

## OPERATING INSTRUCTIONS

# WSG-52

## GEARLESS LIFT MACHINE

Code **GM.8.004125.EN**

Version **B01**

Date **13. Mrz 2023**



### Translation of the Original Operating Instructions

[Download the Operating Instructions](#)

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# Gearless Lift Machine

## WSG-52

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These operating instructions are applicable to lift machines:

**WSG - 52.2- .....**

**WSG - 52.3- .....**

date: 13. Mrz 2023 version: B01

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#### Document history

Date	Version	Modifications
23. Jun 2022	0.7	Complete revision;
13. Mrz 2023	B01	UKCA documents added; new EU type-examination certificate ;new CI

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## 1. General information

### 1.1. About this operating manual

The purpose of this operating manual is to ensure that any work on WSG-52 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-52 lift machines must have read and understood this operating manual.

### 1.2. Intended use

WSG-52 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-52 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-52 lift machines may only be operated under the conditions described in this manual and with due regard to their performance limits.

WSG-52 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-52 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-52 lift machine
- Improper installation, commissioning, operation or maintenance
- Operation of the WSG-52 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-52
- Insufficient monitoring of parts subject to wear
- Repairs carried out improperly
- Emergencies caused by external forces or force majeure.



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## 2. Safety

### 2.1. General safety instructions

#### 2.1.1. Qualified personnel





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

#### 2.1.2. Format of the safety instructions

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

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

#### Danger symbols

	Risk of electric shock		Property damage
	General danger		Information

#### Signal words

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

### 2.2. Safety precautions

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



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## 3. EU Declaration of Conformity


**WITTUR Electric**  
Drives GmbH
 

### EU-Konformitätserklärung EU Declaration of Conformity

im Sinne der EU-Richtlinie Niederspannung (2014/35/EU)  
as defined by the EU Low Voltage Directive (2014/35/EU)

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:**

Asynchronmotoren Asynchronous motors	DS □ 1, DS □ 3
Synchron- Servomotoren Synchronous servo motors	DS □ 2, DS □ 4, DG □ 4, DU □ 4, DG □ 6, DU □ 6, G □ 4, R □ 4, G □ 8, R □ 8
Synchron- Aufzugsmaschinen Synchronous lift machines	WSG, WGG, WSU, WGU, OSG, OGG, HSG, HGG
Sondermotoren Custom-made motors	4HX, 6PX, QPX

den Bestimmungen der EU-Richtlinie 2014/35/EU entsprechen.  
are in conformity with the specification of the EU Directive 2014/35/EU.

**Erklärung zur EMV-Richtlinie (2014/30/EU)**  
Bei Netzbetrieb an sinusförmiger Wechselspannung erfüllen die Motoren die Anforderungen der EU-Richtlinie „Elektromagnetische Verträglichkeit“ 2014/30/EU unter Berücksichtigung der Normen EN IEC 61000-6-1/2: 2019-11, EN IEC 61000-6-3: 2022-06 und EN IEC 61000-6-4: 2020-09.

**Statement relating to EMC Directive (2014/30/EU)**  
When connected to a sinus-shaped a.c. voltage system, the motors conform to the requirements of the EC Directive „Electromagnetic compatibility“ 2014/30/EU, including those specified in standards EN IEC 61000-6-1/2: 2019-11, EN IEC 61000-6-3: 2022-06 and EN IEC 61000-6-4: 2020-09.


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


**EN IEC 60 204-1: 2019-06**  
Sicherheit von Maschinen; Elektrische Ausrüstung von Maschinen; Teil 1: Allg. Anforderungen  
Safety of machinery - Electrical equipment of machines. Part 1: General requirements

**EN IEC 60 034-1 : 2011-02**  
Drehende elektrische Maschinen; Teil 1: Bemessung und Betriebsverhalten  
Rotating electrical machines; Part 1: Rating and performance

**EN ISO 12 100 : 2011-03**  
Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze, Risikobeurteilung und Risikominimierung  
Safety of machinery - General principles for design, risk assessment and risk reduction

Dresden, 2022-12-07  
(Ort, Datum)  
(Place, date)

  
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Geschäftsführer  
Plant Manager

  
 Jens Martin  
Leiter Entwicklung/Vertrieb  
Head of Development/Sales

EU-Conformity\_ed07Dec2022

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## 4. Type code

Example:	W	S	G-	52	.	2	-	0	0	17	/	6 5 A	-	Z F
Customer specific identifier	<b>W</b>	<b>S</b>	<b>G-</b>	<b>Z1 Z2</b>	.	<b>Z3</b>	-	<b>X1</b>	<b>X2</b>	<b>X3 X4</b>	/	<b>X5 X6 X7</b>	-	<b>X8 X9</b>
S: Synchronous motor														
G = gearless														
Z1 Z2: Frame size														
Z3: Overall length 2 overall lengths are available; identified by: 2, 3														
X1: Customer specific identifier														
X2: Motor voltage 0: Single- winding - suitable for 540 ... 620 V d.c. link voltage R: Single- winding - suitable for 660 ... 690 V d.c. link voltage N: Twin- winding - suitable for 540 ... 620 V d.c. link voltage D: Twin- winding - suitable for 660 ... 690 V d.c. link voltage														
X3 X4: Rated speed $n_N$ e.g. 11: $118 \text{ min}^{-1}$ (with $D_T = 650 \text{ mm}$ $v = 2.0 \text{ m/s}$ ; suspension 2:1) 17: $176 \text{ min}^{-1}$ (with $D_T = 650 \text{ mm}$ $v = 3.0 \text{ m/s}$ bei suspension 2:1) 23: $239 \text{ min}^{-1}$ (with $D_T = 800 \text{ mm}$ $v = 5.0 \text{ m/s}$ bei suspension 2:1) 29: $294 \text{ min}^{-1}$ (with $D_T = 650 \text{ mm}$ $v = 5.0 \text{ m/s}$ bei suspension 2:1)														
X5 X6 X7: Traction sheave design (Traction sheave diameter; width, groove design, groove geometry)														
X8 X9: Variant code (brake, measuring system, modifications) ZE: 3 clasp brakes; measuring system ECN 1313-2048 incr. - SSI-interface ZF: 3 clasp brakes; measuring system ECN 1313-2048 incr. - ENDAT-interface ZG: 3 clasp brakes; measuring system ERN 1387-2048 incr. 2E: 2 clasp brakes; measuring system ECN 1313-2048 incr. - SSI-interface 2F: 2 clasp brakes; measuring system ECN 1313-2048 incr. - ENDAT-interface 4F: 4 clasp brakes; measuring system ECN 1313-2048 incr. - ENDAT-interface														

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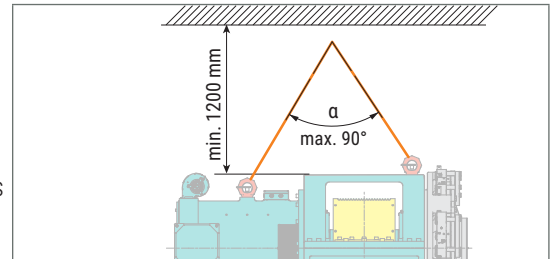
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## 5. Handling

### 5.1. Transport and storage

- Climate class: 2K3 according EN 60721
- Transport temperature: -20°C bis +60°C, max. 20 K/hour fluctuated
- Transport air humidity: max. relative humidity 85 % at 20°C (no moisture condensation)
- The lift machines leave the factory in perfect condition after being tested. Make a visual check for any external damage immediately upon their arrival on site. If any damage is found to have occurred in transit, make a notice of claim in the presence of the carrier. If appropriate, do not put these machines into operation.
- Do not expose the motor to any shocks or impact.
- Observe the relevant safety regulations when handling the lift machines. Use only suitable lifting equipment.
- The lift machine has two lifting hooks. Those are still turnable in the tightly screwed situation and have to be adjusted to the direction of force before connecting the sling gear.
- The length of the sling gear has to be chosen such that the slings are loaded equally on both sides. The angle  $\alpha$  between the slings has to be below 90°.



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



- 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<sup>-1</sup>) to allow the grease to distribute evenly in the bearings. The ropes must not be fitted.

#### Unpacking

- Dispose of the packaging material in an environmentally friendly manner or reuse it.
- Remove any transport locking devices before commissioning - Install the rope slip-off guard correctly.



### 5.3. Disposal

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

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## 6. Product overview


### 6.1. Product description

The compact gearless WSG-52 synchronous lift machines are designed for High-rise traction sheave lifts. They are distinguished by their high efficiency, extremely low noise and excellent operating characteristics. The machines can be supplied for several rated speeds.

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

The winding can be realised as a single- or twin type. The twin type winding is operated by two inverters. Temperature sensors are redundant in any case.

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

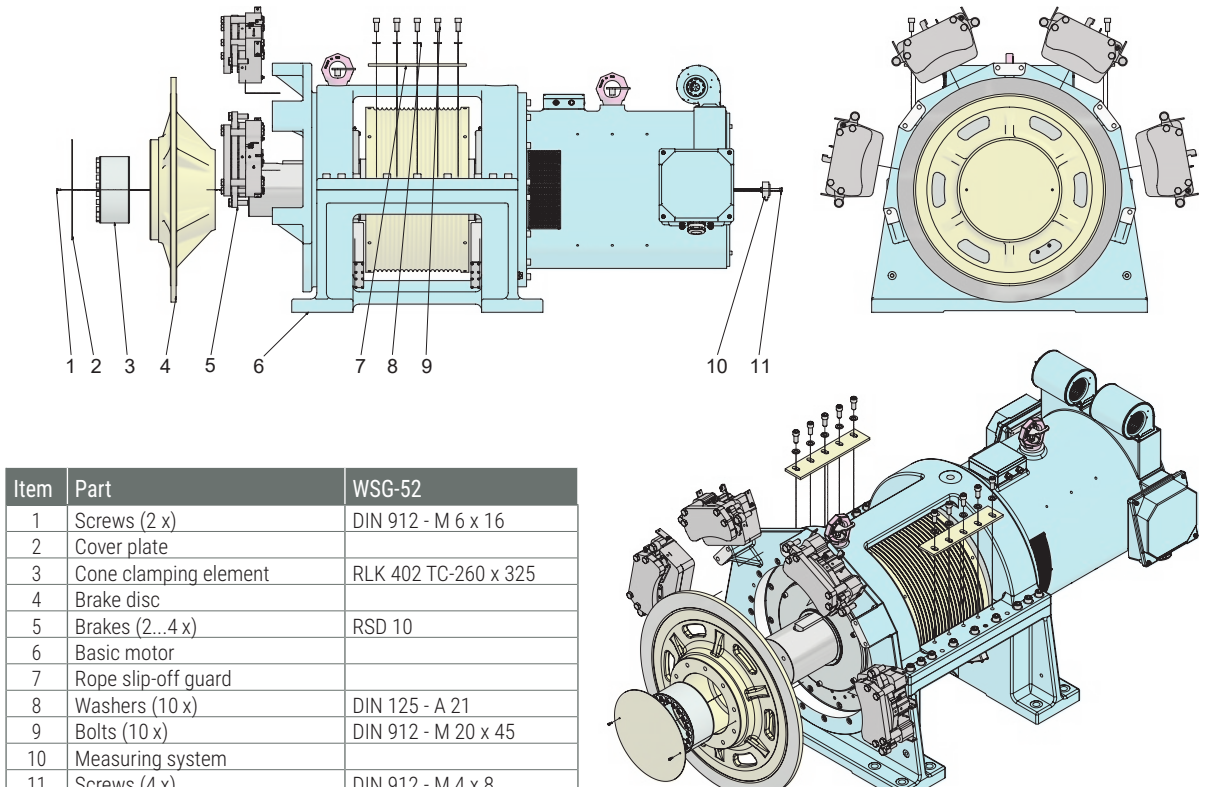


Labels pointing to the nameplate:

- Type code of lift machine: WSG-52.3-0009/80C-4F
- Duty type: S1
- Induced voltage  $k_e$ : 93-40%
- Application data: 155 (F) Stern/Glar. IP 23M/IP 12S J 163-kgm<sup>2</sup>
- Lubrication specification: Schmiervorschriften / Lubricating instruction
- QR-Code (for download this manual): QR code at the bottom left
- Year and month of production: 3-Mot. 22/06
- Serial no.: Nr. 123456
- Rated current: I 266.0 A
- Rated frequency: f<sub>N</sub> 15.83 Hz
- Rated speed: n 95 min<sup>-1</sup>
- Weight: m 8431 kg

Additional data on nameplate:

- M 9200 Nm P 91.5 kW I 266.0 A
- M 14500 Nm P 144. kW I 417.6 A
- $k_e$  2.18 V/min<sup>-1</sup> n<sub>N</sub> 95 min<sup>-1</sup> f<sub>N</sub> 15.83 Hz
- Bremse/Brake: RSD10
- Applikationsdaten / Application data: v 4.0 m/s n 95 min<sup>-1</sup> f 15.83 Hz
- 1:1
- Nachschmierung nach: 3500 Betriebsstunden
- Relubrication after: Operating hours
- DE 120 g // NDE 12 g
- Lagerfett/ Grease: KPF2K-20 nach DIN 51 825
- (Wälzlager L22 oder/for Klüberlub BE41-542)



Item	Part	WSG-52
1	Screws (2 x)	DIN 912 - M 6 x 16
2	Cover plate	
3	Cone clamping element	RLK 402 TC-260 x 325
4	Brake disc	
5	Brakes (2...4 x)	RSD 10
6	Basic motor	
7	Rope slip-off guard	
8	Washers (10 x)	DIN 125 - A 21
9	Bolts (10 x)	DIN 912 - M 20 x 45
10	Measuring system	
11	Screws (4 x)	DIN 912 - M 4 x 8

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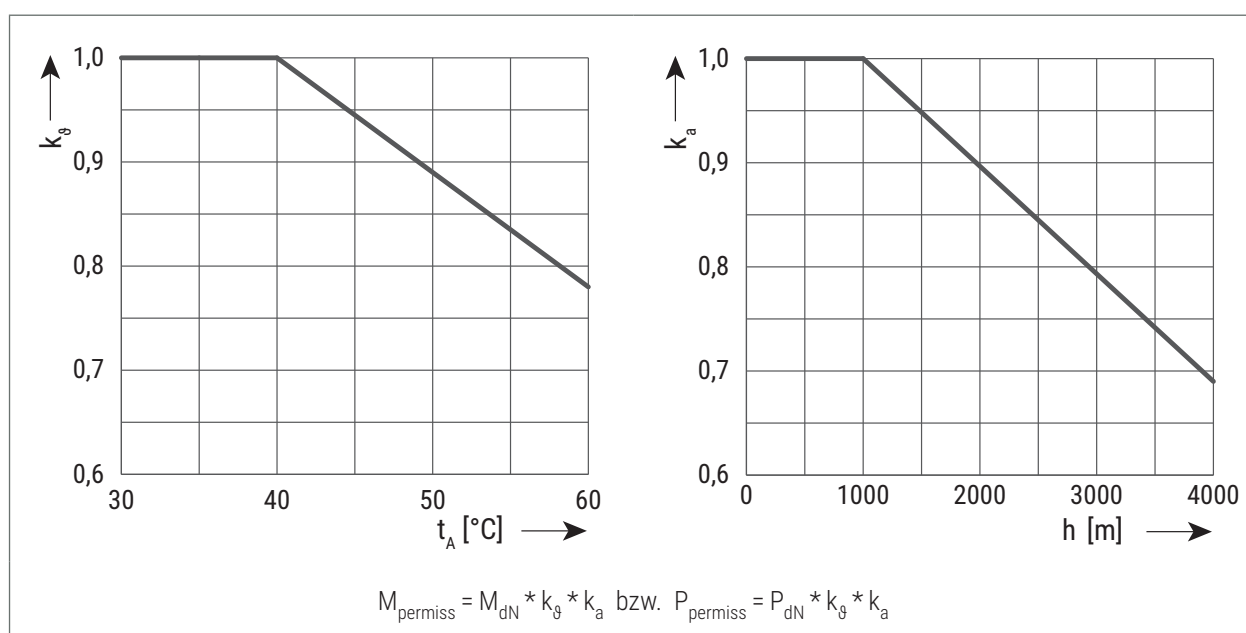
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## 6.2. Permissible ambient conditions

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

### Deviating ambient conditions

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





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## 7. Installation

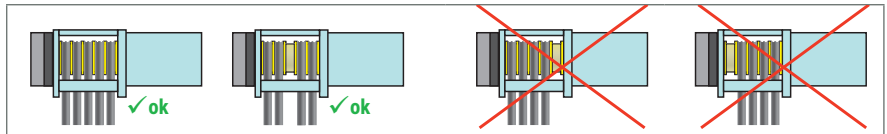
### 7.1. Mechanical installation

#### Setting up



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

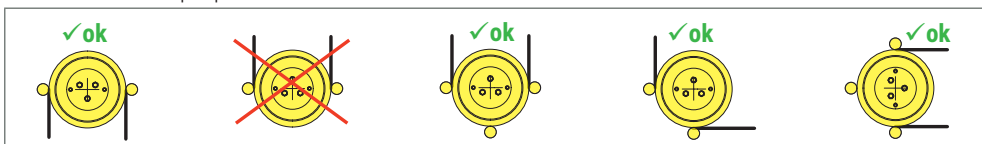
- The machines can be used in lift systems with a machine room.
- The permissible unevenness of the mounting surface is 0.8 mm. The mounting surface must be sufficiently distortion-resistant and stable to accommodate the forces occurring in the system.
- The rope force can be applied to the lift machine in any direction.
- The machine must be mounted on vibration dampers for vibration damping.
- No welding work may be performed on the lift machine, nor is it permissible to use the machine as a mass point for welding work. This might cause irreparable damage to the bearings and magnets.
- Place the load carriers symmetrically.
- It is not permissible to support the load carriers on one side only.
- The measuring system is only accessible from the rear side. Therefore, leave enough space between the wall and the rear side of the machine (recommendation: 500 mm) or ensure that the machine can be moved away from the wall.



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

#### Securing the machine

- Fasten the machine using 12 M 30 bolts - strength class 12.9 tightening torque: 2,160 Nm .
- After completing the adjusting work or after a breakdown, tighten all the fastening bolts of the machine, using the specified torque .
- Lift machines are generally equipped with rope slip-off guards. After putting the ropes in place, adjust them so that the distance between the rope and the rope slip-off guard does not exceed 2 to 3 mm.
- If the lift machine is installed at the head of the machine room as is usually the case, it may be necessary to modify the fitting of the rope slip-off guard to fulfill the requirements of EN 81-20 . Optional rope slip-off guards are available for this purpose.



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## 7.2. Electrical installation

### 7.2.1. General



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

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



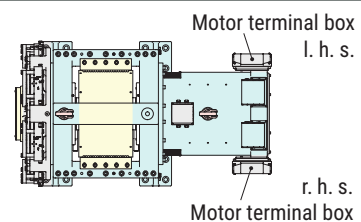
- ▶  $U_{link\ max}$  is the maximum value of the DC link voltage which is only transient and approximately equivalent to the inception voltage of the braking chopper or of the energy recovery unit.



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

### 7.2.2. Motor connection / Winding protection / Fan

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





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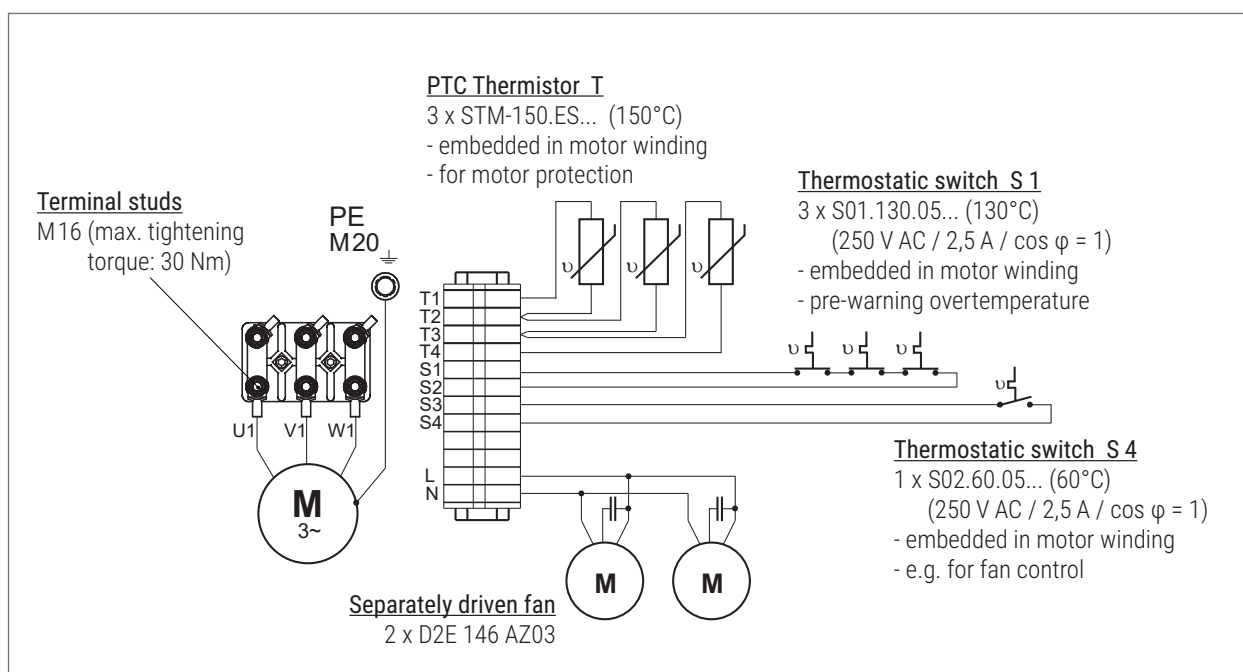
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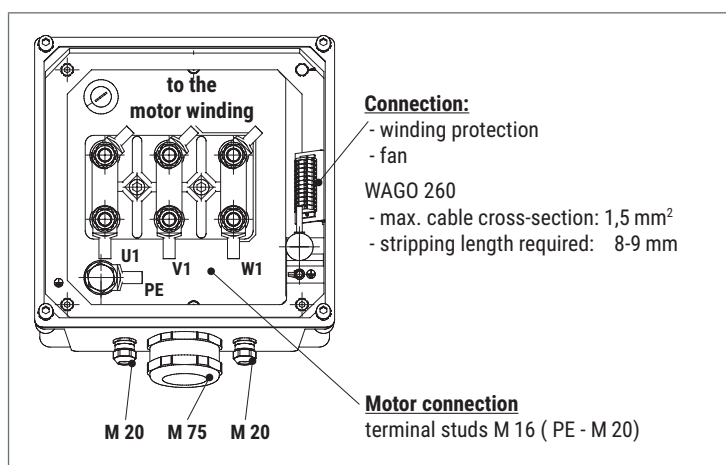
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Winding variant	Motor terminal box r.h.s.	Motor terminal box l.h.s.
<b>Single-Motor winding</b> (Type code: X2 = 0 / R)	Motor winding - exists Thermocouples - exists Fan connection - exists	Motor winding - not assigned Thermocouples - exists Fan connection - not assigned
<b>Twin-Motor winding</b> (Type code: X2 = N / D)	Motor winding - exists Thermocouples - exists Fan connection - exists	Motor winding - exists Thermocouples - exists Fan connection - not assigned

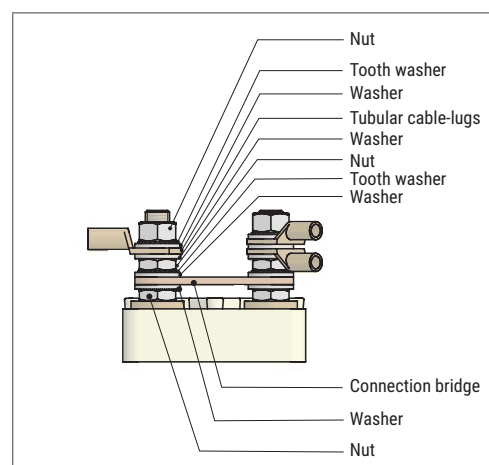
Terminal assignment depending on winding variant (Single/Twin)



Motor wiring diagram



Motor terminal box r.h.s. (arrangement l.h.s. analogous)



Arrangement of the motor terminal studs

# Gearless Lift Machine

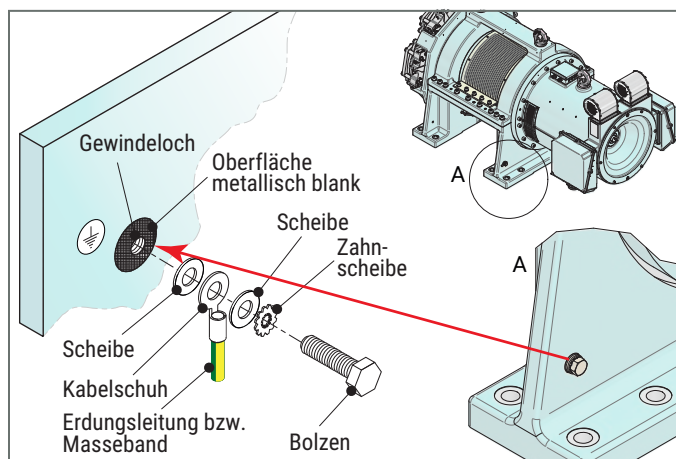
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#### Protective earth connection

- The protective earth conductor is made in the motor terminal box.
- If the protective conductor is smaller than 10 mm<sup>2</sup> in the motor terminal box, an additional protective conductor must be connected. The cross-section must correspond at least to the cross-section of the PE conductor on the motor power cable.
- For this case, an additional protective earth connections are available on the motor housing (see figure opposite).
- These connections can also be used for equipotential bonding of the lift system.



#### 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-52, 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.

# Gearless Lift Machine

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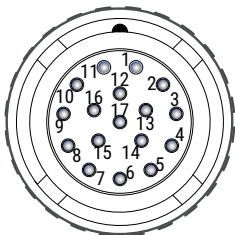
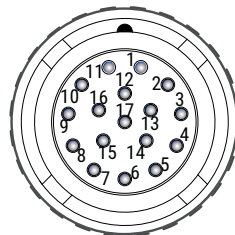
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### 7.2.3. Speed/Position measuring system

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



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

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

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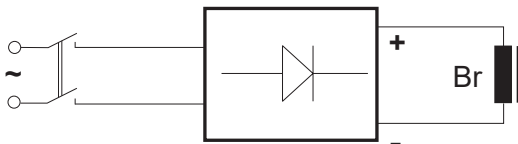
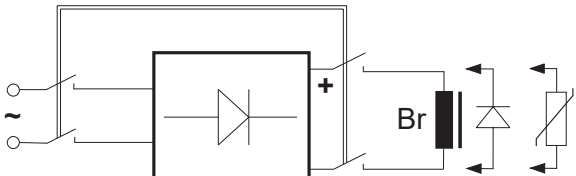
#### 7.2.4. Brake

- Please refer also to the operating instructions for the brake starting on page 56.
- The brakes are supplied with DC voltage by the brake control units, which are fitted in the brake terminal box.
- Only the brake control units which are included in our scope of supply are to be used for the brake activation.
- Repeated switching of the brake magnets during the overexcitation period must be avoided as this will result in overloading of the brake control unit. Therefore, a minimum brake operating time of approx. 1.5 – 2 s should be maintained, especially during an inspection or commissioning drive.
- To reduce the switch-off time, switching can be effected from the DC side. However, switching must also be performed from the AC side at the same time ! (Wiring with a varistor as shown in the „Circuitry suggestion for brake control“ on page 18)
- The brakes must be protected with varistors against overvoltage from switching operations. The varistor must be directly connected to the coil.

#### Note on the use of DC/AC side switching



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

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

#### Time-delayed application of a braking circuit



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

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## Monitoring the brakes

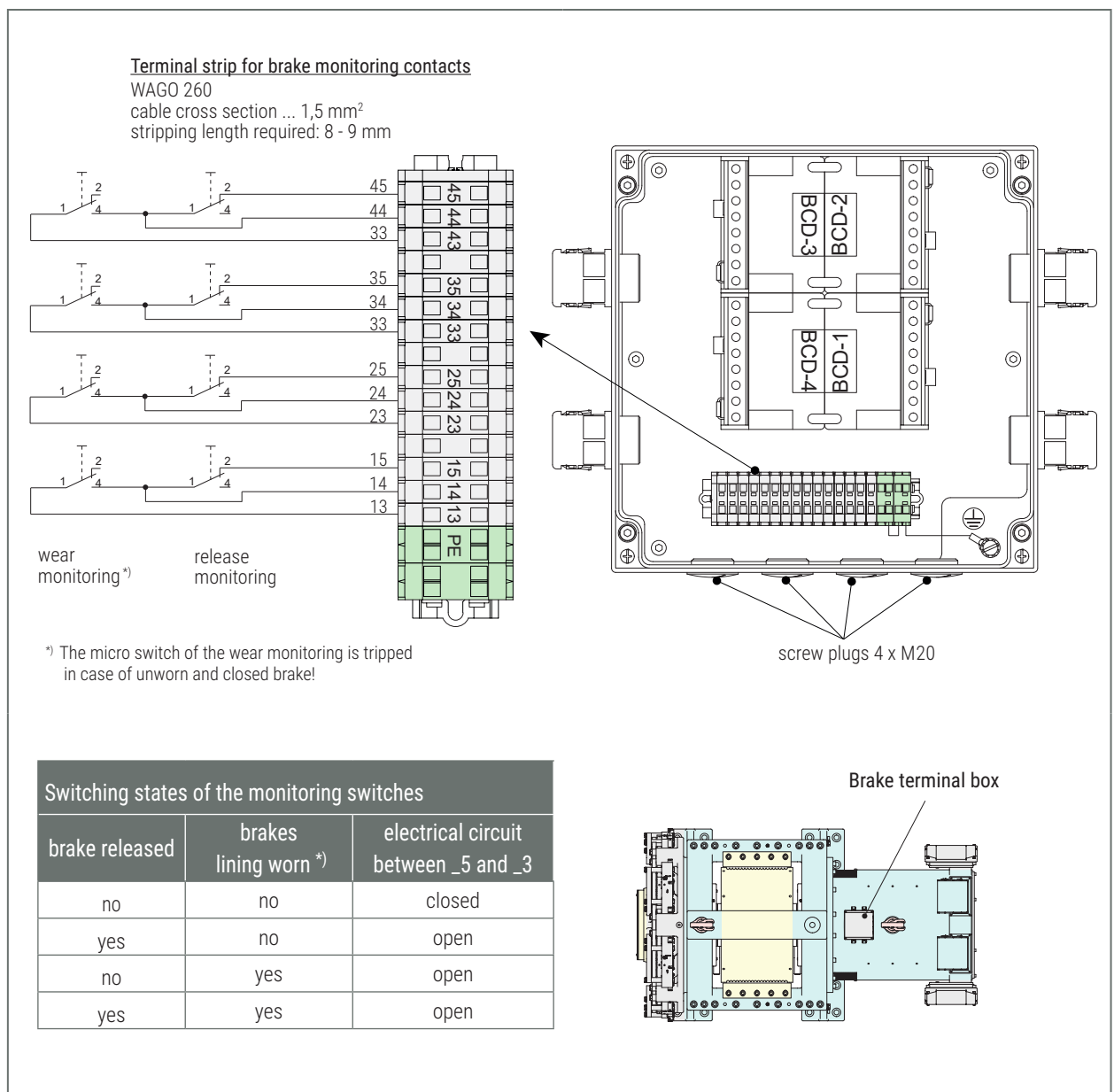
- The switching states of the brakes and the wear of the brake linings are monitored by means of dust-proof microswitches (see wiring diagram).
- Please assure that the contact-current is at least 10 mA to keep the contacts clean.



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

## Connection of the brakes

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



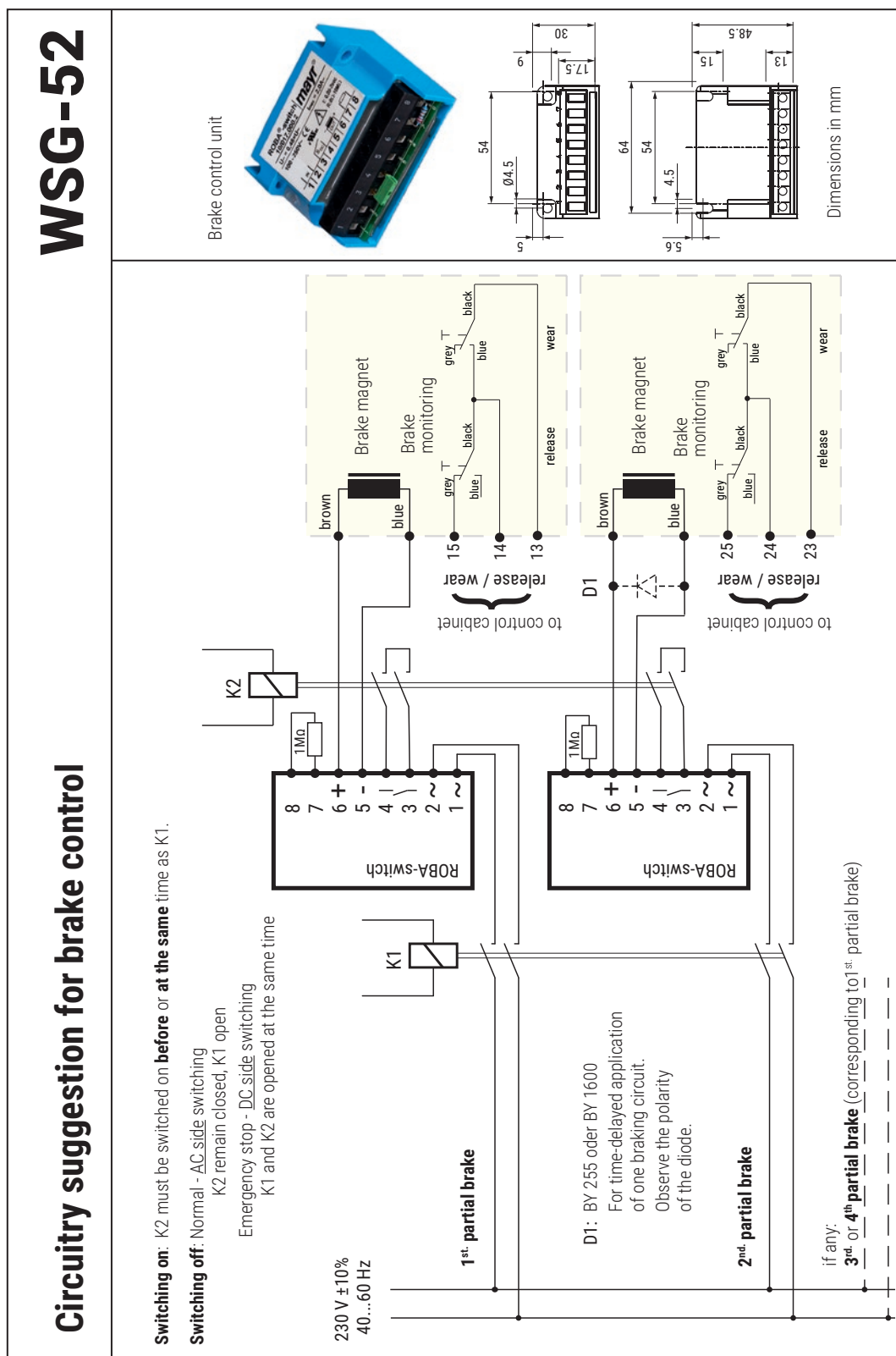
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#### Circuitry suggestion for brake control



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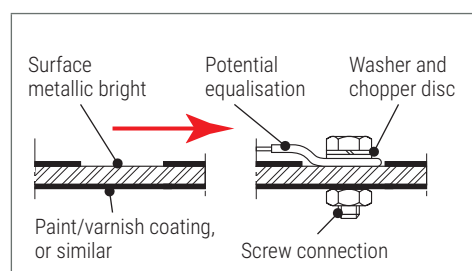
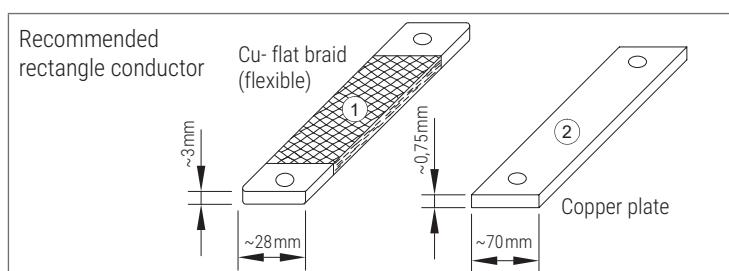
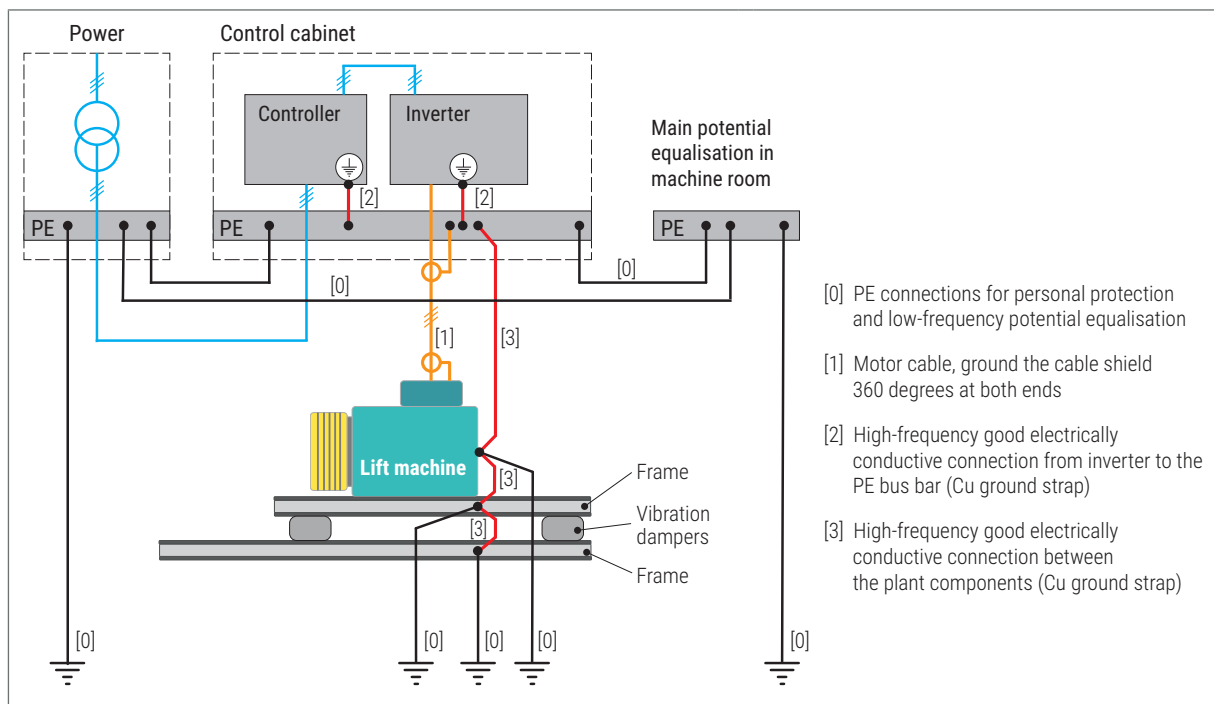
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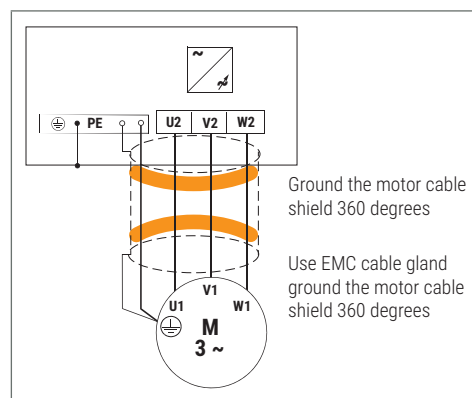
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#### 7.2.5. Earthing, potential equalisation, electromagnetic compatibility (EMC)

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



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

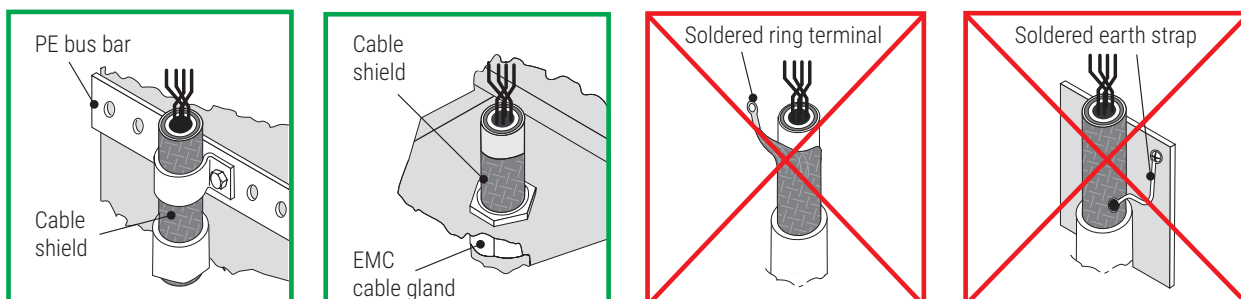


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### 7.3. Overview

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

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



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## 8. Commissioning and operating

### 8.1. Important notes



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

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



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



Information

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

### Half-load test



Information

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

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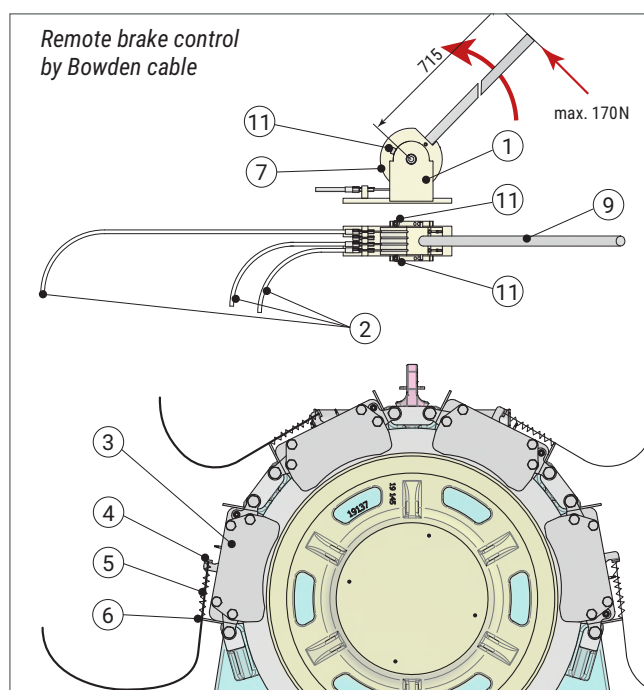
## 8.2. Emergency evacuation



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

### Manually operated evacuation in case of emergency

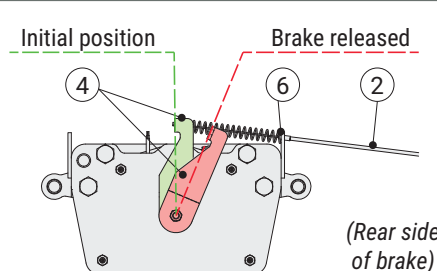
- The brakes (3) can be released remotely by hand using a lever block (1) and Bowden cables (2).
- The installation and operation of this device is described in section „12.5. Remote brake control by Bowden cable“ on page 33. The lever block and the Bowden cables are available separately.
- If the brakes are released manually, the lift car moves in the direction of the higher weight.
- The motor winding should be short-circuited using the motor contactors. This prevents the lift from accelerating in an uncontrolled manner, since the short-circuiting produces a speed-dependent braking torque.
- It may transpire that the braking torque provided by short-circuiting the motor is insufficient to restrict the speed of the lift. You should therefore keep a close eye on the car speed during evacuation and halt the evacuation if necessary.



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



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



### Emergency evacuation by electrical means

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

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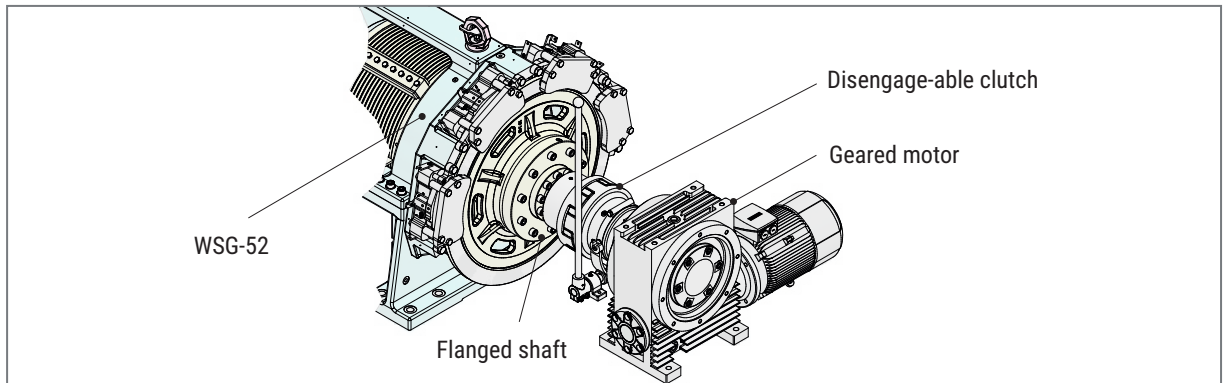
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#### Mechanical return motion device

- For cases such as lift failure or the car being caught by the safety device, a mechanical return motion device can be used to move the lift manually.
- Therefore a geared motor is used, which realises the power transmission to the traction sheave by a disengage-able clutch (see extra instructions).



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

### 8.3. Testing the brake system to EN 81



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

#### Overload

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

#### Failure of a brake

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

#### Separate operation of the individual brakes

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

#### Monitoring the brakes

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

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#### 8.4. Trouble shooting

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

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## 9. Maintenance

### 9.1. General

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

#### Bolt/screw tightening torques

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

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

### 9.2. Maintenance intervals

	During commissioning or after the first 3 months	Every year	Note
Check the brake function and brake monitoring switches	x	x	see the brake operating instructions
Check the brake air gap	x	x	see section 9.5
Check the bearing noise		x	
Regrease the bearings	as required		see section 9.3
Check the traction sheave for wear		x	
Make a visual check of the fastening bolts/screws on the frame, brake and traction sheave	x	x	
Check the rope slip-off guard	x	x	
Check the electrical cables	x	x	
Check the guards and safety devices for their condition and safe functioning	x	x	
Clean the motor surface and the fan filter mats	as required		see section 9.6
Check the tightening torque of the clamping screws of the cone clamping element	x	x	see section 9.4 - ( $M_A = 355 \text{ Nm}$ )

# Gearless Lift Machine

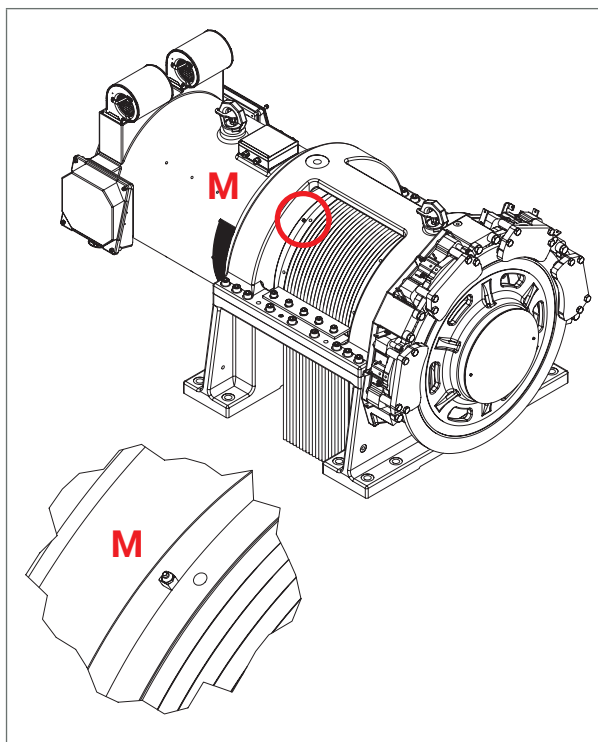
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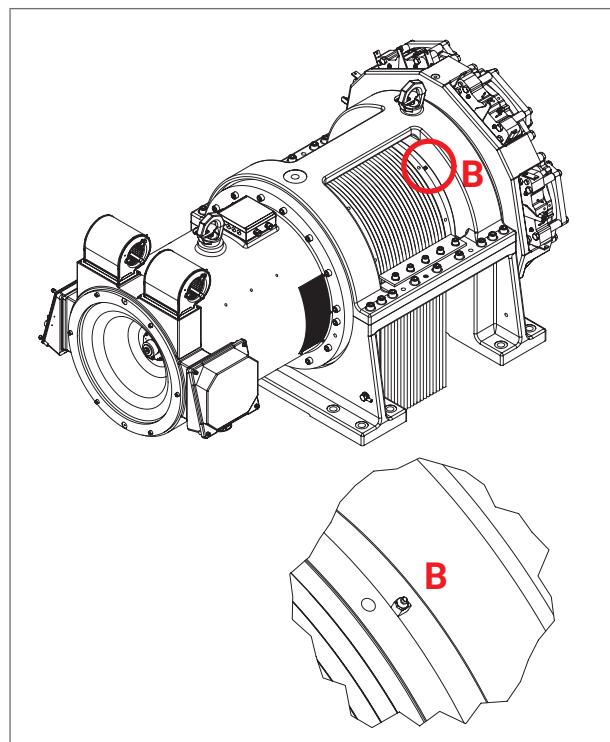
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### 9.3. Regreasing the bearings

Relubricate the main bearing after about 3,500 hours of operation or every 3 years, using a KPF 2 N-30 to DIN 51 502 grease such as Wälait LZ 2, Klüberlub BE 41-542 or LGEM 2 from company SKF (approx. 120 g on each side). Use a conventional grease gun and press the grease into the hydraulic-type grease nipples to DIN 71 412 AM 10x1. The relubricating points are provided on the on the motor side (M) and on bearing ring the brake side (B) of the machine.



Grease nipple on the M-side



Grease nipple on the B-side

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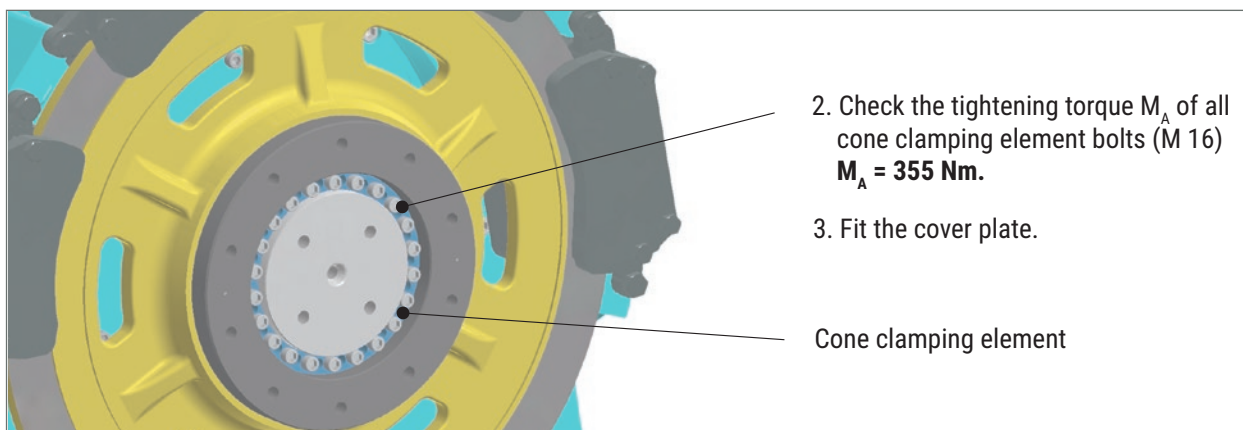
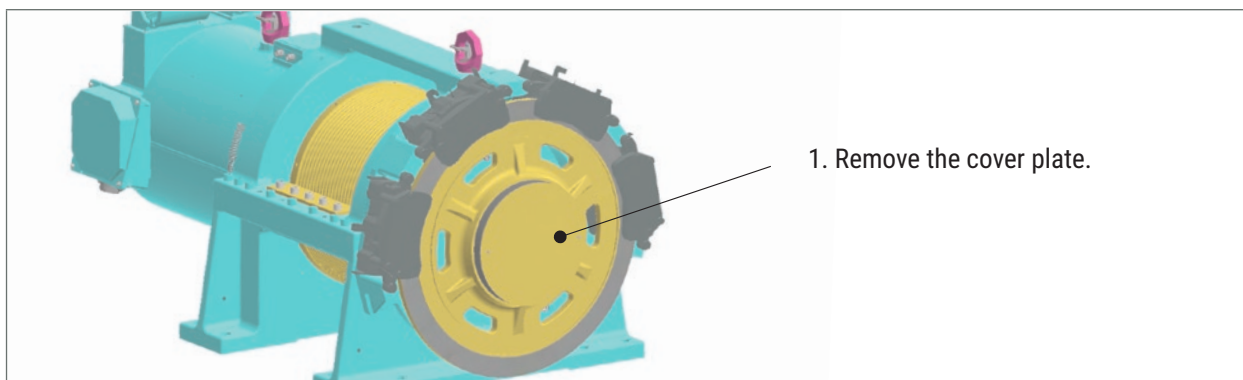
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#### 9.4. Tight fit of the cone clamping element



- Disconnect the machine from the power supply for the following steps and safeguard against accidental restarting.

Signs of loosening may appear in cone clamping connections during operation. Therefore check the tightening torques of the clamping screws at regular intervals.





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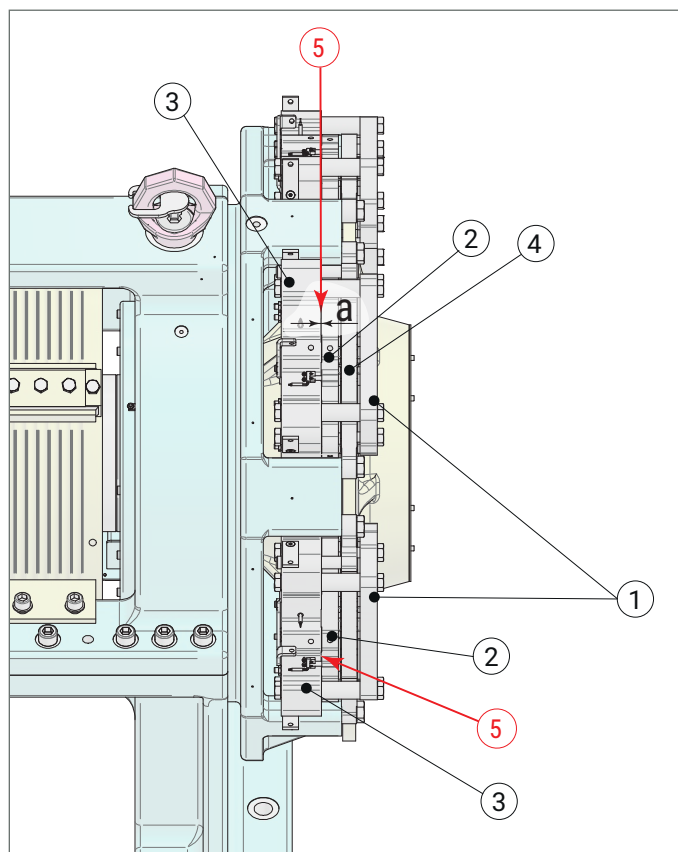
## 9.5. Check brake air gap



- ▶ If the brake air gap exceeds the permissible value „ $a_{max}$ “, 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!
- ▶ Observe the operating instructions for the brake from page 56.

### Necessary tools

- Feeler gauge 0,1 ... 1,8 mm
- Measure the air gap „a“ of all partial brakes (1) between the armature disk (2) and the coil carrier assembly with coil (3) using a feeler gauge (Measurements on both sides at friction pad level).
  - (1) Partial brakes
  - (2) Armature disk
  - (3) Coil carrier assembly with coil
  - (4) Brake hub
  - (5) Air gap
- Compare the measured air gap with the maximum permissible air gap „ $a_{max}$ “, see section „10. Technical data“ on page 30.
- If the brake air gap exceeds the permissible value „ $a_{max}$ “, shut down the lift system and inform the customer service.



## 9.6. Fan filter mats

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



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



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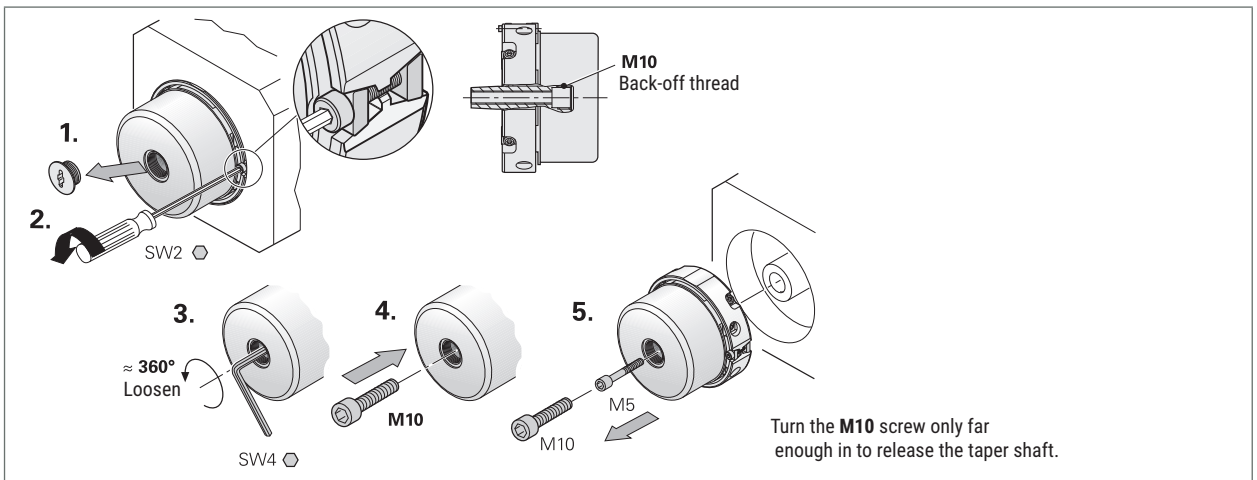
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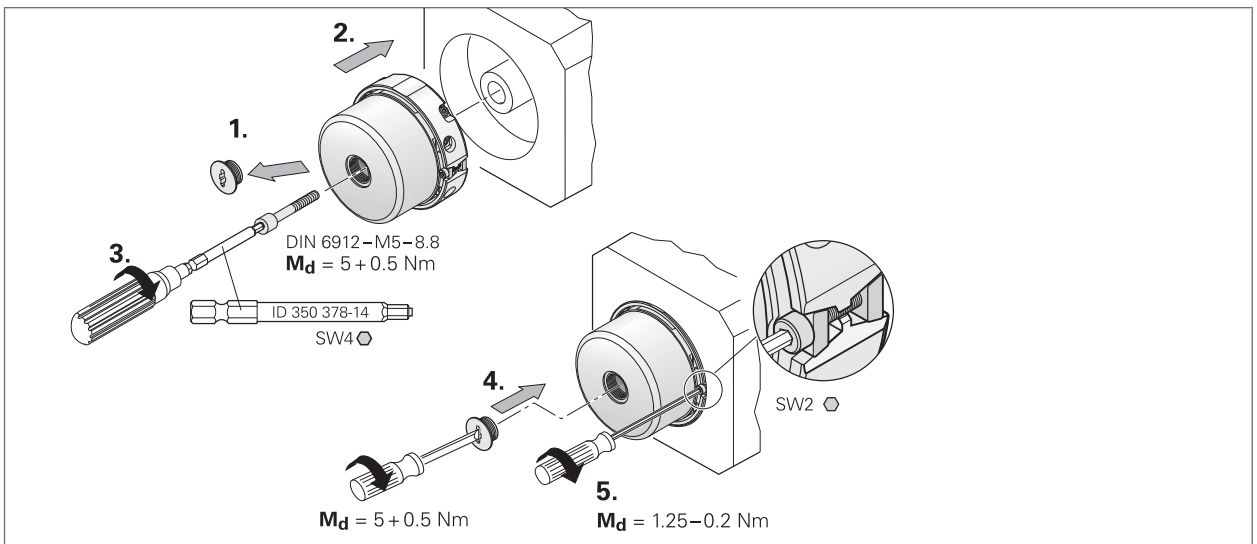
### 9.7. Replacing the measuring system

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

#### Disassembly



#### Assembly



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## 10. Technical data

General	
Duty type::	S1
Traction sheave::	dia. 650, 800 mm
Traction sheave hardness:	mindestens 220 HB 30
DE bearing:	self-aligning roller bearing
NDE bearing:	self-aligning roller bearing
Drive motor:	synchronous motor
perm. shaft load $F_S$ :	bis zu 520 kN
Number of pole pairs:	10
Thermal class:	155 (F)
Degree of protection:	IP 23 M / IP 12 S
Winding protection::	triple PTC 150°C; triple therm. switch (NC contact) 130°C; therm. switch (NO contact) 60°C (Redundancy by double implementation.)
Site conditions	
Max. altitude:	max. 1,000 m (derating required at higher altitudes)
Ambient temperature:	-5°C ... +40°C
Max. rel. humidity:	85% at 20°C (no moisture condensation)
Separately driven fan	
Type:	D2E 146 AZ03
Operating voltage:	230 V AC; 50 Hz; 1,44 A
Capacitor:	7 $\mu$ F / 400 V DB

Dual-circuit fail-safe brake	
Brake type:	RSD 10
Brake torque:	2/3/4 x 5.650 Nm optionally adjustable (-30 %)
Air gap a:	1,0 mm
max. air gap $a_{max}$ :	1,8 mm
Holding voltage:	103 V DC
Holding current:	2/3/4 x 1,0 A
Overexcitation voltage:	205 V DC
Overexcitation current:	2/3/4 x 2,0 A
Brake control units	
Type:	ROBA-switch 10/017.000 (from Mayr GmbH, supplied with the machine)
Operating voltage:	230 V AC ( $\pm 10\%$ ); 40...60 Hz
Dimensions:	64 x 49 x 30
$R_{ext.}$ (1 s Overexcitation time):	1 M $\Omega$
Brake monitoring contacts	
Contact rating:	...250 V AC / ...3 A (ohmic load)
Minimum switching power:	12 V, 10 mA DC-12

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

<sup>\*)</sup> Reference values. Achievable nominal load depends on specific lift system data. .

Motor / motor		WSG-52.2						WSG-52.3					
Drehmoment / torque S1	M <sub>N</sub> [Nm]	6 800						9 200					
max. Drehmoment / max. torque	M <sub>max</sub> [Nm]	17 000						23 000					
Bremsmoment / brake torque	M <sub>br</sub> [Nm]	2/3/4 x 5 650						2/3/4 x 5 650					
Treibscheibe / traction sheave	D <sub>T</sub> [mm]	650		800				650		800			
für Nennlasten bis *) / for loads up to *)	Q [kg]	7 200		5 800				9 800		7 900			
Aufhängung / suspension		Tabelle gilt für / table applies for 2 : 1											
Motorströme gelten für 540...620 V DC / 660...690 V DC Zwischenkreisspannung  Motor currents applicable to 540...620 V d.c. / 660...690 V d.c. link voltage	v [ms]	n <sub>N</sub> [rpm]	P <sub>N</sub> [kW]	I <sub>N</sub> [A]	n <sub>N</sub> [rpm]	P <sub>N</sub> [kW]	I <sub>N</sub> [A]	n <sub>N</sub> [rpm]	P <sub>N</sub> [kW]	I <sub>N</sub> [A]	n <sub>N</sub> [rpm]	P <sub>N</sub> [kW]	I <sub>N</sub> [A]
	1,0	59	42	131 / 87	48	34	131 / 74	59	57	176 / 114	48	46	176 / 100
	2,0	118	84	262 / 174	95	68	196/ 130	118	114	318 / 228	95	92	265 / 177
	3,0	176	125	392 / 261	143	102	314 / 196	176	170	530 / 318	143	138	398 / 266
	4,0	235	167	523 / 392	191	136	392 / 261	235	226	796 / 531	191	184	530 / 398
	5,0	294	209	785 / 392	239	170	523 / 392	294	283	796 / 531	239	230	796 / 531
	6,0	auf Anfrage / on request			286	204	785 / 392	auf Anfrage / on request			286	276	796 / 531
Masse / weight	m <sub>G</sub> [kg]	7 920			8 221			8 050			8 351		
Trägheitsmoment / inertia	J <sub>G</sub> [kgm <sup>2</sup> ]	117,9			121,6			157,4			163,1		
zul. Achskraft / perm. shaft load	F <sub>c</sub> [kN]	520			520			520			520		

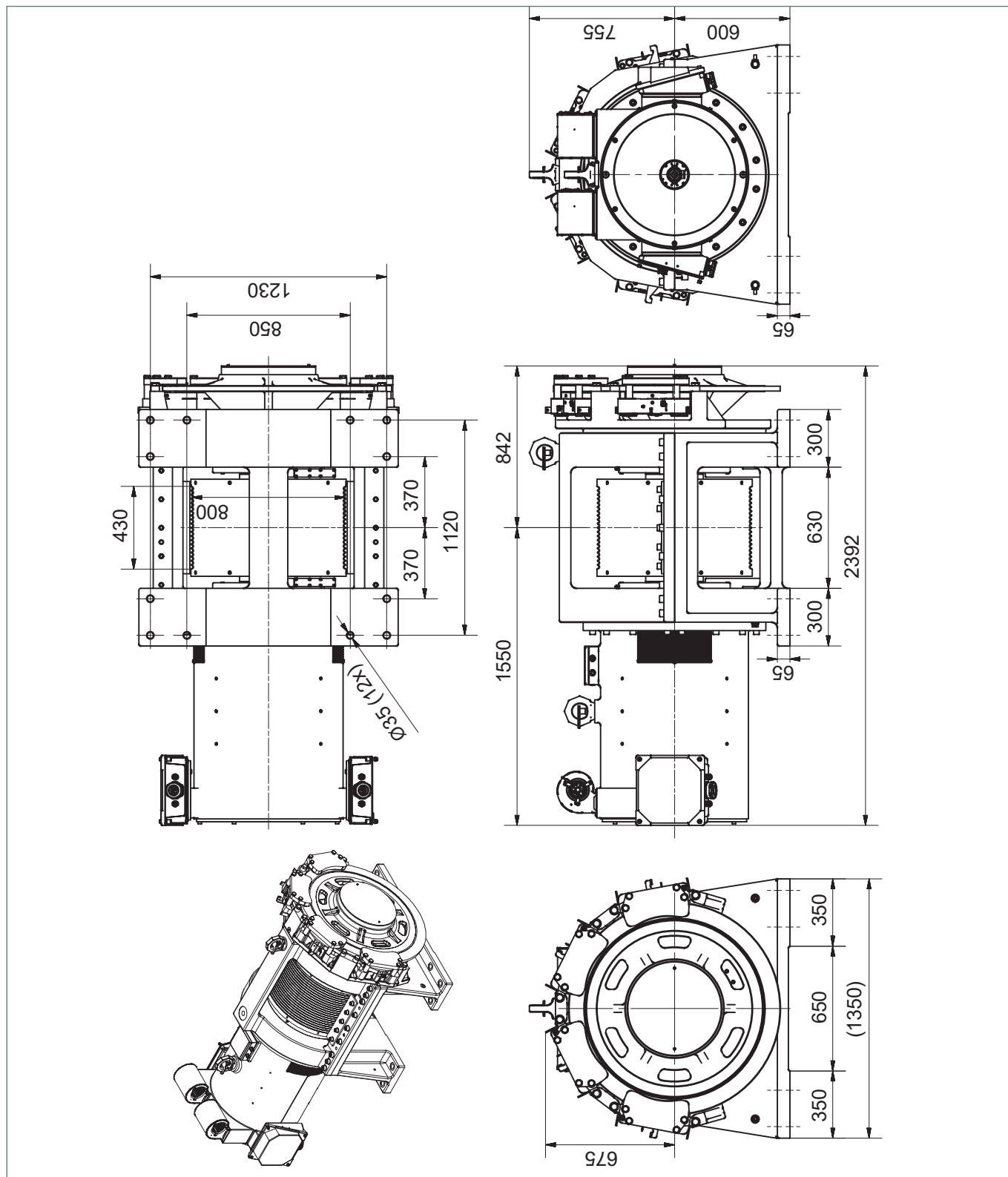
# Gearless Lift Machine

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## 11. Dimension drawing



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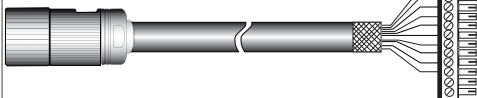
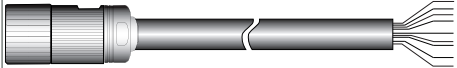




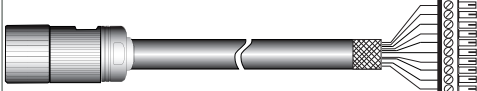



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## 12. Accessories

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

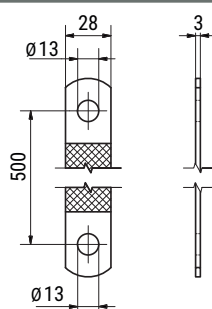
	Inverter type	Recommended encoder system	Recommended measurement system cable
	F-Pack WLD 302	ECN 1313 - EnDat	K 514 273 022-xx
	E-Pack Arkel ARCODE	ECN 1313 - (EnDat/SSI)	K 503 325 021-xx
	D-Pack Arkel ADrive CT unidrive SP / E	ECN 1313 - (EnDat/SSI)	K 502 452 021-xx
	Fuji Frenic	ECN 1313 - (EnDat/SSI)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

xx .. cable length [m]

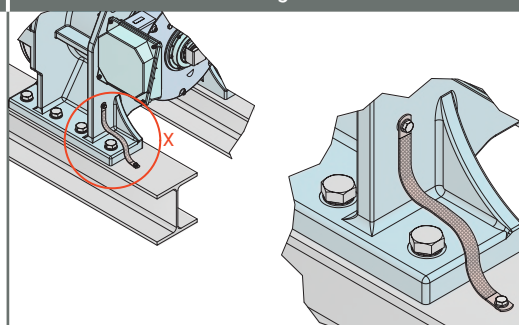
### 12.2. Potential equalisation

The rectangle conductor (ET K829712-500) is used for potential equalisation between the motor and the machine frame. Ensure that the connection points are metallic bright when using it.

#### Cu-flat braid (flexible)



#### Usage



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### 12.3. Cable set for motor and brake

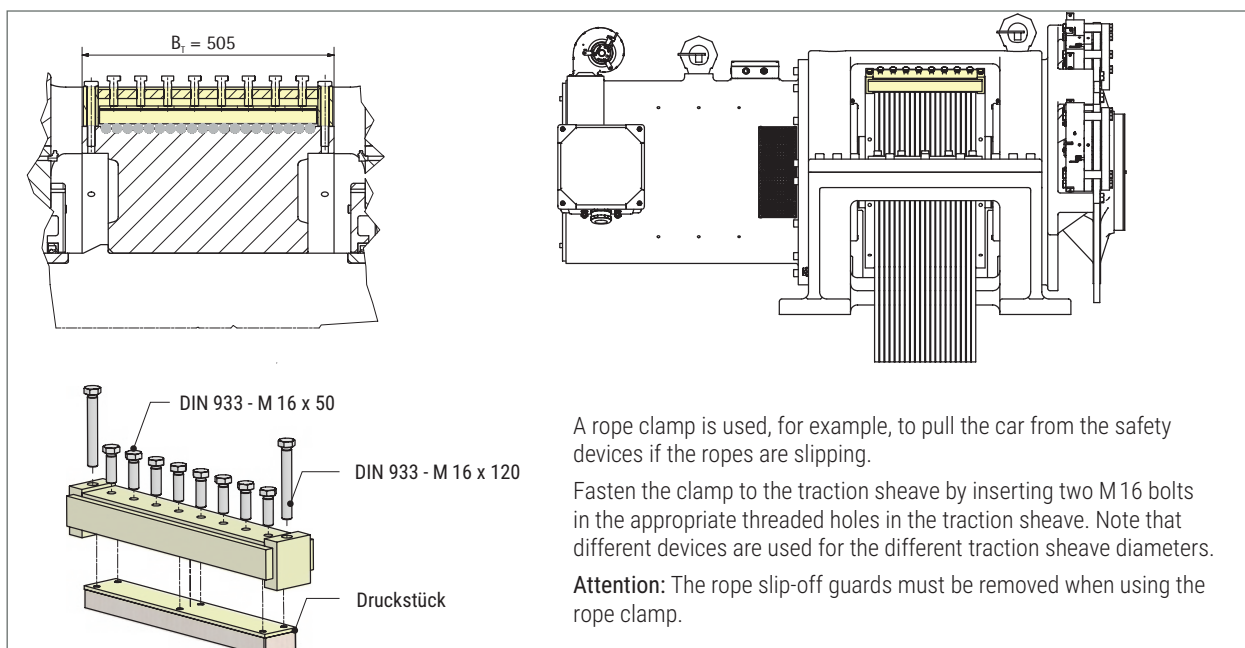
#### Motor cable set

- KS 503 387 G21-xx - motor cable 4x35mm<sup>2</sup>
- KS 503 387 K21-xx - motor cable 4x70mm<sup>2</sup>
- KS 503 387 L21-xx - motor cable 4x95mm<sup>2</sup>
- KS 503 387 M21-xx - motor cable 4x120mm<sup>2</sup>
- KS 503 387 N21-xx - motor cable 4x150mm<sup>2</sup>
- KS 503 387 P21-xx - motor cable 4x185mm<sup>2</sup>

with xx...cable length [m]



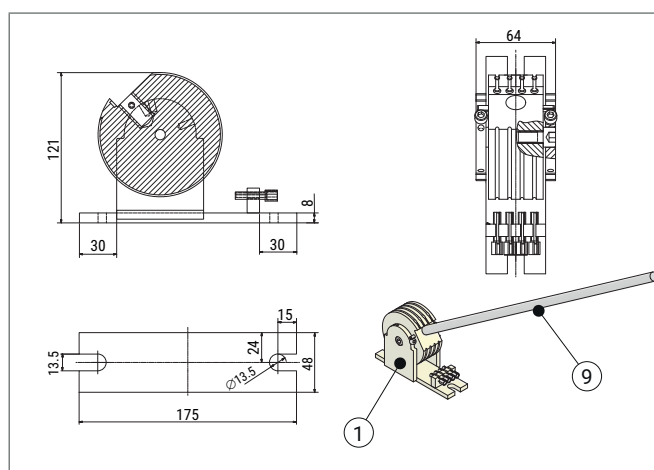
### 12.4. Rope clamp



### 12.5. Remote brake control by Bowden cable

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

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



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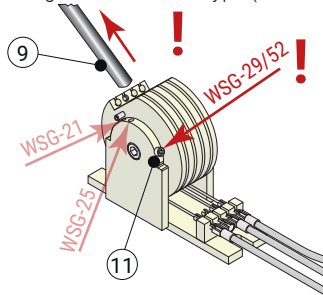
Code: GM.8.004125.EN  
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### Installation

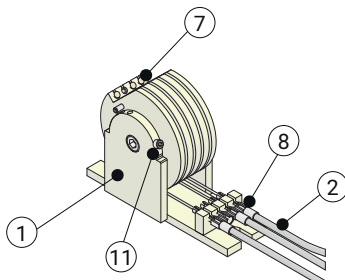


- ▶ Lock the car and the counterweight and ensure that all of the necessary safety precautions are observed for the lift system. The lift may move in an uncontrolled manner.
- ▶ Ideally, the manual releasing device should be installed without the ropes in place.
- ▶ Install the manual releasing device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

1. Install the lever block (1) with two M12 bolts (16) in a suitable location in the vicinity of the lift machine, e.g. on the machine frame.
2. For installation, remove the lever (9) from the lever block (1) and make sure that the rotatable eccentric (7) is not mechanically blocked.
3. Check the correct fit of the two stop screws (11) on each side according to the machine type (WSG/WGG-29).



4. Insert the Bowden cables (2) – side without spring (5) – into the eccentric (7) and the slotted set screw (8) of the lever block (1).
5. Insert the second side of the Bowden cables (2) – side with spring (5) – into the manual release lever (4) and the counter-holder (6) of the brake (3)



6. Tension the Bowden cables on the lever block (1) using the slotted set screw (8).

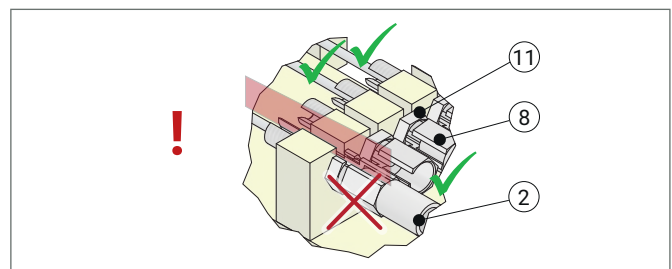
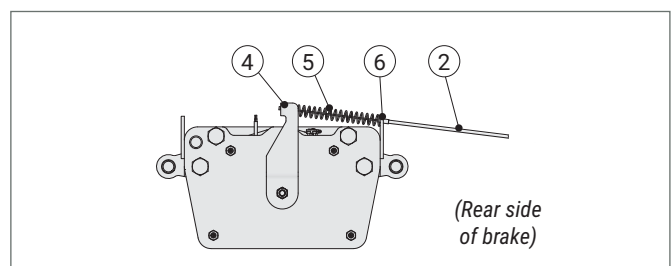
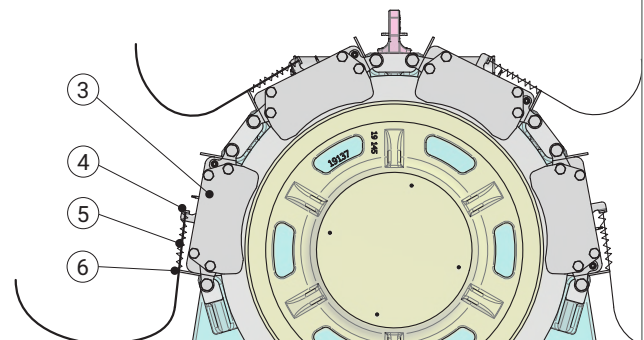
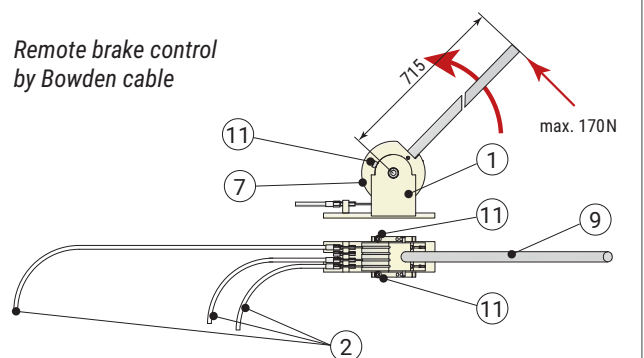
When doing so, the manual release levers (4) of the brakes (3) must not move - the brakes must not be released!

After the adjustment has been completed, secure the set screw (8) with the help of the nut (10). Make sure that the slot of the set screw (8) is positioned in such a way that the Bowden cable (2) is prevented from unhooking.

7. Perform at least three functional tests.

To do this, insert the lever (9) into the lever bracket (1) and operate it until the brakes release (visual inspection of the brake air gap; check that the traction sheave can be turned freely). A force of max. 170 N (at 0.715 m lever length) is required to release the brake (with 3 partial brakes). If the required force is greater, check the installation.

#### Remote brake control by Bowden cable



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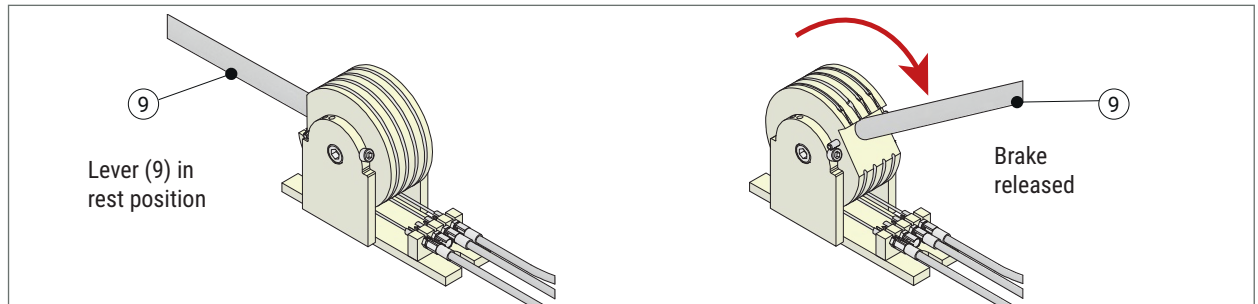
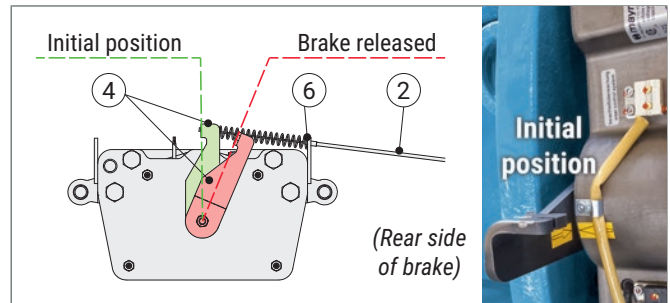
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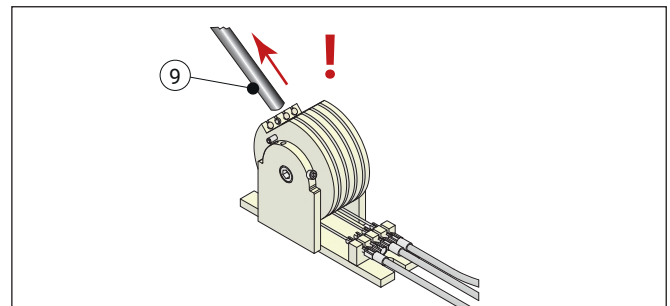
- More excessive force (> 200 N with a 0.715 m lever length) is unacceptable, as it can damage the brakes beyond repair.

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

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



- After manual brake release has been performed, be sure to remove the lever (9) from the lever block.



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



# Gearless Lift Machine

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## 13. Spare parts

Part	Remarks	Description
<b><u>Motor</u></b>		
Measuring system	ECN 1313 / SSI / 2048 Inkr. / clamping ring ECN 1313 / ENDAT / 2048 Inkr. / clamping ring	ET ECN1313SSI ET ECN1313ENDAT
Fan	D2E 146-AZ03	ET 36131114449
Air filter mats	PSB / 290 S	ET 36131130556
<b><u>Brake system</u></b>		
Brake control	ROBA-switch 017.000.2	ET 35372100118
Brake	ROBA-diskstop RSD 10	ET 35372105516
<b><u>Accessories</u></b>		
Grease equipment	Lever grease gun and grease cartridge „Wälalit LZ2“ (0,4 kg)	ET SERVICEKIT
Grease cartridge	„Wälalit LZ2“ (0,4 kg)	ET 13254121163



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## 14. Annex

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



DANGER

- 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:

» **12 M 30 bolts - strength class 12.9 - tightening torque 2,160 Nm**




# Gearless Lift Machine

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## 14.2. Calculation of the traction sheave shaft

 Industrie Service Mehr Sicherheit. Mehr Wert.	
<b>Report</b> <b>on the examination of calculation documents</b>	
<b>Customer:</b>	WITTUR Electric Drives GmbH Offenburger Straße 3 01189 Dresden Germany
<b>TÜV equipment:</b>	2721557
<b>Subject of examination:</b>	Traction sheave shaft for Lift machines, types xSG-52
<b>Scope of order:</b>	Examination of the calculation – Traction sheave shaft – sheave - shaft fastening – brake disc - shaft fastening
<b>Specification:</b>	DIN 743-1: 2012-12 – Calculation of load capacity of shafts and axles – Part 1: General DIN 6892: 2012-08 – Drive type fastenings without taper action – Parallel keys – Calculation and design
Datum: 26.01.2017 Unsere Zeichen: IS-FT1-DRE/Dmü Dokument: 20170126_xSG-52_en.docx Das Dokument besteht aus 2 Seiten. Seite 1 von 2 Die auszugsweise Wiedergabe des Dokumentes und die Verwendung zu Werbezwecken bedürfen der schriftlichen Genehmigung der TÜV SÜD Industrie Service.	
<b>Scope of examination:</b>	– Examination of the calculations to ensure com- pliance with the specifications – Examination of the calculation results – Examination of the calculation documents to ensure compliance with the data in the drawings
<b>Expert:</b>	Dipl.-Ing. Thoralf Mührel Sachverständiger
Die Prüfergebnisse beziehen sich ausschließlich auf die untersuchten Prüfgegenstände.	
	
Sitz: München Amtsgericht München HRB 96 889 USt-IdNr. DE129484218 Informationen gemäß § 2 Abs. 1 DL-InfoV unter <a href="http://www.tuev-sued.de/impressum">www.tuev-sued.de/impressum</a>	Aufsichtsrat: Karsten Xander (Vorsitzender) Geschäftsführer: Ferdinand Neuwieser (Sprecher), Dr. Ulrich Klotz, Thomas Kainz
Telefon: +49 351 4202-213 Telefax: +49 351 4202-242 <a href="http://www.tuev-sued.de/is">www.tuev-sued.de/is</a> 	TÜV SÜD Industrie Service GmbH Standort Dresden Abteilung Fördertechnik Drescherhäuser 5d 01159 Dresden Deutschland

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Seite 2 von 2  
 Unsere Zeichen/Erstelldatum: IS-FT1-DRE/Dmü /26.01.2017  
 Dokument: 20170126\_xSG-52\_en.docx



Industrie Service

#### 1. Calculation documents

The following technical documentation was subject of the examination:

- Calculation documents WSG52\_FE1\_2016\_, pages 1 to 11, dated 2016-02-20 incl. Annexes.
- Drawing 514 107 (revision Äm 292/15, 2015-12-04).

#### 2. Technical Data

The data which are of relevance to the calculation are specified as follows in the calculation document WSG52\_FE1\_2016\_520kN:

- Rope force (center of traction sheave):	520.000,0 N
- max. magnetic pull:	3.800,0 N
- Rated torque:	9.200,0 Nm
- Braking torque:	5.650,0 Nm
- Load torque:	24.000,0 Nm
- Holding brake torque:	11.500,0 Nm
- Emergency braking torque:	22.600,0 Nm
- Traction sheave weight:	1.000,0 kg
- Brake disc weight:	420,0 kg
- Rotor weight:	430,0 kg
- Shaft weight:	815,0 kg

#### 3. Examination result

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

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

The data in drawing no. 514 107 comply with the values relevant for the calculation.

#### 4. Remarks

The evaluation did not cover the verification of the cone clamp elements and the lifetime of the bearings.

The expert

  
 Thoralf Mührel



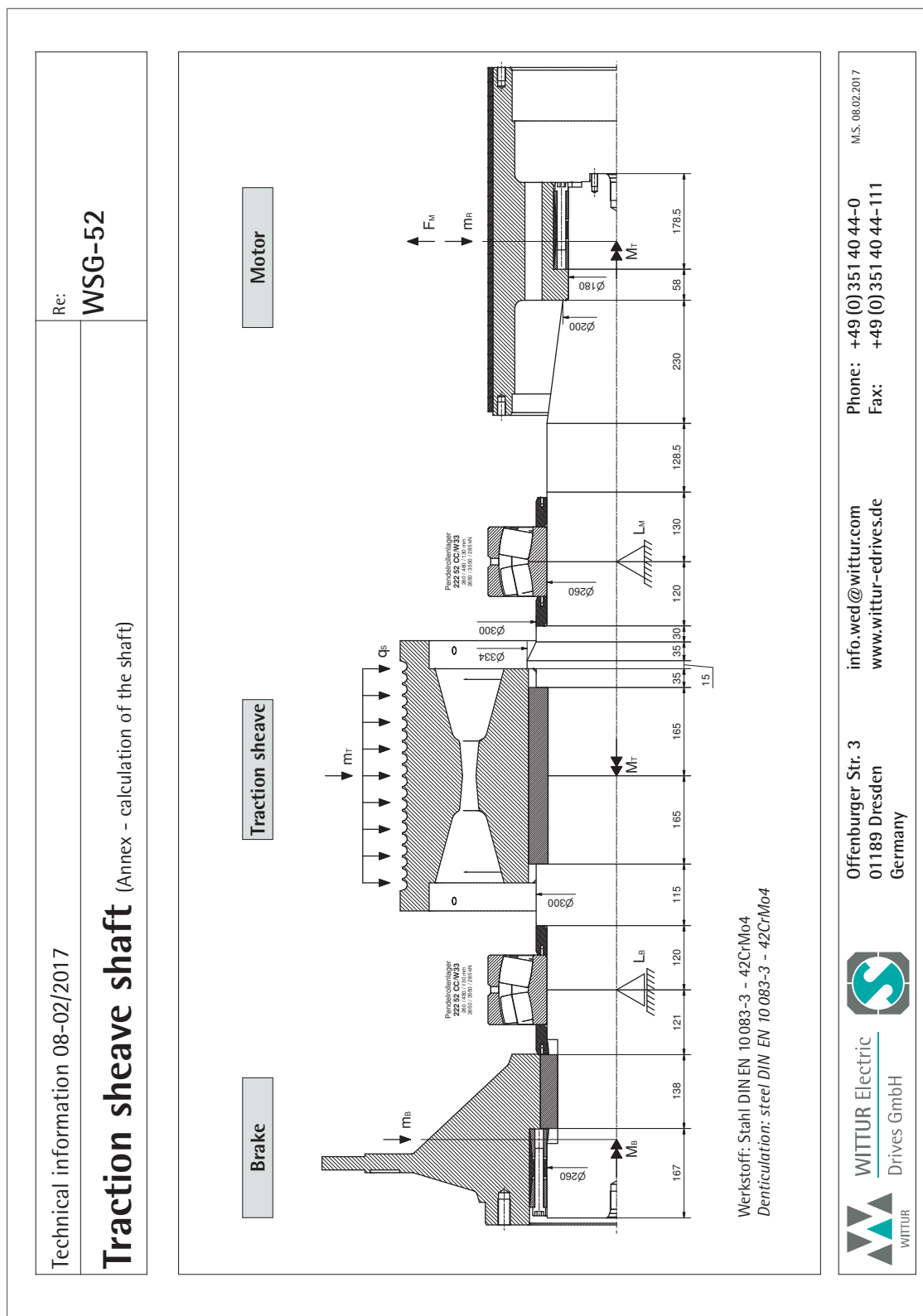
# Gearless Lift Machine

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### 14.3. Traction sheave



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#### 14.4. EU type-examination Certificate EU-BD 1030

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"> ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ CERTIFICADO ◆ CERTIFICAT </p>	 Industrie Service	
	<h3>EU TYPE-EXAMINATION CERTIFICATE</h3> <p>According to Annex IV, Part A of 2014/33/EU Directive</p>	
	<b>Certificate No.:</b>	EU-BD 1030
	<b>Certification Body of the Notified Body:</b>	TÜV SÜD Industrie Service GmbH Westendstr. 199 80686 Munich - Germany Identification No. 0036
	<b>Certificate Holder:</b>	Chr. Mayr GmbH & Co. KG Eichenstr. 1 87665 Mauerstetten - Germany
	<b>Manufacturer of the Test Sample:</b> <small>(Manufacturer of Serial Production – see Enclosure)</small>	Chr. Mayr GmbH & Co. KG Eichenstr. 1 87665 Mauerstetten - Germany
	<b>Product:</b>	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 braking element against unintended car movement
	<b>Type:</b>	RSD Size 10 / 894.5 ___ RSD Size 10 / 894.7 ___
	<b>Directive:</b>	2014/33/EU
	<b>Reference Standards:</b>	EN 81-20:2014 EN 81-50:2014 EN 81-1:1998+A3:2009
<b>Test Report:</b>	EU-BD 1030 of 2017-01-18	
<b>Outcome:</b>	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.	
<b>Date of Issue:</b>	2017-01-18	
 Achim Janocha Certification Body "lifts and cranes"		
 TÜV SÜD Industrie Service GmbH 0036 Notified Body		
		

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#### Annex to the EC Type-Examination Certificate No. EU-BD 1030 of 2017-01-18



#### 1 Scope of application

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

1.1.1 Permissible brake force when the braking device acts on the brake disk while the car is moving upward 4551 - 11182 N

The brake force refers to a single brake resp. brake tongs on the brake disk diameter effectively.

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

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

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

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

Maximum tripping speed (gliding speed) on the brake disk diameter effectively 25.1 m/s

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

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

Size	Min. nominal brake force* [N]	Max. nominal brake force* [N]	Maximum response times** [ms]		
			without $t_0$	with overexcitation $t_{50}$	with overexcitation $t_{90}$
10	4551		210 / 260	320 / 340	720 / 750
10		11182	55 / 60	100 / 110	360 / 380

Interim values can be interpolated

#### Explanations:

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

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

1.2.2 Assigned execution features

Type of powering / deactivation continuous current / continuous current end  
Nominal air gap 0.6 - 0.85 mm  
Damping elements YES  
Overexcitation at double non-release voltage  
Maximum tripping speed on the brake disc diameter effectively 25.1 m/s

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

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## 2 Conditions

- 2.1 Above mentioned safety component represents only a part at the protection device against overspeed for the car moving in upwards direction and unintended car movement. Only in combination with a detecting and triggering component in accordance with the standard (two separate components also possible), which must be subjected to an own type-examination, can the system created fulfil the requirements for a protection device.
- 2.2 The installer of a lift must create an examination instruction to fulfil the overall concept, add it to the lift documentation and provide any necessary tools or measuring devices, which allow a safe examination (e. g. with closed shaft doors).
- 2.3 The single brakes have to be arranged symmetrically around the circumference of the brake disc. In order to comply with the redundancy required in section 5.6.6.2 of EN 81-20:2014 (D), at least two braking circuits (single brake actuator) must be used.
- 2.4 Where more than two braking circuits are used, redundancy requirements necessitate that a sufficient braking effect as outlined in section 5.9.2.2.2.1 of EN 81-20:2014 (D) is still maintained if one of the braking circuit fails. It is not assumed that two braking circuits will fail simultaneously.
- 2.5 The manufacturer of the drive unit must provide calculation evidence that the connection traction sheave – shaft – brake disc and the shaft itself is sufficiently safe, if the brake disc is not a direct component of the traction sheave (e. g. casted on). The shaft itself has to be statically supported in two points.  
The calculation evidence must be enclosed with the technical documentation of the lift.
- 2.6 The setting of the brake force has to be secured against unauthorized adjustment (e. g. sealing lacquer).
- 2.7 The identification drawing no. E08810000100261 and E08910003000261 including stamp dated 2017-01-18 shall be included to the EU type-examination for the identification and information of the general construction and operation and distinctness of the approved type.
- 2.8 The EU type-examination certificate may only be used in combination with the corresponding annex and enclosure (List of authorized manufacturer of the serial production). The enclosure will be updated immediately after any change by the certification holder.

## 3 Remarks

- 3.1 A code number for the manufacturer relevant features and the design characteristics which are not directly part of the type-examination will be marked at the blank in the type designation RSD Size 10 / 894.5 \_ \_ . \_ \_ and RSD Size 10 / 894.7 \_ \_ . \_ \_ (e. g. with/without damping, kind of the manual brake release device, connecting cable).
- 3.2 In the scope of this type-examination it was found out, that the brake device also functions as a brake for normal operation (using at least two single brakes), is designed as a redundant system and therefore meets the requirements to be used also as a part of the protection device against overspeed for the car moving in upwards direction and as braking element as part of the protection device against unintended car movement.
- 3.3 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.
- 3.4 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.

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

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# Gearless Lift Machine

## WSG-52

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#### Annex to the EC Type-Examination Certificate No. EU-BD 1030 of 2017-01-18



- 3.5 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
- 3.6 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.

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**Enclosure to the EU Type-Examination Certificate  
No. EU-BD 1030 of 2017-01-18**



Industrie Service

**Authorised Manufacturer of Serial Production – Production Sites (valid from: 2017-01-18):**

**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 form from Co. Chr. Mayr GmbH & Co. KG of 2016-09-15

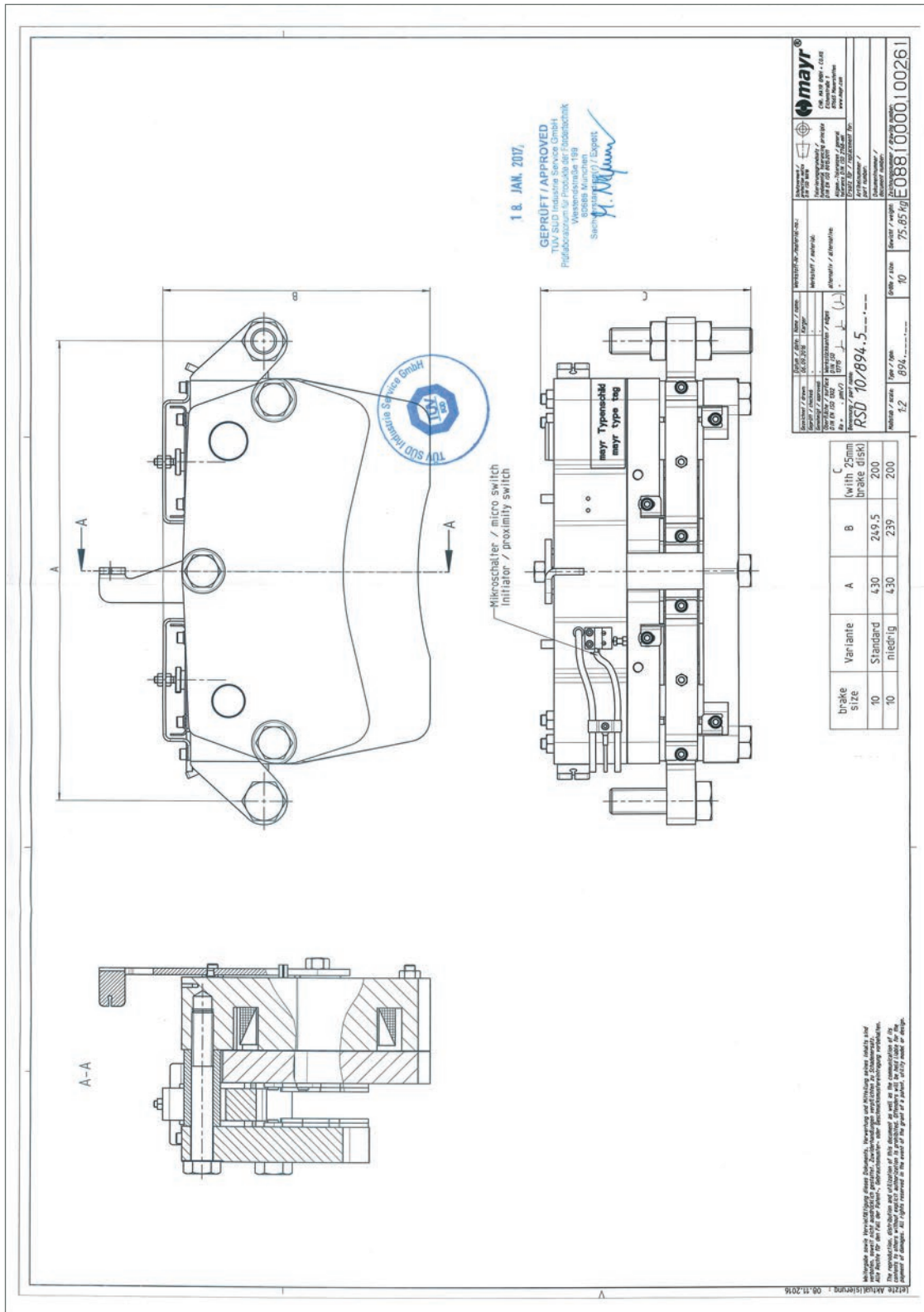
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# Gearless Lift Machine

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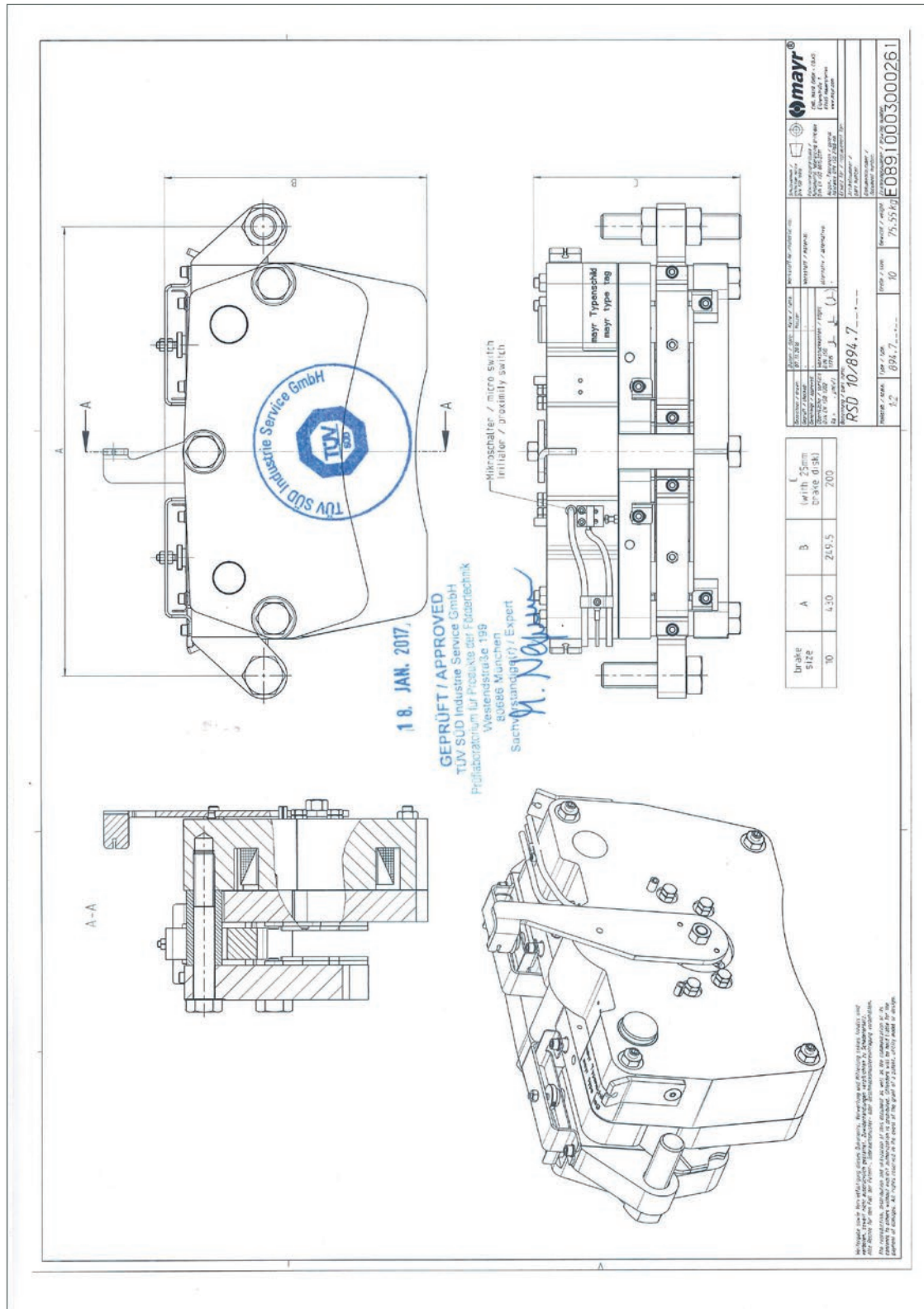


# Gearless Lift Machine

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# Gearless Lift Machine

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## 14.5. UKCA Declaration of Conformity



**WITTUR Electric**  
Drives GmbH





## UKCA Declaration of Conformity

as defined by the Electrical Equipment (Safety) Regulations 2016

The manufacturer

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

certifies that the following products

**Product designation:**

Asynchronous motors	DS□ 1, DS□ 3
Synchronous servo motors	DS□ 2, DS□ 4, DG□ 4, DU□ 4, DG□ 6, DU□ 6, G□ 4, R□ 4, G□ 8, R□ 8
Synchronous lift machines	WSG, WGG, WSU, WGU, OSG, OGG, HSG, HGG
Custom-made motors	4HX, 6PX, QPX

are in conformity with the specification of the Electrical Equipment (Safety) Regulations 2016.

**Statement relating to Electromagnetic Compatibility Regulations 2016**

When connected to a sinus-shaped a.c. voltage system, the motors conform to the requirements of the Electromagnetic Compatibility Regulations 2016.


The following harmonized standards and technical specifications have been applied:

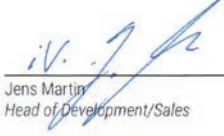
**EN IEC 60 204-1: 2019-06**  
Safety of machinery - Electrical equipment of machines. Part 1: General requirements

**EN IEC 60 034-1 : 2011-02**  
Rotating electrical machines; Part 1: Rating and performance

**EN ISO 12 100 : 2011-03**  
Safety of machinery - General principles for design, risk assessment and risk reduction

Dresden, 2022-12-07  
(Place, date)

  
 Richard D. Harrop  
Plant Manager

  
 Jens Martin  
Head of Development/Sales

UKCA-Conformity\_ed07Dec2022




# Gearless Lift Machine

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## 14.6. UKCA Type-examination Certificate EU-BD 1030

<div style="writing-mode: vertical-rl; transform: rotate(180deg);"> ZERTIFIKAT ◆ CERTIFICATE ◆ CERTIFICADO ◆ CERTIFIKAT ◆ 証書 ◆ CERTIFICATE ◆ CERTIFIKAT </div>			
	<h3>TYPE EXAMINATION CERTIFICATE</h3> <p>According to Lifts Regulations 2016, Schedule 11, Section A</p>		
	<b>Certificate No.:</b>	UK-BD 1030	
	<b>Approved Body:</b>	TUV SUD BABT UNLIMITED Octagon House Concorde Way, Segensworth North Fareham, Hampshire, PO15 5RL, UK Identification No. 0168	
	<b>Certificate Holder:</b>	Chr. Mayr GmbH & Co. KG Eichenstr. 1 87665 Mauerstetten - Germany	
	<b>Manufacturer of the Test Sample:</b> <small>(Manufacturer of Serial Production - see Enclosure)</small>	Chr. Mayr GmbH & Co. KG Eichenstr. 1 87665 Mauerstetten - Germany	
	<b>Product:</b>	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 braking element against unintended car movement	
	<b>Type:</b>	RSD Size 10 / 894.5 _ _ _ RSD Size 10 / 894.7 _ _ _	
	<b>Regulation:</b>	Lifts Regulations 2016	
	<b>Reference Standards:</b>	EN 81-20:2020 EN 81-50:2020	
<b>Test report:</b>	UK-BD Chr. Mayr dated 2022-05-24		
<b>Outcome:</b>	The product conforms to the essential health and safety requirements of the mentioned Regulation if the requirements of the annex to this type examination certificate are kept.		
<b>Date of Issue:</b>	2022-05-27		
	<div style="text-align: center;">   Achim Janocha  TUV SUD BABT UNLIMITED </div> <div style="text-align: right;">  </div>		
			

# Gearless Lift Machine

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### Operating Instructions

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#### Annex to the Type Examination Certificate No. UK-BD 1030 of 2022-05-27



## 1 Scope of application

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

1.1.1 Permissible brake force when the braking device acts on the brake disk while the car is moving upward 4551 - 11182 N

The brake force refers to a single brake resp. brake tongs on the brake disk diameter effectively.

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

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

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

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

Maximum tripping speed (gliding speed) on the brake disk diameter effectively 25.1 m/s

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

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

Size	Min. nominal brake force* [N]	Max. nominal brake force* [N]	Maximum response times** [ms]		
			without $t_0$	with overexcitation $t_{50}$	$t_{90}$
10	4551		210 / 260	320 / 340	720 / 750
10		11182	55 / 60	100 / 110	360 / 380

Interim values can be interpolated

#### Explanations:

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

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

1.2.2 Assigned execution features

Type of powering / deactivation continuous current / continuous current end  
Nominal air gap 0.6 - 0.85 mm  
Damping elements YES  
Overexcitation at double non-release voltage  
Maximum tripping speed on the brake disc diameter effectively 25.1 m/s



# Gearless Lift Machine

## WSG-52

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#### Annex to the Type Examination Certificate No. UK-BD 1030 of 2022-05-27



## 2 Conditions

- 2.1 Above mentioned safety component represents only a part at the protection device against over-speed for the car moving in upwards direction and unintended car movement. Only in combination with a detecting and triggering component in accordance with the standard (two separate components also possible), which must be subjected to an own type-examination, can the system created fulfil the requirements for a protection device.
- 2.2 The installer of a lift must create an examination instruction to fulfil the overall concept, add it to the lift documentation and provide any necessary tools or measuring devices, which allow a safe examination (e. g. with closed shaft doors).
- 2.3 The single brakes have to be arranged symmetrically around the circumference of the brake disc. In order to comply with the redundancy required in section 5.6.6.2 of EN 81-20:2020 (D), at least two braking circuits (single brake actuator) must be used.
- 2.4 Where more than two braking circuits are used, redundancy requirements necessitate that a sufficient braking effect as outlined in section 5.9.2.2.2.1 of EN 81-20:2020 (D) is still maintained if one of the braking circuit fails. It is not assumed that two braking circuits will fail simultaneously.
- 2.5 The manufacturer of the drive unit must provide calculation evidence that the connection traction sheave – shaft – brake disc and the shaft itself is sufficiently safe, if the brake disc is not a direct component of the traction sheave (e. g. casted on). The shaft itself has to be statically supported in two points.  
The calculation evidence must be enclosed with the technical documentation of the lift.
- 2.6 The setting of the brake force has to be secured against unauthorized adjustment (e. g. sealing lacquer).
- 2.7 The identification drawing no. E08810000100261 and E08910003000261 including stamp dated 2017-01-18 shall be included to the type examination for the identification and information of the general construction and operation and distinctness of the approved type.
- 2.8 The 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 A code number for the manufacturer relevant features and the design characteristics which are not directly part of the type examination will be marked at the blank in the type designation RSD Size 10 / 894.5 \_ \_ . \_ \_ and RSD Size 10 / 894.7 \_ \_ . \_ \_ (e. g. with/without damping, kind of the manual brake release device, connecting cable).
- 3.2 In the scope of this type examination it was found out, that the brake device also functions as a brake for normal operation (using at least two single brakes), is designed as a redundant system and therefore meets the requirements to be used also as a part of the protection device against overspeed for the car moving in upwards direction and as braking element as part of the protection device against unintended car movement.
- 3.3 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.

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# Gearless Lift Machine

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#### Annex to the Type Examination Certificate No. UK-BD 1030 of 2022-05-27



- 3.5 This 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
  - EN 81-20:2020 (D), part 5.6.6.11, 5.6.7.13
  - EN 81-50:2020 (D), part 5.7 and 5.8
- 3.6 A revision of this type examination certificate is inevitable in case of changes or additions of the above mentioned standards or of changes of state of the art.



# Gearless Lift Machine

## WSG-52

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#### Enclosure to the Type Examination Certificate No. UK-BD 1030 of 2022-05-27



#### Authorised Manufacturer of Serial Production – Production Sites (valid from: 2022-04-14):

**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 of Co. Chr. Mayr GmbH & Co. KG dated 2022-04-14

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Code: GM.8.004125.EN  
Date: 13. Mrz 2023  
Version: B01  
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# Installation and Operational Instructions for ROBA®-diskstop® Type 894.5\_ \_ \_ \_ Sizes 9 and 10

(B.8.4.5.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:

<b>Page 1:</b>	- Contents
<b>Page 2:</b>	- Safety and Guideline Signs - Certificates - Guidelines on EU Directives
<b>Page 3:</b>	- Safety Regulations
<b>Page 4:</b>	- Safety Regulations
<b>Page 5:</b>	- Safety Regulations
<b>Page 6:</b>	- Brake Illustrations
<b>Page 7:</b>	- Brake Illustrations
<b>Page 8:</b>	- Parts List
<b>Page 9:</b>	- Technical Data - Dimensions
<b>Page 10:</b>	- Switching Times - Torque-Time Diagram
<b>Page 11:</b>	- Application - Design - Function - Scope of Delivery, State of Delivery - Installation Conditions - Brake Temperature
<b>Page 12:</b>	- Adjustment - Noise Damping - Brake Installation - Brake Inspection - Braking Torque
<b>Page 13:</b>	- Installation of Bowden Cable Hand Release
<b>Page 14:</b>	- Electrical Connection and Wiring
<b>Page 15:</b>	- Release Monitoring - Wear Monitoring
<b>Page 16:</b>	- Maintenance - Guidelines on Brake De-installation - Information on the Components - Cleaning the Brake - Disposal
<b>Page 17:</b>	- Malfunctions / Breakdowns

## 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 Certificate (Elevator Directive):

- **EU-BD 1075** for Size 9
- **EU-BD 1030** for Size 10



### 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/EU (RoHS) (Restriction on the Use of Certain Hazardous Substances, such as lead (0.1 %), mercury (0.1 %), cadmium (0.01 %), hexavalent chromium (0.1 %), polybrominated biphenyls (PBB) (0.1 %), polybrominated diphenylethers (PBDE) (0.1 %)). In addition, the product does also not contain the substances listed in the delegated Directive 2015/863 EU – 22 July 2019, Di(2-ethylhexyl)phthalate (DEHP) (0.1 %), butylbenzylphthalate (BBP) (0.1 %), dibutylphthalate (DBP) (0.1 %) and diisobutylphthalate (DIBP) (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.

## 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 lines 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 risk assessment required 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 directive 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 180 1/h. These values are valid for intermittent periodic duty S3 60 %. The permitted surface temperature on the mounting surface must not exceed 80 °C at a max. ambient temperature of 40 °C.
- ☐ 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 any other foreign bodies.
- ☐ The surfaces of the outer components have been phosphated manufacturer-side to form a basic corrosion protection.

#### **CAUTION**



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



## 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 friction linings can seize up to the brake disk 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.

## 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.

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.

### 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


### 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

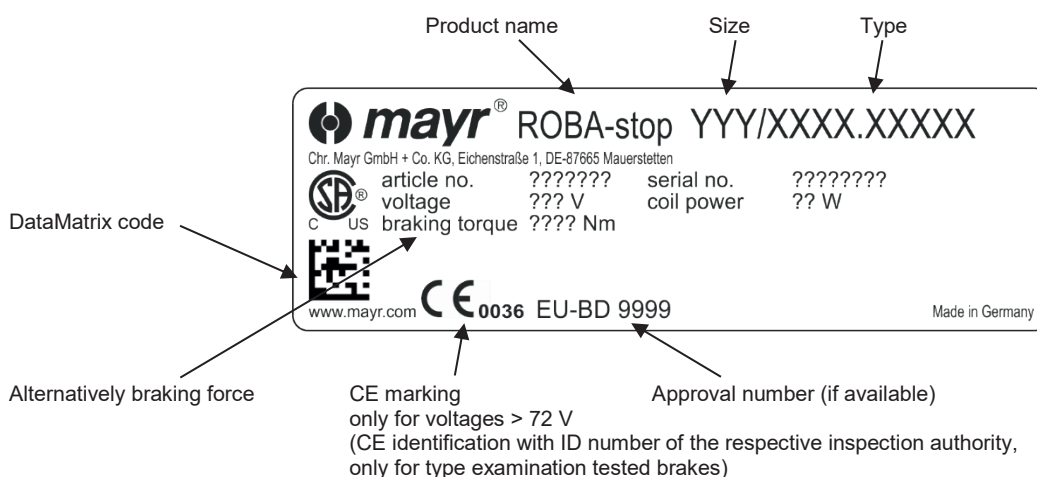
 according to the Low Voltage Directive 2014/35/EU and the Elevator Directive 2014/33/EU

### Conformity Markings

 in terms of the Canadian and American approval

### Identification

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





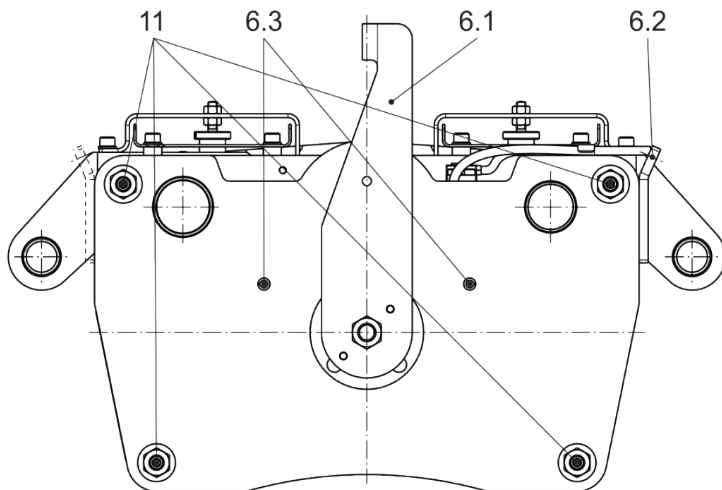


Fig. 1

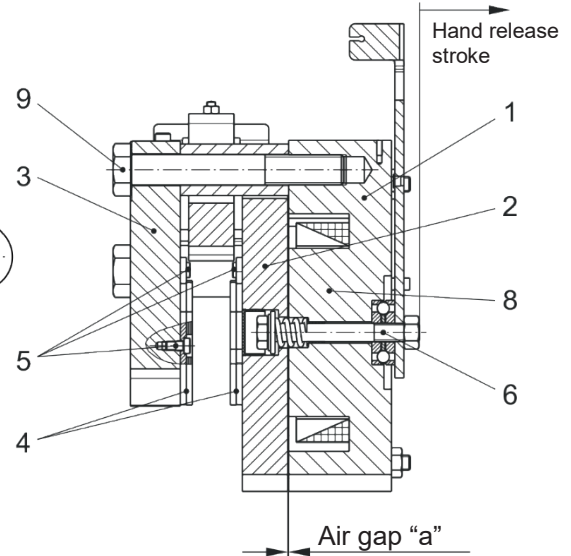


Fig. 2

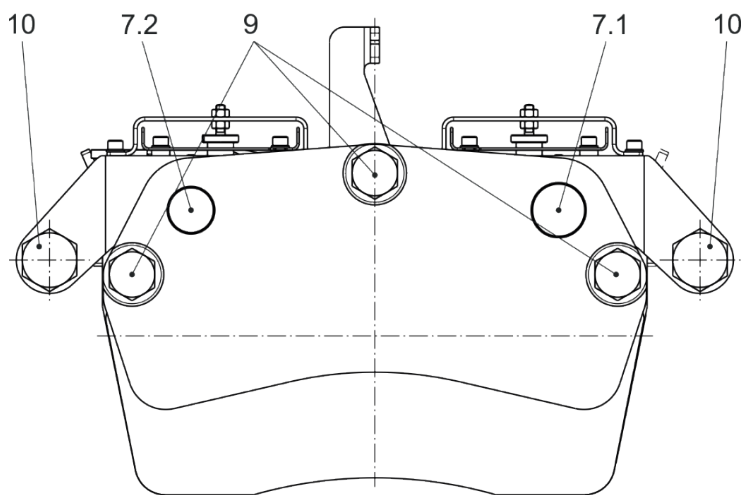


Fig. 3

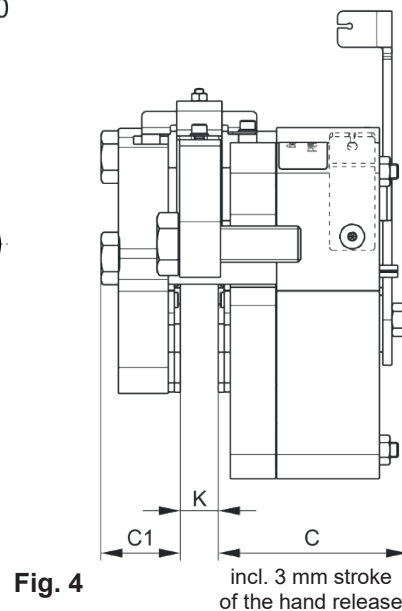


Fig. 4

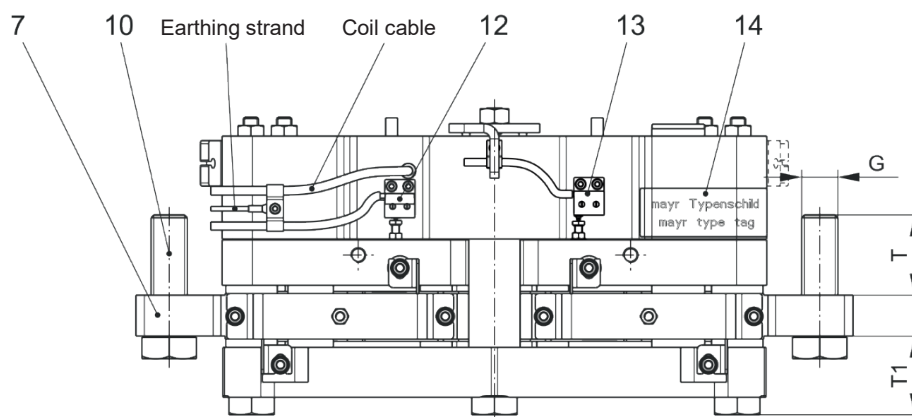


Fig. 5

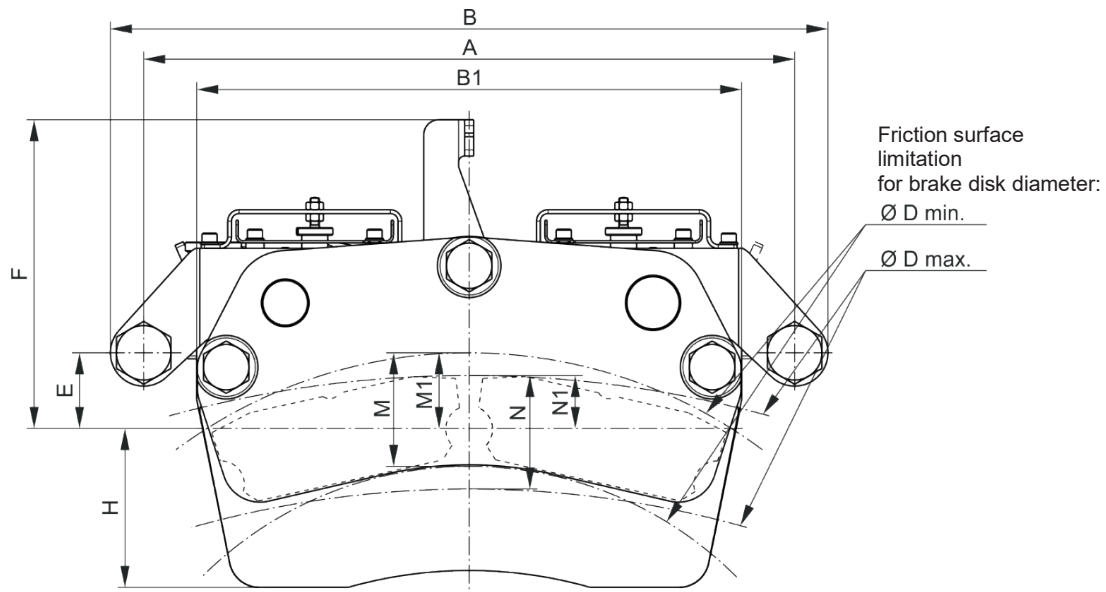


Fig. 6

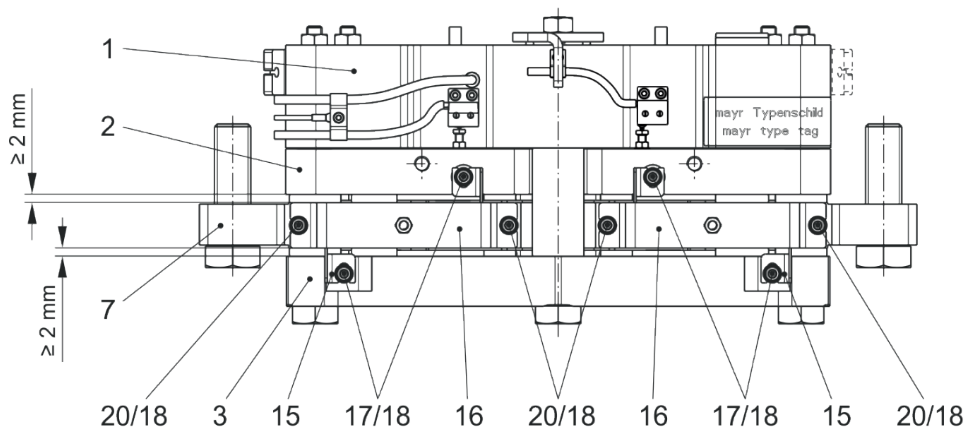


Fig. 7

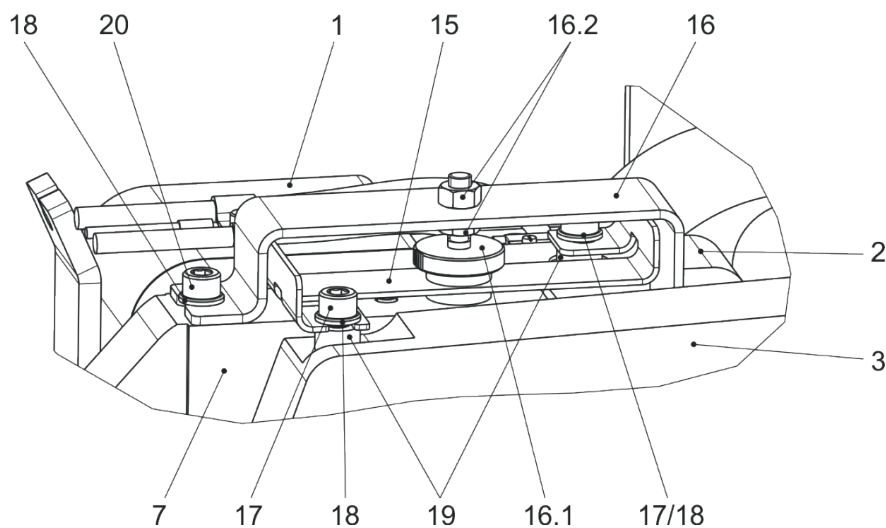


Fig. 8 (Alignment mechanism)

# Installation and Operational Instructions for ROBA®-diskstop® Type 894.5\_ \_ \_ Sizes 9 and 10

(B.8.4.5.EN)

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

Item	Name	Pcs.	
		Size 9	Size 10
1	Coil carrier assembly with coil	1	1
2	Armature disk	1	1
3	Counterplate	1	1
4	Friction pad assembly	4	4
5	Cap screw M6 x 12	24	24
6	Hand release assembly	1	1
6.1	Hand release lever	1	1
6.2	Lock washer	1	1
6.3	Spring pin	2	2
7	Carrier assembly	1	1
7.1	Guide bolt 1	1	1
7.2	Guide bolt 2	1	1
8	Thrust spring	13	14
9	Hexagon head screw	4	3
10	Screw M24 x 80	2	2
11	Noise damping assembly	4	4
12	Release monitoring assembly	1	1
13	Wear monitoring assembly	-	1
14	Type tag	1	1
	<i>Parts for alignment mechanism:</i>		
15	Lever	2	2
16	Thrust piece assembly	2	2
16.1	Knurled-head screw M6 x 20	2	2
16.2	Hexagon nut M6	4	4
17	Cap screw M6 x 16	4	4
18	Washer	8	8
19	Bushing	4	4
20	Cap screw M6 x 16	4	4

# Installation and Operational Instructions for ROBA®-diskstop® Type 894.5\_ \_ \_ Sizes 9 and 10

(B.8.4.5.EN)

Table 1: Technical Data

Size	9	10
Max. braking force:	8749 N	11182 N
Min. braking force:	5029 N	4551 N
Braking force tolerance:	0 / +60 %	0 / +60 %
Max. friction work <sup>1)</sup> $Q_{r \max.}$ per braking action:	400000 J	400000 J
Brake disk diameter D:	600 – 1200 mm	650 – 1500 mm
Effective friction diameter $D_{eff}$ :	$D_{eff} = D - 80 \text{ mm}$	$D_{eff} = D - 80 \text{ mm}$
Max. trigger speed:	25.1 m/s	25.1 m/s
Brake disk width K (+0 / -0.15 mm):	25 – 30 mm	25 – 30 mm
Nominal voltage $U_N$ :	see Type tag	see Type tag
Overexcitation voltage $U_O$ :	$2 \times U_N$	$2 \times U_N$
Coil capacity at nominal voltage $P_N$ :	see Type tag	see Type tag
Coil power at overexcitation $P_O$ :	$4 \times P_N$	$4 \times P_N$
Overexcitation time $t_O$ :	1 – 2 s	1 – 2 s
Max. air gap "a" (Fig. 2) after wear	1.8 mm	1.8 mm
Protection (electrical):	IP54	IP54
Protection (mechanical):	IP10	IP10
Duty cycle with 180 switchings per hour:	60%	60%
Electrical connection of the magnetic coil:	$2 \times 0.88 \text{ mm}^2$	$2 \times 0.88 \text{ mm}^2$
Electrical connection of the microswitch:	$3 \times 0.5 \text{ mm}^2$	$3 \times 0.5 \text{ mm}^2$
Hand release force:	approx. 400 N	approx. 400 N
Hand release stroke:	> 3 mm	> 3 mm
Tightening torque Item 5:	10 Nm	10 Nm
Tightening torque Item 9:	183 Nm	360 Nm
Tightening torque Item 10:	710 Nm	710 Nm
Tightening torque Item 17:	9 Nm	9 Nm
Tightening torque Item 20:	9 Nm	9 Nm
Ambient temperature:	-5 °C to +40 °C	-5 °C to +40 °C
Mass:	54 kg	76 kg

## DANGER



If the brake is operated with an air gap "a" > 1.8 mm, it becomes a **safety risk** as the braking effect is no longer given because the armature disk (2) lies again the hand release (6).



<sup>1)</sup> The thermal load for a brake cannot be stated. Most of the brake energy is transferred onto the brake disk. The thermal load capability is dependent on the heat dissipation capacities of the brake disk.

Table 2: Dimensions

Size	A	B	B1	C	C1	E	F	G	H	M	M1	N	N1	T	T1 <sup>1)</sup>
9	400	445	344	127	32	63.7	204	M24	94	75	45	75	33	53	31.5
10	430	474	360	129	52.5	50	204	M24	105	75	50	75	35	53	52

<sup>1)</sup> The tolerance for dimension "T1" is ±2.5 mm.

Table 3: Switching Times [ms]

Size	9	9	10	10
Design	Min. nominal braking force	Max. nominal braking force	Min. nominal braking force	Max. nominal braking force
Attraction $t_2$ :	500	500	650	650
Drop-out $t_0$ (DC) from holding voltage:	155	40	210	55
Drop-out $t_0$ (DC) from overexcitation:	175	60	260	60
Drop-out $t_{50}$ (DC) <sup>2)</sup> from holding voltage:	210	70	320	100
Drop-out $t_{50}$ (DC) <sup>2)</sup> from overexcitation:	230	90	340	110
Drop-out $t_{90}$ (DC) <sup>2)</sup> from holding voltage:	290	210	720	360
Drop-out $t_{90}$ (DC) <sup>2)</sup> from overexcitation:	310	230	750	380
Drop-out $t_{11}$ (AC):	on request	450	on request	600
Drop-out $t_1$ (AC) <sup>3)</sup> :	on request	900	on request	1000

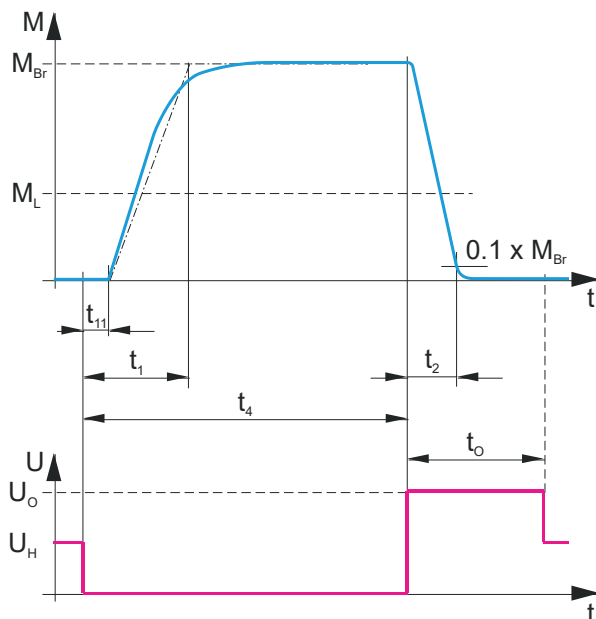


<sup>2)</sup> Referring to the nominal braking force

<sup>3)</sup> Referring to the effective braking force

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.

Diagram 2: Torque-Time Diagram



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



The switching times are dependent on the respective spring pressure.

## Application

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

## Design

The ROBA®-diskstop® is a spring applied, electromagnetically releasing 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®-diskstop® 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.

For a dual-circuit brake system, at least two brakes are necessary.

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

The ROBA®-diskstop® brake is a spring applied, electromagnetic safety brake.

### Spring applied function:

In de-energised condition, the thrust springs (8) press the armature disk (2) against the brake disk. The brake disk is held between the friction pads (4).

### Electromagnetic function:

Due to the magnetic force of the coil in the coil carrier (1), the armature disk (2) is attracted against the spring pressure to the coil carrier (1).

The brake is released and the brake disk can rotate freely.

### Safety brake function:

The ROBA®-diskstop® brakes reliably and safely in the event of a power switch-off, a power failure or an EMERGENCY STOP.

## Scope of Delivery / State of Delivery

The brakes are manufacturer-assembled ready for installation. The release monitoring and wear monitoring devices (Items 12 and 13) are set manufacturer-side. Included loose in delivery are the hexagon head screws (10). 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.

## Installation Conditions

### CAUTION



Please observe precisely the following installation conditions and the brake installation instructions described on page 12. If the conditions and instructions are not observed, this might result in premature brake wear or a substantial loss in braking torque up to total failure of the brake.

### Before mounting the brake, please observe:

- ❑ Axial run-out deviation of the brake disk: max. 0.2 mm



Due to axial run-out deviations or tilting between the brake and the brake disk, the brake disk may rub against the friction linings.

- ❑ Brake disk surface quality (friction surfaces):  $R_a = 3.2 \mu\text{m}$
- ❑ Brake disk material: steel or cast iron.
- ❑ Brake disk width (25 – 30 mm) acc. respective drawing with tolerance  $+0 / -0.15 \text{ mm}$ .
- ❑ There must be a gap of at least 2 mm between the pad (7) and the counterplate (3) as well as between the pad (7) and the armature disk (2).
- ❑ Brake disk deformation or bearing backlash must not influence the set air gap.
- ❑ The screw-on surfaces in the  $\varnothing 50 \text{ mm}$  range must be 0.1 mm parallel to the brake disk.
- ❑ Keep the brake surfaces and the friction linings grease-free at all times.
- ❑ Positional tolerance for installation threaded holes:  $\varnothing 0.5 \text{ mm}$ .
- ❑ Please make sure there is a suitable protective cover for the open brake.
- ❑ The screw connection must transmit the occurring transverse forces safely.
- ❑ The tensile strength  $R_m$  of the attachment wall must be at least  $300 \text{ N/mm}^2$ .
- ❑ The screw-in depth of both fixing screws (10) must be at least 25 mm.

## Brake Temperature

### DANGER



At an ambient temperature of  $+40^\circ\text{C}$  and a duty cycle of 60 %, the brake can heat up to  $+65^\circ\text{C}$ .

Do not touch the brake  
=> Danger of burns!



## Adjustment



The brakes are equipped manufacturer-side with the respective springs for the braking force stated on the Type tag. 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.

## Noise Damping (Item 11 / 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.

## Brake Installation (Figs. 1 – 8)

The brake is pre-assembled manufacturer-side.

1. Release the brake mechanically using a suitable auxiliary device.
2. Push the released brake over the brake disk and position it so that both screws (10) can be screwed in.



While pushing the brake over the brake disk, please make sure that the friction linings are not damaged.

3. Screw in the screws (10) and tighten to a **tightening torque of 710 Nm**.
4. Remove the auxiliary device for releasing the brake.
5. Switch the brake 3 - 4 times so that it aligns with the brake disk.
6. **Check that the brake moves axially on the pad (7). It must be possible to move the opened brake in the guide by hand. On an engaged brake, there must be a gap of at least 2 mm between the pad (7) and the counterplate (3) as well as between the pad (7) and the armature disk (2), see Fig. 7.**
7. **Check the air gaps "a" (Fig. 2) between the coil carrier (1) and the armature disk (2).**  
In new condition, the air gap "a" must be max. 1 mm on a de-energised brake. Measurements on both sides at friction pad (4) level – calculate the average.
8. On the de-energised brake, tighten the cap screws (17) with 9 Nm.
9. Energise the brake.
10. Measure the effective air gap between the friction lining and the side of the brake disk facing away from the screw-on surface on the right and left-hand sides and calculate the difference between the measurement values.  
The **differential dimension must be < 0.3 mm**.
11. Turn the brake disk. The brake disk must not rub against anything.

## Brake Inspection (before brake initial operation)

- **Visual inspection:**  
for proper condition of the brake (rust etc.) and no grinding
- **Carry out a release inspection:**  
by energising the brake or manually by actuating the hand release.
- **Switch functions inspection of the release monitoring / for connection as NC contact:**  
Brake energised → Signal "OFF"  
Brake de-energised → Signal "ON"  
**for connection as NO contact:**  
Brake energised → Signal "ON"  
Brake de-energised → Signal "OFF"

The braking torque is not achieved until after the run-in procedure has been carried out.

The run-in conditions must be aligned with the manufacturer.

## 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. The braking torque is dependent on the respective run-in condition of the friction surfaces.

We recommend allowing the friction surfaces to run in when installed and under permitted loads.

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). Furthermore, friction materials (synthetic resin bonded rubber mixtures) 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.

## Installation of Bowden Cable Hand Release

The hand release is pre-assembled manufacturer-side.

In order to install the Bowden cable, the lock washer (6.2) must be mounted on the correct side. If this is not the case, the lock washer (6.2) must be screwed off and screwed onto the opposite side.

The hand release lever (6.1) can be pivoted by approx. 30°.

Adjust the Bowden cable so that the hand release (after actuation) can pivot back to the unreleased neutral position  
=> functional inspection.

### DANGER



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



Do not push the hand release lever (6.1) up to the stop pins (spring pins Item 6.3), but carefully only to the point, at which the traction sheave or the car starts moving.

The stop pins are only used to prevent blockage of the hand release.

A substantially increased force acting on the hand release lever (6.1) 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 Bowden cable designs by the customer in order to compensate for friction forces in the Bowden cable.

Adjust the Bowden cable length so that the hand release lever (6.1), after actuation, pivots back to the unreleased neutral position.



When actuating the hand release, a switching signal of the release monitoring device cannot be guaranteed.

The hand release is subject to wear and is not suitable for constant release.

A sufficient number of emergency releases is possible (approx. 1000 x).

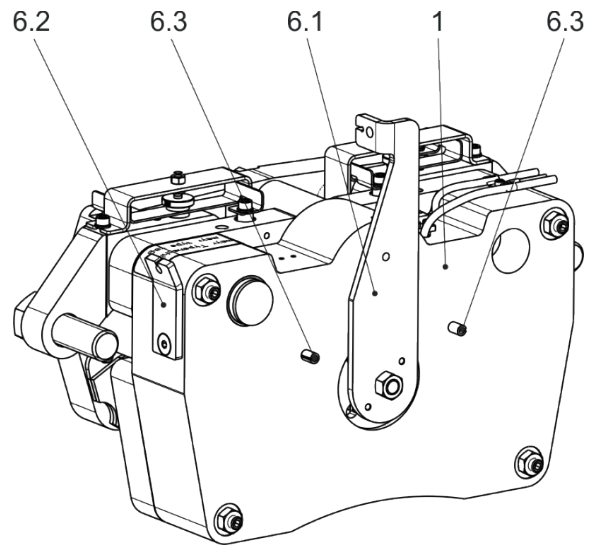


Fig. 9 (Depicted in the unreleased neutral position)



## Electrical Connection and Wiring



The brakes must only be operated with overexcitation.

DC current is necessary for operation of the brake. The coil nominal voltage is indicated on the Type tag as well as on the brake body and is designed according to the DIN IEC 60038 ( $\pm 10\%$  tolerance). The brake must only be operated with overexcitation (e.g. using a ROBA®-switch or -multiswitch fast acting rectifier or phase demodulator). 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!

## 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.

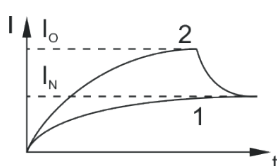
### Field build-up with normal excitation

If the magnetic coil is energised with nominal voltage, the coil current does not immediately reach its nominal value. The coil inductivity causes the current to increase slowly as an exponential function. Accordingly, the build-up of the magnetic field takes place more slowly and the braking torque drop (curve 1) is also delayed.

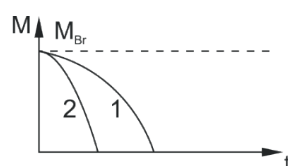
### Field Build-up with Overexcitation

A quicker drop in braking torque is achieved if the coil is temporarily placed under a higher voltage than the nominal voltage, as the current then increases more quickly. Once the brake is released, it needs to be switched over to the nominal voltage (curve 2). The ROBA®-(multi)switch fast acting rectifier and phase demodulator work on this principle.

Current path

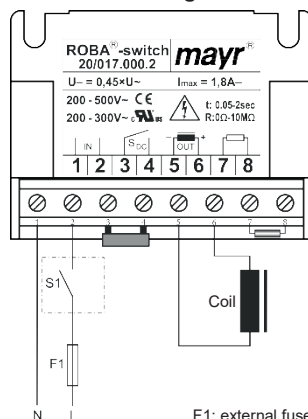


Braking torque path



## Magnetic Field Removal

### AC-side switching

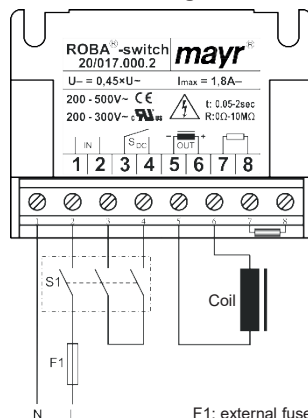


The power circuit is interrupted in front of the rectifier. The magnetic field slowly reduces. This delays the rise in braking torque.

When switching times are not important, please switch AC-side, as no protective measures are necessary for coil and 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 disconnection), 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 can lead to wear on the switching 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.

## Release Monitoring (Item 12 / Fig. 5 / Optional)



Please carry out a functional inspection before brake initial operation!

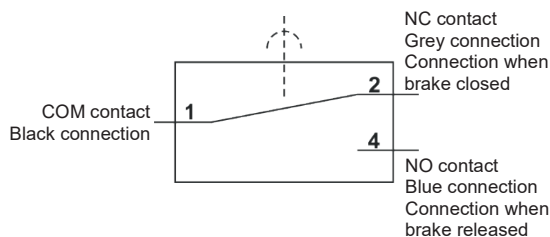
The ROBA®-diskstop® brakes are supplied optionally with manufacturer-side installed and adjusted release monitoring device (12).

A microswitch 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 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 emits a signal, the brake is released.

### Microswitch Specification

<b>Characteristic values for measurement:</b>	250 V~ / 3 A
<b>Minimum switching power:</b>	12 V, 10 mA DC-12
<b>Recommended switching power:</b> 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)

## Wear Monitoring

### (Item 13 / Fig. 5 / Optional, only for Size 10)

The ROBA®-diskstop® brakes are supplied optionally with manufacturer-side installed and adjusted wear monitoring (13) device.

### Function

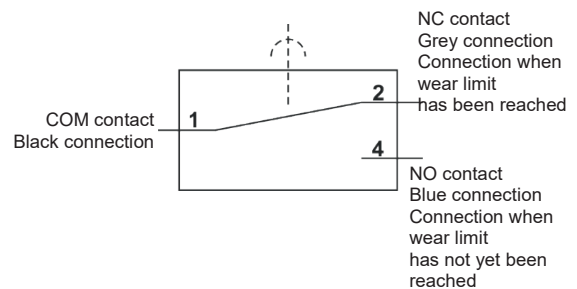
Due to wear on the friction linings, the air gap "a" between the coil carrier (1) and the armature disk (2) increases.

Once the maximum air gap of 1.8 mm (see Technical Data) has been reached, the microswitch contact switches over and emits a signal.

The friction pads (4) must be replaced.

**The customer is responsible for a signal evaluation.**

### Microswitch Wiring Diagram:



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!

## Maintenance

The ROBA®-diskstop® is 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 linings are subject to functional wear. Therefore, please carry out regular friction lining inspections.



The friction pads (4) must be replaced when air gap "a" > 1.8 mm (Fig. 2) is reached between the coil carrier (1) and the armature disk (2) on a warm brake.

Replacement of the friction pads (4) and all other maintenance work must be carried out at the place of manufacture.

## Guidelines on Brake De-installation



Before carrying out brake de-installation (e.g. brake change), all cap screws (17) must be loosened.

## 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 brake 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

## 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 / 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)

### Friction pads (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)

## Cleaning the Brake



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

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

### Malfunctions / Breakdowns:

Malfunction	Possible Causes	Solutions
Brake does not release	<ul style="list-style-type: none"> <li><input type="checkbox"/> Incorrect voltage on rectifier</li> <li><input type="checkbox"/> Rectifier failure</li> <li><input type="checkbox"/> Air gap too large (worn friction lining)</li> <li><input type="checkbox"/> Coil interrupted</li> <li><input type="checkbox"/> Incorrect rectifier (e.g. normal rectifier without overexcitation)</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Apply correct voltage</li> <li><input type="checkbox"/> Replace rectifier</li> <li><input type="checkbox"/> Replace the friction pads</li> <li><input type="checkbox"/> Replace brake</li> <li><input type="checkbox"/> Use the correct, appropriate rectifier</li> </ul>



mayr® will take no responsibility or guarantee for replacement parts and accessories which have not been delivered by mayr®, or for damage resulting from the use of these products.



EN

# Gearless Lift Machine

## WSG-52

### Operating Instructions

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