13 Installation

13.1 Installation instructions for the basic unit

13.1.1 Tightening torques

Tightening torques of power terminals

Only use **original connection elements**. Note the **permitted tightening torques** for MOVIDRIVE® power terminals.

Size	Tightening torque	
	Nm	lb in
0, 1 and 2S	0.6	5
2	1.5	13
3	3.5	31
4 and 5	14.0	124
6	20.0	177
7	70.0	620

- The **permitted tightening torque** for the **signal terminals** is 0.6 Nm (5 lb in).

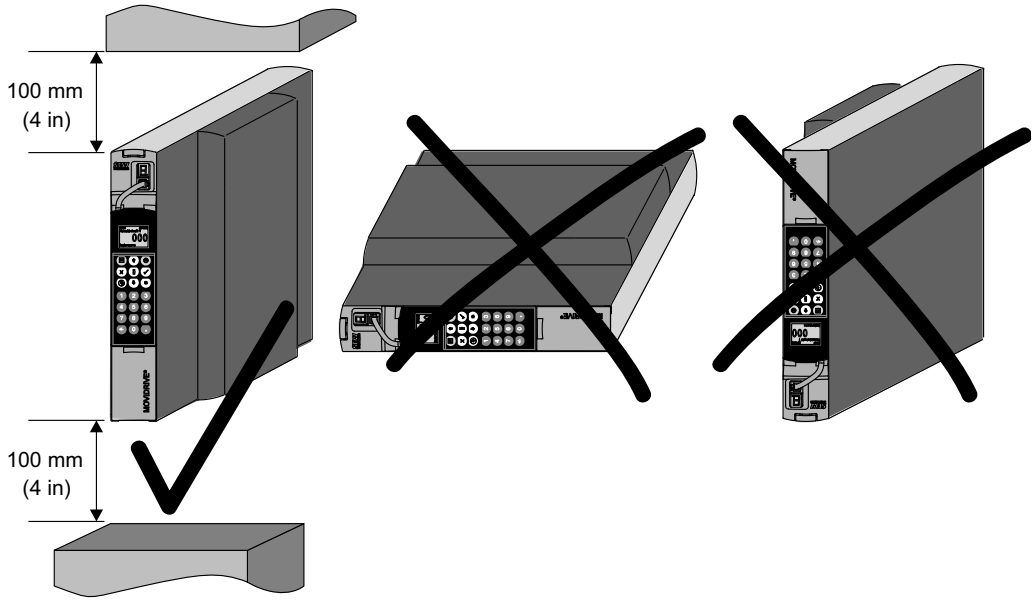
General tightening torques

Note the permitted tightening torques:

Component	Screws	Tightening torque	
		Nm	lb in
Screw cover	M5 x 25	1.4 - 1.7	12 - 15
Screws with integral disk	M4	1.7	15
	M5	3.4	30
	M6	5.7	50
Current rail screws	M10	20	180
Insulating spacer	M10 (SW32)	30	270

13.1.2 Minimum clearance and mounting position

- Leave at least **100 mm (4 in) clearance above and below the unit for optimum cooling**. Make sure air circulation in the clearance is not impaired by cables or other installation equipment. With sizes 4, 5 and 6, do not install any components which are sensitive to high temperatures within 300 mm (12 in) of the top of the unit.
- Ensure unobstructed cooling air supply and make sure that the units are not subjected to heated air from nearby components.
- There is no need for clearance at the sides of the unit. You may line up the units directly next to each other.
- Only install the units **vertically**. Do not install them horizontally, tilted or upside down (→ following figure, applies to all sizes).



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13.1.3 Separate cable ducts

- Route **power cables** and **signal cables** in **separate cable ducts**.

13.1.4 Fuses and earth-leakage circuit breakers

- Install the **input fuses at the beginning of the supply system lead** after the supply bus junction (→ Wiring diagram for basic unit, power section and brake).
- SEW-EURODRIVE recommends that you do not use earth-leakage circuit breakers but take alternative measures. Please refer to the section "PE connection". If you want to use an earth-leakage circuit breaker (RCD) nonetheless, **note the following according to EN 61800-5-1**:

⚠ WARNING

MOVIDRIVE® can cause a DC current in the PE conductor, which might result in a malfunction of the earth leakage circuit breaker.

The use of an incorrect earth-leakage circuit breaker type can cause death or severe injuries.

- Either take alternative measures instead of earth-leakage circuit breakers according to the relevant standards (e.g. 61800-5-1, EN 60204-1) – see section "PE connection" –
- or use earth-leakage circuit breakers of type B.

13.1.5 Line and brake contactors

- Only use **contactors in utilization category AC-3** (IEC 60947-4-1) as mains and brake contactors.

INFORMATION

- Only use the **input contactor K11** (→ Sec. "Wiring diagram for basic unit") to **switch the inverter on and off**. Do not use it for jog mode. For jog mode, use the the commands "Enable/stop", "CW/stop" or "CCW/stop".
- Observe a minimum switch-off time of 10 s for the supply system contactor K11.

13.1.6 PE connection (→ EN 61800-5-1)

Earth-leakage currents ≥ 3.5 mA can occur during normal operation. To meet the requirements of EN 61800-5-1 observe the following:

- **Supply system lead < 10 mm²**:

  Route a **second PE conductor with the cross section of the supply system lead** in parallel to the protective earth via separate terminals or use a **copper protective earth conductor with a cross section of 10 mm²**.

- **Supply system cable 10 mm² ... 16 mm²**:

  Route a **copper protective earth conductor with the cross section of the supply system lead**.

- **Supply system cable 16 mm² ... 35 mm²**:

  Route a **copper protective earth conductor with a cable cross section of 16 mm²**.

- **Supply system cable < 35 mm²**:

  Route a **copper protective earth conductor with the cross section of the supply system lead**.

13.1.7 IT systems

- MOVIDRIVE® B is designed for operation on TN and TT systems with a directly grounded star point. Operation on voltage supply systems with a non-grounded star point is permitted In this case, SEW-EURODRIVE recommends using **earth-leakage monitors with pulse-code measurement** for voltage supply systems with a non-grounded star point **(IT systems)**. Using such devices prevents the earth-leakage monitor mis-tripping due to the ground capacitance of the inverter. **No EMC limits are specified for interference emission** in **voltage supply systems without grounded star point** (IT systems).
- Size 7 can be converted for IT networks. Note the information in the "MOVIDRIVE® MDX60B / 61B – Inspection and Maintenance of Size 7" manual.

13.1.8 Cable cross sections

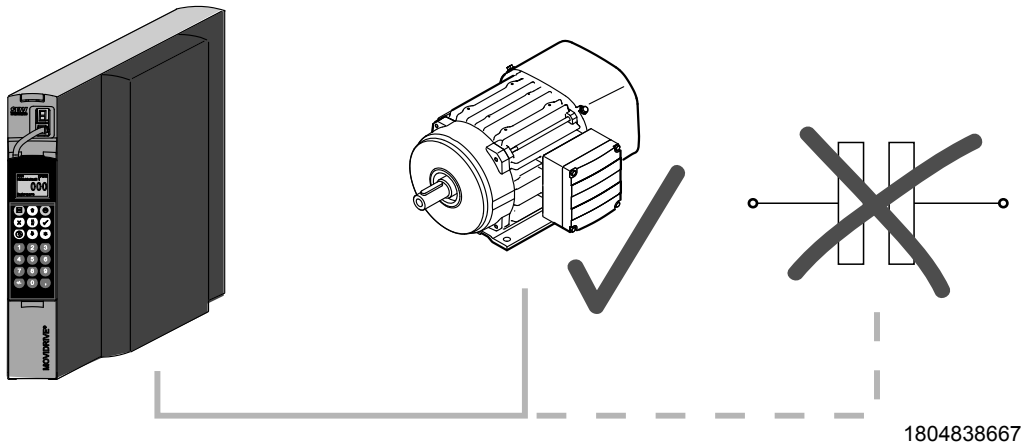
- Supply system cable: **Cable cross section according to rated input current** I_{mains} at rated load.
- Motor cable: **Cable cross section according to rated output current** I_{rated}.
- Signal cables of basic unit (terminals X10, X11, X12, X13, X16):
  - One core per terminal 0.20 ... 2.5 mm^2 (AWG 24 to 13)
  - Two cores per terminal 0.25 ... 1 mm^2 (AWG 23 to 17)
- Signal cables of terminal X17 and DIO11B terminal expansion board (terminals X20, X21, X22):
  - One core per terminal 0.08 ... 1.5 mm^2 (AWG 28 to 16)
  - Two cores per terminal 0.25 ... 1 mm^2 (AWG 23 to 17)

13.1.9 Unit output

NOTICE

MOVIDRIVE® B can suffer irreparable damage if you connect capacitive loads.

- **Only connect ohmic/inductive loads (motors).**
- Never connect capacitive loads.



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13.1.10 Installing braking resistors BW.../ BW..-T / BW...-P

- Mounting permitted:
  - on horizontal surfaces
  - on vertical surfaces with brackets at the bottom and perforated sheets at top and bottom
- Mounting not permitted:
  - on vertical surfaces with brackets at the top, right or left

13.1.11 Connection of braking resistors

- Use **two tightly twisted leads or a 2-core shielded power cable**. Cable cross section according to trip current I_F of F16. The rated voltage of the cable must amount to at least V_0/V = 300 V / 500 V (in accordance with DIN VDE 0298).
- Protect the braking resistor (except for BW90-P52B) using a **bimetallic relay** (→ wiring diagram for basic unit, power section and brake). Set the **trip current** according to the **technical data of the braking resistor**. SEW-EURODRIVE recommends using an overcurrent relay from trip class 10 or 10A in accordance with EN 60947-4-1.
- For braking resistors of the **BW...-T / BW...-P** series, the **integrated temperature switch/overcurrent relay can be connected using a 2-core shielded cable** as an **alternative** to a bimetallic relay.
- **Flat-type braking resistors** have internal thermal overload protection (fuse which cannot be replaced). Install the **flat-type braking resistors** together with the appropriate **touch guard**.

13.1.12 Operating braking resistors

- The connection leads to the braking resistors carry a **high pulsed DC voltage** during rated operation.

⚠ WARNING

The surfaces of the braking resistors get very hot when the braking resistors are loaded with P_{rated}.

Risk of burns and fire.

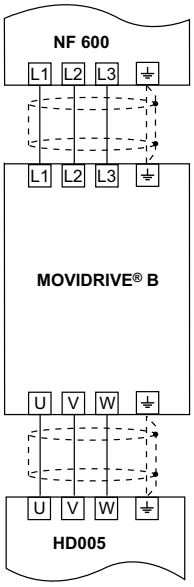
- Choose a suitable installation location. Braking resistors are usually mounted on top of the control cabinet.
- Do not touch the braking resistors.

13.1.13 Binary inputs / binary outputs

- The **binary inputs** are electrically **isolated** by optocouplers.
- The **binary outputs** are **short-circuit proof** and **protected against external voltage to DC 30 V.** External voltages > DC 30 V can cause irreparable damage to binary outputs.

13.1.14 EMC-compliant installation

- All cables except for the supply system lead must be **shielded**. As an alternative to the shielding, the option HD.. (output choke) can be used for the motor cable to achieve the emitted interference limit values.



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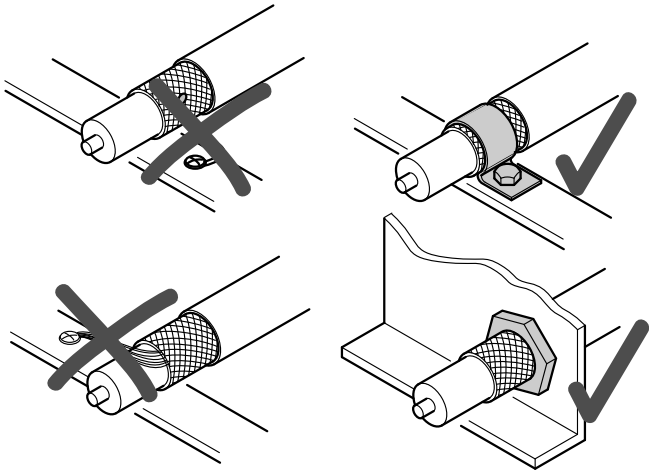
Shielded cables

- When using shielded motor cables, e.g. prefabricated motor cables from SEW-EURODRIVE, you must keep the **unshielded conductors between the shield and connection terminal of the inverter as short as possible**.
- Apply the **shield by the shortest possible route and make sure it is grounded over a wide area at both ends**. Ground one end of the shield using an interference suppression capacitor (220 nF/50 V) to avoid ground loops. If using double-shielded cables, ground the outer shield on the inverter end and the inner shield at the other end.



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Correct shield connection using metal clamp (shield clamp) or cable gland

- You can also use **earthed sheet-metal ducts or metal pipes** to **shield the cables**. **Route** the **power and signal cables separately**.
- Ground the **inverter** and **all additional units to ensure high-frequency compatibility** (wide area, metal-on-metal contact between the unit housing and ground, e.g. unpainted control cabinet mounting panel).

INFORMATION

- MOVIDRIVE® B is a product with restricted availability in accordance with EN 61800-3. It may cause EMC interference. In this case, it is recommended for the operator to take suitable measures.
- For detailed information on EMC compliant installation, refer to the publication "Electromagnetic Compatibility in Drive Engineering" from SEW-EURODRIVE.

NF.. line filter

- The NF.. line filter option can be used to maintain the class C1 limit for MOVIDRIVE® MDX60B/61B units size 0 to 5.
- Do not switch between the line filter and MOVIDRIVE® MDX60B/61B.
- Install the **line filter close to the inverter** but outside the minimum clearance for cooling.
- Keep the **length of the cable between the line filter and inverter to an absolute minimum**, and never more than 400 mm. Unshielded, twisted cables are sufficient. Use unshielded cables for the supply system connection as well.
- SEW-EURODRIVE recommends taking one of the following **EMC measures on the motor side to maintain class C1 and C2 limits**:
  - Shielded motor cable
  - HD... output choke option
  - HF.. output filter option (in operating modes VFC and V/f)

Interference emission category

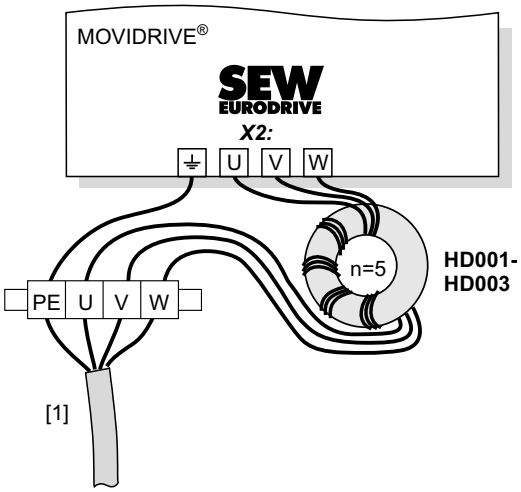
Compliance with category C2 according to EN 61800-3 has been tested in a CE typical drive system. SEW-EURODRIVE can provide detailed information on request.

⚠ WARNING

This product can cause high-frequency interferences in residential areas which can require measures for interference suppression.

HD... output choke

- Install the **output choke close to the inverter** but outside the minimum clearance for cooling.
- For HD001 ... HD003: Route **all three phases (U, V, W) of the motor cable [1] through the output choke**. To achieve a higher filter effect, **do not route the PE conductor through the output choke**.



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Connection of output choke HD001 – HD003

[1] Motor cable

13.1.15 Installation notes for size 6

The MOVIDRIVE® units of size 6 (0900 ... 1320) are equipped with a factory mounted lifting lug [1]. Use a crane and the lifting eye [1] to install the unit.

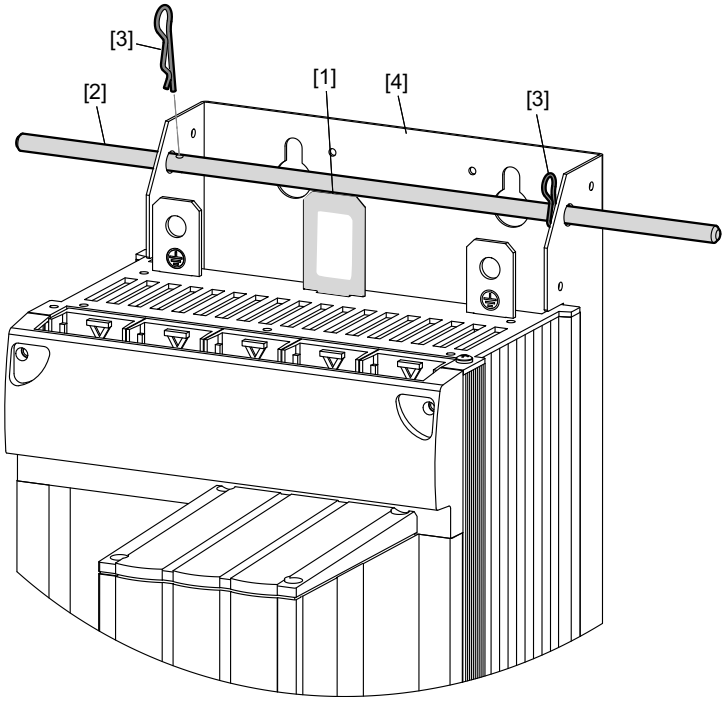
⚠ DANGER

Suspended load.

Danger of fatal injury if the load falls.

- Do not stand under the suspended load.
- Secure the danger zone.

If a crane is not available, you can push a carrying bar [2] through the rear panel [4] to facilitate installation (included in the delivery scope of size 6). Secure the carrying bar [2] against axial displacement using the split pins [3] (see figure below).



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[1] Fixed lifting eye
[2] Carrying bar (included in the delivery of size 6)
[3] 2 split pins (included in the delivery of size 6)
[4] Rear panel

13.1.16 Installation notes for size 7

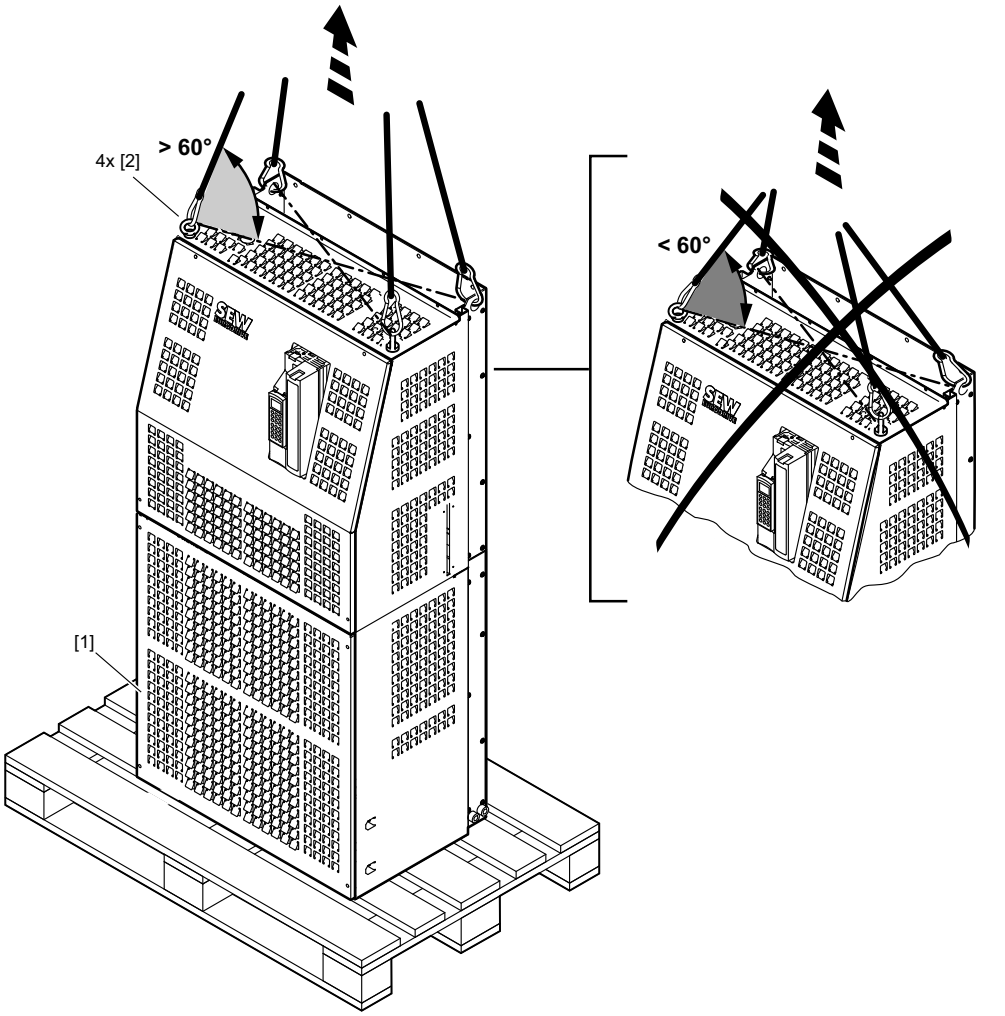
MOVIDRIVE® units size 7 (1600 - 2500) have 4 fixed lifting eyes [2] for transport. Use only these four lifting eyes [2] for installation.

⚠ DANGER

Suspended load.

Danger of fatal injury if the load falls.

- Do not stand under the suspended load.
- Secure the danger zone.
- Always use all 4 lifting eyes.
- Align the lifting eyes with the direction of tension

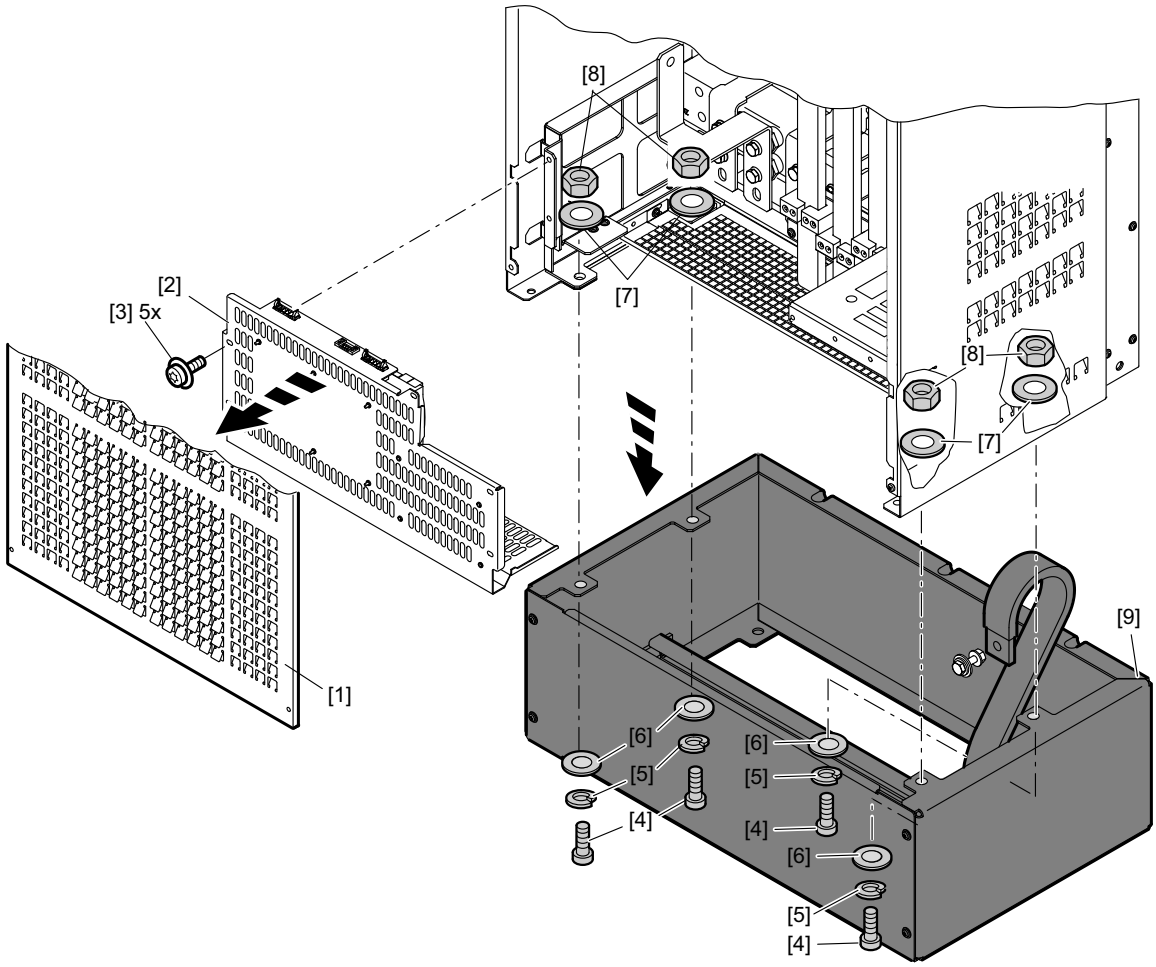


[1] Installed front cover
[2] 4 lifting eyes

13.1.17 Optional scope of delivery for size 7

Mounting base

The **mounting base DLS11B** with mounting material [9] (part no.: 1 822 602 7) is used to **install MOVIDRIVE® B, size 7 on the floor of the control cabinet**. MOVIDRIVE® B size 7 must be screwed onto the mounting base immediately after installation (see following figure). Do not take MOVIDRIVE® B size 7 into operation until the mounting base has been completely mounted.



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The mounting material (pos. 3 - 8) is enclosed in a plastic bag.

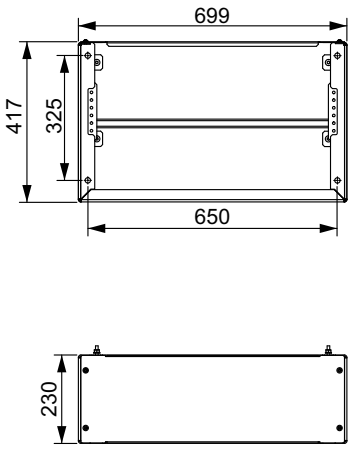
[1] Front cover
[2] Insert (for external power supply)
[3] Retaining screws for insert
[4] Machine screw M8 × 30 hexagon socket
[5] Lock washer
[6] Washer
[7] Washer
[8] M8 nut

Do the following to install the mounting base [9] to MOVIDRIVE® B size 7:

1. Loosen (not unscrew!) the 4 retaining screws of the front cover [1] until you can lift it off. Remove the front cover [1].
2. Remove the insert [2]. Loosen the 5 retaining screws [5] to do so.
3. The following steps apply to each of the 4 mounting holes.
   - Position the washer [7] centrically between inverter and mounting base [9].
   - Place the lock washer [5] and the washer [6] onto the socket head screw [4] M8×30.
   - Insert the preassembled socket head screw through the mounting hole.
   - Screw the M8 nut [8] onto the socket head screw. Tightening torque 20 Nm. Apply thread locking compound.
4. Replace the insert [2] into the unit and fasten it using the 5 retaining screws.
5. Replace the front cover [1] onto the unit and fasten it using the 4 retaining screws.

Dimension drawing of mounting base

The following figure shows the dimensions of the mounting base.



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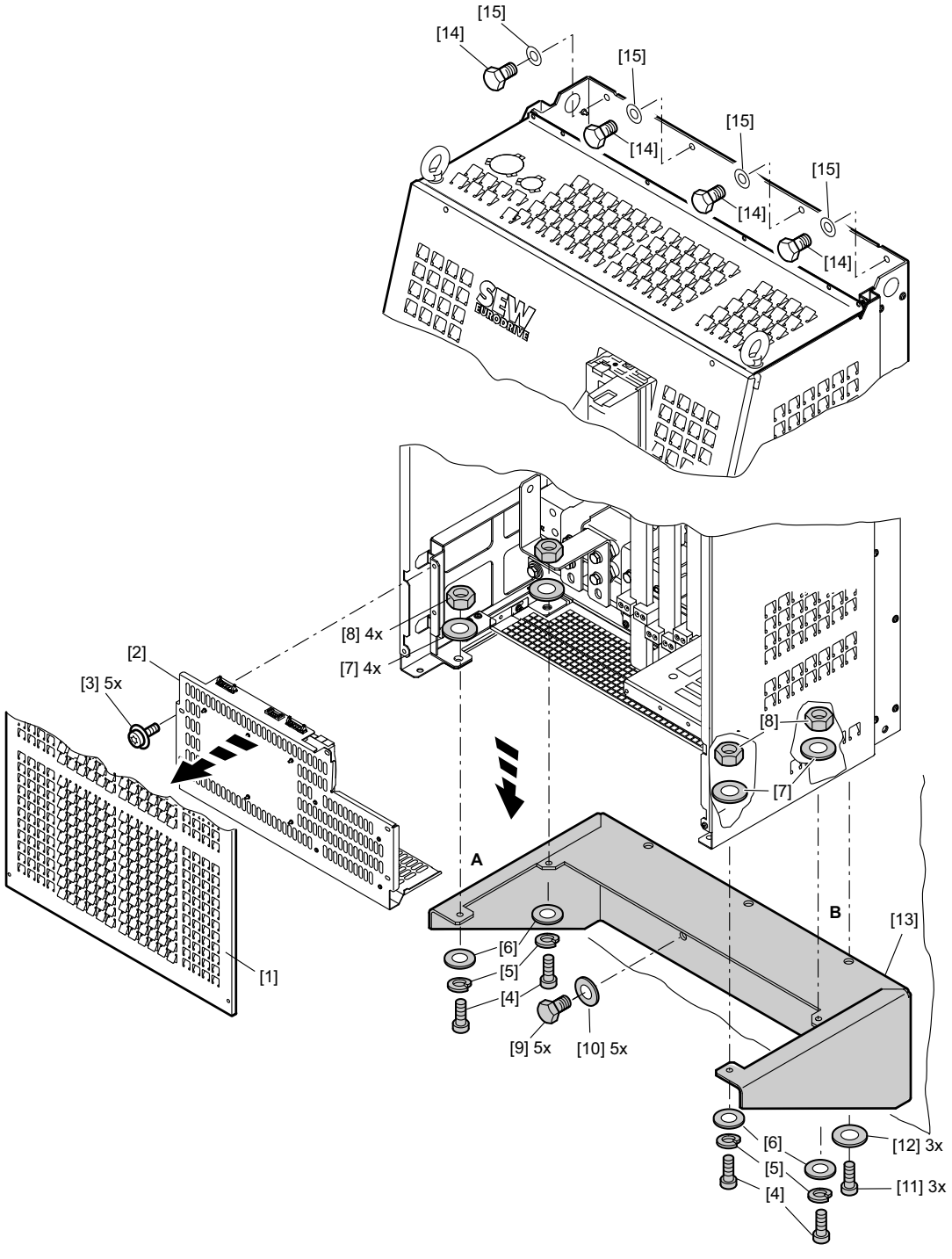
Wall bracket

The **wall bracket DLH11B** [13] (part no: 1 822 610 8) is used to **attach MOVIDRIVE® B size 7 to the wall** (see following figure). Do not take MOVIDRIVE® B size 7 into operation until the installation of the unit is complete.



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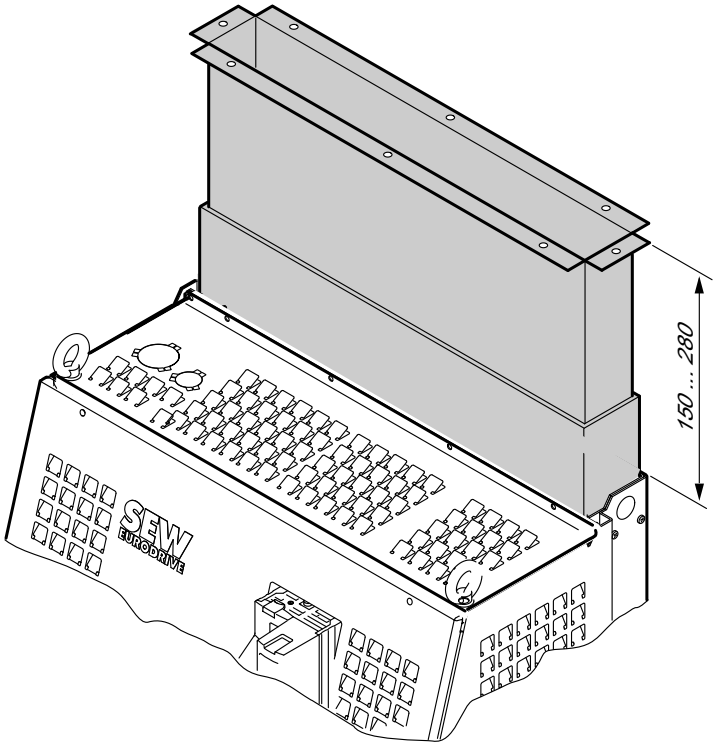
The installation material for wall mounting is not included in the scope of delivery of SEW-EURODRIVE.

Proceed as follows to fasten the wall bracket [13] to MOVIDRIVE® B size 7:

1. Loosen (not unscrew!) the 4 retaining screws of the front cover [1] until you can lift it off. Remove the front cover [1].
2. Remove the insert [2]. Loosen the 5 retaining screws [5] to do so.
3. The wall bracket [13] is screwed onto MOVIDRIVE® B at 5 points [A, B] (see above figure).
   - Position the a washer [7] at each point centrically between inverter and wall bracket [13].
   - Place the lock washer [5] and the washer [6] onto the socket head screw [4] M8×30.
   - Insert the preassembled socket head screw through the two mounting holes [A].
   - Screw the M8 nut [8] onto the socket head screw. Tightening torque 20 Nm. Apply thread locking compound.
   - Screw the wall bracket to MOVIDRIVE® B at the 3 mounting bores [B] using the retaining screws [11] and washers [12].
4. Replace the insert [2] into the unit and fasten it using the 5 retaining screws.
5. Replace the front cover [1] onto the unit and fasten it using the 4 retaining screws.
6. To mount MOVIDRIVE® B size 7 to a wall (material not included in the scope of delivery), use
   - 4 retaining screws [14] and washers [15] for the 4 mounting holes at the top of the unit and
   - 5 retaining screws [9] and washers [10] for the 5 mounting holes on the wall bracket [13].

Heat dissipation through air duct

A **DLK11B air duct** (part no.: 1 822 603 5) is available as an option to dissipate heat of MOVIDRIVE® B size 7. Install the air duct in such a way that it points vertically upwards (see below figure).



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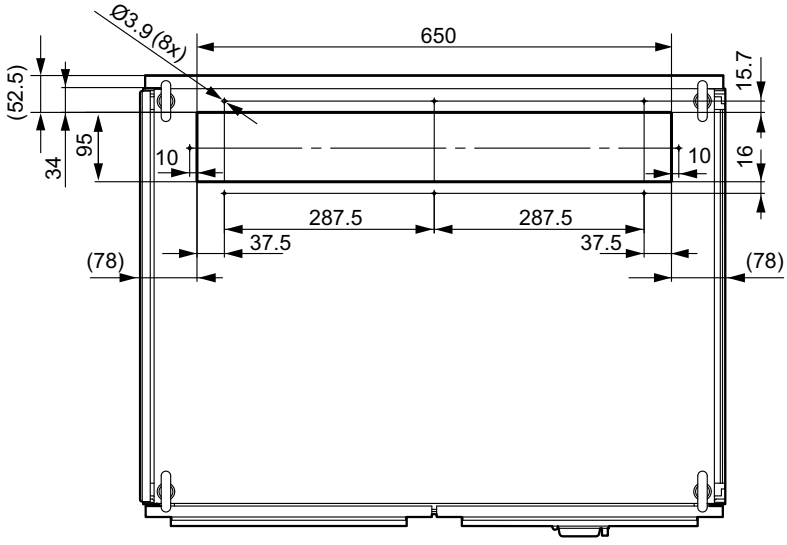
Roof cut-out for DLK11B air duct

The following figure shows the cut-out of the control cabinet roof for the DLK11B air duct.



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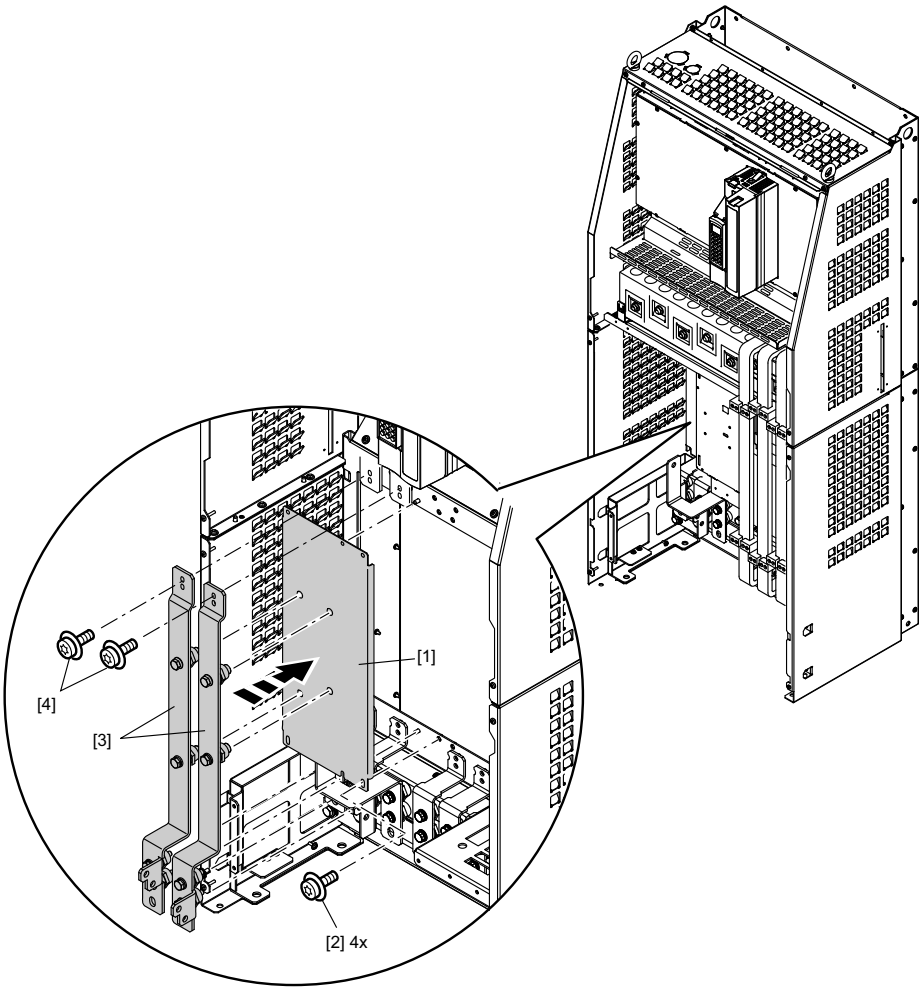
DC link adapter 2Q

The **DC link adapter 2Q DLZ12B** (part no.: 1 822 729 5) can be used to provide a DC link connection at the bottom of the unit:



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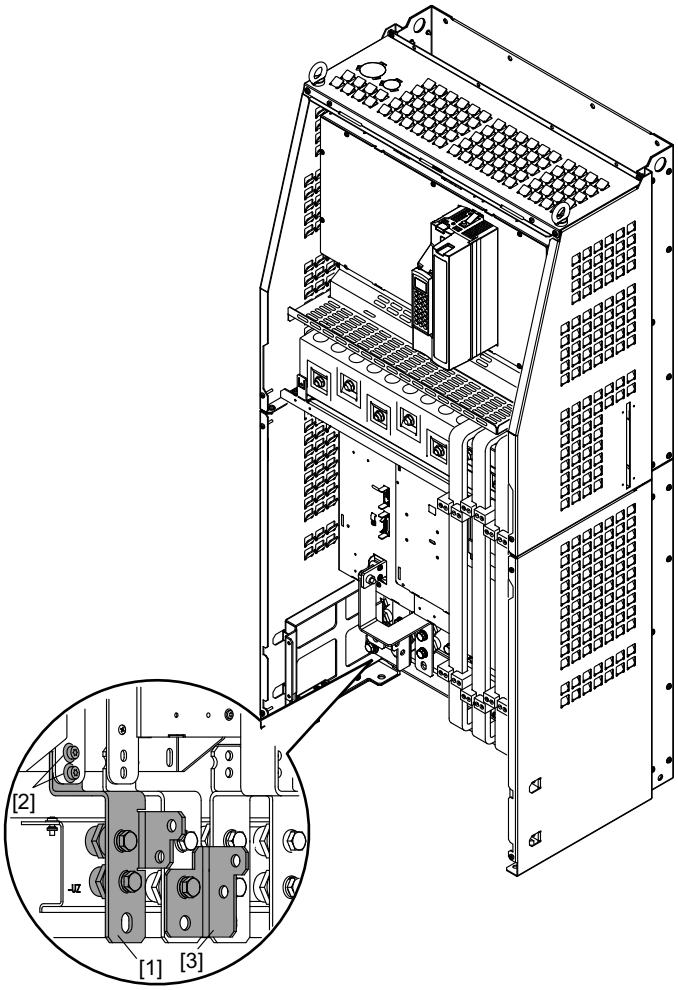
1. Loosen the 4 screws of both the upper and lower cover and remove them.
2. Loosen the 5 screws of the insert and remove it.
3. Place the cover panel on the fastening pin of the slot for the brake chopper module.
4. Position the 2 upper retaining screws [2] of the cover panel [1] in the frame. Position the 2 lower retaining screws of the cover panel in the frame.
5. Screw the insulating spacers tightly to the cover panel [1].
6. Screw the insulating spacers tightly to the frame (bottom).
7. Position the 2 screws of the fixing strap $-U_Z$ at the DC link (top left).
8. Position the 2 screws of the fixing strap $+U_Z$ at the DC link (top right).
9. Position the 4 screws of the fixing straps $-U_Z$ and $+U_Z$ on the insulating spacer.
10. Tighten all screws of the fixing straps $-U_Z$ and $+U_Z$.
11. Replace the covers.

DC link adapter 4Q

The **DC link adapter 4Q DLZ14B** (part no.: 1 822 728 7) can be used to provide a DC link connection at the bottom of the unit:



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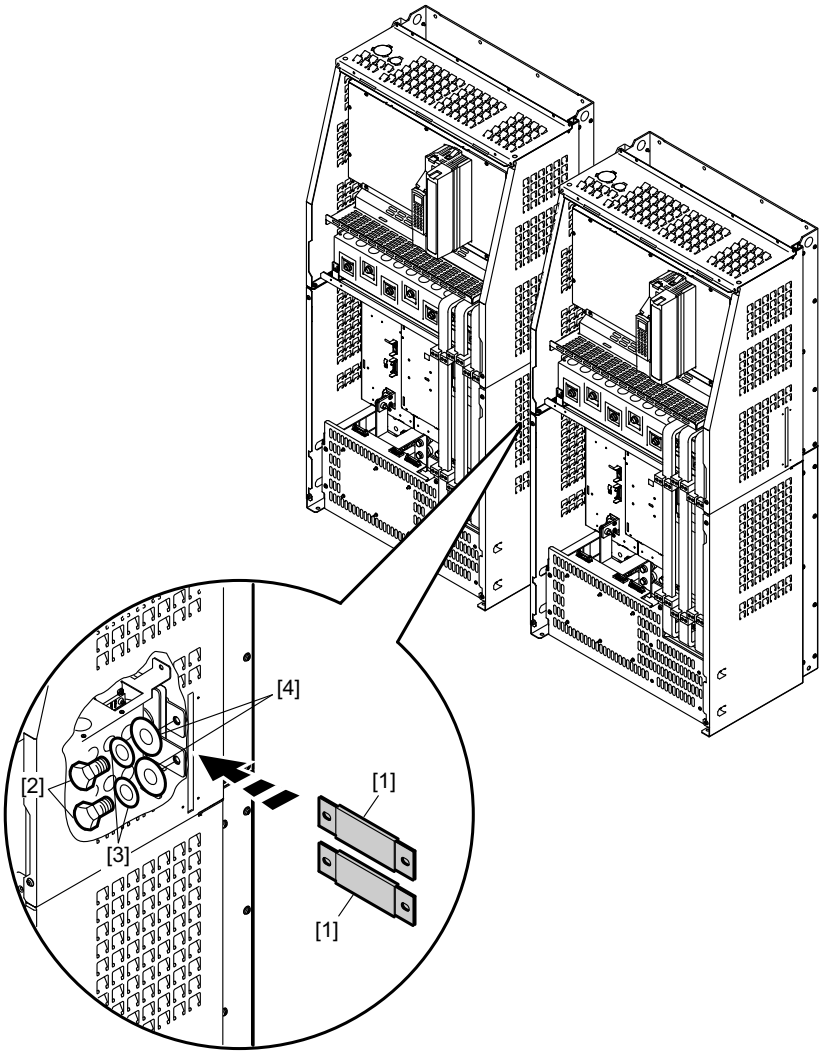
1. Loosen the 4 screws of the upper cover and remove it.
2. Loosen the 4 screws of the lower cover and remove it.
3. Position the 2 screws of the conductor rail [1] $-U_Z$ on the brake chopper module (bottom left) on the insulating spacer.
4. Position the 2 screws of the conductor rail [1] $-U_Z$ on the insulating spacer.
5. Tighten all screws of the fixing strap $-U_Z$.
6. Screw on the angle bracket [3].
7. Replace the covers.

DC link coupling

To connect 2 inverters that are installed next to each other, you can use the **DLZ11B DC link coupling** (part no.: 1 823 193 4):



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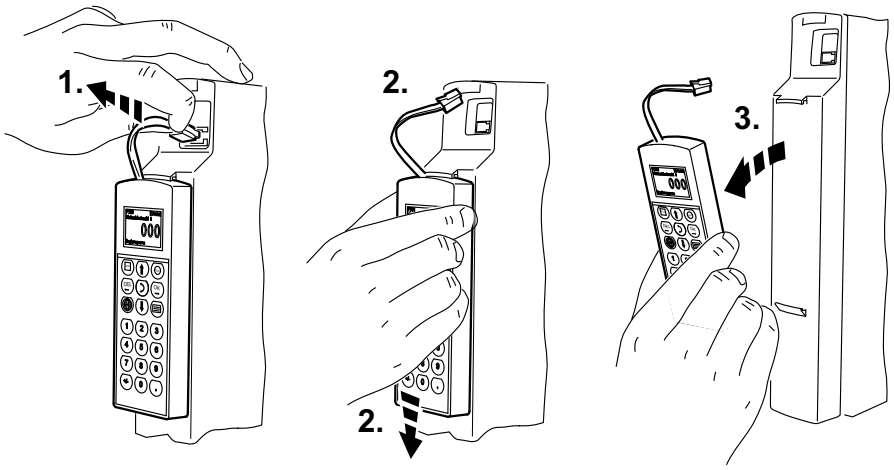
1. The units that you want to connect must be installed at ground level and 100 mm apart from each other.
2. Loosen the 4 screws of the upper cover and remove it.
3. Loosen the 4 screws of the lower cover and remove it.
4. Insert the 2 DC link couplings [1] into the units.
5. Screw the DC link coupling [1] to one unit first, before attaching it to the other units.
6. Tighten the screws [2].
7. Replace the covers.

13.2 Removing/installing the keypad

13.2.1 Removing the keypad

Proceed as follows:



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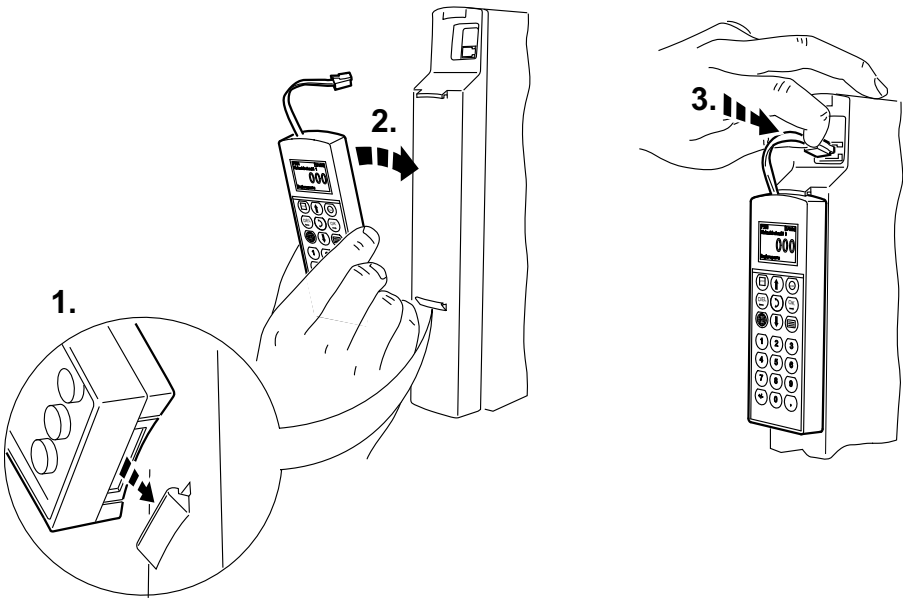
1. Unplug the connection cable from the XT slot.
2. Carefully push the keypad downward until it comes off the upper fixture on the front cover.
3. Remove the keypad **forward** (not to the side!).

13.2.2 Installing the keypad

Proceed as follows:



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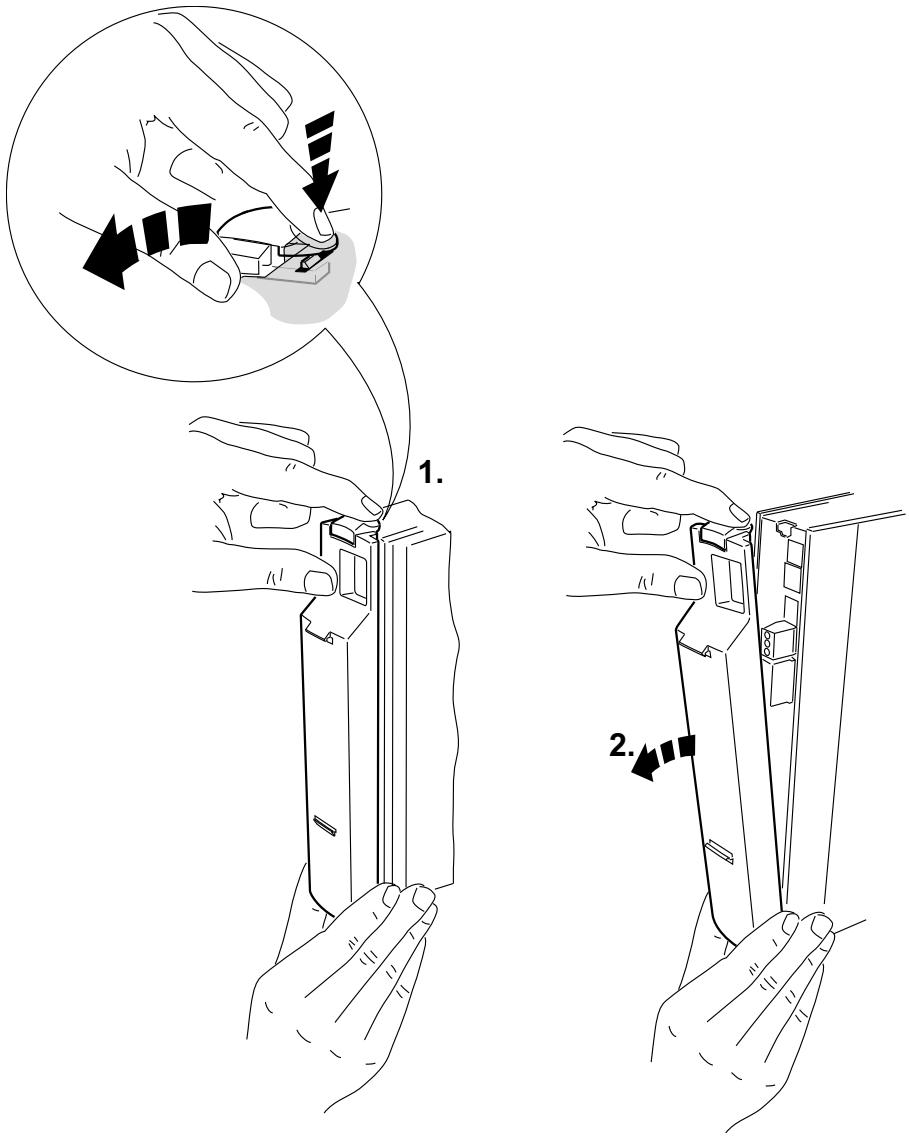
1. Place the underside of the keypad onto the lower fixture of the front cover.
2. Push the keypad into the upper fixture of the front cover.
3. Plug the connecting cable into the XT slot.

13.3 Removing/installing the front cover

13.3.1 Removing the front cover

Proceed as follows to remove the front cover:



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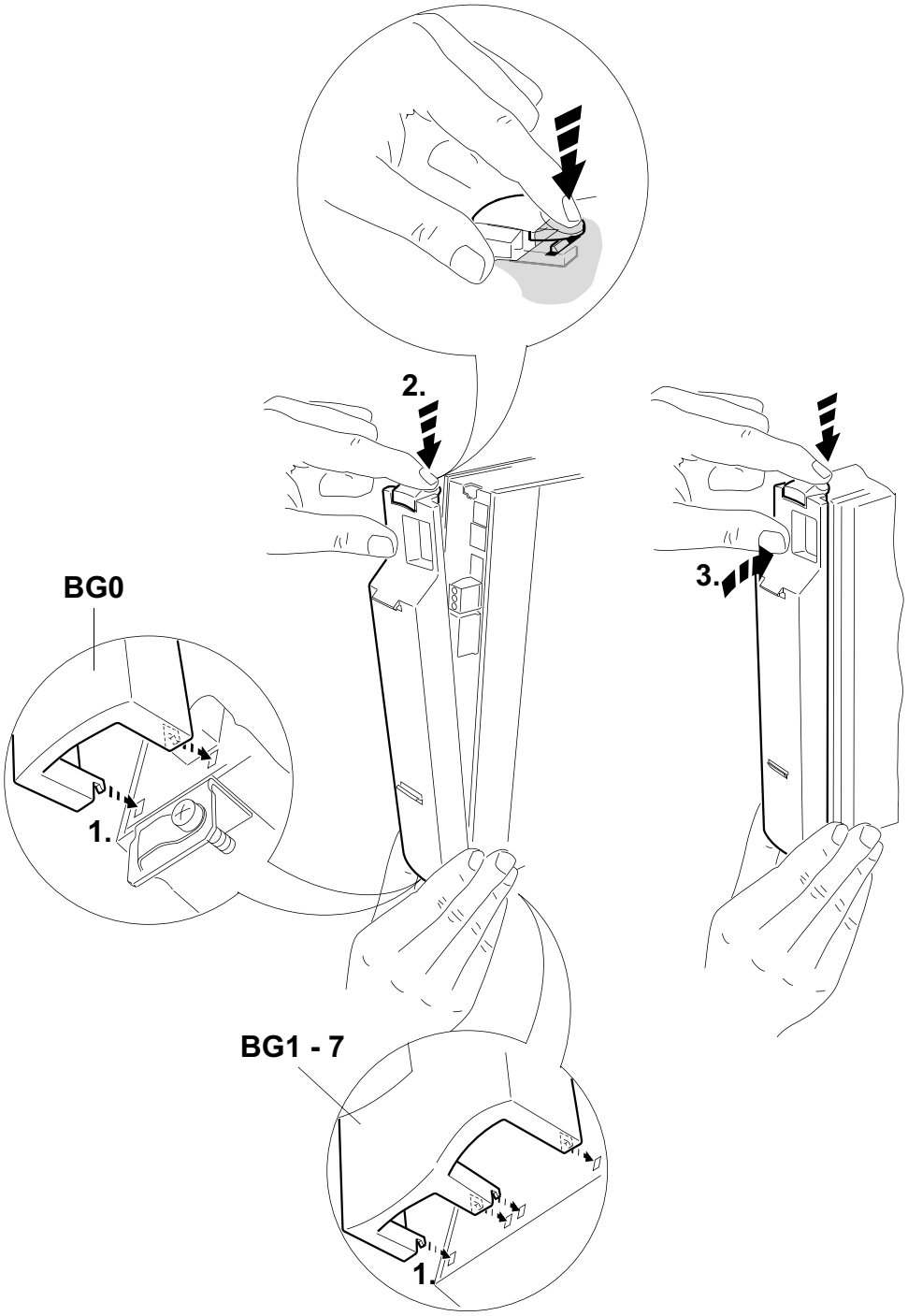
1. If a keypad (page 510) is installed, remove it first.
2. Press the grooved clip on top of the front cover.
3. Keep the clip pressed down to remove the front cover.

13.3.2 Installing the front cover

Proceed as follows to install the front cover:



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1. Insert the underside of the front cover into the support.
2. Keep the grooved clip on top of the front cover pressed down.
3. Push the front cover onto the unit.

13.4 Information regarding UL

13.4.1 Field wiring power terminals

- MOVIDRIVE® MDX60B/61B 0003 – 0300: Only use copper lines with a rated thermal value of 60/75 °C.

  MOVIDRIVE® MDX60B/61B 0370 – 2500: Use only 75 °C copper wire

- Tighten terminals to in-lbs (Nm) as follows:

Series	Size	in-lbs	Nm
MOVIDRIVE® B	0XS, 0S, 0L	5	0.6
	1, 2S	5	0.6
	2	13	1.5
	3	31	3.5
	4, 5	120	14
	6	180	20
	7	620	70

13.4.2 Short circuit current rating

- Suitable for use on a circuit capable of delivering not more than 200000 A symmetrical amperes:
  - MOVIDRIVE® MDX60B/61B 0005 – 2500 (only 400 V units).

    Max. voltage is limited to 500 V.
  - MOVIDRIVE® MDX60B/61B 0015 – 0300 (only 230 V units).

    Max. voltage is limited to 240 V.

13.4.3 Branch circuit protection

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes.

For maximum fuse rating see tables below.

AC 400/500 V units

MOVIDRIVE® MDX60B/61B...5_3	Max. supply short circuit current	Max. line voltage	Max. fuse rating
0005/0008/0011/0014	AC 200000 A	AC 500 V	AC 15 A / 600 V
0015/0022/0030/0040	AC 200000 A	AC 500 V	AC 35 A / 600 V
0055/0075	AC 200000 A	AC 500 V	AC 60 A / 600 V
0110	AC 200000 A	AC 500 V	AC 110 A / 600 V
0150/0220	AC 200000 A	AC 500 V	AC 175 A / 600 V
0300	AC 200000 A	AC 500 V	AC 225 A / 600 V
0370/0450	AC 200000 A	AC 500 V	AC 350 A / 600 V
0550/0750	AC 200000 A	AC 500 V	AC 500 A / 600 V
0900	AC 200000 A	AC 500 V	AC 250 A / 600 V
1100	AC 200000 A	AC 500 V	AC 300 A / 600 V
1320	AC 200000 A	AC 500 V	AC 400 A / 600 V
1600	AC 200000 A	AC 500 V	AC 400 A / 600 V
2000	AC 200000 A	AC 500 V	AC 500 A / 600 V
2500	AC 200000 A	AC 500 V	AC 600 A / 600 V

AC 230 V units

MOVIDRIVE® MDX61B...2_3	Max. supply short circuit current	Max. line voltage	Max. fuse rating
0015/0022/0037	AC 200000 A	AC 240 V	AC 30 A / 250 V
0055/0075	AC 200000 A	AC 240 V	AC 110 A / 250 V
0110	AC 200000 A	AC 240 V	AC 175 A / 250 V
0150	AC 200000 A	AC 240 V	AC 225 A / 250 V
0220/0300	AC 200000 A	AC 240 V	AC 350 A / 250 V

13.4.4 Motor overload protection

The units are provided with motor overload protection with a trip current adjusted to 150% of the rated motor current.

13.4.5 Ambient temperature

The units are suitable for an ambient temperature of 40 °C, max. 60 °C with derated output current.

To determine output current rating at higher than 40 °C, the output current should be derated 2.5% per °C between 40 °C and 50 °C, and 3% per °C between 50 °C and 60 °C.

	INFORMATION
	• Use only tested units with a **limited output voltage** (V_{max} = DC 30 V) and **limited output current** (I_{max} = 8 A) as an **external DC 24 V voltage source**. • **UL certification does not apply to operation in voltage supply systems with a non-grounded star point (IT systems).**

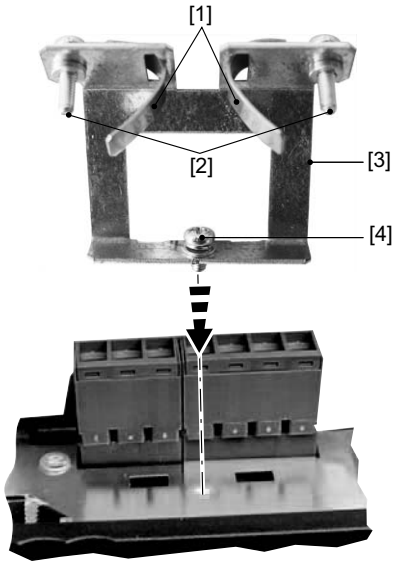
13.5 Shield clamps

13.5.1 Shield clamp for power section, size 0

A set of shield clamps is supplied as standard for the power section of MOVIDRIVE® MDX60B/61B size 0. The shield clamps are not yet installed.

Install the shield clamps for the power section as follows:

- Secure the contact clips to the shield plates.
- Secure the shield clamps to the top and the bottom of the unit.



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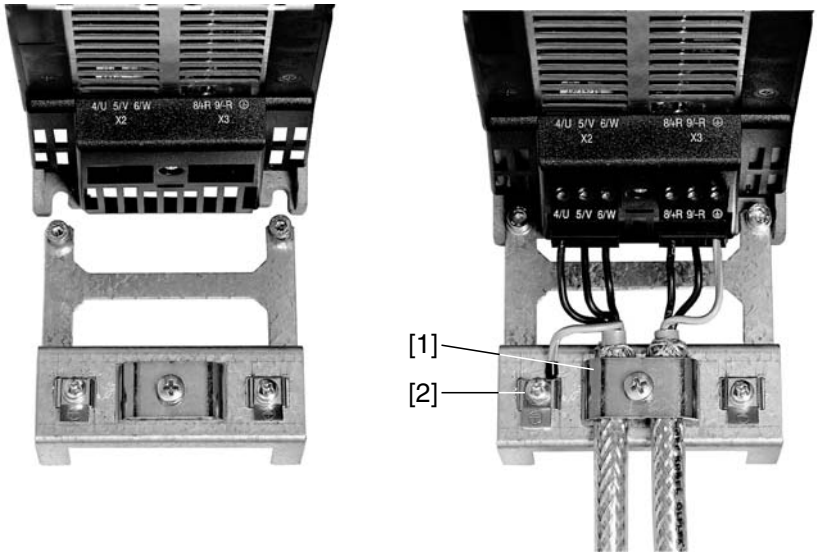
[1] Contact clips
[2] Retaining screws for contact clip
[3] Shield plate
[4] Retaining screw for shield clamp

13.5.2 Shield clamp for power section, size 1

A shield clamp is supplied as standard for the power section with MOVIDRIVE® MDX61B size 1. Install this shield clamp on the power section together with the unit's retaining screws.



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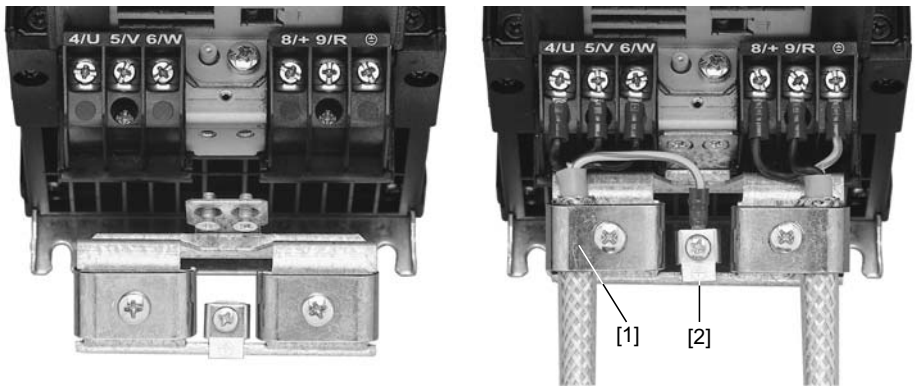
[1] Power section shield clamp [2] PE connection

13.5.3 Shield clamp for power section, sizes 2S and 2

A shield clamp for the power section is supplied as standard with two retaining screws with MOVIDRIVE® MDX61B sizes 2S and 2. Install this shield clamp using the two retaining screws.



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[1] Power section shield clamp [2] PE connection

The shield clamps for the power section provide you with a very convenient way of installing the shield for the motor and brake cables. Apply the shield and PE conductor as shown in the figures below.

13.5.4 Shield clamp for power section, sizes 3 to 7

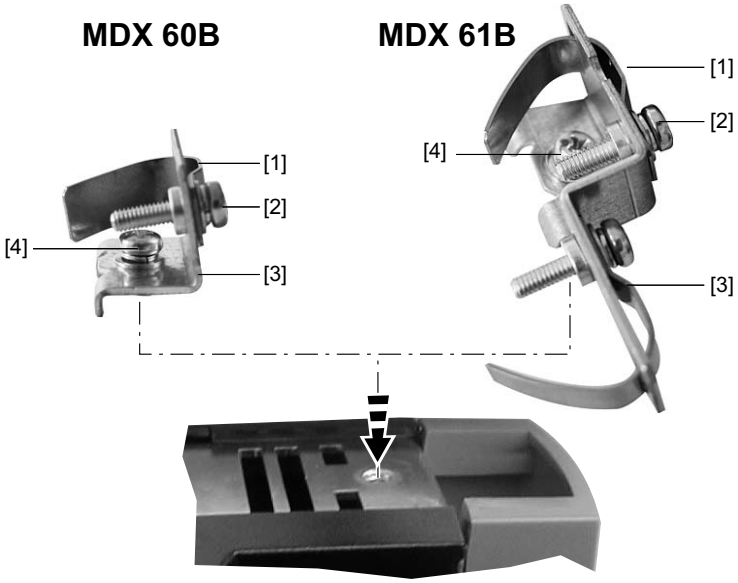
No shield clamps for the power section are supplied with MOVIDRIVE® MDX61B sizes 3 to 7. Use commercially available shield clamps for installing the shielding of motor and brake cables. Apply the shield as closely as possible to the inverter.

13.5.5 Shield clamp for signal cables

Install the shield clamp for the signal cable as follows:

- If installed, remove the keypad and the front cover.
- Size 0: Attach the shield clamp on the bottom of the control unit.
- Sizes 1 to 7: Attach the shield clamp on the bottom of the control unit.

Size 0



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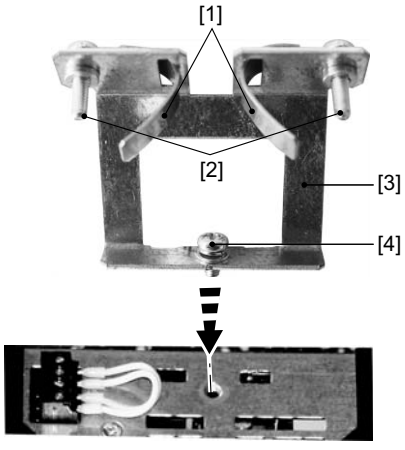
Sizes 1 to 7



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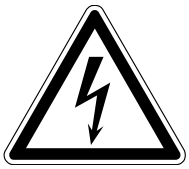
[1] Contact clip(s)
[2] Retaining screw(s) for contact clips
[3] Shield plate
[4] Retaining screw for shield clamp

13.6 Touch guard for power terminals

	**⚠ DANGER** Uncovered power connections. Severe or fatal injuries from electric shock. • Install the touch guard according to the regulations. • Never start the unit if the touch guard is not installed.

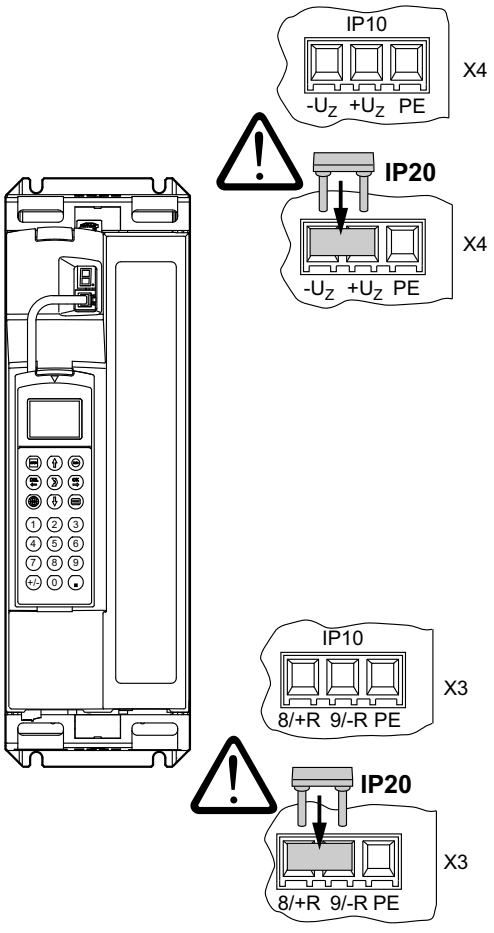
13.6.1 Size 2S

IP20 is achieved for MOVIDRIVE® MDX61B size 2S if one of the following conditions is fulfilled:

- Touch guard is installed on X3 / X4.
- An adequate cable is connected to X3 / X4

If neither of the two conditions is fulfilled, the degree of protection is IP10.

The following figure shows the touch guard for MOVIDRIVE® MDX61B size 2S.



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13.6.2 Sizes 4 and 5

IP20 is achieved for MOVIDRIVE® MDX61B sizes 4 and 5 (AC 500 V units: MDX61B0370/0450/0550/0750; AC 230 V units: MDX61B0220/0300), as soon as one of the following conditions is fulfilled:

- Cables with shrink tubing and a cable cross section of ≥ 35 mm^2 (AWG2) are connected to X1, X2, X3, X4. The additional DLB11B touch guard need not be installed.
- Cables with shrink tubing and a cable cross section of < 35 mm^2 (AWG2) are connected to X1, X2, X3, X4. The DLB11B touch guard must be installed properly (see section "Installing the DLB11B touch guard").
- The DLB11B must be connected to power terminals that are not connected. The DLB11B does not have to be connected to the PE terminals.

If neither of the conditions is fulfilled, the degree of protection is IP10. The **DLB11B touch guard (12 pieces included in the scope of delivery)** is available via the **part number 0823 111 7**.

Installing the DLB11B touch guard

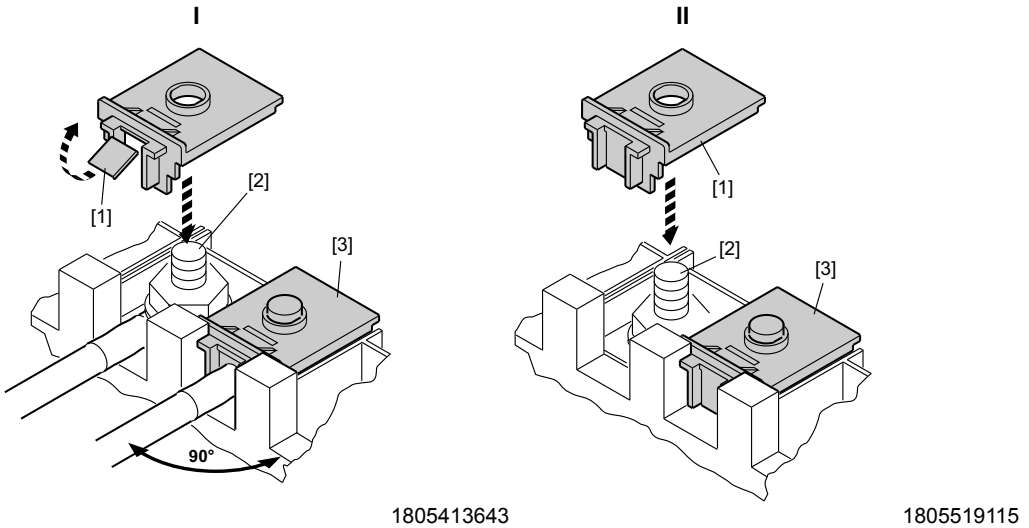
Proceed as follows to install the **DLB11B touch guard**:

- Figure I: Power terminal with connected power cable with a cable cross section of < 35 mm^2 (AWG2):

  Remove the plastic saddle [1] and push the DLB11B touch guard [3] on the respective stud [2] of the power terminal. Make sure that the cable output is straight. Install the cover for the power terminals.

- Figure II: Power terminal without connected power cable:

  Push the DLB11B touch guard [1] on the respective stud [2]. Install the cover for the power terminals.



[1] Plastic saddle
[2] Terminal stud
[3] Correctly mounted touch guard

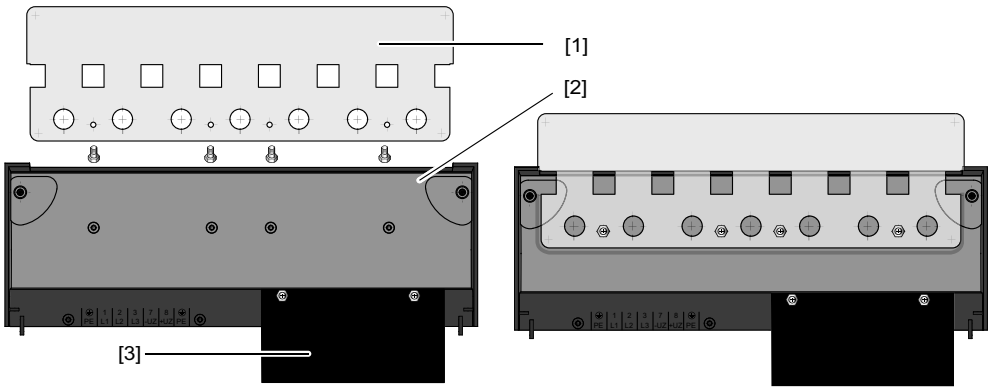
[1] Touch guard
[2] Terminal stud
[3] Correctly mounted touch guard

For additional information on the X1, X2, X3 and X4 power terminals, refer to the "Technical Data" section.

13.6.3 Sizes 4 - 6

For MOVIDRIVE® size 4 (AC 500 V units: MDX61B0370/0450; AC 230 V units: MDX61B0220/0300), size 5 (MDX61B0550/0750) and size 6 (MDX61B0900/1100/1320), two (2) touch guards with eight (8) retaining screws are supplied as standard. Install the touch guard on both covers of the power terminals.

The following figure shows the touch guard for MOVIDRIVE® MDX61B sizes 4, 5 and 6.



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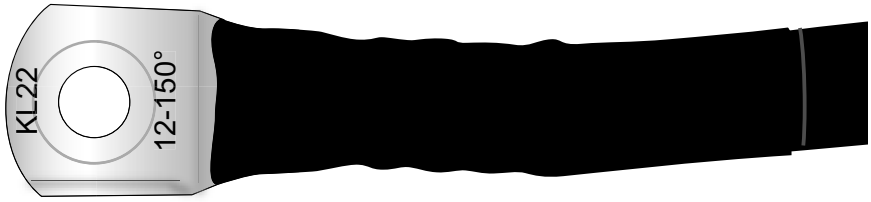
The touch guard comprises the following parts:

[1] Cover plate
[2] Connection plate
[3] Screen (only for size 5)

IP10 degree of protection is only achieved for the MOVIDRIVE® MDX61B units sizes 4, 5 and 6 when the following conditions are fulfilled:

- Touch guard is fully installed
- Shrink tubing is installed on the power cables of all power terminals (X1, X2, X3, X4) (see following picture)



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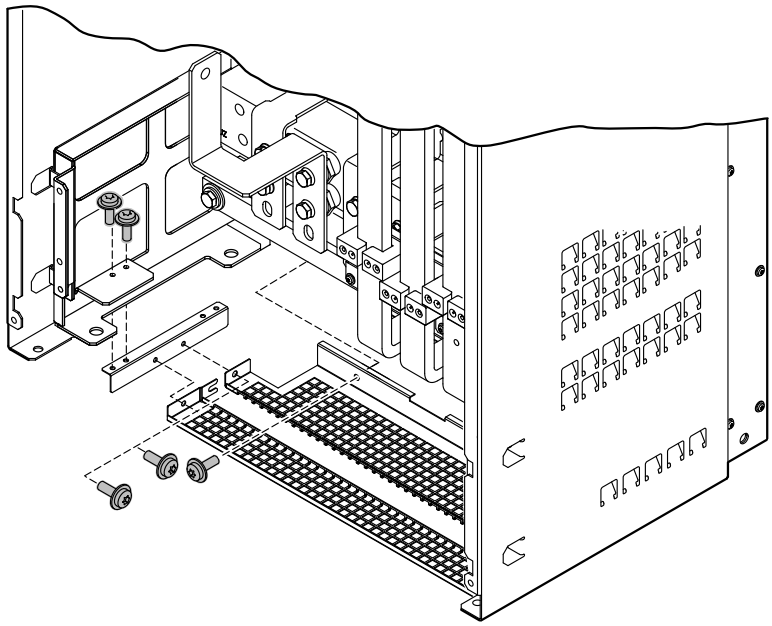
	INFORMATION
	If the above conditions are not met, MOVIDRIVE® units sizes 4, 5 and 6 have degree of protection IP00.

13.6.4 Size 7

Installation of touch guard DLB21B

Degree of protection IP20 is achieved for MOVIDRIVE® MDX61B size 7 when the touch guard DLB21B (part no 1 822 608 6) is trimmed to size by the customer and mounted in front and behind the power connections.



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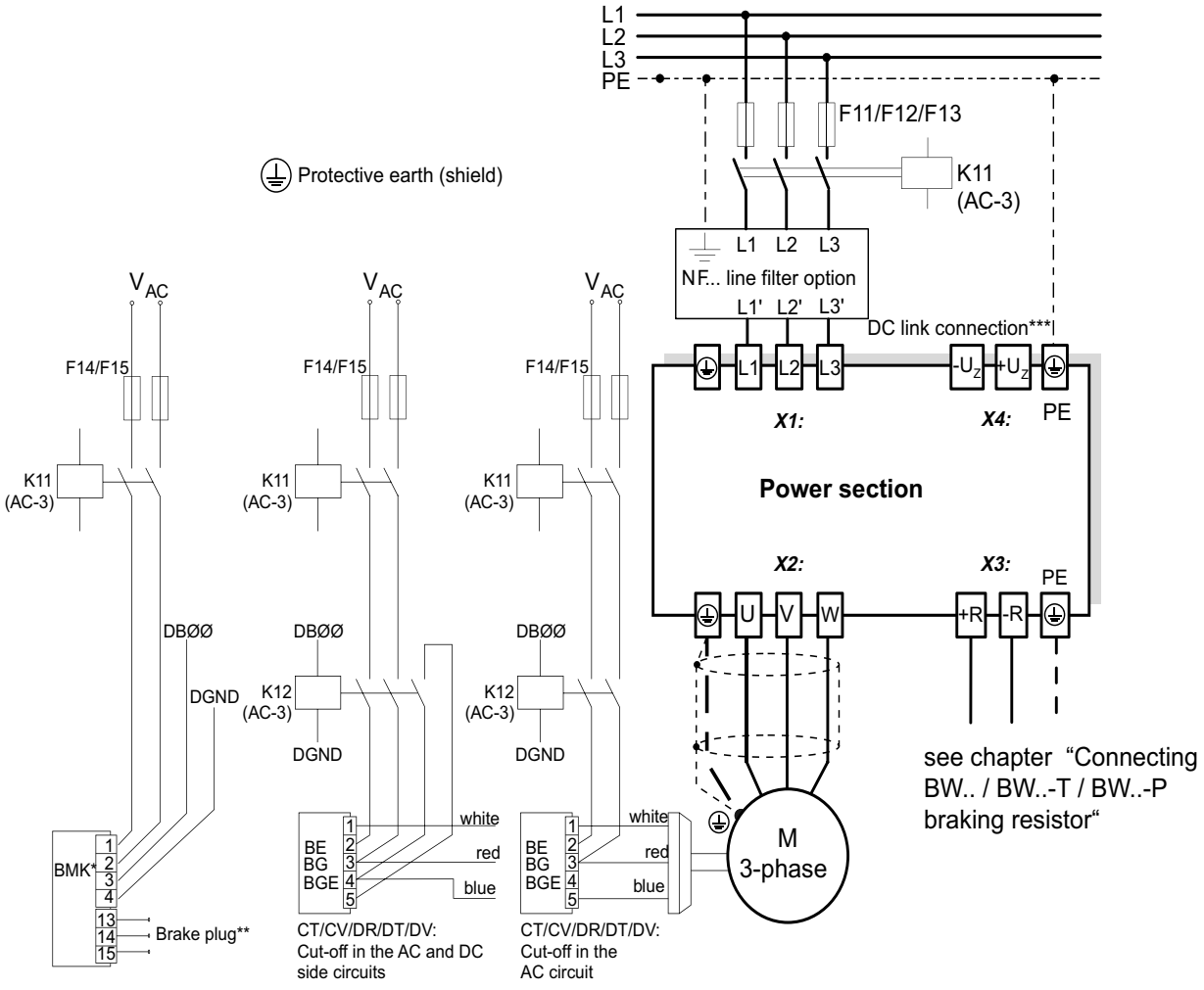
	INFORMATION
	If the above conditions are not met, MOVIDRIVE® units size 7 have degree of protection IP00.

13.7 Wiring diagram for basic unit

13.7.1 Power section (sizes 0 – 6) and brake



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* K12 is not required when K11 is used

** **You must adhere to the connection sequence of the brake connector.** Incorrect connection will cause irreparable damage to the brake. **Read the operating instructions for the motors** when connecting the brake using the terminal box.

*** With sizes 1, 2 and 2S, there is no PE connection next to the supply system connection terminals and motor connection terminals (X1, X2). In this case, use the PE terminal next to the DC link connection (X4).

	INFORMATION
	• Connect the brake rectifier using a separate supply system lead. • **Supply via the motor voltage is not permitted!**

Always switch off the brake on the DC and AC sides with:

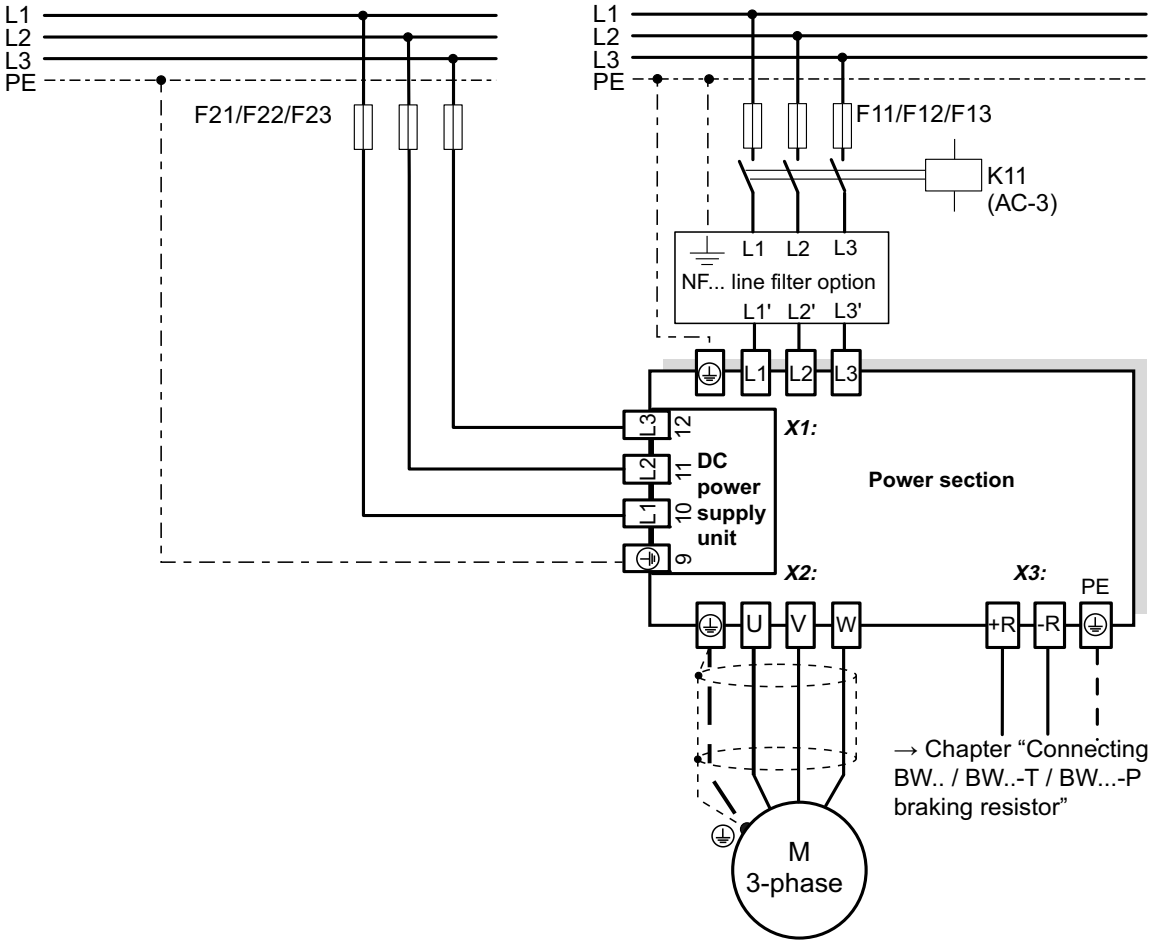
– all hoist applications,

– Drives that require a rapid brake response time

– CFC and SERVO operating modes

13.7.2 Power section and DC power supply unit (size7)

For connecting the brake, refer to the wiring diagram of size 1-6.



Technical data of DC power supply unit:

- Rated current: AC 2.4 A
- Inrush current AC 30 A / AC 380 - 500 V

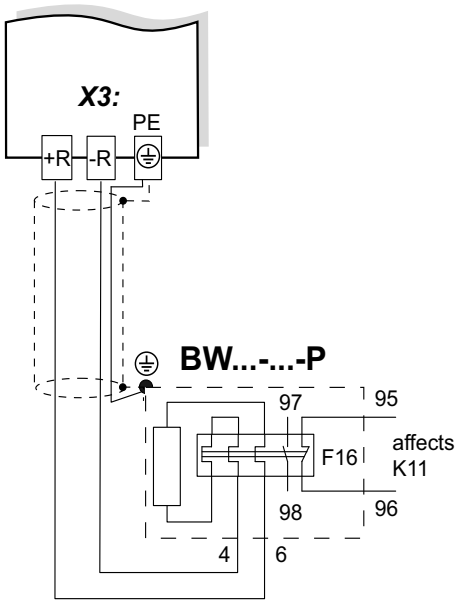
	INFORMATION
	Note that the connection of external +24 V power supply units to the X10:9 control terminal is not permitted in backup mode via power supply unit. Incorrect connection prompts an error message.

13.7.3 Brake rectifier in the control cabinet

Install the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is only permitted with shielded power cables.

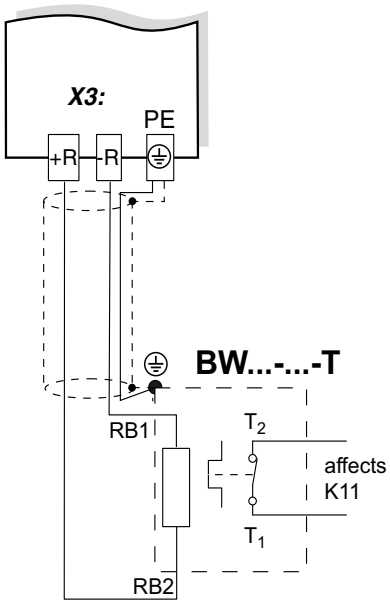
13.7.4 Braking resistor BW... / BW...-...-T /BW...-...-P

Power section



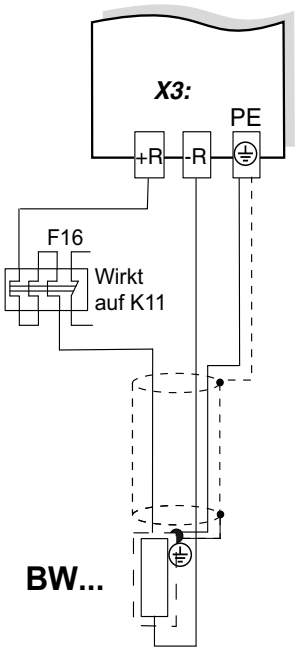
When the signal contact F16 trips, K11 must be opened and DIØØ"/Controller inhibit" must receive a "0" signal. The resistor circuit must not be interrupted!

Power section



When the internal temperature switch trips, K11 must be opened and DIØØ"/Controller inhibit" must receive a "0" signal. The resistor circuit must not be interrupted!

Power section



When the external bimetal relay (F16) trips, K11 must be opened and DIØØ "/Controller inhibit" must receive a "0" signal . The resistor circuit must not be interrupted!

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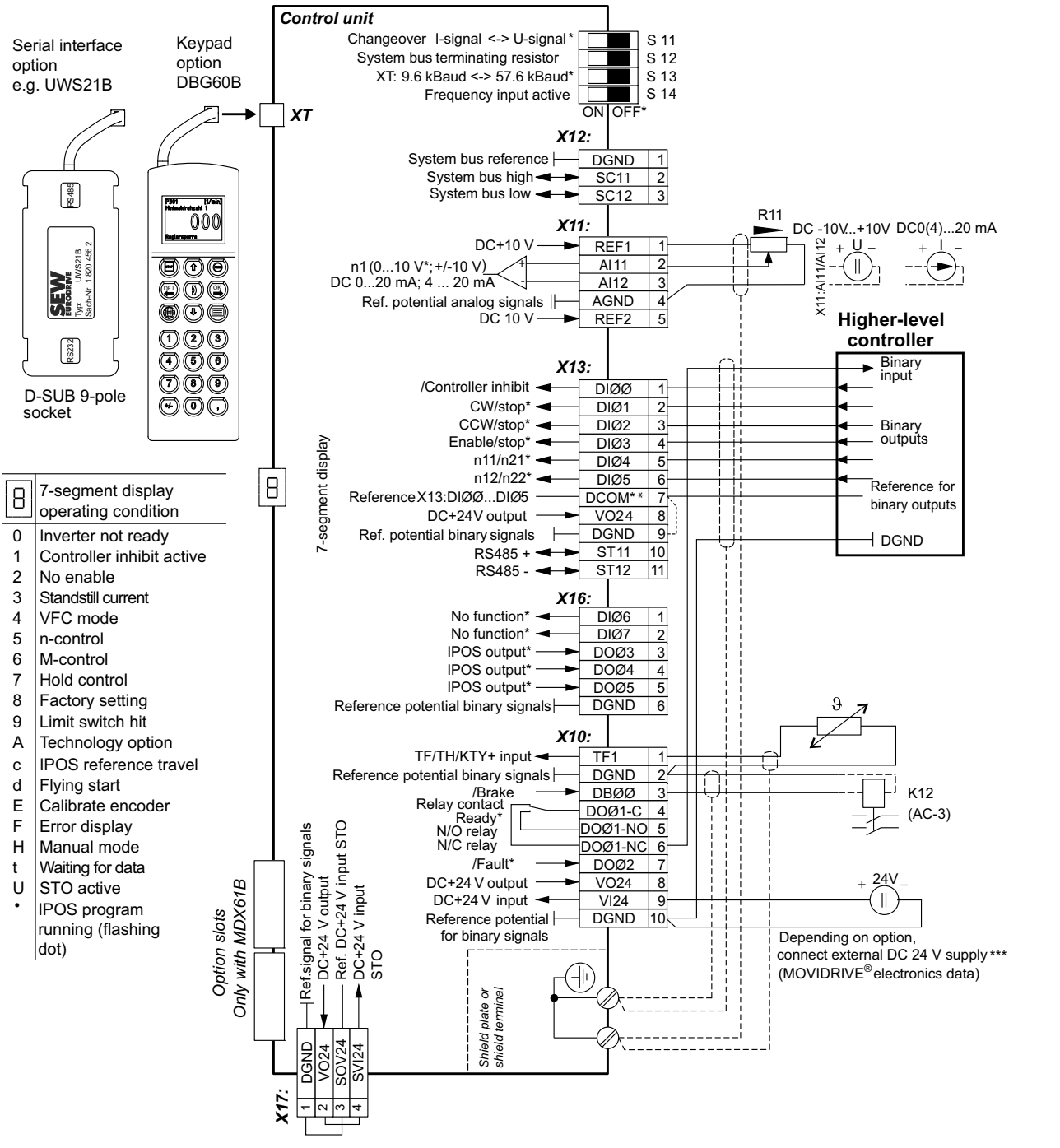
Braking resistor type	Overload protection		
	Design specified	Internal temperature switch (..T)	External bimetallic relay (F16)
BW...	-	-	Required
BW...-...-T	-	One of the two options (internal temperature switch/external bimetallic relay) is required.	
BW...-003 / BW...-005	Adequate	-	Permitted
BW090-P52B	Adequate	-	-

13.7.5 Signal terminals



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* Factory setting

** If the binary inputs are connected to the DC 24 V voltage supply X13:8 "VO24", install a jumper between X13:7 (DCOM) and X13:9 (DGND) on MOVIDRIVE®.

DGND (X10, X12, X13, X16, X17) is connected with PE as standard (threaded hole, see section "Unit structure"). You can establish galvanic isolation by removing the M4 x 14 grounding screw.

*** External voltage supply via X:10 only for size 0-6. With size 7, the 24 V backup voltage must be connected via the DC power supply unit.

13.7.6 Description of terminal functions on the basic unit (power section and control unit)

Terminal		Function	
X1:1/2/3 **X2:4/5/6** **X3:8/9** **X4:**	**L1/L2/L3 (PE)** **U/V/W (PE)** **+R/-R (PE)** **+U_Z/-U_Z (PE)**	Power supply Motor connection Braking resistor connection DC link connection	
9,10,11,12	**L1/L2/L3/PE**	Connection of switched-mode power supply (only for size 7)	
S11: **S12:** **S13:** **S14:**		Change I-signal DC(0(4)...20 am) ↔ V-signal DC (-10 V...0...10 V, 0...10 V), factory setting to V signal. Switching system bus terminating resistor on/off; factory setting: OFF. Set baud rate for the RS485 interface XT. Either 9.6 or 57.6 baud, factory setting: 75.6 baud. Switch frequency input on or off, factory setting: switched off.	
X12:1 **X12:2** **X12:3**	**DGND** **SC11** **SC12**	Reference potential system bus System bus high System bus low	
X11:1 **X11:2/3** **X11:4** **X11:5**	**REF1** **AI11/12** **AGND** **REF2**	DC+10 V (max. DC 3 am) for setpoint potentiometer Setpoint input n1 (differential input or input with AGND reference potential), signal form → P11_/ S11 Reference potential for analog signals (REF1, REF2, AI.., AO..) DC–10 V (max. DC 3 mA) for setpoint potentiometer	
X13:1 **X13:2** **X13:3** **X13:4** **X13:5** **X13:6**	**DIØØ** **DIØ1** **DIØ2** **DIØ3** **DIØ4** **DIØ5**	Binary input 1, with fixed assignment "/Controller inhibit" Binary input 2, factory setting "CW/stop" Binary input 3, factory setting "CCW/stop" Binary input 4, factory setting "Enable/stop" Binary input 5, factory setting "n11/n21" Binary input 6, factory setting "n12/n22"	• The binary inputs are electrically isolated by optocouplers. • Selection options for binary inputs 2 to 6 (DIØ1 ... DIØ5) → Parameter menu P60_
X13:7	**DCOM**	Reference for binary inputs X13:1 to X13:6 (DIØØ to DIØ5) and X16:1/X16:2 (DIØ6 to DIØ7) • Switching binary inputs with DC+24 V external voltage: Connection X13:7 (DCOM) must be connected to the reference potential of the external voltage. – Without jumper X13:7-X13:9 (DCOM-DGND) → Isolated binary inputs – With jumper X13:7-X13:9 (DCOM-DGND) → Non-isolated binary inputs • The binary inputs must be switched with DC+24 V from X13:8 or X10:8 (VO24) → Jumper required X13:7-X13:9 (DCOM-DGND).	
X13:8 **X13:9** **X13:10** **X13:11**	**VO24** **DGND** **ST11** **ST12**	Auxiliary supply output DC+24 V (max. load X13:8 **and** X10:8 = 400 mA) for external command switches Reference potential for binary signals RS485+ (baud rate has a fixed setting of 9.6 kBaud) RS485-	
X16:1 **X16:2** **X16:3** **X16:4** **X16:5** **X16:6**	**DIØ6** **DIØ7** **DOØ3** **DOØ4** **DOØ5** **DGND**	Binary input 7, factory setting "No function" Binary input 8, factory setting "No function" Binary output 3, factory setting "IPOS output" Binary output 4, factory setting "IPOS output" Binary output 5, factory setting "IPOS output" **Do not connect external voltage to binary outputs X16:3 (DOØ3) and X16:5 (DOØ5)!** Reference potential for binary signals	• The binary inputs are electrically isolated by optocouplers. • Selection options for binary inputs 7 to 8 (DIØ6/ DIØ7) → Parameter menu P60_ • Selection options for binary outputs 3 to 5 (DOØ3...DOØ5) → Parameter menu P62_

Terminal		Function
X10:1	**TF1**	KTY+/TF-/TH connection (connect to X10:2 via TF/TH), factory set to "No response" (→ P835)
X10:2	**DGND**	Reference potential for binary signals / KTY–
X10:3	**DBØØ**	Binary output DBØØ with fixed assignment "/Brake", load capacity max DC 150 mA (short-circuit proof, protected against external voltage to DC 30 V)
X10:4	**DOØ1-C**	Shared contact binary output 1, factory setting "Ready"
X10:5	**DOØ1-NO**	Normally open contact binary output 1, max. load of relay contacts DC 30 V and DC 0.8 A
X10:6	**DOØ1-NC**	NC contact binary output 1
X10:7	**DOØ2**	Binary output DBØ2, factory set to "/Fault", max. load capacity DC 50 mA (short-circuit proof, protected against external voltage to DC 30 V). Selection options for binary outputs 1 and 2 (DOØ1 and DOØ2) → Parameter menu P62_. Do not apply external voltage to binary outputs X10:3 (DBØØ) and X10:7 (DOØ2).
X10:8	**VO24**	Auxiliary supply output DC+24 V (max. load X13:8 **and** X10:8 = 400 mA) for external command switches
X10:9	**VI24**	Input DC+24 V voltage supply (backup voltage depending on options, unit diagnosis when supply system off)
X10:10	**DGND**	Reference potential for binary signals **Note for X:10.9: Only connect external backup voltage DC +24 V to sizes 0-6. With size 7, the DC power supply unit must be connected to the supply system. Refer to section "Power section and DC power supply unit (size 7)" (page 525).**
X17:1	**DGND**	Reference potential for X17:2
X17:2	**VO24**	Auxiliary supply voltage DC+24 V, **only to supply X17:4 on the same unit**
X17:3	**SOV24**	Reference potential for DC +24 V "STO" input (safety contact)
X17:4	**SVI24**	DC+24 V "STO" input (safety contact)
XT		Only service interface. Option slot: DBG60B / UWS21B / USB11A

13.8 Assignment of braking resistors, chokes and filters

13.8.1 AC 400/500 V units, size 0

MOVIDRIVE® MDX60/61B...-5A3 Size				0005	0008	0011	0014
				0			
Braking resistors BW... / BW..-..-T	**Trip current**	**Part number BW...**	**Part number BW...-...-T**				
BW090-P52B[1)]	-	824 563 0					
BW072-003	I_F = 0.8 A	826 058 3					
BW072-005	I_F = 1.2 A	826 060 5					
BW168/BW168-T	I_F = 3.6 A	820 604 X	1820 133 4				
BW100-006 BW100-006-T	I_F = 2.4 A	821 701 7	1820 419 8				
Line chokes		**Part number**					
ND020-013	ΣI_{line} = AC 20 A	826 012 5					
Line filter		**Part number**					
NF009-503	U_{max} = AC 550 V	827 412 6					
Output chokes	**Inner diameter**	**Part number**					
HD001	d = 50 mm (2 in)	813 325 5		for cable cross sections 1.5 to 16 mm² (AWG 16 to 6)			
HD002	d = 23 mm (0.91 in)	813 557 6		For cable cross sections ≤ 1.5 mm² (AWG 16)			
Output filter (only in VFC operating mode)		**Part number**					
HF008-503		826 029 X			A		
HF015-503		826 030 3			B		A
HF022-503		826 031 1					B

1) Internal thermal overload protection, no bimetallic relay required.

A **In rated operation (100%)**
B **With variable torque load (125%)**

13.8.2 AC 400/500 V units, sizes 1, 2S, and 2

MOVIDRIVE® MDX61B...-5A3 Size				0015	0022	0030	0040	0055	0075	0110
				1				2S		2
Braking resistors BW... / BW..-..-T	**Trip current**	**Part number BW...**	**Part number BW...-...-T**							
BW100-005	I_F = 1.0 A	826 269 1								
BW100-006/ BW100-006-T	I_F = 2.4 A	821 701 7	1820 419 8							
BW168/BW168-T	I_F = 3.6 A	820 604 X	1820 133 4							
BW268/BW268-T	I_F = 4.2 A	820 715 1	1820 417 1							
BW147/BW147-T	I_F = 5.1 A	820 713 5	1820 134 2							
BW247/BW247-T	I_F = 6.5 A	820 714 3	1820 084 2							
BW347/BW347-T	I_F = 9.2 A	820 798 4	1820 135 0							
BW039-012/ BW039-012-T	I_F = 5.5 A	821 689 4	1820 136 9							
BW039-026-T	I_F = 8.2 A		1820 415 5							
BW039-050-T	I_F = 11.3 A		1820 137 7							
Line chokes		**Part number**								
ND020-013	ΣI_{line} = AC 20 A	826 012 5								
ND045-013	ΣI_{line} = AC 45 A	826 013 3								
Line filter		**Part number**								
NF009-503	V_{max} = AC 550 V	827 412 6					A			
NF014-503		827 116 X					B		A	
NF018-503		827 413 4							B	
NF035-503		827 128 3								
Output chokes	**Inner diameter**	**Part number**								
HD001	d = 50 mm (2 in)	813 325 5		For cable cross sections 1.5 – 16 mm² (AWG 16 – 26)						
HD002	d = 23 mm (0.91 in)	813 557 6		For cable cross sections ≤ 1.5 mm² (AWG 16)						
HD003	d = 88 mm (3.5 in)	813 558 4		for cable cross sections > 16 mm² (AWG 6)						
Output filter (only in VFC operating mode)		**Part number**								
HF015-503		826 030 3		A						
HF022-503		826 031 1		B	A					
HF030-503		826 032 X			B	A				
HF040-503		826 311 6				B	A			
HF055-503		826 312 4					B	A		
HF075-503		826 313 2						B	A	
HF023-403		825 784 1							B	A
HF033-403		825 785 X								B

A In rated operation (100%)
B With variable torque load (125%)

13.8.3 AC 400/500 V units, sizes 3 and 4

MOVIDRIVE® MDX61B...-503 Size					0150	0220	0300	0370	0450
					3			4	
Braking resistors BW... / BW...-...-T BW...-...-P	**Trip current**	**Part number BW...**	**Part number BW...-...-T**	**Part number BW...-...-P**					
BW018-015/ BW018-015-P	I_F = 9.1 A	821 684 3		1 820 416 3				C	C
BW018-035-T	I_F = 13.9 A		1820 138 5					C	C
BW018-075-T	I_F = 20.4 A		1820 139 3					C	C
BW915-T	I_F = 32.7 A		1820 413 9						
BW012-025/ BW012-025-P	I_F = 14.4A	821 680 0		1 820 414 7					
BW012-050-T	I_F = 20.4 A		1820 140 7						
BW012-100-T	I_F = 28.9 A		1820 141 5						
BW106-T	I_F = 47.4 A		1820 083 4						
BW206-T	I_F = 54.8 A		1820 412 0						
Line chokes		**Part number**							
ND045-013	ΣI_{line} = AC 45 A	826 013 3				A			
ND085-013	ΣI_{line} = AC 85 A	826 014 1				B			A
ND150-013	ΣI_{line} = AC 150 A	825 548 2							B
ND300-0053	ΣI_{line} = AC 300 A	827 721 4							
Line filter		**Part number**							
NF035-503	V_{max} = AC 550 V	827 128 3			A				
NF048-503		827 117 8			B	A			
NF063-503		827 414 2				B	A		
NF085-503		827 415 0					B		A
NF115-503		827 416 9							B
Output chokes	**Inner diameter**	**Part number**							
HD001	d = 50 mm	813 325 5	For cable cross sections 1.5 – 16 mm² (AWG 16 – 6)						
HD003	d = 88 mm	813 558 4	for cable cross sections > 16 mm² (AWG 6)						
Output filter (only in VFC operating mode)		Part number							
HF033-403		825 785 X			A	B / D	A / D		
HF047-403		825 786 8			B	A			
HF450-503		826 948 3					B		E

A In rated operation (100%)
B With variable torque load (125%)
C Connect two braking resistors in parallel and set twice the trip current on F16 (2 × I_F)
D Connect three braking resistors in parallel and set three times the trip current on F16 (3 × I_F)
E Connect four braking resistors in parallel and set four times the trip current on F16 (4 × I_F)

13.8.4 AC 400/500 V units, sizes 5 to 7

MOVIDRIVE® MDX61B...-503			0550	0750	0900	1100	1320	1600	2000	2500
Size			5		6			7		
Braking resistors BW...-...-T	**Trip current**	**Part number BW...-...-T**								
BW106-T	I_F = 47.4 A	1820 083 4			C	C	C	D	E	F
BW206-T	I_F = 54.8 A	1820 412 0			C	C	C	D	E	F
BW1.4-170	I_F = 110 A	1330 152 7								
BW003-420-T	I_F = 129 A	1330 234 5						C	C	C
Line filter		**Part number**								
NF115-503	V_{max} = AC 550 V	827 416 9	A							
NF150-503		827 417 7	B							
NF210-503		827 418 5				A				
NF300-503		827 419 3				B				
NF600-503		1 796 338 9						B	B	B
Output chokes	**Inner diameter**	**Part number**								
HD001	d = 50 mm	813 325 5	For cable cross sections 1.5 – 16 mm² (AWG 16 – 6)							
HD003	d = 88 mm	813 558 4	for cable cross sections > 16 mm² (AWG 6)							
HD004	Connection with M12 bolt	816 885 7								
HD005	Connection With M12 cable lug, M10 PE connection	1 796 336 2						B	B	B
Output filter (only in V/f and VFC operating mode)		**Part number**								
HF450-503		826 948 3	H	H						
HF180-403		829 909 9								
HF325-403		829 948 3								

A In rated operation (100%)
B With variable torque load (125%)
C Connect two braking resistors in parallel and set twice the trip current on F16 ($2 \times I_F$)
D Connect three braking resistors in parallel and set three times the trip current on F16 ($3 \times I_F$)
E Connect four braking resistors in parallel and set four times the trip current on F16 ($4 \times I_F$)
F Connect five braking resistors in parallel and set five times the trip current on F16 ($5 \times I_F$)
H Two filter in parallel

13.8.5 AC 230 V units, sizes 1 to 4

MOVIDRIVE® MDX61B...-2_3 Size				0015	0022	0037	0055	0075	0110	0150	0220	0300
				1			2		3		4	
Braking resistors BW...-.../ BW...-...-T BW...-...-P	**Trip current**	**Part number BW...**	**Part number BW...-...-T**									
BW039-003	I_F = 2.7 A	821 687 8										
BW039-006	I_F = 3.9 A	821 688 6										
BW039-012 BW039-012-T	I_F = 5.5 A	821 689 4	1 820 136 9									
BW039-026-T	I_F = 8.1 A		1 820 415 5									
BW027-006	I_F = 4.7 A	822 422 6										
BW027-012	I_F = 6.6 A	822 423 4										
BW018-015-T	I_F = 9.1 A		1 820 416 3						C	C	C	C
BW018-035-T	I_F = 13.9 A		1 820 138 5						C	C	C	C
BW018-075-T	I_F = 20.4 A		1 820 139 3						C	C	C	C
BW915-T	I_F = 32.6 A		1 820 413 9						C	C	C	C
BW012-025-P	I_F = 14.4 A		1 820 414 7									
BW012-050-T	I_F = 20.4 A		1 820 140 7									
BW012-100-T	I_F = 28.8 A		1 820 141 5									
BW106-T	I_F = 47.4 A		1 820 083 4								C	C
BW206-T	I_F = 54.7 A		1 820 412 0								C	C
Line chokes		**Part number**										
ND020-013	S I_{line} = AC 20 A	826 012 5					A					
ND045-013	S I_{line} = AC 45 A	826 013 3					B		A			
ND085-013	S I_{line} = AC 85 A	826 014 1							B		A	
ND150-013	S I_{line} = AC 150 A	825 548 2									B	
Line filter		**Part number**										
NF009-503	V_{max} = AC 550 V	827 412 6			A							
NF014-503		827 116 X			B	A						
NF018-503		827 413 4				B						
NF035-503		827 128 3										
NF048-503		827 117 8							A			
NF063-503		827 414 2							B			
NF085-503		827 415 0									A	
NF115-503		827 416 9									B	
Output chokes	**Inner diameter**	**Part number**										
HD001	d = 50 mm (2 in)	813 325 5	for cable cross sections 1.5 to 16 mm^2 (AWG 16 to 6)									
HD002	d = 23 mm (0.91 in)	813 557 6	For cable cross sections ≤ 1.5 mm^2 (AWG 16)									
HD003	d = 88 mm (3.5 in)	813 558 4	for cable cross sections > 16 mm^2 (AWG 6)									

A In rated operation (100%)
B With variable torque load (125%)
C Connect two braking resistors in parallel and set twice the trip current on F16 (2 × I_F)

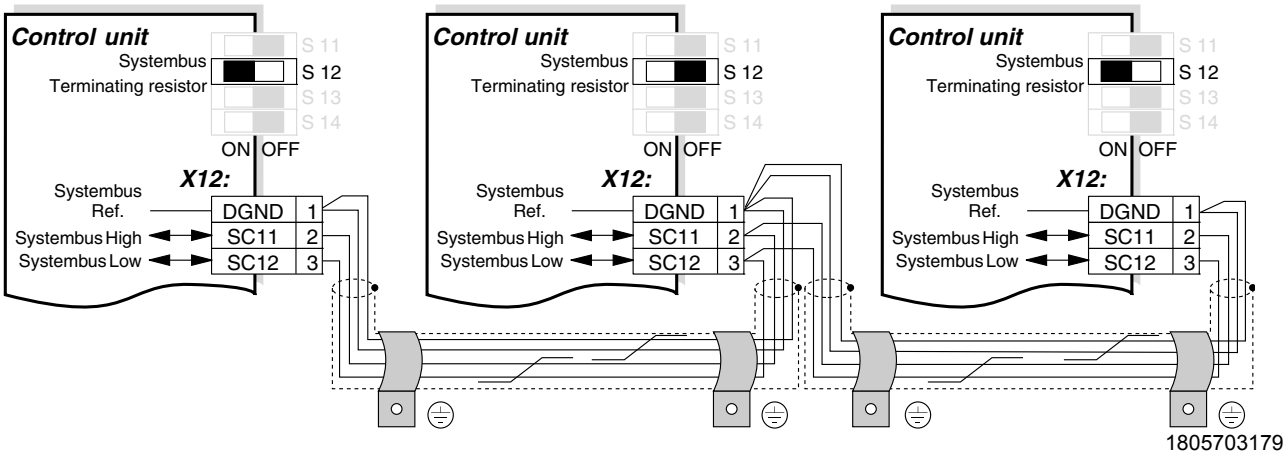
13.9 Connecting the system bus (SBus 1)

	INFORMATION
	Only when P884 "SBus baud rate" = 1000 kBaud: MOVIDRIVE® *compact* MCH4_A units are not allowed to be combined with other MOVIDRIVE® units in the same system bus combination. The units are allowed to be mixed when baud rates ≠ 1000 kBaud.

Max. 64 CAN bus stations can be addressed via system bus (SBus). Use a repeater after 20 or 30 nodes, depending on the length of the cables and the cable capacity. The SBus supports transmission technology compliant with ISO 11898.

The "Serial Communication" manual contains detailed information about the system bus. You can order the manual from SEW-EURODRIVE.

13.9.1 SBus wiring diagram



Cable specification

- Use a 4-core twisted and shielded copper cable (data transmission cable with braided copper shield). The cable must meet the following specifications:
  - Cable cross section 0.25 ... 0.75 mm^2 (AWG 23 to AWG 19)
  - Cable resistance 120 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m at 1 kHz

  Suitable cables include CAN bus or DeviceNet cables.

Connecting the shield

- Connect the shield to the electronics shield clamp on the inverter or master controller and make sure it is connected over a wide area at both ends.

Cable length

- The permitted total cable length depends on the baud rate setting of the SBus (P884):
  - 125 kBaud → 500 m (1640 ft)
  - 250 kBaud → 250 m (820 ft)
  - **500 kBaud → 100 m (328 ft)**
  - 1000 kBaud → 25 m (82 ft)

Terminating resistor

- Switch on the system bus terminating resistor (S12 = ON) at the start and end of the system bus connection. Switch off the terminating resistor on the other units (S12 = OFF).

NOTICE

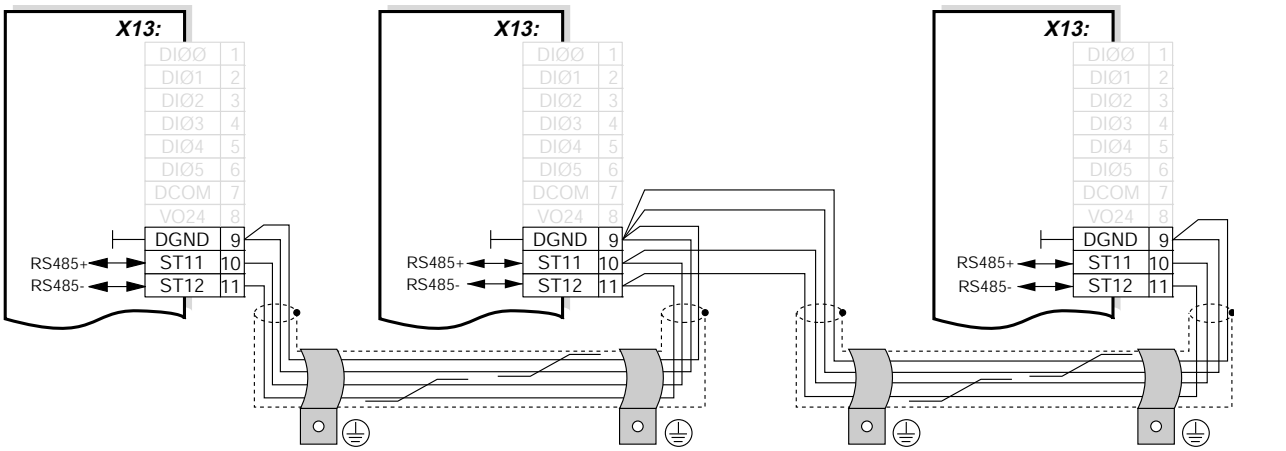
There must not be any potential displacement between the units connected with the SBus. This may affect the functionality of the units.

Take suitable measures to avoid potential displacement, such as connecting the unit ground connectors using a separate cable.

13.10 Connecting the RS485 interface

The RS485 interface (X13:ST11, ST12) can be used for connecting max. 32 MOVIDRIVE® units, e.g. for master/slave operation, or 31 MOVIDRIVE® units and a master control system (PLC). The baud rate is set to 9.6 baud by default.

13.10.1 Wiring diagram of the RS485 interface (X13)



Cable specification

- Use a 4-core twisted and shielded copper cable (data transmission cable with braided copper shield). The cable must meet the following specifications:
  - Cable cross section 0.25 ... 0.75 mm^2 (AWG 23 to AWG 19)
  - Cable resistance 100 ... 150 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m at 1 kHz

Connecting the shield

- Connect the shield to the electronics shield clamp on the inverter or higher-level controller and make sure it is connected over a wide area at both ends.

Cable length

- The permitted total cable length is 200 m (656 ft).

Terminating resistor

- Dynamic terminating resistors are installed. **Do not connect any external terminating resistors.**

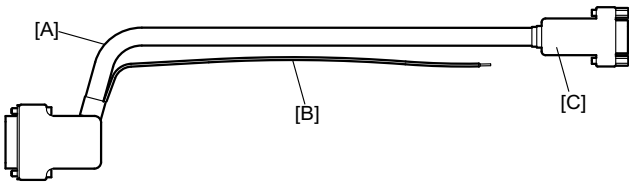
	NOTICE
	There must not be any potential displacement between the units connected via the RS485. This may affect the functionality of the units. Take suitable measures to avoid potential displacement, such as connecting the unit ground connectors using a separate cable.

13.11 Connecting the interface adapter option type DWE11B/12B

13.11.1 Part number and description

- DWE11B, part number 188 187 6

  The interface adapter DWE11B (HTL→TTL) in the form of an adapter cable is used **to connect single-ended HTL encoders to theDEH11B/DEH21B option**. Only the A, B and C tracks are connected. The interface adapter is suitable for all HTL encoders that were operated on MOVIDRIVE® A, MDV and MCV and can be connected without any rewiring effort.



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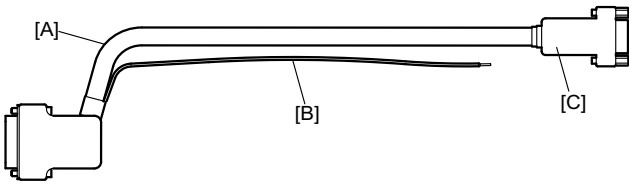
[A] 5 x 2 x 0.25 mm^2 (AWG 23) / length 1000 mm (39.37 in) / max. cable length inverter - encoder: 100 m (328 ft)

[B] DC 24 V connection for HTL encoder; 1 x 0.5 mm^2 (AWG 20) / length 250 mm (9.84 in)

Signal	Terminal of 9-pin sub D socket [C] (encoder end)
A	1
B	2
C	3
UB	9
GND	5

- DWE12B, part number 188 180 9

  The interface adapter DWE12B (HTL→TTL) in the form of an adapter cable is used **to connect single-ended HTL encoders to theDEH11B/DEH21B option**. In addition to the A, B and C track, you will also have to connect the negated tracks ($\overline{A}$, $\overline{B}$, $\overline{C}$). SEW-EURODRIVE recommends using this interface adapter for any new system.



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[A] 4 x 2 x 0.25 mm^2 (AWG 23) / length 1000 mm (39.37 in) / max. cable length inverter - encoder: 200 m (656 ft)

[B] DC 24 V connection for HTL encoder; 1 x 0.5 mm^2 (AWG 20) / length 250 mm (9.84 in)

Signal	Terminal of 9-pin sub D socket [C] (encoder end)
A	1
$\overline{A}$	6
B	2
$\overline{B}$	7
C	3
$\overline{C}$	8
UB	9
GND	5

13.12 Connection of interface adapter option UWS21B (RS232)

13.12.1 Part number

Interface adapter UWS21B: 1 820 456 2

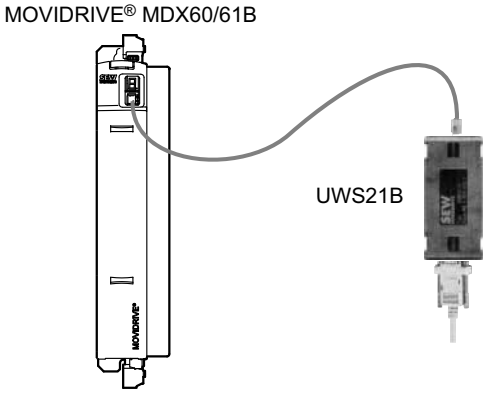
13.12.2 Scope of delivery

The scope of delivery for the UWS21B option includes:

- UWS21B
- CD-ROM with MOVITOOLS® MotionStudio
- Serial interface cable with 9-pin sub D socket and 9-pin sub D connector to connect the UWS21B option to the PC.
- Serial interface cable with two RJ10 connectors to connect UWS21B to MOVIDRIVE®.

13.12.3 MOVIDRIVE® – UWS21B connection

- Use the connection cable supplied to connect the UWS21B option to the MOVIDRIVE® unit.
- Plug the connection cable into the XT terminal socket of the MOVIDRIVE® unit.
- Note that the DBG60B keypad and the UWS21B serial interface cannot be connected to the MOVIDRIVE® at the same time.
- The following figure shows the connection cable between MOVIDRIVE® and UWS21B.



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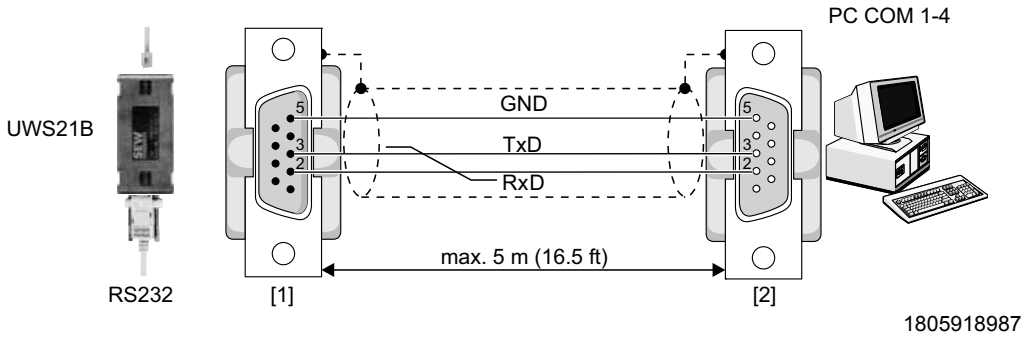
13.12.4 Connecting UWS21B to PC

- Use the connection cable supplied (shielded RS232 standard interface cable) to connect the UWS21B option to the PC.
- The following figure shows the connection cable between UWS21B and PC (1:1 connection).



[1] 9-pin D-sub connector
[2] 9-pin D-sub socket

13.13 Connecting the interface adapter option USB11A

13.13.1 Part number

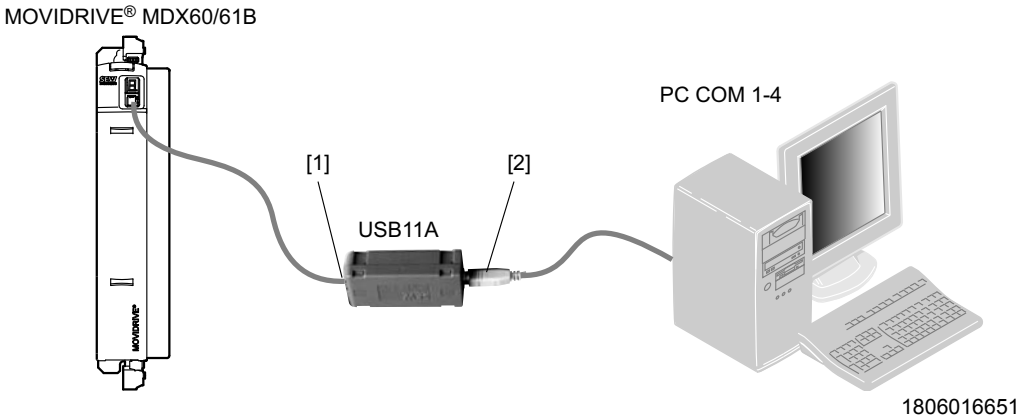
Interface adapter USB11A: 824 831 1

13.13.2 Scope of delivery

- The scope of delivery for the USB11A includes:
  - USB11A interface adapter
  - USB connection cable PC - USB11A (type USB A-B)
  - Connection cable for MOVIDRIVE® MDX60B/61B - USB11A (cable RJ10-RJ10)
  - CD-ROM with drivers and MOVITOOLS® MotionStudio
- The USB11A interface adapter supports USB 1.1 and USB 2.0.

13.13.3 Connecting MOVIDRIVE® USB11A – PC

- Use the connection cable [1] (RJ10 - RJ10) supplied to connect the USB11A option to the MOVIDRIVE® unit.
- Plug the connection cable [1] into the XT terminal slot of the MOVIDRIVE® MDX60B/61B and into the RS485 slot of the USB11A.
- Note that the DBG60B keypad and the USB11A interface adapter cannot be connected to MOVIDRIVE® at the same time.
- Use the supplied USB connection cable [2] (type USB A-B) to connect the USB11A to the PC.
- The following figure shows the connection cable between MOVIDRIVE MDX60B/61B and USB11A.



13.13.4 Installation

- Connect the USB11A to a PC and MOVIDRIVE® MDX60B/61B using the connection cables supplied.
- Insert the enclosed CD into the CD drive of your PC and install the driver. The first free COM port on the PC will be assigned to the USB11A interface adapter.

13.13.5 Operation with MOVITOOLS® MotionStudio

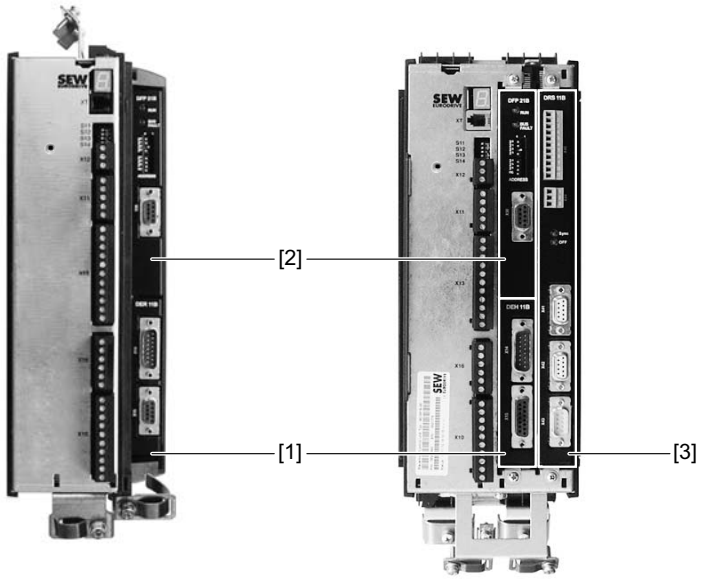
- After installation, the PC recognizes the USB11A interface adapter after approximately 5 to 10 s.
- Start MOVITOOLS® MotionStudio.

	INFORMATION
	If the connection between the PC and USB11A is interrupted, you will have to restart MOVITOOLS® MotionStudio.

13.14 Option combinations for MDX61B

13.14.1 Arrangement of the option slots

Size 0 (0005 ... 0014) Size 1 ... 6 (0015 ... 1320)



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[1] Encoder slot for encoder options
[2] Fieldbus slot for communication options
[3] Expansion slot for communication options (only sizes 1 to 6)

13.14.2 Option card combinations for MDX61B

The option cards are different sizes and can only be installed in the matching option slots. Fieldbus interfaces including DHx cannot be combined with one another. The following list shows the possible combinations of option cards for MOVIDRIVE® MDX61B.

Option card	Designation	MOVIDRIVE® MDX61B		
		Encoder slot Size 0 - size 7	Fieldbus slot Sizes 0 - 7	Expansion slot Sizes 1 - 7
DEH11B	Encoder input incr. / Hiperface®	X		
DEH21B	Encoder input absolute encoder	X		
DEU21B	Encoder input absolute encoder	X		
DER11B	Encoder input resolver / Hiperface®	X		
DFP21B	PROFIBUS fieldbus interface		X	
DFI11B	Interbus fieldbus interface		X	
DFI21B	Interbus LWL fieldbus interface		X	
DFD11B	DeviceNet fieldbus interface		X	
DFC11B	CAN/CANopen fieldbus interface		X	
DFE11B DFE12B DFE13B	Ethernet fieldbus interface		X	
DFE32B	PROFINET IO fieldbus interface		X	
DFE33B	EtherNet/IP fieldbus interface		X	
DFE24B	EtherCAT fieldbus interface		X	
DFS11B	PROFIBUS fieldbus interface with PROFIsafe (STO)		X	
DFS12B	PROFIBUS fieldbus interface with PROFIsafe		X	
DFS21B	PROFINET IO fieldbus interface with PROFIsafe (STO)		X	
DCS21B/ 31B	Safety monitor			X
DIO11B	I/O expansion		X	X[1)]
DRS11B	Phase-synchronous operation			X
DIP11B	SSI encoder interface			X
DHP11B	User-programmable MOVI-PLC® *basic* controller		X	X[1)]
DHE41B	User-programmable MOVI-PLC® *advanced* controller		X	X[1)]
DHF41B	User-programmable MOVI-PLC® *advanced* controller			X
DHR41B	User-programmable MOVI-PLC® *advanced* controller			X
DHP11B + OST11B	DHP11B + OST11B (RS485 interface, only in combination with DHP11B)	OST11B	DHP11B	DHP11B + OST11B[2)]

1) When fieldbus slot is not available

2) When encoder slot is not available

13.15 Installing and removing option cards

	INFORMATION
	• For MOVIDRIVE® **MDX61B size 0**, **only SEW-EURODRIVE** is authorized to install or remove option cards. • For MOVIDRIVE® MDX61B sizes 1 to 7, you can install or remove the option cards yourself.

13.15.1 Before you start

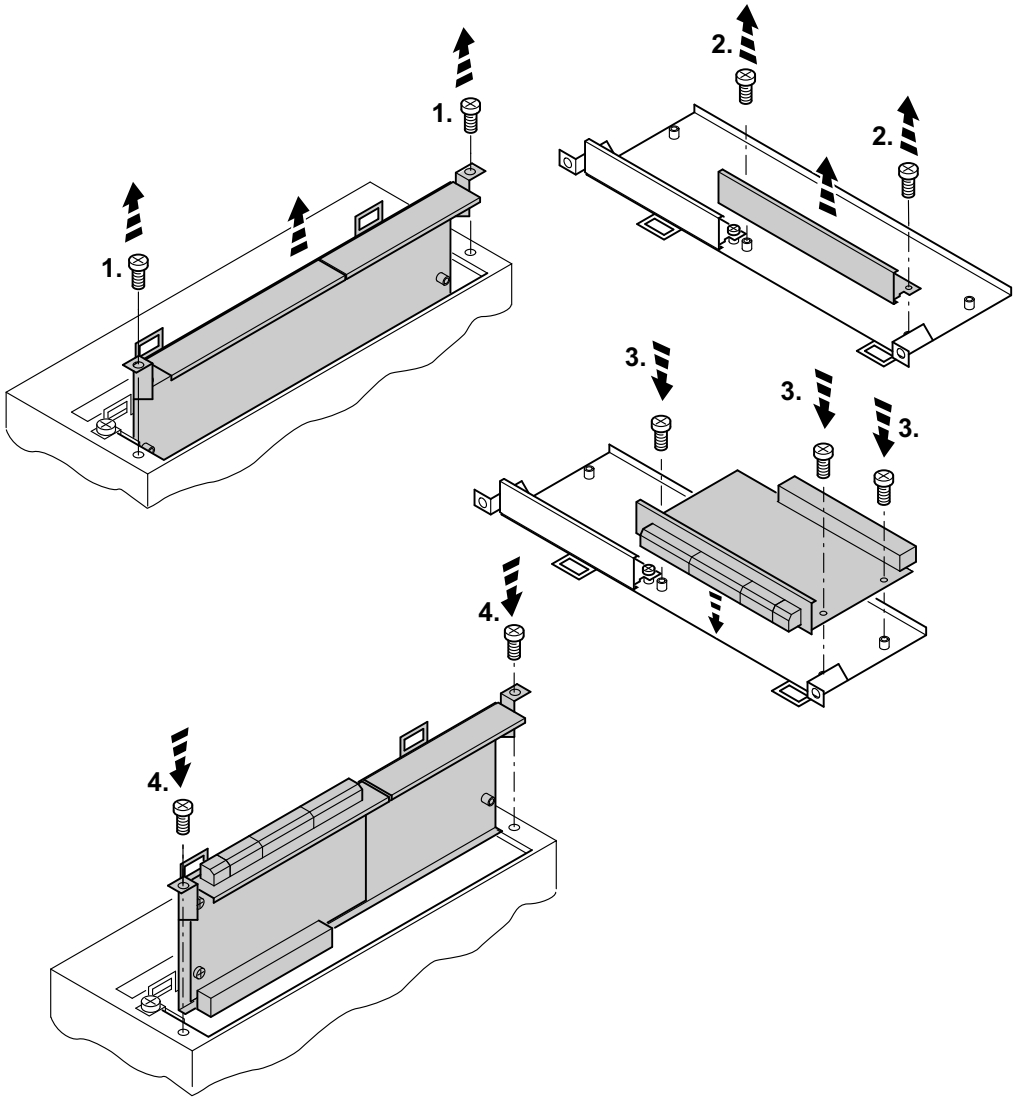
Observe the following notes before installing or removing an option card:

	NOTICE
	Electrostatic charge. Damage to electronic components. • Disconnect the inverter from the power. Switch off the DC 24 V and the supply system voltage. • Take appropriate measures to protect the option card from electrostatic charge (use discharge strap, conductive shoes, etc.) before touching it.

- **Before installing the option card**, remove the keypad (→ Sec. "Removing/ installing the keypad") and the front cover (→ Sec. "Removing/installing the front cover").
- **After having installed the option card**, replace the keypad (→ Sec. "Removing/ installing the keypad") and the front cover (→ Sec. "Removing/installing the front cover").
- Keep the option card in its original packaging until immediately before you are ready to install it.
- Hold the option card by its edges only. Do not touch any of the components.

13.15.2 Basic procedure for installing/removing an option card

The following figure shows the basic procedure for installing an option card in MOVIDRIVE® MDX61B size 1 - 7



1. Remove the retaining screws holding the card retaining bracket. Pull the card retaining bracket out evenly from the slot (do not twist!).
2. Remove the retaining screws of the black cover plate on the card retaining bracket. Remove the black cover plate.
3. Position the option card onto the retaining bracket so that the retaining screws fit into the corresponding bores on the card retaining bracket.
4. Insert the retaining bracket with the installed option card into the slot, pressing slightly so it is seated properly. Secure the card retaining bracket with the retaining screws.
5. To remove the option card, follow the instructions in reverse order.

13.16 Connecting encoders and resolvers

	INFORMATION
	• The wiring diagrams do not show the view onto the cable end but the connection to the motor or MOVIDRIVE®. • The conductor colors specified in the wiring diagrams are in accordance with IEC 757 and correspond to the conductor colors used in the pre-fabricated cables from SEW.

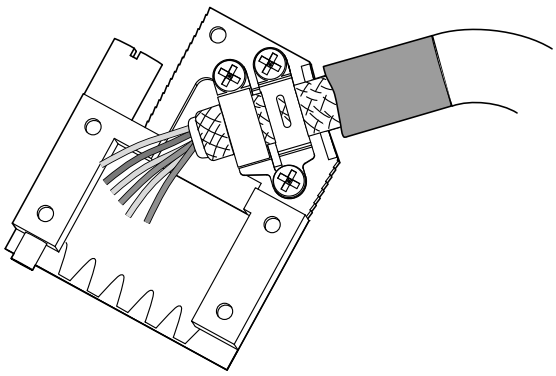
13.16.1 General installation notes

- The D-sub connectors shown in the wiring diagrams have a 4/40 UNC thread.
- Max. line length inverter – encoder/resolver: 100 m (328 ft) with a capacitance per unit length ≤ 120 nF/km.
- Cable cross section: 0.20 – 0.5 mm^2 (AWG 24 ... 20)
- If you cut a core of the encoder/resolver cable, insulate the cut-off end of the core.
- Use shielded cables with twisted pair conductors and make sure they are grounded on both ends over a large surface area:
  - At the encoder in the cable gland or in the encoder plug
  - At the inverter in the housing of the D-sub plug
- Route the encoder/resolver cable separately from the power cables.

13.16.2 Connecting the shield

Connect the shield of the encoder/resolver cable over a large area.

On the inverter Connect the shield on the inverter end in the housing of the sub D connector (→ following figure).



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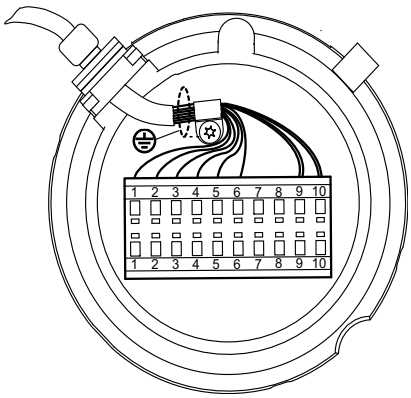
On the encoder/ resolver

Connect the shield on the encoder/resolver side at the respective grounding clamps (→ following figure). When using an EMC screw fitting, apply the shield over a wide area in the cable gland. For drives with a plug connector, connect the shield on the encoder plug.



1806052363

13.16.3 Prefabricated cables

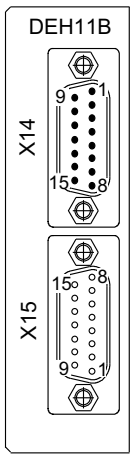
SEW-EURODRIVE offers pre-fabricated cables for connecting encoders/resolvers. We recommend using these prefabricated cables.

13.17 Connection and terminal description of the DEH11B (Hiperface®) option

13.17.1 Part number

Option Hiperface® encoder card type DEH11B: 824 310 7

	INFORMATION
	• The "Hiperface® encoder card type DEH11B" option is only possible in conjunction with MOVIDRIVE® MDX61B, not with MDX60B. • The DEH11B option must be plugged into the encoder slot.

Front view of DEH11B	Description	Terminal	Function
 1806062475	**X14: Input for external encoder or output for incremental encoder simulation** **Pulse count of the incremental encoder simulation:** • **1024 pulses/revolution with HIPERFACE® encoder on X15** • **As at X15: Motor encoder input with sin/cos encoder or TTL sensor on X15**	**X14:1** **X14:2** **X14:3** **X14:4** **X14:5/6** **X14:7** **X14:8** **X14:9** **X14:10** **X14:11** **X14:12** **X14:13/14** **X14:15**	(COS+) signal track A (K1) (SIN+) signal track B (K2) Signal track C (K0) DATA+ Reserved Changeover Reference potential DGND (COS–) Signal track $\overline{A}$ ($\overline{K1}$) (SIN–) Signal track $\overline{B}$ ($\overline{K2}$) Signal track $\overline{C}$ ($\overline{K0}$) DATA- Reserved DC+12 V (tolerance range DC 10.5 – 13 V) (max. load X14:15 **and** X15:15 = DC 650 mA)
	X15: Motor encoder input	**X15:1** **X15:2** **X15:3** **X15:4** **X15:5** **X15:6** **X15:7** **X15:8** **X15:9** **X15:10** **X15:11** **X15:12** **X15:13** **X15:14** **X15:15**	(COS+) signal track A (K1) (SIN+) signal track B (K2) Signal track C (K0) DATA+ Reserved Reference potential TF/TH/KTY– Reserved Reference potential DGND (COS–) Signal track $\overline{A}$ ($\overline{K1}$) (SIN–) Signal track $\overline{B}$ ($\overline{K2}$) Signal track $\overline{C}$ ($\overline{K0}$) DATA- Reserved TF/TH/KTY+ connection DC+12 V (tolerance range DC 10.5 – 13 V) (max. load X14:15 **and** X15:15 = DC 650 mA)

	INFORMATION
	• If X14 is used as an incremental encoder simulation output, the switchover (X14:7) must be jumpered with DGND (X14:8). • The DC 12 V supply voltage from X14 and X15 is sufficient to operate SEW encoders (except HTL encoders) with a DC 24 V supply voltage. With all other encoders, check whether they can be connected to the DC 12 V supply voltage.

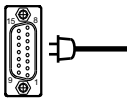
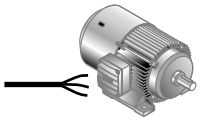
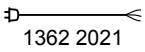
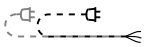
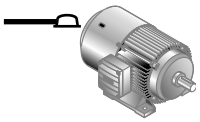
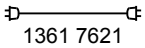
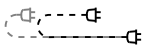
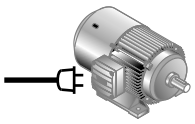
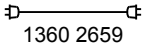
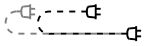
	NOTICE
	Do not connect HTL encoders E..C to X15 of option DEH11B. Doing so can destroy the X15 (motor encoder input) on the DEH11B option. Only connect HTL encoders E..C to option DEH11B/12B using the interface adapter DWE11B/12B (→ Sec. "Connecting the interface adapter type DWE11B/12B").

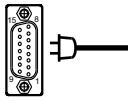
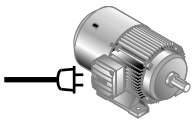
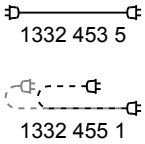
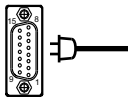
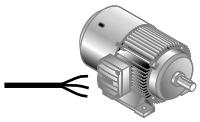
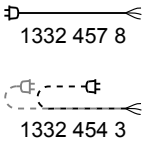
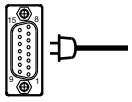
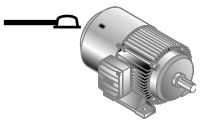
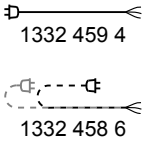
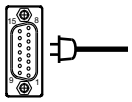
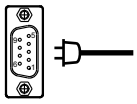
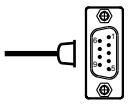
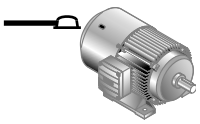
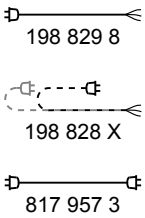
13.17.2 Permissible encoders at X:14

Refer to section "Connecting external encoders to X:14" (page 559).

13.17.3 Permissible encoders at X:15

The following SEW encoders can be connected to the option HIPERFACE® encoder card type DEH11B:

Encoder on DR series AC motors – MOVIDRIVE®					
Motor type	**Encoder**	**MOVIDRIVE® inverter**	**Motor**	**Cable**	**Details**
DR71 – DR132	ES7S ES7R AS7W	X15 		 1362 2021  1362 2048	(page 560)
DR160 – DR225	EG7S EG7R AG7W				
DR71 – DR132	ES7S ES7R AS7W			 1361 7621  1361 7648	
DR160 – DR225	EG7S EG7R AG7W				
DR315	EH7S			 1360 2659  1362 3206	

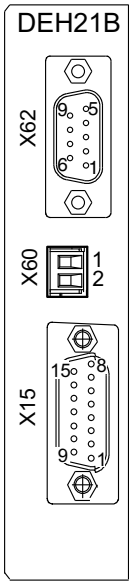
Encoders on DT../DV.. and CM series motors – MOVIDRIVE®					
Motor type	**Encoder**	**MOVIDRIVE® inverter**	**Motor**	**Cable**	**Details**
DT../DV.., DS56 CT../CV.., CM71 – 112 CMP	AS1H ES1H AK0H EK0H AV1H AF1H EG7C			 1332 453 5 1332 455 1	(page 560)
CM71 – 112	AS1H ES1H AV1H AF1H EG7C			 1332 457 8 1332 454 3	
DT../DV.., CT../CV.., EH1S ES1S ES2S EV1S ES1R ES2R EV1R: EH1R				 1332 459 4 1332 458 6	
DT../DV..,	ES1T ES2T EV1T EH1T	X15:  DWI11A X2: 	DWI11A X1:  	 198 829 8 198 828 X 817 957 3	

13.18 Connection and terminal description of the DEH21B option

13.18.1 Part number

Encoder card option DEH21B: 1820 818 5

	INFORMATION
	• For detailed information on the DEH21B option, refer to the "MOVIDRIVE® MDX61B DIP11B/DEH21B absolute encoder cards". • The DEH21B option card can be installed in MOVIDRIVE® MDX61B sizes 0 to 7. Only SEW-EURODRIVE staff may install or remove the DEH21B option for MOVIDRIVE® MDX61B size 0. • The DEH21B option card must be plugged into the encoder slot. • The DC 24 V power supply of an encoder connected to X62 is ensured when X60 is supplied with DC 24 V. Observe the "Project planning" chapter in the MOVIDRIVE® MDX60B/61B system manual.

Front view of DEH21B	Description	Terminal	Function
 1806096139	**X62: Absolute encoder connection**	**X62:1** **X62:2** **X62:3** **X62:4** **X62:5** **X62:6** **X62:7** **X62:8** **X62:9**	Data + Reserved Cycle + Reserved DGND Data – Reserved Pulse – DC 24 V output
	X60: Voltage supply	**X60:1** **X60:2**	24VIN DGND
	X15: Motor encoder input	**X15:1** **X15:2** **X15:3** **X15:4** **X15:5** **X15:6** **X15:7** **X15:8** **X15:9** **X15:10** **X15:11** **X15:12** **X15:13** **X15:14** **X15:15**	(COS+) signal track A (K1) (SIN+) signal track B (K2) Signal track C (K0) DATA+ Reserved Reference potential TF/TH/KTY– Reserved Reference potential DGND (COS–) Signal track $\overline{A}$ ($\overline{K1}$) (SIN–) Signal track $\overline{B}$ ($\overline{K2}$) Signal track $\overline{C}$ ($\overline{K0}$) DATA- Reserved TF/TH/KTY+ connection DC+12 V (tolerance range DC 10.5 – 13 V) (max. load X15:15 = DC 650 mA)

	INFORMATION
	The DC 12 V supply voltage from X15 is sufficient to operate SEW encoders (except HTL encoders) with a DC 24 V supply voltage. With all other encoders, check whether they can be connected to the DC 12 V supply voltage.

	NOTICE
	Do not connect HTL encoders E..C to X15 of the DEH21B option. Doing so can destroy the X15 (motor encoder input) of the DEH21B option. Only connect HTL encoders E..C to option DEH21B using the interface adapter DWE11B/12B (→ Sec. "Connecting the interface adapter type DWE11B/12B").

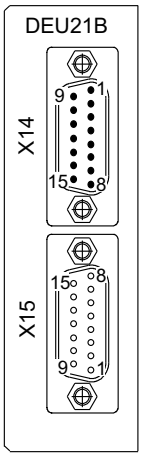
13.19 Connection and terminal description of the DEU21B option

13.19.1 Part number

Multi-encoder card option type DEU21B: 18221696

INFORMATION

- For detailed information on the DEU21B option, refer to the "MOVIDRIVE® MDX61B multi-encoder card DEU21B" manual.
- The DEU21B option card can be installed in MOVIDRIVE® MDX61B sizes 0 to 7. Only SEW-EURODRIVE staff may install or remove the DEU21B option for MOVIDRIVE® MDX61B size 0.
- The DEU21B option card must be plugged into the encoder slot.
- The DC 24 V power supply of an encoder connected to X62 is ensured when X60 is supplied with DC 24 V. Observe the "Project planning" chapter in the MOVIDRIVE® MDX60B/61B system manual.

Front view of DEU21B	Description	Terminal	Function
	**X14: Input for external encoder or output for incremental encoder simulation** **Output for incremental encoder simulation:** • **Signal level to RS422** • **The number of pulses is the same as on X15 motor encoder input**	**X14:1**	(COS+) signal track A (K1)
		X14:2	(SIN+) signal track B (K2)
		X14:3	Signal track C (K0) / pulse +
		X14:4	DATA+ CANHigh
		X14:5/6	Reserved
		X14:7	Changeover
		X14:8	Reference potential DGND
		X14:9	(COS–) Signal track $\overline{A}$ ($\overline{K1}$)
		X14:10	(SIN–) Signal track $\overline{B}$ ($\overline{K2}$)
		X14:11	Signal track $\overline{C}$ ($\overline{K0}$) / pulse –
		X14:12	DATA- CANLow
		X14:13	DC 24 V encoder supply[1)]
		X14:14	Reserved[1)]
		X14:15	DC 12 V encoder supply[1)]
	X15: Motor encoder input	**X15:1**	(COS+) signal track A (K1)
		X15:2	(SIN+) signal track B (K2)
		X15:3	Signal track C (K0) / pulse +
		X15:4	DATA+
		X15:5	Reserved
		X15:6	Reference potential TF/TH/KTY–
		X15:7	Reserved
		X15:8	Reference potential DGND
		X15:9	(COS–) Signal track $\overline{A}$ ($\overline{K1}$)
		X15:10	(SIN–) Signal track $\overline{B}$ ($\overline{K2}$)
		X15:11	Signal track $\overline{C}$ ($\overline{K0}$) / pulse –
		X15:12	DATA-
		X15:13	DC 24 V encoder supply[1)]
		X15:14	TF/TH/KTY+ connection
		X15:15	DC 24 V (tolerance range DC 10.5 - 13 V)[1)]

1) The maximum load on X14:13 and X15:13 is DC 650 mA in total. It the overall unit load on the 24 V level exceeds 400 mA, you must connect an external DC 24 V to X10:9/X10:10. Observe the "Project planning" chapter in the "MOVIDRIVE® MDX60B/61B" system manual.

	NOTICE
	The connections on X14 and X15 must not be installed or removed during operation. Electrical components in the encoder or on the encoder card could be destroyed. De-energize the inverter before plugging or removing the encoder connections. Switch off the supply voltage and the DC 24 V (X10:9).

	INFORMATION
	• If X14 is used as an incremental encoder simulation output, the switchover (X14:7) must be jumpered with DGND (X14:8). • The 24 V encoders from SEW (except HTL and Hiperface®) have a wide voltage range (DC 10 V – 30 V) and can be supplied alternatively with DC 24 V (PIN13) or DC 12 V (PIN15).

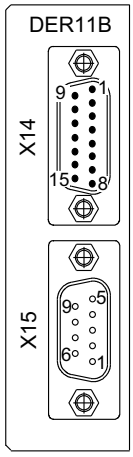
13.20 Connection and terminal description of the DER11B (resolver) option

13.20.1 Part number

Resolver card option type DER11B: 824 307 7

INFORMATION

- The "Resolver card type DER11B" option can only be used with MOVIDRIVE® MDX61B, not with MDX60B.
- The DER11B option must be plugged into the encoder slot.

Front view of DER11B	Description	Terminal	Function
 1806100363	**X14: Input for external encoder or output for incremental encoder simulation** **The pulse count of the incremental encoder simulation is always 1024 pulses per revolution**	**X14:1** **X14:2** **X14:3** **X14:4** **X14:5/6** **X14:7** **X14:8** **X14:9** **X14:10** **X14:11** **X14:12** **X14:13/14** **X14:15**	(cos) signal track A (K1) (sin) signal track B (K2) Signal track C (K0) DATA+ Reserved Switchover Reference potential DGND (cos–) signal track $\overline{A}$ ($\overline{K1}$) (sin–) signal track $\overline{B}$ ($\overline{K2}$) Signal track $\overline{C}$ ($\overline{K0}$) DATA- Reserved DC+12 V (tolerance range DC 10.5 – 13 V) (max. load DC 650 mA)
	X15: Resolver input	**X15:1** **X15:2** **X15:3** **X15:4** **X15:5** **X15:6** **X15:7** **X15:8** **X15:9**	sin+ (S2) cos+ (S1) Ref.+ (R1) N.C. Reference potential TF/TH/KTY– sin– (S4) cos– (S3) Ref.– (R2) TF/TH/KTY+ connection

INFORMATION

- If X14 is used as an incremental encoder simulation output, the switchover (X14:7) must be jumpered with DGND (X14:8).
- The DC 12 V supply voltage from X14 is sufficient to operate SEW encoders (except HTL encoders) with a DC 24 V supply voltage. With all other encoders, check whether they can be connected to the DC 12 V supply voltage.

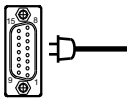
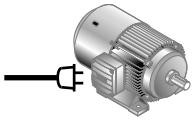
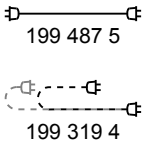
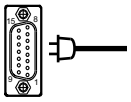
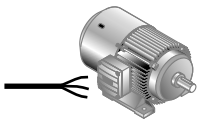
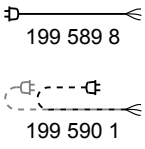
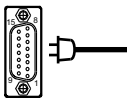
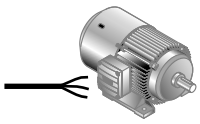
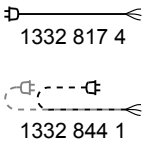
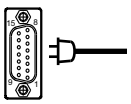
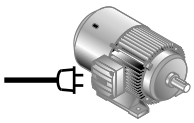
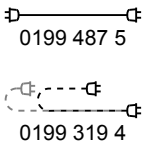
13.20.2 Permissible encoders at X:14

Refer to section "Connecting external encoders to X:14" (page 559).

13.20.3 Resolver at X:15

2-pole resolvers, AC 7 V, 7 kHz, can be connected at X15 (resolver input). The gear ratio of the resolver amplitudes must be approximately 0.5 ± 10%. The control dynamics decrease if the value is lower; the evaluation may be unstable if the value is higher.

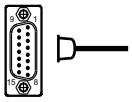
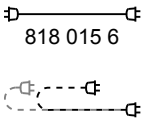
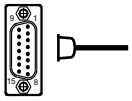
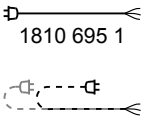
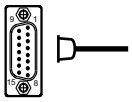
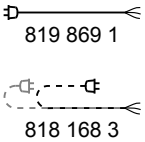
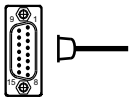
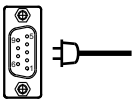
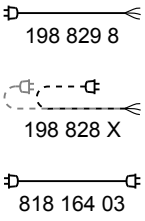
SEW-EURODRIVE offers the following prefabricated cables for connecting resolvers to DER11B:

Encoders on DT../DV.. and CM series motors – MOVIDRIVE®					
Motor type	**Encoder**	**MOVIDRIVE® inverter**	**Motor**	**Cable**	**Details**
DS56 CM71..112	Resolver			 199 487 5 199 319 4	(page 563)
CM71 – 112	Resolver			 199 589 8 199 590 1	
DS56	Resolver			 1332 817 4 1332 844 1	
CMP	Resolver			 0199 487 5 0199 319 4	

13.21 Connecting external encoders to X:14

13.21.1 External encoder at DEH11B and DER11B (X:14)

The following external encoders can be connected to connector X14 of the DEH11B option and the DER11B option.

External encoder at DEH11B and DER11B - MOVIDRIVE® (X:14)			
Encoder	**MOVIDRIVE® inverter**	**Cable**	**Details**
AS1H ES1H AV1H			(page 564)
AS1H ES1H AV1H			
EH1S ES1S ES2S EV1S ES1R ES2R EV1R: EH1R			
ES1T ES2T EV1T EH1T	 DWI11A X2: 		

13.22 Connection of encoder options

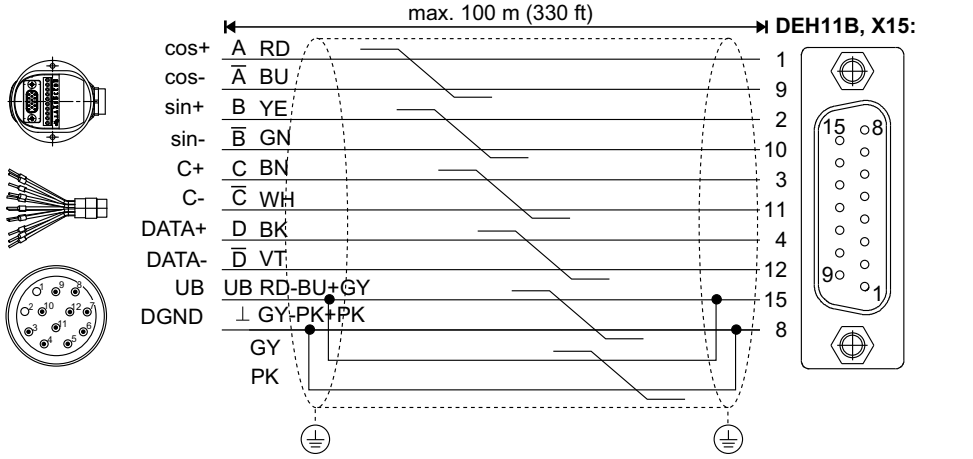
13.22.1 Connection of DEH11B option

Encoder connection at X:15

Depending on the motor type and motor configuration, the encoder is connected via plug connector or terminal box.

DR71...315

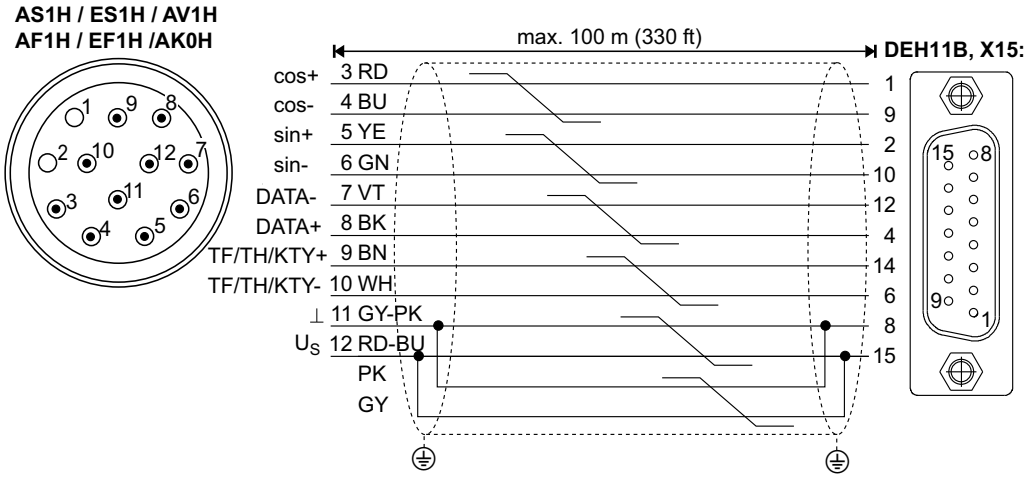
Connect the encoder to the option DEH11B as follows:



2307941643

DT../DV.., DS56, CT../CV.., CM71...112/CMP with plug connector

Connect the HIPERFACE® encoder to the DEH11B option as follows:

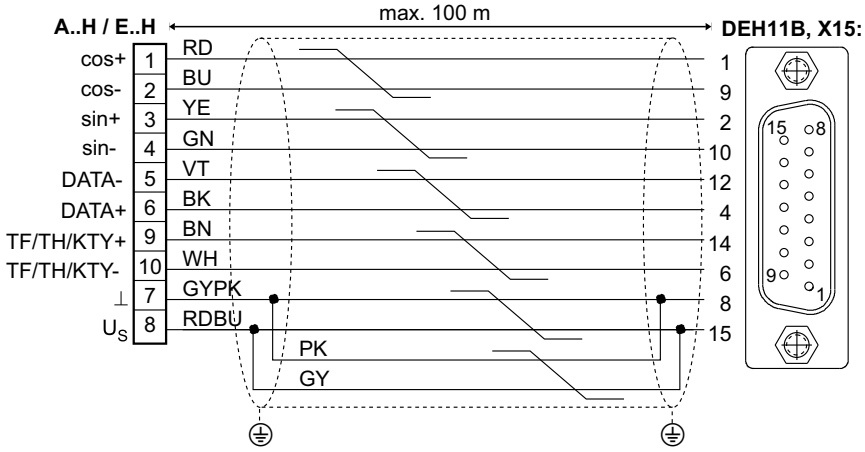


1806065547

	INFORMATION
	Important for DT/DV or CT/CV motors: TF or TH is **not** connected with the encoder cable but must be connected using an additional 2-core shielded cable.

CM71...112 with terminal box

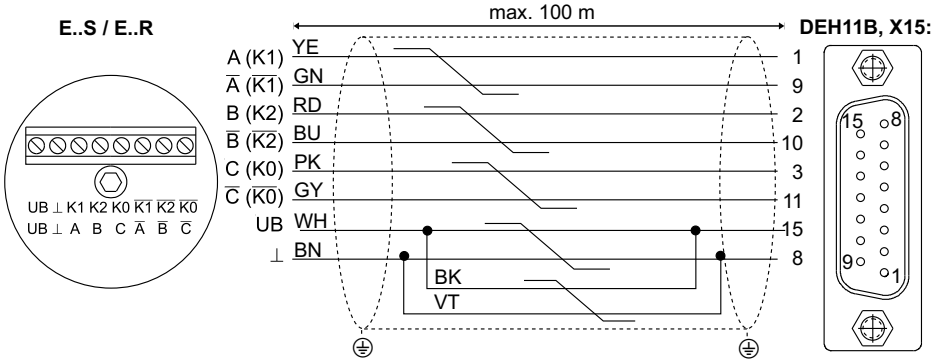
Connect the HIPERFACE® encoder to the DEH11B option as follows:



1806071179

Connecting sin/cos and TTL encoders (DC 24 V) to DT../ DV.., CT../CV.. motors

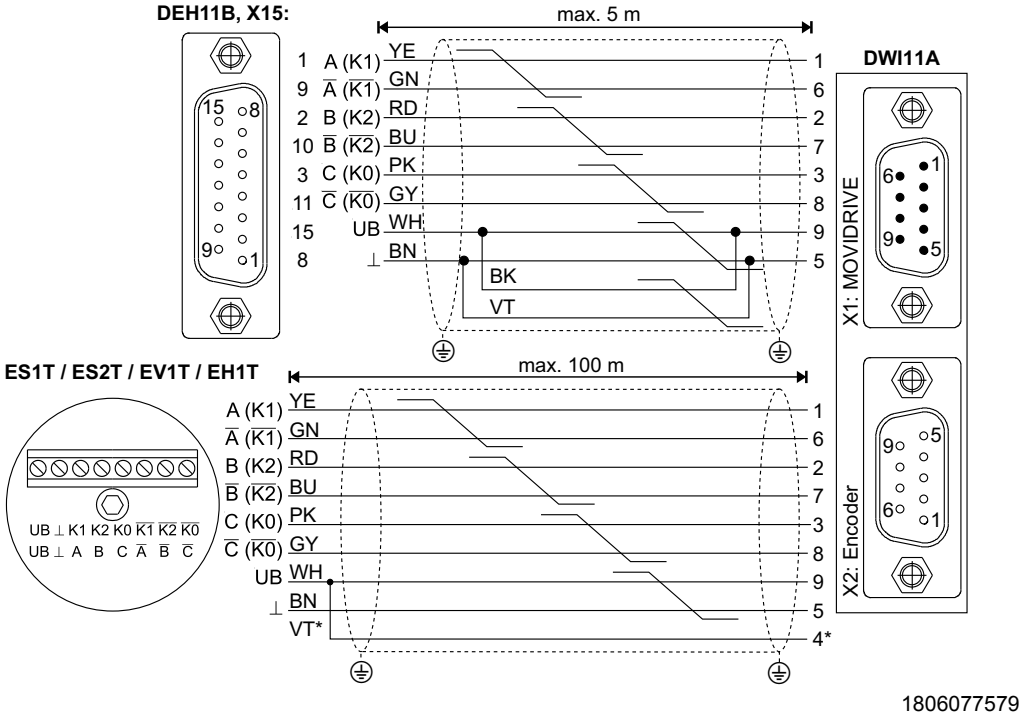
The high resolution sin/cos encoders and TTL encoders with DC 24 V supply can also be connected to DEH11B. Proceed as follows to connect sin/cos encoders and TTL encoders with DC 24 V supply to the DEH11B option:



1806074507

Connecting TTL encoders (DC 5 V) to DT../DV.. motors

Connect the TTL encoders with a DC 5 V voltage supply via the "DC 5 V encoder power supply type DWI11A" option (part number 822 759 4). The sensor cable must also be connected to correct the supply voltage of the encoder. Connect this encoder as follows:



* Connect the sensor cable (VT) on the encoder to UB, do not jumper on the DWI11A!

13.22.2 Connection of DER11B (resolver) option to X:15

Terminal/pin assignment

CM motors: The resolver connections are accommodated in a plug connector or on the 10-pin Wago terminal strip.

DS Motors: The resolver connections in the terminal box are either located on a 10-pin Phoenix terminal strip or in the plug connector.

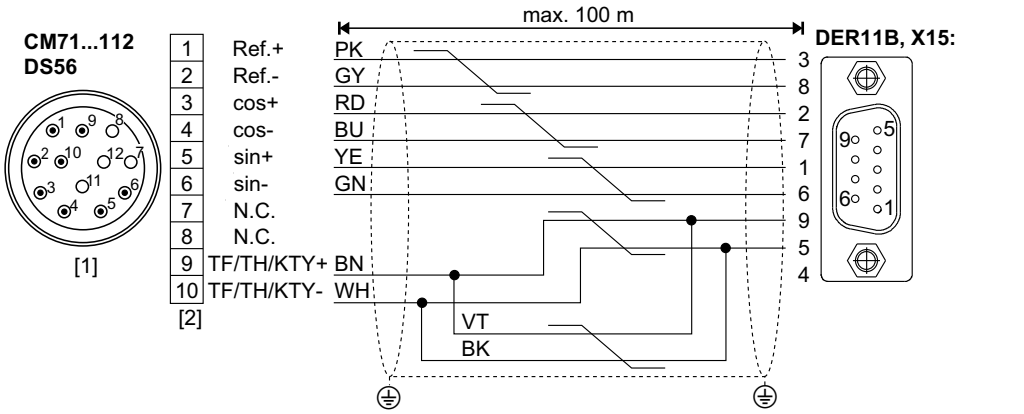
CM plug connector DS56: Intercontec, type ASTA021NN00 10 000 5 000

Terminal / pin	Description		Core color in prefabricated cable
1	Ref.+	Reference	Pink (PK)
2	Ref.-		Gray (GY)
3	cos +	Cosine signal	Red (RD)
4	cos-		Blue (BU)
5	sin+	Sine signal	Yellow (YE)
6	sin-		Green (GN)
9	TF/TH/KTY+	Motor protection	Brown (BN) / violet (VT)
10	TF/TH/KTY–		White (WH) / black (BK)

The resolver signals have the same numbering on the 10-pin Phoenix terminal strip and in the plug connectors.

Connection

Connect the resolver as follows:



1806120331

[1] Plug connector
[2] Terminal strip

13.22.3 Connection of external encoders to the DEH11B and DER11B options

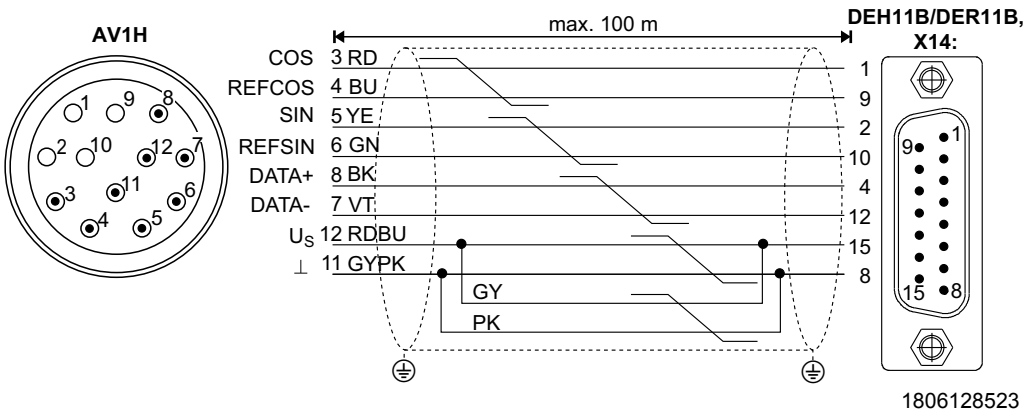
Voltage supply

SEW encoders with DC 24 V voltage supply (max. DC 180 mA) are connected directly to X14. . These SEW encoders are then powered by the inverter.

SEW encoders with a DC 5 V voltage supply must be connected via the "DC 5 V encoder power supply type DWI11A" option (part number 822 759 4).

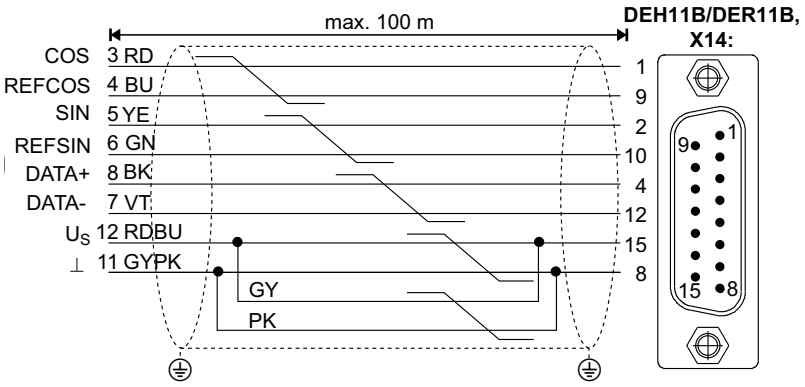
Hiperface® encoder connection

Connect the HIPERFACE® encoder AV1H as follows:



1806128523

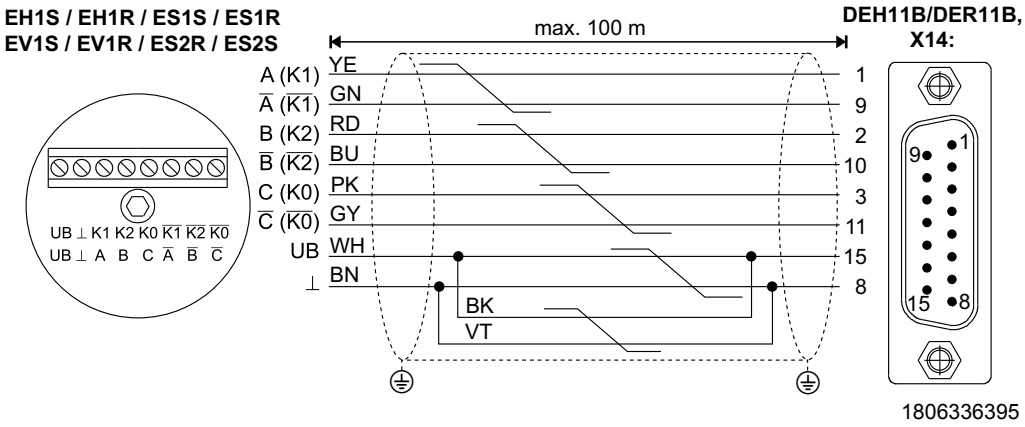
You can still connect HIPERFACE® encoders via a prefabricated cable with conductor end sleeves.



1806128523

Connection of sin/cos and TTL encoders (DC 24 V)

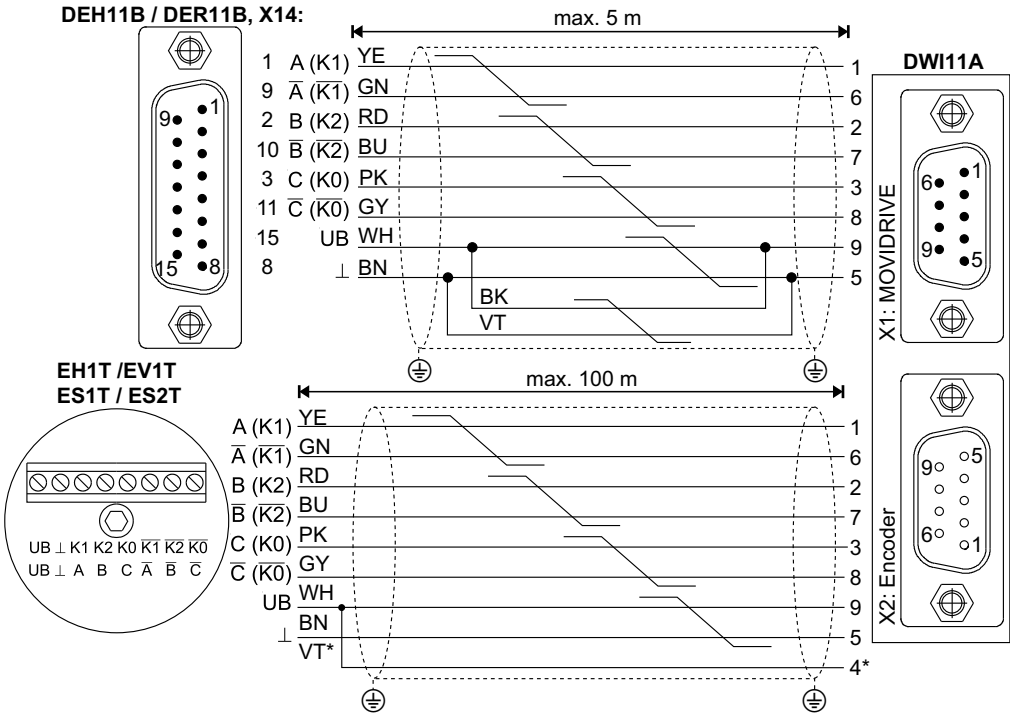
Proceed as follows to connect sin/cos encoders and TTL encoders with DC 24 V supply:



1806336395

Connection of TTL encoder (DC 5 V)

DC 5 V encoders with a DC 5 V voltage supply EV1T, EH1T, ES1T and ES2T must be connected via the "DC 5 V encoder power supply type DWI11A" option (part number 822 759 4). The sensor cable must also be connected to correct the supply voltage of the encoder. Connect this encoder as follows:



1806339467

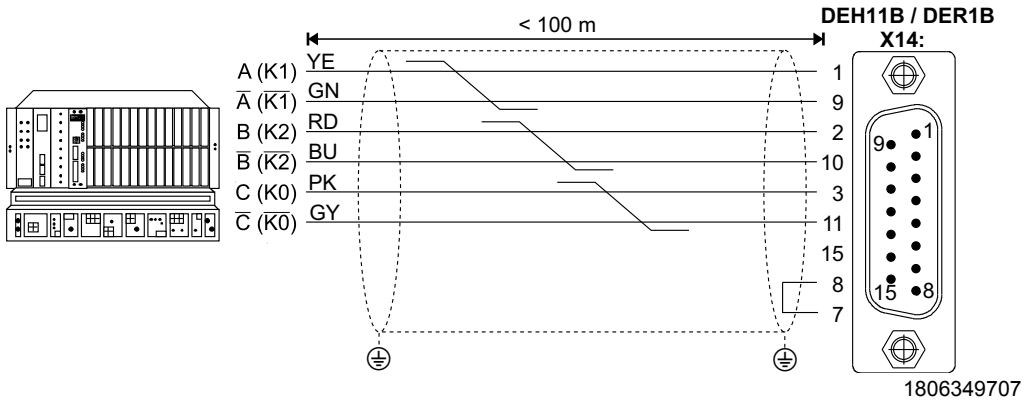
* Connect the sensor cable (VT) on the encoder to UB, do not jumper with DWI11A!

13.23 Connection of incremental encoder simulation

13.23.1 Incremental encoder simulation

Connector X14 of the DEH11B or DER11B option can also be used as the incremental encoder simulation output. For this purpose, you must jumper "switchover" (X14:7) with DGND (X14:8). X14 then delivers the incremental encoder signals with a signal level according to RS422. The number of pulses is:

- With DEH11B as on X15 motor encoder input
- With DER11B 1024 pulses/revolution



Part number of the prefabricated cable:

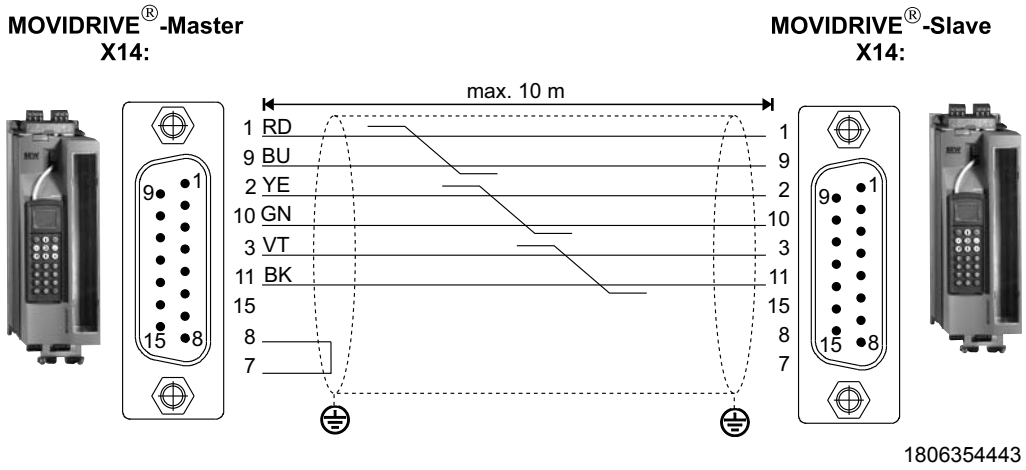
- Option type DEH/DER11B X14: → Incremental encoder simulation
  - For fixed installation: 819 768 7

13.24 Master/slave connection

13.24.1 Master/Slave connection

Connector X14 of the DEH11B or DER11B option can also be used for the "internal synchronous operation" application (master/slave connection of several MOVIDRIVE® units). For this purpose, you must jumper "switchover" (X14:7) with DGND (X14:8) on the master end.

The following figure shows an X14-X14 connection (= master/slave connection) between two MOVIDRIVE® units.



1806354443

Part number of the prefabricated cable:

- For fixed installation: 817 958 1

	INFORMATION
	• A **maximum of 3 slaves can be connected to the MOVIDRIVE® master**. • Important: **Do not connect X14:7** when connecting the individual **MOVIDRIVE® slaves together**. Only jumper the connections **X14:7 and X14:8 on the MOVIDRIVE® master**.

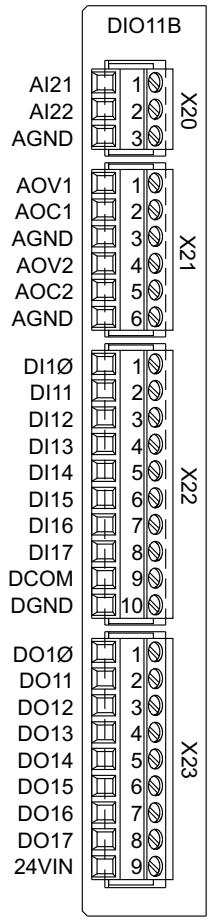
13.25 Connection and terminal description of the DIO11B option

13.25.1 Part number

Input/output card type DIO11B: 824 308 5

INFORMATION

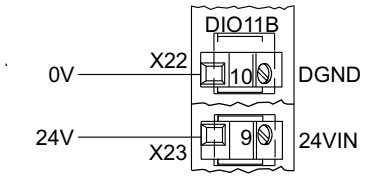
- The "input/output card type DIO11B" option is only possible in conjunction with MOVIDRIVE® MDX61B, not with MDX60B.
- The DIO11B option must be plugged into the fieldbus slot. If the fieldbus slot is not available, you can plug the DIO11B input/output card in the expansion slot.
- The **extended handle end** of the plug connectors (terminals X20, X21, X22, X23) must **only** be used for **removing the plug connectors** (not for plugging them in!).

Front view of DIO11B	Terminal	Function
	**X20:1/2 AI21/22** **X20:3 AGND**	Setpoint input n2, DC-10 V – 0 – 10 V or DC 0 – 10 V (Differential input or input with AGND reference potential) Reference potential for analog signals (REF1, REF2, A.., AO..)
	X21:1 AOV1 **X21:4 AOV2** **X21:2 AOC1** **X21:5 AOC2** **X21:3/6 AGND**	Analog voltage output V1, factory setting: "actual speed" Analog voltage output V2, factory set to "output current" Load capacity of the analog voltage outputs: I_{max} = DC 10 mA Analog current output C1, factory setting: actual speed Analog current output C2, factory setting: output current P642/645 "Operating mode AO1/2" sets whether the voltage outputs V1/2 (DC 10 V – 0 – 10 V) or the current outputs C1/2 DC (0(4) – 20 mA) are in effect. Selection options for the analog outputs → Parameter menu P640/643 Max. permitted cable length: 10 m / max output voltage: DC 15 V Reference potential for analog signals (REF1, REF2, AI.., AO..)
	X22:1...8 DI1Ø...17 **X22:9 DCOM** **X22:10 DGND**	Binary inputs 1 – 8, factory setting: "No function" The binary inputs are electrically isolated by optocouplers. Selection options for the binary inputs → Parameter menu P61_ Reference potential for the binary inputs DI1Ø – 17 Reference potential for binary signals – Without jumper X22:9-X22:10 (DCOM-DGND) → Isolated binary inputs – With jumper X22:9-X22:10 (DCOM-DGND) → Non-isolated binary inputs
	X23:1...8 DO1Ø...17 **X23:9 24VIN**	Binary outputs 1 – 8, factory setting: "No function" Load capacity of binary outputs: I_{max} = DC 50 mA (short-circuit proof, protected against external voltage to DC 30 V) **Do not apply external voltage to the binary outputs.** Supply voltage DC +24 V for binary outputs D01Ø - D017, non-isolated (reference potential DGND)

13.25.2 Voltage input 24 VIN

The 24VIN (X23:9) voltage input serves as DC+24 V supply voltage for the binary outputs DO1Ø – DO17. Reference potential is DGND (X22:10). The binary outputs do not give a level if the DC+24 V supply voltage is not connected. The supply voltage DC+24 V can also be jumpered from the X10:8 connection of the basic unit if the load does not exceed DC 400 mA (current limitation in X10:8).

The following figure shows voltage input 24VIN (X23:9) and reference potential DGND (X22:10).



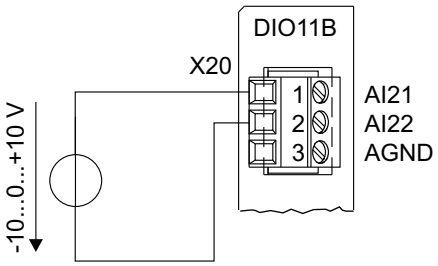
1806364811

13.25.3 Voltage input n2

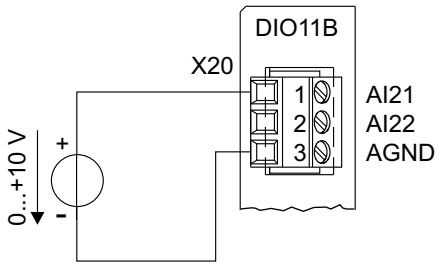
The analog setpoint input n2 (AI21/22) can be used as a differential input or as an input with AGND reference potential.

The following figure shows the n2 setpoint input.

Differential input



Input with AGND reference potential



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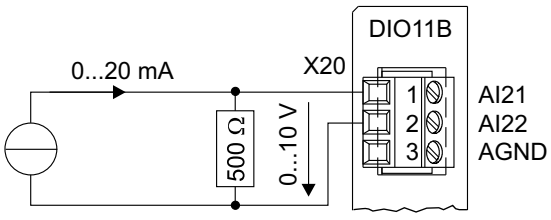
13.25.4 Current input n2

You must use an external load if the analog setpoint input n2 (AI21/22) should be used as a current input.

For example R_B = 500 Ω → DC 0 – 20 mA = DC 0 – 10 V

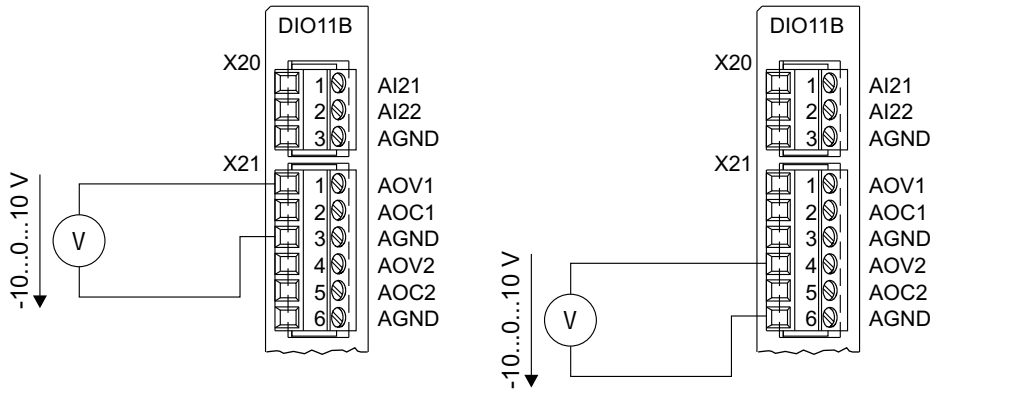
The following figure shows the current input with external load.



1806370955

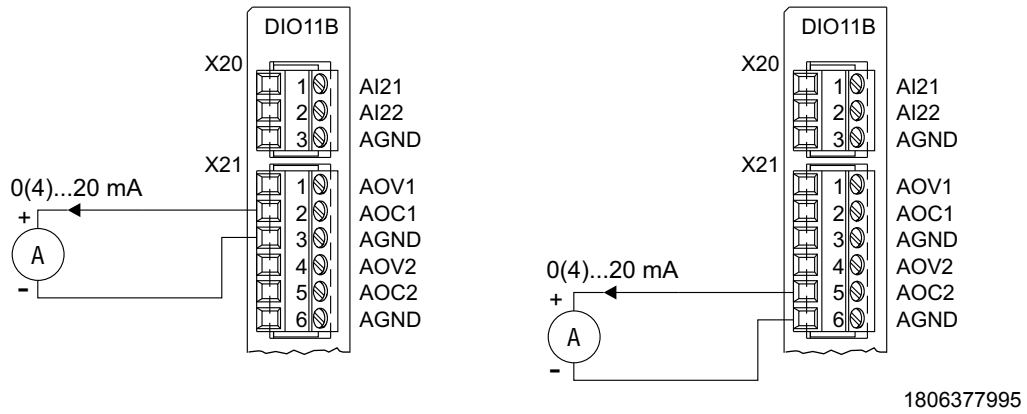
13.25.5 Voltage outputs AOV1 and AOV2

Assign the analog voltage outputs AOV1 and AOV2 in accordance with the following figure:



13.25.6 Current outputs AOC1 and AOC2

Assign the analog current outputs AOC1 and AOC2 in accordance with the following figure:

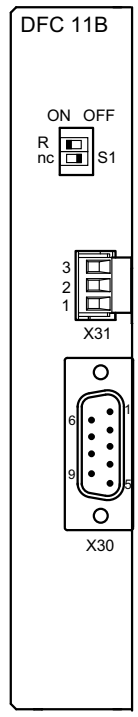


13.26 Connection and terminal description of the DFC11B option

13.26.1 Part number

CAN-Bus interface option type DFC11B: 824 317 4

	INFORMATION
	• The "CAN bus interface type DFC11B" option can only be used with MOVIDRIVE® MDX61B, not with MDX60B. • The DFC11B option must be plugged into the fieldbus slot. • The DFC11B option is powered via MOVIDRIVE® MDX61B. A separate voltage supply is not required.

Front view of DFC11B	Description	DIP switch Terminal	Function
	**DIP switch block S1: Sets the terminating resistor**	**R** **nc**	Terminating resistor for the CAN-Bus cable Reserved
	X31: CAN bus connection	**X31:3** **X31:2** **X31:1**	CAN Low (jumpered with X30:2) CAN High (jumpered with X30:7) DGND CAN[1)]
	X30: CAN bus connection (Sub D9 to CiA standard)	**X30:1** **X30:2** **X30:3** **X30:4** **X30:5** **X30:6** **X30:7** **X30:8** **X30:9**	Reserved CAN Low (jumpered with X31:3) DGND CAN[1)] Reserved Reserved DGND CAN[1)] CAN High (jumpered with X31:2) Reserved Reserved

1) DGND of the CAN bus interface is independent from DGND of the basic unit

13.26.2 Connection MOVIDRIVE® - CAN

The DFC11B option is connected to the CAN bus at X30 or X31 in the same way as the SBus (→ Sec. "System bus connection (SBus 1)") in the basic unit (X12). In contrast to the SBus1, SBus2 is electrically isolated and made available via option DFC11B.