ZIEHL-ABEGG

Die Königsklasse

The Royal League

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

ZA top

SM200.15C
SM200.15C/S
SM200.20C
SM200.20C/S

Gearless permanent magnet synchronous motor

Original operating instructions

Store for future use!

Part.-No. 01007142-GB (EU-BD 845)

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 is designed as a gearless drive for traction sheave rope elevators.
No other drive applications are permitted without the disengagin by the ZIEHL-ABEGG SE company!

1.2 Structure of the operating instructions

This manual is part of the drive and must always be kept in its vicinity for reference at all times. All persons involved in mounting, operation, maintenance or repair of the drive must have read and understood this manual. ZIEHL-ABEGG SE takes no responsibility for damage or disruption caused by disregard of this manual.

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, improper use or as a consequence of unauthorized repairs or modifications.

1.5 Copyright

2 Safety instructions

2.1 General

ZIEHL-ABEGG SE electric motors are not ready-to-use products and may only be operated after having been installed into machines or plants and established their safety, depending on the application, by protective grating, barriers, constructive devices or other adequate measures (see also 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 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!** Middle or slight bodilies harm is possible 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!

2.3 General safety instructions

Danger!
When the motor shaft is turning, voltage will be induced and applied to the connection terminals!

Danger!
▷ The motor has casted eyelets or threads to suit eyebolts. The eyelets are for the transport of the motor including sheave and brake only. Do not lift higher loads with these eyelets for example a socket, ropes, etc. Use adequate hoists. **Danger to life!**

Warning!
▷ Dependent on the working conditions the surface temperature can be very high. **Danger of burns!**

▷ The motor is only to be operated within the ranges specified on the type plate!
▷ Use the motor only as intended and only for the specified tasks in the purchase order!
▷ **When the motor current is off, it can not develop any electric torque. When opening the brakes the lift will accelerate uncontrolled! Therefore it is recommended to short-circuit the motor windings, when the motor current is off. This induces a speed dependent braking torque similar to the friction of a worm gearbox. The short-circuit has to be made by main contacts of the contactors, because the current is approx. rated current. In any case do not short-circuit the windings, while the motor wires still carry current.**
▷ Safety features, for example the brake release monitoring, may not be dismantled, circumvented or made inoperative!
▷ A temperature sensor is installed into the winding as motor protection and must be connected!

2.4 Requirements placed on the personnel / due diligence

▷ 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.

3 Product overview

3.1 Operational area

The ZAtop, a permanent magnet inner-rotor synchronous motor, offers all benefits which a modern elevator motor asks for:

- simple installation
- best controllability
- lowest noise level
- highest travel comfort
- compact design

Due to the very compact design the ZAtop is ideal for machine roomless elevators. Of course the certified brakes provide maximum security and are approved as a safety device for ascending car overspeed protection. Protected through registered design and patents application pending one can for the very first time build a new dimension of machine roomless elevators.

3.2 Transport

▷ ZIEHL-ABEGG SE electric motors are packed by the manufacturer for the types of transport and storage agreed upon.
▷ Transport the motor(s) either with the original packing or at the casted eyelets or eyebolts using adequate hoists.
▷ Transport motor 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 motor.
▷ Avoid excessive vibration and shocks.
▷ Check packing and motor for possible damage and report the forwarding agency about any damages caused by transport. Shipping damages are not covered by our guarantee!

3.3 Storage

▷ Store the motor 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 motor bearing for correct function before installing the motor. (Ease the brakes and move the rotor by hand. Take care if the bearing makes untypical noises)

3.4 Disposal / recycling

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

4 Mechanical installation

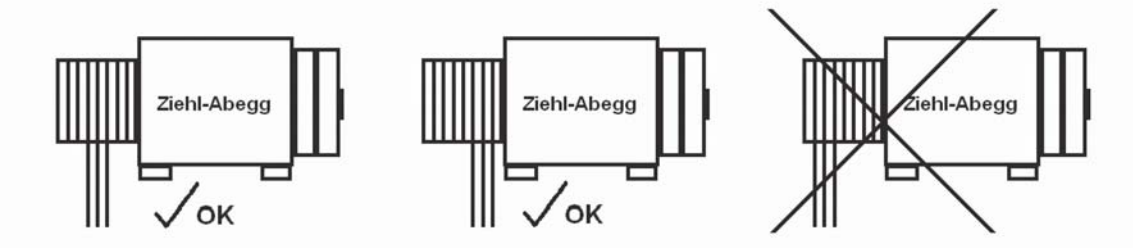
4.1 General mounting advises

▷ 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 lift, the drive and especially the brakes have to be covered and protected against dust and chips.

Any violation will result in a loss of guarantee on the motors and accessories!
The following general rules apply:
▷ The rope pull may be vertical or horizontal.
▷ **At lateral (horizontal) rope pull, the motor housing must be supported on the side. The fixings scews of the motor must not be loaded with shearing force!**
▷ 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.



▷ Do not install distorted.
▷ Do not apply any force (levering, bending). Above all, do not expose the rotor to any heavy mechanical shocks.
▷ Carry out the electrical connection in accordance with the enclosed wiring diagram.
▷ Before starting installation, the drive must be checked for transport damage, especially the cables have to be checked.

▷ No welding must be carried out on the drive. The drive must not be used as an earthing point for welding. Magnets and bearings could be destroyed.
▷ The cooling-airflow around the motor must not be obstructed.
▷ Keep at least 290 mm space between the brake and the wall (axial direction) to make access to the encoder possible.

4.2 Patent situation

Pleasepayattention to the patent situation concerning the use of elevator machines in the shaft. When using the ZAtop according to our installation examples there are no problems with patents. In doubt please contact ZIEHL-ABEGG SE.

▷ When installing the motor in the elevator shaft, the motor can be placed in the shaft head, with the motor axle parallel to the nearest wall.
▷ The motor must not be hanged over the cabin.
▷ The motor should be fastened at the framework, Halfen cast-in channals or girders. The drive must not be placed of fastened onto all four guide rails.
▷ If the girder that supports the motor is fastened at one wall, the motor has to be installed on top of the girder. A hanging motor is not permissible!

4.3 Mounting the drive unit

▷ On the bottom side of the socket are 4 threads.
▷ The motor has to be fixed with 4 screws M16 - 8.8 at the mounting plate.
Tightening torque M16 - 8.8: 195 Nm
▷ Screw-in depth at least 1.5 times of screw size. (minimum 24 mm, maximum 32 mm)
▷ Fasten the screws crosswise in at least two steps to the required tightening torque.
▷ The permissible unevenness for the mounting surface is 0.3 mm.
▷ The mounting surface has to be rigid and robust enough to withstand the forces.
▷ For the installation, insulating elements should be used to absorb the vibration.

4.4 Fastening the brake

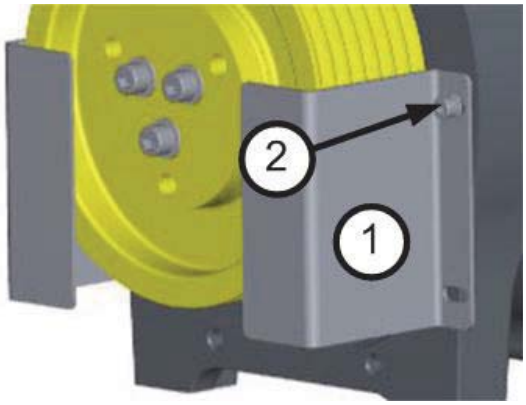
The drive will be delivered with the mounted brake.
Brake fixation in accordance with the brake operating instructions.

Information
An exchange of the brake can be carried out only with special centering tool. Please contact the ZIEHL-ABEGG SE customer service in case of a brake exchange!

4.5 Fastening rope protection clamp

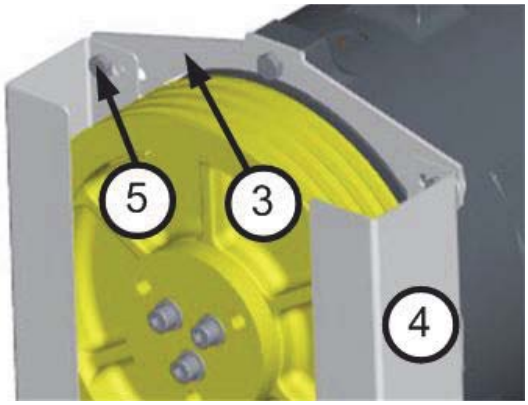
▷ The drive unit is equipped with two rope protection clamps.

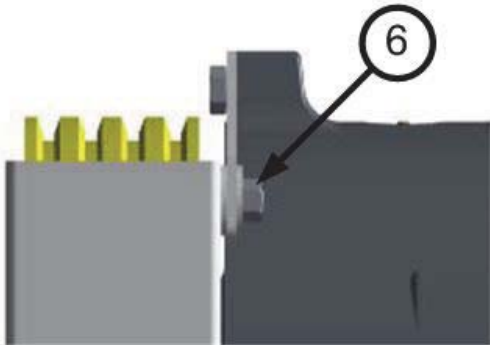
With traction sheave up to 240 mm:



▷ Each of the two protection clamps (1) will be fastened at the housing with a socket cap screw M8 x 16 (2) and washers.
Tightening torque M8 - 8.8: 23 Nm
▷ Through the longholes in the rope protection clamps (1) the required distance to the ropes can be adjusted.
▷ The rope protection clamp (1) must be fastened in a distance of 2 - 3 mm to the ropes.
▷ **On installations with rope pull upwards a protection must be installed to prevent foreign bodies to entering between rope and traction sheave.**

With traction sheave from 320 mm:





▷ The rope protection clamps (4) are fastened with one hexagon head screw M10 x 20 (5) each, two washers and one hexagon nut M10 (6) to the fixing plate (3).
Torque M8 - 8.8: 23 Nm
▷ The necessary distance from the ropes can be set by the slotted holes in the fixing plate (3) and the two holes in the rope protection clamp (4).
▷ The rope protection clamp (4) must be fastened in a distance of 2 - 3 mm to the ropes.
▷ **On installations with rope pull upwards a protection must be installed to prevent foreign bodies to entering between rope and traction sheave.**

5 Electrical installation

5.1 Safety precautions

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.

5.2 EMC directive

The adherence to the EMC Directive 2004/108/EC only pertains to this product if controllers tested and recommended by ZIEHL-ABEGG SE are used, which have been installed in accordance with the corresponding controller description and in line with the EMC. If the product is integrated unprofessionally into a system or complemented by and operated with components (e. g. regulators and controllers) which have not been recommended, the operator of the complete system alone shall be responsible for adhering to the EMC Directive 2004/108/EC.

5.3 Motor connection

CAUTION!

▷ **The drive must not be connected to the mains supply without a controller!**
▷ **The motor is permitted to be used at frequency inverters with a maximum DC-link voltage of < 750 V DC!**
▷ **A screened motor cable has to be used. The screen has to be connected on both ends. The maximum motor cable length is 25 m.**

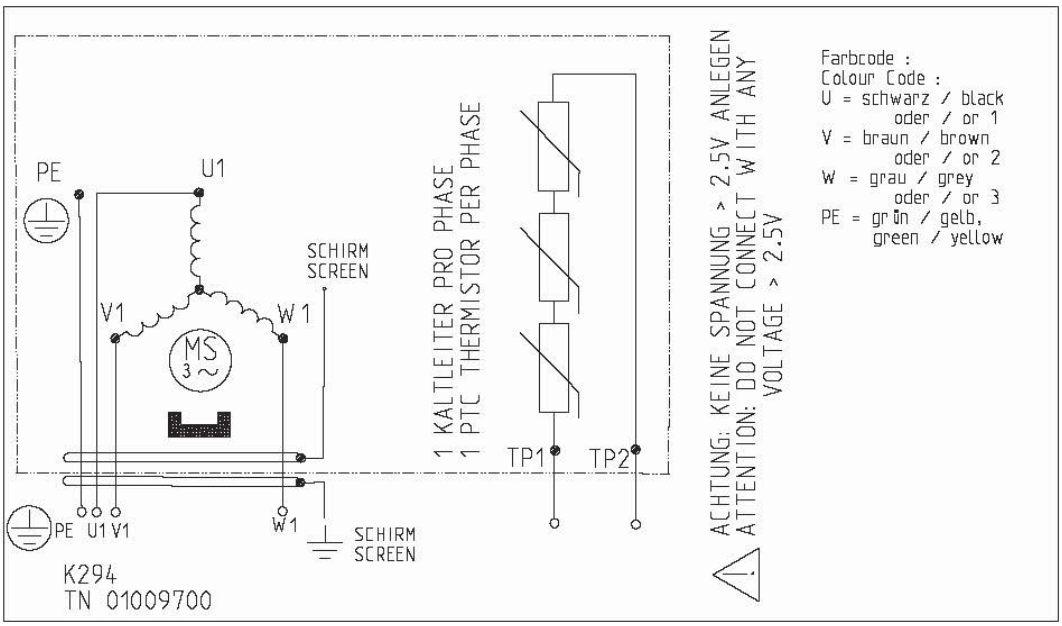
▷ Connect to the motor terminal box depending on the motor cable as follows:

PE	**U**	**V**	**W**	
green/yellow	black	brown	blue	*
green/yellow	black	brown	grey	**
green/yellow	1	2	3	

* *DIN VDE 0243: 1990-01*
** *DIN VDE 0293-308: 2003-01*

▷ If no other agreement was met, the absolute encoder offset is set to 0 To do that, connect the direct current with **U to +** and **V and W to -**.
▷ The motor connection lines U, V and W have to be connected on the motor and inverter side to the correct phases and must not be changed. Otherwise the motor may speed up uncontrolled.
▷ The motor is protected by PTC-resistors. The connection has to be made via a PTC resistor controller! The admissible test voltage of PTC resistors is maximum 2.5 V DC.

Wiring diagram Motor



5.4 Absolute encoder connection

Caution!
Never touch the connection contacts on the position absolute encoder or on the cable! The electronics can be destroyed by static electricity.

▷ The absolute encoder must be connected to the frequency inverter.
▷ The absolute encoder contains components that may be damaged by electrostatic discharge. The body of the person touching them must first be discharged, for example, by touching a conductive, earthed object, (e.g. bright metal parts of a control panel), immediately beforehand.
▷ A shielded cable must be used for the encoder connection. It is recommended to use a ZIEHL-ABEGG SE cable which guarantees a sufficient shield connection.
▷ The absolute encoder must not be detached mechanically in order not to lose the factory settings. If the absolute encoder has been detached, the new encoder-offset has to be determined with the frequency inverter. Please see the inverter operation instructions for this procedure.

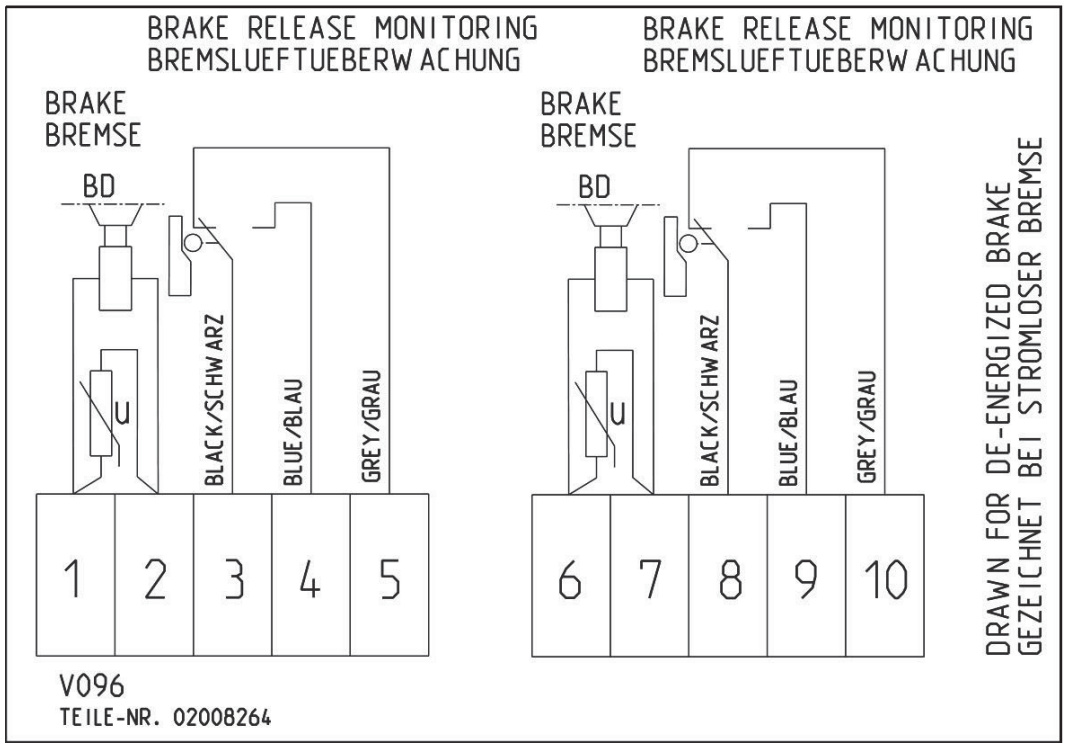
Contacts SV120 round connector at absolute encoder ECN1313 (ZIEHL-ABEGG SE standard)

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

5.5 Brake connection

- **Please also refer to the operating instructions of the brake.**
- **The brake is designed for static applications only. Any dynamic braking must be restricted to emergency braking and test braking. At static use, there is no brake wear. Therefore the brake is almost maintenance free.**
- **Open the brakes:**
  If exist, Electrical release of the brakes with a supply by accumulators/UPS is possible. Mechanical release of the brakes is possible. Hand release version is available as an option. Retrofitting the hand release is not possible.
- Dimension the supply and the wiring adequate for the 24 V brake. Brake current about 3,35 A per circuit!
- The brake circuits can be opened mechanically. They are separated from each other.
- The terminal box for the brake may be removed from the motor 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.
- **The brake release monitoring has to be evaluated; otherwise the type certificate is not fulfilled! The change of state of both brake circuits have to be monitored separately.**
- The brake release monitoring is realized by micro-switches. Please assure with adequate wiring, that the contact-current is at least 10 mA to keep the contacts clean.
- After a long storage period, the brake rotor may stick to the bearing bracket. Then the motor will not move even if the brake is released. In this case, please demount the brake from the motor and separate the brake rotor and the bearing bracket with care.

Wiring diagram brake

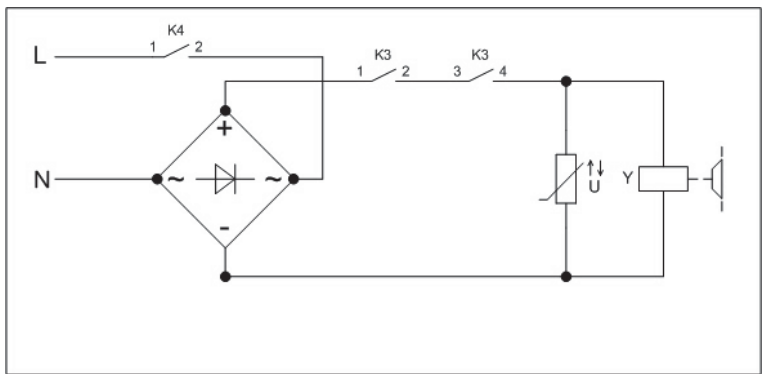


5.5.1 Triggering of the brakes

It is recommended to switch the brake through two contactors, one is switching the AC-side (K4) and the other is switching the DC-side (K3).
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 application in emergencies, during inspection drives and return rides, use a second contactor (K3), which disconnects the brakes from the direct current side. Integrate this contactor into the safety circuit.

CAUTION!

Caution!
Brakes, which are connected to the direct current side, must be protected against excess voltage from the switching actions by using corresponding varistors!
Due to the high operating current, master contactors must be used to switch the brakes!



Simplified diagram for brake activation

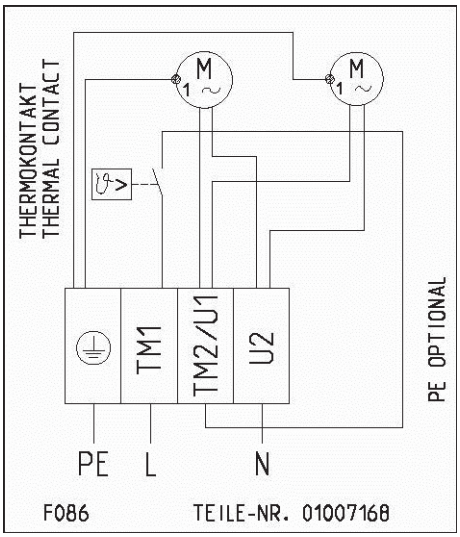
The contacts from K3 must close before the contact from K4 and are only permitted to open after the contact from K4 has opened.

5.6 Connection forced ventilation

The forced ventilation is optional and can be added afterwards.

Connection data		
Voltage	220 - 240	V
Frequency	50 / 60	Hz
output	2 x 14,5 / 14	W
Current	2 x 0.07 / 0,06	A

Wiring diagram forced ventilation



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

6 Start-up

6.1 Operating conditions

▷ The drive 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 motor in an explosive atmosphere.
▷ The ambient temperature may be within 0 °C and +40 °C.
▷ Maximum permissible humidity 95 %, not wet.
▷ Reduced cooling when installed 1000 m above sea level. Therefore, the torque by 1 % per 100 m must be reduced or the duty cycle time of 1.5 % per 100 m.
▷ Please contact ZIEHL-ABEGG SE in case of orders deviating from the corresponding application conditions.

6.2 First-time 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 Drive approval test

6.3.1 Half load test

Due to the short-circuit of the motor while the VVVF is inactive, the motor will create a speed depending braking torque. This braking torque will be produced already at a very low speed.
If the car with half load does not move when the brakes are opened, the short-circuit wiring should be deactivated. After that the test should be repeated.
After testing the short-circuit wiring must be activated again.

Half load test (alternative):
If deactivating of the short-circuit wiring is not possible or not desired, the testing of 50 % balance can be made as follows:
With half load the motor current has to be measured in up and down direction. Mostly this is possible at the VVVF (please see operating instructions of your VVVF). The measured currents should not divert by more than 10 %.

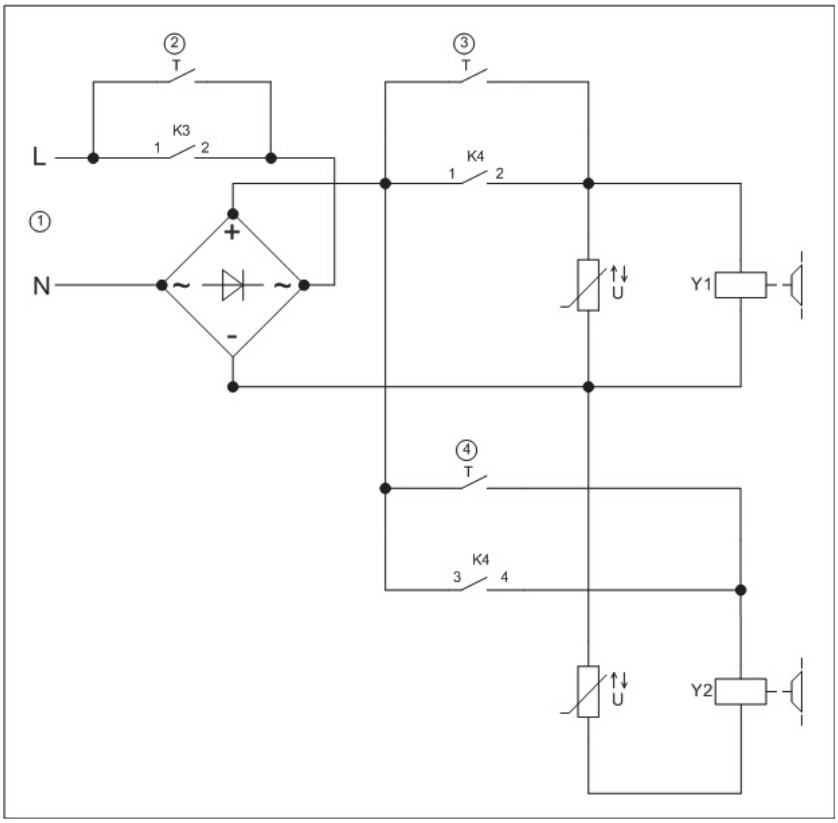
6.3.2 Testing the brake according EN 81-1

▷ 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 the failure of one brake circuit, the brake circuits have to be released separated from each other, also if the safety circuit is open. The brake circuits can be released mechanically or electrically. This state must not be permanently, it has to be done by a key button or equivalent. While using this function the safety circuit should always be opened.
While performing this test the elevator has to be observed. If there should be no visible deceleration, the open brake circuit has to be closed immediately! The elevator has to be put out of service and the brake to be checked!
As an example take a look at simplified diagram. The diagram is to be understood analogously. Their adaptation to other applications must be investigated. ZIEHL-ABEGG does not guarantee their suitability in such circumstances.
If the circuitry is made corresponding simplified diagram:
Press one of the key buttons at nominal speed until the elevator stops. Repeat the test by pressing the other key button to test the second brake circuit.

3. Testing the micro switches
The micro switches have to be single tested. According to their use as a normely open or normaly closed contact one micro switch contact at a time has to be opened or close.
If there is a wrong or missing micro switch signal, a travel must not be started.



Simplified diagram for brake activation
1 Voltage supply
2 Button two circuit test
3 / 4 "Open brake" button

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 drive torque is no longer sufficient to pull the car out of the trap.
With gearless drives 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.
With gearless drives in the shaft, the motor is usually not accessible. A handwheel is unnecessary in such a layout.
In both cases with gearless drives, applicable is: One must fall back on a chain hoist or similar if the drive torque is insufficient or if there is a lack of drive on the rope. It makes sense to keep a suitable chain hoist ready during 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 drives are normally designed for a maximum torque of ca. 170 - 200 %, only slight reserves are available during such special cases.
For that reason it is recommended, just as described in EN 81-1 Appendix D.2 j), to perform a TÜV trap inspection in the door area so that the car can be unloaded there to relieve the drive.

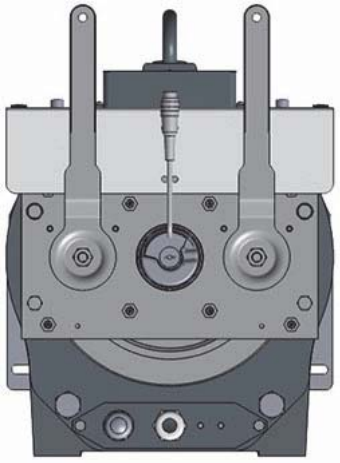
6.5 Emergency evacuation

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

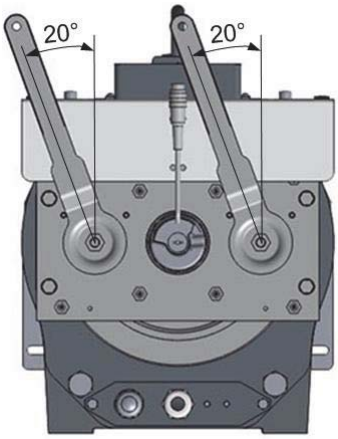
6.5.1 Emergency evacuation with hand release system of the brakes

In case of power failure or failure of the recovery control, emergency rescue is only possible by releasing the brakes. The picture shows how the levers must be actuated for the hand release system.

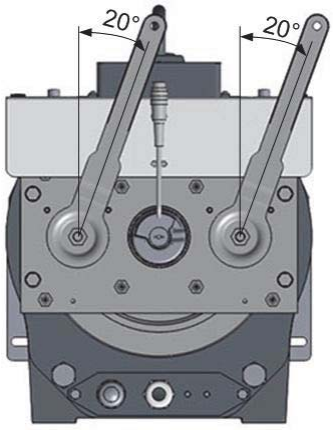
Releasing of the brake with the lever for hand release
The levers for hand release can be opened in both directions.



Brake closed



Brake released (left side)



Brake released (right side)

When the brakes are released with the lever for hand release, the lift 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 lift, we recommend to short-circuit the motor for the evacuation. The short-circuit is generated by the motor contactors.
The short-circuit generates a speed-dependent braking torque. The maximum braking torque is achieved at lower speeds.
Depending on the system type and weight ratios, it is possible that due to the short-circuit generated braking torque is not sufficient to limit the lift speed. So the speed must be monitored closely during evacuation and evacuation interrupted if necessary.
Manual release of the brake is finished when a floor is reached. Now the lift door can be opened with a triangular key.
The lift manufacturer's safety instructions have priority!

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

6.5.2 Electrical emergency evacuation

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

7 Faults and remedy

Failure	Causes	Adjustment
Running noise	Bearing defective	Contact customer service
	VVVF-settings wrong	Check VVVF settings
	Absolute encoder defective	Change absolute encoder
Excessive temperature / Temperature protection trips	Motor surface covered	Remove cover from motor or mount with more distance to motor.
	Ambient temperature higher than 40 °C	Enhance shaft ventilation
	VVVF-settings wrong	Check VVVF settings
Motor will not start	Motor phases connected incorrect	Check motor connection
	VVVF defective	Check VVVF
	Brake does not release	See brake faults
Brake switching noises	Brake is switched on the DC-side	Change brake wiring to AC-switching at normal operation. Add overvoltage protection.
	Air gap of brake too big	Replacement of the brake rotors
Brake does not release	Power supply too low. The voltage at the brake is to low.	Check power supply, change wiring (and transformer) size
	Brake control wrong / defective	Check brake wiring
	Brake coil defective	Replace brake (Special tools necessary! Contact ZIEHL-ABEGG SE customer service)
	Brake worn out	Replace brake rotors (Special tools necessary! Contact ZIEHL-ABEGG SE customer service)
Brake release monitoring does not switch	Micro switches defective	Replace the micro switch
	Contacts dirty	Switch micro switches with a higher contact current, at least 10 mA or change microswitches

8 Service and maintenance

8.1 General notes on maintenance

▷ Observe the safety-at-work regulations!
▷ Disassembling the machine can only be done with special devices!
Caution, strong magnetic force!
▷ Never use a high-pressure cleaner (e. g. a steam jet cleaner) for cleaning the motor!
▷ 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.

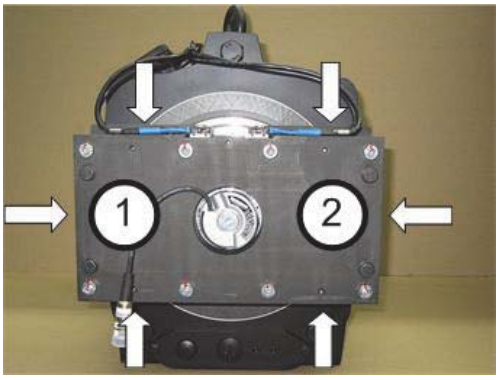
The brake wear has to be checked with the brake closed, therefore:
▷ Make sure that all moving parts have stopped, secure them mechanically if required!
▷ Make sure that the elevator can not be moved from any other person than the one who does the check!

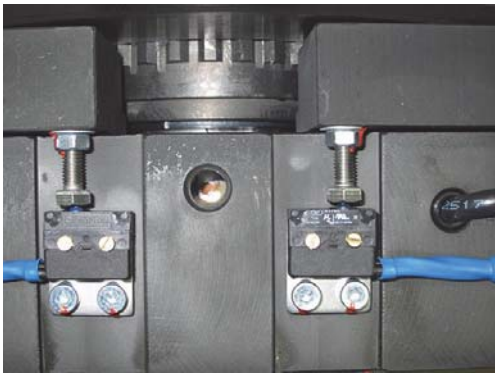
8.2 Inspection intervals

	During commissioning or after the first 3 months	**every year**
Distance of the rope protection clamp	X	X
Checking the air gap of the brake	X	X
Visual inspection of the fixing screws on the housing, brakes and traction sheave. The locking varnish must be free of damage.	X	X
Check the traction sheave if worn out		X
Check the microswitch		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





1. The airgap is to be check with the de-energized brake, 3 times at the circumfence of both brakes (brake 1 + brake 2). The maximum value of the three has to be taken into account.
2. If the maximum value of the air gap is exceeded on one of the magnets, it must be changed the brake rotor and the O-ring.
   Maximum admissible air gap after wear: 0.9 mm!
   Caution!
   Feeler gaugh do not introduce more than 10 mm into the air gap, to avoid damage to the dampers of noise or deterioration by the springs.

8.3 Spare parts

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

Available spare parts:
- Absolute encoder
- Brake (complete)
- Brake rotor & O-rings
- Micro switch for Brake
- Traction sheave
- Rope guard
- Forced cooling

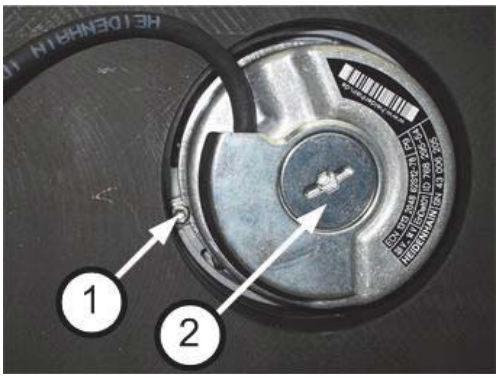
8.3.1 Replacement of the absolute encoder ECN1313/ERN1387

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

8.3.1.1 Required tool for the replacement of the absolute encoder:

- Wire cutter
- Allen wrench SW 2
- Allen wrench SW 4
- Torque key for a tightening torque of 5.2 Nm with Allen key SW 4
- Screw M10 x 25 (included in toolkit, article 70027450)

8.3.1.2 Dismounting the absolute encoder



1. Unscrew the clamping screw (1) with an allen wrench SW 2 The position of the clamping screw can diversify.
2. Removethecover of the encoder (2) with an allen wrench SW 4
3. Unscrew the central fixing screw (3) with an allen wrench SW 4 for 1 - 2 revolutions. The absolute encoder can be turned now.

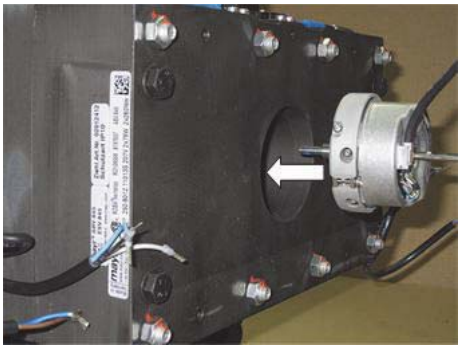
4. Tighten the screw M10 x 25 (4) with the fitting tool until the absolute encoder is loose. Due to the tightening the screw is pressing onto the central fixing screw (3) and pulls the absolute encoder off the drive shaft.
5. Screw out the screw M10 x 25 (4) as well as the central fixing screw.
6. Screw the screw M10 x 25 (4) onto the absolute encoder again. Take the absolute encoder from the motor shaft with the support of the screw.

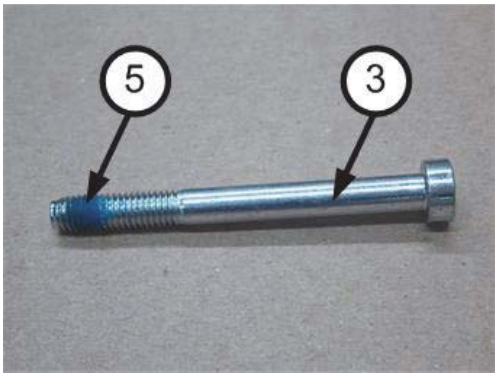
Caution!
Due the electrostatic discharge the absolute encoder can be destroyed! Do not touch the pins of the encoder cable as well as the electronics of the absolute encoder!

8.3.1.3 Mounting the absolute encoder

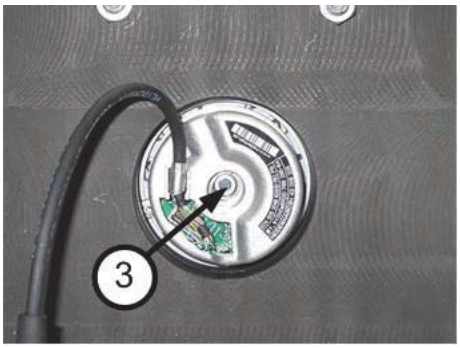
Caution!
Never touch the connection contacts on the position absolute encoder or on the cable! The electronics can be destroyed by static electricity.

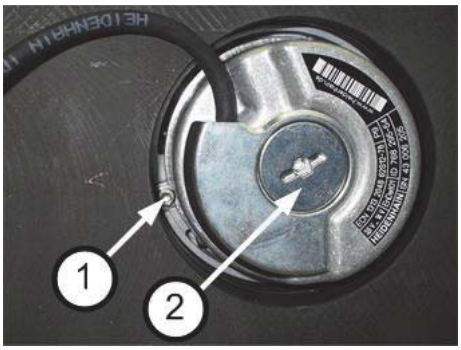
1. The brakes are used to centre the absolute encoder.





2. Attach the absolute encoder to the drive shaft.
3. Provide threadlocker Loctite 243 (5) or similar threadlocker material to the thread of the central fixing screw (3).





4. Tighten the central fixing screw (3) with an allen wrench SW 4
   Tightening torque: 5.2 Nm
5. Fix the cover of the encoder (2) with an allen wrench SW 4
6. Adjust the cable outlet by turning the absolute encoder and tighten the clamping screw (1) with an allen key SW 2 The position of the clamping screw can diversify.
   Tightening torque: 1.2 Nm
7. Carry out the alignment of the absolute encoder corresponding to the operation instructions of the frequency inverter.

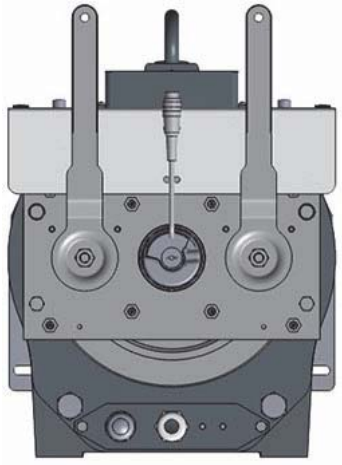
8.3.2 Replacement of the brake

During the mounting as well as the dismounting also the operating manual 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 of the brake can have influence on the braking action!

The brake bodies are mounted on the opposite side of the power take off. (see arrow)



Brake with mechanical hand release system

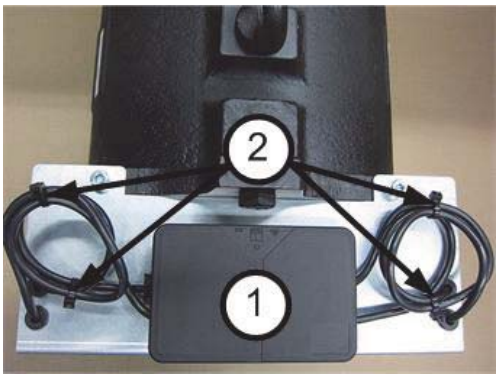
A brake with a mechanical hand release system is available optionally. The hand release system cannot be fitted later. The complete brake must be replaced to retrofit the hand release system.

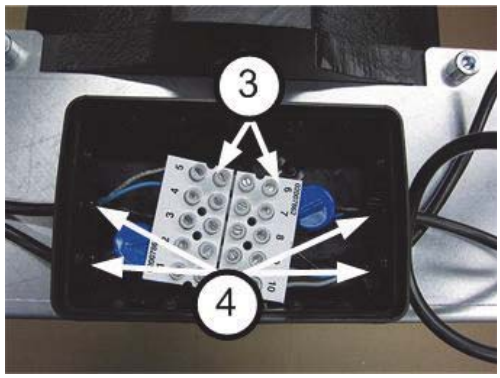
8.3.2.1 Required tool for the replacement of the brake:

- 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
- Allen wrench SW 6
- Allen key SW 17
- screw wrench SW 13
- screw wrench SW 16
- screw wrench SW 32
- Torque wrench for tightening torque 36 Nm with SW 13
- Torque wrench for tightening torque 48 Nm with SW 16
- Wrench (included in toolkit, article 70027450)
- Assembly shaft (included in toolkit, article 70027450)

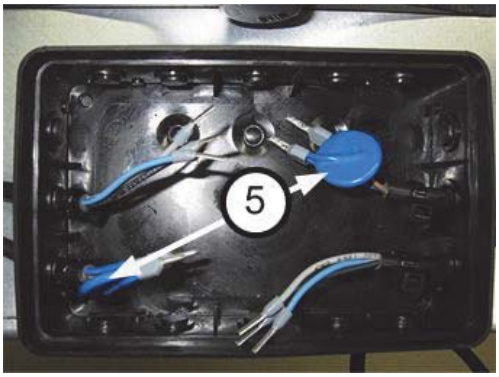
8.3.2.2 Dismounting the brake

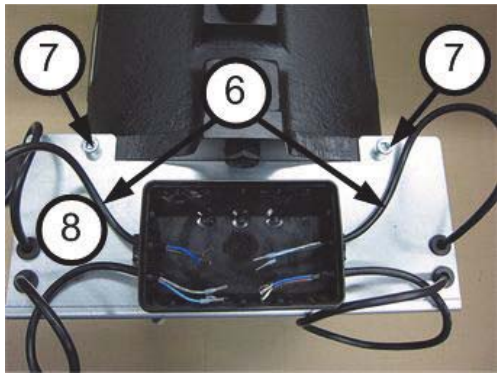
1. Dismount the absolute encoder (see chapter "Replacement of the absolute encoder").



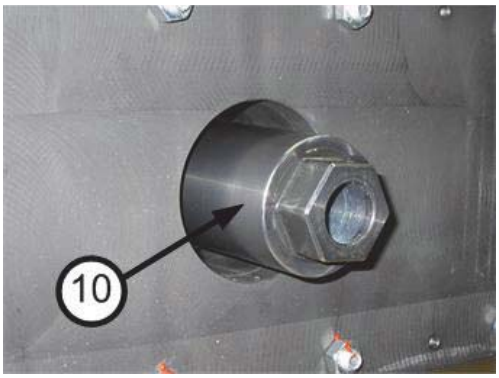


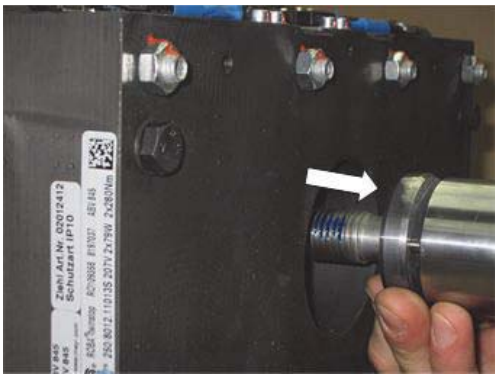
2. Remove the cable ties (2) at the brake lines
3. Remove the terminal box cover (1).
4. Disconnect the electrical connection (3) of both brake bodies.
5. Carefully remove strain reliefs (4) of all connecting cables with wire cutters.



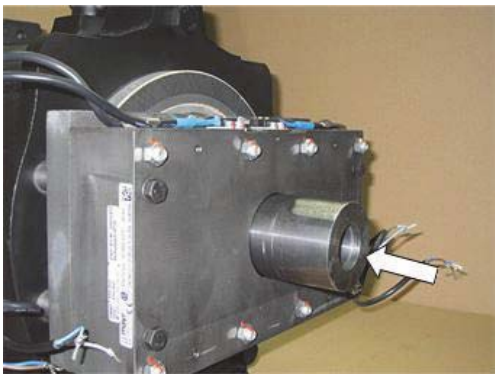


6. Cut off varistors (5).
7. Feed all connecting cables (6) out of the terminal box.
8. Undo cheese-head screws M8 (7) with allen wrench SW 6.
9. Remove cover plate (8).

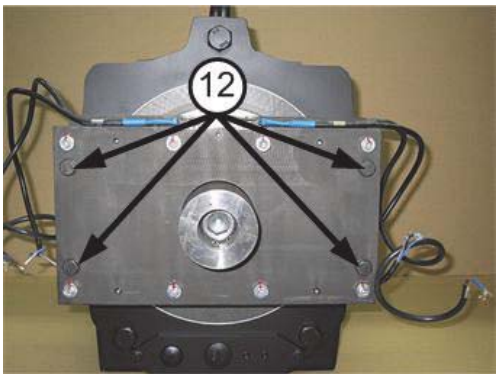


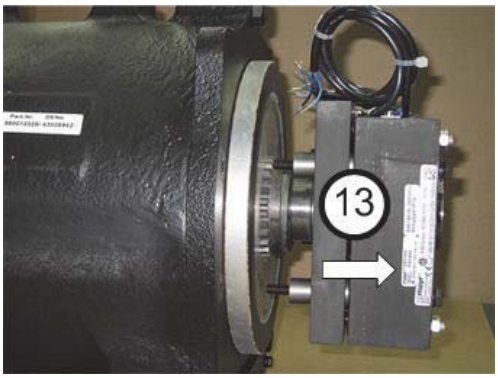


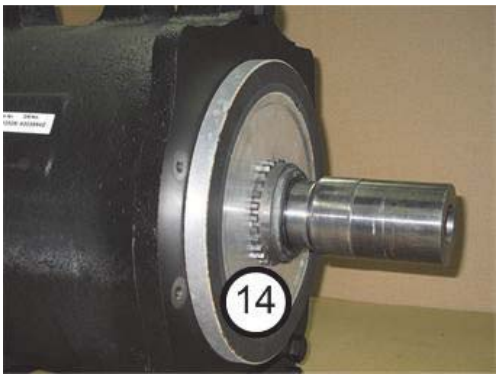
10. Unscrew adapter shaft (9) from the motor shaft with wrench (10) and screw wrench SW 32.

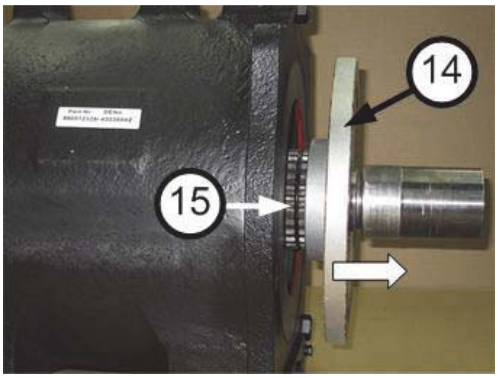


11. Screw assembly shaft (11) onto the motor shaft using SW 17 allen wrench.
Torque: 60 Nm



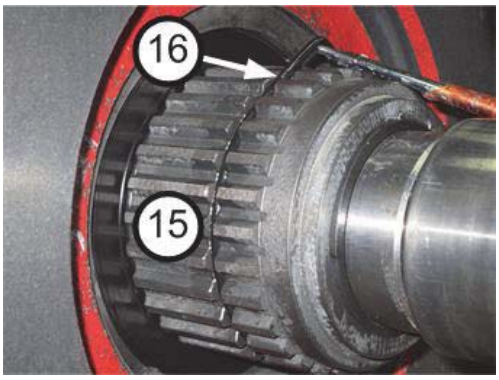


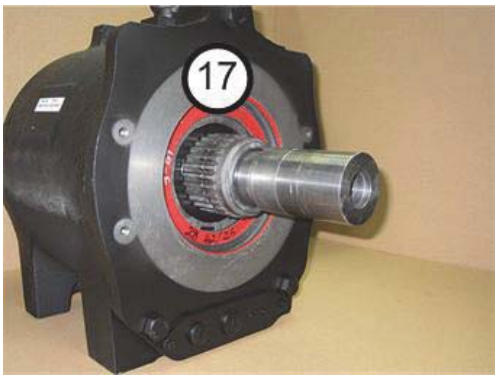




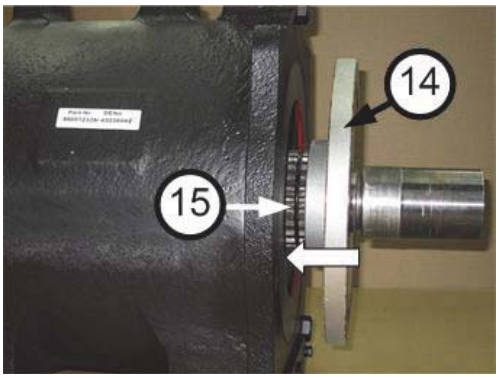
12. Always completely undo the four hexagon head screws (12) alternately.
    Undo SM200.15C – hexagon head screws M8 with screw wrench SW 13
    Undo SM200.20C – hexagon head screws M10 with screw wrench SW 16
13. **Caution!** Due to the great weight of the brake bodies, we recommend use of an eye bolt and an appropriate lifting gear to secure.
14. Take off the brake bodies (13).
    ATTENTION! Weight of the brake bodies is approx. 22 kg!
15. Remove the brake rotor (14) from the toothed motor shaft (15). The brake rotor may only be removed manually.
    ATTENTION! Do not work with screwdrivers to loosen the brake rotor!
    The friction lining can be damaged by the screwdrivers! Brake discs with damaged friction linings may not be mounted any more!

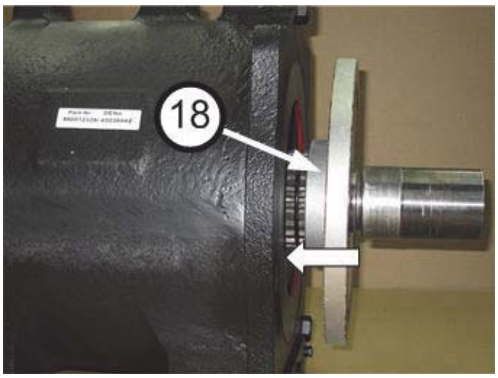
8.3.2.3 Mounting the brake



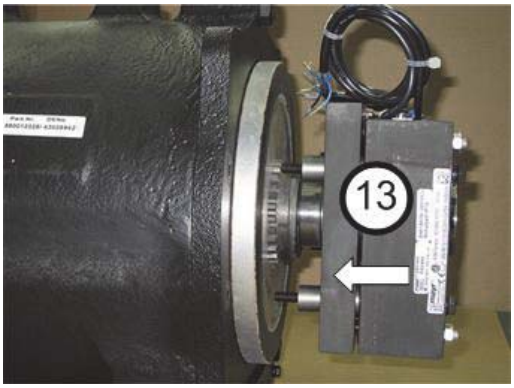


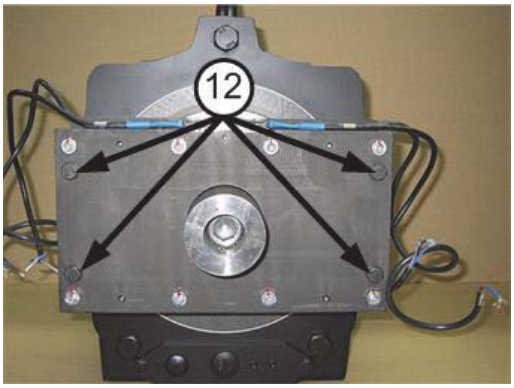
1. Grease the O-ring (for example Vaseline) and place it in the groove (16) of the toothed motor shaft (15).
2. Ensure that the frictionlining of the brake rotor (14) and the braking surface (17) from the flansh bearing bracket of the motor is free of dirt and grease.



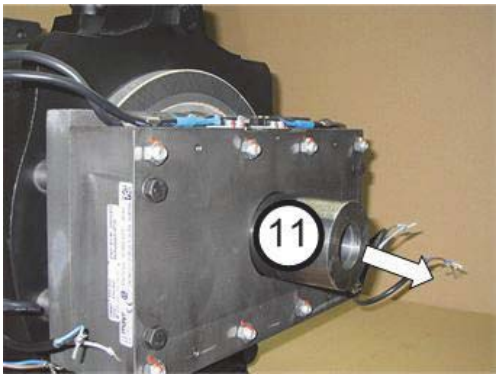


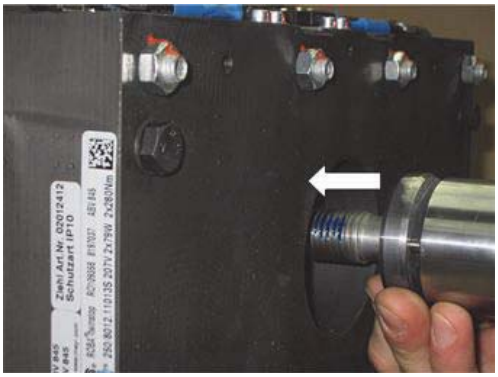
3. Push the brake rotor (14) onto the toothed motor shaft (15) with slight pressure.
   ATTENTION! It must be noted that:
   The stepped brake rotor collar (18) must face to the machine wall.
4. Make sure that the gear teeth engage easily.
5. O-ring may not be damaged.



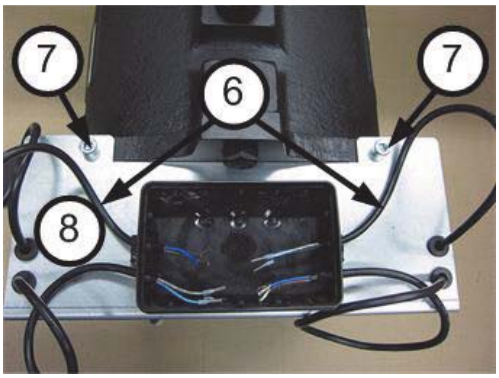


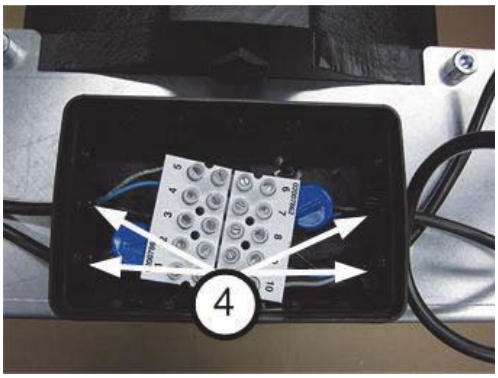
6. Push the brake bodies (13) onto the assembly shaft (11).
   ATTENTION! Weight of the brake bodies approx. 22 kg
7. Fasten stepwise the brake bodies with the four hexagon head screws (12) evenly crosswise.
   SM200.15C: Tightening torque: 36 Nm
   SM200.20C: Tightening torque: 48 Nm
   Do not forget the washers!
8. Endue the hexagon head screws (12) with locking varnish.

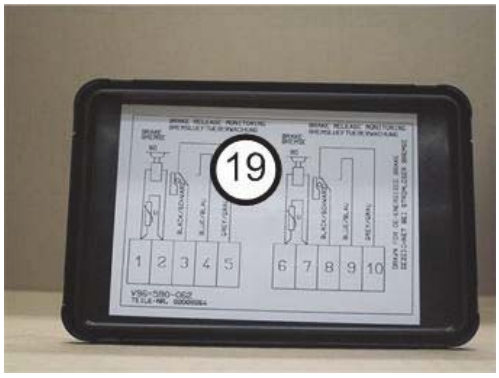




9. Release assembly shaft (11) loosen with an allen wrench SW 17 and take it off the motor shaft.
10. Provide threadlocker Loctite 243 or a similar product to the thread of the adapter shaft (9).
11. Screw the adapter shaft (9) onto the motor shaft with wrench (9) and screw wrench SW 32
    Tightening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







12. Fix cover plate (8) with two cheese-head screws M8 (7) and allen wrench SW 6.
13. Lead the connection cables (6) of the magnet coils and the release monitoring into the terminal box.
14. Connect the magnet coils, the release monitoring and the varistors according to the wiring diagram (19) in the top cover of the connection box.
15. Fit strain reliefs (4).
16. Mount the absolute encoder (see chapter "Replacement of the absolute encoder").

8.3.2.4 Check the micro switches for the release monitoring

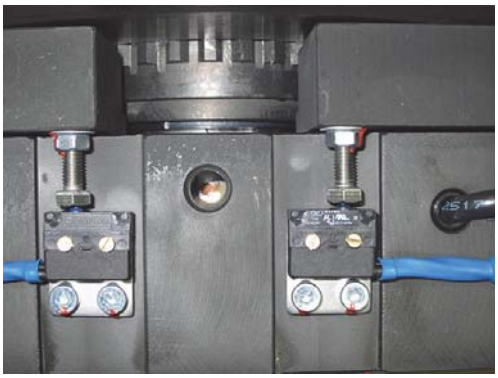
After the mounting of the brake, the function of the micro switches shall be checked.

1. Connect the circuit inductor to the connecting terminals 3/4 and 8/9 respectively (normally open contact).
2. Check the function of the micro switch:
   - Brake de-energised: contact is open.
   - Brake energised: contact is closed.
3. If the function is not given, the micro switches have to be adjusted (see chapter "Adjusting the micro switches for the release monitoring").

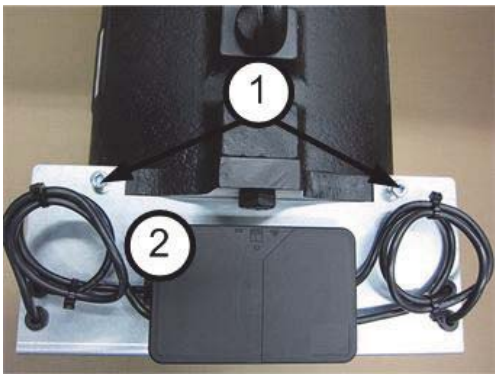
8.3.2.5 Adjusting the micro switches for the release monitoring

Required tool for adjusting the micro switches:

- Circuit inductor
- screw wrench SW 8
- Feeler gauge 0,12 mm
- Feeler gauge 0,2 mm
- Allen wrench SW 6



The adjusting is only necessary if the micro switches are not working correctly.
The micro switches are on the top of the brake body (see arrow).
WARNING! Ensure that you select the appropriate micro switch for the magnet to be adjusted.



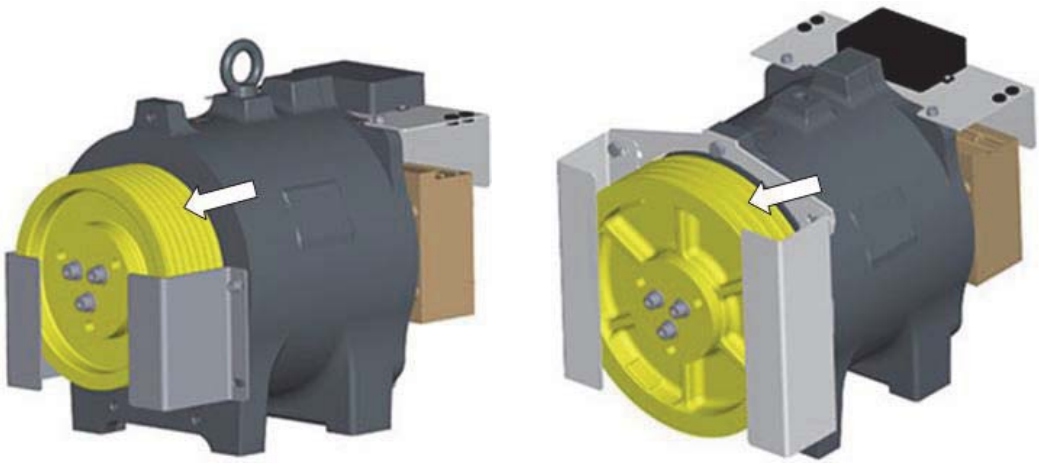
1. De-energize the brake.
2. Remove the both hexagon socket head cap screws M8 (1) with an allen wrench SW 6.
3. Remove the cover plate (2) with the terminal box.
4. Connect the circuit inductor to the connecting terminals 3/4 and 8/9 respectively (normally open contact).
5. Please see the chapter "Enclosure - Brake operation instructions" for the further procedure for setting the micro switches for the release monitor.
6. After making the correct setting, apply locking varnish to adjusting screw.

8.3.3 Replacement of the traction sheave

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

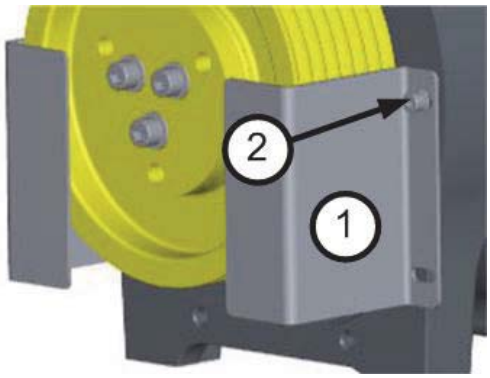
Requirements:
- Release the traction sheave and put the ropes off the traction sheave.
- Secure the traction sheave so that it does not jump off the drive shaft.

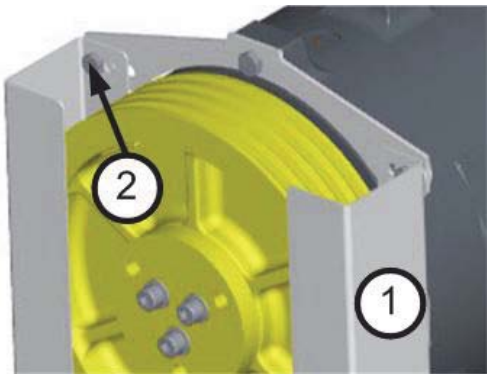
The traction sheave is mounted on the power take-off side of the motor (see arrow).



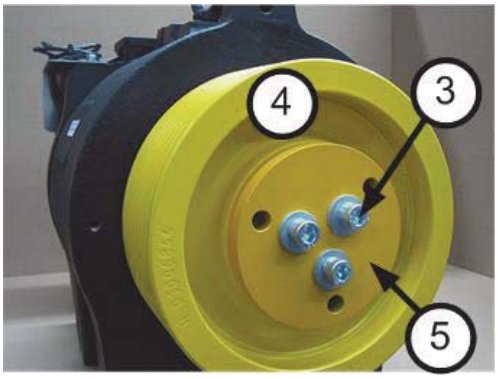
8.3.3.1 Required tools for the replacement of the traction sheave:
- screw wrench SW 13
- Allen wrench SW 6
- Allen key SW 10
- Torque key for a tightening torque of 79 Nm with allen key SW 10
- 5 - 8 mm spacer or hexagon nut

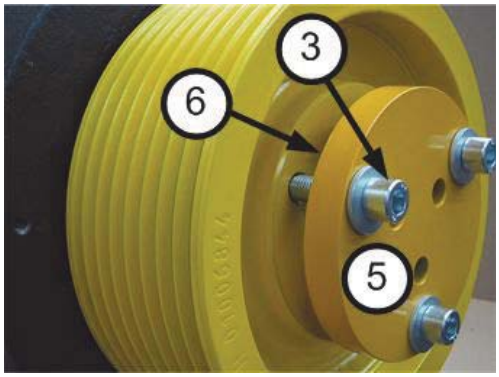
8.3.3.2 Dismounting the traction sheave





1. Undo fixing screws (1) and , if necessary, nuts of the rope jump-off clamps (2) and remove the rope jump-off clamps (2).
   For traction sheave up to 240 mm with allen wrench SW 6.
   For traction sheave from 320 mm with screw wrench SW 13.

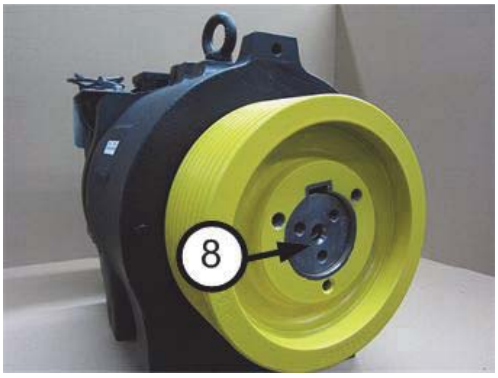




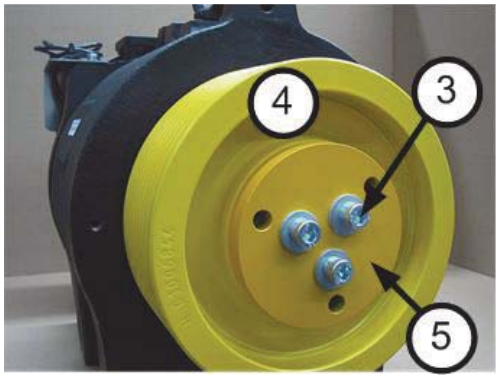
2. Release the fixing screws M12 x 45 (3) of the traction sheave (4) with an allen wrench SW 10 and remove the fixing plate (5).
3. Turn the front plate (5) to press off.
4. 5 - 8 mm spacer or hexagon nut (6) must be placed between shaft end and front plate (5).
5. Screw front plate (5) to the traction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

8.3.3.3 Mounting the traction sheave

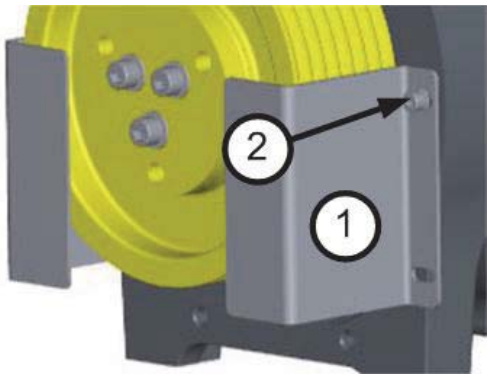
1. Clean the traction sheave (4) and the motor shaft (8). Both parts have to be free of dirt and grease.

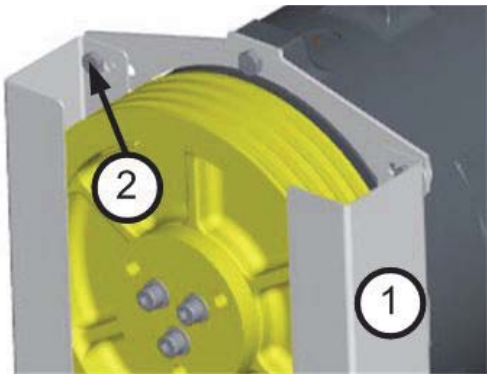


2. The parallel key (7) has to be available.
3. Put traction sheave (4) on drive shaft (8). The bores for screws M12 must point outwards. Observe the position of the groove for the parallel key.



4. Screw front plate (5) to the drive shaft (8) at the inner circle of holes using three screws M12 x 45 (3). Apply threadlocker Loctite 243 or a similar product to the fixing screws.
   Do not forget the washers!
5. Tighten the fixing screws (3) with a torque wrench with an allen screw SW 10 uniformly in two steps:
   - Tightening torque step 1: 50 Nm
   - Tightening torque step 2: 79 Nm
6. Coat the fastening screws (3) with sealing varnish.





7. Mount the rope guards (2).

8.3.4 Fastening flange bearing bracket

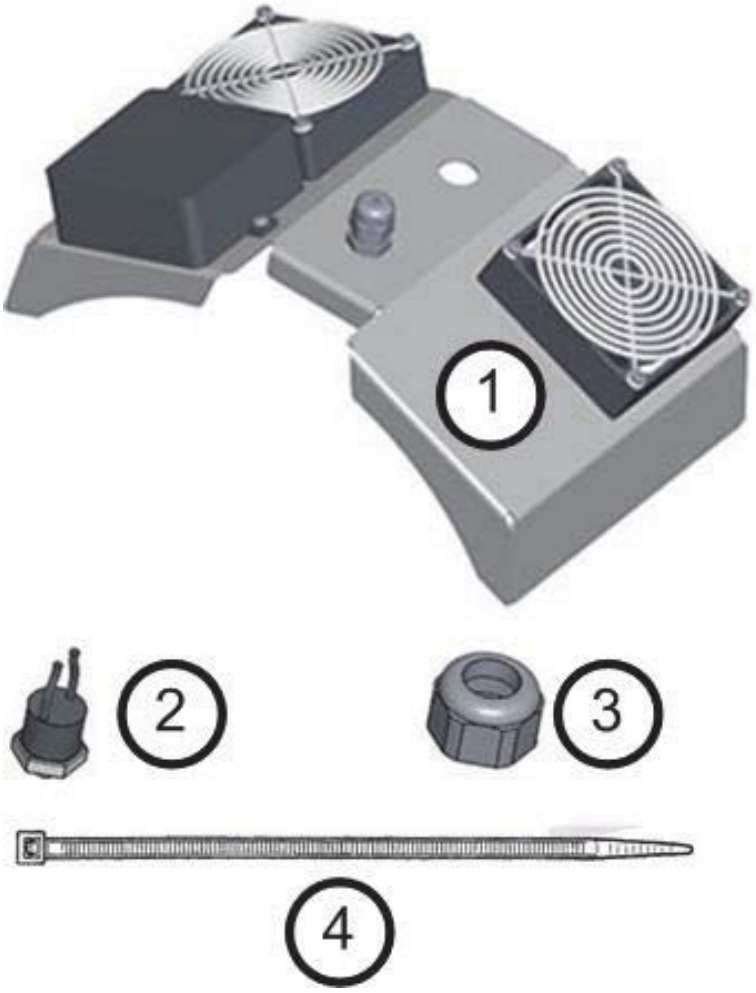
The mounting and dismounting of the magnet rotor and the flange bearing bracket must only be carried out by qualified personnel and with special devices in the factory.

8.3.5 Retrofittiing the forced ventilation

8.3.5.1 Required tools for the retrofitting of the forced ventilation:

- screw wrench SW 16
- Allen wrench SW4

8.3.5.2 Scope of delivery

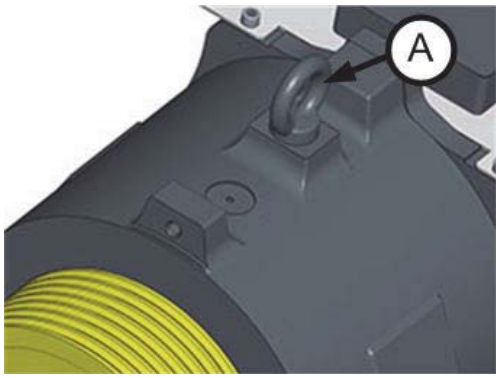


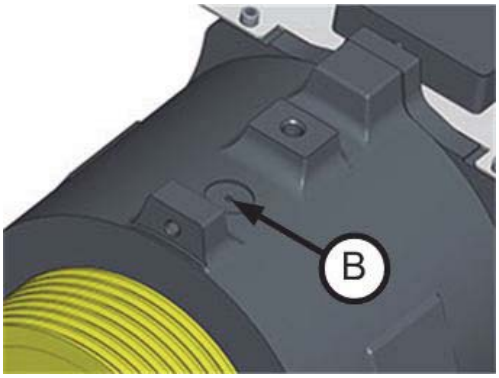
Parts list:

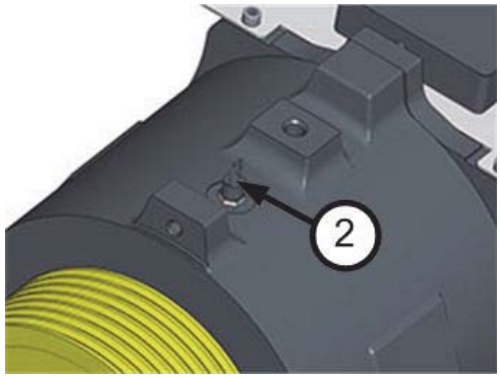
Pos.	Count	Description
1	1	pre-assembled forced ventilation
2	1	thermostatic switch included insulating tube
3	1	cable gland M20 x 1.5
4	1	cable tie

The accessories pos. 2 to 4 lie in the terminal box of the pre-assembled forced ventilation (1), packed in a bag.

8.3.5.3 Mounting of the thermostatic switch

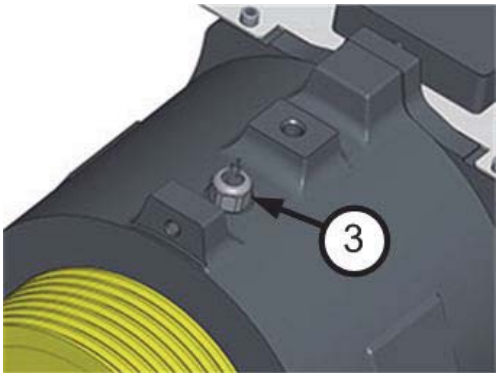


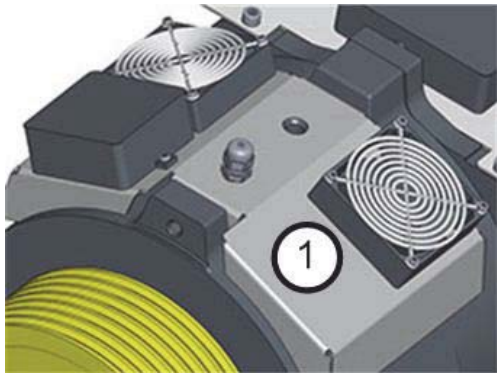




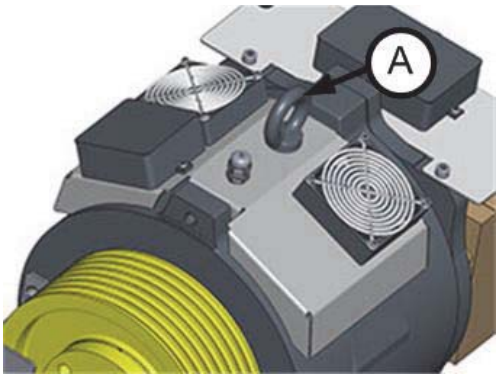
1. Unscrew eye bolt (A).
2. The available set screw (B) with hexagon head must be renmoved with the allen wrench SW 4.
3. The thermostat switch (2) must be screwed into the corresponding thread with a **torque of 3 Nm**. **Exceeding the torque will damage the thermostat switch.**

8.3.5.4 Mounting of the forced ventilation





1. Cover the thermostat switch with a cable gland (3)
2. Place the pre-assembled forced ventilation (1) onto the motor housing.



3. Fix the pre-assembled forced ventilation with the eye bolt (A).
4. Feed the insulating hose of the thermostat into the terminal box.
5. Attach the cable tie as strain relief.

9 Enclosure

9.1 Technical data

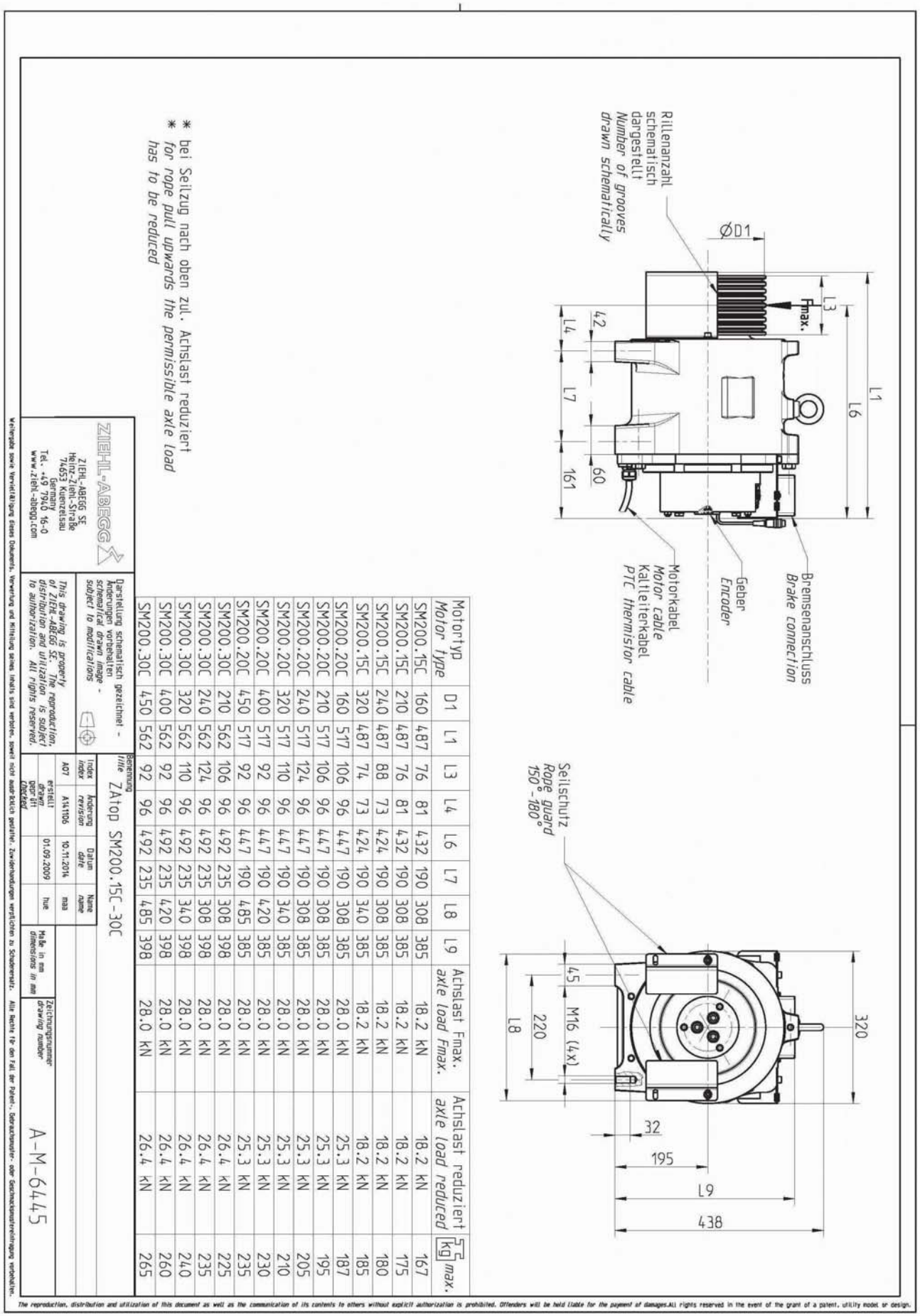
Motor type	**200.15C**		**200.20C**		
Suspension	1:1	2:1	1:1	2:1	
typical payload*	375	750	480	1000	kg
Rated torque	250		330		Nm
Maximum torque	430		570		Nm
permissible radial load	1850		2440/2850**		kg
Rated brake torque	2 x 280		2 x 410		Nm
Speed	1.6				m/s
Total weight	190		240		kg
Traction sheave					
- Diameter	210				mm
- Width	76		100		mm
- Rope diameter	6 - 7				mm
- Standard number of grooves	7		10		
- Standard groove distance	10				mm

Table shows typical data, other values possible.
Other rope diameters and groove distances are possible.
* Dependent on travel, compensation ropes may be necessary.
** Only with rope pull in direction of the motor foot.

Protection class

Component	Protection class
Motor	IP 42
Forced cooling	IP 20
Absolute encoder	IP 40
Brake (electrical)	IP 54
Brake (mechanical)	IP 41
Complete machine	IP 21

9.2 Dimension sheets



Motortyp *Motor type*	D1	L1	L3	L4	L6	L7	L8	L9	Achslast Fmax. *axle load Fmax.*	Achslast reduziert *axle load reduced*	max. kg
SM200.15C	160	487	76	81	432	190	308	385	18.2 kN	18.2 kN	167
SM200.15C	210	487	76	81	432	190	308	385	18.2 kN	18.2 kN	175
SM200.15C	240	487	88	73	424	190	308	385	18.2 kN	18.2 kN	180
SM200.15C	320	487	74	73	424	190	340	385	18.2 kN	18.2 kN	185
SM200.20C	160	517	106	96	447	190	308	385	28.0 kN	25.3 kN	187
SM200.20C	210	517	106	96	447	190	308	385	28.0 kN	25.3 kN	195
SM200.20C	240	517	124	96	447	190	308	385	28.0 kN	25.3 kN	205
SM200.20C	320	517	110	96	447	190	340	385	28.0 kN	25.3 kN	210
SM200.20C	400	517	92	96	447	190	420	385	28.0 kN	25.3 kN	230
SM200.20C	450	517	92	96	447	190	485	385	28.0 kN	25.3 kN	235
SM200.30C	210	562	106	96	492	235	308	398	28.0 kN	26.4 kN	225
SM200.30C	240	562	124	96	492	235	308	398	28.0 kN	26.4 kN	235
SM200.30C	320	562	110	96	492	235	340	398	28.0 kN	26.4 kN	240
SM200.30C	400	562	92	96	492	235	420	398	28.0 kN	26.4 kN	260
SM200.30C	450	562	92	96	492	235	485	398	28.0 kN	26.4 kN	265

* bei Seilzug nach oben zul. Achslast reduziert
** for rope pull upwards the permissible axle load has to be reduced*

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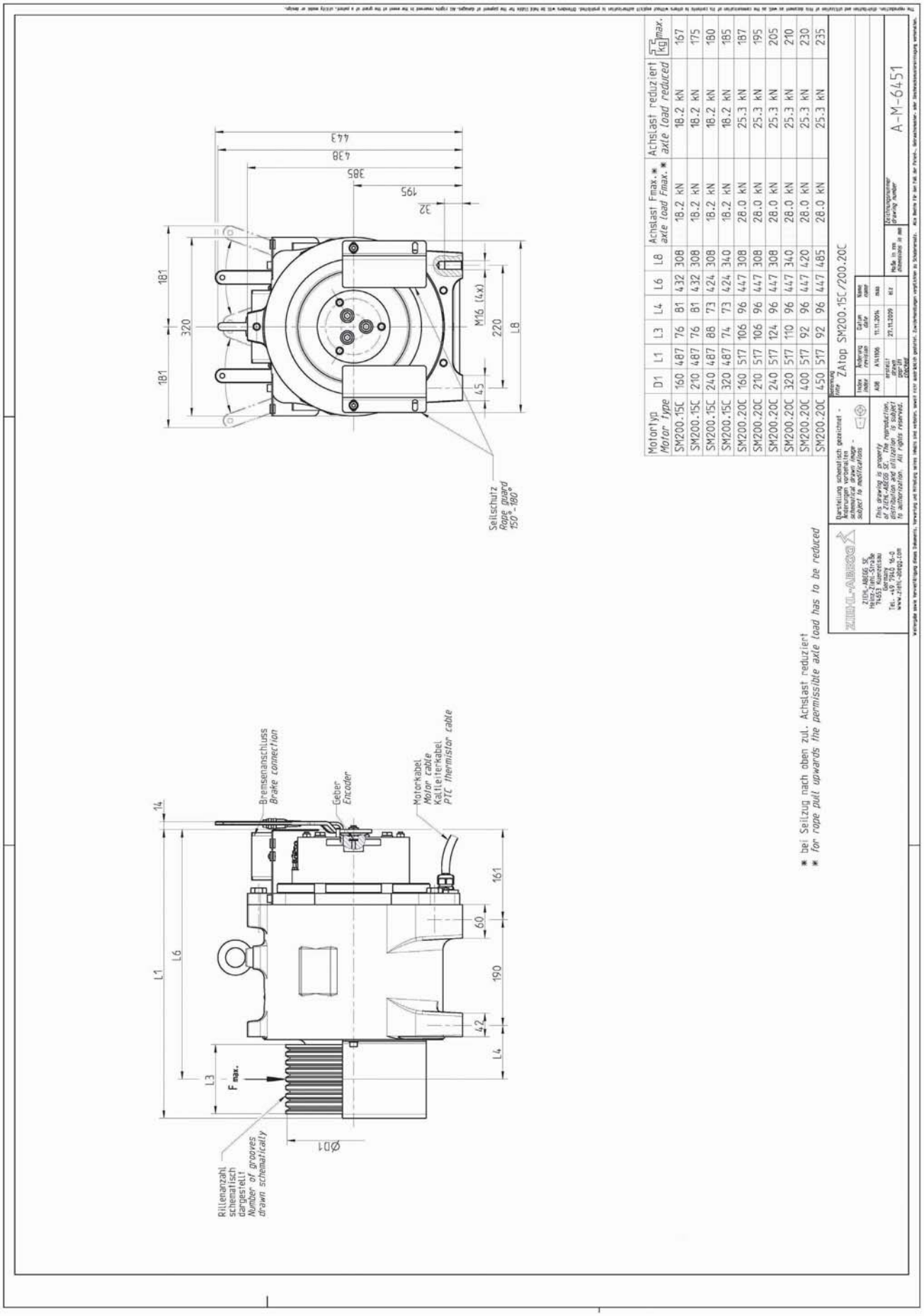
Darstellung schematisch gezeichnet - Änderungen vorbehalten
schematical drawn image - subject to modifications

Benennung / *title*: ZAtop SM200.15C-30C

Index / *index*	Änderung / *revision*	Datum / *date*	Name / *name*
A07	erstellt / *drawn*	10.11.2014	maa
	gepr. / *checked*	01.09.2009	hue

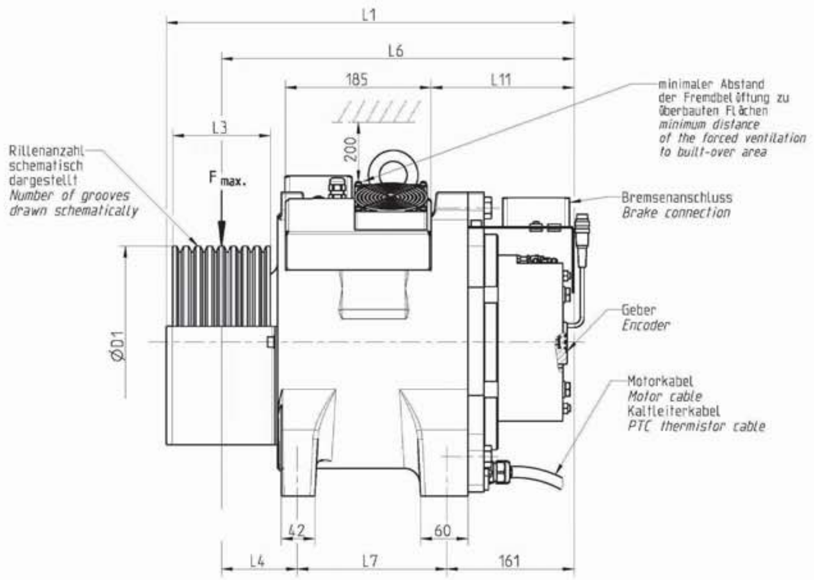
Maße in mm / *dimensions in mm*

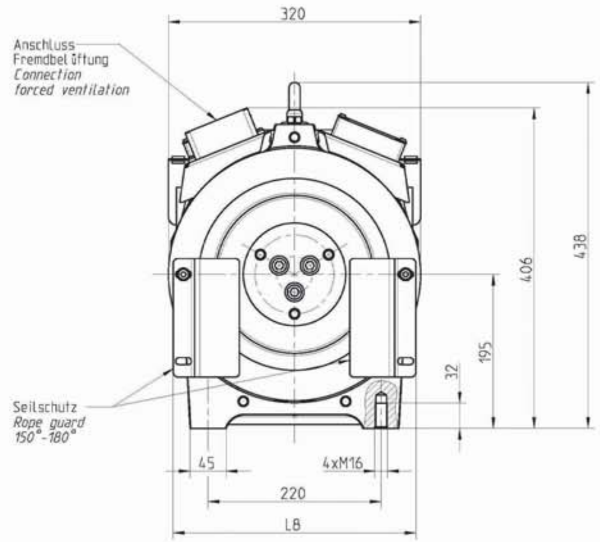
Zeichnungsnummer / *drawing number*: A-M-6445



Motorlyn *Motor type*	D1	L1	L3	L4	L6	L8	Achslast Fmax.* *axle load Fmax.**	Achslast reduziert *axle load reduced*	$F_{max.}$ [kg]
SM200.15C	160	487	76	81	432	308	18.2 kN	18.2 kN	167
SM200.15C	210	487	76	81	432	308	18.2 kN	18.2 kN	175
SM200.15C	240	487	88	73	424	308	18.2 kN	18.2 kN	180
SM200.15C	320	487	74	73	424	340	18.2 kN	18.2 kN	185
SM200.20C	160	517	106	96	447	308	28.0 kN	25.3 kN	187
SM200.20C	210	517	106	96	447	308	28.0 kN	25.3 kN	195
SM200.20C	240	517	124	96	447	308	28.0 kN	25.3 kN	205
SM200.20C	320	517	110	96	447	340	28.0 kN	25.3 kN	210
SM200.20C	400	517	92	96	447	420	28.0 kN	25.3 kN	230
SM200.20C	450	517	92	96	447	485	28.0 kN	25.3 kN	235

* bei Seilzug nach oben zul. Achslast reduziert
* *for rope pull upwards the permissible axle load has to be reduced*





Motortyp Motor type	D1	L1	L3	L4	L6	L7	L8	L11	Achslast Fmax.* axle load Fmax.*	Achslast reduziert axle load reduced	kg max.
SM200.15C	160	487	76	81	432	190	308	181	18.2 kN	18.2 kN	167
SM200.15C	210	487	76	81	432	190	308	181	18.2 kN	18.2 kN	177
SM200.15C	240	487	88	73	424	190	308	181	18.2 kN	18.2 kN	182
SM200.15C	320	487	74	73	424	190	340	181	18.2 kN	18.2 kN	185
SM200.20C	160	517	106	96	447	190	308	181	28.0 kN	25.3 kN	187
SM200.20C	210	517	106	96	447	190	308	181	28.0 kN	25.3 kN	197
SM200.20C	240	517	124	96	447	190	308	181	28.0 kN	25.3 kN	207
SM200.20C	320	517	110	96	447	190	340	181	28.0 kN	25.3 kN	212
SM200.20C	400	517	92	96	447	190	420	181	28.0 kN	25.3 kN	232
SM200.20C	450	517	92	96	447	190	485	181	28.0 kN	25.3 kN	237
SM200.30C	210	562	106	96	492	235	308	211	28.0 kN	26.4 kN	227
SM200.30C	240	562	124	96	492	235	308	211	28.0 kN	26.4 kN	237
SM200.30C	320	562	110	96	492	235	340	211	28.0 kN	26.4 kN	242
SM200.30C	400	562	92	96	492	235	420	211	28.0 kN	26.4 kN	262
SM200.30C	450	562	92	96	492	235	485	211	28.0 kN	26.4 kN	267

* bei Seilzug nach oben zul. Achslast reduziert
* for rope pull upwards the permissible axle load has to be reduced

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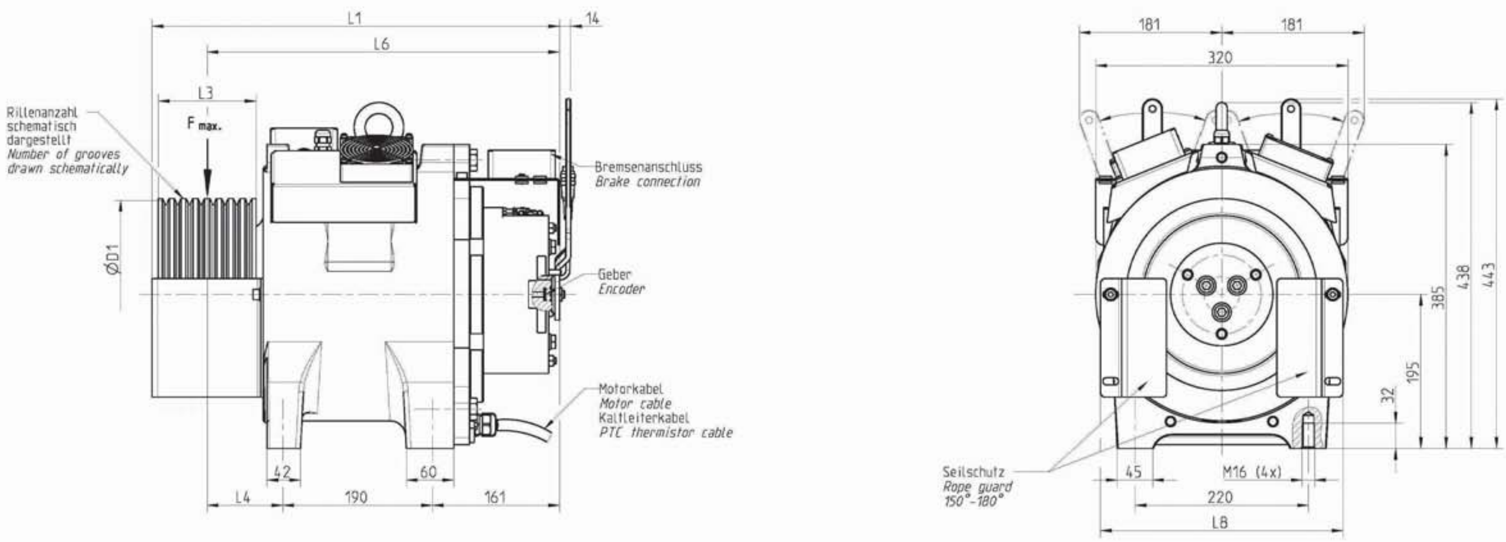
Darstellung schematisch gezeichnet - Änderungen vorbehalten
schematical drawn image - subject to modifications

Benennung / title: ZAtop SM200.15-30C

Index	Änderung revision	Datum date	Name name
A04	A141106	14.11.2014	maz
erstellt drawn		05.04.2011	elz
geprüft checked			

Maße in mm / dimensions in mm

Zeichnungsnummer / drawing number: A-M-6463



Motortyp Motor type	D1	L1	L3	L4	L6	L8	Achslast Fmax.* axle load Fmax.*	Achslast reduziert axle load reduced	Gewicht max. Weight max.
SM200.15C	160	487	76	81	432	308	18.2 kN	18.2 kN	167 kg
SM200.15C	210	487	76	81	432	308	18.2 kN	18.2 kN	175 kg
SM200.15C	240	487	88	73	424	308	18.2 kN	18.2 kN	180 kg
SM200.15C	320	487	74	73	424	340	18.2 kN	18.2 kN	185 kg
SM200.20C	160	517	106	96	447	308	28.0 kN	25.3 kN	187 kg
SM200.20C	210	517	106	96	447	308	28.0 kN	25.3 kN	195 kg
SM200.20C	240	517	124	96	447	308	28.0 kN	25.3 kN	205 kg
SM200.20C	320	517	110	96	447	340	28.0 kN	25.3 kN	210 kg
SM200.20C	400	517	92	96	447	420	28.0 kN	25.3 kN	230 kg
SM200.20C	450	517	92	96	447	485	28.0 kN	25.3 kN	235 kg

* bei Seilzug nach oben zul. Achslast reduziert
* for rope pull upwards the permissible axle load has to be reduced

ZIEHL-ABEGG SE, Heinz-Ziehl-Straße, 74653 Kuenzelsau, Germany, Tel. +49 7940 16-0, www.ziehl-abegg.com

Darstellung schematisch gezeichnet - Änderungen vorbehalten
schematical drawn image - subject to modifications

Benennung / title: ZAtop SM200.15C-20C

Index	Änderung revision	Datum date	Name name
A02	A141106	12.11.2014	maa
erstellt drawn		24.10.2013	kues

Maße in mm / dimensions in mm — Zeichnungsnummer / drawing number: A-M-6603

9.3 EC/EU declaration of conformity

EC/EU declaration of conformity

- original -
(english)
A-KON16_01 1612 Index 001

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

The manufacturer is solely responsible for issuance of the EC/EU declaration of conformity.

Product description: **ZAtop** Gearless elevator machine

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

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

Serial number: 16010001/1 or higher

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

Machinery directive 2006/42/EC

EMC Directive 2014/30/EU

The following harmonised standards have been used:

EN ISO 12100:2010	Safety of machine tools - General principles for design - Risk assessment and risk reduction
EN 60034-1:2010 + AC:2010	Rotating electrical machines - Part 1: Rating and performance
EN 81-20:2014	Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 20: Passenger and goods passenger lifts
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 - Product family 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, 20.04.2016
(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)

i.V.

(signature)

ZIEHL-ABEGG

9.4 Operating instructions brake

Installation and Operational Instructions for ROBA®-twinstop®
Type 8012._ _ _ _ _ Sizes 150 to 350 (B.8012.GB)

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.

Contents:

Declaration of Conformity

A conformity evaluation for the applicable EU directives has been carried out for this product.
The conformity evaluation is set out in writing in a separate document and can be requested if required.
It is forbidden to start use of the product until you have ensured that all applicable EU directives and directives for the machine or system into which the product has been installed have been fulfilled.
Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion.
This statement is based on the ATEX directive.

Safety and Guideline Signs

Danger!
Danger of injury to personnel and damage to machines.

Please Observe!
Guidelines on important points.

TÜV (German Technical Inspectorate) Certification

License number: **ABV 845**

Please Observe!
According to German notation, decimal points in this document are represented with a comma (e.g. 0,5 instead of 0.5).

05/07/2010 TK/HW/SU
Page 1 of 15
Chr. Mayr GmbH + Co. KG
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eMail: info@mayr.de
mayr® Antriebstechnik

Installation and Operational Instructions for ROBA®-twinstop®
Type 8012._ _ _ _ _ Sizes 150 to 350 (B.8012.GB)

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

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

To prevent injury or damage, only professionals and specialists should work on the devices.

Danger!

This warning applies if:

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

Please Observe!
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. The electromagnetic brakes have been developed in accordance with the latest technology regulations and are, at the point of delivery, operationally safe.

Please Observe!

- ❒ Only specialists who are trained in the transport, installation, operation, maintenance and general operation of these devices and who are aware of the relevant standards should be allowed to carry out this work.
- ❒ Technical data and specifications (Type tags and documentation) must be followed.
- ❒ The correct connection voltage must be connected according to the Type tag.
- ❒ Never loosen electrical connections or carry out installations, maintenance or repairs while the voltage connection is energised!
- ❒ Cable connections must not be placed under mechanical strain.
- ❒ Check electrical components for signs of damage before putting them into operation. Never bring them into contact with water or other fluids.
- ❒ The braking torque is lost if the friction lining and / or the friction surface come into contact with oil or grease.

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

Appointed Use
This safety brake is intended for use in electrically operated elevators and goods elevators according to EC 81-1/1998.
The safety brake corresponds to DIN EN 81, Part 1 [Sections 12.4.2.1 (2nd Paragraph), 12.4.2.2, and 12.4.2.5] in its general design and its mode of operation.
The effectiveness of the mechanical dual circuit system can be tested at the place of operation (requirement acc. TRA 102).

Guidelines for Electromagnetic Compatibility (EMC)
In accordance with the EMC directives 2004/108/EC, 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.

Device Conditions

Please Observe!
When dimensioning the brakes, please remember that installation situations, braking torque fluctuations, permitted friction work, run-in behaviour 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.

Please Observe!

- ❒ Mounting dimensions and connecting 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 magnetic coils are designed for 100 % duty cycle. However, a switch-on duration of > 60 % duty cycle results in increased temperatures, which cause premature aging on the noise damping system, and therefore to an increase in switching noises.
  The max. permitted switching frequency is 240 1/h. If the brakes are overexcited, a switching frequency of 180 1/h must not be exceeded.
  These values apply for intermittent duty S3 60%.
  The permitted surface temperature on the brake flange must not exceed 80 °C and a max. ambient temperatur e of 45 °C.
  The duration of overexcitation should be approx. 1 second.
- ❒ 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.
- ❒ The braking torque is dependent on the present run-in condition of the brakes.
- ❒ Manufacturer-side corrosion protection of the metal surface is provided. The surface is rough sawn and not machined (milled material).

Protection Class I
This protection can only be guaranteed if the basic insulation is intact and if all conductive parts are connected to the PE conductor of the permanent installation. Should the basic insulation fail, the contact voltage cannot remain (VDE 0580).

Ambient Temperature 0 °C up to +45 °C
Danger!
At temperatures of around or under freezing point, condensation can strongly reduce the torque, or the rotors can freeze up. The user is responsible for taking appropriate counter measures.

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mayr® Antriebstechnik

Installation and Operational Instructions for ROBA®-twinstop®
Type 8012._ _ _ _ _ Sizes 150 to 350 (B.8012.GB)

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

Insulation Material Class F (+155 ℃)
The magnetic coil and the casting compound are suitable for use up to a maximum operating temperature of +155 °C.

Brake Storage
- ❑ Store the brakes in a horizontal position, in dry rooms and dust and vibration-free.
- ❑ Relative air humidity < 60 %.
- ❑ Temperature without major fluctuations within a range from – 20 ° up to +60° C.
- ❑ Do not store in direct sunlight or UV light.
- ❑ Do not store aggressive, corrosive substances (solvents / acids / lyes / salts etc.) near to the brakes.

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

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

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.
- ❑ Protect against electric shocks by installing a conductive connection between the magnetic component and the PE conductor on the permanent installation (Protection Class I) and by carrying out a standardised inspection of the continuous PE conductor connection to all contactable metal parts.
- ❑ Protect against highly inductive switch-off peaks by installing varistors, spark quenching units or similar devices according to VDE 0580/2000-07, Paragraph 4.6, to prevent damage to the coil insulations or switch contact consumption in extreme conditions (this protection is contained in *mayr*® rectifiers).
- ❑ Take precautions against freeze-up of the friction surfaces in high humidity and at low temperatures.

Regulations, Standards and Directives Used:

DIN VDE 0580	Electromagnetic devices and components, general directives
2006/95/EC	Low voltage directive
2004/108/EC	EMC directive
95/16/EC	Elevator directive
EN 81-1	Safety regulations for construction and installation of elevators and small goods elevators
BGV C1	(previously VGB 70) Safety regulations for theatre stage technical systems

Please Observe the Following Standards:

DIN EN ISO 12100-1 and 2	Machine Safety
DIN EN 61000-6-4	Noise emission
EN12016	Interference resistance (for elevators, escalators and moving walkways)
EN 60204	Electrical machine equipment

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 delivery conditions.
- ❒ Mistakes or deficiencies are to be reported to *mayr*® at once!

Conformity Markings
The product confirms to the CE according to the low voltage directive 2006/95/EC.

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

Manufacturer

mayr®

Name/Type

Article number

Serial number

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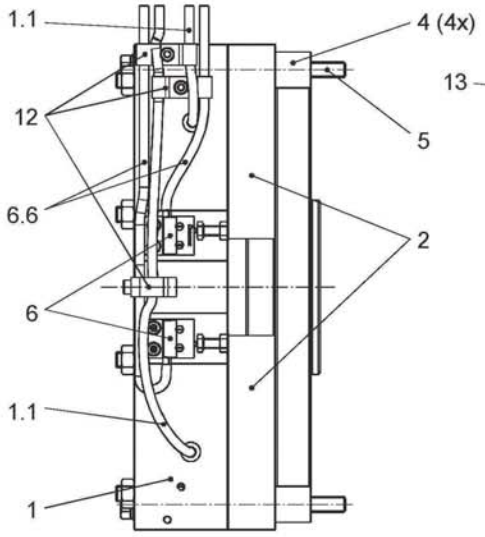

Fig. 1

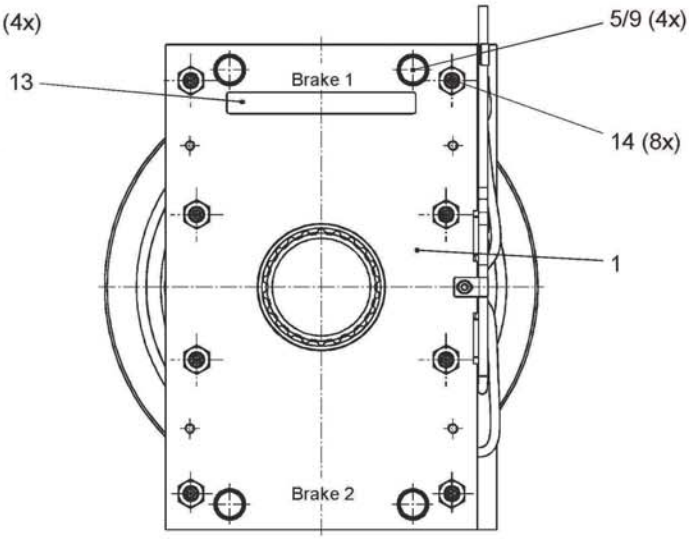

Fig. 2

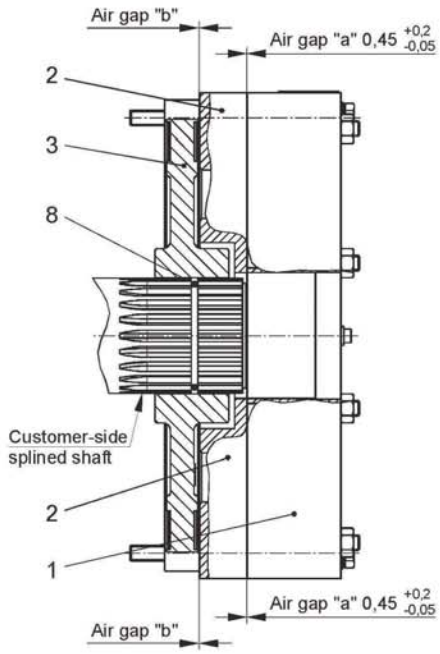

Fig. 3

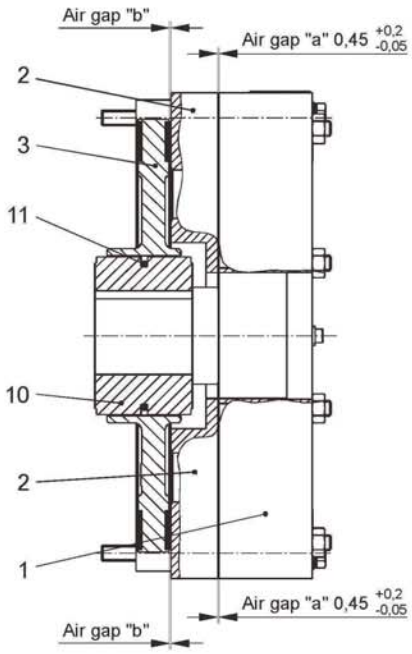

Fig. 4

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Parts List
(Only use mayr® original parts)

Item	Name	
1	Coil carrier assembly (incl. magnetic coils)	
1.1	Coil cable 2 x AWG18 blue / brown	
2	Armature disk	
3	Rotor	
4	Distance bolts	
5	Hexagon head screw acc. DIN EN ISO 4014:	
	For Sizes 150 and 200:	M8 x 110 / 8.8
	For Size 250:	M8 x 120 / 10.9
	For Size 350:	M10 x 120 / 8.8
6	Release monitoring assembly	
6.1	Microswitch incl. adapter plate (Fig. 9; page 11)	
6.2	Cap screw (Fig. 9; page 11)	
6.3	Hexagon nut (Fig. 9; page 11)	
6.4	Hexagon head screw (Fig. 9; page 11)	
6.5	Spring washer (Fig. 9; page 11)	
6.6	Microswitch cable 3 x AWG20 black / blue / brown	
7	Hand release assembly (page 10)	
7.1	Hand release lever (page 10)	
7.2	Steel ball (page 10)	
7.3	Thrust spring (page 10)	
7.4	Cap screw (page 10)	
7.5	Hexagon nut (page 10)	
7.6	Washer (page 10)	
8	O-ring NBR 70 (not included in delivery):	
	For Sizes 150 and 200:	D48 x 3
	For Size 250:	D52 x 3
	For Size 350 (braking torque up to 410 Nm):	D52 x 3
	For Size 350 (braking torque > 410 Nm):	D60 x 3
9	Washer	
10	Hub	
11	O-ring	
12	Cable clamp	
13	Type tag	
14	Noise damping	
15	Wear monitoring assembly (page 12)	
15.1	Microswitch incl. adapter plate (Fig. 10; page 12)	
15.2	Cap screw (Fig. 10; page 12)	
15.3	Hexagon nut (Fig. 10; page 12)	
15.4	Hexagon head screw (Fig. 10; page 12)	
15.5	Spring washer (Fig. 10; page 12)	

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

Nominal air gap [1] "a" braked (Fig. 3)	0,45 $^{+0,2}_{-0,05}$ mm
Limit air gap [2] "a" for rotor replacement	0,9 mm
Inspection air gap "b" on released brake (Fig. 3)	min. 0,25 mm
Protection (coil/casting compound):	IP54
Protection (mechanical):	IP10
Protection (switch):	IP67
Ambient temperature:	0 °C to +45 °C
Duty cycle:	60 %

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

[2] **Danger!**
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 reasons of safety, 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 reaches "a" > 2,0 mm (design with hand release) or "a" > 2,5 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.

Table 2: Technical Data

Size	Nominal torque [3] minimal	Overexcitation voltage 1,5 to 2 x U_{Nom}	Nominal voltage U_{Nom}	Nominal capacity P (20 °C)	Inductivity (207 V – coil)	Rotor thickness in new condition
150	90 Nm	No	24/104/180/207 V DC	2 x 68 W		18 $_{-0.05}$ mm
	120 Nm					
	150 Nm					
	[4] > 150 Nm	Yes	24/104/180/207 V DC			18 $_{-0.05}$ mm
200	120 Nm	No	24/104/180/207 V DC	2 x 63 W		18 $_{-0.05}$ mm
	160 Nm					
	200 Nm					
	[4] > 200 Nm	Yes	24/104/180/207 V DC			18 $_{-0.05}$ mm
250	185 Nm	No	24/104/180/207 V DC	2 x 79 W		18 $_{-0.05}$ mm
	230 Nm					
	250 Nm					
	280 Nm					
	[4] > 280 Nm	Yes	24/104/180/207 V DC			18 $_{-0.05}$ mm
350	250 Nm	No	24/104/180/207 V DC	2 x 82 W		18 $_{-0.05}$ mm
	300 Nm					
	350 Nm					
	410 Nm					
	[4] > 410 Nm	Yes	24/104/180/207 V DC			18 $_{-0.05}$ 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 medium friction radius.

[4] Larger braking torques available on request

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Table 3: Technical Data

Size	Max. permitted friction work per single circuit [5]	Inspected max. speed in the elevator area as prototype-inspected brake	Tightening torque on fixing screw Item 5	Weight
150	17500 J	1000 rpm	24 Nm	19,6 kg
200	16500 J	1000 rpm	24 Nm	23,7 kg
250	25500 J	1000 rpm	36 Nm	27,0 kg
350	23500 J	1000 rpm	48 Nm	34,9 kg

[5] Values apply for a speed of 400 rpm and nominal torque. The value can be doubled for both brake circuits. The value increases at lower speeds and decreases at higher speeds (please contact *mayr*®).

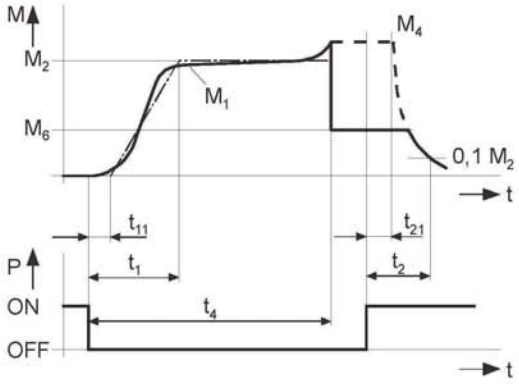
Table 4: Switching Times

Size	Nominal torque minimal	Tightening t_2	Tightening t_2 on overexcitation	Drop-out t_{11} AC	Drop-out t_1 AC	Drop-out t_{11} DC	Drop-out t1 DC
150	90 Nm	145		250	570	35	140
	120 Nm	170		200	510	27	125
	150 Nm	200		150	450	20	110
	> 150 Nm		Approx. 120				
200	120 Nm	170		420	980	75	230
	160 Nm	225		310	790	53	195
	200 Nm	280		190	620	30	160
	> 200 Nm		Approx. 170				
250	185 Nm	210		300	720	50	180
	230 Nm	260		240	640	40	165
	250 Nm	285		215	590	37	155
	280 Nm	310		180	540	25	140
	> 280 Nm		Approx. 190				
350	250 Nm	290		370	700	45	150
	300 Nm	330		320	640	40	140
	350 Nm	370		270	580	37	130
	410 Nm	400		200	510	30	110
	> 410 Nm		Approx. 240				

Please Observe:

- The use of varistors for spark quenching increases the DC-side switching times.
- At temperatures of around or under freezing point, condensation can strongly reduce the braking torque. The user is responsible for taking appropriate counter measures. The customer is responsible for providing a protective cover against contamination caused by construction sites.

Torque-Time Diagram



Key:

M_1 = Switching torque
M_2 = Nominal torque (characteristic torque)
M_4 = Transmittable torque
M_6 = Load torque
t_1 = Connection time
t_{11} = Response delay on connection
t_2 = Separation time
t_{21} = Response delay on separation
t_4 = Slipping time + t_{11}

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Design

The ROBA®-twinstop® is a spring applied, electromagnetically releasing dual circuit brake.
It is used for installation in a gearless elevator and serves as a brake assembly on the drive sheave shaft and as part of the protective assembly against excessive upward-moving cage speeds.

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 by the rotor (3).

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

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

State of Delivery

The brake body is partly assembled with armature disks (2), distance bolts (4), adjusted microswitches (option, dependent on Type) and hand release (Item 7 / option, dependent on Type). The rotor (3), hexagon head screws (5), washers (9) and the hub (10) with O-ring (11) are included loose in delivery.

Please check state of delivery!

Application

- **ROBA®-twinstop® for use as holding brakes with occasional emergency STOP braking actions.**
- **The max. permitted speeds and friction work, see Table 3, must be observed.**

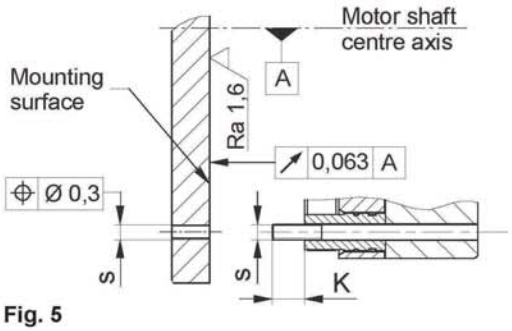

Fig. 5

Installation Conditions

- The eccentricity of the shaft end in relation to the fixing holes must not exceed 0,3 mm.
- The position tolerance of the threaded holes 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.
  Larger deviations can lead to a drop in torque, to continuous slipping on the rotor (3) and to overheating.
- The toothed motor shaft (Type 8012._0_ _3) should be designed according to the information given in the applicable assembly drawing.
  The O-ring groove must be inserted before the shaft is splined. The O-ring groove must be free of burrs.

Please Observe!
The dimensions on the assembly drawings are manufacturer-side recommendations.

- On hub designs (Type 8012._1_ _3), the hub bore (10) tolerances and the shaft must be selected so that the hub toothing (10) is not widened. Widening of the toothing leads to the rotor (3) jamming on the hub (10) and therefore to brake malfunctions.
  Recommended hub - shaft tolerance H7/k6.
  If the hub (10) is heated for better joining, the O-ring (11) must be removed beforehand and re-mounted after hub installation.
  The max. permitted joining temperature of 200 °C mu st 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/mm^2 should be used.
  The length of the key should lie over the entire hub (10).
- For the dimensioning of the key connections, the permitted tensions common in machine construction must be considered.
- The mounting dimensions and the screw-on surface s with depth K + 2 mm (K = screw projection) acc. Catalogue or applicable assembly drawing must be given (Fig. 5).
- The rotor and brake surfaces must be oil and grease-free. 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 µm.
  In particular customer-side mounting surfaces made of grey cast iron are to be rubbed down additionally with fine sandpaper (grain ≈ 200 – 400), or ideally with a sander.
- Please abstain from using cleaning agents containing solvents, as they could affect the friction material.
- During longer downtimes, we recommend the use of suitable corrosion protection measures for the mounting surface (e.g. zinc-phosphate coating) until initial operation.

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Installation of Type 8012._0_ _3 (Figs. 1 - 3) (Design with toothed motor shaft)

1. Insert the O-ring (8), slightly greased, acc. Parts List with NBR 70 material (provided by customer) into the motor shaft groove. Please use NLGI Class 2 grease with a basic oil viscosity of 220 mm^2/s at 40 °C, e.g. Mobilgrease HP222.
2. Push the rotor (3) onto the motor shaft by hand using light pressure.
   Please observe that the longer rotor collar faces away from the machine wall on Sizes 150 und 200,
   the installation direction is unimportant on Size 250,
   because the rotor (3) is symmetrical,
   the graduated rotor collar faces away from the machine wall on Size 350.
   Check that the toothing moves easily.
   Do not damage the O-ring.
3. Secure the brake bodies using 4 hexagon head screws (5) and washers (9) all-round step-wise evenly (we recommend that you secure the screws using Loctite 243).
   Tighten the hexagon head screws using a torque wrench and observe the tightening torque acc. Table 3.
4. **Check air gap "a" = 0,45** $^{+0,2}_{-0,05}$ **mm** (Fig. 3).
   The nominal air gap must be in the horizontal centre axis area on both armature disks (2) (Fig. 1).
5. **Check air gap "b" > 0,25 mm in energised state on the rotor (3)** (Fig. 3).
   The inspection air gap must be given.

Installation of Type 8012._1_ _3 (Figs. 1, 2 and 4) (Hub Design)

1. Mount the hub (10) with the O-ring inserted (Item 11 / **O-ring must be lightly greased**) onto the shaft and bring it into the correct position (the length of the key should cover the entire hub) and secure it axially e.g. using a locking ring).
2. Push the rotor (3) over the O-ring (11) onto the hub (10) by hand using light pressure.
   Please observe the the rotor collar (on Size 150, the longer rotor collar) is facing the machine wall.
   Ensure that the toothing moves easily.
   Do not damage the O-ring.
3. Secure the brake bodies using 4 hexagon head screws (5) and washers (9) all round step-wise evenly (we recommend that you secure the screws using Loctite 243).
   Tighten the hexagon head screws using a torque wrench and observe the tightening torque acc. Table 3.
4. **Check air gap "a" = 0,45** $^{+0,2}_{-0,05}$ **mm** (Fig. 4).
   The nominal air gap must be given in the horizontal centre axis area on both armature disks (2) (Fig. 1).
5. **Check air gap "b" > 0,25 mm in energised state on the rotor (3) (Fig. 4).**
   The inspection air gap must be given.

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Hand Release (7)

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

Danger!
Operate the hand release carefully.
Existing loads are put into motion when the hand release is activated.

The hand release is completely assembled manufacturer-side.
The brake is released when both hand release levers are moved simultaneously (7.1), see Figs. 7 and 8.
By lifting the hand release levers (7.1) up from the steel balls (7.2), both cap screws (7.4) incl. washers (7.6) together with the armature disk (2) are pulled against the coil carrier (1) (Fig. 6).
The rotor (3) is then free, thus releasing the brake.

Table 5: Technical Data

Size	Braking torque	Release force per braking circuit with	
		Bowden cable	Hand release lever
150	150 Nm	Approx. 160 N	Approx. 95 N
200	200 Nm	Approx. 200 N	Approx. 120 N
250	280 Nm	Approx. 280 N	Approx. 165 N
350	410 Nm	Approx. 370 N	Approx. 215 N

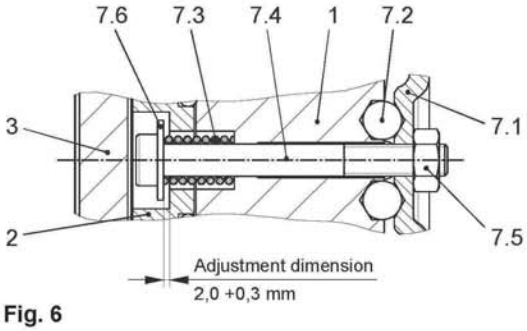

Fig. 6

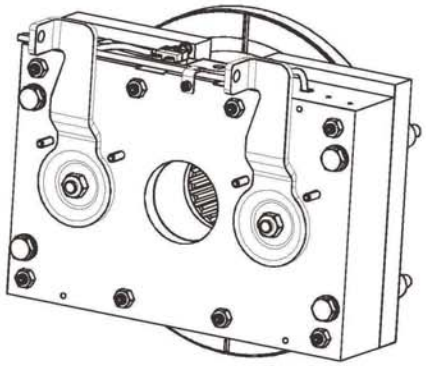

Fig. 7 (Hand release for Bowden cable)

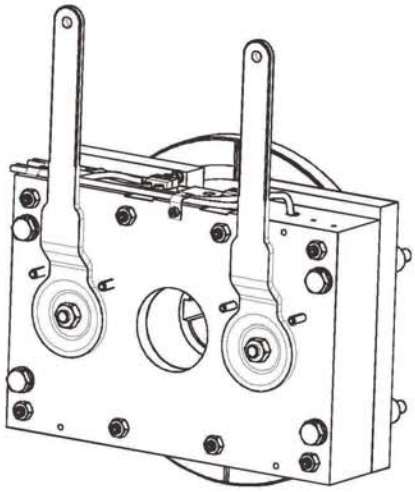

Fig. 8 (Hand release with hand release lever)

Braking Torque Adjustment

ROBA®-twinstop® brakes are delivered adjusted to the braking torque required on order.

Noise Damping (Item 14 / Fig. 2)

The noise damping used here was set and adjusted manufacturer-side. However, this component is subject to aging dependent on the application or operational conditions (torque adjustment, switching frequency, ambient conditions, system vibrations etc.)

Please Observe!
Replacing the damping element is only permitted at the *mayr®* site of manufacture.

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Release Monitoring (6) Fig. 9
(Option, dependent on Type)

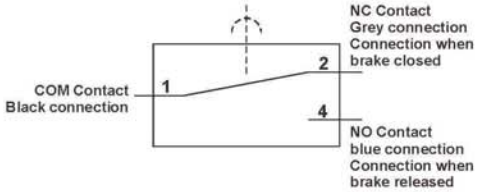
ROBA®-twinstop® brakes are delivered with one release monitoring (6) per brake circuit.
The microswitches (6.1) emit a signal for every brake condition change "signal brake opened or brake closed"

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.

Wiring Diagram:



Re-adjustment is possible via the hexagon head screws (6.4) and the hexagon nuts (6.3).
If this proves necessary, please contact the manufacturers.

Function

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

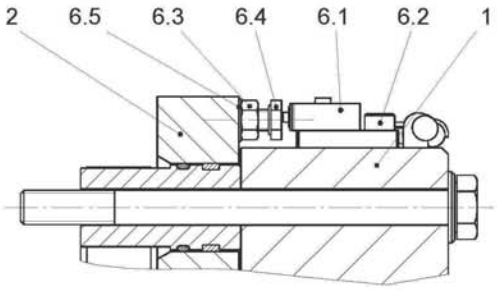


Fig. 9

Manufacturer-side Adjustment and Functional Inspection of the Microswitch (6.1), see Fig. 9

Danger!
The brake is mounted, secured to the tightening torque (see Table 3) and the coil is de-energised.

1. Turn the hexagon head screw (6.4) in the direction of the microswitch (6.1) up to the microswitch tappet.
2. Tighten the hexagon nut (6.3), so that the hexagon head screw (6.4) is placed under pre-tension by the spring washer (6.5).
3. Put a feeler gauge 0,12 mm (loose sensor plate) between the switch tappet and the hexagon head screw (6.4).
4. Connect the inspection or measurement device (diode inspection) to the NO contact black/blue.
5. Turn the hexagon head screw (6.4) in the direction of the switch (6.1) up to **signal "ON",** turn it back to the **signal "OFF"** and counter the hexagon head screw (6.4) with the hexagon nut (6.3).
6. Energise brake → **Signal "ON"**,
   De-energise brake → **Signal "OFF"**,
   Re-adjust if necessary and repeat the inspection.
7. Inspection with feeler gauge 0,16 mm
   energised → **Signal "ON"**
   de-energised → **Signal "ON"**
8. Inspection with feeler gauge 0,12 mm
   energised → **Signal "ON"**
   de-energised → **Signal "OFF"**
9. Put the feeler gauge 0,20 mm between the armature disk (2) and the coil carrier (1) in the microswitch (6.1) area and then energise the brake. **The signal must be "ON".**
10. Paint items 6.2, 6.3 and 6.4 with sealing lacquer.

Customer-side Inspection after Mounting onto the Elevator Machine

The customer-side contact is an NO contact.
Please inspect the release monitoring of both circuits:
Brake de-energised → Signal "OFF",
Brake energised → Signal "ON"

Table 6:
Microswitch Specifications (6.1)

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

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

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Installation and Operational Instructions for ROBA®-twinstop®
Type 8012._ _ _ _ _ Sizes 150 to 350 (B.8012.GB)

Wear Monitoring (15) Fig. 10
(Option, dependent on Type)

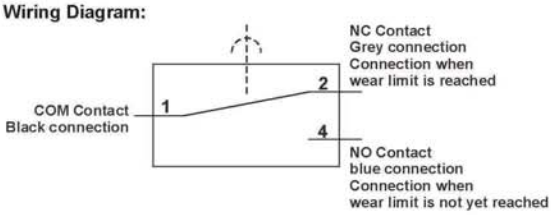
Only one microswitch for wear monitoring (15) is required per **ROBA®-twinstop®**, which is mounted onto the brake as shown in Fig. 10.
The **ROBA®-twinstop®** brake is delivered with manufacturer-side adjusted wear monitoring (15).

Function

Due to wear on the rotor, (3) the air gap "a" between the coil carrier (1) and the armature disk increases (2).
Once the maximum air gap (limit air gap) of 0,9 mm has been reached (Table 1), the microswitch contact (15.1) switches over and emits a signal.
The rotor (3) must be replaced.

The customer is responsible for signal evaluation.

Wiring Diagram:



Before replacing the rotor (3)

- Clean the brake and remove abraded particles using compressed air.
- Do not inhale brake dust.
- Measure the rotor thickness "new" (see Table 2).

Replacing the rotor (3)
Replace the rotor 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!

Table 7:
Microswitch Specifications (15.1)

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

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

Manufacturer-side Adjustment and Functional Inspection of the Microswitch (15.1), see Fig. 10

Danger!
The brake is mounted, secured to the tightening torque (see Table 3) and the coil is de-energised.

1. Connect the inspection or measurement device (diode inspection) to the NC contact black/grey.
2. Turn the hexagon head screw (15.4) in the direction of the microswitch (15.1) until it switches, and apply pre-tension via the spring washer (15.5) using the hexagon nut (15.3).
3. Hold the hexagon nut (15.3) and turn the hexagon head screw (15.4) back until the microswitch contact (15.1) switches over again.
4. Mark the position of the hexagon head screw (15.4) (marker pen).
5. Hold the hexagon head screw (15.3) and turn the hexagon head screw (15.4) approx. 0,6 – 0,7 turns back in the direction of the microswitch (15.1).
6. Counter the hexagon head screw (15.4) with the hexagon nut (15.3) and mark the position using red securing lacquer.
7. Mount the Wear Monitoring guideline sign.

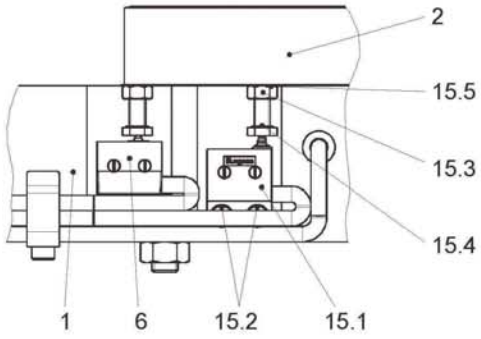


Fig. 10

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Electrical Connection for Operation with Nominal Voltage (Without Overexcitation)

DC current is necessary for operation of the brake. The coil voltage is indicated on the Type tag (14) 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. Dependent on the brake equipment, the connection possibilities can vary. Please follow the exact connections according to the Wiring Diagram. The manufacturer and the user must observe the applicable directives and standards (e.g. DIN EN 60204-1 and DIN VDE 0580). Their observance must be guaranteed and double-checked!

Earthing Connection

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

Supply Voltage Requirements

In order to minimise noise development of the released brake, it must only be operated via DC current 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.

Device Fuses

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

Switching Behaviour

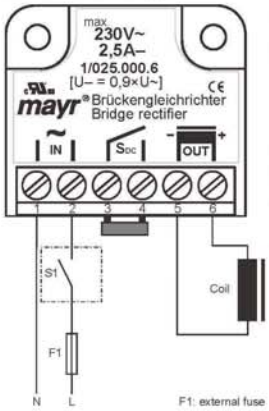
The operational behaviour of a brake is to a large extent dependent on the switching mode used. Furthermore, the switching times are influenced by the temperature and the air gap between the armature disk (2) and the coil carrier (1) (dependent on the wear condition of the linings).

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 (2) to the coil carrier (1) and releases the brake.

Magnetic Field Removal

AC-side Switching

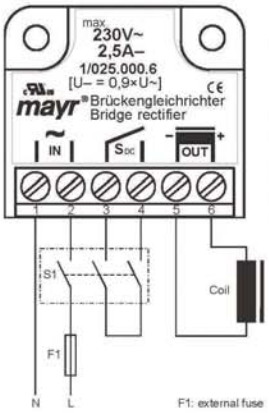


The power circuit is interrupted before the rectifier. The magnetic field slowly reduces. This delays the rise in braking torque.

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

→ **Low-noise switching;** however, the brake engagement time is longer (c. 6-10 times longer than with DC-side switching). Use for non-critical brake times.

DC-side Switching



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

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

→ **Short brake engagement times (e.g. for emergency STOP);** however, louder switching noises.

Protective Circuit

When using DC-side switching, the coil must be protected by a suitable protective 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 operation current are sufficient. Depending on the application, the switching contact can also be protected by other protective circuits (e.g. *mayr*®-spark quenching unit), although this may of course then alter the switching time.

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Electrical Connection for Operation with Overexcitation

DC current is necessary for operation of the brake. The coil voltage is indicated on the Type tag (14) as well as on the brake body and is designed according to the DIN IEC 60038 (± 10 % tolerance). The brake may only be operated with overexcitation (e.g. with a ROBA®-switch fast acting rectifier or phase demodulator). Dependent on the brake equipment, the connection possibilities can vary. Please follow the exact connections according to the Wiring Diagram. The manufacturer and the user must observe the applicable directives and standards (e.g. DIN EN 60204-1 and DIN VDE 0580). Their observance must be guaranteed and double-checked!

Earthing Connection

The brake is designed for Protection Class I. This protection covers not only the basic insulation, but also the connection of all conductive parts to the PE conductor on the fixed installation. If the basic insulation fails, no contact voltage will remain. Please carry out a standardized inspection of the PE 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 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 (2) and the coil carrier (1) (dependent on the wear condition of the linings).

Magnetic Field Build-up

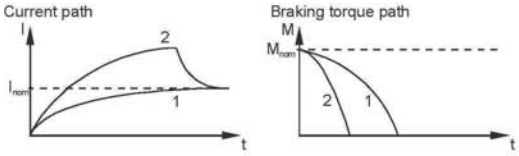
When the voltage is switched on, a magnetic field is built up in the brake coil, which attracts the armature disk (2) to the coil carrier (1) and releases the brake.

Field Build-up with Normal Excitation

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

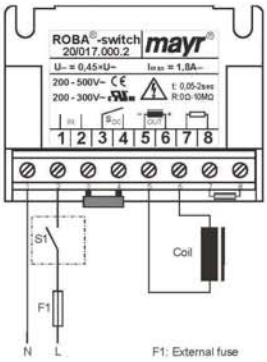
Field Build-up with Overexcitation

A quicker and safer drop in braking torque is achieved if the coil is temporarily placed under a higher voltage than the nominal voltage, as the current then increases more quickly. Once the brake is released, it is possible to switch over to the nominal voltage (curve 2). The effective capacity may however not be larger than the nominal capacity of the coil.
The ROBA®-switch fast acting rectifier works on this principle, which is obligatory for safe operation of this brake.



Magnetic Field Removal

AC-side Switching

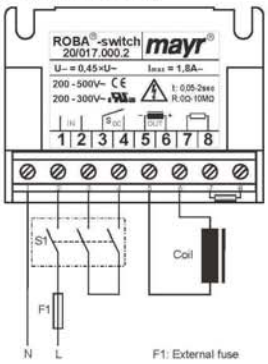


The power circuit is interrupted before the rectifier. The magnetic field slowly reduces. This delays the rise in braking torque.

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

⇒ **Low-noise switching;** however, the brake engagement time is longer (c. 6-10 times longer than with DC-side switching). Use for non-critical brake times.

DC-side Switching



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

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

⇒ **Short brake engagement times (e.g. for emergency STOP);** however, louder switching noises.

Protective Circuit

When using DC-side switching, the coil must be protected by a suitable protective 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 operation current are sufficient. Depending on the application, the switching contact can also be protected by other protective circuits (e.g. *mayr®*-spark quenching unit), although this may of course then alter the switching times.

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Customer-side Brake Inspection (after Mounting onto the Elevator Machine)

- ❑ **Individual air gap inspection**
  (Nominal air gap "a" and air gap "b" on both brake circuits acc. Table 1 and Figs. 3 / 4).
- ❑ **Braking torque inspection:**
  Please compare the requested braking torque with the torque stated on the Type Tag.
- ❑ **Release function inspection**
  (Battery operated to guarantee emergency escape for passengers during a power failure).
- ❑ **Switching function inspection**
  Energised brake Signal "ON" (NO contact)
  De-energised brake Signal "OFF" (NO contact)

Dual Circuit Brake Functional Inspection

The **ROBA®-twinstop®** brake is equipped with a double safety (redundant) brake system.
This means that, should one circuit fail, the braking effect is 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 function is not guaranteed.
Shut down the elevator, de-install and inspect the brake.

The individual circuit inspection is carried out by energising the individual circuits with nominal voltage.

Inspection brake circuit 1:

1. Energise brake circuit 2.
2. Trigger an emergency STOP with brake circuit 1 and inspect the stopping distance according to the elevator regulations.
3. De-energise brake circuit 2.

Inspection brake circuit 2:

1. Energise brake circuit 1.
2. Trigger an emergency STOP with the brake circuit 2 and inspect the stopping distance according to the elevator regulations.
3. De-energise brake circuit 1.

Inspection both circuits:

Energise both braking circuits with nominal voltage.
Trigger an emergency STOP and inspect the stopping distance according to the elevator regulations. The stopping distance must be much shorter than the stopping distance for an individual circuit.

Maintenance

ROBA®-twinstop® brakes are mainly maintenance-free. The friction linings are robust and wear-resistant. This ensures a particularly long service lifetime.
However, the friction linings are subject to functional wear on frequent use of emergency STOP. Therefore, the following inspections are to be carried out at regular inspection intervals:

- ❑ Braking torque or retardation inspection (individual brake circuits). (TÜV interval)
- ❑ Inspection of air gap braked (both brake circuits) (TÜV interval)
- ❑ Inspection of toothing backlash, toothed hub on motor to the rotor (3) or hub (10) to the rotor (3) Max. permitted toothing backlash 0,5°. (TÜV interva l)

To inspect the rotor (3) wear condition, please measure the air gap "a" acc. Table 1 and Figs. 3 /4.
If the brake limit air gap has been reached (0,9 mm), meaning that the friction linings are worn down, the rotor (3) must be replaced.
Please follow the Installation section backwards to dismantle the brake (page 9).

Disposal

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

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

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

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

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:

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

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9.5 EU declaration of conformity of the 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®	150/200/250/350	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

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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:

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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 845

	*** 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

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9.6 EU type-examination certificate

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

TÜV SÜD Industrie Service

EU TYPE-EXAMINATION CERTIFICATE

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

Certificate No.:	EU-BD 845
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 150, 200, 250, 350 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 845 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

Achim Janocha
Certification Body "lifts and cranes"

TÜV SÜD Industrie Service GmbH 00 36 Notified Body

TÜV®

Annex to the EC Type-Examination Certificate No. EU-BD 845 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]
150	180 - 360	981
200	240 - 500	979
250	370 - 640	800
350	500 - 920	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}
150	2 x 90 = 180		981	40	70	95
150		2 x 180 = 360	981	20	40	70
200	2 x 120 = 240		979	85	145	190
200		2 x 250 = 500	979	30	60	110
250	2 x 185 = 370		800	50	75	110
250		2 x 320 = 640	800	25	45	85
350	2 x 250 = 500		800	60	100	125
350		2 x 460 = 920	800	30	50	85

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 845 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. E02812200000161 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 845 of 2015-09-30

Industrie Service

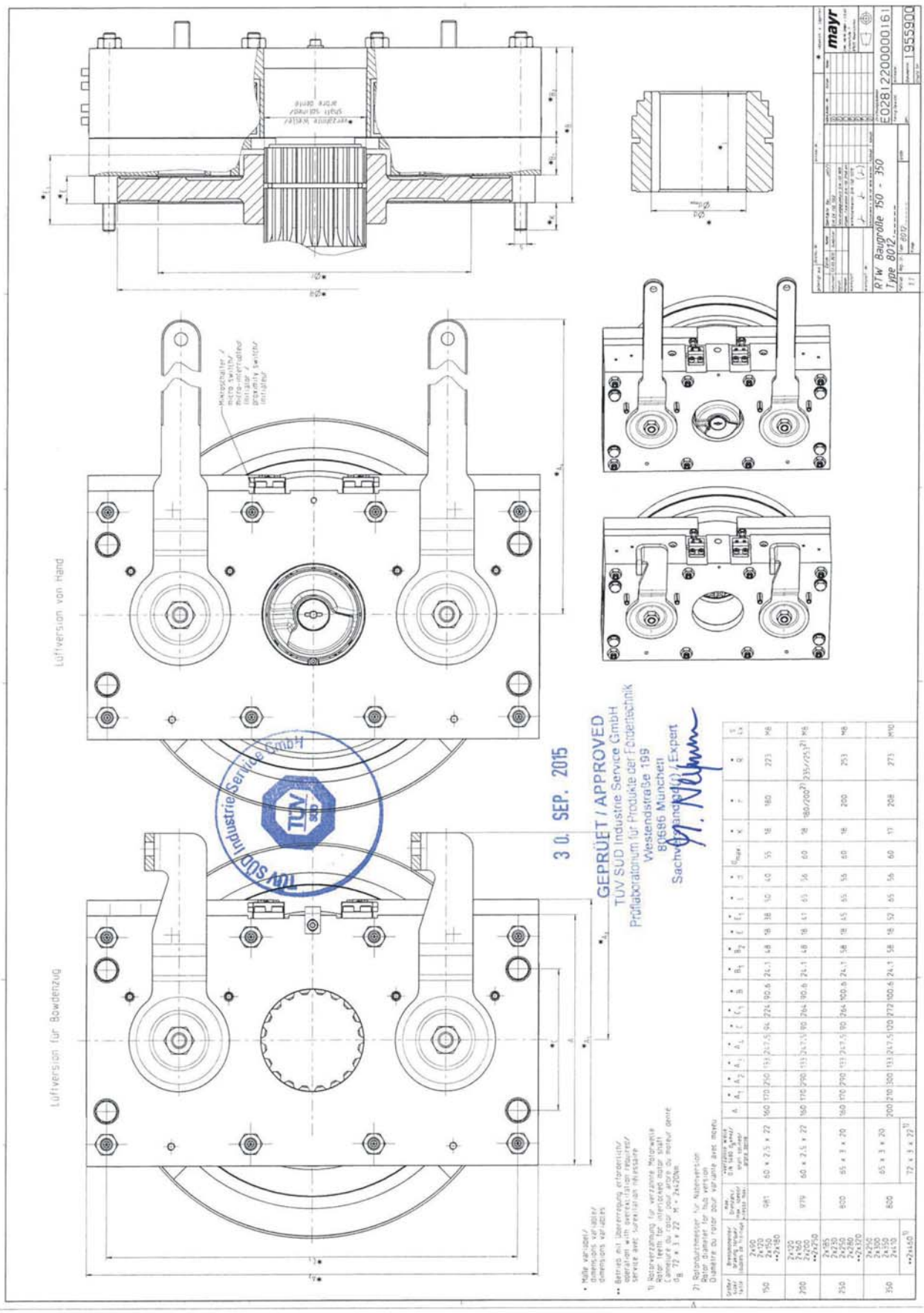
Authorised Manufacturer of Serial Production – Production Sites (valid from: 2016-01-13):

Company	Chr. Mayr GmbH & Co. KG
Address	Eichenstr. 1 87665 Mauerstetten - Germany
Company	Mayr Power Transmission Co. Ltd.
Address	7 Fuxin Road, Jiangsu Province 215637 Zhangjiagang - P.R. China
Company	Mayr Polska Sp. z. o. o.
Address	Rojów, ul. Hetmanska 1 63-500 Ostrzesów - Poland

- END OF DOCUMENT -

Based on: Application form from Co. Chr. Mayr GmbH & Co. KG of 2016-01-13

Page 1 of 1


mayr
RTW Baugröße 150 - 350
Type 8012.
E028122000000161
1955900
Luftversion von Hand
Luftversion für Bowdenzug
GEPRÜFT / APPROVED
TÜV SÜD Industrie Service GmbH
Prüflaboratorium für Produkte der Fördertechnik
Westendstraße 199
80686 München
30. SEP. 2015

Industrie Service

TÜV SÜD Industrie Service GmbH · 80684 Munich · Germany

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Add value.**

Chr. Mayr GmbH & Co. KG
Eichenstraße 1
87665 Mauerstetten – Germany

Your reference/letter of	Our reference/name	Tel.-Extension/E-Mail	Fax-Extension	Date	Page
	IS-FT1-MUC/ng Manfred Negru	+49 89 5791-3336 manfred.negru@tuev-sued.de	+49 89 5791-3337	2015-11-09 C_Mayr_Bestätigung_EN81-20_50_151109_en	1 of 2

Fulfillment of requirements concerning type-examinations of ascending car overspeed protection means (ACOP) and protection devices against unintended car movement according to the harmonized standard EN 81-50:2014 (D) by (EC) type-examination certificates according to Directive 95/16/EC

Dear Sirs,

For the products listed below were issued (EC) type-examination certificates according to Directive 95/16/EC. Test basis was the harmonized standard EN 81-1. In the meantime EU type-examination certificates according to Directive 2014/33/EU were issued for the tested products. So far as relevant, additional requirements of the harmonized standard EN 81-20:2014 (D) were taken into consideration.

Type:	(EC) type-examination certificate	EU type-examination certificate
894.001.1 SO, Größe 8	ABV 550/2, ESV 550	EU-BD 550
RSD 500/891 _ _ _ . _, Größe 500	ABV 703, ESV 703	EU-BD 703
RSD 1000/891 _ _ _ . _, Größe 1000	ABV 704, ESV 704	EU-BD 704
896.0 _ _ . _ _, Größe 200, 300, 500, 800, 1300, 1800	ABV 760/2, ESV 760	EU-BD 760
896.1 _ _ . _ _, Größe 200, 300, 500, 800, 1300, 1800	ABV 761/2, ESV 761	EU-BD 761
896.2 _ _ . _ _, Größe 300, 500, 800, 1300, 1800	ABV 762/2, ESV 762/1	EU-BD 762
RSR/8010._ _ _ _, Größe 200, 400, 600, 800, 1000, 1500	ABV 766/3, ESV 766/1	EU-BD 766
RSO 1300/896.30_.3 SO	ABV 783/2, ESV 783	EU-BD 783
RSD Größe 10 / 894.0_ _ . _ _ RSD Größe 10 / 894.2_ _ . _ _	ABV 822/1, ESV 822/1	EU-BD 822
RSO 1800/896.03-.--	ABV 834/1, ESV 834	EU-BD 834

Headquarters: Munich
Trade Register Munich HRB 96 869
VAT ID No. DE129484218
Information pursuant to § 2 [1] DL-InfoV (Germany) at www.tuv-sud.com/imprint

Supervisory Board:
Karsten Xander (Chairman)
Board of Management:
Ferdinand Neuwieser (CEO),
Dr. Ulrich Klotz, Thomas Kainz

Phone: +49 89 5791-3336
Fax: +49 89 5791-3337
www.tuv-sud.com/is

TÜV SÜD Industrie Service GmbH
Niederlassung München
Abteilung Fördertechnik
Westendstrasse 199
80686 Munich
Germany

Industrie Service

RTW Größe 150, 200, 250, 350 Type 8012._ _ _ . _ _	ABV 845, ESV 845	EU-BD 845
RSO 1300/896.2 _ _ . _ _	ABV 891, ESV 891	EU-BD 891
RSO 1800/896.2 _ _ . _ _	ABV 892, ESV 892	EU-BD 892
RTW Größe 125, 180, 225 Type 8012._ _ _ _ _	ABV 954, ESV 954	EU-BD 954

According to the new standard EN 81-50:2014 (D) there are new requirements for the type-examination of the braking devices as part of the ascending car overspeed protection means (ACOP) and against unintended car movement (UCM) respectively the requirements have changed. But these requirements already have been considered in the past. For this reason additional tests were not necessary. The content of the EC type examination certificates was formally adapted. The safety components mentioned above fulfill the requirements of the harmonized standard EN 81-50:2014 (D) already.

For the function as safety component as part of the ascending car overspeed protection means (ACOP) the transitional regulation according to Article 44 of the Directive 2014/33/EU is fully applicable.

In the future protecting devices against unintended car movement (UCM) will be safety components according to Annex III of the Directive 2014/33/EU.

Furthermore according to Article 44 of the Directive 2014/33/EU the making available on the market of safety components for lifts covered by Directive 95/16/EC which are in conformity with that Directive and which were placed on the market before 20 April 2016 shall not be impeded. To avoid problems in the meantime with document NB-L/2015-061 of 2015-07-06 Notified Bodies Lift (NB-Lift) suggested to apply Article 44 for components of protecting devices against unintended car movement (UCM) analogously. A definitive statement of NB-Lift respectively the European Commission is planed, but is pending. After consideration a transformation of the existing type-examination certificates in EU type-examination certificates is possible.

For this reason, additional formal requirements and due to the validity of the new Lift Directive 2014/33/EU from 2016-04-20, EU type-examination certificates already may be issued, but they are valid from 2016-04-20 only.

Best regards

Achim Janocha
Leiter der Zertifizierungsstelle
für Produkte der Fördertechnik

Manfred Negru
Niederlassung München
Abteilung Fördertechnik

9.6.1 Statement on type examination certificates

The rated brake torques can be found on the rating 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.

9.8 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]
SM160A/B	160	384	441	3.22	3.69	1.61	1.85
SM160A/B	200	384	441	4.02	4.62	2,01	2.31
SM160A/B	210	384	441	4.22	4.85	2.11	2.42
SM160A/B	240	384	441	4.83	5.54	2.41	2.77
SM190	200	300	345	3.14	3.61	1.57	1.81
SM190	240	300	345	3.77	4.34	1.88	2.17
SM200C	160	300	345	2.51	2.89	1.26	1.45
SM200C	210	300	345	3.30	3.79	1.65	1.90
SM200C	240	300	345	3.77	4.34	1.88	2.17
SM200C	320	300	345	5.03	5.78	2.51	2.89
SM200C	400	300	345	6.28	7.23	3.14	3.61
SM200C	450	300	345	7.07	8.13	3.53	4.06
SM200C	500	300	345	7.85	9.03	3.93	4.52
SM225(B)	320	217	250	3.64	4.19	1.82	2.09
SM225(B)	400	217	250	4.54	5.24	2.27	2.62
SM225(B)	500	217	250	5.68	6.54	2.84	3.27
SM225(B)	600	217	250	6.82	7.85	3.41	3.93
SM225C	240	400	460	5.03	5.78	2.51	2.89
SM225C	320	400	460	6.70	7.71	3.35	3.85
SM225C	400	400	460	8.83	9.63	4.19	4.82
SM250.60B	320	400	460	6.70	7.71	3.35	3.85
SM250.60B	400	400	460	8.83	9.63	4.19	4.82
SM250.60B	500	400	460	10.47	12.04	5.24	6.02
SM250.60B	600	400	460	12.57	14.45	6.28	7.23
SM250D	440	400	460	9.22	10.60	4.61	5.30
SM250C	450	400	460	9.42	10.84	4.71	5.42
SM250C	500	400	460	10.47	12.04	5.24	6.02
SM250C/D	520	400	460	10.89	12.52	5.45	6.26

9.9 Shaft calculation

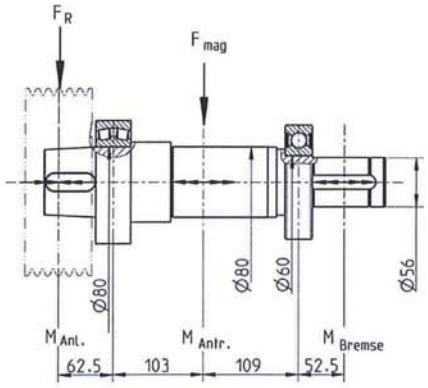
Industrie Service

Choose certainty.
Add value.

Certificate

about the verification of the calculation of a traction sheave shaft including Shaft / Hub connections

Type of the gearless machine:	**SM 200.15C**
Manufacturer:	Ziehl-Abegg AG, Heinz-Ziehl-Strasse 74653 Künzelsau - Germany
Examination number:	**G 518/2**
Tested product:	Traction sheave shaft including Shaft / Hub connections Test Report of IFF ENGINEERING & CONSULTING GmbH No. 4.1.551.3-1 dated 2014-11-25 (Page 1 – 17)
Basis of examination:	DIN 743 (10/2000), calculation of the safe working load of shafts and axis In connections with KTA 3902 (06/1999) DIN 6892 (11/98), fitting key springs, calculation and design Niemann, machine elements 1981, Volume no. 1



Date: 2015-01-07

Our reference:
IS-FTA-STG/No

Document: BS_G518-2_150107_en

This Document consists of 2 Pages.
Page 1 of 2

The test results refer exclusively to the units under test.

Construction drawing:	A-20-121-0012, Index A02 dated 2009-10-19
Material:	Steel EN 10025-2 (12/1999) – S355J2G3 (1.0570) Steel EN 10025-2 (04/2005) – S355J2G4 (1.0577) Steel EN 10025-2 (04/2005) – S355K2G3 (1.0595) Steel EN 10025-2 (04/2005) – S355K2G4 (1.0596) Steel EN 10083-2 (10/2006) – C45+N (1.0503+N) Steel EN 10083-2 (10/2006) – C60+N (1.0601+N) Steel EN 10083-3 (01/2007) – 42CrMo4+QT (1.7225+QT) Steel EN 10083-3 (01/2007) – 42CrMoS4+QT (1.7227+QT)

Minimum permissible surface pressure according to DIN 6892, paragraph 5.1.2 for the material of the hub connections of the **traction sheave** (material EN-GJL-300, DIN EN 1561, values as stated by the manufacturer):

$p_{zul} = f_s * f_H * R_e$ respectively $p_{zul} = f_s * f_H * R_{P0,2}$ or $p_{zul} = f_s * R_m$ (f_s ; f_H Table B1)

$p_{zul} \geq 450$ N/mm²

Headquarters: Munich
Trade Register Munich HRB 96 869
VAT ID No. DE129484218
Information pursuant to Section 2(1) DL-InfoV (Germany) at
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TÜV SÜD Industrie Service GmbH
Zentralbereich Fördertechnik
Abteilung Aufzüge und Sicherheitsbauteile
Gottlieb-Daimler-Str. 7
70794 Filderstadt
Germany

TÜV SÜD Industrie Service

Minimum permissible surface pressure according to DIN 6892, paragraph 5.1.2 for the material of the hub connections of the **brake rotor** (Material 16MnCr5, approximate value R_e=0,7*R_m DIN EN 10084, values as stated by the manufacturer):

$p_{zul} = f_s * f_H * R_e$ respectively $p_{zul} = f_s * f_H * R_{P0,2}$ or $p_{zul} = f_s * R_m$ (f_s ; f_H Table B1)

$p_{zul} \geq 660$ N/mm²

Details for the calculation, applicable to the event of load

Maximum permissible static load	F_R	18.2 kN
Maximum torque of the installation	M_{Inst}	280 Nm
Maximum starting-up torque	M_{Max}	430 Nm
Magnetic force	$F_{magnetic}$	2.493 kN
Rated braking torque	$M_{braking}$	560 Nm (2 x 280 Nm)
Maximum braking torque	1.5 x $M_{braking}$	840 Nm
Maximum nominal speed of rotation		510 min^{-1}

Test result

The verification of the shaft calculation including the Shaft / Hub connections was carried out by means of a comparative calculation and is documented and evaluated in the test report no. FIL-ETK2-14-0101 dated 2014-12-15. The test proved that the traction sheave shafts are dimensioned in accordance with the details of maximum load according to the requirements of the basis of examination.

An installation free of stresses and a unmoveable mounting of the supports 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 supports.

Notice: This certificate only refers to the sufficient calculation of the traction sheave shaft and hub/shaft connections but not to the sufficient dimensioning of the brake.

Prüflaboratorium für Produkte der Fördertechnik
Prüfbereich Aufzüge und Sicherheitsbauteile

Peter Retzbach

The expert

Chadi Noureddine

Industrie Service

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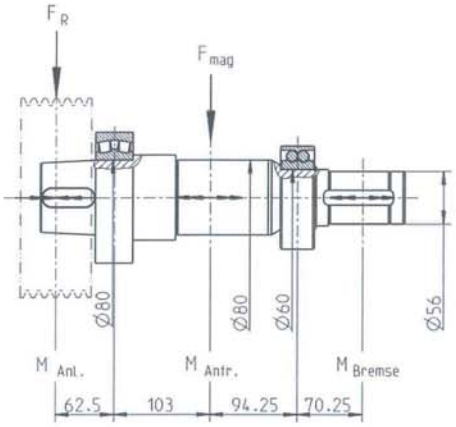
Certificate

about the verification of the calculation of a traction sheave shaft including Shaft / Hub connections

Type of the gearless machine:	**SM190.15C-20/S und SM200.15C-20/S**
Manufacturer:	ZIEHL-ABEGG SE, Heinz-Ziehl-Strasse 74653 Künzelsau - Germany
Examination number:	**G 621**
Tested product:	Traction sheave shaft including shaft / hub connections Test report of IFF ENGINEERING & CONSULTING GmbH No. 5.1.518.3-1 dated 2015-04-17 (Page 1 – 18 and annex 104 pages)
Basis of examination:	DIN 743 (10/2000), calculation of the safe working load of shafts and axis DIN 6892 (11/1998), fitting key springs, calculation and design DIN 6885-1 (08/1968), Parallel Keys, Keyways – Sheet 1 FKM-Guideline (2012), Analytical Strength Assessment of Mechanical Parts



Construction drawing:	A-20-121-0021, Index '-' dated 2015-03-11
Permissible materials shaft:	Steel EN 10025-2 (11/2004) - S355J2G3 (1.0570) Steel EN 10025-2 (11/2004) - S355J2G4 (1.0577) Steel EN 10025-2 (11/2004) - S355K2G3 (1.0595) Steel EN 10025-2 (11/2004) - S355K2G4 (1.0596) Steel EN 10083-2 (08/2006) - C45+N (1.0503) Steel EN 10083-2 (08/2006) - C60+N (1.0601) Steel EN 10083-3 (08/2006) - 42CrMo4+QT (1.7225) Steel EN 10083-3 (08/2006) - 42CrMoS4+QT (1.7227)

Date: 2015-07-09

Our reference:
IS-FTA-STG/Dh

Document:
BS_G621_150709_en.docx

This Document consists of 2 Pages.
Page 1 of 2

The test results refer exclusively to the units under test.

Industrie Service

Material traction sheave hub and brake disc hub:

Minimum permissible surface pressure according to DIN 6892, paragraph 5.1.2 for the material of the **traction sheave hub** (cast iron DIN EN 1561 (01/2012) - EN-GJL-300 (5.1302) as stated by the manufacturer): $p_{zul} = f_s * f_H * R_e$ respectively $p_{zul} = f_s * f_H * R_{P0,2}$ or $p_{zul} = f_s * R_m$ (f_s ; f_H according to DIN 6892, table B1) **$p_{zul} \geq 292{,}5$ N/mm²**

A proof of the brake disc hub was not performed, because there have to be an EC type-examination for the brake.

Material feather keys (traction sheave and brake disc):

Minimum permissible surface pressure according to DIN 6892, paragraph 5.1.2 for the material of the **feather keys** (steel DIN EN 10277-2 (06/2008) - C45+C (1.0503) as stated by the manufacturer): $p_{zul} = f_s * f_H * R_e$ respectively $p_{zul} = f_s * f_H * R_{P0,2}$ or $p_{zul} = f_s * R_m$ (f_s ; f_H according to DIN 6892, table B1) **$p_{zul} \geq 340$ N/mm²**

Details for the calculation applicable to the event of load

Maximum permissible static operating shaft load	F_R	18,2 kN
Maximum permissible system torque	M_{Sys}	280 Nm
Maximum starting-up torque	M_{Max}	430 Nm
Radial force on the rotor (magnetic force)	$F_{magnetic}$	2493 N
Rated braking torque	$M_{braking}$	560 Nm (2 x 280 Nm)
Maximum braking torque	2 x $M_{braking}$	1120 Nm
Rated speed of rotation	n_N	510 min^{-1}

Test result

The verification of the shaft calculation including the shaft / hub connections was carried out by means of a comparative calculation and is documented and evaluated in the test report no. FIL-ETK2-15-0057 dated 2015-07-03. The test proved that the traction sheave shafts are dimensioned in accordance with the details of maximum load according to the requirements of the basis of examination.

For the brake, an EC type-examination certificate must be presented. The surface pressure by the key on the hub must be proven with the above mentioned permissible values.

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 side of the brake only a braking torque is permitted, because the calculation does not account additional transverse forces due to the braking effect on the traction sheave shaft.

Notice: This certificate only refers to the sufficient calculation of the traction sheave shaft and hub/shaft connections but not to the sufficient dimensioning of the brake.

Test laboratory for lifts and cranes
Business unit lifts and cranes

Peter Retzbach

The expert

Caroline D'hein

Industrie Service

Choose certainty.
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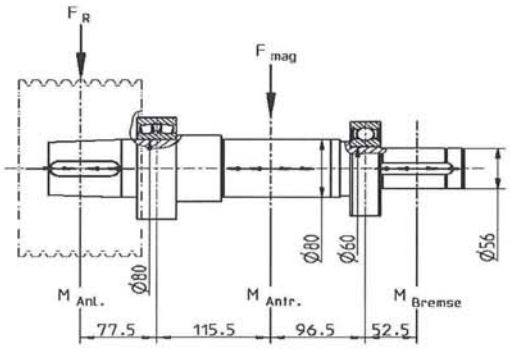
Certificate

about the verification of the calculation of a traction sheave shaft including Shaft / Hub connections

Type of the gearless machine:	**SM 200.20C**
Manufacturer:	Ziehl-Abegg AG, Heinz-Ziehl-Strasse 74653 Künzelsau - Germany
Examination number:	**G 519/2**
Tested product:	Traction sheave shaft including Shaft / Hub connections Test Report of IFF ENGINEERING & CONSULTING GmbH No. 4.1.551.3-2 dated 2014-11-25 (Page 1 – 17)
Basis of examination:	DIN 743 (10/2000), calculation of the safe working load of shafts and axis In connections with KTA 3902 (06/1999) DIN 6892 (11/98), fitting key springs, calculation and design Niemann, machine elements 1981, Volume no. 1



Date: 2015-01-08

Our reference:
IS-FTA-STG/No

Document: BS_G519-2_150108_en

This Document consists of 2 Pages.
Page 1 of 2

The test results refer exclusively to the units under test.

Construction drawing:	A-20-121-0013, Index A04 dated 2009-10-19
Material:	Steel EN 10083-1 (10/2006) – 42CrMo4+QT (1.7225+QT) Steel EN 10083-1 (10/2006) – 42CrMoS4+QT (1.7227+QT)

Minimum permissible surface pressure according to DIN 6892, paragraph 5.1.2 for the material of the hub connections of the **traction sheave** (material EN-GJL-300, DIN EN 1561, values as stated by the manufacturer):

$p_{zul} = f_s * f_H * R_e$ respectively $p_{zul} = f_s * f_H * R_{P0,2}$ or $p_{zul} = f_s * R_m$ (f_s ; f_H Table B1)

$p_{zul} \geq 450$ N/mm²

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Germany

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Minimum permissible surface pressure according to DIN 6892, paragraph 5.1.2 for the material of the hub connections of the **brake rotor** (Material 16MnCr5, approximate value R_e=0,7*R_m DIN EN 10084, values as stated by the manufacturer):

$p_{zul} = f_s * f_H * R_e$ respectively $p_{zul} = f_s * f_H * R_{P0,2}$ or $p_{zul} = f_s * R_m$ (f_s ; f_H Table B1)

$p_{zul} \geq 660$ N/mm²

Details for the calculation, applicable to the event of load

Maximum permissible static load	F_R	28.0 kN
Maximum torque of the installation	M_{Inst}	410 Nm
Maximum starting-up torque	M_{Max}	570 Nm
Magnetic force	$F_{magnetic}$	3.562 kN
Rated braking torque	$M_{braking}$	820 Nm (2 x 410 Nm)
Maximum braking torque	1.5 x $M_{braking}$	1230 Nm
Maximum nominal speed of rotation		510 min^{-1}

Test result

The verification of the shaft calculation including the Shaft / Hub connections was carried out by means of a comparative calculation and is documented and evaluated in the test report no. FIL-ETK2-14-0101 dated 2014-12-15. The test proved that the traction sheave shafts are dimensioned in accordance with the details of maximum load according to the requirements of the basis of examination.

An installation free of stresses and a unmoveable mounting of the supports 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 supports.

Notice: This certificate only refers to the sufficient calculation of the traction sheave shaft and hub/shaft connections but not to the sufficient dimensioning of the brake.

Prüflaboratorium für Produkte der Fördertechnik
Prüfbereich Aufzüge und Sicherheitsbauteile

Peter Retzbach

The expert

Chadi Noureddine

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Choose certainty.
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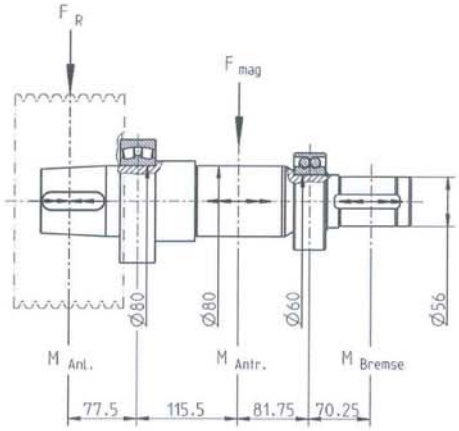
Certificate

about the verification of the calculation of a traction sheave shaft including Shaft / Hub connections

Type of the gearless machine:	**SM190.23C-20/S und SM200.20C-20/S**
Manufacturer:	ZIEHL-ABEGG SE, Heinz-Ziehl-Strasse 74653 Künzelsau - Germany
Examination number:	**G 620**
Tested product:	Traction sheave shaft including shaft / hub connections Test report of IFF ENGINEERING & CONSULTING GmbH No. 5.1.518.3-2 dated 2015-04-17 (Page 1 – 17 and annex 29 pages)
Basis of examination:	DIN 743 (10/2000), calculation of the safe working load of shafts and axis DIN 6892 (11/1998), fitting key springs, calculation and design DIN 6885-1 (08/1968), Parallel Keys, Keyways – Sheet 1 FKM-Guideline (2012), Analytical Strength Assessment of Mechanical Parts



Construction drawing:	A-20-121-0022, Index '-' dated 2015-03-11
Permissible materials shaft:	Steel EN 10083-3 (08/2006) – 42CrMo4+QT (1.7225+QT) Steel EN 10083-3 (08/2006) – 42CrMoS4+QT (1.7227+QT)

Material traction sheave hub and brake disc hub:

Minimum permissible surface pressure according to DIN 6892, paragraph 5.1.2 for the material of the **traction sheave hub** (cast iron DIN EN 1561 (01/2012) - EN-GJL-300 (5.1302) as stated by the manufacturer): $p_{zul} = f_s * f_H * R_e$ respectively $p_{zul} = f_s * f_H * R_{P0,2}$ or $p_{zul} = f_s * R_m$ (f_s ; f_H according to DIN 6892, table B1) **$p_{zul} \geq 292{,}5$ N/mm²**

Date: 2015-07-09

Our reference:
IS-FTA-STG/Dh

Document:
BS_G620_150709_en.docx

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A proof of the brake disc hub was not performed, because there have to be an EC type-examination for the brake.
Material feather keys (traction sheave and brake disc):

Minimum permissible surface pressure according to DIN 6892, paragraph 5.1.2 for the material of the **feather keys** (steel DIN EN 10277-2 (06/2008) - C45+C (1.0503) as stated by the manufacturer): $p_{zul} = f_s * f_H * R_e$ respectively $p_{zul} = f_s * f_H * R_{P0,2}$ or $p_{zul} = f_s * R_m$ (f_s ; f_H according to DIN 6892, table B1) **$p_{zul} \geq 340$ N/mm²**

Details for the calculation applicable to the event of load

Maximum permissible static operating shaft load	F_R	28 kN
Maximum permissible system torque	M_{Sys}	410 Nm
Maximum starting-up torque	M_{Max}	570 Nm
Radial force on the rotor (magnetic force)	$F_{magnetic}$	3562 N
Rated braking torque	$M_{braking}$	820 Nm (2 x 410 Nm)
Maximum braking torque	2 x $M_{braking}$	1640 Nm
Rated speed of rotation	n_N	510 min^{-1}

Test result

The verification of the shaft calculation including the shaft / hub connections was carried out by means of a comparative calculation and is documented and evaluated in the test report no. FIL-ETK2-15-0057 dated 2015-07-03. The test proved that the traction sheave shafts are dimensioned in accordance with the details of maximum load according to the requirements of the basis of examination.

For the brake, an EC type-examination certificate must be presented.
The surface pressure by the key on the hub must be proven with the above mentioned permissible values.

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 side of the brake only a braking torque is permitted, because the calculation does not account additional transverse forces due to the braking effect on the traction sheave shaft.

Notice: This certificate only refers to the sufficient calculation of the traction sheave shaft and hub/shaft connections but not to the sufficient dimensioning of the brake.

Test laboratory for lifts and cranes
Business unit lifts and cranes

Peter Retzbach

The expert

Caroline D'hein

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29-02-2016

Statement concerning the certificates G 632 and G 633 and other motor shaft certificates

Dear Sir or Madam

The motor shafts of our elevator drive machines ZAtop are constantly monitored by independent institutes and in accordance with the provisions of the Lifts Directive 95/16/EG and the harmonized standard EN 81-1. Certificates of the calculations are issued by a notified body.

The certificates contain the type of drive machine and the drawing number of the shaft with version index for identification.

ZIEHL-ABEGG reserves the right to attach suffixes to the basic type name of the machines for the distinction of variants. We hereby confirm that the shafts are always identical to the basic type.

Example 1: SM132.21-14/A is the basic type. The motor types SM132.21-14/AS or SM132.21-14/ASU or SM132.21-14/ASO have the same shafts in accordance to the certificate G 632.

Example 2: SM132.35-14/A is the basic type. The motor types SM132.35-14/AS or SM132.35-14/ASU or SM132.35-14/ASO have the same shafts in accordance to the certificate G 633.

Yours sincerely

Ziehl-Abegg SE

R. Hoppenstedt

i. V.
Roland Hoppenstedt
Head of R&D Drive Division

Registergericht: Amtsgericht Stuttgart HRB 746188
Vorstand: Peter Fenkl (Vorsitzender), Achim Curd Rägle, Norbert Schuster, Dr. Klaus Weiß
Aufsichtsrat: Uwe Ziehl (Vorsitzender)
Umsatzsteuer-Identnummer: DE146280211

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Zusatzhinweis zu den Betriebsanleitungen
Additional instructions for manuals
ZAtop / ZAsyn / ZAdisc

ZIEHL-ABEGG

A-TIA16_02-D-GB

Typenschild:

Auf den Typenschildern der ZAtop / ZAsyn / ZAdisc Antriebe werden jeweils zwei Werte als Nennwerte für Leistung, Strom, Drehmoment und Einschaltdauer angegeben.
Die jeweils ersten Werte stehen für die maximale Belastung bei Betrieb des Aufzugs (Fahrt mit leerer Kabine abwärts, bzw. mit voller Kabine aufwärts).
Die jeweils zweiten Werte stehen für die mittlere Belastung bei Betrieb des Aufzugs.

Name plate:

On the name plates of ZAtop / ZAsyn / ZAdisc motors, two values are mentioned respectively as the rated values for output power, current, torque and duty cycle.
The first value indicated refers to the maximum load while the lift is in operation (empty car travels downwards /loaded car travels upwards).
The second value respectively refers to average load while the lift is in operation.

Beispielhaftes Typenschild:

Example for name plate:

ZIEHL-ABEGG					
		IMB3	F	IP21	IEC60034-1
S/N 16231769/01		U_G	204 V	P_r	18/13 kW
Typ SM225.60B-20		240 st/h	26 Hz	n	156 rpm
3 ~ Y 360 V	S3	duty	20/40 %	I_r	53,5/38 A
cos φ	0,9/0,95			I_{max}	98 A
J_M	0,75 kgm2	R_{U20}	0,37 Ω	T_r	1120/800 Nm
		mass		T_{max}	1900 Nm
Made by ZIEHL-ABEGG · 74653 Künzelsau · Germany Tel. +49 (0) 7940 16-0 · www.ziehl-abegg.com					

Werte für maximale Belastung:
1120 Nm; 20 % ED; 18,0 kW; 53,5 A

Values for maximum load:
1120 Nm; 20 % ED; 18.0 kW; 53.5 A

Werte für mittlere Belastung:
800 Nm; 40 % ED; 13,0 kW; 38 A

Values for average load:
800 Nm; 40 % ED; 13.0 kW; 38 A

Hinweis:
Für die Auswahl des Frequenzumrichters sowie des Querschnittes der Motorleitung ist der jeweils erste Stromwert relevant.

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.

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