SEW EURODRIVE

Manual

Controllers of the MOVI-C® Modular Automation System

Startup with EtherNet/IP™

Edition 01/2022

29279550/EN

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1 General information

1.1 About this documentation

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 with 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 Content of the documentation

The descriptions in this documentation apply to the software and firmware versions applicable at the time of publication. These descriptions might differ if you install later software or firmware versions. In this case, contact SEW-EURODRIVE.

1.3 Other applicable documentation

This documentation supplements the operating instructions of the associated product. Use this documentation only in connection with the operating instructions.

Observe the following other applicable documentation:

- "MOVI-C® CONTROLLER standard UHX25A" operating instructions
- "MOVI-C® CONTROLLER advanced UHX45A" operating instructions
- "MOVI-C® CONTROLLER progressive UHX65A" operating instructions
- "MOVI-C® CONTROLLER power UHX85A" operating instructions
- "MOVI-C® FIELD CONTROLLER standard/advanced MFC1../FHX operating instructions
- "MOVIDRIVE® modular Application Inverters" operating instructions
- "MOVIDRIVE® system Application Inverters" operating instructions
- "MOVITRAC® advanced Inverters" operating instructions
- "MOVIMOT® flexible MMF1..-C/DSI.., MMF3..-C/DSI.." operating instructions
- "MOVIMOT® advanced DRN..DSI.." operating instructions
- "MOVIMOT® performance CM3C..DSI.." operating instructions
- "MOVIGEAR® performance MGF..-DSI-C" operating instructions
- "MOVIDRIVE® modular/system/technology safety card MOVISAFE® CS..A" manual
- "MOVI-C® Decentralized Electronics Safety Option MOVISAFE® CSB51A" manual

Always use the latest edition of the documentation and the 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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1.4 Structure of the safety notes

1.4.1 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.	

1.4.2 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.

Meaning of the hazard symbols

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

Hazard symbol	Meaning
	General hazard

1.4.3 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.

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1.5 Decimal separator in numerical values

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

Example: 30.5 kg

1.6 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.

1.7 Product names and trademarks

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

1.7.1 Trademark of Beckhoff Automation GmbH

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

1.8 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 Target group

Software specialist

Any work with the software may only be performed by a specialist with suitable training. A specialist in this context is someone who has the following qualifications:

- Appropriate training
- Knowledge of this documentation and other applicable documentation
- SEW-EURODRIVE recommends additional training for products that are operated using this software.

The above-mentioned persons must have the authorization expressly issued by the company to operate, program, configure, label, and ground devices, systems, and circuits in accordance with the standards of safety technology.

2.3 Network security and access protection

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

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

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

2.4 Designated use

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

If you also use other components, also pay attention to the technical data and conditions that apply to them.

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3 Introduction

3.1 Short designation

The following short designations are used in this document.

Type designation	Short designation
Controllers of the MOVI-C® modular automation system in the control cabinet: • MOVI-C® CONTROLLER standard UHX25-E • MOVI-C® CONTROLLER advanced UHX45-E • MOVI-C® CONTROLLER progressive UHX65A-R • MOVI-C® CONTROLLER power UHX85-R	Controller/ EtherNet/IP™ slave
Decentralized controllers of the MOVI-C® modular automation system: • MOVI-C® FIELD CONTROLLER standard MFC1../FHX25-E • MOVI-C® FIELD CONTROLLER advanced MFC1../FHX45-E	Controller/ EtherNet/IP™ slave
Control cabinet inverters of the MOVI-C® modular automation system: • MOVIDRIVE® modular • MOVIDRIVE® system • MOVITRAC® advanced	Inverter
Decentralized inverters of the MOVI-C® modular automation system (in the DSI communication version): • MOVIGEAR® performance • MOVIMOT® flexible • MOVIMOT® advanced • MOVIMOT® performance	Inverter
Higher-level controller	PLC/EtherNet/IP™ scanner

3.2 Content of this document

This document describes the startup of a MOVI-C® CONTROLLER progressive UHX65A-R with the EtherNet/IP™ fieldbus interface on a higher-level programmable logic controller (PLC) from Rockwell Automation as an example.

The startup of the other controllers in the MOVI-C® modular automation system is performed in the same way.

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3.3 MOVISUITE® engineering software

The MOVISUITE® engineering software is the operating platform for all hardware and software components of the MOVI-C® modular automation system.

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

- Project planning
- Startup
- Parameterization
- Programming
- Diagnostics
- Analysis using the scope function

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4 Industrial Ethernet networks – Basics

4.1 TCP/IP addressing and subnets

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 subnets are explained in this chapter to help you set the parameters correctly.

4.2 MAC address

The MAC (**M**edia **A**ccess **C**ontroller) address is the basis for all address settings. The MAC address is a globally unique 6-byte value (48 bits) assigned to the Ethernet device. The MAC address of Ethernet devices from SEW-EURODRIVE is 00-0F-69-xx-xx-xx.

4.3 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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4.4 Network class

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

Range of values (byte 1 of the 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.

4.5 Subnet 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:

Example of a 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
Meaning	**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.

4.6 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.

4.7 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 EtherNet/IP™ networks – Recommendations

The Ethernet Industrial Protocol (EtherNet/IP™) is an open communication standard based on the conventional Ethernet protocols TCP/IP and UDP/IP.

EtherNet/IP™ has been defined by the **O**pen **D**eviceNet **V**endor **A**ssociation (ODVA) and **C**ontrolNet **I**nternational (CI).

EtherNet/IP™ extends the Ethernet technology by the CIP application protocol (**C**ommon **I**ndustrial **P**rotocol). CIP is known in the field of automation engineering because it is also used as an application protocol for DeviceNet™ and ControlNet™.

INFORMATION

Adhere to the information and regulations of the ODVA when planning your EtherNet/IP™ network and taking it into operation.

This chapter describes the most important conditions to be observed for planning and operating an EtherNet/IP™ network. The list is not complete.

5.1 Network components

Observe the following when selecting the network components for an EtherNet/IP™ network:

- Use only industry-standard network components.
- Use industry-standard switches.
- Use fast Ethernet according to IEEE802.3u.
- The managed switch must support VLAN tagging according to IEEE802.1Q.

5.2 Maximum line depth

It is recommended to use a maximum of 50 fieldbus nodes in a line regardless of the poll rate.

5.3 Network load

The network load should not exceed 80% of the bandwidth at any point in the network.

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6 Engineering access of the controllers

6.1 Standard engineering access

The standard engineering access differs depending on the device design.

The following table shows the access options from an engineering PC to the various controllers:

Connection: Via the Ethernet interface of the PC	Connection to device	Device
Ethernet connection cable RJ45/RJ45, industry standard	X80 Standard engineering interface	UHX25A UHX45A UHX65A
	X81	UHX45A UHX65A
	LAN 3 Standard engineering interface	UHX85A
Ethernet connection cable RJ45/M12, industry standard	X4224 Standard engineering interface M12 plug connector, 4-pin, female, D-coded	MFC1../FHX

The standard engineering interface is available on all controllers. It has the following IP address settings in the delivery state:

- IP address: 192.168.10.4
- Subnet mask: 255.255.255.0
- Standard gateway: 192.168.10.4

Some device versions have additional engineering accesses but these differ depending on the variant.

6.2 Engineering via Ethernet/IP™ interface

In principle, engineering is possible via the Ethernet/IP™ interface. Engineering via the Ethernet/IP™ interface is subject to the following limitations:

- Speed

  The Ethernet/IP™ interface is designed for process data exchange and reliability. The Ethernet/IP™ interface is not optimized for transmission of large amounts of data, such as IEC projects.

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- IP stack

  The IP stack is part of the IEC project. If an IEC project is loaded without fieldbus stations, a connection to the device via the Ethernet/IP™ interface is no longer possible.

- IP address

  The initial IP address is specified in the IEC project. When communication via the Ethernet/IP™ interface is started, the IP address is rewritten by the Ethernet/IP™ scanner. A connection via the initial Ethernet/IP™ interface is then no longer possible.

INFORMATION

SEW-EURODRIVE recommends using the standard engineering interface for startup.

As soon as the project on the controller has reached a stable state, e.g. when regular updates and downloads of the IEC project are no longer required, the EtherNet/IP™ interface can be used for engineering. If already known, assign the correct IP address in the IEC project in the properties of the fieldbus station.

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7 Operating behavior on EtherNet/IP™

The controller is an EtherNet/IP™ scanner.

7.1 EtherNet/IP™ interface

The supported features of the EtherNet/IP™ fieldbus interface can be found in the "Technical data" chapter in the operating instructions of the respective controller.

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.

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.

7.1.1 The integrated Ethernet switch

The controller 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

Note that an IEC program with a suitable fieldbus station must be loaded on the MOVI-C® CONTROLLER progressive UHX65 and MOVI-C® CONTROLLER power UHX85 to support the integrated Ethernet switch.

Switch latency time

The number of industrial Ethernet switches connected in line impacts the telegram runtime. If a telegram passes through the bus stations, the telegram runtime is delayed by the latency time of the Ethernet switch.

The integrated switch operates using the cut-through method. The latency time is about 5.5 µs.

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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7.2 Device description file

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 requirement for proper device configuration with the EtherNet/IP™ fieldbus interface is that the matching device description file (EDS file) is used in the engineering tool of the EtherNet/IP™ controller. The file contains all the relevant data for engineering and for the data exchange of the device.

The current version of the device description file is available on the homepage of SEW-EURODRIVE (www.sew-eurodrive.com). Search for "EDS file" on the [Online Support] > [Data & Documents] > [Software] page.

The following table shows the names of the device description files of the individual devices:

Device	Device description file
MOVI-C® CONTROLLER standard UHX25A-E	`SEW MOVI-C CONTROLLER UHX25A.eds`
MOVI-C® CONTROLLER advanced UHX45A-E	`SEW MOVI-C CONTROLLER UHX45A.eds`
MOVI-C® CONTROLLER progressive UHX65A-R	`SEW_UHX65A.eds`
MOVI-C® CONTROLLER power UHX85-R	`SEW_UHX85A.eds`
MOVI-C® FIELD CONTROLLER standard MFC1../FHX25-E	`SEW MOVI-C CONTROLLER FHX25A.eds`
MOVI-C® FIELD CONTROLLER advanced MFC1../FHX45-E	`SEW MOVI-C CONTROLLER UHX45A.eds`

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7.3 Process data configuration

The controller is controlled via the process data channel. The process data words are created via module configuration in the startup software and are mapped accordingly in the I/O section of the EtherNet/IP™ scanner.

The configuration depends on the device family and must be adjusted accordingly.

The following table shows the maximum number of process data words that can be used for communication depending on the device family:

Controller	Maximum number of process data words
UHX25	128
UHX45	256
UHX65	512
UHX85	512
MFC1../FHX25-N	128
MFC1../FHX45-N	256

When configuring the application and communication, also observe the maximum number of 1500 bytes on EtherCAT®/SBus^{PLUS}.

7.4 IP address settings

The standard engineering interfaces of the controllers (see chapter "Standard engineering access" (→ 🗎 15)) have the following IP address settings in the delivery state:

- IP address: 192.168.10.4
- Subnet mask: 255.255.255.0
- Standard gateway: 192.168.10.4

With the following controllers, the DIP switch can be used to set whether the IP address is fixed at 192.168.10.4 or whether the address set by the user on the memory card is used:

- MOVI-C® FIELD CONTROLLER standard MFC1../FHX25-E
- MOVI-C® FIELD CONTROLLER advanced MFC1../FHX45-E
- MOVI-C® CONTROLLER standard UHX25-E
- MOVI-C® CONTROLLER advanced UHX45-E

For a description of the individual functions of the DIP switches, refer to the operating instructions of the respective device. You can download the documentation from the SEW-EURODRIVE website (www.sew-eurodrive.com) in various languages.

The IP address is not retained when the delivery state is restored.

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7.5 Bus-specific LEDs for EtherNet/IP™

The following table shows an overview of the bus-specific LEDs of the controllers of the MOVI-C® modular automation system:

Controller	Status LED
MOVI-C® CONTROLLER standard UHX25A-E	MS (Module Status) NS (Network Status) L/A
MOVI-C® CONTROLLER advanced UHX45A-E	MS (Module Status) NS (Network Status) L/A
MOVI-C® CONTROLLER progressive UHX65A-R	L40 (corresponds to "MS" status LED) L41 (corresponds to "NS" status LED) L/A
MOVI-C® CONTROLLER power UHX85-R	L23.2 (corresponds to "NS" status LED) L23.3 (corresponds to "MS" status LED) L23.4 (SYS) L/A
MOVI-C® FIELD CONTROLLER standard MFC1../FHX25-E	MS (Module Status) NS (Network Status) L/A
MOVI-C® FIELD CONTROLLER advanced MFC1../FHX45-E	MS (Module Status) NS (Network Status) L/A

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7.5.1 "MS" status LED (module status)/"L40"/"L23.3"

The "MS" status LEDs (correspond to "L40" or "L23.3" status LED) is present in all controllers.

LED	Meaning	Measure
– **Off**	No power supply or DC 24 V supply.	• Check the voltage supply.
Green **Flashing**	The device has not been configured yet.	• Configure the device. • Check the DHCP server connection (only if DHCP is activated and in persistent status).
Green **Illuminated**	Device OK.	–
Red **Flashing**	A correctable fault has occurred on the device.	• Check whether there is another device with the same IP address in the network. • Change the IP address of the device. • Check the DHCP settings for IP address assignment of the DHCP server (only when using a DHCP server).
Red **Illuminated**	A fault that cannot be corrected has occurred on the device.	• Switch on the device again. • Reset the device to the factory settings. • If this fault occurs repeatedly, replace the device or contact SEW-EURODRIVE Service.
Red/green **Flashing**	The device performs a LED test. This state may only be active for a short time during startup.	–

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7.5.2 "NS" status LEDs (network status)/"L41"/"L23.2"

The "NS" status LED (corresponds to "L41" or "L23.2" status LED) is present in all controllers.

LED	Meaning	Measure
– **Off**	Device is switched off. No DC 24 V supply.	• Check the DC 24 V voltage supply. • Switch on the device again.
	The IP address is not set.	• Set the IP address.
Green **Flashing**	The connection to the Ethernet master has failed. The device does not detect a connection to the Ethernet master (bus error).	• Check the Ethernet connection of the device. • Check all Ethernet connections.
Green **Illuminated**	The IP address is set. The Ethernet connection has been established.	–
Red **Flashing**	Timeout delay of the controlling connection has expired. The state is reset by restarting communication.	• Check the fieldbus connection. • Check the master/scanner. • Check all Ethernet connections.
Red **Illuminated**	Conflict detected in IP address assignment.	• Check whether there is another device with the same IP address in the network. • Change the IP address of the device. • Check the DHCP settings for IP address assignment of the DHCP server (only when using a DHCP server).
Red/green **Flashing**	The device performs a LED test. This state may only be active for a short time during startup.	–

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7.5.3 "L23.4" status LED (SYS)

The "L23.4" status LED is only present in the MOVI-C® CONTROLLER progressive UHX85A-R.

Status	Meaning
Green	Fieldbus slave OK.
Orange	Fieldbus slave is initialized.

7.5.4 "L/A" status LEDs (Link/Activity)

The "L/A" status LED is present in all controllers.

The status LED indicates the physical status of the corresponding Ethernet port.

Status	Meaning
All LEDs Green Permanently lit	A physical connection to another Ethernet node was detected. No data is currently exchanged via the Ethernet port.
All LEDs Off	No physical connection to further Ethernet nodes was detected.
LED at the respective Ethernet port Green/yellow, flashing	Data is being sent or received via the Ethernet port.

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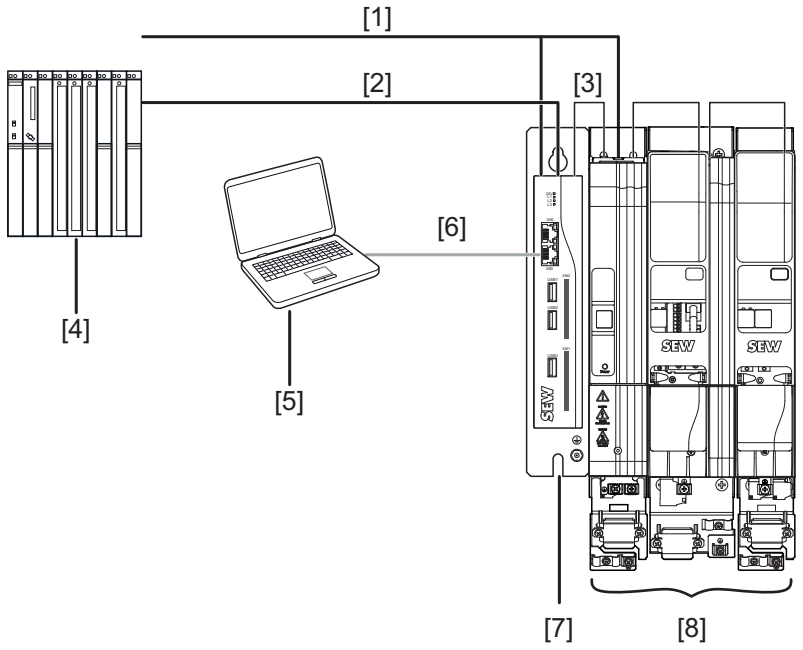
8 Startup with EtherNet/IP™

8.1 Engineering PC – Controller connection

The standard engineering interfaces have the following IP address settings in the delivery state:

- IP address: 192.168.10.4
- Subnet mask: 255.255.255.0
- Standard gateway: 192.168.10.4
- Connect the MOVI-C® CONTROLLER UHX.. to the engineering PC via the standard engineering interface X80 or LAN3 using an Ethernet connection cable RJ45/RJ45. The following illustration is a schematic representation of the device topology using the MOVI-C® CONTROLLER progressive UHX65A-R as an example:



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[1] DC 24 V supply voltage
[2] Connection to EtherNet interface
[3] EtherCAT®/SBus^{PLUS} connection
[4] PLC
[5] Engineering PC
[6] Connection to engineering interface X80
[7] MOVI-C® CONTROLLER progressive UHX65A-R
[8] MOVIDRIVE® modular axis system

- Connect the MOVI-C®-FIELD CONTROLLER FHX.. to the engineering PC via the standard engineering interface X4224 using an Ethernet connection cable RJ45/M12 (4-pin, male, D-coded). The following illustration is a schematic representation of the device topology:

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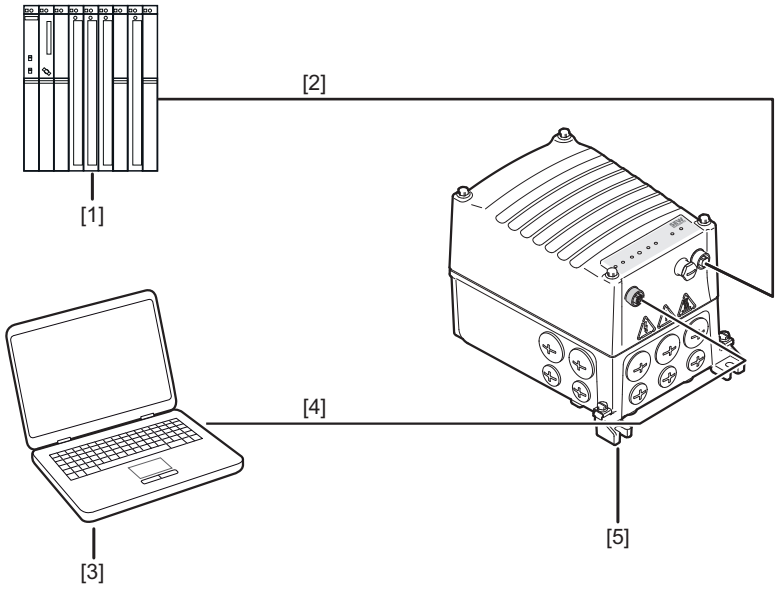

34452930571

[1] PLC
[2] Connection to EtherNet interface
[3] Engineering PC
[4] Connection to engineering interface X4224
[5] MOVI®-C FIELD CONTROLLER

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

The following device topology is used in the example:

- Higher-level Allen-Bradley controller ControlLogix® 1756-L71
- MOVI-C® CONTROLLER progressive, device variant UHX65A-R
- MOVIDRIVE® modular application inverter, MDD90A double-axis module
- MOVIDRIVE® modular application inverter, MDA90A single-axis module

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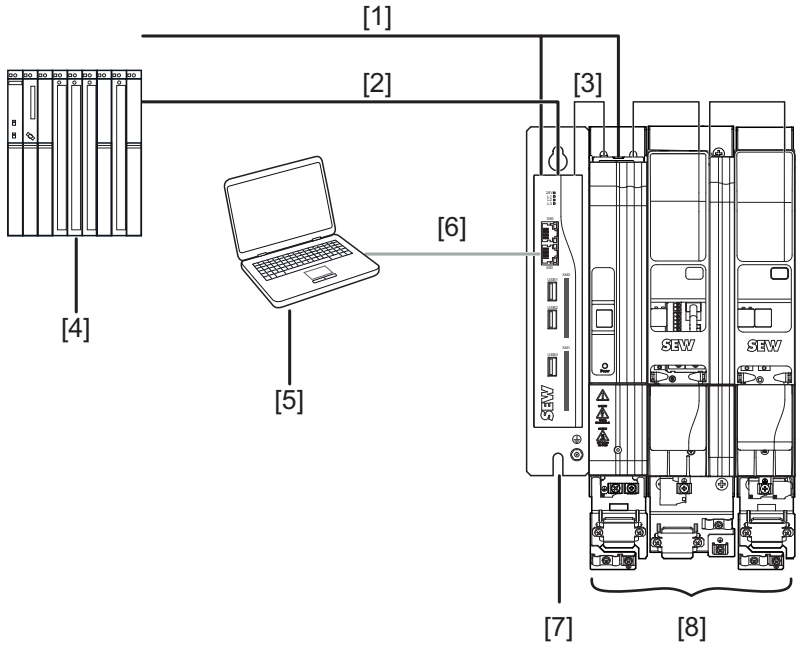
The following figure is a schematic representation of the device topology:



33125724683

[1] DC 24 V supply voltage
[2] Connection to EtherNet interface
[3] EtherCAT®/SBus^{PLUS} connection
[4] PLC
[5] Engineering PC
[6] Connection to engineering interface X80
[7] MOVI-C® CONTROLLER progressive UHX65A-R
[8] MOVIDRIVE® modular axis system

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

- MOVISUITE® for the devices of the MOVI-C® modular automation system 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:

- "Configuring the devices of the MOVI-C® modular automation system in MOVISUITE®" (→ 🗎 27)
- "Adding the controller in Logix Designer to the EtherNet/IP™ network" (→ 🗎 39)
- "Checking the process data transfer" (→ 🗎 44)

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8.3 Configuring devices of the MOVI-C® modular automation system in MOVISUITE®

Startup is described in detail by way of an example. In the example, a MOVI-C® CONTROLLER progressive UHX65A-R is integrated into the following network: EtherNet/IP™ network.

The startup of the other controllers in the MOVI-C® modular automation system is performed in the same way.

8.3.1 Establishing the network connection

Proceed as follows:

1. Establish a physical connection between the engineering PC and the MOVI-C® CONTROLLER.
2. Configure the interfaces of the engineering PC and the MOVI-C® CONTROLLER so that they are in a common network. The standard engineering interface X80 of the MOVI-C® CONTROLLER has the following IP address parameters in the delivery state: IP address 192.168.10.4, subnet mask 255.255.255.0

INFORMATION

SEW-EURODRIVE recommends using the standard engineering interface for startup.

As soon as the project on the controller has reached a stable state, e.g. when regular updates and downloads of the IEC project are no longer required, the EtherNet/IP™ interface can be used for engineering. If already known, assign the correct IP address in the IEC project in the properties of the fieldbus station.

3. Use the "ping *IP address of MOVI-C® CONTROLLER*" command in the Windows command prompt to check whether there is a communication connection to the MOVI-C® CONTROLLER.

8.3.2 Scanning the network for devices

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.

1. Start the MOVISUITE® engineering software.

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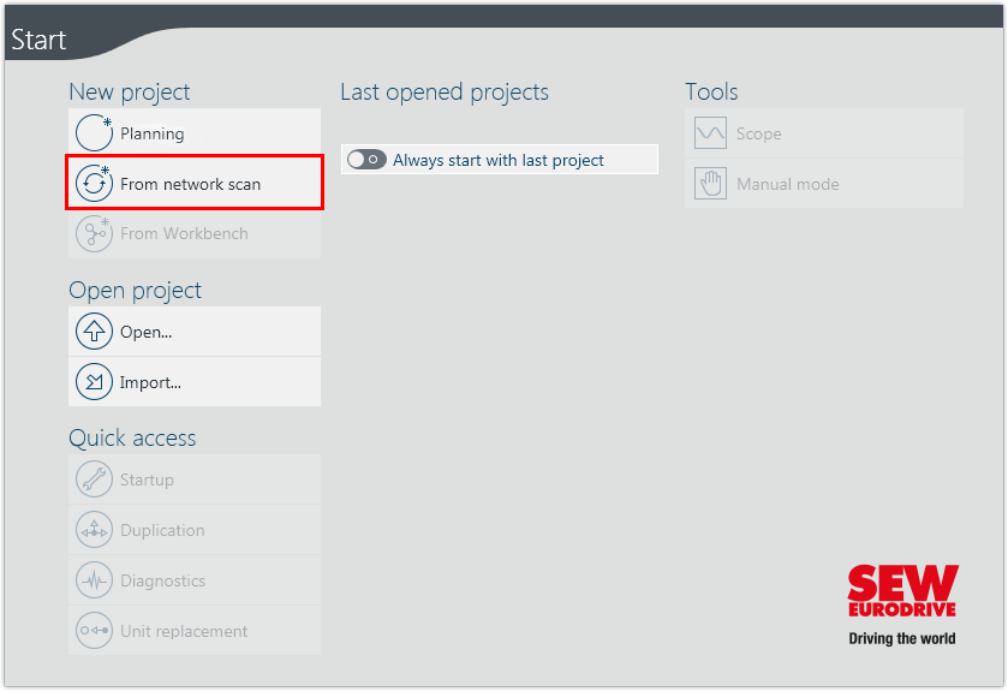
2. Create a new MOVISUITE® project from a network scan.



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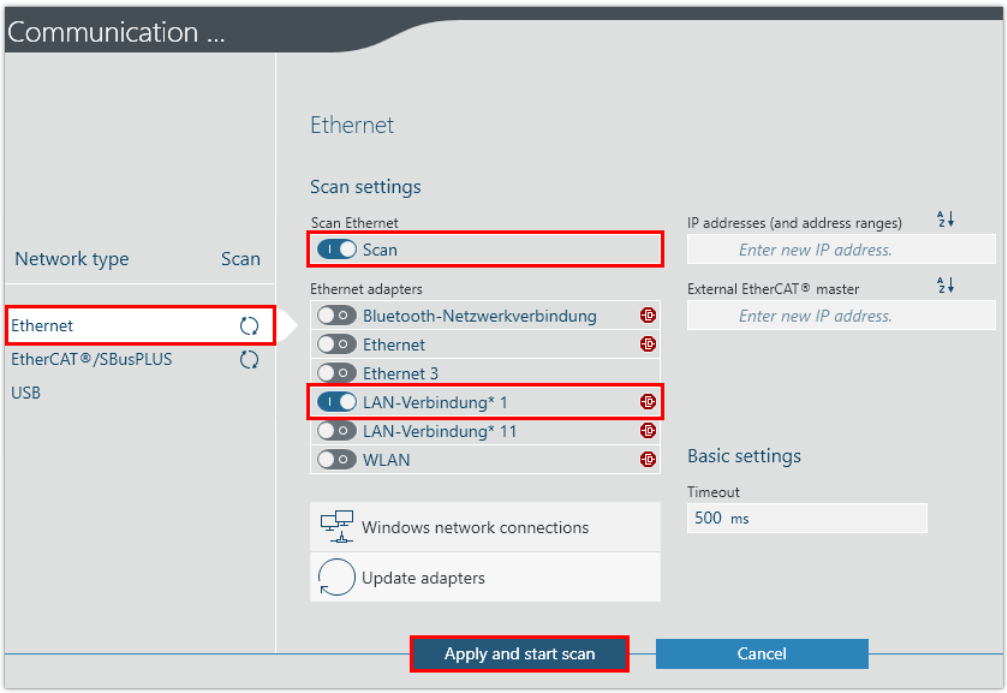
3. Select the network type (Ethernet) and activate the configured adapter (LAN connection). Apply the settings and perform the network scan.



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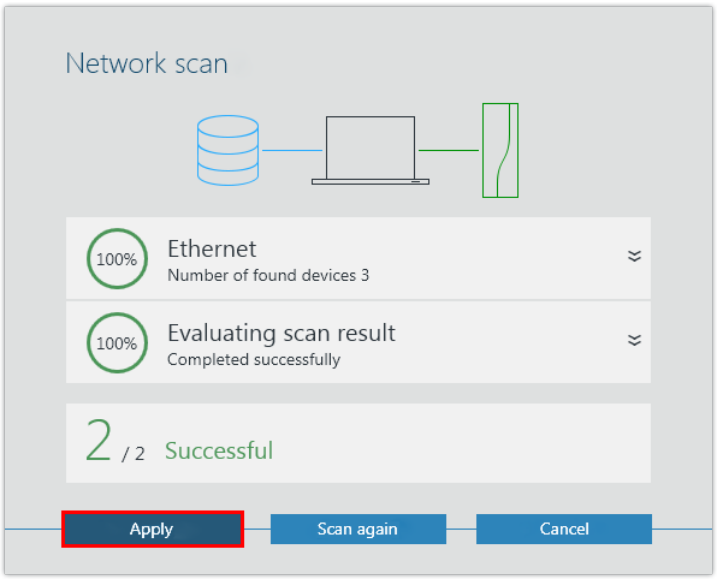
8.3.3 Adding devices to MOVISUITE®

The devices are detected during the network scan.

Proceed as follows:

✓ You have started a network scan.

1. Add the scanned devices to MOVISUITE®.



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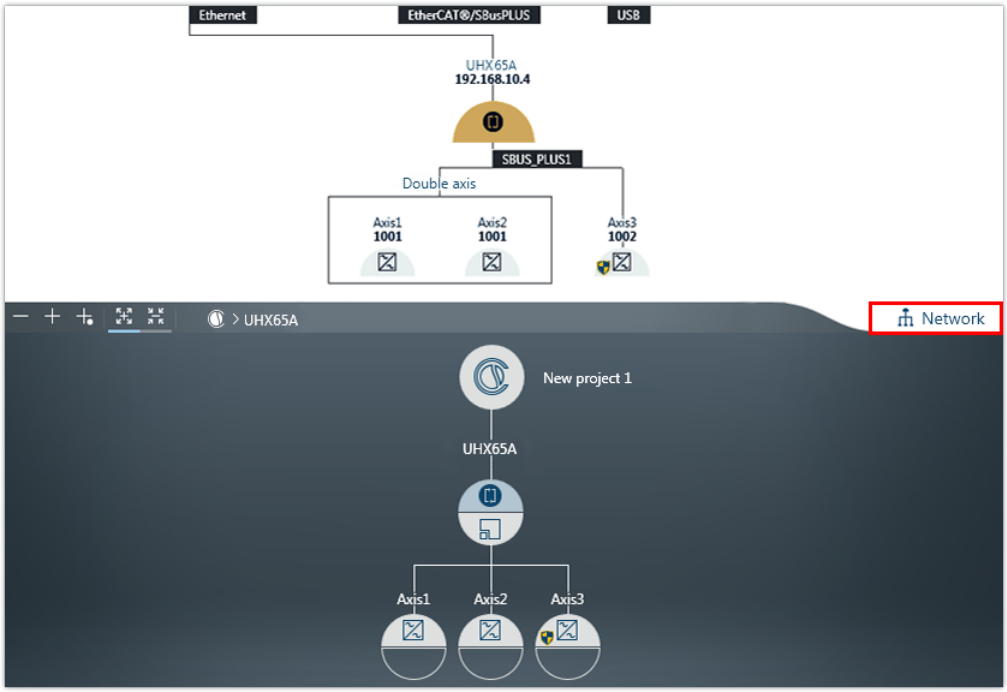
2. Load the device data into the MOVISUITE® project. Confirm the message stating that the device data has been successfully transferred.
   ⇨ The devices are displayed in one of the MOVISUITE® views. The display depends on the view you used when closing MOVISUITE® for the last time:
   ⇨ The combined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



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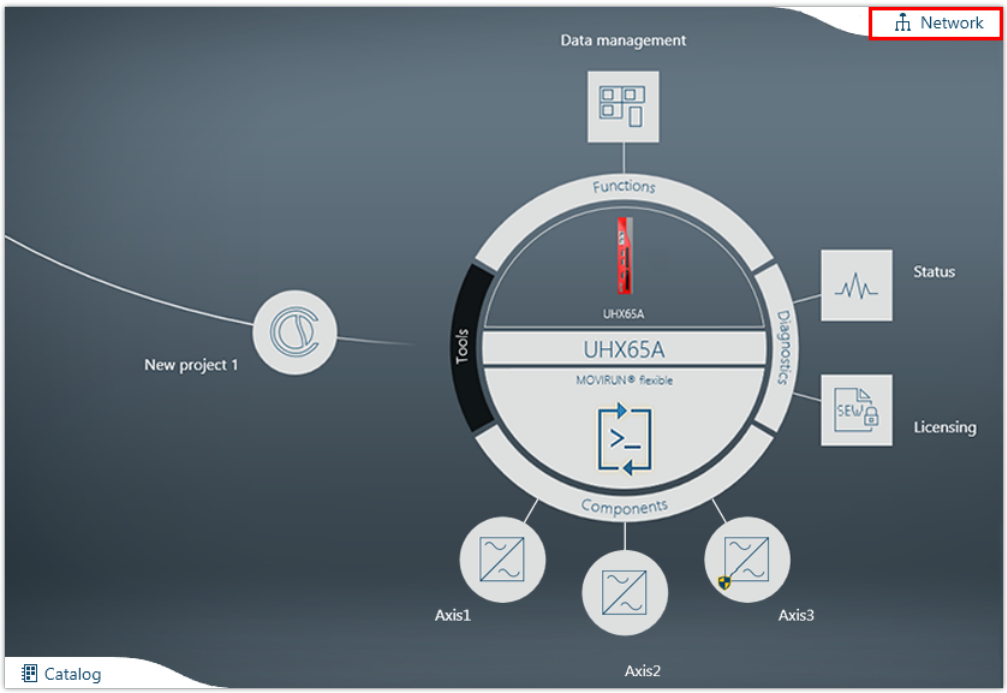
⇨ The function view has 2 views. The tree view provides an overview of the entire project. The circle view shows the current node as a large circle in the center of the workspace.



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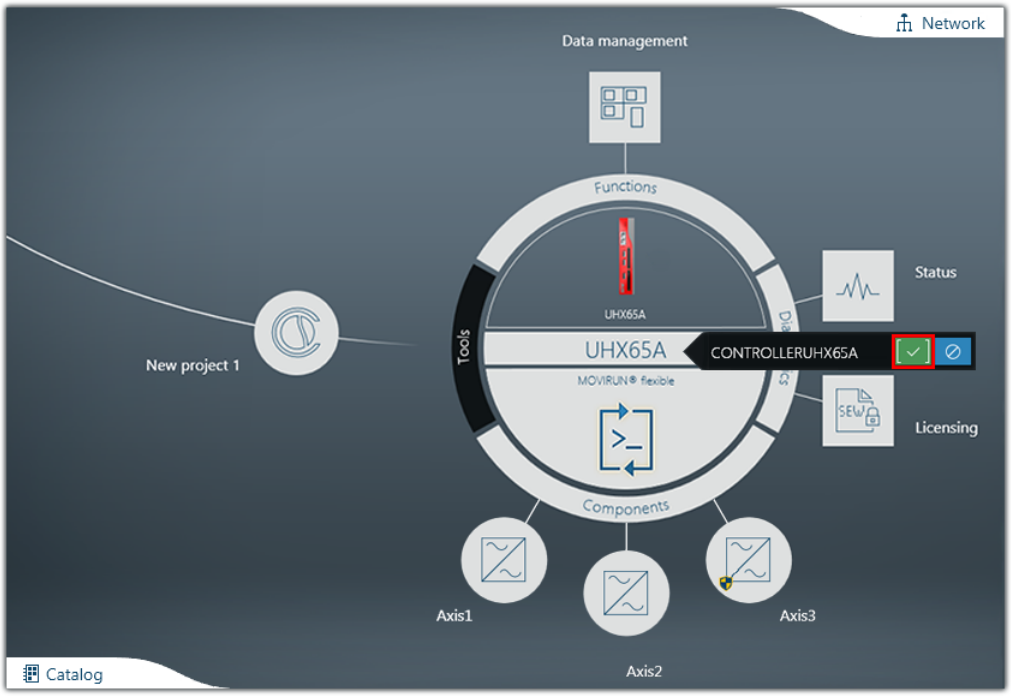
3. Enter a name for the controller. The controller will then be shown in the MOVISUITE® project under this name.



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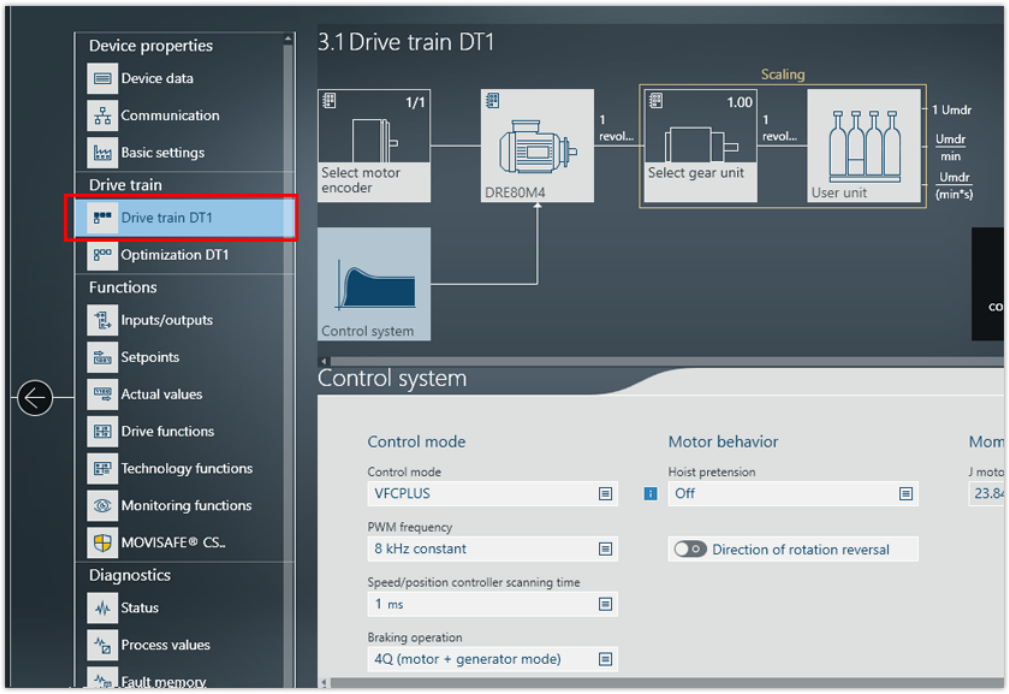
4. Save the MOVISUITE® project.

8.3.4 Configuring the drive train

Proceed as follows:

- Start up the drive train.



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8.3.5 Starting up the MOVIKIT® software module

The MOVIKIT® Velocity software module from the "SingleAxis" category is used for this example. MOVIKIT® Velocity provides a standardized functionality and interface for a typical speed-controlled drive.

INFORMATION

For more detailed information on MOVIKIT® software modules, refer to the corresponding documentation.

Proceed as follows:

✓ You have integrated the devices of the MOVI-C® modular automation system in a MOVISUITE® project and configured the drive train.

1. Click [Add software module] in the circle view of the inverter and select "Velocity" from the catalog in the "SingleAxis" category. Accept the suggested version of the software module.

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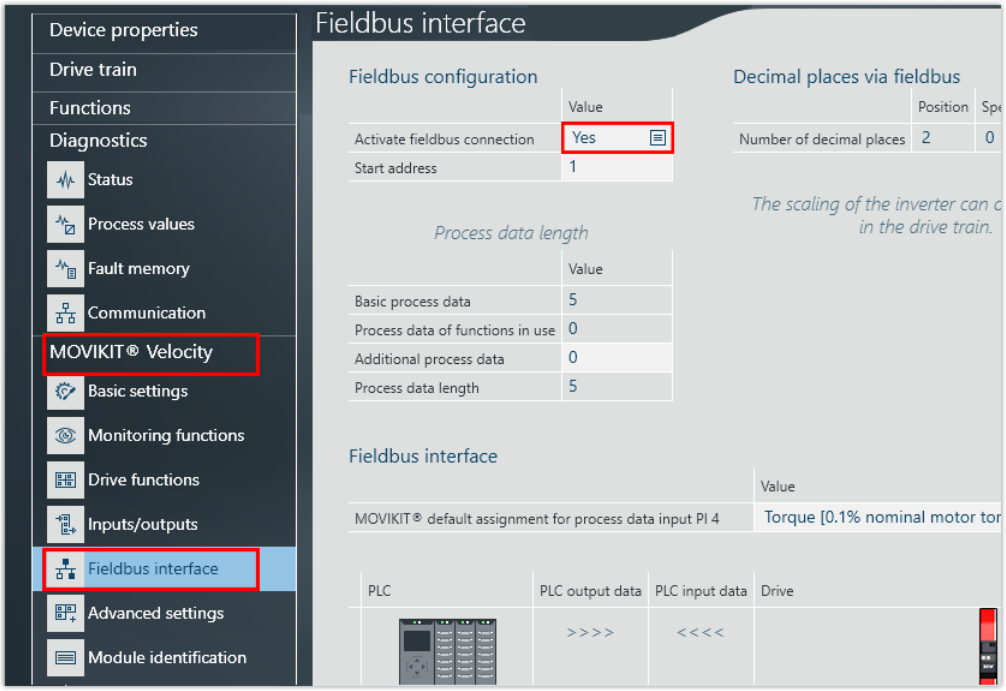
2. Open the configuration of the inverter and activate the fieldbus connection of the software module in the [MOVIKIT® Velocity] > [Fieldbus interface] parameter group.



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3. Configure the start address and the process data length.
   - ⇨ The start address of the first inverter is 1. If you have subordinated several inverters to a MOVI-C® CONTROLLER, the start address of the following inverters is shifted by the total length of the preceding process data.
   - ⇨ The different MOVIKIT® software modules have different process data lengths. For example, MOVIKIT® Velocity has 5 process data words and MOVIKIT® Positioning has 8 process data words.
   - ⇨ The following example shows the dependency of the start addresses on the number of process data words in a device topology with 3 lower-level inverters:

Device	Assigned software module	Start address
Inverter 1	MOVIKIT® Velocity (5 PD)	1
Inverter 2	MOVIKIT® Positioning (8 PD)	6 (= 1 + 5 from inverter 1)
Inverter 3	MOVIKIT® Velocity (5 PD)	14 (= 1 + 5 from inverter 1 + 8 from inverter 2)

INFORMATION

The MOVIKIT® software modules of the "SingleAxis" and "Motion" categories are calculated in the MOVI-C® CONTROLLER. Therefore, diagnostics and monitoring of the software modules in these categories are not performed on the inverter but in the MOVI-C® CONTROLLER.

8.3.6 Configuring the fieldbus card

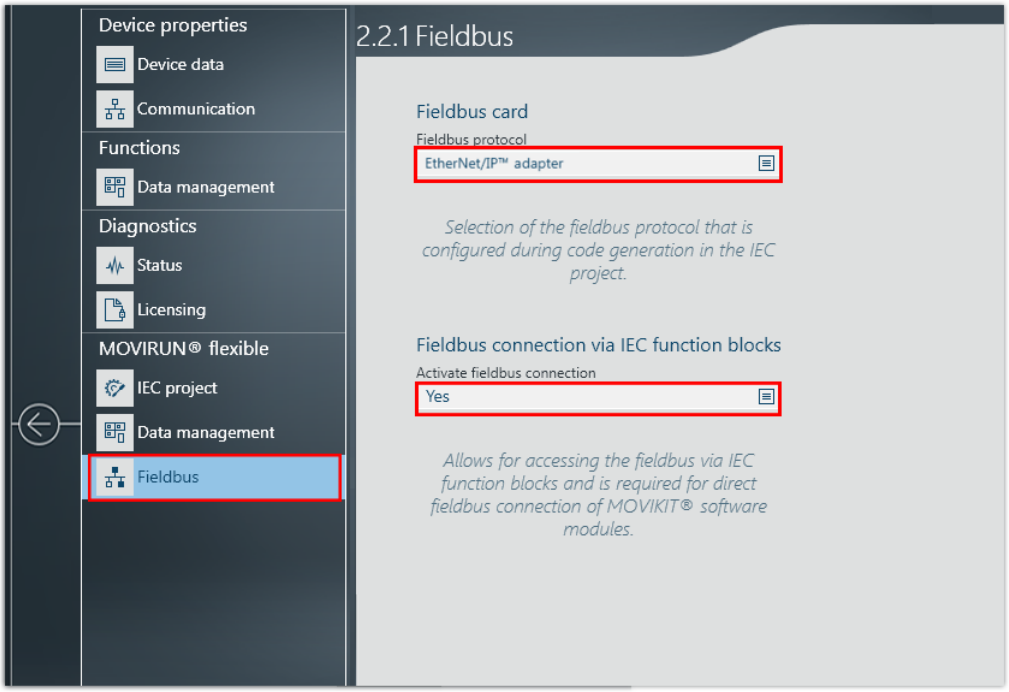
The fieldbus interface for the EtherNet/IP™ slave connection has to be set in the MOVISUITE® project and the device configuration has to be loaded to the MOVI-C® CONTROLLER via the IEC Editor.

Proceed as follows:

1. In the configuration of the MOVI-C® CONTROLLER, open the [MOVIRUN® flexible] > [Fieldbus] parameter group.
2. To integrate the MOVI-C® CONTROLLER as an EtherNet/IP™ slave in the EtherNet/IP™ network, set "EtherNet/IP™ adapter" as the fieldbus protocol.
3. To link the EtherNet/IP™ process data interface directly with the MOVIKIT® software module, activate the "Fieldbus interface via IEC modules" parameter.

INFORMATION

The process data interface is configured in the engineering tool of the PLC (e.g. Studio 5000 Logix Designer). Make sure that the process data module you insert in the hardware configuration at the process data interface (slot) matches the selected MOVIKIT® software module. For example, for MOVIKIT® Velocity, you must insert a process data module of 5 process data words.



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8.3.7 Creating an IEC project

INFORMATION

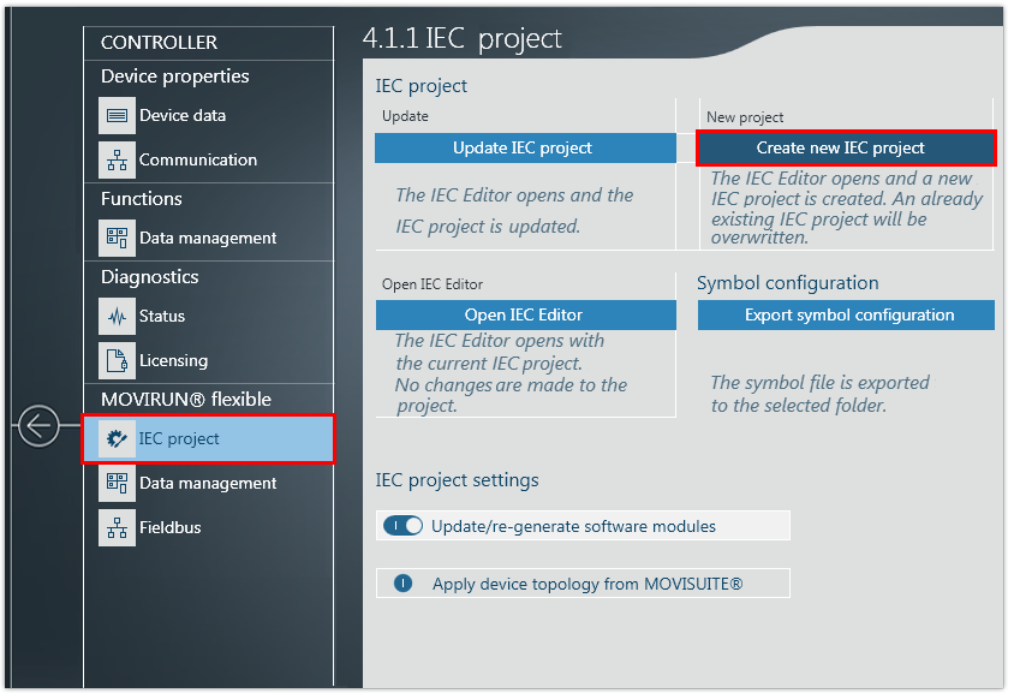
For detailed information on IEC project generation, refer to the "MOVISUITE® IEC project creation" manual.

If all components used, such as user units, fieldbus, process data length, and offset of the MOVIKIT® software modules, are configured in MOVISUITE®, a suitable, executable IEC project is created during code generation. In this IEC project, you can access the functionalities of the MOVIKIT® software module without further IEC programming.

Proceed as follows:

✓ You have configured the components used in MOVISUITE®.

1. Start the IEC Editor with a newly generated (or existing) project.



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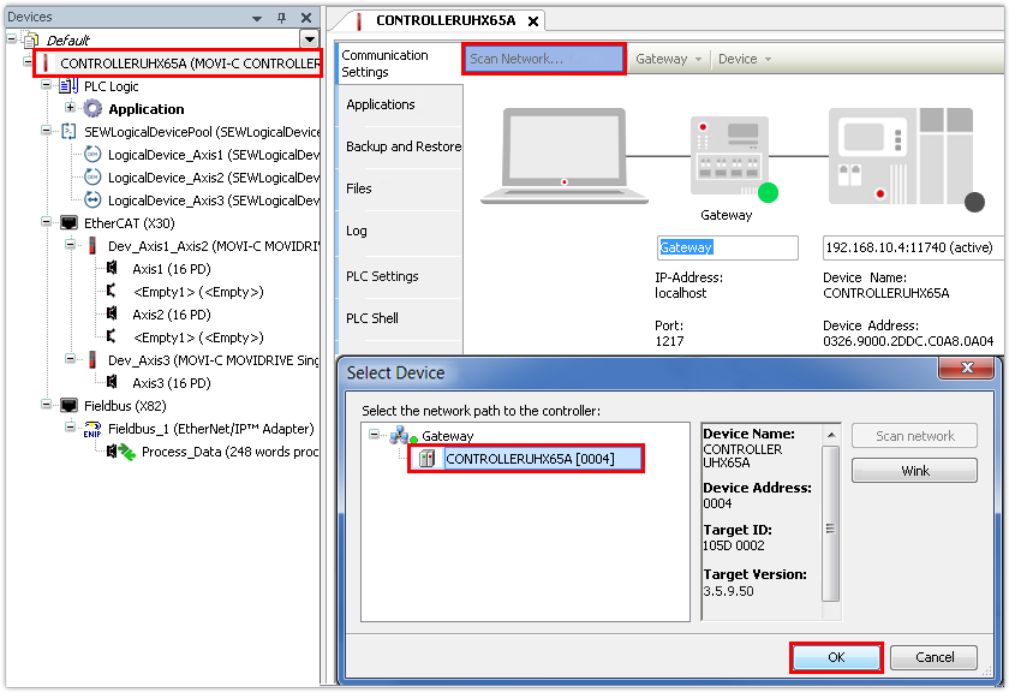
⇨ A message about the used compiler version is displayed.

2. You must 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.

3. Search the network and accept the controller found. If the controller is not found, enter the IP address of the controller in the IP address field.



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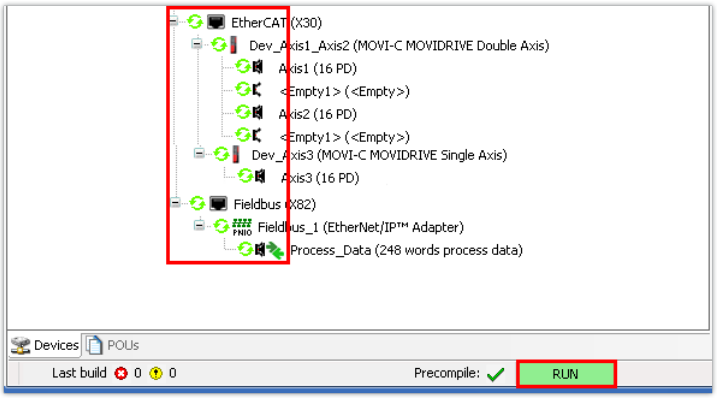
4. Once the connection to the controller is established, compile the IEC program and transfer it to the controller.
5. Start the IEC program.
   ⇨ The devices in the device tree are marked by a green circle. The green circle indicates fault-free function of the fieldbus option but does not indicate the state of communication between the controller and the PLC.



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6. Create a boot project. This way, the IEC Editor project is stored on the memory card of the controller and is still available after a restart of the controller.

⇨ The controller can now be integrated into the EtherNet/IP™ network in the engineering tool of the PLC.

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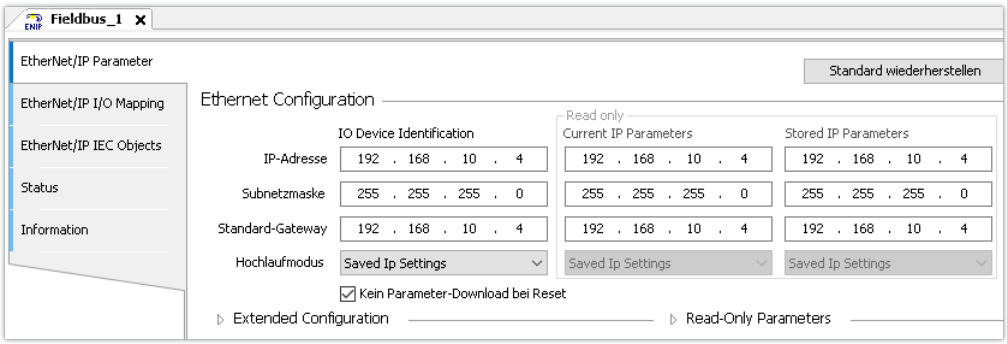
8.3.8 Setting the IP address in the IEC Editor

By default, the IP address is assigned with EtherNet/IP™ via a DHCP server. The IP address is not stored in a power-failure-proof manner and must be reassigned at each startup.

If no DHCP server is available, the IP address has to be entered manually in the IEC Editor.



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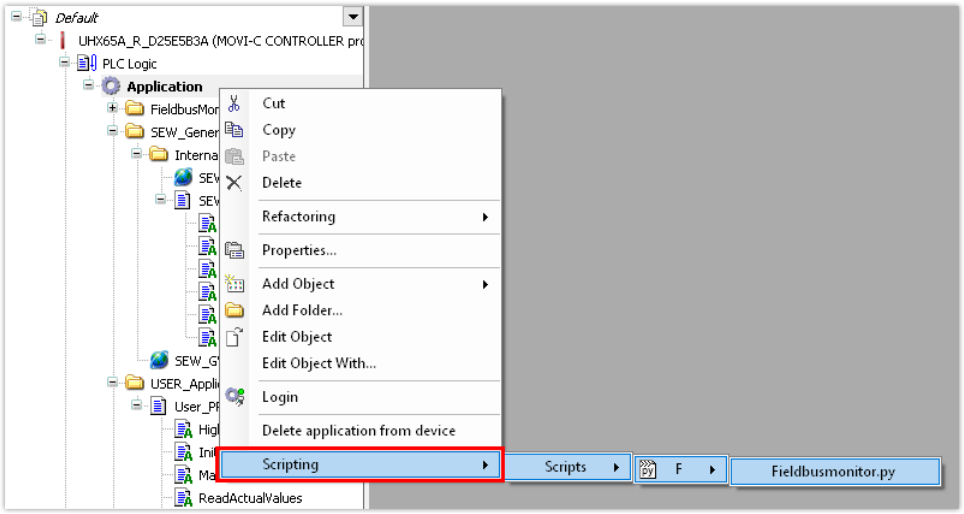
8.3.9 Performing fieldbus diagnostics in the IEC Editor

The IEC Editor has a fieldbus monitor. The fieldbus monitor enables both monitoring of the real fieldbus data and local control.

Proceed as follows:

1. To activate the fieldbus monitor, right-click in the device tree to open the shortcut menu of the application. Select the [Scripting] > [Scripts] > [F] > [Fieldbusmonitor.py] menu command.



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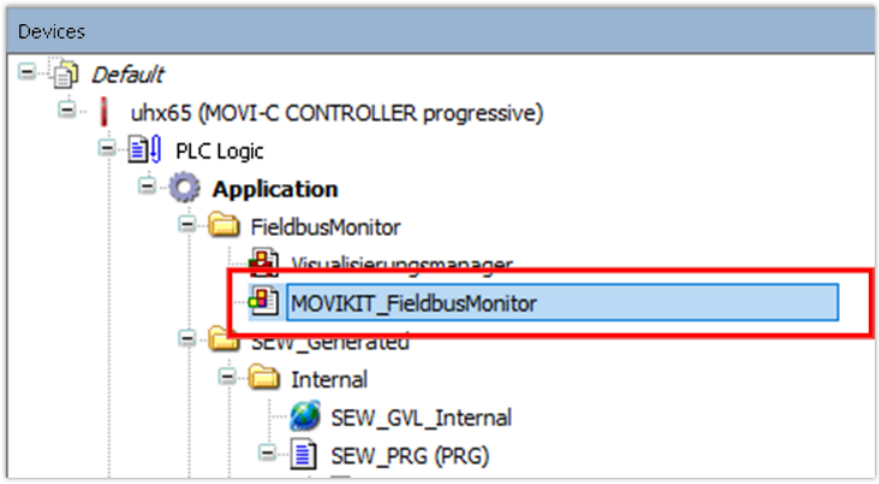
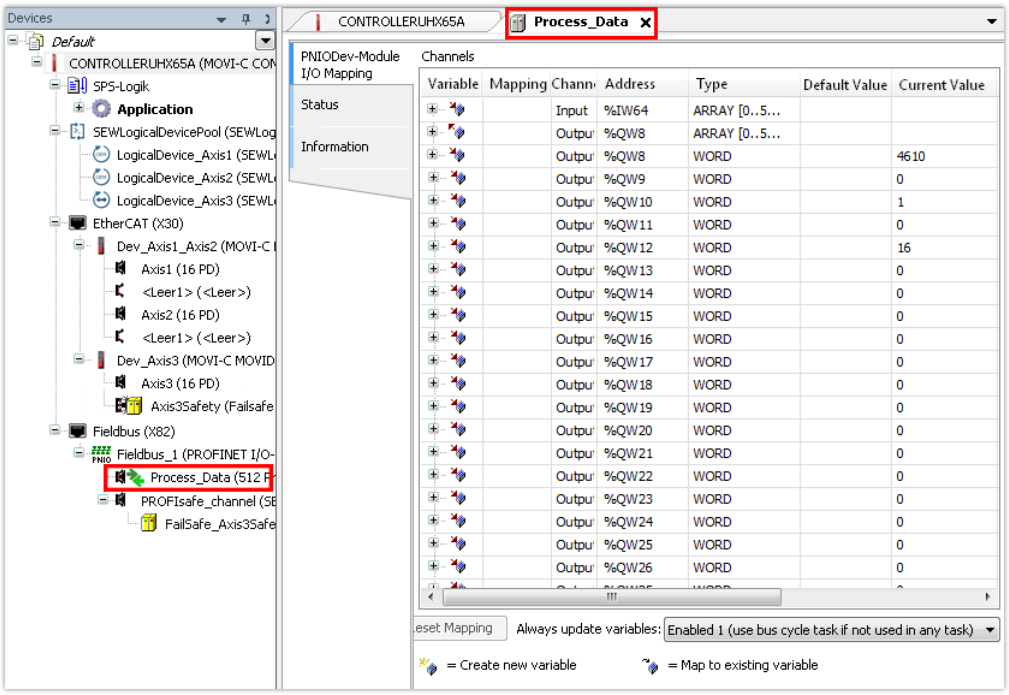
⇨ The fieldbus monitor is displayed in the [Application] > [FieldbusMonitor] folder.



33922148491

2. Alternatively, you can view the process data in the [Fieldbus] area.



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8.4 Adding the controller in Logix Designer to the EtherNet/IP™ network

The controller must be added to the Logix Designer project, connected to the PLC, and configured.

During configuration, the controller is assigned a logical name, an IP address, and process data with addresses.

INFORMATION

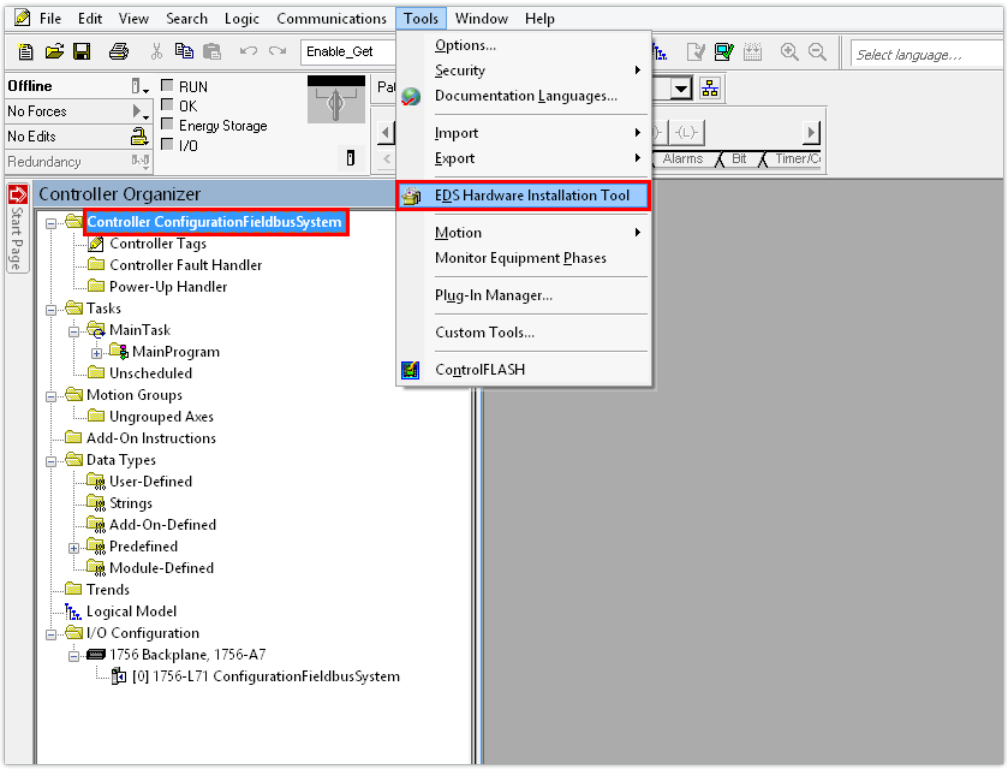
The figures in the sample project refer to the English version of the Studio 5000 Logix Designer tool.

8.4.1 Integrating and configuring the controller in the fieldbus network

Proceed as follows:

✓ You have already downloaded the device description file (EDS file) of the controller from the SEW-EURODRIVE homepage → **www.sew-eurodrive.com** and saved it locally on the engineering PC.

1. Start the "Studio 5000 Logix Designer" tool and create a new Logix Designer project.
2. Add an EtherNet/IP™ scanner to the project. Assign a name and enter the IP address of the EtherNet/IP™ scanner.
3. Load the device description file to the Logix Designer.



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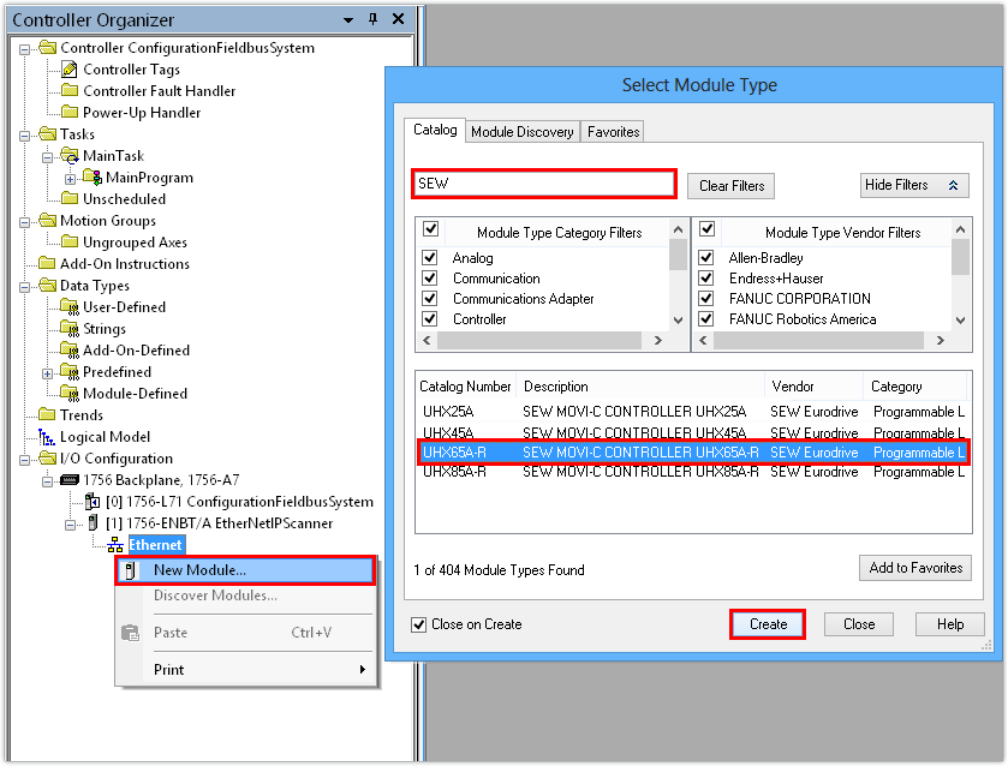
4. Right-click to open the Ethernet interface context menu and add the communication partner.

   ⇨ A module catalog is displayed.

5. Select the controller. Set a filter to reduce the number of modules shown.



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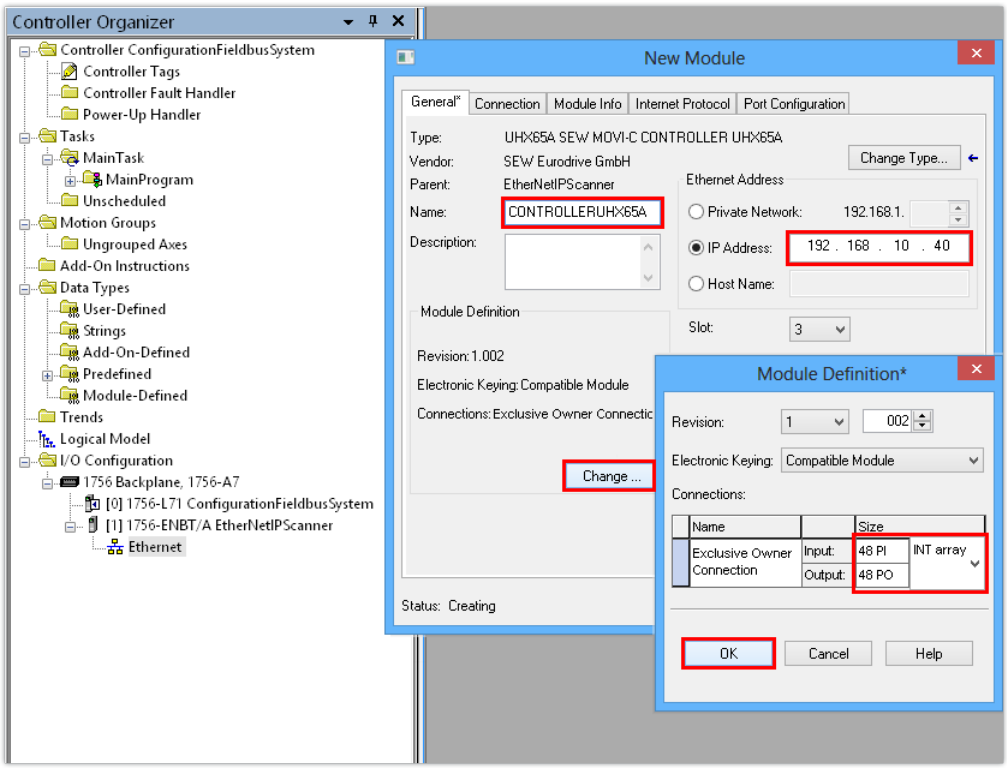
⇨ In this example, "SEW" is filtered and the UHX65A-R controller is used as the communication partner.

6. Assign a project name for the controller.
7. Enter the IP address of the controller. The PLC will address the device using this IP address.

8. 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).



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⇨ In this example, the IP address of the controller is 192.168.10.40. Each application inverter module (slave of the controller) is provided with 16 process data words for communication. This makes a total of 48 (3 × 16) process data words.

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

Assembly instance	Value
PO Data Exclusive Owner	161
PI Data Exclusive Owner	171
Listen Only	192
Input Only	193

10. Save the Logix Designer project.

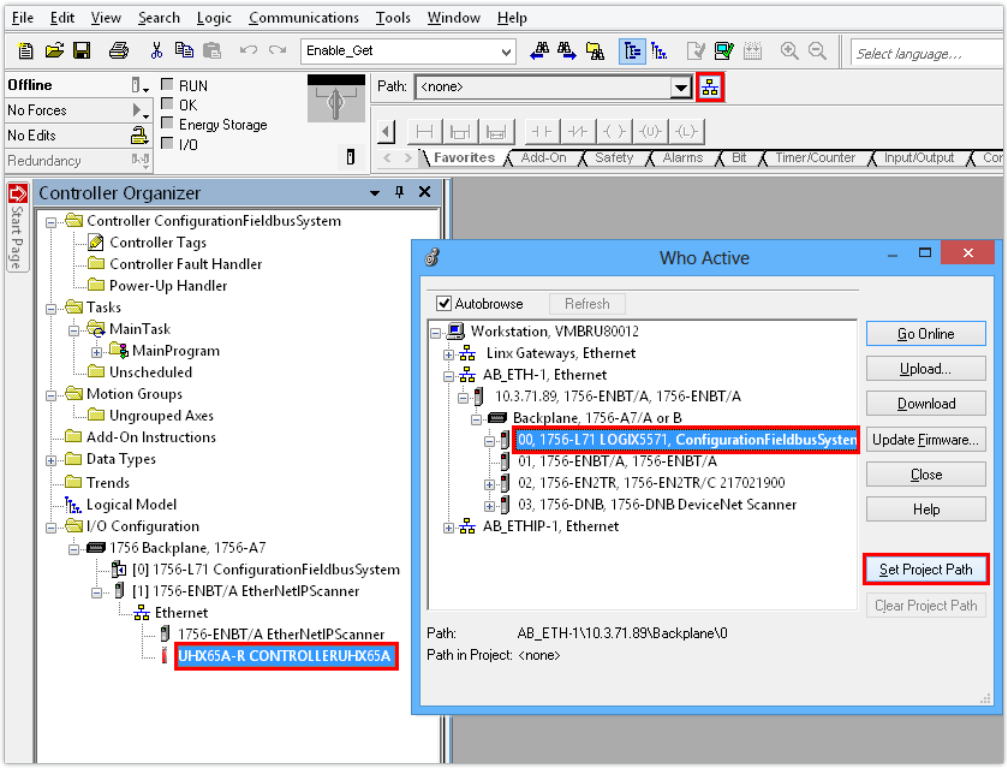
8.4.2 Setting up the project path

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

Proceed as follows:

✓ You have configured the controller.

1. In the "Controller Organizer", select the controller and click on the network icon in the toolbar.
2. Set the project path to the relevant PLC.



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

8.4.3 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 have configured the controller.

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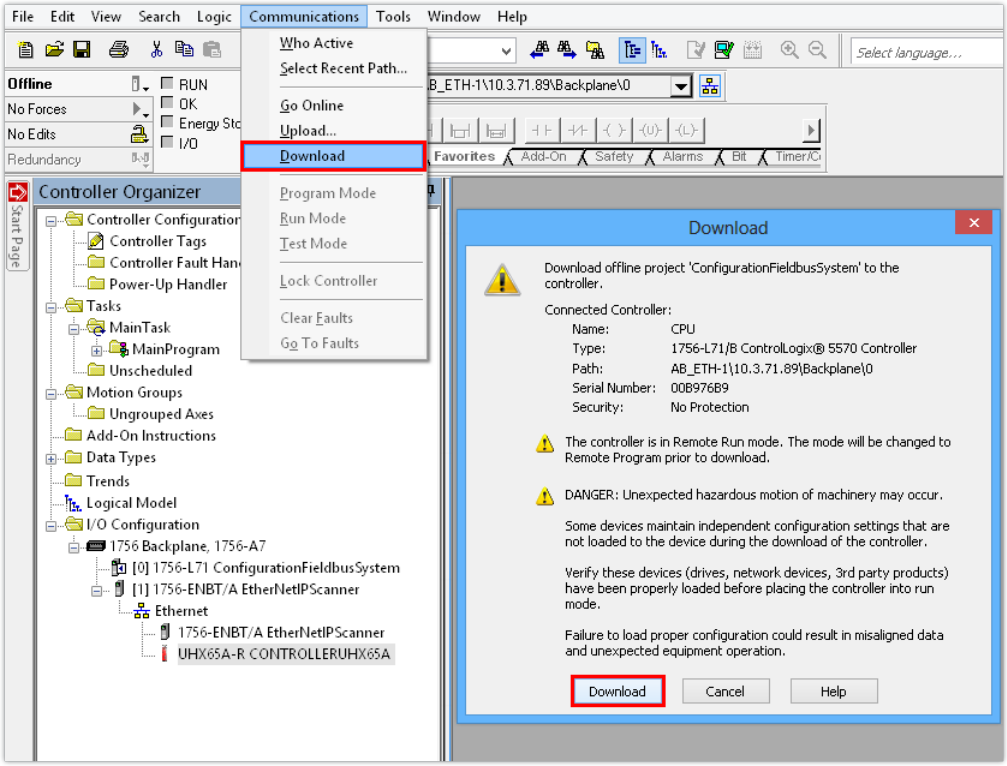
1. Load the project to the PLC and then switch to RUN mode.



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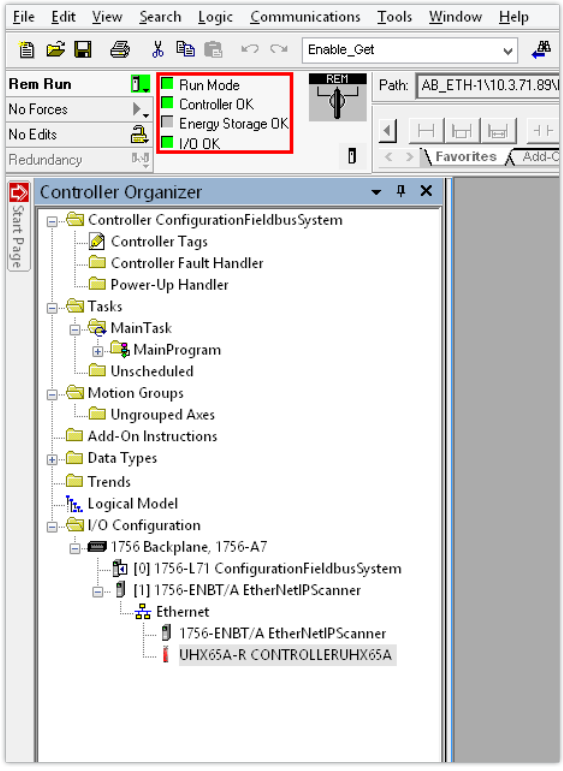
⇨ As soon as you have set up the connection between the PLC and the controller, the message bits in the online toolbar turn green.



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8.5 Checking the process data transfer

During successful communication between the PLC and the controller, process data words are transferred between the devices without faults.

8.5.1 Transferring process data words to the controller

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

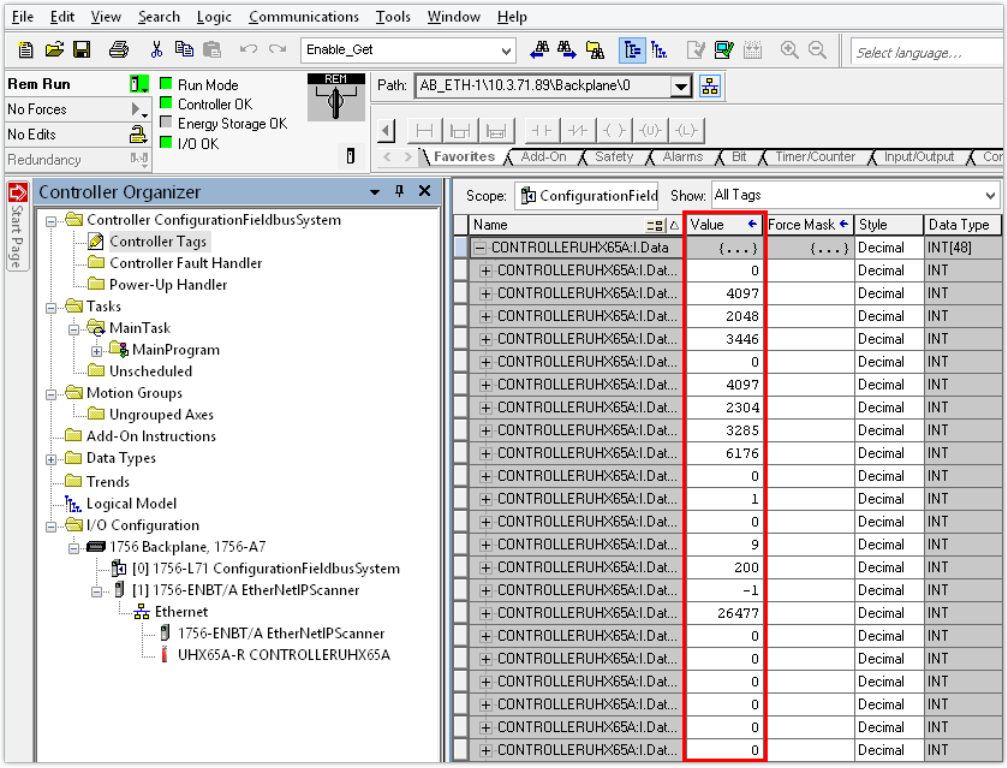
Proceed as follows:

✓ You have loaded the MOVISUITE® project to the controller via the IEC Editor.

✓ The connection between the PLC and the 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 controller.



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⇨ In this example, these process output data words are sent to the controller.

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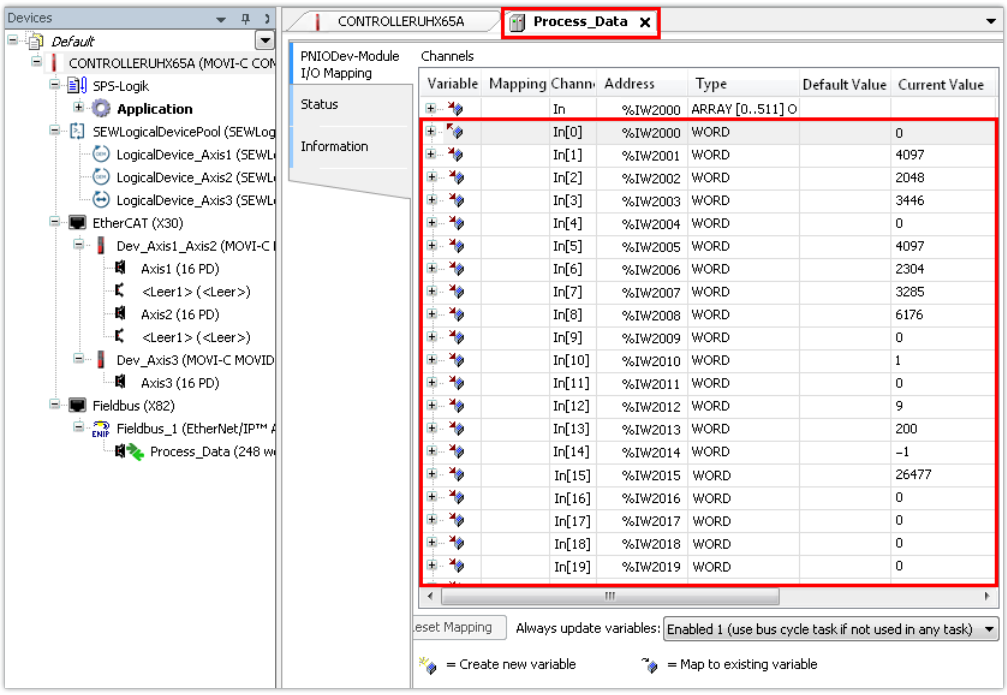
3. Switch to the IEC Editor project.
4. Double-click the process data of the EtherNet/IP™ slave in the device tree and check if the values of the process input data words of the controller are identical to the sent process output data words of the PLC.



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⇨ If the process data words sent by the PLC have arrived at the controller, the communication has been established successfully.

⇨ Instead, you can use the fieldbus monitor in the IEC Editor (see "Performing fieldbus diagnostics in the IEC Editor").

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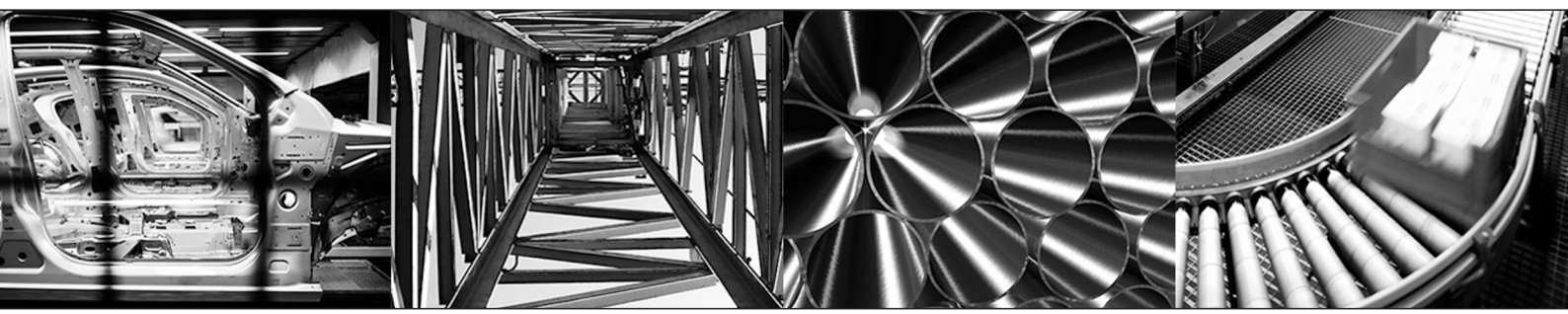

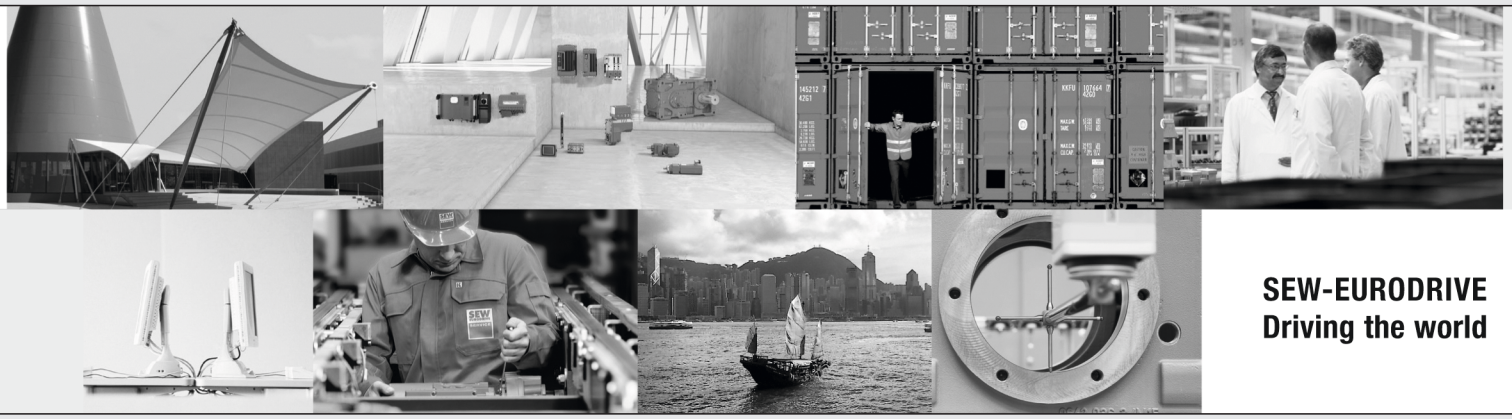

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