

OPERATING INSTRUCTIONS

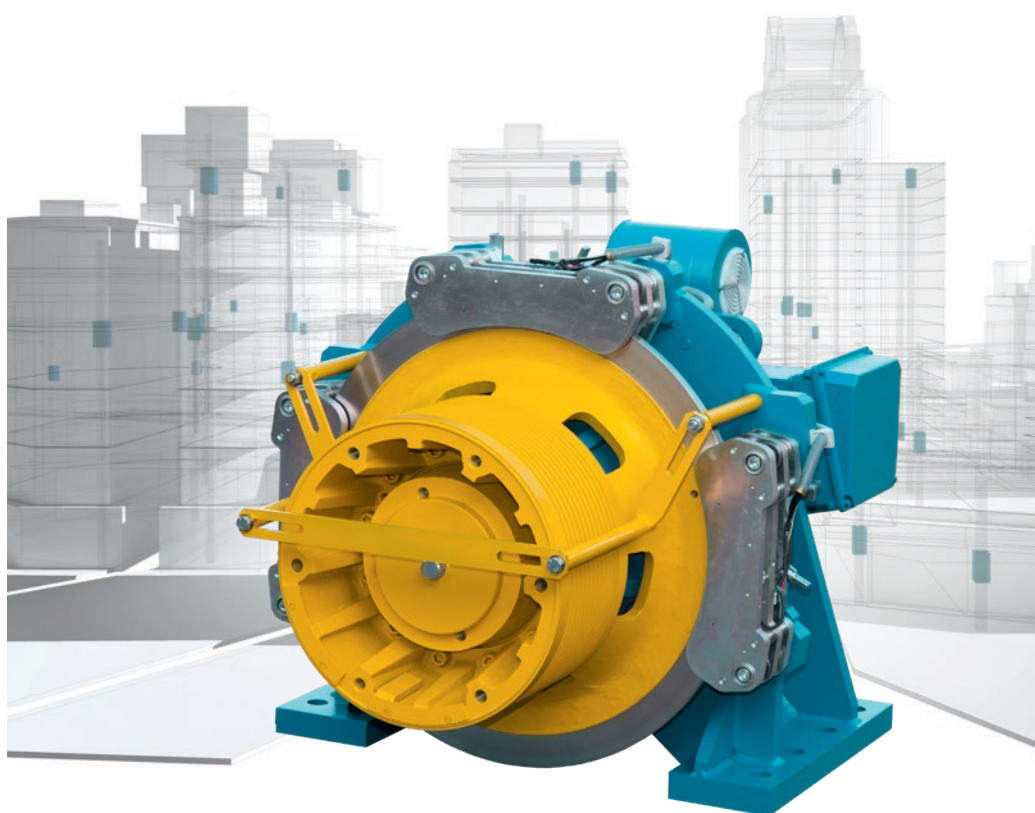
WSG-25

GEARLESS LIFT MACHINE

Code **GM.8.002673.EN**

Version **E11**

Date **12. Jul 2023**



Translation of the Original Operating Instructions

[Download the Operating Instructions](#)

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Gearless Lift Machine

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These operating instructions are applicable to lift machines:

WSG - 25.1-

WSG - 25.2-

date: 12. Jul 2023 version: E11

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Document history

Date	Version	Modifications
30. Apr 2019	0.13	Complete revision; supplement of individual check of brake functionality; installation of the remote control by Bowden cable for old and new systems
07. May 2019	0.13a	Several minor bug fixes
27. May 2019	0.14	Lever block (manual release) was extended by protection cover
15. Nov 2019	0.15	Danger if brake air gap is too large (measurement); Update when motors are stored for a long time
26. Mrz 2020	0.16	Sub item „Earthing, potential equalization, EMC“ added; further small corrections;
24. Jul 2020	0.17	Marking the brake initial position; revision chapter „Electrical Installation“
03. Mrz 2021	0.18	Dimensional drawings of brake control units added; brake control updated; accessories and spare parts added;
22. Mrz 2021	0.19	Minor bug fixes
25. Nov 2022	0.20	New EU Declaration of Conformity; chapter "Spare parts" - reference to new document "Spare part catalogue"; options for rope slip-off guard; Improvements to the brake connection; UKCA documents added; new layout
13. Jul 2023	E11	New EU Declaration of Conformity; minor bug fixes

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1. General information

1.1. About this operating manual

The purpose of this operating manual is to ensure that any work on WSG-25 lift machines is carried out safely. Please regard it as part of the product and keep it within easy reach.

All persons working on or with WSG-25 lift machines must have read and understood this operating manual.

1.2. Intended use

WSG-25 lift machines are intended for use as gearless drives for rope lifts and they must never be connected directly to the mains supply. They may only be used for their intended purpose and with all safety devices in proper working order. WSG-25 lift machines are intended for use in an enclosed, lockable operating area to which only qualified personnel and personnel authorised by the customer have access.

WSG-25 lift machines may only be operated under the conditions described in this manual and with due regard to their performance limits.

WSG-25 lift machines are not ready-to-use products; they may only be operated after they have been installed in lift systems and their safe operation has been ensured by taking the appropriate measures.

1.3. Scope of delivery

The WSG-25 lift machines are customised to meet individual requirements. The exact scope of delivery can be found in the accompanying documentation.

1.4. Warranty and liability

Our „Conditions of Sale and Delivery“ shall apply for all our supplies and services.

Any warranty claims must be made immediately upon discovery of the deficiency or defect.

We do not accept any warranty or liability claims for personal injury or property damage resulting from one or more of the following causes:

- Improper use of the WSG-25 lift machine
- Improper installation, commissioning, operation or maintenance
- Operation of the WSG-25 with defective and/or inoperative safety or protective devices
- Non-compliance with the instructions contained in the operating manual or other documentation supplied
- Unauthorised construction modifications to the WSG-25
- Insufficient monitoring of parts subject to wear
- Repairs carried out improperly
- Emergencies caused by external forces or force majeure.

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2. Safety

2.1. General safety instructions

2.1.1. Qualified personnel





Only qualified personnel are authorised to perform any planning, installation or maintenance work, and this must be done in accordance with the relevant instructions. The personnel must be trained for the job and must be familiar with the installation, assembly, commissioning and operation of the product.

2.1.2. Format of the safety instructions

The safety instructions contained in this operating manual are presented in a standardised format.

They comprise a danger symbol + signal word + instruction text. The danger symbol indicates the type of danger, the signal word specifies the severity of the danger, and the instruction text describes the danger and explains how to avoid it.

Danger symbols

	Risk of electric shock		Property damage
	General danger		Information

Signal words

- **DANGER** Serious injuries or death will result.
- **WARNING** Serious injuries or death may result.
- **CAUTION** Minor to moderate injuries may result.
- **NOTICE** Property damage may result.
- **Information** Points out useful information.

2.2. Safety precautions

- Check the proper functioning of the motor and the brake after installing the machine.
- Repairs may only be carried out by the manufacturer or an authorised repair agency. Unauthorised opening and tampering may result in injuries to persons and property.
- The machines are not designed for direct connection to the three-phase system but are to be operated via an electronic frequency inverter. Direct connection to the mains may damage the motor beyond repair.
- High surface temperatures may occur on the external parts of the machine. Therefore, no temperature-sensitive parts may be in contact with these parts or attached to them. Protection against accidental contact should be provided, if required.
- The EU type-examined fail-safe brakes provided are designed only for a limited number of emergency braking operations. They must not be used as working brakes.
- If the brake air gap exceeds the permissible value, the braking torque may be significantly reduced.
- If the motor is not energised, no torque is produced. This may result in uncontrolled acceleration of the lift, if the brakes are released. Therefore, the motor winding should be short-circuited to produce a speed-dependent braking torque while the motor is not supplied with current. (Use the main contacts for short-circuiting as rated motor current may be flowing.) The motor must never be short-circuited while it is energised.
- High voltages are present at the terminal connections during the operation of synchronous motors.


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3. EU Declaration of Conformity



WITTUR Electric
Drives GmbH



EU-Konformitätserklärung

EU Declaration of Conformity

im Sinne der EG-Maschinenrichtlinie (2006/42/EG)
as defined by the EG Machinery Directive (2006/42/EG)

Der Hersteller
The manufacturer

WITTUR Electric Drives GmbH
Offenburger Straße 3
D-01189 Dresden
Deutschland / Germany

erklärt hiermit, dass die folgenden Produkte
certifies that the following products

Produktbezeichnung:
Product designation:

Getrieblöse Aufzugsmaschinen vom Typ: WSG-..., WGG-..., WSU-..., WGU-..., OSG-..., OGG-..., HSG-..., HGG-...
Gearless lift machines of the type:

den Bestimmungen der folgenden EU/EG-Richtlinien entsprechen:
are in conformity with the following specification of the EU/EG Directives:

- **Maschinenrichtlinie 2006/42/EG**
Machinery Directive 2006/42/EG
- **EMV-Richtlinie 2014/30/EU**
EMC Directive 2014/30/EU

Folgende Normen sind angewandt:
The following standards are in use:

EN ISO 12100:2010
Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobeurteilung und Risikominderung
Safety of machinery - General principles for design - Risk assessment and risk reduction

EN 60034-1:2011
Drehende elektrische Maschinen; Teil 1: Bemessung und Betriebsverhalten
Rotating electrical machines; Part 1: Rating and performance

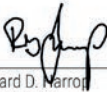
EN 81-20:2020
Sicherheitsregeln für die Konstruktion und den Einbau von Aufzügen - Aufzüge für den Personen- und Gütertransport - Teil 20: Personen- und Lastenaufzüge
Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 20: Passenger and goods passenger lifts

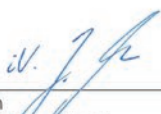
DIN EN 60204-1:2019
Sicherheit von Maschinen; Elektrische Ausrüstung von Maschinen; Teil 1: Allg. Anforderungen
Safety of machinery - Electrical equipment of machines. Part 1: General requirements

EN 12015:2021
Elektromagnetische Verträglichkeit - Produktfamilien-Norm für Aufzüge, Fahrtreppen und Fahrsteige - Störaussendung
Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks - Emission

Erstmalige Anbringung der CE-Kennzeichnung: 1999
Date of first application of CE-mark: 1999

Dresden, 2023-05-25
(Ort, Datum)
(Place, date)


 Richard D. Marro
Geschäftsführer
Plant Manager


 Jens Martin
Leiter Entwicklung/Vertrieb
Head of Development/Sales

EU-Conformity_WSG_ed25May2023

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4. Type code

Example:	W	S	G-	25	.	2	-	0	0	23	/	6 5 A	-	Z F
Customer specific identifier	W	S	G-	Z1 Z2	.	Z3	-	X1	X2	X3 X4	/	X5 X6 X7	-	X8 X9
S: Synchronous motor														
G = gearless U = gearless; UL-CSA approved														
Z1 Z2: Frame size														
Z3: Overall length 2 overall lengths are available; identified by: 1, 2														
X1: Customer specific identifier														
X2: Motor voltage 0 - $U_N = 400 \text{ V} / U_{ZK} = 500...620 \text{ V DC}$														
X3 X4: Rated speed n_N z.B. 11 - 118 rpm (with $D_T = 650 \text{ mm}$ $v = 2,0 \text{ m/s}$; suspension 2:1) 21 - 216 rpm (with $D_T = 530 \text{ mm}$ $v = 3,0 \text{ m/s}$; suspension 2:1) 23 - 235 rpm (with $D_T = 650 \text{ mm}$ $v = 4,0 \text{ m/s}$; suspension 2:1)														
X5 X6 X7: Traction sheave design (Traction sheave diameter; width, groove design, groove geometry)														
X8 X9: Variant code (brake, measuring system, modifications) ZE: 3 clasp brakes; measuring system ECN 1313-2048 incr. - SSI-interface ZF: 3 clasp brakes; measuring system ECN 1313-2048 incr. - ENDAT-interface ZG: 3 clasp brakes; measuring system ERN 1387-2048 incr. 2E: 2 clasp brakes; measuring system ECN 1313-2048 incr. - SSI-interface 2F: 2 clasp brakes; measuring system ECN 1313-2048 incr. - ENDAT-interface														

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5. Handling

5.1. Transport and storage

- Climate class: 2K3 according EN 60721
- Transport temperature: -20°C bis +60°C, max. 20 K/hour fluctuated
- Transport air humidity: max. relative humidity 85 % at 20°C (no moisture condensation)
- The lift machines leave the factory in perfect condition after being tested. Make a visual check for any external damage immediately upon their arrival on site. If any damage is found to have occurred in transit, make a notice of claim in the presence of the carrier. If appropriate, do not put these machines into operation.
- Do not expose the motor to any shocks or impact.
- Observe the relevant safety regulations and take the centre of gravity into account when handling the lift machines.
- Check that the eyebolts are tightly fitted before using them and use only suitable lifting equipment.



- ▶ The eyebolts are designed for the specified machine weight, i.e. additional loads must not be applied. Danger of breakage!

5.2. Storage

- Climate class: 2K3 nach EN 60721
- Storage temperature: -20°C to +60°C, max. 20 K/hour fluctuated
- Storage air humidity: max. relative humidity 85 % at 20°C (no moisture condensation)
- Store the motors only in closed, dry, dust-free, well-ventilated and vibration-free rooms. Do not store lift machines in the open air. Bright parts are not sufficiently preserved to withstand extended periods of exposure.



- ▶ Avoid excessive storage periods (recommendation: max. one year).
- ▶ After prolonged storage (>3 months), rotate the motor - **every** three month continuously - in both directions at a low speed (< 20 min⁻¹) to allow the grease to distribute evenly in the bearings. The ropes must not be fitted.

- Measure the insulation resistance before initial operation of the machine. If the value has dropped below 1 kΩ per volt of rated voltage, the winding needs to be dried (insulation meter voltage: 1,000 VDC).

Unpacking

- Dispose of the packaging material in an environmentally friendly manner or reuse it.
- Any special transport aids or shipping braces are left with the customer.

5.3. Disposal

- The lift machines consist of different materials. A waste separation of those different material components has to be done.
- The disposal must be professional and environmentally friendly according to law.

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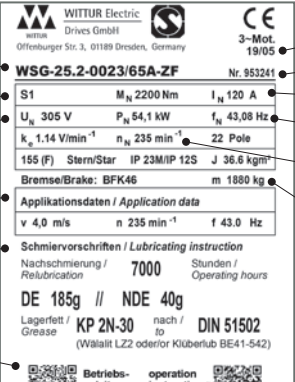
6. Product overview

6.1. Product description

The compact gearless WSG-25 synchronous lift machines are designed for traction sheave lifts. They are distinguished by their high efficiency, extremely low noise and excellent operating characteristics. The machines can be supplied for several rated speeds.

The machine comprises a frame, the synchronous motor, the traction sheave, and the type-tested safety brakes, which can be used to prevent uncontrolled upward movement of the car.

The nameplate of the lift machine is on the motor housing.



Labels on the left side of the nameplate:

- Type code of lift machine
- Duty type
- Rated voltage
- Application data
- Lubrication specification
- QR-Code (for download this manual)

Labels on the right side of the nameplate:

- Year and month of production
- Serial no.
- Rated current
- Rated frequency
- Rated speed
- Weight

Technical data on the nameplate:

WITTUR Electric
Drives GmbH
Offenburger Str. 3, 01189 Dresden, Germany

WSG-25.2-0023/65A-ZF Nr. 953241

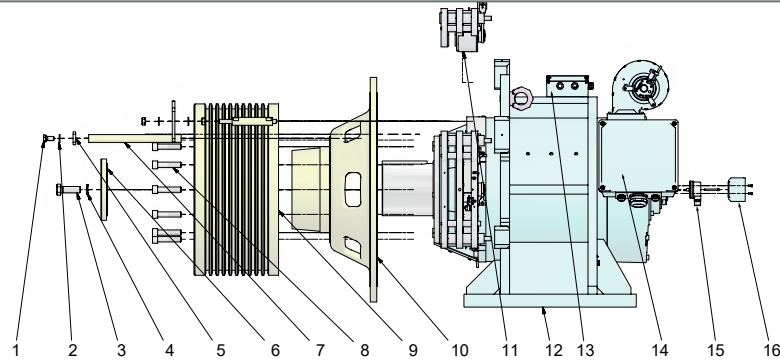
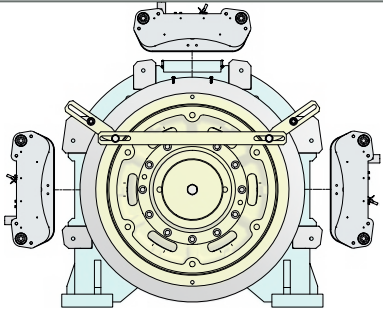
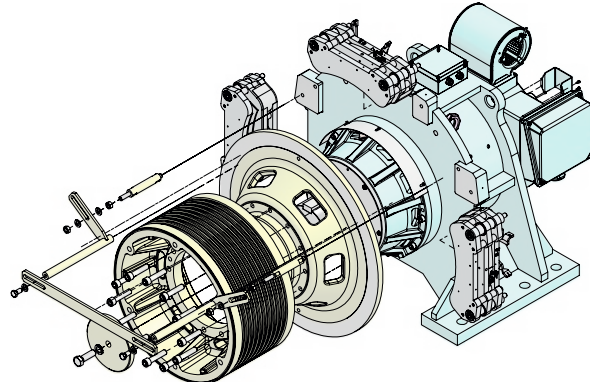
S1 M_N 2200 Nm I_N 120 A
U_N 305 V P_N 54,1 kW f_N 43,08 Hz
k_s 1,14 V/min⁻¹ n_N 235 min⁻¹ 22 Pole
155 (F) Stern/Star IP 23M/IP 12S J 36,6 kgm²
Bremsse/Brake: BFK46 m 1880 kg

Applikationsdaten / Application data
v 4,0 m/s n 235 min⁻¹ f 43,0 Hz

Schmiervorschriften / Lubricating instruction
Nachschmierung / Relubrication 7000 Stunden / Operating hours

DE 185g // NDE 40g
Lagerfett / Grease KP 2N-30 nach / to DIN 51502
(Walait L22 oder/and Klüberlub BE41-542)

Betriebs- operation
anleitung instruction

Item	Part	WSG-25
1	Bolts (2 x)	DIN 933 - M 16 x 30
2	Washer (2 x)	DIN 125-A17
3	Bolt	DIN 933 - M 24 x 75
4	Lock washer	NL 24-DIN 25201
5	Rope slip-off guard	
6	Pressure disc	
7	Rope slip-off guard (2 x)	
8	Bolts (12 x)	DIN 912-M20x90-12.9
9	Traction sheave	
10	Brake hub	
11	Brake	BFK 466-61
12	Motor housing	
13	Brake terminal box	
14	Motor terminal box	
15	Measuring system	
16	Protective cover	

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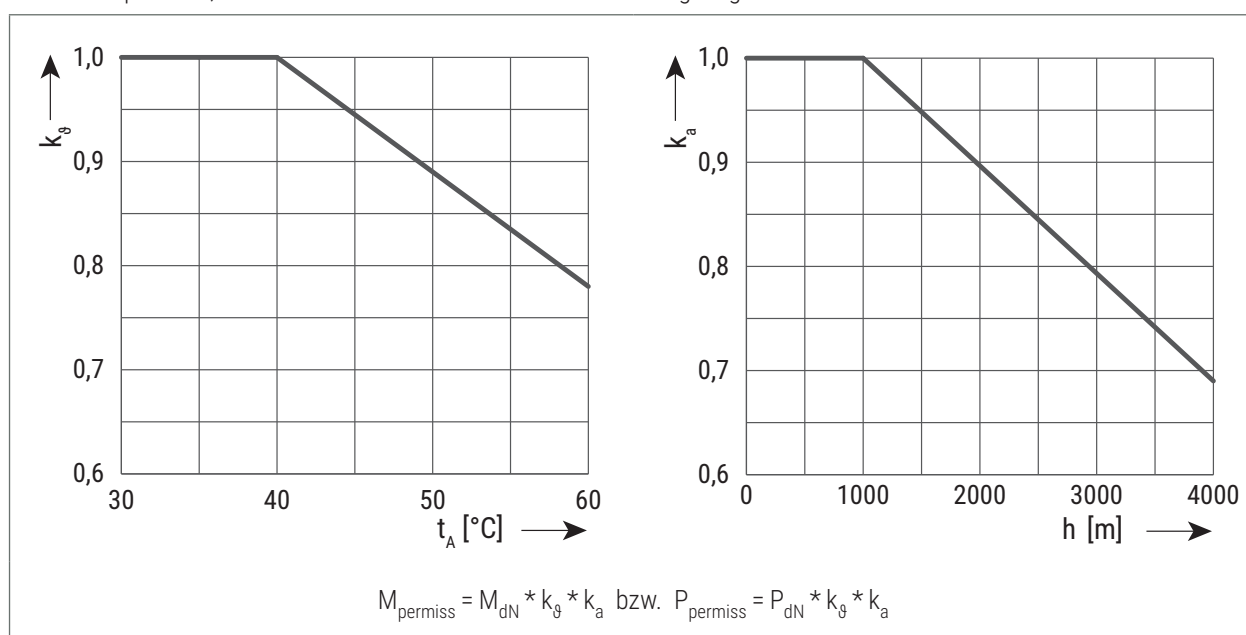
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6.2. Permissible ambient conditions

- Ambient temperature: -5°C to +40°C
- Air humidity: max. relative humidity: 85% at 20°C (no moisture condensation)
- Install the machine so that ventilation is not obstruct and sufficient heat dissipation by convection and radiation must be ensured.

Deviating ambient conditions

At higher temperatures or altitudes, the overload capability of the motors is reduced. In the case of a deviating altitude and/or temperature, the reduction factors k shown in the following diagrams must be used.



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7. Installation

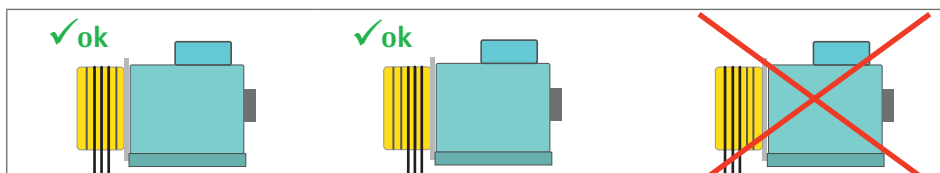
7.1. Mechanical installation

Setting up



- ▶ Be sure to use calculations to check the base frame or foundation loads before installing the lift machine.
- ▶ The lift machines must be installed by trained and qualified personnel with professional knowledge of mechanical engineering and lift construction.

- The machines can be used in lift systems with a machine room.
- The permissible unevenness of the mounting surface is 0.3 mm. The mounting surface must be sufficiently distortion-resistant and stable to accommodate the forces occurring in the system.
- The rope force can be applied to the lift machine in any direction.
- The machine must be mounted on vibration dampers for vibration damping.
- No welding work may be performed on the lift machine, nor is it permissible to use the machine as a mass point for welding work. This might cause irreparable damage to the bearings and magnets.
- If there are more grooves on the traction sheave than the number of ropes used, position the ropes either in the centre of the traction sheave or towards the motor end.



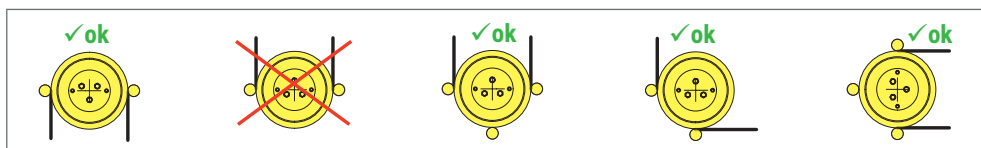
- The measuring system is only accessible from the rear side. Therefore, leave enough space between the wall and the rear side of the machine (recommendation: 500 mm) or ensure that the machine can be moved away from the wall.



- ▶ Cover the machine and especially the brakes when doing any machining or dust-producing work in the shaft or machine room.

Securing the machine

- Fasten the machine using **8 M 36 bolts - strength class 8.8 tightening torque: 2,360 Nm**.
- After completing the adjusting work or after a breakdown, tighten all the fastening bolts of the machine, using the specified torque.
- Lift machines are generally equipped with rope slip-off guards. After putting the ropes in place, adjust them so that the distance between the rope and the rope slip-off guard does not exceed 2 to 3 mm.
- If the lift machine is not installed at the head of the machine room as is usually the case, it may be necessary to modify the fitting of the rope slip-off guard to fulfill the requirements of EN 81-20. Optional rope slip-off guards are available for this purpose (refer „Versions of rope slip-off guards“ on page 12).



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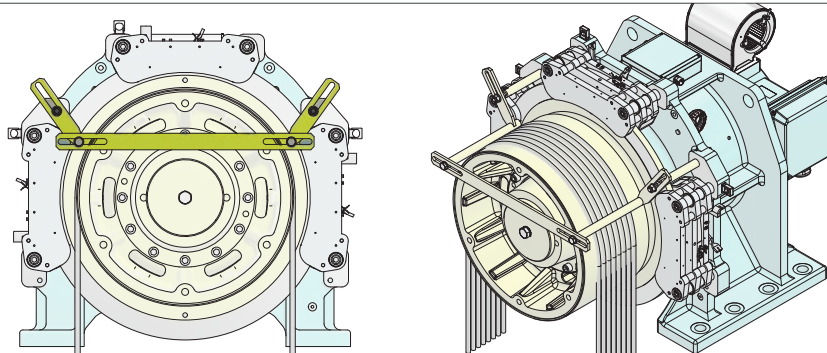
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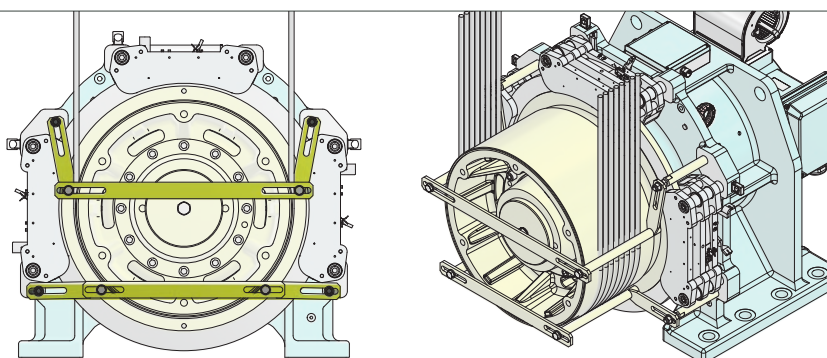
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Versions of rope slip-off guards

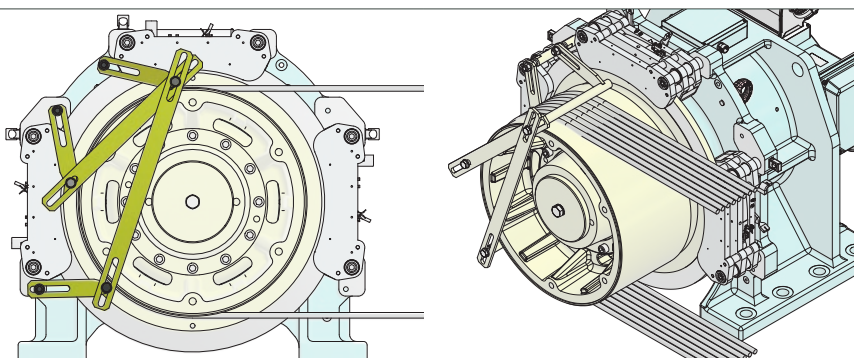
Standard version of the rope slip-off guards
 - Rope direction downwards



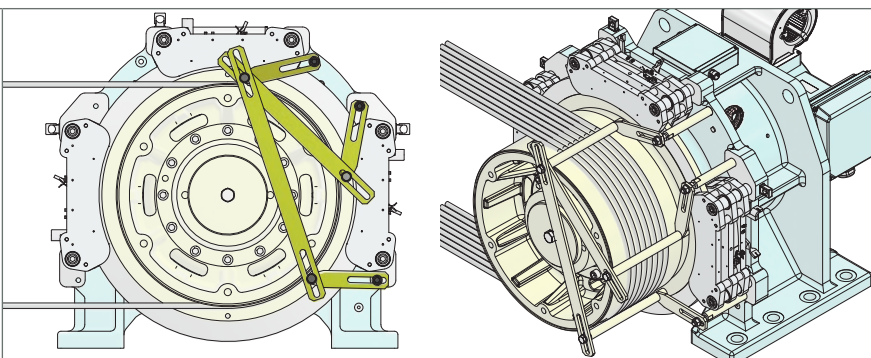
Option
 - Rope direction upwards



Option
 - Rope direction right



Option
 - Rope direction left



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7.2. Electrical installation

7.2.1. General



- ▶ The electrical installation may only be carried out by trained and qualified personnel with professional knowledge of electrical engineering.

- Before starting any work on the machines, ensure that the lift machine or system is properly isolated.
- Before making any electrical connections check that:
 - » the connecting cables are suitable for their specific application and for the relevant voltages and currents
 - » the protective conductor is connected to the earthing terminal
 - » there are no foreign bodies, dirt or moisture in the terminal boxes
 - » cable entries not in use and the terminal box itself are tightly sealed to prevent the ingress of dust
 - » sufficiently dimensioned connecting cables, torsion, strain and shear relief, as well as anti-kink protection are provided.
- The insulation system of the motors is designed such that they can be connected to a inverter with a maximum DC link voltage $U_{\text{link max}}$ up to max. 700 V DC.



- ▶ $U_{\text{link max}}$ is the maximum value of the DC link voltage which is only transient and approximately equivalent to the inception voltage of the braking chopper or of the energy recovery unit.



- ▶ The maximum permissible rate of voltage rise (dU/dt) at the motor terminals is 4 kV/ μ s. The overvoltage at the motor terminals must not exceed 1.56 kV. It may be necessary to use motor current filters or reactors to achieve these values.

7.2.2. Motor connection / Winding protection / Fan

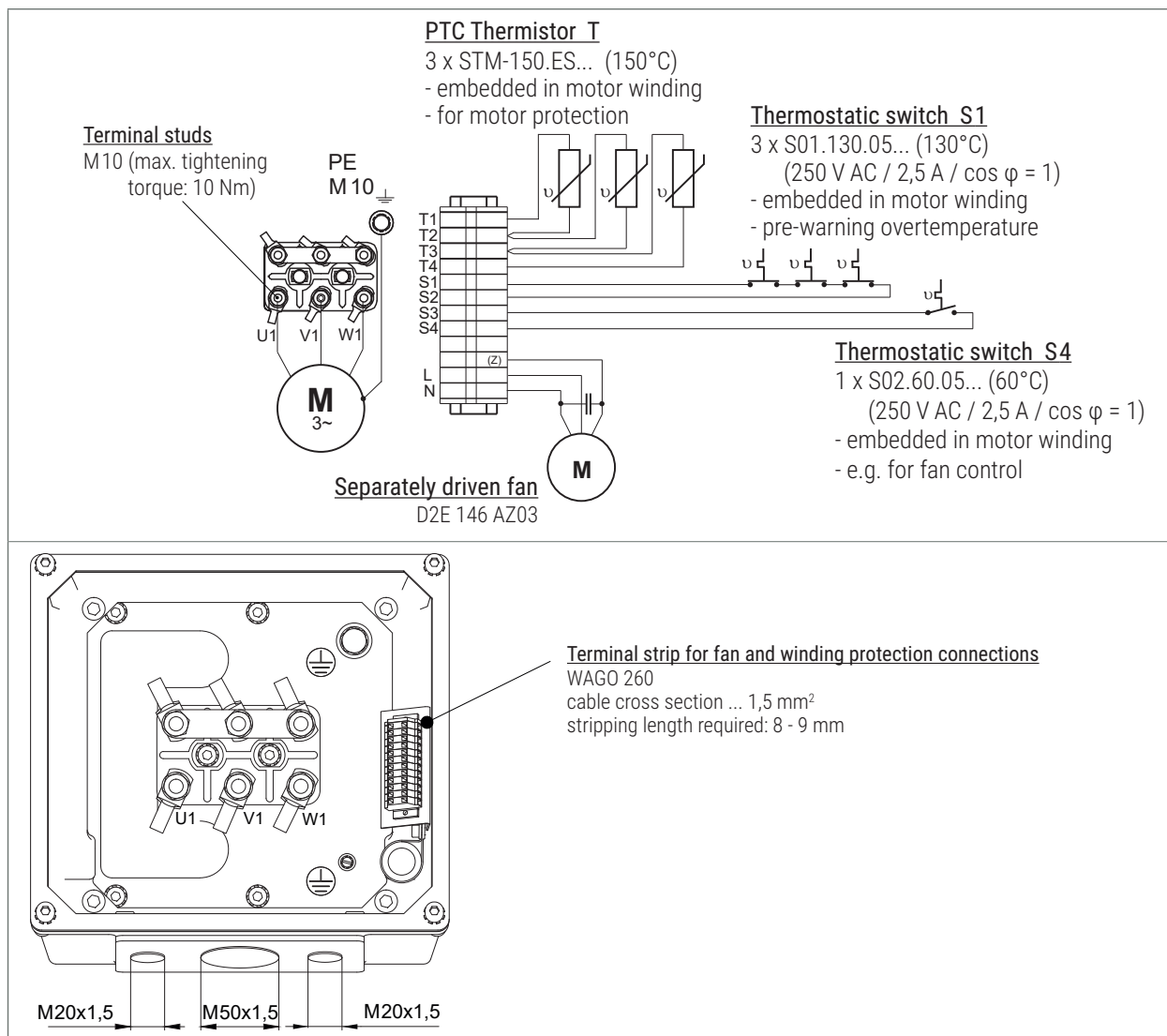
- The electrical connection of the motor, the fan and the winding sensors is made in the motor terminal box on the machine.
- The cable cross-section must be determined in accordance with the applicable regulations, depending on the motor current and the ambient conditions, e.g. temperature and type of installation.
- The motor cable must be shielded. Ensure that the cable shield contacts the frame over a large area at both ends.
- In general, the motor power cable must not exceed a length of 25m. For other lengths, please contact us.
- The motor phases U1, V1 and W1 must be connected correctly to the corresponding phases of the inverter; they must not be interchanged.
- We recommend using a inverter with a switching frequency of 8 kHz.
- The thermocouples installed in the winding such as PTC thermistor detectors and thermostatic switches must be evaluated in the control system or frequency inverter to protect the motor from overtemperature.
- The separately driven fan must be properly connected and operated. If required, it can be switched in dependence of the temperature by means of thermal switch S4 (relay must be used).

Gearless Lift Machine

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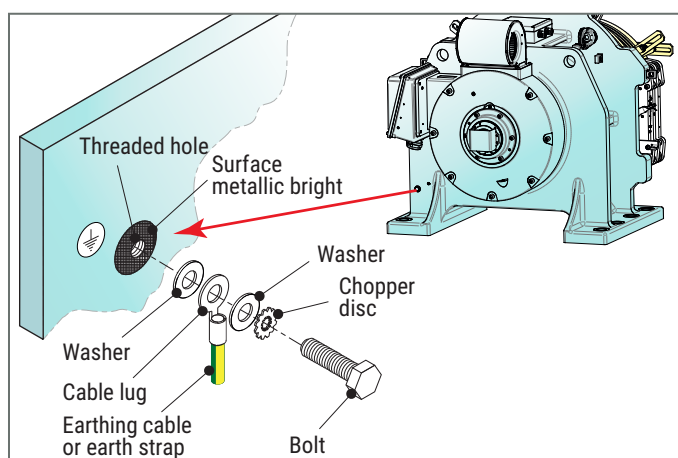
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Protective earth connection

- The protective earth conductor is made in the motor terminal box.
- If the protective conductor is smaller than 10 mm² in the motor terminal box, an additional protective conductor must be connected. The cross-section must correspond at least to the cross-section of the PE conductor on the motor power cable.
- For this case, an additional protective earth connection is available on the motor housing (see figure opposite).



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PTC thermistors

- The maximum operating voltage of the PTC thermistors is not allowed to exceed 25 V DC
- To achieve the maximum precision, the measurement voltage per PTC thermistor must not exceed 2.5 V DC.

Short-circuiting the motor terminals

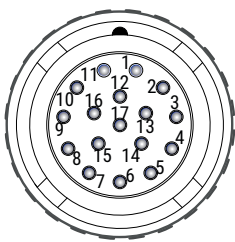
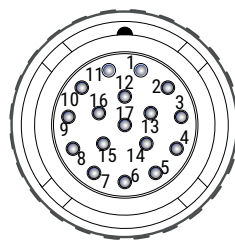
- The motor terminals of the synchronous lift machines, type WSG-25, can be short-circuited, if required, to brake the lift machine faster.
- However, this is only permissible at speeds less than or equal to the rated speed of the respective motor.

7.2.3. Speed/Position measuring system

- The basic version of the lift machines is equipped with an ECN 1313 SineCosine encoder with EnDat- interface from Heidenhain GmbH. The encoder is connected via a 17-pole signal plug connector.
- Alternatively, the machines can be equipped with ERN 1387 encoders (from Heidenhain GmbH). We can also provide other measuring systems on request.
- Use a shielded cable to connect the measuring system to the inverter system. The maximum cable length should not be longer than 25 m. We recommend the use of our cable sets, which can be supplied as an accessory.



- ▶ The measuring system of WSG lift machines with a synchronous motor (WSG) is matched to the associated inverter. Do not change the adjustment, as this may make it impossible to use the motor. On the measuring system housing there is a label showing the „offset angle“ and the inverter type.
- ▶ The offset angle depends on the inverter used.

Measuring system ECN 1313			Measuring system ECN 1387		
Data interface: EnDat or SSI			Data interface: Z1 track		
Operating voltage: 5 V DC			Operating voltage: 5 V DC		
Recommended mating connector: ASTA 035 NN 00 73 0100 00 (company Intercontec GmbH)			Recommended mating connector: ASTA 035 NN 00 73 0100 00 (company Intercontec GmbH)		
Pin	Signal	 Pin contacts of flanged connector socket (exterior)	Pin	Signal	 Pin contacts of flanged connector socket (exterior)
1	U_p Sensor		1	A +	
4	0 V Sensor		2	A -	
7	U_p		3	R +	
8	Clock +		4	D -	
9	Clock -		5	C +	
10	0 V (U_p)		6	C -	
12	B +		7	0 V (U_p)	
13	B -		10	U_p	
14	DATA +		11	B +	
15	A +		12	B -	
16	A -		13	R -	
17	DATA -		14	D +	
			15	0 V Sensor	
			16	U_p Sensor	

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7.2.4. Brake

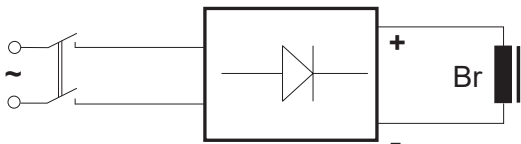
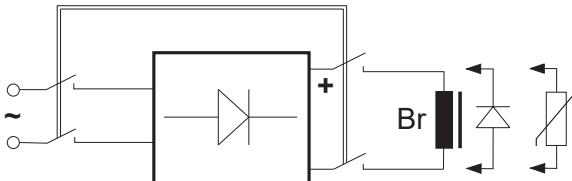
- Please refer also to the operating instructions for the brake starting on page 52.
- The brakes are supplied with DC voltage by the brake control units, which are fitted in the brake terminal box.
- Only the brake control units which are included in our scope of supply are to be used for the brake activation.
- Repeated switching of the brake magnets during the overexcitation period must be avoided as this will result in overloading of the brake control unit. Therefore, a minimum brake operating time of approx. 1.5 – 2 s should be maintained, especially during an inspection or commissioning drive.
- To reduce the switch-off time, switching can be effected from the DC side. However, switching must also be performed from the AC side at the same time ! (Wiring with a varistor as shown in the „Circuitry suggestion for brake control“ on page 18)
- The brakes must be protected with varistors against overvoltage from switching operations. The varistor must be directly connected to the coil.

Note on the use of DC/AC side switching



Information

- ▶ AC side switching is recommended for normal operation, since the lift machine is then decelerated in a controlled manner to zero speed and the switching noise of the brake is negligible.
- ▶ When braking in the event of a breakdown (emergency stop) or during an inspection drive, the switching should be performed from the DC side, since this ensures a faster braking effect with the car being stopped earlier. We therefore recommend the use of 2 separate contactors for the brake control circuitry, one of which switches at the DC side, the other at the AC side.

AC side switching	DC side switching
<ul style="list-style-type: none"> ▶ Low-noise switching of the brake ▶ No protective measures required for switching contact ▶ Slow application of the brake.  <p>Attention: Schematic diagram!</p>	<ul style="list-style-type: none"> ▶ Noisy switching ▶ Burn-up protection for switching contact required (e.g. varistor, free-wheeling diode) ▶ Fast application of the brake.  <p>Attention: Schematic diagram!</p>

Time-delayed application of a braking circuit



Information

- ▶ Sometimes, when the lift makes an emergency stop, in-admissibly high decelerations occur in the car. This can be remedied by the time-delayed application of the brake circuits, i.e. one brake is applied with a slight delay.
- ▶ To achieve this time delay between the two brake circuits, it is sufficient to use a diode D1 in one of the two brake circuits, as shown in the connection diagram on page 18. Pay attention to the polarity of the diode!
- ▶ Check the function of the diode regularly, as this avoid in-admissibly high deceleration of the car.

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Monitoring the brakes

- The switching states of the brakes and the wear of the brake linings are monitored by means of dust-proof microswitches (see wiring diagram).
- Please assure that the contact-current is at least 10 mA to keep the contacts clean.

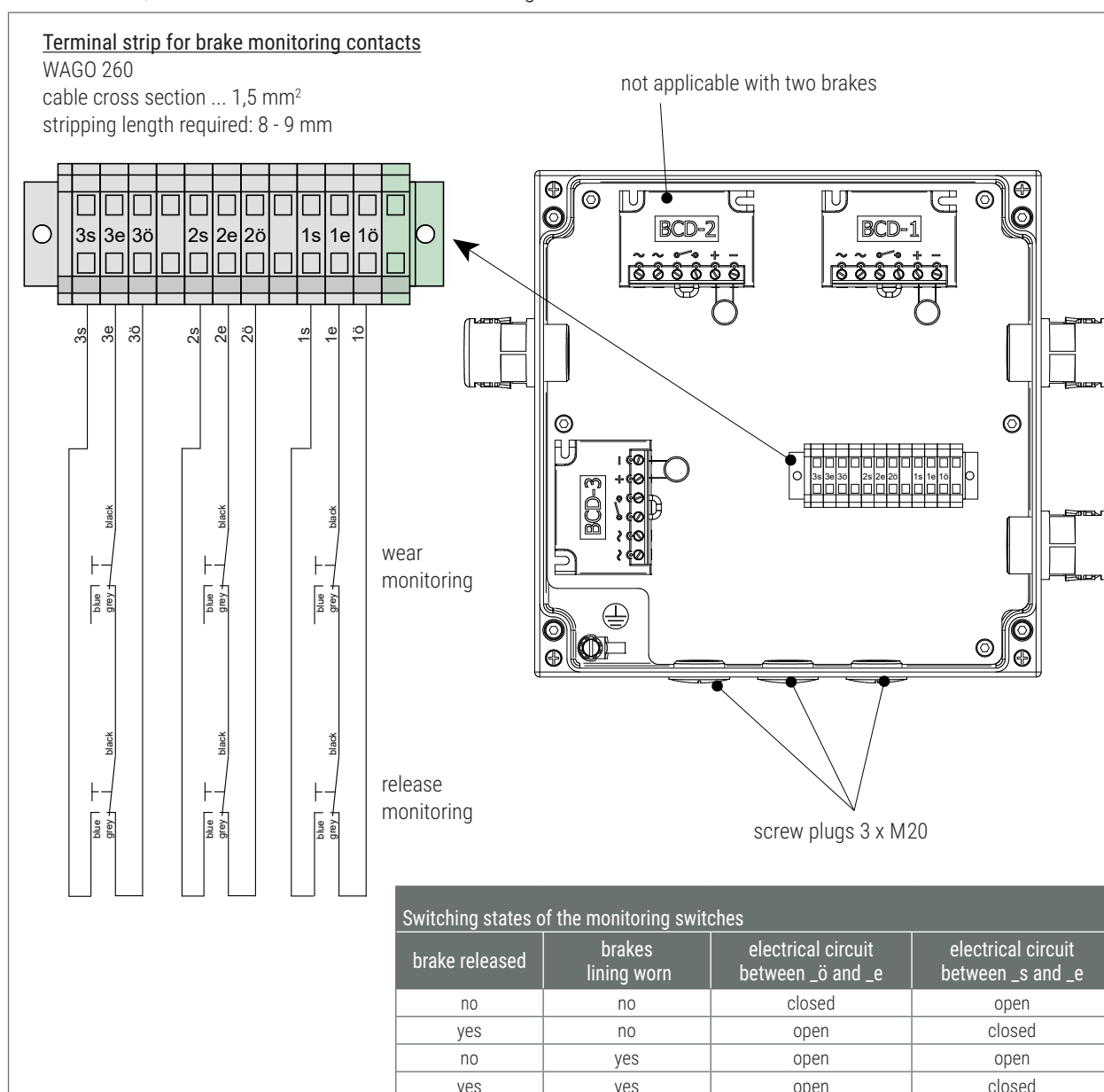


WARNING

- The microswitches must be evaluated separately for each partial brake to ensure compliance with the requirements of the type examination.
- If the wear monitoring is to be evaluated as well, the connection must be made via terminals *_e* and *_ö* (normally closed contact of the release monitoring).

Connection of the brakes

The brake coils, the brake control units and the monitoring contacts are connected to the mains in the brake terminal box.



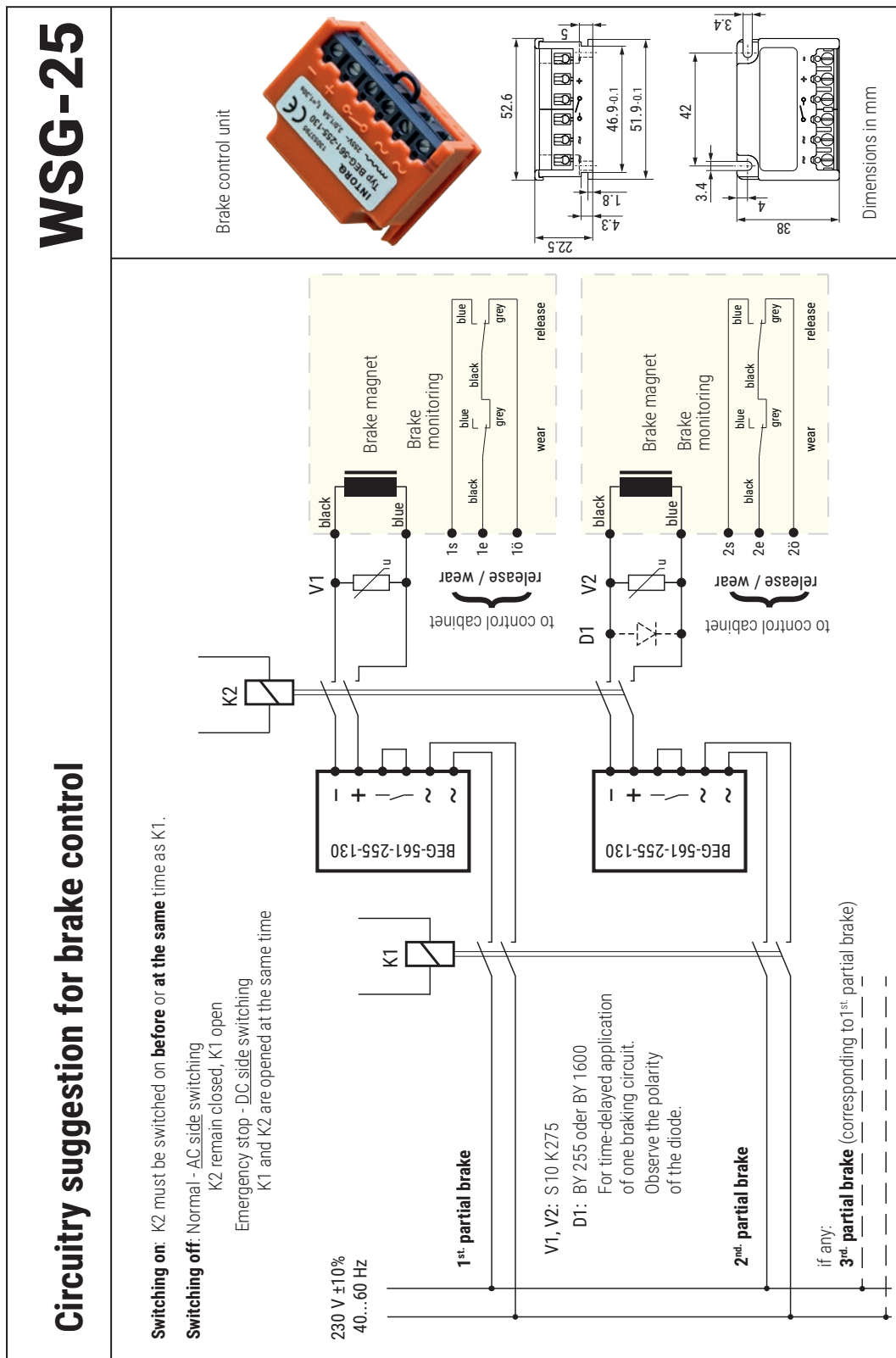
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Circuitry suggestion for brake control



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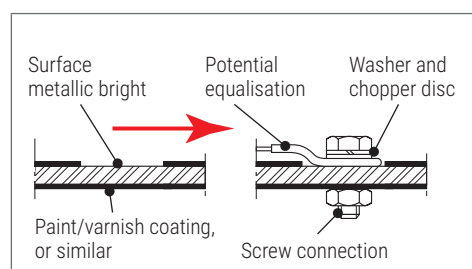
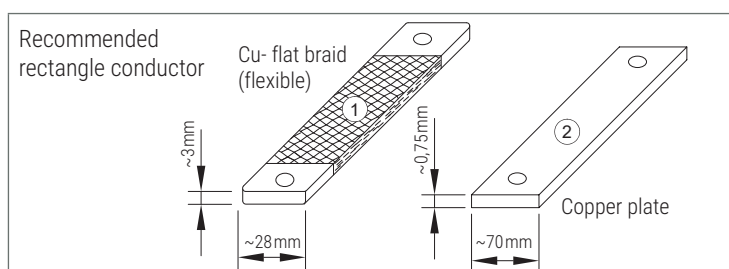
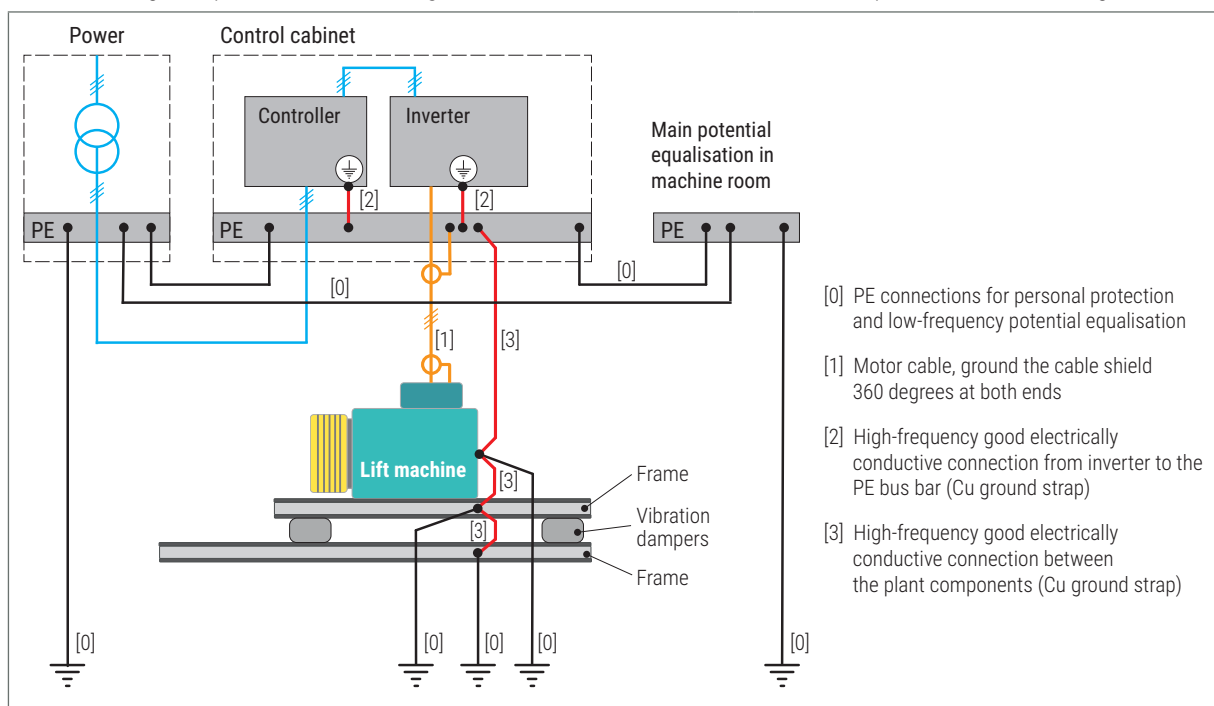
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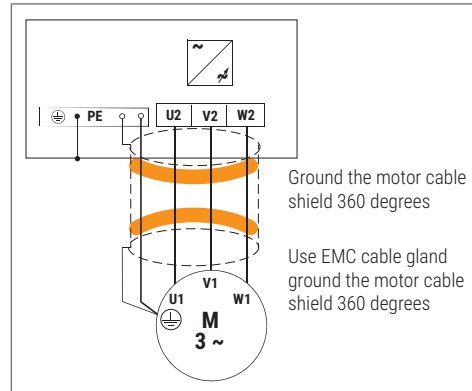
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7.2.5. Earthing, potential equalisation, electromagnetic compatibility (EMC)

- Always keep in mind the generally applicable regulations and the specifications of the inverter manufacturer. The following notes give an overview for the construction of an EMC- compliant installation.
- Ensure proper earthing and comprehensive potential equalisation between the system components, which is also effective at high frequencies - use **rectangle conductors**! Ensure that the connection points are metallic bright!



- The motor cable must be shielded. Ground the motor cable shield 360° at both ends.
- Always connect cable shields 360°. Use suitable cable glands or special cable mounting clamps for shield contact.
- Never connect the shield via a twisted shielding braid (so-called "pigtail") or via a wire extension. This reduces the shielding effect by up to 90 %.
- Keep control cables (e.g. measuring system cables) separately from the mains power and motor cables.
- **Safety always has the highest priority and takes precedence over EMC requirements.**

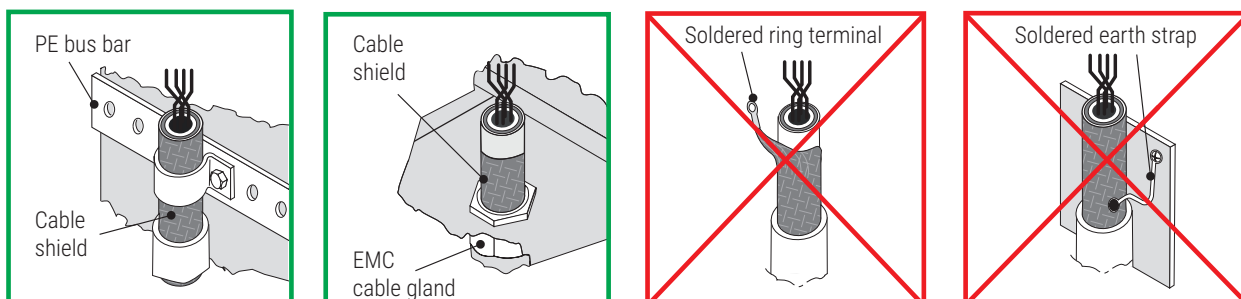


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7.3. Overview

The following notes should help you to carry out the assembly and wiring in an appropriate sequence, without overlooking anything.

Site	Please note the intended use and the permissible ambient conditions of the machine. The site must be free of conductive and aggressive material.
Ventilation	Install the machine so that ventilation is not obstructed, i.e. sufficient heat dissipation by convection and radiation must be ensured.
Assembly	Be aware of the secure motor fastening and the proper use of vibration dampers.
Cable selection	Select cables and wire cross section in accordance with the binding regulations and law.
Earthing / Shielding	Use correct earthing of machine and machine frame and that all components are installed in accordance with EMC requirements. Important notes can be found in the manual of the inverter manufacturer.
Wiring	We recommend the use of our cable sets, which can be supplied as an accessory. Route power cables as separately as possible from control cables. <ul style="list-style-type: none"> - Connect the motor leads - Connect the measurement system and the winding protection. - Connect the safety brake, the brake control units and the brake monitoring switches - Connect the fan
Check	Final check of the installed wiring, according to the wiring diagram which was used.

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8. Commissioning and operating

8.1. Important notes



- ▶ The commissioning may only be carried out by trained and qualified personnel with professional knowledge of electrical engineering and lift construction.
- ▶ Check that all live connection points are safe against accidental contact.
- ▶ During commissioning, unintentional movements of the traction sheave may occur. Make sure that, even if the motor starts to move unintentionally, no danger can result for personnel or machinery.

Before starting up the motor the following points must be checked:



- Check that all performance and application data specified on the name plate of the machine are consistent with your application.
- Have all securing, auxiliary and installation tools been removed from the danger area?
- Check if the lift machine is being used for its intended purpose – comply with the permissible ambient conditions.
- Check if the lift machine has been properly fastened with the fastening bolts – have all the bolts been tightened to the specified torque and secured?
- Has the motor been properly connected, including the motor protection? Has the PE terminal been properly connected? Is the potential equalisation with the machine frame ensured?
- Check the proper functioning of the temperature monitoring devices (e.g. by interrupting the temperature monitoring circuit).
- Has the measuring system been properly connected?
- Check the brake connection and the proper functioning of the brake monitoring switches.
- Ensure that the brake operates correctly; perform a brake test using one partial brake.
- Has the rope slip-off guard been tightly fastened and properly adjusted?



Information

- ▶ An initial function test of the motor and the brake, together with the inverter, should be performed before the ropes are put in place.
- ▶ If the motors are being operated at no shaft load (no ropes put in place) for an extended period of time, abnormal noise may occur resulting from the bearing type used.

Half-load test



Information

- ▶ If the motor winding is short-circuited with the control system deactivated, a speed-dependent braking torque will be produced, even at low speeds. Therefore, the short-circuiting should be deactivated during the half-load test. It is imperative for it to be reactivated after the test.

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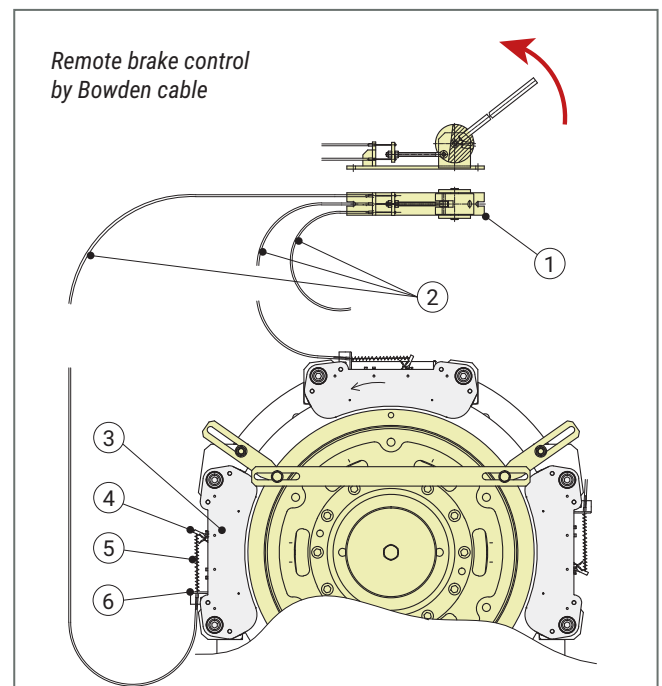
8.2. Emergency evacuation



- ▶ The emergency evacuation procedure must be specified by the installer or operator of the lift system. Only he knows the requirements and special conditions of the system.
- ▶ All actions for evacuation in case of emergency have to be done by qualified service personnel.
- ▶ When attempting an evacuation, the car may not move even when the brakes are released, as a result of load compensation between the car and the counterweight. In this case, add weight to the car by suitable means, e.g. sand bags, or use the mechanical return motion device.

Manually operated evacuation in case of emergency

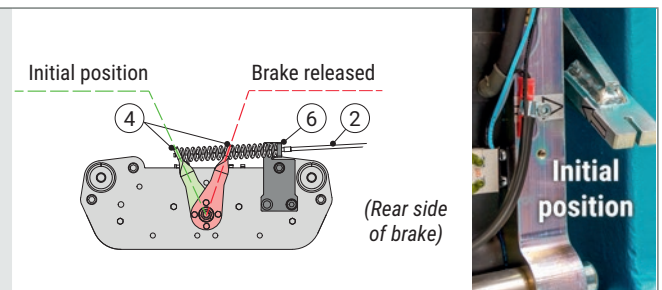
- The brakes (3) can be released remotely by hand using a lever block (1) and Bowden cables (2).
- The installation and operation of this device is described in section „12.5. Remote brake control by Bowden cable“ on page 35. The lever block and the Bowden cables are available separately.
- If the brakes are released manually, the lift car moves in the direction of the higher weight.
- The motor winding should be short-circuited using the motor contactors. This prevents the lift from accelerating in an uncontrolled manner, since the short-circuiting produces a speed-dependent braking torque.
- It may transpire that the braking torque provided by short-circuiting the motor is insufficient to restrict the speed of the lift. You should therefore keep a close eye on the car speed during evacuation and halt the evacuation if necessary.



- Stop the manual release of the brake when the car has reached the next floor. The trapped passengers can now be evacuated.



- ▶ After releasing the brakes manually, check that the manual release levers (4) return to their initial position (identification of the initial position by arrow symbols on each partial brake).



Emergency evacuation by electrical means

- Alternatively, the brakes can be released electrically in an emergency, using the mains or a UPS.
- When resorting to this method of emergency evacuation, refer to the relevant instructions in the operating manual regarding the control system, the inverter and the evacuation unit (with UPS).

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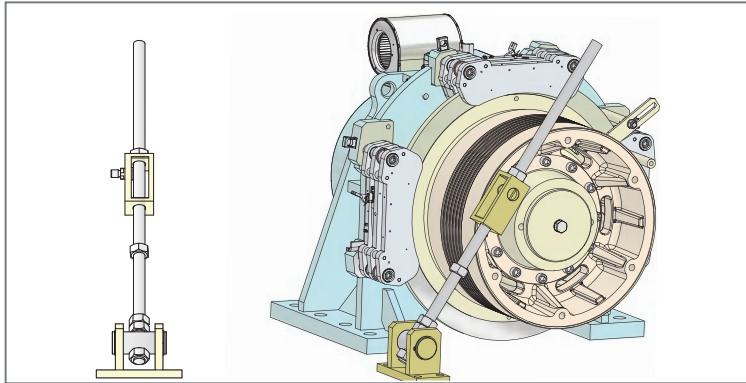
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Mechanical return motion device

- For cases such as lift failure or the car being retained by the safety device, a mechanical return motion device can be used to move the lift manually. Use of the return motion device is shown in the drawing.
- Instructions for installing and using the return motion device can be found in section „12.6. Return motion device“ on page 40.



- Make sure that you restore the lift system to its original state after completing the emergency evacuation. Take particular care to remove the lever extensions and all parts of the mechanical return motion device.

8.3. Testing the brake system to EN 81



- The brake system should be tested with the car about halfway down the shaft. If any motor short-circuit connections have been made, these should be deactivated so that the brake effect can be tested independently.

Overload

- The brake system should be tested by interrupting the power supply to the motor and brake system with the car moving downward at rated speed and 1.25 times the rated load. The brake system must be capable of decelerating the car.

Failure of a brake

- If one brake fails, the brake system must still be capable of decelerating the car sufficiently during its downward travel at rated load and rated speed.
- When simulating the failure of one brake, the other brakes must be kept open separately, even if the safety circuit is open. This should be done using suitable electric circuitry or by hand.
- This state must not be maintained in the long term!
- Observe the lift during this test. If it does not decelerate, close the open brake circuit immediately.

Separate operation of the individual brakes

- The only method by which the partial brakes can be released separately is through electrical control. The brakes can be activated/deactivated quickly using individual control buttons.

Monitoring the brakes

- Check the brake monitoring switches individually. No car travel must be permitted if a microswitch signal is missing or a wrong signal operates.

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8.4. Trouble shooting

Fault	Possible cause	Remedy
Motor does not start, operates out of control or develops no torque	Motor not connected in proper phase sequence	Connect motor correctly
	Measuring system not properly connected	Connect measuring system correctly
	Converter parametrisation incorrect	Check inverter parametrisation
	EMC disturbance	Carry out shielding and earthing measures as described by the inverter manufacturer
	Measuring system offset angle incorrectly set	Check measuring system offset angle
	Measuring system defective	Replace measuring system
Motor noise	Converter parametrisation incorrect	Check inverter parametrisation
	Bearing defective	Notify customer service
Motor temperature too high	Motor surface dirty; Filter mats of the forced cooling fan dirty	Clean the motor surface and the fan filter mats
	Forced cooling fan not in operation	Operate forced cooling fan correctly
	Ambient temperature too high	Improve shaft and machine room ventilation
	Converter parametrisation incorrect	Check inverter parametrisation
Braking system does not release	Braking system is not supplied with voltage	Check electrical connection
	Brake shoes mechanically blocked	Remove mechanical blocking
	Brake control unit defective	Replace brake control unit
Delay in braking system release	Brake control unit defective	Replace brake control unit
Braking system does not engage	Brake shoe mechanically blocked	Remove mechanical blocking
Delay in engaging of braking system	Switch-off time too short with AC side switching	Brake control using DC side switching of the overexcitation rectifier
Brake makes loud switching noise	DC side switching of the brake in "normal operation"	Change over to brake control by AC side switching in "normal operation"
	Brake air gap too large	Adjust brake air gap
Braking torque too low	Brake friction surface or brake linings dirty	Clean friction surface / brake linings
	Foreign bodies between friction surface and brake lining	Remove foreign bodies
	Brake friction surface or brake lining have come into contact with oily or greasy materials	Replace brake lining, clean brake drum thoroughly
	Load torque too high	Reduce load torque
Condition monitoring of the brakes does not switch	Micro-switch defective	Replace micro-switch
	Micro-switch adjustment faulty	Adjust micro-switch
	Dirty contacts	Use micro-switch with at least 10 mA contact current, Replace micro-switch

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9. Maintenance

9.1. General

- The regulations concerning operation, maintenance and inspection pursuant to the applicable safety regulations for lift construction such as DIN EN 81-20, DIN EN 81-50, LD 2014/33/EU and other relevant regulations are to be strictly observed.
- The operator is responsible for ensuring that the motor is installed properly and in accordance with the safety requirements, as well as for its inspection and maintenance as specified in the applicable regulations.
- The proper maintenance of gearless lift machines requires adequately trained specialist personnel and special devices and tools.
- Repairs other than those described in these operating instructions are not to be carried out by the lift fitter/maintenance technician for liability reasons.

Bolt/screw tightening torques

- When performing any work on the machine or replacing parts, make sure that the specified bolt/screw strength class and the tightening torques are observed (see table).
- Secure the bolts/screws with "omnifit 100" or a similar product against accidental loosening.

Dimension	Tightening torque [Nm]		
Strength class	8.8	10.9	12.9
M 5	5.5	8.1	9.5
M 6	9.6	14	16
M 8	23	34	40
M 10	46	67	79
M 12	79	115	135
M 16	195	290	340
M 20	395	560	660
M 24	680	970	1150
M 30	1,100	1,900	2,150
M 36	2,300	3,300	3,700

9.2. Maintenance intervals

	During commissioning or after the first 3 months	Every year	Note
Check the brake function and brake monitoring switches	x	x	see the brake operating instructions
Check the brake air gap	x	x	see section 9.5
Individual check of the brake function	as required		see section 9.6
Check the bearing noise		x	
Regrease the bearings	as required		see section 9.3
Check the traction sheave for wear		x	
Make a visual check of the fastening bolts/screws on the frame, brake and traction sheave	x	x	
Check the rope slip-off guard	x	x	
Check the electrical cables	x	x	
Check the guards and safety devices for their condition and safe functioning	x	x	
Clean the motor surface and the fan filter mats	as required		see section 9.4

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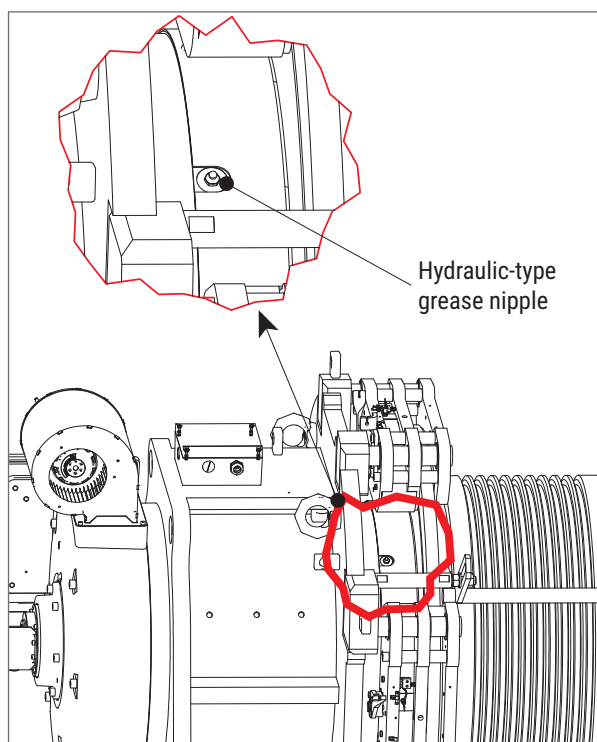
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9.3. Regreasing the bearings

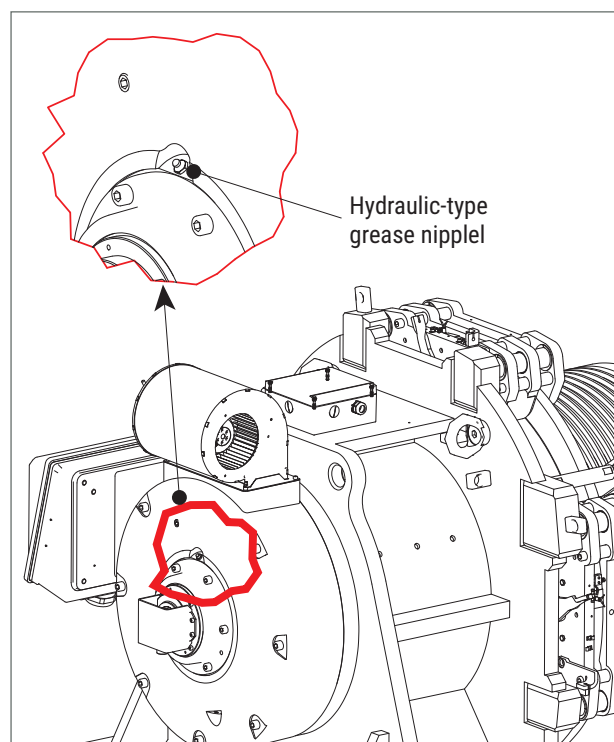
Relubricate the main bearing after about 7,000 hours of operation or every 3 years, using a KPF 2 N-30 to DIN 51 502 grease such as Wälait LZ 2 or Klüberlub BE 41-542 (approx. 185 g on DE and approx. 40 g on NDE).

Use a conventional grease gun and press the grease into the hydraulic-type grease nipples to DIN 71 412 AM 10x1.

The relubricating points are provided on the D- and N- end shields of the machine. The DE grease nipple is located behind the traction sheave.



DE grease nipple



NDE grease nipple

Further information:



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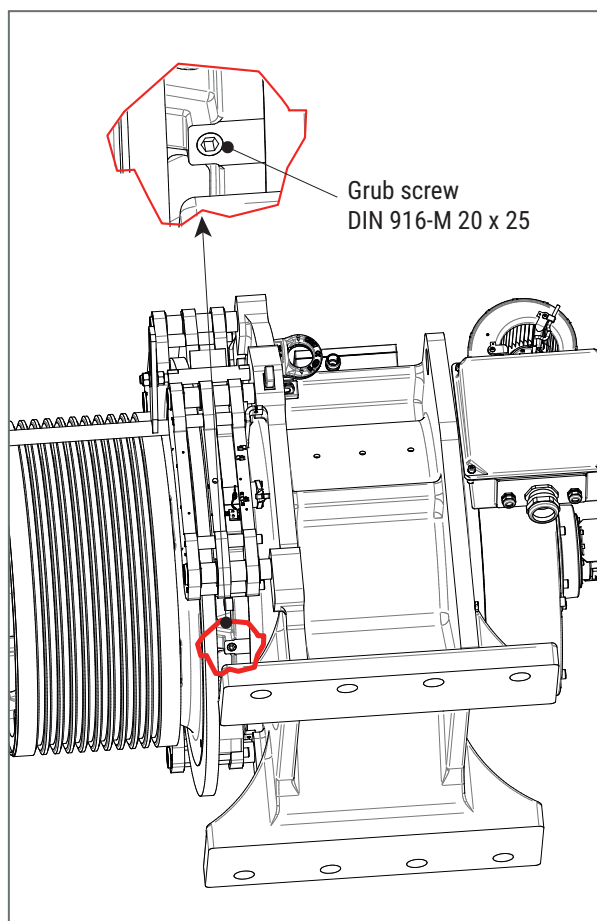
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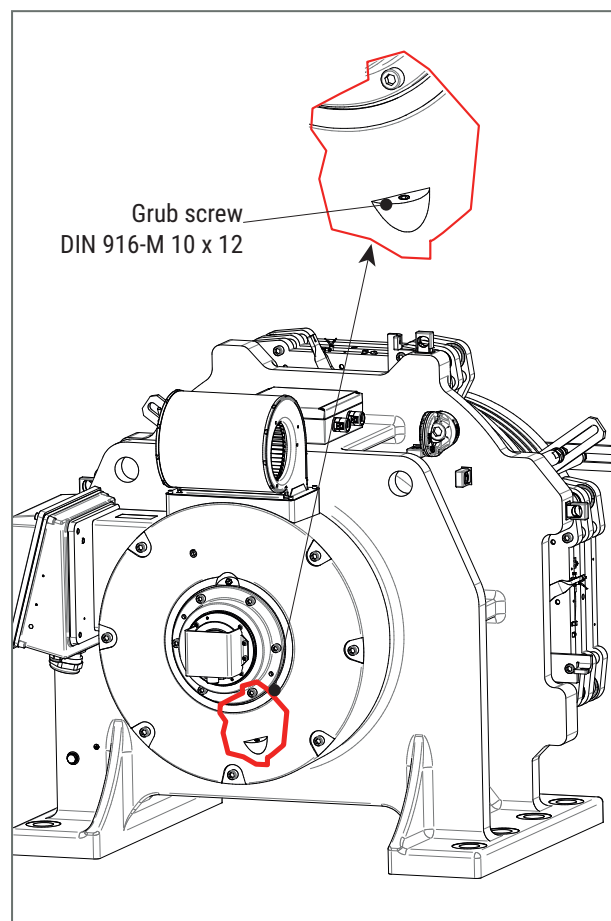
Extraction of the grease

With the re-lubrication the old or surplus grease is pressed in a collector duct. The collector duct is big enough to catch grease of 12...15 proper re-lubrications and is therefore sufficient for the lifetime of the machine.

If necessary, the collector duct can be opened with a grub screw on D-end and ND-end.



DE extraction of the grease



NDE extraction of the grease

9.4. Fan filter mats

Remove the three screws from the protective screen. Then remove the screen and filter to clean or replace the filter mats.



- ▶ Do this work only with the fan switched off as the rotating fan wheel could be dangerous.
- ▶ Operation of the motor without fan filter mats is not permitted!

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9.5. Check brake air gap

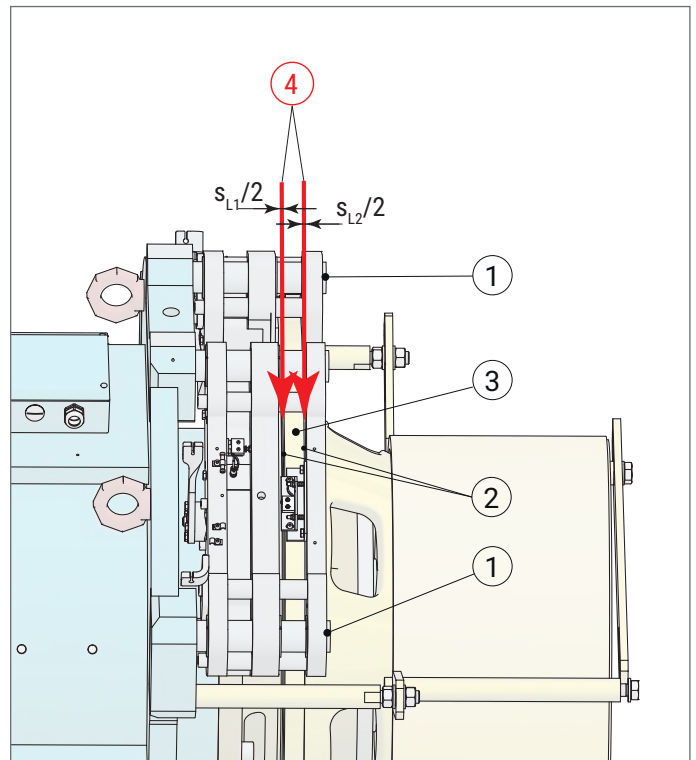


- ▶ If the brake air gap exceeds the permissible value „ $s_{L\max}$ “, the braking torque may be significantly reduced. Shut down the lift system and inform customer service.
- ▶ Unit-power-off. Lock out and tag out. Motor and brakes have to be de-energised!
- ▶ Observe the operating instructions for the brake from page 52.

Necessary tools



- Feeler gauge 0,05 ... 1,0 mm
- Release a partial brake electrically. Due to the redundancy of the brakes, the lift must not start moving. Otherwise switch off the partial brake immediately and check the system.
- Measure the partial air gaps „ $s_{L1}/2$ “ and „ $s_{L2}/2$ “ of the released brakes (1) between the both brake linings (2) and the brake disc (3) using a feeler gauge and calculate $s_L = s_{L1}/2 + s_{L2}/2$.
 - (1) Partial brakes
 - (2) Brake lining
 - (3) Brake disc
 - (4) Air gap
- Proceed in the same way with all other partial brakes.
- Compare the measured air gap with the maximum permissible air gap „ a_{\max} “, see section “Technical data” on page 31.
- If the brake air gap exceeds the permissible value „ $s_{L\max}$ “, shut down the lift system and inform the customer service.



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9.6. Individual check of the brake function

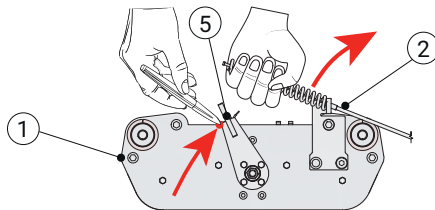
Only perform this test if necessary, e.g. after an emergency evacuation by mechanical manual means.



- ▶ All work on the brakes may only be carried out when the lift system is at a standstill. Unit power-off. Lock out and tag out.
- ▶ Carry out the test one after the other on the individual partial brakes of the lift machine.

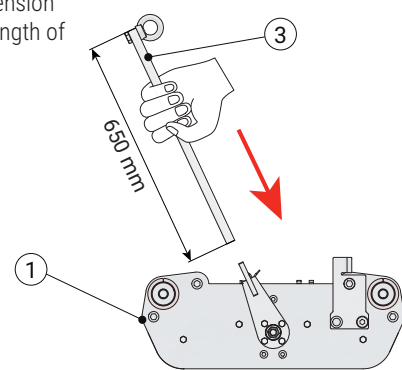
I. Release the brake

1. Mark the initial position of manual release lever (5) on the brake (e.g. with a text marker). Unhinge the Bowden cable of manual brake release.

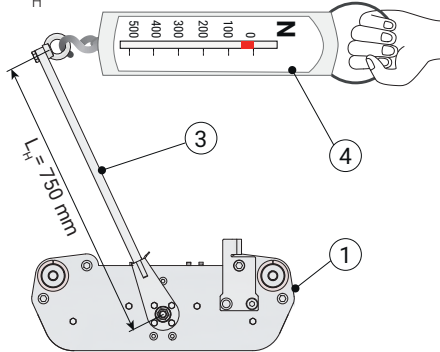


- ① Brake ② Bowden cable ③ Lever extension
④ Spring force measuring device ⑤ Manual release lever

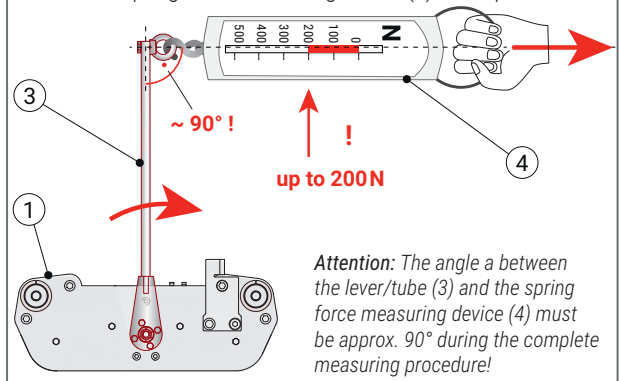
2. Attach lever extension (3) - tube with length of 650 mm.



3. Fix a spring force measuring device (4) at the connecting position $L_H = 750$ mm.

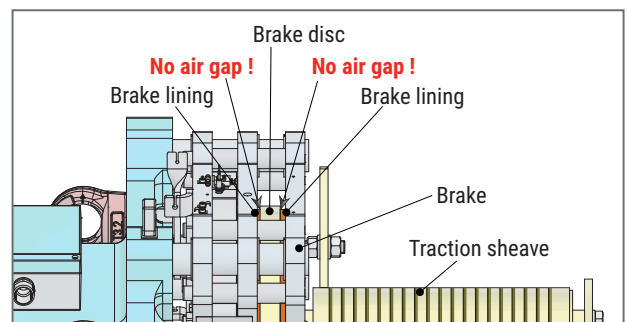


4. Pull on the spring force measuring device (4) with up to 200 N.



II. Applied the brake

1. Remove the spring force measuring device (4) and the lever extension (3).
2. The manual release lever (5) must return to the initial position. Observe the marking in point I./1. (Initial position of the brake).
3. Brake torque has been built up. The brake must not be released. No air gap between brake disc and brake lining.
4. If not, it is strongly recommended to shut down the lift system.



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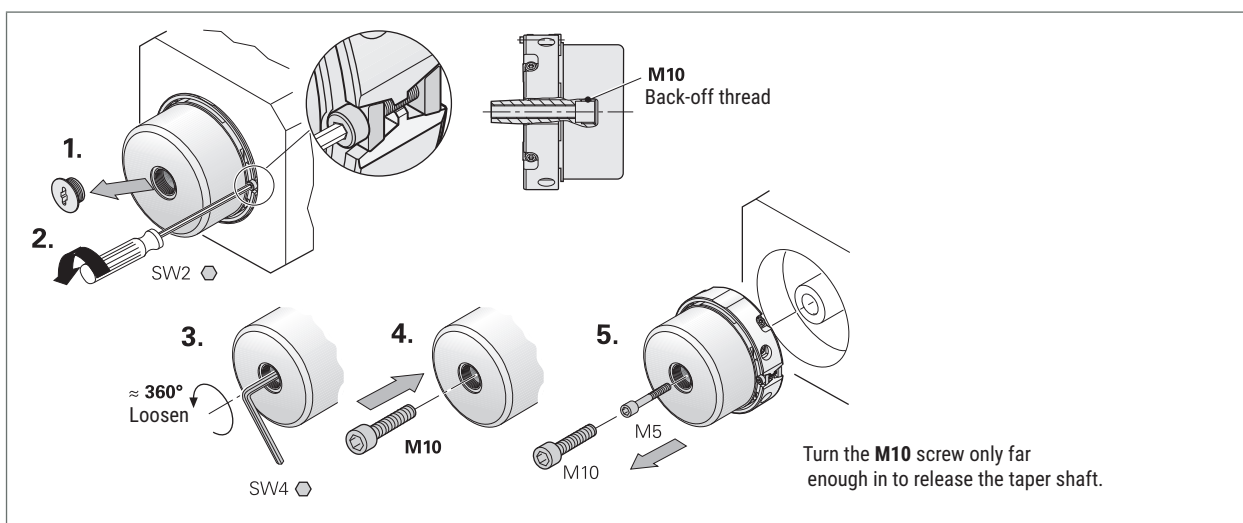
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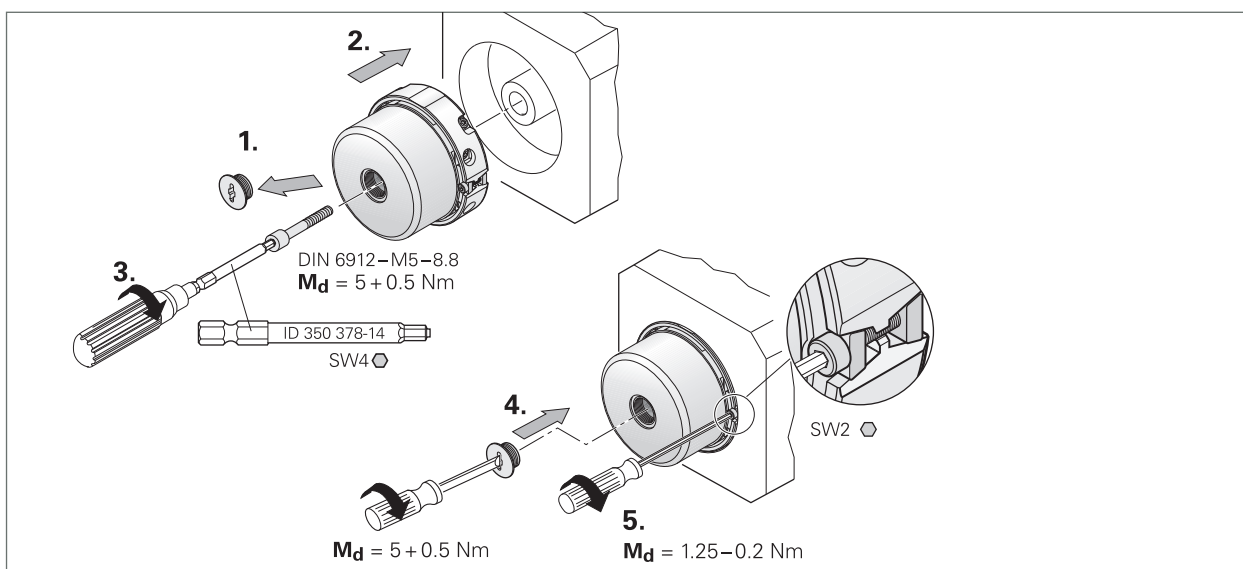
9.7. Replacing the measuring system

- ▶ The measuring system is only accessible from the rear side of the motor.
- ▶ See the mounting instructions for the Heidenhain encoder.
- ▶ Disassemble the measuring system only if this is necessary because of a defect. Remember to readjust the offset value after reassembly (see the inverter operating instructions).

Disassembly



Assembly



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10. Technical data

General	
Duty type:	S1 (S3-40% ED)
Traction sheave:	dia. 530 mm or dia. 650 mm
Traction sheave hardness:	mind. 220 HB 30
DE bearing:	self-aligning roller bearing
NDE bearing:	self-aligning roller bearing
Drive motor:	synchronous motor
perm. shaft load F_S :	up to 200 kN
Number of pole pairs:	11
Thermal class:	155 (F)
Degree of protection:	IP 23 M / IP 12 S
Winding protection:	triple PTC 150°C; triple therm. switch (NC contact) 130°C; therm. switch (NO contact) 60°C
Site conditions	
Max. altitude:	max. 1,000 m (derating required at higher altitudes)
Ambient temperature:	-5°C ... +40°C
Max. rel. humidity:	85 % at 20°C (no moisture condensation)
Separately driven fan	
Type:	D2E 146 AZ03
Operating voltage:	230 V AC; 50 Hz; 1,44 A
Capacitor:	7 μ F / 400 V DB

Dual-circuit fail-safe brake	
Motor:	WSG-25.1/2
Brake type:	BFK 466-61
Brake torque:	2/3 x 2.400 Nm
Air gap s_L :	0,4 \pm 0,1 mm
Max. air gap $s_{L\ max}$:	0,7 mm
Holding voltage:	103 V DC
Holding current:	2/3 x 1,4 A
Overexcitation voltage:	205 V DC
Overexcitation current:	2/3 x 2,7 A

Brake control units	
Type:	BEG-561-255-130 from intorq GmbH (accessories)
Operating voltage:	230 V AC (\pm 10%); 40...60 Hz
Dimensions:	52 x 22 x 38 (B x H x T)
Brake monitoring contacts	
Contact rating:	12...30 V DC / 0,01-0,1 A
Min. contact current:	10 mA
Mechanical life of contacts:	2 x 10 ⁶ switching operations

^{*)} Reference values. Achievable nominal load depends on specific lift system data.

The table is applicable to an overall shaft efficiency of approx. 73..85 % (counterweight: 50 %). It lists a standard selection of machines. The lift and project data will be adapted to actual site conditions and may deviate from the above values.

Motor / motor		WSG-25.1						WSG-25.2							
Drehmoment / torque S1 (S3-40 %) M _N [Nm]		1.750 (2.765)						2.200 (3.475)							
max. Drehmoment / max. torque M _{max} [Nm]		4.850						6.100							
Bremsmoment / brake torque M _{br} [Nm]		2 x 2.400 / 3 x 2.400						2 x 2.400 / 3 x 2.400							
Treibscheibe / traction sheave D _T [mm]		530			650			530			650				
für Nennlasten bis *) for loads up to *) Q [kg]		3.200			2.500			4.000			3.200				
Aufhängung / suspension		Tabelle gilt für / table applies for 2 : 1													
Motorströme gelten für 500...620 V Zwischenkreisspannung Motor currents applicable to 500...620 V d.c. link voltage	v [ms]	n _N [rpm]	P _N [kW]	I _N [A]	n _N [rpm]	P _N [kW]	I _N [A]	n _N [rpm]	P _N [kW]	I _N [A]	n _N [rpm]	P _N [kW]	I _N [A]		
	1,0	72	13,2	36,5	59	10,8	36,5	72	16,6	45	59	13,6	45		
	2,0	144	26,4	66	118	21,6	56	144	33,2	81	118	27,2	66		
	3,0	216	39,6	103	176	32,3	80	216	49,8	120	176	40,5	91		
	4,0	288	52,8	120	235	43,1	103	288	66,4	145	235	54,1	120		
	5.0	-			294	53,9	120	-			294	67,7	145		

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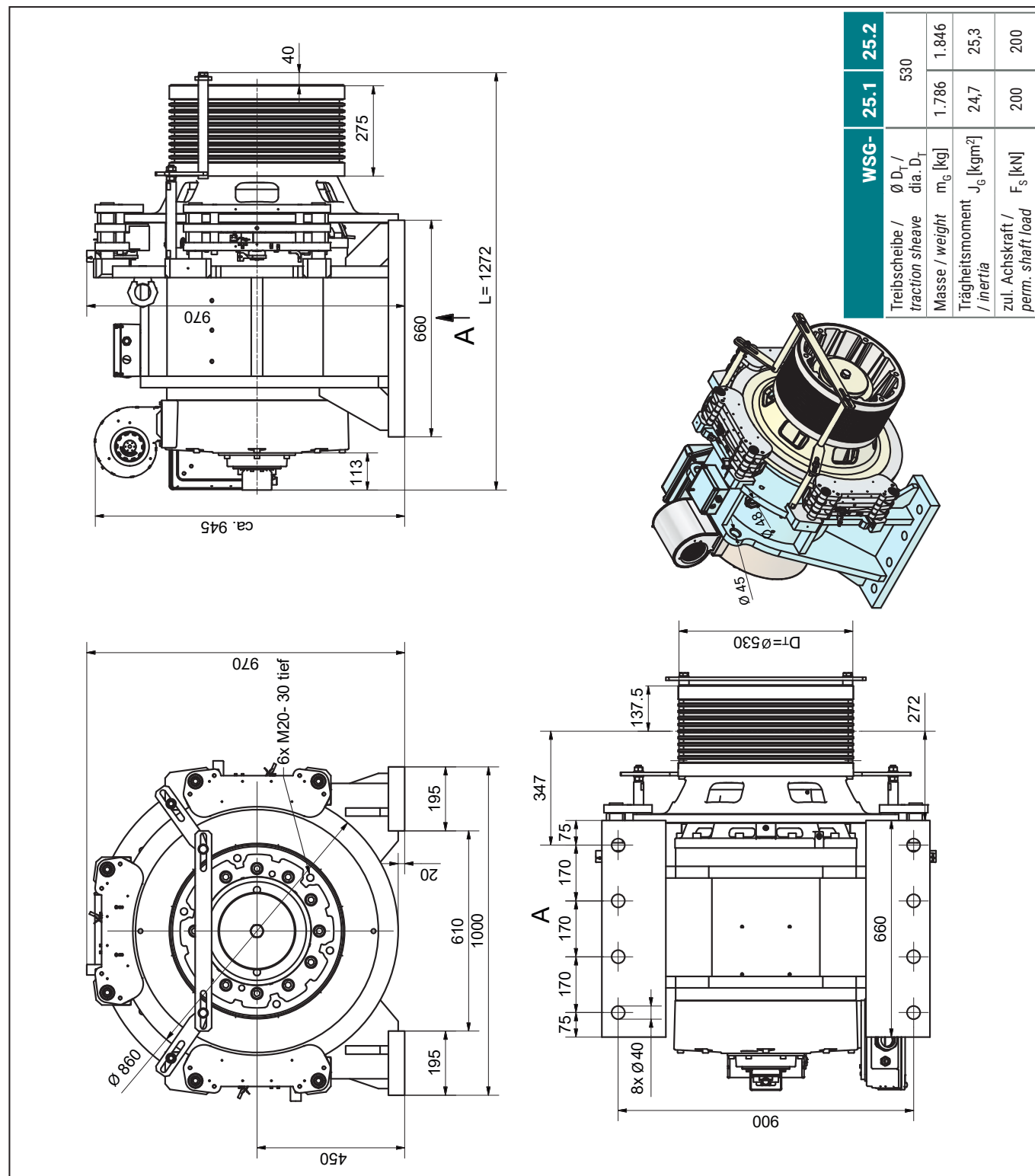
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11. Dimension drawing

11.1. WSG-25.1/2 with traction sheave dia. 530 mm



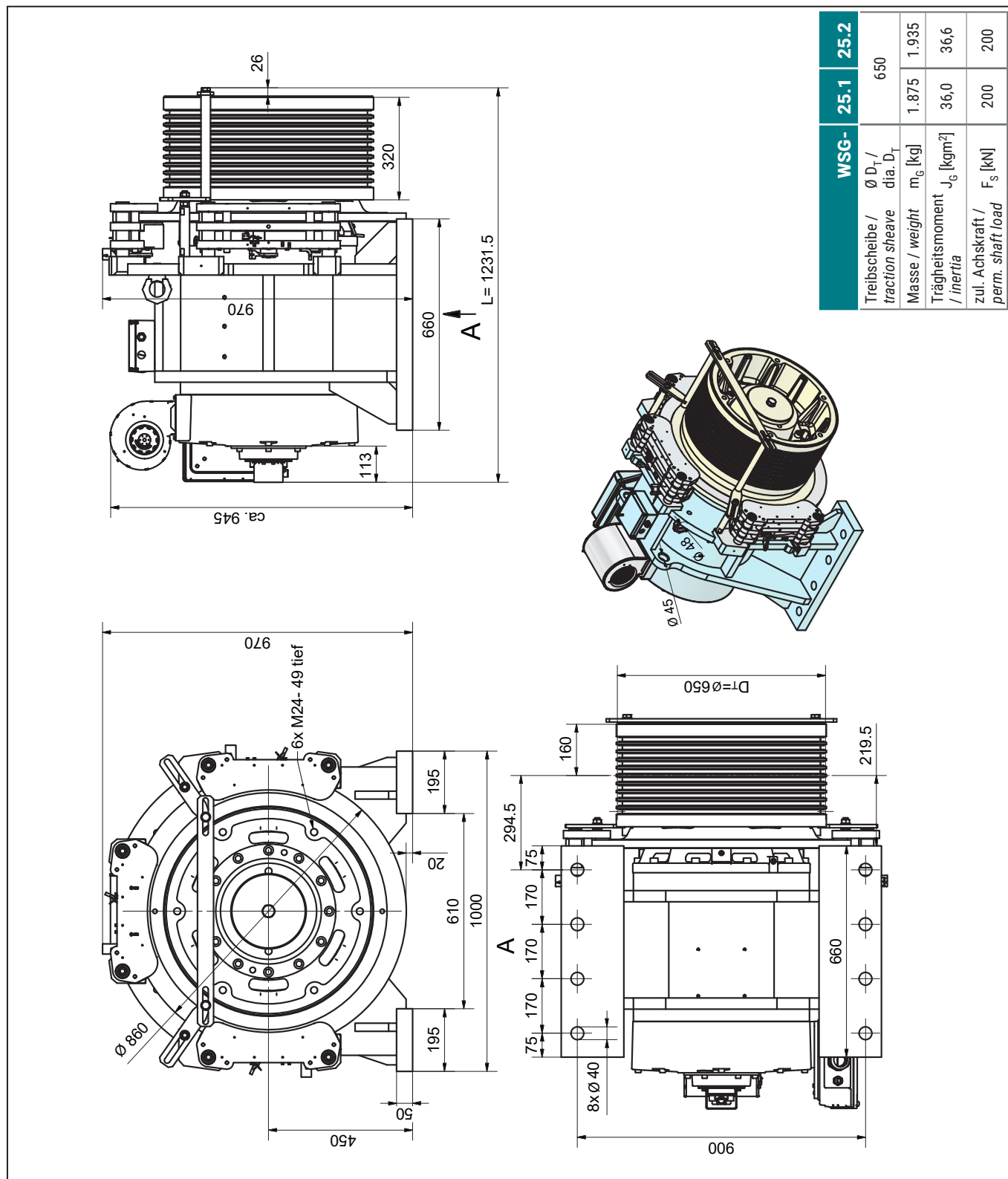
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11.2. WSG-25.1/2 with traction sheave dia. 650 mm



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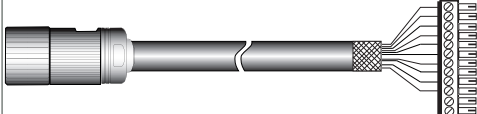
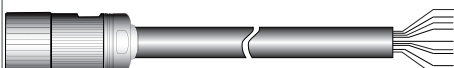

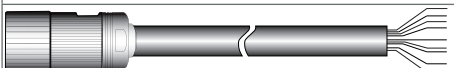


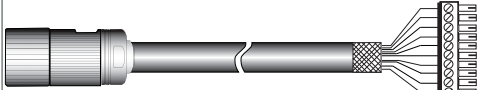
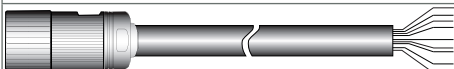


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12. Accessories

12.1. Connecting cable for measuring systems for ECN 1313 and ERN 1387

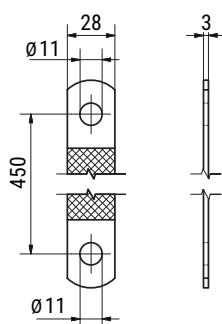
	Inverter type	Recommended encoder system	Recommended measurement system cable
	F-Pack WLD 302	ECN 1313 - EnDat	K 514 273 022-xx
	E-Pack Arkel ARCODE	ECN 1313 - (EnDat/SSI)	K 503 325 021-xx
	D-Pack Arkel ADrive CT unidrive SP / E	ECN 1313 - (EnDat/SSI)	K 502 452 021-xx
	Fuji Frenic	ECN 1313 - (EnDat/SSI)	K 502 679 022-xx
	RST Elektronik FRC	ECN 1313 - EnDat	K 508 752 022-xx
	GEFRAN (SIEI) AVY-L-M	ERN 1387	K 502 599 022-xx
	Vacon NXP	ECN 1313 - EnDat	K 503 289 021-xx
	Yaskawa/Omron L7 Telemecanique/Schneider Altivar 71	ECN 1313 - EnDat	K 503 715 022-xx
	KW Goliath Ziehl-Abegg 3C	ECN 1313 - EnDat	K 508 749 022-xx
	Ziehl-Abegg 4C	ECN 1313 - (EnDat/SSI)	K 504 503 022-xx

xx .. cable length [m]

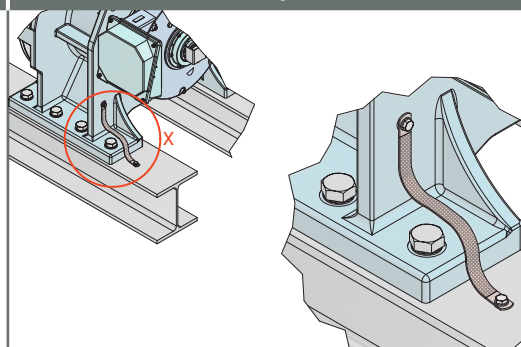
12.2. Potential equalisation

The rectangle conductor (ET K829712-450) is used for potential equalisation between the motor and the machine frame. Ensure that the connection points are metallic bright when using it.

Cu-flat braid (flexible)



Usage



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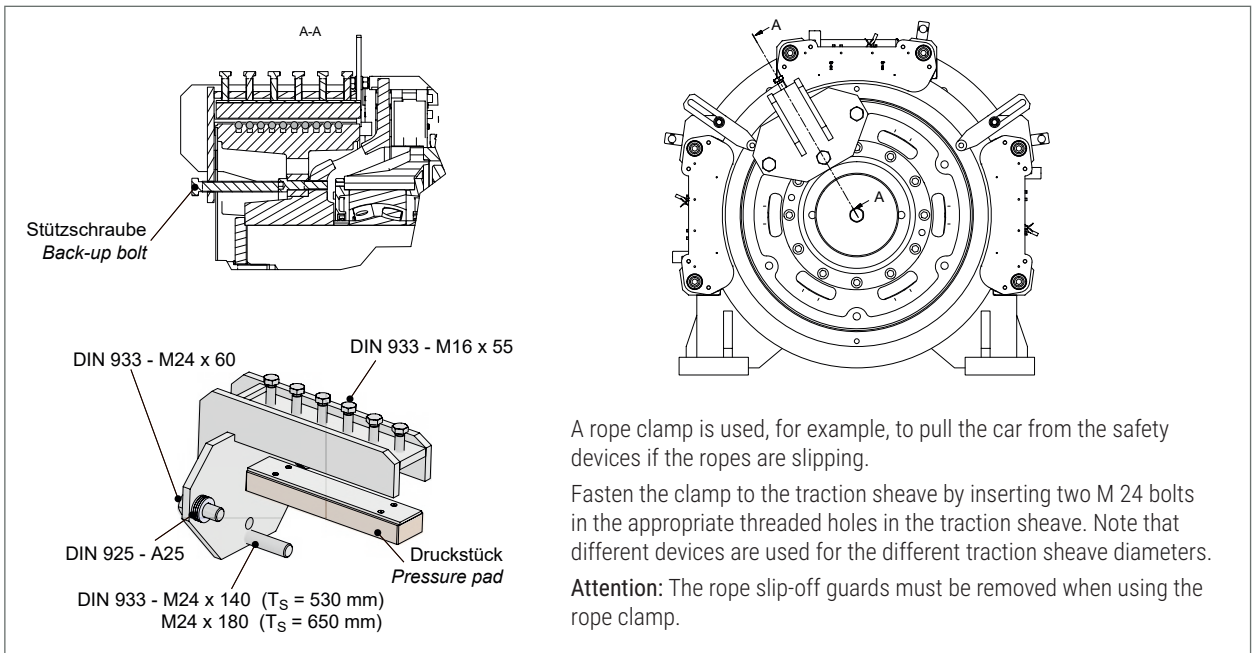
12.3. Cable set for motor and brake

Motor cable set

- KS 503 653 E21-xx - motor cable 4x16 mm²
 - KS 503 653 H21-xx - motor cable 4x50 mm²
- with xx...cable length [m]



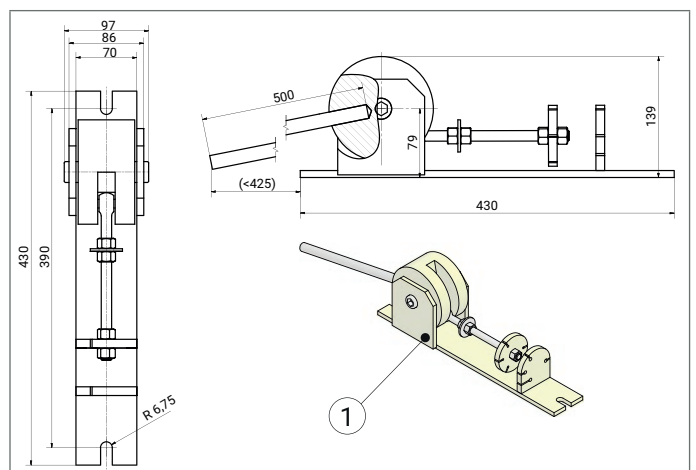
12.4. Rope clamp



12.5. Remote brake control by Bowden cable

The Bowden cable remote control is used to release the brakes mechanically in the event of an emergency. See section „8.2. Emergency evacuation“ on page 22 for details.

The standard length of the Bowden cable is 3 m. Other lengths are available on request.



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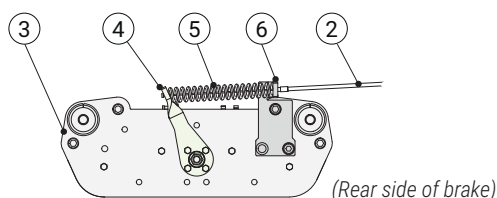
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12.5.1. Installation for new systems



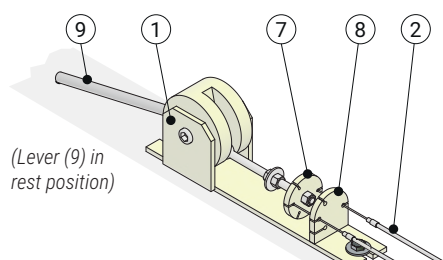
- ▶ Lock the car and the counterweight and ensure that all of the necessary safety precautions are observed for the lift system. The lift may move in an uncontrolled manner.
- ▶ Ideally, the manual releasing device should be installed without the ropes in place.

1. Install the lever block (1) with two M12 bolts (16) in a suitable location in the vicinity of the lift machine, e.g. on the machine frame.
2. Insert the Bowden cables (2) – the ends with the spring (5) – into the manual release lever (4) and the counterholder (6) of the brake (3)



3. Insert the Bowden cables (2) into the holders (7) and (8) of the lever block (1) with the lever (9) in the rest position (see picture below).

Caution. Install the Bowden cables symmetrically. Note the different configurations when using two or three brakes.

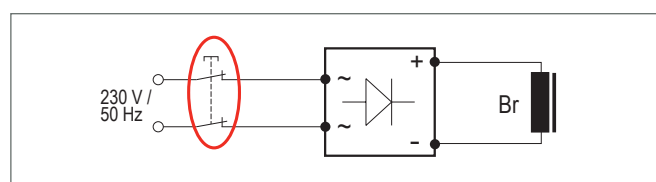
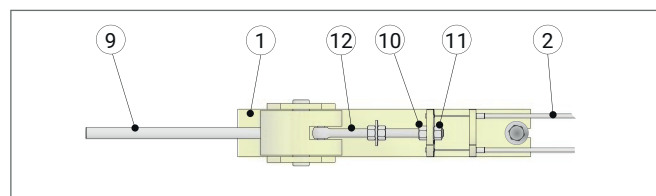
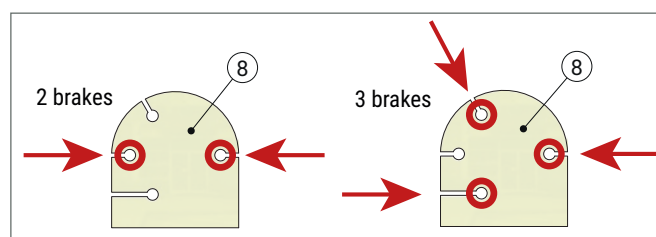
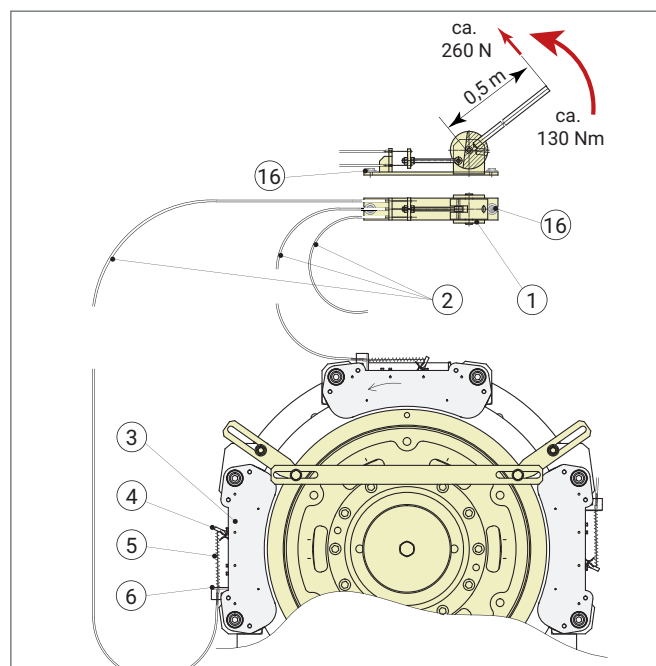


4. Tension the Bowden cables on the lever block (1) using the nuts (10 and 11) on the threaded rod (12). The manual release levers (4) of the brakes (3) must not move.

Caution. Do not operate the lever (9) during tensioning (in rest position).

The brakes must not be released.

5. Release the brakes electrically. Energise the brake solenoids using the control units. Check that the traction sheave of the motor can turn freely.



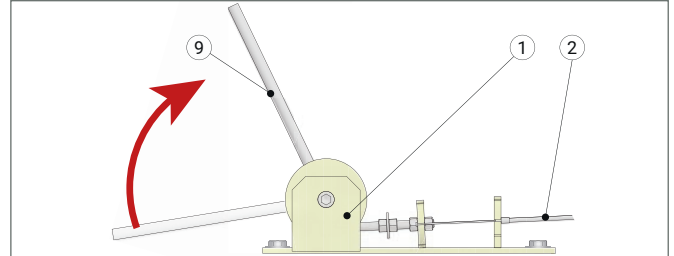
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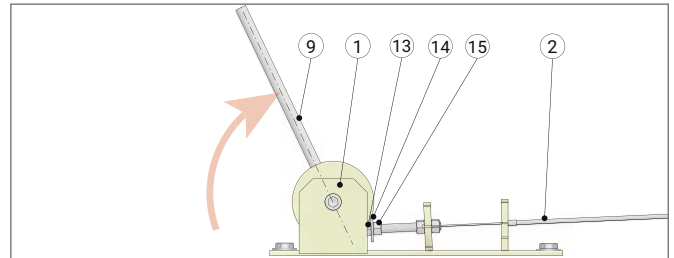
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6. Actuate the manual release lever (9) with minimal force until you encounter clear resistance.



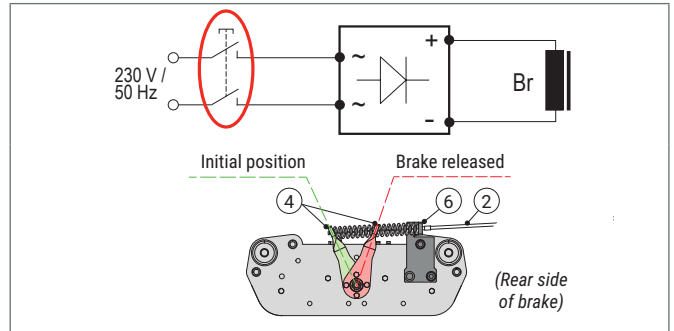
7. Mark this lever position and restrict the movement of the lever (9) by means of the disc (14) to prevent it from being pulled further.
To this end, lock the disc (14) on the threaded rod (12) in the appropriate position by tightening the lock nuts (13 and 15).



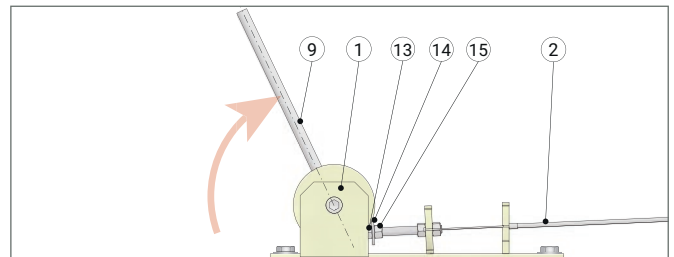
8. Once this has been done, set the lever (9) back to its rest position.
Disconnect the power supply to the brakes.

The traction sheave must be locked and must not be allowed to turn.

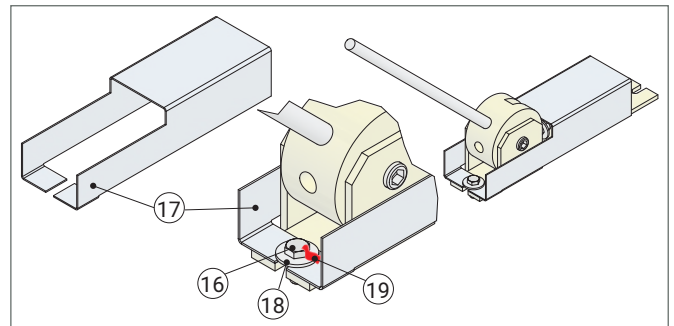
Ensure that the manual release levers (4) on the individual partial brakes are back to their initial positions.



9. Perform at least three functional tests by operating the lever (9) on the lever block (1) until it can go no further (14), and check that the traction sheave can move freely.



10. Loosen the fixing bolt (16) on the lever block (1) and place the protection cover (17) on the lever block (1).
Then fasten the lever block (1) and the protective cover (17) together with the screw (16) and the supplied washer (18) DIN 9021 - A 13.
Then seal the bolt (16) and washer (18), e.g. with locking varnish (19) or with a safety label.



- Install the Bowden cables only with large radii (bending radius > 0.5m, if possible). Do not allow any loops to be formed.

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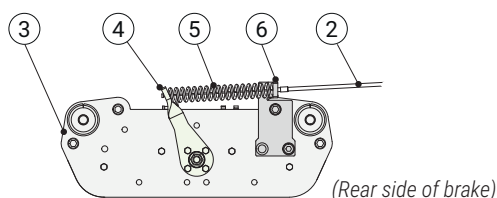
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12.5.2. Installation when retrofitting systems



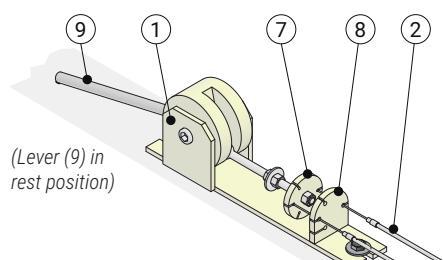
- ▶ Lock the car and the counterweight and ensure that all of the necessary safety precautions are observed for the lift system. The lift may move in an uncontrolled manner.
- ▶ Install the manual releasing device while the brake is disconnected from the power supply.

1. Install the lever block (1) with two M12 bolts (16) in a suitable location in the vicinity of the lift machine, e.g. on the machine frame.
2. Insert the Bowden cables (2) – the ends with the spring (5) – into the manual release lever (4) and the counter-holder (6) of the brake (3)



3. Insert the Bowden cables (2) into the holders (7) and (8) of the lever block (1) with the lever (9) in the rest position (see picture below).

Caution. Install the Bowden cables symmetrically. Note the different configurations when using two or three brakes.



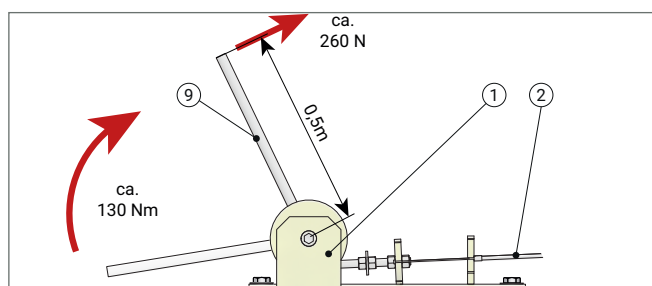
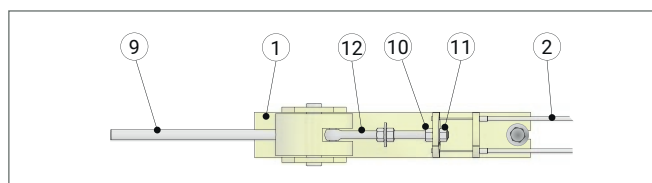
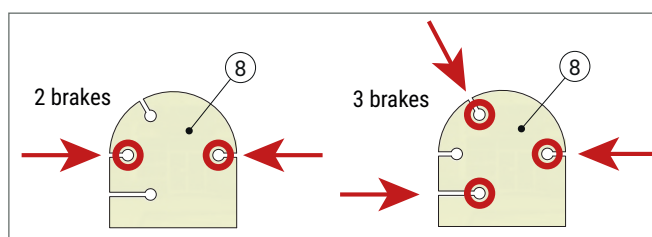
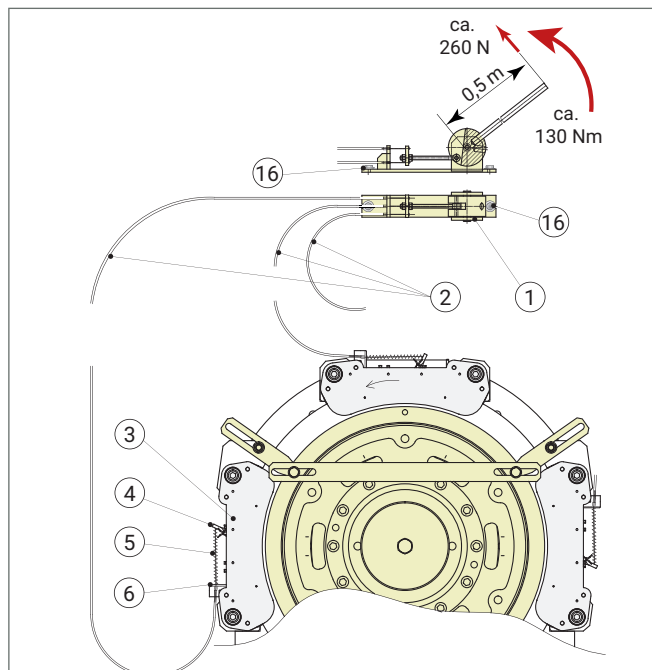
4. Tension the Bowden cables on the lever block (1) using the nuts (10 and 11) on the threaded rod (12). The manual release levers (4) of the brakes (3) must not move.

Caution. Do not operate the lever (9) during tensioning (in rest position).

The brakes must not be released.

5. Perform at least three functional tests by actuating the lever (9) on the lever block (1) until the brakes are released. (Make a visual check of the brake air gap; check that the traction sheave can turn freely.)

A force of ca. 260 N should be required to release the brakes with a lever length of 0.5 m (if 3 partial brakes are provided). Check the installation if greater force than this is required.



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- More excessive force (> 300 N with a 0.5 m lever length) is unacceptable, as it can damage the brakes beyond repair.

- Set the lever (9) back to its rest position once the test is completed (check the air gap with the traction sheave locked).

Ensure that the manual release levers (4) on the individual partial brakes are back to their initial positions (identification by arrow symbols).

- Upon completion of the three functional tests, release the brake once again and mark the position of the lever at which the traction sheave can turn freely.

- Restrict the movement of the lever (9) using the disc (14) to prevent it from being pulled further (with a tolerance of approx. +3°).

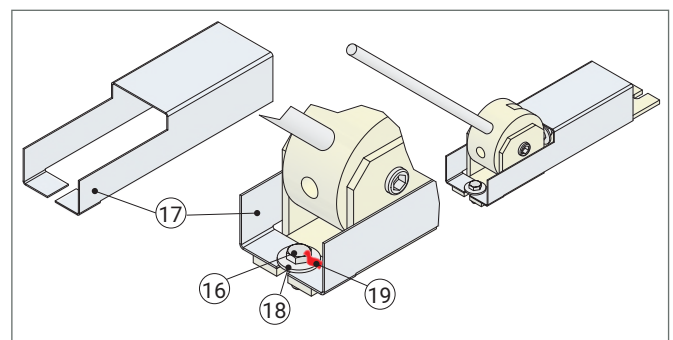
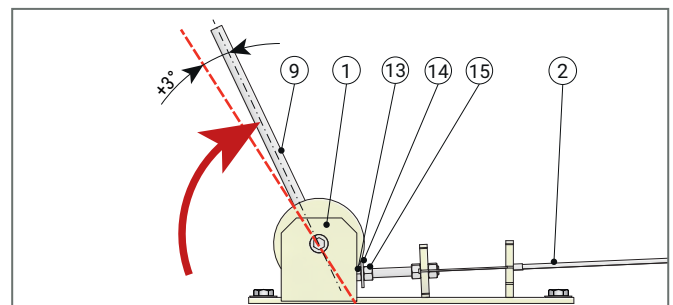
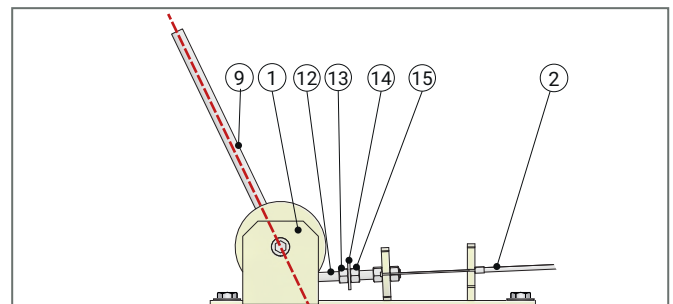
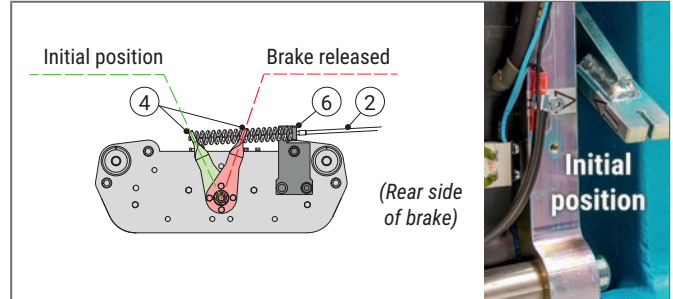
To this end, lock the disc (14) on the threaded rod (12) in the appropriate position by tightening the lock nuts (13 and 15).

- Loosen the fixing bolt (16) on the lever block (1) and place the protection cover (17) on the lever block (1).

Then fasten the lever block (1) and the protective cover (17) together with the screw (16) and the supplied washer (18) DIN 9021 - A 13.

Then seal the bolt (16) and washer (18), e.g. with locking varnish (19) or with a safety label.

Once this has been done, check once again the functioning of the manual release unit.



- Install the Bowden cables only with large radii (bending radius > 0.5 m, if possible). Do not allow any loops to be formed.

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12.6. Return motion device



► Only qualified service personnel are permitted to take any evacuation measures in the event of an emergency.

The return motion device is used to move the lift manually in an emergency, such as if the car is retained by the safety device.

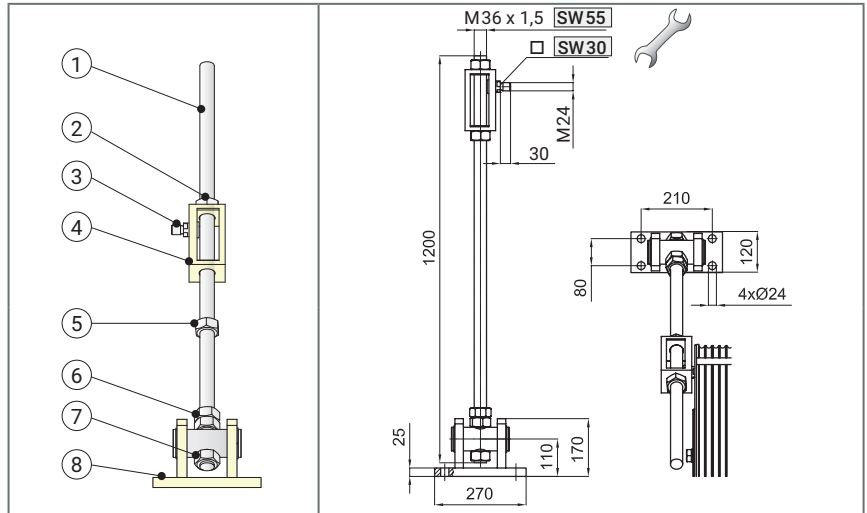


Caution. When using the return motion device, beware of the potential risk of collision with parts of the lift machine or other safety devices, such as the rope slip-off guards.



Special tools required

- 30 mm jaw spanner
- 55 mm jaw spanner

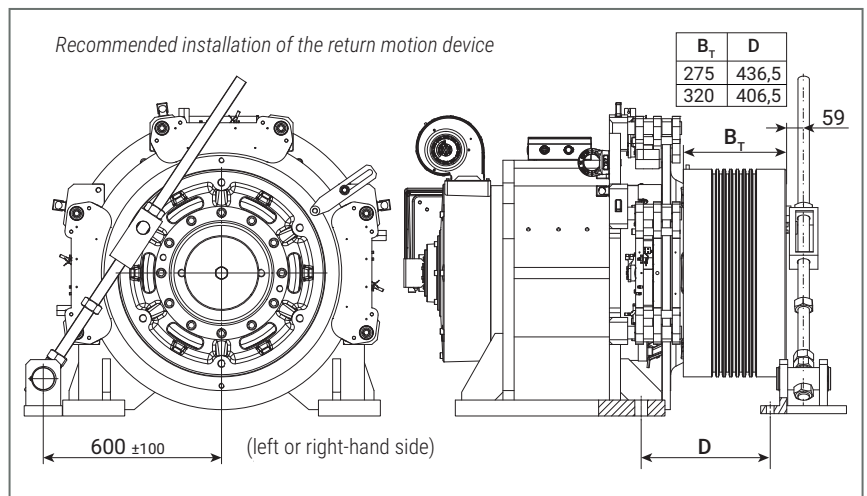


Installation

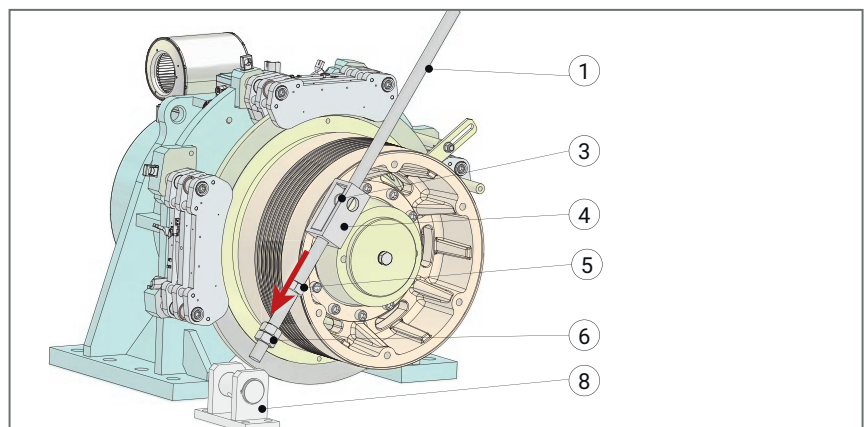
1. Slacken the nut (7) and remove the bearing block (8) from the threaded rod (1), which is provided with a fine thread (M36 x 1,5).
2. Install the bearing block (8) as recommended in the drawing on the machine frame. It can be mounted to the left or right-hand side of the machine.



Warning: Ensure that the safety circuit of the lift system is interrupted by a switching contact while mounting the bearing block (8), to prevent any unintentional electric operation of the machine.



3. Remove nut (2) from the threaded rod (1) and turn nut (5) towards nuts (6).
4. Screw the slide block (4) into a suitably located threaded hole in the traction sheave with the threaded bolt (3); the threaded rod (1) should be loosely inserted into the slide block (4).



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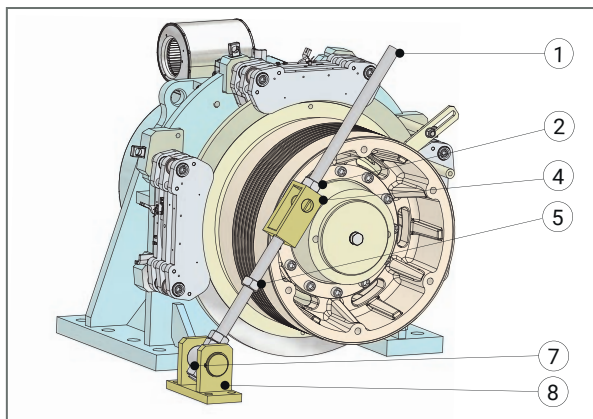
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5. Insert the threaded rod (1) into the bearing block (8) and fasten it using the nut (7).

Ensure that the nut (7) is completely screwed onto the threaded rod (1) with 2-4 mm of thread left protruding beyond the nut. The turning movement of the lever must not be obstructed.

6. Screw the nut (2) onto the threaded rod (1) flush with the slide block (4).

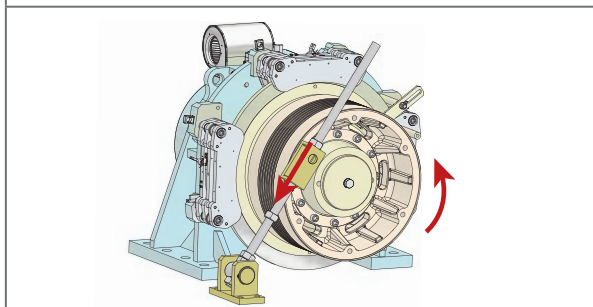
The return motion device is now ready for use.



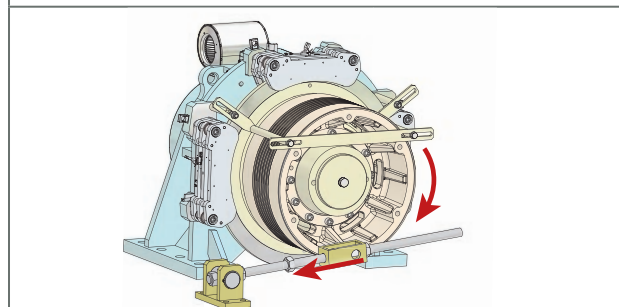
Information

- As a rule, the threaded rod (1) may only be subjected to compressive load.
- This causes the traction sheave to rotate anti-clockwise in the version shown above.

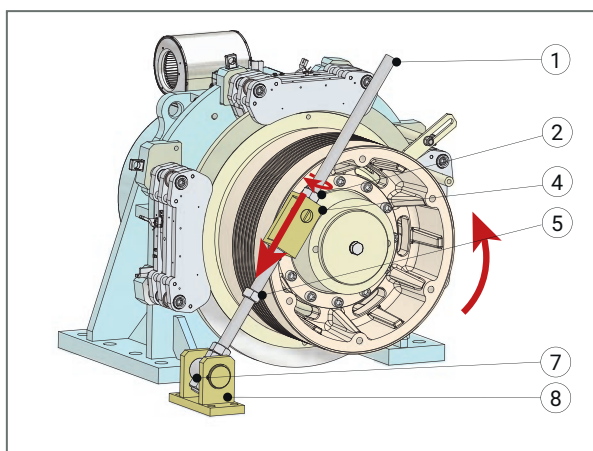
Anti-clockwise rotation of the traction sheave



Alternative position of the return motion device for clockwise rotation of the traction sheave



Use of the return motion device



1. Once the return motion device has been installed correctly, the brakes of the lift machine can be released by means of the hand release lever or electrically.
2. Turn the nut (2) clockwise; the traction sheave will rotate anti-clockwise.
Make sure that the nut (5) does not obstruct the movement of the slide block (4).
3. If necessary, the slide block (4) can be repositioned by inserting the threaded bolt (3) into a subsequent hole in the traction sheave.



- When changing the position of the threaded bolt in the holes, the lift must be secured by its brakes.



- Make sure that you restore the lift system to its original state after completing the emergency evacuation. Take particular care to remove the lever extensions and all parts of the mechanical return motion device.

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13. Spare parts



Information

► For the spare parts refer to "Spare Part Document SM.8.006024.EN"




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14. Annex

14.1. Calculation of the traction sheave shaft WSG-25



Industrie Service

**Mehr Sicherheit.
Mehr Wert.**

**Report
on the review of calculation documents**

Customer: WITTUR Electric Drives GmbH
Offenburger Strasse 3
01189 Dresden

Subject of inspection: Traction sheave shaft for lift machines,
types xSG-25.1, xSG-25.2

Inspection order: Review of the traction sheave shaft calculation

Specification: DIN 743
Shafts and axles; calculation of load capacity

Scope:

- Review of the calculations to ensure compliance with the specification
- Review of the calculation results
- Review of the calculation documents to ensure compliance with the data in the drawings


Inspector: Dipl.-Ing. Thoralf Mührel
Technical Expert

Datum: 12.01.2012

Unsere Zeichen:
IS-FT1-DRE/Dmü

Dokument:
20120112_xSG-25_X_en.docx


Das Dokument besteht aus
2 Seiten.
Seite 1 von 2



Swiss TS
ISO 9001

Sitz: München
Amtsgericht München HRB 96 869
USt-IdNr. DE129484218
Informationen gemäß § 2 Abs. 1 DL-InfoV
unter www.tuev-sued.de/impressum

Aufsichtsrat:
Karsten Xander (Vorsitzender)
Geschäftsführer:
Ferdinand Neuwieser (Sprecher),
Dr. Ulrich Klotz, Thomas Kalnz

Telefon: +49 351 4202-213
Telefax: +49 351 4202-242
www.tuev-sued.de/is


TÜV SÜD Industrie Service GmbH
Standort Dresden
Abteilung Fördertechnik
Drescherhäuser 5d
01159 Dresden
Deutschland

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Zeichen/Erstelldatum: IS-FT1-DRE/Dmü / 12.01.2012
Dokument: 20120112_xSG-25_X_en.docx



1. Calculation documents

The following technical documents were to be reviewed:

- Calculation documents 25FE1.DOC pages 1 to 5 dated 12/01/2012.
- Drawing no. 512 410 (Revision Äm 201/11, 18/08/2011).

2. Technical data

The data which are of relevance to the calculation are specified as follows in the calculation document 25FE1.DOC :

– max. shaft load:	200.0 kN
– max. magnetic pull:	1.9 kN
– traction sheave+hub weight:	417.0 kg
– rotor weight:	121.0 kg

3. Results of the review

The calculations submitted were drawn up in compliance with the specification.

The values determined in the safety verification calculation were confirmed by performing a control calculation.

The data in drawings nos. 512 410 comply with the values relevant for the calculation.

4. Comments

The review did not cover verification of the rotor hub/shaft, traction sheave/shaft and key shrink fits, or of the bearing life.

The Inspector







Thoralf Mührel



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14.2. EU type-examination Certificate EU-BD 908

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ CERTIFICADO ◆ CERTIFICAT	 Industrie Service
	EU TYPE-EXAMINATION CERTIFICATE According to Annex IV, Part A of 2014/33/EU Directive
	Certificate No.: EU-BD 908
	Certification Body of the Notified Body: TÜV SÜD Industrie Service GmbH Westendstr. 199 80686 Munich - Germany Identification No. 0036
	Certificate Holder: INTORQ GmbH & Co. KG Wülmser Weg 5 31855 Aerzen - Germany
	Manufacturer of the Test Sample: INTORQ GmbH & Co. KG Wülmser Weg 5 31855 Aerzen - Germany <small>(Manufacturer of Serial Production – see Enclosure)</small>
	Product: Braking device acting on the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and braking element against unintended car movement
	Type: BFK466-61
	Directive: 2014/33/EU
	Reference Standards: EN 81-20:2014 EN 81-50:2014 EN 81-1:1998+A3:2009
Test Report: EU-BD 908 of 2016-03-18	
Outcome: The safety component conforms to the essential health and safety requirements of the mentioned Directive as long as the requirements of the annex of this certificate are kept.	
Date of Issue: 2016-03-18	
Date of Validity: from 2016-04-20	
 Werner Rau Certification Body "lifts and cranes"	
	
	

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Annex to the EC Type-Examination Certificate No. EU-BD 908 of 2016-03-18



1 Scope of application

1.1 Use as braking device – part of the the protection device against overspeed for the car moving in upwards direction – permissible brake force and tripping speed

1.1.1 Permissible brake force when the braking device acts on the brake disk while the car is moving upward 6011 N

The brake force refers to a single brake on the brake disc diameter effectively

1.1.2 Maximum tripping speed of the overspeed governor and maximum rated speed of the lift

The maximum tripping speed of the overspeed governor and the maximum rated speed of the lift must be calculated on the basis of the brake disc maximum tripping speed (gliding speed) as outlined below taking into account the brake disc diameter effectively, traction sheave diameter and car suspension.

$$v = \frac{D_{TS} \times v_{BS}}{D_{BS} \times i}$$

v = Tripping (rated) speed (m/s)
 D_{TS} = Diameter of the traction sheave from rope's center to rope's center (m)
 D_{BS} = Diameter of the brake disk effectively (m)
 v_{BS} = Gliding speed on the brake disk diameter effectively (m/s)
 i = Ratio of the car suspension

Maximum tripping speed on the brake disk diameter effectively 19.02 m/s

1.2 Use as braking element – part of the protection device against unintended car movement (acting in up and down direction) – permissible brake force, tripping speed and characteristics

1.2.1 Nominal brake force and response times with relation to a brand-new brake element

Nominal brake force* [N]	Maximum response times** [ms]		
	without / with overexcitation		
	t_{10}	t_{50}	t_{90}
6011	57 / 68	119 / 131	181 / 194

Interim values can be interpolated

Explanations:

* **Nominal brake force:** Brake force assured for installation operation by the safety component manufacturer.

** **Response times:** t_x time difference between the drop of the braking power until establishing X% of the nominal brake force, t_{50} optionally calculated $t_{50} = (t_{10} + t_{90})/2$ or value taken from the examination recording

1.2.2 Assigned execution features

Type of powering / deactivation continuous current / continuous current end

Brake control single

Nominal air gap 0.35 mm

Damping elements YES

Overexcitation at double non-release voltage

Maximum tripping speed on the brake disc diameter effectively 19.02 m/s

Note: The English text is a translation of the German original. In case of any discrepancy, the German version is valid only.

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Annex to the EC Type-Examination Certificate No. EU-BD 908 of 2016-03-18



2 Conditions

- 2.1 Above mentioned safety component represents only a part at the protection device against overspeed for the car moving in upwards direction and unintended car movement. Only in combination with a detecting and triggering component in accordance with the standard (two separate components also possible), which must be subjected to an own type-examination, can the system created fulfil the requirements for a protection device.
- 2.2 The installer of a lift must create an examination instruction to fulfil the overall concept, add it to the lift documentation and provide any necessary tools or measuring devices, which allow a safe examination (e. g. with closed shaft doors).
- 2.3 The single brakes have to be arranged symmetrically around the circumference of the brake disc. In order to comply with the redundancy required in section 5.6.6.2 of EN 81-20:2014 (D), at least two braking circuits (single brake actuator) must be used.
- 2.4 Where more than two braking circuits are used, redundancy requirements necessitate that a sufficient braking effect as outlined in section 5.9.2.2.2.1 of EN 81-20:2014 (D) is still maintained if one of the braking circuit fails. It is not assumed that two braking circuits will fail simultaneously.
- 2.5 The manufacturer of the drive unit must provide calculation evidence that the connection traction sheave – shaft – brake disc and the shaft itself is sufficiently safe, if the brake disc is not a direct component of the traction sheave (e. g. casted on). The shaft itself has to be statically supported in two points.
 The calculation evidence must be enclosed with the technical documentation of the lift.
- 2.6 The setting of the brake force has to be secured against unauthorized adjustment (e. g. sealing lacquer).
- 2.7 The identification drawing no. 5020186 including stamp dated 2016-03-18 shall be included to the EU type-examination for the identification and information of the general construction and operation and distinctness of the approved type.
- 2.8 The EU type-examination certificate may only be used in combination with the corresponding annex and enclosure (List of authorized manufacturer of the serial production). The enclosure will be updated immediately after any change by the certification holder.

3 Remarks

- 3.1 In the scope of this type-examination it was found out, that the brake device also functions as a brake for normal operation (using at least two single brakes), is designed as a redundant system and therefore meets the requirements to be used also as a part of the protection device against overspeed for the car moving in upwards direction and as braking element as part of the protection device against unintended car movement.
- 3.2 Checking whether the requirements as per section 5.9.2.2 of EN 81-20:2014 (D) have been complied with is not part of this type examination.
- 3.3 Other requirements of the standard, such as reduction of brake moment respectively brake force due to wear or operational caused changes of traction are not part of this type examination.
- 3.4 This EU type-examination certificate was issued according to the following standards:
 - EN 81-1:1998 + A3:2009 (D), Annex F.7 and F.8
 - EN 81-20:2014 (D), part 5.6.6.11, 5.6.7.13
 - EN 81-50:2014 (D), part 5.7 and 5.8
- 3.5 A revision of this EU type-examination certificate is inevitable in case of changes or additions of the above mentioned standards or of changes of state of the art.

Note: The English text is a translation of the German original. In case of any discrepancy, the German version is valid only.

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Enclosure to the EU Type-Examination Certificate No. EU-BD 908 of 2016-03-18



Authorised Manufacturer of Serial Production – Production Sites (valid from: 2016-03-18):

Company INTORQ GmbH & Co. KG
Address Wülmser Weg 5
31855 Aerzen – Germany

- END OF DOCUMENT -

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14.3. UKCA type-examination Certificate of the brake

			
		<p>Kendrion INTORQ GmbH Wülmsen Weg 5 31855 Aerzen Postfach 11 03 31849 Aerzen Deutschland T +49 5154 70534-0 F +49 5154 70534-100 deae-info@kendrion.com www.kendrion.com Geschäftsführer: Dr. Andreas Laschet Lars Knoke</p>	
<h2>Declaration of Conformity</h2>			
<p>We hereby declare under our sole responsibility that the product(s)</p>			
Description:	Electromagnetically released spring-applied brake		
Type:	INTORQ BFK455, INTORQ BFK464, INTORQ BFK466		
Function:	Braking device acting on the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and breaking element against unintended car movement.		
<p>Year of manufacture: 2022 ff.</p>			
<p>fulfills all the relevant provisions of the regulations:</p> <ul style="list-style-type: none"> • Health and Safety: Supply of Machinery (Safety) Regulations 2008 • Electric Equipment (Safety) Regulations 2016 • Lifts Regulations 2016 			
<p>Applied designated standards:</p>			
• EN ISO 12100	Safety of machinery		
• EN 60204-1	Safety of machinery – Electrical equipment of machines - Part 1 – General requirements		
• EN 81-20	Safety rules for the construction and installation of lifts – Lifts for the transport of persons and goods – Part 20: Passenger and goods lifts		
• EN 81-50	Safety rules for the construction and installation of lifts – Examination and tests – Part 50: Design rules, calculations, examination and tests lift components		
Deutsche Bank AG BIC: DEUTDE2HXXX IBAN: DE05 2507 0070 0026 2501 00	Commerzbank Hannover BIC: DRESDEFF250, IBAN: DE12 2508 0020 0701 2421 00	Handelsregister AG Hannover, HRB 220878 UST-ID-Nr. DE 814 222 523	
Sparkasse Hameln-Weserbergland BIC: NOLADE21SWB IBAN: DE88 2545 0110 0000 8035 69	HypoVereinsbank BIC: HYVEDEMM300 IBAN: DE71 2003 0000 0010 8508 16		

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page 2 - UK-Declaration of Conformity

KENDRION

INTORQ

POWERED BY KENDRION

Other technical standards and specifications used:

VDE 0580 Electromagnetic devices and components –
 General specifications

EN 60529 Degrees of protection provided by enclosures

This declaration of conformity is issued based on the EU-type examination carried out by / the quality assurance system approved by:

TÜV SÜD Industrie Service GmbH
 Westendstraße 199
 80686 München / Germany

Identification number 0036

Type	Type examination 2014/33EU
BFK455-25	EU-BD 1077
BFK455-28	EU-BD 881
BFK464-17R	EU-BD 1051
BFK464-18R	EU-BD 1056
BFK464-19R	EU-BD 1055
BFK464-20R	EU-BD 1034
BFK464-22R	EU-BD 1054
BFK464-25R	EU-BD 1053
BFK464-28R	EU-BD 1052
BFK466-55	EU-BD 715
BFK466-61	EU-BD 908



Lars Knoke
 Managing Director



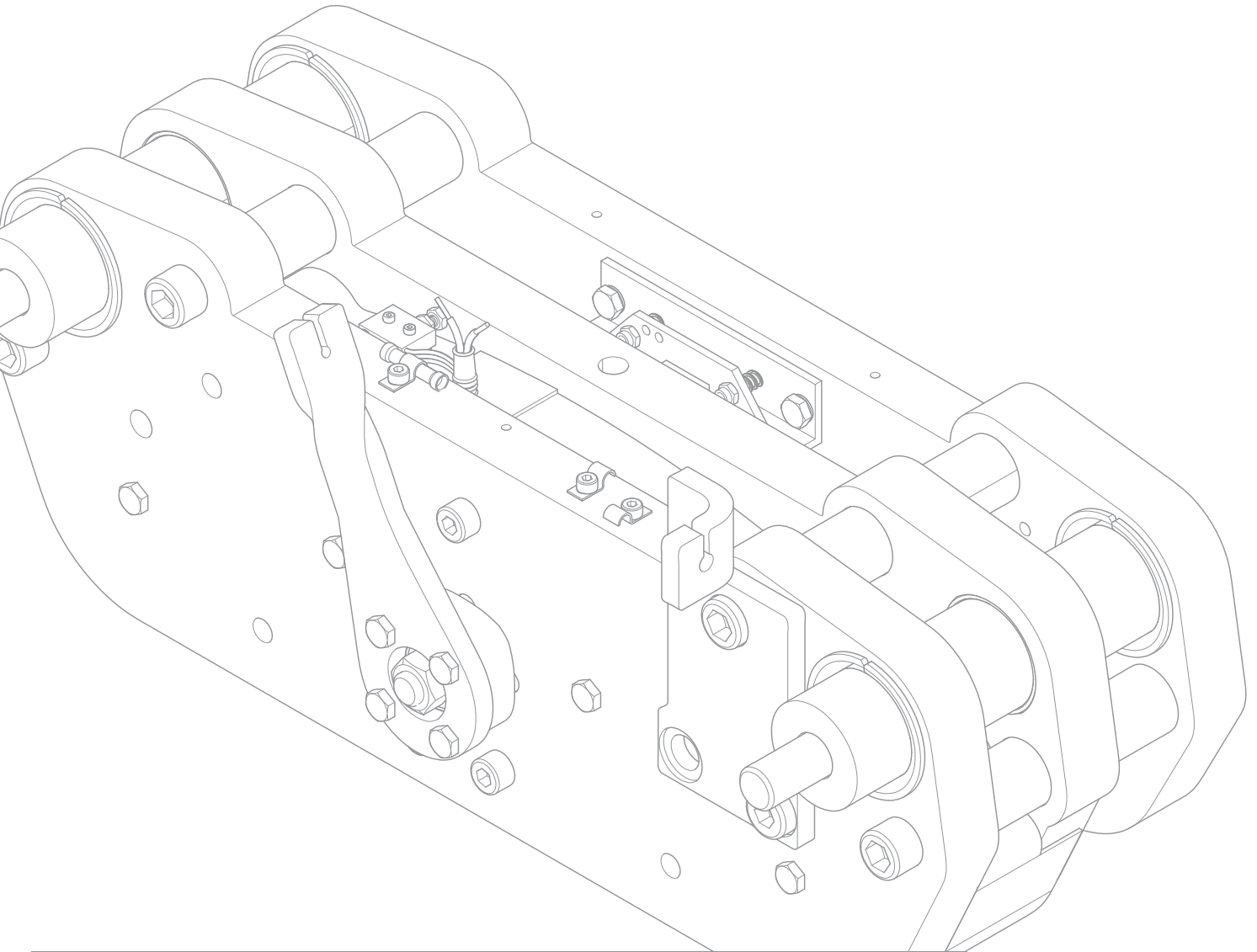
Winfried Küter
 Head of Technology Industrial Brakes

Aerzen, October 14, 2022

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INTORQ

setting the standard



INTORQ BFK466-61

Multi-pole spring-loaded brake

Translation of the Original Operating Instructions

Product key

	INTORQ	B	FK	466	-	□□
A						
B						
C						
D						

Legend for the product key

INTORQ BFK466

A	Product group	Brakes
B	Product type	Spring-applied brake
C	Type	466
D	Size	61

Not coded: Supply voltage, hub bore hole, options


Identification

Packaging label	Example
Manufacturer	Type No.
Type	Bar code
Designation	Qty. per box
Rated/holding voltage	Rated frictional force
Rated/holding power	Packaging date
Model identification	CE mark
Addition	



Nameplate	Example
Manufacturer	
Type	Model identification
Rated/holding voltage	Rated/holding power
Type No.	Rated frictional force
	Date of manufacture



Product traceability sticker		Example
Type	QR code	<div> <div>Product Traceability</div> <div> <div>BFK466-61</div> <div>33001308</div> <div>1000061653</div> <div>INTORQ GmbH & Co. KG</div> <div>31855 Aerzen DE</div> </div> <div>  </div> </div>
Type No.		
Serial number		
Manufacturer		

Document history

Material number	Version			Description
33002314	1.0	04/2016	SC	First edition

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1 Preface and general information

1.1 About these Operating Instructions

- These Operating Instructions will help you to work safely with the multi-pole spring-applied brake. They contain safety instructions that must be followed.
- All persons working on or with the multi-pole spring-applied brake must have these Operating Instructions available and observe the information and notes relevant for their work.
- The Operating Instructions must always be in a complete and perfectly readable condition.

1.2 Terminology used

Term	In the following text used for
Spring-applied brake	Multi-pole spring-loaded brake
Drive system	Drive systems with spring-applied brakes and other drive components




1.3 Abbreviations used

Letter symbol	Unit	Designation
F_R	N	Rated frictional force
I	A	Current
I_H	A	Holding current, at 20 °C and holding voltage
I_L	A	Release current, at 20 °C and release voltage
I_N	A	Rated current, at 20 °C and rated voltage
M_A	Nm	Tightening torque of fixing screws
M_{dyn}	Nm	Braking torque at a constant speed of rotation
M_K	Nm	Rated torque of the brake, rated value at a relative speed of rotation of 100 rpm
n_{max}	rpm	Maximum occurring speed of rotation during the slipping time t_3
P_H	W	Coil power during holding, after voltage change-over and 20 °C
P_L	W	Coil power during release, before voltage change-over and 20 °C
P_N	W	Rated coil power, at rated voltage and 20 °C
Q	J	Quantity of heat/energy
Q_E	J	Max. permissible friction energy for one-time switching, thermal parameter of the brake
Q_R	J	Braking energy, friction energy

Letter symbol	Unit	Designation
Q_{Smax}	J	Maximally permissible friction energy for cyclic switching, depending on the switching frequency
R_m	N/mm ²	Tensile strength
R_N	Ohms	Rated coil resistance at 20 °C
R_z	µm	Averaged surface roughness
S_h	1/h	Switching frequency: the number of switching operations evenly spread over the time unit
S_{hue}	1/h	Transition switching frequency, thermal parameter of the brake
S_{hmax}	1/h	Maximum permissible switching frequency, depending on the friction energy per switching operation
s_L	mm	Air gap: the lift of the armature plate while the brake is switched
s_{LN}	mm	Rated air gap
s_{Lmin}	mm	Minimum air gap
s_{Lmax}	mm	Maximum air gap
s_{HL}	mm	Air gap for manual release
t_1	ms	Engagement time, sum of the delay time and braking torque - rise time $t_1 = t_{11} + t_{12}$
t_2	ms	Disengagement time, time from switching the stator until reaching 0.1 M_{dyn}
t_3	ms	Slipping time, operation time of the brake (according to t_{11}) until standstill
t_{11}	ms	Delay during engagement (time from switching off the supply voltage to the beginning of the torque rise)
t_{12}	ms	Rise time of the braking torque, time from the start of torque rise until reaching the braking torque
t_{ue}	s	Overexcitation time
U	V	Voltage
U_H	V DC	Holding voltage, after voltage change-over
U_L	V DC	Release voltage, before voltage change-over
U_N	V DC	Rated coil voltage; in the case of brakes requiring a voltage change-over, U_N equals U_L

1.4 Conventions in use

This document uses the following styles to distinguish between different types of information:




Spelling of numbers	Decimal separator	Point	The decimal point is always used. For example: 1234.56
Symbols	Page reference		Reference to another page with additional information For example:  16 = refer to page 16
	Wildcard	<input type="checkbox"/>	Wildcard for options, selections For example: BFK466- <input type="checkbox"/> <input type="checkbox"/> = BFK466-10
	Note		Important notice about ensuring smooth operations or other key information.

1.5 Notices used








The following icons and signal words are used in this document to indicate dangers and important safety information:

Safety instructions

Structure of safety instructions:

	 SIGNAL WORD
	Icon Indicates the type of danger
	Signal word Characterises the type and severity of danger
	Note Describes the danger
	Possible consequences ■ List of possible consequences if the safety instructions are disregarded.
	Protective measure ■ List of protective measures to avoid the danger.

Danger level

	<div data-bbox="432 297 616 353">  DANGER </div> <div data-bbox="432 376 1426 450"> DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury. </div>
	<div data-bbox="432 517 627 573">  WARNING </div> <div data-bbox="432 595 1394 669"> WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. </div>
	<div data-bbox="432 736 620 792">  CAUTION </div> <div data-bbox="432 815 1426 889"> CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. </div>
	<div data-bbox="448 945 544 978"> NOTICE </div> <div data-bbox="432 1001 1426 1075"> Notice about a harmful situation with possible consequences: the product itself or surrounding objects could be damaged. </div>

1.6 Scope of delivery

- The spring-applied brakes are delivered preassembled, the brake disc is not included in the scope of supply.
- After receipt of the delivery, check immediately whether the items delivered match the accompanying papers. INTORQ does not accept any liability for deficiencies claimed subsequently. You should make a complaint concerning:
 - visible transport damage immediately to the forwarder.
 - visible deficiencies / incompleteness immediately to INTORQ GmbH & Co. KG.

1.7 Disposal

The spring-applied brake consists of different types of material.

- Recycle metals and plastics.
- Ensure professional disposal of assembled PCBs according to the applicable environmental regulations.

1.8 Drive systems

Labelling

Drive systems and components are unambiguously designated by the indications on the name plate.

Manufacturer: INTORQ GmbH & Co. KG, Wülmser Weg 5, D-31855 Aerzen, Germany

1.9 Legal regulations

Liability

- The information, data and notes in these Operating Instructions met the state of the art at the time of printing. Claims referring to drive systems which have already been supplied cannot be derived from this information, illustrations and descriptions.
- We do not accept any liability for damage and operating interference caused by:
 - inappropriate use
 - unauthorised modifications to the product
 - improper work on or with the drive system
 - operating errors
 - disregarding the documentation

Warranty

- Terms of warranty: Refer to the terms of sale and delivery for INTORQ GmbH & Co. KG.
- Warranty claims must be made to INTORQ immediately after the defects or faults are detected.
- The warranty is void in all cases when liability claims cannot be made.

2 Safety instructions

2.1 General safety instructions

- INTORQ components ...
 - ... must only be used as directed.
 - ... must not be commissioned if they are noticeably damaged.
 - ... must not be technically modified.
 - ... must not be used if they are incompletely mounted.
 - ... must not be operated without the required covers.
 - ... can hold live as well as moving or rotary parts during operation according to their degree of protection. Surfaces may be hot.
- For INTORQ components ...
 - ... the documentation must always be kept at the installation site.
 - ... only permitted accessories are allowed to be used.
 - ... only original spare parts of the manufacturer are allowed to be used.
- Follow all specifications and information found in the corresponding enclosed documentation.
 - These must be followed to maintain safe, trouble-free operations and to achieve the specified product characteristics.
- Only qualified, skilled personnel are permitted to work on and with INTORQ components.
According to IEC 60364 or CENELEC HD 384, qualified, skilled personnel are persons ...
 - ... who are familiar with the installation, mounting, commissioning, and operation of the product.
 - ... who have the qualifications necessary for their occupation.
 - ... who know and apply all regulations for the prevention of accidents, directives, and laws relevant on site.
- Risk of burns!
 - Surfaces may be hot during operation! Provide for protection against accidental contact.
- Risk of injury due to a rotating shaft!
 - Wait until the motor is at standstill before you start working on the motor.
- The friction lining and the friction surfaces must never contact oil or grease since even small amounts reduce the braking torque considerably.
- The brake is designed for operation under the environmental conditions that apply to IP54 protection. Because of the numerous possibilities of using the brake, it is still necessary to check the functionality of all mechanical components under the corresponding operating conditions.

2.2 Application as directed

- INTORQ components ...
 - ... are intended for use in machinery and systems.
 - ... must only be used for the purposes ordered and confirmed.
 - ... must only be operated under the ambient conditions prescribed in these Operating Instructions.
 - ... must not be operated beyond their corresponding power limits.

Any other use or excessive usage shall be deemed improper!

Possible applications of the INTORQ spring-applied brake

- Humidity: no restrictions
- Ambient temperature:
 - 5 °C to +40 °C (standard)
- At high humidity and low temperature:
 - Take measures to protect the armature plate and rotor from freezing.
- Protect the electrical connections against any contact or touching.

3 Technical specifications

3.1 Product description

3.1.1 Structure and function

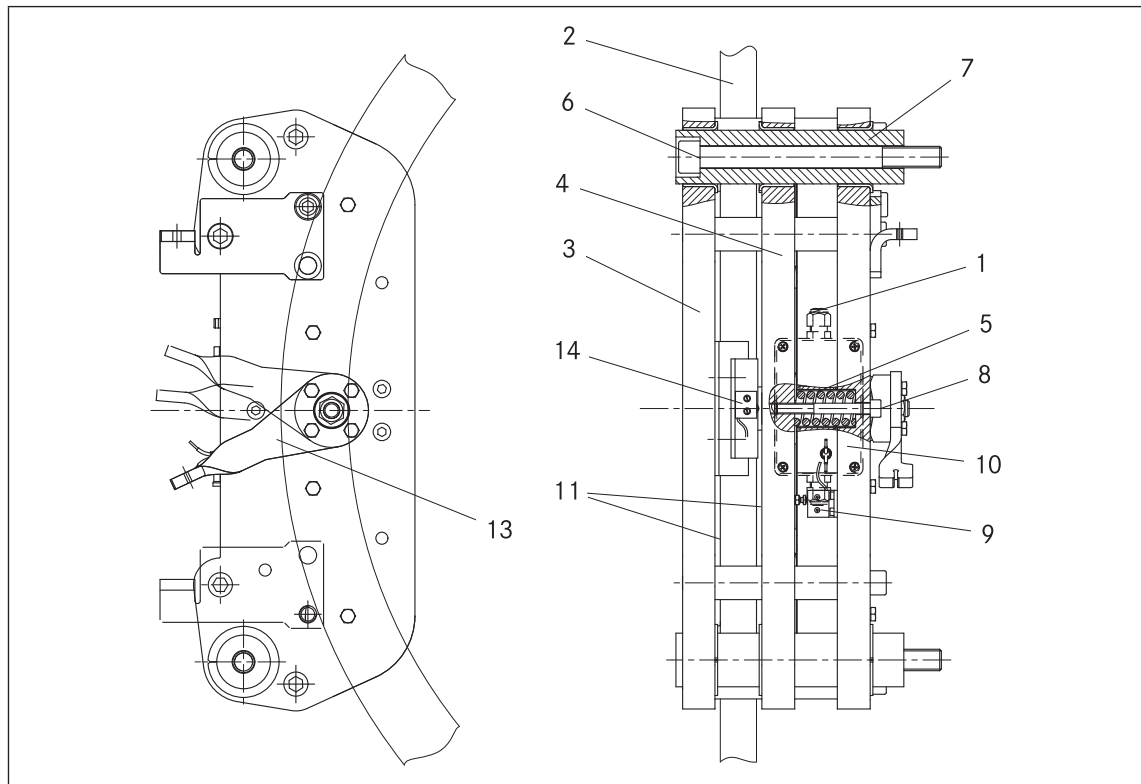


Fig. 1 Construction of an INTORQ BFK466-61 spring-applied brake


1 Stator	6 Cylinder head bolt	11 Friction lining
2 Brake disc	7 Guide sleeve	13 Manual release lever
3 Flange	8 Cylinder head bolt	14 Microswitch (wear monitoring)
4 Armature plate	9 Microswitch (release check)	
5 Pressure spring	10 Terminal box (optional)	

3.1.2 General information

The spring-applied brake is designed as a floating caliper brake for mounting on direct drive motors. The brake disc (2) is not included in the scope of supply. By using two or more spring-applied brakes on one brake disc, the demand for redundancy can be fulfilled for special applications such as lift and stage technology.

The braking torque is generated by the pressure of several compression springs (5) via friction locking between the two friction linings (11) of the friction lining support (12) and the flange (3) and the brake disc (2). The brake is released electromagnetically. For this, an overexcitation voltage is applied to the brake for approx. 1 to 2 seconds. The voltage is then decreased by 50 %. This results in a reduction of the average electrical power of the brake.

The BFK466 spring-applied brake is designed for converting mechanical work and kinetic energy into heat energy. Due to the static braking torque, loads can be held at a standstill.

Emergency braking at higher speeds is possible. Here, the maximum permissible speed of rotation must not be exceeded (refer to  14).

The stator (1) is supplied in heat class F. The temperature limit of the coil is 155 °C.

The spring-applied brake is designed for a maximum switching time (duty cycle) of 80 %.

Certificate

Type	EC-type examination certificate		
	Directive 95/16/EC	UCM	Directive 2014/33/EC
BFK466-61	ABV 908/1	ESV 908/1	EU-BD 908

3.1.3 Brakes

During braking, the friction lining carrier (12) and the affixed friction lining (11) are pushed against the axially fixed brake disc (2). Almost simultaneously, the caliper moves in the opposite direction on the guide sleeves (7), so that the friction lining (11) on the flange (3) is also pushed against the brake disc (2). The braking torque is supported by the mounting flange via the guide sleeves (7). The asbestos-free friction linings ensure high braking torque and low wear.

3.1.4 Brake release

When the brake is being applied, there is an air gap "s_L" between the armature plate (4) and the pole faces of the stator (1). To release the brake, the coils of the stator (1) are supplied with overexcitation voltage from the associated switching device. The resulting magnetic force pulls the armature plate (4) to the pole faces of the stator (1) against the spring pressure. The friction lining (12) is now relieved of the spring force. The caliper can move on the guide sleeves (7) until the brake disc (2) is relieved and can rotate freely. After 1 or 2 seconds, the supply voltage is reduced by half.

3.1.5 Release monitoring

The INTORQ BFK466 spring-applied brake is equipped with a microswitch (changeover contact) which monitors the switching status. When the brake is released, the microswitch (9) toggles. This means that it is possible to prevent the drive from being operated when the brake is closed.

3.1.6 Monitoring wear

The amount of wear of this spring-applied brake is monitored by an additional microswitch (14). The microswitches can be used as NC contacts (series connection) or as NO contacts (parallel connection).

3.1.7 Emergency release option

An optional manual release is available for briefly releasing the brake. This allows the load to be lowered in the event of a power failure.

3.1.8 Project planning notes

- The brakes are dimensioned in such a way that the given rated torques are reached safely after a short run-in process.
- However, as the organic friction linings used do not all have identical properties and because environmental conditions can vary, deviations from the specified braking torques are possible. These must be taken into account in the form of appropriate dimensioning tolerances. Increased breakaway torque is common, in particular after long downtimes in humid environments where temperatures vary.
- Check the braking torque when the brake is being used on the customer's friction surfaces.
- If the brake is used as a pure holding brake without dynamic load, the friction lining must be reactivated regularly.

3.2 Rated data

Type	Friction force F_R [N]	Brake disc radius R_a [mm] min / max	Max. sliding speed $V_{max.}$ [m/s]	Voltage ¹⁾ $U \pm 10\%$ [V] DC	Power ²⁾ P_N [W]	Coil resistance $R_N \pm 5\%$ [Ω]	Max. Current $I_{max.}$ [A]	Over-excitation time t_{ue} [s]
BFK466-61	6011	300 / 600	19	90/45	522/130.5	15.52	5.8	1...2
				110/55	522/130.5	23.18	4.75	
				205/103	550/137.5	76.41	2.68	

¹⁾ Voltage for releasing/holding

²⁾ Coil power at 20 °C during the release/holding

Type	Air gap s_L [mm]	Max. Air gap s_{Lmax} [mm]	Fixing screws	Tightening torque M_A [Nm]	Max. perm. Switching energy Q_E [J]	Transitional switching frequency S_{hue} [h ⁻¹]	Weight (without brake disc) m [kg]
BFK466-61	0.4 ±0.1	0.7	2 x M16	195	250000	24	44

3.3 Switching times

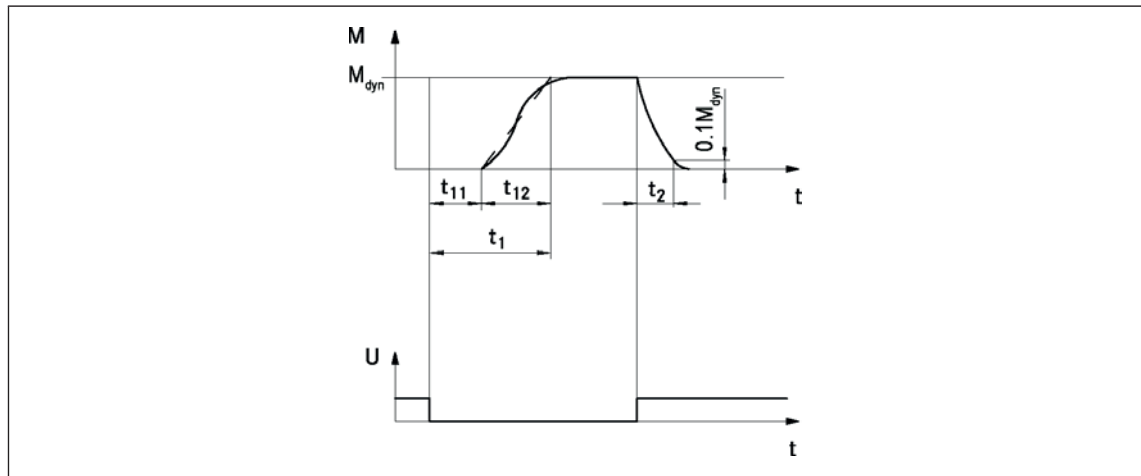


Fig. 2 Operating/switching times of the spring-applied brakes

t_1	Engagement time	t_{11}	Reaction delay of engagement
t_2	Disengagement time (up to $M = 0.1 M_{dyn}$)	t_{12}	Rise time of the braking torque
M_{dyn}	Braking torque at a constant speed of rotation	U	Voltage

Type	Switching times [ms] for s_{LN} and 70 % current			
	Engage			Disengage
	t_{11}	t_{12}	t_1	t_2
INTORQ BFK466-61	36	94	130	172

Tab. 1: Switching energy - switching frequency - switching times

Disengagement time

The disengagement time is not influenced by DC or AC switching operations. The indicated disengagement time applies to an air gap of 0.4 mm. If the air gap is larger (due to wear), the disengagement time increases.

Engagement time

For emergency braking, short engagement times for the brake are absolutely essential. The DC switching in connection with a suitable spark suppressor must therefore be provided.

If the drive system is operated with a frequency inverter so that the brake will not be de-energized before the motor is at standstill, AC switching is also possible (not applicable to emergency braking). In this case, the engagement times increase approximately by a factor of 5.

3.4 Switching energy / switching frequency

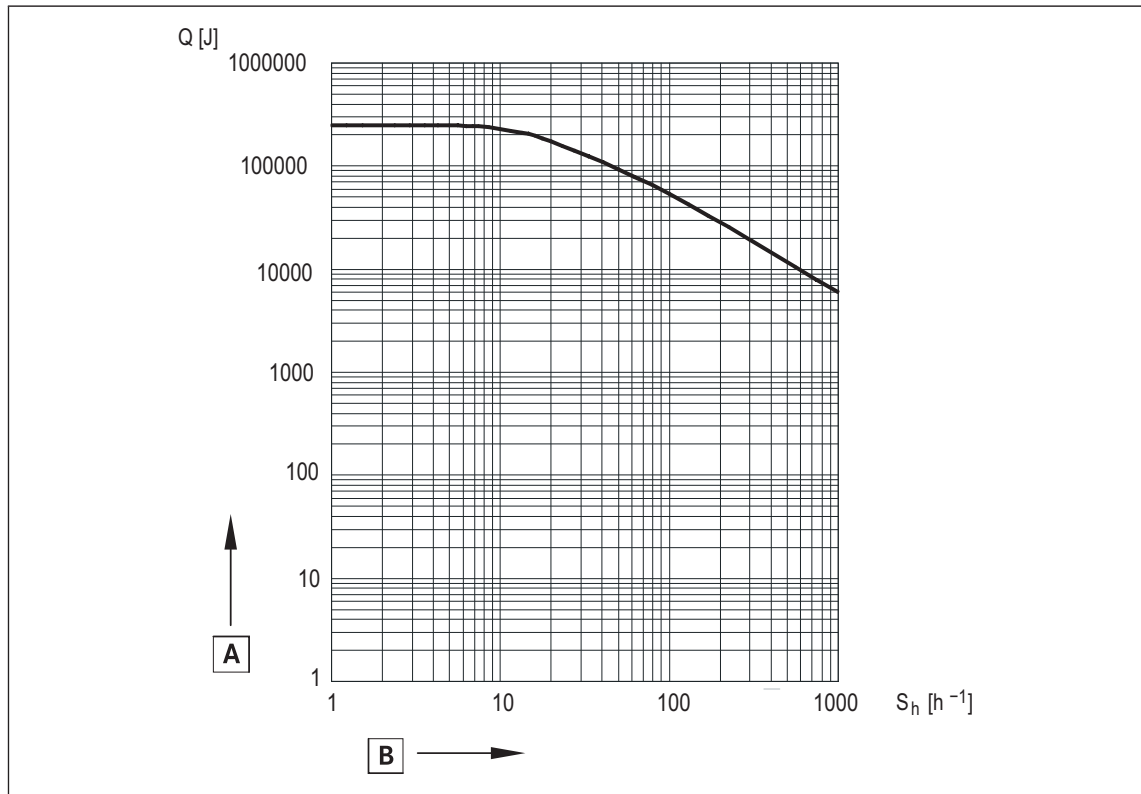



Fig. 3 Switching energy as a function of the switching frequency

A Switching energy

B Switching frequency

$$S_{hzul} = \frac{-S_{hue}}{\ln\left(1 - \frac{Q}{Q_E}\right)}$$



$$Q_{zul} = Q_E \left(1 - e^{\frac{-S_{hue}}{S_h}} \right)$$

The permissible switching frequency " S_{hzul} " depends on the amount of heat " Q " (refer to Figure 3). At a pre-set switching frequency " S_h ", the permissible amount of switching energy is " Q_{zul} ". " S_{hue} " and " Q_E " are specified in  14.

3.5 Emissions

Heat

Since the brake converts kinetic energy as well as mechanical and electrical energy into heat, the surface temperature varies considerably, depending on the operating conditions and possible heat dissipation. Under unfavourable conditions, the surface temperature can reach 130 °C.

	 DANGER
	Risk of burns on brake and brake disc!

Noise

The loudness of the switching noise during engaging and disengaging depends on the air gap "s_L" and the brake size.


Others

Abrasion due to braking occurs in the form of dust.





In case of high load, the friction face will become so hot that odours may occur.




4 Mechanical installation

Important notes

	NOTICE
	Do not lubricate the screws with oil or grease.

4.1 Necessary tools

Type	Torque wrench 	Insert for hexagon socket screws 	Transport screw 	Cross-tip screwdriver 
	Measurement range [NM]	Width across flats [mm]	Wrench width [mm]	Cross-tip size
BFK466-61	250	14 x 1/2" square	6 x 1/4" square	2

Multi-meter 	Calliper gauge 	Feeler gauge 
--	--	---

4.2 Assembly


4.2.1 Preparing the installation


1. Unpack the spring-applied brake.
2. Check for completeness.
3. Verify the nameplate data (especially the rated voltage).

4.3 Installation

The brake is delivered preassembled with two transport safety bolts (17).

1. Fit the guide sleeve (19) on the drive and tighten it lightly with the fixing screw (21).
2. Use a through-hole and push the brake onto the guide sleeve until the friction faces are in alignment with the brake disc (20).
3. Turn the brake around the guide sleeve (19) and position the brake radially over the brake disc (20).
4. Push the second guide sleeve (19) into the second through-hole of the brake and tighten it with the fixing screw (21).

	NOTICE
	The sum of the measured gaps may not be larger than " s_{Lmax} "!

5. Tighten the two fixing screws (21) to the specified torque ( 14).
6. Remove locking screws (17) that secure the device during transport!
7. Switch the current on and off several times, checking the movability of the brake on the guide sleeves.
8. Check the clearance of the brake disc and the air gap " s_L " between the two friction linings (3.2) and the brake disc (20) using a feeler gauge (24).

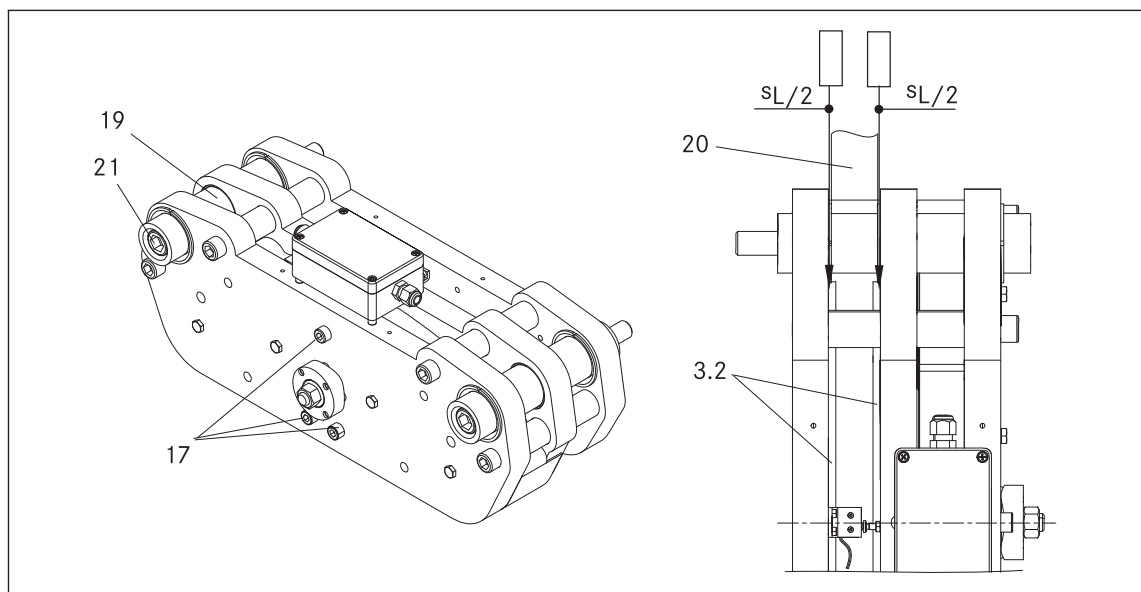






Fig. 4 Procedure for installing the BFK466-61 spring-applied brake

5 Electrical installation

Important notes

	 DANGER
	<p>There is a risk of injury by electrical shock!</p> <ul style="list-style-type: none"> ■ Electrical connection must only be carried out by skilled personnel! ■ Only carry out connection work when no voltage is applied (no live parts)! There is a risk of unintended start-ups or electric shock.
	NOTICE
	<ul style="list-style-type: none"> ■ It must be ensured that the supply voltage corresponds to the name plate data. ■ Voltages must be adjusted to the local environment!
	NOTICE
	<ul style="list-style-type: none"> ■ If emergency switching off is carried out without the required suppressor circuit, the control unit may be destroyed. ■ Observe the correct polarity of the suppressor circuit!

5.1 Electrical connection

Ground/earth

Use the PE screw in the terminal box (Figures 6 and 8) to establish the PE (earth) connection.

PE connection via the fixing screws on the motor is not permitted because there is no electrically conductive connection between the brake and the guide sleeves!

Temperature sensor connection (optional)

The spring-applied brake can be delivered with PTC sensors according to DIN 44082 for temperature monitoring (reference temperature 130 °C). The signal is evaluated via a PTC thermistor tripping device provided by the customer.

Connection: AWG 26 blue/blue

5.2 Microswitch

**NOTICE****Application range recommended for the microswitch**

- DC current: 10 mA to 100 mA at 12 V
- AC current: 10 mA to 5 A at 12 V / max. 250 V

5.2.1 Microswitch as NC contact (series connection)

	<p>! DANGER</p> <p>There is a risk of injury by electrical shock!</p> <ul style="list-style-type: none"> ■ If an emergency stop is carried out without the required suppressor circuit, the control unit may be destroyed. ■ Observe the correct polarity of the suppressor circuit!
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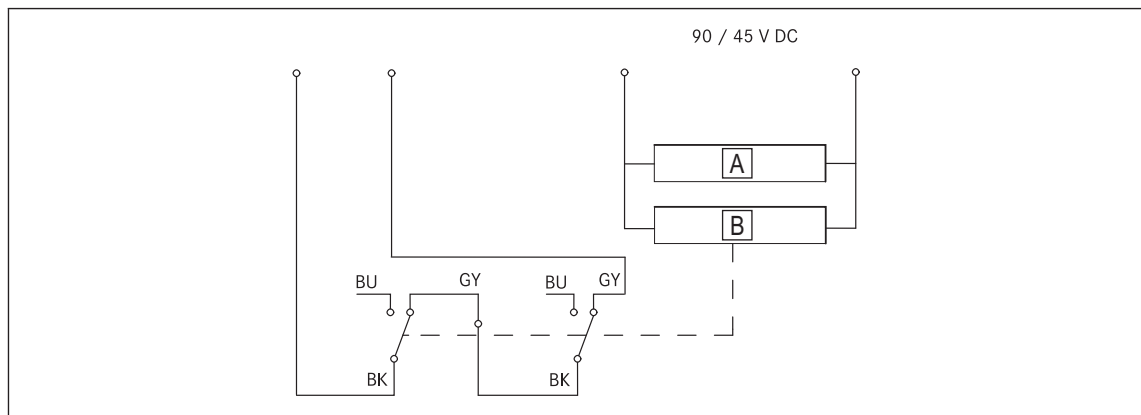


Fig. 5 BFK466 connection diagram (circuit proposal for series connection)

[A] Suppressor circuit

[B] Brake

Pin assignment for microswitch

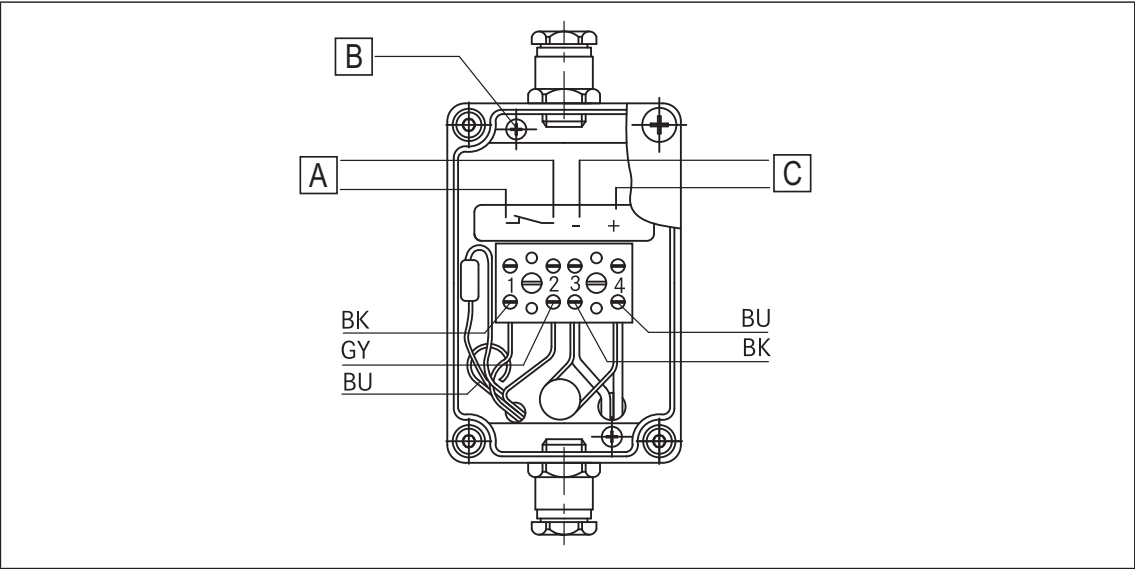


Fig. 6 BFK466 terminal box (optional: series connection, with built-in varistor)

A Microswitch	B Ground/earth	C Brake
Microswitch:	Input connection	BK
	N/O contact	BU
	NC contact	GY

When current is fed to the spring-applied brake, the armature plate is released. The microswitch (NC contact) is actuated and gives the signal "Spring-applied brake released".

When the maximum working air gap is exceeded, the release monitoring circuit is opened by the wear monitoring microswitch connected in series. In this case, the signal "Spring-applied brake applied" will not be given when the brake is de-energized.

Brake released	Brake worn-out	Circuit
no	no	closed
yes	no	open
no	yes	open
yes	yes	open

Tab. 2: Microswitch (NC contact, series connection)

5.2.2 Microswitch as NO contact (parallel connection)

	<p>! DANGER</p>
<p>⚡</p>	<p>There is a risk of injury by electrical shock!</p> <ul style="list-style-type: none"> ■ If an emergency stop is carried out without the required suppressor circuit, the control unit may be destroyed. ■ Observe the correct polarity of the suppressor circuit!

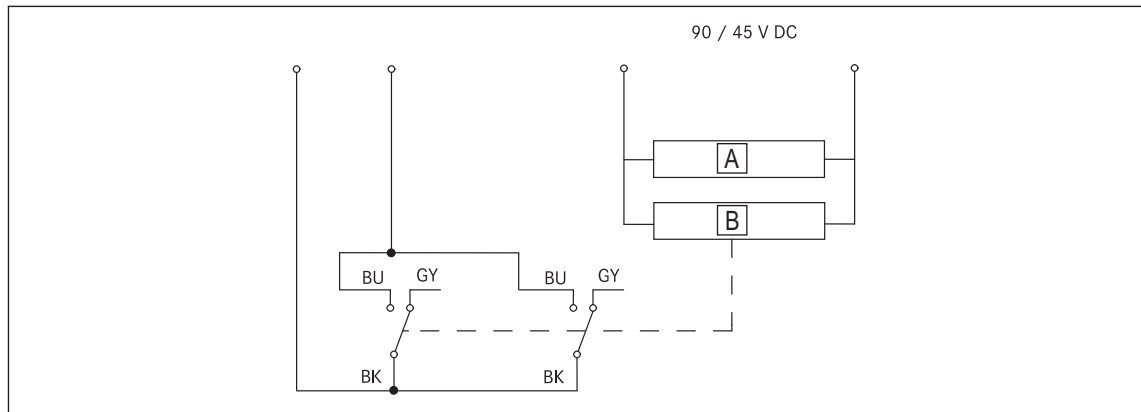


Fig. 7 BFK466 connection diagram (circuit proposal for parallel connection)

A Suppressor circuit

B Brake

Pin assignment for microswitch

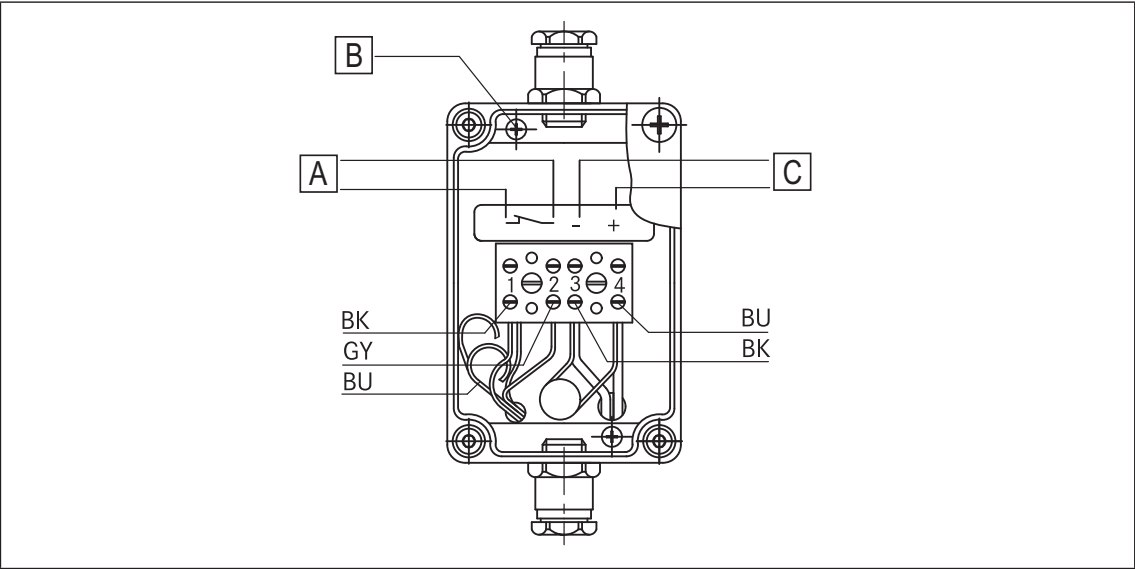


Fig. 8 BFK466 terminal box (optional: parallel connection, with built-in varistor)

A Microswitch	B Ground/earth	C Brake
Microswitch:	Input connection	BK
	N/O contact	BU
	NC contact	GY

When current is fed to the spring-applied brake, the armature plate is released. The microswitch (NO contact) is actuated and gives the signal "Spring-applied brake released".



When the maximum working air gap is exceeded, the wear monitoring circuit is closed. In this case, the signal "Spring-applied brake released" will also be given when the brake is de-energized.



Brake released	Brake worn-out	Circuit
no	no	open
yes	no	closed
no	yes	closed
yes	yes	closed

Tab. 3: Microswitch (NO contact, parallel connection)

6 Commissioning and operation



Important notes

	 DANGER
	Danger: rotating parts! The brake must be free of residual torque. The motor must not run!

	 DANGER
	There is a risk of injury by electrical shock! Live connections must not be touched.

6.1 Performing functional tests

6.1.1 Release / voltage control

	 DANGER
	Make sure that you remove all loads from the drive. Otherwise, there is a risk of an accident. The motor must not run while the spring-applied brake is being checked.

1. Remove two bridges from the motor terminals. Do not switch off the voltage supply to the brake.
2. Measure the AC voltage at the motor terminals. The measured level must be zero!
3. Switch on the power supply for the brake.
4. Measure the AC voltage at the motor terminals. It must be the same as the mains voltage!
5. Check the air gap "s_L" between the brake disc and friction lining. It must be a total of 0.4 (± 0.1) mm.
The brake disc must be able to be turned freely!
6. Switch off the power supply.
7. Screw the bridges onto the motor terminals.

6.1.2 Microswitch

These spring-applied brakes are equipped with two microswitches. One microswitch is for release monitoring and one is for wear monitoring (see Figure 1). The microswitches are either connected in series (NC contacts, black and grey wire strands) or in parallel as NO contacts (black and blue wire strands).



NOTICE

Each of the two microswitches should be checked for correct operation when the brake is applied (not actuated). During the check, the other microswitch must not be actuated.

Checking the release control



NOTICE

The brake is deenergized, the transport screws are removed.

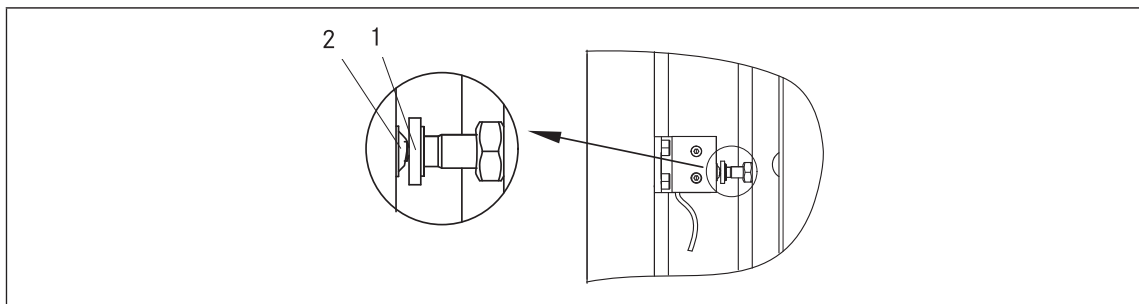


Fig. 9 Release monitoring

1 Hexagon head screw 2 Microswitch tappet

Check the setting of the microswitch for release monitoring using a feeler gauge with thickness " Y_{\max} and Y_{\min} " between hexagon head cap screw (1) and microswitch tappet (2).

Feeler gauge thickness	NC contact	N/O contact
$Y_{\max.} = s_L - 0.10$	Switch open	Switch closed
$Y_{\min.} = s_L - 0.25$	Switch closed	Switch open

Checking the wear monitoring

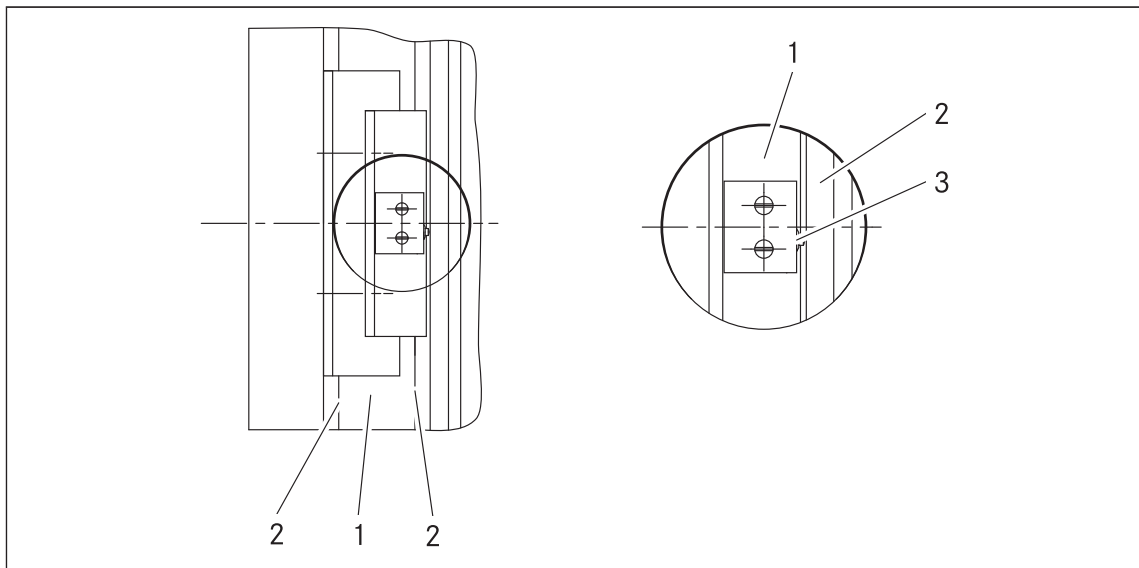


Fig. 10 Wear monitoring

1 Brake disc

2 Friction lining

3 Microswitch tappet



1. Measure the air gap " s_L " between brake disc (1) and friction linings (2) using a feeler gauge (with brake energized, refer to 25).
2. Switch off the voltage supply
3. Calculate the thickness " X " of the feeler gauge: $0.75 - "s_L" = X$
4. Insert a feeler gauge of thickness " X " between microswitch tappet (3) and friction lining carrier (2) (with brake deenergized). The feeler gauge must lie flat. The switch must be actuated.
5. Use a feeler gauge with a thickness lower by 0.05 mm and check if the switch remains in the original switch position. The feeler gauge must lie flat.

6.1.3 Test that the manual release functions

	NOTICE
	This operational test is to be carried out additionally!
	DANGER
	The drive system must be free of loads. The motor must not run!
	NOTICE
	When the maximum permissible working air gap " s_{Lmax} " (14) is exceeded during brake operation, the braking torque is considerably reduced by the manual release. Proper brake function is no longer ensured.

Manual release with lever

The installed manual release is designed to be manually operated in two directions. The lever is detachable.

	NOTICE
	When the maximum permissible working air gap " s_{Lmax} " ( 14) is exceeded during brake operation, the braking torque is considerably reduced by the manual release. Proper brake function is no longer ensured.

1. Pull the lever with approx. 270 N until the resistance significantly increases.
2. Release the lever.

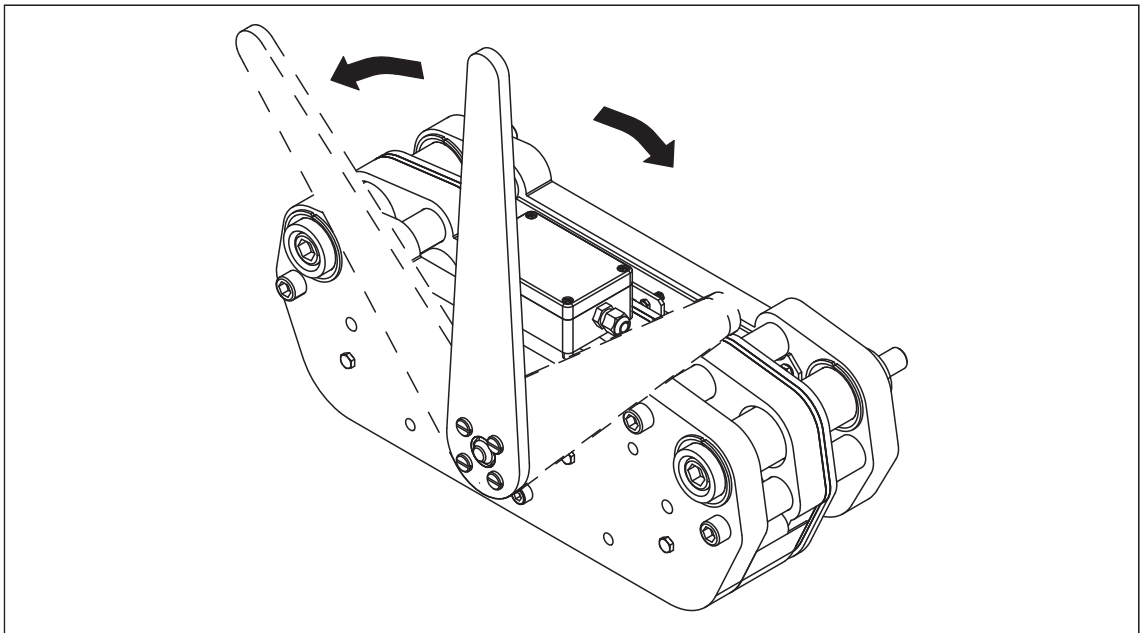


Fig. 11 Checking the manual release

Manual release with Bowden cable**NOTICE**

The manual release is designed for activation via a Bowden cable.

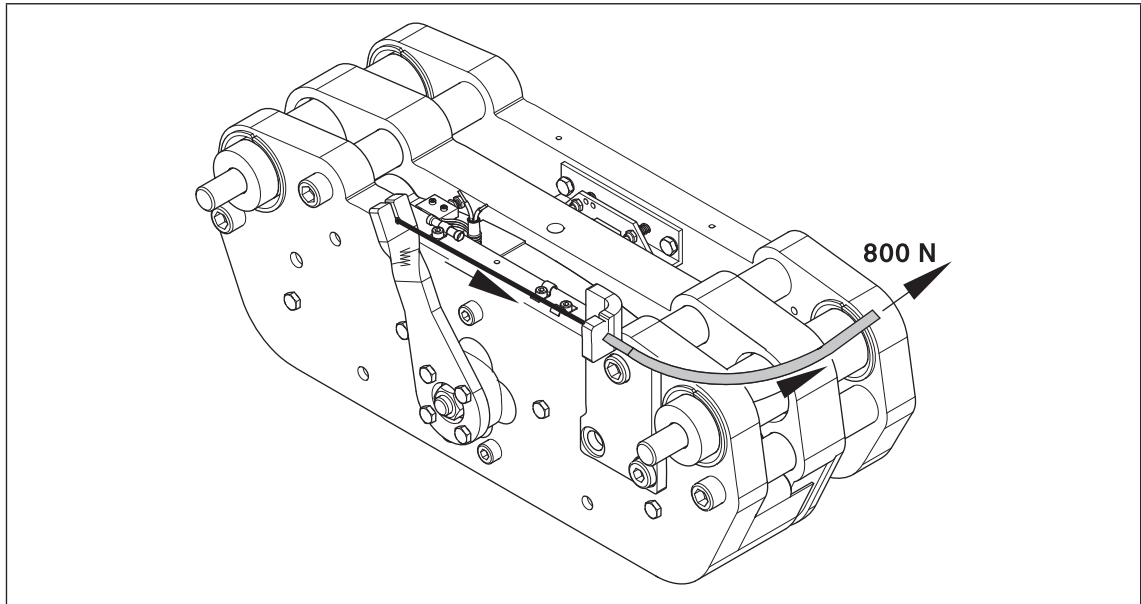


Fig. 12 **Manual release with Bowden cable**

Motor and brake are de-energized.



3. Suspend Bowden cable (not included in the delivery package) and pull with approx. 800 N.
 - The drive must be able to be turned freely. A low residual torque is permitted.
4. Release the lever.
 - Torque must be available!

The preparations for commissioning are completed.

6.2 **Commissioning**

1. Switch on drive system.
2. Carry out a braking test.

6.3 During operation

	 DANGER
	There is a risk of injury by electrical shock! Live connections must not be touched.

- Checks must be carried out regularly. Pay special attention to:
 - unusual noises or temperatures
 - loose fixing/attachment elements
 - the condition of the electrical cables.
- The armature plate must be attracted and the rotor must move without residual torque.
- Measure the DC voltage at the brake.
 - Compare the DC voltage with the voltage indicated on the name plate. A deviation of $\pm 10\%$ is permissible.

7 Maintenance and repair

7.1 Wear of spring-applied brakes

The table below shows the different causes of wear and their impact on the components of the spring-applied brake. The influential factors must be quantified so that the service life of the rotor and brake can be calculated and so that the prescribed maintenance intervals can be specified accurately. The most important factors in this context are the applied friction energy, the initial speed of rotation of braking and the switching frequency. If several of the causes of friction lining wear occur in an application at the same time, the influencing factors should be added together when the amount of wear is calculated.


Component	Cause	Effect	Influencing factors
Friction lining	Braking during operation	Wear of the friction lining	Friction work
	Emergency stops		
	Overlapping wear during start and stop of drive		
	Active braking via the drive motor with support of brake (quick stop)		
	Starting wear in case of motor mounting position with vertical shaft, even when the brake is not applied		Number of start/stop cycles
Armature plate and counter friction face	Rubbing and friction of the brake lining	Run-in of armature plate and counter friction face	Friction work
Brake support	Load reversals and jerks in the backlash between armature plate, adjustment tubes and guide pins	Breaking of armature plate, adjustment tubes and guide pins	Number of start/stop cycles, braking torque
Springs	Axial load cycle and shear stress of springs through radial backlash on reversal of armature plate	Reduced spring force or fatigue failure	Number of switching operations of brake

Tab. 4: Causes for wear

7.2 Inspections

Important notes

To ensure safe and trouble-free operations, the spring-applied brakes must be checked at regular intervals and, if necessary, be replaced. Servicing will be easier at the plant if the brakes are made accessible. This must be considered when installing the drives in the plant.

Primarily, the required maintenance intervals for industrial brakes result from their load during operation. When calculating the maintenance interval, all causes for wear must be taken into account,  32. For brakes with low loads (such as holding brakes with emergency stop function), we recommend a regular inspection at a fixed time interval. To reduce costs, the inspection can be carried out along with other regular maintenance work in the plant.



Failures, production losses or damage to the system may occur when the brakes are not serviced. Therefore, a maintenance strategy that is adapted to the particular operating conditions and brake loads must be defined for every application. For the spring-applied brakes, the maintenance intervals and maintenance operations listed in the table below must be followed. The maintenance operations must be carried out as described in the detailed descriptions.



7.2.1 Maintenance intervals

The spring-applied brake must be checked during the prescribed inspections of the drive system in which it is installed.

- The service life of the brake before replacement does not only depend on the number of emergency brakings.
- The wear of the brake friction linings varies depending on the operating conditions.
- The friction work possible before replacement decreases with every braking when the switching energy increases.


7.2.2 Checking the air gap


	 DANGER
	<p>Make sure that you remove all loads from the drive. Otherwise, there is a risk of an accident. The motor must not run while the spring-applied brake is being checked.</p>

1. Switch on the current for the brake (see  25).
2. Use a feeler gauge to check the air gap " s_L " between the brake disc and friction lining. It must not exceed the maximum permissible air gap " s_{Lmax} ", as specified in the table ( 14).
3. Switch off the current.
4. Reconnect the motor.


7.2.3 Braking torque / delay check



In case of drives with several brakes, one brake at a time can be released with the socket head cap screws of the transport safety device or the manual release when checking redundancy. These screws must be removed again after checking.


	NOTICE
	The screws of the transport locking device must not be used for releasing the brake during evacuation!

The stopping distances of the drive must be within the permissible tolerance range of the corresponding facility ( , Operating Instructions for the facility).

7.3 Maintenance

The brake does not require any maintenance when it is being used as a holding brake. The brake is replaced in the reverse order of the assembly ( 18).

	 DANGER
	Make sure that you remove all loads from the drive. Otherwise, there is a risk of an accident. The motor must not run while the spring-applied brake is being checked.

1. Screw in the transport screws (17; DIN912 M8x70) ( 19).
2. Switch off the power supply and disconnect the connecting cables.
3. Loosen a fixing screw (4) and remove the guide sleeve (2) from the through-hole.
4. Turn the brake around the second guide sleeve (2) away from the brake disc (3).
5. Remove the brake from the guide sleeve (2).

7.4 Ordering spare parts

INTORQ BFK466-61 spring-applied brake

Order quantity	_____	Pieces
Size	<input type="checkbox"/> 61	
Voltage	<input type="checkbox"/> 90 / 45 VDC	<input type="checkbox"/> 110/55 VDC <input type="checkbox"/> 205/103 VDC
Cable length	<input type="checkbox"/> Standard	
	_____ mm	(from 100-1000 mm in 100 mm steps, from 1000-2500 mm in 250 mm steps)
Terminal box mounted	<input type="checkbox"/>	
PTC sensor	<input type="checkbox"/>	
Manual release mounted	<input type="checkbox"/>	

8 Troubleshooting and fault elimination

If any malfunctions should occur when operating the braking system, please check for possible causes based on the following table. If the fault cannot be fixed or eliminated by one of the listed measures, please contact customer service.

Fault	Cause	Remedy
Brake does not release The air gap is zero	Coil interruption	<ul style="list-style-type: none"> ■ Measure coil resistance using a multimeter: <ul style="list-style-type: none"> - Compare the measured resistance with the nominal resistance (📖 14). - Replace the brake when the resistance is too high.
	Coil has contact to earth or between windings	<ul style="list-style-type: none"> ■ Measure the coil resistance using a multimeter: <ul style="list-style-type: none"> - Compare the measured resistance with the nominal resistance. Refer to 📖 14 for the values. If resistance is too low, replace the complete brake. ■ Check the coil for short to ground using a multimeter: <ul style="list-style-type: none"> - Replace the brake in case of short circuit to ground. ■ Check the brake voltage (refer to section on defective rectifier, voltage too low).
	Wiring defective or wrong	<ul style="list-style-type: none"> ■ Check and correct ■ cable for continuity using a multimeter <ul style="list-style-type: none"> - Replace defective cable.
	Rectifier defective or incorrect	<ul style="list-style-type: none"> ■ Measure rectifier DC voltage using a multimeter. <p>If DC voltage is zero:</p> <ul style="list-style-type: none"> ■ Check AC rectifier voltage. <p>If AC voltage is zero:</p> <ul style="list-style-type: none"> - Switch on power supply - Check fuse - Check wiring. - Check microswitch <p>If AC voltage is okay:</p> <ul style="list-style-type: none"> - Check rectifier, - Replace defective rectifier <p>Measure the DC voltage:</p> <ul style="list-style-type: none"> - Overexcitation 90 V (approx. 1 sec.) holding voltage 45 V (tolerance $\pm 10\%$) <ul style="list-style-type: none"> ■ Check coil for inter-turn fault or short circuit to ground. ■ If the rectifier defect occurs again, replace the entire stator, even if you cannot find any fault between turns or short circuit to ground. The error may only occur on warming up.
	Air gap too big	Replace the brake (📖 33)

Fault	Cause	Remedy
Brake disc cannot rotate freely	Air gap "s _L " is too small	<ul style="list-style-type: none"> ■ Check air gap "s_L" and replace brake if necessary. ■ Check the thickness of the brake disc and replace the brake disc if necessary. ■ Check the movability of the brake on the guide sleeves and, if necessary, replace the guide sleeves.
Brake cannot be released with manual release	Wrong setting of manual release	Replace the brake and complain about the manual release setting to the manufacturer.
Microswitch furnishes wrong signal despite correct function of the brake	Incorrect micro-switch wiring	Check and correct the wiring of the micro-switch.
	Micro-switch defective or incorrectly set	Replace the brake and send the defective brake to the manufacturer.
Voltage too high	Supply voltage too high	Adjust the coil voltage to the supply voltage.
	Rectifier is defective	Replace the rectifier
	Bridge rectifier used instead of bridge/half-wave rectifier	Replace the bridge rectifier by a bridge/half-wave rectifier.
Voltage too low	Supply voltage too low	Adjust the coil voltage to the supply voltage.
AC voltage is not mains voltage	Fuse is missing or defective	Select a connection with proper fusing.
	Incorrect micro-switch wiring	Check and correct the wiring of the micro-switch.
	Micro-switch defective or incorrectly set	Replace the complete brake and return the defective complete brake to the manufacturer.

Notes



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