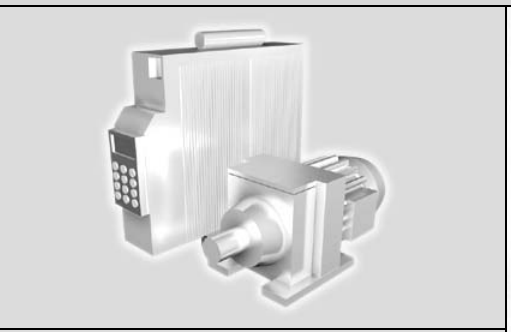
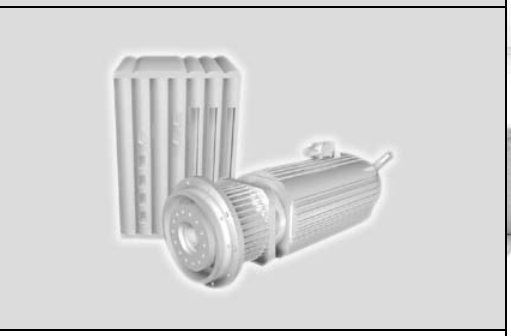
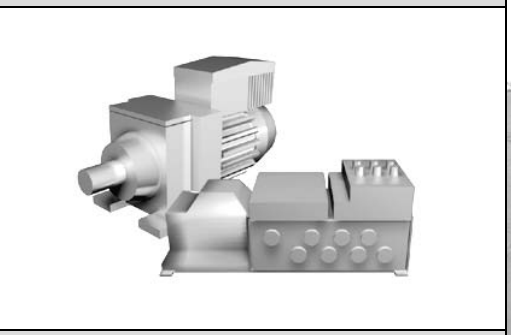
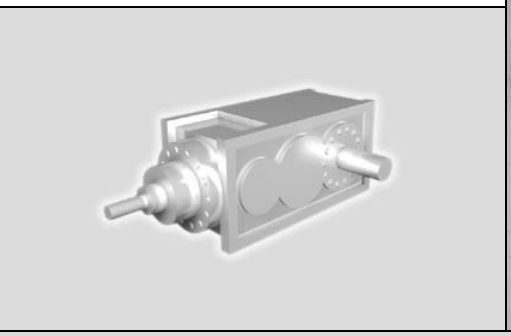
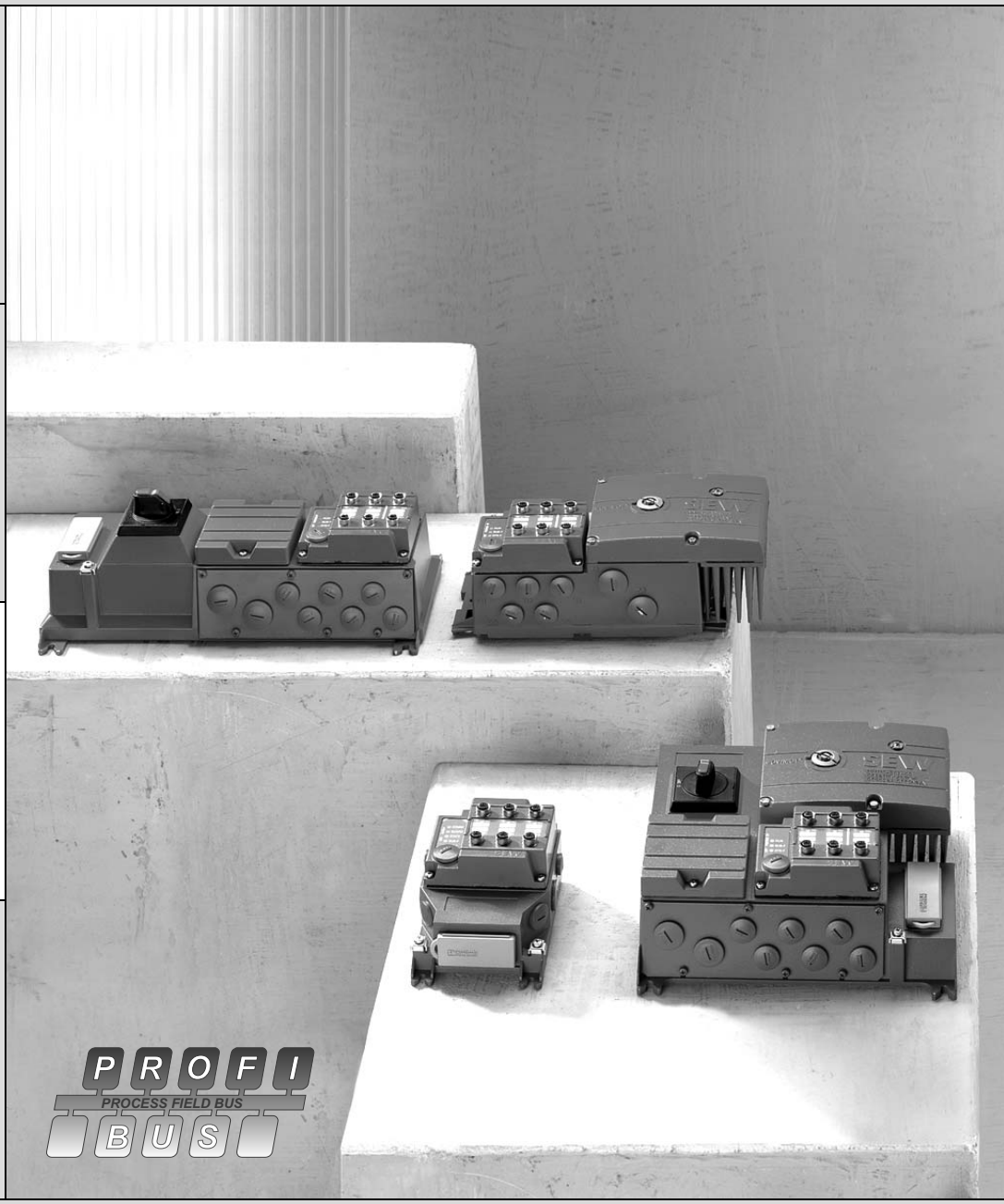
SEW EURODRIVE











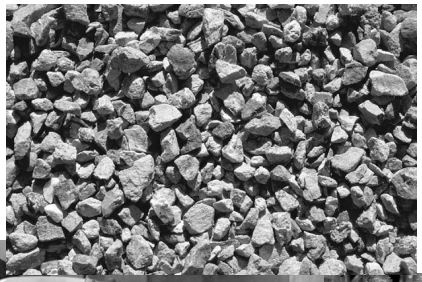
Drive System for Decentralized Installation PROFIBUS Interfaces, Field Distributors

FC240000

Edition 07/2006

11401419 / EN

Manual



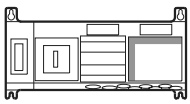
SEW
EURODRIVE

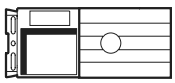
1 Applicable Components

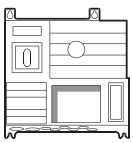
This manual applies to the following products:

Connection module ..Z.1. with fieldbus interface			
	**4 x I / 2 x O (terminals)** 	**4 x I / 2 x O (M12)** 	**6 x I (M12)** 
PROFIBUS	MFP 21D / Z21D	MFP 22D / Z21D	MFP 32D / Z21D
PROFIBUS with integrated minicontroller	MQP 21D / Z21D	MQP 22D / Z21D	MQP 32D / Z21D

Field distributor ..Z.3. with fieldbus interface			
	**No I/Os** 	**4 x I / 2 x O (M12)** 	**6 x I (M12)** 
PROFIBUS	MFP 21D / Z23D	MFP 22D / Z23D	MFP 32D / Z23D
PROFIBUS with integrated minicontroller	MQP 21D / Z23D	MQP 22D / Z23D	MQP 32D / Z23D

Field distributor ..Z.6. with fieldbus interface			
	**4 x I / 2 x O (terminals)** 	**4 x I / 2 x O (M12)** 	**6 x I (M12)** 
PROFIBUS	MFP 21D / Z26F / AF.	MFP 22D / Z26F / AF.	MFP 32D / Z26F / AF.
PROFIBUS with integrated minicontroller	MQP 21D / Z26F / AF.	MQP 22D / Z26F / AF.	MQP 32D / Z26F / AF.

Field distributor ..Z.7. with fieldbus interface			
	**4 x I / 2 x O (terminals)** 	**4 x I / 2 x O (M12)** 	**6 x I (M12)** 
PROFIBUS	MFP21D/MM../Z27F.	MFP22D/MM../Z27F.	MFP32D/MM../Z27F.
PROFIBUS with integrated minicontroller	MQP21D/MM../Z27F.	MQP22D/MM../Z27F.	MQP32D/MM../Z27F.

Field distributor ..Z.8. with fieldbus interface			
	**4 x I / 2 x O (terminals)** 	**4 x I / 2 x O (M12)** 	**6 x I (M12)** 
PROFIBUS	MFP21D/MM../Z28F./AF.	MFP22D/MM../Z28F./AF.	MFP32D/MM../Z28F./AF.
PROFIBUS with integrated minicontroller	MQP21D/MM../Z28F./AF.	MQP22D/MM../Z28F./AF.	MQP32D/MM../Z28F./AF.

2 Important Notes

Safety and warning instructions

Always observe the safety and warning information in this documentation.

Electrical hazard
Possible consequences: Severe or fatal injuries.

Hazard
Possible consequences: Severe or fatal injuries.

Hazardous situation
Possible consequences: Slight or minor injuries.

Harmful situation
Possible consequences: Damage to the unit and the environment.

Tips and useful information.

Other applicable documentation

- "MOVIMOT® MM..C" operating instructions
- "DR/DV/DT/DTE/DVE AC Motors, CT/CV Asynchronous Servomotors" operating instructions
- "IPOS$^{plus®}$ Positioning and Sequence Control" manual
- **When operating MOVIMOT® units or field distributors in safety applications, observe the complementary publications "Safe Disconnection for MOVIMOT® – Conditions" and "Safe Disconnection for MOVIMOT® – Applications." Use only those components in safety applications that were explicitly designed and delivered for this purpose by SEW-EURODRIVE.**

Designated use

- These MOVIMOT® drives are intended for industrial systems. The drives comply with the applicable standards and regulations and meet the requirements of the Low Voltage Directive 73/23/EEC.
- The use of MOVIMOT® units for hoist applications is limited.
- Technical data and information on approved conditions on site can be found on the nameplate and in this manual.
- You must comply with this information!
- Do not start up the unit (take it into operation in the designated fashion) until you have established that the machine complies with the EMC Directive 89/336/EEC and that the conformity of the end product has been determined in accordance with the Machinery Directive 98/37/EC (with reference to EN 60204).

Operational environment

The following uses are prohibited unless the unit has been designed expressly for this purpose:

- Use in explosion-proof areas.
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.
- Use in non-stationary applications that are subject to mechanical vibration and shock loads in excess of the requirements in EN 50178.
- Use in applications in which the MOVIMOT® inverter undertakes independent safety functions (without master safety systems) to ensure the safety of machines and personnel.

Disposal

This product consists of:

- Iron
- Aluminum
- Copper
- Plastics
- Electronic components

Dispose of all components in accordance with applicable regulations!

3 Safety Notes

3.1 Safety notes for MOVIMOT® drives

- Never install damaged products or take them into operation. Submit a complaint to the shipping company immediately in the event of damage.

- Only specialists with the appropriate accident prevention training are allowed to perform installation, startup and service work. These specialist must also comply with the regulations in force (e.g. EN 60204, VBG 4, DIN-VDE 0100/0113/0160) when performing this work.

- Preventive measures and protection devices must meet the regulations in force (e.g. EN 60204 or EN 50178).

  Required preventive measures: Grounding of the MOVIMOT® and field distributor.

- The unit meets all requirements for safe isolation of power and electronic connections in accordance with EN 50178. All connected circuits must also satisfy the requirements for safe disconnection.

- Before removing the MOVIMOT® inverter, it must be disconnected from the power supply system. Dangerous voltages may still be present for up to one minute after disconnection from the power supply.

- As soon as supply voltage is present at the MOVIMOT® unit or field distributor, close the terminal box or field distributor and install the MOVIMOT® inverter.

- The fact that the status LED and other display elements are no longer illuminated does not indicate that the unit has been disconnected from the power supply and no longer carries any voltage.

- Mechanical blocking or internal safety functions of the unit can cause a motor standstill. Removing the cause of this problem or performing a reset can result in the motor re-starting on its own. If, for safety reasons, this is not permitted for the driven machine, the MOVIMOT® inverter must be disconnected from the power supply before correcting the problem.

- Danger of burns: The surface temperature of the MOVIMOT® inverter (especially of the heat sink) can exceed 60 °C during operation.

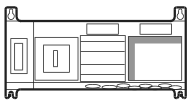
- If MOVIMOT® units or field distributors are used in safe applications, you must observe the supplemental documentation "Safe Disconnection for MOVIMOT®". Use only those components in safety applications that were explicitly designed and delivered for this purpose by SEW-EURODRIVE.

3.2 Supplementary safety notes for field distributors

MFZ.3.

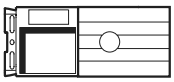
- Disconnect the unit from the power supply system before removing the bus module or the motor connector. Dangerous voltages may still be present for up to one minute after disconnection from the power supply.
- The bus module and the connector of the hybrid cable must be connected to the field distributor and fastened during operation.

MFZ.6.



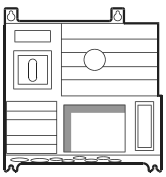
- Before removing the terminal box cover for the power supply connection, disconnect the unit from the power supply system. Dangerous voltages may still be present for up to one minute after disconnection from the power supply.
- Important: The switch only disconnects the MOVIMOT® unit from the power supply system. The terminals of the field distributor are still connected to the power supply after activating the maintenance switch.
- During operation, the terminal box cover for the power supply connection and the plug of the hybrid cable must be connected to the field distributor and fastened.

MFZ.7.



- Before removing the MOVIMOT® inverter, disconnected the unit from the power supply system. Dangerous voltages may still be present for up to one minute after disconnection from the power supply.
- The MOVIMOT® inverter and the connector of the hybrid cable must be connected to the field distributor and fastened during operation.

MFZ.8.

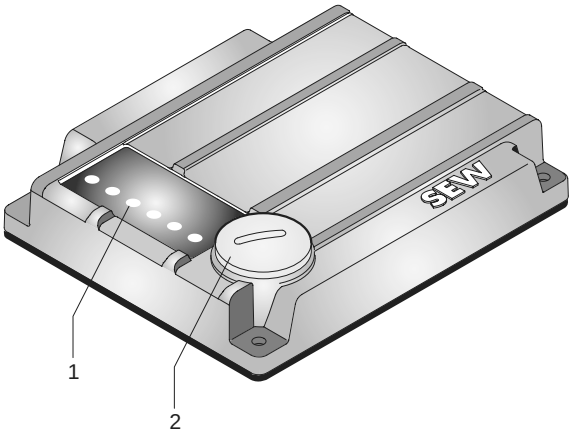


- Disconnect the unit from the power supply system before removing the terminal box cover for the power supply connection or the MOVIMOT® inverter. Dangerous voltages may still be present for up to one minute after disconnection from the power supply.
- Important: The maintenance switch only disconnects the connected motor from the power supply system. The terminals of the field distributor are still connected to the power supply after activating the maintenance switch.
- The terminal box cover for the power supply connection, the MOVIMOT® inverter and the plug of the hybrid cable must be connected to the field distributor and fastened during operation.

4 Unit Design

4.1 Fieldbus interfaces

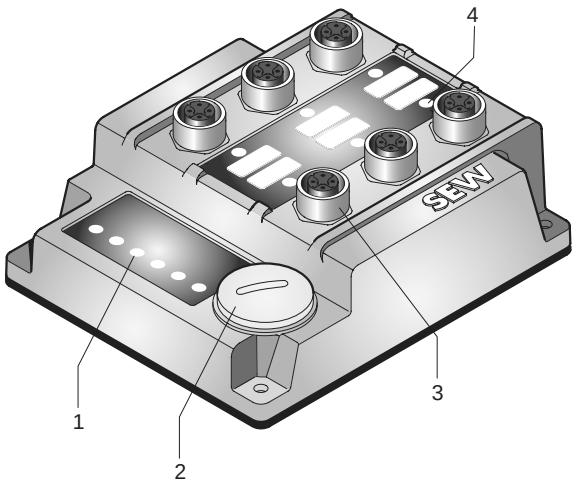
Fieldbus interfaces MF.21/MQ.21



50353AXX

1 Diagnostic LEDs
2 Diagnostics interface (behind the screw plug)

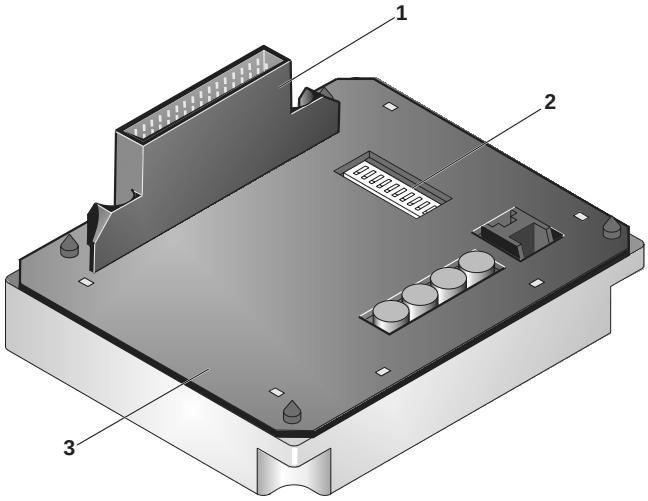
Fieldbus interfaces MF.22, MF.32, MQ.22, MQ.32



50352AXX

1 Diagnostic LEDs
2 Diagnostics interface (behind the screw plug)
3 M12 connection sockets
4 Status LED

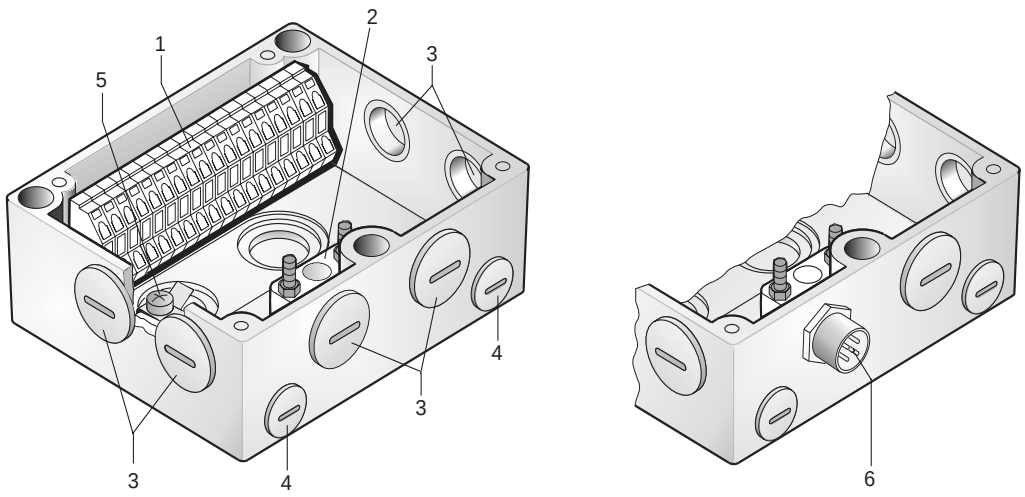
Underside of module (all MF../MQ.. variants)



01802CDE

1 Connection to connection module
2 DIP switches (dependent on variant)
3 Gasket

Unit design of MFZ connection module

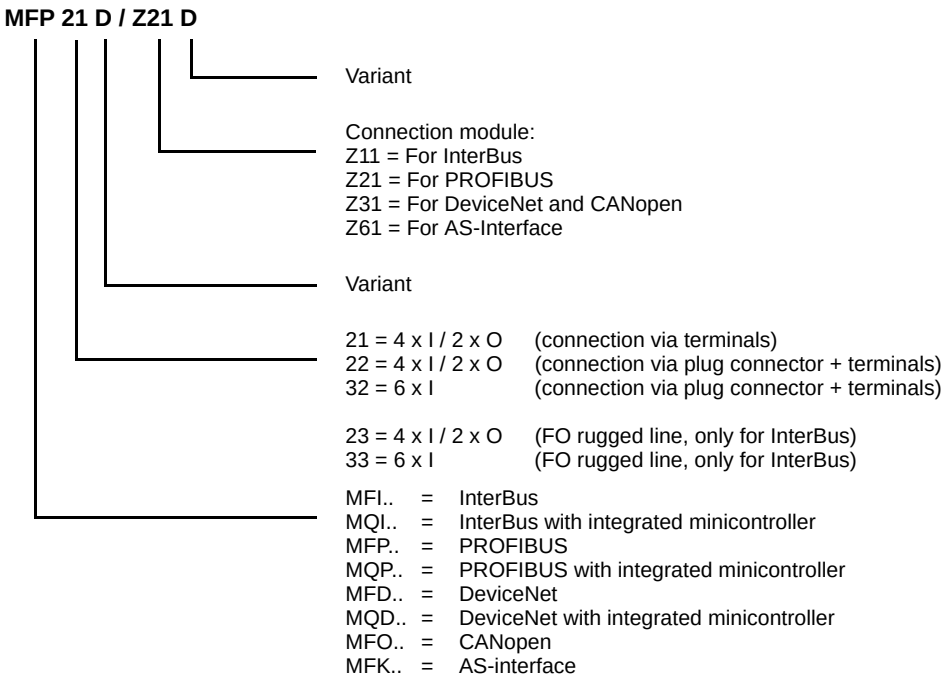


06169AXX

1 Terminal strip (X20)
2 Isolated terminal block for 24 V through-wiring
(Caution: Do not use for shielding!)
3 M20 cable gland
4 M12 cable gland
5 Grounding terminal
6 For DeviceNet and CANopen: Micro-style connector/M12 connector (X11)
For AS-Interface: AS-interface M12 connector (X11)

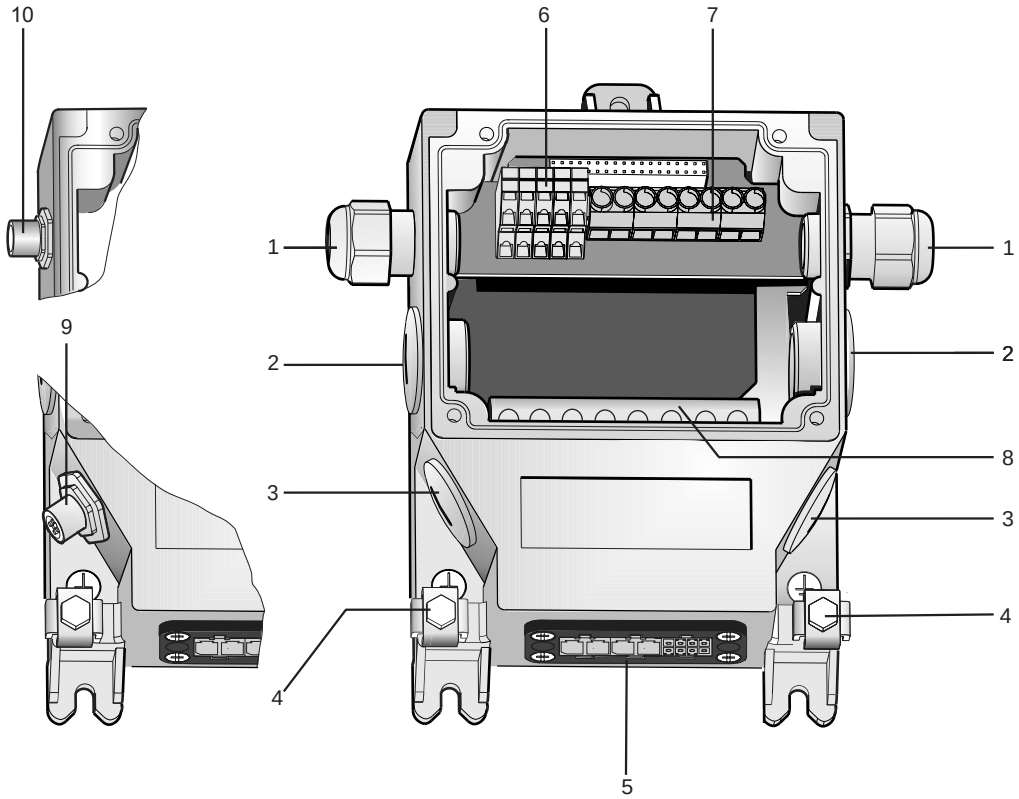
The scope of delivery includes two EMC cable glands.

4.2 Unit designation of PROFIBUS interfaces



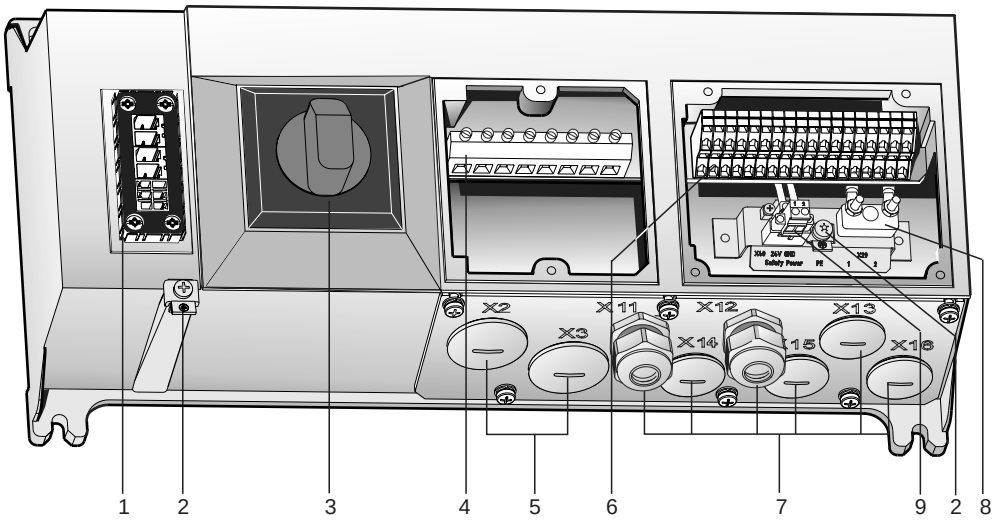
4.3 Field distributor

Field distributors MF.../Z.3., MQ.../Z.3.



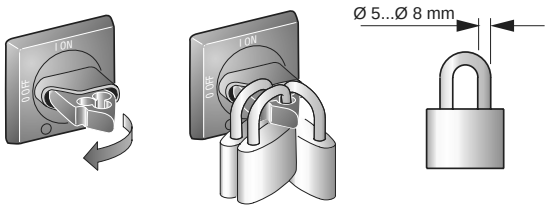
1 2 x M16 x 1.5 (scope of delivery includes two EMC cable glands)
2 2 x M25 x 1.5
3 2 x M20 x 1.5
4 Equipotential bonding connection
5 Hybrid cable connection; connection to MOVIMOT® (X9)
6 Terminals for fieldbus connection (X20)
7 Terminals for 24 V connection (X21)
8 Terminals for power supply and PE connection (X1)
9 For DeviceNet and CANopen: Micro-style connector/M12 connector (X11)
10 For AS-Interface: AS-interface M12 connector (X11)

Field distributors MF.../Z.6., MQ.../Z.6.



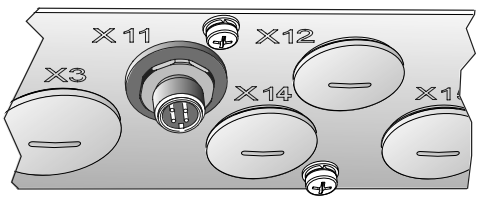
05903AXX

1 Hybrid cable connection; connection to MOVIMOT® (X9)
2 Equipotential bonding connection
3 Maintenance switch **with line protection** (triple lock, color: black/red)
Only for MFZ26J: Optional integrated feedback for position of the maintenance switch. The feedback is evaluated at digital input DI0 (see the section "Connection of inputs/ outputs (I/O) of fieldbus interfaces MF../MQ..)



03546AXX

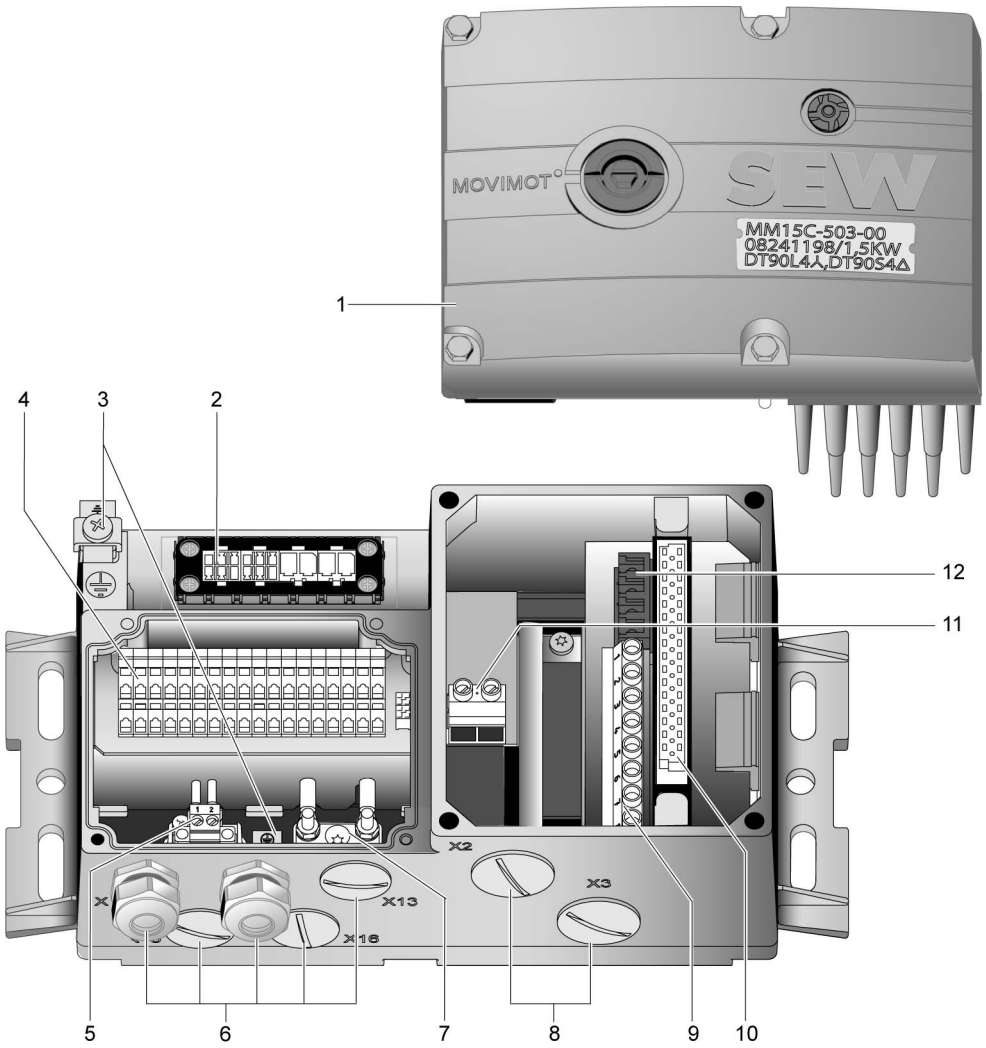
4 Terminals for power supply and PE connection (X1)
5 2 x M25 x 1.5
6 Terminals for bus, sensor, actuator, 24 V connection (X29)
7 6 x M20 x 1.5 (scope of delivery includes two EMC cable glands)
For DeviceNet and CANopen: Micro-style connector/M12 connector (X11), see following figure
For AS-Interface: AS-interface M12 connector (X11), see following figure



06115AXX

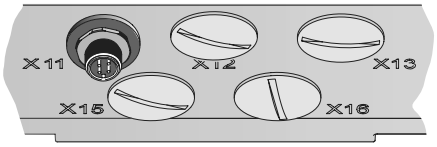
8 Terminal block for 24 V through-wiring (X29), internal connection to 24 V on X20
9 Pluggable "Safety Power" terminal for 24 V MOVIMOT® supply (X40)

Field distributors
MF.../MM../Z.7.,
MQ.../MM../Z.7.



51174AXX

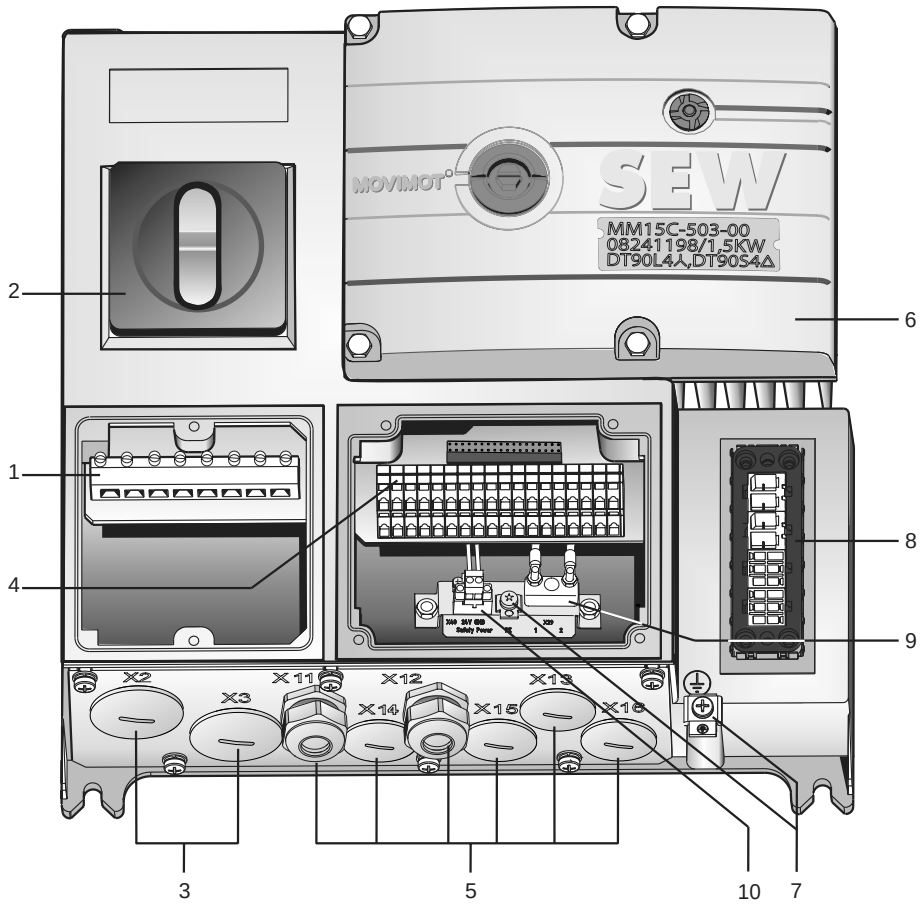
1 MOVIMOT® frequency inverter
2 Hybrid cable connection; connection to AC motor (X9)
3 Equipotential bonding connection
4 Terminals for bus, sensor, actuator, 24 V connection (X29)
5 Pluggable "Safety Power" terminal for 24 V MOVIMOT® supply (X40)
6 5 x M20 x 1.5 cable gland (scope of delivery includes two EMC cable glands)
For DeviceNet and CANopen: Micro-style connector/M12 connector (X11), see following figure
For AS-Interface: AS-interface M12 connector (X11), see following figure



51325AXX

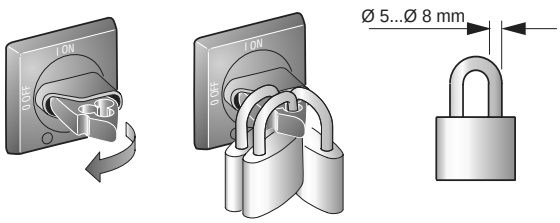
7 Terminal block for 24 V through-wiring (X29), internal connection to 24 V on X20
8 2 x M25 x 1.5 cable glands
9 Terminals for power supply and PE connection (X1)
10 Connection to frequency inverter
11 Terminal for integrated brake resistor
12 Terminals for enabling the direction of rotation

Field distributors MF.../MM../Z.8., MQ.../MM../Z.8.



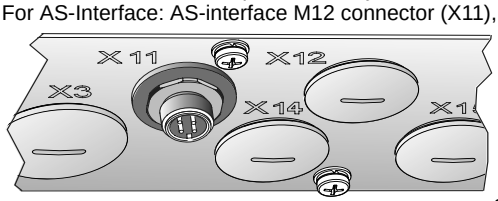
05902AXX

1 Terminals for power supply and PE connection (X1)
2 Maintenance switch (triple lock, color: black/red)
Only for MFZ28J: Optional integrated feedback for position of the maintenance switch. The feedback is evaluated at digital input DI0 (see the section "Connection of inputs/ outputs (I/O) of fieldbus interfaces MF../MQ..)



03546AXX

3 2 x M25 x 1.5 cable glands
4 Terminals for bus, sensor, actuator, 24 V connection (X29)
5 6 x M20 x 1.5 cable gland (scope of delivery includes two EMC cable glands)
For DeviceNet and CANopen: Micro-style connector/M12 connector (X11), see following figure
For AS-Interface: AS-interface M12 connector (X11), see following figure



06115AXX

6 MOVIMOT® frequency inverter
7 Equipotential bonding connection
8 Hybrid cable connection; connection to AC motor (X9)
9 Terminal block for 24 V through-wiring (X29), internal connection to 24 V on X20
10 Pluggable "Safety Power" terminal for 24 V MOVIMOT® supply (X40)

4.4 Unit designation of PROFIBUS field distributors

Example MF.../Z.3., MQ.../Z.3.

MFP21D/Z23D

Connection module
Z13 = For InterBus
Z23 = For PROFIBUS
Z33 = For DeviceNet and CANopen
Z63 = For AS-Interface

Fieldbus interface
MFI../MQI.. = InterBus
MFP../MQP.. = PROFIBUS
MFD../MQD.. = DeviceNet
MFO.. = CANopen
MFK.. = AS-interface

Example MF.../Z.6., MQ.../Z.6.

MFP21D/Z26F/AF0

Connection technology
AF0 = Metric cable entry
AF1 = With micro-style connector/M12 connector for DeviceNet and CANopen
AF2 = M12 plug connector for PROFIBUS
AF3 = M12 plug connector for PROFIBUS + M12 plug connector for DC 24 V supply
AF6 = M12 plug connector for AS-Interface connection

Connection module
Z16 = For InterBus
Z26 = For PROFIBUS
Z36 = For DeviceNet and CANopen
Z66 = For AS-Interface

Fieldbus interface
MFI../MQI.. = InterBus
MFP../MQP.. = PROFIBUS
MFD../MQD.. = DeviceNet
MFO.. = CANopen
MFK.. = AS-interface

Example
MF.../MM../Z.7.,
MQ.../MM../Z.7.

MFP22D/MM15C-503-00/Z27F 0

Connection type
0 = 人 / 1 = △

Connection module
Z17 = For InterBus
Z27 = For PROFIBUS
Z37 = For DeviceNet and CANopen
Z67 = For AS-Interface

MOVIMOT® inverter

Fieldbus interface
MFI../MQI.. = InterBus
MFP../MQP.. = PROFIBUS
MFD../MQD.. = DeviceNet
MFO.. = CANopen
MFK.. = AS-interface

Example
MF.../MM../Z.8.,
MQ.../MM../Z.8.

MFP22D/MM22C-503-00/Z28F 0/AF0

Connection technology
AF0 = Metric cable entry
AF1 = With micro-style connector/M12 connector for DeviceNet and CANopen
AF2 = M12 plug connector for PROFIBUS
AF3 = M12 plug connector for PROFIBUS + M12 plug connector for DC 24 V supply
AF6 = M12 plug connector for AS-Interface connection

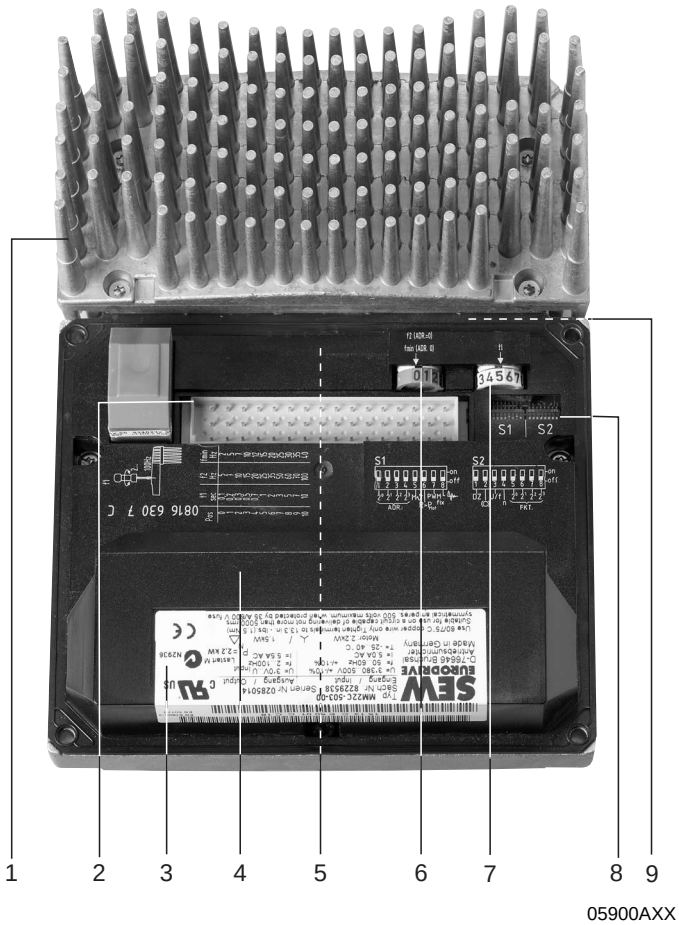
Connection type
0 = 人 / 1 = △

Connection module
Z18 = For InterBus
Z28 = For PROFIBUS
Z38 = For DeviceNet and CANopen
Z68 = For AS-Interface

MOVIMOT® inverter

Fieldbus interface
MFI../MQI.. = InterBus
MFP../MQP.. = PROFIBUS
MFD../MQD.. = DeviceNet
MFO.. = CANopen
MFK.. = AS-interface

4.5 MOVIMOT® frequency inverter (integrated in Z.7/Z.8 field distributors)



1. Heat sink
2. Plug for connection unit with inverter
3. Electronic nameplate
4. Protection cover for inverter electronics
5. Setpoint potentiometer f1 (not shown), accessible through a cable gland on top of the terminal box cover
6. Setpoint switch f2 (green)
7. Switch t1 for integrator ramp (white)
8. DIP switches S1 and S2 (for settings see Sec. "Startup")
9. Status LED (visible from the top of the terminal box cover, see the section "Diagnostics")

5 Mechanical Installation

5.1 Installation instructions

On delivery, field distributors are equipped with transportation protection covering the plug connector of the outgoing motor circuit (hybrid cable).

This cover only guarantees enclosure IP40. To obtain the specified enclosure, remove the transportation protection and install and fasten the appropriate mating connector.

Installation

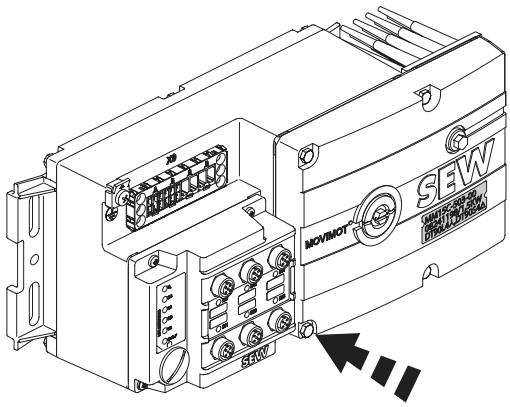
- Fieldbus interfaces/field distributors are only allowed to be mounted on a level, vibration-proof and torsionally rigid support structure.
- Use M5 screws with matching washers to connect the **MFZ.3** field distributor. Tighten screws with torque wrench (permitted tightening torque 2.8 to 3.1 Nm (25...27 lb.in)).
- Use M6 screws and suitable washers for installation of **MFZ.6, MFZ.7** or **MFZ.8** field distributors. Tighten screws with torque wrench (permitted tightening torque 3.1 to 3.5 Nm (27...31 lb.in)).

Installation in damp locations or in the open

- Use suitable screw fittings for the cables (use reducing adapters if necessary).
- Seal open cable entries and M12 connection sockets with screw plugs.
- When the cable entry is located on the side of the unit, install the cable using a drip loop.
- Check the sealing surfaces before reassembling the bus module / connection box cover. Clean the surfaces if necessary.

5.2 Tightening torque

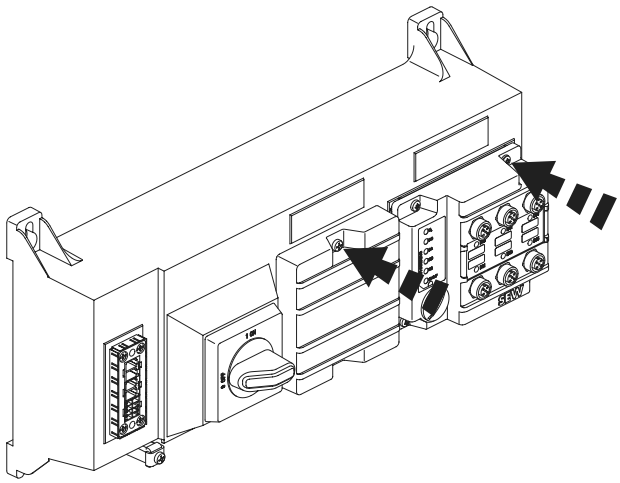
MOVIMOT® inverter:



57670AXX

Tighten the screws on the MOVIMOT® inverter using 3.0 Nm (27 lb.in) working diagonally across.

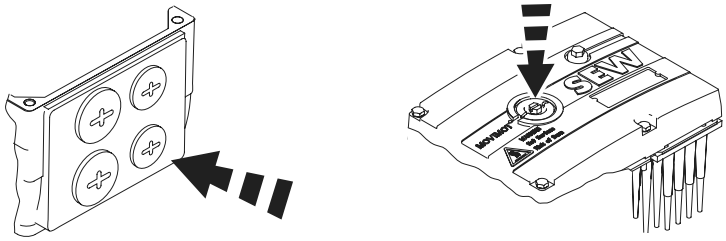
Fieldbus interfaces/terminal box lid:



57671AXX

Tighten the screws on the fieldbus interfaces or terminal box cover using 2.5 Nm (22 lb.in) working diagonally across.

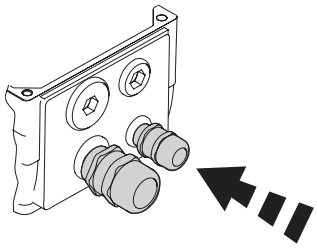
Blanking plug for cable entries, F1 potentiometer plug



57672AXX

Tighten blanking plugs and F1 potentiometer plugs using 2.5 Nm (22 lb.in).

EMC cable glands



56360AXX

Tighten EMC cable glands supplied by SEW-EURODRIVE using the following torque ratings:

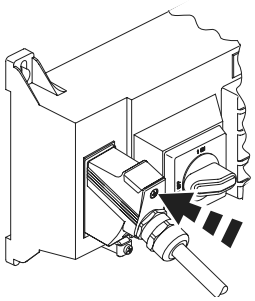
Screw fitting	Tightening torque
M12 x 1.5	2.5 Nm to 3.5 Nm (22...31lb.in)
M16 x 1.5	3.0 Nm to 4.0 Nm (27...35 lb.in)
M20 x 1.5	3.5 Nm to 5.0 Nm (31...44 lb.in)
M25 x 1.5	4.0 Nm to 5.5 Nm (35...49 lb.in)

The cable retention in the cable gland has to withstand the following removal force of the cable from the cable gland:

- Cable with outer diameter > 10 mm: ≥ 160 N
- Cable with outer diameter < 10 mm: = 100 N

Motor cables

Tighten screws for motor cables using 1.2 to 1.8 Nm (11...16 lb.in).



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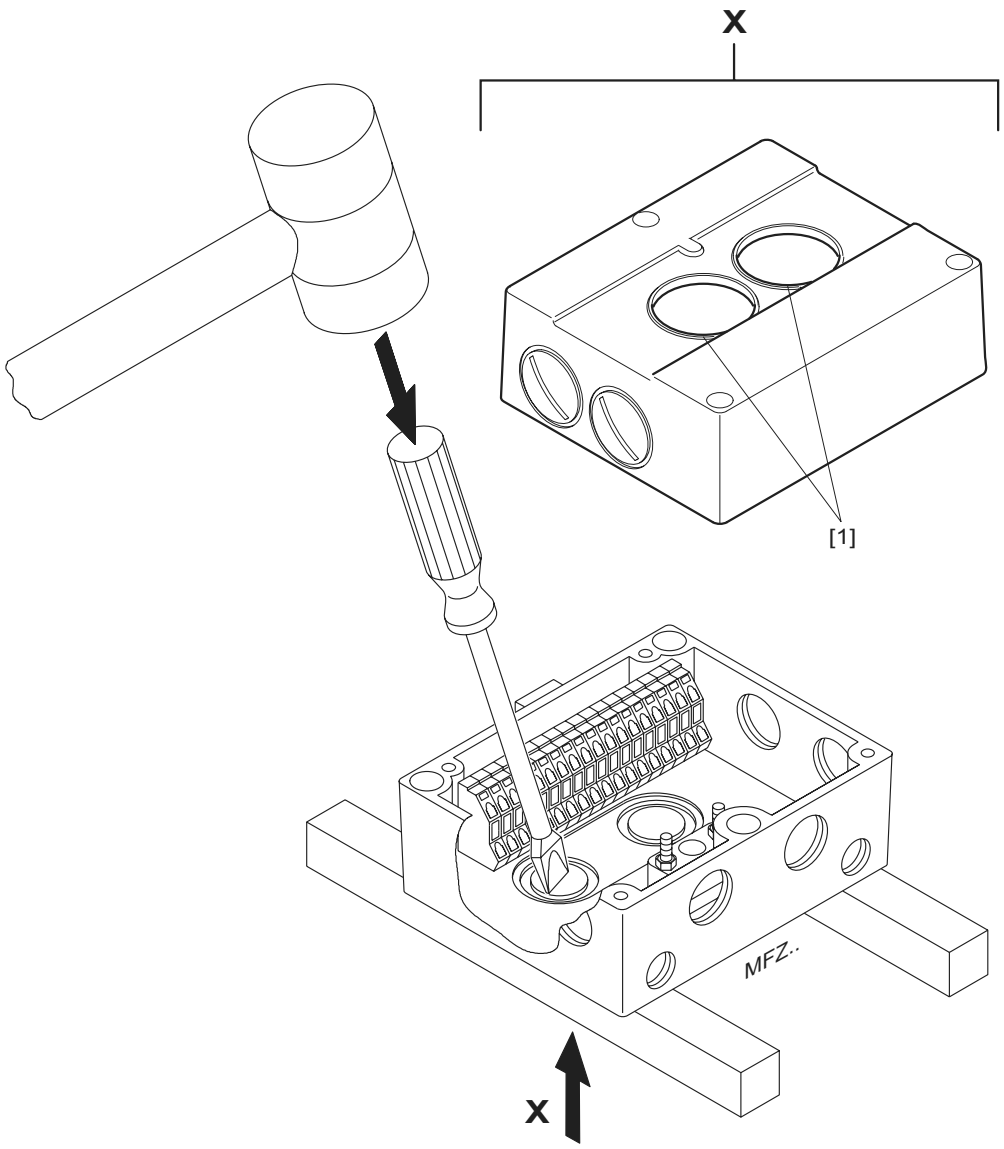
5.3 Fieldbus interfaces MF../MQ..

MF../MQ.. fieldbus interfaces can be installed as follows:

- Installation on MOVIMOT® terminal box
- Installation in the field

Installation on MOVIMOT® terminal box

1. Remove knock outs on MFZ underside from the inside, as illustrated in the following figure:



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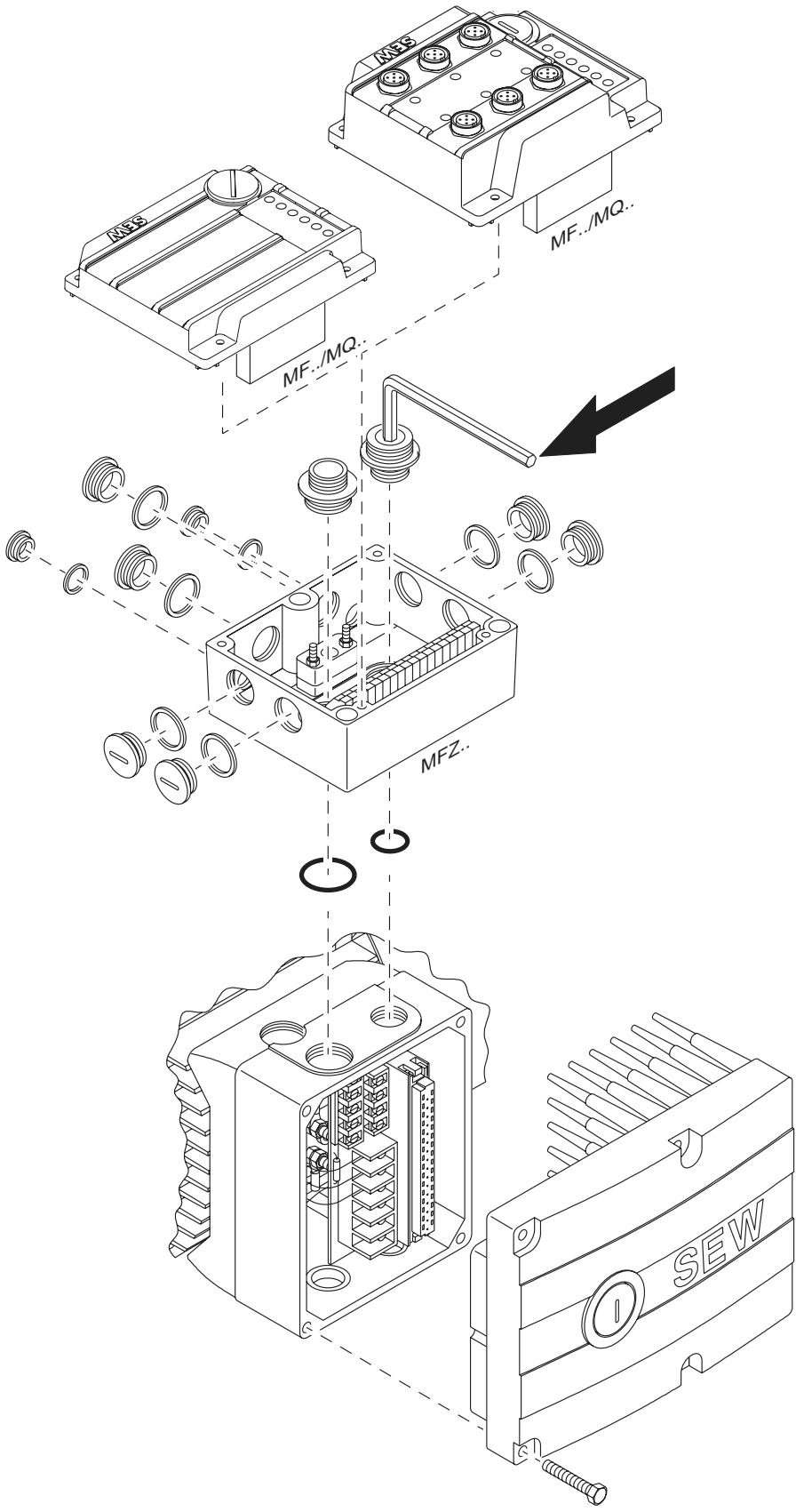
[1] The break lines that occur after the knock outs have been removed may have to be deburred.

2. Install the fieldbus interface on the MOVIMOT® terminal box according to the following figure:



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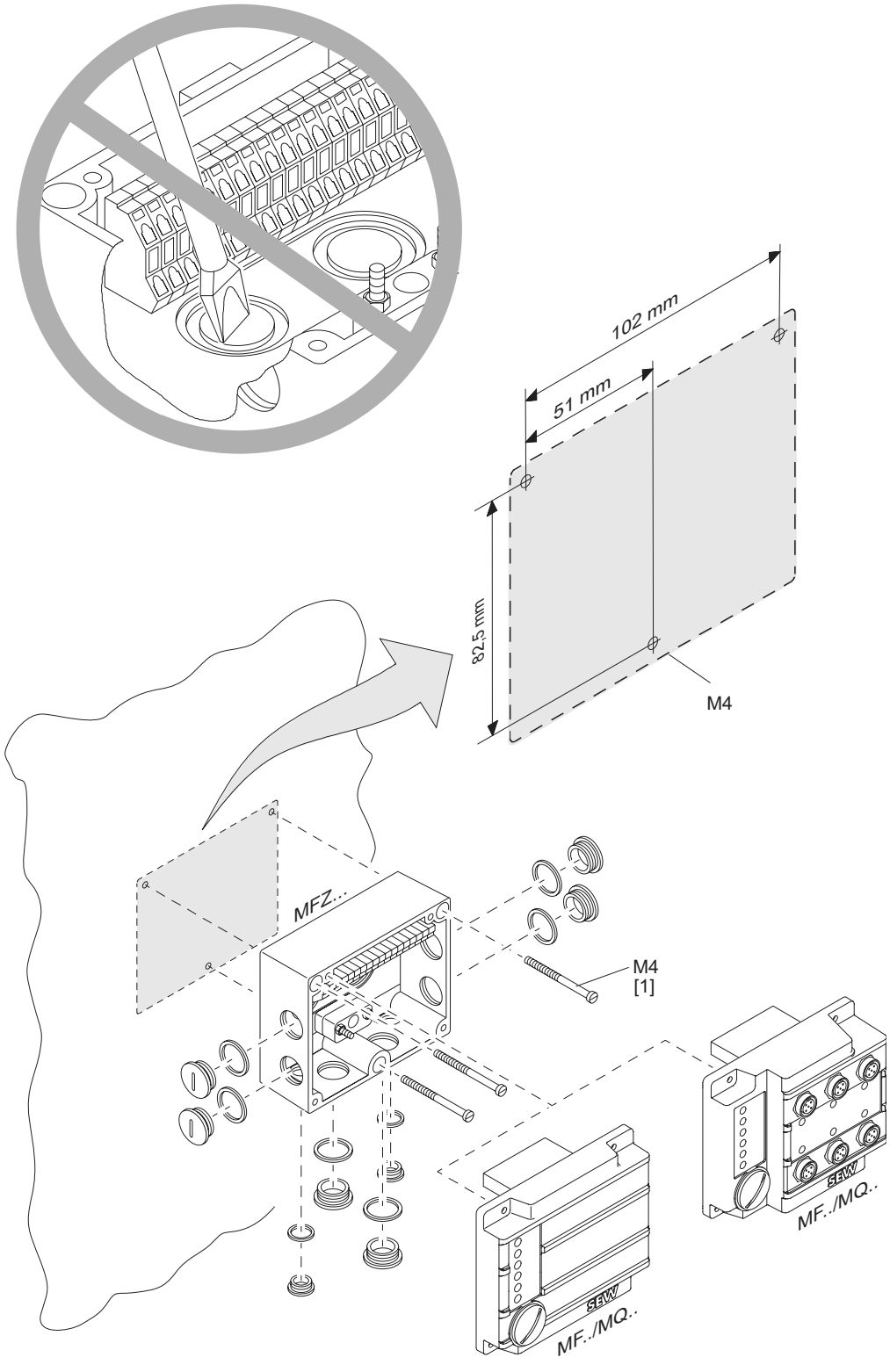
Installation in the field

The following figure shows how to install an MF../MQ.. fieldbus interface in the field:

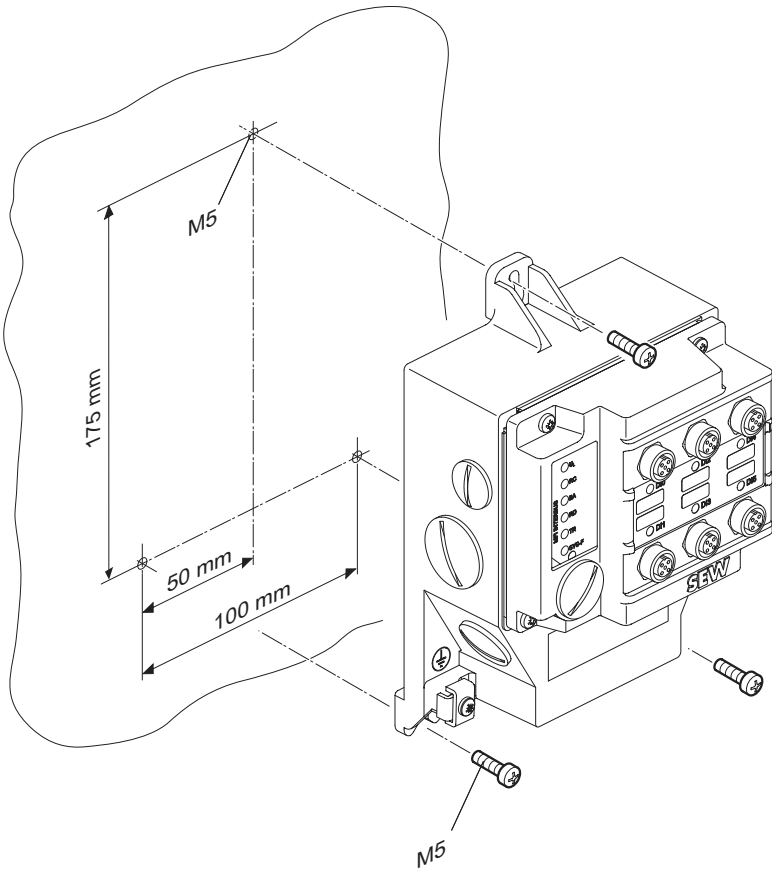


[1] Length of screws min. 40 mm

5.4 Field distributors

Installing field distributors MF.../Z.3., MQ.../Z.3.

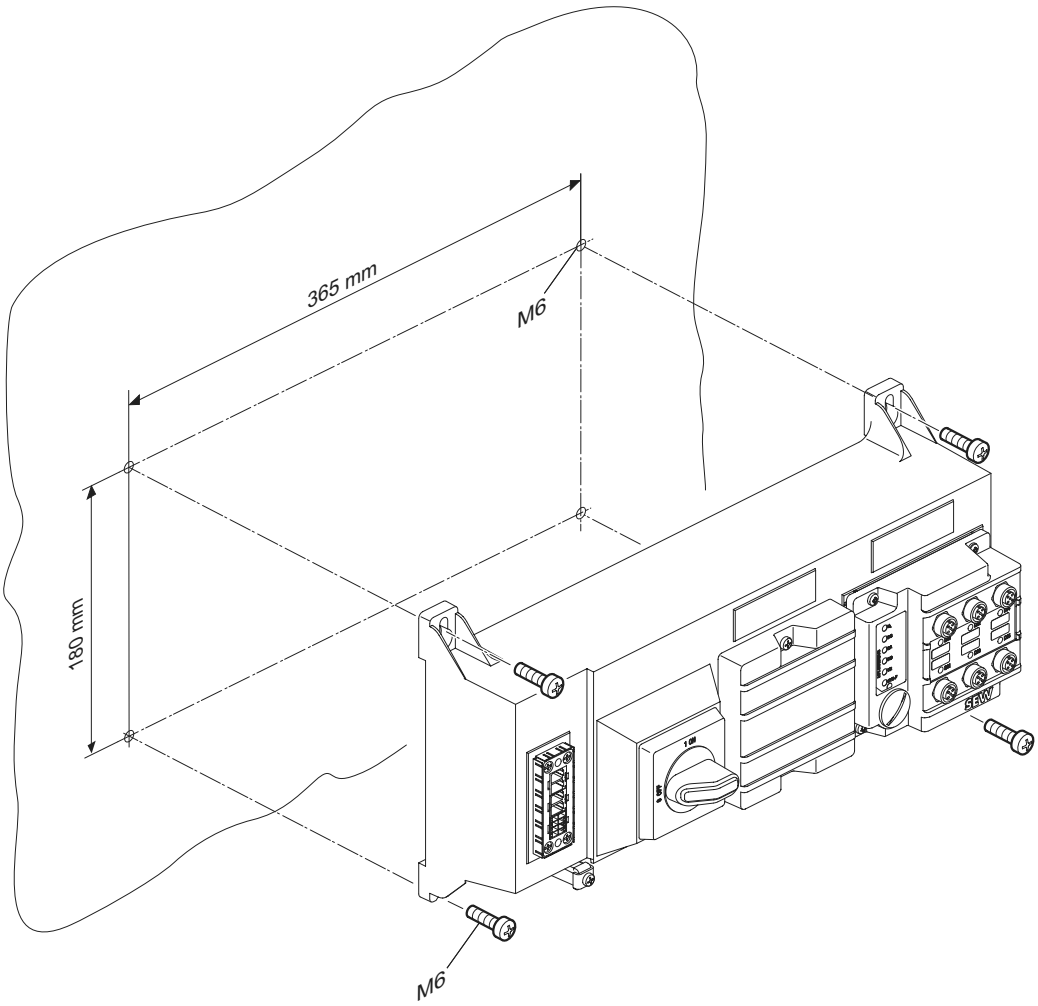
The following figure shows the mounting dimensions for ..Z.3. field distributors:



51219AXX

Installing field distributors MF.../Z.6., MQ.../Z.6.

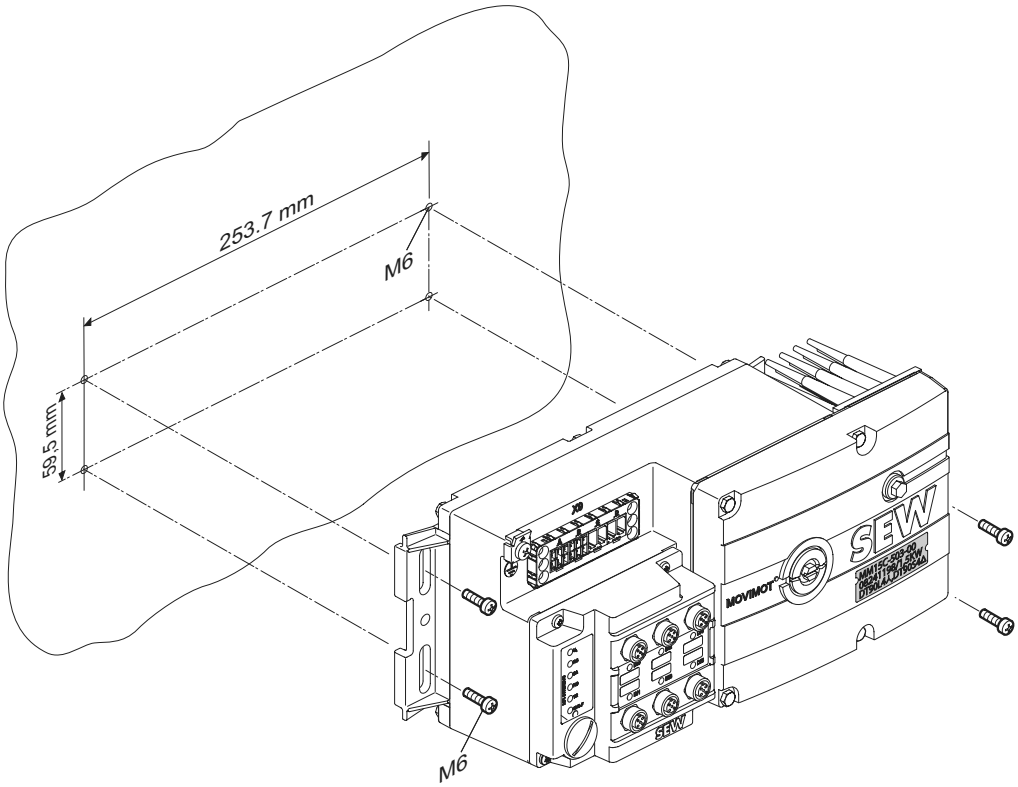
The following figure shows the mounting dimensions for ..Z.6. field distributors:



51239AXX

Installing field distributors MF.../MM../Z.7., MQ.../MM../Z.7.

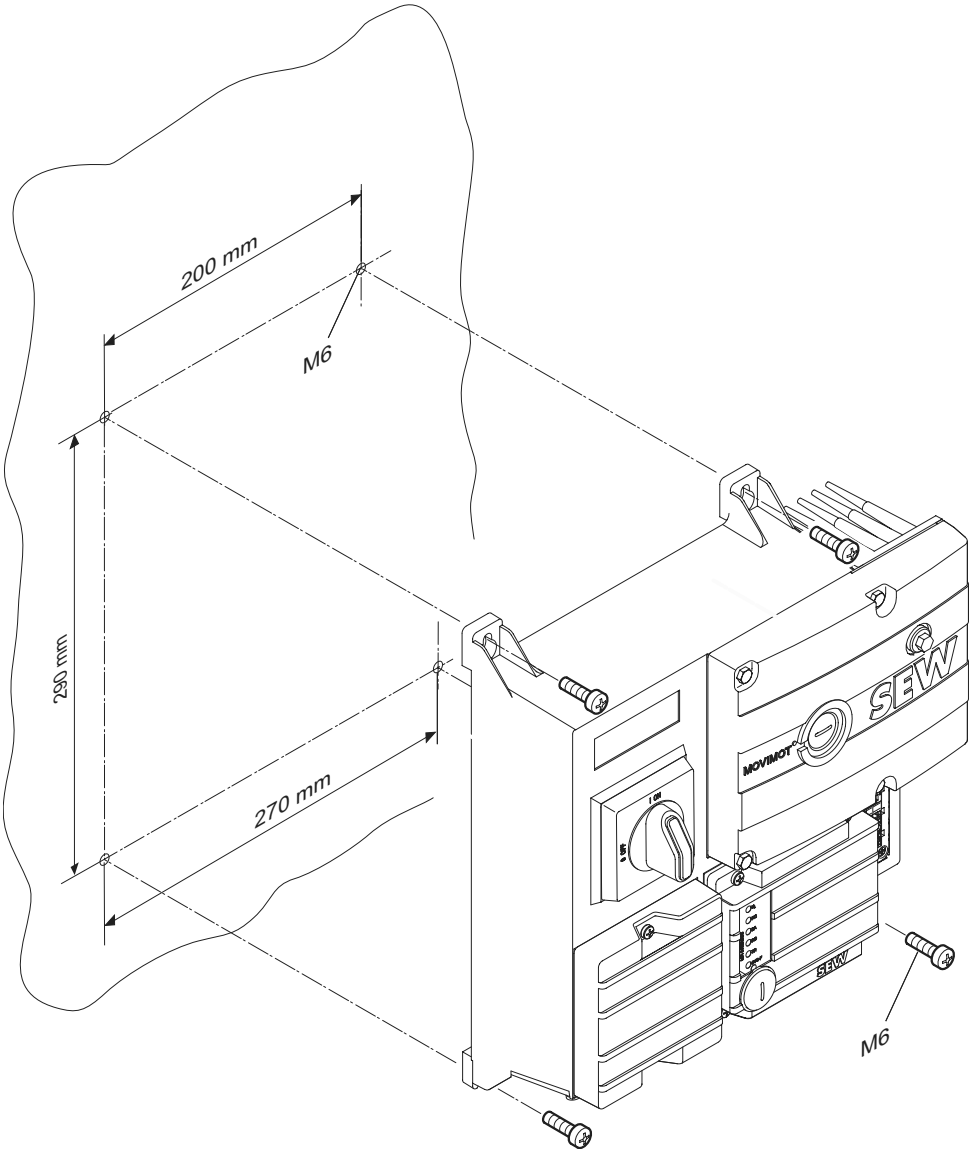
The following figure shows the mounting dimensions for ..Z.7. field distributors:



51243AXX

Installing field distributors MF.../MM03-MM15/Z.8., MQ.../MM03-MM15/Z.8. (size 1)

The following figure shows the mounting dimensions for ..Z.8. field distributors (size 1):



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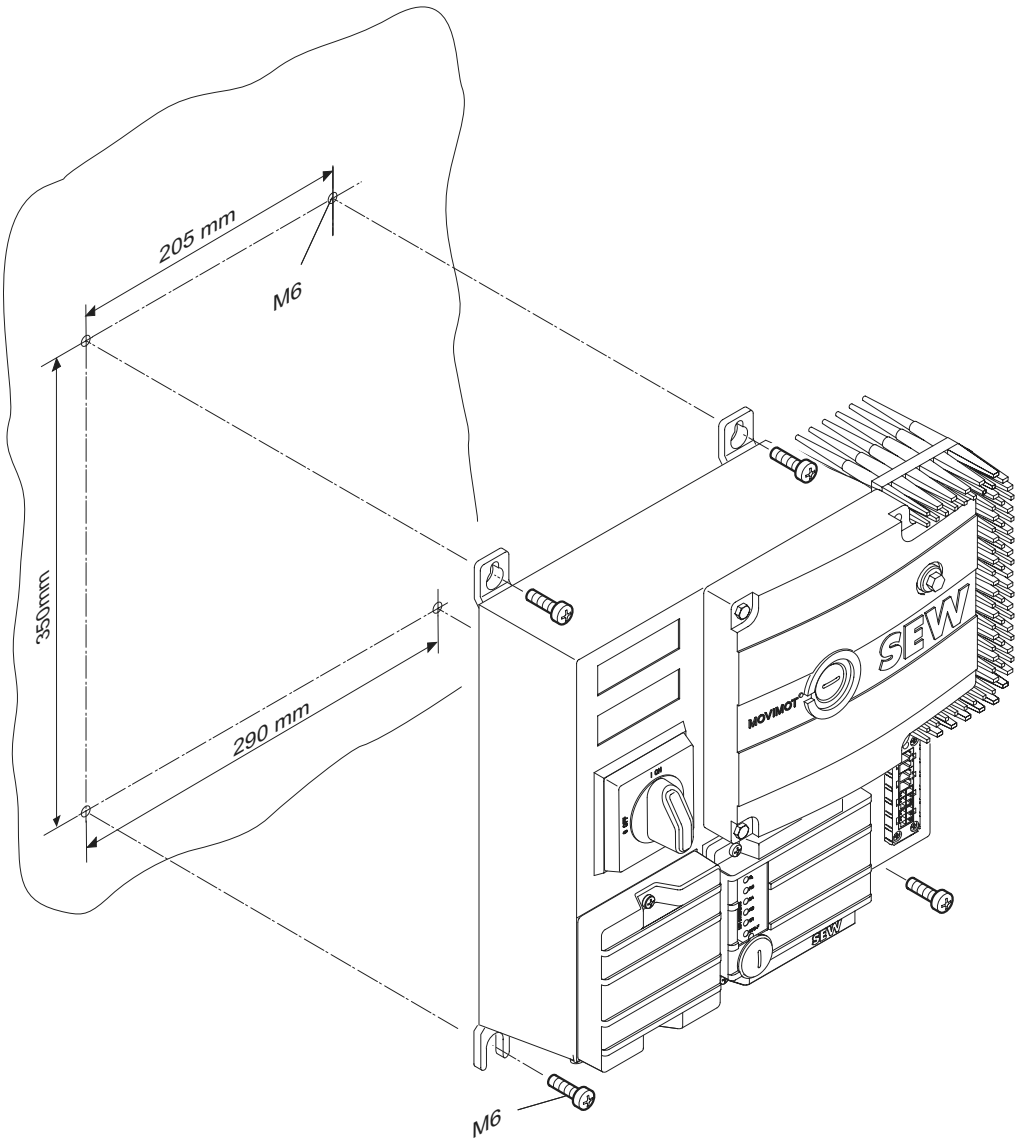
Installing field distributors MF.../MM22-MM3X/Z.8., MQ.../MM22-MM3X/Z.8. (size 2)

The following figure shows the mounting dimensions for ..Z.8. field distributors (size 2):



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6 Electrical Installation

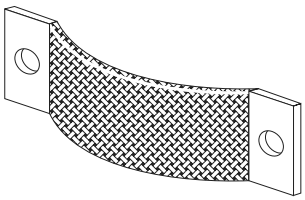
6.1 Installation planning taking EMC aspects into account

Notes on arranging and routing installation components

Successful installation of decentralized drives depends on selecting the correct cables, providing correct grounding and a functioning equipotential bonding.

You should always apply **relevant standards**. You also need to consider the following points:

- **Equipotential bonding**
  - Low-impedance HF-capable potential compensation must be provided independent of the functional ground (PE terminal) (see also VDE 0113 or VDE 0100 Part 540) for example through
    - Flat contact surface connection of metal (system) components
    - Flat grounding strips (HF litz wire)



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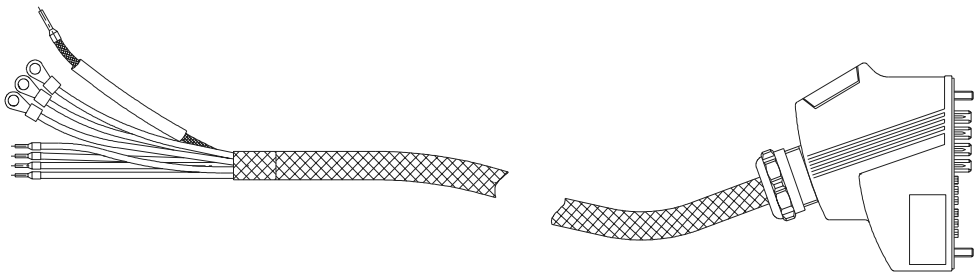
  - Do not use the cable shield of data lines for equipotential bonding.
- **Data lines and 24 V supply**
  - These lines must be routed separately from cables subject to interference (e.g. control cables for solenoid valves, motor cables).
- **Field distributor**
  - We recommend using pre-fabricated SEW hybrid cables especially designed for the connection of field distributors and motors.



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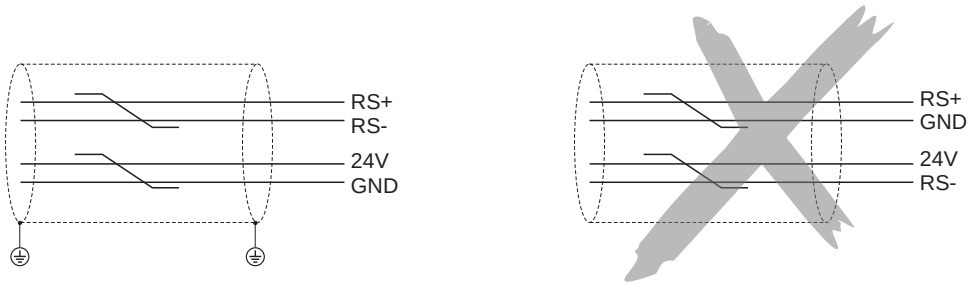
- **Cable glands**
  - Select a cable gland with large contact surface shield (consult the notes on selection and appropriate assembly of cable glands).
- **Cable shield**
  - Must have good EMC characteristics (high shield attenuation)
  - May not only serve as a means of mechanical protection for the cable.
  - Must be connected with the metal housing of the unit (via EMC metal cable glands) at the flat contact surface cable ends (consult the notes on selection and appropriate assembly of cable glands).
- **Additional information is available in the SEW publication "Drive Engineering – Practical Implementation, Electromagnetic Compatibility (EMC) in Drive Engineering."**

Example for connecting fieldbus module MF../MQ.. and MOVIMOT®

If the MF../MQ.. fieldbus module and MOVIMOT® are to be installed separately, implement the RS-485 connection as follows:

- **With DC 24 V supply**
  - Use shielded lines
  - Apply shielding to the housing of both units via EMC metal cable glands (consult the notes on appropriate assembly of EMC metal cable glands)
  - Strands twisted in pairs (see the following illustration)



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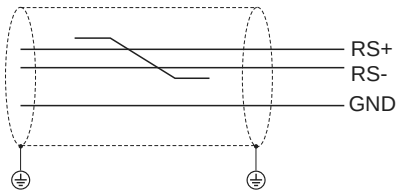
- **Without DC 24 V supply**

  If MOVIMOT® is supplied with 24 V_{DC} via a separate line, the RS-485 connection must be designed as follows:

  - Use shielded lines
  - Apply shielding to the housing of both units via EMC metal cable glands (consult the notes on selection and appropriate assembly of cable glands)
  - The GND reference potential must be provided for the RS-485 interface
  - Strands twisted (see the following illustration)



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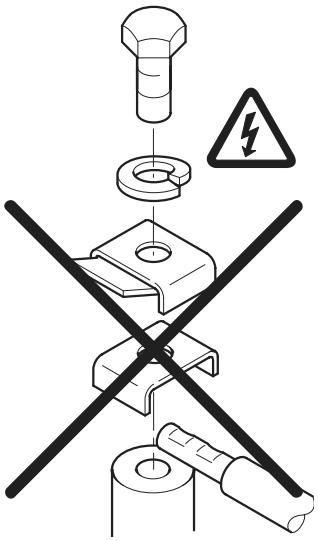
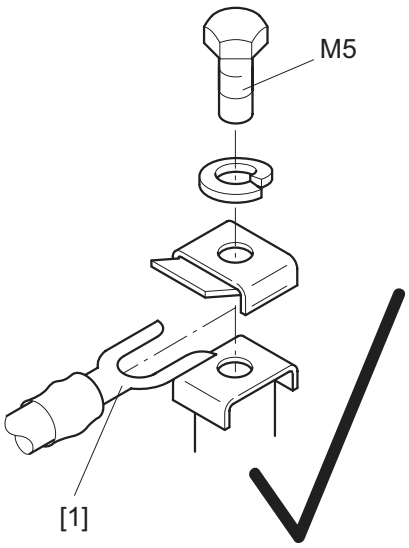
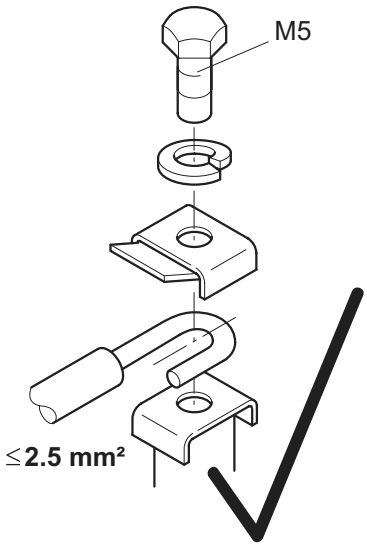
6.2 Installation instructions for fieldbus interfaces, field distributors

Connecting supply system leads

- The rated voltage and frequency of the MOVIMOT® inverter must correspond to the data for the power supply system.
- Line cross section: according to input current I_{mains} for rated power (see Technical Data).
- Install line fuses at the beginning of the supply system line behind the supply bus junction. Use D, DO, NH fuses or circuit breakers. Select the fuse size according to the line cross section.
- Do not use a conventional earth leakage circuit-breaker as a protective device. Universal current-sensitive earth-leakage circuit breakers ("type B") are permitted as a protective device. During normal operation of MOVIMOT® drives, earth-leakage currents > 3.5 mA can occur.
- In accordance with EN 50178, a second PE connection (with at least the same cross section as the supply system lead) is required parallel to the protective earth via separate points of connection. Leakage currents > 3.5 mA may arise during operation.
- Use contactor switch contacts from utilization category AC-3 according to IEC 158 to connect MOVIMOT® drives.
- SEW recommends using earth-leakage monitors with pulse-code measurement for voltage supply systems with non-grounded star point (IT nets). Using such devices prevents the earth-leakage monitor mis-tripping due to the ground capacitance of the inverter.

Notes on the PE connection and equipotential bonding

Observe the following notes regarding PE connection and equipotential bonding. The permitted tightening torque for the screw fitting is 2.0 to 2.4 Nm (18...21 lb.in).

Prohibited assembly sequence	Recommendation: Assembly with forked cable lug Permitted for all cross sections	Assembly with thick connecting wire Permitted for cross-sections up to max. 2.5 mm²
 57461AXX	 57463AXX	 57464AXX

[1] Forked cable lug suitable for M5 PE screws

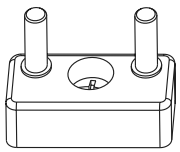
Permitted connection cross section and current carrying capacity of the terminals

	Power terminals X1, X21 (screw terminals)	**Control terminals X20 (cage clamp terminals)**
Connection cross section (mm^2)	0.2 mm^2 – 4 mm^2	0.08 mm^2 – 2.5 mm^2
Connection cross section (AWG)	AWG 24 – AWG 10	AWG 28 – AWG 12
Current carrying capacity	32 A maximum continuous current	12 A maximum continuous current

The permitted tightening torque of the power terminals is 0.6 Nm (5 lb.in).

Daisychaining DC 24 V supply voltage for module carrier MFZ.1 :

- Two M4 x 12 studs are located on the connection part of the DC 24 V supply. These studs can be used for daisy-chaining the DC 24 V supply voltage.



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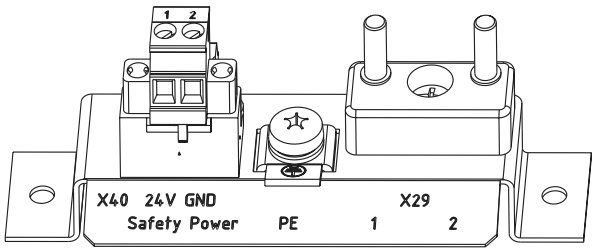
- The terminal studs have a current carrying capacity of 16 A.
- The permitted tightening torque for the hex nuts of the terminal studs is 1.2 Nm (11 lb.in) ± 20 %.

Additional connection options for MFZ.6, MFZ.7 and MFZ.8 field distributors

- The connection part of the DC 24 V supply comprises a X29 terminal block with two M4 x 12 studs and a pluggable X40 terminal.



05237AXX

- The X29 terminal block can be used an an alternative to X20 terminal for daisychaining the DC 24 V supply voltage. Both studs are connected internally to the 24 V connection at terminal X20.

Terminal assignment			
No.		**Name**	**Function**
X29	1	24 V	24 V voltage supply for module electronics and sensors (studs, jumpered with terminal X20/11)
	2	GND	0V24 reference potential for module electronics and sensors (studs, jumpered with terminal X20/13)

- The plug-in terminal X40 ("Safety Power") is intended for the external DC 24 V supply of the MOVIMOT® inverter using an emergency stop relay.

  This setup allows for the operation of a MOVIMOT® drive in safety applications. For more information, refer to the publications "Safe Disconnection for MOVIMOT® MM..C - Conditions" and "Safe Disconnection for MOVIMOT® MM..C - Applications."

Terminal assignment			
No.		**Name**	**Function**
X40	1	24 V	24 V voltage supply for MOVIMOT® for disconnection with emergency stop relay
	2	GND	0V24 reference potential for MOVIMOT® for disconnection with emergency stop relay

- On delivery, terminal X29/1 is jumpered with X40/1 and terminal X29/2 with X40/2 so that the MOVIMOT® inverter is supplied by the same DC 24 V voltage as the fieldbus module.
- The current carrying capacity of both studs is 16 A, the permitted tightening torque of the hex nuts is 1.2 Nm (11 lb.in) ± 20 %.
- The current carrying capacity of screw terminal X40 is 10 A, the connection cross section is 0.25 mm^2 to 2.5 mm^2 (AWG24 to AWG12) and the permitted tightening torque is 0.6 Nm (5 lb.in).

Installation over 1,000 meters above sea level

MOVIMOT® drives with supply voltages of 380 to 500 V can be used at altitudes above 1,000 msl up to 4,000 msl under the following conditions[1] .

- The rated continuous power is reduced based on the reduced cooling above 1,000 m (see MOVIMOT® operating instructions).
- Above 2,000 msl, the air and creeping distances are only sufficient for overvoltage class 2. If the installation calls for overvoltage class 3, you will have to install additional external overvoltage protection to limit overvoltage peaks to 2.5 kV phase-to-phase and phase-to-ground.
- If "safe electrical disconnection" is required, it must be implemented outside the device at altitudes of 2,000 msl (safe electrical disconnection in accordance with EN 61800-5-1).
- The permitted rated supply voltage of 3 x 500 V up to 2,000 msl is reduced by 6 V for every 100 m to a maximum of 3 x 380 V at 4,000 msl.

Protection devices

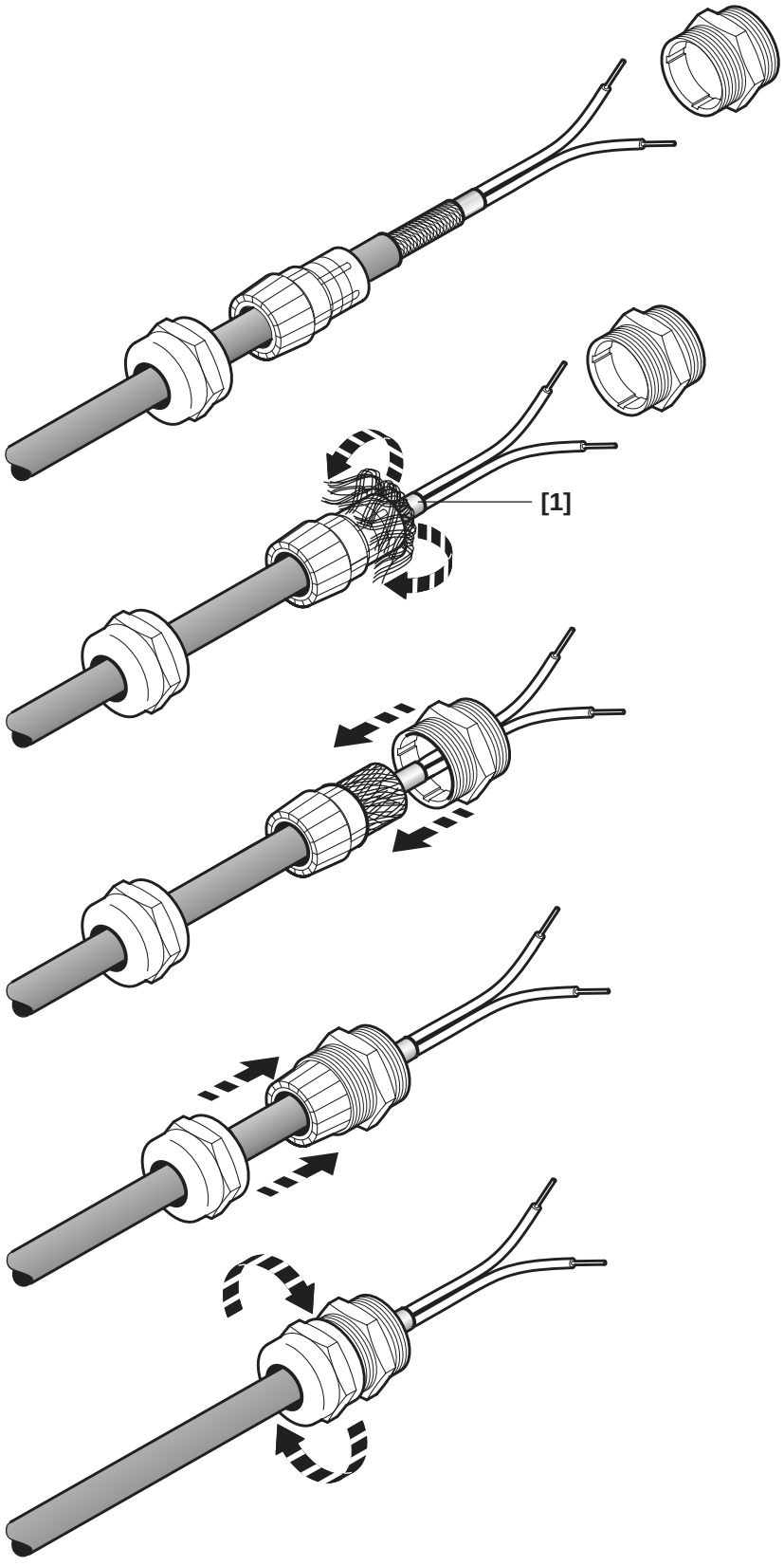
- MOVIMOT® drives are equipped with integrated protective overload devices, which means that external devices are no longer required.

UL-compliant installation for field distributors

- Use only copper cables in the temperature range 60 / 75 °C as the connection lead.
- MOVIMOT® units are suited for operation on voltage supply systems with grounded star (TN and TT systems) supplying a maximum supply current of 5,000 A_{AC} and a maximum rated voltage of 500 V_{AC}. To ensure UL-compliant installation, the power data for fuses installed in MOVIMOT® units may not exceed 35 A/600 V.
- Use only tested units with a limited output voltage (V_{max} = DC 30 V) and limited output current (I = 8 A) as external DC 24 V voltage sources.
- The UL certification only applies to operation on voltage networks with voltages to ground up to a maximum of 300 V.

1) The maximum altitude is limited by creeping distances and flameproof components such as electrolytic capacitors.

EMC metal cable glands Install the EMC metal cable glands from SEW as follows:



[1] Important: Cut off insulation foil, do not fold it back.

Wiring check

Before connecting power to the system for the first time, perform a wiring check to **prevent injury to persons or damage to systems and equipment** caused by incorrect wiring.

- Remove all bus modules from the connection module
- Disconnect all MOVIMOT® inverters from the connection module (only with MFZ.7, MFZ.8)
- Disconnect all plug connectors of the motor connection (hybrid cable) from the field distributor
- Check the insulation of the cabling in accordance with applicable national standards
- Check the grounding
- Check insulation between the supply system cable and the DC 24 V cable
- Check insulation between supply system cable and communication line
- Check the polarity of the DC 24 V cable
- Check the polarity of the communication line
- Check the mains phase sequence
- Ensure equipotential bonding between the fieldbus interfaces

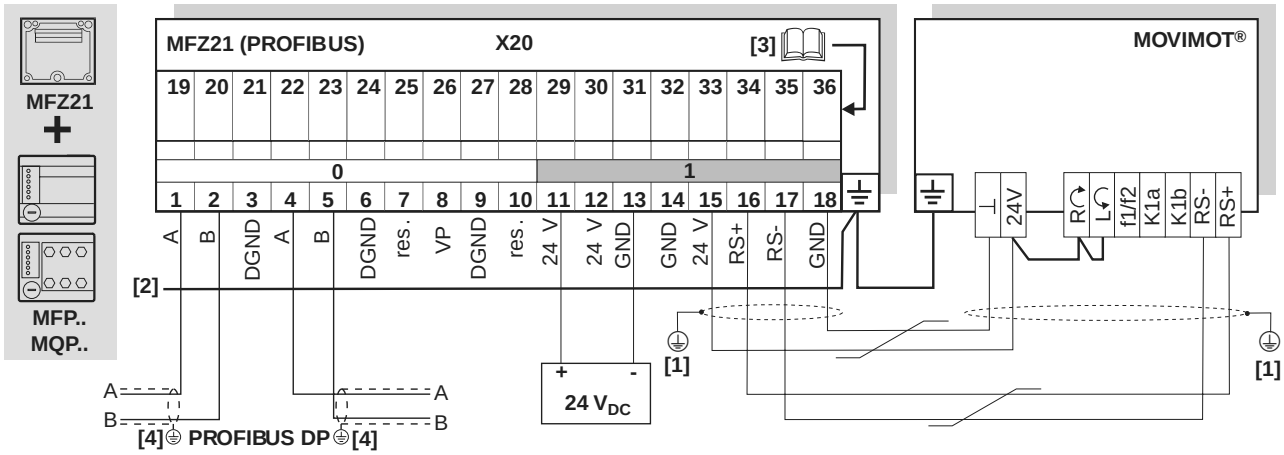
After the wiring check

- Connect and fasten all motor connections (hybrid cable)
- Connect and fasten all bus modules
- Install and fasten all MOVIMOT® inverters (for MFZ.7, MFZ.8 only)
- Install all terminal box covers
- Cover any plug connections not in use

Connecting the PROFIBUS cable in the field distributor

Note that the PROFIBUS connector cores inside the field distributor must be kept as short as possible and are always of equal length for the incoming and outgoing bus.

6.3 Connecting MFZ21 to MOVIMOT®



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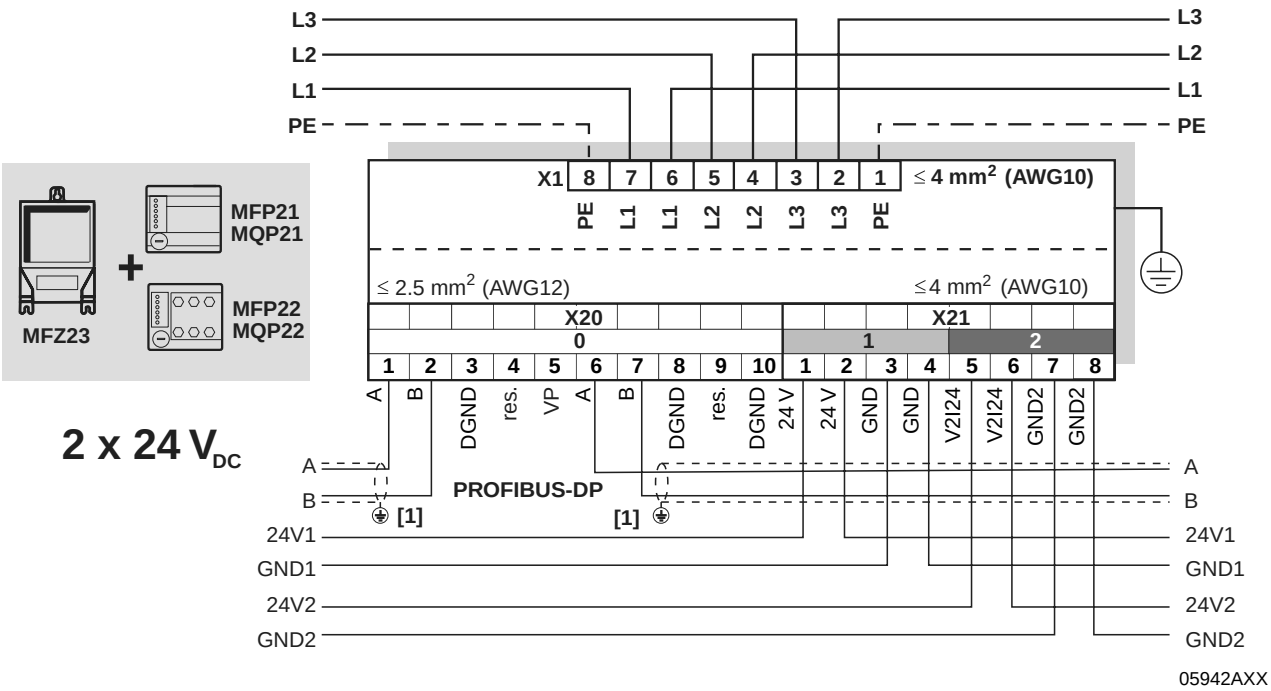
0 = Potential level 0 **1** = Potential level 1

[1] If MFZ21/MOVIMOT® are mounted separately:
Connect the shield of the RS-485 cable using the EMC metal cable gland on MFZ and the MOVIMOT® housing.
[2] Ensure equipotential bonding between all bus stations.
[3] 🕮 Assignment of terminals 19-36 from page 46
[4] EMC metal cable gland

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	A	Input	PROFIBUS-DP data line A (incoming)
	2	B	Input	PROFIBUS-DP data line B (incoming)
	3	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	4	A	Output	PROFIBUS-DP data line A (outgoing)
	5	B	Output	PROFIBUS-DP data line B (outgoing)
	6	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	7	-	-	Reserved
	8	VP	Output	+5 V output (max. 10 mA) (for test purposes only)
	9	DGND	-	Reference potential for VP (terminal 8, for test purposes only)
	10	-	-	Reserved
	11	24 V	Input	24 V voltage supply for module electronics and sensors
	12	24 V	Output	24 V voltage supply (jumpered with terminal X20/11)
	13	GND	-	0V24 reference potential for module electronics and sensors
	14	GND	-	0V24 reference potential for module electronics and sensors
	15	24 V	Output	24 V voltage supply for MOVIMOT® (jumpered with terminal X20/11)
	16	RS+	Output	Communication link to MOVIMOT® terminal RS+
	17	RS-	Output	Communication link to MOVIMOT® terminal RS-
	18	GND	-	0V24 reference potential for MOVIMOT® (jumpered with terminal X20/13)

6.4 Connecting field distributor MFZ23 to MFP../MQP..

Connection module MFZ23 with fieldbus module MFP/MQP21, MFP/MQP22 and two separate DC 24 V voltage circuits

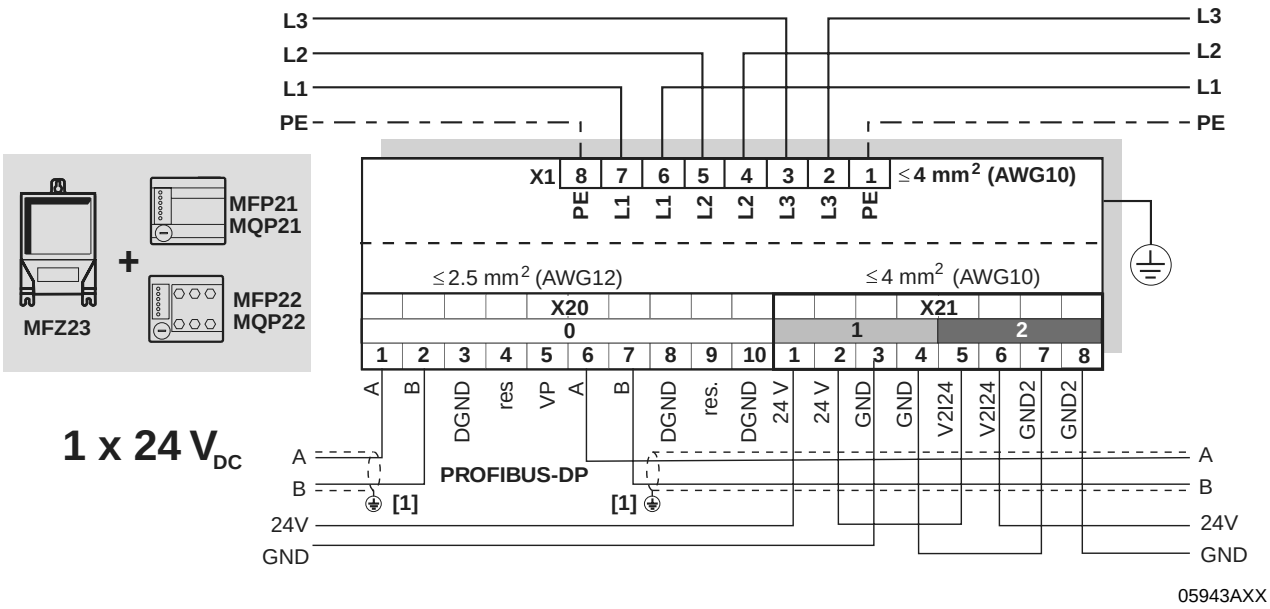


0 = Potential level 0 **1** = Potential level 1 **2** = Potential level 2

[1] EMC metal cable gland

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	A	Input	PROFIBUS-DP data line A (incoming)
	2	B	Input	PROFIBUS-DP data line B (incoming)
	3	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	4	-	-	Reserved
	5	VP	Output	+5 V output (max. 10 mA) (for test purposes only)
	6	A	Output	PROFIBUS-DP data line A (outgoing)
	7	B	Output	PROFIBUS-DP data line B (outgoing)
	8	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	9	-	-	Reserved
	10	DGND	-	Reference potential for VP (terminal 5, for test purposes only)
X21	**1**	24 V	Input	24 V voltage supply for module electronics, sensors and MOVIMOT®
	2	24 V	Output	24 V voltage supply (jumpered with terminal X21/1)
	3	GND	-	0V24 reference potential for module electronics, sensors and MOVIMOT®
	4	GND	-	0V24 reference potential for module electronics, sensors and MOVIMOT®
	5	V2I24	Input	24 V voltage supply for actuators (digital outputs)
	6	V2I24	Output	24 V voltage supply for actuators (digital outputs) jumpered with terminal X21/5
	7	GND2	-	0V24 reference potential for actuators
	8	GND2	-	0V24 reference potential for actuators

Connection module MFZ2 with fieldbus module MFP/MQP21, MFP/MQP22 and one DC 24 V voltage circuit

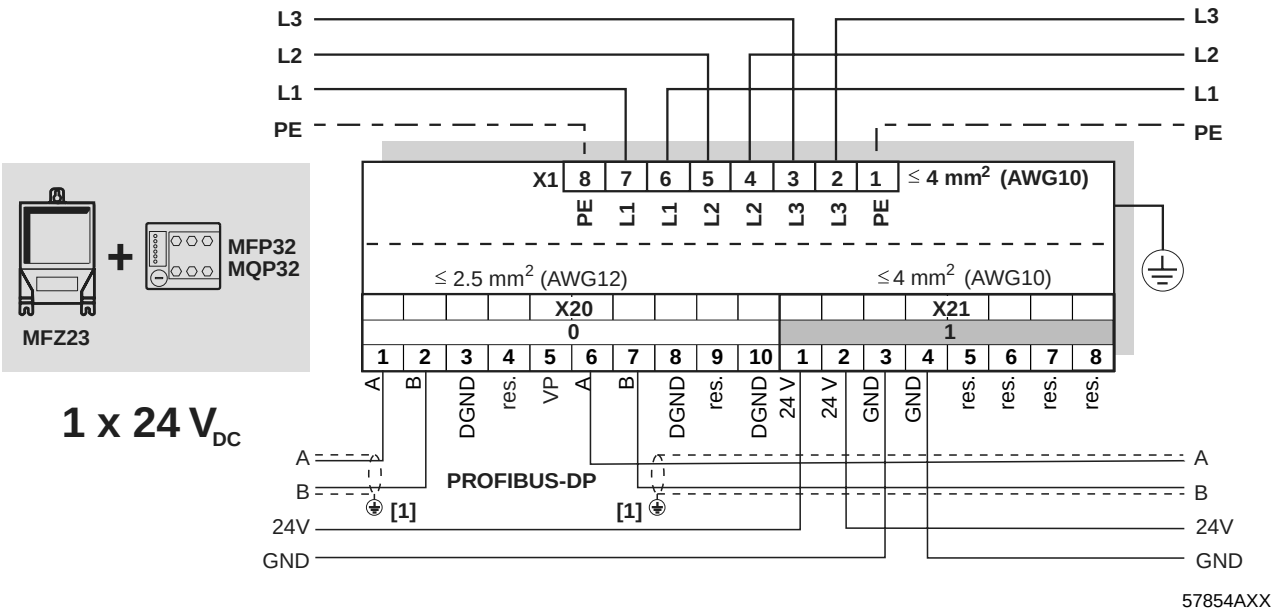


0 = Potential level 0 **1** = Potential level 1 **2** = Potential level 2

[1] EMC metal cable gland

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	A	Input	PROFIBUS-DP data line A (incoming)
	2	B	Input	PROFIBUS-DP data line B (incoming)
	3	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	4	-	-	Reserved
	5	VP	Output	+5 V output (max. 10 mA) (for test purposes only)
	6	A	Output	PROFIBUS-DP data line A (outgoing)
	7	B	Output	PROFIBUS-DP data line B (outgoing)
	8	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	9	-	-	Reserved
	10	DGND	-	Reference potential for VP (terminal 5, for test purposes only)
X21	**1**	24 V	Input	24 V voltage supply for module electronics, sensors and MOVIMOT®
	2	24 V	Output	24 V voltage supply (jumpered with terminal X21/1)
	3	GND	-	0V24 reference potential for module electronics, sensors and MOVIMOT®
	4	GND	-	0V24 reference potential for module electronics, sensors and MOVIMOT®
	5	V2I24	Input	24 V voltage supply for actuators (digital outputs)
	6	V2I24	Output	24 V voltage supply for actuators (digital outputs) jumpered with terminal X21/5
	7	GND2	-	0V24 reference potential for actuators
	8	GND2	-	0V24 reference potential for actuators

Connection module MFZ23 with fieldbus module MFP/MQP32



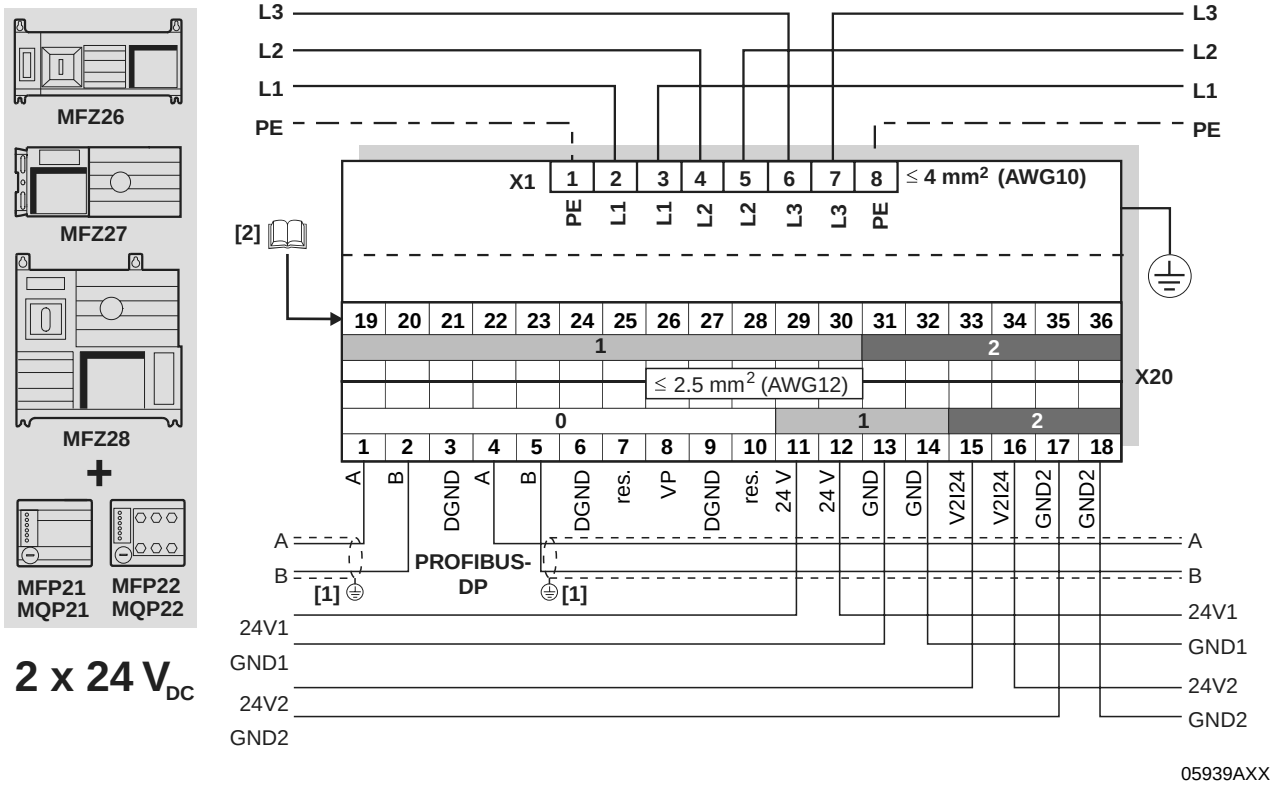
0 = Potential level 0 **1** = Potential level 1

[1] EMC metal cable gland

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	A	Input	PROFIBUS-DP data line A (incoming)
	2	B	Input	PROFIBUS-DP data line B (incoming)
	3	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	4	-	-	Reserved
	5	VP	Output	+5 V output (max. 10 mA) (for test purposes only)
	6	A	Output	PROFIBUS-DP data line A (outgoing)
	7	B	Output	PROFIBUS-DP data line B (outgoing)
	8	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	9	-	-	Reserved
	10	DGND	-	Reference potential for VP (terminal 5, for test purposes only)
X21	**1**	24 V	Input	24 V voltage supply for module electronics, sensors and MOVIMOT®
	2	24 V	Output	24 V voltage supply (jumpered with terminal X21/1)
	3	GND	-	0V24 reference potential for module electronics, sensors and MOVIMOT®
	4	GND	-	0V24 reference potential for module electronics, sensors and MOVIMOT®
	5	-	-	Reserved
	6	-	-	Reserved
	7	-	-	Reserved
	8	-	-	Reserved

6.5 Connecting field distributors MFZ26, MFZ27, MFZ28 to MFP../MQP..

Connection modules MFZ26, MFZ27, MFZ28 with fieldbus modules MFP/MQP21, MFP/MQP22 and two separate DC 24 V voltage circuits

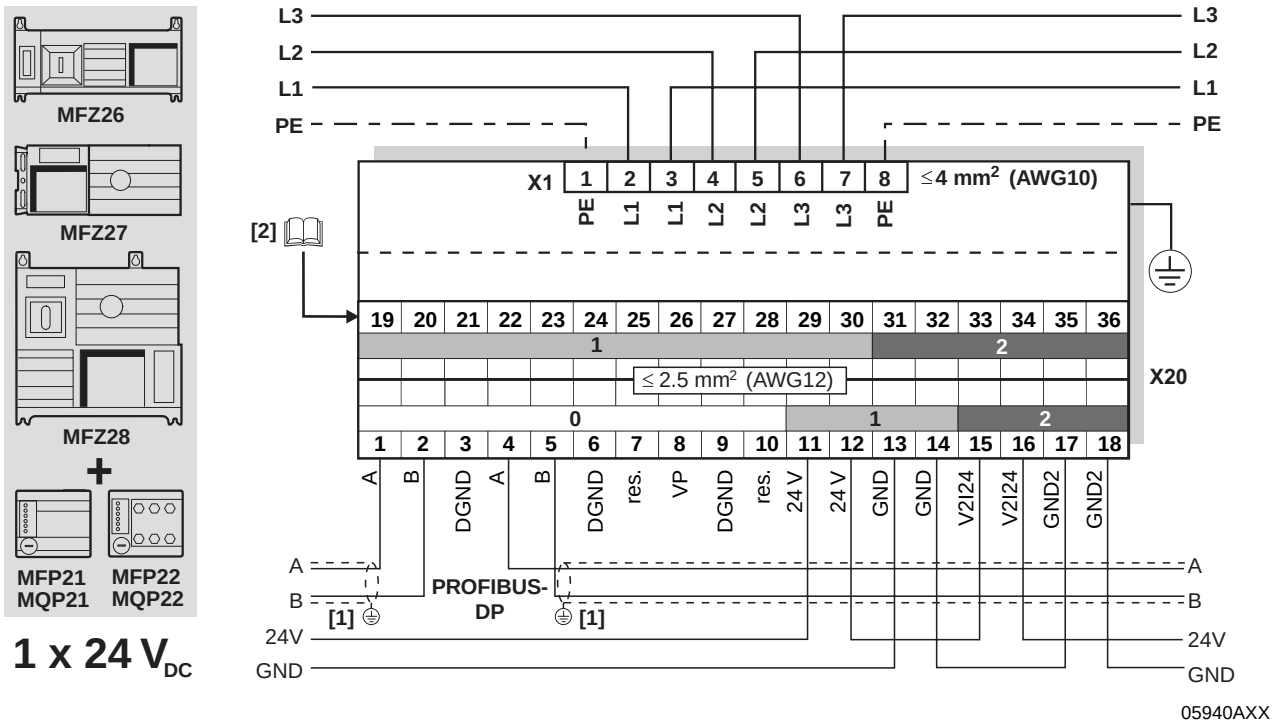


0 = Potential level 0 **1** = Potential level 1 **2** = Potential level 2

[1] EMC metal cable gland
[2] Assignment of terminals 19-36 from page 46

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	A	Input	PROFIBUS-DP data line A (incoming)
	2	B	Input	PROFIBUS-DP data line B (incoming)
	3	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	4	A	Output	PROFIBUS-DP data line A (outgoing)
	5	B	Output	PROFIBUS-DP data line B (outgoing)
	6	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	7	-	-	Reserved
	8	VP	Output	+5 V output (max. 10 mA) (for test purposes only)
	9	DGND	-	Reference potential for VP (terminal 8, for test purposes only)
	10	-	-	Reserved
	11	24 V	Input	24 V voltage supply for module electronics and sensors
	12	24 V	Output	24 V voltage supply (jumpered with terminal X20/11)
	13	GND	-	0V24 reference potential for module electronics and sensors
	14	GND	-	0V24 reference potential for module electronics and sensors
	15	V2I24	Input	24 V voltage supply for actuators (digital outputs)
	16	V2I24	Output	24 V voltage supply for actuators (digital outputs) jumpered with terminal X20/15
	17	GND2	-	0V24 reference potential for voltage potential
	18	GND2	-	0V24 reference potential for voltage potential

Connection modules MFZ26, MFZ 27, MFZ28 with fieldbus modules MFP/MQP21, MFP/MQP22 and one DC 24 V voltage circuit

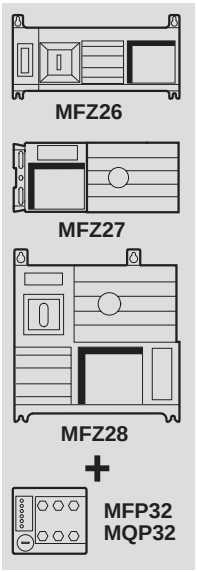


0 = Potential level 0 **1** = Potential level 1 **2** = Potential level 2

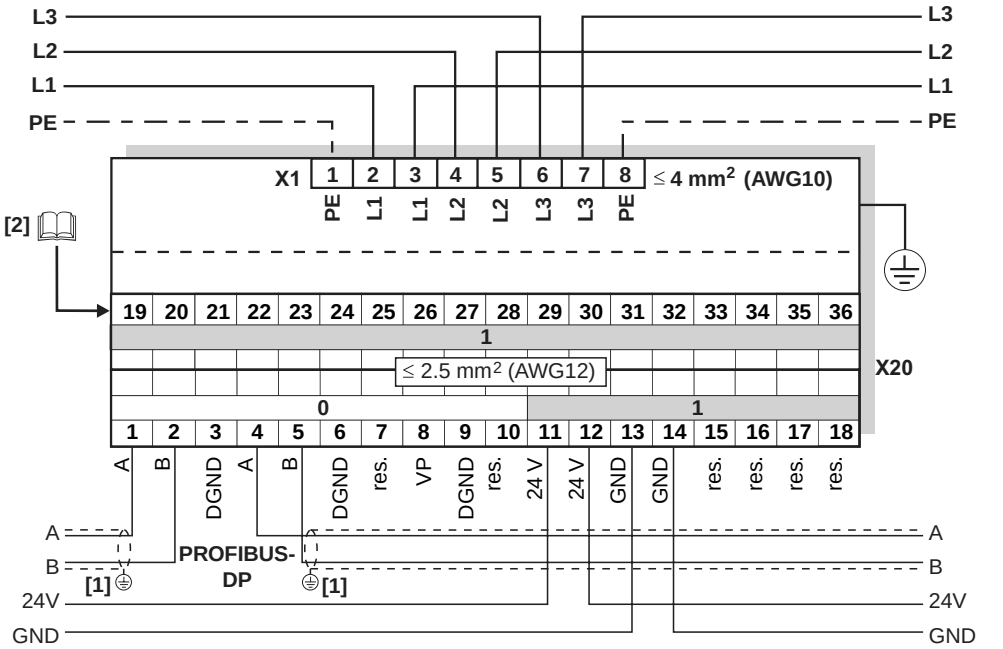
[1] EMC metal cable gland
[2] Assignment of terminals 19-36 from page 46

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	A	Input	PROFIBUS-DP data line A (incoming)
	2	B	Input	PROFIBUS-DP data line B (incoming)
	3	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	4	A	Output	PROFIBUS-DP data line A (outgoing)
	5	B	Output	PROFIBUS-DP data line B (outgoing)
	6	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	7	-	-	Reserved
	8	VP	Output	+5 V output (max. 10 mA) (for test purposes only)
	9	DGND	-	Reference potential for VP (terminal 8, for test purposes only)
	10	-	-	Reserved
	11	24 V	Input	24 V voltage supply for module electronics and sensors
	12	24 V	Output	24 V voltage supply (jumpered with terminal X20/11)
	13	GND	-	0V24 reference potential for module electronics and sensors
	14	GND	-	0V24 reference potential for module electronics and sensors
	15	V2I24	Input	24 V voltage supply for actuators (digital outputs)
	16	V2I24	Output	24 V voltage supply for actuators (digital outputs) jumpered with terminal X20/15
	17	GND2	-	0V24 reference potential for voltage potential
	18	GND2	-	0V24 reference potential for voltage potential

Connection modules MFZ26, MFZ27, MFZ28 with fieldbus module MFP/MQP32



1 x 24 V_{DC}



0 = Potential level 0 **1** = Potential level 1

[1] EMC metal cable gland
[2] 📖 Assignment of terminals 19-36 from page 46

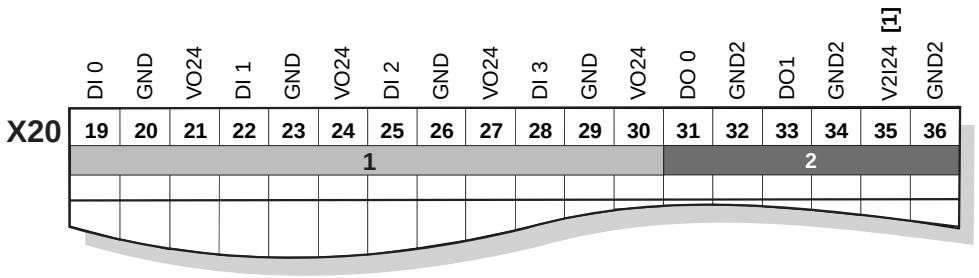
Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	A	Input	PROFIBUS-DP data line A (incoming)
	2	B	Input	PROFIBUS-DP data line B (incoming)
	3	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	4	A	Output	PROFIBUS-DP data line A (outgoing)
	5	B	Output	PROFIBUS-DP data line B (outgoing)
	6	DGND	-	Data reference potential for PROFIBUS-DP (for test purposes only)
	7	-	-	Reserved
	8	VP	Output	+5 V output (max. 10 mA) (for test purposes only)
	9	DGND	-	Reference potential for VP (terminal 8, for test purposes only)
	10	-	-	Reserved
	11	24 V	Input	24 V voltage supply for module electronics and sensors
	12	24 V	Output	24 V voltage supply (jumpered with terminal X20/11)
	13	GND	-	0V24 reference potential for module electronics and sensors
	14	GND	-	0V24 reference potential for module electronics and sensors
	15	V2I24	-	Reserved
	16	V2I24	-	Reserved
	17	GND2-	-	Reserved
	18	GND2	-	Reserved

6.6 Connecting inputs/outputs (I/Os) of fieldbus interfaces MF../MQ..

Connection via terminals for...

...fieldbus interfaces with 4 digital inputs and 2 digital outputs:

MFZ.1 **MFZ.6** **MFZ.7** **MFZ.8**	in combination with	**MF.21** **MF.22** **MF.23** **MQ.21** **MQ.22**



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[1] Only MFI23: Reserved
All other MF.. modules: V2I24

1	= Potential level 1
2	= Potential level 2

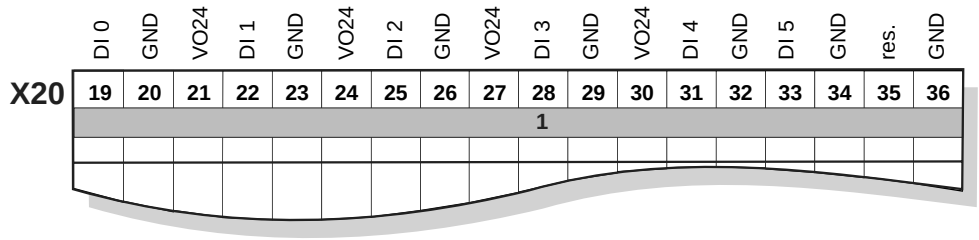
No.		Name	Direction	Function
X20	**19**	DI0	Input	Control signal of sensor 1[1)]
	20	GND	-	0V24 reference potential for sensor 1
	21	V024	Output	24 V voltage supply for sensor 1[1)]
	22	DI1	Input	Control signal of sensor 2
	23	GND	-	0V24 reference potential for sensor 2
	24	V024	Output	24 V voltage supply for sensor 2
	25	DI2	Input	Control signal of sensor 3
	26	GND	-	0V24 reference potential for sensor 3
	27	V024	Output	24 V voltage supply for sensor 3
	28	DI3	Input	Control signal of sensor 4
	29	GND	-	0V24 reference potential for sensor 4
	30	V024	Output	24 V voltage supply for sensor 4
	31	DO0	Output	Control signal of actuator 1
	32	GND2	-	0V24 reference potential for actuator 1
	33	DO1	Output	Control signal of actuator 2
	34	GND2	-	0V24 reference potential for actuator 2
	35	V2I24	Input	24 V voltage supply for actuators **Only for MFI23: Reserved** **Only for MFZ.6, MFZ.7 and MFZ.8: Jumpered with terminal 15 or 16**
	36	GND2	-	0V24 reference potential for actuators **Only for MFZ.6, MFZ.7 and MFZ.8: Jumpered with terminal 17 or 18**

1) Used in conjunction with field distributors MFZ26J and MFZ28J for maintenance switch feedback signal (NO contact). Evaluation via control is possible.

Connection via terminals for...

...fieldbus interfaces with 6 digital inputs:

MFZ.1 **MFZ.6** **MFZ.7** **MFZ.8**	in combination with	**MF.32** **MF.33**	**MQ.32**



06123AXX

1 = Potential level 1

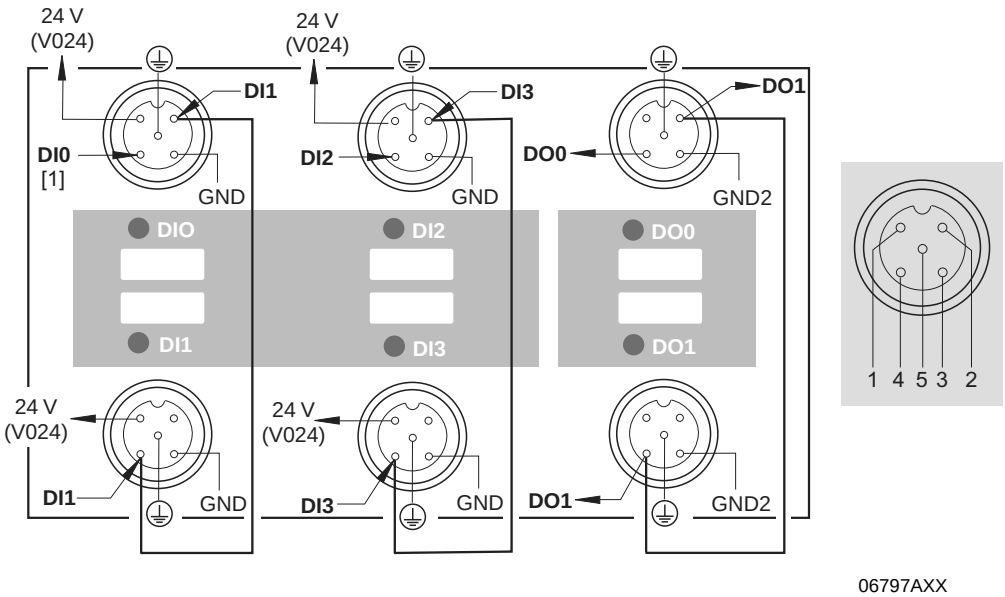
No.		Name	Direction	Function
X20	**19**	DI0	Input	Control signal of sensor 1[1)]
	20	GND	-	0V24 reference potential for sensor 1
	21	V024	Output	24 V voltage supply for sensor 1[1)]
	22	DI1	Input	Control signal of sensor 2
	23	GND	-	0V24 reference potential for sensor 2
	24	V024	Output	24 V voltage supply for sensor 2
	25	DI2	Input	Control signal of sensor 3
	26	GND	-	0V24 reference potential for sensor 3
	27	V024	Output	24 V voltage supply for sensor 3
	28	DI3	Input	Control signal of sensor 4
	29	GND	-	0V24 reference potential for sensor 4
	30	V024	Output	24 V voltage supply for sensor 4
	31	DI4	Input	Control signal of sensor 5
	32	GND	-	0V24 reference potential for sensor 5
	33	DI5	Input	Control signal of sensor 6
	34	GND	-	0V24 reference potential for sensor 6
	35	res.	-	Reserved
	36	GND	-	0V24 reference potential for sensors

1) Used in conjunction with field distributors MFZ26J and MFZ28J for maintenance switch feedback signal (NO contact). Evaluation via control is possible.

Connection via M12 connector for...

...fieldbus interfaces MF.22, MQ.22, MF.23 with 4 digital inputs and 2 digital outputs:

- Connect sensors/actuators using either M12 sockets or terminals.
- When using outputs: Connect 24 V to V2I24 / GND2.
- Connect dual-channel sensors/actuators to DI0, DI2 and DO0. DI1, DI3 and DO1 can no longer be used.



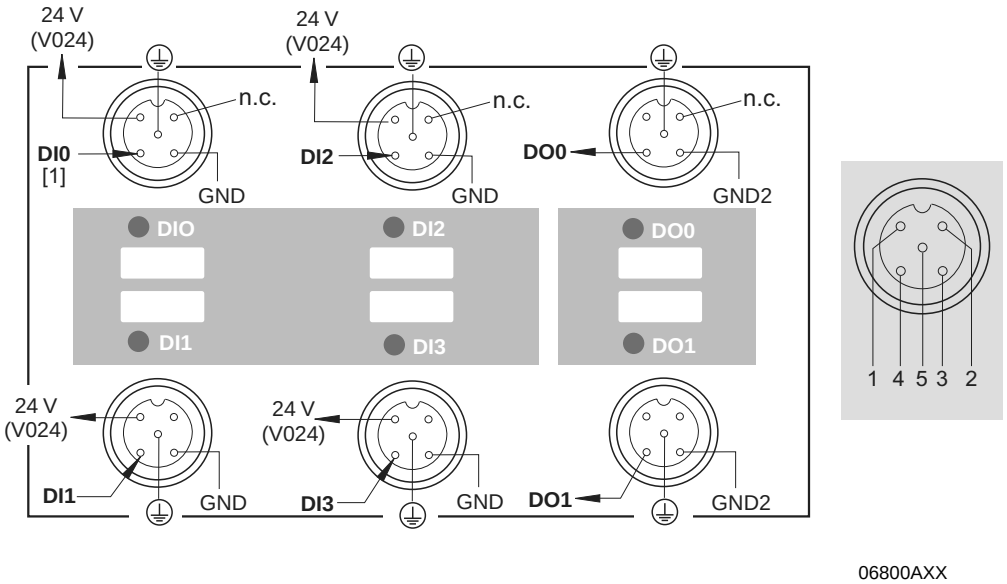
[1] Do not use DI0 in combination with field distributors MFZ26**J** and MFZ28**J**.

Important: Connections that are not in use must be covered with M12 closing caps to guarantee enclosure IP65.

Connection via M12 connector for...

...fieldbus interfaces MFP22H, MFD22H:

- Connect sensors/actuators using either M12 sockets or terminals.
- When using outputs: Connect 24 V to V2I24 / GND2.
- The following sensors/actuators can be connected:
  - Four single-channel sensors and two single-channel actuators or four dual-channel sensors and two dual-channel actuators.
  - The second channel is not connected when dual-channel sensors/actuators are used.



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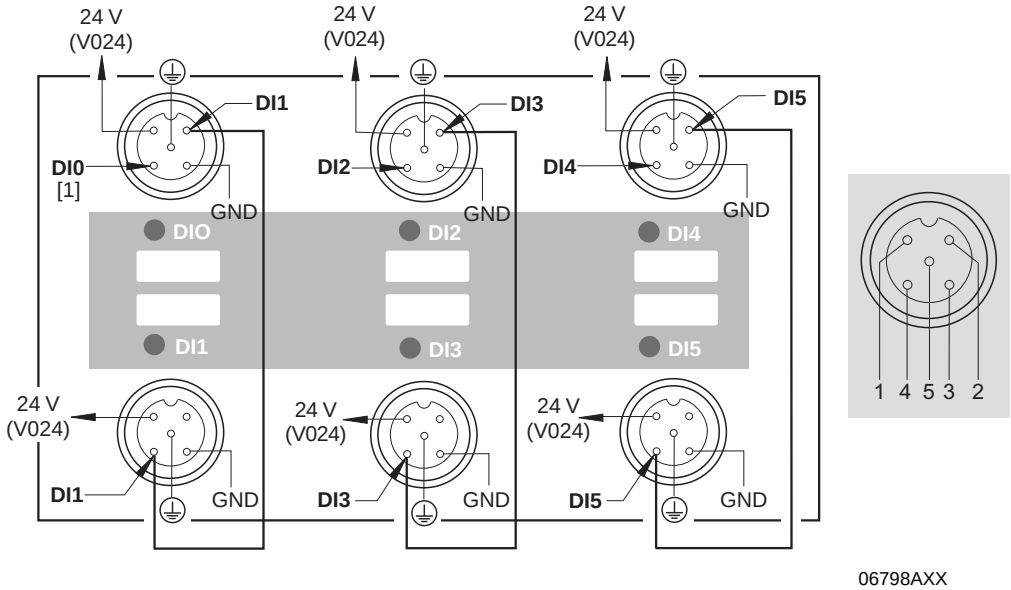
[1] Do not use DI0 in combination with field distributors MFZ26**J** and MFZ28**J**.

Important: Connections that are not in use must be covered with M12 closing caps to guarantee enclosure IP65.

Connection via M12 connector for...

MF.32, MQ.32, MF.33 fieldbus interfaces with 6 digital inputs:

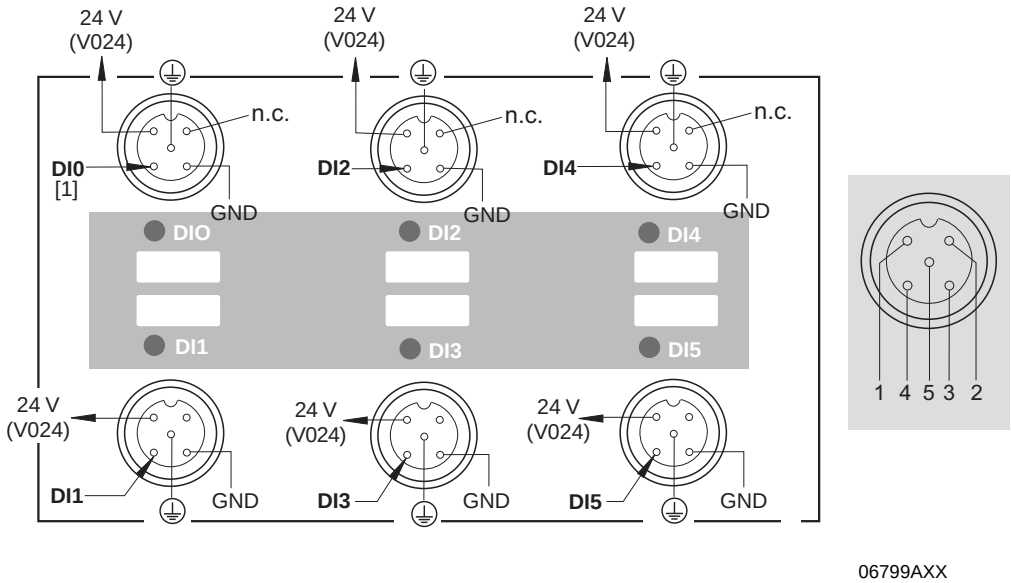
- Connect sensors using either M12 sockets or terminals.
- Connect dual-channel sensors to DI0, DI2 and DI4. DI1, DI3 and DI5 can no longer be used.



[1] Do not use DI0 in combination with field distributors MFZ26**J** and MFZ28**J**.

Fieldbus interfaces MFP32H, MFD32H:

- Connect sensors using either M12 sockets or terminals.
- The following sensors can be connected:
  - Six single-channel sensors or six dual-channel sensors.
  - The second channel is not connected when dual-channel sensors are used.



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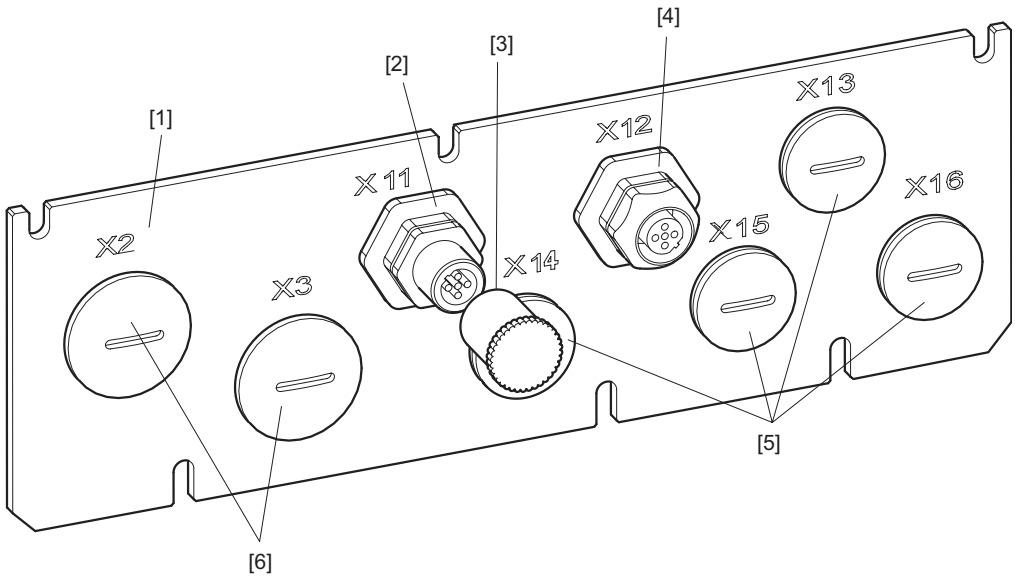
[1] Do not use DI0 in combination with field distributors MFZ26**J** and MFZ28**J**.

Important: Connections that are not in use must be covered with M12 closing caps to guarantee enclosure IP65.

6.7 Bus connection with optional connection technology

Mounting flange AF2

Mounting flange AF2 can be used instead of standard design AF0 with field distributors for PROFIBUS MFZ26D6 and MFZ28D. AF2 comes equipped with a M12 connector system for PROFIBUS connection. The unit comes equipped with an X11 connector for the incoming PROFIBUS and an X12 socket for the outgoing PROFIBUS. The M12 connectors have a "reverse-key coding design" also referred to as B or W coding.



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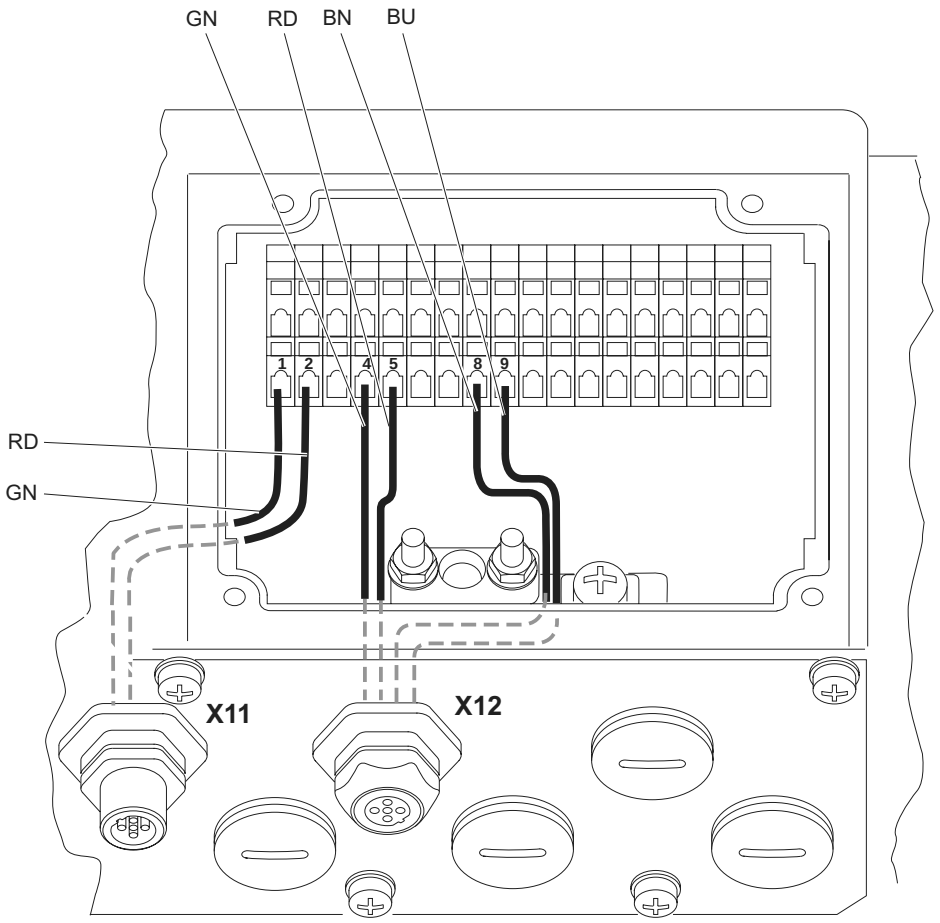
[1] Front panel
[2] Connector M12, incoming PROFIBUS (X11)
[3] Protection cap
[4] Socket M12, outgoing PROFIBUS (X12)
[5] Screw plug M20
[6] Screw plug M25

Mounting flange AF2 corresponds to the recommendations from PROFIBUS Directive no. 2.141 "Connection technology for Profibus."

In contrast to the standard design, the switchable bus terminator in the MFP../MQP module is not available if AF2 is used. A pluggable bus terminator (M12) should be used in the last station in place of the outgoing X12 bus connection.

Wiring and pin assignment for AF2



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M12 connector X11		
	**Pin 1**	Not assigned
	Pin 2	A line PROFIBUS (incoming)
	Pin 3	Not assigned
	Pin 4	B line PROFIBUS (incoming)
	Pin 5	Not assigned
	Thread	Shield or protective earth

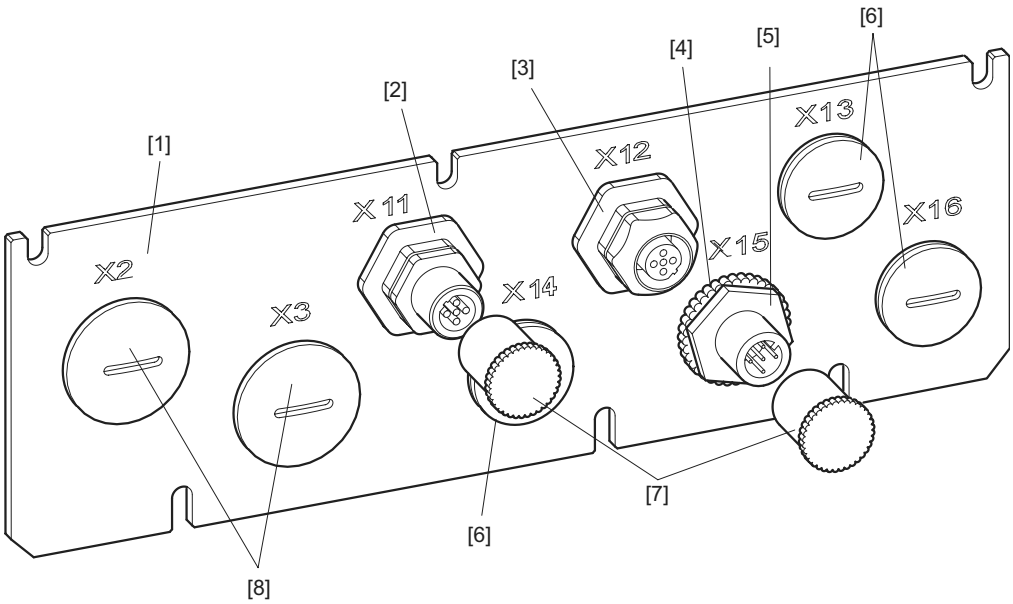
M12 socket X12		
	**Pin 1**	VP supply voltage 5 V for terminating resistor
	Pin 2	A line PROFIBUS (outgoing)
	Pin 3	DGND reference potential for VP (pin 1)
	Pin 4	B line PROFIBUS (outgoing)
	Pin 5	Not assigned
	Thread	Shield or protective earth

Mounting flange AF3

Mounting flange AF3 can be used instead of standard design AF0 with field distributors for PROFIBUS MFZ26D and MFZ28D.

AF3 comes equipped with a M12 connector system for PROFIBUS connection. The unit comes equipped with an X11 connector for the incoming PROFIBUS and an X12 socket for the outgoing PROFIBUS. The M12 connectors have a "reverse-key coding design" also referred to as B or W coding.

In addition, AF3 features an M12 connector plug X15 (4-pin, regular coding) for supplying the 24 V supply voltage(s).



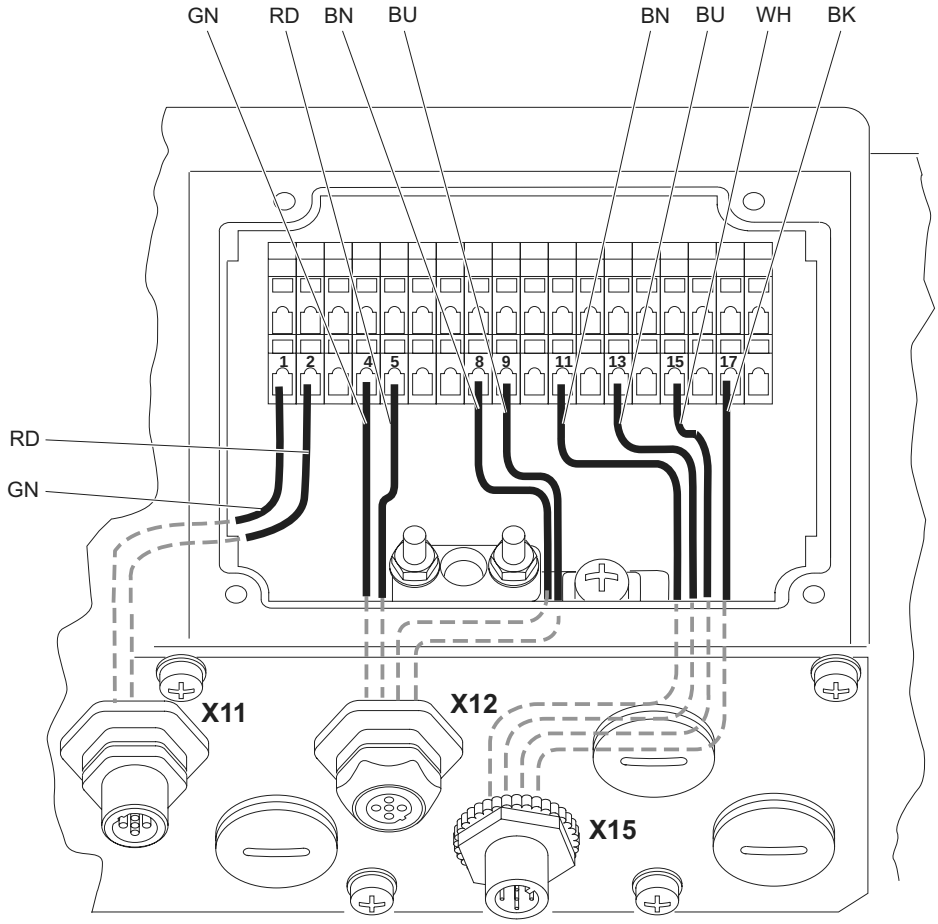
51336AXX

[1] Front panel
[2] Connector M12, incoming PROFIBUS (X11)
[3] Socket M12, outgoing PROFIBUS (X12)
[4] Reduction
[5] Connector M12, 24 V voltage supply (X15)
[6] Screw plug M20
[7] Protection cap
[8] Screw plug M25

Mounting flange AF3 corresponds to the recommendations from PROFIBUS Directive no. 2.141 "Connection technology for Profibus."

In contrast to the standard design, the switchable bus terminator in the MFP../MQP module is not available if AF3 is used. A pluggable bus terminator (M12) should be used in the last station in place of the outgoing X12 bus connection.

AF3 wiring and pin assignment



51335AXX

M12 connector X11		
	**Pin 1**	Not assigned
	Pin 2	A line PROFIBUS (incoming)
	Pin 3	Not assigned
	Pin 4	B line PROFIBUS (incoming)
	Pin 5	Not assigned
	Thread	Shield or protective earth

M12 socket X12		
	**Pin 1**	VP supply voltage 5 V for terminating resistor
	Pin 2	A line PROFIBUS (outgoing)
	Pin 3	DGND reference potential for VP (pin 1)
	Pin 4	B line PROFIBUS (outgoing)
	Pin 5	Not assigned
	Thread	Shield or protective earth

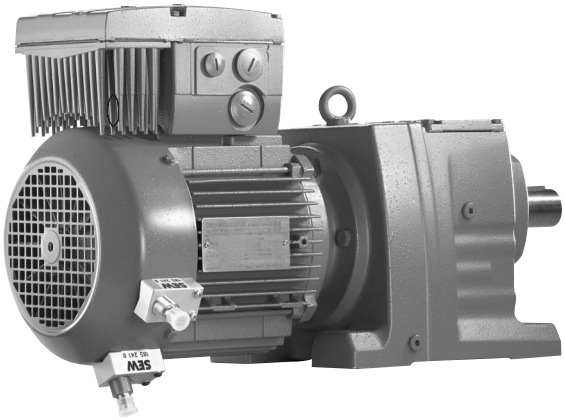
M12 plug X15		
	**Pin 1**	24 V voltage supply, 24 V for module electronics and sensors
	Pin 2	V2I24 voltage supply, 24 V for actuators
	Pin 3	GND - 0V24 reference potential, 24 V for module electronics and sensors
	Pin 4	GND2 - 0V24 reference potential for actuators

6.8 Connecting the NV26 proximity sensor

Features

The NV26 proximity sensor has the following features:

- 2 sensors with 6 pulses/revolution
- 24 increments/revolution with 4-fold evaluation
- Encoder monitoring and evaluation is possible with the MQ.. fieldbus interface



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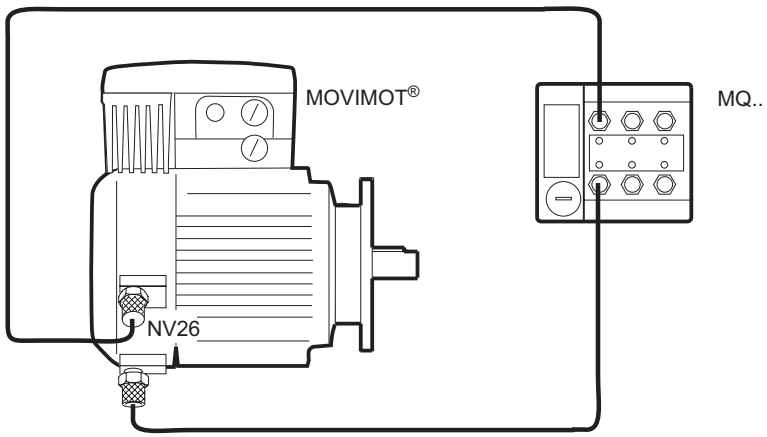
There must be a 45° angle between the sensors.

Connection

- Use a shielded M12 cable to connect the NV26 proximity sensor to the DI0 and DI1 inputs of the MQ.. fieldbus interface.



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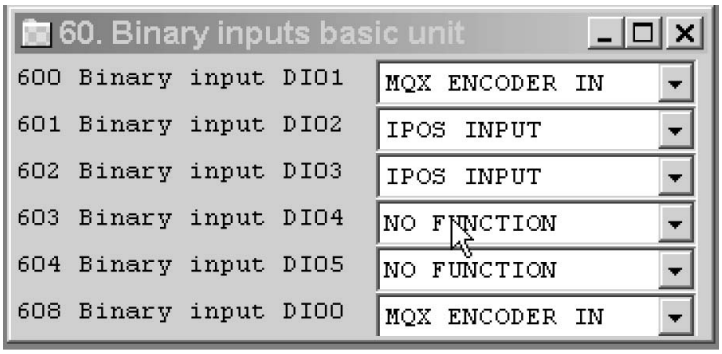
- The current position can be checked by reading variable H511 (ActPosMot).
- SEW-EURODRIVE recommends activating the encoder monitoring function using parameter P504 "Encoder monitoring motor".

Encoder evaluation

The inputs of the MQX fieldbus interface are filtered with 4 ms according to the factory setting. The terminal assignment "MQX ENCODER IN" switches this filter off for the proximity sensor evaluation.



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For more information, refer to the "IPOS$^{plus®}$ positioning and sequence control" manual, section "IPOS for MQX", in particular the paragraph "Proximity sensor evaluation."

6.9 Connecting the incremental encoder ES16

Features

The ES16 incremental encoder has the following features:

- 6 pulses/revolution
- 24 increments/revolution with 4-fold evaluation
- Encoder monitoring and evaluation is possible with the MQ.. fieldbus interface

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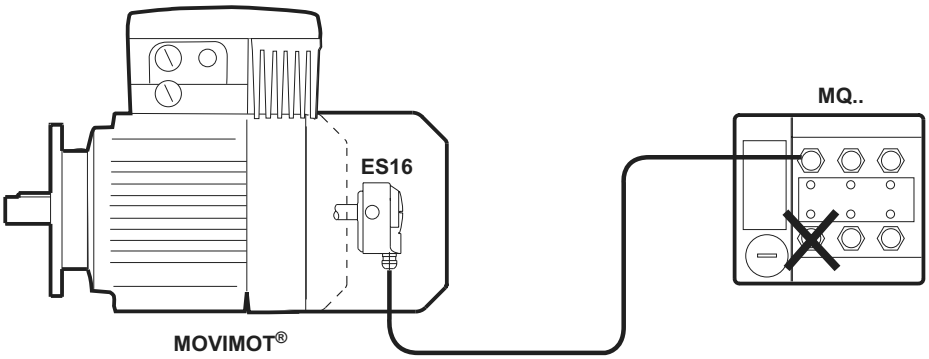
Installation in combination with fieldbus interface MQ..

- Connect the ES16 incremental encoder to the inputs of the MQ.. fieldbus interface using a shielded M12 cable (see section "Wiring diagram").



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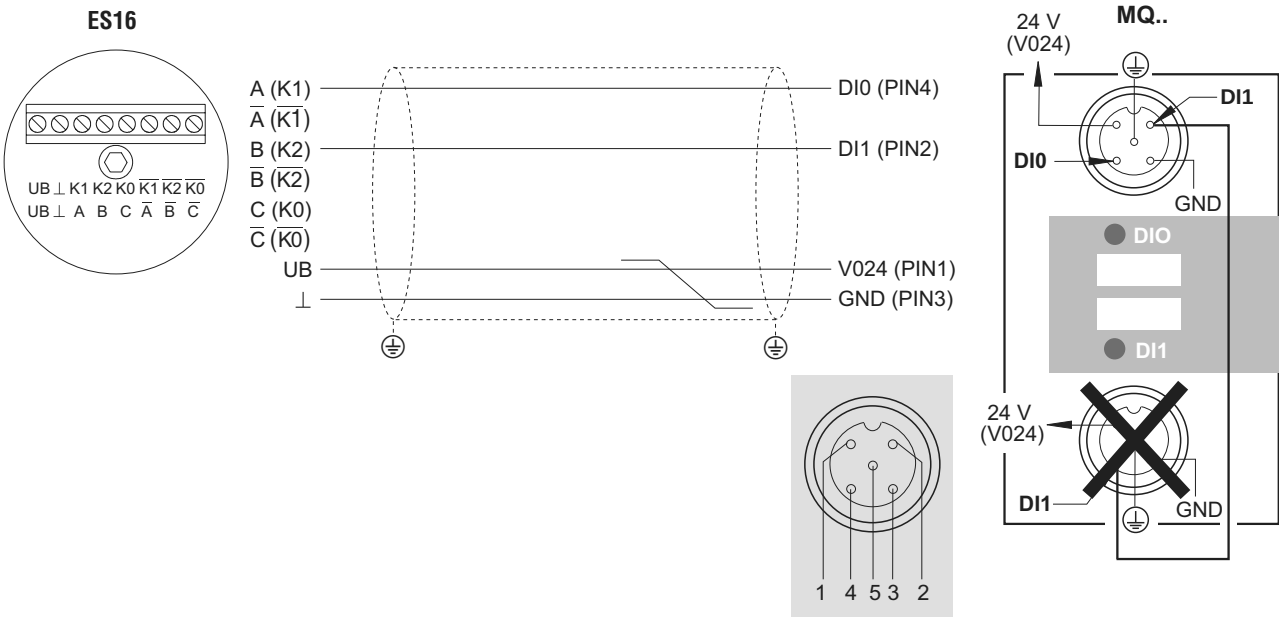
- The current position can be checked by reading variable H511 (ActPosMot).
- SEW-EURODRIVE recommends activating the encoder monitoring function using parameter P504 "Encoder monitoring motor".

Wiring diagram



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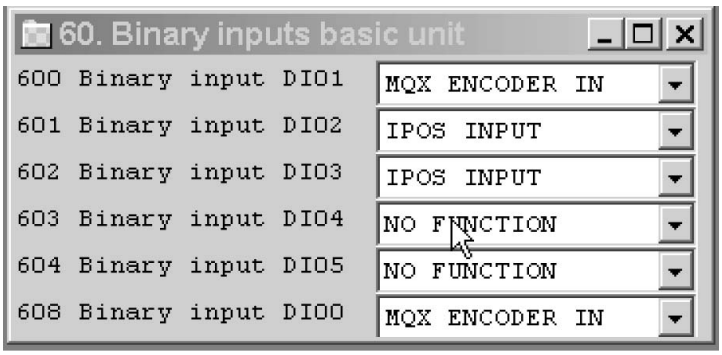
Do not assign the input socket DI1 more than once.

Encoder evaluation

The inputs of the MQX fieldbus interface are filtered with 4 ms according to the factory setting. The terminal assignment "MQX ENCODER IN" switches this filter off for the proximity sensor evaluation.



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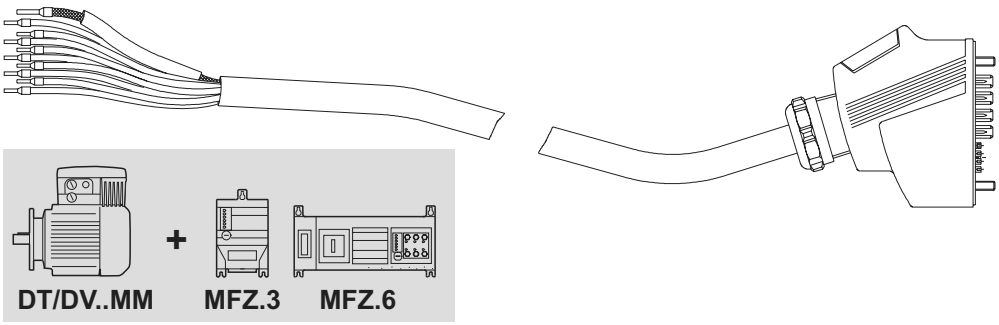
For more information, refer to the "IPOS$^{plus®}$ positioning and sequence control" manual, section "IPOS for MQX", in particular the paragraph "Proximity sensor evaluation."

The functions of the ES16 incremental encoder are comparable with the functions of the NV26 proximity sensor.

6.10 Connecting prefabricated cables

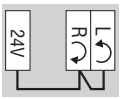
Connection between field distributor MFZ.3. or MFZ.6. and MOVIMOT® (part number 0 186 725 3)



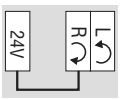
51246AXX

Cable assignment	
MOVIMOT® terminal	**Core color / designation**
L1	Black/L1
L2	Black/L2
L3	Black/L3
24 V	Red/24V
⊥	White / 0V, white / 0V
RS+	Orange/RS+
RS-	Green/RS-
PE terminal	Green/yellow + shield end

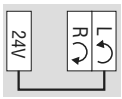
Observe the enable for the direction of rotation



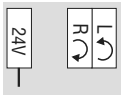
Both directions of rotation are enabled



Only CW operation is enabled; Setpoint specifications for CCW rotation result in standstill of drive

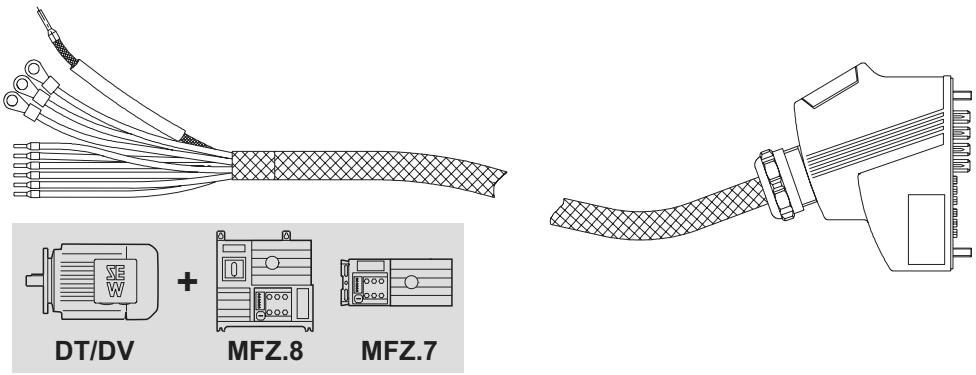


Only CCW operation is enabled; Setpoint specifications for CW rotation result in standstill of drive



Drive is blocked or brought to a stop

Connection between field distributor MFZ.7. or MFZ.8. and AC motors (part number 0 186 742 3)



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The outer shield of the cable must be attached to the housing of the motor terminal box using an EMC metal cable gland.

Cable assignment	
Motor terminal	**Core color / designation**
U1	Black/U1
V1	Black/V1
W1	Black/W1
4a	Red/13
3a	White/14
5a	Blue/15
1a	Black/1
2a	Black/2
PE terminal	Green/yellow + shield end (internal shield)

Assignments for motors → field distributors MF../MM../Z.7., MQ../MM../Z.7.

1400 1/min:

Power [kW]	Motor ⅄	Field distributor	
		with MF.. fieldbus interface	with MQ.. fieldbus interface
0.25	DFR63L4/TH	– MF../ **MM03C** / Z.7F **0** / **BW1**[1)]	– MQ../ **MM03C** / Z.7F **0** / **BW1**[1)]
	DFR63L4/**BMG**/TH.	– MF../ **MM03C** / Z.7F **0**[1)]	– MQ../ **MM03C** / Z.7F **0**[1)]
0.37	DT71D4/TH	MF../ **MM03C** / Z.7F **0** / **BW1** MF../ **MM05C** / Z.7F **0** / **BW1**[1)]	MQ../ **MM03C** / Z.7F **0** / **BW1** MQ../ **MM05C** / Z.7F **0** / **BW1**[1)]
	DT71D4/**BMG**/TH.	MF../ **MM03C** / Z.7F **0** MF../ **MM05C** / Z.7F **0**[1)]	MQ../ **MM03C** / Z.7F **0** MQ../ **MM05C** / Z.7F **0**[1)]
0.55	DT80K4/TH	MF../ **MM05C** / Z.7F **0** / **BW1** MF../ **MM07C** / Z.7F **0** / **BW1**[1)]	MQ../ **MM05C** / Z.7F **0** / **BW1** MQ../ **MM07C** / Z.7F **0** / **BW1**[1)]
	DT80K4/**BMG**/TH.	MF../ **MM05C** / Z.7F **0** MF../ **MM07C** / Z.7F **0**[1)]	MQ../ **MM05C** / Z.7F **0** MQ../ **MM07C** / Z.7F **0**[1)]
0.75	DT80N4/TH	MF../ **MM07C** / Z.7F **0** / **BW1** MF../ **MM11C** / Z.7F **0** / **BW1**[1)]	MQ../ **MM07C** / Z.7F **0** / **BW1** MQ../ **MM11C** / Z.7F **0** / **BW1**[1)]
	DT80N4/**BMG**/TH.	MF../ **MM07C** / Z.7F **0** MF../ **MM11C** / Z.7F **0**[1)]	MQ../ **MM07C** / Z.7F **0** MQ../ **MM11C** / Z.7F **0**[1)]
1.1	DT90S4/TH	MF../ **MM11C** / Z.7F **0** / **BW1** MF../ **MM15C** / Z.7F **0** / **BW1**[1)]	MQ../ **MM11C** / Z.7F **0** / **BW1** MQ../ **MM15C** / Z.7F **0** / **BW1**[1)]
	DT90S4/**BMG**/TH.	MF../ **MM11C** / Z.7F **0** MF../ **MM15C** / Z.7F **0**[1)]	MQ../ **MM11C** / Z.7F **0** MQ../ **MM15C** / Z.7F **0**[1)]
1.5	DT90L4/TH	MF../ **MM15C** / Z.7F **0** / **BW1** –	MQ../ **MM15C** / Z.7F **0** / **BW1** –
	DT90L4/**BMG**/TH.	MF../ **MM15C** / Z.7F **0** –	MQ../ **MM15C** / Z.7F **0** –

1) Combination with increased short-term torque

2900 1/min:

Power [kW]	Motor △	Field distributor	
		with MF.. fieldbus interface	with MQ.. fieldbus interface
0.37	DFR63L4/TH	MF../ **MM03C** / Z.7F **1** / **BW1** MF../ **MM05C** / Z.7F **1** / **BW1**[1)]	MQ../ **MM03C** / Z.7F **1** / **BW1** MQ../ **MM05C** / Z.7F **1** / **BW1**[1)]
	DFR63L4 / **BMG** / TH .	MF../ **MM03C** / Z.7F **1** MF../ **MM05C** / Z.7F **1**[1)]	MQ../ **MM03C** / Z.7F **1** MQ../ **MM05C** / Z.7F **1**[1)]
0.55	DT71D4/TH	MF../ **MM05C** / Z.7F **1** / **BW1** MF../ **MM07C** / Z.7F **1** / **BW1**[1)]	MQ../ **MM05C** / Z.7F **1** / **BW1** MQ../ **MM07C** / Z.7F **1** / **BW1**[1)]
	DT71D4 / **BMG** / TH .	MF../ **MM05C** / Z.7F **1** MF../ **MM07C** / Z.7F **1**[1)]	MQ../ **MM05C** / Z.7F **1** MQ../ **MM07C** / Z.7F **1**[1)]
0.75	DT80K4/TH	MF../ **MM07C** / Z.7F **1** / **BW1** MF../ **MM11C** / Z.7F **1** / **BW1**[1)]	MQ../ **MM07C** / Z.7F **1** / **BW1** MQ../ **MM11C** / Z.7F **1** / **BW1**[1)]
	DT80K4 / **BMG** / TH .	MF../ **MM07C** / Z.7F **1** MF../ **MM11C** / Z.7F **1**[1)]	MQ../ **MM07C** / Z.7F **1** MQ../ **MM11C** / Z.7F **1**[1)]
1.1	DT80N4/TH	MF../ **MM11C** / Z.7F **1** / **BW1** MF../ **MM15C** / Z.7F **1** / **BW1**[1)]	MQ../ **MM11C** / Z.7F **1** / **BW1** MQ../ **MM15C** / Z.7F **1** / **BW1**[1)]
	DT80N4 / **BMG** / TH .	MF../ **MM11C** / Z.7F **1** MF../ **MM15C** / Z.7F **1**[1)]	MQ../ **MM11C** / Z.7F **1** MQ../ **MM15C** / Z.7F **1**[1)]
1.5	DT90S4/TH	MF../ **MM15C** / Z.7F **1** / **BW1** –	MQ../ **MM15C** / Z.7F **1** / **BW1** –
	DT90S4 / **BMG** / TH .	MF../ **MM15C** / Z.7F **1** –	MQ../ **MM15C** / Z.7F **1** –

1) Combination with increased short-term torque

Assignments for motors → field distributors MF../MM../Z.8., MQ../MM../Z.8.

1400 1/min:

Power [kW]	Motor	Field distributor	
		with MF.. fieldbus interface	**with MQ.. fieldbus interface**
0.25	DFR63L4/TH	–	–
		MF../ **MM03C** / Z.8F **0** / **BW1** / AF..[1)]	MQ../ **MM03C** / Z.8F **0** / **BW1** / AF..[1)]
	DFR63L4 / **BMG** / TH .	–	–
		MF../ **MM03C** / Z.8F **0** / AF..[1)]	MQ../ **MM03C** / Z.8F **0** / AF..[1)]
0.37	DT71D4/TH	MF../ **MM03C** / Z.8F **0** / **BW1** / AF.. MF../ **MM05C** / Z.8F **0** / **BW1** / AF..[1)]	MQ../ **MM03C** / Z.8F **0** / **BW1** / AF.. MQ../ **MM05C** / Z.8F **0** / **BW1** / AF..[1)]
	DT71D4 / **BMG** / TH .	MF../ **MM03C** / Z.8F **0** / AF.. MF../ **MM05C** / Z.8F **0** / AF..[1)]	MQ../ **MM03C** / Z.8F **0** / AF.. MQ../ **MM05C** / Z.8F **0** / AF..[1)]
0.55	DT80K4/TH	MF../ **MM05C** / Z.8F **0** / **BW1** / AF.. MF../ **MM07C** / Z.8F **0** / **BW1** / AF..[1)]	MQ../ **MM05C** / Z.8F **0** / **BW1** / AF.. MQ../ **MM07C** / Z.8F **0** / **BW1** / AF..[1)]
	DT80K4 / **BMG** / TH .	MF../ **MM05C** / Z.8F **0** / AF.. MF../ **MM07C** / Z.8F **0** / AF..[1)]	MQ../ **MM05C** / Z.8F **0** / AF.. MQ../ **MM07C** / Z.8F **0** / AF..[1)]
0.75	DT80N4/TH	MF../ **MM07C** / Z.8F **0** / **BW1** / AF.. MF../ **MM11C** / Z.8F **0** / **BW1** / AF..[1)]	MQ../ **MM07C** / Z.8F **0** / **BW1** / AF.. MQ../ **MM11C** / Z.8F **0** / **BW1** / AF..[1)]
	DT80N4 / **BMG** / TH .	MF../ **MM07C** / Z.8F **0** / AF.. MF../ **MM11C** / Z.8F **0** / AF..[1)]	MQ../ **MM07C** / Z.8F **0** / AF.. MQ../ **MM11C** / Z.8F **0** / AF..[1)]
1.1	DT90S4/TH	MF../ **MM11C** / Z.8F **0** / **BW1** / AF.. MF../ **MM15C** / Z.8F **0** / **BW1** / AF..[1)]	MQ../ **MM11C** / Z.8F **0** / **BW1** / AF.. MQ../ **MM15C** / Z.8F **0** / **BW1** / AF..[1)]
	DT90S4 / **BMG** / TH .	MF../ **MM11C** / Z.8F **0** / AF.. MF../ **MM15C** / Z.8F **0** / AF..[1)]	MQ../ **MM11C** / Z.8F **0** / AF.. MQ../ **MM15C** / Z.8F **0** / AF..[1)]
1.5	DT90L4/TH	MF../ **MM15C** / Z.8F **0** / **BW1** / AF.. MF../ **MM22C** / Z.8F **0** / **BW2** / AF..[1)]	MQ../ **MM15C** / Z.8F **0** / **BW1** / AF.. MQ../ **MM22C** / Z.8F **0** / **BW2** / AF..[1)]
	DT90L4 / **BMG** / TH .	MF../ **MM15C** / Z.8F **0** / AF.. MF../ **MM22C** / Z.8F **0** / AF..[1)]	MQ../ **MM15C** / Z.8F **0** / AF.. MQ../ **MM22C** / Z.8F **0** / AF..[1)]
2.2	DV100M4/TH	MF../ **MM22C** / Z.8F **0** / **BW2** / AF.. MF../ **MM30C** / Z.8F **0** / **BW2** / AF..[1)]	MQ../ **MM22C** / Z.8F **0** / **BW2** / AF.. MQ../ **MM30C** / Z.8F **0** / **BW2** / AF..[1)]
	DV100M4 / **BMG** / TH .	MF../ **MM22C** / Z.8F **0** / AF.. MF../ **MM30C** / Z.8F **0** / AF..[1)]	MQ../ **MM22C** / Z.8F **0** / AF.. MQ../ **MM30C** / Z.8F **0** / AF..[1)]
3	DV100L4/TH	MF../ **MM30C** / Z.8F **0** / **BW2** / AF.. MF../ **MM3XC** / Z.8F **0** / **BW2** / AF..[1)]	MQ../ **MM30C** / Z.8F **0** / **BW2** / AF.. MQ../ **MM3XC** / Z.8F **0** / **BW2** / AF..[1)]
	DV100L4 / **BMG** / TH .	MF../ **MM30C** / Z.8F **0** / AF.. MF../ **MM3XC** / Z.8F **0** / AF..[1)]	MQ../ **MM30C** / Z.8F **0** / AF.. MQ../ **MM3XC** / Z.8F **0** / AF..[1)]

1) Combination with increased short-term torque

2900 1/min:

Power [kW]	Motor △	Field distributor	
		with MF.. fieldbus interface	with MQ.. fieldbus interface
0.37	DFR63L4/TH	MF../ **MM03C** / Z.8F **1** / **BW1** / AF.. MF../ **MM05C** / Z.8F **1** / **BW1** / AF..[1)]	MQ../ **MM03C** / Z.8F **1** / **BW1** / AF.. MQ../ **MM05C** / Z.8F **1** / **BW1** / AF..[1)]
	DFR63L4/**BMG**/TH.	MF../ **MM03C** / Z.8F **1** / AF.. MF../ **MM05C** / Z.8F **1** / AF..[1)]	MQ../ **MM03C** / Z.8F **1** / AF.. MQ../ **MM05C** / Z.8F **1** / AF..[1)]
0.55	DT71D4/TH	MF../ **MM05C** / Z.8F **1** / **BW1** / AF.. MF../ **MM07C** / Z.8F **1** / **BW1** / AF..[1)]	MQ../ **MM05C** / Z.8F **1** / **BW1** / AF.. MQ../ **MM07C** / Z.8F **1** / **BW1** / AF..[1)]
	DT71D4 / **BMG** / TH .	MF../ **MM05C** / Z.8F **1** / AF.. MF../ **MM07C** / Z.8F **1** / AF..[1)]	MQ../ **MM05C** / Z.8F **1** / AF.. MQ../ **MM07C** / Z.8F **1** / AF..[1)]
0.75	DT80K4/TH	MF../ **MM07C** / Z.8F **1** / **BW1** / AF.. MF../ **MM11C** / Z.8F **1** / **BW1** / AF..[1)]	MQ../ **MM07C** / Z.8F **1** / **BW1** / AF.. MQ../ **MM11C** / Z.8F **1** / **BW1** / AF..[1)]
	DT80K4 / **BMG** / TH .	MF../ **MM07C** / Z.8F **1** / AF.. MF../ **MM11C** / Z.8F **1** / AF..[1)]	MQ../ **MM07C** / Z.8F **1** / AF.. MQ../ **MM11C** / Z.8F **1** / AF..[1)]
1.1	DT80N4/TH	MF../ **MM11C** / Z.8F **1** / **BW1** / AF.. MF../ **MM15C** / Z.8F **1** / **BW1** / AF..[1)]	MQ../ **MM11C** / Z.8F **1** / **BW1** / AF.. MQ../ **MM15C** / Z.8F **1** / **BW1** / AF..[1)]
	DT80N4 / **BMG** / TH .	MF../ **MM11C** / Z.8F **1** / AF.. MF../ **MM15C** / Z.8F **1** / AF..[1)]	MQ../ **MM11C** / Z.8F **1** / AF.. MQ../ **MM15C** / Z.8F **1** / AF..[1)]
1.5	DT90S4/TH	MF../ **MM15C** / Z.8F **1** / **BW1** / AF.. MF../ **MM22C** / Z.8F **1** / **BW2** / AF..[1)]	MQ../ **MM15C** / Z.8F **1** / **BW1** / AF.. MQ../ **MM22C** / Z.8F **1** / **BW2** / AF..[1)]
	DT90S4 / **BMG** / TH .	MF../ **MM15C** / Z.8F **1** / AF.. MF../ **MM22C** / Z.8F **1** / AF..[1)]	MQ../ **MM15C** / Z.8F **1** / AF.. MQ../ **MM22C** / Z.8F **1** / AF..[1)]
2.2	DT90L4/TH	MF../ **MM22C** / Z.8F **1** / **BW2** / AF.. MF../ **MM30C** / Z.8F **1** / **BW2** / AF..[1)]	MQ../ **MM22C** / Z.8F **1** / **BW2** / AF.. MQ../ **MM30C** / Z.8F **1** / **BW2** / AF..[1)]
	DT90L4 / **BMG** / TH .	MF../ **MM22C** / Z.8F **1** / AF.. MF../ **MM30C** / Z.8F **1** / AF..[1)]	MQ../ **MM22C** / Z.8F **1** / AF.. MQ../ **MM30C** / Z.8F **1** / AF..[1)]
3	DV100M4/TH	MF../ **MM30C** / Z.8F **1** / **BW2**/ AF.. MF../ **MM3XC** / Z.8F **1** / **BW2**/ AF..[1)]	MQ../ **MM30C** / Z.8F **1** / **BW2**/ AF.. MQ../ **MM3XC** / Z.8F **1** / **BW2**/ AF..[1)]
	DV100M4 / **BMG** / TH .	MF../ **MM30C** / Z.8F **1** / AF.. MF../ **MM3XC** / Z.8F **1** / AF..[1)]	MQ../ **MM30C** / Z.8F **1** / AF.. MQ../ **MM3XC** / Z.8F **1** / AF..[1)]

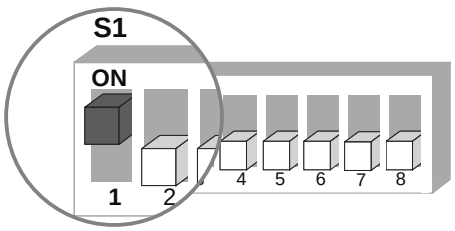
1) Combinations with increased short-term torque

7 Startup with PROFIBUS (MFP + MQP)

7.1 Startup procedure

- We recommend turning off the DC 24 V power supply before removing/replacing the bus module (MFP/MQP).
- The bus connection of the incoming and outgoing PROFIBUS is integrated in the connection module, which means the PROFIBUS can be operated even when the module electronics have been disconnected.
- In addition, please observe the notes in the section "Supplementary Field Distributor Startup Information."

1. Check that MOVIMOT® and the PROFIBUS connection module (MFZ21, MFZ23, MFZ26, MFZ27 or MFZ28) are connected correctly.
2. Set DIP switch S1/1 (on MOVIMOT®) to ON (= address 1)



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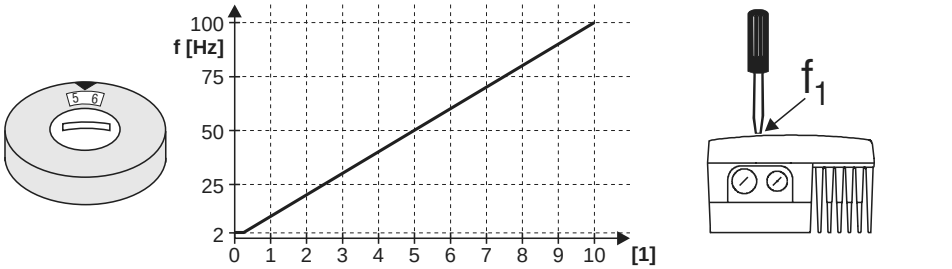
3. Use setpoint potentiometer f1 to set maximum speed



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[1] Potentiometer setting

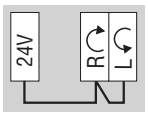
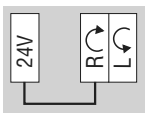
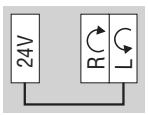
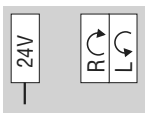
4. Reinstall screw plug of the cover (with gasket).
5. Use switch f2 to set the minimum frequency f_{min}

Function	Setting										
Detent setting	0	1	2	3	4	5	6	7	8	9	10
Minimum frequency f_{min} [Hz]	2	5	7	10	12	15	20	25	30	35	40

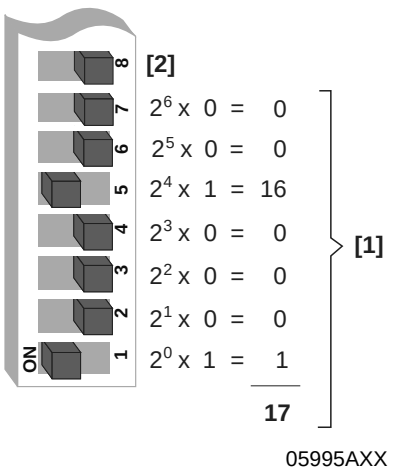
6. If the ramp is not set using the fieldbus (2 PD), use switch t1 on the MOVIMOT® to set ramp time. The ramp times are based on a setpoint step change of 50 Hz.

Function	Setting										
Detent setting	0	1	2	3	4	5	6	7	8	9	10
Ramp time t1 [s]	0,1	0,2	0,3	0,5	0,7	1	2	3	5	7	10

7. Check whether the requested direction of rotation has been enabled (on MOVIMOT®).

Terminal R	Terminal L	Meaning
activated	activated	• Both directions of rotation are enabled
		
activated	not activated	• Only CW operation enabled • Preselected setpoints for CCW rotation result in standstill of drive
		
not activated	activated	• Only CCW operation enabled • Preselected setpoints for CW rotation result in standstill of drive
		
not activated	not activated	• Unit is blocked or drive brought to a stop
		

8. Set PROFIBUS address on MFP/MQP (factory setting: Address 4). Use DIP switches 1 to 7 to set the PROFIBUS address.



[1] Example: Address 17
[2] Switch 8 = reserved

Address 0 through 125: Valid address
Address 126: Not supported
Address 127: Broadcast

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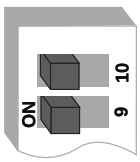
The following table uses address 17 as example to show how to determine the DIP switch settings for any bus address.

Calculation	Remainder	DIP switch setting	Significance
17 / 2 = 8	1	DIP 1 = ON	1
8 / 2 = 4	0	DIP 2 = OFF	2
4 / 2 = 2	0	DIP 3 = OFF	4
2 / 2 = 1	0	DIP 4 = OFF	8
1 / 2 = 0	1	DIP 5 = ON	16
0 / 2 = 0	0	DIP 6 = OFF	32
0 / 2 = 0	0	DIP 7 = OFF	64

9. Switch on the bus terminating resistors on the MFP/MQP fieldbus interface at the last bus station.
   - If the MFP/MQP is located at the end of a PROFIBUS segment, it is only connected to the PROFIBUS network via the incoming PROFIBUS cable (terminals 1/2).
   - To prevent malfunctions in the bus system due to reflections, etc., the PROFIBUS segment must be terminated using bus terminating resistors at the first and last stations.
   - The bus terminating resistors are already implemented in the MFP/MQP and can be activated using two DIP switches (see following figure). Bus termination is implemented for cable type A to EN 50170 (volume 2)!

Bus termination **ON**



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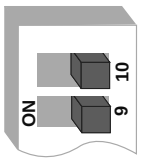
Bus termination **OFF**

Factory setting



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Observe the following points when using field distributors with AF2 or AF3 connection technology:

In contrast to the standard design, the switchable bus terminator in the MFP/MQP.. module is not available if AF2/AF3 is used. A pluggable bus terminator (M12) should be used in place of the outgoing X12 bus connection at the last station (see also the section "Connection via Plug Connector").

10. Reinstall and secure MOVIMOT® inverter \and MFP/MQP housing cover.
11. Connect supply voltage (DC 24 V) for the MFP/MQP PROFIBUS interface and MOVIMOT®. The green "RUN" LED on the MFP/MQP should now light up and the red /SYS-F/ LED should go out.
12. Configuring the MFP/MQP PROFIBUS interface in the DP master.

7.2 Configuring the PROFIBUS master

"GSD files" are provided for configuring the DP master. These files are copied into special directories in the project planning software and updated as part of the configuration software. Refer to the manuals for the appropriate project planning software for details on the procedure.

The latest version of the GSD files is always available on the Internet at the following address: http://www.SEW-EURODRIVE.de

Configuring the MFP/MQP PROFIBUS-DP interface:

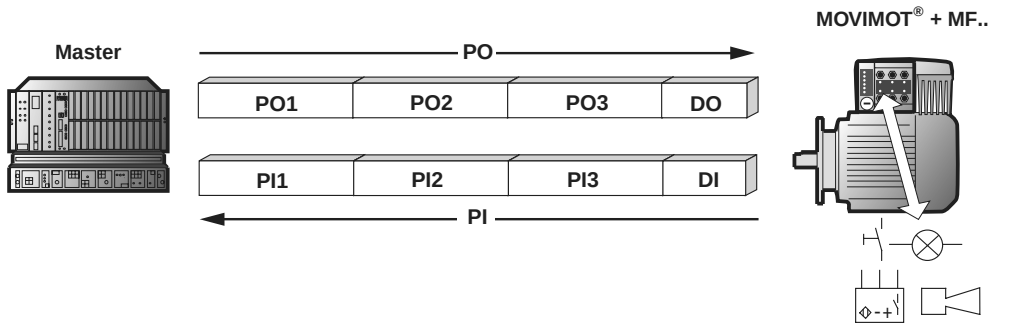
- Observe the notes in the README.TXT file on the GSD disk.
- Install the GSD file "SEW_6001.GSD" (starting with version 1.5) according to the instructions of the project planning software for the DP master. After successful installation, the "MFP/MQP + MOVIMOT" device appears at the slave stations.
- Add the fieldbus interface module under the name "MFP/MQP + MOVIMOT" into the PROFIBUS structure and assign the PROFIBUS address.
- Select the process data configuration required for your application (see the section "Function of MFP \PROFIBUS Interface" or "Function of the MQP PROFIBUS interface").
- Enter the I/O or periphery addresses for the configured data widths. Save the configuration.
- Expand your application program by the data exchange with the MQP/MFP. Process data transfer is not consistent. Do not use SFC14 and SFC15 to transfer process data; they are only required for the parameter channel.
- After saving the project, loading it in the DP master and starting the DP master, the "Bus-F" LED of the MFP/MQP should go out. If this is not the case, check the wiring and terminating resistors of the PROFIBUS and the configuration, especially the PROFIBUS address.

8 Function of MFP PROFIBUS interface

8.1 Process data and sensor/actuator processing

The MFP PROFIBUS interfaces not only make it possible to control MOVIMOT® AC motors but also permit connection of sensors/actuators to digital input and output terminals. An additional I/O byte is added to the PROFIBUS DP protocol after the process data for MOVIMOT®. The extra digital inputs and outputs of the MFP are mapped in this I/O byte. The process data is coded according to the uniform MOVILINK® profile for SEW drive inverters (see section "MOVILINK® unit profile").

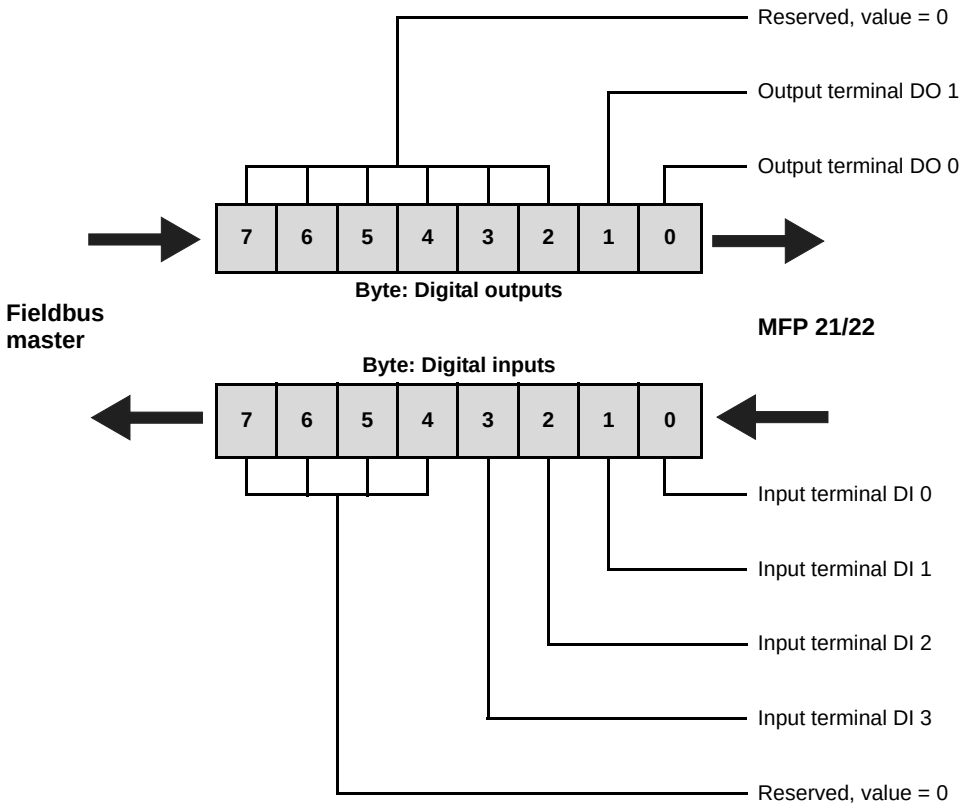
PROFIBUS-DP Configuration "3 PD + I/O":



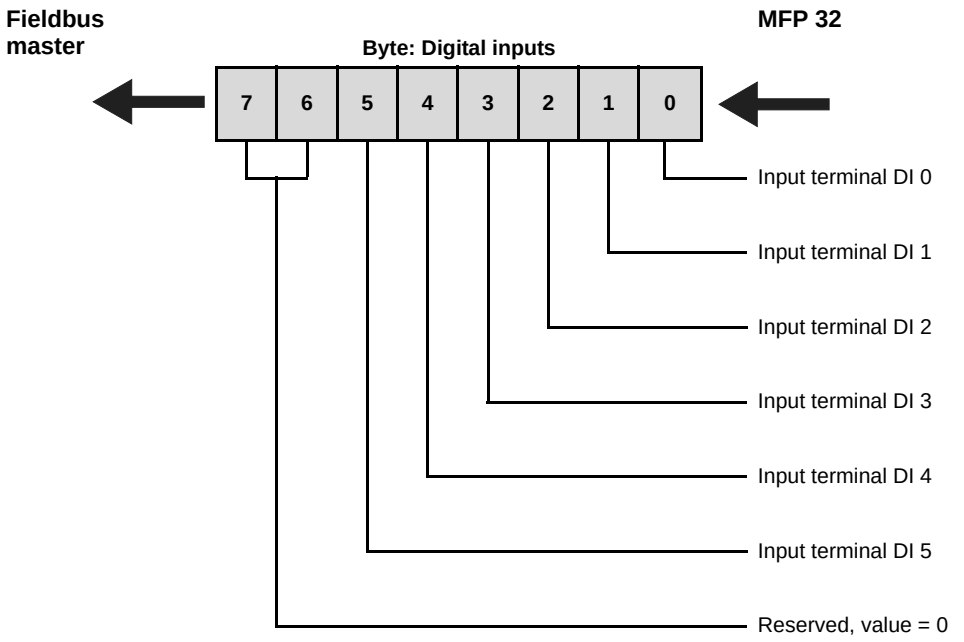
PO	Process output data	PI	Process input data
PO1	Control word	PI1	Status word 1
PO2	Speed [%]	PI2	Output current
PO3	Ramp	PI3	Status word 2
DO	Digital outputs	DI	Digital inputs

8.2 Structure of the input/output byte

MFP 21/22



MFP32



8.3 DP configuration

In general, only functions supported by the MFP variants can be configured. However, certain functions can be deactivated, i.e. you can deselect the digital outputs from a configuration for an MFP 21, by selecting the DP configuration ' ... + DI".

The MFP versions allow for a variety of DP configurations. The following table lists all DP configurations and the supported MFP versions. The decimal IDs of individual slots for the DP master configuration software are listed in the 'DP Ident' column.

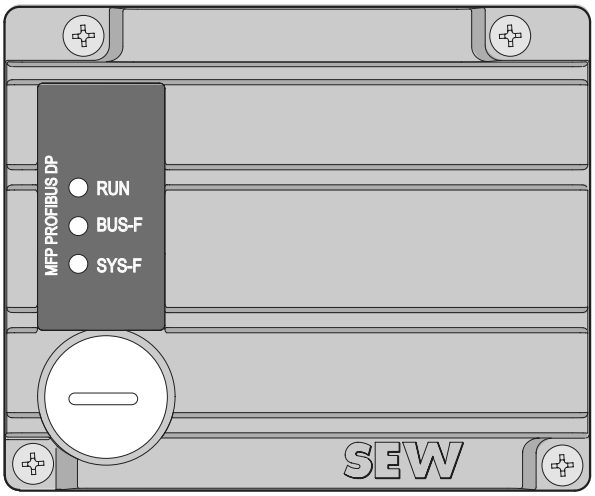
Name	Supported MFP version	Description	DP ID		
			0	1	2
2 PD	all MFP versions	MOVIMOT® control via two process data words	113_{dec}	0_{dec}	–
3 PD	all MFP versions	MOVIMOT® control via three process data words	114_{dec}	0_{dec}	–
0 PD + DI/DO	MFP 21/22	No MOVIMOT® control, processing of digital inputs and outputs.	0_{dec}	48_{dec}	–
2 PD + DI/DO	MFP 21/22	MOVIMOT® control using two process data words and processing of digital inputs and outputs	113_{dec}	48_{dec}	–
3 PD + DI/DO	MFP 21/22	MOVIMOT® control using three process data words and processing of digital inputs and outputs	114_{dec}	48_{dec}	–
0 PD + DI	all MFP versions	No MOVIMOT® control, processing of digital inputs only. The digital outputs of the MFP are not in use!	0_{dec}	16_{dec}	–
2 PD + DI	all MFP versions	MOVIMOT® control using two process data words and processing of digital inputs. The digital outputs of the MFP are not in use!	113_{dec}	16_{dec}	–
3 PD + DI	all MFP versions	MOVIMOT® control using three process data words and processing of digital inputs The digital outputs of the MFP are not in use!	114_{dec}	16_{dec}	–
Universal configuration	all MFP versions	Reserved for all special configurations	0_{dec}	0_{dec}	0_{dec}

8.4 Description of the LED display

The PROFIBUS interface MFP has three diagnostic LEDs.

- LED "RUN" (green) for displaying the normal operating status
- LED "BUS-FAULT" (red) for displaying errors at the PROFIBUS-DP
- LED "SYS-FAULT" (red) for display of system errors MFP or MOVIMOT®

Note: The LED 'SYS-Fault' is generally without any function in the DP configurations '0PD+DI/DO' and '0PD+DI.'



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States of the "RUN" LED (green)

RUN	BUS-F	SYS-F	Meaning	Remedy
On	x	x	• MFP components hardware OK	–
On	Off	Off	• Correct MFP operation • MFP is currently exchanging data with the DP master (data exchange) and MOVIMOT®	–
Off	x	x	• MFP not ready for operation • No DC 24 V power supply	• Check DC 24 V voltage supply • Switch MFP on again. Exchange module if problem occurs several times.
Flash-ing	x	x	• PROFIBUS address is set higher than 125.	• Check the PROFIBUS address set on the MFP.

x = any status

States of the "BUS-F" LED (red)

RUN	BUS-F	SYS-F	Meaning	Remedy
On	**Off**	x	• MFP is currently exchanging data with the DP master (data exchange).	–
On	**Flash-ing**	x	• Baud rate is detected, however not addressed by DP master. • MFP was not configured in DP master or configured incorrectly.	• Check configuration of the DP master.
On	**On**	x	• Connection to the DP master has failed. • MFP does not detect baud rate. • Bus interruption • DP master not in operation	• Check the PROFIBUS-DP connection to the MFP • Check the DP master. • Check all cables in your PROFIBUS-DP network.

x = any status

States of the "SYS-F" LED (red)

RUN	BUS-F	SYS-F	Meaning	Remedy
On	x	**Off**	• Standard operating status of MFP and MOVIMOT®	–
On	x	**flashes 1 x**	• MFP operating status OK, MOVIMOT® reports error	• Evaluate the error number of MOVIMOT® status word 1 in the controller. • Read the MOVIMOT® operating instructions for information about error rectification • Reset MOVIMOT® with programmable controller (reset bit in control word 1), if necessary.
On	x	**flashes 2 x**	• MOVIMOT® does not respond to setpoints from DP master because PO data are not enabled.	• Check DIP switches S1/1..4 in MOVIMOT® • Set RS-485 address 1 to enable the PO data.
On	x	**On**	• Communication link between MFP and MOVIMOT® is disrupted or interrupted.	• Check the electrical connection between MFP and MOVIMOT® (terminals RS+ and RS-) • also see section "Electrical Installation" and section "Installation planning under EMC aspects"
			• Maintenance switch on the field distributor is set to OFF	• Check setting of maintenance switch on field distributor

x = any status

8.5 MFP system faults/MOVIMOT® errors

The communication link between MFP and MOVIMOT® is interrupted if the MFP signals a system fault ("SYS-FAULT" LED continuously lit). This system fault is signaled to the controller as error code 91 $_{dec}$ via the diagnostics channel and via the status words of the process input data. **Since this system fault generally indicates cabling problems or a missing 24 V supply of the \MOVIMOT® inverter, RESET via control word is not possible. As soon as the communication link is reestablished, the error automatically resets itself.** Check the electrical connection of MFP and MOVIMOT®. In the event of a system fault, the process input data returns a fixed bit pattern as valid MOVIMOT® status information is no longer available. Consequently, only status word bit 5 (malfunction) and the fault code can be used for evaluation in the controller. All other information is invalid!

Process input word	Hex value	Meaning
PI1: Status word 1	$5B20_{hex}$	Error code 91 ($5B_{hex}$), bit 5 (malfunction) = 1 No other status information is valid!
PI2: Current actual value	0000_{hex}	Invalid information!
PI3: Status word 2	0020_{hex}	Bit 5 (fault) = 1 all other status information invalid!
Input byte of digital inputs	XX_{hex}	The input information of the digital inputs continues to be updated!

The input information of the digital inputs continues to be updated, and can therefore continue to be evaluated within the controller.

PROFIBUS-DP timeout

If the data transfer via PROFIBUS-DP is faulty or interrupted, the response monitoring time in MFP elapses (if configured in the DP master). The "BUS-FAULT" LED lights up (or flashes) to signal that no new user data are being received. MOVIMOT® decelerates with the most recently valid ramp, the "ready" relay drops out after about 1 second to signal a malfunction.

The digital outputs will be reset immediately after the response monitoring time has elapsed!

DP master active/Control failure

The DP master sets all process output data to 0 if the PLC is switched from RUN to STOP status. MOVIMOT® then receives the ramp setpoint = 0 in 3 PD mode.

The digital outputs DO 0 and DO 1 are also reset by the DP master!

8.6 Diagnostics

Slave diagnostic information

The MFP PROFIBUS interface reports all errors via the diagnostics channel of the PROFIBUS-DP to the control. These error messages are evaluated by the controller with the help of system functions (e.g. diagnostic alarm OB 82/SFC 13 for S7-400). The following figure shows the structure of diagnostic data that is composed of diagnostic information to EN 50170 (volume 2) and (in case of a MOVIMOT®//MFP error) the unit-specific diagnostic data.

Byte 0:	Station status 1	•	
Byte 1:	Station status 2	•	
Byte 2:	Station status 3	•	
Byte 3:	DP Master address	•	
Byte 4:	Ident Number High [60]	•	
Byte 5:	Ident Number Low [01]	•	
Byte 6:	Header [02]	•	X
Byte 7:	Error code MOVIMOT®/MFP		X

- • DIN/EN
- X Only in case of an error
- [...] contains constant codes of MFP, Rest variable

The coding of bytes 0..3 is defined in EN 50170 (volume 2). Bytes 4, 5 and 6 include the constant codes seen in the figure.

Byte 7 includes:

- MOVIMOT® error codes (see the chapter "Diagnostics MOVIMOT® Inverter") or
- MFP error codes: Error code 91_{dec} = SYS-FAULT (see the section "MFP system error / MOVIMOT error" on page 74)

Switching the alarm on/off

All error information is also transmitted to the controller directly via the status words of the process input data. This means triggering the diagnostic alarm by a MOVIMOT®/MFP error can also be deactivated using the application-specific parameter of the PROFIBUS-DP.

Note: You use this mechanism to turn off the diagnostic alarm that will be triggered by a MOVIMOT® or MFP error. The PROFIBUS-DP system can trigger diagnostic alarms in the DP master at any time so that we recommend creating the respective organizational components (e.g. OB82 for S7-400) in the controller.

Procedure

Additional, application-specific parameters can be defined during configuration of a DP slave; they are transmitted to the slave during initialization of the PROFIBUS-DP. Ten application-specific parameter data have been set up for the MFP interface, with only byte 1 having been assigned the following function:

Byte:	Permitted value	Function
0	00_{hex}	Reserved
1	00_{hex} 01_{hex}	MOVIMOT® /MFP error generates diagnostics alarm MOVIMOT® /MFP error does not generate diagnostics alarm
2-9	00_{hex}	Reserved

Values not listed here are not permitted as they can cause malfunctions in the MFP!

Example for project planning

Parameter data (hex)	Function
00,00,00,00,00,00,00,00,00,00,	Diagnostic alarms are generated even in case of an error
00,**01**,00,00,00,00,00,00,00,00,	Diagnostic alarms are not generated if there is an error

9 Function of MQP PROFIBUS interface

M**Q**P PROFIBUS modules with integrated control (and M**F**P modules) enable fieldbuses to be connected quickly and easily to MOVIMOT® drives.

In addition, they are equipped with control functions that help you determine the response of the drive to external input via fieldbus and integrated I/Os. This allows, for example, sensor signals to be processed directly at the fieldbus interface or allows users to define their own communication profile via the fieldbus interface. The NV26 or ES16 proximity encoder makes for a simple positioning system that can be integrated in your application in combination with an MQP control program.

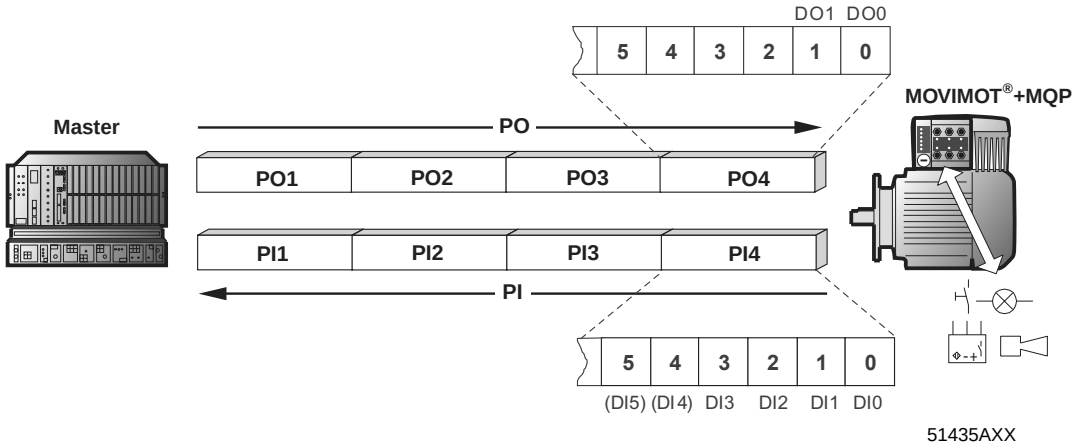
The control functionality of the MQP modules is enabled with IPOS$^{plus®}$. The diagnostics and programming interface (under the screw plug on the front) of the modules provides access to the integrated IPOS control. Option UWS21B or USB11A is used for connection to a PC. Programming takes place using the MOVITOOLS® Compiler.

For more information on programming, refer to the "IPOS$^{plus®}$ Positioning and Sequence Control" manual.

9.1 Default program

The M**Q**P modules are supplied as standard with an IPOS program, which simulates the functionality of the M**F**P modules.

Set address 1 of the MOVIMOT® and observe the instructions for startup. The process data width is fixed at four words (take into account for project planning/startup). The first three words are exchanged transparently with MOVIMOT® and correspond to the MOVILINK® unit profile (see the section "MOVILINK® Unit Profile"). The I/Os of the MQP modules are transmitted in the fourth word.

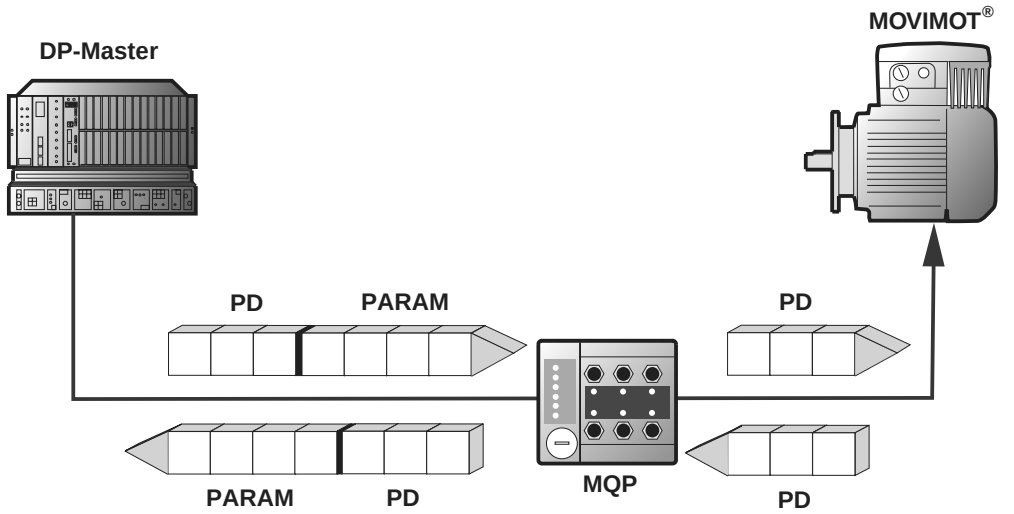


Error response An interruption of the connection between the MQP module and MOVIMOT® leads to shutdown after 1 s. The error is displayed via status word 1 (error 91). **Since this system fault generally indicates wiring problems or a missing 24 V supply of the MOVIMOT® inverter, a RESET via control word is not possible. As soon as the communication link is reestablished, the error automatically resets itself.** An interruption of the connection between fieldbus master and MQP module after expiration of the fieldbus timeout interval, sets the process output data for MOVIMOT® to 0. This fault response can be deactivated using parameter 831 in MOVITOOLS® Shell.

9.2 Configuration

The MQP must be given a specific DP configuration by the DP master to define type and number of input and output data used for the transmission. You can control the MQP via process data and read or write all MQP parameters via the parameter channel.

The following figure shows a schematic view of the data exchange between the DP master, MQP fieldbus interface (DP slave) and a MOVIMOT® drive with process data and parameter channel.



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PARAM Parameter data
PD Process data

Process data configuration

The MQP PROFIBUS interface allows for different DP configurations in the data exchange between DP master and MQP.

The following table provides additional information on all standard DP configurations of the MQP modules. The "Process data configuration" column shows the name of the configuration. The texts will also be displayed as selection list within the project planning software for the DP master. The GSD file is used for the MFP modules. Therefore, use the entries for the MQP only. The DP configurations column shows the type of configuration data sent to the MQP while the link of the PROFIBUS DP is being established. The parameter channel is used for setting the parameters of the MQP and is not passed on to the connected stations (MOVIMOT®). The DP configurations can be defined using the universal configuration. The MQP accepts 1-10 process data words with and without parameter channel.

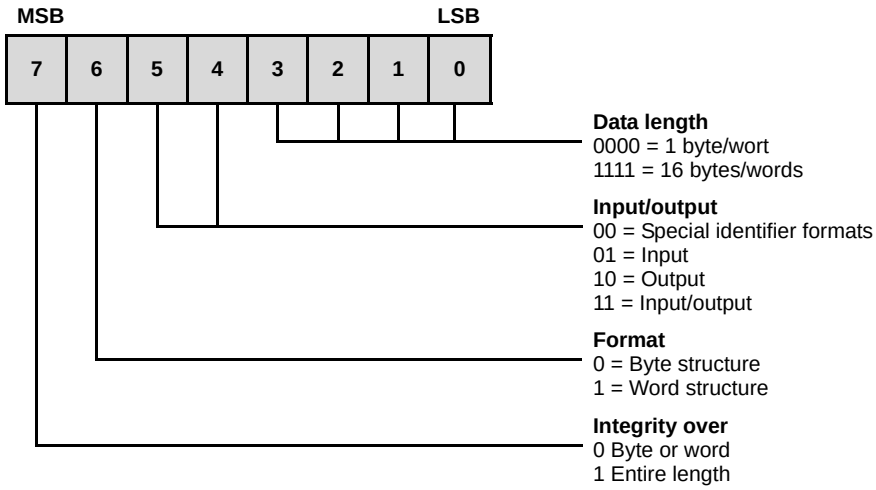
Process data configuration Configurations for MQP	Meaning / notes	Cfg 0	Cfg 1	Cfg 2
1 PD (MQP)	Control via one process data word	0_{dec}	112_{dec}	0_{dec}
2 PD (MQP)	Control via 2 process data words	0_{dec}	113_{dec}	0_{dec}
3 PD (MQP)	Control via 3 process data words	0_{dec}	114_{dec}	0_{dec}
4 PD (MQP)	Control via 4 process data words	0_{dec}	115_{dec}	0_{dec}
6 PD (MQP)	Control via 6 process data words	0_{dec}	117_{dec}	0_{dec}
10 PD (MQP)	Control via 10 process data words	0_{dec}	121_{dec}	0_{dec}
Param + 1 PD (MQP)	Control via one process data word Parameter setting via 8 byte parameter channel	243_{dec}	112_{dec}	0_{dec}
Param + 2 PD (MQP)	Control via two process data words Parameter setting via 8 byte parameter channel	243_{dec}	113_{dec}	0_{dec}
Param + 3 PD (MQP)	Control via three process data words Parameter setting via 8 byte parameter channel	243_{dec}	114_{dec}	0_{dec}
Param + 4 PD (MQP)	Control via four process data words Parameter setting via 8 byte parameter channel	243_{dec}	115_{dec}	0_{dec}
Param + 6 PD (MQP)	Control via six process data words Parameter setting via 8 byte parameter channel	243_{dec}	117_{dec}	0_{dec}
Param + 10 PD (MQP)	Control via ten process data words Parameter setting via 8 byte parameter channel	243_{dec}	121_{dec}	0_{dec}
Universal configuration (MQP)	Reserved for special configurations	0_{dec}	0_{dec}	0_{dec}

DP configuration "Universal configuration"

You can use the universal configuration to configure the MQP to values other than the specified standard values in the GSD file. You must observe the following conditions:

- Module 0 defines the parameter channel of the MQP. Entering 0 switches off the parameter channel. Entering the value 243 switches on the parameter channel with 8 bytes length.
- The following modules determine the process data width of the MQP on the PROFIBUS. The total process data width of all following modules must be between 1 and 10 words.

Format of the Cfg_Data identifier byte according to EN 50170 (V2):



Notes on data consistency

As a rule, non-consistent data exchange is sufficient. However, if your application requires consistent process data exchange between the DP master and MQP, you can make the settings using universal configuration. In this case, you have to use system functions SFC14 and SFC15 for data exchange in the S7 program with S7 firmware status V 3.0.

External diagnostics

The MQP does not support external diagnostics. Error messages of the individual MOVIMOT® can be taken from the corresponding status words. Error states of the MQP, e.g. a timeout of the RS-485 connection to MOVIMOT®, are also displayed in status word 1. On request, the MQP provides the standard diagnostics in accordance with EN 50170 (V2).

Note on Simatic S7 master systems:

Diagnostic alarms may also be triggered by the PROFIBUS-DP system in the DP master at any time by other stations if the external diagnostic generation is deactivated. As a result, the corresponding organizational blocks (OB82) should always be created in the controller.

Ident. number

Each DP master and DP slave must have an individual identity number assigned by the PROFIBUS Nutzerorganisation (user organization) to identify the connected unit. When the PROFIBUS-DP master starts up, it compares the identity numbers of the connected DP slaves with the identity numbers the user has entered during configuration. The user data transfer will only be activated after the DP master has ensured that the connected station addresses and device types (ident numbers) correspond to the project planning data. This procedure achieves a high degree of safety with respect to project planning errors.

The identity number is defined as an unsigned 16-bit number (Unsigned16). The PROFIBUS Nutzerorganisation has defined identity number 6001_{hex} (24577_{dec}) for the MQP and MFP modules.

9.3 Control via PROFIBUS-DP

The process output data sent by the PROFIBUS master can be processed in the IPOS® program of MQP. The process input data sent to the PROFIBUS master are specified via the IPOS® program of MQP.

The process data width can be set as required (1-10 words).

If a PLC is used as the PROFIBUS master, the process data lie within the I/O or peripheral area of the PLC.

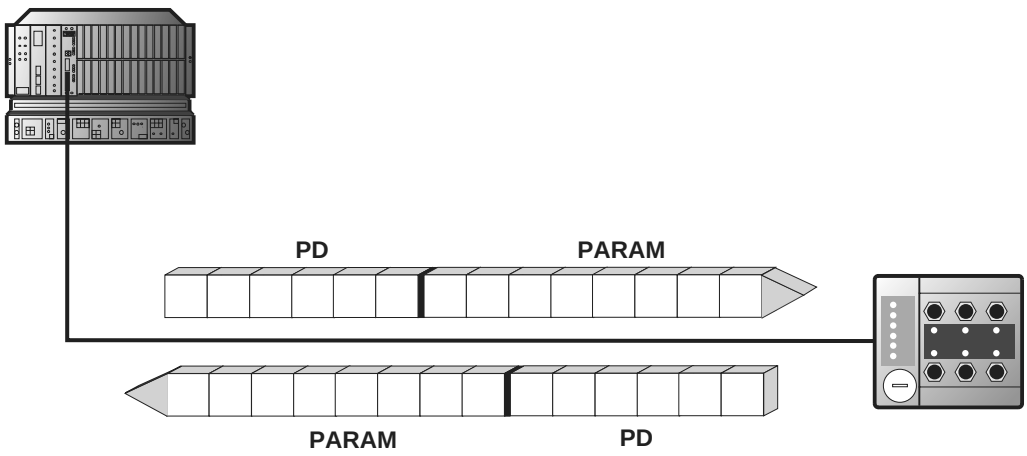
9.4 Parameter setting via PROFIBUS-DP

With PROFIBUS-DP, the MQP parameters are accessed via the MOVILINK® parameter channel; it offers additional parameter services in addition to the conventional READ and WRITE services.

Only MQP parameters can be addressed via the parameter channel.

Structure of the parameter channel

It is necessary to recreate the most important functions and services, such as READ and WRITE for reading and writing of parameters, to set the parameters of peripheral units via fieldbus systems that do not provide an application layer. You will have to define a parameter process data object (PPO) for PROFIBUS-DP. This PPO is transmitted cyclically and contains the process data channel as well as a parameter channel that can be used to exchange acyclical parameter values.



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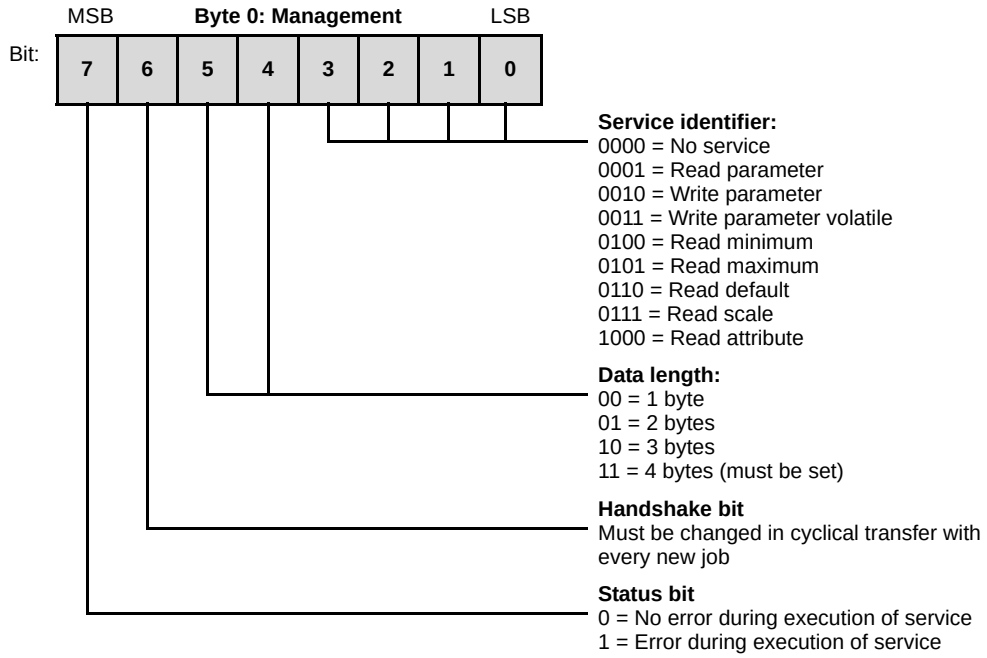
PARAM Parameter data
PD Process data

The following table shows the structure of the parameter channel. It is made up of an administration byte, a reserved byte, an index word and four data bytes.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Management	**Reserved**	**Index high**	**Index low**	**MSB data**	**Data**	**Data**	**LSB data**
Management	Reserved=0	Parameter index		4-byte data			

Management of the parameter channel

The entire parameter setting sequence is co-ordinated with byte 0 (Management). This byte provides important service parameters such as service identifier, data length, version and status of the service performed. The following figure shows that bits 0, 1, 2 and 3 contain the service identifier, and therefore define which service is performed. Bit 4 and bit 5 specify the data length in bytes for the write service; it should be set to 4 bytes for all SEW parameters.



Bit 6 is used as an acknowledgment between the controller and the MQP. It triggers the execution of the transferred service in the MQP. Since the parameter channel is transmitted cyclically with the process data particularly with PROFIBUS-DP, the execution of the service in the MQP must be edge-triggered via the "handshake bit." For this purpose, the value of this bit is altered (toggled) for each new service that is to be executed. The MQP uses the handshake bit to signal whether the service has been executed or not. The service was executed if the handshake bit received in the controller is identical with the transmitted handshake bit. The status bit indicates whether it was possible to carry out the service properly or if there were errors.

Reserved byte

Byte 1 should be viewed as reserved and must always be set to 0x00.

Index addressing

Byte 2 (Index high) and byte 3 (Index low) determine the parameter to be read or written via the fieldbus system. The parameters of MQP are addressed with a uniform index regardless of the connected fieldbus system. The section "Parameter List" contains all MQx parameters with index.

Data range

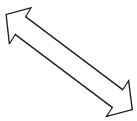
As can be seen in the following table, the data is contained in byte 4 through byte 7 of the parameter channel. This means up to 4 bytes of data can be transmitted per service. The data is always entered with right-justification; that is, byte 7 contains the least significant data byte (Data LSB) whereas byte 4 is the most significant data byte (Data MSB).

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Management	**Reserved**	**Index high**	**Index low**	**MSB data**	**Data**	**Data**	**LSB data**
				High byte 1	Low byte 1	High byte 2	Low byte 2
				High word		Low word	
				Double word			

Incorrect execution of a service

The status bit in the management byte is set to signal that a service has been performed incorrectly. If the received handshake bit is identical to the transmitted handshake bit, the MQP has executed the service. If the status bit now signals an error, the error code is entered in the data range of the parameter telegram. Bytes 4 through 7 provide the return code in a structured format (see the chapter Return Codes).

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Management	**Reserved**	**Index high**	**Index low**	**Error class**	**Error code**	**Add. code high**	**Add. code low**



Status bit = 1: Incorrect execution of a service

Configuration return codes

In case of incorrect configuration, the MQP returns various return codes to the configuration master providing detailed information on the cause of the error. All of these return codes are structured in accordance with EN 50170. The MQP distinguishes between the following elements:

- Error class
- Error code
- Additional code

These return codes apply to all communication interfaces of the MQP.

Error class

The error class element provides a more exact classification of the error type. The MQP supports the following error classes defined in accordance with EN 50170(V2):

Class (hex)	Name	Meaning
1	vfd state	Status error of the virtual field device
2	application reference	Error in application program
3	definition	Definition error
4	resource	Resource error
5	service	Error during execution of service
6	access	Access error
7	OV	Error in the object list
8	other	Other error (see additional code)

Error class is generated by the communication software of the fieldbus interface in the event of an error in communication. The error can be more precisely identified using the elements Error code and Additional code.

Error code

The error code element provides a means for more precisely identifying the cause of the error within the error class. It is generated by the communication software of the MQP in the event of an error in communication. Only error code 0 (Other error code) is only defined for error class 8, "Other error." In this case, detailed identification is available in the additional code.

Additional code

The additional code contains SEW-specific return codes for errors in the MQP configuration. They are returned to the master under Error Class 8 = "Other Error". The following table shows all possible codings for the additional code.

Error class: 8 = "Other error:":

Add. code high (hex)	Add. code low (hex)	Meaning
00	00	No error
00	10	Illegal parameter index
00	11	Function / parameter not implemented
00	12	Read access only
00	13	Parameter lock is active
00	14	Factory setting is active
00	15	Value for parameter too large
00	16	Value for parameter too small
00	17	Required option card missing for this function/parameter
00	18	Error in system software
00	19	Parameter access via RS-485 process interface on X13 only
00	1A	Parameter access via RS-485 diagnostic interface only
00	1B	Parameter is access-protected
00	1C	Controller inhibit required
00	1D	Invalid value for parameter
00	1E	Factory setting was activated
00	1F	Parameter was not saved in EEPROM
00	20	Parameter cannot be changed with enabled output stage
00	21	Copypen end string reached
00	22	Copypen not enabled
00	23	Parameter may only be changed with IPOS program stop
00	24	Parameter may only be changed with deactivated Autosetup

Special return codes (special cases)

Errors in parameter settings which cannot be identified either automatically by the application layer of the fieldbus system or by the system software of the MQP module are treated as special cases. The possible causes for such errors are as follows:

- Incorrect coding of a service via parameter channel
- Incorrect length specification of a service via parameter channel
- Configuration error of station communication

Incorrect service identifier in the parameter channel

An invalid service identifier was specified in the management byte during parameter setting via parameter channel. The following table shows the return code for this special case.

	Code (dec)	Meaning
Error class:	5	Service
Error code:	5	Illegal parameter
Add. code high:	0	–
Add. code high:	0	–

Incorrect length specification in parameter channel

A data length other than 4 data bytes was specified in a write service during configuration via the parameter channel. The following table displays the return codes.

	Code (dec)	Meaning
Error class:	6	Access
Error code:	8	Type conflict
Add. code high:	0	–
Add. code high:	0	–

Troubleshooting:

Check bit 4 and bit 5 for the data length in the management byte of the parameter channel.

Configuration error in station communication

The return code listed in the following table is returned if an attempt is made to issue a parameter service to a station even though no parameter channel was configured for the station.

	Code (dec)	Meaning
Error class:	6	Access
Error code:	1	Object not existent
Add. code high:	0	–
Add. code high:	0	–

Troubleshooting:

Configure a parameter channel for the desired station.

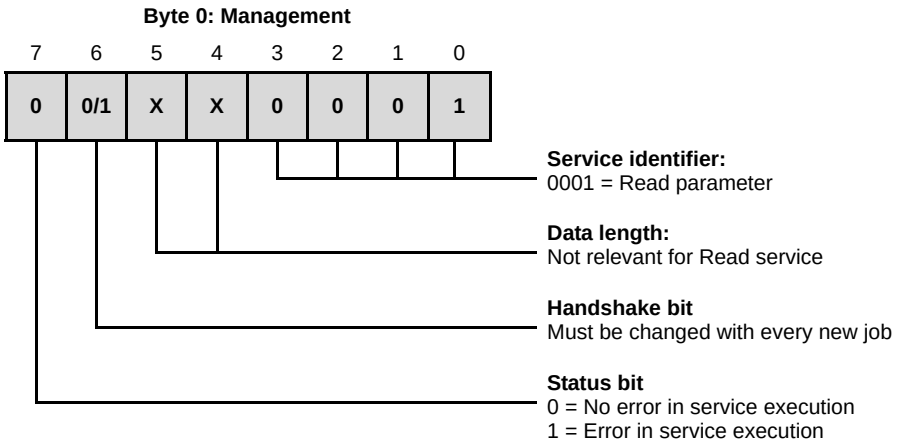
Reading and writing parameters using PROFIBUS-DP

Reading a parameter using PROFIBUS-DP (Read)

To execute a READ service via parameter channel, the handshake bit may be changed only after the complete parameter channel was set up for the specific service because of the cyclical transfer of the parameter channel. As a result, adhere to the following sequence when reading a parameter:

1. Enter the index of the parameter to be read in byte 2 (Index high) and byte 3 (Index low).
2. Enter the service identifier for the Read service in the management byte (byte 0).
3. Transfer the read service to the MQP by changing the handshake bit.

Since this is a read service, the sent data bytes (bytes 4...7) and the data length (in the management byte) are ignored and do not need to be set. The MQP now processes the read service and sends back the service confirmation by changing the handshake bit.



X = Not relevant
0/1 = Bit value is changed

The figure shows the coding of a READ service in the management byte. The data length is not relevant, you only need to enter the service identifier for the READ service. This service is now activated in the MQP when the handshake bit changes. It would be possible to activate the read service with the management byte coding 01_{hex} or 41_{hex}.

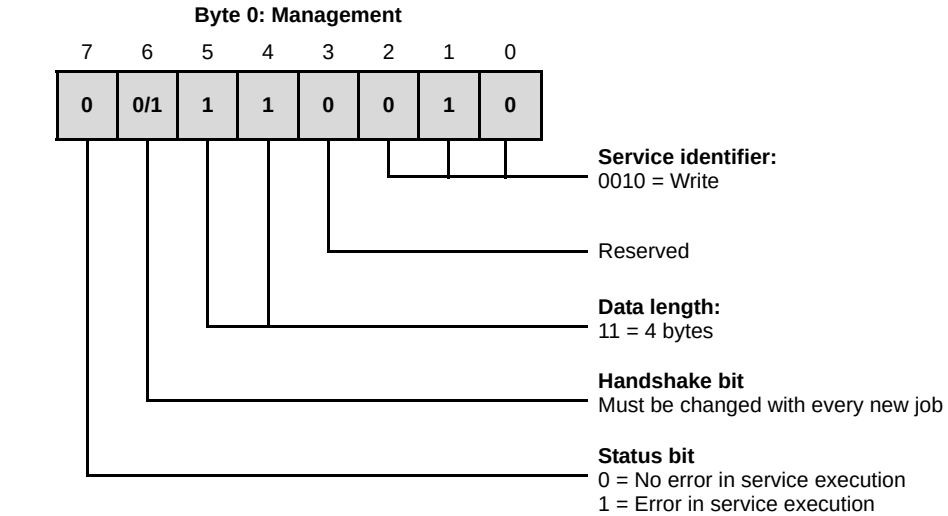
Writing a parameter via PROFIBUS-DP (Write)

To execute a WRITE service via parameter channel, the handshake bit may be changed only after the complete parameter channel was set up for the specific service because of the cyclical transfer of the parameter channel. Observe the following sequence when writing a parameter:

1. Enter the index of the parameter to be written in byte 2 (Index high) and byte 3 (Index low).
2. Enter the data to be written in bytes 4 through 7.
3. Enter the service identifier and the data length for the Write service in the management byte (byte 0).
4. Transfer the write service to the MQP by changing the handshake bit.

The MQP now processes the write service and sends the service confirmation back by changing the handshake bit.

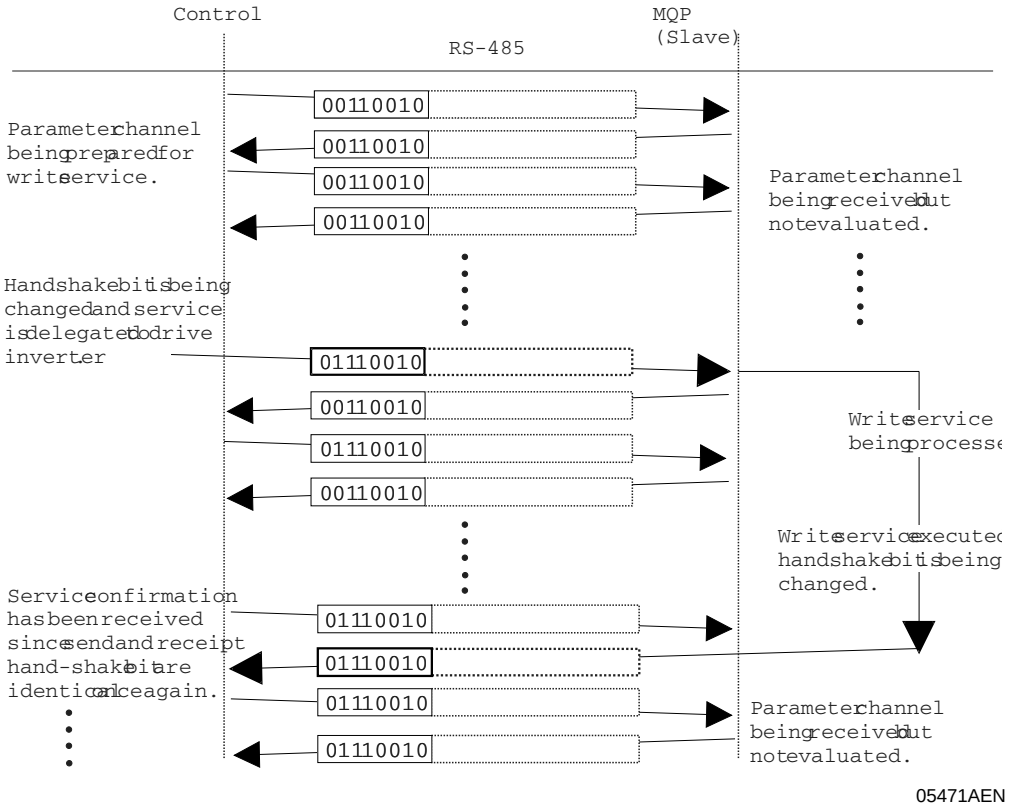
The figure shows the coding of a WRITE service in the management byte. The data length is 4 bytes for all parameters in the MQP. This service is now transferred to the MQP when the handshake bit changes. This means a write service to the MQP generally has the management byte coding 32_{hex} or 72_{hex}.



0/1 = Bit value is changed

Parameter setting with PROFIBUS-DP

Using the WRITE service as an example, the following figure is used to show a parameter setting procedure between controller and MQP via PROFIBUS-DP. To simplify the sequence, only the management byte of the parameter channel is shown in the figure. The parameter channel is only received and returned by the MQP while the controller is preparing the parameter channel for the write service. The service is not activated until the moment when the handshake bit is changed (in this example, when it changes from 0 to 1). The MQP now interprets the parameter channel and processes the write service, but continues to answer all messages with h\andshake bit = 0. The executed service is acknowledged with a change of the handshake bit in the response message of the MQP. The controller now detects that the received handshake bit is once again the same as the one which was sent. It can now prepare another parameter setting procedure.



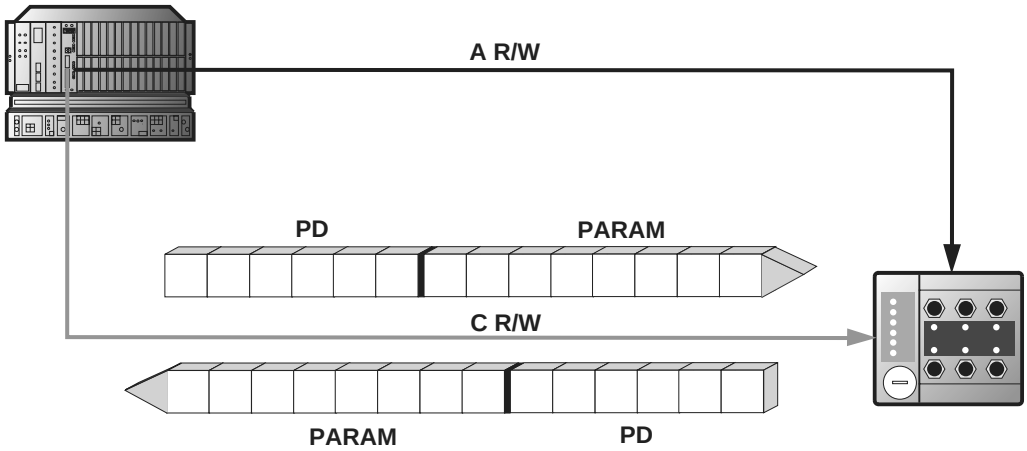
Parameter data format

When parameters are set via the fieldbus interface, the same parameter coding is used as with the serial RS-485 interfaces. The list of the individual parameters can be found in the chapter "Parameter List."

9.5 Parameter setting with PROFIBUS-DPV1

The PROFIBUS-DPV1 specification introduced new acyclical read/write services within the context of the PROFIBUS-DP expansions. These acyclical services are added to the current cyclical bus operation in special telegrams to ensure compatibility of PROFIBUS-DP (version 0) and PROFIBUS-DPV1 (version 1).

The acyclical read/write services can be used to exchange larger data quantities between master and slave (drive inverter) than it would be possible to transfer in the cyclical input or output data using the 8-byte parameter channel. The advantage of the acyclical data exchange via DPV1 lies in the minimum load on the cyclical bus operation since DPV1 telegrams are only added to the bus cycle if required.



PARAM	Parameter data
PD	Process data
A R/W	Acyclical read/write services
C R/W	Cyclical read/write services

Structure of the \DPV1 parameter channel

Data sets (DS)

The user data transported via a DPV1 service is grouped in a data set. Each data set is represented uniquely by its length, a slot number and an index. DPV1 communication with MQP.. uses the structure of data set 47, which is defined as DPV1 parameter channel for drives starting with V3.1 in the PROFIdrive profile "Drive engineering" of the PROFIBUS Nutzerorganisation. Different procedures for accessing parameter data in the drive inverter are provided via this parameter channel.

The drive parameters are usually set according to the PROFIdrive DPV1 parameter channel of profile version 3.0 via data set index 47. The 'Request ID' entry is used to distinguish between parameter access based on PROFIdrive profile or via SEW-EURODRIVE MOVILINK® services. The section "Elements of data set DS47" shows the possible codings of the individual elements. The data set structure is the same for PROFIdrive and MOVILINK® access.

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

The following PROFIdrive services are supported:

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

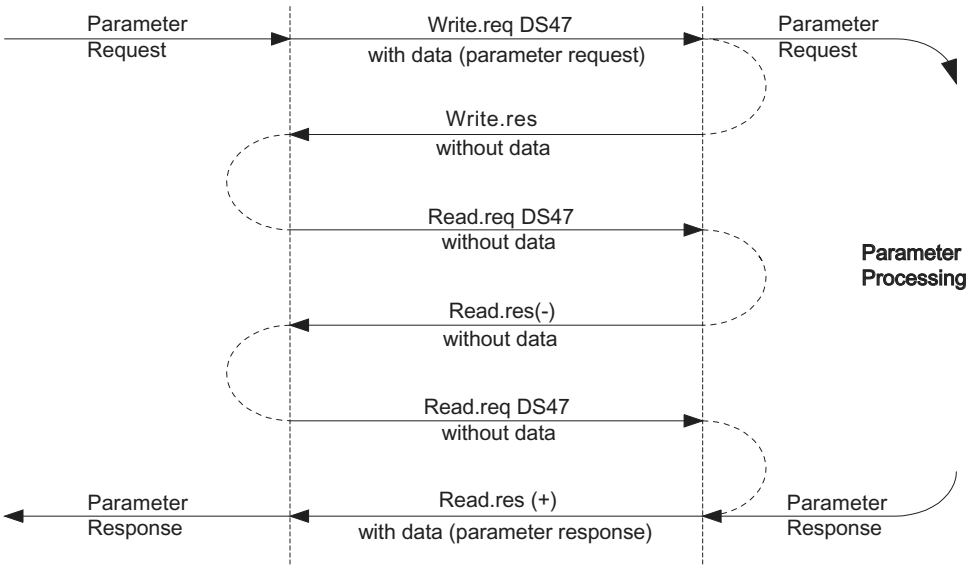
Elements of data set DS47

The following table shows the elements of data set DS47.

Field	Data Type	Values	
Request reference	Unsigned8	0x00	Reserved
		0x01..0xFF	
Request ID	Unsigned8	0x01	Request parameter (PROFIdrive)
		0x02	Change parameter (PROFIdrive)
		0x40	SEW-EURODRIVE MOVILINK® Service
Response ID	Unsigned8	Response (+):	
		0x00	Reserved
		0x01	Request parameter (+) (PROFIdrive)
		0x02	Change parameter (+) (PROFIdrive)
		0x40	SEW-EURODRIVE MOVILINK® service (+)
		Response (-):	
		0x81	Request parameter (-) (PROFIdrive)
		0x82	Change parameter (-) (PROFIdrive)
		0xC0	SEW-EURODRIVE MOVILINK® service (-)
Axis	Unsigned8	0x00..0xFF	Number of axis 0..255
No. of parameters	Unsigned8	0x01..0x13	1..19 DWORDs (240 DPV1 data bytes)
Attributes	Unsigned8	0x10	Value
		For SEW-EURODRIVE MOVILINK® (Request ID = 0x40):	
		0x00	No service
		0x10	Read parameter
		0x20	Write parameter
		0x30	Write Parameter volatile
		0x40	Read Minimum
		0x50	Read Maximum
		0x60	Read Default
		0x70	Read Scale
		0x80	Read Attribute
		0xA0..0xF0	Reserved
No. of elements	Unsigned8	0x00	for non-indexed parameters
		0x01..0x75	Quantity 1.0.117
Parameter Number	Unsigned16	0x0000..0xFFFF MOVILINK® parameter index	
Subindex	Unsigned16	0x0000	SEW-EURODRIVE: always 0
Format	Unsigned8	0x43	Double word
		0x44	Error
No. of Values	Unsigned8	0x00..0xEA	Quantity 0..234
Error Value	Unsigned16	0x0000..0x0064 PROFIdrive-Errorcodes	
		0x0080 + MOVILINK®-AdditionalCode Low	
		For SEW-EURODRIVE MOVILINK® 16 Bit Error Value	

Procedure for setting parameters via data set 47 for PROFIBUS-DPV1

Parameter access takes place with the combination of the DPV1 services "Write" and "Read". The parameter setting service is transferred to the slave with Write.req, followed by slave-internal processing. The master now sends a Read.req to pick up the parameter setting response. The master repeats the Read.req if the answer (Read.res) from the slave is negative. As soon as the parameter processing in MQP is concluded, it answers with a positive response (Read.res). The user data now contains the parameter setting response of the parameter setting request that was previously sent with Write.req (see following figure). This mechanism applies to both a C1 and a C2 master.



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MOVILINK® parameter requests

The parameter channel of the MQP is directly mapped in the structure of data set 47. The Request ID 0x40 (SEW MOVILINK® service) is used to exchange MOVILINK® parameter setting requests. Parameter access with MOVILINK® services usually takes place according to the structure described below. The typical message sequence for data set 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 DPV0 parameter channel.

Example for reading a parameter via MOVILINK® (reading a parameter via DPV1)

The following tables give an example of the structure of the Write.req and Read.res user data for reading an individual parameter via the MOVILINK® parameter channel.

Sending a parameter request:

The following tables show the coding of the user data for the Write.req service including the DPV1 header. The Write.req service is used to transfer the parameter setting request to the drive inverter.

	Service:	Write.request	Description
DPV1 header	Slot_Number	0	random, (is not evaluated)
	Index	47	Index of the data set; constant index 47
	Length	10	10byte user data for parameter request

	Byte	Field	Value	Description
PROFIdrive Parameter channel	0	Request reference	0x01	Individual reference number for the parameter setting request is mirrored in the parameter response
	1	Request ID	0x40	SEW MOVILINK® service
	2	Axis	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 to 7	Parameter Number	0x206C	MOVILINK® index 8300 = firmware version
	8 to 9	Subindex	0x0000	Subindex 0

Query parameter response:

The following table shows the coding of the Write.req user data including the DPV1 header.

	Service:	Read.request	Description
DPV1 header	Slot_Number	0	random, (is not evaluated)
	Index	47	Index of the data set; constant index 47
	Length	240	Maximum length of response buffer in the DPV1 master

Positive MOVILINK® parameter response:

The following tables show the Read.res user data with the positive response data of the parameter setting request. The parameter value for index 8300 (firmware version) is returned as an example.

	Service:	Read.request	Description
DPV1 header	Slot_Number	0	random, (is not evaluated)
	Index	47	Index of the data set: constant index 47
	Length	10	10 byte user data for order buffer

Byte	Field	Value	Description
0	Response reference	0x01	Reflected reference number from the parameter setting order
1	Response ID	0x40	Positive MOVILINK® response
2	Axis	0x00	Reflected axis number: 0 for single axis
3	No. of parameters	0x01	1 parameter
4	Format	0x43	Parameter format: Double word
5	No. of values	0x01	1 value
6 to 7	Value Hi	0x311C	Higher-order part of the parameter
8 to 9	Value Lo	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® (writing a parameter via DPV1)

The following tables show the sequence of the Write and Read services for the non-volatile writing of the value 12345 to IPOS variable H0 (parameter index 11000) as an example. The MOVILINK® service Write Parameter volatile is used for this purpose.

	Service:	Read.request	Description
DPV1 header	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

Byte	Field	Value	Description
0	Request reference	0x01	Individual reference number for the parameter setting request is mirrored in the parameter response
1	Request ID	0x40	SEW MOVILINK® service
2	Axis	0x00	Axis number; 0 = single axis
3	No. of parameters	0x01	1 parameter
4	Attributes	0x30	MOVILINK® service Write parameter volatile
5	No. of elements	0x00	0 = access to direct value, no subelement
6 to 7	Parameter Number	0x2AF8	Parameter index 11000 = 'IPOS variable H0'
8 to 9	Subindex	0x0000	Subindex 0
10	Format	0x43	Double word
11	No. of values	0x01	Change 1 parameter value
12 to 13	Value HiWord	0x0000	Higher-order part of the parameter value
14 to 15	Value LoWord	0x0BB8	Lower-order part of the parameter value

After sending this Write.request, the Write.response is received. If there was no status conflict in processing the parameter channel, a \positive Write.response occurs. Otherwise, the status error is located in Error_code_1.

Query parameter response

The following tables show the coding of the Write.req user data including the DPV1 header.

	Byte	Field	Value	Description
DPV1 header		Function_Num		Read.req
		Slot_Number	X	Slot_Number not used
		Index	47	Index of data set
		Length	240	Maximum length of response buffer in DP master

Positive response to "Write Parameter volatile"

	Service:	Read.response	Description
DPV1 header	Slot_Number	0	random, (is not evaluated)
	Index	47	Index of the data set; constant index 47
	Length	4	12 byte user data in response buffer

Byte	Field	Value	Description
0	Response reference	0x01	Reflected reference number from the parameter setting request
1	Response ID	0x40	Positive MOVILINK® response
2	Axis	0x00	Reflected axis number; 0 = single axis
3	No. of parameters	0x01	1 parameter

Return codes for parameter settings

Negative parameter response

The following tables show the coding of a negative response of a MOVILINK® service. Bit 7 is entered in the Response ID if the response is negative.

	Service:	Read.response	Description
DPV1 header	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	Reflected reference number from the parameter setting order
1	Response ID	0xC0	Negative MOVILINK® response
2	Axis	0x00	Reflected axis number; 0 = single axis
3	No. of parameters	0x01	1 parameter
4	Format	0x44	Error
5	No. of values	0x01	1 error code
6 to 7	Error value	0x0811	MOVILINK® return code, e.g. ErrorClass 0x08, Add. code 0x11 (see the table MOVILINK® return codes for DPV1)

MOVILINK® parameter response

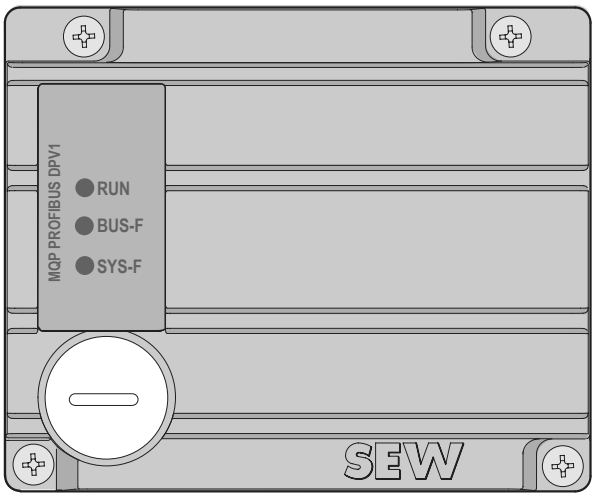
The following table shows the return codes that are returned by the MQP in case of an error in the DPV1 parameter access.

MOVILINK® return code (hex)	Description
0x0810	Invalid index, parameter index does not exist in the unit
0x0811	Function / parameter not implemented
0x0812	Read access only
0x0813	Parameter lock activated
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 via RS-485 process interface only
0x081A	Parameter access via RS-485 diagnostic interface only
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 Autosetup
0x0505	Incorrect coding of management and reserved byte
0x0602	Communication error between inverter system and fieldbus option card
0x0502	Timeout of secondary connection (e.g. during reset or with Sys-Fault)

9.6 Description of the LED display

The PROFIBUS interface MQP has three diagnostic LEDs.

- LED "RUN" (green) for displaying the normal operating status
- LED "BUS-F" (red) for displaying faults on the PROFIBUS-DP
- LED "SYS-F" (red) for displaying system faults on the MQP or MOVIMOT®



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States of the "RUN" LED (green)

RUN	BUS-F	SYS-F	Meaning	Remedy
On	x	x	• MQP circuit board hardware OK	–
On	Off	Off	• Correct MQP operation • MQP is currently exchanging data with the DP master (data exchange) and MOVIMOT®	–
Off	x	x	• MQP not ready • No DC 24 V power supply	• Check DC 24 V voltage supply • Switch MQP on again. Exchange module if problem occurs several times.
Flash-ing	x	x	• PROFIBUS address is set higher than 125.	• Check the PROFIBUS address set on the MQP.

x = any status

States of the "BUS-F" LED (red)

RUN	BUS-F	SYS-F	Meaning	Remedy
On	**Off**	x	• MQP is currently exchanging data with the DP master (data exchange).	–
On	**Flash-ing**	x	• Baud rate is detected, however not addressed by DP master. • MQP was not configured in DP master or configured incorrectly.	• Check configuration of the DP master.
On	**On**	x	• Connection to the DP master has failed. • MQP does not detect baud rate. • Bus interruption • DP master not in operation	• Check the PROFIBUS-DP connection to the MQP • Check the DP master. • Check all cables in your PROFIBUS-DP network.

x = any status

States of the "SYS-F" LED (red)

RUN	BUS-F	SYS-F	Meaning	Remedy
x	x	**Off**	• Normal operating state • The MQP is exchanging data with the connected MOVIMOT®.	–
x	x	**Flashes regularly**	• The MQP is in error state. • An error message is displayed in the MOVITOOLS® status window.	• Please observe the corresponding error description (see error table).
x	x	**On**	• The MQP is not exchanging data with the connected MOVIMOT®. • The MQP was not configured, or the connected MOVIMOT® do not respond.	• Check the wiring of the RS-485 between MQP and connected MOVIMOT® as well as the voltage supply of MOVIMOT®. • Check whether the addresses set on the MOVIMOT® correspond to the addresses set in the IPOS program ("MovcommDef" command). • Check whether the IPOS program has been started.
			• Maintenance switch on the field distributor is set to OFF	• Check the setting of the maintenance switch on the field distributor

x = any status

9.7 Error states

Fieldbus timeout

Switching off the fieldbus master or a broken wire in the fieldbus cabling results in to a fieldbus timeout in the MQP. The connected MOVIMOT® units are stopped by sending "0" in each process output data word. In addition, the digital outputs are set to "0."

This step corresponds to a rapid stop on control word 1. **Caution: If MOVIMOT® is controlled with three process data words, the ramp is specified with 0 s in the third word!**

The "Fieldbus timeout" error resets itself automatically. The MOVIMOT® units will receive the current process output data again from the controller as soon as the fieldbus communication has been reestablished.

This error response can be deactivated via P831 in MOVITOOLS® Shell.

RS-485 timeout

If one or more MOVIMOT® units can no longer be addressed by the MQP via RS-485, error code 91 "System error" is displayed in status word 1. The "SYS-F" LED lights up. The error is also transmitted via diagnostics interface.

MOVIMOT® units that do not receive any data will stop after 1 second. The prerequisite for this is that data exchange between the MQP and MOVIMOT® is enabled via MOVCOMM commands. MOVIMOT® units that continue to receive data can be controlled as usual.

The timeout resets itself automatically, i.e. the current process data are immediately exchanged again with the unavailable MOVIMOT® after restart of the communication.

Unit fault

The MQP fieldbus interfaces can detect a series of hardware defects. After detecting a hardware defect, the devices are inhibited. The exact error responses and remedial measures are listed in the chapter "List of Errors."

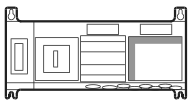
A hardware defect causes error 91 to be displayed in the process input data in status word 1 of all MOVIMOT® units. The "SYS-F" LED on the MQP module flashes regularly.

The exact error code can be displayed via the diagnostics interface in MOVITOOLS® in the MQP status. The error code can be read and processed in the IPOS® program with the command "GETSYS".

10 Supplementary Field Distributor Startup Information

The startup procedure is described in the section "Startup with PROFIBUS (MFP + MQP)." In addition, please observe the following notes about the startup of field distributors.

10.1 Field distributors MF.../Z.6., MQ.../Z.6.



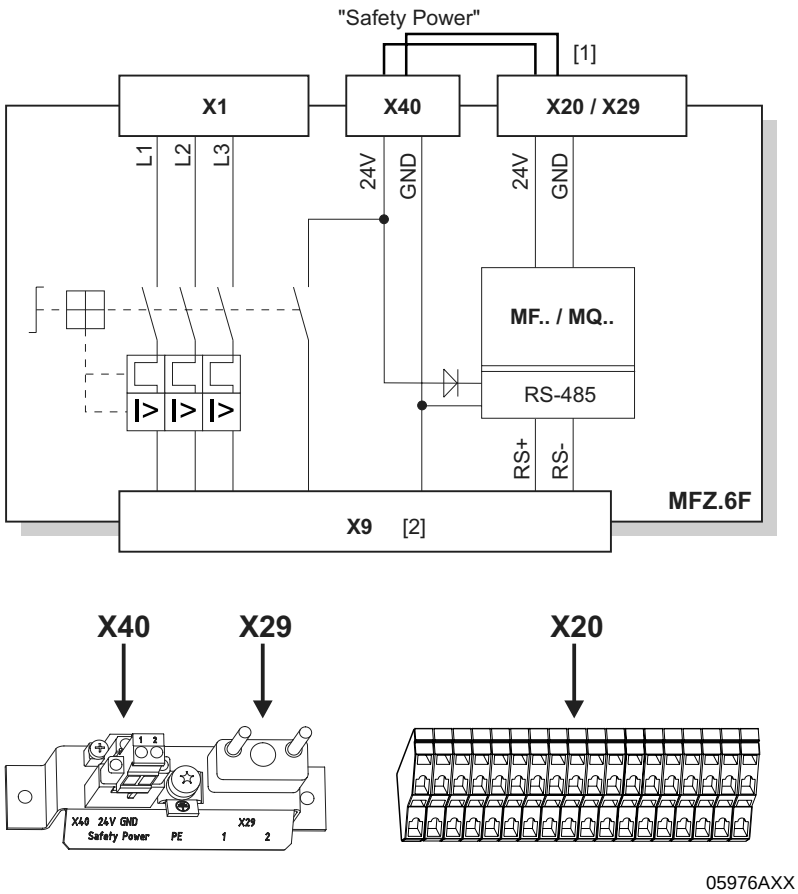
Maintenance switch

The maintenance/line protection switch of the Z.6. field distributor protects the hybrid line against overload and switches the

– power supply of the MOVIMOT®
– DC 24 V power supply for MOVIMOT®

Important: The maintenance/line protection switch disconnects only the MOVIMOT® motor from the power supply system, not the field distributor.

Block diagram:



05976AXX

[1] Jumper to supply MOVIMOT® from the DC 24 V voltage for MF../MQ.. fieldbus module (wired at factory)
[2] Hybrid cable connection

10.2 Field distributors MF.../MM../Z.7., MQ.../MM../Z.7.

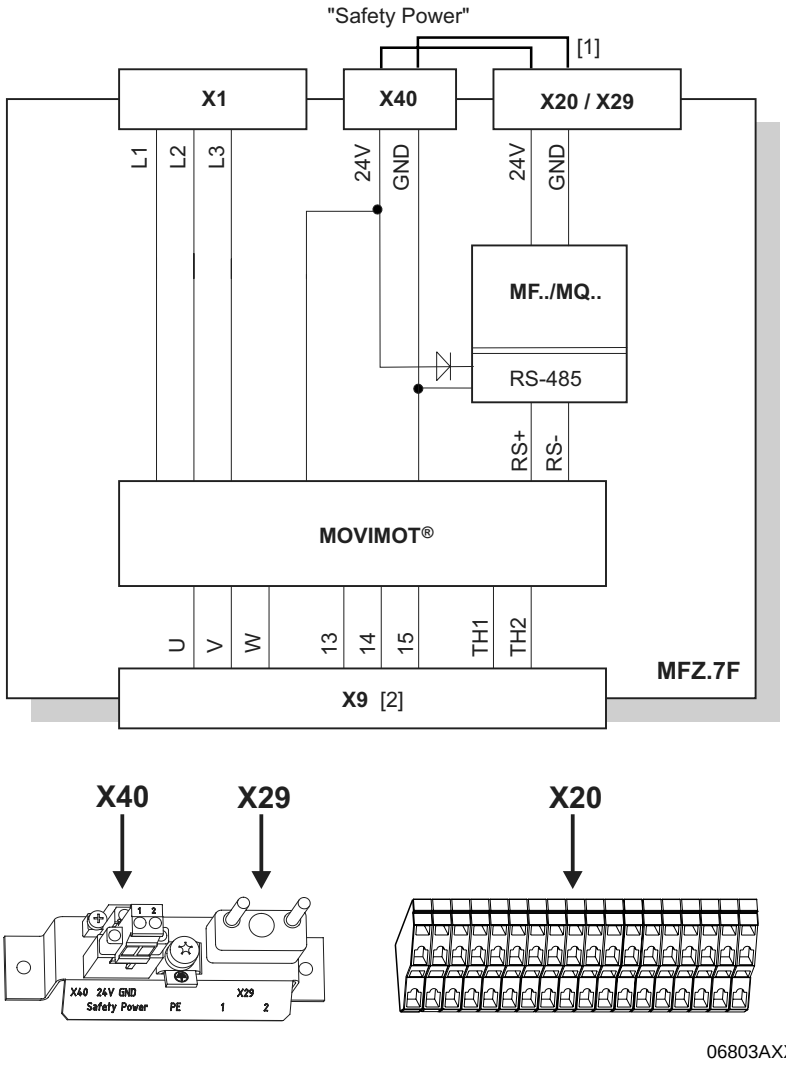
Checking the connection type for the connected motor

Use the following figure to check that the selected connection type is identical for the field distributor and the connected motor.

03636AXX

Important: For brake motors: Do not install brake rectifiers inside the terminal box of the motor!

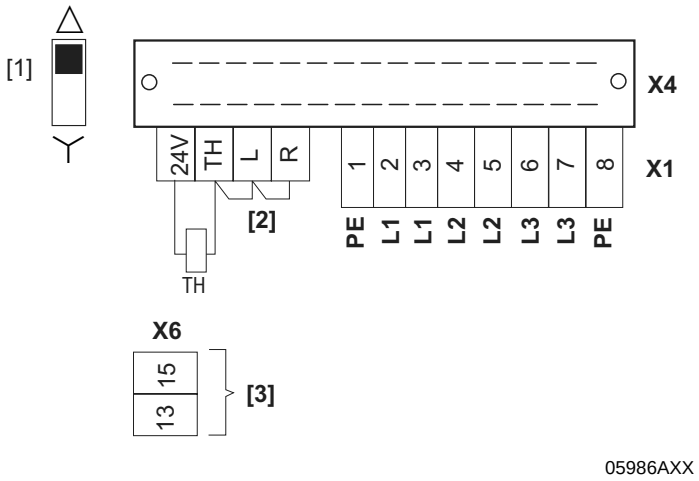
Block diagram



06803AXX

[1] Jumper to supply MOVIMOT® from the DC 24 V voltage for MF../MQ.. fieldbus module (wired at factory)
[2] Hybrid cable connection

Internal wiring of the MOVIMOT® inverter in the field distributor

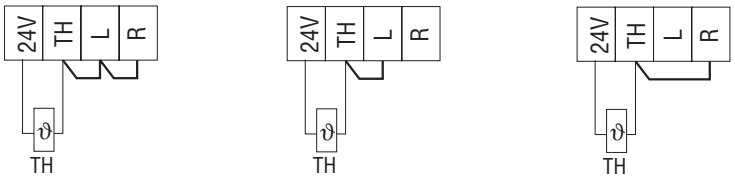


05986AXX

[1] DIP switch for setting the connection type
Make sure that the method of connection for the connected motor matches the setting of the DIP switch.

[2] **Note the enabled direction of rotation**
(Both directions of rotation are enabled as standard)

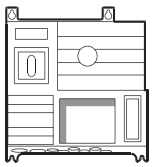
Both directions are enabled	Only direction **counterclockwise** is enabled	Only direction **clockwise** is enabled



04957AXX

[3] Connection for internal braking resistor (in motors without brake only)

10.3 Field distributors MF.../MM../Z.8., MQ.../MM../Z.8.



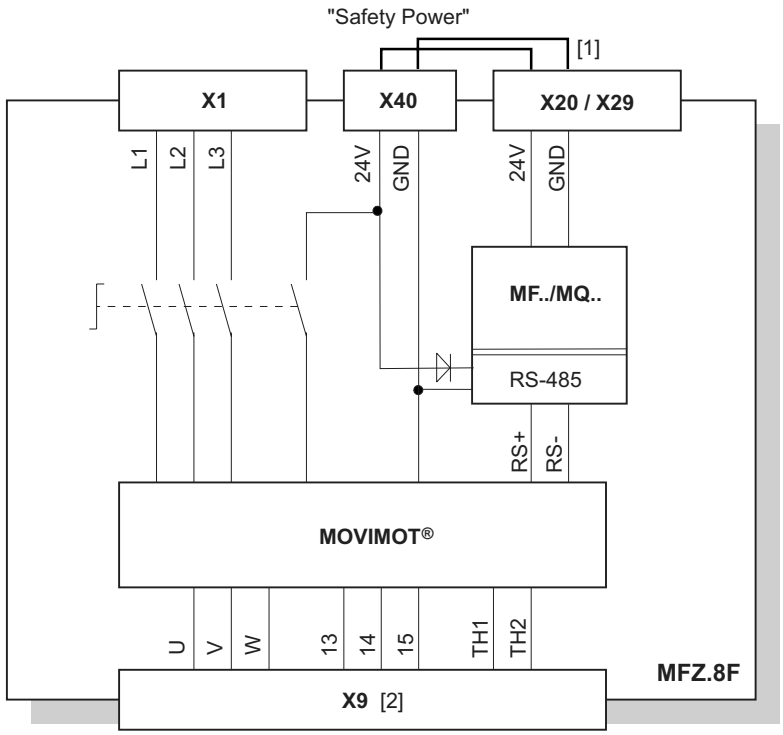
Maintenance switch

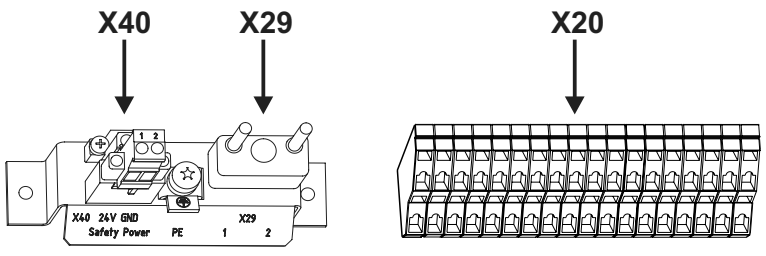
The maintenance switch of the Z.8. field distributor switches the

– power supply of the MOVIMOT®
– DC 24 V power supply for MOVIMOT®

Important: The maintenance switch disconnects the MOVIMOT® inverter with connected motor from the power supply system, but not the field distributor.

Block diagram:





05977AXX

[1] Jumper to supply MOVIMOT® from the DC 24 V voltage for MF../MQ.. fieldbus module (wired at factory)
[2] Hybrid cable connection

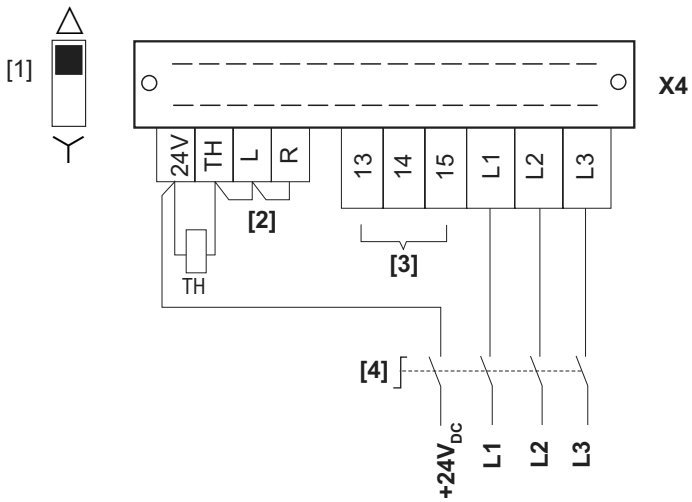
Checking the connection type for the connected motor

Use the following figure to check that the selected connection type is identical for the field distributor and the connected motor.

03636AXX

Important: For brake motors: Do not install brake rectifiers inside the terminal box of the motor!

Internal wiring of the MOVIMOT® inverter in the field distributor

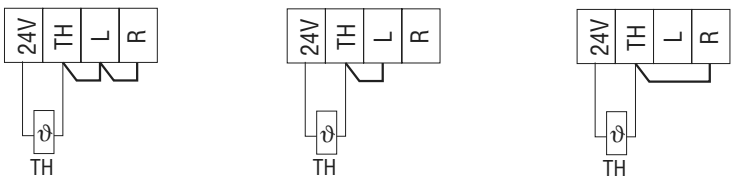


05981AXX

[1] DIP switch for setting the connection type
Make sure that the method of connection for the connected motor matches the setting of the DIP switch.

[2] **Note the enabled direction of rotation**
(Both directions of rotation are enabled as standard)

Both directions are enabled	Only direction **counterclockwise** is enabled	Only direction **clockwise** is enabled



04957AXX

[3] Connection for internal braking resistor (in motors without brake only)

[4] Maintenance switch

10.4 MOVIMOT® frequency inverter integrated in field distributor

The following section describes the changes in the use of the MOVIMOT® frequency inverter integrated in the field distributor compared to the use when it is integrated in the motor.

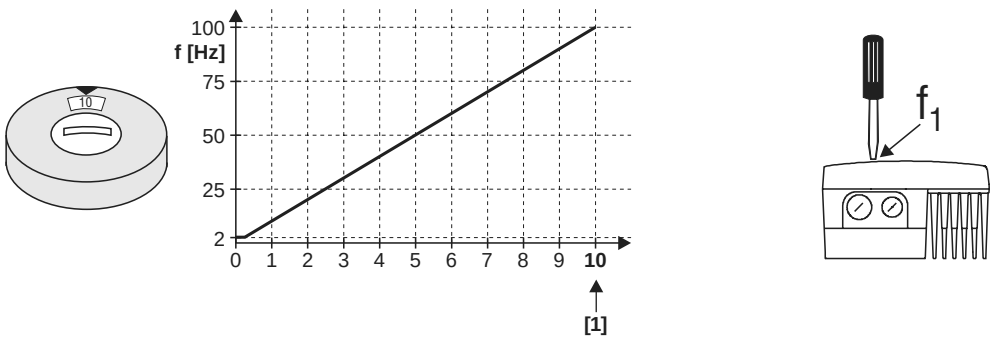
Different factory setting when MOVIMOT® is integrated in the field distributor

Note the **changes to the factory settings when using MOVIMOT® integrated in Z.7 or Z.8. field distributors.** The remaining settings are identical with MOVIMOT® integrated in the motor. Refer to the MOVIMOT® MM..C" operating instructions.

DIP switch S1:

S1	1	2	3	4	5	6	7	8
Meaning	**RS-485 address**				**Motor protec-tion**	**Motor power rating**	**PWM Frequency**	**No-load damping**
	2^0	2^1	2^2	2^3				
ON	**1**	1	1	1	**Off**	Motor one size smaller	**Variable** (16,8,4 kHz)	On
OFF	0	**0**	**0**	**0**	On	**Adjusted**	4kHz	**Off**

Setpoint potentiometer f1:



51261AXX

[1] Factory setting

Additional functions for MOVIMOT® integrated in field distributor

The following additional functions are available (to a limited extent) when MOVIMOT® is integrated in the Z.7/Z.8 field distributor. A detailed description of the additional functions can be found in the "MOVIMOT® MM..C" operating instructions.

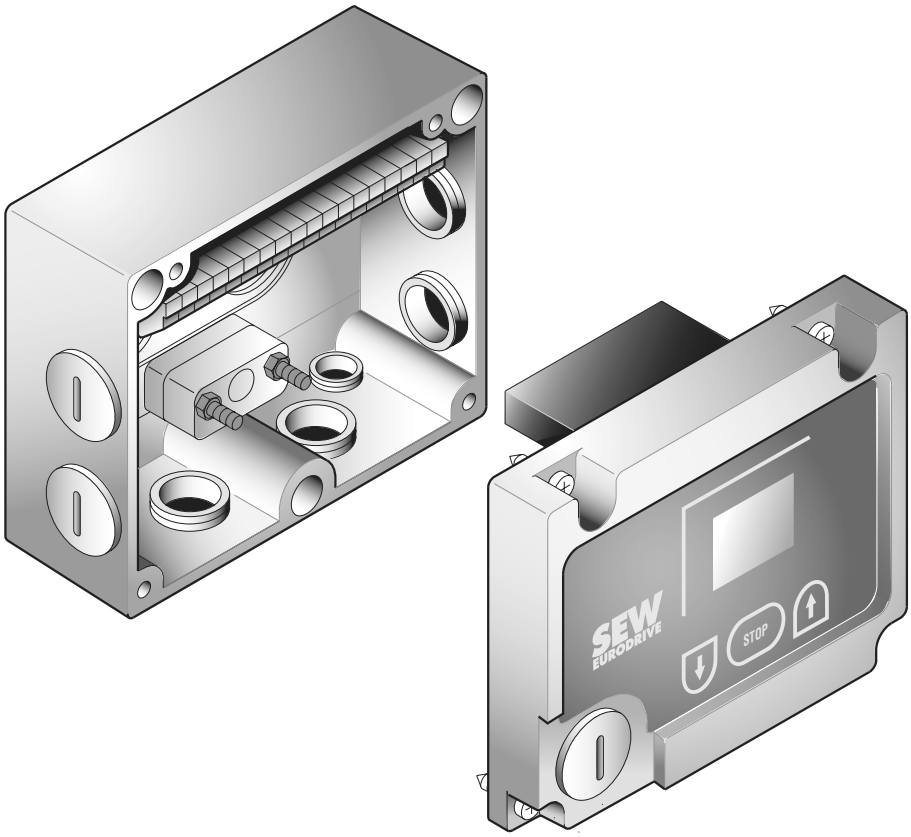
Additional function		Restriction
1	MOVIMOT® with increased ramp times	–
2	MOVIMOT® with adjustable current limitation (fault if exceeded)	–
3	MOVIMOT® with adjustable current limitation (can be changed using using terminal f1/f2)	–
4	MOVIMOT® with bus configuration	Only possible with MQ.. fieldbus interfaces
5	MOVIMOT® with motor protection in Z.7/Z.8 field distributor	Parameter settings can only be made for the bus in combination with the MQ.. fieldbus interface
6	MOVIMOT® with maximum 8 kHz PWM frequency	–
7	MOVIMOT® with rapid start/stop	**The mechanical brake can only be controlled by MOVIMOT®. Do not control the brake using the relay output.**
8	MOVIMOT® with minimum frequency 0 Hz	–
10	MOVIMOT® with minimum frequency 0 Hz and reduced torque at low frequencies\	–
11	Monitoring of supply-phase fault deactivated	–
12	MOVIMOT® with rapid start/stop and motor protection in Z.7 and Z.8 field distributors	**The mechanical brake can only be controlled by MOVIMOT®. Do not control the brake using the relay output.**
14	MOVIMOT® with deactivated slip compensation	–

Do not use additional function 9 "MOVIMOT® for hoist applications" and additional function 13 "MOVIMOT® for hoist applications with extended n-monitoring" when the MOVIMOT® inverter is integrated in the Z.7/Z.8 field distributors.

11 Keypads

11.1 MFG11A keypad

Function The MFG11A keypad is plugged onto any MFZ.. connection module instead of a fieldbus interface for manual control of a MOVIMOT® drive.



50030AXX

Application

Operation of the MFG11A option	
Display	Negative display value e.g.  = counterclockwise Positive display value e.g.  = clockwise The display value is based on the speed set using the setpoint potentiometer f1. Example: Display "50" = 50 % of the speed set with the setpoint potentiometer. Important: If the display is "0," the drive is rotating at f_{min}.
Increase the speed	For CW direction:  For CCW direction: 
Reducing the speed	For CW direction:  For CCW direction: 
Inhibit MOVIMOT®	Press the button:  Display = 
Enable MOVIMOT®	 **or**  Important: After enable, MOVIMOT® accelerates to the value and direction of rotation saved last.
Change direction of rotation from CW to CCW	1.  Until display =  2. Pressing  again changes direction of rotation from CW to CCW.
Change direction of rotation from CCW to CW	1.  Until display =  2. Pressing  changes direction of rotation from CCW to CW.

When the 24 V supply is switched back on, the module is always in STOP status (display = OFF). When selecting the direction using the arrow key, the drive (setpoint) starts from 0.

11.2 DBG60B keypad

Function

The DBG60B keypad can be used to control MOVIMOT® drives via a fieldbus interface (with the exception of the MFK fieldbus interface) in manual mode. Furthermore, the process data words can be displayed in monitor mode.

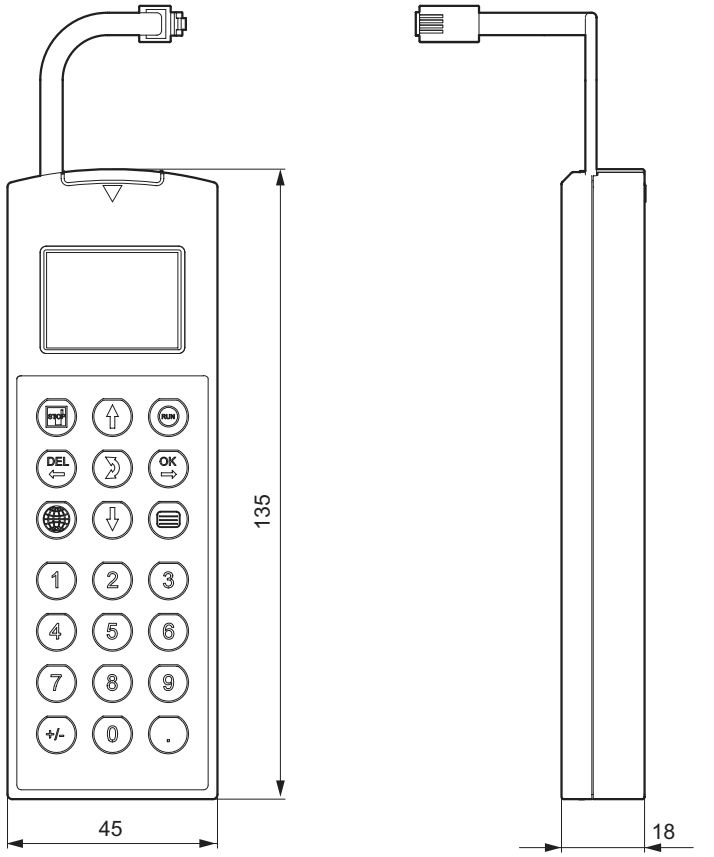
Features

- Illuminated text display, choice of 7 languages
- Keypad with 21 keys
- Can be connected via extension cable DKG60B (5 m)
- Enclosure IP40 (EN 60529)

Overview

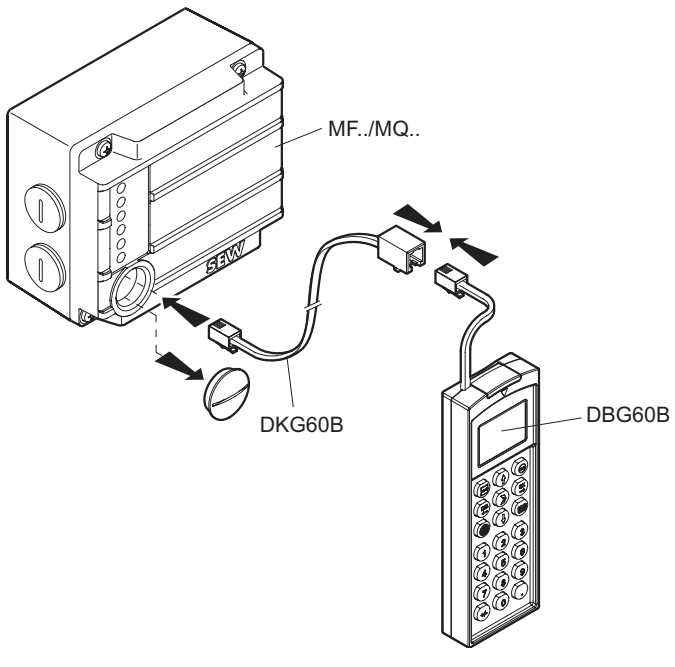
Keypad		Language	Part number
 56555AXX	**DBG60B-01**	DE/EN/FR/IT/ES/PT/NL (German/English/French/Italian/Spanish/ Portuguese/Dutch)	1 820 403 1
	DBG60B-02	DE/EN/FR/FI/SV/DA/TR (German/English/French/Finnish/ Swedish/Danish/Turkish)	1 820 405 8
	DBG60B-03	DE/EN/FR/RU/PL/CS (German/English/France/Russian/Polish/ Czech)	1 820 406 6
	Extension cable	**Description (= scope of delivery)**	**Part number**
	DKG60B	• Length 5 m • 4-core, shielded cable (AWG26)	0 817 583 7

Dimension drawing for DBG60B

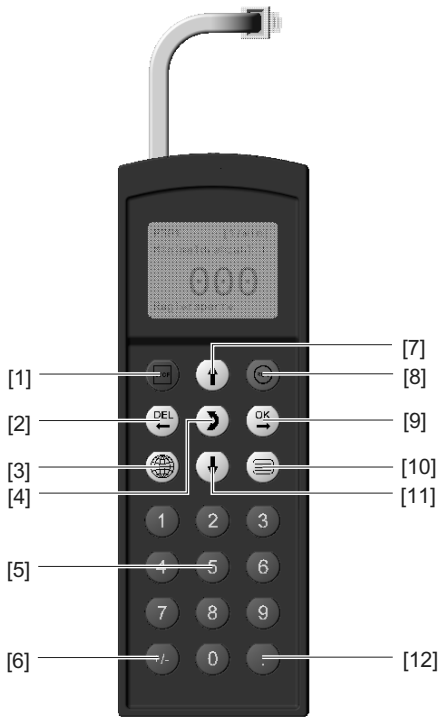


Connection to MF../MQ.. interfaces

The DBG60B keypad is connected directly to the diagnostic interface of the MF../MQ.. fieldbus interface. Alternatively, the keypad can also be connected via the DKG60B option (5 m extension cable).



Key assignments for DBG60B



57483AXX

[1] Stop
[2] Delete previous entry
[3] Language selection
[4] Change menu
[5] Numbers 0 to 9
[6] Reverse the sign
[7] Up arrow, moves up to the next menu item
[8] Start
[9] OK, confirm entry
[10] Activate context menu
[11] Down arrow, moves down to the next menu item
[12] Decimal point

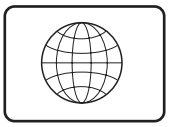
Selecting a language

The following text appears on the display when the keypad is switched on for the first time or after activating the start mode:

SEW

EURODRIVE

The symbol for language selection then appears on the display.



54533AXX

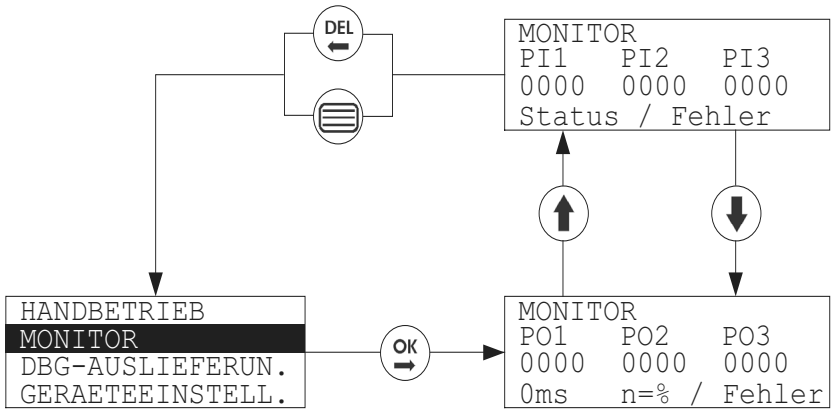
Proceed as follows to select the language:

- Press the [Language selection] key . A list of available languages is displayed on the screen.
- Chose the required language using the [Arrow up] / [Arrow down] keys.
- Confirm your selection by clicking [OK] . The basic display is now shown in your chosen language.

Monitor mode

Activation:

Connect the DBG60B keypad to the diagnostic interface of the fieldbus interface. The unit designation of the MOVIMOT® device selected is displayed for a few seconds. The DBG60B then switches to the monitor mode.



57476ADE

If you are in a different mode and would like to go to the monitor mode, proceed as follows:

- Call up the context menu using the key [Activate context menu] .
- In the context menu, choose the menu item [MONITOR] using the [Arrow up] / [Arrow down] keys.
- Confirm your selection by clicking [OK] . The keypad is now in monitor mode.
- The process output data (PO) and process input data (PI) are displayed in monitor mode. The PO and PI data is displayed in two separate menus. The PO menu window is always displayed from the context menu.

  From here, you can use the [Arrow up] key to go to the PI data display window. To return to the PO menu window, press the [Arrow down] key .
- To return to the context menu, press the [DEL] key or the [Context menu] key .

Display

The process output data is displayed as follows in monitor mode:

```
MONITOR
PO1       PO2 PO3
0000      0000      0000
0ms n=0% / error
```

PO1 = control word, PO2 = speed (%), PO3 = ramp
Additionally: Ramp is displayed in ms and speed in %.
If an error occurs, the fault number and fault text are displayed in turn.

The process input data is displayed as follows in monitor mode:

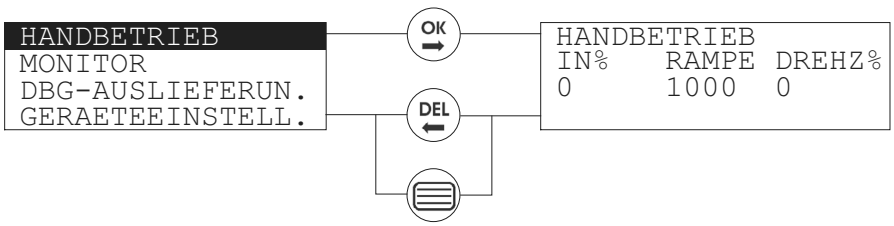
```
MONITOR
PI1 PI2  PI3
0000     0000      0000
Status / error
```

PI1 = status word 1, PI2 = output current, PI3 = status word 2
The status is displayed in the status bar of the PI window. If an error occurs, the fault number and fault text are displayed here instead of the status.

Manual operation mode

Activation

Connect the DBG60B keypad to the diagnostic interface of the module. The unit designation of the MOVIMOT® device selected is displayed for a few seconds. The DBG60B then switches to the monitor mode.



58359AXX

Proceed as follows if you want to go to the manual operation mode:

- Call up the context menu using the key [Activate context menu] .
- In the context menu, choose the menu item [Manual operation] using the [Arrow up] / [Arrow down] keys.
- Confirm your selection by clicking [OK] . The keypad is now in manual operation mode.

Note: Manual operation cannot be selected when the drive is enabled in automation mode (bus operation). The message "MANUAL MODE NOTE 17: INV. ENABLED" appears for 2 s and then the DBG60B returns to the context menu.

Display

The display for the manual operation mode is designed as follows:

```
MANUAL MODE
In% RAMP SPEED%
0        10000    0
ENABLE/NO ENABLE
```

Display value: Output current in % of I_n
Setting value: Ramp time in ms (default value 10000 ms)
Setting value: Speed in % (default value 0 %)

Operation

- The keys [Arrow up] / [Arrow down] or the numbers 0..9 (5) can be used to specify the speed setpoint in %. You can use the "Reverse the sign" key to change the direction.
- You must confirm your selection by pressing the [OK] key. Use the [Change menu] key to enter the ramp time.
- You can also make this setting using the [Arrow up] / [Arrow down] keys or with the numbers 0..9. Confirm your entries by clicking [OK] .
- Press the [RUN] key to start the drive. The status bar now displays the "ENABLE" statically.
- Press the [STOP] key to stop the drive. The message "NO ENABLE" now flashes in the status bar.
- The rated motor current "I_n" is displayed in % during operation.

Important When you exit manual operation mode, the keypad asks whether you want to "Activate automatic operation." If you want to activate automatic operation, press [Yes = OK]. If you do not want to operate this mode, press [NO = DEL]. If you press [NO = DEL], the drive returns to manual operation mode. **If you choose [Yes = OK], the drive is controlled in automatic mode; that is, if the drive is enabled via bus, it starts immediately.**

If an error occurs in manual operation, an error window appears. The fault number and fault text are displayed alternatively in the status bar of the error window. You must press [OK] to exit the error window. This triggers a reset.

12 MOVILINK® Unit Profile

12.1 Coding the process data

The same process data information is used for control and setpoint selection in all fieldbus systems. The process data is coded according to the standard MOVILINK® profile for SEW drive inverters. The following variants are available for MOVIMOT® inverters:

- 2 process data words (2 PD)
- 3 process data words (3 PD)

51334AXX

PO = Process output data	PI = Process input data
PO1 = Control word	PI1 = Status word 1
PO2 = speed (%)	PI2 = Output current
PO3 = Ramp	PI3 = Status word 2

2 process data words

The higher-level controller sends the process output data 'Control word' and 'Speed [%]' to the MOVIMOT® unit to control MOVIMOT® using two process data words; the process input data 'Status word 1' and 'Output current' are sent from the MOVIMOT® unit to the higher-level controller.

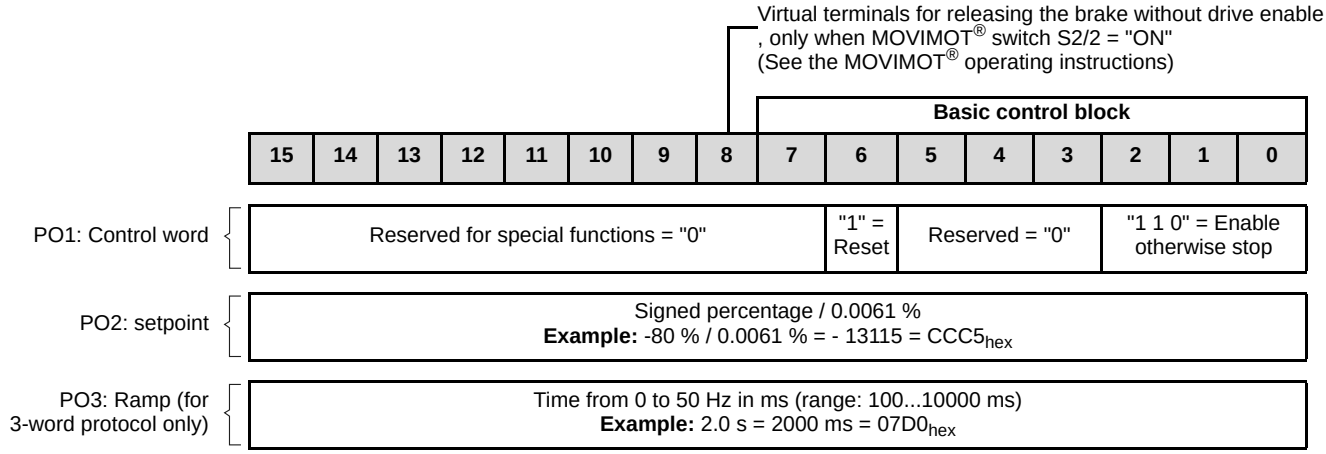
3 process data words

When control uses 3 process data words, the ramp is sent as the additional process output data word and status word 2 is sent as the third process input data word.

Process output data

Process output data is sent from the higher-level controller to the MOVIMOT® inverter (control information and setpoints). However, the data only comes into effect in MOVIMOT® when the RS-485 address in MOVIMOT® (DIP switch S1/1 to S1/4) is set to a value other than 0. MOVIMOT® can be controlled using the following process output data:

- PO1: Control word
- PO2: Speed [%] (setpoint)
- PO3: Ramp



Control word, bits 0 – 2

The "Enable" control command is specified with bits 0 – 2 by entering the control word = 0006_{hex}. The CW and/or CCW input terminal must also be set to +24 V (jumpered) to enable the MOVIMOT® unit.

The "Stop" control command is issued by resetting bit 2 = "0". Use the stop command 0002_{hex} to enable compatibility with other SEW inverter series. MOVIMOT® always triggers a stop at the current ramp whenever bit 2 = "0", regardless of the status of bit 0 and bit 1.

Control word bit 6 = Reset

In the event of a malfunction, the fault can be acknowledged with bit 6 = "1" (Reset). For reasons of compatibility, any control bits not assigned must be set to the value 0.

Speed [%]

The speed setpoint is specified as a percentage value based on the maximum speed set with the f1 setpoint potentiometer.

Coding: $C000_{hex}$ = -100 % (CCW rotation)
4000_{hex} = +100 % (clockwise rotation)
→ 1 digit = 0.0061 %

Example: 80 % f_{max}, CCW rotation:

Calculation: –80 % / 0.0061 = $–13115_{dec}$ = $CCC5_{hex}$

Ramp

The current integrator in the process output data word PO3 is transferred if the process data exchange takes place using three process data words. The ramp generator set with switch t1 is used if MOVIMOT® is controlled by two process data.

Coding: 1 digit = 1 ms

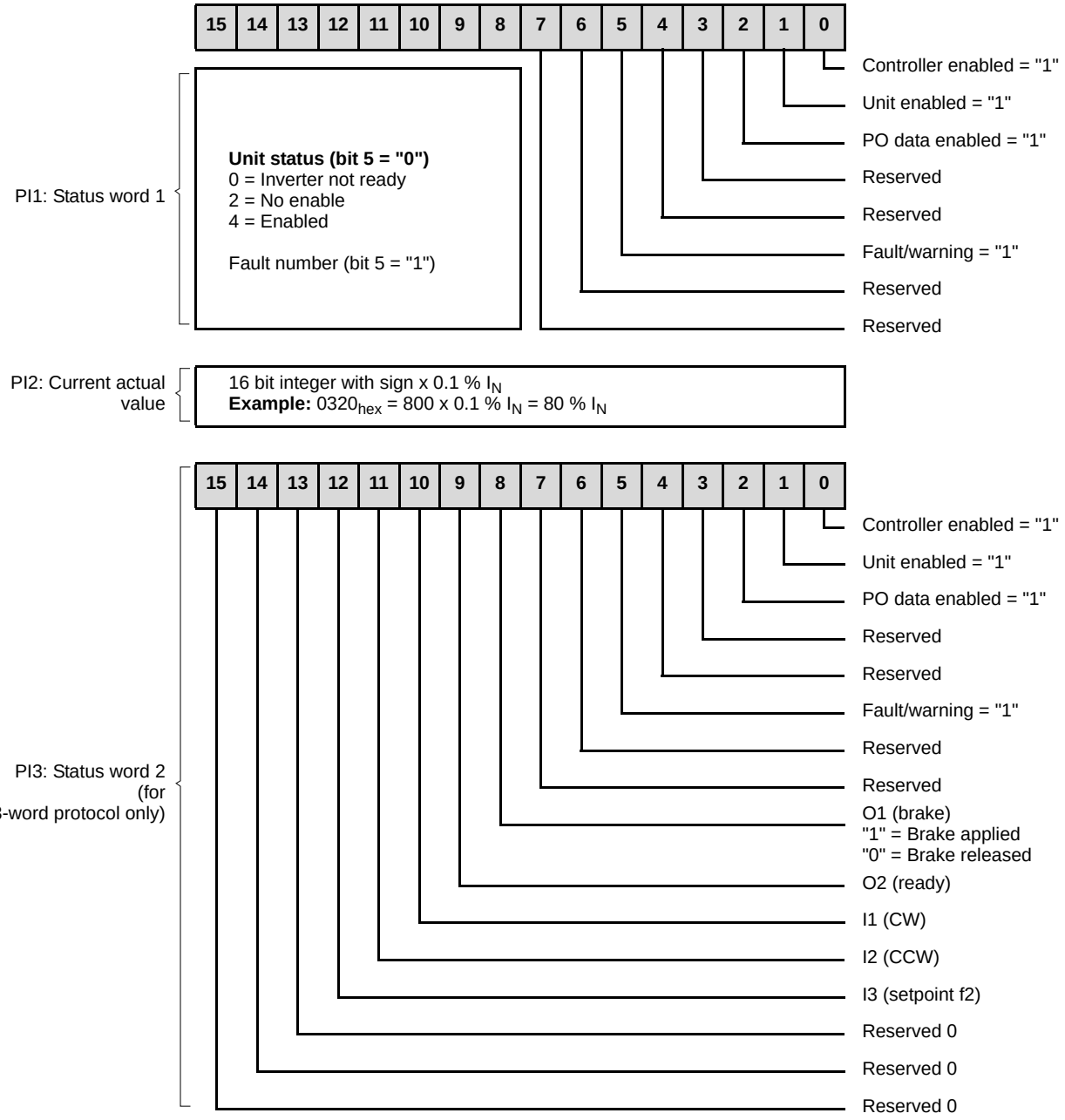
Range: 100...10000 ms

Example: 2.0 s = 2000 ms = 2000_{dec} = $07D0_{hex}$

Process input data

The MOVIMOT® inverter sends back process input data to the higher-level controller. The process input data consists of status and actual value information. MOVIMOT® supports the following process input data:

- PI1: Status word 1
- PI2: Output current
- PI3: Status word 2



12.2 Sample program for Simatic S7 and fieldbus

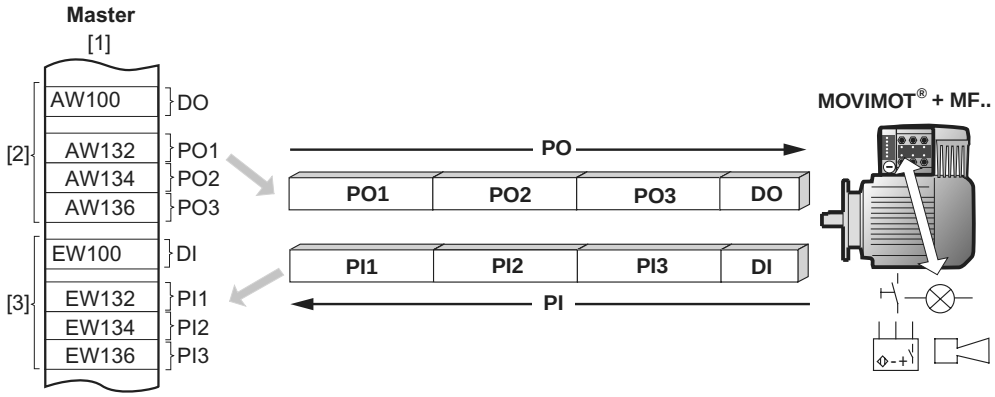
A sample program for Simatic S7 demonstrates the processing of process data as well as the digital inputs and outputs of the MF fieldbus interface.

This section simply demonstrates how to create a PLC program using a non-binding example. SEW is not liable for the contents of the sample program.

Assigning addresses for process data in the automation equipment

In the example, the process data of the MOVIMOT® fieldbus interface is stored in the PLC memory range PW132 – PW136.

The additional output/input word is administered in AW 100 or EW 100.



[1]	Address range	PO	Process output data	PI	Process input data
[2]	Output addresses	PO1	Control word	PI1	Status word 1
[3]	Input addresses	PO2	Speed [%]	PI2	Output current
		PO3	Ramp	PI3	Status word 2
		DO	Digital outputs	DI	Digital inputs

Processing digital inputs/outputs of the MF..

The AND operation of digital inputs DI 0..3 controls the digital outputs DO 0 and DO 1 on the MF...:

```
U E 100.0   // When DI 0 = "1"
U E 100.1 // DI 1 = "1"
U E 100.2   //          DI 2 = "1"
U E 100.3   //          DI 3 = "1"
= A 100.0   // then     DO 0 = "1"
= A 100.1   //          DO 1 = "1"
```

Controlling MOVIMOT®

You enable the MOVIMOT® drive with input DI0:

- E 100.0 = "0": Control command "Stop"
- E 100.0 = "1": Control command "Enable"

Direction of rotation and speed are set via input DI1:

- E 100.1 = "0": 50 % f_{max} clockwise direction
- E 100.1 = "1": 50 % f_{max} counterclockwise direction

The drive is accelerated and decelerated with an integrator ramp of 1 s.

The process input data is saved until further processing in the flag word 20 to 24.

```
      U     E 100.0     // Give control command "Enable" with input 100.0
      SPB FREI

      L     W#16#2      //Control command "Stop"
      T     PAW 132     // Write to PO1 (control word 1)
      SPA   SOLL

FREI: L     W#16#6      // MOVIMOT control command "Enable" (0006hex)
      T     PAW 132     // Write to PO1 (control word 1)

SOLL: U     E 100.1     // Set direction of rotation with input 100.1.
      SPB   LINK        // When input 100.1 = "1", then CCW
      L     W#16#2000   // Set speed = 50% fmax CW rotation (=2000hex)
      T     PAW 134     // Write to PO2 (speed [%])
      SPA   ISTW

LINK: L     W#16#E000   // Set speed = 50% fmax CCW rotation (=E000hex)
      T     PAW 134     // Write to PO2 (speed [%])

ISTW: L     1000        // Ramp = 1s (1000dec)
      T     PAW 136     // Write to PO3 (Ramp)

      L     PEW 132     // Load PI1 (status word 1)
      T MW 20     // and save in buffer
      L     PEW 134     // Load PI2 (output current)
      T MW 22     // and save in buffer
      L     PEW 136     // Load PI3 (status word 2)
      T MW 24     // and save in buffer

      BE
```

13 Parameters

13.1 MQ.. parameter list

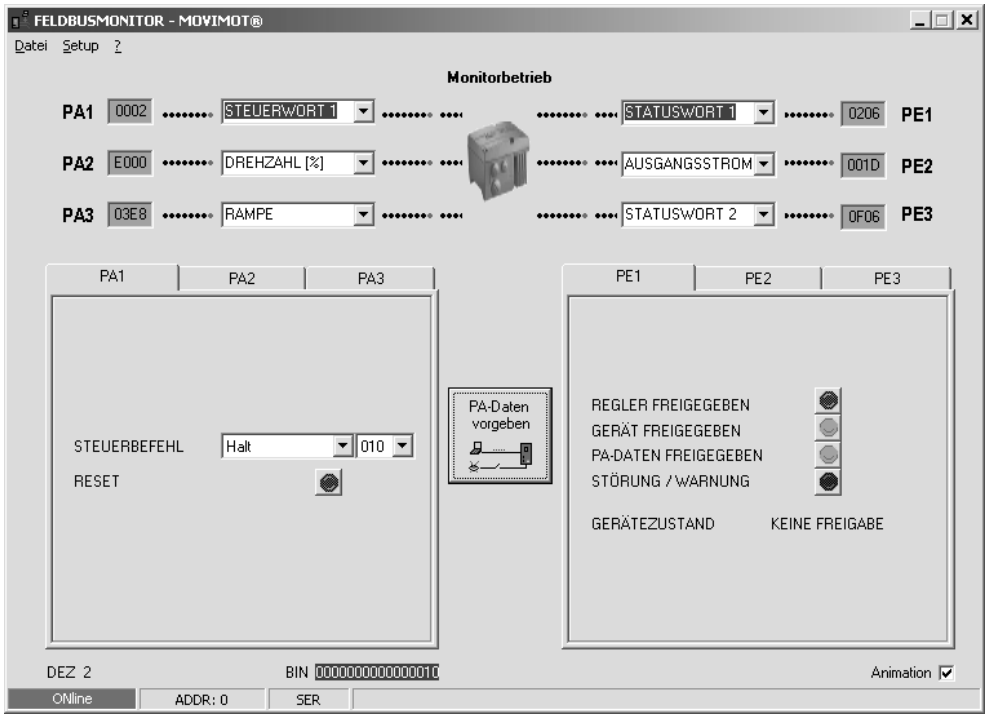
Parameter	Parameter	Index	Unit	Access	Default	Meaning / Value range
010	Inverter status	8310		RO	0	Low word coded, as status word 1
011	Operating state	8310		RO	0	Low word coded, as status word 1
012	Error status	8310		RO	0	Low word coded, as status word 1
013	Current parameter set	8310		RO	0	Low word coded, as status word 1
015	Hours of operation	8328	[s]	RO	0	
030	Binary input DI00	8844		RW	16	0: No function 16: IPOS input 32: MQX Encoder In
031	Binary input DI01	8335		RW	16	
032	Binary input DI02	8336		RO	16	
033	Binary input DI03	8337		RO	16	
034	Binary input DI04	8338		RO	16	
035	Binary input DI05	8339		RO	16	
036	Binary inputs DI00 – DI05	8334		RO	16	
050	Binary output DO00	8843		RW	21	0: No function 21: IPOS output 22: IPOS error
051	Binary output DO01	8350		RW	21	
053	Binary output DO00...	8360		RO		
070	Unit type	8301		RO		
076	Firmware basic unit	8300		RO		
090	PD configuration	8451		RO		
091	Fieldbus type	8452		RO		
092	Fieldbus baud rate	8453		RO		
093	Fieldbus address	8454		RO		
094	PO1 setpoint	8455		RO		
095	PO2 setpoint	8456		RO		
096	PO3 setpoint	8457		RO		
097	PI1 actual value	8458		RO		
098	PI2 actual value	8459		RO		
099	PI3 actual value	8460		RO		
504	Encoder monitoring	8832		RW	1	0: OFF 1: ON
608	Binary input DI00	8844		RW	16	0: No function 16: IPOS input 32: MQX Encoder In
600	Binary input DI01	8335		RW	16	
601	Binary input DI02	8336		RO	16	
602	Binary input DI03	8337		RO	16	
603	Binary input DI04	8338		RO	16	
604	Binary input DI05	8339		RO	16	
628	Binary output DO00	8843		RW	21	0: No function 21: IPOS output 22: IPOS error
620	Binary output DO01	8350		RW	21	
802	Factory setting	8594		R/RW	0	0: No 1: Yes 2: Delivery condition
810	RS-485 address	8597		RO	0	
812	RS-485 timeout delay	8599	[s]	RO	1	
819	Fieldbus timeout delay	8606	[s]	RO		
831	Response fieldbus timeout	8610		RW	10	0: No response 10: PO DATA = 0

Parameter	Parameter	Index	Unit	Access	Default	Meaning / Value range
840	Manual reset	8617		RW		0: OFF 1: ON
870	Setpoint description PO1	8304		RO	12	IPOS PO-DATA
871	Setpoint description PO2	8305		RO	12	IPOS PO-DATA
872	Setpoint description PO3	8306		RO	12	IPOS PO-DATA
873	Actual value description PI1	8307		RO	9	IPOS PI-DATA
874	Actual value description PI2	8308		RO	9	IPOS PI-DATA
875	Actual value description PI3	8309		RO	9	IPOS PI-DATA
-	IPOS control word	8691		RW	0	
-	IPOS program length	8695		RW	0	
-	IPOS variables H0 – H9	11000-11009		RW	–	Memory variable
-	IPOS variable H10s – H511	11010-11511		RW	0	
-	IPOS code	16000-17023		RW	0	

14 Bus Diagnostics with MOVITOOLS®

14.1 Fieldbus diagnostics via MF../MQ.. diagnostics interface

MF../MQ.. fieldbus modules are equipped with a diagnostics interface for startup and service. This interface allows for bus diagnostics with the SEW operating software MOVITOOLS®.



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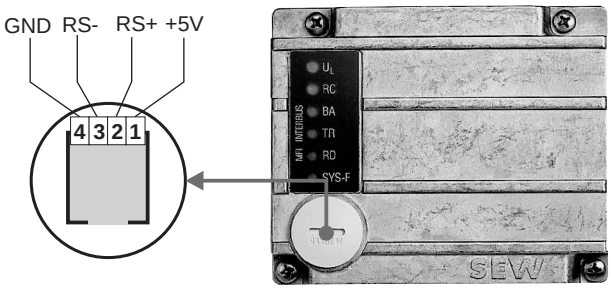
Setpoint and actual values that are exchanged between MOVIMOT® and the fieldbus master can easily be diagnosed.

The MOVIMOT® unit can be controlled directly in the "Control" fieldbus monitor operating mode. See the section "Fieldbus monitor in MOVITOOLS®" on page 129.

Structure of the diagnostics interface

The diagnostics interface is located on potential level 0; the same potential as the module electronics. This setup applies to all MF../MQ.. fieldbus interfaces. For the MFK.. AS-Interface interfaces, the diagnostics interface is located on the MOVIMOT® potential.

The interface can be accessed via a 4-pin plug connected RJ10. The interface is located underneath the cable gland on the module cover.



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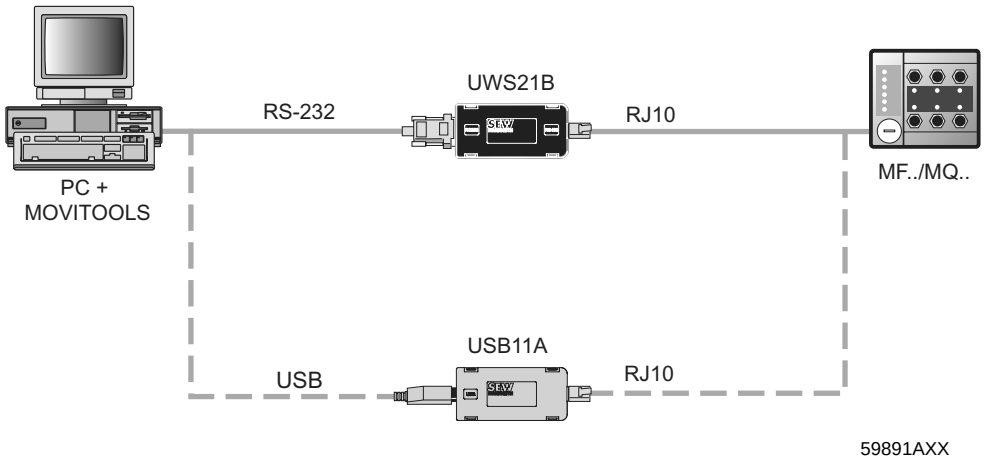
Interface adapter

The diagnostics interface can be connected to a PC using one of the following options:

- UWS21B with serial interface RS-232, part number 1 820 456 2
- USB11A with USB interface, part number 0 824 831 1



Scope of delivery:

- Interface adapter
- Cable with RJ10 plug connector
- Interface cable RS-232 (UWS21B) or USB (USB11A)

Relevant diagnostics parameters

The MOVITOOLS® Shell software enables diagnostics for MOVIMOT® via the diagnostic interface of the fieldbus interfaces.

Display values - 00. process values

MOVIMOT® returns the output current as process value.

Menu number	Parameter name	Index	Meaning / implementation
004	Output current [% In]	8321	MOVIMOT® output current

Display values - 01. status display

The MOVIMOT® status is interpreted and shown in the status display.

Menu number	Parameter name	Index	Meaning / implementation
010	Inverter status	8310	MOVIMOT® inverter status
011	Operating state	8310	MOVIMOT® operating state
012	Error status	8310	MOVIMOT® error status

Display values - 04. Binary input option

The digital inputs of the MF.. fieldbus interfaces are shown as optional MOVIMOT® inputs. Since these inputs do not have a direct effect on MOVIMOT®, the terminal assignment is set to "No function."

Menu number	Parameter name	Index	Meaning / implementation
040	Binary inputs DI10	8340	Status of MF.. binary inputs DI0
041	Binary inputs DI11	8341	Status of MF.. binary inputs DI1
042	Binary inputs DI12	8342	Status of MF.. binary inputs DI2
043	Binary inputs DI13	8343	Status of MF.. binary inputs DI3
044	Binary inputs DI14	8344	Status of MF.. binary inputs DI4
045	Binary inputs DI15	8345	Status of MF.. binary inputs DI5
048	Binary inputs DI10 ... DI17	8348	State of all binary inputs

Display values - 06. Binary output option

The digital outputs of the MF.. fieldbus interfaces are shown as optional MOVIMOT® outputs. Since these outputs do not have a direct effect on MOVIMOT®, the terminal assignment is set to "No function."

Menu number	Parameter name	Index	Meaning / implementation
060	Binary outputs DO10	8352	Status of MF.. binary outputs DO0
061	Binary outputs DO11	8353	Status of MF.. binary outputs DO
068	Binary outputs DO10 to DO17	8360	Status of MF.. binary outputs DO0 and DO1

Display values - 07. unit data

The unit data displays information on MOVIMOT® and the MF.. fieldbus interface.

Menu number	Parameter name	Index	Meaning / implementation
070	Unit type	8301	Unit type MOVIMOT®
072	Option 1	8362	Unit type option 1 = MF.. type
074	Firmware option 1	8364	Firmware part number MF..
076	Firmware basic unit	8300	Firmware part number MOVIMOT®

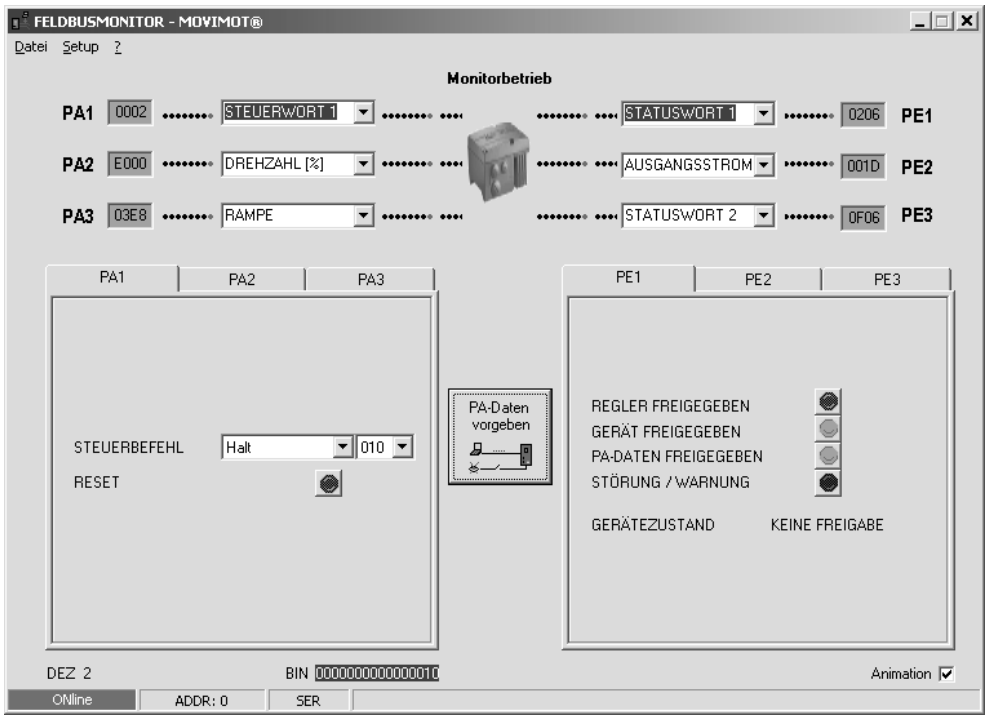
Display values - 09. bus diagnostics

This menu item represents all fieldbus data.

Menu number	Parameter name	Index	Meaning / implementation
090	PD configuration	8451	Set PD configuration for MOVIMOT®
091	Fieldbus type	8452	Fieldbus type of MF..
092	Fieldbus baud rate	8453	Baud rate of MF..
093	Fieldbus address	8454	Fieldbus address of MF.. DIP switches
094	PO1 setpoint [hex]	8455	PO1 setpoint from fieldbus master to MOVIMOT®
095	PO2 setpoint [hex]	8456	PO2 setpoint from fieldbus master to MOVIMOT®
096	PO3 setpoint [hex]	8457	PO3 Setpoint from fieldbus master to MOVIMOT®
097	PI1 actual value [hex]	8458	PI1 actual value from MOVIMOT® to fieldbus master
098	PI2 actual value [hex]	8459	PI2 actual value from MOVIMOT® to fieldbus master
099	PI3 actual value [hex]	8460	PI3 actual value from MOVIMOT® to fieldbus master

Fieldbus monitor in MOVITOOLS®

The fieldbus monitor in MOVITOOLS® makes for user-friendly control and visualization of cyclical MOVIMOT® process data.



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Features

- Intuitive operation
- Easy to learn control functions even without connection to the fieldbus (preparation for startup)
- Integrated in the SEW user interface software MOVITOOLS®
- Quick and easy troubleshooting
- Shorter project planning phase

Function of the fieldbus monitor

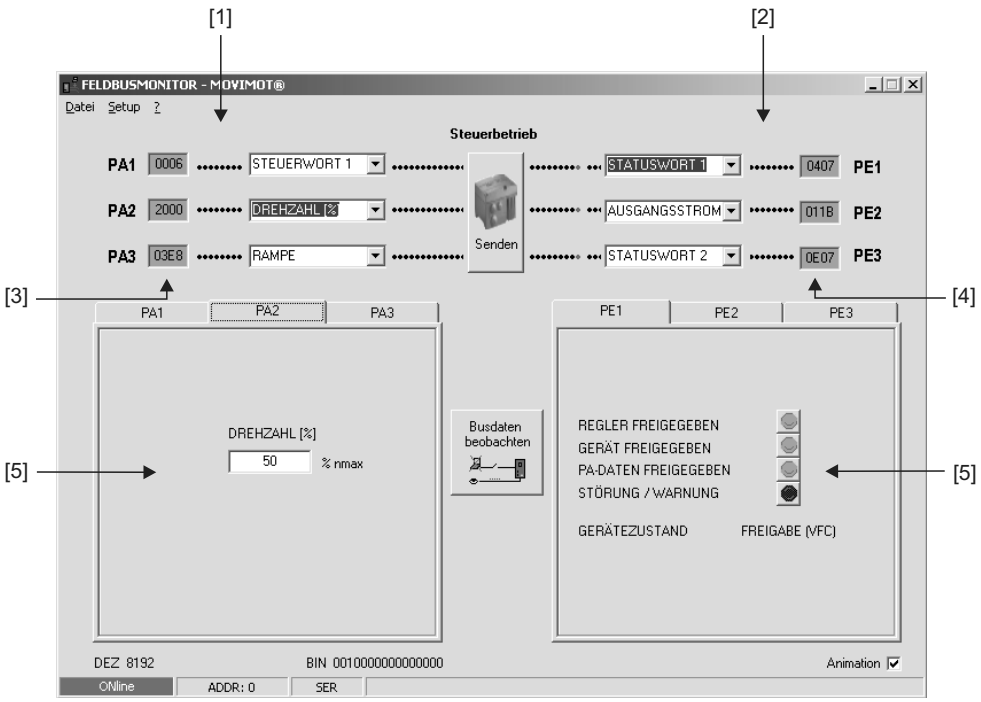
The fieldbus monitor provides the user with a powerful tool for startup and troubleshooting. This tool displays and interprets all cyclical process data exchanged between inverter and control.

The fieldbus monitor lets you monitor the bus operation as a passive participant or take active control of the inverter.

This option provides the user with the following possibilities:

- To interactively take over control of the inverter in an existing system and check the functionality of the drive.
- To remotely simulate the operating principle of an individual drive (without existing system and fieldbus master) so that the control functions can be tested prior to startup.

Fieldbus monitor in control operating mode



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[1] PO data from controller
[2] PI data from inverter to controller
[3] Current HEX values of the process output data (can be edited)
[4] Current HEX values of the process input data
[5] Display of current settings

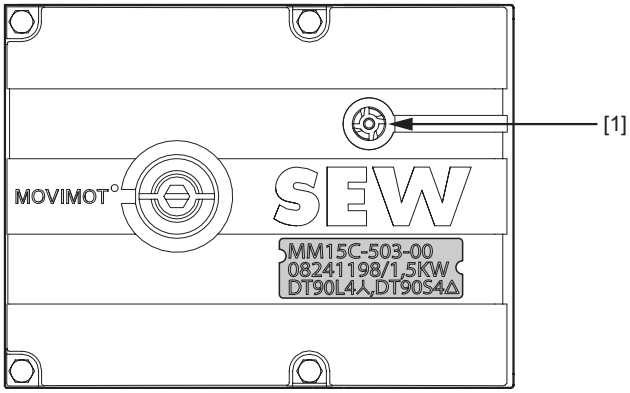
14.2 Error list for fieldbus interfaces

Error code/designation		Response	Cause	Measure
10	**IPOS ILLOP**	IPOS program stopped DO = 0	• Error in IPOS program, see IPOS variable H469 for more information	• Correct, load and reset IPOS program
14	**Encoder error**	Communication to MOVIMOT® stops DO = 0	• Interruption of one or both connections to proximity encoder NV26	• Check the electrical connection between MQ.. and NV26.
17	**Stack overflow**		• Inverter electronics is faulty, possibly due to EMC influence	• Check grounding and shielding and repair, if necessary. • If the error occurs again, contact SEW service.
18	**Stack underflow**			
19	**NMI**			
20	**Undefined Opcode**			
21	**Protection fault**			
22	**Illegal word operand access**			
23	**Illegal instruction access**			
24	**Illegal external bus access**			
25	**EEPROM**		• Error while accessing EEPROM	• Call up the factory setting "Delivery state", perform a reset and set parameters again (Caution: The IPOS program will be deleted) • If the fault occurs again, contact SEW service
28	**Fieldbus timeout**	Process output data = 0 DO = 0 (can be switched off)	• No master-slave communication took place within the configured response monitoring period	• Check communications routine of the master
32	**IPOS index overflow**	IPOS program stopped DO = 0	• Programming principles violated leading to system internal stack overflow	• Check IPOS user program and correct if necessary.
37	**Watchdog error**	Communication to MOVIMOT® stops DO = 0	• Error during execution of system software	• Consult SEW Service
41	**Watchdog option**		• IPOS Watchdog, IPOS program execution time is longer than adjusted Watchdog time	• Check the time specified in the "_WdOn()" command.
45	**Initialization error**		• Error after self-test during reset	• Perform a reset. If the fault reoccurs, contact SEW service
77	**Invalid IPOS control value**	IPOS program stopped DO = 0	• An attempt was made to set an invalid automatic mode	• Check write values of external controller
83	**Short circuit output**	None	• DO0, DO1 or the voltage supply of the VO24 sensors is shorted	• Check the cabling/load of the DO0 and DO1 outputs as well as the voltage supplies of the sensors
91	**System error**	None	• One or several stations (MOVIMOT®) could not be addressed by the MQ.. within the timeout interval	• Check voltage supply and RS-485 wiring • Check address of configured stations
97	**Copy data**	Communication to MOVIMOT® stops DO = 0	• Error occurred when data set was being copied Data is not consistent	• Try again to copy the data or perform the factory setting "Delivery state" and a reset first.

15 MOVIMOT® Diagnostics

15.1 Status LED

The status LED is located on the top of the MOVIMOT® inverter (see the following figure).



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[1] MOVIMOT® status LED

Meaning of the status LED states

The three-color LED signals the operating and fault states.

LED color	LED status	Operating state	Description
–	Off	Not ready for operation	No 24 V power supply
Yellow	Flashes steadily	Not ready for operation	Self-test phase active or 24 V power supply present but supply voltage not OK
Yellow	Flashing evenly, fast	Ready for operation	Brake release without drive enable active (only with S2/2 = "ON")
Yellow	Steady light	Ready, but unit inhibited	24 V power supply and supply voltage OK, but no enable signal
Green / yellow	Flashing with alternating colors	Ready, but timeout	Faulty communication with cyclical data exchange
Green	Steady light	Unit enabled	Motor in operation
Green	Flashing evenly, fast	Current limit active	Drive operating at current limit
Red	Steady light	Not ready for operation	Check the 24 V_{DC} supply. Make sure that there is a smoothed DC voltage with low ripple (residual ripple max. 13 %) present
Red	2x flashing, break	Error 07	DC link voltage too high
Red	Flashing slowly	Error 08	Fault speed monitoring (only with S2/4 = "ON")
		Error 90 Error 09	Motor – inverter assignment incorrect (e.g. MM03 – DT71D4 △)
		Errors 17 to 24, 37	CPU error
		Errors 25, 94	EEPROM error
Red	3x flashing, break	Error 01	Overcurrent in output stage
		Error 11	Overtemperature in output stage
Red	4x flashing, break	Error 84	Overtemperature in motor Motor – frequency inverter assignment incorrect
Red	5x flashing, break	Error 89	Overtemperature in brake Motor – frequency inverter assignment incorrect
Red	6x flashing, break	Error 06	Mains phase failure

15.2 Error table

Error	Cause / Solution
Timeout of communication (motor comes to a stop without fault code)	A Missing connection ⊥, RS+, RS- between MOVIMOT® and RS-485 master. Check and establish connection, especially earth. B EMC influence Check shielding of data lines and improve, if necessary. C Incorrect type (cyclical) in acyclical data transfer, protocol time between the individual telegrams is higher than 1 s (timeout time). Check the number of MOVIMOT® units connected to the master (a maximum of 8 MOVIMOT® units can be connected as slaves for cyclic communication). Reduce telegram cycle or select telegram type "acyclic."
DC link voltage too low, supply system off was detected (motor stops, without fault code)	Check supply system leads, supply voltage and 24 V electronics supply voltage for interruption. Check the 24 V electronics supply voltage (permitted voltage range 24 V ± 25 %, EN 61131-2 residual ripple max. 13 %) Motor restarts automatically as soon as the voltage reaches normal values.
Error code 01 Overcurrent in output stage	Short circuit on inverter output. Check the connection between the inverter output and the motor as well as the motor winding for short circuits. Reset the fault by switching off the DC 24 V supply voltage or resetting the error.
Error code 06 Phase failure (The fault can only be detected when the drive is at load)	Check the supply system cable for phase failure. Reset the fault by switching off the DC 24 V supply voltage or resetting the error.
Fault code 07 DC link voltage too high	A Ramp time too short → Increase ramp time. B Faulty connection between brake coil/braking resistor → Check the connection between braking resistor/brake coil. Correct, if necessary. C Incorrect internal resistance of brake coil/braking resistor → Check the internal resistance of the brake coil → braking resistor (see Sec. "Technical Data"). D Thermal overload in braking resistor → Wrong size of braking resistor selected. E Invalid voltage range of the supply input voltage → check supply input voltage for valid voltage range Reset the fault by switching off the DC 24 V supply voltage or resetting the error.
Fault code 08 Speed monitoring	Speed monitoring has tripped, drive is overloaded → Reduce drive load. Reset the fault by switching off the DC 24 V supply voltage or resetting the error.
Error code 11 Thermal overload of the output stage or internal unit fault	• Clean the heat sink • Lower ambient temperature • Prevent heat build-up • Reduce the load on the drive Reset the fault by switching off the DC 24 V supply voltage or resetting the error.
Error codes 17 to 24, 37 CPU error	Reset the fault by switching off the DC 24 V supply voltage or resetting the error.
Error codes 25, 94 EEPROM error	Reset the fault by switching off the DC 24 V supply voltage or resetting the error.
Error code 84 Thermal overload of motor	• When the MOVIMOT® inverter is installed close to the motor, set DIP switch S1/5 to "ON". • For combinations of "MOVIMOT® and motor with one lower power rating", check the setting of DIP switch S1/6. • Lower ambient temperature • Prevent heat build-up • Reduce the load on the motor • Increase the speed • Check the combination of the drive and MOVIMOT® frequency inverter if the fault is signaled shortly after the first enable. • The temperature monitoring in the motor (TH winding thermostat) has tripped when using MOVIMOT® with the selected extra function 5 → Reduce load on the motor. Reset the fault by switching off the DC 24 V supply voltage or resetting the error.

Error	Cause / Solution
Error code 89 **Thermal overload of brake coil or brake coil defective, brake coil connected incorrectly**	• Increase the set ramp time • Brake inspection (see Sec. "Inspection and Maintenance") • Check brake coil connection • Contact SEW Service • Check the combination of the drive (brake coil) and MOVIMOT® frequency inverter if the fault is signaled shortly after the first enable. • For combinations of "MOVIMOT® and motor with one lower power rating", check the setting of DIP switch S1/6. Reset the fault by switching off the DC 24 V supply voltage or resetting the error.
Error code 91 **Communication error between fieldbus gateway and MOVIMOT® (this error is generated by the bus module)**	• Check electrical connection between fieldbus gateway and MOVIMOT® (RS-485). • The error is automatically reset after removing the cause, a reset via control word is not possible.

16 Technical Data

16.1 Technical data of the MFP.. PROFIBUS interface

MFP electrical specification	
Power supply to MFP control electronics	V = +24 V +/- 25 %, $I_E \leq 150$ mA
Electrical isolation	• PROFIBUS-DP connection potential-free • Between logic and 24 V supply voltage • Between logic and peripherals/MOVIMOT® via opto-coupler
Bus connection technology	Two cage clamp terminals each for incoming and outgoing bus cables (optional M12)
Shielding	**via EMC metal cable glands**
Binary inputs (sensors) Signal level	PLC-compatible to EN 61131-2 (digital inputs type 1), Ri ≈ 3.0 kΩ, Sampling interval about 5 ms 15 V...+30 V “1” = contact closed / -3 V...+5 V “0” = contact open
Sensor supply Rated current Internal voltage drop	24 V_{DC} to EN 61131-2 interference voltage proof and short-circuit proof Σ500 mA max. 1 V
Binary outputs (actuators) Signal level Rated current Leakage current Internal voltage drop	PLC-compatible to EN 61131-2, interference voltage proof and short-circuit proof "0" = 0 V, "1" = 24 V 500 mA max. 0.2 mA max. 1V
Line length RS-485	30 m between MFP and MOVIMOT® if installed separately
Ambient temperature	-25 °C...60 °C
Storage temperature	-25 °C...85 °C
Enclosure	IP65 (installed on MFZ.. connection module, all plug connections sealed)

PROFIBUS specifications	
PROFIBUS protocol option	PROFIBUS-DP
Supported baud rates	9.6 kBaud ... 1.5 MBaud / 3 ... 12 MBaud (with automatic detection)
Bus terminator	Integrated, can be set via DIP switch to EN 50170 (V2)
Permitted cable length for PROFIBUS	• 9.6 kBaud: 1200 m • 19.2 kBaud: 1200 m • 93.75 kBaud: 1200 m • 187.5 kBaud: 1000 m • 500 kBaud: 400 m • 1.5 MBaud: 200 m • 12 Mbaud: 100 m To extend the length, several segments can be coupled via repeater. The max. expansion/cascading depth can be found in the manuals for the DP Master or the repeater modules.
DP ident. number	6001 hex (24577 dec)
DP configurations without DI/DO	2 PD, Configuration: 113dez, 0dez 3 PD, Configuration: 114dez, 0dez
DP configurations with DI/DO	2 PD + DI/DO, configuration: 113dez, 48dez 3 PD + DI/DO, configuration: 114dez, 48dez 0 PD + DI/DO, configuration: 0dec, 48dec,
DP configurations with DI	2 PD + DI, Configuration: 113dez, 16dez 3 PD + DI, Configuration: 114dez, 16dez 0 PD + DI, Configuration: 0dez, 16dez, Universal configuration for direct entry of configurations
Set-Prm application data	Max. 10 bytes Hex parameter setting: 00,00,00,00,00,00,00,00,00,00 diagnostic alarm active (default) 00,**01**,00,00,00,00,00,00,00,00 diagnostic alarm not active
Length of diagnostics data	Max. 8 bytes, incl. 2 bytes equipment-specific diagnostics
Address settings	Not supported, can be adjusted using DIP switch
Name of the GSD file	SEW_6001.GSD
Name of bitmap file	SEW6001N.BMP SEW6001S.BMP

16.2 Technical data of the MQP.. PROFIBUS interface

MQP electrical specification	
Power supply to MQP control electronics	V = +24 V +/- 25 %, $I_E \leq 200$ mA
Electrical isolation	• PROFIBUS-DP connection potential-free • Between logic and 24 V supply voltage • Between logic and peripherals/MOVIMOT® via opto-coupler
Bus connection technology	Two cage clamp terminals each for incoming and outgoing bus cables (optional M12)
Shielding	**via EMC metal cable glands**
Binary inputs (sensors) Signal level	PLC-compatible to EN 61131-2 (digital inputs type 1), Ri ≈ 3.0 kΩ, Sampling interval about 5 ms 15 V...+30 V “1” = contact closed / -3 V...+5 V “0” = contact open
Sensor supply Rated current Internal voltage drop	24 V_{DC} to EN 61131-2 interference voltage proof and short-circuit proof Σ500 mA max. 1 V
Binary outputs (actuators) Signal level Rated current Leakage current Internal voltage drop	PLC-compatible to EN 61131-2, interference voltage proof and short-circuit proof "0" = 0 V, "1" = 24 V 500 mA max. 0.2 mA max. 1 V
Line length RS-485	30 m between MQP and MOVIMOT® if installed separately
Ambient temperature	-25 °C...60 °C
Storage temperature	-25 °C...85 °C
Enclosure	IP65 (installed on MFZ.. connection module, all plug connections sealed)

PROFIBUS specifications	
PROFIBUS protocol option	PROFIBUS-DPV1 (alternative PROFIBUS-DP)
Supported baud rates	9.6 kBaud ...12 MBaud (with automatic detection)
Bus terminator	integrated, can be set via DIP switch to EN 50170 (V2)
Permitted cable length for PROFIBUS	• 9,6 kBaud: 1200 m • 19,2 kBaud: 1200 m • 93.75 kBaud: 1200 m • 187.5 kBaud: 1000 m • 500 kBaud: 400 m • 1.5 MBaud: 200 m • 12 Mbaud: 100 m To extend the length, several segments can be coupled via repeater. The max. expansion/cascading depth can be found in the manuals for the DP Master or the repeater modules.
DP ident. number	6001 hex (24577 dec)
DP Configuration	1-10 process data words with and without parameter channel (see the section "Process data configuration")
Set-Prm application data	max. 10 bytes, without function
Length of diagnostics data	6 byte to EN 50170 (V2)
Address settings	"Set-Slave-Address" not supported, can be set using DIP switch
Number of parallel C2 connections	2
Supported data record	Index 47
Supported slot number	Recommendation: 0
Manufacturer code	10A hex (SEW-EURODRIVE)
Profiles ID	0
C2-Response Timeout	1 s
Max. length C1 channel	240 bytes
Max. length C2 channel	240 bytes
Name of the GSD file	SEWA6001.GSD (DPV1) SEW_6001.GSD (DP)
Name of bitmap file	SEW6001N.BMP SEW6001S.BMP

16.3 Technical data for field distributors

Technical data MF../Z.3., MQ../Z.3.

MF../Z.3. MQ../Z.3.	
Ambient temperature	-25 °C...60 °C
Storage temperature	-25 °C...85 °C
Enclosure	IP65 (fieldbus interface and motor connection cable attached and fastened, all plug connections sealed)
Interface	PROFIBUS, InterBus, DeviceNet, CANopen, AS-Interface
Permitted motor cable lengths	max. 30 m (with SEW hybrid cable, type B) If the motor cable cross section is smaller than the supply system lead cross section, note the line fusing!
Weight	ca. 1.3 kg

Technical data MF../Z.6., MQ../Z.6.

MF../Z.6. MQ../Z.6.	
Maintenance switch	Load interrupter switch and line protection Type: ABB MS 325 – 9 + HK20 Switch activation: black/red, triple lock
Ambient temperature	-25 °C...55°C
Storage temperature	-25 °C...85 °C
Enclosure	IP65 (fieldbus interface, power supply connection cover and motor connection cable attached and fastened, all plug connections sealed)
Interface	PROFIBUS, InterBus, DeviceNet, CANopen, AS-Interface
Permitted motor cable lengths	max. 30 m (with SEW hybrid cable, type B)
Weight	ca. 3.6 kg

Technical data field distributors MF../MM../Z.7., MQ../MM../Z.7.

Field distributor type		MF../MM..-503-00/Z.7 MQ../MM..-503-00/Z.7				
		MM03C	**MM05C**	**MM07C**	**MM11C**	**MM15C**
Apparent output power with U_{mains} = 380...500 V	S_N	1.1 kVA	1.4 kVA	1.8 kVA	2.2 kVA	2.8 kVA
Supply voltages Permitted range	U_{mains}	3 x 380 V_{AC} / **400 V_{AC}** /415 V_{AC} /460 V_{AC} /500 V_{AC} V_{mains} = 380 V_{AC} - 10 %...500 V_{AC} + 10 %				
Supply frequency	f_{mains}	50 Hz ... 60 Hz ±10 %				
Rated mains current (at V_{mains} = 400 V_{AC})	I_{mains}	1.3 A_{AC}	1.6 A_{AC}	1.9 A_{AC}	2.4 A_{AC}	3.5 A_{AC}
Output voltage	U_A	0... U_{mains}				
Output frequency **Resolution** **Operating point**	f_A	2...100 Hz 0.01 Hz 400 V at 50 Hz / 100 Hz				
Rated output current	I_N	1.6 A_{AC}	2.0 A_{AC}	2.5 A_{AC}	3.2 A_{AC}	4.0 A_{AC}
Motor power S1	P_{Mot}	**0.37 kW**	**0.55 kW**	**0.75 kW**	**1.1 kW**	**1.5 kW**
Motor power S3 25 % ED						
PWM frequency		4 / 8 / **16**[1] kHz				
Current limitation	I_{max}:	**motor:** 160 % with ⅄ and △ **regenerative:** 160 % with ⅄ and △				
Maximum motor cable length		15 m (with SEW hybrid cable, type A)				
External braking resistor	R_{min}	150 Ω				
Interference immunity		fulfills EN 61800-3				
Interference emission		Conforms to EN 61800-3 and class A limit to EN 55011 and EN 55014				
Ambient temperature	ϑ_U	-25 °C...40°C (P_N reduction: 3 % I_N per K to max. 60 °C)				
Storage temperature	ϑ_L	-25 °C...85 °C				
Enclosure		IP65 (fieldbus interface, power supply connection cover and motor connection cable attached and fastened, all plug connections sealed)				
Operating mode		DB (EN 60149-1-1 and 1-3), S3 max. cycle duration 10 minutes				
Cooling type (DIN 41 751)		Self-cooling				
Installation altitude		h ≤1000 m (P_N reduction: 1 % per 100 m starting at an altitude of 1000 m, see also the section "Electrical Installation – Installation instructions" in the MOVIMOT® operating instructions)				
ext. power supply to control electronics	Tl. 11 Tl. 13	U = +24 V ± 25 %, EN 61131-2, residual ripple max. 13 % I_E ≤ 250 mA, typ. 150 mA at 24 V (only MOVIMOT®) Input capacitance 100 µF				
Interface		PROFIBUS, InterBus, DeviceNet, CANopen, AS-Interface				
Weight		ca. 3.6 kg				

1) 16 kHz PWM frequency (low-noise). When DIP SWITCH S1/7 = ON (factory setting), the units operate with a 16 kHz PWM frequency (low noise) and switch back in steps to lower switching frequencies depending on the heat sink temperature.

Technical data field distributors MF../MM../Z.8., MQ../MM../Z.8.

Field distributor type		MF../MM..-503-00/Z.8 MQ../MM..-503-00/Z.8							
		MM03C	**MM05C**	**MM07C**	**MM11C**	**MM15C**	**MM22C**	**MM30C**	**MM3XC**
Apparent output power with U_{mains} = 380...500 V	S_N	1.1 kVA	1.4 kVA	1.8 kVA	2.2 kVA	2.8 kVA	3.8 kVA	5.1 kVA	6.7 kVA
Supply voltages **Permitted range**	U_{mains}	3 x 380 V_{AC} / **400 V_{AC}** /415 V_{AC} /460 V_{AC} /500 V_{AC} V_{mains} = 380 V_{AC} - 10 %...500 V_{AC} + 10 %							
Supply frequency	f_{mains}	50 Hz ... 60 Hz ±10 %							
Rated mains current **(at V_{mains} = 400 V_{AC})**	I_{mains}	1.3 A_{AC}	1.6 A_{AC}	1.9 A_{AC}	2.4 A_{AC}	3.5 A_{AC}	5.0 A_{AC}	6.7 A_{AC}	8.6 A_{AC}
Output voltage	U_A	0... U_{mains}							
Output frequency **Resolution** **Operating point**	f_A	2...100 Hz 0.01 Hz 400 V at 50 Hz / 100 Hz							
Rated output current	I_N	1.6 A_{AC}	2.0 A_{AC}	2.5 A_{AC}	3.2 A_{AC}	4.0 A_{AC}	5.5 A_{AC}	7.3 A_{AC}	9.6 A_{AC}
Motor power S1	P_{Mot}	**0.37 kW**	**0.55 kW**	**0.75 kW**	**1.1 kW**	**1.5 kW**	**2.2 kW**	**3.0 kW**	**3.0 kW**
Motor power S3 25 % ED									**4.0 kW**
PWM frequency		4 / 8 / **16**[1] kHz							
Current limitation	I_{max}:	**motor:** 160 % with ⅄ and △ **regenerative:** 160 % with ⅄ and △							
Maximum motor cable length		15 m (with SEW hybrid cable, type A)							
External braking resistor	R_{min}	150 Ω					68 Ω		
Interference immunity		fulfills EN 61800-3							
Interference emission		Conforms to EN 61800-3 and class A limit to EN 55011 and EN 55014							
Ambient temperature	ϑ_U	-25 °C...40°C (P_N reduction: 3 % I_N per K to max. 55 °C)							[2]
Storage temperature	ϑ_L	-25 °C...85 °C							
Enclosure		IP65 (fieldbus interface, power supply connection cover and motor connection cable attached and fastened, all plug connections sealed)							
Operating mode		DB (EN 60149-1-1 and 1-3), S3 max. cycle duration 10 minutes							
Cooling type (DIN 41 751)		Self-cooling							
Installation altitude		h ≤1000 m (P_N reduction: 1 % per 100 m starting at an altitude of 1000 m, see also the section "Electrical Installation – Installation instructions" in the MOVIMOT® operating instructions)							
ext. power supply to control electronics	Tl. 11 Tl. 13	U = +24 V ± 25 %, EN61131-2, residual ripple max. 13 % I_E ≤ 250 mA, typ. 150 mA at 24 V (only MOVIMOT®) Input capacitance 100 µF							
Maintenance switch		Switch disconnector Type: ABB OT16ET3HS3ST1 Switch activation: black/red, triple lock							
Interface		PROFIBUS, InterBus, DeviceNet, CANopen, AS-Interface							
Weight		Size 1: ca. 5.2 kg Size 2: ca. 6.7 kg							

1) 16 kHz PWM frequency (low-noise). When DIP SWITCH S1/7 = ON (factory setting), the units operate with a 16 kHz PWM frequency (low noise) and switch back in steps to lower switching frequencies depending on the heat sink temperature.

2) -25 °C...40 °C with S3 25 % cdf (to max. 55 °C with S3 10 % cdf)

Change Index

The following section lists changes made to the individual chapters.

Unit design

- New section "Tightening torques"

Electrical installation

- Installation instructions for fieldbus interfaces/field distributors
  - New section "Notes on PE connection or equipotential bonding"
- Section "Connecting inputs/outputs (I/Os) of the fieldbus interfaces"
  - Notes on "MFZ26J and MFZ28J" have been supplemented
  - New section "Connection via fieldbus interface MFP22H, MFD22H"
  - New section "Connection via fieldbus interface MFP32H, MFD32H"
- New section "Connecting the NV26 proximity sensor"
- New section "Connecting the ES16 incremental encoder"
- Section "Connecting prefabricating cables"
  - New section "Assignment of motors → field distributors"

Function of the MFP PROFIBUS interface

- New section "Parameter setting with PROFIBUS DPV1"

Supplementary field distributor startup information

- Section "Field distributors MF.../MM../Z.7., MQ.../MM../Z.7"
  - Block diagram has been extended
- Section "MOVIMOT® frequency inverters integrated in the field distributor"
  - Section "Additional functions for MOVIMOT® integrated in the field distributor" has been updated

Keypads

- New section "DBG60B keypad"

Bus diagnostics with MOVITOOLS®

- Section "Interface adapter"
  - USB11A option has been supplemented

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Address List

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 • D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Service **Competence Center**	**Central** Gear units / Motors	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte-gm@sew-eurodrive.de
	Central Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-mitte-e@sew-eurodrive.de
	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54, route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62, avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Alger**	Réducom 16, rue des Frères Zaghnoun Bellevue El-Harrach 16200 Alger	Tel. +213 21 8222-84 Fax +213 21 8222-84

Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
	Townsville	SEW-EURODRIVE PTY. LTD. 12 Leyland Street Garbutt, QLD 4814	Tel. +61 7 4779 4333 Fax +61 7 4779 5333 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://sew-eurodrive.at sew@sew-eurodrive.at

Belgium			
Assembly **Sales** **Service**	**Brüssel**	SEW Caron-Vector S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 50 Caixa Postal: 201-07111-970 Guarulhos/SP - Cep.: 07251-250	Tel. +55 11 6489-9133 Fax +55 11 6480-3328 http://www.sew.com.br sew@sew.com.br
	Additional addresses for service in Brazil provided on request!		

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@fastbg.net

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 4322-99 Fax +237 4277-03

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.reynolds@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Street LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25322611 gm-tianjin@sew-eurodrive.cn http://www.sew-eurodrive.com.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021 P. R. China	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew.com.cn
	Additional addresses for service in China provided on request!		

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sewcol@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@net.hr

Czech Republic			
Sales	**Praha**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Luzna 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 220121234 Fax +420 220121237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	SEW-EURODRIVEA/S Geminivej 28-30, P.O. Box 100 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Mustamäe tee 24 EE-10620Tallin	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	Electro-Services B.P. 1889 Libreville	Tel. +241 7340-11 Fax +241 7340-12

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk

Greece			
Sales **Service**	**Athen**	Christ. Boznos & Son S.A. 12, Mavromichali Street P.O. Box 80136, GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 2 7960477 + 79604654 Fax +852 2 7959129 sew@sewhk.com

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

India			
Assembly **Sales** **Service**	**Baroda**	SEW-EURODRIVE India Pvt. Ltd. Plot No. 4, Gidc Por Ramangamdi • Baroda - 391 243 Gujarat	Tel. +91 265 2831086 Fax +91 265 2831087 http://www.seweurodriveindia.com mdoffice@seweurodriveindia.com
Technical Offices	**Bangalore**	SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road Bangalore	Tel. +91 80 22266565 Fax +91 80 22266569 salesbang@seweurodriveinindia.com

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 lirazhandasa@barak-online.net

Italy			
Assembly **Sales** **Service**	**Milano**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36

Japan			
Assembly **Sales** **Service**	**Toyoda-cho**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 sewjapan@sew-eurodrive.co.jp

Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate Unit 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master@sew-korea.co.kr

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139253 Fax +371 7139386 http://www.alas-kuul.com info@alas-kuul.com

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 gacar@beirut.com

Lithuania			
Sales	**Alytus**	UAB Irseva Naujoji 19 LT-62175 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Queretaro**	SEW-EURODRIVE MEXIKO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrail Queretaro C.P. 76220 Queretaro, Mexico	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Morocco			
Sales	**Casablanca**	Afit 5, rue Emir Abdelkader MA 20300 Casablanca	Tel. +212 22618372 Fax +212 22618351 richard.miekisiak@premium.net.ma

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 241-020 Fax +47 69 241-040 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Lodz	Tel. +48 42 67710-90 Fax +48 42 67710-99 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucuresti**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 849 47-70 Fax +221 849 47-71 senemeca@sentoo.sn

Serbia and Montenegro			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor SCG-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 dipar@yubc.net

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybnicna 40 SK-83107 Bratislava	Tel. +421 2 49595201 Fax +421 2 49595200 http://www.sew.sk sew@sew-eurodrive.sk
	Zilina	SEW-Eurodrive SK s.r.o. ul. Vojtecha Spanyola 33 SK-010 01 Zilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-97411 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za dross@sew.co.za

South Africa			
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chon Buri**	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 7, rue Ibn EI Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76 tms@tms.com.tn

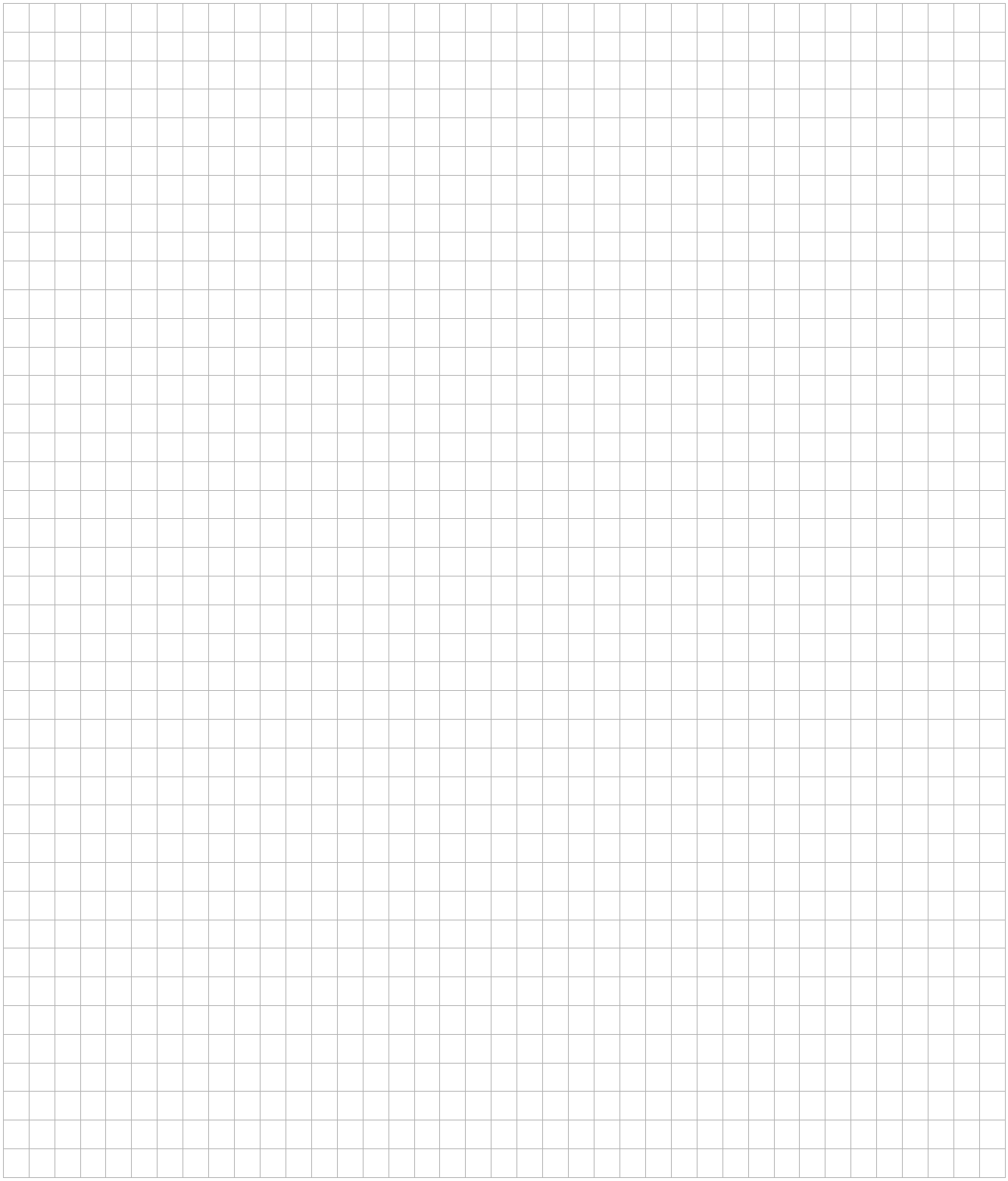
Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 164 3838014/15 Fax +90 216 3055867 sew@sew-eurodrive.com.tr

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com

USA			
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve sewventas@cantv.net sewfinanzas@cantv.net



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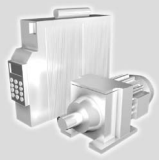

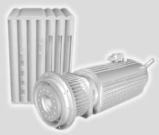

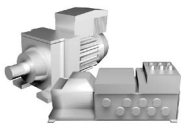

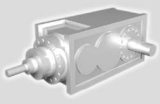

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