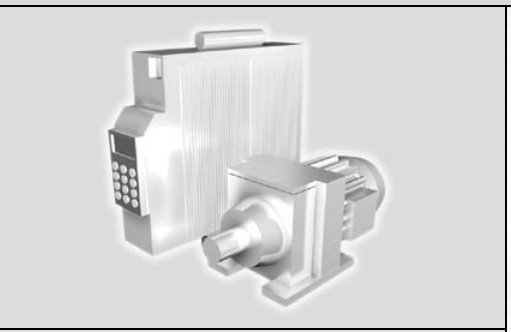
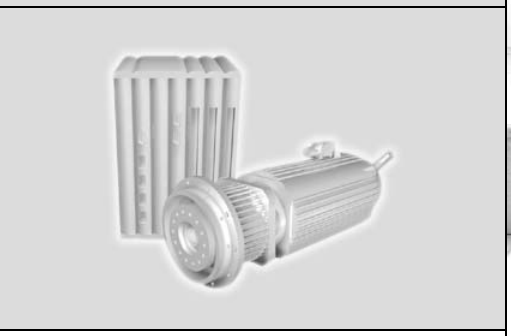
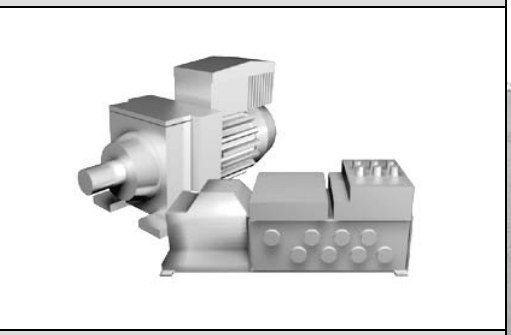
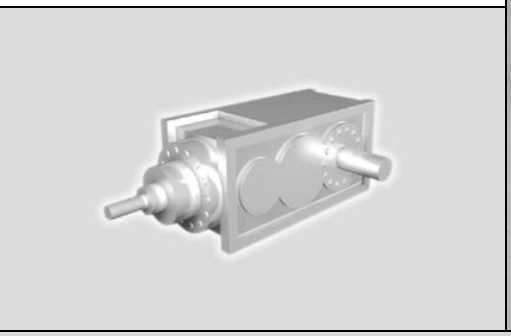
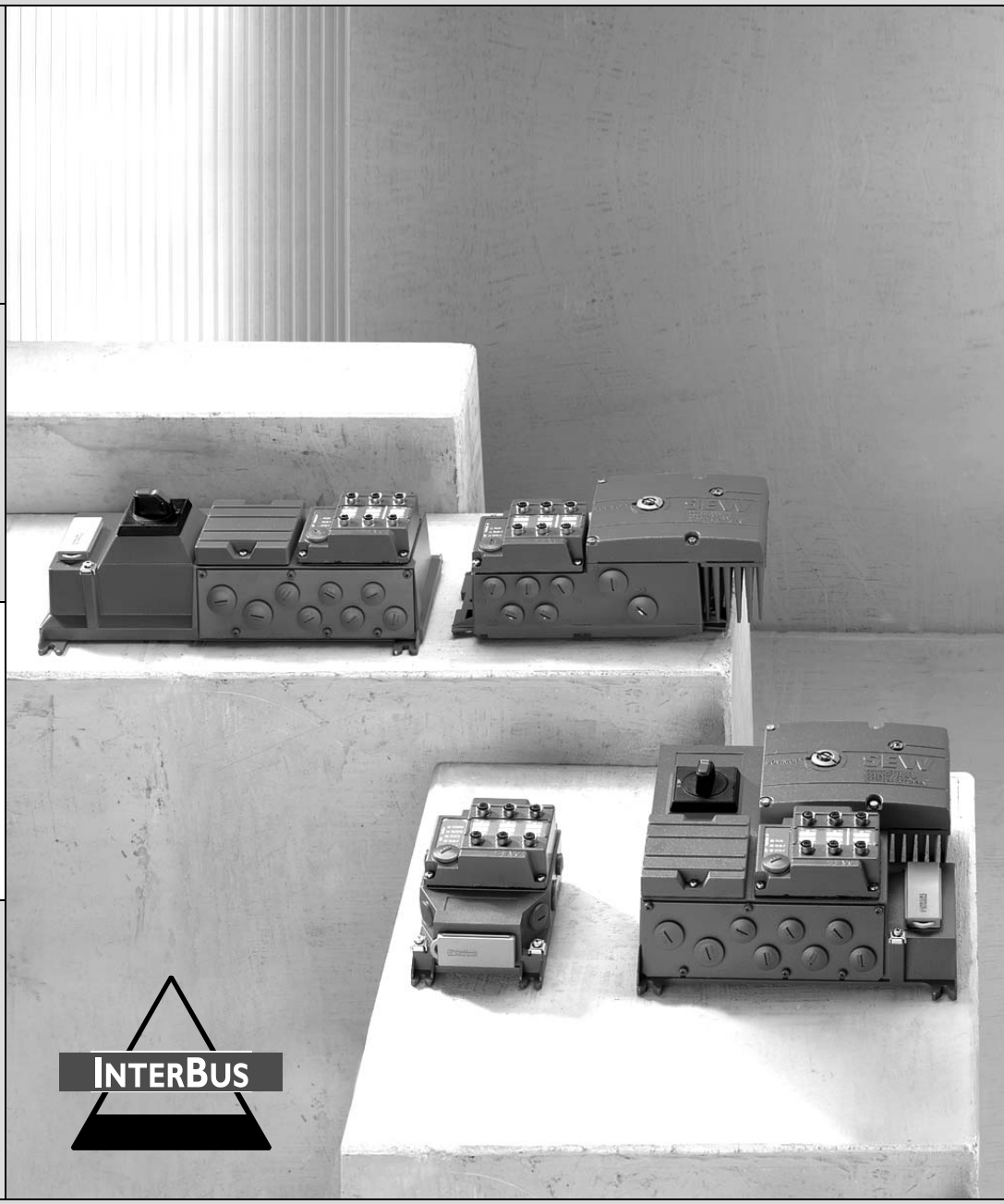
SEW EURODRIVE











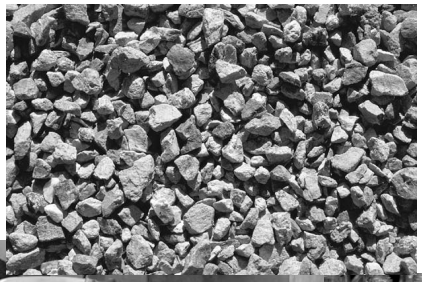
Drive System for Decentralized Installation InterBus Interfaces, Field Distributors

FC230000

Edition 07/2006

11401028 / EN

Manual



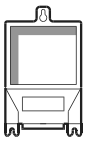
SEW EURODRIVE

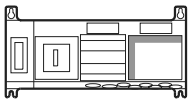
Contents

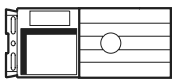
1 Applicable Components

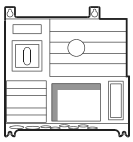
This manual applies to the following products:

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)** 
InterBus (copper)	MFI 21A / Z11A	MFI 22A / Z11A	MFI 32A / Z11A
InterBus (FO)	–	MFI 23F / Z11A	MFI 33F / Z11A
InterBus (copper) with integrated minicontroller	MQI 21A / Z11A	MQI 22A / Z11A	MQI 32A / Z11A

Field distributor ..Z.3. with fieldbus interface			
	**No I/Os** 	**4 x I / 2 x O (M12)** 	**6 x I (M12)** 
InterBus (copper)	MFI 21A / Z13A	MFI 22A / Z13A	MFI 32A / Z13A
InterBus (FO)	–	MFI 23F / Z13A	MFI 33F / Z13A
InterBus (copper) with integrated minicontroller	MQI 21A / Z13A	MQI 22A / Z13A	MQI 32A / Z13A

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)** 
InterBus (copper)	MFI 21A / Z16F / AF0	MFI 22A / Z16F / AF0	MFI 32A / Z16F / AF0
InterBus (FO)	–	MFI 23F / Z16F / AF0	MFI 33F / Z16F / AF0
InterBus (copper) with integrated minicontroller	MQI 21A / Z16F / AF0	MQI 22A / Z16F / AF0	MQI 32A / Z16F / AF0

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)** 
InterBus (copper)	MFI21A/MM../Z17F.	MFI22A/MM../Z17F.	MFI32A/MM../Z17F.
InterBus (FO)	–	MFI23F/MM../Z17F.	MFI33F/MM../Z17F.
InterBus (copper) with integrated minicontroller	MQI21A/MM../Z17F.	MQI22A/MM../Z17F.	MQI32A/MM../Z17F.

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)** 
InterBus (copper)	MFI21A/MM../Z18F./ AF0	MFI22A/MM../Z18F./A F0	MFI32A/MM../Z18F./A F0
InterBus (FO)	–	MFI23F/MM../Z18F./A F0	MFI33F/MM../Z18F./A F0
InterBus (copper) with integrated minicontroller	MQI21A/MM../Z18F./AF 0	MQI22A/MM../Z18F./A F0	MQI32A/MM../Z18F./A F0

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.

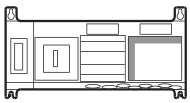
- If MOVIMOT® units or field distributors are used in safe applications, you must observe the supplemental documentation "Safe Disconnection for MOVIMOT®". Use only those components in safety applications that were explicitly designed and delivered for this purpose by SEW-EURODRIVE.

3.2 Supplementary safety notes for field distributors

MFZ.3.

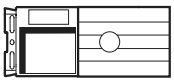
- Disconnect the unit from the power supply system before removing the bus module or the motor connector. Dangerous voltages may still be present for up to one minute after disconnection from the power supply.
- The bus module and the connector of the hybrid cable must be connected to the field distributor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

MFZ.6.



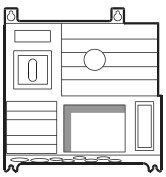
- Before removing the terminal box cover for the power supply connection, disconnect the unit from the power supply system. Dangerous voltages may still be present for up to one minute after disconnection from the power supply.
- Important: The switch only disconnects the MOVIMOT® unit from the power 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.

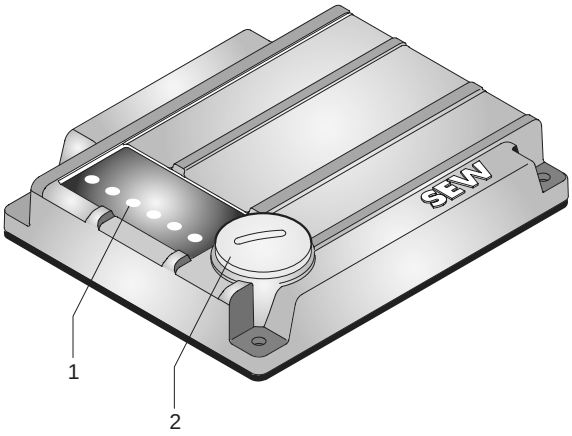


- Disconnect the unit from the power supply system before removing the terminal box cover for the power supply connection or the MOVIMOT® inverter. Dangerous voltages may still be present for up to one minute after disconnection from the power supply.
- Important: The maintenance switch only disconnects 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

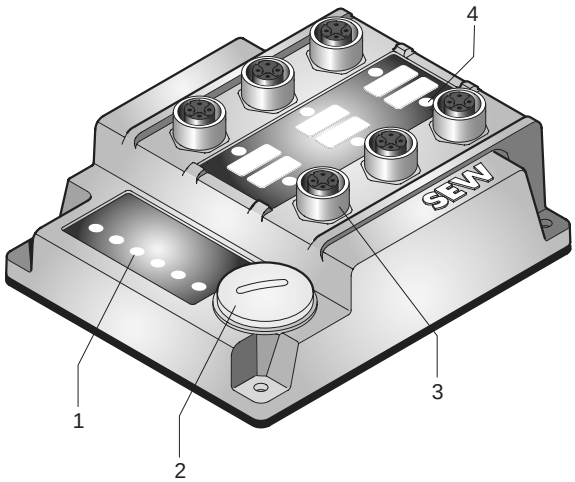
Fieldbus interfaces MF.21/MQ.21



50353AXX

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

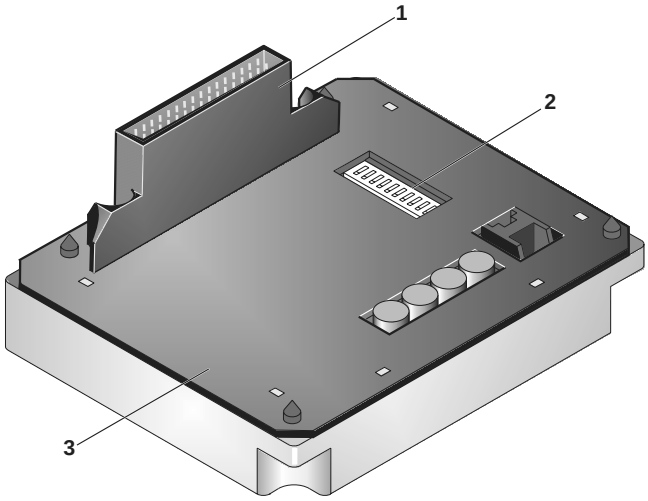
Fieldbus interfaces MF.22, MF.32, MQ.22, MQ.32



50352AXX

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

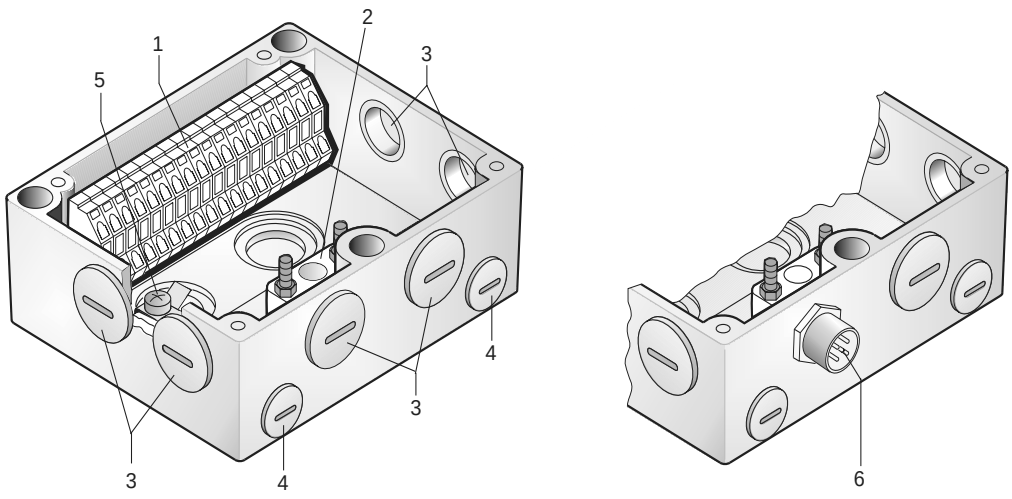
Underside of module (all MF../MQ.. variants)



01802CEN

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

Unit design of MFZ connection module

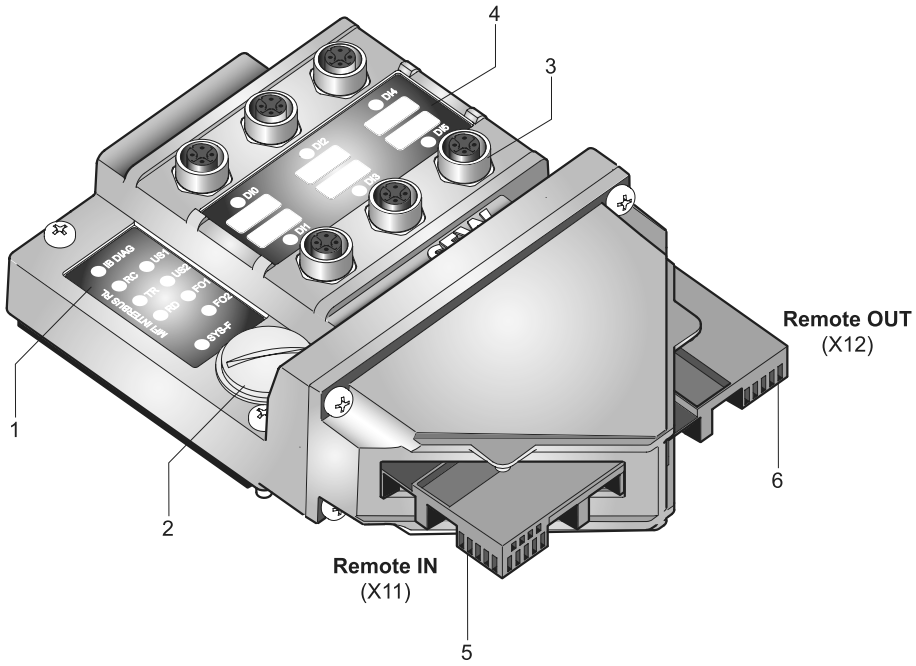


06169AXX

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.

MFI23, MFI33 fieldbus interface with rugged-line plug connector (InterBus only)



50320AXX

1 Diagnostic LEDs
2 Diagnostics interface (behind the screw plug)
3 M12 connection sockets
4 Status LED
5 Rugged line connection "Remote IN" (incoming remote bus and DC 24 V supply)
6 Rugged line connection "Remote OUT" (outgoing remote bus and DC 24 V supply)

4.2 Unit designation of InterBus interfaces

MFI 21 A / Z11 A

Variant

Connection module:
Z11 = For InterBus
Z21 = For PROFIBUS
Z31 = For DeviceNet and CANopen
Z61 = For AS-Interface

Variant

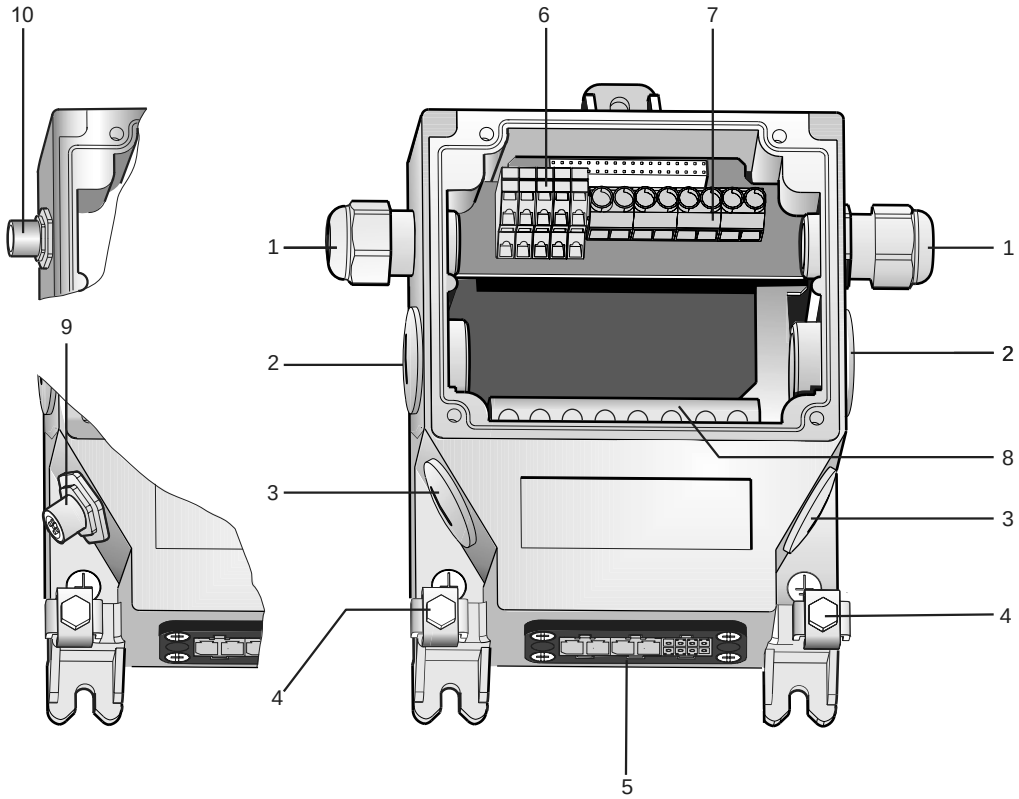
21 = 4 x I / 2 x O (connection via terminals)
22 = 4 x I / 2 x O (connection via plug connector + terminals)
32 = 6 x I (connection via plug connector + terminals)

23 = 4 x I / 2 x O (FO rugged line, only for InterBus)
33 = 6 x I (FO rugged line, only for InterBus)

MFI.. = InterBus
MQI.. = InterBus with integrated minicontroller
MFP.. = PROFIBUS
MQP.. = PROFIBUS with integrated minicontroller
MFD.. = DeviceNet
MQD.. = DeviceNet with integrated minicontroller
MFO.. = CANopen
MFK.. = AS-interface

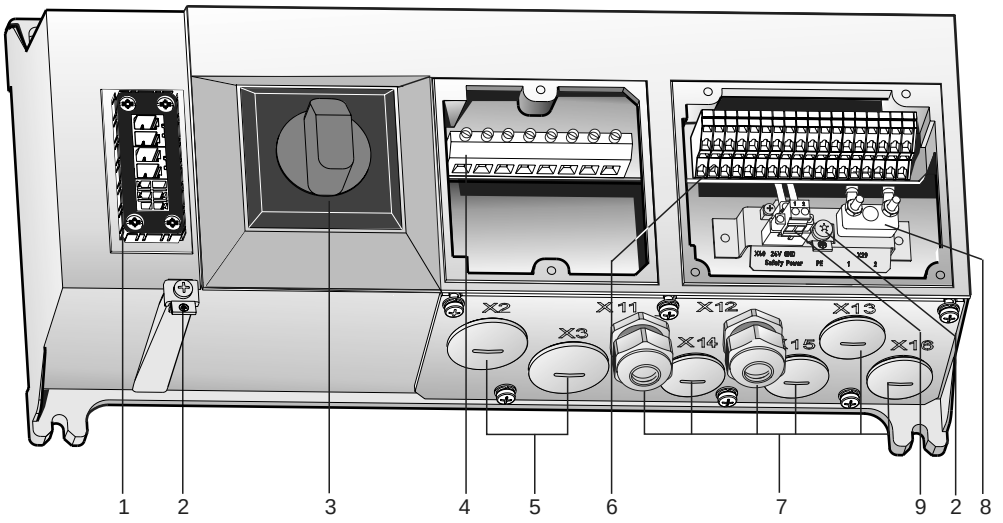
4.3 Field distributor

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



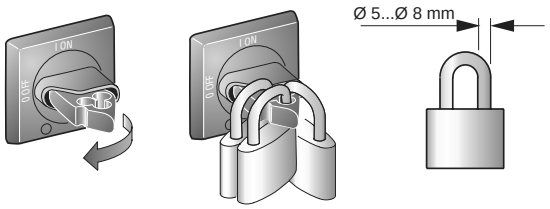
1 2 x M16 x 1.5 (scope of delivery includes two EMC cable glands)
2 2 x M25 x 1.5
3 2 x M20 x 1.5
4 Equipotential bonding connection
5 Hybrid cable connection; connection to MOVIMOT® (X9)
6 Terminals for fieldbus connection (X20)
7 Terminals for 24 V connection (X21)
8 Terminals for power supply and 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.



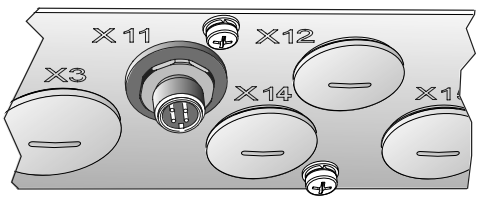
05903AXX

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

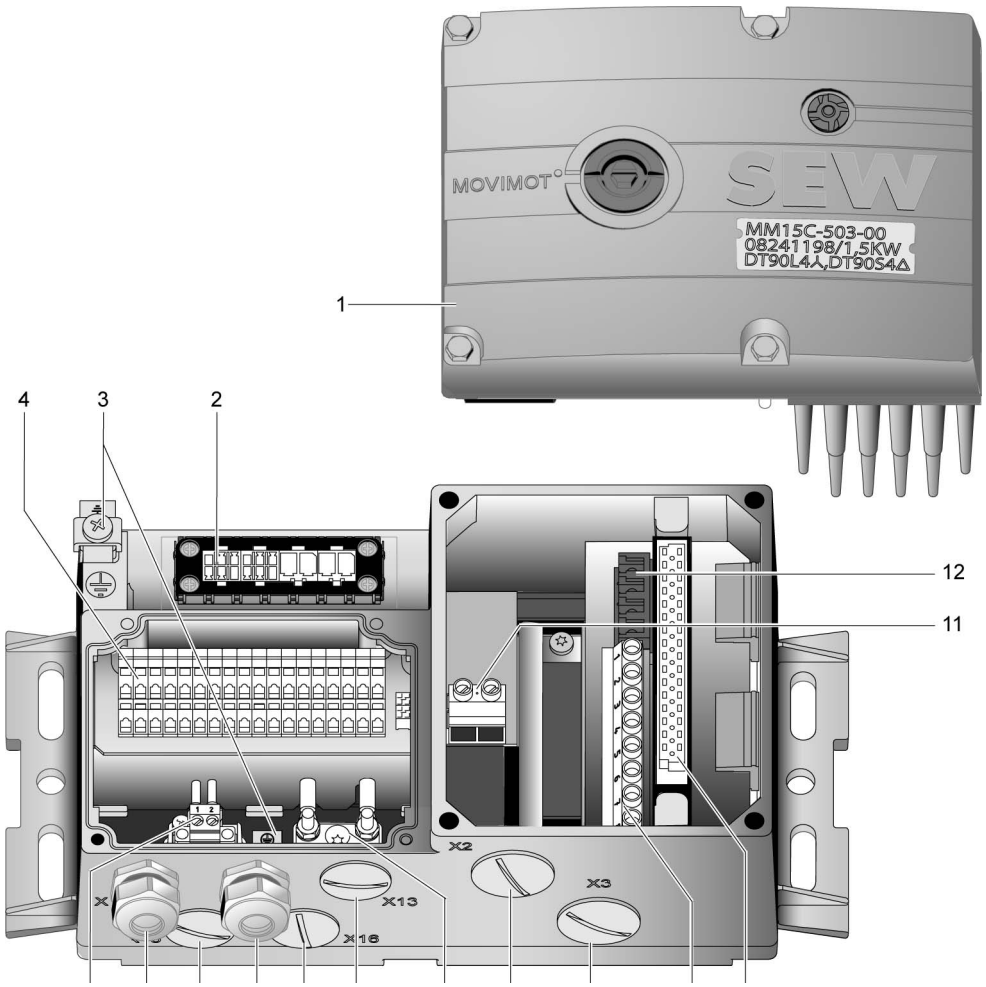
4 Terminals for power supply and PE connection (X1)
5 2 x M25 x 1.5
6 Terminals for bus, sensor, actuator, 24 V connection (X29)
7 6 x M20 x 1.5 (scope of delivery includes two EMC cable glands)
For DeviceNet and CANopen: Micro-style connector/M12 connector (X11), see following figure
For AS-Interface: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



06115AXX

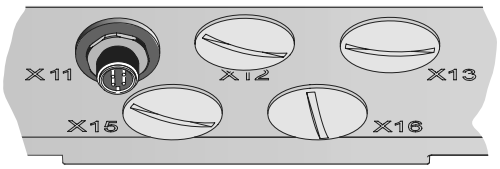
8 Terminal block for 24 V through-wiring (X29), internal connection to 24 V on X20
9 Pluggable "Safety Power" terminal for 24 V MOVIMOT® supply (X40)

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



51174AXX

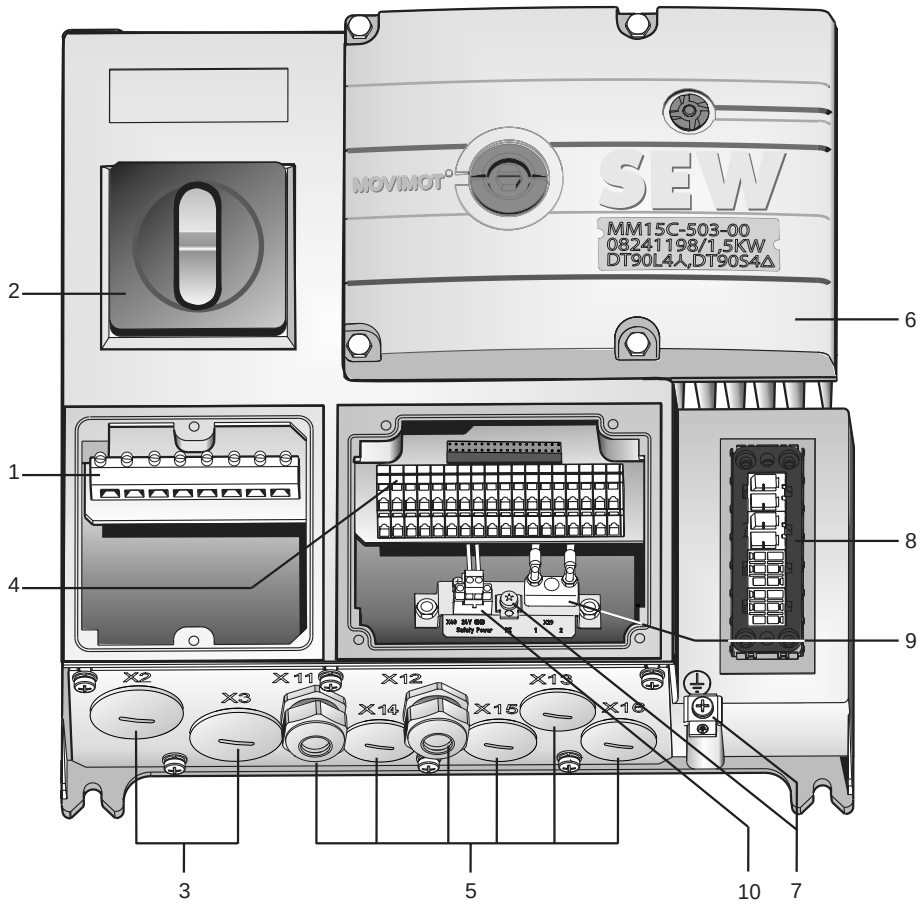
1 MOVIMOT® frequency inverter
2 Hybrid cable connection; connection to AC motor (X9)
3 Equipotential bonding connection
4 Terminals for bus, sensor, actuator, 24 V connection (X29)
5 Pluggable "Safety Power" terminal for 24 V MOVIMOT® supply (X40)
6 5 x M20 x 1.5 cable gland (scope of delivery includes 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

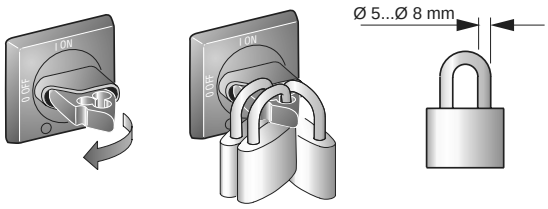
7 Terminal block for 24 V through-wiring (X29), internal connection to 24 V on X20
8 2 x M25 x 1.5 cable glands
9 Terminals for power supply and PE connection (X1)
10 Connection to frequency inverter
11 Terminal for integrated brake resistor
12 Terminals for enabling the direction of rotation

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



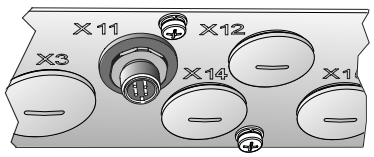
05902AXX

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 InterBus field distributors

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

MFI21A/Z13A

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.

MFI21A/Z16F/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.

MFI22A/MM15C-503-00/Z17F 0

Connection type
0 = ⅄ / 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.

MFI22A/MM22C-503-00/Z18F 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

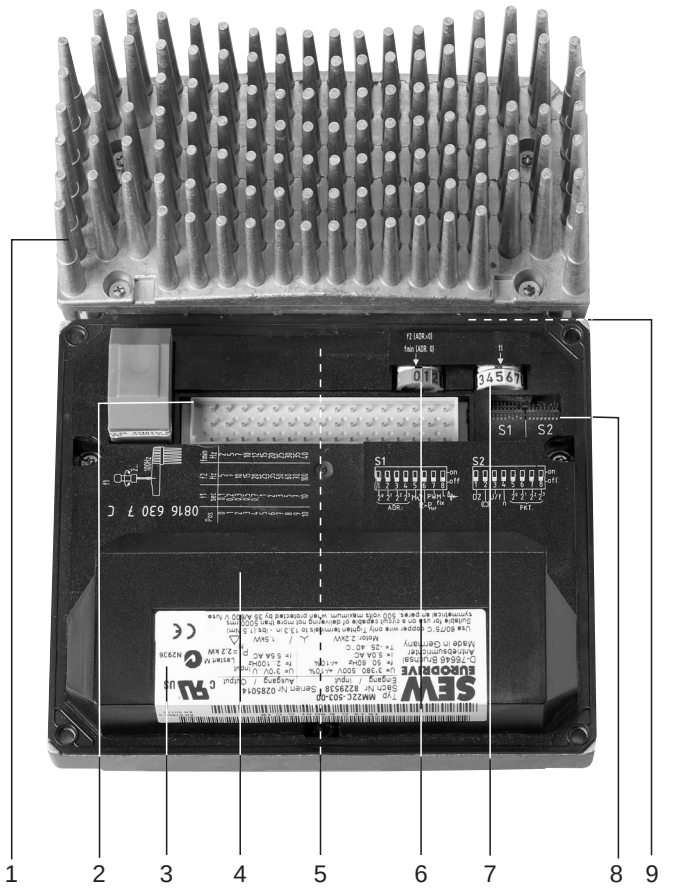
Connection type
0 = ⅄ / 1 = △

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 section "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

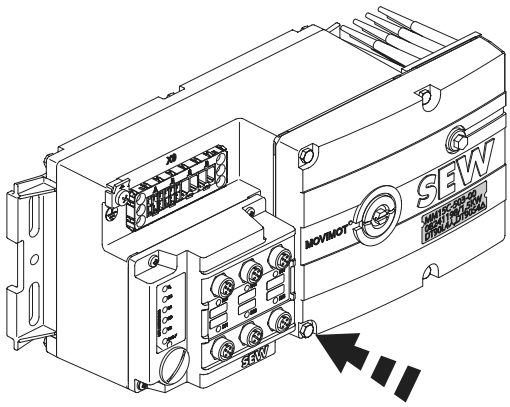
- Fieldbus interfaces/field distributors are only allowed to be mounted on a level, vibration-proof and torsionally rigid support structure.
- Use M5 screws with matching washers to connect the **MFZ.3** field distributor. Tighten screws with torque wrench (permitted tightening torque 2.8 to 3.1 Nm (25...27 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:



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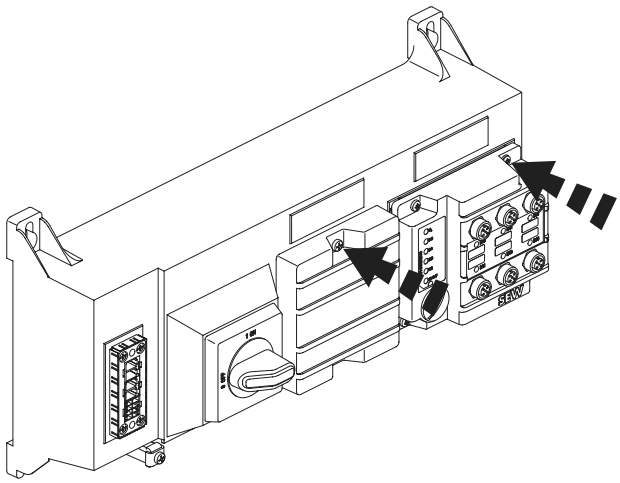
Tighten the screws on the MOVIMOT® inverter using 3.0 Nm (27 lb.in) working diagonally across.

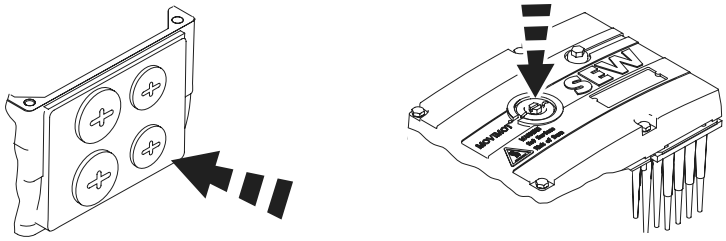
Fieldbus interfaces/terminal box lid:



57671AXX

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

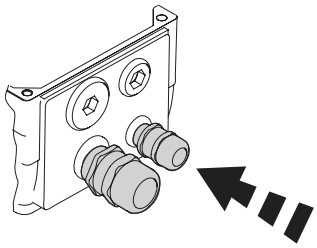
Blanking plug for cable entries, F1 potentiometer plug



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:

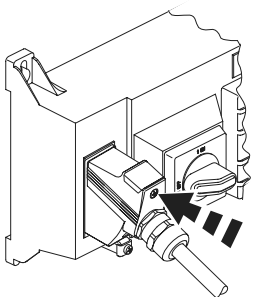
Screw fitting	Tightening torque
M12 x 1.5	2.5 Nm to 3.5 Nm (22...31lb.in)
M16 x 1.5	3.0 Nm to 4.0 Nm (27...35 lb.in)
M20 x 1.5	3.5 Nm to 5.0 Nm (31...44 lb.in)
M25 x 1.5	4.0 Nm to 5.5 Nm (35...49 lb.in)

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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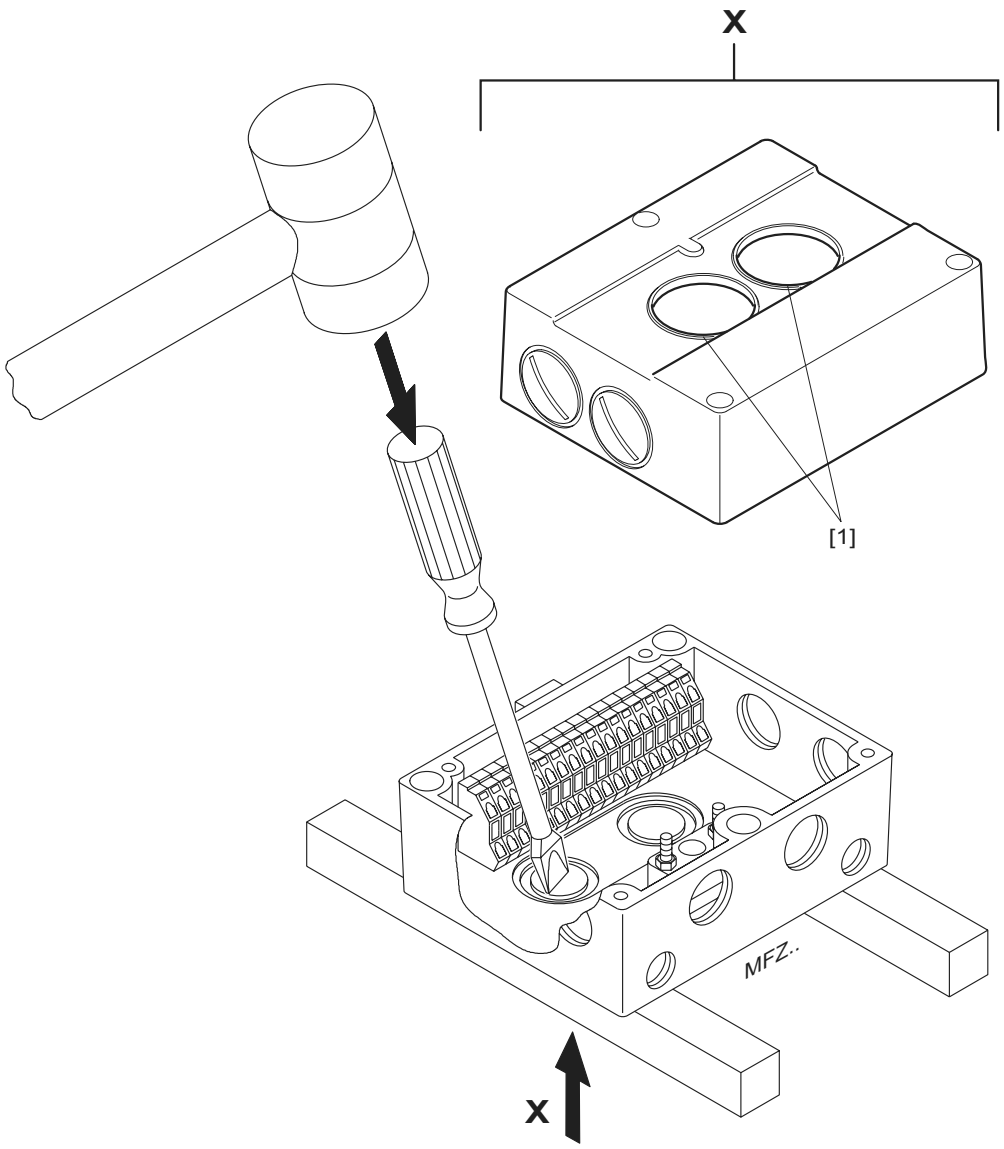
5.3 Fieldbus interfaces MF../MQ..

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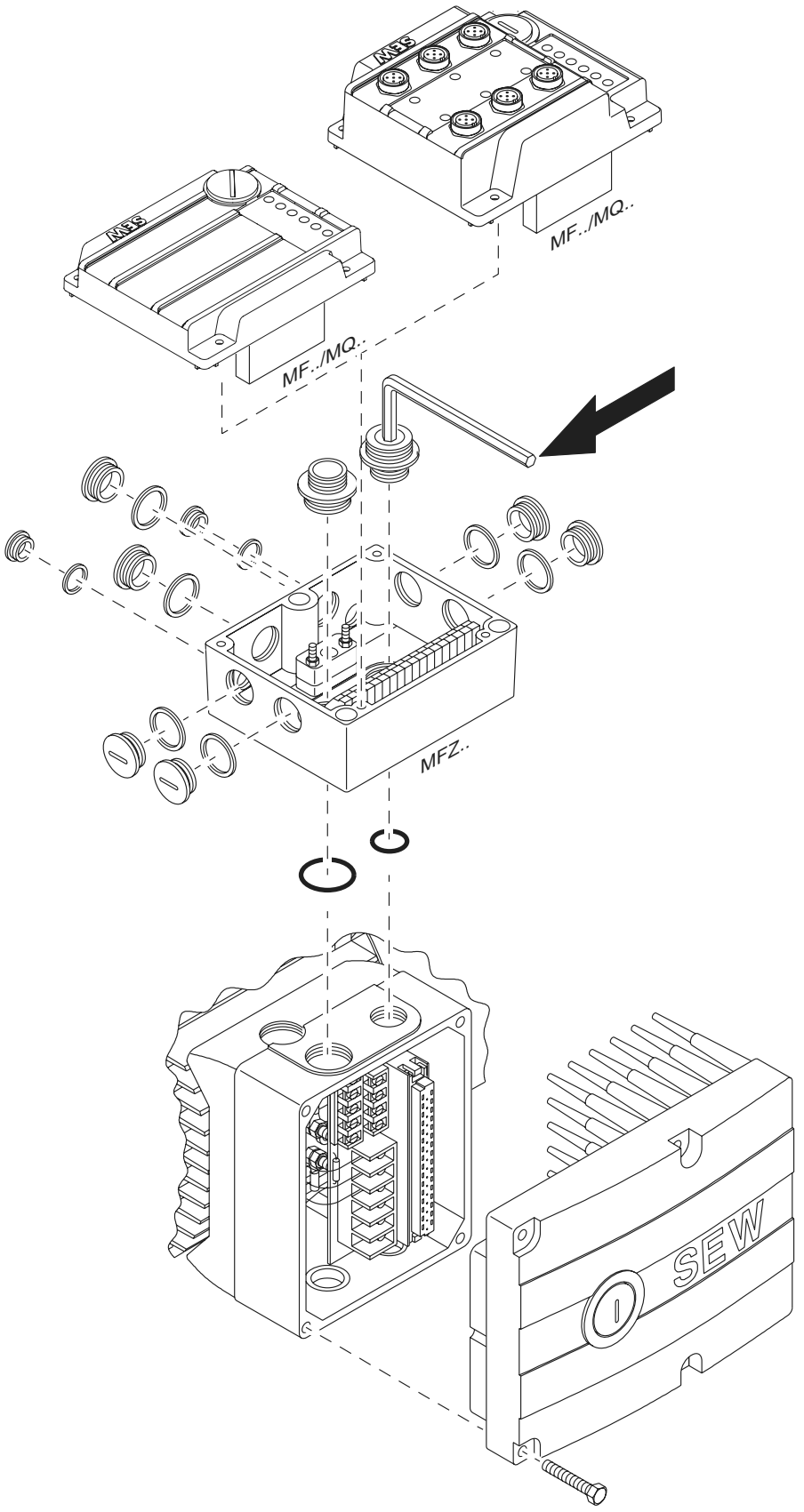
[1] The break lines that occur after the knock outs have been removed may have to be deburred.

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



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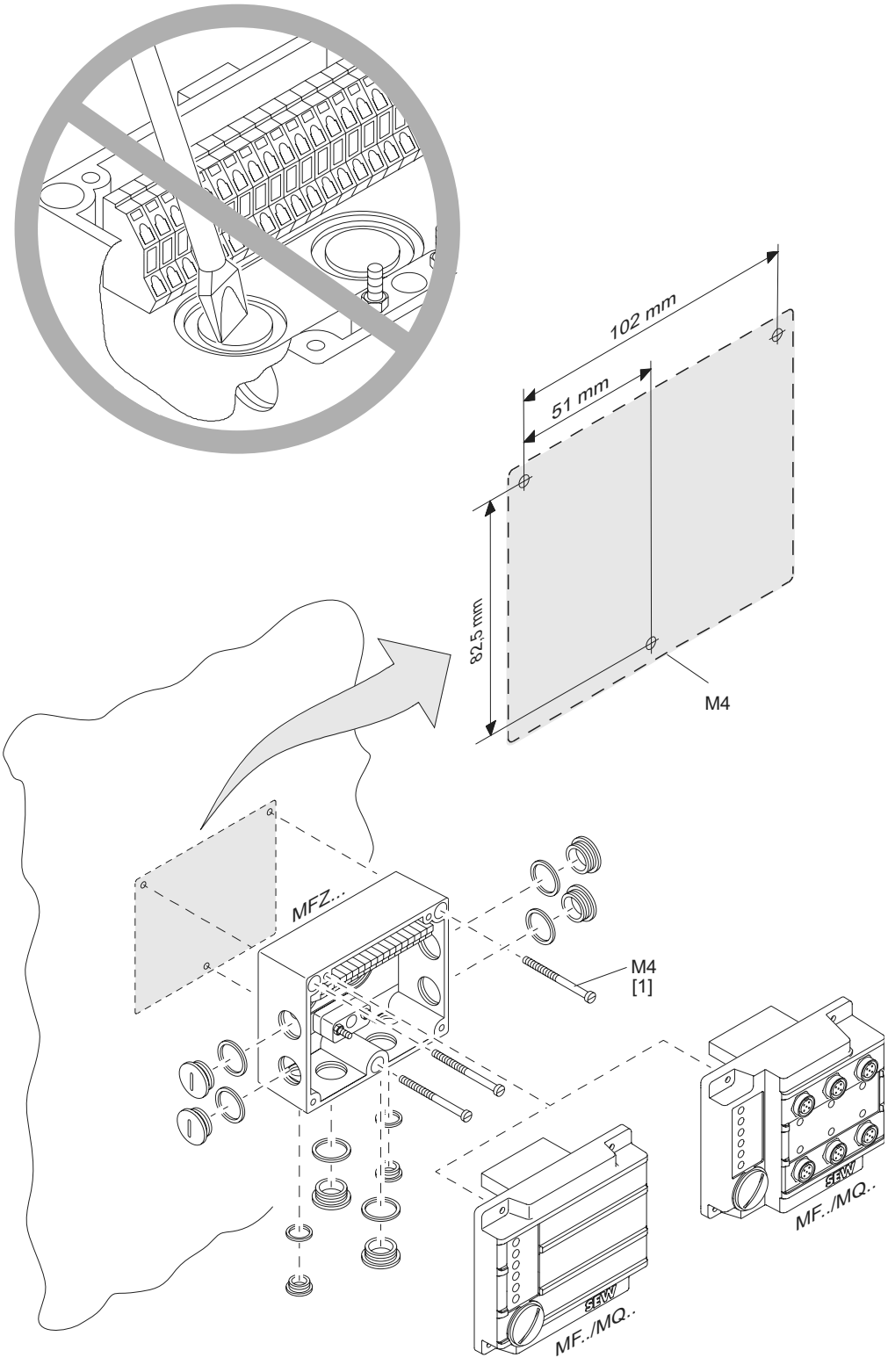
Installation in the field

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

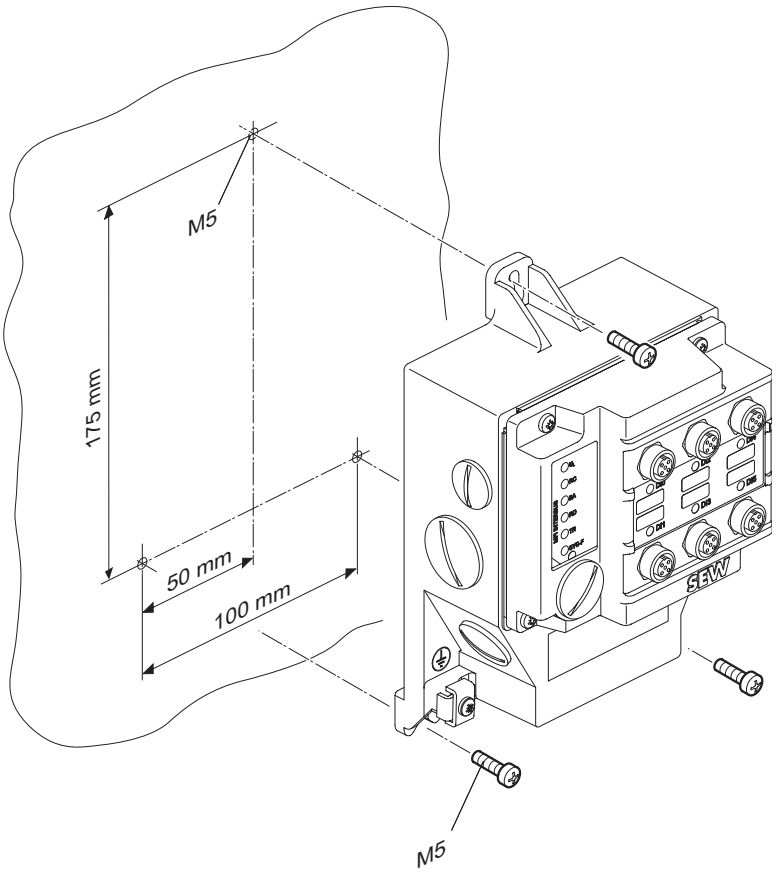


[1] Length of screws min. 40 mm

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:



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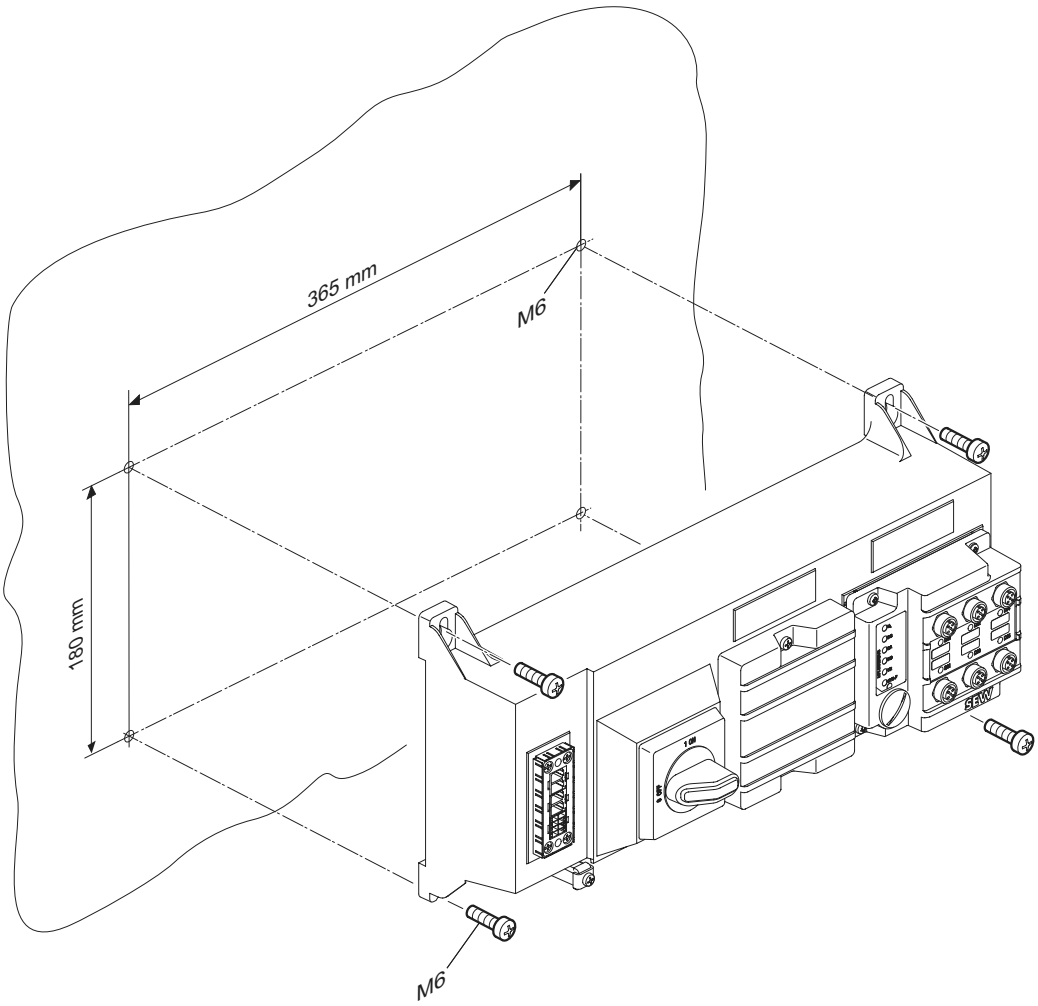
Installing field distributors MF.../Z.6., MQ.../Z.6.

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



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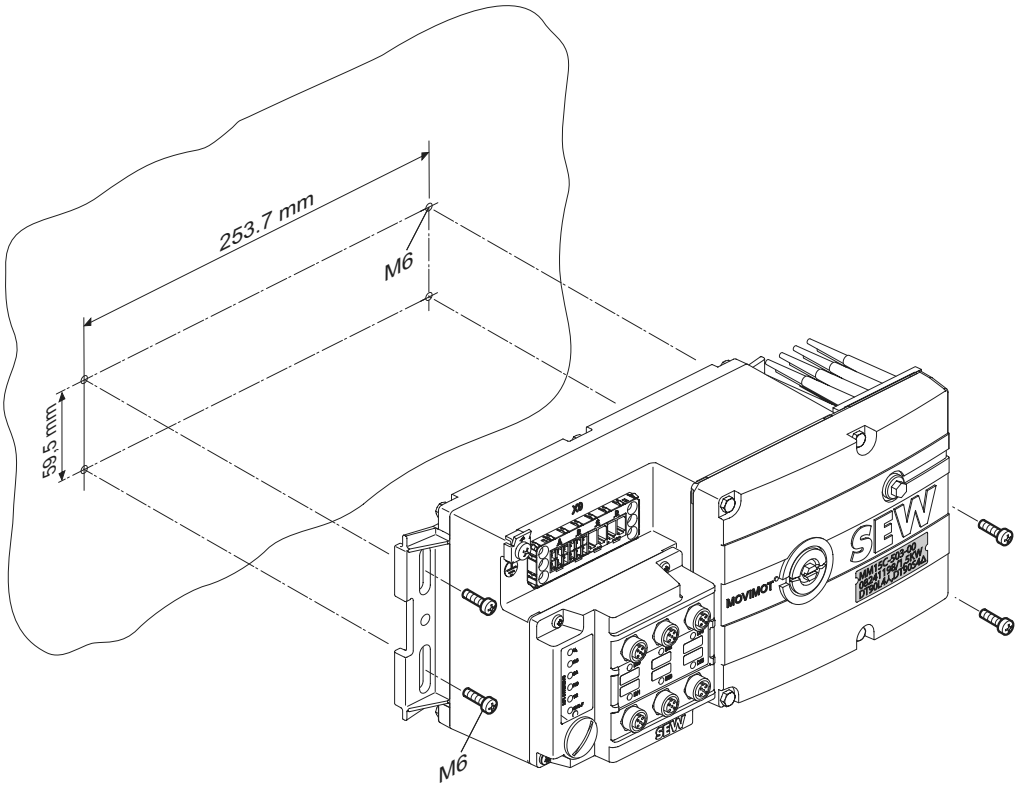
Installing field distributors MF.../MM../Z.7., MQ.../MM../Z.7.

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



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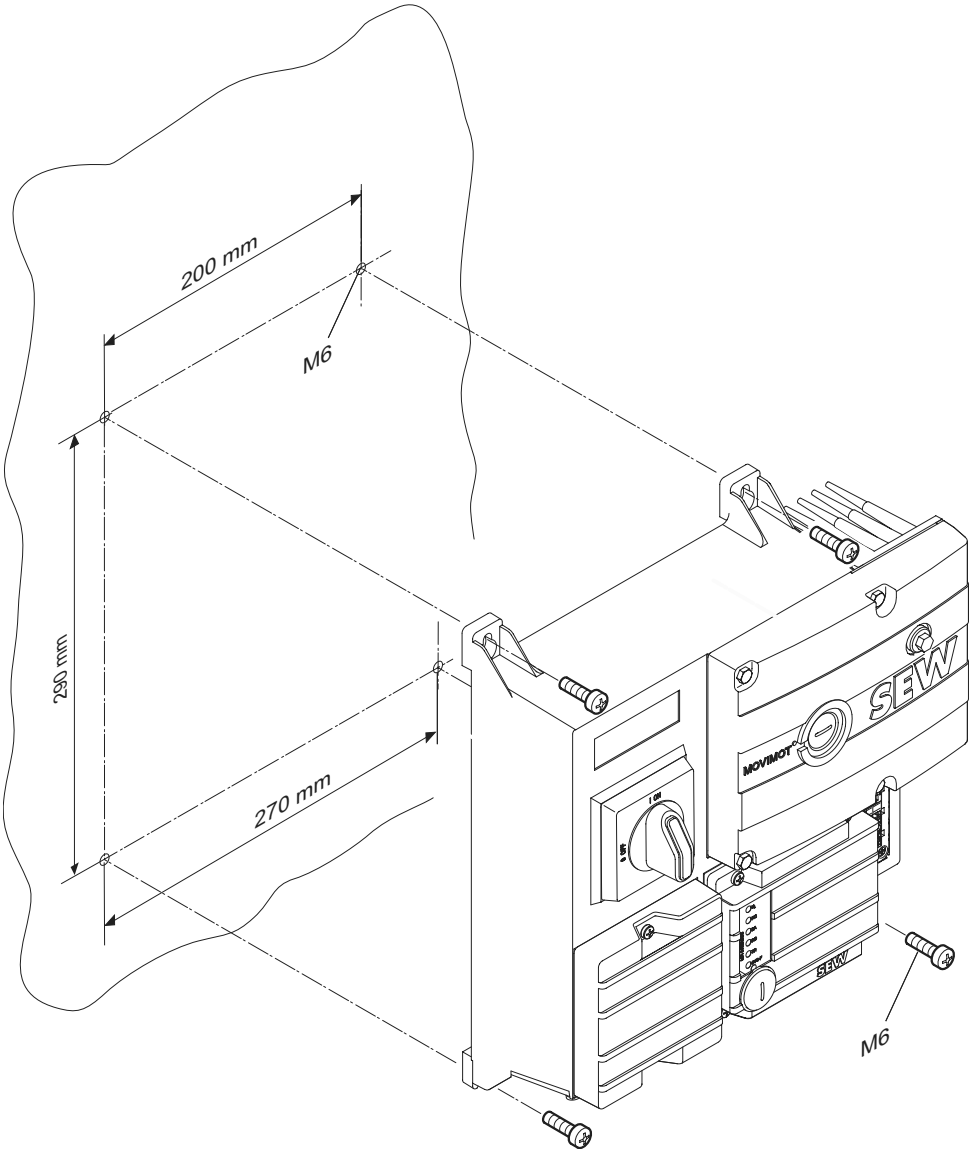
Installing field distributors MF.../MM03-MM15/Z.8., MQ.../MM03-MM15/Z.8. (size 1)

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



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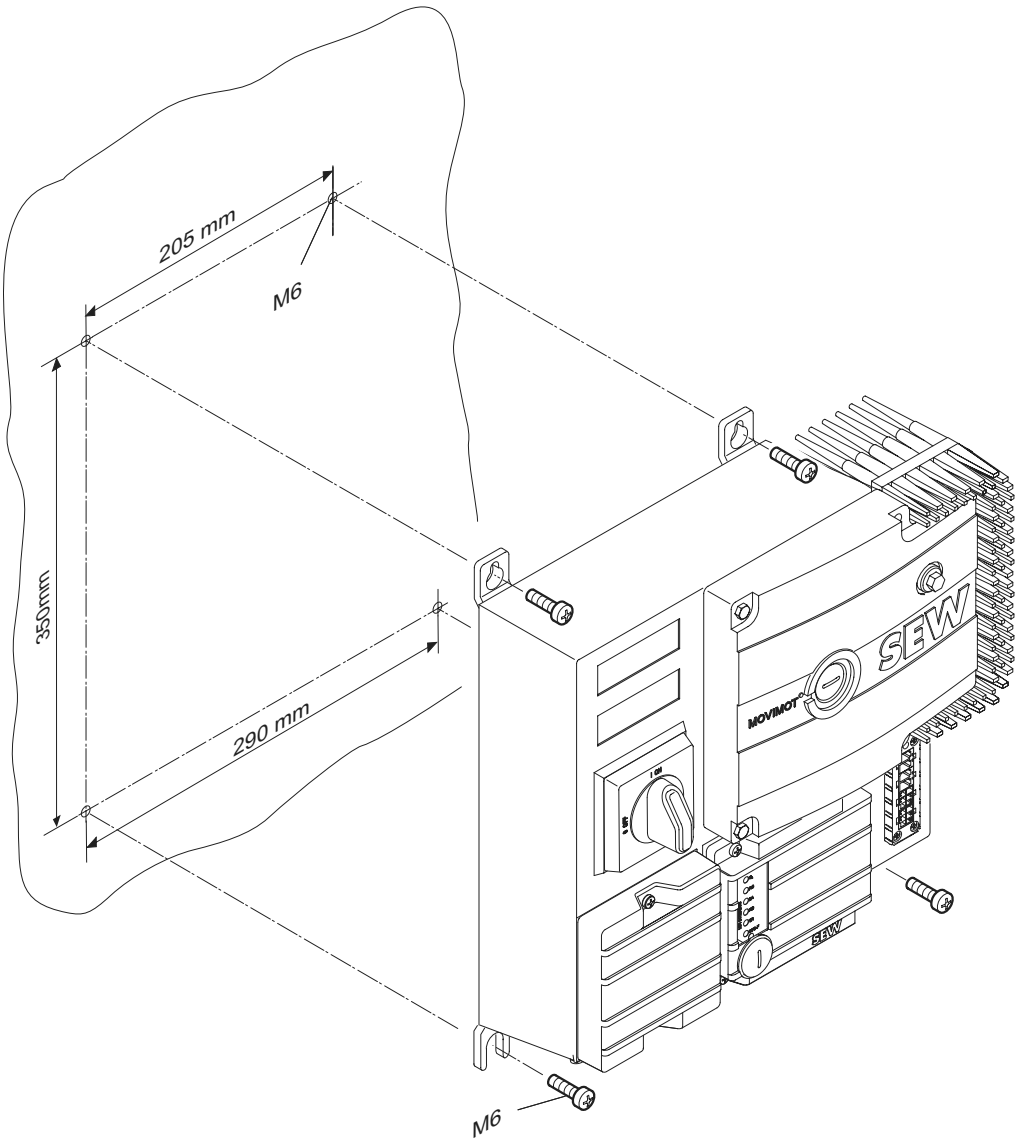
Installing field distributors MF.../MM22-MM3X/Z.8., MQ.../MM22-MM3X/Z.8. (size 2)

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



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6 Electrical Installation

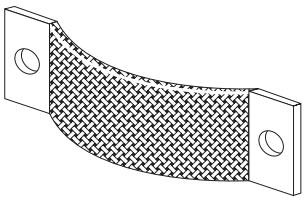
6.1 Installation planning taking EMC aspects into account

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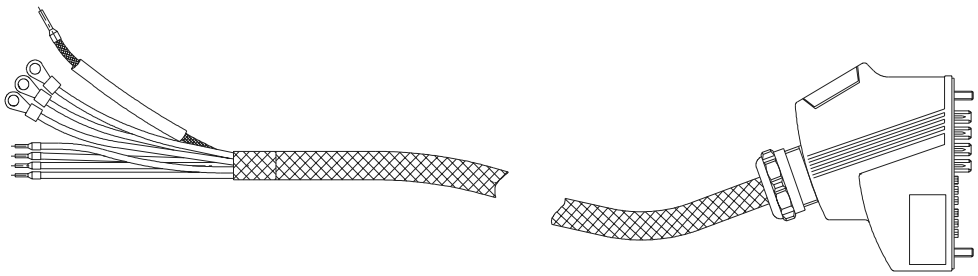
  - Do not use the cable shield of data lines for equipotential bonding.
- **Data lines and 24 V supply**
  - These lines must be routed separately from cables subject to interference (e.g. control cables for solenoid valves, motor cables).
- **Field distributor**
  - We recommend using pre-fabricated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



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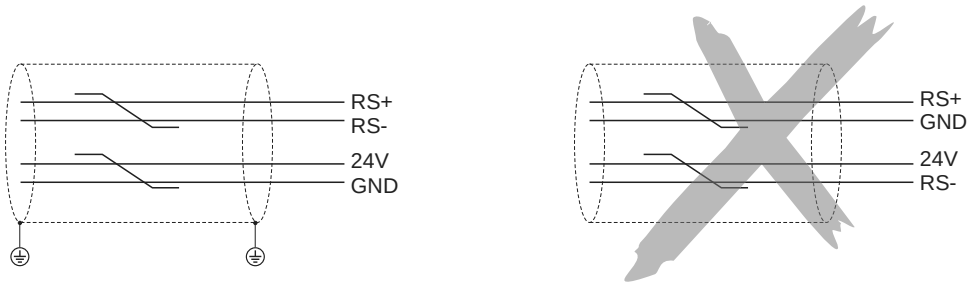
- **Cable glands**
  - Select a cable gland with large contact surface shield (consult the notes on selection and appropriate assembly of cable glands).
- **Cable shield**
  - Must have good EMC characteristics (high shield attenuation)
  - May not only serve as a means of mechanical protection for the 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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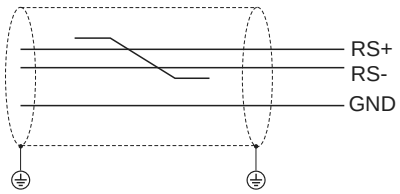
- **Without DC 24 V supply**

  If the MOVIMOT® is supplied with DC 24 V via separate lead, connect the RS485 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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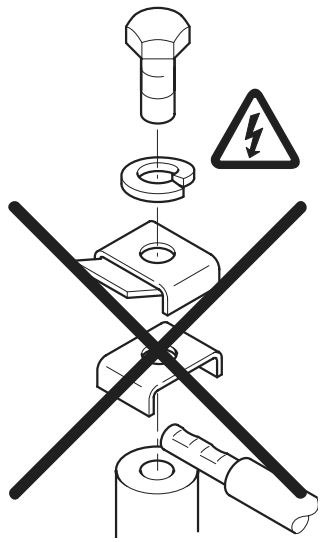
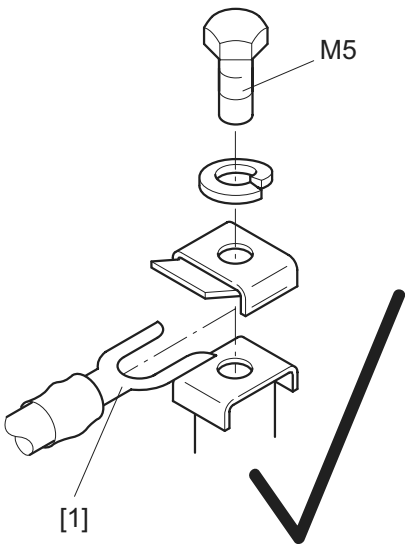
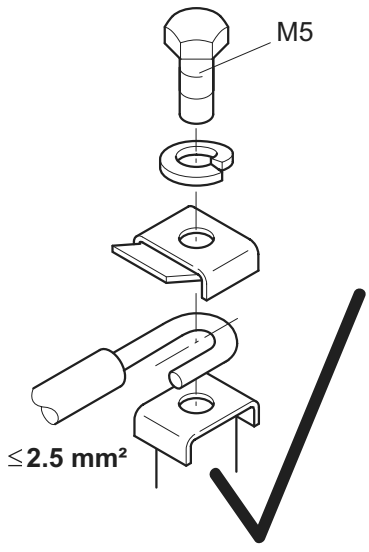
6.2 Installation instructions for fieldbus interfaces, field distributors

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/or 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

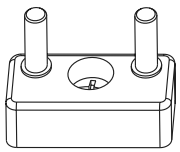
Permitted connection cross section and current carrying capacity of the terminals

	Power terminals X1, X21 (screw terminals)	Control terminals X20 (cage clamp terminals)
Connection cross section (mm2)	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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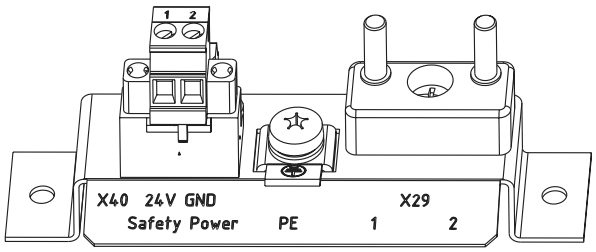
- The terminal studs have a current carrying capacity of 16 A.
- The permitted tightening torque for the hex nuts of the terminal studs is 1.2 Nm (11 lb.in) ± 20 %.

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.



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- 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 2000 msl is reduced by 6 V for every 100 m to a maximum of 3 x 380 V at 4000 msl.

Protection devices

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

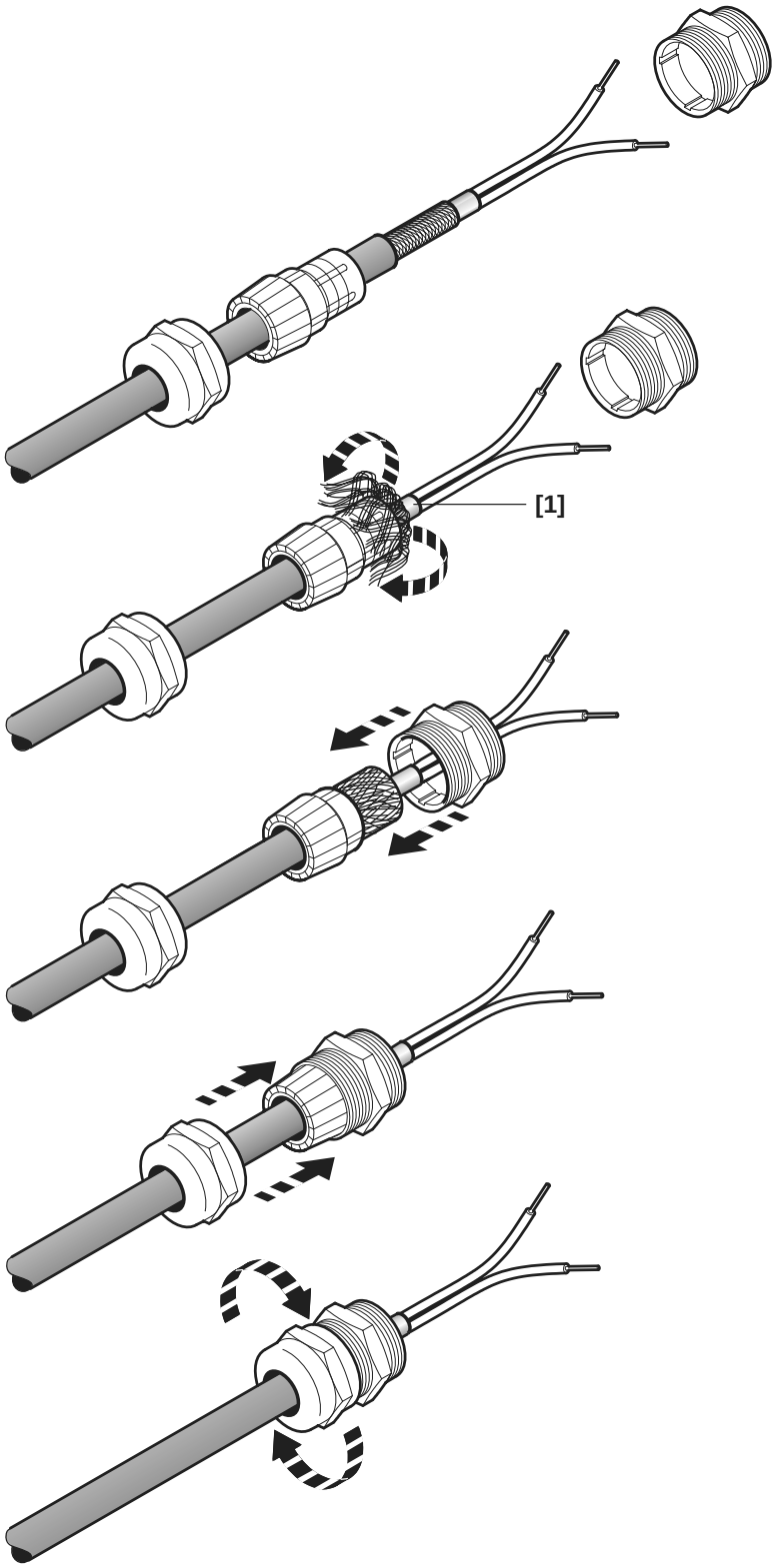
UL-compliant installation for field distributors

- 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 AC 5000 A and a maximum rated voltage of AC 500 V. 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:



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[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 24 V_{DC} 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

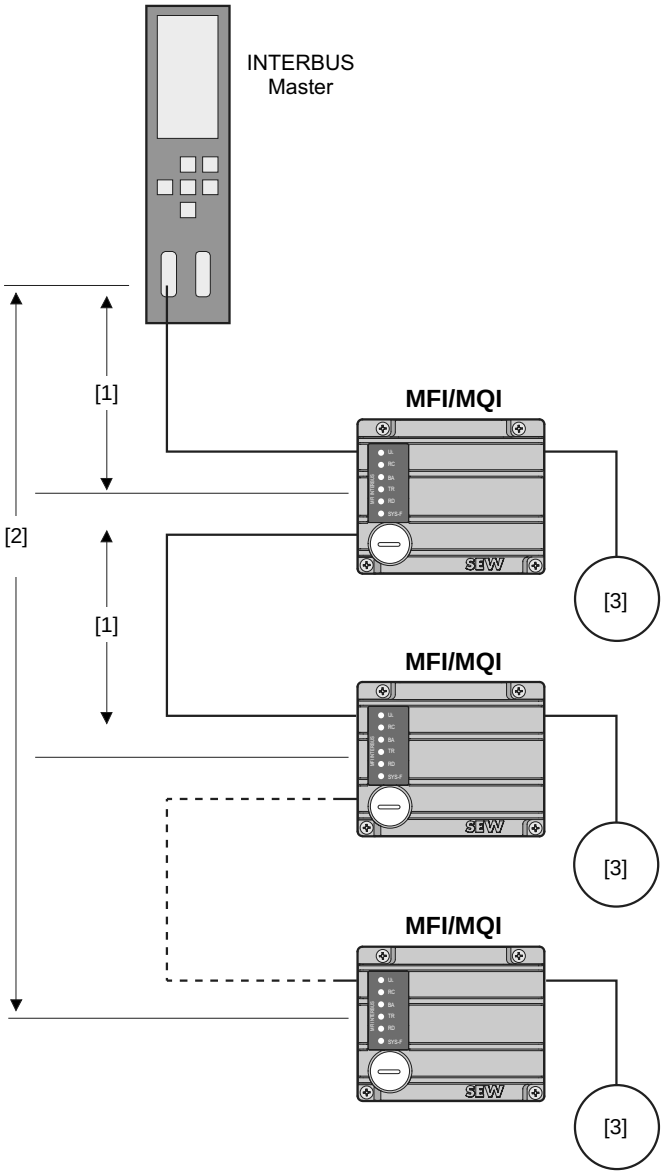
6.3 Connecting InterBus with a copper line

InterBus interfaces

The MFI/MQI fieldbus interfaces can be operated on both the remote bus and the installation remote bus. The principal distinguishing feature between these types of interfaces is the structure of the bus cable. Standard remote bus cables consist of 2-core cables twisted together in three pairs for data transmission. In the installation remote bus, the wires for data transmission may be supplemented by the power supply for the MFI/MQI and active sensors.

Remote bus connection

The remote bus is usually connected using a 9-pin sub D connector for IP20 units. The following wiring examples show how MFIs/MQIs are connected to units on the input or output end using 9-pin sub D connectors.



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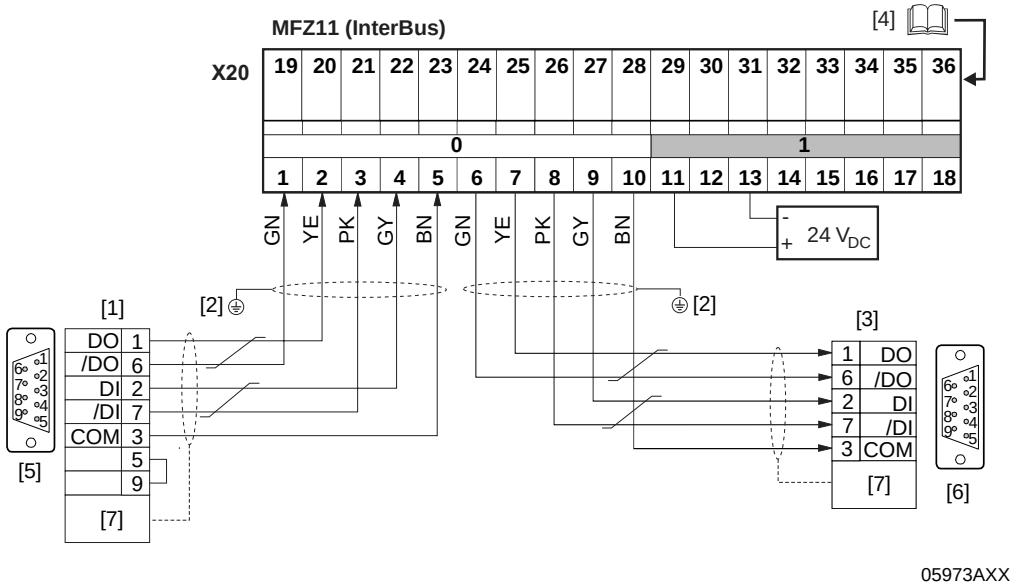
[1] Max. 400 m (max. 1200 ft.)
[2] Max. 12.8 km (max. 8 miles)
[3] Drive

Line type D9-MFI (9-pin sub D to MFI)

The incoming remote bus is picked off from the preceding InterBus module using a 9-pin sub D plug.

Line type MFI-D9 (MFI to 9-pin sub D)

The subsequent InterBus module is connected using a 9-pin sub D socket.



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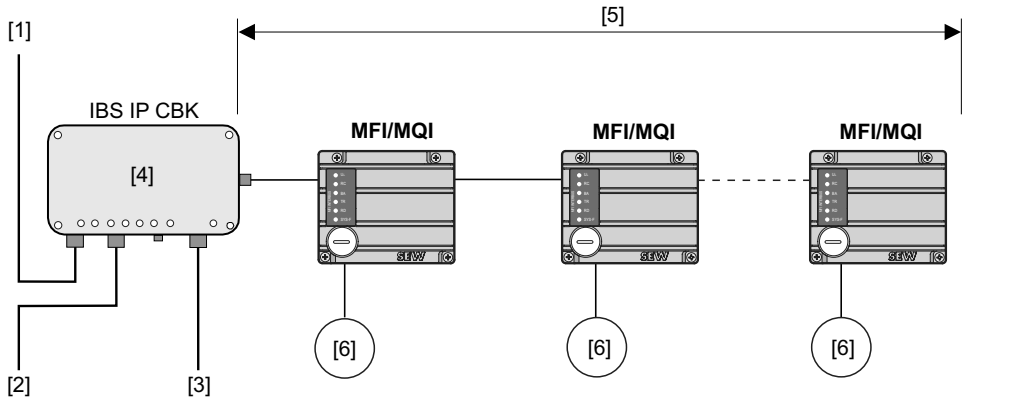
0 = Potential level 0 **1** = Potential level 1

[1] Incoming remote bus cable
[2] Connect shield of incoming/outgoing remote bus cable with EMC metal cable gland at MFZ housing
[3] Outgoing remote bus cable
[4] Assignment of terminals 19-36 from page 58
[5] 9-pin sub D plug
[6] 9-pin sub D socket
[7] Strain relief

Installation remote bus connection

An 8-core cable is used for the installation remote bus. In addition to the cores for transmitting data, the cable also carries the DC 24 V power supply for the MFI/MQI bus electronics and the active sensors.

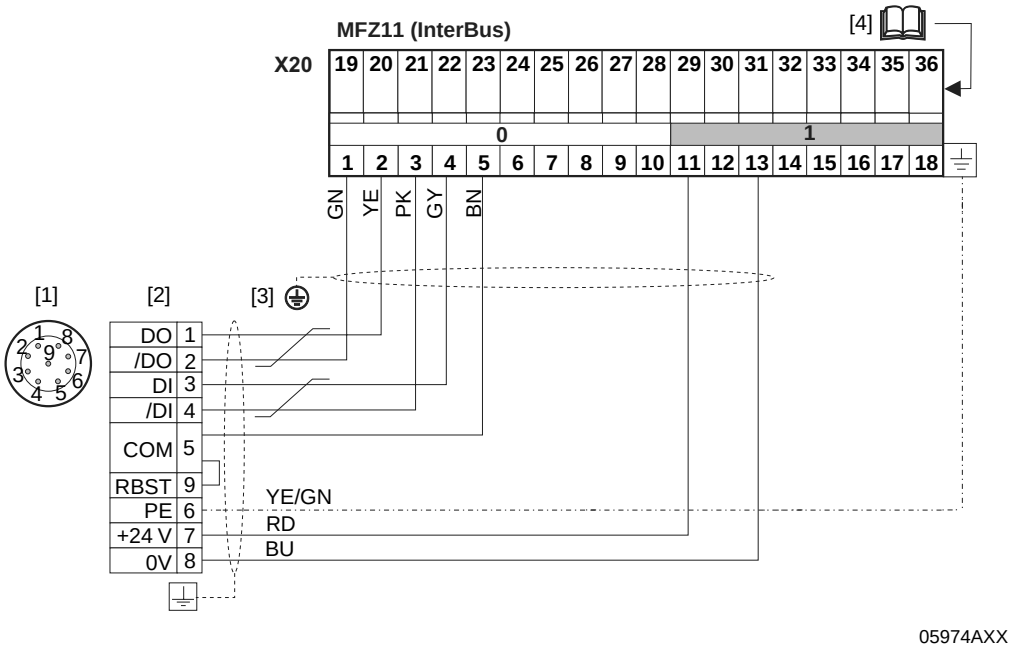


[1] Incoming remote bus
[2] Outgoing remote bus
[3] 24 V power supply
[4] Installation remote bus terminal
[5] Installation remote bus max. 50 m
[6] Drive

The maximum number of modules that can be connected to an installation remote bus terminal is determined by the current consumption of the individual modules.

Line type CCO-I → MFI (IP65 round connector → MFI terminals)

A special InterBus installation remote bus terminal is required to open an installation remote bus segment. The installation remote bus can be connected to this bus terminal (e.g. type IBS IP CBK 1/24F) using an IP65 round plug connector (type CCO-I).

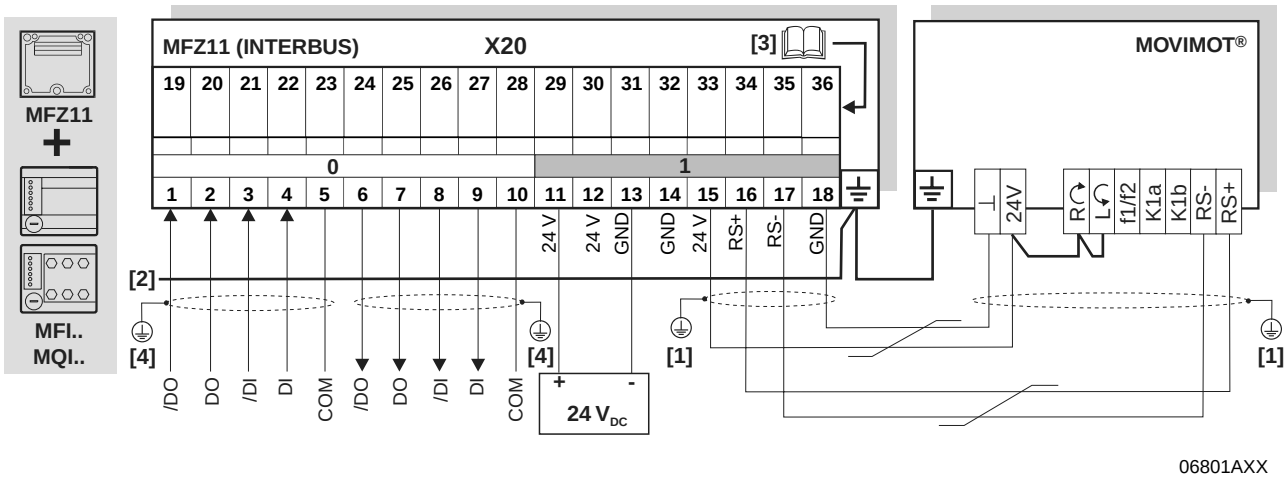


05974AXX

0	= Potential level 0
1	= Potential level 1

[1] IP 65 round connector
[2] Incoming installation remote bus cable
[3] Connect shield of installation remote bus cable with an EMC cable gland on the MFZ housing.
[4] 📖 Assignment of terminals 19-36 from page 58

Connecting MFZ11 with MOVIMOT® (in combination with MFI/MQI21, MFI/MQI22, MFI/MQI23)



06801AXX

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

[1] If MFZ11/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 58
[4] EMC cable gland

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	/DO	Input	Incoming remote bus, negated data send direction (green)
	2	DO	Input	Incoming remote bus, data send direction (yellow)
	3	/DI	Input	Incoming remote bus, negated data reception direction (pink)
	4	DI	Input	Incoming remote bus, data reception direction (gray)
	5	COM	-	Reference potential (brown)
	6	/DO	Output	Outgoing remote bus, negated data send direction (green)
	7	DO	Output	Outgoing remote bus, data send direction (yellow)
	8	/DI	Output	Outgoing remote bus, negated data reception direction (pink)
	9	DI	Output	Outgoing remote bus, data reception direction (gray)
	10	COM	-	Reference potential (brown)
	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)

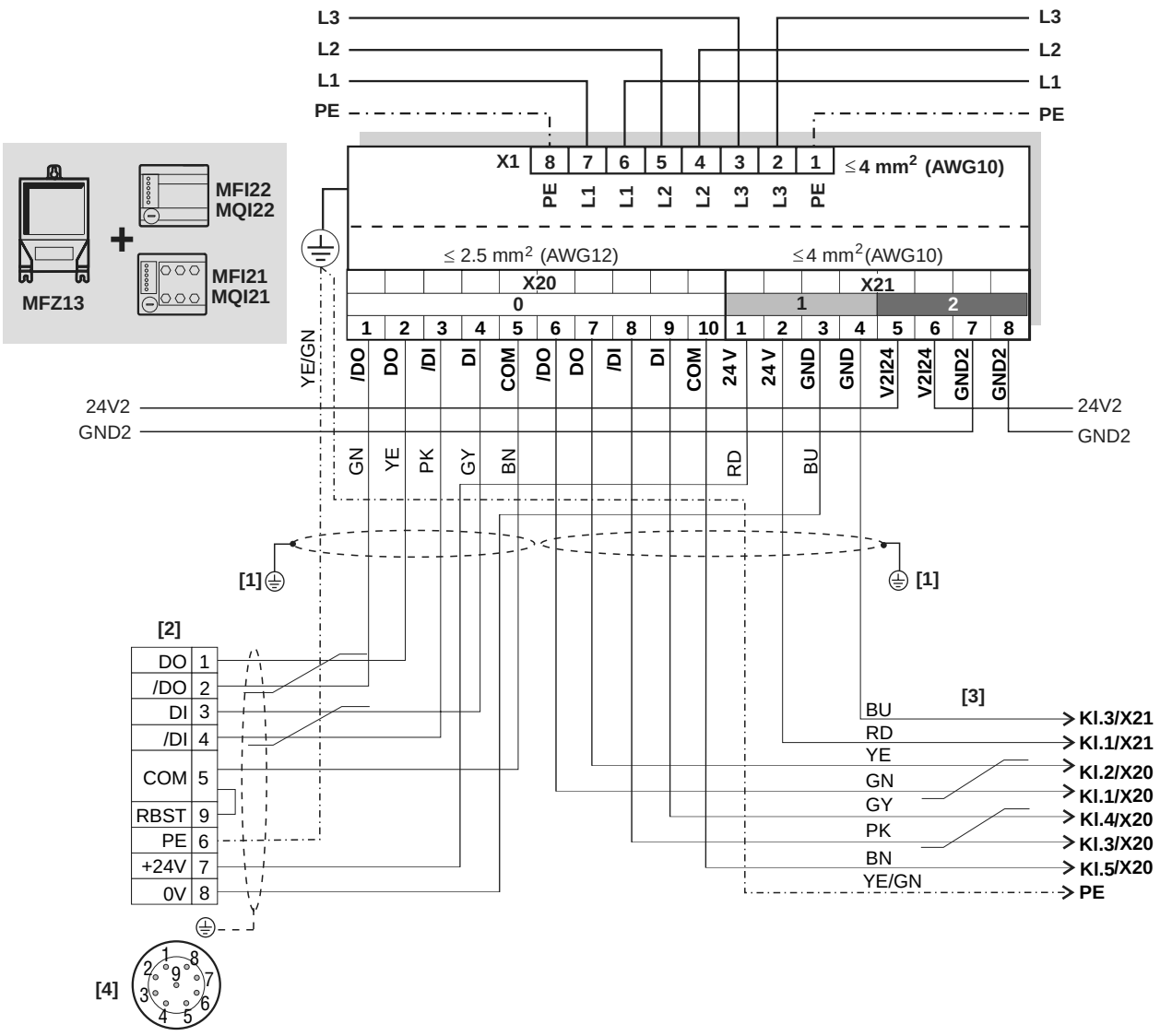
Connecting MFZ13 field distributor with MFI../MQI (installation remote bus connection)

Line type CCO-I → MFI

IP65 round connector → MFI/MQI terminals

A special InterBus installation remote bus terminal is required to open an installation remote bus segment. The installation remote bus can be connected to this bus terminal (e.g. type IBS IP CBK 1/24F) using an IP65 round plug connector (type CCO-I).

MFZ13 connection module with MFI/MQI21, MFI/MQI22 fieldbus module



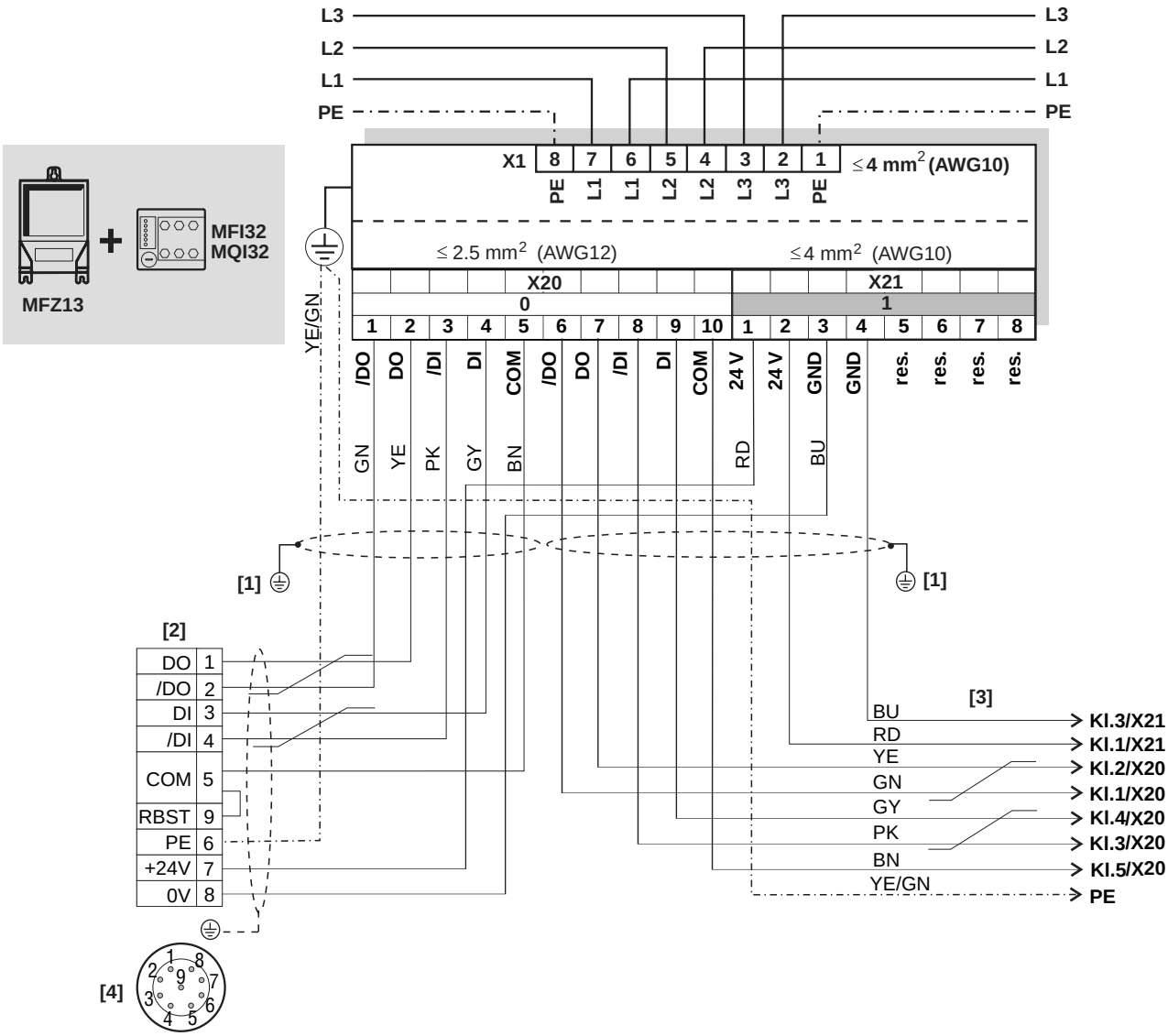
05948AXX

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

[1] EMC metal cable gland
[2] Incoming installation remote bus cable
[3] Outgoing installation remote bus cable
[4] IP65 round connector

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	/DO	Input	Incoming remote bus, negated data send direction (green)
	2	DO	Input	Incoming remote bus, data send direction (yellow)
	3	/DI	Input	Incoming remote bus, negated data reception direction (pink)
	4	DI	Input	Incoming remote bus, data reception direction (gray)
	5	COM	-	Reference potential (brown)
	6	/DO	Output	Outgoing remote bus, negated data send direction (green)
	7	DO	Output	Outgoing remote bus, data send direction (yellow)
	8	/DI	Output	Outgoing remote bus, negated data reception direction (pink)
	9	DI	Output	Outgoing remote bus, data reception direction (gray)
	10	COM	-	Reference potential (brown)
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 MFZ13 with fieldbus module MFI/MQI32



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

[1] EMC metal cable gland
[2] Incoming installation remote bus cable
[3] Outgoing installation remote bus cable
[4] IP65 round connector

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	/DO	Input	Incoming remote bus, negated data send direction (green)
	2	DO	Input	Incoming remote bus, data send direction (yellow)
	3	/DI	Input	Incoming remote bus, negated data reception direction (pink)
	4	DI	Input	Incoming remote bus, data reception direction (gray)
	5	COM	-	Reference potential (brown)
	6	/DO	Output	Outgoing remote bus, negated data send direction (green)
	7	DO	Output	Outgoing remote bus, data send direction (yellow)
	8	/DI	Output	Outgoing remote bus, negated data reception direction (pink)
	9	DI	Output	Outgoing remote bus, data reception direction (gray)
	10	COM	-	Reference potential (brown)
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

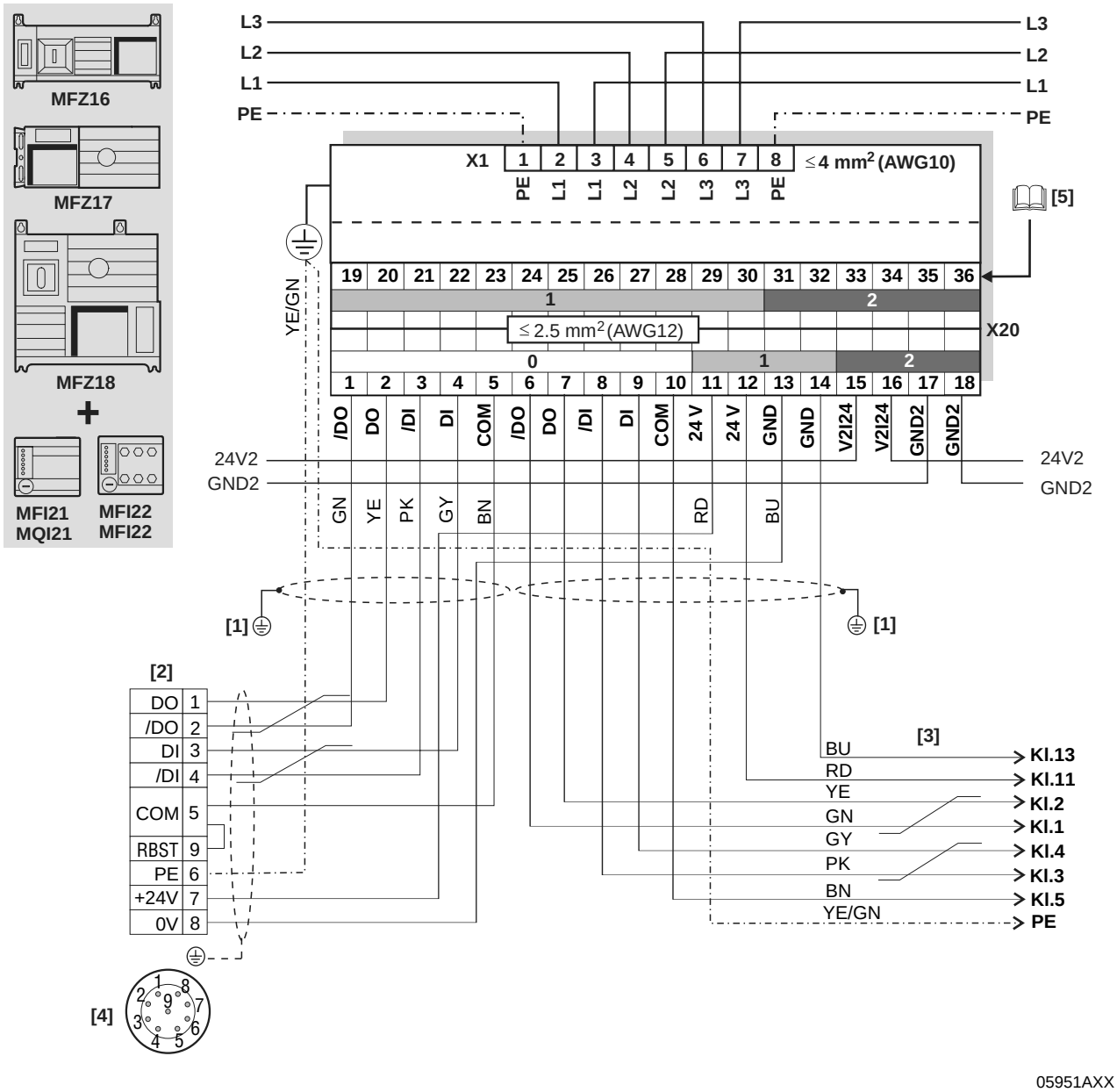
Connecting field distributors MFZ16, MFZ17, MFZ18 with MFI../MQI (installation remote bus connection)

Line type CCO-I → MFI

IP65 round connector → MFI/MQI terminals

A special InterBus installation remote bus terminal is required to open an installation remote bus segment. The installation remote bus can be connected to this bus terminal (e.g. type IBS IP CBK 1/24F) using an IP65 round plug connector (type CCO-I).

MFZ16, MFZ17, MFZ18 connection modules with MFI/MQI21, MFI/MQI22 fieldbus module



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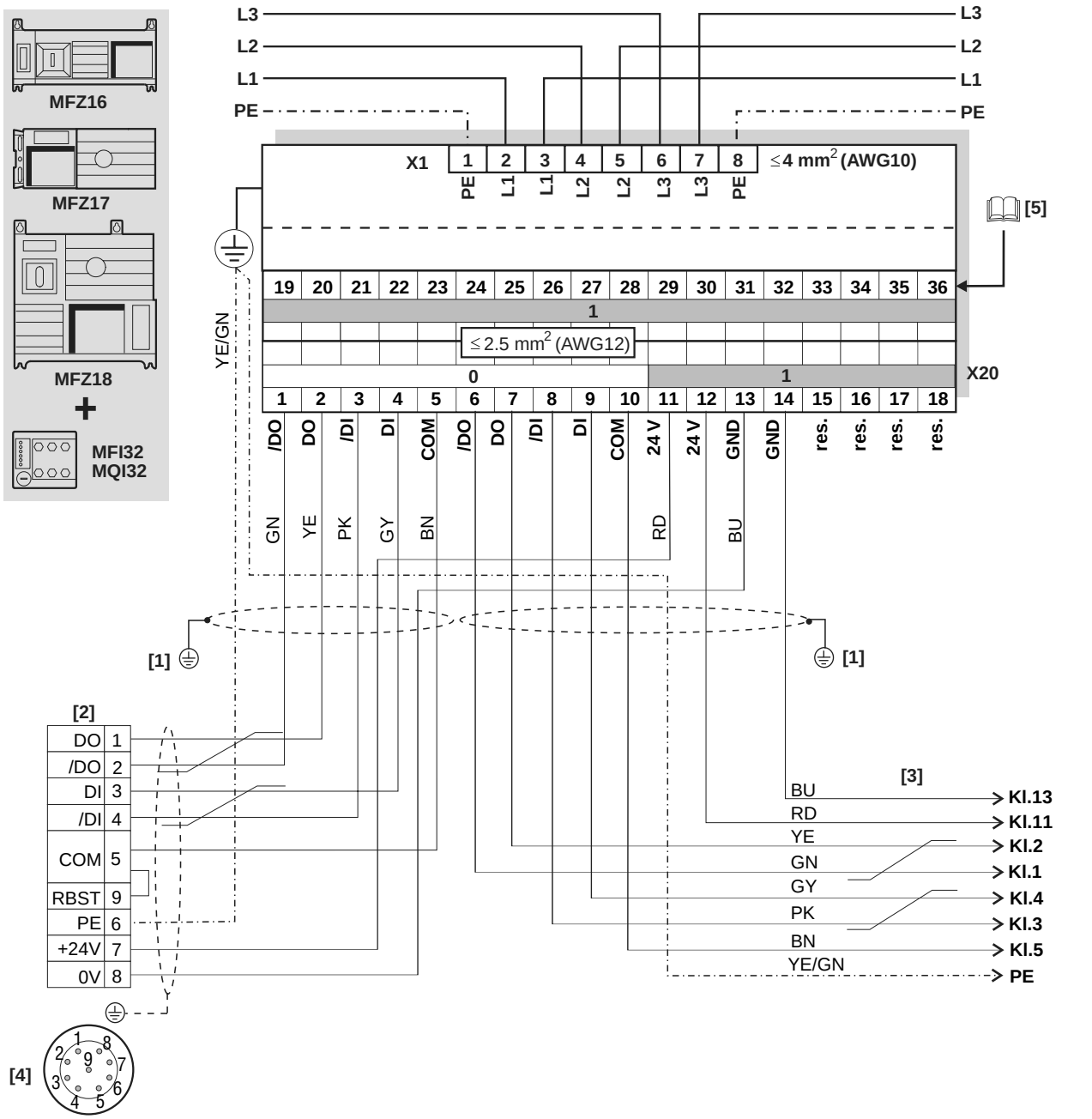
0 = Potential level 0 **1** = Potential level 1 **2** = Potential level 2

[1] EMC metal cable gland
[2] Incoming installation remote bus cable
[3] Outgoing installation remote bus cable
[4] IP65 round connector
[5] 📖 Assignment of terminals 19-36 from page 58

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	/DO	Input	Incoming remote bus, negated data send direction (green)
	2	DO	Input	Incoming remote bus, data send direction (yellow)
	3	/DI	Input	Incoming remote bus, negated data reception direction (pink)
	4	DI	Input	Incoming remote bus, data reception direction (gray)
	5	COM	-	Reference potential (brown)
	6	/DO	Output	Outgoing remote bus, negated data send direction (green)
	7	DO	Output	Outgoing remote bus, data send direction (yellow)
	8	/DI	Output	Outgoing remote bus, negated data reception direction (pink)
	9	DI	Output	Outgoing remote bus, data reception direction (gray)
	10	COM	-	Reference potential (brown)
	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 actuators
	18	GND2	-	0V24 reference potential for actuators

Connection modules MFZ16, MFZ17, MFZ18 with fieldbus module MFI/MQI32



05952AXX

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

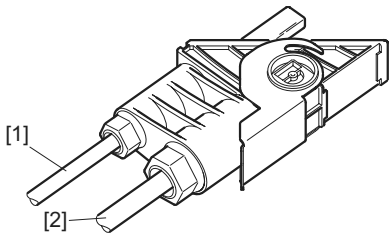
[1] EMC metal cable gland
[2] Incoming installation remote bus cable
[3] Outgoing installation remote bus cable
[4] IP65 round connector
[5] Assignment of terminals 19-36 from page 58

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1**	/DO	Input	Incoming remote bus, negated data send direction (green)
	2	DO	Input	Incoming remote bus, data send direction (yellow)
	3	/DI	Input	Incoming remote bus, negated data reception direction (pink)
	4	DI	Input	Incoming remote bus, data reception direction (gray)
	5	COM	-	Reference potential (brown)
	6	/DO	Output	Outgoing remote bus, negated data send direction (green)
	7	DO	Output	Outgoing remote bus, data send direction (yellow)
	8	/DI	Output	Outgoing remote bus, negated data reception direction (pink)
	9	DI	Output	Outgoing remote bus, data reception direction (gray)
	10	COM	-	Reference potential (brown)
	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	-	-	Reserved
	16	-	-	Reserved
	17	-	-	Reserved
	18	-	-	Reserved

6.4 Connecting InterBus with fiber-optic cables

Connection to communication and DC 24 V voltage supply

- InterBus and the DC 24 V supply are installed using rugged line connectors.



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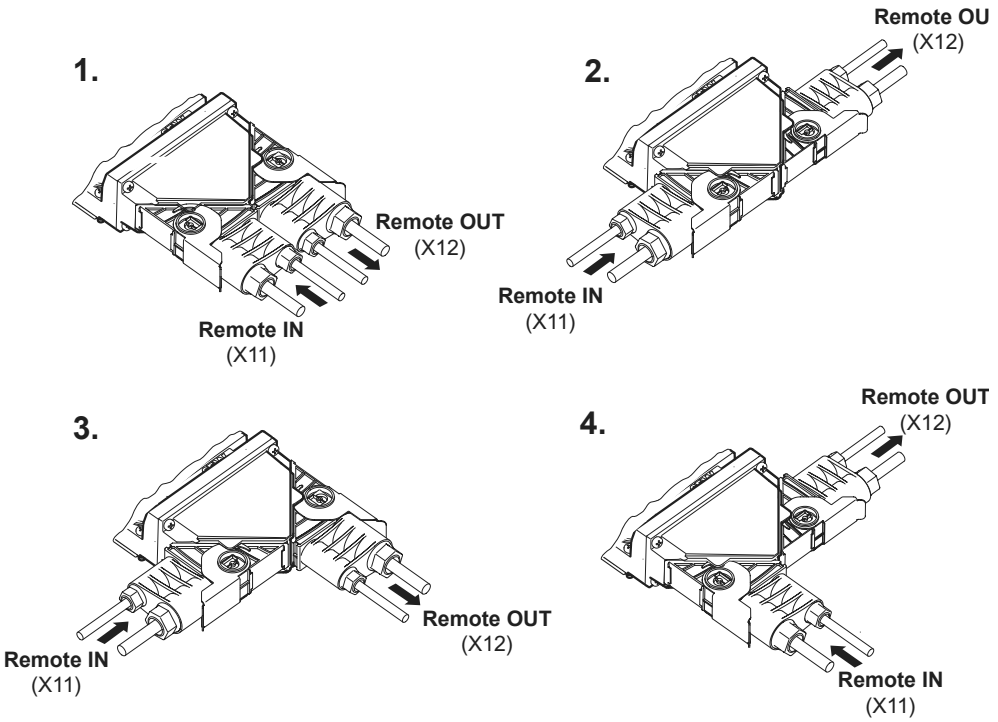
[1] Fiber optic cable (InterBus remote bus)
[2] US1/US2 voltage supply

- The connector plugs are not part of the SEW scope of delivery (made by Phoenix-Contact).
- **It is essential to observe the project planning and installation guidelines for the rugged-line connection technology by Phoenix-Contact.**

Installation of the bus connector plugs

The connector plugs can be connected to the bus module in four different ways (see the following figure).



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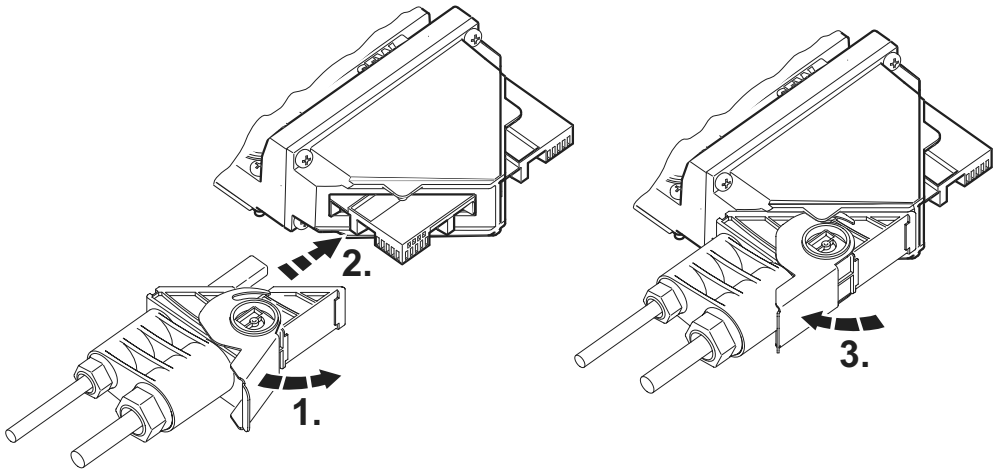
- **Only install the connector plugs when they are deenergized.**
- **Do not use the clip of the connector plug to pull the connector into position.**
- **Important: Connector plugs not in use must be equipped with a dummy plug to ensure the enclosure!**

Installation

- Disconnect the voltage supply.
- Open the clip (1.) and sufficiently insert the connector into the module electronics (2.)
- Close the clip (3.)



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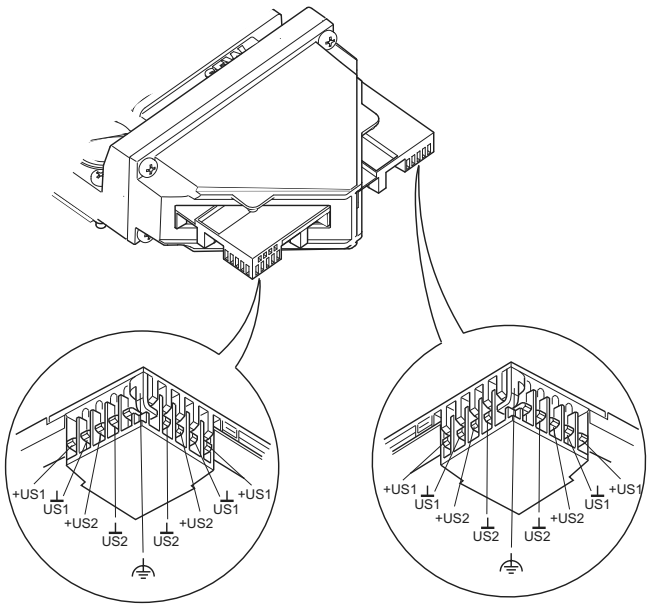
Removal

- Disconnect the voltage supply.
- Open the clip and pull the the connector away from the module in the direction of the cables.

Supply voltage

- The two available supply voltages are used as follows:
  - US1: DC 24 V power supply for bus logic, sensors and MOVIMOT®
  - US2: Power supply for the actuators (for current consumption, see section "Technical Data")

Pin assignment



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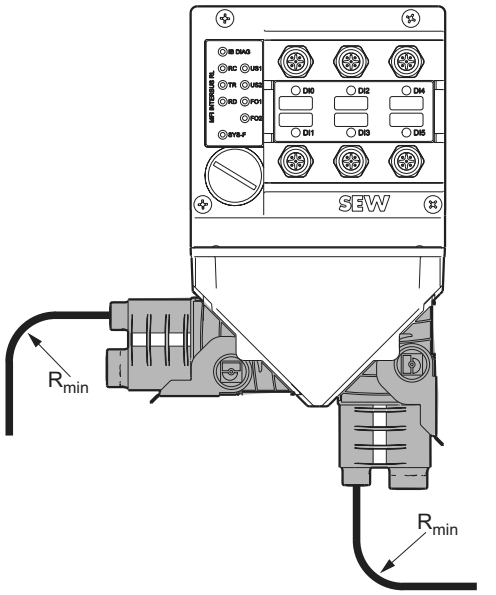
Cable installation

Cabling for the plug connectors requires maintaining a distance that is dependent on the bending radius of the cable type being used (observe the project planning and installation guidelines concerning rugged line connection technology from Phoenix-Contact).



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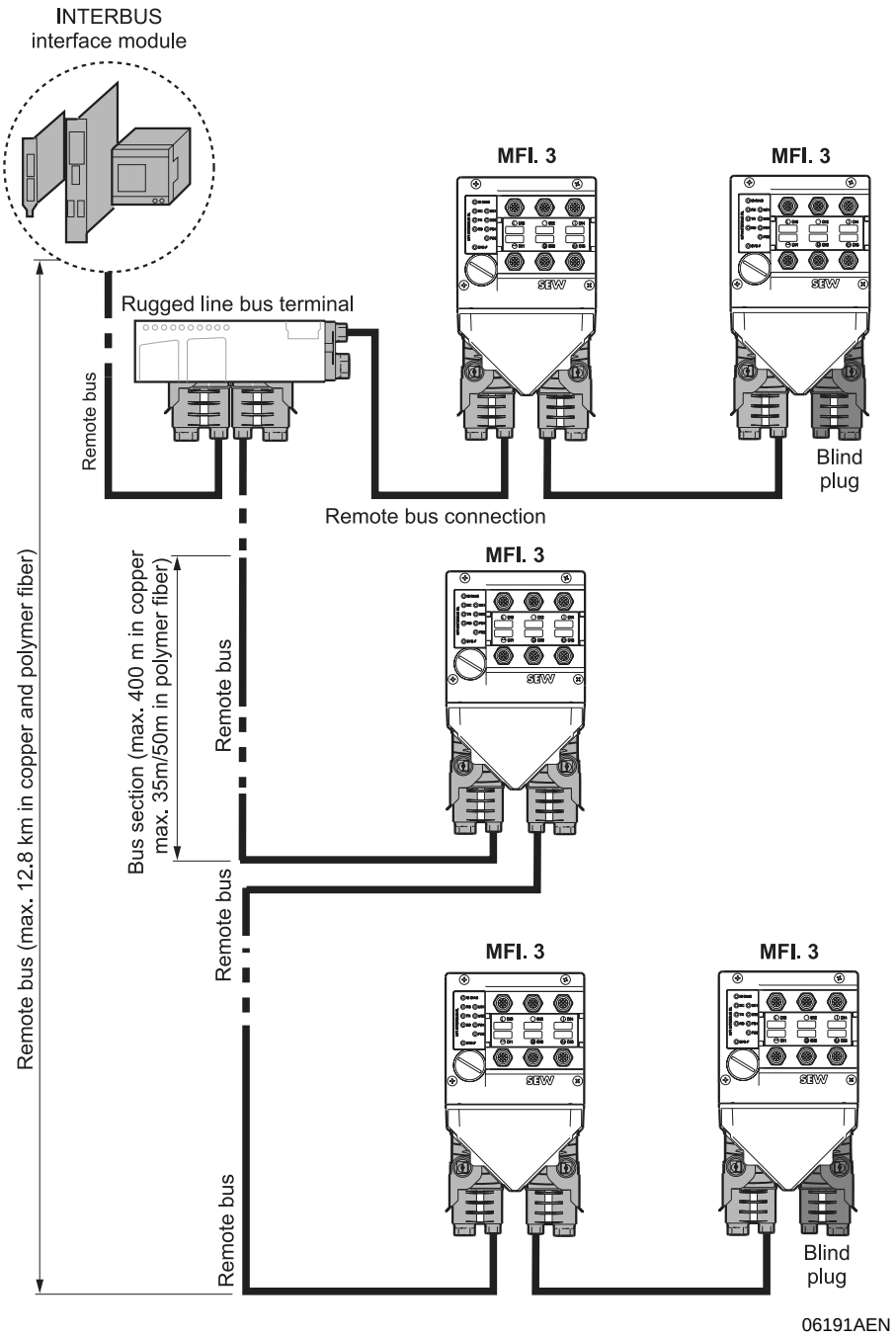
Line lengths < 1m

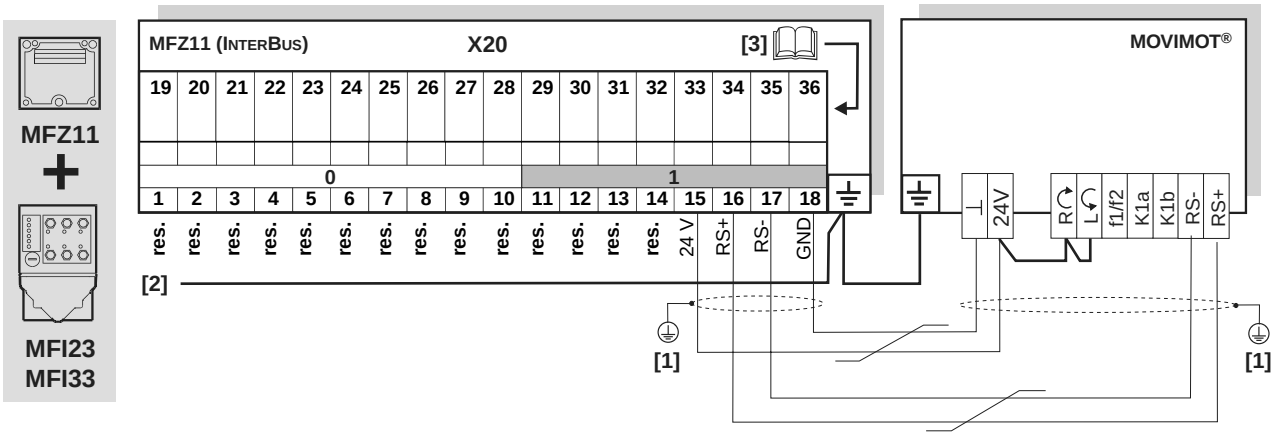
Line lengths < 1 m are only permitted using the special prefabricated IBS RL CONNECTION-LK cable bridge from Phoenix-Contact (observe the project planning and installation guidelines for rugged-line connection technology from Phoenix-Contact).

Sample topology of an InterBus design with rugged-line connection



If fiber optic cables are installed, permanent polymer fibers can be used to bridge a maximum distance of 50 m between two remote bus stations. If flexible polymer fibers are used, the maximum distance is 35 m.

Connecting MFZ11 with MOVIMOT® (in combination with MFI23 and MFI33)



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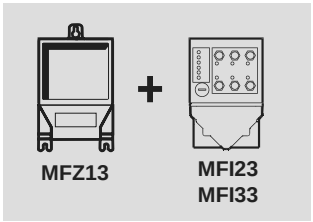
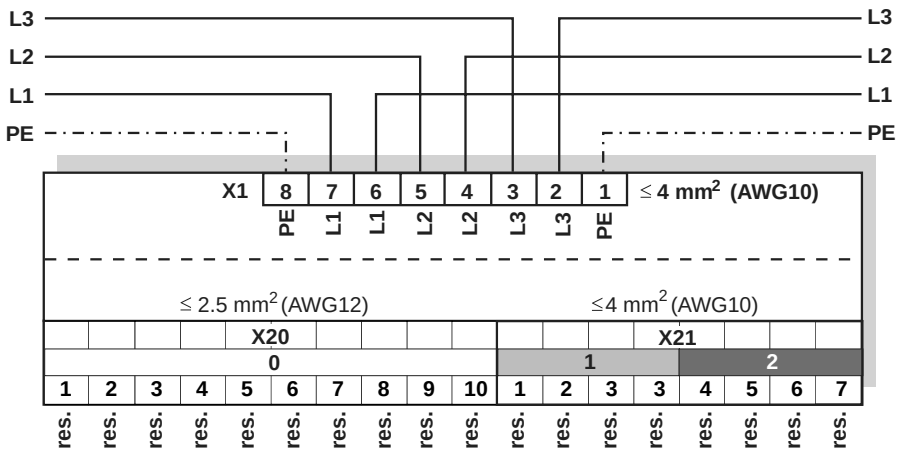
0 = Potential level 0 **1** = Potential level 1

[1] If MFZ11/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 58

Terminal assignment				
No.		**Name**	**Direction**	**Function**
X20	**1 - 14**	–	–	Reserved
	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)

Connecting field distributor MFZ13 with MFI23 and MFI33





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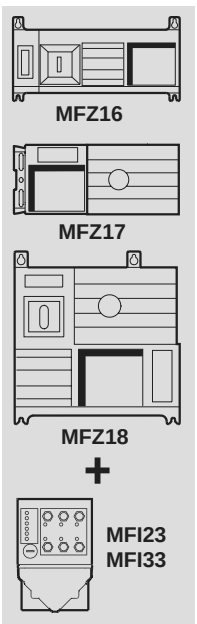
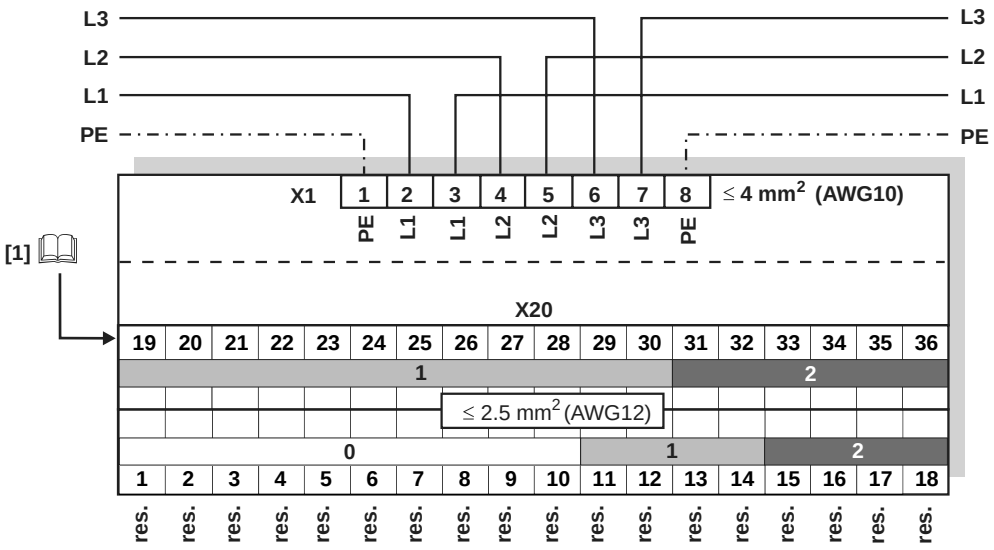
0 = Potential level 0 **1** = Potential level 1 **2** = Potential level 2

Connecting field distributors MFZ16, MFZ18 with MFI23 and MFI33





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

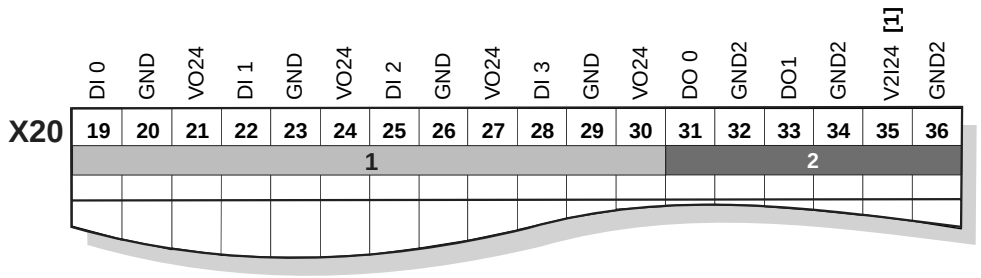
[1] 📖 Assignment of terminals 19-36 from page 58

6.5 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

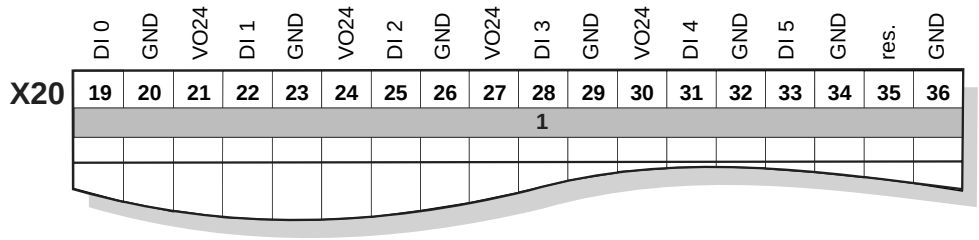
No.		Name	Direction	Function
X20	**19**	DI0	Input	Control signal of sensor 1[1)]
	20	GND	-	0V24 reference potential for sensor 1
	21	V024	Output	24 V voltage supply for sensor 1[1)]
	22	DI1	Input	Control signal of sensor 2
	23	GND	-	0V24 reference potential for sensor 2
	24	V024	Output	24 V voltage supply 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

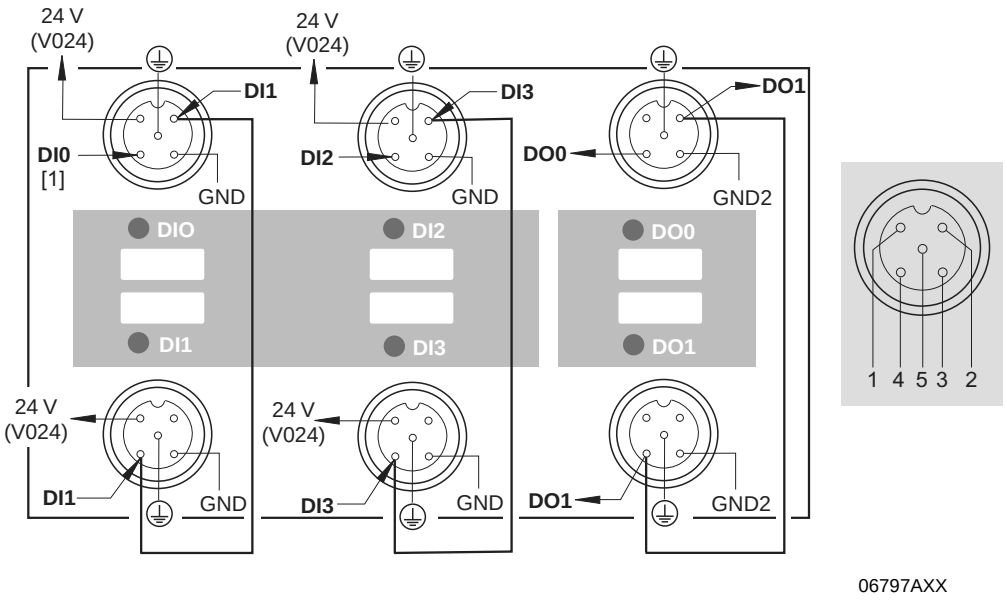
No.		Name	Direction	Function
X20	**19**	DI0	Input	Control signal of sensor 1[1)]
	20	GND	-	0V24 reference potential for sensor 1
	21	V024	Output	24 V voltage supply for sensor 1[1)]
	22	DI1	Input	Control signal of sensor 2
	23	GND	-	0V24 reference potential for sensor 2
	24	V024	Output	24 V voltage supply 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...

MF.22, MQ.22, MF.23 fieldbus interfaces 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.



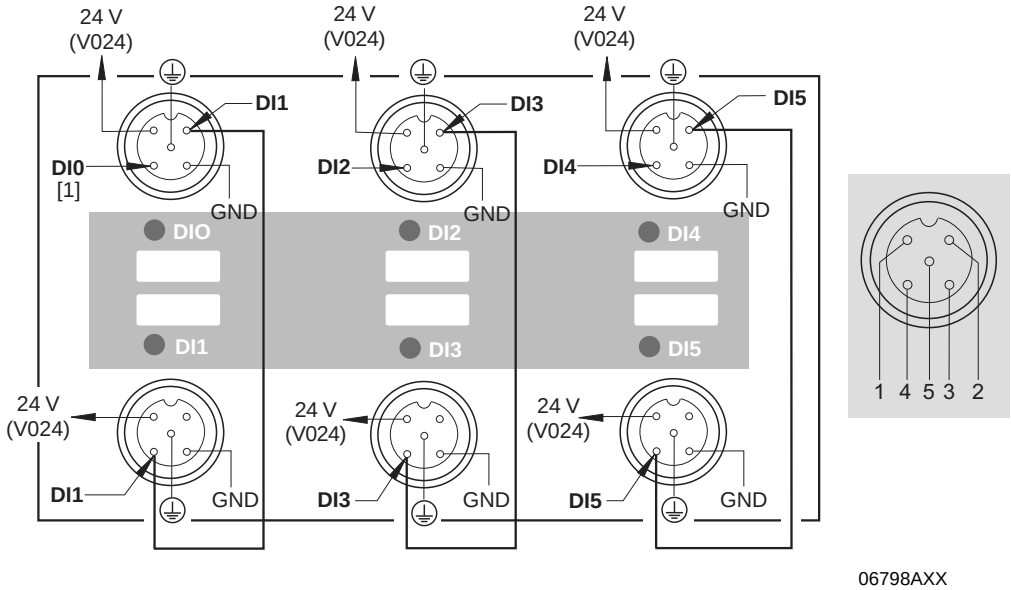
[1] Do not use DI0 in combination with field distributors MFZ26**J** and MFZ28**J**.

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

Connection via M12 connector for...

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.



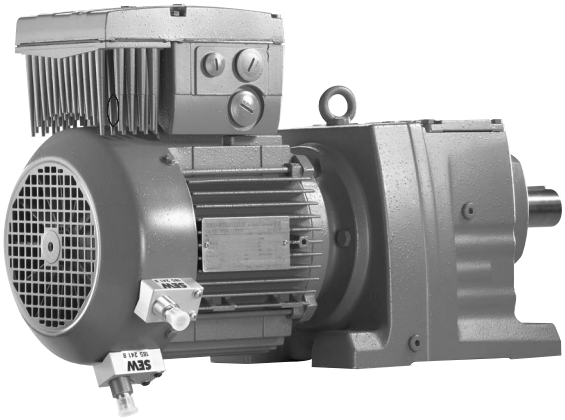
[1] Do not use DI0 in combination with field distributors MFZ26**J** and MFZ28**J**.

6.6 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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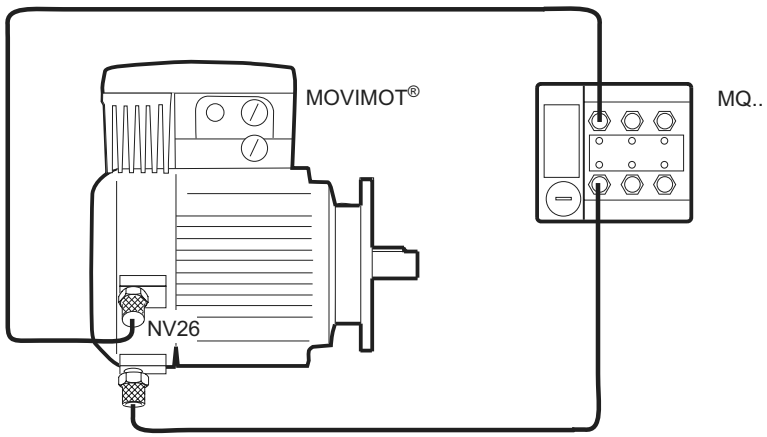
There must be a 45° angle between the sensors.

Connection

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

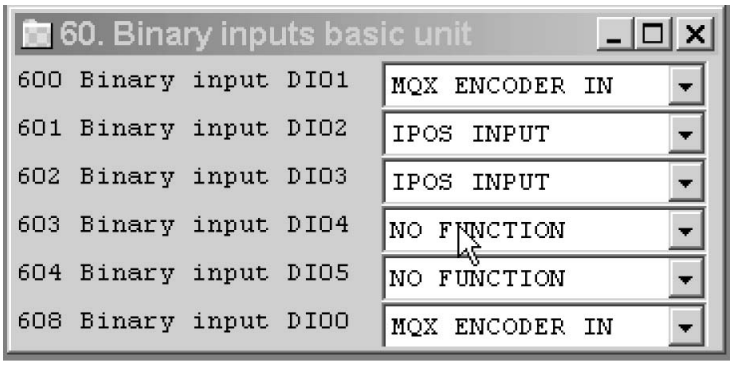


51002AXX

- 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."

6.7 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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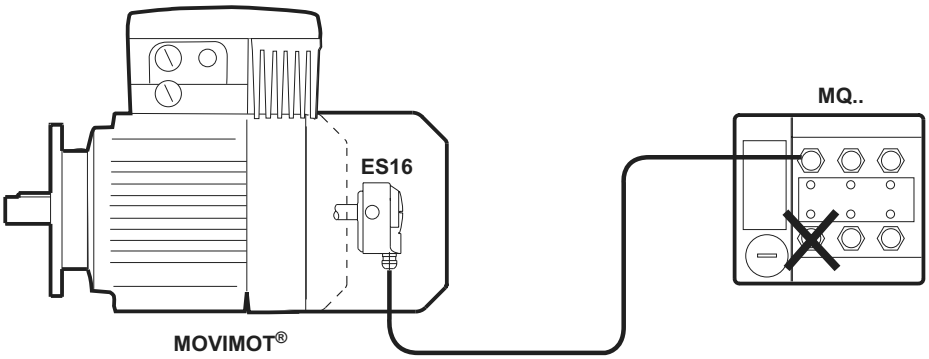
Installation in combination with fieldbus interface MQ..

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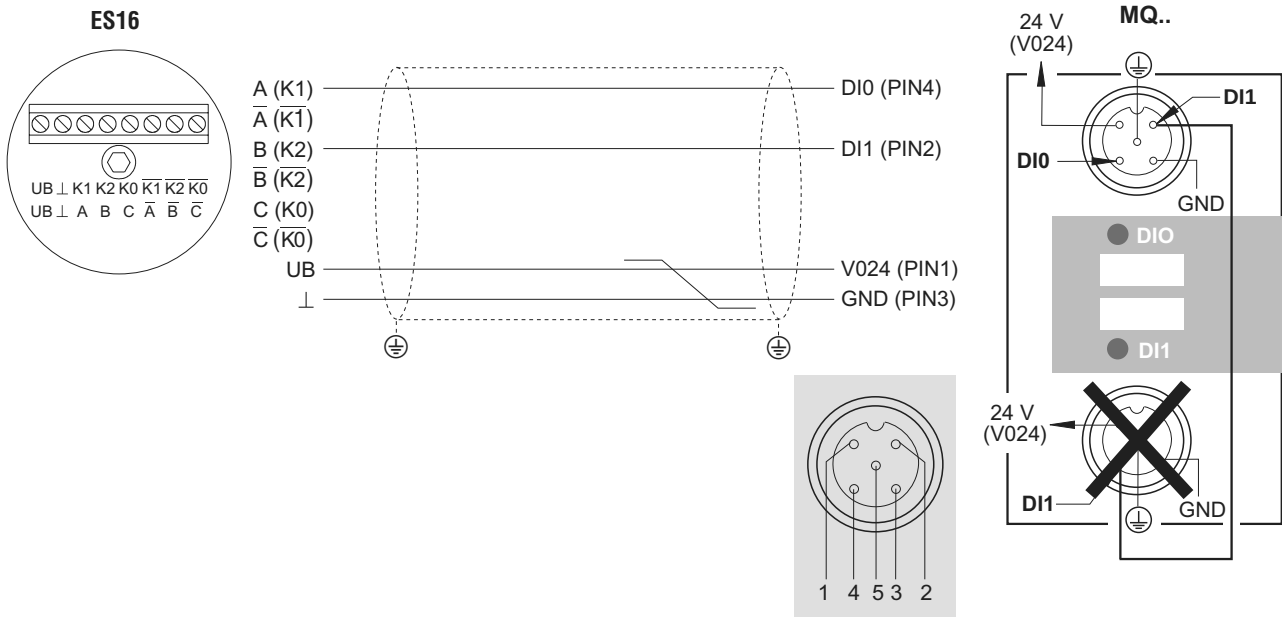
- The current position can be checked by reading variable H511 (ActPosMot).
- SEW-EURODRIVE recommends activating the encoder monitoring function using parameter "P504 Encoder monitoring motor".

Wiring diagram



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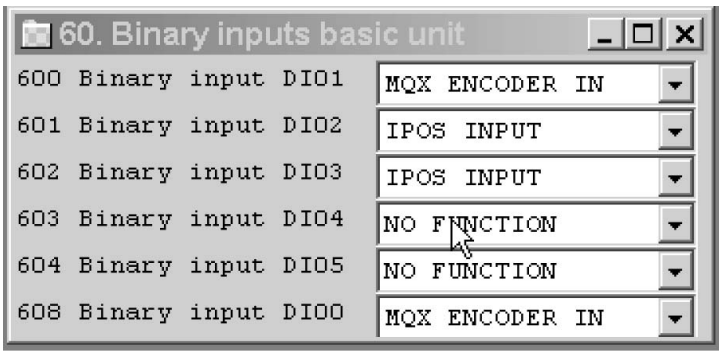
Do not assign the input socket DI1 more than once.

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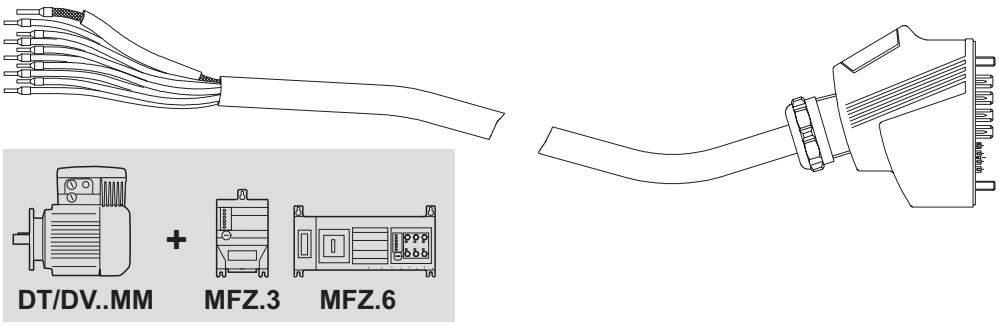
For more information, refer to the "IPOS$^{plus®}$ positioning and sequence control" manual, section "IPOS for MQX", in particular the paragraph "Proximity sensor evaluation."

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

6.8 Connecting prefabricated cables

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



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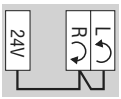
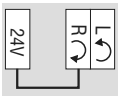
Cable assignment	
MOVIMOT® terminal	**Core color / designation**
L1	Black/L1
L2	Black/L2
L3	Black/L3
24 V	Red / 24 V
⊥	White / 0V, white / 0V
RS+	Orange/RS+
RS-	Green/RS-
PE terminal	Green/yellow + shield end

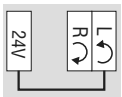
Observe the enable for the direction of rotation



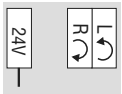
Both directions of rotation are enabled



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

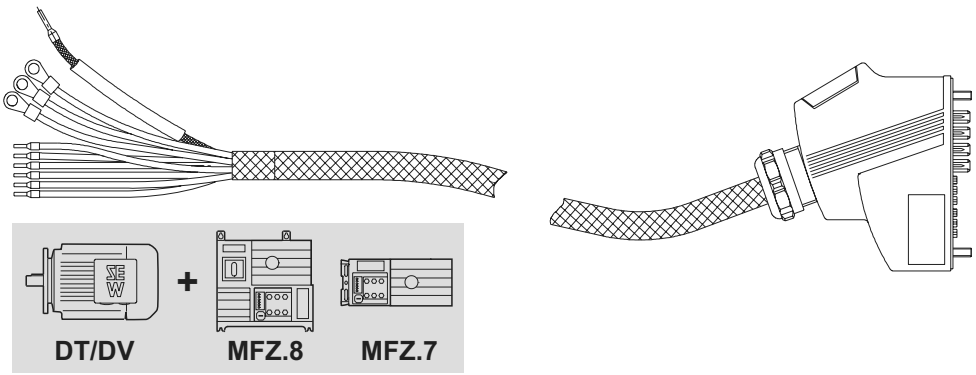


Only CCW operation is enabled; Setpoint specifications for CW rotation result in standstill of drive



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	–	–
	DFR63L4 / **BMG** / TH .	–	–
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)]

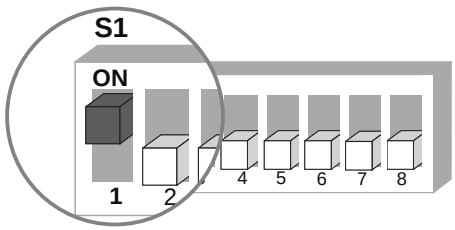
1) Combinations with increased short-term torque

7 Startup with MFI.. InterBus Interface (copper line)

7.1 Startup procedure

- We recommend turning off the DC 24 V power supply before removing/replacing the housing cover (MFI).
- Removal of the housing cover interrupts the ring structure of the InterBus. This means the entire bus system is no longer operational!
- In addition, please observe the notes in the chapter "Supplemental Field Distributor Startup Information."

1. Verify correct connection of the MOVIMOT® and InterBus connection module (MFZ11, MFZ13, MFZ16, MFZ17 or MFZ18).
2. Set DIP switch S1/1 (on MOVIMOT®) to ON (= address 1)



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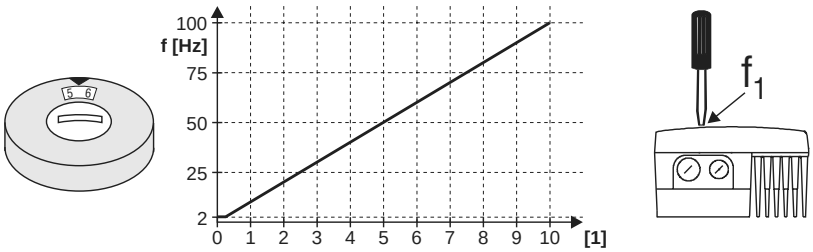
3. Use setpoint potentiometer f1 to set maximum speed



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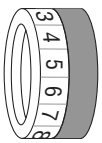
[1] Potentiometer setting

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

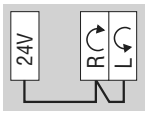
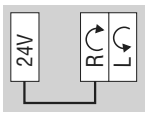
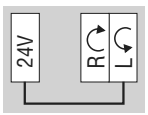
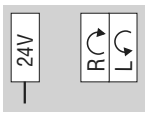
Function	Setting										
Detent setting	0	1	2	3	4	5	6	7	8	9	10
Minimum frequency fmin [Hz]	2	5	7	10	12	15	20	25	30	35	40

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 the MFI DIP switches (see "Setting DIP switches" on page 73).
9. Reinstall and secure MOVIMOT® inverter and MFI housing cover.
10. Turn on the supply voltage (DC 24 V) for the MFI InterBus interface and MOVIMOT®. The LEDs "UL" and "RD" of the MFI must now light up and the red LED "SYS-FAULT" be no longer illuminated. If this is not the case, use the LED states to locate any wiring or setting errors (page 80).
11. Configure MFI InterBus interface in the InterBus master (see "Configuring the InterBus Master" on page 74).

7.2 Setting DIP switches

MFI DIP switches 1 to 6 make it possible to set the MOVIMOT® process data width, the MFI operating mode and the physical continuation of the ring circuit.

Process data width, operating mode

The setting of the process data width for MOVIMOT® takes place with DIP switches 1 and 2. The MFI InterBus interface for MOVIMOT® supports the process data width 2 PD and 3 PD. You can select an additional word to transmit the digital I/Os via DIP switch 5 (I/O).

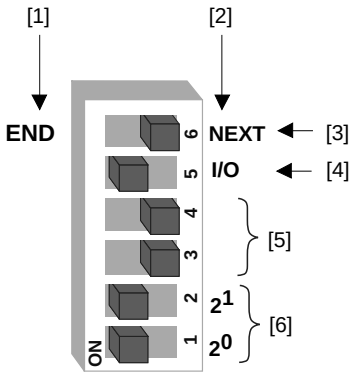
NEXT/END switch

The NEXT/END switch signals the MFI whether another InterBus module follows. Consequently, set the switch to the "NEXT" position when a continuing remote bus is connected to terminals 6 to 10. This switch must be set to "END" position if the MFI is the last module on the InterBus.

All reserved switches must be in OFF position. Else, the InterBus protocol chip will not be initialized. The MFI reports the ID code "MP_Not_Ready" (ID code 78_{hex}). In this case, the InterBus masters signal an initialization fault.

The following figure shows the SEW factory setting:

- 3 PD for MOVIMOT® + 1 word for digital I/O = 64 bit data width in InterBus
- Additional InterBus module follows (NEXT)



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[1] MFI is last InterBus module, no outgoing bus cable connected
[2] Additional InterBus module follows, continuing bus cable connected
[3] InterBus termination
[4] ON = process data width + 1 for digital I/Os
[5] Reserved, position = OFF
[6] Process data width for MOVIMOT®

InterBus data width setting variants

The following table shows the setting variants of the InterBus data width with DIP switches 1, 2 and 5

DIP 1: 2^0	DIP 2: 2^1	DIP 5: + 1 I/O	Name	Function	InterBus data width
OFF	OFF	OFF	Reserved	None	IB Init error
ON	OFF	OFF	Reserved	Not possible with MOVIMOT®	IB Init error
OFF	ON	OFF	2 PD	2 PD to MOVIMOT®	32 bit
ON	ON	OFF	3 PD	3 PD to MOVIMOT®	48 bit
OFF	OFF	ON	0 PD + DI/DO	I/O only	16 bit
ON	OFF	ON	Reserved	Not possible with MOVIMOT®	IB Init error
OFF	ON	ON	2 PD + DI/DO	2 PD to MOVIMOT® + I/O	48 bit
ON	**ON**	**ON**	**3 PD + DI/DO**	**3 PD to MOVIMOT® + I/O**	**64 bit**

7.3 Configuring the InterBus master

There are two steps involved in configuring the MFI in the InterBus master interface module using the project planning software "CMD tool" (Configuration-Monitoring-Diagnostics). The bus structure is created in the first step. Next, the devices must be described and the process data addressed.

Configuring the bus structure

The bus structure can be configured online or offline using the CMD tool "IBS CMD." In offline status, the MFI is configured using "Insert with Ident Code." The following information must be entered:

Offline configuration: Insert with Ident-Code

	Program setting:	Function / Meaning
Ident-Code:	3 decimal	Digital module with input/output data
Process data channel:	This setting depends on DIP switches 1, 2, and 5 on the MFI	
	32 bit	2 PD
	48 bit	3 PD or 2 PD + I/O
	64 Bit (delivery condition)	3 PD + I/O
Type of station:	Remote bus station	

Online configuration: Reading in configuration frame

The InterBus system can also be fully installed first, with all MFI interface modules wired up, and then the DIP switches can be set. Next, the CMD tool can be used to read in the entire bus structure (configuration frame). All MFIs are detected automatically with their data width settings.

Check the setting of MFI DIP switches 1, 2 and 5 with a process data channel length of 48 bits because this process data length is used both for the 3 PD and the 2 PD + DI/DO configuration.
The MFI appears as a digital I/O module (type DIO) after the read-in procedure is complete.

7.4 Creating a process data description

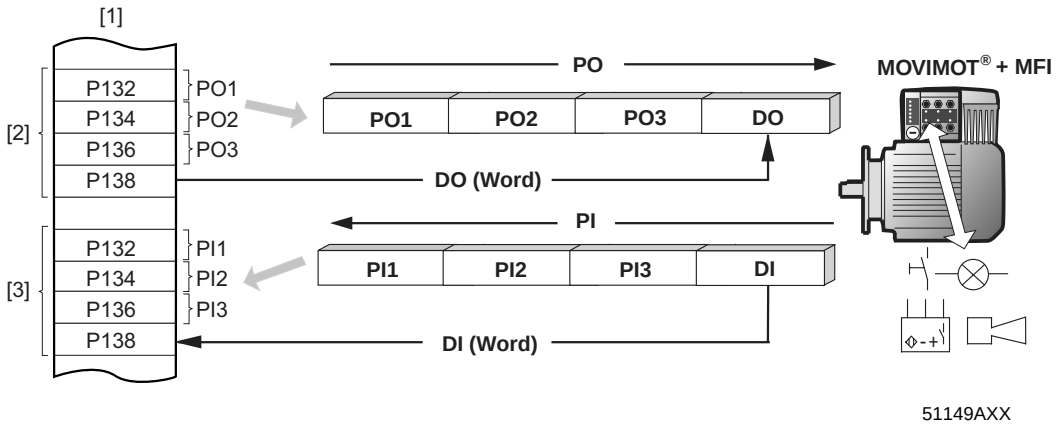
The CMD tool usually provides a default description for all MFI process data. You can use a start address for the input and output area of the control. In this variant, the addresses of the digital inputs and outputs are located directly after the MOVIMOT® process data addresses and could be in the (analog) periphery range of the control. In this case, the reserved bits of the I/O word take up unnecessary memory in the control. A corresponding process data description makes it possible to mask out the reserved bits and assign each process data word its own address.

Example 1: Default process data description

The following table shows the simplest version of the process data description. The four process data words of the MFI indicate that the process data configuration in question is that for 3 PD+DI/DO. The start address P132 will now be assigned separately for the input and output area. All process data words are now lined up without any spaces between them.

Station name	ID	No	Process data name	I/O	Length	Byte	Bit	Assignment
MOVIMOT® + MFI	3	1.0	MFI 21 IN	E	64	0	0	P132
MOVIMOT® + MFI	3	1.0	MFI21 OUT	A	64	0	0	P132

The following figure shows the representation of the process data in the address area of the InterBus master module.



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[1] Address range of the Interbus master	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

You can now access the process data in the control as follows:

Writing to PO1..3: T PW 132, T PW 134, T PW 136

Reading of PI1..3: T PW 132, T PW 134, T PW 136

Setting the outputs: T PW 138

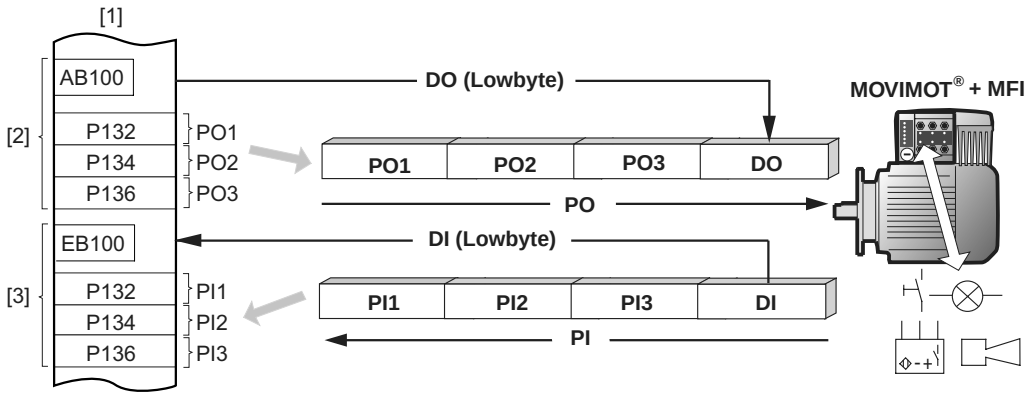
Reading the inputs: L PW 138

Example 2: Separation and optimization of process data for MOVIMOT® and DI/DO

It is much more efficient to separate the MOVIMOT® process data and the I/O data of the digital inputs and outputs that should be located in the bit-addressable area of the controller. The following table shows how the separation is made.

Station name	ID	No	Process data name	I/O	Length	Byte	Bit	Assign-ment
MOVIMOT® + MFI	3	1.0	MFI 21 IN	E	64	0	0	P132
MOVIMOT® + MFI	3	1.0	MFI-PE1..3	E	48	0	0	
MOVIMOT® + MFI	3	1.0	MFI-DI	E	16	7	0	P100
MOVIMOT® + MFI	3	1.0	MFI 21 OUT	A	64	0	0	P132
MOVIMOT® + MFI	3	1.0	MFI-PO1..3	A	48	0	0	
MOVIMOT® + MFI	3	1.0	MFI-DO	A	16	7	0	P100

The following figure shows the representation of the process data in the address area of the InterBus master module for this optimized design.



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[1] Address range of the Interbus master	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

You can now access the process data in the control as follows:

Writing to PO1..3: T PW 132, T PW 134, T PW 136

Reading of PI1..3: L PW 132, L PW 134, L PW 136

Setting outputs: AB 100 (e.g. S A 100.0)

Reading inputs: EB 100 (e.g. U E 100.0)

Example 3: Detailed process data description of the MFI

This example uses the same separation of process data for MOVIMOT® and DI/DO as example 2. Each process data word is, however, described individually. This setup significantly increases the clarity. The access to process data takes place in the same manner as in example 2.

Station name	ID	No	Process data name	I/O	Length	Byte	Bit	Assignment
MOVIMOT® + MFI	3	1.0	MFI 21 IN	E	64	0	0	
MOVIMOT® + MFI	3	1.0	MFI-PI1	E	16	0	0	P132
MOVIMOT® + MFI	3	1.0	MFI-PI2	E	16	2	0	P134
MOVIMOT® + MFI	3	1.0	MFI-PI3	E	16	4	0	P136
MOVIMOT® + MFI	3	1.0	MFI-DI	E	16	7	0	P100
MOVIMOT® + MFI	3	1.0	MFI 21 OUT	A	64	0	0	
MOVIMOT® + MFI	3	1.0	MFI-PO1	A	16	0	0	P132
MOVIMOT® + MFI	3	1.0	MFI-PO2	A	16	2	0	P134
MOVIMOT® + MFI	3	1.0	MFI-PO3	A	16	4	0	P136
MOVIMOT® + MFI	3	1.0	MFI-DO	A	16	7	0	P100

Program in control

A sample program (tailored to the configuration listed above) for controlling the MOVIMOT® unit via InterBus is available in the chapter "Sample program with fieldbus."

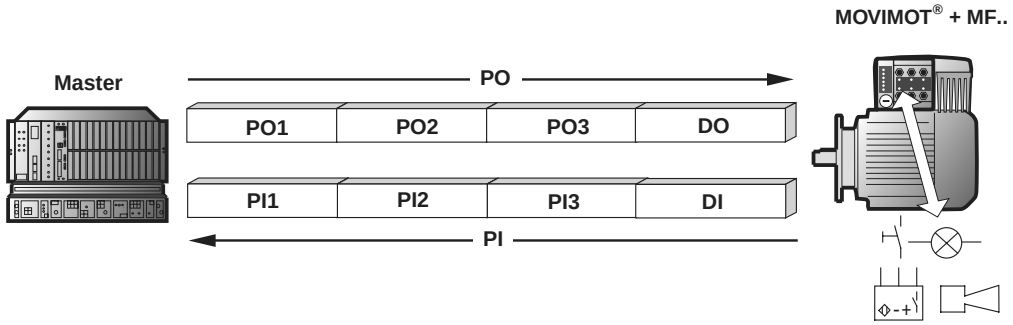
8 Functions of the MFI.. InterBus Interface (Copper Line)

8.1 Process data and sensor/actuator processing

MFI InterBus interfaces not only make it possible to control MOVIMOT® AC motors but also permit connection of sensors/actuators to four digital input terminals and two digital output terminals. An additional I/O byte is added to the InterBus protocol following the process data for MOVIMOT®. The extra digital inputs and outputs of the MFI are mapped in this I/O byte.

The coding of the process data takes place according to the uniform MOVILINK® profile for SEW drive inverters (see section MOVILINK® unit profile).

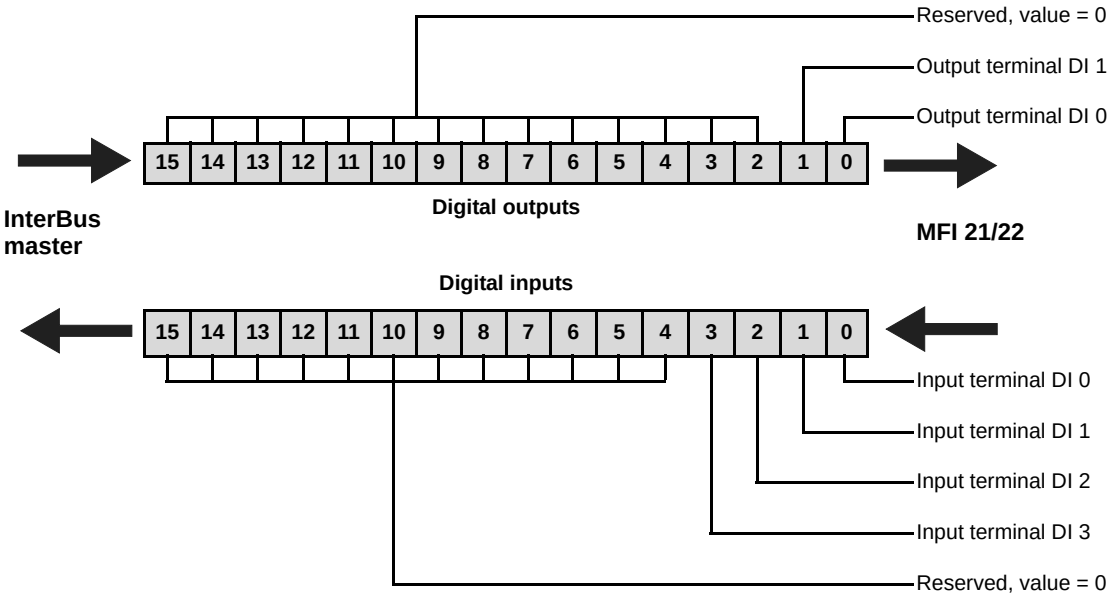
Maximum InterBus configuration "3 PD + DI/DO":

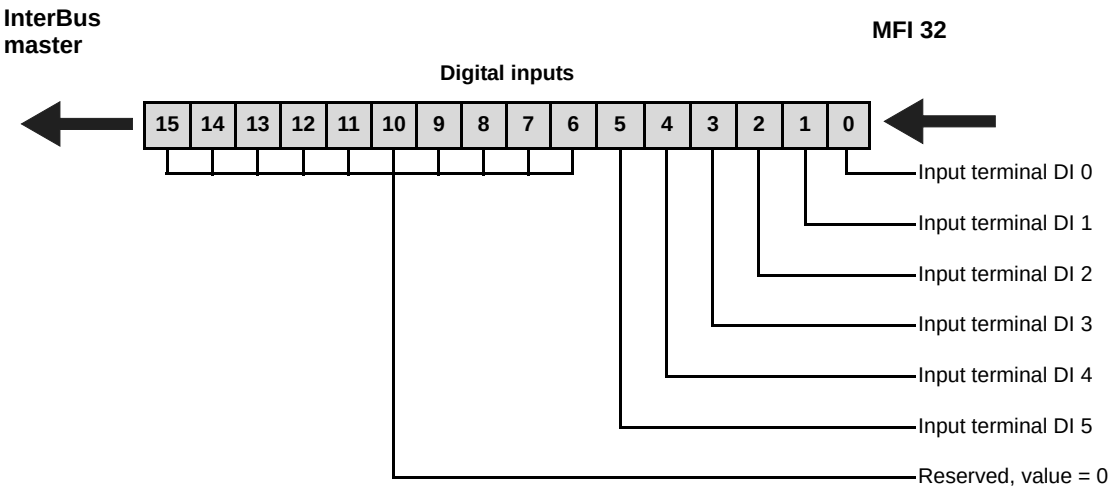


PO	Process output data	PI	Process input data
PO1	Control word	PI1	Status word 1
PO2	Speed [%]	PI2	Output current
PO3	Ramp	PI3	Status word 2
DO	Digital outputs	DI	Digital inputs

8.2 Structure of the input/output word of the MFI

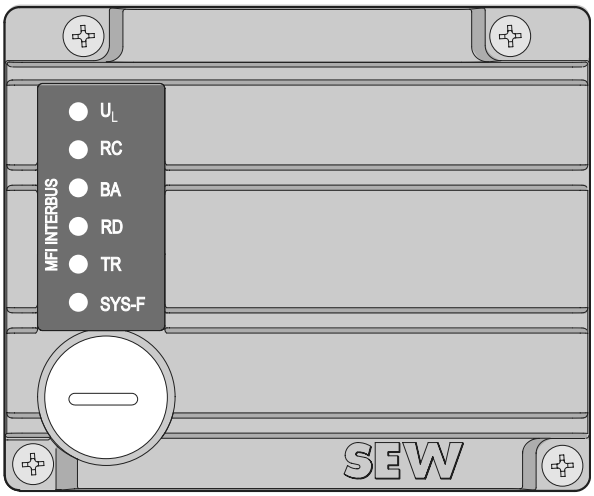
The following illustration shows the terminal information on the individual bits of the input and output word. All reserved bits can be masked out by the process data description in the InterBus CMD tool so that the memory area of the controller is not restricted unnecessarily.





8.3 Description of the LED display

The InterBus interface MFI has five LEDs for InterBus diagnostics and a further LED for displaying system errors.



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LED UL "U-Logic" (green)

State	Meaning	Remedy
On	• Supply voltage is present	–
Off	• Supply voltage is missing	• Check the DC 24 V voltage supply and wiring of the MFI

LED RC "Remote Bus Check" (green)

State	Meaning	Remedy
On	• Incoming remote bus connection o.k.	–
Off	• Incoming remote bus connection interrupted	• Check the incoming remote bus cable

LED BA "Bus Active" (green)

State	Meaning	Remedy
On	• Data transmission on the InterBus is active	–
Off	• No data transmission; InterBus is stopped	• Check the incoming remote bus cable • Use the diagnostic display on the master interface module to localize the error further
Flashing	• Bus active, no cyclical data transmission	–

LED RD "Remote Bus Disable" (red)

State	Meaning	Remedy
On	• Outgoing remote bus is switched off (only in case of an error).	–
Off	• Outgoing remote bus not switched off	–

LED TR "Transmit" (green)

State	Meaning	Remedy
On	• Parameter data exchange via PCP	–
Off	• No parameter data exchange via PCP	–

LED SYS-F"System error" (red)

State	Meaning	Remedy
Off	• Standard operating status of MFI and MOVIMOT®	–
flashes 1x	• MFI 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.
flashes 2x	• MOVIMOT® does not respond to setpoints from InterBus master because PO data are not enabled.	• Check DIP switches S1/1 to S1/4 in MOVIMOT® • Set RS-485 address 1 to enable the PO data.
On	• Communication link between MFI and MOVIMOT® is disrupted or interrupted.	• Check the electrical connection between MFI and MOVIMOT® (terminals RS+ and RS-) • 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

The LED "SYS-F" is generally deactivated in the PD configurations 0 PD + DI/DO and 0 PD + DI because only the I/O module function of the MFI is activated in this operating mode.

8.4 MFI system faults/MOVIMOT® faults

The communication link between MFI and MOVIMOT® is interrupted or disrupted if the MFI signals a system fault ("SYS-FAULT" LED continuously lit). This system fault is reported to the PLC as error code 91_{dec} by way of the status words of the process input data. **Since this system error 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.** Check the electrical connection of MFI 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, Bit 5 (problem) = 1 All other status information is invalid!
PI2: Current actual value	0000_{hex}	Invalid information!
PI3: Status word 2	0020_{hex}	Bit 5 (malfunction) = 1 All other status information is 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.

InterBus timeout

If the master interrupts the data transmission via InterBus, the fieldbus timeout period will start running on the MFI (default value 630 ms). If the transmission is physically interrupted, the interval is approximately 25 ms. The bus active LED "BA" lights up to signal that no InterBus data are being transmitted. 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 fieldbus timeout interval has elapsed!

InterBus master active/Control failure

The InterBus 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 InterBus master!

8.5 Diagnostics via InterBus master interface module (G4)

All generation 4 (G4) InterBus master interface modules offer extensive diagnostic options, both by way of the status and diagnostic display and within the controller. All major G4 diagnostic options are supported because the MFI is based on the InterBus protocol chip SUPI 3. Refer to the documentation for the master module for more information about diagnostics. The following table provides more detailed troubleshooting information about the most important error codes in conjunction with the MFI.

Diagnostic messages via status and diagnostics display of the G4 master components

Error name	Error code (hex)	Description	Remedy
OUT1	0C8A	Error at the outgoing MFI interface. Outgoing interface (OUT1) was activated even though no station is connected or was configured in the master.	Check the setting of DIP switch 6 (NEXT/END). If the MFI is the last station, this switch must be set to END.
DEV	0C40	Error at a station (device). The length code of the indicated MFI does not correspond with the entry in the configuration frame.	Check the setting of the DIP switches on the MFI.
DEV	0C70	Data transfer was cancelled, either because the initialization of SUPI 3 failed or the MFI is defective. This error code will also be displayed when selecting a reserved DIP switch setting!	Check the setting of the DIP switches on the MFI for validity.
PF TEN	0BB4	Error history of the last ten periphery errors (PF). The MFI signals a periphery error when a microprocessor reset has been carried out (due to EMC problems or defective hardware).	Check the wiring and shielding of the MFI. Switch on the MFI. Install a new MFI electronic unit or contact SEW if the error reoccurs.

Additional diagnostic messages are available in the description of your InterBus master module.

8.6 Process data monitoring

When the InterBus is in "RUN" status, you can analyze the process data exchange between the master module and the MFI using the status and diagnostic display of the master module in monitor mode ("MONI"). This is a simple mechanism to analyze which setpoints and actual values are to be exchanged between master and MFI. The following example demonstrates the use of this monitoring function.

Example for process data monitoring:

The MFI is operated with the "3 PD + DI/DO" configuration. The addresses were assigned as follows in the process data description:

Process output data from InterBus master to MFI (OUT):

MFI-PO 1..3: Address P132...136

MFI-DO Address P100

Process input data from MFI to InterBus master (IN):

MFI-PI 1..3: Address P132...136

MFI-DI: Address P100

You can now analyze the MFI process data as follows using the "MONI" operating mode:

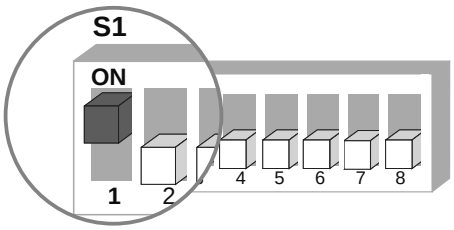
Meaning	Process Data Name	Setting of the diagnostics display: MONI (Monitor) operating mode	
		Direction	Assignment
Control word 1 for MOVIMOT®	MFI-PO1	OUT	P132
Speed setpoint [%] for MOVIMOT®	MFI-PO2	OUT	P134
Ramp [ms] for MOVIMOT®	MFI-PO3	OUT	P136
Status of MFI digital outputs	MFI-DO	OUT	P100
Status word 1 for MOVIMOT®	MFI-PI1	IN	P132
Apparent current actual value of MOVIMOT®	MFI-PI2	IN	P134
Status word 2 for MOVIMOT®	MFI-PI3	IN	P136
Status of MFI digital inputs	MFI-DI	IN	P100

9 Startup with MFI.. InterBus Interface (Fiber Optic Cable)

9.1 Startup procedure

- We recommend turning off the DC 24 V power supply before removing/replacing the housing cover (MFI).
- In addition, please observe the notes in the section "Supplemental Field Distributor Startup Information."

1. Verify correct connection of the MOVIMOT® and InterBus connection module (MFZ11, MFZ13, MFZ16, MFZ17 or MFZ18).
2. Set DIP switch S1/1 (on MOVIMOT®) to ON (= address 1)



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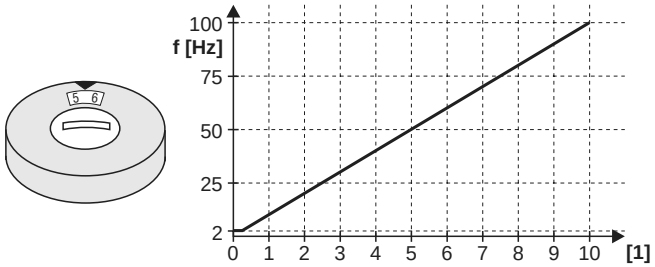
3. Use setpoint potentiometer f1 to set maximum speed



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[1] Potentiometer setting

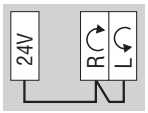
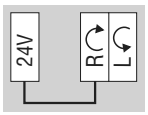
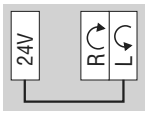
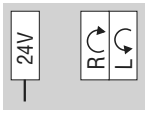
4. Reinstall screw plug of the cover (with gasket).
5. Use switch f2 to set the minimum frequency f_{min}

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 the 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 the MFI DIP switches (see "Setting MFI DIP switches" on page 87)
9. Reinstall and secure MOVIMOT® inverter and MFI housing cover.
10. Turn on the supply voltage (DC 24 V) for the MFI InterBus interface and MOVIMOT®. The LEDs "UL" and "RD" of the MFI must now light up and the red LED "SYS-FAULT" be no longer illuminated. If this is not the case, wiring or setup mistakes can be localized using the LED states (see the section "Function of MFI.. InterBus interface (copper line) – Meaning of the LED display").
11. Configuring the MFI InterBus interface in the InterBus master (see "Configuring the InterBus Master").

9.2 Setting DIP switches

The MOVIMOT® process data width and MFI operating mode can be set with MFI DIP switches 1 to 8.

Process data width, operating mode

The setting of the process data width for MOVIMOT® takes place with DIP switches 1 and 2. The MFI InterBus interface for MOVIMOT® supports the process data widths 2 PD and 3 PD. You can select an additional word to transmit the digital I/Os via DIP switch 7 (I/Os).

Baud rate

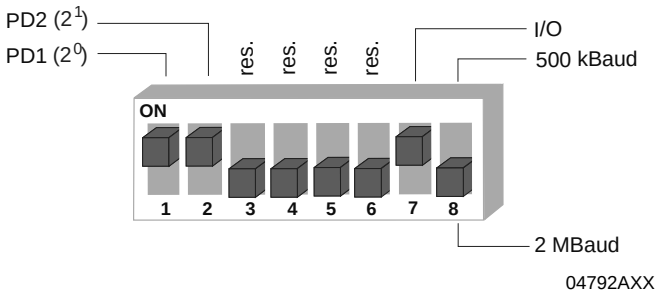
The baud rate is set using DIP switch 8. **It is important that all bus stations are set to the same baud rate!**

Continuation of the ring circuit NEXT/END

The MFI module with fiber optic cable automatically recognizes whether it is the last station on the InterBus. Physical continuation of the ring circuit is not possible.

The following figure shows the SEW factory setting:

- 3 PD for MOVIMOT® + 1 word for digital I/O = 64 bit data width in InterBus
- Baud rate = 2 MBaud



InterBus data width setting variants

The following table shows the setting variants of the InterBus data width with DIP switches 1, 2 and 7

DIP 1: 2^0	DIP 2: 2^1	DIP 7: +1 I/O	Name	Function	InterBus data width
OFF	OFF	OFF	Reserved	None	IB Init error
ON	OFF	OFF	Reserved	Not possible with MOVIMOT®	IB Init error
OFF	ON	OFF	2 PD	2 PD to MOVIMOT®	32 bit
ON	ON	OFF	3 PD	3 PD to MOVIMOT®	48 bit
OFF	OFF	ON	0 PD + DI/DO	I/O only	16 bit
ON	OFF	ON	Reserved	Not possible with MOVIMOT®	IB Init error
OFF	ON	ON	2 PD + DI/DO	2 PD to MOVIMOT® + I/O	48 bit
ON	**ON**	**ON**	**3 PD + DI/DO**	**3 PD to MOVIMOT® + I/O**	**64 bit**

9.3 Configuring the InterBus master

There are two steps involved in configuring the MFI in the InterBus master interface module using the project planning software "CMD tool" (Configuration-Monitoring-Diagnostics). The bus structure is created in the first step. Next, the devices must be described and the process data addressed.

Configuring the bus structure

The bus structure can be configured online or offline using the IBS CMD CMD-tool. In offline status, the MFI is configured using "Insert with Ident Code." The following information must be entered:

Offline configuration: Insert with Ident-Code

	Program setting:	Function / Meaning
Ident-Code:	3 decimal	Digital module with input/output data
Process data channel:	This setting depends on DIP switches 1, 2, and 7 on the MFI	
	32 bit	2 PD
	48 bit	3 PD or 2 PD + I/O
	64 Bit (delivery condition)	3 PD + I/O
Type of station:	Remote bus station	

Online configuration: Reading the configuration frame

The InterBus system can also be fully installed first, with all MFI interface modules wired up, and then the DIP switches can be set. Next, the CMD tool can be used to read in the entire bus structure (configuration frame). All MFIs are detected automatically with their data width settings.

Check the setting of MFI DIP switches 1, 2 and 7 with a process data channel length of 48 bits because this process data length is used both for the 3 PD and the 2 PD + DI/DO configuration. The MFI appears as a digital I/O module (type DIO) after the read-in procedure is complete.

9.4 Creating a process data description

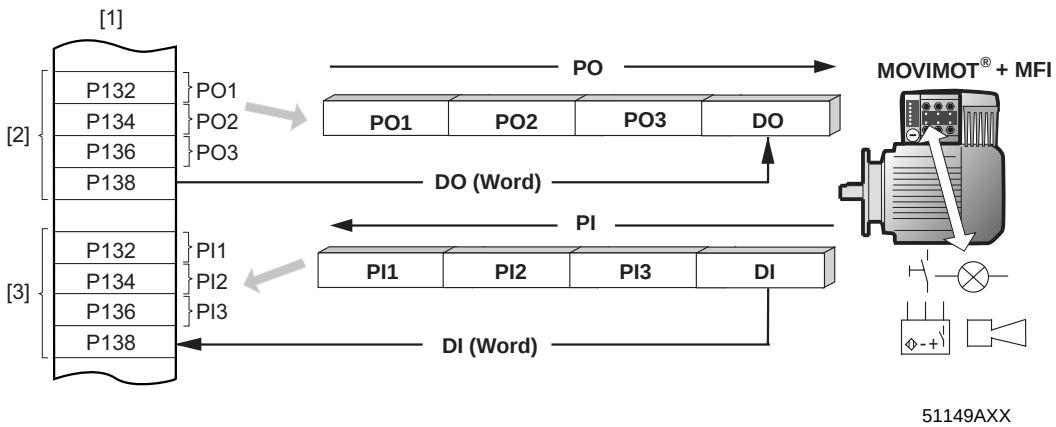
The CMD tool usually provides a default description for all MFI process data. You can use a start address for the input and output area of the control. In this variant, the addresses of the digital inputs and outputs are located directly after the MOVIMOT® process data addresses and could be in the (analog) periphery range of the control. In this case, the reserved bits of the I/O word take up unnecessary memory in the control. A corresponding process data description makes it possible to mask out the reserved bits and assign each process data word its own address.

Example 1: Default process data description

The following table shows the simplest version of the process data description. The four process data words of the MFI indicate that the process data configuration in question is that for 3 PD+DI/DO. The start address P132 will now be assigned separately for the input and output area. All process data words are now lined up without any spaces between them.

Station name	ID	ST-No	Process data name	I/O	Length	Byte	Bit	Assignment
MOVIMOT® + MFI	3	1.0	MFI 23 IN	E	64	0	0	P132
MOVIMOT® + MFI	3	1.0	MFI23 OUT	A	64	0	0	P132

The following figure shows the representation of the process data in the address area of the InterBus master module.



[1] Address range of the Interbus master
[2] Output addresses
[3] Input addresses

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

You can now access the process data in the control as follows:

Writing to PO1..3: T PW 132, T PW 134, T PW 136

Reading PI1..3: L PW 132, L PW 134, L PW 136

Setting outputs: T PW 138

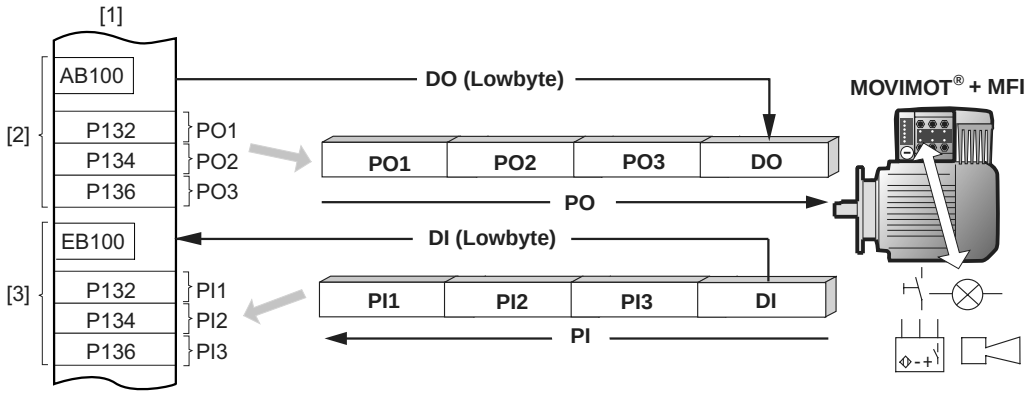
Reading inputs: L PW 138

Example 2: Separation and optimization of process data for MOVIMOT® and DI/DO

It is much more efficient to separate the MOVIMOT® process data and the I/O data of the digital inputs and outputs that should be located in the bit-addressable area of the controller. The following table shows how the separation is made.

Station name	ID	ST-No	Process data name	I/O	Length	Byte	Bit	Assignment
MOVIMOT® + MFI	3	1.0	MFI 23 IN	E	64	0	0	P132
MOVIMOT® + MFI	3	1.0	MFI-PE1..3	E	48	0	0	
MOVIMOT® + MFI	3	1.0	MFI-DI	E	16	7	0	P100
MOVIMOT® + MFI	3	1.0	MFI 23 OUT	A	64	0	0	P132
MOVIMOT® + MFI	3	1.0	MFI-PO1..3	A	48	0	0	
MOVIMOT® + MFI	3	1.0	MFI-DO	A	16	7	0	P100

The following figure shows the representation of the process data in the address area of the InterBus master module for this optimized design.



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[1] Address range of the Interbus master
[2] Output addresses
[3] Input addresses

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

You can now access the process data in the control as follows:

Writing to PO1..3: T PW 132, T PW 134, T PW 136

Reading PI1..3: L PW 132, L PW 134, L PW 136

Setting outputs: AB 100 (e.g. S A 100.0)

Reading inputs: EB 100 (e.g. U E 100.0)

Example 3: Detailed process data description of the MFI

This example uses the same separation of process data for MOVIMOT® and DI/DO as example 2. Each process data word is, however, described individually. This setup significantly increases the clarity. The process data can be accessed in the same way as in example 2.

Station name	ID	ST-No	Process data name	I/O	Length	Byte	Bit	Assign-ment
MOVIMOT® + MFI	31	1.0	MFI 23 IN	E	64	0	0	
MOVIMOT® + MFI	3	1.0	MFI-PI1	E	16	0	0	P132
MOVIMOT® + MFI	3	1.0	MFI-PI2	E	16	2	0	P134
MOVIMOT® + MFI	3	1.0	MFI-PI3	E	16	4	0	P136
MOVIMOT® + MFI	3	1.0	MFI-DI	E	16	7	0	P100
MOVIMOT® + MFI	3	1.0	MFI 23 OUT	A	64	0	0	
MOVIMOT® + MFI	3	1.0	MFI-PO1	A	16	0	0	P132
MOVIMOT® + MFI	3	1.0	MFI-PO2	A	16	2	0	P134
MOVIMOT® + MFI	3	1.0	MFI-PO3	A	16	4	0	P136
MOVIMOT® + MFI	3	1.0	MFI-DO	A	16	7	0	P100

Program in control

A sample program (tailored to the configuration listed above) for controlling the MOVIMOT® unit via InterBus is available in the chapter "Sample program with fieldbus."

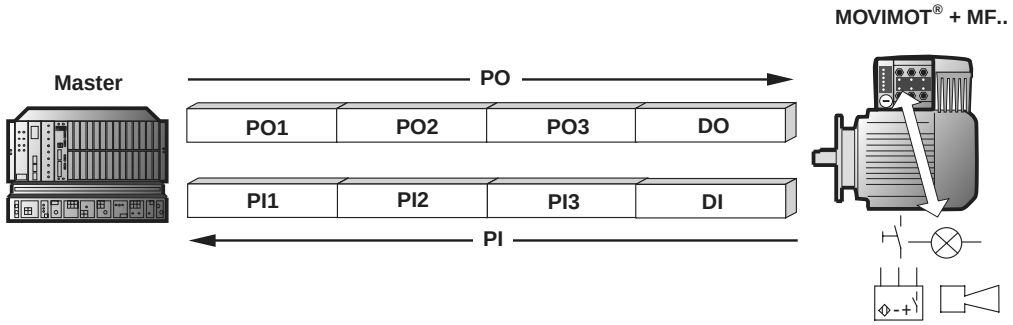
10 Functions of the MFI.. InterBus Interface (Fiber-Optic Cable)

10.1 Process data and sensor/actuator processing

MFI InterBus interfaces not only make it possible to control MOVIMOT® AC motors but also permit connection of sensors/actuators to four digital input terminals and two digital output terminals. An additional I/O byte is added to the InterBus protocol following the process data for MOVIMOT®. The extra digital inputs and outputs of the MFI are mapped in this I/O byte.

The coding of the process data takes place according to the uniform MOVILINK® profile for SEW drive inverters (see section MOVILINK® unit profile).

Maximum InterBus configuration "3 PD + DI/DO":



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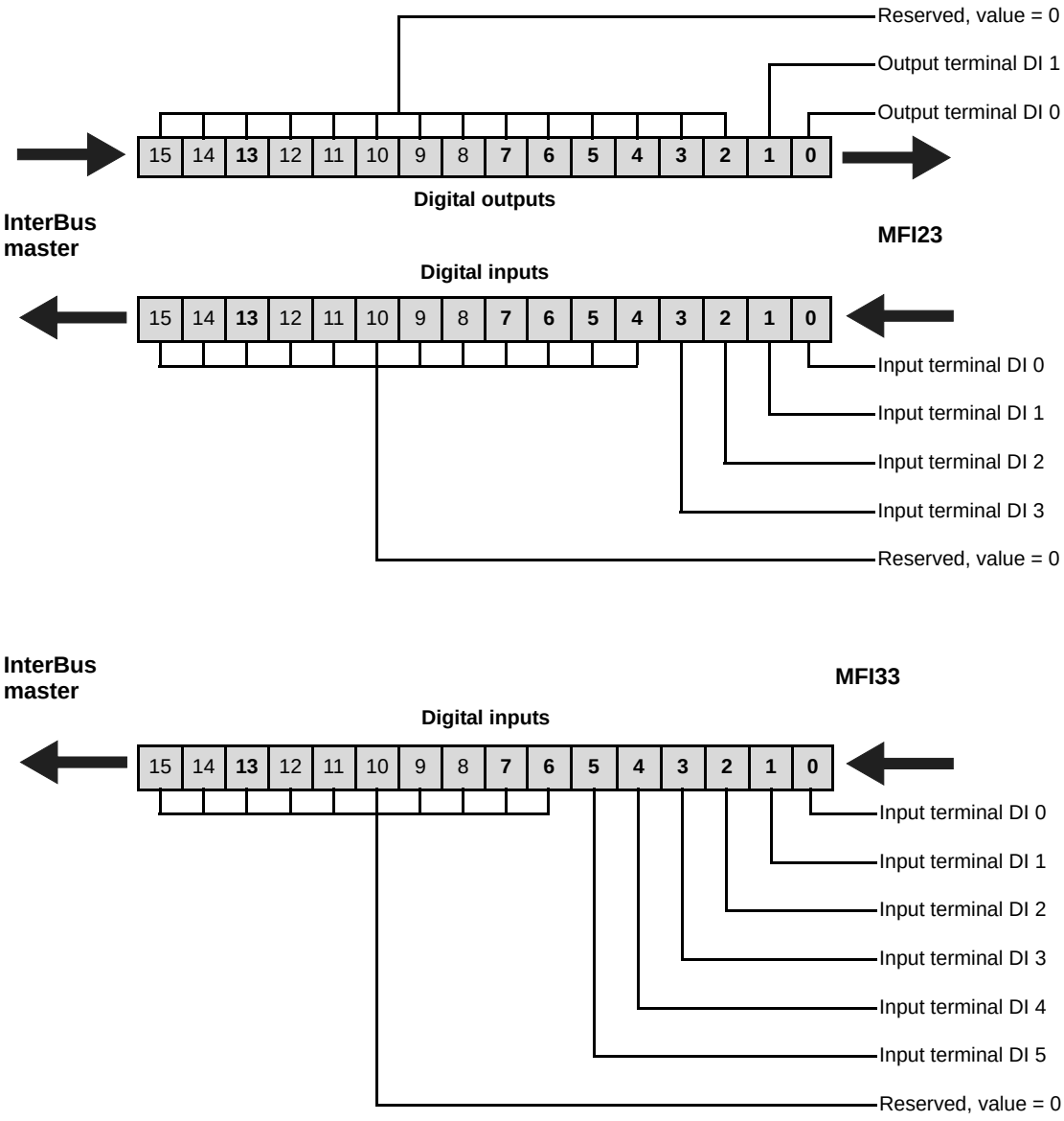
PO	Process output data	PI	Process input data
PO1	Control word	PI1	Status word 1
PO2	Speed [%]	PI2	Output current
PO3	Ramp	PI3	Status word 2
DO	Digital outputs	DI	Digital inputs

10.2 Structure of the input/output word of MFI 23 / MFI 33

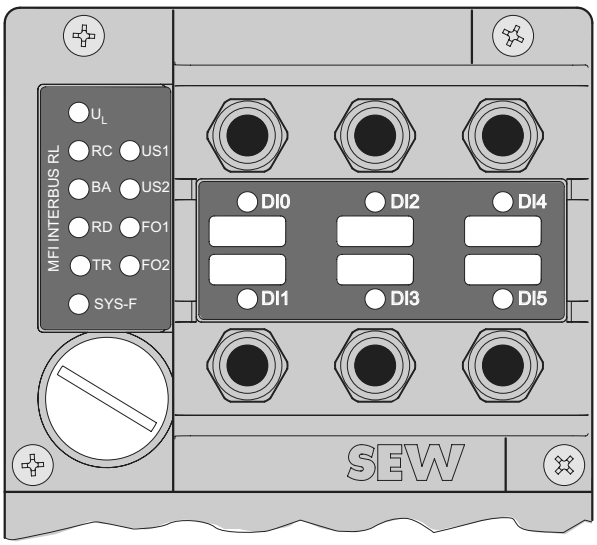


10.3 InterBus peripheral fault

The InterBus interfaces can report the following errors also as peripheral faults to the InterBus master: Error 83 "Short-circuit output" and a US1 supply voltage that is too low. The errors can be reset in the InterBus master using the CMD tool (interface group, right mouse button: Operate/Other services/Accept module error).

10.4 Description of the LED display

The InterBus interface MFI has five LEDs for InterBus diagnostics and a further LED for displaying system errors.



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LED UL "U-Logic" (green)

State	Meaning	Remedy
On	• Supply voltage is present	–
Off	• Supply voltage is missing	• Check the DC 24 V voltage supply and wiring of the MFI

LED RC "Remote Bus Check" (green)

State	Meaning	Remedy
On	• Incoming remote bus connection ok	–
Off	• Incoming remote bus connection interrupted	• Check the incoming remote bus cable

LED BA "Bus Active" (green)

State	Meaning	Remedy
On	• Data transmission on the InterBus is active	–
Off	• No data transmission; InterBus is stopped	• Check the incoming remote bus cable • Use the diagnostic display on the master interface module to localize the error further
Flashing	• Bus active, no cyclical data transmission	–

LED RD "Remote Bus Disable" (yellow)

State	Meaning	Remedy
On	• Outgoing remote bus is switched off (only in case of an error).	–
Off	• Outgoing remote bus not switched off	–

LED TR "Transmit" (green)

State	Meaning	Remedy
On	• Parameter data exchange via PCP	–
Off	• No parameter data exchange via PCP	–

LED SYS-F"System error" (red)

State	Meaning	Remedy
Off	• Standard operating status of MFI and MOVIMOT®	–
flashes 1x	• MFI 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.
flashes 2x	• MOVIMOT® does not respond to setpoints from InterBus master because PO data are not enabled.	• Check DIP switches S1/1 to S1/4 in MOVIMOT® • Set RS-485 address 1 to enable the PO data.
On	• Communication link between MFI and MOVIMOT® is disrupted or interrupted.	• Check the electrical connection between MFI and MOVIMOT® (terminals RS+ and RS-) • 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

The LED "SYS-F" is generally deactivated in the PD configurations 0 PD +DI/DO and 0 PD+DI because only the I/O module function of the MFI is activated in this operating mode.

US1 (green) Monitoring the supply voltage V_{S1}

State	Meaning
Off	U_{S1} not available
Flashing	U_{S1} below the permitted voltage range
On	U_{S1} available

US2 (green) Monitoring the supply voltage U_{S1}

State	Meaning
On	U_{S2} available
Off	U_{S2} not available or below the permitted voltage range

FO1 (yellow) Monitoring of incoming fiber optic cable distance

State	Meaning
On	Incoming fiber optic cable distance not OK or system reserve reached in controlled operation
Off	Incoming fiber optic cable distance OK

FO2 (yellow) Monitoring of outgoing fiber optic cable distance.

State	Meaning
On	Outgoing fiber optic cable distance not OK or system reserve reached in controlled operation
Off	Outgoing fiber optic cable distance OK or not assigned

10.5 MFI system faults/MOVIMOT® faults

The communication link between MFI and MOVIMOT® is interrupted if the MFI signals a system error ("SYS-FAULT" LED continuously lit). This system error is reported to the PLC as error code 91_{dec} by way of the status words of the process input data. **Since this system error 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.** Check the electrical connection of MFI and MOVIMOT®. In the event of a system error, 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, Bit 5 (problem) = 1 All other status information is invalid!
PI2: Current actual value	0000_{hex}	Invalid information!
PI3: Status word 2	0020_{hex}	Bit 5 (malfunction) = 1 All other status information is invalid!
Input byte of the digital inputs	XX_{hex}	The input information of the digital inputs is still updated!

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

InterBus timeout

If the master interrupts the data transmission via InterBus, the fieldbus timeout period will start running on the MFI (default value 630 ms). If the transmission is physically interrupted, the interval is approximately 25 ms. The LED IB DIAG (green) flashes (0.5 Hz) and signals that no InterBus data is being transmitted. MOVIMOT® decelerates immediately 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 fieldbus timeout interval has elapsed!

InterBus master active/Control failure

The InterBus 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 InterBus master!

10.6 Diagnostics via InterBus master interface module (G4)

All generation 4 (G4) InterBus master interface modules offer extensive diagnostic options, both by way of the status and diagnostic display and within the controller. All major G4 diagnostic options are supported because the MFI is based on the InterBus protocol chip SUPI 3. Refer to the documentation for the master module for more information about diagnostics. The following table provides more detailed troubleshooting information about the most important error codes in conjunction with the MFI.

Diagnostic messages via status and diagnostics display of the G4 master modules

Error name	Error code (hex)	Description	Remedy
DEV	0C40	Error at a station (device). The length code of the indicated MFI does not correspond with the entry in the configuration frame.	Check the setting of the DIP switches on the MFI.
DEV	0C70	Data transfer was cancelled, either because the initialization of SUPI 3 failed or the MFI is defective. This error code will also be displayed when selecting a reserved DIP switch setting!	Check the setting of the DIP switches on the MFI for validity.
PF TEN	0BB4	Error history of the last ten periphery errors (PF). The MFI signals a periphery error when a microprocessor reset has been carried out (due to EMC problems or defective hardware) or US2 is below the permitted voltage range.	Check the wiring and shielding of the MFI. Check the US2. Switch on the MFI. Install a new MFI electronic unit or contact SEW if the error reoccurs.

Additional diagnostic messages are available in the description of your InterBus master module.

10.7 Process data monitoring

When the InterBus is in "RUN" status, you can analyze the process data exchange between the master module and the MFI using the status and diagnostic display of the master module in monitor mode ("MONI"). This is a simple mechanism to analyze which setpoints and actual values are to be exchanged between master and MFI. The following example demonstrates the use of this monitoring function.

Example for process data monitoring

The MFI is operated with the "3 PD + DI/DO" configuration. The addresses were assigned as follows in the process data description:

Process output data from InterBus master to MFI (OUT):

MFI-PO 1..3: Address P132...136

MFI-DO Address P100

Process input data from MFI to InterBus master (IN):

MFI-PI 1..3: Address P132...136

MFI-DI: Address P100

You can now analyze the MFI process data as follows using the MONI operating mode:

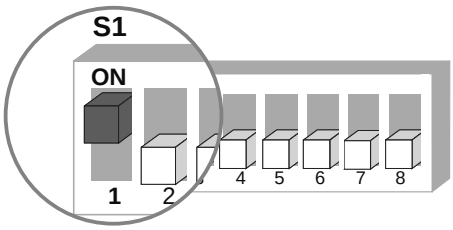
Meaning	Process data name	Setting of the diagnostics display: MONI (Monitor) operating mode	
		Direction	Assignment
Control word 1 for MOVIMOT®	MFI-PO1	OUT	P132
Speed setpoint [%] for MOVIMOT®	MFI-PO2	OUT	P134
Ramp [ms] for MOVIMOT®	MFI-PO3	OUT	P136
Status of MFI digital outputs	MFI-DO	OUT	P100
Status word 1 for MOVIMOT®	MFI-PI1	IN	P132
Apparent current actual value of MOVIMOT®	MFI-PI2	IN	P134
Status word 2 for MOVIMOT®	MFI-PI3	IN	P136
Status of MFI digital inputs	MFI-DI	IN	P100

11 Startup with MQI.. InterBus interface (copper line)

11.1 Startup procedure

- We recommend turning off the DC 24 V power supply before removing/replacing the housing cover (MQI).
- Removal of the housing cover interrupts the ring structure of the InterBus. This means the entire bus system is no longer operational!
- In addition, please observe the notes in the chapter "Supplemental Field Distributor Startup Information."

1. Verify correct connection of the MOVIMOT® and InterBus connection module (MFZ11, MFZ13, MFZ16, MFZ17 or MFZ18).
2. Set DIP switch S1/1 (on MOVIMOT®) to ON (= address 1)



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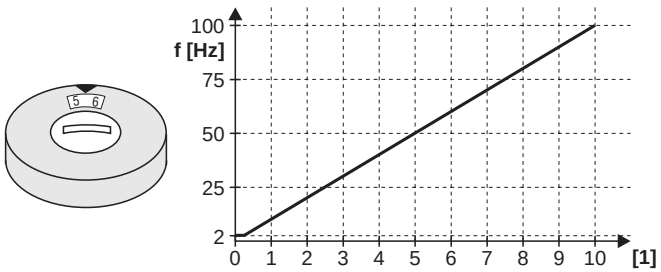
3. Use setpoint potentiometer f1 to set maximum speed



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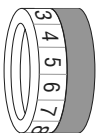
[1] Potentiometer setting

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

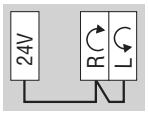
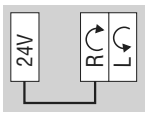
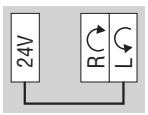
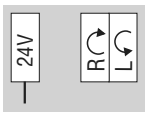
Switch f2											
Detent setting	0	1	2	3	4	5	6	7	8	9	10
Minimum frequency f_{min} [Hz]	2	5	7	10	12	15	20	25	30	35	40

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.



Switch t1											
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

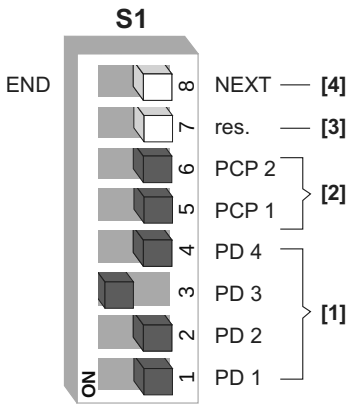
7. Check whether the requested direction of rotation has been enabled (on MOVIMOT®).

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 DIP switches (see page 102).
9. Reinstall and secure MOVIMOT® inverter and MQI housing cover.
10. Turn on the supply voltage (DC 24 V) for the MQI InterBus interface and MOVIMOT®. The LEDs "UL" and "RD" of the MQI must now light up and the red LED "SYS-FAULT" be no longer illuminated. If this is not the case, wiring or setup mistakes can be localized with reference to the LED states (see the section "Function of MQI InterBus Interface (Copper Line), Meaning of the LED display").
11. Configuring the MQI InterBus interface in the InterBus master (see page 104).

11.2 Set the MQI InterBus DIP switch

The following figures shows the factory setting for the MQI DIP switch:



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[1] Process data width setting
[2] PCP length setting
[3] Reserved, position = OFF
[4] Next/End switch

Setting the process data width

DIP switches S1/1 to S1/4 are used to set the process data width up to a length of ten words (see the following table). The process data is used to control the MOVIMOT® connected to the MQI. Control and status information is exchanged via the process data channel. The number of process data words used depends on your IPOS application. All data is processed by IPOS.

S1/1 2^0	S1/2 2^1	S1/3 2^2	S1/4 2^3	Name	Function	InterBus data width
OFF	OFF	OFF	OFF	Reserved	None	IB Init error
ON	OFF	OFF	OFF	1PD	1 PD to MQI	16 bit
OFF	ON	OFF	OFF	2PD	2 PD to MQI	32 bit
ON	ON	OFF	OFF	3PD	3 PD to MQI	48 bit
OFF	**OFF**	**ON**	**OFF**	**4PD**	**4 PD to MQI**	**64 bit**
ON	OFF	ON	OFF	5PD	5 PD to MQI	80 bit
OFF	ON	ON	OFF	6PD	6 PD to MQI	96 bit
ON	ON	ON	OFF	7PD	7 PD to MQI	112 bit
OFF	OFF	OFF	ON	8PD	8 PD to MQI	128 bit
ON	OFF	OFF	ON	9PD	9 PD to MQI	144 bit
OFF	ON	OFF	ON	10PD	10 PD to MQI	160 bit

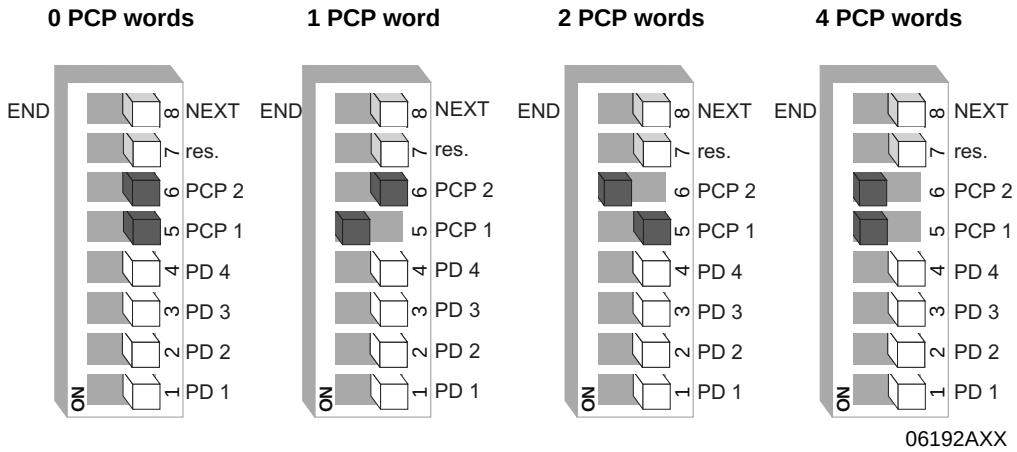
Setting the PCP length

You can use switches S1/5 to S1/6 to set the PCP length. PCP is the InterBus parameter channel and is used to set the parameters for MQI and MOVIMOT®.

PCP channel

The PCP channel can be set to 0 to 4 words. At least one word must be set to enable parameter data exchange. Higher settings increase the transmission speed.

The following figure shows possible settings for the PCP channel:



The MQI supports a maximum data width of 10 words. The valid settings are shown in the following table:

Number of process data words	0 PCP words	1 PCP word	2 PCP words	4 PCP words
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

= valid setting

Note: De-energize the MQI before you change the DIP switch settings. The settings of DIP switches S1/1 through S1/6 only become effective when the drive inverter is initialized.

If the settings of the DIP switches S1/1 to S1/6 are invalid, the MQI outputs the ID code "Microprocessor not ready" (38h).

NEXT/END switch

Switch S1/8 specifies whether another station is available on InterBus (OFF=NEXT) or whether the MQI is the last station (ON=END).

11.3 Configuring the DP master

There are two steps involved in configuring the MQI in the InterBus master interface module using the project planning software "CMD tool" (Configuration Monitoring Diagnostics). The bus structure is created in the first step. Next, the process data must be described and addressed.

Configuring the bus structure

The bus structure can be configured online or offline using the CMD tool "IBS CMD." In offline status, the MQI is configured using "Insert with Ident Code." The following information must be entered:

Offline configuration: Insert with Ident Code

	Program setting	**Function / meaning**
Ident code	3 decimal	Digital module with input/output data
Process data channel	16 bit	1 PD
	32 bit	2 PD
	48 bit	3 PD
	64 bit	4 PD
	80 bit	5 PD
	96 bit	6 PD
	112 bit	7 PD
	128 bit	8 PD
	144 bit	9 PD
	160 bit	10 PD
Ident code	227 decimal	Drivecom 1 PCP word
Process data channel	16 bit	1 PD + 1 word PCP
	32 bit	2 PD + 1 word PCP
	48 bit	3 PD + 1 word PCP
	64 bit	4 PD + 1 word PCP
	80 bit	5 PD + 1 word PCP
	96 bit	6 PD + 1 word PCP
	112 bit	7 PD + 1 word PCP
	128 bit	8 PD + 1 word PCP
	144 bit	9 PD + 1 word PCP
Ident code	224 decimal	Drivecom 2 PCP words
Process data channel	16 bit	1 PD + 2 words PCP
	32 bit	2 PD + 2 words PCP
	48 bit	3 PD + 2 words PCP
	64 bit	4 PD + 2 words PCP
	80 bit	5 PD + 2 words PCP
	96 bit	6 PD + 2 words PCP
	112 bit	7 PD + 2 words PCP
	128 bit	8 PD + 2 words PCP

	Program setting	Function / meaning
Ident code	225 decimal	Drivecom 4 PCP words
Process data channel	16 bit	1 PD + 4 words PCP
	32 bit	2 PD + 4 words PCP
	48 bit	3 PD + 4 words PCP
	64 bit	4 PD + 4 words PCP
	80 bit	5 PD + 4 words PCP
	96 bit	6 PD + 4 words PCP
Type of station	Remote bus station	

Online configuration: Reading in configuration frame

The InterBus system can also be fully installed first, with all MQI interface modules wired up, and then the DIP switches can be set. Next, the CMD tool can be used to read in the entire bus structure (configuration frame). All MQIs are detected automatically with their data width settings.

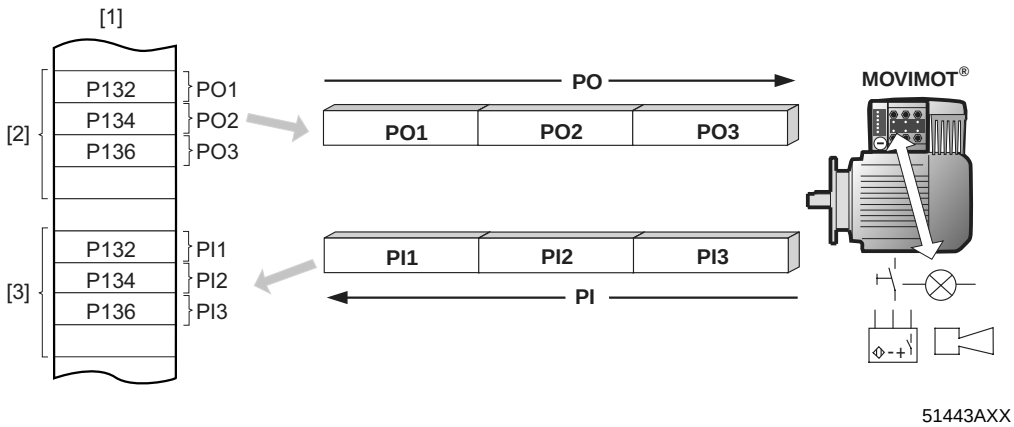
11.4 Creating a process data description

The CMD tool always provides a default description for all MQI process data. You can use a start address for the input and output area of the control.

The following table shows the simplest version of the process data description for three process data words without PCP:

Station name	ID	ST-No	Process data name	I/O	Length	Byte	Bit	Assignment
MOVIMOT® +MQI	3	1.0	MQI IN	E	48	0	0	P132
MOVIMOT® +MQI	3	1.0	MQI OUT	A	48	0	0	P132

The following figure shows the representation of the process data in the address area of the InterBus master module.



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PI Process input data
PO Process output data
[1] Address range of the InterBus master
[2] Output addresses
[3] Input addresses

12 Functions of MQI InterBus Interface MQI (Copper Line)

Intelligent M**Q**I InterBus modules (as well as the M**F**I modules) make for a convenient fieldbus connection of 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 unit 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 MQI control program.

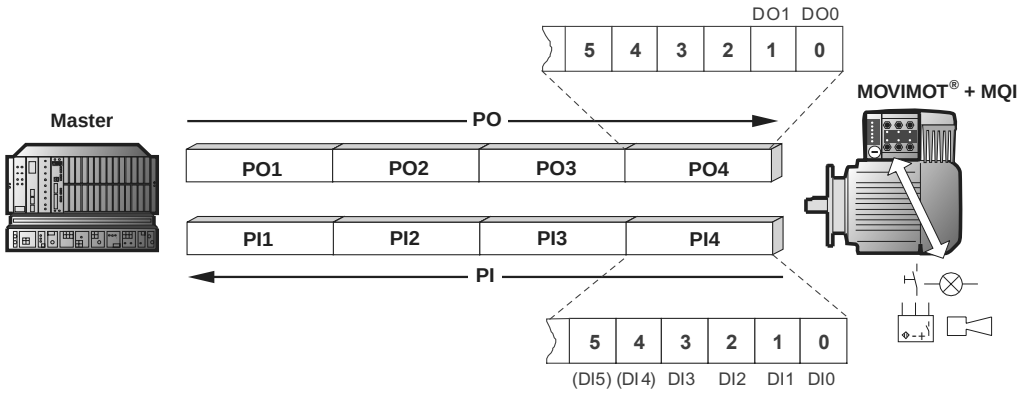
The control functionality of the MQI modules is enabled with IPOS$^{plus®}$. The diagnostics and programming interface (under the screw plug on the front) of the modules provides access to the integrated IPOS control. Option UWS21B or USB11A is used for connection to a PC. Programming takes place using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

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

12.1 Default program

The M**Q**I modules are supplied as standard with an IPOS program, which simulates the functionality of the M**F**I 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 chapter "MOVILINK® Unit Profile"). The I/Os of the MQI modules are transmitted in the fourth word.



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Error response

An interruption of the connection between MQI module and MOVIMOT® results in a 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 MQI 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.

12.2 Control via InterBus

Data is exchanged between the InterBus master and MQI using the peripheral area. The process data is stored as blocks in this range, e.g. PAW 306 - PAW 308 for the process output data or PEW 306 - PEW 308 for the process input data.

12.3 The PCP interface

The MQI fieldbus interfaces offer a standardized interface for setting parameters using the "Peripherals Communication Protocol" (PCP). This communication channel gives you full access to the parameters of the MQI and the drive parameters of the MOVIMOT® connected to the MQI.

Basic overview

The PCP channel of the MQI must be set to one, two or four words (see the chapter "Setting the DIP Switches") to access the MQI or MOVIMOT® parameter values. The speed of access to parameter values via the PCP channel is controlled with the number of PCP words. The PCP interface for MQI is implemented with PCP version 3.0.

The PCP services

The following PCP services are used for parameter setting:

- Initiate
- Read
- Write
- Abort

Refer to the user manual for your InterBus interface module for a detailed description of the PCP services.

Establishing the communication connection with "Initiate"

The "Initiate" PCP service establishes a communication link for parameter setting between an InterBus interface module and the MQI. Communication is always established by the InterBus interface module.

When the connection is being established, various declarations concerning the communication connection are checked, such as supported PCP services, data blocks, etc. After connection has been established, MQI answers with a positive Initiate-Response. If connection could not be established, then the arrangements for the communication link between the InterBus interface module and MQI do not match. MQI answers with "Initiate-Error-Response."

In this case, compare the configured list "Communication relations of the InterBus interface module with the list for MQI. Any attempt to re-establish an already existing communication link generally results in an abort. The communication link is then dropped, which means the "Initiate" PCP service has to be run for a third time to re-establish the communication connection.

Disconnecting the the communication connection with "Abort"

The "Abort" PCP service disconnects an existing communication link between the InterBus interface module and MQI. "Abort" is an unconfirmed PCP service that can be triggered either from the InterBus interface module or from MQI.

Reading parameters values with "Read"

The PCP service "Read" is used to grant the InterBus interface module read access to all communication objects (parameters) of the MQI or to a connected drive inverter. A detailed list of all MQI parameters as well as their coding is available in the chapter "Parameter List."

Writing parameter values with "Write"

The PCP service "Write" is used to grant the InterBus interface module write access to all parameters of the MQI or to a connected drive inverter. If a parameter is accessed incorrectly (e.g. written value is too high), the MQI generates a "Write Error Response" with exact information on the cause of the error.

Parameters in the object list

With the PCP services "Read" and "Write", the InterBus interface module can access all parameters defined in the MQI's object list. All parameters of the fieldbus interface accessible via the bus system are defined as communications objects in the MQI object list. All objects in the static object list are addressed using indices. The following tables shows the structure of the object list for MQI.

The index range is divided into three logical sections. The MQI parameters are address using indices 8300_{dec} to 8313_{dec}. Refer to section "Parameter List" for details on the parameter index. Indices below 8300_{dec} can be used to reach parameters included in the object lists or to address parameters from one of the MOVIMOT® units connected to the MQI.

Parameter index (decimal)	Designation of the communications object
8288	Variable data channel with acyclic routing (MQI and parameters of the connected drive inverters can be reached)
8296	Download parameter block
8297	Last PCP index
8299	Acyclic MOVILINK® parameter channel (only MQI parameters can be reached)
8300-8313	MQI parameters
8314-9999	MQI parameters or parameters from one of the MOVIMOT® units connected to the MQI that can be addressed via object 8288.
> 10000	Table, program and variable memory of MQI or one of the MOVIMOT® units connected to the MQI. These parameters can be addressed with object 8288.

Object description of MQI or drive parameter

The parameters of the connected MOVIMOT® units are described in section "Parameter List." As well as the parameter index, this gives you additional information about coding, the range of values and the meaning of the parameter data. The object description in the object list is identical for all drive parameters. Even parameters that can only be read receive the attribute Read all/Write all in the object list because the MOVIMOT® performs the corresponding check itself and provides a return code, if necessary. The following table shows the object description for all drive parameters.

Index:	**8300 to 8313**
Object code	7 (simple variable)
Data type index	10 (octet string)
Length	4
Local address	
Password	
Access groups	
Access rights	Read all / Write all
Name [16]	-
Extension length	-

Object "Variable data channel with acyclic routing"

This object lets you address all MQI and MOVIMOT® parameters. The object contains a selection list of the sub channel and address information to select the target unit. It contains information on the data length and frame type as well as an acyclic MOVILINK® parameter channel. Enter the service and data value you required here. The length is fixed to 12 bytes.

Octet	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Meaning	Sub channel	Sub address	Frame type	Data length	Management	Reserved	Index high	Index low	MSB data	Data	Data	LSB data
Fine division	Sub channel	Sub address	Frame type	Data length	Management	Reserved	Parameter index		4-byte data			
Rough division	Routing information				MOVILINK® parameter channel, acyclic							

The sub channel decides which interface the data is transmitted to. The value "0" means that the parameters of the MQI are addressed themselves. In this case, the sub address has no importance. The value "1" addresses the standard interface. For MQI, this is the RS-485 interface to the connected MOVIMOT®.

The sub address lets you select the target unit. If you want to address the parameters of a MOVIMOT® connected to MQI via RS-485, enter the RS-485 address of the desired MOVIMOT® here.

The frame type must be fixed to the value 86_{hex} (only acyclic parameter data). The data length for this frame type is set to 8 byte.

Information on the MOVILINK® parameter channel "acyclical" is available on page 115.

Variable data channel executes a "Write" service

When a write type service is executed via the data channel (e.g. write parameter or write parameter volatile), the MQI responds with the current service confirmation once the service has been performed. An incorrect write access returns the corresponding error code.

This option offers the advantage that the write service can be processed upon sending a single WRITE "MOVILINK® parameter channel" and the service confirmation can be accomplished by evaluating the "Write Confirmation." The following table shows the execution of write services via the variable data channel.

Control (master)	MQI (slave)
Initiate the execution of the service coded in the parameter channel with WRITE to the "Variable data channel" object.	
WRITE 8288 (variable data channel) →	
	← Service confirmation (OK/error code)

The WRITE service coded in the parameter channel is executed and the service confirmation is returned immediately as response.

Variable data channel executes a "Read" service

To read a parameter via the data channel, a PCP WRITE service must be executed first. The PCP WRITE service specifies where the data of the MQI should be made available. A read service must be executed on the variable data channel so that this data can reach the master. Consequently, to execute the read services via the variable data channel, you always have to execute PCP WRITE and then PCP READ. The following table shows the execution of read services via the variable data channel.

Control (master)	MQI (slave)
1. Initiate the execution of the service coded in the parameter channel with WRITE to the "Variable data channel" object.	
WRITE 8288 (variable data channel) →	
	← OK
2. READ "Variable data channel" and evaluation of the service confirmation in the parameter channel	
READ 8288 (variable data channel) →	
	← Data = variable data channel with result

1. Receipt is confirmed immediately; data channel is evaluated and the requested service is executed.
2. Service confirmation is entered in the data channel and can be evaluated via READ access in the master.

The "variable data channel with acyclical routing" object is handled locally on the fieldbus interface and is defined as shown in the following tables.

Index:	**8288**
Object code	11 (string variable)
Data type index	10 (octet string)
Length	12
Local address	
Password	
Access groups	
Access rights	Read all / Write all
Name [16]	-
Extension length	-

"Download parameter block" object

The "Download parameter block" object can be used to write a maximum of 38 MQI drive parameters or one of the MOVIMOT® connected to the MQI at the same time with a single write service. This object lets you set the parameters of a MOVIMOT® with a single call of the write service, such as during the starting phase. You will usually only change a few parameters and the parameter block with its maximum 38 parameters is sufficient for almost all applications. The user data area is set to 38 x 6 + 2 Byte = 230 Byte (Type Octet String). The following table shows the structure of the "Download parameter block" object.

Octet	**Meaning**	**Note**
0	Address	Target address: 0 or 254 for MQI RS-485 address for MOVIMOT®
1	Number of parameter	1 to 38 parameters
2	Index high	1. Parameter
3	Index low	
4	MSB data	
5	Data	
6	Data	
7	LSB data	
8	Index high	2. Parameter
...	...	
223	LSB data	
224	Index high	38. Parameter
225	Index low	
226	MSB data	
227	Data	
228	Data	
229	LSB data	

The "download parameter block" object is handled locally on the fieldbus interface and defined as listed in the following tables.

Index:	**8296**
Object code	7 (simple variable)
Data type index	10 (octet string)
Length	230
Local address	
Password	
Access groups	
Access rights	Write all
Name [16]	-
Extension length	-

Using the WRITE service to address the "Download Parameter Block" object, the MQI starts a parameter setting mechanism that writes all defined parameters in the user data area of the object to the MQI or a connected MOVIMOT®. In doing so, it sets the parameters of the MQI or MOVIMOT®. MQI is addressed using the address 0 or 254. One of the MOVIMOT® units connected to the MQI is addressed with its RS-485 address. After successful processing of the download parameter block, i.e. all parameters transferred by the InterBus interface module have been written, the write service is ended with a positive write response. In the event of an error, a negative write response is returned. The return code contains more detailed information on the type of error, as well as the number of the parameter (no. 1 to 38) in which the error occurred (see the following example).

```
Example: Error writing the 11th parameter Write Error Response:
Error class: 8 Other
Error code: 0 Other
Additional code High: 11dec Error writing parameter 11
Additional code Low: 15hex Value too high
```

Observe the following note when using the download parameter block:

- Do not execute any factory setting within the download parameter block.
- After activating a parameter lock, all subsequently written parameters are rejected.

"Last PCP index" object

This object is 4 bytes long and, when read access is made, it returns the numerical value of the last index which can be addressed directly using the PCP services. PCP accesses to indices that are higher than this numerical value must be performed using object 8288 "Variable data channel with acyclic routing". Access is also possible using object 8299 "MOVILINK® parameter channel acyclical" to address the MQI parameters.

Index	**8297**
Object code	7 (simple variable)
Data type index	10 (octet string)
Length	4
Local address	
Password	
Access groups	
Access rights	Read all
Name [16]	-
Extension length	-

"MOVILINK® Acyclic parameter channel" object

The "MOVILINK® acyclic parameter channel" object is 8 bytes long and contains the MOVILINK® parameter channel. This object can be used for acyclical parameter access to the MQI. The MQI processes the service coded in the parameter channel every time a WRITE service to this object is received. The handshake bit is not evaluated. The following table shows the structure of the "MOVILINK® acyclic parameter channel".

Octet	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Meaning	Manage-ment	Reserved	Index high	Index low	MSB data	Data	Data	LSB data
Comment	Manage-ment	Reserved	Parameter index		4-byte data			

Two different operations are involved when setting the drive inverter parameters via the acyclic MOVILINK® parameter channel:

- Parameter channel executes a "Write" service
- Parameter channel executes a "Read" service

Parameter channel performs a "Write" service

If a write service is executed via the acyclic parameter channel (e.g. write parameter or write parameter volatile), MQI responds with the current service confirmation after the service has been executed. An incorrect write access returns the corresponding error code.

This option offers the advantage that the write services can be processed by sending a single WRITE "MOVILINK® parameter channel" and the service confirmation can be accomplished by evaluating the "Write Confirmation." The following table shows the execution of write services via the acyclic MOVILINK® parameter channel.

Control (master)	MQI (slave)
Initiate the execution of the service coded in the parameter channel with WRITE to the "MOVILINK® acyclic parameter channel" object.	
WRITE 8299 (parameter channel) →	
← Service confirmation (OK/error code)	

The WRITE service coded in the parameter channel is executed and the service confirmation is returned immediately as response.

Parameter channel executes a "Read" service

To read a parameter via the parameter channel, it is necessary to execute a PCP WRITE service first. The PCP WRITE service specifies where the data of the MQI should be made available. A read service must be executed on the acyclic parameter channel so that this data can reach the master. This means that the execution of read services via the parameter channel always requires a PCP WRITE and then a PCP READ service. The following table shows how read services are executed via the acyclical MOVILINK® parameter channel.

Control (master)	MQI (slave)
1. Initiate the execution of the service coded in the parameter channel with WRITE to the "MOVILINK® acyclic parameter channel" object.	
WRITE 8299 (parameter channel) →	
← OK	
2. READ "MOVILINK® parameter channel cyclical" and evaluation of the service confirmation in the parameter channel	
READ 8299 (parameter channel) →	
← Data = parameter channel with result	

1. Receipt is confirmed immediately; parameter channel is evaluated and requested service is executed.
2. Service confirmation is entered into parameter channel and can be evaluated via READ access in the master.

The acyclical MOVILINK® parameter channel is handled locally on the MQI and is defined according to the following table.

Index	8299
Object code	7 (simple variable)
Data type index	10 (octet string)
Length	8
Local address	
Password	
Access groups	
Access rights	Read all / Write all
Name [16]	-
Extension length	-

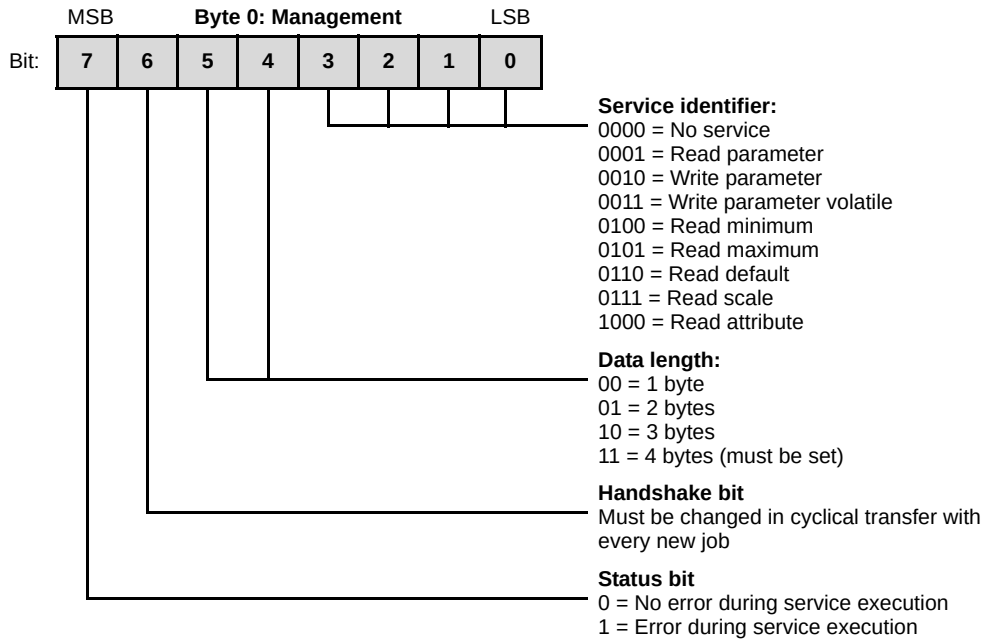
Structure of the parameter channel

The following table shows the structure of the parameter channel. It is made up of a management 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 MQI. It triggers the implementation of the transmitted service in the MQI.

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 the MQI or connected MOVIMOT® are addressed with a uniform index regardless of the connected fieldbus system. The chapter "Parameter List" contains all MQx parameters with index.

Data range

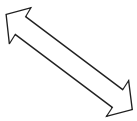
As can be seen in the following table, the data is contained in byte 4 through byte 7 of the parameter channel. This means up to 4 bytes of data can be transmitted per service. The data is always entered with right-justification; that is, byte 7 contains the least significant data byte (Data LSB) whereas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

12.4 Return codes of parameter setting

In case of incorrect parameter setting, the MQI returns various return codes to the parameter setting master. The codes offer detailed information on the cause for the error. These return codes are structured according to EN 50170. The MQI distinguishes between the following elements:

- Error class
- Error code
- Additional code

These return codes apply to all MQI communication interfaces.

Error class

The error class element provides a more exact classification of the error type. The MQI 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 identified more precisely using the elements Error code and Additional code.

Error code

The error code element provides a means of identifying the cause of the error within the error class more precisely. It is generated by the communication software of the MQI in the event of an error in communication. For Error Class 8 = "Other Error," only Error Code 0 = "Other Error Code" is defined. In this case, detailed identification is made using the additional code.

Additional code

The additional code contains SEW-specific return codes for incorrect parameter setting of the MQI. 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:":

Additional code high (hex)	Additional 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 that cannot be identified either automatically by the application layer of the fieldbus system or by the system software of the MQI 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.

Station communication" project planning error"

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:

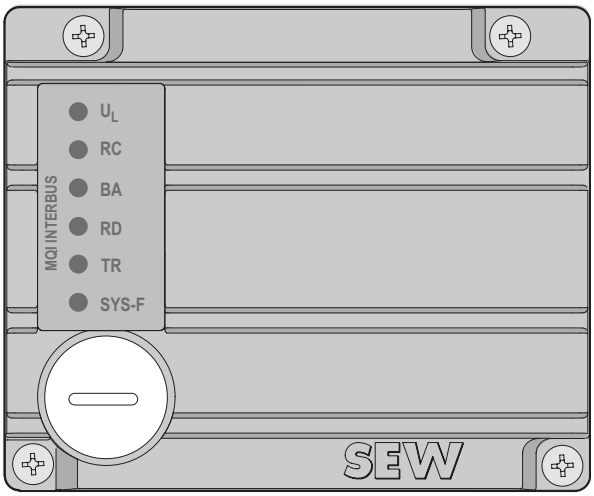
Configure a parameter channel for the desired station.

12.5 InterBus peripheral fault

The InterBus interfaces can report fault 83 "short-circuit output" also as peripheral fault to the InterBus master: The fault can be reset in the InterBus master using the CMD tool (interface group, right mouse button: Operate/Other services/Accept module error).

12.6 Description of the LED display

The InterBus interface MQI has five LEDs for InterBus diagnostics and a further LED for displaying system errors.



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LED UL "U-Logic" (green)

State	Meaning	Remedy
On	• Supply voltage is present	–
Off	• Supply voltage is missing	• Check the DC 24 V voltage supply and wiring of the MQI

LED RC "Remote Bus Check" (green)

State	Meaning	Remedy
On	• Incoming remote bus connection ok	–
Off	• Incoming remote bus connection interrupted	• Check the incoming remote bus cable

LED BA "Bus Active" (green)

State	Meaning	Remedy
On	• Data transmission on the InterBus is active	–
Off	• No data transmission; InterBus is stopped	• Check the incoming remote bus cable • Use the diagnostic display on the master interface module to localize the error further
Flashing	• Bus active, no cyclical data transmission	–

LED RD "Remote Bus Disable" (red)

State	Meaning	Remedy
On	• Outgoing remote bus is switched off (only in case of an error)	–
Off	• Outgoing remote bus not switched off	–

LED TR "Transmit" (green)

State	Meaning	Remedy
On	• Parameter data exchange via PCP	–
Off	• No parameter data exchange via PCP	–

LED SYS-F"System error" (red)

State	Meaning	Remedy
Off	• Normal operating state • The MQI is exchanging data with the connected MOVIMOT®	–
Flashing Flashes	• The MQI is in error state • An error message is displayed in the MOVITOOLS® status window.	• Please observe the corresponding error description (see the chapter "Error Table MQ.. Fieldbus Interfaces").
On	• The MQI is not exchanging data with the connected MOVIMOT® • The MQI was not configured, or the connected MOVIMOT® units do not respond.	• Check the wiring of RS-485 between MQI and the connected MOVIMOT® units as well as the voltage supply of MOVIMOT® units. • 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 setting of maintenance switch on field distributor

12.7 Error states

Fieldbus timeout

Switching off the fieldbus master or an open circuit of the fieldbus cabling results in to a fieldbus timeout at the MQI. 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 MQI 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 MQI 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 faults

The MQI 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 MQI module flashes regularly.

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

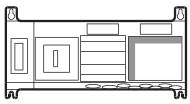
13 Supplementary Field Distributor Startup Information

Startup depends on the fieldbus interface used and is carried out according to the sections:

- "Startup with MFI.. InterBus Interface (copper line)"
- "Startup with MFI.. InterBus interface (Fiber-optic cable)"
- "Startup with MQI.. InterBus Interface (copper line)"

In addition, please observe the following notes about the startup of field distributors.

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



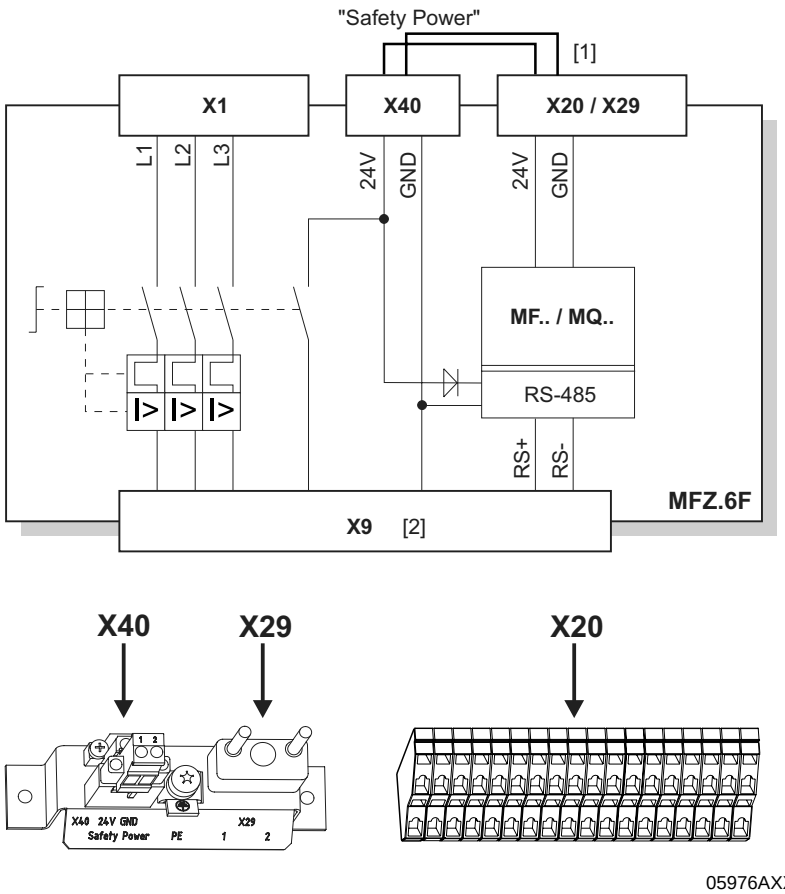
Maintenance switch

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.

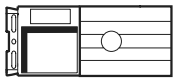
Block diagram:



05976AXX

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

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



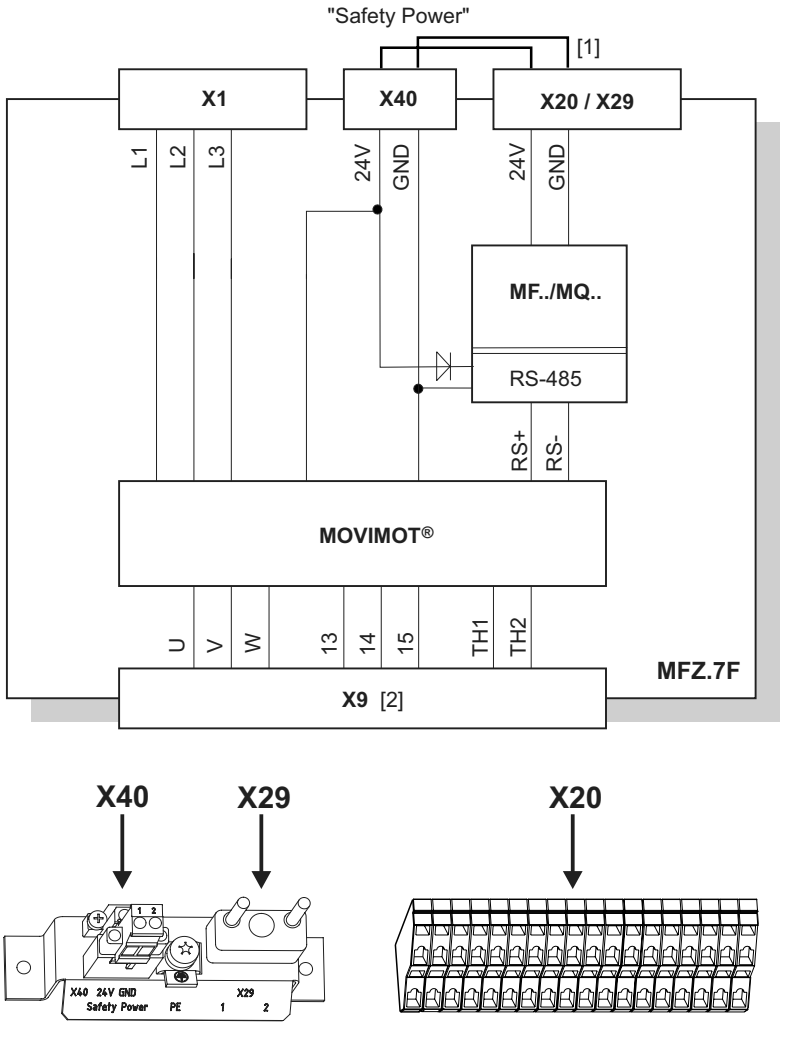
Checking the connection type for the connected motor

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!

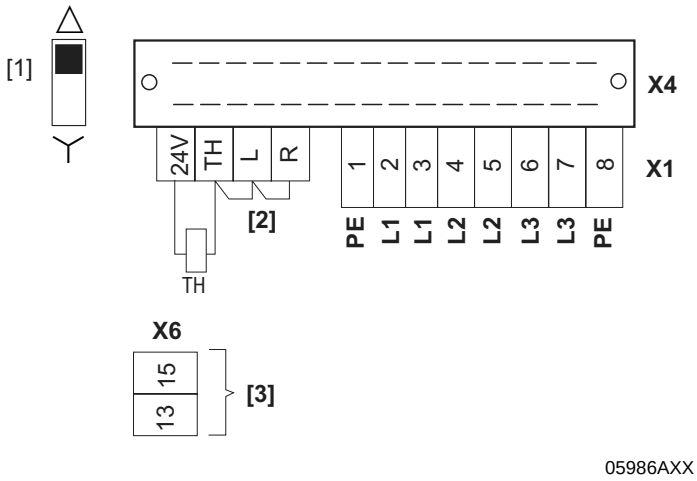
Block diagram



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

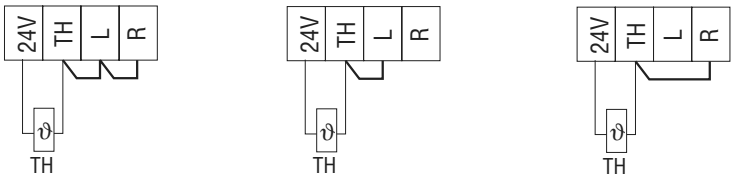


05986AXX

[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)

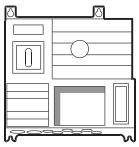
Both directions are enabled	Only direction **counterclockwise** is enabled	Only direction **clockwise** is enabled



04957AXX

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

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



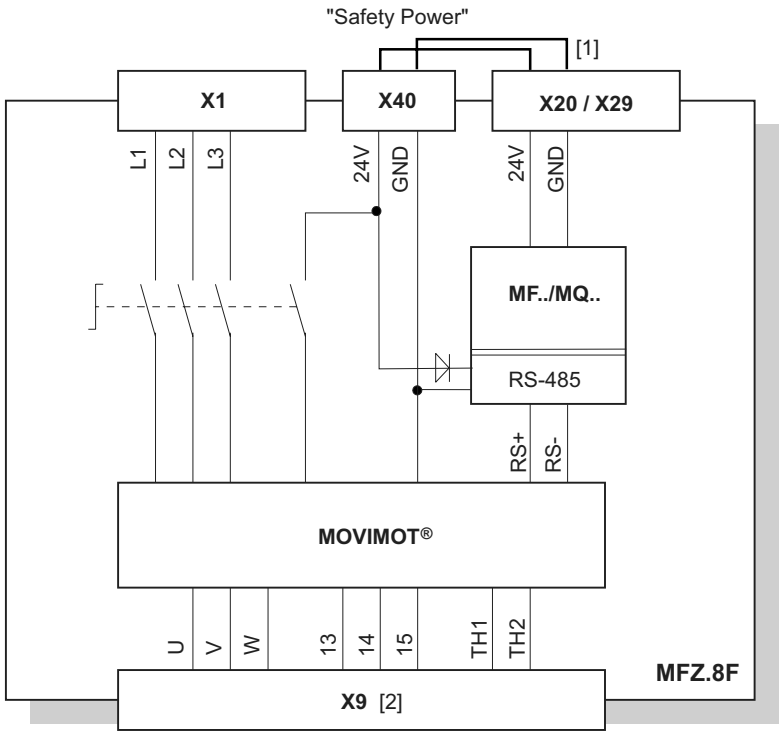
Maintenance switch

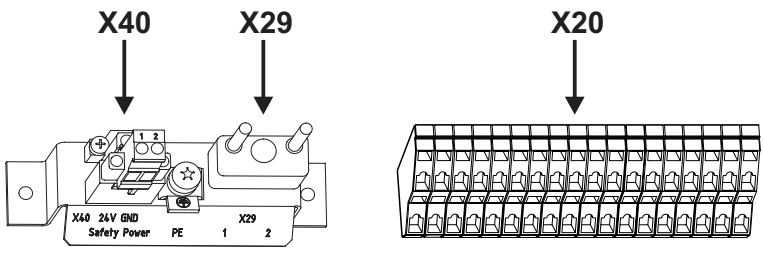
The maintenance switch of the Z.8. field distributor switches the

– 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

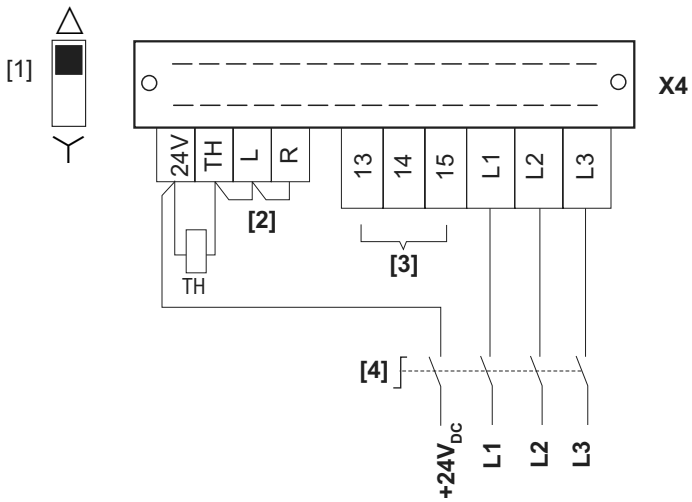
Checking the connection type for the connected motor

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

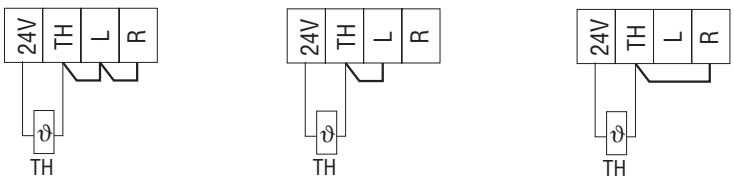


05981AXX

[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

13.4 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.

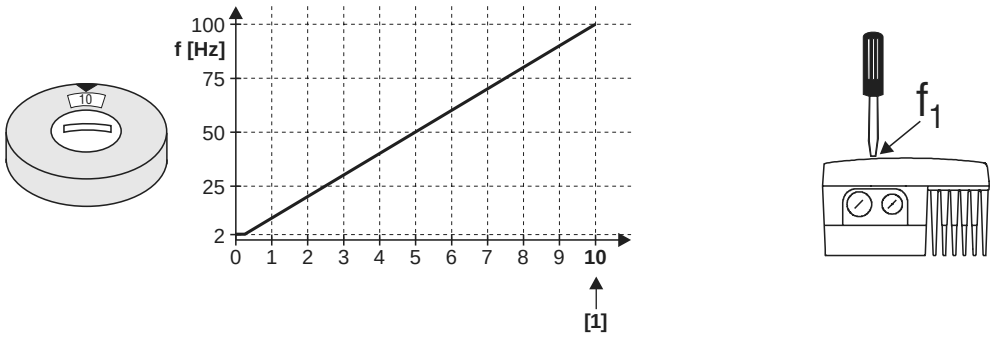
Different factory setting when MOVIMOT® is integrated in the field distributor

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 protection**	**Motor power rating**	**PWM Frequency**	**No-load damping**
	20	**21**	**22**	**23**				
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.

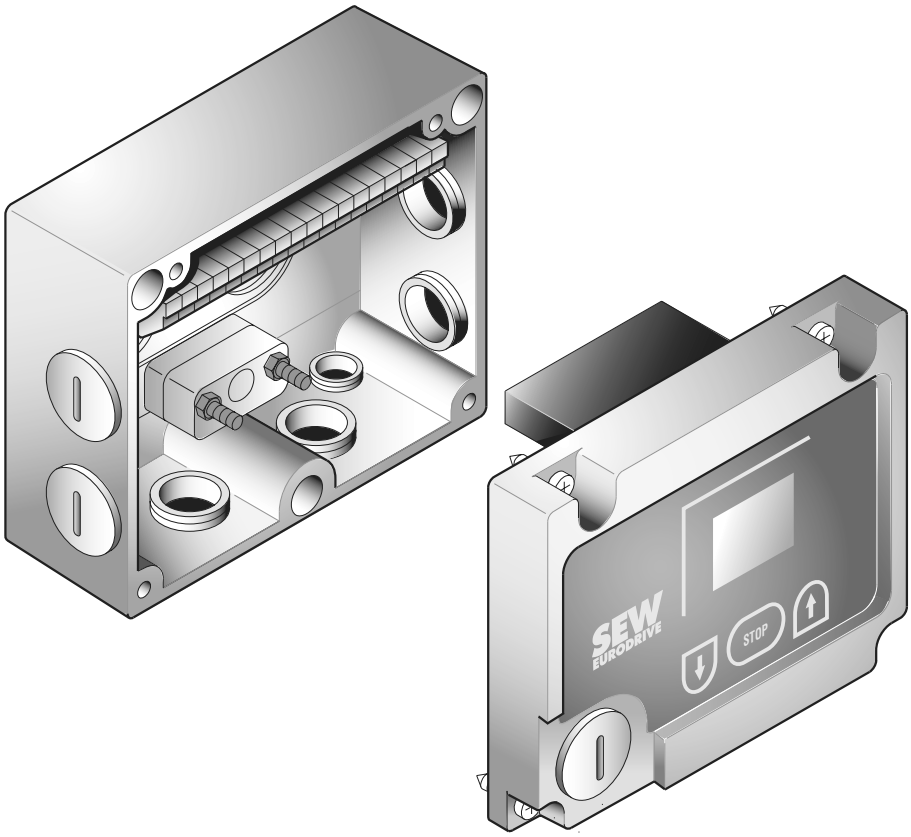
Additional function		Restriction
1	MOVIMOT® with increased ramp times	–
2	MOVIMOT® with adjustable current limitation (fault if exceeded)	–
3	MOVIMOT® with adjustable current limitation (can be changed using using terminal f1/f2)	–
4	MOVIMOT® with bus configuration	Only possible with MQ.. fieldbus interfaces
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.

14 Keypads

14.1 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.

14.2 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.

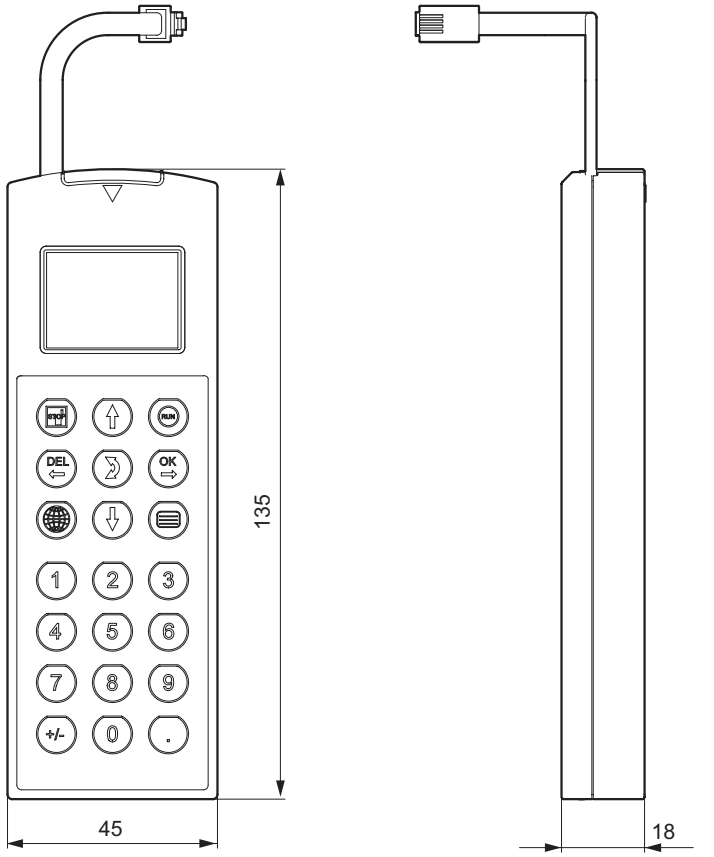
Features

- 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

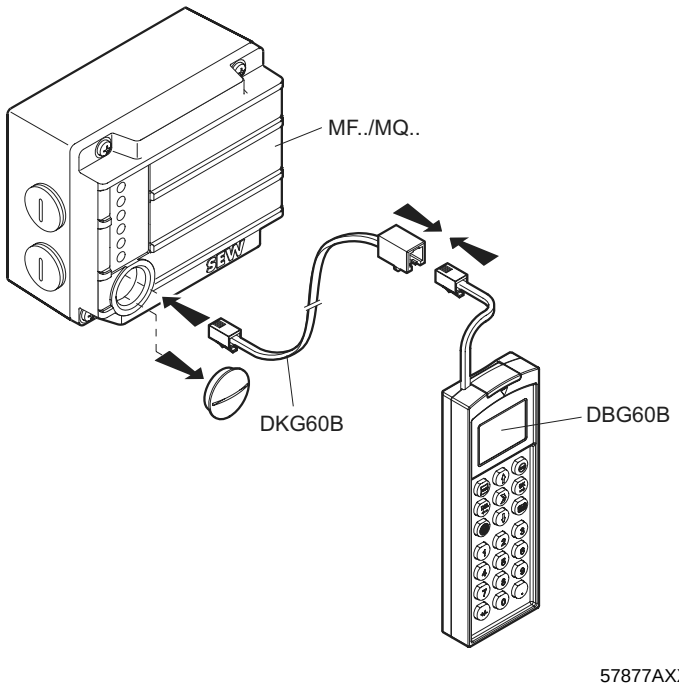
Keypad		Language	Part number
 56555AXX	**DBG60B-01**	DE/EN/FR/IT/ES/PT/NL (German/English/French/Italian/Spanish/ Portuguese/Dutch)	1 820 403 1
	DBG60B-02	DE/EN/FR/FI/SV/DA/TR (German/English/French/Finnish/ Swedish/Danish/Turkish)	1 820 405 8
	DBG60B-03	DE/EN/FR/RU/PL/CS (German/English/France/Russian/Polish/ 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

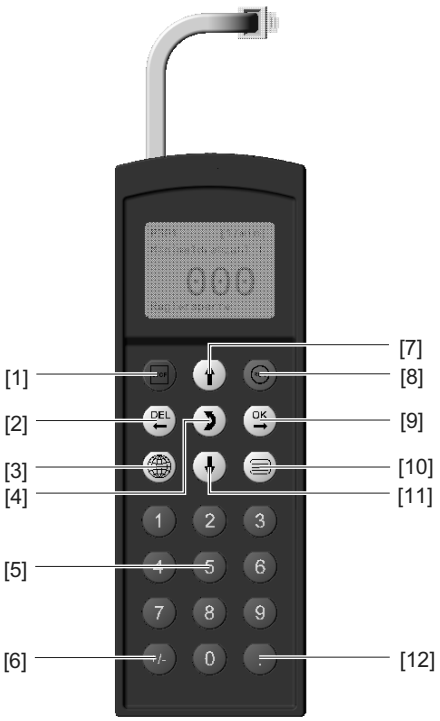


Connection to MF../MQ.. interfaces

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

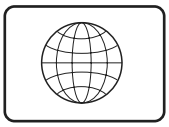
Selecting a language

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

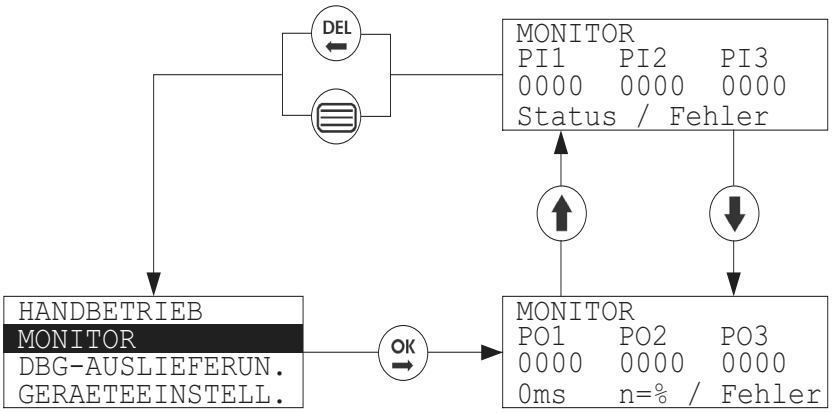
Proceed as follows to select the language:

- 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:

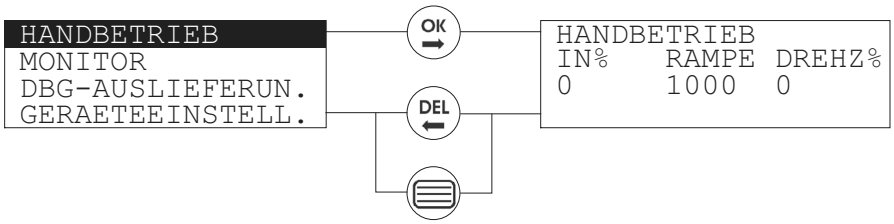
```
MONITOR
PI1 PI2  PI3
0000     0000     0000
Status / error
```

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.**

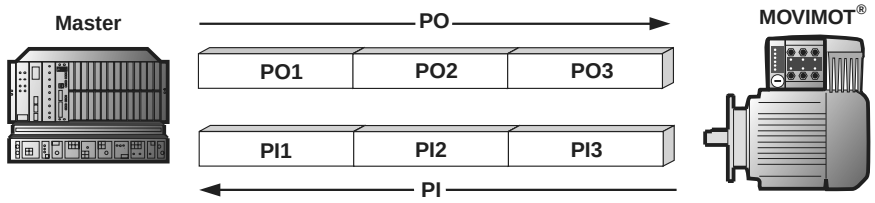
If an error occurs in manual operation, an error window appears. The error number and error text are displayed alternatively in the status bar of the error window. You must press [OK] to exit the error window. This triggers a reset.

15 MOVILINK® Unit Profile

15.1 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.

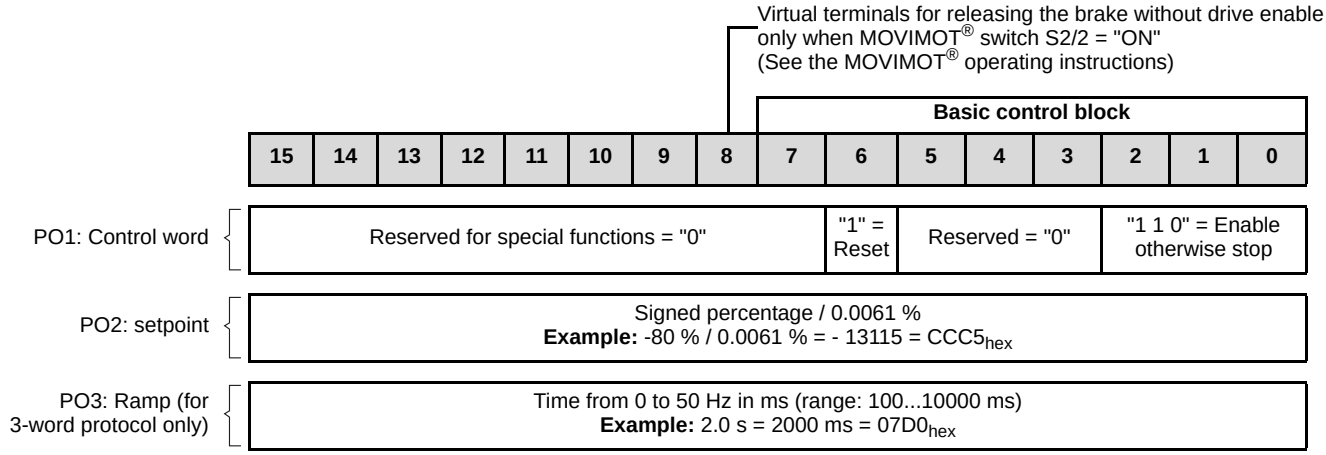
3 process data words

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:

Invoice: –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

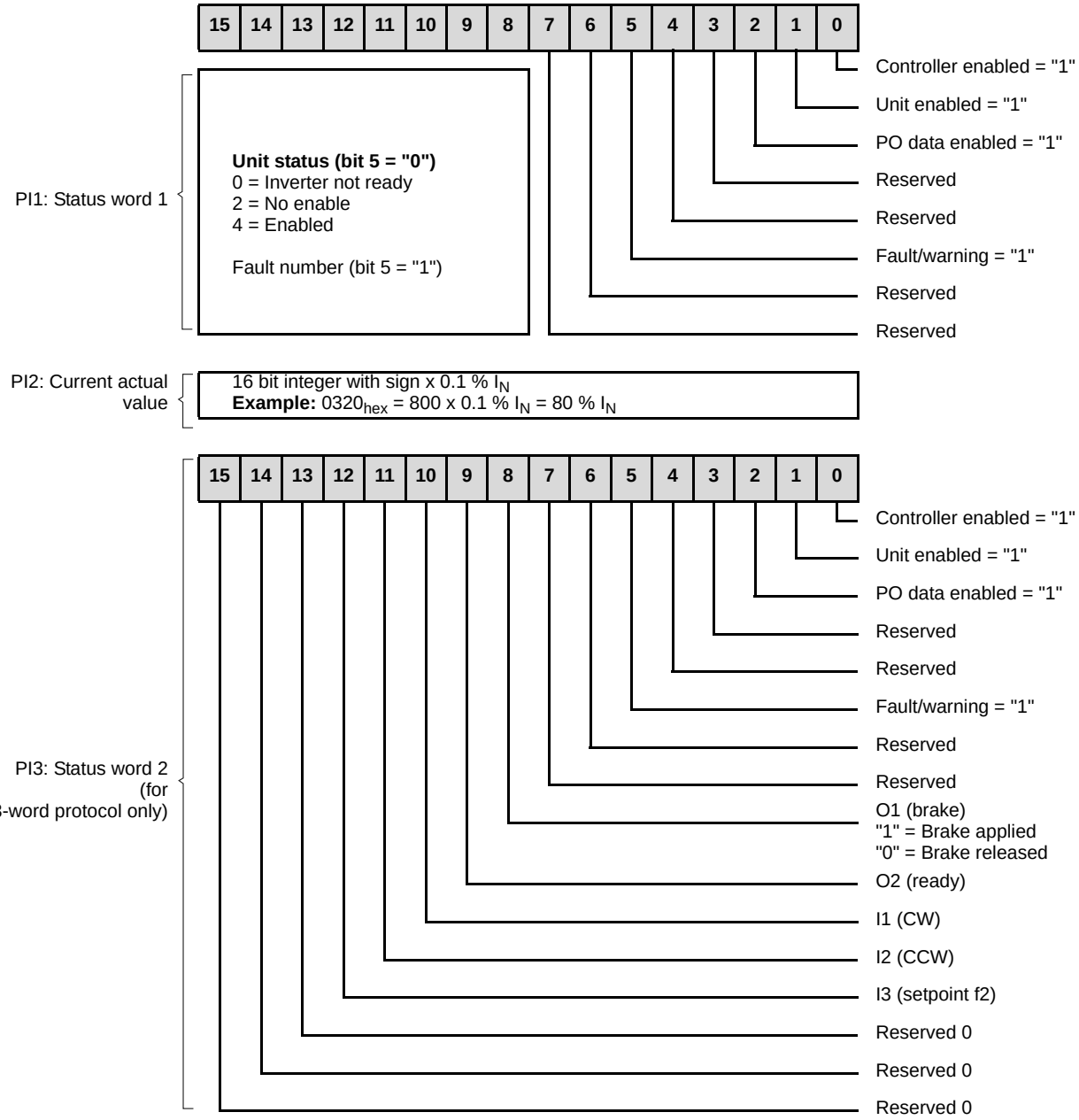
Range: 100...10000 ms

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



15.2 Sample program for Simatic S7 and fieldbus

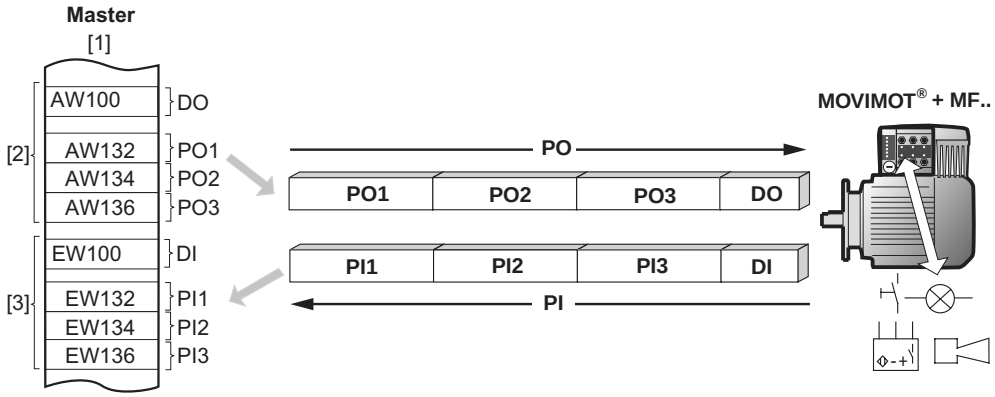
A sample program for Simatic S7 demonstrates the processing of process data as well as the digital inputs and outputs of the MF fieldbus interface.

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   // If       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
```

16 Parameters

16.1 MQ.. parameter list

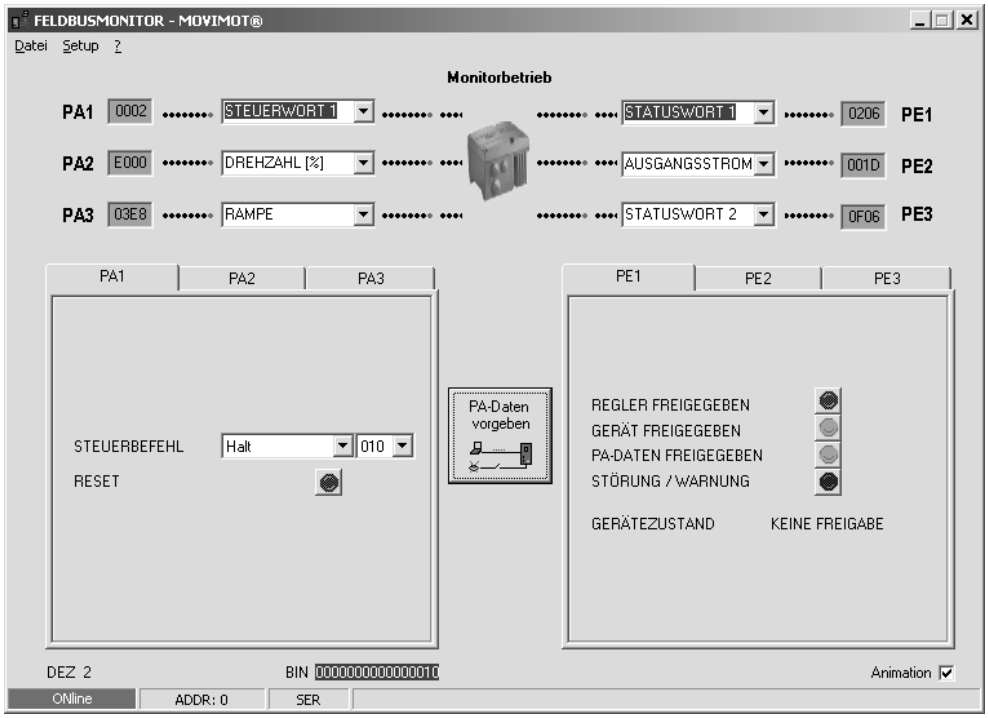
Parameter	Parameter	Index	Unit	Access	Default	Meaning / Value range
010	Inverter status	8310		RO	0	Low word coded, as status word 1
011	Operating state	8310		RO	0	Low word coded, as status word 1
012	Error status	8310		RO	0	Low word coded, as status word 1
013	Current parameter set	8310		RO	0	Low word 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	

17 Bus Diagnostics with MOVITOOLS®

17.1 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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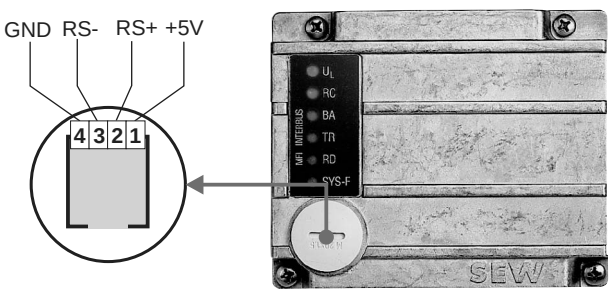
Setpoint and actual values that are exchanged between MOVIMOT® and the fieldbus master can easily be diagnosed.

The MOVIMOT® unit can be controlled directly in the "Control" fieldbus monitor operating mode. See the section "Fieldbus monitor in MOVITOOLS®" on page 150.

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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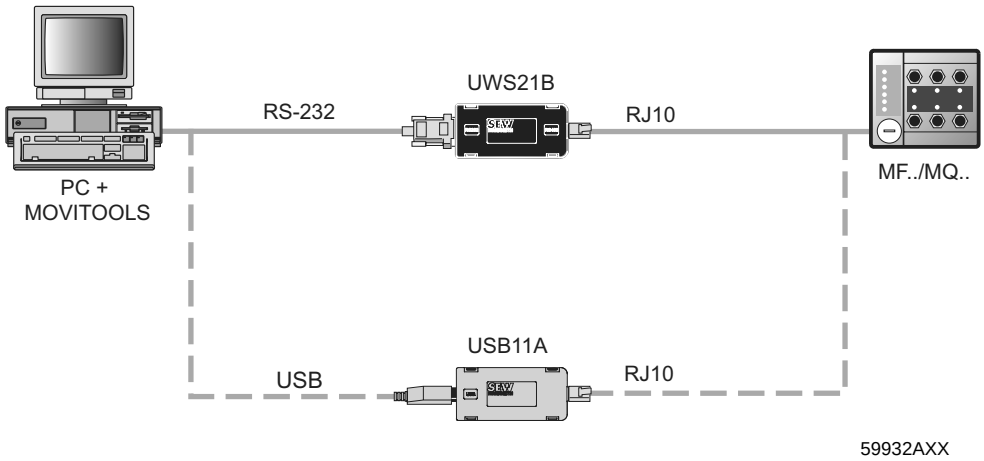
Interface adapter

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®

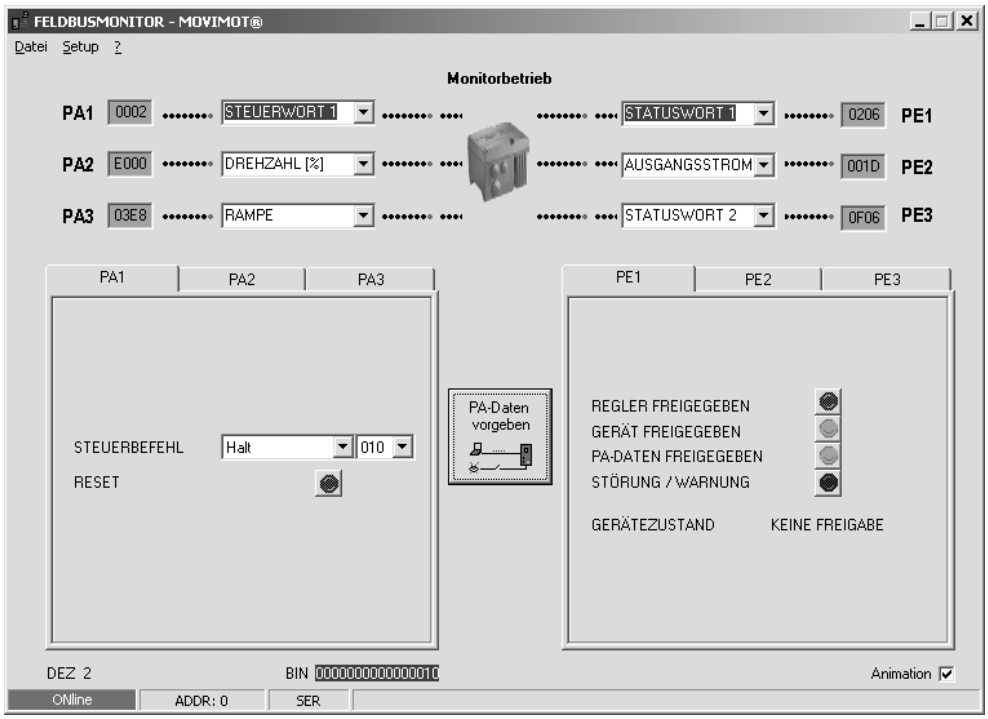
Display values - 09. bus diagnostics

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

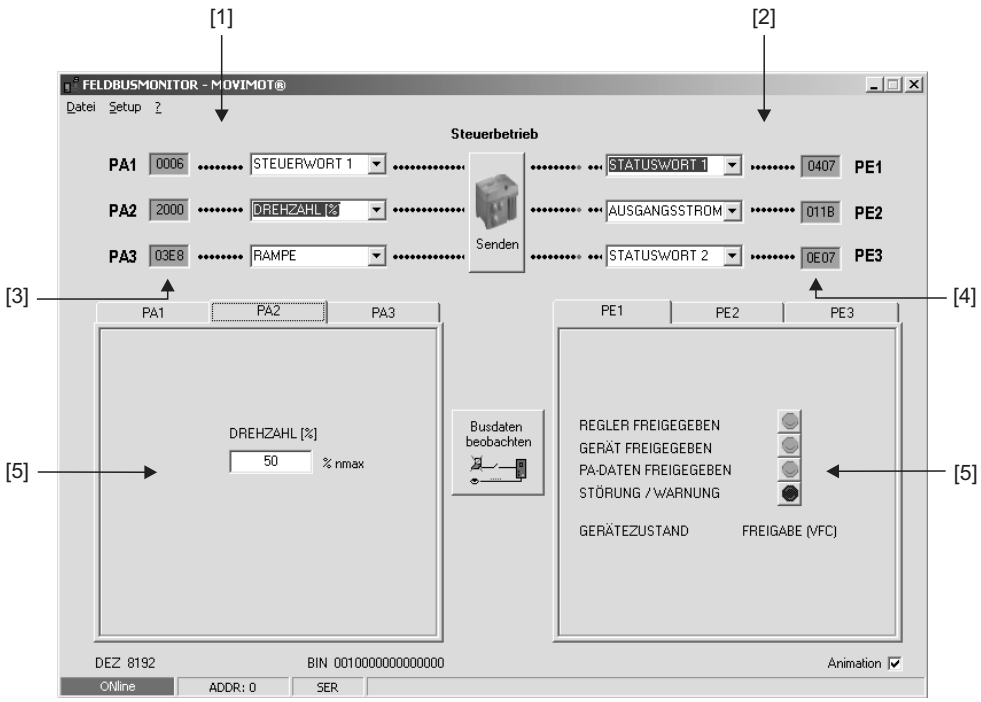
The fieldbus monitor provides the user with a powerful tool for startup and troubleshooting. This tool displays and interprets all cyclical process data exchanged between inverter and control.

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

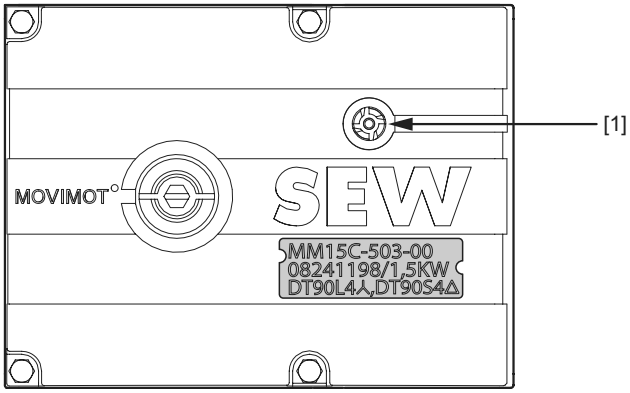
17.2 Error list for fieldbus interfaces

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 **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**		• 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.
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.

18 MOVIMOT® Diagnostics

18.1 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

18.2 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 1s (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.

19 Technical Data

19.1 Technical data of InterBus interface MFI21, MFI22, MFI32 (copper line)

MFI electrical specification	
MFI electronics power supply	V = +24 V +/- 25 %, $I_E \leq 150$ mA
Electrical isolation	• Floating InterBus connection • Between logic and 24 V supply voltage • Between logic and peripherals/MOVIMOT® via opto-coupler
Bus connection technology	Five cage clamp terminals each for incoming and outgoing bus cables
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 MFI 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)

Programming data	
InterBus interface	Remote bus and installation remote bus
Protocol mode	Two conductor asynchronous protocol 500 kbaud
ID-Code	03_{hex} (03_{dec}) = Digital module with input and output data
Length code	2_{hex} / 3_{hex} / 4_{hex} depending on the DIP switch setting
Register length on the bus	2, 3 or 4 words (depending on DIP switch setting)
Parameter channel (PCP)	0 words

Data on remote bus interface	
Cable length between two MFIs in the remote bus	Typical for InterBus, max. 400 m
Maximum number of MFIs on remote bus	Dependent on InterBus master 64 (configuration 3 PD + DI/DO) – 128 (configuration 2 PD)

Data on installation remote bus interface	
Cable length between two MFIs in the installation remote bus	InterBus specific, max. 50 m between first and last station
Maximum number of MFIs on installation remote bus	Limited by the total current consumption (max. 4.5 A) of MFI in installation remote bus reduction and voltage drop in the last MFI connection

19.2 Technical data for InterBus interface MQI21, MQI22, MQI32 (copper line)

MQI electrical specification	
Power supply to MQI control electronics	V = +24 V +/- 25 %, $I_E \leq 200$ mA
Electrical isolation	• Floating InterBus connection • Between logic and 24 V supply voltage • Between logic and peripherals/MOVIMOT® via opto-coupler
Bus connection technology	Five cage clamp terminals each for incoming and outgoing bus cables
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 MQI 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)

Programming data	
InterBus interface	Remote bus and installation remote bus
Protocol mode	Two conductor asynchronous protocol 500 kbaud
ID-Codes	03_{dec} (03_{hex}) = Digital module with input and output data 227_{dec} ($E3_{hex}$) = DRIVECOM 1 PCP word 224_{dec} ($E0_{hex}$) = DRIVECOM 2 PCP words 225_{dec} ($E1_{hex}$) = DRIVECOM 4 PCP words Depending on the setting of the DIP switch
Length code	1_{hex} to A_{hex} (Depending on the setting of the DIP switch)
Register length on the bus	1-10 words (depending on the setting of the DIP switch)
Parameter channel (PCP)	0, 1, 2 or 4 words (depending on the setting of the DIP switch)
Send telegram length (PCP)	243
Receive telegram length (PCP)	243
Supported services (PCP)	Read, Write, Get OV

Data on remote bus interface	
Cable length between two MQIs on the remote bus	Typical for InterBus, max. 400 m
Maximum number of MQIs on remote bus	Dependent on InterBus master 25 (configuration 1 PD) to 256 (configuration 0 PD)

Data on installation remote bus interface	
Cable length between two MQIs on the installation remote bus	Typical for InterBus, max. 50 m between first and last stations
Maximum number of MQIs on installation remote bus	Limited by the total consumption current (max. 4.5 A) of the MQI in the installation remote bus and the voltage drop in the last MQI module.

19.3 Technical data for InterBus interface MFI23, MFI33 (fiber-optic cable)

MFI23B/33B electrical specification	
MFI electronics power supply	• Bus logic U_{S1} = 24 V_{DC} +/- 25 %, $I_E \leq$ 200mA (typ. 80 mA) plus supply current for sensors and MOVIMOT® inverter • Actuator voltage U_{S2} = DC 24 V +/- 25 % The two voltages U_{S1} and U_{S2} are daisychained and can be used at the plug connection for the next remote bus. The maximum continuous current is: – max. 16 A at 0...40 °C ambient temperature – max. 10 A at 0..0.55 °C ambient temperature
Electrical isolation	• between bus logic and MOVIMOT® via opto-coupler • between bus logic and binary outputs via opto-coupler • no separation between bus logic and binary inputs
Bus connection technology	Fiber optic rugged-line connector
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	From US1: DC 24 V to EN 61131-2, interference voltage proof and short-circuit proof Σ 500 mA max. 1V
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	≤ 30m between MFI and MOVIMOT®
Ambient temperature	0 °C...55 °C [max. 10 A continuous current with looping through of the 24 V voltage (US1 and US2)]
Storage temperature	-25 °C...85 °C
Enclosure	IP65 (installed on MFZ.. connection module, all plug connections sealed)

Programming data	
InterBus interface	Fiber-optic remote bus
Transmission rate	500 kBaud / 2 MBaud
ID-Code	03_{hex} (03_{dec}) = Digital module with input and output data
Length code	2_{hex} / 3_{hex} / 4_{hex} depending on the DIP switch setting
Register length on the bus	2, 3 or 4 words (depending on DIP switch setting)
Parameter channel (PCP)	0 words

Data on INTERBUS interface	
Incoming / outgoing remote bus	Fiber optic cable (polymer fiber 980/1000m)
Connection technology	Fiber optic rugged-line connector
Cable length between two MFIs on the bus	max. 50 m, depending on cable type[1)]
Maximum number of MFIs on FO remote bus	Dependent on InterBus master 64 (configuration 3 PD + DI/DO) – 128 (configuration 2 PD)

1) Cable lengths < 1 m are only permitted with the pre-fabricated IBS RL CONNECTION-LK cable bridge from Phoenix Contact.

19.4 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 Vmains = 400 VAC)	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	Kl. 11 Kl. 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 for 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 Vmains = 400 VAC)**	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	Kl. 11 Kl. 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							
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 the 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"
- 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"

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 updatedt

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
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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
Production	**Forbach**	SEW-EUROCOME Zone Industrielle Technopole Forbach Sud – B. P. 30269 F-57604 Forbach Cedex	Tel. +33 3 87 29 38 00
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 LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
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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 http://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
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Colombia			
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Croatia			
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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			
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Estonia			
Sales	**Tallin**	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
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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			
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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 info@alperton.ie

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 http://www.sew-eurodrive.co.jp 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			
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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 Industrial 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 94 43184-70 Fax +34 94 43184-71 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**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 5, Rue El Houdaibiah 1000 Tunis	Tel. +216 71 4340-64 + 71 4320-29 Fax +216 71 4329-76 tms@tms.com.tn

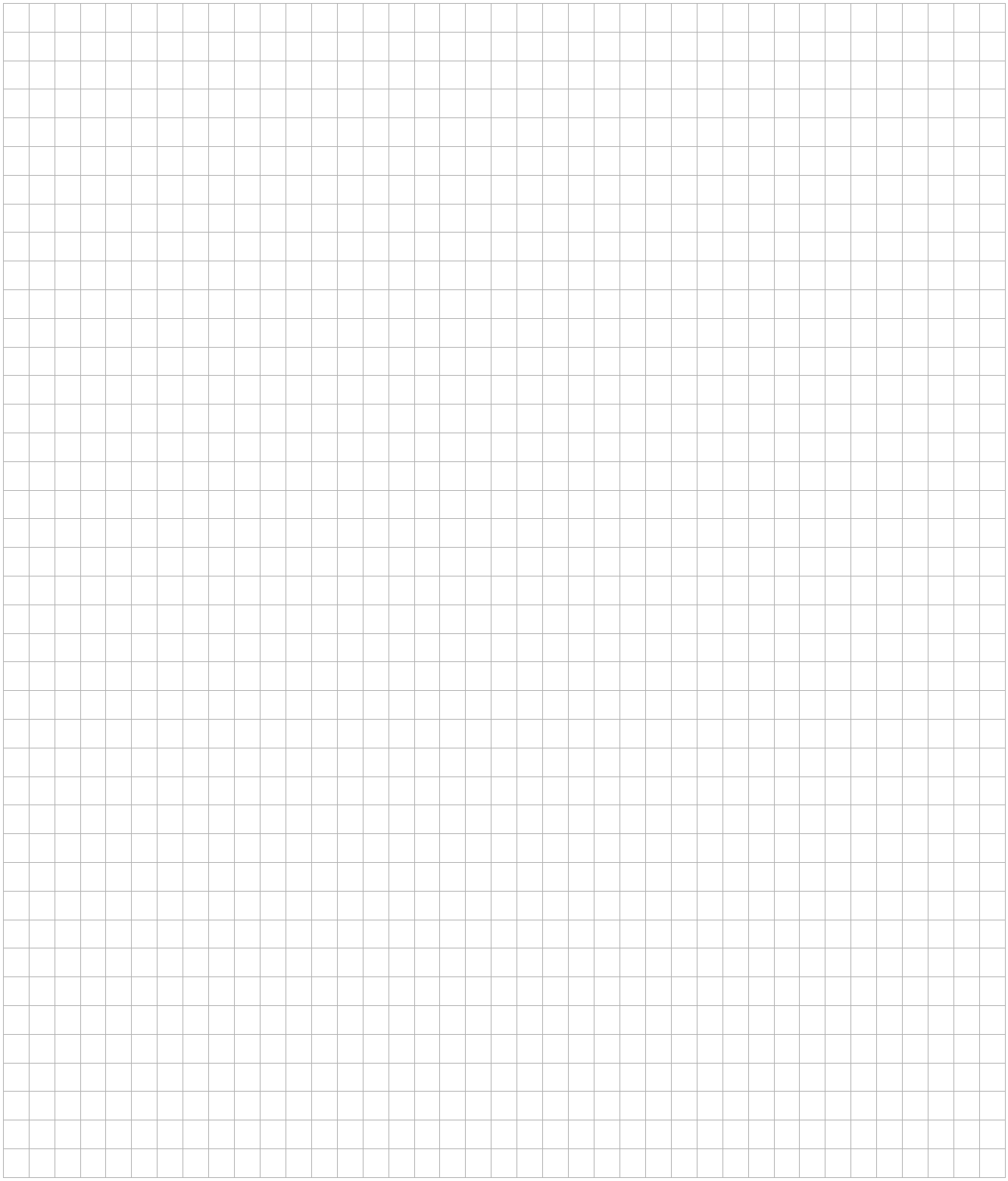
Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 164 3838014/15 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

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
Sales	Kiev	SEW-EURODRIVE GmbH S. Oleynika str. 21 02068 Kiev	Tel. +380 44 503 95 77 Fax +380 44 503 95 78 kso@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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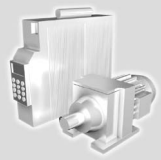

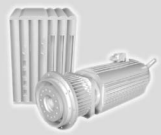

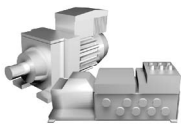

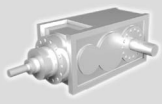

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