microsoft-DS SMB release (also known as the free implementation Samba)
500	UDP	Internet Security Association and Key Management Protocol (ISAKMP)
515	TCP	Line Printer Daemon print services
3389	TCP	Microsoft Terminal Server (RDP), officially registered as Windows Based Terminal (WBT)
4500	UDP	IPSec NAT Traversal (RFC 3947)
5355	UDP	LLMNR – Link-Local Multicast Name Resolution

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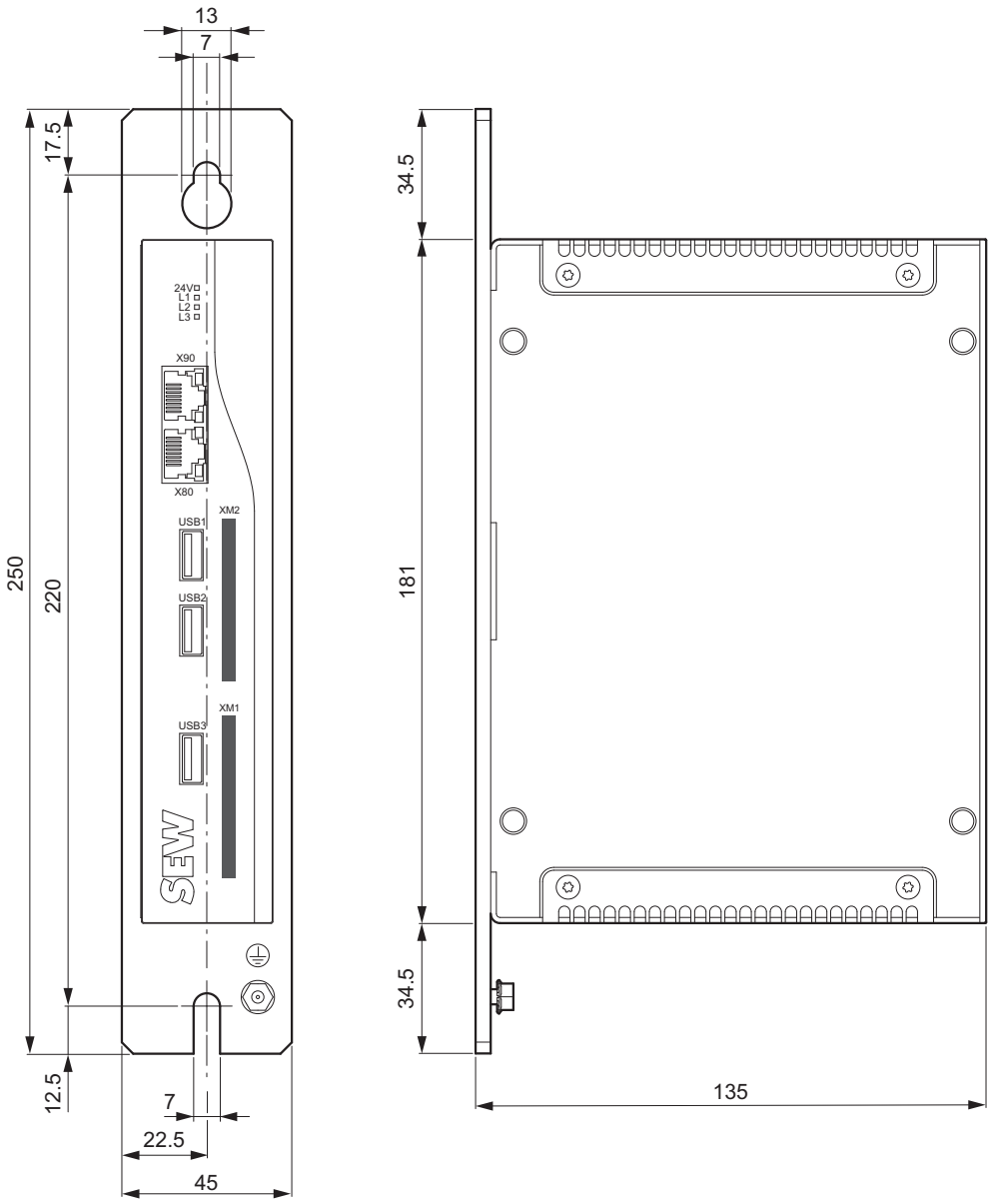
11 Dimension drawings

11.1 MOVI-C® CONTROLLER



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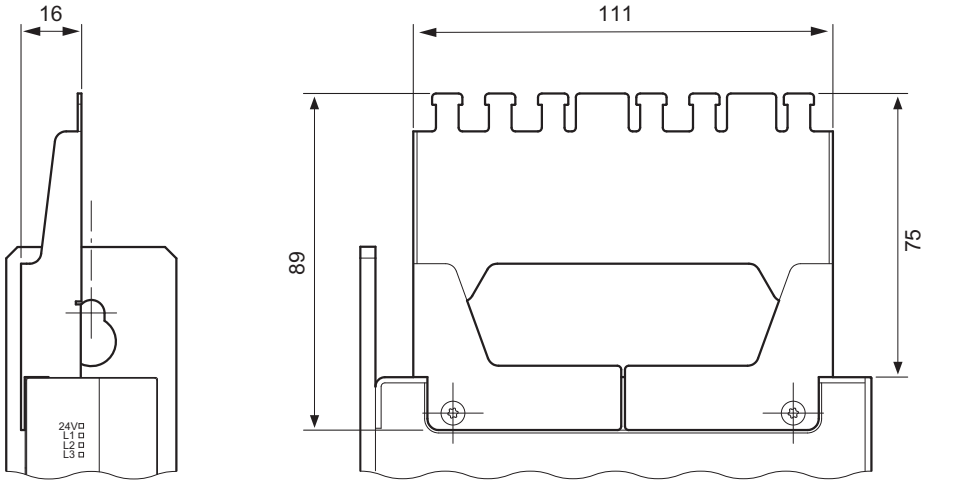
11.2 Accessories cable routing



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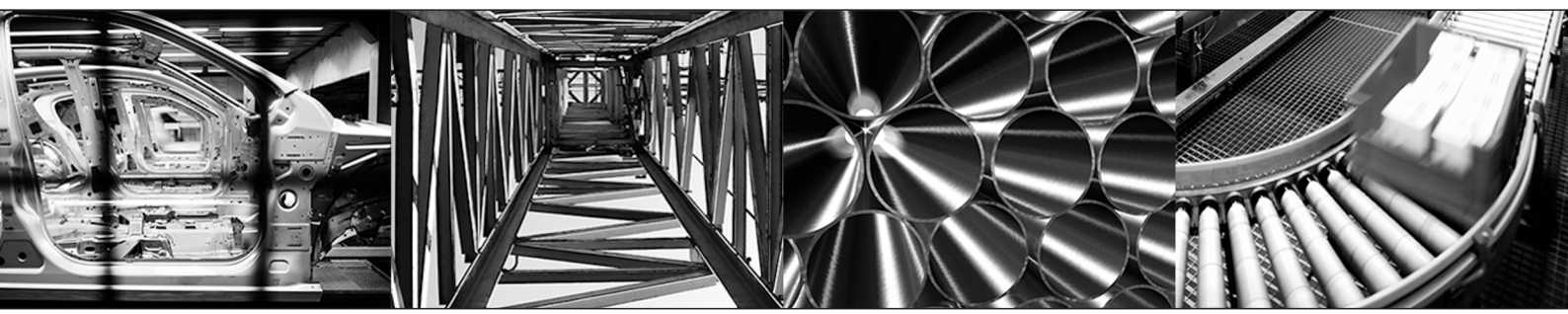

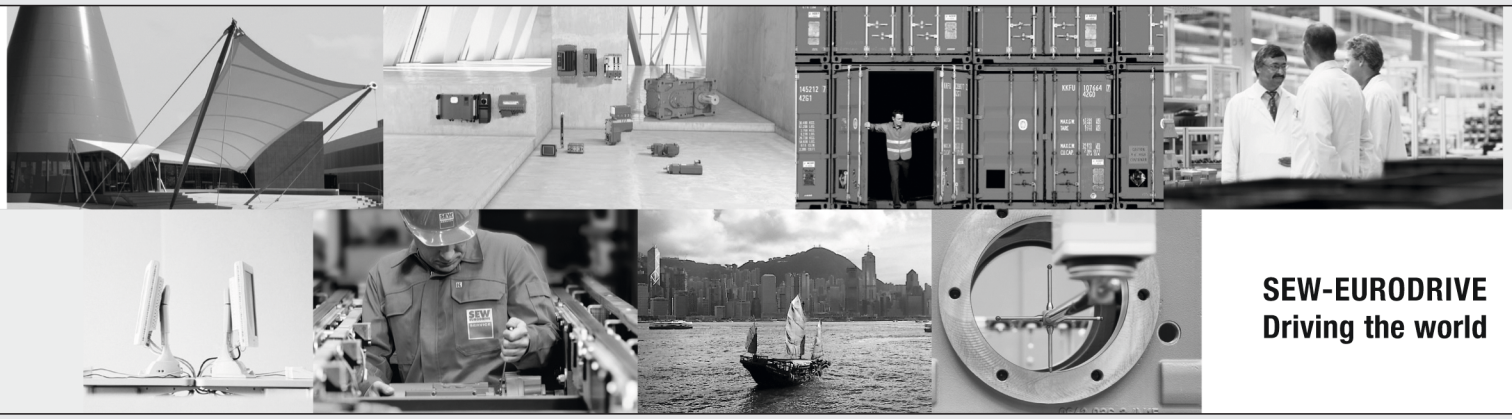

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