ZIEHL-ABEGG

Die Königsklasse
The Royal League

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

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SM132.21/A
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Gearless permanent magnet synchronous motor

Original operating instructions

Store for future use!

ZIEHL-ABEGG

Content

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 Application

The ZAtop SM132 is designed as a gearless elevator machine for traction sheave rope elevators.
Applications other than the intended use of this elevator machine are not permitted without approval by ZIEHL-ABEGG SE.

1.2 Structure of the operating instructions

These operating instructions help you to work safely on and with the elevator machine ZAtop SM132. 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.

1.3 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.

1.4 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.

1.5 Copyright

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 SM132 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.
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 SM132 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.

	**Danger!** General hazardous area. Death or severe injury or significant property damage can occur if the corresponding precautions are not taken!
	**Warning!** Risk of moderate or minor injury if the corresponding precautions are not taken!
CAUTION!	**Caution!** Material damage is possible if the corresponding precautions are not taken.

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

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 Operational area

The ZAtop SM132 is designed as a gearless elevator machine for traction sheaves rope elevators.
Owing to its very compact design, the ZAtop SM132 is ideal for machine roomless elevators.
The type-tested brake can be used as a:

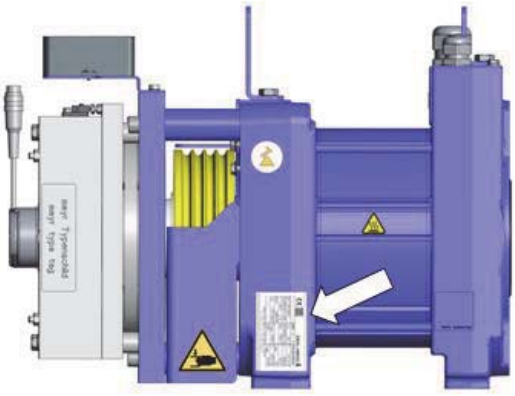
- Brake mechanism acting on the drive shaft as part of the ascending car overspeed protection means
- Brake element acting on the drive shaft as part of the protection against unintended car movement

3.2 Name plate

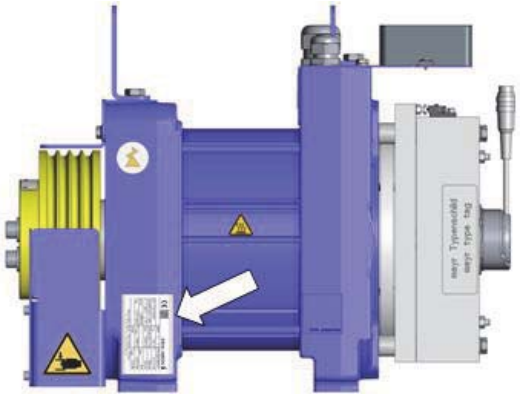
The name plate for the ZAtop SM132 drives specify two values as nominal values for maximum / average nominal power, maximum / average nominal current, maximum / average nominal torque and on time at maximum / average load.
The first values in each case represent the maximum load for operation of the 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 located on the left on the drive side and on the right on the ZAtop SM132 bearing bracket.

Example name plate ZAtop SM132



Position of rating plates on ZAtop SM132.../A and SM132.../AS



Position of rating plates on ZAtop SM132.../B and SM132.../BS

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 ϕ - Power factor		17	P_r - Rated power	[kW]
6	J_M - Moment of inertia	[kg m^2]	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	[Ω]	22	Rated frequency	[Hz]
11	Trips per hour	[st/h]	23	Design	
12	T_{max} - Acceleration torque	[Nm]	24	QR code	

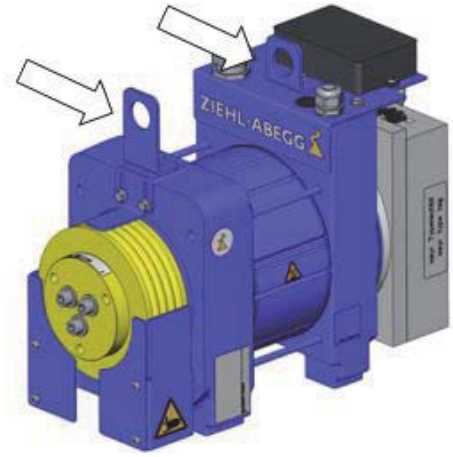
Values for maximum load for operation of elevator (trip with full cabin down and with full cabin up):
120 Nm; 15 % on time; 3.2 kW; 10 A

Values for average load for operation of elevator:
70 Nm; 40 % on time; 1.9 kW; 5.8 A

Note:
The first rated currrent 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.
▷ 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!

Caution!

▷ 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 rcommend keep at least 130 mm space between the brake and the wall (axial direction) to make access to the encoder possible.
▷ **The brake design with manual hand release must be freely accessible since the levers for brake release are moved laterally (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 M30 - 8.8 at the mounting plate.
Tightening torque M30 - 8.8: 1350 Nm
▷ Screw-in depth at least 1.5 times of screw size (minimum 24 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

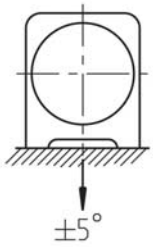
▷ If the traction sheave should offer more grooves than the actual number of ropes, the ropes must be applied on the sheave either centred or towards the motor side.

4.4 Rope pull

Depending on the motor design, the rope pull may only be operated vertically upwards and/or downwards. Ensure that the following specifications, as well as the specifications on the dimension sheet, are observed.

4.4.1 Rope pull for motor version ZAtop SM132.../A and SM132.../B

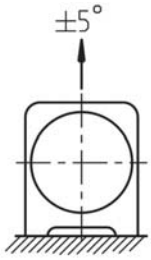
The rope pull must only be in the vertical direction to the motor foot.
The rope force direction resulting from rope pull must be observed.



Resulting rope force for ZAtop SM132.../A and SM132.../B

4.4.2 Rope pull for motor design ZAtop SM132.../AS

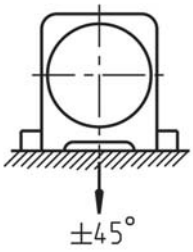
The rope pull must only be in the vertical direction opposed to the motor foot.
The rope force direction resulting from rope pull must be observed.



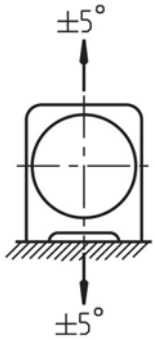
Resulting rope force for ZAtop SM132.../AS

4.4.3 Rope pull for motor design ZAtop SM132.../BS

With lateral form lock support, the rope pull may only be in the vertical direction to the motor foot ± 45° and opposed to the motor foot ± 5°.
Without lateral form lock support, the rope pull may only be in the vertical direction ± 5°.
The rope force direction resulting from rope pull must be observed.



Resulting rope force for ZAtop SM132.../BS
with lateral form lock support

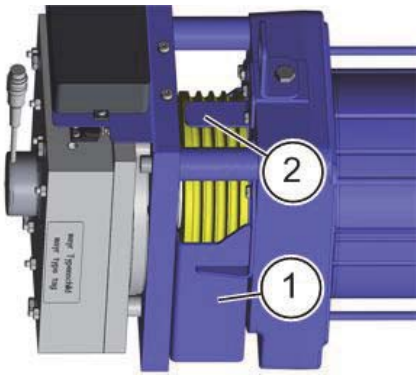


Resulting rope force ZAtop SM132.../BS
without lateral form lock support

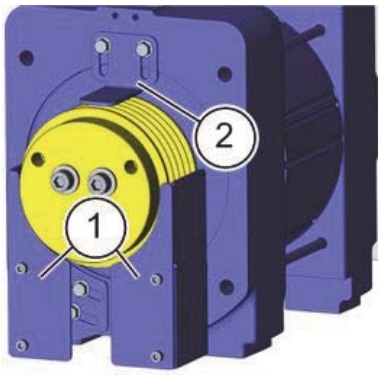
4.5 Fastening rope guard

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.



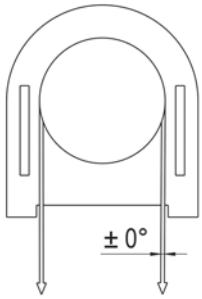
Rope guard ZAtop SM132.../A



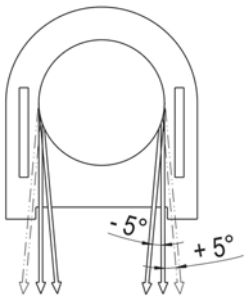
Rope guard ZAtop SM132.../B

▷ 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.

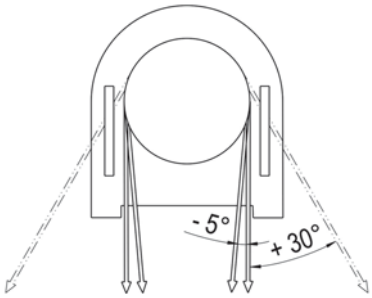
Rope guard adjustability
Depending on the rope guard design, the rope departure can be adjusted differently:



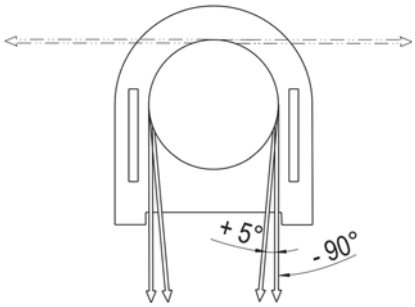
For wrap angle 180°.



Adjustability on both sides ± 5°.
Normal wrap angles 175° - 185°.



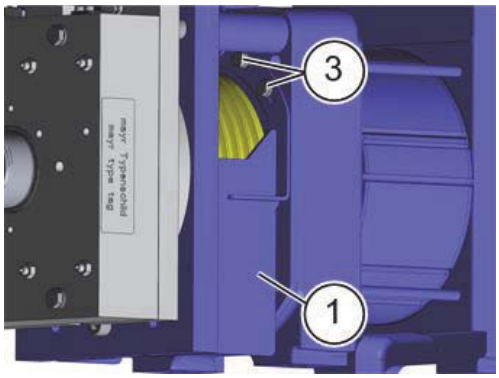
Adjustability on both sides + 5°/- 30°.
Normal wrap angles 150° - 185°.



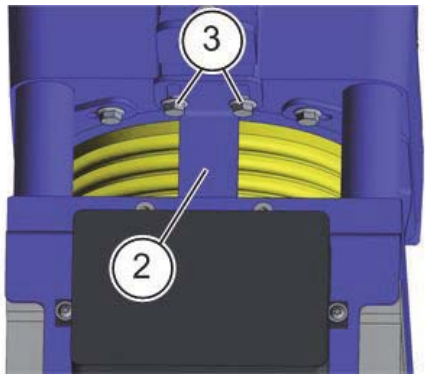
Adjustability on both sides + 5°/- 90°.
Normal wrap angles 90° - 185°.

4.5.1 Rope guard fastening on ZAtop SM132.../A

Adjustability on both sides ± 5°. Normal wrap angles 175° - 185°.



Rope guard on ZAtop SM132.../A

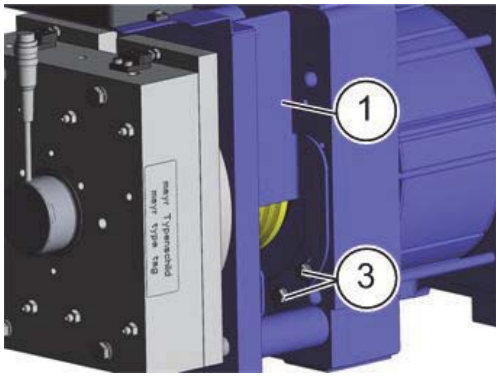


3. rope retainer (optional) on ZAtop SM132.../A

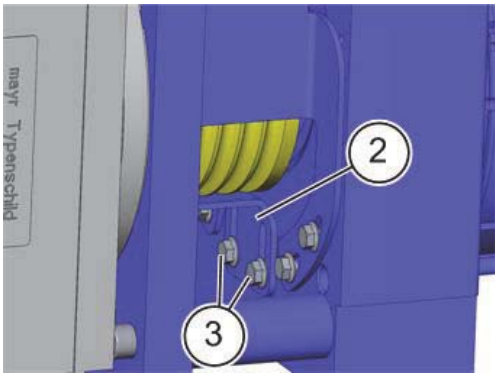
▷ The rope guard (1) is attached to the bearing bracket with two hexagon head screws M6 x 12 - 8.8 (3) in each case.
▷ The elongated hole in the rope guard (1) enables the required distance to the ropes to be set at the hexagon head screws M6 x 12 - 8.8 (3).
Tightening torque M6 - 8.8: 9,5 Nm
▷ The 3. rope retainer (2) is attached with two hexagon head screws M6 x 12 - 8.8 (3).
▷ The elongated hole in the rope retainer (2) enables the required distance to the ropes to be set at the hexagon head screws M6 x 12 - 8.8 (2).
Tightening torque M6 - 8.8: 9.5 Nm

4.5.2 Rope guard fastening on ZAtop SM132.../AS

Adjustability on both sides ± 5°. Normal wrap angles 175° - 185°.



Rope guard on ZAtop SM132.../AS

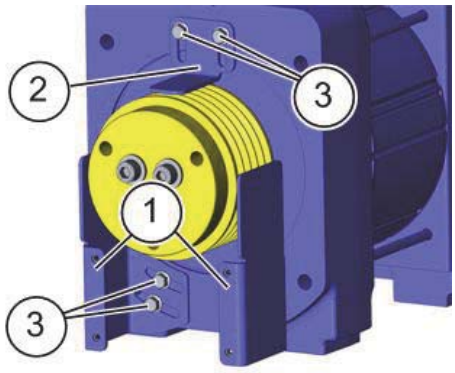


3. rope retainer (optional) on ZAtop SM132.../AS

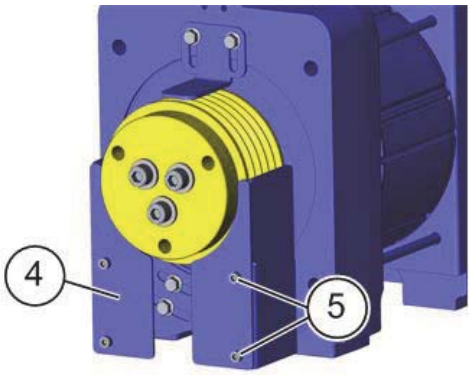
▷ The rope guard (1) is attached to the bearing bracket with two hexagon head screws M6 x 12 - 8.8 (3) in each case.
▷ The elongated hole in the rope guard (1) enables the required distance to the ropes to be set at the hexagon head screws M6 x 12 - 8.8 (3).
Tightening torque M6 - 8.8: 9,5 Nm
▷ The 3. rope retainer (2) is attached with two hexagon head screws M6 x 12 - 8.8 (3).
▷ The elongated hole in the rope retainer (2) enables the required distance to the ropes to be set at the hexagon head screws M6 x 12 - 8.8 (2).
Tightening torque M6 - 8.8: 9.5 Nm

4.5.3 Rope guard fastening on ZAtop SM132.../B

Adjustability on both sides ± 5°. Normal wrap angles 175° - 185°.



Rope guard on ZAtop SM132.../B

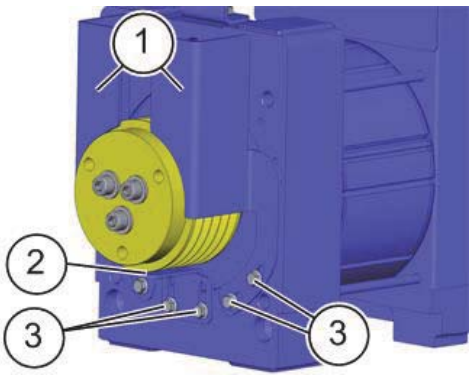


Nip guard on ZAtop SM132.../B

▷ The rope guard (1) is attached to the bearing bracket with two hexagon head screws M6 x 12 - 8.8 (3) in each case.
▷ The elongated 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 (3).
Tightening torque M6 - 8.8: 9,5 Nm
▷ The 3. rope retainer (2) is attached with two hexagon head screws M6 x 12 - 8.8 (3).
▷ The elongated hole in the rope retainer (2) enables the required distance to the ropes to be set at the hexagon head screws M6 x 12 - 8.8 (2).
Tightening torque M6 - 8.8: 9.5 Nm
▷ The nip guard (4) is attached with two socket cap screws M5 x - 8.8 (5) on the rope guard (1) in each case.
Tightening torque M5 - 8.8: 5.5 Nm

4.5.4 Rope guard fastening on ZAtop SM132.../BS

Adjustability on both sides ± 5°. Normal wrap angles 175° - 185°.

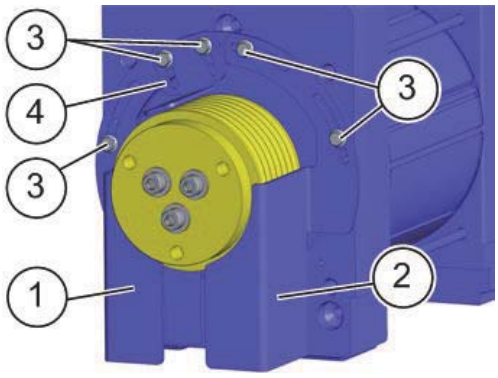


Rope guard on ZAtop SM132.../BS

▷ The rope guard (1) is attached to the bearing bracket with two hexagon head screws M6 x 12 - 8.8 (3) in each case.
▷ The elongated 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 (3).
Tightening torque M6 - 8.8: 9,5 Nm
▷ The 3. rope retainer (2) is attached with two hexagon head screws M6 x 12 - 8.8 (3).
▷ The elongated hole in the rope retainer (2) enables the required distance to the ropes to be set at the hexagon head screws M6 x 12 - 8.8 (2).
Tightening torque M6 - 8.8: 9.5 Nm

4.5.5 Rope guard fastening on ZAtop SM132.../BS

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



Rope guard on ZAtop SM132.../BS

▷ The right rope guard (1) is attached hand tight with a hexagon head screw M6 x 16 - 8.8 (3) on the bearing bracket.
▷ The left rope guard (2) is attached hand tight with two hexagon head screws M6 x 16 - 8.8 (3) on the bearing bracket.
▷ The elongated holes on the right and left rope guard (1) + (2) enable the required distance to the ropes to be set at the hexagon head screws M6 x 16 - 8.8 (3).
Tightening torque M6 - 8.8: 9.5 Nm
▷ The 3. rope retainer (4) is attached with two hexagon head screws M6 x 16 - 8.8 (3).
▷ The elongated hole in the rope retainer (3) enables the required distance to the ropes to be set at the hexagon head screws M6 x 16 - 8.8 (3).
Tightening torque M6 - 8.8: 9.5 Nm

4.6 Patent situation

Note the patent situation when using elevator machines in a shaft. When using the ZAtop SM132 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.
▷ If the girder that supports the elevator machine is attached to a wall, the elevator machine must be attached in a standing position. Suspended attachment is not permitted.
▷ If the girder that supports the elevator machine is fastened at one wall, the elevator machine has to be installed on top of the girder. 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 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 2004/108/EG 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 2004/108/EG.

5.3 Motor

CAUTION!

▷ **The Elevator machine has a connected motor cable.**
▷ **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 U0 / U: 450 / 750 VAC

5.3.3 Cable length

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

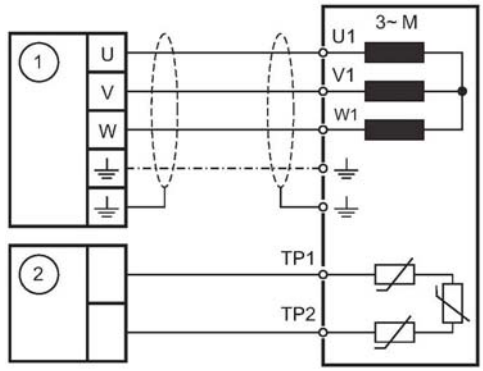
5.3.4 Line assignment

▷ Depending on the motor cable following assignments are possible:

Motor cable	**U**	**V**	**W**	**PE**
Standard	black	brown	grey	green/yellow
halogen-free	U	V	W	green/yellow

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.

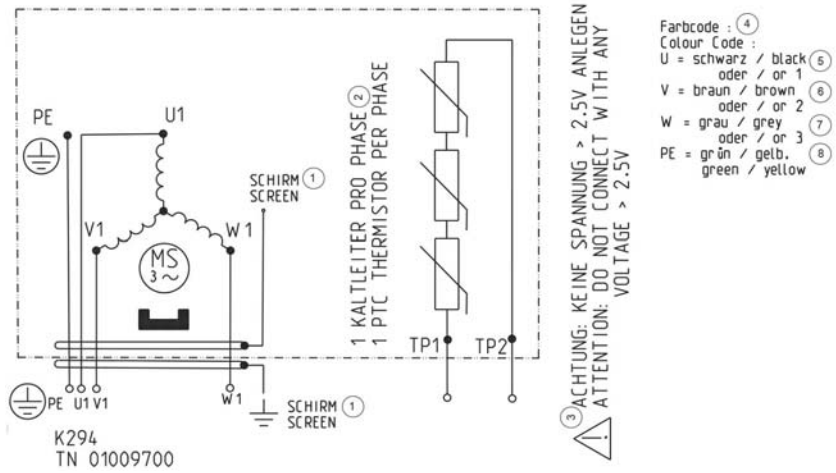


1 Frequency inverter
2 Motor temperature monitoring

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!
4 color code
5 black
6 brown
7 grey
8 green/yellow

5.4 Absolute encoder

Caution!

▷ 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:

The absolute value encoder on the motor version ZAtop SM132.../B and SM132.../BS can only be removed from the rear. Due to the extremely low failure rate of the absolute value 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 cable for communication with the absolute encoder
B	DATA /	Data cable 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 value encoder offset is set to 0. This is achieved by connecting DC voltage with **U to +** and **V and W to -**.

▷ The absolute value encoder may not be mechanically detached to ensure that the factory settings are not lost. If the absolute value 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

ZAtop SM132.21... Brake type ROBA®-twinstop® (RTW), size 180, 2 x 160 Nm
ZAtop SM132.35... Brake type ROBA®-twinstop® (RTW), size 225, 2 x 225 Nm

- 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 by using the manual hand release available as an option. A brake with a mechanical hand release system is available optionally. The hand release system cannot be fitted later. The complete brake must be replaced to retrofit the hand release system.
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 for the brakes is carried out by a microswitch or inductive proximity switch. For technical data, see chapter "Appendix - Technical data - Microswitch or inductive proximity switch".

5.5.4 Brake control

5.5.4.1 Contactorless - ZAsbc4

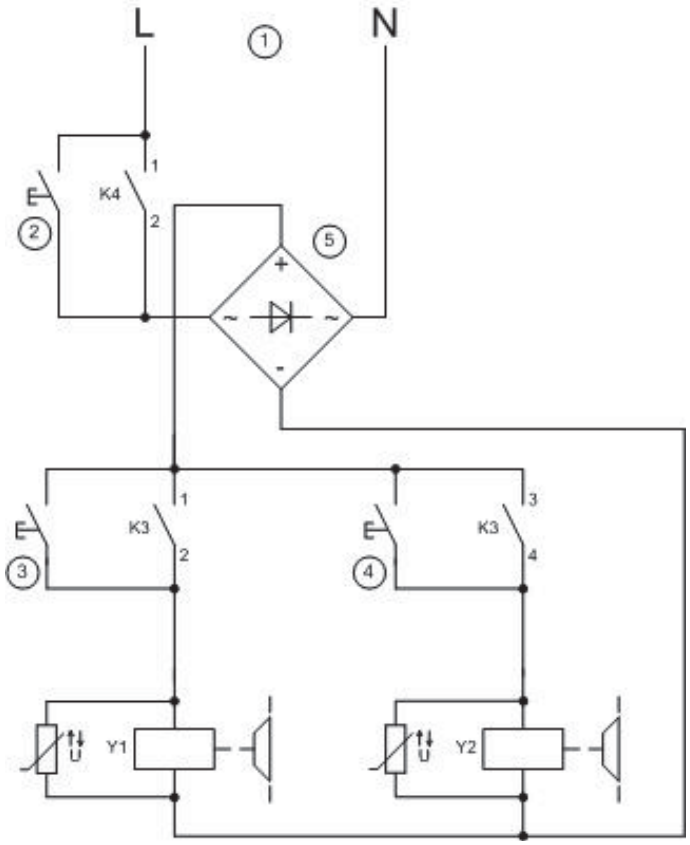
Electronic and noise-free activation of the brake.
The brake operating mode is set on site.
For information on installation and commissioning, refer to the ZAsbc4 operating instructions.

5.5.4.2 Electromechanical contactors

Brake type	RTW 180	RTW 225
Betriebssannung	207 V	207 V
Gleichrichter	Bridge rectifier*	

* *Bridge rectifier is not included in the scope of supply, it is available as option from ZIEHL-ABEGG SE as item 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.



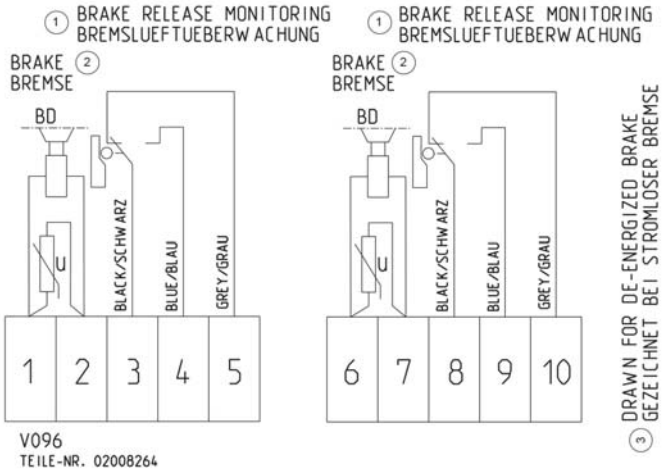
Simplified diagram for brake control
1 Power supply
2 Button two circuit test
3 / 4 "Open brake" button
5 Gleichrichter
K3 Brake contactor, activated by safety circuit
K4 Brake contactor, activated by control or frequency inverter

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 have to be protected against over voltage from switching by varistors. The brakes are supplied with varistors ex factory.

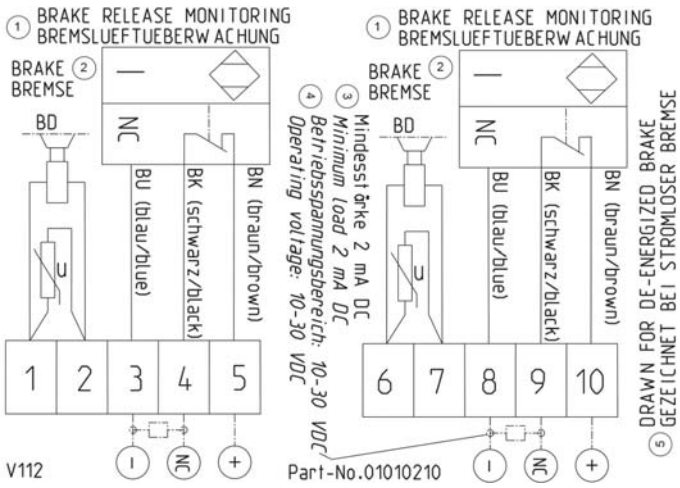
5.5.6 Connection diagram

Brake wiring diagram with micro switch



1 Brake air monitoring
2 Brake
3 Shown with currentless brake

Brake wiring diagram with inductive proximity switch



1 Brake release monitoring
2 Brake
3 Minimum strength 2 mA DC
4 Operating voltage range 10 - 30 V DC
5 Shown with currentless brake

6 Start-up

6.1 Operating conditions

▷ The elevator machine must be installed in a not free accessible machine room or a closed hoistway.
▷ 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.

Note
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 car safety gear"** 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

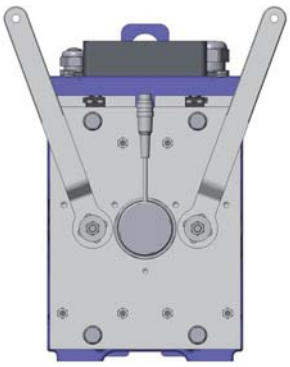
Attention!
The measures for emergency evacuation described below may only be performed by instructed persons for maintenance of the elevator or qualified personnel of elevator companies.

6.5.1 Emergency evacuation by release of the brakes

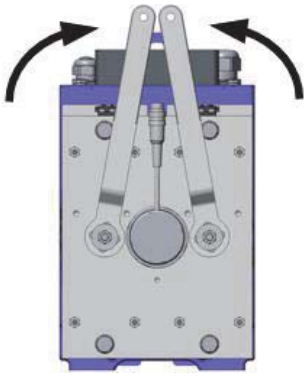
In case of power failure or failure of the recovery control, emergency rescue is only possible by releasing the brakes. The brake can be released by an electrical emergency power supply or, if available, by a manual hand release.
When the brakes are released manually, the elevator moves in the direction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

A brake with a mechanical hand release system is available optionally. The hand release system cannot be fitted later. The complete brake must be replaced to retrofit the hand release system.



Brake not opened



brake manuell released

▷ The brake is released via simultaneous movement of both levers for manuel hand release. Turning direction - see arrows.

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

Failure	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 or remove the brake and release the brake rotor carefully from the armature disk
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 the brake rotors (Special tool required! Contact the customer service of ZIEHL-ABEGG SE).

Failure	Causes	Adjustment
Brake does not release	Power supply too low. The voltage at the brake is to 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	Microswitch/inductive proximity switch defective	Replace microswitch/inductive proximity switch
	Contacts dirty	Operate microswitch/inductive proximity switch with a higher contact current, at least 10 mA or replace microswitch/inductive proximity switch or brake

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 treaction 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.

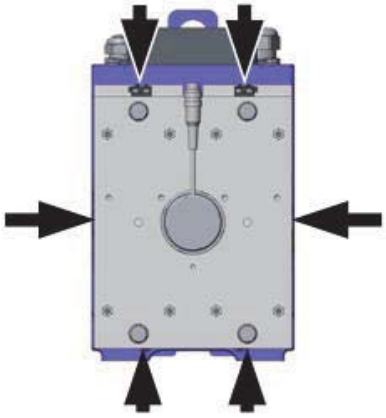
The brake wear has to be checked with the brake closed, therefore:
▷ Make sure that all moving parts have stopped, secure them mechanically if required!
▷ Make sure that the elevator can not be moved from any other person than the one who does the check!

8.2 Inspection intervals

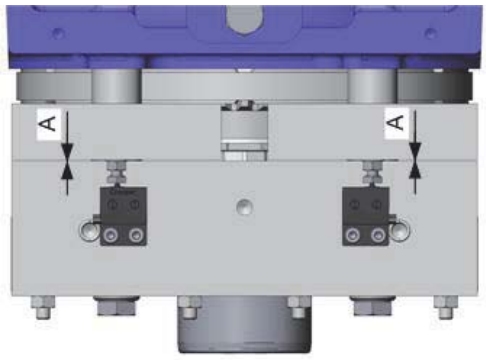
	During commissioning or after the first 3 months	every year
Distance of the rope guard	x	x
Check vibration isolation The thickness of the vibration isolation must be the same on the right and left.	x	x
Checking the air gap of the brake	x	x
Visual inspection of the mounting screws on the housing, brakes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



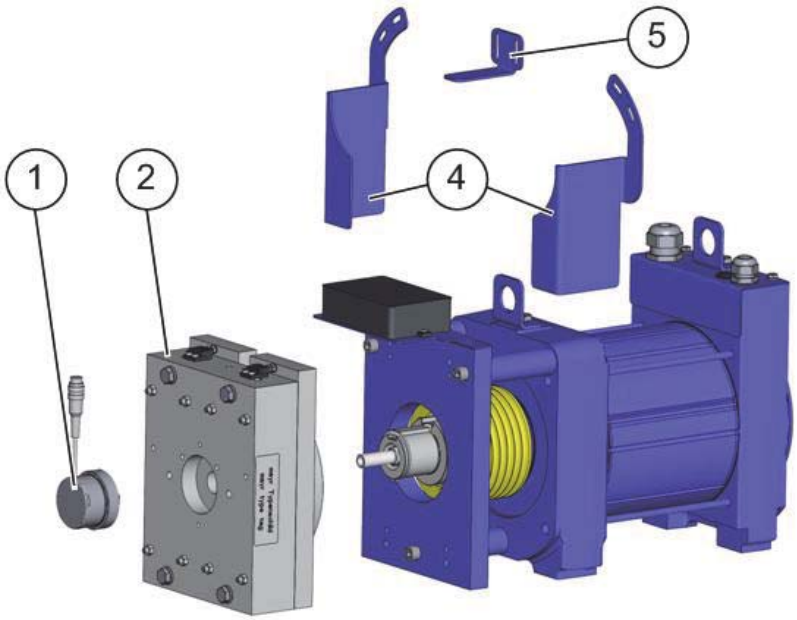
Air gap measurement

1. The air gap "A" has to be measured three times at the circumference (see arrows) of both brakes. The maximum value of the four has to be taken into account.
2. If the maximum value of the air gap "A" is exceeded on one of the magnets, it must be replaced both brake rotors and the appendant O-rings.
   Maximum admissible air gap "A" after wear: 0.9 mm!
   Caution!
   Feeler gauge do not introduce more than 10 mm into the air gap, to avoid damage to the dampers of noise or deterioration by the springs.

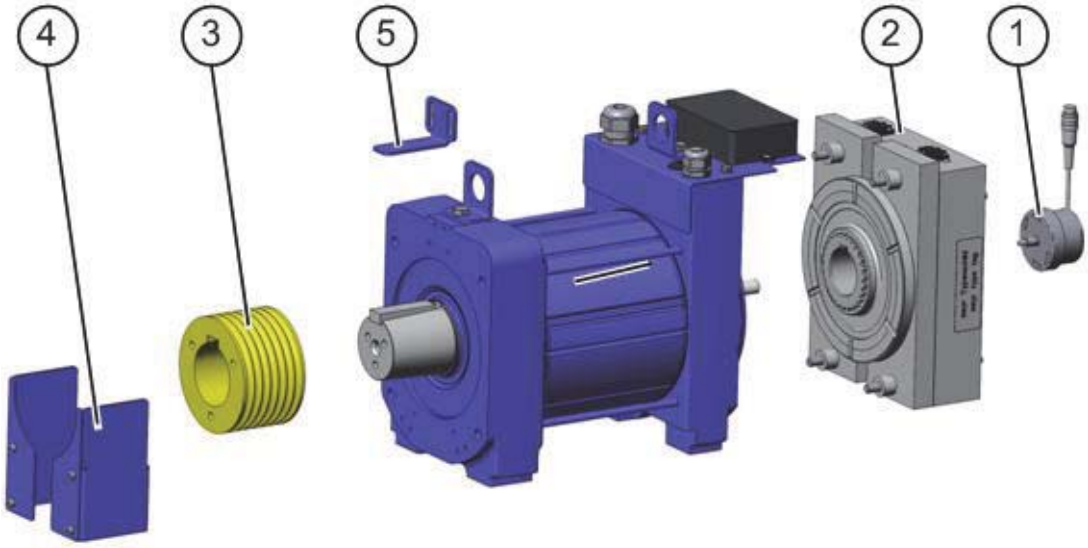
8.3 Spare parts

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 for motor version ZAtop SM132.../A and SM132.../AS



Available spare parts for motor version ZAtop SM132.../B and SM132.../BS

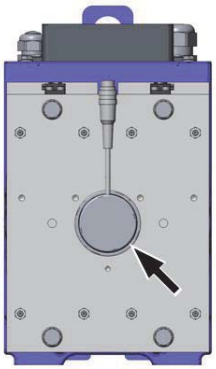


Available spare parts:

1. Absolute encoder
2. Complete brake
   2.1 Brake rotors with O-rings
   2.2 Micro switch for brake
   2.3 Inductive proximity switch for brake
3. Traction sheave
   (only for motor version ZAtop SM132.../B and SM132.../BS)
4. Rope guard
5. Rope retainer

8.3.1 Replacement of the absolute encoder ECN1313/ERN1387

The absolute value encoder is mounted on the motor drive shaft on the brake side (see arrow).

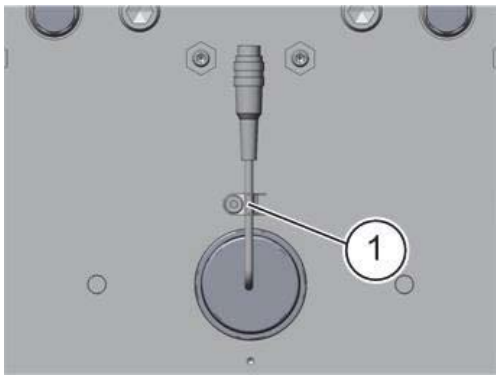


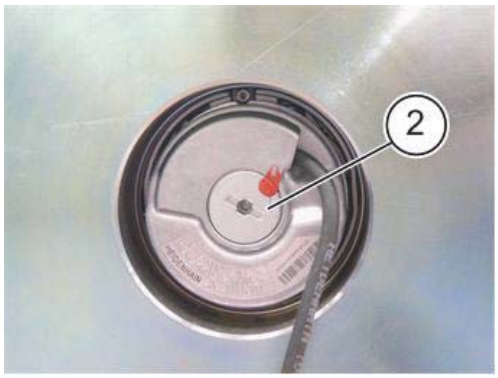
Position of absolute encoder

8.3.1.1 Required tool for the replacement of the absolute encoder:

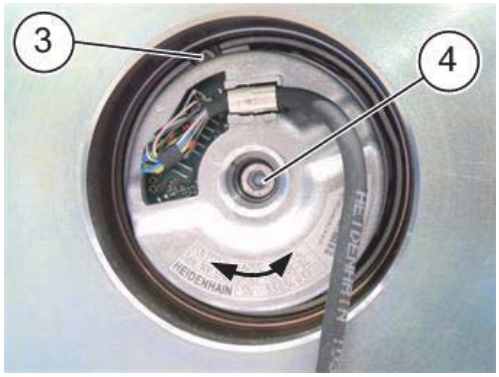
- Wire cutter
- Allen wrench SW 2
- Allen wrench SW 4
- Torque wrench for tightening torque $5^{+0.5}$ Nm with size 4 Allen key
- Torque wrench for tightening torque $1.25_{-0.2}$ Nm with size 2 Allen key
- Screw M10 x 25 (included in toolkit, article 70027450)

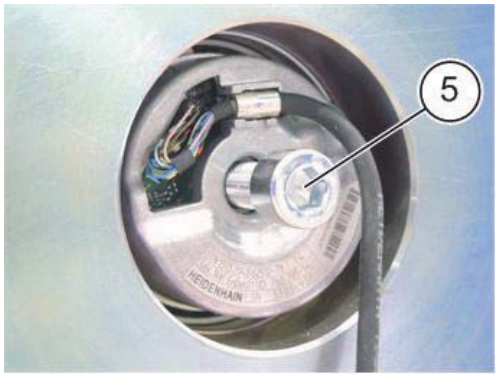
8.3.1.2 Dismounting the absolute encoder



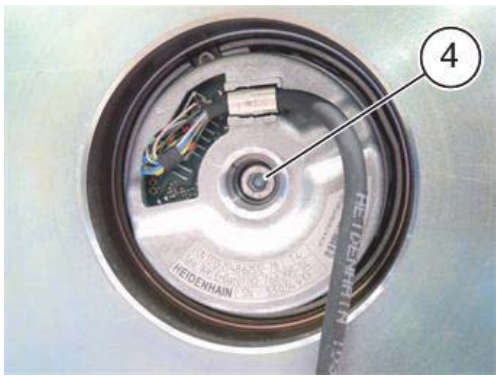


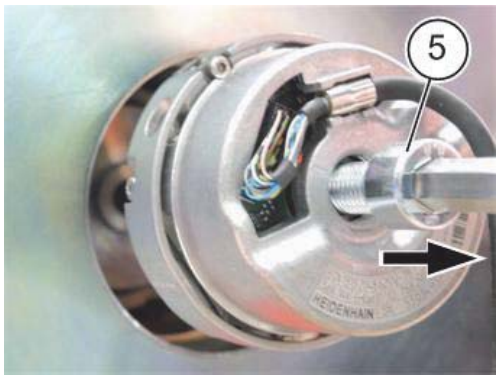
1. Disconnect the encoder cable from the housing by removing the cable retainer (1) with the wire cutters.
2. Removethecover of the encoder (2) with an allen wrench SW 4





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.



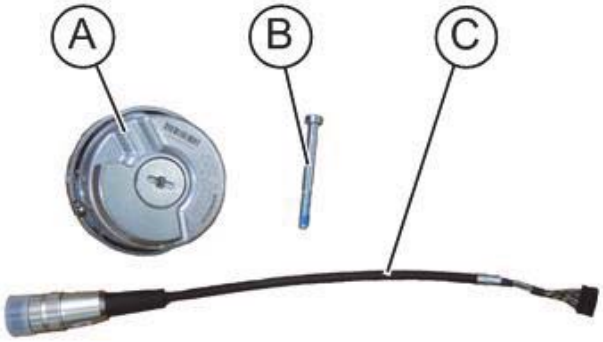


7. Unscrew the central encoder fastening screw (4) with the size 4 Allen key.
8. Screw the screw M10 x 25 (5) onto the absolute encoder again and use the screw to remove the absolute encoder.

Caution!
▷ Due the 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

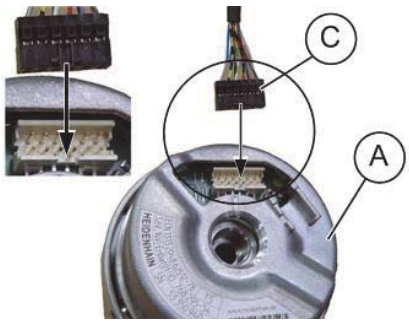


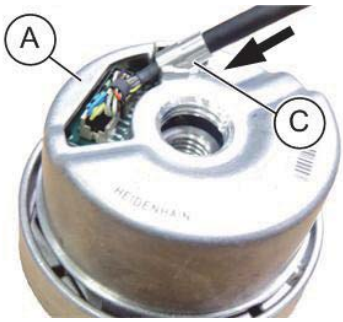
Pos.	Count	Designation
A	1	Absolute encoder
B	1	central encoder fastening screw (self-locking screw M5 x 50 DIN 6912 SW4 - with positive locking) Tightening torque 5+0.5 Nm
C	1	Encoder cable (optional)

Caution!

▷ Due the 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.

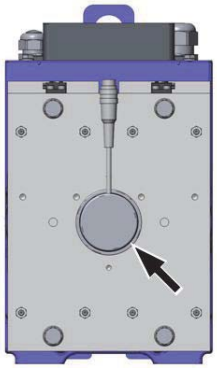


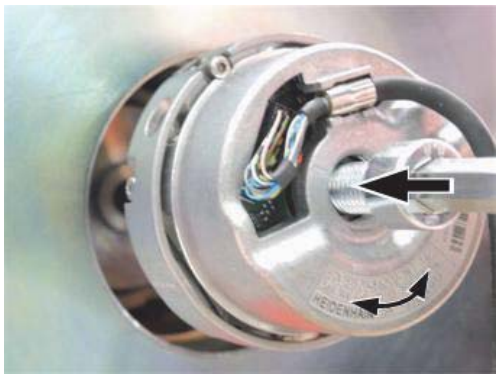


1. Click the socket for the encoder cable (C) into the circuit connector for the absolute value encoder (A). Use the recesses provided.
2. Slide the strain relief for the encoder cable (C) diagonally into the recess on the absolute value encoder (A) as far as it will go and then push in.

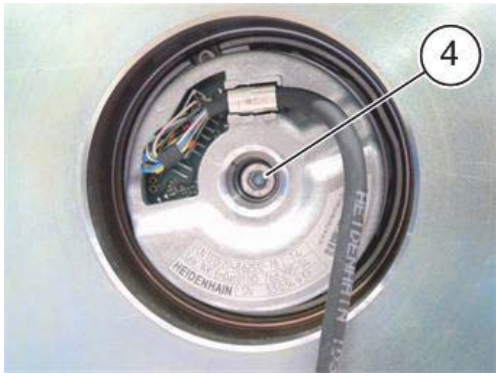
8.3.1.4 Mounting the absolute encoder

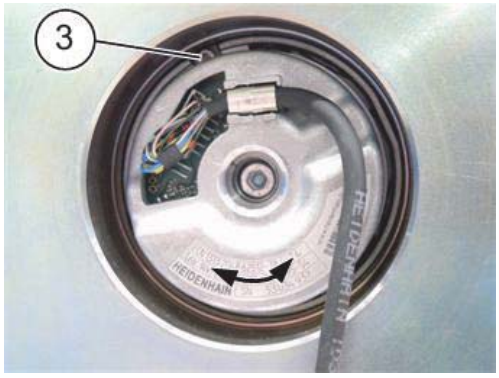
Caution!
▷ Never touch the connection contacts on the position absolute encoder or on the cable! The electronics can be destroyed by static electricity.
▷ You must discharge your own body before touching. This can be done, for example, by touching a conductive, earthed object (e.g. bare metal switch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



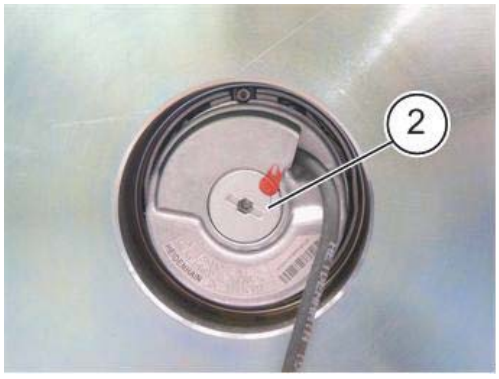


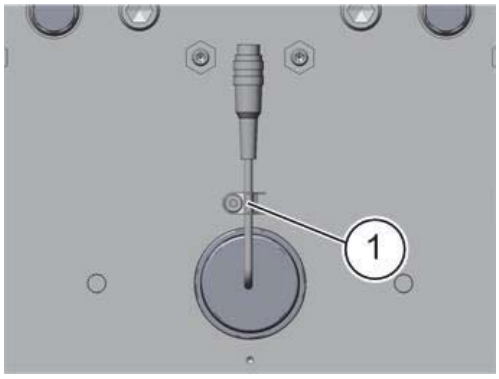
1. The brake is used to centre the absolute encoder.
2. Insert the absolute value encoder into the housing with a slight turning motion.





3. Tighten the central encoder fastening screw (4) with the size 4 Allen key.
   Tightening torque: $5^{+0.5}$ 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: $1.25_{-0.2}$ Nm





5. Screw on the encoder cover (2) with the size 4 Allen key.
   Tightening torque: $5^{+0.5}$ 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

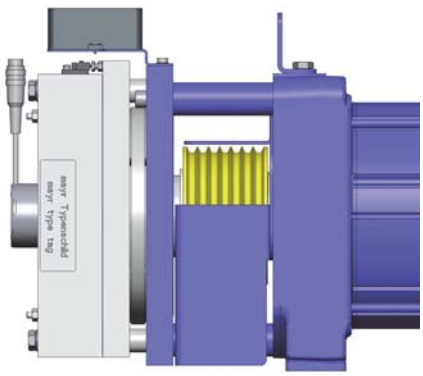
During the mounting as well as the dismounting also the operating instructions of the brake has to be observed.

Risk of death!
When dismounting the brake make sure that the cabin and the counterweight are mechanically secured against movement!

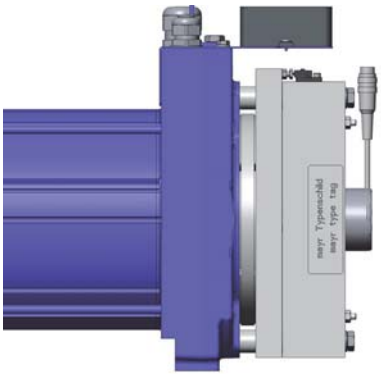
Risk of death!
Incorrect mounting can have a detrimental impact on the braking action.

Brake with mechanical hand release system

A brake with a mechanical hand release system is available optionally. The hand release system cannot be fitted later. The complete brake must be replaced to retrofit the hand release system.
The brake is fitted on the power take-off side on motor version ZAtop SM132../A and SM132.../AS and opposite the power take-off side on motor version ZAtop SM132../B and SM132.../BS.
Replacement of the brake for the motor version ZAtop SM132.../B is depicted in the operating instructions. The brakes for the other motor versions have identical attachment conditions.



Brake version ZAtop SM132.../A and SM132.../AS

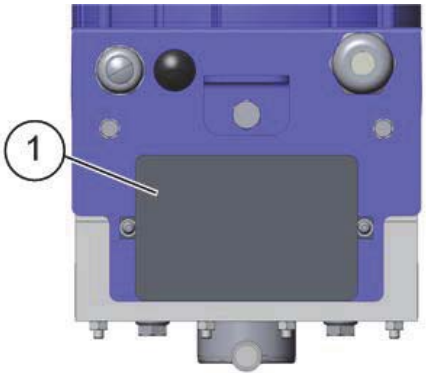


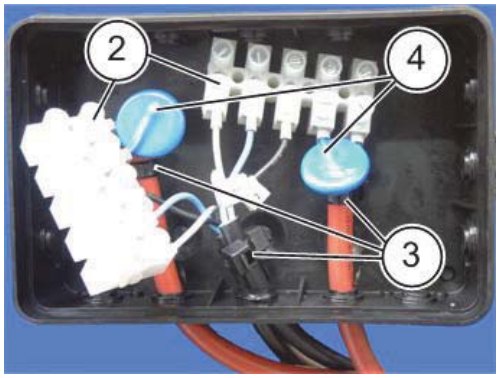
Brake version ZAtop SM132.../B and SM132.../BS

8.3.2.1 Required tool for the replacement of the brake:

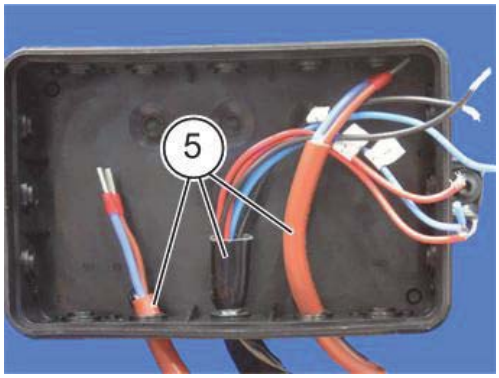
- ZIEHL-ABEGG toolkit article 70027450
- Tool for replacing the absolute encoder (see chapter "Replacement of the absolute encoder")
- Wire cutter
- Cable stripper
- Crimper
- Slotted screwdriver 0.6 x 3.5
- screw wrench SW 10
- screw wrench SW 13
- screw wrench SW 16
- screw wrench SW 17
- Torque wrench for tightening torque 9.5 Nm, size 10
- Torque wrench for tightening torque 30 Nm with SW 13
- Torque wrench for tightening torque 43 Nm with SW 16
- Torque wrench for tightening torque 46 Nm with SW 17
- Mounting sleeve (included in toolkit, item 70027450)
- Cylinder-head screw M6 x 16 (included in toolkit, item 70027450)
- Cylinder-head screw M10 x 100 (included in toolkit, item 70027450)

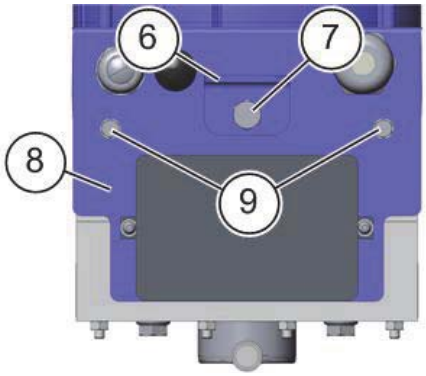
8.3.2.2 Dismounting the brake



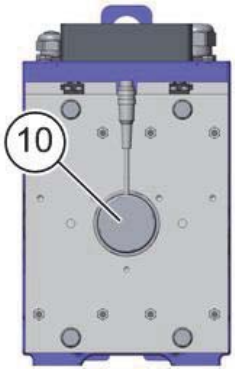


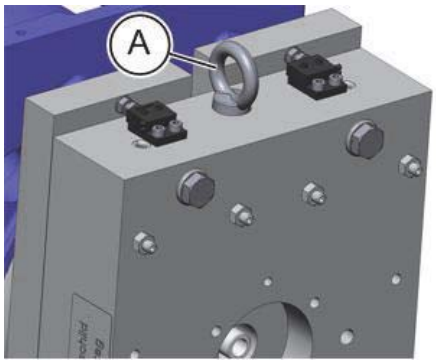
1. Remove cover from connection box (1).
2. Disconnect the electrical connection (2) of both brakes.
3. Carefully remove strain reliefs (3) of all connecting cables with wire cutters.
4. Cut off varistors (4).



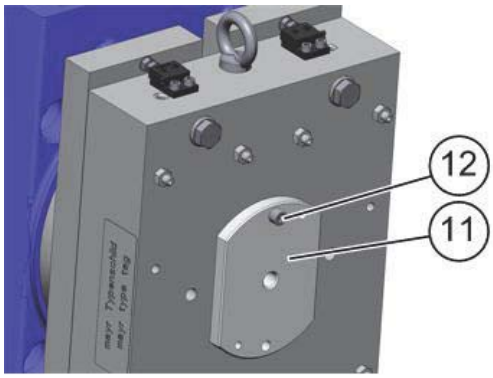


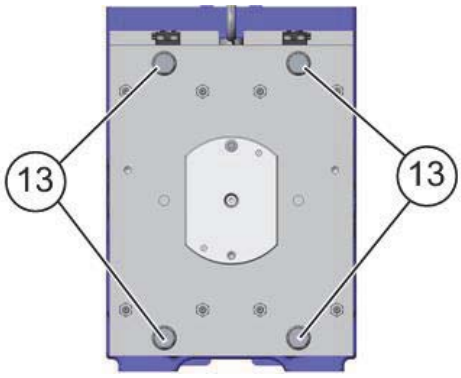
5. Feed all connecting cables (5) out of the terminal box.
6. Remove the cable ties at the brake cables.
7. Unscrew the hexagon head screw M10 x 20 - 8.8 (7) with screw wrench SW 17 and remove the eye plate (6).
8. Unscrew both hexagon head screws M6 x10 - 8.8 (9) with spanner size 10 and carefully fold back the adapter plate (8).



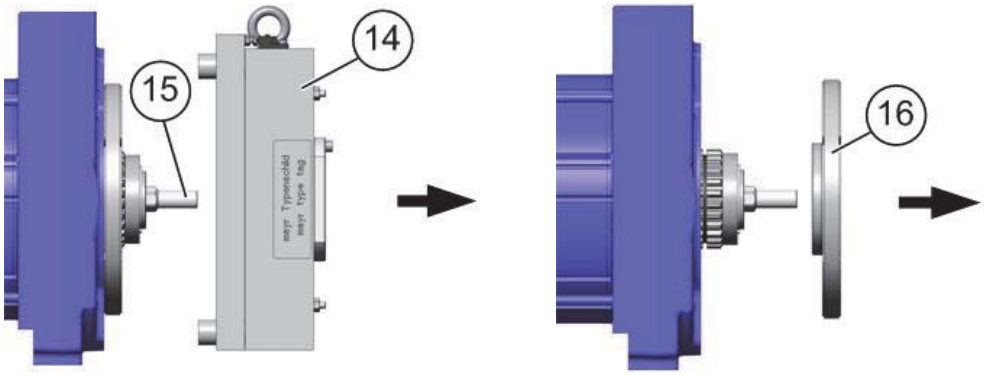


9. Dismount the absolute encoder (10) (see chapter "Replacement of the absolute encoder").
10. **Caution!**Due to the great weight of the brake body, we recommend you to secure and change the brake body by using an eye bolt M8 (A) and appropriate lifting gear.

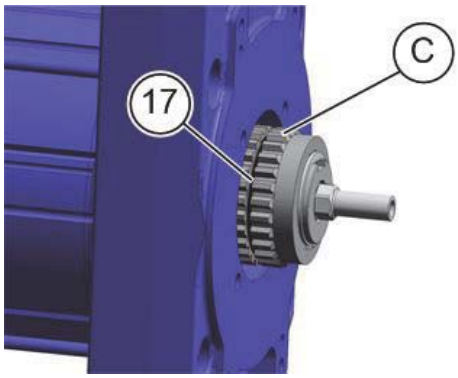




11. Fit the mounting sleeve (11) and secure with the cylinder-head screw M6 x 16 (12). Tighten the cylinder-head screw (12) hand tight.
12. Gradually unscrew the hexagon head screws (13) alternately in a diagonal configuration with a spanner.
    ZAtop SM132.21/... - RTW180 -
    Unscrew the hexagon head screws M8 x 110 - 10.9 (11) with a spanner size 13
    ZAtop SM132.35/... - RTW 225 -
    Unscrew the hexagon head screws M10 x 115 - 8.8 (11) with a spanner size 16



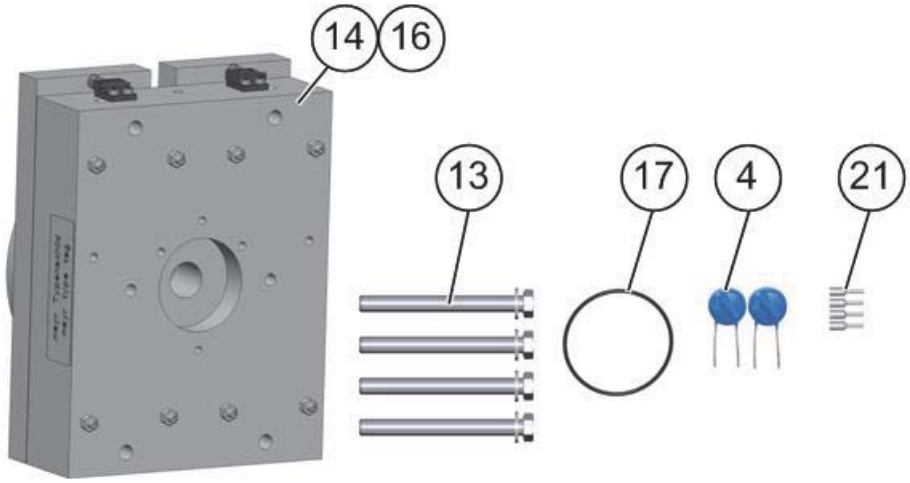
13. Detach the brake body (14).
    ATTENTION! Be aware of the weight of the brake body
    ZAtop SM132.21/... - RTW 180 approx. 24 kg
    ZAtop SM132.35/... - RTW 225 approx. 30 kg
14. **ATTENTION!** Do not use the adapter shaft (15) to help you remove the brake body (14), as otherwise the function of the absolute value encoder is no longer guaranteed.
15. Detach the brake rotor (16) from the toothed hub. The brake rotor may only be detached by hand.
    ATTENTION! Do not use screwdrivers to release the brake rotor.
    The screwdrivers damage the friction lining. Damaged friction linings may not be re-fitted!



16. O-Ring (17) von der verzahnten Nabe (C) entfernen.

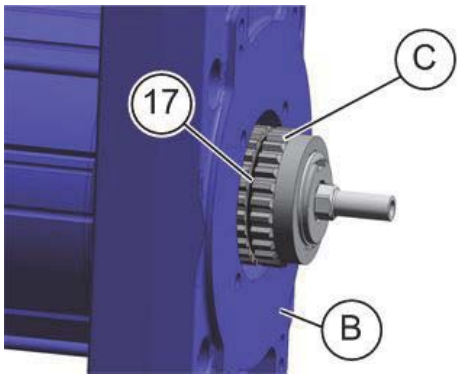
8.3.2.3 Mounting the brake

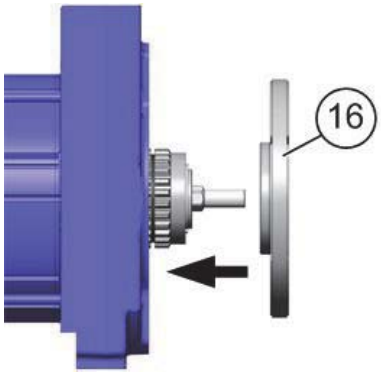
Scope of delivery for the brake and assembly kit (article 70029992) in case of replacement delivery



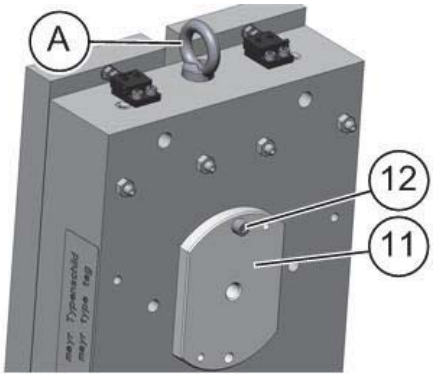
Pos.	Count	Designation
4	2	varistor
13	4	ZAtop SM132.21/... - RTW180 - Hexagon head screws M8 x 110 - 10.9 with washer ZAtop SM132.35/... - RTW 225 - Hexagon head screws M10 x 115 - 8.8 with washer
14	1	Brake body
16	1	Brake rotor
17	1	O-ring
21	4	Wire-end sleeves
22	1	Micro-active cloth
23	1	Feeler gauges, 13-part
24	1	Thread-locking fluid 20 ml
25	1	Technical vaseline 50 g
26	1	Quick cleaner LOCTITE® 7063 400 ml

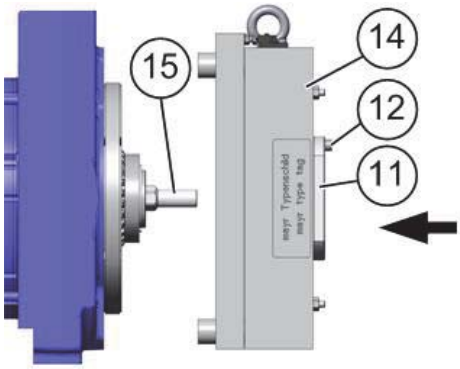
The assembly kit (article 70029992), including nos. 4 and 21 to 26 is optionally available and supplied in a separate folding box.

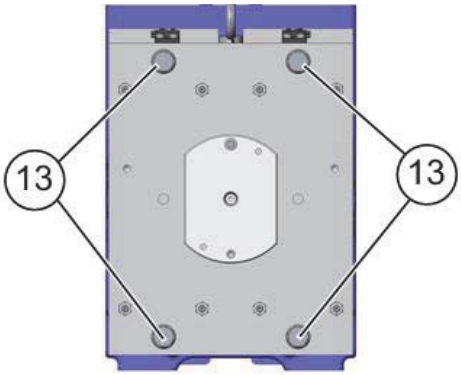


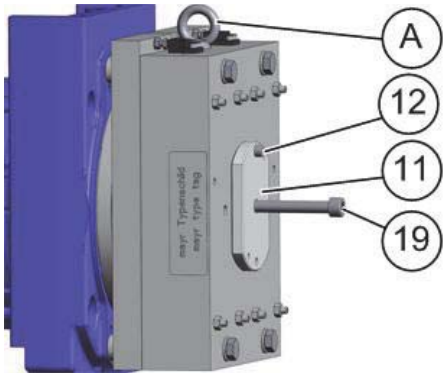


1. Ensure that the friction lining of the brake rotor (16), the braking surface (B) on the flanged bearing plate and the toothed hub (C) on the motor shaft are free of dirt and grease. Perform cleaning with a micro-active cloth and quick cleaner LOCTITE® 7063.
2. Lightly grease the O-ring (17) technical Vaseline and insert into the groove in the hub (C).
3. Slide the brake rotor (16) manually over the O-ring (17) onto the toothed hub (C) with light pressure.
   ATTENTION! Ensure that the rotor collar with the smaller diameter is pointing towards the machine wall.
4. Make sure that the gear teeth engage easily.
5. O-ring may not be damaged.



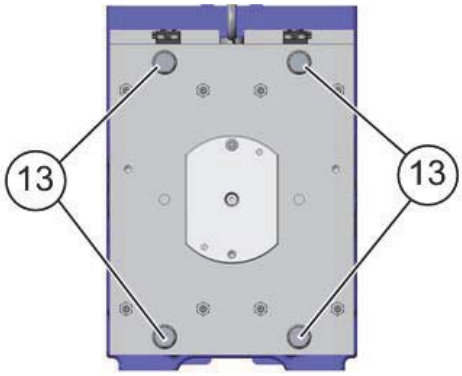


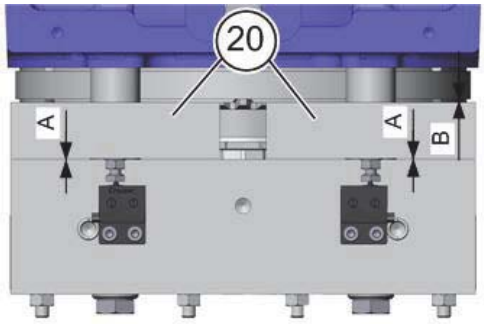




6. **Caution!**Due to the great weight of the brake body, we recommend you to secure and change the brake body by using an eye bolt M8 (A) and appropriate lifting gear.
7. Fit the mounting sleeve (11) and secure with the cylinder-head screw M6 x 16 (12). Tighten the cylinder-head screw (12) hand tight.
8. Position the brake body (14) on the bearing bracket.
   ATTENTION! Be aware of the weight of the brake body
   ZAtop SM132.21/... - RTW 180 approx. 24 kg
   ZAtop SM132.35/... - RTW 225 approx. 30 kg
9. **ATTENTION!** Do not use the adapter shaft (15) to help you mount the brake body (14), as otherwise the function of the absolute value encoder is no longer guaranteed.

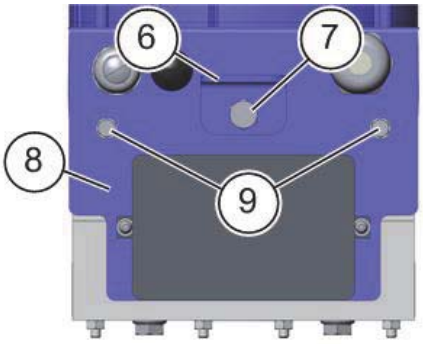
10. Coat the hexagon head screws (13) with Loctite 243 screw lock.
    ZAtop SM132.21/... - RTW180 - Hexagon head screws M8 x 110 - 10.9 (13)
    ZAtop SM132.35/... - RTW 225 - Hexagon head screws M10 x 115 - 8.8 (13)
11. Tighten the brake body hand tight with the hexagon head screws (13).
    Do not forget the washers.
12. Evenly tighten the four hexagon head screws (13) crosswise.
    ZAtop SM132.21/... - RTW180 -
    Tighten the hexagon head screws M8 x 110 - 10.9 (13) with a size 13 torque wrench.
    Tightening torque: 30 Nm
    ZAtop SM132.35/... - RTW 225 -
    Tighten the hexagon head screws M10 x 115 - 8.8 (13) with a size 16 torque wrench.
    Tightening torque: 43 Nm
13. Endue the hexagon head screws (13) with locking paint.
14. Unscrew the eye bolt M8 (A) and cylinder-head screw M6 x 16 (12) and remove the mounting sleeve (11) using the cylinder-head screw M10 x 100 (19).

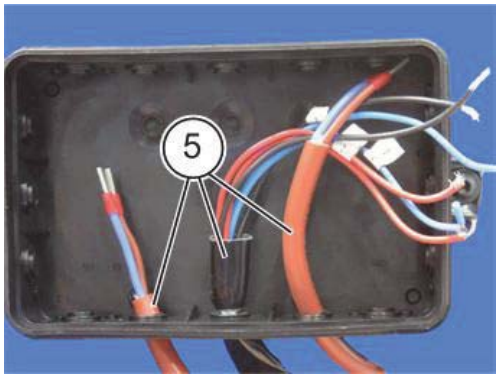


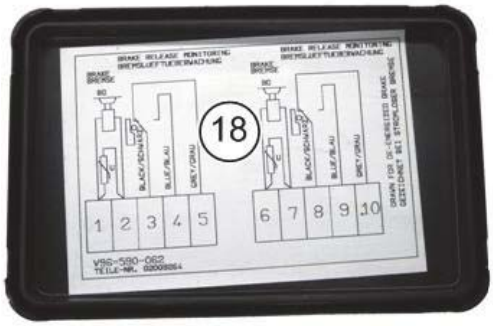


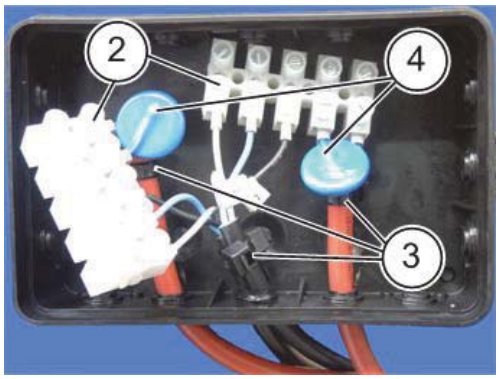
15. **Check the air gap "A" between the coil carrier and armature disk when de-energised:**
    Air gap: 0.4 mm ≤ "A" ≤ 0.65 mm
    This air gap must be present in the area of the vertical central axis of both armature disks (20).
    See the brake operating instructions in the appendix.
16. **Check the air gap "B" > 0.25 mm between the brake rotor and armature disk when energised.**
    The test air gap must be present.
    See brake operating instructions in the appendix.

✓ **If the air gaps are outside the tolerance, please contact our customer service.**







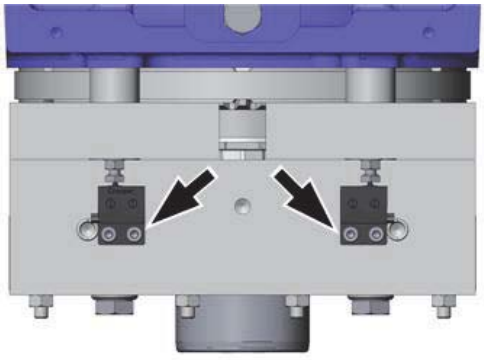


17. Screw on the adapter plate (8) with the two hexagon head screws M6 x 10 - 8.8 (9) using a size 10 spanner.
    Tightening torque: 9.5 Nm
18. Screw on the eye plate (6) with the hexagon head screw M10 x 20 - 8.8 (7) using a size 17 spanner.
    Tightening torque: 46 Nm
19. Bundle the connection cables (5) of the magnet coils and the release monitoring and lead it into the terminal box (1).
20. 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 (1).
21. Fit strain reliefs (3).
22. Close the terminal box cover (1).
23. Perform brake test (see chapter "Brake operating instructions - brake test" in the appendix).
24. Mount the absolute encoder (see chapter "Replacement of the absolute encoder").

8.3.2.4 Functional test on microswitch/inductive proximity switch for release monitor

After mounting of the brake, a functional test must be performed on the micro switches/inductive proximity switches (see chapter "Brake operating instructions - release monitor").
If the function is not available, please check the causes that may prevent the actuation of the micro switches/inductive proximity switches (see chapter "Brake operating instructions - release monitor" in the appendix). The micro switches/inductive proximity switches will otherwise have to be readjusted (see the chapter "Assembly and adjustment of release monitor with micro switches or inductive proximity switches" in the appendix).

8.3.2.5 Adjustment of the microswitch/inductive proximity switch for release monitor



Adjustment of the microswitches/inductive proximity switches is only necessary if they are not working correctly.
The microswitches/inductive proximity switches are located on top of the brake (see arrow).
ATTENTION! It must be ensured that the appropriate microswitches/inductive proximity switches are selected for the magnet to be adjusted.

Adjustment of the release monitor with microswitches/inductive proximity switches, see “Assembly and adjustment of release monitor with microswitches or inductive proximity switches” chapter in the appendix.

8.3.3 Replacement of the traction sheave

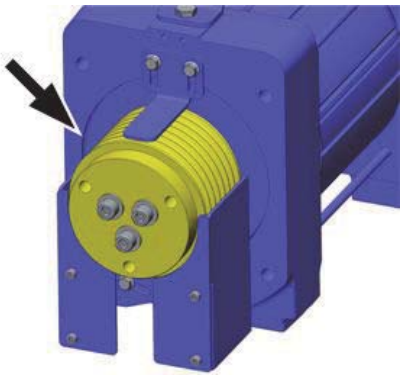
The traction sheave can only be replaced independently on motor version ZAtop SM132.../B and SM132.../BS.

On motor version ZAtop SM132.../A and SM132.../AS the traction sheave can only be mounted and removed by trained specialist personnel using special equipment at the ZIEHL-ABEGG SE plant.

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.

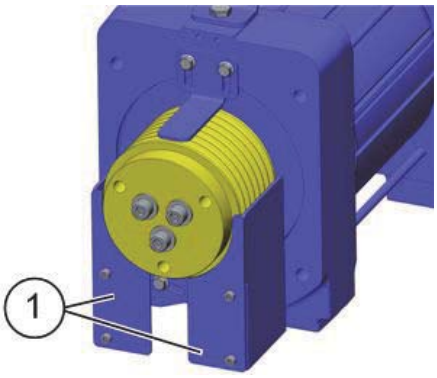
The traction sheave is mounted on the power take-off side of the motor (see arrow).

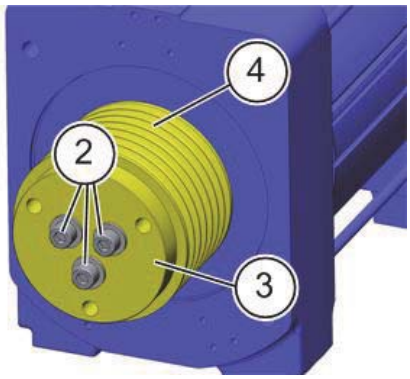


8.3.3.1 Required tools for the replacement of the traction sheave:

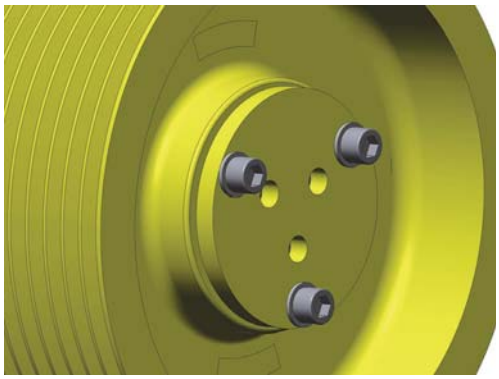
- Allen wrench SW 8
- Torque wrench for a tightening torque of 46 Nm with allen wrench SW 8
- 5 - 8 mm spacer or hexagon nut

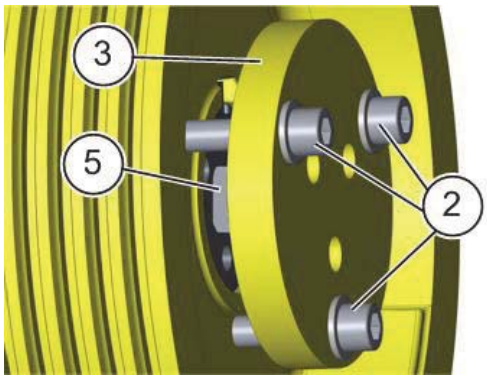
8.3.3.2 Dismounting the traction sheave





1. Remove rope guard (1), see chapter "Mechanical installation - fastening of rope guard".
2. Release the fixing screws M10 x 40 (2) of the traction sheave (4) with an allen wrench SW 8 and remove the fixing plate (3).

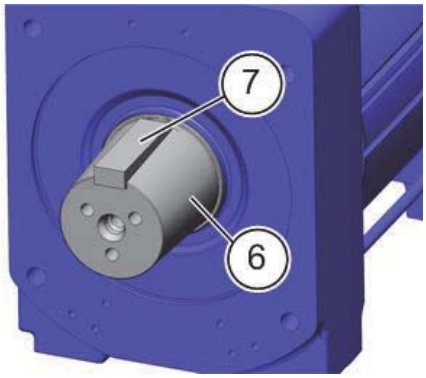


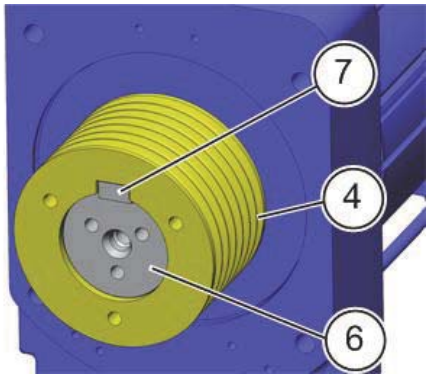


3. Turn the front plate (3) to press off.
4. 5 - 8 mm spacer or hexagon nut (5) must be placed between shaft end and front plate (3).
5. Screw front plate( ) to the traction sheave (4) at the outer circle of holes using hex socket screws M10 x 40 (2).
6. Evenly tighten the hex socket screws M10 x 40 (2) using a size 8 Allen key. Tightening causes the traction sheave (4) to be pressed by the drive shaft.

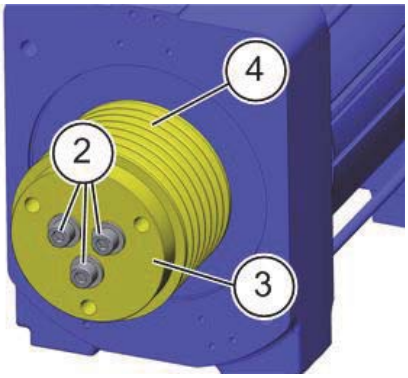
8.3.3.3 Mounting the traction sheave

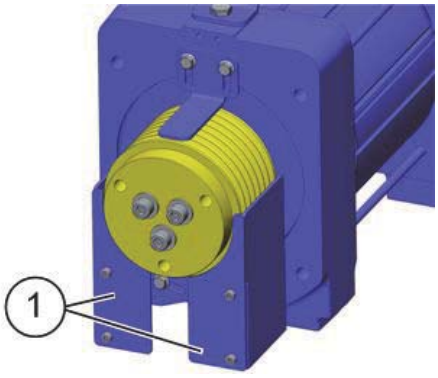
The mounting kit (article 70029992) can be used to mounting the traction sheave. This is optionally available.





1. Clean the traction sheave (4) and drive shaft (6) with a micro-active cloth and quick cleaner. Both parts must be free of dirt, grease and rust.
2. The parallel key (7) has to be available.
3. Put traction sheave (4) on drive shaft (6). The bores for screws M10 must point outwards. Observe the position of the groove for the parallel key.





4. Screw the front plate (3) onto the drive shaft (6) at the inner hole circle using the three hex socket screws M10 x 40 (2). Apply screw threadockerLoctite 243 or a similar product to the fixing screws.
   Do not forget spring washers!

5. Evenly tighten the fastening screws (2) using a size 8 Allen key:
   Tightening torque 68 Nm
6. Endue the fixing screws (2) with locking paint.
7. Fit rope guard (1), see chapter "Mechanical installation - fastening of rope guard".

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.

Warning!
The drawbars of the elevator machine must not be released under any circumstances.

9 Enclosure

9.1 Technical data

Motor type		**ZAtop SM132.21**			**ZAtop SM132.35**	
Suspension		2:1	2:1	2:1	2:1	2:1
Typical payload*	[kg]	480	675	480	1050	675
Rated torque	[Nm]	120			200	
Maximum torque	[Nm]	210			350	
Maximum short circut torque	[Nm]	80 bei 70 [rpm]			140 bei 60 [rpm]	
Permissible radial load	[kg]	2400			2400	
Speed	[m/s]	1.6			1.6	
Total weight witout traction sheave	[kg]	108			137	
Traction sheave						
- Diameter	[mm]	120	120	160	120	160
- Width	[mm]	56	56	56	76	76
- Rope diameter	[mm]					
- Standard number of grooves						
- Standard groove distance	[mm]					

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 10
Complete machine	IP 20

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

Brake type		**RTW 180 (information for each brake circuit)**	**RTW 180 (information for each brake circuit)**
Brake torque	[Nm]	160	225
Operating voltage	[VDC]	207	207
Rated output power	[W]	69	81
Electrical protection rating		IP 54	IP 54
Mechanical protection rating		IP 10	IP 10

9.1.3.1 Micro switch

Minimum rating	[mA / VDC]	10 / 12
Maximum rating	[A / VAC]	3 / 250
Recommended rating	[mA / VDC]	10 - 50 / 24

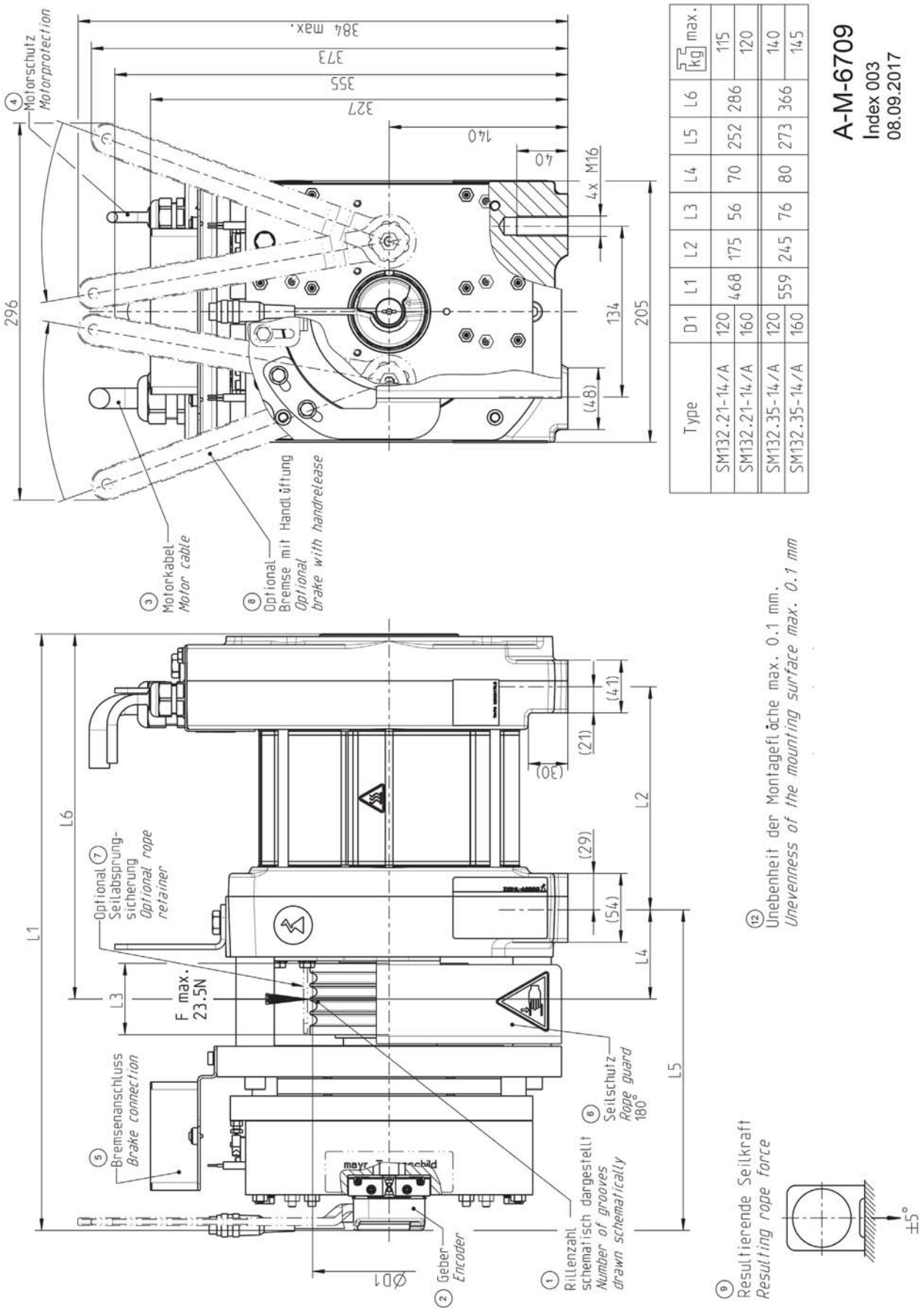
9.1.3.2 Inductive proximity switch

Operating voltage	[VDC]	10 - 30
Rated operating current	[mA DC]	100
Output functions		NC contact / gauge zero

For further information refer to the “Appendix - Brake operating instructions - Assembly and adjustment of the release monitor with inductive proximity switch” chapter.

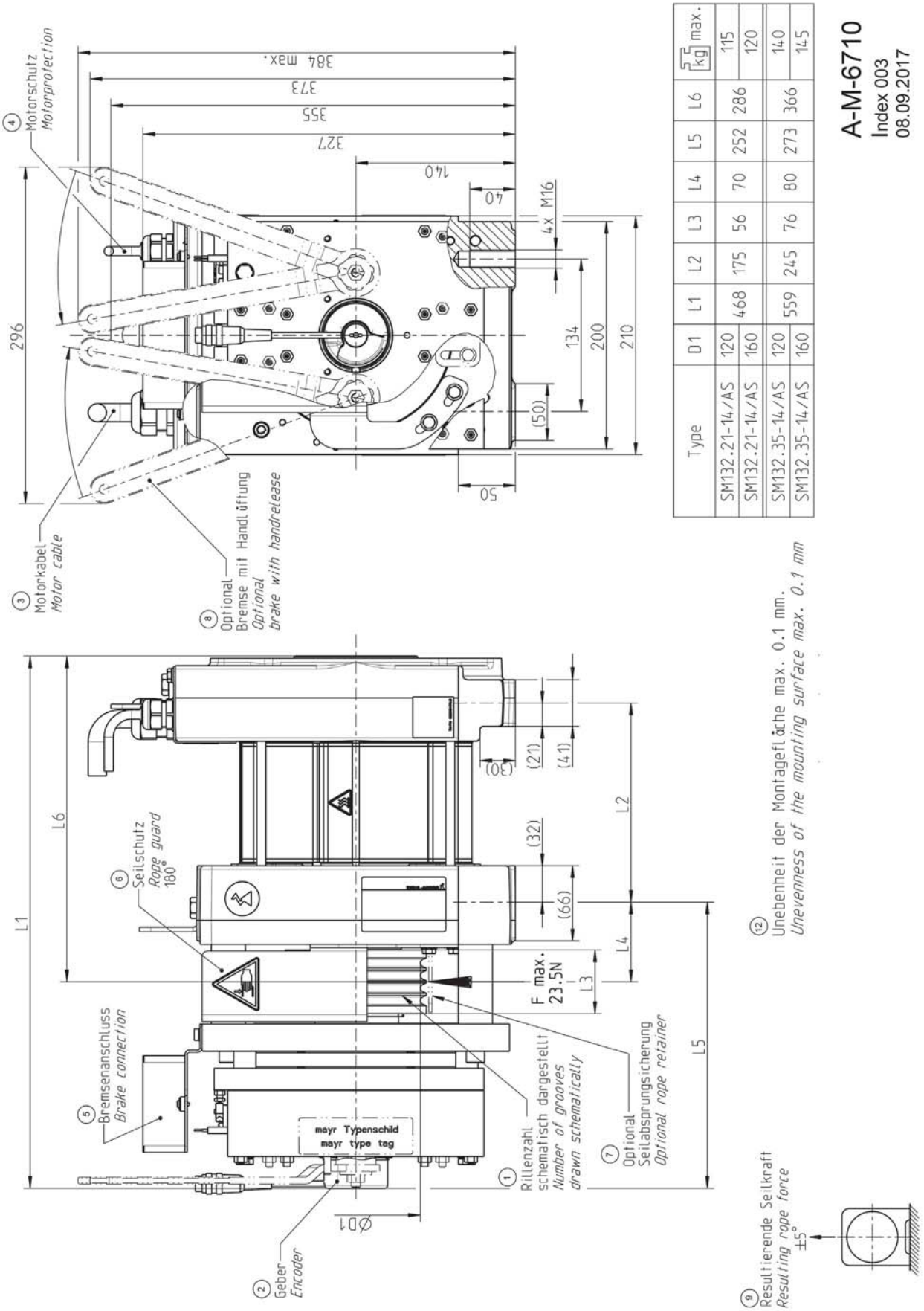
9.2 Legend for dimension sheets

9.2.1 Dimension sheet for ZAtop SM132.21/A and SM132.35/A

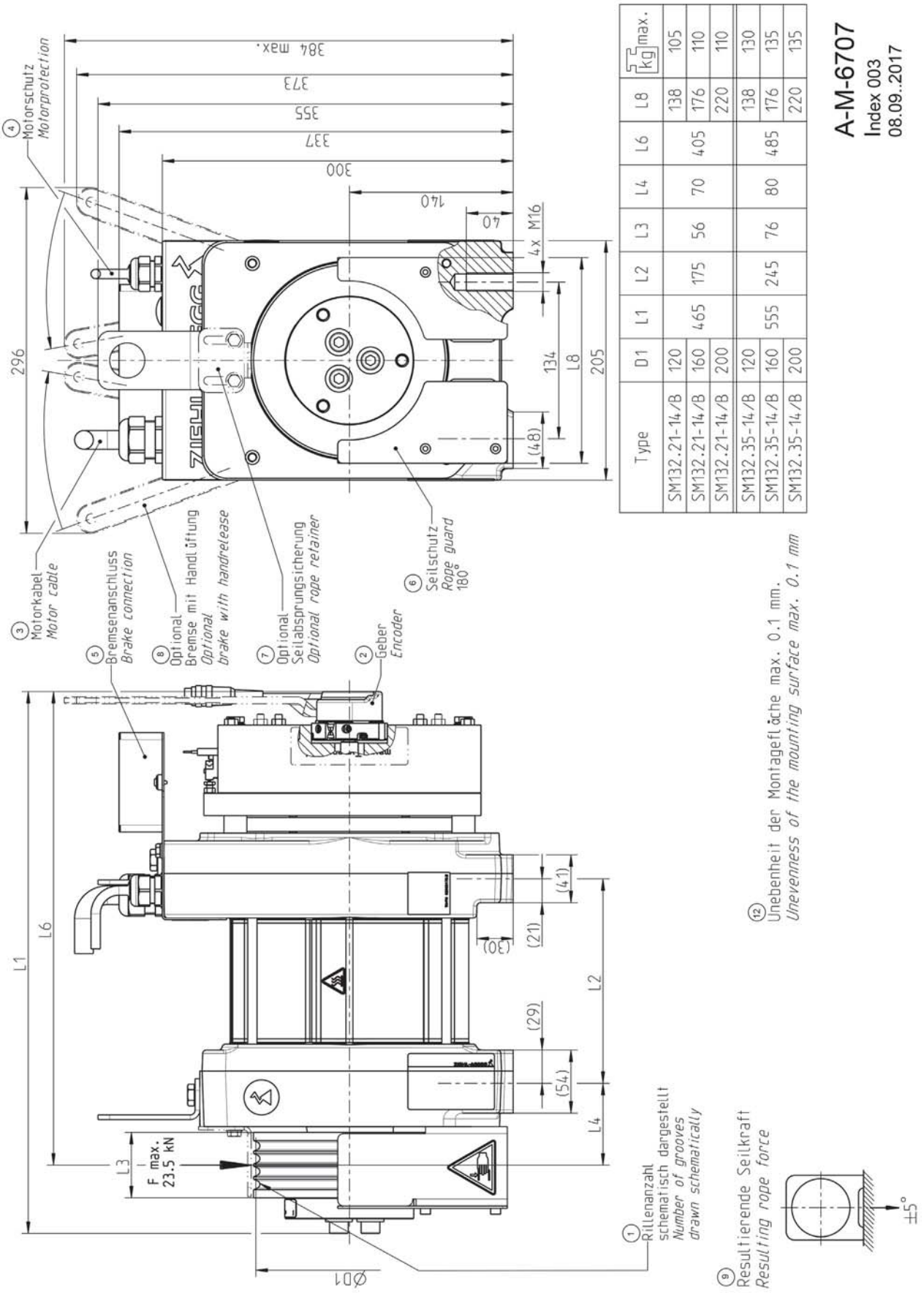


Type	D1	L1	L2	L3	L4	L5	L6	kg max.
SM132.21-14/A	120	468	175	56	70	252	286	115
SM132.21-14/A	160							120
SM132.35-14/A	120	559	245	76	80	273	366	140
SM132.35-14/A	160							145

9.2.2 Dimension sheet for ZAtop SM132.21/AS and SM132.35/AS

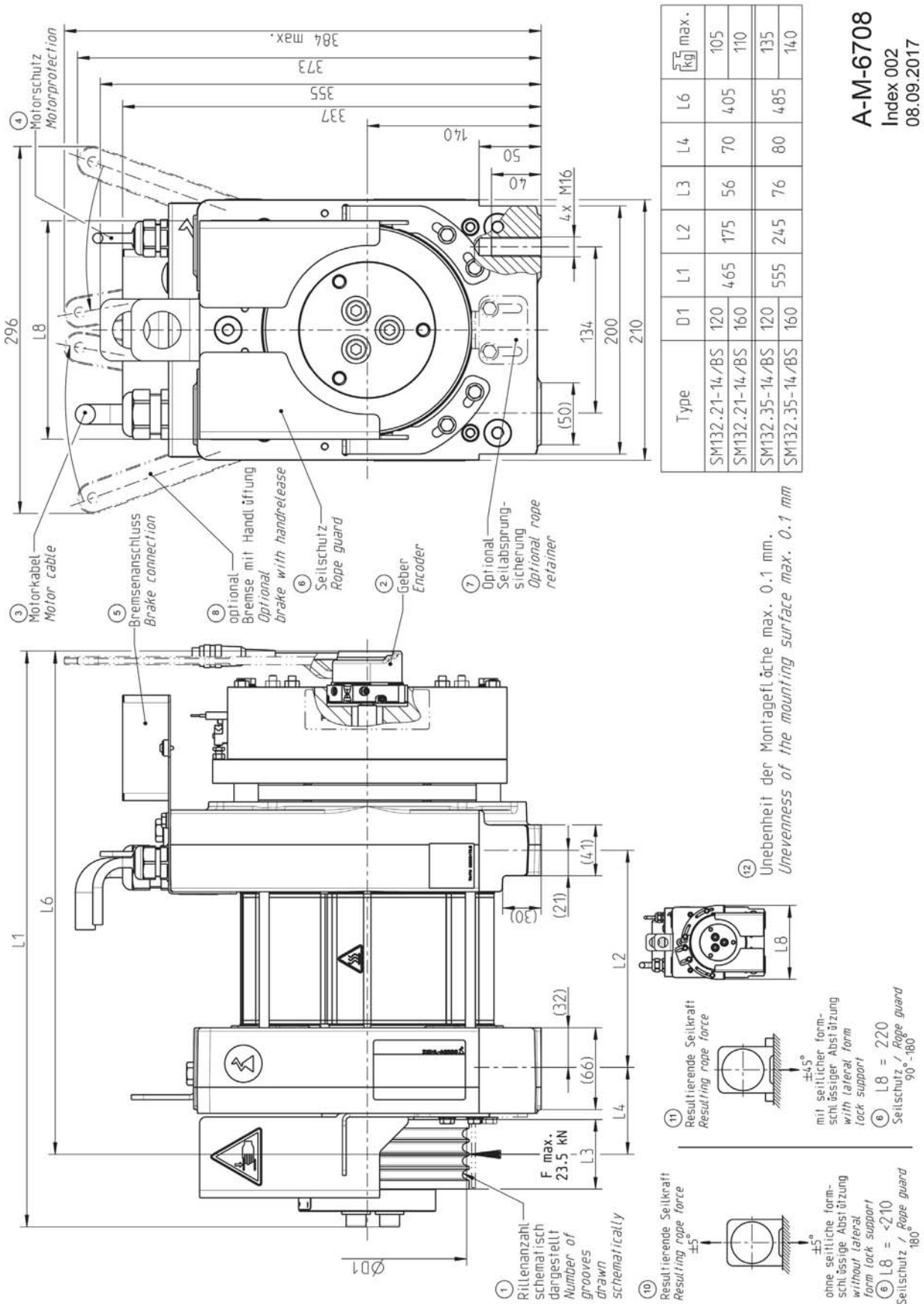


9.2.3 Dimension sheet for ZAtop SM132.21/B and SM132.35/B



Type	D1	L1	L2	L3	L4	L6	L8	max. kg
SM132.21-14/B	120	465	175	56	70	405	138	105
SM132.21-14/B	160						176	110
SM132.21-14/B	200						220	110
SM132.35-14/B	120	555	245	76	80	485	138	130
SM132.35-14/B	160						176	135
SM132.35-14/B	200						220	135

9.2.4 Dimension sheet for ZAtop SM132.21/BS and SM132.35/BS



9.2.5 Legend for dimension sheet

1 Number of grooves represented schematically
2 Encoder
3 Motor cable
4 Motor contactor line
5 Brake connection
6 Rope guard
7 Optional 3. rope retainer
8 Optional brake with manual hand release
9 Resulting rope force
10 Resulting rope force without lateral form lock support
11 Resulting rope force with lateral form lock support
12 Unevenness of mounting surface maximum 0.1 mm Unevenness of mounting surface maximum 0.1 mm

9.3 EC/EU declaration of conformity

- Translation -
(english)

A-KON16_02-GB
1730 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: **SM132...** **SM180...** **SM210...**

The type specifications contain further additions for different versions, for example SM180.40C-14/A.

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 60335-2-24:2010	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, 26.07.2017
(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

Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _14 Sizes 180 and 225

(E028 03 408 000 4 EN)

Design according to

Drawing number	Article number	Sizes	Type
E028 03 408 000 210	8233354	180	8012.33014
E028 03 408 000 211	8233853	180	8012.31114
E028 03 408 000 212	8234214	180	8012.33114
E028 03 408 000 213	8234213	180	8012.31014
E028 03 408 000 214	8244081	180	8012.31114
E028 03 408 000 215	8244082	180	8012.31014
E028 05 402 000 211	8233847	225	8012.01114
E028 05 402 000 212	8234222	225	8012.01014
E028 05 404 000 212	8234207	225	8012.03114
E028 05 404 000 213	8234208	225	8012.03014

Please read these Operational Instructions carefully and follow them accordingly!

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

Contents:

Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Tel.: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, E-Mail: info@mayr.com

Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _14 Sizes 180 and 225

(E028 03 408 000 4 EN)

Safety and Guideline Signs

DANGER

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

CAUTION

Danger of injury to personnel and damage to machines.

Please Observe!
Guidelines on important points.

Certification

EU Type Examination Certificate (Elevator Directive): EU-BD 954

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

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

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

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

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

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _14 Sizes 180 and 225

(E028 03 408 000 4 EN)

Safety Regulations

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

General Guidelines

DANGER

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

Brakes may generate further risks, among other things:


Hand injuries


Danger of seizure


Contact with hot surfaces


Magnetic fields

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

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

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

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

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

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

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

Guidelines for Electromagnetic Compatibility (EMC)

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

Application Conditions

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

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

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

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

CAUTION

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

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mayr® your reliable partner

Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _14 Sizes 180 and 225

(E028 03 408 000 4 EN)

Safety Regulations

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

Dimensioning

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

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

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

Climate Conditions

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

CAUTION

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

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

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

CAUTION

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

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

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

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

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

CAUTION

Temperatures of over 80 °C on designs with elastomer damping or over 90 °C on designs with cup spring damping on the brake mounting flange can have a negative effect on the switching times, the braking torques and the noise damping behaviour.

Intended Use

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

Earthing Connection

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

Class of Insulation F (+155 °C)

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

Protection

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

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

Brake Storage

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

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

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

Handling

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

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _14 Sizes 180 and 225

(E028 03 408 000 4 EN)

Safety Regulations

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

User-implemented Protective Measures:

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

Standards, Directives and Regulations Used and To Be Applied

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

Liability

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

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

Guarantee

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

CE Identification

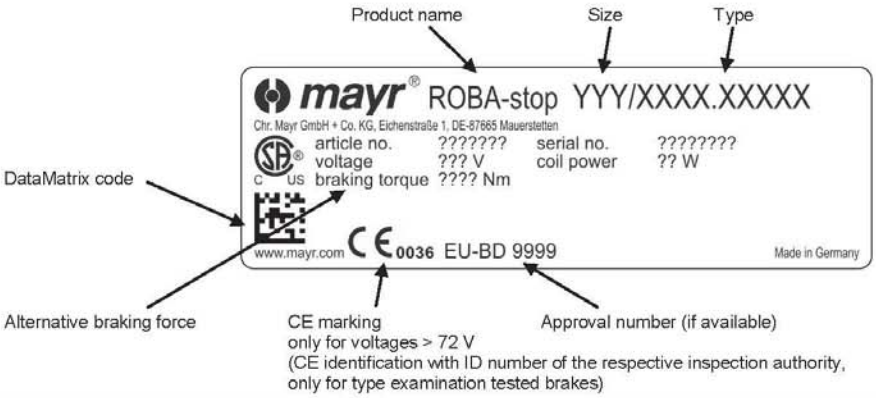
CE according to the Low Voltage Directive 2014/35/EU and the Elevator Directive 2014/33/EU

Conformity Markings

SP c US in terms of the Canadian and American approval

Identification

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



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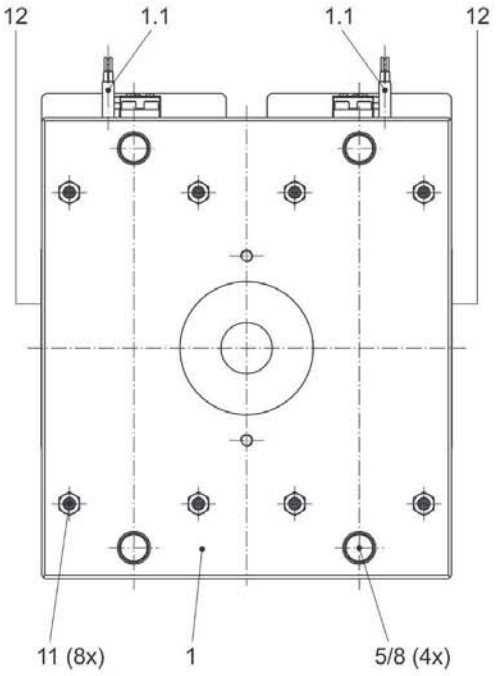

Fig. 1

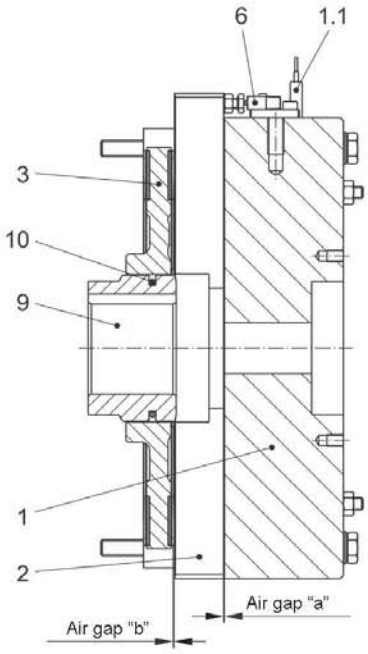

Fig. 2 (Type 8012._1_14)

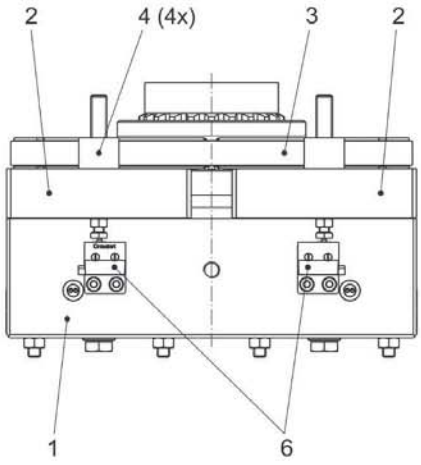

Fig. 3

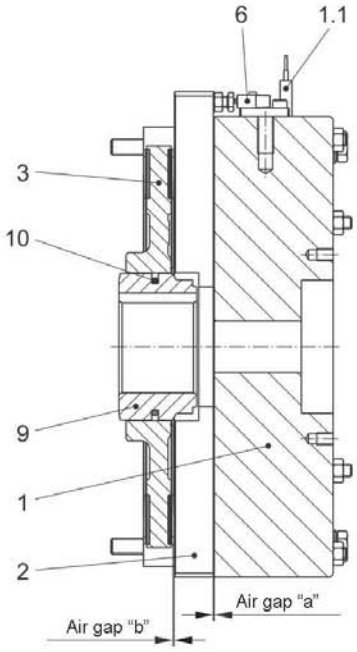

Fig. 4 (Type 8012._3_14)

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

Item	Name
1	Coil carrier assembly (incl. magnetic coils)
1.1	Connection cable 2 x AWG18 blue / brown
2	Armature disk
3	Rotor
4	Distance bolt
5	Hexagon head screw according to DIN EN ISO 4014: On Size 180 Type 8012.31_14 M8 x 120 / 10.9 Type 8012.33_14 M8 x 110 / 10.9 On Size 225 M10 x 115 / 8.8
6	Release monitoring assembly
6.1	Microswitch incl. adaptor plate (Fig. 7, page 13)
6.2	Cap screw (Fig. 7, page 13)
6.3	Hexagon nut (Fig. 7, page 13)
6.4	Hexagon head screw (Fig. 7, page 13)
6.5	Spring washer (Fig. 7, page 13)
7	Hand release assembly (page 12)
7.1	Hand release lever (Fig. 6, page 12)
7.2	Hexagon nut (Fig. 6, page 12)
7.3	Washer (Fig. 6, page 12)
7.4	Spring pin (Fig. 6, page 12)
8	Washer
9	Hub
10	O-ring
11	Noise damping
12	Type tag

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

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

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

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

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

CAUTION

The tension ability of the brake increases, above all when operating with reduced torques and / or in operation with overexcitation.
Due to the brake noise behaviour and for safety reasons, the rotor (3) must however be replaced at the latest when the air gap reaches 0.9 mm (see section on Maintenance, page 15).
If there is still a risk of the device wearing down to an air gap of 0.9 mm unnoticed, we recommend mounting a wear monitoring device (available on request).
When the air gap "a" > 2 mm (design with hand release) or "a" > 3.0 mm (design without hand release), the armature disk (2) will lie against the mechanical contacts, which causes a sudden drop in braking torque to 0 Nm and a risk of load crashes.

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Table 2: Technical Data

Size	Nominal torque [3]	Nominal voltage U_N	Nominal power P (20 °C)	Inductivity 207 V coil	Rotor thickness New condition
180	2 x 160 Nm	207 V DC	2 x 69 W	155 H	$15_{-0.05}$ mm
225	2 x 225 Nm	207 V DC	2 x 81 W	135 H	$15_{-0.05}$ mm

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

Table 3: Technical Data

Size	Permitted friction work per single circuit for max. 10 braking actions [4]	Max. permitted friction work per single circuit [5]	Maximum operating speed	Maximum trigger speed	Tightening torque Fixing screw Item 5	Weight without hand release
180	25000 J	30000 J	509 rpm	585 rpm	30 Nm	24.2 kg
225	25000 J	30000 J	509 rpm	585 rpm	43 Nm	30.3 kg

[4] Values for speed 585 rpm, Brake linings slightly bedded in (see Chapter on Braking Torque).
A break of min. 5 minutes each time must be planned in in-between the individual braking procedures.
The value can be doubled for both brake circuits. The value increases at lower speeds.

[5] Values for speed 585 rpm, brake linings slightly bedded in (see Chapter on Braking Torque). Rotor replacement is necessary after 1 braking action. A temporary drop of the dynamic braking torque to 80% of the nominal torque is possible.

Table 4: Switching Times [ms]

Size	Nominal torque	Attraction t_2	Drop-out t_0 DC	Drop-out t_{00} [6] DC	Drop-out t_{90} [7] DC	Drop-out t_{11} AC	Drop-out t_1 AC
180	2 x 160 Nm	260	35	70	124	370	660
225	2 x 225 Nm	300	25	50	80	250	590

[6] Referring to the effective braking torque on disconnection from holding voltage (nominal voltage)

[7] Referring to the nominal braking torque on disconnection from holding voltage (nominal voltage)

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

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Torque-Time Diagram

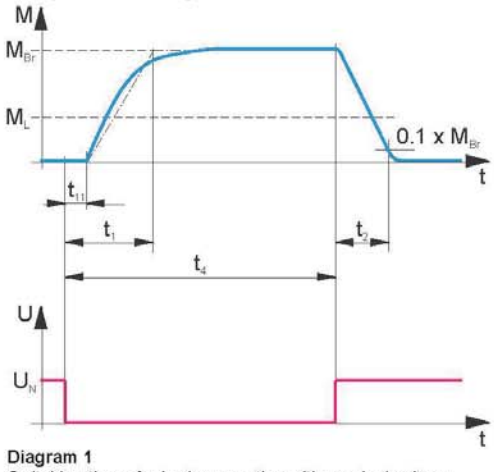

Diagram 1
Switching times for brake operation with nominal voltage

Key

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

Application

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

Design

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

Function

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

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

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

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

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Scope of Delivery / State of Delivery

The brake body is pre-assembled with coil carrier (1), armature disks (2), distance bolts (4), hand release (option dependent on Type) and adjusted microswitches (option dependent on Type). The following are included loose in delivery: rotor (3), hexagon head screws (5), washers (8), hub (9) and O-ring (10).

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

Adjustment

The brakes are equipped manufacturer-side with the respective springs for the braking torque stated on the Type tag (12). Adjustment is not necessary. Adaptions or modifications are not permitted as a rule. This rule also applies to the manufacturer-side adjusted noise damping. The microswitches are also adjusted manufacturer-side. Despite great care during the manufacturer-side adjustment, re-adjustment might be necessary after installation due to transportation and handling. Furthermore, such switches cannot be considered fail-safe. Please also observe the section 'Release Monitoring'.

Installation Conditions

- ❒ The eccentricity of the shaft end in relation to the fixing holes must not exceed 0.3 mm.
- ❒ The positional tolerance of the threads for the hexagon head screws (5) must not exceed 0.3 mm.
- ❒ The axial run-out deviation of the screw-on surface to the shaft must not exceed the permitted axial run-out tolerance of 0.063 mm in the area of the friction surface.
  Measuring procedure acc. DIN 42955.
  The shaft bearing is to be designed so that the axial backlash of the shaft (absolute) does not exceed the permitted axial run-out value during operation.
  Larger deviations can lead to permanent grinding with overheating of the friction linings and thus to a drop in the braking torque.
- ❒ The tolerances of the hub bore (9) and the shaft must be selected so that the hub toothing (9) is not widened.
  Widening of the toothing leads to the rotor (3) jamming on the hub (9) and therefore to brake malfunctions.
  Recommended hub – shaft tolerance H7/k6.
  If the hub (9) is heated for better joining, the O-ring (10) must be removed beforehand and re-mounted after hub installation.
  The max. permitted joining temperature of 200 °C must not be exceeded.
- ❒ Dimensioning of the key connection according to the requirements shaft diameter, transmittable torque and operating conditions must be carried out. For this, the corresponding user data must be known or the customer must carry out the dimensioning according to the valid calculation basis DIN 6892.
  For the calculation, a hub quality of Re = 300 N/mm² should be used.
  The length of the key should lie over the entire hub (9).
- ❒ For the dimensioning of the key connections, the permitted tensions common in machine construction must be considered.
- ❒ The mounting dimensions and the tapped holes s with depth K + 2 mm (K = screw projection) must be provided according to the Catalogue or the applicable assembly drawing (Fig. 5).

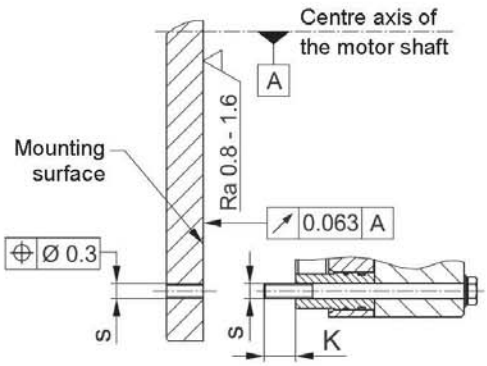

Fig. 5

- ❒ A suitable counter friction surface (steel or cast iron) must be used. Sharp-edged interruptions on the friction surfaces must be avoided. Recommended surface quality in the area of the friction surface Ra = 1.6 – 3.2 µm. The mounting surface must be turned. The surface must be bare or FE-phosphated (layer thickness approx. 0.5 µm) without oil.
  If corrosion protection is applied, the device must be inspected for possible effects on the braking torque.
  In particular customer-side mounting surfaces made of grey cast iron are to be rubbed down additionally with sandpaper (grain ≈ 60 to 100).
- ❒ The rotor and brake surfaces must be oil and grease-free.
- ❒ The O-ring (10) must be lightly greased.
- ❒ The toothings of the motor shaft rotor (3) and the hub (9) must not be oiled or greased.
- ❒ Please abstain from using cleaning agents containing solvents, as they could affect the friction material.

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Installation (Figs. 1 to 4)

1. Mount the hub (9) in the correct position (according to the respective drawing) onto the shaft, bring it in the correct position (the key must lie over the entire hub) and secure it axially, depending on the design using a press cover (Type 8012._1_14) or a locking ring (Type 8012._3_14).
2. Lightly grease the O-ring (10) and insert it into the hub (9) groove.
3. Push the rotor (3) over the O-ring (10) onto the hub (9) by hand using light pressure.
   Please make sure that the rotor collar faces the machine wall.
   Check that the toothing moves easily.
   Do not damage the O-ring.
4. Secure the brake bodies using 4 hexagon head screws (5) and washers (8) all-round step-wise evenly (we recommend that you secure the screws using Loctite 243).
   Tighten the hexagon head screws using a torque wrench and observe the tightening torque acc. Table 3.
5. **Check air gap "a" (Fig. 2/4):**
   Air gap: 0.40 mm ≤ "a" ≤ 0.65 mm
   This air gap must be present in the area of the horizontal centre axis on both armature disks (2) (Fig. 1).
6. **Check air gap "b" > 0.25 mm in energised state on the rotor (3) (Fig. 2 /4).**
   The inspection air gap must be given.

Braking Torque

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

Noise Damping (Item 11 / Fig. 1)

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

Hand Release (7)

(Option dependent on Type for mechanical release of both brake circuits individually by hand)

The hand release is set manufacturer-side ready for installation.
The brake is released by shifting both hand release levers (7.1) simultaneously inwards, see Fig. 6.
The armature disk (2) is attracted to the coil carrier (1); the rotor (3) is then free and the brake is released.

DANGER

Operate the hand release carefully.
Any existing loads will begin to move when the hand release is operated.

Table 5: Technical Data

Size	Release force per brake circuit
180	approx. 95 N
225	approx. 120 N

The release angle totals approx. 30° per lever inwards.
A substantially increased force acting on the hand release lever (7.1) may lead to component destruction.

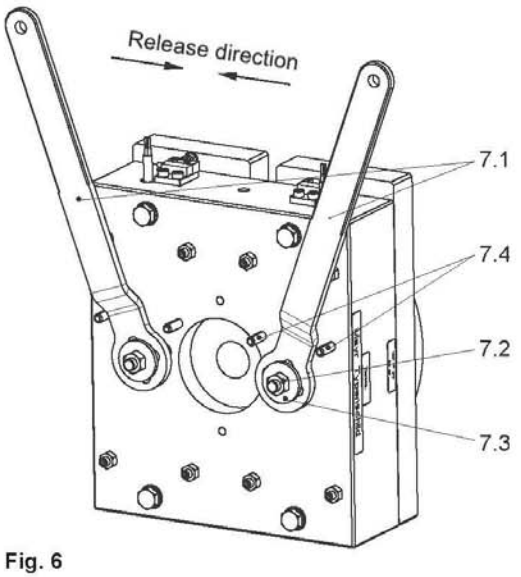

Fig. 6

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Release Monitoring (6) Fig. 7
(Option, dependent on Type)

ROBA®-twinstop® brakes are delivered with manufacturer-side installed and adjusted release monitoring devices.
One microswitch (6.1) per brake circuit emits a signal for every brake signal condition change "Brake opened" or "brake closed"

On initial operation:
Connection as NO contact (black and blue strands).

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

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

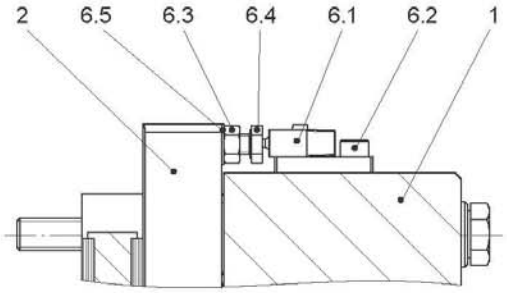
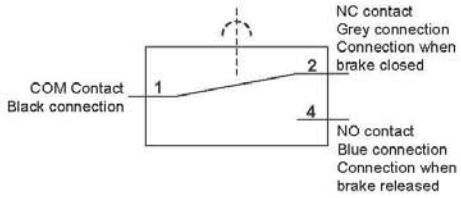


Fig. 7

Function

When the magnetic coils are energised in the coil carrier (1), the armature disks (2) are attracted to the coil carrier (1). The microswitches (6.1) emit a signal and the brake is released.

Wiring Diagram of the Microswitch (6.1):



Microswitch Specification

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

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

Customer-side Inspection after Mounting onto the Elevator Machinery

The customer-side contact is an NO contact.
Please inspect the release monitoring on both circuits:

Brake de-energised ➔ Signal "OFF",

Brake energised ➔ Signal "ON"

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

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

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Electrical Connection and Wiring

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

Supply Voltage Requirements

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

Earthing Connection

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

Device Fuses

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

Switching Behaviour

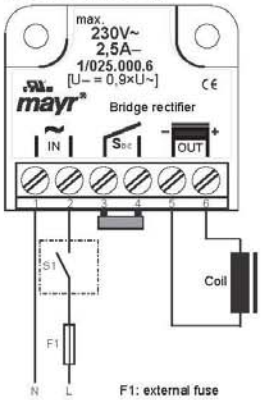
The reliable operational behaviour of a brake is to a large extent dependent on the switching mode used. Furthermore, the switching times are influenced by the temperature and the air gap between the armature disk and the coil carrier (dependent on the wear condition of the linings).

Magnetic Field Build-up

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

Magnetic Field Removal

AC-side Switching



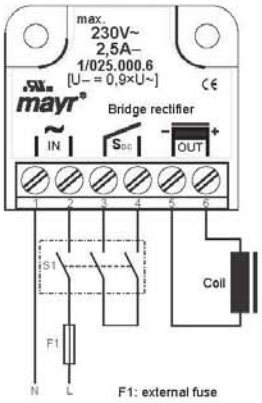
F1: external fuse

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

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

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

DC-side Switching



F1: external fuse

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

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

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

Protection Circuit

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

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _14 Sizes 180 and 225

(E028 03 408 000 4 EN)

Brake Inspection

(Customer-side after Mounting onto the Elevator Machinery)

- ❑ **Individual air gaps inspection (Fig. 2/4)**
  Air gaps "a" of both brake circuits (brake de-energised):
  Air gap 0.40 mm ≤ "a" ≤ 0.65 mm.
  Air gaps "b" of both brake circuits (brake energised):
  Air gap "b" > 0.25 mm.
- ❑ **Braking torque inspection:**
  Please compare the requested braking torque with the torque stated on the Type tag.
- ❑ **Release function inspection**
  By energising the brake via battery operation, to guarantee emergency escape for passengers during a power failure or manually using the hand release.
- ❑ **Switch function inspection of the release monitoring (NO contact)**
  Brake de-energised → Signal "OFF"
  Brake energised → Signal "ON"
- ❑ **Hand release functional inspection (dependent on Type)**
  Please observe the guidelines on page 12!

Dual Circuit Brake Functional Inspection

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

DANGER

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

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

Inspection brake circuit 1:

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

Inspection brake circuit 2:

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

Inspection of both brake circuits:

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

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Maintenance

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

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

1. Visual inspection
   - ➢ Inspection of condition in accordance with the regulations
   - ➢ Brake rotor: in particular the exterior appearance of the brake surfaces
     - wear
     - free of oil / lubricants
     - sticking of linings
2. Tightening torque inspection of the fixing screws on the brakes If the brake fixing screws are covered with sealing lacquer, a visual inspection for damage of the sealing is sufficient.
3. Inspection of the air gap – braked (both brake circuits)
4. Inspection of toothing backlash from the splined motor shaft (or the hub (9)) to the rotor (3)
   Max. permitted toothing backlash 0.5°
5. Running noise (brake rotor) during operation
   Attention: Permanent grinding of the rotor can lead to overheating / damage to the brake linings, and therefore to a drop in braking torque. If such indications are present, it is essential that the braking torque is checked and the rotor replaced if required independent of the inspection or the determined wear value!
6. Braking torque or delay inspection (individual brake circuits) at least once per year (within the scope of the maintenance / main inspection).

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

Replacing the Rotor (3)

Before Replacing the Rotor

- ❑ Clean the brake.

Please observe the "Cleaning the Brake" section, see below.

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

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

DANGER

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

Information on the Components

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

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

Classification: Hazardous property
Attention: H-classification: H372

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

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

Cleaning the Brake

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

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

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012._ _ _14 Sizes 180 and 225

(E028 03 408 000 4 EN)

Disposal

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

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

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

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

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

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

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

Malfunctions / Breakdowns:

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

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9.4.1 Assembly and adjustment of the release monitor with microswitch

Installation and Adjustment of the Release Monitoring with Microswitch for ROBA®-duplostop®/-twinstop® Type 8010._ _ _ _ _ and 8012._ _ _ _ _

(E028 02 000 002 4 EN)

These Additional Instructions serve only as a supplement of the brake Installation and Operational Instructions. Please also observe the Safety Regulations and Protective Measures in the Installation and Operational Instructions!

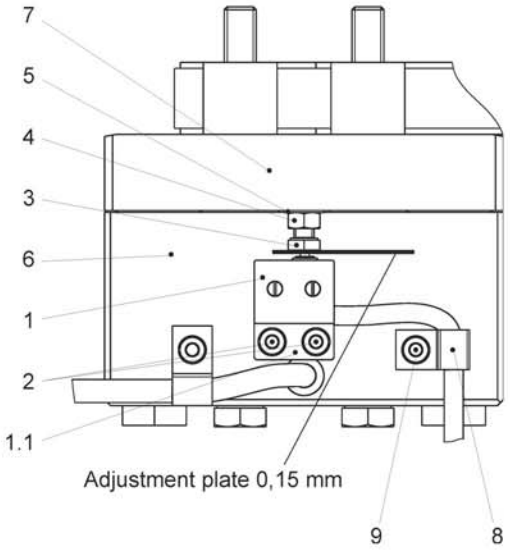

Fig. 1

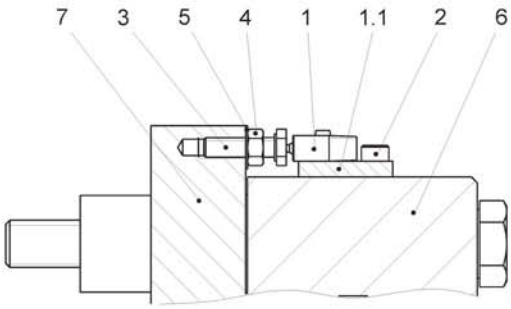

Fig. 2

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

Item	Name
1	Microswitch assembly (glued and screwed onto adaptor plate 1.1)
1.1	Adaptor plate
2	Cap screw M4 x 8
3	Hexagon head screw M5
4	Hexagon nut M5
5	Spring washer A5
6	Coil carrier assembly
7	Armature disk
8	Cable clamp
9	Cap screw

Roba®-duplostop® and Roba®-twinstop® brakes are supplied with manufacturer-side installed and adjusted release monitoring devices.
One microswitch (1) per brake circuit emits a signal for every brake signal condition change:
"brake opened" or "brake closed"

The customer is responsible for a signal evaluation of both conditions.
From the point at which the brake is energised, a time span of three times the separation time must pass before the microswitch signal on the release monitoring is evaluated.

Function

When the magnetic coil is energised in the coil carrier (6), the armature disk (7) is attracted to the coil carrier (6).
The microswitch (1) emits a signal and the brake is released.

For brake design with hand release:
If the hand release is actuated, the switch signal of the microswitch (1) cannot be guaranteed.

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Installation and Adjustment of the Release Monitoring with Microswitch for ROBA®-duplostop®/-twinstop® Type 8010._ _ _ _ _ and 8012._ _ _ _ _

(E028 02 000 002 4 EN)

Microswitch replacement must only be carried out by qualified personnel trained at *mayr*®.

Replacement of a Defective Microswitch

1. Loosen the cap screw (9) and remove the cable clamp (8).
2. Remove the cap screws (2) and remove the adaptor plate (1.1) incl. microswitch (1).
3. Loosen the hexagon nut (4) slightly (< 1/8 turn) making sure that the hexagon head screw (3) remains pre-tensioned by the spring washer (5).
4. Hold the hexagon nut (4) using an open-end wrench, wrench opening 8, and screw the hexagon head screw (3) in by approx. ½ turn in the direction of the armature disk (7) using a second open-end wrench, wrench opening 8.

The purpose of this is to make sure that the adjustment plate can be joined after installation of a new microswitch (1) without damaging or destroying the microswitch tappet.

5. Screw a new microswitch (1) inc. adaptor plate (1.1) onto the coil carrier (6) using cap screws (2), so that the front end edge of the adaptor plate (1.1) is parallel to the armature disk (7).
   We recommend that you secure the screws using Loctite 243.
   Please observe the tightening torque of 2,9 Nm.
6. Re-install the cable clamp (8) using the cap screw (9).

Adjustment of the New Microswitch

The brake is screwed onto the machine wall using the tightening torque stated in the Installation and Operational Instructions. The brake must not be energised.

1. Take the loose adjustment plate **0,15 mm** from a standard feeler gauge set and join it between the hexagon head screw (3) and the microswitch tappet (1).
2. Connect the inspection lamp or measuring device (adjustment diode inspection) to the microswitch (1) (connection as NO contact => black and blue).
3. Hold the hexagon nut (4) using an open-end wrench, wrench opening 8, and turn the hexagon head screw (3) in the direction of the microswitch (1) using a second open-end wrench, wrench opening 8, until **the inspection lamp signals "ON"**.
4. Hold the hexagon nut (4) using an open-end wrench, wrench opening 8, and screw the hexagon head screw (3) **slowly** in the direction of the armature disk (7) using a second open-end wrench, wrench opening 8, until **the inspection lamp signals "OFF".**

Please make sure that the open-end wrenches do not touch the adjustment plate.

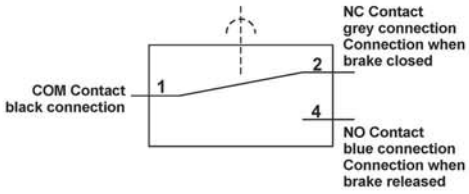
5. Hold the hexagon head screw (3) using an open-end wrench, wrench opening 8, and counter the hexagon nut (4) using a second open-end wrench, wrench opening 8.
6. Remove the adjustment plate.

Functional Inspection

Carry out a functional inspection before brake initial operation.

- ❑ Brake de-energised:
  Inspection lamp must signal "OFF".
- ❑ Brake energised:
  Inspection lamp must signal "ON".

Microswitch Wiring Diagram (1):



Microswitch Specification

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

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

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

The Following Prevent Actuation of the Microswitch (1) and Lead to a Malfunction:

- ❑ Heavy contamination between the armature disk (7) and the coil carrier (6).
- ❑ Extreme warping on the armature disk (7)
- ❑ Excessively large air gap "a" between the armature disk (7) and the coil carrier (6) due to wear on the friction linings.
- ❑ Defective brake magnetic coil.
- ❑ No or incorrect voltage on the brake coil.

If none of these error sources prove to be the reason for incorrect release monitoring function, the microswitch (1) must be checked and the adjustment corrected if necessary.

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ZIEHL-ABEGG

9.4.2 Assembly and adjustment of the release monitor with inductive proximity switch

Installation and Adjustment of the Release Monitoring with Proximity Switch (NC Contact) for ROBA®-duplostop®/-twinstop® Type 8010._ _ _ _ _ and 8012._ _ _ _ _

(E028 12 209 001 4 EN)

For designs by company Ziehl-Abegg

These Additional Instructions serve only as an extension of the brake Installation and Operational Instructions. Please also observe the Safety Regulations and Protective Measures in the Installation and Operational Instructions!

Proximity Switch Assembly:

Item	Name	Pcs.
1	Proximity switch NC contact (assembly with adaptor plate and sticker Item 7)	1
2	Cap screw (self-locking)	2
3	Spacer	1
4	Switching bolt	1
5	Spring lock washer	1
6	Glass fibre insulation tube Ø4 x 35	1
7	Sticker with dimension for adjustment plate	(1)

Packed into mini grip bags with marking (sticker) featuring the Mayr article number and the Ziehl article number.

For **ROBA®-duplostop®** brakes, the same assembly is required 2x.
For **ROBA®-twinstop®** brakes, one assembly (cable left-hand side) for brake 1 as well as one assembly (cable right-hand side) for brake 2 are required.

Components:

Item	Name
A	Coil carrier assembly
B	Armature disk
C	Rotor

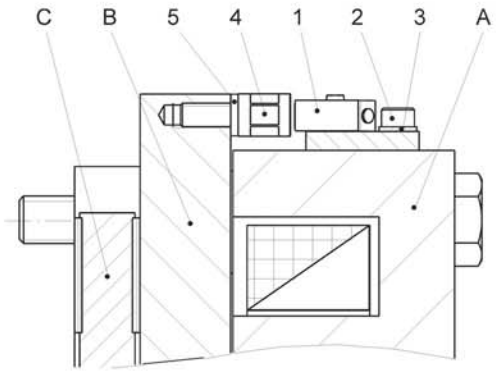

Fig. 1

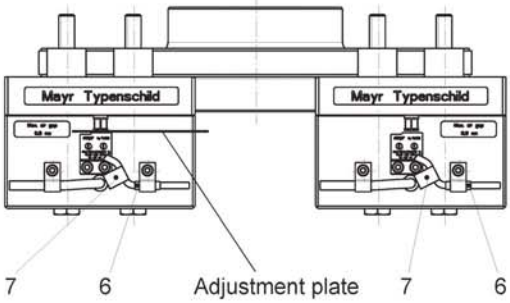

Fig. 2 (ROBA®-duplostop®)

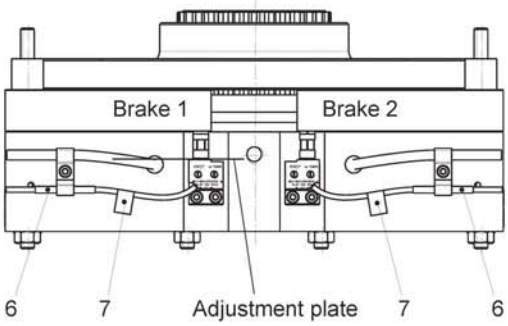

Fig. 3 (ROBA®-twinstop®)

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Installation and Adjustment of the Release Monitoring with Proximity Switch (NC Contact) for ROBA®-duplostop®/-twinstop® Type 8010._ _ _ _ _ and 8012._ _ _ _ _

(E028 12 209 001 4 EN)

ROBA®-duplostop® and ROBA®-twinstop® brakes are delivered with manufacturer-side installed and adjusted release monitoring devices.
One proximity switch (1) per brake circuit emits a signal for every brake signal condition change:
"brake opened" or "brake closed"

The customer is responsible for a signal evaluation of both conditions.
From the point at which the brake is energised, a time span of three times the separation time t_2 (brake release time) must pass before the proximity switch signal on the release monitoring is evaluated.

Function

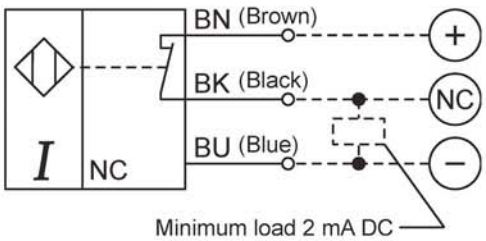
When the magnetic coil is energised in the coil carrier (A), the armature disk (B) is attracted to the coil carrier (A).
The proximity switch (1) emits a signal and the brake is released.

For brake design with hand release:
If the hand release is actuated, the switch signal of the proximity switch cannot be guaranteed.

Technical Data

Operating voltage:	10.. 30 VDC
Residual ripple content:	≤ 10 % U_{ss}
DC rated operating current: (Max. load current for continuous operation)	≤ 150 mA
No-load current I_0:	≤ 15 mA
Residual current:	≤ 0,1 mA
Rated insulation voltage:	≤ 0,5 kV
Short-circuit protection:	yes / synchronising
Line voltage drop at I_e:	≤ 1,8 V
Wire breakage protection / reverse voltage protection:	yes / completely
Output function:	3-wire, NC contact, PNP
Switching frequency:	≤ 2 kHz

Proximity Switch (1) Wiring Diagram:



Installation and Adjustment

The brake is screwed onto the machine wall using the tightening torque stated in the Installation and Operational Instructions. The brake must not be energised.

1. Push the spring lock washer (5) onto the thread of the switching bolt (4).
2. Screw the switching bolt (4) into the armature disk (B) using a tightening torque of 3 Nm.
3. Apply the proximity switch (1) assembly inc. the adaptor plate lightly using two cap screws (2) via the spacer (3) so that the proximity switch (1) can still be moved.
4. See the sticker (7) on the proximity switch cable for the dimension of the adjustment plate; join the appropriate adjustment plate between the proximity switch (1) and the switching bolt (4) (Fig. 2/3).

On the proximity switch cable, there is a sticker (7) stating the dimension for the required adjustment plate thickness [mm]. The adjustment plate for adjustment of the switch should consist of individual plates of a standard feeler gauge set, e.g.:
0,8 mm + 0,25 mm for a total dimension of 1,05 mm.

5. Press the proximity switch (1) **lightly and in parallel** against the adjustment plate and the switching bolt (4) and secure it using the two cap screws (2). It should still be possible to remove the adjustment plate easily; it must not jam.
   Please observe the tightening torque of 3 Nm.
6. Remove the adjustment plate.
7. Mount the glass fibre insulation tube (Item 6) via the switch cable and secure it onto the free position of a cable clamp already present.
8. Wire the proximity switch cable (1) acc. Wiring Diagram.

Customer-side Inspection after Attachment

Please inspect the release monitoring unit:
Brake de-energised ➔ Signal "ON"
Brake energised ➔ Signal "OFF",

Proximity switches are much more reliable than microswitches.
However, accessibility for replacement or adjustment must be provided for.

The Following Prevent Actuation of the Proximity Switch (1) and Lead to a Malfunction:

- ❑ Heavy contamination between the armature disk (B) and the coil carrier (A).
- ❑ Extreme warping on the armature disk (B)
- ❑ Excessively large air gap "a" between the armature disk (B) and the coil carrier (A) due to wear on the friction linings
- ❑ Defective brake magnetic coil.
- ❑ No or incorrect voltage on the brake coil.
- ❑ The proximity switch (1) was pressed on too strongly or was tilted during the installation procedure.

If none of these error sources prove to be the reason for incorrect release monitoring function, the proximity switch (1) must be checked and the adjustment corrected if necessary.

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9.5 EU Declaration of Conformity for Brake

mayr® Antriebstechnik

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

Im Sinne der Richtlinie Aufzüge 2014/33/EU erklären wir
In terms of the Directive 2014/33/EU relating to lifts, we
Conformément à la directive 2014/33/UE sur les ascenseurs, nous déclarons par la présente,
Secondo la Direttiva per ascensori 2014/33/UE, la presente
En el sentido de la Directiva 2014/33/UE sobre ascensores
Nos termos da diretiva 2014/33/UE declaramos

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dass die angeführten Produkte den Anforderungen der oben genannten EU-Richtlinie entsprechen.
declare that the listed products meet the requirements of the above mentioned EU Directive.
que les produits décrits satisfont aux exigences de la directive UE susmentionnée.
dichiara che i prodotti sotto elencati soddisfano i requisiti della suddetta Direttiva UE.
declaramos que los productos indicados arriba cumplen los requisitos de la Directiva UE.
que os produtos abaixo mencionados correspondem às exigências da diretiva UE supramencionada.

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

Produkt / *Product* / **Produit** / *Prodotto* / **Producto** / *Produto*	**Größen** / *Sizes* / **Tailles** / *Grandezze* / **Dimensión** / *Dimensão*	**Typen** / *Types* / **Types** / *Serie* / **Tipos** / *Tipos*	**ANVP**
ROBA®-twinstop®	125/180/225	8012._ _ _ _ _	1,**,***

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

Mauerstetten, gültig ab dem 20.4.2016
Ort und Datum / place and date / Lieu et date / luogo – data / fecha y lugar / Lugar e data

Dipl. Ing. (FH) / graduate engineer / Engenheiro graduado
Geschäftsführer / Managing Director / Directeur Général / Gerente / Gerente
Günther Klingler

Seite / *Page* / **Page** / *Pagina* / **Página** / *Página*
1 / 2

mayr® Antriebstechnik

Angewendete Normen, Vorschriften und Prüfungen (ANVP) / *Applied standards, regulations and inspections (ANVP)* **/ Normes, prescriptions et contrôles appliqués (ANVP) /** *In conformità alle direttive UE di norme, specifiche e controlli (ANVP)* **/ Normas, regulaciones e inspecciones aplicadas (ANVP) /** *Normas, regulamentações e inspeções aplicadas (ANVP)*

1	EN 81-20:2014 / EN 81-50:2014 / EN 81-1:1998 + A3:2009	**Sicherheitsregeln – Konstruktion u. Einbau von Aufzügen**	**2014/33/EU**
		Safety rules – Construction and installation of lifts	*2014/33/EU*
		Règles de sécurité – construction et installation d'ascenseurs	**2014/33/UE**
		Regole di sicurezza per la costruzione e il montaggio di ascensori	*2014/33/UE*
		Reglas de seguridad – Construcción y montaje de ascensores	**2014/33/UE**
		Regras de segurança – Construção e instalação de elevadores	*2014/33/UE*

Zertifizierungsstelle für Aufzüge und Sicherheitsbauteile, Überwachung gemäß Aufzugsrichtlinie:
Certification body for lifts and safety components, monitoring of production acc. lifts directive:
Organisme de certification pour ascenseurs et composants de sécurité, contrôle de production selon la directive sur les ascenseurs:
Organismo di certificazione per ascensori e componenti di sicurezza, controllo di produzione secondo la Direttiva per ascensori :
Centro de certificación para ascensores y componentes de seguridad, supervisión según la directiva de ascensores:
Centro de certificação para elevadores e componentes de segurança, monitoramento conforme a diretiva para elevadores:

© TÜV SÜD Industrie Service GmbH
Westendstraße 199
D-80686 München

Kennnummer 0036 / *Identification number 0036 /* **Numéro d'identification 0036 /** *Numero d'identificazione 0036 /* **Número de identificación 0036 /** *Número de identificação 0036 /*

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

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

EU-Baumusterprüfbescheinigung / *EU type examination certificate* **/ Certificate d'examen de type UE /** *Certificato di omologazione UE* **/ Certificado de examen UE /** *Certificado de exame UE*

EU-BD 954

	*** EG-Maschinenrichtlinie 2006/42/EG** *** Directive 2006/42/CE sur les machines** *** Directiva de Máquinas 2006/42/CE**	** EC-Machinery directive 2006/42/EC* ** Direttiva macchine 2006/42/CE* ** Diretiva para maquinaria 2006/42/CE*
X	**** Richtlinie Niederspannung 2014/35/EU** **** Directive 2014/35/UE sur les basses tensions** **** Directivas de Baja Tensión 2014/35/UE**	*** EC-Low voltage directive 2014/35/EU* *** Direttiva per il basso voltaggio 2014/35/UE* *** Diretiva de baixa voltagem 2014/35/UE*
X	***** Elektromagnetische Verträglichkeit 2014/30/EU** ***** Directive 2014/30/UE sur la compatibilité électromagnétique** ***** Compatibilidad Electromagnética 2014/30/UE**	**** Electromagnetic compatibility directive 2014/30/EU* **** Direttiva per la compatibilità elettromagnetica 2014/30/UE* **** Diretiva de compatibilidade eletromagnética 2014/30/UE*

Mauerstetten, gültig ab dem 20.4.2016
Ort und Datum / place and date / Lieu et date / luogo – data / fecha y lugar / Lugar e data

Dipl.-Ing. (FH) / graduate engineer / Engenheiro graduado
Geschäftsführer / Managing Director / Directeur Général / Gerente / Gerente
Günther Klingler

9.6 EU Type Examination Certificate

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

Industrie Service

EU TYPE-EXAMINATION CERTIFICATE

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

Certificate No.:	EU-BD 954
Certification Body of the Notified Body:	TÜV SÜD Industrie Service GmbH Westendstr. 199 80686 Munich - Germany Identification No. 0036
Certificate Holder:	Chr. Mayr GmbH & Co. KG Eichenstr. 1 87665 Mauerstetten - Germany
Manufacturer of the Test Sample: (Manufacturer of Serial Production – see Enclosure)	Chr. Mayr GmbH & Co. KG Eichenstr. 1 87665 Mauerstetten - Germany
Product:	Braking device acting on the shaft of the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and braking element against unintended car movement
Type:	RTW Size 125, 180, 225 Type 8012._ _ _ _ _
Directive:	2014/33/EU
Reference Standards:	EN 81-20:2014 EN 81-50:2014 EN 81-1:1998+A3:2009
Test Report:	EU-BD 954 of 2015-09-30
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:	2015-09-30
Date of Validity:	from 2016-04-20

TÜV SÜD Industrie Service GmbH 00 36 Notified Body

Achim Janocha
Certification Body "lifts and cranes"

TÜV®

Annex to the EC Type-Examination Certificate No. EU-BD 954 of 2015-09-30

Industrie Service

1 Scope of application

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

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

Size	Permissible brake torque [Nm]	Max. tripping rotary speed of the traction sheave [rpm]
125	180 - 250	1000
180	280 - 360	900
225	340 - 500	800

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

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

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

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

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

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

Size	Min. nominal brake torque* [Nm]	Max. nominal brake torque * [Nm]	Max. tripping rotary speed [rpm]	Maximum response times** [ms] without overexcitation		
				t_0	t_{50}	t_{90}
125	2 x 90 = 180		1000	60	100	140
125		2 x 125 = 250	1000	35	70	110
180	2 x 140 = 280		900	40	80	140
180		2 x 180 = 360	900	30	60	110
225	2 x 170 = 370		800	35	60	110
225		2 x 250 = 500	800	25	50	80

Interim values can be interpolated

Explanations:

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

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

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

Annex to the EC Type-Examination Certificate No. EU-BD 954 of 2015-09-30

Industrie Service

1.2.2 Assigned execution features

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

2 Conditions

2.1 Above mentioned safety component represents only a part at the protection device against overspeed for the car moving in upwards direction and unintended car movement. Only in combination with a detecting and triggering component in accordance with the standard (two separate components also possible), which must be subjected to an own type-examination, can the system created fulfil the requirements for a protection device.

2.2 The installer of a lift must create an examination instruction to fulfil the overall concept, add it to the lift documentation and provide any necessary tools or measuring devices, which allow a safe examination (e. g. with closed shaft doors).

2.3 The manufacturer of the drive unit must provide calculation evidence that the connection traction sheave – shaft – brake disc and the shaft itself is sufficiently safe, if the brake disc is not a direct component of the traction sheave (e. g. casted on). The shaft itself has to be statically supported in two points.

The calculation evidence must be enclosed with the technical documentation of the lift.

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

2.5 The identification drawing no. E02803400000161 including stamp dated 2015-09-30 shall be included to the EU type-examination for the identification and information of the general construction and operation and distinctness of the approved type.

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

3 Remarks

3.1 In the scope of this type-examination it was found out, that the brake device also functions as a brake for normal operation, is designed as a redundant system and therefore meets the requirements to be used also as a part of the protection device against overspeed for the car moving in upwards direction and as braking element as part of the protection device against unintended car movement.

3.2 Checking whether the requirements as per section 5.9.2.2 of EN 81-20:2014 (D) have been complied with is not part of this type examination.

3.3 Other requirements of the standard, such as reduction of brake moment respectively brake force due to wear or operational caused changes of traction are not part of this type examination.

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

- EN 81-1:1998 + A3:2009 (D), Annex F.7 and F.8
- EN 81-20:2014 (D), part 5.6.6.11, 5.6.7.13
- EN 81-50:2014 (D), part 5.7 and 5.8

3.5 A revision of this EU type-examination certificate is inevitable in case of changes or additions of the above mentioned standards or of changes of state of the art.

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

Page 2 of 2

Enclosure to the EU Type-Examination Certificate No. EU-BD 954 of 2015-09-30

Industrie Service

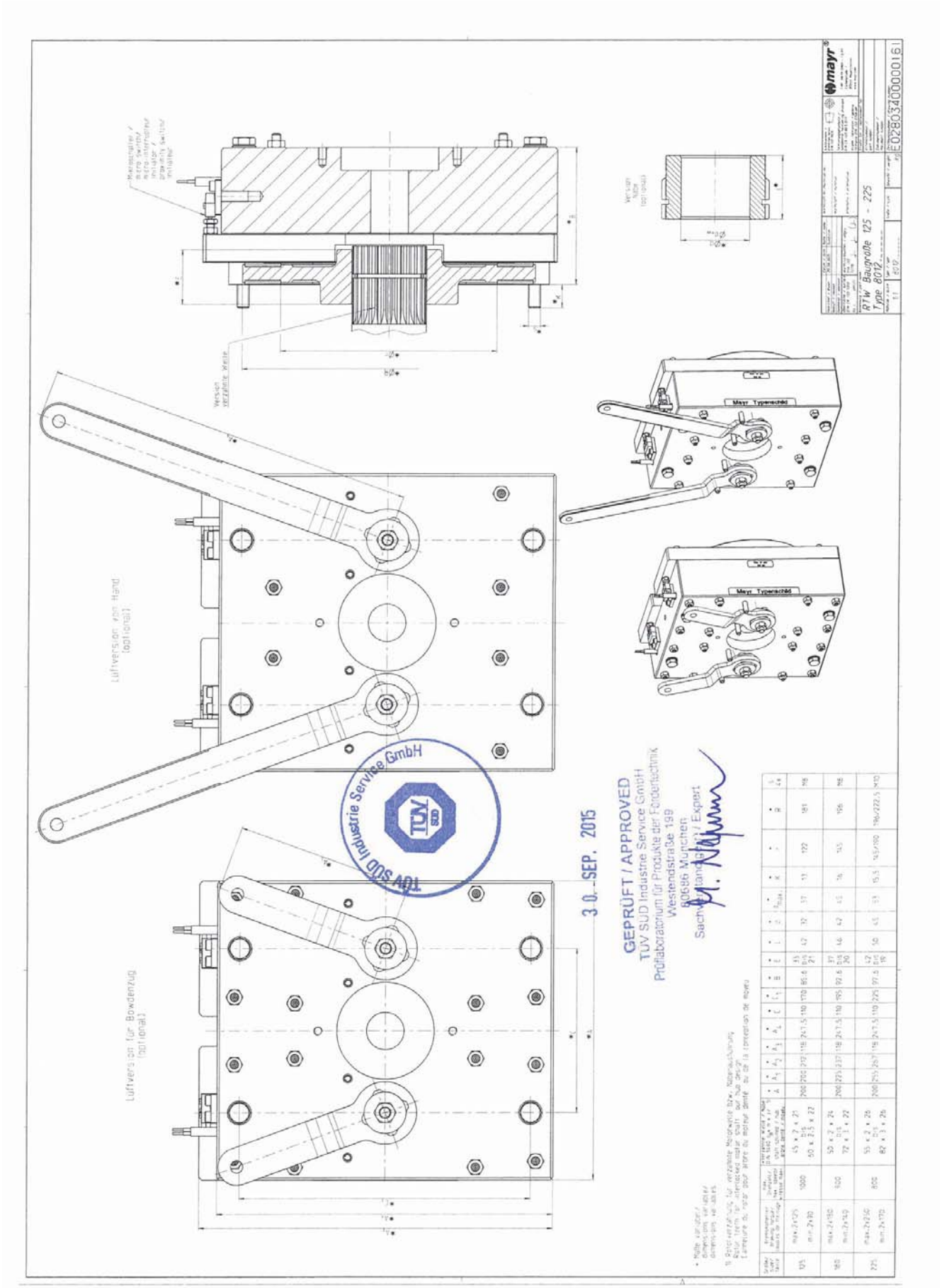
Authorised Manufacturer of Serial Production – Production Sites (valid from: 2015-09-30):

Company	Chr. Mayr GmbH & Co. KG
Address	Eichenstr. 1 87665 Mauerstetten - Germany
Company	Mayr Polska Sp. z. o. o.
Address	Rojów, ul. Hetmanska 1 63-500 Ostrzesów - Poland

- END OF DOCUMENT -

Based on: Document from Mayr GmbH of 2015-06-16

Page 1 of 1


mayr
RTW Baugröße 125 - 225
Type 8012
E02803400000161
Luftversion von Hand (optional)
Luftversion für Bowdenzug (optional)
Mayr Typenschild
GEPRÜFT / APPROVED
TÜV SÜD Industrie Service GmbH
Prüflaboratorium für Produkte der Fördertechnik
Westendstraße 199
80686 München
Sachverständiger / Expert
30. SEP. 2015
TÜV SÜD Industrie Service GmbH

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^{-1}]	[min^{-1}]	[m/s]	[m/s]	[m/s]	[m/s]
132./A/AS/B/BS	120	520	598	3.27	3.76	1.63	1.88
132./A/AS/B/BS	160	520	598	4.36	5.01	2.18	2.50
132./A/AS/B/BS	200	520	598	5.45	6.26	2.72	3.13

9.8 Calculation proof

- Translation - (english)

A-BN17_02-GB
1808 Index 002

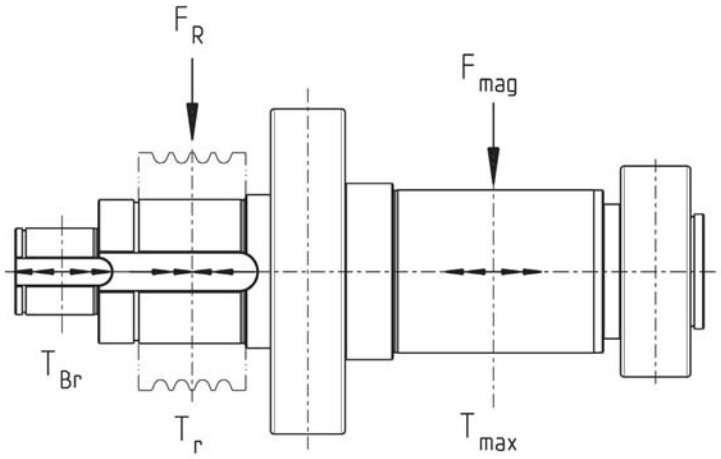
Manufacturer: ZIEHL-ABEGG SE
Heinz-Ziehl-Straße
74653 Künzelsau
Germany

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

Type of the gearless maschine: **ZAtop SM132.21/A (with sheave width 56 mm)**

Object examined: Calculation of traction sheave shaft including shaft-hub-connections by IFF ENGINEERING & CONSULTING GmbH No. 6.1.523.3 (1) dated 21.06.2016

Examination basis:	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: Strenght of materials
	DIN 743-3 Corrigendum 1:2014-12	Calculation of load capacity of shafts and axles – Part 3: Strenght of materials, Corrigendum to DIN 743-3:2012-12
	DIN 743-4:2012-12	Calculation of load capacity of shafts and axles – Part 4: Fatique 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



Construction drawing: A-13-121-0072-01 index 000 dated 14.04.2016

Permissible shaft materials:
Steel DIN EN 10025-2:2005-04 – S355JR (1.0045)
or material of higher strength
Steel DIN EN 10083-2:2006-10 – C35E+N (1.1181+N)
or material of higher strength
Steel DIN EN 10083-3:2007-01 – 42CrMo4+QT (1.7225+QT)
or material of higher strength

Permissible traction sheave hub materials:
Steel DIN EN 10083-2:2006-10 – C45+N or material of higher strength
Cast iron DIN EN 1561:2012-01 – EN-GJL-300 (GG-30)
or material of higher strength

Permissible feather key traction sheave materials: Steel DIN EN 10277-2:2008-06 – C45+C

Permitted materials brake hub: Steel DIN EN 10083-2:2006-10 – C45+N

Permissible parallel key brake hub materials: Steel DIN EN 10277-2:2008-06 – C45+C

Load data:

Maximum permissible static operating shaft load	F_R	23.5 kN
Distance from bearing A to centre traction sheave	a	60.5 mm
Rated torque	T_r	131 Nm
Maximum torque	T_{max}	260 Nm
Magnetic force	F_{Mag}	600 N
Nominal brake torque	T_{Br}	320 Nm (2 x 160 Nm)
Maximum brake torque	2 x T_{Br}	640 Nm
Rated speed	n_r	520 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, 21.02.2018
(place and date of issue)

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

i.V. R. Hoppenstedt

(signature)

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

i.V. A. Lagies

(signature)

9.9 Calculation proof

- Translation -
(english)

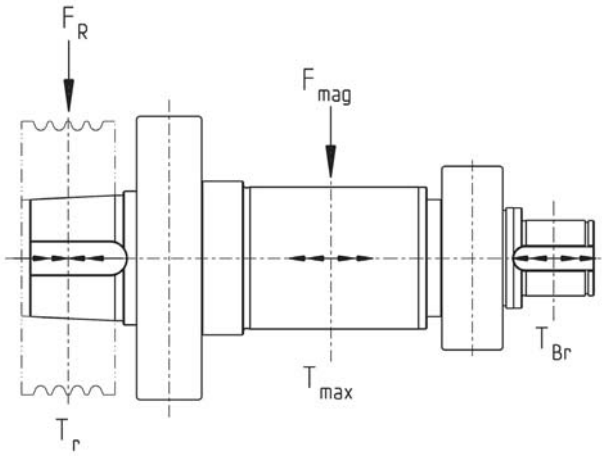
A-BN17_03-GB
1808 Index 002

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 maschine:	**ZAtop SM132.21/B (with sheave width 56 mm)**
Object examined:	Calculation of traction sheave shaft including shaft-hub-connections by IFF ENGINEERING & CONSULTING GmbH No. 6.1.523.3 (1) dated 21.06.2016

Examination basis:	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: Strenght of materials
	DIN 743-3 Corrigendum 1:2014-12	Calculation of load capacity of shafts and axles – Part 3: Strenght of materials, Corrigendum to DIN 743-3:2012-12
	DIN 743-4:2012-12	Calculation of load capacity of shafts and axles – Part 4: Fatique 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



Construction drawing: A-13-121-0071-01 index 000 dated 12.04.2016

Permissible shaft materials: Steel DIN EN 10083-2:2006-10 – C45+N (1.0503+N) or material of higher strength
Steel DIN EN 10083-3:2007-01 – 42CrMo4+QT (1.7225+QT) or material of higher strength

Permissible traction sheave hub materials: Steel DIN EN 10083-2:2006-10 – C45+N or material of higher strength
Cast iron DIN EN 1561:2012-01 – EN-GJL-300 (GG-30) or material of higher strength

Permissible feather key traction sheave materials: Steel DIN EN 10277-2:2008-06 – C45+C

Permitted materials brake hub: Steel DIN EN 10083-2:2006-10 – C45+N

Permissible parallel key brake hub materials: Steel DIN EN 10277-2:2008-06 – C45+C

Load data:

Maximum permissible static operating shaft load	F_R	23.5 kN
Distance from bearing A to centre traction sheave	a	60.5 mm
Rated torque	T_r	131 Nm
Maximum torque	T_{max}	260 Nm
Magnetic force	F_{Mag}	600 N
Nominal brake torque	T_{Br}	320 Nm (2 x 160 Nm)
Maximum brake torque	2 x T_{Br}	640 Nm
Rated speed	n_r	520 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, 21.02.2018
(place and date of issue)

ZIEHL-ABEGG SE	ZIEHL-ABEGG SE
Roland Hoppenstedt	André Lagies
Head of R&D Drive Division	Manager R&D Mechanics Drive Division
(name, function)	(name, function)
i.V. R. Hoppenstedt	i.V. A. Lagies
(signature)	(signature)

9.10 Calculation proof

- Translation -
(english)

A-BN17_04-GB
1808 Index 002

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

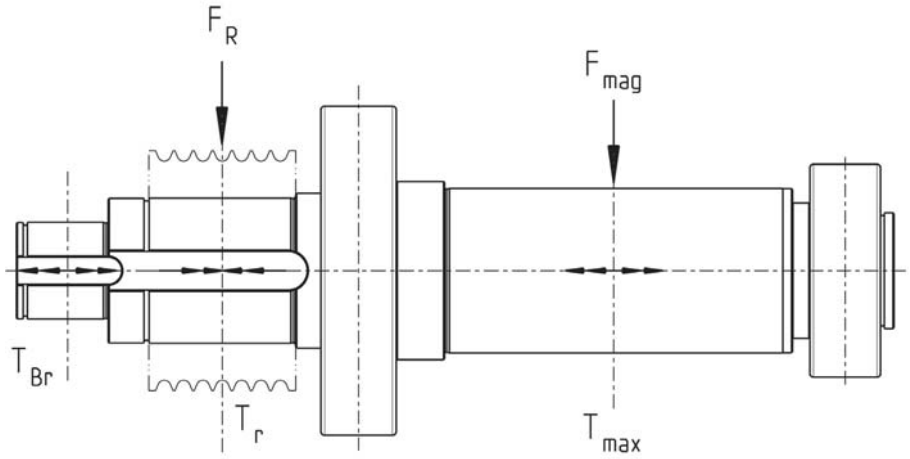
Confirmation concerning the examination of traction sheave shaft calculation including shaft-hub-connections.

Type of the gearless maschine: **ZAtop SM132.35/A (with sheave width 76 mm)**

Object examined: Calculation of traction sheave shaft including shaft-hub-connections by IFF ENGINEERING & CONSULTING GmbH No. 6.1.523.3 (1) dated 21.06.2016

Examination basis:

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: Strenght of materials
DIN 743-3 Corrigendum 1:2014-12	Calculation of load capacity of shafts and axles – Part 3: Strenght of materials, Corrigendum to DIN 743-3:2012-12
DIN 743-4:2012-12	Calculation of load capacity of shafts and axles – Part 4: Fatique 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



Construction drawing: A-13-121-0072-04 index 000 dated 14.04.2016

Permissible shaft materials: Steel DIN EN 10025-2:2005-04 – S355JR (1.0045) or material of higher strength
Steel DIN EN 10083-2:2006-10 – C45+N (1.0503+N) or material of higher strength
Steel DIN EN 10083-3:2007-01 – 42CrMo4+QT (1.7225+QT) or material of higher strength

Permissible traction sheave hub materials: Steel DIN EN 10083-2:2006-10 – C45+N or material of higher strength
Cast iron DIN EN 1561:2012-01 – EN-GJL-300 (GG-30) or material of higher strength

Permissible feather key traction sheave materials: Steel DIN EN 10277-2:2008-06 – C45+C

Permitted materials brake hub: Steel DIN EN 10083-2:2006-10 – C45+N

Permissible parallel key brake hub materials: Steel DIN EN 10277-2:2008-06 – C45+C

Load data:

Maximum permissible static operating shaft load	F_R	23.5 kN
Distance from bearing A to centre traction sheave	a	70.5 mm
Rated torque	T_r	203 Nm
Maximum torque	T_{max}	400 Nm
Magnetic force	F_{Mag}	1000 N
Nominal brake torque	T_{Br}	450 Nm (2 x 225 Nm)
Maximum brake torque	2 x T_{Br}	900 Nm
Rated speed	n_r	520 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, 21.02.2018
(place and date of issue)

ZIEHL-ABEGG SE	ZIEHL-ABEGG SE
Roland Hoppenstedt	André Lagies
Head of R&D Drive Division	Manager R&D Mechanics Drive Division
(name, function)	(name, function)
i.V. R. Hoppenstedt	i.V. A. Lagies
(signature)	(signature)

9.11 Calculation proof

- Translation -
(english)

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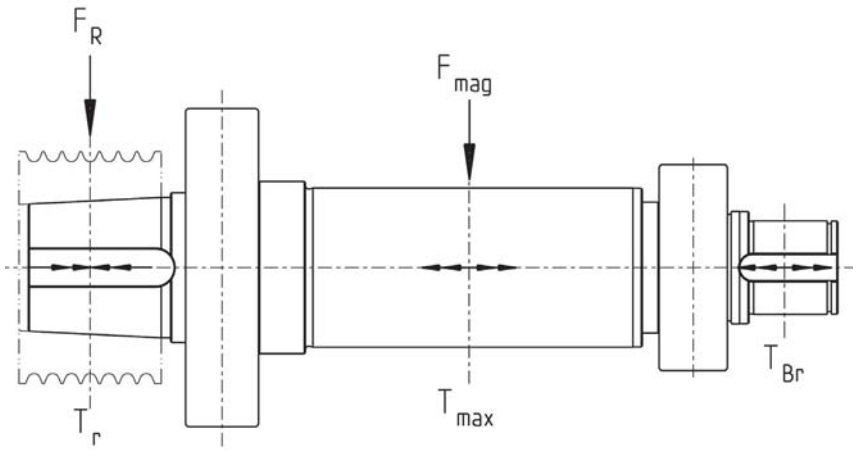
1808 Index 002

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 maschine:	**ZAtop SM132.35/B (with sheave width 76 mm)**
Object examined:	Calculation of traction sheave shaft including shaft-hub-connections by IFF ENGINEERING & CONSULTING GmbH No. 6.1.523.3 (1) dated 21.06.2016

Examination basis:	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: Strenght of materials
	DIN 743-3 Corrigendum 1:2014-12	Calculation of load capacity of shafts and axles – Part 3: Strenght of materials, Corrigendum to DIN 743-3:2012-12
	DIN 743-4:2012-12	Calculation of load capacity of shafts and axles – Part 4: Fatique 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



Construction drawing: A-13-121-0071-03 index 000 dated 12.04.2016

Permissible shaft materials: Steel DIN EN 10083-2:2006-10 – C45+N (1.0503+N) or material of higher strength
Steel DIN EN 10083-3:2007-01 – 42CrMo4+QT (1.7225+QT) or material of higher strength

Permissible traction sheave hub materials: Steel DIN EN 10083-2:2006-10 – C45+N or material of higher strength
Cast iron DIN EN 1561:2012-01 – EN-GJL-300 (GG-30) or material of higher strength

Permissible feather key traction sheave materials: Steel DIN EN 10277-2:2008-06 – C45+C

Permitted materials brake hub: Steel DIN EN 10083-2:2006-10 – C45+N

Permissible parallel key brake hub materials: Steel DIN EN 10277-2:2008-06 – C45+C

Load data:

Maximum permissible static operating shaft load	F_R	23.5 kN
Distance from bearing A to centre traction sheave	a	70.5 mm
Rated torque	T_r	203 Nm
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Nominal brake torque	T_{Br}	450 Nm (2 x 225 Nm)
Maximum brake torque	2 x T_{Br}	900 Nm
Rated speed	n_r	520 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, 22.02.2018
(place and date of issue)

ZIEHL-ABEGG SE	ZIEHL-ABEGG SE
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