SEW EURODRIVE

Manual

MOVI-C® CONTROLLER advanced UHX45A

with EtherNet/IP™ Fieldbus Interface

Edition 08/2018

25800337/EN

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1 General information

1.1 About this documentation

The current version of the documentation is the original.

This documentation is an integral part of the product. The documentation is written for all employees who assemble, install, start up, and service this product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the machinery and its 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 require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

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

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

1.2.2 Structure of 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.

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Meaning of the hazard symbols

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

Hazard symbol	Meaning
	General hazard
	Warning of dangerous electrical voltage
	Warning of hot surfaces
	Warning of risk of crushing
	Warning of suspended load
	Warning of automatic restart

1.2.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

⚠ **SIGNAL WORD** Type and source of hazard. Possible consequence(s) if disregarded. Measure(s) to prevent the hazard.

1.3 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.

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1.4 Other applicable documentation

Observe the corresponding documentation for all further components.

1.5 Product names and trademarks

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

1.6 Copyright notice

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2 Safety notes

2.1 Preliminary information

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

2.2 Duties of the user

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

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

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

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

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

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

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2.3 Target group

Specialist for mechanical work

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

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

Specialist for electrotechnical work

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

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

Additional qualification

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

Instructed persons

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

2.4 Designated use

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

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

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

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

2.4.1 Hoist applications

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

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

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2.5 Functional safety technology

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

2.6 Transport

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

Observe the following notes when transporting the device:

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

If necessary, use suitable, sufficiently dimensioned handling equipment.

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

2.7 Installation/assembly

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

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

Observe the notes in chapter Mechanical installation in the documentation.

2.7.1 Restrictions of use

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

- Use in potentially explosive atmospheres
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation
- Operation in applications with impermissibly high mechanical vibration and shock loads in excess of the regulations stipulated in EN 61800-5-1
- Use at an elevation of more than 4000 m above sea level

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2.8 Electrical installation

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

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

2.8.1 Required preventive measure

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

2.9 Bus systems

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

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

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

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3 Introduction

3.1 General information

3.1.1 Short designation

The following short designations are used in this documentation.

Type designation	Short designation
MOVI-C® CONTROLLER advanced UHX45A	MOVI-C® CONTROLLER
Higher-level controller	PLC
MOVISUITE® standard	MOVISUITE®

3.1.2 Content of this manual

This manual describes:

- The installation of the MOVI-C® CONTROLLER
- The interfaces and LEDs of the MOVI-C® CONTROLLER
- The engineering access to the MOVI-C® CONTROLLER
- Configuration and startup of the MOVI-C® CONTROLLER with the EtherNet/IP™ fieldbus interface

3.1.3 Additional documentation

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

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

Always use the latest edition of documentation and software.

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

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3.2 MOVI-C® CONTROLLER advanced UHX45A

The MOVI-C® CONTROLLER in the performance class "advanced" is a motion controller for demanding automation tasks. The real-time operating system guarantees very short response times as well as a high-performance connection of system buses from SEW-EURODRIVE and standard fieldbuses.

The MOVI-C® CONTROLLER is suitable for automating machines and cells for up to 8 interpolating axes and 8 auxiliary axes depending on the size of the application program. It can be used as a module controller for complex motion functions such as electronic cams and robotics.

3.2.1 Device variants

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

Device variant	Fieldbus interface
UHX45A-N	MOVI-C® CONTROLLER with PROFINET IO fieldbus interface for slave connection as compact controller
UHX45A-N /MDM90A	MOVI-C® CONTROLLER with PROFINET IO fieldbus interface for slave connection as master module
UHX45A-E	MOVI-C® CONTROLLER with EtherNet/IP™ or Modbus TCP fieldbus interface for slave connection as compact controller
UHX45A-E /MDM90A	MOVI-C® CONTROLLER with EtherNet/IP™ or Modbus TCP fieldbus interface for slave connection as master module

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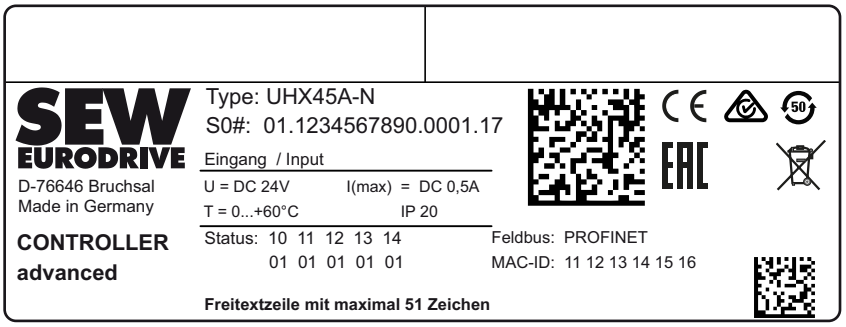
3.2.2 Nameplate

Compact controller



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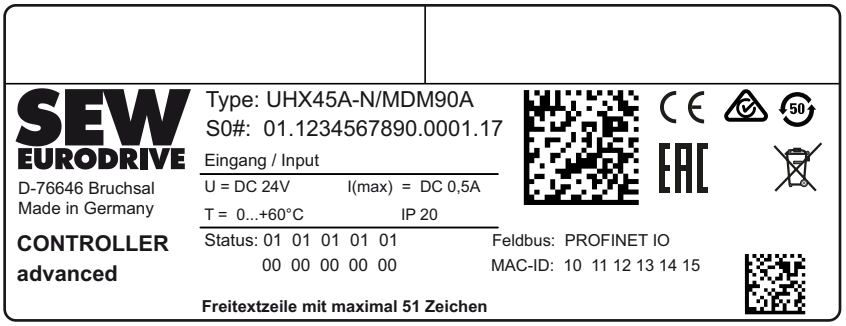
Master module

MOVI-C® CONTROLLER



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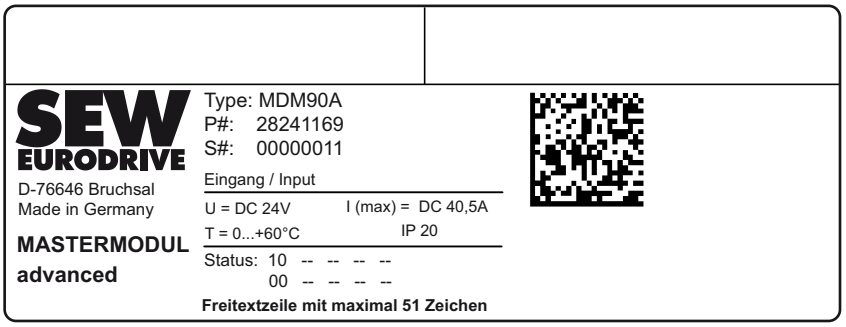
L-carrier MDM90A



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3.2.3 Type code

The following tables show the type code structure:

Compact controller

For example: UHX45A-N		
Product name	**UHX**	MOVI-C® CONTROLLER
Series	**45**	Advanced
Version	**A**	Version status
Designs	**N**	• N = with PROFINET IO fieldbus interface • E = with EtherNet/IP™ or Modbus TCP fieldbus interface

Master module

For example: UHX45A-N /MDM90A		
Product name	**UHX**	MOVI-C® CONTROLLER
Series	**45**	Advanced
Version	**A**	Version status
Designs	**N**	• N = with PROFINET IO fieldbus interface • E = with EtherNet/IP™ or Modbus TCP fieldbus interface
Product name	**MD**	MOVIDRIVE®
Device type	**M**	Master module
Series	**90**	Standard variant
Version	**A**	Version status

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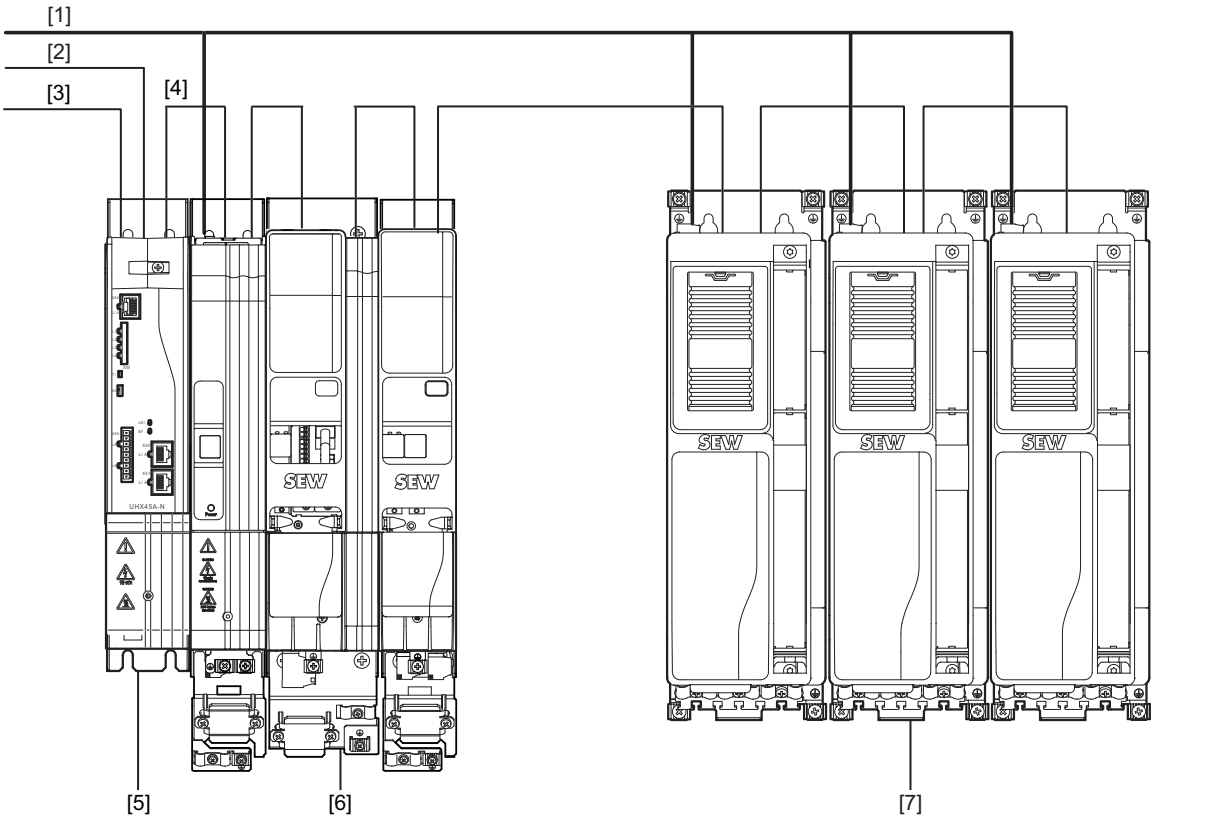
3.2.4 Overview of communication interfaces

The MOVI-C® CONTROLLER has various communication interfaces:

- The Ethernet communication interfaces allow for engineering purposes for the MOVI-C® CONTROLLER, for connecting an operator panel as well as for communication with other Ethernet nodes (e.g. with a PLC).
- The EtherCAT®/SBus^{PLUS} interface is used to control drive inverters, I/O modules and other EtherCAT® slave components.



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

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Engineering interface

The following functions can be realized via this (X80) interface:

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

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

- Configuration
- Parameterization
- Programming

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

EtherCAT®/SBus^{PLUS} interface

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

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

The maximum number of application inverters that can be connected to the MOVI-C® CONTROLLER is: 16.

CAN system bus

In preparation

RS485 interface

In preparation

Fieldbus interface

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

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

3.2.5 SD memory card OMH45A

The SD memory card (**S**ecure **D**igital Memory Card) is required to operate the MOVI-C® CONTROLLER, and contains firmware, IEC program, user data (e.g. recipes) as well as parameter sets of the lower-level MOVI-C® inverter by SEW-EURODRIVE. You can use the memory card for data backup and automatic parameterization in the event of an axis replacement. The SD memory card OMH45A is plugged into card slot XM of the MOVI-C® CONTROLLER.

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3.3 MOVISUITE® engineering software

The new MOVISUITE® engineering software is the operating platform for all MOVI-C® hardware and software components.

The following MOVI-C® devices are currently supported by MOVISUITE®:

- MOVI-C® CONTROLLER
- MOVIDRIVE® modular application inverter, single-axis module and double-axis module
- MOVIDRIVE® system application inverter

The following engineering tasks can be conveniently performed with MOVISUITE®:

- Configuration
- Startup
- Parameter setting
- Programming
- Diagnostics

3.3.1 Advantages of MOVISUITE®

MOVISUITE® offers the following advantages:

- Easy and intuitive operation
- Project management for storing the devices and data sets
- Convenient forwarding of projects via automatically created e-mails
- Automatic project creation from scanned devices
- Startup preparation in the planning phase even without connected devices
- Design of the drive train from the motor to the gear unit via the product catalog or automatic identification of the gearmotor data by reading the electronic nameplate stored in the motor encoder.
- Product catalog for selecting encoders, brakes, control modes, user units
- Provision of standard drive trains and drive functions summarized in FCBs (**f**unction **c**ontrol **b**locks)
- Convenient, graphical startup and parameterization of the drive train
- Function view with overview of the status of the connected devices
- Creation of an overall system by structuring the devices as needed in the function view
- Easily calling up different manual modes
- Detailed messages and remedial measures in case of malfunction
- Identifying and supporting device replacements
- Synchronization functions for device data
- Data management with clearly marked transfer directions during data transmission
- Diagnostics of the drives with the integrated oscilloscope with up to 10 recording channels
- Integration of the IEC Editor for programming MOVI-C® CONTROLLER
- Integration of MOVIKIT® software modules (e.g. MOVIKIT® MultiMotion or MOVIKIT® MultiMotion Camming)
- Long-term data acquisition on the engineering PC hard disk

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4 Installation notes

4.1 Installation accessories

The listed standard accessories are included in the scope of delivery for the basic device.

The accessories can be ordered with the following part numbers:

Compact controller (UHX45A)

Accessory	Part number
Carrier plate UHX45A	28234863
Screw for support plate	00126497
DC 24 V voltage supply connector	19148410
Accessory shield plate UHX45A	28244389

Master module (UHX45A /MDM90A)

Accessory	Part number
L-carrier MDM90A	28241169
Accessory L-carrier MDM90A	28244397
In detail:	**In detail:**
PE connection	08178798
2 x connection DC 24 V supply voltage	18152694
Pan head screw M6x16	00137596
Pan head screw M4x12	00176230
System bus cable 4-pin, length 0.26 m	18179940
E connector DC 24 V supply voltage	18191711
Touch guard L-carrier MDM90A	18183859
Screw for touch guard	19189451
Accessory shield plate UHX45A	28244389
Fusing for DC 24 V supply voltage: 5 x 20 mm glass tube, 4 A, 125 V, slow-blow	13292668

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4.2 Mechanical installation

⚠ CAUTION

Risk of injury to persons and damage to property.

Never install a defective or damaged MOVI-C® CONTROLLER.

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

NOTICE

Risk of damage to property due to mounting surface with poor conductivity.

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

Risk of damage to property due to 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.

4.2.1 Minimum clearance and mounting position

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

- To ensure unobstructed cooling of the MOVI-C® CONTROLLER, leave a minimum clearance of 100 mm above and below the device's housing. Make sure air circulation in the clearance is not impaired by cables or other installation equipment.
- Ensure unobstructed cooling air supply and make sure that the MOVI-C® CONTROLLER is not exposed to the warm exhaust air from other devices.
- There is no need for clearance at the sides of the device. You may connect the MOVI-C® CONTROLLER and other devices (e.g. MOVIDRIVE® modular) in series.
- Install the devices only vertically. You must not install them horizontally, tilted or upside down.

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4.2.2 Control cabinet installation

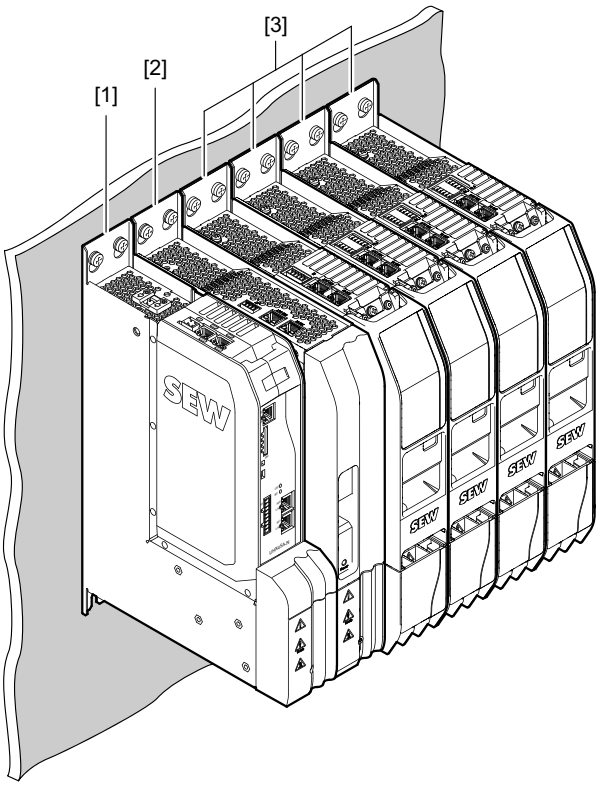
Control cabinet installation is shown at an axis system with a MOVI-C® CONTROLLER, a power supply module and several axis modules. The MOVI-C® CONTROLLER can either be used as compact controller or as master module.

Alignment in the axis system

When arranging the axis system, observe that the nominal output current I_N of the axis modules must decrease from left to right. The axis module with the highest nominal output current must be on the right side of the power supply module. All remaining axis modules are installed in descending order regarding their nominal output current.

When used as master module (see figure), as well as when used as compact controller, MOVI-C® CONTROLLER must always be installed left of the power supply module.

In one axis system, up to 15 axis modules can be used, both as single-axis modules and double-axis modules.



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[1] MOVI-C® CONTROLLER
[2] Power supply module
[3] Axis module sizes 1

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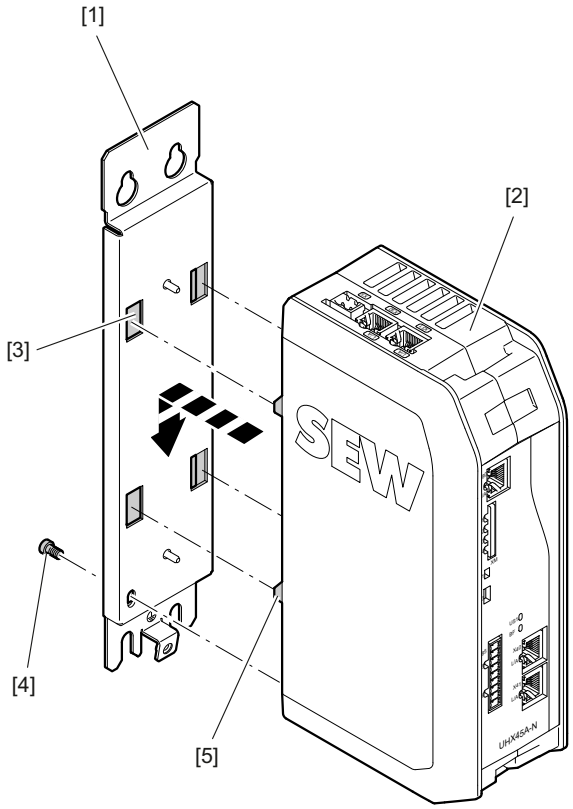
Compact controller

In preparation to the control cabinet installation, MOVI-C® CONTROLLER must be mounted to a carrier plate.



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[1]	Support plate	[4]	Screw
[2]	MOVI-C® CONTROLLER	[5]	Cam
[3]	Recess		

Mounting the carrier plate

Proceed as follows:

1. Install the housing of the MOVI-C® CONTROLLER [2] so that the cams [5] fit into the recesses [3] at the carrier plate [1].
2. Push the housing of the MOVI-C® CONTROLLER [2] downward to the stop at the cams [5].
3. Tighten the screw [4].

Removing the carrier plate

Proceed as follows:

1. Loosen the screw [4].
2. Pull the housing of the MOVI-C® CONTROLLER [2] upward and remove it toward the front.

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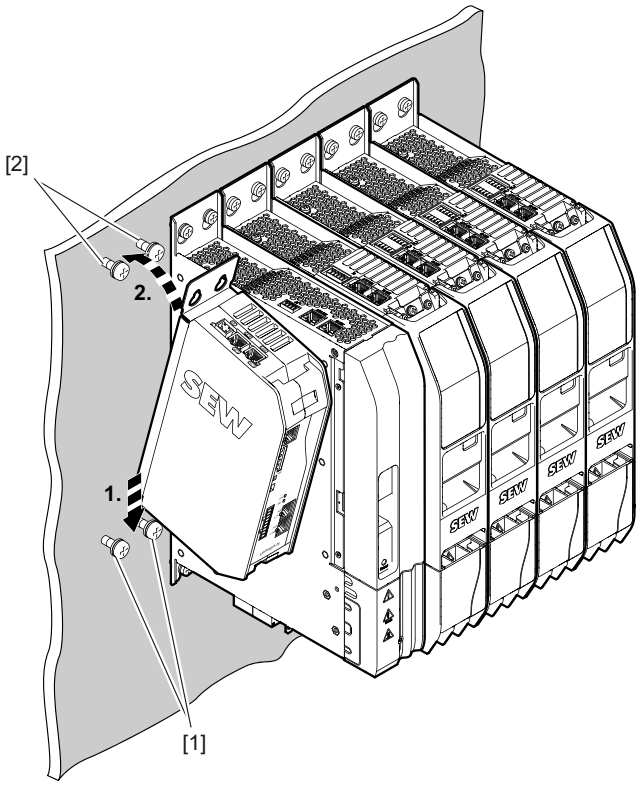
Inserting MOVI-C® CONTROLLER

Proceed as follows:

✓ The retaining screws [1] and [2] are screwed into the prepared mounting grid in the control cabinet but not tightened.

1. Place the MOVI-C® CONTROLLER with the slotted holes in the device base plate onto the retaining screws [1] from the top.



21228343051

2. Push the module backwards to insert the retaining screws [2] into the upper holes in the carrier plate.
3. Lower the module.
4. Tighten the retaining screws [1] and [2].

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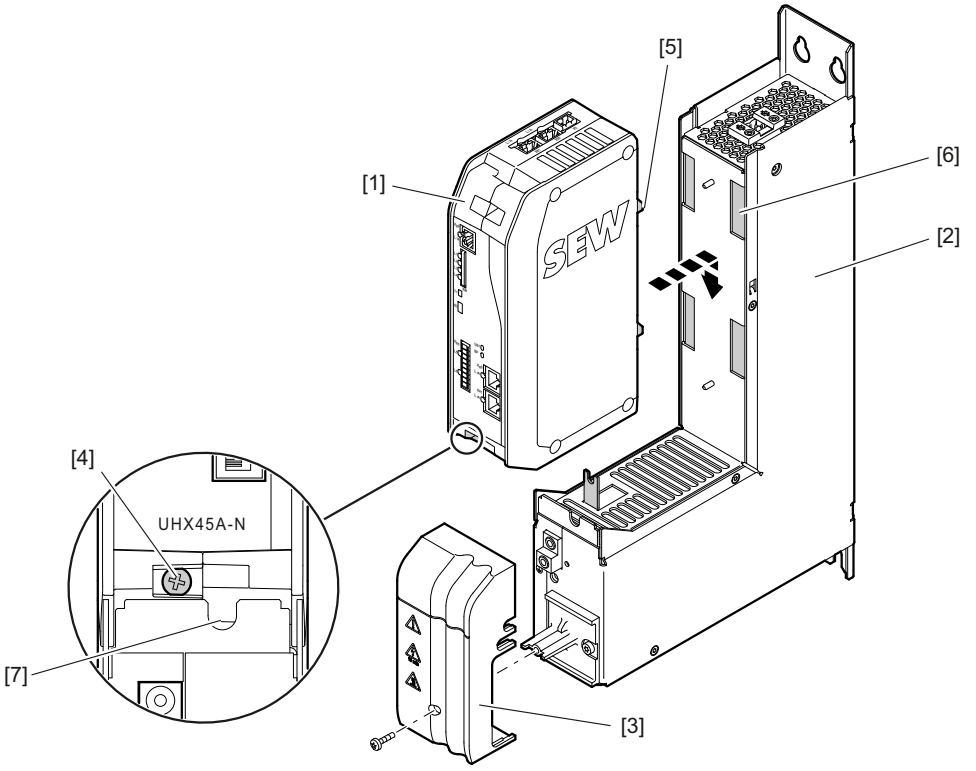
Master module



21394940683

[1]	MOVI-C® CONTROLLER	[5]	Cam
[2]	L-carrier MDM90A	[6]	Recess for cams
[3]	Touch guard	[7]	Pry-out recess
[4]	Screw		

Mounting the L-carrier

Proceed as follows:

1. Remove the touch guard [3] at the housing of the L-carrier [2].
2. Install the housing of the MOVI-C® CONTROLLER [1] so that the cams [5] fit into the recesses [6] at the housing of the L-carrier [2].
3. Push the housing of the MOVI-C® CONTROLLER [1] downward until it touches the housing of the L-carrier.
4. Tighten the screw [4].
5. Install the touch guard [3] again.

Removing the L-carrier

Proceed as follows:

1. Remove the touch guard [3] at the housing of the L-carrier [2].
2. Loosen the screw [4].
3. Pull the housing of the MOVI-C® CONTROLLER [1] upward. Recess [7] can be used to pry out the housing if necessary.
4. Remove MOVI-C® CONTROLLER housing to the front.

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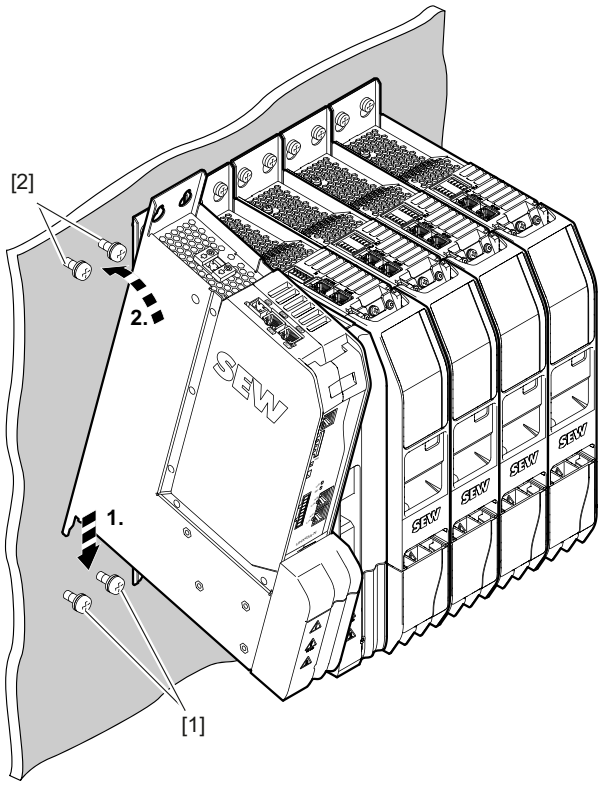
Inserting the master module

Proceed as follows:

✓ The retaining screws [1] and [2] are screwed into the prepared mounting grid in the control cabinet but not tightened.

1. Place the module with the slotted holes on the unit base plate onto the retaining screws [1] from the top.



21228294027

2. Push the module backwards to insert the retaining screws [2] into the upper holes in the unit base plate.
3. Lower the module.
4. Tighten the retaining screws [1] and [2].

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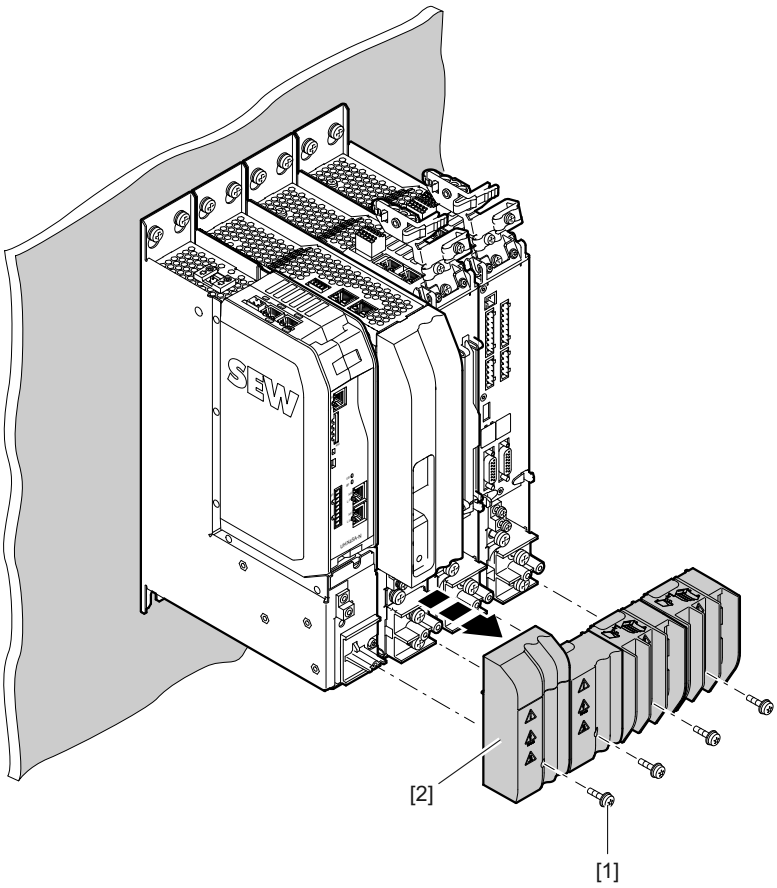
Removing the touch guard

Proceed as follows:

1. Remove the screws [1] from the touch guard.



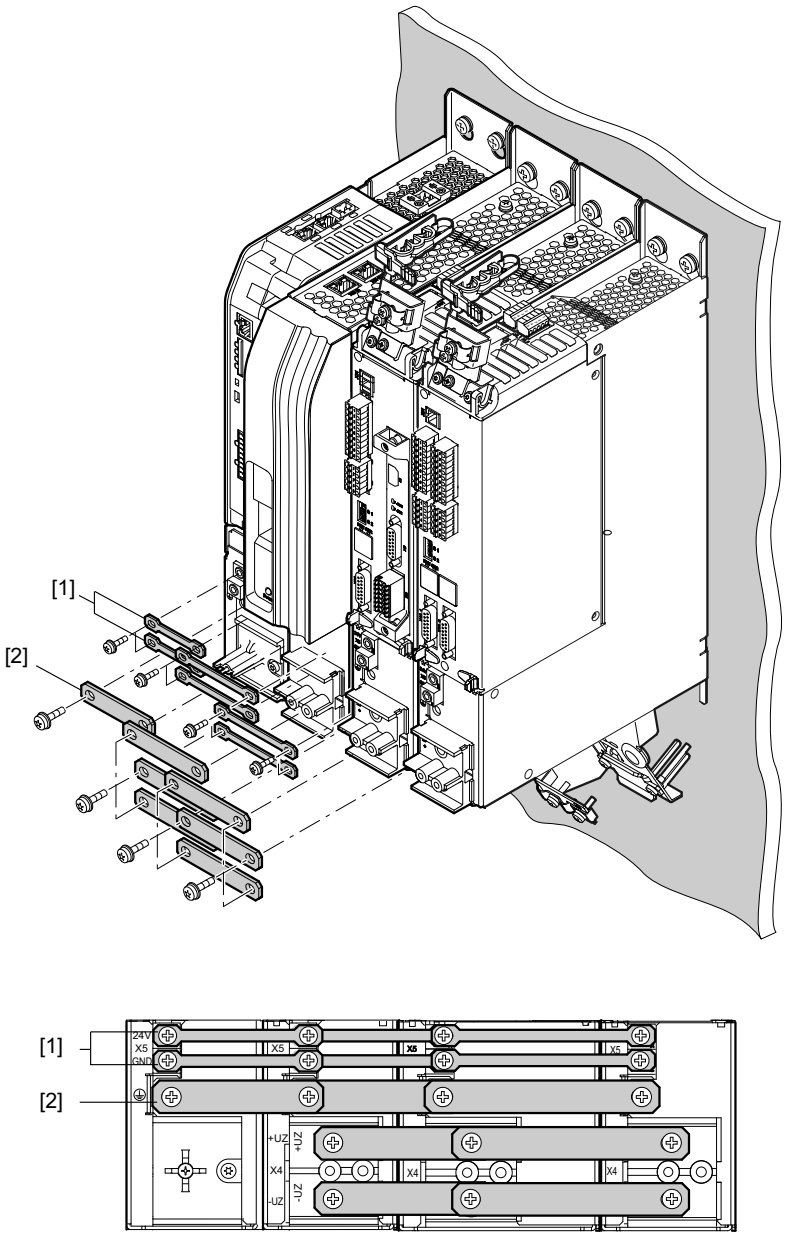
21010480523

2. Remove the touch guard [2].

Installing the busbar

Proceed as follows:

1. Install the busbar [1] for the DC 24 V supply voltage as shown in the figure. Tighten the screws with the specified tightening torque (1.2 – 1.5 Nm).



21010487819

2. Install the busbar [2] for the PE connection as shown in the figure. Tighten the screws with the specified tightening torque (3 – 4 Nm).

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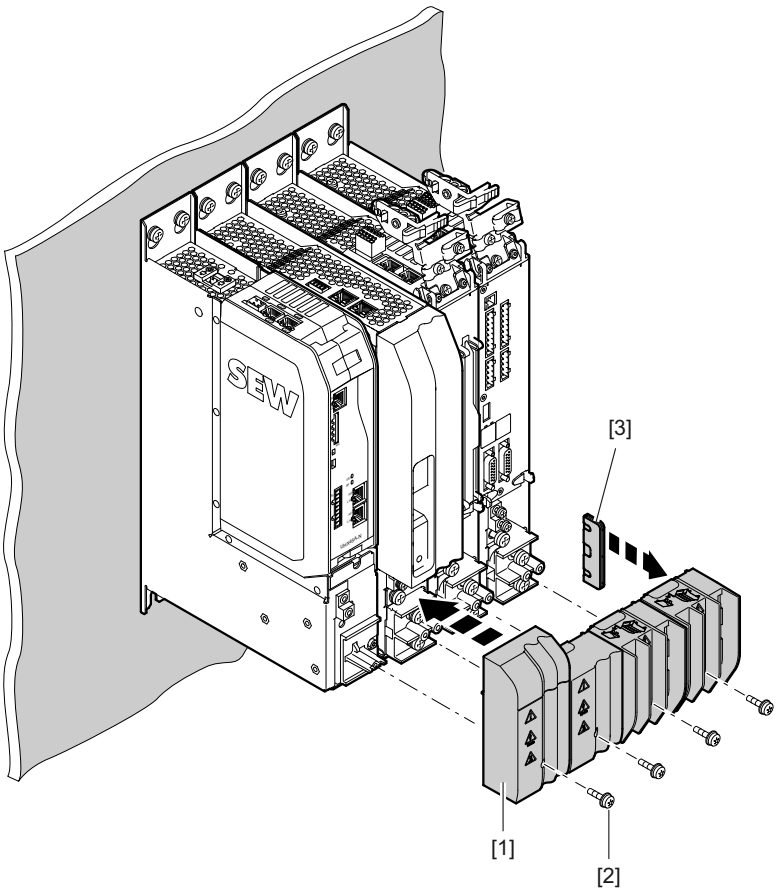
Installing the touch guard

A closing cover has to be attached to the last module of the axis system.

Proceed as follows:

1. Slide the closing cover [3] onto the touch guard.



21058855947

2. Install the touch guard [1] on the module.
3. Insert the screw [2] and tighten it securely with the specified tightening torque (0.6 – 0.8 Nm).

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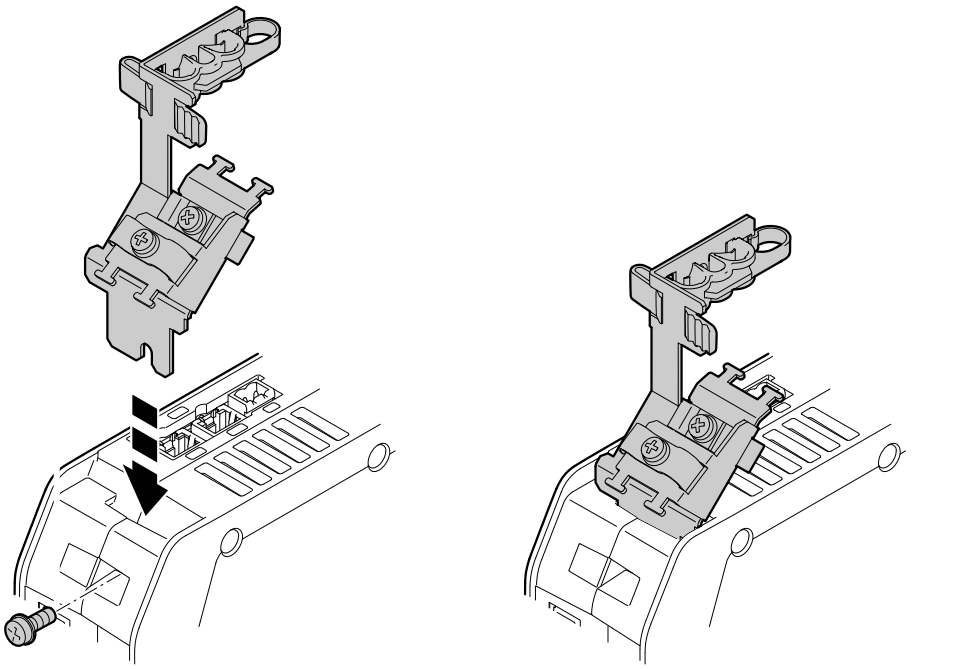
Top shield plate

Install the top shield plate as shown in the figure.



20988935947

4.2.3 Removing the MOVI-C® CONTROLLER

Removal of the compact controller and the master module is performed in reverse order as with installation, see chapter "Compact controller" (→ 🗎 23) and "Master module" (→ 🗎 25).

Also observe the safety notes in chapter "Electrical installation" (→ 🗎 31).

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4.3 Electrical installation

INFORMATION

Installation with protective separation.

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

4.3.1 Shielding and routing bus cables

NOTICE

Risk of a compensating current flowing as a result of incorrect bus cable type, improper shielding and/or improperly routed bus cables.

Possible damage to property.

- In case 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 supply adequate equipotential bonding in accordance with relevant IEC regulations in such a case.

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

Correct shielding of the bus cable attenuates electrical interference that can occur in industrial environments. The following measures ensure the best possible shielding:

- Manually tighten the mounting screws on the connectors, modules, and equipotential bonding conductors.
- Use only connectors with a metal housing or a metalized housing.
- Connect the shielding in the connector over a wide surface area.
- Apply the shielding of the bus cable on both ends.
- Route signal and bus cables in separate cable ducts. Do not route them parallel to power cables (motor leads).
- Use metallic, grounded cable racks in industrial environments.
- Route the signal cable and the corresponding equipotential bonding close to each other using the shortest possible route.
- Avoid using plug connectors to extend bus cables.
- Route the bus cables closely along existing grounding surfaces.

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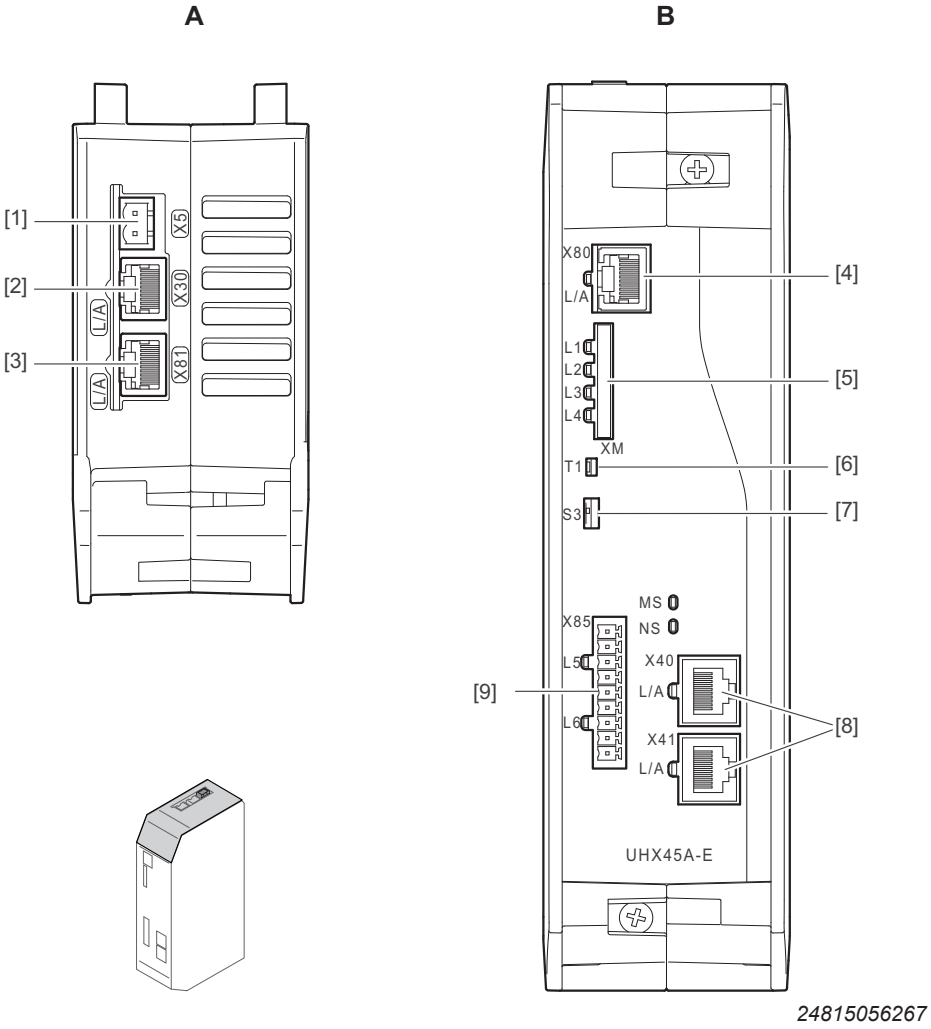
4.3.2 Functional description of the terminals

MOVI-C® CONTROLLER



A: View from top **B: View from front**

No.	Designation	Ter-minal	Function
[1]	DC 24 V supply voltage connection (2-pin connection)	X5	DC 24 V voltage supply
[2]	EtherCAT®/SBus^{PLUS} interface (RJ45 socket)	X30	EtherCAT®/SBus^{PLUS} master connection
[3]	Engineering interface (RJ45 socket)	X81	Engineering PC connection IP address on the SD memory card set by user (standard IP address of the X81 engineering interface on delivery: 10.1.254.128)
[4]	Engineering interface (RJ45 socket)	X80	Engineering PC connection Default IP address: 192.168.10.4 (dependent on the DIP switch setting S3)

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No.	Designation	Ter-minal	Function
[5]	SD card slot	XM	Card slot for SD memory card OMH45A (control section with firmware, IEC program, user data) **INFORMATION:** Make sure the SD memory card is correctly aligned when inserting it: The name-plate must be on the right side of the SD memory card.
[6]	Reset button	T1	Reset
[7]	DIP switch	S3	• Bottom position: Standard IP address of the X80 engineering interface: 192.168.10.4 (cannot be changed) • Top position: IP address on the SD memory card set by user (standard IP address of the X80 engineering interface on delivery: 192.168.10.4)
[8]	Fieldbus interface (RJ45 socket)	X40/X41	• MOVI-C® CONTROLLER UHX45A-N: Slave connection PROFINET IO • MOVI-C® CONTROLLER UHX45A-E: Slave connection EtherNet/IP™ or Mod-bus TCP
[9]	System bus and RS485 interface (9-pin connection)	X85	• RS485 interface (in preparation) • System bus CAN 1 (in preparation) • System bus CAN 2 (in preparation)

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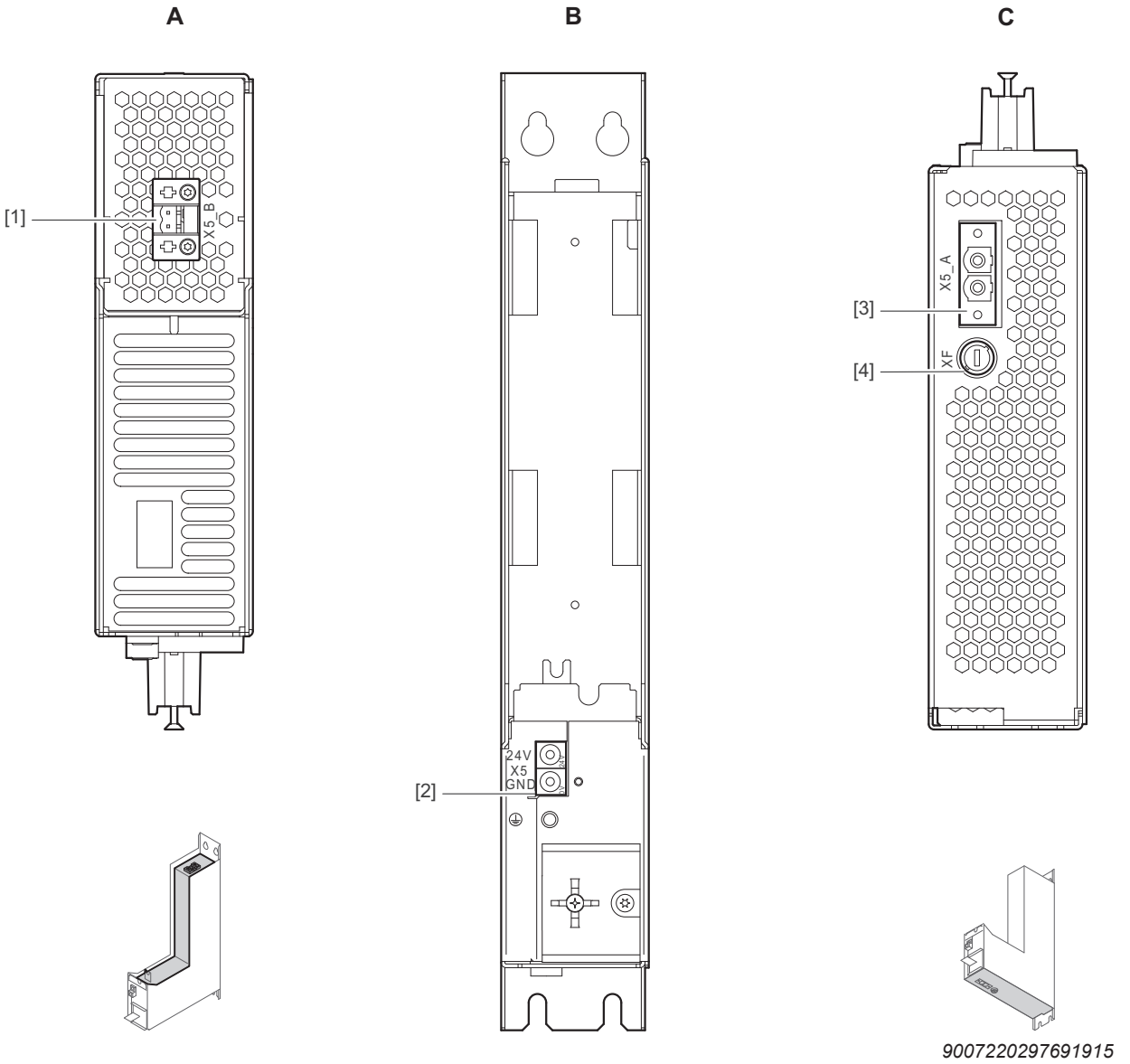
L-carrier MDM90A



A: View from top **B: View from front** **B: View from bottom**

No.	Designation	Ter-minal	Function
[1]	Output for the DC 24 V supply voltage (2-pin connection)	X5_B	Voltage supply of the MOVI-C® CONTROLLER
[2]	Connection DC 24 V supply voltage	X5	Voltage supply of the MOVIDRIVE® axis system
[3]	External DC 24 V supply voltage	X5_A	Voltage supply input of the MOVIDRIVE® axis system and MOVI-C® CONTROLLER
[4]	Fusing for DC 24 V supply voltage: 5 x 20 mm glass tube, 4 A, 125 V, slow-blow	XF	Fusing for voltage supply MOVI-C® CONTROLLER

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4.3.3 Voltage supply

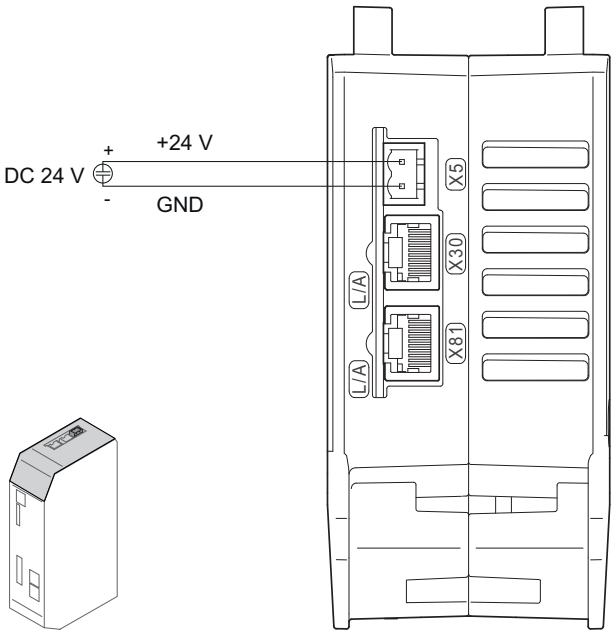
Compact controller

Use an external DC 24 V power supply unit for the voltage supply:

- Power consumption P_{max} = 12 W
- Current consumption I_{max} = 500 mA (with DC 24 V supply voltage)

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

Wiring diagram



9007220297965451

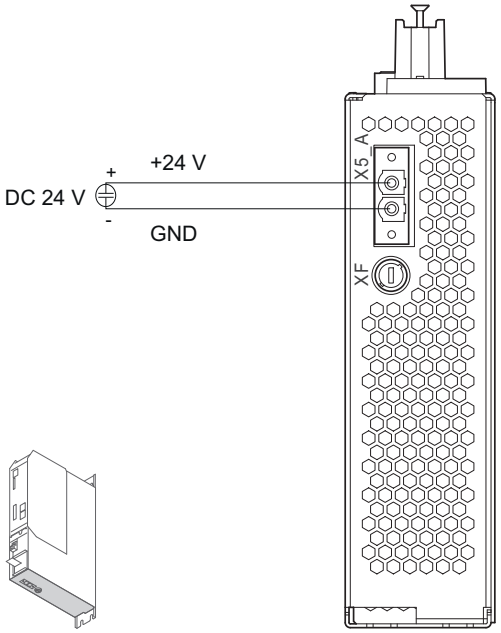
Master module

Use an external DC 24 V power supply unit for the voltage supply:

- Power consumption P_{max} = 972 W
- Current consumption I_{max} = 40.5 A (with DC 24 V supply voltage)

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

Wiring diagram



9007220694161931

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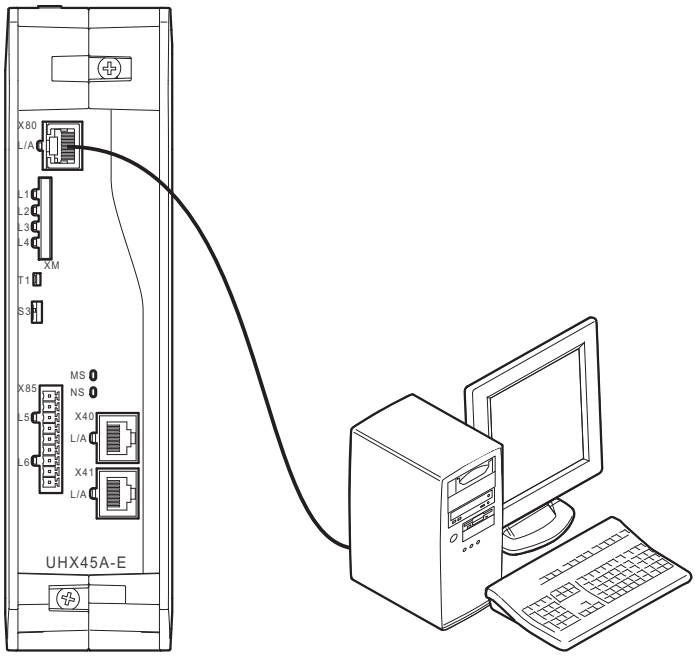
4.3.4 Engineering PC connection

The MOVI-C® CONTROLLER is connected to the engineering interface X80 (RJ45 connector) with the engineering PC or other network stations (e.g. visualization systems). The communication is realized via Ethernet.

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



24815106443

INFORMATION

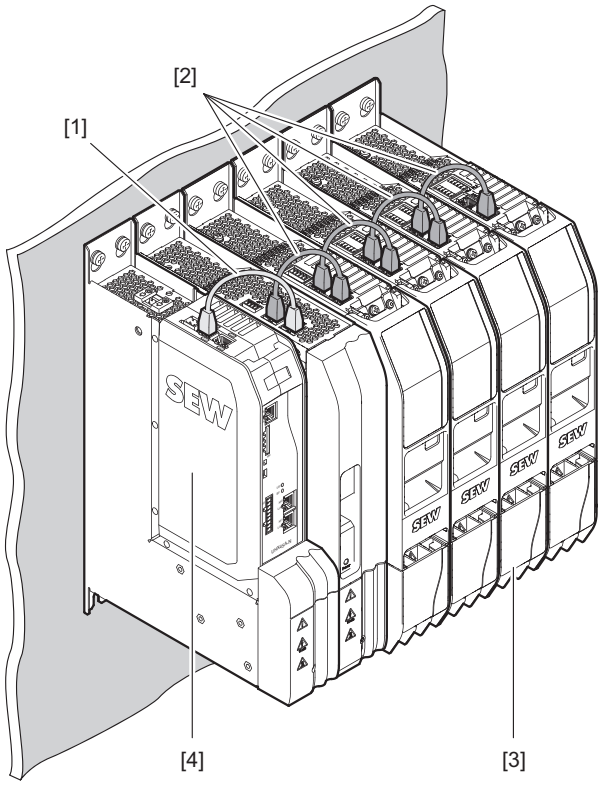
According to IEEE 802.3, 200 Edition, the maximum cable length for 10 MBaud/100 MBaud Ethernet (10BaseT/100BaseT) between 2 EtherCAT®/ SBus^{PLUS} stations is 100 m.

4.3.5 EtherCAT®/SBus^{PLUS} master connection

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

EtherCAT®/SBus^{PLUS} bus topology

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



18014419737244299

[1] System bus cable, 4-pin, color: light gray
[2] Module bus cable, 8-pin, color: anthracite gray
[3] MOVIDRIVE® modular
[4] MOVI-C® CONTROLLER (master module)

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.

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.

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4.3.6 CAN system bus connection

In preparation

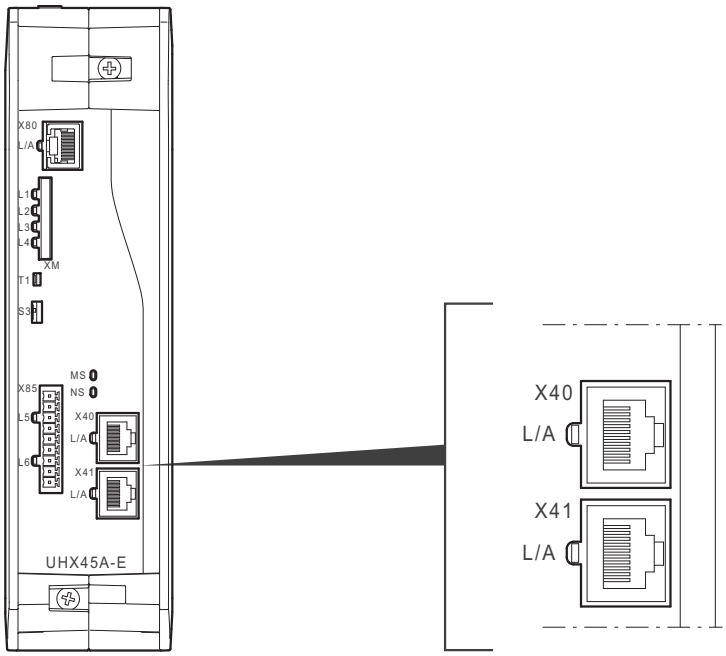
4.3.7 Connecting the fieldbus slave

The MOVI-C® CONTROLLER serves as fieldbus slave for the PLC (fieldbus master). The communication is realized 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 stations, using a category 5, class D twisted-pair cable in accordance with IEC 11801, edition 2.0.



24817228939

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.

The integrated Ethernet switch

The device is equipped with an integrated 2 port Ethernet switch for connecting the fieldbus technology. The following network topologies are supported:

- Tree topology
- Star topology
- Line topology
- Ring topology

INFORMATION

The number of industrial Ethernet switches connected in line impacts the telegram runtime. If a telegram passes through the devices, the telegram runtime is delayed by the "store-and-forward" function of the Ethernet switch:

- For a telegram length of 64 bytes by approximately 10 µs (at 100 MBit/s)
- For a telegram length of 1500 bytes by approximately 130 µs (at 100 MBit/s)

→ This means the more devices a telegram has to pass through, the higher the telegram runtime is.

Auto-crossing

The two ports leading out of the Ethernet switch have auto-crossing functionality. You can use both patch and crossover cables to connect to the next Ethernet node.

Auto-negotiation

The baud rate and duplex mode are negotiated by both Ethernet nodes when establishing the connection. For this purpose, both Ethernet ports of the Ethernet connection support an auto-negotiation functionality and work with a baud rate of either 100 Mbit or 10 Mbit in full duplex or half duplex mode.

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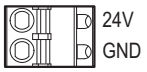
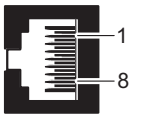
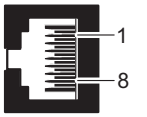
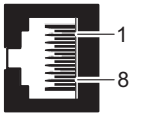
4.4 Terminal assignment

INFORMATION

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

Representation	Terminal	Connection		Brief description	
	X5:24 V	V_I24 V		DC 24 V supply voltage	
	X5:GND	GND		Reference potential	
	X30			Fast system bus SBus^{PLUS} 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		–	

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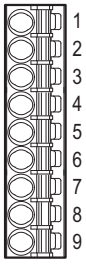
Represent-ation	Terminal	Connection	Brief description
	X85:1	DGND-II	Reference potential (in preparation)
	X85:2	RS485 + (insulated)	RS485 signal line (-) (in preparation)
	X85:3	RS485 - (insulated)	RS485 signal line (+) (in preparation)
	X85:4	DGND-I	Reference potential (in preparation)
	X85:5	CAN 2 H (insulated)	System bus CAN 2 high (in preparation)
	X85:6	CAN 2 L (insulated)	System bus CAN 2 low (in preparation)
	X85:7	DGND	Reference potential (internally connected to PE) (in preparation)
	X85:8	CAN 1 H	System bus CAN 1 high (in preparation)
	X85:9	CAN 1 L	System bus CAN 1 low (in preparation)

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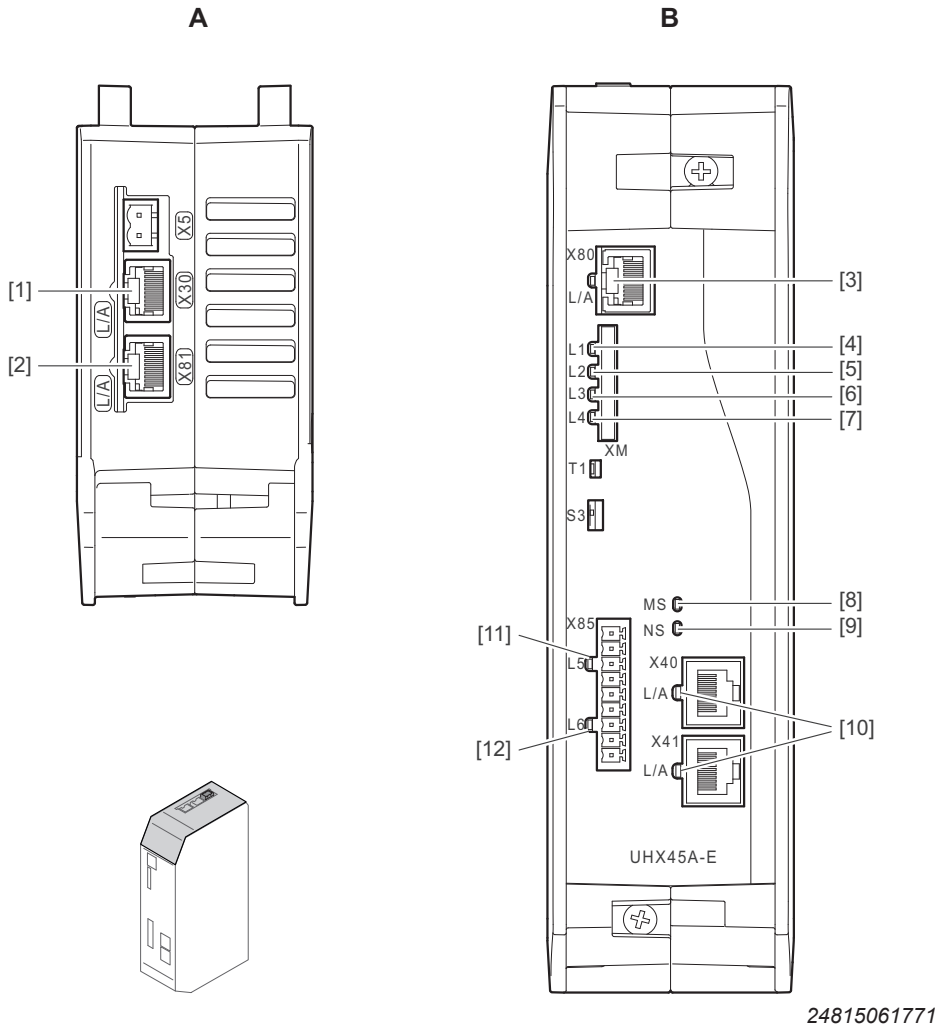
4.5 Status LEDs



A: View from top **B: View from front**

[1] L/A: Status of the EtherCAT®/SBus^{PLUS} connection
[2] L/A: Status of the engineering connection (X81)
[3] L/A: Status of the engineering connection (X80)
[4] L1: Status of the MOVI-C® CONTROLLER firmware
[5] L2: Status of the IEC program
[6] L3: Reserved
[7] L4: Status of the system bus SBus^{PLUS} (not yet supported)
[8] MS: Status of the bus electronics
[9] NS: Status of the fieldbus connection
[10] L/A: Status of the Ethernet connection
[11] L5: Status of the system bus CAN 2 (in preparation)
[12] L6: Status of the system bus CAN 1 (in preparation)

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4.5.1 Status LED "L1"

Indicates the status of the firmware during the boot phase as well as during operation.

During boot phase

Status	Possible cause	Measure
Red	The firmware of the device fails to boot.	Contact SEW-EURODRIVE service.
Orange	The SD memory card is not inserted.	Insert a SD memory card into the device.
	The data system of the SD memory card is corrupt.	Contact SEW-EURODRIVE service.
Green	The SD memory card has faulty contents.	Contact SEW-EURODRIVE service.
Red, flashing with 1 Hz	The SD memory card has faulty contents. The firmware of the device is faulty.	Contact SEW-EURODRIVE service.

During operation

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

4.5.2 Status LED "L2"

Indicates the status of the IEC program.

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

4.5.3 Status LED "L3"

LED	Meaning
–	Is reserved.

4.5.4 Status LED "L4"

Displays the status of the system bus SBus^{PLUS} (not yet supported)

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LED	Meaning
–	Is reserved.

4.5.5 Status LED "L5"

In preparation

4.5.6 Status LED "L6"

In preparation

4.5.7 Status LED "MS" (Module Status)

Indicates the status of the bus electronics.

Status	Possible cause	Measure
Green	The bus electronics is in standard operating state.	–
Green, flashing Lights up: 0.5 s Disabled: 0.5 s	The device is waiting for the data of a DHCP server to initialize the TCP/IP stack.	–
Red, flashing Lights up: 0.5 s Disabled: 0.5 s	Conflict detected while assigning the IP address. Another node in the network uses the same IP address.	Assign an unique IP address to the device.
Red	The bus electronics is in fault state.	Switch the device off and back on again. If the fault occurs repeatedly, contact SEW-EURODRIVE Service.

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4.5.8 Status LED "NS" (Network Status)

Shows the status of the fieldbus connection.

Status	Possible cause	Measure
Off	The device does not yet have any IP address parameters.	Assign an unique IP address to the device.
Green	There is a controlling connection to the fieldbus master (PLC).	–
Green, flashing Lights up: 0.5 s Disabled: 0.5 s	The IP address parameters are configured, but there is no controlling connection to the fieldbus master.	• Check if the fieldbus master is switched on. • Perform the configuration of the fieldbus master again.
Red	Conflict detected while assigning the IP address. Another node in the network uses the same IP address.	Assign an unique IP address to the device.
Red, flashing Lights up: 0.5 s Disabled: 0.5 s	The controlling connection is in timeout state.	Reestablish the communication to the fieldbus master.

4.5.9 Status LEDs "L/A" (Link/Activity)

Indicate the status of the Ethernet connection.

Status LED	Meaning
Green	There is an Ethernet connection.
EtherCAT®/SBus^{PLUS} interface: Green, flashing	Data is currently being exchanged via Ethernet.
Engineering interface and fieldbus interface: Orange, flashing	Data is currently being exchanged via Ethernet.
Off	There is no Ethernet connection.

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5 Startup with EtherNet/IP™

5.1 Industrial Ethernet networks

5.1.1 TCP/IP addressing and subnetworks

The address of the TCP/IP protocol is set using the following parameters:

- MAC address
- IP address
- Subnet mask
- Standard gateway

The addressing mechanisms and subdivision of the TCP/IP networks into subnetworks are explained in this chapter to help you set the parameters correctly.

5.1.2 MAC address

The MAC (**M**edia **A**ccess **C**ontroller) address is the basis for all address settings. The MAC address is a worldwide unique 6-byte value (48 bits) assigned to the Ethernet device. The MAC address of Ethernet devices from SEW-EURODRIVE is 00-0F69-xx-xx-xx.

The MAC address is difficult to handle for larger networks. This is why freely assignable IP addresses are used.

5.1.3 IP address

The IP address is a 32-bit value that uniquely identifies a node in the network. An IP address is represented by 4 decimal numbers separated by decimal points.

Each decimal number stands for 1 byte (8 bits) of the address and can also be represented using binary code:

Exemplary IP address: 192.168.10.4		
Byte	**Decimal**	**Binary**
1	192	11000000
2	168	10101000
3	10	00001010
4	4	00000100

The IP address comprises a network address and a node address.

The part of the IP address that denotes the network and the part that identifies the node is determined by the network class and the subnet mask.

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5.1.4 Network class

The first byte of the IP address determines the network class and as such represents the division into network addresses and node addresses:

Range of values (Byte 1 of IP address)	Network class	Example: Complete network address	Meaning
0 – 127	A	10.1.22.3	10 = Network address 1.22.3 = Node address
128 – 191	B	172.16.52.4	172.16 = Network address 52.4 = Node address
192 – 223	C	192.168.10.4	192.168.10 = Network address 4 = Node address

Node addresses that consist only of zeros or ones are not permitted. The smallest address (all bits are zero) describes the network itself and the largest address (all bits are 1) is reserved for the broadcast.

This rough division is not sufficient for a number of networks. The networks also use an explicit, adjustable subnet mask.

5.1.5 Subnetwork mask

A subnet mask is used to divide the network classes into even finer sections. Like the IP address, the subnet mask is represented by 4 decimal numbers separated by decimal points.

Each decimal number stands for 1 byte (8 bits) of the subnet mask and can also be represented using binary code:

Exemplary subnet mask: 255.255.255.128		
Byte	**Decimal**	**Binary**
1	255	11111111
2	255	11111111
3	255	11111111
4	128	10000000

The binary representation of the IP address and the subnet mask shows that in the subnet mask, all bits of the network address are set to 1 and only the bits of the node addresses have the value 0:

IP address: 192.168.10.129		Subnet mask: 255.255.255.128
	Bytes 1 – 4	**Bytes 1 – 4**
Network address	11000000	11111111
	10101000	11111111
	00001010	11111111
Node address	10000001	10000000

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The class C network with the network address 192.168.10 is further subdivided into the following 2 networks by the subnet mask 255.255.255.128:

Network address	Node addresses
192.168.10.0	192.168.10.1 – 192.168.10.126
192.168.10.128	192.168.10.129 – 192.168.10.254

The network nodes use a logical AND operation for the IP address and the subnet mask to determine whether there is a communication partner in the same network or in a different network. If the communication partner is in a different network, the standard gateway is addressed for passing on the data.

5.1.6 Standard gateway

The standard gateway is also addressed via a 32-bit address. The 32-bit address is represented by 4 decimal numbers separated by decimal points.

Exemplary standard gateway: 192.168.10.1

The standard gateway establishes a connection to other networks. A network node that wants to address another node uses a logical AND operation of the IP address and subnet mask to determine whether the node is in the same network. If this is not the case, the network node addresses the standard gateway (router), which must be part of the actual network. The standard gateway then takes on the job of transmitting the data packages.

5.1.7 DHCP (Dynamic Host Configuration Protocol)

Instead of setting the 3 parameters IP address, subnet mask and standard gateway manually, they can be assigned automatically by a DHCP server in the Ethernet network.

The IP address is assigned based on a table in the DHCP server. The table contains an assignment of MAC addresses to IP addresses.

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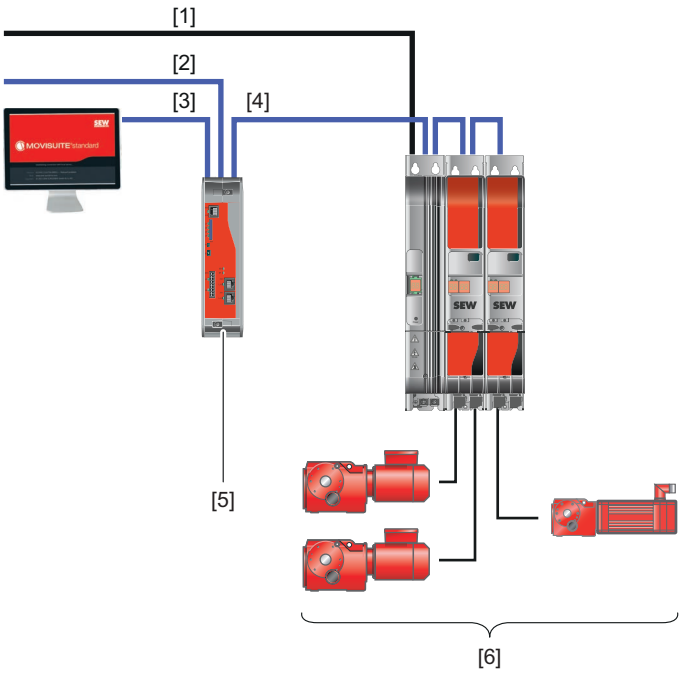
5.2 Connecting the MOVI-C® CONTROLLER to an EtherNet/IP™ network

This example explains how to connect the MOVI-C® CONTROLLER to an EtherNet/IP™ network. The following device topology was used in the example:

- Higher-level Allen-Bradley ControlLogix® 1756-L71 controller
- MOVI-C® CONTROLLER advanced, device variant UHX45A-E
- MOVIDRIVE® modular application inverter, MDD90A double-axis module
- MOVIDRIVE® modular application inverter, MDA90A single-axis module

The following figure is a schematic representation of the device topology:



21974213643

[1]	Line voltage	[4]	EtherCAT®/SBus^{PLUS} connection
[2]	Fieldbus connection	[5]	MOVI-C® CONTROLLER advanced UHX45A-E
[3]	Engineering connection	[6]	MOVIDRIVE® modular axis system

For configuration and startup of the devices, the following tools are used:

- MOVISUITE® for the MOVI-C® devices from SEW-EURODRIVE

  MOVISUITE® contains the IEC Editor tool for programming the MOVI-C® CONTROLLER.
- Studio 5000 Logix Designer from Rockwell Automation for the PLC

The MOVI-C® CONTROLLER is integrated into the EtherNet/IP™ network in several process steps:

- "Configuration of the EtherCAT®/SBusPLUS stations" (→ 🗎 51)
- "Configuration of the fieldbus stations" (→ 🗎 56)
- "Controlling the stations in test run" (→ 🗎 72)

INFORMATION

It is not possible to program and start up the MOVI-C® CONTROLLER via the fieldbus interface.

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

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

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

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

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

1. "Establishing a connection between engineering PC and MOVI-C® CONTROLLER" (→ 🗎 51)
2. "Scanning the network for devices" (→ 🗎 53)
3. "Applying MOVI-C® devices to MOVISUITE®" (→ 🗎 54)

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

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

INFORMATION

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

Proceed as follows:

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

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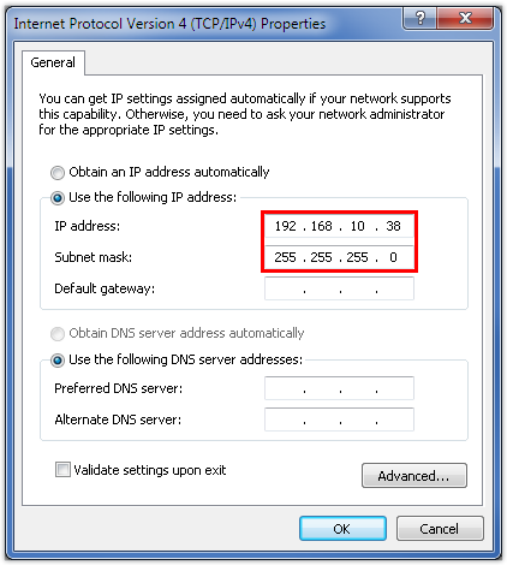
3. Select the internet protocol version 4 "TCP/IPv4" in the adapter properties.
4. Enter the IP address parameters of the engineering PC in the internet protocol properties. Note that the IP address of the engineering PC is different from the IP address of all other network stations and thus is unique.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



9007216660423563

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

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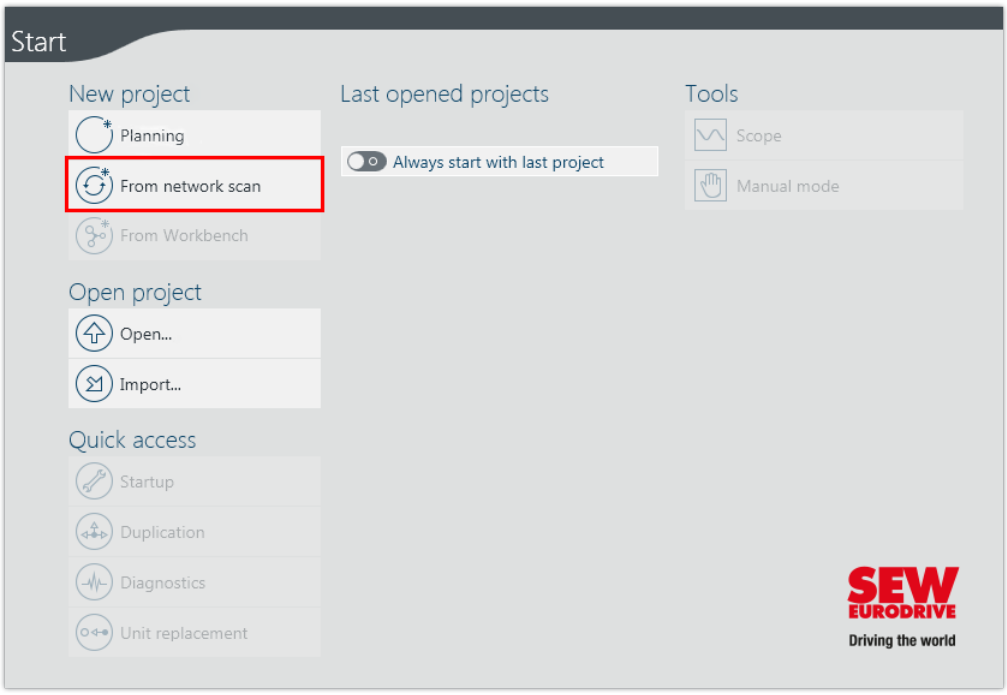
5.3.2 Scanning the network for devices

Proceed as follows:

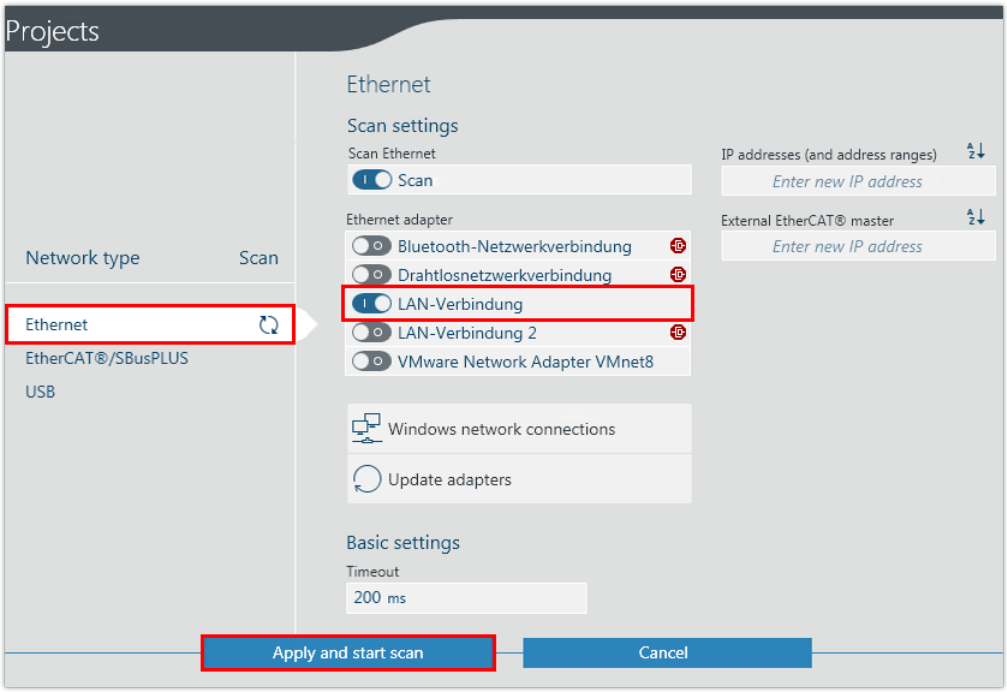
✓ The connection between the engineering PC and MOVI-C® CONTROLLER is established.

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



9007216181236875

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



18014415924706187

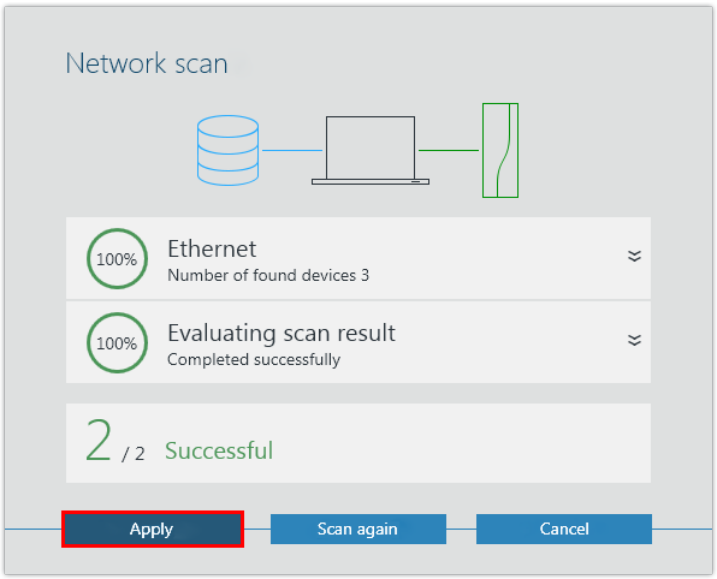
5.3.3 Applying MOVI-C® devices to MOVISUITE®

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

Proceed as follows:

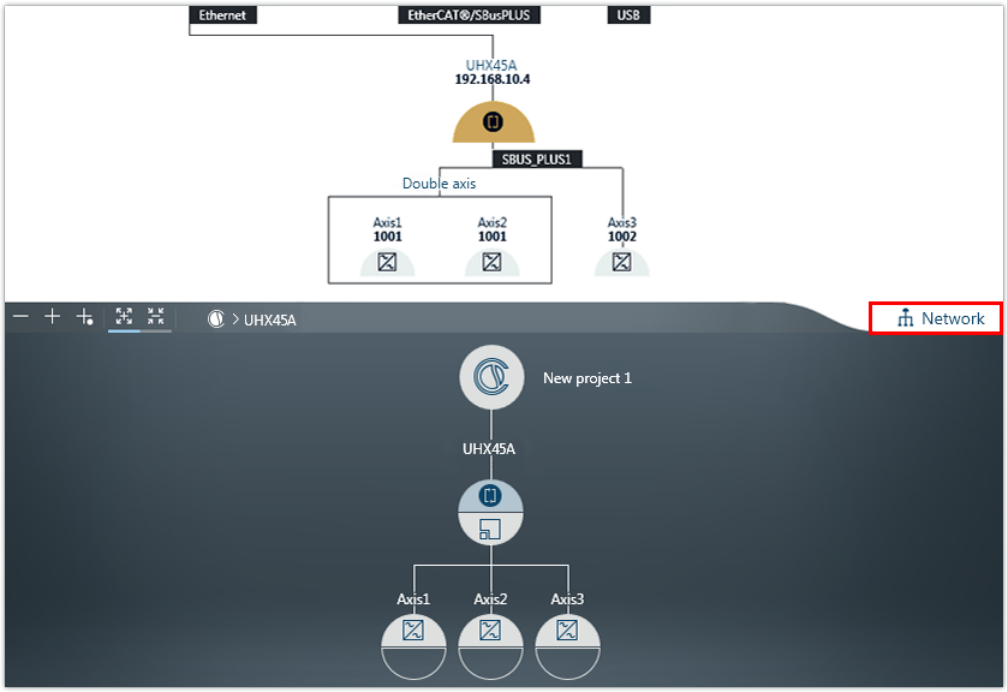
✓ You started a network scan.

1. Apply the scanned devices to MOVISUITE®.



9007216181358219

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



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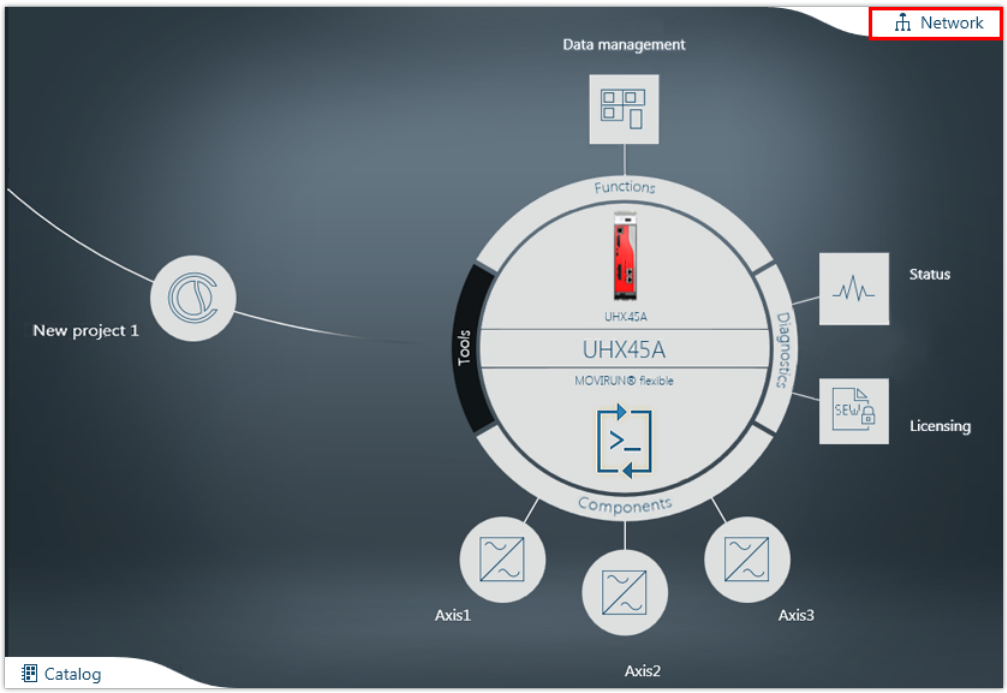
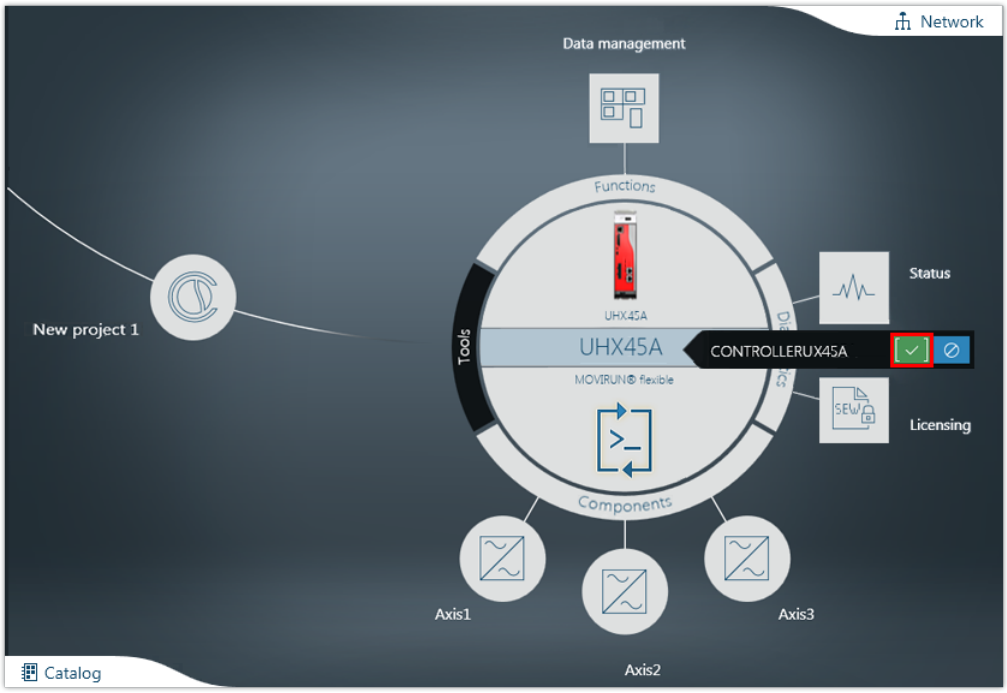
⇨ The function view has 2 views. The tree view shows an overview of the entire project. The circle view shows the current node as a large circle in the center of the working area.



9007222061976715

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



9007222061981707

⇨ The MOVI-C® CONTROLLER has the following device name in this example: CONTROLLERUHX45A

5. Save the MOVISUITE® project.

5.4 Configuration of the fieldbus stations

In the exemplary project, the following devices are the fieldbus stations:

- The PLC serves as fieldbus master.
- The MOVI-C® CONTROLLER serves as fieldbus slave.

The devices are configured in the following tools:

- MOVISUITE®
- IEC Editor (integrated in MOVISUITE®)
- Studio 5000 Logix Designer, Version V27

INFORMATION

The figures in the sample project refer to the English version of the tool Studio 5000 Logix Designer.

The fieldbus stations are configured in several process steps:

- Configuring the fieldbus option of the MOVI-C® CONTROLLER
- "Installing the device description file of the MOVI-C® CONTROLLER" (→ 🗎 56)
- "Creating a project in Logix Designer" (→ 🗎 57)
- "Configuring the EtherNet/IP™ scanner" (→ 🗎 58)
- "Integrating and configuring the MOVI-C® CONTROLLER in the fieldbus network" (→ 🗎 60)
- "Setting up the project path" (→ 🗎 64)
- "Loading the Logix Designer project to the PLC" (→ 🗎 65)

5.4.1 Installing the device description file of the MOVI-C® CONTROLLER

INFORMATION

A modified device description file can cause malfunctions in the device.

Do **not** change or expand entries in the device description file. SEW-EURODRIVE assumes no liability for malfunctions of the device caused by a modified device description file.

A prerequisite for the correct configuration of the MOVI-C® CONTROLLER with fieldbus interface EtherNet/IP™ is the installation of the device description file (EDS file) in the Studio 5000 Logix Designer. The file contains all relevant data for the engineering and data exchange of the MOVI-C® CONTROLLER.

The current version of the device description file for the MOVI-C® CONTROLLER with fieldbus interface EDS file is available on the website of SEW-EURODRIVE → **www.sew-eurodrive.com**. Search on the page [Online Support] > [Data & documents] > [Software] for "EDS files for EtherNet/IP™".

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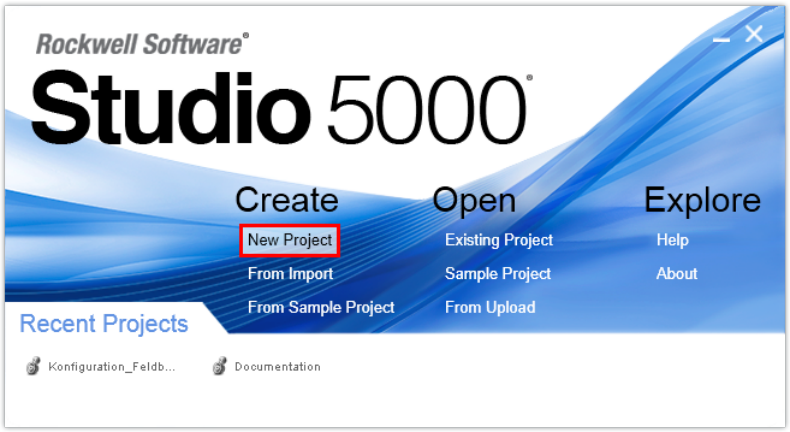
5.4.2 Creating a project in Logix Designer

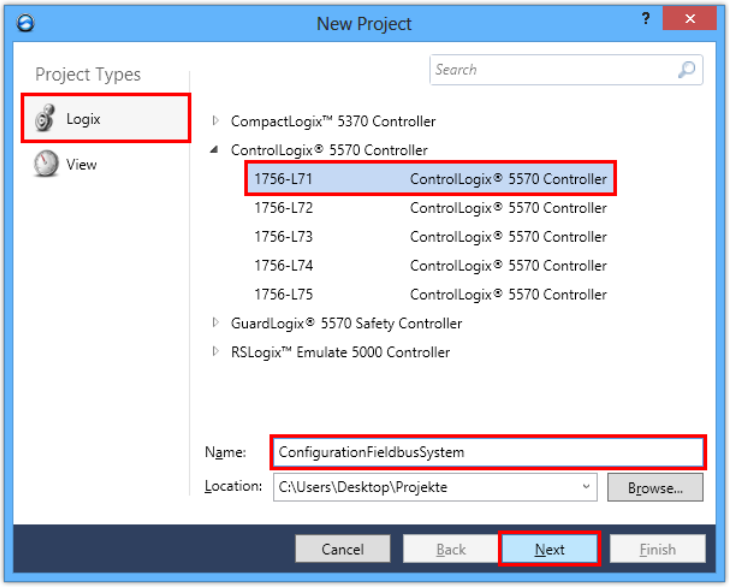
Proceed as follows:

1. Start the "Logix Designer" tool.
2. Create a new Logix Designer project.



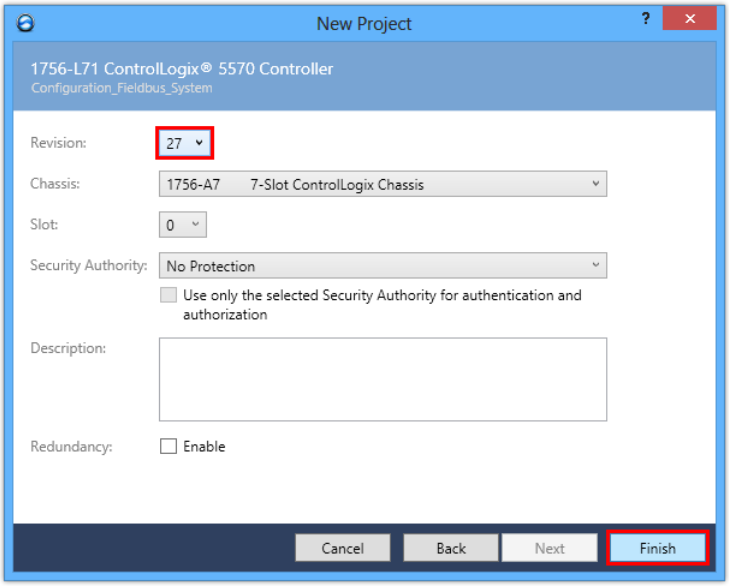
24488016523

3. Add the PLC to the project. Enter a device name and specify the storage location of the project. The device name is also used as the project name.



24488504971

4. Set the version of the device firmware.



24488508683

⇨ The project is created. Information about the programs and data in the project is displayed in the "Controller Organizer" (right-hand screen pane).

5.4.3 Configuring the EtherNet/IP™ scanner

In the "Controller Organizer", the "I/O Configuration" folder contains all the hardware modules that are responsible for communication with the PLC. An EtherNet/IP™ scanner is used for communicating via Ethernet.

Proceed as follows:

✓ You have created a new Logix Designer project.

1. Right-click to open the context menu of the backplane (1756 Backplane 1756-A7) and enter a new hardware module.
   ⇨ A catalog with the installed modules is displayed.

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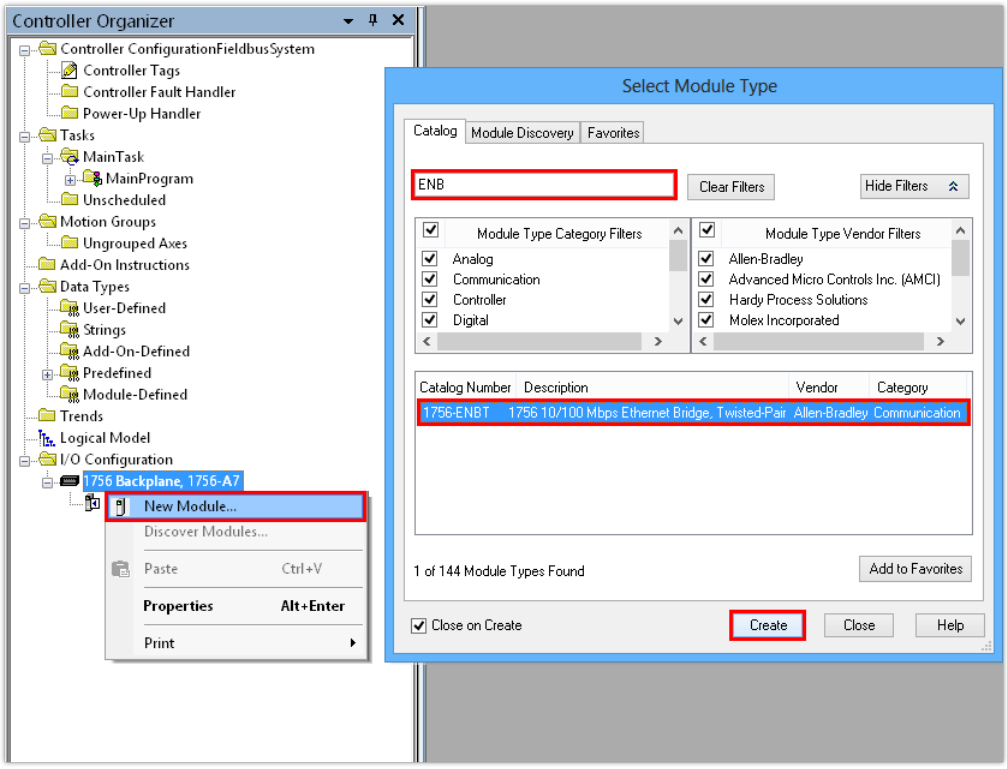
2. Select the EtherNet/IP™ scanner. Set a filter to reduce the number of modules shown in the module catalog.

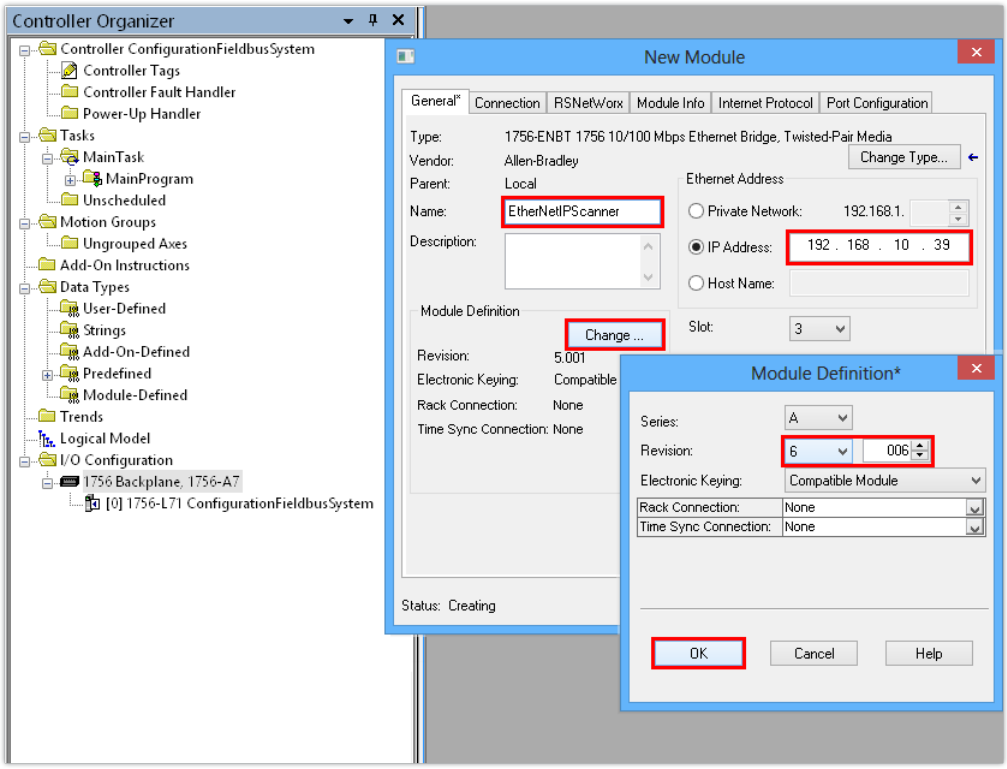


24493778699

⇨ In this example, there is a filter for "ENB" modules and the EtherNet/IP™ scanner "1756-ENBT" is used as the Ethernet interface.

3. Assign a name for the EtherNet/IP™ scanner.

4. Set the correct firmware version of the EtherNet/IP™ scanner.
5. Enter the IP address of the EtherNet/IP™ scanner. You can find the IP address on the display of the hardware module.



24493782411

⇨ In this example, the name of the EtherNet/IP™ scanner is: EtherNetIPScanner. The IP address of the EtherNet/IP™ scanner is: 192.168.10.39

5.4.4 Integrating and configuring the MOVI-C® CONTROLLER in the fieldbus network

The MOVI-C® CONTROLLER must also be added to the Logix Designer project, connected to the PLC, and configured.

During configuration, the MOVI-C® CONTROLLER is assigned a logical name, an IP address, and process data with addresses.

Proceed as follows:

✓ You have already downloaded the device description file (EDS file) of the MOVI-C® CONTROLLER from the SEW-EURODRIVE website → **www.sew-eurodrive.com** and saved it locally to the engineering PC (see the chapter "Installing the device description file of the MOVI-C® CONTROLLER" (→ 🗎 56)).

✓ You have configured the EtherNet/IP™ scanner in the Logix Designer.

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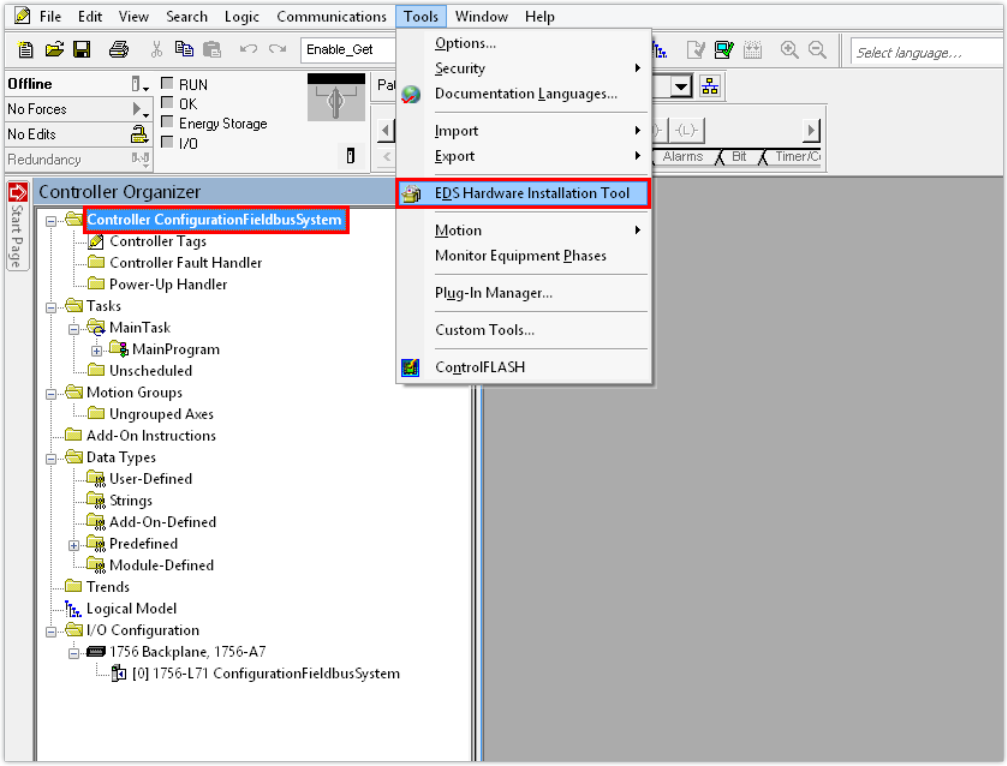
1. Load the device description file to the Studio 5000 Logix Designer.

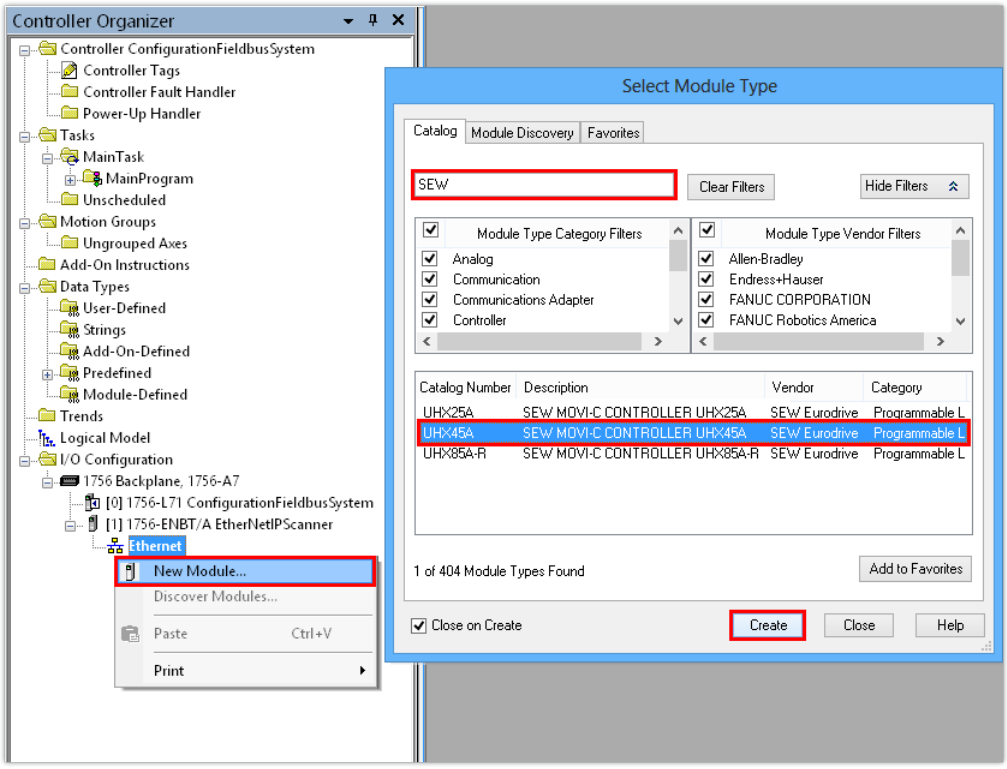


24496457739

2. Right-click to open the Ethernet interface context menu and add the communication partner.

   ⇨ A module catalog is displayed.

3. Select the MOVI-C® CONTROLLER. Set a filter to reduce the number of modules shown.



24811018507

⇨ In this example, there is a filter for "SEW module" and the MOVI-C® CONTROLLER standard UHX45A is the communication partner.

4. Enter a project name for the MOVI-C® CONTROLLER.
5. Enter the IP address of the MOVI-C® CONTROLLER. The PLC addresses the device using this IP address. Note that the IP address of the MOVI-C® CONTROLLER is different from the IP address of all other network stations and thus is unique. The network address (here the first 3 address blocks) for all network stations must be identical and the station address (here the last address block) must be different for all network stations.

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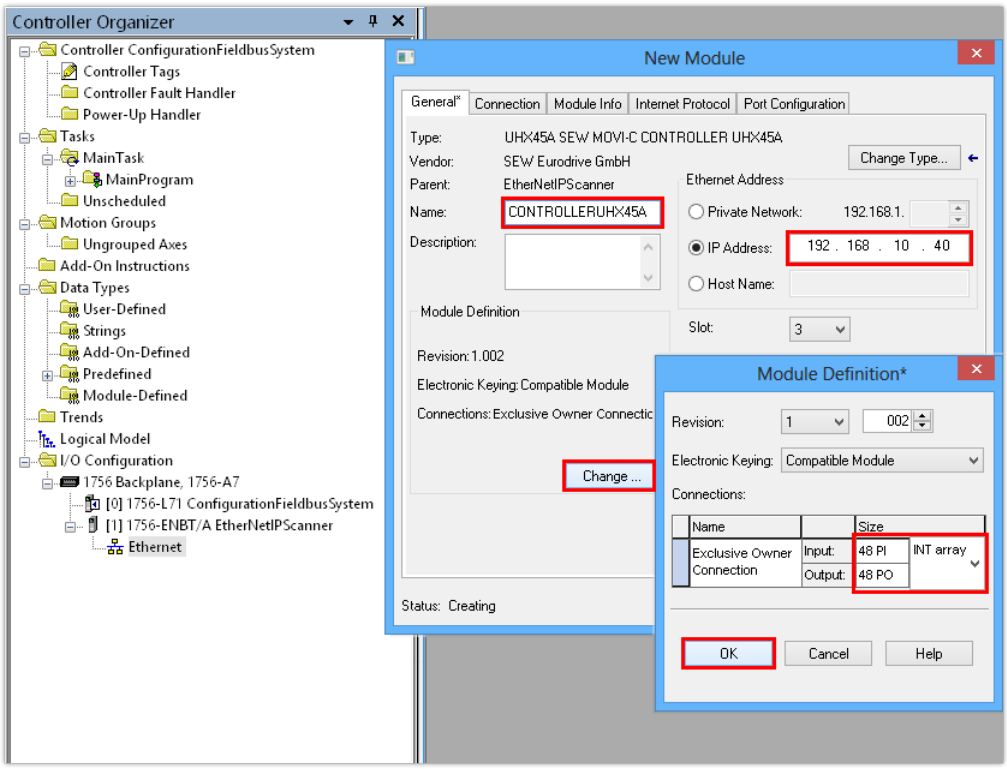
6. Select the number of process data words that you wish to use for communicating with the subordinated slaves. Set the data format for the process data words. The process data always contains 16 bits (data format INT).



24811176459

⇨ In this example, the IP address of the MOVI-C® CONTROLLER is: 192.168.10.40. 16 process data words are assigned to each application inverter module (slave of the MOVI-C® CONTROLLER) for communication. This makes a total of 3 x 16 = 48 process data words.

7. If the direct integration of the device description file is not supported, set the following connection parameters:

Assembly instance	Value
PO Data Exclusive Owner	120
PI Data Exclusive Owner	130
Listen Only	192
Input Only	193

8. Save the Logix Designer project.

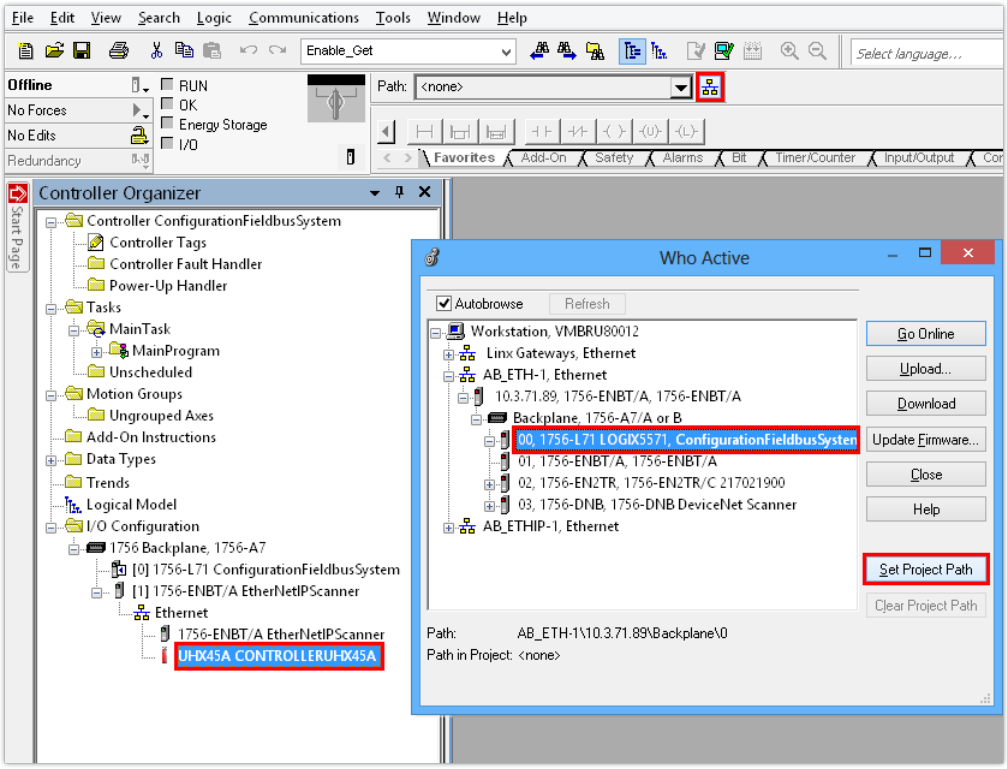
5.4.5 Setting up the project path

A project path is necessary for setting up a connection between the engineering PC and the PLC.

Proceed as follows:

✓ You configured the MOVI-C® CONTROLLER.

1. In the "Controller Organizer", select the MOVI-C® CONTROLLER and click on the network icon in the toolbar.
2. Set the project path to the relevant PLC.



24811493899

⇨ In this example, the PLC is: ControlLogix® 1756-L71.

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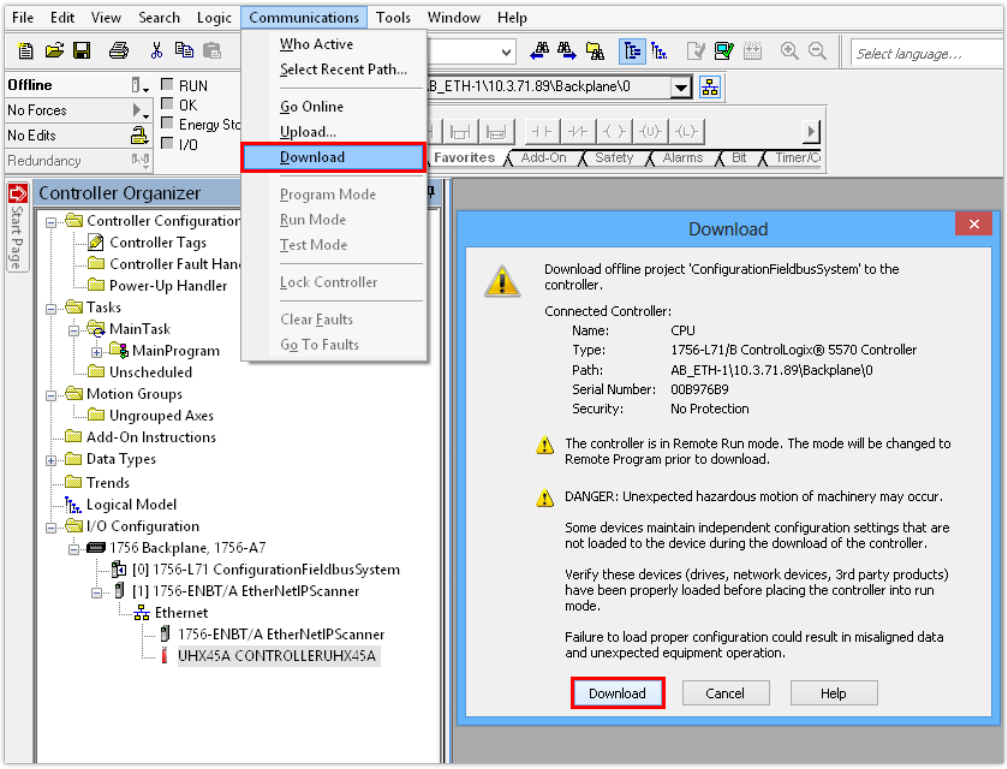
5.4.6 Loading the Logix Designer project to the PLC

Data (IP address, standard process data) that has been assigned to the fieldbus stations during configuration is first defined only in the Logix Designer project on the engineering PC. The data is transferred to the PLC and activated only when the project is loaded to the PLC.

Proceed as follows:

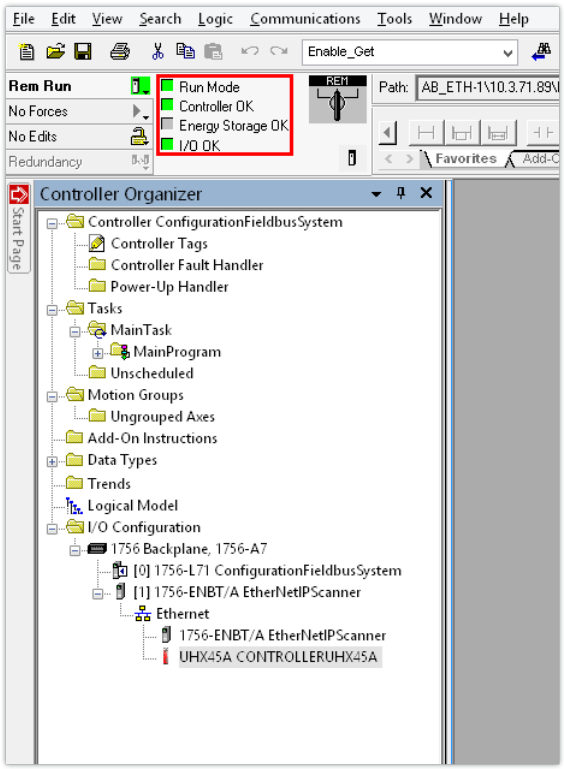
✓ You configured the MOVI-C® CONTROLLER.

1. Load the project to the PLC and then switch to RUN mode.



24811614603

⇨ As soon as you have set up the connection between the PLC and the MOVI-C® CONTROLLER, the message bits in the online toolbar turn green.



24811618315

5.4.7 Loading the MOVISUITE® project to the MOVI-C® CONTROLLER

The fieldbus interface for the slave connection has to be set in the MOVISUITE® project and the device configuration has to be loaded to the MOVI-C® CONTROLLER via the IEC Editor.

Proceed as follows:

✓ You integrated the MOVI-C® devices into a MOVISUITE® project.

1. Switch to the MOVISUITE® project.

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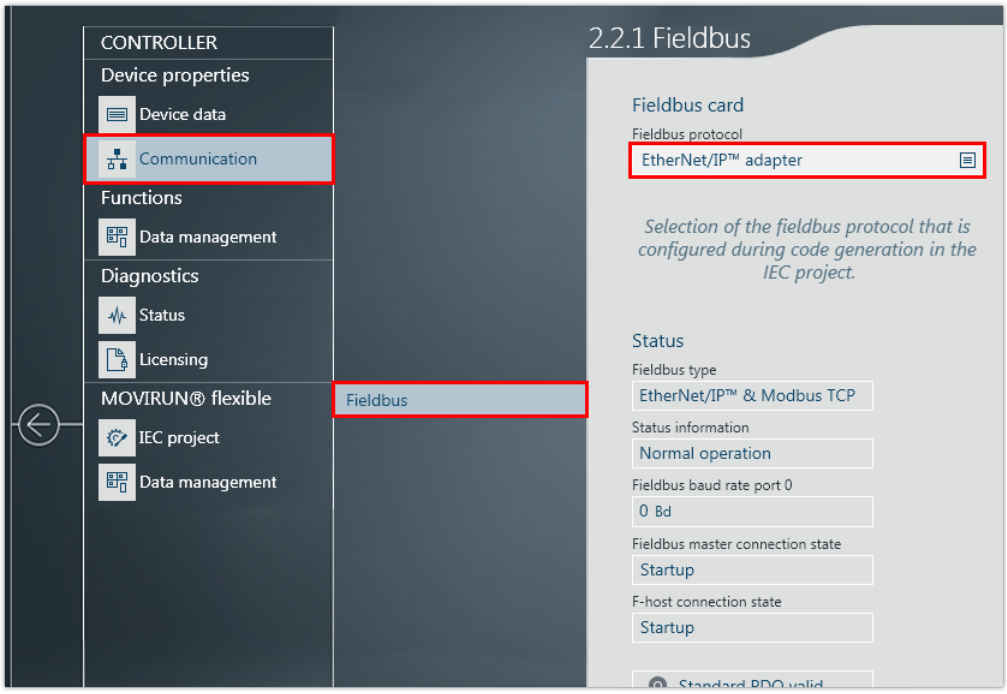
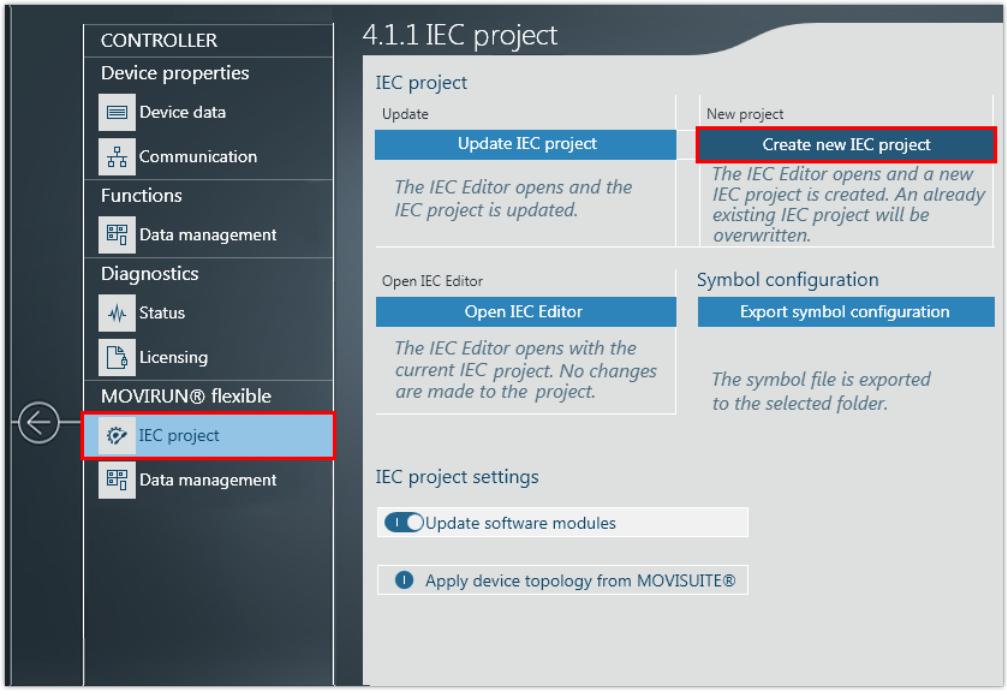
2. Open the configuration of the MOVI-C® CONTROLLER and set the fieldbus protocol.



24542461451

3. Start the IEC Editor with a new project.



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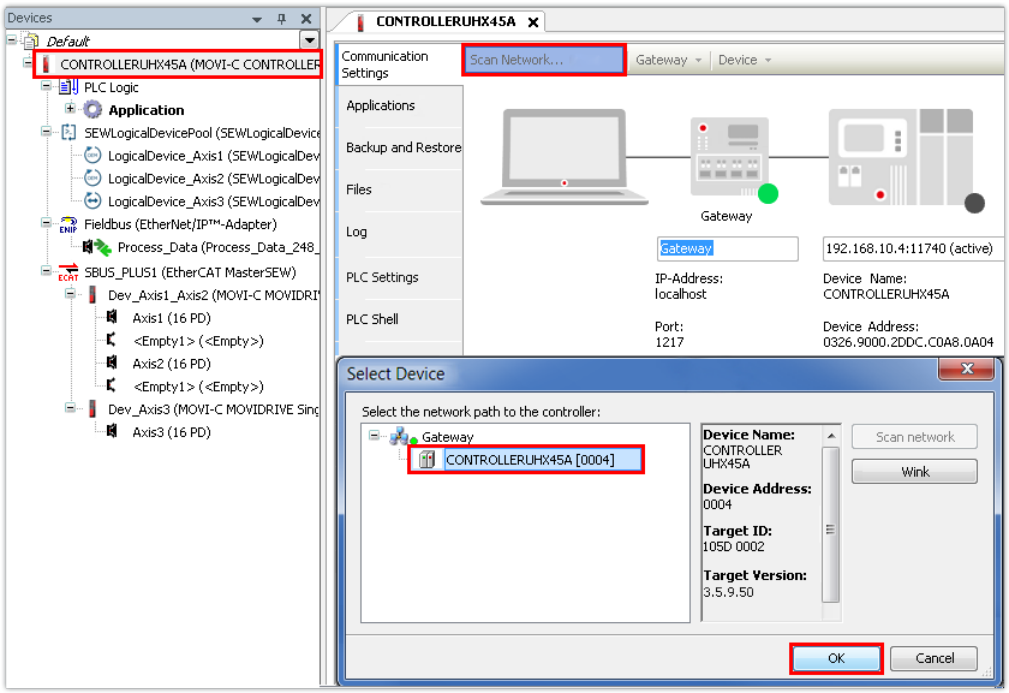
⇨ A message about the used compiler version is displayed.

4. It is necessary to keep the current compiler version. Click the [Cancel] button in the message window.

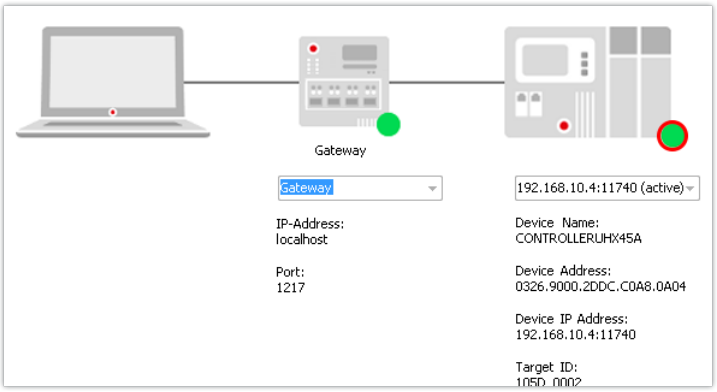
⇨ A new IEC Editor project is created. The device topology is shown in the device tree.

5. To set up a connection from the IEC Editor project to the MOVI-C® CONTROLLER, double-click on the MOVI-C® CONTROLLER in the device tree and scan the network. Add the found device.



24812052747

⇨ If the connection is established, the LED of the MOVI-C® CONTROLLER lights up green.



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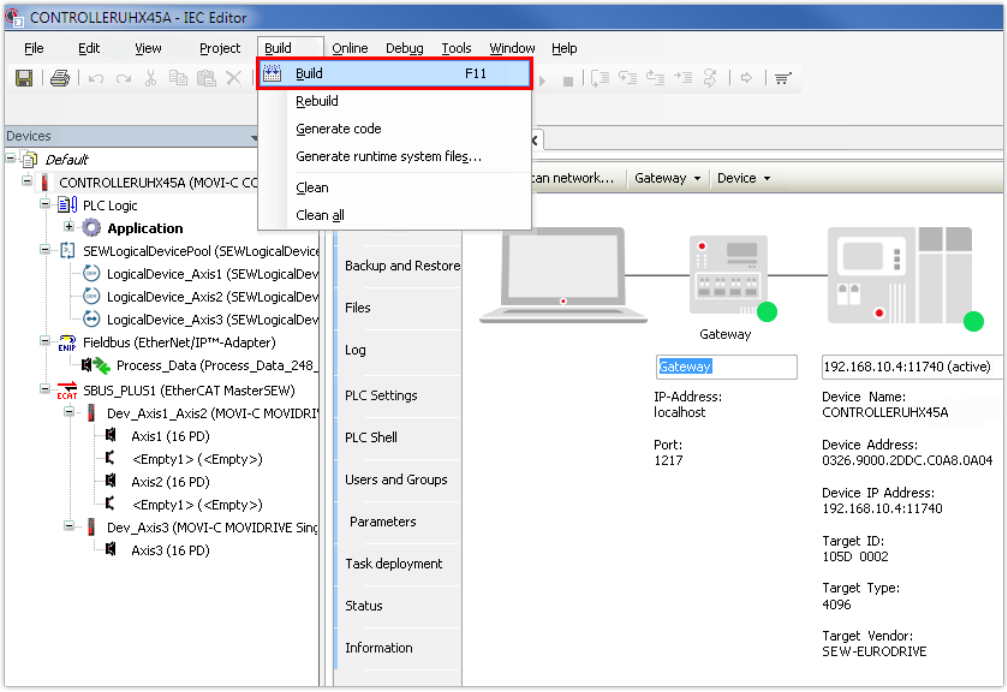
6. Build the IEC program in the machine code of the MOVI-C® CONTROLLER.



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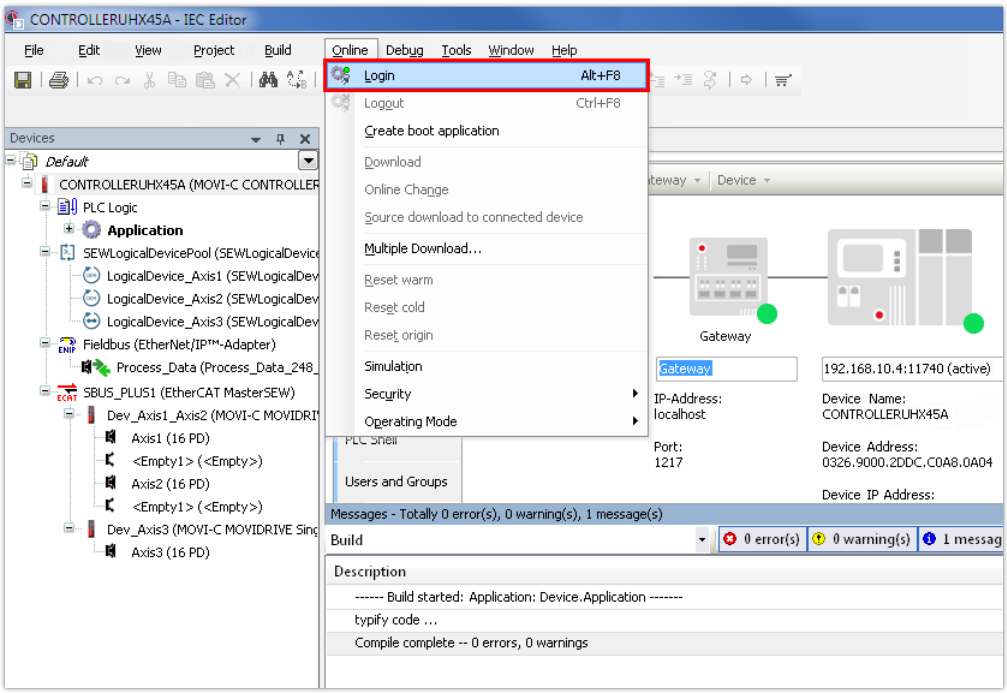
7. After successful compilation of the IEC program, the program can be transferred to the MOVI-C® CONTROLLER. For this purpose, log on to the network.

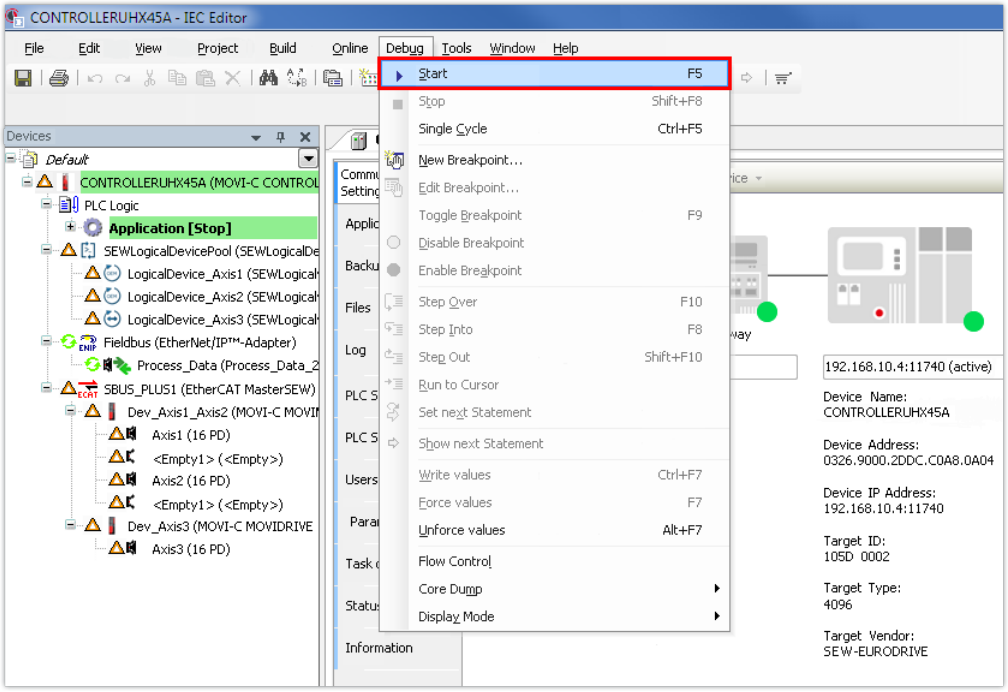


24813099019

⇨ A message is displayed that the IEC program (application) from the IEC Editor program has been created and loaded to the MOVI-C® CONTROLLER.

8. Confirm the message.

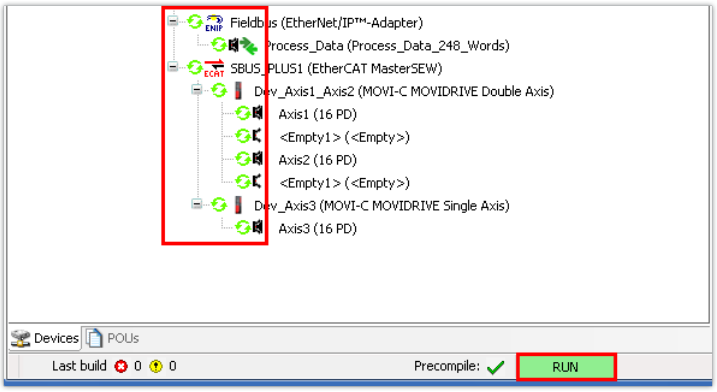
9. Start the IEC program.



24813103243

⇨ The MOVI-C® CONTROLLER starts. The message "RUN" is displayed in the status bar of the IEC editor.

⇨ The devices in the device tree are marked by a green circle. The green circle indicates fault-free function of the fieldbus interface but does not indicate the state of communication between the MOVI-C® CONTROLLER and the PLC.



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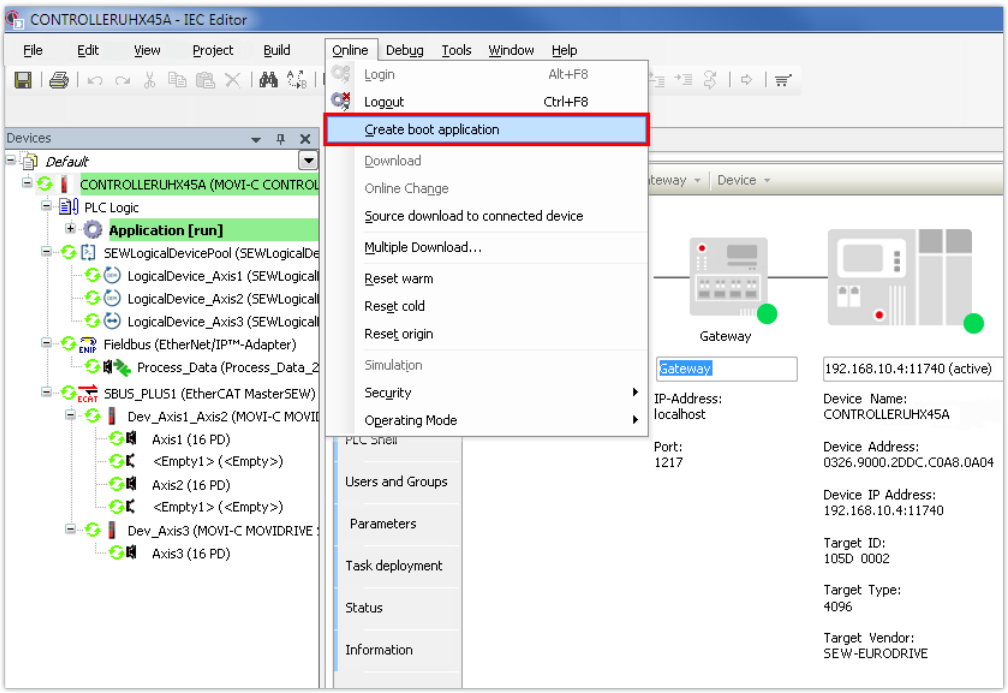
10. Create a boot project. This way, the IEC Editor project is stored on the SD memory card of the MOVI-C® CONTROLLER and is still available after a restart of the MOVI-C® CONTROLLER.



24813235467

⇨ The correct process data transfer between PLC and MOVI-C® CONTROLLER can now be tested.

5.5 Controlling the stations in test run

During successful communication between PLC and the MOVI-C® CONTROLLER, process data words are transferred between the devices without faults.

5.5.1 Transferring process data words to the MOVI-C® CONTROLLER

The process data exchange is monitored and controlled in Logix Designer with "Controller Tags".

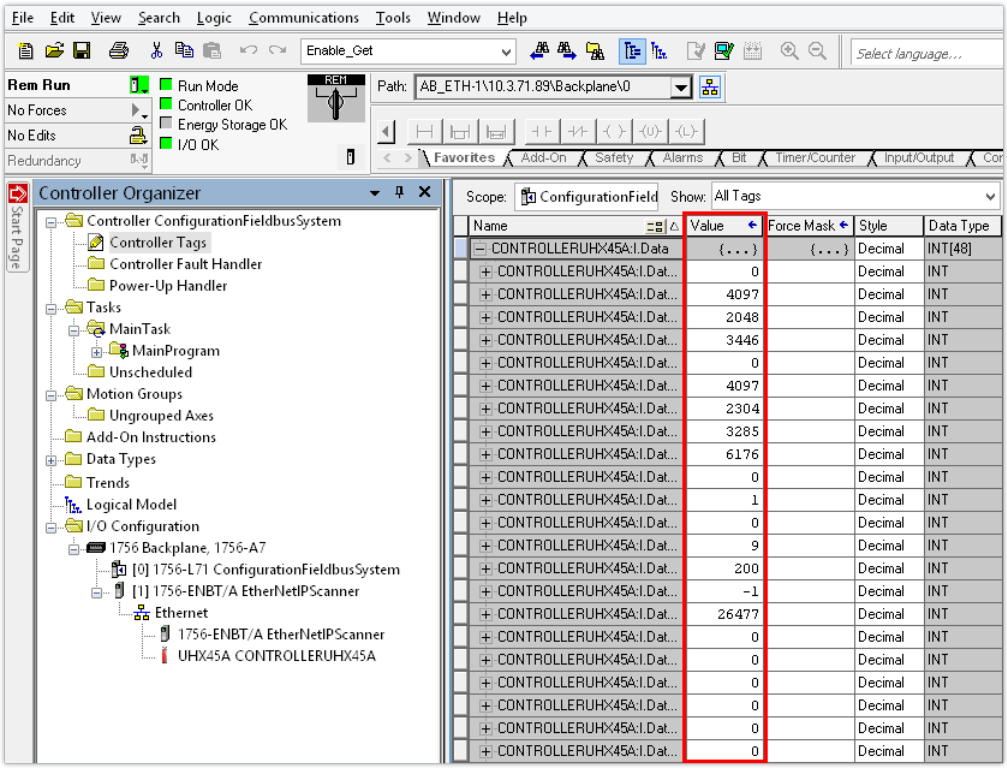
Proceed as follows:

✓ You loaded the MOVISUITE® project to the MOVI-C® CONTROLLER via the IEC Editor.

✓ The connection between the PLC and the MOVI-C® CONTROLLER is set up (the PLC is in RUN mode).

1. Switch to the Logix Designer project.
2. In the "Controller Organizer", select the "Controller Tags" area.

   ⇨ The right-hand screen pane displays the process data words that the PLC exchanges with the MOVI-C® CONTROLLER.



24814584075

⇨ In this example, these process output data words are sent to the MOVI-C® CONTROLLER.

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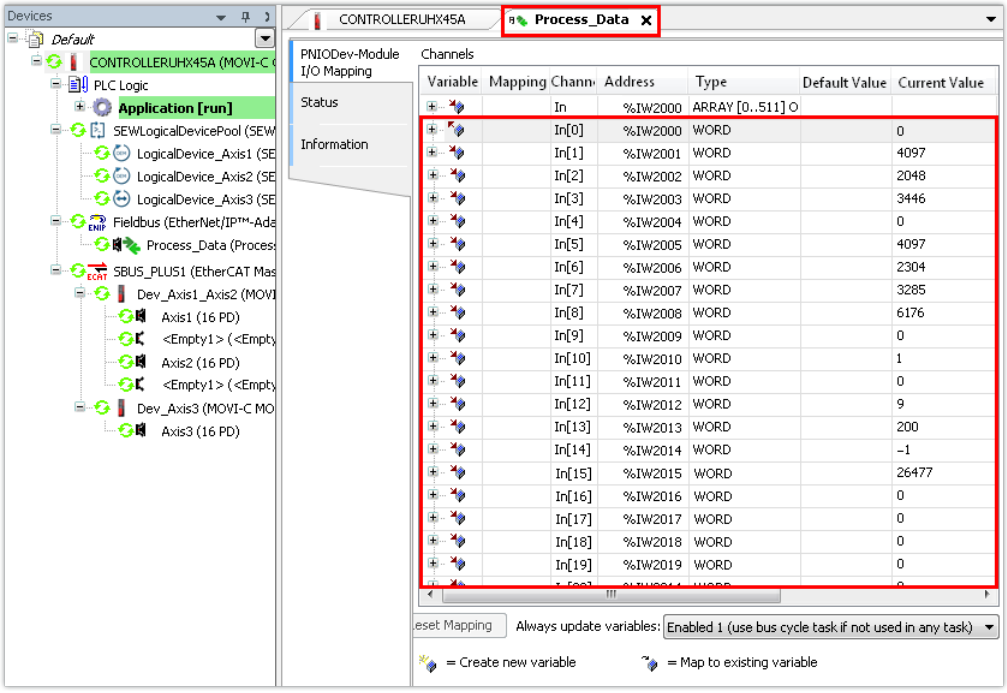
3. Switch to the IEC Editor project.
4. Double click the process data of the EtherNet/IP™ device in the device tree and check if the values of the process input data words of the MOVI-C® CONTROLLER are identical to the sent process output data words of the PLC.



24814590091

⇨ If the process data words sent by the PLC arrived at the MOVI-C® CONTROLLER, you have set up the communication successfully.

6 Procedure for device replacement

When replacing a MOVI-C® CONTROLLER, proceed as described in chapter "Installation notes" (→ 🗎 20). Insert the SD memory card of the previous MOVI-C® CONTROLLER into the new MOVI-C® CONTROLLER.

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

- Program the application (IEC program) accordingly.
- Load the data backup into the engineering software MOVISUITE® via the project management.

INFORMATION

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

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7 Service

7.1 Waste disposal

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

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

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

- Oil and grease

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

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

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8 Technical data

8.1 Markings

The MOVI-C® CONTROLLER complies with the following directives and guidelines:

Marking	Meaning
CE	CE mark to state compliance with the following European guidelines: • EMC Directive 2014/30/EU
EAC	EAC marking (**Eur**a**s**ian **C**onformity) to certify the conformity with the safety requirements of the Customs Union of Russia, Kazakhstan, and Belarus
c UL us LISTED	In preparation: UL-mark to confirm UL (**U**nderwriters **L**aboratory) In combination with the registration number the mark is also valid for CSA (**C**anadian **S**tandards **A**ssociation).
	RCM logo (**R**egulatory **C**ompliance **M**ark) to confirm compliance with the technical regulations of the **A**ustralian **C**ommunications and **M**edia **A**uthority ACMA
50	RoHS Directive (**R**estriction **o**f **H**azardous **S**ubstances) of the People's Republic of China to confirm compliance with the regulations of the ACPEIP (**A**dministration on the **C**ontrol of **P**ollution caused by **E**letronic **I**nformation **P**roducts)
	WEEE Directive 2012/19/EU (**W**aste of **E**lectrical and **E**lectronic **E**quipment) of the European Union on specific recycling of batteries

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8.2 General

General technical data	
Interference immunity	Meets EN 61800-3; 2. Environment
Interference emission	Limit value category C2 to EN 61800-3
Ambient temperature ϑ_{amb}	0 °C – +60 °C
Type of cooling	Convection cooling

Environmental conditions	
Climatic requirements	• Extended storage: EN 60721-3-1 class 1K2 temperature -25 °C – +70 °C • Transportation: EN 60721-3-2 class 2K3 temperature -25 °C – +70 °C • Operation (fixed installation, weatherproof): EN 60721-3-3 class 3K3 temperature 0 °C – +60 °C
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 testing	• 3M5 according to EN 60721-3-3 • 5M1 according to EN 60721-3-5

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

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8.3 Compact controller

MOVI-C® CONTROLLER advanced UHX45A	
Electrical supply	• Power consumption: P_{max} = 12 W • Supply voltage V = DC 24 V (-15% / +20%) in accordance with IEC 61131-2 • Current consumption I_{max} = 500 mA (with DC 24 V supply voltage) • The MOVI-C® CONTROLLER has to be supplied by an external voltage source.
Memory	• Retain data: 32 kB • Retain persistent: 2 kB • Program sequences: 2 MB for application, including IEC libraries • Data memory: 6 MB
OMH45A SD memory card in the XM SD card slot	• PC-readable • Contents: – Firmware – IEC program – Application data • 512 MB memory
X5 DC 24 V supply voltage connection (2-pin connection)	Connection type: Plug connector • 1 core: 0.25 mm² – 2.5 mm² • 2 cores: 0.5 mm² – 1.5 mm² (TWIN-AEH[1])
X30 (RJ45 socket) EtherCAT®/SBus^{PLUS} interface	Fast system bus SBus^{PLUS} based on EtherCAT® for master connection
X40/X41 fieldbus interface (RJ45 socket)	Fieldbus interfaces for slave connection: • MOVI-C® CONTROLLER UHX45A-N: PROFINET IO • MOVI-C® CONTROLLER UHX45A-E: EtherNet/IP™ or Modbus TCP
X80/X81 Engineering interface (RJ45 socket)	• TCP/IP • Possible connections: Engineering PC, visualization, other controller • Engineering for all SEW-EURODRIVE components connected to the MOVI-C® CONTROLLER can be performed via the MOVI-C® CONTROLLER.
X85 System bus and RS485 interface (9-pin connection)	Connection type: Plug connector, 1 core: 0.25 mm² – 0.75 mm²

1) AEH: Conductor end sleeve

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8.4 Master module

MOVI-C® CONTROLLER advanced UHX45A /MDM90A	
Electrical supply	• Power consumption: P_{max} = 972 W • Supply voltage V = DC 24 V (-15% / +20%) according to IEC 61131-2 • Current consumption I_{max} = 40.5 A (with DC 24 V supply voltage)
X5_A External DC 24 V supply voltage (2-pin connection)	Connection type: Plug connector with strain relief • 1 core: 0.5 mm² – 16 mm² • 2 cores: 0.25 mm² – 6 mm² (TWIN-AEH[1)]) Tightening torque: 1.7 – 1.8 Nm
X5_B Output for the DC 24 V supply voltage (2-pin connection)	Connection type: Plug connector via prefabricated connection
X5 Connection DC 24 V supply voltage	Connection type: CU bars 2 x 5 mm², M4 screw fitting
PE connection	Connection type: CU bar 3 × 14 mm², M6 screw fitting
XF Safe DC 24 V supply voltage	Type: 5 x 20 mm glass tube, 4 A, 125 V, slow-blow

1) AEH: Conductor end sleeve

8.5 Technical data of the EtherNet/IP™ interface

MOVI-C® CONTROLLER advanced UHX45A	
Manufacturer ID	013Bhex
Product code	18hex
Connection technology	RJ45
Baud rate	100 MBd/10 MBd (full duplex/half duplex)
Maximum process data length	248 PD
Application protocols	EtherNet/IP™, Modbus TCP, SNMP, DHCP, SEW Application Services
Port numbers used	67/68, 161, 310, 502, 2222, 44818
Application profiles	CIP Safety (in preparation)
Permitted cable types	Category 5 and higher, class D in accordance with IEC 11801
Maximum cable length (switch to switch)	100 m
GSD file name	SEW MOVI-C CONTROLLER UHX45A.eds

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8.6 Port overview

8.6.1 Interface description

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

- X30 – EtherCAT®/SBus^{PLUS} interface for master connection
- X40/X41 – Fieldbus interface for slave connection
- X80/X81 – Engineering interface
- X85 – System bus interface and RS485 interface

8.6.2 Engineering interface

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

8.6.3 EtherNet/IP™

Port	TCP/ UDP	Function	Authorization
Ethertype 88B5hex		Address Editor from SEW-EURODRIVE	Reading and writing of all address parameters of the Ethernet interface
67/68	UDP	DHCP	Reading and writing of all address parameters of the Ethernet interface
161	UDP	SNMP	Reading on MIBs
310	TCP	Data streaming	Reading and writing of all indexed parameters
502	TCP	Modbus TCP	Process data exchange; reading and writing of all indexed parameters
2222	UDP	EtherNet/IP™	Process data exchange; reading and writing of all indexed parameters
44818	TCP/ UDP	EtherNet/IP™	Parameter exchange; reading and writing of all indexed parameters

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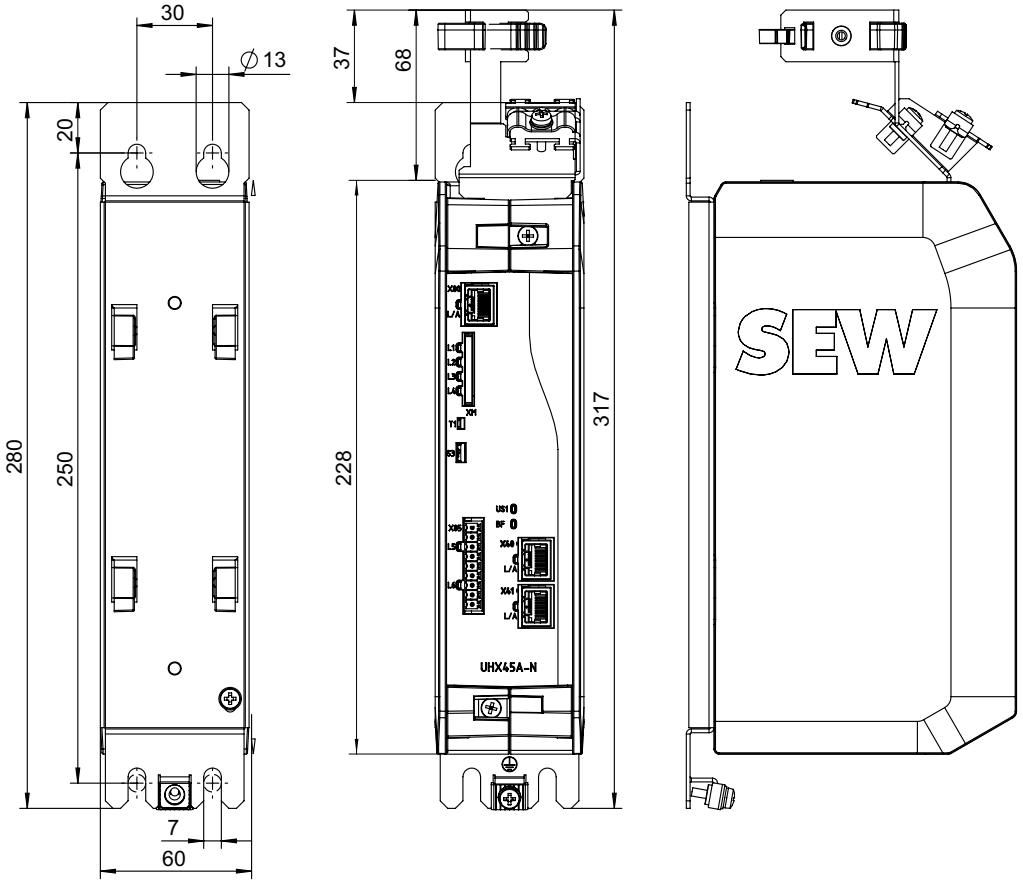
8.7 Dimension drawing MOVI-C® CONTROLLER advanced

8.7.1 Compact controller



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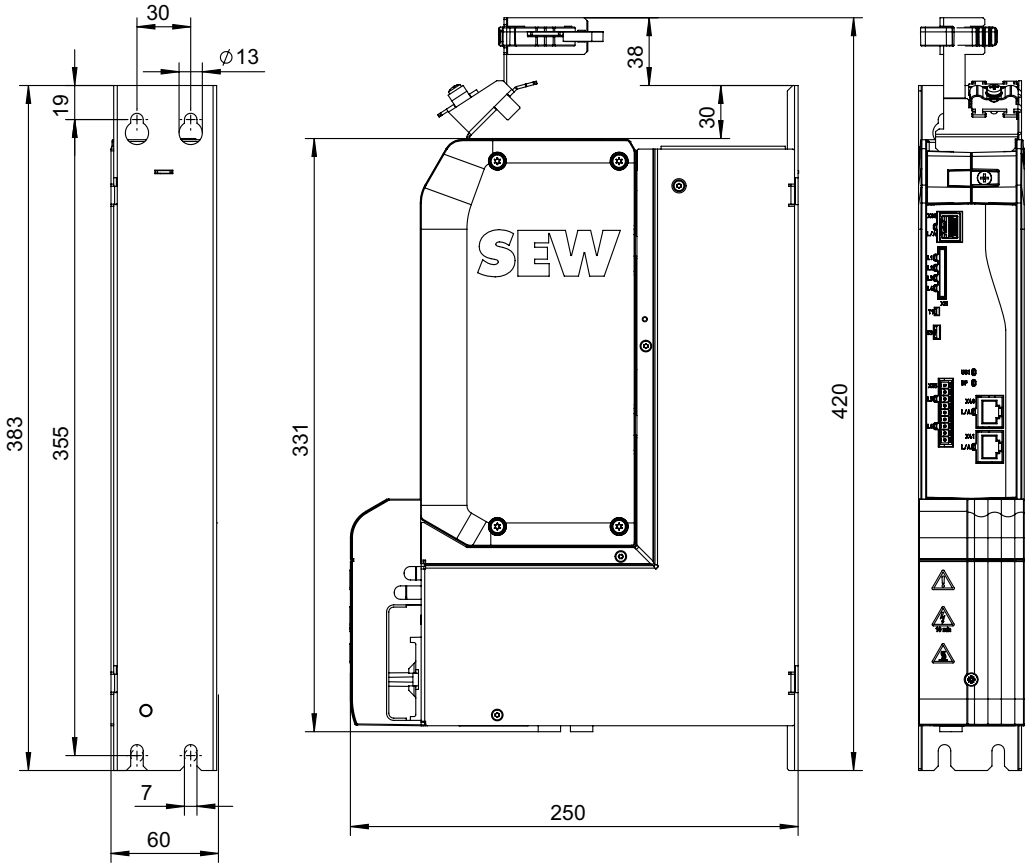
8.7.2 Master module



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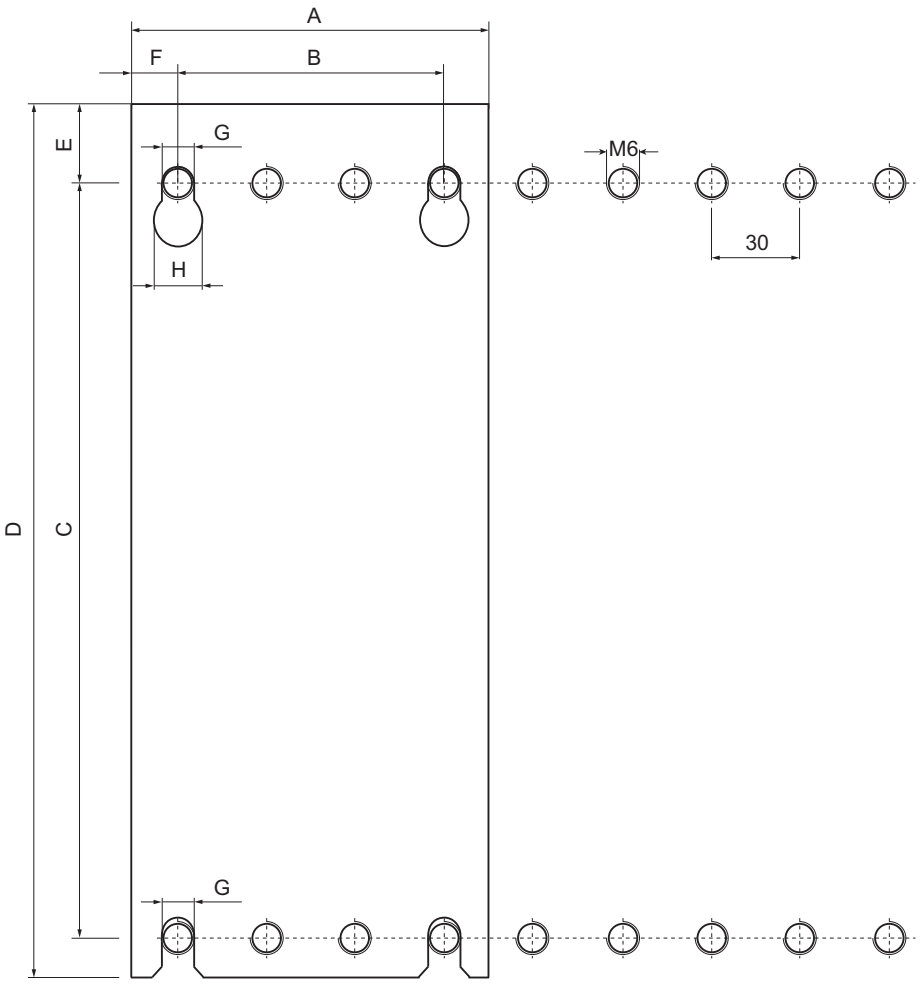
Drilling template



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The following table shows the dimensions in mm of the device base plate for the L-carrier MDM90A:

A	B	C	D	E	F	G	H
60	30	355	383	19	15	7	13

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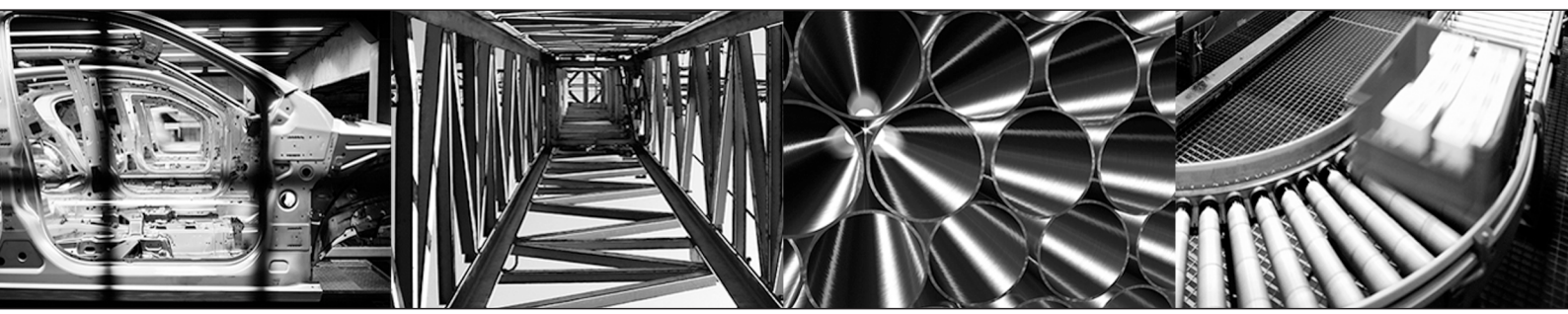

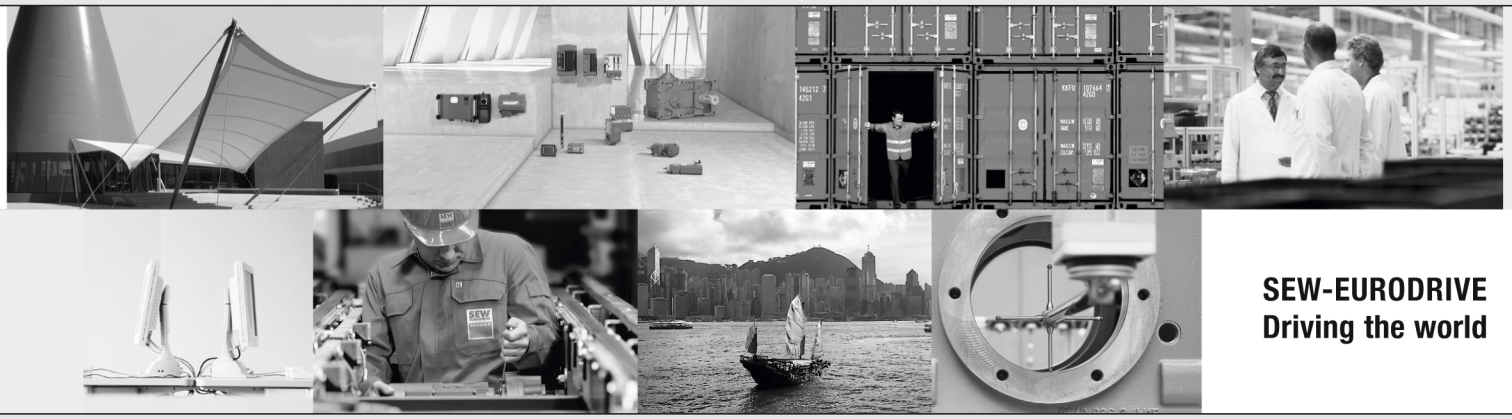

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