



Operating Instructions



MOVI-C® CONTROLLER Type UHX86A



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1 General information

1.1 About this documentation

The documentation at hand is the original.

This documentation is an integral part of the product. The documentation is intended for all employees who perform work on the product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the systems and their operation as well as persons who work on the product independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation or if you require further information, contact SEW-EURODRIVE.

1.2 Other applicable documentation

Refer to the corresponding documentation for all other components.

Always use the latest edition of the 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 order printed and bound copies of the documentation from SEW-EURODRIVE.

1.3 Structure of the safety notes

1.3.1 Meaning of signal words

The following table shows the graduation and meaning of the signal words in the safety notes.

Signal word	Meaning	Consequences if not observed
▲ DANGER	Imminent danger	Death or severe injuries
▲ WARNING	Possibly dangerous situation	Death or severe injuries
▲ CAUTION	Possibly 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.	

1.3.2 Structure of section-related safety notes

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

This is the formal structure of a safety note for a specific section:



SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

1.3.3 Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard

1.3.4 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

▲ SIGNAL WORD! Type and source of danger. Possible consequence(s) if disregarded. Measure(s) to prevent danger.

1.4 Decimal separator in numerical values

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

Example: 30.5 kg

1.5 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the product.

1.6 Product names and trademarks

The product names mentioned 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.

EtherCAT 

1.7 Copyright notice

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1.8 Short designation

The following short designation is used in this documentation.

Type designation	Short designation
MOVI-C® CONTROLLER Type UHX86A	MOVI-C® CONTROLLER
Real-Time Operating System	RTOS
General Purpose Operating System	GPOS

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:

- The national and regional regulations governing safety and the prevention of accidents
- Product safety label on the product
- All other associated project planning documents, installation and startup instructions, as well as connection and wiring diagrams
- Do not assemble, install, or operate damaged products
- All system-specific specifications and regulations

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.

2.3 Target group

Specialist for mechanical work	Any mechanical work may be performed only by adequately qualified specialists. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product, and who possess the following qualifications: • Qualifications in the field of mechanics in accordance with the national regulations • Familiarity with this documentation
Specialist for electrotechnical work	Any electrotechnical work may be performed only by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product, and who possess the following qualifications: • Qualifications in the field of electrical engineering in accordance with the national regulations • Familiarity with this documentation
Additional qualifications	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 devices, systems, and circuits in accordance with the standards of safety technology.
Instructed persons	All work in the areas of transport, storage, installation, operation and waste disposal may only be carried out by persons who are trained and instructed appropriately. These instructions must enable the persons to carry out the required activities and work steps safely and in accordance with regulations.

2.4 IT security

2.4.1 Contact



If you need support with the configuration, contact SEW-EURODRIVE Service. You can obtain information about the latest security-related problems via e-mail (cert@sew-eurodrive.com) or by visiting the Product Security Management website (<http://go.sew/psm>). You will find various contact options there for reporting security-related problems.

2.4.2 Other applicable documentation

Follow the instructions in the manual "Security options for MOVI-C® CONTROLLER" when using the product. You can download the document from the [SEW-EURODRIVE website](#).

2.4.3 IT security of the product



As of version V2.40 (IEC 3.5.18) of the MOVISUITE® engineering software and firmware version 8 of the product, you can activate user management on the product and so you can assign an access level to certain functions. In addition, you can set up certificate-based secure communication between the product and the IEC Editor via fieldbus and the Ethernet communication interface.

Firmware



The version of the MOVISUITE® engineering software and the version of the product firmware must be up to date. You can check the firmware version using the MOVISUITE® engineering software. If the product does not have the latest version of the firmware, update it.

You can download the latest version of the MOVISUITE® engineering software from the SEW-EURODRIVE website. The MOVISUITE® engineering software contains the latest version of the product firmware. For a detailed description of the firmware update, refer to chapter "Service" (→ [70](#)).

2.4.4 IT security of the environment



For drive and control components that are integrated in a network (e.g., fieldbus, WLAN or Ethernet network), settings can even be made from more remote locations. This brings with it the risk of a parameter change not visible externally resulting in unexpected, but not uncontrolled system behavior and this may impact negatively on operational safety and reliability, system availability or data security.

With WLAN or Ethernet-based networked systems and engineering interfaces in particular, make sure that unauthorized access is not possible. Using IT-specific security standards, such as network segmentation, adds to the protection of access to the ports. For an overview of the ports and of the services provided by the communication interfaces, refer to [Online Support](#). The IT security of the product is only guaranteed when used in an environment secured by defense-in-depth strategies.

Ensure that clear responsibility for security is guaranteed during operation. SEW-EURODRIVE recommends an IT security management system in accordance with ISO/IEC 27001 and ISO/IEC 62443-2-4.

2.5 Designated use

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

When installed in electrical systems or machines, startup of the product is prohibited until it has been determined that the machine complies with local laws and guidelines.

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.

Options and accessories from SEW-EURODRIVE may only be used in combination with products from SEW-EURODRIVE.

2.6 Functional safety technology

If the documentation does not expressly permit it, the product must not perform any safety sub-function without higher-level safety systems.

2.7 Transport

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product or the packaging is damaged, do not assemble, install, connect, or start up the product. If the packaging is damaged, the product itself may also be damaged.

Observe the following notes when transporting the device:

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

If necessary, use suitable, adequately dimensioned transport aids.

Observe the notes on the climatic conditions in accordance with chapter "Technical data" in the corresponding product manual.

2.8 Installation/assembly

Ensure that the product is installed and cooled in accordance with the regulations in the documentation.

Protect the product from strong mechanical strain. Ensure that components are not deformed and insulation spaces are not changed, particularly during transportation and handling. Electrical components must not be mechanically damaged or destroyed.

Observe the notes in chapter "Mechanical installation" (→  30) in the documentation.

2.9 Electrical installation

Ensure that all of the required covers are correctly attached after 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).

2.10 Startup/operation

Make sure the connection boxes are closed and screwed before connecting the supply voltage.

Depending on the degree of protection, products may have live, uninsulated, and sometimes moving or rotating parts as well as hot surfaces during operation.

Additional preventive measures may be required for applications with increased hazard potential. Be sure to check the effectiveness of the protection devices after every modification.

In the event of deviations from normal operation, switch off the product. Possible deviations are increased temperatures, noise, or vibration, for example. Determine the cause. Contact SEW-EURODRIVE if necessary.

Observe the corresponding information signs on the product.

The fact that the operation or display elements are no longer illuminated does not indicate that the product has been disconnected from the supply system and no longer carries any voltage.

Mechanical blocking or internal protective functions of the product can cause a motor standstill. Removing the cause of this problem or performing a reset can result in the machine or the system re-starting on its own. First, disconnect the product from the supply system before you start troubleshooting.

Risk of burns: The surface temperature of the product can exceed 60 °C during operation. Do not touch the product during operation. Let the product cool down before touching it.

3 Device structure

3.1 Device description

The MOVI-C® CONTROLLER type UHX86A is designed for demanding motion and automation control tasks that require multi-bus and ERP interfaces, as well as Windows and Linux apps (high-level programming). It offers Cyber-Physical Control, control, and safety in one. At present, these tasks can often only be addressed with several HW platforms.

Depending on the application program, the MOVI-C® CONTROLLER type UHX86A is suitable for automating machines and cells of up to 64 interpolating axes and 64 auxiliary axes. With installed active or passive cooling, even more than 64 axes are possible. It is therefore suitable as a module controller for complex motion control tasks such as cams and robotics, as well as for the complete automation of machines and systems.

The MOVI-C® CONTROLLER type UHX86A is available in designs with a 2-, 4-, or 6-core processor. In addition to a real-time operating system (RTOS) on a CFast memory card, an optional NVMe hard disk with Windows operating system (GPOS) is available. In this case, the real-time operating system and the Windows operating system are executed in parallel using a hypervisor in such a way that the real-time behavior of the IEC section is not affected.

3.2 Type code

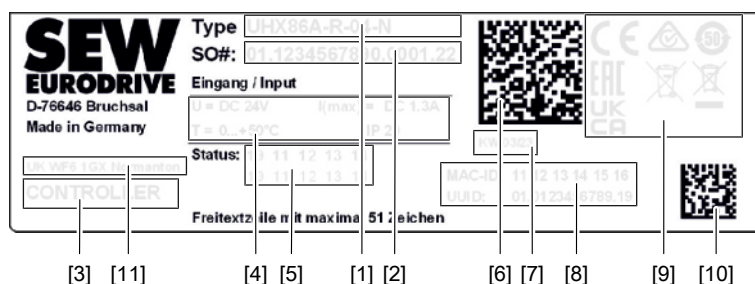
The following table explains the structure of the type code and the available variants of the device:

Example: UHX86A-R-20-N0-S05A-N1C2		
Product name	UHX	MOVI-C® CONTROLLER
Series	86	
Version	A	Version status A
Variants	R	0 = No fieldbus interface - R = With EtherNet/IP™ fieldbus interface adapter, Modbus TCP and PROFINET IO device - M = As EtherNet/IP™ scanner and PROFINET IO controller INFORMATION: When using the fieldbus variants, observe the respective communication manual available from the Online Support portal of SEW-EURODRIVE.

Example: UHX86A-R-20-N0-S05A-N1C2		
Efficiency	20	INFORMATION: The specified number of recommended interpolated axes is a rough guide value for the "Parameterization instead of programming" approach. The number of axes is subject to the size of the user program in MOVIRUN® flexible and not rigidly limited if the minimum task cycle time is not specified. 20 = Celeron G4932E (2 cores, 8 GB RAM) Recommended for up to 32 interpolated axes in RTOS without GPOS function. 40 = Core i3 9100HL (4 cores, 16 GB RAM) Recommended for 32 or more interpolated axes in RTOS. Optional GPOS for simple applications available. 50 = Core i3 8100H (4 cores, 16 GB RAM) Recommended for 32 or more interpolated axes (maximum RTOS performance). Optional GPOS for demanding applications available. 60 = Core i7 9850HE (6 cores, 32 GB RAM) Recommended for 32 or more interpolated axes in RTOS. Optional GPOS with maximum processing power available.
Additional option	N0	0 = No retain memory available - N0 = Retain memory available
Additional option	S05A	0000 = Without safety option - S05A = Control Safety
Additional option	N1	00 = Without NVMe - N1 = 120 GB NVMe - N2 = 240 GB NVMe - N3 = 480 GB NVMe
Additional option	C2	00 = Without operating system - C2 = Windows 10 IoT Enterprise - E1 = DriveRadar® EdgeProcessing platform INFORMATION: The DriveRadar® EdgeProcessing platform is a Linux-based operating system developed by SEW-EURODRIVE. The operating system offers the option of installing various DriveRadar® EdgeProcessing apps in order to implement condition monitoring and predictive maintenance. The MOVI-C® CONTROLLER in combination with the DriveRadar® EdgeProcessing platform is referred to as a DriveRadar® EdgeProcessing unit; it is only available in performance class 40 and without retain memory, fieldbus interface, or safety option. For further information, refer to the corresponding documentation.
Additional option	/C	Special version of the device with cold plate INFORMATION: Consultation with SEW-EURODRIVE is necessary to use this special version.

3.3 Nameplate

The following figure shows an example of the nameplate of the device:



18014436723416459

- | | |
|---|--|
| [1] "Type code" (→ 14) | [7] Production date |
| [2] Serial number | [8] Data of the fieldbus interface |
| [3] Device name | [9] "Markings" (→ 80) |
| [4] Input data | [10] Data matrix code (MAC ID of the fieldbus interface) |
| [5] Device status | [11] SEW-EURODRIVE UK branch |
| [6] Data matrix code (type designation, serial number, device status) | |

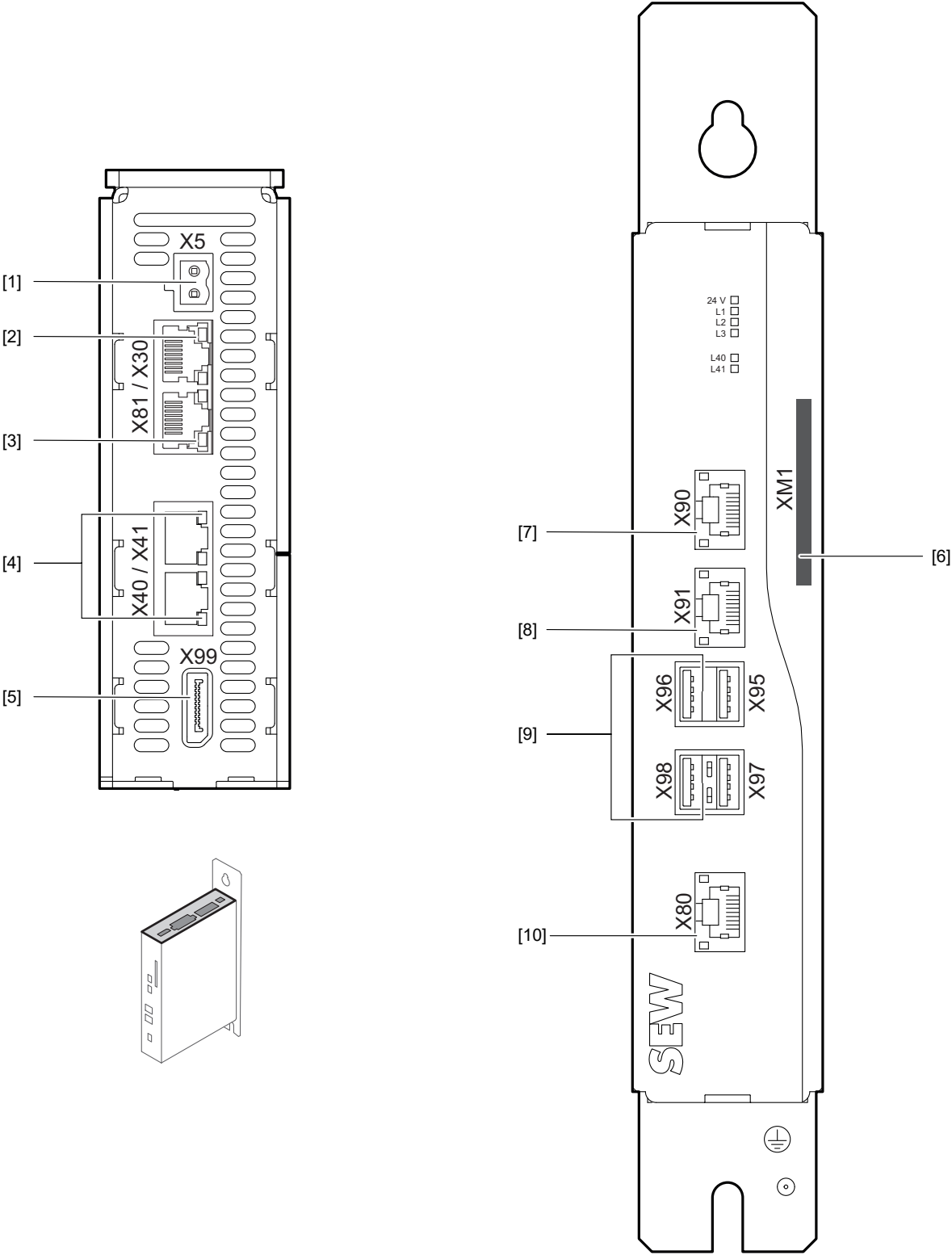
3.4 Product label

The product label with QR code is clearly visible attached on the front of the device.

By scanning the QR code you will be forwarded to the digital services of SEW-EURODRIVE. There, you have access to product-specific data, documents, and further services.

For more information, refer to the chapter "Markings" (→ 80).

3.5 Terminals



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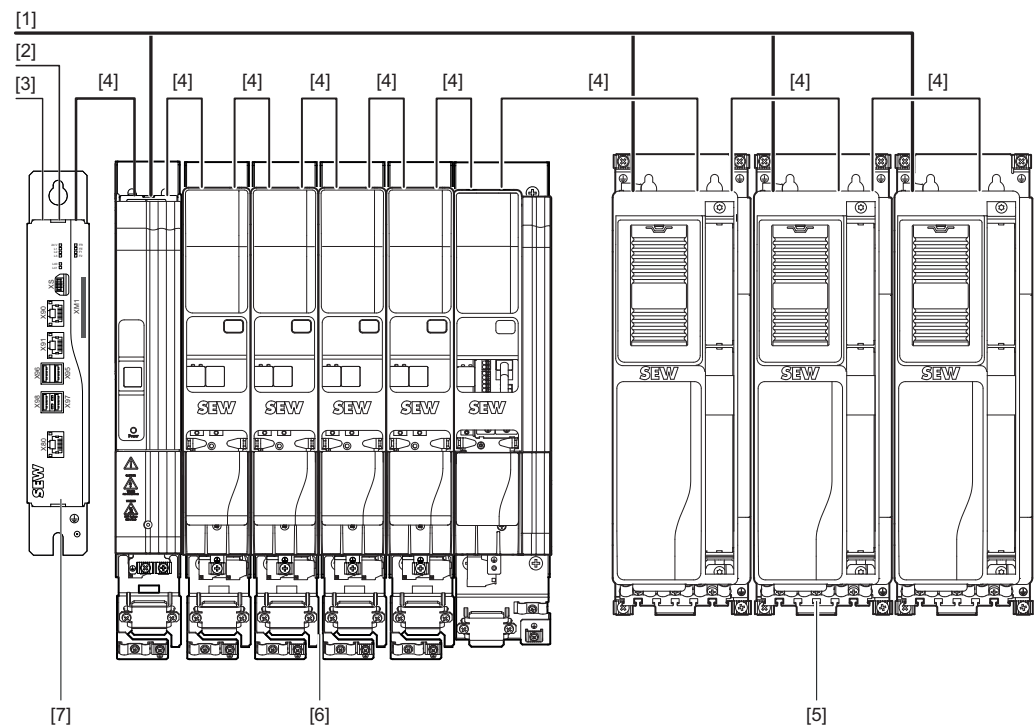
No.	Designation	Terminal	Function
[1]	Connection for DC 24 V supply voltage	X5: 24 V	DC 24 V voltage supply
	Connection for DC GND supply voltage	X5: GND	
[2]	EtherCAT®/SBus ^{PLUS} interface (RJ45 socket contact)	X30	Connection of the EtherCAT®/SBus ^{PLUS} MainDevice
[3]	Ethernet communication interface (RJ45 socket contact)	X81	Ethernet communication interface used for engineering.
[4]	Fieldbus interface (RJ45 socket contact)	X40/X41	Real-time Ethernet fieldbus INFORMATION: Both interfaces can be used as input or output.
[5]	DisplayPort interface	X99	Monitor connection
[6]	CFast card slot INFORMATION: The card slot is located behind the front panel. See "Inserting the memory card" (→ 31).	XM1	Card slot for OMH CFast memory card (Control section)
[7]	Ethernet communication interface (RJ45 socket contact)	X90	Ethernet communication interface for the Windows section
[8]	Ethernet communication interface (RJ45 socket contact)	X91	Ethernet communication interface for the Windows section
[9]	USB interface (2.0)	X95	USB interfaces for the Windows section
	USB interface (2.0)	X96	
	USB interface (3.0)	X97	
	USB interface (3.0)	X98	
[10]	Ethernet communication interface (RJ45 socket contact)	X80	Ethernet communication interface used for engineering.

3.6 Communication interfaces

MOVI-C® CONTROLLER has the following communication interfaces:

- The Ethernet communication interfaces are used for engineering the MOVI-C® CONTROLLER, for connecting an operator panel, and for communicating with other Ethernet stations (e.g. with a higher-level PLC).
- The EtherCAT®/SBus^{PLUS} interface is used to control application inverters, I/O modules and other EtherCAT® SubDevice 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.

The following figure illustrates the use of the communication interfaces:



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- | | |
|---|------------------------------------|
| [1] Line voltage | [5] MOVIDRIVE® system |
| [2] Fieldbus connection | [6] MOVIDRIVE® modular axis system |
| [3] Engineering connection | [7] MOVI-C® CONTROLLER |
| [4] EtherCAT®/SBus ^{PLUS} connection | |

3.6.1 Ethernet communication interface

Ethernet communication interface X80, X81

The Ethernet communication interface X80, X81 is assigned to the control section (real-time operating system) of the MOVI-C® CONTROLLER. The following functions can be implemented via this interface:

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

Ethernet communication interface X90, X91

The Ethernet communication interface X90, X91 is assigned to the Windows section of the MOVI-C® CONTROLLER. The interface is only available if the NVMe hard disk with Windows operating system is used. The following functions can be implemented via this interface:

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

3.6.2 EtherCAT®/SBus^{PLUS} interface

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

- Inverters from the MOVI-C® modular automation system
- MOVI-PLC® I/O system C
- Third-party components with ESI project planning file

The maximum number of EtherCAT®/SBus^{PLUS} SubDevice components that can be connected to the MOVI-C® CONTROLLER is: 256.

3.6.3 Fieldbus interface

The MOVI-C® CONTROLLER can be connected to a higher-level PLC via the fieldbus interfaces (X40, X41).

The fieldbus interface is integrated into the MOVI-C® CONTROLLER.

PROFINET IRT communication

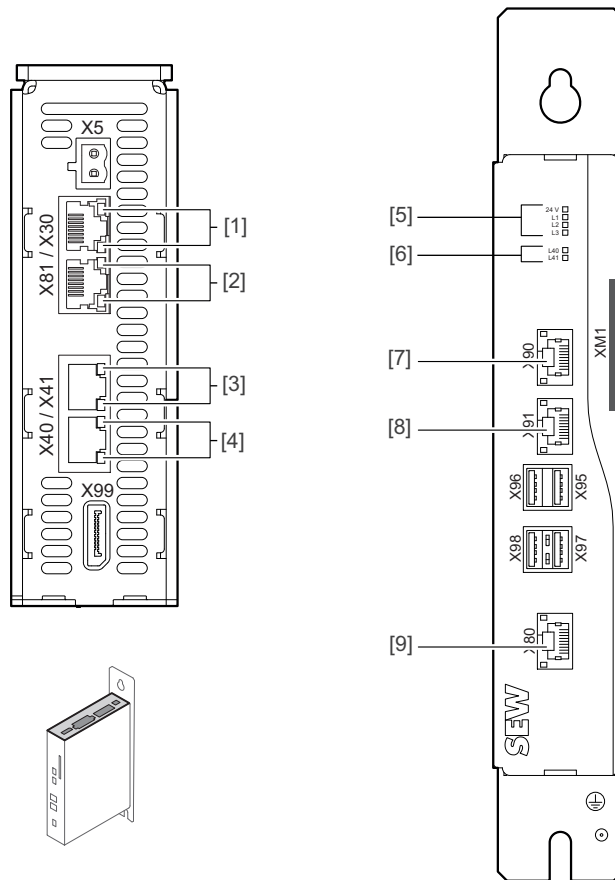
The device supports the IRT communication feature of PROFINET (Isochronous Real-Time).

No synchronization with the lower-level EtherCAT®/SBus^{PLUS} interface is performed during IRT communication. This means that it is not possible to access EtherCAT®/SBus^{PLUS} devices isochronously with the PROFINET controller.

3.6.4 Virtual network card (VNET)

The NVMe hard disk (SSD) is required to use the virtual network card. For more information, refer to chapters "NVMe hard disk (SSD)" (→ 28) and "Virtual network card (VNET)" (→ 38).

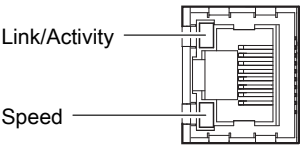
3.7 Status LEDs



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- [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 (X81)
Speed: Speed of the engineering connection (X81)
- [3] L/A: Status of the fieldbus connection (X41)
Speed: Speed of the fieldbus connection (X41)
- [4] L/A: Status of the fieldbus connection (X40)
Speed: Speed of the fieldbus connection (X40)
- [5] 24 V: Firmware status
L1: Firmware status
L2: Status of the IEC program
L3: Reserved
- [6] L40 - PROFINET - SF (SYS FAULT): System fault
L40 - EtherNet/IP™ - MS (MODULE STATUS): Module status
L40 - Modbus TCP - RUN: Operating status
L41 - PROFINET - BF (BUS FAULT): Bus fault
L41 - EtherNet/IP™ - NS (NETWORK STATUS): Network status
L41 - Modbus TCP - ERR: Fault status
- [7] L/A: Status of the engineering connection (X90)
Speed: Speed of the engineering connection (X90)
- [8] L/A: Status of the engineering connection (X91)
Speed: Speed of the engineering connection (X91)
- [9] L/A: Status of the engineering connection (X80)
Speed: Speed of the engineering connection (X80)

3.7.1 Status LEDs "L/A" (Link/Activity) and "Speed"



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

Status	Meaning
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
Orange	Current exchange rate of the data via Ethernet is 2500 Mbps (2.5 Gbps).
Off	Current exchange rate of data via Ethernet is 10 Mbps or 100 Mbps or there is no Ethernet connection.

3.7.2 Status LED "24V"

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

3.7.3 Status LED "L1"

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

During the boot phase:

Status	Possible cause	Measure
Orange, flashing at 0.5 Hz	Firmware of the device starts properly.	–

During operation:

Status	Possible cause	Measure
Green, flashing at 0.5 Hz	The firmware of the device is running properly.	–
Red, flashing at 0.5 Hz	The firmware of the device is faulty.	Contact SEW-EURODRIVE Service.

3.7.4 Status LED "L2"

Indicates the status of the IEC program.

Status	Possible cause	Measure
Off	No IEC program is loaded.	Load an IEC program into the device.
Orange, flashing at 0.5 Hz	Program sequence has stopped.	Start the IEC program.
Red, flashing at 0.5 Hz	The IEC program is faulty.	Check and correct the IEC program.
Green, flashing at 0.5 Hz	The IEC program is running properly.	–

3.7.5 PROFINET

Status LED "SF" (SYS FAULT)

Status	Possible cause	Measure
Off	Error-free operating state	–
Red, flashes for 3 s Switch-on time: 500 ms Switch-off time: 500 ms	To localize the network stations visually, the flashing test has been activated in the configuration of the PROFINET controller.	–
Red Permanently lit	Error in hardware or configuration (channel/system error)	Switch the device off and back on again. Check the configuration. If the fault occurs repeatedly, contact SEW-EURODRIVE Service.

Status LED "BF" (BUS FAULT)

Status	Possible cause	Measure
Off	The PROFINET device exchanges data with the PROFINET controller (PLC) (data exchange).	–
Red, flashing at 2 Hz	No data exchange	–
Red	- The connection to the PROFINET controller has failed. - The PROFINET device does not detect a link. - Bus interruption - The PROFINET controller is not in operation.	- Check the fieldbus connection of the device. - Check the PROFINET controller. - Check the cabling of the Ethernet network.

3.7.6 EtherNet/IP™, Modbus TCP

Status LED "MS" (MODULE STATUS)

Status	Meaning
Green	The controller is in normal operating state.
Green, flashing	The controller has not yet been configured and is in "Standby" state.
Green/red, flashing	The option card is performing a self-test.
Red, flashing	A simple, correctable fault, e.g. a faulty configuration, was detected.
Red	A serious, non-correctable fault was detected.
Off	The controller is not switched on or is defective.

Status LED "NS" (NETWORK STATUS)

Status	Meaning
Green	There is a controlling connection to the fieldbus system.
Green, flashing	No controlling connection. However, the device is configured (including IP address) and ready for a connection.
Green/red, flashing	The option card is performing a self-test.
Red, flashing	The previously established controlling connection is in timeout state. The state is reset by restarting communication.
Red	Conflict detected during IP address assignment. Another node in the network uses the same IP address.
Off	The option card does not yet have any IP address parameters.

3.7.7 Modbus TCP

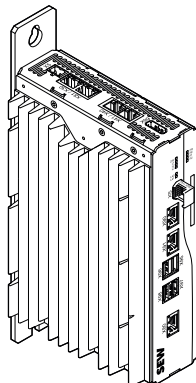
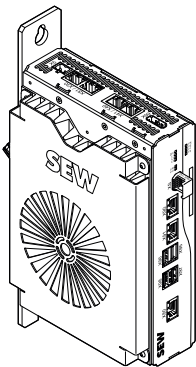
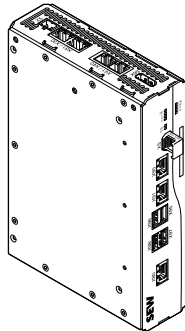
"RUN" status LED

Status	Meaning
Green	OMB task has communication. At least one TCP connection has been established.
Green, flashing at 1 Hz	OMB task ready and not yet configured.
Green, flashing at 5 Hz	OMB task is configured.
Off	OMB task is not ready.

"ERR" status LED

Status	Meaning
Off	No communication error
Red, flashing at 2 Hz	System fault
Red	Communication error active

3.8 Cooling

Passive cooling	
	With the "passive cooling" option, the device is cooled in the control cabinet via cooling fins on the device. To ensure the heat dissipation, a distance of at least 100 mm from the next installed device or cable duct must be maintained on all sides of the device. The following devices are available with this option: • UHX86A-x-20 • UHX86A-x-40
Active cooling	
	With the "active cooling" option, the device is cooled in the control cabinet via a regulated fan that is integrated into the device. To ensure the heat circulation, a distance of at least 100 mm from the next installed device or cable duct must be maintained on all sides of the device. The following devices are available with this option: • UHX86A-x-50 • UHX86A-x-60
Without cooling option (special version with cold plate)	
	With the "cold plate" option, the device must be mounted to a heat sink that is not permitted to exceed a temperature of max. 50 °C. You must take appropriate measures for this. The temperature connection must ensure that the device does not overheat. The following devices are available with this option: • UHX86A-x-20 • UHX86A-x-40 INFORMATION: Consultation with SEW-EURODRIVE is necessary to use this special version.

3.9 Accessories

3.9.1 OMH86A CFast memory card

INFORMATION



Make sure that only authorized persons can access the memory card. By accessing the memory card, you can make changes to the configuration.

The OMH86A CFast memory card (exact designation: OMH86A-C1) is required for operating the MOVI-C® CONTROLLER with the real-time operating system and contains the firmware, the IEC program, and user data (such as recipes). It can be used for data backup and for automatic parameterization in the event of a "Device replacement" (→ 71).

The OMH86A CFast memory card is plugged into the XM1 card slot of the MOVI-C® CONTROLLER. The slot is located behind the front panel. See also chapter "Inserting the memory card" (→ 31).

3.9.2 NVMe hard disk (SSD)

INFORMATION



The NVMe hard disk (SSD) may only be used in conjunction with the MOVI-C® CONTROLLER in the slot provided for this purpose. The license terms of Microsoft apply when using the Windows operating system.

The NVMe hard disk (SSD) expands the MOVI-C® CONTROLLER to include a Windows operating system and can be used for plant visualization, for example.

The NVMe hard disk (SSD) is available in different versions, and can be supplied already inserted or ordered and inserted separately. The NVMe hard disk (SSD) is inserted into the slot of the MOVI-C® CONTROLLER provided for this purpose. See also chapter "Inserting/replacing the NVMe hard disk (SSD)" (→ 32).

To increase the service life, we recommend using an NVMe hard disk with 50% of the memory space available after installation of all applications. The following variants of the NVMe hard disk are available:

INFORMATION: If the NVMe hard disk is ordered separately, a gap pad and the corresponding SMID label are included in the scope of delivery. When an existing NVMe hard disk is exchanged, the licenses contained on it and the operating system must be reinstalled manually.

Designation		Memory space	Part number
NVMe hard disk unprogrammed	OMN01A-2-00	120 GB	28324927
NVMe hard disk unprogrammed	OMN02A-2-00	240 GB	28324935
NVMe hard disk unprogrammed	OMN03A-2-00	480 GB	28324943

3.9.3 Cable routing

Used to secure and stabilize the cable routing and the connections to the MOVI-C® CONTROLLER terminals

Designation	Part number
	
Accessory bag UHX86A In detail: • 1 × top cable retainer (see left figure) • 1 × front cable retainer (see right figure) • 7 × screws • 12 × cable ties	28306759

For installation information, refer to chapter "Using the cable routing" (→ 34).

3.9.4 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}	• 0.29 m • 0.44 m • 0.75 m • 1.5 m • 3 m • 5 m • 10 m	2 × RJ45	• 18179959 • 18179967 • 18167039 • 18179975 • 18167047 • 18179983 • 18179991

For more information, refer to chapter "System bus cable" (→ 42).

4 Installation

4.1 Mechanical installation

4.1.1 General information



⚠ CAUTION

Installing a defective or damaged MOVI-C® CONTROLLER.

Injury to persons and damage to property.

- Before installation, check the device for external damage and replace a damaged device.

NOTICE

Mounting the MOVI-C® CONTROLLER on a poorly conductive mounting surface.

Damage to the MOVI-C® CONTROLLER.

- The mounting plate in the control cabinet must be conductive over a large area for the mounting surface of the MOVI-C® CONTROLLER (metallically pure, good conductivity). EMC-compliant installation of the device can only be accomplished with a mounting plate that is conductive over a large area.

NOTICE

Non-compliance with the stipulated tightening torques.

Damage to the MOVI-C® CONTROLLER.

- Always adhere to the stipulated tightening torques. Otherwise, excessive heat can develop which would damage the device.

4.1.2 Minimum clearance and mounting position

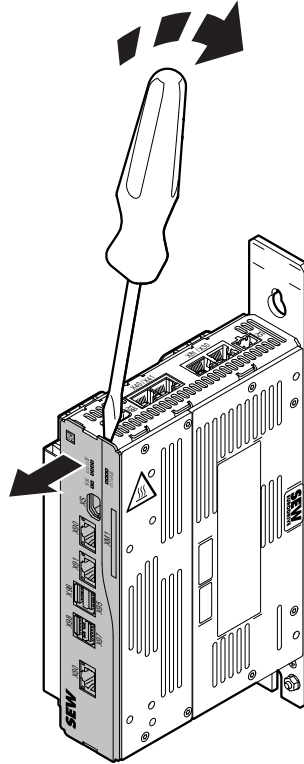
Install the MOVI-C® CONTROLLER in the control cabinet. Observe the following for installation:

- Mount the device with the provided support plate flush to the metal bare rear wall of the control cabinet. With the cold plate special version (**INFORMATION:** to be used subject to consultation with SEW-EURODRIVE), the MOVI-C® CONTROLLER must be mounted flush with the cooling surface (cold plate) on a wall of the control cabinet to ensure sufficient dissipation of the heat.
- 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 left and right. Ensure that the air circulation in this clearance is not impaired by cables or other installation equipment. The preferred mounting position is left of the axis system.
- Make sure that the MOVI-C® CONTROLLER is not subjected to warm exhaust air from nearby components.
- Install the device only vertically. Do not install it horizontally, tilted, or upside down.

4.1.3 Accessories

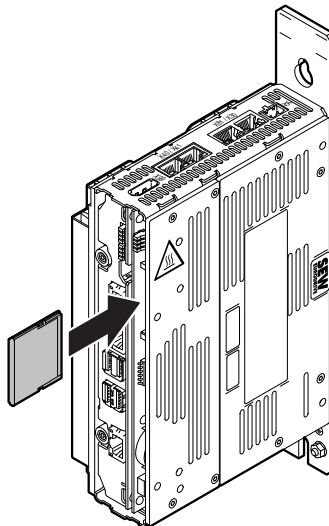
Inserting the memory card

1. Lift the magnetically affixed front panel off the MOVI-C® CONTROLLER. Use a screwdriver as a lever in the provided recess.



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2. Insert the OMH CFast memory card into the slot marked with XM1.

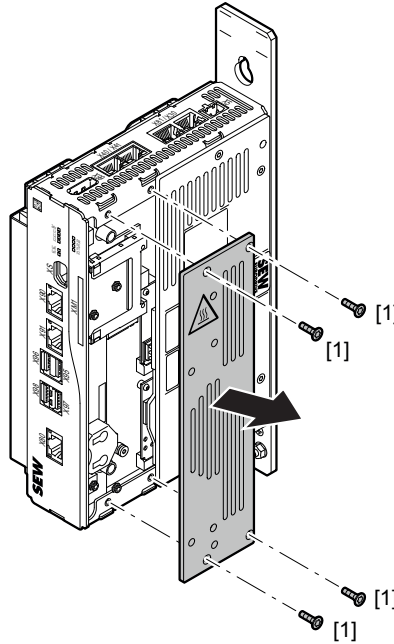


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3. Replace the front panel on the MOVI-C® CONTROLLER.

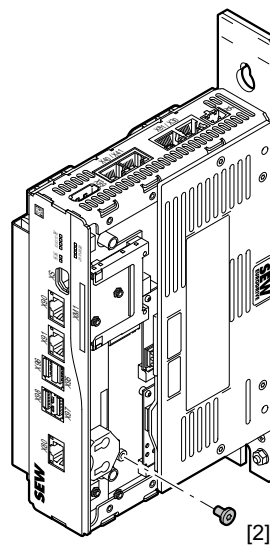
Inserting/replacing the NVMe hard disk (SSD)

1. Loosen the screws [1] from the side cover of the MOVI-C® CONTROLLER as shown in the figure.
2. Remove the cover. **INFORMATION:** Proceed with caution if an NVMe hard disk is already inserted, because a connection can form between the NVMe hard disk and the gap pad over time. In this case, do not pry off the gap pad with a screwdriver, but loosen it slowly to reach screw [2]. Then dispose of the gap pad and replace it with a new one.



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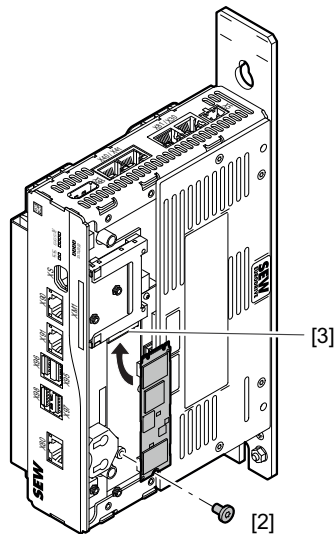
3. Loosen screw [2] at the slot of the NVMe hard disk. **INFORMATION:** Do not let the screw fall into the housing when loosening. If an NVMe hard disk is already inserted, it is pushed slightly away from the slot by a soft spring mechanism when the screw is loosened.



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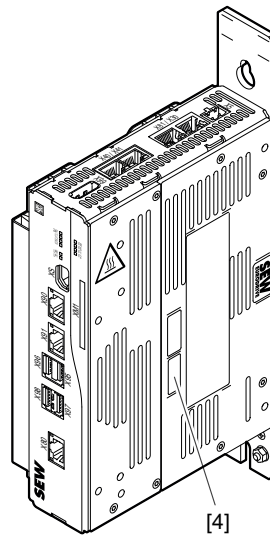
4. If an NVMe hard disk is already inserted, pull it out towards the rear.

5. Insert the NMVe hard disk into the designated slot [3].



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6. Reinsert screw [2] to secure the NMVe hard disk and tighten the screw with a tightening torque of 0.4 to 0.45 Nm.
7. Place the gap pad on the NMVe hard disk. Be careful not to stretch the gap pad.
8. Reattach the side cover to the MOVIE-C® CONTROLLER with the loosened screws [1], applying a tightening torque of 0.72 Nm.
9. Attach the label that belongs to the Windows operating system on the NMVe hard disk in the designated position [4] on the housing of the MOVIE-C® CONTROLLER.

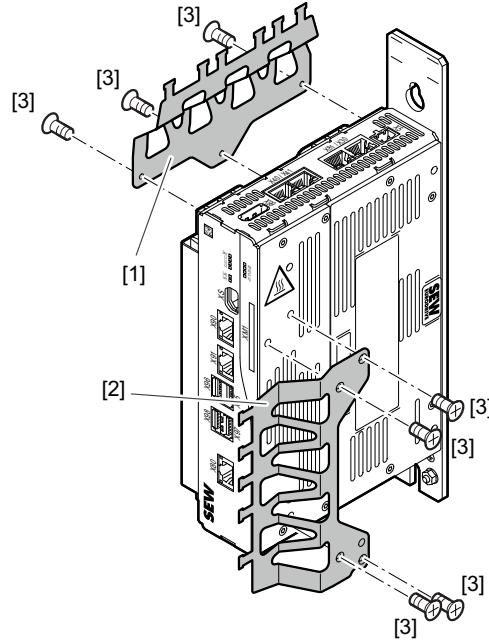


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Using the cable routing

Installing the cable retainers

1. Position the top cable retainer [1] and the front cable retainer [2] on the MOVI-C® CONTROLLER as shown in the figure.

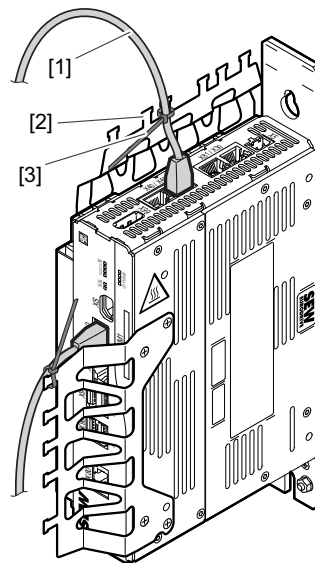


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2. Insert the screws [3] included in the "Cable routing" (→ 29) accessory as shown in the figure and tighten the screws with a tightening torque of 0.72 Nm.

Attaching the cable to the cable retainer

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



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2. Fasten the cables to the cable holder as shown in the figure, using the cable ties [3] included in the "Cable routing" (→ 29) accessory.

4.2 Electrical installation

4.2.1 General information



INFORMATION

The device meets the requirements for signal circuits according to SELV (**S**afety **E**xtra-**L**ow **V**oltage) or PELV (**P**rotective **E**xtra-**L**ow **V**oltage). The connected voltage sources must ensure protective separation between power and electronic connections.



INFORMATION

The MOVI-C® CONTROLLER has a fused power consumption $P_{\max} < 100$ VA and therefore does not require separate UL approval as an SEW-EURODRIVE inverter accessory according to UL508. If the MOVI-C® CONTROLLER is not used as an SEW-EURODRIVE inverter accessory, it must be supplied with a UL-approved class 2 power supply unit.

4.2.2 Shielding and routing bus cables

NOTICE

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

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 connecting elements that meet the requirements of category 6, class E in accordance with IEC 11801 edition 2.0.

Do the following to minimize electrical interference:

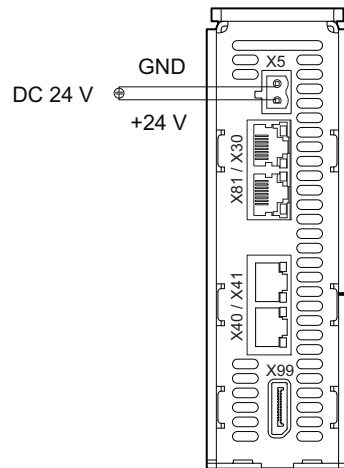
- Tighten the retaining screws of connectors, modules and equipotential bonding cables below the guaranteed yield strength.
Tighten the retaining screws of connectors, modules and equipotential bonding cables to the tightening torque specified by the manufacturer.
- Only use connectors with a metal housing 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 connectors to extend bus cables.
- Route the bus cables closely along existing grounding surfaces.

4.2.3 Voltage supply connection

An external DC 24 V power supply unit (power consumption $P_{\max}$ up to a maximum of 100 W) must 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



4.2.4 Connecting the engineering PC

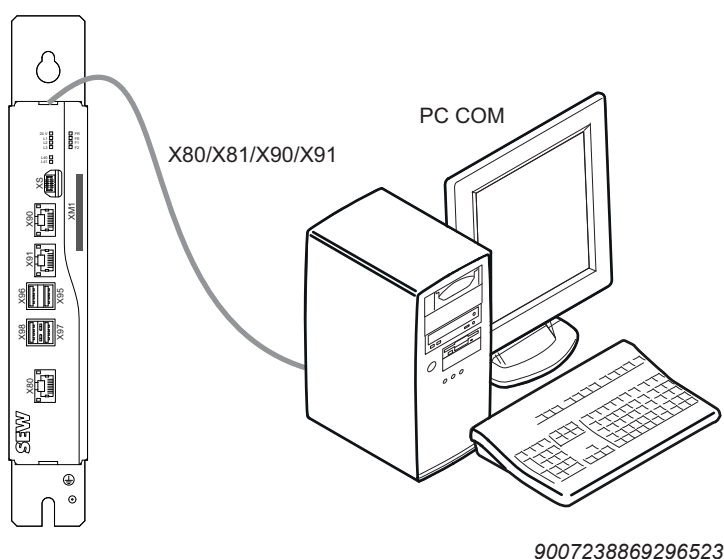
INFORMATION



Before connecting, make sure that the engineering PC is adequately protected with regard to IT security. To do so, check whether anti-virus software and all updates for it are available on the engineering PC. For this connection, use a point-to-point Ethernet connection if possible and do not connect the engineering PC to a network.

To connect the MOVI-C® CONTROLLER to the Ethernet network, connect one of the Ethernet communication interfaces X80, X81 or X90, X91 (RJ45 connector) to the other network stations using a category 5, class D shielded twisted-pair cable in accordance with IEC 11801 edition 2.0.

You can connect an engineering PC or other network stations (e.g. visualization systems) to the Ethernet communication interfaces. The X90, X91 Ethernet communication interface is only available in combination with the NVMe hard disk (SSD) with Windows operating system.



In delivery state, the engineering interfaces of the MOVI-C® CONTROLLER have the following IP address parameters:

X80 – IP address: 192.168.10.4, subnet mask: 255.255.255.0

X81 – IP address: 10.1.254.128, subnet mask: 255.255.255.0

4.2.5 Virtual network card (VNET)

INFORMATION



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

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, X91) and of the control section (X80, X81) via a network switch.

Setting the network address of the Windows section

INFORMATION



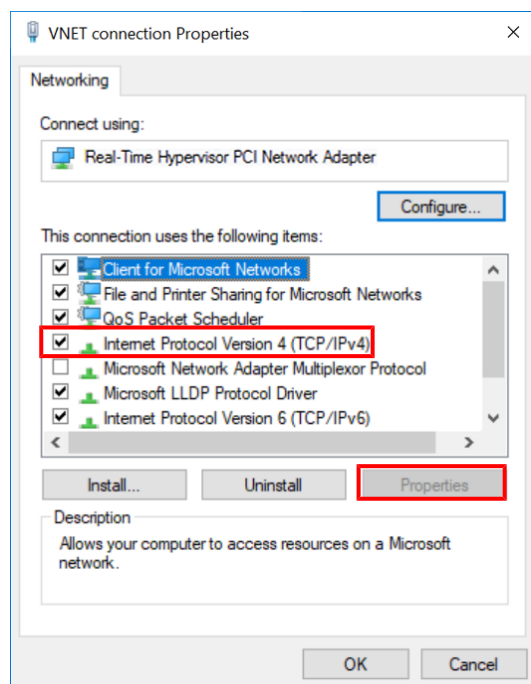
Setting the network address is only required if you want to use a network address other than the default value. The network address (192.168.2.1) used in the following instructions is initially set as the default value for the Windows section.

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 the "Settings" icon.
2. Click the "Network and Internet" tile and open the "Ethernet" submenu.
3. In the "Ethernet" menu, click the "Change adapter options" link at the right side of the screen.
 - ⇒ The current network connections are displayed.
4. Open the context menu of the "VNET connection" network connection and select "Properties".
 - ⇒ The "VNET connection Properties" dialog opens.

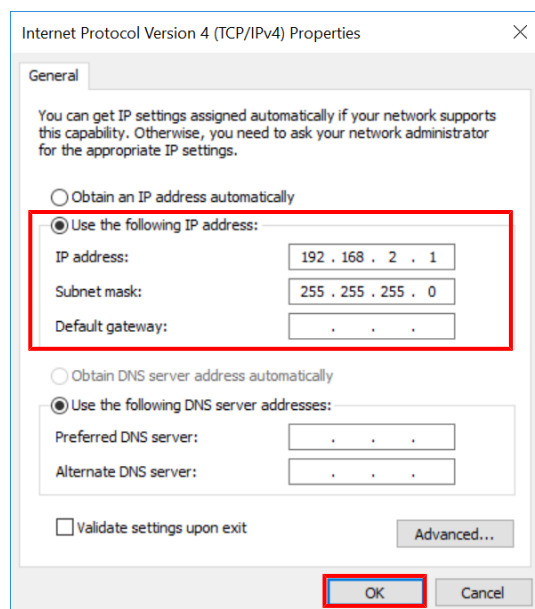
5. On the "Networking" tab, select the entry "Internet Protocol Version 4" in the group "This connection uses the following items" and then click [Properties].



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

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



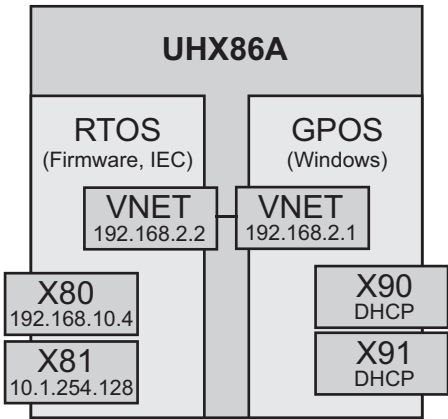
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7. Confirm your entries with [OK].

Connecting Windows section and control section

Via virtual network card (VNET)

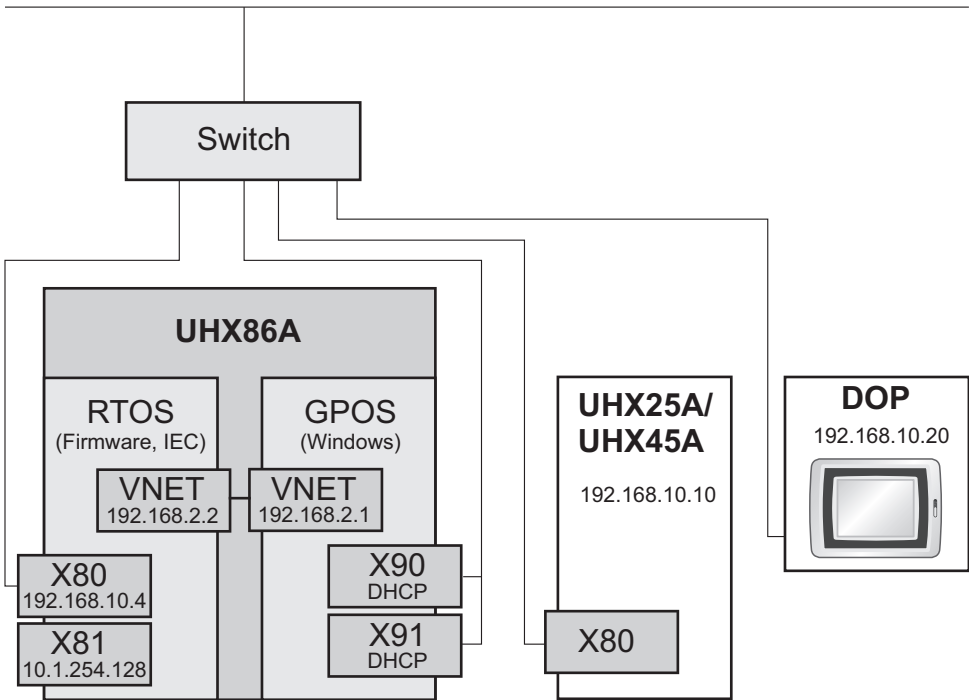
The internal connection between the Windows section and the control section is available as standard and does not require any additional hardware such as network cables, for example.



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Via external network

The Windows section (X90, X91) and the control section (X80, X81) of the MOVI-C® CONTROLLER and another external MOVI-C® CONTROLLER of type **UHX25A/UHX45A** are connected to an external network via a network switch (**connection: X80**). This connection option also allows you to connect external devices, e.g. a keypad.



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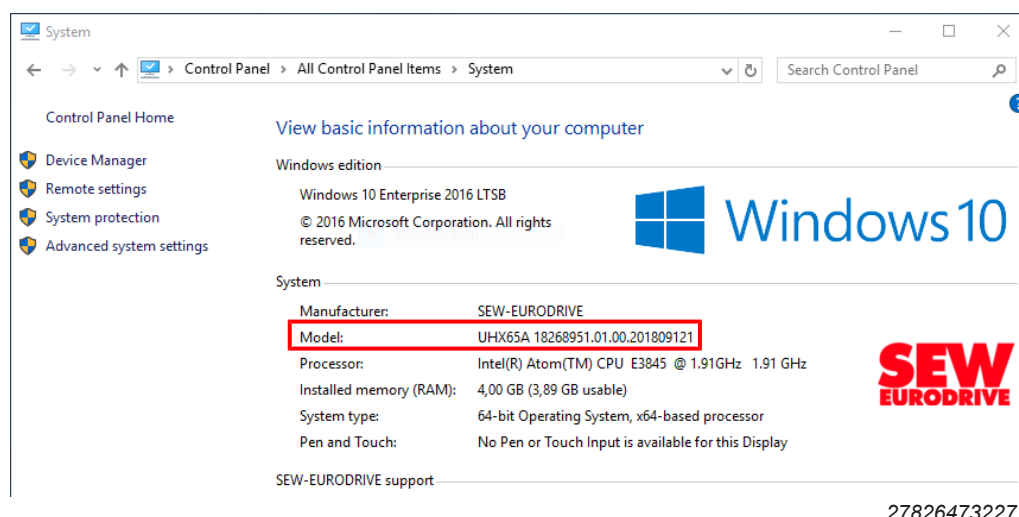
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Reading out the version number of the software package

You can view the version number of the software package installed 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 the app entry [Control Panel].
 3. Select the "System and Security" submenu and click "System".
- ⇒ The "View basic information about your computer" window opens.



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

4.2.6 EtherCAT®/SBus^{PLUS} connection

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

EtherCAT®/SBus^{PLUS} bus topology

EtherCAT®/SBus^{PLUS} is designed for a linear bus structure with RJ45 connectors. The EtherCAT®/SBus^{PLUS} SubDevices 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.

An example of an EtherCAT®/SBus^{PLUS} bus topology can be found in the chapter "Communication interfaces" (→ 19).

System bus cable

NOTICE

Malfunctions or defects in the connected devices due to the use of incorrect cables.

Damage to the product or its environment.

- Use one of the cables recommended by SEW-EURODRIVE in the chapter "Accessories" (→ 31).



INFORMATION

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

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). SEW-EURODRIVE recommends using only the prefabricated cables from SEW-EURODRIVE listed in the "System bus cable" (→ 29) chapter for connecting the EtherCAT®/SBus^{PLUS} system bus.

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} SubDevices from SEW-EURODRIVE do not have an address that can be set on the device. These devices are recognized via their position in the bus structure and are then assigned an address by the EtherCAT®/SBus^{PLUS} MainDevice.

4.2.7 Connecting USB interfaces

The USB interfaces X95-98 are assigned to the Windows operating system. A keyboard, mouse, touchpad, or SSD, for example, can be connected to these USB interfaces.

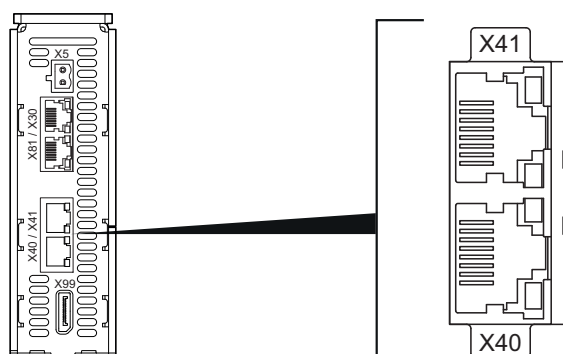
4.2.8 Fieldbus device connection

The MOVI-C[®] CONTROLLER serves as a fieldbus device for the higher-level PLC (fieldbus scanner). Communication takes place via Ethernet.

The MOVI-C[®] CONTROLLER is connected to the Ethernet network via the following terminals:

- X40 (RJ45 connector)
- X41 (RJ45 connector)

The device is connected to the other network nodes using a category 5, class D twisted-pair cable in accordance with IEC 11801, edition 2.0.



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INFORMATION



According to IEEE 802.3, 200 Edition, the maximum cable length for 10 MBaud/100 MBaud Ethernet (10BaseT/100BaseT) between 2 network nodes is 100 m.

4.2.9 DisplayPort interface connection

The DisplayPort interface assigned to the Windows operating system is used for connecting a monitor to the MOVI-C[®] CONTROLLER.

4.2.10 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 _{24 V}		DC 24 V supply voltage	
	X5: GND	GND		DC GND supply voltage (internally connected to PE)	
	X30			Fast SBus ^{PLUS} system bus based on EtherCAT®	
		10/100 BaseT	1000 BaseT	10/100 BaseT	1000 BaseT
	X80/X81:1	TX+	DA+	Transmit line (+)	Bidirectional pair A
	X80/X81:2	TX-	DA-	Transmit line (-)	Bidirectional pair A
	X80/X81:3	RX+	DB+	Receive line (+)	Bidirectional pair B
	X80/X81:4	Reserved	DC+	–	Bidirectional pair C
	X80/X81:5	Reserved	DC-	–	Bidirectional pair C
	X80/X81:6	RX-	DB-	Receive line (-)	Bidirectional pair B
	X80/X81:7	Reserved	DD+	–	Bidirectional pair D
	X80/X81:8	Reserved	DD-	–	Bidirectional pair D
	X40/X41:1	TX+		Transmit line (+)	
	X40/X41:2	TX-		Transmit line (-)	
	X40/X41:3	RX+		Receive line (+)	
	X40/X41:4	Reserved		–	
	X40/X41:5	Reserved		–	
	X40/X41:6	RX-		Receive line (-)	
	X40/X41:7	Reserved		–	
	X40/X41:8	Reserved		–	
		10/100 BaseT	1000 BaseT	10/100 BaseT	1000 BaseT
	X90/X91:1	TX+	DA+	Transmit line (+)	Bidirectional pair A
	X90/X91:2	TX-	DA-	Transmit line (-)	Bidirectional pair A
	X90/X91:3	RX+	DB+	Receive line (+)	Bidirectional pair B
	X90/X91:4	Reserved	DC+	–	Bidirectional pair C
	X90/X91:5	Reserved	DC-	–	Bidirectional pair C
	X90/X91:6	RX-	DB-	Receive line (-)	Bidirectional pair B
	X90/X91:7	Reserved	DD+	–	Bidirectional pair D
	X90/X91:8	Reserved	DD-	–	Bidirectional pair D

5 Startup

5.1 Prerequisites

The following prerequisites are required for startup:

- The MOVI-C® CONTROLLER is installed correctly mechanically and electrically.
- The MOVI-C® CONTROLLER and the connected drives are correctly configured.
- Suitable measures have been taken to ensure that the drives do not start up unintentionally.
- Safety measures prevent danger to persons and machines.
- MOVISUITE® engineering software is installed on the engineering PC.

5.2 Setting an IP address (optional)

If you want to use an IP address other than the default IP address (192.168.10.4) for communication, you can change the IP address using one of the following methods.

5.2.1 Via MOVISUITE®

Proceed as follows to change the IP address for communication directly in the configuration of the MOVI-C® CONTROLLER in MOVISUITE®:



INFORMATION

When using this function to set the IP address, the specified IP address is written directly to the memory only. If a `SewPlcIp.xml` file exists in the "System" directory on the MOVI-C® CONTROLLER, the IP address declared in the `SewPlcIp.xml` file is adopted the next time the MOVI-C® CONTROLLER is switched on.

- Access the file system on the MOVI-C® CONTROLLER via the engineering interface for the control section or using a card reader, navigate to the "System" directory, and check if the `SewPlcIp.xml` file exists. If you always want to set the IP address via MOVISUITE® in the future, delete or rename the file.

1. In MOVISUITE®, open the configuration of the MOVI-C® CONTROLLER.
2. Open the configuration menu "Device properties" > "Communication" > "Engineering".

3. Enter the required IP address data in the "Saved address settings" section.

The screenshot shows the 'Engineering' interface with a tab labeled 'Engineering X'. The interface is divided into four main sections: Adapter selection, Selected adapter, Active address settings, and Saved address settings.

- Adapter selection:** Includes a dropdown for 'Adapter no. 1' and a text field for 'Number of configurable adapters' set to 3. A 'Default-IP active' button is present.
- Selected adapter:** Shows 'Adapter designation' as X80, 'MAC ID' as 00-30-d6-24-f3-89, and 'Baud rate' as 1000 MBd. A 'Link available' button is present.
- Active address settings:** Shows 'DHCP currently activated' as the active option. Fields for 'Current IP address' (192.168.10.4), 'Current subnet mask' (255.255.255.0), 'Current default gateway' (192.168.10.1), 'Current DNS address' (0.0.0.0), and 'Current host name' (MOVI-C-ENG) are displayed.
- Saved address settings:** This section is highlighted. It includes fields for 'Saved IP address' (192.168.10.4), 'Saved subnet mask' (255.255.255.0), 'Saved default gateway' (192.168.10.1), 'Saved DNS address' (0.0.0.0), and 'Saved host name' (MOVI-C-ENG). A 'Settings changed' button and an 'Apply address settings' button with a 'Set parameter' sub-button are at the bottom.

Below the interface, the text '36669845515' is displayed.

4. Click [Set parameters].

5.2.2 Via file system

The MOVI-C® CONTROLLER reads the IP address for communication from the `SewPlcIp.xml` file in the "System" directory of the OMH memory card of the MOVI-C® CONTROLLER. Proceed as follows to change the IP address by customizing this file:

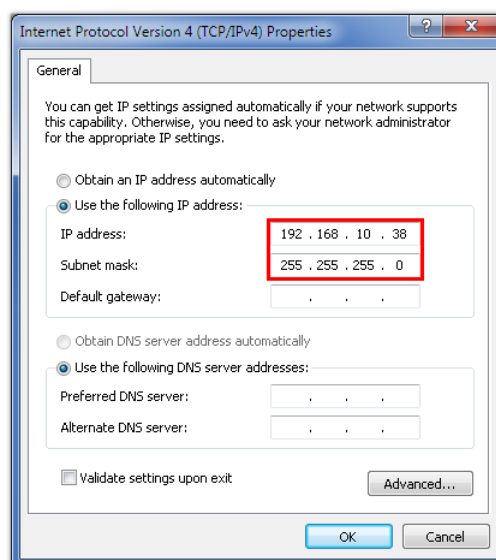
1. Access the file system on the MOVI-C® CONTROLLER via the engineering interface for the control section or using a card reader and navigate to the "System" directory.
 2. Open the `SewPlcIp.Example.xml` file for editing in an editor.
 3. In the file, replace the currently specified IP addresses with the ones you require.
 4. Save the file and close the editor.
 5. Rename the edited file to `SewPlcIp.xml`.
- ⇒ The new values are applied and used the next time the MOVI-C® CONTROLLER is started up.
- ⇒ After the first startup after editing, the `SewPlcIp.xml` file should be deleted or renamed to `SewPlcIp.Example.xml` to allow the IP address to be changed via the configuration of the MOVI-C® CONTROLLER in MOVISUITE®. See the information in chapter "Via MOVISUITE®" (→ 45).
- INFORMATION:** When the file is deleted, the default address (192.168.10.4) is not automatically set again.

5.3 Connecting the engineering PC and MOVI-C® CONTROLLER

To ensure that the engineering PC can communicate via the X80, X81 engineering interface 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. The default IP address(es) of the Ethernet communication interface(s) can be found in the chapter "Connecting the engineering PC" (→ 37).

Proceed as follows:

1. Open the settings for the network via the Windows control panel.
2. Double-click the adapter that is physically connected to the X80, X81 engineering interface of the MOVI-C® CONTROLLER.
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 is therefore 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

5.4 Adding devices to MOVISUITE®

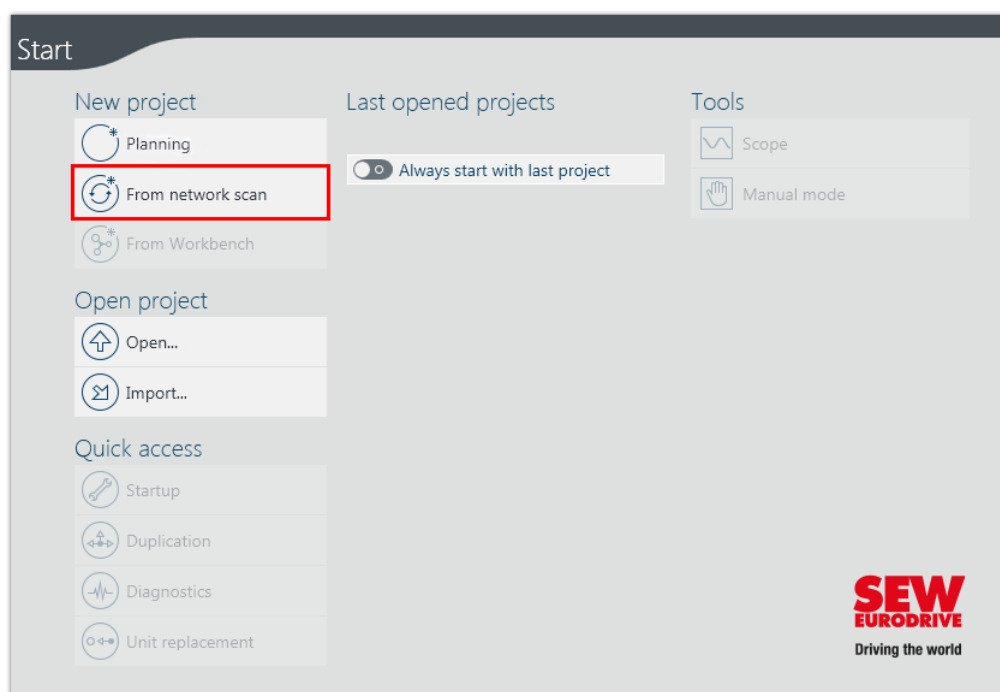
INFORMATION



For detailed information on how to use the MOVISUITE® engineering software, refer to the corresponding documentation.

Proceed as follows:

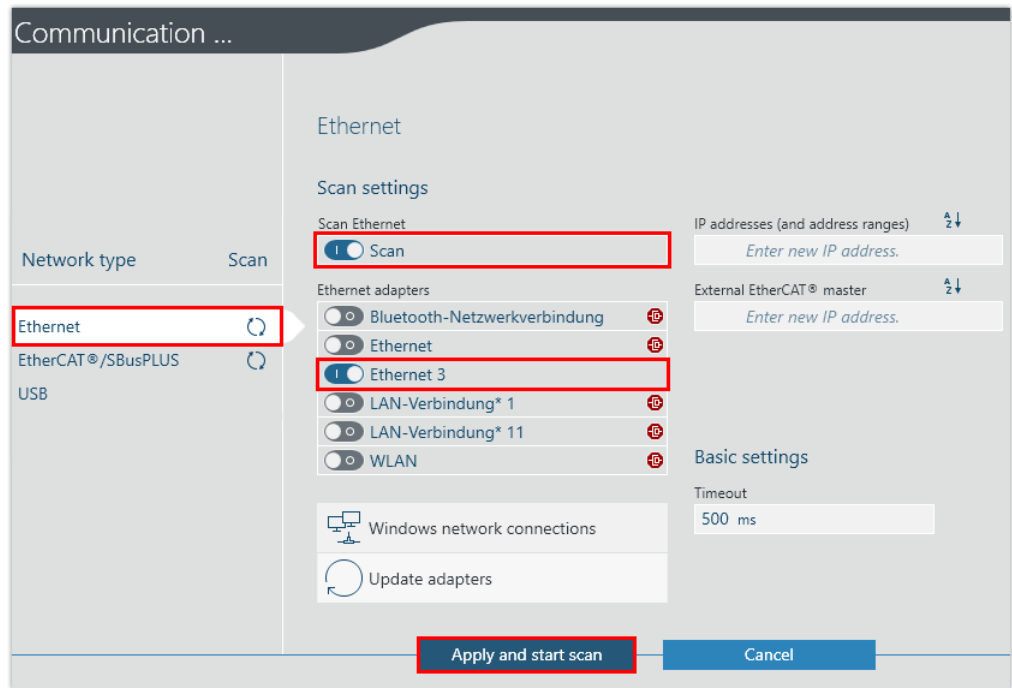
- ✓ The connection between the engineering PC and MOVI-C® CONTROLLER is established via the engineering interface (X80, X81).
 - ✓ Both devices are connected in the same local network and the IP address parameters of the engineering PC are set to the local network.
1. Start the MOVISUITE® engineering software.
 2. Create a new MOVISUITE® project from a network scan.



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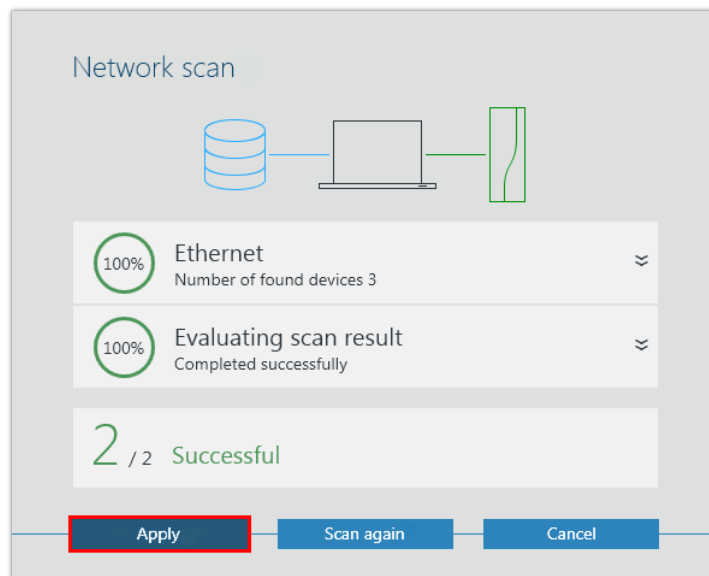
3. Select the network type "Ethernet", activate "Scan Ethernet", and select the desired Ethernet adapter from the list.

4. Click [Apply and start scan].



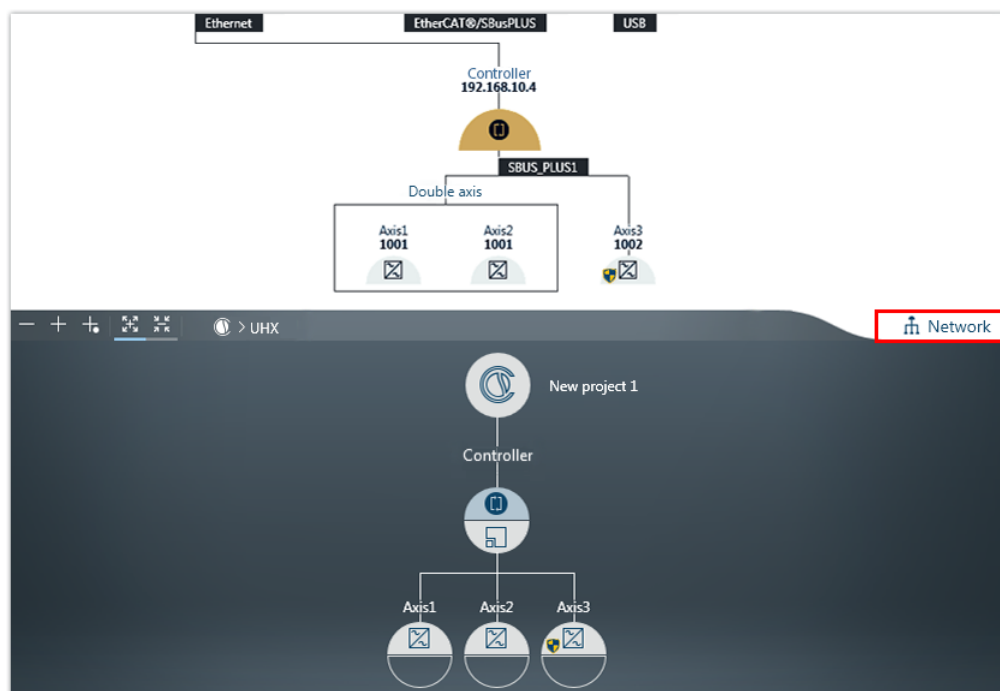
36028814434188171

⇒ The "Network scan" dialog box opens and shows the number of found devices.



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5. To apply the found devices to the MOVISUITE® project, click [Apply].
 - ⇒ The devices found during the network scan are displayed in the MOVISUITE® project.



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6. Assign a name to the MOVI-C® CONTROLLER in the MOVISUITE® project by opening the shortcut menu of the device node and clicking [Rename] in the menu.
7. Save the MOVISUITE® project.

5.5 Setting up the Windows operating system (optional)

INFORMATION



The Windows operating system must be started up the first time the MOVI-C® CONTROLLER is booted.

The scope of functions of your MOVI-C® CONTROLLER can be extended to include a Windows operating system by means of the optional NVMe hard disk (SSD).

When you start the operating system for the first time, you must first go through various setup steps. This involves adapting the operating system in terms of system time, number formats and user accounts, among other things. Furthermore, you must accept the license terms of Microsoft for using the Windows operating system.

Observe the following information when starting the operating system for the first time:

- The installation process of the Windows operating system must be performed completely and without interruption. Interrupting the voltage supply of the MOVI-C® CONTROLLER during the boot process can damage the Windows image, which would then have to be restored by SEW-EURODRIVE Service.
- The operating system cannot be initially booted via remote desktop access. You need external input/output devices (monitor, keyboard, mouse) connected to the MOVI-C® CONTROLLER. The monitor must be connected and switched on before the MOVI-C® CONTROLLER is switched on. If the monitor is switched on afterwards, the Windows image could be damaged and would have to be restored by SEW-EURODRIVE Service.

Once the setup steps are complete, the Windows operating system is available. For further information and instructions on using the operating system in connection with the MOVI-C® CONTROLLER, refer to chapter "Operation" (→ 55).

5.6 Setting the cycle time

To prevent overloading of the MOVI-C® CONTROLLER (which can be recognized, for example, by noise development on the axes), check the task configuration to ensure that the cycle time of the *HighPrio* task is not exceeded during operation. If necessary, it is recommended for the cycle time set on the axes and on the MOVI-C® CONTROLLER (set to 1 ms by default) to be increased according to the application (number of axes, software modules/visualizations used).

The following steps must be taken to set the cycle time. The change only takes effect after the IEC program and the configuration data have been updated.

Setting the TaskHighPrio cycle time for the MOVI-C® CONTROLLER

In MOVISUITE®, perform the following steps for the MOVI-C® CONTROLLER:

1. Open the configuration of the MOVI-C® CONTROLLER.
2. In the "MOVIRUN® flexible" section, open the "Task system" configuration menu.
3. Under "Task system", enter the required value in the "Cycle time of the HighPrio Task" edit box. **INFORMATION:** The value must be an integer and identical to the "Controller setpoint cycle" value (see below).
4. Click the blue arrow in the "Task system" section of the "Sync offset EtherCAT" edit box to apply the suggested value.

Setting the "Controller setpoint cycle" on the axes

In MOVISUITE®, perform the following steps for all axes that are subordinate to the MOVI-C® CONTROLLER:

5. Open the configuration for the axis.
6. In the "Functions" section, open the "Setpoints" configuration menu and its sub-menu "Basic settings".
7. In the "Basic settings" section, set the value in the "Controller setpoint cycle" edit box to the required value. **INFORMATION:** The value must be an integer and identical to the "Cycle time of the HighPrio Task" value (see above).
8. In the section of the software module of the axis, open the "Drive functions" configuration menu and then the "FCB 10 Interpolated position control" submenu.
9. In the "FCB 10 Interpolated position control" section, set an integer multiple (factor 5) of the cycle time in the "Mean value filter time" edit box.

6 Operation

6.1 IT security

6.1.1 Hardening measures



Perform the following hardening measures:

- Regularly check if updates are available for your products.
- Report incidents concerning IT security by e-mail to cert@sew-eurodrive.com.
- Regularly check which Security Advisories are available in the Online Support of SEW-EURODRIVE.
- Evaluate the fault memories and diagnostics information of your products regularly and check whether there are entries that affect IT security.

6.1.2 Guidelines for secure operation



The engineering protocol from SEW-EURODRIVE allows authorized personnel to activate various service accesses on the device. Authentication is implemented by using static access data. This data is not used to defend against attacks on IT security but to protect against unintentional modification. This is the reason why it cannot be changed.

To prevent misuse of these service accesses, network access must be restricted according to the state of the art. For more information, refer to section "IT security of the environment" (→  11).

6.1.3 Guidelines for user account management



As of version V2.40 (IEC 3.5.18) of the MOVISUITE® engineering software and firmware version 8 of the product, you can activate user management on the product and so you can assign an access level to certain functions. In addition, you can set up certificate-based secure communication between the product and the IEC Editor via field-bus and the Ethernet communication interface.

If a Windows operating system is used, at least one user account must be configured on it. It is recommended to configure an administrator account, which is not relevant for operational use and is only used to administer the Windows operating system. Appropriate user accounts with restricted permissions should be configured for operational use. The exact configuration should follow the IT policies of the operator.

6.1.4 Communication



Use secure protocols (e.g. TLS-based protocols) for communications via TCP/IP or UDP with other stations. As of version 2.40 (IEC 3.5.18) of the MOVISUITE® engineering software and firmware version 8 of the product, the use of OPC UA based on certificates is recommended.

6.2 Logging function

The MOVI-C® CONTROLLER has a logging function, for example, to track the processing procedures in the event of an error. The logging function is disabled by default.

INFORMATION



To keep the write operations on the memory card low and in this way prevent a defect, the logging function should not be activated permanently.

To activate the logging function, do the following:

1. On your engineering PC connected to the MOVI-C® CONTROLLER, open the OMH memory card content using a file explorer.
2. Navigate to the "log" directory on the OMH memory card.
⇒ The "log" directory contains the `LogConfig.Example.xml` file.
3. Rename the `LogConfig.Example.xml` file into `LogConfig.xml`.
⇒ The logging function is now active.

6.3 Activating the trace function

If the trace function of the MOVI-C® CONTROLLER is used, the maximum runtime of the *HighPrio* task must be checked and, if necessary, adjusted for the trace recordings. The runtime of the *HighPrio* task is measured on the "Monitoring" tab of the task configuration.

The maximum task runtime depends on the set scheduling mode. With a set cycle time of 1 ms, the following values must be observed for the MOVI-C® CONTROLLER type UHX86A:

- *DeadTimeOptimal* scheduling mode: **400 µs**
- *MaximumCommunicationTime* scheduling mode: **400 µs**
- *Multicore_MaxComTime* scheduling mode: **900 µs**

6.4 Windows operating system

6.4.1 General information

Observe the following notes when using the Windows operating system:

- The license terms of Microsoft apply when using the Windows operating system.
- The Windows operating system is only available in English.
- SEW-EURODRIVE does not offer support for setting up the Windows operating system.
- If you wish to use a Windows remote desktop connection, you have to use a user password.

6.4.2 IT security



Observe the following notes relating to IT security when using the Windows operating system:

- Follow the Windows security policies of your IT organization.
- Install the required security updates for the Windows operating system at regular intervals.
- Only install appropriately signed drivers and packages from trusted sources on the Windows operating system.
- Use antivirus software on the Windows operating system and keep it up-to-date.
- Activate and configure a firewall on the Windows operating system.
- Refer to the Port Overview chapter for information on the relevant ports and their functionality.

6.4.3 Monitor mode

If no image appears on the monitor, perform the following steps to correct the problem:

- Make sure that the Windows operating system has been set up completely and that the monitor was connected and switched on before the Windows operating system was switched on for the first time.

The Windows operating system must be set up completely and without interruption until the desktop appears. Failure to follow these steps can result in sporadic image failures during the boot process or, in the worst case, total image loss. A recovery image for Windows is available as a download from the Online Support on the SEW-EURODRIVE website.

- Check the DisplayPort cable used.

A defective or incorrectly inserted cable can be the reason for a black screen. Check whether the DisplayPort connector is correctly plugged into the monitor and the MOVI-C® CONTROLLER. Depending on the manufacturer, the DisplayPort connectors have a different length and some have a locking function. Failure to insert the DisplayPort connector into the socket contact until it locks in place can lead to image distortion or complete image loss. The length of the DisplayPort connector should be greater than 10.5 mm. Also check whether the cable works with another monitor and replace the used DisplayPort cable with a new one, if necessary.

- If necessary, check the settings in the on-screen display menu of the monitor.
The input of the monitor must be set to DisplayPort (DP). Select this option manually again (even if it is already selected) for checking. Also check whether an auto function is activated. Depending on the monitor type, the auto function can cause an incorrect input signal (DVI, HDMI, RGB) to be selected and then the monitor switches to sleep mode. In addition, certain monitors offer the option of choosing between DisplayPort standards. The DisplayPort of the MOVI-C® CONTROLLER is based on the standard 1.1 and is upward compatible. If the monitor still does not display an image after adjusting the settings in the on-screen menu mentioned above, reset the monitor to the factory settings.
- Connect the monitor using a DisplayPort adapter (DP-HDMI, DP-DVI).
- If the monitor still does not display an image, contact SEW-EURODRIVE Service. Have the following information available:
 - Is the MOVI-C® CONTROLLER being operated with external storage media (e.g. CFast memory cards or NVMe hard disk)?
 - What monitors (manufacturer, resolution) are in use?
 - Is an image displayed without CFast memory cards?
 - What is the behavior when only the Windows memory card is inserted?

6.4.4 Creating a data backup

SEW-EURODRIVE strongly recommends to create a data backup of the NVMe hard disk (SSD), for example in the event of a "device replacement" (→ 71). Use the tools included in the Windows operating system to create a backup image.

6.4.5 Resetting the Windows operating system

If you need to reset the Windows operating system of the MOVI-C® CONTROLLER to the delivery state, you can download a suitable recovery image as a ZIP file in the [Online Support](#) portal of SEW-EURODRIVE. The ZIP file contains the recovery image and a recovery tool for creating a USB stick that can be used to reset the Windows operating system.

To perform the reset, the following requirements must be met:

- Computer with Windows operating system, administrator authorization, and at least 16 GB of free hard disk space
- USB stick with at least 16 GB storage capacity (**INFORMATION:** Encrypted, protected or non-bootable USB sticks are not supported)
- Mouse, keyboard, and monitor for operating the MOVI-C® CONTROLLER

INFORMATION



Since the contents of the NVMe hard disk (SSD) are completely deleted during reset, the license files of any software installed on the Windows operating system should be backed up beforehand. Contact SEW-EURODRIVE Service in this case.

After the reset, the license files must be saved again in the same directory. If this folder structure is not displayed, you may need to adjust the view options in Windows Explorer to show hidden folder items.

To perform the reset, proceed as follows:

- ✓ The ZIP file with the recovery image and the recovery tool has been downloaded from the [Online Support](#) portal of SEW-EURODRIVE.

1. Unzip the ZIP file with the recovery image and the recovery tool on your computer.
2. Insert the USB stick into a USB port on your computer.
3. Run the file `Make_USB_Bootable.bat` that has been unzipped from the ZIP file as an administrator.
 - ⇒ A query is displayed, asking you which device should be used.
4. Select the inserted USB stick in the query and confirm with [Enter].

INFORMATION: The USB stick is formatted at the beginning of the process. Therefore, you should make a backup of all files that are saved on the USB stick before executing the file `Make_USB_Bootable.bat`. If an incorrect device is selected, serious failures and data loss may occur.

 - ⇒ The USB stick is prepared for resetting the Windows operating system of the MOVI-C® CONTROLLER.
5. Connect the USB stick to a USB port of the MOVI-C® CONTROLLER (Recommended: USB 3.0 port X98 or X97).
6. Switch on the MOVI-C® CONTROLLER.
7. Follow the instructions of the recovery script that is executed via the USB stick on the Windows operating system of the MOVI-C® CONTROLLER. Select the NVMe hard disk (SSD) with the Windows operating system during this process.

INFORMATION: The NVMe hard disk is formatted at the beginning of the process. Therefore, make sure that you have backed up all data on it beforehand.

 - ⇒ The Windows operating system of the MOVI-C® CONTROLLER is reset to the delivery state.

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

INFORMATION



If the voltage supply to the MOVI-C® CONTROLLER is disconnected without first shutting down the Windows operating system, data and recently made settings can be lost. SEW-EURODRIVE therefore recommends always shutting down the Windows operating system in the normal way before disconnecting the voltage supply.

If the MOVI-C® CONTROLLER is operated with both the OMW CFast memory card and the NVMe hard disk (SSD), then it is a combined device containing a control section and a Windows section. In this context, observe the following notes on the shut-down and reboot behavior:

- Restarting the Windows operating system
The Windows operating system (the Windows section) is restarted.
The control section keeps running as normal without a restart.
- Shutting down the Windows operating system
The Windows operating system (the Windows section) and the control section are shut down. For restarting, the voltage supply of the MOVI-C® CONTROLLER must be disconnected and then reconnected.

6.4.7 Setting write protection

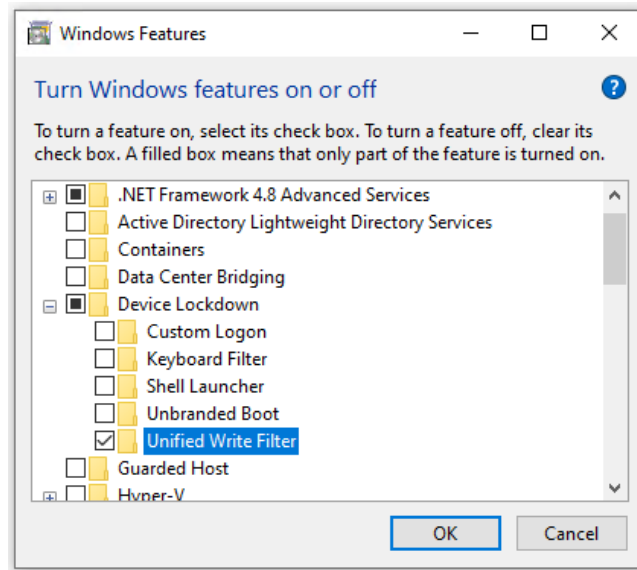
If you switch off the voltage supply of the MOVI-C® CONTROLLER without shutting down the Windows operating system first, data can be lost. You can prevent such a loss of data by setting a write protection.

The write protection restricts write access to the Windows memory card. As long as write protection is enabled, there is no write access to the blocked sections of the Windows memory card. In order for Windows programs to continue to work without errors, the actual write accesses are redirected to the volatile RAM. This means that newly created texts or modifications in files are lost when the system is rebooted. Windows does not output any message when there is an attempt to write on a write-protected data carrier.

Write protection is implemented using the Windows Unified Write Filter (UWF) function. The basic steps for setting up the function are described below. More detailed instructions, for example on how to define exceptions, can be found in the associated documentation from Microsoft.

1. Click "Start" and enter "Turn Windows features on or off".
2. Click the search result "Turn Windows features on or off" to open the control panel menu of the same name.
 - ⇒ The "Windows Features" window is displayed.

3. In the "Windows Features" window, expand the "Device Lockdown" entry and activate the "Unified Write Filter" entry in it.



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4. Close the "Windows Features" window with [OK].
5. Start the command line in administrative mode.
6. Run the following command from the command line:
⇒ `uwfmgr filter enable`
7. Restart the Windows operating system to use the function.
8. Execute the following command to verify that the function is executed and to obtain an overview of the current configuration:
⇒ `uwfmgr.exe get-config`
9. Run the following command to apply write protection explicitly to the C drive:
⇒ `uwfmgr.exe volume protect C:`
10. Restart the Windows operating system.
⇒ Write protection has been set up. More detailed instructions, for example on how to define exceptions, can be found in the associated documentation from Microsoft.

6.4.8 Further instructions

INFORMATION



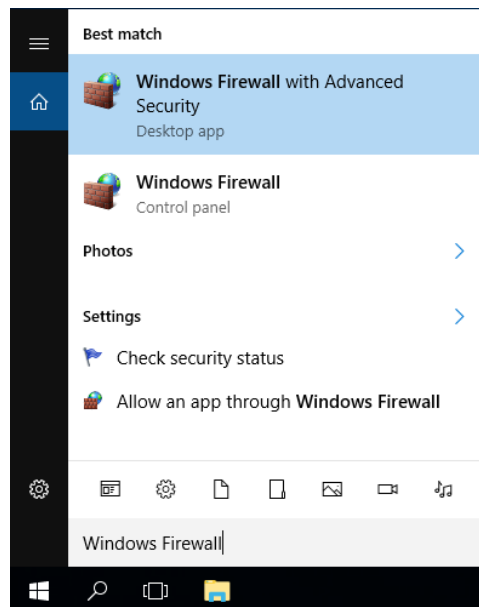
The instructions in this chapter are only intended as specific help for using the Windows operating system in connection with the MOVI-C® CONTROLLER. The explanations of the respective functions do not claim to be complete and are provided by SEW-EURODRIVE without warranty. Therefore be sure to also observe the associated documentation provided by Microsoft when using the Windows operating system.

Activating the ping function

The ping function for checking an available network connection is deactivated by default on the Windows part of the MOVI-C® CONTROLLER. To test the established network connection, it is recommended that the ping function be activated.

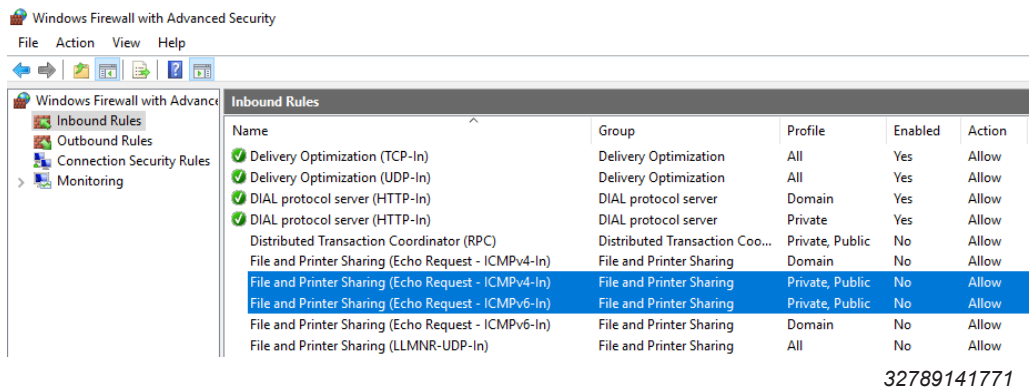
Carry out the following steps to activate the ping function:

1. Open the Start menu on the Windows part of the MOVI-C® CONTROLLER and enter "Windows Firewall with Advanced Security".



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2. Open the "Windows Firewall with Advanced Security" desktop app.
3. Click the "Inbound Rules" object and activate the following rules using the [Enable Rule] button on the right (active rules are indicated by a green symbol):
 - ⇒ File and Printer Sharing (Echo Request - ICMPv6-in)
 - ⇒ File and Printer Sharing (Echo Request - ICMPv4-in)



⇒ The ping function is now activated for external access. Active rules are indicated by a green symbol.

Setting up a remote desktop connection

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

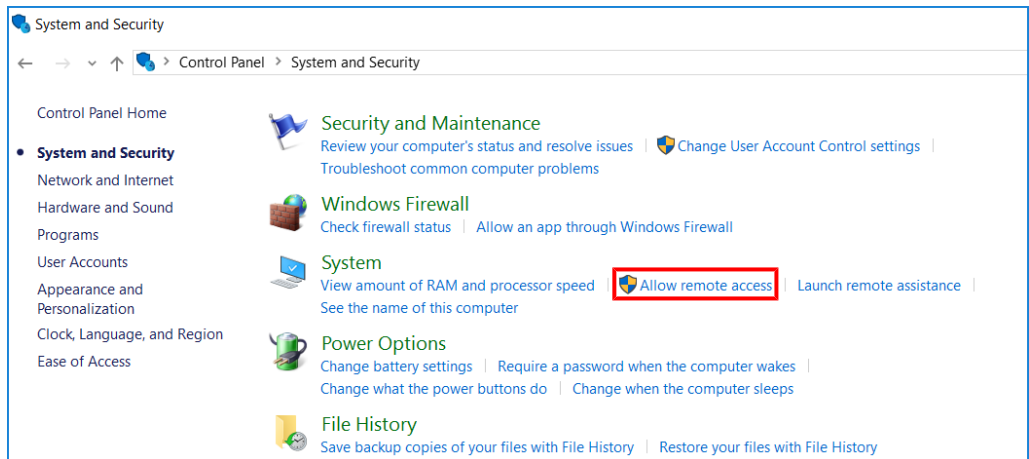
INFORMATION



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

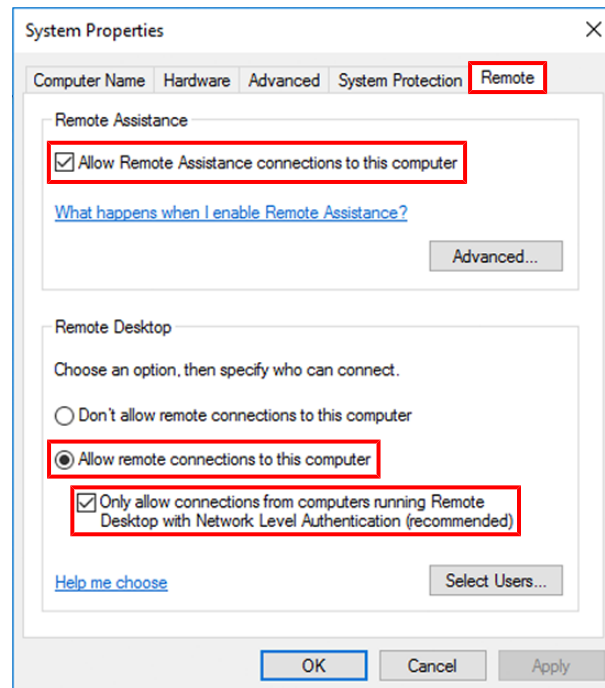
Proceed as follows:

- ✓ 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 the [Control Panel] app entry.
 3. Select the "System and Security" submenu and call up the "Allow remote access" menu in the "System" group.



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.

6. In the "Remote Desktop" section, activate the "Only allow connections from computers running Remote Desktop with Network Level Authentication (recommended)" check box.



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7. Click [OK] to confirm your settings.

Starting the remote desktop connection

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.
 - ✓ The remote desktop connection has been set up correctly. For more information, refer to chapter "Setting up a remote desktop connection" (→ 61).
1. Open the start menu and type "remote desktop connection" into the search field.
 2. In the list of results, click the entry for the [Remote Desktop Connection] desktop app.
 - ⇒ The "Remote Desktop Connection" dialog box is displayed.
 3. Click [Show options].
 - ⇒ Advanced settings are displayed in the "Remote Desktop Connection" dialog box.
 4. In the "Login settings" section, enter the IP address of the MOVI-C® CONTROLLER in the "Computer" field.
 5. In the "Login settings" section, enter in the "User name" field the user name of the user created on the Windows operating system on the MOVI-C® CONTROLLER.
 6. Click [Connect].
 - ⇒ A password prompt is displayed.

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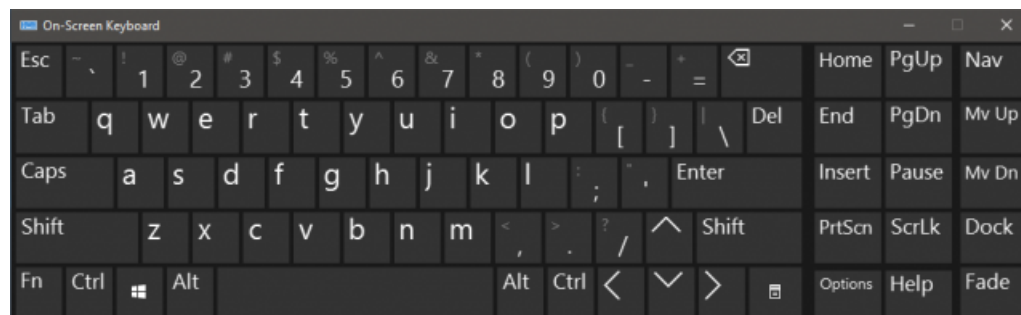
7. Enter the password of the user created on the Windows operating system on the MOVI-C® CONTROLLER.

⇒ The remote desktop connection is started.

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.

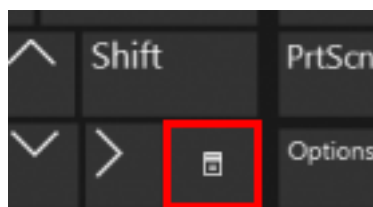


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You can call up the on-screen keyboard either via the Windows Start menu (search for "On-screen keyboard") or with the icon at the bottom left of the Windows login screen.

Right mouse button

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



Setting an automatic system startup

After startup, you can configure the system to boot automatically to improve the user experience (e.g. by directly displaying a created visualization).

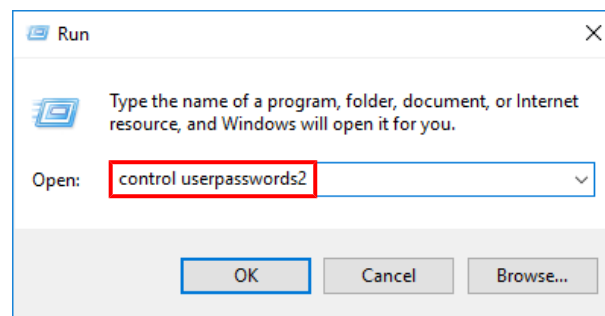
INFORMATION



Using this function can pose a risk with regard to IT security. If you configure automatic login, all users who have physical access can access all contents of the computer and all networks connected to the computer. This function is therefore only recommended if the computer is physically secured.

Proceed as follows:

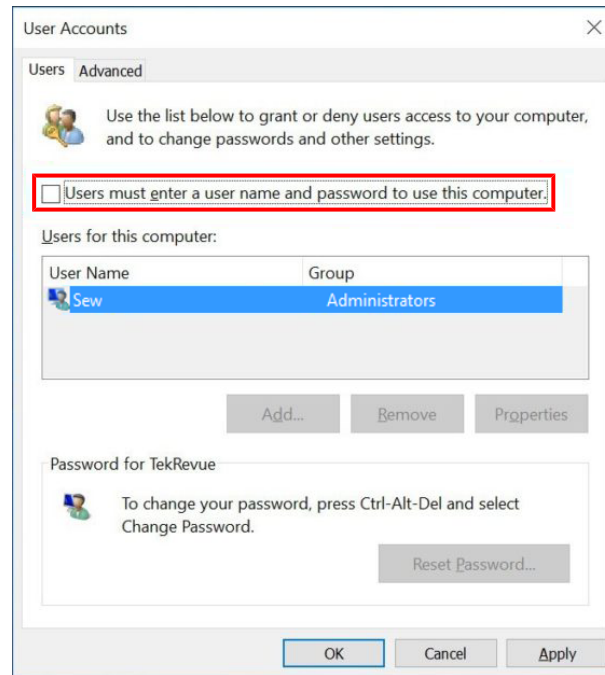
1. Open the start menu and type "registry editor" into the search field.
2. In the result list, click the [Registry Editor] app entry.
 - ⇒ The "Registry Editor" window is displayed.
3. In the Registry Editor, navigate to the key `HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\PasswordLess\Device`.
 - ⇒ The "DevicePasswordLessBuildVersion" entry is displayed in the right window area of the Registry Editor.
4. Double-click the "DevicePasswordLessBuildVersion" entry and change its DWORD value from 2 to 0.
5. Confirm the entry with [OK] and close the Registry Editor.
6. Open the start menu and type "Run" into the search field.
7. In the result list, click the [Run] app entry.
 - ⇒ The "Run" window is displayed.
8. In the "Open" edit box, enter the command `control userpasswords2` and confirm with [OK].



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- ⇒ The "User Accounts" window opens.

9. Deactivate the "Users must enter a user name and password to use this computer" check box for the user who is to be logged in automatically.



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10. Confirm deactivation of the option with [OK].
 - ⇒ You are prompted to enter your user password.
11. Enter your user password and then confirm with [OK].
12. To activate the automatic start, place a suitable link in the "Startup" program group in the Windows start menu.

6.5 Use of RETAIN/PERSISTENT variables

RETAIN/PERSISTENT variables can keep their value beyond the standard program runtime. This is why they are used in the IEC program to save values in a power failure-safe manner. The memory area required for using the RETAIN/PERSISTENT variables is available on the MOVI-C® CONTROLLER. See chapter "Technical data" (→ 82).

RETAIN variables retain their value after an uncontrolled exit (or online command `Reset warm`). RETAIN variables are initialized with the `Reset origin` command, the `Reset cold` command, and a new program download.

PERSISTENT variables keep their values in case of a `Reset cold`, when the application is downloaded again, and during a reset warm. This means that PERSISTENT variables are only re-initialized with `Reset origin`.

The following table provides an overview of whether the variable type keeps its value for certain commands (x) or whether the variable is initialized (i).

Action in the IEC menu "Online"	Neither RETAIN nor PERSISTENT	RETAIN	RETAIN PERSISTENT
Online change	x	x	x
Reset warm	i	x	x
Reset cold	i	i	x
Load	i	i	x
Reset original	i	i	i

6.5.1 Adding RETAIN/PERSISTENT variables

To add RETAIN/PERSISTENT variables at the corresponding position in the device tree, open the context menu and select "Persistent variables..." in the "Add object" submenu. This adds a corresponding object to the device tree that you can fill with your variables.

Observe the following information when using RETAIN/PERSISTENT variables:

- RETAIN/PERSISTENT variables are stored in NVRAM. As the NVRAM is 10x slower than the RAM, you should avoid using RETAIN/PERSISTENT variables in the TaskPrio.
- If RETAIN/PERSISTENT variables are used in a task, the task creates a copy of the data for reading, writing and executing the program at the start of the cycle and then copies the data back to the NVRAM. For this reason, you should avoid using a RETAIN/PERSISTENT variable in more than one task because the data is always overwritten by the later task.
- You should avoid using function blocks with local RETAIN variables because in this case the entire function block runs in the RETAIN memory. This makes the execution very slow and wastes memory space.
- Inconsistent data sets might occur if the MOVI-C® CONTROLLER is switched off while a write process is in progress on the NVRAM. To prevent this, an uninterruptible power supply (UPS) can be used to bring the write process to completion, or a "PersistentDataHandler" function block from the "SEW MOVIKIT Utilities" library can be employed to take over the handling for consistent data sets. The "PersistentDataHandler" function block has a 2-buffer system that restores the last consistent data set when the MOVI-C® CONTROLLER is switched on.

6.5.2 Cleaning up the PERSISTENT memory

After changing PERSISTENT variables, the PERSISTENT memory may be completely filled even though only a few PERSISTENT variables are used. In this case, the PERSISTENT memory should be reorganized. The reorganization removes gaps that have occurred when changing declarations of PERSISTENT variables and thus reduces the memory requirement.

Proceed as follows:

1. Double-click the added "Persistent variables" object in the device tree.
⇒ The "Declarations" menu is displayed in the menu bar.
2. Open the "Declarations" menu and click the entry [Reorder list and clean up gaps].

6.5.3 Saving and restoring the RETAIN/PERSISTENT memory

During the "Device replacement" (→ 71), the RETAIN/PERSISTENT variables are not saved and restored. The RETAIN/PERSISTENT variables must be saved and restored manually as described below.

INFORMATION



To execute the corresponding command, the program must be stopped. The RETAIN/PERSISTENT memory can be saved without a login.

To save the RETAIN/PERSISTENT memory (or optionally from a specific program), execute the following command in the configuration of the MOVI-C® CONTROLLER in the IEC Editor in the "PLC Shell" tab:

```
saveretains [<applicationname>]
```

To restore the RETAIN/PERSISTENT memory (or optionally from a specific program), execute the following command in the communication settings of the MOVI-C® CONTROLLER in the IEC Editor in the "PLC Shell" tab:

```
restoreretains [<applicationname>]
```

6.6 Fault description

6.6.1 Fault 150 controller firmware – general device fault

Subfault: 150.1		
Description: Unknown fault		
	Response: No response	
	Cause	Measure
	The firmware of the MOVI-C® CONTROLLER detected a severe fault that cannot be attributed to a precise device fault.	– Activate the function that the log books are stored in the file system of the MOVI-C® CONTROLLER. Check the entries with the severity "Fault" or "Exception" in the log books for further information. – Acknowledge the fault. The MOVI-C® CONTROLLER is restarted. – If the fault occurs repeatedly, contact SEW- EURODRIVE Service.

Subfault: 150.2**Description: Restart after exception handling**

Response: No response		
Cause		Measure
The MOVI-C® CONTROLLER has performed exception handling due to unauthorized access to the memory with subsequent restart.		– Activate the function that the log books are stored in the file system of the MOVI-C® CONTROLLER. Check the entries with the severity "Fault" or "Exception" in the log books for further information. – Acknowledge the fault. The MOVI-C® CONTROLLER is restarted. – If the fault occurs repeatedly, contact SEW- EURODRIVE Service.

Subfault: 150.3**Description: Faulty booting**

Response: No response		
Cause		Measure
Failed to start the MOVI-C® CONTROLLER properly. The configuration of the firmware of the MOVI-C® CONTROLLER is incorrect or corrupt.		– Activate the function that the log books are stored in the file system of the MOVI-C® CONTROLLER. Check the entries with the severity "Fault" or "Exception" in the log books for further information. – Acknowledge the fault. The MOVI-C® CONTROLLER is restarted. – If the fault occurs repeatedly, contact SEW- EURODRIVE Service.

Subfault: 150.4**Description: Fault in early booting phase**

Response: No response		
Cause		Measure
The MOVI-C® CONTROLLER could not start properly due to errors in the early start phase.		– Activate the function that the log books are stored in the file system of the MOVI-C® CONTROLLER. Check the entries with the severity "Fault" or "Exception" in the log books for further information. - If the software packages are corrupt, load original SEW-EURODRIVE software packages onto the removable storage device again. – Acknowledge the fault. The MOVI-C® CONTROLLER is restarted. – If the fault occurs repeatedly, contact SEW- EURODRIVE Service.

6.6.2 Fault 151 controller firmware – License Manager fault

Subfault: 151.1		
Description: License Manager not working properly		
	Response: No response	
	Cause	Measure
	An internal software error has been detected.	Contact SEW-EURODRIVE Service.

7 Service

7.1 SEW-EURODRIVE Service

If you are unable to rectify a fault, contact SEW-EURODRIVE Service. For addresses, refer to www.sew-eurodrive.com.

When contacting SEW-EURODRIVE Service, always specify the following information so that our service personnel can assist you more effectively:

- Information on the nameplate (e.g. type designation, serial number, part number, product key, purchase order number)
- Brief description of the application
- Error message on the status display
- Type of fault
- Accompanying circumstances
- Unusual events preceding the problems

7.2 IT security

7.2.1 IT security guidelines for secure disposal

Removing the product from its intended environment



If the data stored on the product is considered relevant for IT security, remove it as described in the section "Secure removal of data stored in the product." (→ 70)

Removing reference and configuration data in the environment



Reference files, configuration files, log files, and other data belonging to the product can be stored in the environment on other devices, such as a higher-level controller or a local OPC-UA client. If the stored data is considered relevant for IT security, remove it from the corresponding devices.

Secure removal of data stored in the product



You can reset the data saved in the product to the factory settings using the MOVISUITE® engineering software.

This encompasses the following data, if present on the device variant:

- Configuration of the device
- Scope recording of the device
- Fault memory
 - Error number
 - Timestamp
 - Error code, sub-error code, description text
 - Process data
 - States of the digital inputs/outputs
 - Control word and status word
- Device name

- IP address
- Safety-relevant data

The following data is not reset during this procedure and can be modified individually, if it is present in the device variant:

- Function activations
- AS-Interface address
- Data set of the safety option
- EtherCAT® device designation
- PROFINET name
- Last detected options

Safe removal of data stored on the memory card



Before disposing of the memory card, proceed as follows to remove any data stored on it:

1. Remove the memory card from the product.
 2. Insert the memory card into a suitable interface of your computer or a memory card reader connected to the computer.
 3. Perform a low-level format of the memory card using an appropriate formatting tool.
- ⇒ You can dispose of the memory card in accordance with chapter "Waste disposal" (→ 78).

Removing a customer data backup



The product does not create local customer data backups.

If a data backup of the OMW CFast memory card was created via the Windows operating system, remove this data backup accordingly.

7.3 Device replacement

INFORMATION



When replacing a MOVI-C® CONTROLLER, observe the information in chapter "Installation" (→ 30) and the "Safety notes" (→ 9).

INFORMATION



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

INFORMATION



The variable values permanently stored on the MOVI-C® CONTROLLER are not stored on the OMH memory card by default. To store the variable values on the OMH memory card, program a suitable IEC program.

To replace a MOVI-C® CONTROLLER, proceed as follows:

1. In MOVISUITE®, open the configuration of the MOVI-C® CONTROLLER.

2. Open the configuration menu "Functions" > "Data management" > "Device replacement".
3. Under "Configuration data", enable the "Controller replacement function".
4. Click the [Update configuration data] button.
 - ⇒ The current failsafe data of the MOVI-C® CONTROLLER is saved once on the OMH memory card. This means that all the data that is required when replacing the MOVI-C® CONTROLLER is stored on the OMH memory card so that the system can run again in the same way as before the replacement. A detailed list of the stored data can be found in the table below. This information may vary depending on the firmware version.

NV data	Category
IP settings	Backup and restore
IEC settings	Backup and restore
Customer-specific device designation	Backup and restore
Fieldbus parameters, e.g. "PROFINET device name"	Backup and restore
Time/date settings	Backup and restore
Device faults and info	Backup only, no restore
Device faults and info	Backup only, no restore
IEC RETAIN/PERSISTENT	Not backed up. To back up this data, contact SEW-EURODRIVE Service. See also "Saving and restoring the RETAIN/PERSISTENT memory" (→ 67).

5. Insert the OMH memory card of the MOVI-C® CONTROLLER you want to replace into the corresponding card slot of the new MOVI-C® CONTROLLER.
 - ⇒ The most recently saved failsafe data is transferred from the OMH memory card to the MOVI-C® CONTROLLER.

7.4 Backup and restore

In MOVISUITE®, it is possible to save a comprehensive backup of the project data centrally in the system, and thus completely restore the project saved on the memory card of the MOVI-C® CONTROLLER. If the function is used, no update is required when the IEC Editor is opened, and no download is required when logging onto the MOVI-C® CONTROLLER.

Project data is saved and restored in MOVISUITE® via the shortcut menu of the MOVI-C® CONTROLLER. To back up the project data, click [PC→Devices] or to restore after a device scan, click [Devices→PC] and, in the dialog box that appears, select whether all or only selected data should be transferred. The following data can be selected for the backup or restore operation:

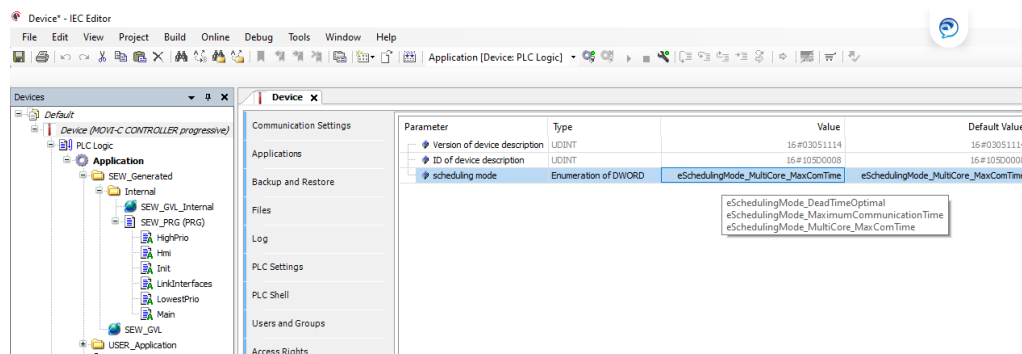
- MOVISUITE® project structure
 - Inverters and subcomponents with MOVIKIT®
 - Virtual axes with MOVIKIT®
 - Software node with MOVIKIT®
 - Structure node
 - Order of the nodes
- IEC program
 - IEC project archive
 - Boot application
- Data sets
 - Controller parameters
 - MOVIKIT® parameters
 - Data sets for device replacement
 - Curve descriptions
 - MOVIKIT® Robotics SRL programs
- Inverter and other devices
 - Device parameters including MOVIKIT® of the Drive category

7.5 Program transfer

If you load a program from an older MOVI-C® CONTROLLER (firmware earlier than version 2.10) to a newer one, the latter will not start due to a different setting of the scheduling mode ("MaximumCommunicationTime" instead of "Multicore_MaxComTime"). In this case, the scheduling mode of the MOVI-C® CONTROLLER must be set from "MaximumCommunicationTime" to "MultiCore_MaxComTime".

Proceed as follows to adjust the scheduling mode:

1. In the IEC Editor, open the configuration of the MOVI-C® CONTROLLER.
2. In the configuration of the MOVI-C® CONTROLLER, open the "Parameter" tab.



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3. Set the "Scheduling mode" parameter to the value "Multicore_MaxComTime".
4. Save the IEC project.
5. Restart the MOVI-C® CONTROLLER.

7.6 Firmware update

The methods described in the following chapters are available for updating the firmware of the MOVI-C® CONTROLLER.

7.6.1 Via MOVISUITE®

INFORMATION

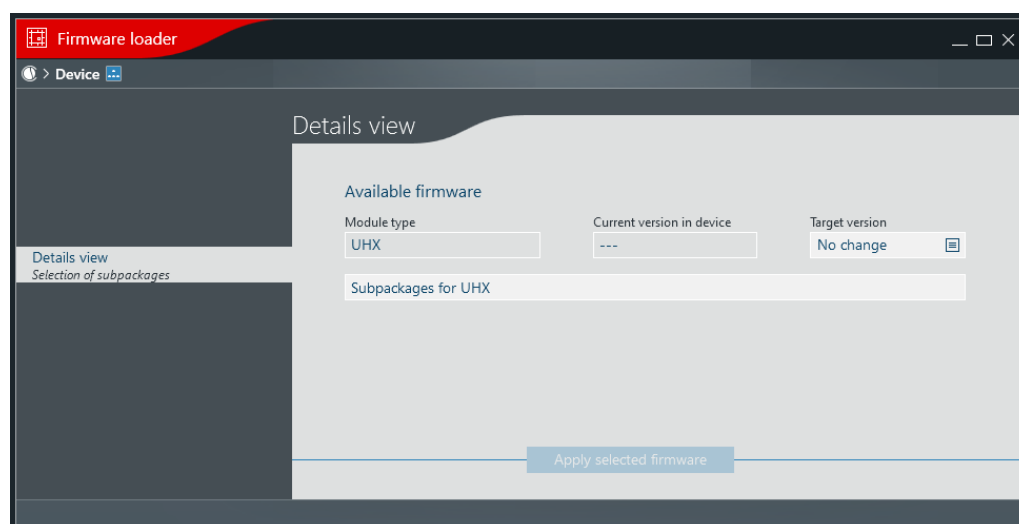


The tool is only available with permission level "advanced".

The "Firmware loader" tool is available in MOVISUITE® to change the firmware version.

Proceed as follows to change the firmware:

1. Open the context menu of the MOVI-C® CONTROLLER in the MOVISUITE® project.
2. In the "Tools" submenu, select the "Firmware loader" menu entry.
⇒ The "Firmware loader" tool opens.



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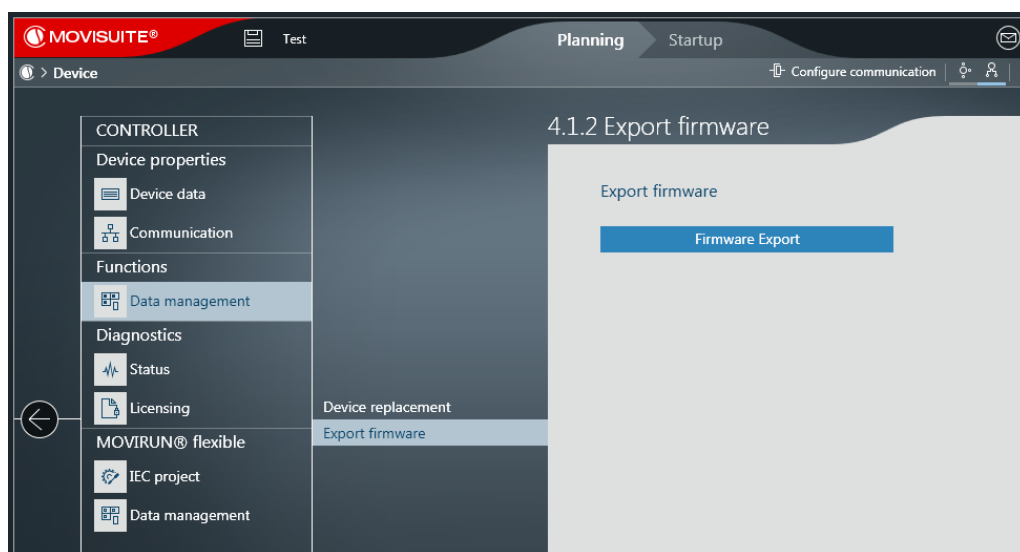
3. In the "Target version" drop-down list, select the firmware version to be applied.
4. Click [Apply selected firmware].

7.6.2 Via file system

The firmware of the MOVI-C® CONTROLLER can be updated manually via the file system as follows.

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. Open the configuration menu "Functions" > "Data management" > "Export firmware".



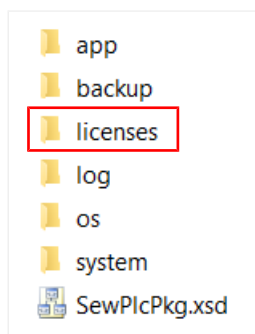
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5. Click the [Firmware Export] button in the "Export firmware" menu.
⇒ A dialog opens where you can select the export directory.
6. Navigate to the export directory and confirm your selection by clicking [OK].
⇒ The firmware of the MOVI-C® CONTROLLER is stored in the selected export directory as a zip file (file name: FS.zip).

Copying a firmware image to the OMH memory card

- ✓ The steps described in chapter "Exporting a firmware image" (→ 76) have been performed. The firmware image of the MOVI-C® CONTROLLER is located on your computer as a ZIP archive.
1. Remove the OMH memory card from the MOVI-C® CONTROLLER.
 2. To read the data stored on the OMH memory card, insert the card in a card reader connected to your computer. You can also use another suitable interface of your computer.

3. On your computer, use a file explorer to open the contents of the OMH memory card.
 - ⇒ The "licenses" directory on the OMH memory card contains the SEW license file. To ensure that the licenses you have purchased remain valid, the SEW license file must again be contained in a "licenses" directory on the OMH memory card after the firmware update.



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4. To save your license files, copy the "licenses" directory locally to your computer.
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" (→ 76).
7. From the "licenses" directory copied locally to your computer, copy the SEW license file to the "licenses" directory on the OMH memory card.

INFORMATION



Restoring the "licenses" directory after deleting the OMH memory card is also possible via 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.
- Open the License Manager via the context menu of the MOVI-C® CONTROLLER in MOVISUITE® in the "Tools" menu.
- Click [Transfer licenses to the MOVI-C® CONTROLLER].

- ⇒ The firmware has been updated. Now you can create a new MOVISUITE® project.

7.7 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



Waste disposal according to WEEE Directive 2012/19/EU

This product and its accessories may fall within the scope of the country-specific application of the WEEE Directive. Dispose of the product and its accessories according to the national regulations of your country.

For further information, contact the responsible SEW-EURODRIVE branch or an authorized partner of SEW-EURODRIVE.

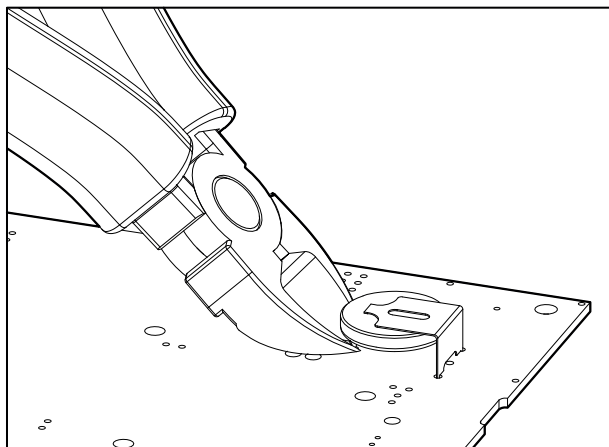


Waste disposal in accordance with Battery Regulation 2023/1542

This product contains batteries or accumulators. Dispose of this product and the batteries or accumulators separately from the municipal waste in accordance with the national regulations.

7.7.1 Removing the battery for waste disposal

Open the housing of the device and remove the circuit board. To detach the battery from the circuit board, use a pair of diagonal cutting pliers to cut all of the connections between the battery holder and the circuit board. An example of how to cut a connection is shown in the following figure:



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8 Technical data

8.1 Markings

Mark	Definition
	CE marking to state compliance with European Directives, (see EU declaration of conformity or EU declaration of incorporation).
	The RCM mark indicates compliance with the technical regulations of the Australian Communications and Media Authority (ACMA).
	The China RoHS mark indicates compliance with the directive SJ/T 11364-2014 regarding the restriction of use of certain hazardous substances in electrical and electronic equipment and its packaging.
	The EAC mark indicates compliance with the requirements of the technical regulations of the Customs Union (Eurasian Economic Union), Armenia, Belarus, Kazakhstan, Kyrgyzstan, and Russia.
	The waste disposal of this product is performed in compliance with the WEEE Directive 2012/19/EU.
	The NM mark indicates compliance with Moroccan guidelines.
	The KC mark declares compliance with §3 of Article 58-2 for the Korean Radio Wave Act.
	Product label with QR code. The QR code can be scanned. You will be re-directed to the Digital Services of SEW-EURODRIVE. There, you have access to product-specific data, documents, and further services. The product manual of the device with further information is available in the "Documentation" > "Data and documents" area.

8.2 General technical data

General technical data	
Interference immunity	Meets EN 61800-3; 2nd environment
Interference emission	Limit value category C2 in accordance with EN 61800-3
Type of cooling	Convection cooling, heat conduction, or increased air cooling via a built-in, temperature-controlled fan

Environmental conditions	
Climatic conditions	- Extended storage: EN 60721-3-1 class 1K2, temperature 0 °C to +70 °C - Transportation: EN 60721-3-2 class 2K3, temperature 0 °C to +70 °C - Operation (fixed installation, weatherproof): EN 60721-3-3 class 3K3, temperature 0 °C to +50 °C (non-condensing, no moisture condensation)
Chemically active substances	- Extended storage: EN 60721-3-1, class 1C2 - Transportation: 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 - Transportation: EN 60721-3-3, class 2S1 - Operation (fixed installation, weatherproof): EN 60721-3-3, class 3S1
Vibration check	3M5 in accordance with EN 60721-3-3 5M1 in accordance with EN 60721-3-5

Degree of protection	
IP degree of protection	IP20 in accordance with 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)

8.3 Technical data of the MOVI-C® CONTROLLER

MOVI-C® CONTROLLER type UHX86A	
Electrical supply	- Power consumption: $P_{\max}$ = up to a maximum of 100 W - Supply voltage U = DC 24 V in accordance with IEC 61131-2 - Current consumption $I_{\max}$ = 4 A (with DC 24 V supply voltage) - The MOVI-C® CONTROLLER must be supplied by an external voltage source.
Battery INFORMATION: The battery is designed to last for 20 years.	CR2477W (de-energized buffering of the real-time clock)
CPU (available processors) INFORMATION: The service life of the processors is designed as follows, depending on the ambient temperature: +25 °C MTBF [a] = 111 years +50 °C MTBF [a] = 45 years	- Celeron G4932E (2 cores, 8 GB RAM) Optimal for up to 32 RTOS axes without GPOS function - Core i3 9100HL (4 cores, 16 GB RAM) Optimal for more than 32 RTOS axes in parallel for GPOS applications - Core i3 8100H (4 cores, 16 GB RAM) Optimal for more than 32 axes, maximum RTOS performance parallel to the GPOS. More processing power compared to performance class 40 - Core i7 9850HE (6 cores, 32 GB RAM) Optimal for more than 32 RTOS axes. Maximum GPOS processing power
Memory	- Retain data: 30 kB - Retain persistent: 2 kB - Code/data/constants: 96 MB
NVMe hard disk (SSD)	- Memory space: N1 = 120 GB N2 = 240 GB N3 = 480 GB - Software package: C1 = Windows 10 IoT Enterprise
OMH86A-C1 CFast memory card control section (card slot XM1):	- PC-readable - Contains: Firmware, IEC program, application data 2 GB memory
X5 Connection for DC 24 V supply voltage (2-pin connection)	Connection type: Connector 1 core: 0.25 mm² – 2.5 mm² 2 cores: 0.5 mm² – 1.5 mm² (TWIN core end sleeve)
X30 EtherCAT®/SBus ^{PLUS} interface (RJ45 socket contact)	Fast system bus SBus ^{PLUS} based on EtherCAT® for EtherCAT® MainDevice connection.

MOVI-C® CONTROLLER type UHX86A	
X80 (2.5 GB) X81 (1.0 GB) Ethernet communication interfaces (RJ45 socket contact)	- TCP/IP (INFORMATION: As of MOVISUITE® V2.30, IPv6 is deactivated by default) - Possible connections: Engineering PC, visualization, other control - Engineering for all SEW-EURODRIVE components connected to the MOVI-C® CONTROLLER can be performed via the MOVI-C® CONTROLLER.
X40, X41 Fieldbus interface (RJ45 socket contact)	Fieldbus interfaces for device connection (EtherNet/IP™, Modbus TCP, and PROFINET IO)
X90 (1.0 GB); X91 (2.5 GB) Ethernet communication interfaces (RJ45 socket contact)	Ethernet communication interfaces for the Windows section
X95-96 (USB 2.0); X97-98 (USB 3.0)	USB interfaces assigned to the Windows section

8.4 Technical data of the PROFINET interface

INFORMATION



The device variant with PROFINET IO controller does not support the following functions: PROFIsafe, topology configuration, media redundancy, shared device, combi-slave, PROFINET alarm handling, topology diagnostics

MOVI-C® CONTROLLER Type UHX86A	
Manufacturer ID	010Ahex
Device ID	13dec
Connection technology	RJ45
Baud rate	100 Mbaud, full duplex
Network protocols	ARP, ICMP
Application protocols	PROFINET IO, HTTP, SNMP
Port numbers used	80, 161, 310, PROFINET DCE/RPC Ports (dynamic via end point mapper)
Conformance class	C
Application profiles	PROFIsafe
Permitted cable types	Category 5 and higher, class D in accordance with IEC 11801
Maximum cable length (switch to switch)	100 m
GSDML file name	GSDML-Vx.yz-SEW-MOVI-C-CONTROLLER-UHX86-yyyymmdd-hhmmss
Process data words	512
Number of non-safe slots	64
Number of PROFIsafe stations	24
Shared device	Not supported

8.5 Technical data of the EtherNet/IP™ interface

MOVI-C® CONTROLLER Type UHX86A	
Manufacturer ID	315 (0x013B)
Product code	20 (0x14)
Connection technology	RJ45
Baud rate	100 Mbaud/10 Mbaud, full duplex/half duplex
Maximum process data length	248 PD
Application protocols	EtherNet/IP™, Modbus TCP, SNMP, DHCP
Port numbers used	67/68, 161, 310, 502, 2222, 44818
Permitted cable types	Category 5 and higher, class D in accordance with IEC 11801
Maximum cable length (switch to switch)	100 m
EDS file name	SEW_UHX86A.eds

8.6 Port overview

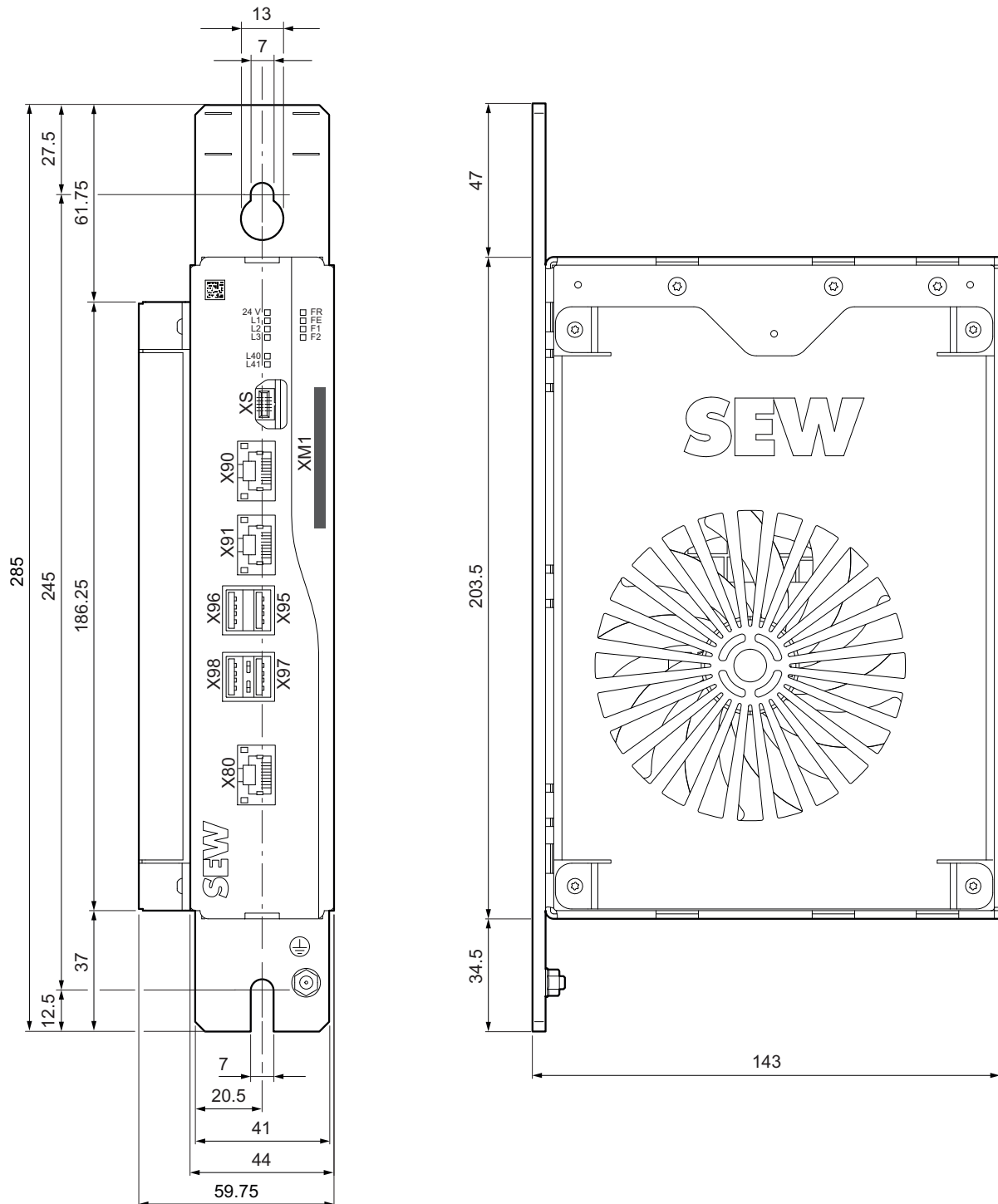
For an overview of the ports and of the services provided by the communication interfaces, refer to the [Online Support](#) portal.

The following dimension drawings show the device at its respective maximum expansion.

[illegible]

31968376/EN – 03/2025

8.7.2 Dimension drawing of MOVI-C® CONTROLLER with active cooling



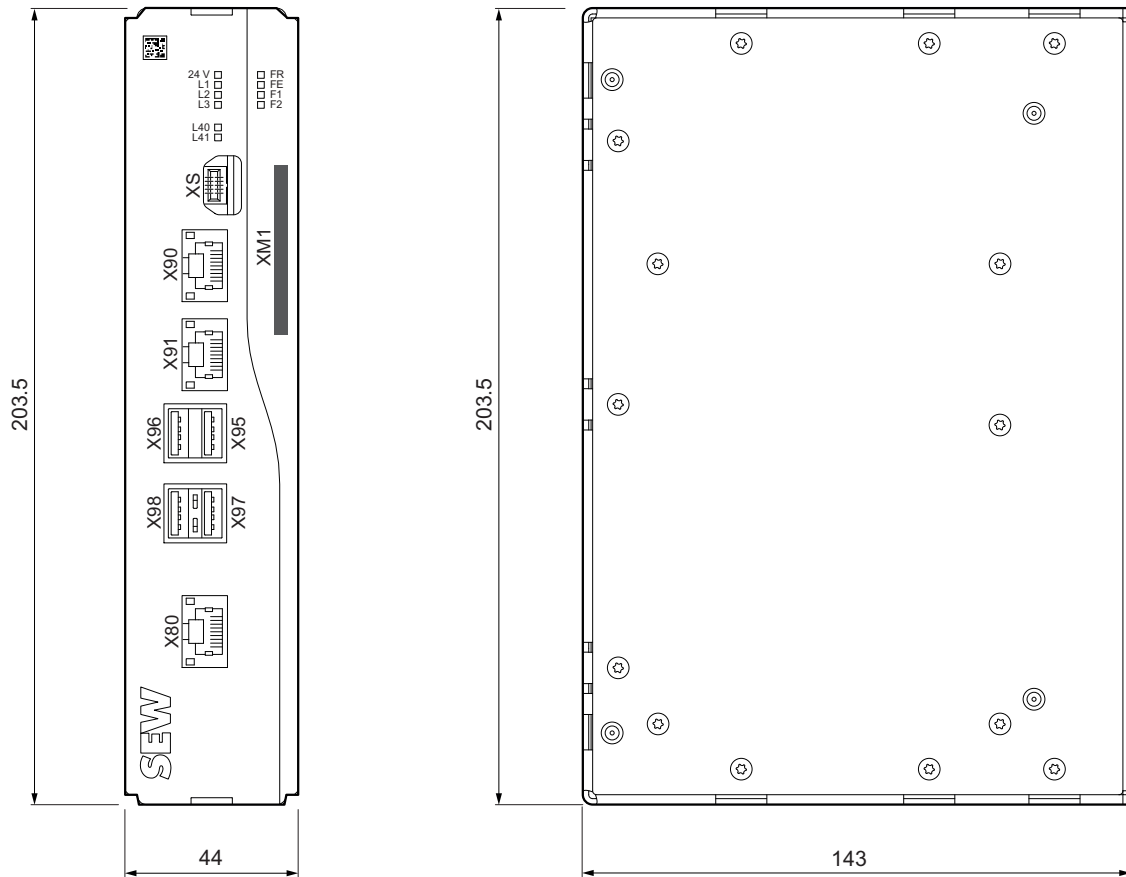
9007239287457291

8.7.3 Dimension drawing of MOVI-C® CONTROLLER without cooling option (special version with cold plate)

INFORMATION



Consultation with SEW-EURODRIVE is necessary to use this special version.



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9 Contacting SEW-EURODRIVE

You can find the worldwide contact data and locations on the **SEW-EURODRIVE website** via the following link or the QR code shown below.

<https://www.sew-eurodrive.de/contacts-worldwide>



SEW
EURODRIVE



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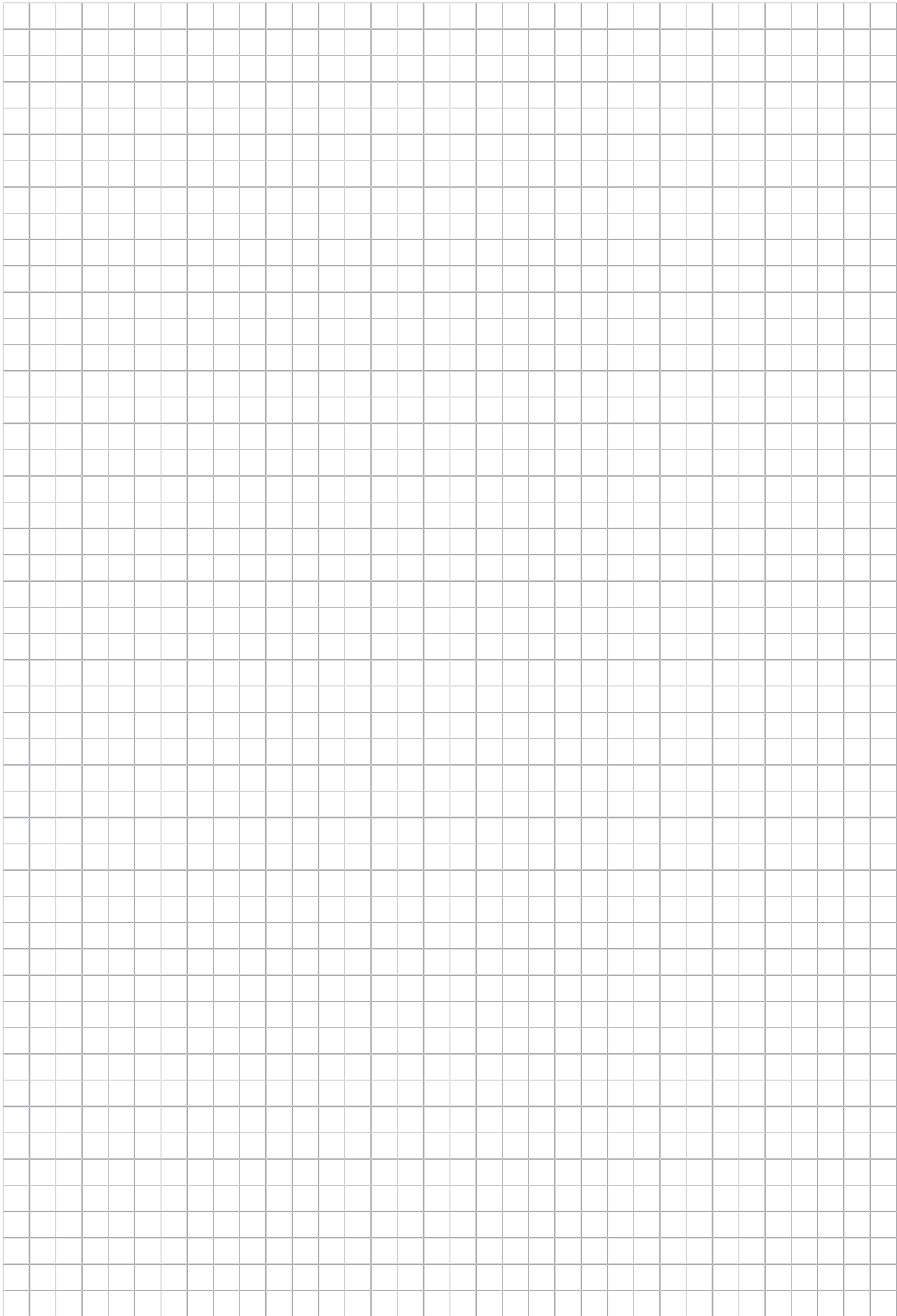
L

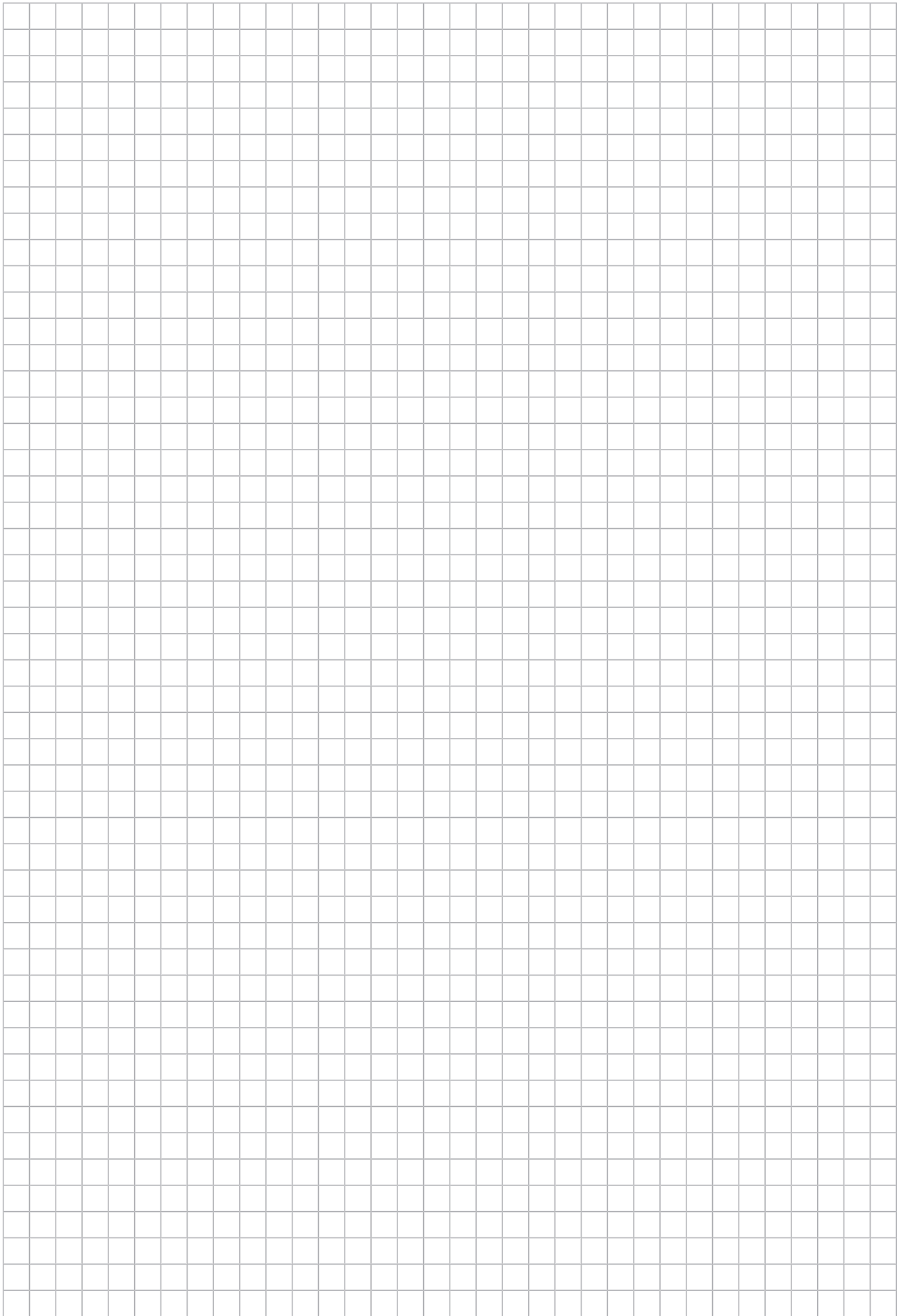
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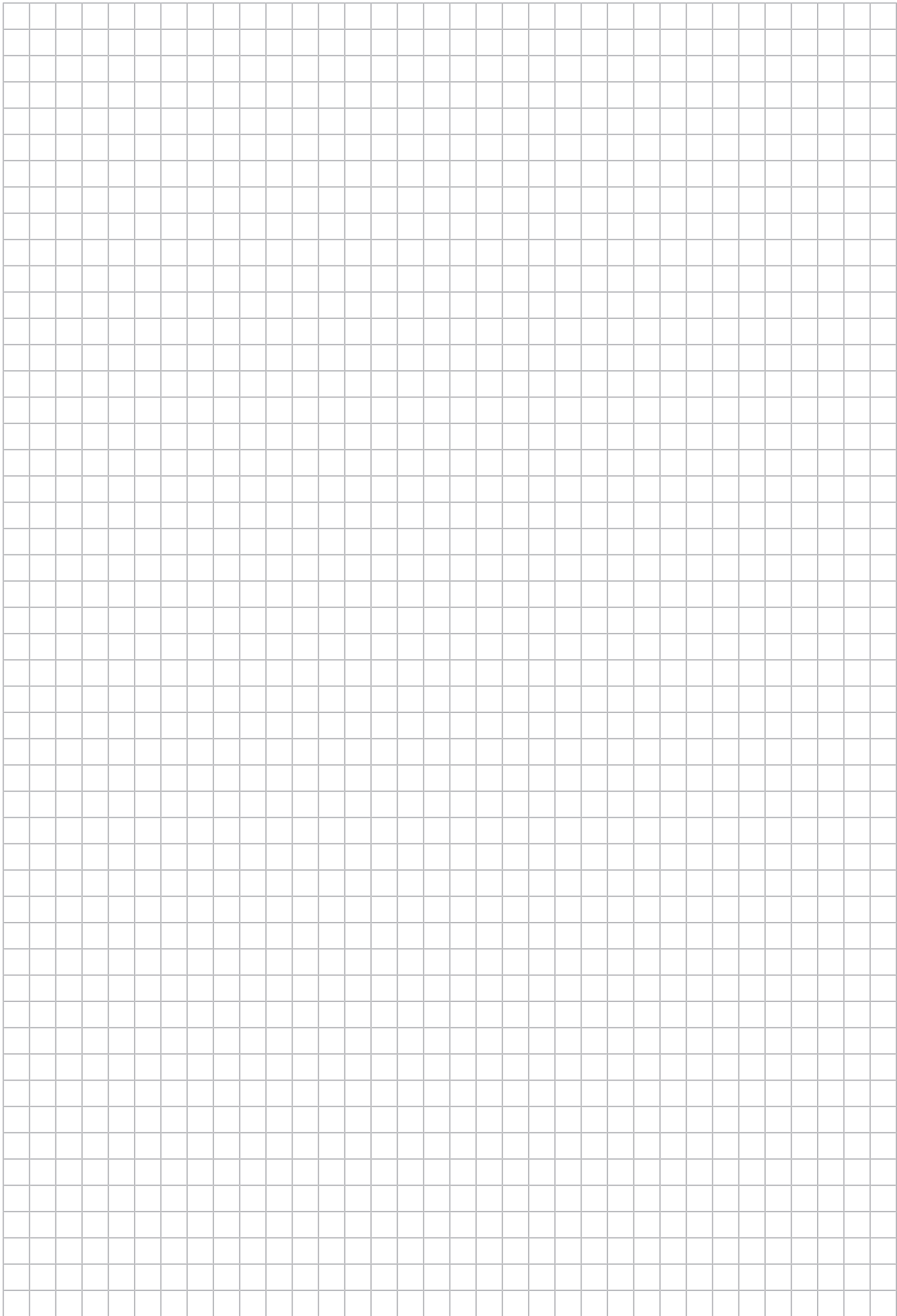
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