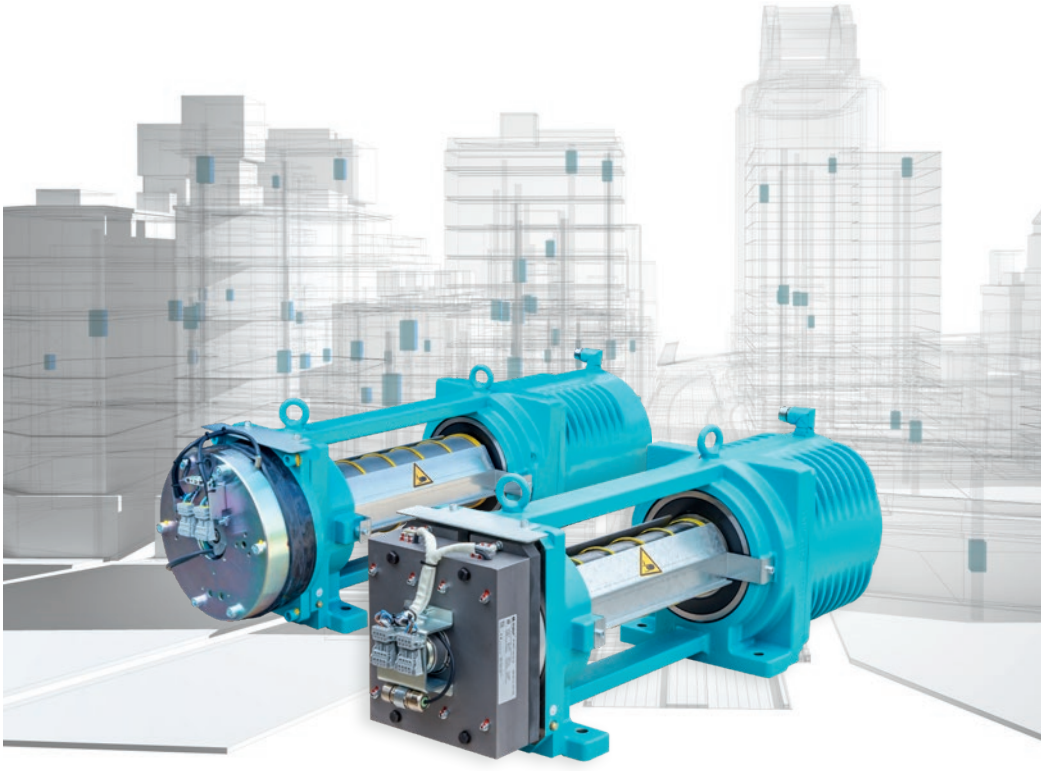
OPERATING INSTRUCTIONS

WSG-TB

GEARLESS LIFT MACHINE

Code	**GM.8.004610.EN**
Version	**D**
Date	**01. Jul 2025**



Translation of the Original Operating Instructions

Download the Operating Instructions

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Gearless Lift Machine
WSG-TB
Operating Instructions

These operating instructions are applicable to lift machines:

WSG - TB.J - .....
WSG - TB.K - .....
WSG - TB.L - .....
WSG - TB.M - .....

date: 01. Jul 2025 version: D

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Document history		
Date	Version	Modifications
07. Sep 2021	A01	First edition (Motor ReDesign)
14. Dec 2021	A02	New EU Declaration of Conformity; permissible angle of the load carriers extended; Dimension drawing updated; new brake for WSG-TB.K and WSG-TB.L
13. Jun 2022	A03	Chapter „Special features for use according to ASME 17.1" added
26. Apr 2023	B	New layout; UKCA documents added; new EU Declaration of Conformity; update electrical data and dimensions;
16. Jan 2024	B01	EU Declaration of Conformity updated; additions to the product description; use of alternative brake control units
22. Jan 2024	B02	Dimension drawing updated (WG-TB.A/B/C/D)
04. Jun 2024	C	New EU type-examination certificate for brakes (brake monitoring methods); overall lengths TB.A/C/L removed; updated motor dimensions WSG-TB.K/M
05 Jun 2024	C01	Connector 1.5 pin assignment added
02. Jul 2024	C02	Brake type for WSG-TB.K changed, standardised brake connection via plug, dimension drawing updated
06. Aug 2024	C03	EU Declaration of Conformity for brakes updated; UL certificate added; WSG-TB.M with traction sheave dia. 120 mm
20. Aug 2024	C04	WSG-TB.L with BFK 464-18R added;
10. Sep 2024	C05	Updated motor dimensions WSG-TB.K/L/M
01. Jul 2025	D	Motor and brake ReDesign - traction sheave options

Gearless Lift Machine

WSG-TB

Operating Instructions

Code: GM.8.004610.EN
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Contents

1. General information

1.1. About this operating manual

The purpose of this operating manual is to ensure that any work on WSG-TB 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-TB lift machines must have read and understood this operating manual.

1.2. Intended use

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

WSG-TB 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-TB 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-TB lift machine
- Improper installation, commissioning, operation or maintenance
- Operation of the WSG-TB 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-TB
- Insufficient monitoring of parts subject to wear
- Repairs carried out improperly
- Emergencies caused by external forces or force majeure.

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.

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:

Getriebelose 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)

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Plant Manager

iV.
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Head of Development/Sales

EU-Conformity_WSG_ed25May2023

4. Type code

Example:	W	S	G-	TB	.	J	-	3	E	382	/	10A2	-	DQ
Customer specific identifier	**W**	**S**	**G-**	**Z1 Z2**	.	**Z3**	-	**X1**	**X2**	**X3**	/	**X4**	-	**X5 X6**

S: Synchronous motor

G: Gearless
U: Gearless, UL/CSA approved

Z1 Z2: Frame size

Z3: Overall length
4 overall lengths are available; identified by: J, K, L, M

X1: Customer specific identifier
3 - Traction sheave width B_T = 190 mm
5 - Traction sheave width B_T = 340 mm
6 - Traction sheave width B_T = 500 mm

X2: Motor voltage
E - U_N = 400 V / U_{ZK} = 500...620 V DC

X3: Rated speed n_N
e.g. 382 - 382 rpm (with D_T = 100 mm v = 1,0 m/s; suspension 2:1)
611 - 611 rpm (with D_T = 100 mm v = 1,6 m/s; suspension 2:1)

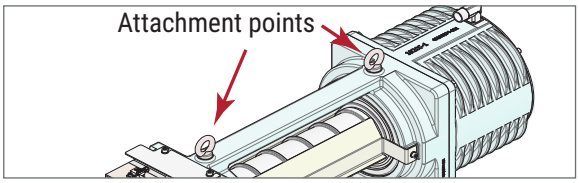
X4: Traction sheave design
(Traction sheave diameter; width, groove design, groove geometry)

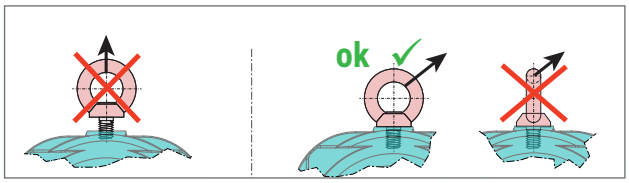
X5 X6: Variant code (brake, measuring system, modifications)
DE - dual-curcuit brake, measuring system ECN 1313 - 2048 Incr. - SSI- Interface
DF - dual-curcuit brake, measuring system ECN 1313 - 2048 Incr. - EnDat- Interface
DG - dual-curcuit brake, measuring system ERN 1387 - 2048 Incr.
DQ - dual-curcuit brake, measuring system Sendix 8.5873.HKRF.C323 - 2048 Incr. - BiSS- Interface

5. Handling

5.1. Transport

- 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.
- Observe the relevant safety regulations and take the centre of gravity into account when handling the lift machines.
- Use only suitable transport and lifting equipment.
- Check that the eyebolt are tightly fitted before using them. If necessary, screw the eyebolt completely into the threaded hole and tighten it only by hand. **Important!** Avoid lateral pulling.





WARNING

▶ 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.

STOP
NOTICE

▶ 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 V DC).

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.

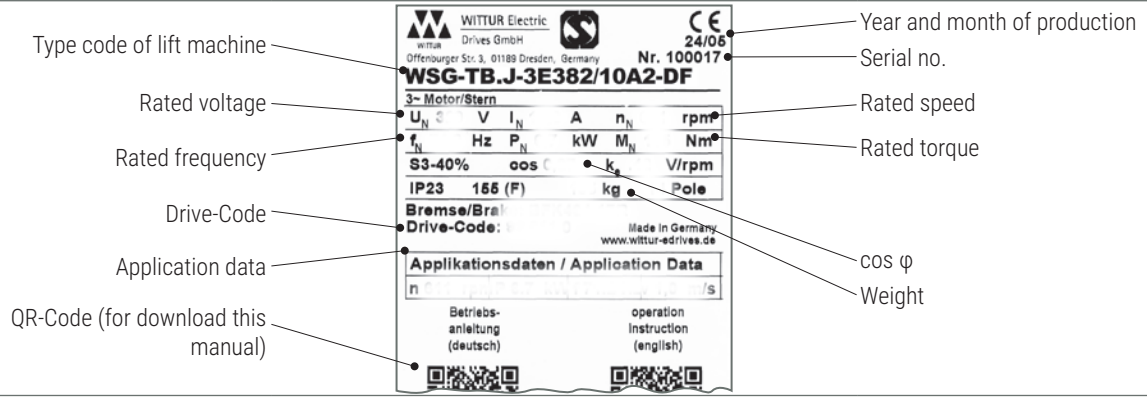
6. Product overview

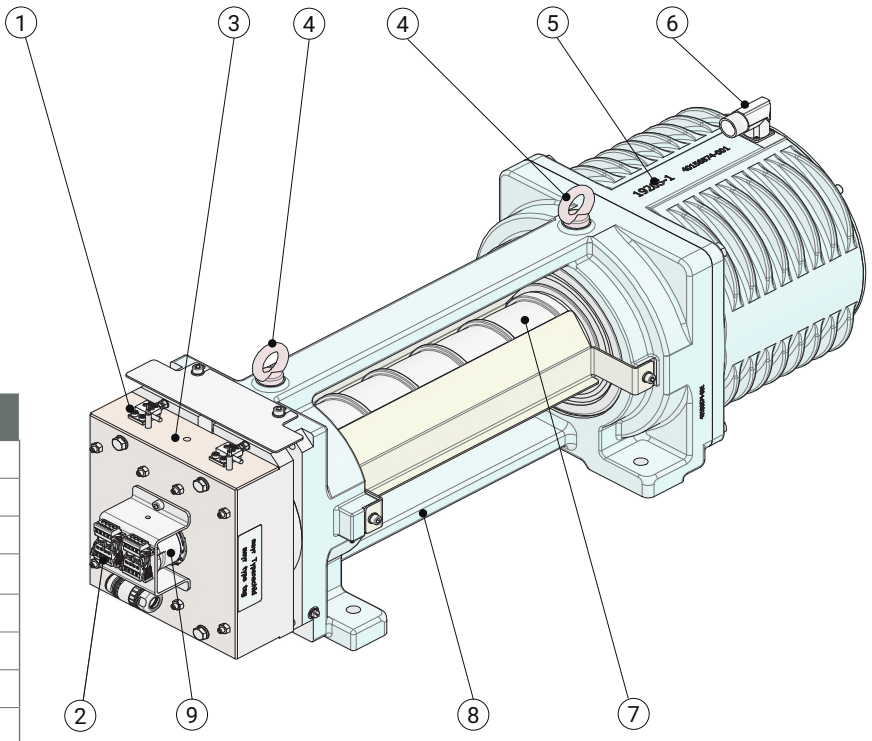
6.1. Product description

The compact gearless WSG-TB synchronous lift machines are especially designed for traction sheave lifts with Polyropes or belts. They are distinguished by their high efficiency, extremely low noise and excellent operating characteristics.

The machines can be supplied for several rated speeds, which can be further adapted to meet individual customer requirements. The machine comprises the synchronous motor with high-efficiency permanent magnets, the traction sheave, and the type-tested safety brake, which can be used to prevent uncontrolled upward movement of the car.

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





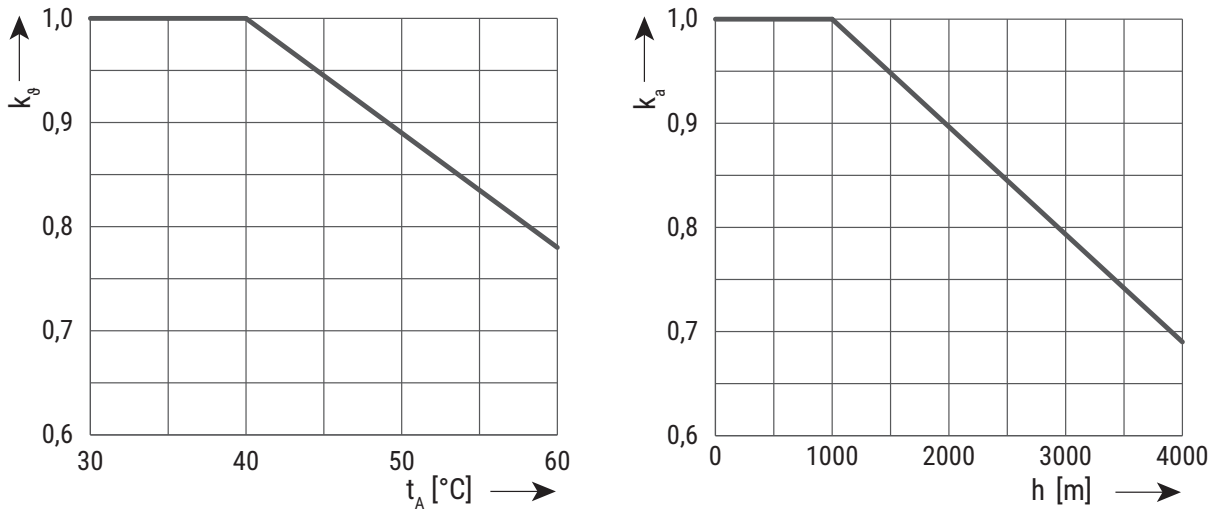
Item	Part
1	Brake monitoring
2	Brake connection
3	Brake
4	Attachment points
5	Motor
6	Motor connection
7	Traction sheave
8	Frame
9	Measurement system

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, ed, i.e. 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.



$M_{permiss} = M_{dN} * k_\vartheta * k_a$ bzw. $P_{permiss} = P_{dN} * k_\vartheta * k_a$

7. Installation

7.1. Mechanical installation

7.1.1. Setting up

DANGER

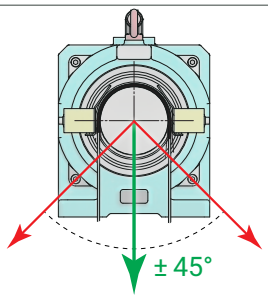
- The lift machines must be installed by trained and qualified personnel with professional knowledge of mechanical engineering and lift construction.
- Be sure to use calculations to check the base frame or foundation loads before installing the lift machine.

NOTICE

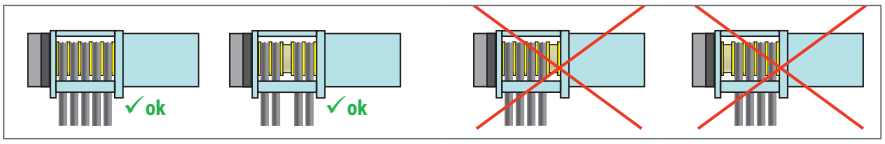
- Do not install the motor distorted !
- The permissible unevenness of the mounting surface is 0.1 mm. The mounting surface must be sufficiently distortion-resistant and stable to accommodate the forces occurring in the system.

WARNING

- The resulting force direction of the load carriers may only be in vertical direction in the direction of the motor base in the tolerance range ±45° downwards (see sketch opposite).
- In this context, please note when designing your lift system that certain outgoing angles of the load carriers cannot be realised due to the motor frame.



- Place the load carriers symmetrically.
- It is not permissible to support the load carriers on one side only.



- 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.

WARNING

- 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 four **M16 bolts - strength class 8.8 tightening torque: 190 Nm** .
- After completing the adjusting work or after a breakdown, tighten all the fastening bolts of the machine, using the specified torque .

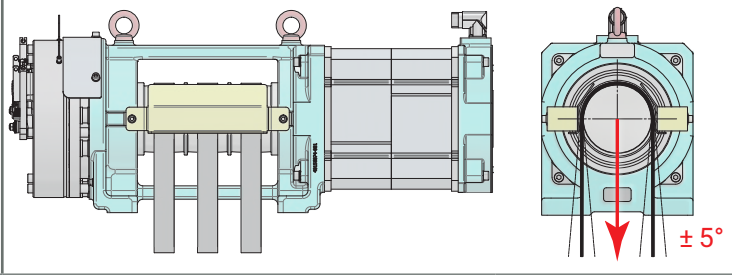
Information

- When using the machine in a shaft, please take into account the patent situation.

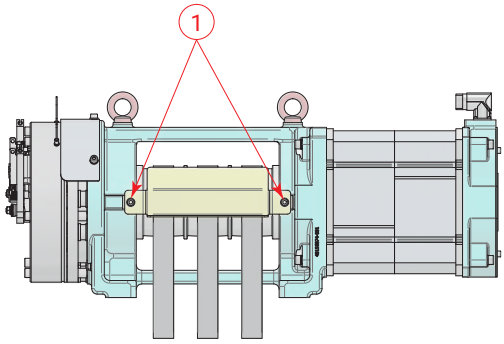
7.1.2. Load carriers guard

WARNING

- All work on the rope guard may only be carried out when the system is at a standstill.

	Standard version	Option
Traction sheave dia. 100 mm		

Fastening load carriers guards

	Load carrier guard	Information
Traction sheave dia. 100 mm		- Fastening the rope guard with two screws (1) M 6 x 12 and washers **Tightening torque M 6-8.8: 9,6 Nm**

7.2. Electrical installation

7.2.1. General

DANGER

▶ 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
  - » 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 $U_{link\ max}$ up to max. 700 V DC.

Information

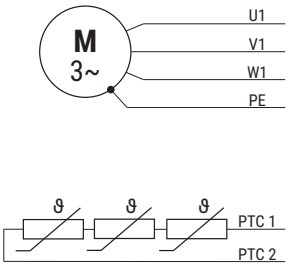
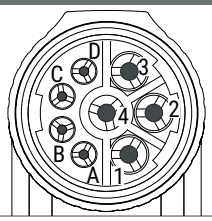
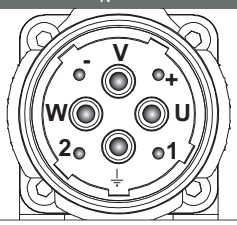
▶ $U_{link\ max}$ is the maximum value of the DC link voltage which is only transient and approximately equivalent to the inception voltage of the braking chopper or of the energy recovery unit.

STOP
NOTICE

▶ The maximum permissible rate of voltage rise (dU/dt) at the motor terminals is 4 kV/µs. 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.

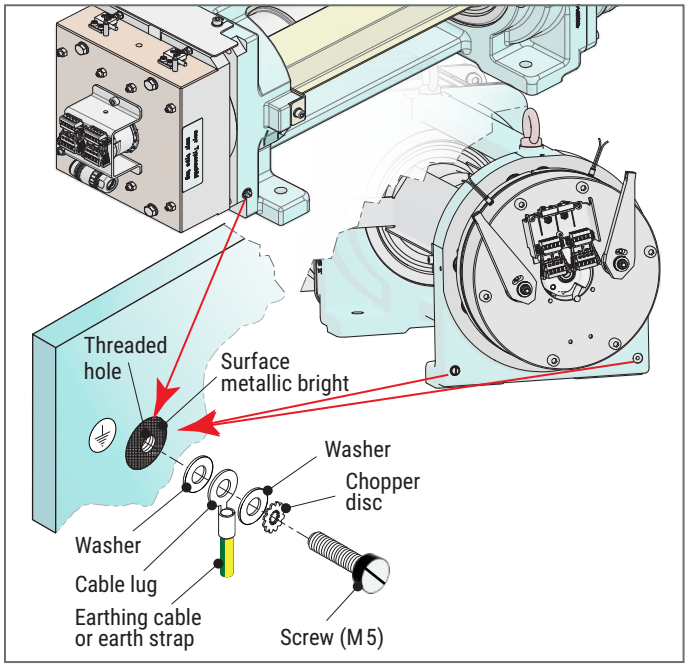
7.2.2. Motor connection / Winding protection

- The electrical connection of the motor and the winding sensors is made by power connector..
- 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 25 m. 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 maximum switching frequency of 10 to 12 kHz.
- The PTC resistor embedded in the winding must be evaluated in the control system or frequency inverter to protect the motor from overtemperature.

	Signal	Pin	for $I_N \leq 35$ A	for $I_N > 35$ A	Pin	Signal
	U1	1			U	U1
	PE	2			PE	PE
	W1	3			W	W1
	V1	4			V	V1
	-	A	Pin contacts of flanged connector socket (exterior) **Connector 1.0:** B ST A 078 FR 05 08 0035 000 (TE connectivity)	Pin contacts of flanged connector socket (exterior) **Connector 1.5:** C ST A 264 FR 48 45 0001 000 (TE connectivity)	+	-
	-	B			-	-
	PTC 1	C			1	PTC 1
	PTC 2	D			2	PTC 2

Protective earth connection

- The protective earth conductor is made in the motor power connector.
- If the protective conductor is smaller than 10 mm^2 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, two additional protective earth connections (M 6) are available on the motor housing (see figure opposite).



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, 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 sendix 8.5873 SineCosine encoder from Kübler GmbH. The encoder is connected by cable (length: 10m) with open wire ends (no plug).
- Alternatively, the machines can be equipped with ECN 1313 or 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.

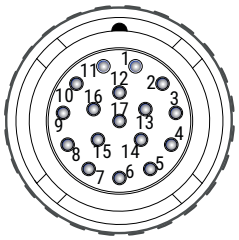
STOP
NOTICE

- ▶ 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 Sendix 8.5873.HKEF.C323	
Data interface:	BiSS-C
Operating voltage:	5 V DC
Recommended mating connector: -	

Ader	Signal
white	0 V (U_p)
brown	+V (U_P)
green	Clock +
yellow	Clock -
grey	DATA +
pink	DATA -
blue	A +
red	A -
black	B +
violet	B -
grey-pink	0 V (Sensor)
red-blue	+V (Sensor)
shield	shield

Measuring system ECN 1313	
Data interface:	EnDat or SSI
Operating voltage:	5 V DC
Recommended mating connector:	ASTA 035 NN 00 73 0100 00 (company Intercontec GmbH)

Pin	Signal	
1	U_p Sensor	
4	0 V Sensor	
7	U_p	
8	Clock +	
9	Clock -	
10	0 V (U_p)	
12	B +	
13	B -	
14	DATA +	
15	A +	Pin contacts of flanged connector socket (exterior)
16	A -	
17	DATA -	

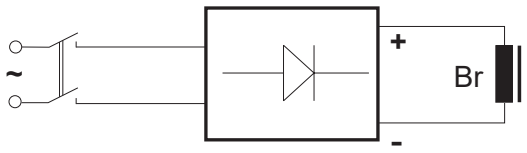
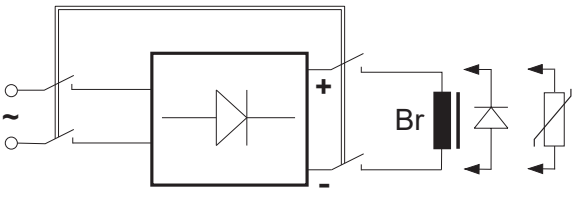
7.2.4. Brake

- Please refer also to the operating instructions for the brake on page 65 or page 120.
- The brakes are supplied with DC voltage by the brake control units, which are supplied separately.
- We recommend to use the supplied brake control units. Alternatively, other devices/controllers that fulfil the necessary requirements can also be used - see „10. Technical data“ on page 29.
- 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 (does not apply for WSG-TB.K).
- 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 on page 18 or page 19).
- Protect the brakes against overvoltage from switching operations by using varistors. 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
▶ Low-noise switching of the brake ▶ No protective measures required for switching contact ▶ Slow application of the brake.	▶ Noisy switching ▶ Burn-up protection for switching contact required (e.g. varistor, free-wheeling diode) ▶ Fast application of the brake.
	
Attention: Schematic diagram!	**Attention:** Schematic diagram!

Time-delayed application of the two brake circuits

STOP
NOTICE

- If ropes with plastic sheathing or belts are used, the increased friction during emergency stops may be damaged the suspensions. For this reason, both braking circuits should not be applied simultaneously, but one after the other with a time delay. This also helps to avoid in-admissibly high decelerations in the car.
- 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 or page 19. Pay attention to the polarity of the diode!
- Check the function of the diode regularly, as this avoids suspensions wear or in-admissibly high decelerations of the car.

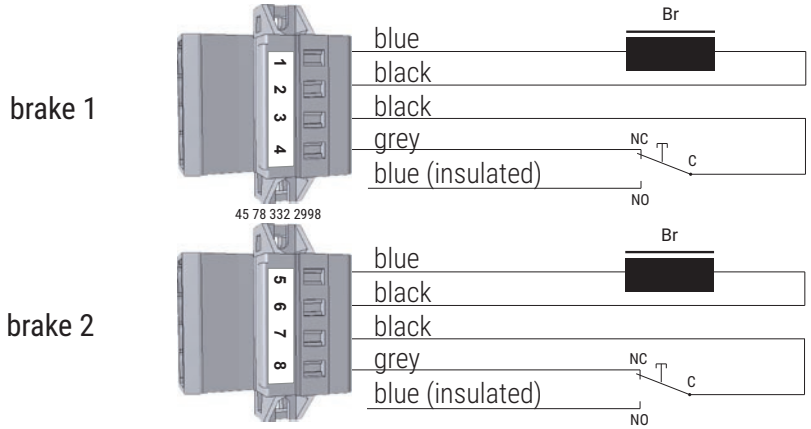
Monitoring the brakes

- There are various options for monitoring the switching status of the brakes - see the type examination certificate for the brake.
- If a micro-switch (standard) is used, a contact current of at least 10 mA must be ensured to keep the contacts clean.

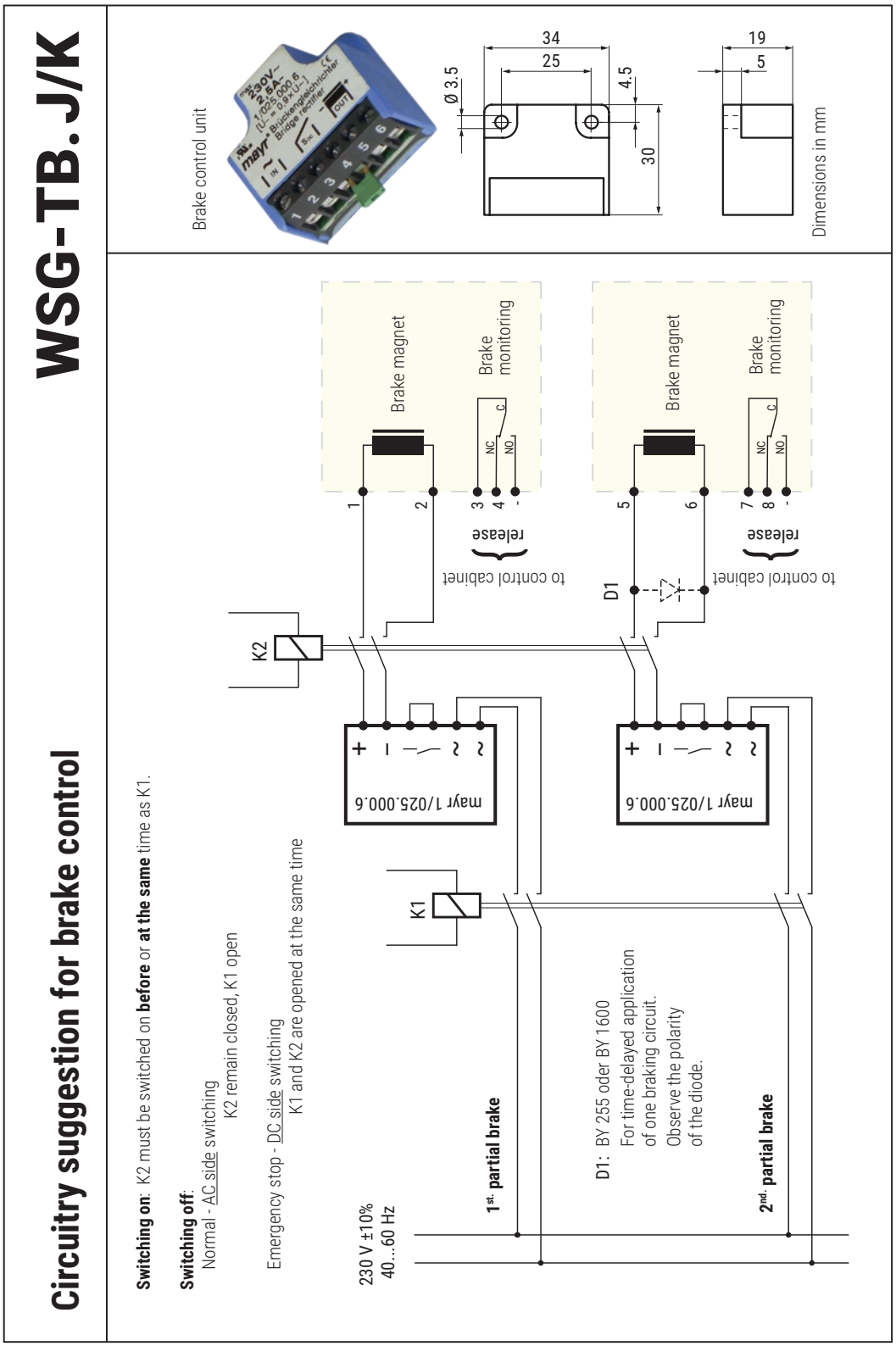
STOP
NOTICE

▶ The micro-switches must be evaluated separately for each partial brake to ensure compliance with the requirements of the type examination.

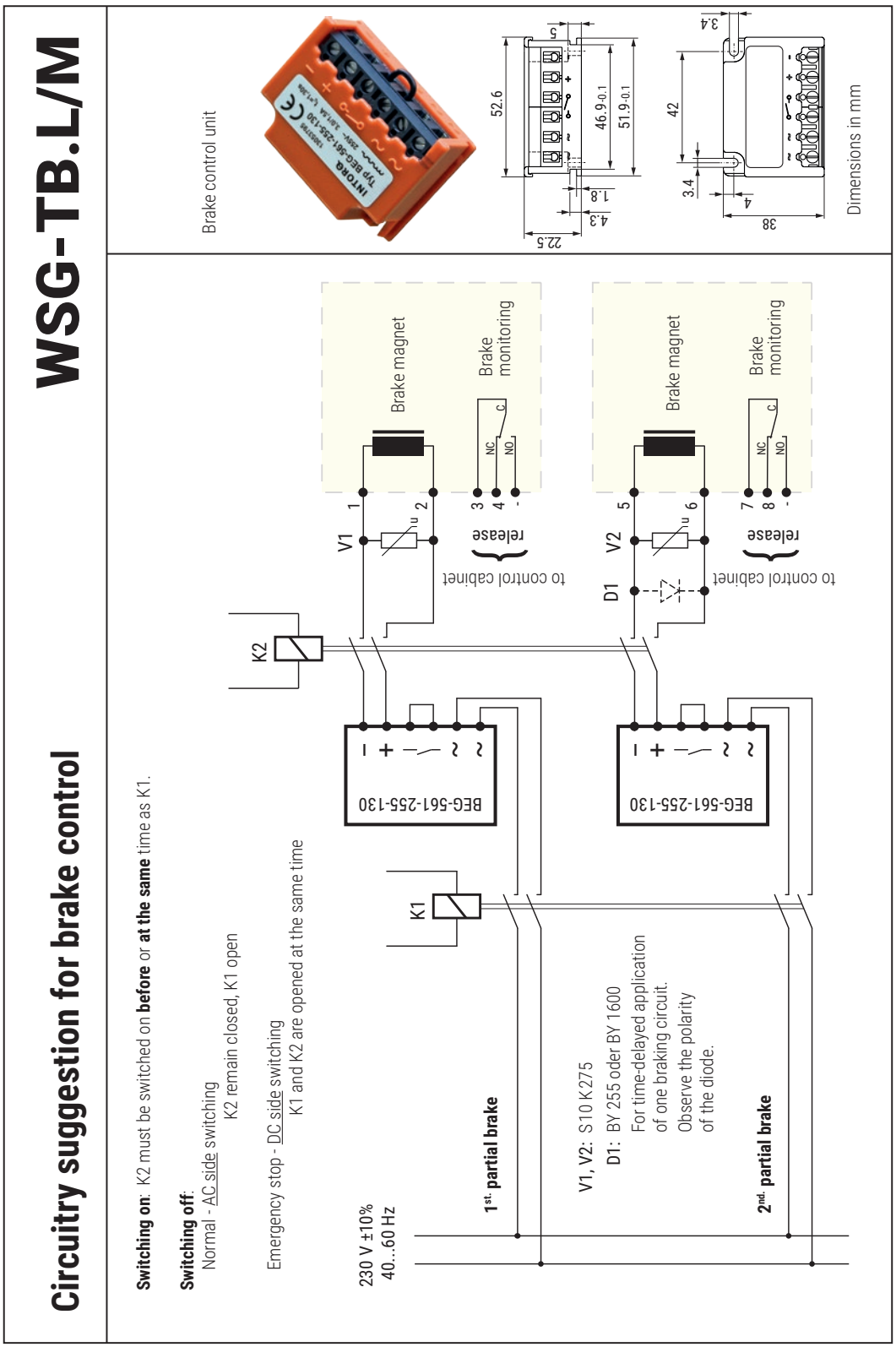
Connection of the brakes



Circuitry suggestion for brake control WSG-TB.J/K

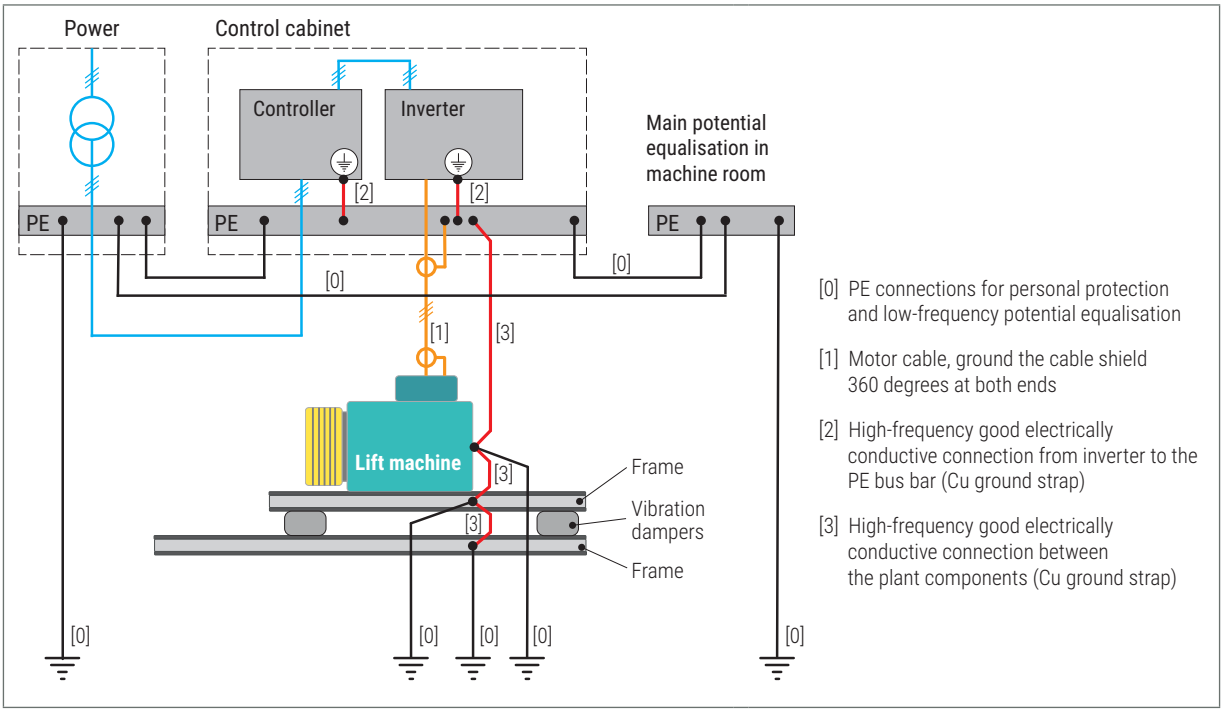


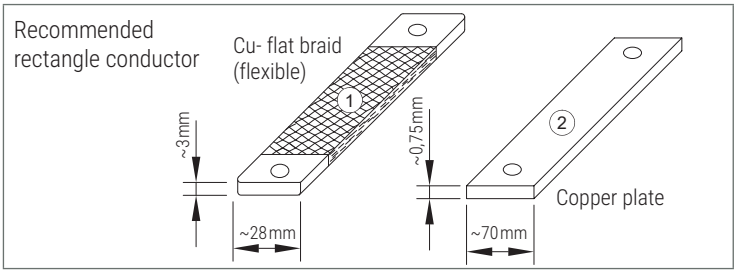
Circuitry suggestion for brake control WSG-TB.L/M

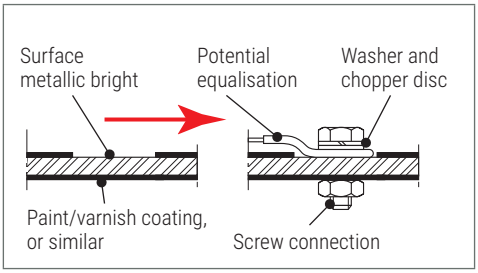


7.2.5. Earthing, potential equalisation, electromagnetic compatibility (EMC)

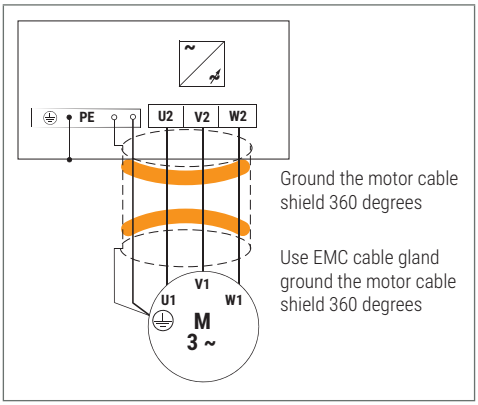
- Always keep in mind the generally applicable regulations and the specifications of the inverter manufacturer. The following notes give an overview for the construction of an EMC- compliant installation.
- Ensure proper earthing and comprehensive potential equalisation between the system components,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

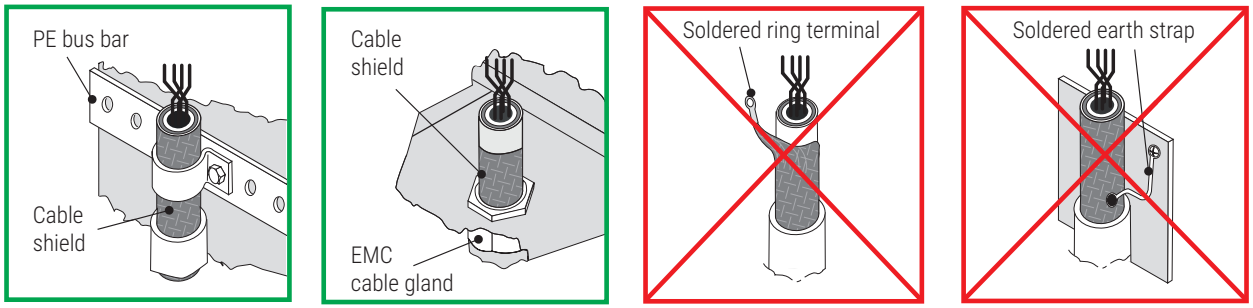






- The motor cable must be shielded. Ground the motor cable shield 360° at both ends.
- Always connect cable shields 360°. Use suitable cable glands or special cable mounting clamps for shield contact.
- Never connect the shield via a twisted shielding braid (so-called "pigtail") or via a wire extension. 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.**





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 die proper use of vibration dampers.
Cable selection	Select cables and wire cross section in according to 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 on 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. - 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
Check	Final check of the installed wiring, according to the wiring diagram which was used.

8. Commissioning and operating

8.1. Important notes

DANGER

- 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 load carrier 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 load carriers 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.

8.2. Emergency evacuation

DANGER

- 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..

Electrically operated evacuation in case of emergency

- The electrical opening of the brakes is done using the power grid or an UPS.
- The operating instructions of the controller, the inverter or the evacuation unit with UPS have to be followed!

8.3. Testing the brake system to EN 81

Information

▶ 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.
- 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 micro-switch signal is missing or a wrong signal operates.

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
	Inverter 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 (see inverter's instruction manual)
	Measuring system defective	Replace measuring system
Motor noise	Inverter parametrisation incorrect	Check inverter parametrisation
	Bearing defective	Notify customer service
Motor temperature too high	Motor surface dirty	Clean the motor surface
	Ambient temperature too high	Improve shaft and machine room ventilation
	Inverter parametrisation incorrect	Check inverter parametrisation
Braking system does not release	Braking system is not supplied with voltage	Check electrical connection
	Brake 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 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	Notify customer service
	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	Notify customer service
	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
Increased abrasion on the load carriers	too many emergency stops	Identify and eliminate the cause of the increased number of emergency stops
	Diode in brake circuit defective or missing	Replace or add diode in brake circuit

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 4	2,8	4,1	4,8
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

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 9.4 and the brake operating instructions (page 65 or page 120)
Check the diode in the brake circuit	x	x	see section 7.2.4
Check the bearing noise		x	
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 load carrier guard	x	x	
Clean the motor surface	x	x	

9.3. Regreasing the bearings

- The anti-friction bearings have been provided with a grease filling at the factory that is sufficient for the planned service life of the machine. Under normal operating conditions, regreasing is not required or recommended.

9.4. Check brake air gap

DANGER

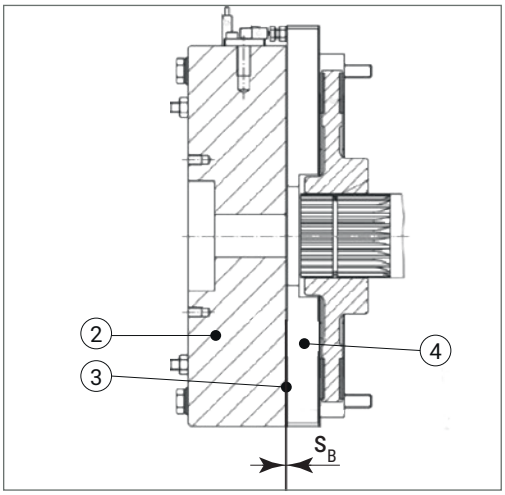
- ▶ If the brake air gap exceeds the permissible value „$s_{B\,max}$“, the braking torque may be significantly reduced. Shut down the lift system and inform customer service.
- ▶ Unit-power-off. Lock out and tag out. Motor and brake have to be de-energised!

Necessary tools

- Feeler gauge 0,05 ... 1,0 mm

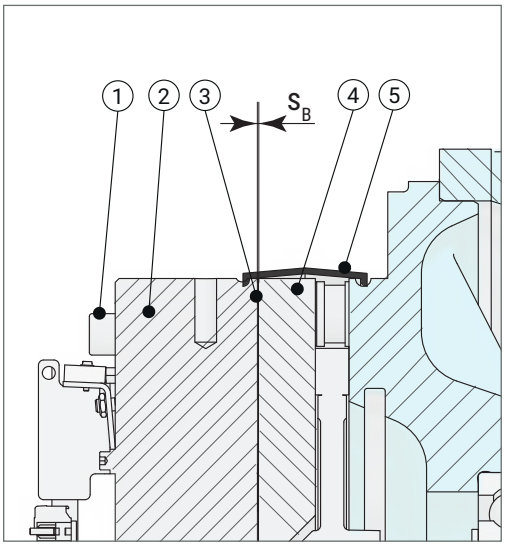
9.4.1. WSG-TB.J/K

- Observe the brake operating manual from page 120.
- Measure the air gap "s_B" (3) on both brake circuits between the armature plate (4) and the stator (2) using a feeler gauge.
- Compare the measured air gap with the maximum permissible air gap „$s_{B\,max}$“, see section „10. Technical data“ on page 29.
- If the brake air gap exceeds the permissible value „$s_{B\,max}$“, shut down the lift system and inform the customer service.



9.4.2. WSG-TB. L/M

- Observe the brake operating manual from page 65.
- Remove the cover ring (5) from the air gap (if there is one).
- Measure the air gap "s_B" (3) at two opposite points near the fastening screws (1) between the armature plate (4) and the stator (2) using a feeler gauge.
- Do not insert feeler gauge more than 10 mm between armature plate (4) and stator (2) !
- Compare the measured air gap with the maximum permissible air gap „$s_{B\,max}$“, see section „10. Technical data“ on page 29.
- If the brake air gap exceeds the permissible value „$s_{B\,max}$“, shut down the lift system and inform the customer service.
- After the measurement has been completed, fit the protective brake covers.



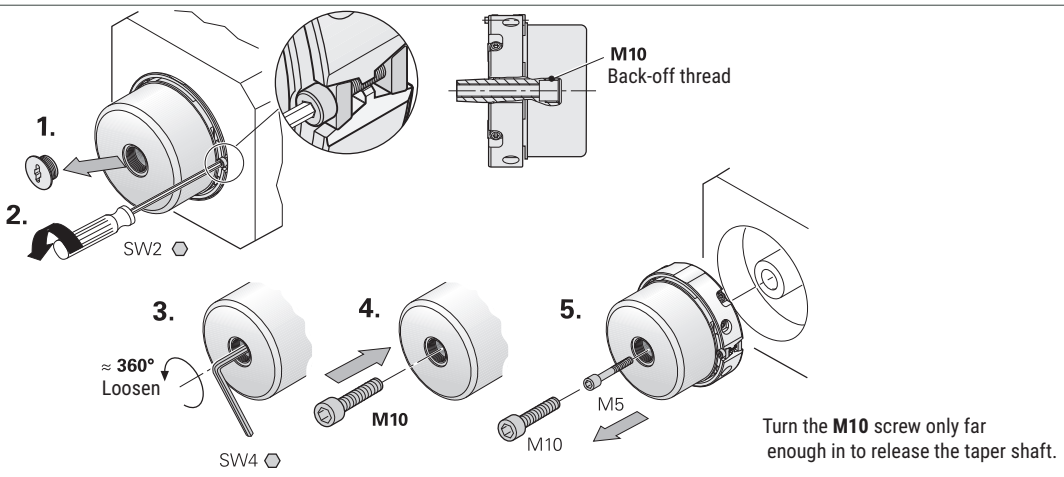
9.5. Replacing the measuring system

Necessary tools

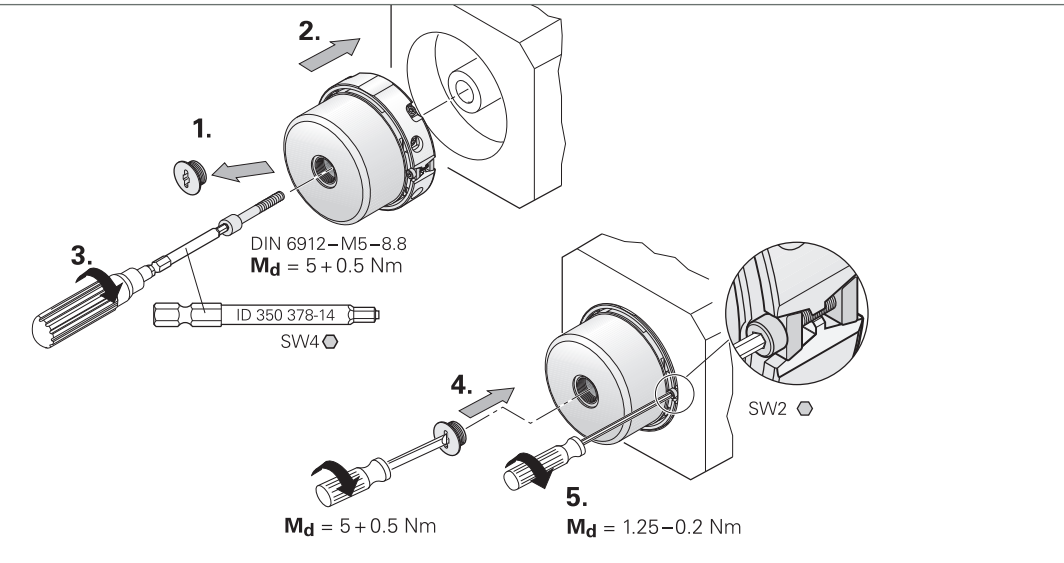
- Torque wrench (1 ... 5 Nm) with Allen key size 2 and 4 mm
- Allen wrench size 8 mm

▶ **Valid for ECN 1313 and ERN 1387 (Heidenhain).**
▶ 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



10. Technical data

Duty type:	S3 - 40 % ED
Traction sheave:	dia. 100 / 120 mm
NDE bearing:	ball bearing
Drive motor:	synchronous motor
Permissible shaft load F_S:	35 kN
Number of pole pairs:	8
Thermal class:	155 (F)
Degree of protection:	IP 23
Winding protection:	3 x PTC 150°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)

Dual-circuit fail-safe brake					
Motor type:	**WSG-TB.J**	**WSG-TB.K**	**WSG-TB.L**	**WSG-TB.M-**	
X1=	**-R/S**	**-R/S**	**-S**	**-S**	**-T**
Brake:	RTW 180	RTW 180	BFK 464-18R	BFK 464-19R	BFK 464-20R
Type-examination cert.:	EU-BD 945	EU-BD 945	EU-BD 1056	EU-BD 1055	EU-BD 1034
Max. braking torque:	2 x 200 Nm	2 x 200 Nm	2 x 280 Nm	2 x 350 Nm	2 x 450 Nm
Air gap s_B:	0,45 mm	0,45 mm	$0,4^{+0,06/-0,08}$ mm	$0,4^{+0,06/-0,08}$ mm	
Max. air gap $s_{B\,max}$:	0,9 mm	0,9 mm	0,6 mm	0,6 mm	
Holding voltage:	205 V DC	205 V DC	103 V DC	103 V DC	
Holding current:	2 x 0,34 A	2 x 0,34 A	2 x 0,56 A	2 x 0,60 A	2 x 0,65 A
Overexcitation voltage:	-	-	205 V DC	205 V DC	
Overexcitation current:	-	-	2 x 1,12 A	2 x 1,20 A	2 x 1,32 A
Overexcitation time:	-		1,3 s	1,3 s	

Brake control units		
Type:	mayr 1/025.000.6	BEG-561-255-130
Operating voltage:	230 V AC (±10%); 40...60 Hz	230 V AC (±10%); 40...60 Hz

Brake monitoring contacts	
Contact rating:	250 V AC / max. 3 A /// 30 V DC / max. 3 A
Minimum switching power:	24 V DC; 10 mA; DC-12

Motor type		**WSG-TB.J**			**WSG-TB.K**			**WSG-TB.L**			**WSG-TB.M**		
torque (S3-40 %)	M_N [Nm]	140			180			240			290		
max. torque	M_{max} [Nm]	250			320			430			520		
traction sheave	D_T [mm]	100 / 120			100 / 120			100 / 120			100 / 120		
for loads up to *)	Q [kg]	1.000			1.300			1.600			2.000		
suspension		table applies for 2 : 1											
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]
	0,5	191 / 159	2,8 /2,3	7,5	191 / 159	3,6 / 3,0	9,0	191 / 159	4,8 / 4,0	12,0	191 / 159	5,8 / 4,8	15,3 / 13,2
	0,63	241 / 201	3,5 / 2,9	9,0	241 / 201	4,5 / 3,8	11,5	241 / 201	6,1 / 5,1	15,0	241 / 201	7,3 / 6,1	19,4 / 15,3
	1,0	382 / 318	5,6 / 4,7	13,5 / 11,0	382 / 318	7,2 / 6,0	16,0 / 14,0	382 / 318	9,6 / 8,0	22,0 / 17,5	382 / 318	11,6 / 9,7	26,4 / 19,4
torque (S3-40 %)	M_N [Nm]	130			165			220			265		
		611 / 509	8,3 / 6,9	19,1	611 / 509	10,6 / 8,8	22,5	611 / 509	14,1 / 11,7	31,1	611 / 509	17,0 / 14,1	38,0

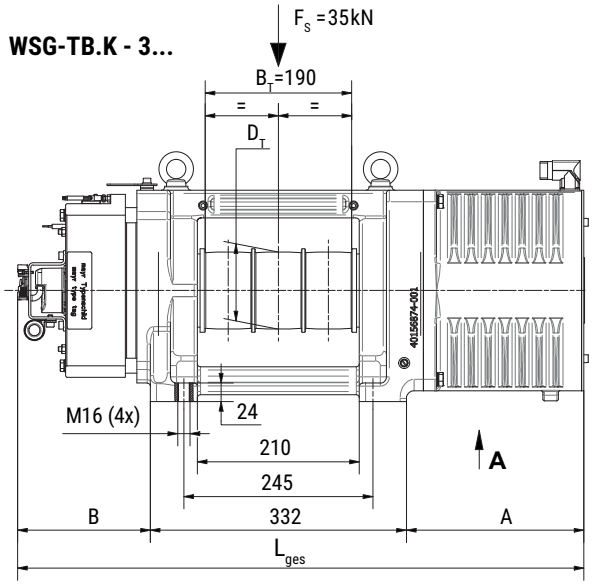
*) Reference values. Achievable nominal load depends on specific lift system data

The table is applicable to an overall shaft efficiency of approx. 80...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..

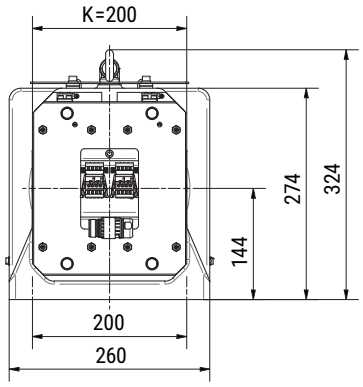
11. Dimension drawing

11.1. WSG-TB.x-R...

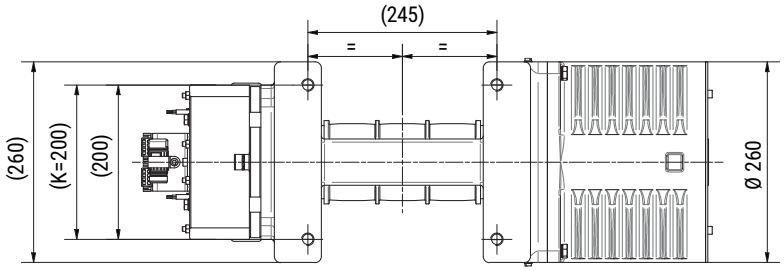
WSG-TB.K - 3...



WSG-TB.J/K - 3 ...

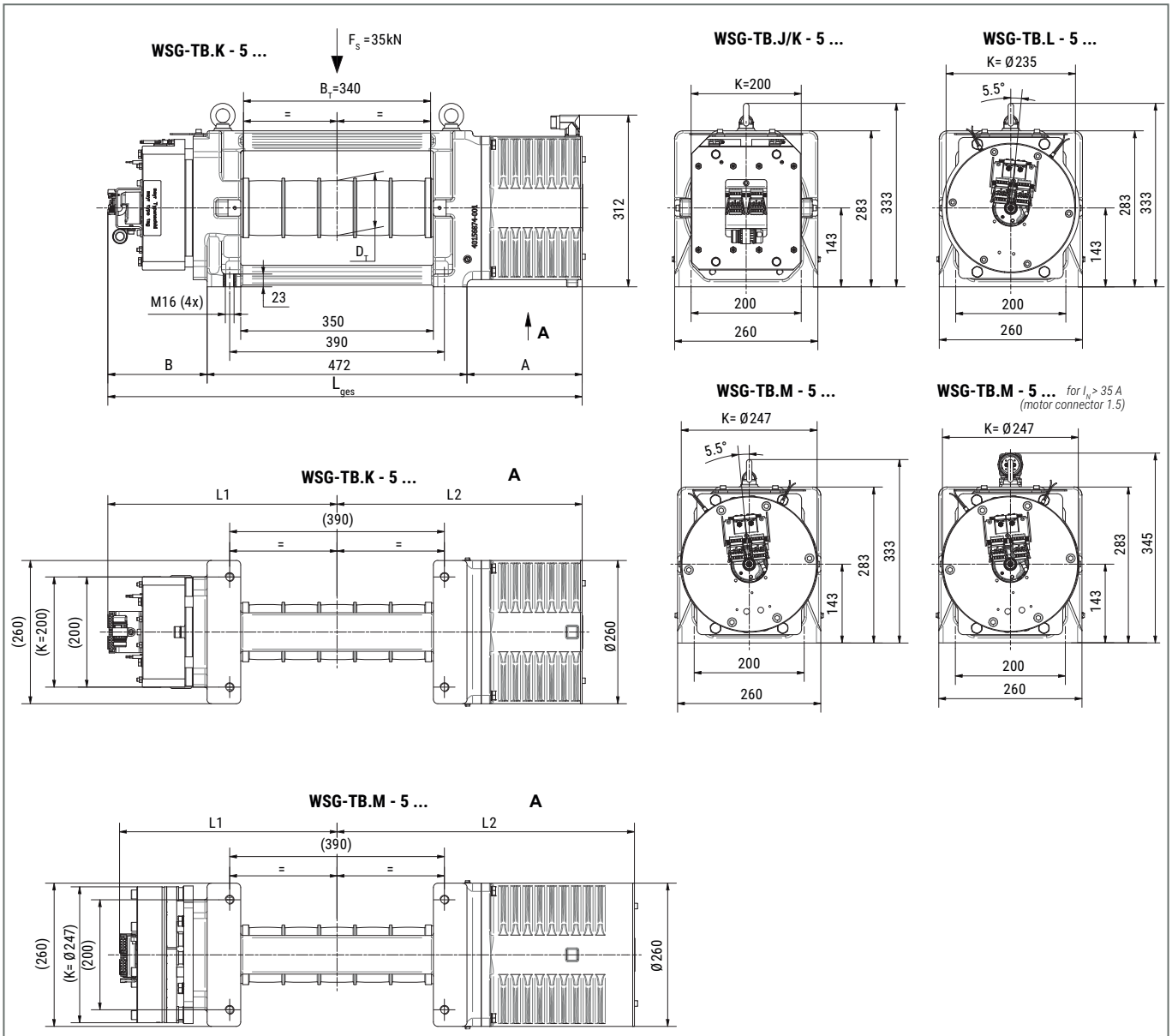


WSG-TB.K - 3... **A**



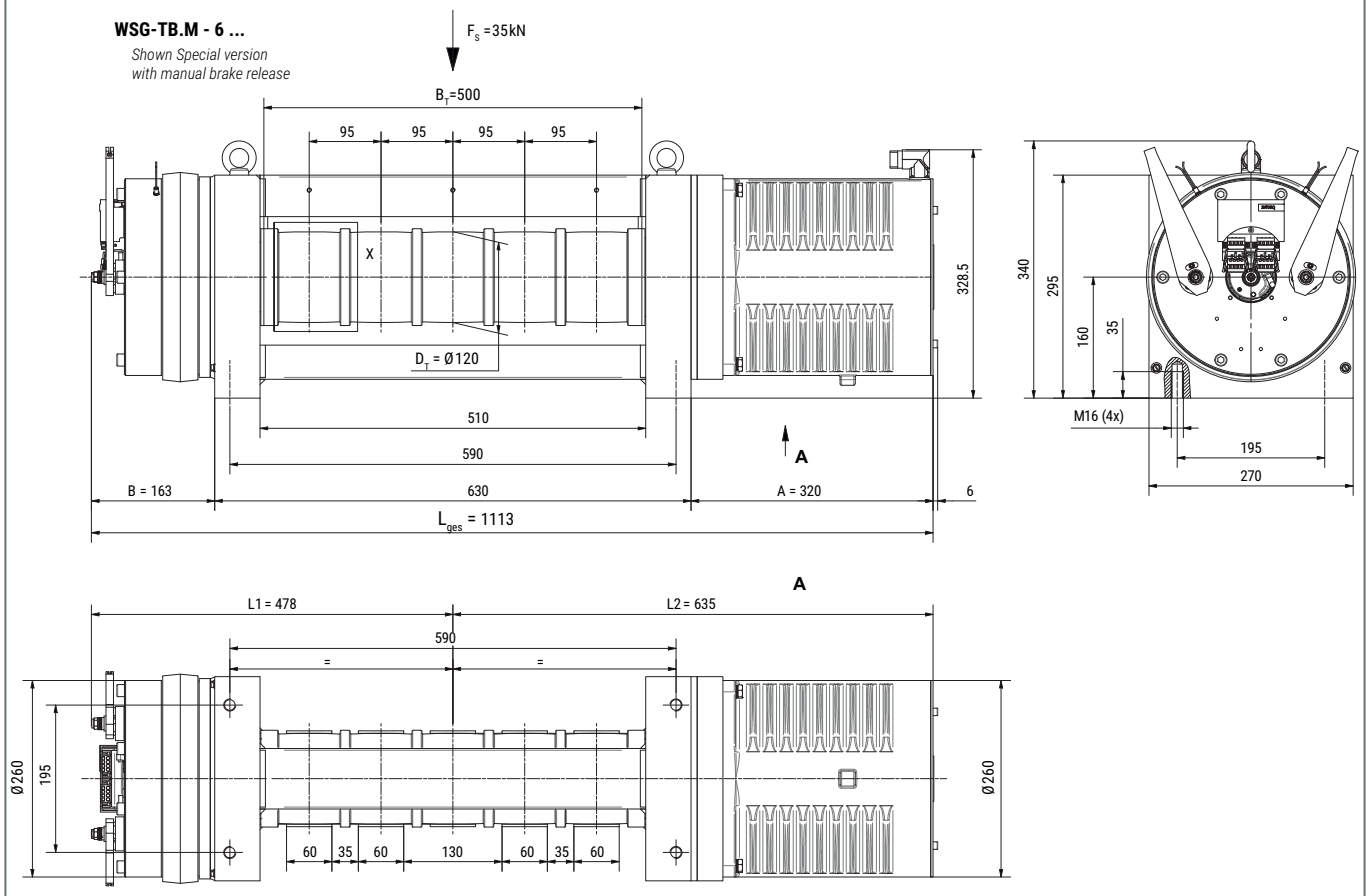
WSG-	TB.J-3...		TB.K-3...	
B_T	190		190	
Ø D_T / dia. D_T	80	100	80	100
L_{ges}	710		735	
L1	339		339	
L2	371		396	
A	205		230	
B	173		173	
K	180		180	
m_G [kg]	145		150	
J_G [kgm^2]				

11.2. WSG-TB.x-S...



WSG-	TB.J-S		TB.K-S...		TB.L-S...		TB.M-S...	
B_T	340		340		340		340	
Ø D_T / dia. D_T	100	120	100	120	100	120	100	120
L_{ges}	862		887		900		935	
L1	417		417		393		395	
L2	445		470		507		540	
A	209		234		271		304	
B	181		181		157		159	
K	180		180		Ø 235		Ø 247	
m_G [kg]	165		175		185		195	
J_G [kgm^2]	0,092	0,120	0,094	0,122	0,115	0,143	0,117	0,145

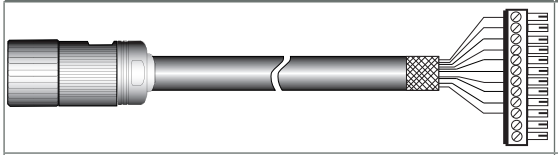
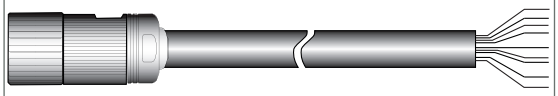
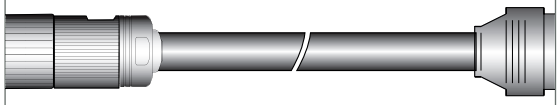
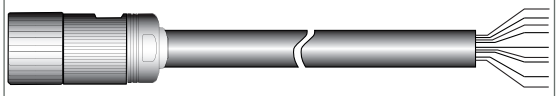
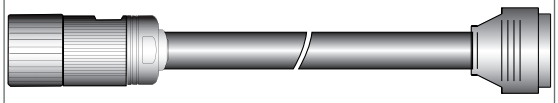
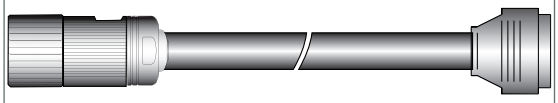
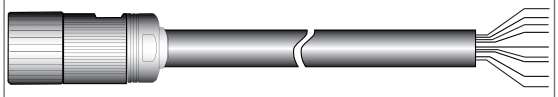
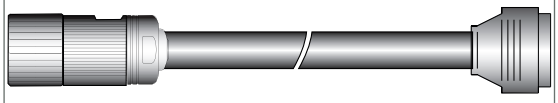
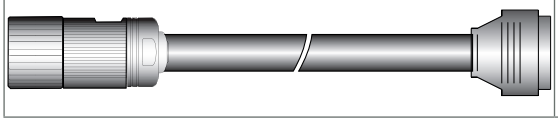
11.3. WSG-TB.M-T...



WSG-	TB.M-T...
B_T	500
Ø D_T / dia. D_T	120
L_{ges}	1113
L1	478
L2	635
A	320
B	163
K	
m_G [kg]	260
J_G [kgm^2]	0,175

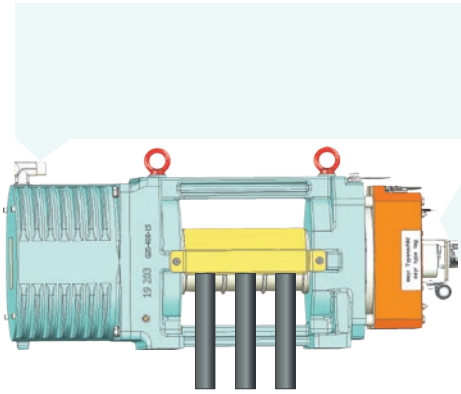
12. Accessories

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

	Inverter type	Recommended encoder system	Recommended measurement system cable
	F-Pack WLD 302	ECN 1313 - EnDat	514 273 022-xx
	E-Pack Arkel ARCODE	ECN 1313 - (EnDat/SSI)	503 325 021-xx
	D-Pack Arkel ADrive CT unidrive SP / E	ECN 1313 - (EnDat/SSI)	502 452 021-xx
	Brunner & Fecher (FB xx)	ECN 1313 - (EnDat/SSI)	640 007 022-xx
	Fuji Frenic	ECN 1313 - (EnDat/SSI)	502 679 022-xx
	RST Elektronik FRC	ECN 1313 - EnDat	508 752 022-xx
	GEFRAN (SIEI) AVY-L-M	ERN 1387	502 599 022-xx
	Yaskawa/Omron L7 Telemecanique/Schneider Altivar 71	ECN 1313 - EnDat	503 715 022-xx
	KW Goliath Ziehl-Abegg 3C	ECN 1313 - EnDat	508 749 022-xx
	Ziehl-Abegg 4C	ECN 1313 - (EnDat/SSI)	504 503 022-xx

xx .. cable length [m]

12.2. Cable set for motor and brake

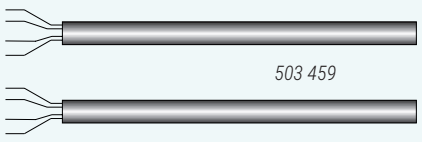


Motor cable

503 120

Pin	Wire
1 (U1)	No.1 / U1
4 (V1)	No.2 / V1
3 (W1)	No.3 / W1
PE	green/yellow
C (T1)	No.5 / BR1
D (T2)	No.6 / BR2

Brake cable



503 459

Wire		
1	brake	Brake 1
2	brake	
3	switch	
4	switch	
1	brake	Brake 2
2	brake	
3	switch	
4	switch	

13. Spare parts

Part	Remarks	Description
Motor		
Measuring system	ECN 1313 / SSI / 2048 Inkr. / clamping ring ECN 1313 / ENDAT / 2048 Inkr. / clamping ring	ET ECN1313SSI ET ECN1313ENDAT
Brake system		
Brake control unit WSG-TB.J/K	mayr 1/025.000.6	ET 35372100119
Brake control unit WSG-TB.L/M	BEG-561-255-130	ET 35372100111
Accessories		

14. Annex

14.1. Special features for use in elevator systems according to ASME A17.1

- Please note that in the case of elevator systems according to ASME 17.1, in contrast to EN 81, the machine fastening must be done as follows:
  - » **4 M 16 bolts - strength class 12.9 - tightening torque 350 Nm**

- According to ASME regulations, the grooves/profiles on the traction sheave must not be reworked.
  This means: Regrooving is not allowed.

14.2. UL/CSA certificate

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD America

CERTIFICATE

No. U10 116576 0001 Rev. 01

Holder of Certificate: **Wittur Electric Drives GmbH**
Offenburger Straße 3
01189 Dresden
GERMANY

Certification Mark:

Product: **Electric Motors**
(Gearless synchronous lift machine)

Tested according to:
UL 1004-1:2012/R:2020-11
UL 1004-8:2013/R:2018-12
CSA C22.2 No. 100:2014/U1:2017-04
CSA B44.1:19/ASME A17.5-2019

This product was voluntarily tested to the relevant safety requirements referenced on this certificate. It can be marked with the certification mark above. The mark must not be altered in any way. The certificate holder shall not transfer this certificate to third parties. This product certification system operated by TÜV SÜD America Inc. most closely resembles system 3 as defined in ISO/IEC 17067. Certification is based on the TÜV SÜD "Testing, Certification, Validation and Verification Regulations (TCVVR)". For Canadian standards TÜV SÜD America Inc. is accredited by the Standards Council of Canada to ISO/IEC 17065.

Test report no.: 713330016

Date, 2024-07-23

(Benedikt Pulver)

Page 1 of 6

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ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD America

CERTIFICATE

No. U10 116576 0001 Rev. 01

Model(s):

WSU-LF series
WSU-TB series
WSU-TR series
WSU-TS series
WSU-08 series
WSU-21 series
WSU-25 series
WSU-29 series

Brand Name(s): **WITTUR**

Parameters:

WSU-LF Series

Duty	S3-40%
Torque (Nm)	900/1200/1650/1850
Maximum Torque (Nm)	1800/2400/3300/3700
Max. Speed (RPM)	298
Max. link voltage (V)	620
Max. Current (A)	123
Max. Power (kW)	46,2

WSU-TB Series
WSU-TR Series

Duty	S3-40%
Torque (Nm)	80/105/140/170/180/240/290
Maximum Torque (Nm)	160/220/275/330/325/430/520
Max. Speed (RPM)	611
Max. link voltage (V)	620
Max. Current (A)	38
Max. Power (kW)	17

WSU-TS Series

Duty	S3-40%
Torque (Nm)	180/240/290
Maximum Torque (Nm)	325/430/520
Max. Speed (RPM)	239
Max. link voltage (V)	620
Max. Current (A)	19,4
Max. Power (kW)	7,2

Ratings:	**WSU-08** Series
Duty	S3-40%
Max Voltage (V)	80
Max. Frequency (Hz)	48
Max. Current (A)	62,5
Max. Power (kW)	27,6

	WSU-29 Series
Duty	S1
Max Voltage (V)	480
Max. Frequency (Hz)	53,9
Max. Current (A)	1345
Max. Power (kW)	123

Page 2 of 6

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14.3. EU type-examination certificate EU-BD 945 (WSG-TB.J/K)

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Industrie Service

EU TYPE-EXAMINATION CERTIFICATE

According to Annex IV, Part A of 2014/33/EU Directive

Certificate No.:	EU-BD 954/1
Certification Body of the Notified Body:	TÜV SÜD Industrie Service GmbH Westendstr. 199 80686 Munich - Germany Identification No. 0036
Certificate Holder:	Chr. Mayr GmbH & Co. KG Eichenstr. 1 87665 Mauerstetten - Germany
Manufacturer of the Test Sample: (Manufacturer of Serial Production – see Enclosure)	Chr. Mayr GmbH & Co. KG Eichenstr. 1 87665 Mauerstetten - Germany
Product:	Braking device acting on the shaft of 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:	RTW Size 125, 180, 225 Type 8012.___.__
Directive:	2014/33/EU
Reference Standards:	EN 81-20:2014 EN 81-50:2014 EN 81-1:1998+A3:2009
Test Report:	EU-BD 954/1 of 2016-06-03
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:	2016-07-18

Achim Janocha
Certification Body "lifts and cranes"

TÜV SÜD Industrie Service GmbH 00 36 Notified Body

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Annex to the EC Type-Examination Certificate No. EU-BD 954/1 of 2016-07-18

TÜV SÜD Industrie Service

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 torques and tripping rotary speeds

1.1.1 Permissible brake torques and maximum tripping rotary speeds of the traction sheave when the brake device acts on the shaft of the traction sheave while the car is moving upward

Size	Permissible brake torque [Nm]	Max. tripping rotary speed of the traction sheave [rpm]
125	180 - 250	1000
180	280 - 400	900
225	340 - 500	800

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 traction sheave's maximum tripping rotary speed as outlined above taking into account traction sheave diameter and car suspension.

$$v = \frac{D_{TS} \times \pi \times n}{60 \times i}$$

v = Tripping (rated) speed (m/s)
D_{TS} = Diameter of the traction sheave from rope's center to rope's center (m)
π = 3,14
n = Rotary speed (rpm)
i = Ratio of the car suspension

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

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

Size	Min. nominal brake torque* [Nm]	Max. nominal brake torque * [Nm]	Max. tripping rotary speed [rpm]	Maximum response times** [ms] without overexcitation		
				t_0	t_{50}	t_{90}
125	2 x 90 = 180		1000	60	100	140
125		2 x 125 = 250	1000	35	70	110
180	2 x 140 = 280		900	40	80	140
180		2 x 200 = 400	900	25	55	95
225	2 x 170 = 370		800	35	60	110
225		2 x 250 = 500	800	25	50	80

Interim values can be interpolated

Explanations:

* **Nominal brake torque:** Brake torque 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 torque, t_{50} optionally calculated $t_{50} = (t_{10} + t_{90})/2$ or value taken from the examination recording

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

Page 1 of 2

Annex to the EC Type-Examination Certificate No. EU-BD 954/1 of 2016-07-18

TÜV SÜD Industrie Service

1.2.2 Assigned execution features

Type of powering / deactivation	continuous current / continuous current end
Brake control	parallel
Nominal air gap	0.45 mm
Damping elements	YES
Overexcitation	NO

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 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.

2.4 The setting of the brake torque has to be secured against unauthorized adjustment (e. g. sealing lacquer).

2.5 The identification drawing no. E02803400000162 including stamp dated 2016-06-03 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.

2.6 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, 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.

Page 2 of 2

Enclosure to the EU Type-Examination Certificate
No. EU-BD 954/1 of 2016-07-18

TÜV SÜD Industrie Service

Authorised Manufacturer of Serial Production – Production Sites (valid from: 2016-07-18):

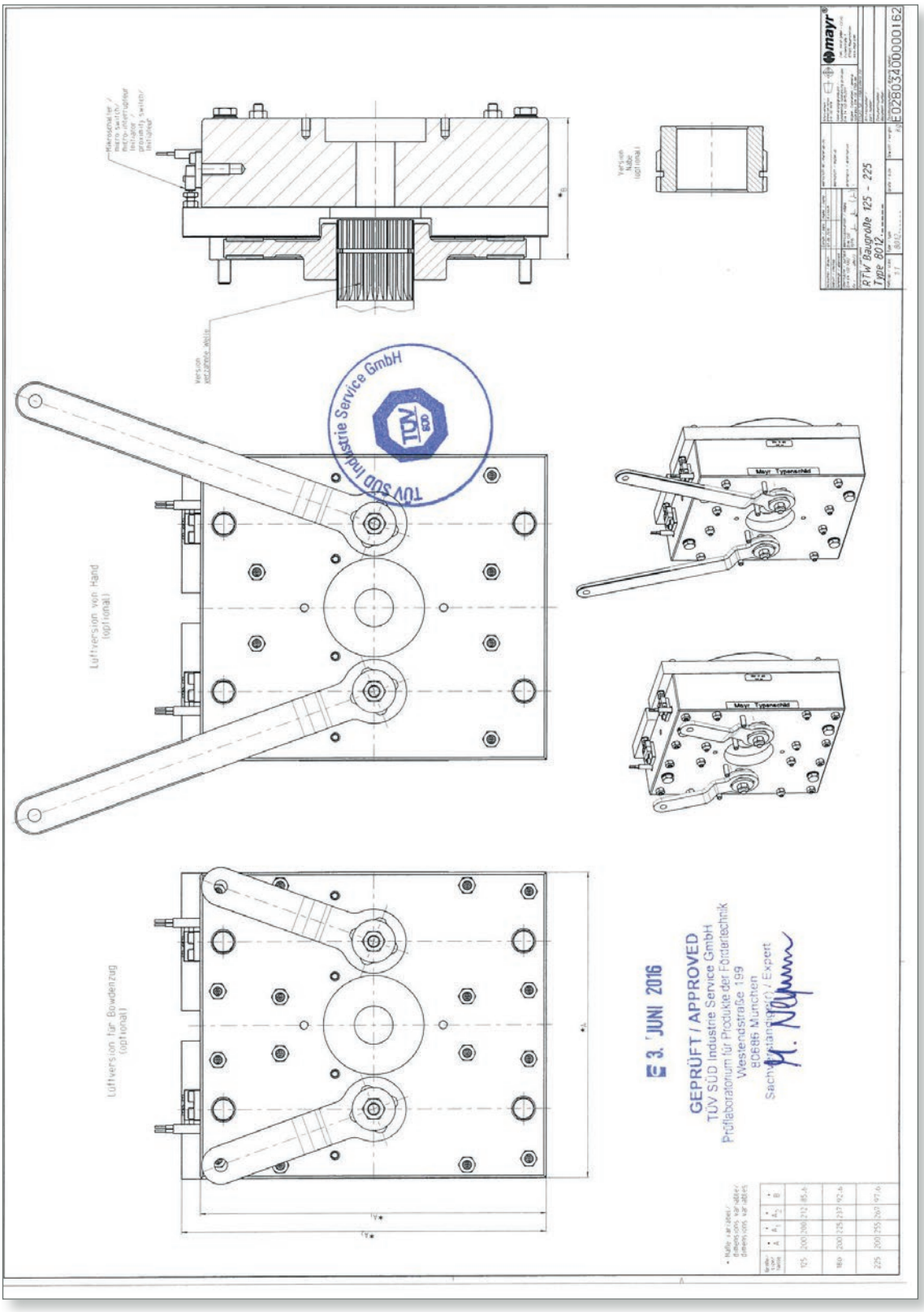
Company	Chr. Mayr GmbH & Co. KG
Address	Eichenstr. 1 87665 Mauerstetten - Germany

Company	Mayr Polska Sp. z. o. o.
Address	Rojów, ul. Hetmanska 1 63-500 Ostrzesów - Poland

- END OF DOCUMENT -

Based on: Application letter from Co. Chr. Mayr GmbH & Co. KG of 2016-03-10

Page 1 of 1


mayr
RTw Baugröße 125 - 225
Type 8012
E028034000000162
TÜV SÜD Industrie Service GmbH
Luftversion von Hand (optional)
Luftversion für Bowdenzug (optional)
Mayr Typenschild
GEPRÜFT / APPROVED
TÜV SÜD Industrie Service GmbH
Prüflaboratorium für Produkte der Fördertechnik
Westendstraße 199
80686 München
13. JUNI 2016

14.4. EU type-examination certificate EU-BD 1056 (WSG-TB.L)

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Industrie Service

EU TYPE-EXAMINATION CERTIFICATE

According to Annex IV, Part A of 2014/33/EU Directive

Certificate No.:	EU-BD 1056-1
Notified Body:	TÜV SÜD Industrie Service GmbH Westendstr. 199 80686 Munich - Germany Identification No. 0036
Certificate Holder:	Kendrion INTORQ GmbH Wülmser Weg 5 31855 Aerzen - Germany
Manufacturer of the Test Sample: (Manufacturer of Serial Production – see Enclosure)	Kendrion INTORQ GmbH Wülmser Weg 5 31855 Aerzen - Germany
Product:	Braking device acting on the shaft of 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:	BFK464-18R
Directive:	2014/33/EU
Reference Standards:	EN 81-20:2020 EN 81-50:2020
Test Report:	EU-BD 881-1, 1093-1 of 2024-02-22
Outcome:	The product conforms to the essential health and safety requirements of the mentioned Directive if the requirements of the annex to this EU-type examination certificate are kept.
Date of Issue:	2024-02-28

TÜV SÜD Industrie Service GmbH 00 36 Notified Body

Achim Janocha
Notified Body LCC

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Annex to the EU-Type Examination Certificate
No. EU-BD 1056-1 of 2024-02-28

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 torques and tripping rotary speeds

1.1.1 Permissible brake torque when the braking device acts on the shaft of the traction sheave while the car is moving upwards

Nominal brake torque [Nm]	Maximum tripping rotary speed of the traction sheave [rpm]
340 - 560	900

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 traction sheave's maximum tripping rotary speed as outlined above taking into account traction sheave diameter and car suspension.

$$v = \frac{D_{TS} \times \pi \times n}{60 \times i}$$

v = Tripping (rated) speed (m/s)
D_{TS} = Diameter of the traction sheave from rope's center to rope's center (m)
π = 3,14
n = Rotary speed (rpm)
i = Ratio of the car suspension

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

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

Intermediate values can be interpolated

Minimum brake torque* [Nm]	Maximum brake torque* [Nm]	Maximum tripping rotary speed [rpm]	Maximum response times** [ms] without / with overexcitation		
			t_{10}	t_{50}	t_{90}
2 x 170 = 340		900	69 / 86	113 / 129	156 / 172
	2 x 280 = 560		46 / 56	72 / 82	98 / 107

Explanations:

* **Nominal brake torque:** Brake torque 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 torque, 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	serial / parallel
Nominal air gap	0.45 mm
Damping elements	YES
Overexcitation	2-fold non-release voltage

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

Annex to the EU-Type Examination Certificate
No. EU-BD 1056-1 of 2024-02-28

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 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.

2.4 The setting of the brake torque has to be secured against unauthorized adjustment (e. g. sealing lacquer).

2.5 The identification drawing no. 5021979 (page 3 of 3), 5023876 (page 3 of 3) or 5032461 (page 3 of 3) including stamp dated 2024-02-22 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.

2.6 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, 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 In the scope of this type-examination, it was determined, that the braking device was designed without a switching status control to evaluate the position of the anchor plates.

The brakes should be monitored as follows

a. through microswitches or proximity switches on both brakes that are connected to the lift control, or

b. through a built-in brake monitoring system of the lift control to ensure the correct opening and closing of both brakes before each start or stop of the elevator, or

c. through an automatic system specified by the lift manufacturer to check or ensure the correct braking torque. This test procedure must be carried out at least once daily.

3.3 Checking whether the requirements as per section 5.9.2.2 of EN 81-20:2020 (D) have been complied with is not part of this type examination.

3.4 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.

3.5 This EU-type examination certificate was issued according to the following standards:

- EN 81-20:2020, part 5.6.6.11, 5.6.7.13
- EN 81-50:2020, part 5.7 and 5.8

3.6 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. page 2 of 2

Enclosure to the EU-Type Examination Certificate
No. EU-BD 1056-1 of 2024-02-28

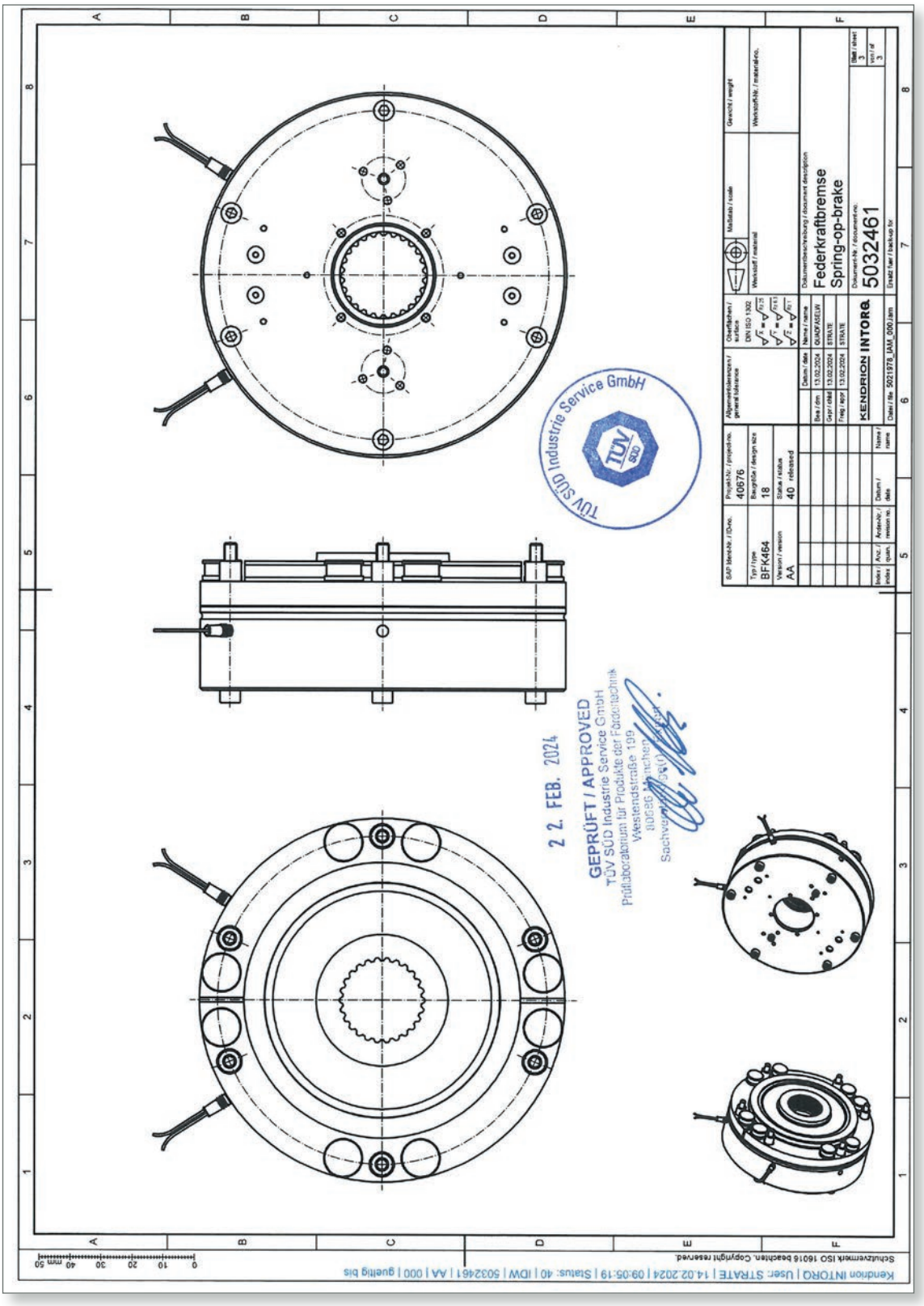
Authorised Manufacturer – Production Sites (valid from: 2024-02-07):

Company	Kendrion INTORQ GmbH
Address	Wülmser Weg 5 31855 Aerzen - Germany
Company	Kendrion (China) Co., Ltd.
Address	No. 10 Huipu Road, Suzhou Industrial Park, 215021 Suzhou, P.R. China

- END OF DOCUMENT -

Based on: Application of Co. Kendrion INTORQ GmbH dated 2024-02-07

page 1 of 1


TÜV SÜD Industrie Service GmbH
GEPRÜFT / APPROVED
TÜV SÜD Industrie Service GmbH
Prüflaboratorium für Produkte der Fördertechnik
Westendstraße 199
80686 München
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Federkraftbremse
Spring-op-brake
KENDRION INTORQ
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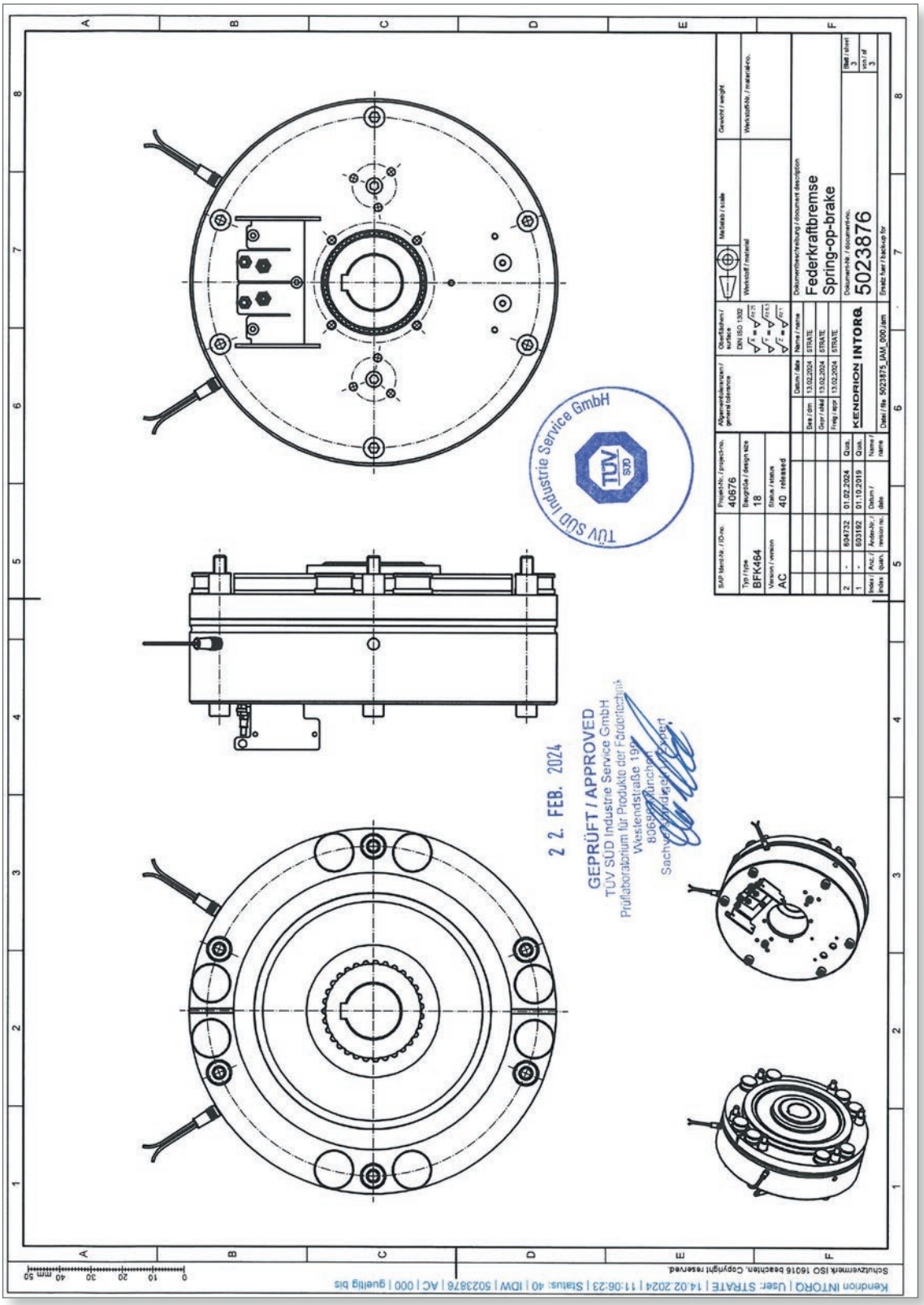

TÜV SÜD Industrie Service GmbH
GEPRÜFT / APPROVED
TÜV SÜD Industrie Service GmbH
22. FEB. 2024
Federkraftbremse
Spring-op-brake
5023876
KENDRION INTORQ
BFK464
AC

14.5. EU type-examination certificate EU-BD 1055 (WSG-TB.M-S...)

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Industrie Service

EU TYPE-EXAMINATION CERTIFICATE

According to Annex IV, Part A of 2014/33/EU Directive

Certificate No.:	EU-BD 1055-1
Notified Body:	TÜV SÜD Industrie Service GmbH Westendstr. 199 80686 Munich - Germany Identification No. 0036
Certificate Holder:	Kendrion INTORQ GmbH Wülmser Weg 5 31855 Aerzen - Germany
Manufacturer of the Test Sample: (Manufacturer of Serial Production – see Enclosure)	Kendrion INTORQ GmbH Wülmser Weg 5 31855 Aerzen - Germany
Product:	Braking device acting on the shaft of 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:	BFK464-19R
Directive:	2014/33/EU
Reference Standards:	EN 81-20:2020 EN 81-50:2020
Test Report:	EU-BD 881-1, 1093-1 of 2024-02-22
Outcome:	The product conforms to the essential health and safety requirements of the mentioned Directive if the requirements of the annex to this EU-type examination certificate are kept.
Date of Issue:	2024-02-28

TÜV SÜD Industrie Service GmbH 00 36 Notified Body

Achim Janocha
Notified Body LCC

TÜV®

Annex to the EU-Type Examination Certificate
No. EU-BD 1055-1 of 2024-02-28

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 torques and tripping rotary speeds

1.1.1 Permissible brake torque when the braking device acts on the shaft of the traction sheave while the car is moving upwards

Nominal brake torque [Nm]	Maximum tripping rotary speed of the traction sheave [rpm]
420	900
700	

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 traction sheave's maximum tripping rotary speed as outlined above taking into account traction sheave diameter and car suspension.

$$v = \frac{D_{TS} \times \pi \times n}{60 \times i}$$

v = Tripping (rated) speed (m/s)
D_{TS} = Diameter of the traction sheave from rope's center to rope's center (m)
π = 3,14
n = Rotary speed (rpm)
i = Ratio of the car suspension

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

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

Intermediate values can be interpolated

Minimum brake torque* [Nm]	Maximum brake torque* [Nm]	Maximum tripping rotary speed [rpm]	Maximum response times** [ms] without / with overexcitation		
			t_{10}	t_{50}	t_{90}
2 x 210 = 420		900	83 / 100	124 / 141	165 / 182
	2 x 350 = 700		45 / 53	77 / 85	108 / 116

Explanations:

* **Nominal brake torque:** Brake torque 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 torque, 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	serial / parallel
Nominal air gap	0.45 mm
Damping elements	YES
Overexcitation	2-fold non-release voltage

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

Annex to the EU-Type Examination Certificate
No. EU-BD 1055-1 of 2024-02-28

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 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.

2.4 The setting of the brake torque has to be secured against unauthorized adjustment (e. g. sealing lacquer).

2.5 The identification drawing no. 5020230 (page 3 of 3), 5024231 (page 3 of 3) or 5032463 (page 3 of 3) including stamp dated 2024-02-22 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.

2.6 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, 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 In the scope of this type-examination, it was determined, that the braking device was designed without a switching status control to evaluate the position of the anchor plates.

The brakes should be monitored as follows

a. through microswitches or proximity switches on both brakes that are connected to the lift control, or

b. through a built-in brake monitoring system of the lift control to ensure the correct opening and closing of both brakes before each start or stop of the elevator, or

c. through an automatic system specified by the lift manufacturer to check or ensure the correct braking torque. This test procedure must be carried out at least once daily.

3.3 Checking whether the requirements as per section 5.9.2.2 of EN 81-20:2020 (D) have been complied with is not part of this type examination.

3.4 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.

3.5 This EU-type examination certificate was issued according to the following standards:

- EN 81-20:2020, part 5.6.6.11, 5.6.7.13
- EN 81-50:2020, part 5.7 and 5.8

3.6 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.

Enclosure to the EU-Type Examination Certificate
No. EU-BD 1055-1 of 2024-02-28

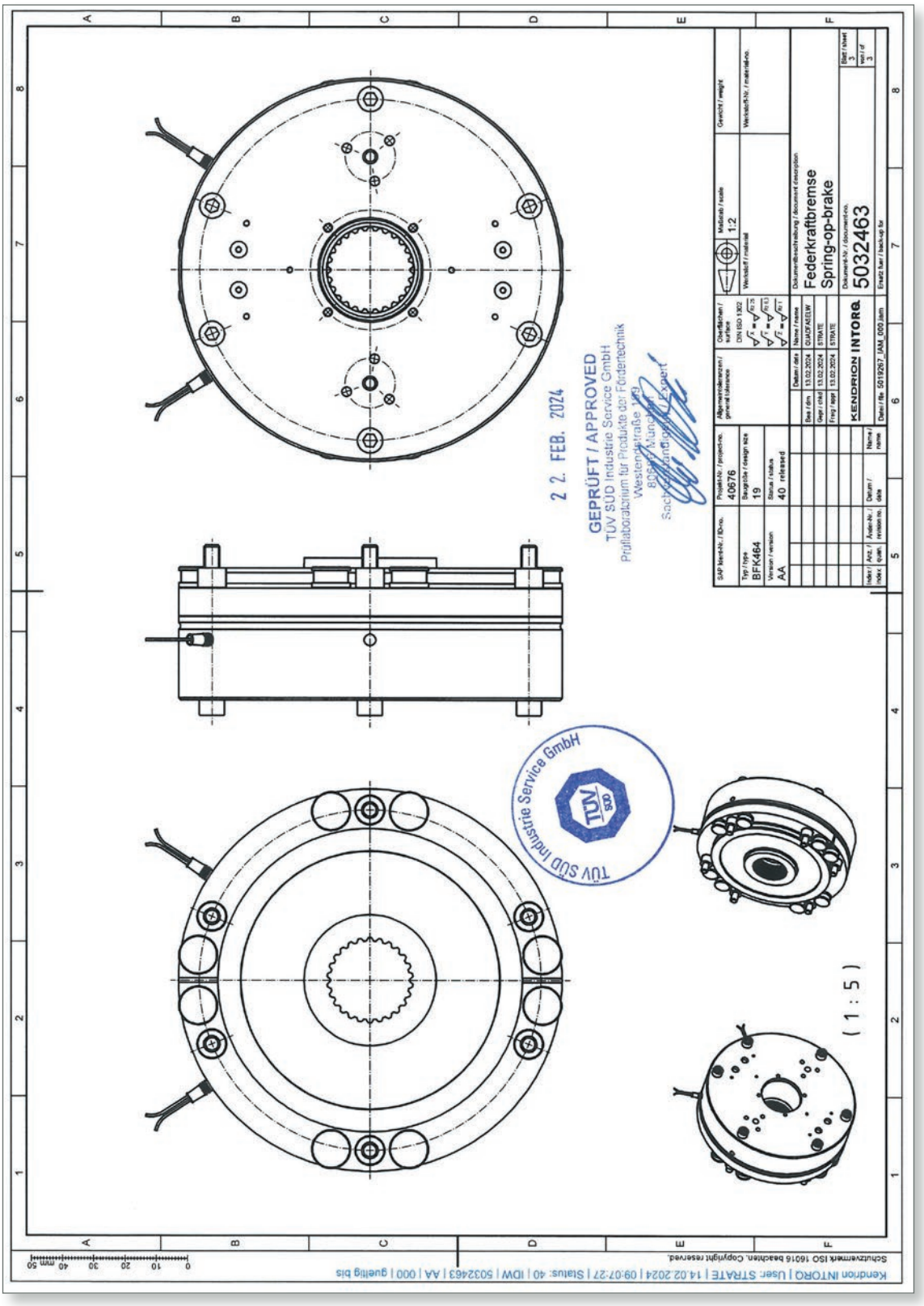
Authorised Manufacturer – Production Sites (valid from: 2024-02-07):

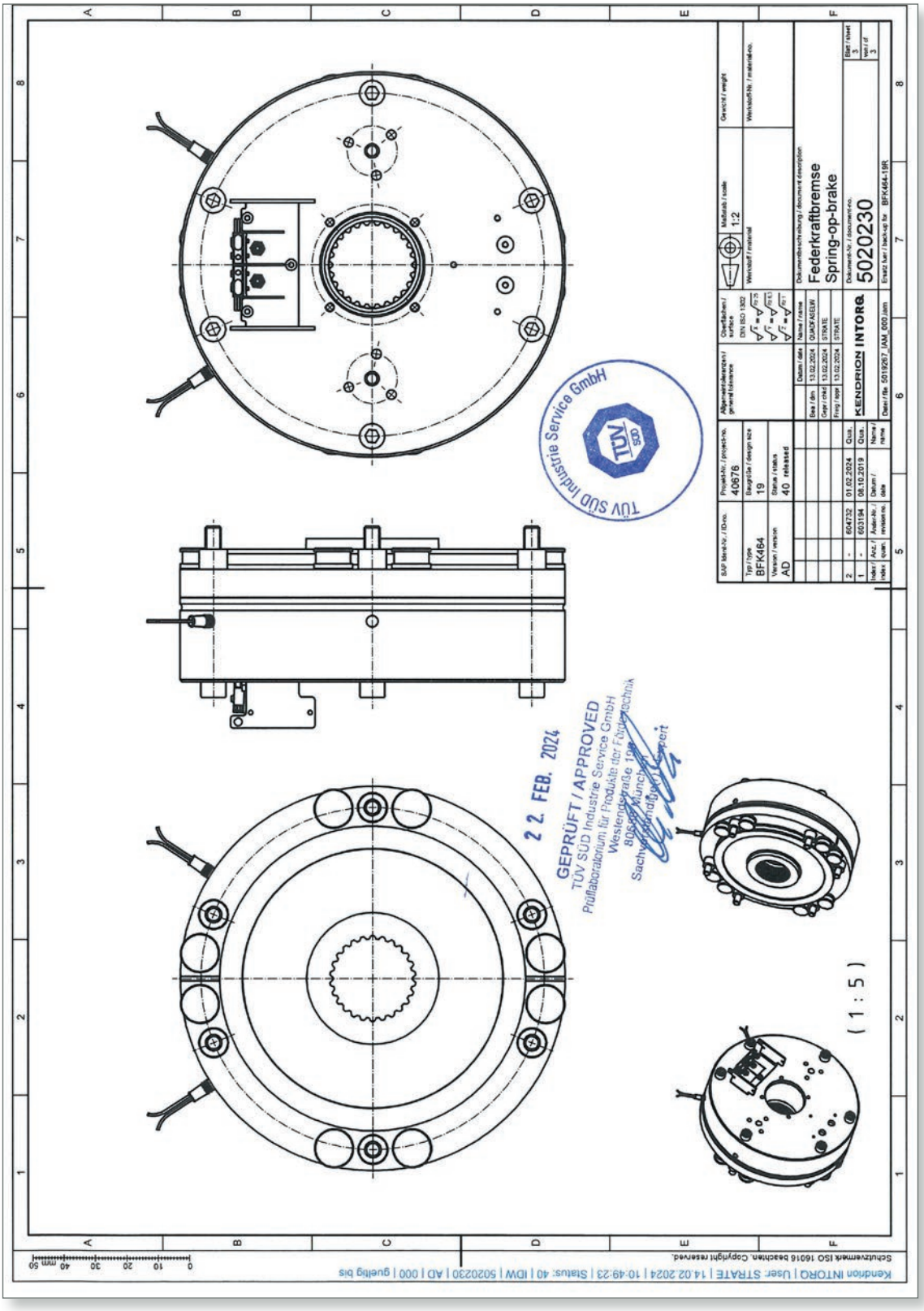
Company	Kendrion INTORQ GmbH
Address	Wülmser Weg 5 31855 Aerzen - Germany
Company	Kendrion (China) Co., Ltd.
Address	No. 10 Huipu Road, Suzhou Industrial Park, 215021 Suzhou, P.R. China

- END OF DOCUMENT -

Based on: Application of Co. Kendrion INTORQ GmbH dated 2024-02-07

page 1 of 1


GEPRÜFT / APPROVED
TÜV SÜD Industrie Service GmbH
Prüflaboratorium für Produkte der Fördertechnik
2 2. FEB. 2024
TÜV SÜD Industrie Service GmbH
Federkraftbremse
Spring-op-brake
5032463
KENDRION INTORQ
(1 : 5)


Federkraftbremse
Spring-op-brake
KENDRION INTORQ
5020230
BFK464-19R
TÜV SÜD Industrie Service GmbH
GEPRÜFT / APPROVED
TÜV SÜD Industrie Service GmbH
Prüflaboratorium für Produkte der Fördertechnik
22. FEB. 2024
(1 : 5)

14.6. EU type-examination certificate EU-BD 1034 (WSG-TB.M-T..)

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Industrie Service

EU TYPE-EXAMINATION CERTIFICATE

According to Annex IV, Part A of 2014/33/EU Directive

Certificate No.:	EU-BD 1034-1
Notified Body:	TÜV SÜD Industrie Service GmbH Westendstr. 199 80686 Munich - Germany Identification No. 0036
Certificate Holder:	Kendrion INTORQ GmbH Wülmser Weg 5 31855 Aerzen - Germany
Manufacturer of the Test Sample: (Manufacturer of Serial Production – see Enclosure)	Kendrion INTORQ GmbH Wülmser Weg 5 31855 Aerzen - Germany
Product:	Braking device acting on the shaft of 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:	BFK464-20R
Directive:	2014/33/EU
Reference Standards:	EN 81-20:2020 EN 81-50:2020
Test Report:	EU-BD 881-1, 1093-1 of 2024-02-22
Outcome:	The product conforms to the essential health and safety requirements of the mentioned Directive if the requirements of the annex to this EU-type examination certificate are kept.
Date of Issue:	2024-02-28

TÜV SÜD Industrie Service GmbH 00 36 Notified Body

Achim Janocha
Notified Body LCC

TÜV®

Annex to the EU-Type Examination Certificate
No. EU-BD 1034-1 of 2024-02-28

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 torques and tripping rotary speeds

1.1.1 Permissible brake torque when the braking device acts on the shaft of the traction sheave while the car is moving upwards

Nominal brake torque [Nm]	Maximum tripping rotary speed of the traction sheave [rpm]
560 - 900	900

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 traction sheave's maximum tripping rotary speed as outlined above taking into account traction sheave diameter and car suspension.

$$v = \frac{D_{TS} \times \pi \times n}{60 \times i}$$

v = Tripping (rated) speed (m/s)
D_{TS} = Diameter of the traction sheave from rope's center to rope's center (m)
π = 3,14
n = Rotary speed (rpm)
i = Ratio of the car suspension

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

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

Intermediate values can be interpolated

Minimum brake torque* [Nm]	Maximum brake torque* [Nm]	Maximum tripping rotary speed [rpm]	Maximum response times** [ms] without / with overexcitation		
			t_{10}	t_{50}	t_{90}
2 x 280 = 560		900	79 / 87	123 / 131	167 / 175
	2 x 450 = 900		42 / 49	70 / 77	99 / 105

Explanations:

* **Nominal brake torque:** Brake torque 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 torque, 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	serial / parallel
Nominal air gap	0.45 mm
Damping elements	YES
Overexcitation	2-fold non-release voltage

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

Annex to the EU-Type Examination Certificate
No. EU-BD 1034-1 of 2024-02-28

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 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.

2.4 The setting of the brake torque has to be secured against unauthorized adjustment (e. g. sealing lacquer).

2.5 The identification drawing no. 5021915 (page 3 of 3), 5023866 (page 3 of 3) or 5032464 (page 3 of 3) including stamp dated 2024-02-22 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.

2.6 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

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c. through an automatic system specified by the lift manufacturer to check or ensure the correct braking torque. This test procedure must be carried out at least once daily.

3.3 Checking whether the requirements as per section 5.9.2.2 of EN 81-20:2020 (D) have been complied with is not part of this type examination.

3.4 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.

3.5 This EU-type examination certificate was issued according to the following standards:

- EN 81-20:2020, part 5.6.6.11, 5.6.7.13
- EN 81-50:2020, part 5.7 and 5.8

3.6 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. page 2 of 2

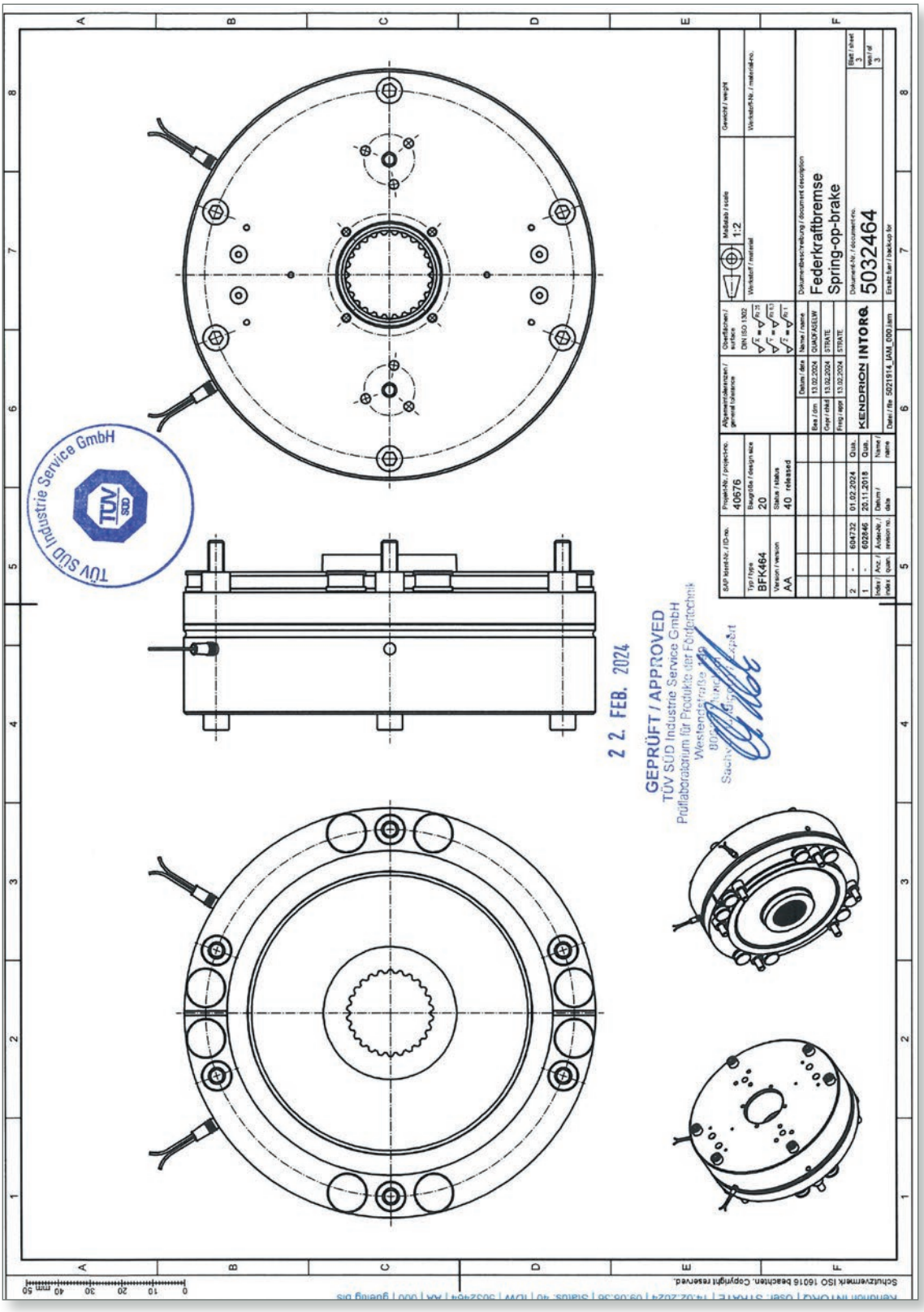
Enclosure to the EU-Type Examination Certificate
No. EU-BD 1034-1 of 2024-02-28

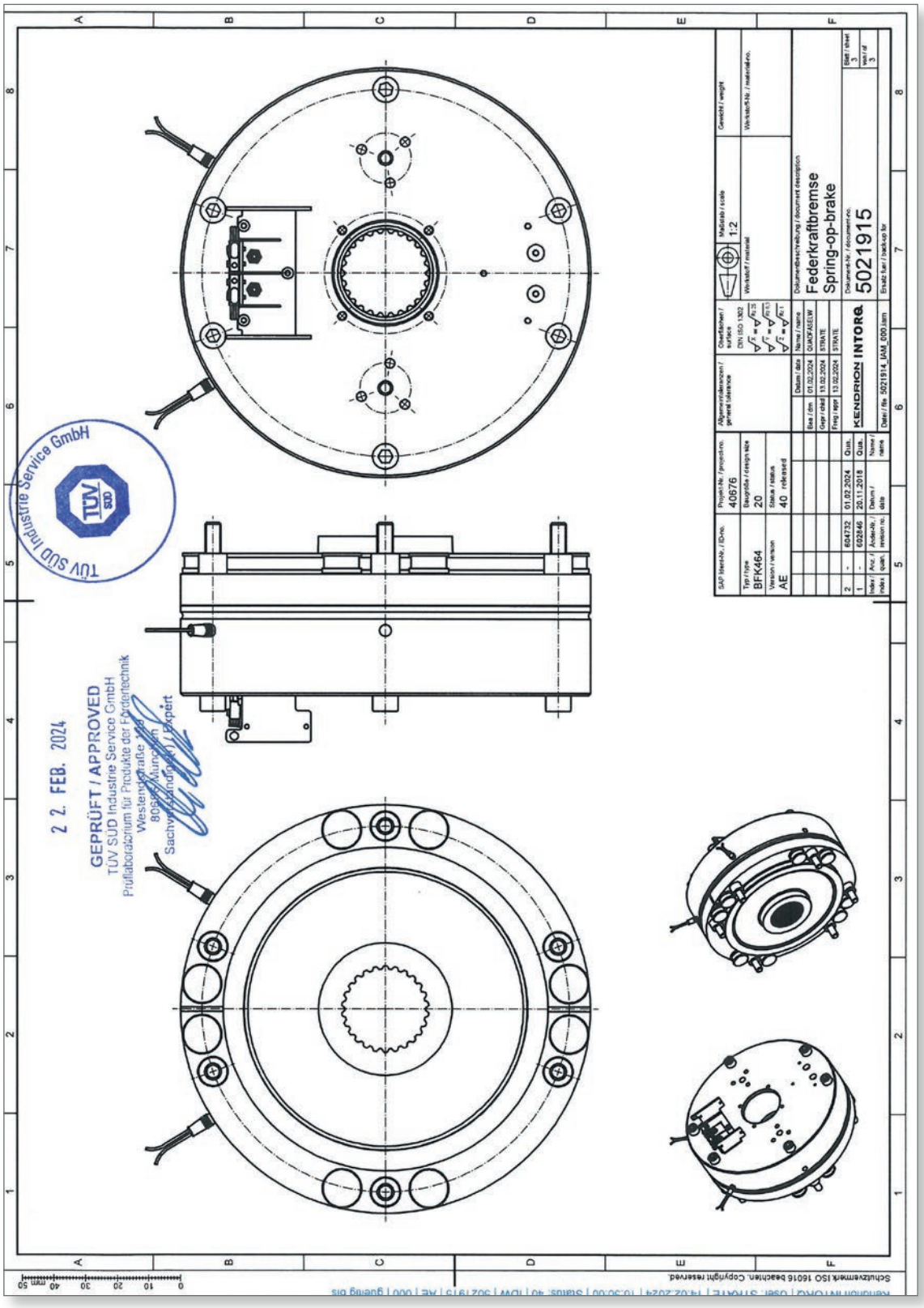
Authorised Manufacturer – Production Sites (valid from: 2024-02-07):

Company	Kendrion INTORQ GmbH
Address	Wülmser Weg 5 31855 Aerzen - Germany
Company	Kendrion (China) Co., Ltd.
Address	No. 10 Huipu Road, Suzhou Industrial Park, 215021 Suzhou, P.R. China

- END OF DOCUMENT -

Based on: Application of Co. Kendrion INTORQ GmbH dated 2024-02-07


TÜV SÜD Industrie Service GmbH
GEPRÜFT / APPROVED
TÜV SÜD Industrie Service GmbH
2 2. FEB. 2024
KENDRION INTORQ
5032464
Federkraftbremse
Spring-op-brake


TÜV SÜD Industrie Service GmbH
GEPRÜFT / APPROVED
TÜV SÜD Industrie Service GmbH
22. FEB. 2024
KENDRION INTORQ
5021915
Federkraftbremse
Spring-op-brake

14.7. EU Declaration of Conformity brake WSG-TB.J/K

EU Konformitätserklärung

EU – Declaration of conformity / Déclaration de conformité UE / Dichiarazione di conformità UE
Declaración de conformidad de la UE / Declaração de conformidade da UE

mayr®

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten

DE	erklärt folgende Konformität gemäß EU-Richtlinie und Normen für Artikel	**IT**	dichiara la seguente conformità secondo la direttiva UE e le norme per l'articolo
EN	explains the following conformity according to EU directives and norms for the following product	**ES**	declara la siguiente conformidad a tenor de la directiva y normas de la UE para el artículo
FR	déclare la conformité suivante selon la directive CE et les normes concernant l'article	**PT**	declara a seguinte conformidade, de acordo com as diretiva CE e normas para o artigo

Elektromagnetische Federdruckbremse / Electromagnetic spring applied brakes / Freins électromagnétiques à ressort de pression / Freni elettromagnetici a molle compresse / Frenos de muelles electromagnéticos / Freio eletromagnético de molas

Produkt / Product / Produit / Prodotto / Producto / Produto	**Größen** / Sizes / Tailles / Grandezze / Dimensión / Dimensão	**Typen** / *Types / Types / Serie / Tipos / Tipos*
ROBA®-twinstop®	125/180/225	8012._ _ _ _ _

	2006/42/EG	**X**	**2011/65/EU (RoHs II) incl. 2015/863/EU (RoHs III)**
X	**2014/35/EU**	**X**	**2014/33/EU**
	2014/30/EU		

Certification	*Monitoring of production (if deviates from the certifier)*
Notified Body: © TÜV SÜD Industrie Service GmbH Westendstraße 199 D-80686 München	**Notified Body:**
Reg. No.: 0036	**Reg. No.:**
Certificate No. EU-BD 954, 954/1	**Certificate No.:**

Normen Referenz / Standards reference / Référence normes / Riferimenti norme / Referencia normas / Referência padrões:

EN 81-20:2020-06 / EN 81-50:2020-06 / DIN VDE 0580:2011-11 / DIN EN IEC 63000:2019-05

Sicherheitsfunktion / *Safety function* / Fonction de sécurité / *Funzione di sicurezza* / Función de seguridad / *Função de segurança*

DE	**Bremseinrichtung, als Teil der Schutzeinrichtung für den aufwärtsfahrenden Fahrkorb gegen Übergeschwindigkeit und Bremselement gegen unbeabsichtigte Bewegung des Fahrkorbs.**
EN	Braking device as part of the protection device against over speed for the car moving in upwards direction and braking element against unintended car movement.
FR	Dispositif de freinage faisant partie d'un système de protection contre la survitesse en montée de la cabine d'ascenseur et élément de freinage contre le déplacement involontaire de la cabine d'ascenseur.
IT	Dispositivo di frenatura come parte del dispositivo di protezione contro la fuga verso l'alto della cabina e elemento di frenatura contro i movimenti incontrollati della cabina.
ES	Dispositivo de frenado como parte de un dispositivo de seguridad contra la sobrevelocidad de la cabina en movimiento ascendente y como elemento de frenado contra movimientos incontrolados de la cabina.
PT	Dispositivo de freio para ser usado como parte da unidade de proteção para prevenir excesso de velocidade da cabine elevadora em movimento ascendente e elemento de freio contra movimentos inadvertidos da cabine elevadora.

Identification:	**Jahr der Herstellung:** *Année de production: Año de fabricación:*	**Siehe Typenschild am Produkt** *Voir l'étiquette sur le produit ver placa de identificación del produto*	*Year of manufacture: Anno di produzione: Ano de fabricação:*	*see product label vedi l'etichetta sul prodotto Ver placa do produto*

Dokumentationsbeauftragter /documentation officer / Spécialiste documentation / ufficiale documentazione / oficial documentación / oficial documentação

Qualitätsmanagement

Mauerstetten, 14.12.2022
Ort und Datum / place and date / Lieu et date / luogo – data / fecha y lugar / Lugar e data

Geschäftsführer / Managing Director / Directeur Général / Gerente / Gerente
Ferdinand Mayr M.Sc.

CE 8012

Seite / *Page* / **Page** / *Pagina* / **Página** / *Página*
1 / 1

14.12.2022

14.8. EU Declaration of Conformity brake WSG-TB.L/M

KENDRION

INTORQ
POWERED BY KENDRION

Kendrion INTORQ GmbH
Wuelmser Weg 5
31855 Aerzen
PO Box 11 03
31849 Aerzen
Germany
T +49 5154 70534-0
F +49 5154 70534-100
info-aerzen-ib@kendrion.com
www.kendrion.com
Managing Director:
Lars Knoke

EU Declaration of Conformity

CE

Original Declaration of Conformity

We hereby declare that the type of construction of

Designation: ***Electromagnetically releases spring-operated brake***
Machine type: ***INTORQ BFK464***

Function: ***Brake assembly acting on the leaving sheave shaft as part of the protection for the upwards moving lift car against excessive speed***
Year of manufacture: ***2018 ff.***

complies with the following European directives and harmonised standards which were valid on the date of issue indicated below in their versions applicable at that time.

EU Directives

2006/42/EC	Machinery Directive
2014/35/EU	Low Voltage Directive
2014/33/EU	European Lift Directive

Applied, harmonised standards

DIN EN ISO 12100:2011-03	Safety of machinery
DIN EN 60204-1:2019-06	Safety of machinery - Electrical equipment of machines - Part 1 – General requirements
DIN VDE 0580:2011-11	Electromagnetic devices and components - General Specifications

Deutsche Bank AG
BIC: DEUTDE2HXXX
IBAN: DE05 2507 0070 0026 2501 00

Commerzbank Hannover
BIC: DRESDEFF250
IBAN: DE12 2508 0020 0701 2421 00

HSBC Bank USA
US BIC: MRMDUS33
USD Account: 104048816

Sparkasse Hameln-Weserbergland
BIC: NOLADE21SWB
IBAN: DE88 2545 0110 0000 8035 69

HSBC The Netherlands
BIC: HSBCNL2A
IBAN: NL07 HSBC 1046 5580 15

Commercial Register
AG Hanover, HRB 220878
VAT No. DE 814 222 523

KENDRION

INTORQ
POWERED BY KENDRION

DIN EN 60529:2014-09	Degrees of protection provided by enclosures
DIN EN 81-20:2020-06	Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 20: Passenger and goods lifts
DIN EN 81-50:2020-06	Safety rules for the construction and installation of lifts - Examination and tests - Part 50: Design rules, calculations, examination and tests of lift components

Brake type	Type examination RL 2014/33/EU
BFK464-17R	EU-BD 1051-1
BFK464-18R	EU-BD 1056-1
BFK464-18R.1	EU-BD 1058-1
BFK464-19R	EU-BD 1055-1
BFK464-20R	EU-BD 1034-1
BFK464-20R.1	EU-BD 1057-1
BFK464-22R	EU-BD 1054-1
BFK464-25R	EU-BD 1053-1
BFK464-28R	EU-BD 1052-1

Testing lab
TÜV SÜD Industrie Service GmbH
Westendstraße 199
80686 München/Germany
Identification number 0036

Production control
TÜV SÜD Industrie Service GmbH
Gottlieb-Daimler-Str. 7
70794 Filderstadt/Deutschland
Identification number 0036

Lars Knoke
Managing Director

i.V.
Winfried Kuter
R&D Head of Technology

Aerzen, 03.07.2024

Page 2 of 2

14.9. Brake operating instructions WSG-TB.L/M

INTORQ

Document history

Material number	Version			Description
33006446	1.0	09/2017	SC	First edition
33006446	2.0	05/2018	SC	Update of HR and tightening torques
33006446	3.0	10/2019	SC	Migration to ST4

Legal regulations

Liability

- The information, data and notes in these Operating Instructions are up to date 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

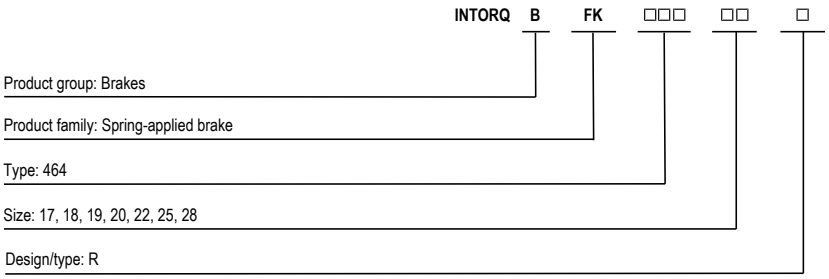
Notice

The warranty conditions can be found in the terms of sale and delivery from 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.

INTORQ

Product key



Not coded: Connection voltage, hub bore hole, options

Checking the delivery

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.

- Claim visible transport damage immediately to the deliverer.
- Claim visible deficiencies or incomplete deliveries immediately to INTORQ GmbH & Co. KG.

NOTICE

Labelling of drive systems and individual components

- Drive systems and components are unambiguously designated by the labelling on their name plates.
- The spring-applied INTORQ brake is also delivered in single modules which can then be put together by the customer according to their requirements. The specifications – particularly the packaging label, name plate and type code – apply to a complete stator.
- The labelling is not included when components are delivered individually.

INTORQ

Contents

INTORQ

1 General information

1.1 Using these Operating Instructions

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

1.2 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
Page reference	Underscore, orange	———	Reference to another page with additional information For example: Using these Operating Instructions, Page 6
Symbols	Wildcard	□	Wildcard (placeholder) for options or selection details For example: BFK464-R-□□ = BFK464-R-10
	Notice		Important notice about ensuring smooth operations or other key information.

1.3 Safety instructions and notices

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

Structure of safety notices:

	**⚠ CAUTION** **Icon** Indicates the type of danger **Signal word** Characterizes the type and severity of danger. **Notice text** Describes the danger. **Possible causes** List of possible consequences if the safety notices are disregarded. **Protective measures** List of protective measures required to avoid the danger.

Danger level

	**⚠ DANGER** DANGER indicates a hazardous situation which, if not avoided, *will* result in death or serious injury.
	**⚠ WARNING** WARNING indicates a potentially hazardous situation which, if not avoided, *could* result in death or serious injury.
	**⚠ CAUTION** CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	**NOTICE** Notice about a harmful situation with possible consequences: the product itself or surrounding objects could be damaged.

1.4 Terminology used

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

1.5 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 fastening 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
Q_{Smax}	J	Maximally permissible friction energy for cyclic switching, depending on the operating 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	Operating frequency: the number of switching operations evenly spread over the time unit
S_{hue}	1/h	Transition operating frequency, thermal parameter of the brake
S_{hmax}	1/h	Maximum permissible operating 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 hand-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}

General information

INTORQ

Letter symbol	Unit	Designation
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	Over-excitation period
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

2 Safety instructions

2.1 General safety instructions

- Never operate INTORQ components when you notice they are damaged.
- Never make any technical changes to INTORQ components.
- Never operate INTORQ components when they are incompletely mounted or incompletely connected.
- Never operate INTORQ components without their required covers.
- Only use accessories that have been approved by INTORQ.
- Only use original spare parts from the manufacturer.

Keep the following in mind during the initial commissioning and during operation:

- Depending on the degree of protection, INTORQ components may have both live (voltage carrying), moving and rotating parts. Such components require the appropriate safety mechanisms.
- Surfaces can become hot during operation. Take the appropriate safety measures (to ensure contact/ touch protection).
- Follow all specifications and information found in the Operating Instructions and the corresponding documentation. These must be followed to maintain safe, trouble-free operations and to achieve the specified product characteristics.
- The installation, maintenance and operation of INTORQ components may only be carried out by qualified personnel. According to IEC 60364 and CENELEC HD 384, skilled personnel must be qualified in the following areas:
  - Familiarity and experience with the installation, assembly, commissioning and operation of the product.
  - Specialist qualifications for the specific field of activity.
  - Skilled personnel must know and apply all regulations for the prevention of accidents, directives, and laws relevant on site.

2.2 Disposal

The INTORQ components are made of various differing materials.

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

3 Product description

3.1 Proper and intended usage

3.1.1 Standard applications

INTORQ components are intended for use in machinery and facilities. They may only be used for purposes as specified in the order and confirmed by INTORQ. The INTORQ components may only be operated under the conditions specified in these Operating Instructions. They may never be operated beyond their specified performance limits. The technical specifications (refer to Technical specifications, Page 15) must be followed to comply with the proper and intended usage. Any other usage is consider improper and prohibited.

3.2 Layout

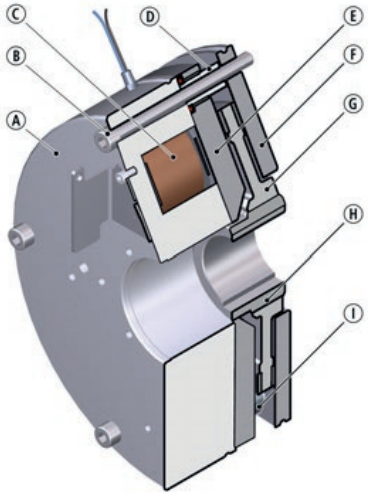


Fig. 1: **Layout of an INTORQ BFK464-□□R spring-applied brake Complete stator + rotor + flange**

Ⓐ Stator	Ⓑ Socket-head cap screw	Ⓒ Coil
Ⓓ Sleeve	Ⓔ Armature plate	Ⓕ Flange (optional)
Ⓖ Rotor	Ⓗ Hub (optional)	Ⓘ Noise reducer

The BFK464-R spring-applied brake is a single-disk brake with two friction surfaces. The braking torque is applied through two separate braking circuits, both electrical and mechanical, via several compression springs in the form of friction locking. The brake circuits are released electromagnetically. Due to its division into two brake circuits, the brake is particularly suitable for applications such as lift systems and stage/platform technology. The brake can be selected based on the rated torque for one brake circuit. The second brake circuit meets the requirement for redundancy (refer to Rated data for coil power, Page 16).

Product description

INTORQ

The division of the brake circuits is done using a two-part armature disk with the associated compression springs and electromagnetic coils. Each brake circuit can be operated individually due to the separate supply lines for each stator and armature plate (siehe).

Each brake circuit has a micro-switch which monitors the switching state of the spring-applied brake. Using the associated switching device, the supply voltage (AC voltage) is rectified and, when the brake is released, lowered after a short period of time. This results in a reduction of the average electrical power of the brake.

The BFK464 spring-applied brake (with the high rated torque for the respective size) is designed for a maximum duty cycle of 60% with holding current reduction. The brakes with the lower rated torques are suitable for a maximum 60% duty cycle with no holding current reduction. The permissible operating frequency for both versions in each size is 180 1/h (with a short-term maximum of 240 1/h).

Size	Rated torque M_K [Nm]	EC-type examination certificate Directive 2014/33/EC
17R	2 x 75	EU-BD 1051
	2 x 150	
18R	2 x 170	EU-BD 1056
	2 x 280	
19R	2 x 210	EU-BD 1055
	2 x 350	
20R	2 x 280	EU-BD 1034
	2 x 450	
22R	2 x 360	EU-BD 1054
	2 x 600	
25R	2 x 540	EU-BD 1053
	2 x 900	
28R	2 x 720	EU-BD 1052
	2 x 1200	

3.3 Function

This brake is an electrically releasable spring-applied brake with a rotating brake disc (rotor) that is equipped on both sides with friction linings. In its de-energised state, the rotor is clamped with braking force applied by pressure springs between the armature plate and a counter friction surface. This corresponds to a fail-safe functionality.

The brake torque applied to the rotor is transferred to the input shaft via a hub that has axial gear teeth.

The brake can be used as a holding brake, as an operating brake, and as an emergency stop brake for high speeds.

The asbestos-free friction linings ensure a safe braking torque and low wear.

To release the brake, the armature plate is released electromagnetically from the rotor. The rotor, shifted axially and balanced by the spring force, can rotate freely.

3.4 Braking and release

During the braking procedure, the inner and outer springs use the armature plate to press the rotor (which can be shifted axially on the hub) against the friction surface. The asbestos-free friction linings ensure high braking torque and low wear. The braking torque is transmitted between the hub and the rotor via gear teeth.

When the brakes are applied, an air gap (s_L) is present between the stator and the armature plate. To release the brake, the coil of the stator is energised with the DC voltage provided. The resulting magnetic flux works against the spring force to draw the armature plate to the stator. This releases the rotor from the spring force and allows it to rotate freely.

3.5 Project planning notes

- When designing a brake for specific applications, torque tolerances, the limiting speeds of the rotors, the thermal resistance of the brake, and the effect of environmental influences must all be taken into account.
- The brakes are dimensioned in such a way that the specified 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.
- If the brake is used as a pure holding brake without dynamic load, the friction lining must be reactivated regularly.

3.6 Optional configuration

3.6.1 Hand-release (optional)

To temporarily release the brake when there is no electricity available, a hand-release function is available as an option. The hand-release function can be retrofitted.

3.6.2 Optional micro-switch

The micro-switch is used for the release monitoring or for wear monitoring. The user is responsible for arranging the electrical connection for this optional micro-switch.

- Usage for the (air) release monitoring: The motor will start only after the brake has been released. This enables the micro-switch to monitor for errors (e.g. when the motor does not start because of a defective rectifier, if there are broken connection cables, defective coils, or an excessive air gap).
- Usage for monitoring wear: The brake and motor are not supplied with power when the air gap is too large.

3.6.3 Optional encapsulated design

This design not only prevents the penetration of spray water and dust, but also the spreading of abrasion particles outside the brake. This is achieved by the following enclosures:

- A cover ring over the armature plate and rotor.

4 Technical specifications

4.1 Possible applications of the INTORQ spring-applied brake

- Degree of protection:
  - 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.
- Ambient temperature:
  - -20 °C to +40 °C (Standard)

4.2 Rated data

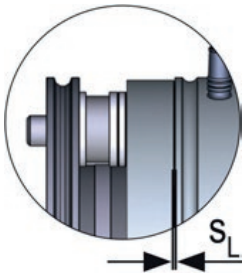


Fig. 2: **Air gap measurement**

Size	Air gap		Permissible wear distance	Rotor thickness		Mass of stator
	$s_{LN}{}^{+0.06/-0.08}$	s_{Lmax}		Min.	Max.	m
	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
17R	0.4	0.6	0.2	12.7	13.0	12.4
18R						19.2
19R						22.5
20R						26.5
22R						31.0
25R						41.5
28R	0.5	0.8	0.3	12.6		55.5

Tab. 1: **Rated data for air gap specifications**

Technical specifications

INTORQ

Size	Screw hole circle		Fastening screws DIN 912		Minimum thread depth		Tightening torque M_A	
	Diameter	Thread	without flange	with flange	without flange	with flange[1]	without flange	with flange[1]
	[mm]		[mm]	[mm]	[mm]	[mm]	[Nm]	[Nm]
17R	176	M8	6 x M8x85	6 x M8x95	13.0	12.0	24.6	24.6
18R	212		6 x M8x95	6 x M8x105[1]				30.4
19R	220	M10	6 x M10x100	6 x M10x110	16.0	15.0	48.0	48.0
20R	233		6 x M10x110	6 x M10x120[1]	21.0	20.0		66.5
22R	252							
25R	282	M12	6 x M12x110	6 x M12x130[1]	18.0	25.0	84.0	104.7
28R	314	M16	6 x M16x130	6 x M16x140	30.0	27.5	206.0	206.0

Tab. 2: **Rated data for the screw set for brake mounting**

[1] Bolt fastening class 10.9 with washers in accordance with ISO 7089--300HV-A2C

⚠ CAUTION

- The screws for the different brake attachment variants have different strength grades and may have special surface coatings. In order to guarantee a secure screw connection, use ONLY the proper screws from INTORQ!
- It is very important to comply with the minimum thread depth of the end shield (refer to Rated data for the screw set for brake mounting, Page 16).
- If the required thread depth is not maintained, the fastening screws may run onto the thread root. This has the effect that the required pre-load force is no longer established – the brake is no longer securely fastened!

Size	Rated torque[1]	Voltage		Power[2]		Coil resistance	Current[3]
		Release ±10%	Hold ±10%	Brake release	Brake hold		
	M_K	U_L	U_H	P_N	P_H	R_N ±5%	I_L
	[Nm]	[V DC]	[V DC]	[W]	[W]	[Ω]	[A]
17R	2 x 75	205	205	2 x 75	2 x 75	2 x 560	2 x 0.37
		103	103			2 x 142	2 x 0.73
	2 x 150	205	103	2 x 200	2 x 50	2 x 210	2 x 0.98
		103	51.5			2 x 52	2 x 1.99
18R	2 x 170	205	205	2 x 88	2 x 88	2 x 478	2 x 0.43
		103	103			2 x 121	2 x 0.85
	2 x 280	205	103	2 x 230	2 x 57.5	2 x 183	2 x 1.12
		103	51.5			2 x 46	2 x 2.23

Technical specifications

INTORQ

Size	Rated torque[1]	Voltage		Power[2]		Coil resistance	Current[3]
		Release ±10%	Hold ±10%	Brake release	Brake hold		
	M_K	U_L	U_H	P_N	P_H	R_N ±5%	I_L
	[Nm]	[V DC]	[V DC]	[W]	[W]	[Ω]	[A]
19R	2 x 210	205	205	2 x 95	2 x 95	2 x 442	2 x 0.46
		103	103			2 x 112	2 x 0.92
	2 x 350	205	103	2 x 245	2 x 61	2 x 172	2 x 1.20
		103	51.5			2 x 43	2 x 2.38
20R	2 x 280	205	205	2 x 100	2 x 100	2 x 420	2 x 0.49
		103	103			2 x 106	2 x 0.97
	2 x 450	205	103	2 x 270	2 x 67.5	2 x 156	2 x 1.32
		103	51.5			2 x 39	2 x 2.62
22R	2 x 360	205	205	2 x 110	2 x 110	2 x 382	2 x 0.54
		103	103			2 x 96	2 x 1.07
	2 x 600	205	103	2 x 285	2 x 71	2 x 147	2 x 1.39
		103	51.5			2 x 37	2 x 2.77
25R	2 x 540	205	205	2 x 120	2 x 120	2 x 350	2 x 0.59
		103	103			2 x 88	2 x 1.17
	2 x 900	205	103	2 x 300	2 x 75	2 x 140	2 x 1.46
		103	51.5			2 x 35	2 x 2.91
28R	2 x 720	205	205	2 x 160	2 x 160	2 x 262	2 x 0.78
		103	103			2 x 66	2 x 1.55
	2 x 1200	205	103	2 x 400	2 x 100	2 x 106	2 x 1.95
		103	51.5			2 x 26	2 x 3.88

Tab. 3: **Rated data for coil power**

[1] Minimum braking torque with run-in friction pairs at Δn = 100 rpm

[2] Power at 20 °C

[3] Current at 20 °C during brake release

4.3 Switching times

The operating times listed here are guide values which apply to DC switching with rated air gap s_{LN}, warm coil and standard characteristic torque. The operating times given are mean values and subject to variations. The engagement time t_1 is approximately 8 to 10 times longer for AC switching. ...

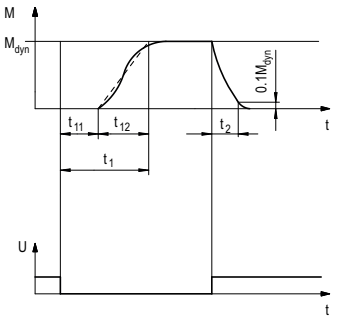


Fig. 3: **Operating/switching times of the spring-applied brakes**

t_1	Engagement time	t_{11}	Delay time during 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

Size	Rated torque	Max. permissible switching energy	Transitional operating frequency	Switching times						Max. speed
				DC-side engagement				Disengaging		
	M_K	Q_E	S_{hue}	t_{10} [1)]	t_{90} [1)]	$t_{11.AC}$ [2)]	$t_{1.AC}$ [2)]	t_{2ab} @s_{LN} [3)]	t_{2ab}@s_{Lmax} [3)]	n_{max} [5)]
	[Nm]	[J]	[1/h]	[ms]	[ms]	[ms]	[ms]	[ms]	[ms]	[rpm]
17R	2 x 75	42000	25	68	140	275	530	180	339	900
17R[4)]	2 x 150			39	77	150	315	134	194	
18R	2 x 170	60000	20	86	172	350	800	234	365	
18R[4)]	2 x 280			55	100	225	615	169	265	
19R	2 x 210	68000	19	100	182	425	1025	240	435	
19R[4)]	2 x 350			53	116	225	735	180	310	
20R	2 x 280	80000	19	87	175	350	1100	334	700	
20R[4)]	2 x 450			49	106	200	830	216	390	
22R	2 x 360	90000	18	95	207	350	1160	323	622	750
22R[4)]	2 x 600			53	125	200	890	234	400	
25R	2 x 540	120000	15	130	250	450	1410	362	800	700
25R[4)]	2 x 900			73	153	250	970	287	480	600

Technical specifications

INTORQ

Size	Rated torque	Max. permissible switching energy	Transitional operating frequency	Switching times						Max. speed
				DC-side engagement				Disengaging		
	M_K	Q_E	S_{hue}	t_{10} [1]	t_{90} [1]	$t_{11.AC}$ [2]	$t_{1.AC}$ [2]	$t_{2ab\ @S_{LN}}$ [3]	$t_{2ab@S_{Lmax}}$ [3]	n_{max} [5]
	[Nm]	[J]	[1/h]	[ms]	[ms]	[ms]	[ms]	[ms]	[ms]	[rpm]
28R	2 x 720	180000	14	141	277	500	1490	402	750	600
28R[4]	2 x 1200			69	176	300	1050	298	500	500

Tab. 4: **Switching energy - operating frequency - operating times**

[1] Operating/switching times, according to type examination certificate, are based on the rated torque. $t_{50} = (t_{10} + t_{90}) / 2$.

[2] Operating times refer to steady braking torque.

[3] Venting times under unfavorable conditions (240 switching operations per hour, 60% DC, 40 °C ambient temperature).

[4] Brake supplied with over-excitation (release voltage / holding voltage = 2/1).

[5] Max. speed according to type examination certificate (for higher speeds, please first contact the manufacturer).

Engagement time
The transition from a brake-torque-free state to a holding-braking torque is not free of time lags.

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

Engagement time for AC-side switching: The engagement time is significantly longer (approx. 5 times longer).

NOTICE

Connect the spark suppressors in parallel to the contact. If this is not admissible for safety reasons (e.g. with hoists and lifts), the spark suppressor can also be connected in parallel to the brake coil.

- 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).
- The specified engagement times are valid for DC switching with a spark suppressor.
  - Circuit proposals: refer to DC switching at mains – fast engagement.

Notice

Spark suppressors are available for the rated voltages.

Disengagement time
The disengagement time is the same for DC-side and AC-side switching. The specified disengagement times always refer to control using INTORQ rectifiers and rated voltage.

4.4 Friction work / operating frequency

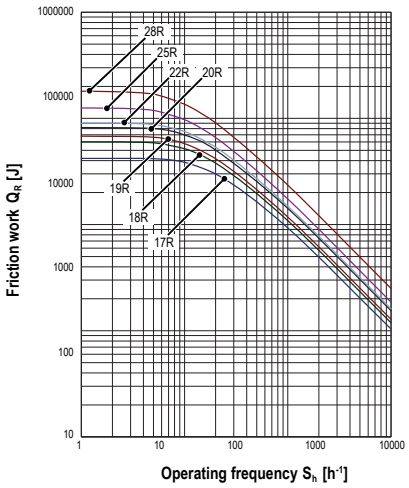


Fig. 4: **Friction work as a function of the operating frequency**

$$S_{hmax} = \frac{-S_{hue}}{\ln\left(1-\frac{Q_R}{Q_E}\right)} \qquad Q_{hmax} = Q_E \left(1 - e^{\frac{-S_{hue}}{S_h}}\right)$$

The permissible operating frequency S_{hmax} depends on the amount of heat Q_R (refer to Figure Friction work / operating frequency, Page 20). At a pre-set operating frequency S_h, the permissible amount of heat is Q_{Smax}.

Notice

With high speeds of rotation and switching energy, the wear increases, because very high temperatures occur at the friction surfaces for a short time.

4.5 Electromagnetic compatibility

Notice

The user must ensure compliance with EMC Directive 2014/30/EC using appropriate controls and switching devices.

NOTICE

If an INTORQ rectifier is used for the DC switching of the spring-applied brake and if the operating frequency exceeds five switching operations per minute, the use of a mains filter is required.

If the spring-applied brake uses a rectifier of another manufacturer for the switching, it may become necessary to connect a spark suppressor in parallel with the AC voltage. Spark suppressors are available on request, depending on the coil voltage.

4.6 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.

Noise

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

Depending on the natural oscillation after installation, operating conditions and the state of the friction surfaces, the brake may squeak during braking.

Others

The abrasion of the friction parts produces dust.

4.7 Labels on product

There is a packaging label on the package. The name plate is glued to the outer surface of the brake.

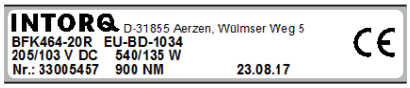


Fig. 5: **Name plate**

INTORQ	Manufacturer
BFK464-20-R	Type (refer to Product key, Page 3)
EU-BD-1934	EC-type examination certificate
205/103 V DC	Rated voltage
540/135 W	Rated power
33005457	ID number
900 NM	Rated torque
23.08.17	Packaging date
CE	CE mark

Fig. 6: **Packaging label**

INTORQ	Manufacturer
33005457	ID number
BFK464-20R	Type (refer to Product key, Page 3)
	Bar code
SPRING-APPLIED BRAKE	Designation of the product family
205/103 V DC	Rated voltages of both braking circuits
900 NM	Rated torque
Pieces	Qty. per box
540/135 W	Rated powers for both braking circuits
28.07.17	Packaging date
Anti-rust packaging: keep friction surface free of grease!	Addition
CE	CE mark

Fig. 7: **Product traceability sticker**

BFK464-20-R	Type (refer to Product key, Page 3)
33005457	ID number
G170820000000000	Serial number
	QR code

5 Mechanical installation

This chapter provides step-by-step instructions for the installation.

Important notes

NOTICE

The toothed hub and screws must not be lubricated with grease or oil.

5.1 Design of end shield and shaft

- Comply with the specified minimum requirements regarding the end shield and the shaft to ensure a correct function of the brake.
- The diameter of the shaft shoulder must not be greater than the tooth root diameter of the hub.
- The form and position tolerances apply only to the materials mentioned. Consult with INTORQ before using other materials; INTORQ's written confirmation is required for such usage.
- The brake flange must be supported by the end shield across the full surface.
- Keep the end shield free from grease or oil.

Minimum requirements of the end shield

Size	Material	Roughness	Run-out	Levelness
			[mm]	[mm]
17R ... 28R	S235JR; C15; EN-GJL-250	Rz10 ... Rz16	< 0.1	< 0.1

Tab. 5: **End shield as counter friction surface**

5.2 Tools

Size	Torque wrench Insert for hexagonal socket (Allen) screws		Open-end wrench Width across flats	Socket wrench for transport safety bolts
				
	Measuring range	Wrench width	Width across flats	Width across flats
	[Nm]	[mm]	[mm]	[mm]
17R	20 to 100	6	10	5
18R				
19R		8	13	6
20R				
22R			17	8
25R		10		
28R	40 to 250	14	19	10

Multimeter	Caliper gage	Feeler gage
		

5.3 Preparing the installation

1. Remove the packaging from the spring-applied brake and dispose of it properly.
2. Check the delivery for completeness.
3. Check the name plate specifications (especially rated voltage)!

Notice

We provide a lifting mechanism for hooking onto a hoist to make it easier to remove the brake from its shipping container.
For sizes 22, 25 and 28, there is also an M10 thread (not shown) located in the middle between the connecting cables of the two brake circuits.
Make sure that the cylindrical dampers on the armature plate are not damaged when you are lifting the brake using an eyebolt.

Fig. 8: **Lifting mechanism for hooking onto a hoist**

5.4 Installing the hub onto the shaft

Notice

The customer is responsible for dimensioning the shaft-hub connection. Make sure that the supporting length of the key is identical to the length of the hub.

NOTICE

If you are using the spring-applied brake for reverse operations, glue the hub to the shaft.

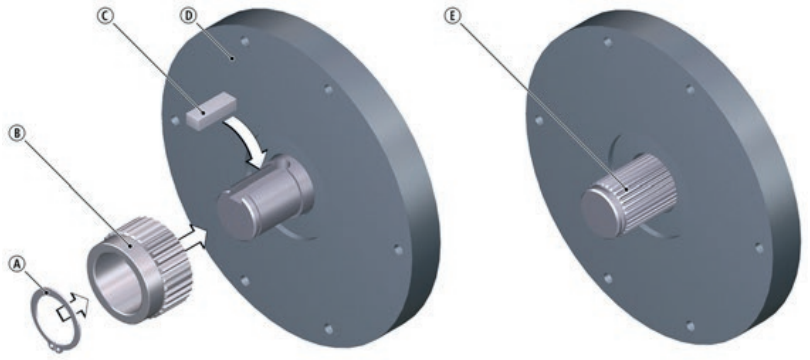


Fig. 9: **Installing the hub onto the shaft**

Ⓐ Circlip
Ⓑ Hub (optional)
Ⓒ Key shape B (angular version)
Ⓓ End shield
Ⓔ Toothed shaft (optional)

1. Insert the key into the shaft.
2. Press the hub with a moderate amount of force to the shaft.
3. Secure the hub against axial displacement (for example, by using a circlip).

5.5 Mounting the flange (optional)

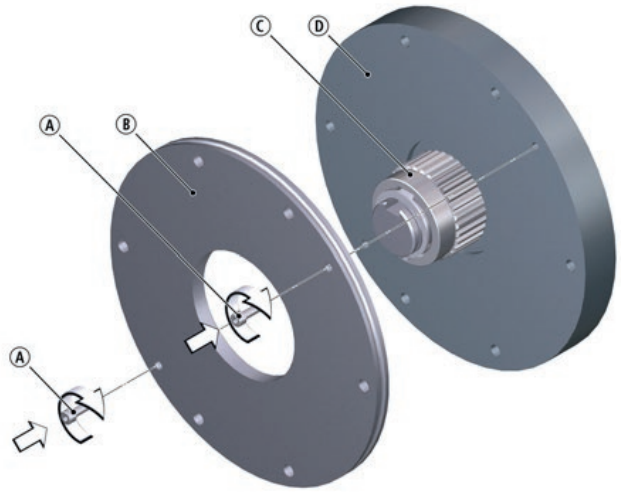


Fig. 10: **Mounting the flange**

Ⓐ Socket-head cap screw Ⓑ Flange (optional) Ⓒ Hub or shaft with teeth (optional)
Ⓓ End shield

1. Hold the flange to the end shield. Place the chamfer at the inner diameter on the side of the end shield.
2. Align the through holes in the flange to the threads of the fastening bore holes.

5.6 Brake mounting

Notice

Here, the mounting of the brake is shown in the version with the optional flange and toothed shaft

NOTICE

Only in the case of rotors with mounting paste on their gear teeth:

- Remove cover films from both front ends of the rotor.
- Protect friction surfaces against contact with mounting paste!
- After the mounting, excessive mounting paste must be removed properly!

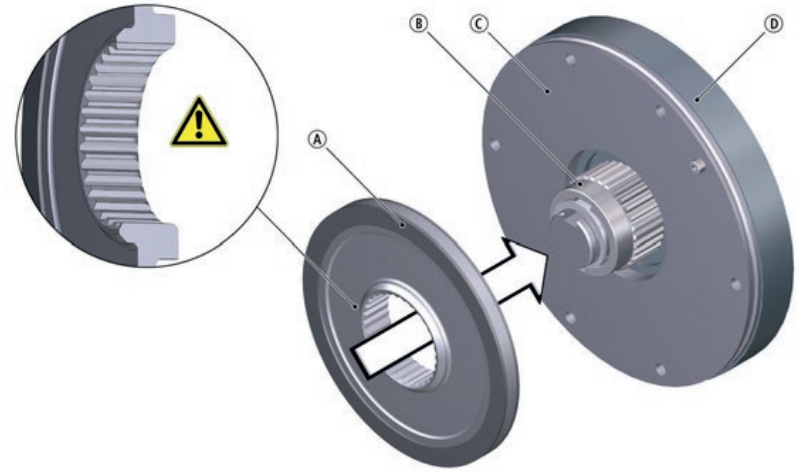


Fig. 11: **Assembly of the rotor**

Ⓐ Rotor Ⓑ Hub or shaft with teeth (optional) Ⓒ Flange (optional)
Ⓓ End shield

⚠ CAUTION

Note the illustration showing the chamfer of the rotor!

1. Push the rotor onto the shaft and check that it can be moved by hand.

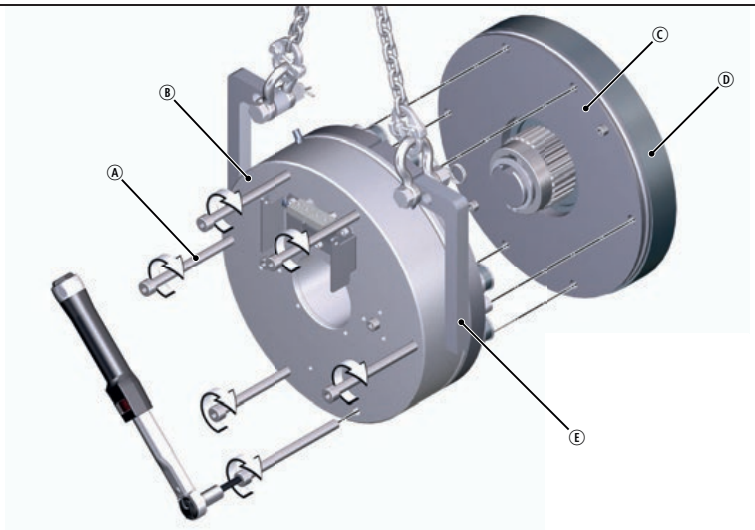


Fig. 12: **Assembly of the stator**

Ⓐ Socket head cap screws
Ⓑ Stator
Ⓒ Flange (optional)
Ⓓ End shield
Ⓔ Lifting mechanism (optional)

2. Push the complete stator onto the shaft.
3. Evenly tighten the brake with the six socket head cap screws included in the scope of supply in several runs using a torque wrench.
4. Establish the electrical connection and energize the brake (siehe Chapter Electrical connection, Page 38).

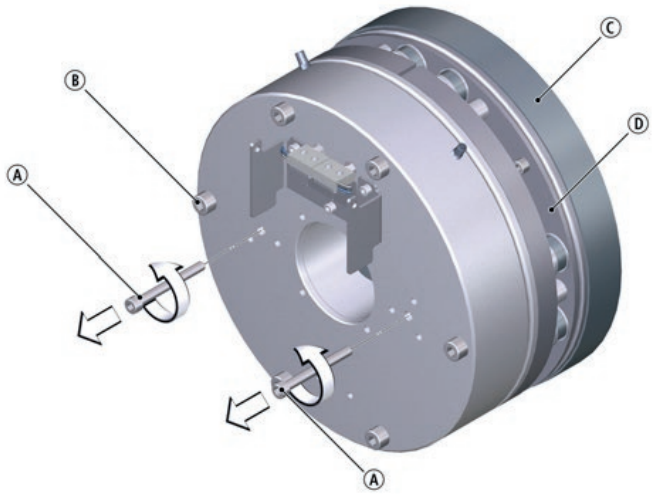


Fig. 13: **Remove the safety bolts**

Ⓐ Transport safety bolts Ⓑ Socket head cap screws Ⓒ End shield
Ⓓ Flange (optional)

5. Remove the screws of the transport lock.
6. Use a torque wrench to retighten the supplied fastening screws with the required tightening torque, as shown in the table Rated data for the screw set for brake mounting, Page 16.
7. Switch off the power.

Checking the air gap

⚠ DANGER

Danger: rotating parts!

Switch off the voltage. The brake must be free of residual torque.

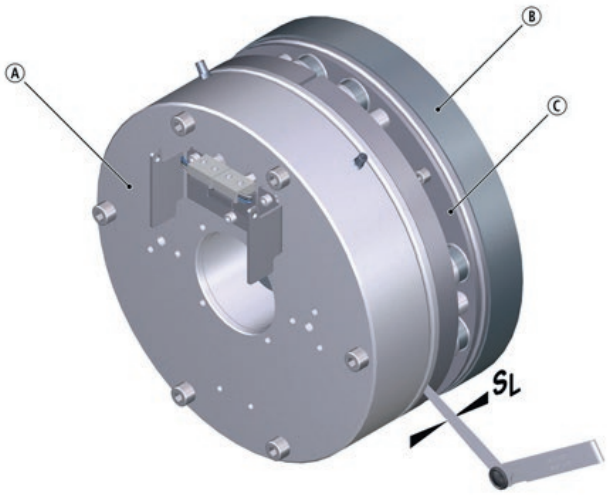


Fig. 14: **Checking the air gap**

8. Check the air gap near the screws by means of a feeler gage. Compare the measured values to the values for "s_{LN}" in the table (Rated data, Page 15).

Notice

Do not insert feeler gage more than 10 mm between armature plate and stator!

Notice

If the measured value for "s_L" is not within the tolerance, then the brake and the motor end shield must be checked!

5.7 Cover ring assembly

NOTICE

Brakes without flange require a groove at the end shield for the lip of the cover ring.

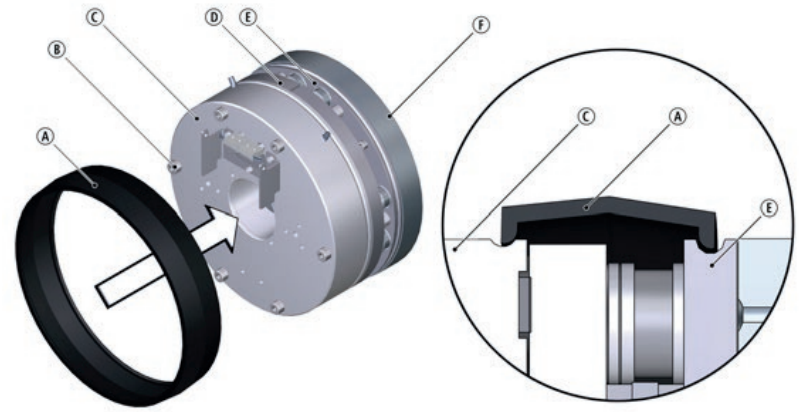


Fig. 15: **Cover ring assembly**

Ⓐ Cover ring
Ⓑ Socket head cap screws
Ⓒ Stator
Ⓓ Armature plate
Ⓔ Flange (optional)
Ⓕ End shield

1. Disconnect electrical connection.
2. Pull the cable through the cover ring.
3. Push the cover ring over the complete stator.
4. Press the lips of the cover ring into the groove of the complete stator and flange / end shield.
5. Re-establish the electrical connection.

NOTICE

Cover ring with condensation drain hole:
Attach the cover ring so that condensation can drain through the bore hole.

5.8 Installing the hand-release (retrofitting)

Notice

The hand-release is mounted on the spring-applied brake which is already fitted on the motor. During this, the brake is not energized (except for steps 10 through 14). The brake's air gap is less than the maximum permissible value "S_{Lmax}".

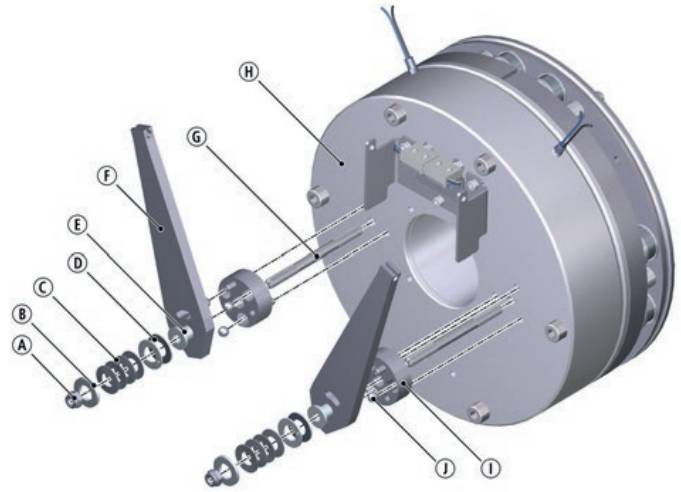


Fig. 16: **Assembly of the hand-release BFK464-R**

- Ⓐ Nut
- Ⓑ Washer
- Ⓒ Disk spring
- Ⓓ Thrust washer
- Ⓔ Sleeve
- Ⓕ Lever
- Ⓖ Stud bolt
- Ⓗ Stator
- Ⓘ Perforated disk
- Ⓙ Ball

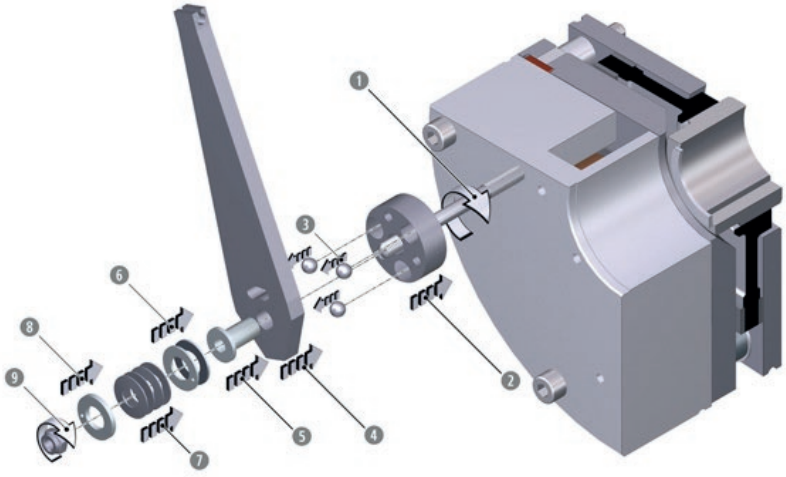


Fig. 17: **Assembly of the hand-release BFK464-R**

1. Insert two stud bolts (with the short threaded ends first) into the housing bore holes of the transport locking screws (which have already been removed). Use a suitable tool to tighten them with the following tightening torques:
   10 Nm for sizes 17R and 18R, 20 Nm for sizes 19R and 20R, 40 Nm for sizes 22R and 25R or 70 Nm for size 28R.
2. Mount the disk with the three dowel pins into the bore holes on the brake. The protruding pins on the visible side of the disk must be oriented towards the cable outlet at the stator.
3. Insert the balls using some assembly paste into the bores of the lever.

NOTICE

Keep the friction lining free from grease and oil.

4. Put the lever (with the balls already inserted) onto the disk so it is concentric with the stud bolts. The dowel pin must protrude into the slot of the lever.
5. Insert the sleeves into the holes in the lever.
6. Place two thrust washers on the sleeve so that the lubricated coated sides face each other.
7. Place four disk springs in alternate directions in each of the thrust washers.
8. Place ring washers on the disk springs.
9. Screw the self-locking nuts onto the stud bolts and tighten them until they are flush against the ring washers.
10. Connect the brake to a suitable power supply and switch on the voltage (electrical release).
11. Tighten the nuts with the following tightening torques:
    4 Nm for sizes 17R and 18R, 7 Nm for sizes 19R and 20R, 10 Nm for sizes 22R and 25R or 15 Nm for size 28R.
12. Turn the nuts back according to the corresponding degrees:
    450° for sizes 17R and 18R, 360° for sizes 19R and 20R, 300° for sizes 22R and 25R or 260° for size 28R.
13. Check if a gap remains between the slot in the lever and the dowel pin while in this state (during hand-release).
14. Switch off the voltage.
15. Hook the Bowden cable onto the levers and operate the hand-release five times. Check the function of the hand-release mechanism (if the rotor can rotate). If necessary, repeat the configuration as described in steps 10 to 15.

NOTICE

Be sure to check the air gap "s_L" before adjusting the hand-release (siehe Checking the air gap, Page 32).

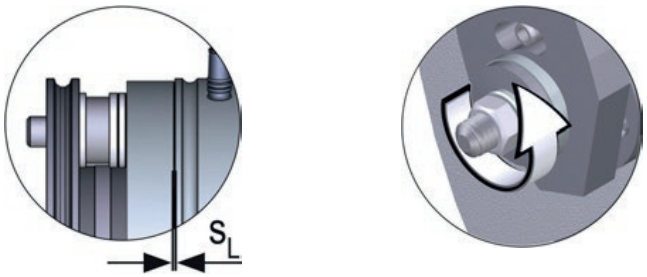


Fig. 18: Dimension "s_L"

Size	s_{LN} $^{+0.06/-0.08}$	Turn-back degrees
	[mm]	[°]
17R	0.4	450 (1 1/4 turn)
18R		
19R		360 (1 turn)
20R		
22R		
25R		300 (5/6 turn)
28R	0.5	260 (7/10 turn)

Tab. 6: Turn-back degrees and air gap

⚠ DANGER

The brake may fail.

If the hand-release is incorrectly adjusted, the brake may fail and cause serious personal injury and damage to property.

Protective measure:

- Make sure that you comply with the specified turn-back degrees.

6 Electrical installation

Important notes

⚠ DANGER

There is a risk of injury by electrical shock!

- The electrical connections may only be made by trained electricians!
- Make sure that you switch off the electricity before working on the connections! There is a risk of unintended start-ups or electric shock.

NOTICE

Make sure that the supply voltage matches the voltage specification on the name plate.

NOTICE

- 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!

NOTICE

- To functionally test the individual brake circuits, the power supply must be able to be switched off individually. For a new over-energizing during switch-on, it is also necessary to open switches K1/K3.
- The protective circuitry contained in the INTORQ switching device BEG-561- □□□-□□□ is not permitted for use in the lift technology. The protective circuitry must be connected in parallel to the brake coil (refer to the figure).

6.1 Electrical connection

Switching suggestions

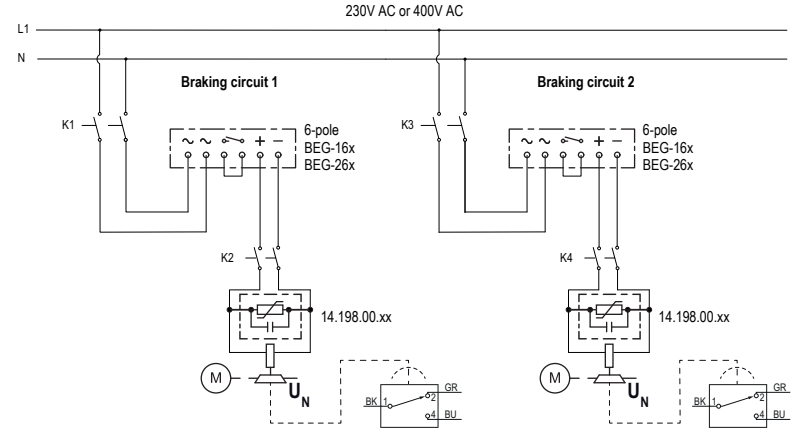


Fig. 19: **Switching suggestion for the BFK464-R with holding current reduction**

BK Black GR Grey BU Blue

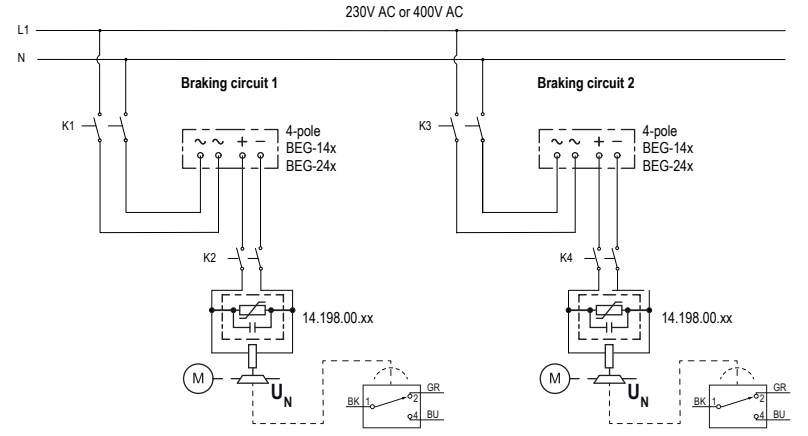


Fig. 20: **Switching suggestion for the BFK464-R without holding current reduction**

BK Black GR Grey BU Blue

Switching on

- K2/K4 must be switched on **before or at the same time** as K1/K3!

Switching off

- Normal - AC switching
  - K2/K4 remain closed
  - K1/K3 open
- Emergency stop - DC switching
  - K1/K3 and K2/K4 are opened at the same time

Notice

Recommended current load for the micro-switches

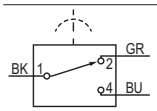
- DC current: 10 mA to 100 mA at 12 V
- AC current: 10 mA to 5 A at 12 V / max. 250 V
- Suppressor circuit: The limit voltage impacts the switching times (refer to the table Switching energy - operating frequency - operating times, Page 18).

6.2 Technical specifications for the micro-switch

The brake can be equipped with a micro-switch for monitoring the release or wear. The micro-switch can be integrated into the circuit as an NO or NC contact.

Design	Micro-switch
3-wire connecting cable	3 x 0.34 mm² (AWG22) black / grey / blue
	UL file number 36479 Single wires, length 500 mm
Contacts	Silver
Current carrying capacity 250 V AC	Max. 3 A
Current carrying capacity 30 V DC	Max. 3 A
Minimum load at 24 V DC	10 mA
Temperature range:	-40 °C to +85 °C
Protection class	IP67

Tab. 7: **Technical specifications for the micro-switch**



	$s_L = 0$	s_{LN}	s_{Lmax} (-0.1)
Switching states			
Checking the air gap	1 - 4	1 - 2	1 - 2
Monitoring wear	1 - 4	1 - 4	1 - 2

Tab. 8: **Switching states of the mechanical micro-switches**

6.3 Rectifier

6.3.1 Bridge-half-wave rectifier for brakes with holding voltage reduction

BEG-561-□□□-□□□

The bridge-half-wave rectifiers are used to supply electromagnetic DC spring-applied brakes which are approved for use with such rectifiers. Other use is only permitted with the approval of INTORQ.

Once a set over-excitation period has elapsed, the bridge-half-wave rectifiers switch over from bridge rectification to half-wave rectification.

Terminals 3 and 4 are located in the brake's DC circuit. When used in passenger elevators, these contacts must not be used to switch off the brake. Be sure to provide a protective circuit according to the "Switching suggestions" figures in the chapter Electrical connection, Page 38.

6.3.2 Bridge rectifier for brakes without holding voltage reduction

BEG-142-270

The four-pole bridge rectifiers are used to supply electromagnetic DC spring-applied brakes which are approved for use with such rectifiers. Other use is only permitted with the approval of INTORQ.

6.3.3 Assignment: Rectifier - Brake size

Rectifier type	Supply voltage	Over-excitation		Holding current reduction	
		Coil voltage	Size	Coil voltage	Size
	[V AC]	[V DC]		[V DC]	
BEG-561-255-130	230	205	17R ... 28R	103	17R ... 28R
BEG-561-440-030-1	400	360	17R ... 28R	180	17R ... 28R
BEG-142-270	230	205	17R ... 28R	Without holding current reduction	

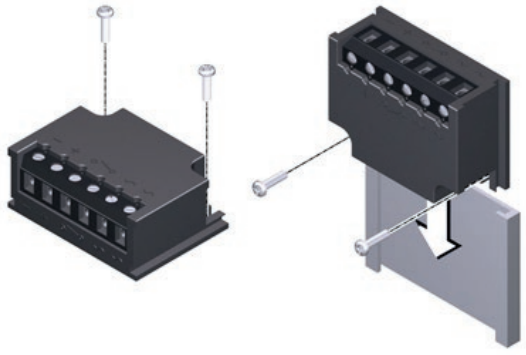


Fig. 21: **BEG-561 fastening options**

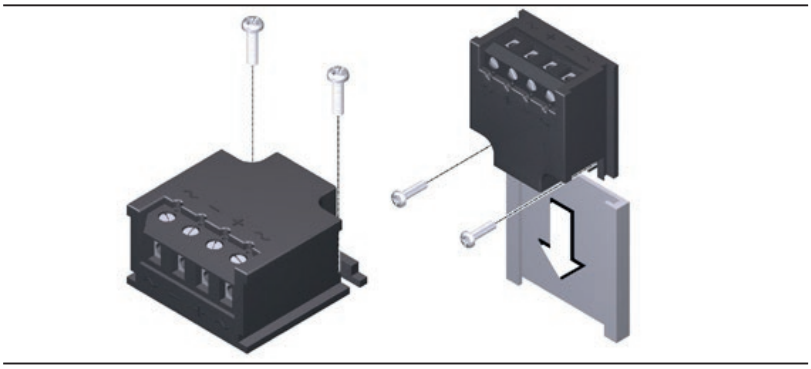


Fig. 22: **BEG-142-270 fastening options**

6.3.4 Technical specifications

Rectifier type	Bridge / half-wave rectifier	Bridge rectifiers
Output voltage for bridge rectification	0.9 x U_1	0.9 x U_1
Output voltage for half-wave rectification	0.45 x U_1	without
Ambient temperature (storage/operation) [°C]	-25 – +70	-25 – +80

U_1 input voltage (40 – 60 Hz)

Type	Input voltage U_1 (40 Hz – 60 Hz)			Max. current I_{max}		Over-excitation period t_{ue} (± 20 %)		
	Min.	Rated	Max.	Bridge	half-wave	at $U_{1\,min}$	at $U_{1\,Nom}$	at $U_{1\,max}$
	[V~]	[V~]	[V~]	[A]	[A]	[s]	[s]	[s]
BEG-561-255-130	160	230	255	3.0	1.5	1,870	1,300	1,170
BEG-561-440-030-1	230	400	440	3.0	1.5	2,300	1,300	1,200
BEG-142-270	-	230	270	1.0	without	without	without	without

Tab. 9: **Rectifier data**

6.3.5 Permissible current load at ambient temperature

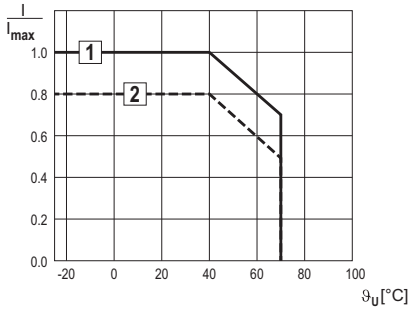


Fig. 23: **Permissible current load for BEG-561-xxx-xxx**

① If screwed to metal surface (good heat dissipation)
② For other installations (e.g. with adhesive)

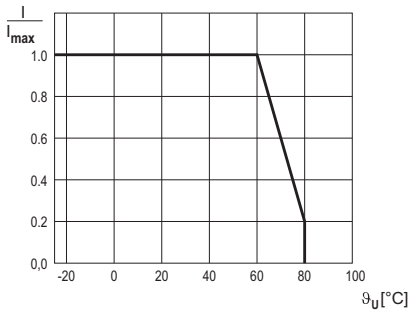


Fig. 24: **Permissible current load for BEG-142-270**

7 Commissioning and operation

Important notes

⚠ DANGER

Danger: rotating parts!

- The running rotor must not be touched.
- Take structural design measures on your final product and implement organizational safety rules to ensure that nobody can touch a rotor.

⚠ DANGER

There is a risk of injury by electrical shock!

The live connections must not be touched.

- The brakes are dimensioned in such a way that the specified rated torques are reached safely after a short run-in period.
- Increased breakaway torque is common, in particular after long downtimes in humid environments where temperatures vary.
- Before the initial commissioning, 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 any dynamic load, the friction lining must be reactivated regularly by implementing the friction work.

7.1 Function checks before initial commissioning

7.1.1 Brake with micro-switch

1. The switching contact for the brake must be open.
2. Remove two bridges from the motor terminals to de-energize the motor.
   – Do not switch off the voltage supply to the brake.

NOTICE

If the brake is connected via the neutral point of the motor, this connection must also be used for connecting the neutral conductor.

3. Apply DC voltage to the brake.
4. Measure the AC voltage at the motor terminals. The measured level must be zero.
5. Close the switching contact for the brake.
   – The brake is released.

6. Measure the DC voltage at the brake:
   – After the over-excitation time (refer to the table), the measured DC voltage must correspond to the holding voltage (refer to Assignment: Bridge/half-wave rectifier – brake size). A deviation of ±10 % is permissible.
7. Check the air gap "s_L".
8. It must be zero and the rotor must rotate freely.
9. Check the switching status of the micro-switch (siehe to table Switching status of micro-switch, Page 44).
10. Open the switching contact for the brake.
    – The brake is applied.
11. Check the switching status of the micro-switch (siehe to table Switching status of micro-switch, Page 44).
12. Switch off DC voltage for the brake.
13. Screw the bridges onto the motor terminals.
14. If necessary, remove the neutral conductor from the neutral point (step 2).

Contact type	Connection	Brake released	Micro-switch closed
N/C contact	black / grey	yes	no
		no	yes
NO contact	black / blue	yes	yes
		no	no

Tab. 10: **Switching status of micro-switch**

The preparations for commissioning are completed.

7.1.2 Checking the hand-release

NOTICE

Labeling of drive systems and individual components

- The hand-release is designed for activation via a Bowden cable.
- An individual brake circuit can only be released electrically.

Fig. 25: **Turning direction of the lever**

DANGER

Danger: rotating parts!

The motor must **not** be running when checking the hand-release.

1. Hang the Bowden cable (not included in the scope of delivery) and tighten it using the torque required for that size (750 to 1100 newtons for size 17 to size 28).
   - The drive must be able to turn freely. A low residual torque is permitted.
2. Release the lever.
   - A torque must now be built up!

7.2 Commissioning

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

7.3 During operation

⚠ DANGER

Danger: rotating parts!

The running rotor must not be touched.

⚠ DANGER

There is a risk of injury by electrical shock!

The live connections must not be touched.

- Checks must be carried out regularly. Pay special attention to:
  - unusual noises or temperatures
  - loose fixing elements
  - the condition of the electrical cables
- The armature plate must be tightened and the rotor must move without residual torque.
- Measure the DC voltage at the brake.
  - After the over-excitation time (refer to the table), the measured DC voltage must correspond to the holding voltage (refer to Assignment: Bridge/half-wave rectifier – brake size). A deviation of ±10 % is permissible.
- If a fault occurs once, go through the troubleshooting table (siehe the chapter Troubleshooting and fault elimination). If the fault cannot be fixed or eliminated, please contact the customer service department.

8 Maintenance and repair

INTORQ spring-applied brakes are wear-resistant and designed for long maintenance intervals. The friction lining and braking mechanism are subject to operational wear. To ensure safe and trouble-free operations, the brake must be checked at regular intervals and replaced when necessary (refer to the table Maintenance intervals BFK458).

8.1 Wear of spring-applied brakes

⚠ WARNING

Braking torque reduction

The system must **not** be allowed to continue operations after the maximum air gap s_{Lmax} has been exceeded. Exceeding the maximum air gap can cause a major reduction in the braking torque!

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 work, the initial speed of rotation of braking and the operating frequency. If several of the causes of friction lining wear occur in an application at the same time, the effects 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 flange	Rubbing and friction of the brake lining	Armature plate and flange are run in	Friction work
Gear teeth of brake rotor	Relative movements and shocks between brake rotor and brake hub / toothed shaft	Wear of gear teeth (primarily on the rotor side)	Number of start/stop cycles
Brake support	Load reversals and jerks in the backlash between the armature plate and guide pins	Breaking of armature plate 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. 11: **Causes for wear**

8.2 Inspections

To ensure safe and trouble-free operations, the spring-applied brakes must be checked at regular intervals and, if necessary, replaced. Servicing at the facility will be easier 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. (Refer to the table Causes for wear). 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.

8.2.1 Maintenance intervals

Versions	Operating brakes	Holding brakes with emergency stop
BFK464-R	▮ according to the service life calculation	▮ at least every 2 years
	▮ or else every six months	▮ after 1 million cycles at the latest
	▮ after 4000 operating hours at the latest	▮ Plan shorter intervals for frequent emergency stops.

8.3 Maintenance

Notice

Brakes with defective armature plates, springs or flanges must be completely replaced. Observe the following for inspections and maintenance works:

- Contamination by oils and greases should be removed using brake cleaner, or the brake should be replaced after determining the cause. Dirt and particles in the air gap between the stator and the armature plate endanger the function and should be removed.
- After replacing the rotor, the original braking torque will not be reached until the run-in operation for the friction surfaces has been completed. After replacing the rotor, the run-in armature plates and the flanges have an increased initial rate of wear.

8.3.1 Checking the components

With mounted brake	▮ Check release function and control	Refer to Release / voltage, Page 50
	▮ Measure the air gap	
	▮ Measure the rotor thickness (replace rotor if required)	Refer to Check the rotor thickness, Page 49
	▮ Thermal damage of armature plate or flange (dark-blue tarnishing)	
After removing the brake	▮ Check the play of the rotor gear teeth (replace worn-out rotors)	Refer to Replace rotor, Page 51
	▮ Check for breaking out of the torque support at the guide parts and the armature plate	
	▮ Check the springs for damage	
	▮ Check the armature plate and flange or end shield	
	– Flatness depending on the size	Refer to the End shield as counter-friction surface: Table table.
	– Max. run-in depth = rated air gap for the size	Refer to the Rated data for air gap specifications table.

8.3.2 Check the rotor thickness

⚠ DANGER

Danger: rotating parts!

The motor must **not** be running when checking the rotor thickness.

1. Remove the fan cover.
2. Remove the cover ring, when present.
3. Measure the rotor thickness using a caliper gage. For the friction-plate design: observe the edging on outer diameter of friction plate.
4. Compare the measured rotor thickness with the minimum permissible rotor thickness. (Refer to the values in the table Rated data for air gap specifications.) If the measured rotor thickness is insufficient, the rotor must be replaced completely. (Refer to Replace rotor for the description.)

8.3.3 Checking the air gap

⚠ DANGER

Danger: rotating parts!

The motor must **not** run while the air gap is being checked.

1. Measure the air gap s_L between the armature plate and the stator near the fastening screws using a feeler gauge. (Refer to table Rated data for air gap specifications for the values.)
2. Compare the measured air gap to the value for the max. permissible air gap s_{Lmax} . (Refer to table Rated data for air gap specifications for the values.)
3. If required, replace both rotors completely (Replace rotor, Page 51).

8.3.4 Release / voltage

⚠ DANGER

Danger: rotating parts!

The running rotor must not be touched.

1. Check the brake functionality when the drive is running: The armature plate must be tightened and the rotor must move without residual torque.
2. Measure the DC voltage at the brake.
   - Compare the measured voltage to the voltage specified on the name plate. A deviation of up to 10% is permitted.
   - When using bridge/half-wave rectifiers: After switching to one-way voltage, the measured DC voltage may drop to 45% of the voltage specified on the name plate.

8.3.5 Replace rotor

⚠ DANGER

Danger: rotating parts!

Switch off the voltage. The brake must be free of residual torque.
Your system should be mechanically immobilized in the event that it could start moving when the brake is released.

1. Remove the connection cables.
2. Loosen the screws evenly and then remove them.
3. Pay attention to the connection cable during this step! Remove the complete stator from the end shield.
4. Check the armature plate's friction surface. Replace the complete stator when there is clearly visible scoring at the running surface.
5. Pull the rotor off the hub.
6. Check the hub's gear teeth.
7. Replace the hub if wear is visible.
8. Check the end shield's friction surface. Replace the friction surface on the end shield when there is clearly visible scoring at the running surface.
9. You can now install and adjust the new rotor and the complete stator. (Refer to Brake mounting, Page 29.)
10. Re-connect the connection cables.
11. If necessary, deactivate the mechanical shutdown of the system.

8.4 Spare parts list

- Only parts with item numbers are available.
  - The item numbers are only valid for the standard design.
- Please include the following information with the order:
  - Order number of the brake
  - Position number of the spare part

Fig. 26: **Spring-applied brake 464-□□R**

	Designation	Variant
Ⓐ	Complete hand-release	
Ⓑ	Fastening screws Fastening screws	▮ for mounting to the flange with through-holes ▮ for mounting to the motor
Ⓒ	Complete stator	▮ Voltage ▮ Rated torques
Ⓓ	Noise reducer	
Ⓔ	Hub	
Ⓕ	Complete rotor	▮ For brake with hub ▮ For directly toothed shaft
Ⓖ	Flange	
Ⓗ	Cover ring	

9 Troubleshooting and fault elimination

If any malfunctions should occur during operations, please check for possible causes based on the following table. If the fault cannot be fixed or eliminated by one of the listed steps, please contact customer service.

Fault	Cause	Remedy
Brake does not release	Coil interruption	▮ Measure coil resistance using a multimeter: – If resistance is too high, replace the complete stator.
	Coil has contact to earth or between windings	▮ Measure coil resistance using a multimeter: – Compare the measured resistance with the nominal resistance. Refer to Rated data for coil powers for the values. If resistance is too low, replace the complete stator. ▮ Check the coil for short to ground using a multimeter: – If there is a short to ground, replace the complete spring-applied brake. ▮ Check the brake voltage (refer to section on defective rectifier, voltage too low).
	Wiring defective or wrong	Check the wiring and correct. ▮ Check the cable for continuity using a multimeter – Replace a defective cable.
	Rectifier defective or incorrect	▮ Measure rectifier DC voltage using a multimeter. ▮ If DC voltage is zero: ▮ Check AC rectifier voltage. ▮ If AC voltage is zero: – Switch on power supply – Check fuse – Check wiring. ▮ If AC voltage is okay: – Check rectifier, – Replace defective rectifier ▮ Check coil for inter-turn fault or short circuit to ground. ▮ If the rectifier defect occurs again, replace the entire spring-applied brake, even if you cannot find any fault between turns or short circuit to ground. The error may only occur on warming up.

Troubleshooting and fault elimination

INTORQ

Fault	Cause	Remedy
Brake does not release	Incorrect micro-switch wiring	Check the wiring of the micro-switch and correct it.
	Micro-switch incorrectly set	Replace the complete stator and make a complaint about the setting of the micro-switch to the manufacturer.
	Air gap "s_L" is too large	▮ For non-adjustable brakes: – Replace rotor. Refer to Replace rotor, Page 51.
Rotor cannot rotate freely	Air gap "s_L" too small	Check the air gap "s_L".
Rotor is too thin	Rotor has not been replaced in time	Replace rotor. Refer to Replace rotor, Page 51.
The voltage is not zero during the functional test (refer to the chapter Function checks before initial commissioning, Page 43).	Incorrect micro-switch wiring	Check and correct the wiring of the micro-switch.
	Micro-switch defective or incorrectly set	Replace the complete stator and return the defective complete stator to the manufacturer.
Voltage too high	Brake voltage does not match the rectifier	Adjust rectifier and brake voltage to each other.
Voltage too low	Brake voltage does not match the rectifier	Adjust rectifier and brake voltage to each other.
	Defective rectifier diode	Replace the defective rectifier with a suitable undamaged one.
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 stator and return the defective complete stator to the manufacturer.

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14.10. Brake operating instructions WSG-TB.J/K

Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _ _ _ Sizes 125 / 180 / 225

(B.8012.1.EN)

Please read these Operational Instructions carefully and follow them accordingly!

Ignoring these Instructions can lead to lethal accidents, malfunctions, brake failure and damage to other parts.
These Installation and Operational Instructions (I + O) are part of the brake delivery.
Please keep them handy and near to the brake at all times.

Contents:

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _ _ _ Sizes 125 / 180 / 225

(B.8012.1.EN)

Safety and Guideline Signs

DANGER

Immediate and impending danger, which can lead to severe physical injuries or to death.

CAUTION

Danger of injury to personnel and damage to machines.

Please Observe!
Guidelines on important points.

Approvals

EU Type Examination Certificates (Elevator Directive):

- EU-BD 954
- EU-BD 954/1

Guidelines on the Declaration of Conformity
A conformity evaluation has been carried out for the product (electromagnetic safety brake) in terms of the EU Low Voltage Directive 2014/35/EU. The Declaration of Conformity is laid out in writing in a separate document and can be requested if required.

Guidelines on the EMC Directive (2014/30/EU)
The product cannot be operated independently according to the EMC directive.
Due to their passive state, brakes are also non-critical equipment according to the EMC.
Only after integration of the product into an overall system can this be evaluated in terms of the EMC.
For electronic equipment, the evaluation has been verified for the individual product in laboratory conditions, but not in the overall system.

Guidelines on the Machinery Directive (2006/42/EC)
The product is a component for installation into machines according to the Machinery Directive 2006/42/EC.
The brakes can fulfil the specifications for safety-related applications in coordination with other elements.
The type and scope of the required measures result from the machine risk analysis. The brake then becomes a machine component and the machine manufacturer assesses the conformity of the safety device to the directive.
It is forbidden to start use of the product until you have ensured that the machine accords with the regulations stated in the directive.

Guidelines on the EU Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment
The electromagnetic brake as well as the rectifiers / microswitches / proximity switches required for control / self-monitoring fulfil the requirements laid down in the EU Directive 2011/65/EC (RoHS).
(Restrictions on the use of certain hazardous substances, such as lead (0.1 %), mercury (0.1 %), cadmium (0.01 %), hexavelent chromium (0.1 %), polybrominated biphenyls (PBB) (0.1 %), polybrominated diphenylethers (PBDE) (0.1 %))

Guidelines on the ATEX Directive
Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion.
For application of this product in areas where there is a high danger of explosion, it must be classified and marked according to Directive 2014/34/EU.

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _ _ _ Sizes 125 / 180 / 225

(B.8012.1.EN)

Safety Regulations

These Safety Regulations are user hints only and may not be complete!

General Guidelines

DANGER

Danger of death!
Do not touch voltage-carrying cables and components.

Brakes may generate further risks, among other things:


Hand injuries


Danger of seizure


Contact with hot surfaces


Magnetic fields

Severe injury to people and damage to objects may result if:

- ❒ the electromagnetic brake is used incorrectly.
- ❒ the electromagnetic brake is modified.
- ❒ the relevant standards for safety and / or installation conditions are ignored.

During the required risk assessment when designing the machine or system, the dangers involved must be evaluated and removed by taking appropriate protective measures.

To prevent injury or damage, only specialist personnel are allowed to work on the components.
They must be familiar with the dimensioning, transport, installation, inspection of the brake equipment, initial operation, maintenance and disposal according to the relevant standards and regulations.

Before product installation and initial operation, please read the Installation and Operational Instructions carefully and observe the Safety Regulations. Incorrect operation can cause injury or damage. At the time these Installation and Operational Instructions go to print, the electromagnetic brakes accord with the known technical specifications and are operationally safe at the time of delivery.

- ❒ Technical data and specifications (Type tags and documentation) must be followed.
- ❒ The correct connection voltage must be connected according to the Type tag and wiring guidelines.
- ❒ Check electrical components for signs of damage before putting them into operation. Never bring them into contact with water or other fluids.
- ❒ Please observe the EN 60204-1 requirements for electrical connection when using in machines.

Only carry out installation, maintenance and repairs in a de-energised, disengaged state and secure the system against inadvertent switch-on.

Guidelines for Electromagnetic Compatibility (EMC)

In accordance with the EMC directives 2014/30/EU, the individual components produce no emissions. However, functional components e.g. mains-side energisation of the brakes with rectifiers, phase demodulators, ROBA®-switch devices or similar controls can produce disturbance which lies above the allowed limit values. For this reason it is important to read the Installation and Operational Instructions very carefully and to keep to the EMC directives.

Application Conditions

The catalogue values are guideline values which have been determined in test facilities. It may be necessary to carry out your own tests for the intended application. When dimensioning the brakes, please remember that installation situations, braking torque fluctuations, permitted friction work, bedding-in condition / conditioning of the brake linings and wear as well as general ambient conditions can all affect the given values. These factors should therefore be carefully assessed, and alignments made accordingly.

- ❒ Mounting dimensions and connection dimensions must be adjusted according to the size of the brake at the place of installation.
- ❒ Use of the brake in extreme environmental conditions or outdoors, directly exposed to the weather, is not permitted.
- ❒ The brakes are designed for a relative duty cycle of 60 %. A duty cycle > 60 % leads to higher temperatures, which cause premature ageing of the noise damping and therefore lead to an increase in switching noises. Furthermore, the switch function of the release monitoring can be impaired. The max. permitted switching frequency is 240 1/h. On overexcited brakes, the switching frequency must not exceed 180 1/h. These values are valid for intermittent periodic duty S3 60 %. The permitted surface temperature on the brake flange must not exceed 80 °C at a max. ambient temperature of 40 °C. For higher requirements on the friction work in case of EMERGENCY STOP or at temperatures of up to 90 °C on the brake flange, special friction materials and noise damping are to be used (see Type key).
- ❒ The braking torque is dependent on the current bedding-in condition of the brake. Bedding in / conditioning of the friction linings is necessary.
- ❒ The brakes are only designed for dry running. The torque is lost if the friction surfaces come into contact with oil, grease, water or similar substances or foreign bodies.

Please ensure that the brake is clean and oil-free, as both brake circuits have an effect on the same linings. In particular in gear applications, special sealing measures, among other precautions, may be necessary!

- ❒ The surfaces of the outer components have been phosphated manufacturer-side to form a basic corrosion protection. The surface is rough-sawn and unprocessed (rolled material)

CAUTION

The rotors may rust up and seize up in corrosive ambient conditions and / or after longer downtimes.
The user is responsible for taking appropriate countermeasures.

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _ _ _ Sizes 125 / 180 / 225

(B.8012.1.EN)

Safety Regulations

These Safety Regulations are user hints only and may not be complete!

Dimensioning

Attention!
When dimensioning the brake, please take into consideration whether a load torque is present when selecting the protection.

- ❒ Load torques reduce the deceleration torque available.
- ❒ Load torques may increase the output speed:
  - ➔ during a possible processing time in the controls
  - ➔ during the brake downtime

When calculating the friction work, please observe that the brake nominal torque is subject to a tolerance.

Climate Conditions

The electromagnetic brake is suitable for applications with an ambient temperature of between -5 °C and +40 °C.

CAUTION

Reduction in braking torque possible
Condensation can form on the brake and cause a loss in braking torque:

- ❒ due to fast changes in temperature
- ❒ at temperatures of around or under freezing point

The user is responsible for taking appropriate countermeasures (e.g. forced convection, heating, drain screw).

CAUTION

Brake malfunction possible
Condensation can form on the brake and cause malfunctions:

- ❒ at temperatures around or under freezing point, the brake can freeze over and not release any more.

The user is responsible for taking appropriate countermeasures (e.g. forced convection, heating, drain screw).

The system function must be checked by the user after longer downtimes.

At high temperatures and in high humidity or with occurring dampness, the rotor can seize up to the armature disk or the bearing shield / the flange plate after longer downtimes.

CAUTION

Temperatures of over 80 °C on the brake mounting flange can have a negative effect on the switching times, the braking torque levels and the noise damping behaviour.

Intended Use

This safety brake is intended for use in electrically operated elevators and goods elevators. Furthermore, this brake can be used as a braking device acting on the traction sheave or the shaft of the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and as a braking element against unintended car movement.

Earthing Connection

The brake is designed for Protection Class I. This protection covers not only the basic insulation, but also the connection of all conductive parts to the protective conductor (PE) on the fixed installation. If the basic insulation fails, no contact voltage will remain. Please carry out a standardised inspection of the protective conductor connections to all contactable metal parts!

Class of Insulation F (+155 °C)

The insulation components on the magnetic coils are manufactured at least to class of insulation F (+155 °C).

Protection

(mechanical) IP10: Protection against large body surfaces and large foreign bodies > 50 mm in diameter. No protection against water.

(electrical) IP54: Dust-proof and protected against contact as well as against water spray from any direction.

Brake Storage

- ❑ Store the brakes in a horizontal position, in dry rooms and dust and vibration-free.
- ❑ Relative air humidity < 50 %.
- ❑ Temperature without major fluctuations within a range from -5 °C up to +40 °C.
- ❑ Do not store in direct sunlight or UV light.
- ❑ Do not store aggressive, corrosive substances (solvents / acids / lyes / salts / oils / etc.) near to the brakes.

For longer storage of more than 2 years, special measures are required (please contact the manufacturer).

Storage acc. DIN EN 60721-3-1 (including the limitations / additions described above): 1K3; 1Z1; 1B1; 1C2; 1S3; 1M1

Handling

Before installation, the brake must be inspected and found to be in proper condition.
The brake function must be inspected both **once attachment has taken place** as well as **after longer system downtimes**, in order to prevent the drive starting up against possibly seized linings.

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(B.8012.1.EN)

Safety Regulations

These Safety Regulations are user hints only and may not be complete!

User-implemented Protective Measures:

- ❒ Please cover moving parts to protect **against injury through seizure**.
- ❒ Place a cover on the magnetic part to protect **against injury through high temperatures**.
- ❒ **Protection circuit:** When using DC-side switching, the coil must be protected by a suitable protection circuit according to VDE 0580, which is integrated in *mayr*®-rectifiers. To protect the switching contact from consumption when using DC-side switching, additional protective measures are necessary (e.g. series connection of switching contacts). The switching contacts used should have a minimum contact opening of 3 mm and should be suitable for inductive load switching. Please make sure on selection that the rated voltage and the rated operating current are sufficient. Depending on the application, the switching contact can also be protected by other protection circuits (e.g. *mayr*®-spark quenching unit, half-wave and bridge rectifiers), although this may of course then alter the switching times.
- ❒ Take precautions **against freeze-up of the friction surfaces** in high humidity and at low temperatures.

Standards, Directives and Regulations Used and To Be Applied

DIN VDE 0580	Electromagnetic devices and components, general specifications
2014/35/EU	Low Voltage Directive
CSA C22.2 No. 14-2010	Industrial Control Equipment
UL 508 (Edition 17)	Industrial Control Equipment
2014/33/EU	Elevator Directive
EN 81-20	Safety rules for the construction and installation of lifts – Part 20: Passenger and goods passenger lifts
EN 81-50	Safety rules for the construction and installation of lifts - Examinations and tests – Part 50: Design rules, calculations, examinations and tests of lift components
EN 81-1	(End of the period of applicability: 31 AUG 2017)
EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
DIN EN 61000-6-4	Interference emission
EN 12016	Interference immunity (for elevators, escalators and moving walkways)

Liability

The information, guidelines and technical data in these documents were up to date at the time of printing. Demands on previously delivered brakes are not valid.
Liability for damage and operational malfunctions will not be taken if:

- the Installation and Operational Instructions are ignored or neglected.
- the brakes are used inappropriately.
- the brakes are modified.
- the brakes are worked on unprofessionally.
- the brakes are handled or operated incorrectly.

Guarantee

- ❒ The guarantee conditions correspond with the Chr. Mayr GmbH + Co. KG sales and delivery conditions.
- ❒ Mistakes or deficiencies are to be reported to *mayr*® at once!

CE Identification

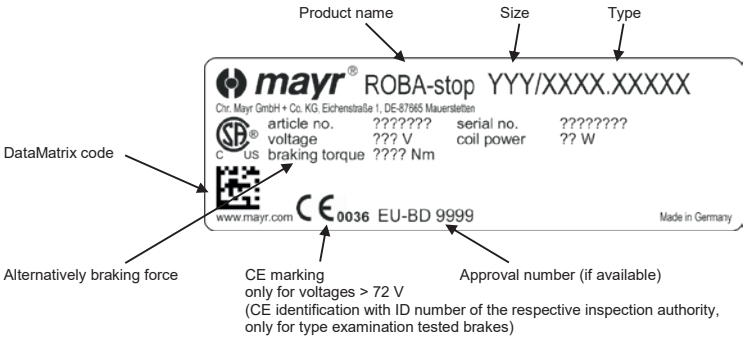
CE according to the Low Voltage Directive 2014/35/EU and the Elevator Directive 2014/33/EU

Conformity Markings

c SA us in terms of the Canadian and American approval

Identification

mayr® components are clearly marked and described on the Type tag:



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Sizes 125 / 180 / 225 **(B.8012.1.EN)**

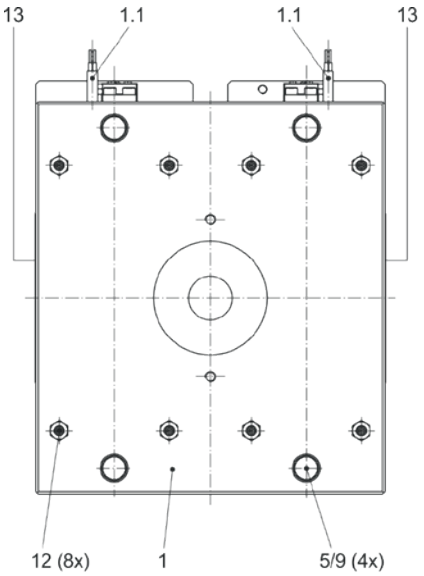

Fig. 1

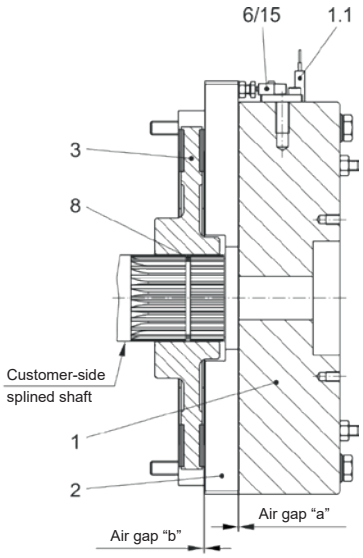

Fig. 2 (Design for splined shaft)

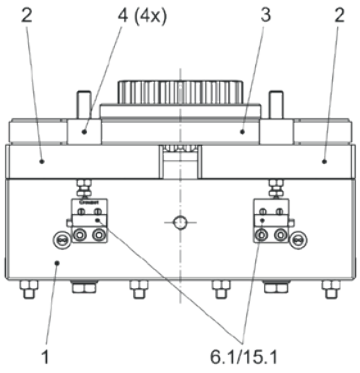

Fig. 3

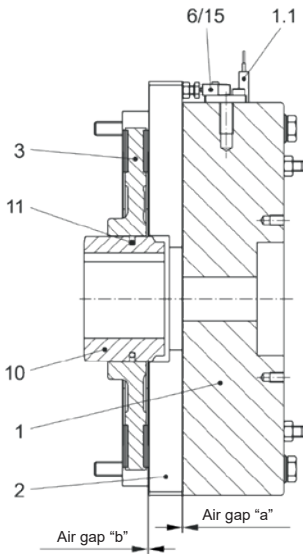

Fig. 4 (Hub design)

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Parts List (Only use *mayr*® original parts)

Item	Name
1	Coil carrier assembly (incl. magnetic coils)
1.1	Connection cable 2 x AWG18 blue / brown
2	Armature disk
3	Rotor
4	Distance bolt
5	Hexagon head screw according to DIN EN ISO 4014: On Size 125: M8 x 100 / 8.8 On Size 180: M8 x 110 / 10.9 On Size 225: M10 x 115 / 8.8
6	Release monitoring assembly with microswitch
6.1	Microswitch
7	Hand release assembly (page 13)
7.1	Hand release lever (page 13)
7.2	Hexagon nut (page 13)
7.3	Washer (page 13)
7.4	Spring pin (page 13)
8	O-ring NBR 70 (not included in the standard scope of delivery) On Size 125: D34 x 2.5 On Size 180: D40 x 3 On Size 225: D45 x 3
9	Washer
10	Hub
11	O-ring
12	Noise damping
13	Type tag
14	Wear monitoring assembly (Fig. 8, page 15)
14.1	Microswitch incl. adaptor plate (Fig. 8, page 15)
15	Release monitoring assembly with proximity switch
15.1	Proximity switch

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Table 1: Technical Data (Independent of Type and Size)

Nominal air gap [1] "a" braked (Figs. 2 / 4)	0.45 mm
Limit air gap [2] "a" at nominal torque (Figs. 2 / 4)	0.9 mm
Inspection air gap "b" on released brake (Figs. 2 / 4)	min. 0.25 mm
Protection (coil/casting compound):	IP54
Protection (mechanical):	IP10
Protection (switch):	IP67
Ambient temperature:	-5 °C to +40 °C
Duty cycle:	60 %

[1] Measured in the vertical centre axis area of the respective armature disk (2).

[2] Once the limit air gap has been reached, the rotors must be replaced. However, the brake already becomes louder at an air gap > "a" +0.2 mm.

At temperatures of around or under freezing point, condensation can strongly reduce the braking torque. The user is responsible for taking appropriate countermeasures. The customer is responsible for providing a protective cover against contamination caused by construction sites.

CAUTION

The rotor (3) must be replaced at the latest when a maximum air gap of 0.9 mm has been reached.

Table 2: Technical Data

Size	Nominal torque [3]	Overexcitation voltage 1.5 to 2 x U_N	Nominal voltage U_N	Nominal power P (20 °C)	Inductivity 207 V coil	Rotor thickness New condition
125	2 x 125 Nm	no	24/104/180/207 V DC	2 x 64 W	150 H	$13_{-0.05}$ mm
	2 x 115 Nm					
	2 x 100 Nm					
	2 x 90 Nm					
180	2 x 200 Nm	yes	24/104/180/207 V DC	2 x 69 W	155 H	$15_{-0.05}$ mm
	2 x 180 Nm	no				
	2 x 170 Nm					
	2 x 160 Nm					
	2 x 150 Nm					
	2 x 140 Nm					
225	2 x 250 Nm [4]	no	24/104/180/207 V DC	2 x 81 W	135 H	$15_{-0.05}$ mm
	2 x 225 Nm					
	2 x 215 Nm					
	2 x 200 Nm					
	2 x 170 Nm					

[3] The braking torque (nominal torque) is the torque effective in the shaft train on slipping brakes with a sliding speed of 1 m/s referring to the mean friction radius.

[4] with rotor Ø 223

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Table 3: Technical Data

Size	Max. permitted friction work per single circuit [5]	Max. trigger speed	Tightening torque Fixing screw Item 5	Weight without hub / without hand release
125	20000 J	1000 rpm	21 Nm	21 kg
180	20000 J	900 rpm	30 Nm	23.6 kg
225	19000 J / 27000 J [6]	800 rpm	43 Nm	29.4 kg

[5] Values for speed 400 rpm, brake linings slightly bedded in (see Chapter on Braking Torque).
The value can be doubled for both brake circuits.
The value increases at lower speeds and decreases at higher speeds (please contact *mayr*®).

[6] on 250 Nm design / rotor Ø 223

Table 4: Switching Times [ms]

Size	Nominal torque	Overexcitation	Attraction t_2	Drop-out t_0 DC	Drop-out t_{50} [7] DC	Drop-out t_{90} [8] DC	Drop-out t_{11} AC	Drop-out t_1 AC
125	2 x 125 Nm	no	260	35	70	110	175	430
	2 x 115 Nm	no	240	45	80	120	230	480
	2 x 100 Nm	no	225	55	90	130	290	520
	2 x 90 Nm	no	210	60	100	140	350	560
180	2 x 200 Nm	yes	300	30	65	110	240	560
	2 x 180 Nm	no	290	30	60	110	245	580
	2 x 170 Nm	no	275	33	65	116	310	610
	2 x 160 Nm	no	260	35	70	124	370	660
	2 x 150 Nm	no	245	38	75	132	430	710
	2 x 140 Nm	no	230	40	80	140	490	760
225	2 x 250 Nm	no	300	25	50	80	250	590
	2 x 225 Nm	no	300	25	50	80	250	590
	2 x 215 Nm	no	280	28	53	90	330	630
	2 x 200 Nm	no	270	32	57	100	420	700
	2 x 170 Nm	no	250	35	60	110	500	770

[7] Referring to the effective braking torque

[8] Referring to the nominal braking torque

The stated switching times can only be achieved using the respective correct electrical wiring. This also refers to the protection circuit for brake control and the response delay times of all control components.
The use of varistors for spark quenching increases the DC-side switching times.

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Torque-Time Diagram

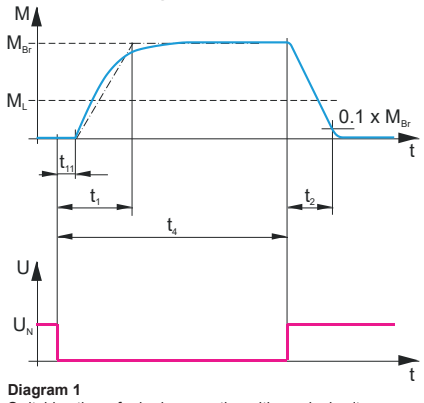

Diagram 1
Switching times for brake operation with nominal voltage

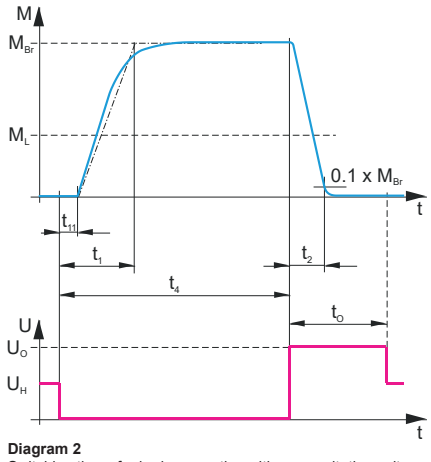

Diagram 2
Switching times for brake operation with overexcitation voltage

Key

M_{Br}	=	Braking torque
M_L	=	Load torque
t_1	=	Connection time
t_{11}	=	Response delay on connection (≙ t_0 acc. Type Examination Certificate)
t_2	=	Separation time
t_4	=	Slip time + t_{11}
t_O	=	Overexcitation time
U_N	=	Coil nominal voltage
U_H	=	Holding voltage
U_O	=	Overexcitation voltage

Application

- ROBA®-twinstop® for use as a holding brake with occasional EMERGENCY STOP braking actions.
- The max. permitted speed and friction work (see Technical Data, Table 3) must be observed.

Design

The ROBA®-twinstop® is a spring applied, electromagnetically releasing dual circuit safety brake - a component in terms of DIN VDE 0580.
It is designed for installation into gearless elevator machinery for use as a holding brake with occasional EMERGENCY STOP braking actions.
On dimensioning, the braking torque, the speed as well as the permitted friction work in case of EMERGENCY STOP need to be taken into consideration for safe holding of the load torque and safe compliance with the required braking distance.
Furthermore, the ROBA®-twinstop® can be used as a braking device acting on the shaft of the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and as a braking element against unintended car movement.
Please also observe the Annex in the EU Type Examination Certificate.
In order to guarantee the maximum braking distance while both brakes act, an inspection of the protection device including all control and brake times (detector / control / brake) is necessary.
The respective standards, regulations and directives must be observed.

Function

ROBA®-twinstop® brakes are spring applied, electromagnetic safety brakes.

Spring applied function:
In de-energised condition, thrust springs press against the armature disks (2). The rotor (3) with the friction linings is therefore held between the armature disks (2) and the machine screw-on surface.
The motor shaft is braked via the rotor (3).

Electromagnetic function:
Due to the magnetic force of the coils in the coil carrier (1), the armature disks (2) are attracted against the spring pressure to the coil carrier (1).
The brake is thereby released and the shaft can rotate freely.

Safety brake function:
The ROBA®-twinstop® brakes reliably and safely in the event of a power switch-off, a power failure or an EMERGENCY STOP.

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Scope of Delivery / State of Delivery

The brake body is pre-assembled with coil carrier (1), armature disks (2), distance bolts (4) as well as optionally with hand release (7), release monitoring devices (6/15) and wear monitoring device (14).
The hand release device (7) as well as the release monitoring and wear monitoring devices (6/14/15) are mounted and set manufacturer-side.
The following are included loose in delivery: rotor (3), hexagon head screws (5), washers (9) as well as - if applicable - the hub (10) with O-ring (11).

Please check the scope of delivery according to the Parts List as well as the state of delivery immediately after receiving the goods.
mayr® will take no responsibility for belated complaints.
Please report transport damage immediately to the deliverer.
Please report incomplete delivery and obvious defects immediately to the manufacturer.

Adjustment

The brakes are equipped manufacturer-side with the respective springs for the braking torque stated on the Type tag (13). Adjustment is not necessary. Adaptions or modifications are not permitted as a rule. This rule also applies to the manufacturer-side adjusted noise damping. The microswitches are also adjusted manufacturer-side. Despite great care during the manufacturer-side adjustment, re-adjustment might be necessary after installation due to transportation and handling. Furthermore, such switches cannot be considered fail-safe. Please observe the sections Release Monitoring and Wear Monitoring.

Installation Conditions

- The eccentricity of the shaft end in relation to the fixing holes must not exceed 0.3 mm.
- The positional tolerance of the threads for the hexagon head screws (5) must not exceed 0.3 mm.
- The axial run-out deviation of the screw-on surface to the shaft must not exceed the permitted axial run-out tolerance of 0.063 mm in the area of the friction surface.
  Measuring procedure acc. DIN 42955.
  The shaft bearing is to be designed so that the axial backlash of the shaft (absolute) does not exceed the permitted axial run-out value during operation.
  Larger deviations can lead to permanent grinding with overheating of the friction linings and thus to a drop in the braking torque.
- The splined motor shaft should be designed according to the information given in the applicable assembly drawing.
  The O-ring groove must be inserted before the shaft is splined. The O-ring groove must be free of burrs.

The dimensions stated in the assembly drawings are manufacturer-side recommendations.

- On hub designs the tolerances of the hub bore (10) and the shaft must be selected so that the hub toothing (10) is not widened. Widening of the toothing leads to the rotor (3) jamming on the hub (10) and therefore to brake malfunctions.
  Recommended hub – shaft tolerance H7/k6.
  If the hub (10) is heated for better joining, the O-ring (11) must be removed beforehand and re-mounted after hub installation.
  The max. permitted joining temperature of 200 °C must not be exceeded.
- Dimensioning of the key connection according to the requirements shaft diameter, transmittable torque and operating conditions must be carried out. For this, the corresponding user data must be known or the customer must carry out the dimensioning according to the valid calculation basis DIN 6892.
  For the calculation, a hub quality of Re = 300 N/mm² should be used.
  The length of the key should lie over the entire hub (10).
- For the dimensioning of the key connections, the permitted tensions common in machine construction must be considered.
- The mounting dimensions and the tapped holes s with depth K + 2 mm (K = screw projection) must be provided according to the Catalogue or the applicable assembly drawing (Fig. 5).

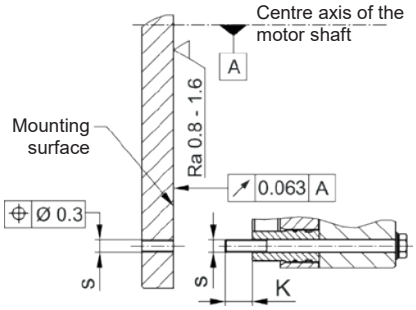

Fig. 5

- A suitable counter friction surface (steel or cast iron) must be used. Sharp-edged interruptions on the friction surfaces must be avoided. Recommended surface quality in the area of the friction surface Ra = 0.8 – 1.6 µm. The mounting surface must be turned. The surface must be bare or FE-phosphated (layer thickness approx. 0.5 µm) without oil.
  If corrosion protection is applied, the device must be inspected for possible effects on the braking torque.
  In particular customer-side mounting surfaces made of grey cast iron are to be rubbed down additionally with sandpaper (grain ≈ 60 to 100).
- The rotor and brake surfaces must be oil and grease-free.
- The O-ring (8) or O-ring (11) must be lightly greased.
- The toothings of the motor shaft, rotor (3) and the hub (10) must not be oiled or greased.
- Please abstain from using cleaning agents containing solvents, as they could affect the friction material.

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Installation: Design for Splined Motor Shaft (Figs. 1 – 3)

1. Insert the O-ring (8), lightly greased, acc. Parts List with NBR 70 material (provided by customer) into the motor shaft groove. Please use a grease based on mineral oil, NLGI Class 2, with a basic oil viscosity of 220 mm^2/s at 40 °C.
2. Push the rotor (3) onto the motor shaft by hand using light pressure.
   Please ensure that the rotor collar with the smaller diameter faces away from the machine wall.
   Make sure that the toothing moves easily.
   Do not damage the O-ring.
3. Secure the brake bodies using 4 hexagon head screws (5) and washers (9) all-round step-wise evenly (we recommend that you secure the screws using Loctite 243).
   Tighten the hexagon head screws using a torque wrench and observe the tightening torque acc. Table 3.
4. **Check air gap "a" (Fig. 2):**
   Air gap: 0.40 mm ≤ "a" ≤ 0.65 mm
   This air gap must be present in the area of the vertical centre axis on both armature disks (2) (Fig. 1).
5. **Check air gap "b" > 0.25 mm in energised state on the rotor (3) (Fig. 2).**
   The inspection air gap must be given.

Installation: Hub Design (Figs. 1, 3 and 4)

1. Mount the hub (10) with the inserted O-ring (Item 11 / **O-ring must be lightly greased**) onto the shaft, bring it into the correct position (the length of the key should lie over the entire hub) and secure it axially (e.g. using a locking ring).
2. Push the rotor (3) over the O-ring (11) onto the hub (10) by hand using light pressure.
   Please make sure that the rotor collar faces the machine wall.
   Make sure that the toothing moves easily.
   Do not damage the O-ring.
3. Secure the brake bodies using 4 hexagon head screws (5) and washers (9) all-round step-wise evenly (we recommend that you secure the screws using Loctite 243).
   Tighten the hexagon head screws using a torque wrench and observe the tightening torque acc. Table 3.
4. **Check air gap "a" (Fig. 4):**
   Air gap: 0.40 mm ≤ "a" ≤ 0.65 mm
   This air gap must be present in the area of the vertical centre axis on both armature disks (2) (Fig. 1).
5. **Check air gap "b" > 0.25 mm in energised state on the rotor (3) (Fig. 4).**
   The inspection air gap must be given.

Braking Torque

The (nominal) braking torque is the torque effective in the shaft train on slipping brakes, with a sliding speed of 1 m/s referring to the mean friction radius.
The brake is loaded statically when used as a service brake and loaded dynamically in EMERGENCY STOP operation (part of the brake equipment against overspeed or inadvertent movement of the elevator cage). Respectively, there are different speed values for the friction material, which in practice also leads to different friction values and therefore braking torques.
Amongst other things, the braking torque is dependent on the respective quality / condition of the friction surfaces (conditioning). Therefore, bedding in of the brake linings on newly installed brakes or on rotor replacement when mounted onto the motor is required, taking into account the permitted loads. The following applies as a reference value for the bedding in of new brake linings. The load in new condition may not be more than 50 % of the max. friction work per individual circuit (see Table 3). This process is to be carried out at reduced speed, approx. 30 % of the operating speed.
If the bedding in should take place under works-specific conditions, we ask you to contact us, so that we can provide the appropriate parameters.
Friction materials develop their optimum effect only under speed at the appropriate contact pressure, as continuous regeneration of the friction surface then takes place (torque consistency).
Permanent grinding of the rotor can lead to overheating / damage to the brake linings, and therefore to a drop in braking torque.
Furthermore, friction materials are subject to ageing, which is also influenced, among other things, by higher temperatures and other ambient influences. We recommend regular inspection of the braking torque (1 x per year) including the respective dynamic braking actions as a refresher.

Noise Damping (Item 12 / Fig. 1)

The noise damping was set and adjusted manufacturer-side. However, this component is subject to ageing dependent on the application or operating conditions (torque adjustment, switching frequency, ambient conditions, system vibrations etc.).
Replacing the damping element is only permitted at the *mayr*® site of manufacture.

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Hand Release (7)

(Option dependent on Type for mechanical release of both brake circuits individually using a Bowden cable or by hand)

The hand release is set manufacturer-side ready for installation.

The brake is released by shifting both hand release levers (7.1) simultaneously inwards, see Figs. 6 and 7.
The armature disk (2) is attracted to the coil carrier (1); the rotor (3) is then free and the brake is released.

DANGER

Operate the hand release carefully.
Any existing loads are put into motion when the hand release is actuated.

Table 5: Technical data

Size	Braking torque	Release force per brake circuit with	
		Bowden cable	hand release lever
125	125 Nm	approx. 130 N	approx. 70 N
180	200 Nm	approx. 190 N	approx. 105 N
225	225 Nm 250 Nm	approx. 210 N	approx. 120 N

The release angle totals approx. 30° per lever inwards.

A substantially increased force acting on the hand release lever (7.1) may lead to component destruction.

Bowden cable designs must be designed with an end stop for the Bowden cable lever as soon as release of the brake is residual torque-free.

In addition, a suitable return spring must be installed on customer Bowden cable designs in order to align friction forces in the Bowden cable.

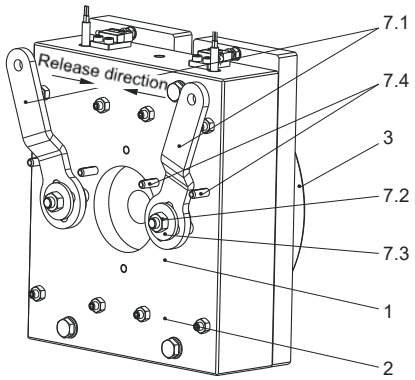

Fig. 6 (Hand release for Bowden cable)

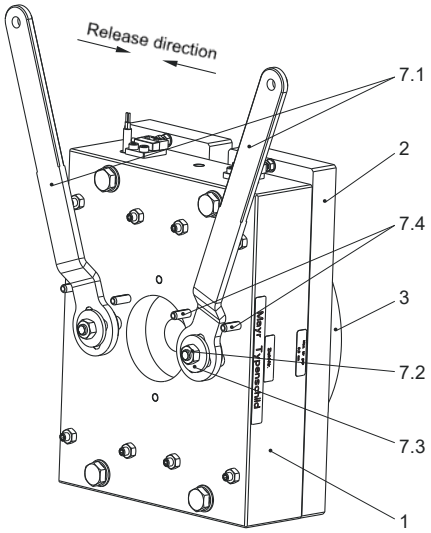

Fig. 7 (Hand release with hand release lever)

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Release Monitoring (Item 6 or 15 / Figs. 2 to 4)
(Option, dependent on Type)

Please carry out a functional inspection before brake initial operation!

ROBA®-twinstop® brakes are delivered with manufacturer-side adjusted release monitoring devices.
A microswitch (6.1) or a proximity switch (15.1) per brake circuit emits a signal for every brake condition change:
"brake opened" or "brake closed".

The customer is responsible for a signal evaluation of both conditions.

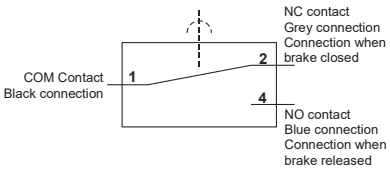
From the point at which the brake is energised, a time span of three times the separation time must pass before the switch signal on the release monitoring is evaluated.

Microswitch Specification (6.1)

Characteristic values for measurement:	250 V~ / 3 A
Minimum switching power:	12 V, 10 mA DC-12
Recommended switching power: for maximum lifetime and reliability	24 V, 10...50 mA DC-12 DC-13 with freewheeling diode!

Usage category acc. IEC 60947-5-1:
DC-12 (resistance load), DC-13 (inductive load)

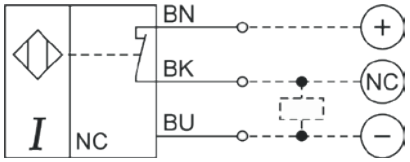
Microswitch (6.1) Wiring Diagram:



Technical Data of the Proximity Switch (15.1)

Operating voltage:	10...30 VDC
Residual ripple content:	≤ 10 % U_{ss}
DC rated operating current:	≤ 150 mA
No-load current I_0:	≤ 15 mA
Residual current:	≤ 0.1 mA
Rated insulation voltage:	≤ 0.5 kV
Short-circuit protection:	yes / synchronising
Line voltage drop at I_e:	≤ 1.8 V
Wire breakage protection / reverse voltage protection:	yes / completely
Output function:	3-wire, NC contact, PNP
Switching frequency:	≤ 2 kHz

Proximity Switch (15.1) Wiring Diagram:



Function

When the magnetic coil is energised in the coil carrier (1), the armature disk (2) is attracted to the coil carrier (1), the microswitch (6.1) or the proximity switch (15.1) emits a signal, the brake is released.

Customer-side Functional Inspection Once Attachment Has Taken Place

Carry out a functional inspection before brake initial operation.

Microswitch (6.1) for connection as NO contact:
- Brake **de-energised**: Inspection lamp must signal **"OFF"**.
- Brake **energised**: Inspection lamp must signal **"ON"**.

Microswitch (6.1) for connection as NC contact:
- Brake **de-energised**: Inspection lamp must signal **"ON"**.
- Brake **energised**: Inspection lamp must signal **"OFF"**.

Proximity switch (15.1):
- Brake **de-energised**: Inspection lamp must signal **"ON"**.
- Brake **energised**: Inspection lamp must signal **"OFF"**.

Microswitches and proximity switches cannot be guaranteed fail-safe. Therefore, please ensure appropriate access for replacement or adjustment.
The switching contacts of the microswitches are designed so that they can be used for both small switching powers and medium ones.
However, after switching a medium switching power, small switching powers are no longer reliably possible.
In order to switch inductive, capacitive and non-linear loads, please use the appropriate protection circuit to protect against electric arcs and unpermitted loads!

The following prevent actuation of the microswitch (6.1) or proximity switch (15.1) and lead to a malfunction.
- ❑ Heavy contamination between the armature disk (2) and the coil carrier (1).
- ❑ Extreme warping on the armature disk (2).
- ❑ Excessively large air gap "a" between the armature disk (2) and the coil carrier (1) due to wear on the friction linings.
- ❑ Defective brake magnetic coil.
- ❑ No or incorrect voltage on the brake coil.

If none of these error sources prove to be the reason for incorrect release monitoring function, the microswitch (6.1) or the proximity switch (15.1) must be checked and the adjustment corrected if necessary.

If a replacement or new adjustment of the switch (6.1/15.1) is required by the customer, separate adjustment instructions stating the article or serial number of the respective brake can be requested from the manufacturer.

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Wear Monitoring (14) Fig. 8
(Option, dependent on Type)

Only one microswitch for wear monitoring (14) is required per **ROBA®-twinstop®** brake, which is mounted onto the right brake (Fig. 8).
The **ROBA®-twinstop®** brake is delivered with manufacturer-side installed and adjusted wear monitoring (14).

Function

Due to wear on the rotor (3), the air gap “a” between the coil carrier (1) and the armature disk (2) increases.
Once the maximum air gap of 0,9 mm has been reached, the microswitch (14.1) contact switches over and emits a signal.
The rotor (3) must be replaced.

The customer is responsible for a signal evaluation.

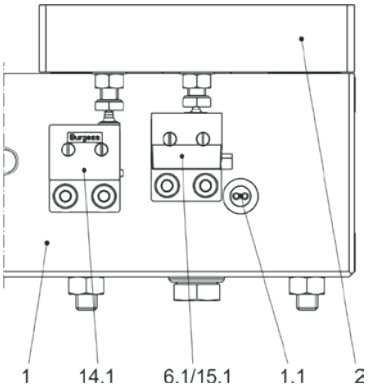
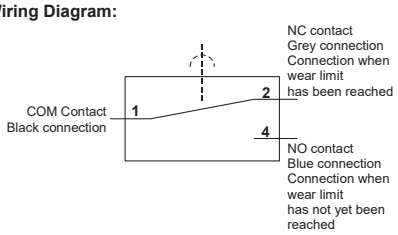


Fig. 8

Wiring Diagram:



If a replacement or new adjustment of the microswitch (14.1) is required by the customer, separate adjustment instructions stating the article or serial number of the respective brake can be requested from the manufacturer.

For switch power values, please see Release Monitoring

Microswitches cannot be guaranteed fail-safe. Therefore, please ensure appropriate access for replacement or adjustment.
The switching contacts are designed so that they can be used for both small switching powers and medium ones. However, after switching a medium switching power, small switching powers are no longer reliably possible.
In order to switch inductive, capacitive and non-linear loads, please use the appropriate protection circuit to protect against electric arcs and unpermitted loads!

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Electrical Connection and Wiring

DC current is necessary for operation of the brake. The coil voltage is indicated on the Type tag as well as on the brake body and is designed according to the DIN IEC 60038 (± 10 % tolerance). Operation must take place via DC voltage with a low ripple content, e.g. via a bridge rectifier or with another suitable DC supply. The connection possibilities can vary dependent on the brake equipment. Please follow the exact connections according to the Wiring Diagram. The manufacturer and the user must observe the applicable regulations and standards (e.g. DIN EN 60204-1 and DIN VDE 0580). Their observance must be guaranteed and double-checked!

Supply Voltage Requirements

In order to minimise noise development of the released brake, it must only be operated via DC voltage with low ripple content. AC current operation can take place using a bridge rectifier or another suitable DC power supply. Supplies whose output voltages have a high ripple content (e.g. a half-wave rectifier, a switch-mode mains adaptor, ...) are not suitable for operation of the brake.

Earthing Connection

The brake is designed for Protection Class I. This protection covers therefore not only the basic insulation, but also the connection of all conductive parts to the protective conductor (PE) on the fixed installation. If the basic insulation fails, no contact voltage will remain. Please carry out a standardised inspection of the protective conductor connections to all contactable metal parts!

Device Fuses

To protect against damage from short circuits, please add suitable device fuses to the mains cable.

Switching Behaviour

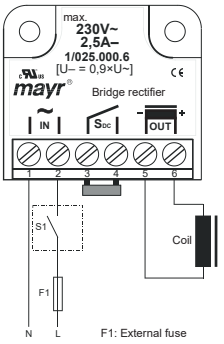
The reliable operational behaviour of a brake is to a large extent dependent on the switching mode used. Furthermore, the switching times are influenced by the temperature and the air gap between the armature disk and the coil carrier (dependent on the wear condition of the linings).

Magnetic Field Build-up

When the voltage is switched on, a magnetic field is built up in the brake coil, which attracts the armature disk to the coil carrier and releases the brake.

Magnetic Field Removal

AC-side switching

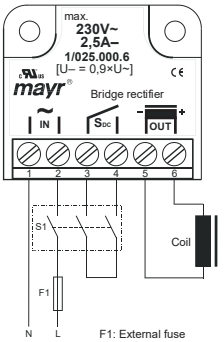


The power circuit is interrupted in front of the rectifier. The magnetic field slowly reduces. This delays the rise in braking torque.

When switching times are not important, please switch AC-side, as no protective measures are necessary for the coil and the switching contacts.

AC-side switching means **low-noise switching**; however, the brake engagement time is longer (approx. 6-10 times longer than with DC-side switching), use for non-critical braking times.

DC-side Switching



The power circuit is interrupted between the rectifier and the coil as well as mains-side. The magnetic field reduces extremely quickly. This causes a quick rise in braking torque.

When switching DC-side, high voltage peaks are produced in the coil, which lead to wear on the contacts from sparks and to destruction of the insulation.

DC-side switching means **short brake engagement times (e.g. for EMERGENCY STOP operation)**; however, louder switching noises.

Protection Circuit

When using DC-side switching, the coil must be protected by a suitable protection circuit according to VDE 0580, which is integrated in *mayr*®-rectifiers. To protect the switching contact from consumption when using DC-side switching, additional protective measures are necessary (e.g. series connection of switching contacts). The switching contacts used should have a minimum contact opening of 3 mm and should be suitable for inductive load switching. Please make sure on selection that the rated voltage and the rated operating current are sufficient. Depending on the application, the switching contact can also be protected by other protection circuits (e.g. *mayr*®-spark quenching unit, half-wave and bridge rectifiers), although this may of course then alter the switching times.

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _ _ _ Sizes 125 / 180 / 225

(B.8012.1.EN)

Brake Inspection

(Customer-side after Mounting onto the Elevator Machinery)

- ❑ **Inspection of the individual air gaps (Fig. 2 / 4)**
  Air gaps "a" of both brake circuits (brake de-energised):
  Air gap 0.40 mm ≤ "a" ≤ 0.65 mm.
  Air gaps "b" of both brake circuits (brake energised):
  Air gap "b" > 0.25 mm.
- ❑ **Braking torque inspection:**
  Please compare the requested braking torque with the torque stated on the Type tag.
- ❑ **Release function inspection**
  By energising the brake via battery operation, to guarantee emergency escape for passengers during a power failure or manually using the hand release.
- ❑ **Switch function inspection of the release monitoring (NO contact)**
  Brake de-energised → Signal "OFF"
  Brake energised → Signal "ON"
- ❑ **Hand release functional inspection (dependent on Type)**
  Please observe the guidelines on page 13!

Dual Circuit Brake Functional Inspection

The **ROBA®-twinstop®** brake is equipped with a double safety (redundant) braking system.
This means that, should one brake circuit fail, the braking effect is still maintained.

DANGER

Should the elevator begin to move after release of one brake circuit or should it fail to react to the braking procedure, the energised coil must be switched off immediately!
The dual circuit braking function is not guaranteed.
Shut down the elevator, lower and secure the load, remove and inspect the brake.
Please observe the installation guidelines of the elevator manufacturer as well as the accident prevention regulations.

The individual circuit inspection is carried out by energising the individual circuits. The braking effect sufficient for the retardation of the elevator cage, which is loaded with nominal load and moving downwards at nominal speed, must be maintained (please observe the permitted friction work acc. Technical Data).

Inspection brake circuit 1:

1. Energise brake circuits 1 and 2 and put the system into operation.
2. De-energise brake circuit 1 (= EMERGENCY STOP) and inspect the stopping distance according to the elevator regulations.
3. De-energise brake circuit 2.

Inspection brake circuit 2:

1. Energise brake circuits 1 and 2 and put the system into operation.
2. De-energise brake circuit 2 (= EMERGENCY STOP) and inspect the stopping distance according to the elevator regulations.
3. De-energise brake circuit 1.

Inspection of both brake circuits:

Energise both brake circuits and put the drive into operation. Trigger an EMERGENCY STOP and inspect the stopping distance. The stopping distance must be much shorter than the stopping distance for an individual circuit.
If the brake is used as part of the protection device against unintended car movement, the functionality of the protection device must be verified using the type examination (compliance of the entire concept - detector/control/brake element - for the elevator system).
The inspection proves that the brake element (both brake circuits work together) releases correctly. Furthermore, it must be confirmed that the travelled distance does not exceed the stated value.
If the brake is normally released using overexcitation, brake release during the inspection must be carried out via DC-side switch-off from the overexcitation voltage.

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Maintenance

ROBA®-twinstop® brakes are mainly maintenance-free. The friction lining pairing is robust and wear-resistant. This ensures a particularly long service lifetime of the brake.
However, the friction lining is subject to operational wear on frequent EMERGENCY STOP braking actions. Normally, such occurrences are recorded and saved by the elevator control, or they require the intervention of qualified personnel. When carrying out this maintenance work (especially when taking DIN EN 13015 Appendix A into account), the causes of the malfunction must be determined, assessed and removed by specialist personnel. Causal events such as the air gap can be checked and respective measures can be taken.

The brakes on the elevator system must be maintained and repaired by a **specialist employee**, taking into consideration the type and intensity of use of the system.
The following inspections / tests are to be conducted within the scope of the defined elevator maintenance interval during maintenance and repairs.

1. Visual inspection
   - ➢ Inspection of condition in accordance with the regulations
   - ➢ Brake rotor: in particular the exterior appearance of the brake surfaces
     - wear
     - free of oil / lubricants
     - sticking of linings
2. Tightening torque inspection of the fixing screws on the brakes.
3. Inspection of the air gap – braked (both brake circuits).
4. Inspection of toothing backlash from the splined motor shaft (or the hub (10)) to the rotor (3)
   Max. permitted toothing backlash 0.5°
5. Running noise (brake rotor) during operation
   Attention: Permanent grinding of the rotor can lead to overheating / damage to the brake linings, and therefore to a drop in braking torque. If such indications are present, it is essential that the braking torque is checked and the rotor replaced if required independent of the inspection or the determined wear value!
6. Braking torque or delay inspection (individual brake circuits) at least once per year (within the scope of the maintenance / main inspection).

In order to inspect the wear condition of the rotor (3), please measure the air gap “a”, see Figs. 2 / 4.
If the brake limit air gap (0.9 mm) has been reached, meaning that the friction linings are worn down, the braking torque is lost and the rotor (3) must be replaced.
Brake de-installation is carried out by following the instructions in the section Installation (page 12) backwards.

Replacing the Rotor (3)

Before Replacing the Rotor

- ❑ Clean the brake.

Please observe the “Cleaning the Brake” section, see below.

- ❑ Measure the rotor thickness “new” (nominal dimension acc. Table 2).

Replace the rotor (3) by following the Brake Installation instructions backwards.

DANGER

The drive-brake must be load-free on hoist drives.
Otherwise there is a danger of load crashes!

Information on the Components

The **friction material** contains different inorganic and organic compounds, which are integrated into a system of hardened binding agents and fibres.

Possible hazards:
No potential dangers have been recognised so far when the brake is used according to its intended purpose. When grinding in the friction linings (new condition) and also in case of EMERGENCY STOP braking actions, functional wear can occur (wear on the friction linings); on open brake designs, fine dust can be emitted.

Classification: Hazardous property
Attention: H-classification: H372

Protective measures and rules of behaviour:
Do not inhale dusts
Vacuum the dusts at the point of origin (tested suction devices, tested filters acc. DIN EN 60335-2-69 for dust classes H; maintenance of the suction devices and filter replacement at regular intervals).
If local dust suction is not possible or is insufficient, the entire work area must be ventilated using appropriate technology.

Additional information:
This friction lining (asbestos free) is not a dangerous product in terms of the EU Directive

Cleaning the Brake

Do not clean the brake using compressed air, brushes or similar devices!

- ❒ Use a suction system or wet towels to clean off the brake dust.
- ❒ Do not inhale brake dust (wear safety gloves / safety goggles)
- ❒ In case of dust formation, a dust mask FFP 2 is recommended.

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Disposal

Our electromagnetic brake components must be disposed of separately as they consist of different materials. Please also observe the relevant authority regulations. Code numbers may vary according to the disassembling process (metal, plastic and cables).

Electronic components
(Rectifier / ROBA®-switch / Switch):

Products which have not been disassembled can be disposed of under Code No. 160214 (mixed materials) or components under Code No. 160216, or can be disposed of by a certified disposal firm.

Brake bodies made of steel with coil/cable and all other steel components:
Steel scrap (Code No. 160117)

All aluminium components:
Non-ferrous metals (Code No. 160118)

Brake rotor (steel or aluminium pads with friction linings):
Brake linings (Code No. 160112)

Seals, O-rings, V-seals, elastomers, terminal boxes (PVC):
Plastic (Code No. 160119)

Malfunctions / Breakdowns:

Malfunction	Possible Causes	Solutions
Brake does not release	❑ Incorrect voltage on rectifier ❑ Rectifier failure ❑ Air gap too large (worn rotor) ❑ Coil interrupted	❑ Apply correct voltage ❑ Replace rectifier ❑ Replace the rotor ❑ Replace brake
Release monitoring does not switch	❑ Brake does not release ❑ Defective switch	❑ Solution as above ❑ Replace the switch (manufacturer-side)

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Gearless Lift Machine

WSG-TB

Operating Instructions

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