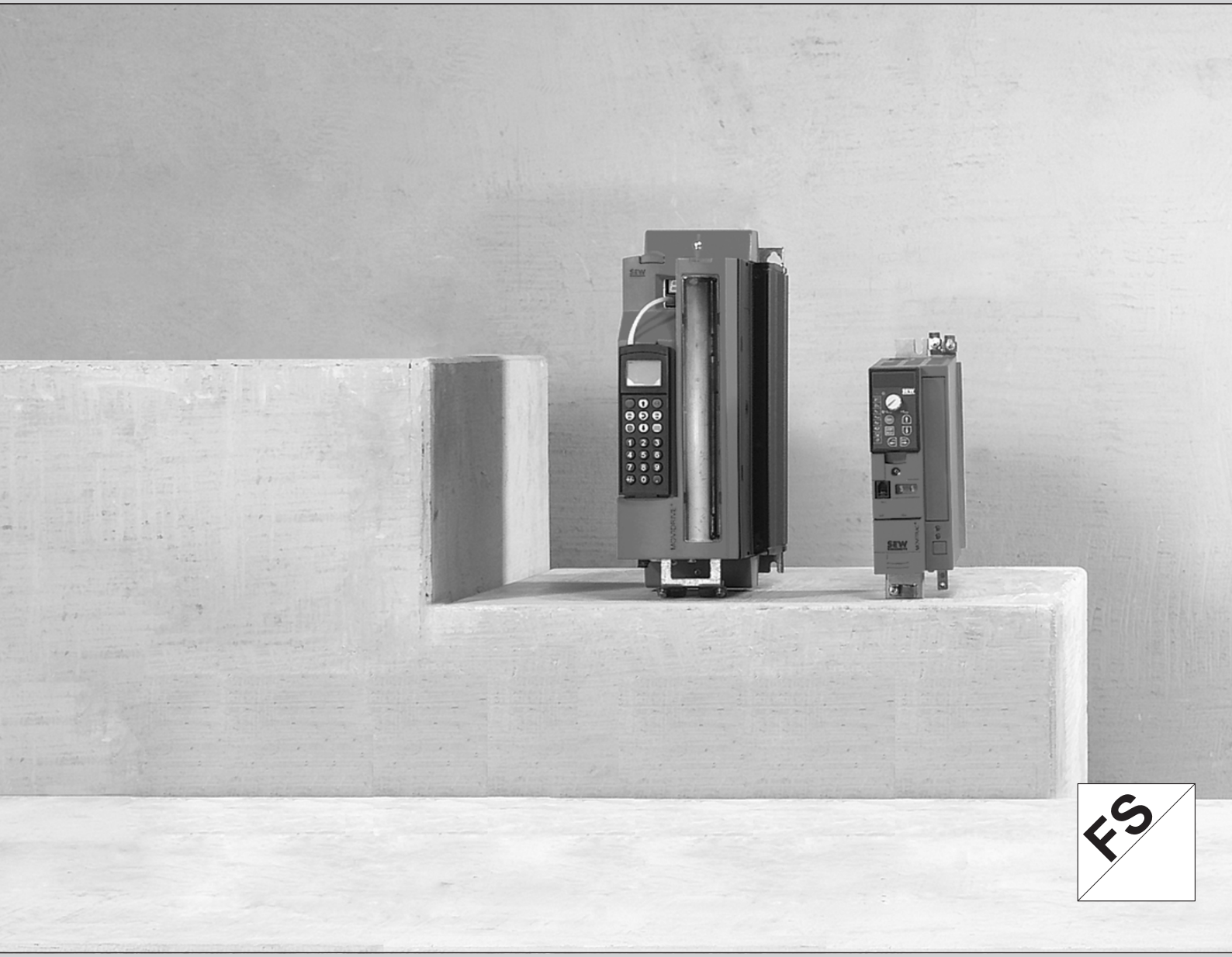
SEW EURODRIVE

Manual



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DFS21B PROFINET IO Fieldbus Interface with PROFIsafe

Edition 10/2019

29172659/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 intended for all employees who perform work on the product.

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

1.2 Underlying standards

The safety assessment of the device is based on the following standards and safety classes:

Underlying standards	
Safety class/underlying standards	Performance Level (PL) in accordance with EN ISO 13849-1

Observe the versions of the applicable standards as specified on the declaration of conformity or on the TÜV certificate.

1.3 Structure of the safety notes

1.3.1 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.	

1.3.2 Structure of section-related safety notes

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

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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
	Warning of dangerous electrical voltage
	Warning of automatic restart

1.3.3 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.

1.4 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.

1.5 Content of the documentation

This documentation contains additional safety-related information and conditions for operation in safety-related applications.

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1.6 Other applicable documentation

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

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.

1.7 Decimal separator in numerical values

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

Example: 30.5 kg

1.8 Product names and trademarks

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

1.9 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

Specialist for mechanical work

Any mechanical work may be performed only by adequately qualified specialists. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product 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 be performed only by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product 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 devices, 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 to give persons the ability to perform the required tasks and work steps in a safe and correct manner.

2.3 Designated use

The DFS21B option is designated for installation in the inverters MOVIDRIVE® MDX61B (size 0 – 7) and MOVITRAC® B (size 0 – 5), and in the UOH11B gateway housing.

The DFS21B option enables the connected inverters to exchange data with a higher-level controller via PROFINET IO. In addition, the DFS21B is suitable for controlling the STO safety function in the inverters if the controller supports PROFIsafe.

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2.4 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.

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3 Introduction

3.1 Content of this manual

This user manual illustrates:

- How to install the "DFS21B PROFINET IO with PROFIsafe" option card in the MOVIDRIVE® MDX61B drive inverter.
- How to use the "DFS21B PROFINET IO with PROFIsafe" option card in the MOVITRAC® B frequency inverter and in the UOH11B gateway housing.
- How to start up MOVIDRIVE® B in the PROFINET fieldbus system.
- How to start up MOVITRAC® B connected to the PROFINET gateway.
- How to configure PROFINET using GSDML files.
- How to operate MOVITOOLS® MotionStudio via PROFINET.
- How to diagnose using the integrated web server.

3.2 Characteristics

MOVIDRIVE® MDX61B and MOVITRAC® B enables you to use the DFS21B option to connect to higher-level automation systems via PROFINET IO thanks to its powerful, universal fieldbus interface.

3.2.1 MOVIDRIVE® B, MOVITRAC® B and PROFINET

The device behavior of the inverter that forms the basis of PROFINET operation is referred to as the device profile. It is independent of any particular fieldbus and is therefore a uniform feature. This feature allows the user to develop fieldbus-independent applications. This makes it much easier to change to other bus systems, such as DeviceNet.

3.2.2 Access to all information

MOVIDRIVE® MDX61B and MOVITRAC® B offer digital access to all drive parameters and functions via the PROFINET interface. The inverter is controlled via fast, cyclic process data. Via this process data channel, you can enter setpoints such as the setpoint speed, ramp generator time for acceleration/deceleration, etc. as well as trigger various drive functions such as enable, control inhibit, normal stop, rapid stop, etc. At the same time you can also use this channel to read back actual values from the inverter, such as actual speed, current, device status, error number or reference signals.

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3.2.3 Monitoring functions

Using a fieldbus system requires additional monitoring functions for the drive technology, for example, time monitoring of the fieldbus (fieldbus timeout) or rapid stop concepts. For example, you can adapt MOVIDRIVE®/MOVITRAC® monitoring functions specifically to your application. You can determine, for instance, which of the drive inverter fault responses should be triggered in the event of a bus error. A rapid stop makes sense for many applications, although this can also be achieved by "freezing" the last setpoints so the drive continues operating with the most recently valid setpoints (such as with a conveyor belt). As the functions of the control terminals are still active in fieldbus operation, you can still implement fieldbus-independent emergency stop concepts via the terminals of the inverter.

3.2.4 Diagnostics

MOVIDRIVE® B and MOVITRAC® B provide numerous diagnostics options for startup and service. You can, for instance, use the fieldbus monitor integrated in MOVITOOLS® MotionStudio to control setpoint values sent from the higher-level controller as well as the actual values. The integrated web server allows you to access the diagnostic values using a standard browser.

3.2.5 Fieldbus monitor

Furthermore, you are supplied with a variety of additional information about the status of the fieldbus interface. The fieldbus monitor in conjunction with the MOVITOOLS® MotionStudio engineering software offers you an easy-to-use diagnostic tool for setting all drive parameters (including the fieldbus parameters) and for displaying the fieldbus and device status information in detail.

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4 Integrated safety technology

4.1 Safety concept for PROFIsafe fieldbus interfaces

- Within the DFS.. PROFIsafe interface, PROFIsafe fieldbus interfaces are equipped with an integrated safety-related electronics components with a failsafe output (F-DO). The safety concept of this subassembly is based on the fact that there is a safe state for all safety-related process values. With the DFS.. PROFIsafe interface, this is the value "0" for the F-DO output.
- The following requirements are fulfilled by means of a 2-channel redundant system structure of the safety component with suitable monitoring mechanisms:
  - Performance level e in accordance with EN ISO 13849-1

  When the system detects a fault, it reacts by reverting to a safe state. This makes the safety function available in the form of a failsafe input connected to a higher-level safety control via the PROFIsafe communication. The safe output on the safety component of the DFS interface is neither evaluated locally nor processed logically.

INFORMATION

The safety function of MOVIDRIVE® B/MOVITRAC® B is only approved for applications up to performance level d according to EN ISO 13849-1.

4.2 Safety concept for MOVIDRIVE® B and MOVITRAC® B

- In the event of danger, any potential risk related to a machine must be eliminated as quickly as possible. Standstill with restart prevention is generally the safe condition for preventing dangerous movements.
- The MOVIDRIVE® MDX61B and MOVITRAC® B inverters are characterized by the optional connection of an external fail-safe, approved emergency stop relay (with performance level d according to EN ISO 13849-1). The emergency stop relay disconnects all active elements (disconnection of the safety oriented 24 V power supply of the output stage control) that generate the pulse trains to the power output stage (IGBT) when a connected control device (emergency stop button with latching function) is activated.
- Disconnecting the 24 V at the positive and negative pole ensures that the supply voltages required for operating the inverter and consequently for generating a rotating field of pulse patterns (which allow the generation of a rotating field) are safely interrupted, preventing automatic restart.
- Instead of galvanic isolation of the drive from the supply system using contactors or switches, the disconnection of the 24 V voltage supply described here safely prevents the gating of the power semiconductors in the inverter. This process disconnects the rotating field generation for the respective motor. The individual motor cannot develop any torque in this state even though the line voltage is still present.

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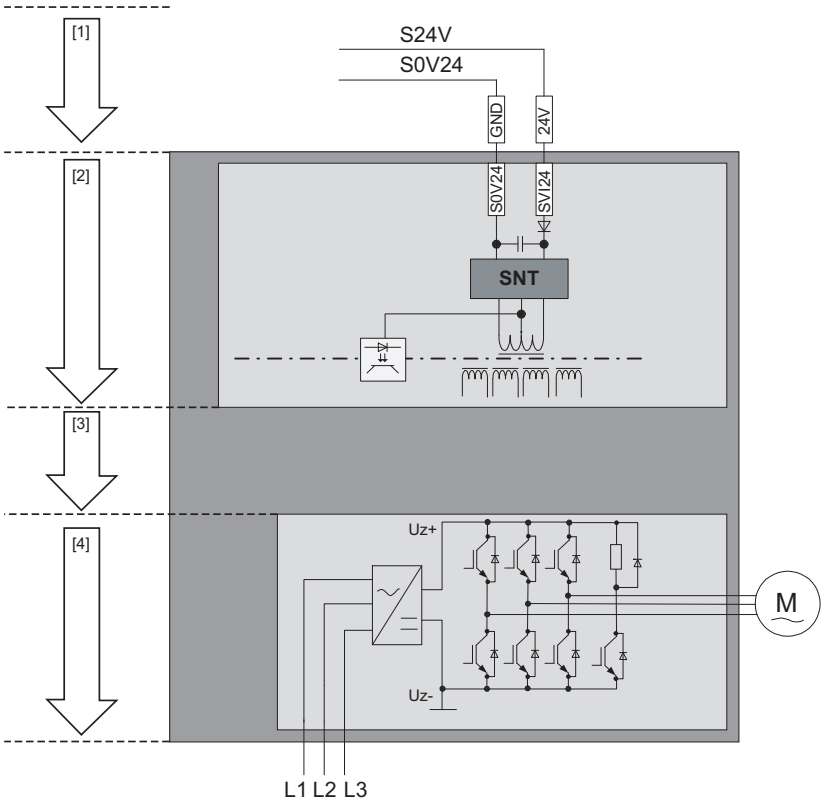
4.2.1 Schematic representation "Safety concept for MOVIDRIVE® B"



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[1] Safety-related DC 24 V voltage supply
[2] Electrical isolation
[3] Voltage supply for controlling the power transistors
[4] Pulse width modulated signals for the output stage

4.2.2 Restrictions

A system/machine-specific risk assessment must be carried out by the system/machine manufacturer and taken into account for operation of the MOVIDRIVE® MDX 61B and MOVITRAC® B inverters.

⚠ WARNING

If the STO signal is disconnected, the supply system voltage is still present at the MOVIDRIVE® B/MOVITRAC® B DC link.

This can result in severe or fatal injuries.

- Before working on the electric part of the drive system, disconnect it from the supply voltage using an appropriate external disconnecting device, and secure it against unintentional reconnection to the voltage supply.
- The safety concept is only suitable for performing mechanical work on driven system/machine components.

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5 Safety requirements

5.1 Installation requirements

5.1.1 Connecting the safety-related digital output F-DO

- Only connect cables with a core cross section of a minimum of 0.25 mm^2 up to a maximum 1 mm^2 to the safety-related digital output F-DO (X31:1, X31:2) of the DFS21B option. Clamping without conductor end sleeves is possible in accordance with IEC 60999. The maximum cable length is 30 m.
- The maximum current load of the F-DO safety-related digital output is DC 1 A.
- The safety digital output is bipolar, P and M switching and is controlled via PROFIsafe by a higher-level safety control.
- An actuator must generally be connected with the safe output F-DO with a 2-pole connection between the P switch output and the M switch output (F-DO_P and F-DO_M).
- It is not permitted to make a 1-pole connection between F-DO_P and the GND reference potential as doing so would cause an error as soon as the output is controlled.
- The safe output is tested internally in cycles. However, when decoupled, the test pulses are not visible at the connection terminals and do not have to be taken into account during operation.

  A range of external faults can be detected using internal tests and monitoring functions:

  The following faults can be detected when the output is activated:

  – Short circuit between the P output and the reference potential
  – Short circuit between the M output and the +24 V supply voltage
  – Short circuit between the P output and the M output

  The following faults can be detected when the output is deactivated:

  – Short circuit between the P output and the reference potential
  – Short circuit between the M output and the reference potential
  – Short circuit between the P output and the +24 V supply voltage
  – Short circuit between the M output and the +24 V supply voltage

  Whenever the system detects a fault, it reverts to a safe status, i.e. all safety-related process values (F-DO) are set to "0". In addition, the safety component is passivated. The "FS" LED (failsafe status) indicates the fault status (see chapter "Operating displays of the DFS21B option").

5.1.2 DC 24 V voltage supply

The DC 24 V supply voltage(s) of the DFS21B and all stations connected to the fieldbus must be designed as safety extra-low voltage. The voltage must be within the limits specified in the technical data. In addition, the following voltage values must not be exceeded if a fault occurs (according to EN 60950): Max. DC 60 V, Max. DC 120 V for 200 ms.

The connection cables for the supply voltages 24 V_LS and 24 V_PS must not be longer than 30 m.

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6 Assembly and installation notes

This section contains information about assembly and installation of the DFS21B option card in MOVIDRIVE® MDX61B, MOVITRAC® B and UOH11B gateway housing.

6.1 Installing the DFS21B option card in MOVIDRIVE® MDX61B

INFORMATION

- If a fault has been detected, the DFS21B option card has to be switched immediately.
- Only SEW-EURODRIVE personnel may install or remove option cards for MOVIDRIVE® MDX61B size 0.
- Users may only install or remove option cards for MOVIDRIVE® MDX61B sizes 1 to 7.
- Plug the DFS21B option card into the fieldbus slot [1].
- Only use connectors and cables approved for PROFINET IO for cabling.

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[1] Fieldbus option slot

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6.1.1 Before you start

Observe the following notes before installing or removing an option card:

- Disconnect the inverter from the power. Disconnect the DC 24 V supply and the line voltage.
- Take appropriate measures (discharge strap, conductive shoes, etc.) to protect the option card from electrostatic charge before touching it.
- **After** having installed the option card, replace the keypad and the front cover (see MOVIDRIVE® MDX60B/61B operating instructions, chapter "Installation").
- **Before** installing the option card, remove the keypad and the front cover (see MOVIDRIVE® MDX60B/61B operating instructions, chapter "Installation").
- Keep the option card in its original packaging until immediately before you are ready to install it.
- Hold the option card by its edges only. Do not touch any of the components.

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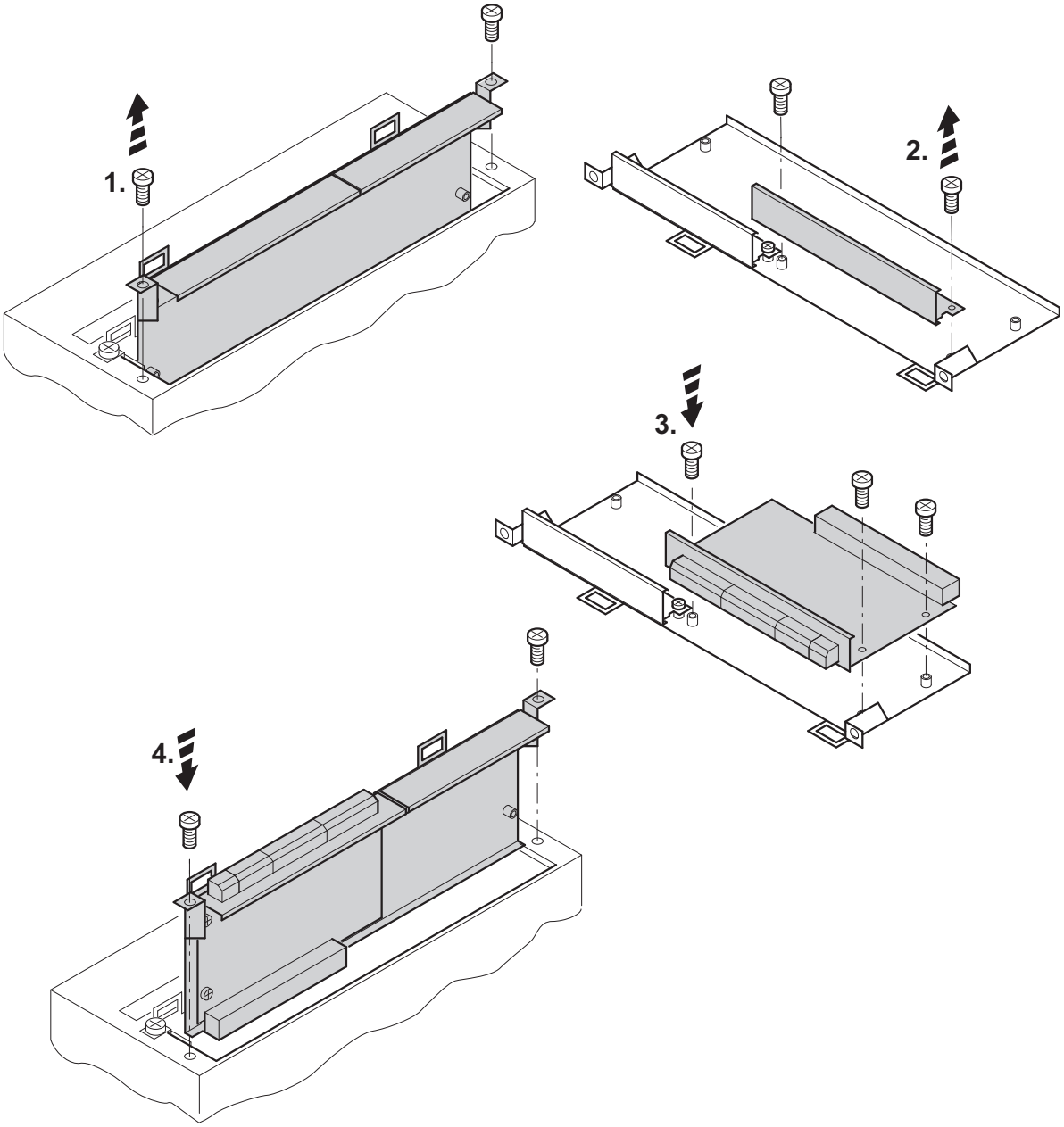
6.1.2 Installing and removing option cards



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1. Remove the two retaining screws holding the option card retaining bracket. Pull the option card retaining bracket out evenly from the slot (do not twist).
2. Remove the 2 retaining screws from the black cover plate on the option card retaining bracket. Remove the black cover plate.
3. Position the option card onto the option card retaining bracket so that the three retaining screws fit into the corresponding bores on the option card retaining bracket.
4. Insert the option card retaining bracket with the installed option card into the slot, pressing slightly so it is seated properly. Secure the option card retaining bracket with the two retaining screws.
5. To remove the option card, follow the instructions in reverse order.

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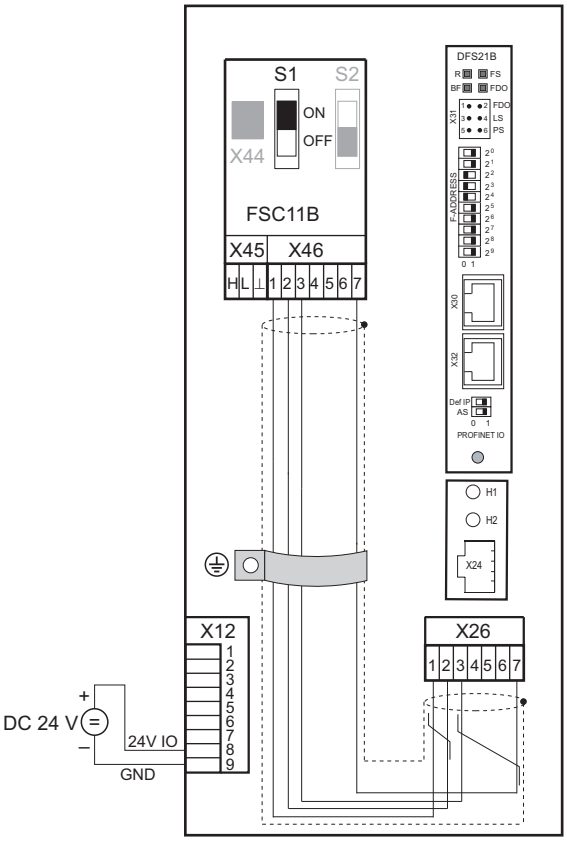
6.2 Installing the DFS21B option card in MOVITRAC® B

INFORMATION

- MOVITRAC® B does not require a special firmware status.
- Only SEW-EURODRIVE technicians are allowed to install or remove option cards for MOVITRAC® B.

6.2.1 Connecting the system bus (SBus 1) to a MOVITRAC® B and the DFS21B option



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S12 = ON (terminating resistor activated)

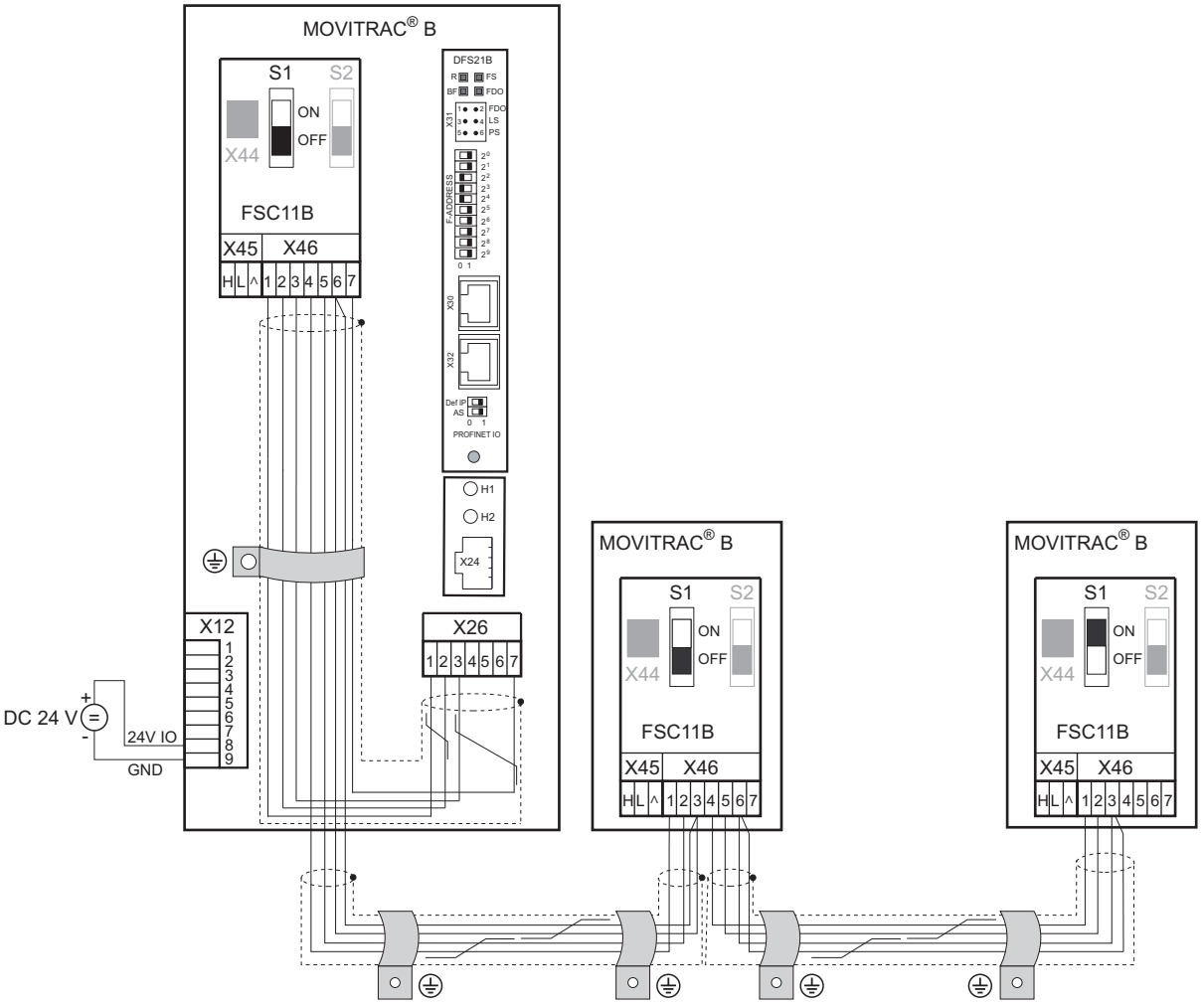
X46	X26	Terminal assignment
X46:1	X26:1	SC11 SBus +, CAN high
X46:2	X26:2	SC12 SBus -, CAN low
X46:3	X26:3	GND, CAN GND
X46:7	X26:7	DC 24 V

X12	Terminal assignment
X12:8	DC+24 V input
X12:9	GND reference potential for the digital inputs

To simplify cabling, the DFE24B can be supplied with DC 24 V from X46:7 of MOVITRAC® B to X26:7. In this case the DC 24 V voltage supply of the MOVITRAC® B must be connected to terminals X12:8 and X12:9.

Activate the bus terminating resistor at the FSC11B option (S1 = ON).

6.2.2 Connecting the system bus (SBus 1) to several MOVITRAC® B devices and the DFS21B option



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MOVITRAC® B		DFS21B via UOH11B gateway housing	
X46	**Terminal assignment**	**X26**	**Terminal assignment**
X46:1	SC11 (System bus high, incoming)	X26:1	SC11 SBus +, CAN High
X46:2	SC12 (System bus low, incoming)	X26:2	SC12 SBus –, CAN Low
X46:3	GND (System bus reference)	X26:3	GND, CAN GND
X46:4	SC21 (System bus high, outgoing)		
X46:5	SC22 (System bus low, outgoing)		
X46:6	GND (System bus reference)		
X46:7	DC 24 V	X26:7	DC 24 V

X12	Terminal assignment
X12:8	DC+24 V input

X12	Terminal assignment
X12:9	GND reference potential for digital inputs

- Use a 2×2-core twisted pair and shielded copper cable (data transmission cable with braided copper shield). Connect the shield flatly on both sides of the electronics shield clamp of MOVITRAC® B. Also connect the ends of the shield to GND. The cable must meet the following specifications:
  - Core cross section 0.25 mm^2 to 0.75 mm^2
  - Line resistance 120 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m at 1 kHz

  Suitable cables are CAN or DeviceNet™ cables.
- The permitted total cable length depends on the baud rate set for the SBus:
  - 250 kBaud: 160 m
  - 500 kBaud: 80 m
  - 1000 kBaud: 40 m
- Connect the system bus terminating resistor (S1 = ON) at the end of the system bus connection. Switch off the terminating resistor on the other devices (S1 = OFF). The DFS21B gateway must always be connected either at the beginning or the end of the system bus connection and feature a permanently installed terminating resistor.

INFORMATION

- There must not be any potential shift between the devices connected via the SBus. Take suitable measures to avoid potential shift, e.g. by connecting the unit ground connectors using a separate cable.
- Point-to-point wiring is not permitted.

6.3 Assembling and installing the DFS21B/UOH11B gateway housing

INFORMATION

Only SEW-EURODRIVE engineers are allowed to install or remove option cards in/ from the UOH11B gateway housing.

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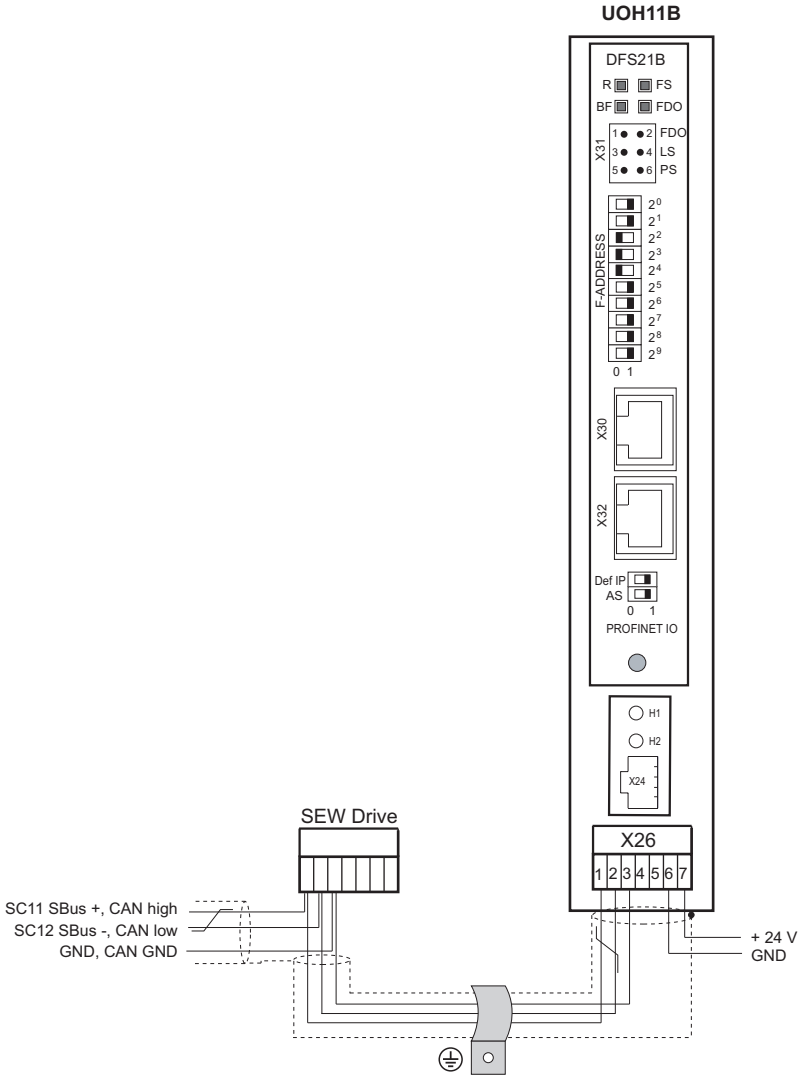
The following figure shows the connection of the DFS21B option via the UOH11B:X26 gateway housing.



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UOH11B gateway housing	
X26	**Terminal assignment**
X26:1	SC11 system bus +, CAN high
X26:2	SC12 system bus –, CAN low
X26:3	GND, CAN GND
X26:4	Reserved
X26:5	Reserved
X26:6	GND, CAN GND
X26:7	DC 24 V

The gateway housing is supplied with DC 24 V via X26. Connect the bus terminating resistor at the end of the system bus connection.

6.4 Connection and terminal description of the DFS21B option

6.4.1 Part number

PROFINET IO with PROFIsafe DFS21B Fieldbus Interface option 18211836

INFORMATION

- The DFS21B option is only possible in connection with MOVITRAC® B and MOVIDRIVE® MDX61B, not with MOVIDRIVE® MDX60B.
- Plug the DFS21B option into the fieldbus option slot.

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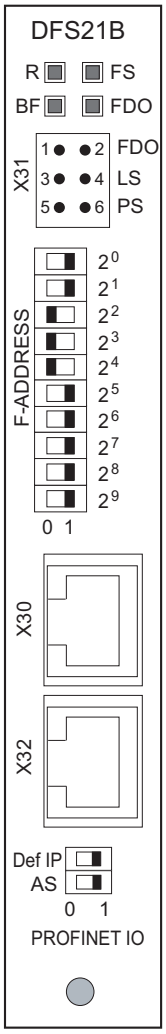
Front view of DFS21B	Description	LED DIP switch Terminal	Function
	Diagnostic LEDs	R	RUN – Component status (green)
		FS	Failsafe status – Status of the safety option (green during standard operation)
		BF	BUS FAULT – Bus status (red if a fault occurs, else disabled)
		FDO	Failsafe output – Status of the safe output (orange)
	X31 connection	1 (F_DO_M)	Safe output
		2 (F_DO_P)	Safe output
		3 (GND)	Supply of the safe output
		4 (24 V_LS)	Supply of the safe output[1)]
		5 (GND)	Electronic supply
		6 (24 V_PS)	Electronic supply[1)]
	F-ADDRESS: DIP switch for setting the failsafe address	2^0	Significance: 1
		2^1	Significance: 2
		2^2	Significance: 4
		2^3	Significance: 8
		2^4	Significance: 16
		2^5	Significance: 32
		2^6	Significance: 64
		2^7	Significance: 128
		2^8	Significance: 256
		2^9	Significance: 512
	X30, X32: Ethernet connection	LED Link (green)	Indicates the status of the Ethernet connection.
		LED Activity (yellow)	Indicates the data exchange via Ethernet.
	DIP switch	AS	Auto setup for gateway operation
		DEF IP	Resets the address parameters to the following default values: • IP address: 192.168.10.4 • Subnet mask: 255.255.255.0 • Gateway: 1.0.0.0 • PROFINET device name: PNETDevice-Name_MACID

1) The 24 V supply voltage(s) of the DFS21B and all stations connected to the fieldbus must be designed as safety extra-low voltage. The voltage must be within the limits specified in the technical data. In addition, the following voltage values must not be exceeded if a fault occurs (according to EN 60950): max. DC 60 V, max. DC 120 V for 200 ms.

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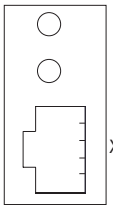
Front view of MOVITRAC® B, DFS21B and UOH11B	Description	Function
	LED H1 (red) LED H2 (green) X24 X terminal	System error (only for gateway functionality) Reserved RS485 interface for diagnostics via PC and MOVITOOLS® MotionStudio (only for MOVITRAC® B)

6.5 Wiring diagrams

6.5.1 Using the safe digital output F-DO

INFORMATION

The safe digital output F-DO can drive the following maximum number of devices irrespective of the required current:

- 4 devices of size 0 (MOVIDRIVE® MDX61B or MOVITRAC® B) and one BST safety-related brake module each.
- 2 devices of size ≥1 (MOVIDRIVE® MDX61B or MOVITRAC® B) and one BST safety-related brake module each.
- 2 devices of size 0 (MOVIDRIVE® MDX61B or MOVITRAC® B) and one device of size ≥1 (MOVIDRIVE® MDX61B or MOVITRAC® B) and one BST safety-related brake module each.
- Observe the corresponding operating instructions when using the BST safety-related brake module.

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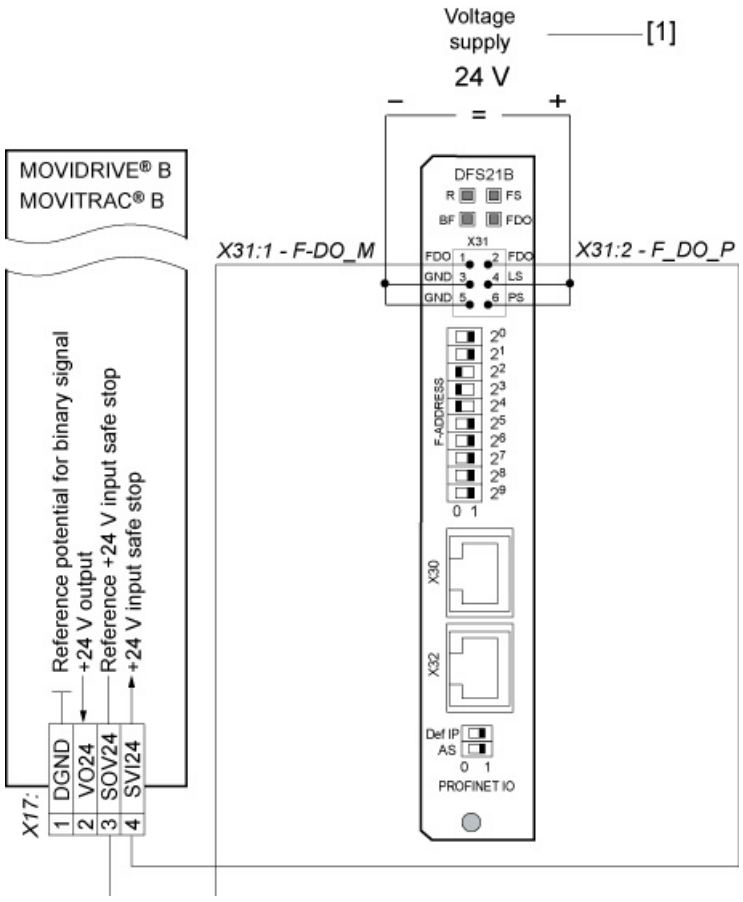
6.5.2 Individual wiring of MOVIDRIVE® MDX61B and MOVITRAC® B

With external DC 24 V voltage supply



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[1] The 24 V supply voltage(s) of the DFS21B and all stations connected to the fieldbus must be designed as safety extra-low voltage. The voltage must be within the limits specified in the technical data. Moreover, the following voltage values may not be exceeded in case of error (in accordance with EN 60950): Max. DC 60 V, max. DC 120 V for 200 ms.

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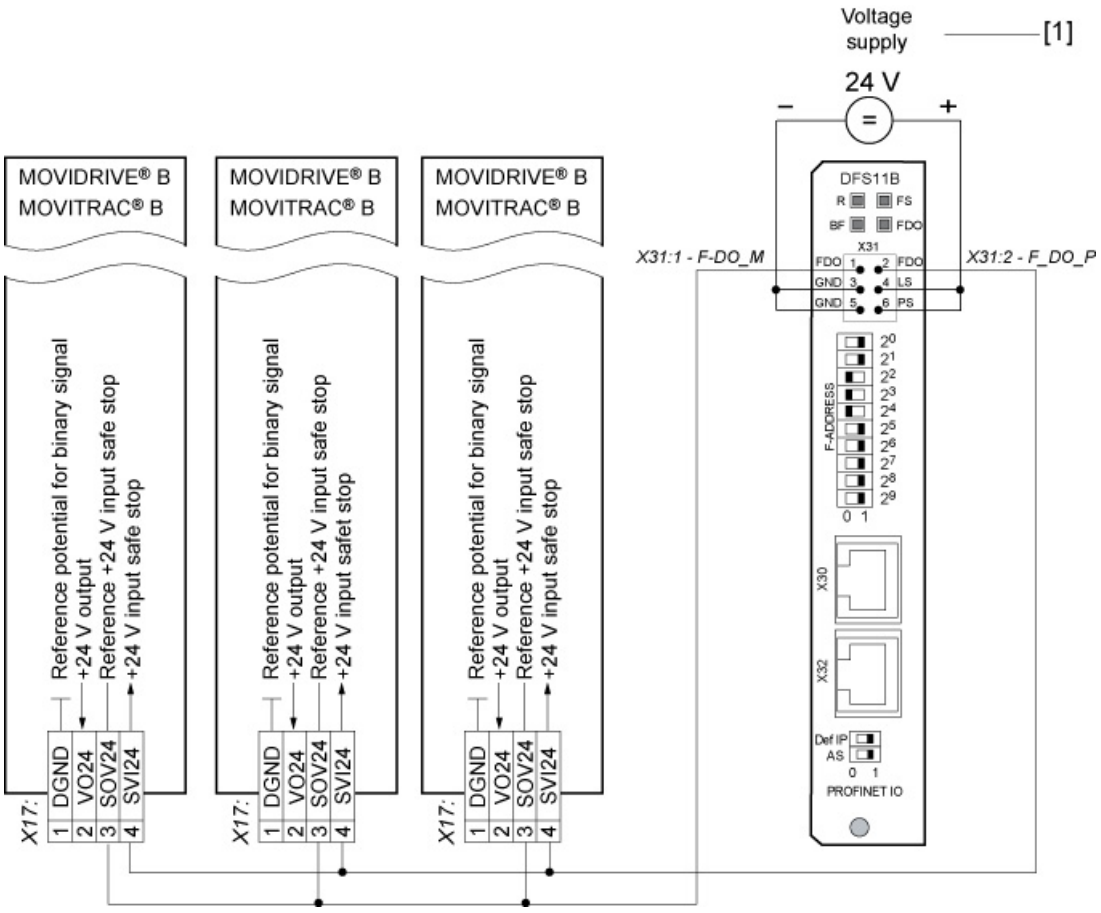
6.5.3 Group wiring of MOVIDRIVE® MDX61B and MOVITRAC® B

With external DC 24 V voltage supply



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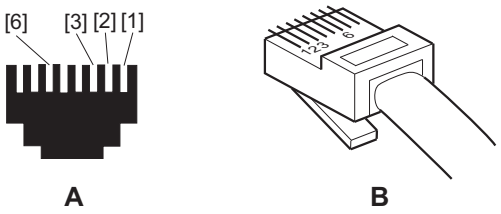
[1] The DC 24 V supply voltage(s) of the DFS21B and all stations connected to the fieldbus must be designed as safety extra-low voltage. The voltage must be within the limits specified in the technical data. Moreover, the following voltage values may not be exceeded in case of error (in accordance with EN 60950): Max. DC 60 V, max. DC 120 V for 200 ms.

6.6 Pin assignment of an RJ45 plug connector

Use prefabricated, shielded RJ45 plug connectors compliant with IEC 11801, edition 2.0, category 5.



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A View from front
B View from back
[1] Pin 1 TX+ Transmit Plus
[2] Pin 2 TX− Transmit Minus
[3] Pin 3 RX+ Receive Plus
[4] Pin 6 RX− Receive Minus

6.6.1 MOVIDRIVE® / MOVITRAC® B / Ethernet connection

To connect the DFS21B, connect the Ethernet interface X30 or X32 (RJ45 connector) using a category 5, class D shielded twisted-pair cable in compliance with IEC 11801 edition 2.0. The integrated switch provides support for realizing a line topology.

INFORMATION

- According to IEC 802.3, the maximum cable length for 10/100 MBaud Ethernet (10BaseT/100BaseT), e.g. between DFS21B and switch, is 100 m.
- VLAN tag prioritized Ethernet frames with the frame identification 8892_{hex} are used for the real-time data exchange with PROFINET IO. This requires switched networks. The switches must support prioritization. Hubs are not permitted. Data transmission takes place using the full duplex process with 100 MBit. Detailed information on cabling can be found in the "PROFINET installation guideline" publication that was issued by the PROFINET user organization.

6.7 Shielding and routing bus cables

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.

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- 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.

INFORMATION

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 VDE regulations in such a case.

6.8 TCP/IP addressing and subnetworks

6.8.1 Introduction

The settings for the address of the IP protocol are made using the following parameters:

- IP address
- Subnet mask
- Standard gateway

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

6.8.2 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.

Example: 192.168.10.4

Each decimal number stands for one byte (= 8 bits) of the address and can also be represented using binary code (see following table).

Byte 1		Byte 2		Byte 3		Byte 4
11000000	.	10101000	.	00001010	.	00000100

The IP address comprises a network address and a node address (see following table).

Network address	Node address
192.168.10	4

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.

Node addresses cannot consist of only zeros or ones (binary) because they represent the network itself or a broadcast address.

6.8.3 Network classes

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

Value range Byte 1	Network class	Complete network address (Example)	Meaning
0 to 127	A	10.1.22.3	10 = Network address 1.22.3 = Node address
128 to 191	B	172.16.52.4	172.16 = Network address 52.4 = Node address
192 to 223	C	192.168.10.4	192.168.10 = Network address 4 = Node address

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

6.8.4 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. Every decimal number stands for one byte.

Example: 255.255.255.128

Each decimal number stands for one byte (= 8 bits) of the subnet mask and can also be represented using binary code (see the following table).

Byte 1		Byte 2		Byte 3		Byte 4
11111111	.	11111111	.	11111111	.	10000000

If you compare the IP addresses with the subnet masks, you see that in the binary representation of the subnet mask all ones determine the network address and all the zeros determine the node address (see the following table).

		Byte 1		Byte 2		Byte 3		Byte 4
IP address	decimal	192	.	168.	.	10	.	128
	binary	11000000	.	10101000	.	00001010	.	10000000
Subnet mask	decimal	255	.	255	.	255	.	128
	binary	11111111	.	11111111	.	11111111	.	10000000

The class C network with the address 192.168.10. is further subdivided by the subnet mask 255.255.255.128. 2 networks are created with the address 192.168.10.0 and 192.168.10.128.

The permitted node addresses in the two networks are:

- 192.168.10.1 to 192.168.10.126
- 192.168.10.129 to 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.

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6.8.5 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.

Example: 192.168.10.1

The standard gateway establishes a connection to other networks. In this way, a network station that wants to address another station can use a logical AND operation with the IP address and the subnetwork mask to decide whether the desired station is located in the same network. If this is not the case, the 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.

6.9 Setting the IP address parameters via DCP

6.9.1 Initial startup

For PROFINET IO, the IP address parameters are determined via the "DCP" protocol (**D**iscovery and **C**onfiguration **P**rotocol). DCP operates with device names. The device name uniquely identifies a PROFINET IO node in the network. It is identified with the PROFINET IO controller during the configuration of the node and also set using the configuration software on the PROFINET IO device. With the aid of the device name, the controller identifies the device during startup and transfers the corresponding IP address parameters. Settings directly on the slave are no longer required. The basic procedure is described with SIMATIC STEP 7 as an example in chapter "Project planning with PROFINET" (see section "Assigning the PROFINET device name").

6.9.2 Resetting the IP address parameters

If you do not know the IP address parameters and cannot access the inverter using the serial interface or the DBG60B keypad, you can reset the IP address parameters to the default values using the DIP switch "Def IP".

This action resets the DFS21B option to the following default values:

- IP address: 192.168.10.4
- Subnet mask: 255.255.255.0
- Standard gateway: 1.0.0.0
- PROFINET device name: PNETDeviceName

Proceed as follows to reset the IP address parameters to the default values:

- Switch off the 24 V DC supply voltage and the mains voltage.
- Set the DIP switch "Def IP" on the DFS21B option to "1".
- Switch the DC 24 V supply voltage and the line voltage back on.
- Wait until the DFS21B option has booted up. This is indicated by the green "Run" LED.

You can now access the inverter via the IP address 192.168.10.4. Proceed as follows to set new IP address parameters:

- Start a web browser and access the homepage of the DFS21B option or start MOVITOOLS® MotionStudio.
- Select the required address parameters.

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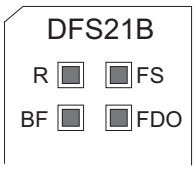
- Set the DIP switch "Def IP" on the DFE32B option to "0".
- The new address parameters are adopted after the device is switched off and switched on again.

6.10 Operating display DFS21B option

6.10.1 PROFINET LEDs

There are 4 LEDs on the DFS21B option card that display the current status of the DFS21B option and the PROFINET system.



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LED "R" (RUN)

The **R** LED (RUN) indicates whether the bus electronics is functioning properly.

"R" LED	Cause of error	Troubleshooting
Green	Proper operation, the DFS21B hardware is OK.	–
Off	DFS21B is not ready for operation.	Switch the device on again. Consult SEW Service if the error occurs again.
Red	Error in the DFS21B hardware.	
Flashing green	Hardware of the DFS21B does not boot.	
Flashing yellow		Switch the device on again. Set default IP address parameter using "DEF IP" DIP switch. Consult SEW Service if the error occurs again.
Yellow		Switch the device on again. Consult SEW Service if the error occurs again.

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LED "BF" (BUS FAULT)

The **BF** LED (BUS FAULT) displays the status of the PROFINET.

"BF" LED	Cause of error	Troubleshooting
Off	PROFINET IO device is currently exchanging data with the PROFINET master (data exchange).	-
Flashing green Flashing green/red	The flashing function in the PROFINET IO controller configuration is activated to visually locate the stations.	-
Red	• Connection to the PROFINET IO controller has failed. • PROFINET IO device does not detect a link • Bus interruption • PROFINET IO controller is not in operation	• Check the PROFINET connection of the DFS21B option • Check the PROFINET IO controller. • Check the cabling of your PROFINET network
Yellow Flashing yellow	The STEP 7 hardware configuration contains a module that is not permitted.	Switch the STEP 7 hardware configuration to ONLINE and analyze the component status of the slots in the PROFINET IO device.

LED "FS" (FAILSAFE STATUS)

The **FS** LED (FAILSAFE STATUS) indicates the failsafe status on PROFINET.

"FS" LED	Cause of error	Troubleshooting
Green	• The DFS21B option is currently performing a cyclical data exchange with the F-host (data exchange). • Standard operating state.	–
Red	• Fault status in the safety part. • No 24 V_LS supply voltage present.	• Read diagnostics in F-Host. • Eliminate the cause of the fault and acknowledge in the F-Host.
Off	The DFS21B option is currently in the initialization phase.	• Check voltage supply. • Check configuration of the bus master.
Flashing red / green	A fault occurred in the safety part; cause of the fault already remedied – acknowledgement required.	Acknowledge fault in the F-Host (reintegration).

LED "FDO" (FAILSAFE OUTPUT)

The **FDO** LED (FAILSAFE OUTPUT) indicates the failsafe status on PROFINET.

LED FDO	State
Orange	Output F-DO active

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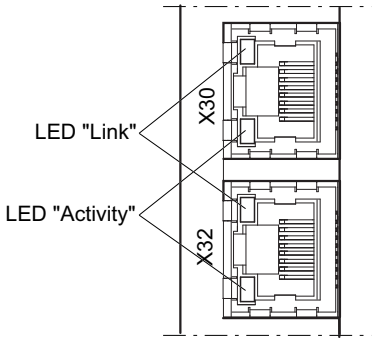
LED FDO	State
Off	Output F-DO inactive (switched off)

INFORMATION

The LEDs "R", "BF", "F-DO" and "FS" are not safety-related and may not be used as a safety device.

Link/Activity LED

The two LEDs **Link (green)** and **Activity (yellow)**, integrated in the RJ45 plug connectors (X30, X32), display the status of the Ethernet connection.



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"Link/Activity" LED	Meaning
Link/green	There is an Ethernet connection.
Link/off	There is no Ethernet connection.
Activity/yellow	Data is currently being exchanged via Ethernet.

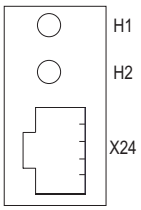
INFORMATION

- As the firmware of the DFS21B option card requires approximately 10 seconds for initialization, the status "0" (inverter not ready) is displayed in the 7-segment display of MOVIDRIVE® B during this time.
- The "R" LED on the DFS21B option card lights up green.

6.10.2 Gateway LEDs

LED H1 and H2

LEDs H1 (red) and H2 (green) indicate the communication status in gateway operation.



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LED H1 Sys-Fault	State	Description
Red	System error	Gateway is not configured or one of the drives is inactive.
Off	SBus OK	Gateway is configured correctly.
Flashing	Bus scan	Gateway checks the bus.

INFORMATION

- LED H2 (green) is currently reserved.
- X terminal X24 is the RS485 interface for diagnostics via PC and MOVITOOLS® MotionStudio.

6.11 Procedure after device replacement

6.11.1 MOVIDRIVE® B device replacement

If you insert the memory card of the replaced MOVIDRIVE® B in the new MOVIDRIVE® B (including new fieldbus option card), the new device will be recognized by the PROFINET IO controller without having to take any additional measures if the following is observed:

- Use the "F-ADDRESS" DIP switches to set the PROFIsafe address of the new option card. Make sure that the set address corresponds to the PROFIsafe address in STEP7 HW Config.

If you do **not** insert the memory card of the replaced MOVIDRIVE® B in the new MOVIDRIVE® B (including new fieldbus option card), the new device will be recognized by the PROFINET IO controller without having to take any additional measures if the following points are observed:

- Perform a complete startup of the inverter or load the saved parameter set into the new MOVIDRIVE® B.
- Use the "F-ADDRESS" DIP switches to set the PROFIsafe address of the new option card. Make sure that the set address corresponds to the PROFIsafe address in STEP7 HW Config.
- You have to set the PROFINET IO device name again using the configuration software. Proceed as with an initial startup (see chapter "Project planning with PROFINET").

6.11.2 Device replacement MOVITRAC® B / gateway

- Only for device replacement MOVITRAC® B with fieldbus option: You have to load the saved parameter set into the new MOVITRAC® B, or you have to perform a complete startup of the inverter (see MOVITRAC® B operating instructions).
- You have to set the PROFINET IO device name again using the configuration software. Proceed as with an initial startup (see chapter "Project Planning with PROFINET").
- **Prior to the auto setup**, check the parameters *P884 SBus baud rate* and *P831 Fieldbus timeout response*. The baud rate of the devices connected to the SBus has to correspond to the baud rate of the gateway (DFS21B). Use the parameter tree of the gateway in MOVITOOLS® MotionStudio.

- Now activate the auto setup function. Set the DIP switch "AS" on the DFS21B option to 1.
- Use the "F-ADDRESS" DIP switches to set the PROFIsafe address of the new option card. Make sure that the set address corresponds to the PROFIsafe address in STEP 7 HW Config.

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7 Project planning with PROFINET

This chapter describes the project planning of the MOVIDRIVE® B and MOVITRAC® B/ gateway inverters with the DFS21B option. The following GSDML file is used for the project planning of the DFS21B with MOVIDRIVE® B or in MOVITRAC® B:

GSDML-V2.1-SEW-DFE-DFS-2Ports-yyyymmdd.xml

This GSDML file contains the device description for the operation of the DFS21B in MOVIDRIVE® B or as fieldbus gateway for MOVITRAC® B.

7.1 Project planning for the PROFINET IO controller

This chapter describes the project planning for MOVIDRIVE® B or MOVITRAC® B with PROFINET using the current GSDML file. The project planning is described using the example of the SIMATIC Manager project planning software with a SIMATIC CPU 315F 2 PN/DP.

7.1.1 Installing the GSDML file

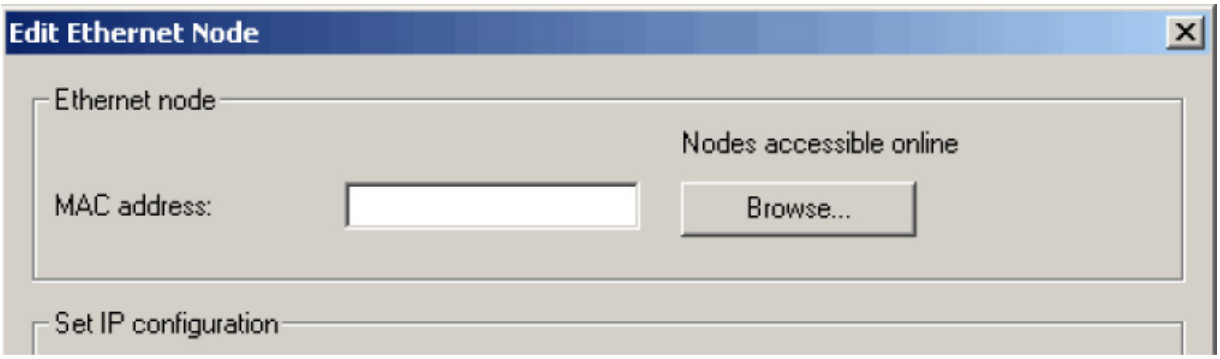
- Start STEP7 HW Config and select the [Install new GSD file] menu item from the [Extras] menu.
- Select the file "GSDML-V2.1-SEW-DFE-DFS-2Ports-YYYYMMDD.xml" on the "Software ROM 7" CD in the following dialog. "YYYYMMDD" represents the date of the file. You can navigate to the required directory via [Browse]. Confirm your selection with [OK].
- The SEW PROFINET IO DFS21B connection can be found under [Additional Field Devices] > [Drives] > [SEW] > [DFE/DFS (2 ports)].

INFORMATION

The latest GSDML file version is also available for download on the SEW website (www.sew-eurodrive.de) in the Software section.

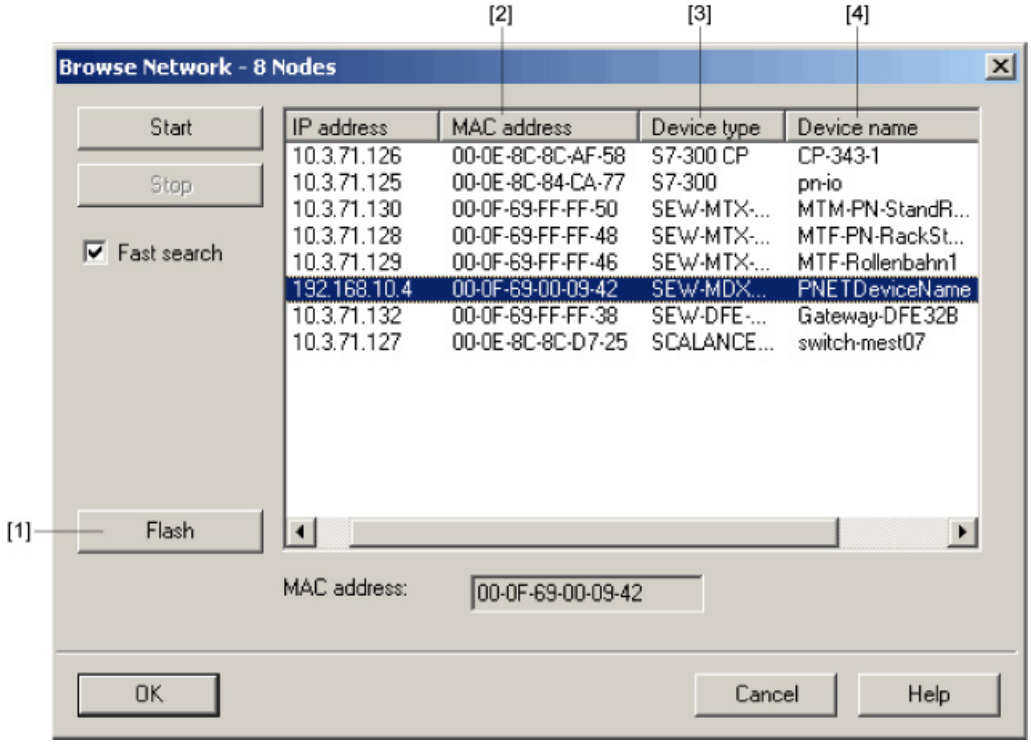
7.1.2 Assigning the PROFINET device name

- Select [Ethernet] > [Edit Ethernet node ...] from the [Target system] menu in STEP7 HW Config.



6143244427

- Click on the "Browse" button You receive an overview of all PROFINET IO nodes that you can reach online with your project planning tool (see the following figure).



6143249931

- Choose the required node. The SEW node appears as "SEW-MDX61B+DFS21B" under Device type [3]. The device name [4] is set to "PNETDeviceName" ex works and must be adapted to your system conditions by you. Several MDX61B devices can be distinguished between by the MAC addresses [2] displayed. A label with the MAC address [2] is attached to the DFS21B option. Use the [Flash] button [1] to enable the Status LED to flash green for the selected DFS21B in order to check your selection.

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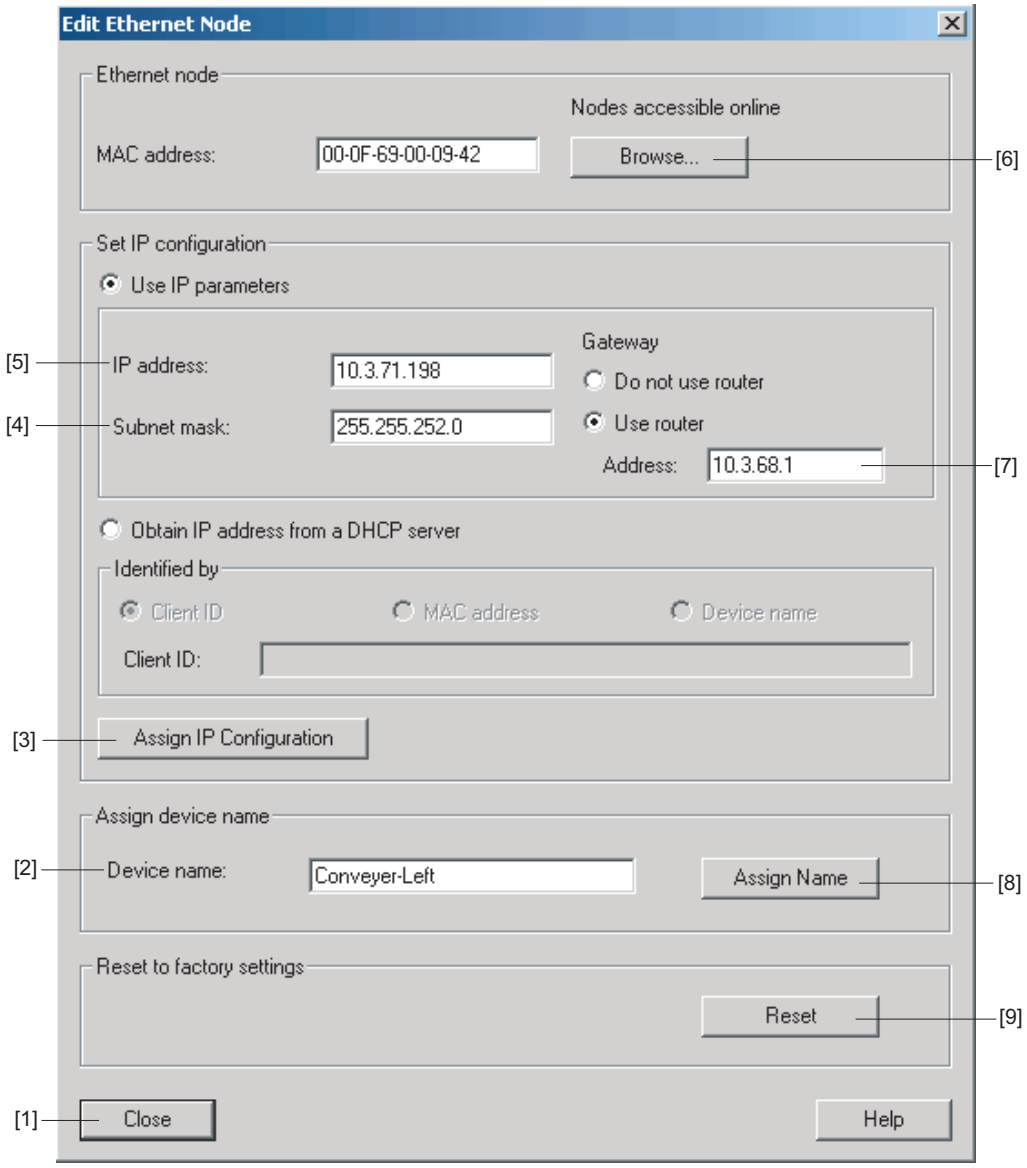


6143255435

[1] "Close" button
[2] "Device name" edit box
[3] "Assign IP Configuration" button
[4] "Subnet mask" edit box
[5] "IP address" edit box
[6] "Browse" button
[7] "Router address" edit box
[8] "Assign Name" button
[9] "Reset" button

- Enter the device name in the "Device name" edit box [2] and click the [Assign Name] button [8]. The device name is now transferred to the station and saved there. It can be up to 255 characters long.
- Specify an IP address [5] and a subnet mask [4] as well as a router address [7] if required. Click the [Assign IP Configuration] [3] button.

INFORMATION

The IO controller must not yet be in a cyclic data exchange with the IO devices.

- Click the [Browse] [6] button again to check whether your settings have been adopted.

  Click [Close] [1].
- You can reset the device name of the DFS21B online via the [Reset] button [9]. Now you need to restart the DFS21B.

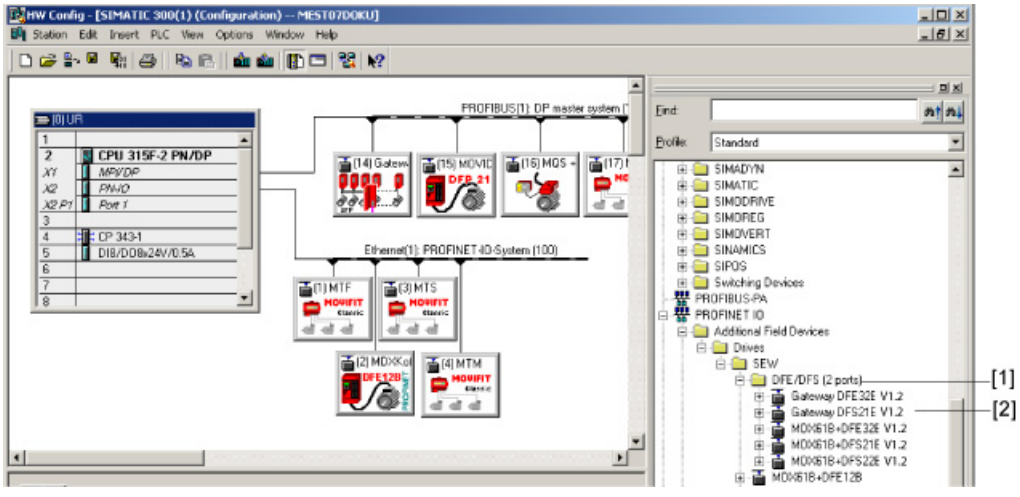
7.1.3 Project planning for the PROFINET interface for MOVIDRIVE® B

Creating a new project

Start the SIMATIC Manager and create a new project. Select your control type and add the required modules. The OB82, OB86 and OB122 operation modules are particularly useful.

The OB82 operation module makes sure that the controller does not go to "STOP" for so-called diagnostic alarms. The OB86 operation module indicates the failure of decentralized periphery devices. The OB122 operation module is called up if the controller cannot access data of a station of the decentralized periphery. This can occur, for example, when the DFS21B is ready for operation later than the controller.

- Start STEP7 HW Config and select the PN-IO slot in the control rack.
- Add a PROFINET IO system by right-clicking the context menu with your mouse. Specify an IP address for the PROFINET IO controller when doing this. Add a new PROFINET subsystem using the [Ethernet] button.
- In the hardware catalog, open [PROFINET IO] > [Additional Field Devices] > [Drives] > [SEW] > [DFE/DFS (2 ports)] [1].



6144169355

- There are several entries.
- Copy the required entry to the PROFINET IO system via drag & drop:
  - If your controller supports topology detection, select “MDX61B+DFS21B V1.2" [2].
  - If your controller **does not** support topology detection, select "MDX61B+DFS22B V1.1 **OLD**".

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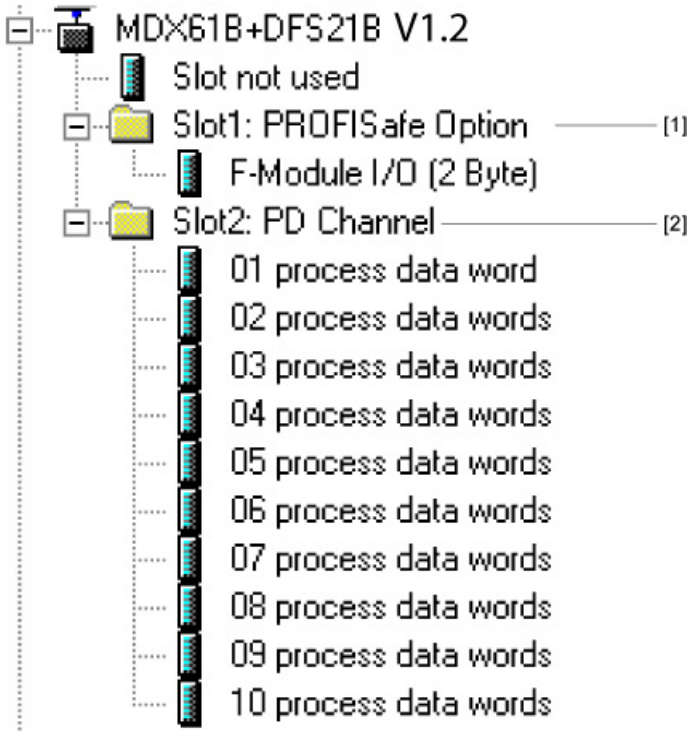
- Assign the name of the PROFINET node.

  This name must later correspond to the PROFINET device name specified in the DFS21B.
- Delete the entry on slot 2 to enable the configuration of your application. Select the process data configuration required for your application.
- Specify the I/O and periphery addresses for the configured data widths and save your configuration.

  The slot model is used for configuration with PROFINET. Each slot is assigned to a DFS21B communication interface.

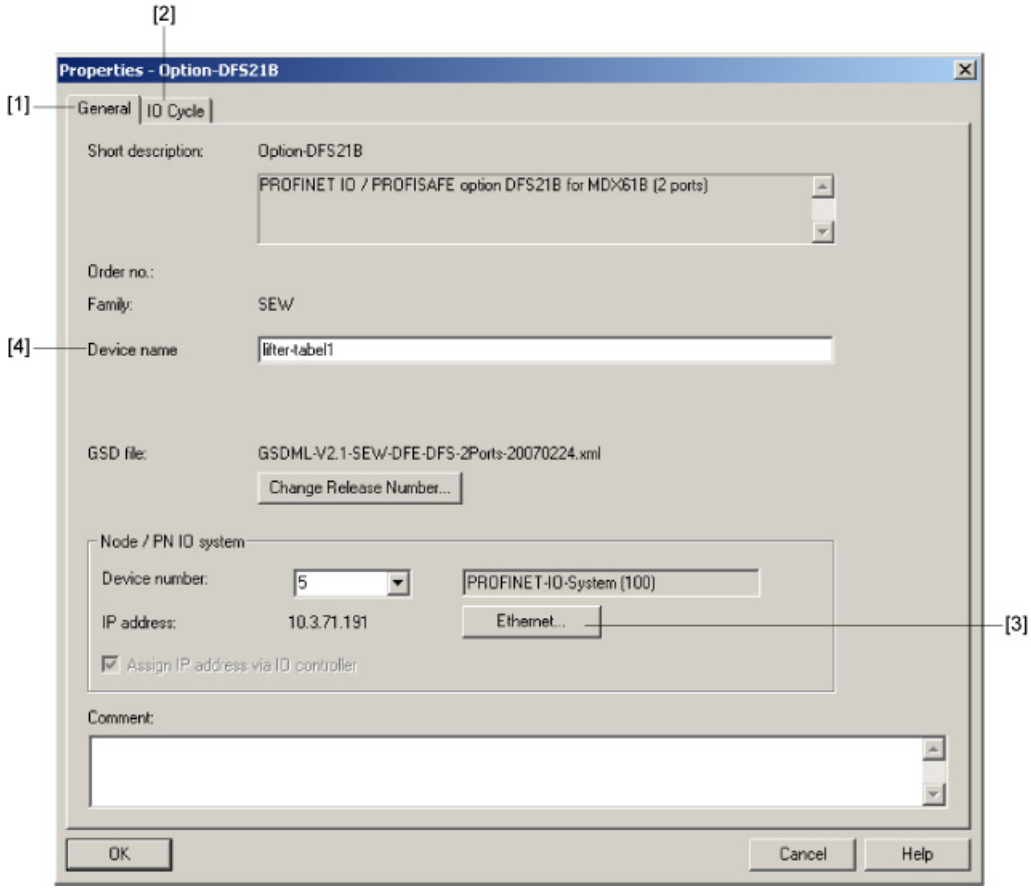


6144255115

- Add data exchange with the new devices to your user program.
- Process data transfer is consistent. SFC14 and SFC15 can be used to transfer process data.

Configuring a node

Once the individual slots are configured, further settings have to be made for the new node. Double-click the device icon of the new node to open the following dialog.



6144260875

[1] "General" tab
[2] "IO cycle" tab
[3] "Ethernet" input field
[4] "Device name" edit box

- Enter the previously specified device name in the “Device name” edit box [4] on the "General” tab [1]. Note that the name is case-sensitive.
- Click [Ethernet] [3] in the "Node / PN IO system" section to enter the IP address assigned before (see following figure).

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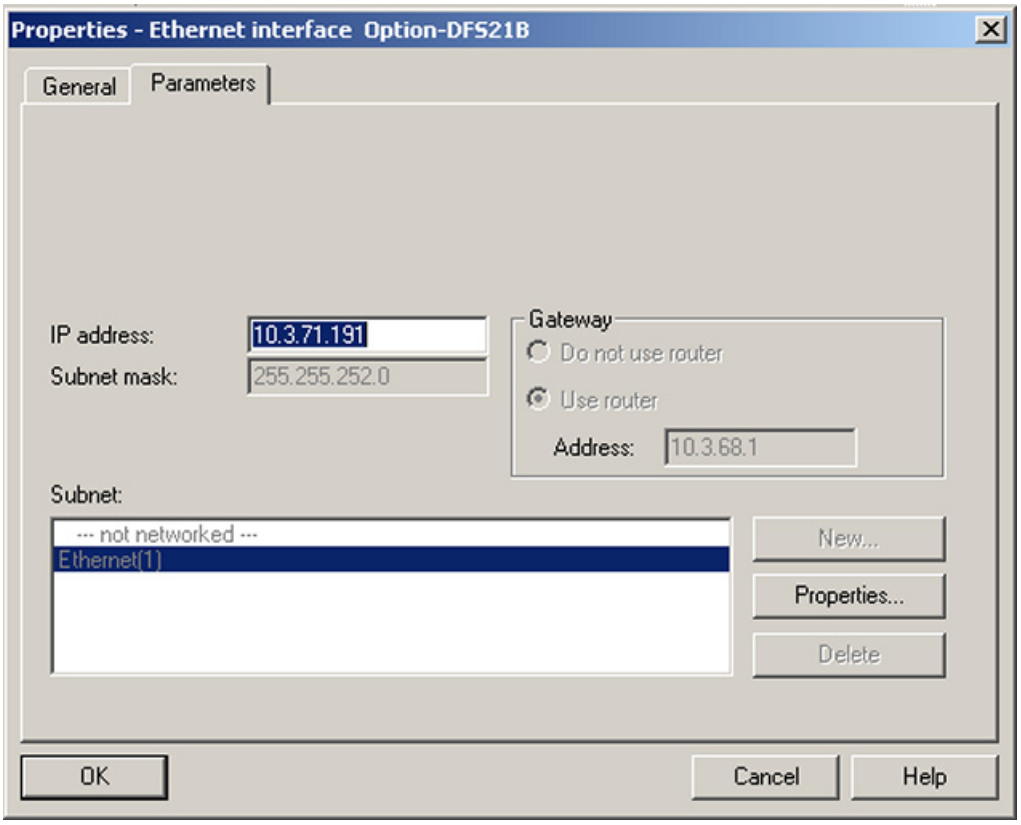
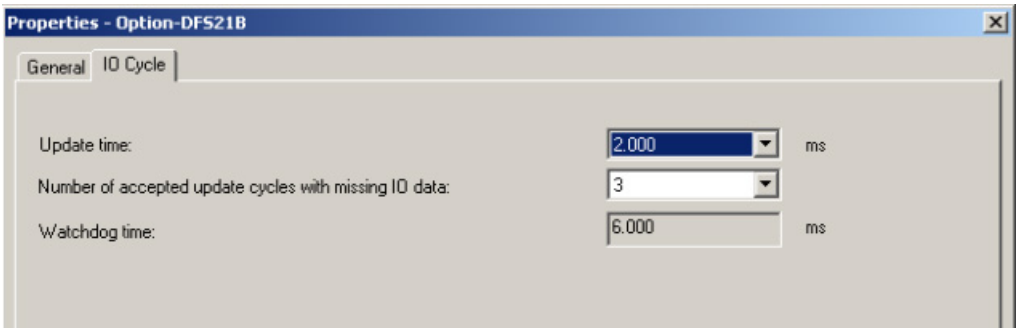


6144266379

- On the "IO Cycle" tab [2], you can specify an update time for the node to update its process data. The DFS21B option in MOVIDRIVE® B supports a minimum refresh time of 2 ms (see following figure).



6144361483

Starting the controller

Load the configuration to the SIMATIC S7 and start the module. The error LED of the controller should now go out.

The LEDs of the DFS21B option should have the following statuses:

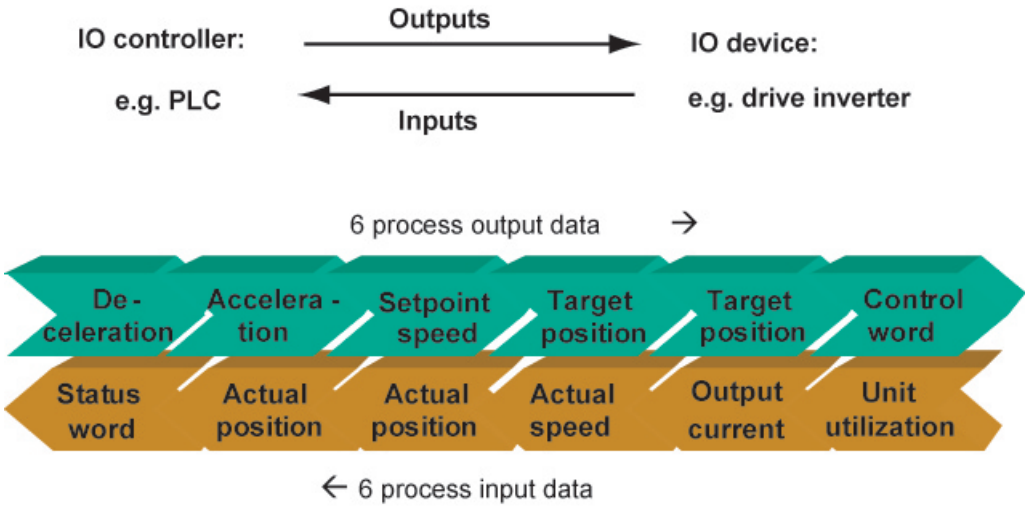
- LED R: lights up green
- LED BF: off
- Link and activity LEDs: flashing

If this is not the case, check the configuration, especially the device name and the IP address of the node.

Project planning example for process data configuration of MOVIDRIVE® B

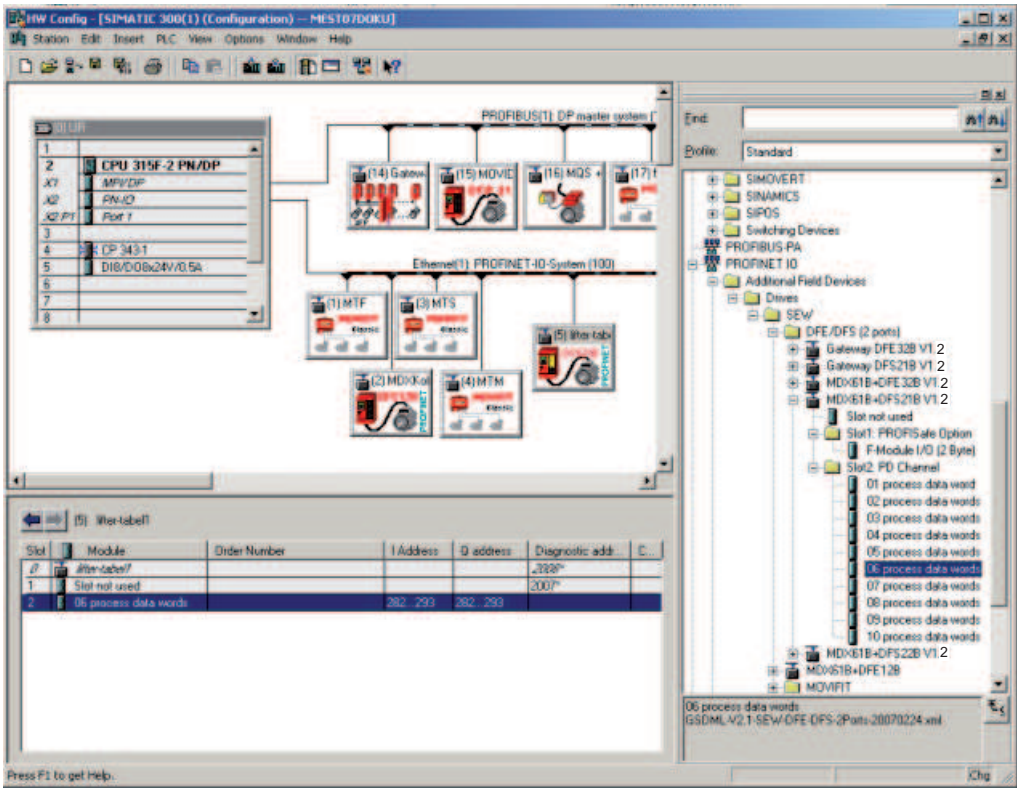
This example is to show the positioning of the drive via MOVIDRIVE® B. The "Extended positioning via bus" application module can be used.

The information between PLC and inverter is exchanged via 6 process data words.



6144366987

The following figure shows the corresponding PROFINET parameter settings.



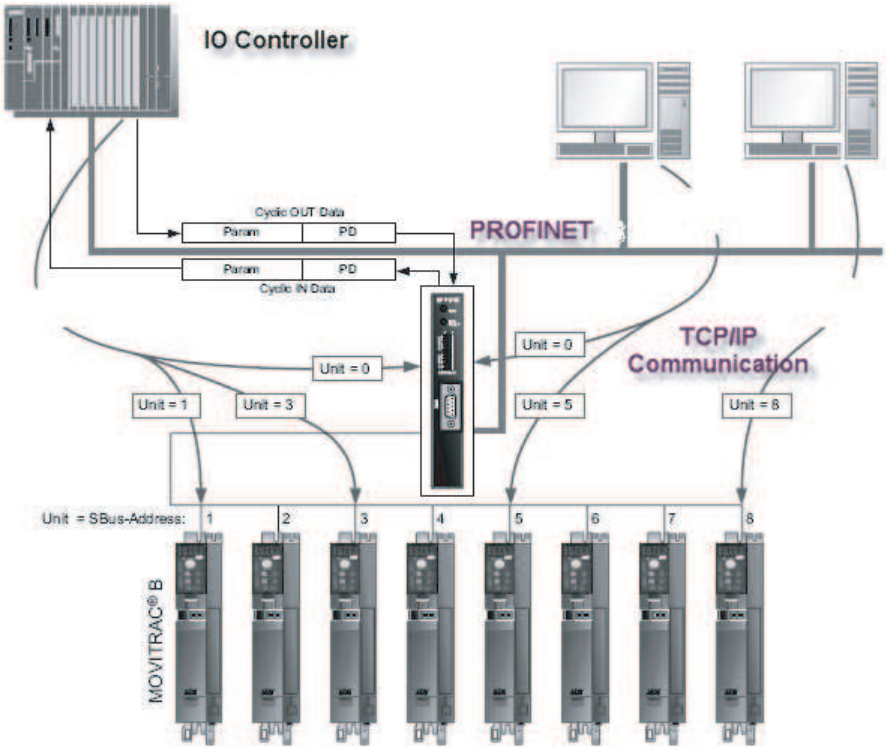
6148084747

7.1.4 Project planning for MOVITRAC® B or gateway with DFS21B option

General

The inverter must be given a specific PROFINET configuration by the IO controller to define type and number of input and output data words used for the transmission. You have the opportunity to control the drives via process data and to read and write all parameters of the fieldbus interface in an acyclic way.

The following figure describes the data exchange between the programmable controller (IO controller), the fieldbus interface (IO device) and an inverter with process data channel.



6148534923

Configuring process data

The PROFINET interface allows for different configurations for the data exchange between IO controller and IO device. The configurations are determined by the default process data width for SEW inverters of three process data words. The fieldbus interface then distributes these process data words to the individual devices. The PROFINET interface accepts 1 × 3 to 8 × 3 process data words.

INFORMATION

3 PDs are always assigned to any SBus station.

7.1.5 Project planning for the PROFINET interface for MOVITRAC® B

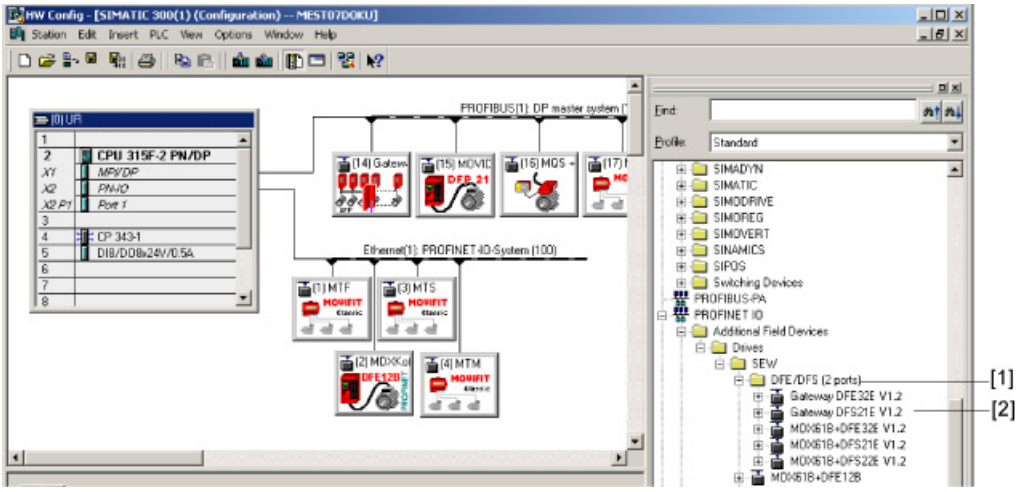
Creating a new project

Start the SIMATIC Manager and create a new project. Select your control type and add the required modules. The OB82, OB86 and OB122 operation modules are particularly useful.

The OB82 operation module makes sure that the controller does not go to "STOP" for so-called diagnostic alarms. The OB86 operation module indicates the failure of decentralized periphery devices. The OB122 operation module is called up if the controller cannot access data of a station of the decentralized periphery. This can occur when, for example, the DFS21B is ready for operation later than the control system.

Proceed as follows:

- Start STEP7 HW Config and select the PROFINET IO slot in the control rack.
- Add a PROFINET IO system by right-clicking the context menu with your mouse. Specify an IP address for the PROFINET IO controller when doing this. Add a new PROFINET subsystem using the [Ethernet] button.
- In the hardware catalog, open [PROFINET IO] > [Additional Field Devices] > [Drives] > [SEW] > [DFE/DFS (2 ports)] [1].



6144169355

- There are several entries.
- Copy the required entry to the PROFINET IO system via drag & drop:
  - If your controller supports topology detection, select “Gateway DFS21B V1.2" [2].
  - If your controller **does not** support topology detection, select "Gateway DFS21B V1.1 **OLD**".
- Assign the name of the PROFINET node.

  This name must later correspond to the PROFINET device name specified in the DFS21B.
- The inverters connected to the gateway are represented in PROFINET as of slot 2. Delete the entries for the respective slots depending on the number of connected inverters (e.g. slot 2 to slot 7 for a configuration of 5 inverters).
- Move the entry "AS 1 Drive" (1x3PD) to the free slots via drag & drop.
- Specify the IO and periphery addresses for the configured drives and save your configuration.

  The slot model is used for configuration with PROFINET. Each slot is assigned to a DFS21B fieldbus interface. The following segmentation is used for the gateway function of the DFS21B.

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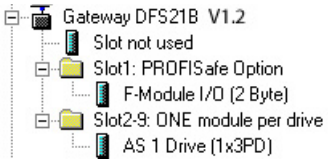
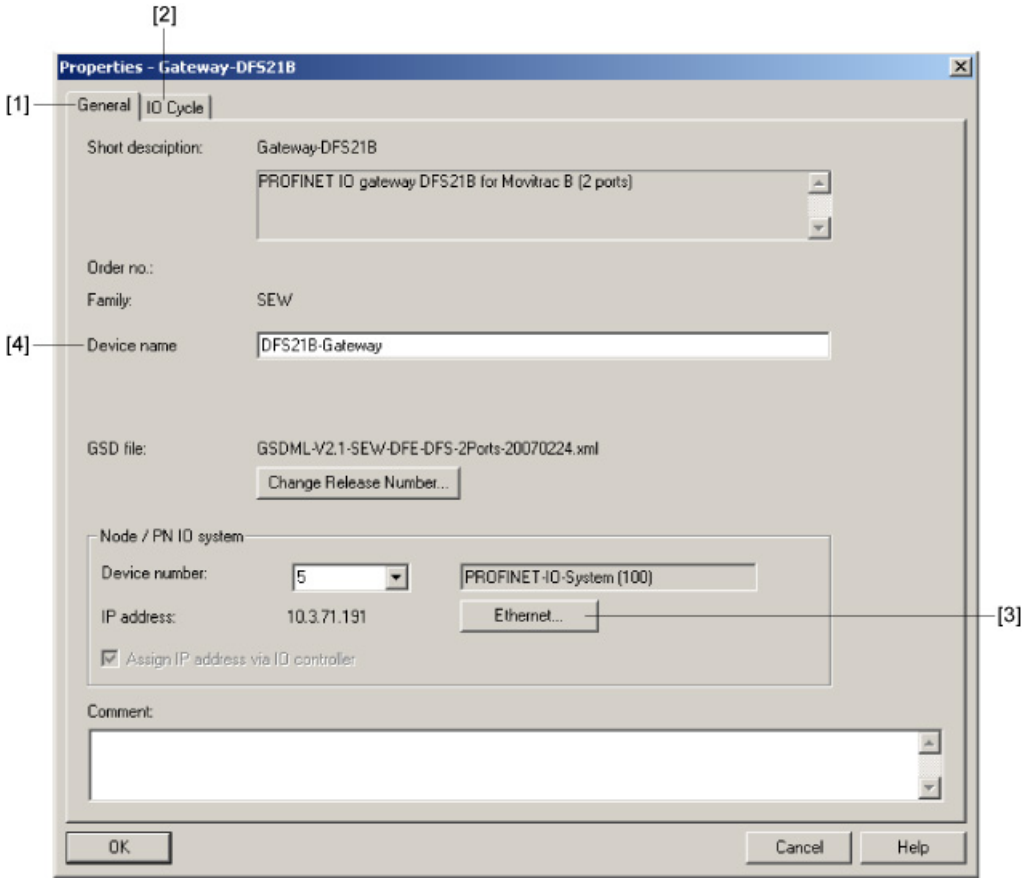


6148542219

- Expand your user program by the data exchange with the new devices.
- Process data transfer is consistent. SFC14 and SFC15 can be used to transfer process data.

Configuring a node

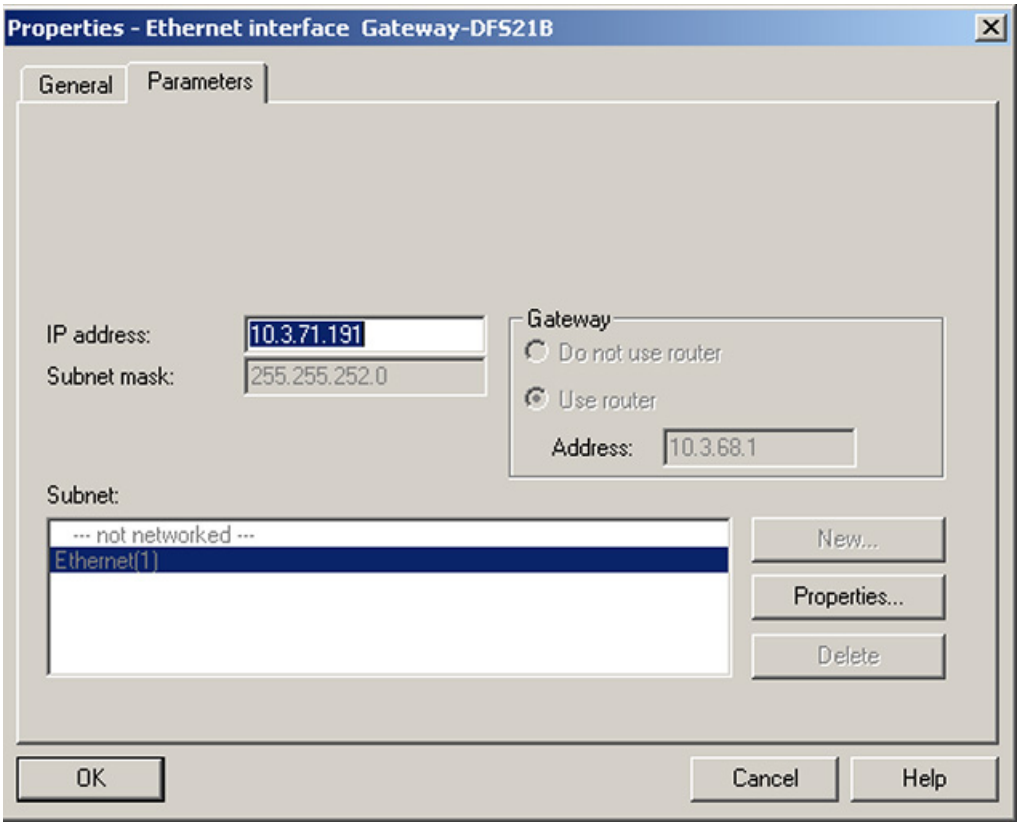
Once the individual slots are configured, further settings have to be made for the new node. Double-click the device icon of the new node to open the following dialog.



6148970123

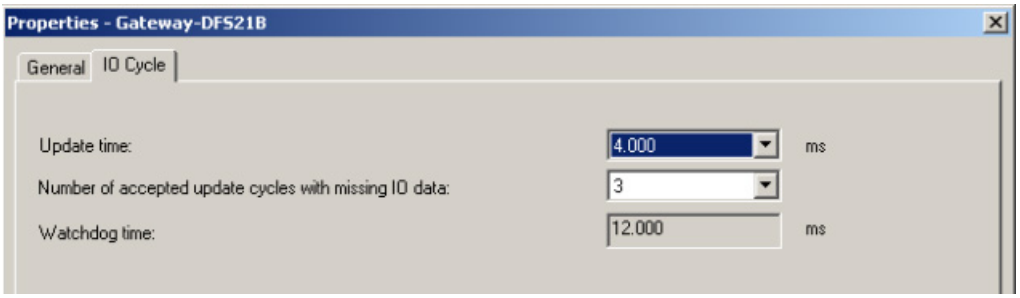
[1] "General" tab
[2] "IO cycle" tab
[3] "Ethernet" input field
[4] "Device name" edit box

- Enter the previously specified device name in the “Device name” edit box [4] on the "General” tab [1]. Note that the name is case-sensitive.
- Click [Ethernet] [3] in the "Node / PN IO system" section to enter the IP address assigned before (see following figure).



6148975883

- On the "IO Cycle" tab [2], you can specify an update time for the node to update its process data. The DFS21B option in MOVITRAC® B as a gateway supports a minimum update time of 4 ms (see the following figure).



6149160587

Starting the controller

Load the configuration to the SIMATIC S7 and start the module. The error LED of the controller should now go out.

The LEDs of the DFS21B option should have the following statuses:

- LED R: lights up green
- LED BF: off
- Link and activity LEDs: flashing

If this is not the case, check the configuration, especially the device name and the IP address of the node.

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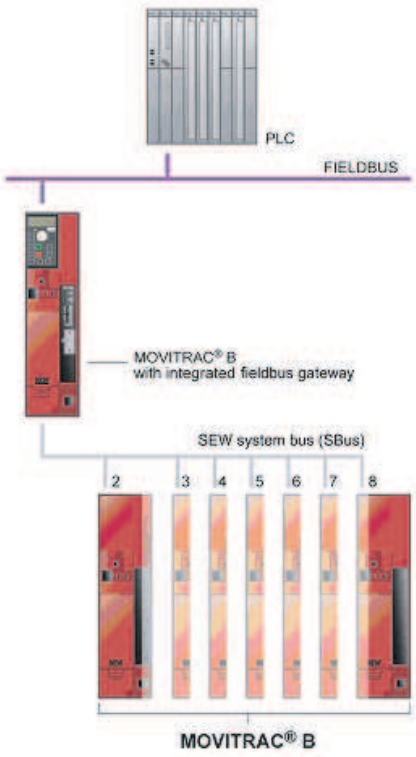
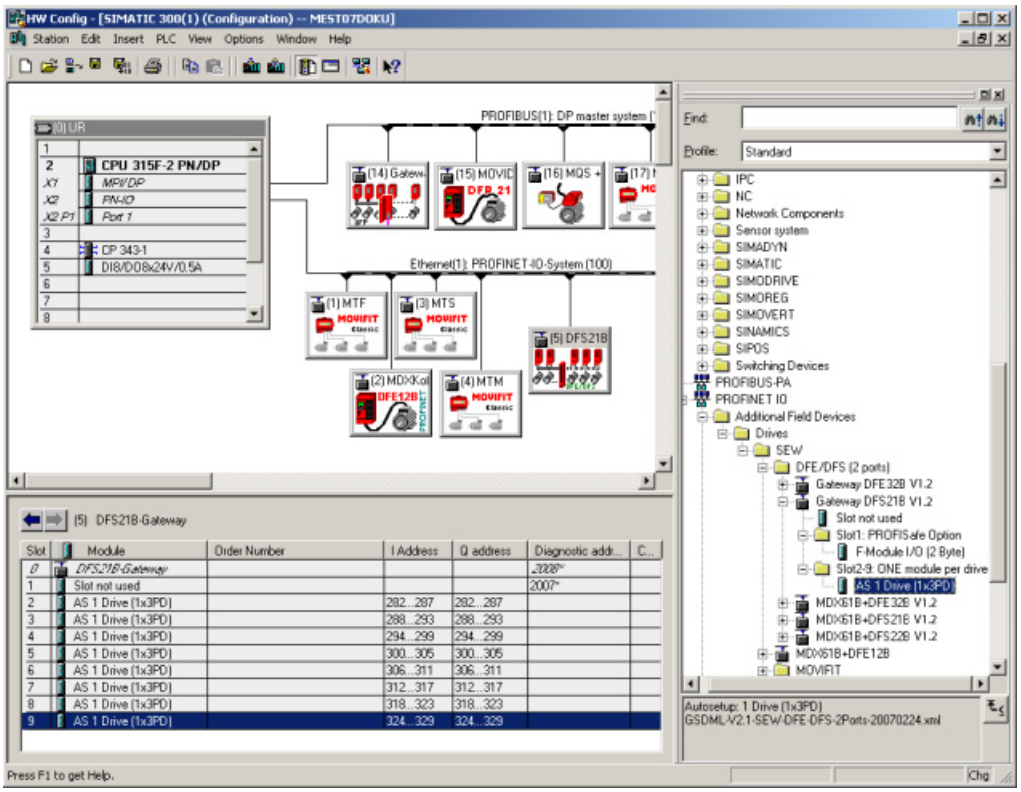
Application example

8 MOVITRAC® B frequency inverters are to be operated at a variable speeds in this example. The information between PLC and the individual inverters is exchanged via 3 process data.



6149166091

The following figure shows the corresponding PROFINET parameter settings.



6149169547

7.2 Auto setup for gateway operation

The auto setup function enables startup of the DFS21B as gateway to be performed without a PC. It is activated via the auto setup DIP switch (see chapter "Installing the DFS21B/UOH11B gateway").

INFORMATION

Switching on the Autosetup DIP switch causes the function to be performed once. **The Auto-Setup DIP switch must then remain in ON position.** The function can be reactivated by turning the DIP switch off and back on again.

As a first step, the DFS21B searches for drive inverters on the SBus below its hierarchical level. This process is indicated by the **H1** LED (system bus error) flashing briefly. For this purpose, different SBus addresses must be set for the drive inverters (P813). SEW-EURODRIVE recommends assigning the addresses beginning with address 1 in ascending order based on the arrangement of inverters in the control cabinet. The process image on the fieldbus side is expanded by three words for each detected drive inverter.

The LED **H1** remains lit if no drive inverter is located. A total of up to 8 drive inverters is taken into account. The following figure shows the process image for three drive inverters with three words each of process output data and process input data.

Following the search, the DFS21B cyclically exchanges 3 process data words with each connected drive inverter. The process output data is taken from the fieldbus, divided into blocks of three and transmitted. The drive inverters read the process input data, put it together and send it to the fieldbus master.

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The cycle time of the SBus communication is 2 ms per node at a baud rate of 500 kbit/s without any additional engineering activities.

For an application with 8 inverters on the SBus, the cycle time for the process data update will be 8 × 2 ms = 16 ms.

INFORMATION

Perform auto setup again in the following cases, since the DFS21B stores these values once during auto setup. All devices installed at the SBus must be switched on. At the same time, the process data assignments of the connected inverters may not be changed dynamically after Auto Setup.

- If you change the process data assignment of the drive inverters connected to the DFS21B.
- If you changed the SBus address of one of the connected devices.
- If you add or remove devices.

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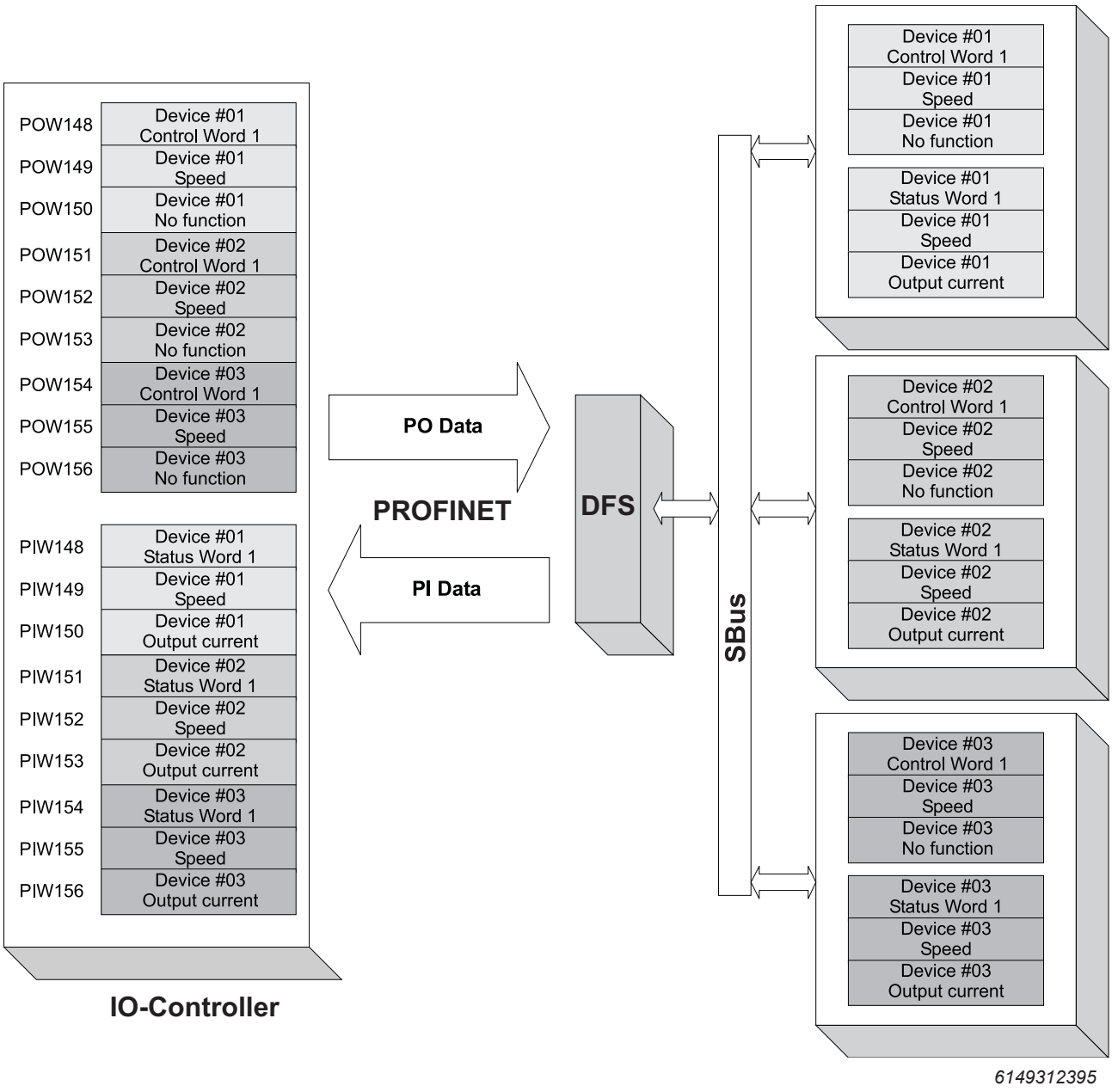
The following illustration shows the data exchange between the PLC, the DFS21B option and the inverter.



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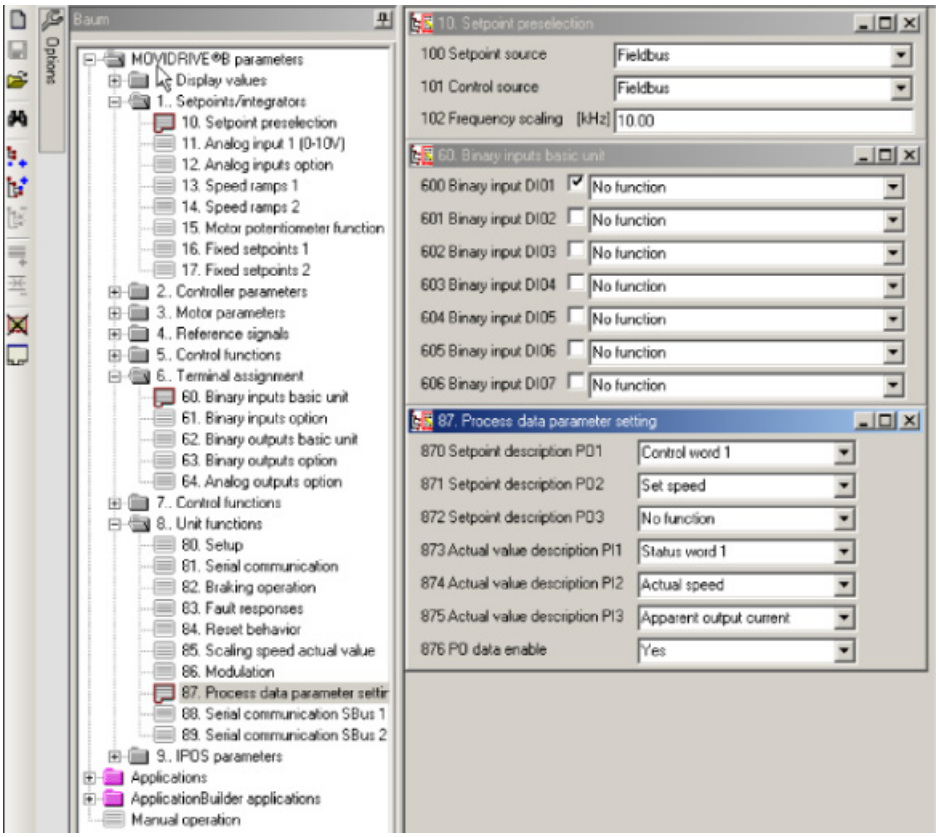
7.3 Setting the MOVIDRIVE® MDX61B drive inverter



6149774859

To control the drive inverter via PROFINET, you must first switch the drive inverter to control signal source (P101) and setpoint source (P100) = FIELDBUS. The FIELDBUS setting means the drive inverter parameters are set for control and setpoint entry via PROFINET. The MOVIDRIVE® drive inverter then responds to the process output data transmitted from the master programmable controller.

The parameters of the MOVIDRIVE® drive inverter can be set straight away via PROFINET without any further settings once the PROFINET option card has been installed. For example, all parameters can be set by the master programmable controller after power-on.

Activation of the control signal source and setpoint source FIELDBUS is signaled to the machine control using the "Fieldbus mode active" bit in the status word.

For safety reasons, you must also enable the drive inverter at the terminals for control via the fieldbus system. Therefore, you must wire and program the terminals in such a way that the drive inverter is enabled via the input terminals. The simplest way of enabling the drive inverter at the terminals is, for example, to connect the DIØØ (function /CONTROLLER INHIBIT) input terminal to a DC +24 V signal and to program input terminals DIØ1 to DIØ3 to NO FUNCTION.

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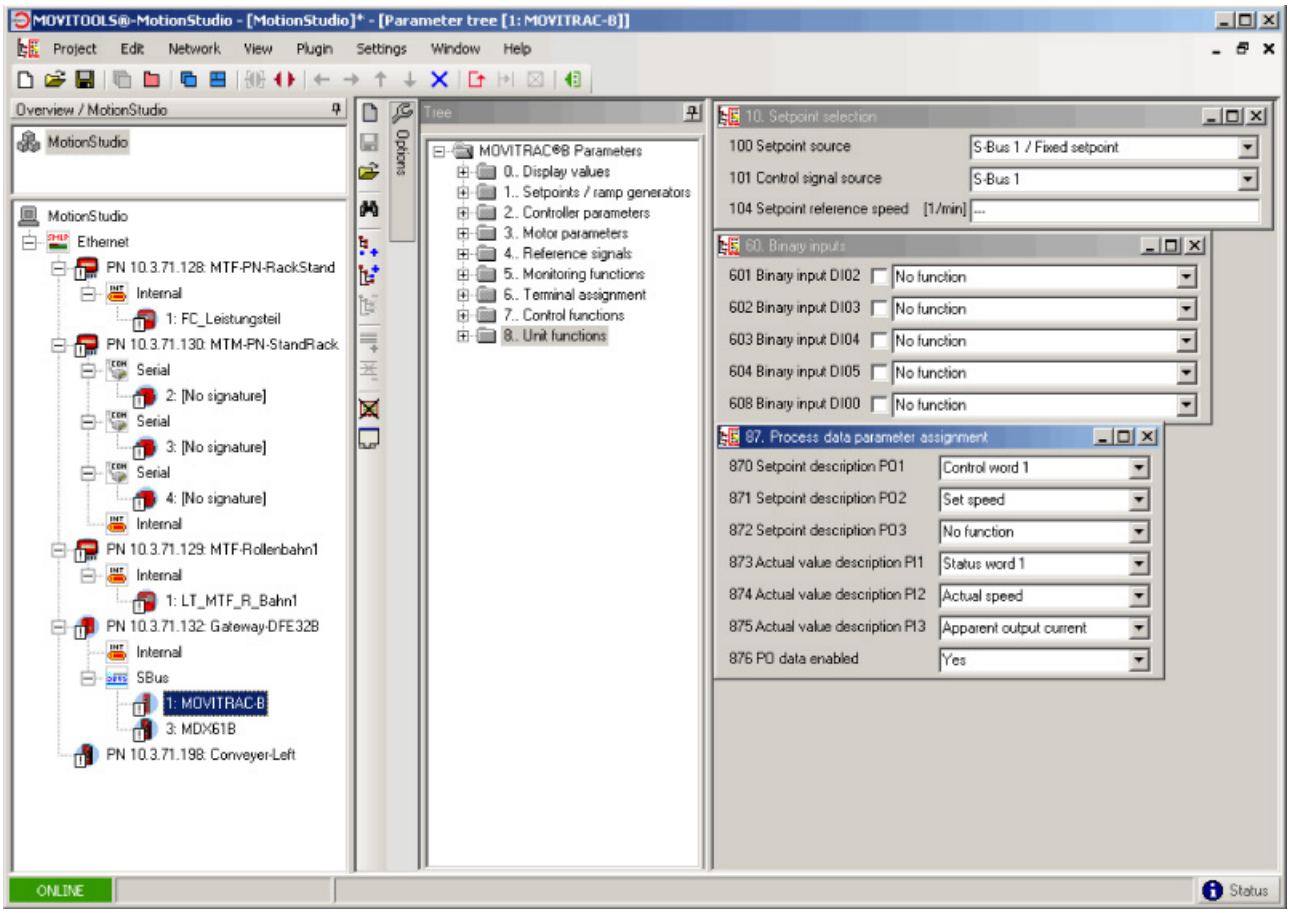
7.4 Setting the MOVITRAC® B frequency inverter



6149780619

To control the frequency inverter via PROFINET, you must switch the drive inverter to control *signal source (P101)* and *setpoint source (P100)* = SBus beforehand. The SBus setting means the inverter parameters are set for control and setpoint entry via gateway. The MOVITRAC® B frequency inverter now responds to the process output data transmitted from the master programmable controller.

It is necessary to set the SBus1 timeout interval (P815) to a value other than 0 ms for the MOVITRAC® B frequency inverter to stop if faulty SBus communication is encountered. SEW-EURODRIVE recommends a value in the range between 50 and 200 ms.

Activation of the control signal source and setpoint source SBus is signaled to the machine control using the "SBus mode active" bit in the status word.

For safety reasons, you must also enable the MOVITRAC® B at the terminals for control via the fieldbus system. Consequently, you must wire and program the terminals in such a way that the inverter is enabled via the input terminals. The simplest way of enabling MOVITRAC® B at the terminals is, for example, to connect the DIØ1 (function CW/STOP) input terminal to a DC +24 V signal and to parameterize the remaining input terminals to NO FUNCTION.

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INFORMATION

- Configure the parameter *P881 SBus address* to values 1 – 8 in ascending order.
- The SBus address 0 is used by the DFS21B gateway and must therefore not be used.
- Set the parameter *P883 SBus timeout* to values from 50 to 200 ms.

7.5 Configuring PROFIsafe with STEP7

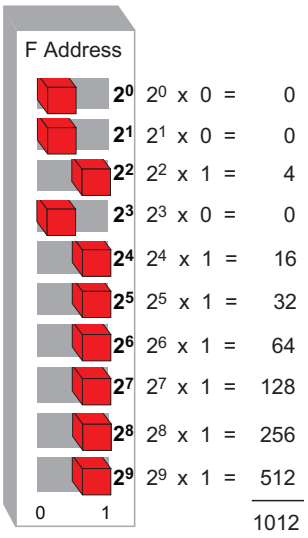
Configure the failsafe DFS21B fieldbus interface as usual under STEP7 HW Config for PROFINET operation.

To ensure fault-free DFS21B operation with PROFIsafe, you must obtain the optional package entitled "Distributed Safety (V5.4 or later)" for configuring and setting the parameters of the module under STEP7.

7.5.1 Hardware structure

- Connect the respective device to PROFINET.
- Set the PROFIsafe address at the "F-ADDRESS" DIP switches of the DFS21B option. You may enter an address ranging from 1 to 1022 (factory setting: address 255).
- Make sure that the PROFIsafe address set at the F-ADDRESS DIP switches corresponds to the PROFIsafe address in STEP7 HW Config.

  The following figure shows the DIP switch setting for address 1012 in the example.



6065567883

7.5.2 Configuring the PROFIsafe properties

- You will usually have to adjust the project planning in HW Config to your specific application. To do so, insert the required modules into the slots. Each slot has a fixed functionality. The following table gives an overview of the slot functions.

MOVITRAC® B	MOVIDRIVE® B	DP ID	Description of the function
Slot			
1		F-Channel	The PROFIsafe channel is configured in slot 1. The following modules can be assigned to this slot: • "F-Module I/O (2 Byte)" = PROFIsafe channel is used for DFS21B option • "Empty" = PROFIsafe channel is not used **NOTICE!** If no PROFIsafe channel is configured, the safety-related part of the DFS is in safe state and the safe output F-DO0 remains switched off.
2 – 9	2	PD channel	The process data for controlling MOVIDRIVE® B/MOVITRAC® B are configured in slot 2. The same amount of process data is always input and output. The process data channel must always be configured. **This channel is not safety-related.**

- For using the safety functions of the DFS21B, you must configure an "F-Module I/O (2 Byte)" in slot 1.
- Mark slot 1 and delete the entry "Slot not used". Next, move the "F-Module I/O (2 Byte)" entry [2] to slot 1 [1]. The following figure shows configuration with MOVIDRIVE® B and option DFS21B.

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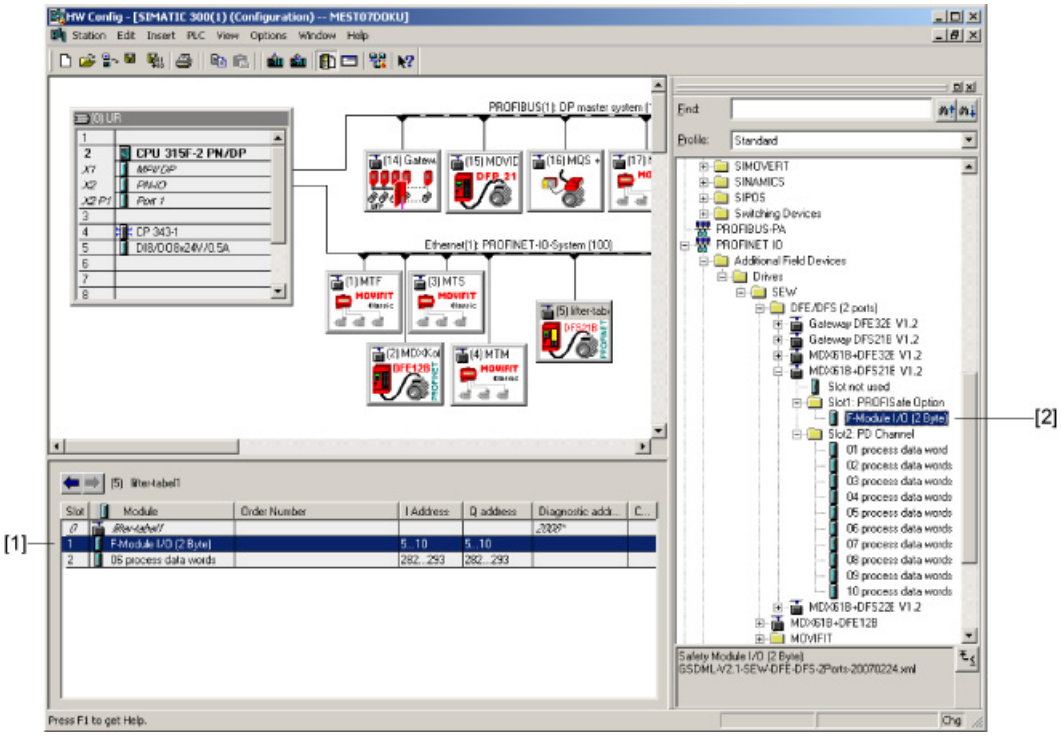

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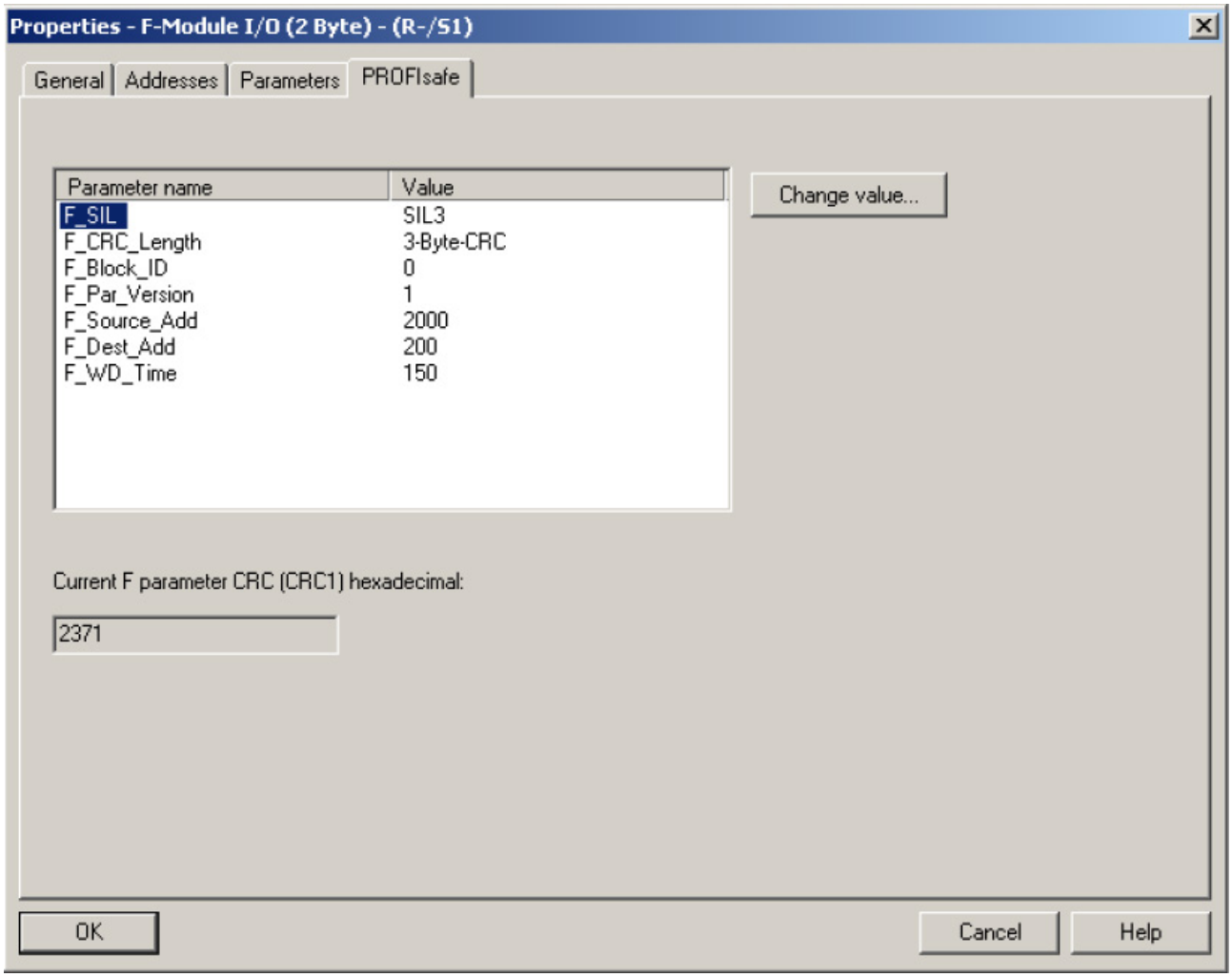
- Set the parameters of the PROFIsafe properties of the fail-safe DFS21B in STEP7 HW Config by double-clicking the configured F-module in slot 1. The window [Properties – F-Module I/O (2 Byte)] appears with its tab pages [General], [Addresses], [Parameters] and [PROFIsafe].
- The F-parameters are set on the "PROFIsafe" tab page (see the following figure)



6151765643

The address *F_DestAdd* configured in this dialog must correspond to the PROFIsafe address set at the DFS21B via the "F-ADDRESS" DIP switches.

7.5.3 Description of the F-parameters

When PROFINET starts up, the PROFINET IO controller sends the safety-relevant parameters for PROFIsafe operation in an F-parameter block to the DFS21B option. The parameters will then be checked for plausibility in the safety-related part of the DFS21B. The DFS21B does not start data exchange on PROFINET until this F-parameter block is acknowledged positively.

Below is a list of the safety-related parameters which are passed on to the DFS21B option. Depending on the bus system being used, the following parameters are available.

PROFIsafe parameters	PROFINET IO bus system
F_Check_SeqNr	No
F_SIL	Fixed
F_CRC_Length	Fixed
F_Par_Version	Fixed
F_Source_Add	Fixed

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PROFIsafe parameters	PROFINET IO bus system
F_Dest_Add	Variable
F_WD_Time	Variable

Parameter "F_SIL"

This parameter allows F stations to check whether the safety class matches that of the F host. Safety circuits with different safety classes SIL 1 to SIL 3 (SIL = safety integrity level) are available for these safety-relevant cases according to the risk.

The DFS21B option supports the following setting:

- F_SIL = SIL 3

Parameter "F_CRC_Length"

The required length of the CRC test value depends on the length of the F user data (process values) and the PROFIsafe version. This parameter communicates the anticipated length of the CRC2 key in the safety telegram to the F component.

The DFS21B option handles user data that is less than 12 bytes in length, so that with PROFIsafe V2, a 3 byte CRC is used.

The DFS21B option supports the following settings:

- F_CRC_Length = 3 byte CRC (only with PROFIsafe V2)

Parameter "F_Par_Version"

This parameter identifies the PROFIsafe version supported by the DFS21B option. When using a MOVIDRIVE® B PROFINET variant, only PROFIsafe V2 is supported.

Parameter "F_Source_Add"

The PROFIsafe addresses are used for unique identification of the source (F_Source_Add) and destination (F_Dest_Add). The combination of source and target address must be unique across the network and all nodes. The source address F_Source_Add is automatically provided by STEP7 depending on the master configuration.

Values ranging from 1 to 65534 can be entered in parameter "F_Source_Add".

You cannot directly edit this parameter in STEP7 HW Config.

Parameter "F_Dest_Add"

The PROFIsafe address you have set using the F-ADDRESS DIP switch on the DFS21B module is displayed in this parameter.

Values ranging from 1 to 1023 can be entered in parameter "F_Dest_Add".

Parameter "F_WD_Time"

This parameter defines a monitoring time in the DFS21B option.

A valid safety telegram must arrive from the F-CPU within this monitoring time. Otherwise the DFS21B option reverts to safe state.

Select a monitoring time of sufficient length so that communication can tolerate telegram delays, but also short enough for your safety application to run without restrictions.

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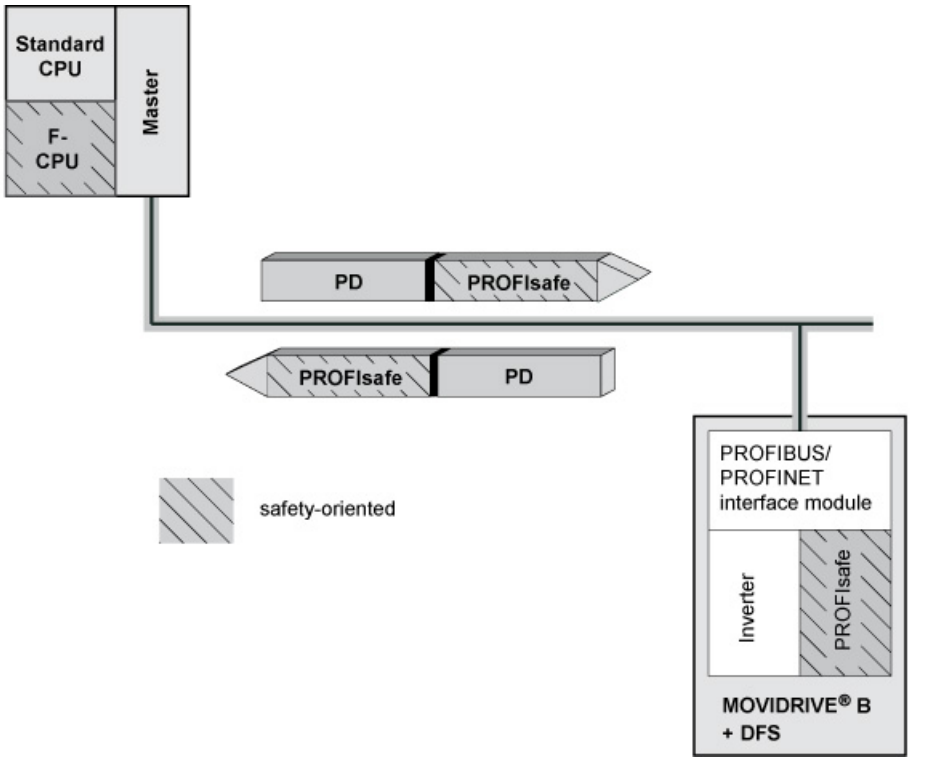
With the DFS21B option, you can enter the "F_WD_Time" parameter in steps of 1 ms, ranging from 1 ms to 10 s.

7.6 Data exchange with PROFIsafe option DFS

7.6.1 Introduction

The DFS option supports parallel operation of standard and safety-related communication via fieldbus system or network. You can run safety-related PROFIsafe communication using PROFIBUS DP (DFS11B) or PROFINET IO (DFS21B).

Data exchange between bus master and the DFS option takes place via the respective communication system that simultaneously acts as a "grey channel" for the safety-related application. The bus messages transferred then contain standard information for conventional inverter operation and the PROFIsafe safety message. Depending on the configuration, the maximum available expansion level enables parallel exchanges of PROFIsafe safety data and the process data between the bus master and the DFS option.



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7.6.2 F periphery data block of PROFIsafe option DFS

During compilation in the HW Config tool (HW Config), the system automatically generates an F periphery data block for every PROFIsafe option DFS. The F periphery data block provides the user with an interface in which s/he can evaluate or control variables in the safety program.

The symbolic name consists of the invariable prefix "F", the start address of the F periphery, and the name entered in the object properties during configuration for the F periphery (e.g. F00008_198).

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The following table shows the F periphery data block of PROFIsafe option DFS.

	Address	Symbol	Data type	Function	Preset-ting
User-control-lable vari-ables	DBX0.0	“F00008_198.PASS_ON“	Boolea n	1 = activate passivation	0
	DBX0.1	“F00008_198.ACK_NEC“	Boolea n	1 = acknowledgment required for reintegration with DFS	1
	DBX0.2	“F00008_198.ACK_REI“	Boolea n	1 = acknowledgment for reinteg-ration	0
	DBX0.3	“F00008_198.IPAR_EN“	Boolea n	Variable for resetting parameters (not supported by PROFIsafe op-tion DFS)	0
Variables that can be evaluated	DBX2.0	“F00008_198.PASS_OUT“	Boolea n	Run passivation	1
	DBX2.1	“F00008_198.QBAD“	Boolea n	1 = substitute values are output	1
	DBX2.2	“F00008_198.ACK_REQ“	Boolea n	1 = acknowledgment required for reintegration	0
	DBX2.3	“F00008_198.IPAR_OK “	Boolea n	Variable for resetting parameters (not supported by PROFIsafe op-tion DFS)	0
	DBB3	“F00008_198.DIAG“	Byte	Service information	

PASS_ON

This variable lets you activate passivation of the PROFIsafe option DFS. Passivation of the F periphery takes place, Provided that PASS_ON = "1".

ACK_NEC

After a fault has been corrected, the PROFIsafe option DFS is reintegrated, depending on ACK_NEC.

- ACK_NEC = 0: Automatic reintegration
- ACK_NEC = 1: Reintegration following acknowledgement by the user

⚠ WARNING

The variable ACK_ NEC = 0 may only be parameterized if automatic reintegration is safe for the process in question.

Severe or fatal injuries.

- Check if automatic reintegration is permitted for the process in question.

ACK_REI

In order to reintegrate PROFIsafe option DFS after the fault has been corrected, user acknowledgement with positive edge of variable ACK_REI is required. Acknowledge-ment is only possible if variable ACK_REQ = 1.

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ACK_REQ

The F control system sets ACK_REQ = 1 after all faults in the data exchange with PROFIsafe option DFS have been corrected. After successful acknowledgement, the F control system sets ACK_REQ = 0.

PASS_OUT

Indicates whether PROFIsafe option DFS has been passivated. Substitute values are output.

QBAD

Fault in the data exchange with PROFIsafe option DFS. Indicates passivation. Substitute values are output.

DIAG

For service information purposes, the variable DIAG supplies non-failsafe information about faults that have occurred in the F control system. For further information, refer to the relevant F control system manual.

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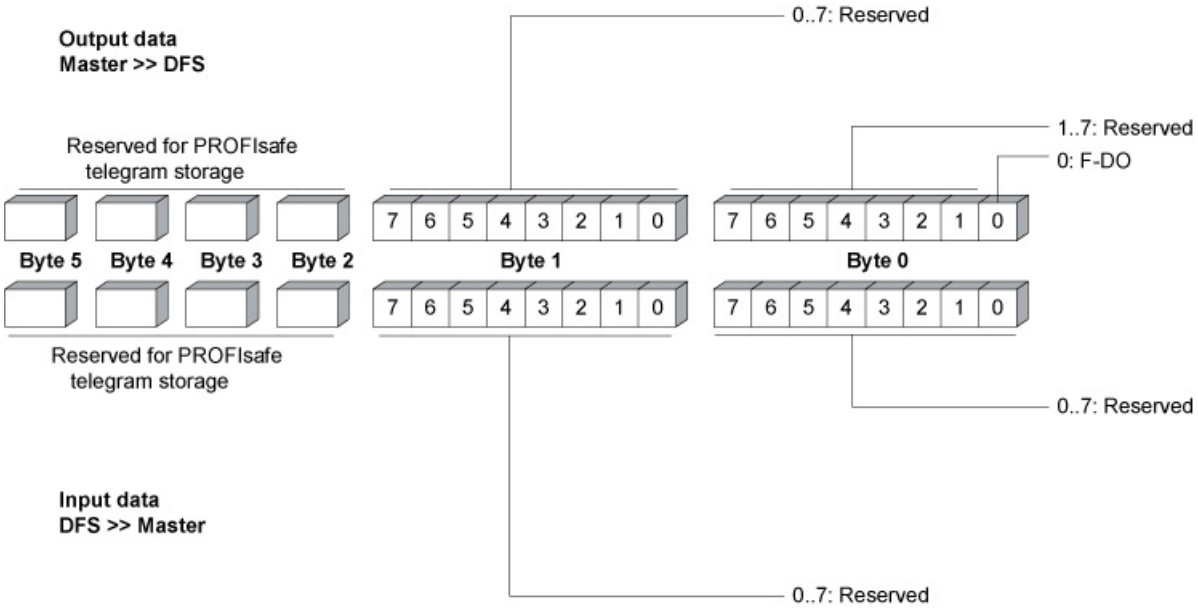
Input and output data



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- Output data:

Byte	Bit	Name	Default	Function	Remark
0	0	F-DO	0	For safe disconnection of the drive if F-DO is connected to X17	0: F-DO not active 1: F-DO active
	1 – 7	-	0	Reserved	Do not use.
1	0 – 7	-	0	Reserved	Do not use.

- Input data:

Byte	Bit	Name	Default	Function	Remark
0, 1	0 – 7	-	0	Reserved	Do not use.

7.7 Response times of PROFIsafe option DFS

Response times play a decisive role in the design and execution of safety functions of systems and machines. In order to match the response time to the requirements of a safety function, always take the entire system from sensor (or control device) to actuator into account. The following times are decisive:

- Response time of the connected sensors
- Internal response time of the failsafe inputs (filter time + processing time)
- PROFIsafe cycle time
- Processing time (cycle time) in the safety controller
- PROFIsafe monitoring time "F_WD_Time"
- Internal reaction time of the safe outputs
- Response or switching time of the actuator

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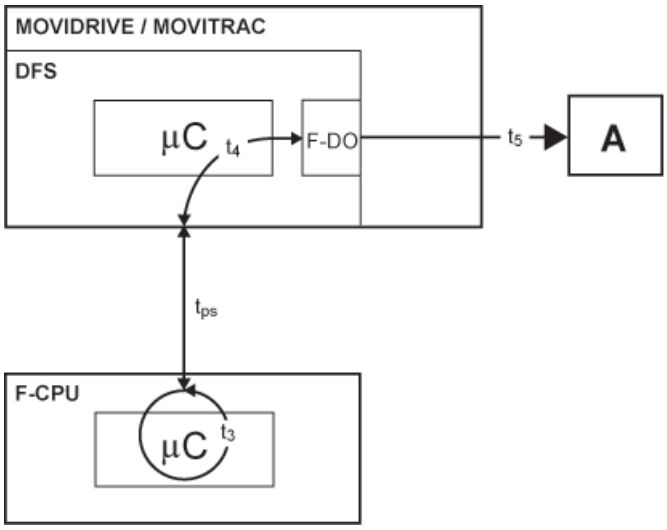
7.7.1 Response sequence in conjunction with the PROFIsafe option DFS

The following figure shows the response sequence in conjunction with PROFIsafe option DFS.



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DFS PROFIsafe option
F CPU Safety controller
µC Micro-controller
F-DO Safe output
A Actuator for activating the STO

Response time from safety control to actuator for controlling the STO		
t3	Processing time in safety control	To be determined from the safety control
t_{ps}	PROFIsafe cycle time	According to safety control data
t4	Internal response time of the safe output	25 ms
t5	Response or switching time of the actuator	According to the manufacturer
	Actuator switches after xx ms	Total

PROFIsafe monitoring time ("F_WD_Time") plays an important role in determining the maximum response time for a safety requirement. This time must be set in the safety control for the DFS option.

For the response sequence described above, with the PROFIsafe monitoring time defined as t_{WD}, the following formula is used to calculate the maximum total response time for an event at the safety sensor to switching the actuator:

$$\mathbf{t_{response,max} = max\ (t_{ps} + t_3 + t_{ps} + t_4) + t_5}$$

7.8 Fault statuses of the PROFIsafe option DF S

INFORMATION

Depending on the safety control used, other terms may be used for "passivation" and "reintegration" in the safety control documentation. For more information, refer to the safety control documentation.

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7.8.1 Faults in the safety section

PROFIsafe option DFS is able to detect various internal and external faults (at the failsafe inputs/outputs). For information on the types of faults, exact responses, and how to correct the faults, refer to the section entitled "Fault table for PROFIsafe option DFS". When faults occur in the safety part, the DFS option usually responds by passivation of the module and switching to substitute values instead of process values. All safety-related process values (F-DO) are then set to "0" (safe state).

After the fault has been corrected, the DFS option is reintegrated with a user acknowledgement.

7.8.2 PROFIsafe timeout

If safety-related PROFIsafe communication is interrupted or delayed, after the adjustable monitoring time "F_WD_Time" (see description of F parameters) has expired, the DFS option also responds with passivation and assuming safe status. After this time has expired, the relevant module is passivated in the safety control and the associated safety-related process values for the safety application are set to "0" (safe state).

Whenever passivation occurs, user acknowledgement is required to reintegrate the module in question.

⚠ WARNING

Automation reintegration can also be set in the safety controller.

Severe or fatal injuries.

- This function must not be used in safety-related applications.

7.8.3 Safety diagnostics via PROFINET

The status of PROFIsafe communication and error messages of the DFS option are reported to the PROFINET IO controller where they can be diagnosed.

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Diagnostic messages of the PROFIsafe layer

The following table shows the diagnostic messages of the PROFIsafe layer:

Byte 11	PFOFINET diagnostic text (German)	PFOFINET diagnostic text (English)
0_{hex} / 0_{dec}	Kein Fehler	---
40_{hex} / 64_{dec}	F_Dest_Add stimmt nicht überein	Mismatch of F_Dest_Add
41_{hex} / 65_{dec}	F_Dest_Add ist ungültig	F_Dest_Add not valid
42_{hex} / 66_{dec}	F_Source_Add ist ungültig	F_Source_Add not valid
43_{hex} / 67_{dec}	F_WD_Time ist 0 ms	F_WD_Time is 0 ms
44_{hex} / 68_{dec}	F_SIL Level größer max SIL Level	F_SIL exceeds SIL f. application
45_{hex} / 69_{dec}	Falsche F_CRC_Length	F_CRC_Length does not match
46_{hex} / 70_{dec}	Falsche F-Parameter Version	F-parameter set incorrectly
47_{hex} / 71_{dec}	Fehler im CRC1-Wert	CRC1-Fault

INFORMATION

For more information on the meaning of fault messages and correction procedures refer to the PROFIBUS IO controller manuals.

DFS21B fault codes

The following table shows the fault codes of the DFS21B option:

Byte 12	Byte 13	Designation (German)	Designation (English)	Meaning/remedy
00_{hex} / 00_{dec}	00_{hex}/00_{dec}	kein Fehler	-	See chapter "Fault table PROFIsafe DFS11B option".
	01_{hex}/01_{dec}	Interner Ablauffehler	Internal sequence fault	
	02_{hex}/02_{dec}	Interner Systemfehler	Internal system fault	
	03_{hex}/03_{dec}	Fehler Kommunikation	Communication fault	
	04_{hex}/04_{dec}	Fehler Elektronikversorgung	Circuit supply voltage fault	
	14_{hex}/20_{dec}	Interner Fehler am sicheren Eingang (F-DIx)	Internal fault failsafe input	
	15_{hex}/21_{dec}	Kurzschluss am sicheren Eingang (F-DIx)	Short-circuit failsafe input	
	32_{hex}/50_{dec}	Interner Fehler am sicheren Ausgang (F-DOx)	Internal fault failsafe output	
	33_{hex}/51_{dec}	Kurzschluss am sicheren Ausgang (F-DOx)	Short-circuit failsafe output	
	34_{hex}/52_{dec}	Überlast am sicheren Ausgang (F-DOx)	Overload failsafe output	
	$6F_{hex}$/111_{dec}	Interner Kommunikationsfehler zur DFS21B	Internal communication timeout	
	$7F_{hex}$/127_{dec}	Fehler Initialisierung DFS21B	F init fault	

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8 Operating characteristics with the PROFINET

8.1 Introduction

Classic fieldbus communication is enhanced by fast Ethernet technology as a physical transmission medium using PROFINET IO. PROFINET supports real-time capable process communication as well as open communication via Ethernet TCP/IP. PROFINET distinguishes between 3 communication classes that differentiate in terms of efficiency and functionality.

8.1.1 Three communication classes

- **TCP/IP**

  Open Ethernet TCP/IP communication without real-time requirements (e.g. web technology).

- **RT (Real-Time)**

  IO data exchange between automation devices in real-time (> 1 ms).

- **IRT (Isochronous Real-Time)**

  Isochronous real-time communication for synchronized IO data exchange (e.g. for motion control applications - not for DFE32B option).

The DFS21B option meets the requirements of the PROFINET RT class and provides open communication via TCP/IP or UDP/IP.

8.1.2 Three device types

PROFINET IO differentiates between three device types - "IO controller", "IO device" and "IO supervisor."

- **IO controller**

  The IO controller undertakes the master function for the cyclic IO data exchange with the decentralized field devices and is usually implemented as a communication interface of a controller. It is comparable with a PROFIBUS DP master class 1. There can be several IO controllers in a PROFINET IO system.

- **IO device**

  All field devices of PROFINET IO that are controlled by an IO controller are designated as IO devices, e.g. I/O, drives, valve terminals, etc. IO devices are comparable with PROFIBUS DP slave nodes. The DFE32B option is a PROFINET IO device.

- **IO supervisor**

  Programming devices/PC with corresponding engineering/diagnostic tools are called IO supervisors. IO supervisors have access to process and parameter data as well as alarm and diagnostic information.

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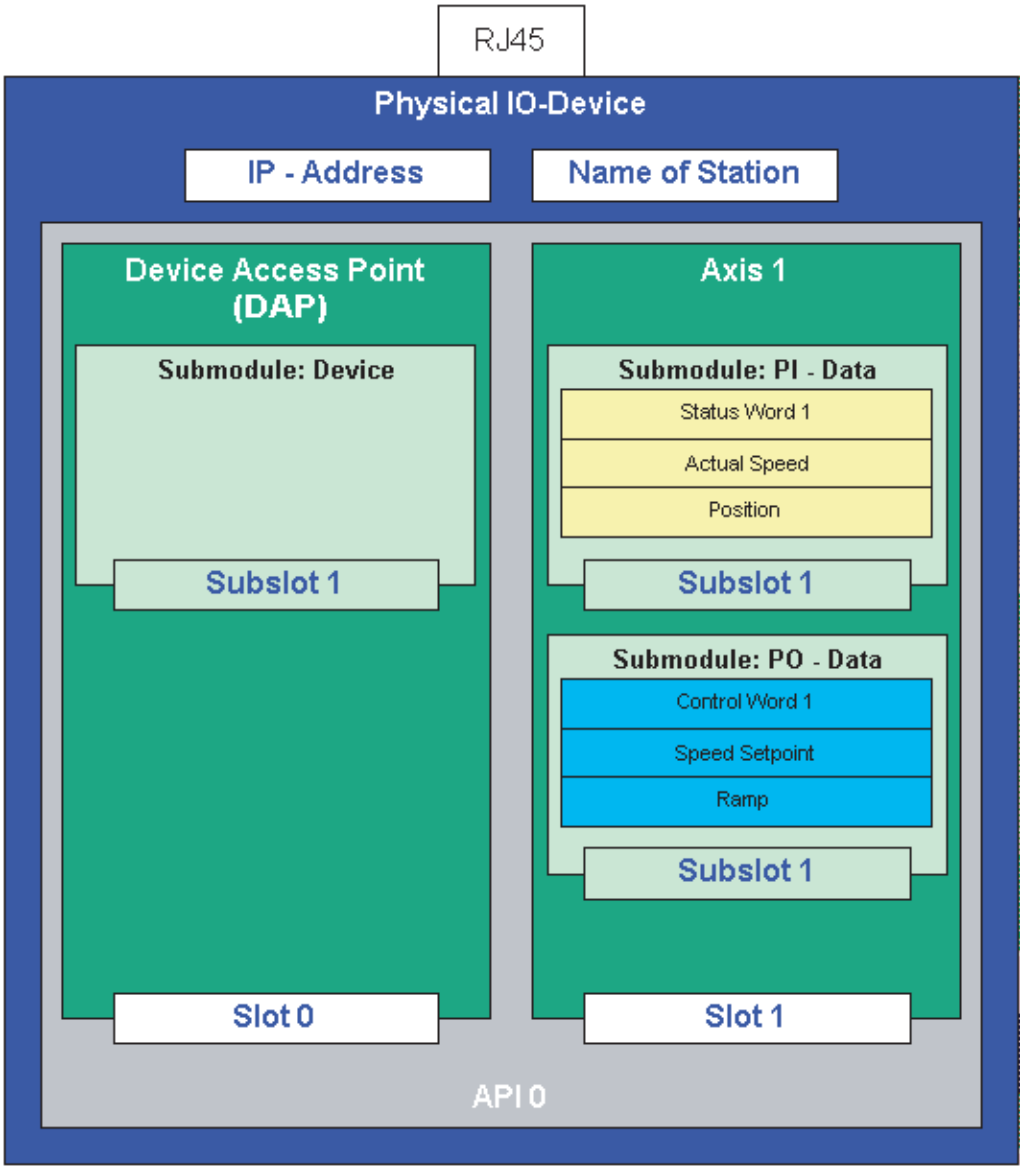
8.1.3 Communication model

The communication model of PROFINET IO is based on the many years of experience with PROFIBUS DP-V1. The master slave access procedure was mapped on a provider-consumer model.

Several communication channels are used for the data exchange between IO controller and IO devices. The cyclic IO data and the event-driven alarms are transferred via real-time channels. The standard channel based on UDP/IP is used for parameterization, configuration and diagnostic information.

8.1.4 Device model

The known decentralized periphery of PROFIBUS DP was enhanced for the device model. The device model is based on slot and subslot mechanisms where modular devices with slots can be implemented for modules and submodules. In this way, the slot and submodules are represented by subslots for the modules. These mechanisms also enable logical modularization, e.g. for a drive system (see following figure).



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A single drive axis is represented as a module under PROFINET IO. Several submodules can be plugged into this module. The submodules define the process data interface for the IO controller or data traffic partner. They have provider or consumer quality. The model provides the option to plug several modules into an IO device for multi-axis systems that have a common PROFINET IO interface. In this way, each module again represents a single axis. Slot 0 is used as a Device Access Point (DAP) and usually represents the IO device.

8.2 The integrated Ethernet switch

You can use the integrated Ethernet switch to achieve line topologies known from the fieldbus technology. Other bus topologies such as star or tree are, of course, also possible. Ring topologies are not supported.

INFORMATION

The number of industrial Ethernet switches connected to the line affects the telegram runtime. If a telegram passes through the devices, the telegram runtime is delayed by the store & forward function of the Ethernet switch:

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

- 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)

8.2.1 Auto-crossing

The two ports leading out of the Ethernet switch have auto-crossing functionality. This means that they can use both patch and cross-over cables to connect to the next Ethernet node.

8.2.2 Auto-negotiation

The baud rate and duplex mode are negotiated by both Ethernet nodes when establishing the connection. The two Ethernet ports of the PROFINET interface support autonegotiation functionality and operate at a baud rate of 100 Mbit or 10 Mbit in full duplex or half duplex mode.

INFORMATION

PROFINET IO networks must be operated at a baud rate of 100 Mbit in full duplex mode.

8.2.3 Monitoring the LINK status

Both ports allow for a monitoring of the LINK status. You can set up this function via the STEP7 hardware configuration as follows:

- Select slot 0 in STEP7.
- Select [Object properties] from the context menu.
- Select the tab "Parameters".

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Only set the monitoring for the port that sends data packages to other nodes and not to the control. If a LINK DOWN is detected when the monitoring function is switched on, the PROFINET device sends a diagnostics alarm to the control via the other port (see chapter "PROFINET alarms using the example of MOVIDRIVE® B").

8.3 Process data configuration

For the DFS21B option, slot 1 must be configured as "slot not used". Modules with 1 to 10 I/O process data words can be configured in slot 2. The configuration is set for 3 I/O process data words after switching on the device and before establishing communication. It can be changed by the IO controller while establishing communication. The current configuration is displayed in *P090 PD configuration*.

8.3.1 Permitted configurations

ID	Process data length
101	1 process data word I/O
102	2 process data words I/O
103	3 process data words I/O
104	4 process data words I/O
105	5 process data words I/O
106	6 process data words I/O
107	7 process data words I/O
108	8 process data words I/O
109	9 process data words I/O
110	10 process data words I/O

The DAP (Device Access Point) is designated as ID 100 (slot 0, subslot 1)

INFORMATION

The configuration of the DFS21B option is compatible to the DFE12B option. That means that you do not have to change the configuration when you replace the DFE12B option with the DFS21B option. The DFS21B option then accepts 1 to 10 process data words at slot 1.

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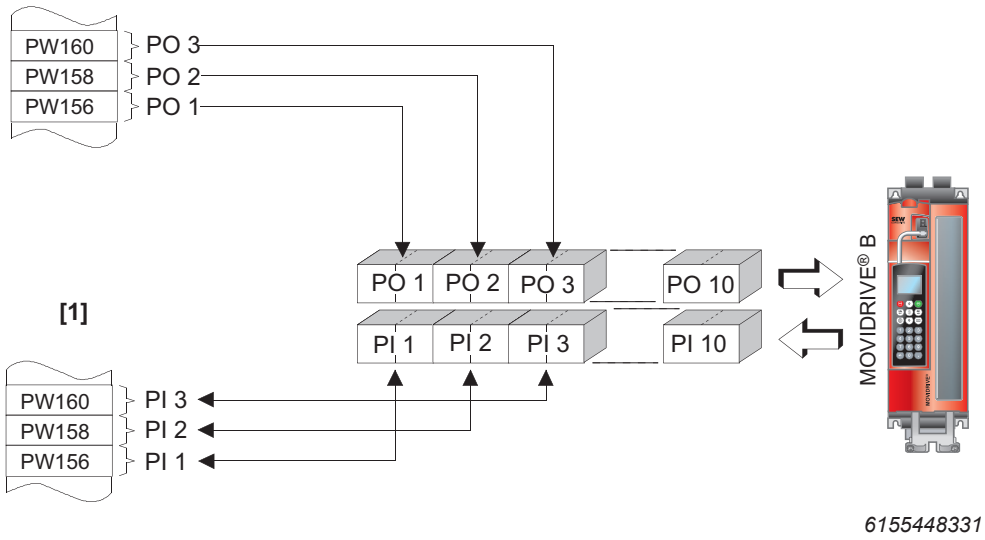
8.4 Controlling the MOVIDRIVE® MDX61B drive inverter

The drive inverter is controlled via the process data channel which is up to 10 I/O words in length. These process data words may be mapped in the I/O or peripheral area of the controller if a programmable controller is used as IO controller and can be addressed as usual.



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[1] PLC address range
PI1 – 10 Process input data
PO1 – 10 Process output data

INFORMATION

For more information about control via the process data channel, in particular regarding the coding of the control and status word, refer to the "MOVIDRIVE® MDX60B/61B Communication and Fieldbus Device Profile" manual.

8.4.1 Control example for SIMATIC S7 with MOVIDRIVE® MDX61B

MOVIDRIVE® MDX61B is controlled using SIMATIC S7 in accordance with the selected process data configuration either directly using load and transfer commands or by means of special system functions, *SFC 14 DPRD_DAT* and *SFC15 DPWR_DAT*.

In principle, S7 data lengths of 3 bytes or more than 4 bytes must be transmitted using system functions SFC14 and SFC15.

Consequently, the data in the following table applies:

Process data configuration	STEP 7 access via
1 PD	Load/transfer commands
2 PD	Load/transfer commands
3 PD	System functions SFC14/15 (length 6 bytes)
6 PD	System functions SFC14/15 (length 12 bytes)
10 PD	System functions SFC14/15 (length 20 bytes)

8.4.2 PROFINET timeout (MOVIDRIVE® MDX61B)

If the data transfer via PROFINET is faulty or interrupted, the response monitoring time in MOVIDRIVE® MDX61B elapses (if configured in the IO control). The **BUS FAULT** LED lights up or flashes to indicate that no new user data is being received. At the same time, MOVIDRIVE® performs the fault response selected with *P831 Fieldbus timeout response*.

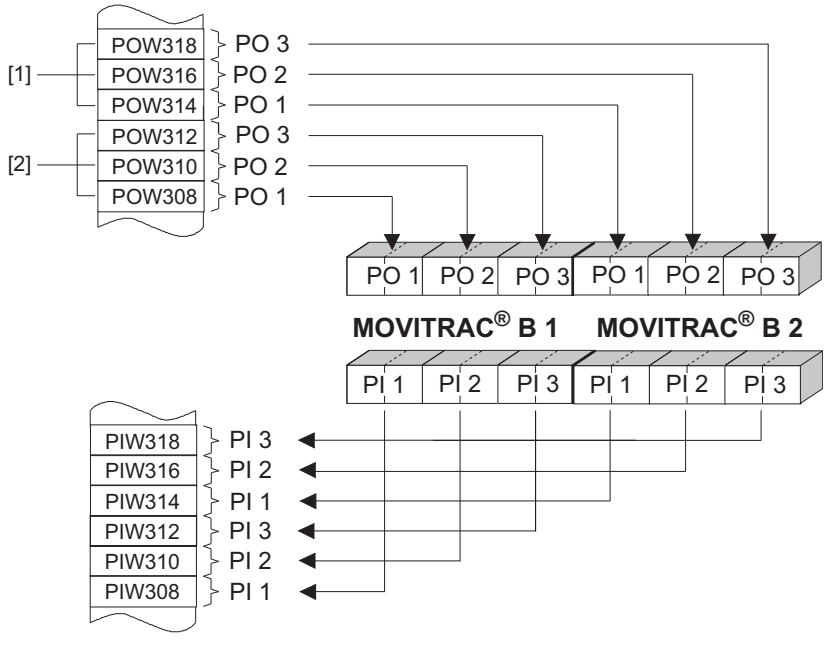
P819 Fieldbus timeout displays the response monitoring time specified by the IO controller during the PROFINET startup. The timeout can only be changed via the IO controller. Although modifications made via the keypad or MOVITOOLS® MotionStudio are displayed, they do not have any effect and are overwritten when the PROFINET is next started up.

8.4.3 Fieldbus timeout response (MOVIDRIVE® MDX61B)

P831 Fieldbus timeout response is used to set the fault response that is triggered via the fieldbus timeout monitoring function. The setting made here must correspond to the setting in the master system (S7: response monitoring).

8.5 Controlling the MOVITRAC® B frequency inverter (gateway)

The frequency inverter is controlled via the process data channel, which is up to 3 I/O words in length. These process data words are reproduced in the I/O or peripheral area of the controller, for example when a programmable logic controller is used as the I/O controller. As a result, they can be addressed in the usual manner.



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[1] Address range MOVITRAC® B, device 2
[2] Address range MOVITRAC® B, device 1
PO Process output data
PI Process input data

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8.5.1 Control example for SIMATIC S7 with MOVITRAC® B (gateway)

The drive inverter is controlled using SIMATIC S7 in accordance with the selected process data configuration either directly using load and transfer commands or by means of special system functions *SFC 14 DPRD_DAT* and *SFC15 DPWR_DAT*.

In principle, S7 data lengths of 3 bytes or more than 4 bytes must be transmitted using system functions SFC14 and SFC15.

Process data configuration	STEP 7 access via
3 PD – 24 PD	System functions SFC14/15 (length: 6 – 48 bytes)
Param +3 PD – 24 PD	System functions SFC14/15 (length 6 – 48 bytes for PD + 8 bytes for parameter)

8.5.2 SBus timeout

If one or more drive inverters on the SBus can no longer be addressed by the DFS21B, the gateway enters error code *F111 System fault*, in status word 1 of the corresponding inverter. The H1 LED (system error) lights up, and the error is also displayed via the diagnostics interface. It is necessary to set the *SBus timeout interval* (P815) of the MOVITRAC® B system error to a value other than 0 for the inverter to stop. The error resets itself in the gateway. This means that the current process data is exchanged immediately after restarting the communication.

8.5.3 Device fault

Gateways detect a series of hardware defects automatically and lock out as a result. The exact error responses and remedies can be found in the list of errors. A hardware defect causes error *F111 system fault* to be displayed on the fieldbus process input data for status words 1 of all inverters. The H1 LED (system fault) at the DFS11B then flashes at regular intervals. The exact fault code is displayed in the status of the gateway using MOVITOOLS® MotionStudio on the diagnostic interface.

8.5.4 Fieldbus timeout of the DFS11B in gateway operation

You can set how the gateway should respond in case of timeout using the *P831 Fieldbus timeout response* parameter.

No response	The drives on the subordinate SBus continue with the last setpoint value. These drives cannot be controlled when the PROFIBUS communication is interrupted.
PO_DATA = 0	When a PROFIBUS timeout is detected, a rapid stop is activated for all drives that have process data configuration with control word 1 or 2. For this, the gateway sets the bits 0 – 2 of the control word to 0. The drives are brought to a standstill using the rapid stop ramp.

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8.6 SIMATIC S7 example program

INFORMATION

This example is a special and free service that demonstrates only the basic approach to generating a PLC program as a non-binding sample. SEW is not liable for the content of the sample program.

In this example, the project planning for MOVIDRIVE® or MOVITRAC® has the process data configuration "3 PD" on input addresses PIW576... and output addresses POW576.... A data block DB3 is created with about 50 data words.

When SFC14 is called, the process input data is copied to data block DB3, data words 0, 2 and 4. When SFC15 is called after the control program has been processed, the process output data are copied from data words 20, 22 and 24 to the output address POW 576 ...

Note the length specification in bytes for the RECORD parameter. The length information must correspond to the configured length.

```
//Start of cyclical program processing in OB1
BEGIN
NETWORK
TITLE = Copy PI data from inverter to DB3, words 0/2/4
CALL SFC 14 (DPRD_DAT) //READ DP Slave Record
LADDR := W#16#240 //Input address 576
RET_VAL:= MW 30 //Result in flag word 30
RECORD := P#DB3.DBX 0.0 BYTE 6 //Pointer
NETWORK
TITLE =PLC program with drive application
// PLC program uses the process data in DB3 for
// controlling the drive
L DB3.DBW 0 //Load PI1 laden (status word 1)
L DB3.DBW 2 //Load PI2 (actual speed value)
L DB3.DBW 4 //Load PI3 (no function)
L W#16#0006
T DB3.DBW 20 //Write 6hex on PO1 (control word = enable)
L 1500
T DB3.DBW 22 //Write 1500dec on PO2 (speed setpoint = 300 1/
min)
L W#16#0000
T DB3.DBW 24 //Write 0hex on PO3 (no function, however)
//End of cyclical program processing in OB1
NETWORK
TITLE =Copy PO data from DB3, word 20/22/24 to inverter
CALL SFC 15 (DPWR_DAT) //WRITE DP Slave Record
LADDR := W#16#240 ///Output address 576 = 240hex
RECORD := P#DB3.DBX 20.0 BYTE 6 //Pointer to DB/DW
RET_VAL:= MW 32 //Result in flag word 32
```

Refer to the online help for STEP7 for further information about the system functions.

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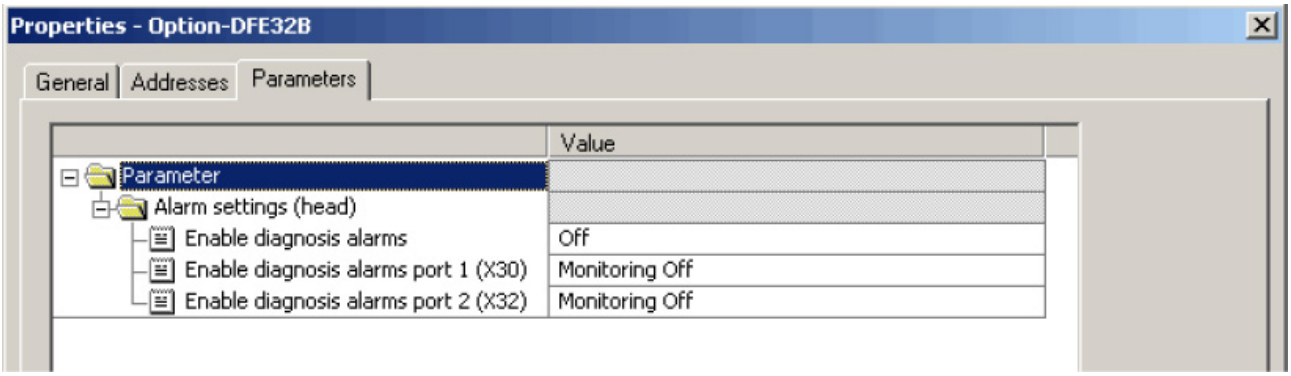
8.7 PROFINET alarms using the example of MOVIDRIVE® B

The DFS21B supports diagnostics alarms in case of a device fault. These diagnostic alarms are deactivated by default. Proceed as follows to enable the diagnostics alarms in STEP7 HW Config (see the following figure).



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8.7.1 Diagnostic alarm of the safety option

Only in connection with options DFS21B and DFS22B.

- Select slot 1 of DFS21B.
- Press the right mouse button and select [Object properties] or double-click on the slot. The "DFS21B properties" window opens.
- Activate the "Parameters" tab.
- Set the alarms to "ON" and confirm with [OK].

8.7.2 Diagnostics alarm of MOVIDRIVE®

- Select slot 2 of DFS21B.
- Press the right mouse button and select [Object properties] or double-click on the slot. The "DFS21B properties" window opens.
- Activate the "Parameters" tab.
- Set the diagnostics alarms to "ON" and confirm with [OK].

  In case of an error of the MOVIDRIVE®, a diagnostics alarm is generated and you can read the error message of the MOVIDRIVE® in plain text.

8.7.3 Diagnostics alarm of the integrated switch

- Select slot 0 of DFS21B.
- Press the right mouse button and select [Object properties] or double-click on the slot. The "DFS21B properties" window opens.
- Activate the "Parameters" tab.
- **The further procedure depends on the GSD file version** you are using:
  - **MDX61B+DFS21B V1.2**

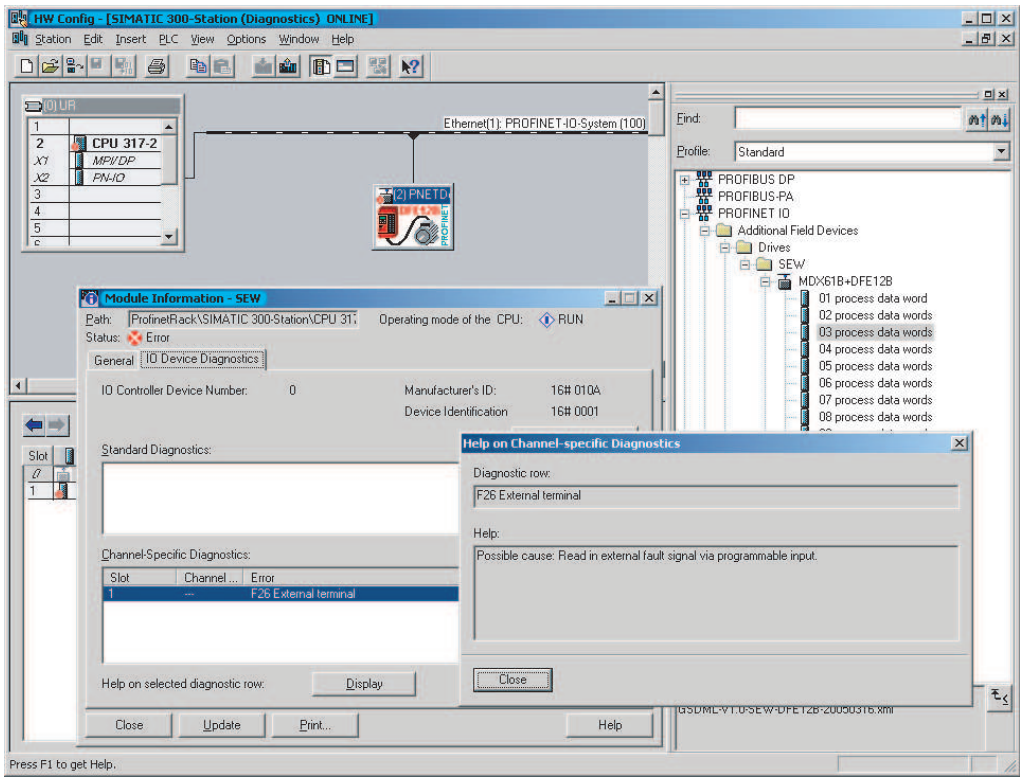
    Set "Activate diagnostic alarms" to "ON" and confirm with [OK].
  - **MDX61B+DFS21B V1.1 OLD**

    Set "Enable diagnosis alarms port 1" or "Enable diagnosis alarms port 2" to "ON" and confirm with [OK].

In a line topology, the respective port of the Ethernet node must be monitored that leads to the subsequent Ethernet node (coming from the PLC).

The DFS21B uses this setting to monitor the device communication with adjacent nodes. A diagnostic alarm is generated when the DFS21B detects an inactive partner at port 1 or 2.

A device fault of the MOVIDRIVE® B or the integrated switch results in a diagnostics alarm being sent to the SIMATIC control as a so-called "incoming event". The "SF" LED of the controller lights up red. You can determine the cause of the fault in STEP7 HW Config. Go to ONLINE, mark the symbol of the DFS21B and check the module information via the context menu (right mouse button).



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8.8 PROFINET configuration with topology detection

8.8.1 Introduction

The PROFINET technology detection allows for projecting and monitoring the structure of the network with the PROFINET IO controller in addition to the PROFINET IO devices.

The so-called "Physical device (PHDEV)" is the starting point for project planning. PDEV is a model for the Ethernet interface and can be found in slot 0 in the configuration with an "Ethernet interface" subslot and one subslot for each Ethernet port.

The Ethernet ports made visible in this way can be connected to the configuration tool. The result is an image of the desired Ethernet routing for the plant. This image is stored in the PROFINET IO controller.

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In order to be able to determine the real plant topology, the PROFINET IO devices must support the so-called LLDP (**L**ink **L**ayer **D**iscovery **P**rotocol). The PROFINET IO devices exchange information with the neighboring PROFINET IO devices via LLDP. Via LLDP, each PROFINET IO device cyclically sends information using its own PROFINET device name and port number. The neighboring device receives and stores this information. A PROFINET IO controller can now read the stored information from the PROFINET IO devices and determine the real plant topology.

By comparing the projected topology with the real topology, you can detect any missing or incorrectly wired PROFINET IO devices and localize them in the plant.

Apart from cabling you can still determine the transmission characteristics for the ports. For example, you can set an "Auto-negotiation" port to "100 Mbit full duplex". The settings will be monitored.

SNMP (**S**imple **N**etwork **M**anagement **P**rotocol) as a protocol for network diagnostics extends the topology detection by standard diagnostics mechanisms from the IT area.

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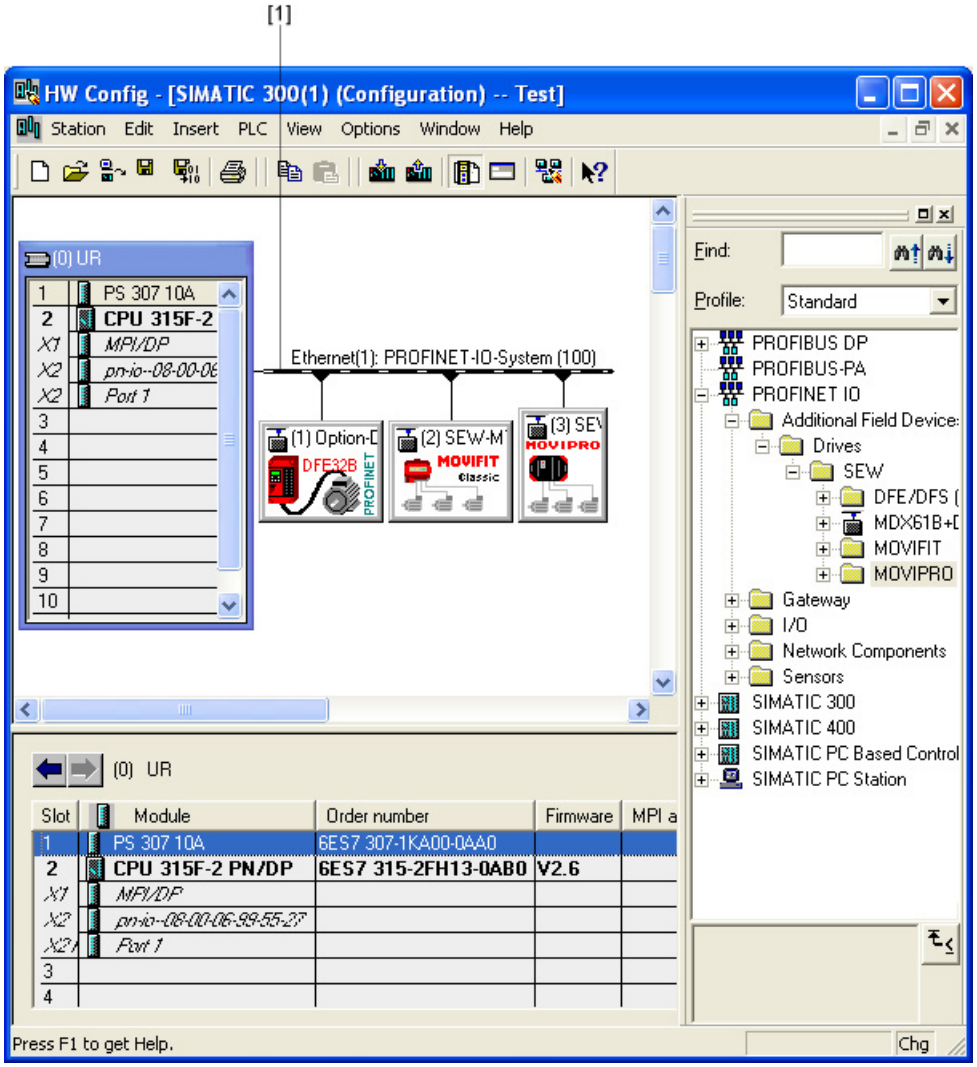
8.8.2 Creating a PROFINET IO project and starting the topology editor

The following section describes the configuration procedure for a PROFINET topology with the SIMATIC STEP7 topology editor. Configuration can be performed in different ways in SIMATIC STEP7. This example will focus on one approach.

1. In STEP7 HW Config, import the PROFINET IO devices from the hardware catalog into the PROFINET IO network as usual.

   Make sure that the PROFINET IO controller supports topology detection. The controller manufacturer will provide according information.

   The hardware catalog contains several entries for each SEW interface marked as different versions. An entry marked with "OLD" does not support the PROFINET IO topology detection.



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2. Right-click on the bus cable [1] and select "PROFINET IO topology" from the context menu to start the topology editor. The "Topology editor" window is displayed.
3. Proceed according to section "Specifying the topology and detecting faulty connections".

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8.8.3 Specifying the topology and detecting faulty connections

Topology detection with topology editor

The topology detection is to compare the current topology (online topology) with the configured topology (offline topology). Any deviations suggest faulty connections in the PROFINET network.

The following section provides an introduction as to how to use the topology editor to specify PROFINET nodes and detect faulty connections to ports.

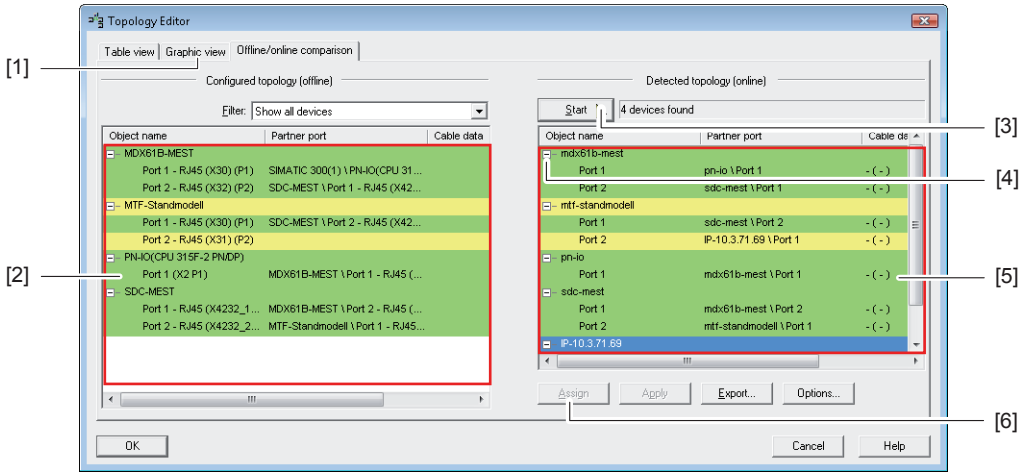
Refer to the online help for a detailed description and important additional information (e.g. the color code of the comparison results).

Click [Help] to open the online help in the open topology editor.

Specifying the topology

Proceed as follows to specify the topology of nodes in a PROFINET network:

1. Start the topology editor according to section "Creating a PROFINET project and starting the topology editor".
2. Select the "Offline/online comparison" tab [6].



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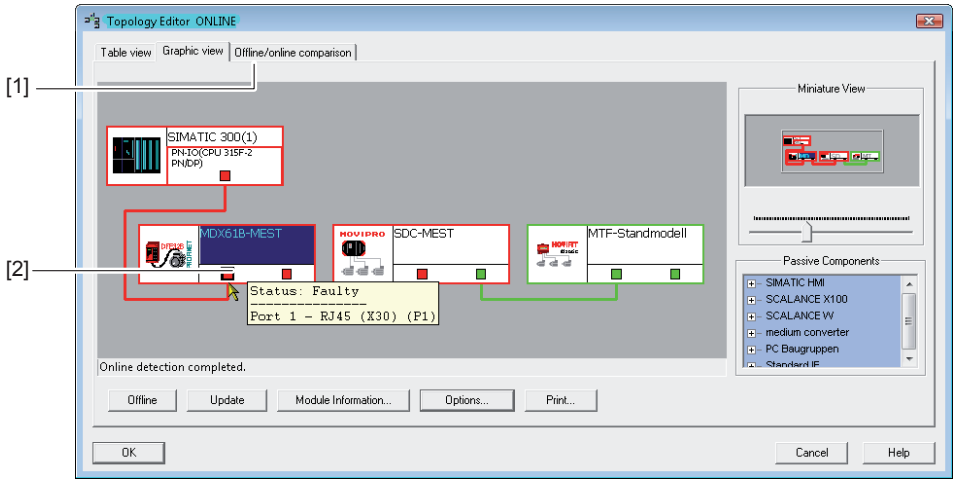
Detecting faulty connections

Faulty connections can be detected in the graphic view of the topology editor.

Proceed as follows to switch to the graphic view:

1. Start the topology editor according to section "Creating a PROFINET project and starting the topology editor".
2. Select the "Graphic view" tab [1].



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[1] "Graphic view" tab
[2] Port with faulty connection

The graphic view provides a clear display of your PROFINET network (offline or online) with all devices and connected ports.

Faulty connections between ports are indicated by red lines.

3. Move the cursor over the port with the faulty connection [2] to display a status message for the error.

   The present example illustrates a faulty connection between the controller and "port 1" of the first device. The faulty connection is indicated by a red connection line as well as the status message to the port.

8.8.4 Changing port properties

The two Ethernet ports of the PROFINET interface are set to "Automatic setup" by default. Observe the following for this default setup:

- Auto-negotiation and auto-crossover are activated in this setup.
- Baud rate and duplex mode are configured automatically.
- The neighboring port must also be set to "Automatic setup".
- You can use patch or crossover cables.

You can set a port to "100 Mbit/s full duplex". Observe the following for this setup:

- This setting must also be made for the port of the neighboring device, otherwise it would work with 100 Mbit/s half duplex.
- If auto-crossover is deactivated, you have to use cross cables.

Proceed as follows to set a port to "100 Mbit/s full duplex":

1. Select a device in STEP7 HW Config.

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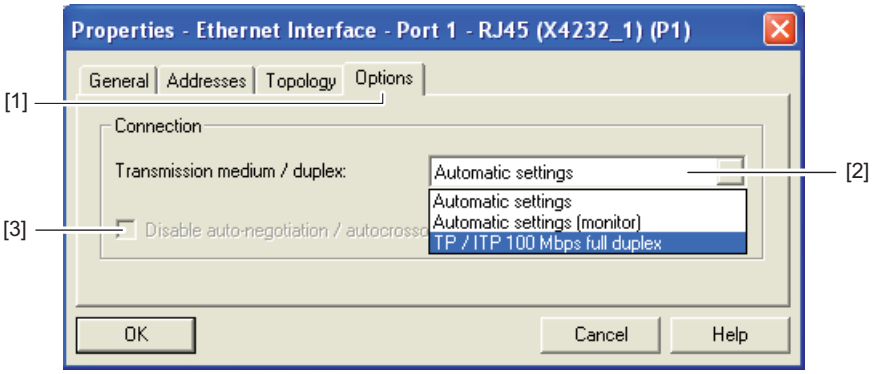
2. Select the desired port on slot 0.
3. Right-click on the port and select "Object properties" from the context menu.

   A window is displayed.
4. Select the "Options" tab [1].



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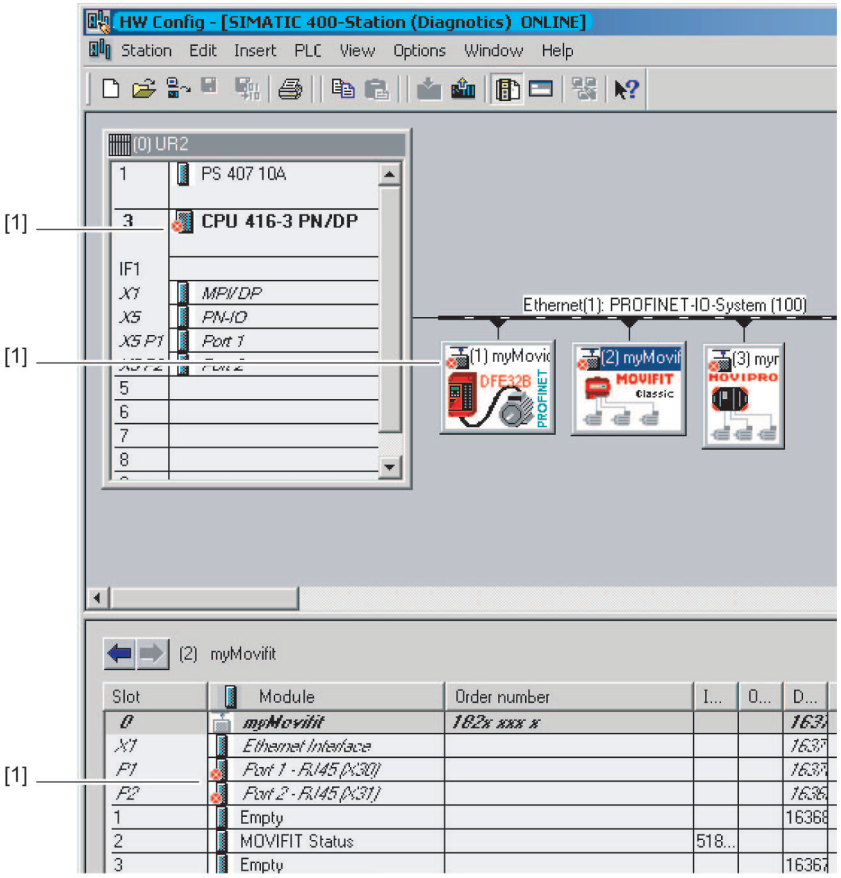
[1] "Options" tab
[2] "Transmission medium/duplex" drop-down menu
[3] "Auto-negotiation/auto-crossover" checkbox

5. From the "Transmission medium/duplex" [2] drop-down menu select "TP/ITP 100 Mbps full duplex".
6. Deactivate "Auto-negotiation/auto-crossover" checkbox [3].

8.8.5 Topology diagnostics

Topology errors are reported to the PROFINET IO controller as diagnostics alarms. In the event of an fault, the "EXTF" LED of the PROFINET IO controller is lit. The fault is also indicated by a red cross [1] in STEP7 HW Config.



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[1] "Red cross" – symbol for fault

Possible causes:

- Ethernet ports swapped
- Incorrectly set port properties
- Devices cannot be addressed

Proceed as follows to display information about an error:

1. Select the device or the respective slot.
2. Right-click and select "Module status" from the context menu.

   A window is displayed.
3. Select the "Communication diagnostics" tab.

8.8.6 Port statistics

Proceed as follows to display the port statistics for an Ethernet port in STEP7 HW Config:

1. Click the "ONLINE ↔ OFFLINE" icon, to switch to the "Online" communication mode.
2. Select a device.

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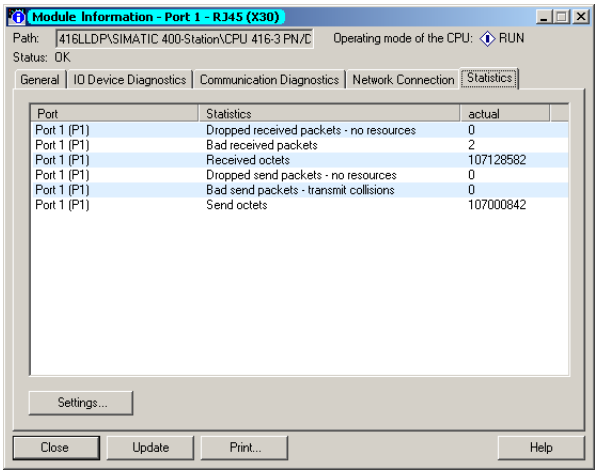
3. Select the desired port on slot 0.
4. Right-click and select "Module status" from the context menu.

   A window is displayed.

   Select the "Statistics" tab [1].

   The following view is displayed:



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[1] "Statistics" tab

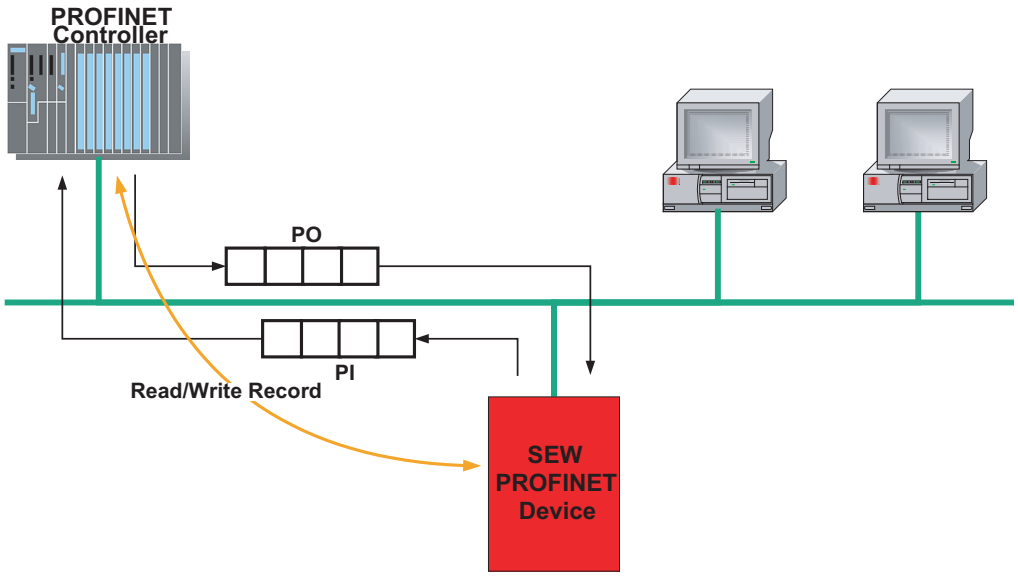
The following statistic values can be displayed:

- **Dropped received packets – no resources** shows the number of valid Ethernet packets discarded upon reception. A large number of discarded valid packets suggests a high load on the bus system. In this case, try to reduce the utilization by reducing in particular the number of broadcast and multicast telegrams and reducing the IO cycle or the number of PROFINET devices in a line if required.
- **Bad received packets** shows the number of faulty Ethernet packets. A high number suggests a bus error. In this case, check the cabling and shielding of the network.
- **Received octets** shows the number of received packets.
- **Dropped send packets – no resources** shows the number of valid Ethernet packets discarded during transmission. A large number of discarded valid packets suggests a high load on the bus system. In this case, try to reduce the utilization by reducing in particular the number of broadcast and multicast telegrams and reducing the IO cycle or the number of PROFINET devices in a line if required.
- **Bad send packets – transmit collisions** shows the number of discarded Ethernet packets due to collisions. There should be no collisions in a switched network.
- **Send octets** shows the number of sent packets.

9 Parameterization via PROFIdrive dataset 47

9.1 Introduction PROFINET data sets

With "Read record" and "Write record", PROFINET offers acyclic services that can be used to transfer parameter data between the PROFINET controller (master) and a PROFINET device (slave). Via UDP (User Datagram Protocol), the priority of this data exchange is lower than the priority of the process data exchange.



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The user data transported via an acyclic PROFINET service is grouped in a data set. Each data set is clearly addressed by the following characteristics:

- API
- Slot number
- Subslot number
- Index

The structure of dataset 47 is used for the parameter exchange with SEW-EURODRIVE PROFINET devices. The structure of data set 47 is specified in the PROFIdrive profile drive technology of the PROFIBUS user organization; as of V4.0 as PROFINET parameter channel. Different procedures for accessing parameter data of the SEWEURODRIVE PROFINET device are provided via this parameter channel.

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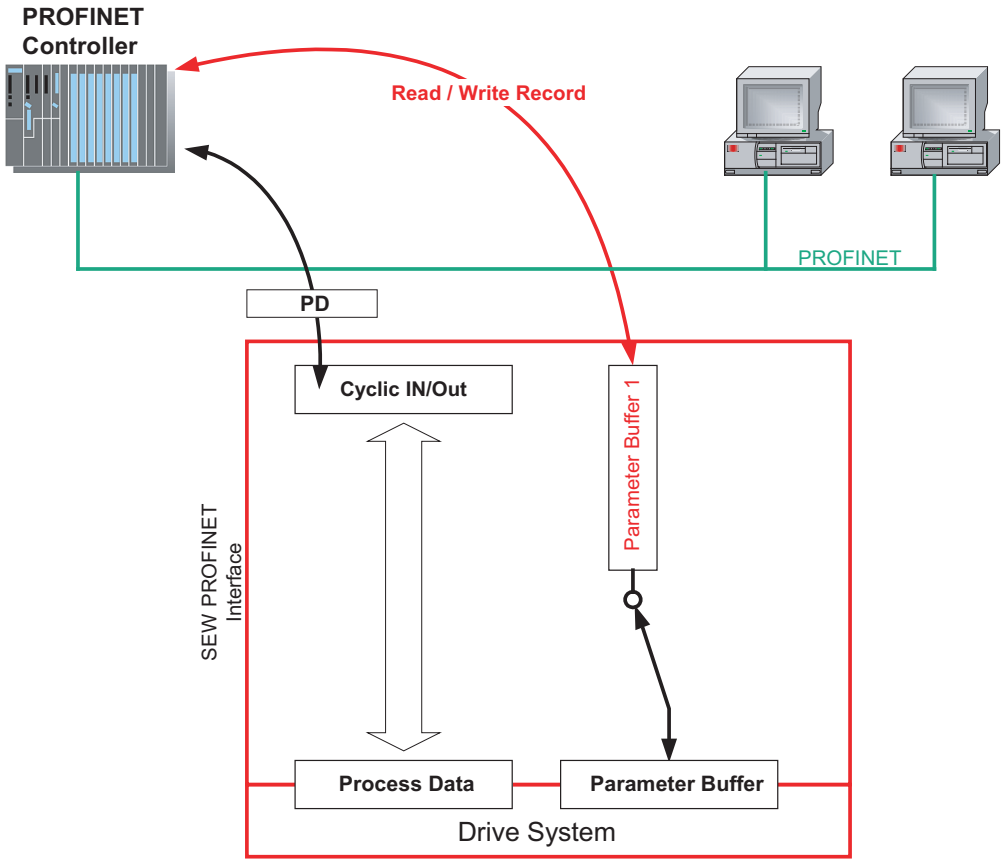
9.1.1 Properties of the SEW-EURODRIVE PROFINET devices

The SEW-EURODRIVE PROFINET devices that support acyclic Read Record and Write Record services all have the same communication characteristics. The devices are basically controlled via a PROFINET controller with cyclic process data. Additionally, this controller (usually a PLC) can set the parameters for the SEW-EURODRIVE PROFINET device via Read Record and Write Record.



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9.2 Structure of the PROFINET parameter channel

Generally, the parameter setting of the drives to the PROFIdrive DP-V1 parameter channel of profile version 3.0 is implemented via data set 47. The *Request ID* entry is used to distinguish between parameter access based on PROFIdrive profile or via SEW-MOVILINK® services. The following table shows the possible codes of the individual elements. The data set structure is the same for PROFIdrive and MOVILINK® access.

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The following MOVILINK® services are supported:

- 8-byte MOVILINK® parameter channel with all the services supported by the drive inverter such as
  - READ parameter

– WRITE parameter
– WRITE parameter volatile
– etc.

The following PROFIdrive services are supported:

- Reading (request parameter) individual parameters of the type *double word*
- Writing (change parameter) individual parameters of type *double word*

Field	Data Type	Values
Request reference	Unsigned8	0x00 reserved 0x01 – 0xFF
Request ID	Unsigned8	0x01 Request parameter (PROFIdrive) 0x02 Change parameter (PROFIdrive) 0x40 SEW MOVILINK® Service
Response ID	Unsigned8	**Response (+):** 0x00 reserved 0x01 Request parameter (+) (PROFIdrive) 0x02 Change parameter (+) (PROFIdrive) **0x40 SEW MOVILINK® Service (+)** **Response (-):** 0x81 Request parameter (-) (PROFIdrive) 0x82 Change parameter (-) (PROFIdrive) **0xC0 SEW MOVILINK® Service (-)**
Axis	Unsigned8	0x00 – 0xFF Number of axis 0 – 255
No. of parameters	Unsigned8	0x01 – 0x13 1 – 19 DWORDs (240 DP-V1 data bytes)
Attributes	Unsigned8	0x10 Value **For SEW MOVILINK® (request ID = 0x40):** **0x00 No service** **0x01 READ parameter** **0x20 WRITE parameter** **0x30 WRITE parameter volatile** **0x40 – 0xF0 reserved**
No. of elements	Unsigned8	0x00 for non-indexed parameters 0x01 – 0x75 Quantity 1 – 117
Parameter Number	Unsigned16	0x0000 – 0xFFFF MOVILINK® parameter index
Subindex	Unsigned16	0x0000 SEW: always 0
Format	Unsigned8	0x43 Double word 0x44 Error
No. of Values	Unsigned8	0x00 – 0xEA Quantity 0 – 234

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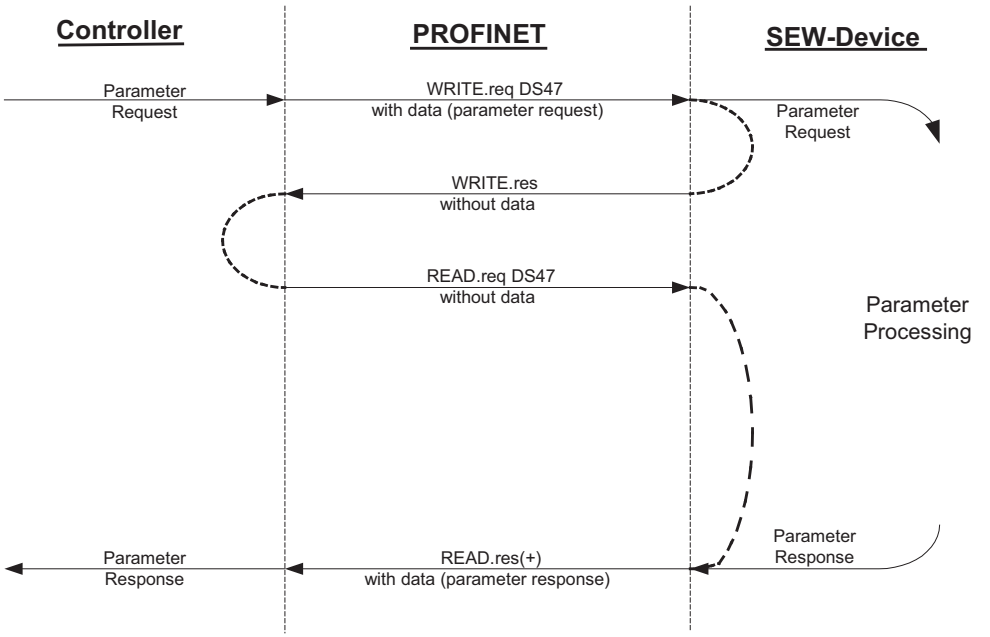
Field	Data Type	Values
Error Value	Unsigned16	0x0000 – 0x0064 PROFIdrive-Errorcodes 0x0080 + MOVILINK®-AdditionalCode Low **For SEW MOVILINK® 16 Bit error value**

9.2.1 Parameterization procedure via data set 47

Parameter access is provided by the combination of the DP-V1 services *WRITE* and *READ*. The parameter setting order is transferred to the slave using the *WRITE.req*. followed by slave-internal processing.

The master now sends a *READ.req* to pick up the parameterization response. The master repeats the *READ.req* if the *READ.res* from the slave is negative. As soon as the parameter processing in the inverter is concluded, it answers with a positive response *READ.res*. The user data now contain the parameter setting response of the parameter setting order that was previously sent with *Write.req*. This mechanism applies to both a C1 and a C2 master.

The following figure shows the telegram sequence for the parameter access via PROFINET.



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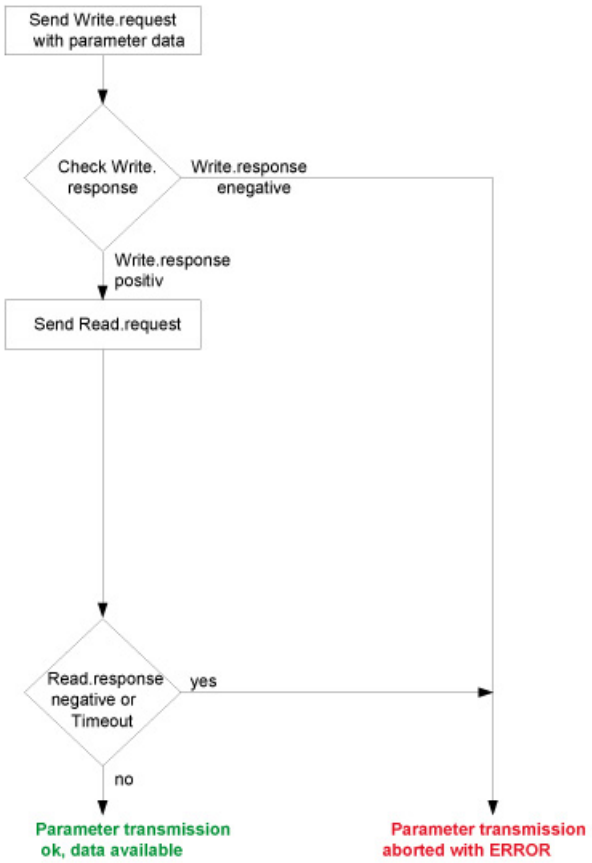
9.2.2 Controller processing sequence

If the bus cycles are very short, the request for the parameter response arrives before the inverter has concluded parameter access in the device. This means that the response data from the inverter is not yet available. In this state, the device delays the response to the *Read Record Request*.



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9.2.3 Addressing connected inverters

The structure of the DS47 data set defines an *Axis* element. This element is used to reach multi-axis drives that are operated via one PROFINET interface. The *Axis* element addresses one of the devices connected via the PROFIBUS interface.

Addressing a MOVIDRIVE® B on PROFINET

With the setting *Axis = 0*, the parameters of the drive inverter can be accessed directly. Since there are no drive devices connected to MOVIDRIVE®, access with *Axis > 0* is returned with an error code.

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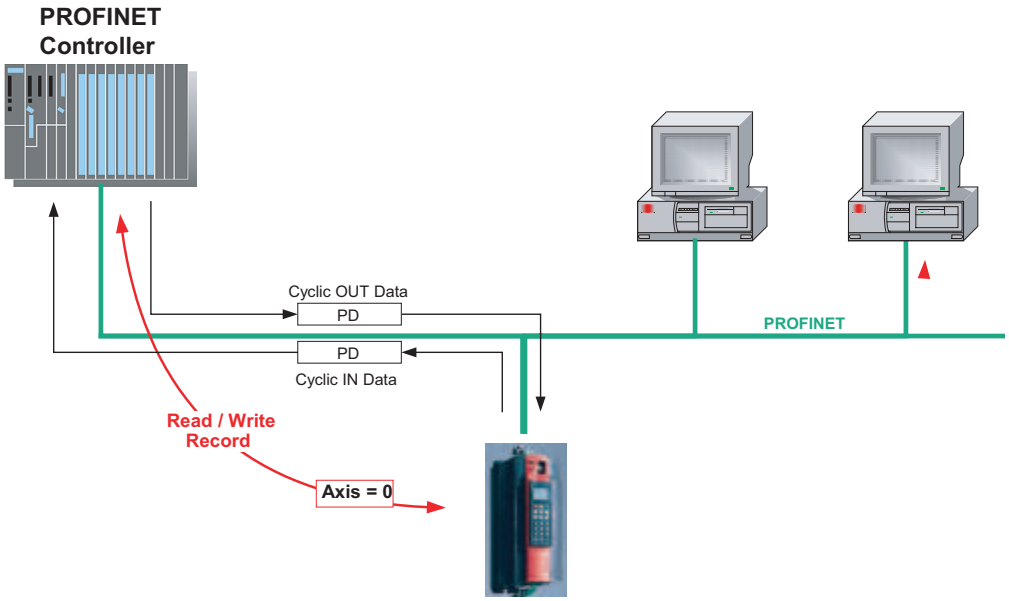
The following figure shows direct addressing of a MOVIDRIVE® B via PROFINET with *Axis = 0*.



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9.2.4 MOVILINK® parameter requests

The MOVILINK® parameter channel of the SEW inverter is directly mapped in the structure of data set 47. The Request ID 0x40 (SEW MOVILINK® service) is used to exchange MOVILINK® parameterization requests. Parameter access with MOVILINK® services usually takes place according to the structure described below. The typical message sequence for dataset 47 is used.

Request ID: 0x40 SEW MOVILINK® service

The actual service is defined by the data set element *Attribute* in the MOVILINK® parameter channel. The high nibble of this element corresponds to the service nibble in the management byte of the DP parameter channel.

Example for reading a parameter via MOVILINK®

The following tables give an example of the structure of the *WRITE.request* and *READ.res* user data for reading an individual parameter via the MOVILINK® parameter channel.

- **Sending a parameter request**

  The table shows the coding of the user data for the *WRITE.request* PROFINET service. The *WRITE.request* service is used to transfer the parameterization request to the inverter. The firmware version is read.

  The following table shows the *WRITE request* header for transferring the parameter request.

Service	WRITE.request	Description
API	0	Fixed setting = 0
Slot_Number	0	Random (is not evaluated)
Subslot_Number	1	Fixed setting = 1

Service	WRITE.request	Description
Index	47	Index of the data set for the parameter request; constant index 47
Length	10	10 bytes user data for parameter request

- The following table shows the *WRITE.request* user data for MOVILINK® "Read parameters".

Byte	Field	Value	Description
0		0x01	Individual reference number for the parameter setting request is mirrored in the parameter response.
1, 2	Request ID	0x40	SEW MOVILINK® service
2		0x00	Axis number; 0 = Single axis
3	No. of parameters	0x01	1 parameter
4	Attributes	0x10	MOVILINK® service "READ parameter"
5	No. of elements	0x00	0 = access to direct value,no subelement
6, 7	Parameter Number	0x206C	MOVILINK® index 8300 = "Firmware version"
8, 9	Subindex	0x0000	Subindex 0

- **Query parameter response**

  The following table shows the coding of the *READ.request* user data including the PROFINET header.

Service	READ.request	Description
API	0	Fixed setting = 0
Slot_Number	0	Random (is not evaluated)
Subslot_Number	1	Fixed setting = 1
Index	47	Index of the data set for the parameter request; constant index 47
Length	240	Maximum length of response buffer in the master

- **Positive MOVILINK® parameterization request**

  The table shows the *READ.response* user data with the positive response data of the parameterization request. The parameter value for index 8300 (firmware version) is returned as an example.

Service	READ.request	Description
API	0	Fixed setting = 0
Slot_Number	0	Random (is not evaluated)
Subslot_Number	1	Fixed setting = 1
Index	47	Index of the data set for the parameter request; constant index 47
Length	10	Maximum length of response buffer in the master

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Byte	Field	Value	Description
0		0x01	Mirrored reference number from the parameter setting request
1	Response ID	0x40	Positive MOVILINK® response
2		0x00	Reflected axis number; 0 = Single axis
3	No. of parameters	0x01	1 parameter
4	Format	0x43	Parameter format: Double word
5	No. of values	0x01	1 value
6, 7	Value High	0x311C	Higher-order part of the parameter
8, 9	Value Low	0x7289	Lower-order part of the parameter
			Decoding: 0x 311C 7289 = 823947913 dec >> firmware version 823 947 9.13

Example for writing a parameter via MOVILINK®

As an example, the following tables show the structure of the *WRITE* and *READ* services for the volatile writing of the value 12345 to IPOS$^{plus®}$ variable H0 (parameter index 11000). The MOVILINK® service *WRITE Parameter volatile* is used for this purpose.

- **Send "WRITE parameter volatile" request**

Service	WRITE.request	Description
API	0	Fixed setting = 0
Slot_Number	0	Random (is not evaluated)
Subslot_Number	1	Fixed setting = 1
Index	47	Index of the data set for the parameter request; constant index 47
Length	16	16 byte user data for order buffer

Negative parameter response

The following table shows the coding of a negative response of a MOVILINK® service. Bit 7 is entered in the response ID if the response is negative.

Service	WRITE.response	Description
API	0	Fixed setting = 0
Slot_Number	0	Random (is not evaluated)
Subslot_Number	1	Fixed setting = 1
Index	47	Index of the data set for the parameter request; constant index 47
Length	8	8 byte user data in response buffer

Byte	Field	Value	Description
0	Response reference	0x01	Mirrored reference number from the parameter setting request

Byte	Field	Value	Description
1	Response ID	0xC0	Negative MOVILINK® response
2	Axis	0x00	Reflected axis number; 0 for single axis
3	No. of parameters	0x01	1 parameter
4	Format	0x44	Fault
5	No. of values	0x01	1 Error code
6, 7	Error value	0x0811	MOVILINK® return code e.g. Error class 0x08, Add. code 0x11 (see section "MOVILINK® parameterization return codes for DP-V1")

MOVILINK® parameterization return codes for PROFINET

The following table shows the return codes that are returned by the SEW PROFINET interface if an error occurs during PROFINET parameter access.

MOVILINK® Return code (hex)	Description
0x0810	Invalid index, parameter index does not exist in the device.
0x0811	Function/parameter not implemented.
0x0812	Only read access is allowed.
0x0813	Parameter lock active
0x0814	Factory setting is active.
0x0815	Value for parameter too large.
0x0816	Value for parameter too small.
0x0817	Required option card not installed.
0x0818	Error in system software.
0x0819	Parameter access only via RS485 process interface.
0x081A	Parameter access only via RS485 diagnostics interface.
0x081B	Parameter is access-protected.
0x081C	Controller inhibit is required.
0x081D	Invalid value for parameter.
0x081E	Factory setting was activated.
0x081F	Parameter was not saved in EEPROM.
0x0820	Parameter cannot be changed with output stage enabled/reserved.
0x0821	Reserved
0x0822	Reserved
0x0823	Parameter may only be changed with IPOS program stop.
0x0824	Parameter may only be changed with deactivated auto setup.
0x0505	Incorrect coding of management and reserved byte.

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MOVILINK® Return code (hex)	Description
0x0602	Communication error between inverter system and fieldbus option card
0x0502	Timeout of secondary connection (e.g. during reset or with SysFault)

9.2.5 PROFIdrive parameter requests

The PROFIdrive parameter channel of SEW inverters is directly mapped in the structure of data set 47. Parameter access with PROFIdrive services usually takes place according to the structure described below. The typical telegram sequence is used for data set 47. PROFIdrive only defines the 2 request IDs

Request ID: 0x01Request Parameter (PROFIdrive)

Request ID: 0x02Change Parameter (PROFIdrive)

Therefore there is restricted data access in comparison to the MOVILINK® services.

INFORMATION

The request ID *0x02 Change Parameter (PROFIdrive)* results in remanent write access to the selected parameter. Consequently, the internal flash/EEPROM of the inverter is written with each write access. Use the MOVILINK® service *Write Parameter volatile* if parameters must be written cyclically at short intervals. With this service, you only alter the parameter values in the RAM of the inverter.

Example for reading a parameter via PROFIdrive

The following tables show an example of the structure of the *WRITE.request* and *READ.res* user data for reading an individual parameter via the MOVILINK® parameter channel.

- **Sending a parameter request**

  The table shows the coding of the user data for the *WRITE.req* service specifying the DP-V1 header. The *WRITE.req* service is used to transfer the parameterization request to the inverter.

Service	WRITE.request	Description
Slot_Number	0	Random, (is not evaluated)
Index	47	Index of the data set; constant index 47
Length	10	10 bytes user data for parameter request

Example for writing a parameter via PROFIdrive

The following tables show an example of the structure of the WRITE and READ services for the **remanent** writing of the internal setpoint n11 (see section "Example for writing a parameter via MOVILINK®"). The PROFIdrive service *Change parameter* is used for this purpose.

- **Send "WRITE parameter" request**

  The following table shows the PROFINET header of the *WRITE request* with parameterization request.

Service	WRITE.request	Description
Slot_Number	0	Random, (is not evaluated)
Index	47	Index of the data set; constant index 47
Length	16	16 byte user data for order buffer

- The following table shows the *WRITE.req* user data for the "Change Parameter" PROFIdrive service.

Byte	Field	Value	Description
0	Request reference	0x01	Individual reference number for the parameterization request is mirrored in the parameter response.
1	Request ID	0x02	Change parameter (PROFIdrive)
2	Axis	0x01	Axis number; 0 = Single axis
3	No. of parameters	0x01	1 parameter
4	Attributes	0x10	Access to parameter value
5	No. of elements	0x00	0 = access to direct value,no subelement
6, 7	Parameter Number	0x7129	Parameter index 8489 = P160 n11
8, 9	Subindex	0x0000	Subindex 0
10	Format	0x43	Double word
11	No. of values	0x01	Change 1 parameter value
12, 13	Value HiWord	0x0000	Higher-order part of the parameter value
14, 15	Value LoWord	0x0BB8	Lower-order part of the parameter word

After sending this *WRITE.request*, the *WRITE.response* is received. If there was no status conflict in processing of the parameter channel, a positive *WRITE.response* results. Otherwise, the status fault is located in *Error_code_1*.

Negative parameter response

The following table shows the coding of a negative response of a PROFIdrive service. Bit 7 is entered in the Response ID if the response is negative.

Service	READ.response	Description
Slot_Number	0	Random, (is not evaluated)
Index	47	Index of the data set; constant index 47
Length	8	8 byte user data in response buffer

Byte	Field	Value	Description
0	Response reference	0x01	Mirrored reference number from the parameterization request
1	Response ID	0x810x82	Negative response for "Request Parameter" Negative response for “Change Parameter”.
2	Axis	0x00	Reflected axis number; 0 = Single axis
3	No. of parameters	0x01	1 parameter
4	Format	0x44	Fault

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Byte	Field	Value	Description
5	No. of values	0x01	1 Error code
6, 7	Error value	0x0811	MOVILINK® return code e. g. ErrorClass 0x08, add. code 0x11 (see section "MOVILINK® return codes for DP-V1")

PROFIdrive return codes for PROFINET

This table shows the coding of the error number in the PROFIdrive DP-V1 parameter response according to PROFIdrive profile V3.1. This table applies if you use the PROFIdrive services *Request parameter* and/or *Change parameter*.

Error no.	Meaning	Used for
0x00	Invalid parameter number.	Access to non-existent parameters.
0x01	Parameter value cannot be changed	An attempt was made to change a parameter value that cannot be changed.
0x02	Minimum or maximum value exceeded	An attempt was made to change a value to one that is outside of the limit values.
0x03	Incorrect subindex	Access to non-existent subindex.
0x04	No assignment	Access with subindex to parameter that is not indexed.
0x05	Incorrect data type	An attempt was made to replace a value with one that does not correspond to the data type of the parameter.
0x06	Setting not permitted (can only be reset)	An attempt was made to set a value to one larger than 0 where this is not permitted.
0x07	Description element cannot be changed	Access to description element that cannot be changed.
0x08	Reserved	(PROFIdrive Profile V2: PPO write query for IR not available).
0x09	No description available	Access to description that is not accessible (parameter value is exists).
0x0A	Reserved	(PROFIdrive Profile V2: incorrect access group).
0x0B	No operation priority	An attempt was made to change a parameter without change rights.
0x0C	Reserved	(PROFIdrive Profile V2: incorrect password).
0x0D	Reserved	(PROFIdrive Profile V2: text cannot be read in cyclic data transfer).
0x0E	Reserved	(PROFIdrive Profile V2: name cannot be read in cyclic data transfer).
0x0F	No text assignment available	Access to text assignment that is not accessible (parameter value exists).
0x10	Reserved	(PROFIdrive Profile V2: no PPO write).

Error no.	Meaning	Used for
0x11	Request cannot be executed due to the operating mode	Access is currently not possible and the reason is not explained.
0x12	Reserved	(PROFIdrive Profile V2: other error).
0x13	Reserved	(PROFIdrive Profile V2: data cannot be read in cyclic exchange).
0x14	Incorrect value	An attempt was made to change a value to one that is in the permitted range but is not permitted due to other long-term reasons (parameter with specified individual values).
0x15	Response is too long	The length of the current response exceeds the maximum transmittable length.
0x16	Invalid parameter address	Invalid value or value that is not valid for this attribute, number of elements, parameter number, subindex or a combination of these factors.
0x17	Wrong format	Write request: Invalid format or parameter data format that is not supported.
0x18	Number of values is not consistent	Write request: Number of values of parameter data does not correspond to the number of elements in the parameter address.
0x19	Axis does not exist	Access to an axis that does not exist.
Up to 0x64	Reserved	–
0x65 – 0xFF	Depends on the manufacturer	–

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9.3 Reading or writing parameters via data set 47

9.3.1 Sample program for SIMATIC S7

The STEP 7 code stored in the GSDML file shows how parameters are accessed via the STEP 7 system function units SFB 52/53. You can copy the STEP 7 code and import/compile it as a STEP 7 source.

INFORMATION

- There is an example of a function unit for SIMATIC S7 controls available for download in the Software section on the SEW website (www.sew-eurodrive.de).
- This example is a special and free service that demonstrates only the basic approach to generating a PLC program as a non-binding sample. SEW is not liable for the content of the sample program.

9.3.2 Technical data of the GSDML file for operation on PROFINET

The GSDML file is valid for the following devices when operated on PROFINET:

- MOVIDRIVE® MDX61B with DFS21B option
- MOVITRAC® B with DFS21B option
- MOVITRAC® B and DFS21B option installed in UOH11B gateway housing

GSDML-V2.1-SEW-DFE-DFS-2Ports-jjjj.mm.tt.xml	
Module name for project planning:	MOVIDRIVE DFS21B
Supported dataset:	Index 47
Supported slot number:	Recommended: 0
Manufacturer code:	10A hex (SEW-EURODRIVE)
Profile ID:	0
C2 response timeout	1 s
Max. length C1 channel:	240 bytes
Max. length C2 channel:	240 bytes

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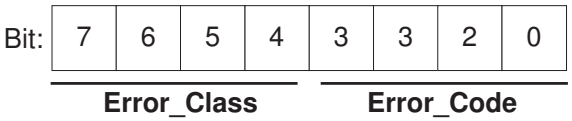
9.3.3 Error codes of the PROFINET services

The following table shows possible error codes of PROFINET services that may occur in the event of an error in the communication on PROFINET telegram level. This table is relevant if you want to write your own parameter assignment block based on the PROFINET services because the error codes are reported directly back on the telegram level.



172299531

Error_Class (from PROFINET specification)	Error_Code (from PROFINET specification)	PROFINET parameter channel
0x0 – 0x9 hex = reserved		
0xA = application	0x0 = read error 0x2 = module failure 0x3 to 0x7 = reserved 0x8 = version conflict 0xA to 0xF = user specific	
0xB = access	0x0 = invalid index	0xB0 = No data block Index 47 (DB47); parameter requests are not supported
	0x1 = write length error 0x2 = invalid slot 0x3 = type conflict 0x4 = invalid area	
	0x5 = state conflict	0xB5 = access to DB47 temporarily not possible due to internal processing status
	0x6 = access denied	
	0x7 = invalid range	0xB7 = WRITE DB 47 with error in the DB 47 header
	0x8 = invalid parameter 0x9 = invalid type 0xA to 0xF = user specific	

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Error_Class (from PROFINET specification)	Error_Code (from PROFINET specification)	PROFINET parameter channel
0xC = resource	0x0 = read constraint conflict 0x1 = write constraint conflict 0x2 = resource busy 0x3 = resource unavailable 0x4..0x7 = reserved 0x8..0xF = user specific	
0xD...0xF = user specific		

10 Integrated web server

The DFS21B option card has a homepage for simple web diagnostics of MOVIDRIVE® and MOVITRAC®. Enter the configured IP address to access the homepage.

You can use the web page to access information about service and diagnostics.

10.1 Software requirements

The website has been tested with Microsoft® Internet Explorer 5.0 and Mozilla® Firefox 2.0. To display dynamic elements you will need the Java 2 Runtime Environment SE, v1.5.0 or higher.

If the Java 2 Runtime environment is not installed on your system, the program will connect to Java and start an automatic download, if you allow it. Should you encounter any problems, you can also download Java 2 Runtime from www.sun.com and install it locally.

10.2 Security settings

If you are using a firewall or if you have a personal firewall installed on your system, they could prevent you from accessing the Ethernet devices. In this situation, you should allow outgoing TCP/IP and UDP/IP traffic.

- The applet "sewAppletsMoviEWeb.JAppletWeb" will prompt you to accept a certificate. Click <Execute>. The certificate will be imported to the certificate list of the Java 2 Runtime environment.
- Select the checkbox "Always trust content from this publisher" in order to avoid this window for future executions.

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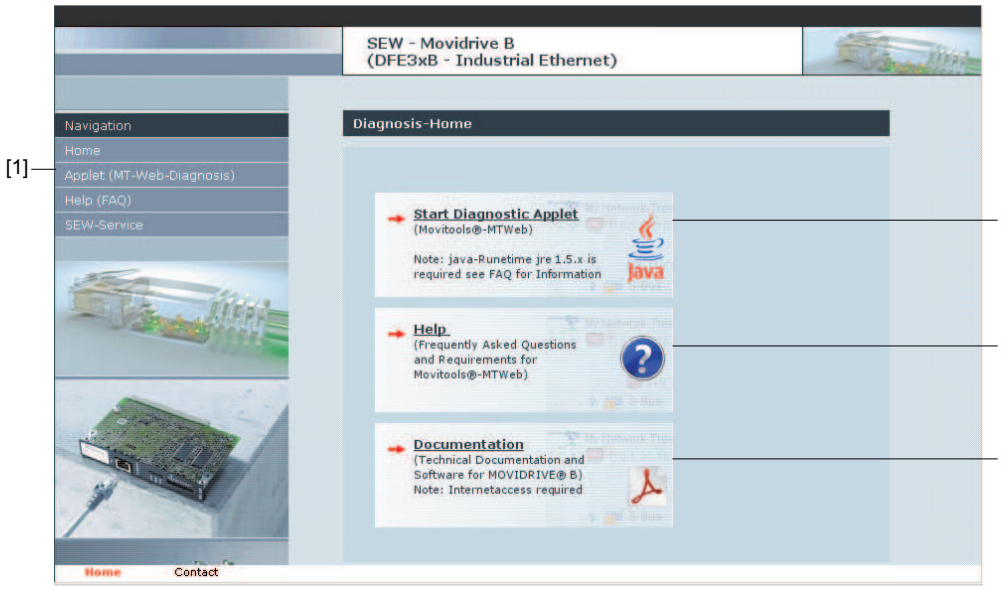
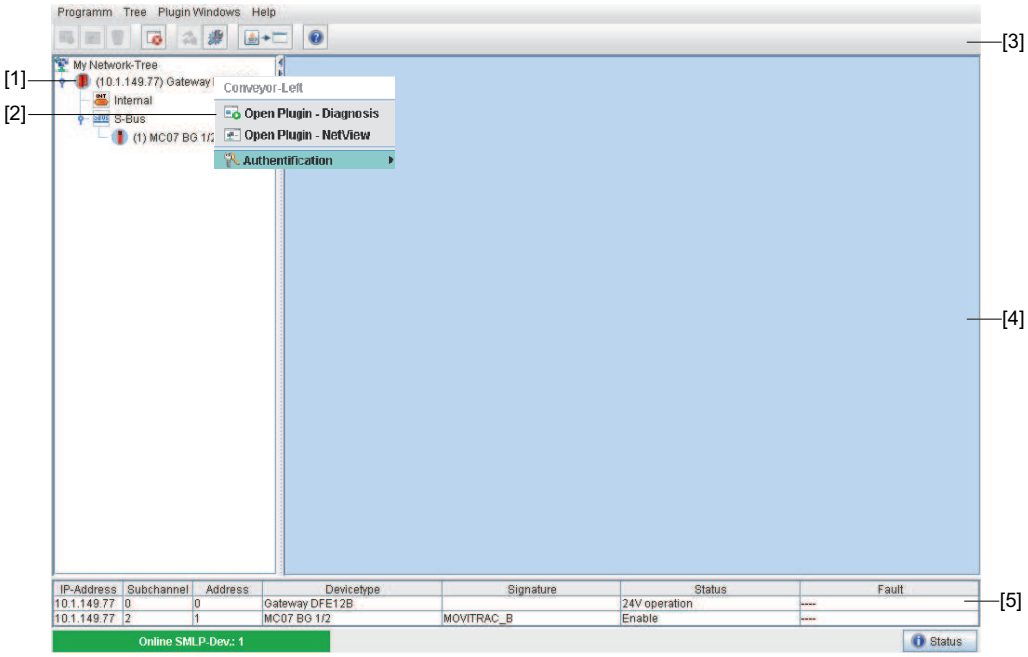
10.3 Layout of the MOVIDRIVE® MDX61B homepage with the DFS21B option



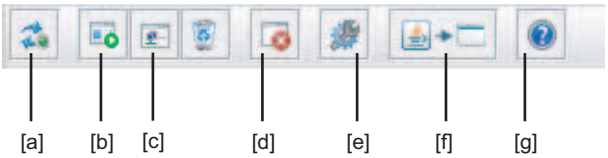
6164273931

[1] Navigation bar
[2] Button for starting the diagnostics applet
[3] Button for displaying website help
[4] Link to the MOVIDRIVE® B documentation page (Internet access required)

10.4 Structure of the diagnostics applet



6165685387

[1]	The tree displays the MOVIDRIVE® B Ethernet device in the network node "My Network Tree". Individual subsystems of the corresponding device versions are displayed below that; they may contain additional devices.
[2]	You can navigate to the plug-ins of an individual device by right-clicking a device in the tree. A pop-up window appears guiding you to the corresponding device plug-ins. You can also adjust the access settings for a MOVIDRIVE® B (see chapter "Access protection"). To detect new devices and have them displayed in the tree, right-click on the network node and select "Scan".
[3]	The following toolbar is available:  [a] Rescan device tree and display it in the tree [b] Open plug-in for selected device in device tree [c] Overview plug-in for selected device in device tree, see section "Plug-in window (Overview)" [d] Close the selected plug-in [e] Settings for Ethernet communication and scanner [f] Change to window mode or applet mode [g] Display information dialog box
[4]	See chapter "Plug-in window".
[5]	The status table and the device status are visible by default. All devices and subdevices found during a scan are listed. Since the status table sends cyclic parameter requests to the device, you can also close the table using the [Status] button (bottom right).

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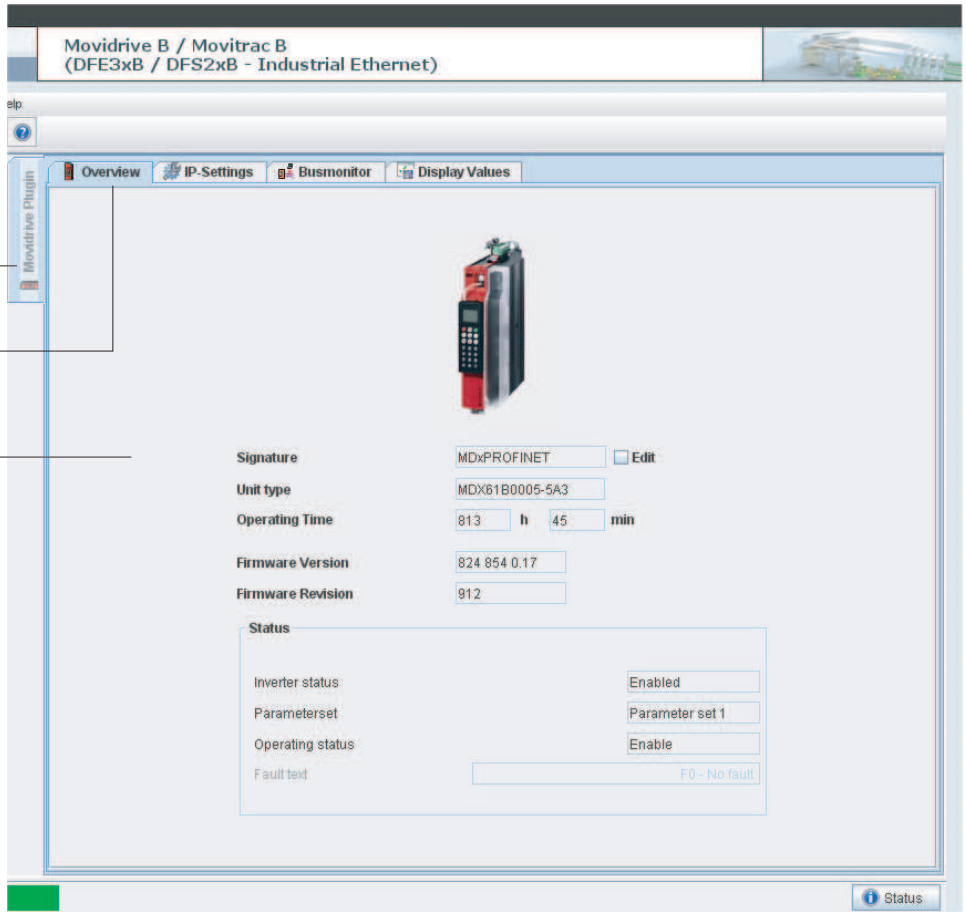
10.4.1 Plug-in window

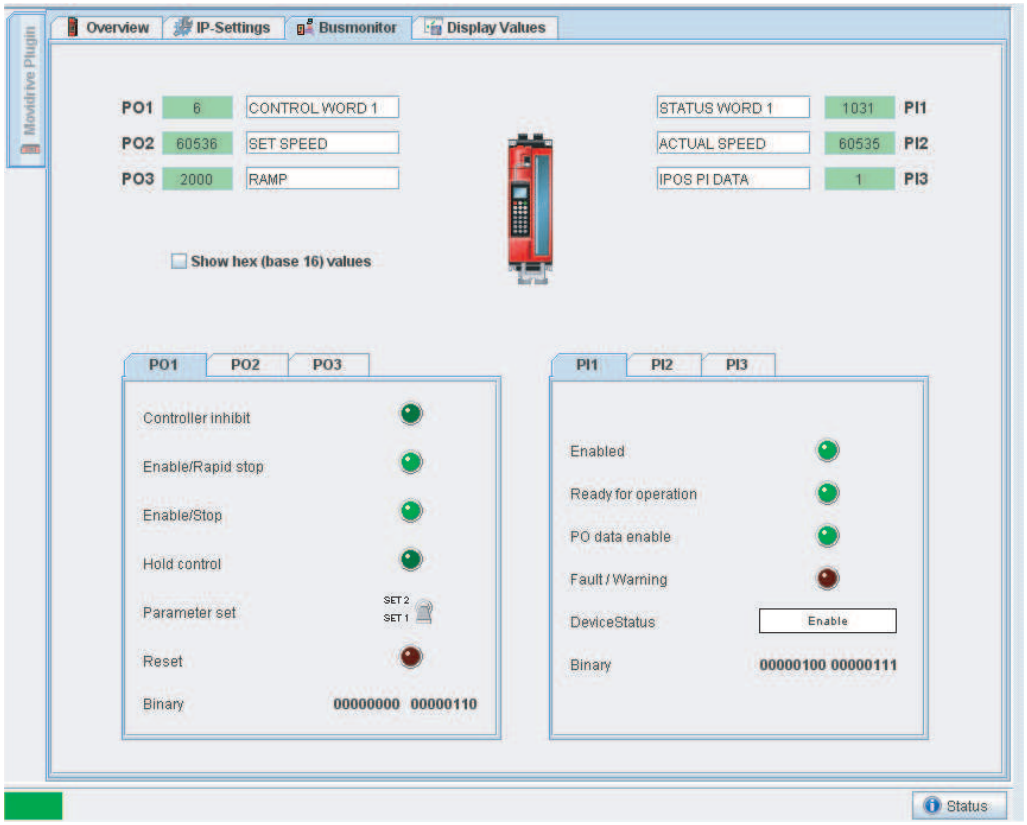


6166025995

[1]	If several plug-ins are open (e.g. plug-ins of various devices), they are listed on the tab for open plug-ins.
[2]	If the selected device has several display columns, the tab within the plug-in (shows parameter displays being implemented) will display those columns.
[3]	The main window with display values and figures visualizes the parameters.

Example: Bus monitor plug-in for MOVIDRIVE® B

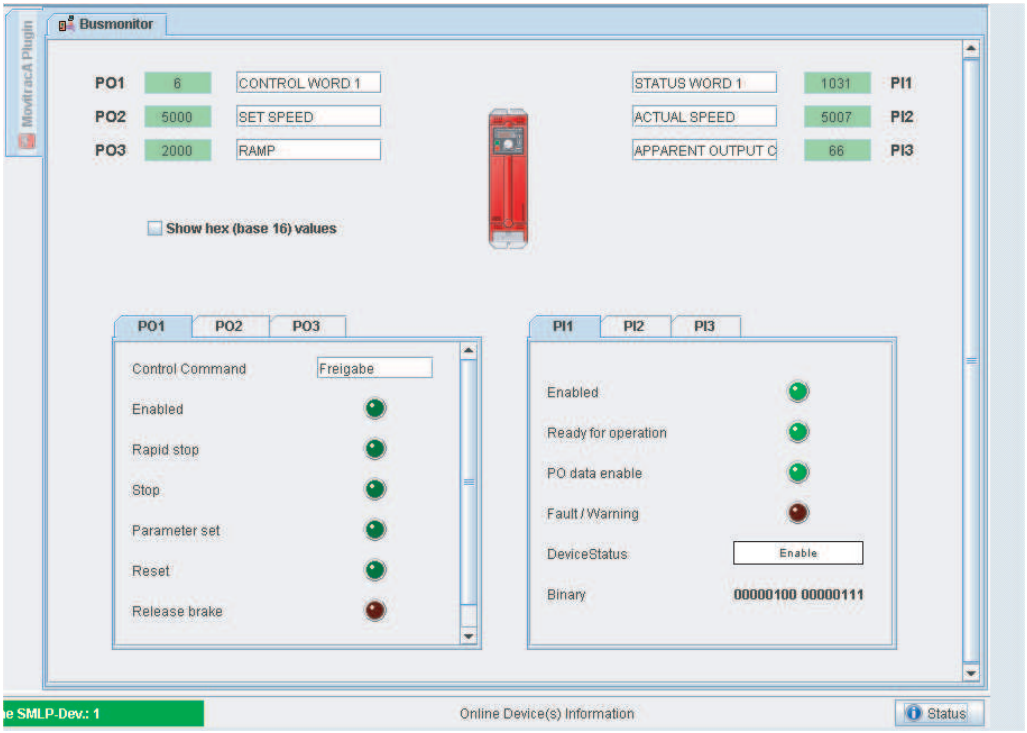
This plug-in is used to display the process data between the controller and MOVITRAC® B as well as to diagnose the process data assignment.



6166106251

Example: Bus monitor plug-in for MOVITRAC® B

This plug-in is used to display the process data between the control and the MOVITRAC® B and also for diagnosing the process data assignment.



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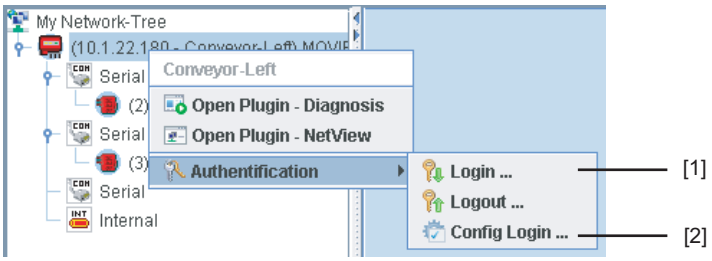
10.5 Access protection

Access to the drive parameters and diagnostics information can be protected by a password. The access protection is deactivated as standard. You can activate the access protection function by assigning a password [2]. To deactivate the function again, delete the password (blank password).

If access protection is activated, a login dialog [1] will appear to request the saved password.



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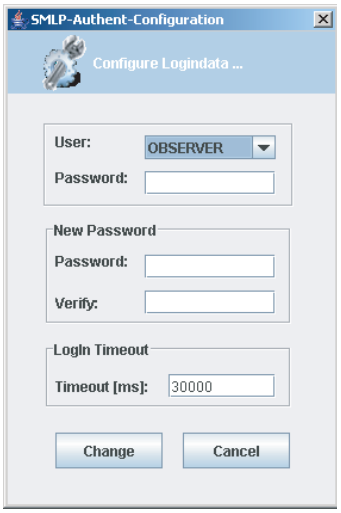
Login dialog:

Password dialog:



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11 Operation with the MOVITOOLS® MotionStudio engineering software

11.1 About MOVITOOLS® MotionStudio

11.1.1 Tasks

The MOVITOOLS® MotionStudio engineering software enables you to perform the following tasks with consistency:

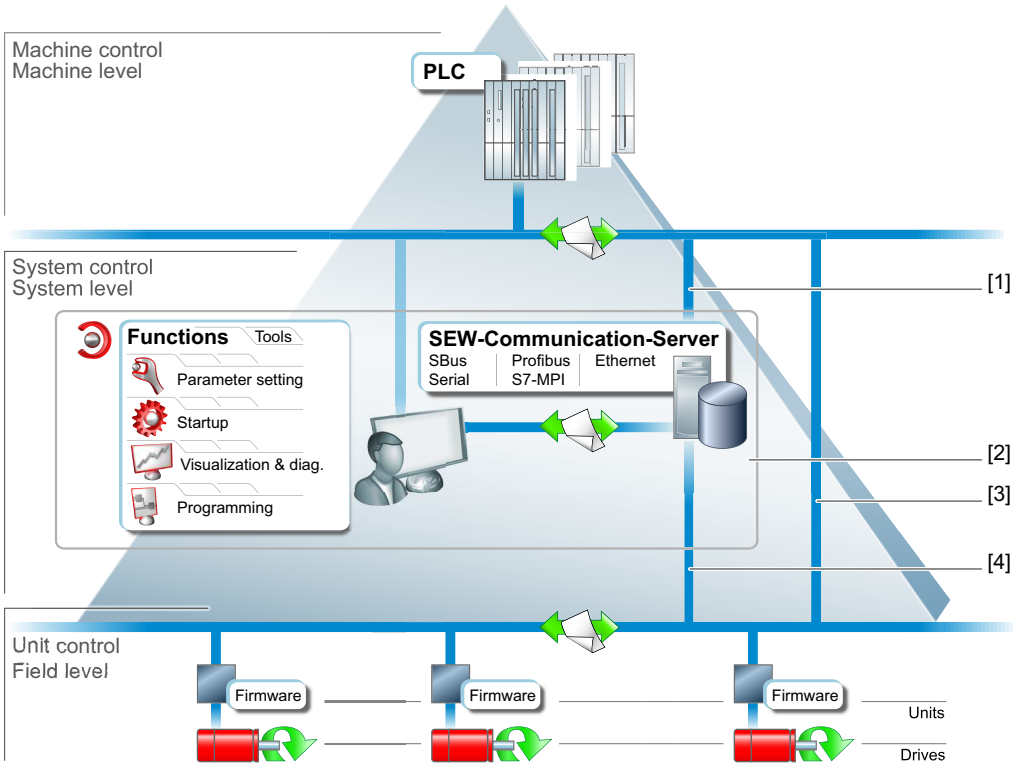
- Establishing communication with devices
- Executing functions with the devices

11.1.2 Functional principle

Overview

The following figure illustrates the functional principle of the MOVITOOLS® MotionStudio software package.

Note that this illustration only shows the logical communication relationships and not the hardware connections.



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[1] Communication channel for fieldbus or Industrial Ethernet
[2] MOVITOOLS® MotionStudio software package with integrated SEW Communication Server
[3] Communication between fieldbus nodes or Industrial Ethernet
[4] Communication channel via interface adapter to SBus (CAN) or serial

Engineering via interface adapters

If your device supports the "SBus" or "Serial" communication options, you can use a suitable interface adapter for engineering.

The interface adapter is additional hardware that you can obtain from SEW-EURODRIVE. You can use it to connect your engineering PC with the respective communication option of the device.

The type of interface adapter you require depends on the communication options of the respective device.

Communication channels

The SEW Communication Server is integrated into the engineering software MOVITOOLS® MotionStudio for establishing communication with the devices.

The SEW Communication Server allows you to create communication channels. Once the channels are established, the devices communicate via these communication channels using their communication options. You can operate up to 4 communication channels at the same time.

MOVITOOLS® MotionStudio supports the following types of communication channels:

- Serial (RS485) via interface adapters
- System bus (SBus) via interface adapters
- Ethernet TCP/IP, PROFINET IO, EtherNet/IP™, Modbus/TCP
- EtherCAT®
- Fieldbus (PROFIBUS DP-V1)
- Non-proprietary software interface Tool Calling Interface

The available channels can vary depending on the device and its communication options.

Functions

The MOVITOOLS® MotionStudio engineering software enables you to perform the following tasks with consistency:

- Parameterization (e. g. in the parameter tree of the device)
- Startup
- Visualization and diagnostics
- Programming

MOVITOOLS® MotionStudio provides the right tools for every device type.

TCI call interface

TCI (Tool Calling Interface) is a standardized call interface based on the specification of the PROFIBUS user organization (PNO).

MOVITOOLS® MotionStudio (version 5.60 and higher) supports TCI for all devices with the following communication options:

- PROFIBUS DP-V1
- PROFINET IO

These devices must have been configured in the configuration software SIMATIC Manager (from the STEP 7 software package of Siemens).

You can select the configured devices in the tool "HW Config" and call MOVITOOLS® MotionStudio as a so-called "device tool".

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11.2 First steps

11.2.1 Starting the software and creating a project

Proceed as follows:

1. Select the following item from the Windows start menu: [Start] / [Programs] / [SEW] / [MOVITOOLS MotionStudio] / [MOVITOOLS MotionStudio]
   ⇨ MOVITOOLS® MotionStudio is started.
2. Create a project with a name and directory.

11.2.2 Establishing communication and scanning the network

Proceed as follows:

1. Click "Configure communication channels" [1] in the toolbar.

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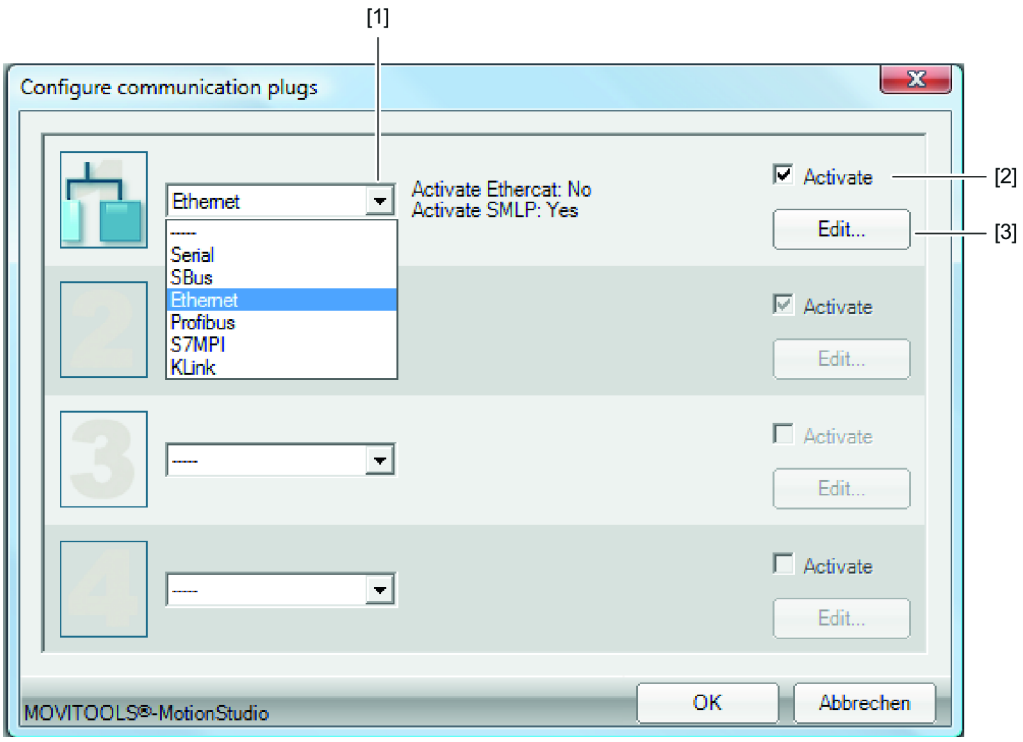
⇨ The following window opens.



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2. From the drop-down list [1], select the communication type.
3. Activate the selected communication type [2].
4. To edit the settings of the selected communication type, click the button [3].

5. If necessary, change the preset communication parameters. When doing so, refer to the detailed description of the communication channels.
6. Scan your network via the "Device scan" icon [1] in the toolbar.

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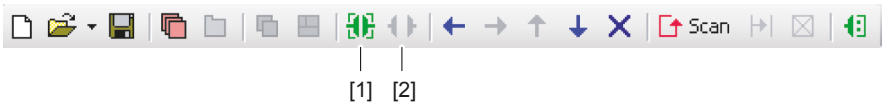
11.2.3 Selecting the communication mode (online or offline)

Proceed as follows:

1. Select the connection mode:

- For functions (online tools) that should directly influence the device, switch to online mode by using the icon [1].
- For functions (offline tools) that should directly influence the device, switch to offline mode by using the icon [2].



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2. Select the device node.
3. Select the tools for configuring the device from the context menu.

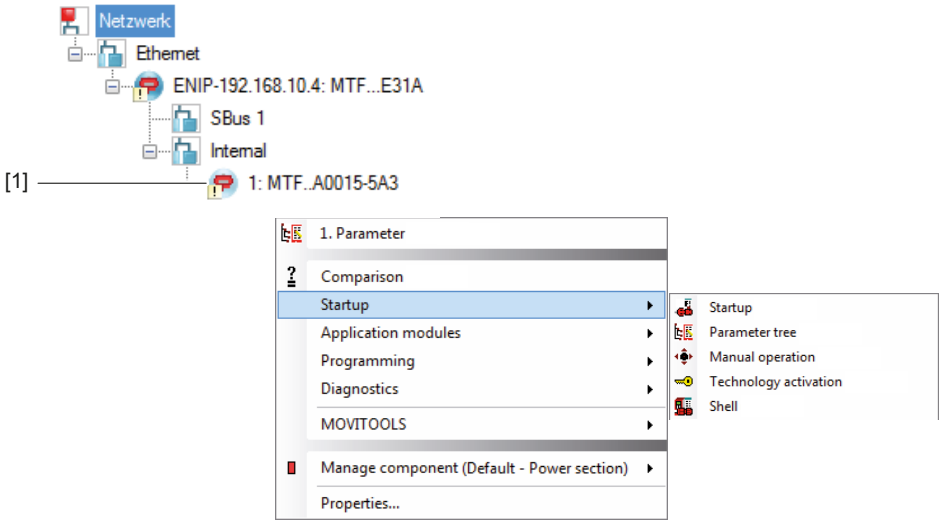
11.2.4 Configuring devices

The following example uses a MOVIFIT® device to show how to display the tools for configuring the device.

The connection mode is "online". The device has been scanned in the network view.

Proceed as follows:

1. Select the device (in this example the power section [1]) in the network view.
2. Right-click to open the context menu.



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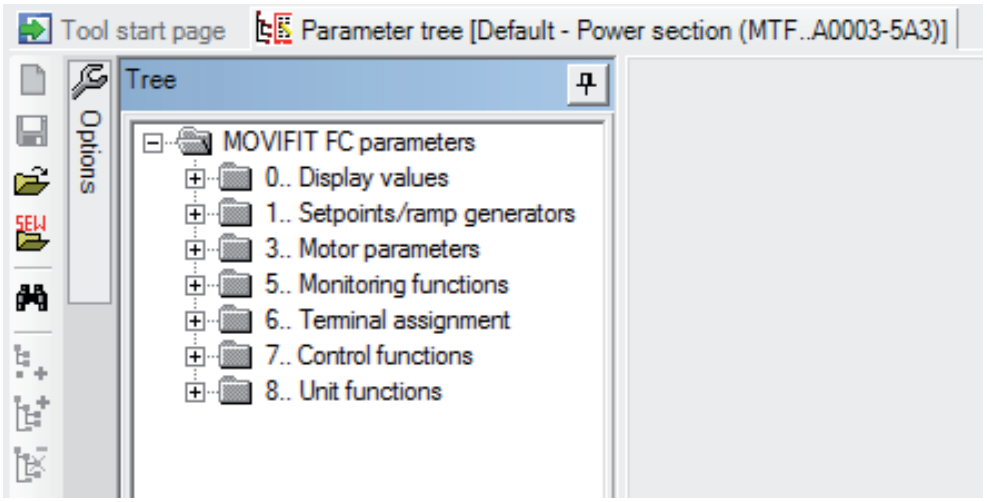
3. Select the tool for configuring the device (in this example the command [Startup] > [Parameter tree]).



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11.3 Connection mode

11.3.1 Overview

The MOVITOOLS® MotionStudio engineering software differentiates between "online" and "offline" connection mode. You determine the connection mode yourself. MOVITOOLS® MotionStudio starts up in the connection mode that was set before the program was closed.

INFORMATION

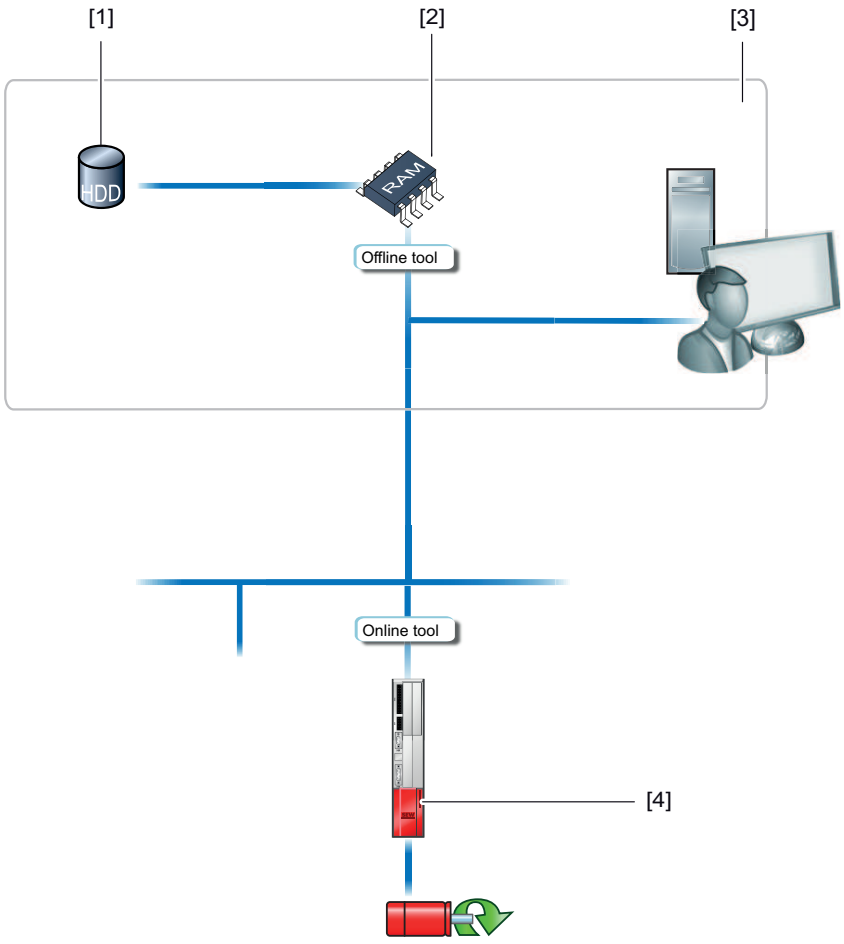
The "Online" connection mode is **not** a response message which informs you that you are currently connected to the device or that your device is ready for communication.

- Should you require this feedback, observe chapter "Setting the cyclical accessibility test" in the online help (or the manual) of MOVITOOLS® MotionStudio.

INFORMATION

Project management commands (such as "download" and "upload"), the online device status, and the "device scan" work independently of the set connection mode.

Depending on the selected connection mode, you can choose offline or online tools specific to your device. The following figure illustrates the two types of tools:



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[1] Hard drive of the engineering PC
[2] RAM of the engineering PC
[3] Engineering PC
[4] Device

Tools	Description
Online tools	Changes made using online tools affect **only** the device [4]. • Execute the "Upload (device → PC)" function if you want to transfer the changes to your RAM [2]. • Save your project so that the changes can be stored on the hard disk [1] of your engineering PC [3].
Offline tools	Changes made using offline tools affect **only** the RAM [2] at first. • Save your project so that the changes can be stored on the hard disk [1] of your engineering PC [3]. • Execute the "Download (PC → device)" function if you want to transfer the changes to your device [4] as well. Check the parameterization afterwards.

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11.4 Serial communication (RS485) via interface adapters

11.4.1 Engineering via interface adapter (serial)

Since your device supports the "serial" communication option, you can use a suitable interface adapter for engineering.

The interface adapter is additional hardware that you can obtain from SEW-EURODRIVE. You can use it to connect your engineering PC with the respective communication option of the device.

The following table shows you the different types of interface adapters available, and for which devices they are suitable.

Type of interface adapter (option)	Order No.	Scope of delivery	Devices
USB11A (USB to RS-485)	08248311	Two connection cables: • TAE connection cable with two RJ10 connectors • USB connection cable with USB-A connector and USB-B connector	• MOVIDRIVE® B • MOVITRAC® 07A • MOVITRAC® B • MOVIFIT® MC/FC/SC • MOVIGEAR® • UFx11A fieldbus gateways • DFx fieldbus gateways • DHx MOVI-PLC® control • MFx/MQx fieldbus interfaces for MOVIMOT® • MOVIMOT® MM..D
UWS21B (RS-232 to RS-485)	18204562	Two connection cables: • TAE connection cable with two RJ10 connectors • Connection cable with 9-pin sub-D connector	
UWS11A (RS-232 to RS-485) For mounting rail	822689X	without	

As the majority of PCs come equipped with USB interfaces instead of RS-232 interfaces, the following section only focuses on the USB11A interface adapter.

11.4.2 Startup of the USB11A interface adapter

The USB11A interface adapter uses a COM redirector. This assigns the first free COM port to the interface adapter.

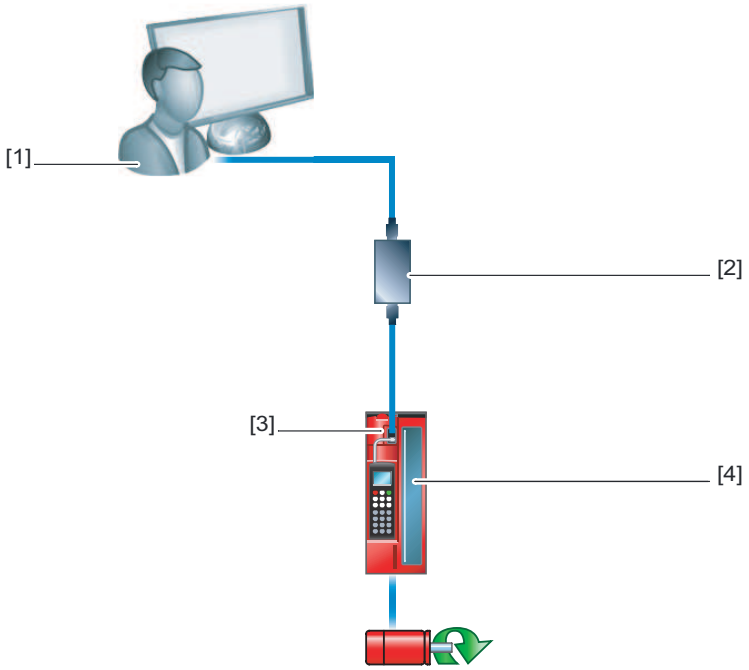
Overview

The USB11A interface adapter operates with a COM redirector. This assigns the first free COM port to the interface adapter.

The following section describes how to connect the USB11A interface adapter and, if required, install the respective drivers.

Connecting the USB11A interface adapter

The following figure shows how the USB11A interface adapter [2] is connected with the device [4] and with the PC [1] via the diagnostic socket [3]:



[1] PC

[2] USB11A with two connection cables (included in the scope of delivery)

[3] Diagnostic socket of the device

[4] Device (MOVIDRIVE® in the example)

Proceed as follows to connect the USB11A interface adapter with the PC and your device:

1. Connect the USB11A interface adapter [2] with the two connection cables provided.
2. Plug the RJ10 connector of the first connector cable into the diagnostics socket [3] of the device [4].
3. Plug the USB-**A** connector of the second connection cable into a free USB port on your PC [1].
4. If you are operating the interface adapter with MOVITOOLS® MotionStudio for the first time, you will have to install the required driver.

Installing the drivers

The drivers for the USB11A interface adapter are installed during installation of MOVITOOLS® MotionStudio.

Proceed as follows:

1. Make sure that you have local administrator rights on your PC/laptop.
2. Connect the USB11A interface adapter to a free USB port on your PC/laptop.
   ⇨ Your PC will detect the new hardware and launch the hardware wizard.

⇨ The interface adapter is ready for operation.

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Checking the COM port of the USB11A on the PC/laptop

Proceed as follows:

1. Select the following item from the Windows start menu on your PC/laptop: [Start] / [Settings] / [Control Panel] / [System].
2. Open the "Hardware" tab.
3. Click on the [Device manager] button.
4. Open the "Connections (COM and LPT)" folder.
   ⇨ The virtual COM port assigned to the interface adapter is displayed (e.g. "USB Serial Port (COM3)").
5. To avoid conflicts with another COM port, change the COM port of the USB11A interface adapter:

- Select the COM port of USB11A in the device manager.
- In the context menu, click the [Properties] command and assign the USB11A to another COM port.
- Restart your PC/laptop for the changes to become effective.

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11.4.3 Configuring the serial communication

Proceed as follows:

✓ There is a serial connection between your PC/laptop and the devices you want to configure via the USB11A interface adapter.

1. Click the icon [1] in the toolbar.

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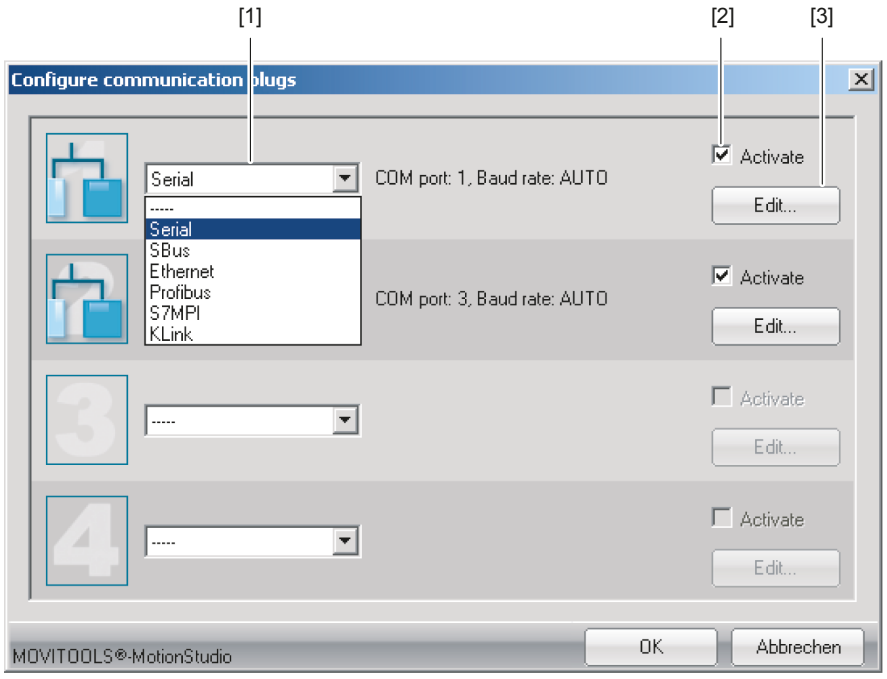
⇨ The following window is displayed.



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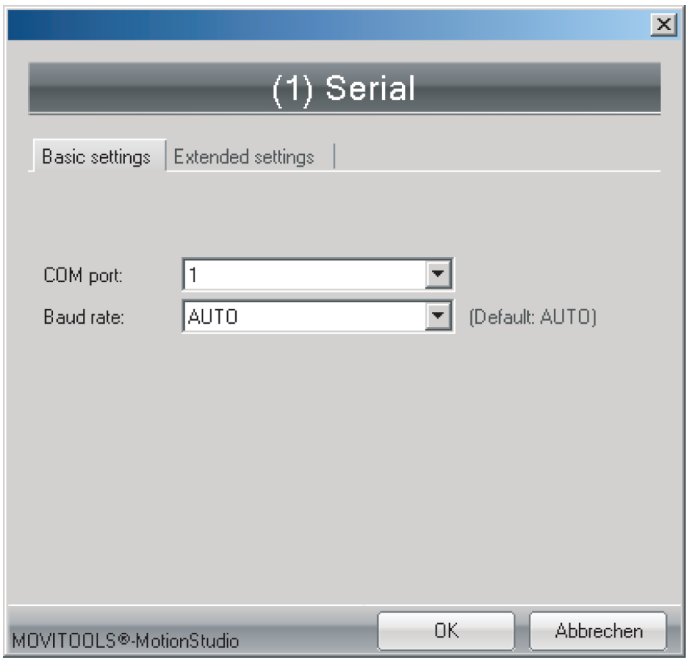
2. From the list [1], select "Serial" as the communication type.

⇨ In the example, "Serial" is activated as the communication type for the first communication channel [2].

3. Click the button [3].
   ⇨ This displays the settings for the communication type "Serial".



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4. It might be necessary to change the preset communication parameters on the tab pages "Basic settings" and "Extended settings". Refer to chapter Serial communication parameter (RS485) for a detailed description of the communication parameters.

11.4.4 Serial communication parameter (RS485)

The following table describes the "Basic setting" for the serial (RS485) communication channel:

Communication parameter	Description	Information
COM port	Serial port connected to the interface adapter.	• If there is no value entered here, the SEW Communication Server uses the first available port.
Baud rate	Transmission speed with which the connected PC communicates with the device in the network via the communication channel.	• Possible values: – 9.6 kBit/s – 57.6 kBit/s – AUTO (default setting) • Find the correct value for the connected device in the documentation. • If you set "AUTO", the devices are scanned with both baud rates in succession. • Set the starting value for automatic baud rate detection under [Settings] > [Options] > [Communication].

The following table describes the "Extended setting" for the serial (RS485) communication channel:

Communication parameter	Description	Information
Parameter telegrams	Telegram with a single parameter	Used to transfer a **single parameter** of a device.
Multi-byte telegrams	Telegram with several parameters	Used to transfer the **complete** parameter set of a device.
Timeout	Waiting time in ms that the master waits for a response from the slave after it has made a request.	• Default setting: – 100 ms (parameter telegram) – 350 ms (multi-byte telegram) • If not all devices are detected during a network scan or communication problems occur, increase the values as follows: – 300 ms (parameter telegram) – 1000 ms (multi-byte telegram)
Retries	Number of request retries after the timeout is exceeded	Default setting: 3

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11.5 Communication SBus (CAN) via interface adapter

11.5.1 Engineering via interface adapter (SBus)

Since your device supports the "SBus" communication option, you can use a suitable interface adapter for engineering.

The interface adapter is additional hardware that you can obtain from SEW-EURODRIVE. You can use it to connect your engineering PC with the respective communication option of the device.

The following table shows you the available types of interface adapters (option) and suitable devices:

Type of interface adapter (option)	Order no.	Scope of delivery	Devices
PC-CAN interface from SEW-EURODRIVE (including prefabricated connection cable with integrated terminating resistor)	18210597	• Prefabricated cable with 9-pin D-sub connector for connection to the device, length 2 m • A 120 ohm terminating resistor is fitted to one end of the prefabricated cable (between CAN_H and CAN_L).	• MOVIAXIS® • MOVIDRIVE® B • MOVITRAC® B • MOVI-PLC® (*basic* and *advanced*) • MOVITRANS® TPS and TES
PCAN-USB ISO from Peak	IPEH 002022	• Without connection cable • Without terminating resistor	

To connect the PC CAN interface to the device, you need an additional connection cable with terminating resistor. The scope of delivery of the PC CAN interface from SEW-EURODRIVE includes a prefabricated connection cable on the device with terminating resistor. Therefore, only this PC-CAN interface is described in the following chapter.

11.5.2 Starting up the USB-CAN interface

This section describes how to connect the PC-CAN interface from SEW-EURODRIVE to the SBus interface or your devices and what must be considered for this.

Overview

This section describes how to connect the PC-CAN interface from SEW-EURODRIVE to the SBus interface of your devices and what must be considered for this.

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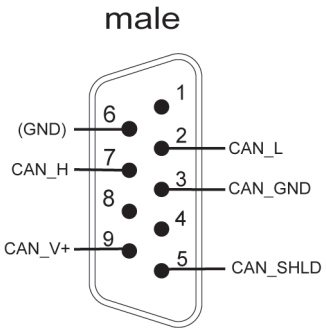
CAN pin assignment

The following figure shows the pin assignment of the 9-pin D-sub connector of the PC-CAN interface from SEW-EURODRIVE (view from top):



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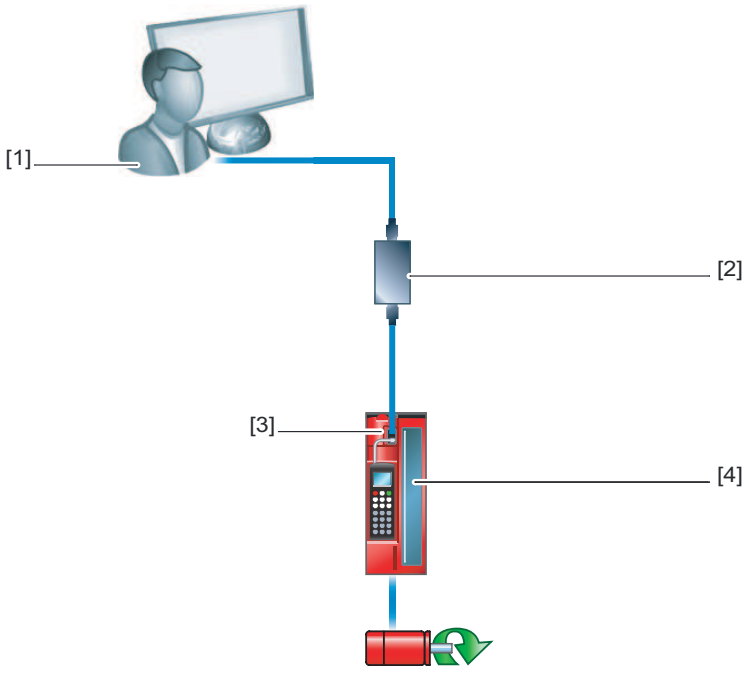
Connecting the USB-CAN interface to the device

INFORMATION

Faulty data transmission

- Use only shielded cables suitable (approved) for CAN networks.

The figure shows how the USB-CAN interface adapter [2] from SEW-EURODRIVE is connected with the device [4] and the PC [1] via the SBus interface [3], in this example the device is a MOVIDRIVE®:



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[1] PC
[2] USB-CAN interface with prefabricated connection cable with terminating resistor (included in the delivery)
[3] SBus interface of the device (terminal X30 on DFC11B)
[4] Device (MOVIDRIVE® with connection option DFC11B in this example)

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Proceed as follows to connect the USB-CAN interface with the PC and your device:

1. Connect the 9-pin D-sub connector of the USB-CAN interface with the prefabricated connection cable. Make sure that the cable end with the terminating resistor leads to the USB-CAN interface.
2. If the device is operated within a CAN network, connect the terminating resistor at the last device.

   Connect the second cable end (without terminating resistor) with the SBus interface [3] of the device [4].

   - If MOVIDRIVE® is equipped with the DFC11B connection option, you can connect the D-sub plug of the prefabricated cable directly with terminal X30.
   - Without the connection option, connect the cores of the prefabricated cable to the X12 terminal of MOVIDRIVE® as follows:

Signal	Terminal on MOVIDRIVE®	CAN pin assignment (9-pin D-sub connector)	Core (Deviations are possible)
CAN_H	X12:2	PIN 7	Brown
CAN_L	X12:3	PIN 2	White
CAN_GND	X12:1	PIN 3	Shield

3. Plug the USB-**A** connector of the USB cable into a free USB port on your PC [1].

Signal	Terminal on MOVIDRIVE®	CAN pin assignment (9-pin D-sub connector)	Core (Deviations are possible)
CAN_H	X12:2	PIN 7	Brown
CAN_L	X12:3	PIN 2	White
CAN_GND	X12:1	PIN 3	Shield

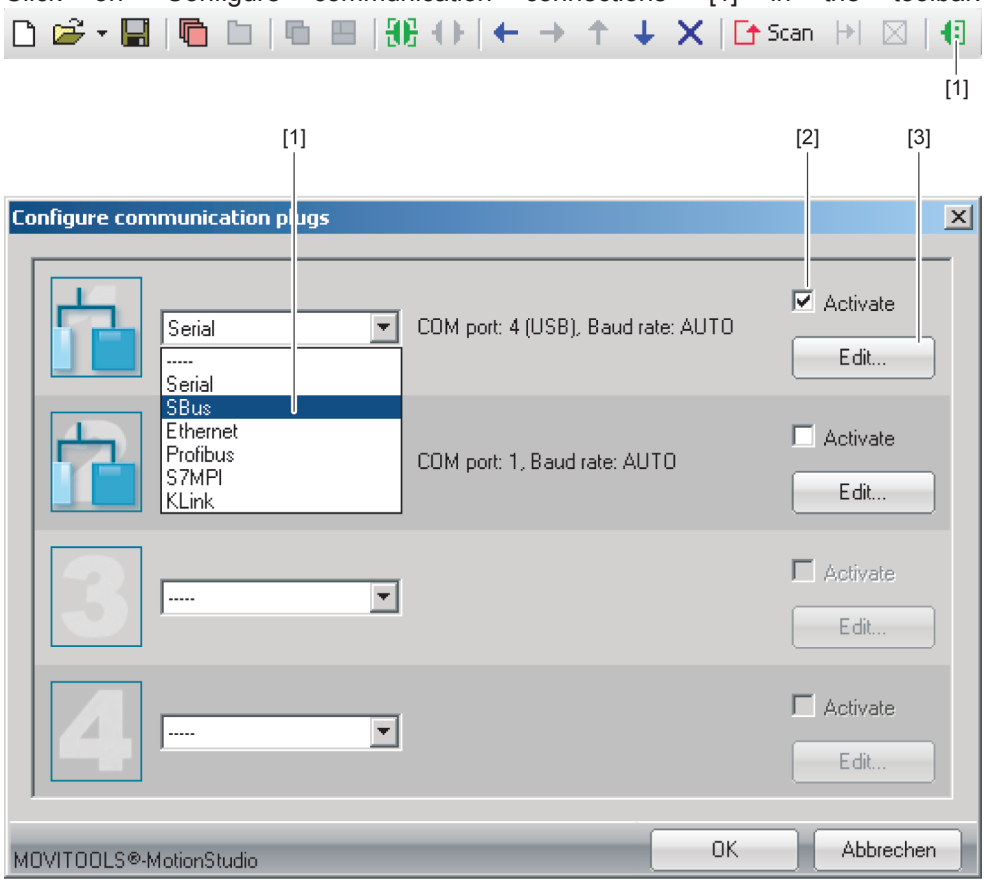
For detailed information about the startup of a USB-CAN interface in connection with MOVIAXIS®, refer to the "MOVIAXIS® MX Multi-Axis Servo Inverter" operating instructions.

11.5.3 Configuring the SBus communication

You need an SBus connection between your PC and the devices you want to configure. You can use a USB-CAN interface for this purpose.

Proceed as follows to configure an SBus connection:

1. Click on "Configure communication connections" [1] in the toolbar.



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11.5.4 Communication parameters for SBus

The following table describes the [Basic setting] for the SBus communication channel:

Communication parameter	Description	Information
Baud rate	Transmission speed with which the connected PC communicates with the device in the network via the communication channel	• Adjustable values (permitted total cable length): – 125 kBaud (500 m) – 250 kBaud (250 m) – 500 kBaud (100 m) (Default setting) – 1 Mbaud (25 m) • All connected devices must support the same baud rate

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The following table describes the [Advanced setting] for the SBus communication channel:

Communication parameter	Description	Information
Parameter telegrams	Telegram with a single parameter	Used to transfer a **single parameter** of a device
Multi-byte telegrams	Telegram with several parameters	Used to transfer the **complete** parameter set of a device
Timeout	Waiting time in [ms] that the master waits for a response from the slave after it has made a request	• Default setting: – 100 ms (parameter telegram) – 350 ms (multi-byte telegram) • Increase the value if not all devices are detected during a network scan
Repetitions	Number of request retries after the timeout is exceeded	Default setting: 3

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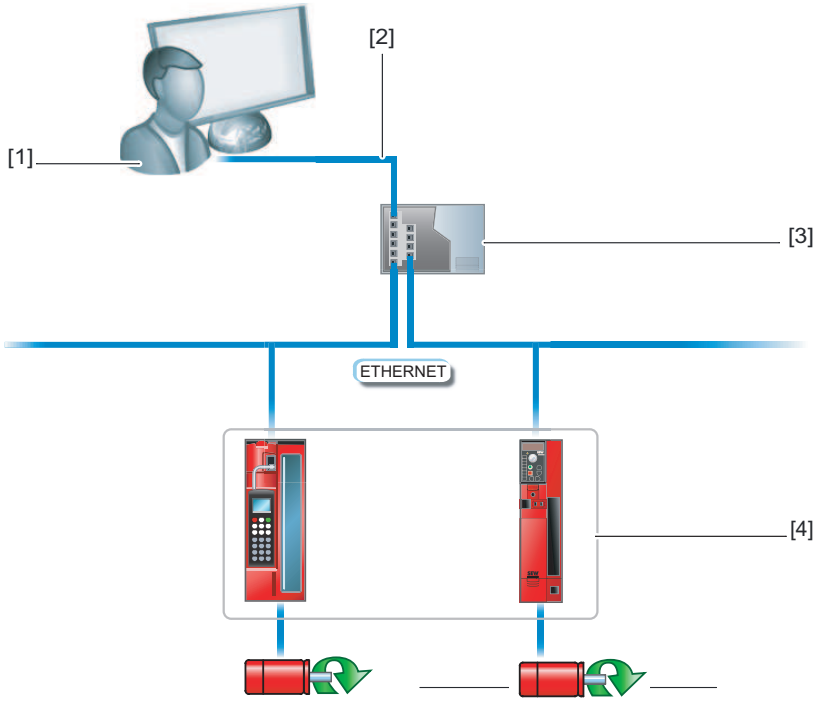
11.6 Communication via Ethernet

11.6.1 Connecting the device with the PC via Ethernet

The following figure shows the network with direct communication using Ethernet:



1193501835

[1] Engineering PC with Ethernet interface
[2] Ethernet connection
[3] Switch
[4] Devices (examples) with Ethernet interfaces

Parameter requests from the MOVITOOLS® MotionStudio engineering software are transferred to a switch [3] via Ethernet [2] from an engineering PC [1] using the Ethernet interface. The switch [3] then directly passes on the parameter requests to the Ethernet interface of the devices [4].

11.6.2 Establishing communication with the Address Editor

Address Editor is a free software tool from SEW-EURODRIVE. It is available once the MOVITOOLS® MotionStudio engineering software is installed. However, it is used separately.

The Address Editor allows to find all SEW-EURODRIVE devices connected at the local network segment (subnetwork) and to parameterize the network settings.

INFORMATION

The Address Editor only finds SEW-EURODRIVE devices. The devices have to be connected to the network via the Ethernet fieldbus interface.

In contrast to MOVITOOLS® MotionStudio, you do **not** need to set the IP address of the engineering PC to the local network segment.

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Perform the following process steps to add additional Ethernet nodes to an existing network:

1. "Starting the Address Editor" (→ 🗎 127)
2. "Searching Ethernet nodes" (→ 🗎 127)
3. "Adjusting the IP address of the Ethernet nodes" (→ 🗎 128)
4. Optional: "Setting the engineering PC appropriately for the network" (→ 🗎 130)

Overview

Address Editor is a free software tool from SEW-EURODRIVE. It is available once the MOVITOOLS® MotionStudio software package is installed. However, it is used separately.

You can use Address Editor to establish communication with your devices via Ethernet and to address the devices.

If you connect the Ethernet interface of your engineering PC to the Ethernet using a patch cable, Address Editor detects all Ethernet stations in the connected network segment (local subnetwork).

In contrast to MOVITOOLS® MotionStudio, you do **not** need to set the IP address of the engineering PC to the local subnetwork.

Perform the following process steps to add additional Ethernet nodes to an existing network:

1. "Starting the Address Editor" (→ 🗎 127)
2. "Searching Ethernet nodes" (→ 🗎 127)
3. Once you have found the added Ethernet nodes, you have two options:
   - ⇨ "Adjusting the IP address of the Ethernet nodes" (→ 🗎 128)
   - ⇨ "Setting the engineering PC appropriately for the network" (→ 🗎 130)

Starting the Address Editor

You can use the Address Editor immediately after installing the MOVITOOLS® MotionStudio engineering software.

Proceed as follows:

1. Close MOVITOOLS® MotionStudio.
2. Select the following item from the Windows start menu: [Start] / [Programs] / [SEW] / [MOVITOOLS MotionStudio] / [Address Editor]

Searching Ethernet nodes

You can use the Address Editor to find Ethernet nodes in a network. It can also be used for detecting new Ethernet nodes. The Address Editor also helps you locate the detected Ethernet nodes.

Proceed as follows:

1. Start the Address Editor.
2. Select "Ethernet" as the interface for engineering PC and device. To do so, activate the appropriate radio button.
3. Click [Next] to continue.

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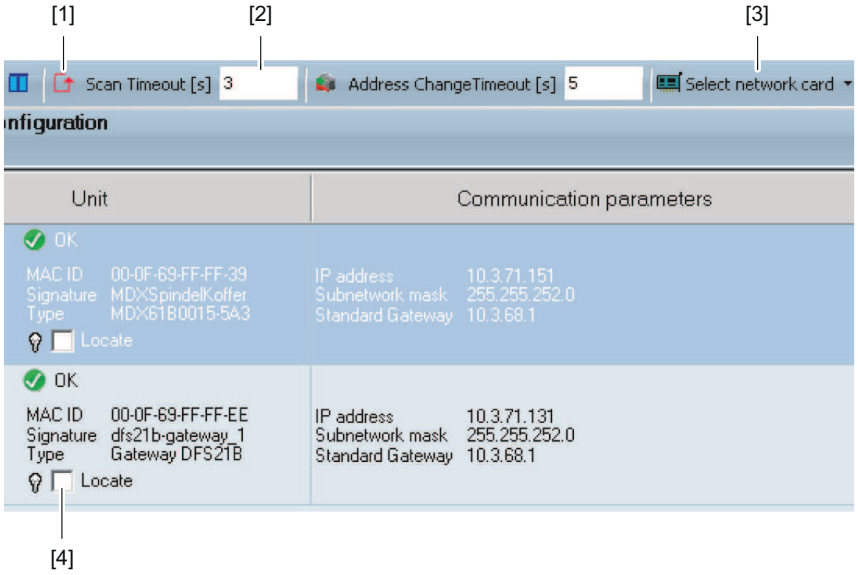
4. Wait until the network scan starts **automatically**. The default setting for the waiting time is 3 s (edit box [2]).



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⇨ The current addresses of all Ethernet nodes in the connected network will be displayed.

5. If no devices are detected during the network scan, check the wiring or if you have installed (activated) several network cards in your engineering PC.
6. Proceed as follows to search the devices with a specific network card:

- Select the required card. To do so, click the icon [3] in the toolbar.
- Start the network scan **manually**. To do so, click the icon [1] in the toolbar.

7. Activate the check box [4] to localize an Ethernet node.

⇨ The "link/act "LED of the first Ethernet interface of the respective Ethernet node will flash green.

Adjusting the IP address of the Ethernet nodes

Proceed as follows:

1. Start the Address Editor and scan the network.
2. Double-click in the area behind the setting [1] of the Ethernet node you want to change. You can change the following settings:

- IP address
- Subnet mask
- Standard gateway
- DHCP startup configuration (if supported by the device)

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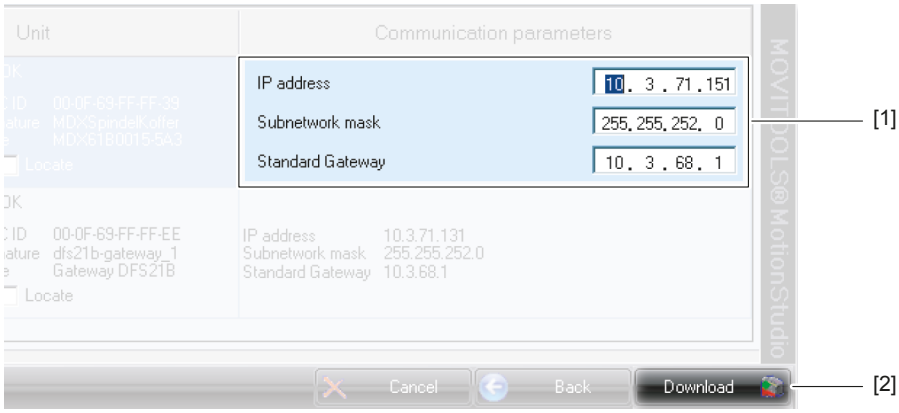

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3. Press the enter key to confirm your changes.
4. To transfer the address changes to the Ethernet node, click button [2].
5. For the changed settings to become effective, switch off the device and restart it afterwards.

Setting the engineering PC appropriately for the network

Proceed as follows:

1. Select the network settings in the Windows control panel.
2. Select the Internet protocol version 4 "TCP/IPv4" in the adapter properties.
3. Enter the IP address parameters of the engineering PC in the Internet protocol properties:

- For the subnet mask and standard gateway, enter the same IP address parameters that are used for the other network stations in this local network.
- Enter the IP address of the engineering PC depending on the subnet mask. 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 for all network stations must be identical and the station address must be different for all network stations.

  Example: On delivery, all SEW-EURODRIVE devices have the following IP address parameters: Standard IP address "192.168.10.4", subnet mask "255.255.255.0". In this case, the engineering PC must not have the values "0", "4", "127" or "255" in the last address block of the IP address.

4. Confirm with [OK].
5. Click [OK] again to close the window.

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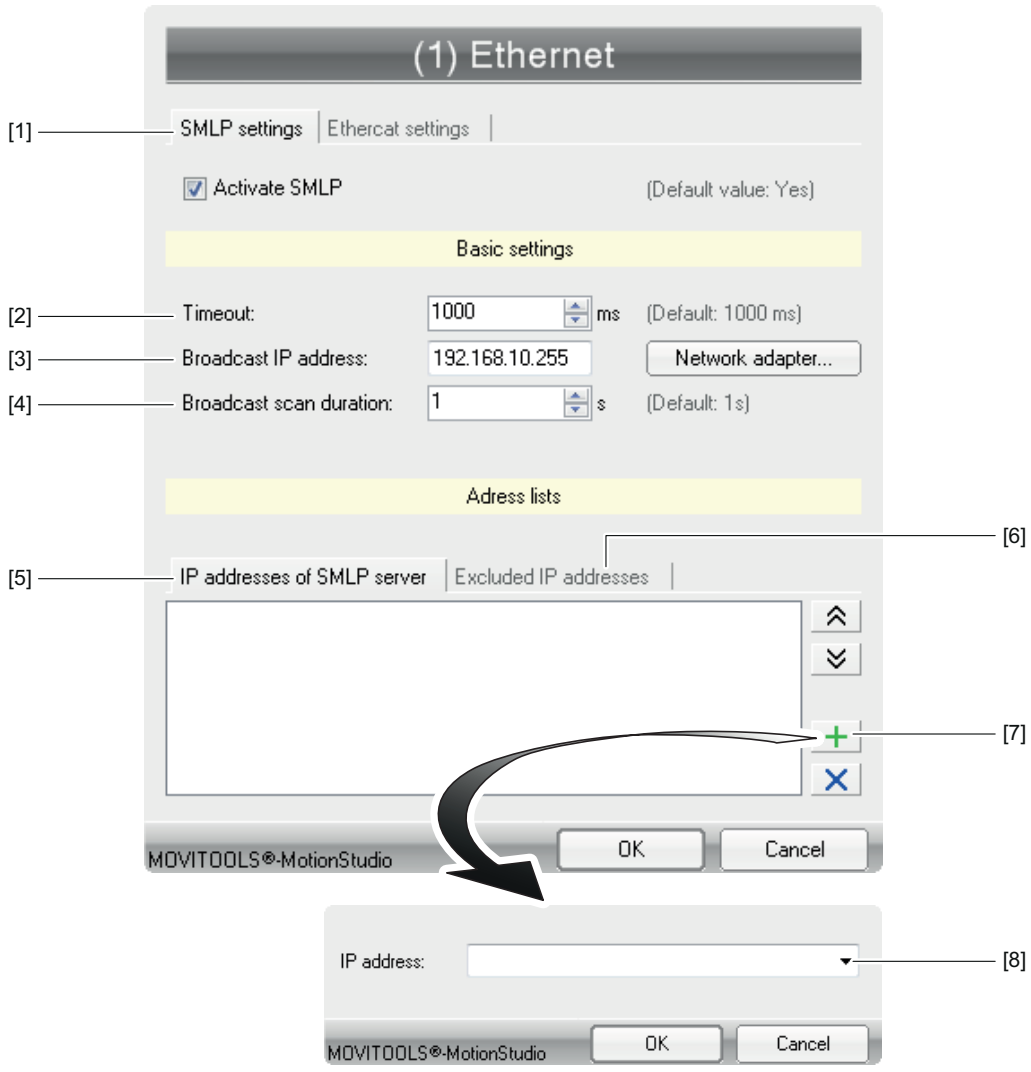
11.6.3 Configuring the communication channel via Ethernet

The devices use the device protocol from SEW-EURODRIVE **SMLP** (**S**imple **M**OVI**L**INK® **P**rotocol) that is directly transferred via TCP/IP.

Proceed as follows:

1. Establish the communication channel via Ethernet (→ 🗎 111).
2. Set the SMLP protocol parameters in the following window in the "SMLP settings" tab [1] (→ 🗎 132).



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[1] "SMLP settings" tab
[2] Timeout
[3] Broadcast IP address
[4] Broadcast scan duration
[5] "IP addresses of SMLP server" tab
[6] "Excluded IP addresses" tab
[7] Add IP address
[8] IP address edit box

Ethernet parameters for SMLP

The following table shows the communication parameters for SMLP:

No.	Ethernet parameter	Description	Information
[2]	Timeout	Waiting time in ms that the client waits for a reply from the server after it has made a request.	• Default setting: 1000 ms • If a delay of the communication causes failure, increase the value.
[3]	Broadcast IP address	IP address of the local network segment **within** which the device scan is carried out.	In the default setting, the device scan only retrieves devices in the local network segment.
[4]	IP address SMLP server	IP address of the SMLP server or of other devices that are to be included in the device scan but are **outside** the local network segment.	• Enter the IP address of devices that are to be included in the device scan but are **outside** the local network segment. • If you are operating an indirect communication from Ethernet to PROFIBUS, enter the IP address of the controller.
[6]	Excluded IP address	IP addresses of devices that should **not** be included in the device scan.	Enter the IP address of devices that should **not** be included in the device scan. This can be devices that are not ready for communication (e.g. because they have not been started up yet).

Adding devices to the local network segment

During a device scan, the system recognizes only devices that are in the same local network segment as the engineering PC. If you have devices that are outside the local network segment, add the IP addresses of these devices to the list of SMLP servers.

Proceed as follows:

1. Open the "SMLP settings" tab [1] (→ 🗎 131).
2. Select the address list of the SMLP server.
3. Open the "IP address of SMLP server" tab [5] (→ 🗎 131).
4. To enter the IP address, click on the plus symbol [7].
5. Enter the IP address in the edit box [8]. Click [OK].

11.6.4 Adding devices to the local network segment

During a device scan, the system recognizes only devices that are in the same local network segment as the engineering PC. If you have devices that are outside the local network segment, add the IP addresses of these devices to the list of SMLP servers.

Proceed as follows:

1. Open the "SMLP settings" tab [1] (→ 🗎 131).

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2. Select the address list of the SMLP server.
3. Open the "IP address of SMLP server" tab [5] (→ 🗎 131).
4. To enter the IP address, click on the plus symbol [7].
5. Enter the IP address in the edit box [8]. Click [OK].

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11.6.5 Ethernet parameters for SMLP

The following table shows the communication parameters for SMLP:

No.	Ethernet parameter	Description	Information
[2]	Timeout	Waiting time in ms that the client waits for a reply from the server after it has made a request.	• Default setting: 1000 ms • If a delay of the communication causes failure, increase the value.
[3]	Broadcast IP address	IP address of the local network segment **within** which the device scan is carried out.	In the default setting, the device scan only retrieves devices in the local network segment.
[4]	IP address SMLP server	IP address of the SMLP server or of other devices that are to be included in the device scan but are **outside** the local network segment.	• Enter the IP address of devices that are to be included in the device scan but are **outside** the local network segment. • If you are operating an indirect communication from Ethernet to PROFIBUS, enter the IP address of the controller.
[6]	Excluded IP address	IP addresses of devices that should **not** be included in the device scan.	Enter the IP address of devices that should **not** be included in the device scan. This can be devices that are not ready for communication (e.g. because they have not been started up yet).

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11.6.6 Communication ports used

The following table shows the communication ports that are used by the MOVITOOLS® MotionStudio engineering software:

Application	Number of the communication port	Description
ETH server	300 (TCP/UDP)	For the services of the SMLP and for using a PC as Ethernet gateway.
SEW Communication Server	301 (TCP)	For communication between MOVITOOLS® MotionStudio and the SEW Communication Server.
Offline data server	302 (TCP)	For communication of MOVITOOLS® MotionStudio in offline mode.
MOVIVISION® server	303 (TCP)	For communication with a PC with active MOVIVISION® server
Reserved	304	–
TCI server	305 (TCP)	For communication via TCI (**T**ool **C**alling **I**nterface by Siemens)
EcEngineeringServer-RemoteControl	306 (UDP)	For direct communication (without master) with the slaves
EcEngineeringServer mailbox gateway	307 (UDP)	For direct communication (without master) with the slaves and for communication via a mailbox gateway
MOVI-PLC® visualization	308 (TCP/UDP)	For communication between MOVI-PLC® and the 3D simulation of MOVITOOLS® MotionStudio

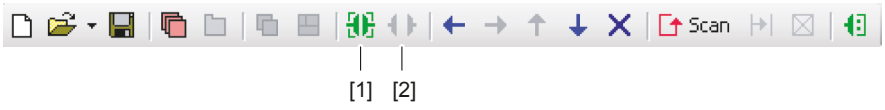
11.7 Executing functions with the devices

11.7.1 Reading or changing device parameters

Proceed as follows:

1. Switch to the required view (project view or network view).
2. Select the connection mode:

- If you want to read/change parameters directly on the **device**, switch to online mode by using the icon [1].
- If you want to read/change parameters in the **project**, switch to offline mode by using the icon [2].



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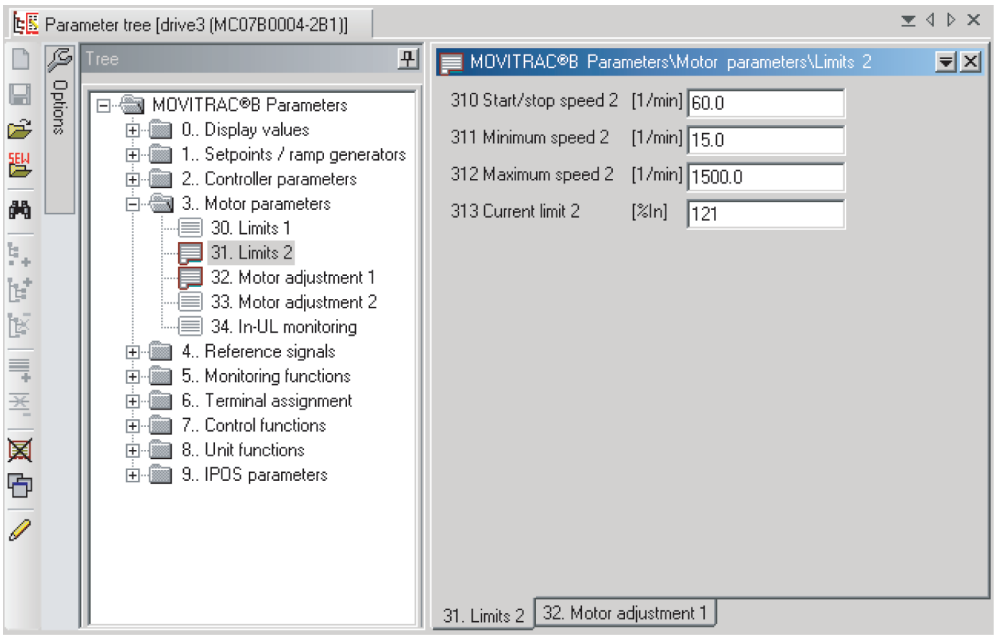
3. Select the device you want to parameterize.

4. Choose the command [Startup] > [Parameter tree] from the context menu.
   ⇨ This opens the "Parameter tree" view on the right section of the screen.
5. Expand the parameter tree to the node you require.



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6. To display a specific group of device parameters, double-click on the group.
7. Press the enter key to finalize any changes you make to numerical values in the input fields.

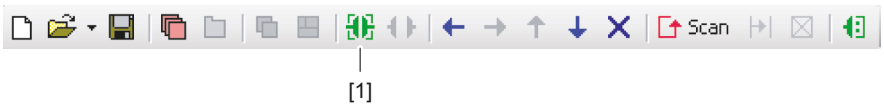
INFORMATION

For detailed information about the device parameters, refer to the parameter list for the device.

11.7.2 Starting up devices (online)

Proceed as follows:

1. Switch to the network view.
2. Switch to online mode by using the icon [1].



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3. Select the device you want to startup.
4. Choose the command [Startup] > [Startup] from the context menu.
   ⇨ The startup assistant is displayed.
5. Follow the instructions of the startup wizard and then load the startup data into your device.

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12 Fault diagnostics

12.1 General information

The diagnostics procedures described in the following section demonstrate the fault analysis methods for the most frequent problems:

- Inverter does not work on PROFINET IO
- Inverter cannot be controlled using the PROFINET IO controller

For more information dealing specifically with the inverter parameterization for various fieldbus applications, refer to the "MOVIDRIVE® MDX60B/61B Communication and Fieldbus Device Profile" manual.

12.2 Fault list – PROFIsafe DFS21B option

Fault code	Designation	Response	Cause	Measure
00	No fault	–	–	–
01	Internal sequence error	• F-DOx = 0 (switch off failsafe outputs) • F-DIx = 0 (→ safe state) • Passivation of DFS21B	Fault in safety electronics, e.g. due to non-EMC-compliant installation.	• Check the installation (EMC) • Switch the 24 V voltage off and on again • Reintegration of DFS21B • If the fault occurs again, contact SEW service.
02	Internal System error			
03	Communication fault		PROFIsafe communication interrupted.	• Check the project planning (e.g. PROFIsafe monitoring time) • Reintegration of DFS21B
04	Electronics supply fault		Electronics supply is outside the specified limits.	• Check the installation (EMC) • Switch the 24 V voltage off and on again • Reintegration of DFS21B • If the fault occurs again, contact SEW service.

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Fault code	Designation	Response	Cause	Measure
50	Internal fault at failsafe output (F-DOx)	• F-DOx = 0 (switch off failsafe outputs) • Passivation of DFS21B	Fault in safety electronics, e.g. due to non-EMC-compliant installation.	• Check the installation (EMC) • Switch the 24 V voltage off and on again • Reintegration of DFS21B • If the fault occurs again, contact SEW service.
51	Short circuit at safe output (F-DOx)		• Short circuit in 24 V supply voltage or reference potential • Short circuit between F-DOx_P and F-DOx_M	• Check the installation/ cabling and repair the short circuit • Reintegration of DFS21B
52	Overload at safe output (F-DOx)		Overload at F-DOx (excessive current)	• Check installation/wiring and eliminate overload • Reintegration of DFS21B
111	Internal communication error	• F-DOx = 0 (switch off failsafe outputs) • F-DIx = 0 (→ safe state) • Passivation of DFS21B	Fault in safety electronics, e.g. due to non-EMC-compliant installation.	• Check the installation (EMC) • Switch the 24 V voltage off and on again • Reintegration of DFS21B • If the fault occurs again, contact SEW service.
127	Initialization error	• F-DOx = 0 (switch off failsafe outputs) • F-DIx = 0 (→ safe state) • Passivation of DFS21B	• F_Dest_Add is set to zero • The DFS21B option is not compatible with the desired (configured) safety functions	• Use MOVITOOLS® MotionStudio to set F_Dest_Add to configured value • Contact SEW Service

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12.3 Fault list – PROFIsafe DFS21B option in gateway operation

Fault code	Designation	Response	Cause	Measure
25	Eeprom	SBus communication stopped	Error while accessing EEPROM	Activate factory settings, perform reset and set parameters for DFS21B again. Contact SEW service if the error occurs again.
28	Fieldbus timeout	Default: PO data = 0 Error response adjustable via P831	No communication between master and slave within the projected response monitoring.	• Check master communication routine. • Extend the fieldbus timeout interval (response monitoring) in the master configuration or deactivate monitoring
37	Watchdog error	SBus communication stopped	Error while executing the system software.	Contact SEW Service.
45	Initialization error	SBus communication stopped	Error after self-test during reset	Perform a reset. Consult SEW Service if the error occurs again.
111	Device Timeout system error	None	Check the red system error H1 LED of the DFS21B. If the H1 LED is not lit, one or more stations on the SBus could not be addressed within the timeout interval. If the H1 LED flashes, the DFS21B itself is in fault state. In this case, error F111 was only reported to the controller via fieldbus.	Check voltage supply, SBus cabling and Bus terminating resistors. Check the project planning if the DFS21B was configured with the PC. Switch the DFS21B off and on again. If the error is still present, query the error via diagnostic interface and perform the action described in this table.

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13 Technical data

13.1 DFS21B for MOVIDRIVE® MDX61B, MOVITRAC® B and UOH11B gateway

DFS21B option	
Part number	18211836
Power consumption	P = 3 W
Voltage supply (Only for gateway operation)	U = DC 24 V (–15%, +20%) I_{max} = DC 200 mA P_{max} = 3.4 W
Application protocols	• **PROFINET IO** (Ethernet frames with frame identification 8892_{hex}) to control and set parameters for the drive inverter. • **HTTP** (Hypertext Transfer Protocol) for diagnostics using a web browser. • **SMLP** (Simple Movilink Protocol), protocol used by MOVITOOLS®.
Port numbers used	• 300 (SMLP) • 80 (HTTP)
Ethernet services	• ARP • ICMP (ping)
ISO / OSI layer 2	Ethernet II
Baud rate	100 Mbaud in full duplex mode
Connection technology	RJ45
Addressing	4 byte IP address or MAC-ID (00:0F:69:xx:xx:xx)
Manufacturer ID (Vendor ID)	$010A_{hex}$
Tools for startup	• MOVITOOLS® MotionStudio version 5.40 and higher • DBG60B keypad
Firmware status of MOVIDRIVE® MDX61B	Firmware version 824 854 0.17 or higher (display with P076)

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13.2 Safety characteristic values DFS21B fieldbus interface

	Characteristic values to EN ISO 13849-1
Classification/underlying standards	PL e
System structure	Dual-channel, with diagnostics
Probability of dangerous failure per hour (PFHd value)	$< 1 \times 10^{-9}$ 1/h
Mission time / service life	20 years, after which the component must be replaced with a new one.
Repair time (MTTR)	100 hours
Safe state	Value "0" for all safety-related F-DO process values (output disabled)
Safety function	• Safe digital outputs • PROFIsafe communication

13.3 Safe output F-DO of DFS21B

Safe output F-DO	
Sourcing/sinking (from load voltage supply)	DC 24 V output according to EN 61131-2, protected against short circuits and overloads
Rated current	1 A
Leakage current (for "0" signal)	Typically -2 mA (with 2 V / 1 kΩ load resistance) (Note: Current flows from F-DO_M to F-DO_P)
Internal voltage drop (P and M output)	Max. 3 V
Short-circuit protection	Electronic, response value: 2.8 A – 9 A
Overload protection	Trigger value: 1.4 A – 1.6 A
Load resistance range	24 kΩ – 1 kΩ
Voltage limitation when switching off inductive loads	Typically -70 V
Response time (command via PROFIsafe → the output switches)	≤ 25 ms
Maximum line length	30 m

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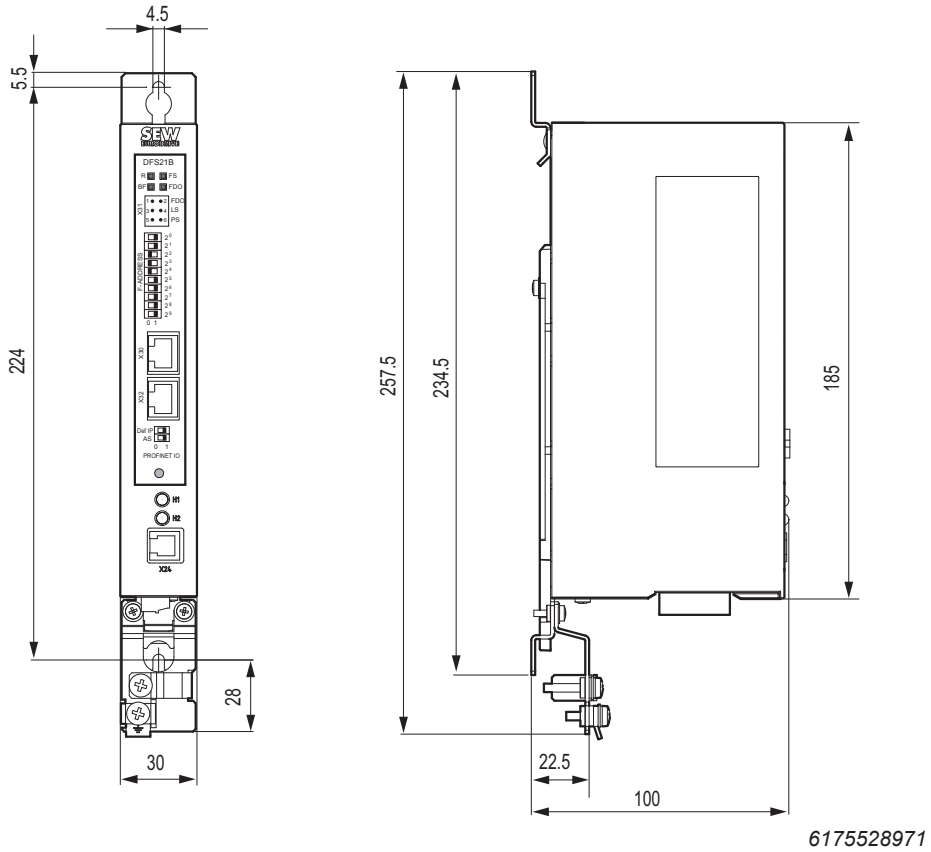
13.4 STO input at MOVIDRIVE® MDX61B

	Min.	Typical	Max.
Input voltage range	DC 19.2 V	DC 24 V	DC 30 V
Time to inhibit output stage			100 ms
Time for restart		200 ms	

13.5 STO input at MOVITRAC® B

	Min.	Typical	Max.
Input voltage range	DC 19.2 V	DC 24 V	DC 30 V
Time to inhibit output stage			BG0 = 20 ms BG1 – 5 = 100 ms
Time for restart		200 ms	

13.6 Dimension drawing of DFS21B in UOH11B gateway housing



All dimensions in mm.

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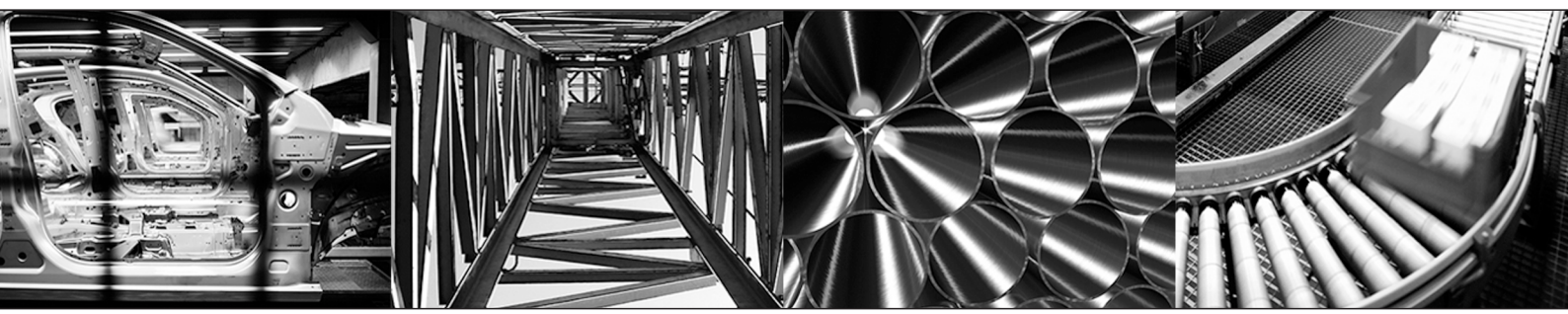

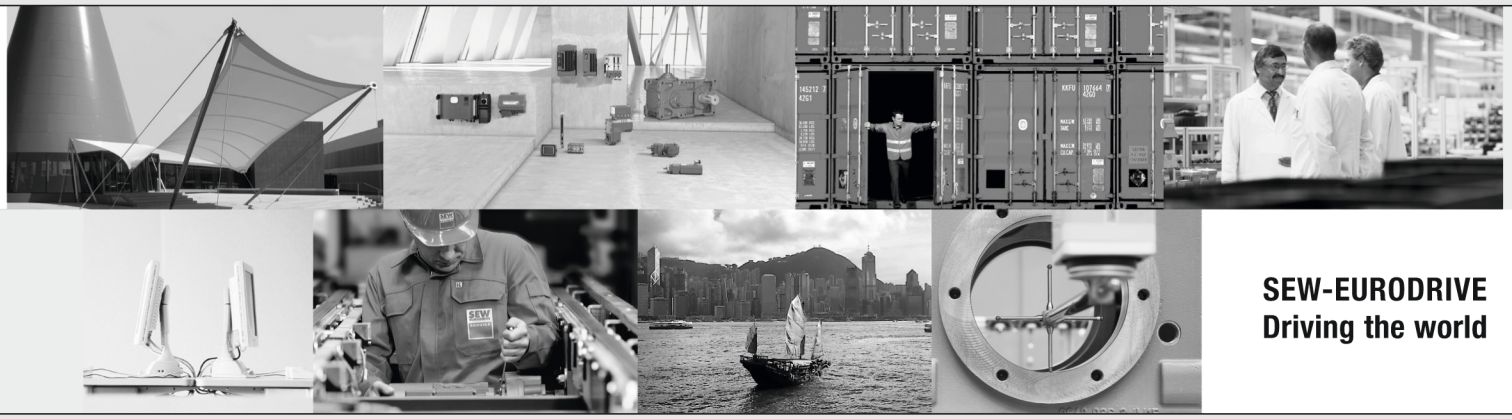

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