SEW EURODRIVE

Manual

UFR41B Fieldbus Gateway

PROFINET or EtherNet/IP™

Edition 05/2022

27785483/EN

Table of contents

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

You can always find the latest version of the documentation in Online Support on the website of 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:

- "MOVITRAC® advanced Inverters" operating instructions
- "MOVIDRIVE® technology Application Inverters" operating instructions
- "MOVIDRIVE® system Application Inverters" operating instructions
- "UFR41B Fieldbus Gateway – EtherNet/IP™, Modbus/TCP and PROFINET IO" manual (part number 16798813/EN, edition 05/2009)

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.

1.7.2 Trademarks of ODVA, Inc.

EtherNet/IP™, CIP™, ODVA®, and ODVA CONFORMANT® are registered trademarks of ODVA, Inc.

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.

2.3 IT security of the environment

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. Using IT-specific security standards, such as network segmentation, adds to the protection of access to the ports. For an overview of ports and of the provided communication interface services, refer to the technical data of the device used.

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

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
Higher-level controller	PLC In the fieldbus network: PROFINET controller/EtherNet/IP™ scanner
UFR41B fieldbus gateway	Gateway In the fieldbus network: PROFINET device/Ethernet/IP™ device In the EtherCAT®/SBus^{PLUS} network: EtherCAT® master
Inverter from the MOVI-C® modular automation system: • MOVITRAC® advanced inverter • MOVIDRIVE® system application inverter • MOVIDRIVE® technology application inverter	Inverters In the EtherCAT®/SBus^{PLUS} network: EtherCAT® slave

3.2 Content of this document

This document describes the startup of the UFR41B fieldbus gateway, which allows the inverters of the MOVI-C® modular automation system to communicate with a higher-level controller via the PROFINET or Ethernet/IP™ fieldbus protocol.

3.3 UFR41B fieldbus gateway

The UFR41B fieldbus gateway can be used to control inverters via the PROFINET or Ethernet/IP™ fieldbus protocol. The process data communication from the PLC to the inverters is transmitted transparently via the gateway to the EtherCAT®/SBus^{PLUS} system bus via which the inverters are connected to the gateway.

Unlike direct fieldbus control, no individual fieldbus interface is required in the inverters, which often results in a cost advantage for the overall system.

The gateway has the following functions:

- Support of a maximum of 11 of the following inverters of the MOVI-C® modular automation system:
  - MOVITRAC® advanced inverter
  - MOVIDRIVE® system application inverter
  - MOVIDRIVE® technology application inverter

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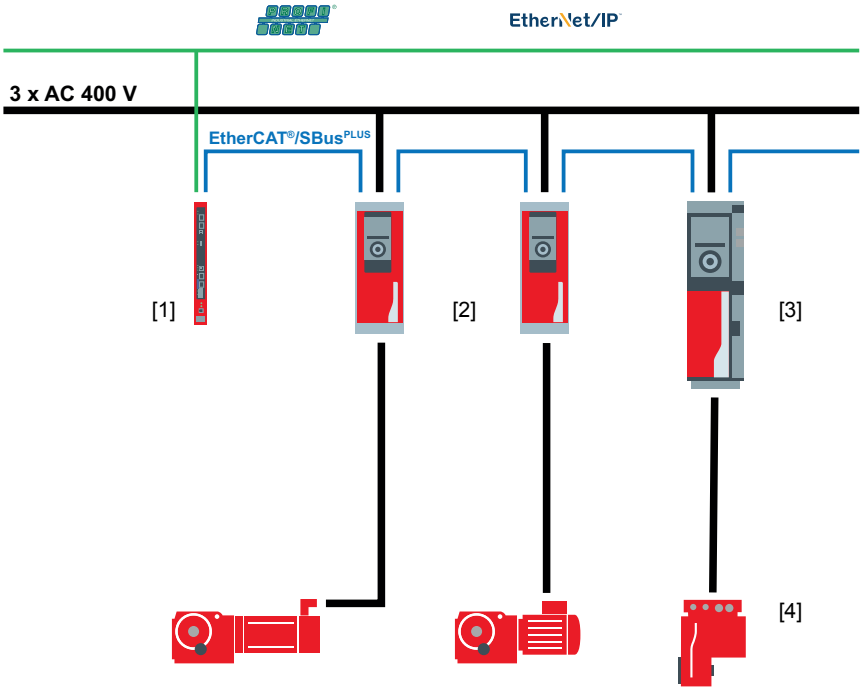
- Gateway application for transparent process data communication of 10 process data words per inverter
- The MOVI-C® Gateway Configurator configuration tool for configuring the connected inverters and displaying the transferred process data.

The following figure shows an example of a device topology with the gateway:



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[1] UFR41B fieldbus gateway
[2] MOVITRAC® advanced inverter
[3] Application inverter of the MOVIDRIVE® device family
[4] Drive components

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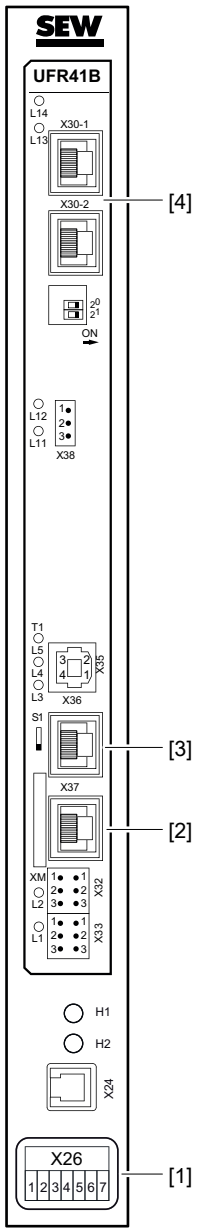
4 Device structure

The UFR41B fieldbus gateway is used in a UOH21B gateway housing:

UFR41B/ UOH21B



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No.	Designation	Connection	Function
[1]	DC 24 V supply voltage connection (2-pin connection)	X26	DC 24 V voltage supply • X26.7: +24 V – DC 24 V supply voltage • X26.6: GND
[2]	Engineering interface (RJ45 socket)	X37	Engineering PC connection IP address on the SD memory card set by the user (default IP address of the X37 engineering interface on delivery: 192.168.10.4)

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No.	Designation	Connection	Function
[3]	EtherCAT®/SBus^{PLUS} interface (RJ45 socket)	X36	EtherCAT®/SBus^{PLUS} master connection
[4]	Fieldbus interface (RJ45 socket)	X30.1/ X30.2	• PROFINET device connection • EtherNet/IP™ device connection

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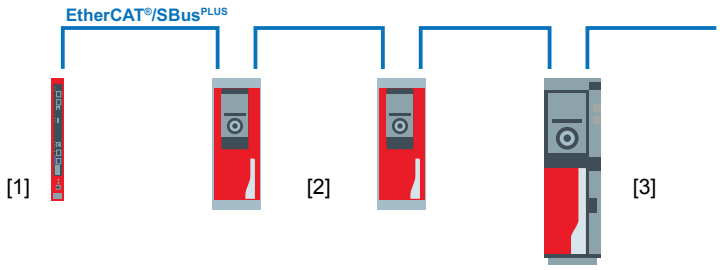
5 Installation topology

The following wiring sequence must be observed:

- UFR41B fieldbus gateway
- All MOVITRAC® advanced inverters
- All application inverters of the MOVIDRIVE® device family (MOVIDRIVE® system and MOVIDRIVE® technology)



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[1] UFR41B fieldbus gateway
[2] MOVITRAC® advanced inverter
[3] Application inverter of the MOVIDRIVE® device family

The wiring sequence automatically corresponds to the addressing and thus the assignment of the process data blocks of 10 process data words.

INFORMATION

The EtherCAT®/SBusPLUS address setting on the inverter is ignored. The assignment of the process data blocks to the inverters is only determined by the wiring sequence.

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6 Startup

6.1 Configuring the UFR41B fieldbus gateway

6.1.1 Installing the MOVI-C® Gateway Configurator configuration tool

Proceed as follows:

✓ You have already downloaded the compressed data of the configuration tool MOVI-C® Gateway Configurator (as .ZIP file) from the SEW-EURODRIVE website (www.sew-eurodrive.com), saved it locally to the engineering PC, and unpacked the data. SEW-EURODRIVE recommends saving the .ZIP file in the directory `C:\Program Files (x86)\SEW\ .`

1. Open the directory `ConfigTool`.
2. Run the `GatewayConfigurator.exe` installation file.

6.1.2 Setting the system requirements

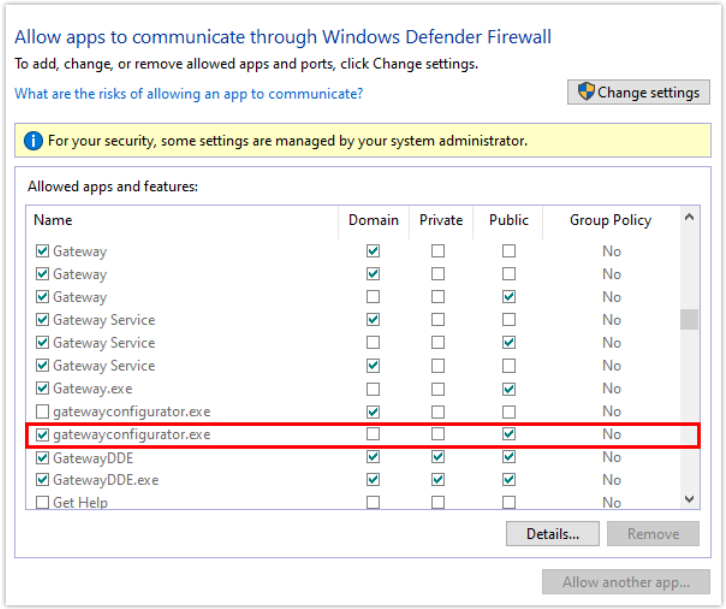
The following services and ports are used by the MOVI-C® Gateway Configurator configuration tool:

- The `ping` diagnostics service is used to check the communication connection between the network participants.
- The network protocol FTP (**F**ile **T**transfer **P**rotocol) is used for data transmission.
- The data is transmitted via UDP port 51000 (**U**ser **D**atagram **P**rotocol).

The configuration tool must be enabled for communication by the firewall.

Proceed as follows:

1. Open the firewall settings in the settings for the network via the Windows control panel.
2. Make sure that the access of the configuration tool is permitted by the firewall.



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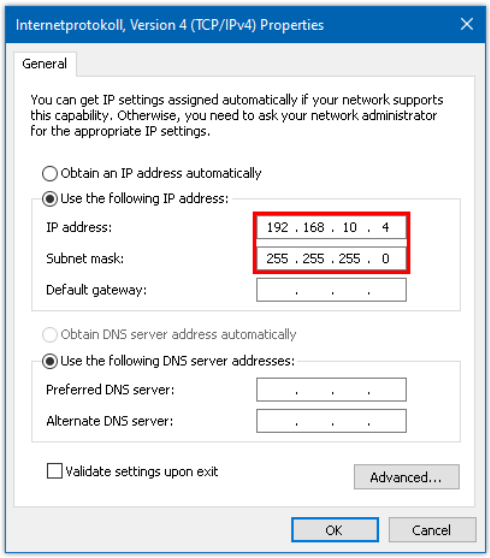
6.1.3 Setting the IP address of the UFR41B fieldbus gateway

To allow for the UFR41B fieldbus gateway to communicate with the inverters via the EtherCAT®/SBus^{PLUS} protocol, the devices need to be connected to the same local network. The IP-address parameters of the gateway must be set manually to use the local network as DHCP is not supported.

Proceed as follows:

1. Open the settings for the network via the Windows control panel.
2. Double-click on the adapter that is physically connected to the engineering interface of the gateway.
3. Select the Internet protocol version 4 "TCP/IPv4" in the adapter properties.
4. Enter the IP address parameters of the gateway in the Internet protocol properties. The standard IP address of the gateway is 192.168.10.4.



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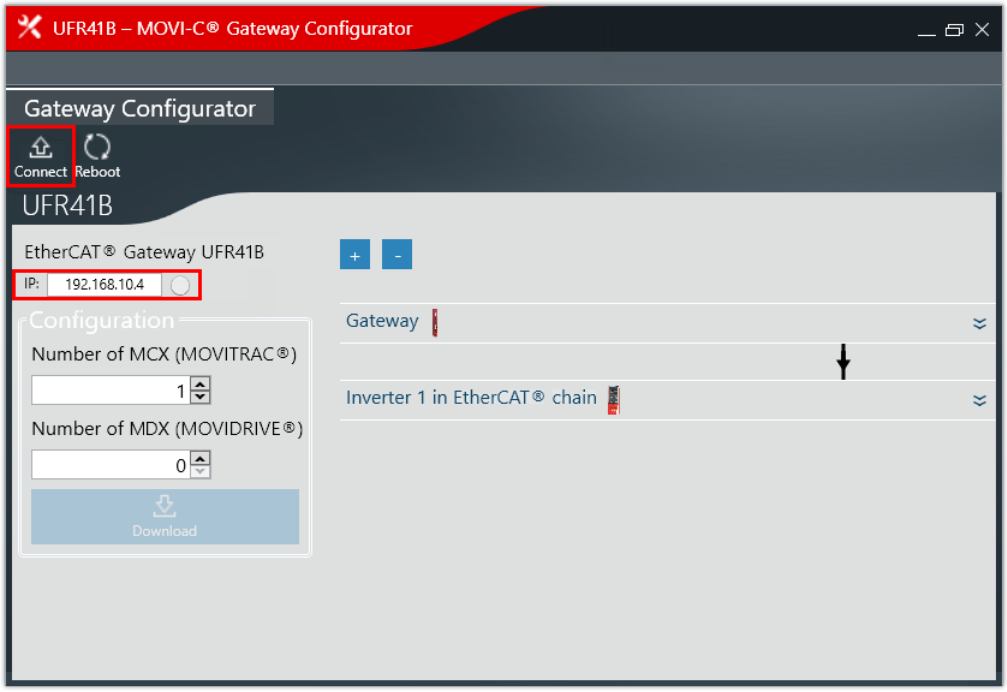
6.1.4 Integrate devices into the EtherCAT® /SBus^{PLUS} network

The UFR41B fieldbus gateway and the inverters must be integrated into the EtherCAT®/SBus^{PLUS}network.

Proceed as follows:

✓ The devices from SEW-EURODRIVE are wired in the EtherCAT®/SBus^{PLUS} network in the mandatory order: UFR41B fieldbus gateway, all MOVITRAC ® advanced inverters, all inverters of the MOVIDRIVE® device family (see "Installation topology" (→ 🗎 13)).

1. Start the MOVI-C® Gateway Configurator configuration tool.
2. Insert the IP address of the gateway and click the [Connect] button.



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⇨ A connection test is performed using a `ping` command.

⇨ In the case of an existing connection, a check is performed as to whether a UDP connection to the gateway application can be established.

INFORMATION

If a UDP connection to the gateway application cannot be established, the gateway application is loaded to the gateway together with the firmware.

In this case, disconnect the gateway from the DC 24 V voltage supply and reconnect it again.

3. Set the correct number of connected inverters.
4. Click the [Download] button.

⇨ The diagnostics information of the connected devices is displayed in the configuration tool (see "Diagnostics" (→ 🗎 27)).

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6.1.5 Integrating and configuring the UFR41B fieldbus gateway in the fieldbus network

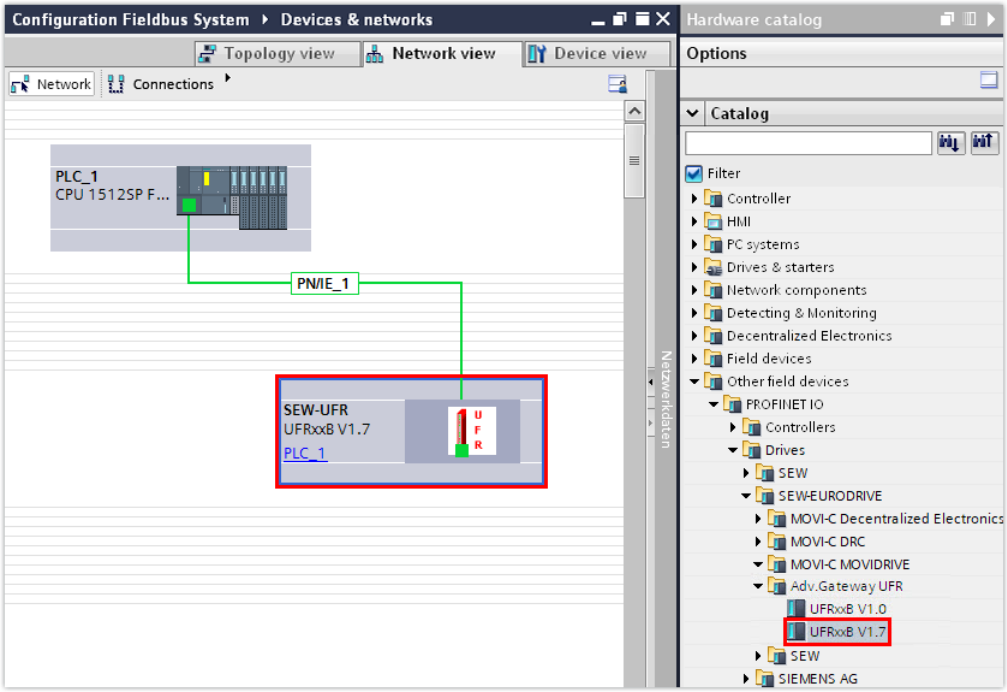
The UFR41B fieldbus gateway must also be integrated and configured in the fieldbus network.

In this example, the gateway is integrated in a PROFINET network. The configuration is performed in TIA Portal, the engineering tool of the PLC.

Proceed as follows:

✓ You have already downloaded the device description file (`SEW_GSDML_UFR_V2-25_20130919.xml`) of the gateway from the SEW-EURODRIVE homepage (www.sew-eurodrive.com) and saved it locally to the engineering PC.

1. Start the TIA Portal and create a new TIA Portal project.
2. Install the device description file in the TIA Portal.
3. Open the hardware catalog. Under [Other field devices] > [PROFINET IO] > [Drives] > [SEW-EURODRIVE] > [Adv.Gateway UFR], select the entry for the gateway and assign this entry to the PLC in the network view.



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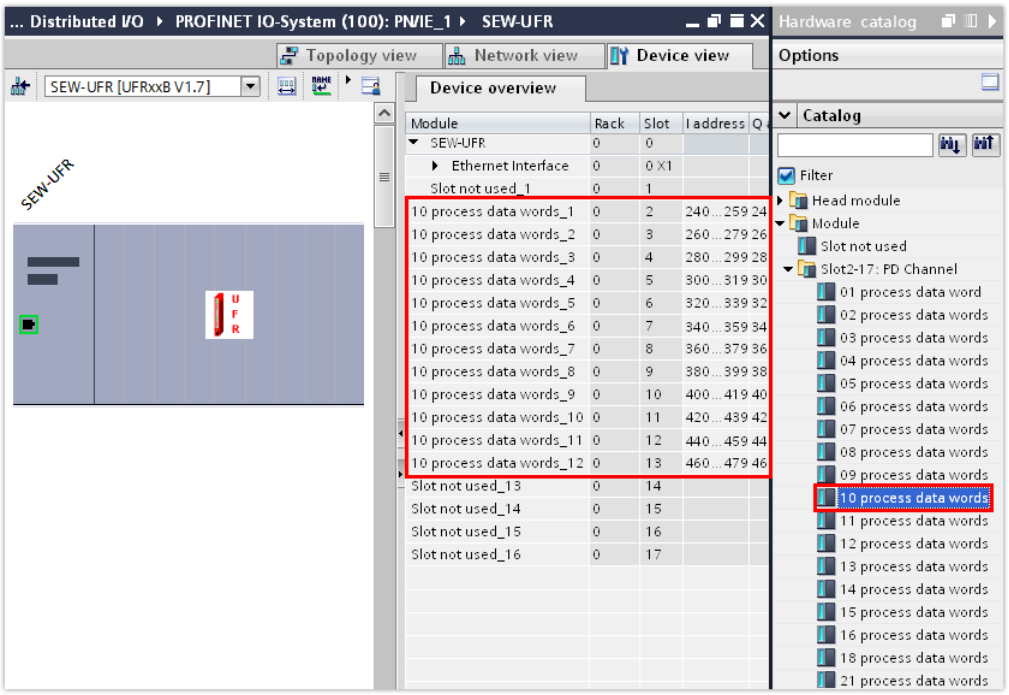
4. Add the required number of process data words from the hardware catalog using drag and drop. Instead, you can add the process data words by double-clicking the module in the device overview. They will be inserted at the proper slot automatically.

INFORMATION

SEW-EURODRIVE recommends adding 10 process data words for each lower-level device in the PROFINET network, including the gateway.



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6.2 Configuring the inverters

6.2.1 Connection of engineering PC – inverter

The engineering PC can be connected to the inverter in several ways:

- "Connection via interface adapter USM21A" (→ 🖹 18)
- "Connection via CBG.. keypad" (→ 🖹 20)

Connection via interface adapter USM21A

A point-to-point connection can be established to the engineering interface of the inverter via the USM21A interface adapter.

Connection: Via the USB interface of the PC			Connection to device	Device
Cable PC – USM21A	**Interface adapter**	**Cable USM21 – device**		
USB 2.0 connection cable[1]	USM21A Part number: 28231449	RJ10/RJ10 connection cable[2]	X31 RJ10 socket	MDX system
		RJ10/D-sub connection cable, part number: 18123864	X32 D-sub plug connector, 9-pin, male	• MDX technology • MCX..[3]

1) Included in the scope of delivery of the interface adapter
2) included in the scope of delivery of the interface adapter
3) Connection via diagnostic module CDM11A

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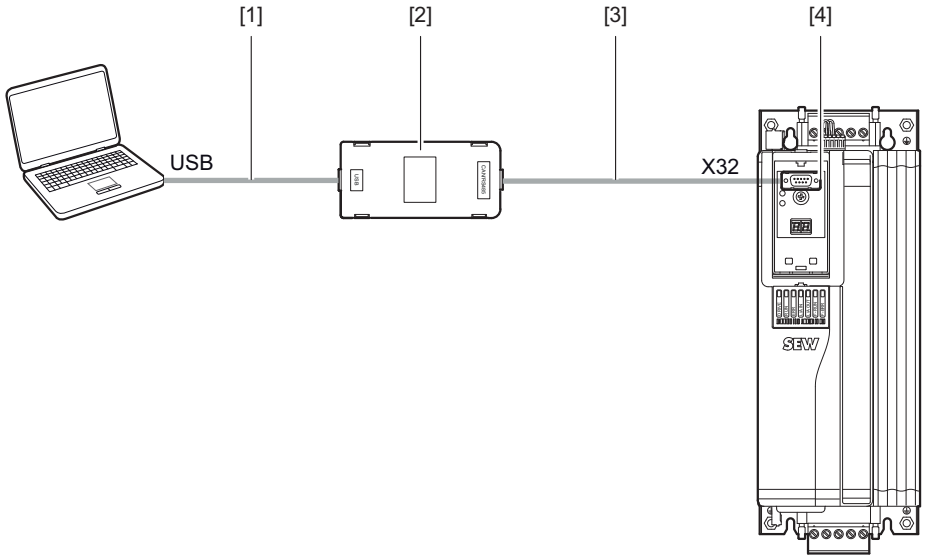
The following figure shows the connection of the engineering-PC to the MOVITRAC® advanced inverter. A CDM11A diagnostic module at the inverter is required for the connection.



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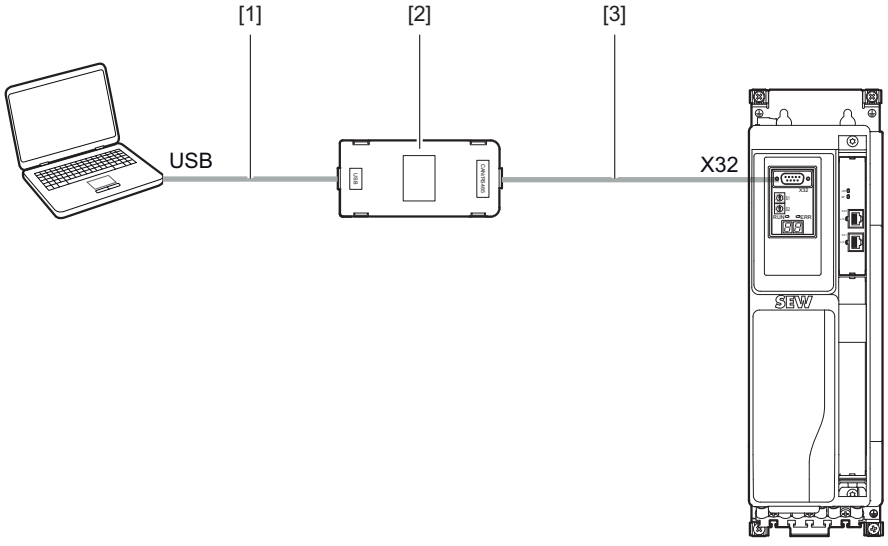
[1] Commercially available USB connection cable, type USB A-B. The cable is included in the scope of delivery of the interface adapter.
[2] Interface adapter USM21A, (part number: 28231449)
[3] Serial interface cable with RJ10 connector and 9-pin D-sub connector. This cable must be ordered separately (part number: 18123864).
[4] CDM11A diagnostic module (part number: 28265092)

The following figure shows the connection of the engineering-PC to the MOVIDRIVE® technology inverter.



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[1] Commercially available USB connection cable, type USB A-B. The cable is included in the scope of delivery of the interface adapter.
[2] Interface adapter USM21A, (part number: 28231449)
[3] Serial interface cable with RJ10 connector and 9-pin D-sub connector. This cable must be ordered separately (part number: 18123864).

Connection via CBG.. keypad

A point-to-point connection can be established to the engineering interface of the inverter via the CBG.. keypad.

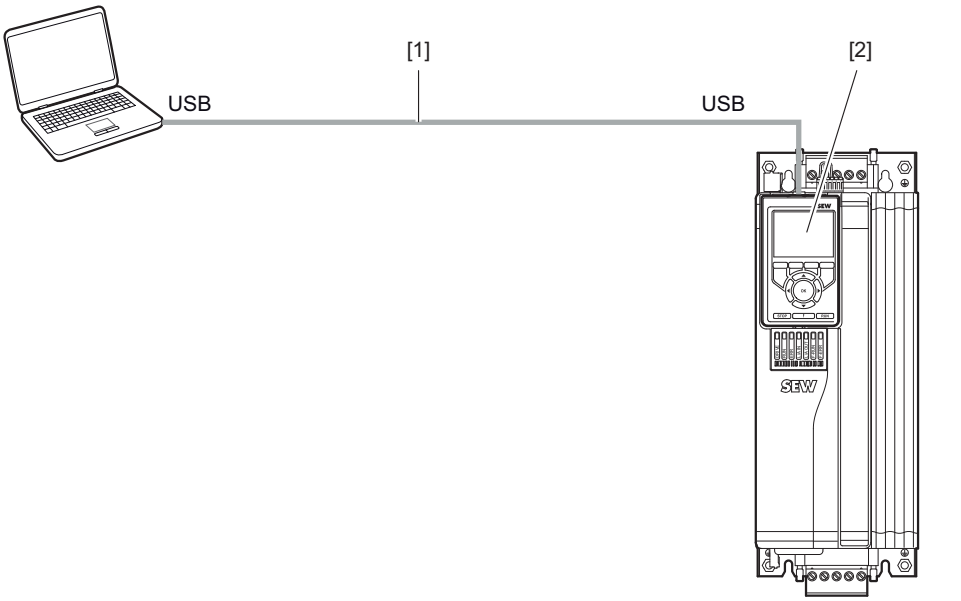
Connection: Via the USB interface of the PC			Connection to device	Device
Cable PC – CBG..A	**Operator panel**	**Cable CBG..A – device**		
Connection cable USB-A/ USB-2.0 mini B part number: 25643517	• CBG11A part number: 28233646 • CBG21A part number: 28238133 • CBG22A part number: 28277554	Directly plugged[1)]	X32 D-sub plug connector, 9-pin, male	• MDX technology • MCX..[2)]

1) or in a COG11A door-mounting frame with UKS11A connection cable (CBG11A and CBG21A) or UKS52A (CBG22A)

2) Connection via diagnostic module CDM11A

The following figure shows the connection of the engineering-PC to the MOVITRAC® advanced inverter. A CDM11A diagnostic module at the inverter is required for the connection.

The keypad is connected to the inverter via the CDM11A diagnostic module.



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[1] USB cable, type USB A-Mini-B (part number: 25643517)
[2] Keypad (here the CBG21A as an example, part number: 28238133) plugged onto the CDM11A diagnostic module (part number: 28265092)

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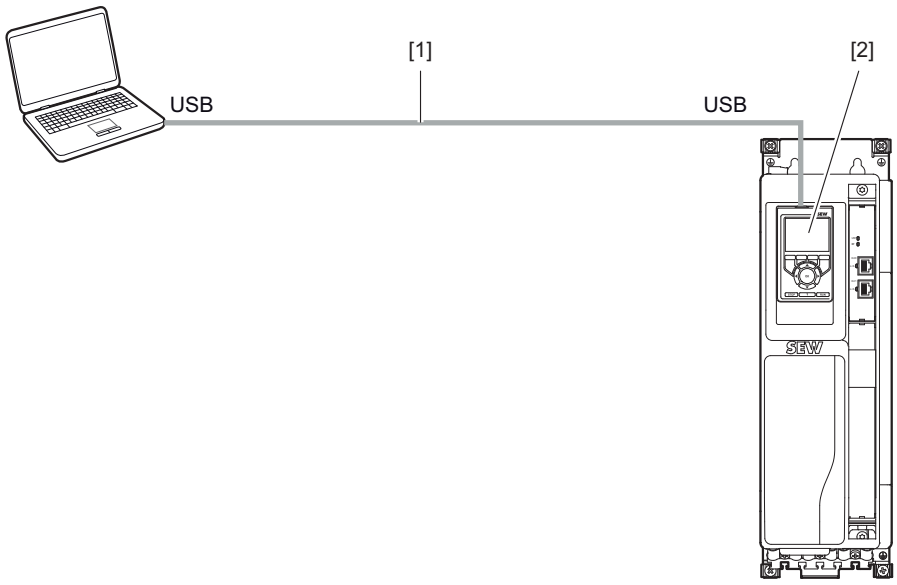
The following figure shows the connection of the engineering-PC to the MOVIDRIVE® technology inverter.



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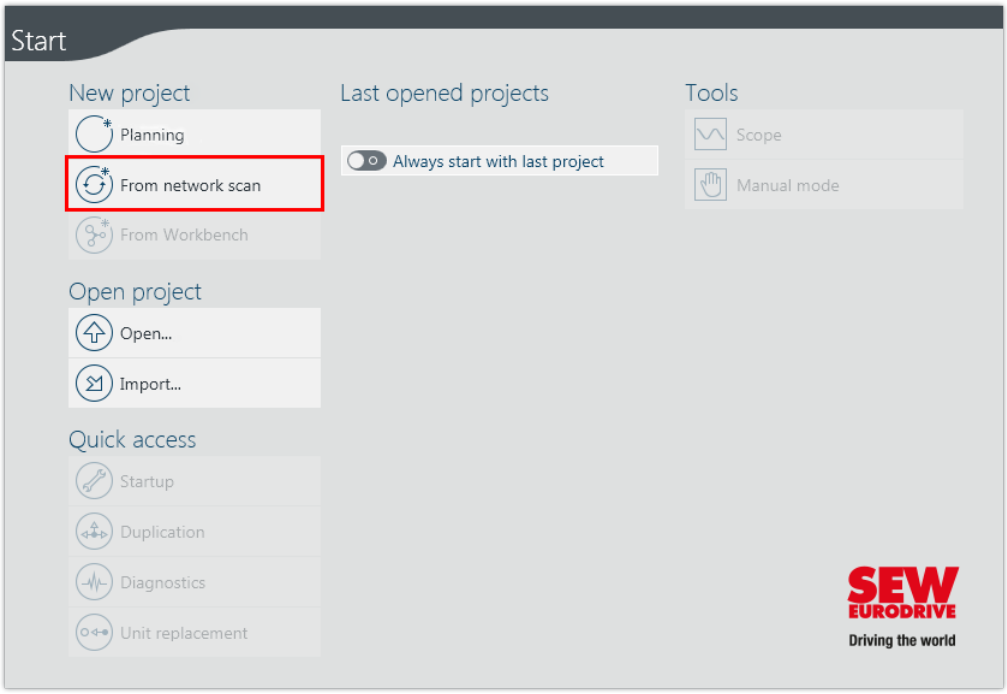
[1] USB cable, type USB A-Mini-B (part number: 25643517)
[2] Keypad (here the CBG21A as an example, part number: 28238133)

6.2.2 Creating a project in MOVISUITE®

Proceed as follows:

✓ The connection between engineering PC and inverter is established using the US-M21A interface adapter or the CBG.. keypad.

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



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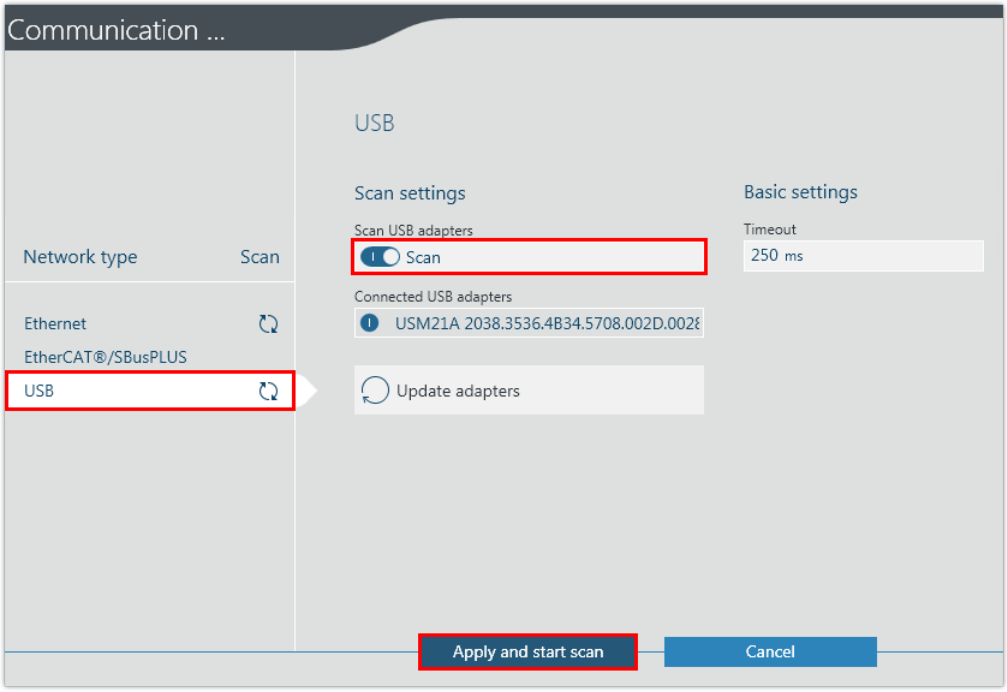
3. Activate the network type "USB" and the slide switch "Scan".



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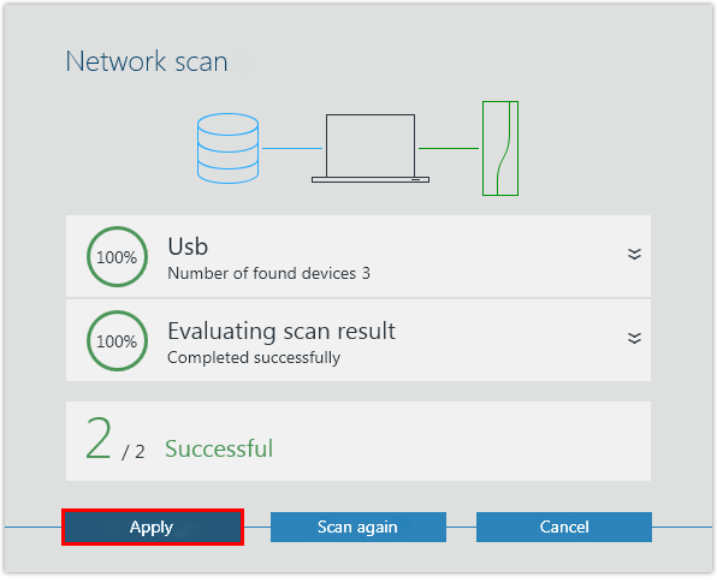
⇨ In this example, the engineering PC is connected to the inverter via the USM21A interface adapter.

4. Apply the settings and perform the network scan.
5. Add the scanned devices to MOVISUITE®.



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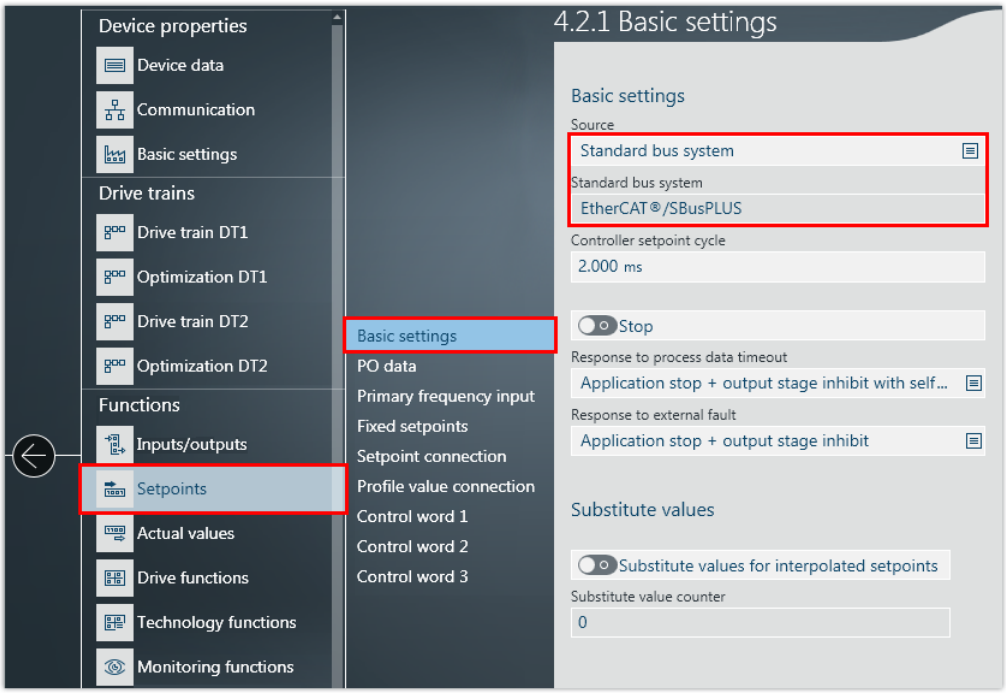
6.2.3 Parameterizing MOVITRAC® advanced

Proceed as follows:

1. Open the configuration of the inverter and set the process data source. In the delivery state, the process data values are taken from the standard fieldbus system of the inverter (the EtherCAT® /SBus^{PLUS} interface) and displayed.



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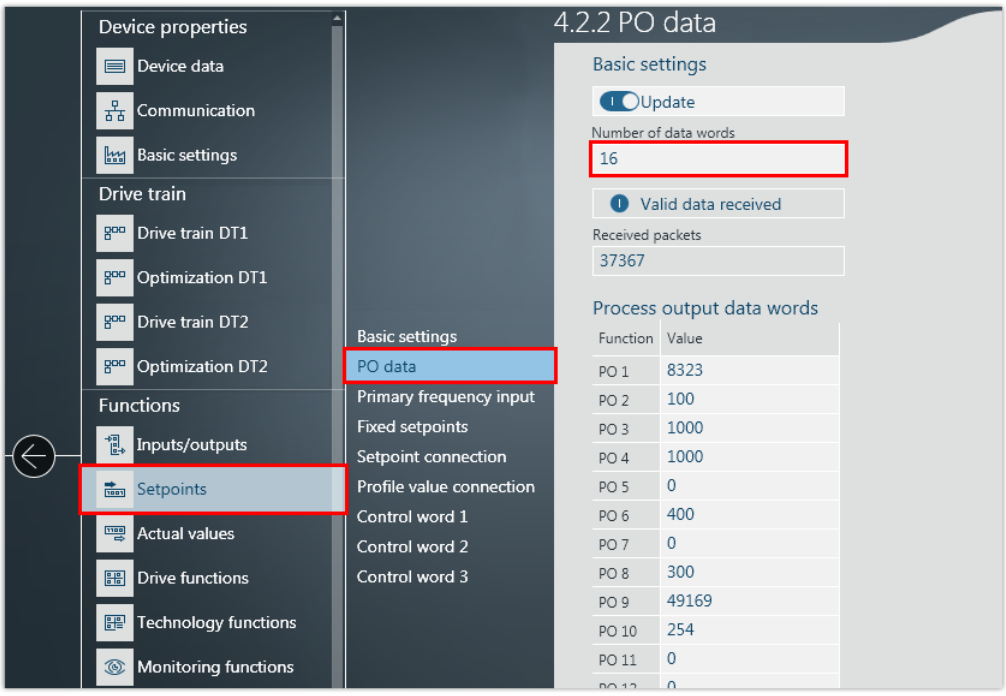
2. Configure the process data (setpoints and actual values) in the inverter. Note that the value 16 must be set for both PO data and PI data in the *Data word count* parameter (default setting in delivery state) although only 10 process data words are transferred.



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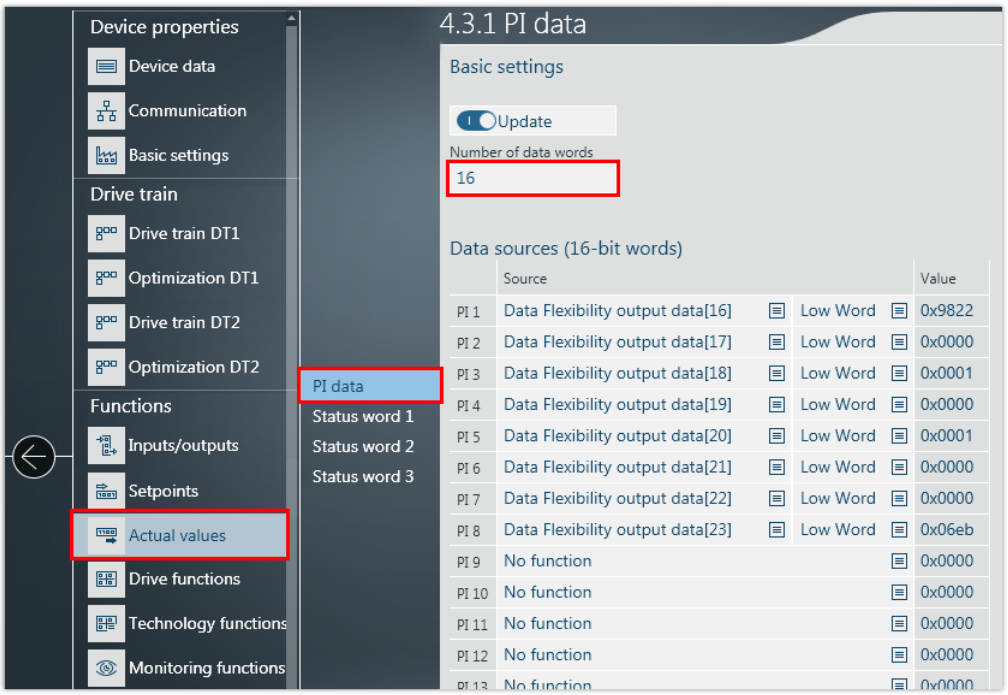

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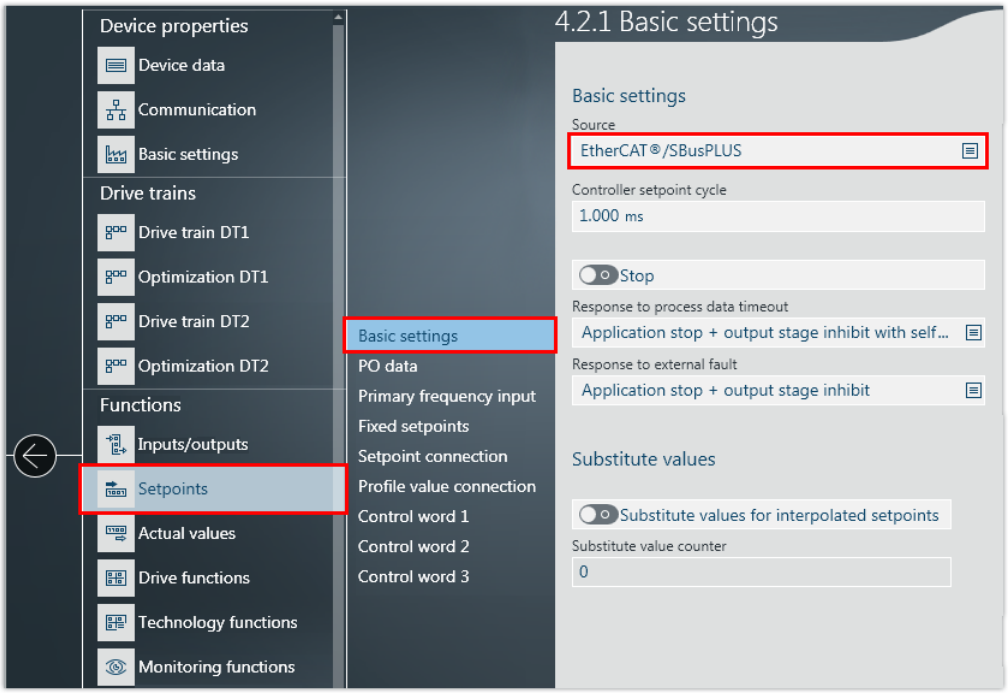
3. Save the MOVISUITE® project.

6.2.4 Parameterizing the inverters of the MOVIDRIVE® device family

Proceed as follows:

1. Open the configuration of the inverter and set the process data source. In the delivery state, the process data values are taken from the EtherCAT®/SBus^{PLUS} interface and are displayed.



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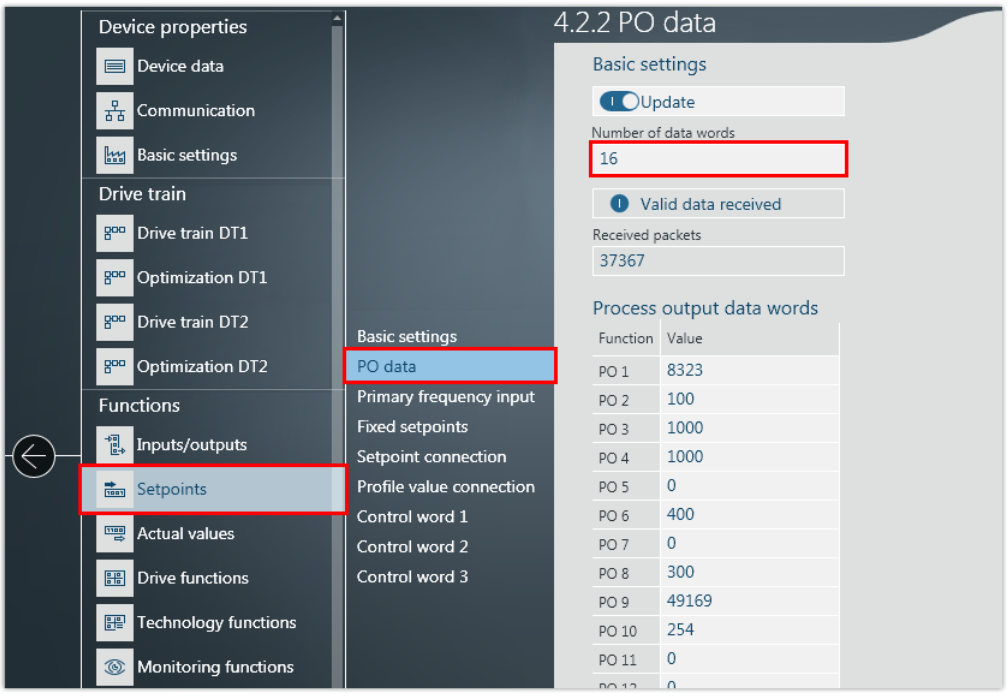
2. Configure the process data (setpoints and actual values) in the inverter. Note that the value 16 must be set for both PO data and PI data in the *Data word count* parameter (default setting in delivery state) although only 10 process data words are transferred.



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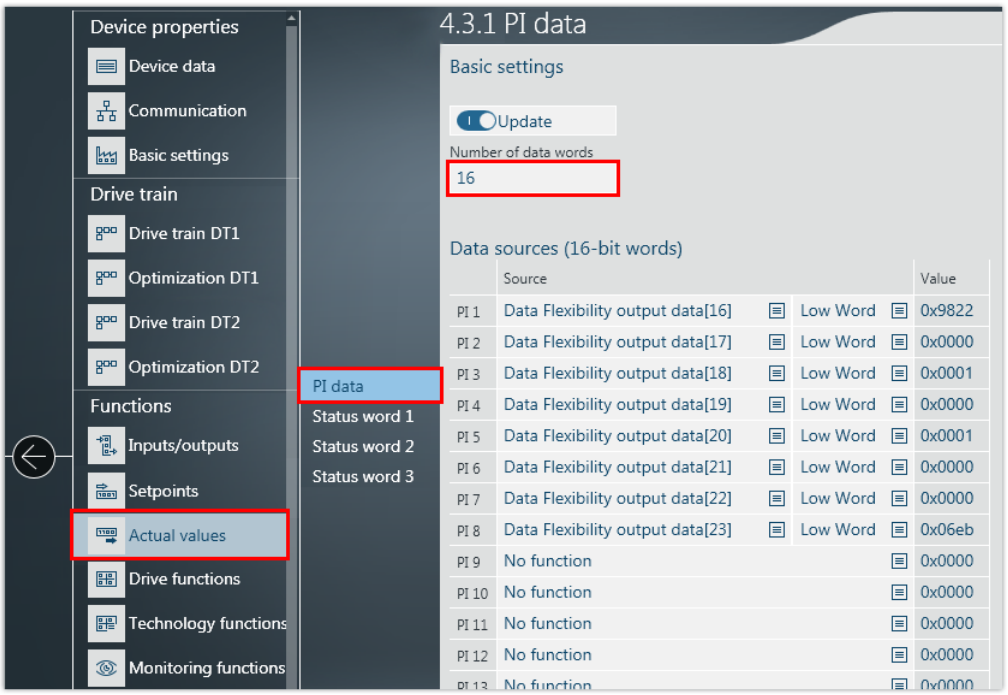

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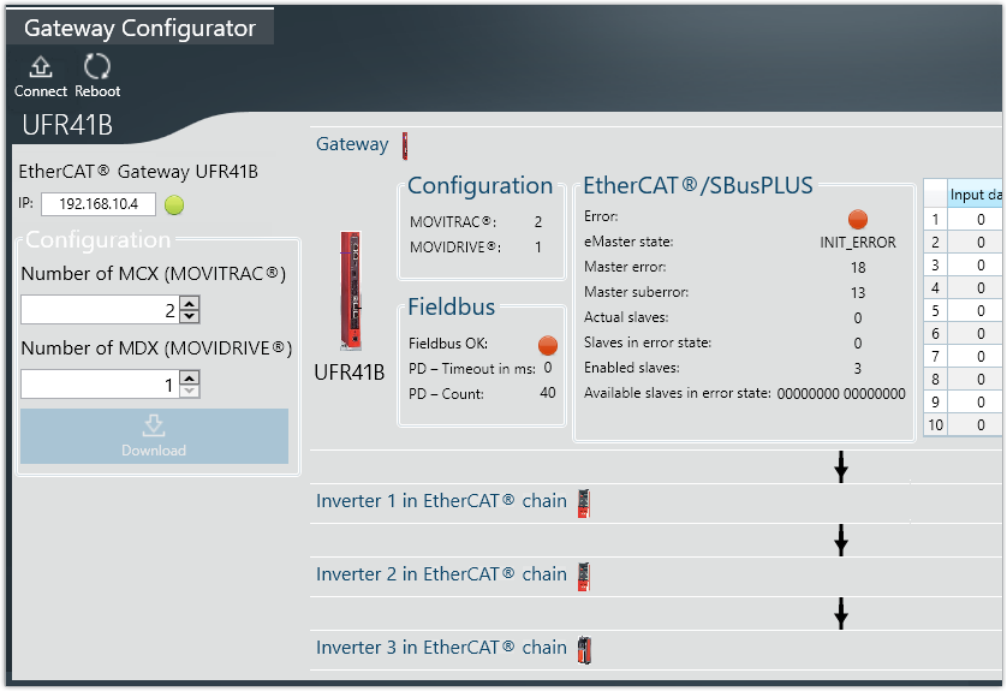
3. Save the MOVISUITE® project.

7 Operation

7.1 Diagnostics

After the connection has been successfully established, the current EtherCAT®/ SBus^{PLUS}network configuration, the status of the system bus, the process data, and the status of the UFR41B fieldbus gateway are displayed in the MOVI-C® Gateway Configurator configuration tool:



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The following information is displayed in the "Gateway" area:

Area	Field	Meaning
Configuration		Number and type of configured inverters
Fieldbus	Fieldbus OK	Status of the fieldbus connection to the PLC
	PD – Timeout in ms	Timeout time of the fieldbus connection. The time is transmitted by the PROFINET controller/Ethernet/IP™ scanner.
	PD – Count	Number of process data words used by the gateway.

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Area	Field	Meaning
EtherCAT®/ SBus^{PLUS}	eMaster state	State of the EtherCAT®/SBus^{PLUS} master: • INIT – initialization state • PREOP – preoperative state
	Master error/master suberror	The EtherCAT®/SBus^{PLUS} master has detected a fault. Proceed as follows: • Check the wiring of the network stations. • Check the configuration of the network stations. • Check the parameterization of the inverters. • If the fault occurs repeatedly, contact SEW-EURODRIVE Service.
	Actual slaves	Number of detected EtherCAT®/SBus^{PLUS} slaves. In normal operation, this number must correspond to the number of configured inverters in the network.
	Enabled slaves	Number of configured EtherCAT®/SBus^{PLUS} slaves (inverter)
	Available slaves in error state	If the EtherCAT®/SBus^{PLUS} master is in fault state, bit-coded display of the EtherCAT®/ SBus^{PLUS} slaves that cause the fault. This can be used to diagnose after which slave the connection is interrupted.

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7.2 Process data assignment of the devices

A block with 10 process data words is assigned to each device in the fieldbus network. The first process data block contains control information and status information for the UFR41B fieldbus gateway itself. Each subsequent process data block is assigned to an inverter connected to the EtherCAT® /SBus^{PLUS} line and transferred transparently.

Control words

The following table shows the data assignment of the control word from the PLC to the gateway:

Process data word	Description
1	Reserved
2	Reserved
3	Reserved
4	Reserved
5	Reserved
6	Reserved
7	Reserved
8	Reserved
9	Reserved

A block with 10 process data words is then transferred for each connected and configured inverter.

The data assignment of the inverter control words depends on the parameterization of the respective inverter.

Status words

The following table shows the data assignment of the status word from the gateway to the PLC:

Process data word	Description
1	Status word • Bit 0: Toggle bit 200 ms/200 ms • Bit 1: EtherCAT® master is ready • Bit 2: Data of the EtherCAT® slaves are valid (DataValid)
2	Fault code of the EtherCAT® master (master fault)
3	Subfault code of the EtherCAT® master (master subfault)
4	Number of process data used
5	Version ID of the gateway application
6	Reserved
7	Reserved
8	Reserved
9	Reserved

A block with 10 process data words is then transferred for each connected and configured inverter.

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The data assignment of the inverter status words depends on the parameterization of the respective inverter.

7.3 Timeout behavior

If a fieldbus timeout is detected by the UFR41B fieldbus gateway, all data from the gateway to the lower-level inverters is deleted after the timeout time set in the PROFINET controller/Ethernet/IP™ scanner.

If a fault is detected on the EtherCAT® /SBus^{PLUS} line, all setpoints and actual values of the connected inverters are deleted. In this case, the value 0 (DataValid = 0) is output in bit 2 in the status word of the gateway.

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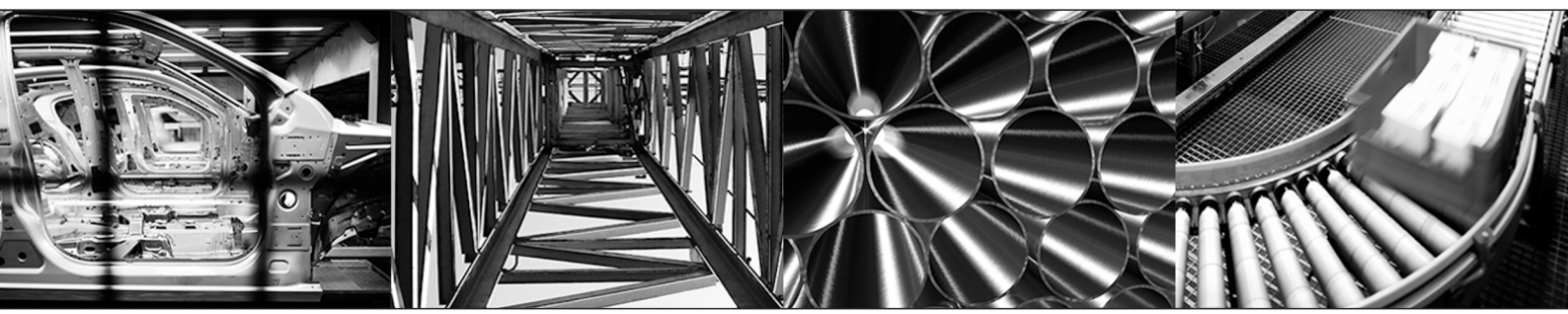

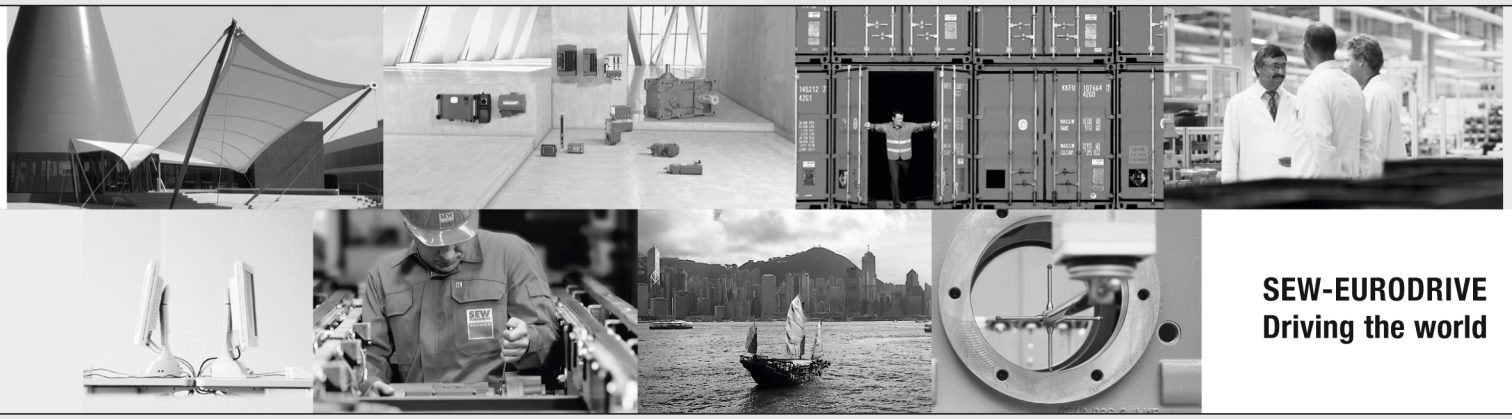

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