

Bewegung durch Perfektion | Movement by Perfection

# ZIEHL-ABEGG



Die Königsklasse  
The Royal League

Die Königsklasse in Lufttechnik, Regeltechnik und Antriebstechnik | The Royal League in ventilation, control and drive technology



**ZA top**

SM200.40D

SM200.45D

Gearless permanent magnet synchronous motor

**Original operating instructions**

Store for future use!

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## 1 General information

Compliance with the following instructions is mandatory to ensure the functionality and safety of the product. If the following instructions given especially but not limited for general safety, transport, storage, mounting, operating conditions, start-up, maintenance, repair, cleaning and disposal / recycling are not observed, the product may not operate safely and may cause a hazard to the life and limb of users and third parties.

Deviations from the following requirements may therefore lead both to the loss of the statutory material defect liability rights and to the liability of the buyer for the product that has become unsafe due to the deviation from the specifications.

### 1.1 Structure of the operating instructions

These operating instructions help you to work safely on and with the elevator machine ZAtop SM200.40D/SM200.45D. They contain safety instructions that must be complied with as well as information that is required for failure-free operation of the elevator machine.

The operating instructions must be stored in the vicinity of the elevator machine. It must be ensured that all persons who have to perform activities on the elevator machine can consult the operating instructions at any time. Instructions for use in accordance with the German Occupational Safety and Health Act and the German Work Equipment Ordinance must be provided in addition to these operating instructions.

Keep the operating instructions for continued use. They must be passed-on to all successive owners, users and final customers.

### 1.2 Target group

The operating instructions address persons entrusted with planning, installation, commissioning and maintenance and servicing and who have the corresponding qualifications and skills for their job.

### 1.3 Exclusion of liability

ZIEHL-ABEGG SE is not liable for damage due to misuse, incorrect use, improper use or as a consequence of unauthorized repairs or modifications.

### 1.4 Copyright

These operating instructions contain information protected by copyright. The operating instructions may be neither completely nor partially photocopied, reproduced, translated or put on a data medium without prior explicit consent from ZIEHL-ABEGG SE. Infringements are liable for damages.

All rights reserved, including those that arise through patent issue or registration on a utility model.

## 2 Safety instructions

### 2.1 General

The ZIEHL-ABEGG SE elevator machine is not a ready-to-use product and may only be operated after having been installed in machines or plants and its safety, depending on the application, has been ensured by protective grille, barriers, constructive devices or other adequate measures (see DIN EN ISO 13857)!

Installation, connection to the power supply and commissioning may only be performed by qualified service personnel! The relevant regulations must be observed!

Planners, manufacturers and operators of system parts or entire systems are responsible for the correct and safe mounting and a reliable operation.

### 2.2 Intended use

The ZAtop SM200.40D/SM200.45D is a permanent-magnet, gearless elevator machine, designed as an internal rotor motor for elevator with and without a machine room. The elevator machine is not designed for any use other than those listed here – this is considered improper use.

**Applications other than the intended use of this elevator machine are not permitted without approval by ZIEHL-ABEGG SE.**

Reading these operating instructions and complying with all instructions - especially the safety instructions - they contain is considered part of intended use. It also includes carrying out all the inspection work at the prescribed intervals.

Not the manufacturer, rather the operator of the ZAtop SM200.40D/SM200.45D is liable for any personal harm or material damage arising from non-intended use!

### 2.3 Pictographs

Safety instructions are highlighted with warning triangles and are depicted according to the degree of hazard as follows.

	<p><b>Danger!</b>                  General hazardous area. Death or severe injury or significant property damage can occur if the corresponding precautions are not taken!</p>
	<p><b>Warning!</b>                  Risk of moderate or minor injury if the corresponding precautions are not taken!</p>
CAUTION!	<p><b>Attention!</b>                  Material damage is possible if the corresponding precautions are not taken.</p>

	<p><b>Danger!</b>                  Danger by dangerous, electric voltage! Death or severe injury can occur if the corresponding precautions are not taken!</p>
	<p><b>Information</b>                  Important additional information and advice for user.</p>
	<p><b>Warning!</b>                  Danger by hot surface! Slight bodily harm is possible if the corresponding precautions are not taken!</p>

### 2.4 Product safety

The elevator machine conforms to the state of the art at the time of delivery and is fundamentally considered to be reliable. The elevator machine and accessories may only be installed and operated in perfect condition and in compliance with the operating instructions. Exceeding the limits stated in the chapter “Enclosure / technical data” can lead to a defect in the elevator machine.

### 2.5 Requirements placed on the personnel / due diligence

Persons entrusted with the planning, installation, commissioning and maintenance and servicing in connection with the elevator machine must have the corresponding qualifications and skills for these jobs. Based on their training, knowledge and experience as well as knowledge of the relevant standards, they must be able to judge the work transferred to them and be able to recognize possible hazards.

In addition, they must be knowledgeable about the safety regulations, EU directives, rules for the prevention of accidents and the corresponding national as well as regional and in-house regulations. Personnel undergoing training, instruction, or on apprenticeship may only work on the elevator machine under the supervision of an experienced person. This also applies to personnel in general training.

Comply with the legal minimum age

### 2.6 General safety instructions



**Danger!**

▷ Rotation of the drive shaft induces a voltage, which is applied to the connection terminals.



**Danger!**

- ▷ The elevator machine has attachment points: integrally cast eyelets or screwed-on eye bolts, eye plates or steel cable loops. The attachment points are designed exclusively for transporting the elevator machine including brake and traction sheave. Do not lift other loads such as bolted on components, ropes lying on top, etc. with the attachment points. Suitable lifting gear must be used.



**Warning!**

- ▷ Depending on the operating conditions, the elevator machine can have high surface temperatures of > 80°C.

**Risk of burns!**

**If the installation situation does not provide sufficient personal protection, then this must be provided by the customer in the form of additional measures.**

**If work has to be carried out on the machine at normal operating temperature, suitable gloves must be worn.**



**Warning!**

**Warning of hand injuries!**



- ▷ Risk of injury from reaching into the rope guard.
- ▷ Do not carry out any activities during operation.
- ▷ Only perform maintenance work on the drive when stopped.
  
- ▷ The elevator machine is only to be operated within the ranges dened on the name plate of the motor!
  
- ▷ Use the elevator machine only in the authorised fashion and only for the tasks and flow media specified in the order!
  
- ▷ If the elevator machine is not energised, no electric torque is available. Releasing the brakes can cause uncontrolled acceleration of the elevator.  
We recommend short-circuiting the windings of the de-energised elevator machine to generate a brake torque dependent on the speed.  
In the event of a short-circuit, a short-circuit current of at least the level of the rated current is flowing.  
The windings may not be short-circuited when the elevator machine is energised.
  
- ▷ Safety features, for example the brake release monitoring, may not be dismantled, circumvented or made inoperative!
  
- ▷ Thermistor installed in the winding act as protection against excess temperatures in the elevator machine and must be evaluated. When the thermistor are activated, the energy supply to the elevator machine must be switched off.

## 2.7 Operator's obligation of diligence

The elevator machine has been designed and built after consideration of a risk analysis and after careful selection of the harmonised standards to be complied with as well as other technical specifications. It therefore complies with the state of the art and guarantees maximum safety during operation. However, this safety can only be achieved in practical operation when all the necessary measures are taken. The machine operator therefore has a duty of care to ensure that these measures are planned and to supervise their execution.

**In particular, the operator must ensure that**

- ▷ the elevator machine is used as intended (see chapter "Product overview")
- ▷ the installation is operated in a flawless, functional condition and the safety devices are periodically checked for their properly functioning condition
- ▷ The required personal safety gear is available to and used by the operating, maintenance and repair personnel

- ▷ the operating instructions are available at the location where the elevator machine is being used, are complete and are in legible condition
- ▷ sufficiently qualified and authorized personnel operate, maintain and repair the elevator machine
- ▷ these personnel receive regular instruction in all relevant industrial safety and environmental protection issues and are familiar with the operating instructions and the safety instructions they contain
- ▷ all safety and warning notices attached to the elevator machine are never removed and remain legible

## 2.8 Employment of external personnel

Maintenance and service work are frequently carried out by external employees who often do not recognize the specific situations and the thus resulting dangers. These persons must be comprehensively informed about the hazards in their area of activity. You must monitor their working methods in order to intervene in good time if necessary.

## 3 Product overview

### 3.1 Application

The ZAtop SM200.40D/SM200.45D is designed as a gearless elevator machine for traction sheave rope elevators. Owing to its very compact design, the ZAtop SM200.40D/SM200.45D is ideal for machine roomless elevators.

The type-tested brake can be used as a:

- Brake mechanism acting on the drive shaft as part of the ascending car overspeed protection means
- Brake element acting on the drive shaft as part of the protection against unintended car movement

### 3.2 Name plate

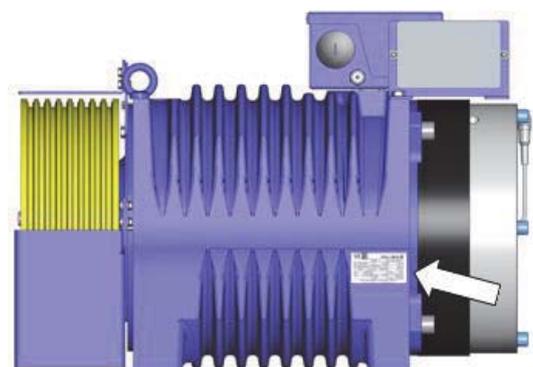
The name plate for the ZAtop SM200.40D/SM200.45D drives specify two values as nominal values for maximum / average nominal power, maximum / average nominal current, maximum / average nominal torque and on time at maximum / average load.

The first values in each case represent the maximum load for operation of the elevator (descending with empty car or ascending with full car). The second values stand for the average load for operation of the elevator.

The name plate is on the brake-side on the left and right on the housing of the ZAtop SM200.40D/SM200.45D.

1	24	23	22	21	20	19	18
2	CE		ZIEHL-ABEGG		17		
3	S/N 17051359/01	IMB3	F	IP21	16		
4	Typ SM200.45D-20	U <sub>G</sub> 182 V	P <sub>r</sub> 7,1/5 kW	15			
5	3 ~ Y 360 V   S3	duty 20/40 %	I <sub>r</sub> 21/15 A	14			
6	cos φ 0,92/0,92	R 1,20	T <sub>r</sub> 710/500 Nm	13			
7	J <sub>M</sub> 0,65 kgm <sup>2</sup>	mass	T <sub>max</sub> 1200 Nm	12			
8	Made by ZIEHL-ABEGG AG 7453 Kitzbühel, Germany						
9	Tel: +49 (0) 794 16-0   www.ziehl-abegg.com						
10	11	12	13	14	15	16	17

Example name plate ZAtop SM200.40D/SM200.45D



Position of the name plate

no.	Designation	no.	Designation
1	CE mark	13	$T_r$ - Rated torque [Nm]
2	S/N - Motor number	14	$I_{max}$ - Acceleration current [A]
3	Type - Motor type and size	15	$I_r$ - Rated current [A]
4	Network form / Connection type / Rated voltage [V]	16	n - Rated speed [rpm]
5	$\cos \phi$ - Power factor	17	$P_r$ - Rated power [kW]
6	$J_M$ - Moment of inertia [kg m <sup>2</sup> ]	18	Specification of relevant standard
7	Mode	19	Protection rating
8	Duty - On time [%]	20	Insulation class
9	Mass - Weight [kg]	21	$U_G$ - Generator voltage
10	$R_{U20}$ - Winding resistance [ $\Omega$ ]	22	Rated frequency [Hz]
11	Trips per hour [st/h]	23	Design
12	$T_{max}$ - Acceleration torque [Nm]	24	QR code

**Values for maximum load for operation of elevator (trip with full cabin down and with full cabin up):**

710 Nm; 20 % ED; 7,1 kW; 21 A

**Values for average load for operation of elevator:**

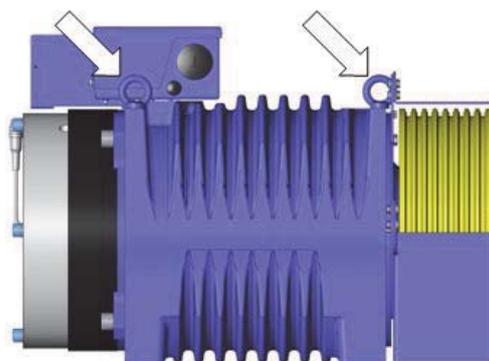
500 Nm; 40 % ED; 5 kW; 15 A

**Note:**

The first rated current is the decisive factor in the selection of both the frequency inverter and the line cross section of the motor cable.

### 3.3 Transport

- ZIEHL-ABEGG SE elevator machine are packed by the manufacturer for the types of transport and storage agreed upon.



Position of attachment points

- ▷ Transport the elevator machine either in the original packing or at the attachment points using suitable lifting gear.
- ▷ Transport elevator machine without any additional load and taking the centre of gravity into account!
- ▷ The threads in the shaft ends are not to suit eyebolts to transport the elevator machine.
- ▷ Avoid excessive vibration and shocks.
- ▷ Extreme heat or cold (transport temperature -20 °C to +60 °C) must be avoided!
- ▷ Check packing and elevator machine for possible damage and report the forwarding agency about any damages caused by transport. Shipping damages are not covered by our guarantee!

### 3.4 Storage

- ▷ Store the elevator machine in the original packaging in a dry area protected from the weather or protect it from dirt and weather until final mounting.
- ▷ Extreme heat or cold (storage temperature -20 °C to +60 °C) must be avoided!
- ▷ High humidity which can lead to condensation must be avoided.
- ▷ Avoid aggressive conditions (for example salt spray)!
- ▷ Avoid excessive storage times (we recommend max. one year) and check bearing for correct function before installing the motor. (Release the brakes and move the rotor by hand. Take care if the bearing makes untypical noises)

### 3.5 Disposal / recycling



Disposal must be carried out professionally and environmentally friendly in accordance with the legal stipulations.

## 4 Mechanical installation

### 4.1 General mounting advises

Mounting, electrical connection and commissioning are only to be performed by trained service personnel. Adhere to all machinery-related requirements and specifications supplied by the system manufacturer or machine builder.

CAUTION!

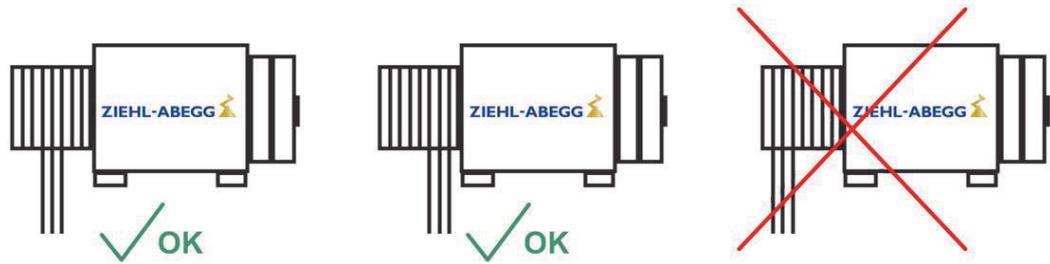
#### Attention!

- ▷ When working at or in the elevator, the elevator machine and especially the brakes have to be covered and protected against dust and chips.
- ▷ Do not install distorted.
- ▷ Do not apply any force (levering, bending). Above all, do not expose the rotor to any heavy mechanical shocks.
- ▷ Before starting installation, the elevator machine must be checked for transport damage, especially the cables have to be checked.
- ▷ No welding must be carried out on the elevator machine. The elevator machine must not be used as an earthing point for welding. Magnets and bearings could be destroyed.
- ▷ The cooling-airflow around the elevator machine must not be obstructed.
- ▷ We recommend keep at least 170 mm space between the brake and the wall (axial direction) to make access to the encoder possible.
- ▷ **The brake design with hand release must be freely accessible since the brake release levers are opened backwards (see chapter "Start-up / manual emergency evacuation")!**

### 4.2 Fastening the elevator machine

- ▷ On the bottom side of the socket are 4 threads.
- ▷ The elevator machine has to be fixed with 4 screws M20 - 8.8 at the mounting plate.  
**Tightening torque M20 - 8.8: 390 Nm**
- ▷ Screw-in depth at least 1.5 times of screw size (minimum 30 mm, maximum 35 mm).
- ▷ Fasten the screws crosswise in at least two steps to the required tightening torque.
- ▷ The permissible unevenness for the mounting surface is 0.1 mm.
- ▷ The mounting surface has to be rigid and robust enough to withstand the forces.
- ▷ For the vibration decoupling of the elevator system, damping elements should be used.

### 4.3 Fitting the ropes



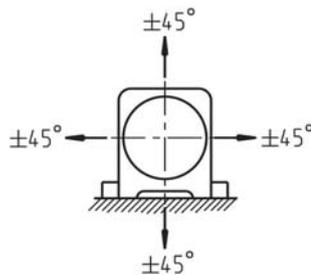
Fitting the ropes

- ▷ If the traction sheave should offer more grooves than the actual number of ropes, the ropes must be applied on the sheave either centred or towards the motor side.

### 4.4 Rope pull



**With side interlocking support, rope pull may be carried out in all directions.  
 Without side interlocking support, rope pull may only be carried out in vertical direction.  
 The rope force direction resulting from rope pull must be observed.**



Resulting rope force  
with lateral form lock support



Resulting rope force  
without lateral form lock support

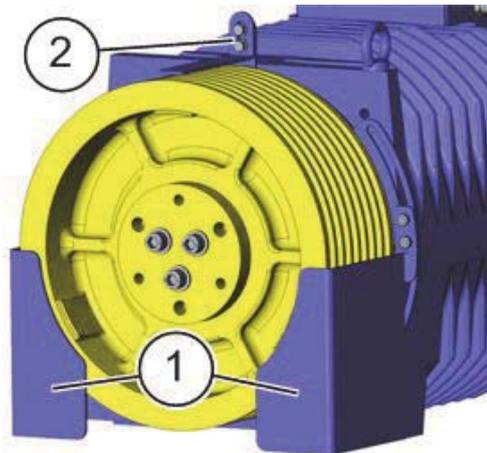
## 4.5 Fastening rope guard



**Warning!**  
**Warning of hand injuries!**



- ▷ Risk of injury from reaching into the rope guard.
- ▷ Do not carry out any activities during operation.
- ▷ Only perform maintenance work on the drive when stopped.

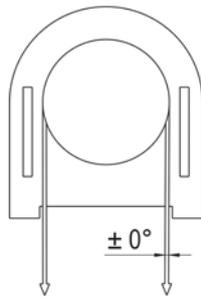


Rope guard

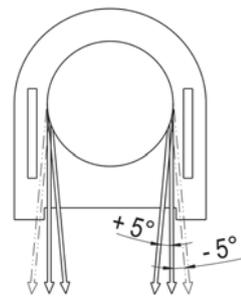
- ▷ The elevator machine is on the right and left fitted with rope guard (1).
- ▷ A 3. rope retainer (2) is optionally available.
- ▷ Set the rope guard to a distance of 2 - 3 mm from the ropes.

### Rope guard adjustability

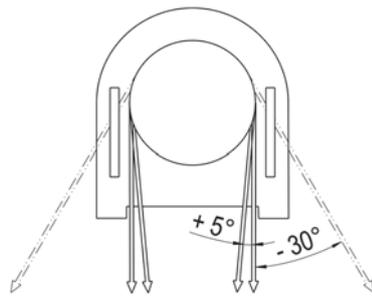
Depending on the rope guard design, the rope departure can be adjusted differently:



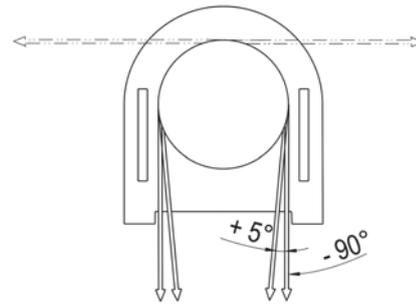
For wrap angle 180°.



Adjustability on both sides  $\pm 5^\circ$ .  
Normal wrap angles 175° - 185°.

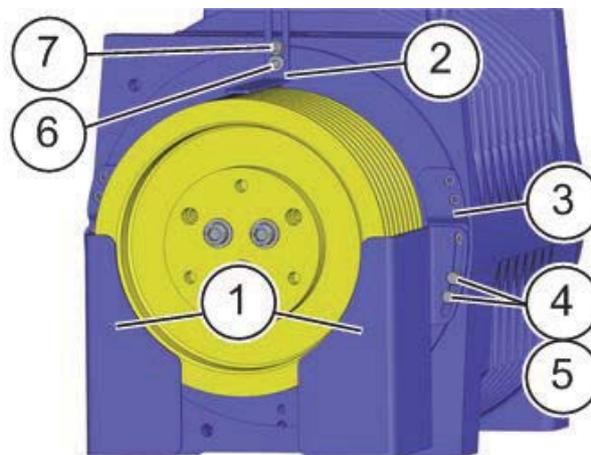


Adjustability on both sides + 5°/- 30°.  
 Normal wrap angles 150° - 185°.



Adjustability on both sides + 5°/- 90°.  
 Normal wrap angles 90° - 185°.

**4.5.1 Rope guard fastening in the case of a traction sheave diameter of 160 mm - 240 mm**  
 Adjustability on both sides + 5°/- 30°. Normal wrap angles 30° - 185°.

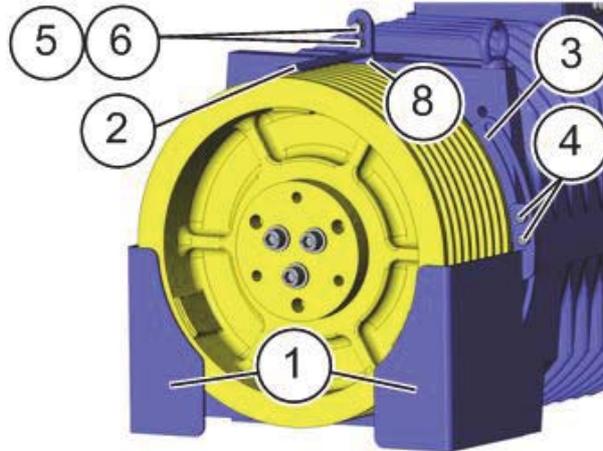


Rope guard in the case of a traction sheave diameter of 160 mm - 240 mm

- ▷ The rope guard (1) is fastened in each case with two hexagon head screws M6 x 12 - 8.8 (4) and washers (5) to the relevant fixing plate (3).
- ▷ The slotted hole in the rope guard (1) enables the required distance to the ropes to be set at the hexagon head screws M6 x 12 - 8.8 (4).  
**Tightening torque M6 - 8.8: 9,5 Nm**
- ▷ The third rope retainer (2) is fastened with two socket cap screws M8 x 20 - 8.8 (6) or in the case of a traction sheave diameter of 240 mm each with one socket cap screw M8 x 20 - 8.8 (6) and one socket cap screw M6 x 20 - 8.8 (7).
- ▷ The slotted hole in the 3. rope retainer (2) enables the required distance to the ropes to be set at the socket cap screws (6) or (7).  
**Tightening torque M6 - 8.8: 9.5 Nm**  
**Tightening torque M8 - 8.8: 23 Nm**

#### 4.5.2 Rope guard fastening in the case of a traction sheave diameter of 320 mm

Adjustability on both sides + 5°/- 30°. Normal wrap angles 30° - 185°.

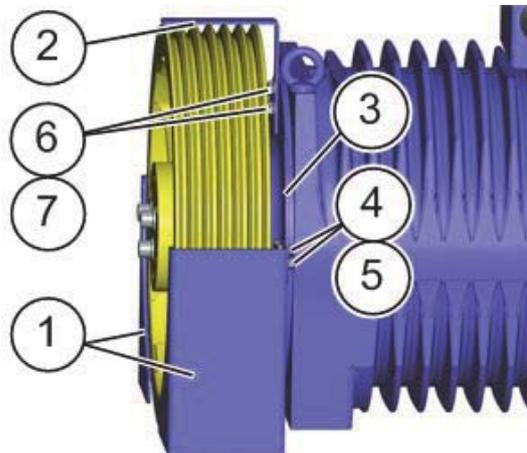


Rope guard in the case of a traction sheave diameter of 320 mm

- ▷ The rope guard (1) is fastened in each case with two socket cap screws M6 x 12 - 8.8 (4) to the relevant fixing plate (3).
- ▷ Through the elongated hole in the fixing plate (3) enables the required distance to the ropes to be set at the socket cap screws M6 x 12 - 8.8 (4).  
**Tightening torque M6 - 8.8: 9.5 Nm**
- ▷ The 3. rope retainer (2) is fastened with two hexagon head screws M6 x 12 - 8.8 (5) and washers (6) to the fixing plate (8).
- ▷ The slotted hole in the 3. rope retainer (2) enables the required distance to the ropes to be set at the hexagon head screws M6 x 12 - 8.8 (5).  
**Tightening torque M6 - 8.8: 9.5 Nm**

#### 4.5.3 Rope guard fastening in the case of a traction sheave diameter of 400 mm and 500 mm

Adjustability on both sides + 5°/- 30°. Normal wrap angles 30° - 185°.



Rope guard in the case of a traction sheave diameter of 400 mm and 500 mm

- ▷ The rope guard (1) is fastened in each case with two hexagon head screws M6 x 12 - 8.8 (4) and washers (5) to the relevant fixing plate (3).
- ▷ Through the elongated holes in the fixing plate (3) enables the required distance to the ropes to be set at the hexagon head screws M6 x 12 - 8.8 (4).  
**Tightening torque M6 - 8.8: 9,5 Nm**
- ▷ The third rope retainer (2) is fastened with two hexagon head screws M8 x 16 - 8.8 (6) and washers (7) to the housing.
- ▷ The slotted hole in the 3. rope retainer (2) enables the required distance to the ropes to be set at the hexagon head screws M8 x 16 - 8.8 (6).  
**Tightening torque M8 - 8.8: 9.5 Nm**

## 4.6 Patent situation

**Note the patent situation when using elevator machines in a shaft. When using the ZAtop SM200.40D/SM200.45D in line with our installation suggestions there are no patent problems. In case of doubt, please contact ZIEHL-ABEGG SE.**

- ▷ When installing the elevator machine in the elevator shaft, the elevator machine can be placed in the shaft head, with the drive shaft parallel to the nearest wall.
- ▷ The elevator machine must not be hanged over the cabin.
- ▷ The elevator machine should be fastened at the framework, Halfen cast-in channels or girders. The elevator machine must not be placed or fastened onto all four guide rails.
- ▷ If the girder that supports the elevator machine is attached to a wall, the elevator machine must be attached in a standing position. A hanging fastening is not permissible!

# 5 Electrical installation

## 5.1 Safety precautions

Work on electric components may only be carried out by trained electricians or by persons instructed in electricity under the supervision of an electrician in accordance with electrical engineering regulations.

A second person must always be present when working on energized parts or lines who disconnects in case of emergency.

Electrical equipment must be checked regularly: Loose connections are to be re-tightened and damaged lines or cables must be replaced immediately.

Always keep switch cabinets and all electrical supply facilities locked. Access is only allowed for authorized persons using a key or special tool.

Never clean electrical equipment with water or similar liquids.

## 5.2 EMC directive

Compliance with the EMC directive 2014/30/EU only applies to this product if frequency inverters tested and recommended by ZIEHL-ABEGG SE are used and they are installed in line with the associated operating instructions and are EMC-compatible. If this product is improperly integrated into a system or is combined and operated with non-recommended components, the manufacturer or operator of the complete system is solely responsible for compliance with the EMC directive 2014/30/EU.

## 5.3 Motor

CAUTION!

- ▷ **The motor cable for the elevator machine is available as an option.**
- ▷ **The elevator machine may not be connected to the supply voltage without a frequency inverter.**

### 5.3.1 Cable cross section

The cable cross-section must be specified dependent on the motor current and the ambient conditions (e.g. temperature, wiring method) in accordance with DIN VDE 0298-4.

### 5.3.2 Type of cable

Always use shielded cables for the motor connections! Both rigid and flexible lines can be installed.

The use of wire-end sleeves is recommended for flexible lines.

Rated voltage  $U_0 / U$ : 450 / 750 V AC

### 5.3.3 Cable length

The maximum cable length is 25 m. With a motor line **> 25 m** compliance with DIN EN 12015 (Electromagnetic Compatibility - Interference emissions) and DIN EN 12016 (Electromagnetic Compatibility - Interference immunity) can no longer be guaranteed.

### 5.3.4 Mechanical connection conditions

Rated motor current [A]	Thread Terminal board	Thread Cable gland
up to 20	M8	M25
> 20 - 35	M8	M32
> 35 - 63	M8	M40
> 63 - 80	M8	M50
> 80 - 100	M10	M50
> 100 - 125	M10	M63
> 125	M12	M63

Permissible tightening torque for M8 bolts: 6 Nm  
 Permissible tightening torque for M10 bolt: 10 Nm  
 Permissible tightening torque for M12 bolt: 15.5 Nm

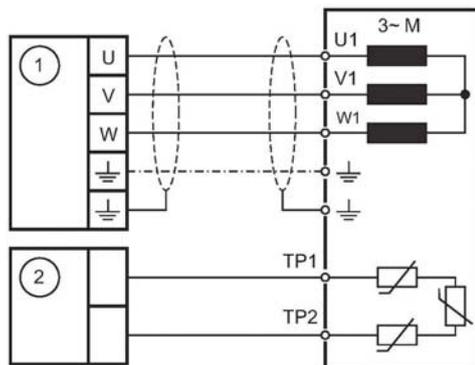
### 5.3.5 Connection



#### Danger!

The motor cable must be connected to the correct phase of the frequency inverter and the elevator machine: U -> U / V -> V / W -> W.

If the actual direction of travel does not correspond to the selected direction, the turning direction of the elevator machine must be changed in the frequency inverter configuration. If the motor cable is not connected to the correct phase, control of the elevator machine is not possible. It can result in jerky movements or uncontrolled acceleration of the elevator machine.

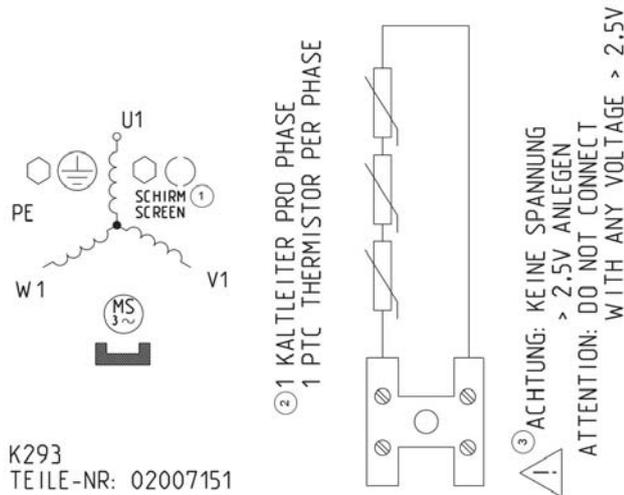


1 Frequency inverter  
 2 Motor temperature monitoring

### 5.3.6 Temperature monitoring

- The PTC thermistor motor protection must be connected.
- Only connect to monitor inputs approved for PTC thermistors.
- Maximum permissible test voltage for PTC thermistors 2.5 V DC.

### 5.3.7 Connection diagram



- 1 Shielding
- 2 1 PTC thermistor per phase
- 3 Attention: Do not apply any voltage > 2.5 V!

### 5.4 Absolute encoder



#### Attention!

- ▷ Never touch the connection contacts on the position absolute encoder or on the cable! The electronics can be destroyed by static electricity.
- ▷ You must discharge your own body before touching. This can be done, for example, by touching a conductive, earthed object (e.g. bare metal switch cabinet parts) immediately before.
- ▷ Operation of the elevator machine without an absolute encoder is not permissible.

#### Note:

Removal of the absolute encoder is only possible from the rear. Due to the extremely low failure rate of the absolute encoder, this does not represent a problem.

#### 5.4.1 Cable length

- Cable length maximum 25 m
- Shielded twisted pair cable

#### 5.4.2 Contact assignment

SV120 circular connector to absolute value encoder ECN1313 (ZIEHL-ABEGG SE Standard)

Pin	Signal	Designation
A	DATA	Data line for communication with the absolute encoder
B	DATA /	Data line inverse
C	5 V sensor up	Sensor cable for encoder voltage (5 V positive)
D	5 V up	Controlled +5 V voltage supply (positive)
E	0 V un	Ground voltage supply absolute encoder (negative)
F	B+ (sine)	Analog track B (sine)
G	CLOCK /	Clock signal invers
H	CLOCK	Clock signal for serial transfer
J	0 V sensor un	Sensor cable for encoder voltage (negative)
K	A+ (cosine)	Analog track A (cosine)
L	A- (cosine inverse)	Analog track A invers (cosine invers)
M	B- inverse (sine inverse)	Analog track B invers (sine invers)

### 5.4.3 Offset

- ▷ Unless otherwise agreed, the absolute encoder offset is set to 0. This is achieved by connecting DC voltage with **U to +** and **V and W to -**.
- ▷ The absolute encoder may not be mechanically detached to ensure that the factory settings are not lost. If the absolute encoder has been detached, a new absolute value encoder calibration must be performed with the frequency inverter. For details of the procedure, refer to the frequency inverter operating instructions.

## 5.5 Brake

Brake type ERS VAR07 SZ800/800

- Also refer to the operating instructions for the brake.

### 5.5.1 Application

- The brakes are intended for static applications as holding brakes. Dynamic braking must be restricted to emergency and inspection braking. No wear occurs on a holding brake. This means that the brake is maintenance free, and only the air gap has to be checked as described in the "Maintenance and repair - Inspection intervals - Checking the air gap" chapter.

### 5.5.2 Mechanical releasing

Mechanical release of the brakes is possible.

The mechanical hand release is optional and can be added afterwards.

The brake circuits can be opened separately with mechanical hand release.

### 5.5.3 Release monitoring

- The brake release monitoring serves as monitoring for redundancy and the operation status of the brakes.
- Release monitoring of the brakes is carried out by a microswitch. For technical data, see chapter "Enclosure - technical data - microswitch".

### 5.5.4 Modulation

#### 5.5.4.1 Contactorless - ZAsbc4

Electronic and noise-free activation of the brake.

The brake operating mode is set on site.

For information on installation and commissioning, refer to the ZAsbc4 operating instructions.

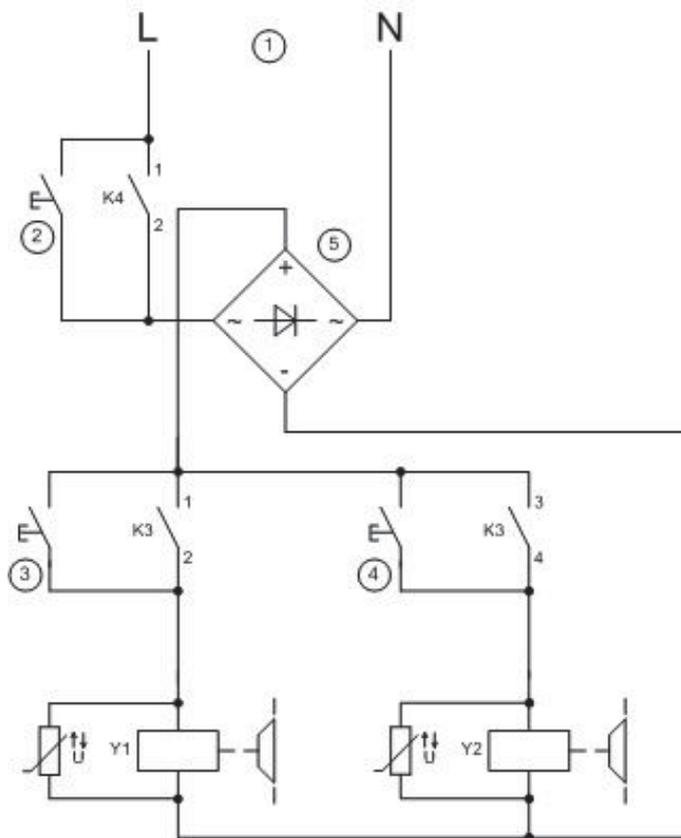
#### 5.5.4.2 Electromechanical contactors

Brake type	ERS VAR07 SZ800/800
Operating voltage	207 V
Rectifier	Bridge rectifier*

\* *Bridge rectifier is not included in the scope of supply, it is available as option from ZIEHL-ABEGG as article 00154988*

To reduce noises during brake disconnect the brakes should be switched to the alternating current side (K4), while normal operation. The brakes are switched-off slower and thus quieter through the rectifier.

To ensure instantaneous brake engagement in emergencies, during inspection runs and return runs, a second contactor (K3), which disconnects the brake on the direct current side, is used. This contactor is to be switched depending on the safety circuit.



Simplified diagram for brake control

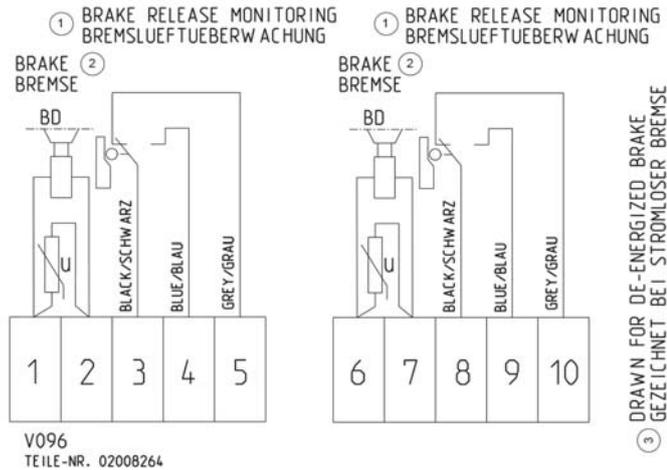
- 1 Voltage supply
- 2 Button two circuit test
- 3/4 "Open brake" button
- 5 Rectifier
- K3 Brake contactor, activated by safety circuit
- K4 Brake contactor, activated by control or frequency inverter

### 5.5.5 Connection

- The terminal box for the brake may be removed from the elevator machine and mounted on site for a better attainability.
- The brake is only allowed to be supplied with power when fastened to the motor and after having connected the protective conductor of the motor at the control and the motor side.
- The brakes must be protected with varistors against overvoltage from switching operations. The varistor must lie directly on the coil or its connections.

### 5.5.6 Connection diagram

Brake wiring diagram with micro switch



- 1 Brake release monitoring
- 2 Brake
- 3 Shown with currentless brake

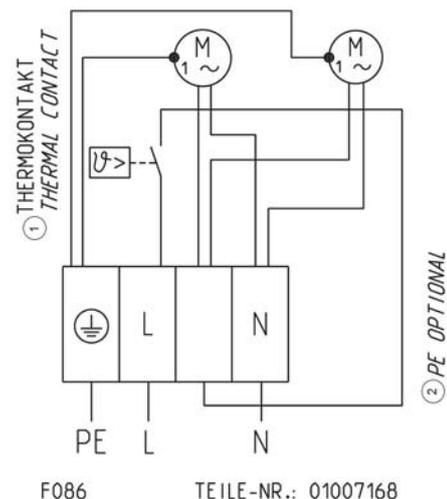
### 5.6 Forced ventilation

The forced ventilation is optional and can be added afterwards.

#### 5.6.1 Technical data

Operating voltage	220 - 240	[V]
Frequency	50 / 60	[Hz]
Power	2 x 20 / 19	[W]
Current	2 x 0.125 / 0.11	[A]

#### 5.6.2 Connection diagram



- 1 Thermal contact
- 2 PE optional

## 6 Start-up

### 6.1 Operating conditions

- ▷ The elevator machine must be installed in a not free accessible machine room or a closed hoist-way.
- ▷ Be aware of the protection class specified on the name plate.
- ▷ Do not operate the elevator machine in an explosive atmosphere.
- ▷ Please contact ZIEHL-ABEGG SE in case of orders deviating from the corresponding application conditions.

### 6.2 First Start-up

Before first-time start-up, check the following:

- ▷ Installation and electrical connection have been properly completed.
- ▷ Safety devices are installed.
- ▷ All leftover installation materials and other foreign materials have been removed.
- ▷ The protective earth is connected.
- ▷ Motor protection correctly connected and operative.
- ▷ Cable entries closed.
- ▷ Mounting, installation position and accessories are o.k.
- ▷ Connection data corresponds to the data on the name plate.

### 6.3 Tests

Tests on elevator systems can be performed by the assembly company or a certification authority or organisation. This involves discovering of failure-critical and hazardous conditions. The relevant operator is responsible for safety. The descriptions below are intended as recommendations for the technical procedure and do not deal in sufficient depth with safety engineering aspects of the relevant system. Therefore, priority is given to the safety engineering specifications of the assembly company or operator. Only trained specialist personnel may carry out tests.

#### 6.3.1 Half load test with current measurement

The test for the 50 % weight compensation should preferably be carried out as follows:

- ▷ The motor current is to be measured in both travel directions with a half load.
- ▷ The measured currents should correspond as closely as possible.
- ▷ The difference between the measured currents should not show a variation of more than 10 %.

#### Half load test with release of the brake only

- ▷ The shorting circuit, if installed, should be disabled for the duration of the half load test.
- ▷ With a half load and the brake released, the car may not move.
- ▷ After the half load test, the shorting circuit is to be reactivated.

#### 6.3.2 Testing the brake in accordance with EN 81-20:2014

- ▷ When testing the brakes, the short-circuit wiring has to be deactivated to only test the effect of the brake.
- ▷ It is recommended to perform the tests when the car position is about in the middle of the shaft.

##### 1. Overload

- ▷ The test shall be carried out whilst the car is descending at rated speed with 125 % of the rated load and interrupting the supply to the motor and the brake.

##### 2. Failure of one brake circuit:

- ▷ The test shall be carried out whilst the car is descending at rated speed with rated load.
- ▷ To simulate failure of a brake circuit, it must be possible to keep the brake circuits open mechanically independently of one another even when opening the safety circuit.
- ▷ This condition may not be permanent and must therefore be created using buttons or similar.
- ▷ At the same time, the safety circuit should be opened when using this function.
- ▷ For this test, the elevator must be observed.
- ▷ If no discernible delay occurs, the brake circuit held open is to be closed immediately.
- ▷ The system should be stopped and the brake tested.

As an example, refer to the principle circuit diagram in the “Electrical installation / Brake / Brake control” chapter. The logic of the principle circuit diagram should be understood. Transferability to the relevant application must be verified and ZIEHL-ABEGG SE provides no guarantee of suitability.

If the circuit is designed in accordance with the principle circuit diagram:

- ▷ At the nominal speed, press one of the buttons and hold it down until the elevator has stopped.
- ▷ Repeat the test with the other button to test the second brake circuit.

### **3. Testing the microswitches / inductive proximity switches**

- ▷ The release monitoring for the brakes must be evaluated.
- ▷ Before every trip, the change in the state of both brake circuits must be monitored separately.
- ▷ Switching must thus be tested individually, according to the function as an NC and/or NO contact.
- ▷ If there is a missing or incorrect signal, the elevator cabin may not leave the stopping point.

## **6.4 Pull out of safety gear**

If the car loaded with the nominal load enters the trap due to a malfunction or during the TÜV certification, it is possible that the trap device is seated rather firmly. In such a case, it is entirely possible that the elevator machine torque is no longer sufficient to pull the car out of the trap.

With gearless elevator machines in the shaft, the elevator machine is usually not accessible. A handwheel is unnecessary in such a layout.

With gearless elevator machines in machine rooms, a handwheel does not make any sense because there is no gear reduction. That is because due to the low moment arm of force, only slight force can be applied. A handwheel could even present a hazard, as even with only a slight imbalance in the installation, it is no longer possible to stop the elevator with the handwheel.

For both cases involving gearless elevator machines:

- ▷ If the elevator machine torque or the driving capability is not sufficient, a block and tackle or similar should be used.
- ▷ It is advisable to have a suitable block and tackle on hand for the TÜV inspection.

### **Information**

Note that an overload in the car leads to an increase in the motor torque. 25 % overload results in 150 % of the required motor torque! As regulated elevator machines are normally designed for a maximum torque of ca. 170 - 200 % rated torque, only slight reserves are available during such special cases.

Correspondingly, section **6.3.4 "Capture device on the cabin"** in **EN 81-20:2014** must be followed: "To enable the cabin to be lifted out of the trap more easily, we recommend performing the test close to a door so that the load can be removed from the cabin there."

## **6.5 Emergency evacuation**



### **Attention!**

The measures for emergency evacuation described below may only be performed by instructed persons for maintenance of the elevator or qualified personnel of elevator companies.

### **6.5.1 Emergency evacuation by release of the brakes**

In case of power failure or failure of the recovery control, emergency rescue is only possible by releasing the brakes. The brake can be released by an electrical emergency power supply or, if available, by a manual hand release.

When the brakes are released manually, the elevator moves in the direction of the greater weight. If there is a balance between the cabin and the counterweight, the cabin must be made heavier by suitable means.

To reduce the acceleration of the elevator, we recommend short-circuiting the motor windings for the evacuation. The short-circuit is generated by the motor contactors or an electronic circuit, as in the ZAdyn 4. This is always effective even in the event of a power failure.

The short-circuit generates a speed-dependent braking torque. The maximum braking torque is achieved at lower speeds.

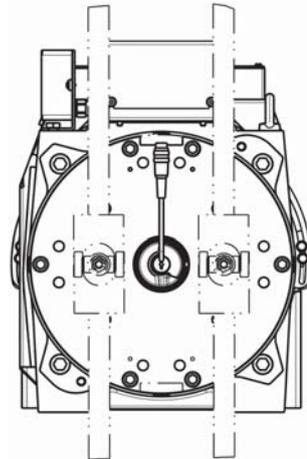
**Depending on the system type and weight ratios, it is possible that due to the short-circuit generated braking torque is not sufficient to limit the lift speed. So the speed must be monitored closely during evacuation and evacuation interrupted if necessary.**

Releasing of the brake can be ended when a floor is reached. Now the elevator door can be opened with a triangular key.

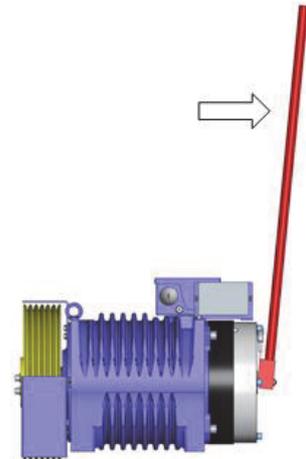
**The elevator manufacturer's safety instructions have priority!**

### 6.5.2 Releasing of the brake with the lever for hand release

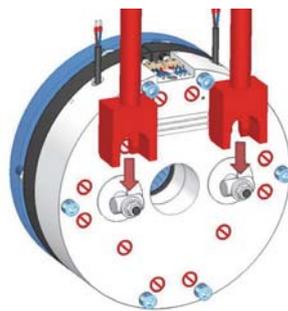
The levers for hand release are optional and can be added afterwards.  
 The levers for hand release can be inserted with an offset of 180°.



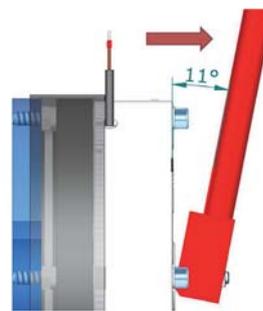
Possible insertion positions  
of the levers for hand release



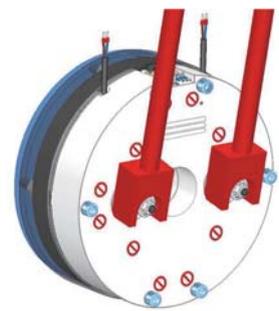
Brake manuell released  
Example for hand release lever position



Attach levers for hand release



Pull lever for hand release 1



Pull lever for hand release 2

- ▷ Attach the levers for hand release to the brake.
- ▷ Pull the levers for hand release to open the brake.



#### **Danger!**

High force for mechanical release of the brake is required!  
 The levers for hand release must be removed after brake hand release action.

### 6.5.3 Releasing the brake with electric emergency power supply (UPS)

By means of an uninterruptible power supply (UPS) the brake can be opened electrically. For this purpose, for example, the existing dual circuit testing buttons can be used.  
 See "Brake control principle circuit diagram" in the Brake - Brake control chapter.

### 6.5.4 Automatic emergency evacuation

The automatic emergency evacuation is described in the operation instructions of the control, the frequency inverter and, if available, an evacuation unit with UPS.

## 7 Faults and remedy

### Excessive temperature / Temperature protection trips

Fault	Causes	Adjustment
Noises on elevator machine	Bearing defective	Contact customer service
	Wrong setting at the frequency inverter	Check setting at the frequency inverter
	Absolute encoder defective	Change absolute encoder
Excessive temperature / Temperature protection trips	Surface of the elevator machine is covered	Remove cover from drive or mount with more distance to the elevator machine.
	Ambient temperature higher than 40 °C	Enhance shaft ventilation
	Wrong setting at the frequency inverter	Check setting at the frequency inverter
Elevator machine does not start	Motor phases connected incorrect	Check motor connection
	VVVF defective	Check VVVF
	Brake does not release	See brake faults
Elevator machine does not turn when the brake is released	Brake rotor sticks after a long storage time on the armature disk	Release the brake mechanically or remove it and loosen the brake rotor carefully from the armature plate.
Brake switching noises	Brake is switched on the DC-side	Modify the control to AC switching for normal operation. Fit an additional protective circuit.
	Air gap of brake too big	Replace brake rotors (Special tools necessary! Contact ZIEHL-ABEGG SE customer service).
Brake does not release	Power supply too low. The voltage at the brake is too low.	Check supply, if necessary increase cable cross-section (and transformer)
	Brake control wrong / defective	Check brake control
	Brake coil defective	Replace brake (special tool required. ZIEHL-ABEGG SE Contact customer service).
	Brake worn out	Replace the brake rotors (Special tool required! Contact the customer service of ZIEHL-ABEGG SE).
Brake release monitoring does not switch	Micro switches defective	Replace the micro switch
	Contacts dirty	Switch micro switches with a higher contact current, at least 10 mA or change micro-switches

## 8 Service and maintenance

### 8.1 General notes on maintenance

- ▷ Observe the safety-at-work regulations!
- ▷ Disassembling the elevator machine can only be done with special devices!  
**Caution, strong magnetic force!**
- ▷ Never use a high-pressure cleaner (for example steam jet cleaner) for cleaning the elevator machine!
- ▷ Take note of abnormal operating noise.

- ▷ The bearings have a lifetime lubrication. There is no possibility to relubricate. Maintenance is not necessary for the bearings.

To check the brake wear or to check the traction sheave, the following instructions have to be referred:

It is not possible to adjust the brakes. The brakes cannot be readjusted. Replace the both brake rotors when the maximum air gap has been reached.

The brake wear has to be checked with the brake closed, therefore:

- ▷ Make sure that all moving parts have stopped, secure them mechanically if required!
- ▷ Make sure that the elevator can not be moved from any other person than the one who does the check!

## 8.2 Inspection intervals

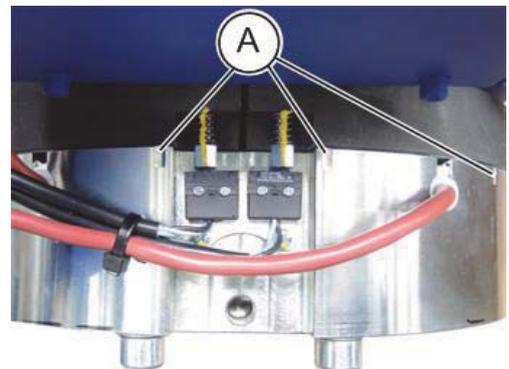
	During commissioning or after the first 3 months	every year
Distance of the rope guard	x	x
Check vibration isolation The thickness of the vibration isolation must be the same on the right and left.	x	x
Checking the air gap of the brake	x	x
Visual inspection of the mounting screws on the housing, brakes and traction sheave. The locking compound must be free of damage.	x	x
Check the traction sheave if worn out		x

Note: All fixing screws on the housing, brakes and traction sheave are marked with locking varnish. That means a loosened screw is optically visible. If a screw does get turned, it must be tightened using the prescribed tightening torque, the old locking varnish needs to be removed and marking has to be made again.

### 8.2.1 Checking the air gap



Air gap measurement position



Air gap measurement

1. If the brake is currentless, the air gap must be checked at eight positions (see arrows), at the respective marks (A). The maximum value from the measurements is taken as the assessment criterion.
2. If the maximum value of the air gap is exceeded on one of the magnets, it must be the brake rotor and the appendant O-ring.

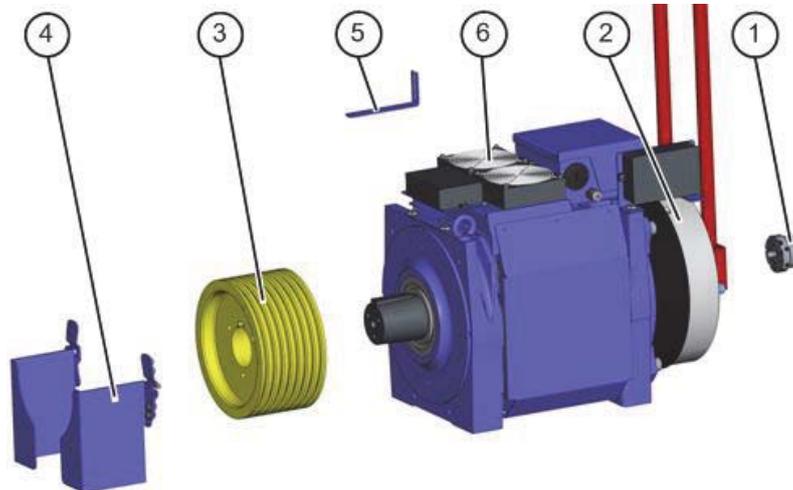
**Maximum admissible air gap after wear: 0.6 mm!**

**Caution!**

**Feeler gaugh do not introduce more than 10 mm into the air gap, to avoid damage to the dampers of noise or deterioration by the springs.**

### 8.3 Spare parts

Spare parts and accessories not supplied by ZIEHL-ABEGG SE have not been tested or approved by us. These parts may be lower in function or quality and there fore can reduce functionality or safety of the elevator machine installation. Will assume no liability or guarantee for damages caused by ZIEHL-ABEGG SE spare parts that are not approved.



#### Available spare parts:

1. Absolute encoder
2. Complete brake
  - 2.1 Brake rotor with O-ring
  - 2.2 Micro switch for brake
  - 2.3 Mechanical hand release of the brake
3. Traction sheave
4. Rope guard
5. Rope retainer
6. Forced ventilation

#### 8.3.1 Replacement of the absolute encoder ECN1313/ERN1387

The absolute encoder is mounted on the motor drive shaft opposite the power take off side (see arrow).



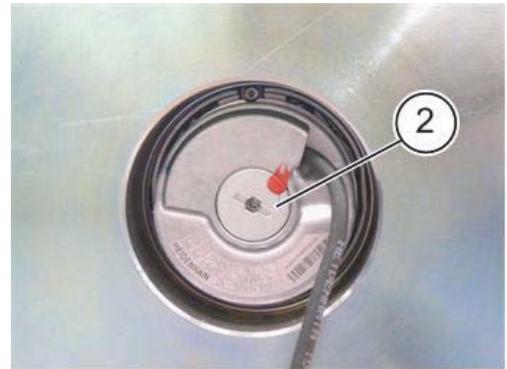
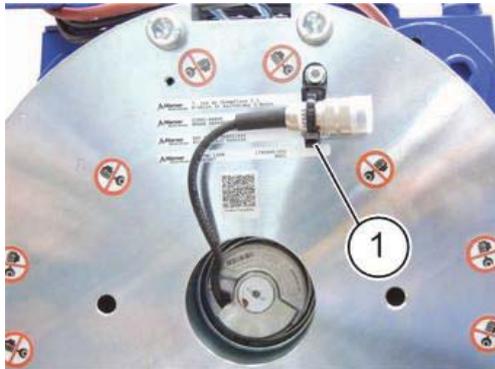
Position of absolute encoder

##### 8.3.1.1 Required tool for the replacement of the absolute encoder:

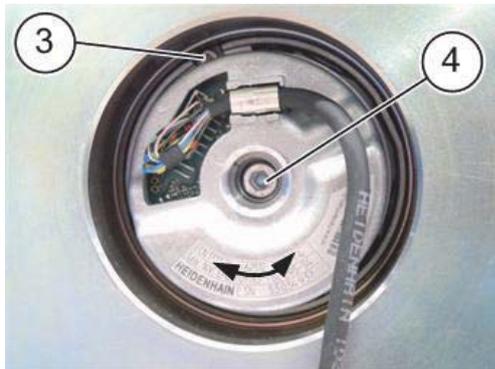
- Wire cutter
- Allen wrench SW 2
- Allen wrench SW 4
- Torque wrench for tightening torque  $5^{+0.5}$  Nm with size 4 Allen key

- Torque wrench for tightening torque 1.25<sub>-0.2</sub> Nm with size 2 Allen key
- Screw M10 x 25 (included in toolkit, article 70027450)

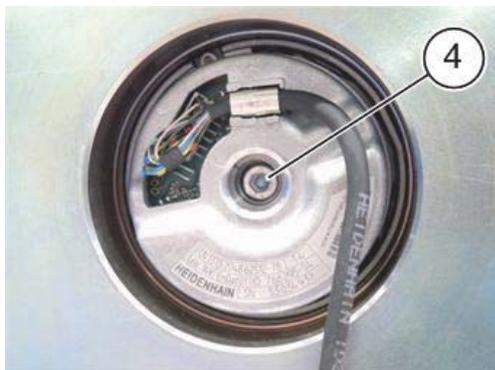
### 8.3.1.2 Dismounting the absolute encoder



1. Disconnect the encoder cable from the housing by removing the cable retainer (1) with the wire cutters.
2. Remove the cover of the encoder (2) with an Allen wrench SW 4



3. Unscrew the clamping screw (3) with an Allen wrench SW 2. The position of the clamping screw can vary.
4. Loosen the central encoder fastening screw (4) by 2 turns using the size 4 Allen key. The absolute value encoder can now be turned.
5. Screw the screw M10 x 25 (5) onto the absolute value encoder with an appropriate tool until the encoder is released. (Screwing in presses the screw onto the central encoder fastening screw (4), thus releasing the absolute value encoder).
6. Unscrew the screw M10 x 25 (5) again.



7. Unscrew the central encoder fastening screw (4) with the size 4 Allen key.
8. Screw the screw M10 x 25 (5) onto the absolute encoder again and use the screw to remove the absolute encoder.

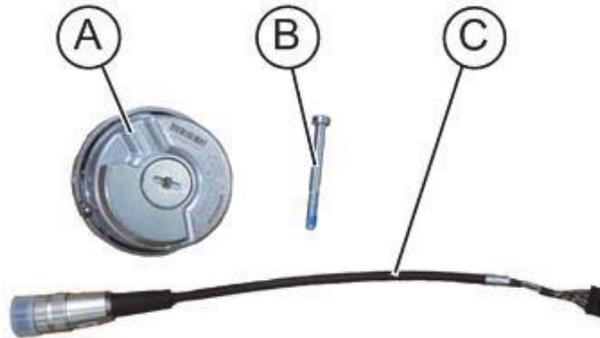


**Attention!**

- ▷ Due to electrostatic discharge the absolute encoder can be destroyed! Do not touch the pins of the encoder cable as well as the electronics of the absolute encoder!
- ▷ You must discharge your own body before touching. This can be done, for example, by touching a conductive, earthed object (e.g. bare metal switch cabinet parts) immediately before.

**8.3.1.3 Pre-assembly of the absolute value encoder**

**Scope of supply for replacement absolute value encoder**

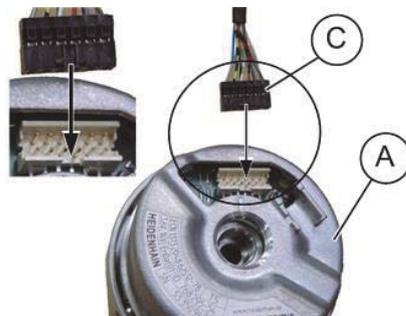


Pos.	Count	Designation
A	1	Absolute encoder
B	1	central encoder fastening screw (self-locking screw M5 x 50 DIN 6912 SW4 - with positive locking) Tightening torque 5+0.5 Nm
C	1	Encoder cable (optional)



**Attention!**

- ▷ Due to electrostatic discharge the absolute encoder can be destroyed! Do not touch the pins of the encoder cable as well as the electronics of the absolute encoder!
- ▷ You must discharge your own body before touching. This can be done, for example, by touching a conductive, earthed object (e.g. bare metal switch cabinet parts) immediately before.





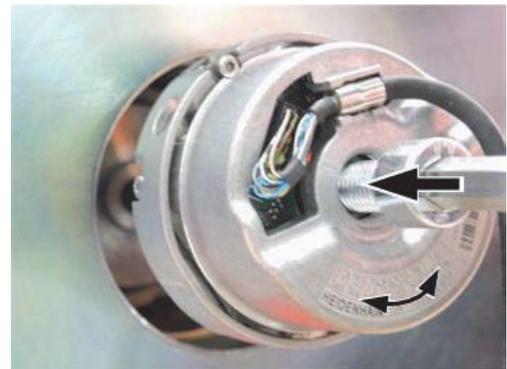
1. Click the socket for the encoder cable (C) into the circuit connector for the absolute value encoder (A). Use the recesses provided.
2. Slide the strain relief for the encoder cable (C) diagonally into the recess on the absolute value encoder (A) as far as it will go and then push in.

### 8.3.1.4 Mounting the absolute encoder

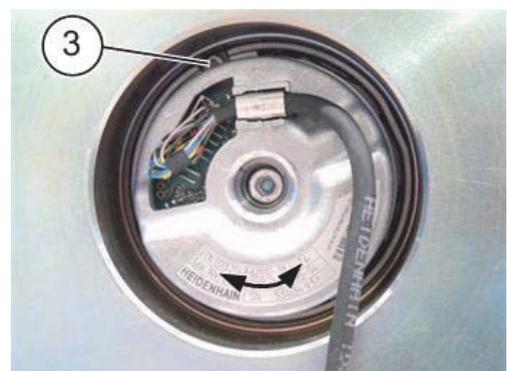
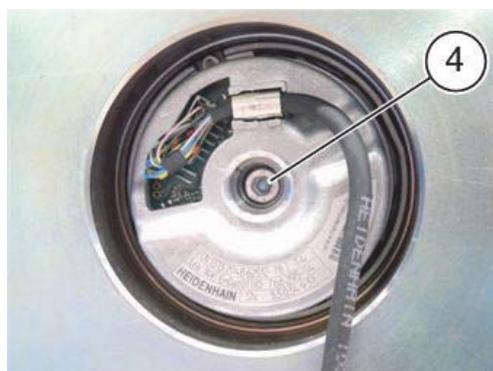


**Attention!**

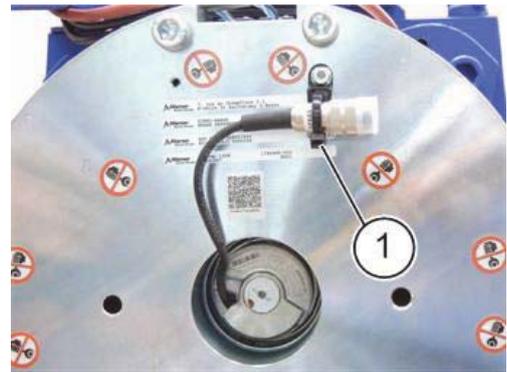
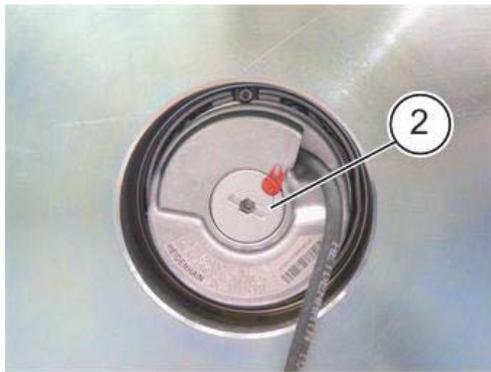
- ▷ Never touch the connection contacts on the position absolute encoder or on the cable! The electronics can be destroyed by static electricity.
- ▷ You must discharge your own body before touching. This can be done, for example, by touching a conductive, earthed object (e.g. bare metal switch cabinet parts) immediately before.



1. The brake is used to centre the absolute encoder.
2. Insert the absolute value encoder into the housing with a slight turning motion.



3. Tighten the central encoder fastening screw (4) with the size 4 Allen key.  
**Tightening torque: 5<sup>+0.5</sup> Nm**
4. Align the cable outlet by rotating the absolute value encoder and tighten the locking screw (3) using the size 2 Allen key. The position of the locking screw may vary.  
**Tightening torque: 1.25<sub>0,2</sub> Nm**



5. Screw on the encoder cover (2) with the size 4 Allen key.  
**Tightening torque: 5<sup>+0.5</sup> Nm**
6. Secure the encoder cable to the brake with cable tie (1).
7. Carry out the alignment of the absolute encoder corresponding to the operation instructions of the frequency inverter.

### 8.3.2 Replacement of the brake

During the mounting as well as the dismantling also the operating manual of the brake has to be observed.



#### Risk of death!

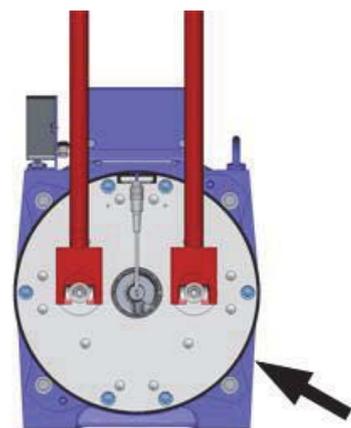
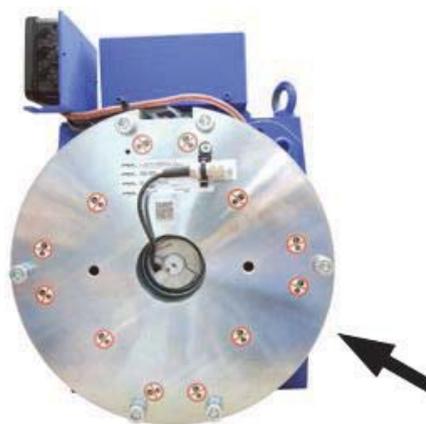
When dismantling the brake make sure that the cabin and the counterweight are mechanically secured against movement!



#### Risk of death!

Incorrect mounting can have a detrimental impact on the braking action.

The brake is mounted opposite the power take-off side (see arrow).



Brake with mechanical hand release system

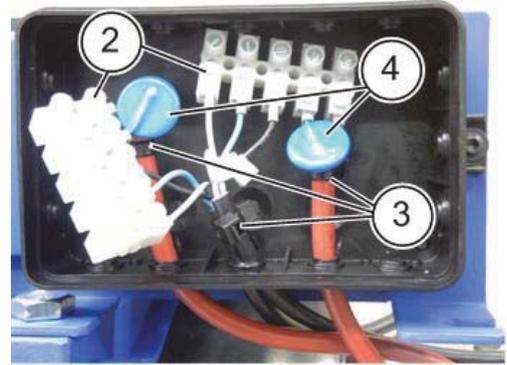
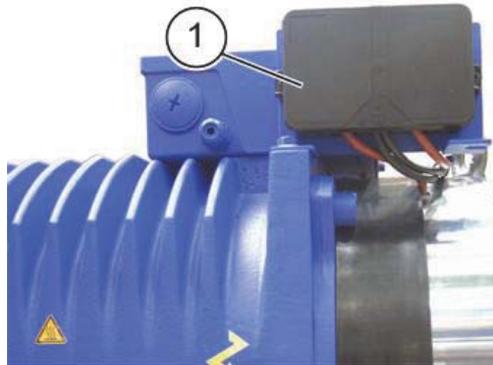
**A brake with a mechanical hand release system is available optionally. The mechanical hand release system can be added afterwards.**

#### 8.3.2.1 Required tool for the replacement of the brake:

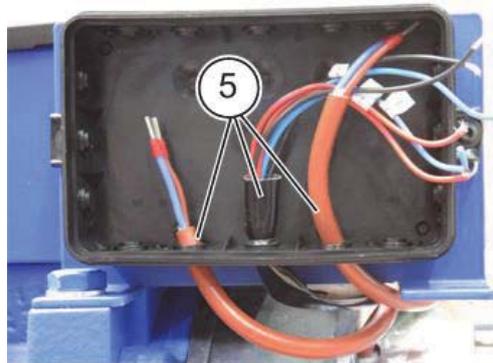
- ZIEHL-ABEGG toolkit article 70027450
- Tool for replacing the absolute encoder (see chapter "Replacement of the absolute encoder")
- Wire cutter
- Cable stripper
- Crimper

- Slotted screwdriver 0.6 x 3.5
- screw wrench SW 32
- Allen key SW 10
- Allen key SW 17
- Torque key for a tightening torque of 111 Nm ( $\pm 10$  Nm) with allen wrench SW 10
- Torque wrench for a tightening torque of 60 Nm with allen wrench SW 17
- Wrench (included in toolkit, article 70027450)
- Assembly shaft (included in toolkit, article 70027450)

### 8.3.2.2 Dismounting the brake



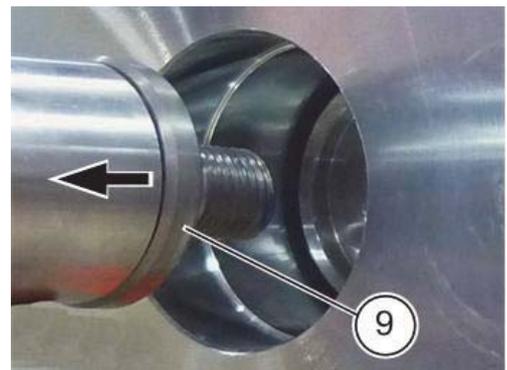
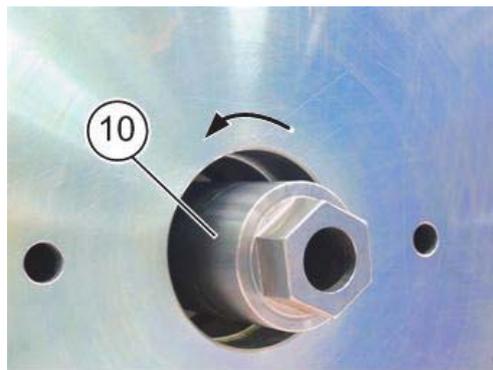
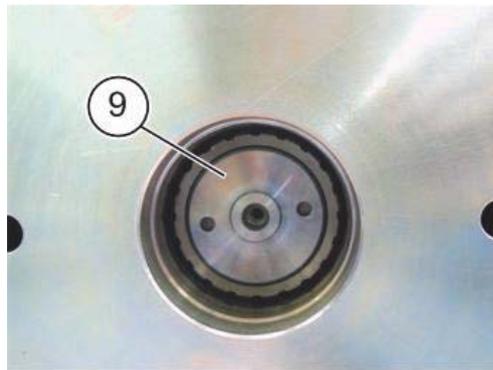
1. Remove the terminal box cover (1).
2. Disconnect the electrical connection (2) of the brake.
3. Carefully remove strain reliefs (3) of all connecting cables with wire cutters.
4. Cut off varistors (4).



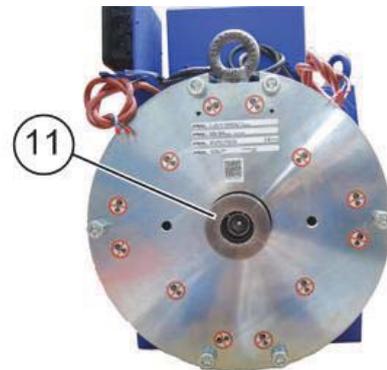
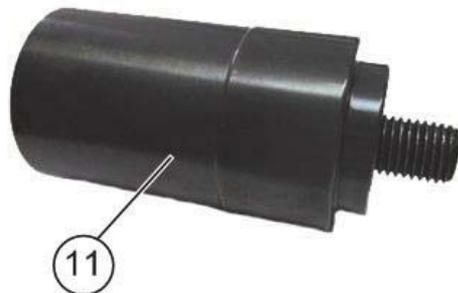
5. Feed all connecting cables (5) out of the terminal box.
6. Remove the cable ties (6) at the brake lines



7. Dismount the absolute encoder (7) (see chapter "Replacement of the absolute encoder").
8. Remove the cover ring (8).

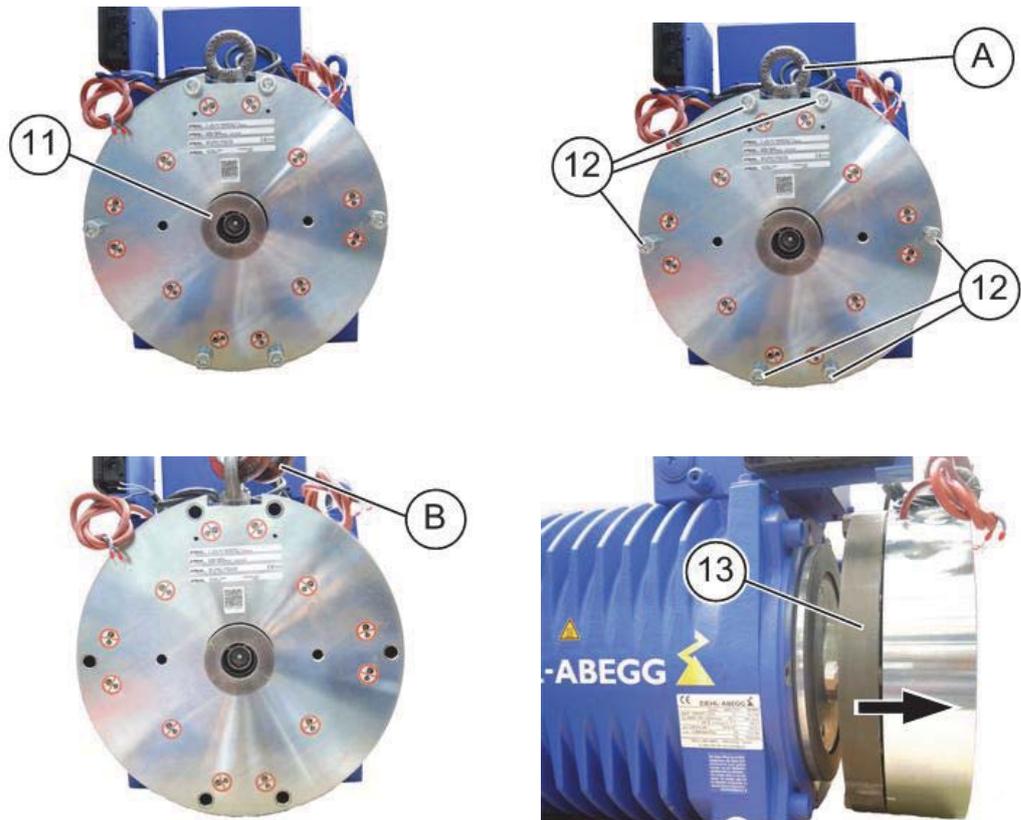


9. Unscrew adapter shaft (9) from the motor shaft with wrench (10) and screw wrench SW 32.



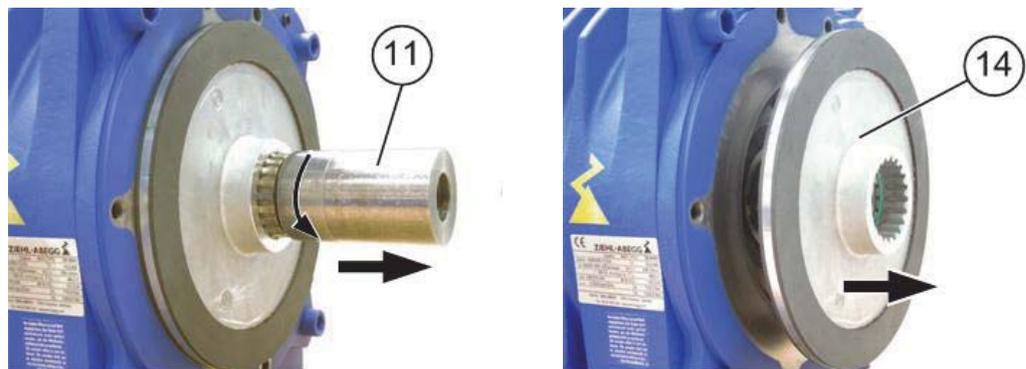
10. Screw the assembly shaft (11) with tightening torque using the allen wrench size 17 onto the motor shaft.

**Tightening torque: 60 Nm**



11. **Caution:** Due to the great weight of the brake, we recommend you to secure and change the brake by using an eye bolt M12 (A) and appropriate lifting gear (B).
12. The socket cap screws M12 (12) are released alternately diagonally step by step using the Allen wrench size 10.
13. Take off the brake (13).

**WARNING! The brake weighs approx. 50 kg**



14. Unscrew the assembly shaft (11) using the allen wrench size 17.
15. Remove the brake rotor (14) from the toothed motor shaft. The brake rotor may only be removed manually.

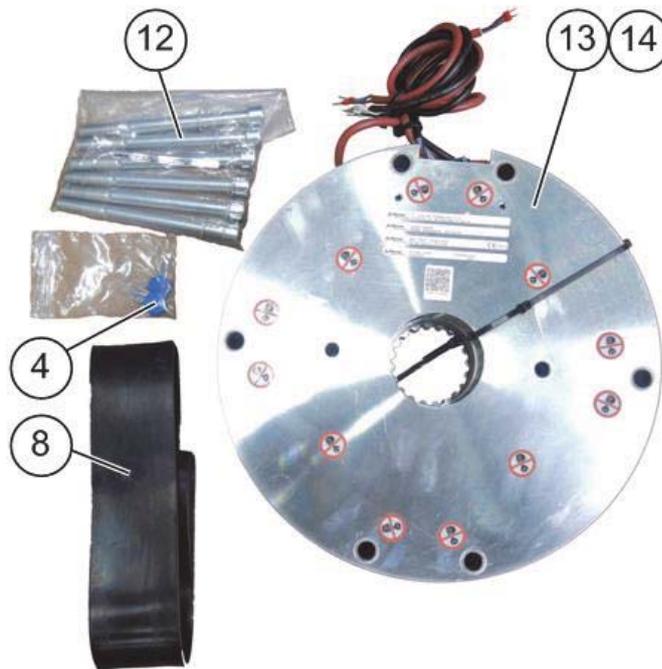
**ATTENTION! Do not work with screwdrivers to loosen the brake rotor!**

The friction lining can be damaged by the screwdrivers! Brake discs with damaged friction linings may not be mounted any more!

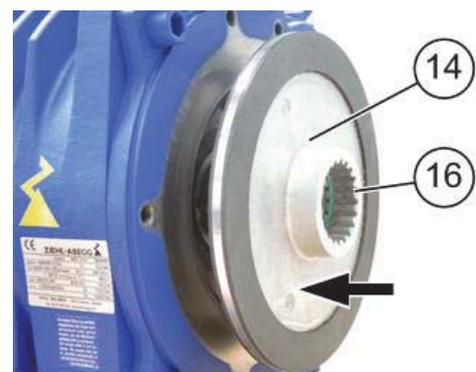
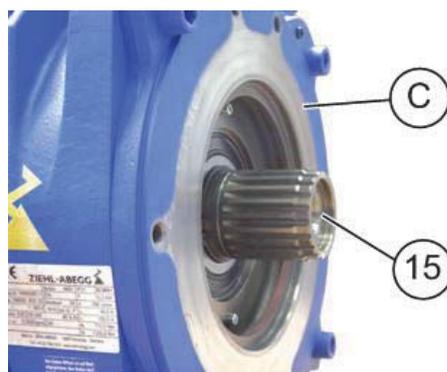
### 8.3.2.3 Mounting the brake

Brakes with retrofitted mechanical hand release system, please observe the chapter "Retrofitting mechanical hand release system"

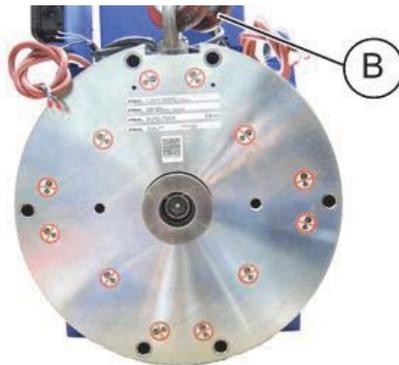
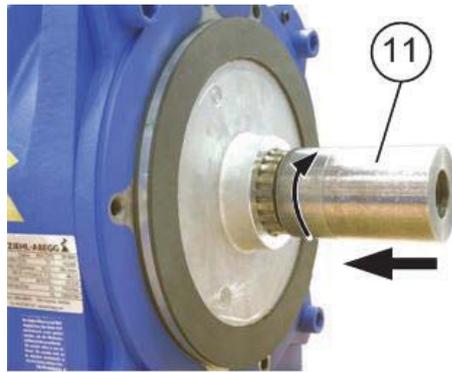
#### Scope of delivery for brake replacement



Pos.	Count	Designation
4	2	Varistor and accessories
8	1	Dust cover
12	6	Socket cap screw M12 with washer
13	1	Brake
14	1	Brake rotor with O-ring

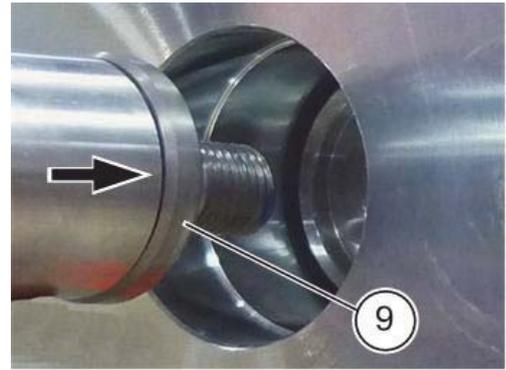


1. Ensure that the friction disk of the brake rotor (14) and the braking surface (C) from the flash bearing bracket of the motor is free of dirt and grease.
2. Push the brake rotor (14) onto the toothed motor shaft (15) with slight pressure.  
**ATTENTION!** It must be noted that:  
 The stepped brake rotor collar (16) must face to the machine wall.
3. Make sure that the gear teeth engage easily.
4. O-ring may not be damaged.

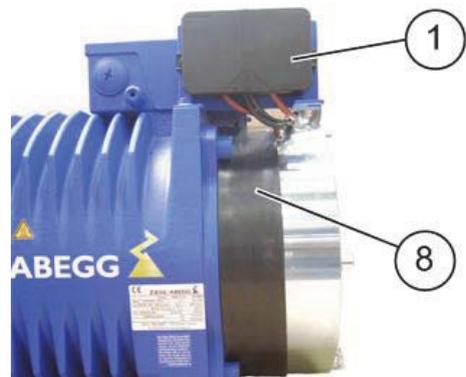
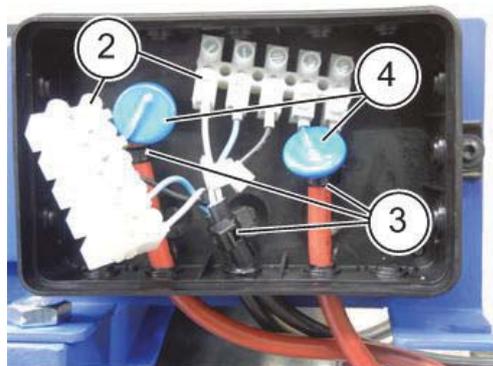
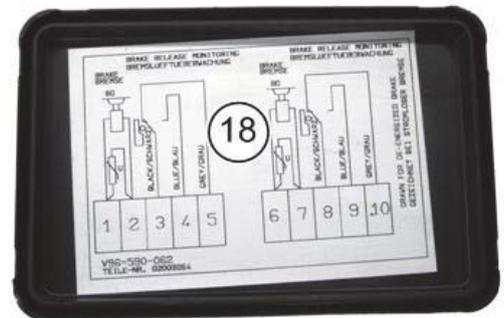
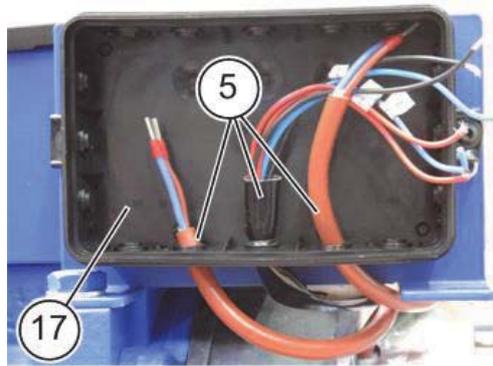


5. Screw the assembly shaft (11) with tightening torque using the allen wrench size 17 onto the motor shaft.  
**Tightening torque: 60 Nm**
6. **Caution:** Due to the great weight of the brake, we recommend you to secure and change the brake by using an eye bolt M12 (A) and appropriate lifting gear (B).
7. Push the brake (13) onto the assembly shaft (11).  
**ATTENTION! Weight of the brake approx. 50 kg**
8. Secure the socket cap screws M12 (12) with Loctite 243 thread-locker.
9. Fasten the brake evenly step by step with six socket cap screws M12 (12) in a crosswise sequence.  
**Tightening torque: 111 Nm**  
**Do not forget the washers!**
10. Coat the socket cap screws (12) with locking varnish.





11. Release assembly shaft (11) loosen with an allen wrench SW 17 and take it off the motor shaft.
12. Provide threadlocker Loctite 243 or a similar product to the thread of the adapter shaft (9).
13. Screw the adapter shaft (9) onto the motor shaft with wrench (9) and screw wrench SW 32  
**Tightening torque: 60 Nm**



14. Bundle the connection cables (5) of the magnet coils and the release monitoring and lead it into the terminal box (17).
15. Connect the magnet coils, the release monitoring and the varistors (4) according to the wiring diagram (18) in the top cover of the connection box (17).
16. Fit strain reliefs (3).
17. Close the cover on the connection box (1).
18. Fit dust cover (8).
19. Mount the absolute encoder (see chapter "Replacement of the absolute encoder").

#### 8.3.2.4 Function check of the microswitches for the release monitoring

After the mounting of the brake, the function of the micro switches shall be checked.

1. Connect the circuit inductor to the connecting terminals 3/4 and 8/9 respectively (normally open contact).
2. Check the function of the micro switch:
  - Brake de-energised: contact is open.
  - Brake energised: contact is closed.

3. If the function is not given, the micro switches have to be adjusted (see chapter "Adjusting the micro switches for the release monitoring").

### 8.3.2.5 Adjusting the micro switches for the release monitoring



The adjusting is only necessary if the micro switches are not working correctly.  
 The micro switches are on the top of the brake (see arrow).

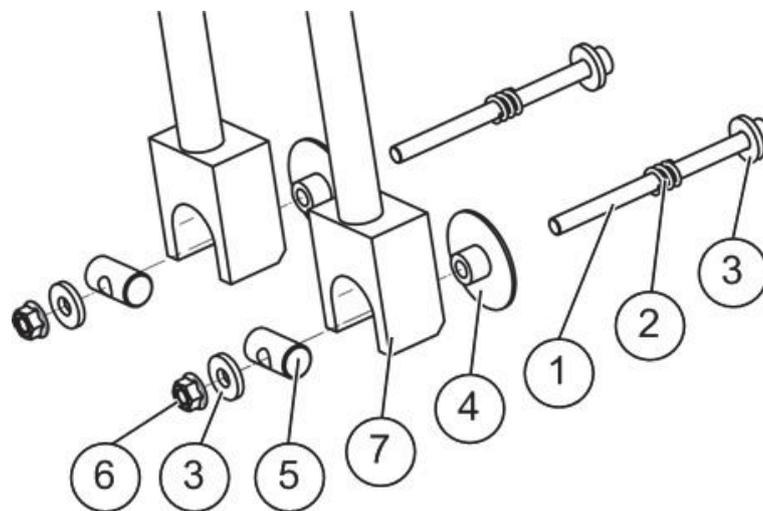
**WARNING! Ensure that you select the appropriate micro switch for the magnet to be adjusted.**  
 For adjustment of the release monitoring with microswitch, see in the enclosure, chapter "Brake operating instructions - microswitch adjustment".

### 8.3.2.6 Retrofitting the hand release system

**Required tools for the retrofitting of the hand release system:**

- Tool for replacing the absolute encoder (see chapter "Replacement of the absolute encoder")
- Tool for replacing the brake (see chapter "Replacement of the brake")
- 4 Feeler gauges 2 mm

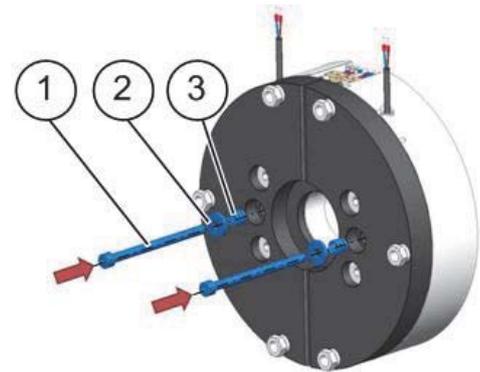
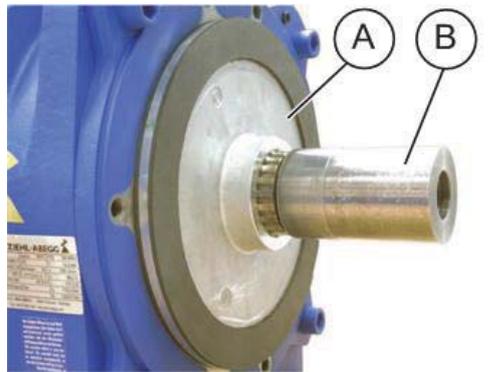
**Scope of delivery for subsequent attachment of hand release**



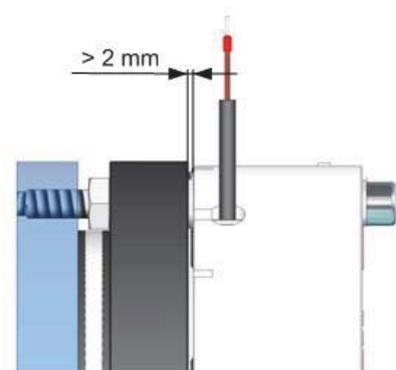
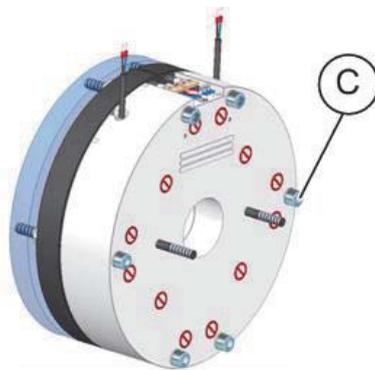
Pos.	Count	Designation
1	2	Socket cap screw M10 x 140 - 12.9
2	4	Washer
3	2	Spring
4	2	Support flange
5	2	Lever axle
6	2	Hexagon flange nut M10
7	2	Removable lever

The accessory parts items 1 - 6 are packed in a bag and attached to the removable levers.

**Mounting the hand release system:**

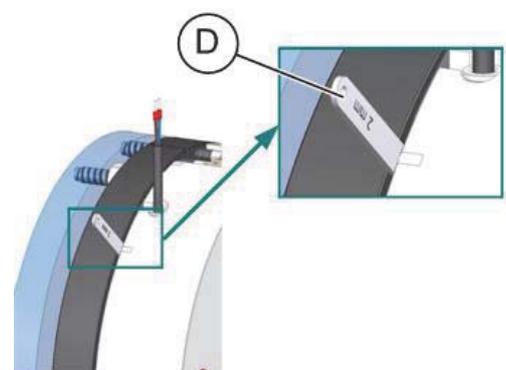
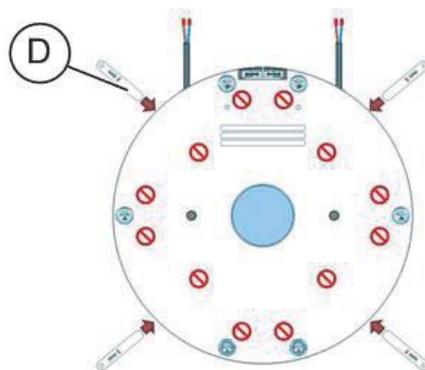


1. Dismantle brake and absolute encoder (see chapter "Dismantling of the brake" - Step 1 - 13). The brake rotor (A) and the assembly shaft (B) remain on the motor.
2. Insert both socket cap screws M10 x 140 - 12.9 (1) with washers (2) and springs (3) into the appropriate bore holes (1).



3. Secure the socket cap screws M12 (C) with Loctite 243 thread-locker.
4. Tighten the brake slightly with the six socket cap screws M12 (C) until the screw head is in contact with the coil body.

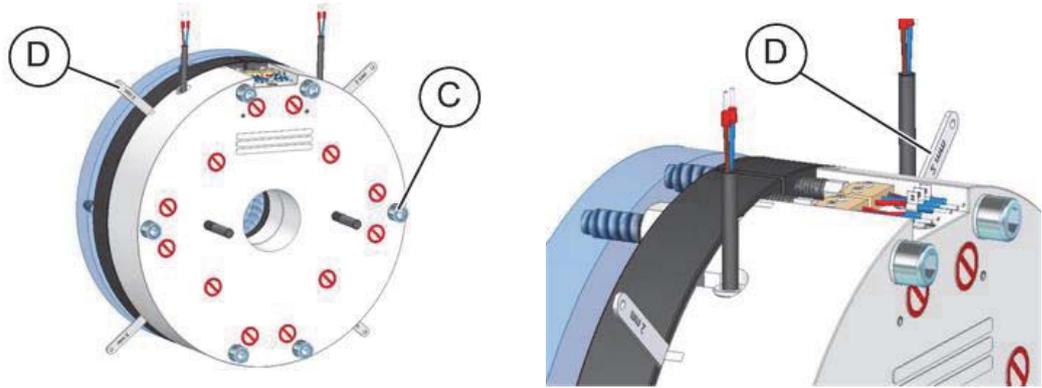
**It must be ensured that the air gap is more than 2 mm!**



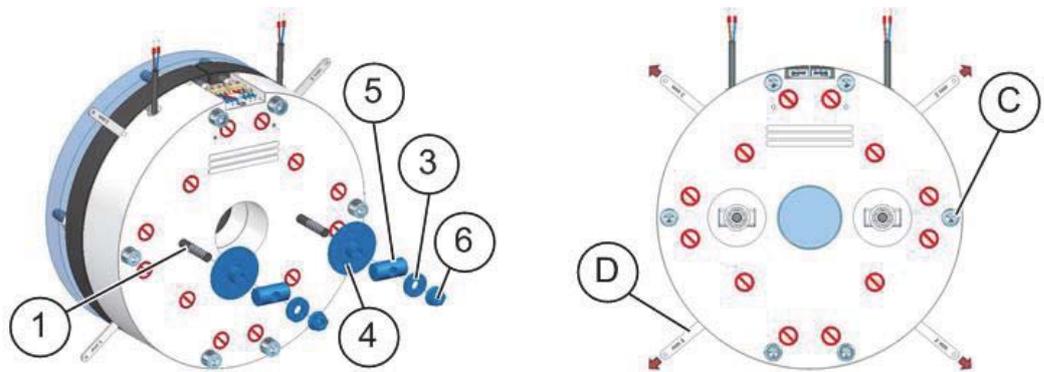
5. Insert 4 x 2 mm feeler gauges (D) into the air gap at the positions marked. If that does not function, the socket cap screws M12 (C) are tightened too securely.

**Caution!**

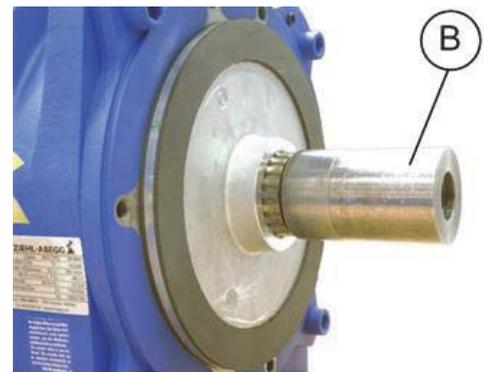
**To prevent damage to the shock-absorber elements or interference from the springs, do not insert the feeler gauge more than 10 mm into the air gap.**



6. Carefully hand-tighten the brake evenly step by step with the six socket cap screws M12 (C) in a crosswise sequence until the feeler gauges (D) hold.



7. Secure the hexagon flange nut (6) with Loctite 243 threadlocker.  
 8. Mount the support flange (4), lever axle (5), washer (3) and hexagon nut M10 (3) on both socket cap screws M10 x 140 - 12.9 (1).  
 9. Tighten the hexagon flange nut (6).  
 10. Slightly release the six socket cap screws M12 (C).  
 11. Remove the feeler gauge (D).



12. Tighten the brake evenly step by step with the 6 socket cap screws M12 (C) in a crosswise sequence.  
**Tightening torque: 111 Nm**  
 13. Coat the socket cap screws (12) with locking varnish.  
 14. Release the assembly shaft (B) and connect brake (see chapter "Brake assembly" - Step 10 - 17).  
 15. Mount the absolute encoder (see chapter "Mounting the absolute encoder").

### 8.3.3 Replacement of the traction sheave



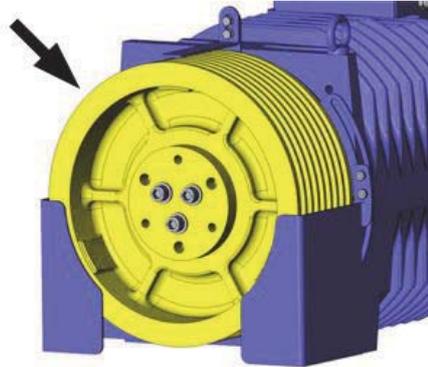
#### Warning!

Due to incorrect mounting the traction sheave can get loose from the drive shaft!

#### Requirements:

- Release the traction sheave and put the ropes off the traction sheave.
- Secure the traction sheave so that it does not jump off the shaft.

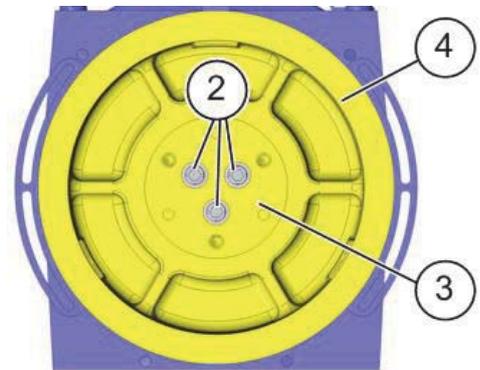
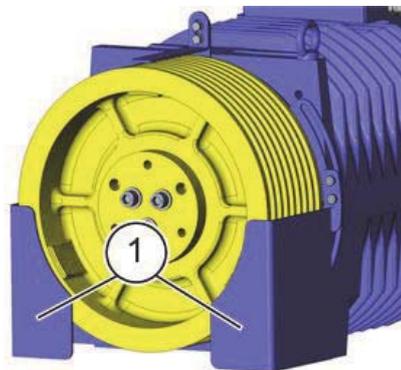
The traction sheave is mounted on the power take-off side of the motor (see arrow).



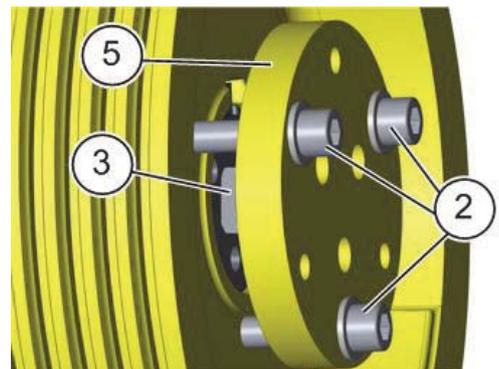
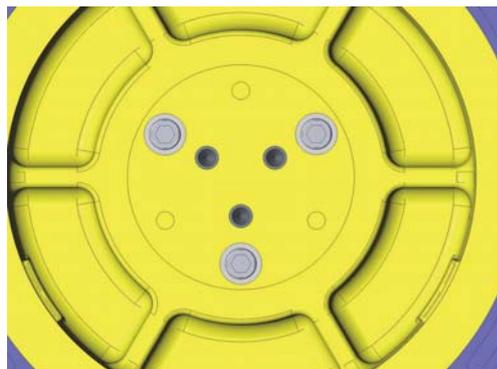
#### 8.3.3.1 Required tools for the replacement of the traction sheave:

- Allen key SW 10
- Torque key for a tightening torque of 79 Nm with allen key SW 10
- 5 - 8 mm spacer or hexagon nut

#### 8.3.3.2 Dismounting the traction sheave

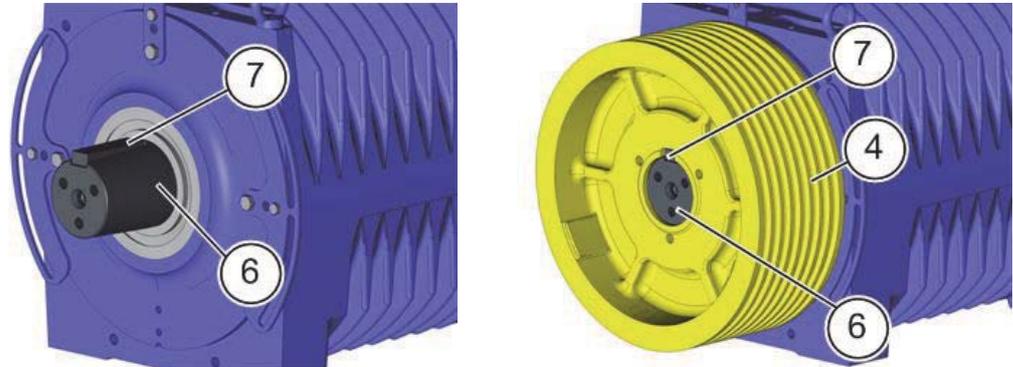


1. Remove rope guard (1), see chapter "Mechanical installation - fastening of rope guard".
2. Release the fixing screws M12 x 45 (2) of the traction sheave (4) with an allen wrench SW 10 and remove the fixing plate (3).

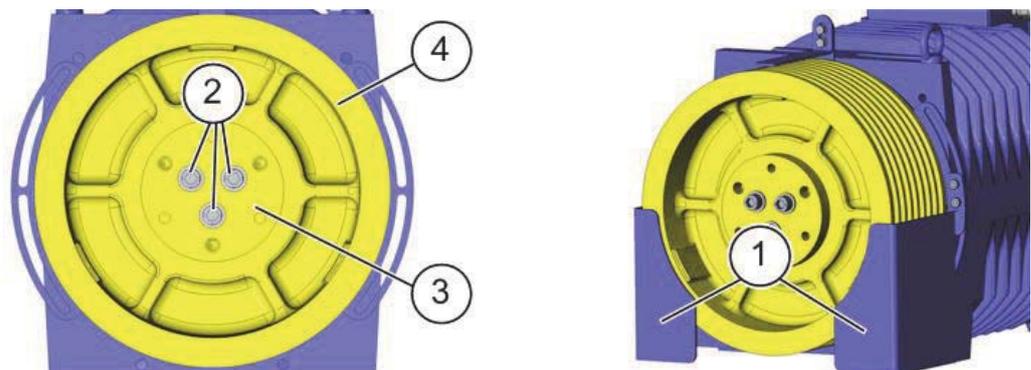


3. Turn the front plate (3) to press off.
4. 5 - 8 mm spacer or hexagon nut (5) must be placed between shaft end and front plate (3).
5. Screw front plate ( ) to the traction sheave (4) at the outer circle of holes using hex socket screws M12 x 45 (2).
6. Tighten the screws M12 x 45 (2) uniformly with an allen wrench SW 10. By tightening the screws the tractions sheave (4) will be pulled from the drive shaft.

### 8.3.3.3 Mounting the traction sheave



1. Clean the traction sheave (4) and the motor shaft (6). Both parts have to be free of dirt and grease.
2. The parallel key (7) has to be available.
3. Put traction sheave (4) on drive shaft (6). The bores for screws M12 must point outwards. Observe the position of the groove for the parallel key.



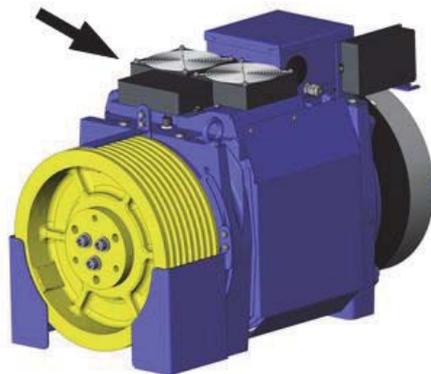
4. Screw front plate (3) to the drive shaft (6) at the inner circle of holes using three screws M12 x 45 (2). Apply threadlocker Loctite 243 or a similar product to the fixing screws.  
**Do not forget washers!**
5. Tighten the fixing screws (2) with a torque wrench with an allen screw SW 10 uniformly in two steps:
  - Tightening torque step 1: 50 Nm
  - Tightening torque step 2: 79 Nm
6. Coat the fastening screws (2) with sealing varnish.
7. Mount the rope guard (1).

### 8.3.4 Replacement of the bearing bracket



The mounting and dismounting of the magnet rotor and the flange bearing bracket must only be carried out by qualified personnel and with special devices in the factory.

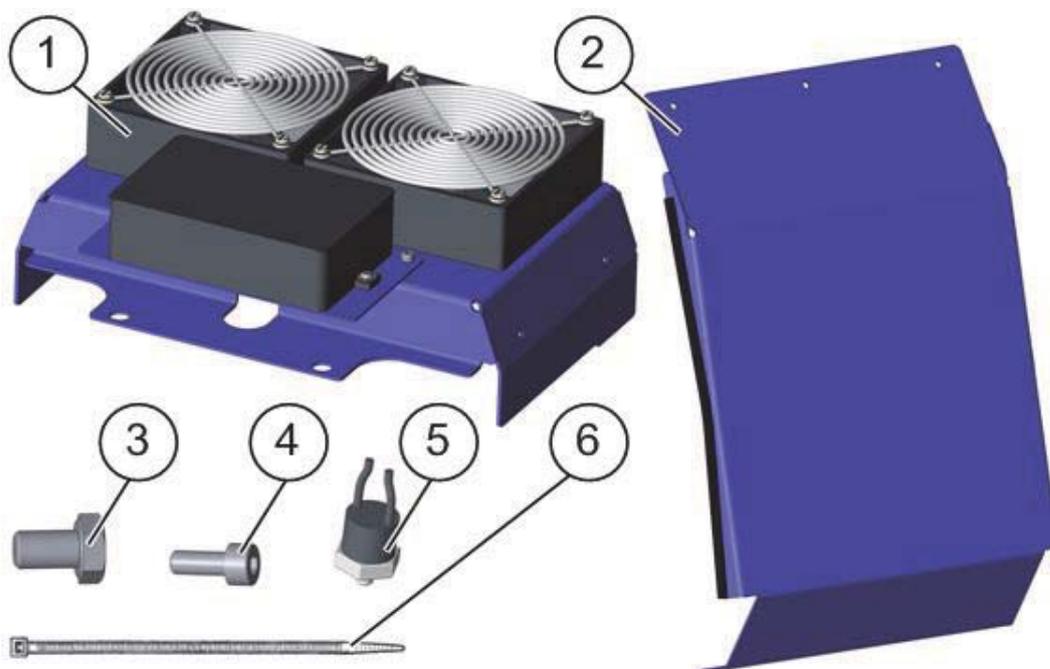
### 8.3.5 Retrofitting the forced ventilation



#### 8.3.5.1 Required tools for the retrofitting of the forced ventilation:

- screw wrench SW 16
- Allen wrench SW 3

#### 8.3.5.2 Scope of delivery

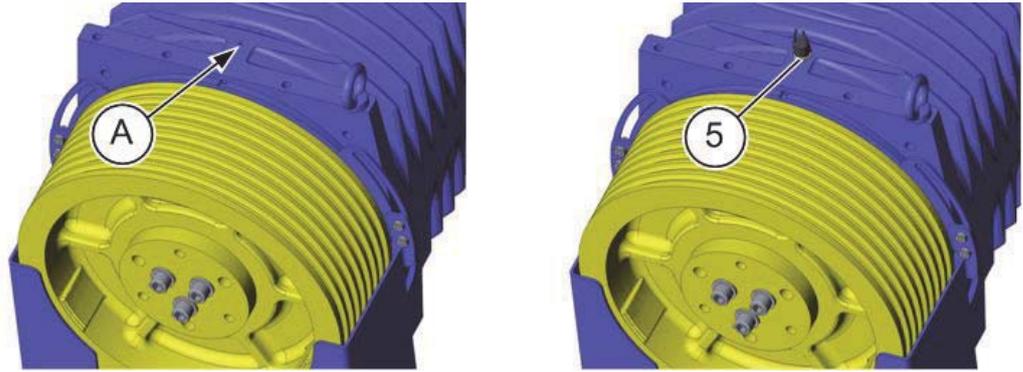


#### Parts list:

Pos.	Count	Designation
1	1	pre-assembled forced ventilation
2	1	Air guide plate with edge protection
3	2	hexagonal screws ISO 4017 - M10 x 16 - 8.8
4	2	hex socket screw ISO 4762 - M4 x 10 - 8.8
5	1	thermostatic switch included insulating tube
6	1	cable tie

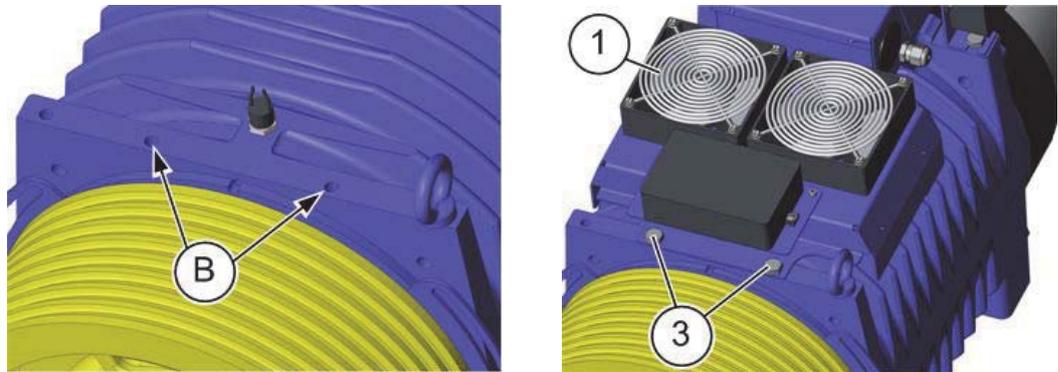
The accessories pos. 3, 4, 5 and 6 lie in the terminal box of the pre-assembled forced ventilation (1), packed in a bag.

### 8.3.5.3 Mounting of the thermostatic switch

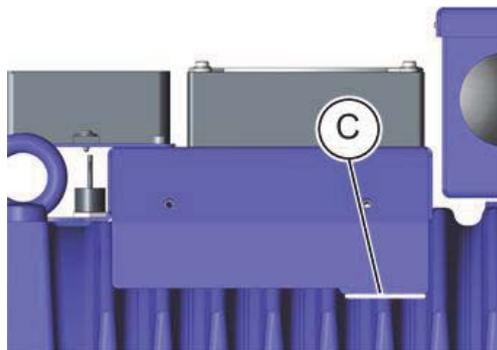


1. Screw the thermostatic switch (5) with a **tightening torque of 3 Nm** into the intended thread (A). **A exceeding of the tightening torque leads to the damage of the thermostat switch.**

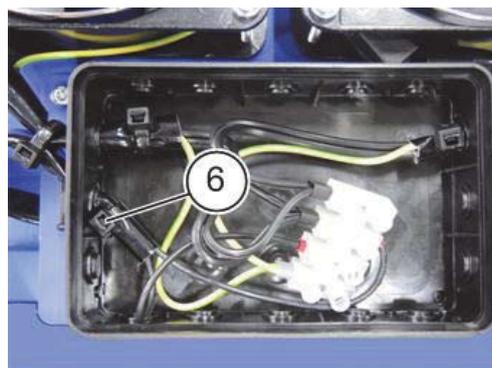
### 8.3.5.4 Mounting of the forced ventilation



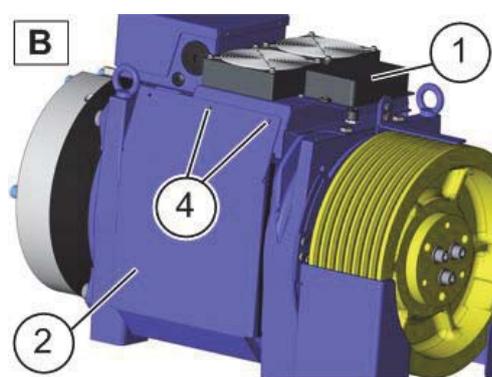
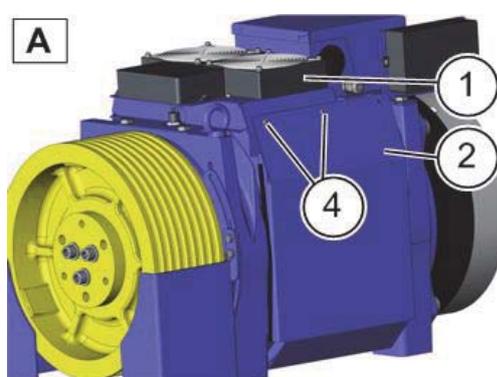
1. Attach the pre-assembled forced ventilation (1) with the both hexagon head screws M10 x 16 - 8.8 (3) at the thread (B) of the motor housing.



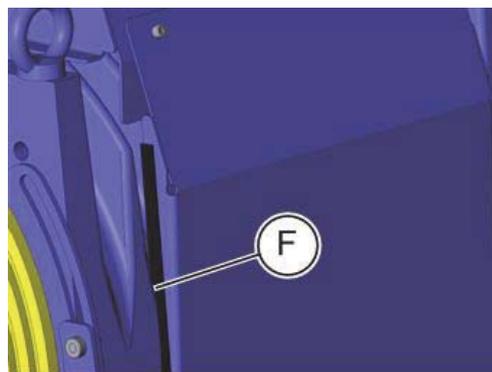
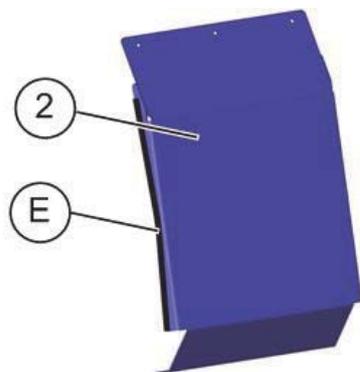
2. The pre-assembled forced ventilation contacted on a rib (C).



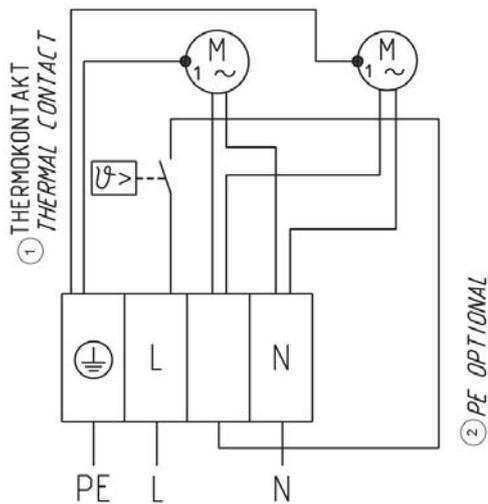
3. Insert the insulating tube (D) of the thermostatic switch into the terminal box according the illustration.
4. Attach the cable tie (6) as strain relief.



5. Attach the air guide plate (2) with both socket cap screws M4 x 10 - 8.8 (4) at the pre-assembled forced ventilation (1).
6. The air guide plate (2) can be attached either on the right [A] or on the left [B] side from the motor.



7. The edge protection (E) of the air guide plate (2) bear on with the motor housing (F).



F086 TEILE-NR.: 01007168

- 1 Thermal contact
- 2 PE optional

8. On-site connection must be made by the customer according to the wiring diagram in the separate terminal box of the external ventilation.

## 9 Enclosure

### 9.1 Technical data

Motor type	ZAtop SM200.40D		ZAtop SM200.45D	
	1:1	2:1	1:1	2:1
Suspension				
Typical payload* [kg]	800	1600	800	1600
Rated torque [Nm]	600		710	
Maximum torque [Nm]	1000		1200	
maximum short circuit torque [Nm]			480 at 25 rpm	
permissible radial load [kg]	3300		3300	
Speed [m/s]	1.6		1.6	
Total weight without traction sheave [kg]	303		303	
Traction sheave				
- Diameter [mm]	240		240	
- Width [mm]	173		173	
- Rope diameter [mm]	6 - 7		6 - 7	
- Standard number of grooves	16		16	
- Standard groove distance [mm]	10		10	

Table shows typical data, other values possible.

Other rope diameters and groove distances are possible.

\* Dependent on travel, compensation ropes may be necessary.

#### 9.1.1 Protection rating

Component	Protection rating
Motor	IP 21
Absolute encoder	IP 40
Brake (electrical)	IP 54
Brake (mechanical)	IP 14
Complete machine	IP 21

### 9.1.2 Ambient conditions

The user must ensure that the specified ambient conditions are observed.		
Ambient temperature for operation	[°C]	0 to +40
Humidity	[%]	Maximum 95 / condensation not permitted
Installation height	[m above sea]	Above 1000 Torque reduction by 1 % per 100 m or On time reduction by 1.5 % per 100 m

### 9.1.3 Brake

<b>Brake type</b>		<b>ERS VAR07 SZ800/800 (information for each magnet)</b>
Brake torque	[Nm]	800
Operating voltage	[V DC]	207
Rated output power	[W]	132
Electrical protection rating		IP 54
Mechanical protection rating		IP 14

#### 9.1.3.1 Micro switch

Operating voltage	[V DC]	24
Current	[mA]	10 - 100



### 9.2.2 Legend for dimension sheet

- 1 Number of grooves represented schematically
- 2 Encoder
- 3 Motor connection possible on both sides  
1 x maximum Ø 40  
1 x Ø 16 with cable gland M16
- 4 Brake connection box mountable on both sides
- 5 Rope guard 150° - 190°
- 6 Optional 3. rope retainer
- 7 wall distance
- 8 Optional brake with manual hand release
- 9 Levers for hand release may inserted each 180°
- 10 Optional forced ventilation
- 11 Resulting rope force with lateral form lock support
- 12 Resulting rope force without lateral form lock support

### 9.3 EC/EU declaration of conformity

- Translation -  
(english)

A-KON16\_01-GB  
1729 Index 002

**Manufacturer:** ZIEHL-ABEGG SE  
Heinz-Ziehl-Straße  
74653 Künzelsau  
Germany

**The manufacturer shall bear sole responsibility for issuing this EC/EU declaration of conformity.**

**Product description:** ZAtop Gearless elevator machine

**Type:**                      **SM160...**        **SM190...**        **SM200...**        **SM225...**        **SM250...**

The type specifications contain further additions for different versions, for example SM250.60B-20/S.

**Valid from serial number:**                      16010001/1 or higher

**The above mentioned products of this declaration fulfil all relevant provisions of the following Directives of the Union:**

Machinery directive 2006/42/EC

EMC Directive 2014/30/EU

**The following harmonised standards have been used:**

EN ISO 12100:2010	Safety of machine tools - General principles for design - Risk assessment and risk reduction
EN 60034-1:2010 + AC:2010	Rotating electrical machines - Part 1: Rating and performance
EN 81-20:2014	Safety rules for the construction and installation of elevators - Lifts for the transport of persons and goods - Part 20: Passenger and goods passenger elevators
EN 60204-1:2006 + A1:2009 + AC:2010	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

**For the assessment of the products concerning electromagnetic compatibility the following standards have been used.**

EN 12015:2014	Electromagnetic compatibility- Productfamily standard for lifts, escalators and moving walks - Emission
---------------	--

This declaration relates exclusively to the product in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user.

The authorised representative for the assembly of the technical file is:  
Mr. Roland Hoppenstedt (see above for address).

Künzelsau, 18.07.2017  
(place and date of issue )

ZIEHL-ABEGG SE  
Werner Bundscherer  
Director Drive Division  
(name, function)



(signature)

ZIEHL-ABEGG SE  
Roland Hoppenstedt  
Technical Director Drive Division  
(name, function)



(signature)

## 9.4 Operating instructions brake



Industrial Clutches, Brakes, Controls, Tension Systems, Sensors, and Switches

# SM497gb - rev 07/16

## Electrically Released Brake

ERS VAR07 SZ800



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## 1- EU Declaration of conformity

The Product described in this manual is in conformity with the relevant EU harmonized legislation:

**Directive 2014/33/EU** Ensuring lift safety

**Directive 2014/35/EU** Electrical safety: Low-voltage electrical equipment

**Directive 2006/42/EC** Machinery safety

Evidence of conformity to the Directives is assured through the application of the following standards:

<b>EN 81-1+A3:2009</b>	Safety rules for the construction and installation of lifts – Part 1: Electric lifts (end of the period of applicability: 31 August 2017).
<b>EN 81-20:2014</b>	Safety rules for the construction and installation of lifts – Lifts for the transport of persons and goods – Parts 20: Passenger and goods passenger lifts.
<b>EN 81-50:2014</b>	Safety rules for the construction and installation of lifts – Examinations and tests – Parts 50: Design rules, calculations, examination and tests of lift components.
<b>DIN VDE 0580:2011</b>	Electromagnetic devices and components, General requirements.
<b>EN ISO 12100:2010</b>	Safety of machinery – General principles for design – Risk assessment and risk reduction.

## 2- Precautions And Safety Measures

**Precautions and safety measures must be read before any installation or maintenance of the brake.  
Compliance with the instructions and values given by the documentation and marking of the unit is imperative in order to ensure a proper functioning of the brake.**

### 2.1 - Symbols used in this manual



Action that might damage the brake.



Action that might be dangerous to human safety.



Electrical action that might be dangerous to human safety.



Handling of loads that might be dangerous to human safety.



Surface temperature that might be dangerous to human safety.

## 2.2 - Safety precautions for installation and maintenance

-  During maintenance, make sure that the driving mechanism is stopped and that there is no risk of accidental starting. The intervention must be signaled and the work area delimited.
-  All intervention must be done by authorized and qualified personnel, having read and understood this manual, using adapted procedures and professional tools. All intervention must be done according the regulation of the country of the installation.
-  All works on the electrical connections must be done with power off.
-  Magnetic field generated by the magnet, can create dysfunctions on near machine or device. Users must also be careful about attractions of tools or other devices during interventions.
-   Due to the magnetic field generated by the magnet, the bearers of a heart pace-maker or an implant must avoid the proximity of the unit.
-   During operation the brake surface can reach temperatures higher than 80°C. Users must be careful during contact with the unit.

### Respiratory protection

-  Inhalation of large amounts of dust can cause coughs and difficulty in breathing. Respirator must be worn if exposed to friction material dust. [Dust mask FFP2]. Move to fresh air in case of accidental inhalation of dusts. In the event of persistent symptoms receive medical treatment. In case of ingestion of friction material dust, consult a doctor.
-  Provide appropriate exhaust ventilation at places where friction material dust can be generated. Do not use brushes, pressurized air or hazardous agents to clean the brake. The use of a vacuum cleaner is recommended.



### Hand protection

Protective and dust-resistant gloves.



### Eyes protection

Friction material dust particles, like other inert materials, may be mechanically irritating the eyes. Safety goggles with side protection. In case of contact with eyes, carefully rinse with plenty of water. In the event of persistent symptoms seek medical treatment.



### Skin protection

Prolonged skin contact may cause mechanical irritation. Dust resistant protective clothing. In case of contact with skin, wash with soap and water as a precaution. Consult a doctor if skin irritation persists.



### Feet protection

Safety shoes must be worn.



### Helmet protection

Safety helmet must be worn.

### **Protective and hygiene measures**

Do not breathe friction material dust.  
Wash hands before breaks and at the end of workday.  
During maintenance, do not eat, drink or smoke.  
Handle in accordance with the general hygienic rules.  
Remove and wash contaminated clothes before re-use.

### **2.3 - Precautions for handling**



Avoid any impact or damage to the brake during handling.



To avoid risk of injury (see mass of the units in the service manual of the brake), use an adapted device, hoist or crane, for the handling of the unit.



When handling, use the handling holes intended for this purpose.  
Never lift the brake using the coil cables.

### **2.4 - Precautions on use**



**Customer is responsible of brake qualification with his interface in order to guaranty that brake performances are not reduced.**

The use of the 2 circuits in redundancy is mandatory.  
This brake is designed to work in clean conditions. Friction faces must be kept completely clean of any oil, water, grease or abrasive dust.  
The friction flange, on customer side, must be, also, carefully cleaned and degreased.  
The friction faces must be protected, with adapted devices (cover, heating devices, etc...):

- To avoid pollution and rusting during the lifetime of the unit.
- To avoid condensation, resulting in freezing conditions, in low temperature/high humidity, or sticking of the disc.



This brake is designed to work in ambient temperature between 0°C and 40°C.



This brake is designed to work with duty cycle of 50% (Insulation class: 155°C). The temperature of customer friction flange must not exceed 90°C.



This brake can only be used on « horizontal » position.



When switching on DC-side the coil must be protected against voltage peaks, according DIN VDE0580.



Make sure the rated supply voltage is set within the tolerances, an under-voltage supply, generates a reduction of the maximum air gap.



An over-voltage supply generates additional heat on the surface of the brake, with risks of injury by burning and possible damage to the coil.



**Emergency braking:** for emergency braking the switching OFF must be connected on DC current side, in order to obtain short engaging time of the brake.



**Service braking:** for service braking, the switching OFF and ON must be connected on AC current side, in order to obtain silent switching.

## 2.5 - Restrictions on use



Any modification made to the brake without the express authorisation of a representative of Warner Electric, as far as, any use out of the contractual specification accepted by "Warner Electric", will result in the warranty being invalidated and Warner Electric will no longer be liable in any way with regard to conformity.



If maximum rotation speed is exceeded, the guarantee is no longer valid.



The brake must be replaced if it is submitted to water projections.



For the brake to comply with directive 2014/33/EU, the installer must observe the general conditions for installations and use as defined in the EU type certificate, drawn up by the TÜV SÜD Industrie Service (see EU-BD number in **table 1**), including the mandatory use of a speed limiting device, in compliance with EN 81-20 paragraphs 5.6.2.2.1 and 5.6.6.10. Under no circumstances, this device can replace the system case against the car overspeed in the descending phase.



The customer must be careful to not alter the factory set parameters: Microswitch adjustment. This brake must not be dismantled.



This brake is designed for static applications. Dynamic brakings are restricted to emergency braking and test braking.



Unless otherwise specified in the manual service, this range of product is not designed to be used according 2014/34/EU directive "Equipment for explosive atmospheres" (ATEX).

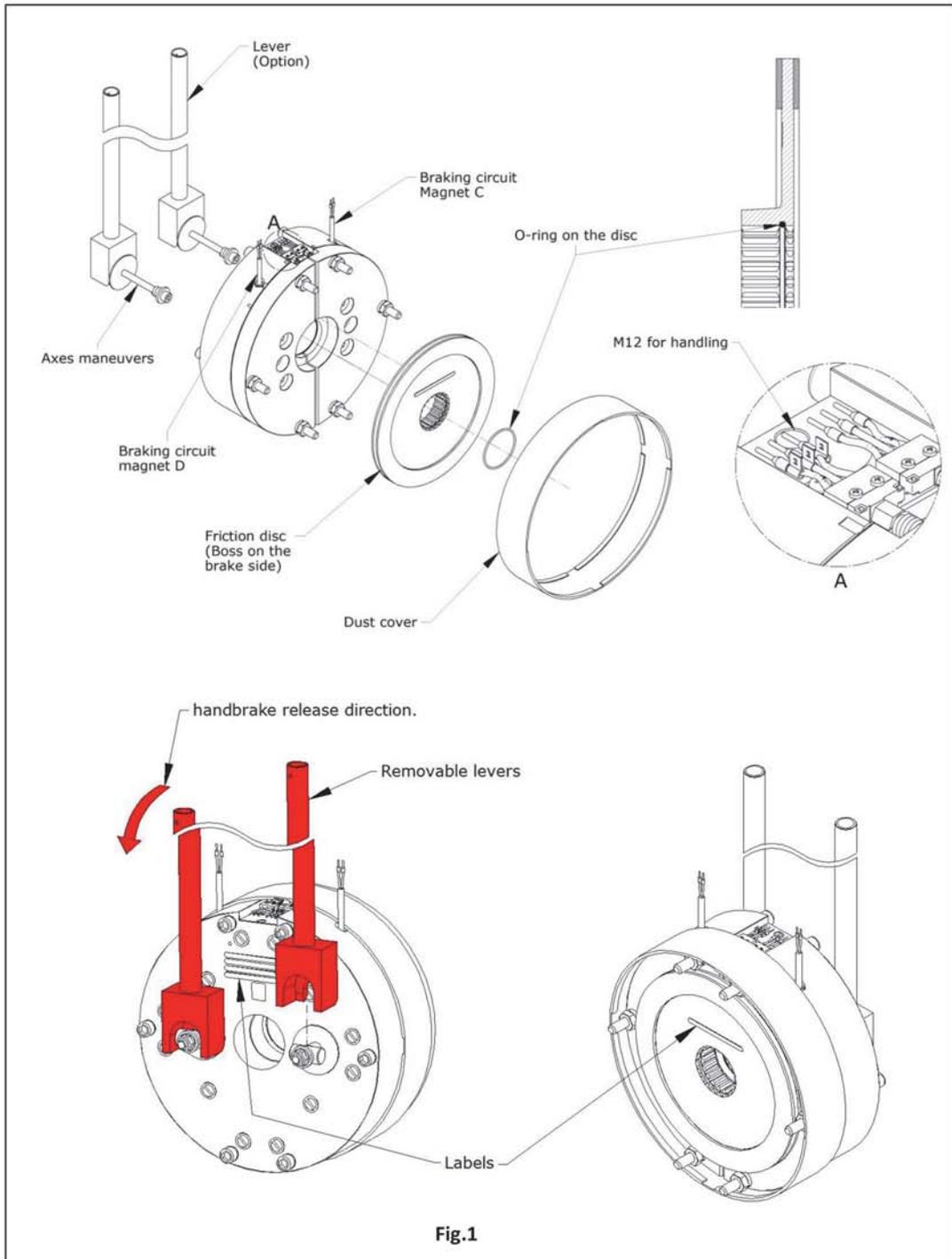
## 3- Storage



These devices are delivered in a package guaranteeing the preservation of the product providing it is by surface transportation.  
In case of a specific request (air or sea transport, long-term storage, etc) contact our factory.

## 4- Technical Specification

### 4.1 - Brake description



**4.2 - Technical data**

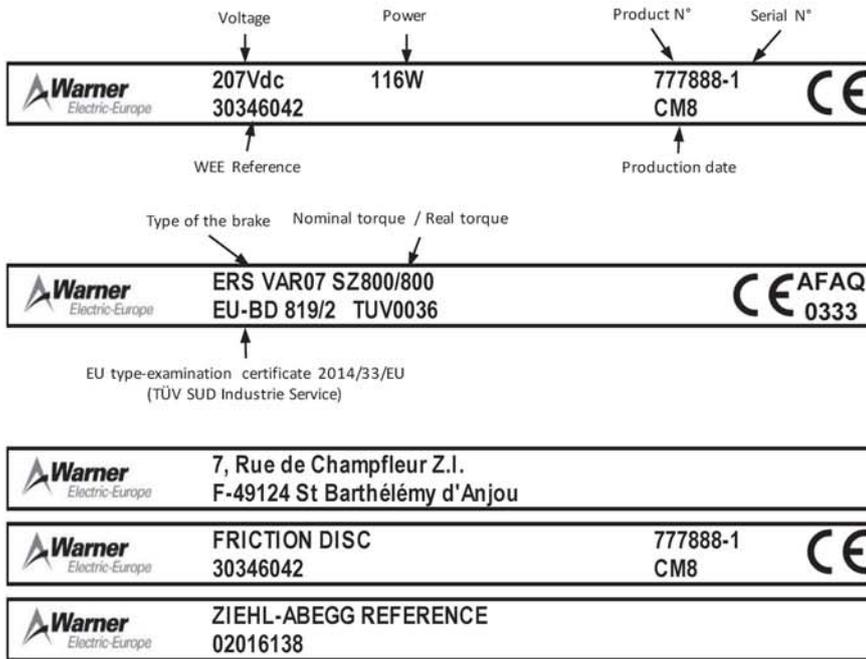
<b>Table 1</b>	<b>ERS VAR07 SZ800/800</b>
Certificate : Directive 2014/33/EU - Norm EN81-20&50	<b>EU-BD 819/2</b>
Warner Electric Europe Part Number	<b>30346042</b>
Plan Part Number	<b>1 12 108135 (134 c/d)</b>
ZIEHL ABEGG Part number	<b>02016138</b>

<b>Per magnet</b>	Torque installed	Nm	<b>800</b>
	Overexcitation voltage	Vdc	207
	Holding voltage	Vdc	-
	Overexcitation power	Watt	132
	Holding power	Watt	-
	Resistance	Ω	324
Maximum speed	min-1	460	
Minimum Air gap	mm	0.3	
Maximum Air gap (after wear)	mm	0.6	
Cyclic duration factor	ED	60%	
Weight	Kg	54	

### 4.3 - Labeling details

For location of labeling on brake, please refer to **Fig. 1**, page 7.

#### Braking unit labels (example)



In case of presence of QR code label, here is the information contained.



Identify	Data Field
1	Product name
2	Release (NA)
3	Revision (NA)
4	Identification number
5	Serial number
6	Batch number (NA)
7	Manufacturer name
8	Manufacturer postal code
9	Manufacturer town
10	Manufacturer country code

#### Encoded date details:

Y	M	Day
---	---	-----

Encoded year: 1 letter    Encoded month: 1 letter    Production day

2006	2007	2008	2009	2010	2011	January	February	March	April	May	June	July	August	September	October	November	December
U	V	W	X	Y	Z	M	N	O	P	Q	R	S	T	U	V	W	X
2012	2013	2014	2015	2016	2017												
A	B	C	D	E	F												
2018	2019	2020	2021	2022	2023												
G	H	I	J	K	L												

Example: AU08 is, 2012, September 8th

## 5- Installation

### 5.1 - Customer Interface Specification

Customer friction flange specification:

- Material: Steel (150 to 250 HV) or Cast iron
- Roughness:  $\leq Ra 3.2$
- Finishing: Dry phosphate (with manganese or zinc)
- Geometric tolerances:

	0,1	Customer shaft axis
	0,1	

### 5.2 - Brake Mounting

#### Reminder:

**Precautions and safety measures must be read before any installation or maintenance of the brake. Compliance with the instructions and values given by the documentation and marking of the unit is imperative in order to ensure a proper functioning of the brake.**



Avoid any impact or damage to the brake during handling.

Never lift the brake using the coil cables.

This brake is designed to work in clean conditions. Friction faces must be kept completely clean of any oil, water, grease or abrasive dust.

The brake is delivered pre-assembled with detection, air gap and dampening system already set.

The O ring is delivered already assembled in the disc.

Fixing screws and safety washers are supplied in a kit.

For the operations described below please refer to **Fig. 1**, page 7.

- ✓ Engage the disc (equipped the seal) on the motor shaft, the boss on the brake side.
- ✓ Engage the magnet sub-assembly and tighten the 6 fixing screws M12, star sequence tightening, to an initial torque of 50 Nm, then to a finish torque of 111 Nm ( $\pm 10$  Nm).
- ✓ Make all the permanent electrical connections.
- ✓ Positioning the dust cover

For the brake hand release option, insert the levers on the maneuvering shafts and pull them to release the brake. (See **Fig. 1**, page 7).

## 6- Electrical Connection



Brake **ERS VAR07** operates on a direct current supply. Polarity does not affect the brake operation.



All works on the electrical connections have to be made with power off.



Make sure that the nominal supply voltage is always maintained. A lack of power results in a reduction to the maximum air gap.



When switching on DC-side the coil must be protected against voltage peaks, according DIN VDE0580.



**Emergency braking:** for emergency braking the switching OFF must be connected on DC current side, in order to obtain short engaging time of the brake.



**Service braking:** for service braking, the switching OFF and ON must be connected on AC current side, in order to obtain silent switching.



The connecting wires must be thick enough to help prevent sudden drops in voltage between the source and the brake.

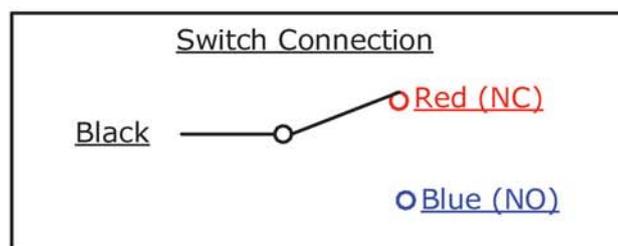
Cable length	m	0 -> 10	10 -> 20
Cross section	mm <sup>2</sup>	1.5	2.5

**Table 2**



Tolerances on the supply voltage at the brake terminals: +10% / -15% (CEI 60038:2009:2009-06).

### 6.1 - **Microswitch Technical Data**



**Fig. 2**

- **Current range:** 10 mA to 100 mA at 24 Vdc
- For maximum electrical lifetime of the microswitch ensure switching under resistive load only.

## 7- Maintenance

### 7.1 - Air Gap Checking



Check the air gap at each maintenance inspection.



This brake is intended for a static application as a safety brake. Any dynamic braking is restricted to emergency and test braking. Normal use will not lead to any noticeable wear on the lining. Under no circumstances, this device can replace the system case against the car overspeed in the descending phase.



Air gap has to be measured at the 4 points at the circumference and at each braking circuit (see Fig. 3). If the maximum value of the air gap (see Table 1) is exceeded in one point for one of the two circuits, change the disc and the O-ring.



Do not introduce the feeler gauge more than 10 mm into the air gap. Avoid the springs and the dampers of noise.

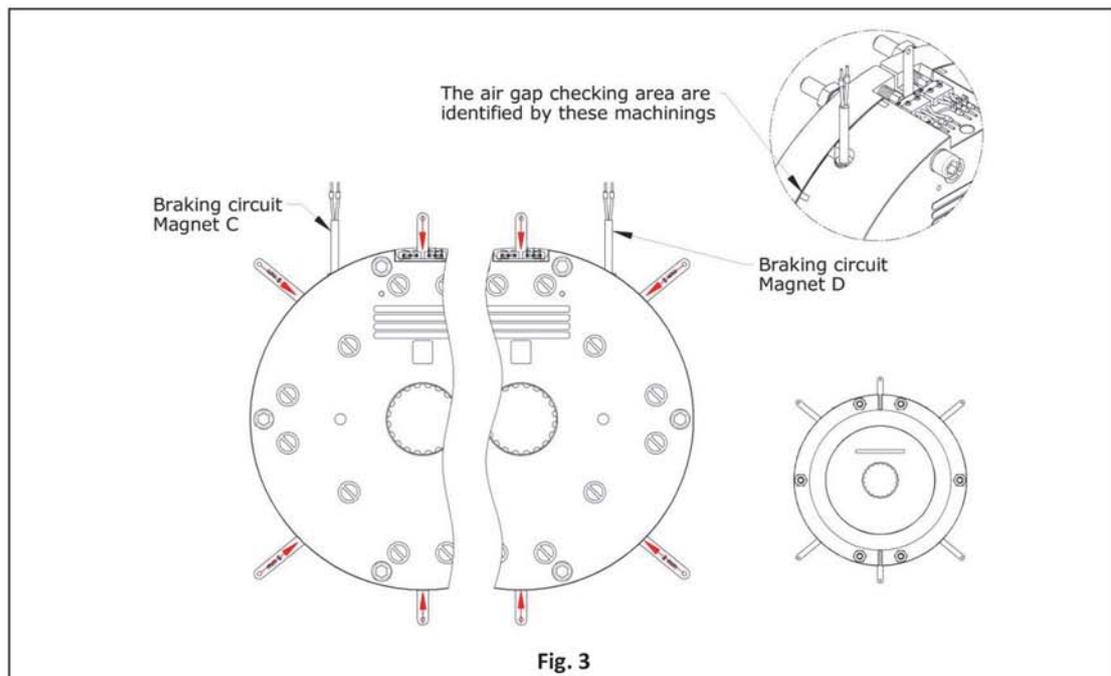


Any modification made to the brake without the express authorisation of a representative of Warner Electric, as far as, any use out of the contractual specification accepted by "Warner Electric", will result in the warranty being invalidated and Warner Electric will no longer be liable in any way with regard to conformity.



The customer must be careful to not alter the factory set parameters: Microswitch adjustment, air gap adjustment and dampening system. This brake must not be dismantled.

Location of feeler gauges per braking unit:



## 7.2 - Disc exchange



During maintenance, make sure that the driving mechanism is stopped and that there is no risk of accidental starting. The intervention must be signaled and the work area delimited.



All intervention must be done by authorized and qualified personnel, having read and understood this manual, using adapted procedures and professional tools. All intervention must be done according the regulation of the country of the installation.



**Warning:** It is mandatory that disassembling and assembling of the encoder is done according the instructions of the drive manufacturer.



**Warning:** not to damage the electric cables during the maintenance action.



This brake is designed to work in clean conditions. Friction faces must be kept completely clean of any oil, water, grease or abrasive dust.  
Customer friction flange must be also carefully cleaned.

For the operations described below please refer to **Fig. 1**, page 7.

- ✓ Disconnect the brake electrically.
- ✓ Remove the fixing screws.
- ✓ Remove the brake.
- ✓ Clean the faces of friction with a clean and dry rag.
- ✓ After that the worn friction discs were removed, assemble the brake according chapter 3.3.

### 7.3 - Detection Checking



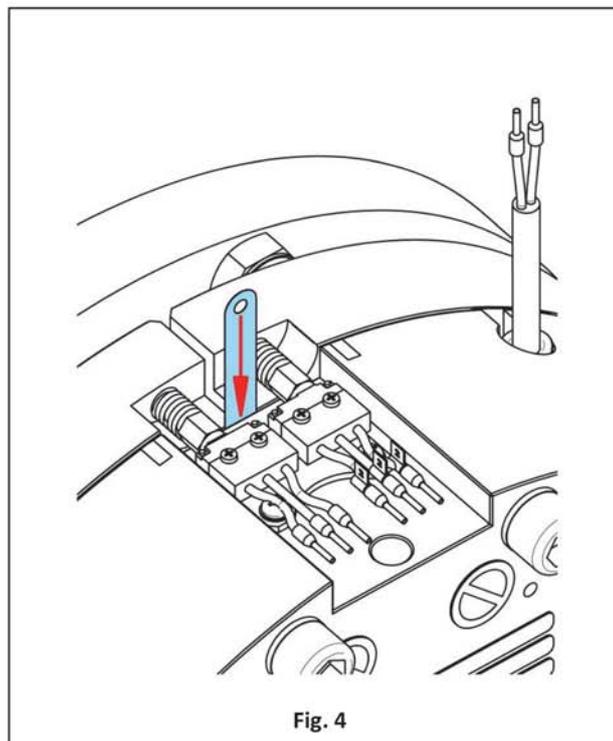
Any modification made to the brake without the express authorisation of a representative of Warner Electric, as far as, any use out of the contractual specification accepted by "Warner Electric", will result in the warranty being invalidated and Warner Electric will no longer be liable in any way with regard to conformity.



The customer must be careful to not alter the factory set parameters: Microswitch adjustment, air gap adjustment and dampening system adjustment. This brake must not be dismantled.

For the operations described below please refer to **Fig. 4**.

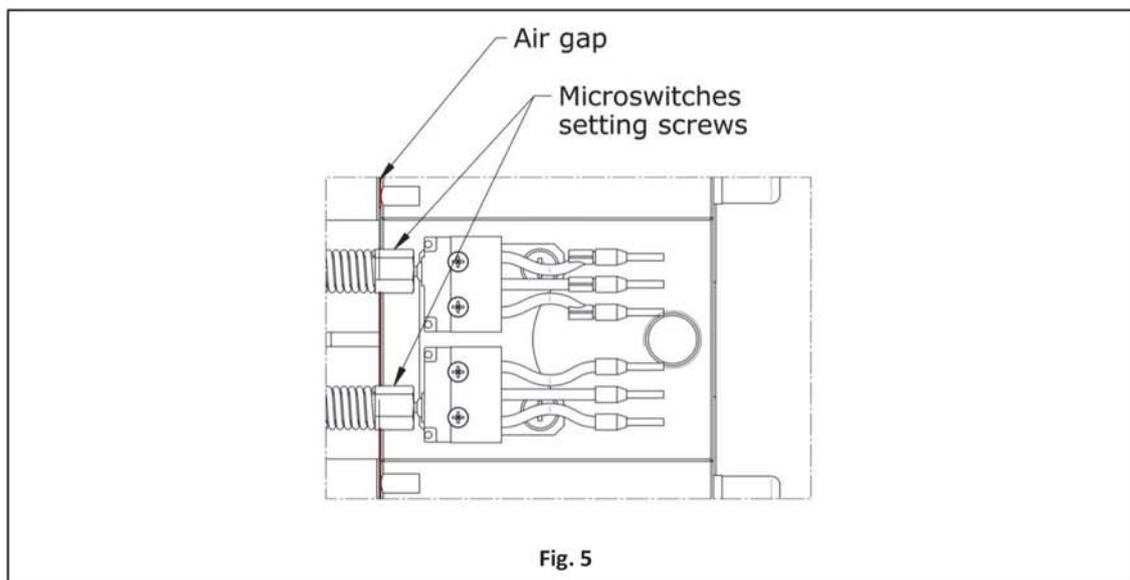
- ✓ Switch ON the brake, the state of both microswitches must change.
- ✓ Switch OFF the brake.
- ✓ Insert a feeler gauge **0.25 mm** thick as it is shown in **Fig. 4**.
- ✓ Switch ON the brake, the state of both microswitches must not change.



#### 7.4 - Detection setting

For the operations described below, please refer to **Fig. 4**, page 14 and **Fig. 5** below.

- ✓ Insert a feeler gauge **0.2 mm** thick as it is shown in **Fig. 4**.
- ✓ Switch **ON** the brake and adjust the setting screw with an open jawed spanner (8mm A/F) until to obtain detection. (**Fig. 5**)
- ✓ Re-tighten carefully the setting screw until to have no detection.
- ✓ Switch **OFF** the brake and perform 3 detection checking as it is described in chapter7-3.



### 7.5 - Microswitch exchange



During maintenance, make sure that the driving mechanism is stopped and that there is no risk of accidental starting. The intervention must be signaled and the work area delimited.

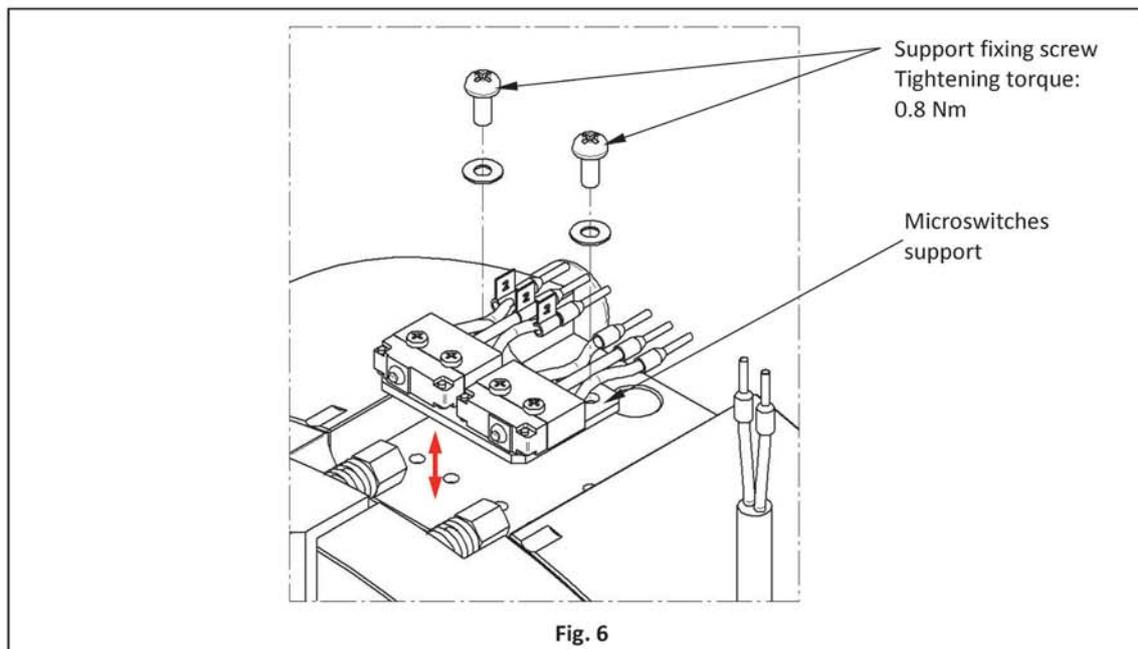


All intervention must be done by authorized and qualified personnel, having read and understood this manual, using adapted procedures and professional tools. All intervention must be done according to the regulation of the country of the installation.



**Warning:** not to damage the electric cables during the maintenance action.

- ✓ Unplug the microswitch.
- ✓ Untighten and remove microswitches support fixing screw. (Fig. 6)
- ✓ Replace the sub assembly microswitches support and re-tighten fixing screw.
- ✓ Re-connect microswitches wires. (Fig. 2)
- ✓ Perform detection checking as it is described in chapter 7-3.
- ✓ If the detection checking fails, perform a detection setting as it is described in chapter 7-4.



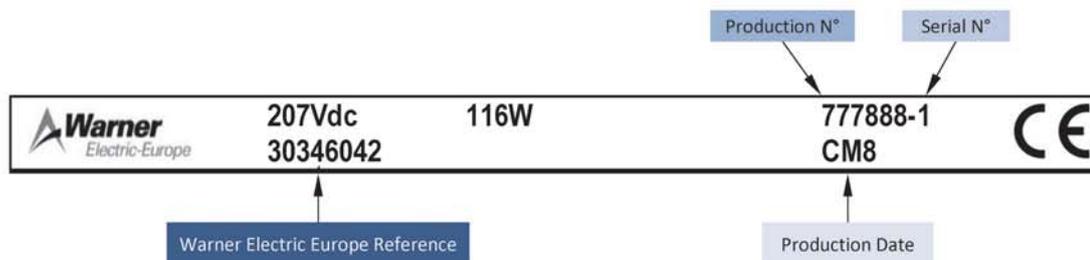
## 8- Spare parts

Available spare parts for this brake are the following:

- Disc
- O-ring (to put in the disc)
- The microswitches sub-assembly.

Please, join to your spare part request the following information:

• Warner Electric Europe Reference
• Production Number
• Serial Number
• Production Date



## 9- Tooling

Tooling	Function
Torque wrench ( > 120 Nm) + hexagonal socket insert 10mm A/F	Brake fixing screws
Feeler gauges set	Air gap checking Detection setting Detection checking
Open jawed spanner 21mm A/F	Air gap setting
Open jawed spanner 8mm A/F	Detection setting
Phillips screwdriver	Microswitches exchange
Multimeter	Voltage checking

## 10- Troubleshooting

Troubleshooting		
Problem	Possible Cause	Remedy
<b>Brake doesn't release</b>	<ul style="list-style-type: none"> <li>• OEX Time too short</li> <li>• Voltage too low</li> <li>• Power supply is interrupted</li> <li>• Air gap too large</li> <li>• Disc worn</li> <li>• Coil damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Re-set OEX time</li> <li>• Re-set voltage</li> <li>• Re-connect the support supply, check detection</li> <li>• Replace disc and O-rings</li> <li>• Replace disc and O-rings</li> <li>• Replace the brake</li> </ul>
<b>Brake doesn't brake</b>	<ul style="list-style-type: none"> <li>• Voltage present at switch off position</li> <li>• Grease on friction faces</li> </ul>	<ul style="list-style-type: none"> <li>• Check detection and customer power supply</li> <li>• Clean the friction faces, change disc and O-Ring</li> </ul>
<b>Nuisance braking</b>	<ul style="list-style-type: none"> <li>• Voltage too low</li> <li>• Wrong information from microswitch</li> </ul>	<ul style="list-style-type: none"> <li>• Re-set voltage</li> <li>• Re-set detection</li> </ul>
<b>Brake vibration in holding voltage</b>	<ul style="list-style-type: none"> <li>• Poor connection of the brake connector</li> </ul>	<ul style="list-style-type: none"> <li>• Check the correct connection configuration Between the wires coils and the connector.</li> </ul>

## 11- Contact

Any question? You can contact us at: [info@warnerelectric-eu.com](mailto:info@warnerelectric-eu.com)

*This translation is for information only. In case of discrepancy between this version and the original in French, only the text of the French version prevails.  
 All rights reserved to change without prior notice*

### 9.5 EU Declaration of Conformity for Brake

<b>Warner Electric Europe</b> 7, rue Champfleür B.P. 20095 49182 St Barthélemy d'Anjou	<b>DECLARATION OF CONFORMITY TO                  THE DIRECTIVE 2014/33/EU</b>	
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**This is to declare that the following safety device listed in appendix III point 2 of the directive 2014/33/EU**

Product : **Braking system**

According to the following specification :

Brake type	Part N°	Drawing N°	Voltage	Torque	EU type examination + NB		T10	T90
ERS VAR09 SZ800/800	30343291	I-112108048-c/d	24 Vdc	2x 800 Nm	EU-BD591	NB0036	110 ms	240 ms
ERS VAR09 SZ800/800	30343333	I-112108048-c/d	207 Vdc	2x 800 Nm	EU-BD591	NB0036	110 ms	240 ms
ERS VAR09 SZ800/600	30343340	I-112108048-c/d	207 Vdc	2x 600 Nm	EU-BD591	NB0036	110 ms	240 ms
ERS VAR09 SZ800 H/R	30343461	I-112108045-c/d	207 Vdc	2x 800 Nm	EU-BD591	NB0036	110 ms	240 ms
ERS VAR09 SZ1700/1200	30346146	I-112108138-c/d	207 Vdc	2x 1200 Nm	EU-BD591	NB0036	65 ms	155 ms
ERS VAR09 SZ1700/1200	30346145	I-112108138-c/d	24 Vdc	2x 1200 Nm	EU-BD591	NB0036	65 ms	155 ms
ERS VAR09 SZ1700/1200 H/R	30346144	I-112108141-c/d	207 Vdc	2x 1200 Nm	EU-BD591	NB0036	65 ms	155 ms
ERS FENIX 09 10-1000	30343395	I-112108041-c/d	207 Vdc	2x 1000 Nm	EU-BD906	NB0036	100 ms	160 ms
ERS FENIX 09 10-1000	30343417	I-112108041-c/d	24 Vdc	2x 1000 Nm	EU-BD906	NB0036	100 ms	160 ms
ERS FENIX 09 10-1000 H/R	30343419	I-112108037-c/d	207 Vdc	2x 1000 Nm	EU-BD906	NB0036	100 ms	160 ms
ERS VAR08 SZ1050/1000	30343705	I-112108060	180/90 Vdc	1000 Nm	EU-BD590	NB0036	125 ms	260 ms
ERS VAR08 SZ1700/1550	30343612	I-112108111	207/103 Vdc	1550 Nm	EU-BD590	NB0036	70 ms	200 ms
ERS VAR10 SZ2500/2500	30343459	I-112108033	207/103 Vdc	2500 Nm	EU-BD592	NB0036	70 ms	170 ms
ERS VAR10 SZ5000/5000	30343936	I-112108072-c/d	207/103 Vdc	5000 Nm	EU-BD592	NB0036	125 ms	255 ms
ERS VAR10 SZ5000/5800	30343941	I-112108072-c/d	207/103 Vdc	5800 Nm	EU-BD592	NB0036	130 ms	300 ms
ERS VAR07 SZ800/800 AZ	30315457	I-112108002	207 Vdc	2x 800 Nm	EU-BD819/1	NB0036	100 ms	150 ms
ERS VAR07 SZ800/800	30346042	I-112108135 c/d	207 Vdc	2x 800 Nm	EU-BD819/2	NB0036	40 ms	90 ms

<b>Warner Electric Europe</b> 7, rue Champfleur B.P. 20095 49182 St Barthélemy d'Anjou	<b>DECLARATION OF CONFORMITY TO THE DIRECTIVE 2014/33/EU</b>	
<p>Year of manufacture :           <b>See brake label</b> Manufactured by :               <b>Warner Electric Europe</b></p> <p>That has obtained the UE type examination N° <b>(see table above)</b> by the following notified body :</p> <p><u>Notified body (NB)</u> <b>TÜV SÜD Industrie Service GmbH</b> <b>Westendstr. 199</b> <b>D 80686 MÜNCHEN</b></p> <p>Covered par the Quality Insurance attestation Module E N°2002/2820/013D delivered by the following body :</p> <p style="text-align: center;"><b>AFNOR Certification NB 0333</b> <b>11 rue Francis de Pressensé</b> <b>93571, La pleine St Denis Cedex France</b></p> <p><b>Is compliant with the Directive 2014/33/EU and applied the harmonized standard EN81-20:2014 and EN81-50:2014</b></p>		
Function : Name : Date : Visa :	<b>Operation Quality Manager</b> <b>Ms Lucie Godicheau</b>  	 <p><b>WARNER ELECTRIC EUROPE</b> CS 20095 49182 ST-BARTHELEMY D'ANJOU CEDEX Tél. 02 41 21 24 24 Fax. 02 41 21 24 00 E-mail : warnerelectric-eu.com</p>

## 9.6 EU Type Examination Certificate

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ CERTIFICADO ◆ CERTIFICAT



Industrie Service

# EU TYPE-EXAMINATION CERTIFICATE

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

**Certificate No.:** EU-BD 819/2

**Certification Body of the Notified Body:** TÜV SÜD Industrie Service GmbH  
Westendstr. 199  
80686 Munich - Germany  
Identification No. 0036

**Certificate Holder:** WARNER Electric Europe  
7, rue de Champfleür  
BP 20095  
49124 Saint Barthélemy d'Anjou - France

**Manufacturer of the Test Sample:** WARNER Electric Europe  
7, rue de Champfleür  
BP 20095  
49124 Saint Barthélemy d'Anjou - France  
(Manufacturer of Serial Production – see Enclosure)

**Product:** Braking device acting on the shaft of the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and braking element against unintended car movement

**Type:** ERS VAR07  
Size:  
SZ300/\_\_\_, SZ420/\_\_\_, SZ420/\_\_\_ SY,  
SZ600/\_\_\_, SZ600/\_\_\_ SY, SZ800/\_\_\_,  
SZ800/\_\_\_ AZ

**Directive:** 2014/33/EU

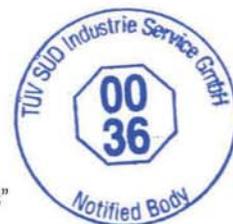
**Reference Standards:** EN 81-20:2014  
EN 81-50:2014  
EN 81-1:1998+A3:2009

**Test Report:** EU-BD 819/2 of 2016-05-13

**Outcome:** The safety component conforms to the essential health and safety requirements of the mentioned Directive as long as the requirements of the annex of this certificate are kept.

**Date of Issue:** 2016-05-13

Achim Janocha  
Certification Body "lifts and cranes"



TUV®

**Annex to the EU Type-Examination Certificate  
 No. EU-BD 819/2 of 2016-05-13**



**1 Scope of application**

**1.1 Use as braking device – part of the the protection device against overspeed for the car moving in upwards direction – permissible brake torques and tripping rotary speeds**

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

Size	Permissible brake torque [Nm]	Max. tripping rotary speed of the traction sheave [rpm]
SZ300/___	482 - 747	300
SZ300/___	434 - 689	600
SZ420/___	547 - 999	300
SZ420/___	502 - 788	600
SZ420/___ SY	603 - 1070	600
SZ600/___	947 - 1306	300
SZ600/___	724 - 1045	600
SZ600/___ SY	811 - 1688	600
SZ800/___	933 - 1811	300
SZ800/___	900 - 1708	500
SZ800/___ AZ	1007 - 1871	400

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

The maximum tripping speed of the overspeed governor and the maximum rated speed of the lift must be calculated on the basis of the traction sheave's maximum tripping rotary speed as outlined above taking into account traction sheave diameter and car suspension.

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

v = Tripping (rated) speed (m/s)  
 D<sub>TS</sub> = Diameter of the traction sheave from rope's centre to rope's centre (m)  
 π = 3,14  
 n = Rotary speed (rpm)  
 i = Ratio of the car suspension

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

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

Size	Min. nominal brake torque* [Nm]	Intermediate nominal brake torque * [Nm]	Max. nominal brake torque * [Nm]	Max. tripping rotary speed [rpm]	Maximum response times** [ms] with / without overexcitation		
					t <sub>10</sub>	t <sub>50</sub>	t <sub>90</sub>
SZ300/___	2 x 250 = 500			300	60	93	125
SZ300/___			2 x 350 = 700	300	50	100	150
SZ300/___	2 x 250 = 500			600	55	88	120
SZ300/___			2 x 315 = 630	600	50	90	130
SZ420/___	2 x 250 = 500			300	60	90	120
SZ420/___			2 x 450 = 900	300	50	105	160
SZ420/___	2 x 225 = 450			600	60	75	90
SZ420/___			2 x 350 = 700	600	60	80	100
SZ420/___ SY	2 x 360 = 720			600	95	128	160

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

**Annex to the EU Type-Examination Certificate  
 No. EU-BD 819/2 of 2016-05-13**



SZ420/___SY			2 x 420 = 840	600	95	148	200
SZ600/___	2 x 420 = 840			300	80	120	160
SZ600/___		2 x 550 = 1100		300	50	85	120
SZ600/___			2 x 600 = 1200	300	50	100	150
SZ600/___	2 x 315 = 630			600	70	90	110
SZ600/___			2 x 500 = 1000	600	50	90	130
SZ600/___SY	2 x 550 = 1100			600	80	108	135
SZ800/___			2 x 900 = 1800	300	40	75	110
SZ800/___			2 x 800 = 1600	500	40	65	90
SZ800/___AZ	2 x 667 = 1334			400	120	160	200
SZ800/___AZ			2 x 800 = 1600	400	100	125	150

Interim values can be interpolated

**Explanations:**

- \* **Nominal brake torque:** Brake torque assured for installation operation by the safety component manufacturer.
- \*\* **Response times:**  $t_x$  time difference between the drop of the braking power until establishing X% of the nominal brake torque,  $t_{50}$  optionally calculated  $t_{50} = (t_{10} + t_{90})/2$  or value taken from the examination recording

1.2.2 Assigned execution features

Size	Type of powering / deactivation	Brake control	Nominal air gap [mm]	Damping elements / adhesive foil integrated	Overexcitation
SZ300/___	Continuous current / continuous current end	serial	0.6	yes / yes	at double non-release voltage
SZ420/___	Continuous current / continuous current end	serial	0.6	yes / yes	at double non-release voltage
SZ420/___SY	Continuous current / continuous current end	serial or parallel	0.65	yes / no	at double non-release voltage
SZ600/___	Continuous current / continuous current end	serial	0.6	yes / yes	at double non-release voltage
SZ600/___SY	Continuous current / continuous current end	serial or parallel	0.65	yes / no	at double non-release voltage
SZ800/___	Continuous current / continuous current end	serial	0.4	yes / yes	no
SZ800/___AZ	Continuous current / continuous current end	parallel	0.65	no / no	no

**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.

**Annex to the EU Type-Examination Certificate  
 No. EU-BD 819/2 of 2016-05-13**



Industrie Service

- 2.2 The installer of a lift must create an examination instruction to fulfil the overall concept, add it to the lift documentation and provide any necessary tools or measuring devices, which allow a safe examination (e. g. with closed shaft doors).
- 2.3 The manufacturer of the drive unit must provide calculation evidence that the connection traction sheave – shaft – brake disc and the shaft itself is sufficiently safe, if the brake disc is not a direct component of the traction sheave (e. g. casted on). The shaft itself has to be statically supported in two points.  
 An evidence must be enclosed with the technical documentation of the lift.
- 2.4 The setting of the brake torque has to be secured against unauthorized adjustment (e. g. sealing lacquer).
- 2.5 The respective identification drawing according to the following table shall be included to the EU type-examination certificate for the identification and information of the general construction and operation and distinctness of the approved type:

Size	No. of the identification drawing	Date of stamp
SZ300/____	1 12 107185	01.07.2009
SZ420/____	1 12 107272	15.03.2010
SZ420/____SY	I-1 12 108237	09.03.2016
SZ600/____	1 12 107273	15.03.2010
SZ600/____SY	I-1 12 108239	09.03.2016
SZ800/____	I-1 12 107213	09.03.2016
SZ800/____AZ	I-1 12 108244	09.03.2016

- 2.6 The EU type-examination certificate may only be used in combination with the corresponding annex and enclosure (List of authorized manufacturer of the serial production). The enclosure will be updated immediately after any change by the certification holder.

**3 Remarks**

- 3.1 The brake moments effectively adjusted of one brake circuit will be marked at the blank after the type designation ERS VAR07 SZXXX/\_\_\_\_XX.
- 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, 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 torque respectively brake force due to wear or operational caused changes of traction are not part of this type examination.
- 3.5 This EU type-examination certificate was issued according to the following standards:
  - EN 81-1:1998 + 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.

**Enclosure to the EU Type-Examination Certificate  
No. EU-BD 819/2 of 2016-05-13**



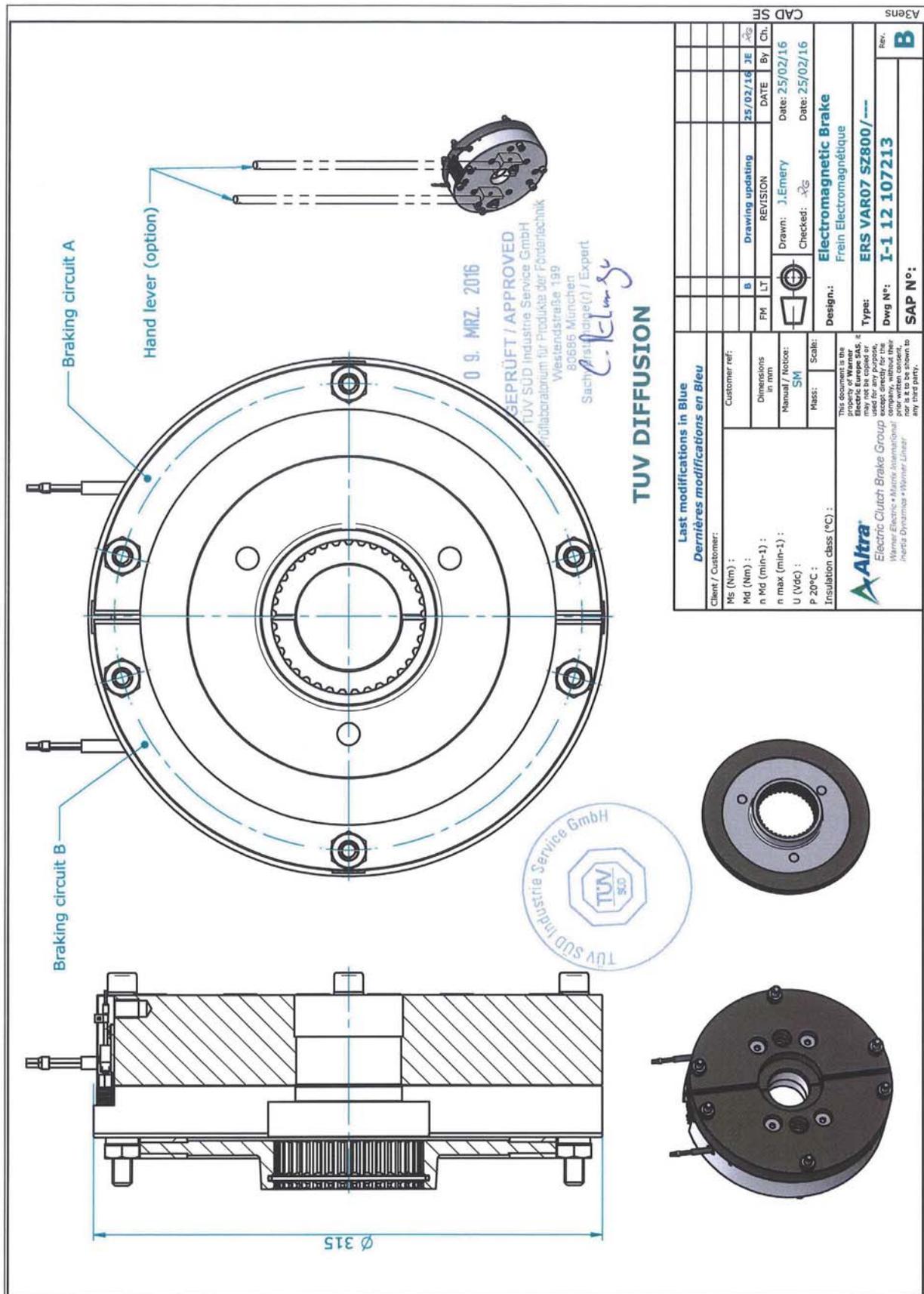
Industrie Service

**Authorised Manufacturer of Serial Production – Production Sites (valid from: 2016-01-22):**

**Company** WARNER Electric Europe  
**Address** 7, rue de Champfleür  
BP 20095  
49124 Saint Barthélemy d'Anjou - France

**Company** Altra Industrial Motion Shenzhen Co. Ltd.  
**Address** Dabo Industry Zone  
18 Huanzhen Road  
Bogang County, Shajing Town  
Baoan District, Shenzhen City  
518104 Guangdong province - China (PRC)

- END OF DOCUMENT -



**9.6.1 Statement on type examination certificates**

The rated brake torques can be found on the name plate. The switching times are assigned to the brake torque in the type examination certificate.

Increases in the index (added with “/”) for a type examination certificate are only used for technical improvements and are approved by the authorised body with this condition.

**9.7 Calculation of tripping speed**

- DTS = diameter of the traction sheave (table contains typical traction sheave diameters, other diameters can be recalculated linear)
- Nbn = maximum nominal speed of the brake rotor
- Nbmax = maximum trip torque of the brake rotor
- Vn = maximum rated speed of the elevator
- Vmax = maximum tripping speed of the elevator

Type	DTS	Nbn	Nbmax	Vn (1:1)	Vmax (1:1)	Vn (2:1)	Vmax (2:1)
	[mm]	[min <sup>-1</sup> ]	[min <sup>-1</sup> ]	[m/s]	[m/s]	[m/s]	[m/s]
SM200.40D/SM200.45D	160	400	460	3.35	3.85	1.68	1.93
SM200.40D/SM200.45D	200	400	460	4.19	4.82	2.09	2.41
SM200.40D/SM200.45D	240	400	460	5.03	5.78	2.51	2.89
SM200.40D/SM200.45D	320	400	460	6.70	7.71	3.35	3.85
SM200.40D/SM200.45D	400	400	460	8.38	9.63	4.19	4.82
SM200.40D/SM200.45D	500	400	460	10.47	12.04	5.24	6.02

**9.8 Calculation proof**

- Translation -  
(english)

A-BN17\_01-GB  
1814 Index 003

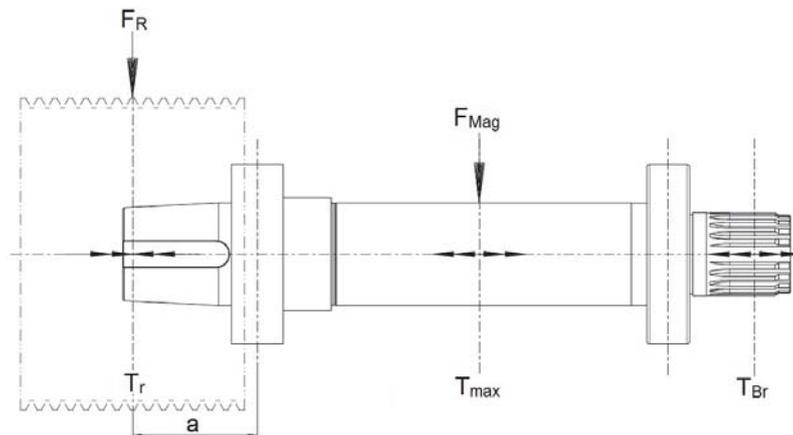
**Manufacturer:** ZIEHL-ABEGG SE  
 Heinz-Ziehl-Straße  
 74653 Künzelsau  
 Germany

**Confirmation concerning the examination of traction sheave shaft calculation including shaft-hub-connections.**

**Type of the gearless machine:** ZAtop SM200.40D  
 ZAtop SM200.45D

**Object examined:** Calculation of traction sheave shaft including shaft-hub-connections by IFF ENGINEERING & CONSULTING GmbH No. 6.1.507.3 dated 18.02.2016

<b>Examination basis:</b>	DIN 743-1:2012-12	Calculation of load capacity of shafts and axles – Part 1: General
	DIN 743-2:2012-12	Calculation of load capacity of shafts and axles – Part 2: Theoretical stress concentration factors and fatigue notch factors
	DIN 743-3:2012-12	Calculation of load capacity of shafts and axles – Part 3: Strength of materials
	DIN 743-3 Corrigendum 1:2014-12	Calculation of load capacity of shafts and axles – Part 3: Strength of materials, Corrigendum to DIN 743-3:2012-12
	DIN 743-4:2012-12	Calculation of load capacity of shafts and axles – Part 4: Fatigue limit, endurance limit – Equivalently damaging continuous stress
	DIN 6892:2012-08	Drive type fastenings without taper action – Parallel keys – Calculation and design
	DIN 6892 Corrigendum 1:2014-05	Drive type fastenings without taper action – Parallel keys – Calculation and design, Corrigendum to DIN 6892:2012-08
	DIN 5466-1:2000-10	Splined joints, calculation of load capacity – Part 1: General basis
	FKM-Guideline 2012	Analytical strength assessment of mechanical components



<b>Construction drawing:</b>	A-20-121-0024 index A05 dated 21.12.2016 A-20-121-0025 index A03 dated 23.11.2016
<b>Permissible shaft materials:</b>	Steel DIN EN 10083-3:2007-01 – 42CrMo4+QT (1.7225+QT) Steel DIN EN 10083-3:2007-01 – 42CrMo4+QT (1.7227+QT) Steel DIN EN 10083-3:2007-01 – 50CrMo4+QT (1.7228+QT)
<b>Permissible traction sheave hub materials:</b>	Steel DIN EN 10083-2:2006-10 – C45+N (1.0503+N) Cast iron DIN EN 1561:2012-01 – EN-GJL-300 (GG-30)
<b>Permissible feather key traction sheave materials:</b>	Steel DIN EN 10083-3:2007-01 – 42CrMo4+QT (1.7225+QT)
<b>Permissible brake rotor materials:</b>	DIN EN 1706:2013-12 AC-AlZn10Si8Mg (AC71100) tensile strength $R_{eN} = 210 \text{ N/mm}^2$

**Load data:**

Maximum permissible static operating shaft load	$F_R$	32.4 kN	36 kN
Distance from bearing A to centre traction sheave	$a$	96.5 mm	77 mm
Rated torque	$T_r$	710 Nm	
Tightening torque	$T_{max}$	1200 Nm	
Magnetic force	$F_{Mag}$	9945 N	
Nominal brake torque	$T_{Br}$	1600 Nm	
Maximum brake torque	$1.5 \times T_{Br}$	3200 Nm	
Rated speed	$n_r$	510 rpm	

**Examination result:**

For the examination a calculation of traction sheave shaft including shaft-hub-connections was carried out by IFF ENGINEERING & CONSULTING GmbH. The result was that the traction sheave and the shaft-hub-connections were designed according to the maximum load data.

An installation free of stresses and an unmovable mounting of the bearings in each direction is presupposed. The machine frame and the points of force introduction have to be designed regarding construction and strength appropriate to the forces imposed on the bearings.

It should be noted that on the brake side only braking torque is applicable, because the calculation does not take into account the additional transverse forces due to the braking effect on the traction sheave shaft.

Künzelsau, 05.04.2018  
 (place and date of issue)

ZIEHL-ABEGG SE  
 Roland Hoppenstedt  
 Head of R&D Drive Division  
 (name, function)

ZIEHL-ABEGG SE  
 André Lagies  
 Manager R&D Mechanics Drive Division  
 (name, function)

*i.V. R. Hoppenstedt*  
 (signature)

*i.V. A. Lagies*  
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