



SEW
EURODRIVE

Manual



Drive System for Decentralized Installation
PROFIsafe Field Distributor with MOVIMOT® MM..D





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1 Valid Components

1.1 Brief description

PROFIsafe MQS.2F/Z2.F field distributors provide a connection between MOVIMOT® drives and the safety-oriented PROFIsafe communication system.

The MQS22F fieldbus interface is equipped with 4 standard binary inputs and 2 standard binary outputs.

The MQS32F fieldbus interface is equipped with 6 standard binary inputs and 0 standard binary outputs.

The PROFIsafe MQS.2F interface also has a safety-oriented binary output and 2 safety-related binary inputs. The MOVIMOT® drive "Safe stop" function can be realized with the safe binary output in combination with a security control via PROFIsafe.

1.2 Type designations

The type designations for the MQS.. PROFIsafe interfaces are as follows:

- **MQS22F** 4DI/2DO (via M12 plug connector) + 2F-DI/1F-DO (2-pole)
- **MQS32F** 6DI/0DO (via M12 plug connector) + 2F-DI/1F-DO (2-pole)

For safety-relevant applications up to:

- Stop category 0 or 1 according to EN 60204-1
- and
 - Category 3 according to EN 954-1
 - or performance level d according to EN ISO 136849-1
 - or SIL 2 according to EN 61508

only the following field distributor combinations are permitted in conjunction with MOVIMOT®:

Permitted field distributor combinations		
Field distributor Z.6.	MQS22F / Z26F / AF0 MQS22F / Z26F / AF2 MQS22F / Z26F / AF3	MQS32F / Z26F / AF0 MQS32F / Z26F / AF2 MQS32F / Z26F / AF3
Field distributor Z.7.	MQS22F / MM... / Z27F . MQS22F / MM... / Z27F . /AVT2/AWT2	MQS32F / MM... / Z27F . MQS32F / MM... / Z27F . /AVT2/AWT2
Field distributor Z.8.	MQS22F / MM... / Z28F . /AF0 MQS22F / MM... / Z28F . / AF2 MQS22F / MM... / Z28F . / AF3	MQS32F / MM... / Z28F . /AF0 MQS32F / MM... / Z28F . / AF2 MQS32F / MM... / Z28F . / AF3

Not permitted are:

- Combinations with Z.1 field distributors.
- Combinations with Z.3 field distributors.
- Variants without M12 plug connector



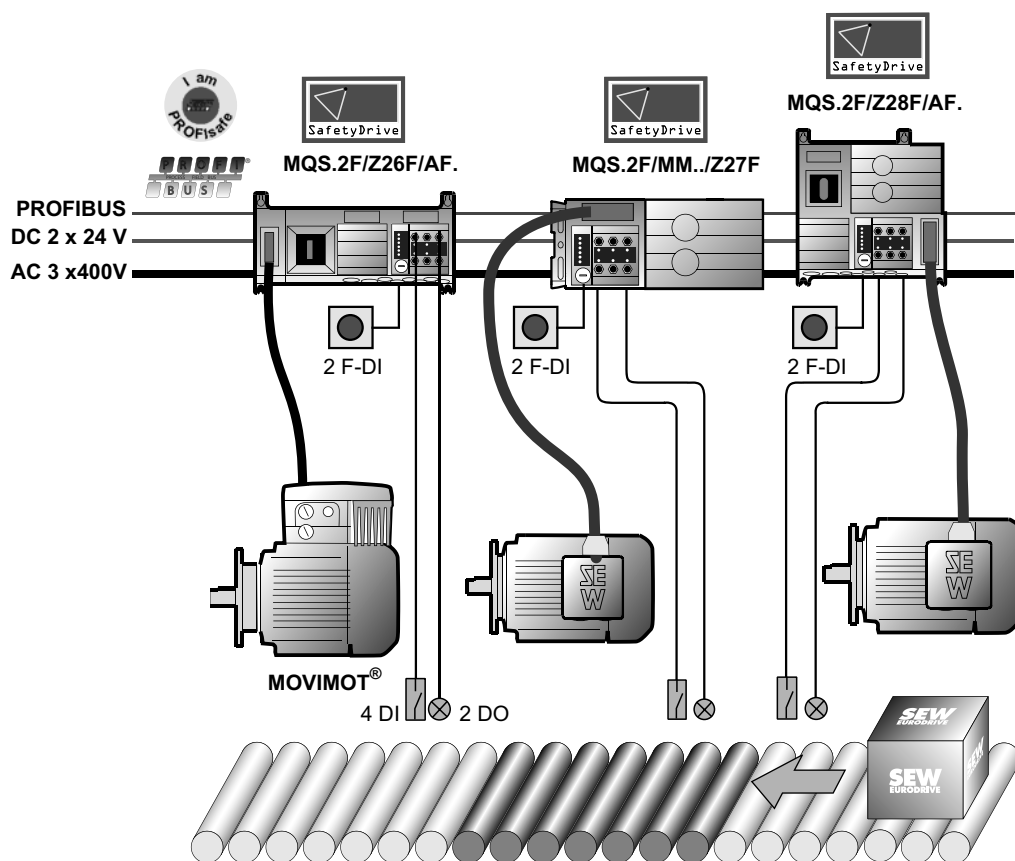
INFORMATION

Any combinations and options listed in other publications are not permitted.



1.3 Overview

The following overview lists the possible field distributor variants in conjunction with the PROFIsafe MQS.. interface. The "Safe stop" function with MOVIMOT® is controlled by the PROFIsafe field distributors via the standard PROFIBUS connection. In this case, the 24 V supply to the MOVIMOT® drive is disconnected via the safe binary output (wired internally).



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2 General Information



2.1 About this manual








The manual is part of the product and contains important information on operation and service. This manual is written for all employees who assemble, install, startup, and service the product.

The manual must be accessible and legible. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the manual carefully and understood it. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

2.2 Structure of the safety notes

The safety notes in these operating instructions are designed as follows:

Pictogram 	 SIGNAL WORD Type and source of danger. Possible consequence(s) if disregarded. • Measure(s) to prevent the danger.
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Pictogram	Signal word	Meaning	Consequences if disregarded
Example:  General danger  Specific danger, e.g. electric shock	<div data-bbox="443 1182 662 1305"> DANGER</div> <div data-bbox="443 1305 662 1429"> WARNING</div> <div data-bbox="443 1429 662 1552"> CAUTION</div> <div data-bbox="443 1552 662 1675"> NOTICE</div>	Imminent danger Possible dangerous situation Possible dangerous situation Possible damage to property	Severe or fatal injuries Severe or fatal injuries Minor injuries Damage to the drive system or its environment
	INFORMATION	Useful information or tip. Simplifies the handling of the drive system.	

**2.3 *Rights to claim under limited warranty***

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the operating instructions and this manual. Consequently, read the operating instructions and this manual before you start working with the unit!

2.4 *Exclusion of liability*

It is essential that you observe the operating instructions to ensure safe operation and to achieve the specified product characteristics and performance features of the fieldbus interfaces, field distributors and MOVIMOT® MM..D inverters. SEW-EURODRIVE does not assume liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

2.5 *Copyright notice*

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3 Safety Notes

The following basic safety notes are intended to prevent injury to persons and damage to property. The operator must ensure that the basic safety notes are read and observed. Ensure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the operating instructions carefully and understood them. If you are unclear about any parts of this documentation or require further information, please contact SEW-EURODRIVE.

3.1 General information

Never install or start up damaged products. Submit a complaint to the shipping company immediately in the event of damage.

During operation, field distributors or MOVIMOT® drives can have live, bare and movable or rotating parts as well as hot surfaces, depending on their degree of protection.

Removing covers without authorization, improper use as well as incorrect installation or operation may result in severe injuries to persons or damage to property. Refer to the documentation for additional information.

3.2 Target group

Only qualified electricians are authorized to install, startup or service the units or correct unit faults (observing IEC 60364 or CENELEC HD 384 or DIN VDE 0100 and IEC 60664 or DIN VDE 0110 as well as national accident prevention guidelines).

Qualified personnel in the context of these basic safety notes are persons familiar with installation, assembly, startup and operation of the product who possess the necessary qualifications.

Any activities regarding transportation, storage, operation, and disposal must be carried out by persons who have been instructed appropriately.

3.3 Designated use

Field distributors and fieldbus interfaces are components intended for installation in electrical systems or machines.

When installed in machines, startup (i.e. start of designated operation) is prohibited until it is determined that the machine meets the requirements stipulated in EC directive 2006/42/EC (Machinery Directive).

Startup (i.e. the start of designated use) is only permitted under observance of the EMC directive 2004/108/EC.

MOVIMOT® inverters comply with the regulations of the Low Voltage Directive 2006/95/EC. The standards given in the declaration of conformity are used for the MOVIMOT® inverter.

You must observe the technical data and information on the connection requirements as provided on the nameplate and in the documentation.

**3.3.1 Safety functions**

Field distributors, fieldbus interfaces and MOVIMOT® inverters may not perform safety functions unless these functions are described and expressly permitted.

For safety functions, ensure that the information in the supplied publications is observed.

Use only components in safety applications that were explicitly designed and supplied for this purpose by SEW-EURODRIVE.

3.3.2 Hoist applications

When using MOVIMOT® inverters in hoist applications, you must observe the special configuration and settings for hoist applications specified in the operating instructions for MOVIMOT®.

MOVIMOT® inverters may not be used as a safety device in hoist applications.

3.4 Other applicable documentation

Note also the following documentation:

- "MOVIMOT® MM..D with AC Motors DRS/DRE/DRP" operating instructions
and
"DR.71.225, 315 AC Motors" operating instructions
- or "MOVIMOT® MM..D with AC Motors DT//DV" operating instructions
and
"DR/DV/DT/DTE/DVE AC Motors, CT/CV Asynchronous Servomotors" operating instructions

3.5 Transport, storage

You must observe the notes on transportation, storage and proper handling. Comply with the requirements for climatic conditions stated in section "Technical Data". Tighten installed eyebolts securely. They are designed for the weight of the MOVIMOT® drive. Do not attach any additional loads. Use suitable, sufficiently rated handling equipment (e.g. rope guides) if required.



3.6 Installation

The units must be installed and cooled according to the regulations and specifications in the corresponding documentation.

Protect the MOVIMOT® inverters from improper strain.

The following applications are prohibited unless the unit is explicitly designed for such use:

- Use in potentially explosive atmospheres.
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.
- Use in non-stationary applications with strong mechanical oscillation and impact loads, as specified in the documentation

3.7 Electrical connection

Observe the applicable national accident prevention guidelines when working on live field distributors, fieldbus interfaces and MOVIMOT® inverters (e.g. BGV A3).

Perform electrical installation according to the pertinent regulations (e.g. cable cross sections, fusing, protective conductor connection). For any additional information, refer to the applicable documentation.

For information on EMC-compliant installation – such as shielding, grounding, arrangement of filters and routing of lines – refer to the documentation. The manufacturer of the system or machine is responsible for maintaining the limits established by EMC legislation.

Protective measures and protection devices must comply with the regulations in force (e.g. EN 60204 or EN 61800-5-1).

A voltage test according to EN 61800-5-1:2007 chapter 5.2.3.2 is required for the MOVIMOT® drives prior to startup in order to ensure the insulation.

3.8 Safe disconnection

MOVIMOT® inverters meet all requirements for safe disconnection of power and electronic connections in accordance with EN 61800-5-1. All connected circuits must also satisfy the requirements for safe disconnection.



3.9 Operation

Systems equipped with field distributors, fieldbus interfaces or MOVIMOT® inverters must be equipped with additional monitoring and protection devices according to the applicable safety guidelines, such as the law governing technical equipment, accident prevention regulations, etc. Additional protective measures may be necessary for applications with increased potential risk.

Do not touch live components or power connections immediately after disconnecting the MOVIMOT® inverter, the field distributor (if installed) or the bus module (if installed) from the supply voltage because there may still be some charged capacitors. Wait at least for 1 minute after having switched off the supply voltage.

As soon as supply voltage is present at the field distributor MOVIMOT® inverter, the terminal box must be closed, which means that:

- The MOVIMOT® inverter must be screwed on.
- The connection box cover of the field distributor (if installed) and the fieldbus interface (if installed) must be screwed on.
- The connector of the hybrid cable (if installed) must be connected and screwed on.

Note: The maintenance switch of the field distributor (if installed) only disconnects the connected MOVIMOT® drive or motor from the power supply system. The terminals of the field distributor remain connected to the line voltage even after the maintenance switch is activated.

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 supply system and no longer carries any voltage.

Mechanical blocking or internal safety functions of the unit can cause a motor standstill. Eliminating the cause of the problem or performing a reset may result in the drive restarting automatically. If, for safety reasons, this is not permitted for the driven machine, disconnect the unit from the supply system before correcting the error.

Caution: Danger of burns: The surface temperature of the MOVIMOT® drive and of external options, e.g. the heat sink of the braking resistor, can exceed 60 °C during operation!



4 Integrated Safety Technology

4.1 PROFIsafe safety concept

- The PROFIsafe field distributors have an integrated safety-oriented electronics sub-assembly with safety inputs and outputs (F-DI, F-DO) in the PROFIsafe MQS.. interface. The safety concept of this component is based on a safe status for all safety-related process variables. For the MQS.. PROFIsafe interface this value is "0", for all inputs F-DI and outputs F-DO.
- The 2-channel redundant system structure of the safety component ensures that, with suitable monitoring mechanisms, requirements SIL3 according to EN 61508, category 4 according to EN 954-1 and performance level "e" according to EN ISO 13849-1 are fulfilled. When the system detects a fault, the system responds by reverting to a safe status. This makes the safety function available in the form of failsafe inputs and outputs connected to a higher-level safety controller via PROFIsafe communication. The safe inputs/outputs on the safety subassembly of the MQS interface are not evaluated locally or processed logically.
- The safety output F-DO can be used to disconnect the 24 V supply of the MOVIMOT[®] inverter, thus bringing the drive to a safe stop. In this context, observe the following safety concept of the MOVIMOT[®] frequency inverter and all safety notes, conditions and installation regulations in this publication.

The safety function of the MOVIMOT[®] inverter is only permitted for applications up to

- Category 3 according to EN 954-1
- or performance level d according to EN ISO 13849-1
- or SIL 2 according to EN 61805



4.2 MOVIMOT® inverters – safety concept

4.2.1 Safe condition

For safety-related operation of MOVIMOT® MM..D, **Safe Torque Off is defined as safe condition** (see STO safety function). The safety concept is based on this.

4.2.2 Safety concept

- The MOVIMOT® MM..D inverter can be connected to an external safety controller or safety relay. This de-energizes all active elements that generate the pulse trains to the power output stage (IGBT) by switching off the safety-related 24 V supply when a connected control device (e.g. emergency stop button with latching function) is activated. This ensures that the inverter no longer supplies power to the motor for generating torque.
- Disconnecting the 24 V power supply ensures that the voltage supplies required for operation of the drive are safely interrupted.
- Instead of galvanic isolation of the drive from the supply system using contactors or switches, the disconnection of the 24 V supply described here safely prevents the gating of the power semiconductors in the inverter. The rotary-field generation for the respective motor is deactivated even though the line voltage is still present.



4.3 Safety functions

The following drive-related safety functions can be used:

- **STO** (Safe Torque Off according to IEC 61800-5-2) by switching off the safety-related 24 V power supply.

If the STO function is activated, the inverter no longer supplies power to the motor for generating torque. This safety function corresponds to a non-controlled stop according to EN 60204-1, stop category 0.

The safety-related 24 V power supply must be switched off by a suitable external safety controller or a suitable external safety relay.

- **SS1(c)** (Safe Stop 1, function variant c according to IEC 61800-5-2) through suitable external control (e.g. safety relay with delayed deactivation).

The following sequence is mandatory:

- Decelerate the drive using an appropriate brake ramp specified via setpoints
- Disconnect the safety-related 24 V power supply (= triggering the STO function) after a specified safety-related time delay.

This safety function corresponds to a controlled stop according to EN 60204-1, stop category 1.



4.4 Limitations

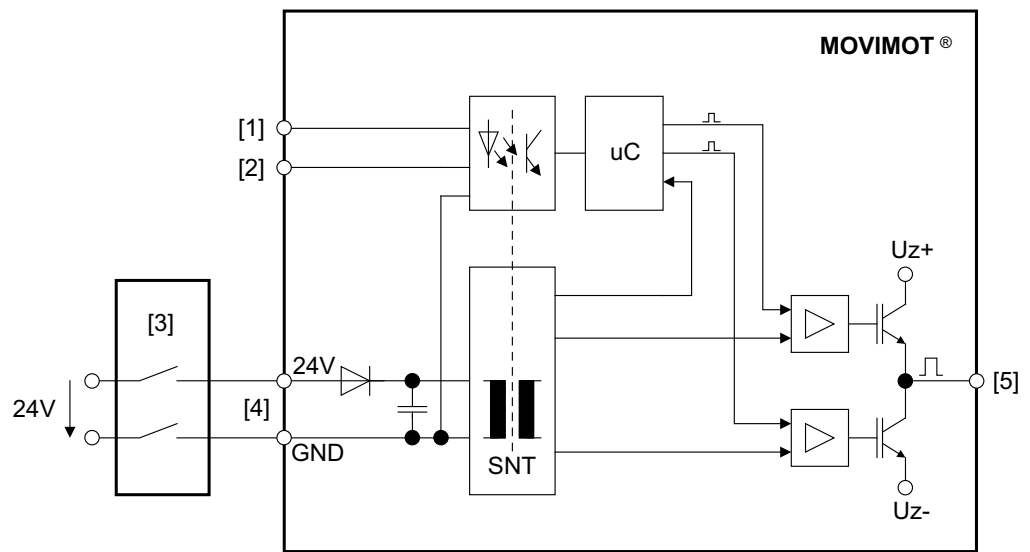
- **Note:** The brake controller integrated in MOVIMOT® and the standard brake integrated in brakemotors is not safety-related and therefore not part of the safety functions mentioned above. If the brake controller and/or the motor brake fails, the drive can coast for much longer depending on the application (i.e. the friction and inertia of the system). In case of regenerative loads (e.g. lifting axes, declining conveying lines), the drive can even accelerate. This must be taken into account for a risk analysis of the system/machine. Additional safety measures might have to be implemented (e.g. safety brake system).

MOVIMOT® cannot be used without an additional brake system for application-specific safety functions that require active deceleration (braking) of the dangerous movement.

- **Note:** When using the SS1(c) function as described above, the brake ramp of the drive is not monitored with respect to safety. In case of a fault, the drive might not be decelerated after the delay time, or it might be accelerated in the worst case. In this case, the STO function (see above) is only activated after the set time delay has passed. The resulting danger must be taken into account for the risk analysis of the system/machine. Additional safety measures might have to be implemented.
- **Note:** A system/machine-specific risk analysis must be carried out through the system/machine manufacturer and taken into account for the use of the drive system with MOVIMOT®.
- **Important: The safety concept is only suitable for performing mechanical work on system/machine components.**
- **Note:** When using a thermistor, protection against restart is not guaranteed when the thermistor is triggered. This fact must be taken into account in the risk analysis and, if necessary, appropriate measures must be taken.
- **Danger of fatal injury:** If the 24 V power supply is disconnected, the line voltage is still present at the inverter DC link.
- **Important: If work is carried out on the electrical section of the drive system, the power supply must be disconnected using an external maintenance switch.**



Schematic illustration of the "safety concept for MOVIMOT®"



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- [1] RS-485
- [2] Binary inputs "R", "L", "f1/f2"
- [3] Safety relay, external
- [4] Safety-related 24 V power supply
- [5] Motor phase



5 Safety Conditions

The safety functions of the PROFIsafe field distributors and the MOVIMOT® MM..D can only be used for safe operation of the system/machine if they are integrated correctly in an application-specific, higher-level safety function or safety system. It is essential that the system/machine manufacturer conducts a system/machine-specific risk analysis (e.g. according to ISO 14121, previously: EN 1050) and validates the required safety conditions and functions prior to startup. The system/machine manufacturer and the operator are responsible for compliance of the system/machine with applicable safety regulations.

The following conditions are mandatory when installing and operating PROFIsafe field distributors and MOVIMOT® MM..D in safety-related applications.

The conditions are divided into the following sections:

- Installation requirements
- Requirements for external safety controllers/safety relays
- Startup requirements
- Operation requirements



5.1 Installation requirements

- You may only use SEW hybrid cables for safety-related applications with PROFIsafe field distributors and MOVIMOT[®] inverters.
 - Do not shorten SEW hybrid cables. Use cables in their original lengths with prefabricated plug connectors. Check for proper connection.
 - Supply system cables and the safety-related control cables must be routed separately, unless you are using genuine SEW hybrid cables.
 - The length of the cable from the safety controller to the MOVIMOT[®] may not exceed 100 m.
 - Wiring must comply with EN 60204-1.
 - The safety-related control lines must be routed according to EMC guidelines and as follows:
 - Outside an electrical installation space: Shielded cables must be routed permanently (fixed) and protected against external damage, or other equivalent measures.
 - Individual conductors can be routed inside an electrical installation space.Observe the respective regulations governing the application.
 - The safety-related 24 V power supply may not be used for feedback.
 - Make sure that parasitic voltages cannot be generated in the safety-related control lines.
 - Observe the values specified for safety components when designing the safety circuits.
 - Only the voltage for the safety-related 24 V supply is permitted for connecting the direction of rotation signals and setpoint changeover (terminals "R", "L", "f1/f2").
 - For EMC-compliant installation, observe the information in the following publications:
 - "MOVIMOT[®] MM..D with AC Motors DRS/DRE/DRP" operating instructions
 - or "MOVIMOT[®] MM..D with AC Motors DT//DV" operating instructionsand one of the following manuals
 - "PROFIBUS Interfaces, Field Distributors" manual (optional)
 - "INTERBUS Interfaces, Field Distributors" manual (optional)
 - "DeviceNet/CANopen Interfaces, Field Distributors" manual (optional)
- It is important that the shielding of the safety-related 24 V supply cable is connected to the housing at both ends.
- For all 24 V power supplies of the MOVIMOT[®] inverter, the field distributor and all stations of the fieldbus, only voltage sources with safe disconnection (SELV/PELV) according to VDE 0100 are permitted.

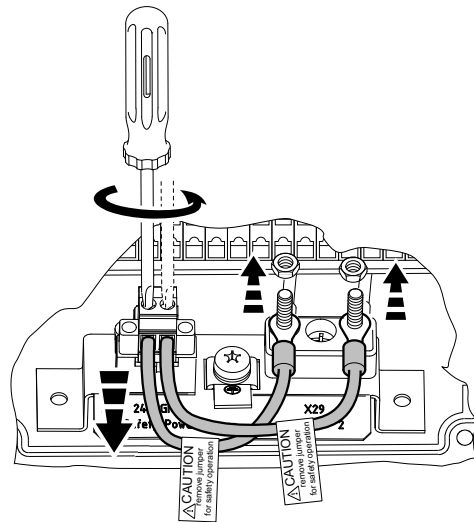
In case of a single fault, the voltage between the outputs or between any output and grounded parts may not exceed DC 60 V.



Safety Conditions

Installation requirements

- For safety-related applications with MOVIMOT® remove the jumpers on the field distributors between 24V/X40 and 24V/X29 labeled "Caution, remove jumper for safety operation", see following figure:



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- Do not make any changes to the wiring of the field distributor.
- When planning the installation, observe the technical data of MOVIMOT® MM..D.
- Observe the following when installing option MBG11A or MWA21A:
 - No other field unit (e.g. PLC) must be connected to the RS-485 interface.
 - Use of the safety-related 24 V power supply
 - Protected wiring of the connected cables



5.2 External safety controller requirements

A safety relay can be used as an alternative to a safety controller. The following requirements apply analogously.

- For safety-related applications up to category 3 per EN 954-1, the safety controller and all other safety-relevant subsystems must be approved for at least category 3 to EN 954-1 or performance level d to EN ISO 13849-1 or SIL 2 to EN 61508.
- For safety-related applications up to performance level d per EN ISO 13849-1, the safety controller and all other safety-relevant subsystems must be approved for at least performance level d to EN ISO 13849-1 or SIL 2 to EN 61508. For determining the performance level of the overall application, the method described in EN ISO 13849-1 for combining several safety-relevant subsystems (without PFH value calculation) can be used. However, we recommend to determine the PFH value for the overall application. For MOVIMOT® MM..D, PFH = 0 can be assumed.
- For safety-related applications up to SIL 2 per EN 62061, the safety controller and all other safety-relevant subsystems must be approved for at least SIL 2 to EN 61508 or performance level d to EN ISO 13849-1. The probability of a dangerous failure per hour (= PFH value) must also be determined. For determining the PFH value for the overall application, PFH = 0 can be assumed for MOVIMOT® MM..D.

Application	Safety controller requirements
Category 3 according to EN 954-1	Category 3 according to EN 954-1 Performance level d according to EN ISO 13849-1 SIL 2 according to EN 61508
Performance level d according to EN ISO 13849-1	Performance level d according to EN ISO 13849-1 SIL 2 according to EN 61508
SIL 2 according to EN 62061	Performance level d according to EN ISO 13849-1 SIL 2 according to EN 61508

- The wiring of the safety controller must be suitable for the required safety class, (see manufacturer documentation). Safety circuits with MOVIMOT® require 2-pole disconnection.
- The values specified for the safety controller must be strictly adhered to when designing the circuit.
- The switching capacity of the safety relays or the relay outputs of the safety controller must correspond at least to the maximally permitted, limited output current of the 24 V voltage supply. **Observe the manufacturer's instructions concerning the permitted contact loads and fusing that may be required for the safety contacts. Unless specified otherwise, the contacts must be protected with 0.6 times the nominal value of the maximum contact rating specified by the manufacturer.**



Safety Conditions

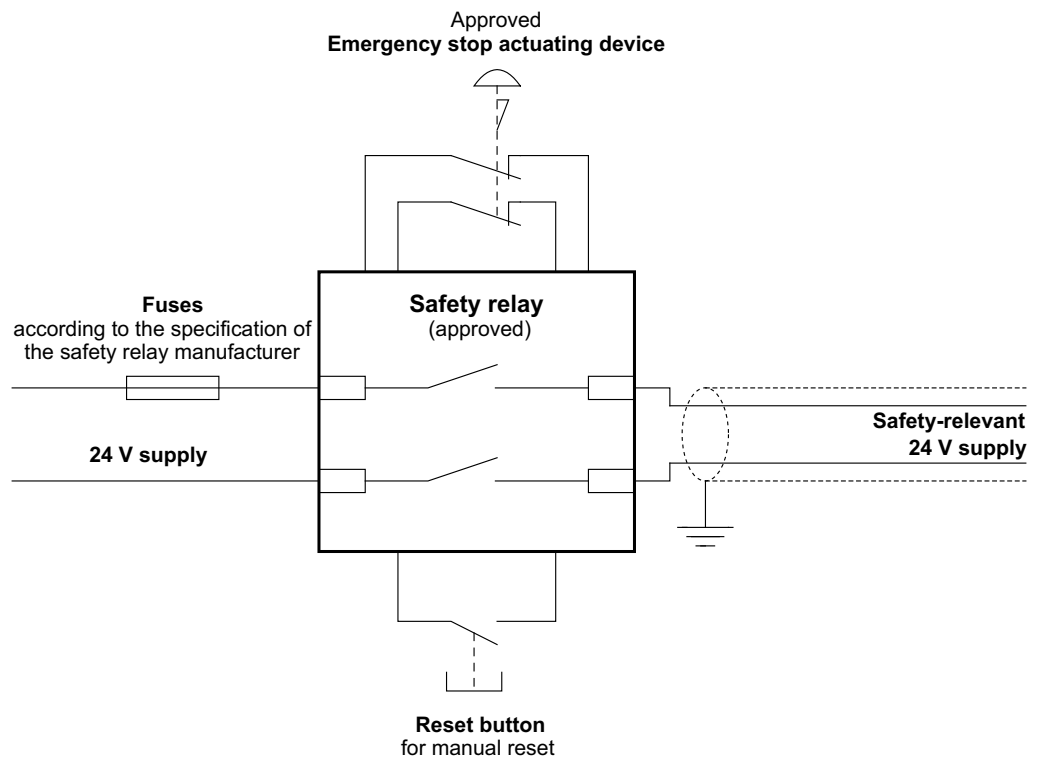
External safety controller requirements

- To ensure protection against unintended restart in accordance with EN 1037, the safety controllers must be designed and connected in such a way that resetting the control device alone does not lead to a restart. A restart may only be carried out after a manual reset of the safety circuit.
- The 24 V power supply input of MOVIMOT® comes equipped with a serial polarity protection diode as well as a buffer capacitor with $C = 130 \mu\text{F}$. This must be considered as load when dimensioning the switching output.

"Safety relay" switching example

The following figure shows the basic interface of an external safety relay (according to the before mentioned requirements) to MOVIMOT® MM..D.

The information in the respective manufacturer's data sheets must be observed for connection.



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5.3 Sensor and actuator requirements

- The project planning engineer and system/machine operator are responsible for selecting and implementing external sensors and actuators for connection to the safety inputs/outputs of the MQS.. PROFIsafe interface.

Note that most of the hazardous errors that may occur in the safety classes are caused by the sensors and actuators.

In order to meet the safety category and/or SIL class requirements you must use suitable and qualified sensors and actuators and observe the permissible wiring diagram connections in section "Connecting safety-related inputs and outputs" (page 46).

- For the MQS.. PROFIsafe interfaces, only connect sensors with contact according to the fail-safe principle to the safety inputs F-Dlx. They must be supplied from the internal sensor supply voltage F-SSx.
- In order for the failsafe inputs to register the sensor signals correctly, the duration of a signal may not be less than 15 ms.

5.4 Startup requirements

- Startup must be documented and the functionality of the safety functions must be demonstrated. Observe the limitations for the safety functions of MOVIMOT® in chapter "Limitations" (page 16) for the verification of the safety functions. Non-safety-relevant parts and components that affect the result of the verification test (e.g. motor brake) must be deactivated, if necessary.
- For the implementation of PROFIsafe field distributors and MOVIMOT® MM..D in safety-related applications, you must perform and record startup checks for the disconnecting device and correct wiring.
- During the startup/function test, you must measure the voltage supplies (e.g. safety power X40, bus module supply X29) to check whether they are assigned correctly.
- The function test must be carried out in succession for all potentials, i.e. separately.

5.5 Operation requirements

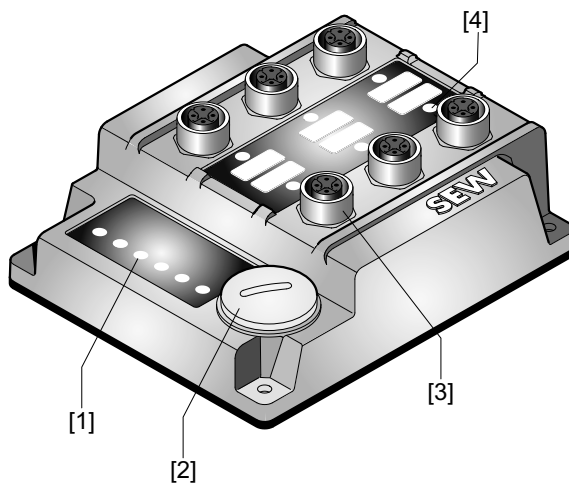
- Operation is only allowed within the limits specified in the data sheets. This applies to the external safety relay as well as to the PROFIsafe field distributors, MOVIMOT® MM..D and approved options.
- The safety functions must be checked at regular intervals to ensure that the functions work properly. The test intervals should be specified in accordance with the risk analysis.



6 Unit Structure

6.1 Fieldbus interfaces

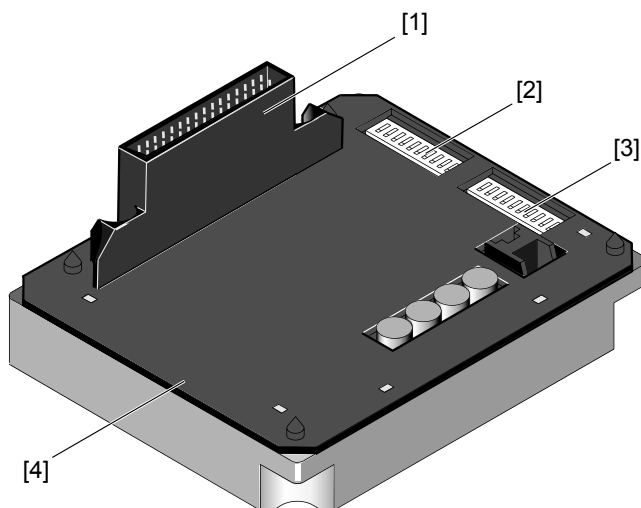
6.1.1 MQS22F, MQS32F fieldbus interface



1132781835

- [1] Diagnostic LEDs
- [2] Diagnostics interface (underneath the gland)
- [3] M12 connection sockets
- [4] Status LED

6.1.2 Bottom side of the MQS22F, MQS32F interface



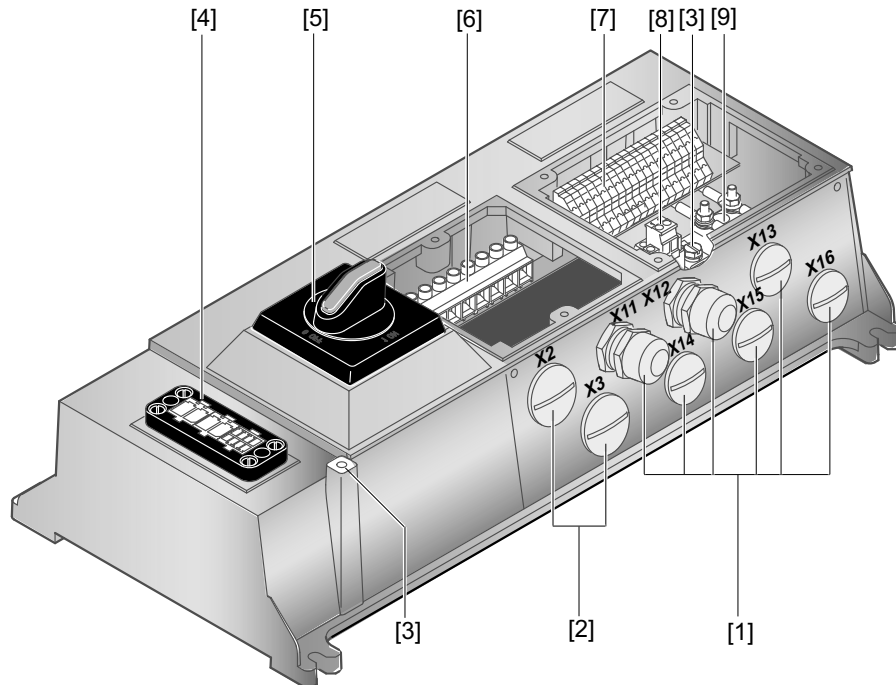
2087403915

- [1] Connection to connection module
- [2] DIP switch S1 for PROFIBUS DP address
- [3] DIP switch S2 for PROFIsafe address
- [4] Sealing



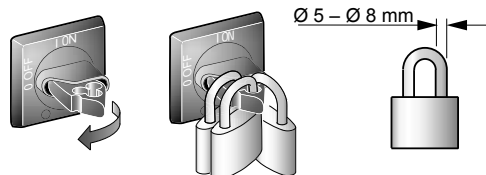
6.2 Field distributors

6.2.1 MQS../Z.6. field distributor



1136203659

- [1] 6 x M20 x 1.5 (scope of delivery includes two EMC cable glands)
- [2] 2 x M25 x 1.5
- [3] Equipotential bonding connection
- [4] Hybrid cable connection; connection to MOVIMOT® inverter (X9)
- [5] Maintenance switch **with line protection** (triple lock, color: black/red)

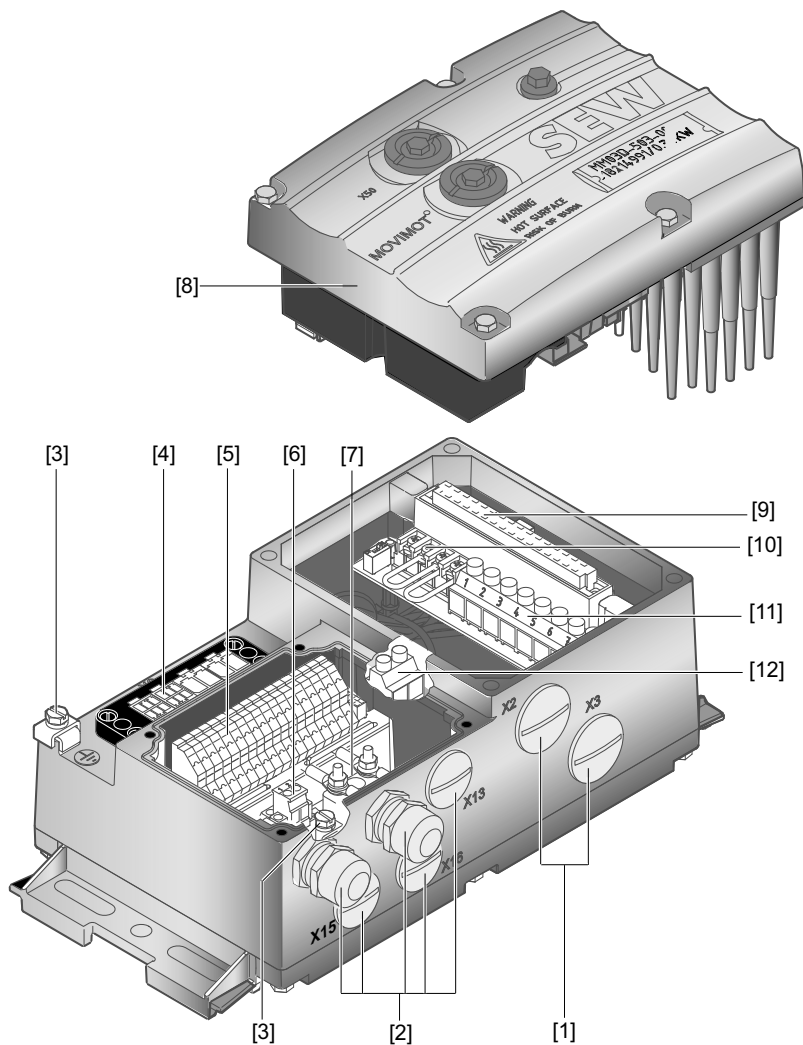


1136352395

- [6] Terminals for power supply and PE connection (X1)
- [7] Terminals for bus, sensor, actuator, 24 V connection (X29)
- [8] Pluggable terminal "Safety Power" for 24 V MOVIMOT® supply (X40)
- [9] Terminal block for 24 V through-wiring (X29), internal connection to 24 V on X20



6.2.2 MQS../MM../Z.7. field distributor

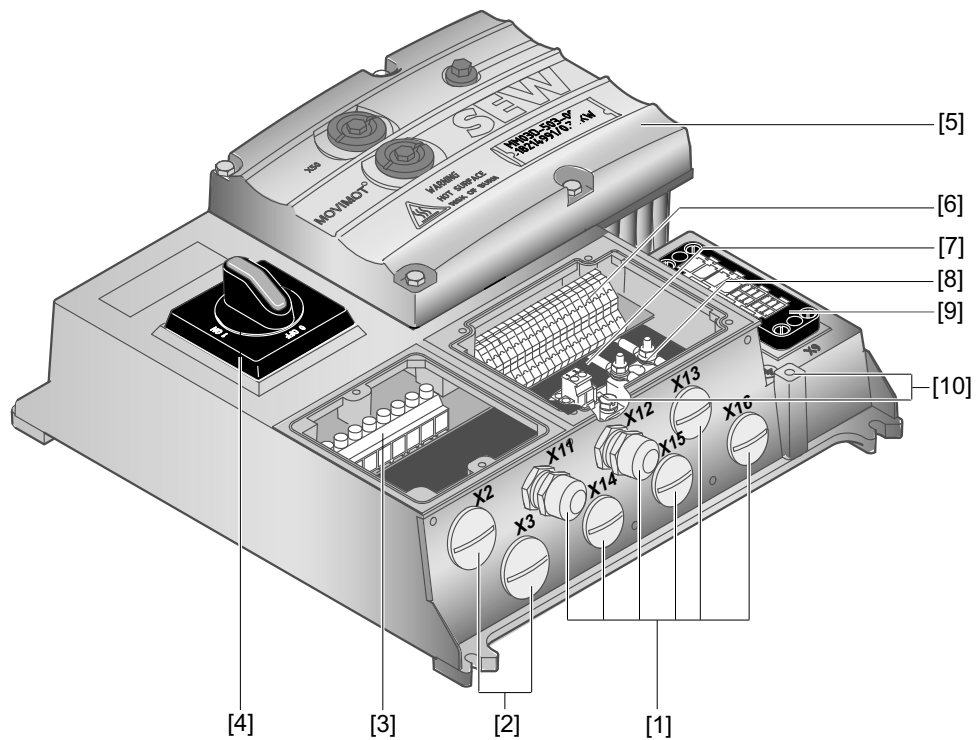


1136447627

- [1] 2 x M25 x 1.5 cable glands
- [2] 5 x M20 x 1.5 cable gland (scope of delivery includes two EMC cable glands)
- [3] Equipotential bonding connection
- [4] Hybrid cable connection; connection to AC motor (X9)
- [5] Terminals for bus, sensor, actuator, 24 V connection (X29)
- [6] Pluggable terminal "Safety Power" for 24 V MOVIMOT® supply (X40)
- [7] Terminal block for 24 V through-wiring (X29), internal connection to 24 V on X20
- [8] MOVIMOT® inverter
- [9] Connection to the MOVIMOT® inverter
- [10] Terminals for enabling the direction of rotation
- [11] Terminals for power supply and PE connection (X1)
- [12] Terminal for integrated brake resistor

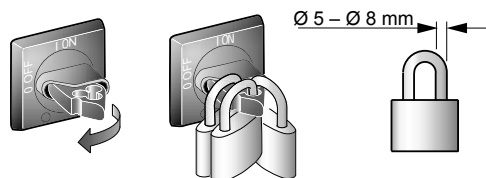


6.2.3 MQS../MM../Z.8. field distributor



1136479371

- [1] 6 x M20 x 1.5 cable gland (scope of delivery includes two EMC cable glands)
- [2] 2 x M25 x 1.5 cable glands
- [3] Terminals for power supply and PE connection (X1)
- [4] Maintenance switch (triple lock, color: black/red)

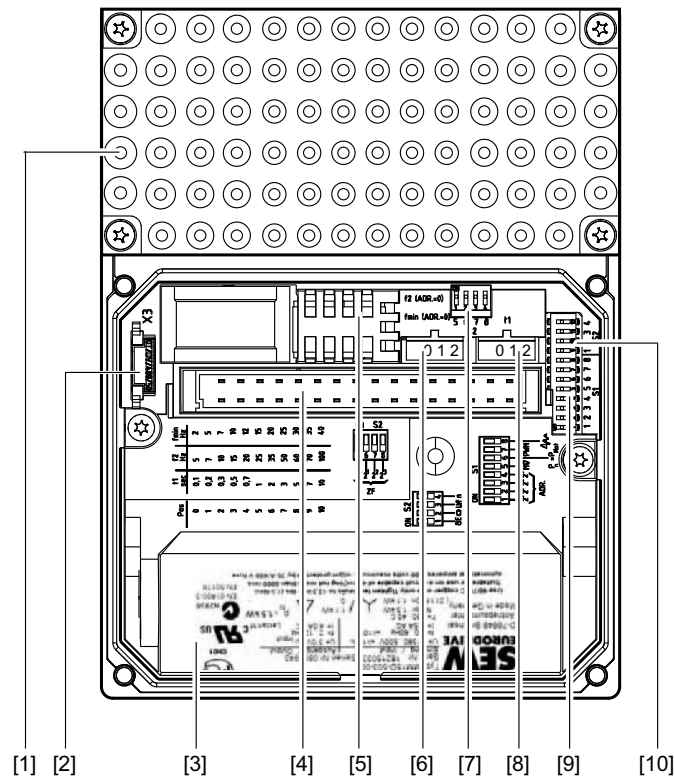


1136352395

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



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



2087545995

- [1] Heat sink
- [2] Drive-ID module
- [3] Inverter nameplate
- [4] Plug for connection unit with inverter
- [5] Setpoint potentiometer f1 (not visible), accessible through a cable gland on the top of the terminal box cover
- [6] Setpoint switch f2 (green)
- [7] DIP switches S2/5 – S2/8
- [8] Switch t1 for integrator ramp (white)
- [9] DIP switches S1/1 – S1/8
- [10] DIP switches S2/1 – S2/4



7 Mechanical Installation

7.1 Installation instructions

	TIP
	<p>On delivery, field distributors are equipped with transportation protection covering the plug connector of the outgoing motor circuit (hybrid cable).</p> <p>This only guarantees enclosure IP40. To attain the specified enclosure rating, remove the transport protection and plug on the appropriate mating connector. Screw them together.</p>

7.1.1 Assembly

- Mount field distributors on a level, vibration-proof and torsionally rigid support structure only.
- Use M6 screws and suitable washers for installing **MFZ.6**, **MFZ.7** or **MFZ.8** field distributors. Tighten the screws with a torque wrench (permitted tightening torque 3.1 – 3.5 Nm (27 – 31 lb.in)).

7.1.2 Installation in damp locations or in the open

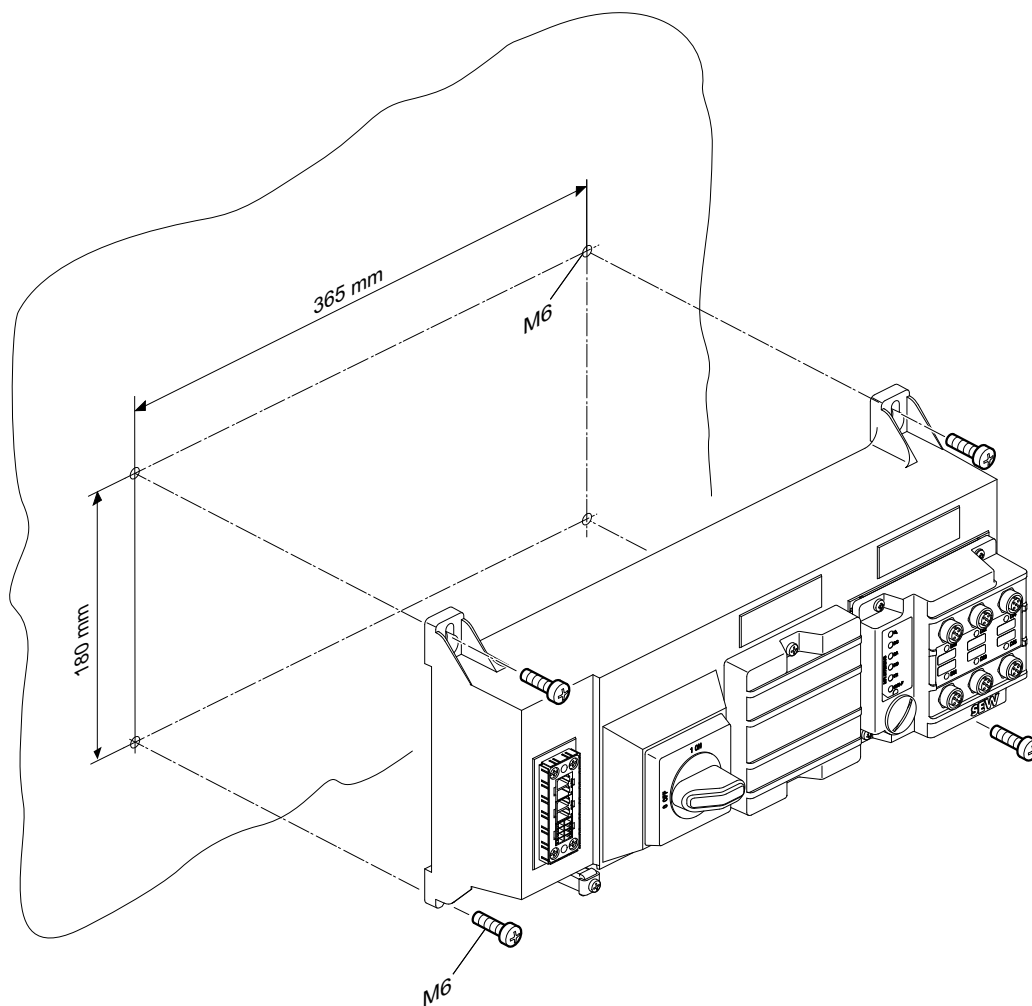
- Use suitable screw fittings for the cables (use reducing adapters if necessary).
- Seal open cable entries and M12 connection sockets with screw plugs.
- When the cable entry is on the side of the unit, route the cable using a drip loop.
- Check and, if necessary, clean the sealing surfaces before re-mounting the fieldbus interface/the connection box cover.



7.2 Field distributors

7.2.1 MQS../Z.6. field distributor, mounting

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

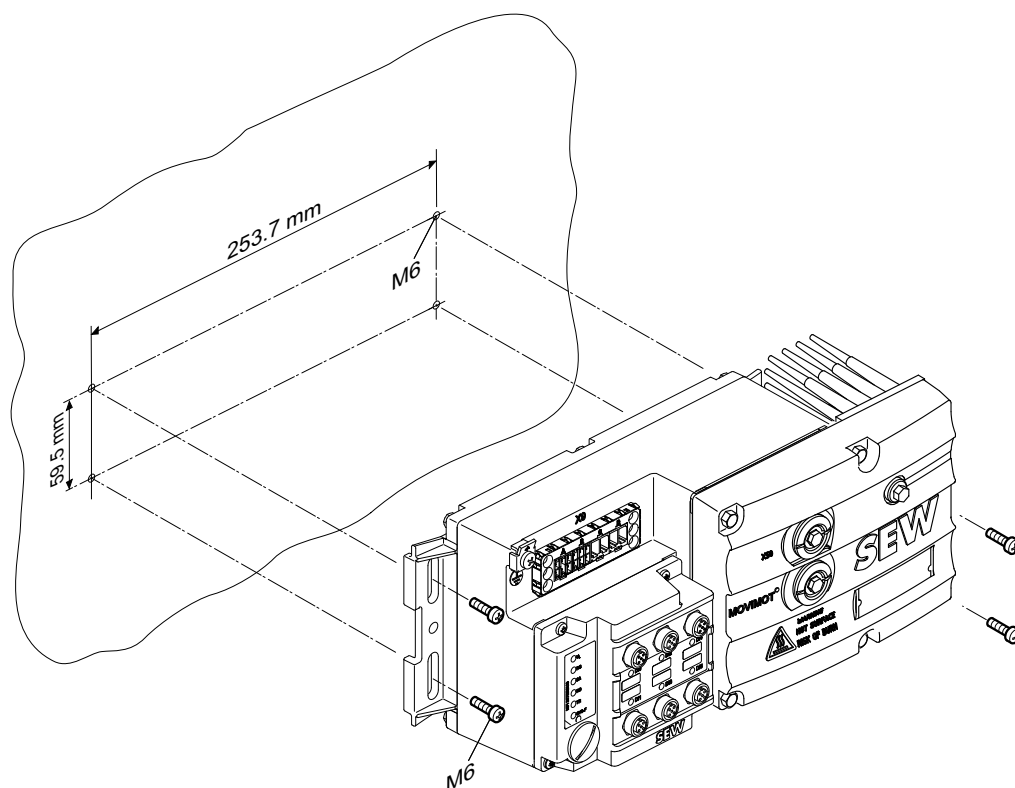


1138795019



7.2.2 MQS../MM../Z.7. field distributor, mounting

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

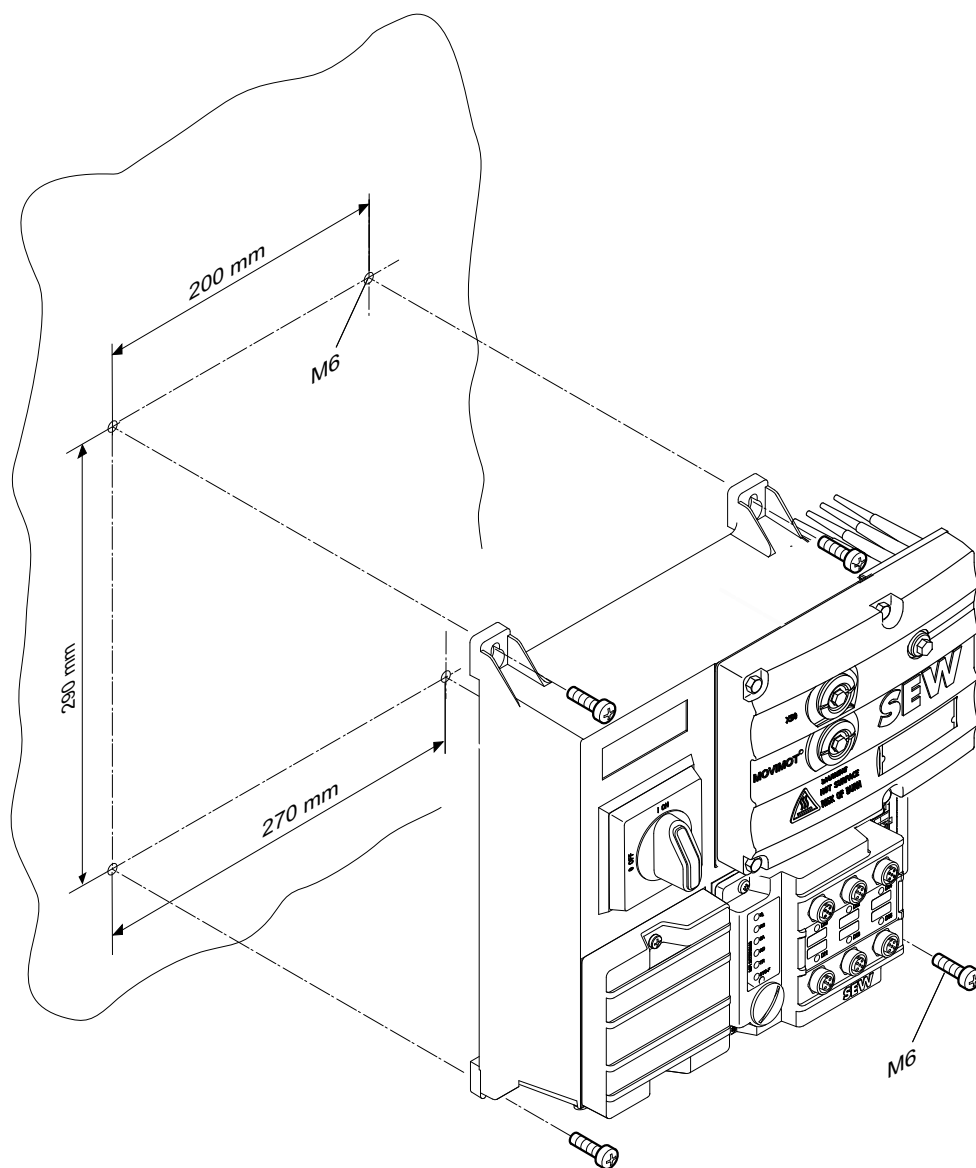


1138831499



7.2.3 MQS../MM../Z.8. field distributor – mounting (Size 1)

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

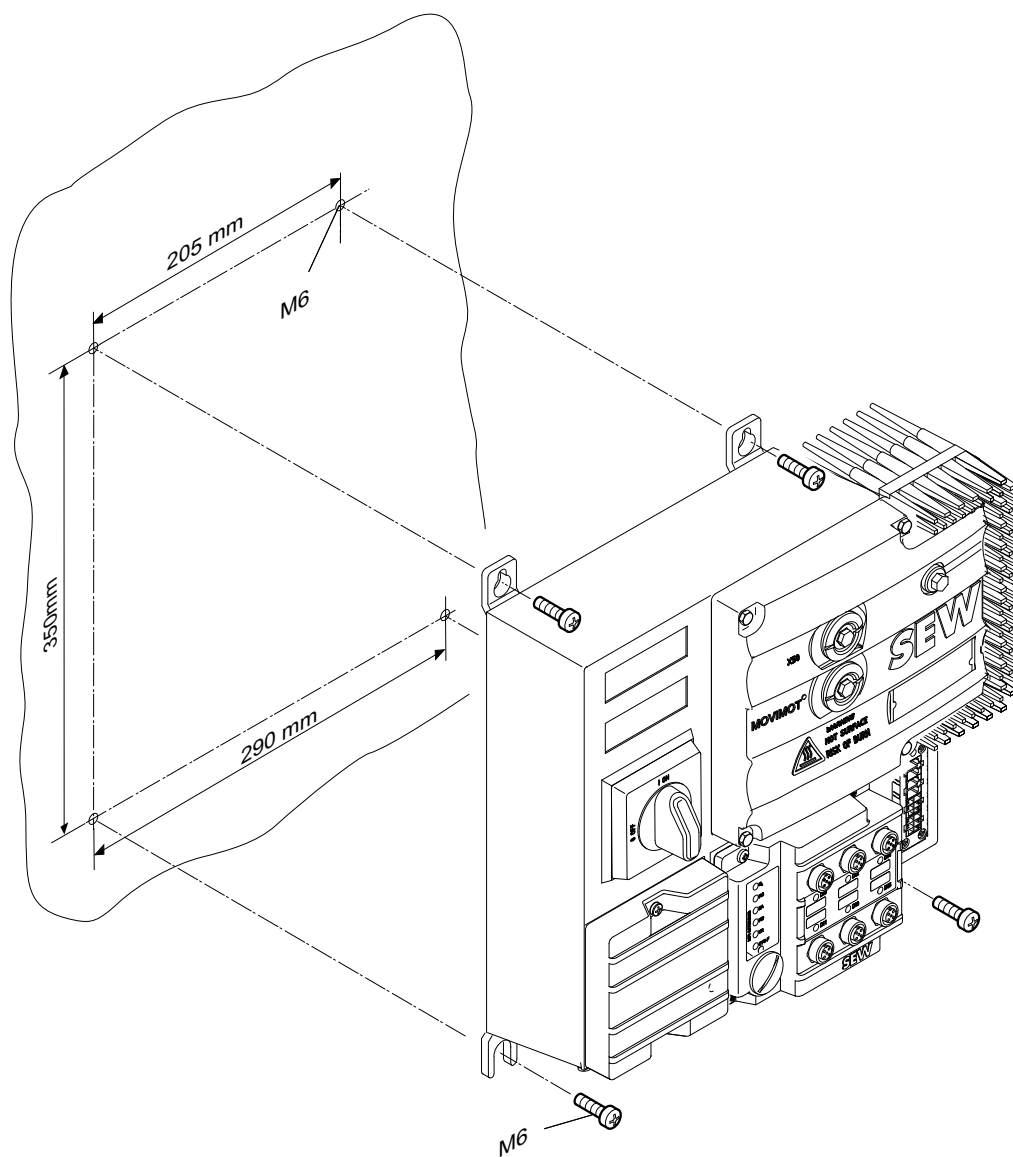


2200451851



7.2.4 MQS../MM../Z.8. field distributor – mounting (Size 2)

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

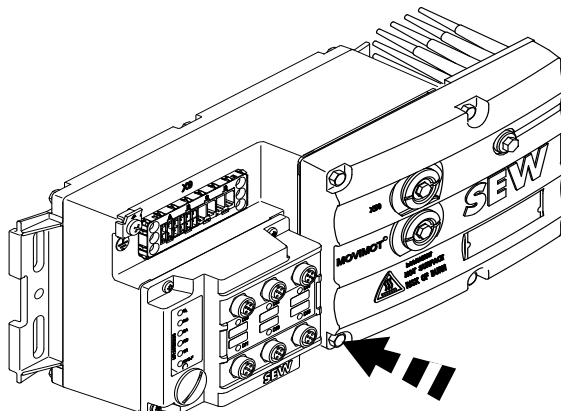


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7.3 Tightening torques

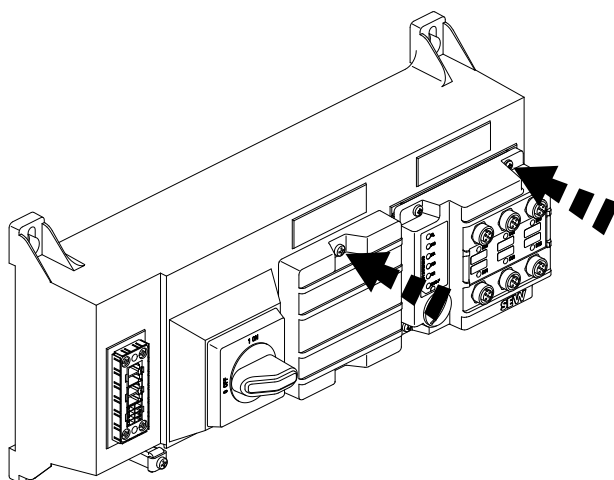
7.3.1 MOVIMOT® inverter



1138500619

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

7.3.2 Fieldbus interfaces/terminal box cover

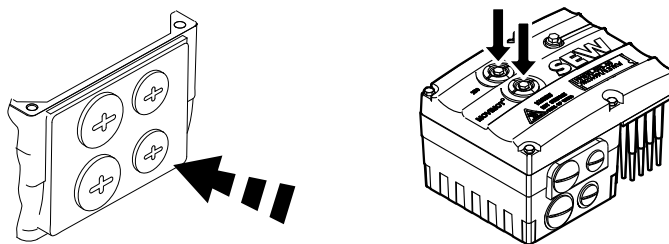


1138504331

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



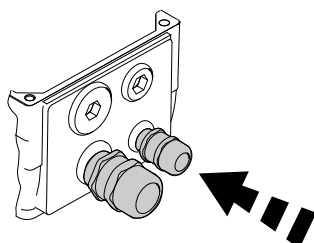
7.3.3 Screw plugs



1138509067

Tighten the blanking plugs and the screw plugs of potentiometer f1 and that of connection X50, if applicable, using 2.5 Nm (22 lb.in).

7.3.4 EMC cable glands



1138616971

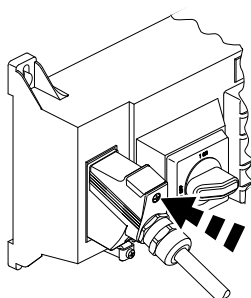
Tighten EMC cable glands supplied by SEW-EURODRIVE using the following torque ratings:

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

The cable retention in the cable gland must be able to withstand the following removal force:

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

7.3.5 Motor cable



1138623499

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



8 Electrical Installation

8.1 Installation planning according to EMC

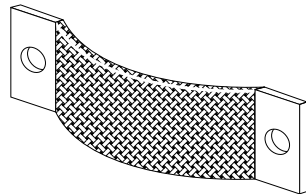
8.1.1 Notes on arranging and routing installation components

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

You must always apply the **relevant standards**. Also observe the following points in particular:

- **Equipotential bonding**

- Low-impedance, HF-capable equipotential bonding must be provided independent of the functional ground (PE terminal) (see also VDE 0113 or VDE 0100 part 540) using, for example
 - Flat contact surface connection of metal components
 - Flat grounding strips (HF stranded wire)



1138895627

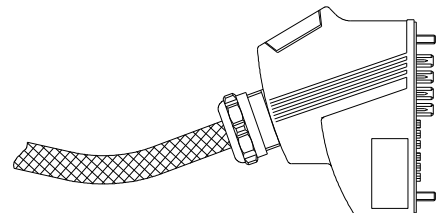
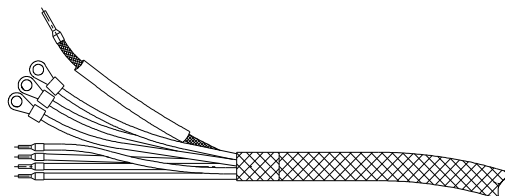
- Do not use the cable shield of data lines for equipotential bonding.

- **Data lines and 24 V supply**

- Must be routed separately from cables that emit interference (e.g. control cables from solenoid valves, motor cables).

- **Field distributor**

- We recommend using prefabricated SEW hybrid cables especially designed for connecting field distributors and motors.



1138899339

- **Cable glands**

- Select a gland with a shield connected over a large area. Observe the notes regarding the selection and the correct mounting of the cable glands.



- **Cable shield**
 - The cable shield must have good EMC characteristics (high shield attenuation).
 - It must protect the cable mechanically and as a shield,
 - Connect the shielding to a wide area of the unit's metal housing at the cable ends (via EMC metal cable glands). Also observe the further notes in this section regarding the selection and correct mounting of cable glands.
- **Additional information is available in the SEW publication "Drive Engineering – Practical Implementation, EMC in Drive Engineering."**



8.2 Field distributors – installation instructions

8.2.1 Connecting supply system cables

- The rated voltage and frequency of the MOVIMOT® inverter must correspond to the data for the supply system.
- Select the cable cross section according to input current I_{mains} at rated power; for detailed information, see section "Technical Data".
- Install line fuses at the beginning of the supply system line behind the supply bus junction. Use D, D0, NH fuses or circuit breakers. Select the fuse size according to the cable 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 61800-5-1, a second PE connection (with at least the same cross-section as the supply system line) 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-EURODRIVE recommends using earth-leakage monitors with pulse code measuring in voltage supply systems with a non-grounded star point (IT systems). Using such devices prevents the earth-leakage monitor mis-tripping due to the ground capacitance of the inverter.



8.2.2 Notes on PE connection and/or equipotential bonding

	! DANGER
	<p>Faulty PE connection.</p> <p>Death, severe injuries or damage to property from electric shock.</p> <ul style="list-style-type: none"> The permitted tightening torque for the screw fitting is 2.0 - 2.4 Nm (18 - 21 lb.in). Observe the following notes regarding PE connection.

Prohibited assembly sequence	Recommendation: Assembly with forked cable lug Permitted for all cross sections	Assembly with thick solid wire Permitted for cross sections up to max. 2.5 mm ²
<p>323042443</p>	<p>323034251</p>	<p>323038347</p>

[1] Forked cable lug suitable for M5 PE screws

8.2.3 Permitted connection cross section and current carrying capacity of the terminals

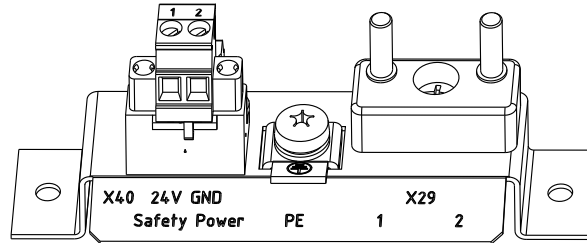
	Power terminals X1, X21 (screw terminals)	Control terminals X20 (cage clamp terminals)
Connection cross section (mm ²)	0.2 mm ² – 4 mm ²	0.08 mm ² – 2.5 mm ²
Connection cross section (AWG)	AWG 24 – AWG 10	AWG 28 – AWG 12
Current carrying capacity	32 A max. continuous current	12 A max. continuous current

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



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

- The connection part of the DC 24 V supply comprises an 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 as an alternative to the X20 terminal (see section "Unit Structure") for looping through 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, (F) sensors and standard actuators (studs bridged with terminal X2011)
	2	GND	0V24 reference potential (Studs, jumpered with terminal X20/13)

- The pluggable terminal X40 ("Safety Power") is intended for the DC 24 V supply of the MOVIMOT[®] inverter via the safety-related output of the MQS.2F PROFIsafe field distributor.

Terminal assignment			
No.		Name	Function
X40	1	24 V	24 V voltage supply for MOVIMOT [®] for safe stop
	2	GND	0V24 reference potential for MOVIMOT [®] for safe stop

- Terminal X40/1 is jumpered with X20/31 and X40/2 with X20/33 at the factory to connect the MOVIMOT[®] inverter to the safe binary output of the MQS.2F PROFIsafe field distributor.
- The current carrying capacity of both studs is 16 A.
The permitted tightening torque of the hex nuts is 1.2 Nm (10.6 lb.in) ± 20%.
- The current carrying capacity of the X40 screw terminal is 10 A.
The connection cross section is 0.25 mm² to 2.5 mm² (AWG 24 to AWG 12).
The permitted tightening torque is 0.6 Nm (5.3 lb.in).



8.2.5 Installation altitude above 1000 m 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 conditions¹⁾.

- The rated continuous power is reduced based on the reduced cooling above 1000 m (see section "Technical Data").
- Above 2000 m asl, 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 more than 2 000 m above sea level (safe electrical disconnection in accordance with EN 61800-5-1 and EN 60204).
- In installation altitudes between 2,000 m to 4,000 msl, the permitted rated power supply voltages are reduced as follows:
 - By 6 V per 100 m for MM..D-503-00

8.2.6 Protection devices

- MOVIMOT® drives are equipped with integrated protection devices against overload. External overload devices are not necessary.

8.2.7 UL-compliant installation for field distributors

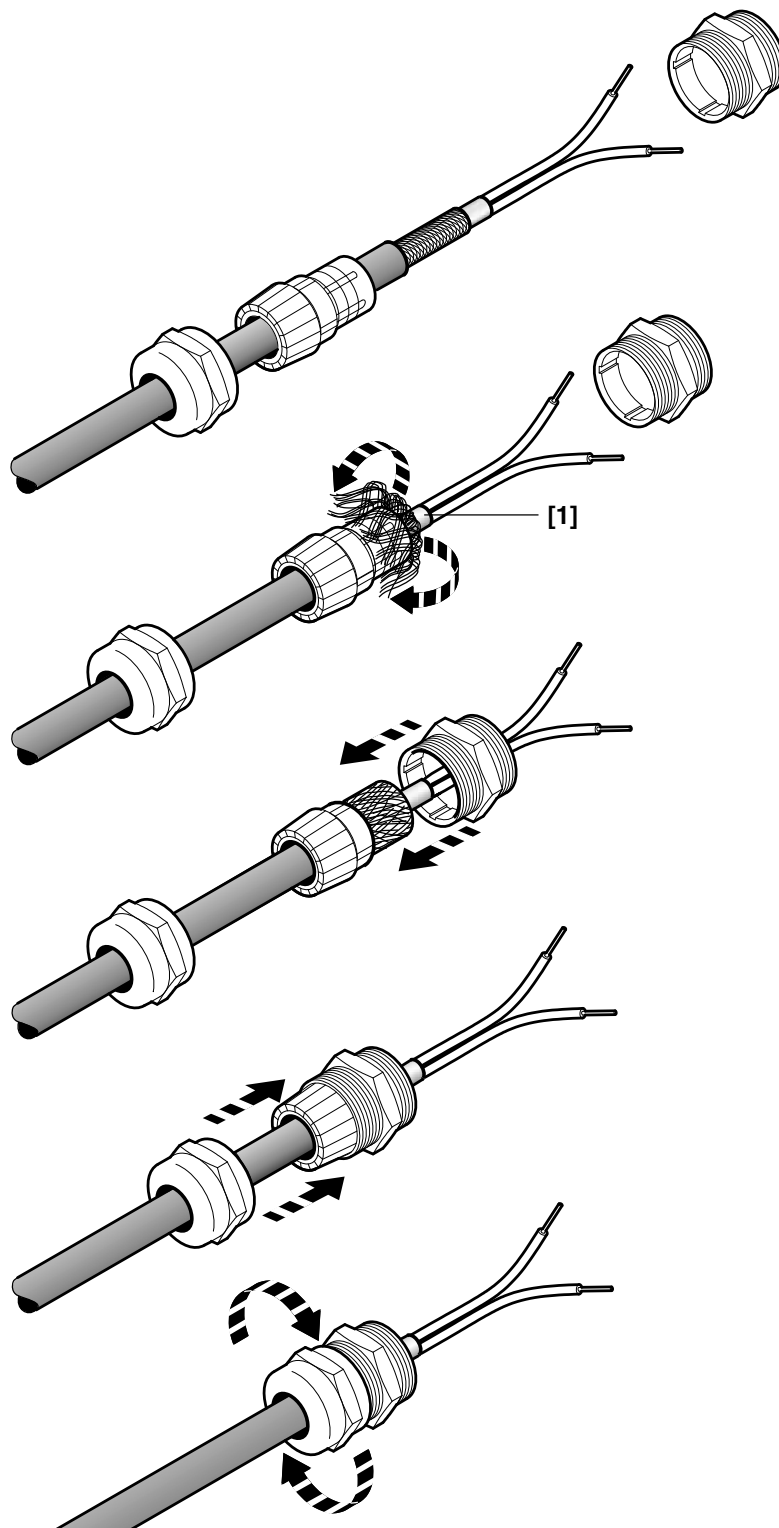
- Use only copper cables with the temperature range 60/75 °C as connection lead:
- MOVIMOT® is suited for operation on voltage supply systems with grounded star (TN and TT systems) supplying a maximum current of AC 5000 A and a maximum rated voltage of AC 500 V. A UL-compliant use of MOVIMOT® requires the use of fuses with a performance data not exceeding 35 A / 600 V.
- Use only tested units with a limited output voltage ($V \leq \text{DC } 30 \text{ V}$) and limited output current ($I \leq 8 \text{ A}$) as an external DC 24 V voltage source.
- 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 capacitors.



8.2.8 EMC metal cable glands

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



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



8.2.9 Wiring check

In order to prevent injury or damage to the plant, check the wiring before you connect the power supply for the first time

- Remove all fieldbus interfaces 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 wiring in accordance with applicable national standards
- Check the grounding.
- Check the insulation between the supply system cable and the DC 24 V cable.
- Check the insulation between mains cable and communication cable.
- 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)
- Plug in and connect all fieldbus interfaces
- Install and fasten all MOVIMOT[®] inverters (for MFZ.7, MFZ.8 only)
- Install all connection box covers
- Cover any plug connections not in use

8.2.10 Connecting the PROFIBUS cable in the field distributor

When connecting the PROFIBUS cables in the field distributor, make sure that:

- The PROFIBUS connector cores inside the field distributor are as short as possible
- And that the PROFIBUS connector cores for incoming and outgoing bus are always the same length
- For EMC reasons, unshielded PROFIBUS cores should not be routed directly next to other supply or signal cables.

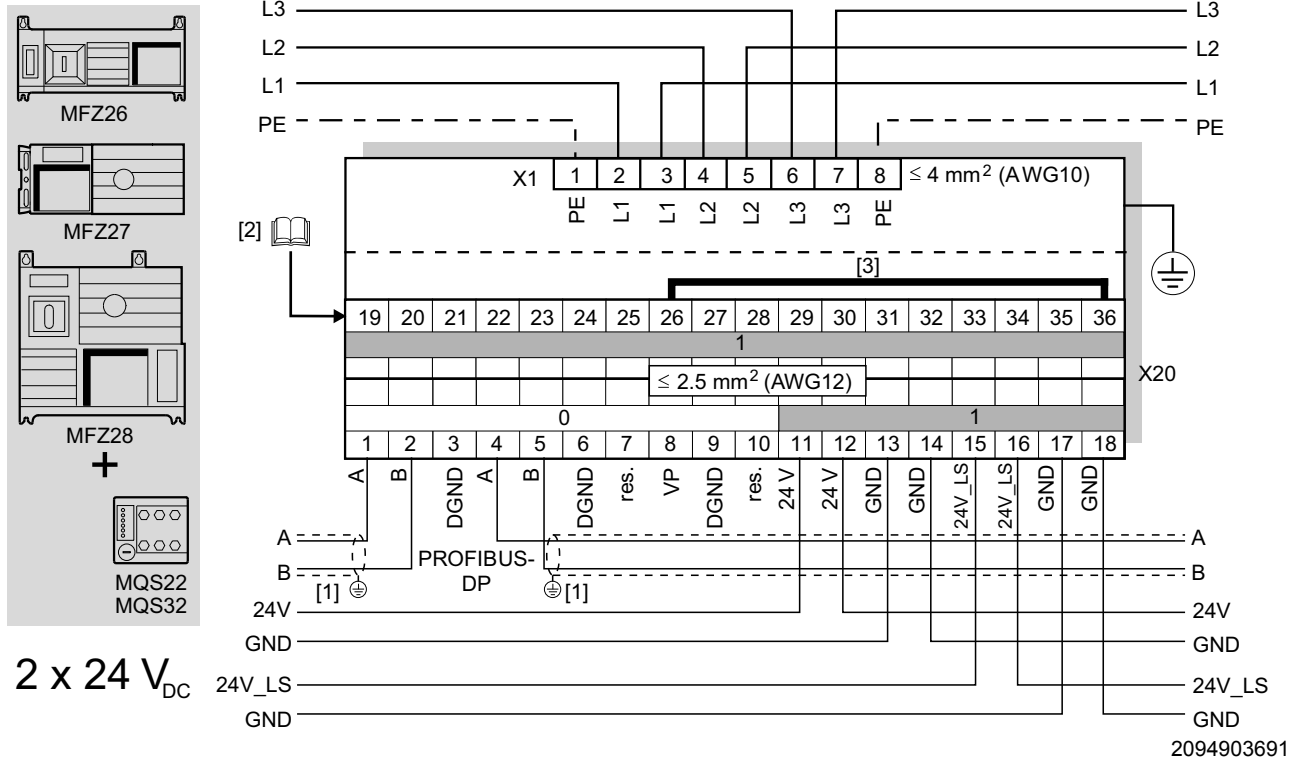


Electrical Installation

Connecting MFZ26, MFZ27, MFZ28 field distributors with MQS..

8.3 Connecting MFZ26, MFZ27, MFZ28 field distributors with MQS..

8.3.1 MFZ26, MFZ27, MFZ28 connection modules with PROFIBUS interface MQS.2 and 2 separate DC 24 V voltage circuits



0 = Potential level 0

1 = Potential level 1

[1] EMC metal cable gland

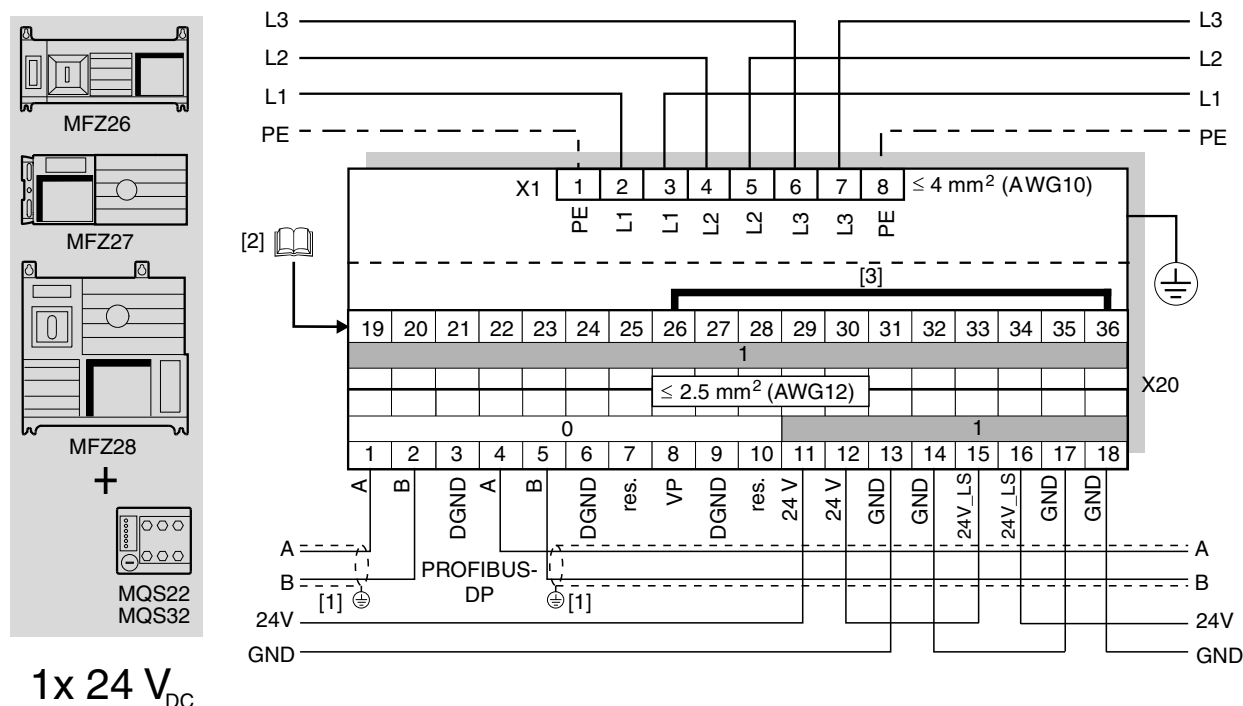
[2] Assignment of terminals 19 - 36 (page 46)

[3] Safety bridge (wired at the factory) **Do not remove!**

Terminal assignment			
No.	Name	Direction	Function
X20	1 A	Input	PROFIBUS DP data line A (incoming)
	2 B	Input	PROFIBUS DP data line B (incoming)
	3 DGND	-	Data reference potential for PROFIBUS DP (for test purposes only)
	4 A	Output	PROFIBUS DP data line A (outgoing)
	5 B	Output	PROFIBUS DP data line B (outgoing)
	6 DGND	-	Data reference potential for PROFIBUS DP (for test purposes only)
	7 -	-	Reserved
	8 VP	Output	+5 V output (max. 10 mA) (for test purposes only)
	9 DGND	-	Reference potential for VP (terminal 8, for test purposes only)
	10 -	-	Reserved
	11 24 V	Input	24 V voltage supply for module electronics, (F) sensors and standard actuators
	12 24 V	Output	24 V voltage supply (jumpered with terminal X20/11)
	13 GND	Input	0V24 reference potential
	14 GND	Output	0V24 Reference potential (jumpered with X20/13)
	15 24V_LS	Input	24 V load voltage supply for safety output (F-DO0)
	16 24V_LS	Output	24 V load voltage supply (jumpered with terminal X20/15)
	17 GND	Input	Reference potential 0V24V
	18 GND	Output	0V24V Reference potential (jumpered with X20/17)



8.3.2 MFZ26, MFZ27, MFZ28 connection modules with PROFIBUS interface MQS.2 and 1 common DC 24 V voltage circuit



2094903691

0 = Potential level 0

1 = Potential level 1

[1] EMC metal cable gland

[2] Assignment of terminals 19 - 36 (page 46)

[3] Safety bridge (wired at the factory) **Do not remove!**

Terminal assignment			
No.	Name	Direction	Function
X20	1	A	Input
	2	B	Input
	3	DGND	-
	4	A	Output
	5	B	Output
	6	DGND	-
	7	-	Reserved
	8	VP	Output
	9	DGND	-
	10	-	Reserved
	11	24 V	Input
	12	24 V	Output
	13	GND	Input
	14	GND	Output
	15	24V_LS	Input
	16	24V_LS	Output
	17	GND	Input
	18	GND	Output



8.4 Connecting the safety-related inputs and output

The top row of terminal strip X20 (terminals 19 - 36) is used to connect the safety-related inputs (F-DIx) and the safety-related output (F-DO0). The following sections explain and describe the terminal assignments and the permitted connection options.

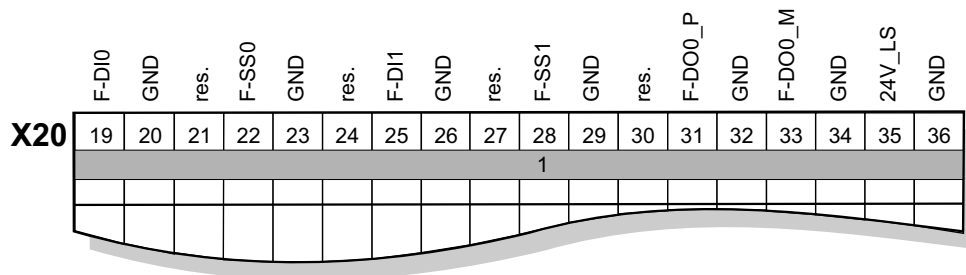
All safety inputs and outputs are processed within the MQS.. PROFIsafe interface, usually in 2 channels. Thus the safe inputs and outputs are suitable for applications up to:

- Category 4 according to EN 954-1
- Performance level e according to EN ISO 13849-1
- and SIL 3 according to EN 61508

The external sensors and actuators and their wiring must comply with the required safety class.

Observe the following wiring diagrams and the lists of known errors. In addition, observe the "Sensor and actuator requirements" (page 23),

8.4.1 Connection via terminal strip X20



2094989835

No.	Name	Direction	Function	
X20	19	F-DI0	Input	Safety-related binary input #0
	20	GND	-	0V24 reference potential
	21	res.	-	Reserved
	22	F-SS0	Output	Safety-related sensor supply for F-DI0
	23	GND	-	0V24 reference potential
	24	res.	-	Reserved
	25	F-DI1	Input	Safety-related binary input #1
	26	GND	-	0V24 reference potential (must be jumpered with X20/36)
	27	res.	-	Reserved
	28	F-SS1	Output	Safety-related sensor supply for F-DI1
	29	GND	-	0V24 reference potential
	30	res.	-	Reserved
	31	F-DO0_P	Output	"High side" channel safe output #0
	32	GND	-	0V24 reference potential
	33	F-DO0_M	Output	"Low side" channel safe output #0
	34	GND	-	0V24 reference potential
	35	24V_LS	Input	24 V voltage supply for actuators (jumpered with terminal X20/15+16)
	36	GND2	Input	0V24 reference potential (jumpered with terminal X20/17+18 and must also be jumpered with terminal X20/26!)

8.4.2 Connection of safe inputs F-DIx and F-SSx

Notes on sensor wiring:

- You do not have to use shielded cables for safety binary inputs.



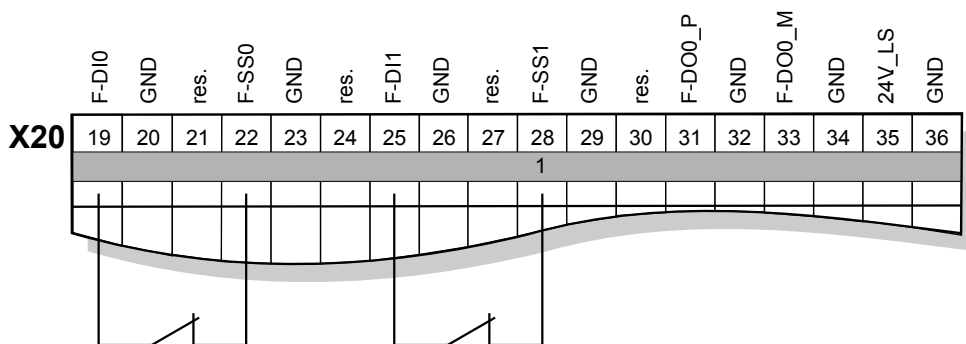
- You may only connect sensors with contacts to the safe F-DIx inputs in accordance with the failsafe principle (e.g. emergency off buttons, door contact switches etc.)
- The two sensor power supplies F-SS0 and F-SS1 are generally clocked.

When connecting the sensors, make sure that

- F-SS0 is connected to F-DI0 via the sensor (fixed assignment) and
- F-SS1 is connected to F-DI1 via the sensor (fixed assignment)
- Unassigned inputs need not be wired. An open input is always read as a "0" signal.

Only the following wiring is permitted in safety-related applications:

a) 2 sensors, 1-pole connection



2095018507

The following errors are detected via tests and monitoring functions:

- Short circuit in the supply voltage
- Cross fault between the two input signals
- Open circuit or short circuit to reference potential is read as a "0" signal (no error status)



! WARNING

The system does not detect a short circuit between the sensor supply F-SSx and the corresponding safe input F-DIx (sensor bypassed)

Severe or fatal injuries.

- Prevent such a short circuit by implementing a suitable cable routing.

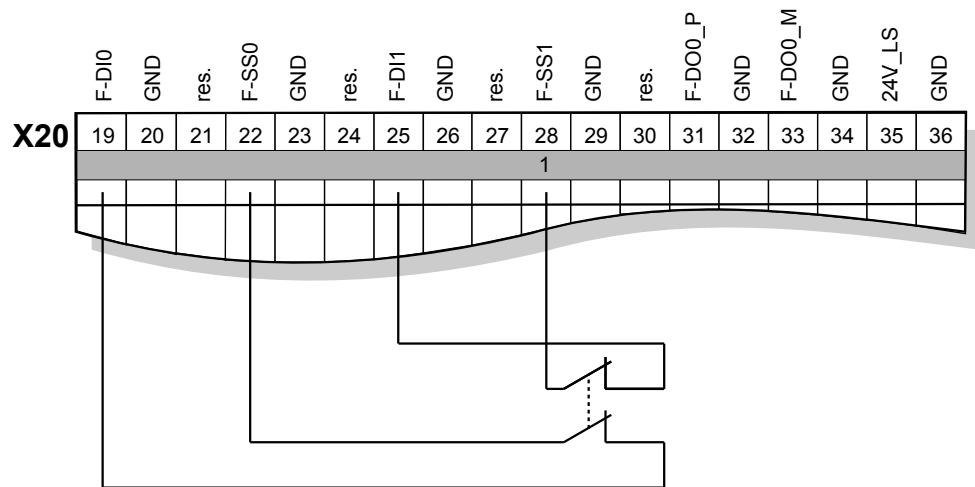
Whenever the system detects an error, it reverts to a safe status, i.e. all safety-related process values (F-DI and F-DO) are set to "0". Furthermore, the safety subassembly is passivated (see section "Error table for the safety section" (page 120), The "F-STATE" LED indicates the error status, see section "Status LED" (page 114).



Electrical Installation

Connecting the safety-related inputs and output

b) 1 sensor, 2-pole connection



2095035787



INFORMATION

For this connection variant, there is no internal connection and no discrepancy time evaluation between the two input signals. The F-DI0 and F-DI1 signals are usually transferred to the higher-level safety control separately. The logical connection and discrepancy time evaluation must take place there.

The following errors are detected via tests and monitoring functions:

- Short circuit in the supply voltage
- Cross fault between the two input signals
- Open circuit or short circuit to reference potential is read as a "0" signal (no error status)



WARNING

The system does not detect a short circuit between the sensor supply F-SSx and the corresponding safe input F-DIx (sensor bypassed)

Severe or fatal injuries.

- Prevent such a short circuit by implementing a suitable cable routing.

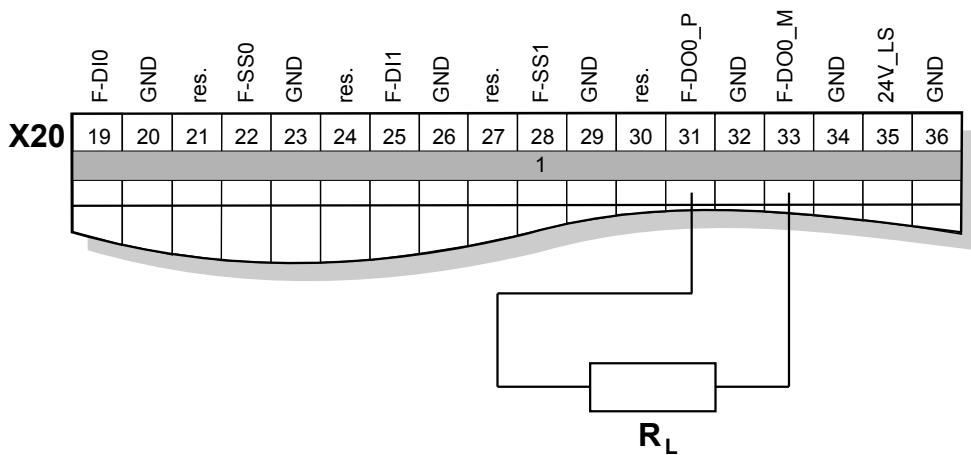
Whenever the system detects an error, it reverts to a safe status, i.e. all safety-related process values (F-DI and F-DO) are set to "0". Furthermore, the safety subassembly is passivated (see section "Error table for the safety section" (page 120), The "F-STATE" LED indicates the error status, see section "Status LED" (page 114).



8.4.3 Connection of the safe output F-DO0

- The safety-related binary output is 2-pole, designed as P-M switch, and controlled via PROFIsafe by a higher-level safety control.
- An actuator must generally be connected with the safe output F-DO0 with a 2-pole connection between the P switch output and the M switch output (F-DO0_P and F-DO0_M).
- It is not permitted to make a 1-pole connection between F-DO0_P and the GND reference potential as it would cause an error as soon as the output is controlled.
- The safe output is tested internally in cycles. However, when decoupled, the test pulses are not visible at the connection terminals and do not have to be taken into account during operation.

Only the following wiring is permitted for safety-related applications:



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

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

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

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

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

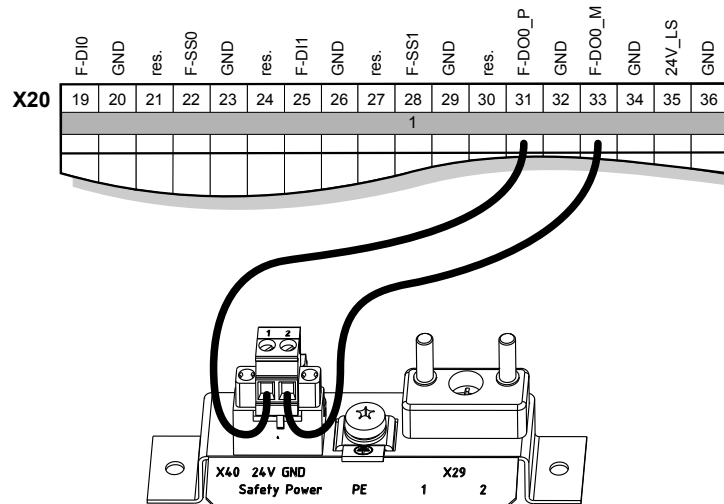
Whenever the system detects an error, it reverts to a safe status, i.e. all safety-related process values (F-DI and F-DO) are set to "0". Furthermore, the safety subassembly is passivated (see section "Error table for the safety section" (page 120), The "F-STATE" LED indicates the error status, see section "Status LED" (page 114).



Electrical Installation

Connecting the safety-related inputs and output

In order to implement a safety stop for MOVIMOT[®] with PROFIsafe, you have to connect output F-DO0 with the 24 V supply of the MOVIMOT[®] inverter as follows:



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⚠ WARNING

The safety function of the MOVIMOT[®] inverter is only permitted for applications up to

- Stop category 0 or 1 according to EN 60204-1,
- and
 - Category 3 according to EN 954-1
 - or performance level d according to EN ISO 136849-1
 - or SIL 2 according to EN 61508

Severe or fatal injuries.

- Observe the notes and instructions in section "Integrated safety technology" (page 13) and "Safety-relevant conditions" (page 18).

When you order a complete MQS.2FZ2.F PROFIsafe field distributor from SEW-EURODRIVE, these connections are made prior to delivery. However, you still have to check the correct wiring. You have to verify and document the correct safety function during startup.

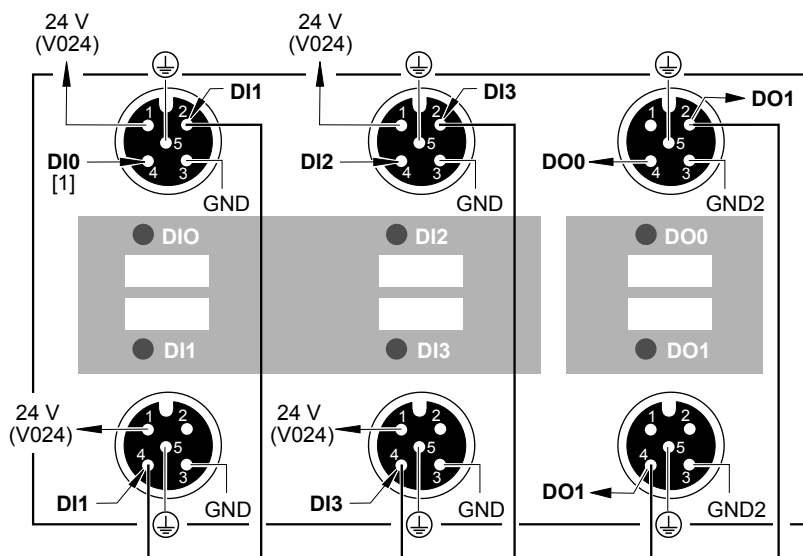


8.5 Connection of standard inputs/outputs

8.5.1 Connection of the fieldbus interfaces via M12 plug connector

Connection of the MQS22 fieldbus interface with 4 digital inputs and 2 digital outputs:

- The sensors and actuators can **only** be connected via the M12 sockets.
- Connect 2-channel sensors and actuators to DI0, DI2 and DO0. DI1, DI3 and DO1 can not be used in this case.



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INFORMATION

- You have to connect safety-related sensors and actuators to terminal strip X20.
- Connections that are not in use must be covered with M12 closing caps to guarantee enclosure IP65.

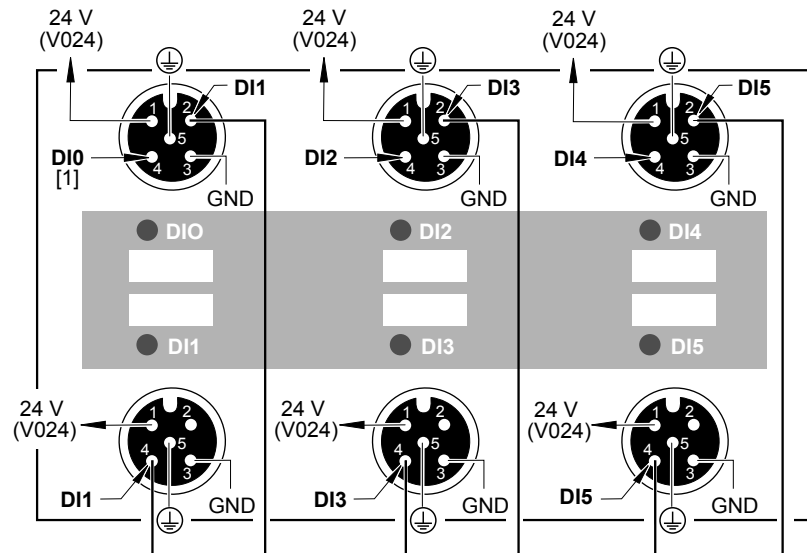


Electrical Installation

Connection of standard inputs/outputs

Connection of MQS32 fieldbus interfaces with 6 digital inputs:

- The sensors can **only** be connected via the M12 sockets.
- Connect 2-channel sensors to DI0, DI2 and DI4. DI1, DI3 and DI5 can not be used in this case.



1141961739



INFORMATION

- You have to connect safety-related sensors and actuators to terminal strip X20.
- Connections that are not in use must be covered with M12 closing caps to guarantee enclosure IP65.



8.6 Bus connection with optional connection technology

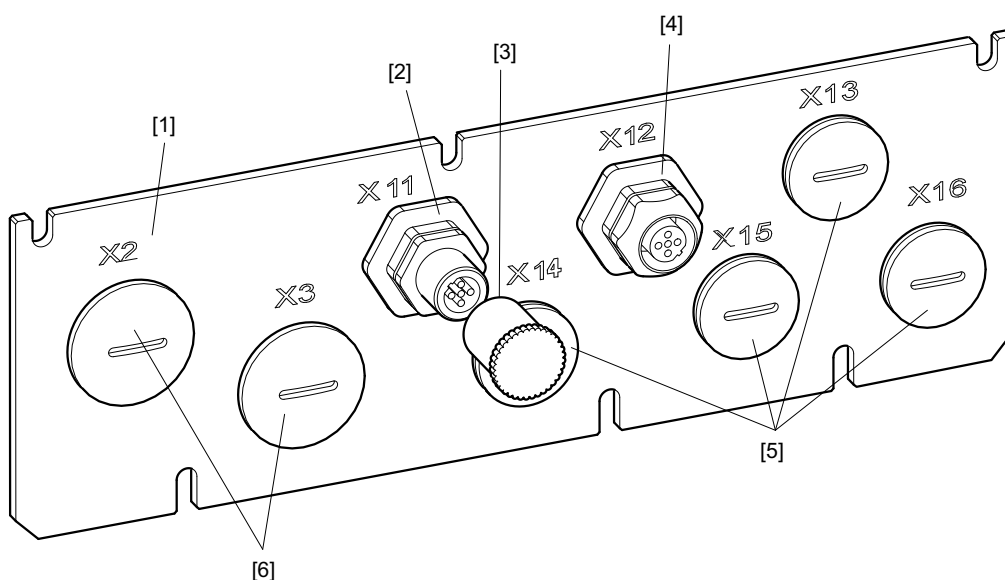
8.6.1 Mounting flange AF2 or ../Z27F/ AVT2/AWT2

As an alternative to the standard design AF0, mounting flange AF2 can be combined with field distributors for PROFIBUS MFZ26F and MFZ28F.

Mounting flange AF2 is equipped with 2 M12 plug connectors for PROFIBUS connection. The unit comes equipped with an X11 connector for the incoming and an X12 socket for the outgoing PROFIBUS.

The M12 connectors have a "reverse-key coding" design also referred to as B or W coding.

Identical M12 connection technology is available for the MFZ27F field distributors. In this case, the unit designation is ../Z27F/AVT2/AWT2.



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- [1] Front sheet metal
- [2] M12 connector, incoming PROFIBUS (X11)
- [3] Protection cap
- [4] M12 socket, outgoing PROFIBUS (X12)
- [5] M20 screw plug
- [6] M25 screw plug

The M12 connection technology complies with the recommendations from PROFIBUS Directive no. 2.141, "Connection technology for PROFIBUS".



INFORMATION

In contrast to the standard design, the switchable bus terminator on the MQS interface may no longer be used.

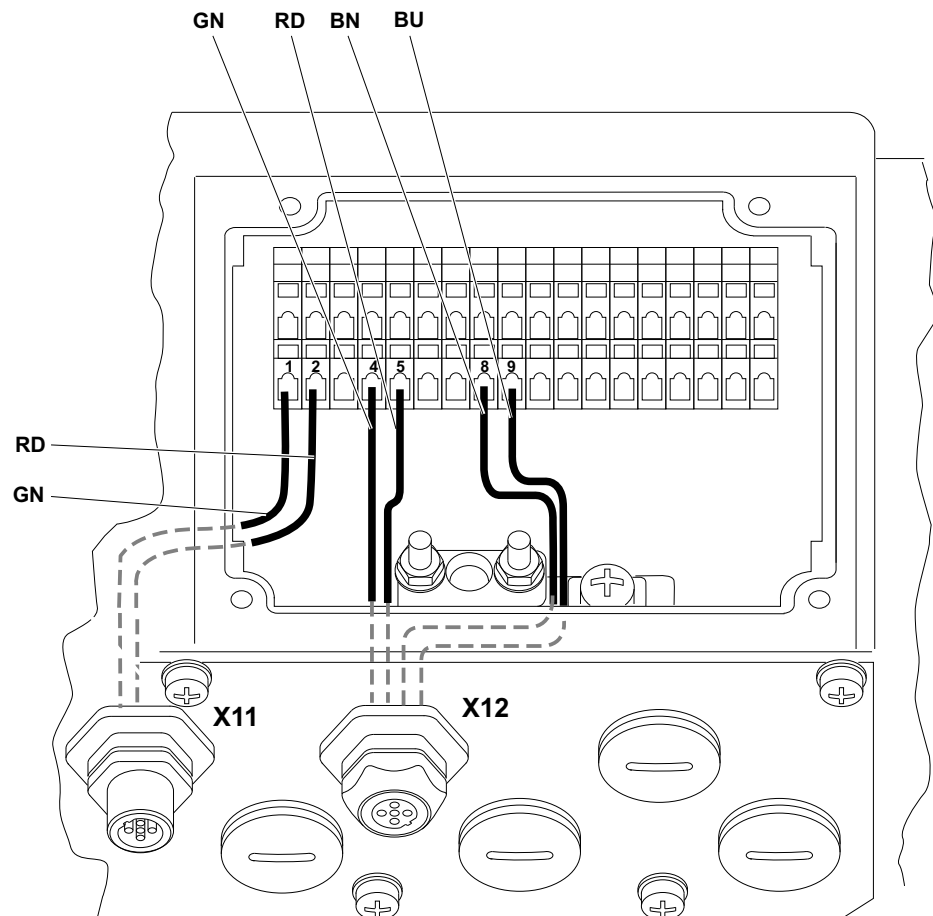
Instead, a plug-in bus terminator (M12) should be used in the last station in place of the outgoing X12 bus connection.



Electrical Installation

Bus connection with optional connection technology

AF2 or ..Z27F/
AVT2/AWT2 – wiring
and pin assign-
ment



1143562251

M12 connector X11

	Pin 1	Not connected
	Pin 2	A line PROFIBUS (incoming)
	Pin 3	Not connected
	Pin 4	B line PROFIBUS (incoming)
	Pin 5	Not connected
	Thread	Shield or protective earth

M12 socket X12

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



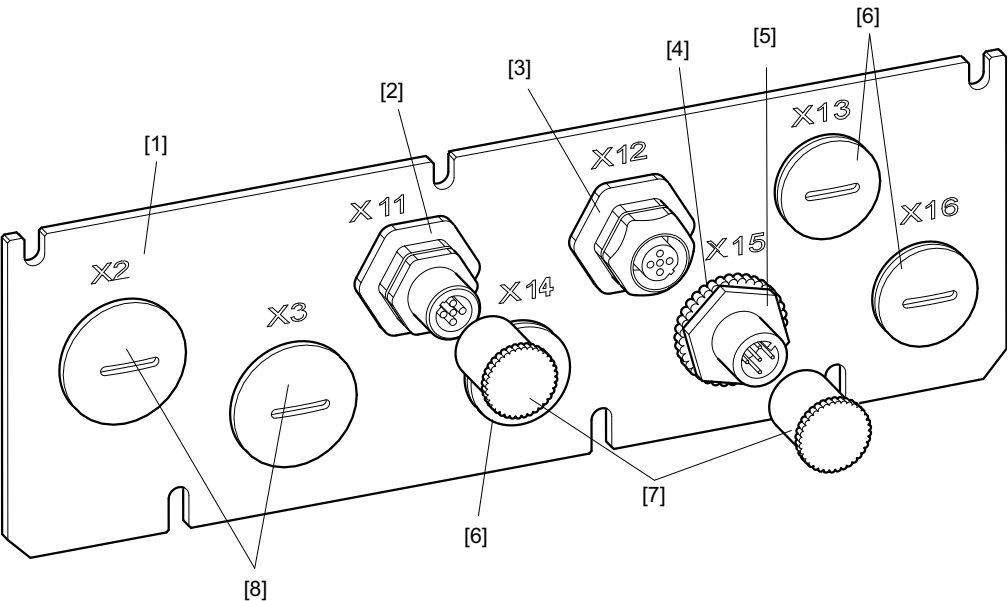
8.6.2 AF3 mounting flange

As an alternative to the standard design AF0, mounting flange AF3 can be combined with field distributors for PROFIBUS MFZ26F and MFZ28F.

Mounting flange AF3 is equipped with 2 M12 plug connectors for PROFIBUS connection. The unit comes equipped with an X11 connector for the incoming and an X12 socket for the outgoing PROFIBUS.

The M12 connectors have a "reverse-key coding" design also referred to as B or W coding.

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



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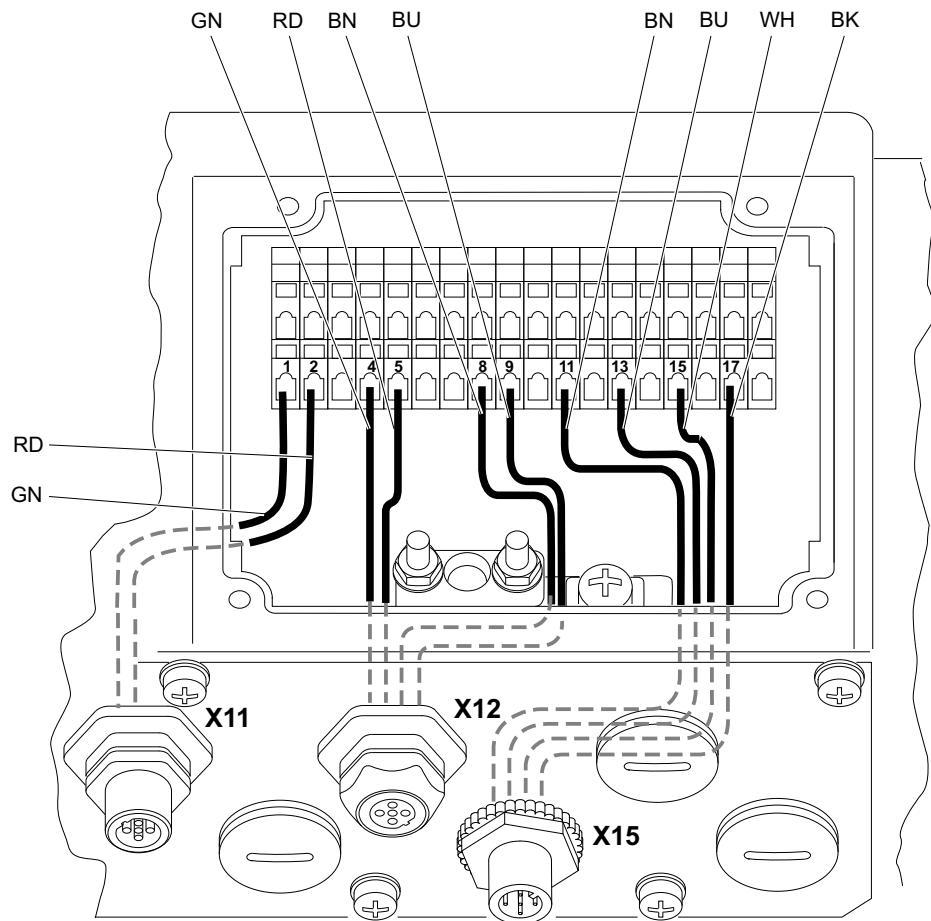
- [1] Front sheet metal
- [2] M12 connector, incoming PROFIBUS (X11)
- [3] M12 socket, outgoing PROFIBUS (X12)
- [4] Reduction
- [5] Connector M12, 24 V voltage supply (X15)
- [6] M20 screw plug
- [7] Protection cap
- [8] M25 screw plug

Mounting flange AF3 complies with the recommendations from PROFIBUS Directive no. 2.141, "Connection technology for PROFIBUS".

	INFORMATION
	<p>In contrast to the standard design, the switchable bus termination at the MFP../MQP interface is not available if the AF3 mounting flange is used.</p> <p>Instead, a plug-in bus terminator (M12) should be used in the last station in place of the outgoing X12 bus connection.</p>



AF3 – wiring and
pin assignment



1146066315

M12 connector X11

	Pin 1	Not connected
	Pin 2	A line PROFIBUS (incoming)
	Pin 3	Not connected
	Pin 4	B line PROFIBUS (incoming)
	Pin 5	Not connected
	Thread	Shield or protective earth

M12 socket X12

	Pin 1	VP supply voltage 5 V for connection resistor
	Pin 2	A line PROFIBUS (outgoing)
	Pin 3	DGND reference potential to VP (pin 1)
	Pin 4	B line PROFIBUS (outgoing)
	Pin 5	Not connected
	Thread	Shield or protective earth

M12 plug X15

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

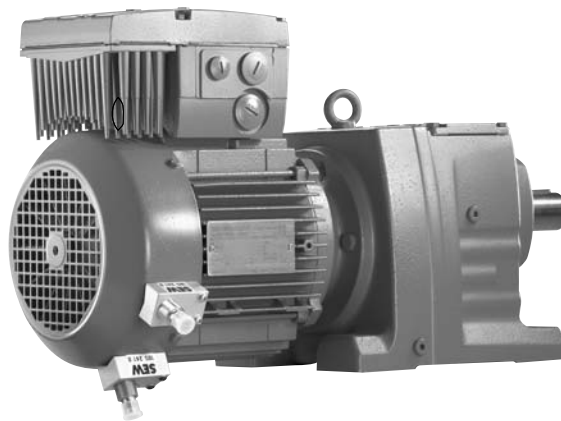


8.7 NV26 proximity sensor connection

8.7.1 Characteristics

The NV26 proximity sensor offers the following features:

- 6 pulses/revolution
- 24 increments/revolution with 4-fold evaluation
- Encoder monitoring and evaluation is possible with the MQS.. fieldbus interface
- Signal level: HTL

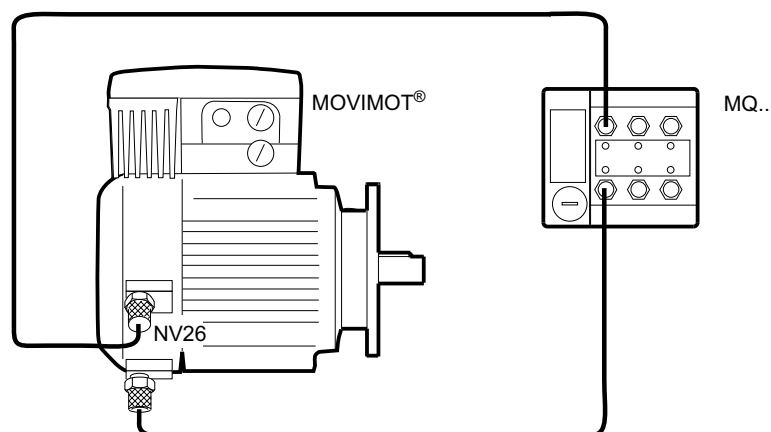


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For constructive reasons, the angle between the sensors is 45°.

8.7.2 Connection

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



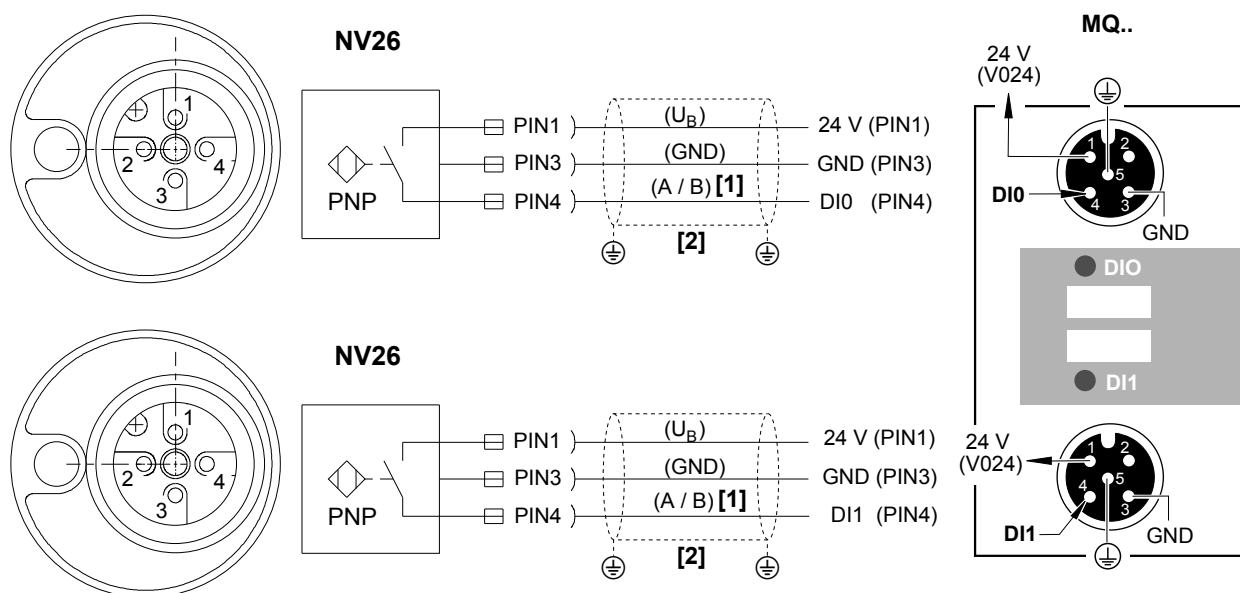
1146334603

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



8.7.3 Wiring diagram

The following figure shows the pin assignment of NV25 sensors to the MQS fieldbus interface:

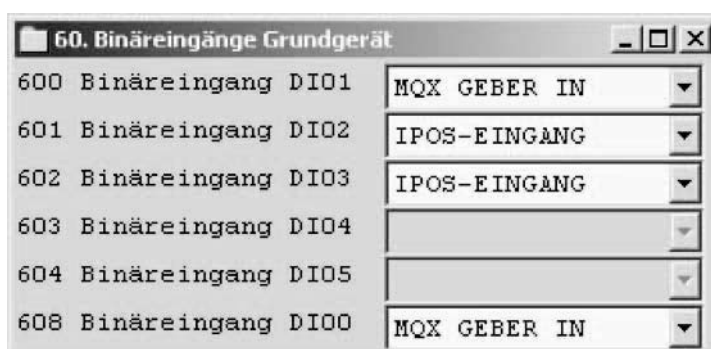


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- [1] Encoder input track A or track B
[2] Shielding

8.7.4 Encoder evaluation

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



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INFORMATION

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



8.8 Connection of ES16 incremental encoder

8.8.1 Characteristics

The ES16 incremental encoder offers the following features:

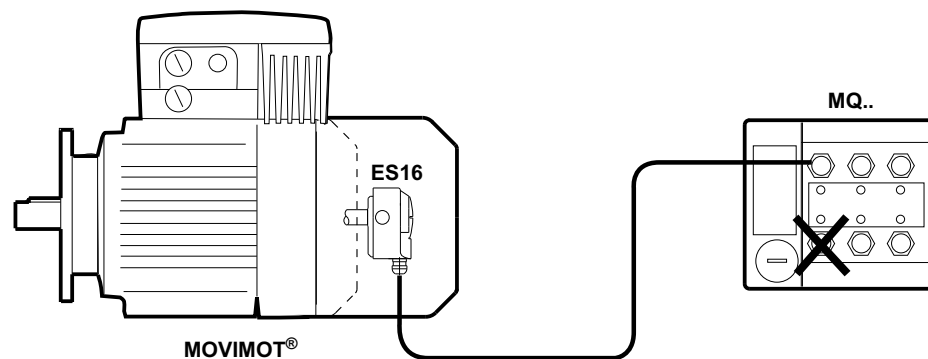
- 6 pulses/revolution
- 24 increments/revolution with 4-fold evaluation
- Encoder monitoring and evaluation is possible with the MQS.. fieldbus interface
- Signal level: HTL



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8.8.2 Installation in combination with the MQS.. fieldbus interface

- Connect the ES16 incremental encoder to the inputs of the MQ.. fieldbus interface using a shielded M12 cable. (See next page).

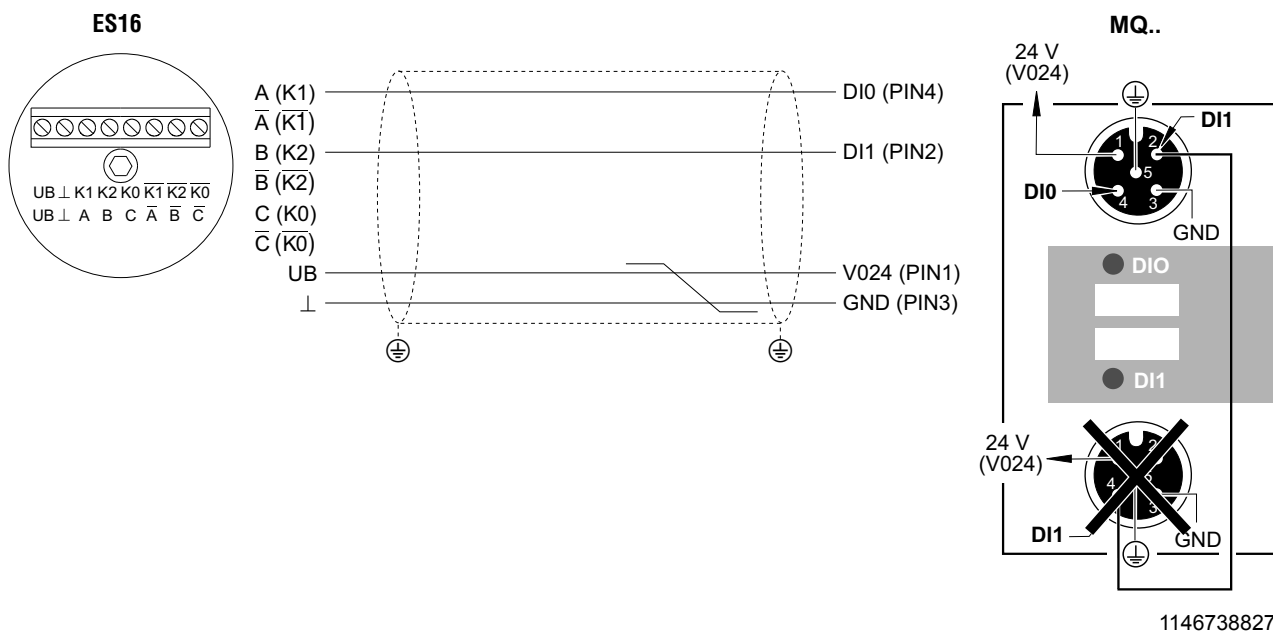


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- The current position can be checked by reading IPOS variable H511 (ActPosMot).
- SEW-EURODRIVE recommends activating the encoder monitoring function using parameter "P504 Encoder monitoring motor".



8.8.3 Wiring diagram



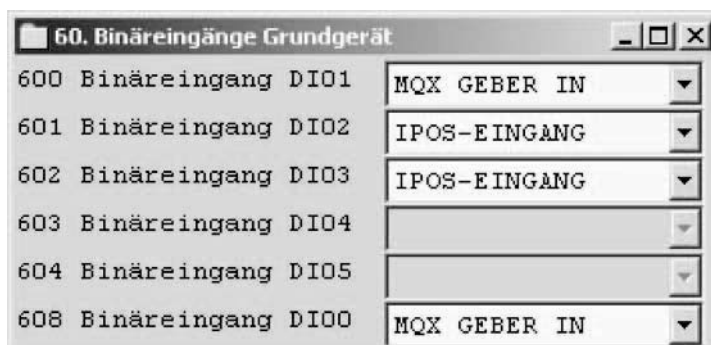
1146738827

**INFORMATION**

Do not assign the input socket DI1 more than once.

8.8.4 Encoder evaluation

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



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**INFORMATION**

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



8.9 Connection of the EI76 incremental encoder

8.9.1 Characteristics

The EI76 incremental encoder is equipped with Hall probes. It has the following characteristics:

- 6 pulses/revolution
- 24 increments/revolution with 4-fold evaluation
- Encoder monitoring and evaluation is possible with the MQS.. fieldbus interface
- Signal level: HTL

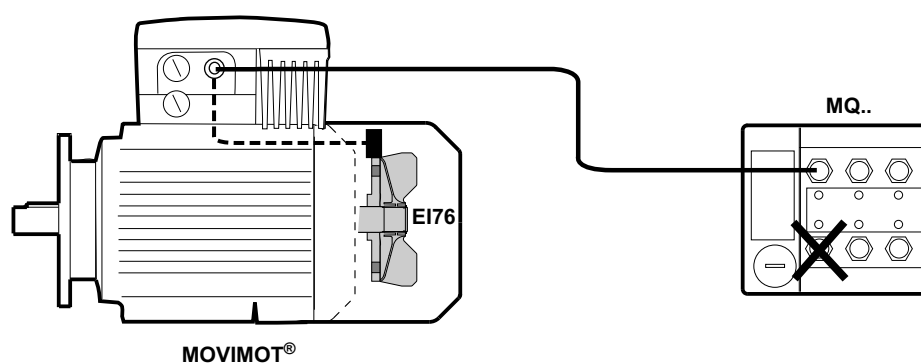


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8.9.2 Fieldbus interface connection

If the MOVIMOT® inverter is mounted to the motor, the built-in EI76 encoder is connected internally to a M12 connector on the connection box of the drive.

- Connect this M12 connection via an M12 cable with the input socket of the MQS.. fieldbus interface (See next page).



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

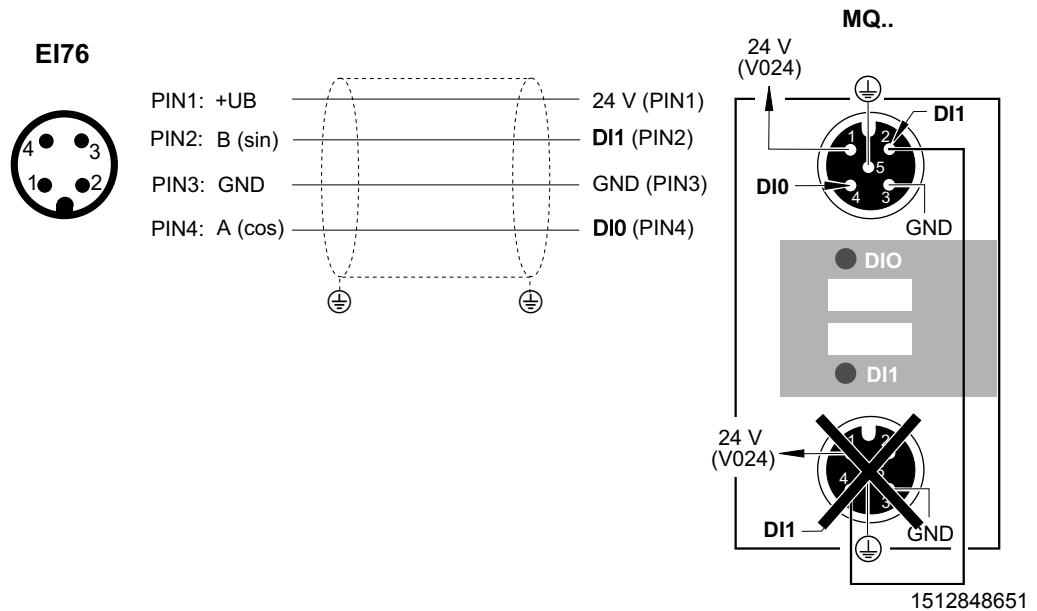


8.9.3 Wiring diagram for mounting the inverter to the motor

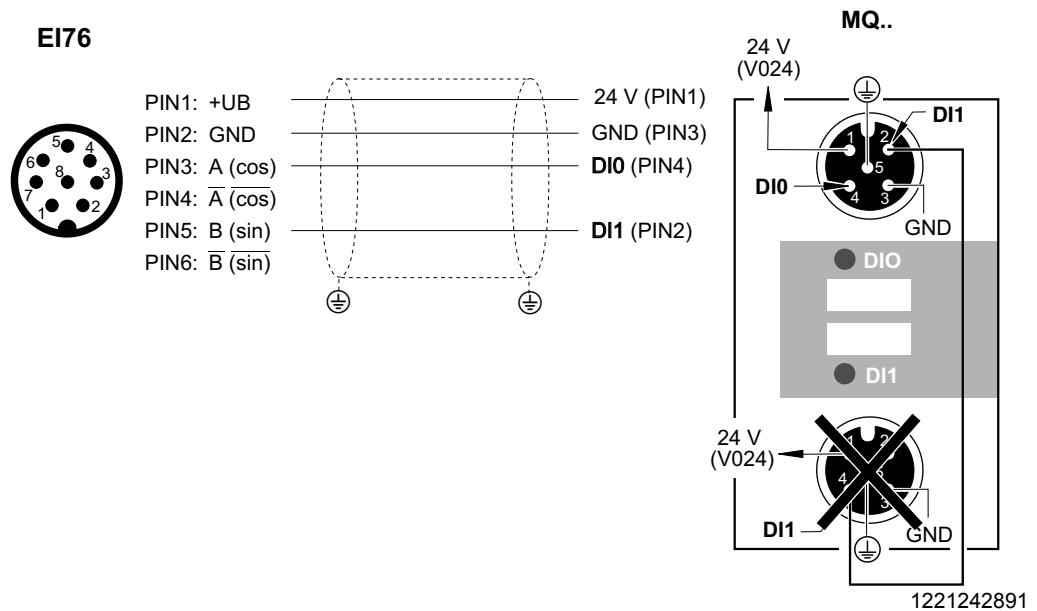
If the MOVIMOT® inverter is mounted on the motor, the encoder is connected to the MQS.. fieldbus interface via a shielded M12 cable plugged in on both ends.

There are 2 possible variants:

Variant 1: AVSE



Variant 2: AVRE



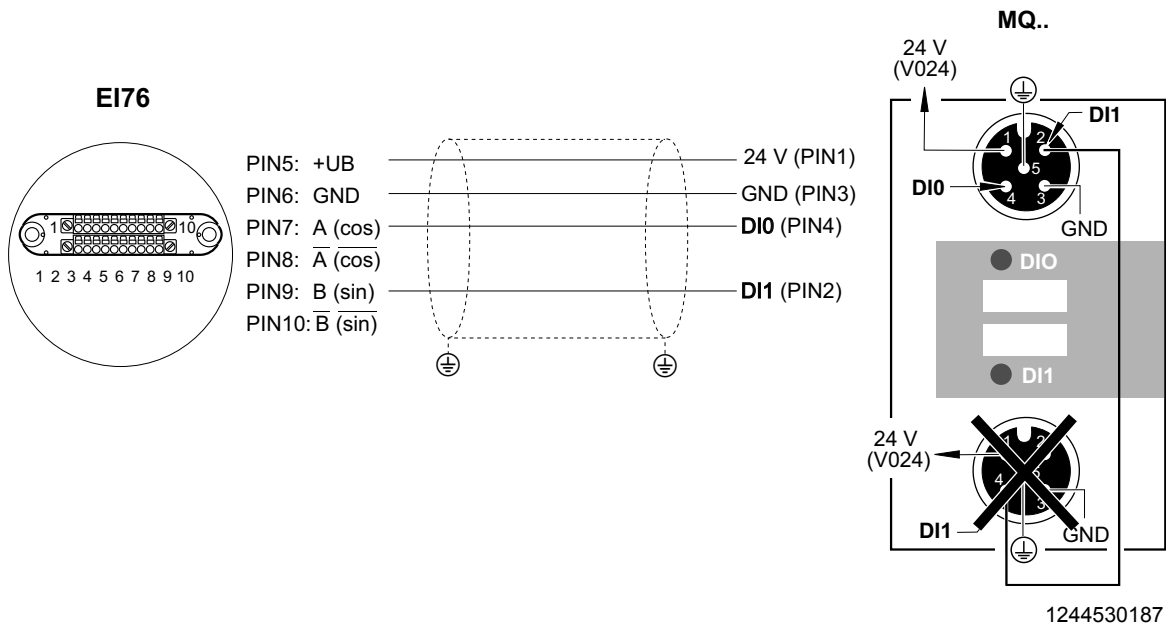
INFORMATION

Do not assign the input socket DI1 more than once.



8.9.4 Wiring diagram for mounting the inverter to the field distributor

If the MOVIMOT® inverter is mounted to the field distributor (mounting close to the motor), the shielded cable is connected to the terminals in the connection box of the drive and plugged into the input socket of the MQS.. fieldbus interface.



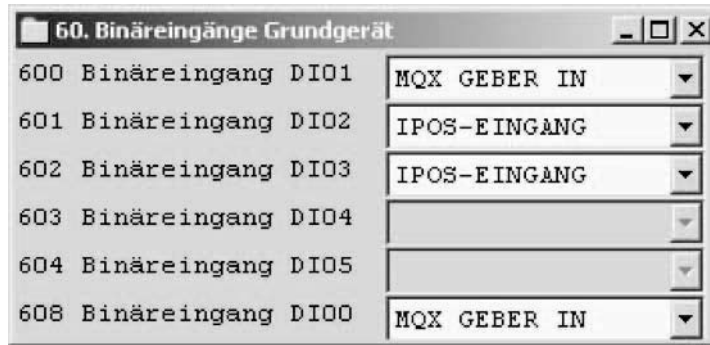
INFORMATION

Do not assign the input socket DI1 more than once.



8.9.5 Encoder evaluation

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



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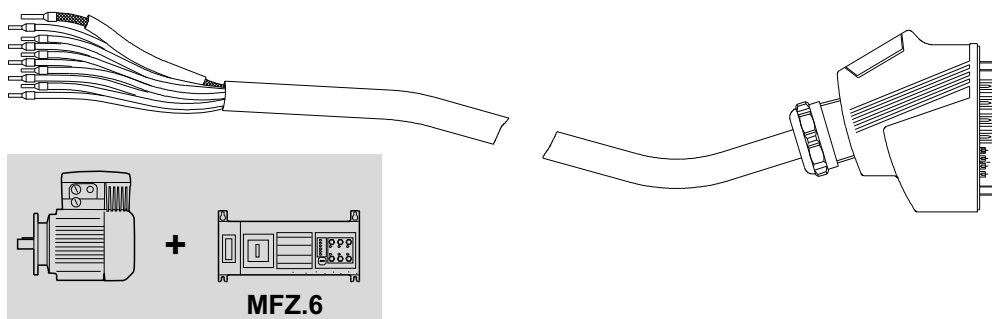
INFORMATION

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



8.10 Hybrid cable connection

8.10.1 Hybrid cable between MFZ.6. field distributor and MOVIMOT® (part number 0186 725 3)



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INFORMATION

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

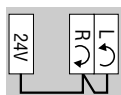
Terminal assignment	
MOVIMOT® terminal	Wire color/hybrid cable designation
L1	Black/L1
L2	Black/L2
L3	Black/L3
24 V	Red/24 V
⊥	White/0 V
RS+	Orange/RS+
RS-	Green/RS-
PE terminal	Green/yellow + shield end

Note the enabled
direction of rotation

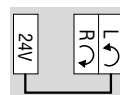


INFORMATION

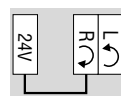
Check to see if requested direction of rotation has been enabled.
Refer to section "Startup..." in the MOVIMOT® MM..D ..." operating instructions for more information.



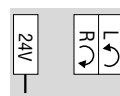
Both directions of rotation are enabled



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



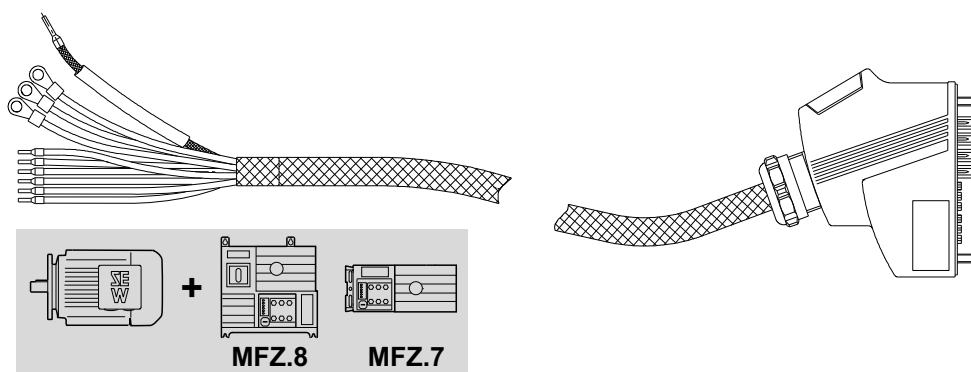
Only CW operation enabled;
Pre-selected setpoints for CCW rotation result in standstill of drive



Drive is inhibited or is being brought to a standstill



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



1147265675



INFORMATION

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

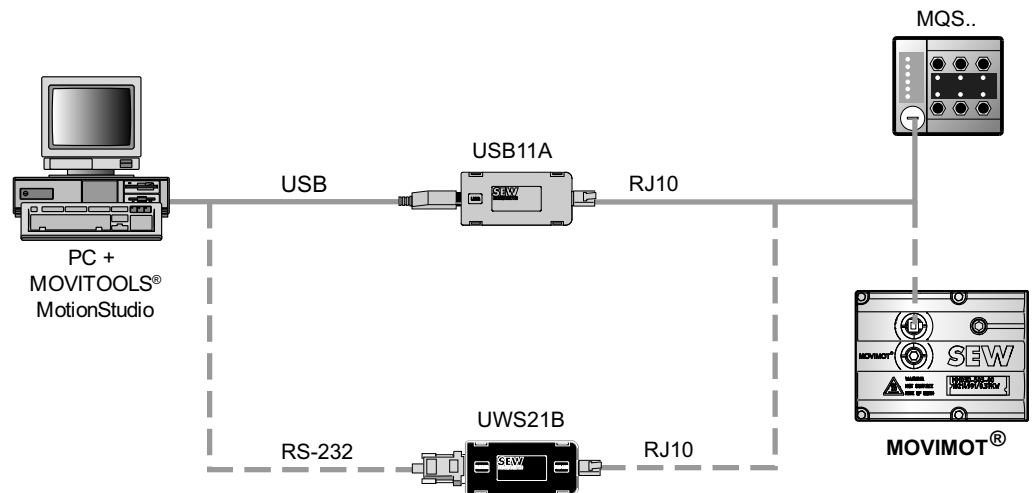
Terminal assignment	
Motor terminal	Wire color/hybrid cable designation
U1	Black/U1
V1	Black/V1
W1	Black/W1
4a	Red/13
3a	White/14
5a	Blue/15
1a	Black/1
2a	Black/2
PE terminal	Green/yellow + shield end (internal shield)



8.11 PC connection

The following options are required for connecting the diagnostics interface (on the MQS.. or the MOVIMOT®) with a conventional PC:

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



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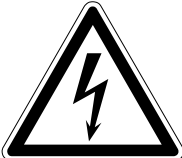



Scope of delivery:

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



9 Startup with PROFIBUS (MQS...)

9.1 Important notes on startup

	<p>! DANGER</p> <p>Before removing/fitting the MOVIMOT[®] inverter, you must disconnect it from the supply system. Dangerous voltages may still be present for up to one minute after disconnection from the power supply.</p> <p>Severe or fatal injuries from electric shock.</p> <ul style="list-style-type: none"> • Deenergize the field distributor and safeguard it against unintentional restart. • Then wait at least for 1 minute.
	<p>! WARNING</p> <p>The surfaces of MOVIMOT[®] inverters and external options, e.g. braking resistors (especially the heat sinks), can become very hot during operation.</p> <p>Danger of burns.</p> <ul style="list-style-type: none"> • Do not touch the MOVIMOT[®] drive and external options until they have cooled down sufficiently.
	<p>INFORMATION</p> <ul style="list-style-type: none"> • Switch off the DC 24 V supply before removing/mounting the fieldbus interface (MFO). • The bus connection of the incoming and outgoing PROFIBUS is integrated in the field distributor. This is why the PROFIBUS line is not interrupted even if the MQS.. fieldbus interface is not plugged in. • In addition, observe the notes in section "Supplementary Field Distributor Startup Information (page 101)".
	<p>INFORMATION</p> <ul style="list-style-type: none"> • Remove paint protection cap from the status LED of the MOVIMOT[®] before startup. • Remove paint protection film from the nameplates before startup. • Check that all protective covers are installed correctly. • Observe a minimum switch-off time of 2 s for the line contactor K11.



9.2 Startup procedure



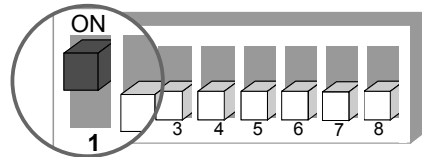
! DANGER

Before removing/fitting the MOVIMOT[®] inverter, you must disconnect it from the supply system. Dangerous voltages may still be present for up to one minute after disconnection from the power supply.

Severe or fatal injuries from electric shock.

- Deenergize the field distributor and safeguard it against unintentional restart.
- Then wait at least for 1 minute.

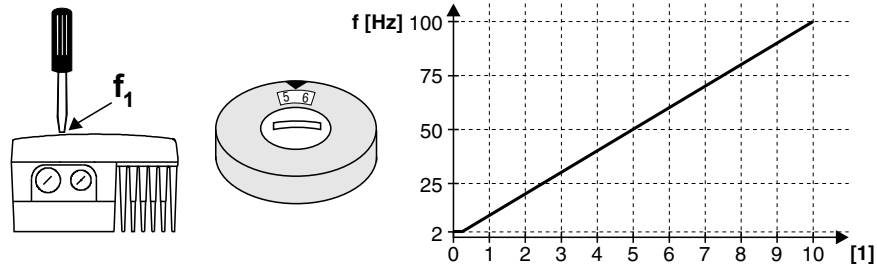
1. Check for correct wiring of the MOVIMOT[®] inverter and the PROFIBUS interface (MFZ26, MFZ27 or MFZ28).
2. Set DIP switch S1/1 of the MOVIMOT[®] to "ON" (= address 1).



1158400267

Set the maximum speed using setpoint potentiometer f1.

Factory setting: about 50 Hz (1500 rpm).



1158517259

[1] Potentiometer setting

3. Make sure the screw plug of the setpoint potentiometer has a seal and screw it in.



INFORMATION

- The enclosure specified in section Technical Data only applies if the screw plugs of the setpoint potentiometer and the X50 diagnostic interface are installed correctly.
- A missing or incorrectly installed screw plug can cause damage to the MOVIMOT[®] inverter.



Startup with PROFIBUS (MQS...)

Startup procedure

4. Set the minimum frequency f_{\min} with switch f2.



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

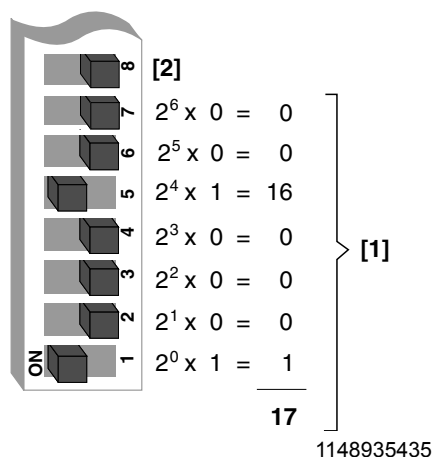
5. If the ramp time is not specified via fieldbus (2 PD), set the ramp time at switch t1 of the MOVIMOT® inverter.

The ramp times are based on a setpoint step change of 1500 rpm (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

6. Set the PROFIBUS address on the MQS.. fieldbus interface. The PROFIBUS address is set via DIP switches S1/1 – S1/7 of the MQS.. fieldbus interface. (Default setting: address 4).



[1] Example: Address 17

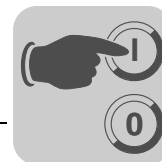
[2] Switch 8 = reserved

Address 0 through 125: Valid address

Address 126, 127: Not supported

In the following table, address 17 is used to show how to determine the DIP switch settings for any bus address.

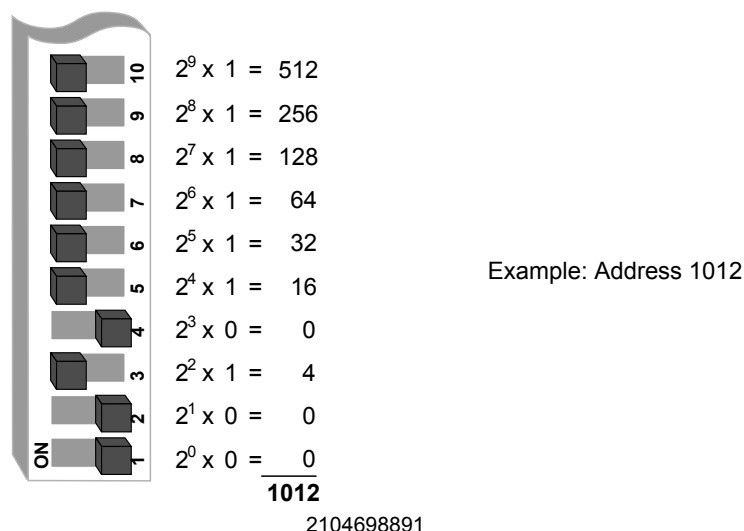
Calculation	Rest	DIP switch setting	Significance
17 / 2 = 8	1	DIP 1 = "ON"	1
8 / 2 = 4	0	DIP 2 = "OFF"	2
4 / 2 = 2	0	DIP 3 = "OFF"	4
2 / 2 = 1	0	DIP 4 = "OFF"	8
1 / 2 = 0	1	DIP 5 = "ON"	16
0 / 2 = 0	0	DIP 6 = "OFF"	32
0 / 2 = 0	0	DIP 7 = "OFF"	64



7. Set the PROFIsafe address on the MQS.. fieldbus interface. The PROFIsafe address is set via DIP switches S2/1 – S2/10 of the MQS.. fieldbus interface. (Default setting: address 255). You may enter an address ranging from 1 to 1022.

Make sure that the setting on the MQS.. fieldbus interface corresponds to the PROFIsafe address in the STEP 7 HW Config software.

The following figure shows the position of DIP switch S2 for the addressing example with address 1012.



The table below gives a sample calculation for determining the DIP switch setting for the address 1012:

Calculation	Rest	DIP switch setting	Significance
1012 / 2	0	DIP 1 = OFF	1
506 / 2	0	DIP 2 = OFF	2
253 / 2	1	DIP 3 = ON	4
126 / 2	0	DIP 4 = OFF	8
63 / 2	1	DIP 5 = ON	16
31 / 2	1	DIP 6 = ON	32
15 / 2	1	DIP 7 = ON	64
7 / 2	1	DIP 8 = ON	128
3 / 2	1	DIP 9 = ON	256
1	1	DIP 10 = ON	512

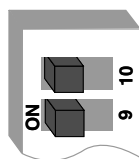


Startup with PROFIBUS (MQS...)

Startup procedure

8. Connect the bus terminating resistors of the MQS.. fieldbus interface to the last bus node.
 - If the MQS fieldbus interface is located at the end of a PROFIBUS segment, it is only connected to the PROFIBUS network via the incoming PROFIBUS cable (terminals 1/2).
 - To prevent malfunctions in the bus system due to reflections, etc., the PROFIBUS segment must be terminated using bus terminating resistors at the first and last stations.
 - The bus terminating resistors are already implemented on the MQS.. fieldbus interface and can be activated using two DIP S1 switches (see following figure). Bus termination is implemented for cable type A to EN 50170 (volume 2).

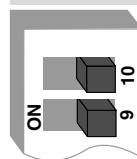
Bus termination **ON**



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Bus termination **OFF**

Factory setting



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INFORMATION

Observe the following information when using field distributors with connection technology AF2, AF3 or ../Z27F/AVT2/AWT2:

If you use the M12 connection technology for the PROFIBUS, you must not use the optional bus termination on the MQS.. fieldbus interface. Instead, a plug-in bus terminator (M12) should be used in the last station in place of the outgoing X12 bus connection.

9. Place the MOVIMOT® inverter and the MQS.. fieldbus interface on the field distributor and screw them on.
10. Switch on the DC 24 V supply voltage for the MQS.. fieldbus interface and the MOVIMOT® inverter. The green LED RUN on the MQS.. fieldbus interface must now be lit.
11. Carry out the project planning for the MQS.. fieldbus interface in the DP master.

9.3 Project planning for MQS.. on PROFIBUS-DP with STEP7

Configure the fail-safe MQS.. fieldbus interfaces as usual for PROFIBUS-DP operation using the STEP7 HW Config.

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

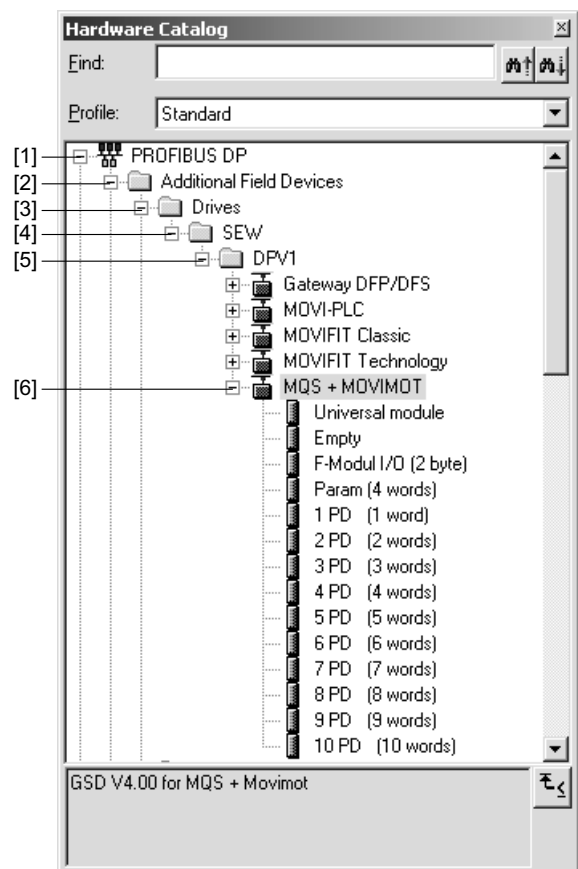
9.3.1 Installing the GSD file

Use the following GSD and image files for the fail-safe MQS.. fieldbus interface with PROFIsafe functionality:

- SEW_6005.GSD
- SEW6005N.BMP
- SEW6005S.BMP
- SEW6005N.DIB
- SEW6005S.DIB

Once you have installed the GSD file, the fieldbus interface appears in the Hardware catalog of STEP7 / HW Config under:

Profibus-DP [1]
 +---Other FIELD UNITS [2]
 +---Drives [3]
 +---SEW [4]
 +---PROFIsafe [5]
 +---MQS + MOVIMOT [6]



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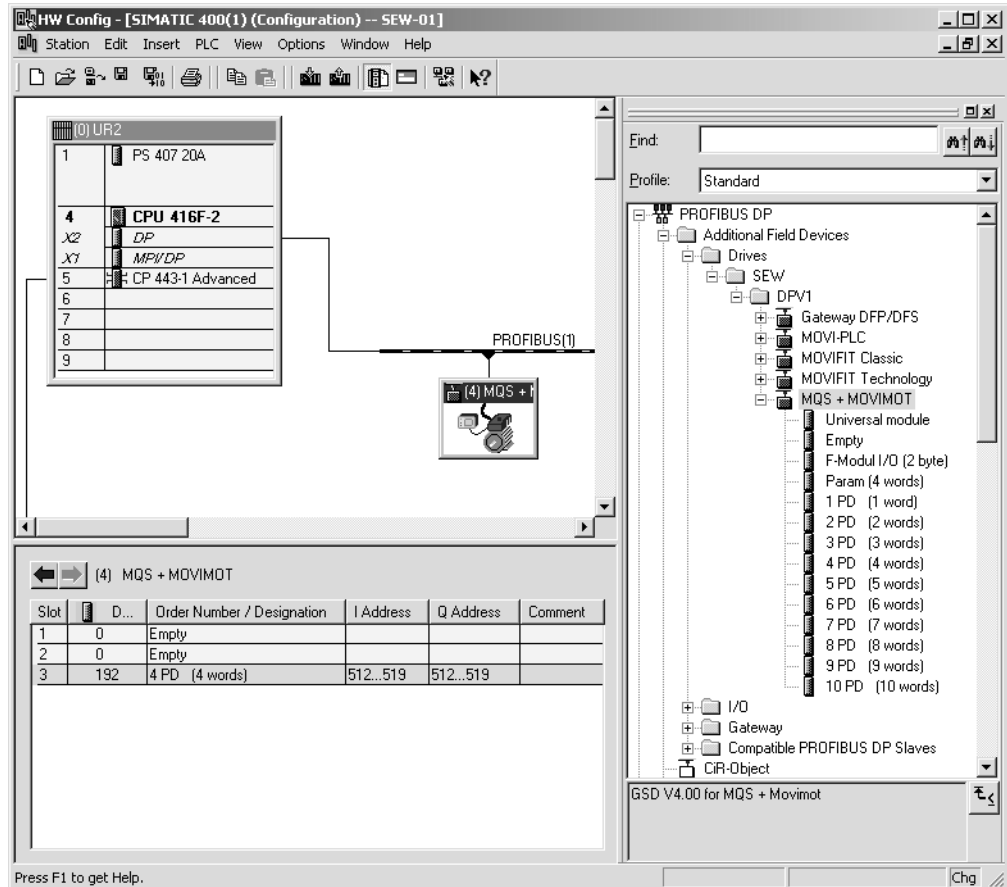


Startup with PROFIBUS (MQS...)

Project planning for MQS.. on PROFIBUS-DP with STEP7

9.3.2 Configuring the MQS in HW Config

In the HW Config, pull the "MQS + MOVIMOT" device to the bus cable using "Drag & Drop". The device is displayed in the menu (see the following figure):



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4 PD (4 words) is set as the default configuration for the MQS.. fieldbus interface.

With this setting, you can operate the MQS.. fieldbus interface like the MQP standard fieldbus interface.

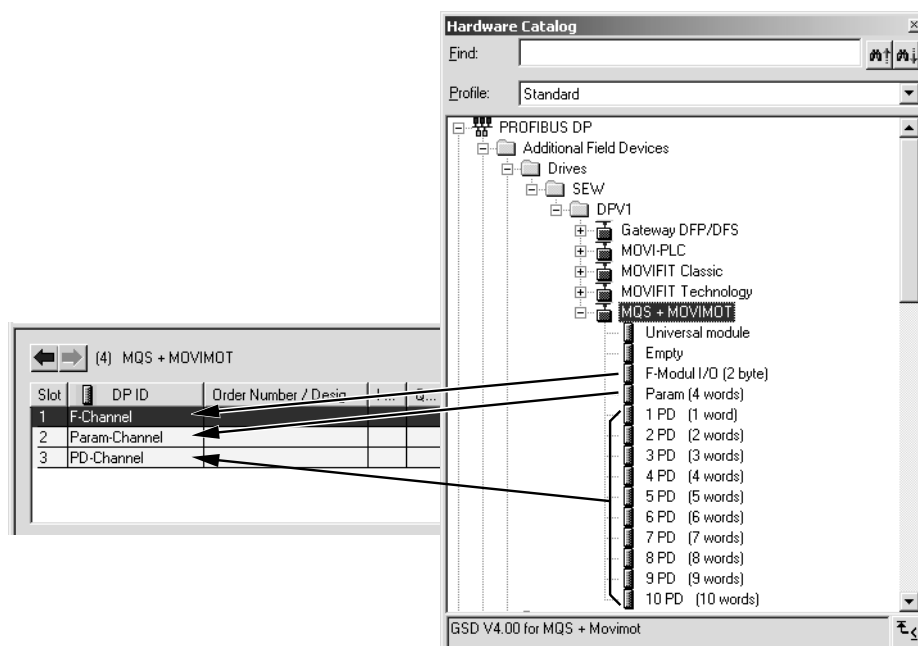
This default configuration does **not contain safety functionality** via PROFIsafe.

9.3.3 Planning a new configuration

You will usually have to adapt the project planning in the HW Config to suit your application. Assign slots 1 – 3 with the modules you need. Each slot has a fixed functionality. Once you have deleted the default configuration from slot 1 – 3, the function of the slot is displayed in the "DP ID" column.

The following table gives an overview of the slot functions.

Slot	DP ID	Description of the function
1	F channel	Use slot 1 to configure the PROFIsafe channel. The following modules can be assigned to this slot: <ul style="list-style-type: none"> "F module I/O (2 bytes)" = PROFIsafe channel is used "Empty" = PROFIsafe channel is not used <p>Note If you do not configure a PROFIsafe channel, the safety-related part of the MQS.. fieldbus interface is in safe state and the safe output DFO0 remains switched off.</p>
2	Parameter channel	The 8-byte parameter channel is configured in slot 2 if you want to reach MQS.. parameters via the cyclic PROFIBUS-DP data. This channel is not safety-related and can be assigned the following modules: <ul style="list-style-type: none"> "Param (4 words)" = Parameter channel is used "Empty" = Parameter channel is not used
3	PD channel	The process data for controlling MOVIMOT® is configured in slot 3. The same amount of process data is always input and output. The process data channel must always be configured. This channel is not safety-related and can be assigned the following modules: <ul style="list-style-type: none"> "1 PD" = Control via 1 process data word "2 PD" = Control via 2 process data words "3 PD" = Control via 3 process data words "4 PD" = Control via 4 process data words "5 PD" = Control via 5 process data words "6 PD" = Control via 6 process data words "7 PD" = Control via 7 process data words "8 PD" = Control via 8 process data words "9 PD" = Control via 9 process data words "10 PD" = Control via 10 process data words

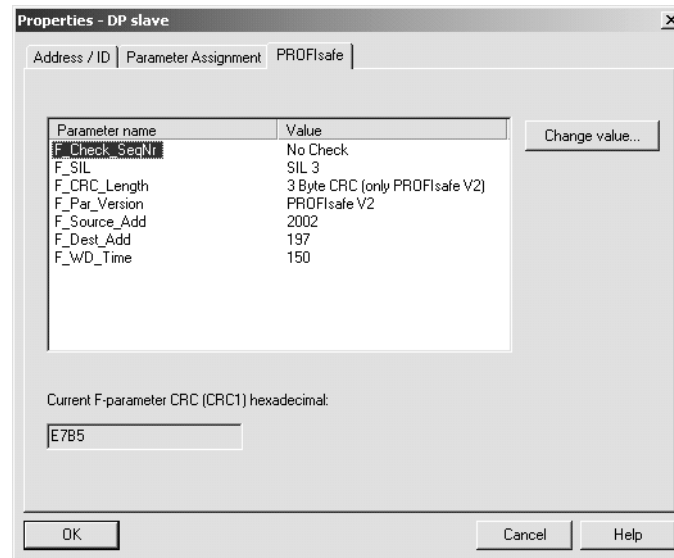


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9.3.4 Parameterizing the PROFIsafe properties

The parameterization of the PROFIsafe properties of the fail-safe MQS.. fieldbus interface is carried out in STEP7 HW Config. Double-click on the projected F module in slot 1. the DP slave properties window is displayed containing the "Address/ID", "Parameterization" and PROFIsafe" tabs.



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Use the *F_Dest_Add* parameter to enter the PROFIsafe address previously set at DIP switch S2 of the MQS.. fieldbus interface.

Description of the F-parameters

When PROFIBUS-DP is started for PROFIsafe operation, the PROFIBUS master sends the safety-critical parameters to the MQS.. fieldbus interface via an F-parameter block. The fieldbus interface checks those parameters for plausibility in the safety-related part. Once the plausibility of the F parameter block has been confirmed, the MQS.. fieldbus interface accepts the data exchange with PROFIBUS-DP.

The following sections describe the safety-related parameters transmitted to the MQS.. fieldbus interface. You can set the following parameters for your safety application:

- *F_CRC_Length*
- *F_Par_Version*
- *F_Dest_Add*
- *F_WD_Time*

F_Check_SeqNr (fix) parameter

This parameter determines whether the ready counter (consecutive number) is to be included in the consistency check (CRC calculation) of the F user data telegram.

The MQS.. fieldbus interface supports the following setting:

- *F_Check_SeqNr* = No check

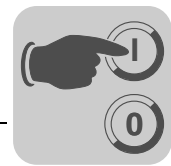


Table with 2 columns: Parameter Name and Description. Parameters include F_SIL (fix) parameter, F_CRC_Length parameter (can be set), F_Par_Version parameter (can be set), F_Source_Add parameter (fix), F_Dest_Add parameter (can be set), and F_WD_Time parameter (can be set).



10 Functionality of the MQS.. Fieldbus Interface

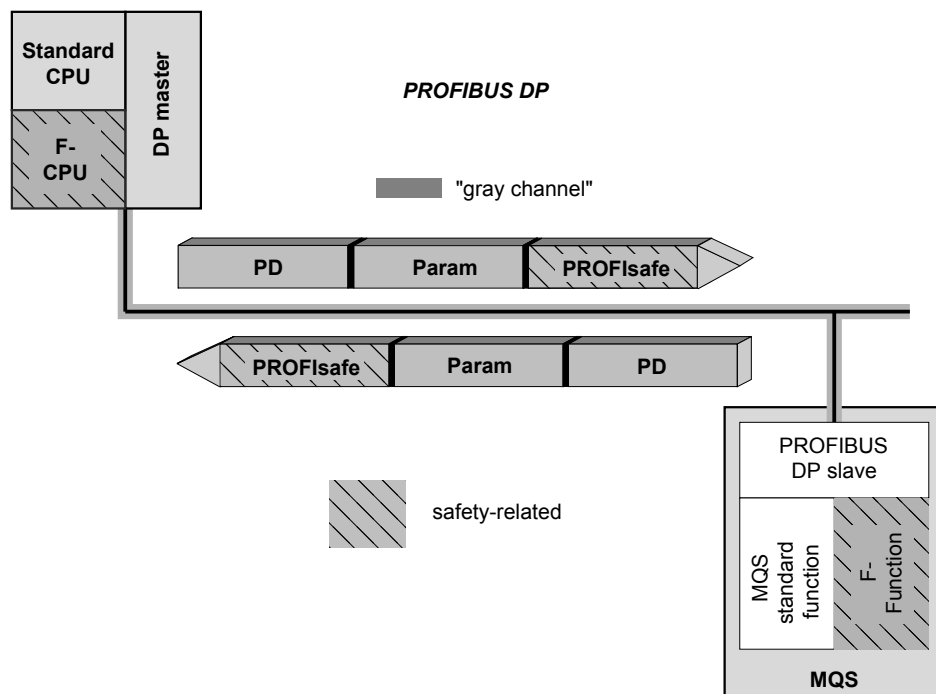
The MQS.. fieldbus interface with integrated control and safe stop of the MOVIMOT® drives supports parallel operation of standard functions and safety-related functions via a PROFIBUS-DP cable.

The MQS.. fieldbus interface provides the following communication functions:

- Standard process data communication, functionality corresponds to MQP fieldbus interface (not safety-related)
- 8-byte parameter channel (not safety-related)
- PROFIBUS-DPV1 functionality for parameterizing and diagnosing the MQS.. fieldbus interface and MOVIMOT® (not safety-related)
- Safety-related PROFIsafe communication for safe inputs and outputs

10.1 Data exchange to MQS..

Data exchange between the PROFIBUS master and the MQS.. fieldbus interface takes place via PROFIBUS-DP, which is also the gray channel for the safety-related application. Therefore, transferred DP telegrams contain standard information for classic operation of the MQS.. fieldbus interface with MOVIMOT® on PROFIBUS-DP and the PROFIsafe safety telegram. Depending on the configuration, the maximum available expansion level enables the exchange of PROFIsafe safety data, the parameter channel, and the process data between the DP master and the MQS.. fieldbus interface shown in the following figure.



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10.1.1 Access to F periphery in Step 7 of the MQS.. fieldbus interface

For safety-related communication, the MQS.. fieldbus interface requires a total of 6 bytes for the PROFIsafe telegram portion and 6 bytes for the process image. Of these, 2 bytes (= 16 bits) constitute the actual safety-related I/O data (F user data), and the remaining 4 bytes are required for storing the telegram in accordance with the PROFIsafe specifications (PROFIsafe header).

F periphery DB of the MQS.. fieldbus interface

During compilation in the HW Config tool, the system automatically generates an F periphery DB for every MQS.. fieldbus interface. The F periphery DB provides users with an interface in which they can evaluate or control variables in the safety program.

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

The following table shows the F periphery DB of the MQS.. fieldbus interface:

	Address	Symbol	Data type	Function	Default
User-controllable variables	DBX0.0	"F00008_198.PASS_ON"	Boolean	1: Activate passivation	0
	DBX0.1	"F00008_198.ACK_NEC"	Boolean	1: Acknowledgement for reintegration required for MQS.. fieldbus interface.	1
	DBX0.2	"F00008_198.ACK_REI"	Boolean	1: Acknowledgement for reintegration	0
	DBX0.3	"F00008_198.IPAR_EN"	Boolean	Variable for resetting parameters (not supported by MQS.. fieldbus interface)	0
Variables that can be evaluated	DBX2.0	"F00008_198.PASS_OUT"	Boolean	Run passivation	1
	DBX2.1	"F00008_198.QBAD"	Boolean	1: Substitute values are output	1
	DBX2.2	"F00008_198.ACK_REQ"	Boolean	1: Acknowledgement required for reintegration	0
	DBX2.3	"F00008_198.IPAR_OK"	Boolean	Variable for resetting parameters (not supported by MQS.. fieldbus interface)	0
	DBB3	"F00008_198.DIAG"	Byte	Service information	



Functionality of the MQS.. Fieldbus Interface

Data exchange to MQS..

PASS_ON This variable lets you activate passivation of the MQS.. fieldbus interface. Provided that **PASS_ON** = "1", the F periphery is passivated.

ACK_NEC After a fault has been corrected, the MQS.. fieldbus interface is reintegrated, depending on **ACK_NEC**.

- **ACK_NEC** = "0": Automatic reintegration
- **ACK_NEC** = "1": Reintegration via user acknowledgement



DANGER

The variable **ACK_NEC** = "0" may only be set if automatic reintegration is safe for the respective process.

Severe or fatal injuries.

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

ACK_REI In order to reintegrate MQS.. fieldbus interface after the fault has been corrected, user acknowledgement with positive edge of variable **ACK_REI** is required. Acknowledgement is only possible if variable **ACK_REQ** = "1".

ACK_REQ The F control system sets **ACK_REQ** = "1" once the errors in the data exchange to the MQS.. fieldbus interface have been corrected. After successful acknowledgement, the F control system sets **ACK_REQ** = "0".

PASS_OUT This variable indicates whether the passivation of the MQS.. fieldbus interface has been activated. Substitute values are output

QBAD Error in the data exchange with MQS.. fieldbus interface. This variable indicates a passivation. Substitute values are output

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



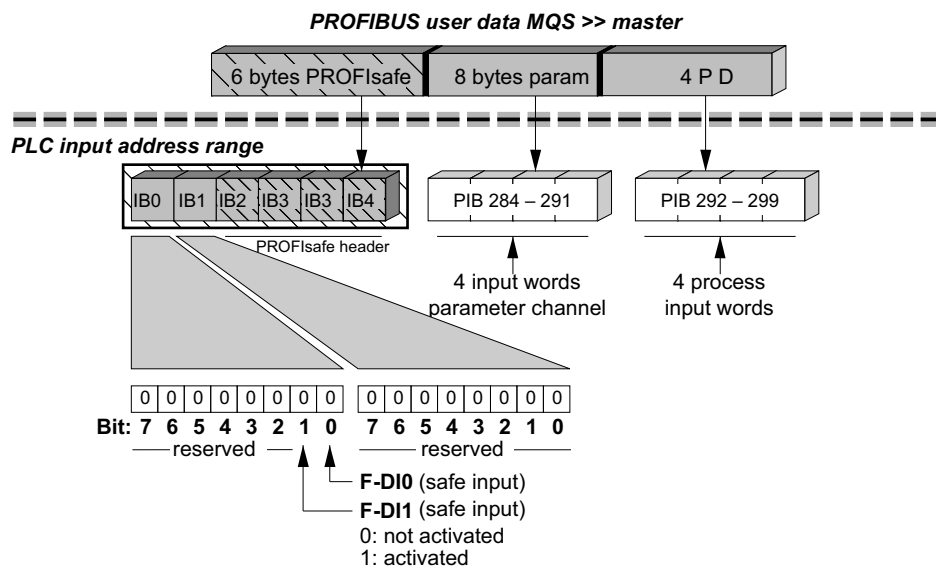
10.1.2 Mapping of the MQS.. fieldbus interface in the PLC address range

The user data information transmitted using PROFIBUS-DP is mapped in the input and output address range in the controller. The standard user data (process data and possibly the 8-byte parameter channel) are used by the standard CPU for processing. The PROFIsafe data can only be used by the F-CPU. The following figures are based on the following PROFIBUS project planning:

	I-address	O-address
F module I/O (2 bytes)	0 – 5	0 – 5
Param (4 words)	284 – 291	284 – 291
4 PD (4 words)	292 – 299	292 – 299

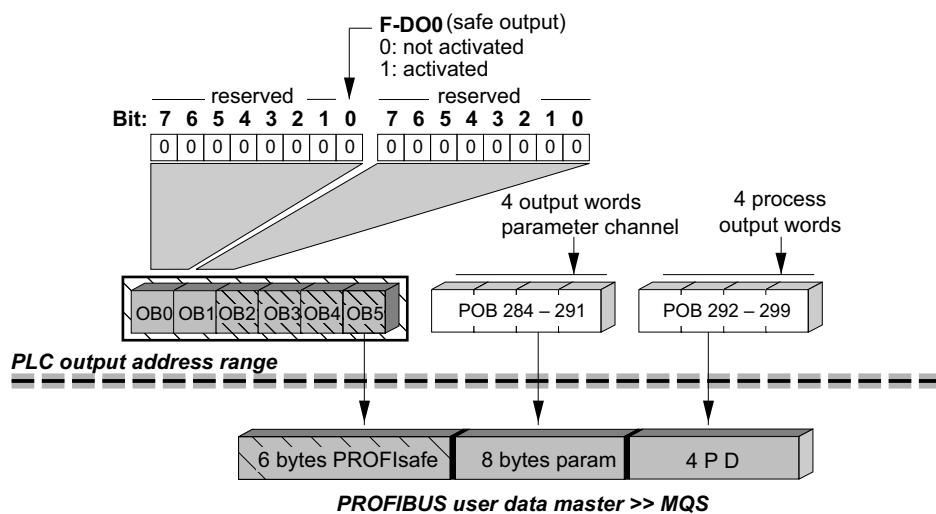
16 input and output bits are available for safety functions in the F CPU. Only 2 input bits (for F-DI0 and F-DI1) and one output bit (for F-DO0) are used. All other bits are reserved and must be set to "0".

The following figure shows the input data in the input address range of the PLC.



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The following figure shows the MQS data in the PLC output address range.



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10.2 Integrated control function

The MQS.. PROFIsafe interfaces are equipped with integrated control functionality in the same way as the MQP.. PROFIBUS interfaces. In addition, they are equipped with control functions that help you determine to a large extent the response of the drive to external specifications via fieldbus and integrated IOs. For example, you can process sensor signals directly at the fieldbus interface or define your own communication profile via the fieldbus interface. The NV26 or ES16 proximity encoder makes for a simple positioning system that can be integrated in your application in combination with an MQS control program.

The control functionality of the MQS.. fieldbus interface is enabled through IPOSplus®. The diagnostics and programming interface (under the screw plug on the front) of the MQS.. fieldbus interface provides access to the integrated IPOS® control. Option USB11A or UWS21B is used for connection to a PC. Programming takes place using the MOVITOOLS® Compiler.

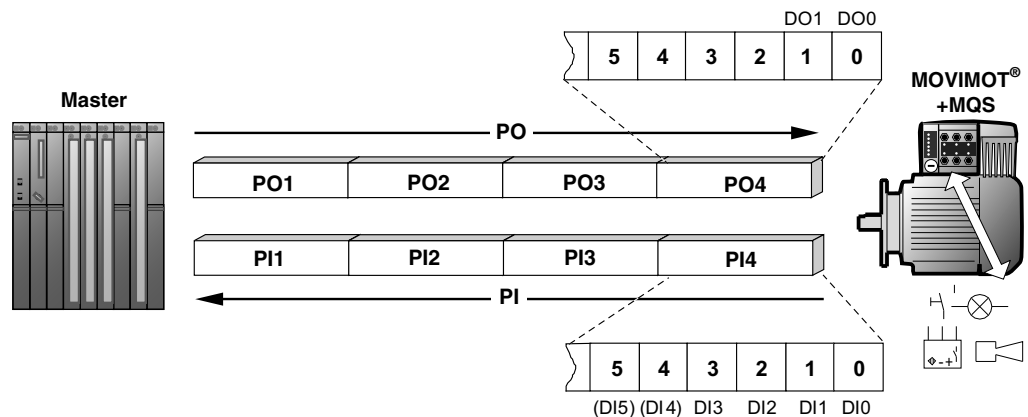
For more information on programming, refer to the "IPOSplus® Positioning and Sequence Control" manual.



10.3 Default program

The MQS.. fieldbus interface is delivered with an IPOS® program as a standard. It largely simulates the functionality of the MFP.. fieldbus interface.

Set address 1 on the MOVIMOT® drive and observe the instructions for startup. The process data length is fixed at 4 words (consider for project planning/startup). The first 3 words are exchanged transparently with MOVIMOT® and correspond to the MOVILINK® unit profile (see the chapter "MOVILINK® Unit Profile" (page 107)). The I/Os of the MQS.. fieldbus interface are transmitted in the 4. word.



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10.3.1 Fault responses

An interruption of the connection between the MQS.. fieldbus interface and the MOVIMOT® inverter leads to shutdown after 1 s. The error is displayed via status word 1 (error 91). **Since this system fault generally calls attention to cabling 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 MQS fieldbus interface after expiration of the set fieldbus timeout interval sets the process output data for MOVIMOT® to "0". This fault response can be deactivated using parameter *P831* in MOVITOOLS® Shell.

10.4 Control via PROFIBUS DP

The standard process output data sent by the PROFIBUS master can be processed in the IPOS® program of the MQS.. fieldbus interface. The standard process input data sent to the PROFIBUS master is specified via the IPOS® program of the MQS.. fieldbus interface.

The process data length can be set as required (1 – 10 words).

If a PLC is used as the PROFIBUS master, the process data lies within the input/output range or peripheral area of the PLC.



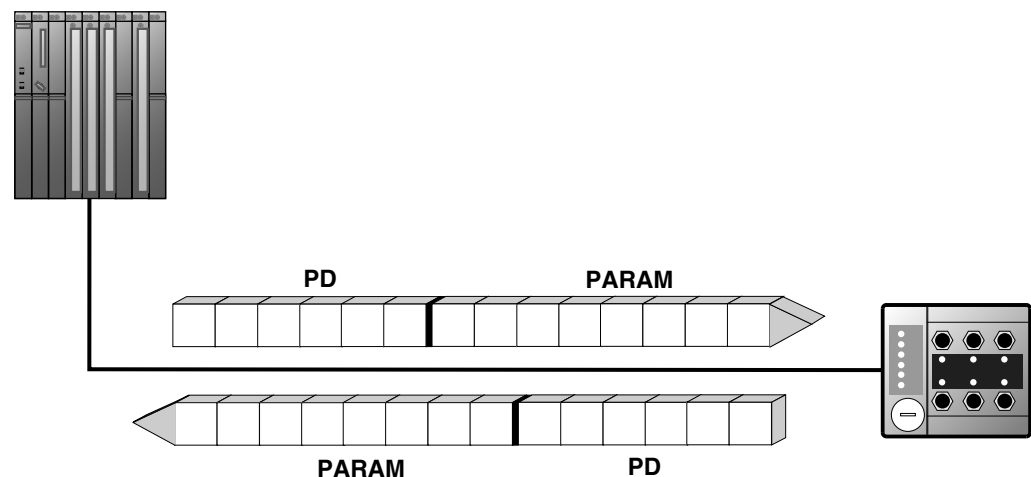
10.5 Parameterization via PROFIBUS-DP

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

Only parameters of the MQS.. fieldbus interface can be addressed via the parameter channel.

10.5.1 Structure of the parameter channel

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



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PARAM Parameter data
PD Process data

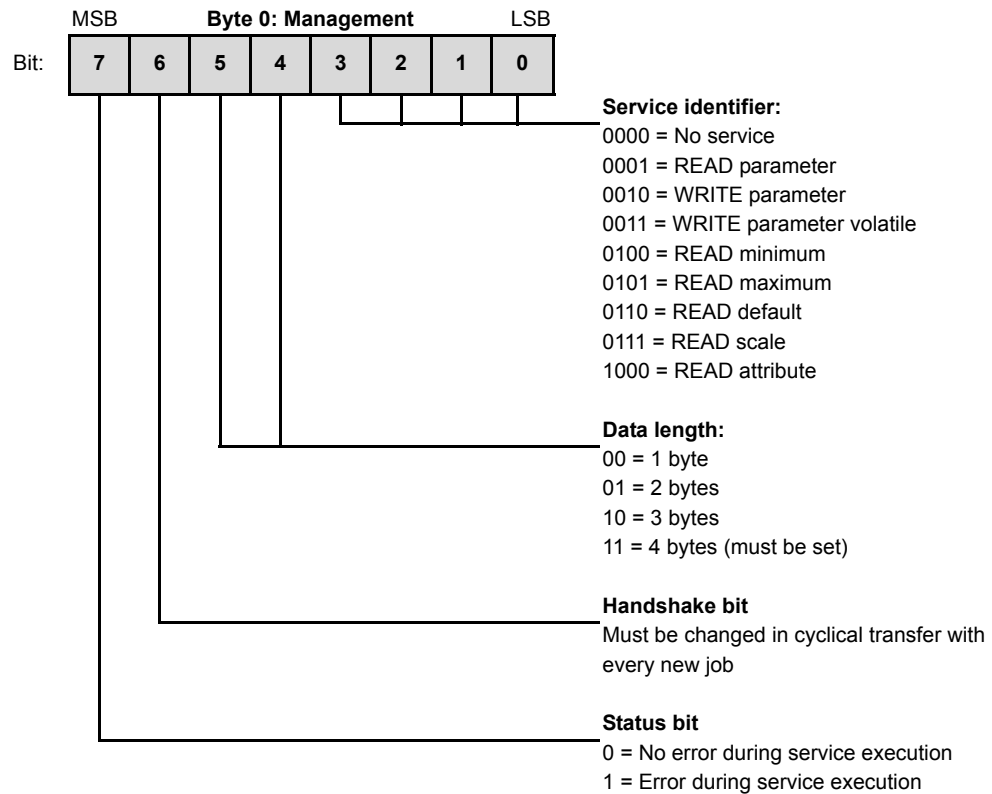
The following table shows the structure of the parameter channel. It is made up of a management byte, a reserved byte, an index word and 4 data bytes.

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			



10.5.2 Management of the parameter channel

The entire parameterization sequence is coordinated 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 ID. These bits determine which service is to be executed. 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 MQS.. fieldbus interface. It triggers the implementation of the transmitted service in the MQS.. fieldbus interface. Since the parameter channel is transmitted cyclically with the process data particularly with PROFIBUS DP, the execution of the service in the MQS.. fieldbus interface must be edge-triggered via the "handshake bit". For this purpose, the value of this bit is toggled for each new service to be executed. The MQS.. fieldbus interface uses the handshake bit to signal whether the service has been executed or not. The service has been executed if the handshake bit received in the controller is identical with the transmitted handshake bit. The status bit indicates whether it was possible to carry out the service properly or if there were errors.

10.5.3 Reserved byte

Byte 1 is reserved and must be set to 0x00.

10.5.4 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 MQS.. fieldbus interface are addressed with a uniform index regardless of the fieldbus system connected. The section "MQ.. Parameter List" (page 112) contains all MQx parameters with index.



10.5.5 Data range

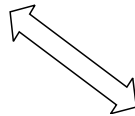
As shown in the following table, the data is contained in byte 4 – 7 of the parameter channel. This means up to 4 bytes of data can be transmitted per service. The data is always entered with right-justification; that is, byte 7 contains the least significant data byte (Data LSB) whereas byte 4 is the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

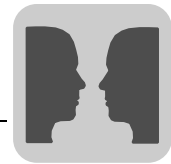
10.5.6 Incorrect service execution

The status bit in the management byte is set to signal that a service has been executed incorrectly. If the received handshake bit is identical to the transmitted handshake bit, the MQS.. fieldbus interface 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 section "Return Codes" on the next page).

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 service execution



10.5.7 Parameterization return codes

In the event of an incorrect parameterization, the MQS.. fieldbus interface sends different return codes to the parameterizing master, providing detailed information regarding the cause for the error. All of these return codes are structured in accordance with EN 50170. The MQP distinguishes between the following elements:

- Error class
- Error code
- Additional code

These return codes apply to all communication interfaces of the MQS.. fieldbus interface.

Error class

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

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

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

Error code

The error code element allows for a more detailed identification of the error cause within the error class and is generated by the communications software of the MQS.. fieldbus interface in the event of faulty 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 parameterization of the MQS.. fieldbus interface. They are returned to the master under error class 8 = "other error". The following table shows all possible codings for the additional code.

Error class: 8 = "Other error":

Add. code high (hex)	Add. code low (hex)	Meaning
00	00	No error
00	10	Illegal parameter index
00	11	Function/parameter not implemented
00	12	Read access only
00	13	Parameter lock is active
00	14	Factory setting is active
00	15	Value for parameter too large
00	16	Value for parameter too small
00	17	Required option card missing for this function/parameter
00	18	Error in system software
00	19	Parameter access via RS-485 process interface 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	Parameters may be changed at IPOS program stop only
00	24	Parameter may only be changed with deactivated Autosetup

Special return codes (special cases)

Parameterization errors that cannot be identified either automatically by the application layer of the fieldbus system or by the system software of the MQS.. fieldbus interface 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
- Node communication project planning error



Incorrect service code in the parameter channel

An invalid service identifier was specified in the management byte during parameterization via the 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 low:	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 shows the return code

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

Correcting the error:

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

Node 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 low:	0	–

Troubleshooting:

Configure a parameter channel for the desired station.



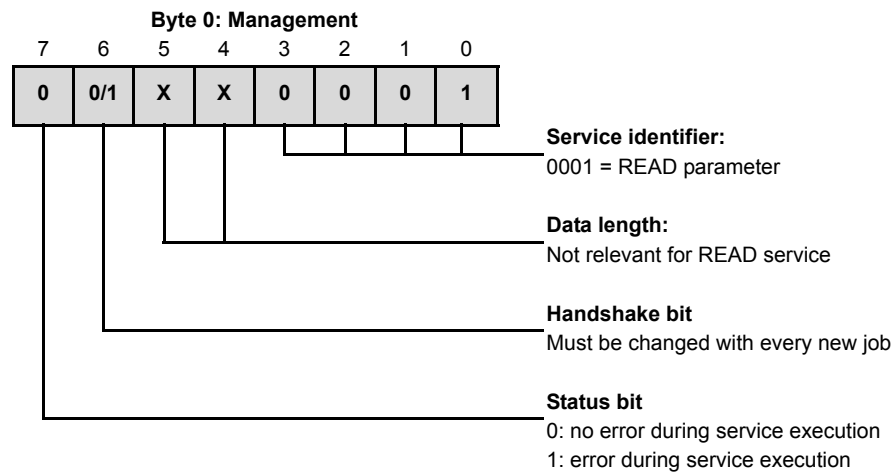
10.5.8 Reading and writing parameters via PROFIBUS-DP

Reading a parameter with PROFIBUS DP (READ)

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

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

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



X: not relevant

0/1 : Bit value is changed

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



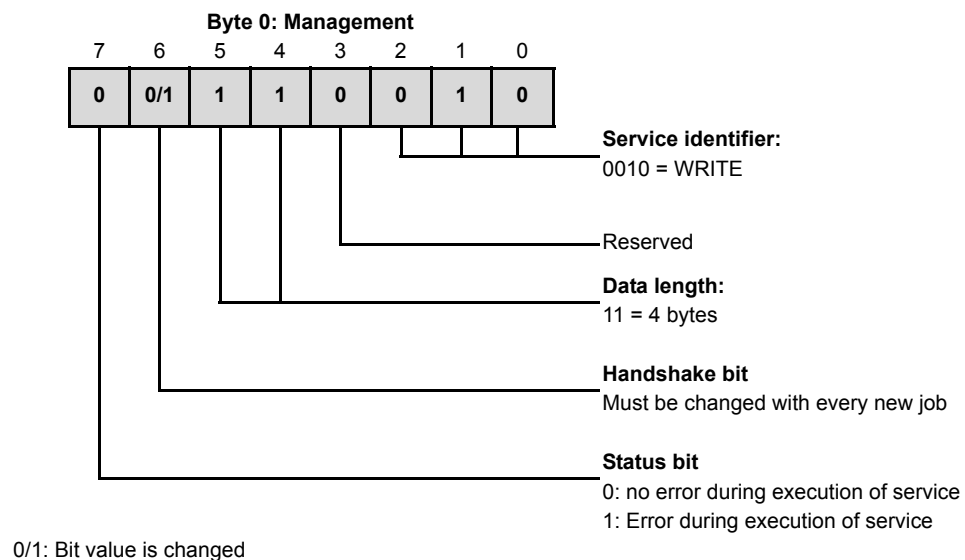
Writing a parameter via PROFIBUS DP (WRITE)

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

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

The MQS.. fieldbus interface now processes the READ service and sends back the service confirmation by changing the handshake bit.

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





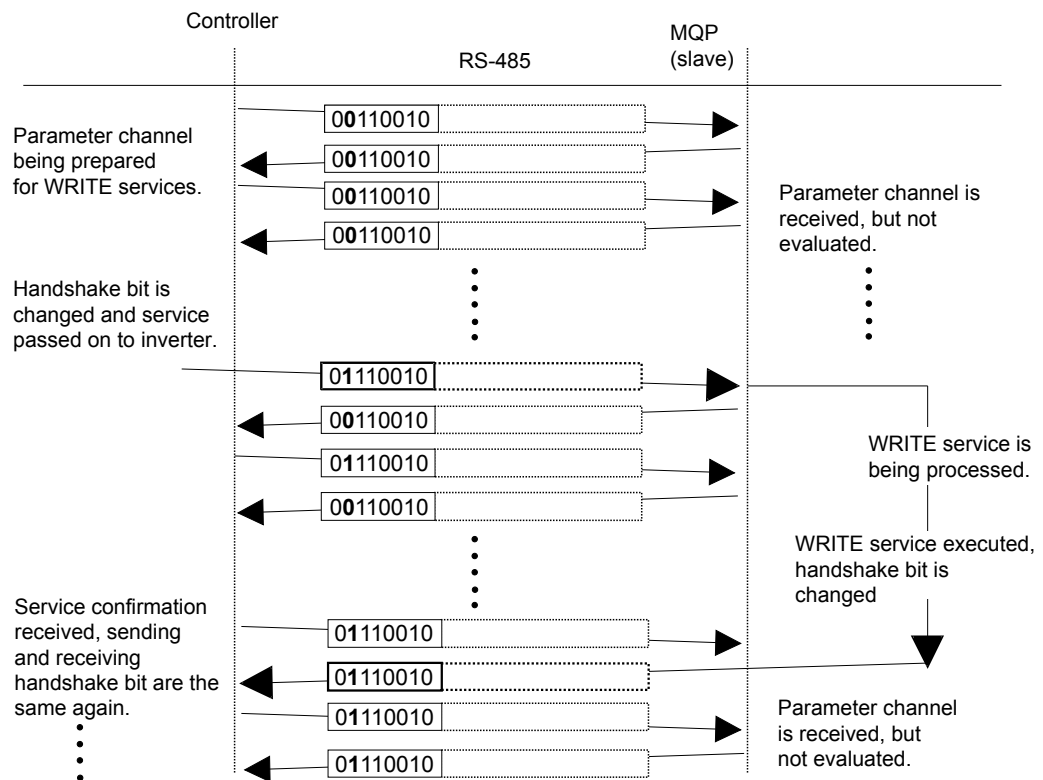
Functionality of the MQS.. Fieldbus Interface

Parameterization via PROFIBUS-DP

Parameterization procedure with PROFIBUS-DP

Using the WRITE service as an example, the following figure is used to show the configuration procedure between the controller and the MQS.. fieldbus interface via PROFIBUS-DP. To simplify the sequence, only the management byte of the parameter channel is shown in the figure.

The parameter channel is only received and returned by the MQS.. fieldbus interface while the controller is preparing the parameter channel for the WRITE service. The service is not activated until the moment when the handshake bit is changed (in this example, when it changes from "0" to "1"). The MQS.. fieldbus interface now interprets the parameter channel and processes the WRITE service. However, it continues to respond to all telegrams with handshake bit = "0". Confirmation that the service has been performed occurs when the handshake bit in the response telegram of the MQS.. fieldbus interface is changed. The controller now detects that the received handshake bit is once again the same as the one which was sent. It can now prepare another parameterization procedure.



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Parameter data format

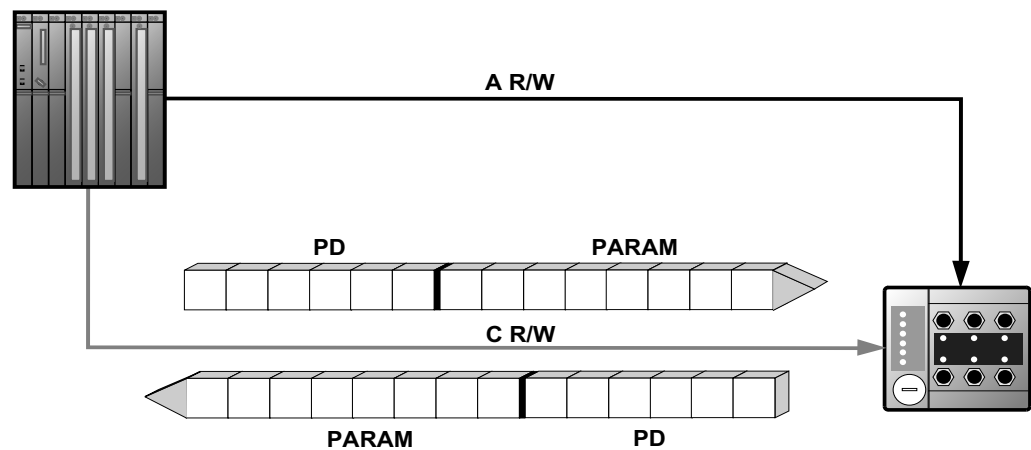
When parameters are set via the fieldbus interface, the same parameter coding is used as with the serial RS-485 interfaces. The list of the individual parameters can be found in the section "MQ.. parameter list" (page 112).



10.6 Parameterization via PROFIBUS-DPV1

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

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



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PARAM	Parameter data
PD	Process data
A R/W	Acyclical READ/WRITE services
C R/W	Cyclical READ/WRITE services



10.6.1 Structure of the DPV1 parameter channel

Data sets (DS)

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

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

DPV1 READ / WRITE	PROFIdrive	SEW-EURODRIVE MOVILINK®
	Parameter channel DS47	

The following MOVILINK® services are supported:

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

The following PROFIdrive services are supported:

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



Elements of data set DS47

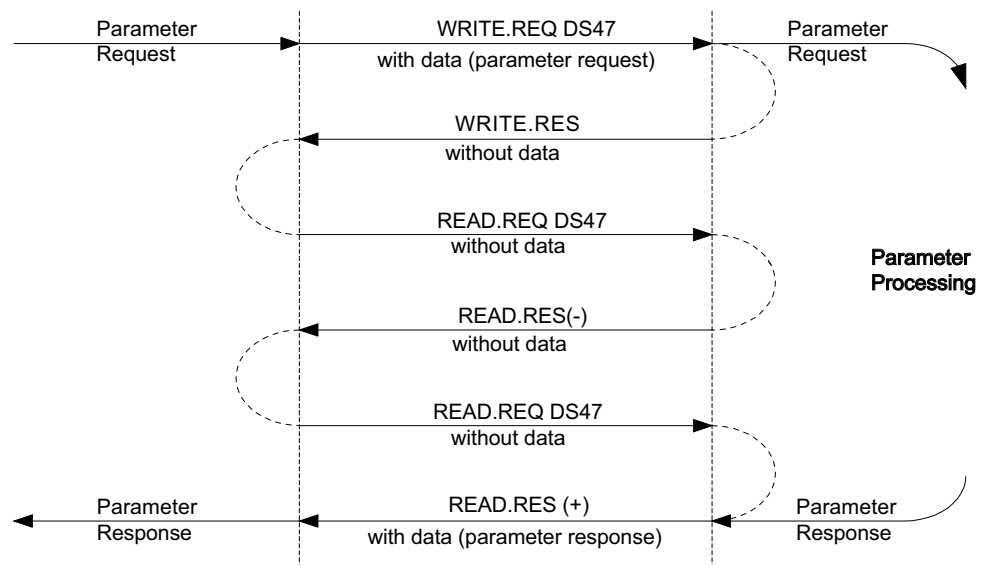
The following table shows the elements of data set DS47.

Field	Data type	Values
Request reference	Unsigned8	0x00 Reserved
		0x01 – 0xFF
Request ID	Unsigned8	0x01 Request parameter (PROFIdrive)
		0x02 Change parameter (PROFIdrive)
		0x40 SEW-EURODRIVE MOVILINK® Service
Response ID	Unsigned8	Response (+):
		0x00 Reserved
		0x01 Request parameter (+) (PROFIdrive)
		0x02 Change parameter (+) (PROFIdrive)
		0x40 SEW-EURODRIVE MOVILINK® service (+)
		Response (-):
		0x81 Request parameter (-) (PROFIdrive)
		0x82 Change parameter (-) (PROFIdrive)
		0xC0 SEW-EURODRIVE MOVILINK® service (-)
Axis	Unsigned8	0x00 – 0xFF Number of axis 0 – 255
No. of parameters	Unsigned8	0x01 – 0x13 1 – 19 DWORDs (240 DPV1 data bytes)
Attributes	Unsigned8	0x10 Value
		For SEW-EURODRIVE MOVILINK® (Request ID = 0x40):
		0x00 No service
		0x10 READ parameters
		0x20 WRITE parameters
		0x30 WRITE parameter volatile
		0x40 READ minimum
		0x50 READ maximum
		0x60 READ default
		0x70 READ scale
		0x80 READ attribute
		0xA0 – 0xF0 Reserved
No. of elements	Unsigned8	0x00 for non-indexed parameters
		0x01 – 0x75 Quantity 1 – 117
Parameter Number	Unsigned16	0x0000 – 0xFFFF MOVILINK® parameter index
Subindex	Unsigned16	0x0000 SEW-EURODRIVE: always 0
Format	Unsigned8	0x43 Double word
		0x44 Error
No. of Values	Unsigned8	0x00 – 0xEA Quantity 0 – 234
Error Value	Unsigned16	0x0000 – 0x0064 PROFIdrive error codes
		0x0080 + MOVILINK® additional code low
		For SEW-EURODRIVE MOVILINK® 16 Bit Error Value



10.6.2 Parameterization procedure – dataset 47 with PROFIBUS-DPV1

Parameter access takes place with the combination of the DPV1 services WRITE and READ. The parameterization request is transferred to the slave with WRITE.req. followed by slave-internal processing. The master now sends a READ.req to pick up the parameterization response. The master repeats the READ.request if the READ.response from the slave is negative. It sends a positive READ.response once the parameter processing in the MQS.. fieldbus interface has been completed. The user data now comprise the parameterization response to the parameterization order sent with WRITE.request (see the following figure). This mechanism applies to both a C1 and a C2 master.



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10.6.3 MOVILINK® parameter requests

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

Request ID: 0x40 SEW MOVILINK® service

The actual service is defined by the data set element Attribute in the MOVILINK® parameter channel. The high nibble of this element corresponds to the service nibble in the management byte of the DPV0 parameter channel.

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

Sending a parameter request:

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

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

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

Query parameter response:

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

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



Positive MOVILINK® parameterization response:

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

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

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

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

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

	Service:	READ.req.	Description
DPV1 header	Slot_Number	0	Random (is not evaluated)
	Index	47	Index of the data set: constant index 47
	Length	16	16-byte user data for order buffer

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

Once the WRITE.req. message is sent, the WRITE.res. response message is received. If there has not been a status conflict during the parameter channel processing, there will be a positive WRITE.res. Otherwise the status error is written in Error_Code_1.



Query parameter response

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

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

Positive response to WRITE parameter volatile

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

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

10.6.4 Parameterization return codes

Negative parameter response

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

	Service:	READ.res.	Description
DPV1 header	Slot_Number	0	random, (is not evaluated)
	Index	47	Index of the data set; constant index 47
	Length	8	8 byte user data in response buffer

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



MOVILINK® parameter response

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

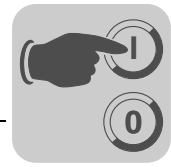
MOVILINK® return code (hex)	Description
0x0810	Invalid index, parameter index does not exist in the unit
0x0811	Function/parameter not implemented
0x0812	Read access only
0x0813	Parameter lock activated
0x0814	Factory setting is active
0x0815	Value for parameter too large
0x0816	Value for parameter too small
0x0817	Required option card not installed
0x0818	Error in system software
0x0819	Parameter access via RS-485 process interface only
0x081A	Parameter access via RS-485 diagnostic interface only
0x081B	Parameter is access-protected
0x081C	Controller inhibit is required
0x081D	Invalid value for parameter
0x081E	Factory setting was activated
0x081F	Parameter was not saved in EEPROM
0x0820	Parameter cannot be changed with output stage enabled / reserved
0x0821	Reserved
0x0822	Reserved
0x0823	Parameter may only be changed with IPOS program stop
0x0824	Parameter may only be changed with deactivated Autsetup
0x0505	Incorrect coding of management and reserved byte
0x0602	Communication error between inverter system and fieldbus interface
0x0502	Timeout of secondary connection (e.g. during reset or with Sys-Fault)



INFORMATION

There is an example of a function module for SIMATIC S7 controls available for download in the Software section on the SEW website (www.sew-eurodrive.de).

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



11 Supplementary Field Distributor Startup Information

The startup procedure is described in the section "Startup with PROFIBUS (MQS..)" (page 68). In addition, please observe the following notes about the startup of field distributors.

11.1 MQS../Z.6. field distributors

11.1.1 Maintenance switch

The maintenance switch of the Z.6. field distributor protects the hybrid cable against overload and switches the following MOVIMOT® components:

- Power supply and
- DC 24 V supply



DANGER

The maintenance switch only disconnects the MOVIMOT® motor from the power supply system, but not the field distributor.

Severe or fatal injuries from electric shock.

- Deenergize the field distributor and safeguard it against unintentional restart.



11.2 MQS../MM../Z.7. field distributors

11.2.1 Checking the motor connection type

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



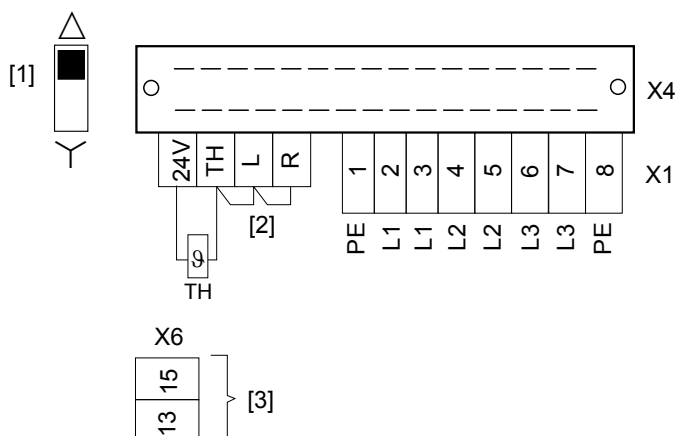
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INFORMATION

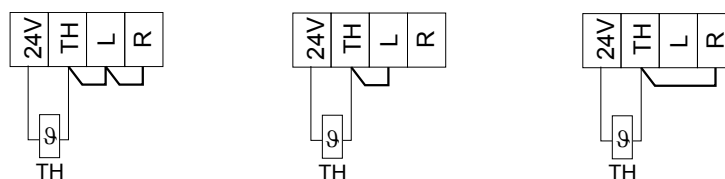
For brake motors: Do not install brake rectifiers inside the terminal box of the motor.

11.2.2 Internal wiring of the MOVIMOT® in the field distributor



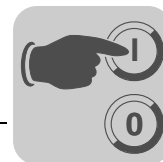
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- [1] DIP switch for setting the connection type
Make sure that the connection type of the connected motor matches the DIP switch setting.
- [2] **Note the enabled direction of rotation**
 (Both directions of rotation are enabled as standard)
 Both directions are enabled Only direction **Counterclockwise rotation** is enabled Only direction **Clockwise rotation** is enabled



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



11.3 MQS../MM../Z.8. field distributors

11.3.1 Maintenance switch

The maintenance switch of the Z.8. field distributor switches the following MOVIMOT® components:

- Power supply and
- DC 24 V supply

	! DANGER
	<p>The maintenance switch only disconnects the MOVIMOT® motor from the power supply system, but not the field distributor.</p> <p>Severe or fatal injuries from electric shock.</p> <ul style="list-style-type: none"> • Deenergize the field distributor and safeguard it against unintentional restart.

11.3.2 Checking the motor connection type

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

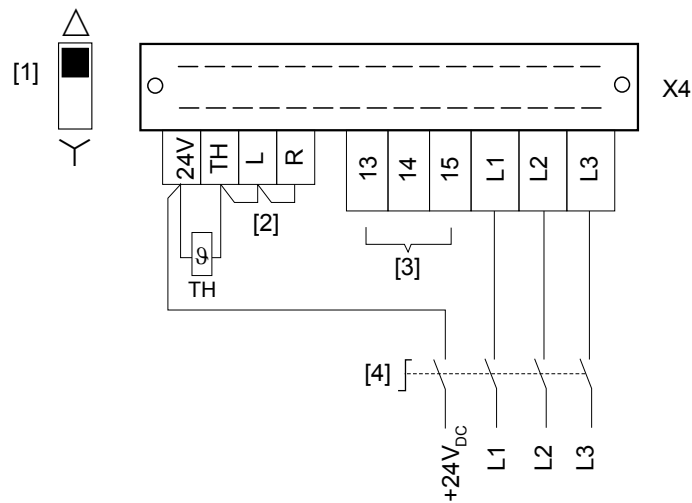


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	INFORMATION
	<p>For brake motors: Do not install brake rectifiers inside the terminal box of the motor!</p>

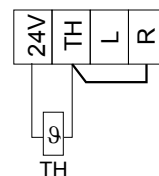
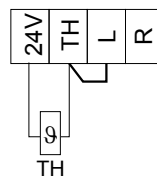
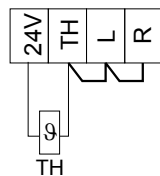


11.3.3 Internal wiring of the MOVIMOT® in the field distributor



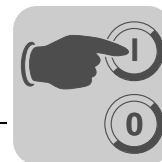
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- [1] DIP switch for setting the connection type
Make sure that the connection type of the connected motor matches the DIP switch setting.
- [2] **Note the enabled direction of rotation**
 (Both directions of rotation are enabled as standard)
 Both directions are enabled Only direction **Counterclockwise rotation** is enabled Only direction **Clockwise rotation** is enabled



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- [3] Connection for internal braking resistor (in motors without brake only)
 [4] Maintenance switch



11.4 MOVIMOT® integrated in the field distributor

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

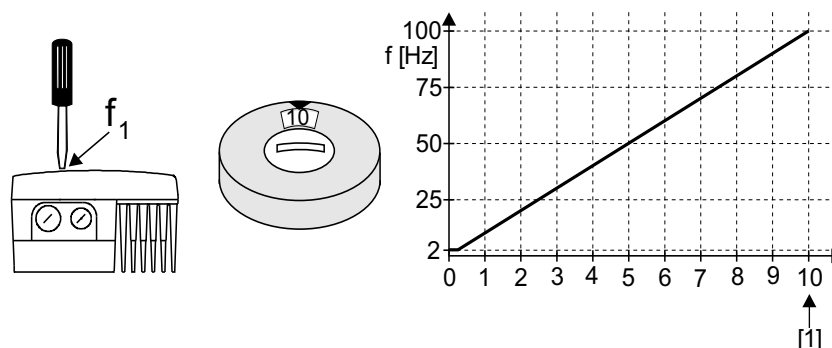
11.4.1 Changed factory settings of MOVIMOT® integrated in the field distributor

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 operating instructions of the respective MOVIMOT® drive.

DIP switch S1:

S1 Meaning	Binary encoding RS-485 unit address				5 Motor protection	6 Motor Power rating	7 PWM Frequency	8 No-load damping
	2 ⁰	2 ¹	2 ²	2 ³				
ON	1	1	1	1	Off	Motor one size smaller	Variable (16, 8, 4 kHz)	On
OFF	0	0	0	0	On	Adjusted	4 kHz	Off

Setpoint potentiometer f1:



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[1] Factory setting



11.4.2 Additional functions of MOVIMOT® integrated in the field distributor

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

Additional function		Restriction
1	MOVIMOT® with increased ramp times	–
2	MOVIMOT® with adjustable current limitation (fault if limit is exceeded)	–
3	MOVIMOT® with adjustable current limitation (can be changed using terminal f1/f2)	–
4	MOVIMOT® with bus parameterization	Only possible with MQ.. fieldbus interfaces
5	MOVIMOT® with motor protection in Z.7. field distributor / Z.8.	Bus parameterization is only possible in conjunction with the MQ.. fieldbus interface
6	MOVIMOT® with maximum PWM frequency of 8 kHz	–
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 failure deactivated	–
12	MOVIMOT® with quick 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	–



INFORMATION

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.

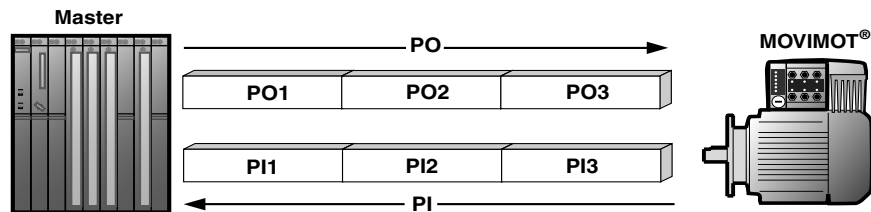


12 MOVILINK® Unit Profile

12.1 Coding of the process data

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

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



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PO = Process output data
PO1 = Control word
PO2 = Speed (%)
PO3 = Ramp

PI = Process input data
PI1 = Status word 1
PI2 = Output current
PI3 = Status word 2

12.1.1 2 process data words

For controlling the MOVIMOT® inverter via 2 process data words, the higher-level controller sends the process output data "Control word" and "Speed [%]" to the MOVIMOT®. The MOVIMOT® inverter sends the process input data "Status word 1" and "Output current" to the higher-level controller.

12.1.2 3 process data words

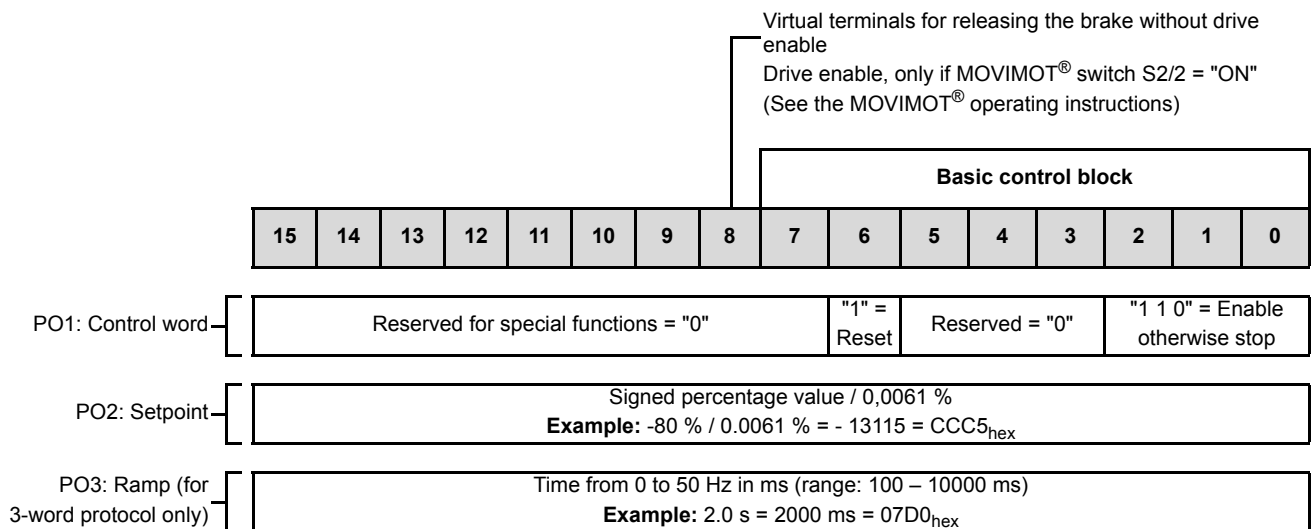
When control uses 3 process data words, the ramp is sent as the additional process output data word and status word 2 is sent as the third process input data word.



12.1.3 Process output data

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

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



Control word, bit 0 – 2

The "Enable" control command is set 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 (jumped) to enable the MOVIMOT® drive.

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 with 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 you can acknowledge the error via bit 6 = "1" (reset). For reasons of compatibility, any control bits not assigned must be set to "0".

Speed [%]

The speed setpoint is given as a relative value in percentage and refers to maximum speed set using the setpoint potentiometer f1.

Coding: C000_{hex} = -100% (counterclockwise direction)
 4000_{hex} = +100% (CW rotation)
 -> 1 digit = 0,0061 %

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

Calculation: -80 % / 0,0061 = -13115_{dec} = CCC5_{hex}

Ramp

The current integrator in the process output data word PO3 is transferred if the process data exchange takes place using three process data words. The integrator ramp set with switch t1 is used if the MOVIMOT® drive is controlled using 2 process data words.

Coding: 1 digit = 1 ms

Range: 100 – 10000 ms

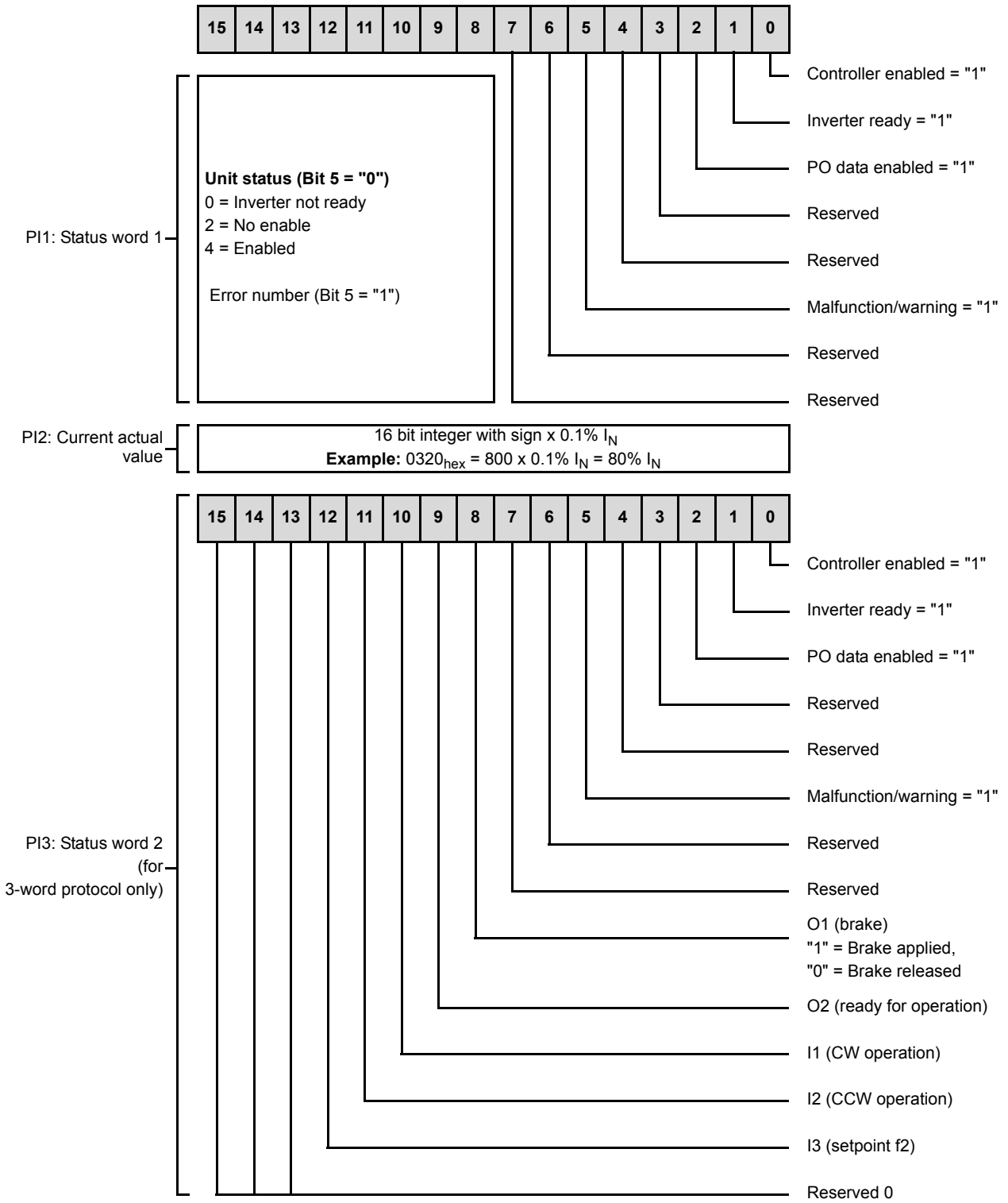
Example: 2.0 s = 2000 ms = 2000_{dec} = 07D0_{hex}



12.1.4 Process input data

The MOVIMOT® inverter sends the process input data back to the higher-level controller. The process input data contains information on statuses and actual values. The MOVIMOT® drive supports the following process input data:

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





12.2 Sample program for Simatic S7 and fieldbus

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



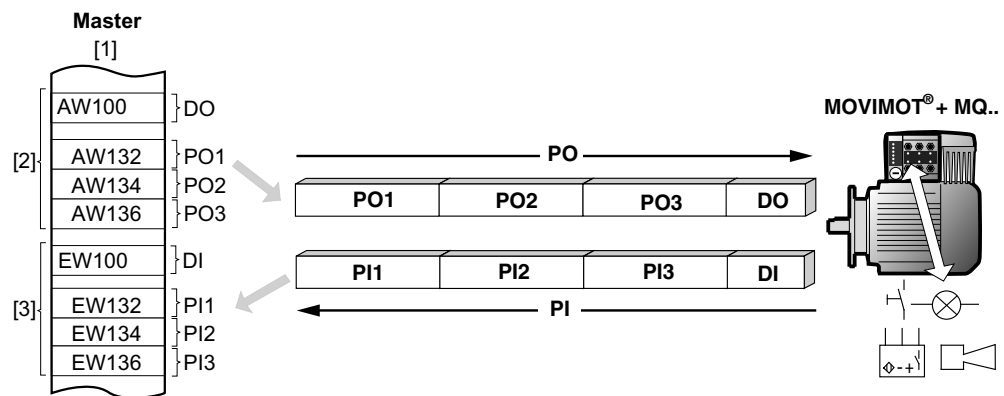
INFORMATION

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

12.2.1 Address assignment of the process data in the automation system

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 and EW 100.



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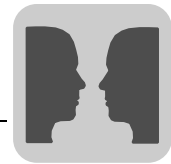
[1] Address range	PO Process output data	PI Process input data
[2] Output addresses	PO1 Control word	PI1 Status word 1
[3] Input addresses	PO2 Speed [%]	PI2 Output current
	PO3 Ramp	PI3 Status word 2
	DO Digital outputs	DI Digital inputs

12.2.2 Processing the digital inputs/outputs of the MQ.. fieldbus interface

The AND operation of digital inputs DI0 – DI3 controls the digital outputs DO0 and DO1 on the MQ... interface:

```

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"
  
```



12.2.3 MOVIMOT® control

Input DI0 enables the MOVIMOT® drive:

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

Input DI1 sets the direction of rotation and the speed:

- 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    // Enter the "Enable" control command with input 100.0
SPB  FREE

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

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

SETP: U E 100.1 // Set direction of rotation with input 100.1
SPB  CCW       // CCW operation if input 100.1 = "1"
L W#16#2000    // Setpoint speed = 50% fmax CW (=2000hex)
T PAW 134     // Write to PO2 (speed [%])
SPA  ACTV

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

ACTV: L 1000    // Ramp = 1 s (1000dez)
T PAW 136      // Write to PO3 (ramp)

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

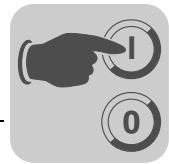
BE
    
```



13 Parameters

13.1 Parameter list of the MQ.. interface

Parameter	Designation	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	Operating hours	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	Basic unit firmware	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 state
810	RS-485 address	8597		RO	0	
812	RS-485 timeout interval	8599	[s]	RO	1	
819	Fieldbus timeout interval	8606	[s]	RO		



Parameter	Designation	Index	Unit	Access	Default	Meaning / value range
831	Fieldbus timeout response	8610		RW	10	0: No response 10: PO DATA = 0
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 variable H0 – H9	11000-11009		RW	–	Memory-resident variable
-	IPOS variable H10 – H511	11010-11511		RW	0	
-	IPOS code	16000-17023		RW	0	



14 Service

14.1 MOVIMOT® status and error display

14.1.1 Status LED

The status LED is located on the top of the MOVIMOT® inverter.

Meaning of the status LED states

The three-color status LED indicates the operating and error statuses of the MOVIMOT® inverter.

LED color	LED status	Error code	Description
–	off	Not ready	No 24 V power supply
Yel-low	Flashes steadily	Not ready	Self-test phase active or 24 V power supply present but supply voltage not OK
Yel-low	Flashing evenly, fast	Ready	Brake release without drive enable active (only with S2/2 = "ON")
Yel-low	Steady light	Ready, but unit inhibited	24 V power supply and supply voltage OK, but no enable signal If drive does not run when enable signal is present - check startup!
Green /yel-low	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
Green	Flashes steadily	Ready	Standstill current function active
Red	Steady light	Not ready	Check the 24 V 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	Speed monitoring error (only with S2/4 = "ON") or additional function 13 is active
		Error 90	Incorrect motor/inverter assignment
		Faults 17 to 24, 37	CPU error
		Error 25, 94	EEPROM error
		Error 97	Parameter transmission error
Red	3x flashing, break	Error 01	Overcurrent in output stage
		Error 11	Overtemperature in output stage
Red	4x flashing, break	Error 84	Overload in motor
Red	5x flashing, break	Error 89	Overtemperature in brake Assignment of motor to frequency inverter incorrect
Red	6x flashing, break	Error 06	Mains phase failure
		Error 81	Start condition ¹⁾
		Error 82	Output phases interrupted ¹⁾

1) Only for hoist applications

Status LED flash codes

Flashing steadily:	LED 600 ms on, 600 ms off
Flashing evenly, fast:	LED 100 ms on, 300 ms off
Flashing with alternating colors:	LED 600 ms green, 600 ms yellow
N x flashing, pause:	LED N x (600 ms red, 300 ms off), then LED off for 1 s



14.1.2 MOVIMOT® error list

Error	Cause/solution
Communication timeout (motor stops, without error code)	<ul style="list-style-type: none"> Missing connection \perp RS+, RS- between MOVIMOT® and RS-485 master. Check and establish connection, especially earth. EMC influence Check shielding of data lines and improve, if necessary. Incorrect type (cyclical) in acyclical data transfer, protocol time between the individual message is longer than 1 s (timeout interval). 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 message cycle or select message type "acyclic".
DC link voltage too low, supply system off was detected (motor stops, without error code)	<p>Check supply system leads, supply voltage and 24 V electronics supply voltage for interruption. Check the value of the 24 V electronics supply voltage (permitted voltage range $24V \pm 25\%$, EN 61131-2 residual ripple max. 13 %)</p> <p>Motor restarts automatically as soon as the voltage reaches normal values.</p>
Error code 01 Overcurrent in output stage	<p>Short circuit on inverter output.</p> <p>Check the connection between the inverter output and the motor as well as the motor winding for short circuits.</p> <p>Reset the fault by switching off the DC 24 V supply voltage or resetting the error.</p>
Error code 06 Phase failure (The error can only be detected when the drive is at load)	<p>Check the supply system cable for phase failure.</p> <p>Reset the fault by switching off the DC 24 V supply voltage or resetting the error.</p>
Error code 07 DC link voltage too high	<ul style="list-style-type: none"> Ramp time too short → Increase ramp time. Faulty connection between brake coil/braking resistor → Check the connection between braking resistor and brake coil. Correct, if necessary. Incorrect internal resistance of brake coil/braking resistor → Check internal resistance of brake coil/braking resistor (see section "Technical Data"). Thermal overload in braking resistor → Wrong size of braking resistor selected. Invalid voltage range of the supply input voltage → Check supply input voltage for valid voltage range <p>Reset the fault by switching off the DC 24 V supply voltage or resetting the error.</p>
Error code 08 Speed monitoring	<p>Speed monitoring has triggered, load on the drive is too high</p> <p>Reduce the load on the drive</p> <p>Reset the fault by switching off the DC 24 V supply voltage or resetting the error.</p>
Error code 11 Thermal overload of the output stage or internal unit error	<ul style="list-style-type: none"> Clean the heat sink Lower ambient temperature Prevent heat build-up Reduce the load on the drive <p>Reset the fault by switching off the DC 24 V supply voltage or resetting the error.</p>
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 43 communication timeout	<p>Communication timeout during cyclical communication via RS-485</p> <p>If this error occurs, the drive is decelerated and stopped along the set ramp.</p> <ul style="list-style-type: none"> Check/establish communication link between RS-485 master and MOVIMOT®. Check the number of slaves connected to the RS-485 master. If the timeout interval of the MOVIMOT® inverter is set to 1 s, you can connect a maximum of 8 MOVIMOT® inverters (slaves) to the RS-485 master for cyclical communication. <p>Note:</p> <p>The drive is enabled again after communication has been re-established.</p>
Error code 81 Start condition error	<p>The motor could not be supplied with the correct amount of current during the pre-magnetizing time.</p> <ul style="list-style-type: none"> Rated motor power too small in relation to rated inverter power Motor cable cross section too small <p>Check connection between MOVIMOT® inverter and motor.</p>
Error code 82 Output open error	<ul style="list-style-type: none"> 2 or all output phases interrupted Rated motor power too small in relation to rated inverter power <p>Check connection between MOVIMOT® inverter and motor.</p>



Service MOVIMOT® status and error display

Error	Cause/solution
Error code 84 Thermal overload of motor	<ul style="list-style-type: none"> 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® 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. <p>Reset the fault by switching off the DC 24 V supply voltage or resetting the error.</p>
Error code 89 Thermal overload of brake coil or brake coil defective, brake coil connected incorrectly	<ul style="list-style-type: none"> Increase the set ramp time Brake inspection Check brake coil connection Contact SEW Service Check the combination of the drive (brake coil) and MOVIMOT® 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. <p>Reset the fault by switching off the DC 24 V supply voltage or resetting the error.</p>
Error code 91 Communication error between fieldbus gateway and MOVIMOT® (this error is generated by the bus module)	<ul style="list-style-type: none"> 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.
Error code 94 EEPROM checksum error	<ul style="list-style-type: none"> Defective EEPROM <p>Contact SEW Service.</p>
Error code 97 Copy error	<ul style="list-style-type: none"> DBG keypad or PC disconnected during the copy process Switching the 24 V supply voltage off and on during the copying process <p>Before acknowledging the error, load the factory setting or the complete data record from the keypad or the MOVITOOLS® MotionStudio software.</p>



14.2 MQS.. status and error display

The MQS.. fieldbus interface is equipped with 7 LEDs for displaying the operating states:

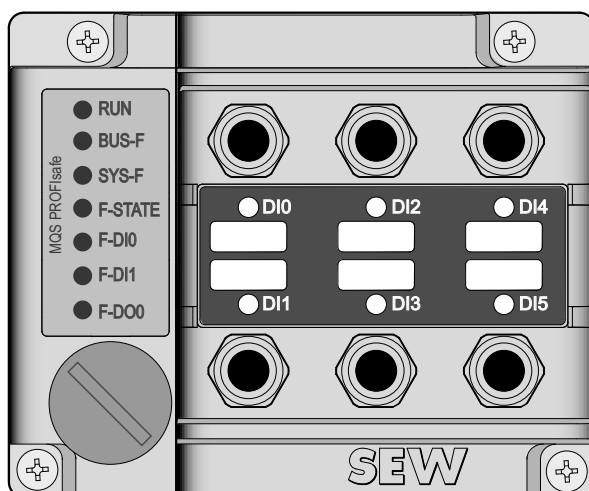
- LED "RUN" (green) for displaying the normal operating status
- LED "BUS-F" (red) for displaying errors at the PROFIBUS DP
- LED "SYS-F" (red) indicates MQS.. or MOVIMOT® system errors
- LED "F-STATE" (green/red) for displaying the operating state of the safety system
- LED "F-DI0" (yellow) for displaying safe input 0
- LED "F-DI1" (yellow) for displaying safe input 1
- LED "F-DO0" (yellow) for displaying the safe output



! WARNING

Incorrect interpretation of the "FDI.", "FDO.", "STO" and "F-STATE" LEDs.
Severe or fatal injuries.

- The LEDs are not safety-related and may not be used as a safety device.



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14.2.1 Overview of LED displays

LED	Condition	Meaning	Remedy
RUN	Green	<ul style="list-style-type: none"> MQS circuit board hardware OK Correct MQS operation 	-
	Off	<ul style="list-style-type: none"> No 24 V power supply 	<ul style="list-style-type: none"> Check voltage supply
	Flashing green	<ul style="list-style-type: none"> PROFIBUS address is set higher than 125 	<ul style="list-style-type: none"> Check the PROFIBUS address
BUS-F	Red	<ul style="list-style-type: none"> Connection to the DP master has failed MQS.. does not detect a baud rate Bus interruption DP master not in operation. 	<ul style="list-style-type: none"> Check the PROFIBUS-DP connection to the MQS.. Check the DP master Check all cables in your PROFIBUS DP network
	Off	<ul style="list-style-type: none"> MQS.. is currently exchanging data with the DP master (data exchange) 	-
	Flashing red	<ul style="list-style-type: none"> Baud rate is detected, however not addressed by DP master MQS.. was not configured in DP master or configured incorrectly 	<ul style="list-style-type: none"> Check project planning of the DP master
SYS-F	Red	<ul style="list-style-type: none"> The MQS.. is not exchanging data with the connected MOVIMOT® The MQS.. was not configured, or the connected MOVIMOT® unit does not respond Maintenance switch on the field distributor is set to OFF MOVIMOT® safe stop is active (switched off) 	<ul style="list-style-type: none"> Check the voltage supply of MOVIMOT® Check the address on MOVIMOT® Check whether the IPOS program has been started Check the setting of the maintenance switch on the field distributor
	Off	<ul style="list-style-type: none"> Normal operating state MQS.. is exchanging data with the connected MOVIMOT® unit 	-
	Flashing red	<ul style="list-style-type: none"> The MQS.. is in error state An error message is displayed in the MOVITOOLS® status window 	<ul style="list-style-type: none"> Please see the corresponding error description (see error table)
F-STATE	Green	<ul style="list-style-type: none"> The MQS safety section is currently exchanging data cyclically with the F host (data exchange) Normal operating state 	-
	Red	<ul style="list-style-type: none"> Error state in the safety section 	<ul style="list-style-type: none"> Read off diagnosis in F module Remedy cause of error and acknowledge the repair in the F host
		<ul style="list-style-type: none"> F module is not configured in the DP master (slot 1 is empty) 	<ul style="list-style-type: none"> Check the project planning of the bus master
	Off	<ul style="list-style-type: none"> 24 V supply voltage missing MQS.. is currently in the initialization phase 	<ul style="list-style-type: none"> Check voltage supply
	Flashing Red/green	<ul style="list-style-type: none"> There was an error in the safety section; cause of error has been repaired - acknowledge repair 	<ul style="list-style-type: none"> Acknowledge error in the F host (Reintegration)
F-DI0	Yellow	<ul style="list-style-type: none"> HIGH level at input F-DI0 	-
	Off	<ul style="list-style-type: none"> LOW level at input F-DI0 or open 	-
F-DI1	Yellow	<ul style="list-style-type: none"> HIGH level at input F-DI1 	-
	Off	<ul style="list-style-type: none"> LOW level at input F-DI1 or open (switched) 	-
F-DO0	Yellow	<ul style="list-style-type: none"> Output F-DO0 active 	-
	Off	<ul style="list-style-type: none"> Output F-DO0 inactive (switched off) 	-



14.2.2 MQS.. fieldbus interface error tables

Error table for the standard section

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



Error table for the safety section

Error code/designation	Response	Cause	Measure
00 No error	-		
01 Internal sequence error	<ul style="list-style-type: none"> F-DO0 = 0 (disconnection of safe output) F-DIx = 0 (=> safe state) Passivation of the fieldbus interface 	<ul style="list-style-type: none"> Malfunction in safety electronics, possibly due to EMC interference 	<ul style="list-style-type: none"> Check the installation (EMC) Switch the 24 V voltage off and on again Reintegration of the fieldbus interface Replace the MQS.. fieldbus interface or contact SEW Service if the error reoccurs.
02 Internal system error			
03 Communication error		<ul style="list-style-type: none"> PROFIsafe communication faulty 	<ul style="list-style-type: none"> Check configuration (e.g. PROFIsafe monitoring time) Reintegration of the fieldbus interface
04 Error in the electronics supply		<ul style="list-style-type: none"> Electronics supply is outside the specified limits 	<ul style="list-style-type: none"> Check the installation (EMC) Switch the 24 V voltage off and on again Reintegration of the fieldbus interface Replace the MQS.. fieldbus interface or contact SEW Service if the error reoccurs.
05 Error in the load voltage supply		<ul style="list-style-type: none"> Load voltage supply is missing or is outside the specified limits 	<ul style="list-style-type: none"> Check the 24 V load supply Reintegration of the fieldbus interface
20 Internal error at safe input (F-DIx)	<ul style="list-style-type: none"> F-DIx = 0 (=> safe state) Passivation of the fieldbus interface 	<ul style="list-style-type: none"> Malfunction in safety electronics, possibly due to EMC interference 	<ul style="list-style-type: none"> Check the installation (EMC) Switch the 24 V voltage off and on again Reintegration of the fieldbus interface Replace the MQS.. fieldbus interface or contact SEW Service if the error reoccurs.
21 Short circuit at safe input (F-DIx)		<ul style="list-style-type: none"> Short circuit on the 24 V supply voltage or Cross-fault between F-DI0 and F-DI1 or F-SS0 and F-SS1 	<ul style="list-style-type: none"> Check installation / wiring and eliminate short circuit Reintegration of the fieldbus interface
50 Internal error at safe output (F-DO0)	<ul style="list-style-type: none"> F-DO0 = 0 (disconnection of safe output) Passivation of the fieldbus interface 	<ul style="list-style-type: none"> Malfunction in safety electronics, possibly due to EMC interference 	<ul style="list-style-type: none"> Check the installation (EMC) Switch the 24 V voltage off and on again Reintegration of the fieldbus interface Replace the MQS.. fieldbus interface or contact SEW Service if the error reoccurs.
51 Short circuit at safe output (F-DO0)		<ul style="list-style-type: none"> Short circuit in 24 V voltage supply or reference potential Short circuit between F-DO0_P and F-DO0_M 	<ul style="list-style-type: none"> Check installation / wiring and eliminate short circuit Reintegration of the fieldbus interface
52 Overload at safe output (F-DO0)		<ul style="list-style-type: none"> Overload at F-DO0 (current is too high!) 	<ul style="list-style-type: none"> Check installation / wiring and eliminate overload Reintegration of the fieldbus interface
111 Internal communication error	<ul style="list-style-type: none"> F-DO0 = 0 (disconnection of safe output) F-DIx = 0 (=> safe state) Passivation of the fieldbus interface 	<ul style="list-style-type: none"> Malfunction in safety electronics, possibly due to EMC interference 	<ul style="list-style-type: none"> Check the installation (EMC) Switch the 24 V voltage off and on again Reintegration of the fieldbus interface Replace the MQS.. fieldbus interface or contact SEW Service if the error reoccurs.



14.2.3 Error states – standard section

Fieldbus timeout

Switching off the fieldbus master or an open circuit in the fieldbus cabling results in a fieldbus timeout in the MQS.. fieldbus interface. The connected MOVIMOT® drives are stopped by sending "0" in each process output data word.

When the MOVIMOT® drive is controlled with 3 process data words, the ramp is specified with 0 s in the 3rd word. That corresponds to a rapid stop on control word 1. In addition, the digital outputs are set to "0".

	<p>! WARNING</p>
	<p>The "Fieldbus timeout" error resets itself automatically. The MOVIMOT® drive will receive the current process output data again from the controller as soon as the fieldbus communication has been reestablished.</p> <p>Severe or fatal injuries due to restart.</p> <ul style="list-style-type: none"> Deenergize the field distributor and safeguard it against unintentional restart before start working on the driven machine.

RS-485 timeout

If one or more MOVIMOT® drives can no longer be addressed by the MQS.. fieldbus interface 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® drives that do not receive any data will stop after 1 second. The prerequisite for this is that data exchange between the MQS.. and MOVIMOT® is enabled via MOVCOMM commands. MOVIMOT® drives that continue to receive data can be controlled as usual.

	<p>! WARNING</p>
	<p>The "RS-485 timeout" timeout resets automatically, i.e. the current process data is exchanged immediately with MOVIMOT® once communication has been restarted.</p> <p>Severe or fatal injuries due to restart.</p> <ul style="list-style-type: none"> Deenergize the field distributor and safeguard it against unintentional restart before start working on the driven machine.

Unit errors

The MQS.. 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 section "Error table for the standard section". (page 119)

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

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



14.2.4 Error states – safety section



INFORMATION

Depending on the safety controller used, other terms may be used for "passivation" and "reintegration" in the safety controller documentation.

For detailed information, refer to the safety controller documentation.

Error in the safety module

The safety subassembly in the MQS.. fieldbus interface can identify a series of internal and external errors (at the safe inputs/outputs). The error types, exact error responses and remedial measures are listed in section "Error table for the safety section" (page 120).

If errors occur in the safety section, the MQS.. fieldbus interface usually responds by passivating the module and switching off the output. All safety-related process values (F-DI and F-DO) are then set to "0" (=> safe status). Once the error has been remedied, the passivation must be acknowledged by reintegrating the fieldbus interface.



! WARNING

Automation reintegration can also be set in the safety controller.

Severe or fatal injuries.

- Do not use this function in safety-related applications.

PROFIsafe timeout

If the safety-related PROFIsafe communication is interrupted or delayed, after the adjustable monitoring time "*F_WD_Time*" (see description of F parameters) has expired, the MQS.. fieldbus interface also responds with passivation and assuming safe status.

This monitoring time also has to be set in the safety controller. Once the time has expired, the respective fieldbus interface is passivated and the corresponding safety-related process values are set to "0" for the safety application (=> safe state).

A passivation must always be acknowledged by reintegrating the respective fieldbus interface.



14.3 Diagnostics via PROFIBUS

The status of the PROFIsafe communication and error messages of the MQS safety section is transmitted to the DP master via a status PDU in accordance with the PROFIBUS DPV1 standard.

The following figure shows how diagnostic data is organized for PROFIsafe communication via slot 1. The F module for the MQS safety section is configured in slot 1.

Byte 11 is used for transferring diagnostics messages. These are defined in the PROFIsafe specifications.

Bytes 12 and 13 transfer the status and error status of the MQS safety section to the higher-level DP master.

The figure below shows the structure of diagnostics data for PROFIBUS DPV1:

Status block							
Byte 1 – 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13
6 bytes Standard diagnostics	Header	Status Type	Slot Number	Status Specifier	Diag User Data 0	Diag User Data 1	Diag User Data 2
...	0x07	0x81	0x00	0x00	PROFIsafe	F-State 1	
	↑ 7 bytes module- specific Diagnostics	↑ 0x81 = Status block with status message	↑ 0x00 = Slot 1 (F-channel)	↑ no DPV1 specifier	↑ PROFIsafe diagnostic information in accor- dance with PROFIsafe profile V2.0	↑ Cyclical F_State of the MQS.. fieldbus inter- face	

14.3.1 Diagnostic messages of the PROFIsafe layer

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

Byte 11	PROFIBUS diagnostics text (German)	PROFIBUS diagnostics text (English)
0 _{hex} / 0 _{dec}	No error	–
40 _{hex} / 64 _{dec}	F_Dest_Add not matching	Mismatch of F_Dest_Add
41 _{hex} / 65 _{dec}	F_Dest_Add invalid	F_Dest_Add not valid
42 _{hex} / 66 _{dec}	F_Source_Add invalid	F_Source_Add not valid
43 _{hex} / 67 _{dec}	F_WD_Time is 0 ms	F_WD_Time is 0 ms
44 _{hex} / 68 _{dec}	SIL Level exceeds SIL Level	F_SIL exceeds SIL f. application
45 _{hex} / 69 _{dec}	Wrong F_CRC_Length	F_CRC_Length does not match
46 _{hex} / 70 _{dec}	Wrong F-Parameter version	F parameter set incorrectly
47 _{hex} / 71 _{dec}	Error in CRC1 value	CRC1 fault

For more information on the meaning and remedy of error messages, refer to the manuals on the PROFIBUS-DP manual.



14.3.2 MQS safety section – error codes

The table below shows the error codes of the MQS safety section:

Byte 12	Byte 13	Designation	Meaning / error correction
0 _{hex} / 0 _{dec}	0 _{hex} / 00 _{dec}	No error	see Error table for the safety section (page 120)
	01 _{hex} / 01 _{dec}	Internal sequence error	
	02 _{hex} / 02 _{dec}	Internal system error	
	03 _{hex} / 03 _{dec}	Communication error	
	04 _{hex} / 04 _{dec}	Error in the electronics supply	
	05 _{hex} / 05 _{dec}	Error in the load voltage supply	
	14 _{hex} / 20 _{dec}	Internal error at safe input (F-DIx)	
	15 _{hex} / 21 _{dec}	Short circuit at safe input (F-DIx)	
	32 _{hex} / 50 _{dec}	Internal error at safe output (F-DO0)	
	33 _{hex} / 51 _{dec}	Short circuit at safe output (F-DO0)	
	34 _{hex} / 52 _{dec}	Overload at safe output (F-DO0)	
	6F _{hex} / 111 _{dec}	Internal communication error in F option	



14.4 Extended storage

If a unit with inverter is being stored for a long time, connect it to the mains voltage for at least 5 minutes every 2 years. Otherwise, the unit's service life may be reduced.

14.5 Procedure when maintenance has been neglected

Electrolytic capacitors are used in the inverters. They are subject to aging effects when de-energized. This effect can damage the capacitors if the unit is connected using the rated voltage after a longer period of storage.

If you have not performed maintenance regularly, SEW-EURODRIVE recommends that you increase the line voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview. After you have completed the regeneration process, the unit can be used immediately or stored again for an extended period with maintenance.

The following stages are recommended:

AC 400/500 V units:

- Stage 1: AC 0 V to AC 350 V within a few seconds
- Stage 2: AC 350 V for 15 minutes
- Stage 3: AC 420 V for 15 minutes
- Stage 4: AC 500 V for 1 hour

14.6 Disposal

This product consists of:

- Iron
- Aluminum
- copper
- Plastic
- Electronic components

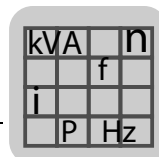
Dispose of all components in accordance with applicable regulations.



15 Technical Data

15.1 Technical data of the MQS.. fieldbus interface

General technical data MQS.. fieldbus interface	
Electronics and F-sensor/actuator supply MQS..	U_{IN} = DC 24 V –15 % / +20 % according to EN 61131-2 $I_E \leq 250$ mA + output current of the actuator + sensor supply + F sensor supply
Load voltage supply (for safe output)	U_{IN} = DC 24 V –15 % / +20 % according to EN 61131-2 $I_E \leq 1.3$ A
Electrical isolation	<ul style="list-style-type: none"> PROFIBUS DP connection potential-free Separate standard electronics from safety electronics
Bus connection technology	Two cage clamp terminals each for incoming and outgoing bus cables (optional M12)
Shielding	via EMC metal cable glands
Standard binary inputs (sensors)	PLC-compatible according to EN 61131-2 (digital inputs type 1), $R_i \approx 3.0$ k Ω , Sampling interval about 5 ms
Signal level	+15 V – +30 V → "1" = contact closed –3 V – +5 V → "0" = contact open
Standard sensor supply Rated current Internal voltage drop	DC 24 V to EN 61131-2, interference voltage proof and short-circuit proof $\Sigma 500$ mA Max. 1 V
Standard 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
Length of RS485 cable	max. 30 m between MQS.. and MOVIMOT® if installed separately
Cable length for standard inputs (DIx)	Max. 30 m
Cable length for sensor supply (VO24)	Max. 30 m
Cable length for standard outputs (DOx)	Max. 30 m
EMC	complies with EN 61800-3
Ambient temperature	–25 – +55 °C
Climate class	Class 3K3 to EN 60721-3-3
Storage temperature	–25 – +85 °C
Degree of protection	IP65 (installed on MFZ.. connection module, all plug connections sealed)
Overvoltage category	III according to IEC 60664-1 (VDE 0110-1)
Pollution class	2 according to IEC 60664-1 (VDE 0110-1) within the housing
Vibration	according to EN 50178



Technical data of the safety section of the MQS.. fieldbus interface	
Safety characteristics	
Maximum possible safety class	SIL 2 to EN 61508, category 3 to EN 954-1 and performance level d according to EN ISO 13849-1
System structure	2 channels with diagnostics (1oo2D)
Operating mode selection	High demand rate according to EN 61508
Probability of a hazardous failure per hour (PFH value)	<1.00E-09 (1 FIT)
Proof test interval (EN61508)	10 years, then the components have to be replaced
Repair time	100 hours
Safe condition	"0" for all safety-related process values – F-DI and F-DO (outputs switched off)
Safe inputs F-DI0, F-DI1	Level according to EN 61131-2 DC 24 V, type 1, no electrical isolation
Signal level	+15 V – +30 V → "1" = contact closed –3 V – +5 V → "0" = contact open
Input resistance	ca. 4 kΩ
Input filter time	4 ms
Minimum input signal duration	15 ms
Response time (sensor switches -> F-DIx updated in the PROFIsafe user data)	≤ 25 ms (incl. filter time)
Sensor supply [cycle outputs] F-SS0, F-SS1	DC 24 V output according to EN 61131-2, protected against short circuits and overloads no electrical isolation
Rated current	250 mA each
Leakage current	Max. 0.5 mA
Internal voltage drop	Max. 2 V
Short circuit protection	electronic, response value: 0.7 – 2.1 A
Safe output P-M switch (from load voltage supply)	DC 24 V output according to EN 61131-2, protected against short circuits and overloads
Rated current	1 A
Leakage current ("0" signal)	typically –2 mA (with 2 V / 1 kΩ load resistance) (Note: Current flows from F-DO_M to FDO_P)
Internal voltage drop (P and M output)	Max. 3 V
Short circuit protection	electronic, response value: 2.8 – 9 A
Overload protection	Response value: 1.4 – 1.6 A
Load resistance range	24 Ω – 1 kΩ
Voltage limitation for disconnection of an inductive load	typically –70 V
Response time (command via PROFIsafe → output switches)	≤ 25 ms
Cable length Safe binary input (F-DIx)	Max. 30 m
Cable length safe voltage supply (F-SSx)	Max. 30 m
Cable length safe output (F-DO0_P, F-DO0_M)	Max. 30 m

Note:

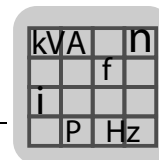
	INFORMATION
	The safety function of MOVIDRIVE® is only permitted for applications up to category 3 according to EN 954-1.



Technical Data

Technical data of the MQS.. fieldbus interface

PROFIBUS specifications	
PROFIBUS protocol option	PROFIBUS-DPV1 (PROFIsafe V1/V2)
Supported baud rates	9.6 kBaud – 12 MBaud (with automatic detection)
Bus termination	integrated, can be set via DIP switch (to EN 50170)
Permitted cable length for PROFIBUS	<ul style="list-style-type: none"> • 9.6 kBaud: 1200 m • 19.2 kBaud: 1200 m • 93.75 kBaud: 1200 m • 187.5 kBaud: 1000 m • 500 kBaud: 400 m • 1.5 MBaud: 200 m • 12 MBaud: 100 m <p>To extend the length, several segments can be coupled using repeaters. The maximum expansion/cascading depth can be found in the manuals for the PROFIBUS DP master or the repeater modules.</p>
DP ID number	6005 hex (24577 dec)
DP configurations	1 process data word with and without parameter channel (see section "MQS.. configuration" (page 74))
Set-Prm application data	max. 10 bytes, without function
Length of diagnostics data	6 byte to EN 50170 (V2)
Address settings	"Set-Slave-Address" not supported, can be set using DIP switch
Number of parallel C2 connections	2
Supported data record	Index 47
Supported slot number	Recommended: 0
Manufacturer code	10A hex (SEW-EURODRIVE)
Profiles ID	0
C2 response timeout	1 s
Max. length C1 channel	240 bytes
Max. length C2 channel	240 bytes
GSD file name	SEW_6005.GSD
Bitmap file name	SEW6005N.BMP SEW6005S.BMP



15.2 Technical data for field distributors

15.2.1 Technical data for MQS../Z.6. field distributors

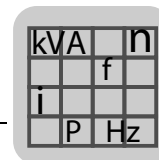
MQS../Z.6.	
Maintenance switch	Load interrupter switch and line protection Type: ABB MS 325 – 9 + HK20 Switch activation: black/red, triple lock
Ambient temperature	–25 – +55 °C
Storage temperature	–25 – +85 °C
Degree of protection	IP65 (fieldbus interface, power supply connection cover and motor connection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



15.2.2 Technical data for MQS../MM../Z.7. field distributors

Field distributor type		MQS../MM../503-00/Z.7				
		MM03D	MM05D	MM07D	MM11D	MM15D
		Size 1				
Apparent output power with $V_{\text{mains}} = \text{AC } 380 - 500 \text{ V}$	S_N	1.1 kVA	1.4 kVA	1.8 kVA	2.2 kVA	2.8 kVA
Supply voltages Permitted range	V_{line}	AC 3 x 380 V/ 400 V /415 V/460 V/500 V $V_{\text{supply}} = \text{AC } 380 \text{ V } -10 \% - \text{AC } 500 \text{ V } +10\%$				
Line frequency	f_{line}	50 – 60 Hz $\pm 10\%$				
Nominal line current (at $V_{\text{line}} = \text{AC } 400 \text{ V}$)	I_{line}	AC 1.3 A	AC 1.6 A	AC 1.9 A	AC 2.4 A	AC 3.5 A
Output voltage	V_O	0 – V_{line}				
Output frequency Resolution Operating point	f_o	2 – 120 Hz 0.01 Hz 400 V at 50 Hz / 100 Hz				
Rated output current	I_N	AC 1.6 A	AC 2.0 A	AC 2.5 A	AC 3.2 A	AC 4.0 A
Motor power S1	P_{Mot}	0.37 kW 0.5 HP	0.55 kW 0.75 HP	0.75 kW 1.0 HP	1.1 kW 1.5 HP	1.5 kW 2.0 HP
PWM frequency		4 / 8 / 16¹⁾ kHz				
Current limitation	I_{max}	motor: 160 % at λ and Δ regenerative: 160 % at λ and Δ				
Maximum motor cable length		15 m (with SEW hybrid cable, type A)				
External braking resistor	R_{min}	150 Ω				
Interference immunity		complies with EN 61800-3				
Interference emission		Complies with category C2 according to EN 61800-3 (limit class A to EN 55011 and EN 55014)				
Ambient temperature	ϑ_A	–25 – +40 °C P_N reduction: 3% I_N per K to max. 55 °C				
Storage temperature	ϑ_L	–25 – +85 °C				
Degree of protection		IP65 (fieldbus interface, power supply connection cover and motor connection cable attached and fastened, all plug connections sealed)				
Operating mode		S1 (EN 60149-1-1 and 1–3), S3 max. cycle duration 10 minutes				
Cooling type (DIN 41 751)		Self-cooling				
Installation altitude		$h \leq 1000 \text{ m}$: No reduction $h > 1000 \text{ m}$: I_N reduction by 1% per 100 m also refer to the MOVIMOT® operating instructions, section "electrical installation – installation instructions")				
ext. electronics supply	TL 11 TL 13	$V = +24 \text{ V} \pm 25 \%$, EN 61131-2, residual ripple max. 13 % $I_E \leq 250 \text{ mA}$, typ. 150 mA at 24 V (only MOVIMOT®) Input capacitance 100 μF				
Interface		PROFIBUS				
Weight		approx. 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.



15.2.3 Technical data for MQS../MM../Z.8. field distributors

Field distributor type		MQS../MM../-503-00/Z.8							
		MM03D	MM05D	MM07D	MM11D	MM15D	MM22D	MM30D	MM40D
		Size 1					Size 2		Size 2L
Apparent output power with $V_{\text{mains}} = \text{AC } 380 - 500 \text{ V}$	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	V_{line}	AC 3 x 380 V/ 400 V /415 V/460 V/500 V $V_{\text{supply}} = \text{AC } 380 \text{ V} - 10 \% - \text{AC } 500 \text{ V} + 10\%$							
Line frequency	f_{line}	50 – 60 Hz $\pm 10\%$							
Nominal line current (at $V_{\text{line}} = \text{AC } 400 \text{ V}$)	I_{line}	AC 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 7.3 A
Output voltage	V_{O}	0 – V_{line}							
Output frequency Resolution Operating point	f_{o}	2 – 120 Hz 0.01 Hz 400 V at 50 Hz / 100 Hz							
Rated output current	I_{N}	AC 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 8.7 A
Motor power S1	P_{Mot}	0.37 kW 0.5 HP	0.55 kW 0.75 HP	0.75 kW 1.0 HP	1.1 kW 1.5 HP	1.5 kW 2.0 HP	2.2 kW 3.0 HP	3.0 kW 4.0 HP	4.0 kW 5.4 HP
PWM frequency		4 / 8 / 16¹⁾ kHz							
Current limitation	I_{max}	motor: 160 % at \angle and \triangle regenerative: 160 % at \angle and \triangle							
Maximum motor cable length		15 m (with SEW hybrid cable, type A)							
External braking resistor	R_{min}	150 Ω					68 Ω		
Interference immunity		complies with EN 61800-3							
Interference emission		Complies with category C2 according to EN 61800-3 (limit class A to EN 55011 and EN 55014)							
Ambient temperature	ϑ_{A}	–25 – +40 °C P_{N} reduction: 3% I_{N} per K to max. 55 °C							
Storage temperature	ϑ_{L}	–25 – +85 °C							
Degree of protection		IP65 (fieldbus interface, power supply connection cover and motor connection cable attached and fastened, all plug connections sealed)							
Operating mode		S1 (EN 60149-1-1 and 1-3), S3 max. cycle duration 10 minutes							
Cooling type (DIN 41 751)		Self-cooling							
Installation altitude		h \leq 1000 m: No reduction h > 1000 m: I_{N} reduction by 1% per 100 m also refer to the MOVIMOT [®] operating instructions, section "electrical installation – installation instructions")							
ext. electronics supply	Tl. 11 Tl. 13	$V = +24 \text{ V} \pm 25 \%$, EN 61131-2, residual ripple max. 13 % $I_{\text{E}} \leq 250 \text{ mA}$, typ. 150 mA at 24 V (only MOVIMOT [®]) Input capacitance 100 μF							
Maintenance switch		Load disconnecter Type: ABB OT16ET3HS3ST1 Switch activation: black/red, triple lock							
Interface		PROFIBUS							
Weight		Size 1: approx. 5.2 kg Size 2: approx. 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.



16 Declarations of Conformity

EC Declaration of Conformity



900050010

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

declares under sole responsibility that the



field distributors of the series	Z.6 Z.7 Z.8	
with built-in	MQS.2F	PROFI-safe®
are in conformity with		
Machinery Directive	2006/42/EC	1)
Low Voltage Directive	2006/95/EC	
EMC Directive	2004/108/EC	4)
applied harmonized standards	EN 13849-1:2008 EN 62061: 2006 EN 50178:1997 EN 61000-6-2:2005 EN 61000-6-3:2001+ A11:2004	5) 5)

- 1) These products are intended for installation in machines. Startup is prohibited until it has been established that the machinery into which these products are to be incorporated complies with the provisions of the aforementioned Machinery Directive.
- 4) According to the EMC Directive, the listed products are not independently operable products. EMC assessment is only possible after these products have been integrated in an overall system. The assessment was verified for a typical system constellation, but not for the individual product.
- 5) All safety-relevant requirements of the product-specific documentation (operating instructions, manual, etc.) must be met over the entire product life cycle.

Bruchsal 11.12.09

Place Date Johann Soder
Managing Director Technology a) b)

- a) Authorized representative for issuing this declaration on behalf of the manufacturer
- b) Authorized representative for compiling the technical documents

2381566987



EC Declaration of Conformity



900030010



SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

declares under sole responsibility that the

frequency inverters of the series	MOVIMOT® D	
possibly in connection with	AC motor	
are in conformity with		
Machinery Directive	2006/42/EC	1)
Low Voltage Directive	2006/95/EC	
EMC Directive	2004/108/EC	4)
applied harmonized standards	EN 13849-1:2008	5)
	EN 61800-5-2: 2007	5)
	EN 60034-1:2004	
	EN 61800-5-1:2007	
	EN 60664-1:2003	
	EN 61800-3:2007	

- 1) These products are intended for installation in machines. Startup is prohibited until it has been established that the machinery into which these products are to be incorporated complies with the provisions of the aforementioned Machinery Directive.
- 4) According to the EMC Directive, the listed products are not independently operable products. EMC assessment is only possible after these products have been integrated in an overall system. The assessment was verified for a typical system constellation, but not for the individual product.
- 5) All safety-relevant requirements of the product-specific documentation (operating instructions, manual, etc.) must be met over the entire product life cycle.

Bruchsal 11.12.09

Place Date Johann Soder
Managing Director Technology a) b)

- a) Authorized representative for issuing this declaration on behalf of the manufacturer
- b) Authorized representative for compiling the technical documents

2309606923



17 Address List

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Service Competence Center	Central	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@sew-eurodrive.de
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	Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-elektronik@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
Additional addresses for service in Germany provided on request!			
France			
Production Sales Service	Haguenau	SEW-USOCOME 48-54 route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocomme.com sew@usocomme.com
Production	Forbach	SEW-USOCOME Zone industrielle Technopôle 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
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	Nantes	SEW-USOCOME Parc d'activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20
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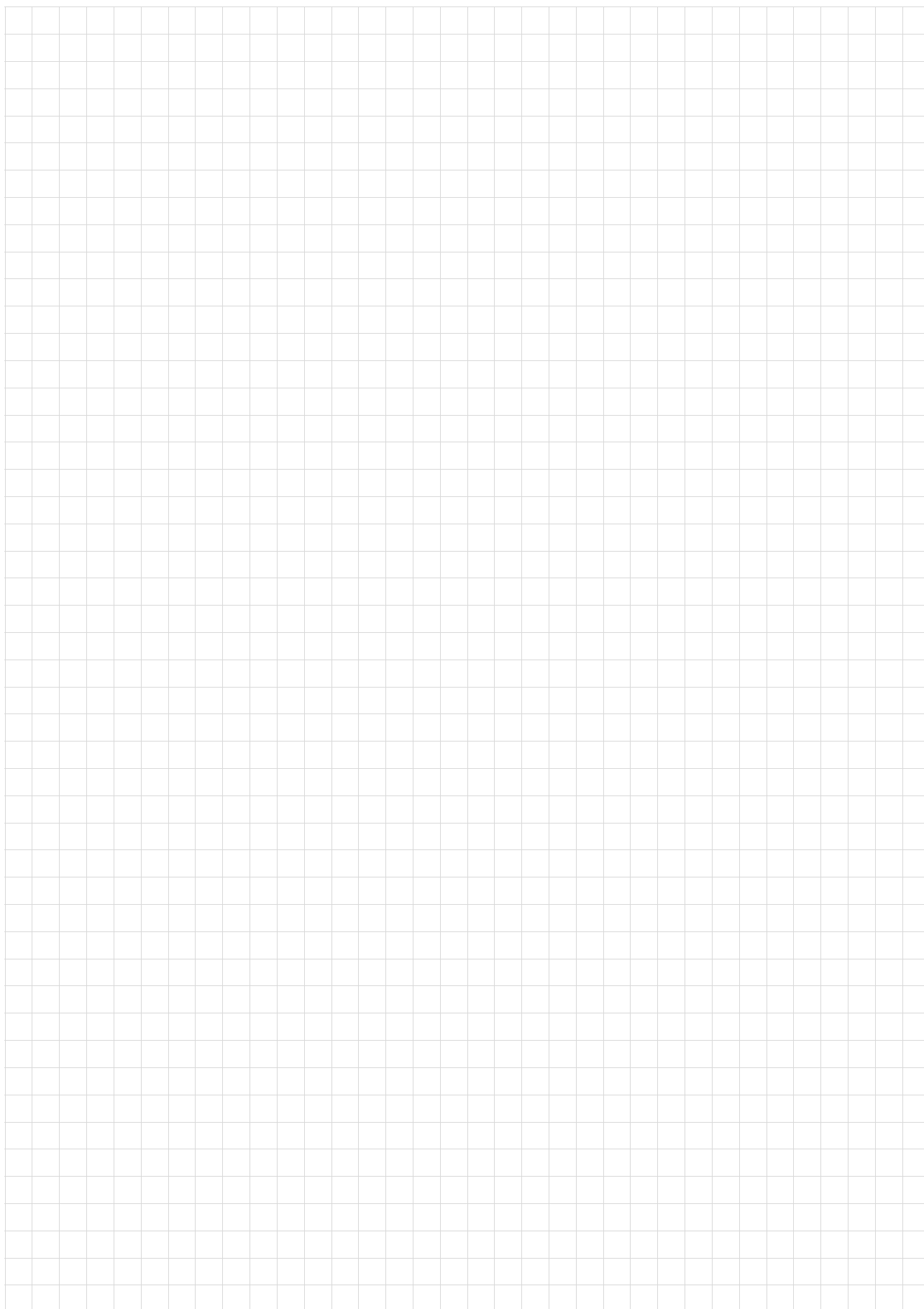


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