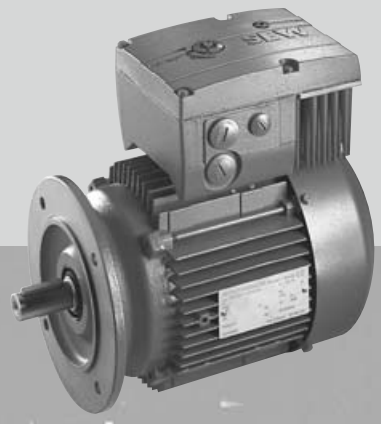
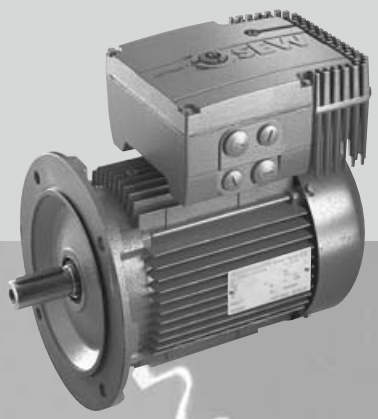
SEW EURODRIVE

MOVIMOT® MM..C

Edition

08/2003





Operating Instructions

11218126 / EN

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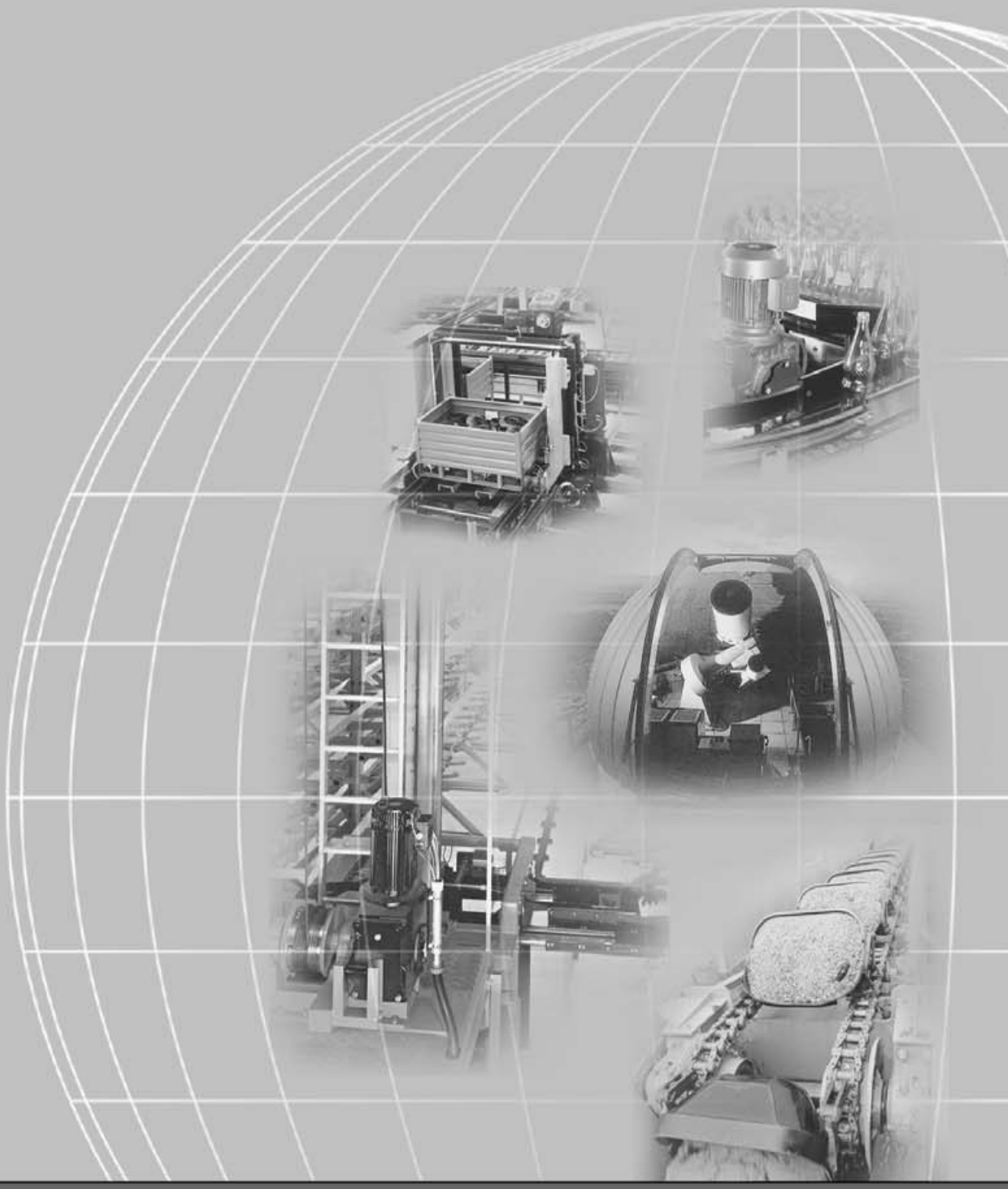


SEW-EURODRIVE

Contents

1 Important Notes

Safety and warning instructions

Always follow the safety and warning instructions contained in this publication!

Electrical hazard
Possible consequences: Severe or fatal injuries.

Hazard
Possible consequences: Severe or fatal injuries.

Hazardous situation
Possible consequences: Slight or minor injuries.

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

Tips and useful information.

Other applicable documents

- Operating Instructions "DR/DT/DV AC Motors, CT/CV Asynchronous Servomotors"
- **If MOVIMOT® is used for emergency stops, the supplemental documentation "Safe Disconnection for MOVIMOT®" must be observed. Only those components may be used in safety applications that were explicitly delivered with this design by SEW-EURODRIVE!**

Intended usage

- These MOVIMOT® drives are intended for industrial equipment. They comply with the applicable standards and regulations and meet the requirements of the Low Voltage Directive 73/23/EEC.
- The use of MOVIMOT® for hoist applications is limited!
- Technical data and information about the permitted conditions where the unit is used can be found on the nameplate and in these operating instructions.
- It is essential to observe this specified information!
- Do not start up the unit (take it into operation in the designated fashion) until you have established that the machine complies with the EMC Directive 89/336/EEC and that the conformity of the end product has been determined in accordance with the Machinery Directive 89/392/EEC (with reference to EN 60204).

Site of operation

The following uses are forbidden unless measures are expressly taken to make them possible:

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

Waste disposal

This product consists of:

- Iron
- Aluminum
- Copper
- Plastic
- Electronic components

Dispose of all components in accordance with applicable regulations!

2 Safety Notes

- Never install damaged products or take them into operation. Please submit a complaint to the shipping company immediately in the event of a damage.
- Only electrical specialists with the relevant accident prevention training are allowed to perform installation, startup and service work on the MOVIMOT®. They must also comply with the regulations in force (e.g. EN 60204, VBG 4, DIN-VDE 0100/0113/0160).
- Preventative measures and protection devices must correspond to the regulations in force (e.g. EN 60204 or EN 50178).

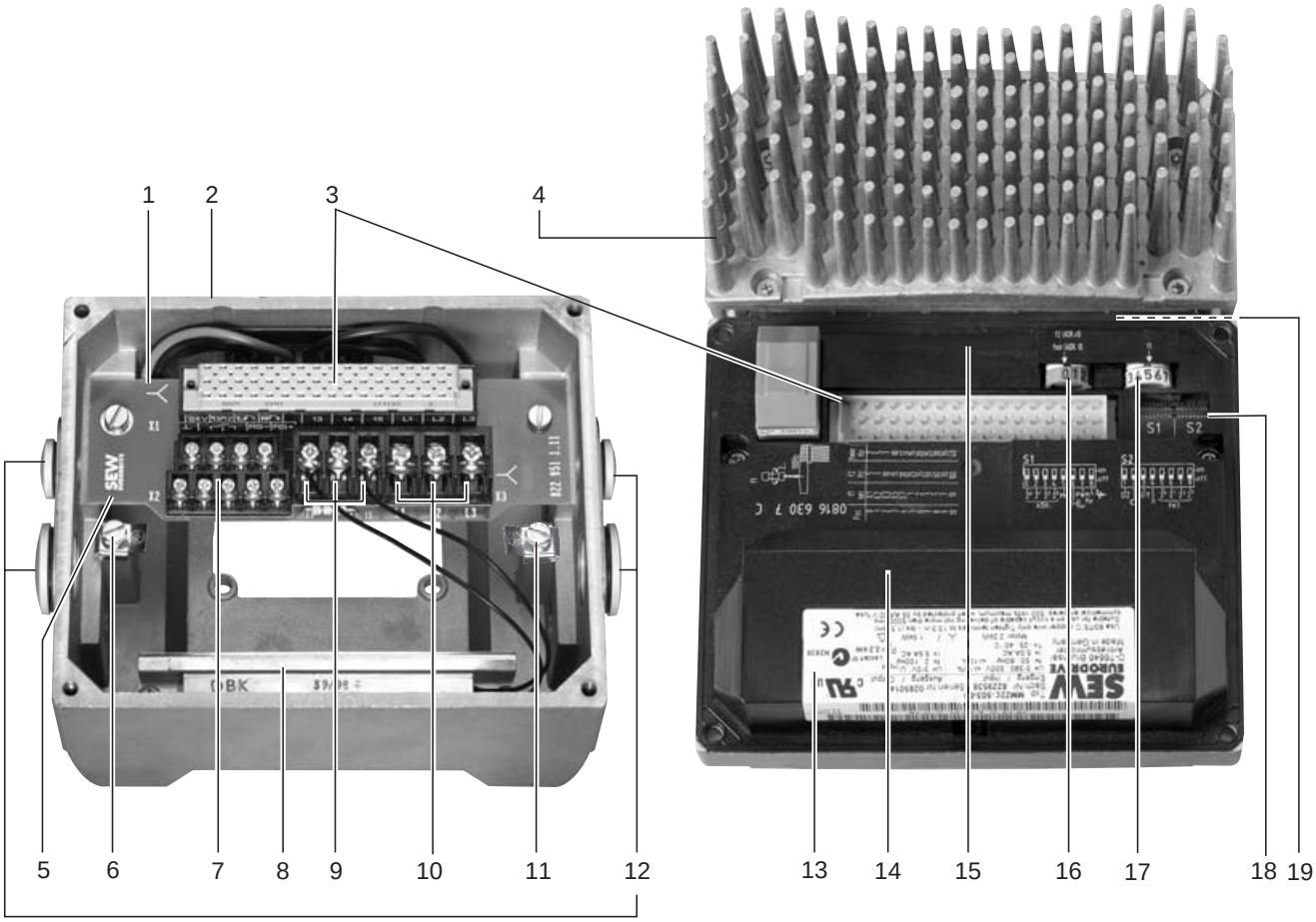
  Necessary protective measures: Grounding of MOVIMOT®.
- The unit meets all requirements for reliable isolation of power and electronics connections in accordance with EN 50178. All connected circuits must also satisfy the requirements for reliable isolation.

- Before removing the MOVIMOT® inverter, it must be disconnected from the supply system. Dangerous voltages may still be present for up to one minute after disconnection from the power supply source.
- As soon as supply voltage is present at the MOVIMOT®, the terminal box must be closed, i.e. the MOVIMOT® inverter must be screwed on.
- The fact that the status LED and other display elements are no longer illuminated does not indicate that the unit has been disconnected from the power supply and no longer carries any voltage.

- Mechanical blocking orunit-internal safety functions can cause a motor standstill. Removing the cause of this problem or performing a reset can result in the motor restarting on its own. If, for safety reasons, this is not permissible for the driven machine, MOVIMOT® must be disconnected from the mains before correcting the fault.
- Danger of burns: The MOVIMOT® surface temperature (especially of the heat sink) can exceed 60 °C during operation!
- If MOVIMOT® or field distributors are used for emergency stops, the supplemental documentation "Safe shutdown for MOVIMOT®" must be observed. Only those components may be used in safety applications that were explicitly delivered with this design by SEW-EURODRIVE!

3 Unit Design

3.1 MOVIMOT® inverter (standard design)



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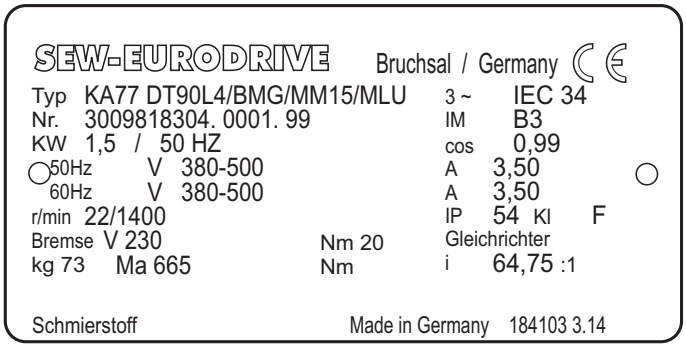
1. Identification of the circuit type
2. Terminal box (size 2 used as example)
3. Connection plug between connection unit and inverter
4. MOVIMOT® inverter with heat sink (size 2 used as example)
5. Connection unit with terminals
6. Screw for PE connection ⏚
7. Electronics terminal strip X2
8. Internal braking resistor BW. (standard for motors without brake)
9. Connection of brake coil (X3). For motors without brake: Connection of internal braking resistor BW. (standard)
10. Mains connection L1, L2, L3 (X3) (suitable for 2 x 4 mm^2)
11. Screw for PE connection ⏚
12. Cable glands
13. Electronics nameplate
14. Safety hood for inverter electronics
15. Setpoint potentiometer f1 (not visible), accessible from top of MOVIMOT® inverter via screw fitting
16. Setpoint switch f2 (green)
17. Switch t1 for generator ramp (white)
18. DIP switches S1 and S2 (for settings see the section "Startup")
19. Status LED (visible from top of MOVIMOT® inverter, see the section "Diagnostics")

3.2 Unit designations (MOVIMOT® standard design)

Sample motor nameplate



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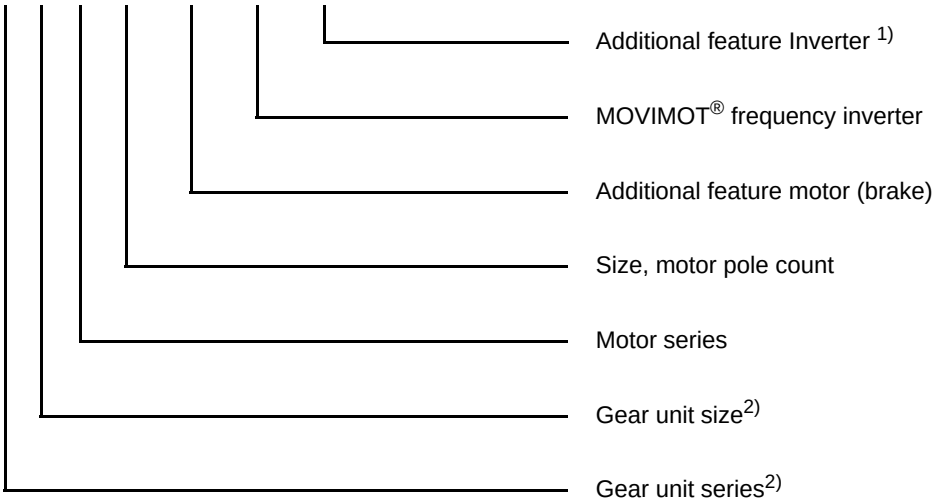
KA 77 DT 90L4 BMG/MM15/MLU

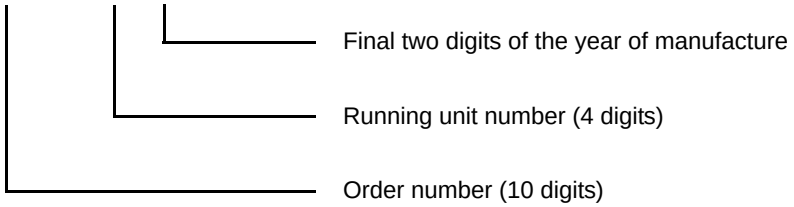


1) Only factory-installed options are listed on the nameplate.

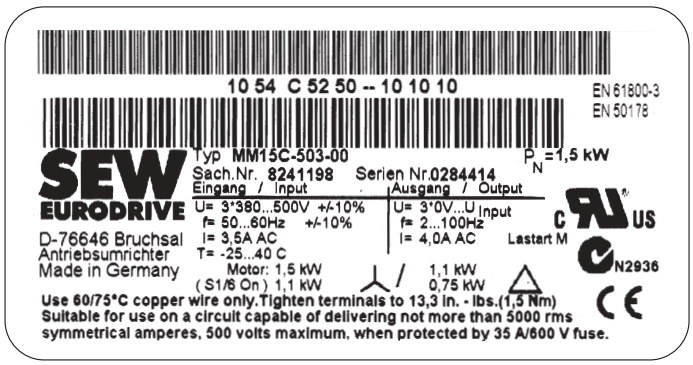
2) Detailed information about geared motor combinations can be found in the catalog "MOVIMOT® Geared Motors."

Structure of sample fabrication number:

3009818304. 0001. 99



Sample inverter nameplate



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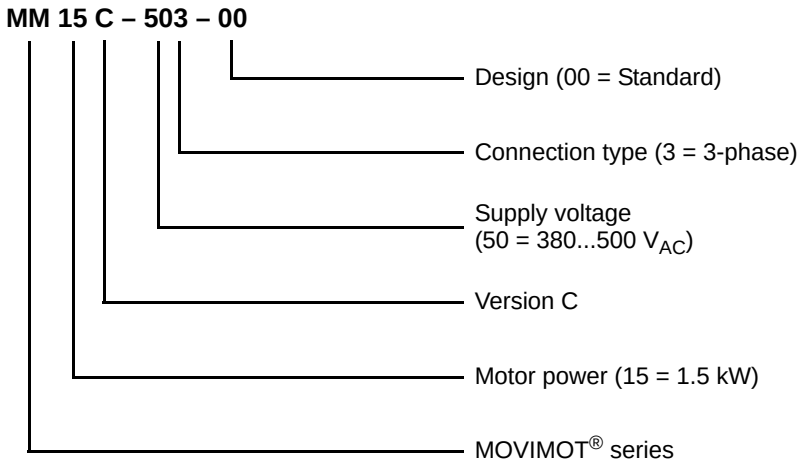
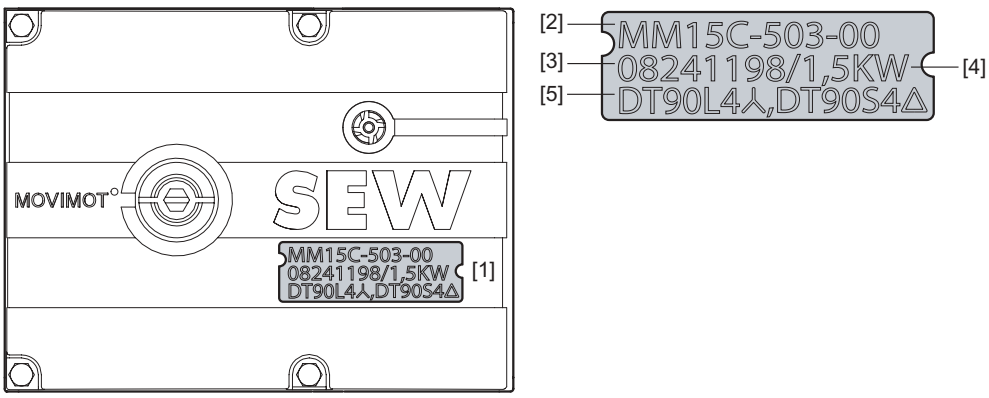


Device identification

The device identification [1] at the top of the MOVIMOT® inverter contains information about inverter type [2], inverter part number [3], equipment power [4] and adapted (associated) motors [5].



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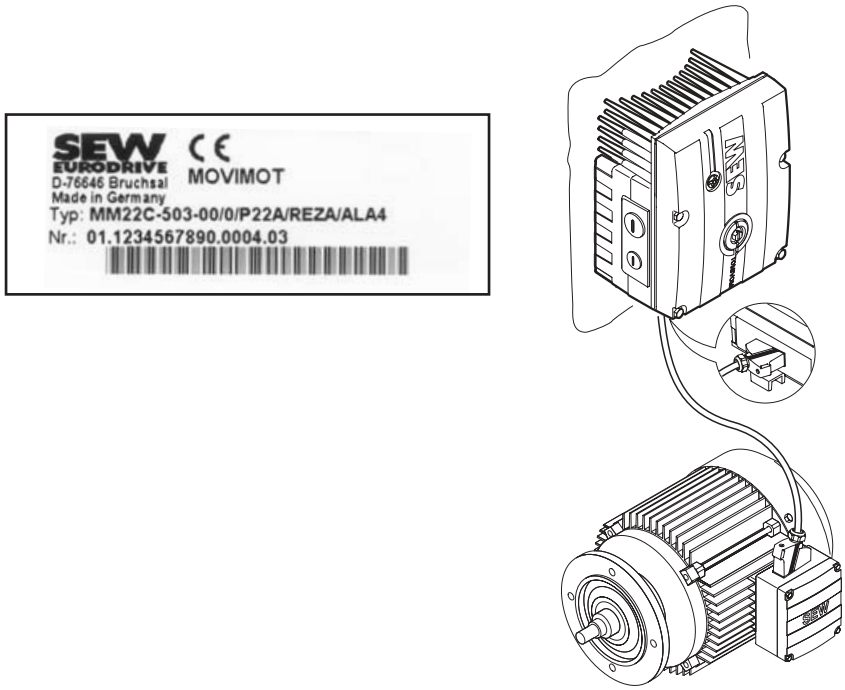
"Mounting close to motor" design with option P2.A

The following illustration shows an example of the MOVIMOT® inverter with option P2.A mounted close to the motor with corresponding nameplate and unit designation:



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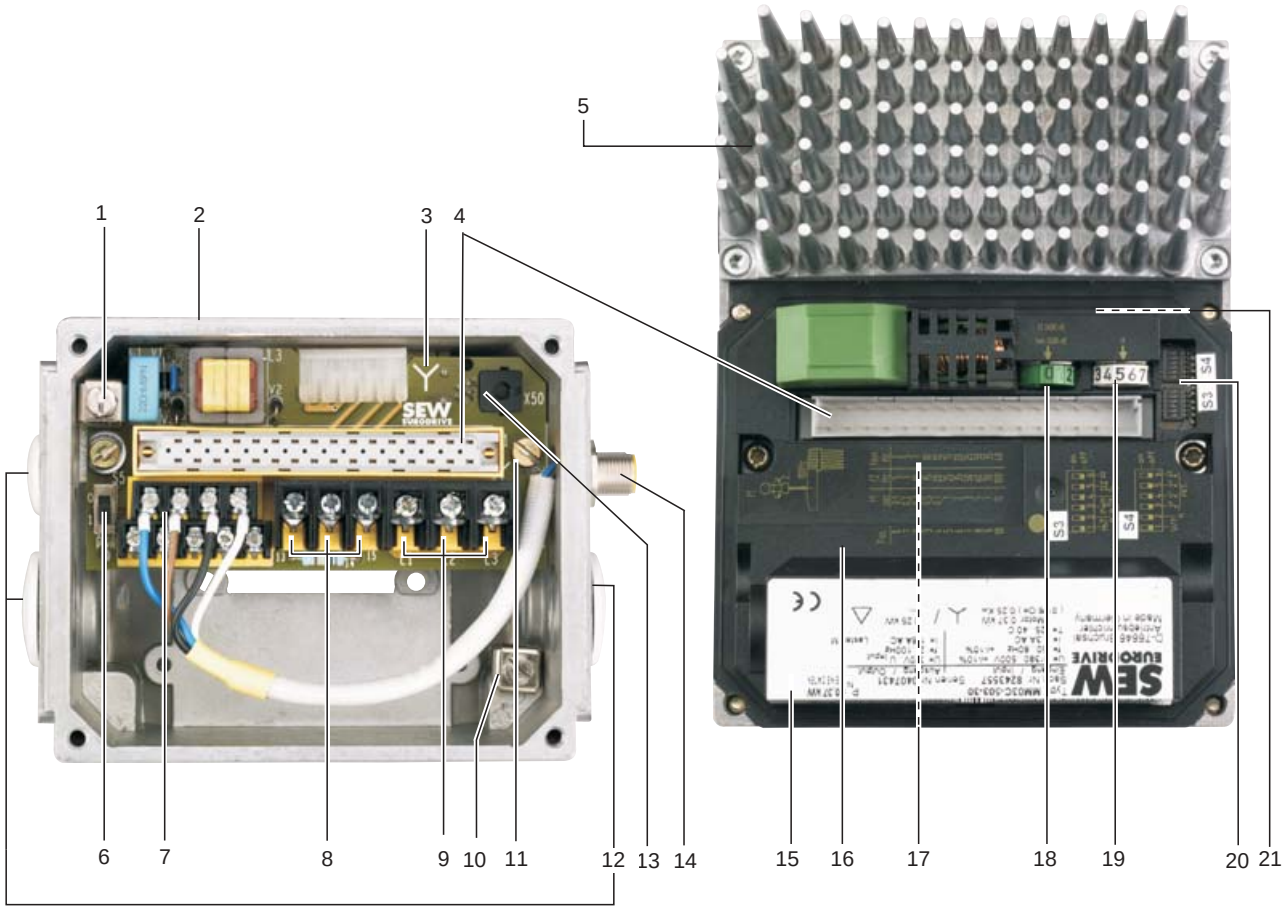
MM22C-503-00/0/P22A/REZA/ALA4

- Plug connector for the connection to the motor
- Terminal box design
- Adapter for mounting close to the motor
  21 = Size 1
  22 = Size 2
- Circuit type
  0 = ⅄
  1 = △
- MOVIMOT®

3.3 MOVIMOT® inverter (with integrated AS-Interface)



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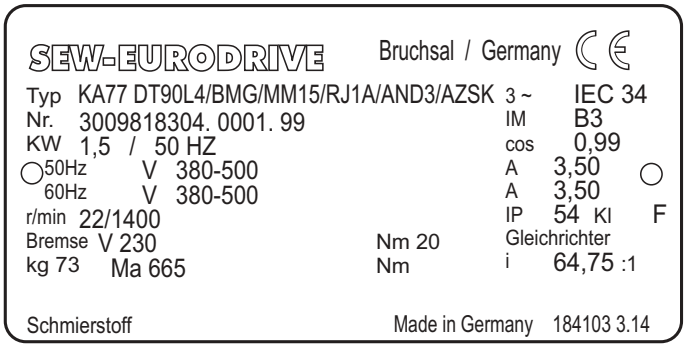
1. Screw for PE connection ⏚
2. Terminal box (size 1 used as example)
3. Identification of the circuit type
4. Connection plug between connection unit and inverter
5. MOVIMOT® inverter with heat sink (size 1 used as example)
6. Switch S5 (AUX/24 V supply, for settings see the section "Startup")
7. Electronics terminal strip X2
8. Connection of brake coil (X3). For motors without brake: Connection of internal braking resistor BW. (standard)
9. Mains connection L1, L2, L3 (X3) (suitable for 2 x 4 mm^2)
10. Screw for PE connection ⏚
11. Connection unit with terminals
12. Cable glands
13. Diagnostic interface (see the section "Diagnostics")
14. AS-i connection
15. Electronics nameplate
16. Safety hood for inverter electronics
17. Setpoint potentiometer f1 (not visible), accessible from top of MOVIMOT® inverter via screw fitting
18. Setpoint switch f2 (green)
19. Switch t1 for generator ramp (white)
20. DIP switches S3 and S4 (for settings see the section "Startup")
21. Status LEDs (visible from top of MOVIMOT® inverter, see the section "Diagnostics")

3.4 Unit designations (MOVIMOT® with integrated AS-Interface)

Sample motor nameplate



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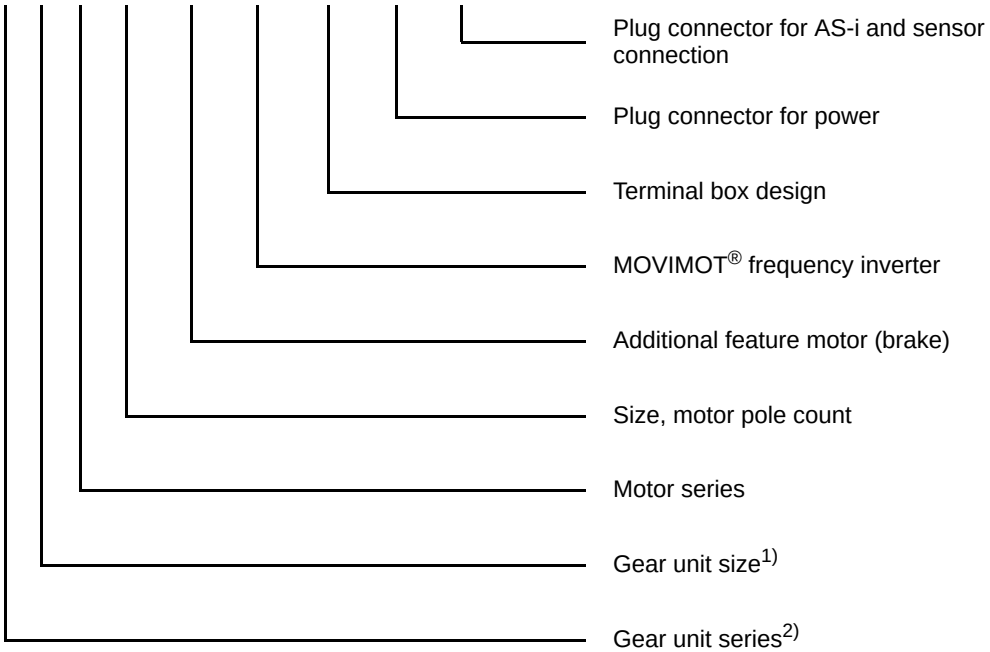
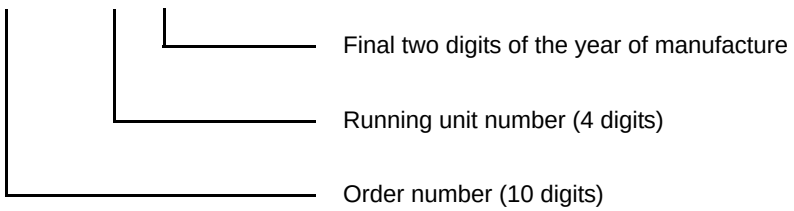
KA 77 DT 90L4 BMG/MM15/RJ1A/AND3/AZSK



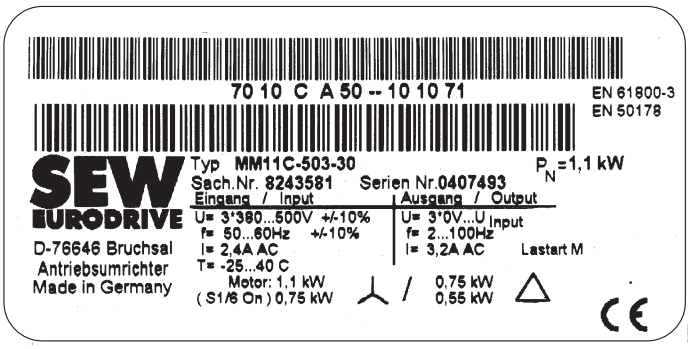
1) Detailed information about geared motor combinations can be found in the catalog "MOVIMOT® Geared Motors."

Structure of sample fabrication number:

3009818304. 0001. 99



Sample inverter nameplate



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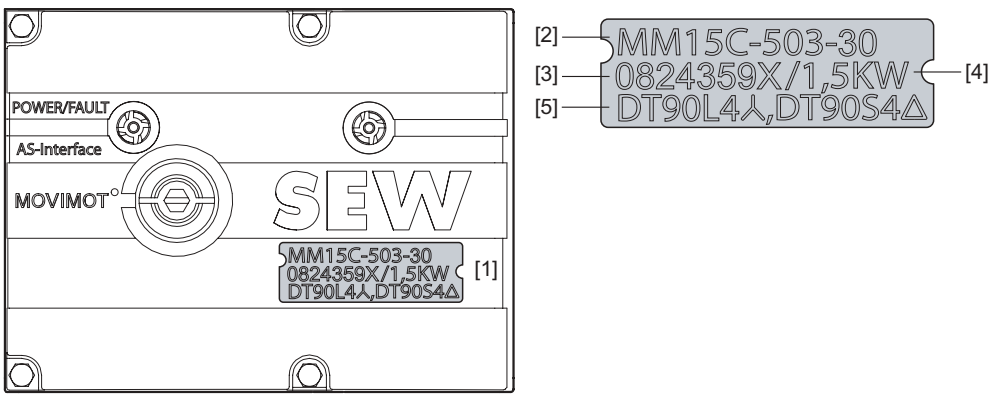
MM 15 C – 503 – 30

- Design (30 = with integrated AS-Interface)
- Connection type (3 = 3-phase)
- Supply voltage (50 = 380...500 V_{AC})
- Version C
- Motor power (15 = 1.5 kW)
- MOVIMOT® series

Device identification

The device identification [1] at the top of the MOVIMOT® inverter contains information about inverter type [2], inverter part number [3], equipment power [4] and adapted (associated) motors [5].



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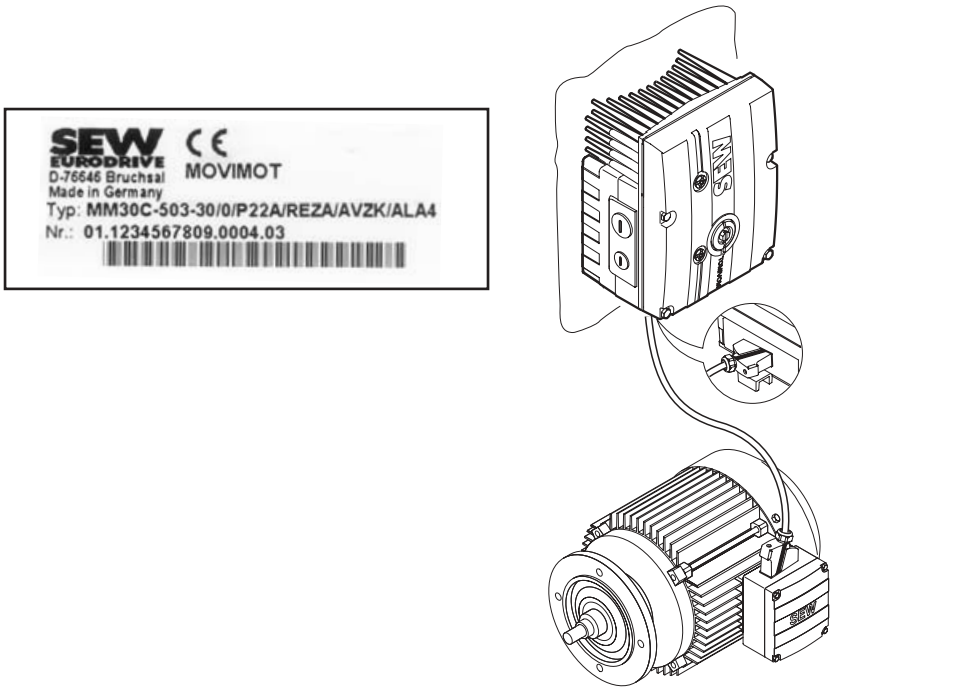
"Mounting close to the motor" design with option P2.A

The following illustration shows an example of the MOVIMOT® inverter with option P2.A mounted close to the motor with corresponding nameplate and unit designation:



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MM30C-503-30/0/P22A/REZA/AVSK/ALA4

- Plug connector for connection to the motor
- Plug connector option
- Terminal box design
- Adapter for mounting close to the motor
  21 = Size 1
  22 = Size 2
- Circuit type
  0 = Y
  1 = Δ
- MOVIMOT®

4 Mechanical Installation

4.1 MOVIMOT® gearmotor

Before you begin

Install MOVIMOT® only if

- the entries on the nameplate of the drive match the voltage supply system,
- the drive is undamaged (no damage caused by transport or storage).
- it is certain that the following requirements have been fulfilled:
  - Ambient temperature between –25 °C and +40 °C (remember that the temperature range of the gear unit may be restricted → operating instructions for the gear unit)
  - No oil, acid, gas, vapors, radiation, etc.

Installation tolerances

Shaft end	Flanges
Diametric tolerance in accordance with DIN 748 • ISO k6 at ∅ ≤ 50 mm • ISO m6 at ∅ > 50 mm (Center bore in accordance with DIN 332, shape DR)	Centering shoulder tolerance in accordance with DIN 42948 • ISO j6 at ∅ ≤ 230 mm • ISO h6 at ∅ > 230 mm

Mounting MOVIMOT®

- The MOVIMOT® may only be mounted or installed in the specified mounting position on a level, vibration-proof and torsionally rigid support structure.
- Thoroughly remove anti-corrosion agents from the shaft extensions (use a commercially available solvent). Do not allow the solvent to penetrate the bearings and shaft seals – this could cause material damage!
- Carefully align MOVIMOT® and the driven machine, to avoid placing any unacceptable strain on the motor shafts (observe permissible overhung load and axial thrust data!).
- Do not butt or hammer the shaft end.
- Use an appropriate cover to protect motors in vertical mounting positions from objects or fluids entering!
- Ensure an unobstructed cooling air supply and that air heated by other apparatus cannot be drawn in or reused.
- Balance components for subsequent mounting on the shaft with a half key (output shafts are balanced with a half key).
- Any condensation drain holes are closed with plastic plugs and must not be opened unless needed.
- Do not leave any condensation drain holes open, since this defeats higher enclosure ratings.

Installation in damp areas or in the open

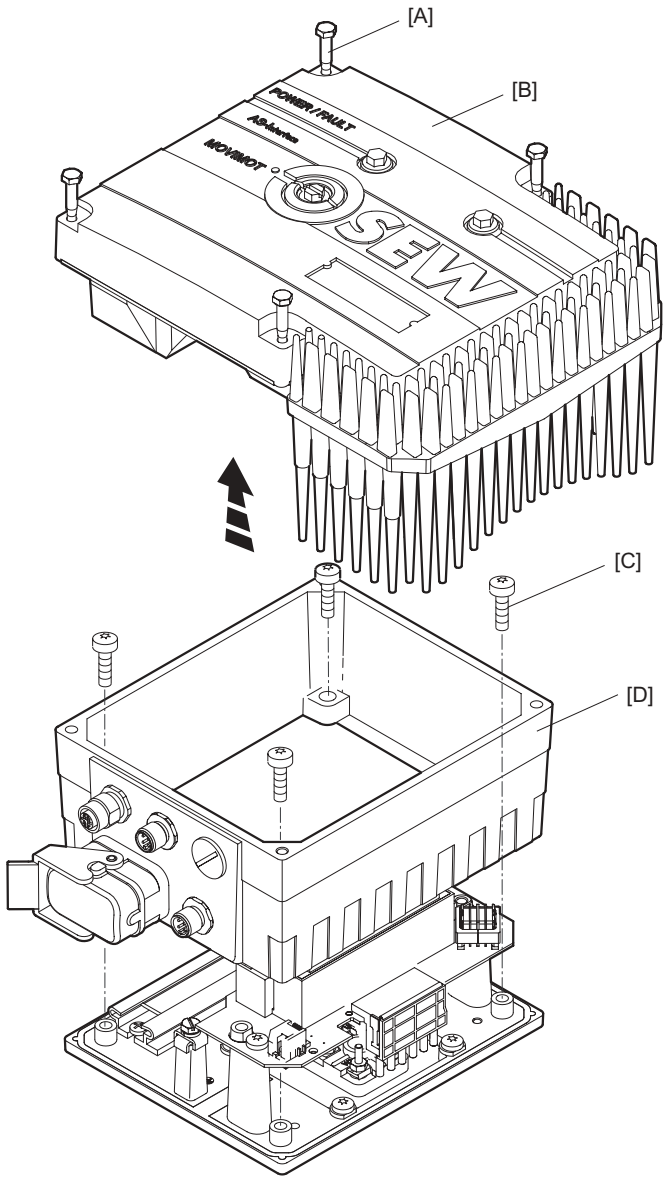
- Use suitable screwed cable glands for the supply leads (use reducing adapters if necessary).
- Coat the threads of cable glands and pocket caps with sealant and tighten them well – then coat them again.
- Seal the cable entry well.
- Clean the sealing faces of the MOVIMOT® inverter well before re-assembly.
- Restore the anticorrosive coating if necessary.
- Check the type of enclosure is authorized (refer to the nameplate).

4.2 Modular terminal box

Turning the terminal box

In principle it is recommended to purchase factory pre-fabricated MOVIMOT® systems with the correct position of cable entries. In exceptional cases, the position of the cable entries can be turned to the opposite side (only for designs with modular terminal box).

1. **Isolate MOVIMOT® drive from the supply, safeguarding it against unintentional restarting! Dangerous voltages may still be present for up to 1 minute after shutdown!**
2. Label the connections before disconnecting them for later reassembly.
3. Disconnect the supply system, control and sensor connections.
4. Remove screws [A] and detach MOVIMOT® inverter [B].
5. Loosen screws [C] and remove terminal box [D].



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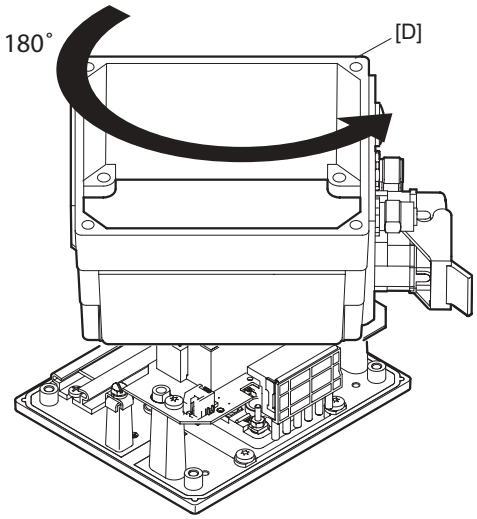
6. Turn terminal box [D] by 180°.



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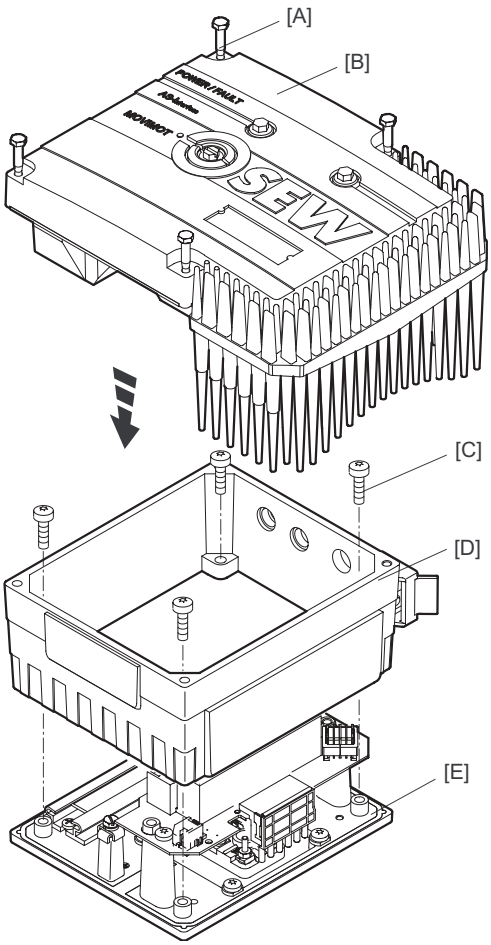
7. Place terminal box [D] on mounting plate [E] and fasten it with screws [C].
8. Reestablish cable connections.
9. Reattach MOVIMOT® inverter [B] and secure with screws [A].



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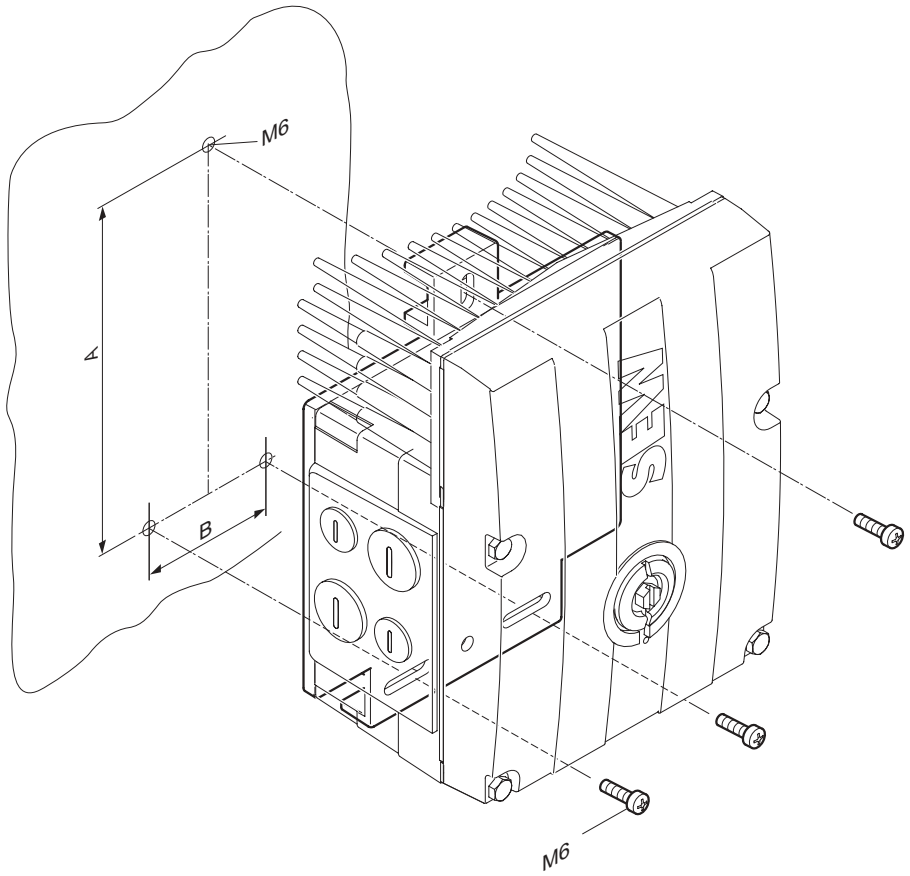
4.3 Mounting MOVIMOT® inverter with option P2.A close to the motor

The following illustration shows the mounting dimensions when mounting the MOVIMOT® inverter with option P2.A close to the motor:



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Size	A	B
MM03 to MM15	65 mm	140 mm
MM22 to MM3X	65 mm	170 mm

4.4 Option MLU..A / MLG..A / MLK11A

Scope of delivery

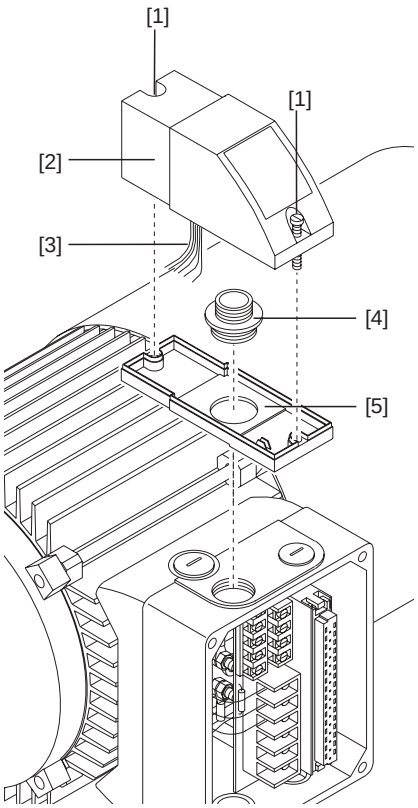
- MLU..A / MLG..A / MLK11A top [2]
- 2 screws [1]
- Cable entry screw [4]
- MLU..A / MLG..A / MLK11A lower section [5]

Installation

1. Remove a screw plug from the MOVIMOT® terminal box.
2. Attach lower section [E] to MOVIMOT® terminal box and fasten it with cable entry screw [4].
3. Guide connection cable [3] through cable entry screw [4] into the MOVIMOT® terminal box.
4. Place top [2] on bottom [5] and fasten it with 2 screws [1].

STOP

Important: Option may be assembled only in the position shown in the following figure!



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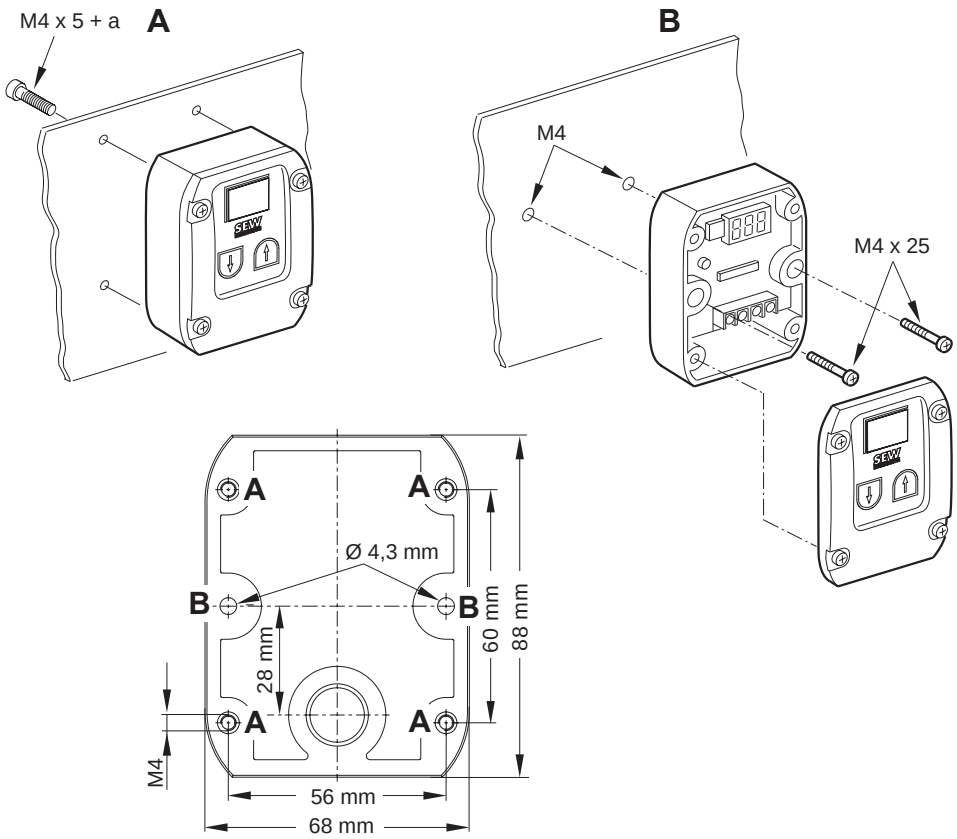
4.5 MBG11A option

- A: Assembly from the rear via 4 tapped holes
- B: Assembly from the front via 2 mounting holes



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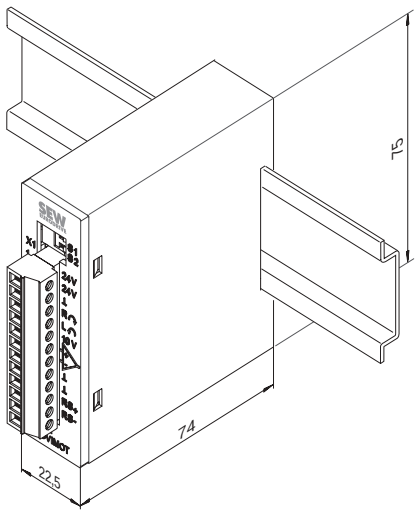
a = wall thickness
Screws are not included in the delivery!

4.6 MWA21A option

- MWA21A is installed in the switch cabinet on the DIN rail (DIN EN 50022):



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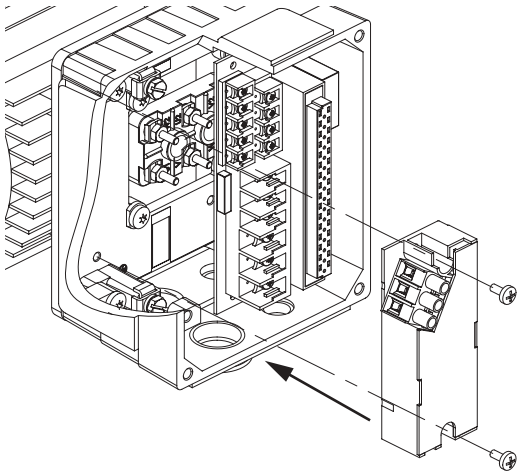
4.7 URM option

Mount the URM option with two screws according to the following illustration. Connection according to section "Electrical Installation."

The installation is only allowed in conjunction with modular terminal box!



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5 Electrical Installation of MOVIMOT® Standard Design

5.1 Installation instructions

Connecting supply system leads

- The rated voltage and frequency of MOVIMOT® must correspond to the data for the power supply system (mains).
- Cable cross section: according to input current I_{mains} for rated power (see Technical Data).
- Permitted cable cross section of MOVIMOT® terminals (does not apply to field distributor)

Power terminals	Control terminals
1.0 mm² – 4.0 mm² (2 x 4.0 mm²)	0.25 mm² – 1.0 mm² (2 x 0.75 mm²)
AWG17 – AWG10 (2 x AWG10)	AWG22 – AWG17 (2 x AWG18)

- Use conductor end sleeves without insulating shrouds (DIN 46228 part 1, material E-CU).
- Install line safety at the beginning of the power cable behind supply bus junction (see the section "Connection of MOVIMOT® basic unit," F11/F12/F13). Use D, DO, NH or circuit breakers. The fusible rating should be selected in accordance with the cable cross section.
- Do not use a conventional earth-leakage circuit breaker as a protective device. Universal current-sensitive earth leakage circuit-breakers (tripping current 300 mA) are permitted as a protective device. During normal operation of MOVIMOT®, earth-leakage currents of > 3.5 mA can occur.
- Use contactor switch contacts to switch MOVIMOT® from utilization category AC-3 according to IEC 158.
- SEW recommends using earth-leakage monitors with pulse-code measurement for voltage supply systems with non-grounded star point (IT nets). The use of such devices avoids mis-tripping of the earth-leakage monitor due to the earth capacitance of the inverter.

Installation at 1000 meters above sea level (msl)

MOVIMOT® drives with supply voltages of 380 to 500 V can be used at altitudes above 2000 m MSL up to 4000 m MSL under the following peripheral conditions.[1)]

- The rated continuous power is reduced based on the reduced cooling above 1000 m (see the section "Technical Data and Dimension Drawings").
- Above 2000 msl, the air and creeping distances are only sufficient for overvoltage class 2. If the installation requires overvoltage class 3, an additional external overvoltage protection must be used to ensure that overvoltage surges are limited to 2.5 kV phase-to-phase and phase-to-ground.
- If safe electrical separation is required, it must be implemented outside the device at altitudes above 2000 m MSL (Safe Electrical Separation in accordance with EN 50178).
- The permitted rated supply voltage of 3 x 500 V up to 2000 msl is reduced by 6 V for every 100 m to a maximum of 3 x 380 V at 4000 msl.

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

Connecting 24V_{DC} supply

- Supply MOVIMOT® either via external 24 V_{DC} or via the MLU..A or MLG..A options.

Conventional control (via binary commands)

- Connect the required control leads (e.g. CW/Stop, CCW/Stop, f1/f2 setpoint change)
- Use shielded cables as control leads and route them separately from power supply cables.

Control via RS-485 interface

with bus master PLC, MLG..A, MBG11A, MWA21A option or MF../MQ.. fieldbus interfaces

- Important: Connect only one bus master.
- Use twisted pair shielded cables as control leads and route them separately from power supply cables.

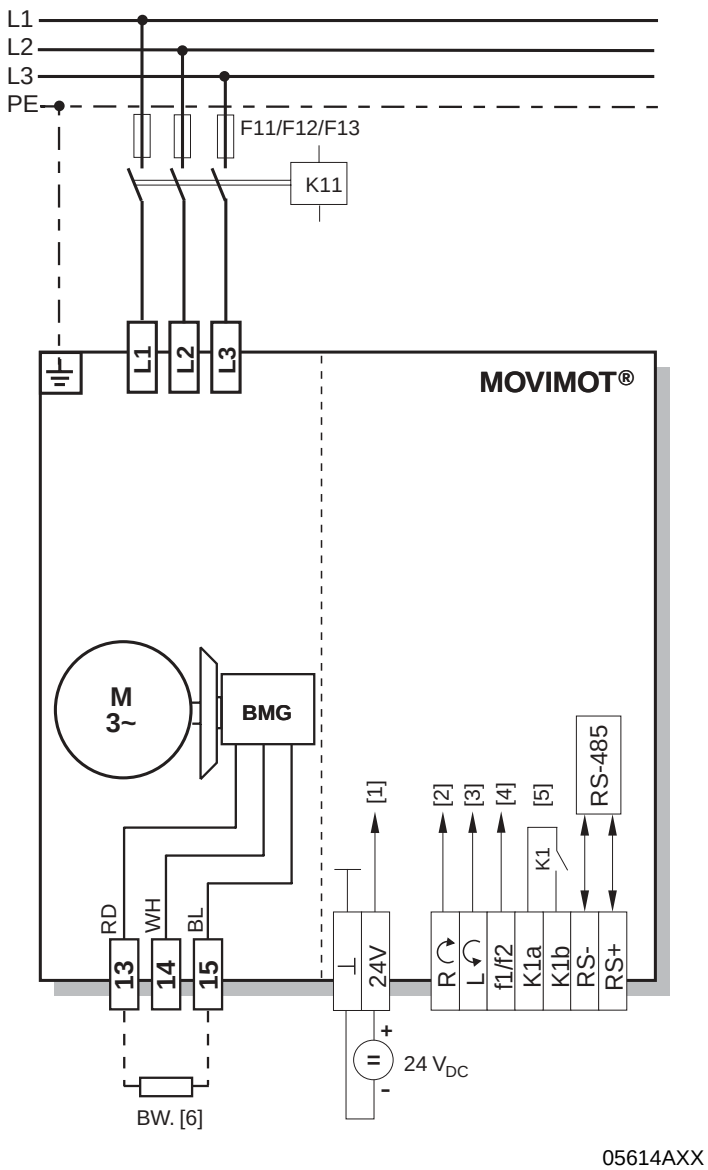
Protection devices

- MOVIMOT® drives are equipped with integrated protective overload devices that are making external overload devices obsolete.

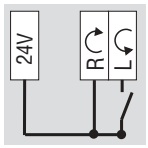
UL compliant installation

- Only use copper cables with the temperature range 60/75 °C as connection lead:
- The permitted tightening torques for MOVIMOT® power terminals are:
  - 1.5 Nm (13.3 lb.in).
- MOVIMOT® are suited for operation on voltage supply systems with grounded star (TN and TT systems) supplying a maximum supply current of 5000 A_{AC} and having a maximum rated voltage of 500 V_{AC} (MM03C-503 to MM3XC-503). The performance data of the fuses must not exceed 35 A/600 V.
- Only use tested units with a limited output voltage (V_{max} = 30 V_{DC}) and limited output current ($I \leq 8$ A) as an external 24 V_{DC} voltage source.
- UL certification applies only to operation in voltage supply systems with voltages to ground up to 300 V.

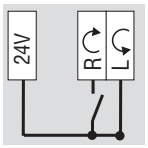
5.2 Connection of MOVIMOT® basic unit



Function of terminals CW/Stop and CCW/Stop with binary control:

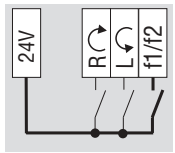


Rotation **CW** active

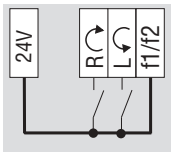


Rotation **CCW** active

Functions of terminals f1/f2:

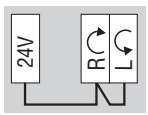


Setpoint **f1** active

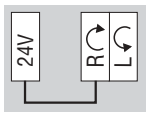


Setpoint **f2** active

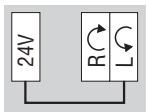
Function of terminals CW/Stop and CCW/Stop with control via RS-485 interface/fieldbus:



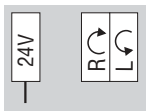
Both directions of rotation are enabled



Only **CW rotation** is enabled,
Setpoint selections for CCW rotation result in standstill of drive



Only **CCW** rotation is enabled,
Setpoint selections for CW rotation result in standstill of drive



Drive is blocked or brought to standstill

[1] 24 V_{DC} supply (external or MLU../MLG.. option)
[2] CW/Stop
[3] CCW/Stop
[4] Setpoint toggle f1/f2
[5] Ready message (contact closed = ready for operation)
[6] BW.. braking resistor (in MOVIMOT® without mechanical brake only)

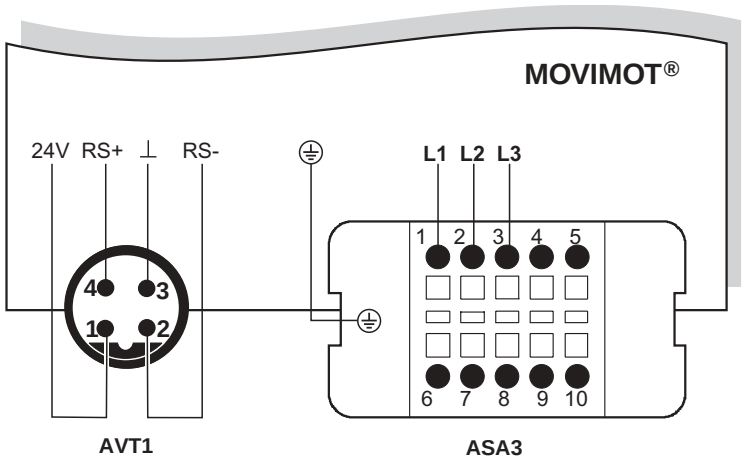
5.3 MOVIMOT® plug connectors

AVT1, ASA3 plug connectors

The following illustration shows the assignment of the optional AVT1 and ASA3 plug connectors.

Available designs:

- MM.../ASA3
- MM.../AVT1
- MM.../ASA3/AVT1



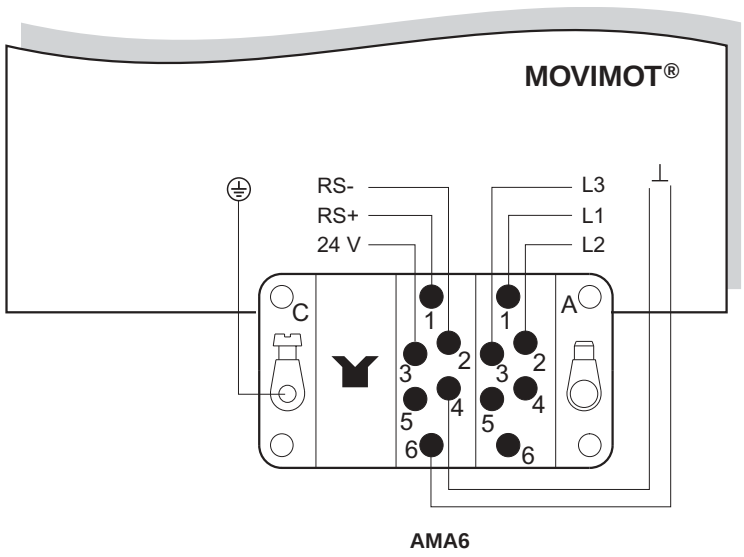
52113AXX

Plug connector AMA6

The following illustration shows the assignment of the optional AMA6 plug connector.

Available design:

- MM.../AMA6



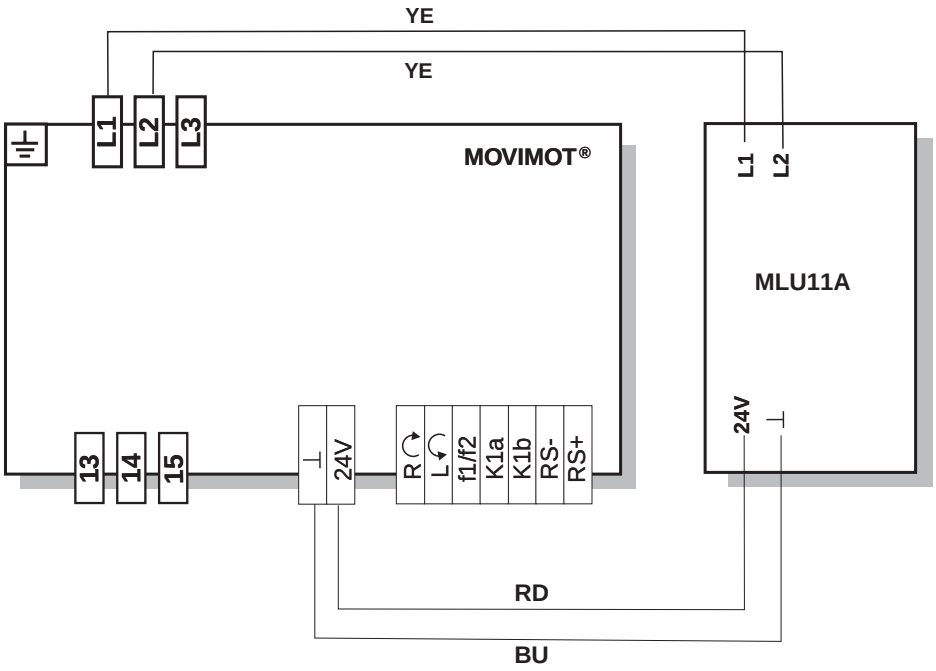
52114AXX

For designs with plug connectors, both directions of rotation are enabled at the factory. If only one direction of rotation is desired, please observe the section "Connection of MOVIMOT® Basic Unit, Functions of the CW/STOP, CCW/STOP terminals in control via RS-485 interface."

5.4 Connection MOVIMOT® options

Connection of MLU11A option

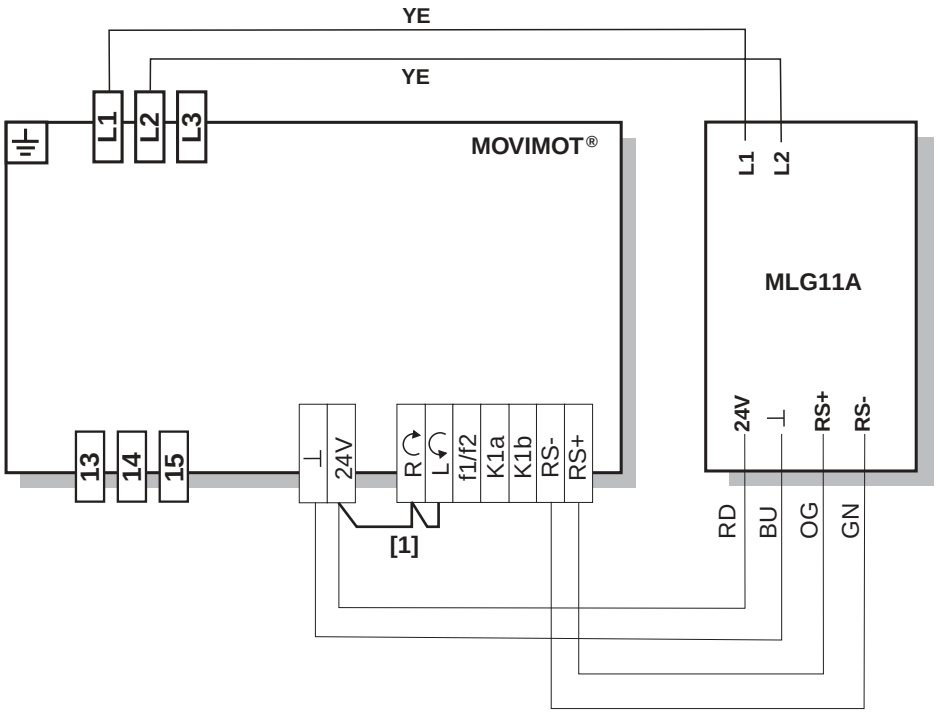
The following figure shows the connection of the MLU11A option.



05651AXX

Connection of MLG11A option

The following figure shows the connection of the MLG11A option.

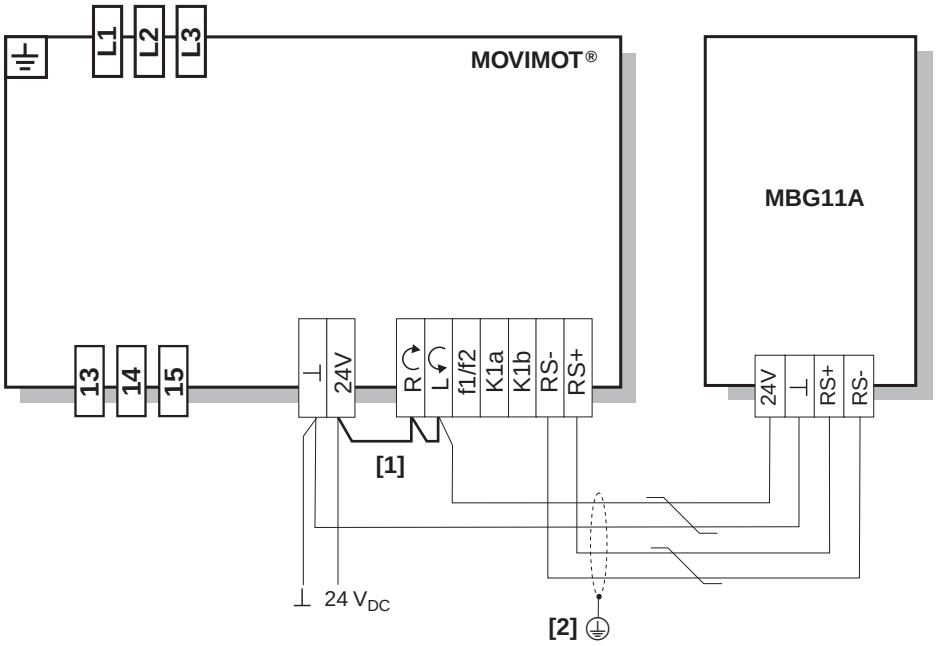


05652AXX

[1] Observe the enabled direction of rotation (see the section "Connection of MOVIMOT® basic unit, Functions of CW/Stop, CCW/Stop terminals with control via RS-485 interface.")

Connection of MBG11A option

The following figure shows the connection of the MBG11A option.

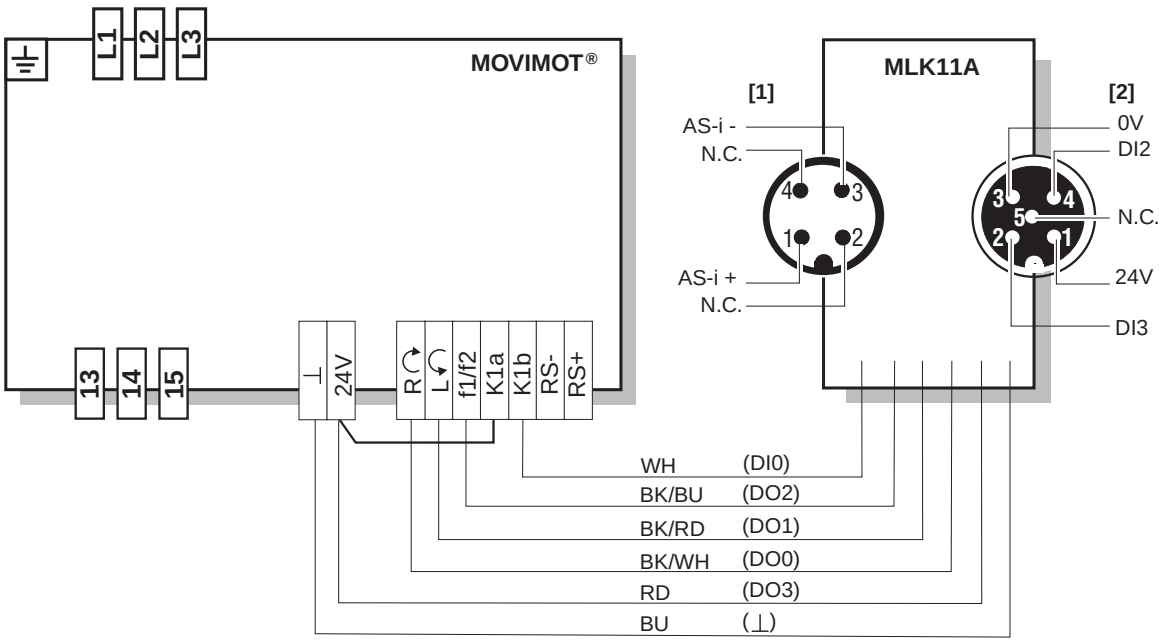


03183CXX

[1] Observe the enabled direction of rotation (see the section "Connection of MOVIMOT® basic unit, Functions of CW/Stop, CCW/Stop terminals with control via RS-485 interface.")
[2] EMC metal cable gland

Connection of MLK11A option

The following illustration shows the connection of the MLK11A option (external AS-i binary slave).

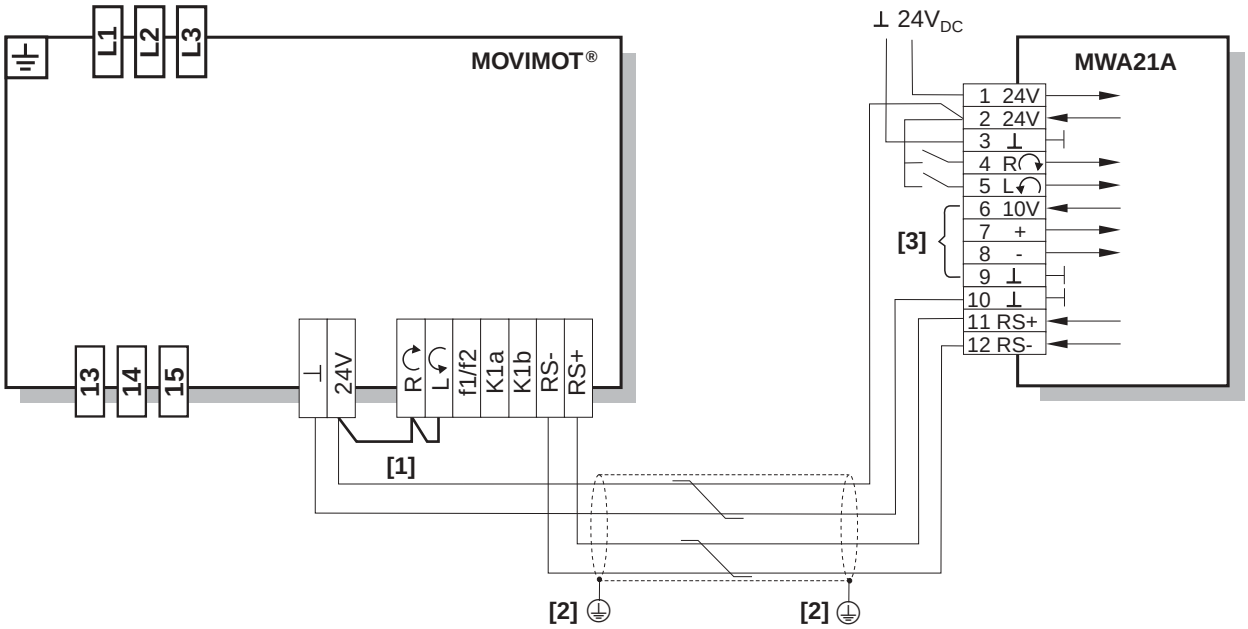


05118CXX

[1] AS-i connection
[2] Connection for two external sensors

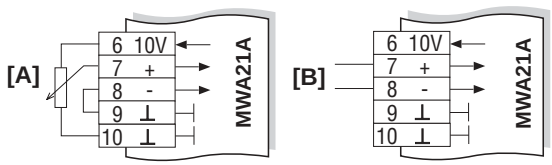
Connection of MWA21A option

The following figure shows the connection of the MWA21A option.



03184DXX

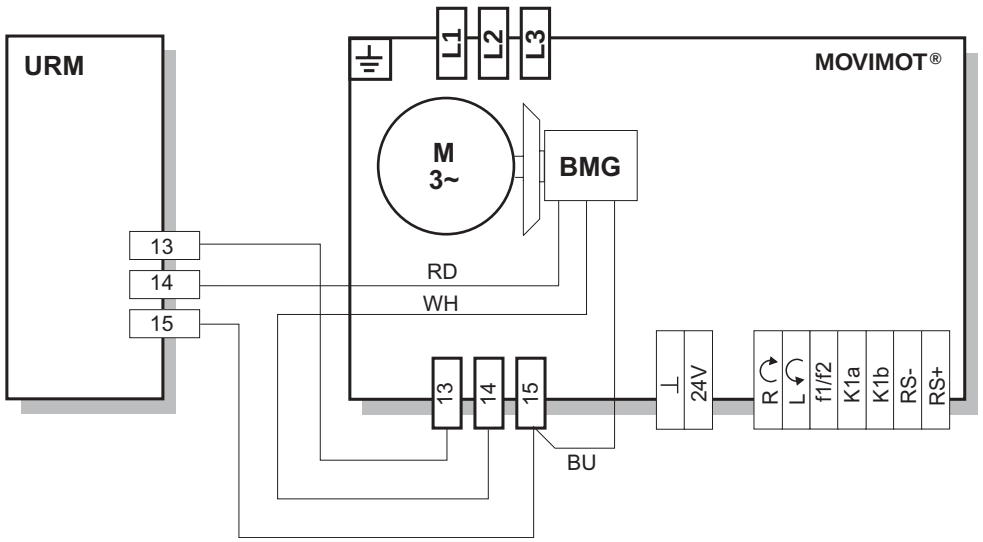
[1] Note the released direction of rotation
(see the section "Connection of MOVIMOT® Basic Unit" Functions of CW/Stop, CCW/Stop terminals with control via RS-485 interface)
[2] EMC metal cable gland
[3] Potentiometer with integration of 10 V reference voltage **[A]**
or potential-free analog signal **[B]**



05622BXX

Connection of URM option

The following figure shows the connection of the URM option.

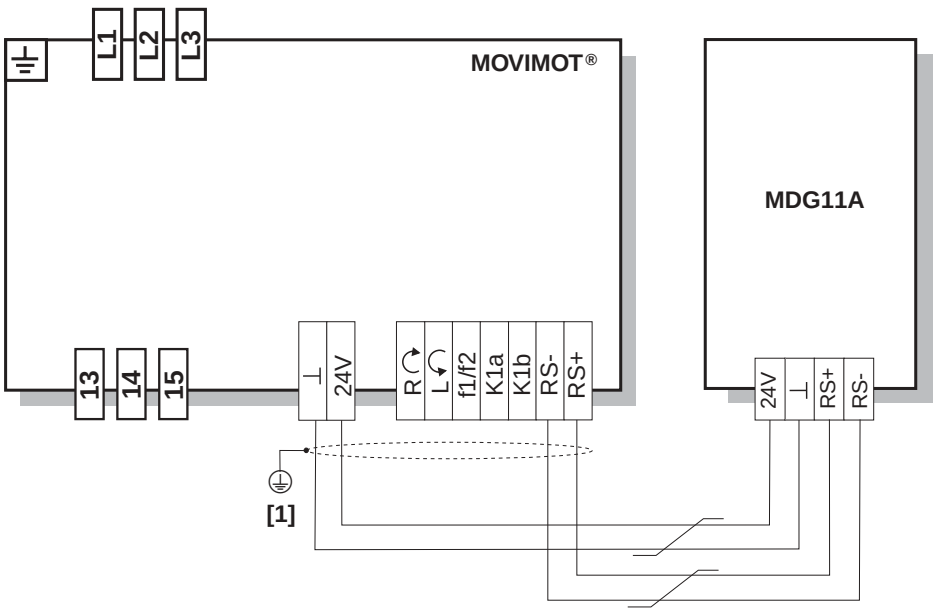


52203AXX

Connection of MDG11A option

The following figure shows the connection of the MDG11A option.

- The diagnostic unit must be connected prior to the possible occurrence of a fault, as MOVIMOT® error messages are not saved and the information is lost when the 24 V supply is disconnected.
- **Connecting the MDG11A to an RS-485 bus with several MOVIMOT® is not allowed.**
- **The diagnostic unit can be used if the MOVIMOT® is controlled via terminals (= address 0 [S1/1-S1/4 = OFF]).**
- **Do nut use the diagnostic unit if setpoint setting takes place via the RS-485 interface.**

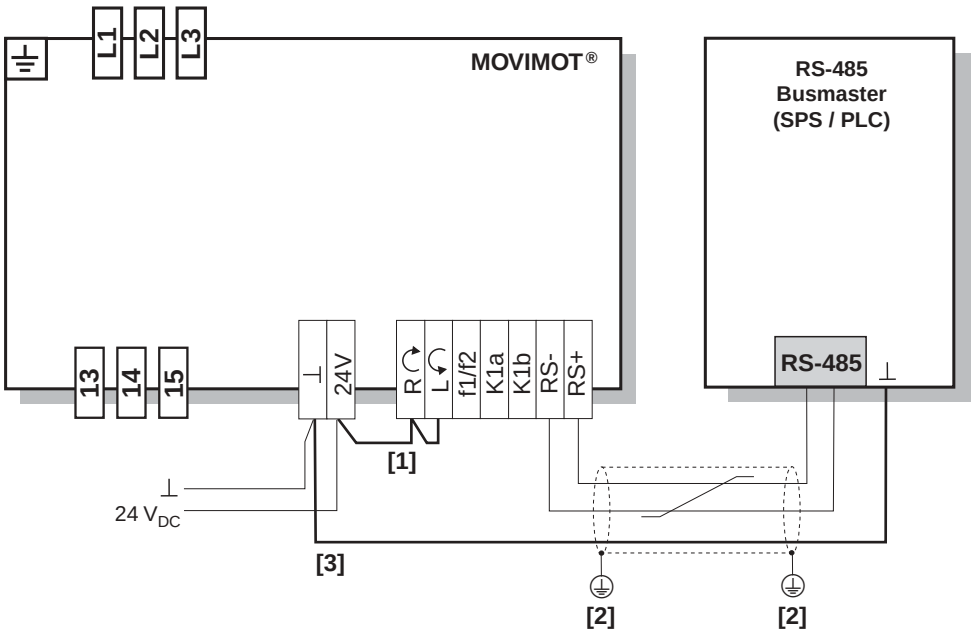


03404CXX

[1] EMC metal cable gland
For operation see the section "Diagnostics"

5.5 Connection RS-485 bus master

The following figure shows the connection of the RS-485 bus master.



03177BXX

[1] Observe enabled direction of rotation (see section "Connection of MOVIMOT® basic unit, Functions of CW/Stop, CCW/Stop terminals with control via RS-485 interface.")
[2] EMC metal cable gland
[3] Potential compensation MOVIMOT®/RS-485 master

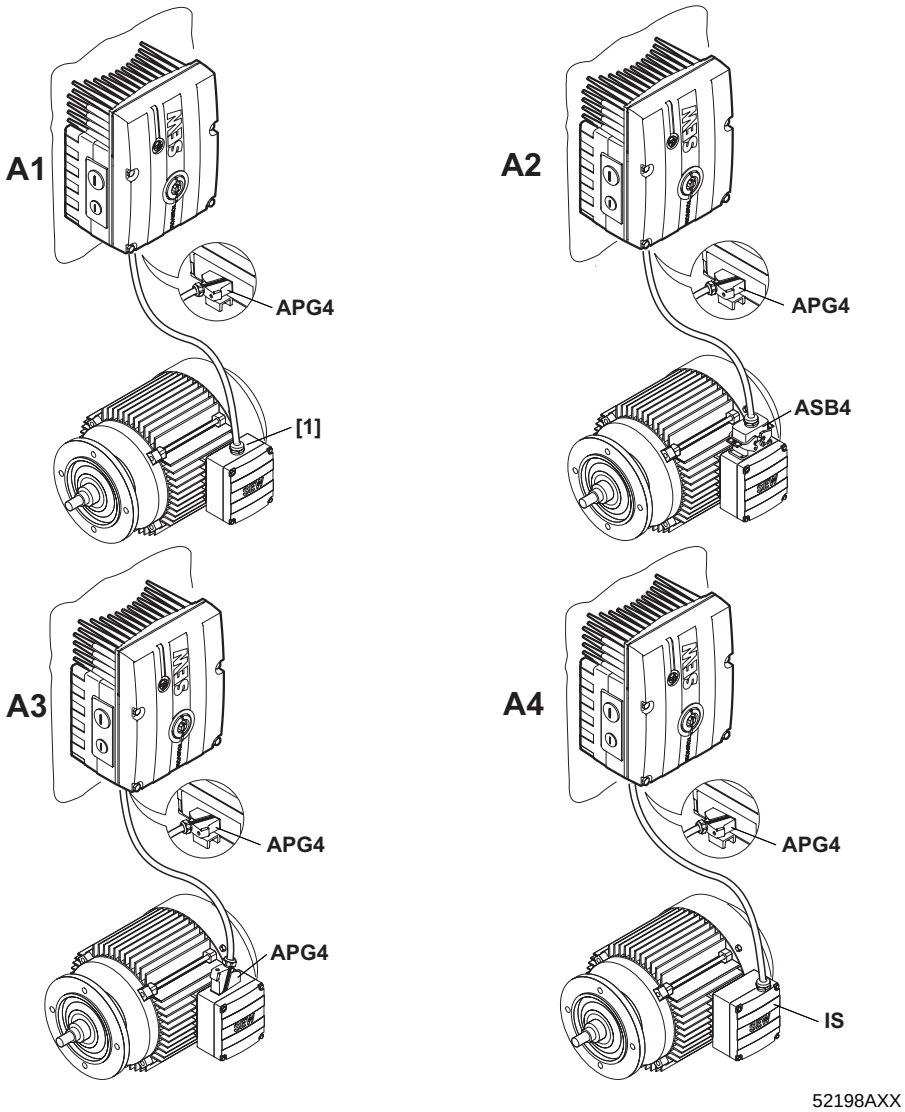
5.6 Connection between MOVIMOT® and motor mounting close to the motor

If the MOVIMOT® inverter with option P2.A is mounted close to the motor, the connection to the motor uses a pre-fabricated cable. The following designs are possible on the MOVIMOT® side:

- A: MM../P2.A/RO.A/**APG4**
- B: MM../P2.A/RE.A/**ALA4**

The APG 4 design results in the following connection options to the motor, dependent upon the hybrid cable used:

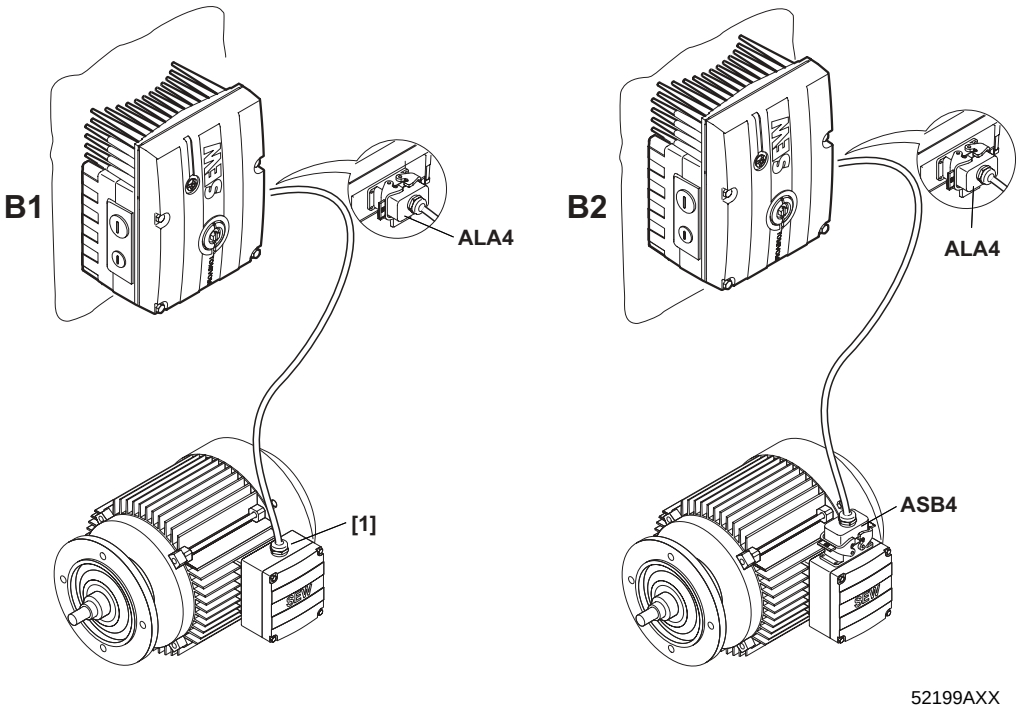
Design	A1	A2	A3	A4
MOVIMOT®	APG4	APG4	APG4	APG4
Motor	Cable gland/terminals	ASB4	APG4	IS
Hybrid cables	0 593 231 9	0 593 076 6	0 186 741 5	0816 325 1 △ 0816 326 X △ 0593 278 5 ⅄ 0593 755 8 ⅄
See also...	page 34	page 34	page 35	page 35



[1] Connection via terminals

The ALA 4 design results in the following connection options to the motor, dependent upon the hybrid cable used:

Design	B1	B2
MOVIMOT®	ALA4	ALA4
Motor	Cable gland/terminals	ASB4
Hybrid cables	0 817 948 4	0 816 208 5
Additional Information	page 36	page 36

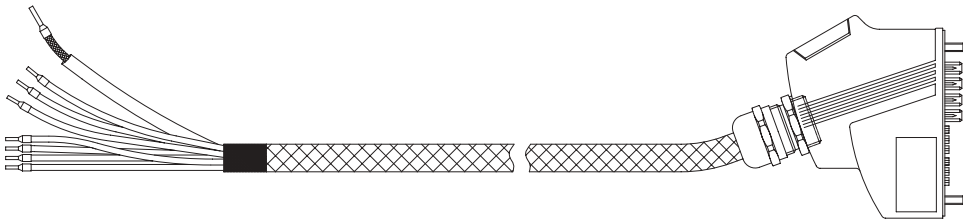


[1] Connection via terminals

Hybrid cable design A

- **Design A1**

  Part number 0 593 231 9



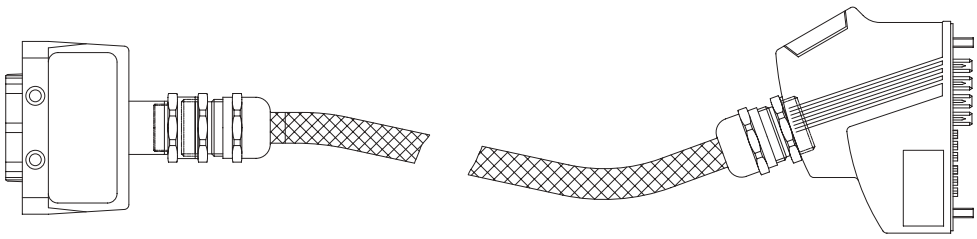
52073AXX

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

Cable assignment	
Motor terminal	**Core color / designation**
U1	Black / U1
V1	Black / V1
W1	Black / W1
13	Red / 13
14	White / 14
15	Blue / 15
TH	Black / 1
TH	Black / 2
PE terminal	Green-yellow + shield end (inside shield)

- **Design A2**

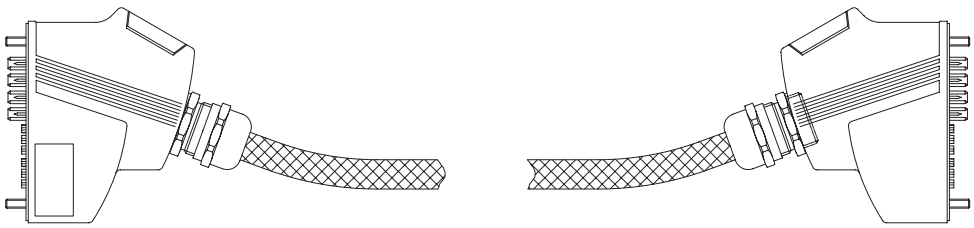
  Part number 0 593 076 6



52074AXX

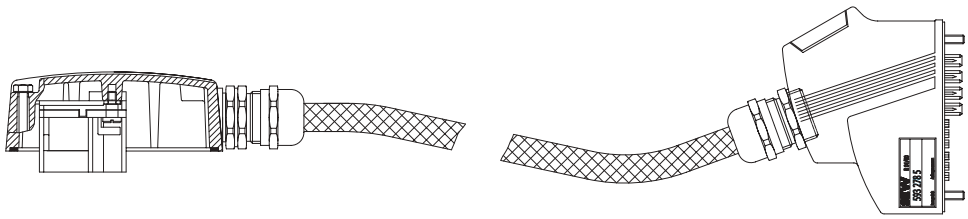
- **Design A3**

  Part number 0 186 741 5



52075AXX

- **Design A4**



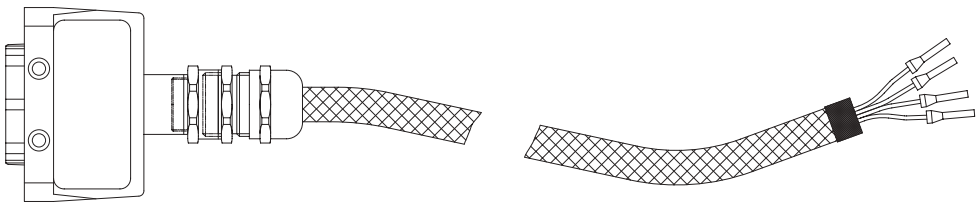
52076AXX

	MOVIMOT® in star connection	MOVIMOT® in delta connection
Motor with IS lower part Size DT71 – DT90	Hybrid cable part number 0593 278 5	Hybrid cable part number 0816 325 1
Motor with IS lower part Size DV100	Hybrid cable part number 0593 755 8	Hybrid cable part number 0816 326 X

Hybrid cable design B

- **B1 version**

  Part number 0 817 948 4



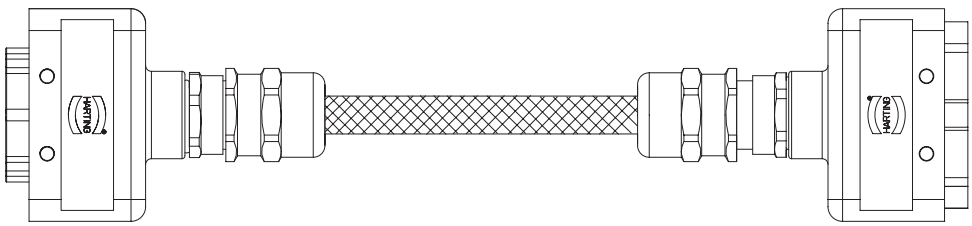
52077AXX

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

Cable assignment	
Motor terminal	**Core color / designation**
U1	Black / U1
V1	Black / V1
W1	Black / W1
13	Red / 13
14	White / 14
15	Blue / 15
TH	Black / 1
TH	Black / 2
PE terminal	Green-yellow + shield end (inside shield)

- **B2 version**

  Part number 0 816 208 5



52078AXX

6 Electrical Installation with Integrated AS-Interface

6.1 Installation instructions

Connecting supply system leads

- The rated voltage and frequency of MOVIMOT® must correspond to the data for the power supply system (mains).
- Cable cross section: according to input current I_{mains} for rated power (see Technical Data).
- Permitted cable cross section of MOVIMOT® terminals (does not apply to field distributor)

Power terminals	Control terminals
1.0 mm² – 4.0 mm² (2 x 4.0 mm²)	0.25 mm² – 1.0 mm² (2 x 0.75 mm²)
AWG17 – AWG10 (2 x AWG10)	AWG22 – AWG17 (2 x AWG18)

- Use conductor end sleeves without insulating shrouds (DIN 46228 part 1, material E-CU).
- Install line safety at the beginning of the power cable behind supply bus junction (see the section "Connection of MOVIMOT® Basic Unit," F11/F12/F13). Use D, DO, NH or circuit breakers. The fusible rating should be selected in accordance with the cable cross section.
- Do not use a conventional earth-leakage circuit breaker as a protective device. Universal current-sensitive earth leakage circuit-breakers (tripping current 300 mA) are permitted as a protective device. During normal operation of MOVIMOT®, earth-leakage currents of > 3.5 mA can occur.
- Use contactor switch contacts to switch MOVIMOT® from utilization category AC-3 according to IEC 158.
- SEW recommends using earth-leakage monitors with pulse-code measurement for voltage supply systems with non-grounded star point (IT nets). The use of such devices avoids mis-tripping of the earth-leakage monitor due to the earth capacitance of the inverter.

Installation at 1000 meters above sea level (msl)

MOVIMOT® drives with supply voltages of 380 to 500 V can be used at altitudes above 2000 m MSL up to 4000 m MSL under the following peripheral conditions.[1)]

- The rated continuous power is reduced based on the reduced cooling above 1000 m (see the section "Technical Data and Dimension Drawings").
- Above 2000 msl, the air and creeping distances are only sufficient for overvoltage class 2. If the installation requires overvoltage class 3, an additional external overvoltage protection must be used to ensure that overvoltage surges are limited to 2.5 kV phase-to-phase and phase-to-ground.
- If safe electrical separation is required, it must be implemented outside the device at altitudes above 2000 m MSL (Safe Electrical Separation in accordance with EN 50178).
- The permitted rated supply voltage of 3 x 500 V up to 2000 msl is reduced by 6 V for every 100 m to a maximum of 3 x 380 V at 4000 msl.

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

Protection devices

- MOVIMOT® drives are equipped with integrated protective overload devices that are making external overload devices obsolete.

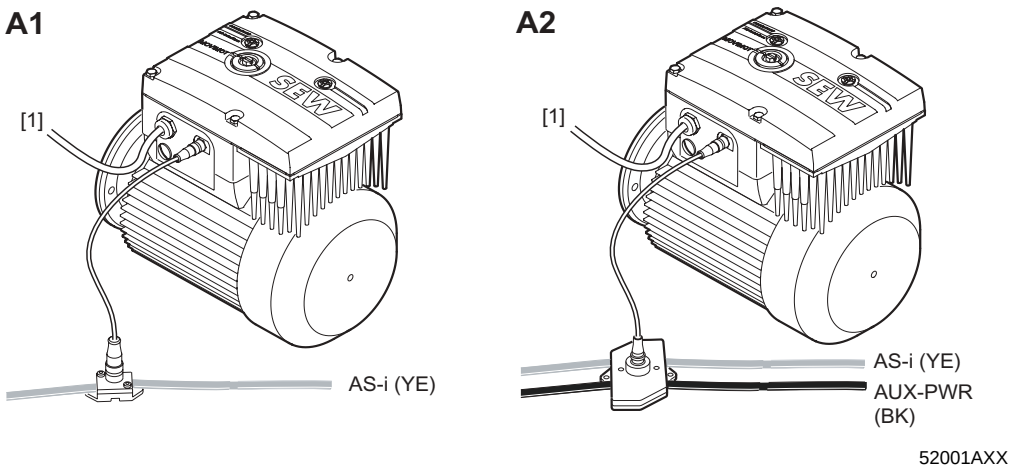
UL compliant installation

- Use only copper cables with the temperature range 60 / 75 °C.
- The permitted tightening torques for MOVIMOT® power terminals are:
  - 1.5 Nm (13.3 lb.in).
- MOVIMOT® are suited for operation on voltage supply systems with grounded star (TN and TT systems) supplying a maximum supply current of 5000 A_{AC} and having a maximum rated voltage of 500 V_{AC} (MM03C-503 to MM3XC-503). The performance data of the fuses must not exceed 35 A/600 V.
- Only use tested units with a limited output voltage (V_{max} = 30 V_{DC}) and limited output current ($I \leq 8$ A) as an external 24 V_{DC} voltage source.
- UL certification applies only to operation in voltage supply systems with voltages to ground up to 300 V.

6.2 Connection options with integrated AS-Interface

Mains and control **A Design with AVSK plug (1 x M12 connector):**

Design **Type designation**	**A1** **MM../AVSK**	**A2** **MM../AVSK**
Switch S5	0	1
24 V supply	Yellow AS-i cable	Black AUX-PWR cable (double tap)
AS-i connection	Yellow AS-i cable	Yellow AS-i cable (double tap)
Mains connection	Terminals	Terminals
Sensor connection	Terminals	Terminals
Additional information	page 42	page 42

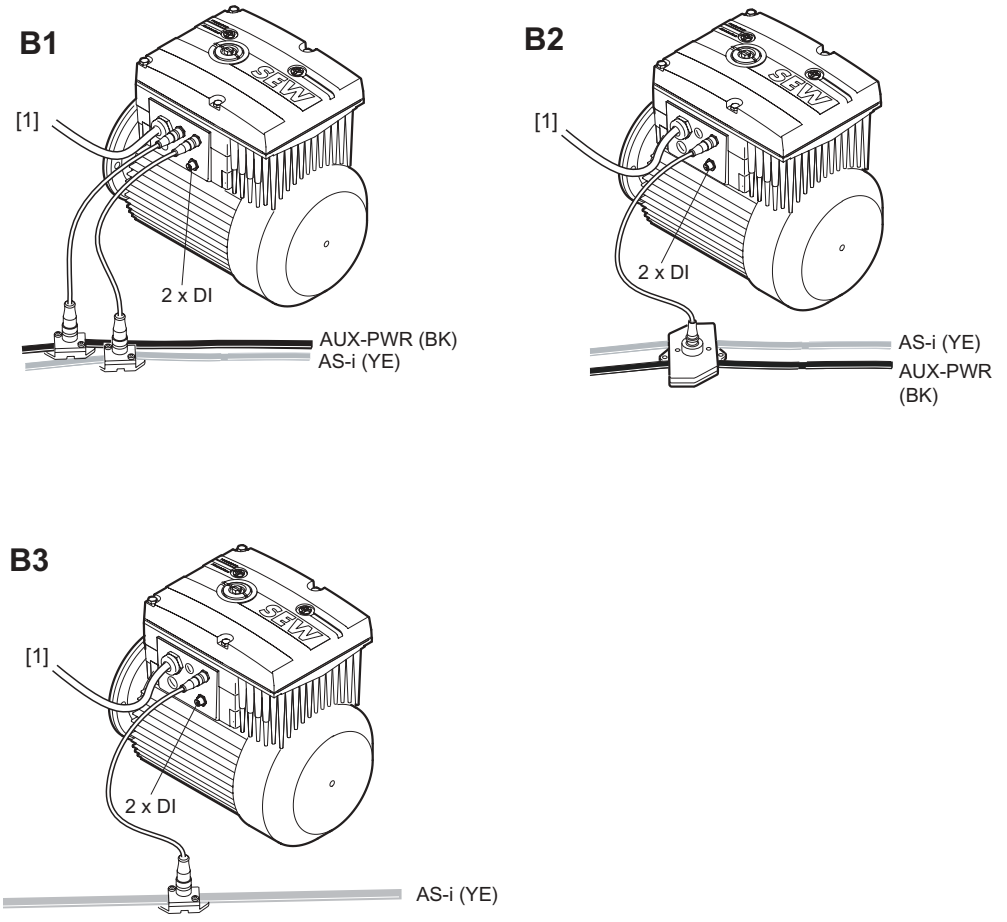


[1] Mains

- The designs listed above are also valid for mounting the MOVIMOT® inverter with option P2.A close to the motor.

B Design with AZSK plug (3 x M12 connector):

Design Type designation	B1 MM../RC.A/AZSK	B2 MM../RC.A/AZSK	B3 MM../RC.A/AZSK
Switch S5	1	1	0
24 V supply	Black AUX-PWR cable	Black AUX-PWR cable (double tap)	Yellow AS-i cable
AS-i connection	Yellow AS-i cable	Yellow AS-i cable (double tap)	Yellow AS-i cable
Mains connection	Terminals	Terminals	Terminals
Sensor connection	M12 plug connector	M12 plug connector	M12 plug connector
Additional information	page 43	page 43	page 43



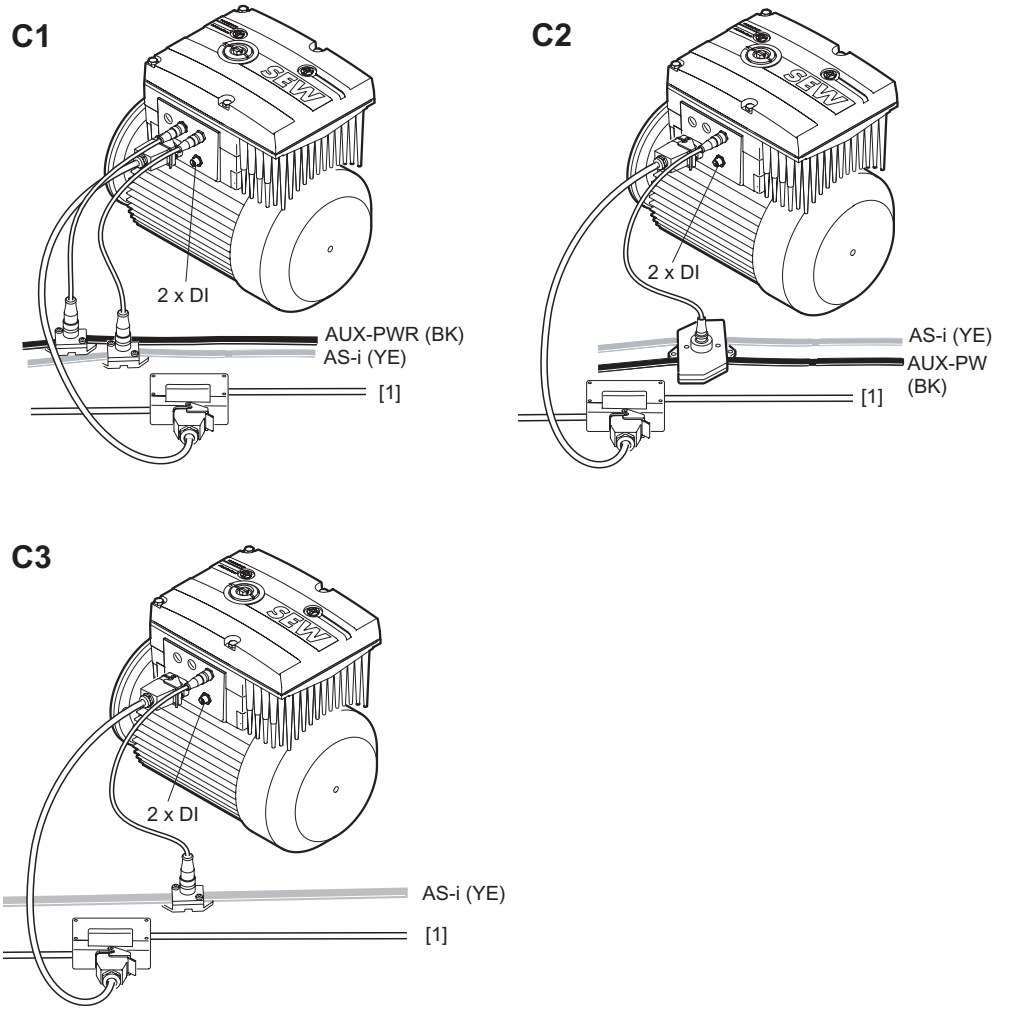
52002AXX

[1] Mains

- The designs listed above are also valid for mounting the MOVIMOT® inverter with option P2.A close to the motor.

C Design with AND3/AZSK plug connector (3 x M12 plug, 1 x Han Q8/0):

Design Type designation	C1 MM../RJ.A/AND3/AZSK	C2 MM../RJ.A/AND3/AZSK	C3 MM../RJ.A/AND3/AZSK
Switch S5	1	1	0
24 V supply	AUX-PWR cable	AUX-PWR cable (double tap)	Yellow AS-i cable
AS-i connection	Yellow AS-i cable	Yellow AS-i cable (double tap)	Yellow AS-i cable
Mains connection	AND3 plug connector	AND3 plug connector	AND3 plug connector
Sensor connection	M12 plug connector	M12 plug connector	M12 plug connector
Additional Information	page 44	page 44	page 44



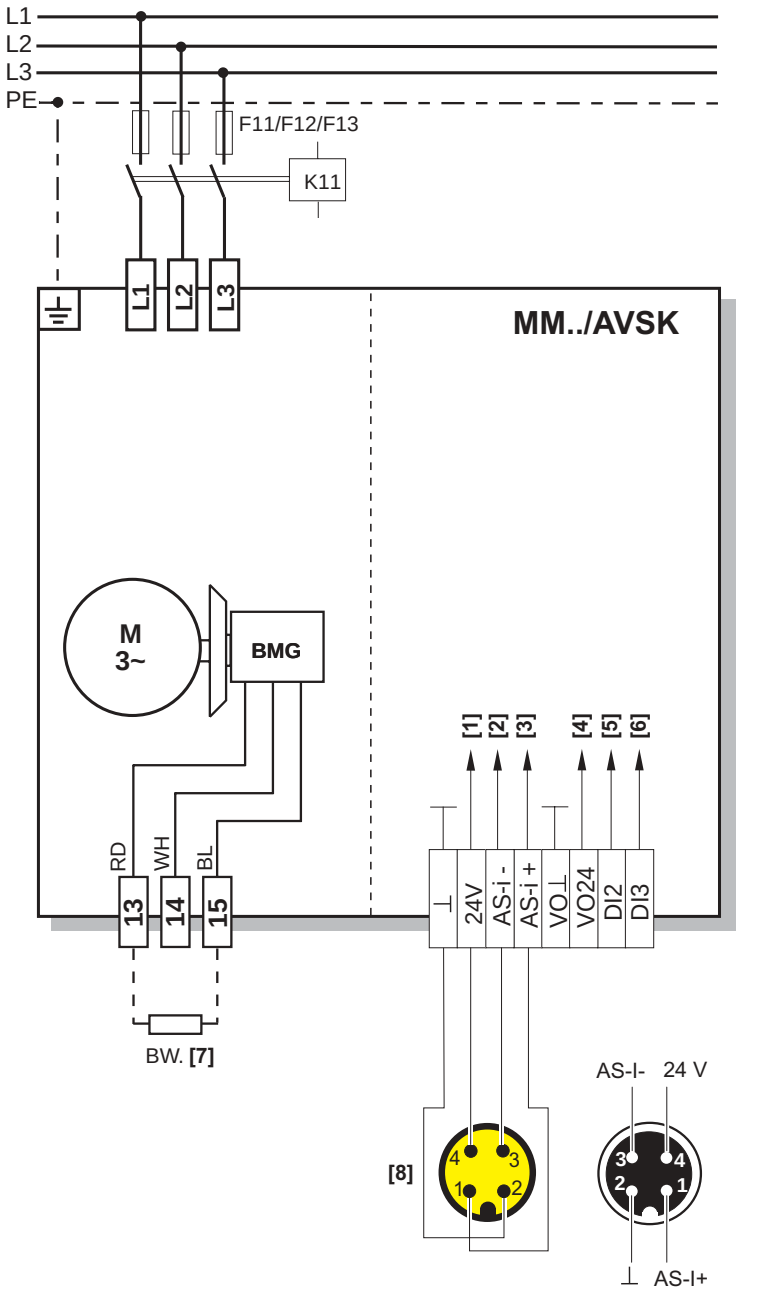
51761AXX

[1] Mains

- The designs listed above are also valid for mounting the MOVIMOT® inverter with option P2.A close to the motor.

6.3 Connection of MOVIMOT® MM../AVSK (connection option A)

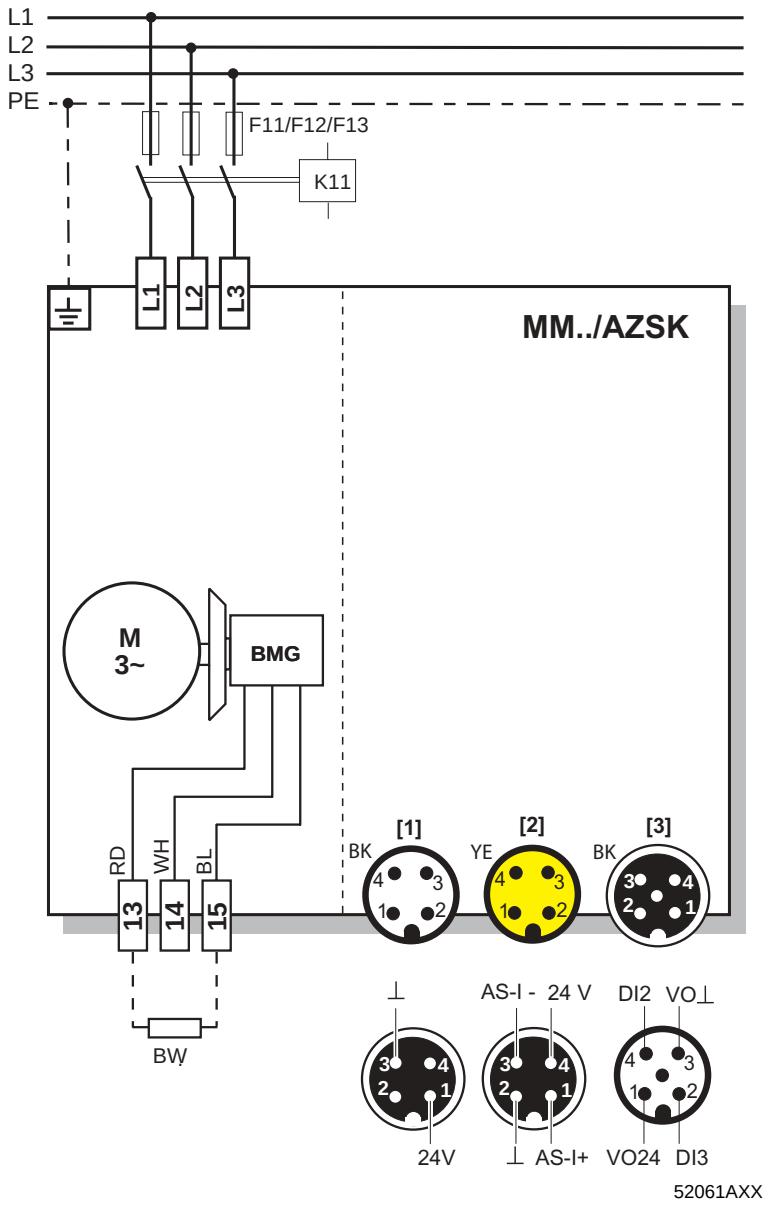
The following figure shows the connection of the MM../AVSK design.



[1] 24 V_{DC} supply
[2] AS-i data cable -
[3] AS-i data cable +
[4] Voltage supply for sensors
[5] Sensor DI2
[6] Sensor DI3
[7] BW.. braking resistor (in MOVIMOT® without mechanical brake only)
[8] M12 plug (yellow)

6.4 Connection of MOVIMOT® MM../AZSK (connection option B)

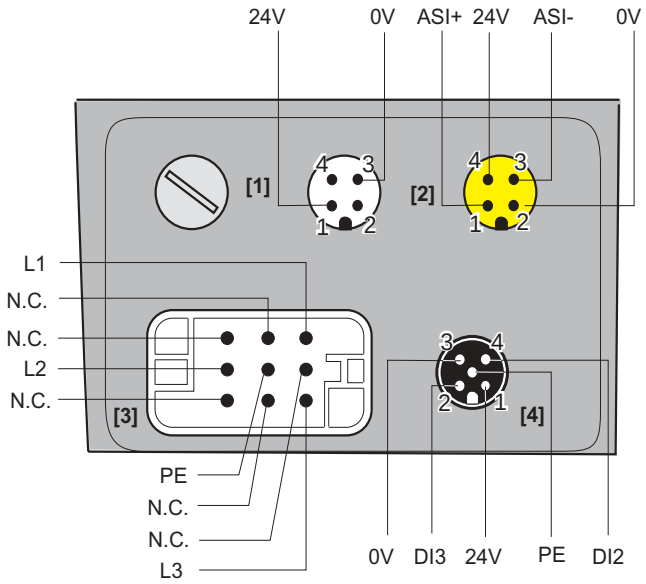
The following figure shows the connection of the MM../AZSK design.



AZSK plug connector			
[1] M12 plug connector (plug, black)	1	24 V	24 V supply (AUX-PWR)
	2	N.C.	Not assigned
	3	0 V	AUX-PWR reference potential
	4	N.C.	Not assigned
[2] M12 plug connector (plug, yellow)	1	AS-i +	AS-i data cable +
	2	0 V	AUX-PWR reference potential
	3	AS-i -	AS-i data cable -
	4	24 V	24 V supply (AUX-PWR)
[3] M12 plug connector (socket, black)	1	VO24	24 V voltage supply for sensors
	2	DI3	Sensor input DI3
	3	VO⊥	0 V reference potential for sensors
	4	DI2	Sensor input DI2

6.5 Connection of MOVIMOT® MM../AND3/AZSK (connection option C)

The following figure shows the connection of the MM../AND3/AZSK design.



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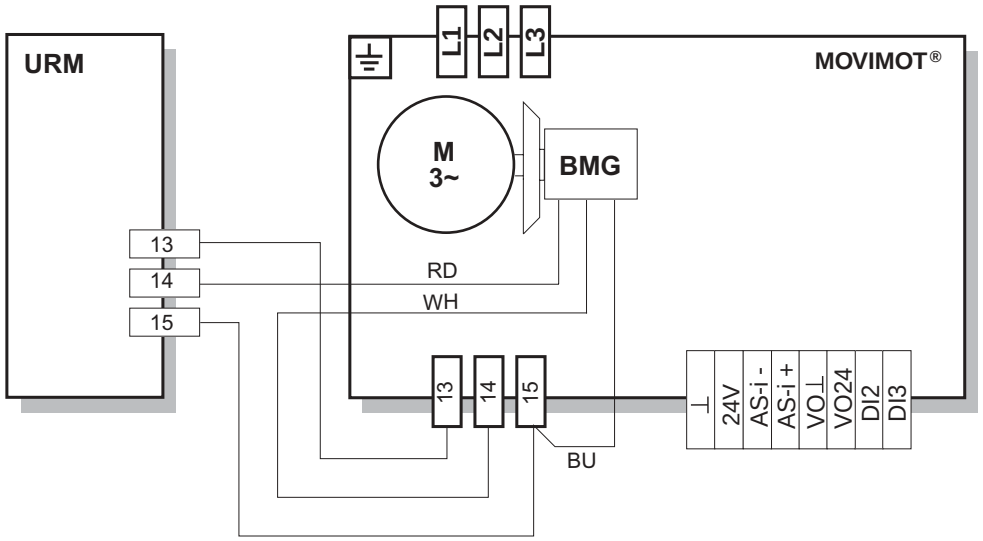
AZSK plug connector			
[1] M12 plug connector (plug, black)	1	24 V	24 V supply (AUX-PWR)
	2	N.C.	Not assigned
	3	0 V	AUX-PWR reference potential
	4	N.C.	Not assigned
[2] M12 plug connector (plug, yellow)	1	AS-i +	AS-i data cable +
	2	0 V	AUX-PWR reference potential
	3	AS-i -	AS-i data cable -
	4	24 V	24 V supply (AUX-PWR)
[4] M12 plug connector (socket, black)	1	VO24	24 V voltage supply for sensors
	2	DI3	Sensor input DI3
	3	VO⊥	0 V reference potential for sensors
	4	DI2	Sensor input DI2

AND3 plug connector			
[3] AND3 plug connector (plug)	1	N.C.	Not assigned (reserved for N)
	2	L2	Mains connection L2
	3	N.C.	Not assigned
	4	N.C.	Not assigned
	5	N.C.	Not assigned
	6	L3	Mains connection L3
	7	N.C.	Not assigned
	8	L1	Mains connection L1
	⏚	PE	PE

6.6 Connection of URM option

The following figure shows the connection of the URM option.



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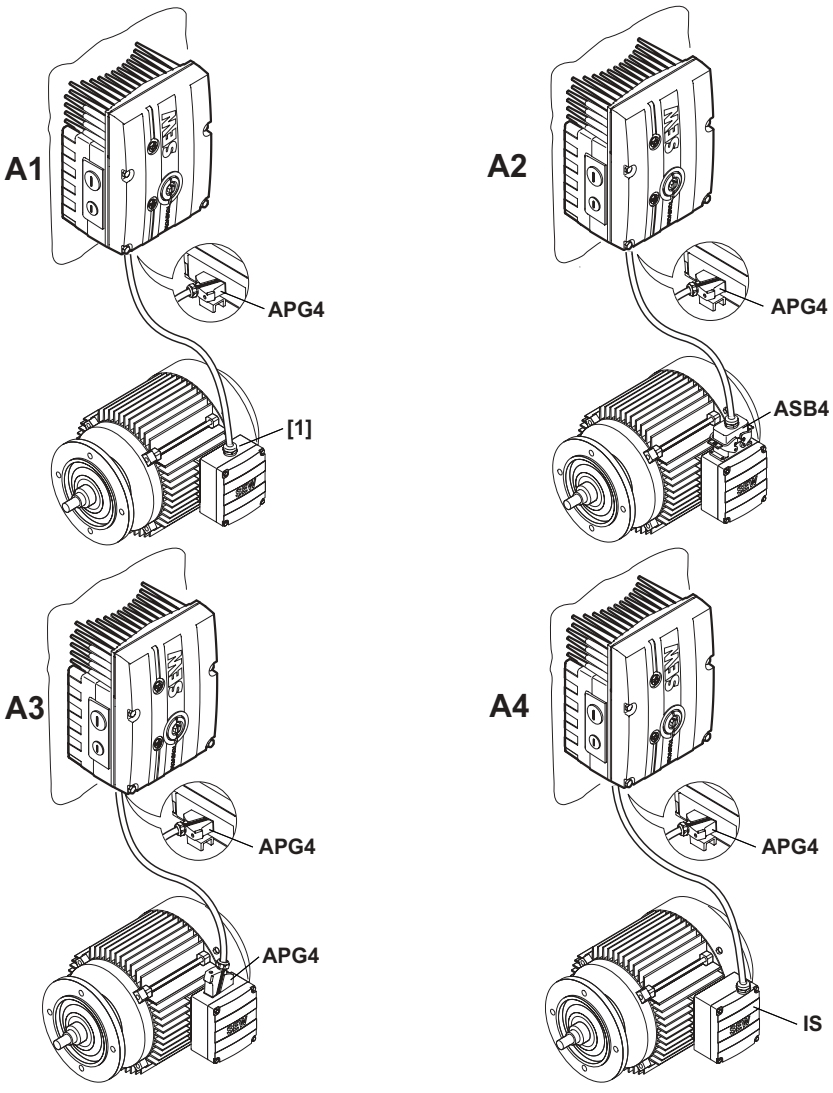
6.7 Connection between MOVIMOT® and motor mounting close to the motor

If the MOVIMOT® inverter with option P2.A is mounted close to the motor (only in conjunction with modular terminal box), the connection to the motor uses a pre-fabricated cable. The following designs are possible on the MOVIMOT® side:

- A: MM../P2.A/RO.A/**APG4**
- B: MM../P2.A/RE.A/**ALA4**

The APG4 design results in the following connection options to the motor, dependent upon the hybrid cable used:

Design	A1	A2	A3	A4
MOVIMOT®	APG4	APG4	APG4	APG4
Motor	Cable gland/terminals	ASB4	APG4	IS
Hybrid cables	0 593 231 9	0 593 076 6	0 186 741 5	0816 325 1 △ 0816 326 X △ 0593 278 5 ⅄ 0593 755 8 ⅄
See also...	page 48	page 48	page 49	page 49



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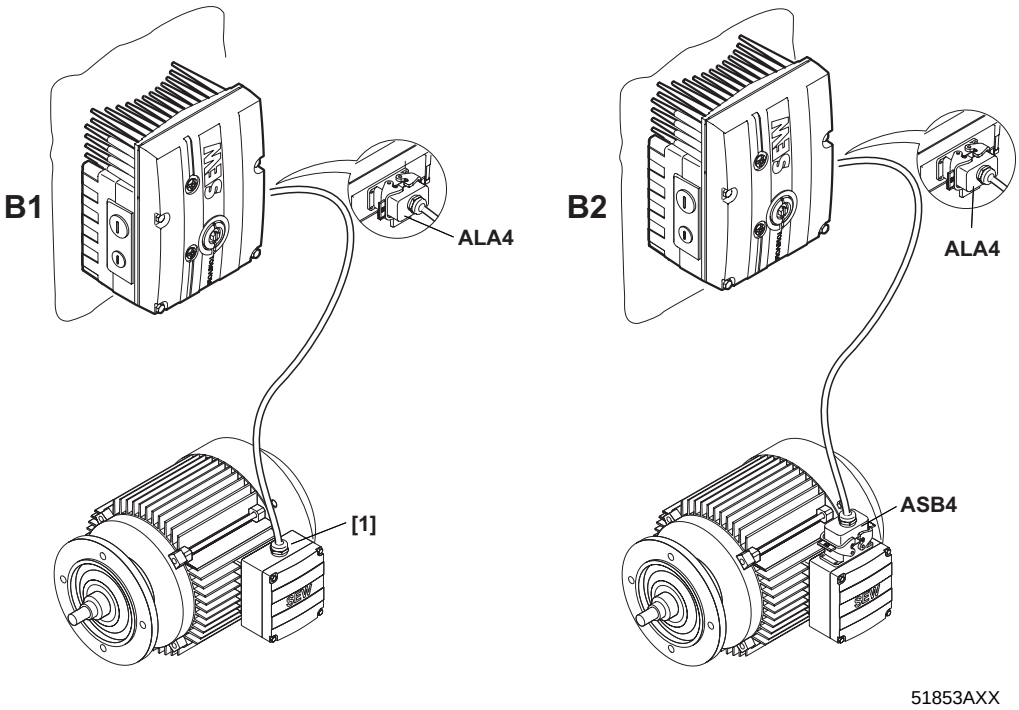
[1] Connection via terminals

The ALA4 design results in the following connection options to the motor, dependent upon the hybrid cable used:

Design	B1	B2
MOVIMOT®	ALA4	ALA4
Motor	Cable gland/terminals	ASB4
Hybrid cables	0 817 948 4	0 816 208 5
Additional Information	page 50	page 50

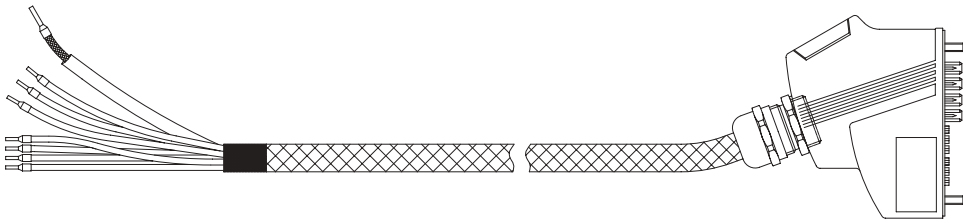


[1] Connection via terminals

Hybrid cable design A

- **Design A1**

  Part number 0 593 231 9



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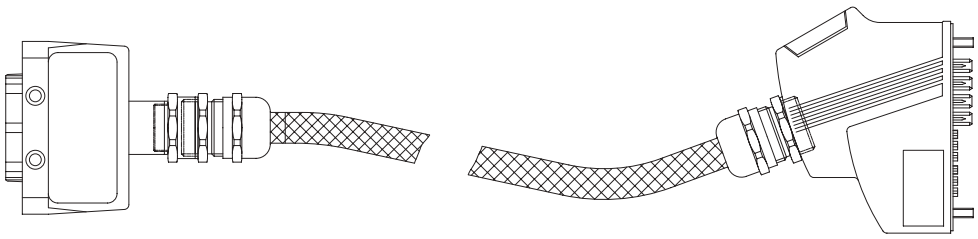
The overall shield of the cable must be attached to the housing of the motor terminal box using an EMC metal cable gland.

Cable assignment	
Motor terminal	**Core color / designation**
U1	Black / U1
V1	Black / V1
W1	Black / W1
13	Red / 13
14	White / 14
15	Blue / 15
TH	Black / 1
TH	Black / 2
PE terminal	Green-yellow + shield end (inside shield)

- **Design A2**

  Part number 0 593 076 6



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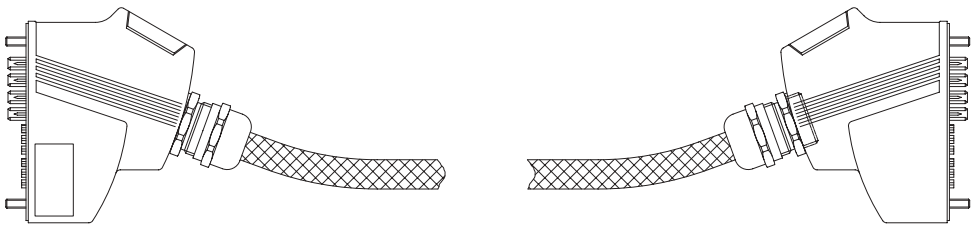
- **Design A3**

  Part number 0 186 741 5



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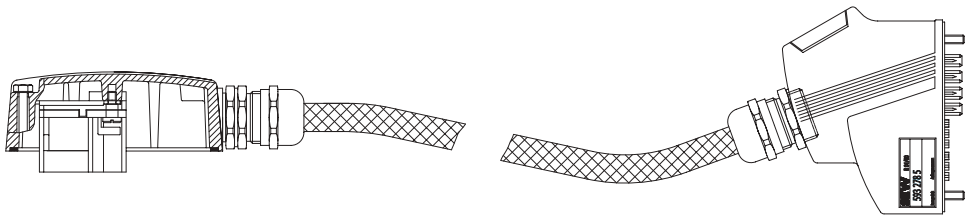
- **Design A4**



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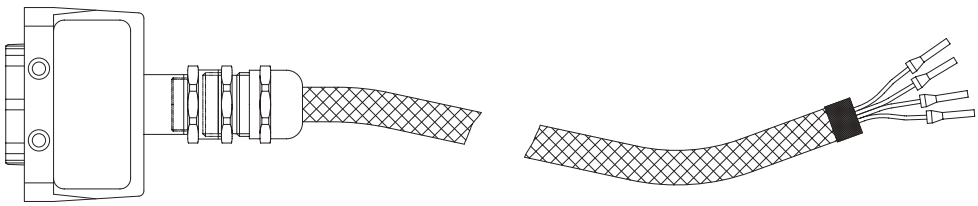
	MOVIMOT® in star connection	MOVIMOT® in delta connection
Motor with IS lower part Size DT71 – DT90	Hybrid cable part number 0593 278 5	Hybrid cable part number 0816 325 1
Motor with IS lower part Size DV100	Hybrid cable part number 0593 755 8	Hybrid cable part number 0816 326 X

Hybrid cable design B

- **B1 version**

  Part number 0 817 948 4



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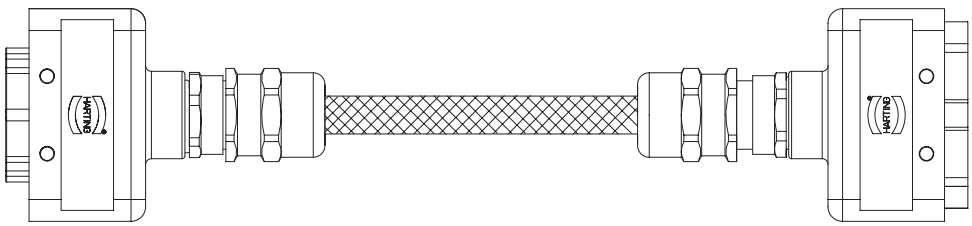
The overall shield of the cable must be attached to the housing of the motor terminal box using an EMC metal cable gland.

Cable assignment	
Motor terminal	**Core color / designation**
U1	Black / U1
V1	Black / V1
W1	Black / W1
13	Red / 13
14	White / 14
15	Blue / 15
TH	Black / 1
TH	Black / 2
PE terminal	Green-yellow + shield end (inside shield)

- **B2 version**

  Part number 0 816 208 5



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7 Startup of Standard Design

7.1 Important startup instructions

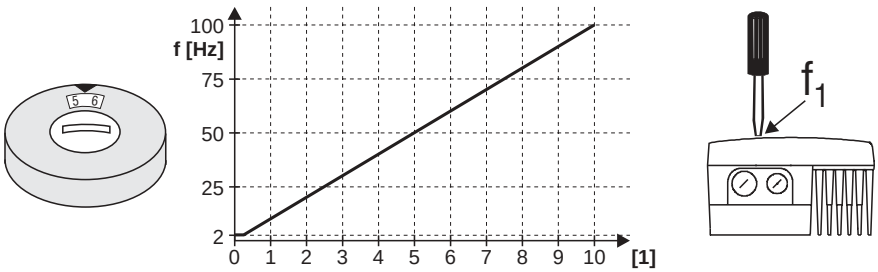
- **It is essential to comply with the safety notes during installation!**
- **Before removing/attaching the MOVIMOT® inverter, it must be disconnected from the power supply system (mains). Dangerous voltages may still be present for up to 1 minute after shutdown.**
- Ensure before startup that the drive has not been damaged.
- Check that all protective covers are installed correctly.
- Use "CW/Stop" or "CCW/Stop" for jog mode.
- A minimum switch-off time of 2 seconds must be maintained for the mains contactor K11.

7.2 Description of the controls

Setpoint potentiometer f1

The potentiometer has a different function, depending on the unit operating mode:

- Control via terminals: Setpoint f1 (selected by tl. f1/f2 = "0")
- Control via RS-485: Maximum frequency f_{max}



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[1] Pot. position

Setpoint switch f2

The function of the switch changes depending on the unit operating mode:

- Control via terminals: Setpoint f2 (selected by tl. f1/f2 = "1")
- Control via RS-485: Minimum frequency f_{min}

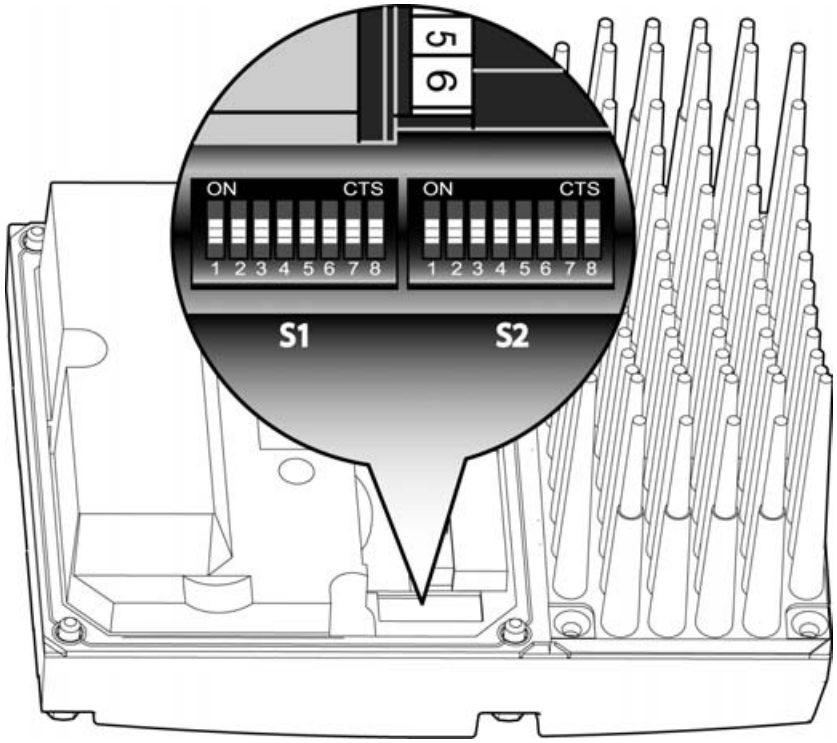
Switch f2											
Detent position	**0**	1	2	3	4	5	6	7	8	9	10
Setpoint f2 [Hz]	**5**	7	10	15	20	25	35	50	60	70	100
Mini. frequency [Hz]	**2**	5	7	10	12	15	20	25	30	35	40

Switch t1

For integrator ramp (ramp times based on a setpoint jump of 50 Hz)

Switch t1											
Detent position	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

DIP switches S1 and S2



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DIP switch S1:

S1	1	2	3	4	5	6	7	8
Message	**RS-485 address**				**Motor protection**	**Motor rating class**	**PWM frequency**	**No-load damping**
	2^0	2^1	2^2	2^3				
ON	1	1	1	1	Off	Motor one size smaller	Variable (16, 8, 4 kHz)	On
OFF	**0**	**0**	**0**	**0**	**On**	**adapted**	**4 kHz**	**Off**

DIP switch S2:

S2	1	2	3	4	5	6	7	8
Message	**Motor type**	**Brake release without Enable**	**Control process**	**Speed monitoring**	**Selection of options**			
					2^0	2^1	2^2	2^3
ON	SEW DZ motor:[1)]	On	V/f	On	1	1	1	1
OFF	**IEC motor**	**Off**	**VFC**	**Off**	**0**	**0**	**0**	**0**

1) only available in Brazil

7.3 Description of the DIP switches S1

DIP switches S1/1-S1/4

Selection of RS-485 address of MOVIMOT® via binary coding

Decimal Address	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
S1/1	–	X	–	X	–	X	–	X	–	X	–	X	–	X	–	X
S1/2	–	–	X	X	–	–	X	X	–	–	X	X	–	–	X	X
S1/3	–	–	–	–	X	X	X	X	–	–	–	–	X	X	X	X
S1/4	–	–	–	–	–	–	–	–	X	X	X	X	X	X	X	X

X = ON

– = OFF

Depending on the control of MOVIMOT®, different addresses must be set:

Control	RS-485 address
Binary control (terminal operation)	0
Via external AS-i binary slave (MLK11A)	0
Via keypad (MLG.., MBG..)	1
Via fieldbus interface (MF..)	1
Via fieldbus interface with integrated small control system (MQ..)	1 to 15
Via RS-485 master	1 to 15

DIP switches S1/5

Motor protection activated or deactivated

- If the MOVIMOT® inverter is mounted close to the motor (with option P2.A or in the field distributor), the motor protection must be deactivated.
- To ensure motor protection after all, a TH (bimetallic thermostat) must be used. In this case, the TH opens the sensor circuit after reaching the nominal response temperature (see the "Startup with field distributor" section in the "Drive System for Decentralized Installation" system manual).

DIP switches S1/6

Motor rating class smaller

- If it is activated, the DIP switch enables the assignment of MOVIMOT® to a motor with a smaller rating class. The rated power of the unit remains unchanged.
- If a motor with less power is used, the overload capacity of the drive may increase since the motor considers the MOVIMOT® to be one power increment too high. A larger current may be impressed for a short period of time, which results in higher torques.
- The purpose of switch S1/6 is the short-term utilization of the motor peak torque. The current limit of the respective unit is always the same, independent of the switch setting. The motor protection function is adapted in reference to the switch setting.
- **In this operating mode with S1/6 = "ON", a pull-out protection of the motor is not possible.**

MOVIMOT® inverter	Assigned motor			
	S1/6 = OFF		S1/6 = ON	
	⅄	△	⅄	△
MM03	DT71D4	DR63L4[1)]	DR63L4[1)]	–
MM05	DT80K4	DT71D4	DT71D4	DFR63L4[1)]
MM07	DT80N4	DT80K4	DT80K4	DT71D4
MM11	DT90S4	DT80N4	DT80N4	DT80K4
MM15	DT90L4	DT90S4	DT90S4	DT80N4
MM22	DV100M4	DT90L4	DT90L4	DT90S4
MM30	DV100L4	DV100M4	DV100M4	DT90L4
MM3X	–	DV100L4	DV100L4	DV100M4

1) Only possible with offset assembly

DIP switches S1/7

Setting the maximum PWM frequency

- With setting DIP SWITCH S1/7 = OFF, MOVIMOT® operates with 4 kHz PWM frequency.
- With setting DIP SWITCH S1/7 = ON, MOVIMOT® operates with a 16 kHz PWM frequency (low noise) and switches back in steps to lower switching frequencies depending on the heat sink temperature.

DIP switches S1/8

No-load damping function (S1/8 = ON)

Upon activation, the function prevents resonant oscillations in no-load operation.

7.4 Description of the DIP switches S2

DIP switches S2/1

Motor type

- With IEC and NEMA motors, DIP switch S2/1 must always be set to OFF!
- With DZ motor with rated voltages of 220/380 V, 60 Hz (only available in Brazil), the DIP switch must always be set to ON.

DIP switches S2/2

Releasing the brake without enable

With activated switch S2/2 = "ON", the brake can also be released if no drive enable is present.

Operation with braking resistor

The special function is not in effect if operated with braking resistor.

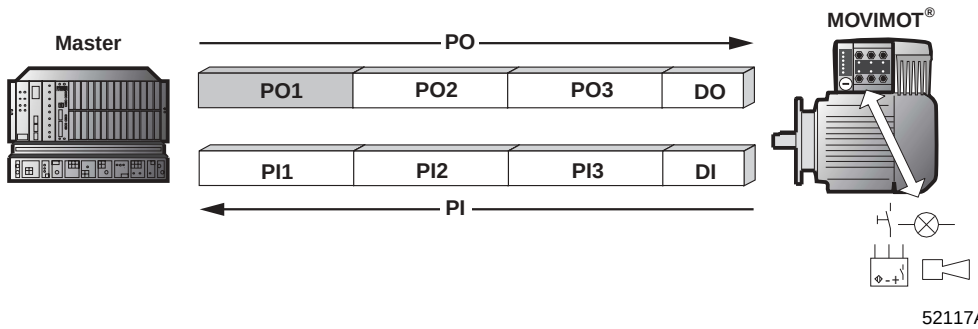
Function with terminal control (address = 0)

With terminal control, the brake can be released by setting terminal f1/f2 if the following requirements exist:

Terminal condition			Enable condition	Fault condition	Brake function
R	L	f1/f2			
"1" "0"	"0" "1"	"0"	Unit enabled	No Unit fault	Brake is controlled by MOVIMOT®, setpoint f1
"1" "0"	"0" "1"	"1"	Unit enabled	No Unit fault	Brake is controlled by MOVIMOT®, setpoint f2
"1" "0"	"1" "0"	"0"	Unit not enabled	No Unit fault	Brake closed
"1"	"1"	"1"	Unit not enabled	No Unit fault	Brake closed
"0"	"0"	**"1"**	**Unit not enabled**	**No Unit fault**	**Brake released for manual procedure**
All conditions possible			Unit not enabled	Unit fault	Brake closed

Functions in bus operation

In bus operation, the brake is released through control in the control word.



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

Setting bit 8 in the control word allows the brake to be released under the following conditions:

								Basic control block							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Control word

Not assigned	**Bit "8"**		"1" = Reset	Not assigned	"1 1 0" = Release otherwise stop

Virtual terminals for releasing the brake without drive enable

Enable condition	Fault condition	Status of bit 8 in control word	Brake function
Unit enabled	No unit fault / no communications timeout	"0"	Brake is controlled by MOVIMOT®
Unit enabled	No unit fault / no communications timeout	"1"	Brake is controlled by MOVIMOT®
Unit not enabled	No unit fault / no communications timeout	"0"	Brake closed
Unit not enabled	**No unit fault / no communications timeout**	**"1"**	**Brake released for manual procedure**
Unit not enabled	Unit fault / communications timeout	"1" or "0"	Brake closed

In case of a unit fault / communications timeout, the brake cannot be released via special function.

Setpoint selection in terminal operation

Setpoint selection in terminal operation depends on status of terminal f1/f2:

Enable condition	Terminal f1/f2	Active setpoint
Unit enabled	Terminal f1/f2 = "0"	Setpoint potentiometer f1 active
Unit enabled	Terminal f1/f2 = "1"	Setpoint potentiometer f2 active

Behavior with a non-operating unit

In case of a non-operating unit, the brake is always applied independent of the setting of terminal f1/f2 or bit 8 in the control word.

LED display

The yellow LED display flashes periodically and quickly (t_{on} : t_{off} = 100 ms : 300 ms) if the brake was released for manual procedure. This applies to terminal operation as well as bus operation.

DIP switches S2/3

Control process

- DIP switches S2/3 = OFF: VFC operation for 4-pole motors
- DIP switches S2/3 = ON: U/f operation reserved for special cases

DIP switches S2/4

Speed monitoring

- Speed monitoring (S2/4 = "ON" is used for the protection of the drive during blocking.
- If the drive is operated at the current limit for more than 1 second with active speed monitoring (S2/4 = "ON"), the speed monitoring trips. MOVIMOT® signals a fault via status LED (red, flashing slowly, fault code 08). The current limit must be attained uninterruptedly for the duration of the delay time before the monitoring function responds.

DIP switches S2/5 to S2/8

Selection of options

- Special functions can be selected using the binary coding of the DIP switches.
- The possible values can be set as follows:

Decimal Value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
S2/5	–	X	–	X	–	X	–	X	–	X	–	X	–	X	–	X
S2/6	–	–	X	X	–	–	X	X	–	–	X	X	–	–	X	X
S2/7	–	–	–	–	X	X	X	X	–	–	–	–	X	X	X	X
S2/8	–	–	–	–	–	–	–	–	X	X	X	X	X	X	X	X

X = ON

– = OFF

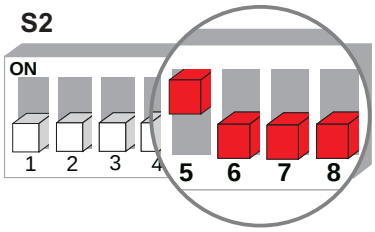
- An overview of the selectable special functions can be found on page 58.

7.5 Selectable special functions MM..C-503-00

Overview of selectable special functions

Decimal Value	Brief description	Intended operating mode		see page	Replaces MOVIMOT® B type
		Bus	Terminals		
0	Basic functionality, no special function selected	X	X	–	–
1	MOVIMOT® with increased ramp times	X	X	page 59	MM..B-503-**01**
2	MOVIMOT® with adjustable current limitation (fault if exceeded)	X	X	page 59	MM..B-503-**02**
3	MOVIMOT® with adjustable current limitation (switchable via terminal f1/f2)	X	X	page 60	MM..B-503-**05**
4	MOVIMOT® with bus parameter setting	X	–	page 62	–
5	MOVIMOT® with motor protection via TH	X	–	page 64	MM..B-503-**14** (partially)
6	MOVIMOT® with maximum 8 kHz PWM frequency	X	X	page 65	MM..B-503-**13**
7	MOVIMOT® with rapid start / stop	X	X	page 66	–
8	MOVIMOT® with minimum frequency 0 Hz	X	X	page 68	–
9	MOVIMOT® for hoist applications	X	X	page 69	–
10	MOVIMOT® with minimum frequency 0 Hz and reduced torque at low frequencies	X	X	page 71	–
11	Monitoring of supply phase fault is deactivated	X	X	page 71	–
12	MOVIMOT® with quick start/stop and motor protection via TH	X	X	page 72	–
13 to 15	Not assigned	–	–	–	–

Special function 1 MOVIMOT® with increased ramp times



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Function description

- It is possible to set ramp times up to 40 s.
- If 3 process data words are used in bus operation, a ramp time of up to 40 s can be transmitted.

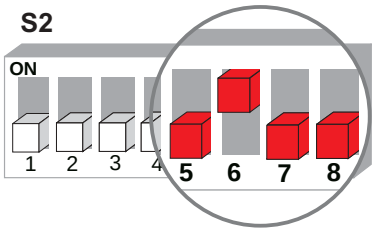
Changed ramp times

Switch t1											
Detent position	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	20	25	30	35	40

= Corresponds to standard setting

= Changed ramp times

Special function 2 MOVIMOT® with adjustable current limitation (fault if exceeded)



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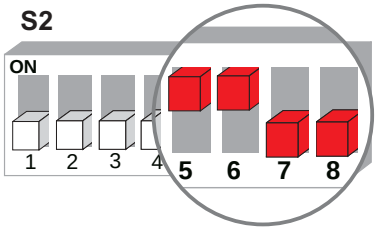
Function description

- The current limit can be set via switch f2.
- The setpoint f2 (with control via terminals) or the minimum frequency (with control via RS-485) can no longer be changed and is fixed at the following values:
  - Setpoint f2: 5 Hz
  - Minimum frequency: 2 Hz
- Monitoring becomes effective above 15 Hz. If the drive is operated at the current limit for more than 500 ms, the unit changes to the fault status (fault 44). The status is indicated through rapid red flashing.

Adjustable current limits

Switch f2											
Detent position	0	1	2	3	4	5	6	7	8	9	10
I_{max} [%] of I_N	90	95	100	105	110	115	120	130	140	150	160

Special function 3 **MOVIMOT® with adjustable current limitation (switchable via terminal f1/f2), with reduction of frequency if exceeded**



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Function description

The current limitation can be set via switch f2. The binary input terminal f1/f2 can be used to toggle between maximum current limit and the current limitation set via switch f2.

Response after reaching the current limitation

- After reaching the current limit, the unit reduces the frequency using the current limitation function and if necessary stops the ramp to prevent the current from increasing.
- If the unit operates at the current limitation, the status is displayed through rapid green flashing of the status LED.

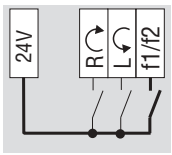
In-system values for setpoint f2/minimum frequency

- It is no longer possible to toggle via terminals between setpoint f1 and setpoint f2 in terminal operation or to set the minimum frequency in bus operation.
- The minimum frequency in bus operation is fixed at 2 Hz.

Adjustable current limits

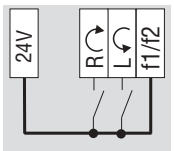
Switch f2											
Detent position	0	1	2	3	4	5	6	7	8	9	10
I_{max} [%] of I_N	60	70	80	90	100	110	120	130	140	150	160

Selection of current limits via binary input terminal f1/f2



03819AXX

f1/f2 = "0" 160 % current limitation is active



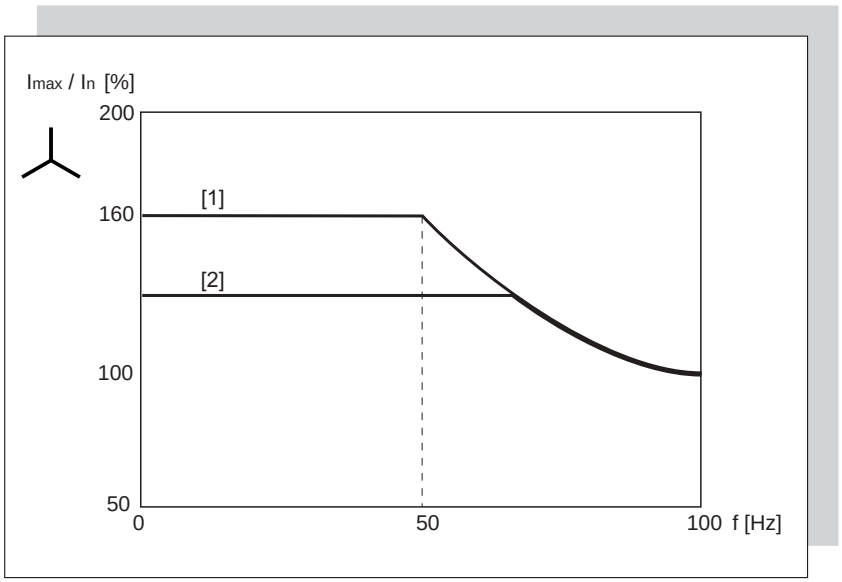
03820AXX

f1/f2 = "1" The current limitation set via switch f2 is active.
The selection can also be made with enabled unit.

Influencing the current characteristic curve

By selecting a lower current limit, the calculation of the current limit is carried out with a constant factor.

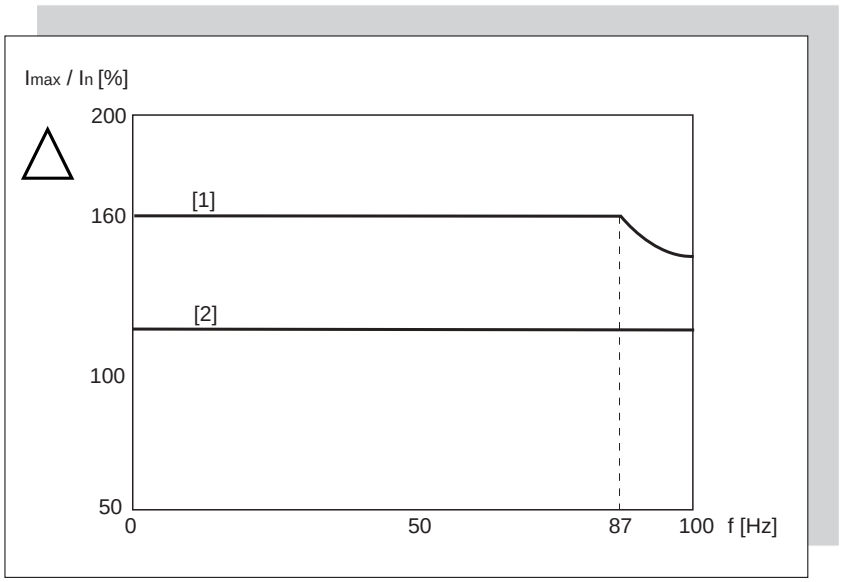
Motor with star connection



50851AXX

[1] Current limit characteristic curve of standard function
[2] Reduced current limit for special function 3 and terminals f1/f2 = "1"

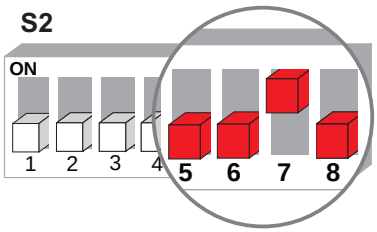
Motor with delta connection



50852AXX

[1] Current limit characteristic curve of standard function
[2] Reduced current limit for special function 3 and terminals f1/f2 = "1"

Special function 4 MOVIMOT® with bus parameter setting



05599AXX

The function is implemented exclusively with bus operation via fieldbus interfaces MQ.. with integrated small control.

A parameter channel is available to operate the unit, and the values are saved in EEPROM.

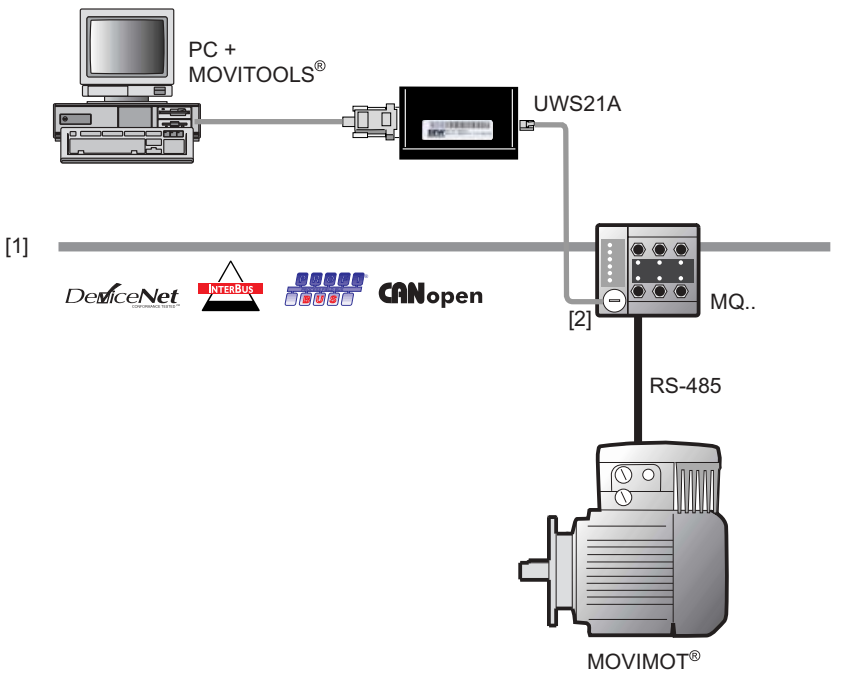
Read the following SEW-EURODRIVE manuals for additional information:

- DeviceNet/CANopen Interfaces, Field Distributors
- InterBus Interfaces, Field Distributors
- PROFIBUS Interfaces, Field Distributors

Function description

Potentiometer f1 and switches f2 and t1 are deactivated. The settings of the potentiometer and the switches are ignored by MOVIMOT®. The setting of the DIP switches continues to be read in by the unit. Functions selected via DIP switches cannot be changed using the bus.

Block diagram



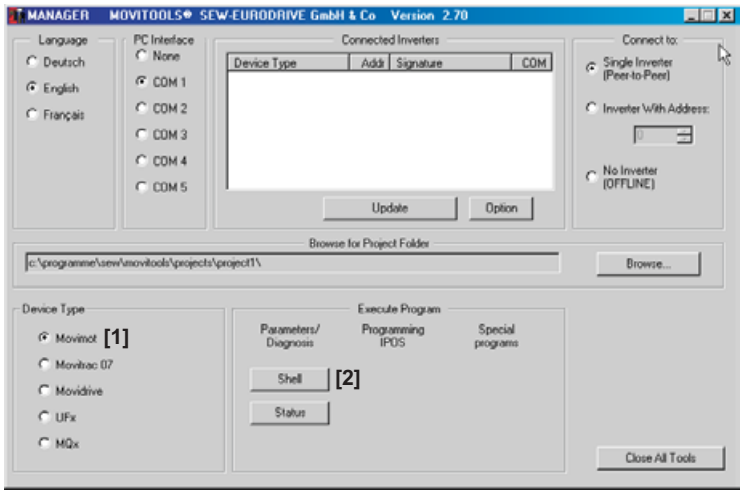
50853AXX

[1] Fieldbus
[2] Diagnostic interface

Changing the parameters in MOVITOOLS®

Open MOVITOOLS®/Shell as follows

- Select "MOVIMOT®" equipment class [1]
- Under program execution, select "Shell" [2]



05595AEN

After opening MOVITOOLS®/Shell, the following parameters are accessible. They can be changed and stored in the unit.

Name	Area	Index	Parameter number	Step width
Ramp up	0.1...**1**...2000 [s]	8807	130	0.1 s – 1 s: 0,01 1 s – 10 s: 0,1 10 s – 100 s: 1 100 s – 2000 s: 10
Ramp down	0.1...**1**...2000 [s]	8808	131	
Minimum frequency	**2**...100 [Hz]	8899	305	0.1
Maximum frequency[1)]	2...**100** [Hz]	8900	306	0.1
Current limit	60...**160** [%]	8518	303	1
Pre-magnetization time	0...**0.4**...2 [s]	8526	323	0.001
Post-magnetization time	0...**0.1**...2 [s]	8585	732	0.001
Parameter lock	On/**Off**	8595	803	–
Factory setting	Yes/**No**	8594	802	–
Delay time (P501/503) Speed monitoring	0.1...**1**...10.0 [s]	8558	501	0.1
Brake release time	**0**..2 [s]	8749	731	0.001
Slip compensation[2)]	0..500 [1/min]	8527	324	0.2

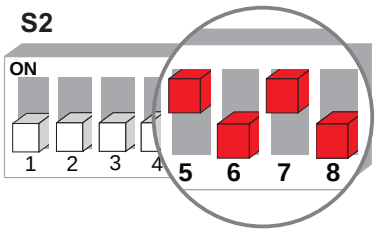
Factory setting = bold

1) Example: Maximum frequency = 60 Hz
Bus setpoint = 10 %
Frequency setpoint = 6 Hz

2) If the special function setting is changed, the value is set to the rated motor slip.

- The factory setting is activated as soon as special function 4 is activated via DIP switches. If the selected special function via DIP switches remains unchanged after switching off the 24 V operating voltage, the reactivation will use the last known values from EEPROM.
- The start frequency is fixed at 0.5 Hz, the stop frequency at 3 Hz.
- If the set setpoint or the maximum frequency is lower than the set minimum frequency, the minimum frequency becomes active.
- The indexes are only evaluated with this special function.

Special function 5 MOVIMOT® motor protection via TH



05600AXX

The special function is only intended for bus operation in conjunction with mounting of the MOVIMOT® inverter close to the motor (with option P2.A or in the field distributor).

Function description

Functions in connection with fieldbus interfaces MF.. and MQ..:

- If both direction of rotation terminals are opened, special function 5 generates fault 84 (overtemperature motor).
- In conjunction with the mounting of the MOVIMOT® inverter close to the motor (with option P2.A or in the field distributor), the direction of rotation terminals are set to "0" by the TH in case of overtemperature in the motor.
- Fault 84 is displayed by means of a flashing signal of the status LED at MOVIMOT®.
- The generated fault 84 is also transmitted via fieldbus.

Functions in connection with fieldbus interfaces MQ..:

- MOVIMOT® bus parameter setting according to special function 4 (see page 62).

Functions in connection with fieldbus interfaces MF..:

- Potentiometer f1 and switches f2 and t1 are deactivated and the following values apply:

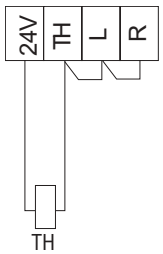
Name	Value
Ramp up	1 [s]
Ramp down	1 [s]
Minimum frequency	2 [Hz]
Maximum frequency	100 [Hz]
Current limit	160 [%]
Pre-magnetization time	0.4 [s]
Post-magnetization time	0.1 [s]
Delay time speed monitoring	1 [s]
Brake release time	0 [s]
Slip compensation	Rated motor slip

Tripping conditions for fault 84

Fault 84 "Overtemperature Motor" is tripped if **all** of the following requirements are met:

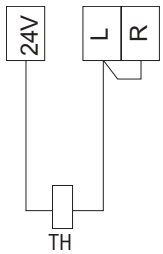
- The standard MOVIMOT® motor protection function can be deactivated via DIP switch S1/5 = ON.
- The direction of rotation terminals are wired to 24 V via a TH as shown in the following figure.

With field distributor:



52119AXX

With mounting on motor with option P2.A:

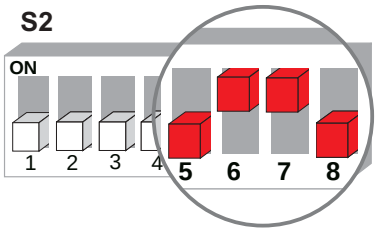


52120AXX

- The TH tripped due to excessive temperature of the motor (release of both direction of rotation terminals does not apply).
- Mains voltage is present.

If **only the 24 V_{DC} supply voltage** is present at the MOVIMOT®, the fault is not initiated.

Special function 6 MOVIMOT® with maximum 8 kHz PWM frequency



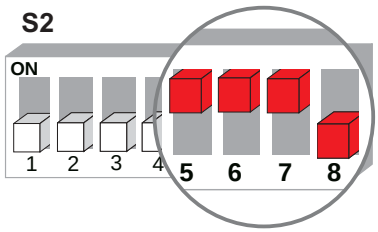
05601AXX

Function description

- The special function reduces the maximum adjustable PWM frequency via S1/7 from 16 kHz to 8 kHz.
- When DIP switch S1/7 = "ON", the unit operates with an 8 kHz PWM frequency (low noise) and switches back to 4 kHz depending on the heat sink temperature.

	S1/7 **without** special function 6	S1/7 **with** special function 6
ON	PWM frequency variable 16, 8, 4 kHz	PWM frequency variable 8, 4 kHz
OFF	PWM frequency 4 kHz	PWM frequency 4 kHz

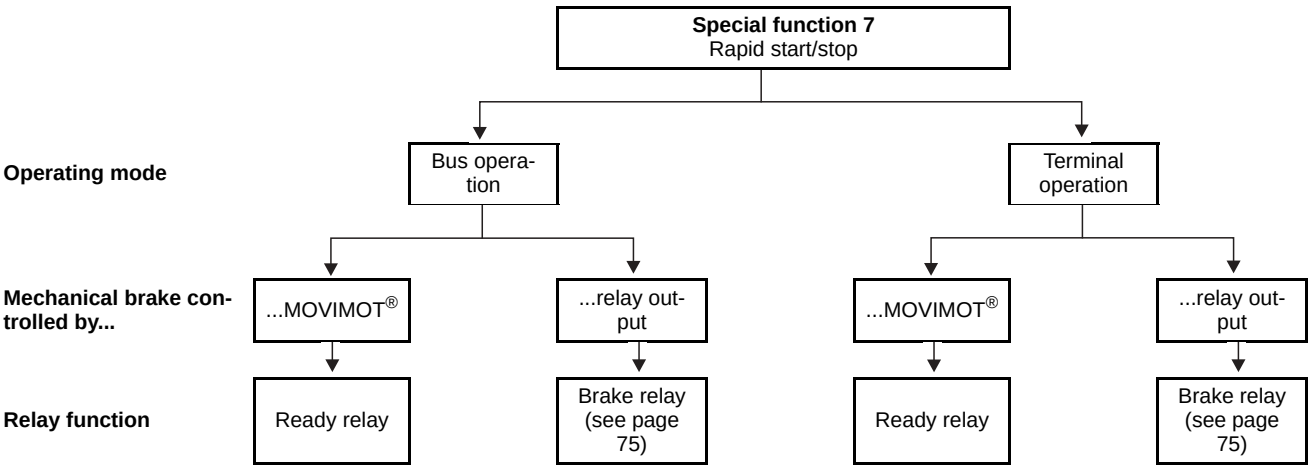
Special function 7 MOVIMOT® with rapid start/stop



05602AXX

Function description

- The pre-magnetization time is fixed at 0 s, independent of whether MOVIMOT® is operated in bus or terminal mode.
- No pre-magnetization is carried out at the start of the release to begin the acceleration at the setpoint ramp as quickly as possible.
- The subsequent behavior of MOVIMOT® is dependent on the operating mode and whether a mechanical brake is connected.



Bus operation

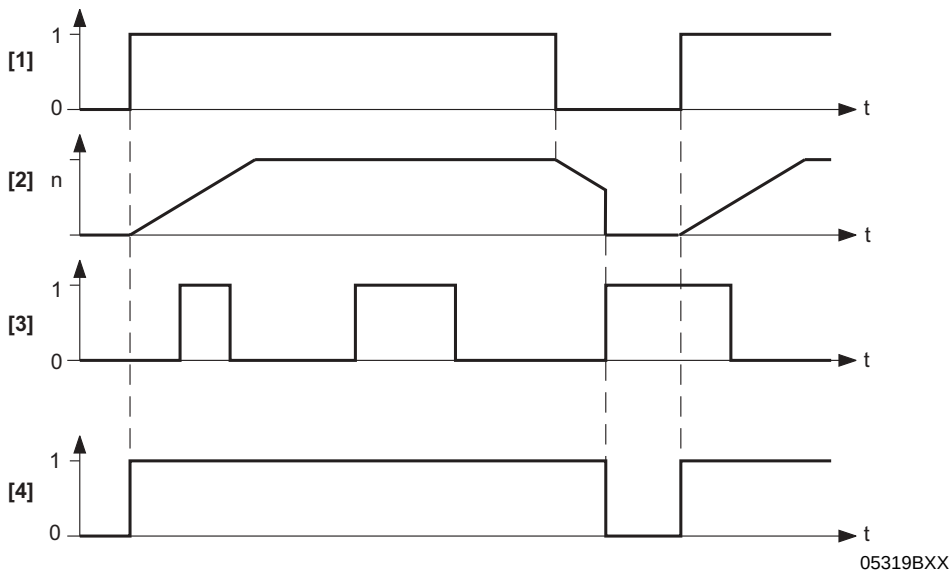
Mechanical brake controlled by MOVIMOT®:

- Terminals 13, 14 and 15 are assigned to the brake coil of the mechanical brake at the wiring board of MOVIMOT®.
- The new function "Brake applied at down ramp" is introduced. Bit 9 in the control word is assigned with this function as virtual terminal according to MOVILINK® profile.
- As soon as bit 9 is set during the down ramp, MOVIMOT® applies the brake and inhibits the output stage.
- If the motor frequency is lower than the stop frequency, the brake is applied independent of the status of bit 9.
- The relay is switched as ready relay (standard function).

Mechanical brake controlled by relay output:

- A braking resistor (BW..) must be connected to terminal 13 and 15 at the wiring board of MOVIMOT®, terminal 14 is not assigned.
- The relay functions as brake control relay so that the ready signal function is no longer available (it is imperative that you observe section "Use of relay output with special function 7 + 9" starting on page 75).
- The new function "Brake applied at down ramp" is introduced. Bit 9 in the control word is assigned with this function as virtual terminal according to MOVILINK® profile.
- As soon as bit 9 is set during the down ramp, the relay output applies the brake and MOVIMOT® inhibits the output stage.
- If the motor frequency is lower than the stop frequency, the brake is applied independent of the status of bit 9.

"Brake control in bus operation" flowchart:



[1] Enable terminals/control word
[2] Speed
[3] Bit 9
[4] Brake control signal: 1 = open, 0 = closed

Terminal operation

Mechanical brake controlled by MOVIMOT®

- Terminals 13, 14 and 15 are assigned to the brake coil of the mechanical brake at the wiring board of MOVIMOT®.
- The mechanical brake cannot be influenced by the terminals. The brake works analogous to a unit without special function.
- The relay is switched as ready relay (standard function).

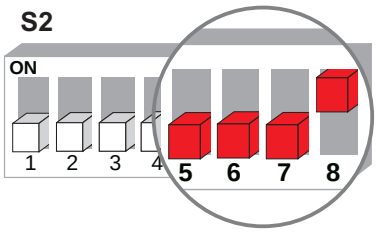
Mechanical brake controlled by relay output

- A braking resistor (BW..) must be connected to terminal 13 and 15 at the wiring board of MOVIMOT®, terminal 14 is not assigned.
- The relay functions as brake control relay so that the ready signal function is no longer available (it is imperative that you observe section "Use of relay output with special function 7 + 9" starting on page 75).

Important: The rapid stop function cannot be used in terminal operation!

Special function 8

MOVIMOT® with minimum frequency 0 Hz



05603AXX

Function description

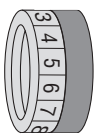
Control via RS-485:

If switch f2 is in position of rest 0, the minimum frequency measures 0 Hz with activated special function. All other adjustable values remain unchanged.

Switch f2											
Detent position	**0**	1	2	3	4	5	6	7	8	9	10
Minimum frequency [Hz] with activated special function	**0**	5	7	10	12	15	20	25	30	35	40
Minimum frequency [Hz] without special function	**2**	5	7	10	12	15	20	25	30	35	40

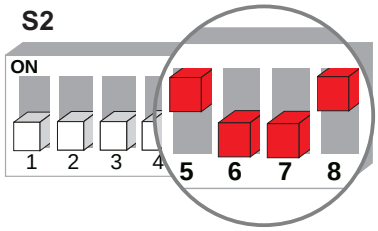
Control via terminals:

If switch f2 is in position of rest 0, the setpoint f2 measures 0 Hz with activated special function. All other adjustable values remain unchanged.



Switch f2											
Detent position	**0**	1	2	3	4	5	6	7	8	9	10
Setpoint f2 [Hz] with activated special function	0	7	10	15	20	25	35	50	60	70	100
Setpoint f2 [Hz] without special function	**5**	7	10	15	20	25	35	50	60	70	100

Special function 9 **MOVIMOT® for hoist applications**



05604AXX

Pre-requisites

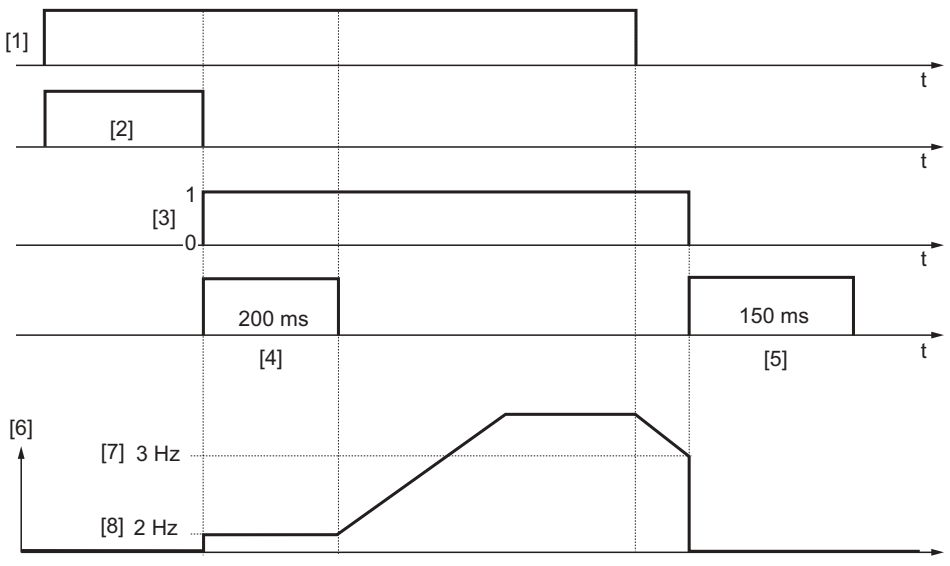
MOVIMOT® may only be used in hoist applications if the following pre-requisites are met:

- Special function 9 is only possible in connection with brake motors.
- Ensure that VFC operation (DIP switches S2/3 = OFF) is selected.
- The use of brake control BGM in connection with an external braking resistor is imperative (starting on page 75).
- It is recommended to activate the function "Speed monitoring" (page 57) .

Function description

- The start frequency is 2 Hz with terminal and bus operation. If the function is not activated, the start frequency is 0.5 Hz.
- The brake release time is fixed at 200 ms (standard = 0 ms), which prevents the motor from working against the applied brake.
- The brake reaction time (post-magnetization time) is 150 ms (standard = 100 ms), which ensures that the brake is applied as soon as the motor stops generating torque.
- The subsequent behavior of MOVIMOT® is dependent on the operating mode (see page 70).

Overview of brake control with special function 9:

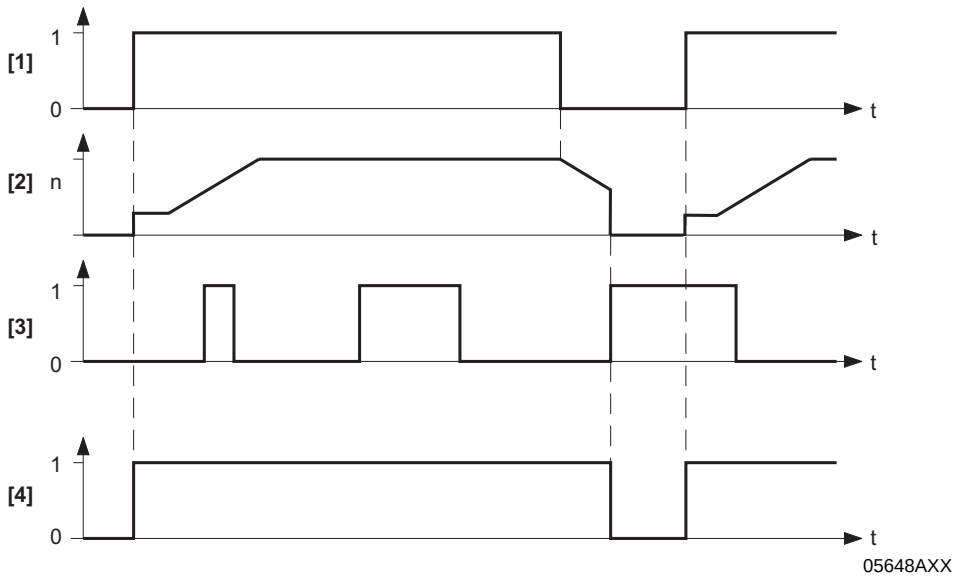


05613AXX

[1] Enable
[2] Pre-magnetization time
[3] Brake control signal
1 = open, 0 = closed
[4] Brake release time
[5] Brake reaction time
(Post-magnetization time)
[6] Frequency
[7] Stop frequency
[8] Start/minimum frequency

Bus operation

- **The mechanical brake is controlled by the relay output.**
- A braking resistor (BW..) must be connected to terminal 13 and 15 at the wiring board of MOVIMOT®, terminal 14 is not assigned.
- The relay functions as brake control relay so that the ready signal function is no longer available (it is imperative that you observe section "Use of relay output with special function 7 + 9" starting on page 75).
- The new function "Brake applied at down ramp" is introduced. Bit 9 in the control word is assigned with this function as virtual terminal according to MOVILINK® profile.
- As soon as bit 9 is set during the down ramp, the relay output applies the brake and MOVIMOT® inhibits the output stage.
- If the motor frequency is lower than the stop frequency, the brake is applied independent of the status of bit 9.



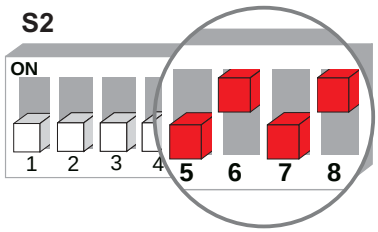
[1] Enable terminals/control word
[2] Speed
[3] Bit 9
[4] Brake control signal: 1 = open, 0 = closed

Terminal operation

- **The mechanical brake is controlled by the relay output.**
- A braking resistor (BW..) must be connected to terminal 13 and 15 at the wiring board of MOVIMOT®, terminal 14 is not assigned.
- The relay functions as brake control relay, so that the ready signal function is no longer available.
- **Applying the brake via bit 9 cannot be used in terminal operation.**

Special function 10

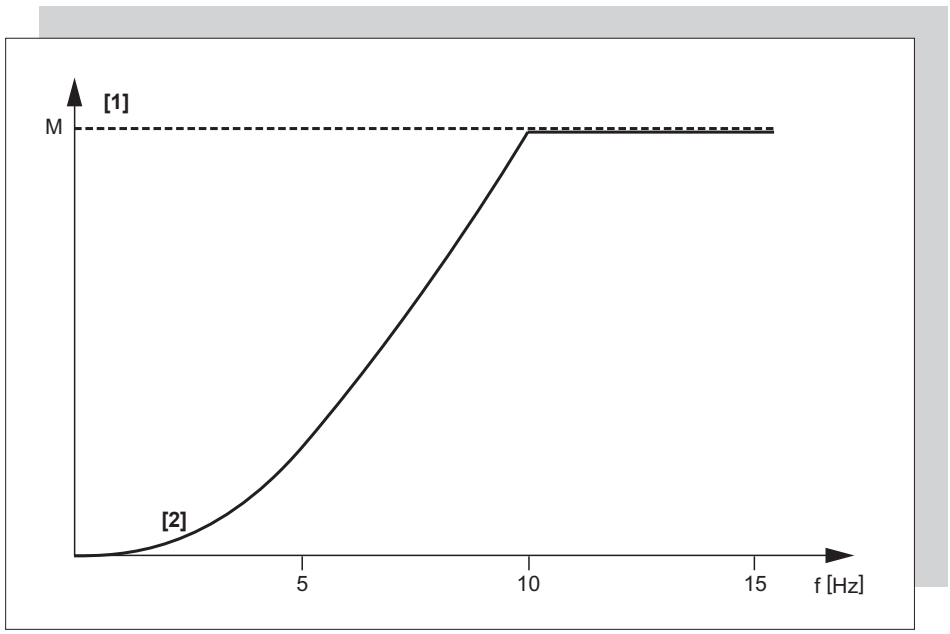
MOVIMOT® with reduced torque at low frequencies



05606AXX

Function description

- The drive builds up only a reduced torque due to a reduction in slip compensation and active current at low speeds (see the following figure):
- Minimum frequency = 0 Hz (see special function 8 on page 68).

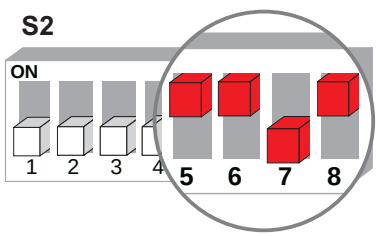


50907AXX

[1] Maximum torque with VFC operation
[2] Maximum torque with activated special function

Special function 11

Deactivation of phase fault control



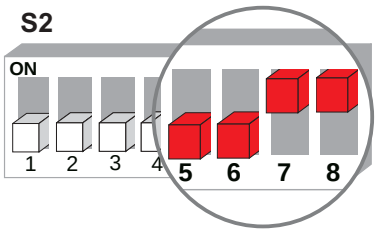
06378AXX

Function description

- Phase control does not take place if the special function is activated.
- This is meaningful, for example, for supply systems with brief asymmetry.

Special function 12

MOVIMOT® with rapid start/stop and motor protection via TH



06379AXX

Functional description

- The special function is active in terminal and bus operation, but there are differences with respect to the usable functional scope.
- If the MOVIMOT® inverter is mounted close to the motor (with option P2.A or in the field distributor), the special function consists of the following:
  - Motor protection function via indirect TH analysis using direction of rotation terminals
  - Rapid start and stop function

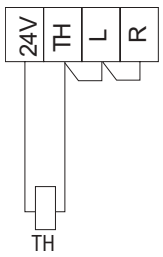
"Motor protection function via TH analysis" partial function

This function is active only in bus operation. The special function implements tripping fault 84 "Excessive motor temperature."

Fault 84 is tripped if all of the following requirements are met:

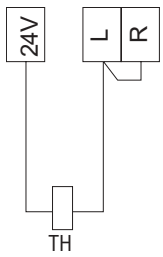
- The standard MOVIMOT® motor protection function can be deactivated via DIP switch S1/5 = ON.
- The direction of rotation terminals are wired to 24 V via a TH as shown in the following figure.

With field distributor:



52119AXX

With mounting on motor with option P2.A:



52120AXX

- The TH tripped due to excessive temperature of the motor (release of both direction of rotation terminals does not apply).
- Mains voltage is present.

The motor protection function via TH analysis can be deactivated by setting DIP switch S1/5 = OFF. In this case, the motor protection in the MOVIMOT® that is implemented via motor model is in effect.

"Rapid start" partial function

Regardless of whether MOVIMOT® is controlled in terminal or bus operation, the pre-magnetization is fixed at 0 s, i.e. pre-magnetization does not take place at the beginning of the release to start accelerating at the setpoint ramp as quickly as possible.

"Rapid stop" partial function

The new function "Brake applied at down ramp" is introduced in bus operation. Bit 9 is assigned with this function as virtual terminal in the control word.

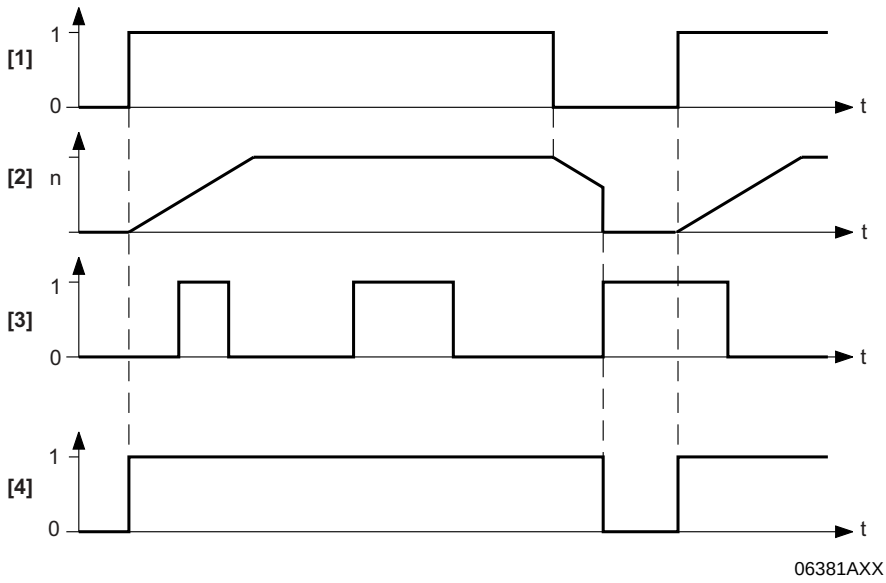
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Not assigned						**Bit "9"**	Not assigned		"1" = Reset	Not assigned			"1 1 0" = Release otherwise stop		

Virtual terminal for "Brake applied at down ramp"

As soon as bit 9 is set during the down ramp, MOVIMOT® directly applies the brake (brake control is carried out through MOVIMOT®) or via the MOVIMOT® signal relay output (brake control is carried out through relay output) and blocks the output stage.

If the motor frequency is lower than the stop frequency (3 Hz), the brake is applied independent of the status of bit 9 during the down ramp.

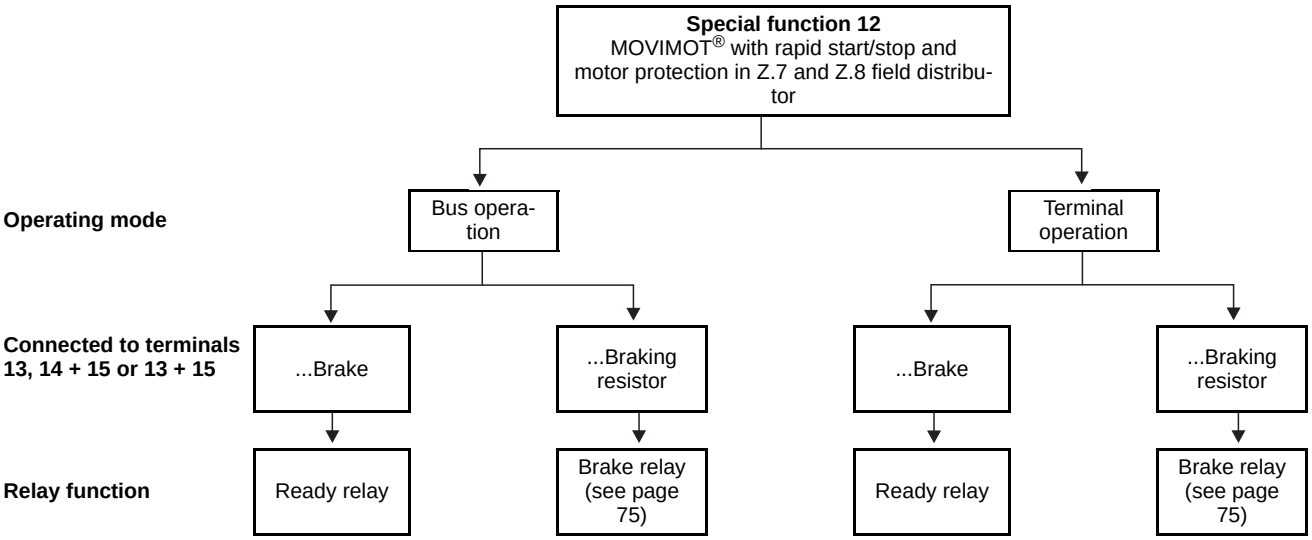
"Brake control in bus operation" flowchart:



[1] Enable terminals/control word
[2] Speed
[3] Bit 9
[4] Brake control signal: 1 = open, 0 = closed

In terminal operation, the rapid stop function via control word bit 9 is not available.

Functionality of the signal relay



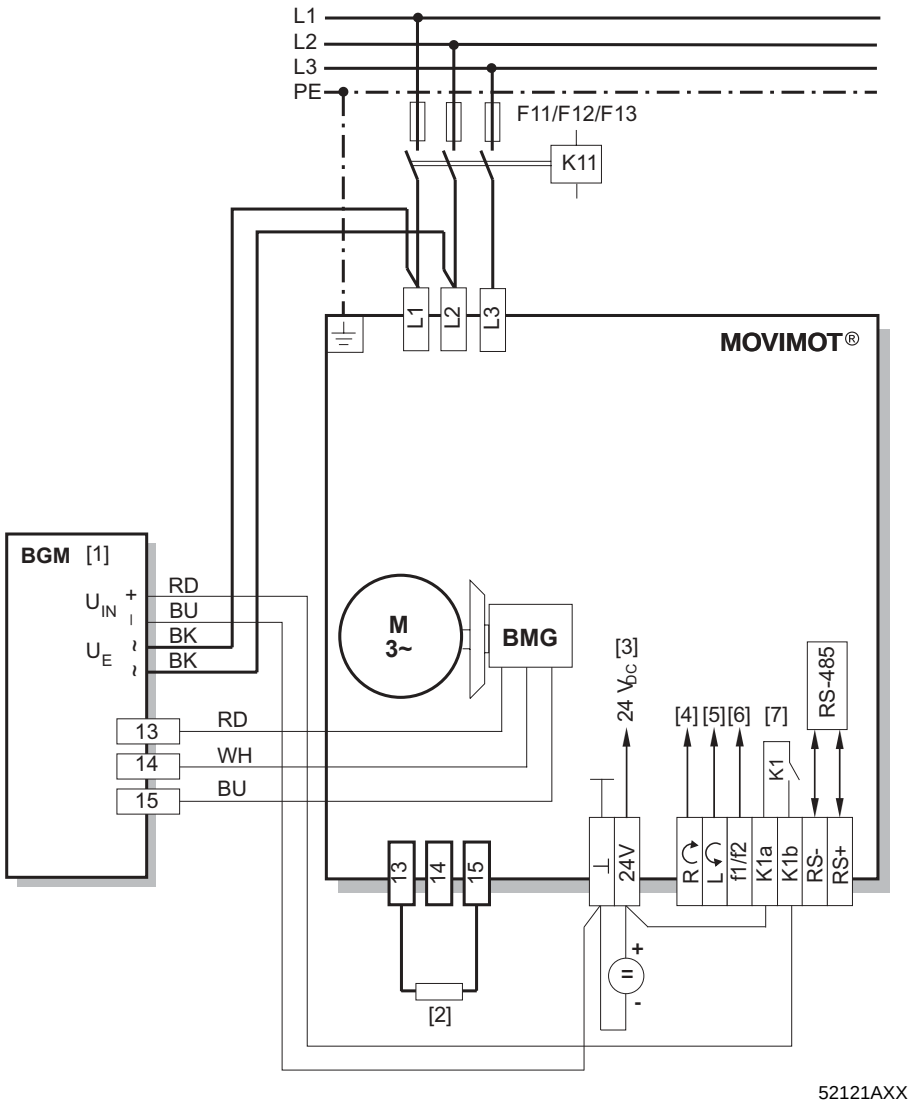
Use of relay output with special functions 7, 9 and 12

The following figure shows the use of relay contact K1 to control the mechanical brake with brake rectifier BGM.

Important: Please observe the following before startup with brake control BGM:

- The brake coil must correspond to the supply voltage (e.g. 400 V).
- **Special function 7, 9 or 12 must be activated, otherwise the brake is permanently released. This must also be observed in the case of an exchange of the MOVIMOT® inverter.**

  If neither of the listed functions is activated, relay contact K1 functions as ready signal contact. **This means that the brake will be released without enable if the BGM is used, if it was connected without permission.**



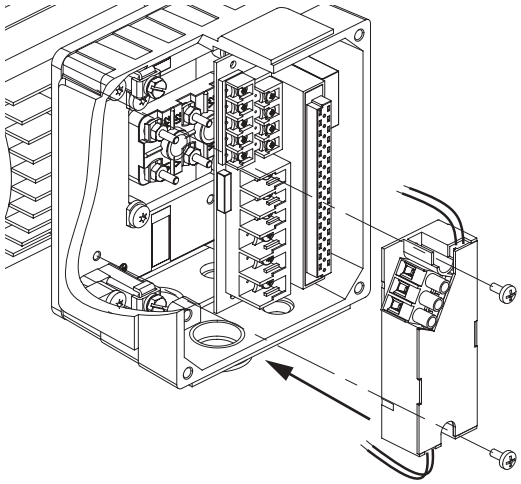
[1] Brake control BGM installed in the terminal box
[2] External braking resistor BW (see the "Technical Data" section for the assignment)
[3] 24 V_{DC} supply
[4] CW/Stop
[5] CCW/Stop
Observe the enabled direction of rotation (see the section "Connection of MOVIMOT® Basic Unit" functions of CW/ Stop, CCW/Stop terminals with control via RS-485 interface)
[6] Setpoint toggle f1/f2
[7] Brake relays

Retrofitting the brake rectifier

If the brake rectifier BGM was not ordered as installed option, it must be retrofitted as follows:

The installation is only allowed in conjunction with modular terminal box!

1. Exchange the brake coil (brake coil must correspond to the supply voltage).
2. Mount the brake control BGM with two screws according to the following figure (connection according to wiring diagram on page 75).

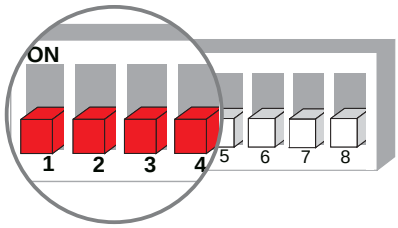


52122AXX

3. Connect the external braking resistor according to the wiring diagram on page 75 (see the "Technical Data" section for assignment).

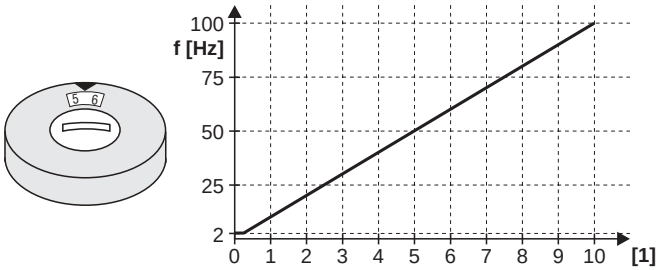
7.6 Startup with binary control (control via terminals)

1. **Isolate MOVIMOT® drive from the supply, safeguarding it against unintentional power-up! Dangerous voltages may still be present for up to 1 minute after shutdown!**
2. **Review correct connection of MOVIMOT® (see the section "Electrical Installation").**
3. Ensure that DIP switches S1/1 – S1/4 are set to OFF (= address 0).



05062AXX

4. Set first speed with f1 setpoint potentiometer (activated if terminal f1/f2 = '0') (factory setting: approx. 50 Hz).



05066BXX

[1] Pot. position

5. Set the second speed with switch f2 (active when tl. f1/f2 = "1").

Switch f2											
Detent position	0	1	2	3	4	5	6	7	8	9	10
Setpoint f2 [Hz]	5	7	10	15	20	25	35	50	60	70	100

During operation, the first speed is infinitely variable using the setpoint potentiometer f1 which is accessible from outside.

Speeds f1 and f2 can be set independently to any value.

6. Set the ramp time with switch t1 (ramp times in relation to a setpoint step change of 50 Hz).

Switch t1											
Detent position	0	1	2	3	4	5	6	7	8	9	10
Ramp time t1 [s]	0.1	0.2	0.3	0.5	0.7	1	2	3	5	7	10

7. Place the MOVIMOT® inverter on the terminal box and secure it.
8. Re-insert screw plug of setpoint potentiometer f1 with gasket.
9. Switch on the control voltage 24 V_{DC} and power supply.

Inverter response according to the terminal level

Network	24 V	f1/f2	CW/Stop	CCW/Stop	Status LED	Inverter behavior
0	0	x	x	x	Off	Inverter off
1	0	x	x	x	Off	Inverter off
0	1	x	x	x	Flashing yellow	Stop, supply system missing
1	1	x	0	0	Yellow	Stop
1	1	0	1	0	Green	Clockwise with f1
1	1	0	0	1	Green	Counterclockwise with f1
1	1	1	1	0	Green	Clockwise with f2
1	1	1	0	1	Green	Counterclockwise with f2
1	1	x	1	1	Yellow	Stop

Legend

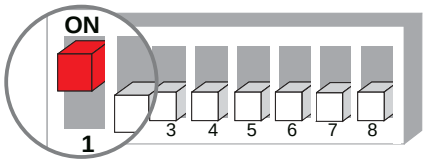
0 = No voltage

1 = Voltage

X = Any

7.7 Startup with options MBG11A or MLG11A

1. **Isolate MOVIMOT® drive from the supply, safeguarding it against unintentional power-up! Dangerous voltages may still be present for up to 1 minute after shutdown!**
2. **Review correct connection of MOVIMOT® (see the section "Electrical Installation").**
3. Set DIP switch S1/1 (on MOVIMOT®) to ON (= address 1).



05064AXX

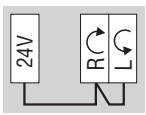
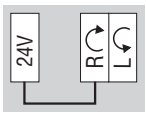
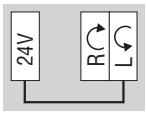
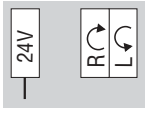
4. Set the minimum frequency f_{min} with switch f2.

Switch f2											
Detent position	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

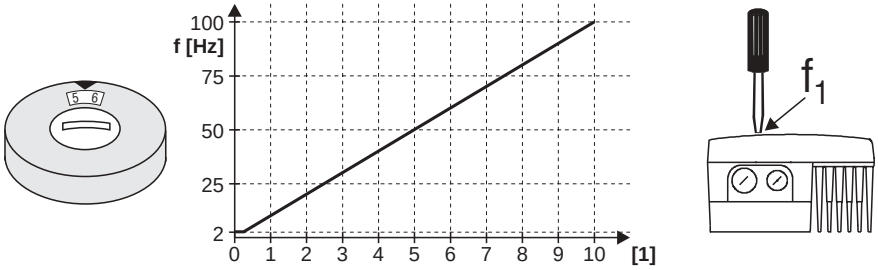
5. Set the ramp time with switch t1 (ramp times in relation to a setpoint step change of 50 Hz).

Switch t1											
Detent position	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. Check whether the required direction of rotation is enabled.

Terminal R	Terminal L	Message
Activated	Activated	• Both directions of rotation are enabled
		
Activated	Not activated	• Only clockwise direction of rotation is enabled • Preselected setpoints for counterclockwise rotation result in standstill of drive
		
Not activated	Activated	• Only counterclockwise direction of rotation is enabled • Setpoint selections for clockwise lead to the drive being stopped
		
Not activated	Not activated	• Unit is blocked or the drive is stopped
		

7. Place the MOVIMOT® inverter on the terminal box and secure it.
8. Set the required maximum speed using setpoint potentiometer f1.

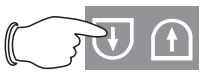


05066BXX

[1] Pot. position

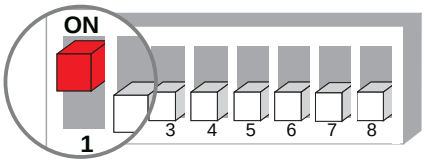
9. Re-insert screw plug of setpoint potentiometer f1 with gasket.
10. Switch on the voltage.

Operating options MBG11A and MLG11A

Function	Explanation
Display	Negative display value e.g.:  = Counterclockwise rotation Positive display value e.g.:  = Clockwise rotation The displayed value indicates the speed set with the setpoint potentiometer f1. Example: Display "50" = 50 % of the speed set with setpoint potentiometer. **Important: If the display is "0," the drive is turning at f_{min}.**
Increasing the speed	With CW rotation:  With CCW rotation: 
Reducing the speed	With CW rotation:  With CCW rotation: 
Blocking MOVIMOT®	Press the following keys simultaneously:  Display = 
Enable MOVIMOT®	 **or**  **Important: After release, MOVIMOT® accelerates to the value and direction of rotation saved last.**
Change in direction of rotation from CW to CCW	1.  Until display =  2. Pressing it again  changes direction of rotation from CW to CCW.
Change in direction of rotation from CCW to CW	1.  Until display =  2. Pressing it again  changes direction of rotation from CCW to CW.
Memory function	After the power supply system has been switched off and on again, the value last set is retained provided the 24 V supply was present for at least 4 seconds following the most recent setpoint change.

7.8 Startup with MWA21A option (speed control module)

1. **Isolate MOVIMOT® drive from the supply, safeguarding it against unintentional power-up! Dangerous voltages may still be present for up to 1 minute after shutdown!**
2. **Review correct connection of MOVIMOT® (see the section "Electrical Installation").**
3. Set DIP switch S1/1 (on MOVIMOT®) to ON (= address 1).



05064AXX

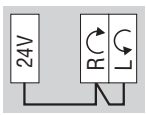
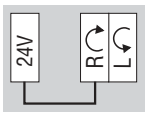
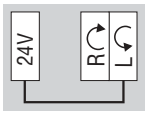
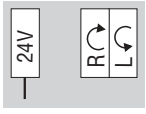
4. Set the minimum frequency f_{min} with switch f2.

Switch f2											
Detent position	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

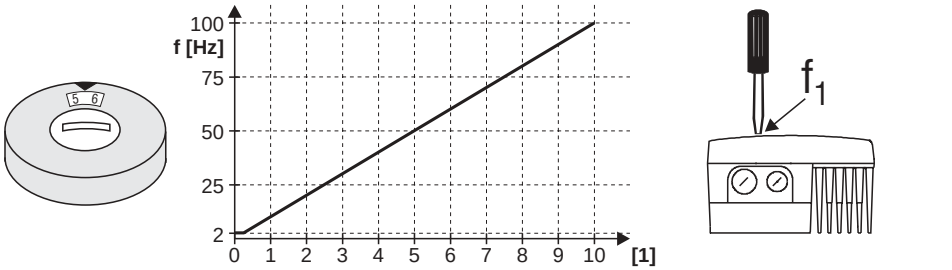
5. Set the ramp time with switch t1 (ramp times in relation to a setpoint step change of 50 Hz).

Switch t1											
Detent position	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. Check whether the required direction of rotation is enabled.

Terminal R	Terminal L	Message
Activated	Activated	• Both directions of rotation are enabled
		
Activated	Not activated	• Only clockwise direction of rotation is enabled • Preselected setpoints for counterclockwise rotation result in standstill of drive
		
Not activated	Activated	• Only counterclockwise direction of rotation is enabled • Setpoint selections for clockwise lead to the drive being stopped
		
Not activated	Not activated	• Unit is blocked or the drive is stopped
		

7. Place the MOVIMOT® inverter on the terminal box and secure it.
8. Set the required maximum speed using setpoint potentiometer f1.



05066BXX

(1) Pot. setting

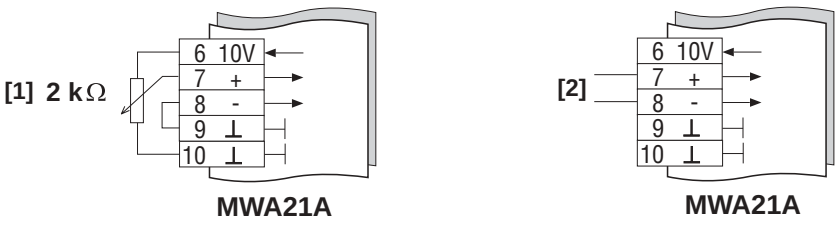
9. Re-insert screw plug of setpoint potentiometer f1 with gasket.
10. Select the signal type for the analog input (terminals 7 and 8) of the MWA21A option using switches S1 and S2.

	S1	S2	Setpoint stop function
V **signal 0...10 V**	OFF	OFF	No
I signal 0...20 mA	ON	OFF	
I signal 4...20 mA	ON	ON	Yes
V **signal 2...10 V**	OFF	ON	

11. Switch on the voltage.
12. Release MOVIMOT® by applying +24 V to tl. 4 (CW rotation) or tl. 5 (CCW rotation) of the MWA21A.

Control

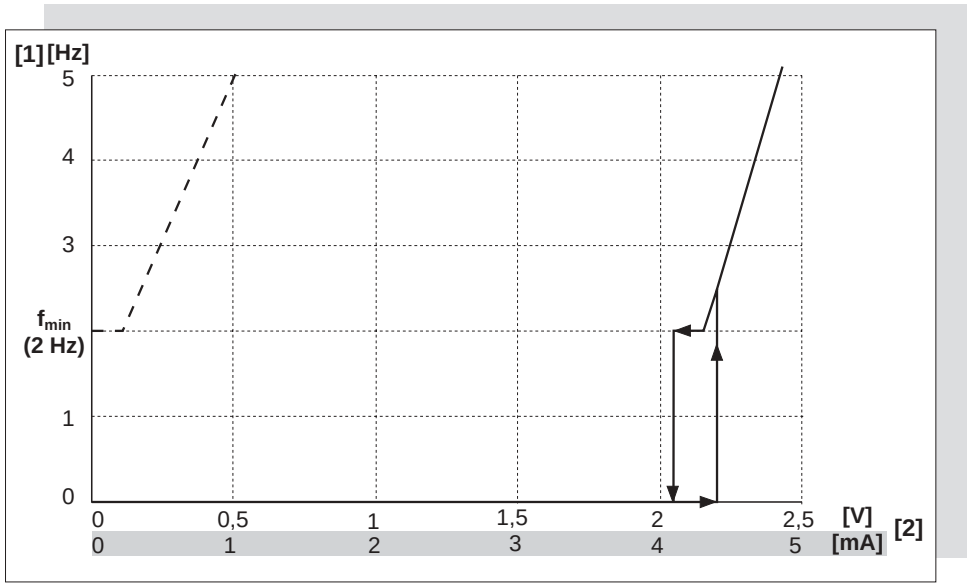
MOVIMOT® is controlled from f_{min} to f_{max} using the analog signal at terminal 7 and terminal 8.



05067BXX

[1] Potentiometer using the 10 V reference voltage (alternatively 5 kΩ)
[2] Floating analog signal

Setpoint stop function:



05068BXX

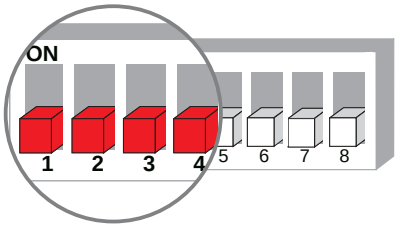
Setting:

– – – –	**0...10 V / 0...20 mA**
———	**2...10 V / 4...20 mA**

[1] Output frequency
[2] Setpoint

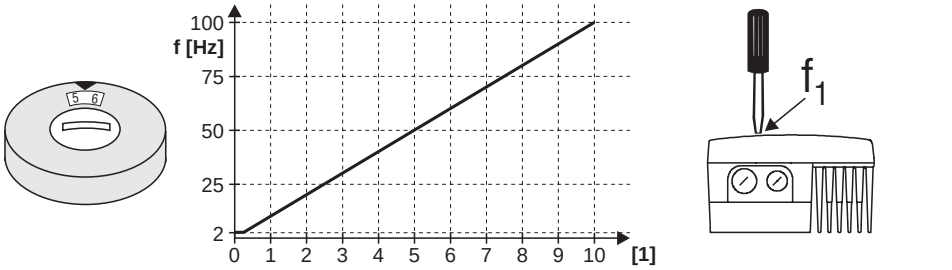
7.9 Startup with external AS-i binary slave MLK11A

1. **Isolate MOVIMOT® drive from the supply, safeguarding it against unintentional power-up! Dangerous voltages may still be present for up to 1 minute after shutdown!**
2. **Review correct connection of MOVIMOT® (see the section "Electrical Installation").**
3. Ensure that DIP switches S1/1 – S1/4 are set to OFF (= address 0).



05062AXX

4. Set first speed with f1 setpoint potentiometer (activated if terminal f1/f2 = '0') (factory setting: approx. 50 Hz).



05066BXX

[1] Pot. position

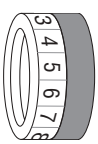
5. Set the second speed with switch f2 (active when tl. f1/f2 = "1").

Switch f2											
Detent position	0	1	2	3	4	5	6	7	8	9	10
Setpoint f2 [Hz]	5	7	10	15	20	25	35	50	60	70	100

During operation, the first speed is infinitely variable using the setpoint potentiometer f1 which is accessible from outside.

Speeds f1 and f2 can be set independently to any value.

6. Set the ramp time with switch t1 (ramp times in relation to a setpoint step change of 50 Hz).



Switch t1											
Detent position	0	1	2	3	4	5	6	7	8	9	10
Ramp time t1 [s]	0.1	0.2	0.3	0.5	0.7	1	2	3	5	7	10

7. Place the MOVIMOT® inverter on the terminal box and secure it.
8. Re-insert screw plug of setpoint potentiometer f1 with gasket.
9. Connect AS-i supply voltage and supply.

Data from AS-i master to MLK11A

The following table shows the 4 data bits that are transferred from the AS-i master to the MLK11A via the AS-Interface:

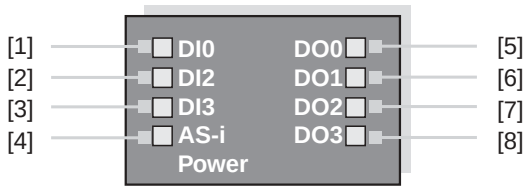
Bit	Function	Display / LED color
D0	Clockwise (terminal R)	DO 0 / yellow
D1	Counterclockwise (terminal L)	DO 1 / yellow
D2	Speed f1 / speed f2 (terminal f1/ f2)	DO 2 / yellow
D3	Voltage supply / reset (terminal 24 V)	DO3 / green

Data from MLK11A to AS-i master

The following table shows the 4 data bits that are transferred from the MLK11A to the AS-i master via the AS-Interface:

Bit	Function	Display / LED color
D0	Ready signal (relay K1)	DI 0 / yellow
D1	-	-
D2	Sensor 1 (M12 socket, pin 4)	DI 2 / yellow
D3	Sensor 2 (M12 socket, pin 2)	DI 3 / yellow

LED display



05070BXX

[1] MOVIMOT® ready for operation
[2] External input DI2
[3] External input DI3
[4] Voltage supply via AS-i system is ok
[5] Clockwise rotation activated
[6] Counterclockwise rotation activated
[7] Speed f2 activated
[8] MOVIMOT® voltage supply

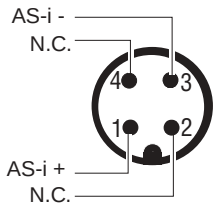
Assigning slave address via hand-held programming device

An AS-i hand-held programming device can be used to assign the slave address. This allows simple and network-independent addressing.

The AS-i hand-held programming devices offer the following functions:

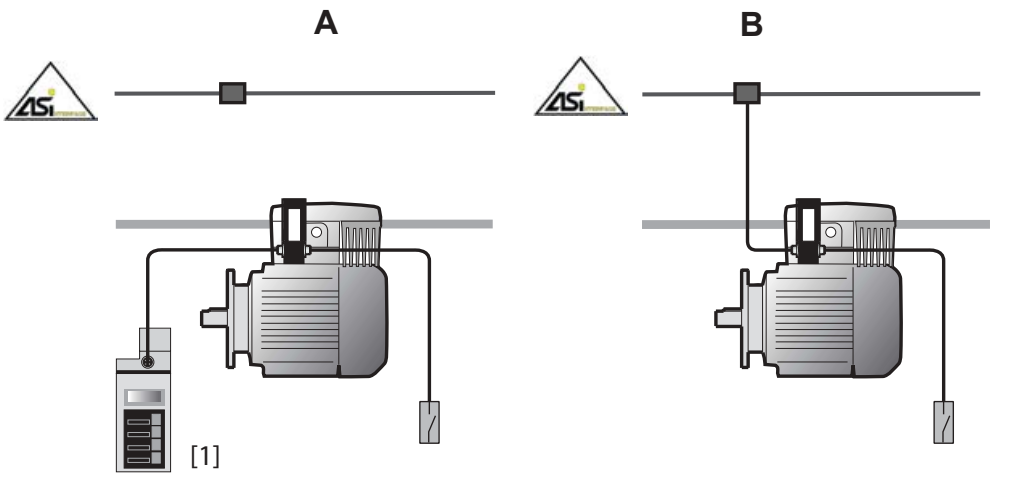
- Reading and changing an AS-i slave address
- Reading the AS-i profile
- Reading and changing the data bits
- Functional test and test operation (the functional test and test operation require an external voltage supply since hand-held programming devices do not supply sufficient current for operation).

The use of a hand-held programming device requires a connecting cable that fits onto the M12 plug connector of the MLK11A (see the following figure).



05135AXX

Example: Every AS-i station is individually addressed (A) and then reintegrated in the AS-i network (B).



52308AXX

[1] AS-i hand-held programming device

7.10 Additional information for mounting close to the motor

If the MOVIMOT® inverter with option P2.A is mounted close to the motor, you need to observe the following instructions:

Checking the method of connection for the connected motor

Use the following figure to verify that the selected connection method of MOVIMOT® is identical for the connected motor.

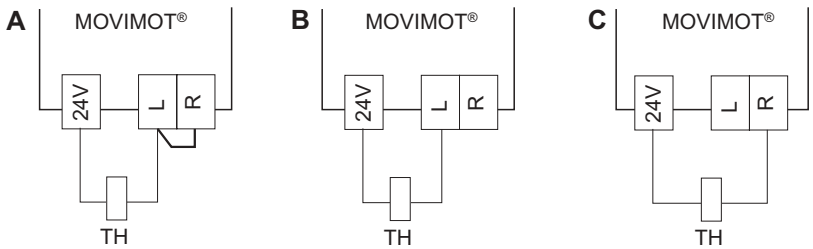
03636AXX

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

Motor protection and direction of rotation enable

The connected motor must be equipped with a TH.

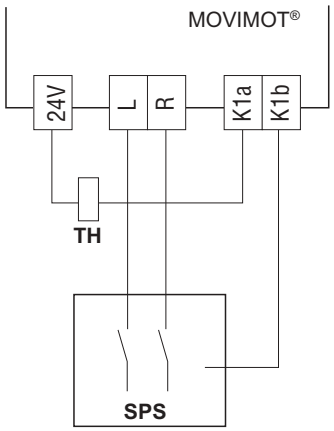
- If control is carried out via RS-485, the TH must be wired as follows:



52257AXX

[A] Both directions of rotation are enabled
[B] Only **counterclockwise** direction of rotation is enabled
[C] Only **clockwise** direction of rotation is enabled

- If control is carried out via binary signals, SEW recommends connecting the TH in series with the "ready signal" relay (see the following figure).
  - The ready signal must be monitored be an external control.
  - As soon as the ready signal is no longer available, the drive must be switched off (tl. R and L = "0").



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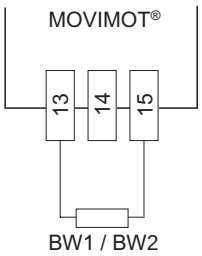
DIP switch

With mounting of the MOVIMOT® inverter close to the motor, set DIP switch S1/5 to ON which is different than the factory setting.

S1 Message	1 RS-485 address 2^0	2 RS-485 address 2^1	3 RS-485 address 2^2	4 RS-485 address 2^3	5 Motor protection	6 Motor rating class	7 PWM frequency	8 No-load damping
ON	1	1	1	1	**Off**	Motor one size smaller	Variable (16, 8, 4 kHz)	On
OFF	**0**	**0**	**0**	**0**	On	**adapted**	**4 kHz**	**Off**

Braking resistor

- With motors without brakes, an internal braking resistor (BW1 or BW2) must be connected to the MOVIMOT®.



06487AXX

- **With brake motors, no braking resistor may be connected to the MOVIMOT®.**

Mounting of the MOVIMOT® inverter in the field distributor

Observe the instructions in the corresponding manuals when mounting the MOVIMOT® inverter close to the motor in the field distributor:

- PROFIBUS Interfaces, Field Distributors
- InterBus Interfaces, Field Distributors
- DeviceNet/CANopen Interfaces, Field Distributors
- AS-Interfaces, AS-i field distributors

8 Startup with Integrated AS-Interface

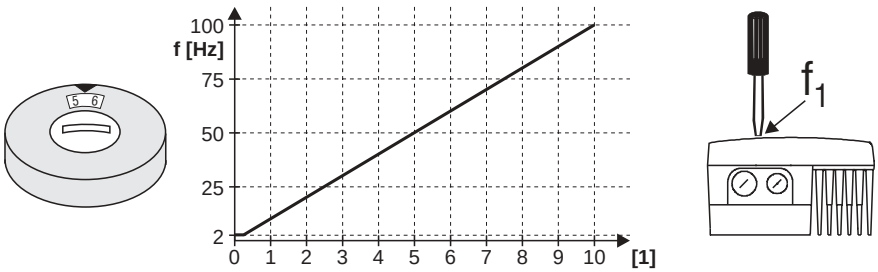
8.1 Important startup instructions

- **It is essential to comply with the safety notes during installation!**
- **Before removing/attaching the MOVIMOT® inverter, it must be disconnected from the power supply system (mains). Dangerous voltages may still be present for up to 1 minute after shutdown.**
- Ensure before startup that the drive has not been damaged.
- Check that all protective covers are installed correctly.
- A minimum switch-off time of 2 seconds must be maintained for the mains contactor K11.

8.2 Description of the controls

Setpoint potentiometer f1

The potentiometer is used to adjust setpoint f1:



05066BXX

[1] Pot. position

Setpoint f1 is selected via the AS-i bit "speed f1/speed f2".

Setpoint switch f2

The switch is used to adjust setpoint f2:

Switch f2											
Detent position	**0**	1	2	3	4	5	6	7	8	9	10
Setpoint f2 [Hz]	**5**	7	10	15	20	25	35	50	60	70	100

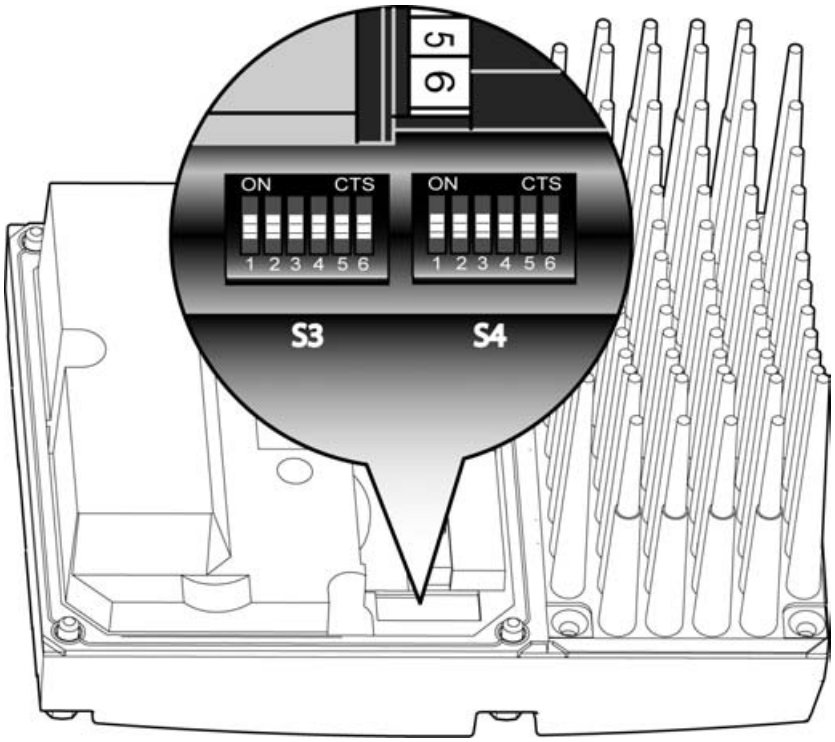
Setpoint f2 is selected via the AS-i bit "speed f1/speed f2".

Switch t1

For integrator ramp (ramp times based on a setpoint jump of 50 Hz)

Switch t1											
Detent position	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

DIP switches S3 and S4



51858AXX

DIP switch S3:

S3 Message	1 Motor protection	2 Motor rating class	3 PWM frequency	4 No-load damping	5 Motor type	6 Brake release without Enable
ON	Off	Motor one size smaller	Variable (16, 8, 4 kHz)	On	SEW DZ motor:[1)]	On
OFF	**On**	**adapted**	**4 kHz**	**Off**	**IEC motor**	**Off**

1) only available in Brazil

DIP switch S4:

S4 Message	1 Control process	2 Speed monitoring	3	4	5	6
			Selection of options			
			2^0	2^1	2^2	2^3
ON	V/f	On	1	1	1	1
OFF	**VFC**	**Off**	**0**	**0**	**0**	**0**

8.3 Description of the DIP switches S3

DIP switch S3/1 **Motor protection activated or deactivated**

- If the MOVIMOT® inverter is mounted close to the motor (with option P2.A or in the field distributor), the motor protection must be deactivated.
- To ensure motor protection after all, a TH (bimetallic thermostat) must be used.

DIP switch S3/2 **Motor rating class smaller**

- If it is activated, the DIP switch enables the assignment of MOVIMOT® to a motor with a smaller rating class. The rated power of the unit remains unchanged.
- If a motor with less power is used, the overload capacity of the drive may increase since the motor considers the MOVIMOT® to be one power increment too high. A larger current may be impressed for a short period of time, which results in higher torques.
- The purpose of switch S3/2 is the short-term utilization of the motor peak torque. The current limit of the respective unit is always the same, independent of the switch setting. The motor protection function is adapted in reference to the switch setting.
- **In this operating mode with S3/2 = "ON", a pull-out protection of the motor is not possible.**

MOVIMOT® inverter	Assigned motor			
	S3/2 = OFF		S3/2 = ON	
	⅄	△	⅄	△
MM03	DT71D4	DR63L4[1)]	DR63L4[1)]	–
MM05	DT80K4	DT71D4	DT71D4	DFR63L4[1)]
MM07	DT80N4	DT80K4	DT80K4	DT71D4
MM11	DT90S4	DT80N4	DT80N4	DT80K4
MM15	DT90L4	DT90S4	DT90S4	DT80N4
MM22	DV100M4	DT90L4	DT90L4	DT90S4
MM30	DV100L4	DV100M4	DV100M4	DT90L4
MM3X	–	DV100L4	DV100L4	DV100M4

1) Only possible with offset assembly

DIP switch S3/3 **Setting the maximum PWM frequency**

- With setting DIP SWITCH S3/3 = OFF, MOVIMOT® operates with 4 kHz PWM frequency.
- With setting DIP SWITCH S3/3 = ON, MOVIMOT® operates with a 16 kHz PWM frequency (low noise) and switches back in steps to lower switching frequencies depending on the heat sink temperature.

DIP switch S3/4 **No-load damping function (S3/4 = ON)**

Upon activation, the function prevents resonant oscillations in no-load operation.

DIP switch S3/5 **Motor type**

With IEC and NEMA motors, DIP switch S3/5 must always be set to OFF, for Brazilian motors to ON.

DIP switch S3/6 **Releasing the brake without enable**

With activated switch S3/6 = "ON", the brake can also be released if no drive enable is present.

Operation with braking resistor

The special function is not in effect if operated with braking resistor.

Releasing the brake

The brake can be released under the following conditions by setting the AS-i bit "speed f1/speed f2":

Status of AS-i bit			Enable condition	Fault condition	Brake function
D0 (R)	D1 (L)	D2 (f1/f2)			
"1" "0"	"0" "1"	"0"	Unit enabled	No Unit fault	Brake is controlled by MOVIMOT®, setpoint f1
"1" "0"	"0" "1"	"1"	Unit enabled	No Unit fault	Brake is controlled by MOVIMOT®, setpoint f2
"1" "0"	"1" "0"	"0"	Unit not enabled	No Unit fault	Brake closed
"1"	"1"	"1"	Unit not enabled	No Unit fault	Brake closed
"0"	"0"	**"1"**	**Unit not enabled**	**No Unit fault**	**Brake released for manual procedure**
All conditions possible			Unit not enabled	Unit fault	Brake closed

Bit D3 (Reset/Controller enable) must be set to enable the drive.

Setpoint selection

Setpoint selection dependent on AS-i bit "speed f1/speed f2":

Enable condition	AS-i bit	Active setpoint
Unit enabled	D2 = "0"	Setpoint potentiometer f1 active
Unit enabled	D2 = "1"	Setpoint potentiometer f2 active

Behavior with a non-operating unit

In case of a non-operating unit, the brake is always applied independent of the setting of AS-i bit "speed f1/speed f2".

LED display

The yellow LED display flashes periodically and quickly (t_{on} : t_{off} = 100 ms : 300 ms) if the brake was released for manual procedure.

8.4 Description of the DIP switches S4

DIP switch S4/1

Control process

- DIP switches S4/1 = OFF: VFC operation for 4-pole motors
- DIP switches S4/1 = ON: U/f operation reserved for special cases

DIP switch S4/2

Speed monitoring

- Speed monitoring (S4/2 = "ON") is used for the protection of the drive during blocking.
- If the drive is operated at the current limit for more than 1 second with active speed monitoring (S4/2 = "ON"), the speed monitoring trips. MOVIMOT® signals a fault via status LED (red, flashing slowly, fault code 08). The current limit must be attained uninterruptedly for the duration of the delay time before the monitoring function responds.

DIP switches S4/3 to S4/6

Selection of options

- Special functions can be selected using the binary coding of the DIP switches.
- The possible values can be set as follows:

Decimal value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
S4/3	–	X	–	X	–	X	–	X	–	X	–	X	–	X	–	X
S4/4	–	–	X	X	–	–	X	X	–	–	X	X	–	–	X	X
S4/5	–	–	–	–	X	X	X	X	–	–	–	–	X	X	X	X
S4/6	–	–	–	–	–	–	–	–	X	X	X	X	X	X	X	X

X = ON

– = OFF

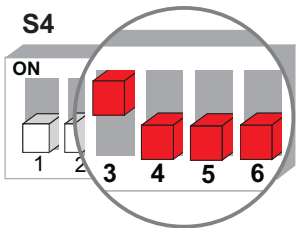
- An overview of the selectable special functions can be found on page 58.

8.5 Selectable special functions MM..C-503-30

Overview of selectable special functions

Decimal value	Brief description	Limitations	see page
0	Basic functionality, no special function selected	–	–
1	MOVIMOT® with increased ramp times	–	page 96
2	MOVIMOT® with adjustable current limitation (fault if exceeded)	–	page 96
3	MOVIMOT® with adjustable current limitation (switchable via terminal f1/f2)	–	page 97
4	**Not possible with MOVIMOT® with integrated AS-Interface**		–
5	**Not possible with MOVIMOT® with integrated AS-Interface**		–
6	MOVIMOT® with maximum 8 kHz PWM frequency	–	page 99
7	MOVIMOT® with rapid start / stop	**Rapid stop not possible**	page 99
8	MOVIMOT® with minimum frequency 0 Hz	–	page 100
9	**Not possible with MOVIMOT® with integrated AS-Interface**		–
10	MOVIMOT® with minimum frequency 0 Hz and reduced torque at low frequencies	–	page 101
11	Monitoring of supply phase fault is deactivated	–	page 101
12	**Not possible with MOVIMOT® with integrated AS-Interface**		–
12 to 15	Not assigned	–	–

Special function 1 MOVIMOT® with increased ramp times



51859AXX

Function description

- It is possible to set ramp times up to 40 s.

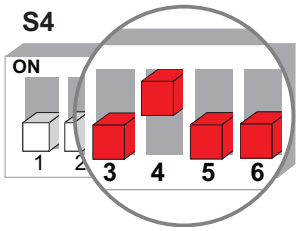
Changed ramp times

Switch t1											
Detent position	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	20	25	30	35	40

= Corresponds to standard setting

= Changed ramp times

Special function 2 MOVIMOT® with adjustable current limitation (fault if exceeded)



51860AXX

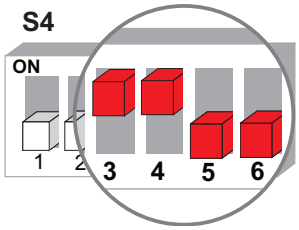
Function description

- The current limit can be set via switch f2.
- Setpoint f2 can no longer be changed and is fixed at the following value:
  - Setpoint f2: 5 Hz
- Monitoring becomes effective above 15 Hz. If the drive is operated at the current limit for more than 500 ms, the unit changes to the fault status (fault 44). The status is indicated through rapid red flashing.

Adjustable current limits

Switch f2											
Detent position	0	1	2	3	4	5	6	7	8	9	10
I_{max} [%] of I_N	90	95	100	105	110	115	120	130	140	150	160

Special function 3 **MOVIMOT® with adjustable current limitation (switchable via AS-i bit "speed f1/ speed f2"), with reduction of frequency if exceeded**



51861AXX

Function description

The current limitation can be set via switch f2. The AS-i bit "speed f1/speed f2" can be used to toggle between maximum current limit and the current limitation set via switch f2.

Response after reaching the current limitation

- After reaching the current limit, the unit reduces the frequency using the current limitation function and if necessary stops the ramp to prevent the current from increasing.
- If the unit operates at the current limitation, the status is displayed through rapid green flashing of the status LED.

In-system values for setpoint f2/minimum frequency

- Switching via AS-i "speed f1/speed f2" between setpoint f1 and setpoint f2 is no longer possible.

Adjustable current limits

Switch f2											
Detent position	0	1	2	3	4	5	6	7	8	9	10
I_{max} [%] of I_N	60	70	80	90	100	110	120	130	140	150	160

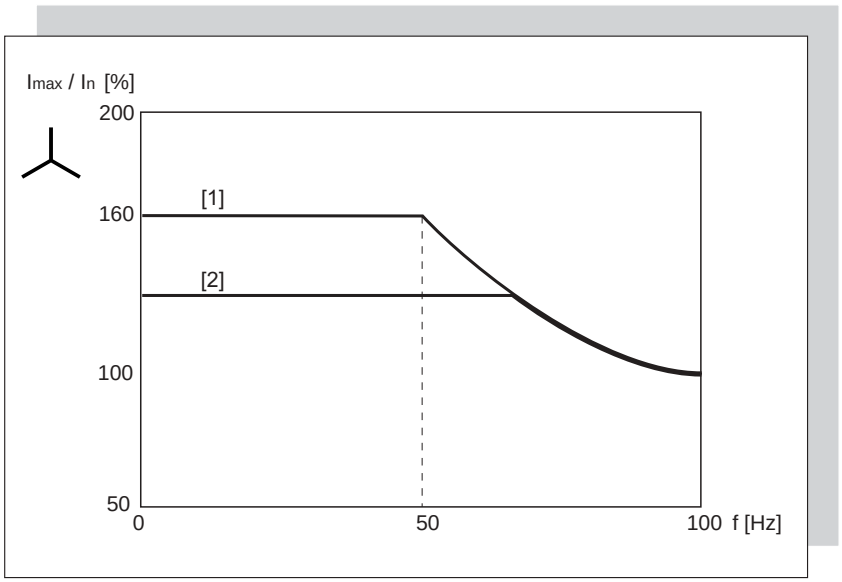
Selection of current limitation via AS-i bit "speed f1/ speed f2"

AS-i bit "speed f1/speed f2" = 0	**AS-i bit "speed f1/speed f2" = 1**
Current limitation 160%	Current limitation via switch f2

Influencing the current characteristic curve

By selecting a lower current limit, the calculation of the current limit is carried out with a constant factor.

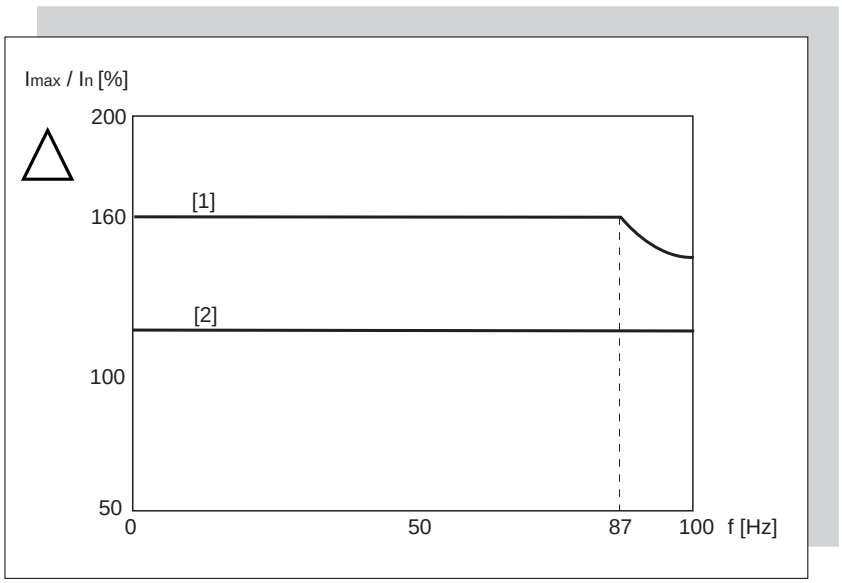
Motor with star connection



50851AXX

[1] Current limit characteristic curve of standard function
[2] Reduced current limit characteristic curve for special function 3 and AS-i bit "speed f1/ speed f2"= "1"

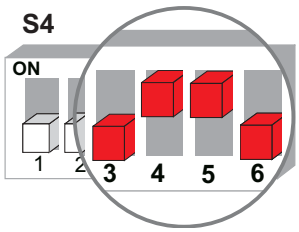
Motor with delta connection



50852AXX

[1] Current limit characteristic curve of standard function
[2] Reduced current limit characteristic curve for special function 3 and AS-i bit "speed f1/ speed f2"= "1"

Special function 6 MOVIMOT® with maximum 8 kHz PWM frequency



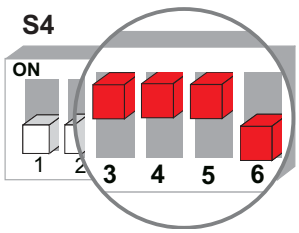
51863AXX

Function description

- The special function reduces the maximum adjustable PWM frequency via S3/3 from 16 kHz to 8 kHz.
- When DIP switch S3/3 = "ON", the unit operates with an 8 kHz PWM frequency (low noise) and switches back to 4 kHz depending on the heat sink temperature.

	S3/3 <u>without</u> special function 6	**S3/3 <u>with</u> special function 6**
ON	PWM frequency variable 16, 8, 4 kHz	PWM frequency variable 8, 4 kHz
OFF	PWM frequency 4 kHz	PWM frequency 4 kHz

Special function 7 MOVIMOT® with rapid start

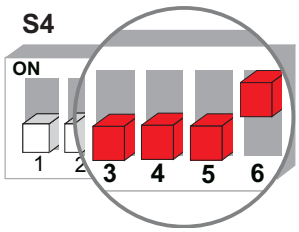


51864AXX

Function description

- The pre-magnetization time is fixed at 0 s.
- No pre-magnetization is carried out at the start of the release to begin the acceleration at the setpoint ramp as quickly as possible.

Special function 8 MOVIMOT® with minimum frequency 0 Hz



51866AXX

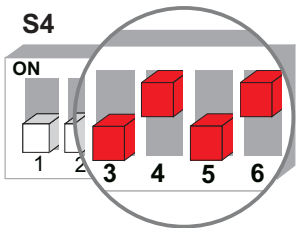
Function description

If switch f2 is in position of rest 0, the setpoint f2 measures 0 Hz with activated special function. All other adjustable values remain unchanged.

Switch f2											
Detent position	**0**	1	2	3	4	5	6	7	8	9	10
Setpoint f2 [Hz] with activated special function	0	7	10	15	20	25	35	50	60	70	100
Setpoint f2 [Hz] without special function	**5**	7	10	15	20	25	35	50	60	70	100

Special function 10

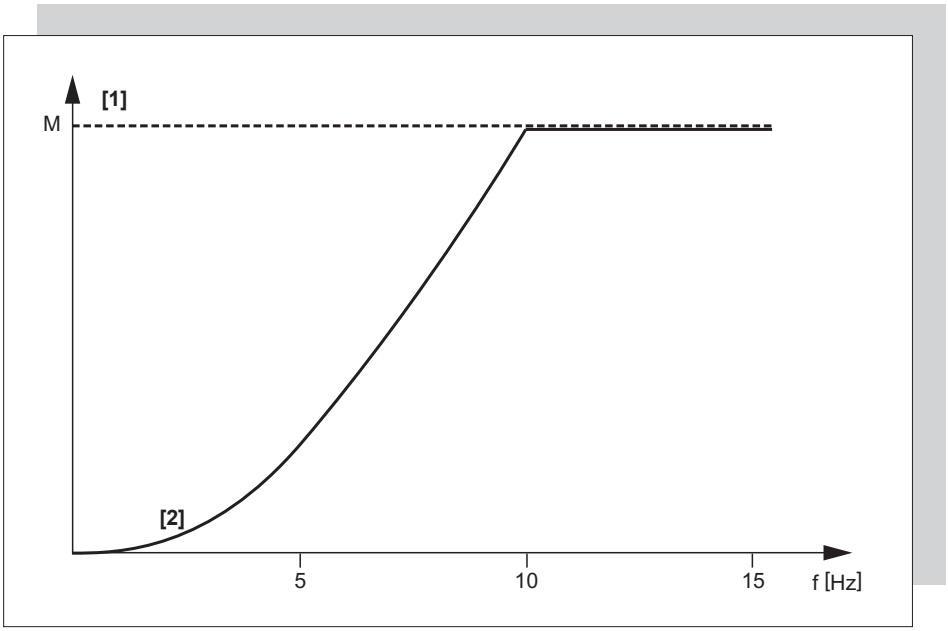
MOVIMOT® with reduced torque at low frequencies



51868AXX

Function description

- The drive builds up only a reduced torque due to a reduction in slip and active current at low speeds (see following figure):
- Minimum frequency = 0 Hz (see special function 8 on page 68)

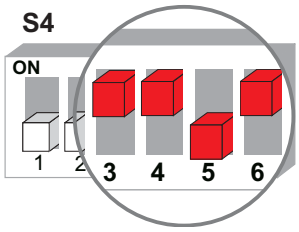


50907AXX

[1] Maximum torque with VFC operation
[2] Maximum torque with activated special function

Special function 11

Deactivation of phase fault control



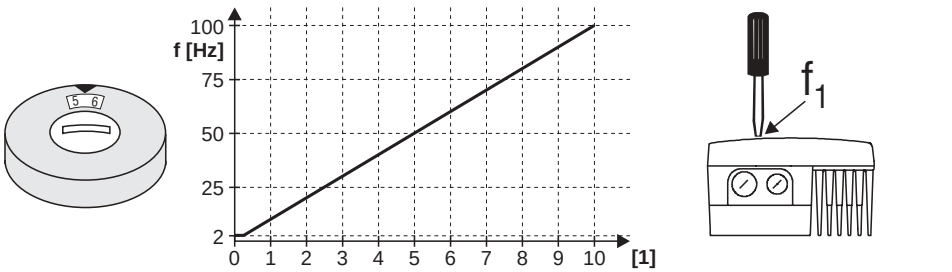
52123AXX

Function description

- Phase control does not take place if the special function is activated.
- This is meaningful, for example, for supply systems with brief asymmetry.

8.6 Startup procedure

1. **Isolate MOVIMOT® drive from the supply, safeguarding it against unintentional power-up! Dangerous voltages may still be present for up to 1 minute after shutdown!**
2. With mounted MOVIMOT® inverter and switch S5 = 1 (factory setting), set the desired AS-i address either via a hand-held programming device (see page 103) or later via a master (see the description of your AS-i master).
3. **Review correct connection of MOVIMOT® (see the section "Electrical Installation").**
4. Set the type of 24 V supply with switch S5 (see page 104).
5. Set the first speed with setpoint potentiometer f1 (factory setting approx. 50 Hz).



05066BXX

[1] Pot. position

6. Set the second speed with switch f2 (active when AS-i bit "speed f1/speed f2" = "1").

Switch f2											
Detent position	0	1	2	3	4	5	6	7	8	9	10
Setpoint f2 [Hz]	5	7	10	15	20	25	35	50	60	70	100

During operation, the first speed is infinitely variable using the setpoint potentiometer f1 which is accessible from outside.

Speeds f1 and f2 can be set independently to any value.

7. Set the ramp time with switch t1. (The ramp times are in relation to a setpoint step change of 50 Hz.)

Switch t1											
Detent position	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

8. Place the MOVIMOT® inverter on the terminal box and secure it.
9. Re-insert screw plug of setpoint potentiometer f1 with gasket.
10. Switch on AS-i voltage, 24 V auxiliary voltage and supply voltage.

Assigning the slave address

MOVIMOT® drives with integrated AS-Interface are supplied with address 0. The address (address 1 to 31) can be assigned as follows:

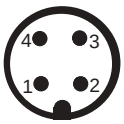
- Automatic address assignment within a projected AS-i system with the replacement of a MOVIMOT®. The following requirements must be met:
  - The new MOVIMOT® must have address 0.
  - If several MOVIMOT® are replaced, they must be replaced one by one (in sequence).
- Manual address assignment via system master (the drives must be connected to the AS-i cable in sequence to prevent having several MOVIMOT® with the same address).
- Manual address assignment by means of an AS-i hand-held programming device (before connecting the MOVIMOT® to the AS-i cable see the following section)

Assigning the slave address via hand-held programming device

The AS-i hand-held programming devices offer the following functions:

- Reading and changing an AS-i slave address
- Reading the AS-i profile
- Reading and changing the data and parameter bits
- Functional test and test operation. The functional test and test operation require an external voltage supply (AUX-PWR) since hand-held programming devices do not supply sufficient current for operation.

The use of an addressing device requires a connecting cable that fits onto the AS-i plug connector on the MOVIMOT® (see the following figure).



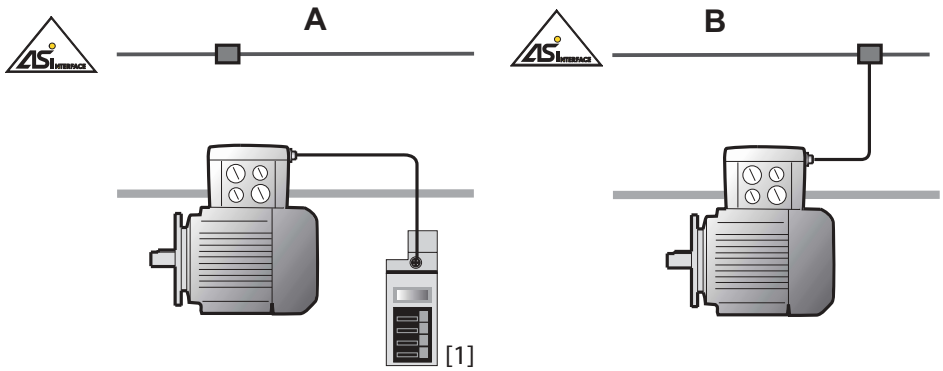
1: AS-i +
2: 0V24 [1]
3: AS-i -
4: 24V [1]

[1] Pin 2 + 4 are not required for address assignment.

52149AXX

- **If the hand-held programming device is not floating at pin 2 + 4, pin 2 + 4 must not be connected.**
- **If addressing is carried out via hand-held programming device, switch S5 on the wiring board must be set to position 1!**
- **After addressing, switch S5 must be set according to the 24 V supply.**

Example: Every AS-i station is individually addressed (A) and then reintegrated in the AS-i network (B).

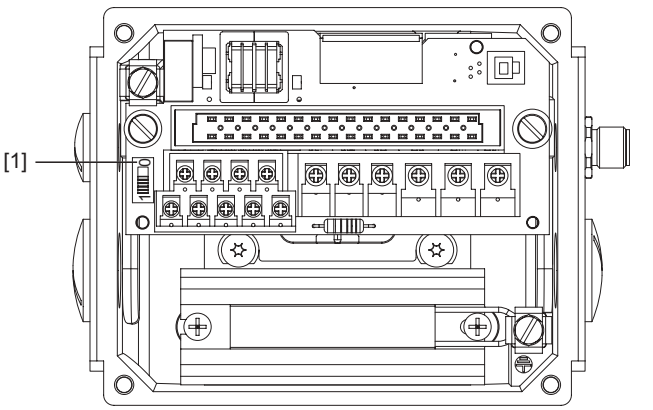


51894AXX

[1] AS-i hand-held programming device

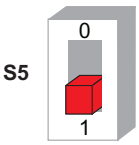
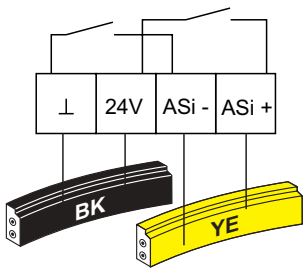
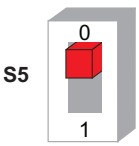
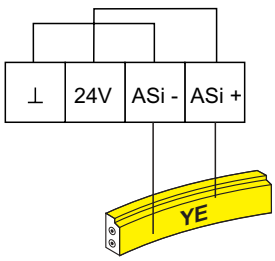
Selecting the 24 V supply via switch S5

Switch S5 is located on the connection board next to the control terminals. The switch is used to select the type of 24 V supply.



51890AXX

[1] Switch S5

Switch	24 V supply
Switch S5 = 1  51941AXX	Supply of MOVIMOT® via AUX-PWR (e.g. black AS-i cable)  06374AXX
Switch S5 = 0  51942AXX	Supply of MOVIMOT® via AS-i data cable  06375AXX

Data from AS-i-Master → MOVIMOT®

The following table shows the 4 data bits that are transferred from the AS-i master to the MOVIMOT® via the AS-Interface:

Bit	Function
D0	CW / Stop
D1	CCW / Stop
D2	Speed f2 / speed f1
D3	Reset[1] / controller enable

1) with signal edge change from "0" → "1" (only effective in case of a fault)

Data from MOVIMOT® → AS-i master

The following table shows the 4 data bits that are transferred from MOVIMOT® to the AS-i master via the AS-Interface:

Bit	Function
D0	Ready message
D1	-
D2	Sensor input 1 (terminal DI 2 or optionally M12 socket pin 4)
D3	Sensor input 2 (terminal DI 3 or optionally M12 socket pin 2)

Setpoint scaling via parameter bits

The following table shows the parameter bits for setpoint scaling. The setpoint scaling only acts on the externally adjustable setpoint f1. Setpoint f2 and the minimum frequency are not affected by the scaling. The table shows the possible setpoint frequencies for settings f1 = 100 Hz and f1 = 50 Hz as examples.

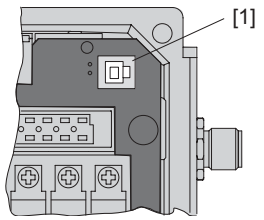
Parameter bits				Divider factor	Example 1	Example 2
P3	**P2**	**P1**	**P0**		**Setting f1 = 100 Hz**	**Setting f1 = 50 Hz**
1	1	1	1	1.00	100	50
1	1	1	0	1.11	90	45
1	1	0	1	1.25	80	40
1	1	0	0	1.43	70	35
1	0	1	1	1.67	60	30
1	0	1	0	2.00	50	25
1	0	0	1	2.22	45	22.5
1	0	0	0	2.50	40	20
0	1	1	1	2.86	35	17.5
0	1	1	0	3.33	30	15
0	1	0	1	4.00	25	12.5
0	1	0	0	5.00	20	10
0	0	1	1	6.67	15	7.5
0	0	1	0	10.00	10	5
0	0	0	1	14.30	7	3.5
0	0	0	0	20.00	5	2.5

8.7 Advanced startup with MOVITOOLS

Diagnostic interface

MOVIMOT® drives with integrated AS-Interface contain a diagnostics interface for startup and service. This allows for diagnostics, manual operation and parameter setting of scaling factors using the SEW software MOVITOOLS **(version 4.0 and higher)**.

The diagnostics interface is located on the top of the MOVIMOT® connection board (see the following figure).

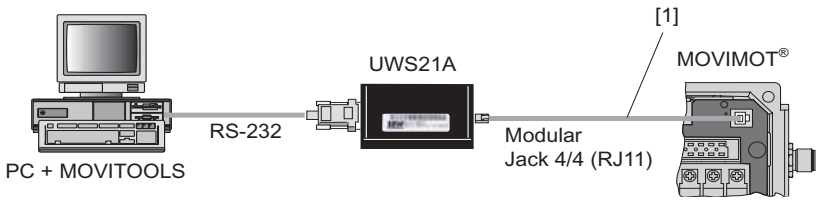


51943AXX

[1] Diagnostic interface X50

MWS21A option

The diagnostics interface can be connected to a commercially available PC with a serial interface (RS-232) using the diagnostic kit MWS21A offered by SEW-EURODRIVE (part number: 823 180X).



51872AXX

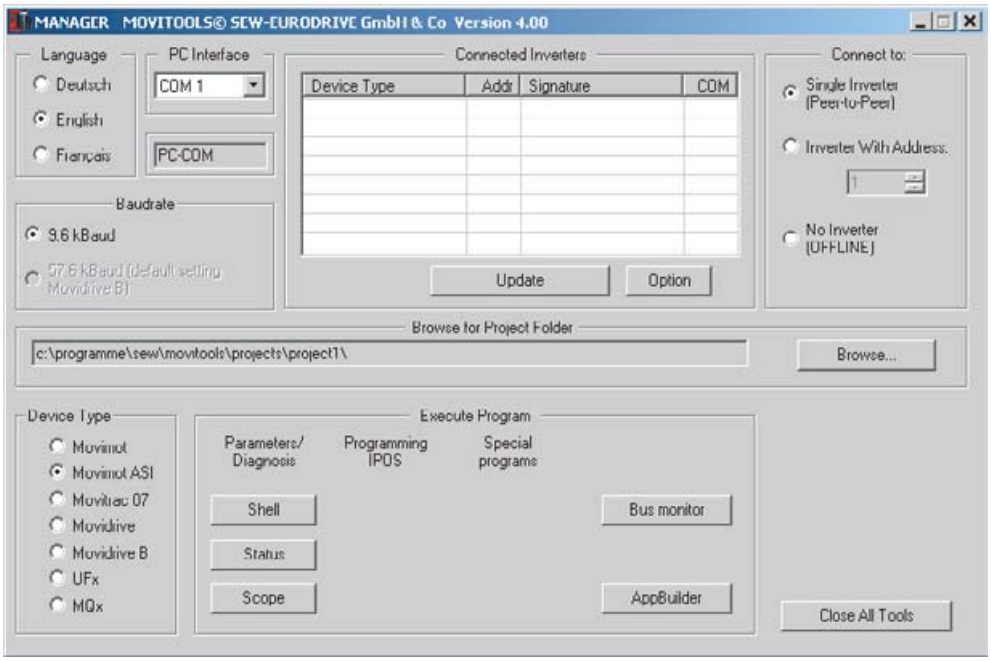
[1] Feed the cable through the cable entry into the MOVIMOT® wiring space!

Scope of delivery of MWS21A:

- Interface adapter
- Cable with modular jack 4/4 (RJ11) plug connector
- RS-232 interface cable
- SOFTWARE-ROM 4 (MOVITOOLS software)

Start MOVITOOLS

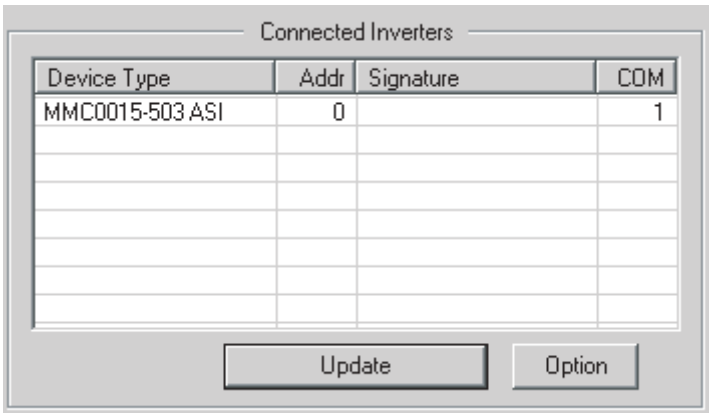
1. **Isolate MOVIMOT® drive from the supply, safeguarding it against unintentional power-up! Dangerous voltages may still be present for up to 1 minute after shutdown!**
2. Remove screws at MOVIMOT® inverter and detach MOVIMOT® inverter.
3. Remove a closing plug from the MOVIMOT® terminal box.
4. Attach the modular jack plug connector 4/4 (RJ11) to the socket X50. Feed the cable through the open cable entry.
5. Place the MOVIMOT® inverter on the terminal box and secure it.
6. Switch in the electronics supply voltage.
7. Start the MOVITOOLS manager on the PC. The following window displays:



06458AEN

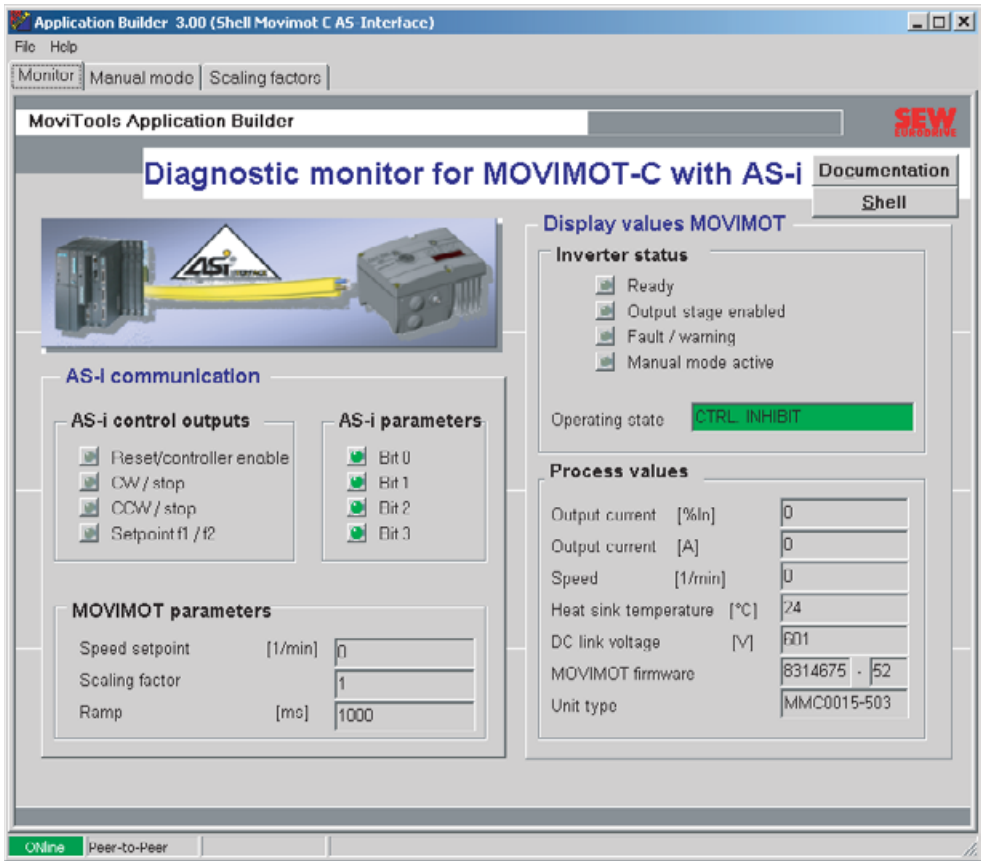
8. In the "PC-COM" selection menu, select the serial interface used in your PC.
9. Activate the button "Single Inverter (Peer-to-Peer)" in the window area "Connect to."

10. After clicking the "Update" button, the "Connected Inverters" window shows the MOVIMOT® in use. If no device is shown, check the communications connection.



06459AEN

11. Activate the "MOVIMOT ASI" button in the "Device Type" window area.
12. Clicking the "Shell" button opens the user interface for diagnostics, manual operation and parameter setting of scaling factors (Shell) as well as a status window.



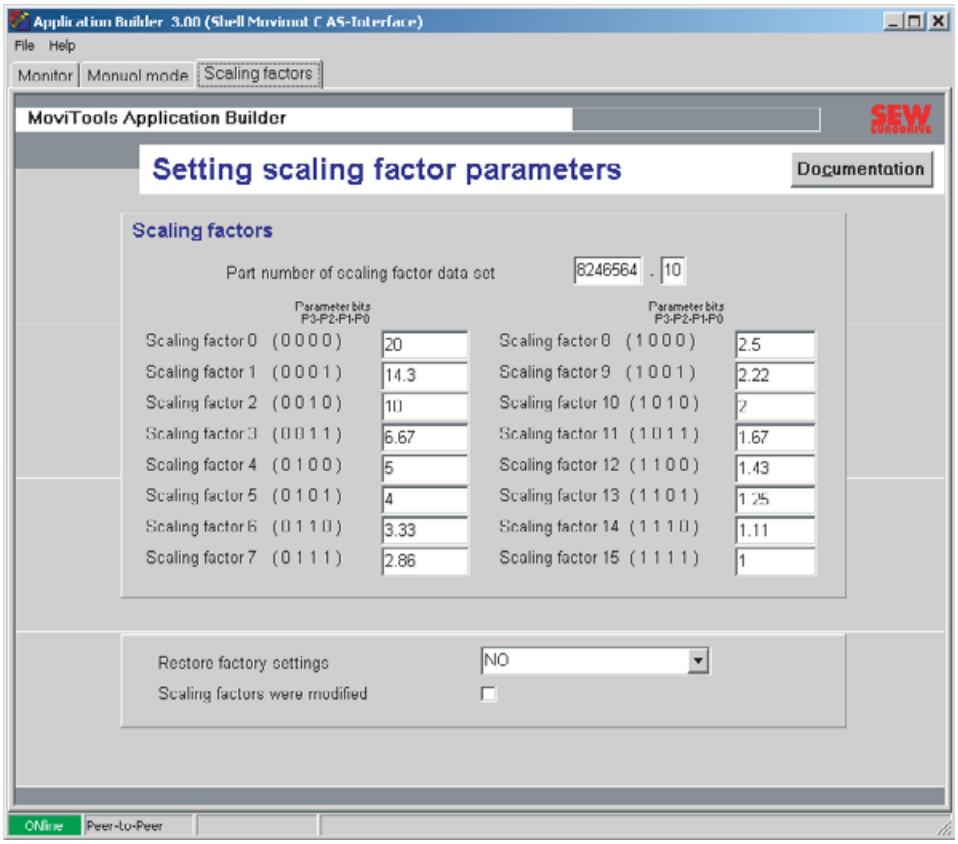
06460AEN

13. The buttons "Monitor", "Manual mode" and "Scaling factors" in the top left window area can be used to select the windows of the program. Additional information about the "Monitor" window can be found in the section "Diagnostics."

"Scaling factors" window

This window is used to enter scaling factors in the range of values from 1.00 to 50.00. The entry must be confirmed with the [Enter] key.

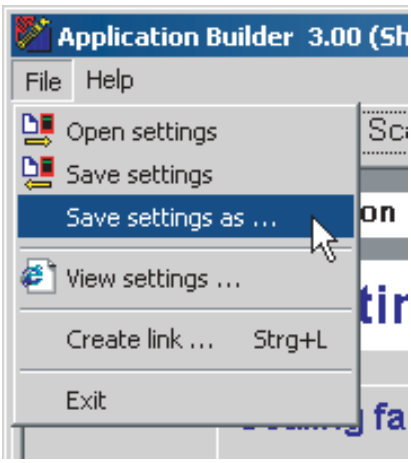
The "Restore factory settings" menu item can be used to restore the basic settings of the scaling factors.



06363AEN

Saving the scaling factors

The scaling factors can be saved to an XML file by using the "File/Save settings as" menu item. The file name and target directory can be selected at random.



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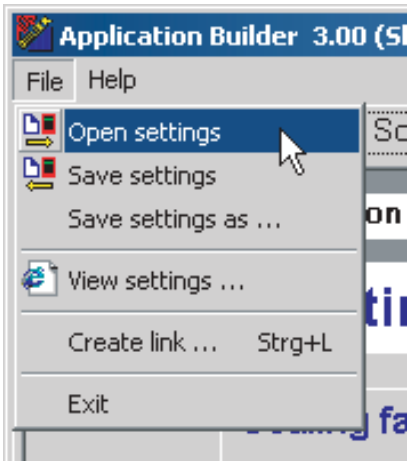
If the values saved in the file must be transferred to MOVIMOT®, the file must be opened using the "File/Open settings" menu item.

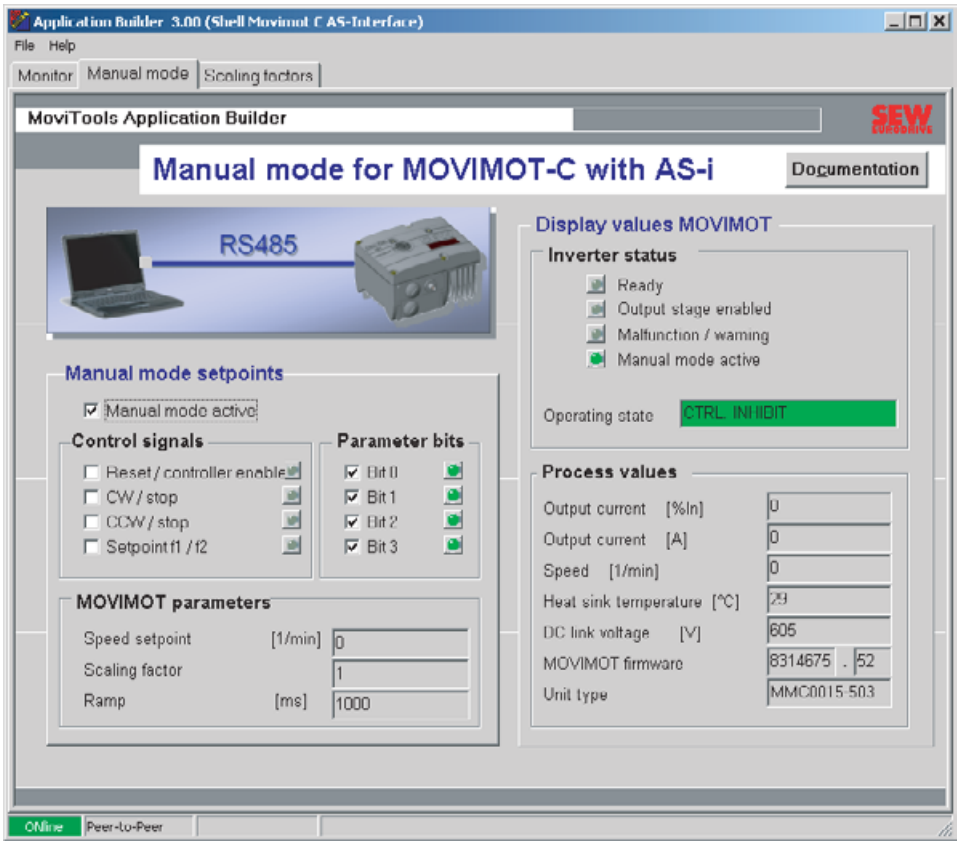
When the file is opened, the scaling factors are automatically downloaded to the device.



06480AEN

"Manual mode" window

Manual mode can be used to manually operate the drive (see the following figure).



06366AEN

Activating manual mode

Manual mode is activated by clicking the "Manual mode active" button:

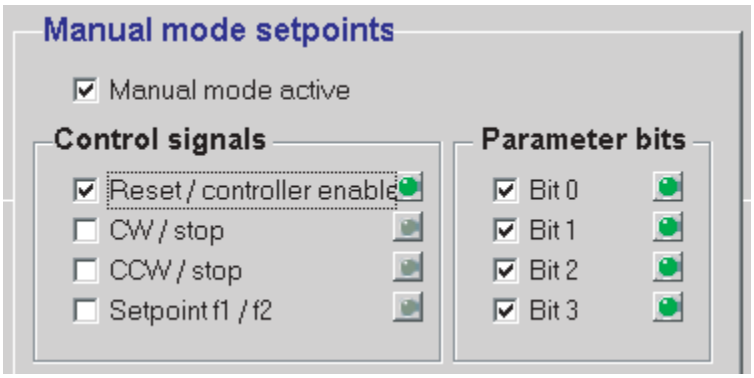
06367AEN

- The successful activation of manual operation is displayed in the MOVIMOT® display values window area by means of the green symbol "Manual mode active." The control signals and parameter bits are set to default values as shown in the figure above.
- The control signals and parameter bits are now available for controlling the device in manual operation.
- If the electronics supply is switched off and on again in manual mode, the device is subsequently in control mode via AS-Interface. To return to manual mode, repeat the steps outlined above.

Control in manual mode

The desired signals are set by clicking the corresponding button and reset by clicking it again. The status is signaled via a symbol (shaded means not active, green means active). The control signal or parameter bit combination in the device becomes effective by activating the button.

In the following illustration, the "Reset" control signal and all parameter bits are active which is indicated by a green symbol:

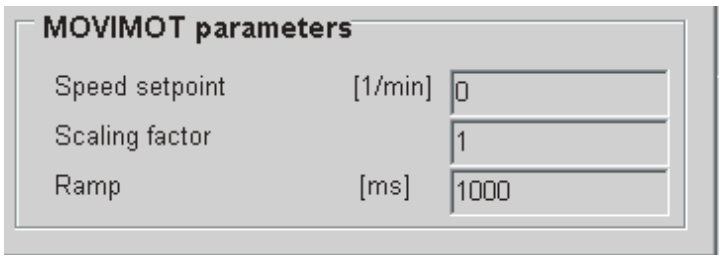


06369AEN

If the enable is to be carried out in manual mode, the "CW/stop" or "CCW/stop" control signal and the "Reset/controller enable" control signal must be set. If the "Reset/controller enable" control signal is not set, the device is in the CTRL. INHIBIT status.

Parameter window area

- This window area displays the current speed setpoint, the scaling factor selected via parameter bits and the ramp time set via potentiometer t1; changes cannot be performed.
- If setpoint f1 is active, the effect of the scaling factor is taken into account in the speed setpoint.



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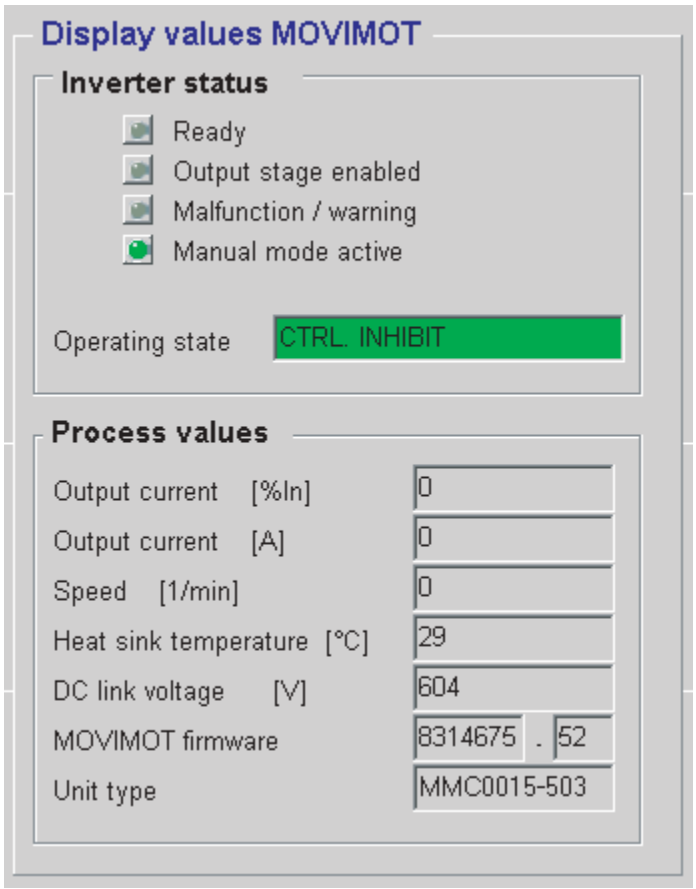
Display values window area

This window area displays important information about inverter status and process values.



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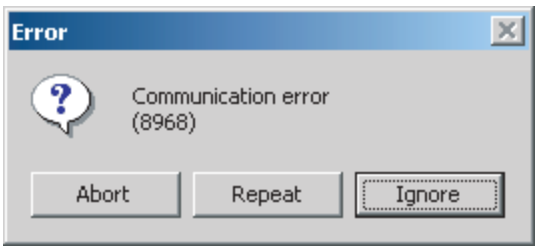
Timeout interval in manual mode

- To avoid uncontrolled operation of the device after activating manual mode, a time-out monitoring in the device becomes effective when the communication is interrupted, the "Manual mode" window or the program is closed.
- Manual mode is deactivated after 10 s, and the device changes to control via AS-Interface mode.

If the timeout monitoring is tripped, the AS-i control signals of the master become effective immediately. To avoid an unintentional start-up, they must be set in advance to "no enable".

Performing a reset

To perform a fault reset in manual operation, the "Reset/controller enable" control signal must be deactivated and then activated since a positive edge from the device must be recognized for performing the reset. Since the PC interface cyclically requests data from the device, the message appears after performing the reset.



06373AEN

This message must be acknowledged by clicking the "Ignore" button.

8.8 Additional information for mounting close to the motor

Observe the following instructions when mounting the MOVIMOT® inverter with option P2.A close to the motor:

Checking the method of connection for the connected motor

Use the following figure to verify that the selected connection method of MOVIMOT® is identical for the connected motor.

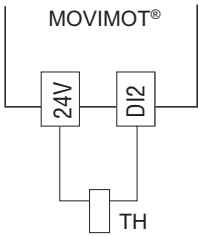
03636AXX

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

Motor protection

The connected motor must be equipped with a TH. SEW recommends wiring the TH via input DI2 (see the following figure).

- Input DI2 must be monitored be an external control.
- As soon as DI2 = LOW, the drive must be switched off (bit D0 and D1 = "0").



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DIP switch

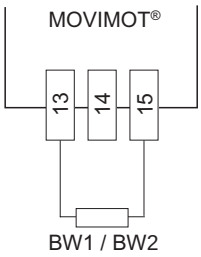
With mounting of the MOVIMOT® inverter close to the motor, set DIP switch S3/1 to ON which is different than the factory setting.

S3 Message	1 Motor protection	2 Motor rating class	3 PWM frequency	4 No-load damping	5 Motor type	6 Brake release without Enable
ON	**Off**	Motor one size smaller	Variable (16, 8, 4 kHz)	On	SEW DZ motor:[1)]	On
OFF	On	**adapted**	**4 kHz**	**Off**	**IEC motor**	**Off**

1) only available in Brazil

Braking resistor

- With motors without brakes, an internal braking resistor (BW1 or BW2) must be connected to the MOVIMOT®.



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- **With brake motors, no braking resistor may be connected to the MOVIMOT®.**

9 Startup with Communications Interface / Fieldbus

9.1 Startup procedure

1. **Review correct connection of MOVIMOT® (see the section "Electrical Installation").**
2. Set the correct RS-485 address on DIP switches S1/1...S1/4. **Always set address "1" in conjunction with SEW fieldbus interfaces (MF...).**

Decimal address	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
S1/1	–	X	–	X	–	X	–	X	–	X	–	X	–	X	–	X
S1/2	–	–	X	X	–	–	X	X	–	–	X	X	–	–	X	X
S1/3	–	–	–	–	X	X	X	X	–	–	–	–	X	X	X	X
S1/4	–	–	–	–	–	–	–	–	X	X	X	X	X	X	X	X

X = ON

– = OFF

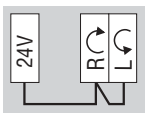
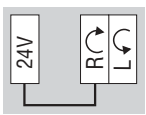
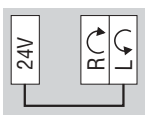
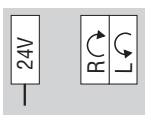
3. Set the minimum frequency f_{min} with switch f2.

Switch f2											
Detent position	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

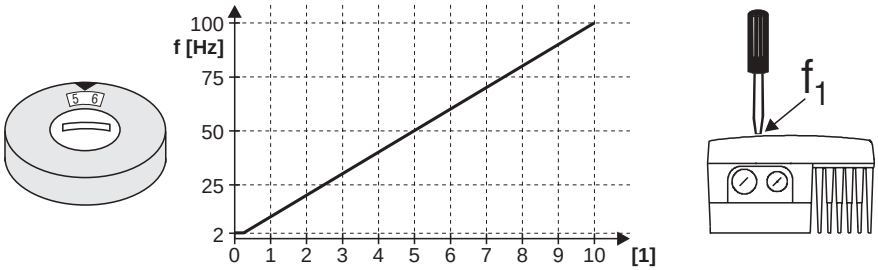
4. If ramp is not set via fieldbus, set ramp time with switch t1 (ramp times are based on a setpoint jump of 50 Hz).

Switch t1											
Detent position	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

5. Check whether the required direction of rotation is enabled.

Terminal R	Terminal L	Message
Activated	Activated	• Both directions of rotation are enabled
		
Activated	Not activated	• Only clockwise direction of rotation is enabled • Preselected setpoints for counterclockwise rotation result in standstill of drive
		
Not activated	Activated	• Only counterclockwise direction of rotation is enabled • Setpoint selections for clockwise lead to the drive being stopped
		
Not activated	Not activated	• Unit is blocked or the drive is stopped
		

6. Place the MOVIMOT® inverter on the terminal box and secure it.
7. Set the required maximum speed using setpoint potentiometer f1.



05066BXX

[1] Pot. position

8. Re-insert screw plug of setpoint potentiometer f1 with gasket.
9. Switch on the voltage.

Information about the function in connection with RS-485 master can be found starting on page 122.

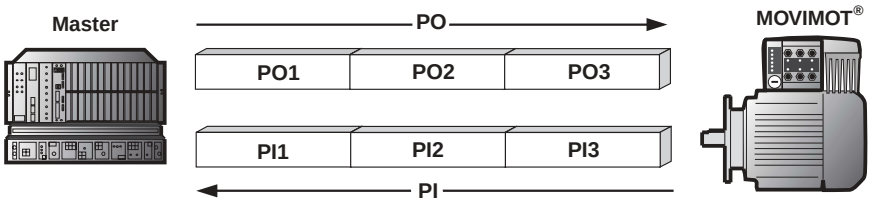
Information about the function in connection with fieldbus interfaces can be found in the corresponding manuals.

- PROFIBUS Interfaces, Field Distributors
- InterBus Interfaces, Field Distributors
- DeviceNet/CANopen Interfaces, Field Distributors
- AS-Interfaces, AS-i field distributors

9.2 Coding of process data

The same process data information is used for controlling and selecting setpoints for all fieldbus systems. The process data are coded using the uniform MOVILINK® profile for SEW drive inverters. In the case of MOVIMOT®, it is always possible to differentiate between the following variants:

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



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

Two process data words

In order to control MOVIMOT® using two process data words, the process output data "Control word 1" and "Speed [%]" are send to the master programmable controller for MOVIMOT®; the process input data "Status word 1" and "Output current" are sent from MOVIMOT® to the programmable controller.

Three process data words

When control takes place with three process data words, 'Ramp' is sent as additional process output data word; "Status word 2" is sent as third process input data word.

Process output data

Process output data are sent from the master 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. MOVIMOT® can be controlled with the following process output data:

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

	Basic control block															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
PO1: Control word	reserved for special functions = "0"									"1" = Reset	reserved = "0"			"1 1 0" = Release otherwise stop		
PO2: Setpoint	Signed percentage / 0.0061 % **Example:** -80% / 0.0061 % = - 13115 = $CCC5_{hex}$															
PO3: Ramp (only for three-word protocol only)	Time from 0 to 50 Hz in ms (range: 100...10000 ms) **Example:** 0.2 s = 2000 ms = $07DO_{hex}$															

Control word, bits 0...2

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

The "Stop" control command is issued by resetting bit 2 = "0." You should use the stop command 0002_{hex} to ensure compatibility with other SEW inverter products. However, MOVIMOT® always triggers a stop with the current ramp whenever bit 2 = "0," irrespective of the status of bit 0 and bit 1.

Control word bit 6 = Reset

In the event of a malfunction, the fault can be acknowledged with bit 6 = "1" (Reset). The value of unassigned control bits should be 0 to ensure compatibility.

Speed [%]

The speed setpoint is specified as a percentage value in reference to the maximum speed set with the f1 setpoint potentiometer.

Coding: $C000_{hex}$ = -100 % (counterclockwise rotation)
4000_{hex} = +100 % (clockwise rotation)
→ 1 digit = 0,0061 %

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

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

Ramp

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

Coding: 1 digit = 1 ms

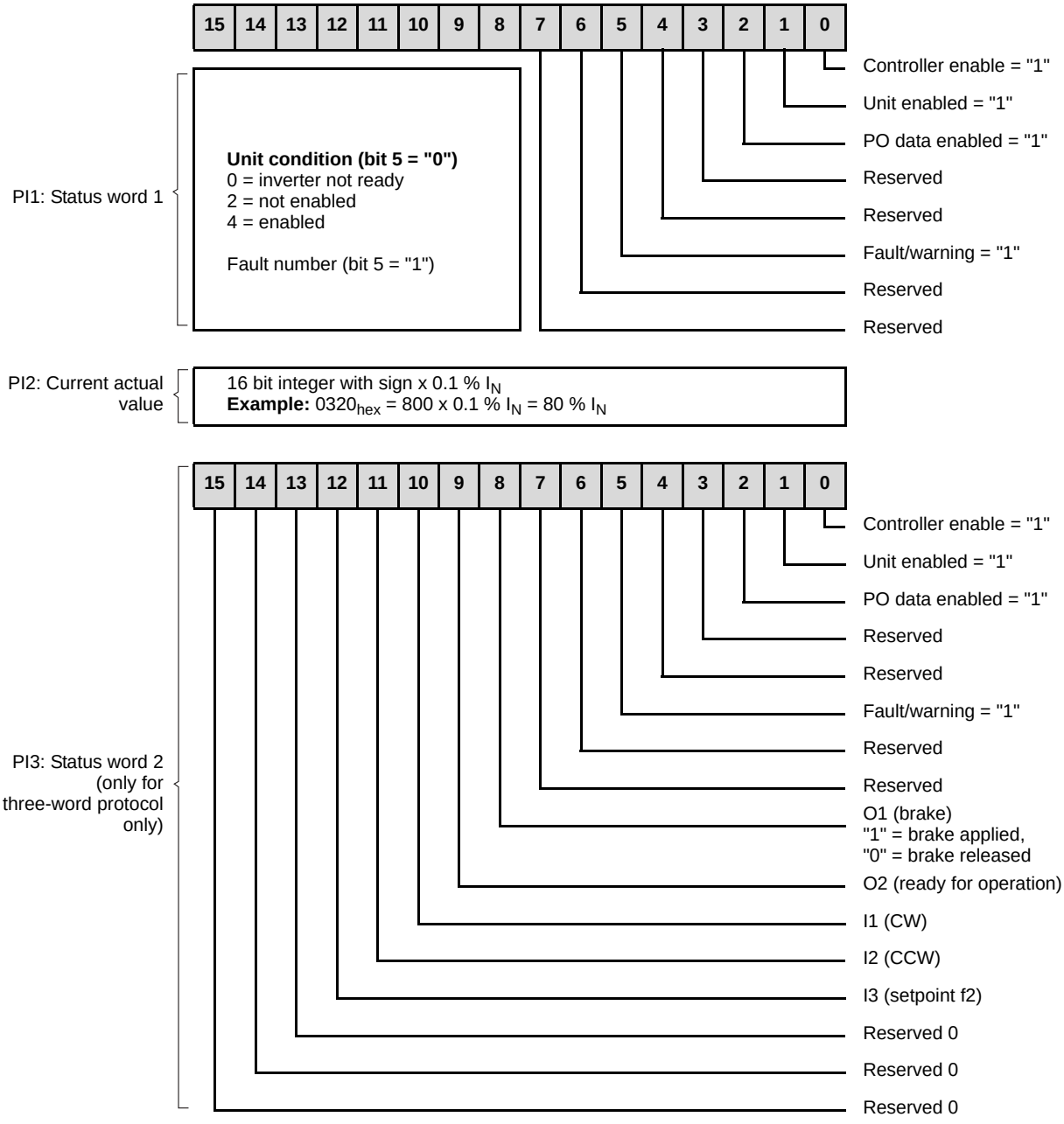
Range: 100...10000 ms

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

Process input data

The MOVIMOT® inverter sends back process input data to the master controller. The process input data consist of status and actual value information. MOVIMOT® supports the following process input data:

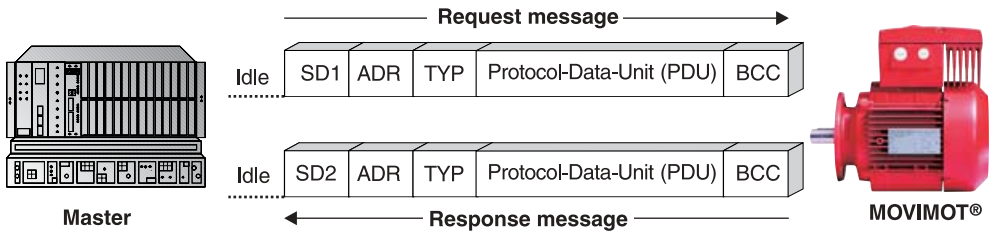
- PI1: Status word 1
- PI2: Output current
- PI3: Status word 2



9.3 Function with RS-485 master

- The controller (e.g. PLC) is master, MOVIMOT® is slave.
- 1 start bit, 1 stop bit and 1 parity bit (even parity) are used.
- The transmission adheres to SEW MOVILINK® protocol (see the section MOVILINK® Unit Profile with a Fixed Transmission Rate of 9,600 Baud).

Message structure



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Idle = Start pause at least 3.44 ms

SD1 = Start delimiter (start character) 1: Master → MOVIMOT: 02_{hex}

SD2 = Start delimiter (start character) 2: MOVIMOT → Master: $1D_{hex}$

ADR = Address 1–15

Group address 101–115

254 = Point-to-point

255 = Broadcast

TYPE = User data type

PDU = User data

BCC = Block check character: XOR of all bytes

- In the 'cyclical' type, MOVIMOT® expects the next bus activity (master protocol) within one second at most. If this bus activity is not detected, MOVIMOT® automatically decelerates to a standstill (timeout monitoring).
- There is no timeout monitoring for the 'acyclical' type.

Start pause (idle) and start character (start delimiter)

MOVIMOT® detects the start of a request message by means of a start pause lasting at least 3.44 ms, followed by the character 02_{hex} (start delimiter 1). In the event that the transmission of a valid request message is broken off by the master, a new request message may not be sent until at least twice the start pause (approx. 6.88 ms) has elapsed.

Address (ADR)

MOVIMOT® supports the address range from 0 to 15 and access via the point-to-point address (254) or via the broadcast address (255). It is only possible to read the current process input data (status word, current actual value) via address 0. The output data sent by the master do not come into effect because PO data processing is not active when the address setting is 0.

Group address

Furthermore, ADR = 101...115 makes it possible to group together several MOVIMOT® units. When this is done, all MOVIMOT® units in one group are set to the same RS-485 address (e.g. group 1: ADR = 1, group 2: ADR = 2).

The master can now specify new group setpoints for these groups using ADR = 101 (setpoints to inverters of group 1) and ADR = 102 (setpoints to group 2). The inverters do not send any response when this addressing variant is used. The master must observe a rest time of min. 25 ms between two broadcast or group messages.

User data type (TYPE)

MOVIMOT® always supports four different PDU types (Protocol Data Unit). These are largely determined by the process data length and type of transmission.

Type	Transmission type	Process data length	User data
03_{hex}	Cyclical	2 words	Control word / speed [%] status word 1 / output current
83_{hex}	Acyclical	2 words	
05_{hex}	Cyclical	3 words	Control word / speed [%] / ramp status word 1 / output current / status word 2
85_{hex}	Acyclical	3 words	

Timeout monitoring

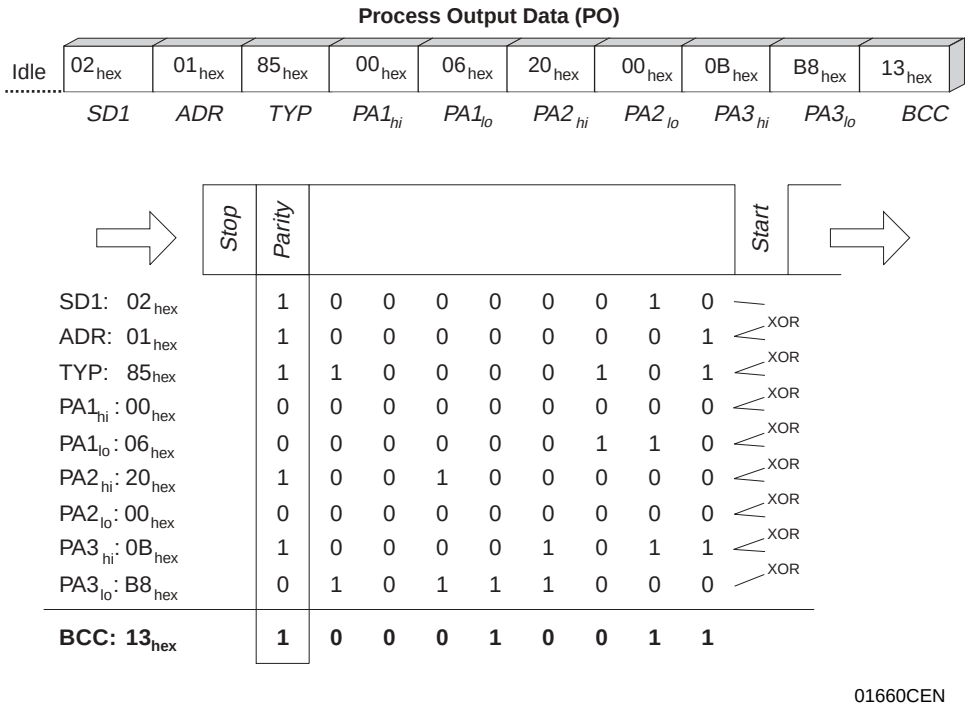
In "cyclical" transmission, MOVIMOT® expects the next bus activity (request message of the aforementioned types) within one second at most. If this bus activity is not detected, the drive automatically decelerates with the most recently valid ramp (timeout monitoring). The "ready" signal relay drops out. There is no timeout monitoring if the "acyclical" transmission variant is selected.

Block check character BCC

The block check character (BCC) is used in conjunction with even parity formation to ensure a reliable data transfer. The block check character is formed by means of an XOR logic operation of all message characters. The result is transmitted at the end of the message in the BCC.

Example

The following figure shows how a block check character is created for a PDU type 85_{hex} acyclical message with three data words. The XOR logic operation on the characters SD1 ... $PO3_{low}$ results in the value 13_{hex} as the block check character. This BCC is sent as the last character in the message. Once the receiver has received the individual characters, it performs a character parity check. The block check character is subsequently created from the characters received, SD1 $PO3_{low}$, in accordance with the procedure below. The telegram has been correctly transmitted if the calculated and received BCCs are identical and there is no character parity error. Otherwise, a transmission error has occurred. The message may have to be repeated.



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Message processing in the MOVILINK® master

The following algorithm should be observed for sending and receiving MOVILINK® messages in any programmable controller, in order to ensure correct data transmission.

Send request message

a) Sending request message (e.g. send setpoints to MOVIMOT®)

1. Wait for the start pause (minimum 3.44 ms, at least 25 ms with group or broadcast messages).
2. Send request message to inverter.

Receive response message

b) Receive response message

(receive confirmation + actual values from MOVIMOT®)

1. The response message must be received within approx. 100 ms, otherwise it is sent again.
2. Calculated block check character (BCC) of the response telegram = received BCC?
3. Start delimiter of response message = $1D_{hex}$?
4. Response address = Request address?
5. Response PDU type = Request PDU type?
6. All criteria satisfied: → Transmission OK! Process data valid!
7. The next request telegram can now be sent (continue from point a).

All criteria satisfied: → Transmission OK! Process data valid! The next request message can now be sent (continue from point a).

Sample message

This example deals with the control of a MOVIMOT® AC motor using the process data words of PDU type 85_{hex} (3 PD acyclical). The RS-485 master sends three process output data (PO) to the MOVIMOT® AC motor. MOVIMOT® responds with three process input data words (PI).

Request message from RS-485 master to MOVIMOT®

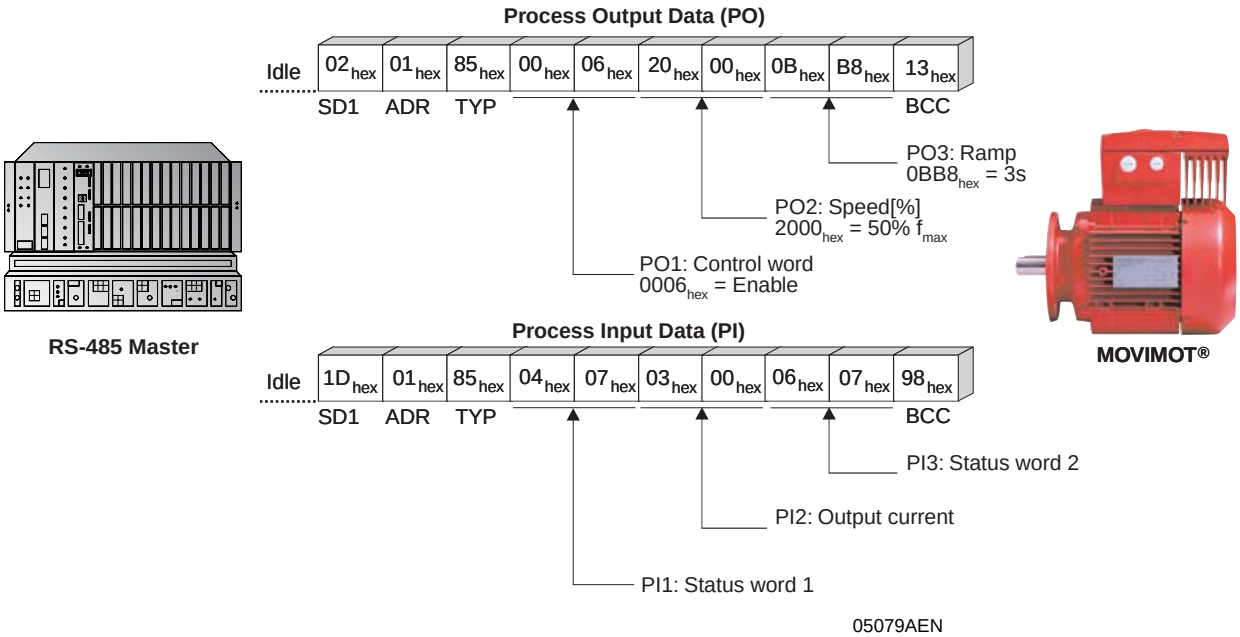
PO1: 0006_{hex} Control word 1 = Enable
PO2: 2000_{hex} Speed [%] setpoint = 50% (from f_{max})[1])
PO3: $0BB8_{hex}$ramp = 3 s

Request message from MOVIMOT® RS-485 master

PI1: 0406_{hex} Status word 1
PI2: 0300_{hex} Output current [% IN]
PI3: 0607_{hex} Status word 2

Coding of process data see section 5.5.

"3PD acyclical" sample message



This example shows acyclical transmission, i.e. no timeout monitoring is active in MOVIMOT®. Cyclical transmission can be implemented with the entry TYPE = 05_{hex}. In this case, MOVIMOT® expects the next bus activity (request message of the aforementioned types) within one second at most, otherwise MOVIMOT® automatically brings itself to a stop (timeout monitoring).

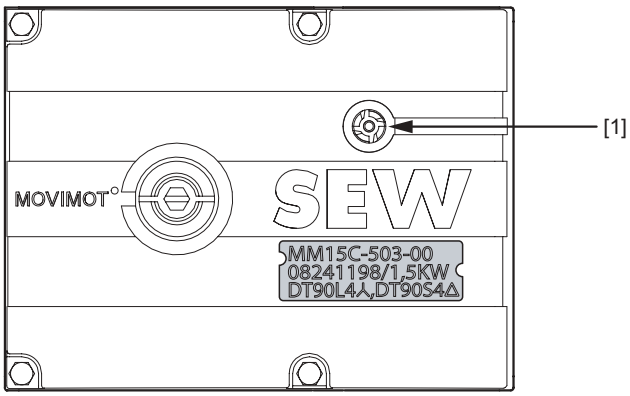
1) f_{max} is preset using f1 setpoint potentiometer

10 Diagnostics

10.1 Diagnostics of MOVIMOT® standard design

Status LED

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



50867AXX

[1] MOVIMOT® status LED

Meaning of the status LED states

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

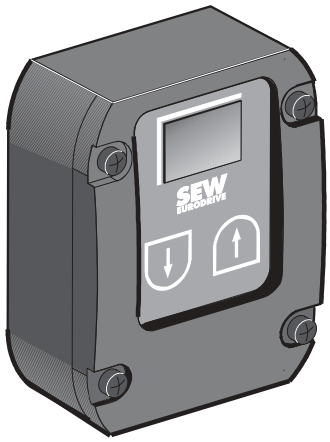
LED color	LED status	Operational status	Description
–	Off	Not ready	No 24 V power supply
Yellow	Steady flashing	Not ready	Self-test phase active or 24 V power supply present but supply voltage not OK
Yellow	Steady, fast flashing	Ready	Releasing the brake without active drive enable (only with S2/2 =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

Table of faults

Faults	Cause / solution
Timeout of communication (motor comes to a stop without error code)	A Missing connection ⊥, RS+, RS- between MOVIMOT® and RS-485 master. Check the connection, in particular the ground, and repair. B EM interference. Check the shielding of the data cables and improve if necessary. C Incorrect type (cyclical) in acyclical protocol time between the individual messages. Messages >1 s with protocol type "cyclical." Shorten message cycle or select "acyclical."
DC link voltage too low, supply system off detected (motor stops, without fault code)	Check power cables and supply voltage for interruption. Motor restarts automatically as soon as the supply voltage reaches normal values.
Fault code 01 Overcurrent of output stage	Short circuit of inverter output. Check the connection between inverter output and motor for short circuit. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 06 Phase fault (The fault can only be recognized with a load on the drive)	Check power cables for phase fault. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 07 DC link voltage too high	A Ramp time too short → Increase ramp time. B Faulty connection between brake coil and braking resistor. → Check the connection between braking resistor and brake coil. Correct, if necessary. C Incorrect internal resistance of brake coil/braking resistor → Check the internal resistance of the brake coil/braking resistor (see the section "Technical Data"). D Thermal overload in braking resistor → Wrong size of braking resistor selected. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 08 Speed monitoring	Speed monitoring tripped, load of drive is too high → Reduce the load of the drive. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 11 Thermal overload of the output stage or internal unit fault	• Clean the heat sink • Reduce the ambient temperature • Prevent heat accumulation • Reduce the load on the drive Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 17 to 24, 37 CPU fault	Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 25, 94 EEPROM error	Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 84 Thermal overload of motor	• With shouldered assembly of the MOVIMOT® inverter, set DIP switch S1/5 to "ON". • For combinations of "MOVIMOT® and motor with one lower power increment," check the position of DIP switch S1/6. • Reduce the ambient temperature • Prevent heat accumulation • Reduce the load on the motor • Increasing the speed • Check the combination of the drive and MOVIMOT® frequency inverter if the fault is signaled shortly after the first release. • The temperature monitoring in the motor (TH winding thermostat) has tripped with the use of MOVIMOT® and selected special function 5 → Reduce load on the motor. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.

Faults	Cause / solution
Fault code 89 **Thermal overload of brake coil or brake coil defective**	• Extend the set ramp time • Brake inspection (see the section "Inspection and Maintenance") • Contact SEW service • If the fault should occur shortly after the initial enable, check the combination of drive (brake coil) and MOVIMOT® frequency inverter. • For combinations of "MOVIMOT® and motor with one lower power increment," check the position of DIP switch S1/6. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 91 **Communication error between fieldbus gateway and MOVIMOT® (this fault is generated by the bus module)**	• Check electrical connection between fieldbus gateway and MOVIMOT® (RS-485) • The fault is automatically reset after removing the cause, a reset via control word is not possible.

Diagnostics via MDG11A option



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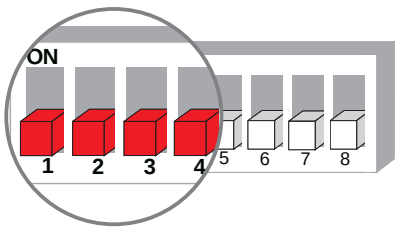
- The diagnostic unit cannot be used in conjunction with MOVIMOT® with integrated AS-Interface.
- The diagnostic unit must be connected prior to the possible occurrence of a fault, as MOVIMOT® error messages are not saved and the information is lost when the 24 V supply is disconnected.
- The diagnostic unit may only be connected to a MOVIMOT® unit.
- Connecting the MDG11A to an RS-485 bus with several MOVIMOT® is not allowed.
- The diagnostic unit can be used only if the MOVIMOT® is controlled via terminals. This requires that DIP switches S1/1 to S1/4 are set to OFF (= address 0).



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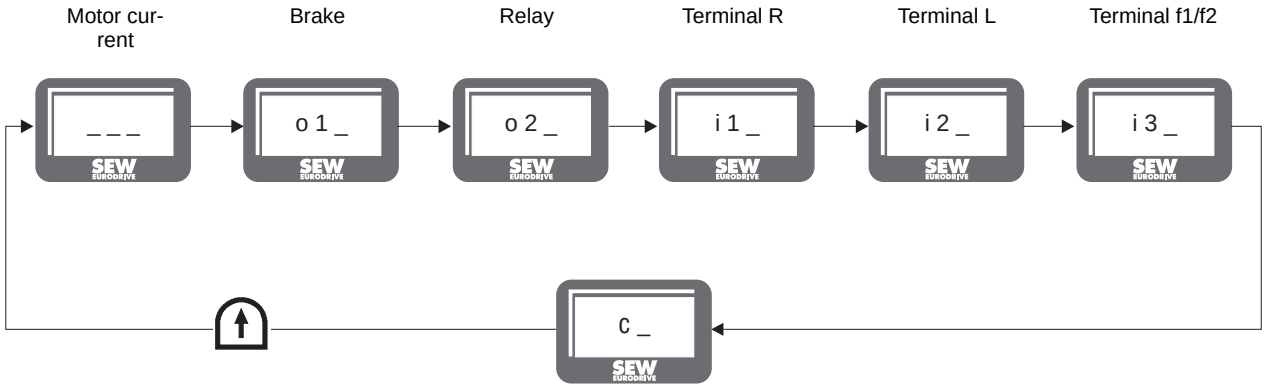
- **Do nut use the diagnostic unit in case setpoint setting takes place via the RS-485 interface.**
- Connection according to section "Electrical Installation."

Diagnostics procedure

The diagnostic unit can display different information such as operating status, motor current, status of input terminals, status of message relay and brake. The selection is made by pressing the button. If a fault occurs, the fault number is automatically displayed.



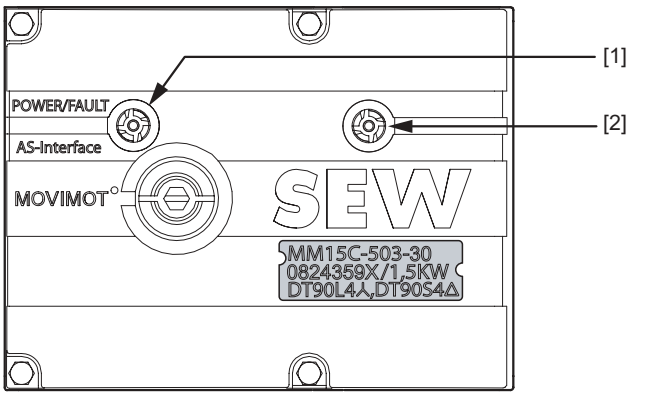
Operational status 05623AXX

Display		Message
Operational status	`---`	No communication no 24 V at MOVIMOT® or RS-485 connection is incorrect (interrupted or switched cable)
	`c 0`	Not ready supply voltage is missing, but 24 V are present
	`c 2`	Ready for operation supply voltage and 24 V are present, but no enable signal at terminal R or L
	`c 4`	Enabled with motor rotating
Fault codes	`F01`	Short circuit of inverter output
	`F06`	Mains phase fault
	`F07`	DC link voltage too high
	`F11`	Thermal overload of the output stage
	`F84`	Thermal overload of the motor or motor blocked
	`F89`	Thermal overload of the brake or internal resistance of the brake not correct
	`F90`	Assignment motor–inverter incorrect (e.g. MM03 – DT71D4 △)
Motor current	`0...180`	Displays percentage of inverter nominal current, from 0% to 180%
Brake	`o10`	Brake applied
	`o11`	Brake released
Relay	`o20`	Inverter not ready for operation (supply voltage is missing or inverter is in "fault" condition, see Operating States or Fault Codes)
	`o21`	Inverter ready
Terminal R	`i10`	Terminal R = "0"
	`i11`	Terminal R = "1" = CW rotation
Terminal L	`i20`	Terminal L = "0"
	`i21`	Terminal L = "1" = CCW rotation
Terminal f1/f2	`i30`	Terminal f1/f2 = "0" = Setpoint f1 active
	`i31`	Terminal f1/f2 = "1" = Setpoint f2 active

10.2 Diagnostics of MOVIMOT® with integrated AS-Interface

Status LED

The status LED and the AS-i LED are located on the top of the MOVIMOT® inverter (see the following figure).



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[1] AS-i LED
[2] MOVIMOT® status LED

Meaning of the AS-i LED states

LED color	LED status	Operational status	Description
–	Off	Not ready	24 V missing at AS-i connection
Green	On	Ready	Normal operation 24 V present at AS-i connection Communication present
Red	On	Not ready	Communication is faulty or slave address 0 is set

Meaning of the status LED states

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

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

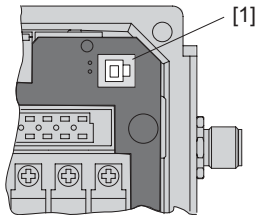
Table of faults

Faults	Cause / solution
DC link voltage too low, supply system off detected (motor stops, without fault code)	Check power cables and supply voltage for interruption. Motor restarts automatically as soon as the supply voltage reaches normal values.
Fault code 01 Overcurrent of output stage	Short circuit of inverter output. Check the connection between inverter output and motor for short circuit. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 06 Phase fault (The fault can only be recognized with a load on the drive)	Check power cables for phase fault. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 07 DC link voltage too high	A Ramp time too short → Increase ramp time. B Faulty connection between brake coil and braking resistor. → Check the connection between braking resistor and brake coil. Correct, if necessary. C Incorrect internal resistance of brake coil/braking resistor → Check the internal resistance of the brake coil/braking resistor (see the section "Technical Data"). D Thermal overload in braking resistor → Wrong size of braking resistor selected. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 08 Speed monitoring	Speed monitoring tripped, load of drive is too high → Reduce the load of the drive. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 11 Thermal overload of the output stage or internal unit fault	• Clean the heat sink • Reduce the ambient temperature • Prevent heat accumulation • Reduce the load on the drive Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 17 to 24, 37 CPU fault	Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 25, 94 EEPROM error	Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 84 Thermal overload of motor	• With shouldered assembly of the MOVIMOT® inverter, set DIP switch S3/1 to "ON". • For combinations of "MOVIMOT® and motor with one lower power increment," check the position of DIP switch S3/2. • Reduce the ambient temperature • Prevent heat accumulation • Reduce the load on the motor • Increasing the speed • Check the combination of the drive and MOVIMOT® frequency inverter if the fault is signaled shortly after the first release. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.
Fault code 89 Thermal overload of brake coil or brake coil defective	• Extend the set ramp time • Brake inspection (see the section "Inspection and Maintenance") • Contact SEW service • If the fault should occur shortly after the initial enable, check the combination of drive (brake coil) and MOVIMOT® frequency inverter. • For combinations of "MOVIMOT® and motor with one lower power increment," check the position of DIP switch S3/2. Reset the fault by switching off the 24 V_{DC} supply voltage or use MOVILINK®.

AS-i diagnostics via diagnostic interface

MOVIMOT® drives with integrated AS-Interface contain a diagnostics interface for start-up and service. This allows for diagnostics, manual operation and parameter setting of scaling factors using the SEW software MOVITOOLS **(version 4.0 and higher)**.

The diagnostics interface is located on the top of the MOVIMOT® connection board (see the following figure).



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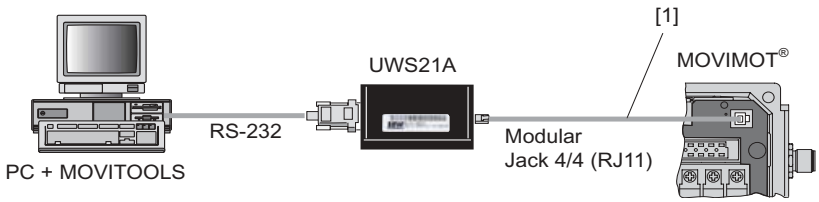
[1] Diagnostic interface X50

MWS21A option

The diagnostic interface can be connected to a commercially available PC with a serial interface (RS-232) using SEW's diagnostic kit MWS21A (part number: 823 180X).



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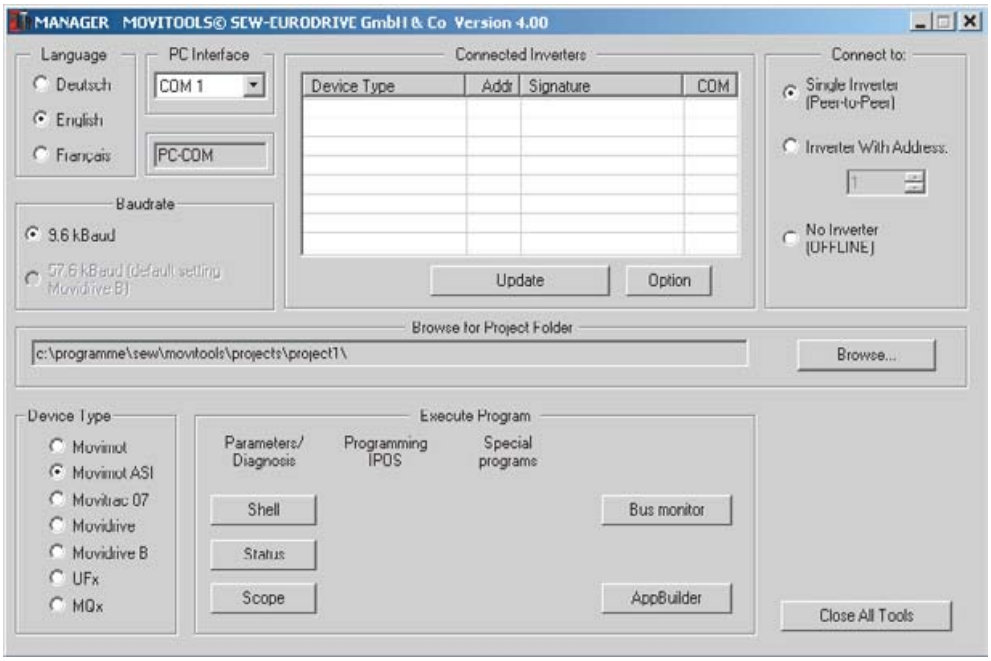
[1] Feed the cable through the cable entry into the MOVIMOT® wiring space!

Scope of delivery of MWS21A:

- Interface adapter
- Cable with modular jack 4/4 (RJ11) plug connector
- RS-232 interface cable
- SOFTWARE-ROM 4 (MOVITOOLS software)

Starting the diagnostic monitor

1. **Isolate MOVIMOT® drive from the supply, safeguarding it against unintentional power-up! Dangerous voltages may still be present for up to 1 minute after shutdown!**
2. Remove screws at MOVIMOT® inverter and detach MOVIMOT® inverter.
3. Remove a closing plug from the MOVIMOT® terminal box.
4. Attach the modular jack plug connector 4/4 (RJ11) to the socket X50. Feed the cable through the open cable entry.
5. Place the MOVIMOT® inverter on the terminal box and secure it.
6. Switch in the electronics supply voltage.
7. Start the MOVITOOLS manager on the PC. The following window displays:



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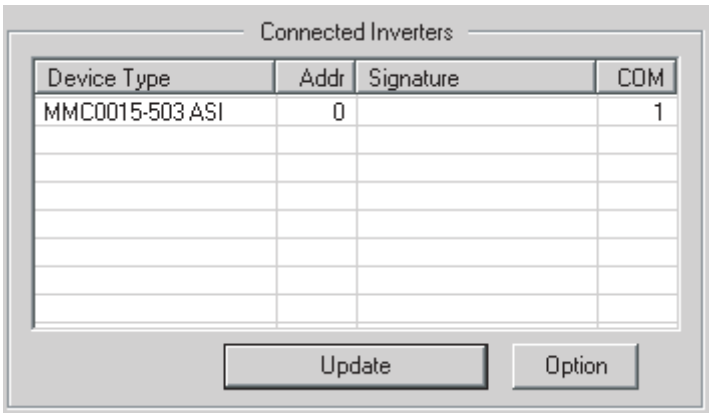
8. In the "PC-COM" selection menu, select the serial interface used in your PC.
9. Activate the button "Single Inverter (Peer-to-Peer)" in the window area "Connect to."

10. After clicking the "Update" button, the "Connected Inverters" window shows the MOVIMOT® in use. If no inverter is shown, check the communications connection.



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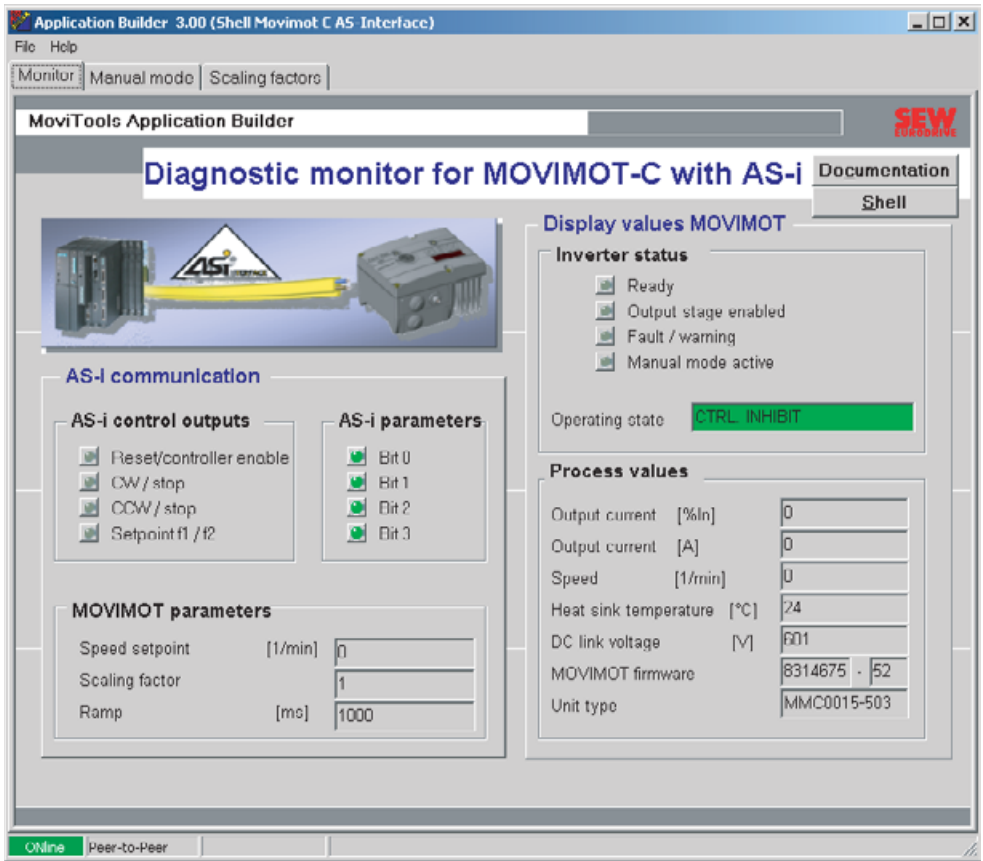
11. Activate the "MOVIMOT ASI" button in the "Device type" window area.

12. Clicking the "Shell" button opens the user interface for diagnostics, manual operation and parameter setting of scaling factors (Shell) as well as a status window.



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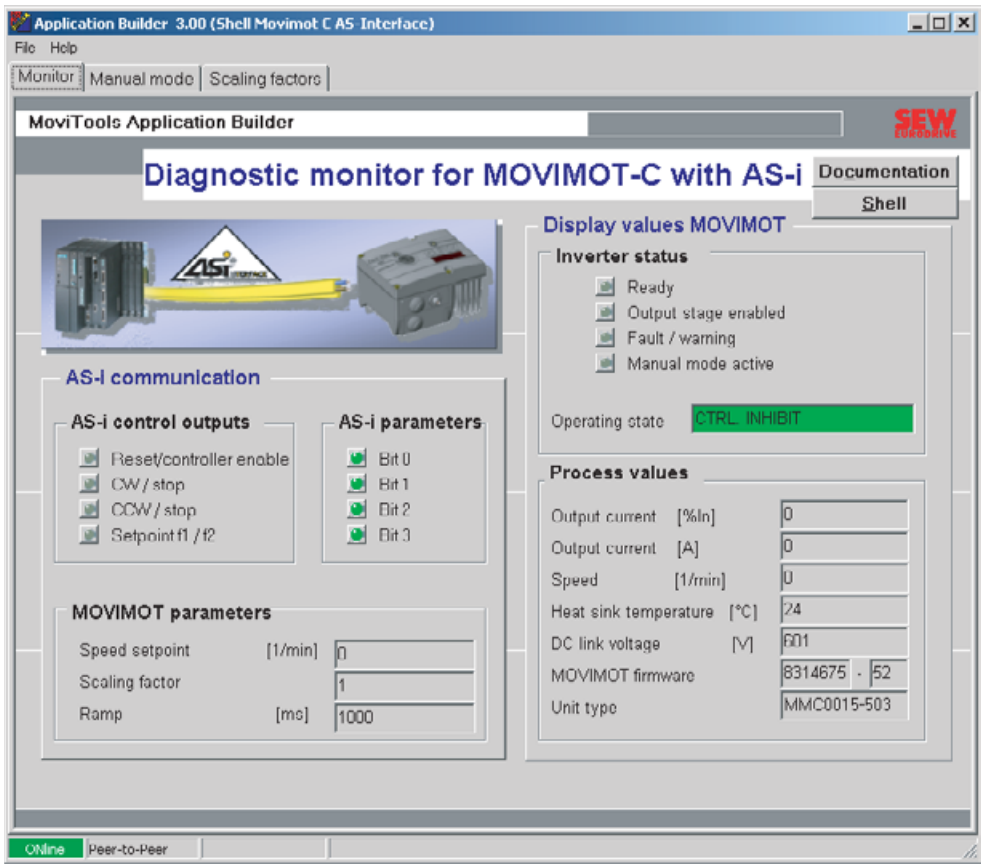
13. The buttons "Monitor", "Manual mode" and "Scaling factors" in the top left window area can be used to select the windows of the program. Additional information about the windows "Manual mode" and "Scaling factors" can be found in the section "Start-up."

"Monitor" window description

The following illustration shows the diagnostic monitor.



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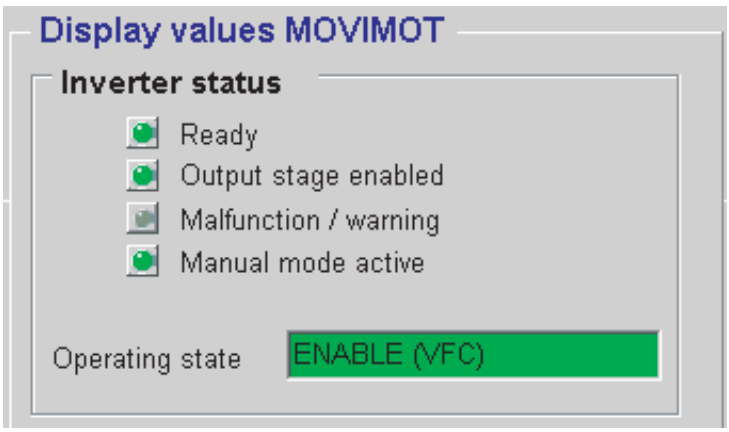
AS-i communication window area

- The "Inverter status" window area displays important information about the status of the AS-Interface. The AS-i control outputs window area displays the current status of the AS-i bits "D0 (CW/stop)", "D1 (CCW/stop)", "D2 (Setpoint f1/f2)" and "D3 (Reset/ controller inhibit)". An AS-i bit set by the master is identified by a green symbol.
- The "AS-i parameters" window area displays the current status of the AS-i parameter bits. These bits are used to select the scaling factor. An AS-i parameter bit set by the master is identified by a green symbol.
- The "MOVIMOT® parameters" window area displays information about the current speed setpoint, the active scaling factor selected (via AS-i parameter bits) and the ramp time selected via switch t1.

Window area of MOVIMOT® display values

The inverter status window area displays the current device status. The following example shows that the device is operational, the output stage is enabled and manual operation is active. The operating status is shown in plain text.



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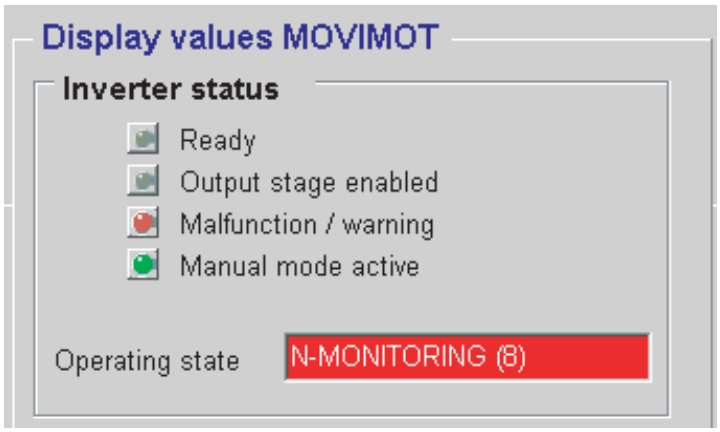
If a device fault is present, it is indicated by a red "Malfunction/warning" symbol, and the cause is displayed in the "Operating state" field.



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Process values window area

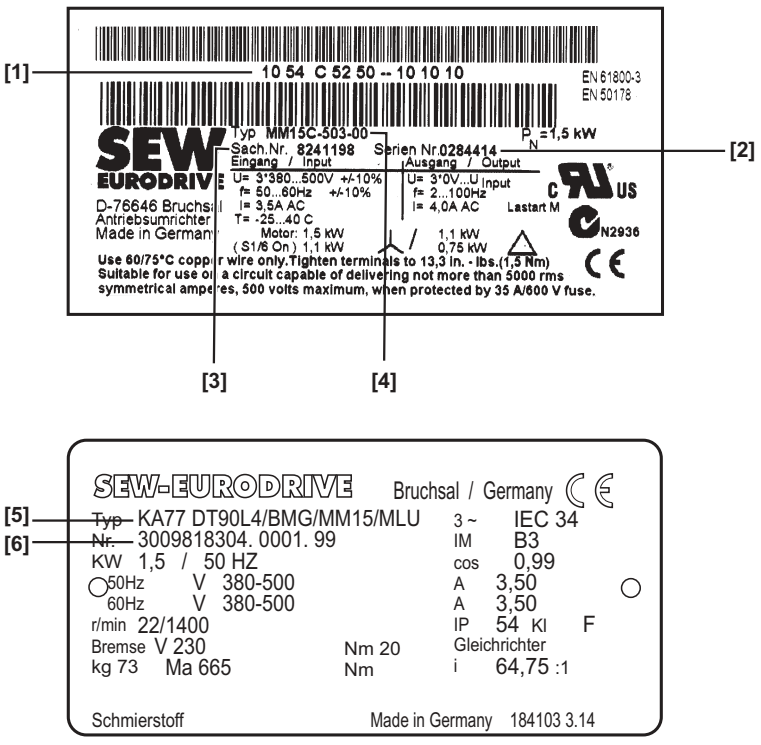
The process values window area displays the current output current (r.m.s. value), speed, heat sink temperature, DC link voltage and information about the firmware part number and the unit type.

10.3 Important service information

If a problem cannot be solved, please consult the SEW Service (→ "Customer and Spare Parts Service").

If you consult the SEW service, please state the following:

- Service code [1]
- Serial number [2]
- Part number [3]
- Type designation (inverter nameplate [4] + motor nameplate [5])
- Plant number [6]
- Brief description of the application (application, control via terminals or serial)
- Nature of the problem
- Accompanying circumstances (e.g. initial startup)
- Your own assumptions as to what has happened
- Any unusual events, etc. preceding the problem



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11 Inspection and Maintenance

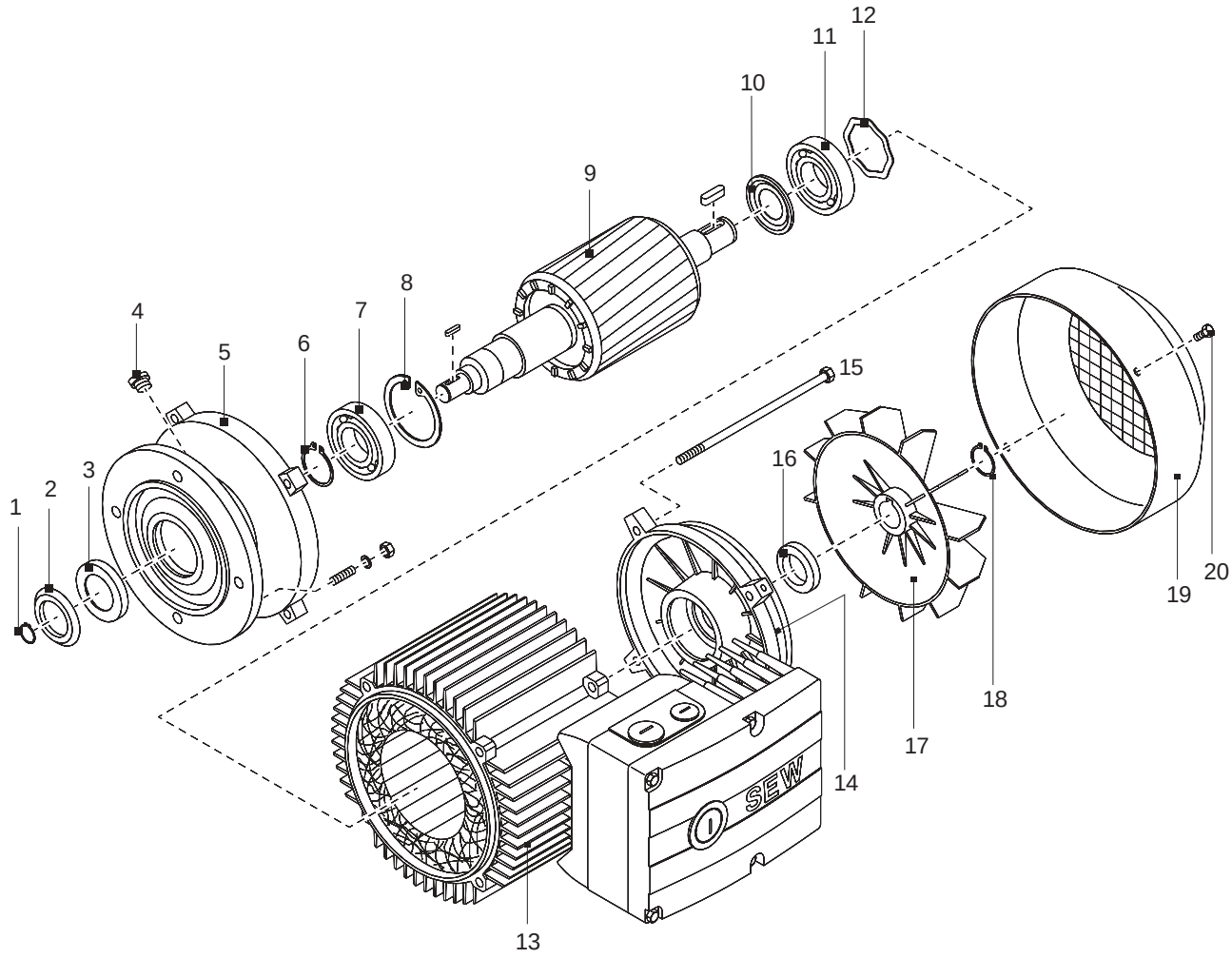
- Only use genuine spare parts in accordance with the valid parts list!
- Danger of burns: Motors can become very hot during operation!

11.1 Inspection and maintenance periods

Frequency	Unit/Unit part	What to do
Depending on loading conditions: Every 2 to 4 years[1)]	Brake	• Inspect the brake (working air gap, brake disk, pressure plate, carrier / gearing, pressure rings) • Extract the abraded matter
Every 10,000 operating hours	Motor	• Inspect motor (replace ball bearing/oil seal) • Clean the cooling air passages
Varies (depending on external factors)	Motor	• Touch up or renew the anticorrosion coating

1) The periods of wear are affected by many factors and may be short. Calculate the required inspection and maintenance intervals separately in accordance with the project planning documents.

11.2 Inspection and maintenance work on the motor



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1	Circlip	6	Circlip	11	Ball bearing	16	V-ring
2	Oil flinger	7	Ball bearing	12	Equalizing ring	17	Fans
3	Oil seal	8	Circlip	13	Stator	18	Circlip
4	Screw plug	9	Rotor	14	Non-drive bearing shield	19	Fan guard
5	Drive end bearing shield	10	Nilos ring	15	Hex head screw	20	Housing screw

Inspecting the motor

1. **Important: Isolate MOVIMOT® from the supply, safeguarding it against unintentional power-up.**
2. Remove proximity sensor NV16 / NV26 if installed.
3. Remove the flange cover or fan guard (19).
4. Remove the hexagon head cap screws (15) from the drive end bearing end shield (5) and the non-drive end bearing end shield (14), release the stator (13) from the drive end bearing end shield.
5. a) Motors with a brake
   - Remove MOVIMOT® inverter, unfasten the brake cable from its terminals
   - Push the non-drive end bearing end shield and the brake off the stator and carefully lift them off (if necessary, run the brake cable along with trailing wire)

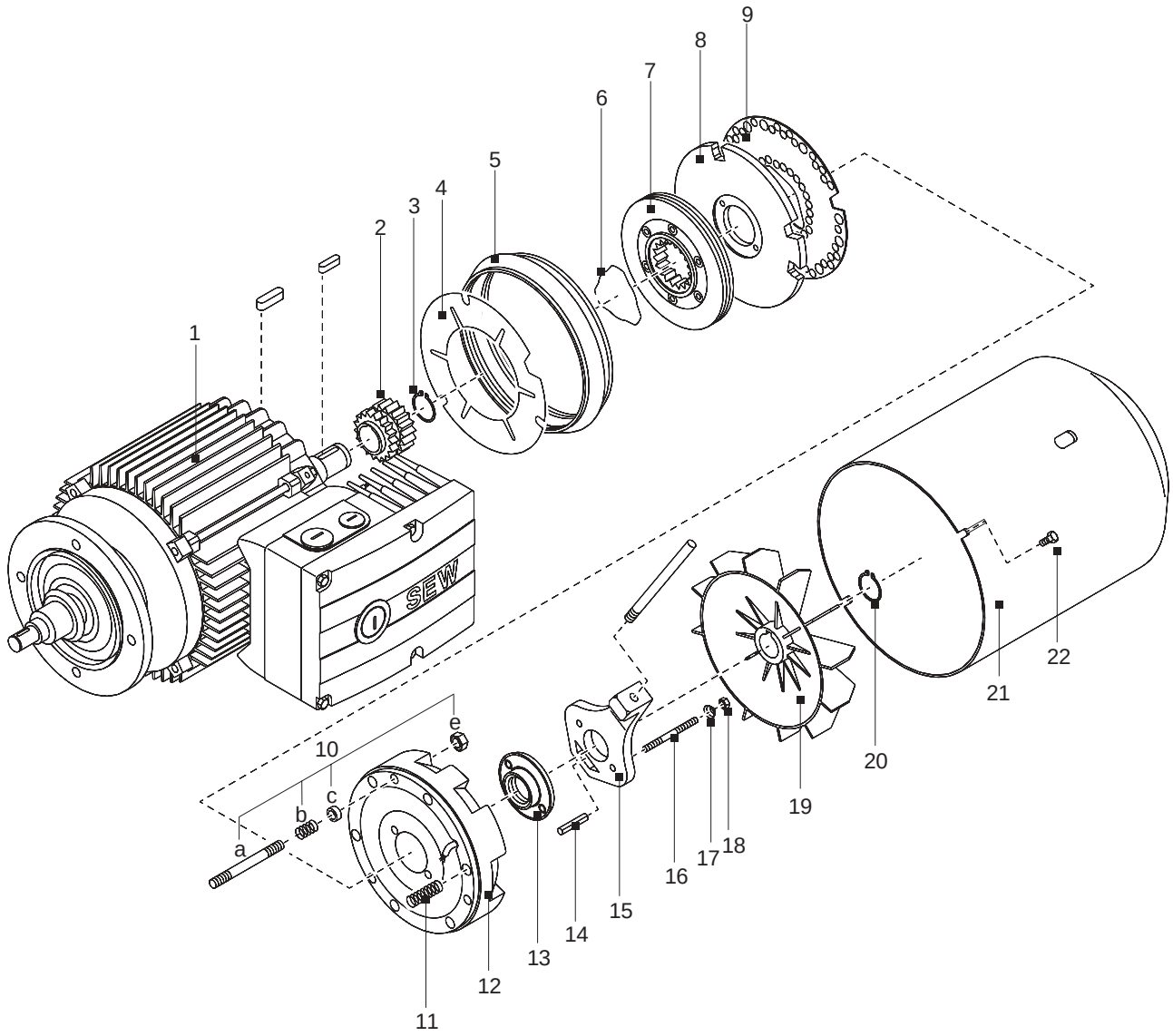
   b) Pull the stator back by approx. 3–4 cm.
6. Visual check:

   Are there traces of gear oil or condensation inside the stator?
   - If not, continue with 9.
   - If condensation is present, continue with 7.
   - If gear oil is present, the motor must be repaired by a specialized workshop.
7. a) Geared motors: Remove the motor from the gear unit.

   b) Motors without a gear unit: Remove the drive end flange.

   c) Remove the rotor (9).
8. Clean the winding, dry it and check it electrically.
9. Replace the ball bearings (7, 11) (use only approved ball bearings, see page 148).
10. Install a new oil seal (3) in the drive end bearing end shield.
11. Reseal the stator seat, reassemble the motor, brake, etc.
12. Check the gear unit, if applicable (see Gear Unit Operating Instructions).

11.3 Inspection and maintenance work on the brake



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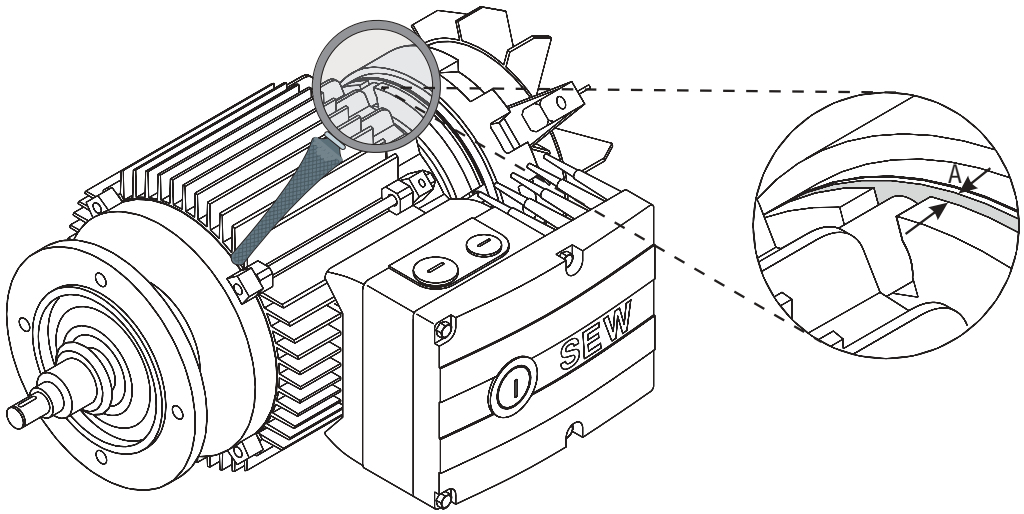
1	Motor with brake end shield	10a	Stud (3 pcs.)	16	Stud (2 pcs.)
2	Carrier	10b	Counter spring	17	Conical coil spring
3	Circlip	10c	Pressure ring	18	Setting nut
4	Niro disk	10e	Hex nut	19	Fans
5	Rubber sealing collar	11	Brake spring	20	Circlip
6	Annular spring	12	Brake coil body	21	Fan guard
7	Brake disk	13	Sealing washer	22	Housing screw
8	Pressure plate	14	Dowel pin		
9	Damping plate (BMG only)	15	Releasing lever with hand lever		

Inspecting the brake, adjusting the working air gap

1. **Isolate MOVIMOT® from the supply, safeguarding it against unintentional power-up.**
2. Remove the following:
   - Proximity sensor NV16 / NV26, if installed
   - Flange cover or fan guard (21).
3. Push the rubber sealing collar (5) aside (loosen the clamp to do this if necessary). Vacuum up the abraded particles.
4. Measure the brake disk (7, 7b):
   - If the brake disk is ≤ 9 mm: Install a new brake disk (see page 146)
5. Measure the working air gap A (see the following figure).
   - Using a feeler gauge at three points offset by approx. 120° between the pressure plate and damping plate (9)



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6. Tighten the hexagon nuts (10e) until the working air gap is set correctly (see page 148).
7. Install the rubber sealing collar back in place and re-install the removed parts.

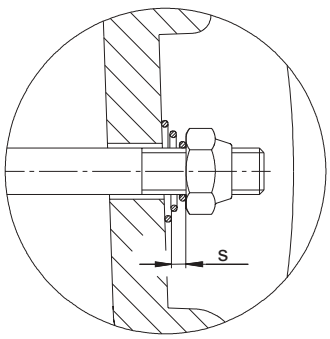
Installing a new brake disk

When installing a new brake disk, inspect the other removed parts as well and install new ones if necessary.

1. Isolate MOVIMOT® from the supply, safeguarding it against unintentional power-up.
2. Remove the following:
   – Proximity sensor NV16 / NV26, if installed
   – Flange cover or fan guard (21), circlip (20) and fan (19)
3. Remove the rubber sealing collar (5).

   Remove the manual brake release: Setting nuts (18), conical coil springs (17), studs (16), releasing lever (15).
4. Loosen hexagon nuts (10e), carefully pull off the coil body (12) (Caution, brake cable!), and take out the brake springs (11).
5. Remove the damping plate (9), pressure plate (8) and brake disk (7, 7b) and clean the brake components.
6. Install a new brake disk.
7. Re-install brake components (except rubber sealing collar, fan and fan guard). Set working air gap (page 145, Points 5 to 7).
8. With manual brake release (type HF or HR):

   Set the floating clearance via the setting nuts between the conical coil springs (pressed flat) and setting nuts (see the following figure).



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Brake	Floating clearance s [mm]
BMG 05 - 1	1,5
BMG 2 - BMG 4	2

Important: This floating clearance is necessary so that the pressure plate can move up as the brake lining wears.

9. Install the rubber sealing collar back in place and re-install the removed parts.

Note:

- The lockable manual brake release (type HF) is already released if a resistance is encountered when operating the grub screw.
- The self-reengaging manual brake release (type HR) can be operated with normal hand pressure.

Important: In brake motors with self-reengaging manual brake release, the manual brake release lever must be removed after startup/maintenance. A bracket is provided for storing it on the outside of the motor.

Changing the braking torque

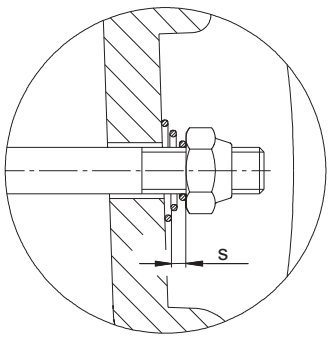
The braking torque can be adjusted in steps (see page 148).

- by installing different brake springs,
- by changing the number of brake springs.

1. Isolate MOVIMOT® from the supply, safeguarding it against unintentional power-up.
2. Remove the following:
   – NV16 / NV26 proximity sensor, flange cover or fan guard (21), snap ring (20) and fan (19), if available.
3. Remove the rubber sealing collar (5).

   Remove the manual brake release: Setting nuts (18), conical coil springs (17), studs (16), releasing lever (15).
4. Loosen the hex nuts (10e) and pull off the brake coil body (12) by approximately 50 mm (caution: brake cable!).
5. Change or add brake springs (11). (Position the brake springs symmetrically.)
6. Re-install brake components except for rubber sealing collar, fan and fan guard. Set working air gap (see page 145, Points 5 to 7).
7. With manual brake release:

   Set the floating clearance between the conical coil springs (pressed flat) and release lever via the setting nuts (see the following figure).



01111AXX

Brake	Floating clearance s [mm]
BMG 05 - 1	1.5
BMG 2 - BMG 4	2

Important: This floating clearance is necessary so that the pressure plate can move up as the brake lining wears.

8. Install the rubber sealing collar back in place and re-install the removed parts.

Note: Install new setting nuts (18) and hex nuts (10e) if the removal procedure is repeated! (due to reduced self-locking of nuts!).

11.4 Permitted ball bearing types

Motor type	Driving end A-bearing (AC motor, brake motor)			Non drive-end bearing (foot, flanged or geared motors)	
	Flange-mounted motor	Geared motor	Foot-mounted motor	AC motor	Brake motor
DT 71-80	6204-Z-J	6303-Z-J	6204-Z-J	6203-J	6203-RS-J-C3
DT 90-DV100	6306-Z-J-C3			6205-J	6205-RS-J-C3

11.5 Working air gap, braking torque, brake

Brake	Motor	Working air gap mm		Braking torque settings				
		min.[1]	max.	Braking torque [Nm]	Type and no. of springs		Order numbers of springs	
					Normal	Red	Normal	Red
BMG 05	**DT 71**	0.25	0.6	5.0 4.0 2.5 1.6 1.2	3 2 - - -	- 2 6 4 3	135 017 X	135 018 8
BMG 1	**DT 80**			10 7.5 6.0 5.0 4.0 2.5	6 4 3 3 2 -	- 2 3 - 2 6		
BMG 2	**DT 90**			20 16 10 6.6 5.0	3 2 - - -	- 2 6 4 3	135 150 8	135 151 6
BMG 4	**DV 100**			40 30 24 20 16	6 4 3 3 2	- 2 3 - 2		

1) Please note when checking the working air gap: After a test run, deviations of +/- 0.15 mm may occur due to parallelism tolerances of the brake disc.

12 Technical Data of Standard Design

12.1 IEC design with connection voltages 380...500 V_{AC}

MOVIMOT® type		MM 03C-503-00	MM 05C-503-00	MM 07C-503-00	MM 11C-503-00	MM 15C-503-00	MM 22C-503-00	MM 30C-503-00	MM 3XC-503-00
Part number		**824 115 5**	**824 116 3**	**824 117 1**	**824 118 X**	**824 119 8**	**824 120 1**	**824 121 X**	**824 180 5**
Apparent output power at V_{mains} = 380...500 V_{AC}	P_{rated}	1.1 kVA	1.4 kVA	1.8 kVA	2.2 kVA	2.8 kVA	3.8 kVA	5.1 kVA	6.7 kVA
Connection voltages Permitted range	V_{mains}	3 x 380 V_{AC} / **400 V_{AC}** / 415 V_{AC} / 460 V_{AC} / 500 V_{AC} V_{in} = 380 V_{AC} -10 % ... 500 V_{AC} +10 %							
Supply frequency	f_{mains}	50 Hz ... 60 Hz ± 10 %							
Rated system current (at V_{mains} = 400 V_{AC})	I_{mains}	1.3 A_{AC}	1.6 A_{AC}	1.9 A_{AC}	2.4 A_{AC}	3.5 A_{AC}	5.0 A_{AC}	6.7 A_{AC}	8.6 A_{AC}
Output voltage	V_{out}	0...V_{in}							
Output frequency Resolution Operating point	f_{out}	2...100 Hz 0.01 Hz 400 V at 50 Hz / 100 Hz							
Rated output current	I_{rated}	1.6 A_{AC}	2.0 A_{AC}	2.5 A_{AC}	3.2 A_{AC}	4.0 A_{AC}	5.5 A_{AC}	7.3 A_{AC}	9.6 A_{AC}
Motor power S1	P_{mot}	**0.37 kW**	**0.55 kW**	**0.75 kW**	**1.1 kW**	**1.5 kW**	**2.2 kW**	**3.0 kW**	**3.0 kW**
Motor power S3 25 % cdf									**4.0 kW**
PWM frequency		**4 (factory setting)** / 8 / 16[1] kHz							
Current limitation	I_{max}	**Motor:** 160 % at ⅄ and △ **regenerative:** 160 % at ⅄ and △							
Maximum motor lead length		15 m when mounting the MOVIMOT® frequency inverter close to the motor (with SEW hybrid cable and option P2.A)							
External braking resistor	R_{min}	150 Ω					68 Ω		
Interference immunity		Meets EN 61800–3							
Interference emission		Meets EN 61800–3 and class A limit to EN 55011 and EN 55014							
Ambient temperature	ϑ_{amb}	**-25 °C...40 °C** (P_{rated} reduction: 3 % I_N per K to max. 60 °C)							[2]
Climate class		3 K3							
Enclosure (motor-dependent)		IP54, IP55, IP65, IP66 (options, specify when ordering) IP67 (only available for inverters with terminal box)							
Operating mode		DB (EN 60149-1-1 and 1-3), S3 max. cycle duration 10 minutes							
Cooling type (DIN 41 751)		Self-cooling							
Altitude		h ≤ 1000 m (P_{rated} reduction: 1 % per 100 m starting at an altitude of 1000 m, see also the section "Electrical Installation – Installation Instructions")							
Ext. power supply to electronics	Tl. 24 V	V = +24 V ± 25 %, EN 61131-2, residual ripple max. 13 % I_{in} ≤ 250 mA (typ. 150 mA at 24 V) Input capacitance 100 µF							
3 binary inputs		Isolated by opto-coupler, PLC-compatible (EN 61131-2) R_i ≈ 3.0 kΩ, I_{in} ≈ 10 mA, sampling time ≤ 5 ms							
Signal level		+13 V...+30 V = "1" = Contact closed -3 V...+5 V = "0" = Contact open							
Control Functions	Tl. R ↻ Tl. L ↺ Tl. f1/f2	CW/Stop CCW/Stop "0" = Setpoint 1 / "1" = Setpoint 2							
Output relay Contact data	Tl. K1a Tl. K1b	Response time ≤ 15 ms 24 V_{DC} / 0.6 A_{DC} / DC11 to IEC 337-1							
Signaling function		Normally open contact for ready signal					Contact made: – with applied voltage (24 V + supply) – if no fault was detected – after self-test phase concluded (after switch-on)		
Serial interface	Tl. RS+ Tl. RS-	RS-485							

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

2) -25 °C...40 °C with S3 25% ED (up to 60 °C with S3 10 % ED)

12.2 UL design with connection voltages 380500 V_{AC}

MOVIMOT® type		MM 03C-503-00	MM 05C-503-00	MM 07C-503-00	MM 11C-503-00	MM 15C-503-00	MM 22C-503-00	MM 30C-503-00	MM 3XC-503-00
Part number		**824 115 5**	**824 116 3**	**824 117 1**	**824 118 X**	**824 119 8**	**824 120 1**	**824 121 X**	**824 180 5**
Apparent output power at V_{mains} = 380...500 V_{AC}	P_{rated}	1.1 kVA	1.4 kVA	1.8 kVA	2.2 kVA	2.8 kVA	3.8 kVA	5.1 kVA	6.7 kVA
Connection voltages Permitted range	V_{mains}	3 x 380 V_{AC} / 400 V_{AC} /415 V_{AC} /**460 V_{AC}** /500 V_{AC} V_{mains} = 380 V_{AC} -10 % ... 500 V_{AC} +10 %							
Supply frequency	f_{mains}	50 Hz ... 60 Hz ± 10 %							
Rated system current (at V_{mains} = 460 V_{AC})	I_{mains}	1.1 A_{AC}	1.4 A_{AC}	1.7 A_{AC}	2.1 A_{AC}	3.0 A_{AC}	4.3 A_{AC}	5.8 A_{AC}	7.5 A_{AC}
Output voltage	V_{out}	0...V_{in}							
Output frequency Resolution Operating point	f_{out}	2...100 Hz 0.01 Hz 460 V at 60 Hz							
Rated output current	I_{rated}	1.6 A_{AC}	2.0 A_{AC}	2.5 A_{AC}	3.2 A_{AC}	4.0 A_{AC}	5.5 A_{AC}	7.3 A_{AC}	9.6 A_{AC}
Motor power	P_{mot}	**0.5 HP 0.37 kW**	**0.75 HP 0.55 kW**	**1.0 HP 0.75 kW**	**1.5 HP 1.1 kW**	**2 HP 1.5 kW**	**3.0 HP 2.2 kW**	**5 HP 3.7 kW**	**5.4 HP**[1] **4 kW**
PWM frequency		**4 (factory setting)** / 8 / 16[2] kHz							
Current limitation	I_{max}	**Motor:** 160 % with ⅄ **Regenerative:**160 % with ⅄							
Maximum motor lead length		15 m when mounting the MOVIMOT® frequency inverter close to the motor (with SEW hybrid cable and option P2.A)							
External braking resistor	R_{min}	150 Ω					68 Ω		
Interference immunity		Meets EN 61800–3							
Interference emission		Meets EN 61800–3 and class A limit to EN 55011 and EN 55014							
Ambient temperature	ϑ_{amb}	**-25 °C...40 °C** (P_{rated} reduction: 3 % I_N per K to max. 60 °C)							[3]
Climate class		3 K3							
Enclosure (motor-dependent)		IP54, IP55, IP65, IP66 (options, specify when ordering) IP67 (only available for inverters with terminal box)							
Operating mode		DB (EN 60149-1-1 and 1-3), S3 max. cycle duration 10 minutes							
Cooling type (DIN 41 751)		Self-cooling							
Altitude		h ≤ 1000 m (P_{rated} reduction: 1 % per 100 m starting at an altitude of 1000 m, see also the section "Electrical Installation – Installation Instructions")							
Ext. power supply to electronics	Tl. 24 V	V = +24 V ± 25 %, EN 61131-2, residual ripple max. 13 % I_{in} ≤ 250 mA (typ. 150 mA at 24 V) Input capacitance 100 µF							
Three binary inputs		Isolated by opto-coupler, PLC-compatible (EN 61131-2) R_i ≈ 3.0 kΩ, I_{in} ≈ 10 mA, sampling time ≤ 5 ms							
Signal level		+13 V...+30 V = "1" = Contact closed -3 V...+5 V = "0" = Contact open							
Control functions	Tl. R ↻ Tl. L ↺ Tl. f1/f2	CW/Stop CCW/Stop "0" = Setpoint 1 / "1" = Setpoint 2							
Output relay Contact data	Tl. K1a Tl. K1b	Response time ≤ 15 ms 24 V_{DC} / 0.6 A_{DC} / DC11 to IEC 337-1							
Signaling function		Normally open contact for ready signal					Contact made: – with applied voltage (24 V + supply) – if no fault was detected – after self-test phase concluded (after switch-on)		
Serial interface	Tl. RS+ Tl. RS-	RS-485							

1) Only possible with S3 25 % ED

2) 16 kHz PWM frequency (low-noise): When DIP SWITCH S1/7 = ON, 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.

3) -25 °C...40 °C with S3 25% ED (up to 60 °C with S3 10 % ED)

12.3 Technical data of options

MLU11A

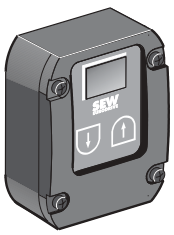
MLU11A option	
Option	**MLU11A**
Part number	823 383 7
Input voltage	380... 500 V_{AC} ± 10 % (50/60 Hz)
Output voltage	24 V_{DC} ± 25 %
Output power	max. 6 W
Enclosure	IP 65
Ambient temperature	-25...60 °C

MLG11A

MLG11A option	
Option	**MLG11A**
Part number	823 384 5
Input voltage	380... 500 V_{AC} ± 10 % (50/60 Hz)
Output voltage	24 V_{DC} ± 25 %
Output power	max. 6 W
Setpoint resolution	1 %
Serial interface[1)]	RS-485 for connecting a MOVIMOT® inverter
Enclosure	IP 65
Ambient temperature	-25...60 °C

1) with integrated dynamic terminating resistor

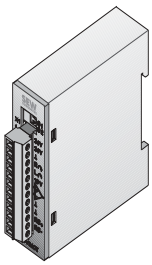
MBG11A



MBG11A option	
Part number	822 547 8
Input voltage	24 V_{DC} ± 25 %
Current consumption	approx. 70 mA
Setpoint resolution	1 %
Serial interface[1)]	RS-485 for connecting max. 31 MOVIMOT® inverters (max. 200 m, 9600 baud)
Enclosure	IP 65
Ambient temperature	-15...60 °C

1) with integrated dynamic terminating resistor

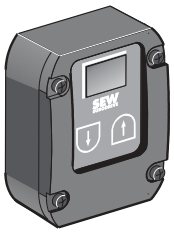
MWA21A



MWA21A option	
Part number	823 006 4
Input voltage	24 V_{DC} ± 25 %
Current consumption	approx. 70 mA
Serial interface[1)]	RS-485 for connecting max. 31 MOVIMOT® inverters (max. 200 m, 9600 baud) Unidirectional communication Cycle time: 100 ms
Analog input	0...10 V / 2...10 V, R_i ≈ 12 kΩ 0...20 mA / 4...20 mA, R_i ≈ 22 Ω
Setpoint resolution of the analog input	8 bit (± 1 bit)
Signal level of binary inputs	+13 V...+30 V = '1' - 3 V ...+5 V = “0”
Enclosure	IP 20
Ambient temperature	-15...60 °C

1) with integrated dynamic terminating resistor

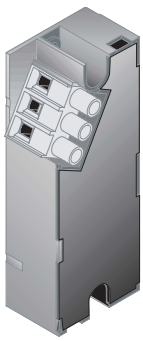
MDG11A



MDG11A option	
Part number	822 941 4
Input voltage	24 V_{DC} ± 25 %
Current consumption	approx. 70 mA
Serial interface	RS-485 for connection of **one** MOVIMOT® inverter with control via terminals
Enclosure	IP 65
Ambient temperature	-15...60 °C

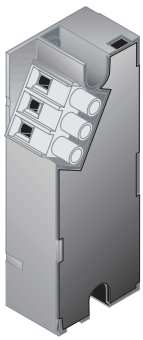
BGM brake rectifier

Important: The brake coil must correspond to the supply voltage



BGM brake rectifier	
Part number	827 602 1
Enclosure	IP20
Rated supply voltage (black connecting leads)	230 V_{AC}...500 V_{AC}, +10% / -15% 50 Hz...60 Hz, ± 5%
Control voltage (red / blue connecting leads)	+13 V...+30 V = "1“ -3 V...+5 V = "0“
Brake current (brake connection 13, 14, 15)	max. 0.8 A_{DC}
Ambient temperature	-25...60 °C

URM voltage relay



Voltage relay	
Part number	827 601 3
Function	Implements quick application of mechanical brake
Enclosure	IP20
Rated voltage V_{rated}	36 V_{DC}...167 V_{DC} (brake coil 88 V_{AC} ...167 V_{AC})
Brake current I_N	0.75 A
Ambient temperature	-25...60 °C
Switch-off time t_{off} (separation on DC side)	approx. 40 ms

12.4 Integrated RS-485 interface

RS-485 interface	
Standard	RS-485 to EIA standard (with integrated dynamic terminating resistor)
Baud rate	9.6 kbaud 31.25 kbaud (in conjunction with fieldbus interfaces MF..)
Start bits	1 start bit
Stop bits	1 stop bit
Data bits	8 data bits
Parity	1 parity bit, supplementing to even parity
Data direction	Unidirectional
Operating mode	Asynchronous, half-duplex
Timeout interval	1 s
Line length	max. 200 m in RS-485 operation at 9,600 baud Max. 30 m with transmission rate: 31,250 baud[1)]
Number of stations	• max. 32 stations (1 bus master[2)] + 31 MOVIMOT®) broadcast and group addresses possible • 15 MOVIMOT® individually addressable

1) Transmission rate 31,250 baud is detected automatically when operating with fieldbus interface MF...

2) Ext. control or MBG11A, MWA21A or MLG..A option

12.5 Assignment of internal braking resistors

MOVIMOT® type	Braking resistor	Part number
MM03 to MM15	BW1	822 897 3[1)]
MM22 to MMM3X	BW2	823 136 2[1)]

1) Two screws M4 x 8, included in delivery

12.6 Assignment of external braking resistors

MOVIMOT® type	Braking resistor	Part number	Protective guard
MM03 to MM15	BW200-003	826 267 5	813 152 X
	BW200-005	826 270 5	813 152 X
	BW150-010	802 285 2	–
MM22 to MMM3X	BW100-003	826 266 7	813 151 1
	BW100-005	826 269 1	813 151 1
	BW068-010	802 287 0	–

12.7 Resistance and assignment of the brake coil

Motor	Brake	Resistance of the brake coil[1)]
DT71	**BMG05**	277 Ω (230 V)
DT80	**BMG1**	248 Ω (230 V)
DT90	**BMG2**	216 Ω (230 V) / 54.2 Ω (110 V)
DV100/DT100	**BMG4**	43.5 Ω (110 V)

1) Rated value measured between the red connection (terminal 13) and the blue connection (terminal 15) at 20 °C, temperature-dependent fluctuations in the range -25 % / +40 % are possible.

13 Technical Data with Integrated AS-Interface

13.1 IEC design with connection voltages 380...500 V_{AC}

MOVIMOT® type		MM 03C-503-30	MM 05C-503-30	MM 07C-503-30	MM 11C-503-30	MM 15C-503-30	MM 22C-503-30	MM 30C-503-30	MM 3XC-503-30
Part number		**824 355 7**	**824 356 5**	**824 357 3**	**824 358 1**	**824 359 X**	**824 360 3**	**824 361 1**	**824 362 X**
Apparent output power at V_{mains} = 380...500 V_{AC}	P_{rated}	1.1 kVA	1.4 kVA	1.8 kVA	2.2 kVA	2.8 kVA	3.8 kVA	5.1 kVA	6.7 kVA
Connection voltages Permitted range	V_{mains}	3 x 380 V_{AC} / **400 V_{AC}** / 415 V_{AC} / 460 V_{AC} / 500 V_{AC} V_{mains} = 380 V_{AC} -10 % ... 500 V_{AC} +10 %							
Supply frequency	f_{mains}	50 Hz ... 60 Hz ± 10 %							
Rated system current (at V_{mains} = 400 V_{AC})	I_{mains}	1.3 A_{AC}	1.6 A_{AC}	1.9 A_{AC}	2.4 A_{AC}	3.5 A_{AC}	5.0 A_{AC}	6.7 A_{AC}	8.6 A_{AC}
Output voltage	V_{out}	0...V_{mains}							
Output frequency **Resolution** **Operating point**	f_{out}	2...100 Hz 0.01 Hz 400 V at 50 Hz / 100 Hz							
Rated output current	I_N	1.6 A_{AC}	2.0 A_{AC}	2.5 A_{AC}	3.2 A_{AC}	4.0 A_{AC}	5.5 A_{AC}	7.3 A_{AC}	9.6 A_{AC}
Motor power S1	P_{mot}	**0.37 kW**	**0.55 kW**	**0.75 kW**	**1.1 kW**	**1.5 kW**	**2.2 kW**	**3.0 kW**	**3.0 kW**
Motor power S3 25 % cdf									**4.0 kW**
PWM frequency		**4 (factory setting)** / 8 / 16[1] kHz							
Current limitation	I_{max}	**Motor:** 160 % with ⅄ and △ **Regenerative:**160 % with ⅄ and △							
Maximum motor lead length		15 m when mounting the MOVIMOT® frequency inverter close to the motor (with SEW hybrid cable and option P2.A)							
External braking resistor	R_{min}	150 Ω					68 Ω		
Interference immunity		Meets EN 61800–3							
Interference emission		Meets EN 61800–3 and class A limit to EN 55011 and EN 55014							
Ambient temperature	ϑ_{amb}	**-25 °C...40 °C** (P_{rated} reduction: 3 % I_N per K to max. 60 °C)							[2]
Climate class		3 K3							
Enclosure (motor-dependent)		IP54, IP55, IP65, IP66 (options, specify when ordering) IP67 (only available for inverters with terminal box)							
Operating mode		DB (EN 60149-1-1 and 1-3), S3 max. cycle duration 10 minutes							
Cooling type (DIN 41 751)		Self-cooling							
Altitude		h ≤ 1000 m (P_{rated} reduction: 1 % per 100 m starting at an altitude of 1000 m, see also the section "Electrical Installation – Installation Instructions")							
Power supply to control electronics		**AS-i** 29.5 V - 31.6 V (AS-i power supply to EN 50295) **Optional AUX-PWR** 24 V ± 25%, EN61131-2, residual ripple max. 13%, input capacitance \100 µF A PELV (Protective Extra Low Voltage) power supply to IEC 60364-4-41 with safe isolation is mandatory for the AUX-PWR auxiliary power supply. **I_E only AS-i** ≤ 200 mA[3] (typ. 120 mA at 30 V) **I_E AS-i + AUX-PWR** ≤ 50 mA (typ. 30 mA at 30 V) + 200 mA[3] (typ. 120 mA at 24 V)							
Control input	AS-i + AS-i -	Connection of AS-i data line Connection of AS-i data line							
Sensor connection (maximum sensor line length \15 m)	TI. DI2 TI. DI3 TI. 0V TI. 0V⊥	External sensor input External sensor input 24 V for sensor supply Reference potential for sensor supply							
Diagnostic interface		Modular jack 4/4 (RJ11)							

1) 16 kHz PWM frequency (low-noise): When DIP SWITCH S3/3 = ON, the units operate with a 16 kHz PWM frequency (low noise) and switch back in steps to lower switching frequencies depending on the heat sink temperature.

2) -25 °C...40 °C with S3 25% ED (up to 60 °C with S3 10 % ED)

3) The current increases by the demand of the connected sensors\ (max. 100 mA)

13.2 Assignment of internal braking resistors

MOVIMOT® type	Braking resistor	Part number
MM03 to MM15	BW1	822 897 3[1)]
MM22 to MMM3X	BW2	823 136 2[1)]

1) 2 screws M4 x 8, included in delivery

13.3 Assignment of external braking resistors

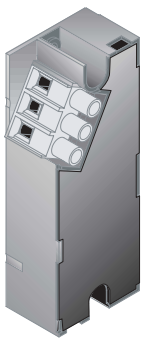
MOVIMOT® type	Braking resistor	Part number	Protective guard
MM03 to MM15	BW200-003	826 267 5	813 152 X
	BW200-005	826 270 5	813 152 X
	BW150-010	802 285 2	–
MM22 to MMM3X	BW100-003	826 266 7	813 151 1
	BW100-005	826 269 1	813 151 1
	BW068-010	802 287 0	–

13.4 Resistance and assignment of the brake coil

Motor	Brake	Resistance of the brake coil[1)]
DT71	**BMG05**	277 Ω (230 V)
DT80	**BMG1**	248 Ω (230 V)
DT90	**BMG2**	216 Ω (230 V) / 54.2 Ω (110 V)
DV100/DT100	**BMG4**	43.5 Ω (110 V)

1) Rated value measured between the red connection (terminal 13) and the blue connection (terminal 15) at 20 °C, temperature-dependent fluctuations in the range -25 % / +40 % are possible.

13.5 URM voltage relay



Voltage relay	
Part number	827 601 3
Function	Implements quick application of mechanical brake
Enclosure	IP20
Rated voltage V_{rated}	36 V_{DC}...167 V_{DC} (brake coil 88 V_{AC} ...167 V_{AC})
Brake current I_N	0.75 A
Ambient temperature	-25...60 °C
Switch-off time t_{off} (separation on DC side)	approx. 40 ms

Index of Changes

This edition reflects the following major changes and amendments in comparison to the preceding edition of the MOVIMOT® operating instructions (publication number: 10527001, Edition: 06/2002):

- New MOVIMOT® versions with AS-Interface
  - MM../AVSK
  - MM../AZSK
  - MM../AND3/AZSK
- In connection with modular terminal box only:
  - Option P2.A for installation of the MOVIMOT® inverter close to the motor
  - Description for later turning of the modular terminal box
- New option "URM voltage relay"
- Connection via MOVIMOT® plug connectors AVT1, ASA3, AMA6 (not in connection with MOVIMOT® with integrated AS-Interface)
- New additional functions:
  - Additional function 11:Monitoring mains-phase failure deactivated
  - Additional function 12:MOVIMOT® with rapid start/stop and motor protection via TH (not in connection with MOVIMOT® with integrated AS-Interface)
- New startup notes for installation of the MOVIMOT® inverter with P2.A option close to the motor
- Description of the function in case of communication with the RS-485 master

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Address List

Germany			
Headquarters **Production** **Sales** **Service**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 · D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de Service Electronics: Tel. +49 171 7210791 Service Gear Units and Motors: Tel. +49 172 7601377
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France			
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	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
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Algeria			
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Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar

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Austria			
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Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 50 Caixa Postal: 201-07111-970 Guarulhos/SP - Cep.: 07251-250	Tel. +55 11 6489-9133 Fax +55 11 6480-3328 http://www.sew.com.br sew@sew.com.br
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	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Street LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
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Sales	**Abidjan**	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36

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	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

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Tunisia			
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	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 467-3792 csbridgeport@seweurodrive.com
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	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
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