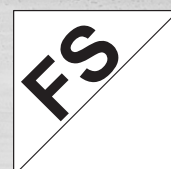
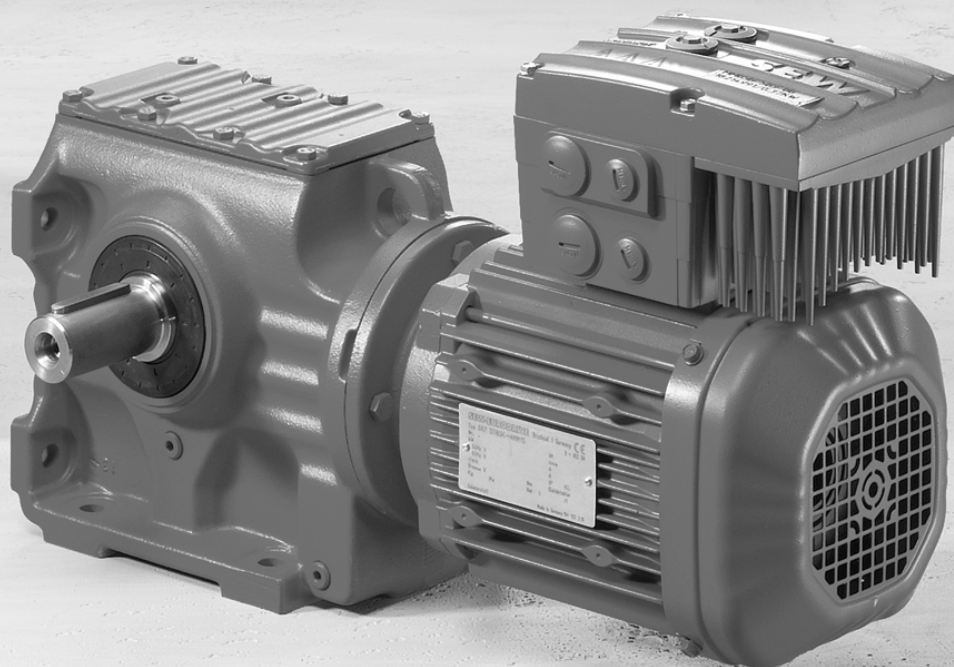




SEW
EURODRIVE

Manual



MOVIMOT® MM..D® – Functional Safety (including field distributor)



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1 General information

1.1 About this documentation

This documentation is an integral part of the product. The documentation is intended for all employees who perform assembly, installation, startup, and service work on the product.

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

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

The following table shows the grading and meaning of the signal words for safety notes.

Signal word	Meaning	Consequences if disregarded
▲ DANGER	Imminent hazard	Severe or fatal injuries.
▲ WARNING	Possible dangerous situation	Severe or fatal injuries.
▲ CAUTION	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the drive system or its environment.
INFORMATION	Useful information or tip: Simplifies handling of the drive system.	

1.2.2 Structure of section-related safety notes

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

This is the formal structure of a safety note for a specific section:



SIGNAL WORD







Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard
	Warning of dangerous electrical voltage
	Warning of hot surfaces
	Warning of risk of crushing
	Warning of suspended load
	Warning of automatic restart

1.2.3 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

▲ SIGNAL WORD Type and source of hazard. Possible consequence(s) if disregarded. Measure(s) to prevent the hazard.

1.3 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the unit!

1.4 Content of the documentation

The current version of the documentation is the original.

This document contains additional safety-relevant information and conditions for use in safety-related applications.

1.5 Exclusion of liability

Read the information in this documentation, otherwise safe operation is impossible. You must comply with the information contained in this documentation to achieve the specified product characteristics and performance features. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, SEW-EURODRIVE assumes no liability for defects.

1.6 Product names and trademarks

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

1.7 Copyright notice

© 2016 SEW-EURODRIVE. All rights reserved. Unauthorized reproduction, modification, distribution or any other use of the whole or any part of this documentation is strictly prohibited.

1.8 Other applicable publications

This document supplements the "MOVIMOT® MM..D ..." operating instructions and limits the application notes according to the following information.

Only use this documentation in conjunction with the following publications:

- For applications with MOVIMOT® MM..D adhere to the operating instructions "MOVIMOT® MM..D".
- For applications with field distributor, also adhere to the relevant one of the following manuals:
 - "PROFIBUS Interfaces, Field Distributors" manual (for PROFIBUS only)
 - or
 - "PROFINET IO Interfaces, Field Distributors" manual (for PROFINET IO only)
 - or
 - "EtherNet/IP™ Interfaces, Field Distributors" manual (for EtherNet/IP™ only)
 - or
 - "EtherCAT® Interfaces, Field Distributors" manual (only for EtherCAT®)
 - or
 - "INTERBUS Interfaces, Field Distributors" manual (for INTERBUS only)
 - or
 - "DeviceNet/CANopen Interfaces, Field Distributors" manual (for DeviceNet/CANopen only)
- For applications with MOVIFIT® MC adhere to the following publications:
 - "MOVIFIT® MC" operating instructions
 - and
 - "MOVIFIT® MC/FC – Functional Safety" manual (only for MOVIFIT® MC with STO or MOVIFIT® MC with S11 PROFIsafe option)
 - "MOVIFIT® MC/FC – Functional Safety with S12 Safety Option" manual (only for MOVIFIT® MC with S12 safety option)

For permitted connection variants, refer to chapter "Connection variants" (→ 22).

2 Integrated safety technology

The safety technology of MOVIMOT® MM..D described below has been developed and tested in accordance with the following safety requirements:

- Performance level d according to EN ISO 13849-1:2008
- SIL 2 according to EN 61800-5-2:2007

This was certified by TÜV Nord. Copies of the TÜV certificate and the corresponding report are available from SEW-EURODRIVE on request.

2.1 Safe condition

For the safety-related use of the MOVIMOT® MM..D, **"Safe Torque Off" is defined as a safe condition** (see STO safety function).

The safety concept is based on this.

2.2 Safety concept

- The MOVIMOT® MM..D frequency 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 voltage when a connected control device (e.g. emergency stop button with latching function) is activated. This ensures that the frequency inverter no longer supplies power to the motor for generating torque.
- Disconnecting the 24 V supply voltage 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 voltage described here safely prevents the gating of the power semiconductors in the frequency inverter. The rotary-field generation for the respective motor is deactivated even though the line voltage is still present.

2.3 Safety functions

The following drive-related safety functions can be used:

- **STO** (safe torque off according to EN 61800-5-2) by disconnecting the safety-related 24 V supply voltage.

If the STO function is activated, the frequency 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 supply voltage 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 EN 61800-5-2) by means of suitable external control (e.g. safety relay with delayed disconnection).

Adhere to the following procedure:

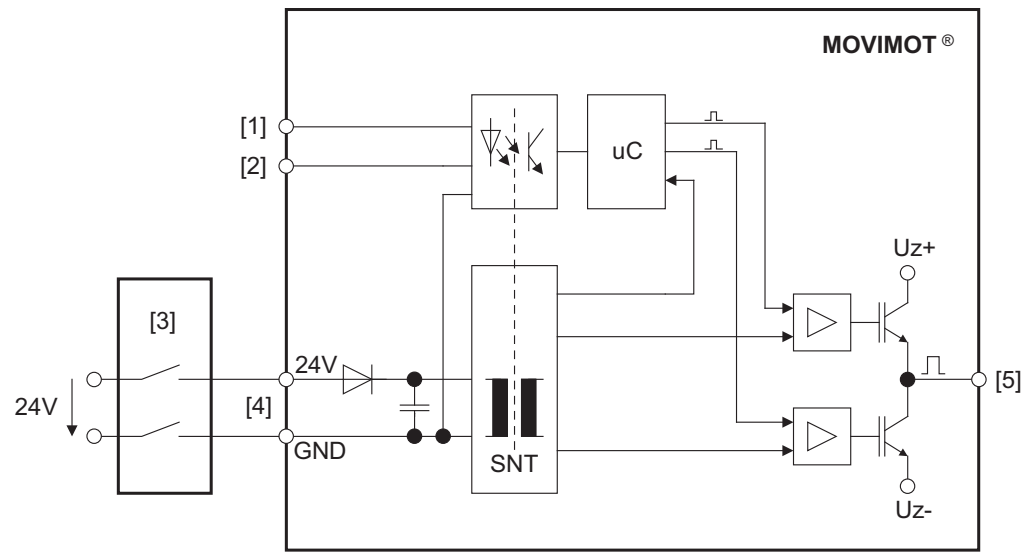
- Decelerate the drive using an appropriate brake ramp specified via setpoint inputs.
- Switching off the safety-relevant 24 V supply voltage (= triggering the STO function) after a specified, safety-related time delay.

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

2.4 Limitations

- 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® drives cannot be used without an additional brake system for application-specific safety functions that require active deceleration (braking) of the dangerous movement.
- 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.
- The system/machine manufacturer must perform a system/machine-specific risk analysis. The use of the drive system with MOVIMOT® must be taken into account.
- **The safety concept is only suitable for performing mechanical work on driven system/machine components.**
- When using a thermistor, protection against restart is not guaranteed when the thermistor is triggered. This must be taken into account for a risk analysis and secured by suitable measures if required.
- When the 24 V supply voltage is disconnected, the line voltage is still present at the frequency inverter DC link.
- **To perform work on the electrical section of the drive system, the supply voltage must be disconnected using an external maintenance switch.**

Schematic representation "Safety concept for MOVIMOT®"



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- [1] RS485
- [2] Digital inputs "R", "L", "f1/f2"
- [3] Safety relay, external
- [4] Safety-related 24 V voltage supply
- [5] Motor phase

3 Safety requirements

The safety functions of 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 manufacturer/machine manufacturer conducts a system-specific/machine-specific risk analysis (e.g. according to ISO 14121, previously EN 1050). The required safety conditions and safety functions must be validated by the system/machine manufacturer before startup. The system/machine manufacturer and the operator are responsible for compliance of the system/machine with applicable safety regulations.

The following requirements are mandatory when installing and operating MOVIMOT® MM..D in safety-relevant applications.

The conditions are divided into the following sections:

- Approved device combinations
- Installation requirements
- External safety controller requirements
- Startup requirements
- Operational requirements

3.1 Permitted unit combinations



Only MOVIMOT® drives marked with the FS logo for functional safety on the nameplate may be used in safety applications.

Only the following combinations with MOVIMOT® MM..D are permitted for safety-relevant applications:

- MOVIMOT® with binary control (control via terminals)
- MOVIMOT® and MBG11A option
- MOVIMOT® and MWA21A option
- MOVIMOT® and MOVIFIT® MC with FS logo and externally switched 24 V supply (STO)
- MOVIMOT® and MOVIFIT® MC with FS logo and PROFIsafe option S11
- MOVIMOT® and MOVIFIT® MC with FS logo and safety option S12
- MOVIMOT® with FS logo and field distributor according to the following chapters:

3.1.1 MFZ.6.

MOVIMOT® and M.Z.6. field distributor (Connection via prefabricated cable).

The following combinations are permitted:

MQ..	Fieldbus interface	
MF..	<div> MFI21A, 22A, 32A Only permitted with Z16F </div> <div> MFI23F, 33F </div> <div> MQI21A, 22A, 32A </div>	
	<div> MFP21D, 22D, 22L, 32D Only permitted with Z26F, Z26J </div> <div> MFP22H, 32H </div> <div> MFE52A, 52H, 52L </div> <div> MFE62A </div> <div> MFE72A </div> <div> MQP21D, 22D, 32D </div>	
	<div> MFD21A, 22A, 32A Only permitted with Z36F </div> <div> MFO21A, 22A, 32A </div> <div> MQD21A, 22A, 32A </div>	
/		
Z..6.	Connection module	
	Z16F, Z26F, Z26J, Z36F	
/		
AF.	Connection technology	
	<div> AF0 Only permitted with Z16F, Z26F, Z26J </div> <div> AF1 Only permitted with Z36F </div> <div> AF2, AF3 Only permitted with Z26F, Z26J </div>	

3.1.2 MFZ.7.

MOVIMOT® frequency inverter integrated in the M.Z.7. field distributor (Connection of the AC motor via prefabricated cable). The following combinations are permitted:

MQ..	Fieldbus interface	
MF..	MFI21A, 22A, 32A MFI23F, 33F MQI21A, 22A, 32A	Only permitted with Z17F
	MFP21D, 22D, 22L, 32D MFP22H, 32H MFE52A, 52H, 52L MFE62A MFE72A MQP21D, 22D, 32D	Only permitted with Z27F
	MFD21A, 22A, 32A MFO21A, 22A, 32A MQD21A, 22A, 32A	Only permitted with Z37F
/		
MM..	MOVIMOT® inverter: MM03D – MM15D	
/		
Z..7.	Connection module Z17F, Z27F, Z37F	

3.1.3 MFZ.8.

MOVIMOT® frequency inverter integrated in the M.Z.8. field distributor (Connection of the AC motor via prefabricated cable). The following combinations are permitted:

MQ..	Fieldbus interface	
MF..	MFI21A, 22A, 32A MFI23F, 33F MQI21A, 22A, 32A	Only permitted with Z18F, Z18J, Z18N
	MFP21D, 22D, 22L, 32D MFP22H, 32H MFE52A, 52H, 52L MFE62A MFE72A MQP21D, 22D, 32D	Only permitted with Z28F, Z28N, Z28J
	MFD21A, 22A, 32A MFO21A, 22A, 32A MQD21A, 22A, 32A	Only permitted with Z38F, Z38N, Z38G, Z38J
/		
MM..	MOVIMOT® inverter: MM03D – MM40D	
/		
Z..8.	Connection module Z18F, Z28F, Z38F, Z18N, Z28N, Z38N, Z38G, Z18J, Z28J, Z38J	
/		
AF.	Connection technology AF0 AF1, AGA, AGB AF2, AF3	Only permitted with Z18F, Z18N, Z18J, Z28F, Z28N, Z28J Only permitted with Z38F, Z38N, Z38G, Z38J Only permitted with Z28F, Z28N, Z28J

3.1.4 Further combinations

Any combinations and option modules listed in other publications are not permitted.

3.1.5 FS logo description

The nameplate of the MOVIMOT® drive and/or the complete unit nameplate of the MOVIFIT® unit can be marked with the FS logo.



- MOVIMOT® MM.. D

For more information about MOVIMOT® with **FS01** logo, refer to the "MOVIMOT® MM..D – Functional Safety" manual.

- MOVIFIT® with STO (with or without S11 PROFIsafe option)

For more information about MOVIFIT® with **FS01** logo, refer to the "MOVIFIT® MC / FC – Functional Safety" manual.

3.2 Installation requirements

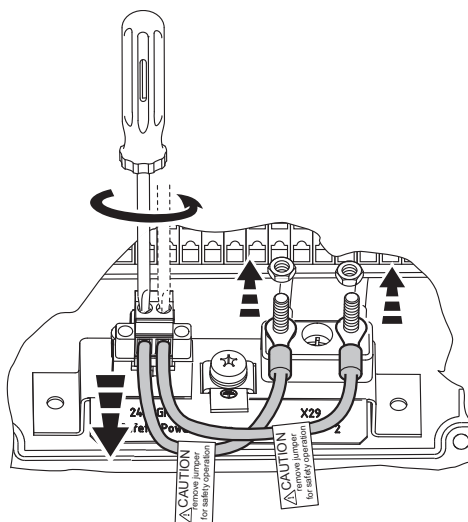
- Use only hybrid cables from SEW-EURODRIVE to connect the M.Z.6. field distributor to the MOVIMOT® inverter with the motor.
- To connect the M.Z.7. or M.Z.8. field distributors or MOVIFIT® MC to the motor, SEW-EURODRIVE recommends using the specifically designed prefabricated hybrid cable by SEW-EURODRIVE.
- To connect the MOVIMOT® inverter to the motor (mounting close to the motor), SEW-EURODRIVE recommends using the specifically designed prefabricated hybrid cable by SEW-EURODRIVE.
- Hybrid cables by SEW-EURODRIVE must not be shortened. Use these hybrid cables with the original cable lengths and the prefabricated plug connectors. Ensure proper connections.
- Supply system cables and the safety-related control cables must be routed separately (Exception: When using genuine hybrid cables by SEW-EURODRIVE).
- Tie all conductors with the same voltage level (e.g. L1 – L3) directly at the terminal using a cable tie.
- The line length between the safety controller and MOVIMOT® may not exceed 100 m.
- Wiring must comply with EN 60204-1.
- Route the safety-related control cables EMC-compliantly.
 - Outside an electrical installation space: Shielded cables must be routed permanently (fixed) and protected against external damage, or other equivalent measures.
 - No single conductors must be routed within the installation space.
- Never use the safety-related 24 V power supply voltage for feedback.
- Make sure that parasitic voltages cannot be generated in the safety-related control cables.
- 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..." operating instructions
 - "PROFIBUS Interfaces, Field Distributors" manual (optional)
 - "PROFINET IO Interfaces, Field Distributors" manual (optional)
 - "EtherNet/IP™ Interfaces, Field Distributors" manual (optional)
 - "EtherCAT® Interfaces, Field Distributors" manual (optional)
 - "INTERBUS Interfaces, Field Distributors" manual (optional)
 - "DeviceNet/CANopen Interfaces, Field Distributors" manual (optional)

Connect the shielding of the safety-related 24 V supply cable to the housing at both ends.

- For all 24 V supply voltages of the MOVIMOT® inverter, the field distributor and all stations of the fieldbus, only voltage sources with safe disconnection (SELV/PELV) according to EN 60204-1 and EN 61131-2 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.

- 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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- No other changes to the wiring of the field distributor are permitted.
- 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 RS485 interface.
 - Use safety-related 24 V supply voltages.
 - Ensure a protected routing of the connected cables.

3.3 External safety controller requirements

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

- For safety-relevant applications up to performance level d to 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, you can use the method described in EN ISO 13849-1 for combining several safety-relevant subsystems (without PFH value calculation). SEW-EURODRIVE recommends to determine the PFH value for the overall application. The PFH value for MOVIMOT® MM..D is 0 1/h (fault exclusion).
- For safety-related applications up to SIL 2 according to 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. To determine the PFH value for the overall application, the PFH value for MOVIMOT® = 0 1/h (fault exclusion).

Application	Safety controller requirements
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

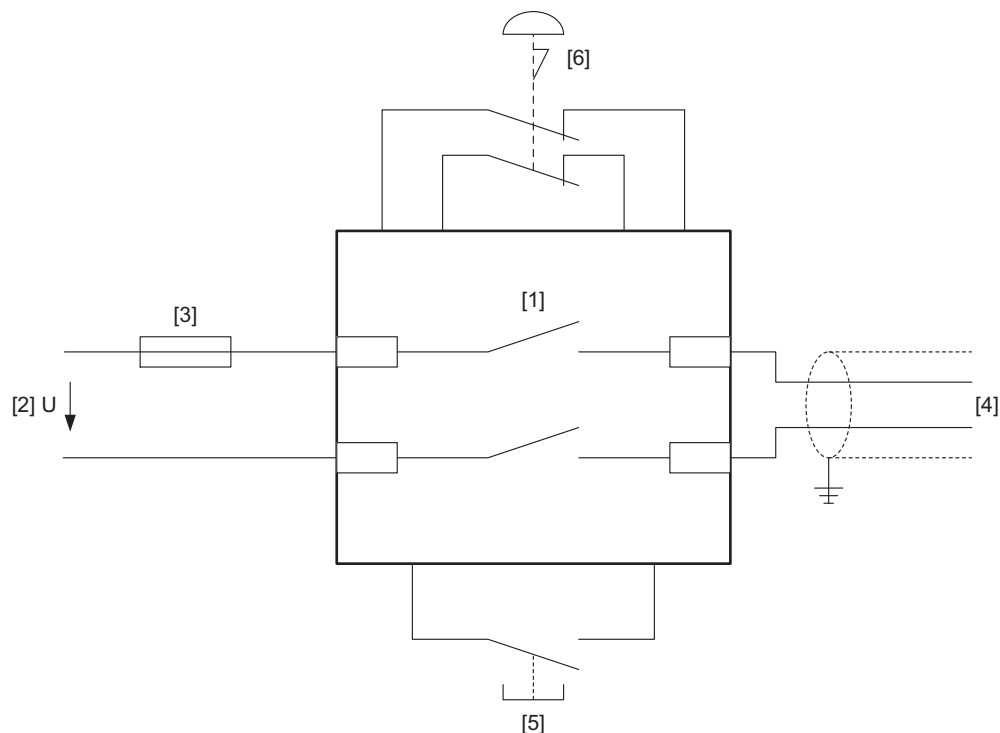
- The wiring of the safety controller must be suitable for the required safety class, (see manufacturer documentation). Safety circuits with MOVIMOT® MM..D require 2-pole disconnection.
- The values specified for the safety controller must be strictly adhered to when designing the circuit.
- The switching 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. If the manufacturer provides no specific information, the contacts must be protected with 0.6 times the nominal value of the maximum contact rating specified by the manufacturer.

- 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® inverters comes equipped with a serial polarity protection diode as well as a buffer capacitor with $C = 120 \mu F$. This must be considered as load when dimensioning the switching output.

**Sample circuit
"safety relay"**

The following figure shows the basic connection of an external safety relay (according to the requirements listed above) to the MOVIMOT® MM..D drive. The information in the respective manufacturer's data sheets must be observed for connection.



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- [1] Safety relay with approval
- [2] DC 24 V voltage supply
- [3] Fuses in accordance with the manufacturer's specifications of the safety relay
- [4] Safety-related DC 24 V voltage supply
- [5] Reset button for manual reset
- [6] Approved emergency stop actuating device

3.4 Startup requirements

- Startup of the system/machine must be documented. The safety functions of the system/machine must be checked and verified. Observe the limitations for the safety functions of MOVIMOT® in chapter "Limitations" (→ 10) for the verification of the safety functions. Non-safety-related parts and components that affect the result of the verification test (e.g. motor brake) must be deactivated, if necessary.
- For the operation of MOVIMOT® MM..D in safety-related applications, the disconnecting device and correct wiring must always be checked and protocolled during startup.
- 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.

3.5 Operation requirements

- Operation is only allowed within the limits specified in the data sheets. This applies to the external safety relay as well as MOVIMOT® MM..D and approved options.
- Check the safety functions at regular intervals to ensure proper functioning. Define the test intervals according to the risk analysis.

4 Connection variants

4.1 24 V voltage supply for group disconnection

4.1.1 Basic considerations

- For group drives, the 24 V supply of several MOVIMOT® drives can be made available by a single safety relay. The maximum possible number of units (n units) results from the maximum permitted contact load of the safety relay and the maximum permitted voltage drop of the DC supply for MOVIMOT® inverters.
- Other requirements of the safety relay manufacturer (such as protecting the output contacts against welding) must be strictly observed. The basic conditions described in the conditions of the certification report for MOVIMOT® MM..D also apply to cable routing.
- For EMC reasons, the maximum cable length is limited to max. 100 m. Other instructions published by the manufacturer on the use of safety relays (for specific applications) must also be observed.
- A calculation based on the technical data for MOVIMOT® MM..D must be performed separately for each group disconnection.

Determining the maximum number of MOVIMOT® drives for group disconnection:

The number of "n" units of MOVIMOT® MM..D that can be disconnected as a group is limited by the following factors:

- **Switching capacity of the safety relay**

A fuse must be connected before the safety contacts according to the specifications of the safety relay manufacturer to prevent contact welding.

It is mandatory to observe the information about the switching capacity according to EN 60947-4-1 and EN 60947-5-1 and the contact protection in the operating instructions of the safety relay manufacturer. Compliance with this information is the sole responsibility of the project planner.

- **Maximum permitted voltage drop in the 24 V supply cable.**

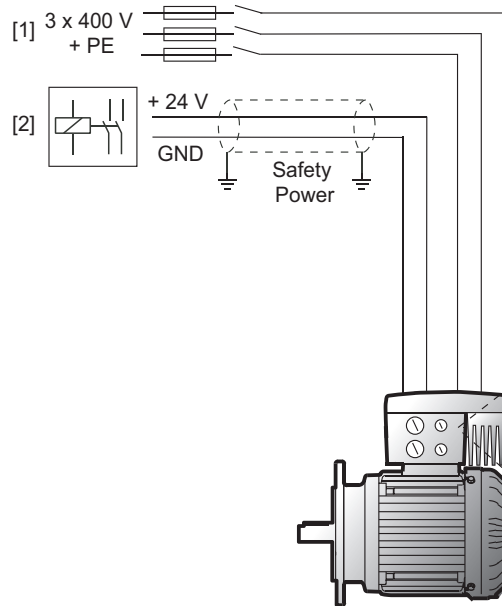
When dimensioning group drives, observe the values of the maximum cable lengths and the permitted voltage drops.

4.2 MOVIMOT® with binary control (control via terminals)

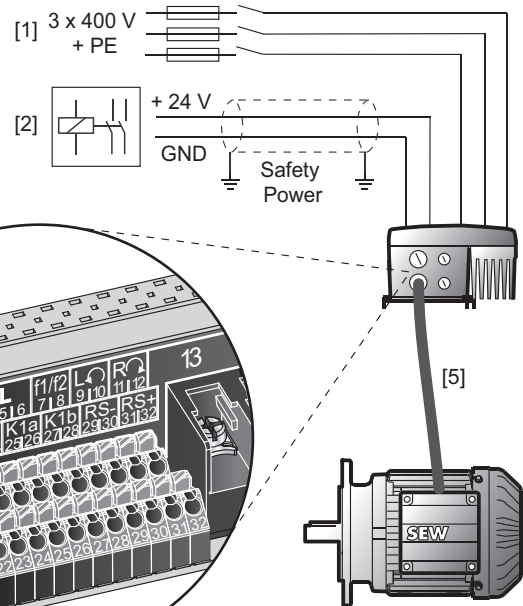
4.2.1 General structure

MOVIMOT® with binary control (control via terminals):

Inverter mounted to the motor



Mounting close to the motor

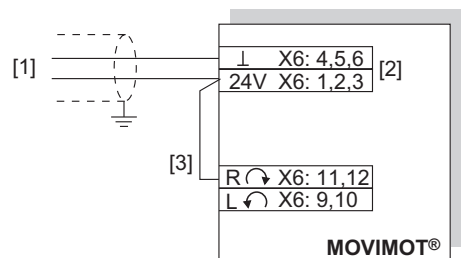


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- [1] Line connection
- [2] 24 V supply from the safety relay
- [3] "24V" safety contact
- [4] "1" safety contact
- [5] Hybrid cable

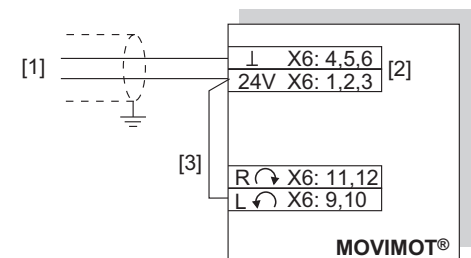
4.2.2 Permitted terminal assignment for direction of rotation signals (jumpers in terminal box)

Variant 1: "Clockwise rotation"



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Variant 2: "Counterclockwise rotation"



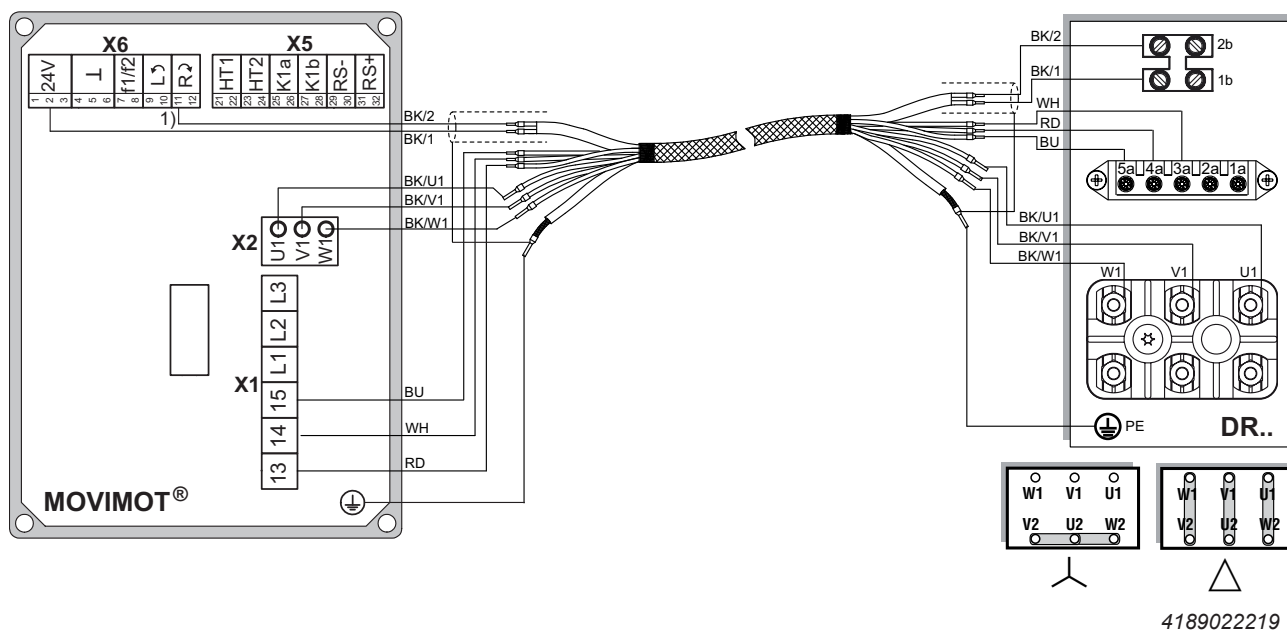
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Make sure that "24V" and "1" are connected correctly and verify this with a test!

- [1] Safety-related 24 V supply from the safety relay
- [2] Safety contacts
- [3] Jumper inside the terminal box (no switch)

4.2.3 Connection hybrid cable (motor cable) for installation close to the motor

The following figure shows the conductor assignment of the hybrid cable and the associated terminals of the MOVIMOT® terminal box and the DR.. motor:

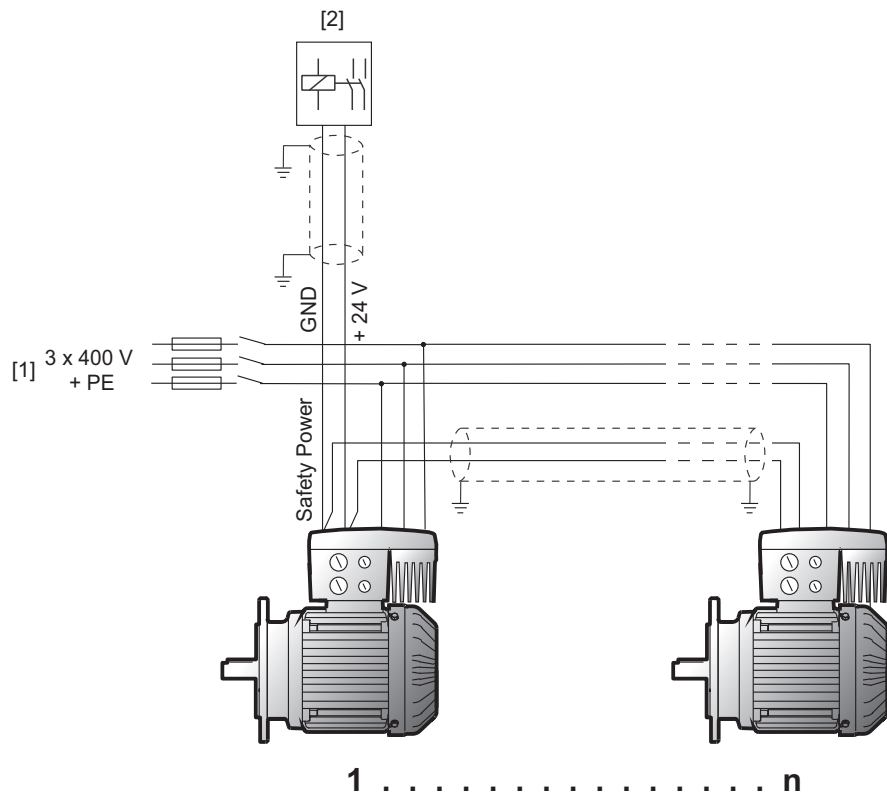


MOVIMOT® Terminal		Hybrid cable Core color/designation	DR.. motor Terminal
X2	U1	Black/U1	U1
	V1	Black/V1	V1
	W1	Black/W1	W1
X1	13	Red/13	4a
	14	White/14	3a
	15	Blue/15	5a
X6	24V	Black/1	1b
	R or L ¹⁾	Black/2	2b
PE connection		Green/yellow + shield end (inner shield)	PE connection

1) Connect the TH cable to terminal "R" (=> CW operation) or "L" (=> CCW operation) depending on the required direction of rotation.

4.2.4 Group disconnection

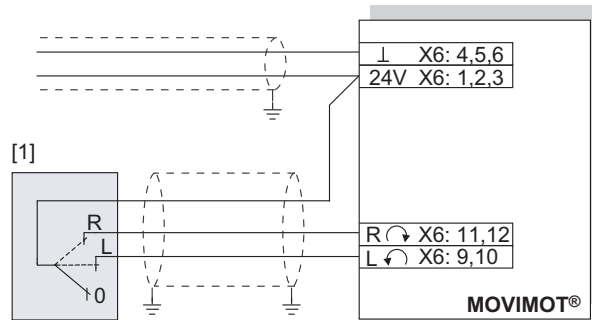
For notes on determining the number "n" of MOVIMOT® units for group disconnection, see chapter "24 V voltage supply for group disconnection" (→ 22).



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- [1] Line connection
- [2] Safety-related 24 V supply from the safety relay

4.2.5 Controlling the direction of rotation signals via an external switch



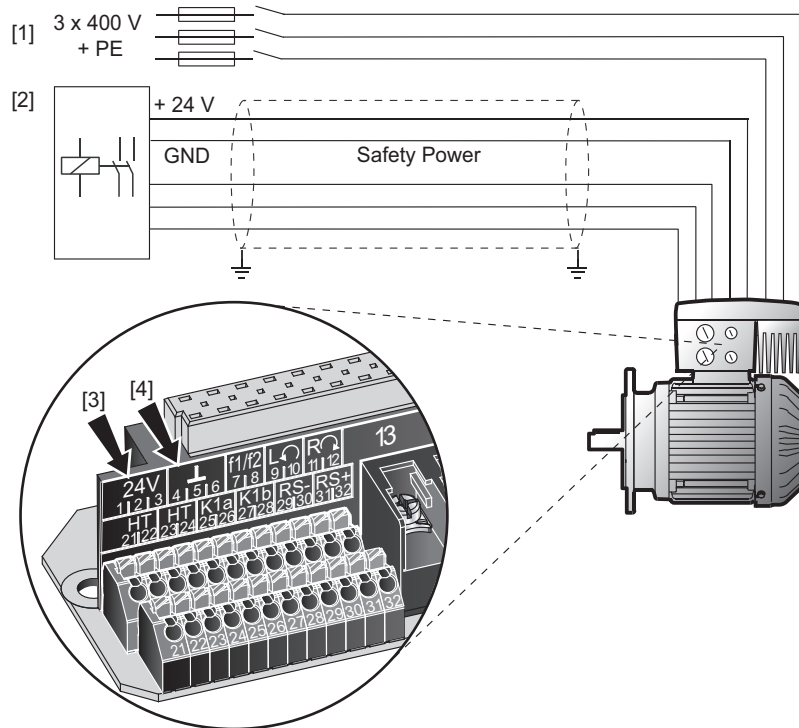
1490179211

[1] Switch

- The cables to the external switch must be routed according to the general notes so that neither parasitic voltages nor induced voltages can occur.
- The direction of rotation cannot be controlled via an external switch for group drives. The switch must comply with EN 50178 "Safe Disconnection".
- The cable length between the MOVIMOT® drive and the external switch must be included in the total cable length.

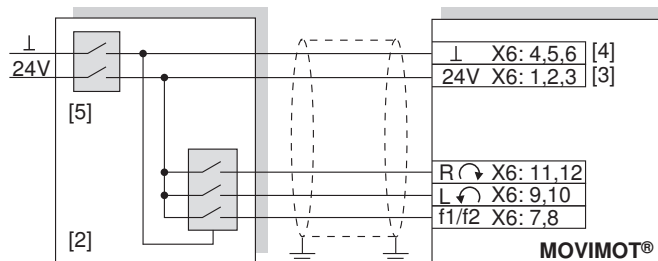
4.2.6 Binary control via safe outputs

MOVIMOT® with binary control (control via terminals):



9007200744922123

Terminal assignment (clockwise, counterclockwise, setpoint changeover):



1490195851

Make sure that "24V" and "1" are connected correctly and verify this with a test!

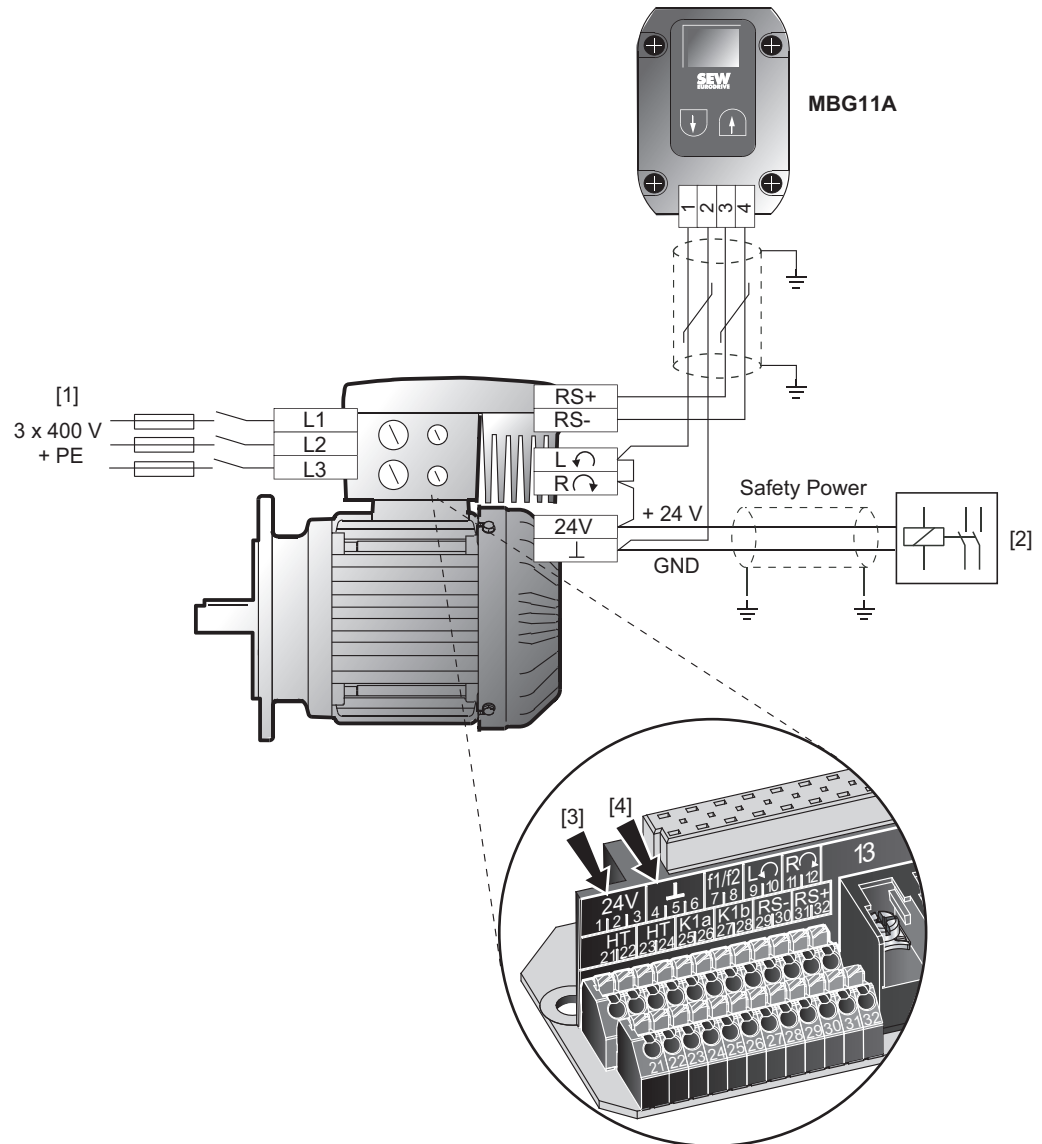
- | | |
|--------------------------------|--|
| [1] Line connection | [3] "24V" safety contact |
| [2] Safe I/O peripheral system | [4] "1" safety contact |
| | [5] Safe 2-pole switch output (relay or electronic switch) |

- The control signals "R", "L", "f1/f2" can be switched via 1 pole. Supply the switching element from the safety-related 24 V supply.
- The maximum cable length of 100 m between MOVIMOT® and the safe PLC is only permitted when all the signals for direction of rotation and setpoint selection are routed in one shielded cable. If the signals are routed in 2 shielded cables, the total permitted cable length is halved (= 50 m).

4.3 MOVIMOT® with MBG11A option

4.3.1 General structure

MOVIMOT® drive with MBG11A option (setpoint adjuster):

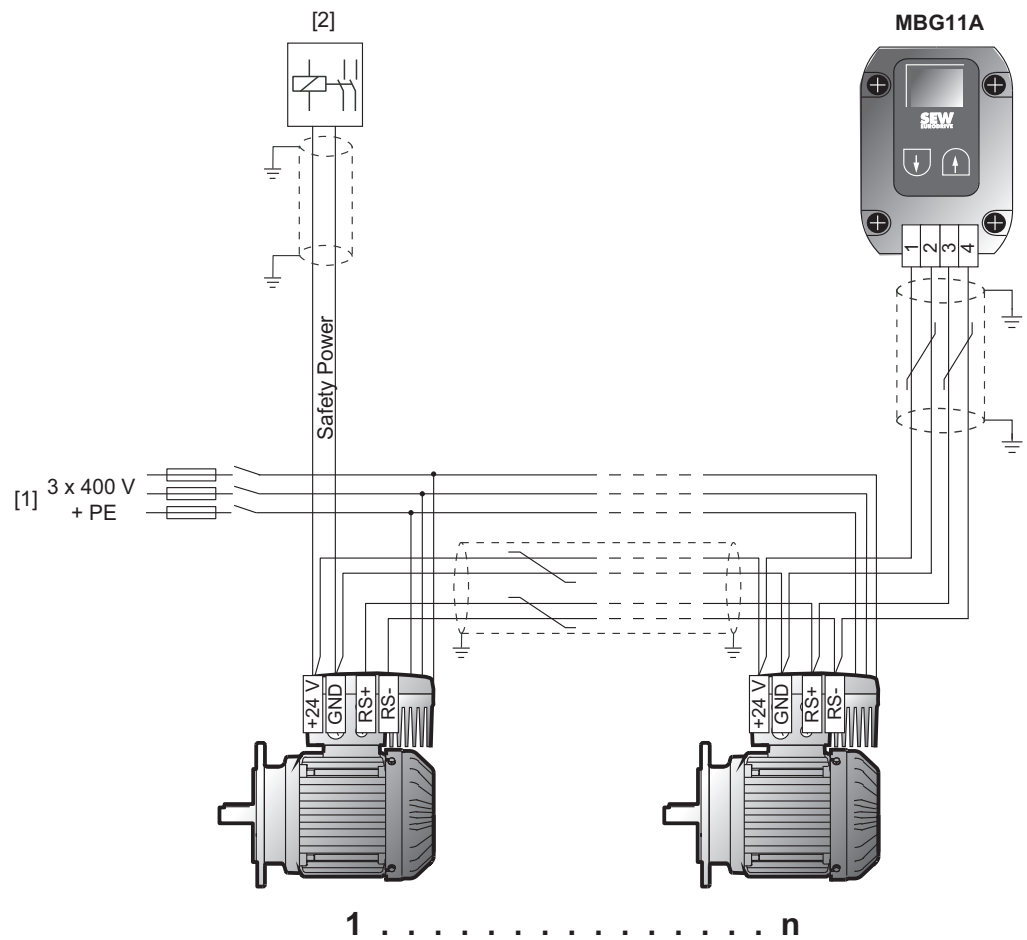


9007200744938763

- [1] Line connection
- [2] 24 V supply from the safety relay
- [3] "24V" safety contact
- [4] "⊥" safety contact

4.3.2 Group disconnection

For notes on determining the number "n" of MOVIMOT® units for group disconnection, see chapter "24 V voltage supply for group disconnection" (→ 22).



18051079307

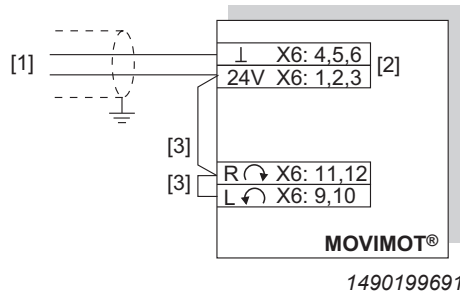
- [1] Line connection
- [2] Safety-related 24 V supply from the safety relay

4.3.3 Enabling the direction of rotation in MOVIMOT®

Make sure that "24V" and "┴" are connected correctly and verify this with a test!

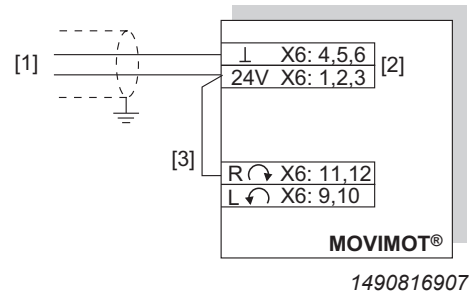
Variant 1

- Both directions of rotation are enabled.



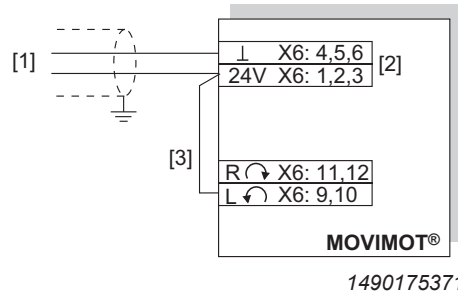
Variant 2

- CW direction of rotation is enabled.



Variant 3

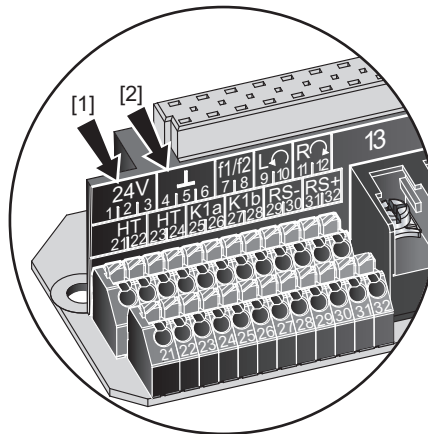
- CCW direction of rotation is enabled.



- [1] Safe 24 V supply from the safety relay
- [2] Safety contacts
- [3] Jumper in the connection box (no switch)

The safety contact "24V" [1] is marked in red.

The safety contact "┴" [2] is marked in blue.



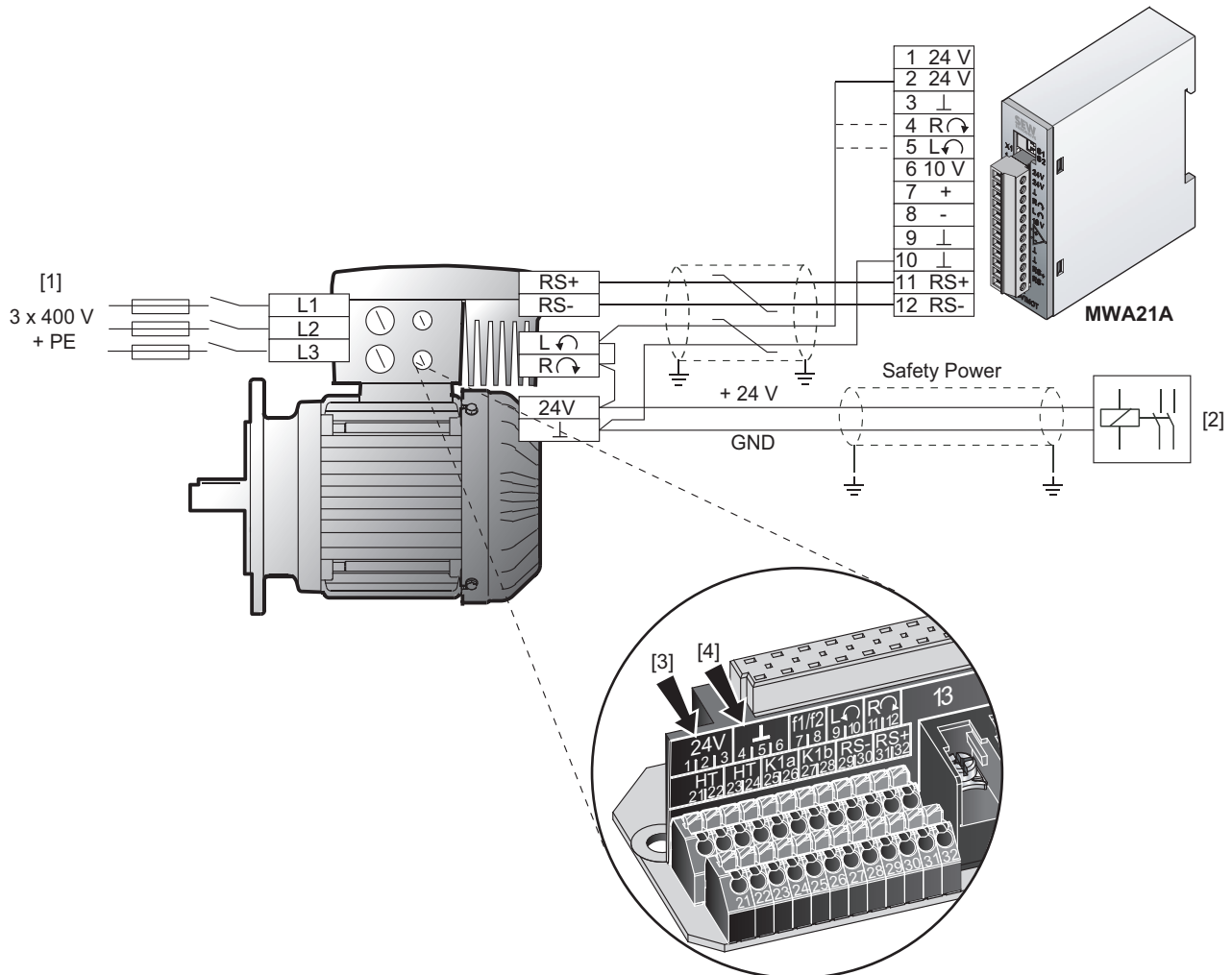
9007200744946443

4.4 MOVIMOT® with MWA21A option

4.4.1 General structure

MOVIMOT® drive with MWA21A option (setpoint adjuster):

Terminals 1 – 10 of the MWA21A option must be supplied by the same 24 V source and switched off via the external safety relay.

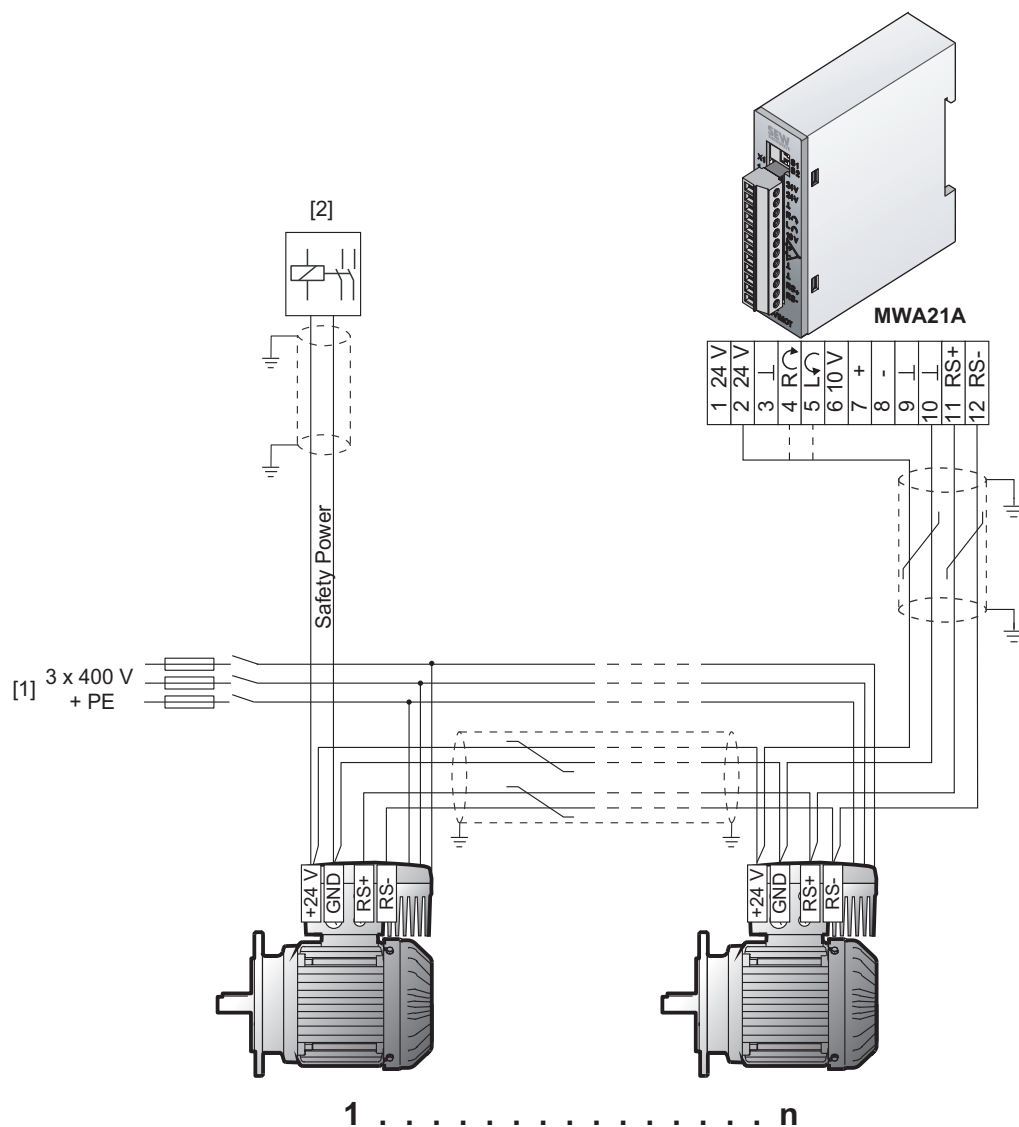


9007200744948363

- [1] Line connection
- [2] 24 V supply from the safety relay
- [3] "24V" safety contact
- [4] "⊥" safety contact

4.4.2 Group disconnection

For notes on determining the number "n" of MOVIMOT® units for group disconnection, see chapter "24 V voltage supply for group disconnection" (→ 22).



18051085835

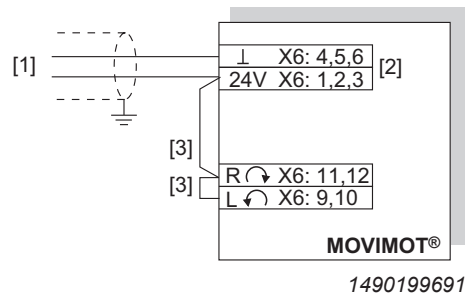
- [1] Line connection
[2] Safety-related 24 V supply from the safety relay

4.4.3 Enabling the direction of rotation in MOVIMOT®

Make sure that "24V" and "┴" are connected correctly and verify this with a test!

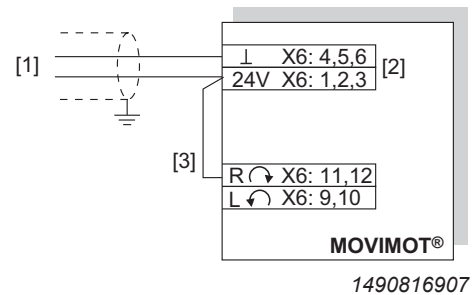
Variant 1

- Both directions of rotation are enabled.



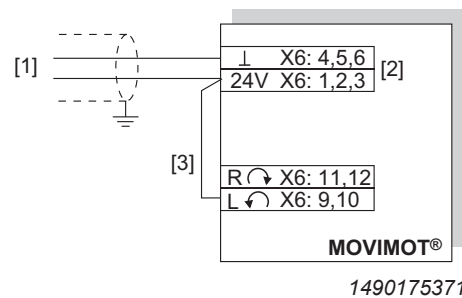
Variant 2

- CW direction of rotation is enabled.



Variant 3

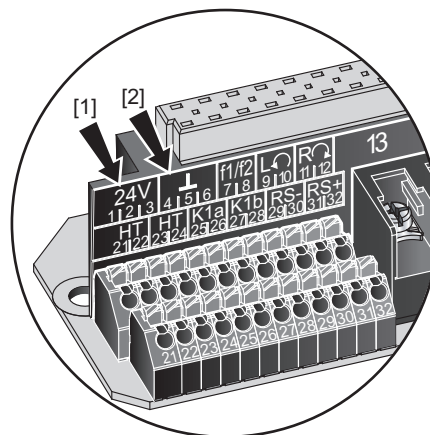
- CCW direction of rotation is enabled.



- [1] Safe 24 V supply from the safety relay
- [2] Safety contacts
- [3] Jumper in the connection box (no switch)

The safety contact "24V" [1] is marked in red.

The safety contact "┴" [2] is marked in blue.



9007200744946443

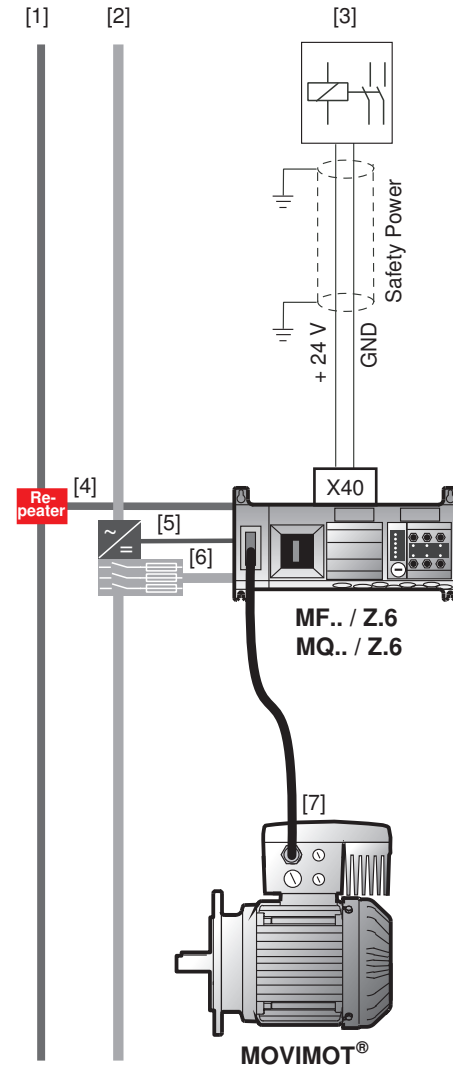
4.5 MOVIMOT® with field distributor MF../Z.6. or MQ../Z.6.

4.5.1 General structure

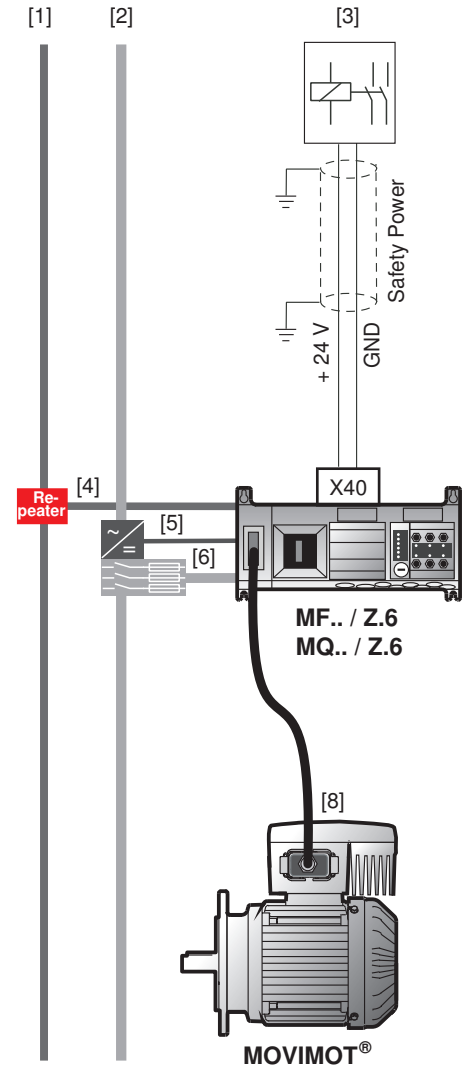
MOVIMOT® drive with field distributor MF../Z.6. or MQ../Z.6.:

The drive is connected using a pre-fabricated hybrid cable.

Connection via cable glands



Connection via AM.6 plug connector



1504746379

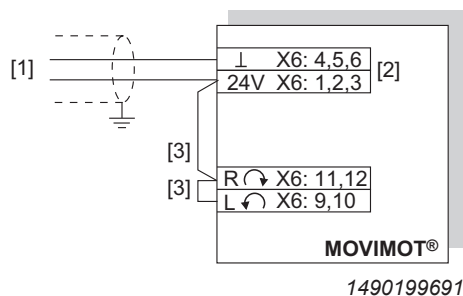
- [1] Communication
- [2][6] Supply system
- [3] 24 V supply for MOVIMOT® inverter from the safety relay
- [4] Fieldbus
- [5] 24 V supply for fieldbus interfaces
- [7] MOVIMOT® design with cable glands
- [8] MOVIMOT® design with AM.6 plug connector

4.5.3 Enabling the direction of rotation in MOVIMOT®

Make sure that "24V" and "┴" are connected correctly and verify this with a test!

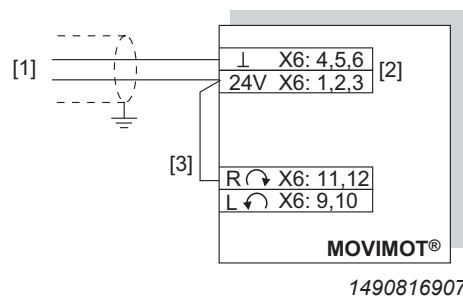
Variant 1

- Both directions of rotation are enabled.



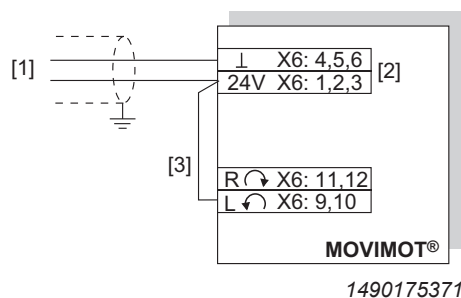
Variant 2

- CW direction of rotation is enabled.



Variant 3

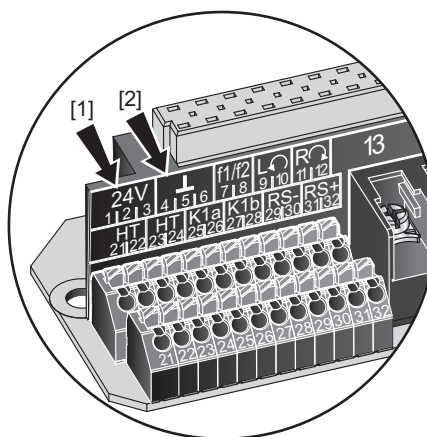
- CCW direction of rotation is enabled.



- [1] Safe 24 V supply from the safety relay
- [2] Safety contacts
- [3] Jumper in the connection box (no switch)

The safety contact "24V" [1] is marked in red.

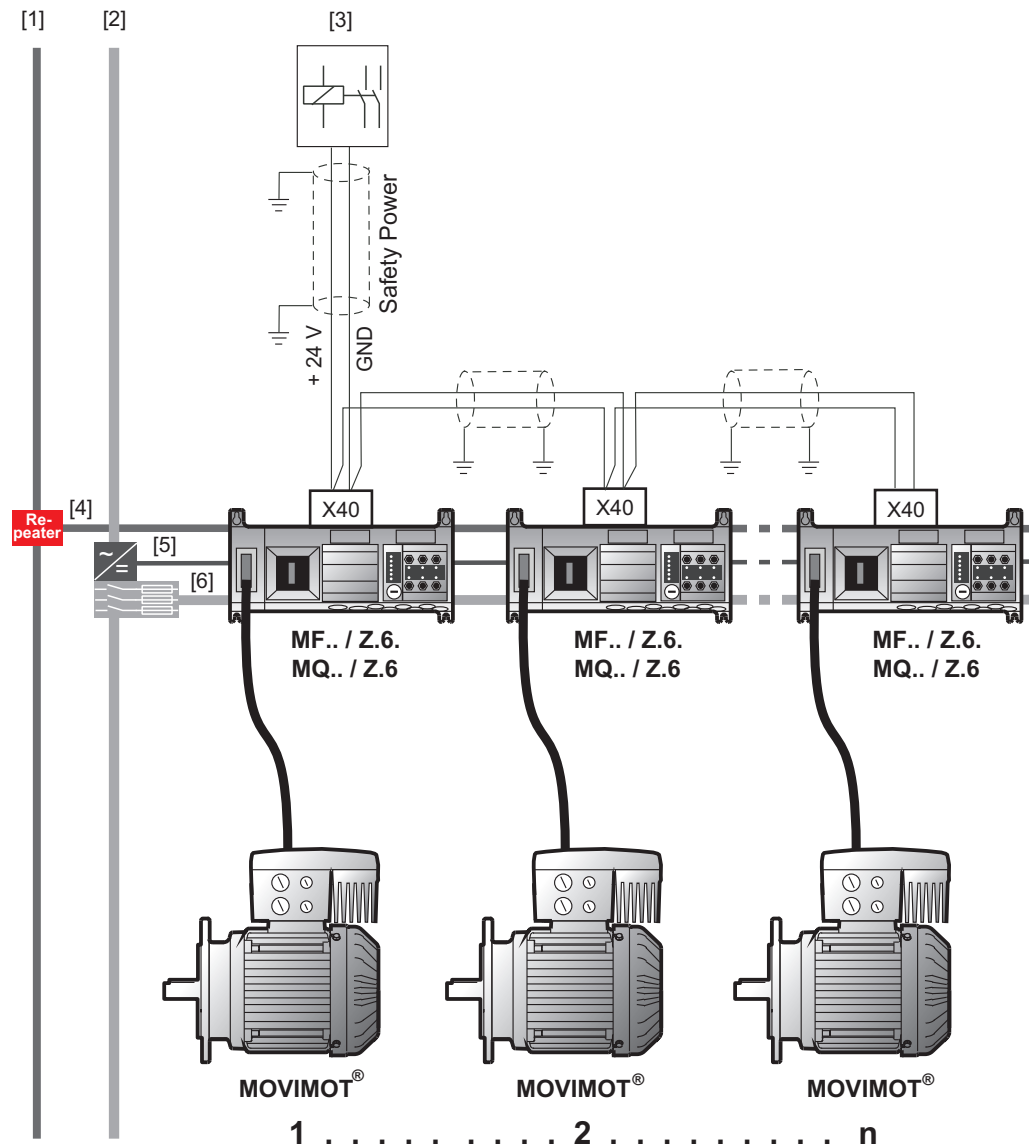
The safety contact "┴" [2] is marked in blue.



9007200744946443

4.5.4 Group disconnection with field distributor MF../Z.6 or MQ../Z.6

For notes on determining the number "n" of MOVIMOT® units for group disconnection, see chapter "24 V voltage supply for group disconnection" (→ 22).



1506432011

- [1] Communication
- [2][6] Supply system
- [3] 24 V supply for MOVIMOT® inverter from the safety relay
- [4] Fieldbus
- [5] 24 V supply for fieldbus interfaces

The length of the hybrid cable between the field distributor and MOVIMOT® must be included in the calculation of the total cable length.

For disconnection of group drives with field distributors, a plug carrier with a dual connection can be used at connection X40 to daisychain the safety-compliant 24 V supply. SEW-EURODRIVE recommends the following connector type:

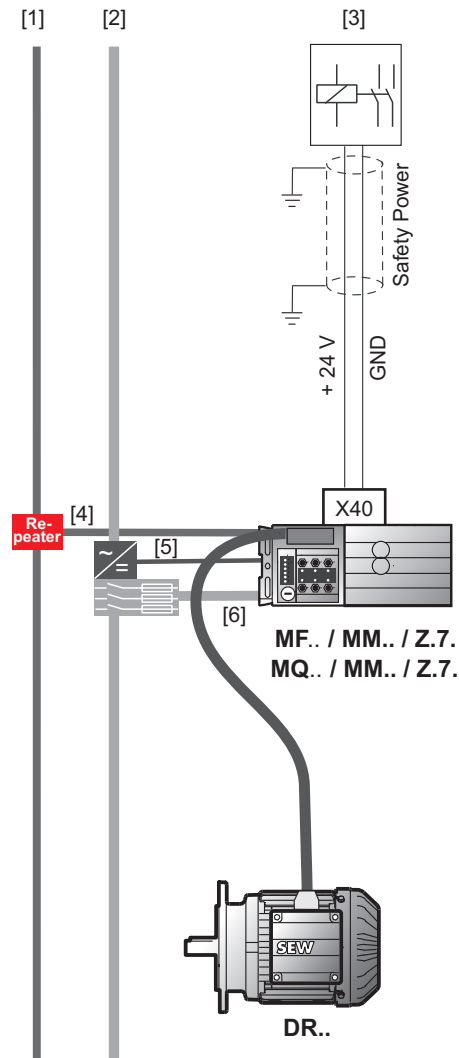
Type designation: TFKC 2,5/2-STF-5,08
 Article no.: 19 62 69 7
 Source of supply: Phoenix Contact GmbH & Co. KG, Blomberg

4.6 MOVIMOT® with MF../MM../Z.7. or MQ../MM../Z.7. field distributor

4.6.1 General structure

MOVIMOT® drive with MF../MM../Z.7. or MQ../MM../Z.7. field distributor

The drive is connected using a pre-fabricated hybrid cable.

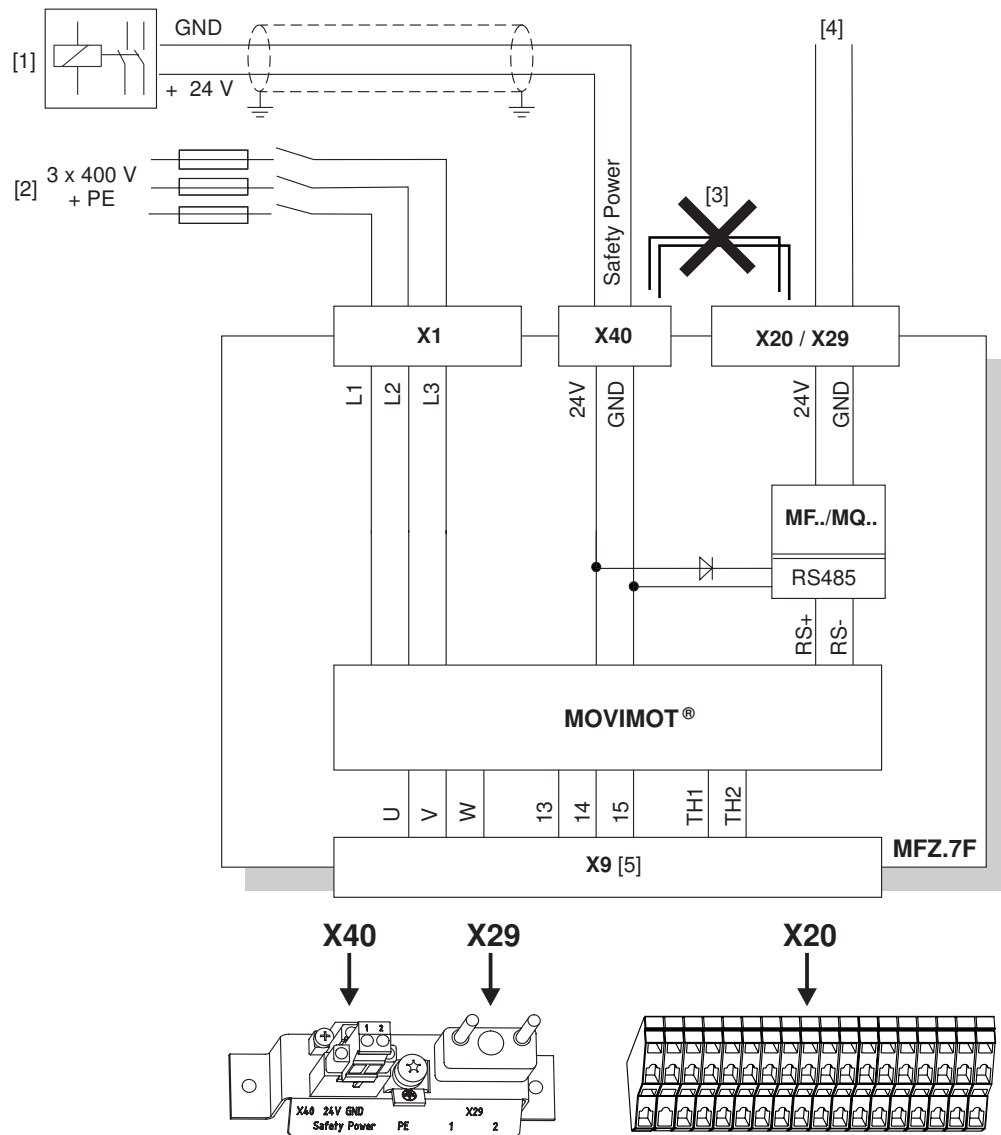


1506799243

- [1] Communication
- [2][6] Supply system
- [3] 24 V supply for MOVIMOT® inverter from the safety relay
- [4] Fieldbus
- [5] 24 V supply for fieldbus interfaces

4.6.2 Field distributor connection

The following figure shows the connection of the MF../MM../Z.7. or MQ../MM../Z.7. field distributor:



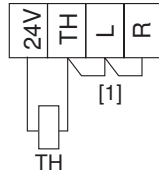
9007200764007819

- [1] 24 V supply for MOVIMOT® inverter from the safety relay
- [2] Line connection
- [3] **NOTICE: Remove the jumpers that were supplied with the device.**
- [4] Wire the 24 V supply for MF../MQ.. fieldbus interfaces according to the following manuals:
 - PROFIBUS Interfaces, Field Distributors manual
 - PROFINET IO Interfaces, Field Distributors manual
 - EtherNet/IP™ Interfaces, Field Distributors manual
 - EtherCAT® Interfaces, Field Distributors manual
 - INTERBUS Interfaces, Field Distributors manual
 - DeviceNet/CANopen Interfaces, Field Distributors manual
- [5] Hybrid cable connection (connection to the motor)

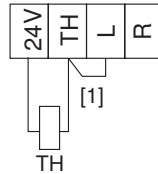
4.6.3 Enabling the direction of rotation on the MOVIMOT® inverter

Make sure that "24V" and "L" are connected correctly and verify this with a test!

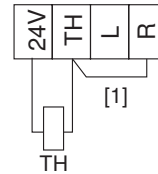
Both directions of rotation are enabled



Only **CCW** direction of rotation is enabled



Only **CW** direction of rotation is enabled



[1] Jumper inside the terminal box (no switch)



▲ WARNING

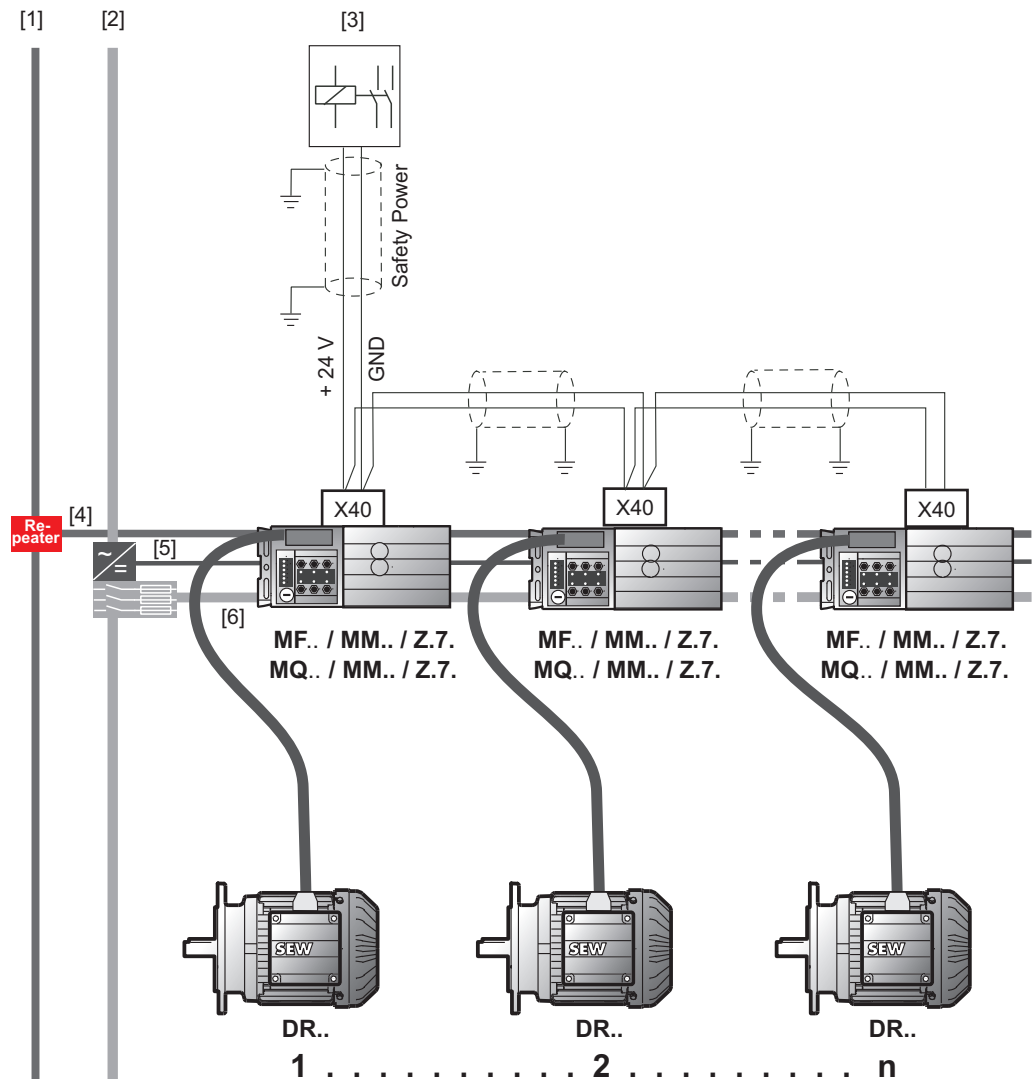
Danger of automatic startup. When using temperature sensors and automatic disconnection in the case of overtemperature, note that the motor restarts automatically once it has cooled down.

Severe or fatal injuries.

- If danger could result from automatic restarts, additional measures must be taken to prevent access to the hazardous areas that are connected to the drive.

4.6.4 Group disconnection with field distributors MF../MM../Z.7 or MQ../MM../Z.7.

For notes on determining the number "n" of MOVIMOT® units for group disconnection, see chapter "24 V voltage supply for group disconnection" (→ 22).



1550772747

- [1] Communication
- [2][6] Supply system
- [3] 24 V supply for MOVIMOT® inverter from the safety relay
- [4] Fieldbus
- [5] 24 V supply for fieldbus interfaces

The length of the hybrid cable between the field distributor and MOVIMOT® must be included in the calculation of the total cable length.

For disconnection of group drives with field distributors, a plug carrier with a dual connection can be used at connection X40 to daisychain the safety-compliant 24 V supply. SEW-EURODRIVE recommends the following connector type:

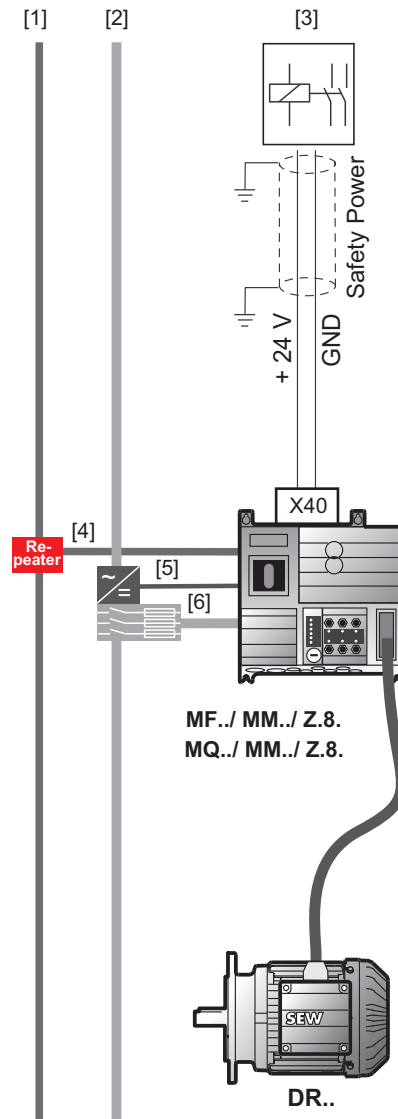
Type designation: TFKC 2,5/2-STF-5,08
 Article no.: 19 62 69 7
 Source of supply: Phoenix Contact GmbH & Co. KG, Blomberg

4.7 MOVIMOT® with MF../MM../Z.8. or MQ../MM../Z.8. field distributor

4.7.1 General structure

MOVIMOT® drive with MF../MM../Z.8. or MQ../MM../Z.8. field distributor:

The drive is connected using a pre-fabricated hybrid cable.

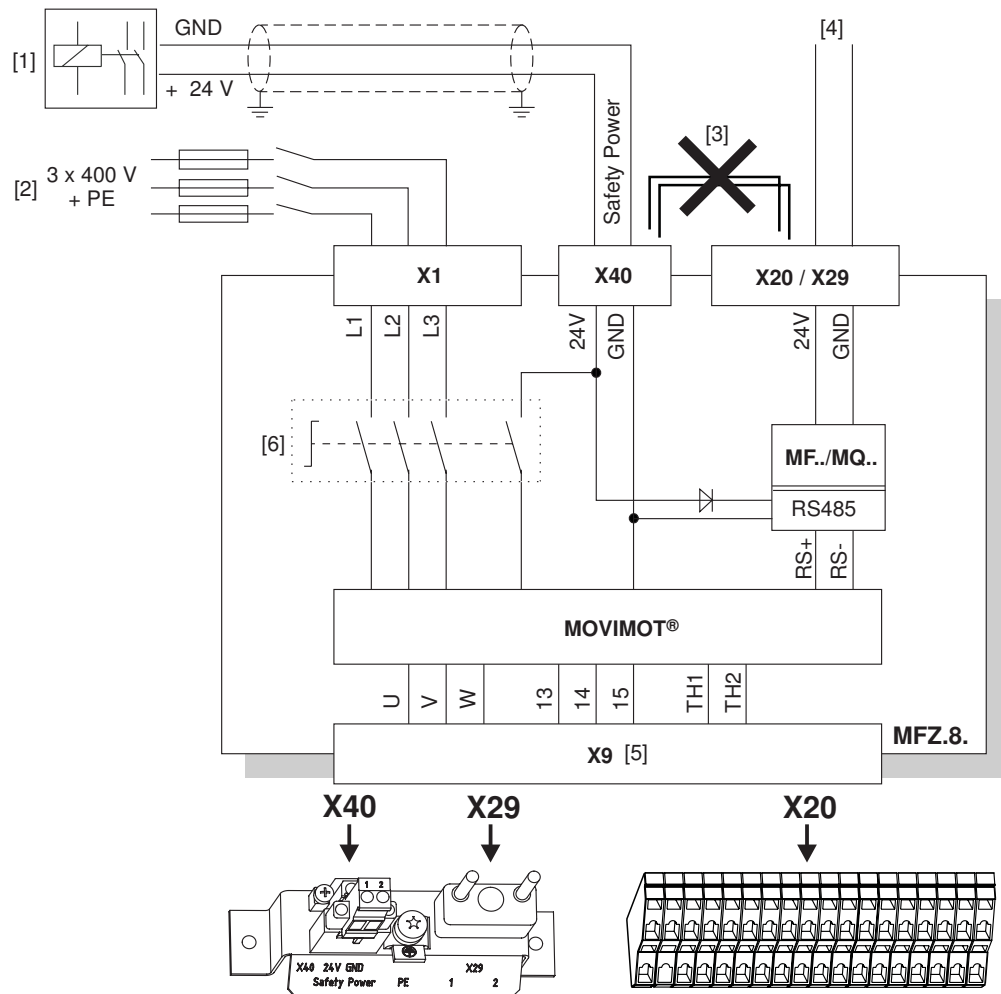


1554437387

- [1] Communication
- [2][6] Supply system
- [3] 24 V supply for MOVIMOT® inverter from the safety relay
- [4] Fieldbus
- [5] 24 V supply for fieldbus interfaces

4.7.2 Field distributor connection

The following figure shows the connection of the MF../MM../Z.8. or MQ../MM../Z.8. field distributor:



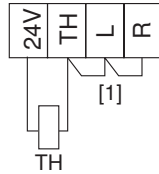
18014400067578891

- [1] 24 V supply for MOVIMOT® inverter from the safety relay
- [2] Line connection
- [3] **NOTICE: Remove the jumpers that were supplied with the device.**
- [4] Wire the 24 V supply for MF../MQ.. fieldbus interfaces according to the following manuals:
 - "PROFIBUS Interfaces, Field Distributors" manual
 - "PROFINET IO Interfaces, Field Distributors" manual
 - "EtherNet/IP™ Interfaces, Field Distributors" manual
 - "EtherCAT® Interfaces, Field Distributors" manual
 - "INTERBUS Interfaces, Field Distributors" manual
 - "DeviceNet/CANopen Interfaces, Field Distributors" manual
- [5] Hybrid cable connection (connection to the motor)
- [6] The MF../MM../Z.8N field distributor is **not equipped with a maintenance switch**. The 4 leads "L1" – "L3" and "24V" are jumpered.

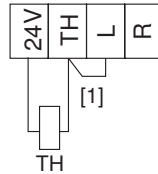
4.7.3 Enabling the direction of rotation on the MOVIMOT® inverter

Make sure that "24V" and "L" are connected correctly and verify this with a test!

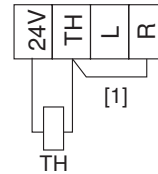
Both directions of rotation are enabled



Only **CCW** direction of rotation is enabled



Only **CW** direction of rotation is enabled



[1] Jumper inside the terminal box (no switch)



▲ WARNING

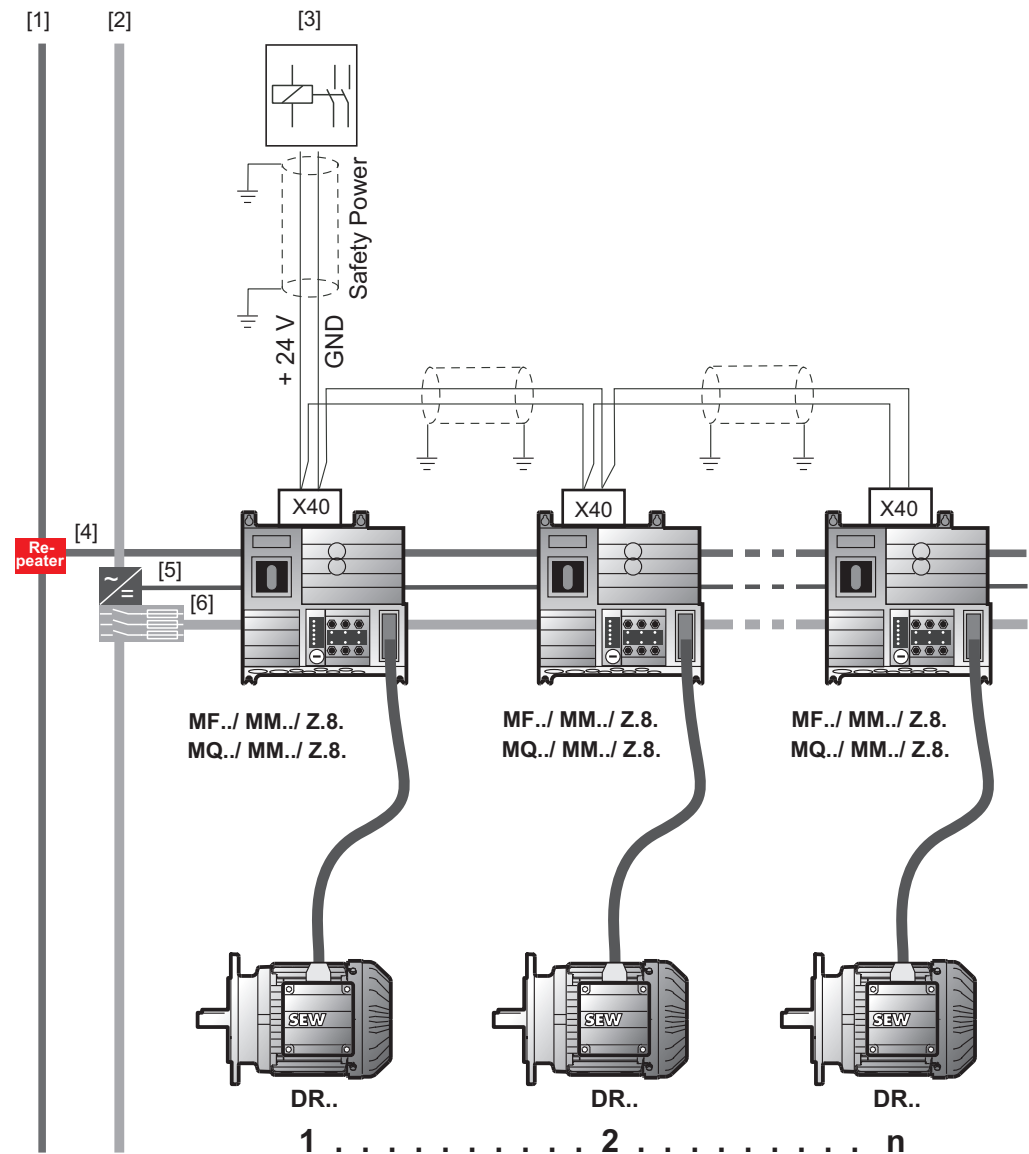
Danger of automatic startup. When using temperature sensors and automatic disconnection in the case of overtemperature, note that the motor restarts automatically once it has cooled down.

Severe or fatal injuries.

- If danger could result from automatic restarts, additional measures must be taken to prevent access to the hazardous areas that are connected to the drive.

4.7.4 Group disconnection with the MF../MM../Z.8. or MQ../MM../Z.8. field distributor

For notes on determining the number "n" of MOVIMOT® units for group disconnection, see chapter "24 V voltage supply for group disconnection" (→ 22).



1554429451

- [1] Communication
- [2][6] Supply system
- [3] 24 V supply for MOVIMOT® inverter from the safety relay
- [4] Fieldbus
- [5] 24 V supply for fieldbus interfaces

The length of the hybrid cable between the field distributor and MOVIMOT® must be included in the calculation of the total cable length.

For disconnection of group drives with field distributors, a plug carrier with a dual connection can be used at connection X40 to daisychain the safety-compliant 24 V supply. SEW-EURODRIVE recommends the following connector type:

Type designation: TFKC 2,5/2-STF-5,08
 Article no.: 19 62 69 7
 Source of supply: Phoenix Contact GmbH & Co. KG, Blomberg

4.8 Other setup variants

Other connection variants are permitted for MOVIMOT® MM..D in safety applications. Further information can be found in the following manuals:

Connection variant		Manual
Inverters	Control	
MOVIMOT®	MOVIFIT® MC with binary control	"MOVIFIT® MC/FC – Functional Safety"
	MOVIFIT® MC with PROFIsafe option S11	
	MOVIFIT® MC with S12 safety option	"MOVIFIT® MC/FC – Functional Safety with S12 Safety Option"
	MOVIPRO®	"MOVIPRO® – Functional Safety"

5 Technical data

The table below shows the technical data for MOVIMOT® MM..D relating to the integrated safety technology. The technical data and approvals from the operating instructions "MOVIMOT® MM..D..." must also be observed.

Technical data of safety-related 24 V supply voltage				
	Min.	Typical	Max.	Unit
Input voltage range	18	24	30	V (DC)
Power consumption		3.4	3.7	W
Input capacitance		100	120	µF
Switch-on/switch-off threshold		7.5		V
Input voltage for OFF status (STO)			5	V
Permitted leakage current of the external safety controller		0	10	mA
Time from disconnecting the 24 V supply until the deactivation of the rotating field		25	50	ms

Safety characteristics	
Approved safety classes	Performance Level d according to EN ISO 13849-1 SIL 2 according to EN 61800-5-2
Probability of a dangerous failure per hour (= PFH value)	0 (fault exclusion)
Service life or proof test interval in accordance with EN 61508	20 years, after which the component must be replaced with a new one.
Safe condition	Safe torque off (STO)

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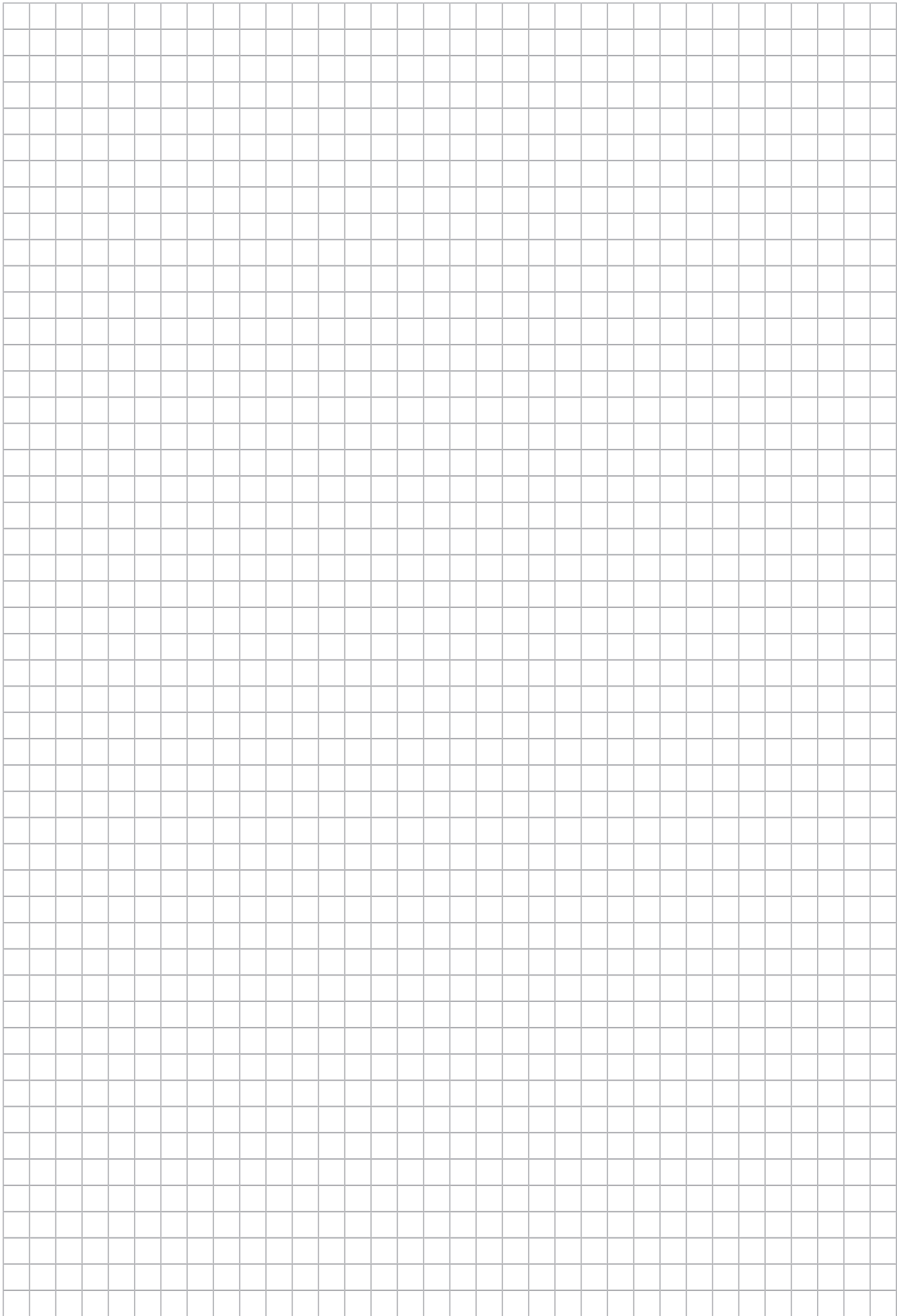
S

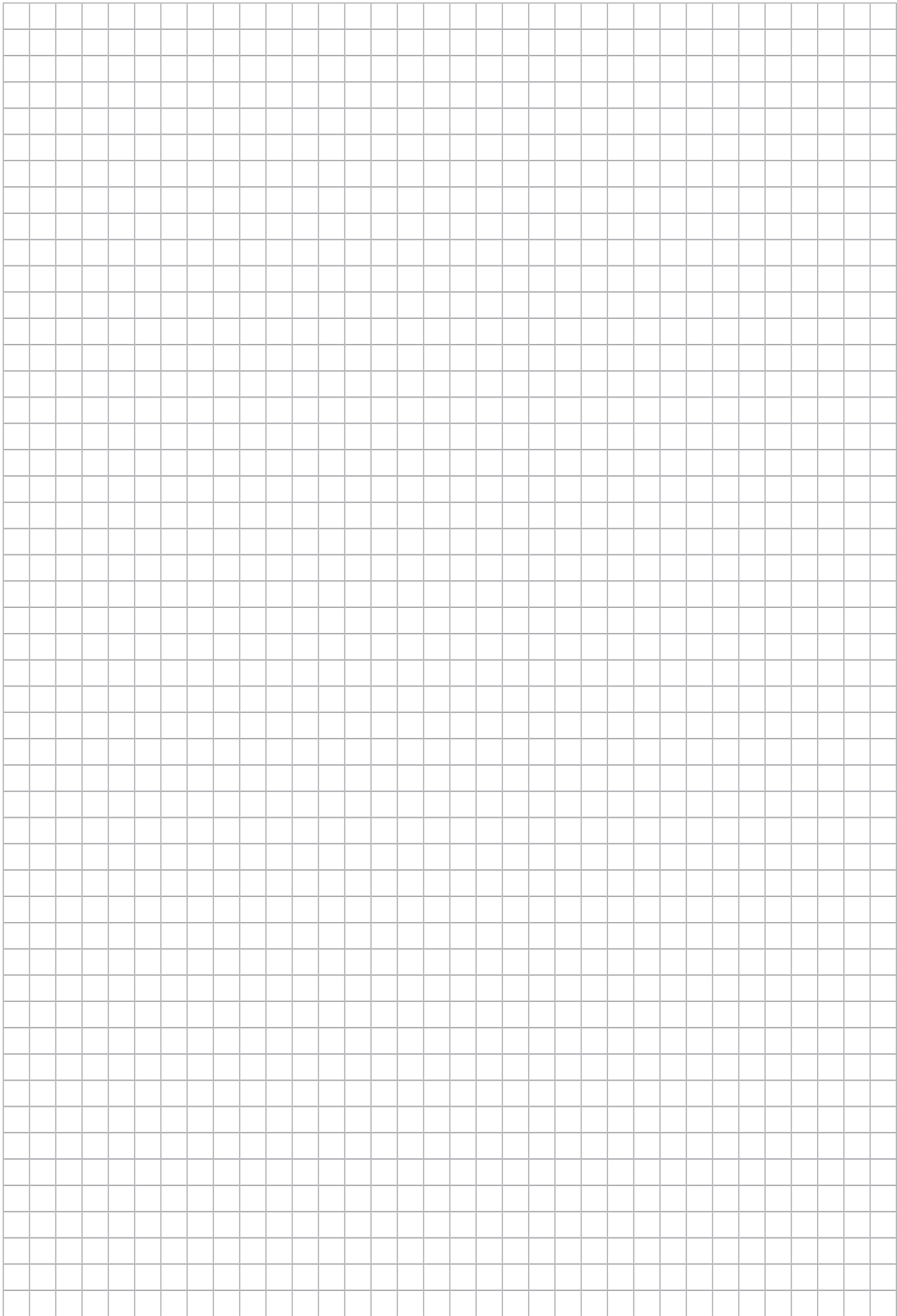
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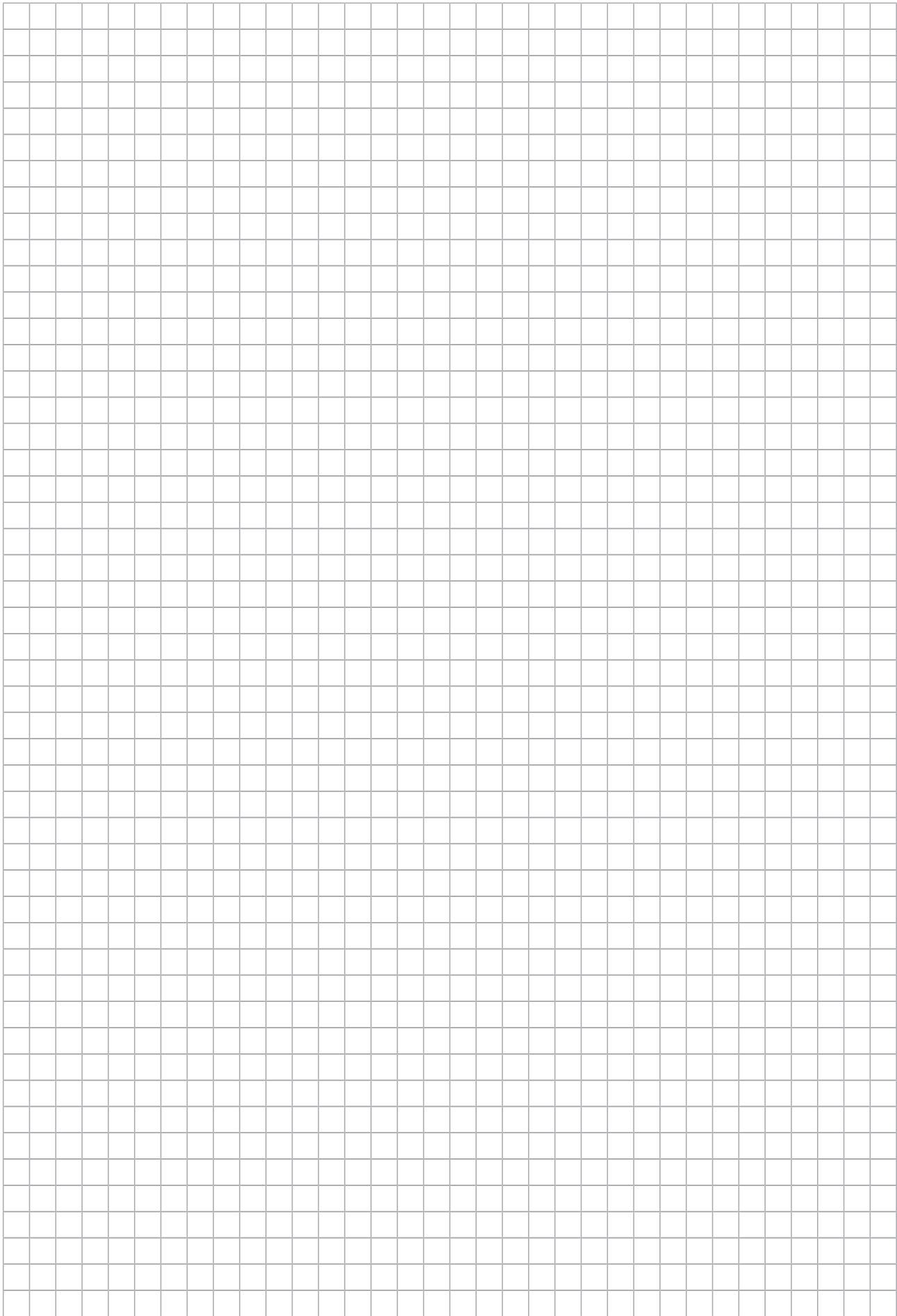
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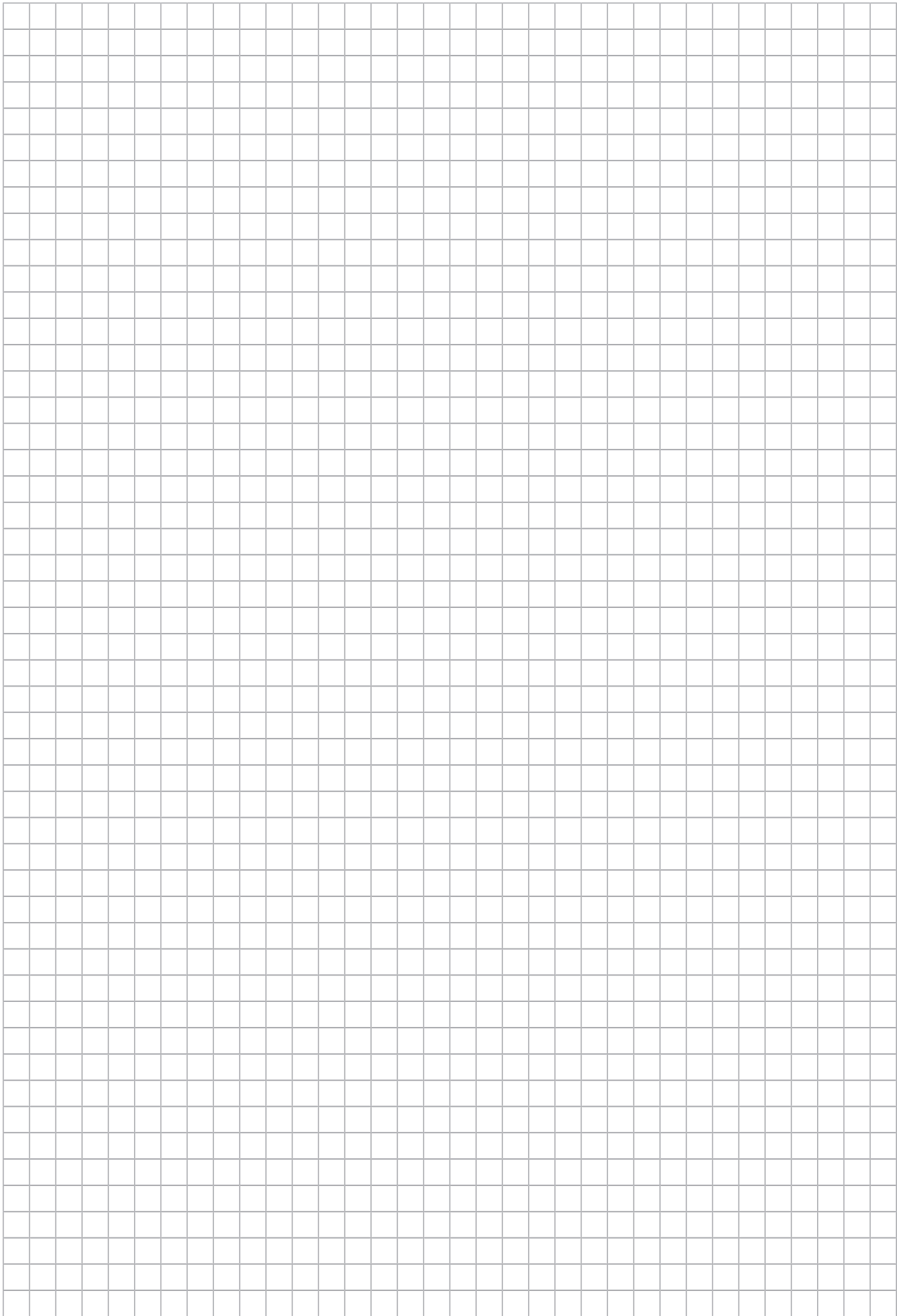
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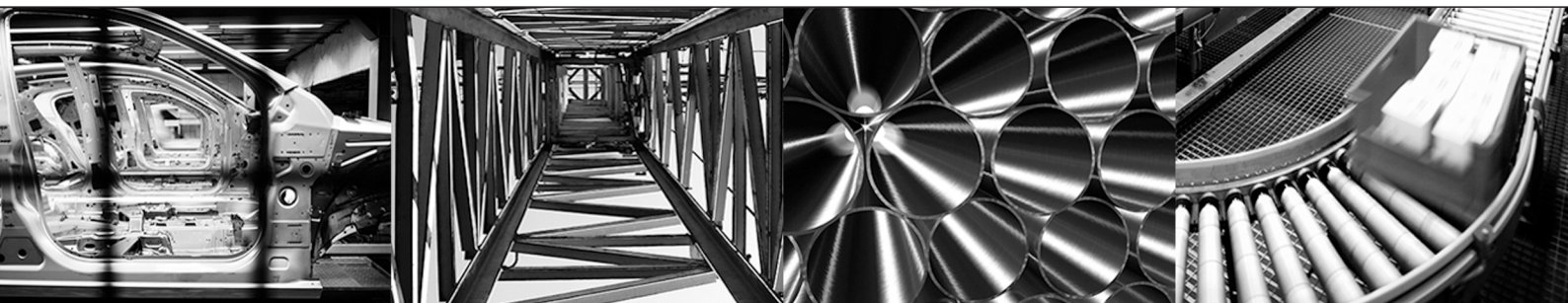
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