ZA top
SM225.45C
Gearless permanent magnet synchronous motor

Original operating instructions
Store for future use!
Content

1 General information ........................................................ 4
  1.1 Application .................................................................. 4
  1.2 Structure of the operating instructions ............................... 4
  1.3 Target group .................................................................. 4
  1.4 Exclusion of liability ................................................... 4
  1.5 Copyright ................................................................ 4

2 Safety instructions ......................................................... 4
  2.1 General ............................................................ 4
  2.2 Pictographs ......................................................... 4
  2.3 General safety instructions .............................................. 5
  2.4 Requirements placed on the personnel / due diligence .......... 5

3 Product overview .......................................................... 5
  3.1 Operational area ...................................................... 5
  3.2 Transport ........................................................... 6
  3.3 Storage ............................................................. 6
  3.4 Disposal / recycling ................................................... 6

4 Mechanical installation ..................................................... 6
  4.1 General mounting advises .............................................. 6
  4.2 Patent situation ....................................................... 7
  4.3 Mounting the drive unit ................................................. 7
  4.4 Fastening the brake ................................................... 7
  4.5 Fastening rope protection clamp ......................................... 7

5 Electrical installation ....................................................... 8
  5.1 Safety precautions .................................................... 8
  5.2 EMC directive ........................................................ 8
  5.3 Motor connection ..................................................... 8
  5.4 Absolute encoder connection ............................................ 9
  5.5 Brake connection ..................................................... 10
    5.5.1 Triggering of the brakes .......................................... 10
  5.6 Connection forced ventilation ............................................ 11

6 Start-up .................................................................. 12
  6.1 Operating conditions ................................................... 12
  6.2 First-time start-up ..................................................... 12
  6.3 Drive approval test .................................................... 12
    6.3.1 Half load test .................................................. 12
    6.3.2 Testing the brake according EN 81-1 ................................. 12
  6.4 Pull out of safety gear ................................................. 13
  6.5 Emergency evacuation ................................................. 14
    6.5.1 Manual emergency evacuation ...................................... 14
    6.5.2 Electrical emergency evacuation .................................... 14

7 Faults and remedy ......................................................... 15

8 Service and maintenance ................................................... 15
  8.1 General notes on maintenance .......................................... 15
  8.2 Inspection intervals ................................................... 16
    8.2.1 Checking the air gap ............................................. 16
8.3 Spare parts .......................................................... 16
  8.3.1 Replacement of the absolute encoder ECN131/ERN1387 ................. 17
    8.3.1.1 Required tool for the replacement of the absolute encoder: .......... 17
    8.3.1.2 Dismounting the absolute encoder ..................................... 17
    8.3.1.3 Mounting the absolute encoder ....................................... 18
  8.3.2 Replacement of the brake ........................................ 20
    8.3.2.1 Required tool for the replacement of the brake: .................. 20
    8.3.2.2 Dismounting the brake ................................... 21
    8.3.2.3 Mounting the brake ..................................... 25
    8.3.2.4 Check the micro switches for the release monitoring .............. 29
    8.3.2.5 Adjusting the micro switches for the release monitoring .......... 29
  8.3.3 Replacement of the traction sheave .................................. 30
    8.3.3.1 Required tools for the replacement of the traction sheave: .......... 30
    8.3.3.2 Dismounting the traction sheave ..................................... 31
    8.3.3.3 Mounting the traction sheave ...................................... 32
  8.3.4 Fastening bearing brackets ........................................ 32
  8.3.5 Retrofitting the forced ventilation .................................... 33
    8.3.5.1 Required tools for the retrofitting of the forced ventilation: ....... 33
    8.3.5.2 Scope of delivery ...................................... 33
    8.3.5.3 Mounting of the forced ventilation .................................. 34

9 Enclosure ................................................................ 36
  9.1 Technical data ....................................................... 36
  9.2 Dimension sheets ..................................................... 37
  9.3 EC/EU declaration of conformity .................................... 41
  9.4 Operating instructions brake ........................................ 42
  9.5 EU declaration of conformity of the brake ......................... 52
  9.6 EU type-examination certificate .................................... 53
    9.6.1 Statement concerning ESV-type-examination ...................... 59
  9.7 Calculation of tripping speed ....................................... 59
  9.8 Shaft calculation .................................................... 60
1 General information

1.1 Application
The ZAtop is designed as a gearless drive for traction sheave rope elevators. **No other drive applications are permitted without the disengaging 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
The copyright to this operation instructions is held by ZIEHL-ABEGG SE, Künzelsau. This operation instructions must not be wholly or partly reproduced for competitive purposes, used in any unauthorised way or made available to third parties without our agreement.

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 bodily harm is possible if the corresponding precautions are not taken! |
| **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.

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!

Warning!
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!
- 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.
  - With lateral (horizontal) cable pull, the drive must be supported on all four feet with a pressure plate over the whole area on the side of the housing. Supporting by pressure screws only is not permissible! On no account may shearing force be exerted on the fastening screws!
  - 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 240 mm space between the brake and the wall (axial direction) to make access to the encoder possible.

Check the position of the terminal block before installing the machine and change it if necessary.

4.2 Patent situation
Please pay attention 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 M24 - 8.8 at the mounting plate.

**Tightening torque M24 - 8.8: 670 Nm**

- Screw-in depth at least 1.5 times of screw size (minimum 36 mm, maximum 57 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.

Each of the two rope protection clamps will be fastened at the bearing bracket with a screw M10 x 16 and a washer.

**Tightening torque M10 - 8.8: 46 Nm**

- Through the longholes in the clamp the required distance to the ropes can be adjusted.
- The rope protection clamps 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.
- 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.

**Mechanical connection conditions**

<table>
<thead>
<tr>
<th>Motor rated current [A]</th>
<th>Terminal board</th>
<th>Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 20</td>
<td>M 8</td>
<td>M 25</td>
</tr>
<tr>
<td>&gt; 20 - 25</td>
<td>M 8</td>
<td>M 32</td>
</tr>
<tr>
<td>&gt; 25 - 35</td>
<td>M 8</td>
<td>M 32</td>
</tr>
<tr>
<td>&gt; 35 - 50</td>
<td>M 8</td>
<td>M 40</td>
</tr>
<tr>
<td>&gt; 50 - 63</td>
<td>M 8</td>
<td>M 40</td>
</tr>
</tbody>
</table>
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)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>DATA</td>
<td>Data line for communication with the absolute encoder</td>
</tr>
<tr>
<td>B</td>
<td>DATA /</td>
<td>Data line inverse</td>
</tr>
<tr>
<td>C</td>
<td>5 V Sensor Up</td>
<td>Sensor cable for encoder voltage (5 V positive)</td>
</tr>
<tr>
<td>D</td>
<td>5 V Up</td>
<td>Controlled +5 V voltage supply (positive)</td>
</tr>
<tr>
<td>E</td>
<td>0 V Un</td>
<td>Ground voltage supply absolute encoder (negative)</td>
</tr>
<tr>
<td>F</td>
<td>B+ (sine)</td>
<td>Analog track B (sine)</td>
</tr>
<tr>
<td>G</td>
<td>CLOCK /</td>
<td>Clock signal invers</td>
</tr>
<tr>
<td>H</td>
<td>CLOCK</td>
<td>Clock signal for serial transfer</td>
</tr>
<tr>
<td>J</td>
<td>0 V Sensor Un</td>
<td>Sensor cable for encoder voltage (negative)</td>
</tr>
<tr>
<td>K</td>
<td>A+ (cosine)</td>
<td>Analog track A (cosine)</td>
</tr>
<tr>
<td>L</td>
<td>A- (cosine inverse)</td>
<td>Analog track A invers (cosine invers)</td>
</tr>
<tr>
<td>M</td>
<td>B- inverse (sine inverse)</td>
<td>Analog track B invers (sine invers)</td>
</tr>
</tbody>
</table>
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 4,7 A per circuit!
- 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 hand release acts on both circuits simultaneously. A separate release of the single circuits for testing purposes is not possible.
- 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 housing. 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 housing with care.

Danger!
The levers for hand release must be removed after brake hand release action.

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!**

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.

<table>
<thead>
<tr>
<th>Connection data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
</tr>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>output</td>
</tr>
<tr>
<td>Current</td>
</tr>
</tbody>
</table>

**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 single brake circuits have to be released independent from the safety circuit. 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 SE 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.

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

**Manual lifting of the brake**

![brake closed](image1)
![brake manually released](image2)

When the brakes are released manually, 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!**

Danger!
The levers for hand release must be removed after brake hand release action.

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.

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

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

### 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 traction sheave, the following instructions have to be referred:

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

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

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

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

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 check 4 times at the circumference (see arrows) of both brakes (brake 1 + brake 2). The maximum value of the four 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 both brake rotors and both O-rings.
   **Maximum admissible air gap after wear: 0.65 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 rotors & 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. Removel thecover 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 (3).
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 brake is used to centre the absolute encoder.

2. Attach the absolute encoder to the drive shaft with the screw M10 x 25 (4).
3. Remove the screw M10 x 25 (4).
4. Provide threadlocker Loctite 243 (5) or similar threadlocker material to the thread of the central fixing screw (3).

5. Tighten the central fixing screw (3) with an allen wrench SW 4
   **Tightening torque: 5.2 Nm**

6. Fix the cover of the encoder (2) with an allen wrench SW 4

7. 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**

8. 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](image.png)

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 3
- Allen wrench SW 5
- Allen wrench SW 6
- Allen key SW 10
- Allen key SW 17
- 2 mounting bolts 12 x 220 (included in toolkit, article 70027450)
- Screw wrench SW 32
- Torque key for a tightening torque of 111 Nm with allen wrench SW 10
- Wrench (included in toolkit, article 70027450)
- Assembly shaft (included in toolkit, article 70027450)
- Eye bolt M10
8.3.2.2 Dismounting the brake

1. Dismount the absolute encoder (see chapter "Replacement of the absolute encoder").
2. Loosen the hexagon socket screw M5 (1) with allen key SW 3 and remove the encoder flange (2).

3. Disconnect the electrical connection of both brake bodies.
4. Carefully remove strain reliefs (4) of all connecting cables with wire cutters.
5. Cut off varistors (5).
6. Feed all connecting cables (6) out of the terminal box (3).
7. Remove the cable ties (7) at the brake lines
8. Loosen the hexagon socket screw M6 (8) with allen key SW 5 and remove the fixing plate (9) with the terminal box (3).
9. Remove the both dust covers (10).

10. Unscrew adapter shaft (11) from the motor shaft with wrench (12) and screw wrench SW 32

11. Screw assembly shaft (13) onto the motor shaft using SW 17 allen wrench.
    Torque: 60 Nm
Demontage the brake with manual release

12. Loosen completely the both hexagon head screws (14) from the right and the left side of the brake, using an allen wrench SW 10.
13. These screws are replaced through the two mounting bolts 12 x 220 (15).

14. Loosen the other two hexagon head screws (14) with an allen wrench SW 10 always in change.
15. Loosen the two hexagon socket screws (16) with an allen wrench SW 6 and remove the lever axis.
Demontage the brake without manual release

16. Loosen completely the both hexagon head screws (14) from the right and the left side of the brake, using an allen wrench SW 10.
17. These screws are replaced through the two mounting bolts 12 x 220 (15).

18. Loosen the other two hexagon head screws (14) with an allen wrench SW 10 always in change.
19. Caution! Due to the great weight of the brake body, we recommend you to secure and change the brake body by using an eye bolt M10 (17) and appropriate lifting gear.

20. Take off the rear brake body (18).

ATTENTION! Weight for each brake body is approx. 40 kg!

21. Remove the rear brake rotor (19) from the toothed motor shaft (20). The brake rotor may only be removed manually.

ATTENTION! Do not work with screwdrivers to loosen the brake rotor!
The friction disk can be damaged by the screwdrivers! Damaged friction discs may not be mounted anymore!
22. Take off the front brake body (21).

**ATTENTION! Weight for each brake body is approx. 40 kg!**

23. Remove the front brake rotor (22) from the toothed motor shaft (20). The brake rotor may only be removed manually.

**ATTENTION! Do not work with screwdrivers to loosen the brake rotor!**
The friction disk can be damaged by the screwdrivers! Damaged friction discs may not be mounted anymore!

### 8.3.2.3 Mounting the brake

1. Grease the O-ring (for example Vaseline) and place it in the front nut (23) of the toothed motor shaft (20).
2. Ensure that the friction disc of the front brake rotor (22) and the braking surface (24) from the housing of the motor is free of dirt and grease.
3. Push the front brake rotor (22) onto the toothed motor shaft (20) with slight pressure.

**ATTENTION!** It must be noted that:
- The stepped disc collar (25) must face outwards.
4. Make sure that the gear teeth engage easily.
5. O-ring may not be damaged.
6. **Attention!** Only execute if configuration has brake airing lever: 
   *Activate the rear brake body (18 - magnet D) to release the rear brake.*

7. Push the front brake body (21) onto the toothed motor shaft (20). 
   **ATTENTION!** Weight of the brake body approx. 40 kg

8. Grease the second O-ring (for example Vaseline) and place it in the rear nut (26) of the toothed motor shaft (20).

9. Ensure that the friction disc of the rear brake rotor (19) is free of dirt and grease.

10. Push the rear brake rotor (19) onto the toothed motor shaft (20) with slight pressure. 
    **ATTENTION!** It must be noted that: 
    The stepped disc collar must face inside.

11. Make sure that the gear teeth engage easily.

12. O-ring may not be damaged.

13. Push the rear brake body (18) onto the toothed motor shaft (20). 
    **ATTENTION!** Weight of the brake body approx. 40 kg
14. **Attention! Only execute configuration has brake airing lever:**
   Deactivate the rear brake body (18 - magnet D).

15. **For brake with brake airing lever:**
   Secure the lever axle with the two cylinder-head screws (16) and the allen wrench SW 6.
   Torque: \(22 \pm 2\) Nm

16. Fasten the brake body evenly with two hexagon head screws (14).
   *Initial tightening torque 50 Nm*
   *Do not forget the washers!*

17. Loosen the both mounting bolts 12 x 220 (15).
18. Screws the both hexagon head screws M12 (14).
    *Initial tightening torque 50 Nm*
    *Do not forget the washers!*

19. Activate current to the brake and tighten the four hex socket screws M12 (14) crosswise gradually and evenly.
    Torque: 111 Nm

20. Endue the hexagon head screws (14) with locking varnish.

21. Attach the encoder flange (2) with the sockel cap screws M5 (1) and an allen key SW 3.
22. Release assembly shaft (13) loosen with an allen wrench SW 17 and take it off the motor shaft.
23. Provide threadlocker Loctite 243 or a similar product to the thread of the adapter shaft (11).
24. Screw the adapter shaft (11) onto the motor shaft with wrench (12) and screw wrench SW 32.
   **Tightening torque: 60 Nm**
25. Remove the wrench (12).
26. Mount the absolute encoder (see chapter "Replacement of the absolute encoder").
27. Fit the dust covers (10).
28. Fit insulating hoses (27).
29. Fit the fixing plate (9) and the terminal box (3) with two hexagon head screws M6 (8) with an allen key SW 5.
30. Bundle the connection cables (6) of the magnet coils and the release monitoring and lead it into the terminal box (3).
31. Connect the magnet coils, the release monitoring and the varistor according to the wiring diagram (28) in the top cover of the connection box (3).
32. Fit strain reliefs (4).

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 0,15 mm

The adjusting is only necessary if the micro switches are not working correctly.
The micro switches are on the side of the brake body (see arrows).
WARNING! Ensure that you select the appropriate micro switch for the magnet to be adjusted.
1. De-energize the brake.
2. Connect the circuit inductor to the connecting terminals 3/4 and 8/9 respectively (normally open contact).
3. Please see the chapter "Enclosure - Brake operation instructions" for the further procedure for setting the micro switches for the release monitor.
4. 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 SW16
- screw wrench gage 24
- Torque wrench for tightening torque 195 Nm with SW 24
- 5 - 8 mm spacer or hexagon nut
8.3.3.2 Dismounting the traction sheave

1. Undo the fixing screws M10 x 16 (1) of the rope guards (2) with a screw wrench SW 16 and remove the rope guards (2).

2. Release the fixing screws M16 x 55 (3) of the traction sheave (4) with an screw wrench SW 24 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 hexagon head screws M16 x 55 (3).

6. Tighten the hexagon head screws M16 x 55 (3) uniformly with an screw wrench SW 24. 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 fitting key (9) has to be available.
3. Put traction sheave (4) on drive shaft (8). The bores for the hexagon head screws M16 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 hexagon head screws M16 x 55 (3). Apply threadlocker Loctite 243 or a similar product to the fixing screws. **Do not forget washers!**
5. Tighten the fixing screws (3) with a torque key with SW 24 uniformly in steps:
   - Tightening torque step 1: 50 Nm
   - Tightening torque step 2: 100 Nm
   - Tightening torque step 3: 195 Nm
6. Coat the fastening screws (3) with sealing varnish.
7. Fit rope guards (2) with screw wrench SW 16

8.3.4 Fastening bearing brackets

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 Retrofittting the forced ventilation

8.3.5.1 Required tools for the retrofittting of the forced ventilation:
- Screwdriver T20
- screw wrench SW 10
- screw wrench SW 17
- Allen wrench SW 5

8.3.5.2 Scope of delivery

Parts list:

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Count</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>pre-assembled forced ventilation</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>socket cap screw ISO 4762 - M6 x 10 - 8.8</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>thermostatic switch included wires with insulating tube</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>cable gland M16 x 1.5</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>cable tie</td>
</tr>
</tbody>
</table>

The accessories position 2, 3, 4 and 5 are packed in a bag.
8.3.5.3 Mounting of the forced ventilation

1. Remove the brake terminal box (A) by loosening the two screws M4 (B) using the screwdriver T20.

2. Loosen the hexagon socket screw M5 (5) with allen key SW and remove the fixing plate (D).

3. Attach the pre-assambled forced ventilation (1) to the provided threads (E) with two hexagon socket screws M6 x 10 - 8.8 (2) and an allen key SW 5 at the motor housing.

4. Loosen the four hexagon head screws M6 x 8 - 8.8 (F) with a screw wrench SW 10 at the motor terminal box and remove the terminal box plate (G).

5. Remove the blind plug (H) at the motor connection box.
6. Screw the thermostatic switch (3) with a tightening torque of 3 Nm into the intended thread (J). **A exceeding of the tightening torque leads to the damage of the thermostat switch.**

7. Attach the cable gland M16 x 1,5 (4).

8. Put the wires with the insulating tube (K) of the thermostatic switch out of the terminal box from the motor and put it into the terminal box of the forced ventilation according the illustration.

9. Attach the cable tie (5) as strain relief at the wires with the insulating tube in the forced ventilation terminal box. Connect the wires according to the wiring diagramm (see chapter "Electrical installation - Connection forced ventilation). 

10. Attach the terminal box plate (G) and fasten with the four hexagon head screws M6 x 8 - 8.8 (F) with a screw wrench SW 10.

11. Secure the brake terminal box (A) to the fixing plate using the two screws M4 (B) and the screwdriver T20.
9 Enclosure

9.1 Technical data

<table>
<thead>
<tr>
<th>Motor type</th>
<th>SM225.45C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspension</td>
<td>1:1</td>
</tr>
<tr>
<td>typical payload*</td>
<td>800 kg</td>
</tr>
<tr>
<td>Rated torque</td>
<td>900 Nm</td>
</tr>
<tr>
<td>Maximum torque</td>
<td>1500 Nm</td>
</tr>
<tr>
<td>Permissible radial load</td>
<td>4000 kg</td>
</tr>
<tr>
<td>Rated brake torque</td>
<td>2 x 1000 Nm</td>
</tr>
<tr>
<td>Speed</td>
<td>1.6 m/s</td>
</tr>
<tr>
<td>Total weight</td>
<td>460 kg</td>
</tr>
</tbody>
</table>

| Traction sheave     |           |           |           |
| - Diameter          | 320 mm    | 400 mm    | 320 mm    |
| - Standard rope diameter | 8 mm | 10 mm    | 8 mm |
| - Standard number of grooves | 8 | 8 | 8 |
| - Standard groove distance | 17 mm |

Table shows typical data, other values possible.
Other rope diameters and groove distances are possible.
* Dependent on travel, compensation ropes may be necessary.

<table>
<thead>
<tr>
<th>Protection class</th>
<th>Protection class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor</td>
<td>IP 42</td>
</tr>
<tr>
<td>Absolute encoder</td>
<td>IP 40</td>
</tr>
<tr>
<td>Brake (electrical)</td>
<td>IP 54</td>
</tr>
<tr>
<td>Brake (mechanical)</td>
<td>IP 41</td>
</tr>
<tr>
<td>Complete machine without forced ventilation</td>
<td>IP 21</td>
</tr>
<tr>
<td>Forced cooling</td>
<td>IP 20</td>
</tr>
</tbody>
</table>
9.2 Dimension sheets
9.3 EC-/EU-Declaration of conformity

EC/EU declaration of conformity

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 fulfill 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:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN ISO 12100:2010</td>
<td>Safety of machine tools - General principles for design - Risk assessment and risk reduction</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 12015:2014</td>
<td>Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks - Emission</td>
</tr>
</tbody>
</table>
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).

(place and date of issue)

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

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

(signature)

(signature)
9.4 Operating instructions brake

SM450gb - rev 06/14

Electrically Released Brake
ERS FENIX 09 10-1000
ERS FENIX 09 10-1000 H/R
Declaration of conformity:
During the design of this product, the EU directives applicable were taken into account.
An attestation of conformity is available on request.
For incorporating the product, the manufacturer of a machine or system needs to take into account the EU directives applicable.

Summary of the directives and standards used:

**Directives:**
- 2006/95/CE Low voltage equipment directive
- 2004/108/CE Electromagnetic compatibility directive
- 95/16/CE Lifts directive

**Standards:**
- DIN VDE 0580 Electromagnetic devices and components, general requirements
- EN 81-1 Safety rules for the construction and installation lifts – Part 1: Electric lifts
- NFC 79300 Industrial electrical apparatus. Electromagnetic apparatus for mechanical applications requirements

CONTENTS

<table>
<thead>
<tr>
<th></th>
<th>Technical specifications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Precautions and restrictions on use</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Restrictions on use</td>
<td>5</td>
</tr>
<tr>
<td>2.1</td>
<td>Precautions and safety measures</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Installation</td>
<td>5</td>
</tr>
<tr>
<td>3.1</td>
<td>Transport - Storage</td>
<td>5</td>
</tr>
<tr>
<td>3.2</td>
<td>Handling</td>
<td>5</td>
</tr>
<tr>
<td>3.3</td>
<td>Installation</td>
<td>5-6</td>
</tr>
<tr>
<td>4</td>
<td>Maintenance</td>
<td>6</td>
</tr>
<tr>
<td>4.1</td>
<td>Air gap checking</td>
<td>6</td>
</tr>
<tr>
<td>4.2</td>
<td>Disc exchange</td>
<td>7-8</td>
</tr>
<tr>
<td>4.3</td>
<td>Microswitch setting</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>Electrical connection</td>
<td>8</td>
</tr>
<tr>
<td>5.1</td>
<td>Important advices</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>Spare parts</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>Tooling</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Troubleshooting</td>
<td>10</td>
</tr>
</tbody>
</table>
1 Technical specification

Without lever

![Fig. 1](image1)

![Fig. 2](image2)

With lever

![Fig. 3](image3)

![Fig. 4](image4)
### Table 1

<table>
<thead>
<tr>
<th>Warner Electric Europe reference</th>
<th>Ziehl-Abegg reference</th>
<th>1 12 107620</th>
<th>1 12 107621</th>
<th>1 12 107622</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque Nm</td>
<td>2 x 1000</td>
<td>2 x 1000</td>
<td>2 x 1000</td>
<td></td>
</tr>
<tr>
<td>Maximum speed min⁻¹</td>
<td>460</td>
<td>460</td>
<td>460</td>
<td></td>
</tr>
<tr>
<td>Nominal air gap mm</td>
<td>0,35</td>
<td>0,35</td>
<td>0,35</td>
<td></td>
</tr>
<tr>
<td>Maximum air gap after wear mm</td>
<td>0,65</td>
<td>0,65</td>
<td>0,65</td>
<td></td>
</tr>
<tr>
<td>Voltage VDC</td>
<td>207</td>
<td>110</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Resistance (1 magnet) Ω</td>
<td>273</td>
<td>73</td>
<td>3,9</td>
<td></td>
</tr>
<tr>
<td>Power (1 magnet) W</td>
<td>157</td>
<td>165</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Duty cycle ED</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Weight kg</td>
<td>82</td>
<td>82</td>
<td>82</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>Warner Electric Europe reference</th>
<th>Ziehl-Abegg reference</th>
<th>1 12 107751</th>
<th>1 12 107752</th>
<th>1 12 107753</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque Nm</td>
<td>2 x 1000</td>
<td>2 x 1000</td>
<td>2 x 1000</td>
<td></td>
</tr>
<tr>
<td>Maximum speed min⁻¹</td>
<td>460</td>
<td>460</td>
<td>460</td>
<td></td>
</tr>
<tr>
<td>Nominal air gap mm</td>
<td>0,35</td>
<td>0,35</td>
<td>0,35</td>
<td></td>
</tr>
<tr>
<td>Maximum air gap after wear mm</td>
<td>0,65</td>
<td>0,65</td>
<td>0,65</td>
<td></td>
</tr>
<tr>
<td>Voltage VDC</td>
<td>207</td>
<td>110</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Resistance (1 magnet) Ω</td>
<td>273</td>
<td>73</td>
<td>3,9</td>
<td></td>
</tr>
<tr>
<td>Power (1 magnet) W</td>
<td>157</td>
<td>165</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Duty cycle ED</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Weight kg</td>
<td>86</td>
<td>86</td>
<td>86</td>
<td></td>
</tr>
</tbody>
</table>
2 Precautions and restrictions on use
2.1 Restrictions on use

For the brake to comply with directive 95/16/EC, the integrator must observe the general conditions for installations and use as defined in the EC type certificate drawn up by the TÜV SÜD Industrie Service (see ASBV number in table 1 & 2), including the mandatory use of a speed limiting device, in compliance with EN 81-1 paragraph 9.9 subpoint 9.10.10.

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

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

This brake may only be used in a “horizontal axis”. The customer must be careful not to alter the factory-set air gap. This is in order to ensure the brakes may be properly released.

This brake is designed for a maximum ambient temperature of 40°C (magnet insulation 155°C). The maximum surface temperature on the brake should not exceed 100°C.

This brake is designed for static applications. Any dynamic braking is restricted to emergency braking and test braking. This brake can in no way replace the safety braking system used during lift descent.

2.2 Precautions and safety measures

During maintenance, make sure that the mechanism to be braked by the brake, is stopped and that there is no risk of it accidentally starting up. All intervention has to be made by qualified personnel, owning this manual.

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

When switching on DC-side the coil must be protected against voltage peaks.

Torque subject to decrease in case of water projection. Use of both brakes circuits mandatory.

Warning: The brake must be replaced after water projection.

For all other precautions and safety measures see SM451gb.

3 Installation
3.1 Transport - Storage

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

3.2 Handling

Avoid any impact to the brake so that its performance is not impaired.

When handling, use the threads for eye hooks intended for this purpose, see Fig.2 & 4.

Never lift the brake by its cables.

3.3 Installation

This brake is designed to operate in dry conditions. The friction faces must be completely clear of any oil, grease or abrasive dust.

Specifications for the customer’s friction face:
Material: Steel (150 to 250 HV) or Cast iron Roughness Ra 3.2
Protection: Phosphatizing (dry) or nitriding.

Geometric tolerance

Customer's shaft axis

The brake is delivered pre-assembled with pre-set microwithes and air gaps. Fixing screws, the hub and the O-rings are supplied separately. The O-rings are not preassembled on the hub.

• Put the hub into position on the costumer's shaft maximum fretting temperature: 150°C (keying P9)
• When the hub has cooled down, assemble the 2 shock absorbing O-rings lightly smeared with Vaseline (see Fig.1 & 3).

NOTA: hold the hub in axial direction (retainer).

• Engage the front disc on the hub as in Fig.1 & 3, the boss on the brake side.

Without Lever

• Engage magnet C
• Engage the rear disc on the hub as illustrated in Fig. 1, with the heel on the customer fixing flange side.
4. Maintenance

4.1 Air gap checking

Check the air gap at each maintenance inspection.

Reminder: This brake is intended for a static application as a safety brake. Any dynamic braking is restricted to emergency and test braking. Normal use will not lead to any noticeable wear on the lining.

Airgap has to be measured 4 times at the circumference, see Fig. 5.

The maximum value of the four has to be taken into account.

If the maximum value of the air gap is exceeded on one of the magnets (see table 1 & 2, page 4), change the 2 discs and the 2 O-rings (see chapter 4.2).
4.2 Disc exchange

During maintenance, make sure that the mechanism to be braked by the brake is stopped and that there is no risk of it accidentally starting up. All intervention has to be made by qualified personnel, owning this manual.

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

**Attention** not to damage the electric cables during the maintenance action.

- Disconnect the brake electrically.

**Without lever**

- Remove the fixation screws.
- Remove the brake.
- Clean the faces of friction with a clean and dry rag.

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

- After the worn friction discs are removed, assembly the brake according chapter 3.3.

**With lever**

- Disconnect the brake electrically.
- Remove the 2 first M12 screws.

- Put in place the 2 mounting pins.

- Remove the 2 last M12 screws and untight the lever axis to separate the 2 magnets (use internal hexagons 6mm on flats).

- Remove successively the magnet D, the friction disc D, the magnet C and the friction disc C.
- Replace Orings

**Warning:** Take care of losing parts.

- Put in place in this order, the new friction C, the magnet C, the new friction disc D and the magnet D.

Re-tight lever axis.

**Warning:** Respect the lever axis tightening torque.
• Re-tight 2 of 4 M12 brake fixing screws.

• Remove mounting pins and re-tight 2 last M12 brake fixing screws.

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

4.3 Microswitch setting

Warning: Be careful to select the microswitch corresponding with the magnet to be adjusted (see Fig. 6).

Slide a wedge 0,15mm thick close the screw in the corresponding air gap.

Switch on the current and tighten the adjusting screw H M5 (R/flat) in contact with the microswitch until you reach the commutation point.

Remove the wedge.

Check that it functions correctly by a few successive draws and releases.

5 Electrical connection

Brake ERS FENIX 09 10-1000 & ERS FENIX 09 10-1000 H/R operates on a direct current supply. Polarity does not effect on the working.

5.1 Important advices

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

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

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

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

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

Tolerances on the supply voltage at the brake terminals: +10% / -15% (NF C 79-300).

Operation microswitch

Current range 10mA min. to 100 mA max. at 24 VDC

Maximum electrical lifetime of the microswitch ensure only by switching under resistive load.

Microswitch connection
6  

Spare parts

<table>
<thead>
<tr>
<th>Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friction disc</td>
</tr>
<tr>
<td>O-ring</td>
</tr>
<tr>
<td>Microswitch</td>
</tr>
<tr>
<td>Dust cover</td>
</tr>
</tbody>
</table>

Please join to your spare part request, the reference an number brake (see example below)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Power</th>
<th>Production n*</th>
<th>Serial n*</th>
</tr>
</thead>
<tbody>
<tr>
<td>20Vdc</td>
<td>15W</td>
<td>722793-1</td>
<td>SM2</td>
</tr>
</tbody>
</table>

Warner Electric Europe reference

Reference    Nominal torque/100    Installed torque

--

CE Certification following 95/16/CE (TÜV SÜD Industry service)
EN81.1+A3 (UCMP) certification (TÜV SÜD Industry service)
## 7 Tooling

<table>
<thead>
<tr>
<th>Tooling</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeler gauges play</td>
<td>Microswitch setting</td>
</tr>
<tr>
<td>Torque wrench (measurement range &gt; 120 Nm avec hexagonal socket insert 10mm and 6mm A/F)</td>
<td>Brake and lever fixing screws</td>
</tr>
<tr>
<td>Metric hexagon key 6 A/F</td>
<td>Brake with lever disc exchange</td>
</tr>
<tr>
<td>Open jawed spanner 8mm A/F</td>
<td>Microswitch setting</td>
</tr>
<tr>
<td>Multimeter</td>
<td>Voltage checking</td>
</tr>
</tbody>
</table>

## 8 Troubleshooting

### Troubleshooting

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake does not release</td>
<td>• Voltage too low</td>
<td>• Re-set voltage</td>
</tr>
<tr>
<td></td>
<td>• Air gap too large</td>
<td>• Exchange 2 discs and 2 o ring (chapter 4.2)</td>
</tr>
<tr>
<td></td>
<td>• Disc worn</td>
<td>• Exchange 2 discs and 2 o ring (chapter 4.2)</td>
</tr>
<tr>
<td></td>
<td>• Coil damaged</td>
<td>• Replace the brake</td>
</tr>
<tr>
<td>Brake does not brake</td>
<td>• Voltage present at switch off position</td>
<td>• Check detection and customer power supply</td>
</tr>
<tr>
<td></td>
<td>• Matière grasse surfaces de friction</td>
<td>• Exchange 2 discs and 2 o ring (chapter 4.2)</td>
</tr>
<tr>
<td>Nuisance braking</td>
<td>• Holding voltage too low</td>
<td>• Re-set voltage</td>
</tr>
<tr>
<td></td>
<td>• Wrong information from microswitch</td>
<td>• Re-set detection</td>
</tr>
</tbody>
</table>

*Subject to alteration without prior notice*
9.5 EU declaration of conformity of the brake

This is to declare that the following safety device listed in appendix III point 2 of the directive 2014/33/EU

Product:  
Braking system

According to the following specification:

<table>
<thead>
<tr>
<th>Brake type</th>
<th>Part N°</th>
<th>Drawing N°</th>
<th>Voltage</th>
<th>Torque</th>
<th>EU type examination + NB</th>
<th>T10</th>
<th>T90</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERS VAR09  S2800/800</td>
<td>30343291</td>
<td>I-112108048- c/d</td>
<td>24 Vdc</td>
<td>2 x 800 Nm</td>
<td>EU-BD591 N80036</td>
<td>110 ms</td>
<td>240 ms</td>
</tr>
<tr>
<td>ERS VAR09  S2800/800</td>
<td>30343333</td>
<td>I-112108048- c/d</td>
<td>207 Vdc</td>
<td>2 x 800 Nm</td>
<td>EU-BD591 N80036</td>
<td>110 ms</td>
<td>240 ms</td>
</tr>
<tr>
<td>ERS VAR09  S2800/600</td>
<td>30343340</td>
<td>I-112108048- c/d</td>
<td>207 Vdc</td>
<td>2 x 600 Nm</td>
<td>EU-BD591 N80036</td>
<td>110 ms</td>
<td>240 ms</td>
</tr>
<tr>
<td>ERS VAR09  S2800 H/R</td>
<td>30343461</td>
<td>I-112108045- c/d</td>
<td>207 Vdc</td>
<td>2 x 800 Nm</td>
<td>EU-BD591 N80036</td>
<td>110 ms</td>
<td>240 ms</td>
</tr>
<tr>
<td>ERS VAR09  S1700/1200</td>
<td>30346146</td>
<td>I-112108138- c/d</td>
<td>207 Vdc</td>
<td>2 x 1200 Nm</td>
<td>EU-BD591 N80036</td>
<td>65 ms</td>
<td>155 ms</td>
</tr>
<tr>
<td>ERS VAR09  S1700/1200</td>
<td>30346145</td>
<td>I-112108138- c/d</td>
<td>24 Vdc</td>
<td>2 x 1200 Nm</td>
<td>EU-BD591 N80036</td>
<td>65 ms</td>
<td>155 ms</td>
</tr>
<tr>
<td>ERS VAR09  S1700/1200 H/R</td>
<td>30346144</td>
<td>I-112108141- c/d</td>
<td>207 Vdc</td>
<td>2 x 1000 Nm</td>
<td>EU-BD906 N80036</td>
<td>100 ms</td>
<td>160 ms</td>
</tr>
<tr>
<td>ERS FENIX  09 10-1000</td>
<td>30343395</td>
<td>I-112108041- c/d</td>
<td>207 Vdc</td>
<td>2 x 1000 Nm</td>
<td>EU-BD906 N80036</td>
<td>100 ms</td>
<td>160 ms</td>
</tr>
<tr>
<td>ERS FENIX  09 10-1000</td>
<td>30343417</td>
<td>I-112108041- c/d</td>
<td>24 Vdc</td>
<td>2 x 1000 Nm</td>
<td>EU-BD906 N80036</td>
<td>100 ms</td>
<td>160 ms</td>
</tr>
<tr>
<td>ERS FENIX  09 10-1000 H/R</td>
<td>30343419</td>
<td>I-112108037- c/d</td>
<td>207 Vdc</td>
<td>2 x 1000 Nm</td>
<td>EU-BD906 N80036</td>
<td>100 ms</td>
<td>160 ms</td>
</tr>
<tr>
<td>ERS VAR08  S21050/1000</td>
<td>30343705</td>
<td>I-112108060</td>
<td>180/90 Vdc</td>
<td>1000 Nm</td>
<td>EU-BD590 N80036</td>
<td>125 ms</td>
<td>260 ms</td>
</tr>
<tr>
<td>ERS VAR08  S21700/1550</td>
<td>30343612</td>
<td>I-112108111</td>
<td>207/103 Vdc</td>
<td>1550 Nm</td>
<td>EU-BD590 N80036</td>
<td>70 ms</td>
<td>200 ms</td>
</tr>
<tr>
<td>ERS VAR10  S22500/2500</td>
<td>30343459</td>
<td>I-112108033</td>
<td>207/103 Vdc</td>
<td>2500 Nm</td>
<td>EU-BD592 N80036</td>
<td>70 ms</td>
<td>170 ms</td>
</tr>
<tr>
<td>ERS VAR10  S25000/5000</td>
<td>30343936</td>
<td>I-112108072- c/d</td>
<td>207/103 Vdc</td>
<td>5000 Nm</td>
<td>EU-BD592 N80036</td>
<td>125 ms</td>
<td>255 ms</td>
</tr>
<tr>
<td>ERS VAR10  S25000/5800</td>
<td>30343941</td>
<td>I-112108072- c/d</td>
<td>207/103 Vdc</td>
<td>5800 Nm</td>
<td>EU-BD592 N80036</td>
<td>130 ms</td>
<td>300 ms</td>
</tr>
<tr>
<td>ERS VAR07 S2800/800 AZ</td>
<td>30315457</td>
<td>I-112108002</td>
<td>207 Vdc</td>
<td>2 x 800 Nm</td>
<td>EU-BD819/1 N80036</td>
<td>100 ms</td>
<td>150 ms</td>
</tr>
</tbody>
</table>
Year of manufacture: See brake label
Manufactured by: Warner Electric Europe

That has obtained the UE type examination N° (see table above) by the following notified body:

Notified body (NB)
TÜV SÜD Industrie Service GmbH
Westendstr. 199
D 80686 MÜNCHEN

Covered par the Quality Insurance attestation Module E N°2002/2820/013D delivered by the following body:

AFNOR Certification NB 0333
11 rue Francis de Pressensé
93571, La pleine St Denis Cedex France

9.6 EU type-examination certificate

**EU TYPE-EXAMINATION CERTIFICATE**

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

**Certificate No.:** EU-BD 906

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

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

**Manufacturer of the Test Sample:** WARNER Electric Europe
7, rue de Champfleur
BP 20095
49124 Saint Barthélemy d’Anjou - France

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

**Type:** ERS FENIX 09
**Size:** 06-____, 10-____

**Directive:** 2014/33/EU

**Reference Standards:** EN 81-20:2014
EN 81-50:2014

**Test Report:** EU-BD 906 of 2016-01-22

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

**Date of Issue:** 2016-01-22

**Date of Validity:** from 2016-04-20

[Signature and stamps]

Werner Rau
Certification Body "lifts and cranes"
Annex to the EU Type-Examination Certificate
No. EU-BD 906 of 2016-01-22

1 Scope of application

1.1 Use as braking device – part of 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

<table>
<thead>
<tr>
<th>Size</th>
<th>Permissible brake torque [Nm]</th>
<th>Max. tripping rotary speed of the traction sheave [rpm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>06-</td>
<td>1200 - 1900</td>
<td>300</td>
</tr>
<tr>
<td>06-</td>
<td>1200 - 1600</td>
<td>400</td>
</tr>
<tr>
<td>10-</td>
<td>1546 - 2904</td>
<td>300</td>
</tr>
<tr>
<td>10-</td>
<td>1319 - 2684</td>
<td>500</td>
</tr>
</tbody>
</table>

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.

\[
v = \frac{D_1 \times \pi \times n}{60 \times i}
\]

\[
v = \text{Tripping (rated) speed (m/s)}
\]

\[
D_1 = \text{Diameter of the traction sheave from rope’s centre to rope’s centre (m)}
\]

\[
\pi = 3.14
\]

\[
n = \text{Rotary speed (rpm)}
\]

\[
i = \text{Ratio of the car suspension}
\]

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

<table>
<thead>
<tr>
<th>Size</th>
<th>Nominal brake torque * [Nm]</th>
<th>Max. tripping rotary speed [rpm]</th>
<th>Maximum response times** [ms] with / without overexcitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>06-</td>
<td>(2 \times 950 = 1900)</td>
<td>300</td>
<td>(t_{10}) 180 / 160 / 260</td>
</tr>
<tr>
<td>06-</td>
<td>(2 \times 600 = 1200)</td>
<td>400</td>
<td>(t_{50}) 125 / 178 / 230</td>
</tr>
<tr>
<td>06-</td>
<td>(2 \times 800 = 1600)</td>
<td>400</td>
<td>(t_{90}) 155 / 210</td>
</tr>
<tr>
<td>10-</td>
<td>(2 \times 1000 = 2000)</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>10-</td>
<td>(2 \times 1200 = 2400)</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>10-</td>
<td>(2 \times 1400 = 2800)</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>10-</td>
<td>(2 \times 1000 = 2000)</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>10-</td>
<td>(2 \times 1300 = 2600)</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>

Interim values can be interpolated

Explanations:

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

** Response times:

\(t_{10}\) 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 EU Type-Examination Certificate
No. EU-BD 906 of 2016-01-22

1.2.2 Assigned execution features

<table>
<thead>
<tr>
<th>Size</th>
<th>Type of powering / deactivation</th>
<th>Brake control</th>
<th>Nominal air gap [mm]</th>
<th>Damping elements / adhesive foil integrated</th>
<th>Overexcitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>06-</td>
<td>Continuous current / continuous current end</td>
<td>serial or parallel</td>
<td>0.65</td>
<td>yes / yes</td>
<td>at double non-release voltage</td>
</tr>
<tr>
<td>10-</td>
<td>Continuous current / continuous current end</td>
<td>serial or parallel</td>
<td>0.65</td>
<td>yes / yes</td>
<td>at double non-release voltage</td>
</tr>
</tbody>
</table>

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 fulfill the requirements for a protection device.

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

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

An evidence must be enclosed with the technical documentation of the lift.

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

2.5 The respective identification drawing according to the following table shall be included to the EU type-examination certificate for the identification and information of the general construction and operation and distinctness of the approved type:

<table>
<thead>
<tr>
<th>Size</th>
<th>No. of the identification drawing</th>
<th>Date of stamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>06-</td>
<td>1 12 108011</td>
<td>09.03.2015</td>
</tr>
<tr>
<td>10-</td>
<td>1 12 107689</td>
<td>24.09.2012</td>
</tr>
</tbody>
</table>

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

3 Remarks

3.1 The brake moment effectively adjusted of one brake circuit will be marked at the blank after the type designation ERS FENIX 09 XX/ _ _ _ _ _ .

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

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

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 3
Annex to the EU Type-Examination Certificate
No. EU-BD 906 of 2016-01-22

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

3.5 This EU type-examination certificate was issued according to the following standards:
   – EN 81-20:2014 (D), part 5.6.6.11, 5.6.7.13
   – EN 81-50:2014 (D), part 5.7 and 5.8

3.6 A revision of this EU type-examination certificate is inevitable in case of changes or additions of the above mentioned standards or of changes of state of the art.
Enclosure to the EU Type-Examination Certificate
No. EU-BD 906 of 2016-01-22

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

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

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

- END OF DOCUMENT -
WARNER Electric Europe  
7, rue de Champfleur  
49124 St. Barthelemy d'Anjou  
France  

Your reference number:  
IS-FT1-MUC2r  
Christian Rühmeyer  
Tel: +49 69 5791-3459  
Fax: +49 69 5791-3337  
Tel: +49 69 5791-3459  
Christian.ruehmeyer@tuev-sued.de  

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.

<table>
<thead>
<tr>
<th>Type:</th>
<th>(EC) type-examination certificate</th>
<th>EU type-examination certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERS VAR08</td>
<td>ABV 590/3, ESV 500/5</td>
<td>EU-BD 590</td>
</tr>
<tr>
<td>Size: SZ200/</td>
<td>ABV 617/1, ESV 817</td>
<td></td>
</tr>
<tr>
<td>SZ100/</td>
<td>ABV 729/2, ESV 729/1</td>
<td></td>
</tr>
<tr>
<td>SZ170/</td>
<td>ABV 591/5, ESV 591/8</td>
<td></td>
</tr>
<tr>
<td>ERS VAR09</td>
<td>ABV 617/1, ESV 817</td>
<td>EU-BD 591</td>
</tr>
<tr>
<td>Size: SZ200/</td>
<td>ABV 729/2, ESV 729/1</td>
<td></td>
</tr>
<tr>
<td>SZ800/</td>
<td>ABV 591/5, ESV 591/8</td>
<td></td>
</tr>
<tr>
<td>SZ170/</td>
<td>ABV 591/5, ESV 591/8</td>
<td></td>
</tr>
<tr>
<td>ERS VAR09</td>
<td>Size</td>
<td>ABV 817/1, ESV 817</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 603/3, NL 11-400-1000-153-01 (R2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 892/2, NL 11-400-1000-153-01 (R1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 739/2, ESV 729/1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 811/2, NL 11-400-1000-153-02 (R2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 591/6, ESV 691/6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 691/6, ESV 691/6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 591/6, ESV 691/6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 591/4, ESV 691/6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ERS VAR10</th>
<th>Size</th>
<th>ABV 892/3, ESV 692/3</th>
<th>EU-BD 592</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ABV 892/2, ESV 892/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 694/2, ESV 694/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 829/1, ESV 829/1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ERS VAR15-02</th>
<th>Size</th>
<th>ABV 777/5, ESV 777/5</th>
<th>EU-BD 777</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ABV 777/3, ESV 777/3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ERS VAR07</th>
<th>Size</th>
<th>ABV 819/2, ESV 819/1</th>
<th>EU-BD 819</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ABV 828/2, ESV 828/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 843/1, ESV 843/1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 844/1, ESV 844/1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ERS VAR07</th>
<th>Size</th>
<th>ABV 819/2, ESV 819/1</th>
<th>EU-BD 819/1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ABV 826/2, ESV 826/2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 843, ESV 843</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 843/1, ESV 843/1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABV 844, ESV 844</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ERS FENIX 08</th>
<th>Size</th>
<th>ABV 905/1</th>
<th>EU-BD 905</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ABVB972</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ERS FENIX 09</th>
<th>Size</th>
<th>ABV 906/1</th>
<th>EU-BD 906</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ABVB973</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ERS FENIX 10</th>
<th>Size</th>
<th>ABV 907/1</th>
<th>EU-BD 907</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ABVB974</td>
<td></td>
</tr>
</tbody>
</table>

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 (ACP) 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 (ACP) 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 planned, 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

Christian Rührmeyer
Niederlassung München
Abteilung Fördertechnik
9.6.1 Statement concerning ESV-type-examination
The manufacturer confirms according to paragraph 2.6 of the type-examination certificate the compliance of the part with the examined brakes. The nominal brake torque is stated on the name plate. The response times are assigned to the brake torque in the type-examination certificate.

The increase of the indices (added with "/") of ABV or ESV certificates serves only the purpose of technical improvement and has been granted by the notified body under this condition.

ABV and ESV numbers are (except for the indices) always identical for the same kind of brake and the use of the ABV number always includes the ESV number, which is also assigned by the documentation.

9.7 Calculation of tripping speed

\[
\text{DTS} = \text{diameter of the traction sheave (table contains typical traction sheave diameters, other diameters can be recalculated linear)}
\]

\[
\text{Nbn} = \text{maximum nominal speed of the brake rotor}
\]

\[
\text{Nbmax} = \text{maximum trip torque of the brake rotor}
\]

\[
\text{Vn} = \text{maximum rated speed of the elevator}
\]

\[
\text{Vmax} = \text{maximum tripping speed of the elevator}
\]

<table>
<thead>
<tr>
<th>Type</th>
<th>DTS (mm)</th>
<th>Nbn (min⁻¹)</th>
<th>Nbmax (min⁻¹)</th>
<th>Vn (m/s)</th>
<th>Vmax (1:1) (m/s)</th>
<th>Vn (2:1) (m/s)</th>
<th>Vmax (2:1) (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>132</td>
<td>120</td>
<td>520</td>
<td>598</td>
<td>3.27</td>
<td>3.75</td>
<td>1.63</td>
<td>1.87</td>
</tr>
<tr>
<td>132</td>
<td>160</td>
<td>520</td>
<td>598</td>
<td>4.35</td>
<td>5.00</td>
<td>2.17</td>
<td>2.50</td>
</tr>
<tr>
<td>SM160A/B</td>
<td>160</td>
<td>384</td>
<td>441</td>
<td>3.22</td>
<td>3.69</td>
<td>1.61</td>
<td>1.85</td>
</tr>
<tr>
<td>SM160A/B</td>
<td>200</td>
<td>384</td>
<td>441</td>
<td>4.02</td>
<td>4.62</td>
<td>2.01</td>
<td>2.31</td>
</tr>
<tr>
<td>SM160A/B</td>
<td>210</td>
<td>384</td>
<td>441</td>
<td>4.22</td>
<td>4.85</td>
<td>2.11</td>
<td>2.42</td>
</tr>
<tr>
<td>SM160A/B</td>
<td>240</td>
<td>384</td>
<td>441</td>
<td>4.83</td>
<td>5.54</td>
<td>2.41</td>
<td>2.77</td>
</tr>
<tr>
<td>SM190</td>
<td>200</td>
<td>300</td>
<td>345</td>
<td>3.14</td>
<td>3.61</td>
<td>1.57</td>
<td>1.81</td>
</tr>
<tr>
<td>SM190</td>
<td>240</td>
<td>300</td>
<td>345</td>
<td>3.77</td>
<td>4.34</td>
<td>1.88</td>
<td>2.17</td>
</tr>
<tr>
<td>SM200C</td>
<td>160</td>
<td>300</td>
<td>345</td>
<td>2.51</td>
<td>2.89</td>
<td>1.26</td>
<td>1.45</td>
</tr>
<tr>
<td>SM200C</td>
<td>210</td>
<td>300</td>
<td>345</td>
<td>3.30</td>
<td>3.79</td>
<td>1.65</td>
<td>1.90</td>
</tr>
<tr>
<td>SM200C</td>
<td>240</td>
<td>300</td>
<td>345</td>
<td>3.77</td>
<td>4.34</td>
<td>1.88</td>
<td>2.17</td>
</tr>
<tr>
<td>SM200C</td>
<td>320</td>
<td>300</td>
<td>345</td>
<td>5.03</td>
<td>5.78</td>
<td>2.51</td>
<td>2.89</td>
</tr>
<tr>
<td>SM200C</td>
<td>400</td>
<td>300</td>
<td>345</td>
<td>6.28</td>
<td>7.23</td>
<td>3.14</td>
<td>3.61</td>
</tr>
<tr>
<td>SM200C</td>
<td>450</td>
<td>300</td>
<td>345</td>
<td>7.07</td>
<td>8.13</td>
<td>3.53</td>
<td>4.06</td>
</tr>
<tr>
<td>SM200C</td>
<td>500</td>
<td>300</td>
<td>345</td>
<td>7.85</td>
<td>9.03</td>
<td>3.93</td>
<td>4.52</td>
</tr>
<tr>
<td>SM225(B)</td>
<td>320</td>
<td>217</td>
<td>250</td>
<td>3.64</td>
<td>4.19</td>
<td>1.82</td>
<td>2.09</td>
</tr>
<tr>
<td>SM225(B)</td>
<td>400</td>
<td>217</td>
<td>250</td>
<td>4.54</td>
<td>5.24</td>
<td>2.27</td>
<td>2.62</td>
</tr>
<tr>
<td>SM225(B)</td>
<td>500</td>
<td>217</td>
<td>250</td>
<td>5.68</td>
<td>6.54</td>
<td>2.84</td>
<td>3.27</td>
</tr>
<tr>
<td>SM225(B)</td>
<td>600</td>
<td>217</td>
<td>250</td>
<td>6.82</td>
<td>7.85</td>
<td>3.41</td>
<td>3.93</td>
</tr>
<tr>
<td>SM225C</td>
<td>240</td>
<td>400</td>
<td>460</td>
<td>5.03</td>
<td>5.78</td>
<td>2.51</td>
<td>2.89</td>
</tr>
<tr>
<td>SM225C</td>
<td>320</td>
<td>400</td>
<td>460</td>
<td>6.70</td>
<td>7.71</td>
<td>3.35</td>
<td>3.85</td>
</tr>
<tr>
<td>SM225C</td>
<td>400</td>
<td>400</td>
<td>460</td>
<td>8.83</td>
<td>9.63</td>
<td>4.19</td>
<td>4.82</td>
</tr>
<tr>
<td>SM250.60B</td>
<td>320</td>
<td>400</td>
<td>460</td>
<td>6.70</td>
<td>7.71</td>
<td>3.35</td>
<td>3.85</td>
</tr>
<tr>
<td>SM250.60B</td>
<td>400</td>
<td>400</td>
<td>460</td>
<td>8.83</td>
<td>9.63</td>
<td>4.19</td>
<td>4.82</td>
</tr>
<tr>
<td>SM250.60B</td>
<td>500</td>
<td>400</td>
<td>460</td>
<td>10.47</td>
<td>12.04</td>
<td>5.24</td>
<td>6.02</td>
</tr>
<tr>
<td>SM250.60B</td>
<td>600</td>
<td>400</td>
<td>460</td>
<td>12.57</td>
<td>14.45</td>
<td>6.28</td>
<td>7.23</td>
</tr>
<tr>
<td>SM250D</td>
<td>440</td>
<td>400</td>
<td>460</td>
<td>9.22</td>
<td>10.60</td>
<td>4.61</td>
<td>5.30</td>
</tr>
<tr>
<td>SM250C</td>
<td>450</td>
<td>400</td>
<td>460</td>
<td>9.42</td>
<td>10.84</td>
<td>4.71</td>
<td>5.42</td>
</tr>
<tr>
<td>SM250C/D</td>
<td>500</td>
<td>400</td>
<td>460</td>
<td>10.47</td>
<td>12.04</td>
<td>5.24</td>
<td>6.02</td>
</tr>
<tr>
<td>SM250C/D</td>
<td>520</td>
<td>400</td>
<td>460</td>
<td>10.89</td>
<td>12.52</td>
<td>5.45</td>
<td>6.26</td>
</tr>
</tbody>
</table>
9.8 Shaft calculation

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

Type of the gearless machine: SM 225.45C
Manufacturer: Ziehl-Abegg AG, Heinz-Ziehl-Strasse 74653 Künzelsau - Germany
Examination number: G 567/1
Tested product: Traction sheave shaft including Shaft / Hub connections
Test Report of IFF ENGENEERING & CONSULTING GmbH dated 2013-01-09 (Page 1 – 17 and 30 pages of annex)
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
FKM-Guideline (2003), Analytical Strength Assessment of Mechanical Parts

Construction drawing: A-22-121-0175, Index A01 dated 2012-06-06
Material: Steel EN 10083-3:2007-01 – 42CrMo4+QT (1.7225+QT)
Steel EN 10083-3:2007-01 – 42CrMo4+QT (1.7225+QT)
Steel EN 10083-3:2007-01 – 50CrMo4+QT (1.7229+QT)

Permissible material of traction sheave
Cast iron EN 1561:2012-01 – EN-GJL-300 (5.1302), Steel EN 10083-2:2006-10 – C45+N (1.0503+N)

Or minimum permissible surface pressure according to DIN 6892, paragraph 5.1.2:
\[ p_{zul} = f_s \cdot f_h \cdot R_p \text{ respectively } p_{zul} = f_s \cdot R_{p0.2} \text{ or } p_{zul} = f_s \cdot R_m \]
\[ (f_s : f_h \text{ Table B1}) \]
\[ p_{zul} = 206 \text{ N/mm}^2 \]

Certificate:

Choose certainty. Add value.

Date: 2013-01-29
Our reference: IS-FBA-07/Gmbh
Document: 06_0657-
1_100130_nr.docx
This Document consists of 2 Pages.
Page 1 of 2

Excerpts from this document may only be reproduced and used for advertising purposes with the express written approval of TÜV SÜD Industrie Service GmbH.
The test results refer exclusively to the units under test.

TÜV SÜD Industrie Service GmbH
Zentralbereich Fördertechnik - Sonderteilen
Abteilung Aufzüge und Sicherheitsbaublöcke
Gottlieb-Daimler-Straße 7
70794 Pforzheim, Deutschland

A-TBA12_02-GB 1626 Part.-No. 01008585-GB (EU-BD 906) 60/64
Permissible material of **brake rotor**

No material specification from the manufacturer (Brake with EC type-examination)

<table>
<thead>
<tr>
<th>Details for the calculation, applicable to the event of load</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum permissible static load</td>
<td>( F_R )</td>
</tr>
<tr>
<td>Maximum torque of the installation</td>
<td>( M_{\text{max}} )</td>
</tr>
<tr>
<td>Maximum starting-up torque</td>
<td>( M_{\text{max}} )</td>
</tr>
<tr>
<td>Magnetic force</td>
<td>( F_{\text{magnetic}} )</td>
</tr>
<tr>
<td>Rated braking torque</td>
<td>( M_{\text{braking}} )</td>
</tr>
<tr>
<td>Maximum braking torque</td>
<td>( 1.5 \times M_{\text{braking}} )</td>
</tr>
<tr>
<td>Maximum nominal speed of rotation</td>
<td></td>
</tr>
</tbody>
</table>

**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-ETK2-13-0010 dated 2013-01-24. 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.

The material for the keyways C45+C has in the tempered cold drawn condition for the reference thickness according to DIN EN 10083-2 and DIN EN 10277-2 a yield strength of 490-500 MPa. Herewith the necessary surface pressure \( p_{\text{ac}} \) according to DIN 6892 with a sufficient safety of \( S = 1.2 \) is met.

The use of the material C45+C for the keys is permissible.

An installation free of stresses and a unmovable 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.

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.

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.

Prüflaboratorium für Produkte der Fördertechnik
Prüfbereich Aufzüge und Sicherheitsbauteile

The expert

Thoralf Mühlal

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

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.

Beispielhaftes Typenschild:

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.

Example for name plate:

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

Werte für mittlere Belastung:
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.

Kundenservice
Telefon +49 7940 16-308
Telefax +49 7940 16-249
drives-service@ziehl-abegg.com

Firmenzentrale
ZIEHL-ABEGG SE
Heinz-Ziehl-Straße
74653 Künzelsau
Deutschland
Telefon +49 7940 16-0
Telefax +49 7940 16-249
drives@ziehl-abegg.de
www.ziehl-abegg.com

Customer Service
phone +49 7940 16-308
fax +49 7940 16-249
drives-service@ziehl-abegg.com

Headquarters
ZIEHL-ABEGG SE
Heinz-Ziehl-Straße
74653 Künzelsau
Germany
phone +49 7940 16-0
fax +49 7940 16-249
drives@ziehl-abegg.de
www.ziehl-abegg.com