



# Operating Instructions



## Safety-Related BST Brake Module For Control Cabinet Installation



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## 1 General information

### 1.1 About this documentation

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

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

### 1.2 Structure of the safety notes

#### 1.2.1 Meaning of signal words

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

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

#### 1.2.2 Structure of section-related safety notes

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

Section-related safety notes are structured as follows:



##### SIGNAL WORD

Type and source of hazard.






Possible consequence(s) if disregarded.

- Measure(s) to prevent hazard.

#### Meaning of the hazard symbols

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

Hazard symbol	Meaning
	General hazard

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

### 1.2.3 Structure of embedded safety notes

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

Embedded safety notes are structured as follows:

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

## 1.3 Rights to claim under limited warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the documentation. Read the documentation before you start working with the product.

## 1.4 Content of the documentation

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

## **1.5 Exclusion of liability**

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

## **1.6 Applicable documentation**

Observe the following applicable documentation:

- "MOVIDRIVE® MDX60B/61B" operating instructions
- "MOVITRAC® B" operating instructions
- "Multi-Axis Servo Inverter MOVIAXIS® MX" operating instructions
- "MOVISAFE® UCS..B Compact Safety Modules" operating instructions
- "MOVISAFE® UCS..B Multi-Axis Safety Modules" operating instructions
- "MOVIDRIVE® MDX61B Safety Module Option MOVISAFE® DCS21B/22B/31B/32B" manual
- Certificates and characteristic safety values

Always use the latest version of the documentation and software.

Our documentation is available in various languages for download from the SEW homepage ([www.sew-eurodrive.com](http://www.sew-eurodrive.com)). If you are unclear about any of the information in this documentation or if you require further information, consult SEW-EURODRIVE.

If required, you can order printed copies of the documentation from SEW-EURODRIVE.

## **1.7 Product names and trademarks**

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

## **1.8 Copyright**

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Unauthorized reproduction, modification, distribution or any other use of the whole or any part of this documentation is strictly prohibited.

## 2 Safety notes

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

### 2.1 Preliminary information

This document contains safety-relevant conditions for the operation of the safety-related BST brake module with safe disconnection of the brake.


The classification in performance level d according to EN ISO 13849-1 applies to the control and not to the brake.

### 2.2 General information

Never install or operate damaged products. In the event of damage, submit a complaint to the shipping company immediately.

All work related to transportation, storage, installation, assembly, connection, startup, maintenance and repair may only be carried out by qualified personnel, in strict observance of:

- The relevant detailed operating instructions
- The warning and safety signs
- All other project planning documents, operating instructions and wiring diagrams related to the drive
- System-specific regulations and requirements
- The national/regional regulations governing safety and the prevention of accidents

The requirements for the safety relay and the permitted circuit variants are specified in detail in chapter "Requirements for external safety switching devices" (→  16) and must be strictly observed.

The system/machine manufacturer must perform a system/machine-specific risk assessment. This is to take into account the safety-relevant BST brake module as well as the mechanical brake design.

Unauthorized removal of covers, improper use, or incorrect installation and operation may result in severe injury to persons, or damage to machinery.

Refer to the documentation for additional information.

### 2.3 Target group

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



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

All persons involved in any other work, such as transportation, storage, operation and waste disposal, must be trained appropriately.

## **2.4 Designated use**

The safety-related BST brake module is responsible for the power supply and control of disk brakes from SEW-EURODRIVE. For the permitted combination of safety-related BST brake module and SEW disk brake, refer to the section "Approved device combinations" in the "Safety-Relevant Conditions" chapter. The safety-related BST brake module is intended for industrial systems and may only be used in accordance with the information provided in SEW-EURODRIVE's technical documentation and the information given on the nameplate.

## **2.5 Transport**

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If necessary, suspend startup.

## **2.6 Installation/assembly**

Observe the notes in chapter "Mechanical installation" (→ 22).

## 2.7 Startup/operation

- When the safety-related control voltage  $V_{\text{SAFE}}$  / functional control voltage  $V_{\text{IN}}$  is disconnected, the DC link voltage  $V_{\text{DC link}}$  is still present at the brake module.
- The safety concept is only suitable for performing mechanical work on driven system/machine components.
- All poles must be disconnected from the supply system when work is carried out on the electrical section of the system. Dangerous voltages may still be present for up to 10 minutes after disconnection from the supply system.
- You have to take into account that, in case of a fault, the application time of the connected brake is longer, which means the drive might coast.
  - For maximum brake application times, refer to chapter "Technical data" of the operating instructions for the BST and SEW disk brakes.
  - Note: If coasting to a halt results in application-dependent hazards, take additional protective measures (for example, movable covers with closure), which cover the hazardous area until persons are no longer in danger.
  - The additional protective covers must be designed and integrated to meet the requirements stipulated in EN ISO 12100:2010 and the requirements determined for the machine based on the risk assessment.
  - After activating the stop command, access to the machine must remain blocked until the drive has reached a standstill. Alternatively, the access time must be determined to ensure that the resulting safety distance is maintained adequately.
- The states of LED V1 and LED V2 must not be regarded as safety-relevant. The fact that the LED V1 and LED V2 are no longer illuminated does not indicate that the safety-related BST brake module is de-energized and the brake is applied. Even if LED V1 and LED V2 are not illuminated, DC link voltage  $V_{\text{DC link}}$  might be present at the BST brake module.
- The safety-related BST brake module does not detect a mechanical fault (such as brake lining wear) of the disk brakes of SEW-EURODRIVE.

## 2.8 Inspection/maintenance

Observe the notes in chapter "Inspection/maintenance" (→ 30).

## 2.9 Waste disposal

Dispose of the BST in accordance with the material structure and the regulations in force for instance as:

- Iron
- Copper
- Aluminum
- Plastic

### 3 Integrated safety technology

The safety technology of the safety-related BST brake module described in this document has been developed and tested in accordance with the following safety requirements:

- Performance level d according to EN ISO 13849-1

This was certified by TÜV Nord. A copy of the TÜV certificate can be obtained from SEW-EURODRIVE.

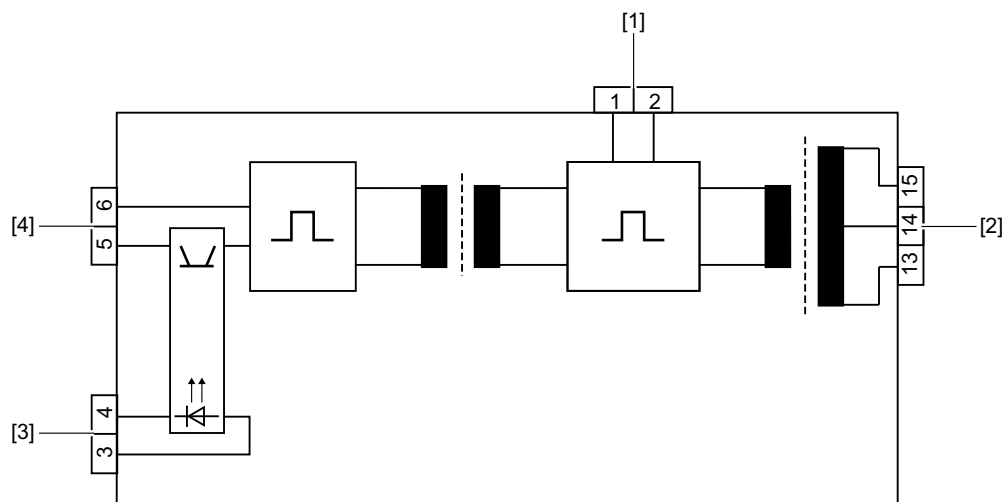
#### 3.1 Safe condition

Safety-related use of the BST brake module means the **de-energized condition of the connected brake is defined as safe condition**. The safety concept is based on this.

#### 3.2 Safety concept

- The safety-related BST brake module enables the connection of an external fail-safe safety switching device/safety controller. The safety relay disconnects the safe control voltage  $V_{SAFE}$  when a connected control device (e.g. emergency stop device) is activated.
- Disconnecting the safe control voltage  $V_{SAFE}$  means the connected brake is disconnected from the power supply. The power supply required for releasing the connected brake is interrupted safely.
- Instead of separating the brake control galvanically from the power supply using contactors or switches, the disconnection procedure described here prevents the power semiconductors in the safety-related BST brake module from being activated, in this way ensuring safe disconnection. This means that all connected brakes are de-energized although the supply voltage is still present at the safety-related BST brake module.

### 3.2.1 Block diagram BST



- [1] DC link voltage input  $V_{DC \text{ link}}$  (terminal 1/2)
- [2] Brake output (terminals 13/14/15)
- [3] Functional control voltage input  $V_{IN}$  (terminal 3/4)
- [4] Safety-related control voltage input  $V_{SAFE}$  (terminal 5/6)

### 3.3 Safety function

The following drive-related safety function can be used.

- **SBC** (Safe Brake Control) according to IEC 61800-5-2.

The SBC function safely de-energizes the connected brake by disconnecting the safety-related control voltage  $V_{SAFE}$ . The safety-related control voltage must be disconnected using a suitable external safety relay/safety controller.

#### INFORMATION



Safety-related brake control must only be carried out using the safety-related control voltage  $V_{SAFE}$  (terminal 5/6).

### 3.4 Restrictions

#### ⚠ WARNING



Voltage is still present at the DC link connection of the frequency inverter even when disconnecting the safety-related control voltage  $V_{SAFE}$  / functional control voltage  $V_{IN}$ . Severe or fatal injuries from electric shock.

- If work is carried out on the electrical section of the brake system, the supply voltage must be disconnected using an external maintenance switch.

## 4 Safety-relevant conditions

The safety function of BST can only be used for safe operation of the system/machine if it is integrated correctly in an application-specific, higher-level safety function or safety system. It is essential that the system/machine manufacturer conducts a system/machine-specific risk assessment (e.g. according to EN ISO 12100:2010) and validates the required safety conditions and functions prior to startup. The system/machine manufacturer and the operator are responsible for compliance of the system/machine with applicable safety regulations.

The following requirements are mandatory when installing and operating the BST brake module in safety-related applications.

The conditions are divided into the following sections:

- Approved device combinations
- Installation requirements (→ 15)
- External safety controller requirements (→ 16)
- Startup requirements (→ 18)
- Operational requirements (→ 18)

### 4.1 Permitted unit combinations

The following BST unit types are permitted for safety-related applications:

Type designation	Part number	Approved SEW disk brakes
BST 0.6S-460V-00	08299714	All brake coils with a coil voltage of AC 460 V and a coil power ≤ 120 W.  Several brake coils can be connected for redundant systems. In this case, the total power must not exceed 120 W.
BST 0.7S-400V-00	13000772	All brake coils with a coil voltage of AC 400 V and a coil power ≤ 120 W.  Several brake coils can be connected for redundant systems. In this case, the total power must not exceed 120 W.
BST 1.2S-230V-00	13001337	All brake coils with a coil voltage of AC 230 V and a coil power ≤ 120 W.  Several brake coils can be connected for redundant systems. In this case, the total power must not exceed 120 W.

Only SEW disk brakes in 3-wire connection may be connected to the BST module.

Brake type <sup>1)</sup>	Asynchronous motor type									
	DR.71	DR.80	DR.90	DR.100	DR.112	DR.132	DR.160	DR.180	DR.200	DR.225
BE05	x	x								
BE1	x	x	x							
BE2		x	x	x						
BE5			x	x	x	x				

Brake type <sup>1)</sup>	Asynchronous motor type									
	DR.71	DR.80	DR.90	DR.100	DR.112	DR.132	DR.160	DR.180	DR.200	DR.225
BE11					x	x	x			
BE20							x	x		
BE30 <sup>2)</sup>								x	x	x
BE32 <sup>2)</sup>								x	x	x

1) Brakes of the type BM or BM(G) 05 – 30 and BM62 can be combined.

2) The BE30 and BE32 brakes can be used although they have a higher coil power according to the brake data sheet.

Brake type <sup>1)</sup>	Synchronous motor type			
	CMP.71	CMP.80	CMP.100	CMP.112
BY2	x			
BY4		x		
BY8			x	
BY14				x

1) Brakes of the type B can be combined.

The following unit combinations (inverter/BST) are approved.

Inverter type	Unit variant	Comments
MOVIDRIVE® B	3 × AC 380 – 500 V Sizes 0 – 7	Connection of BST to size 7 with DC link adapter.
MOVITRAC® B	3 × AC 380 – 500 V Size 2S – 5	Size 0 does not have a DC link connection ( $\pm V_{DC \text{ link}}$ )
MOVIAXIS®	Connection to all supply and regenerative modules as well as capacitance and buffer modules.	Installation via connection set BST to MXP, MXR, MXC, and MXNB.

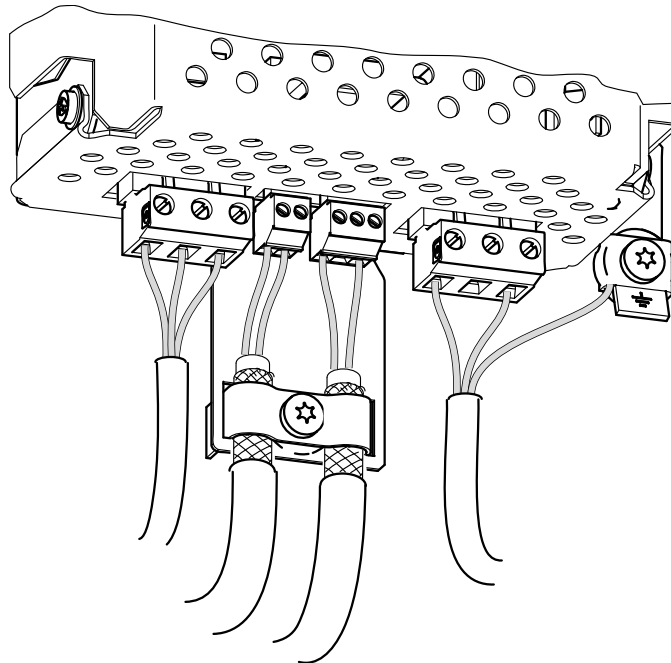
## 4.2 Requirements on the installation

The line between the safety relay/safety controller and the safety-related BST brake module, terminal 5/6 ( $V_{SAFE}$ ) is referred to as safety-related control line (for safe disconnection).

Observe the following requirements on the installation:

- Power lines and safety-related control lines have to be installed in separate cables.
- The total cable length between the safety relay/safety controller and the safety-related BST brake module is limited to a maximum length of 100 m for EMC reasons.
- The total cable length between the safety-related BST brake module and the connected brake must not exceed 200 m.
- Wiring must comply with EN 60204-1.
- The installation space (control cabinet) must have at least degree of protection IP54.
- Outside an electrical installation space: Shielded cables must be routed permanently (fixed) and protected against external damage, or other equivalent measures. It is essential that you apply the shielding at both ends on the housing.
- Individual conductors can be routed inside an electrical installation space. Adhere to the relevant regulations in force for the application.
- The safety-related control voltage  $V_{SAFE}$  may not be used for feedback.
- You have to make sure that there is no transient coupling to the safety-related control voltage  $V_{SAFE}$ .
- Observe the values specified for safety components when designing the safety circuits.
- Use only voltage sources with safe disconnection (SELV/PELV) according to EN 60204-1 for any DC 24 V voltage supply (safety-related control voltage  $V_{SAFE}$  and functional control voltage  $V_{IN}$ ) of the safety-related BST brake module.  
In case of a single fault, the voltage between the outputs or between any output and grounded parts must not exceed DC 60 V.
- Do not interconnect brake cables of several brake control systems.
- For disconnection of group drives, observe the switching capacity of the safety relay and the maximum permitted voltage drop on the safety-related control voltage  $V_{SAFE}$ .
- The technical data of the BST and the brake must be observed (see chapter "Approved device combinations" and "Technical data").
- Adhere to the general installation regulations in the "Installation" chapter.

The following figure shows EMC-compliant installation.



9007199397615115

### 4.3 Requirements on external safety controller

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

- The safety controller and all other safety-related subsystems must be approved for at least that safety class which is required in the overall system for the application-related safety function. The following table shows an example of the required safety class of the safety controller.
- The wiring of the safety controller must be suitable for the required safety class, (see manufacturer documentation). The safety-related control voltage  $V_{SAFE}$  can be safely disconnected either at the positive, or the positive and negative pole. SEW-EURODRIVE recommends bipolar disconnection.
- The values specified for the safety controller must be strictly adhered to when designing the circuit.
- The switching capacity of the safety relays or the relay outputs of the safety controller must correspond at least to the maximally permitted, limited output current of the safety-relevant control voltage  $V_{SAFE}$ . **Observe the manufacturer's instructions concerning the permitted contact loads and fusing that may be required for the safety contacts. If the manufacturer provides no specific information, the contacts must be protected with 0.6 times the nominal value of the maximum contact rating specified by the manufacturer.**
- To ensure protection against unintended restart in accordance with EN 1037, the safety controllers must be designed and connected in such a way that resetting the control device alone does not lead to a restart. A restart may only be carried out after a manual reset of the safety circuit.



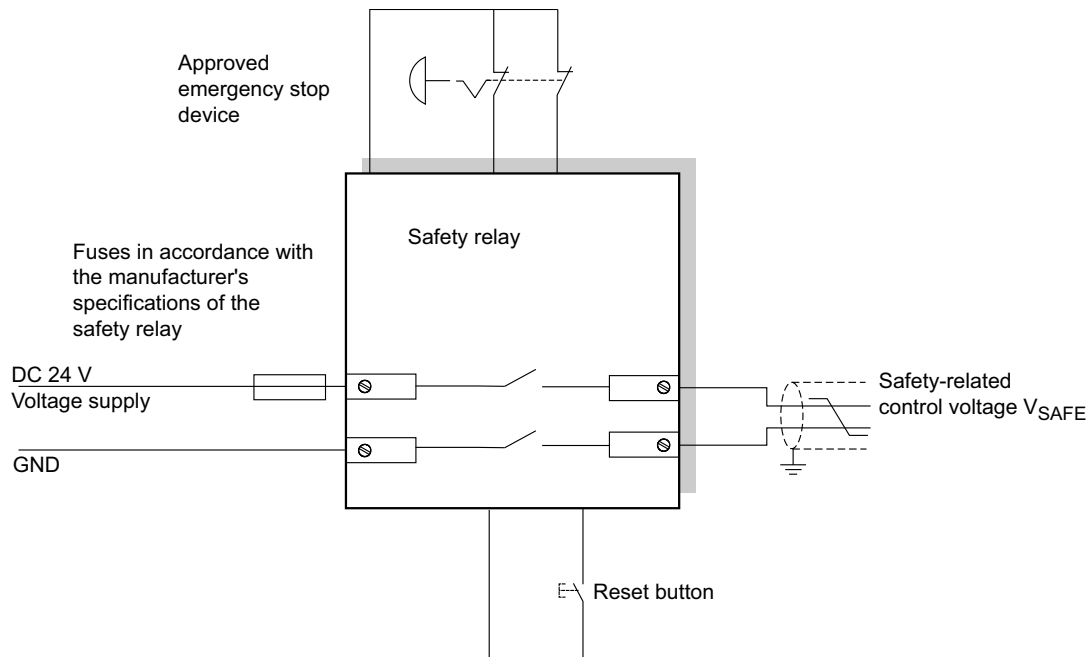
- The input of the safety-relevant control voltage  $V_{SAFE}$  of the safety-relevant BST brake module (terminal 5/6) is equipped with a serial polarity protection diode and a buffer capacitor with  $C = 6 \mu F$ . This must be considered as load when dimensioning the switching output.
- When switching off the BST with tested safe outputs, the switch-off test pulses must not exceed 1 ms. The next pulse blanking cannot reoccur earlier than after 20 ms.

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

#### 4.3.1 Sample circuit for a "safety relay"

The following figure shows the basic connection of an external safety relay (according to the before mentioned requirements).

Observe the information in the respective manufacturer's data sheets for connection.



18014398653823627

#### 4.4 Requirements on startup

- You must document startup and verify the safety functions. Observe the limitations for the safety functions of the BST in chapter "Limitations" for the verification of the safety functions. Non-safety-relevant parts and components that affect the result of the verification test (e.g. brake ramp of a frequency inverter) must be deactivated, if necessary.
- For using the BST brake module in safety-relevant applications, it is essential that you perform and record startup checks for the disconnecting device and correct wiring.
- During the startup procedure/function test, the correct assignment of the respective voltage supply connection must be checked by means of a measurement.
  - Safety-related control voltage  $V_{SAFE}$ : Terminal 5/6
  - Functional control voltage  $V_{IN}$ : Terminal 3/4
- The function check must be carried out separately for all potentials.
- Observe the notes in the "Startup" chapter.

#### 4.5 Requirements on the operation

- Operation is only allowed within the limits specified in the data sheets. This applies to both the external safety relay as well as the BST.
- You must check the safety functions on a regular basis to ensure proper functioning. The test intervals should be specified in accordance with the risk assessment.
- Also observe the information in the "Inspection/Maintenance" chapter.

5 Unit design

5.1 Nameplate and type designation

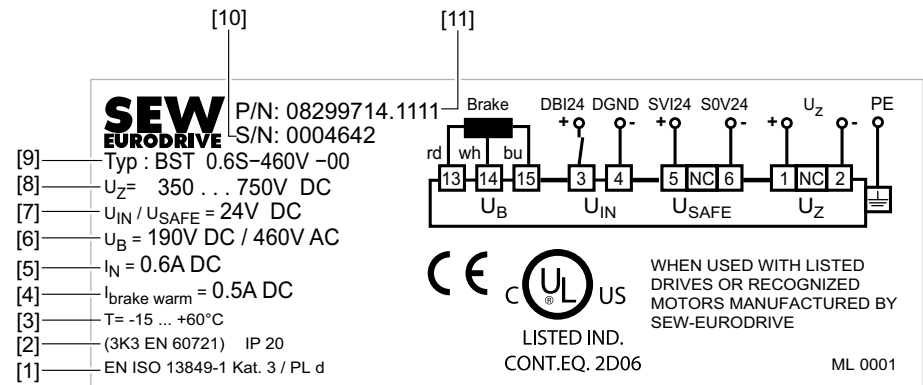
5.1.1 Example: Type designation

The type designation comprises the following characteristic unit data:

Example: BST 0.6S-460V-00		
Series	BST	Brake module
Nominal output current	0.6	<div><div>• 0.6 = DC 0.6 A</div><div>• 0.7 = DC 0.7 A</div><div>• 1.2 = DC 1.2 A</div></div>
Design	S	S = Control cabinet module
Brake voltage	460 V	<div><div>• 460 V = AC 460 V (DC 190 V)</div><div>• 400 V = AC 400 V (DC 167 V)</div><div>• 230 V = AC 230 V (DC 96 V)</div></div>
Version/variant	00	-

5.1.2 Example: Nameplate

The following figure shows a nameplate of BST 0.6S-460V-00:



27021597907135499

- [1]

Characteristic safety value
- [2]

Degree of protection (IP)
- [3]

Ambient temperature (T)
- [4]

Output current ( $I_{\text{brake warm}}$ ) in warm condition
- [5]

Nominal output current ( $I_N$ )
- [6]

Brake voltage ( $V_B$ )
- [7]

Functional control voltage ( $V_{IN}$ ) and safety-related control voltage ( $V_{SAFE}$ )
- [8]

DC link voltage ( $V_{DC \text{ link}}$ )
- [9]

Type designation
- [10]

Serial number (S/N)
- [11]

Part number P/N (in this case: 08299714) and version (in this case: 1111)



CE mark to state compliance with European guidelines, such as the Low Voltage Directive



UL logo to confirm that the component is UL (Underwriters Laboratory) tested, also valid for CSA in conjunction with register number 2D06 The UL approval is valid for the operation of the BST on approved units (e.g. frequency inverters) or drives of SEW-EURODRIVE.

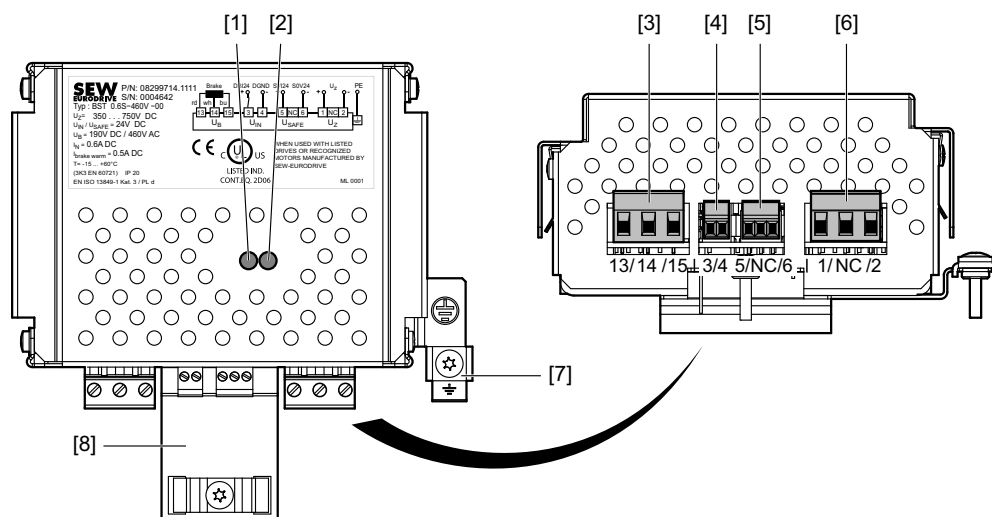
## 5.2 Scope of delivery of BST

The scope of delivery includes:

- Safety-related BST brake module with installed holding fixture for mounting rail installation.
- 4 attached plug connectors for terminal connections

## 5.3 Safety-related BST brake module

The following figure shows the unit design of BST x.xS-xxxV-00:



18014398652354443

- [1] LED V1 for indicating the operating state
- [2] LED V2 for indicating the operating state
- [3] Terminals 13/14/15: Brake connection
- [4] Terminals 3/4: For connecting the functional control voltage  $V_{IN}$
- [5] Terminals 5/6: For connecting the safety-related control voltage  $V_{SAFE}$
- [6] Terminals 1/2: For DC link voltage  $V_{DC \text{ link}}$
- [7] PE connection
- [8] Retaining plate / shield plate

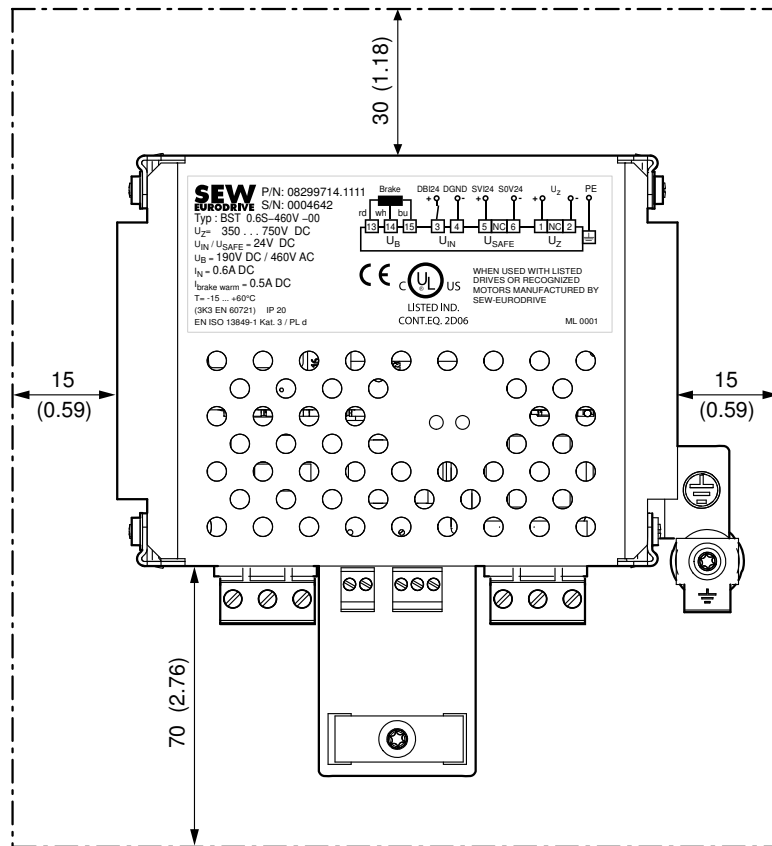
## 5.4 Terminal assignment

Terminal		Function
1	+V <sub>DC link</sub>	Input DC link voltage connection V <sub>DC link</sub>
2	-V <sub>DC link</sub>	
5	SVI24	Safety-related control voltage V <sub>SAFE</sub> input
6	S0V24	Reference potential for safety-related control voltage V <sub>SAFE</sub>
3	DBI24	Functional control voltage V <sub>IN</sub> input
4	DGND	Reference potential for functional control voltage V <sub>IN</sub>
13	RD	Brake output
14	WH	
15	BU	
⏏		Ground connection

## 6 Mechanical installation

### 6.1 Minimum clearance and mounting position

- Leave 30 mm clearance at the top, 70 mm at the bottom and 15 mm at the sides for optimum cooling. Make sure air circulation in the clearance is not impaired by cables or other installation equipment.
- The units must not be exposed to the warm exhaust air from other devices.
- Install the units vertically only. Do not install the units horizontally, tilted or upside down.

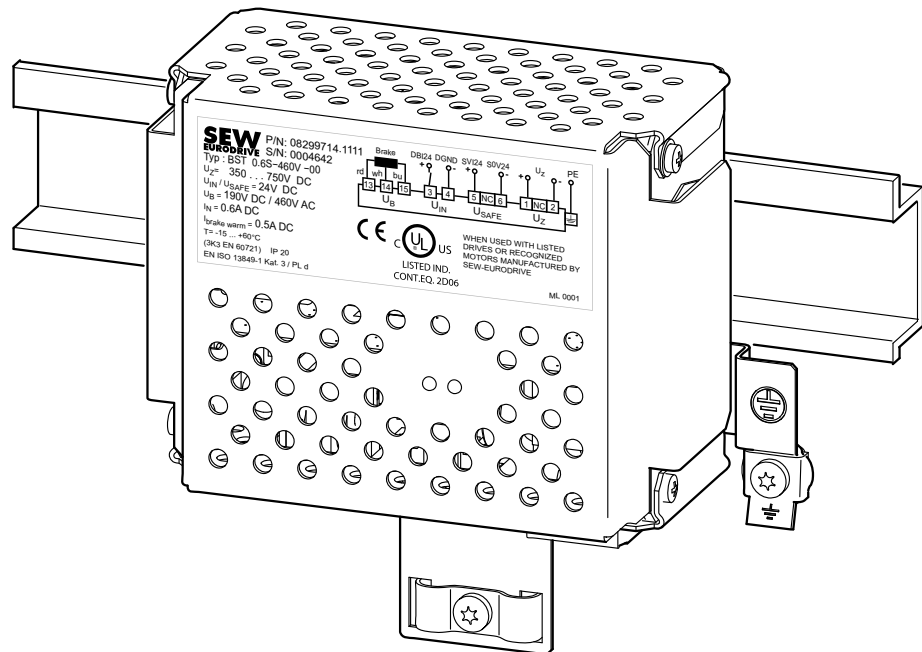


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All dimensions in mm (in).

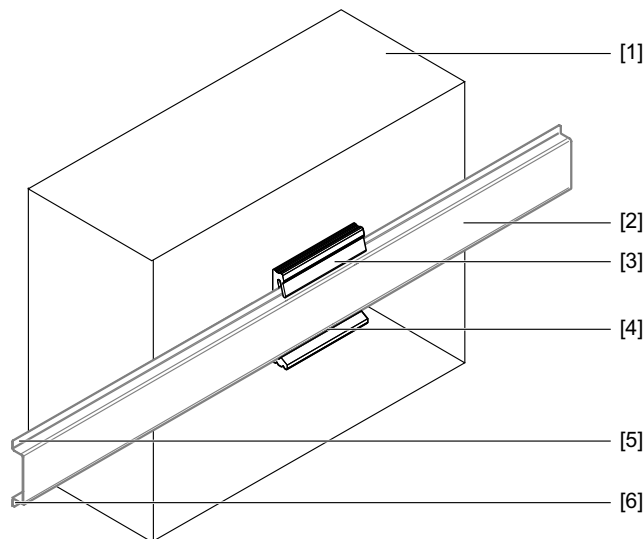
### 6.2 Mounting the BST brake module on a mounting rail

The BST module is mounted onto a mounting rail in the control cabinet.



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Proceed as follows to mount the BST brake module to the mounting rail:



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- |                                      |   |
|--------------------------------------|---|
| [1] Safety-related BST brake module  | [4] Notch, lower holding fixture of the BST |
| [2] Mounting rail                    | [5] Upper mounting rail edge                |
| [3] Upper holding fixture of the BST | [6] Lower mounting rail edge                |

1. The upper holding fixture of the BST [3] is spring-loaded. First, insert the BST into the upper mounting rail edge [5] with the upper holding fixture only.
2. Next, press the BST downward towards the mounting rail until the notch [4] clicks into place on the lower mounting rail edge [6].

The spring at the upper holding fixture causes the lower mounting rail edge to be pressed into the notch so that the BST [1] is secured onto the mounting rail [2].

### **6.3 Removing the BST brake module from a mounting rail**

Proceed as follows to remove the BST brake module from the mounting rail:

1. Press onto the BST from the top. This causes the lower mounting rail edge [6] to come off the notch [4]. At the same time, remove the BST from the lower holding fixture.
2. You can remove the BST from the mounting rail once the lower lock unfastens.



## 7 Electrical installation

### INFORMATION



- The safety-related BST brake module cannot be operated with sine-shaped power regeneration.
- All poles must be disconnected from the supply system when work is carried out on the electrical section of the system. Dangerous voltages may still be present for up to 10 minutes after disconnection from the supply system.

### 7.1 Information on electrical installation

#### 7.1.1 Supply cable (terminal 1/2)

The supply cable must meet the following conditions:

- The supply cables to the BST carry a high DC voltage (max. DC 970 V). The nominal voltage of the cable must amount to at least  $V_0/V = 300 \text{ V} / 500 \text{ V}$  (in accordance with DIN VDE 0298).

#### NOTICE



Incorrect connection of the supply cable (DC link connection  $+V_z$  and  $-V_z$  at terminal 1/2) to the BST brake module.

BST brake module may be destroyed.

- Ensure correct connection of the supply cable (DC link connection  $+V_z$  and  $-V_z$  at terminal 1/2) to the BST brake module.
- The external voltage supply or the inverter supply system must have a grounded star point (TT/TN). The operation is not permitted for IT systems or systems grounded via an outer conductor.
- Cable cross section:  $0.75 \text{ mm}^2 - 2.5 \text{ mm}^2$  (AWG 19 – AWG 13)
- Max. cable length: 100 m (328 ft)
- Min. tightening torque: 0.5 Nm
- When several BST are connected to one DC link, the input power of the inverter must be taken into account.
- All poles of the supply cable / external voltage supply must be protected with 2 corresponding DC fuses F1/F2 (recommended 1000 V/4 A).

#### 7.1.2 Functional control cable (terminal 3/4)

The functional control cable must meet the following conditions:

- Cable cross section of  $0.5 \text{ mm}^2 - 1.5 \text{ mm}^2$  (AWG 20 – AWG 16)
- Max. cable length: 100 m (328 ft)
- Min. tightening torque: 0.22 Nm

#### 7.1.3 Safety-related control cable (terminal 5/6)

The safety-related control cable must meet the following conditions:

- Cable cross section of  $0.5 \text{ mm}^2 - 1.5 \text{ mm}^2$  (AWG 20 – AWG 16)

- Max. cable length: 100 m (328 ft)
- Min. tightening torque: 0.22 Nm

## 7.1.4 Brake cable (terminal 13/14/15)

The brake cable must meet the following conditions:

- Cable cross section of  $0.75 \text{ mm}^2 - 2.5 \text{ mm}^2$  (AWG 19 – AWG 13)
- Max. cable length: 200 m (656 ft)
- Min. tightening torque: 0.5 Nm

### NOTICE



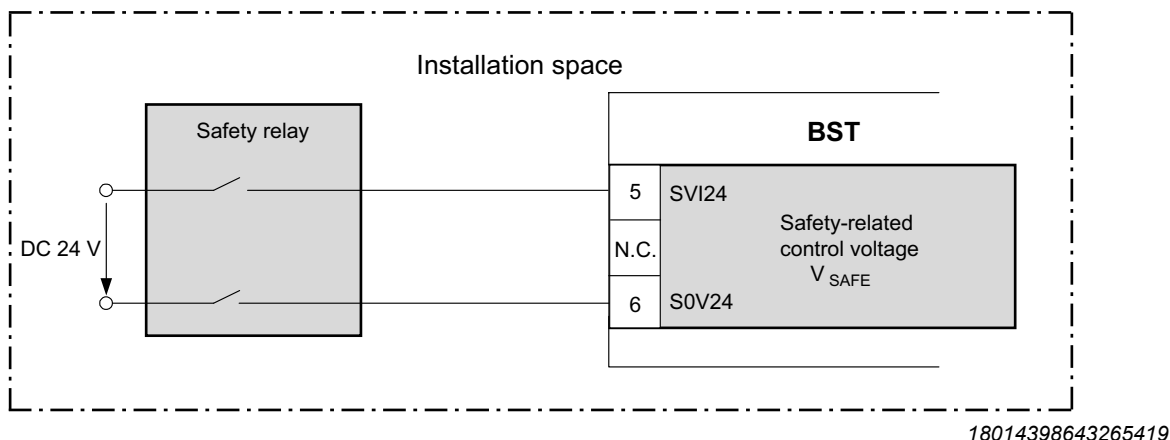
Incorrect connection of the brake cable (terminal 13/14/15) to the BST brake module.

Possible failure of the BST brake module resulting in the destruction of the connected inverter.

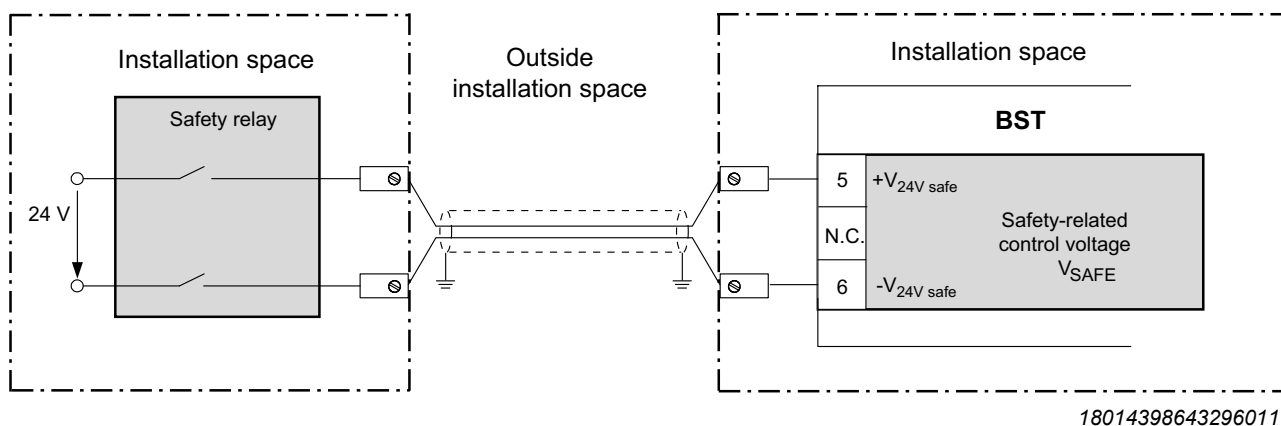
- Ensure correct connection of the brake cable (terminal 13/14/15) to the BST brake module.

## 7.2 Double-pole safe disconnection

The following figure shows the wiring inside the installation space:

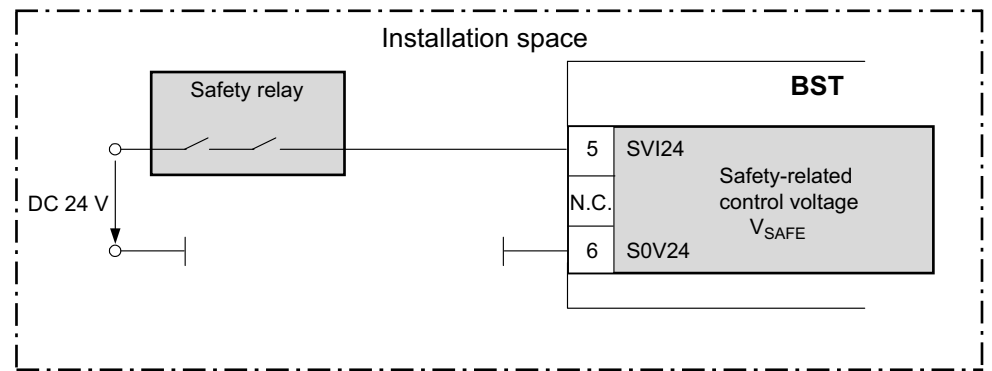


The following figure shows the wiring outside the installation space:



### 7.3 Single-pole safe disconnection

The following figure shows the wiring inside the installation space:



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### INFORMATION



Safe single-pole disconnection is only permitted when short circuits in the safety-relevant control cable between safety relay and BST can be ruled out (fault elimination according to EN ISO 13849-2).

SEW-EURODRIVE recommends bipolar disconnection.

## 8 Startup

### 8.1 Operating states

- The brake is activated with the functional control voltage  $V_{IN}$  when the DC link voltage  $V_{DC\ link}$  and the safety-relevant control voltage  $V_{SAFE}$  are present (brake released).
- If the safety-related control voltage  $V_{SAFE}$  is disconnected, the brake is safely de-energized (**SBC**).
- If the DC link voltage  $V_{DC\ link}$  is disconnected, the brake is de-energized.

The brake is released with high-speed excitation. Rapid brake application (DC and AC switch-off) occurs when it is controlled using the  $V_{IN}$  functional control voltage or the  $V_{SAFE}$  safety-related control voltage.

The response time for releasing and applying the brake results from the response time of the BST  $t_R \leq 6\ ms$  and the response or application time of the brake connected. For information on response or application times, refer to the applicable operating instructions for motors.

### INFORMATION



Fast disconnection (cut-off in the DC circuit) of the brake by the BST module is not part of the safety function (SBC). The brake application time for cut-off in the AC circuit must be consulted.

#### 8.1.1 Operating state display

LEDs V1 and V2 indicate the operating state of the control inputs. The LED display is independent of the DC link voltage  $V_{DC\ link}$ .

- LED V1: State of the safety-related control voltage  $V_{SAFE}$ .
- LED V2: State of the brake when the functional control voltage  $V_{IN}$  is present.

LED V1	LED V2	$V_{SAFE}$	$V_{IN}$	$V_Z$	State of the brake
Off	Off	Off	Off	Off	Off, brake applied (de-energized)
Off	Off	Off	Off	On	Off, brake applied (de-energized)
Off	Green light	Off	On	Off	Off, brake applied (de-energized)
Off	Green light	Off	On	On	Off, brake applied (de-energized)
Lights up orange	Off	On	Off	Off	Off, brake applied (de-energized)
Lights up orange	Off	On	Off	On	Off, brake applied (de-energized)
Lights up orange	Green light	On	On	Off	Off, brake applied (de-energized)
Lights up orange	Green light	On	On	On	On, brake released (energized)

### INFORMATION



- The states of LED V1 and LED V2 must not be regarded as safety-relevant.
- The fact that the LED V1 and LED V2 are no longer illuminated does not indicate that the safety-related BST brake module is de-energized and the brake is applied.
- Even if LED V1 and LED V2 are not illuminated, DC link voltage  $V_{DC\ link}$  might be present at the BST brake module.

## 8.2 Control of the brake module

### NOTICE

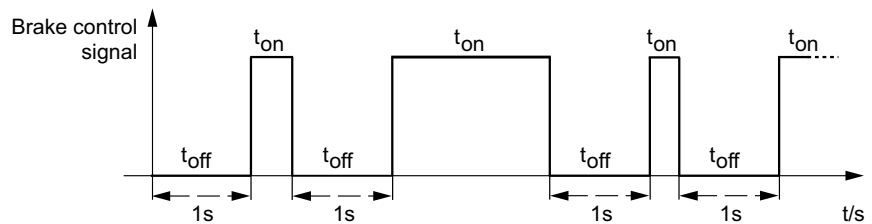


The brake module might be damaged if required off periods are not adhered to.  
Damage to the drive system.

- Adhere to the required off periods for the brake module.

#### 8.2.1 Operating mode: Automatic mode

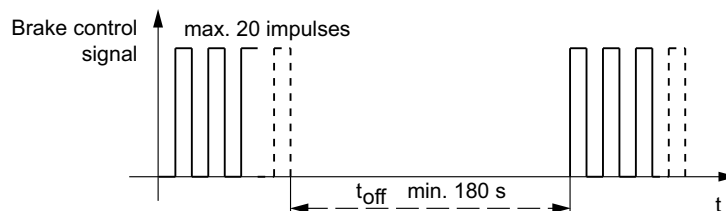
In automatic mode, with a brake coil power of  $P \geq 70 \text{ W}$ , you must ensure a timeout of at least 1 second after brake disconnection.



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#### 8.2.2 Operating mode: Setup mode or jog mode

In setup mode or jog mode, timeouts of less than 1 second are possible with a brake coil power of  $P > 70 \text{ W}$ . After 20 control pulses, a timeout of at least 3 minutes is mandatory in this case.



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## 9 Inspection/maintenance



### ▲ WARNING

Risk of crushing if the hoist falls.

Severe or fatal injuries.

- Secure or lower hoist drives (danger of falling)
- Isolate the inverter, the motor, and the brake from the power supply before starting work, safeguarding them against accidental startup.
- Only use genuine spare parts in accordance with the valid spare parts list.
- Always install a new brake control system at the same time as replacing the brake coil.
- Observe the notes in the operating instructions for AC motors and brakemotors.
- Only qualified personnel may perform maintenance for the brake.



### ▲ WARNING

There may still be dangerous voltages inside the unit and at the terminal strips for up to 10 minutes after the BST has been disconnected from the power supply.

Severe or fatal injuries from electric shock.

- Disconnect the BST from the power supply and ensure that the unit cannot be switched on unintentionally.
- Wait for 10 minutes before carrying out any maintenance or inspection work.
- Prior to maintenance or inspection work, make sure that the BST is de-energized.



### ▲ CAUTION

The surface of the safety-related BST brake module can be very hot during operation.

Risk of burns.

- Let the BST cool down before you start working on it.

### 9.1 Inspection and maintenance intervals

The required inspection/maintenance intervals must be calculated by the system manufacturer according to the specific project planning documents for individual applications, in accordance with the regionally valid standards.

### 9.2 Checking the brake function

The brake function must be checked according to the instructions of the system manufacturer after inspection/maintenance work.

### 9.3 Service

Have the following information available when you require assistance from the SEW-EURODRIVE service:

- Nameplate data (complete)
- Nature and extent of the problem
- Time the failure occurred and any accompanying circumstances
- Assumed cause

### 9.4 Replacing the unit

Proceed as follows to replace a BST:

- Observe the notes regarding inspection/maintenance work for the BST.
- **▲DANGER** There may still be dangerous voltages inside the unit and at the terminal strips for up to 10 minutes after the BST has been disconnected from the power supply.

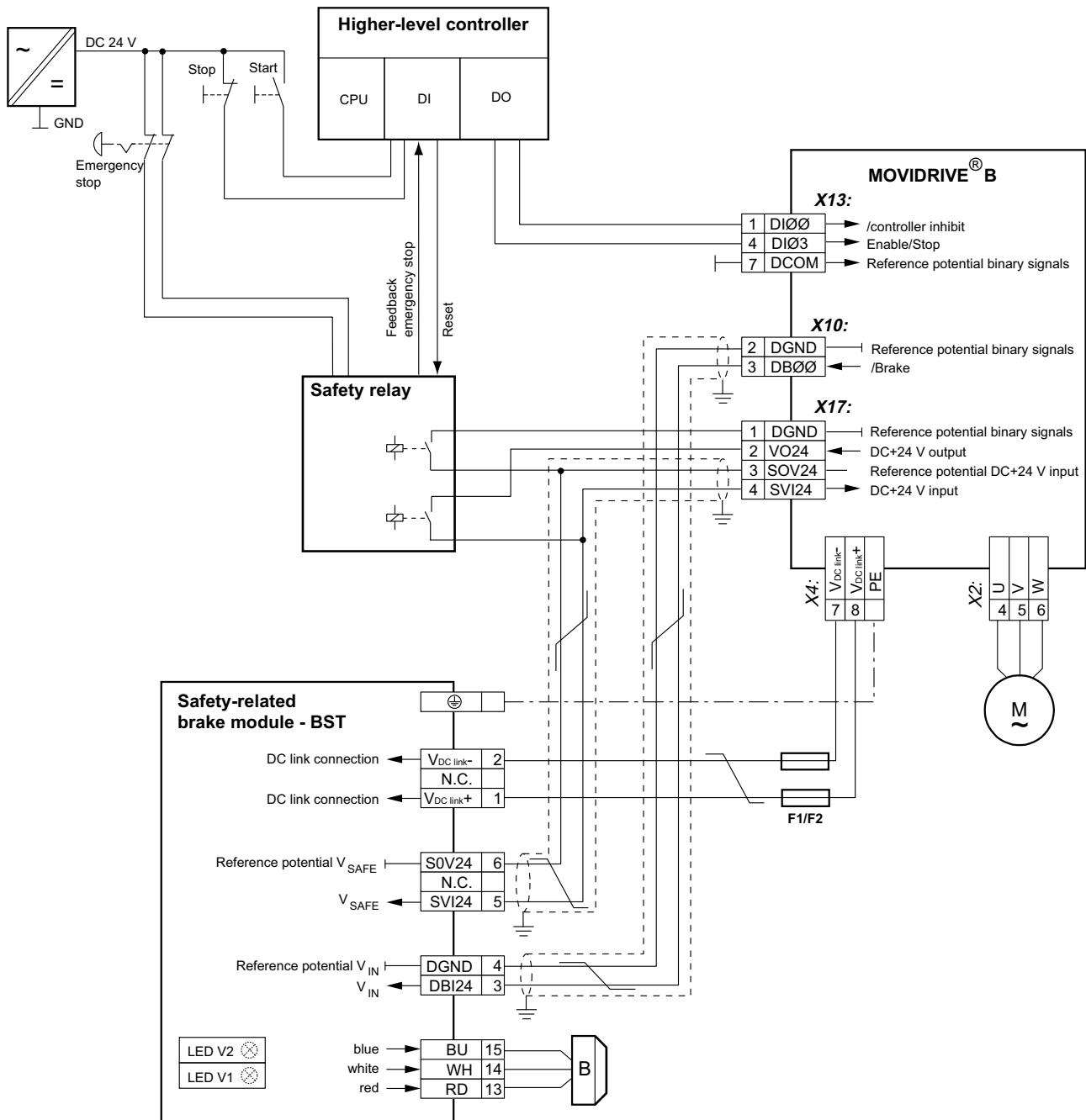
Severe or fatal injuries from electric shock.

- Disconnect the BST from the power supply and ensure that the unit cannot be switched on unintentionally.
- Wait for 10 minutes before carrying out any maintenance or inspection work.
- Prior to maintenance or inspection work, make sure that the BST is de-energized.
- Compare the data on the nameplate of the BST to be replaced with the new one.
- Remove all connecting terminals.
- Loosen the PE connection and the shield terminals and disconnect the respective connection cable.
- Push lightly on the opposite side of the connection terminals and remove the BST from the mounting rail.
- Install the new BST on the mounting rail. Observe chapter "Mechanical installation".
- Connect the connection cables to the PE connection and shield connection.
- Connect all terminals.

## 10 Applications

The following wiring diagrams show the wiring diagram of the SBC and STO (Safe Torque Off) safety function. For information on single-pole and double-pole safe disconnection, refer to chapter "Electrical installation".

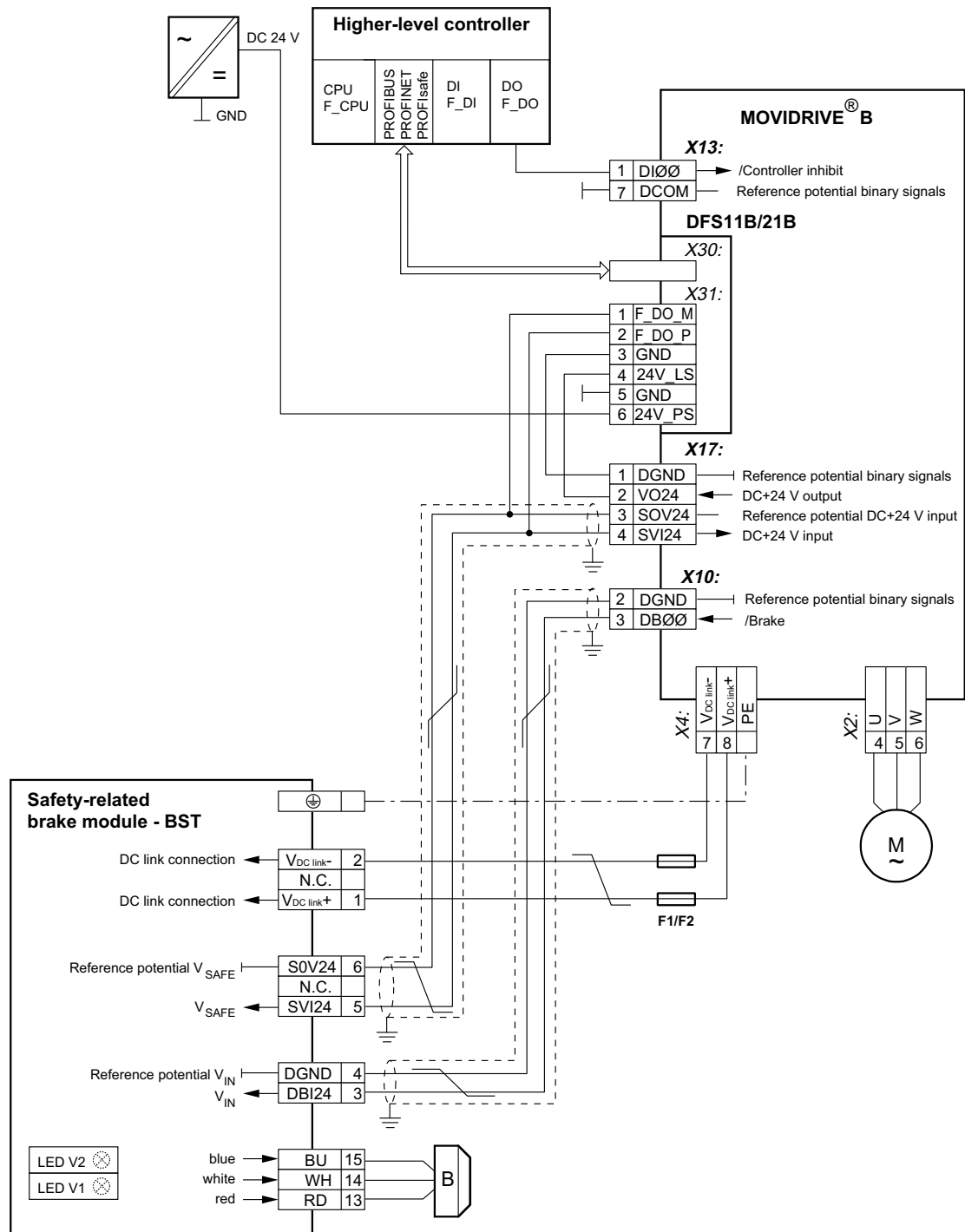
### 10.1 Single disconnection via inverter (example MOVIDRIVE® B)



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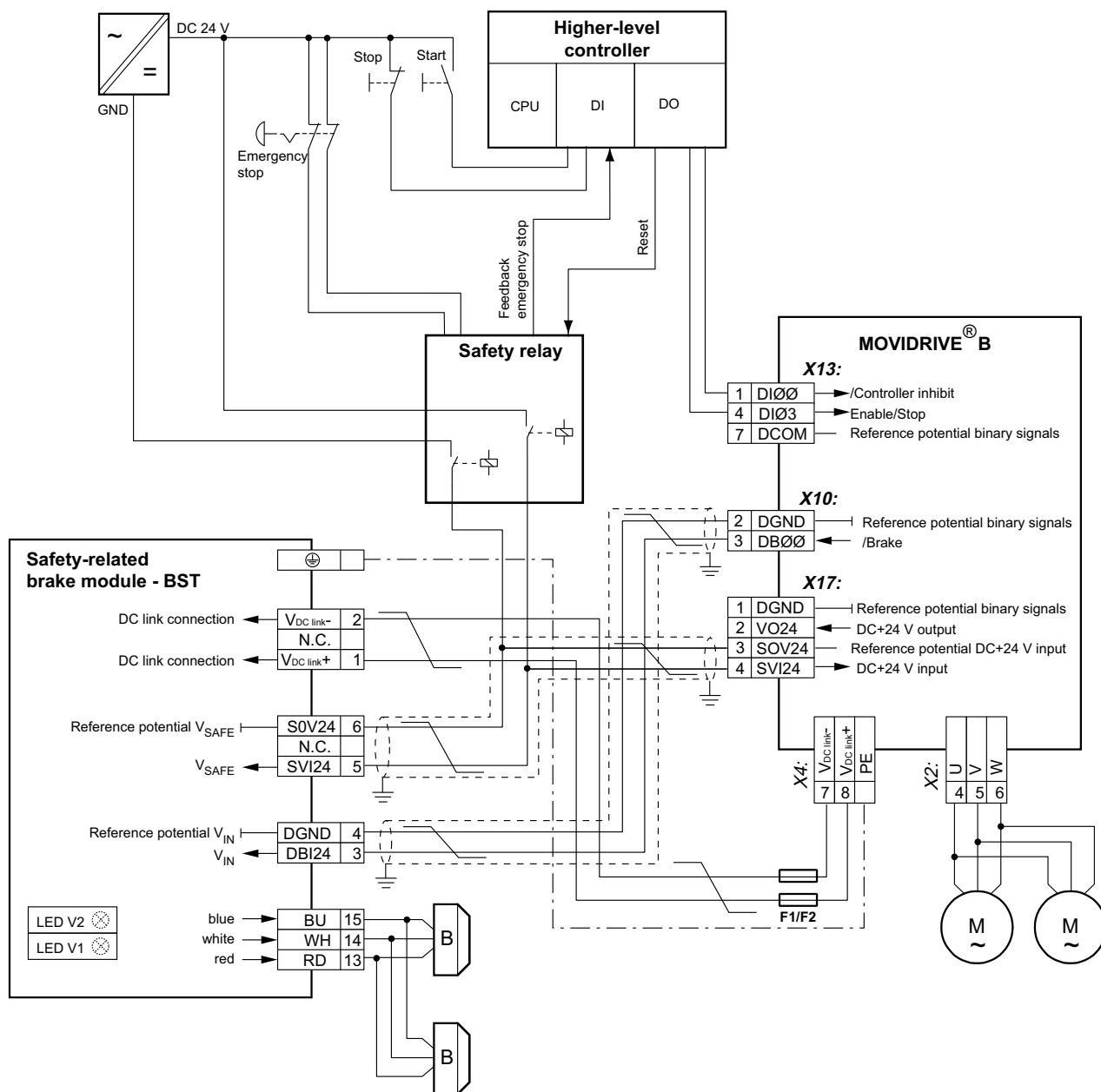


## 10.2 Disconnection of single drives via inverter and DFS11B/21B fieldbus interface



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## 10.3 Disconnection of group drives



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## 11 Technical data

### 11.1 General technical data

Brake module	BST 1.2S-230V-00	BST 0.7S-400V-00	BST 0.6S-460V-00
Part number	13001337	13000772	08299714
Interference immunity	According to EN 61800-3		
Interference emission with EMC-compliant installation	According to EN 61800-3		
Degree of protection	IP20		
Installation	On mounting rail in control cabinet (control cabinet must have at least degree of protection IP54)		
Ambient temperature T	-15 °C to +60 °C		
Installation altitude h	<ul style="list-style-type: none"> <li>Up to <math>h \leq 1000</math> m (3281 ft) without restrictions</li> <li>At <math>h &gt; 1000</math> m (3281 ft), the following restrictions apply: The BST brake module must be handled as auxiliary device and thus as a system component of the used inverter / external voltage supply. The restrictions of the used inverter / external voltage supply must be observed and the required measures must be implemented if necessary. An additional power reduction of the BST brake module as system component must not be taken into account.</li> </ul>		
Climate class	EN 60721-3-3, class 3K3		
DC link voltage / external voltage supply Terminal 1/2	DC 350 V – 750 V (briefly up to DC 970 V) (at $P_A \geq 95$ W at least DC 450 V)		
Power consumption $P_I$ terminal 1/2	150 W, depending on brake type (briefly: max. 800 W / 200 ms)		
Functional control voltage $V_{IN}$ Terminal 3/4	Signal level according to DIN EN 61131-2 type 1 DC +15 V to +30 V ( $> 2$ mA) → 1 / contact closed DC -3 V to +5 V ( $< 2$ mA) → 0 / contact open You must only use grounded voltage sources with safe disconnection (PELV) according to EN 60204-1 for the control input at terminals 3 and 4.		
Functional control current Terminal 3/4	$I > 20$ mA		
Brake voltage $V_B$ Terminal 13/15	DC 96 V	DC 167 V	DC 190 V
AC brake coil voltage	AC 230 V	AC 400 V	AC 460 V
Nominal output current $I_N$ Terminal 13/15	DC 1.2 A	DC 0.7 A	DC 0.6 A

Brake module		BST 1.2S-230V-00	BST 0.7S-400V-00	BST 0.6S-460V-00
Output current Terminal 13/15	$I_{\text{brake warm}}$	DC 1.0 A	DC 0.6 A	DC 0.5 A
		With $P_O = 120 \text{ W}$ , the nominal output current reduces in warm condition.		
Acceleration current Terminal 13/14	$I_B$	4 – 8.5 times the holding current depending on the brake type		
Max. output power	$P_O$	$P_O \leq 120 \text{ W}$ The brakes BM30, BM31, BM32, BM62 as well as BE30 and BE32 on the BST brake module have only a reduced power consumption of 120 W due to the controlled output voltage.		
Brake output Terminals 13/14/15		The figures relate to SEW standard brake coils (two-coil system) Holding coil: Terminal 13 <sub>red</sub> / 15 <sub>blue</sub> Accelerator coil: Terminal 13 <sub>red</sub> / 14 <sub>white</sub> Several brake coils can be connected for redundant systems. The sum of the individual power levels must not exceed the max. output power.		
Shutdown		Cut-off in the DC and AC circuits (rapid application of the brake)		
Supply cable Terminal 1/2	$V_Z$	Nominal voltage of the cable: min. $V_O/V = 300 \text{ V} / 500 \text{ V}$ (in accordance with DIN VDE 0298) Cable cross section: $0.75 \text{ mm}^2 - 2.5 \text{ mm}^2$ (AWG 19 – AWG 13) Max. cable length: 100 m (328 ft) Min. tightening torque: 0.5 Nm		
Functional control cable Terminal 3/4	$V_{IN}$	Cable cross section: $0.5 \text{ mm}^2 - 1.5 \text{ mm}^2$ (AWG 20 – AWG 16) Max. cable length: 100 m (328 ft) Min. tightening torque: 0.22 Nm		
Safety-related control cable Terminal 5/6	$V_{SAFE}$	Cable cross section: $0.5 \text{ mm}^2 - 1.5 \text{ mm}^2$ (AWG 20 – AWG 16) Max. cable length: 100 m (328 ft) Min. tightening torque: 0.22 Nm		
Brake cable Terminals 13/14/15		Cable cross section of $0.75 \text{ mm}^2 - 2.5 \text{ mm}^2$ (AWG 19 – AWG 13) Max. cable length: 200 m (656 ft) at min. $1.5 \text{ mm}^2$ (AWG 16) Min. tightening torque: 0.5 Nm		
PE connection		M4 screw Tightening torque: 1.6 Nm		
Power loss	$P_V$	Max. 30 W		
Storage temperature		-20 °C to +70 °C (EN 60721-3-3, class 3K3)		
Dimensions W × H × D		134 mm × 70 mm × 135 mm (5.28 in × 2.76 in × 5.31 in)		
Weight		approx. 0.79 kg (1.7 lb)		

## 11.2 Safety-related control voltage

The following table shows the technical data for safety-related control voltage  $V_{SAFE}$  at terminals 5/6:

Safety-related control voltage $V_{SAFE}$	Min.	Typical	Max.
Input voltage range according to DIN EN 61131-2 DC 24 V	DC 20.4 V	DC 24 V	DC 28.8 V
Input current			50 mA
Input capacitance		4.7 $\mu$ F	6 $\mu$ F
Switch-on/switch-off threshold		DC 10 V	
Input voltage for OFF state (brake de-energized)			DC 6 V
Duration from switching off the safety-related control voltage at BST until switching off the brake voltage $V_B$ plus the brake application time of the connected brake. <sup>1)</sup>			6 ms
Safety-related control cable			
• Cable length			100 m (328 ft)
• cable cross section	0.5 mm <sup>2</sup> (AWG 20)		1.5 mm <sup>2</sup> (AWG 16)

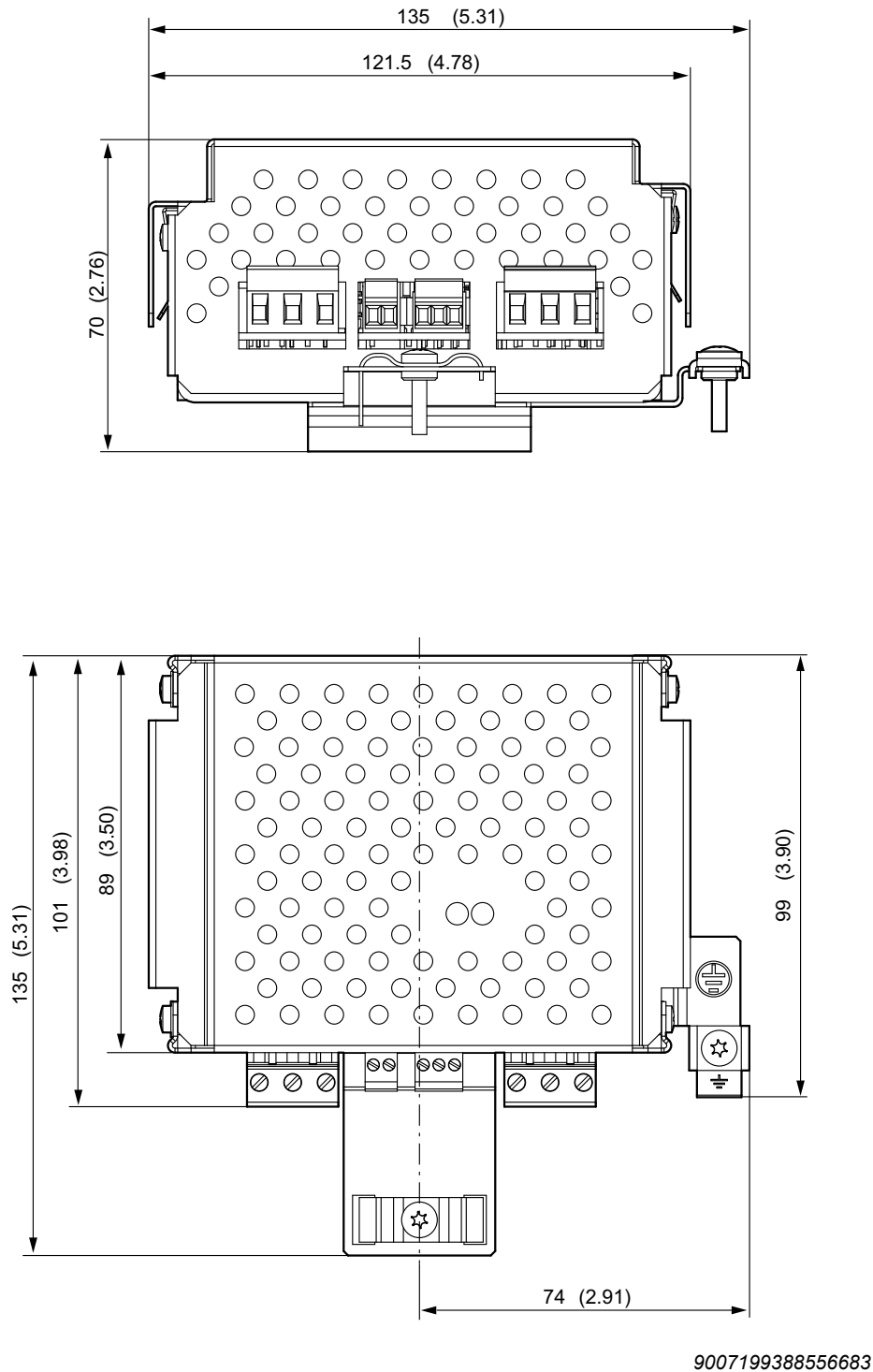
1) The brake application time for cut-off in the AC circuit must be used.

## 11.3 Safety characteristics of BST brake modules

	Characteristic values according to EN ISO 13849-1
Classification	PL d
System structure	Category 3
Probability of dangerous failure per hour (PFH value)	0 (fault exclusion)
Mission time / service life	20 years
Safe condition	Brake de-energized
Safety function	SBC (safe brake control) according to IEC 61800-5-2

### 11.4 Dimension drawing of BST in control cabinet design

The following figure shows the dimension drawings of BST in control cabinet design.  
All dimensions in mm (in).



## 12 Address list

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		SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 <a href="mailto:sc-elektronik@sew-eurodrive.de">sc-elektronik@sew-eurodrive.de</a>
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	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 <a href="mailto:sc-sued@sew-eurodrive.de">sc-sued@sew-eurodrive.de</a>
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		SEW-USOCOME Zone industrielle Technopôle Forbach Sud B. P. 30269 F-57604 Forbach Cedex	Tel. +33 3 87 29 38 00
Assembly Sales Service	Bordeaux	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
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	Nantes	SEW-USOCOME Parc d'activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20
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	Additional addresses for service in France provided on request.		
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	<b>Sydney</b>	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
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<b>Sales</b>	<b>Minsk</b>	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 17 298 47 56 / 298 47 58 Fax +375 17 298 47 54 http://www.sew.by sales@sew.by
Belgium			
<b>Assembly Sales Service</b>	<b>Brussels</b>	<b>SEW-EURODRIVE n.v./s.a.</b> Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be
<b>Service Competence Center</b>	<b>Industrial Gears</b>	<b>SEW-EURODRIVE n.v./s.a.</b> Rue de Parc Industriel, 31 BE-6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-wallonie@sew-eurodrive.be
Brazil			
<b>Production Sales Service</b>	<b>São Paulo</b>	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 152 - Rodovia Presidente Dutra Km 208 Guarulhos - 07251-250 - SP SAT - SEW ATENDE - 0800 7700496	Tel. +55 11 2489-9133 Fax +55 11 2480-3328 http://www.sew-eurodrive.com.br sew@sew.com.br
<b>Assembly Sales Service</b>	<b>Rio Claro</b>	SEW-EURODRIVE Brasil Ltda. Rodovia Washington Luiz, Km 172 Condomínio Industrial Conpark Caixa Postal: 327 13501-600 – Rio Claro / SP	Tel. +55 19 3522-3100 Fax +55 19 3524-6653 montadora.rc@sew.com.br
	<b>Joinville</b>	SEW-EURODRIVE Brasil Ltda. Rua Dona Francisca, 12.346 – Pirabeiraba 89239-270 – Joinville / SC	Tel. +55 47 3027-6886 Fax +55 47 3027-6888 filial.sc@sew.com.br
	<b>Indaiatuba</b>	SEW-EURODRIVE Brasil Ltda. Estrada Municipal Jose Rubim, 205 Rodovia Santos Dumont Km 49 13347-510 - Indaiatuba / SP	Tel. +55 19 3835-8000 sew@sew.com.br
Bulgaria			
<b>Sales</b>	<b>Sofia</b>	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@bever.bg
Cameroon			
<b>Sales</b>	<b>Douala</b>	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 33 431137 Fax +237 33 431137 electrojembra@yahoo.fr



Canada			
Assembly Sales Service	Toronto	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, ON L6T 3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 <a href="http://www.sew-eurodrive.ca">http://www.sew-eurodrive.ca</a> <a href="mailto:l.watson@sew-eurodrive.ca">l.watson@sew-eurodrive.ca</a>
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. Tilbury Industrial Park 7188 Honeyman Street Delta, BC V4G 1G1	Tel. +1 604 946-5535 Fax +1 604 946-2513 <a href="mailto:b.wake@sew-eurodrive.ca">b.wake@sew-eurodrive.ca</a>
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Lasalle, PQ H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 <a href="mailto:a.peluso@sew-eurodrive.ca">a.peluso@sew-eurodrive.ca</a>
	Additional addresses for service in Canada provided on request.		
Chile			
Assembly Sales Service	Santiago	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 <a href="http://www.sew-eurodrive.cl">http://www.sew-eurodrive.cl</a> <a href="mailto:ventas@sew-eurodrive.cl">ventas@sew-eurodrive.cl</a>
China			
Production Assembly Sales Service	Tianjin	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 <a href="mailto:info@sew-eurodrive.cn">info@sew-eurodrive.cn</a> <a href="http://www.sew-eurodrive.cn">http://www.sew-eurodrive.cn</a>
Assembly Sales Service	Suzhou	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 <a href="mailto:suzhou@sew-eurodrive.cn">suzhou@sew-eurodrive.cn</a>
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267922 <a href="mailto:guangzhou@sew-eurodrive.cn">guangzhou@sew-eurodrive.cn</a>
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 <a href="mailto:shenyang@sew-eurodrive.cn">shenyang@sew-eurodrive.cn</a>
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478388 Fax +86 27 84478389 <a href="mailto:wuhan@sew-eurodrive.cn">wuhan@sew-eurodrive.cn</a>
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 <a href="mailto:xian@sew-eurodrive.cn">xian@sew-eurodrive.cn</a>
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Croatia			
Sales Service	Zagreb	KOMPEKS d. o. o. Zeleni dol 10 HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 <a href="mailto:kompeks@inet.hr">kompeks@inet.hr</a>
Czech Republic			
Sales Assembly Service	Hostivice	SEW-EURODRIVE CZ s.r.o. Floriánova 2459 253 01 Hostivice	Tel. +420 255 709 601 Fax +420 235 350 613 <a href="http://www.sew-eurodrive.cz">http://www.sew-eurodrive.cz</a> <a href="mailto:sew@sew-eurodrive.cz">sew@sew-eurodrive.cz</a>

Czech Republic			
		<b>Drive Service Hot-line / 24 Hour Service</b>	<b>HOT-LINE +420 800 739 739 (800 SEW SEW)</b> <b>Servis:</b> Tel. +420 255 709 632 Fax +420 235 358 218 servis@sew-eurodrive.cz
Denmark			
<b>Assembly Sales Service</b>	<b>Copenhagen</b>	SEW-EURODRIVE A/S Geminivej 28-30 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk
Egypt			
<b>Sales Service</b>	<b>Cairo</b>	Copam Egypt for Engineering & Agencies 33 El Hegaz ST, Heliopolis, Cairo	Tel. +20 2 22566-299 +1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg
Estonia			
<b>Sales</b>	<b>Tallin</b>	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee
Finland			
<b>Assembly Sales Service</b>	<b>Hollola</b>	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
<b>Service</b>	<b>Hollola</b>	SEW-EURODRIVE OY Keskikankaantie 21 FIN-15860 Hollola	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
<b>Production Assembly</b>	<b>Karkkila</b>	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi
Gabon			
<b>Sales</b>	<b>Libreville</b>	ESG Electro Services Gabun Feu Rouge Lalala 1889 Libreville Gabun	Tel. +241 741059 Fax +241 741059 esg_services@yahoo.fr
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<b>Assembly Sales Service</b>	<b>Normanton</b>	SEW-EURODRIVE Ltd. DeVilliers Way Trident Park Normanton West Yorkshire WF6 1GX	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
		<b>Drive Service Hotline / 24 Hour Service</b>	Tel. 01924 896911
Greece			
<b>Sales</b>	<b>Athens</b>	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr
Hong Kong			
<b>Assembly Sales Service</b>	<b>Hong Kong</b>	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk

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<b>India</b>			
<b>Registered Office Assembly Sales Service</b>	<b>Vadodara</b>	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200, +91 265 2831086 Fax +91 265 3045300, +91 265 2831087 <a href="http://www.seweurodriveindia.com">http://www.seweurodriveindia.com</a> <a href="mailto:salesvadodara@seweurodriveindia.com">salesvadodara@seweurodriveindia.com</a>
<b>Assembly Sales Service</b>	<b>Chennai</b>	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 <a href="mailto:saleschennai@seweurodriveindia.com">saleschennai@seweurodriveindia.com</a>
<b>Ireland</b>			
<b>Sales Service</b>	<b>Dublin</b>	Alpertor Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 <a href="mailto:info@alperton.ie">info@alperton.ie</a> <a href="http://www.alperton.ie">http://www.alperton.ie</a>
<b>Israel</b>			
<b>Sales</b>	<b>Tel-Aviv</b>	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 <a href="http://www.liraz-handasa.co.il">http://www.liraz-handasa.co.il</a> <a href="mailto:office@liraz-handasa.co.il">office@liraz-handasa.co.il</a>
<b>Italy</b>			
<b>Assembly Sales Service</b>	<b>Solaro</b>	SEW-EURODRIVE di R. Blicke & Co.s.a.s. Via Bernini, 14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 980 999 <a href="http://www.sew-eurodrive.it">http://www.sew-eurodrive.it</a> <a href="mailto:sewit@sew-eurodrive.it">sewit@sew-eurodrive.it</a>
<b>Ivory Coast</b>			
<b>Sales</b>	<b>Abidjan</b>	SICA Société Industrielle & Commerciale pour l'Afrique 165, Boulevard de Marseille 26 BP 1173 Abidjan 26	Tel. +225 21 25 79 44 Fax +225 21 25 88 28 <a href="mailto:sicamot@aviso.ci">sicamot@aviso.ci</a>
<b>Japan</b>			
<b>Assembly Sales Service</b>	<b>Iwata</b>	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373855 <a href="http://www.sew-eurodrive.co.jp">http://www.sew-eurodrive.co.jp</a> <a href="mailto:sewjapan@sew-eurodrive.co.jp">sewjapan@sew-eurodrive.co.jp</a>
<b>Kazakhstan</b>			
<b>Sales</b>	<b>Almaty</b>	TOO "СЕВ-ЕВРОДРАЙВ" пр.Райымбека, 348 050061 г. Алматы Республика Казахстан	Тел. +7 (727) 334 1880 Факс +7 (727) 334 1881 <a href="http://www.sew-eurodrive.kz">http://www.sew-eurodrive.kz</a> <a href="mailto:sew@sew-eurodrive.kz">sew@sew-eurodrive.kz</a>
<b>Kenya</b>			
<b>Sales</b>	<b>Nairobi</b>	Barico Maintenances Ltd Kamutaga Place Commercial Street Industrial Area P.O.BOX 52217 - 00200 Nairobi	Tel. +254 20 6537094/5 Fax +254 20 6537096 <a href="mailto:info@barico.co.ke">info@barico.co.ke</a>
<b>Latvia</b>			
<b>Sales</b>	<b>Riga</b>	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 <a href="http://www.alas-kuul.com">http://www.alas-kuul.com</a> <a href="mailto:info@alas-kuul.com">info@alas-kuul.com</a>

Lebanon			
<b>Sales Lebanon</b>	<b>Beirut</b>	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut After Sales Service	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb service@medrives.com
<b>Sales Jordan / Kuwait / Saudi Arabia / Syria</b>	<b>Beirut</b>	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut After Sales Service	Tel. +961 1 494 786 Fax +961 1 494 971 info@medrives.com http://www.medrives.com service@medrives.com
Lithuania			
<b>Sales</b>	<b>Alytus</b>	UAB Irseva Statybininku 106C LT-63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 irmantas@irseva.lt http://www.sew-eurodrive.lt
Luxembourg			
<b>Assembly Sales Service</b>	<b>Brussels</b>	<b>SEW-EURODRIVE n.v./s.a.</b> Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.lu info@sew-eurodrive.be
Madagascar			
<b>Sales</b>	<b>Antananarivo</b>	Ocean Trade BP21bis. Andraharo Antananarivo. 101 Madagascar	Tel. +261 20 2330303 Fax +261 20 2330330 oceantrabp@moov.mg
Malaysia			
<b>Assembly Sales Service</b>	<b>Johor</b>	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my
Mexico			
<b>Assembly Sales Service</b>	<b>Quéretaro</b>	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Mongolia			
<b>Sales</b>	<b>Ulan Bator</b>	SEW-EURODRIVE Representative Office Mongolia Olympic street 8, 2nd floor Juulchin corp bldg., Sukhbaatar district, Ulaanbaatar 14253	Tel. +976-70009997 Fax +976-70009997 http://www.sew-eurodrive.mn sew@sew-eurodrive.mn
Morocco			
<b>Sales Service</b>	<b>Mohammedia</b>	SEW-EURODRIVE SARL 2 bis, Rue Al Jahid 28810 Mohammedia	Tel. +212 523 32 27 80/81 Fax +212 523 32 27 89 sew@sew-eurodrive.ma http://www.sew-eurodrive.ma
Namibia			
<b>Sales</b>	<b>Swakopmund</b>	DB Mining & Industrial Services Einstein Street Strauss Industrial Park Unit1 Swakopmund	Tel. +264 64 462 738 Fax +264 64 462 734 sales@dbmining.in.na

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<b>Assembly Sales Service</b>	<b>Rotterdam</b>	SEW-EURODRIVE B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 Service: 0800-SEWHELP <a href="http://www.sew-eurodrive.nl">http://www.sew-eurodrive.nl</a> <a href="mailto:info@sew-eurodrive.nl">info@sew-eurodrive.nl</a>
New Zealand			
<b>Assembly Sales Service</b>	<b>Auckland</b>	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 <a href="http://www.sew-eurodrive.co.nz">http://www.sew-eurodrive.co.nz</a> <a href="mailto:sales@sew-eurodrive.co.nz">sales@sew-eurodrive.co.nz</a>
	<b>Christchurch</b>	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 <a href="mailto:sales@sew-eurodrive.co.nz">sales@sew-eurodrive.co.nz</a>
Nigeria			
<b>Sales</b>	<b>Lagos</b>	EISNL Engineering Solutions and Drives Ltd Plot 9, Block A, Ikeja Industrial Estate ( Ogba Scheme) Adeniyi Jones St. End Off ACME Road, Ogba, Ikeja, Lagos Nigeria	Tel. +234 (0)1 217 4332 <a href="mailto:team.sew@eisnl.com">team.sew@eisnl.com</a> <a href="http://www.eisnl.com">http://www.eisnl.com</a>
Norway			
<b>Assembly Sales Service</b>	<b>Moss</b>	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 <a href="http://www.sew-eurodrive.no">http://www.sew-eurodrive.no</a> <a href="mailto:sew@sew-eurodrive.no">sew@sew-eurodrive.no</a>
Pakistan			
<b>Sales</b>	<b>Karachi</b>	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 <a href="mailto:seweurodrive@cyber.net.pk">seweurodrive@cyber.net.pk</a>
Paraguay			
<b>Sales</b>	<b>Fernando de la Mora</b>	SEW-EURODRIVE PARAGUAY S.R.L De la Victoria 112, Esquina nueva Asunción Departamento Central Fernando de la Mora, Barrio Bernardino	Tel. +595 991 519695 Fax +595 21 3285539 <a href="mailto:sew-py@sew-eurodrive.com.py">sew-py@sew-eurodrive.com.py</a>
Peru			
<b>Assembly Sales Service</b>	<b>Lima</b>	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 <a href="http://www.sew-eurodrive.com.pe">http://www.sew-eurodrive.com.pe</a> <a href="mailto:sewperu@sew-eurodrive.com.pe">sewperu@sew-eurodrive.com.pe</a>
Poland			
<b>Assembly Sales Service</b>	<b>Lodz</b>	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 676 53 00 Fax +48 42 676 53 49 <a href="http://www.sew-eurodrive.pl">http://www.sew-eurodrive.pl</a> <a href="mailto:sew@sew-eurodrive.pl">sew@sew-eurodrive.pl</a>
	<b>Service</b>	Tel. +48 42 6765332 / 42 6765343 Fax +48 42 6765346	Linia serwisowa Hotline 24H Tel. +48 602 739 739 (+48 602 SEW SEW) <a href="mailto:serwis@sew-eurodrive.pl">serwis@sew-eurodrive.pl</a>
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<b>Assembly Sales Service</b>	<b>Coimbra</b>	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 <a href="http://www.sew-eurodrive.pt">http://www.sew-eurodrive.pt</a> <a href="mailto:infosew@sew-eurodrive.pt">infosew@sew-eurodrive.pt</a>

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<b>Senegal</b>			
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	<b>Banská Bystrica</b>	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
	<b>Košice</b>	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk
<b>Slovenia</b>			
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