ZIEHL-ABEGG

Die Königsklasse

The Royal League

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

ZA top

SM200.40E
SM200.45E

Gearless permanent magnet synchronous motor

Original operating instructions

Store for future use!

ZIEHL-ABEGG

Content

1 General

Compliance with the following instructions is mandatory to ensure the functionality and safety of the product. If the following instructions given especially but not limited for general safety, transport, storage, mounting, operating conditions, start-up, maintenance, repair, cleaning and disposal / recycling are not observed, the product may not operate safely and may cause a hazard to the life and limb of users and third parties.
Deviations from the following requirements may therefore lead both to the loss of the statutory material defect liability rights and to the liability of the buyer for the product that has become unsafe due to the deviation from the specifications.

1.1 Meaning of the operating instructions

These operating instructions help you to work safely on and with the elevator machine ZAtop SM200.40E/SM200.45E. They contain safety instructions that must be complied with as well as information that is required for failure-free operation of the elevator machine.
The operating instructions must be stored in the vicinity of the elevator machine. It must be ensured that all persons who have to perform activities on the elevator machine can consult the operating instructions at any time. Instructions for use in accordance with the German Occupational Safety and Health Act and the German Work Equipment Ordinance must be provided in addition to these operating instructions.
Keep the operating instructions for continued use. They must be passed-on to all successive owners, users and final customers.

1.2 Target group

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

1.3 Exclusion of liability

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

1.4 Copyright

2 Safety instructions

2.1 General

The ZIEHL-ABEGG SE elevator machine is not a ready-to-use product and may only be operated after having been installed in machines or plants and its safety, depending on the application, has been ensured by protective grille, barriers, constructive devices or other adequate measures (see DIN EN ISO 13857)!
Installation, connection to the power supply and commissioning may only be performed by qualified service personnel! The relevant regulations must be observed!
Planners, manufacturers and operators of system parts or entire systems are responsible for the correct and safe mounting and a reliable operation.

2.2 Intended use

The ZAtop SM200.40E/SM200.45E is a permanent-magnet, gearless elevator machine, designed as an internal rotor motor for elevator with and without a machine room. The elevator machine is not designed for any use other than those listed here – this is considered improper use.
Applications other than the intended use of this elevator machine are not permitted without approval by ZIEHL-ABEGG SE.
Reading these operating instructions and complying with all instructions - especially the safety instructions - they contain is considered part of intended use. It also includes carrying out all the inspection work at the prescribed intervals.
Not the manufacturer, rather the operator of the ZAtop SM200.40E/SM200.45E is liable for any personal harm or material damage arising from non-intended use!

2.3 Pictographs

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

	**Danger!** General hazardous area. Death or severe injury or significant property damage can occur if the corresponding precautions are not taken!
	**Attention!** Risk of moderate or minor injury if the corresponding precautions are not taken!
CAUTION!	**Attention!** 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!
	**Info** Important additional information and advice for user.
	**Attention!** Danger by hot surface! Slight bodily harm is possible if the corresponding precautions are not taken!

2.4 Product safety

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

2.5 Requirements placed on the personnel / due diligence

Persons entrusted with the planning, installation, commissioning and maintenance and servicing in connection with the elevator machine must have the corresponding qualifications and skills for these jobs. Based on their training, knowledge and experience as well as knowledge of the relevant standards, they must be able to judge the work transferred to them and be able to recognize possible hazards.
In addition, they must be knowledgeable about the safety regulations, EU directives, rules for the prevention of accidents and the corresponding national as well as regional and in-house regulations.
Personnel undergoing training, instruction, or on apprenticeship may only work on the elevator machine under the supervision of an experienced person. This also applies to personnel in general training.
Comply with the legal minimum age.

2.6 General safety instructions

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

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

Attention!
▷ Depending on the operating conditions, the elevator machine can have high surface temperatures of > 80°C.
Risk of burns!
If the installation situation does not provide sufficient personal protection, then this must be provided by the customer in the form of additional measures.
If work has to be carried out on the elevator machine at normal operating temperature, suitable gloves must be worn.

Attention!
Warning of hand injuries!

▷ Risk of injury from reaching into the rope guard.

▷ Do not carry out any activities during operation.

▷ Only perform maintenance work on the elevator machine when stopped.

▷ The elevator machine is only to be operated within the ranges dened on the name plate of the motor!

▷ Use the elevator machine only in the authorised fashion and only for the tasks and flow media specified in the order!

▷ If the elevator machine is not energised, no electric torque is available. Releasing the brakes can cause uncontrolled acceleration of the elevator.
We recommend short-circuiting the windings of the de-energised elevator machine to generate a brake torque dependent on the speed.
In the event of a short-circuit, a short-circuit current of at least the level of the rated current is flowing.
The windings may not be short-circuited when the elevator machine is energised.

▷ Safety features, for example the brake release monitoring, may not be dismantled, circumvented or made inoperative!

▷ Thermistor installed in the winding act as protection against excess temperatures in the elevator machine and must be evaluated. When the thermistor are activated, the energy supply to the elevator machine must be switched off.

2.7 Operator's obligation of diligence

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

In particular, the operator must ensure that

▷ the elevator machine is used as intended (see chapter "Product overview")
▷ the installation is operated in a flawless, functional condition and the safety devices are periodically checked for their properly functioning condition
▷ The required personal safety gear is available to and used by the operating, maintenance and repair personnel
▷ the operating instructions are available at the location where the elevator machine is being used, are complete and are in legible condition
▷ sufficiently qualified and authorized personnel operate, maintain and repair the elevator machine
▷ these personnel receive regular instruction in all relevant industrial safety and environmental protection issues and are familiar with the operating instructions and the safety instructions they contain
▷ all safety and warning notices attached to the elevator machine are never removed and remain legible

2.8 Employment of external personnel

Maintenance and service work is frequently carried out by external personnel who are often unfamiliar with the specific circumstances and the resulting hazards.
These persons must be comprehensively informed about the hazards in their area of activity.
You must monitor their working methods in order to intervene in good time if necessary.

3 Product overview

3.1 Operational area

The ZAtop SM200.40E/SM200.45E is designed as a gearless elevator machine for traction sheave rope elevators.
Owing to its very compact design, the ZAtop SM200.40E/SM200.45E is ideal for machine roomless elevators.
The type-tested brake can be used as a:

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

3.2 Rating plate

The name plate for the ZAtop SM200.40E/SM200.45E elevator machines specify two values as nominal values for maximum / average nominal power, maximum / average nominal current, maximum / average nominal torque and on time at maximum / average load.
The first values in each case represent the maximum load for operation of the elevator (descending with empty car or ascending with full car). The second values stand for the average load for operation of the elevator.

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

Figure 3-2-01
Example name plate ZAtop SM200.40E/SM200.45E

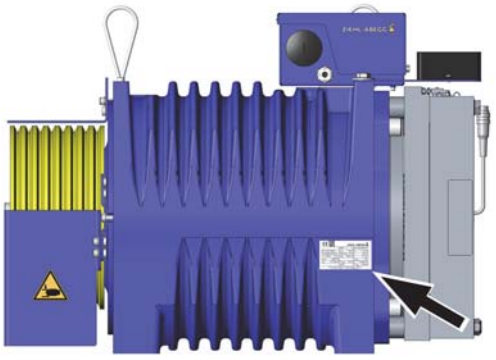


Figure 3-2-02
Name plate position

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

Table 3-2

Values for maximum load for operation of elevator (trip with full cabin down and with full cabin up):
600 Nm; 20 % on time; 12.1 kW; 30 A

Values for average load for operation of elevator:
420 Nm; 40 % on time; 8.4 kW; 21 A

Note:
The higher current value should be used when selecting the frequency converter and the cross-section of the motor cable.

3.3 Transport

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

▷ Check packing and elevator machine for possible damage and report the forwarding agency about any damages caused by transport. Shipping damages are not covered by our guarantee!
▷ Avoid excessive vibration and shockloads!
▷ Extreme heat or cold (transport temperature -20 °C to +60 °C) must be avoided!

3.3.1 Transport

▷ Transport the elevator machine in the original packing.

3.3.2 Lifting

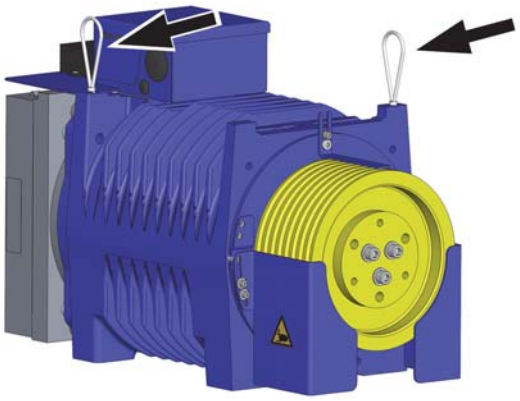


Figure 3-3-2-01 - Position of attachment points

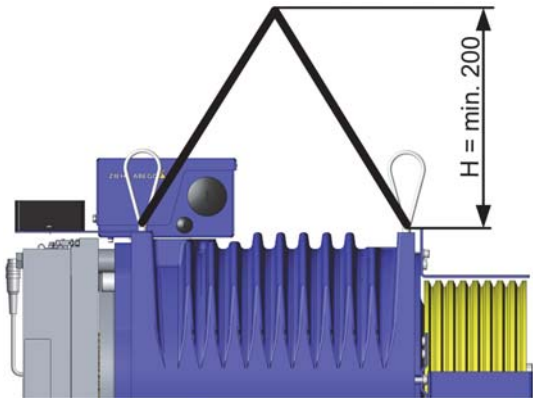


Figure 3-3-2-02 - Diagonal pull lifting gear

Lift the elevator machine:

▷ Only at the designated attachment points (see Figure 3-3-2-01).
▷ At all attachment points at the same time.
▷ Using suitable lifting gear.
▷ taking into account the distance H (see Figure 3-3-2-02).
▷ Correctly taking into account the centre of gravity.
▷ Without additional loads.

3.4 Storage

▷ Store the elevator machine in the original packaging in a dry area protected from the weather or protect it from dirt and weather until final mounting.
▷ Leave the VCI paper on the grooved surface of the traction sheave as corrosion protection until the elevator machine is installed.
▷ 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)!
▷ Maximum storage duration: 12 months
- Release brake
- Turn motor shaft manually
- Listen for unusual bearing noises

If the maximum storage duration is exceeded, the following procedure must be carried out after 12 months at 2-3 month intervals to prevent damage to the bearings:
- Release brake
- Turn motor shaft manually at least 3 turns in both directions to ensure even distribution of the bearing grease

If you encounter any irregularities, please contact ZIEHL-ABEGG SE customer service.

3.5 Disposal / recycling

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

4 Mechanical installation

4.1 General mounting advises

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

CAUTION!

Attention!

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

4.2 Fastening the elevator machine

▷ On the bottom side of the socket are 4 threads.
▷ To attach the elevator machine, use exclusively the following screw types:
4 hexagon head screws ISO 4014 - M20 - 8.8 or
4 hexagon head screws ISO 4017 - M20 - 8.8 or
4 cheese head screws ISO 4762 - M20 - 8.8
Tightening torque M20 - 8.8: 390 Nm.
▷ Screw-in depth of fixing screws:
Minimum 30 mm
Maximum 35 mm
▷ Fasten the screws crosswise in at least two steps to the required tightening torque.
▷ Unevenness of the mounting surface maximum 0.3 mm.
▷ The mounting surface has to be rigid and robust enough to withstand the forces.
▷ For the vibration decoupling of the elevator system, damping elements should be used.

4.3 Rope fitting

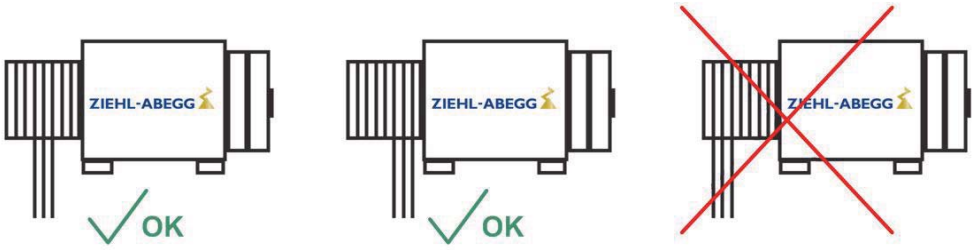


Figure 4-3-01 - Fitting the ropes

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

4.4 Rope pull

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

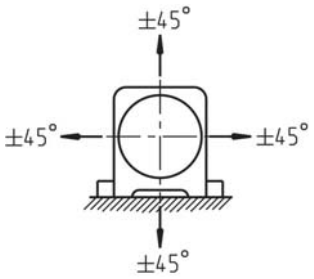


Figure 4-4-01 - Resulting rope force with lateral form lock support

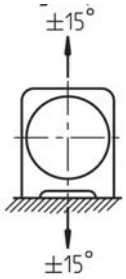


Figure 4-4-02 - Resulting rope force without lateral form lock support

4.5 Fastening rope guard

Attention!
Warning of hand injuries!

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

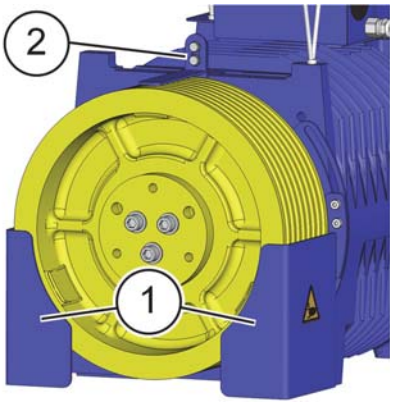


Figure 4-5-01 - Rope guard

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

Rope guard adjustability
The elevator machine is equipped with a fixed or adjustable rope guard depending on the angle of contact.

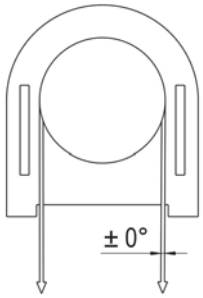


Figure 4-5-02 - For wrap angle 180°.

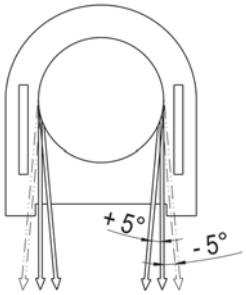


Figure 4-5-03 - Adjustability on both sides ± 5°.
Normal wrap angles 175° - 185°.

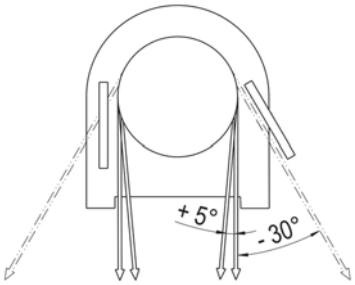


Figure 4-5-04 - Adjustability on both sides + 5°/- 30°.
Normal wrap angles 150° - 185°.

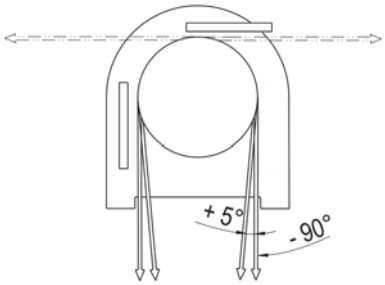


Figure 4-5-05 - Adjustability on both sides + 5°/- 90°.
Normal wrap angles 90° - 185°.

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

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

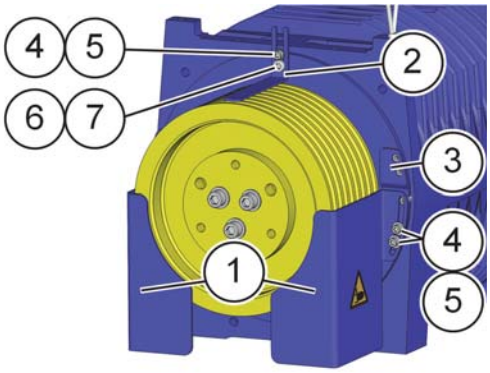


Figure 4-5-1-01 - Rope guard
for traction sheave diameter 160 mm - 240 mm

- ▷ The rope guard (1) is fastened in each case with two socket cap screws M6 x 12 - 8.8 (4) and washers (5) to the relevant fixing plate (3).
- ▷ The slotted hole in the rope guard (1) enables the required distance to the ropes to be set at the socket cap screws M6 x 12 - 8.8 (4).
  Tightening torque M6 - 8.8: 9.5 Nm
- ▷ The 3rd rope retainer (2) is attached to the housing with two cheese head screws M8 x 16 - 8.8 (6) and washers (7) or, for traction sheave diameter 240 mm with one cheese head screw M8 x 16 - 8.8 (6) and one cheese head screw M6 x 12 - 8.8 (4) and a washer (5).
- ▷ The slot in the 3rd rope retainer (2) enables the required distance to the ropes to be set using the relevant cheese head screws (6) or (4) and (6).
  Tightening torque M6 - 8.8: 9.5 Nm
  Tightening torque M8 - 8.8: 23 Nm

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

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

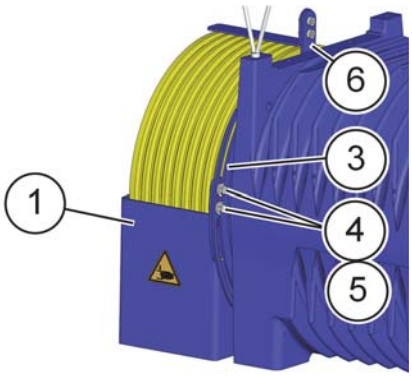


Figure 4-5-2-01 - Rope guard
for traction sheave diameter 320 mm

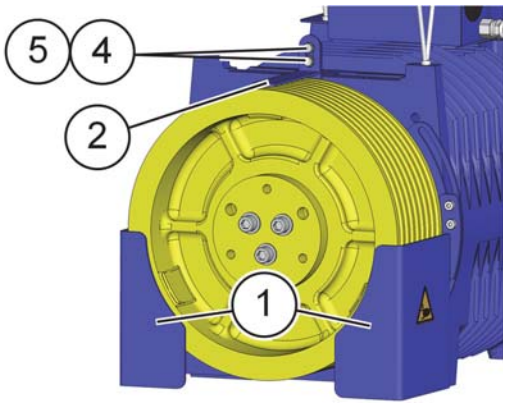


Figure 4-5-2-02 - Rope guard
optionale 3rd rope retainer

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

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

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

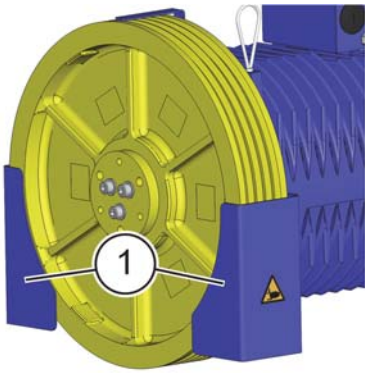


Figure 4-5-3-01 - Rope guard
for traction sheave diameter 400 mm - 500 mm

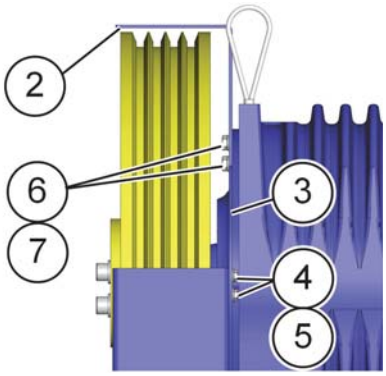


Figure 4-5-3-02 - Rope guard
optionale 3.rd rope retainer

▷ The rope guard (1) is fastened in each case with two hexagon head screws M6 x 12 - 8.8 (4) and washers (5) to the relevant fixing plate (3).
▷ Through the elongated holes in the fixing plate (3) enables the required distance to the ropes to be set at the hexagon head bolts M6 x 12 - 8.8 (4).
Tightening torque M6 - 8.8: 9.5 Nm
▷ The third rope retainer (2) is fastened with two hexagon head screws M8 x 16 - 8.8 (6) and washers (7) to the housing.
▷ The slotted hole in the 3. rope retainer (2) enables the required distance to the ropes to be set at the hexagon head screws M8 x 16 - 8.8 (6).
Tightening torque M8 - 8.8: 23 Nm

4.6 Patent situation

Note the patent situation when using elevator machines in a shaft. When using the ZAtop SM200.40E/SM200.45E in line with our installation suggestions there are no patent problems.
Many of the patents relating to installation in the shaft have now elapsed. Installation of the elevator machine in the shaft head is possible and the elevator machine may also protrude over the cab roof if the appropriate safety precautions have been taken.
However, you have a legal obligation to review the details of your elevator design in terms of the applicable patent law. In case of doubt, please contact ZIEHL-ABEGG SE for support.

5 Electrical installation

5.1 Safety precautions

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

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

Electrical equipment must be checked regularly: Loose connections are to be re-tightened and damaged cables must be replaced immediately.
Always keep switch cabinets and all electrical supply facilities locked. Access is only allowed for authorized persons using a key or special tool.

Never clean electrical equipment with water or similar liquids.

5.2 EMC Directive

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

5.3 motor

CAUTION!

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

5.3.1 Cable cross section

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

5.3.2 Type of cable

Always use shielded cables for the motor connection. Both rigid and flexible cables can be used.

5.3.3 Cable length

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

5.3.4 Mechanical connection conditions

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

Table 5-3-4

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

5.3.5 Connection

Danger!
The motor cable must be connected to the correct phase of the frequency inverter and the elevator machine: U -> U / V -> V / W -> W.
If the actual direction of travel does not correspond to the selected direction, the turning direction of the elevator machine must be changed in the frequency inverter configuration. If the motor cable is not connected to the correct phase, control of the elevator machine is not possible. It can result in jerky movements or uncontrolled acceleration of the elevator machine.

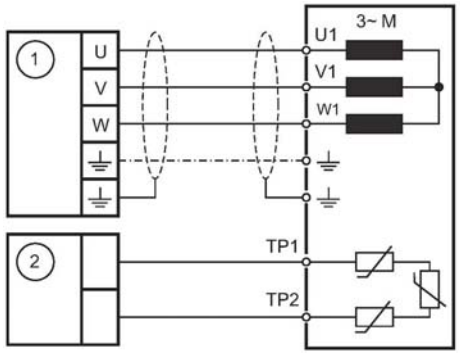


Figure 5-3-5-01
(1) Frequency inverter
(2) Motor temperature monitoring

5.3.6 Protective earth connection

In accordance with EN 50178 section 5.2.11 and 5.3.2.1 the protective earth connection must have a cross-section of at least 10 mm². In the case of protective conductors < 10 mm², an additional protective conductor must be connected. The cross-section must correspond at least to the cross-section of the protective conductor on the connecting cable.
Hexagon head screws M6 (see arrows) are available to connect the additional protective conductor.

Figure 5-3-6-01 - Protective earth connection

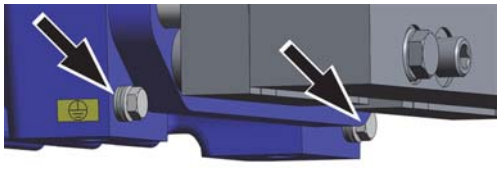


Figure 5-3-6-02 - Protective earth connection

When connecting the protective conductor (PE), make sure that it is connected correctly. **The contact disc (1) must be on the painted surface to ensure contact with earth.**

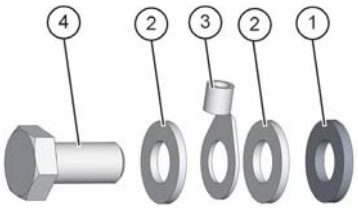


Figure 5-3-6-03 - Connecting the protective conductor

Set up the protective earth connection (PE) in the following order (see Figure 6-3-6-03):
1 - Contact disc
2 - Washer
3 - Cable lug
4 - Hexagon head bolt

5.3.7 Temperature monitoring

- The temperature monitoring by the PTC thermistor or temperature sensor (PT100) must be evaluated.
- Only connect to the inputs suitable for the relevant monitoring type.
- Maximum permissible test voltage for PTC thermistors: 2.5 VDC.
- When monitoring with a temperature sensor (PT100), the monitoring unit must be set to the limit value (° C) specified in the connection diagram.

5.3.7.1 Connection diagram with PTC thermistor (PTC)

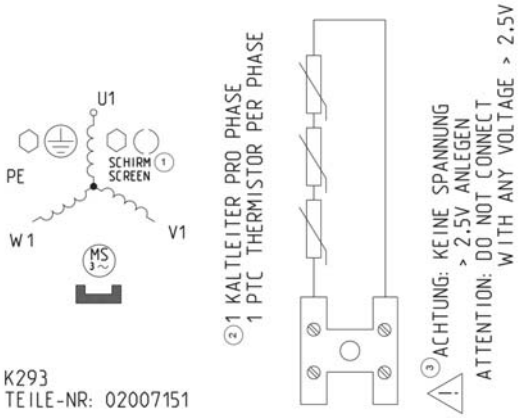


Figure 5-3-7-1-01
1 Shielding
2 1 PTC thermistor per phase
3 Attention: Do not apply any voltage > 2.5 V!

5.3.7.2 Connection diagram with temperature sensor (PT100)

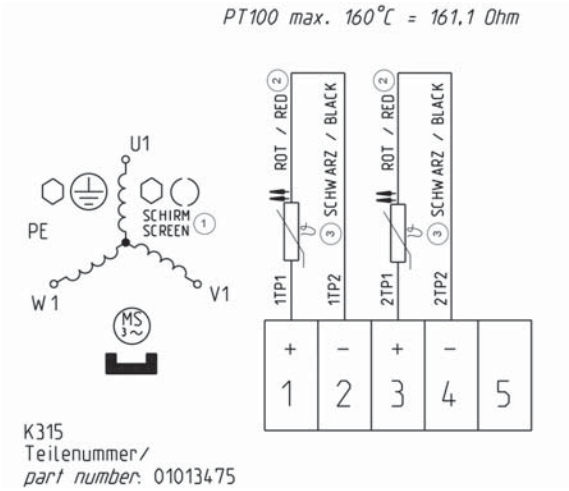


Figure 5-3-7-2-01
1 Shielding
2 red
3 black

5.4 Absolute encoder

Attention!

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

▷ You must discharge your own body before touching. This can be done, for example, by touching a conductive, earthed object (for example bare metal switch cabinet parts) immediately before.

▷ Operation of the elevator machine without an absolute encoder is not permissible.

5.4.1 Cable length

- Maximum line length: 25 m
- Connection and extension cable: Available as an option
- Connection and extension cable version: Shielded twisted pair cable

Absolute encoder			ECN1313 EnDat			ECN1313 SSI		AE-S64-BISSC-05-ZA	ERN1387			AE-S64-SinCos-07-AE
Adapter cables	Connection	Jumper M16 x 0.75 (SV120)	x			x			x			
		Jumper M23 x 1		x			x			x		
		Jumper D-SUB 15-pin			x			x			x	
		Wire-end sleeves										x
	Cable length	0.22 m										
		0.245 m	x	x		x	x		x	x		
		0.35 m									x	
		0.56 m	x			x						
		1.8 m			x							
		5.0 m						x				
		7.0 m										x
Connecting cable frequency inverter (optional)			x			x				x		
Extension cable (optional)			x		x	x		x		x	x	

Table 5-4-1

5.4.2 Connecting cable contact assignment

5.4.2.1 Absolute encoder ECN1313 EnDat/ECN1313 SSI

PIN			Function	Designation
Jumper M16 x 0.75 (SV120)	Jumper M23 x 1	Jumper D-SUB 15 pole		
A	14	1	DATA+	Data line for communication with the absolute encoder
B	17	2	DATA-	Data line inverse
C	1	3	Sensor Up	Voltage supply sensor cable (positive)
D	7	4	Up	Voltage supply +5 V DC
E	10	5	0 V	Power supply ground
F	12	7	B+	Analog track B (sine)
G	9	9	CLOCK-	Clock signal invers
H	8	10	CLOCK+	Clock signal for serial transfer
J	4	11	Sensor 0 V	Sensor cable for absolute encoder voltage (negative)
K	15	12	A+	Analog track A (cosine)
L	16	13	A-	Analog track A invers (cosine invers)
M	13	14	B-	Analog track B invers (sine invers)

Table 5-4-2-1

5.4.2.2 Absolute encoder AE-S64-BISSC-05-ZA

PIN	Function	Designation
Jumper D-SUB 15 pole		
1	DATA+	Data line for communication with the absolute encoder
2	DATA-	Data line inverse
3	-	-
4	VCC	Voltage supply +5 V DC
5	GND	Power supply ground
6	-	-
7	B+	Analog track B (sine)
8	-	-
9	CLOCK-	Clock signal invers
10	CLOCK+	Clock signal for serial transfer
11	-	-
12	A+	Analog track A (cosine)
13	A-	Analog track A invers (cosine invers)
14	B-	Analog track B invers (sine invers)
15	GND sense	Power supply ground

Table 5-4-2-2

5.4.2.3 Absolute encoder ERN1387

PIN			Function	Designation
Jumper M16 x 0.75 (SV120)	Jumper M23 x 1	Jumper D-SUB 15 pole		
A	5	11	C+	Commutation signal (cosine)
B	6	10	C-	Commutation signal inverse (inverse cosine)
C	14	12	D+	Commutation signal (sine)
D	10	9	Up	Voltage supply +5 V DC
E	7	7	0 V	Power supply ground
F	11	8	B+	Analog track B (sine)
G	4	13	D-	Commutation signal (inverse sine)
H	3	3	R+	Reference signal
J	13	4	R-	Reference signal inverse
K	1	5	A+	Analog track A (cosine)
L	2	6	A-	Analog track A invers (cosine invers)
M	12	1	B-	Analog track B invers (sine invers)

Table 5-4-2-3

5.4.2.4 Absolute encoder AE-S64-SinCos-07-AE

Wire-end sleeves	Function	Designation
Grey	C+	Commutation signal (cosine)
Pink	C-	Commutation signal inverse (inverse cosine)
Black	D+	Commutation signal (sine)
Brown	VCC	Voltage supply +5 V DC
White	GND	Power supply ground
Blue	B+	Analog track B (sine)
Violet	D-	Commutation signal inverse (inverse sine)
Grey/pink	Z+	Reference signal
Red/blue	Z-	Reference signal inverse
Green	A+	Analog track A (cosine)
Yellow	A-	Analog track A invers (cosine invers)
Red	B-	Analog track B invers (sine invers)

Table 5-4-2-4

5.4.3 Offset

▷ Unless otherwise agreed, the absolute encoder offset is set to 0. This is achieved by connecting DC voltage with **U to +** and **V and W to -**.

▷ The absolute encoder may not be mechanically detached to ensure that the factory settings are not lost. If the absolute encoder has been detached, a new absolute value encoder calibration must be performed with the frequency inverter. For details of the procedure, refer to the frequency inverter operating instructions.

5.5 Brake

Brake type ROBA®-twinstop® (RTW), size 800, 2 x 800 Nm

- Also refer to the operating instructions for the brake.

5.5.1 Operational area

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

5.5.2 Mechanical releasing

Mechanical release of the brakes is possible by using the manual hand release available as an option. A brake with a mechanical hand release system is available optionally. The hand release system cannot be fitted later. The complete brake must be replaced to retrofit the hand release system.
The brake circuits can be released separately from each other with a mechanical hand release system.

5.5.3 Release monitoring

- The brake release monitoring serves as monitoring for redundancy and the operation status of the brakes.
- **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.**
- Release monitoring for the brakes is carried out by a microswitch or inductive proximity switch. For technical data, see chapter "Appendix - Technical data - Microswitch or inductive proximity switch".

5.5.4 Brake control

5.5.4.1 Contactorless - ZAsbc4

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

5.5.4.2 Electromechanical contactors

Brake type	**RTW 800**
Operating voltage	207 V
Rectifier	Bridge rectifier*

Table 5-5-4-2
* *Bridge rectifier is not included in the scope of supply, it is available as option from ZIEHL-ABEGG SE as item 00154988*

To reduce noises during brake disconnect the brakes should be switched to the alternating current side (K4), while normal operation. The brakes are switched-off slower and thus quieter through the rectifier.
To ensure instantaneous brake application in emergencies, during inspection operation and return ride use a second contactor (K3), which disconnects the brake from the direct current side. Integrate this contactor into the safety circuit.

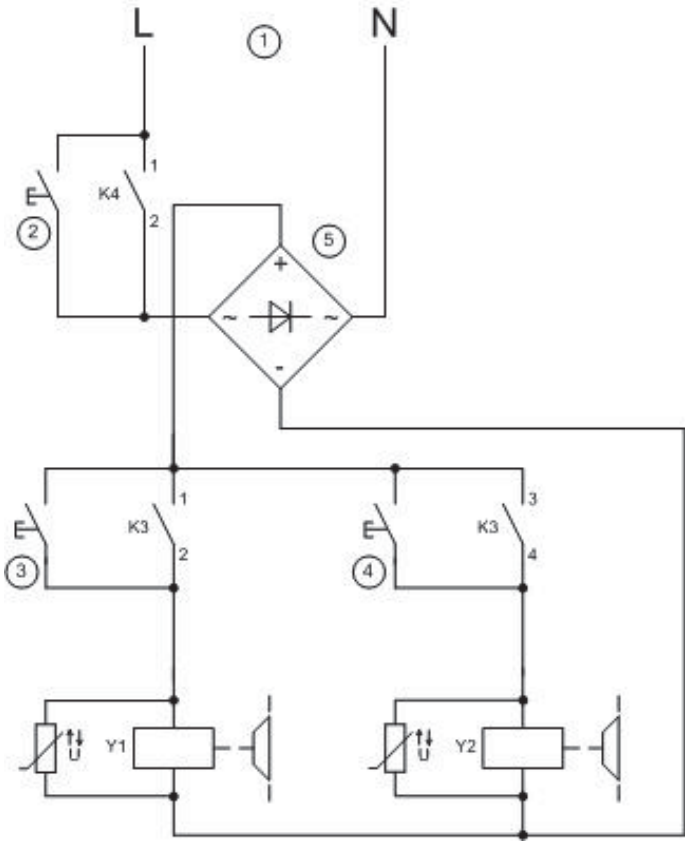


Figure 5-5-4-2-01 - Simplified diagram for brake control
(1) Voltage supply
(2) Button two circuit test
(3) / (4) "Open brake" button
(5) Rectifier
(K3) Brake contactor, activated by safety circuit
(K4) Brake contactor, activated by control or frequency inverter

5.5.5 Connection

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

5.5.6 Connection diagram

Brake wiring diagram with micro switch

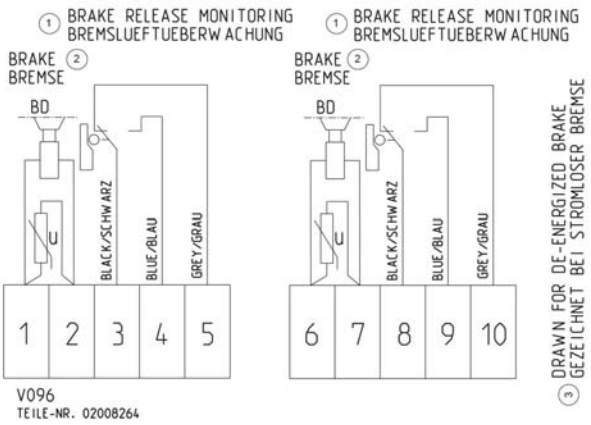


Figure 5-5-6-01
(1) Brake release monitoring
(2) Brake
(3) Shown with currentless brake

Brake wiring diagram with inductive proximity switch

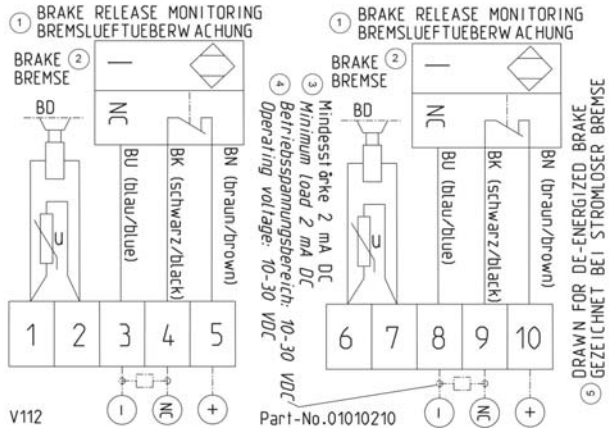


Figure 5-5-6-02
(1) Brake release monitoring
(2) Brake
(3) Minimum strength 2 mA DC
(4) Operating voltage range 10 - 30 V DC
(5) Shown with currentless brake

5.6 Forced ventilation

The forced ventilation is optional and can be added afterwards.

5.6.1 Technical data

Voltage	220 - 240	[V]
Frequency	50 / 60	[Hz]
Power	20 / 19	[W]
Current	0.125 / 0.11	[A]

Table 5-6-1

5.6.2 Connection diagram

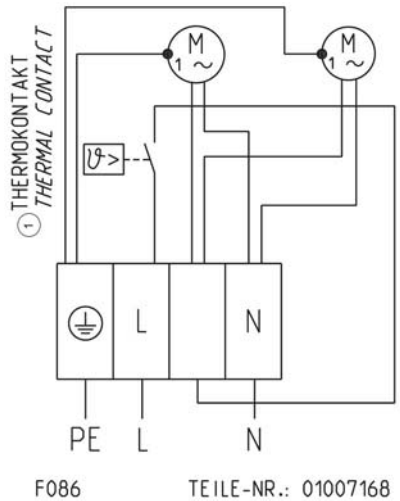


Figure 5-6-2-01
(1) Thermal contact

6 Commissioning

6.1 Operating conditions

▷ The elevator machine must be installed in a not free accessible machine room or a closed hoistway.
▷ Be aware of the protection class specified on the name plate.
▷ Do not operate the elevator machine in an explosive atmosphere.
▷ For all usage conditions that differ from the order, please contact ZIEHL-ABEGG SE.

6.2 First Start-up

Before first-time start-up, check the following:
▷ Installation and electrical connection have been properly completed.
▷ Safety devices are installed.
▷ All leftover installation materials and other foreign materials have been removed.
▷ The protective earth is connected.
▷ Temperature monitoring is evaluated.
▷ Cable entries closed.
▷ Mounting, installation position and accessories are o.k.
▷ Connection data corresponds to the data on the name plate.

6.3 Tests

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

6.3.1 Half load test with current measurement

The test for the 50 % weight compensation should preferably be carried out as follows:
▷ The motor current is to be measured in both travel directions with a half load.
▷ The measured currents should correspond as closely as possible.
▷ The difference between the measured currents should not show a variation of more than 10 %.

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

6.3.2 Testing the brake in accordance with EN 81-20:2020

▷ To test only the effect of the brake, the short-circuit of the motor windings, if installed, must be disabled.
▷ For the test, the cabin should be positioned in the centre 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.
▷ If the elevator machine is driven upwards with a load of 125%, approx. 2.5 x more losses occur than with a 100 % load, which accordingly leads to a rapid heating of the motor. As there is no switch-off in case of overheating during travel, a trip may only be of short duration.
ZAtop SM132/ZAtopx BD132: maximum 10 seconds
ZAtop SM180/ZAdisc SL506/ZAdisc SL510: maximum 15 seconds
ZAtop SM190/SM200/SM210/SM225/SM250: maximum 20 seconds
ZAsyn2 500AL/ZAsyn 700AL/ZAsyn 860AL: maximum 20 seconds
▷ Longer travel at 125 % nominal load due to a low inspection speed and/or a high travel distance is not permitted.
▷ To avoid this problem, we recommend transporting the test load upwards in 2 parts and with a 125 % load only downwards.

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

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

If the circuit is designed in accordance with the principle circuit diagram:
▷ At the nominal speed, press one of the buttons and hold it down until the elevator has stopped.
▷ Repeat the test with the other button to test the second brake circuit.

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

6.4 Pull out of safety gear

If the cabin loaded with rated load is caught by the trap due to a failure or during the acceptance inspection, the capture device could be very tight. In this case it is quite possible that the elevator machine torque is insufficient to pull the cabin out of the trap.
With gearless elevator machines in the shaft, the elevator machine is usually not accessible. A handwheel is unnecessary in such a layout.
With gearless elevator machines in machine rooms, a handwheel does not make any sense because there is no gear reduction. That is because due to the low moment arm of force, only slight force can be applied. A handwheel could even present a hazard, as even with only a slight imbalance in the installation, it is no longer possible to stop the elevator with the handwheel.
For both cases involving gearless elevator machines:
▷ If the elevator machine torque or the traction conditions are not sufficient, a block and tackle or similar device should be used.
▷ Suitable block and tackle should be provided.

Note
Note that an overload in the car leads to an increase in the motor torque. 25 % overload results in 150 % of the required motor torque! As regulated elevator machines are normally designed for a maximum torque of ca. 170 - 200 % rated torque, only slight reserves are available during such special cases.
Correspondingly, section **6.3.4 "Capture device on the cabin"** in **EN 81-20:2020** must be followed: “In order to facilitate disengagement of the safety gear, it is recommended that the test be carried out opposite a door in order to be able to unload the car.”

6.5 Emergency evacuation

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

6.5.1 Emergency evacuation by release of the brakes

In case of power failure or failure of the recovery control, emergency rescue is only possible by releasing the brakes. The brake can be released by an electrical emergency power supply or, if available, by a manual hand release.
When the brakes are released manually, the elevator moves in the direction of the greater weight. If there is a balance between the cabin and the counterweight, the cabin must be made heavier by suitable means.

To reduce the acceleration of the elevator, we recommend short-circuiting the motor windings for the evacuation. The short-circuit is generated by the motor contactors or an electronic circuit, as in the frequenzy inverter type ZAdyn 4C. This is always effective even in the event of a power failure.
The short-circuit generates a speed-dependent braking torque. The maximum braking torque is achieved at lower speeds.
Depending on the system type and weight ratios, it is possible that due to the short-circuit generated braking torque is not sufficient to limit the lift speed. So the speed must be monitored closely during evacuation and evacuation interrupted if necessary.
Releasing of the brake can be ended when a floor is reached. Now the elevator door can be opened with a triangular key.
The elevator manufacturer's safety instructions have priority!

6.5.2 Releasing of the brake with the lever for hand release

A brake with a mechanical hand release system is available optionally. The hand release system cannot be fitted later. The complete brake must be replaced to retrofit the hand release system.
The brake circuits can be released separately from each other with a mechanical hand release system.
The levers for hand release can be attached in 45° steps.

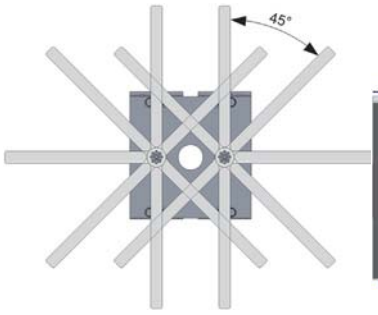


Figure 6-5-2-01
Possible insertion positions of the levers for hand release

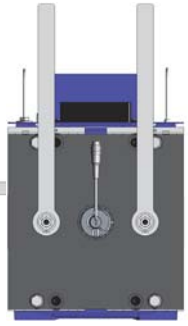


Figure 6-5-2-02
Brake not opened
Example for hand release lever position

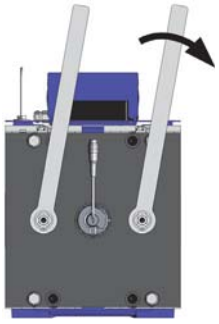


Figure 6-5-2-03
Brake manuell released
Example for hand release lever position

▷ Attach the levers for hand release to the brake in any position.
▷ The brake is released via simultaneous movement of both levers for hand release. The direction is not of any significance in this regard.
▷ The brake is fully open at an angle of approx. 20° - 25°.

Danger!
Operate the hand release system carefully.
Operating the hand release system starts movement of the loads.

Info
Carefully operate the lever for hand release until the traction sheave or the car starts to move.
A significant increase in the force exerted on the levers for hand release can result in irreparable damage to the components.

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

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

6.5.4 Automatic emergency evacuation

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

7 Faults and remedy

Excessive temperature / Temperature protection trips

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

Table 7

8 Service and maintenance

8.1 General notes on maintenance

▷ Observe the safety-at-work regulations!
▷ Disassembly of the elevator machine is not permissible.
▷ Never use a high-pressure cleaner (for example steam jet cleaner) for cleaning the elevator machine!
▷ Take note of abnormal operating noise.
▷ The bearings have a lifetime lubrication. There is no possibility to relubricate. Maintenance is not necessary for the bearings.

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

8.2 Inspection intervals

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

Table 8-2

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

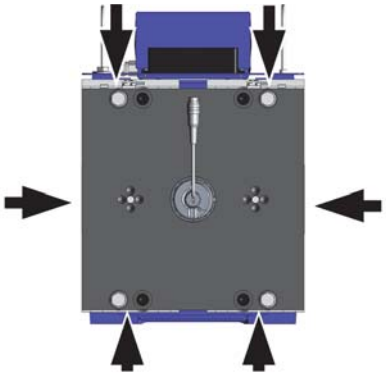


Figure 8-2-1-01 - Air gap measurement position

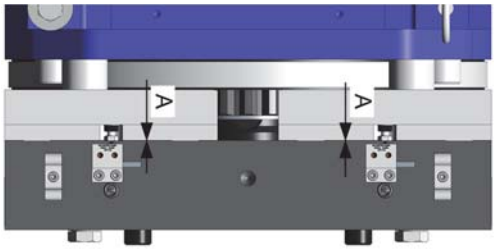


Figure 8-2-1-02 - Air gap measurement

1. The air gap "A" has to be measured three times at the circumference (see arrows) of both brakes. The maximum value of the four has to be taken into account.
2. If the maximum value of the air gap "A" is exceeded on one of the magnets, it must be replaced both brake rotors and the appendant O-rings.
   Maximum admissible air gap "A" after wear: 0.8 mm!
   Caution!
   Feeler gauge do not introduce more than 10 mm into the air gap, to avoid damage to the dampers of noise or deterioration by the springs.

8.3 Spare parts

Spare parts and accessories that were not supplied by ZIEHL-ABEGG SE have not been tested or approved. The function and quality of such parts may therefore be sub-standard and have a negative influence on the function or safety of the elevator machine. ZIEHL-ABEGG SE will accept no liability or warranty for damages resulting from use of unapproved spare parts.

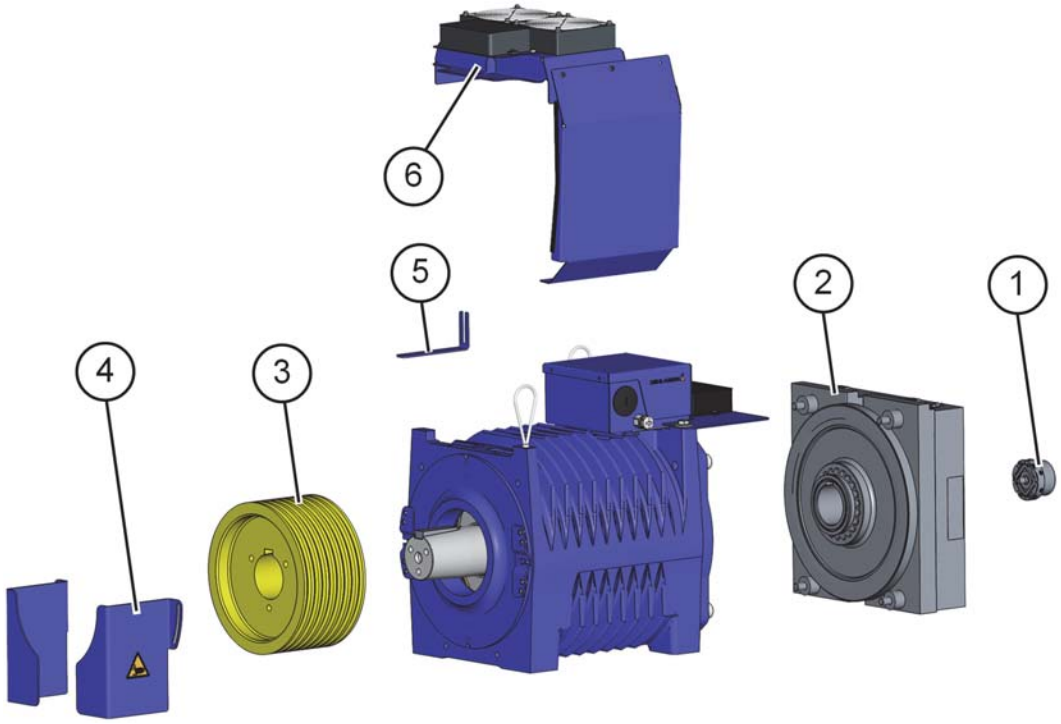


Figure 8-3-01 - Spare parts

Available spare parts:

1. Absolute encoder
2. Complete brake
   2.1 Brake rotors with O-rings
   2.2 Micro switch for brake
   2.3 Inductive proximity switch for brake
3. Traction sheave
4. Rope guard
5. Rope retainer
6. Forced ventilation

Spare parts are supplied with replacement instructions:

▷ Replacement of the absolute encoder, see A-TIA17_02-D-GB
▷ Replacement of the brake, see A-TIA21_04-D or A-TIA21_04-GB
▷ Replacement of thetraction sheave, see A-TIA19_02-D-GB
▷ Replacement of the forced ventilation, see A-TIA21_05-D-GB

9 Enclosure

9.1 Technical data

9.1.1 motor

Motor type		**ZAtop SM200.40E**		**ZAtop SM200.45E**	
Suspension		1:1	2:1	1:1	2:1
Typical payload*	[kg]	800	1600	800	1600
Rated torque	[Nm]	600		710	
Maximum torque	[Nm]	1000		1200	
maximum short circut torque	[Nm]	480 at 25 rpm		480 at 25 rpm	
permissible radial load	[kg]	3300		3300	
Speed	[m/s]	1.6		1.6	

Table 9-1-1

Table shows typical data, other values possible.
* Dependent on travel, compensation ropes may be necessary.

9.1.2 Traction sheaves

- Diameter	[mm]	160	200	240	240	320	400	500
- Width	[mm]	143	106	124	173	122	95	90

Table 9-1-2

9.1.3 Protection rating

Component	Protection rating
motor	IP 21
Forced ventilation	IP 20
Absolute encoder	IP 40
Brake (electrical)	IP 54
Brake (mechanical)	IP 10
Complete machine	IP 21

Table 9-1-3

9.1.4 Ambient conditions

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

Table 9-1-4

9.1.5 Brake

Brake type		**RTW 800 (information for each brake circuit)**
Brake torque	[Nm]	800
Operating voltage	[V DC]	207
Power	[W]	131
Electrical protection rating		IP 54
Mechanical protection rating		IP 10

Table 9-1-5

9.1.5.1 Micro switch

Minimum switching capacity	[mA / V DC]	10 / 12
Maximum rating	[A / V AC]	3 / 250
Recommended rating	[mA / V DC]	10 - 50 / 24

Table 9-1-5-1

9.1.5.2 Inductive proximity switch

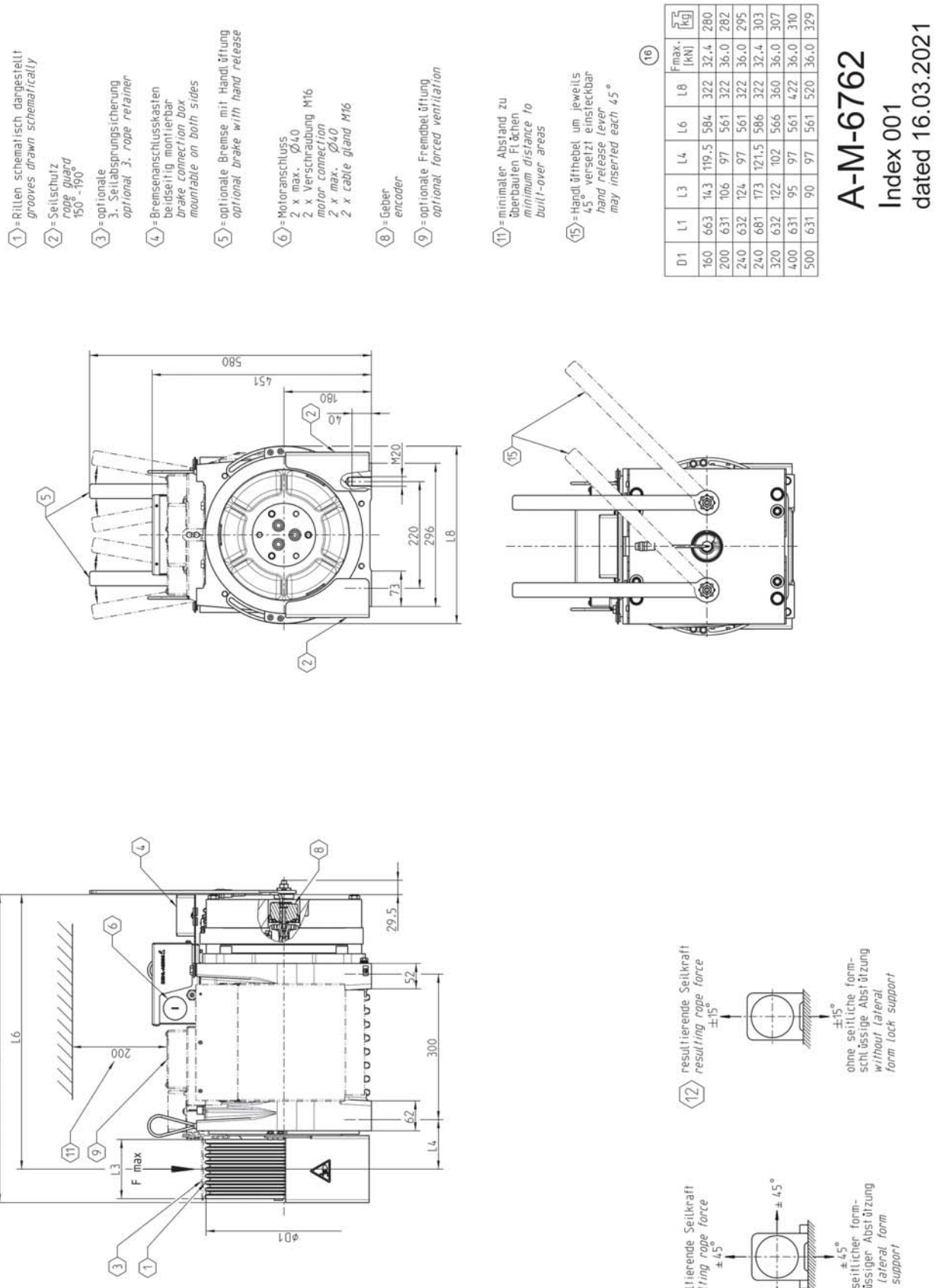
Operating voltage	[V DC]	10 - 30
Rated operating current	[mA DC]	100
Output functions		NC contact / gauge zero

Table 9-1-5-2

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

9.2 Dimension sheet

9.2.1 Dimension sheet ZAtop SM200.40E/SM200.45E



D1	L1	L3	L4	L6	L8	Fmax. [kN]	m [kg]
160	663	143	119.5	584	322	32.4	280
200	631	106	97	561	322	36.0	282
240	632	124	97	561	322	36.0	295
240	681	173	121.5	586	322	32.4	303
320	632	122	102	566	360	36.0	307
400	631	95	97	561	422	36.0	310
500	631	90	97	561	520	36.0	329

9.2.2 Legend for dimension sheet

1 Number of grooves represented schematically
2 Rope guard 150° - 190°
3 Optional 3rd rope retainer
4 Brake connection box mountable on both sides
5 Optional brake with hand release system
Lever for hand release can be attached in 45° steps.
6 Motor connection
2 x maximum Ø 40
2 x Cable gland M16
8 Encoder
9 Optional forced ventilation
11 Minimum distance to built-over area
12 Resulting rope force without lateral form lock support
13 Resulting rope force with lateral form lock support
15 Lever for hand release can be attached in 45° steps
16 Axle load $F_{max.}$

9.3 EC/EU declaration of conformity

- Translation -
(english)

A-KON16_01-GB
2021/28 Index 003

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

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

Product description: **ZAtop** Gearless elevator machine

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

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

Valid from serial number: 21010001/1 or higher

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

Machinery directive 2006/42/EC

EMC Directive 2014/30/EU

The following harmonized standards have been applied:

EN ISO 12100:2010	Safety of machine tools - General principles for design - Risk assessment and risk reduction
EN 60034-1:2010 + AC:2010	Rotating electrical machines - Part 1: Rating and performance
EN 81-20:2020	Safety rules for the construction and installation of elevators - Lifts for the transport of persons and goods - Part 20: Passenger and goods passenger elevators
EN 60204-1:2018	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

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

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

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

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

Künzelsau, 13.07.2021
(place and date of issue)

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

(signature)

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

(signature)

9.4 Operating instructions brake

Installation and Operational Instructions for ROBA®-twinstop® Type 8012.05_13 Size 800

(E028 10 410 000 4 EN)

Design according to

Drawing number	Article number with release monitoring Microswitch	Article number with release monitoring Proximity switch	Hand release	Type
E028 10 410 000 114	8286241	8288452	yes	8012.05113
E028 10 410 000 115	8286301	8286302	no	8012.05013

Please read these Operational Instructions carefully and follow them accordingly!

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

Contents:

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

Installation and Operational Instructions for ROBA®-twinstop® Type 8012.05_13 Size 800

(E028 10 410 000 4 EN)

Safety and Guideline Signs

DANGER

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

CAUTION

Danger of injury to personnel and damage to machines.

Please Observe!
Guidelines on important points.

Certification

EU Type Examination Certificate (Elevator Directive): EU-BD 1112

Guidelines on the Declaration of Conformity
A conformity evaluation has been carried out for the product (electromagnetic safety brake) in terms of the EU Low Voltage Directive 2014/35/EU and the RoHS 2011/65/EU with 2015/863/EU. The Declaration of Conformity is laid out in writing in a separate document and can be requested if required.

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

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

Guidelines on the EU Directive 2011/65/EU (RoHS II) with 2015/863/EU (RoHS III – from 22 July 2019)
These restrict the use of certain hazardous substances in electrical and electronic devices as well as in products / components (category 11), the proper operation of which is dependent on electric currents and electromagnetic fields.
Our electromagnetic products / components fulfill the requirements laid down in the RoHS Directive(s), taking into account the valid exceptions (according to Appendix III and IV RoHS (2011/65/EU) with delegated Directives (EU) 2018/739-741 from 01.03.2018 for Category 11 – until 21 July 2024) and comply with the RoHS.

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

Guidelines on the REACH Regulation (EC) No. 1907/2006
of the European Parliament and of the Council Concerning the Registration, Evaluation, Authorization and Restriction of Chemicals. This regulates the manufacture, placing on the market and use of chemical substances in preparations, under certain conditions also pertaining to substances in products. *mayr*® power transmission exclusively manufactures products (articles: clutches/couplings, electric motors, brakes and the appropriate rectifiers) in accordance with the definition in Article 3 Section 3 of the REACH Regulation. In some products (ROBA-stop®, Sizes 2 – 11, Type 8 - -.- - -.- / ROBA-stop®-M, Sizes 2 – 500, Type 891.- - -.- / ROBA-stop®-silenzio®, Sizes 4 – 8, Type 896.- - -.- - / ROBA®-topstop®, Sizes 100 – 260, Type 899.- - -.- -), shoulder screws are installed which are made from a copper alloy containing up to 2.5 % by weight lead. Products made from copper and copper alloys do not fall within the area of applicability of Regulation (EC) No. 1272/2008 of the European Parliament and Council Concerning the Classification, Labeling and Packaging of Substances and Mixtures (CLP Regulation) and are therefore not subject to the classification and labeling obligations. We would hereby like to point out that the proportion of lead used here is not prohibited according to the REACH Regulation. It is merely necessary to declare the use of this substance.

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012.05_13 Size 800

(E028 10 410 000 4 EN)

Safety Regulations

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

General Guidelines

DANGER

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

Brakes may generate further risks, among other things:


Hand injuries


Danger of seizure


Contact with hot surfaces


Magnetic fields

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

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

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

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

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

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

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

Guidelines for Electromagnetic Compatibility (EMC)

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

Application Conditions

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

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

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

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

CAUTION

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

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012.05_13 Size 800

(E028 10 410 000 4 EN)

Safety Regulations

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

Dimensioning

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

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

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

Climate Conditions

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

CAUTION

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

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

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

CAUTION

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

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

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

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

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

CAUTION

Temperatures of over 80 °C on the brake mounting flange can have a negative effect on the switching times, the braking torque levels and the noise damping behavior.

Intended Use

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

Grounding Connection

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

Class of Insulation F (+155 °C)

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

Protection

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

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

Brake Storage

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

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

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

Handling

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

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012.05_13 Size 800

(E028 10 410 000 4 EN)

Safety Regulations

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

User-implemented Protective Measures:

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

Standards, Directives and Regulations Used and To Be Applied

DIN VDE 0580	Electromagnetic devices and components, general specifications
2014/35/EU	Low Voltage Directive
2011/65/EU	RoHS II - Directive
2015/863/EU	RoHS III- Directive
CSA C22.2 No. 14-2010	Industrial Control Equipment
UL 508 (Edition 17)	Industrial Control Equipment
2014/33/EU	Elevator Directive
EN 81-20	Safety rules for the construction and installation of lifts – Part 20: Passenger and goods passenger lifts
EN 81-50	Safety rules for the construction and installation of lifts - Examinations and tests – Part 50: Design rules, calculations, examinations and tests of lift components
EN ISO 12100	Safety of machinery – General principles for design - Risk assessment and risk reduction
DIN EN 61000-6-4	Interference emission
EN 12016	Interference immunity (for elevators, escalators and moving walkways)

Liability

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

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

Guarantee

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

CE Identification

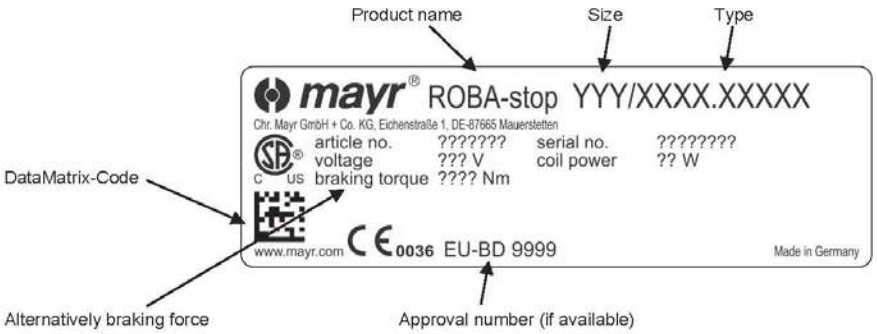
CE in accordance with the Low Voltage Directive 2014/35/EU (only in case of voltages > 72 V) and / or the RoHS Directive 2011/65/EU with 2015/863/EU,
and the Elevator Directive 2014/33/EU
(with the ID number of the respective inspection authority, for type examination tested brakes only)

Conformity Markings

c SP us in terms of the Canadian and American approval

Marking

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



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Installation and Operational Instructions for ROBA®-twinstop® Type 8012.05_13 Size 800

(E028 10 410 000 4 EN)

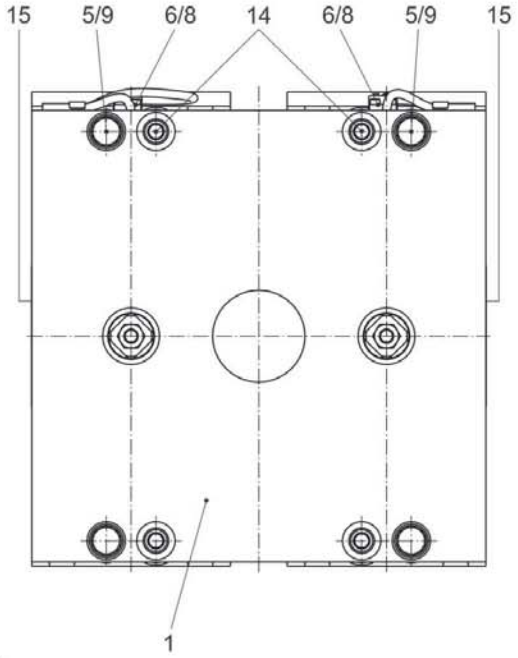

Fig. 1

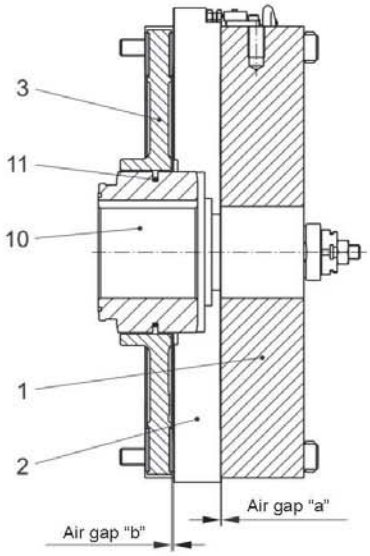

Fig. 2

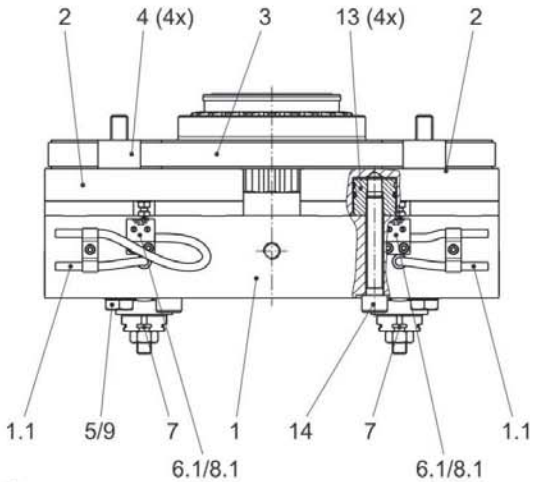

Fig. 3

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012.05_13 Size 800

(E028 10 410 000 4 EN)

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

Item	Name
1	Coil carrier assembly (incl. magnetic coils)
1.1	Connection cable 2 x AWG18 blue / brown
2	Armature disk
3	Rotor
4	Distance bolt
5	Hexagon head screw
6	Release monitoring assembly with microswitch
6.1	Microswitch
7	Hand release fixture
7.1	Hand release lever (Fig. 5, page 11 / must be ordered separately)
8	Release monitoring assembly with proximity switch
8.1	Proximity switch
9	Washer
10	Hub
11	O-ring
12	Noise damping unit (not depicted)
13	Guide bolt
14	Cap screw
15	Type tag

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012.05_13 Size 800

(E028 10 410 000 4 EN)

Table 1: Technical Data

Nominal torque [1]:	2 x 800 Nm
Nominal voltage U_N:	207 V
Nominal power P_N:	2 x 131 W
Inductivity:	119 H
Nominal air gap [2] "a" braked (Fig. 2):	0.44 mm
Maximum air gap [3] "a" at nominal torque (Fig. 2):	0.8 mm
Inspection air gap "b" on released brake (Fig. 2):	min. 0.2 mm
Protection (coil/casting compound):	IP54
Protection (mechanical):	IP10
Protection (switch):	IP67
Ambient temperature:	-5 °C to +40 °C
Duty cycle:	60 %
Rotor thickness, new condition:	$20_{-0.05}$ mm
Max. trigger speed:	460 rpm
Permitted friction work per single circuit [4]:	75000 J
Max. permitted friction work per single circuit for max. 1 braking action with subsequent rotor replacement:	90000 J
Max. permitted friction work for both brake circuits [4]:	90000 J
Tightening torque for fixing screw item 5:	109 Nm
Weight:	approx. 71.5 kg

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

2) Measured in the vertical center axis area of the respective armature disk (2).

3) Once the maximum air gap has been reached, the rotors must be replaced.
However, the brake already becomes louder at an air gap > "a" +0.15 mm.

4) Values for trigger speed 460 rpm, brake linings slightly bedded in (see Chapter "Braking Torque").
The value increases at lower speeds and decreases at higher speeds (please contact *mayr®*).

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

CAUTION

The rotor (3) must be replaced at the latest when a maximum air gap of 0.8 mm has been reached.

Table 2: Switching Times [ms]

Attraction t_2	Drop-out t_0 DC	Drop-out t_{60} [5] DC	Drop-out t_{90} [5] DC	Drop-out t_{11} AC	Drop-out t_1 [6] AC
620	30	60	100	160	750

5) Referring to the nominal braking torque

6) Referring to the effective braking torque

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

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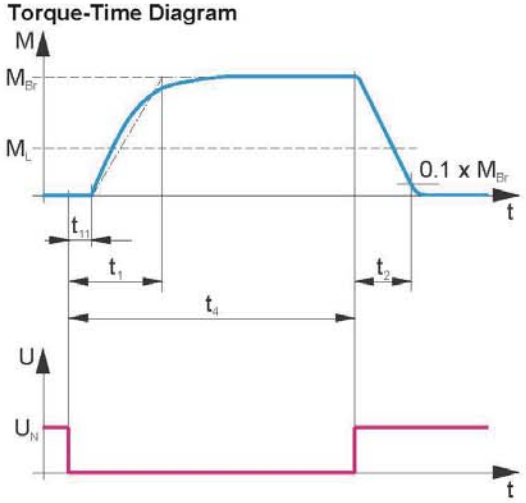
Torque-Time Diagram



Key

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

Application

- ROBA®-twinstop® for use as a holding brake with occasional EMERGENCY STOP braking actions.
- The max. permitted speed and friction work (see Technical Data, Table 1) must be observed.

Design

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

Function

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

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

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

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

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Scope of Delivery / State of Delivery

The brake body is pre-assembled with coil carrier (1), armature disks (2), distance bolts (4), guide bolts (13) and release monitoring devices (6/8) as well as hand release device (7, dependent on Type).
The hand release device (7) and the release monitoring devices (6/8) are mounted and set manufacturer-side.
The following are included loose in delivery: the rotor (3), hexagon head screws (Item 5 / 4 pieces), washers (item 9 / 4 pieces), hub (10) and O-ring (11).

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

Adjustment

The brakes are equipped manufacturer-side with the respective springs for the braking torque stated on the Type tag (15). Adjustment is not necessary. Adaptions or modifications are not permitted as a rule. The switches are adjusted manufacturer-side. Despite great care during the manufacturer-side adjustment, re-adjustment might be necessary after installation due to transportation and handling. Furthermore, such switches cannot be considered fail-safe.
Please also observe the section 'Release Monitoring'.

Installation Conditions

- The eccentricity of the shaft end in relation to the fixing holes must not exceed 0.3 mm.
- The positional tolerance of the threads for the hexagon head screws (5) must not exceed 0.3 mm.
- The axial run-out deviation of the screw-on surface to the shaft must not exceed the permitted axial run-out tolerance of 0.063 mm in the area of the friction surface.
  Measuring procedure acc. DIN 42955.
  The shaft bearing is to be designed so that the axial backlash of the shaft (absolute) does not exceed the permitted axial run-out value during operation.
  Larger deviations can lead to permanent grinding with overheating of the friction linings and thus to a drop in the braking torque.
- The tolerances of the hub bore (10) and the shaft must be selected so that the hub toothing (10) is not widened.
  Widening of the toothing leads to the rotor (3) jamming on the hub (10) and therefore to brake malfunctions.
  Recommended hub – shaft tolerance H7/k6.
  If the hub (10) is heated for better joining, the O-ring (11) must be removed beforehand and re-mounted after hub installation. The max. permitted joining temperature of 150 °C must not be exceeded.
- Dimensioning of the key connection according to the requirements shaft diameter, transmittable torque and operating conditions must be carried out. For this, the corresponding user data must be known or the customer must carry out the dimensioning according to the valid calculation basis DIN 6892.
  For the calculation, a hub quality of Re = 300 N/mm² should be used.
  The length of the key must lie over the entire hub (10).
- For the dimensioning of the key connections, the permitted tensions common in machine construction must be considered.
- The mounting dimensions and the tapped holes s with depth K + 2 mm (K = screw projection) must be provided according to the Catalogue or the applicable assembly drawing (Fig. 4).

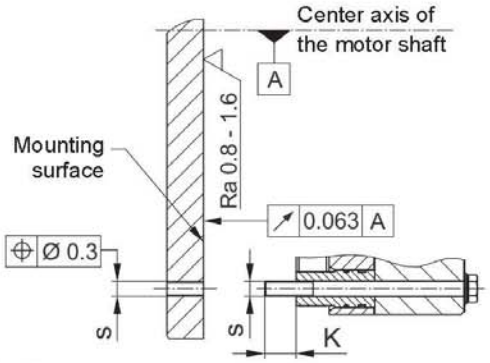

Fig. 4

- A suitable counter friction surface (steel or cast iron) must be used. Sharp-edged interruptions on the friction surfaces must be avoided. Recommended surface quality in the area of the friction surface Ra = 0.8 – 1.6 µm. The mounting surface must be turned. The surface must be bare or FE-phosphated (layer thickness approx. 0.5 µm) without oil.
  If corrosion protection is applied, the device must be inspected for possible effects on the braking torque.
  In particular customer-side mounting surfaces made of grey cast iron are to be rubbed down additionally with sandpaper (grain ≈ 60 to 100).
- The rotor and brake surfaces must be oil and grease-free.
- The O-ring (11) must be lightly greased.
- The toothings of the rotor (3) and the hub (10) must not be oiled or greased.
- Please abstain from using cleaning agents containing solvents, as they could affect the friction material.

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Installation (Figs. 1 to 3)

1. Mount the hub (10) in the correct position (according to the respective drawing) onto the shaft, bring it in the correct position (the length of the key must lie over the entire hub) and secure it axially, e.g. using a locking ring.
2. Lightly grease the O-ring (11) and insert it into the hub (9) groove.
3. Push the rotor (3) over the O-ring (11) onto the hub (10) by hand using light pressure.
   Please make sure that the rotor collar faces the machine wall.
   Make sure that the toothing moves easily.
   Do not damage the O-ring.
4. Secure the brake bodies using 4 hexagon head screws (5) and washers (9) all-round step-wise evenly (we recommend that you secure the screws using Loctite 243).
   Tighten the hexagon head screws using a torque wrench and observe the tightening torque acc. Table 1.
5. **Check air gap "a" (Fig. 2):**
   Air gap: 0.40 mm ≤ "a" ≤ 0.6 mm
   This air gap must be present in the area of the vertical center axis on both armature disks (2) (Fig. 1).
6. **Check air gap "b" > 0.2 mm in energized state on the rotor (3) (Fig. 2).**
   The inspection air gap must be given.

Braking Torque

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

Noise Damping

The brake is designed with an integrated noise damping system, which reduces the switching noises during opening and closing.

Hand Release (7)

The Type 8012.05113 designs are prepared for the attachment of Bowden cable or hand release levers.
The hand release fixtures are set manufacturer-side ready for installation.
Bowden cable or hand release levers must be ordered separately as retrofit kit.
The hand release retrofit kit also includes installation instructions for the installation of the levers.

DANGER

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

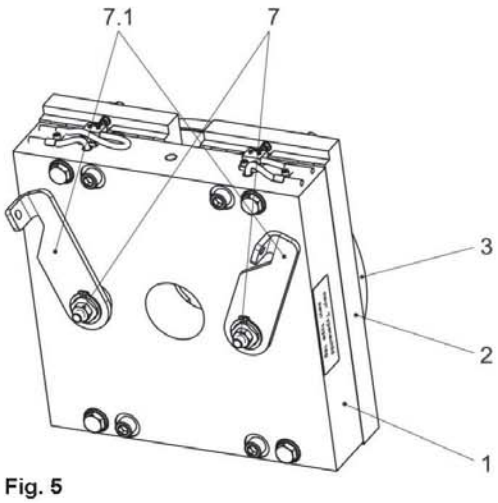

Fig. 5

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Release Monitoring (Item 6 or 8 / Figs. 1 and 3)

Please carry out a functional inspection before brake initial operation!

ROBA®-twinstop® brakes are delivered with manufacturer-side adjusted release monitoring devices.
A microswitch (6.1) or a proximity switch (8.1) per brake circuit emits a signal for every brake condition change:
"brake opened" or "brake closed".

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

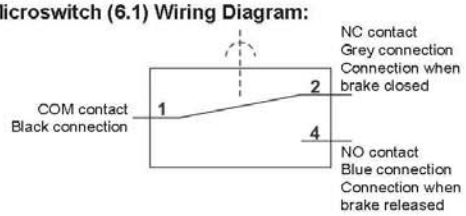
From the point at which the brake is energized, a time span of three times the separation time must pass before the switch signal on the release monitoring is evaluated.

Microswitch Specification (6.1)

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

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

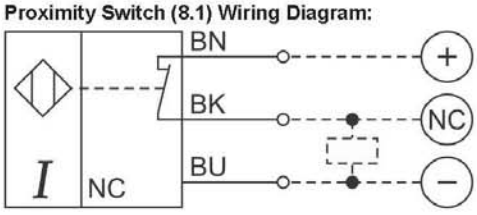
Microswitch (6.1) Wiring Diagram:



Technical Data of the Proximity Switch (8.1)

Operating voltage:	10...30 VDC
Residual ripple content:	≤ 10 % U_{ss}
DC rated operating current:	≤ 150 mA
No-load current I_0:	≤ 15 mA
Residual current:	≤ 0.1 mA
Rated insulation voltage:	≤ 0.5 kV
Short-circuit protection:	yes / synchronizing
Line voltage drop at I_e:	≤ 1.8 V
Wire breakage protection / reverse voltage protection:	yes / completely
Output function:	3-wire, NC contact, PNP
Switching frequency:	≤ 2 kHz

Proximity Switch (8.1) Wiring Diagram:



Function

When the magnetic coil is energized in the coil carrier (1), the armature disk (2) is attracted to the coil carrier (1), the microswitch (6.1) or the proximity switch (8.1) emits a signal, the brake is released.

Customer-side Functional Inspection Once Attachment Has Taken Place

Carry out a functional inspection before brake initial operation.

Microswitch (6.1) for connection as NO contact:

- Brake **de-energized**: Inspection lamp must signal **"OFF"**.
- Brake **energized**: Inspection lamp must signal **"ON"**.

Microswitch (6.1) for connection as NC contact:

- Brake **de-energized**: Inspection lamp must signal **"ON"**.
- Brake **energized**: Inspection lamp must signal **"OFF"**.

Proximity switch (8.1):

- Brake **de-energized**: Inspection lamp must signal **"ON"**.
- Brake **energized**: Inspection lamp must signal **"OFF"**.

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

The following prevent actuation of the microswitch (6.1) or proximity switch (8.1) and lead to a malfunction.

- ❑ Heavy contamination between the armature disk (2) and the coil carrier (1).
- ❑ Extreme warping on the armature disk (2).
- ❑ Excessively large air gap "a" between the armature disk (2) and the coil carrier (1) due to wear on the friction linings.
- ❑ Defective brake magnetic coil.
- ❑ No or incorrect voltage on the brake coil.

If none of these error sources prove to be the reason for incorrect release monitoring function, the microswitch (6.1) or the proximity switch (8.1) must be checked and the adjustment corrected if necessary.

If a replacement or new adjustment of the switch (6.1/8.1) is required by the customer, separate adjustment instructions stating the article or serial number of the respective brake can be requested from the manufacturer.

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Electrical Connection and Wiring

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

Supply Voltage Requirements

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

Grounding Connection

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

Device Fuses

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

Switching Behavior

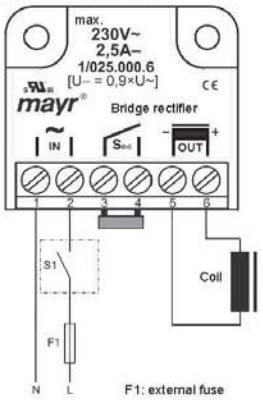
The reliable operational behavior of a brake is to a large extent dependent on the switching mode used. Furthermore, the switching times are influenced by the temperature and the air gap between the armature disk and the coil carrier (dependent on the wear condition of the linings).

Magnetic Field Build-up

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

Magnetic Field Removal

AC-side switching

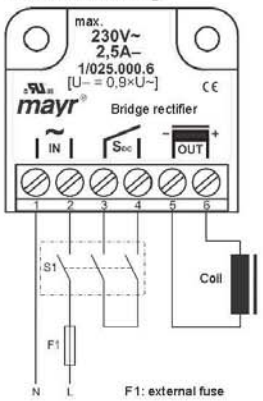


The power circuit is interrupted in front of the rectifier. The magnetic field slowly reduces. This delays the rise in braking torque.

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

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

DC-side Switching



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

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

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

Protection Circuit

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

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Brake Inspection

(Customer-side after Mounting onto the Elevator Machinery)

- ❑ **Inspection of the individual air gaps (Fig. 2)**
  Air gaps "a" of both brake circuits (brake de-energized):
  Air gap 0.40 mm ≤ "a" ≤ 0.6 mm
  Air gaps "b" of both brake circuits (brake energized):
  Air gap "b" > 0.2 mm
- ❑ **Braking torque inspection:**
  Please compare the requested braking torque with the torque stated on the Type tag.
- ❑ **Release function inspection**
  By energizing the brake via battery operation, to guarantee emergency escape for passengers during a power failure or manually using the hand release.
- ❑ **Switch functions inspection of the release monitoring / for connection as NC contact:**
  Brake de-energized ➔ Signal "ON"
  Brake energized ➔ Signal "OFF"
  for connection as NO contact:
  Brake de-energized ➔ Signal "OFF"
  Brake energized ➔ Signal "ON"
- ❑ **Hand release functional inspection (dependent on Type)**
  Please observe the guidelines on page 11!

Dual Circuit Brake Functional Inspection

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

DANGER

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

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

Inspection brake circuit 1:

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

Inspection brake circuit 2:

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

Inspection of both brake circuits:

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

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Maintenance

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

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

1. Visual inspection
   - ➢ Inspection of condition in accordance with the regulations
   - ➢ Brake rotor: in particular the exterior appearance of the brake surfaces
     - wear
     - free of oil / lubricants
     - sticking of linings
2. Tightening torque inspection of the fixing screws on the brakes. If the brake fixing screws are covered with sealing lacquer, a visual inspection for damage of the sealing is sufficient.
3. Inspection of the air gap – braked (both brake circuits).
4. Inspection of toothing backlash from the hub (10) to the rotor (3).
   Max. permitted toothing backlash 0.5°.
5. Running noise (brake rotor) during operation
   Attention: Permanent grinding of the rotor can lead to overheating / damage to the brake linings, and therefore to a drop in braking torque. If such indications are present, it is essential that the braking torque is checked and the rotor replaced if required independent of the inspection or the determined wear value!
6. Braking torque or delay inspection (individual brake circuits) at least once per year (within the scope of the maintenance / main inspection).

In order to inspect the wear condition of the rotor (3), please measure the air gap "a", see Fig. 2.
If the brake limit air gap (0.8 mm) has been reached, meaning that the friction linings are worn down, the braking torque is lost and the rotor (3) must be replaced.
Brake de-installation is carried out by following the instructions in the section Installation (page 11) backwards.

Replacing the Rotor (3)

Before Replacing the Rotor

- ❑ Clean the brake.

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

- ❑ Measure the rotor thickness "new" (nominal dimension acc. Table 1).

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

DANGER

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

Information on the Components

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

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

Classification: Hazardous property
Attention: H-classification: H372

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

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

Cleaning the Brake

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

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

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Installation and Operational Instructions for ROBA®-twinstop® Type 8012.05_13 Size 800

(E028 10 410 000 4 EN)

Disposal

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

Electronic components
(Rectifier / Switch):

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

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

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

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

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

Guidelines on the WEEE Directive 2012/19/EU
Avoidance of waste from electrical and electronic devices and the reduction of such waste through recycling.

Our electromagnetic products (brakes, clutches) as well as the components required to control them (rectifiers) are frequently used in electrical and electronic devices within the appropriate area of application of WEEE, independent of the applicable product categories.
The stated products do not fall within the area of application of this Directive. They have been classified as electromagnetic / electronic components (VDE 0580) or as electronic equipment (DIN EN 50178), and have been determined for installation in devices for "use in accordance with the intended purpose". Only products which are to be viewed as devices in terms of the Directive and not as parts or components are subject to registration obligations.

Malfunctions / Breakdowns:

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

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9.4.1 Assembly and adjustment of the release monitor with microswitch

Installation and Adjustment of the Release Monitoring with Microswitch for ROBA®-duplostop® / ROBA®-twinstop® / RSQ Type 8010._ _ _ _ _ , 8012._ _ _ _ _ and 806_._ _ _ _ _ (E028 02 000 002 4 EN)

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

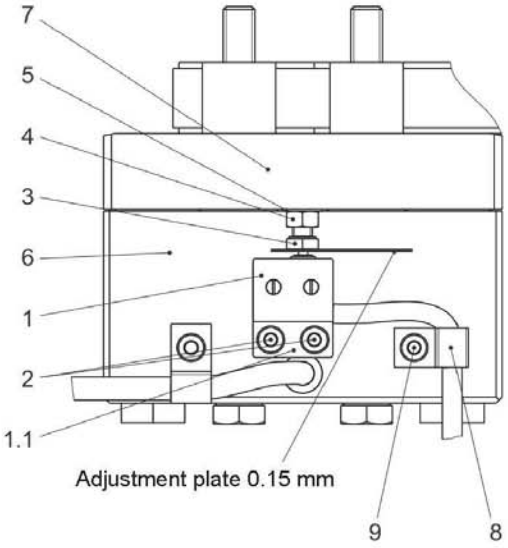

Fig. 1

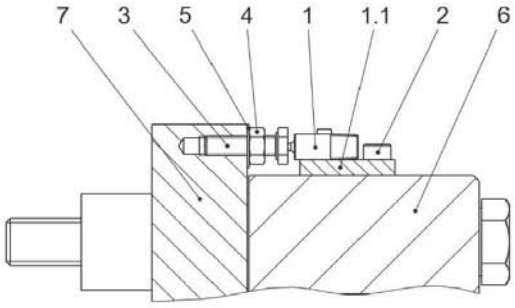

Fig. 2

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

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

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

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

Function

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

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

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Installation and Adjustment of the Release Monitoring with Microswitch for ROBA®-duplostop® / ROBA®-twinstop® / RSQ Type 8010._ _ _ _ _ , 8012._ _ _ _ _ and 806_._ _ _ _ _ (E028 02 000 002 4 EN)

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

Replacement of a Defective Microswitch

1. Loosen the cap screw (9) and remove the cable clamp (8).
2. Remove the cap screws (2) and remove the adaptor plate (1.1) incl. microswitch (1).
3. Loosen the hexagon nut (4) slightly (< 1/8 turn) making sure that the hexagon head screw (3) remains pre-tensioned by the spring washer (5).
4. Hold the hexagon nut (4) using an open-end wrench, wrench opening 8, and screw the hexagon head screw (3) in by approx. ⅓ turn in the direction of the armature disk (7) using a second open-end wrench, wrench opening 8.

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

5. Screw a new microswitch (1) inc. adaptor plate (1.1) onto the coil carrier (6) using cap screws (2), so that the front end edge of the adaptor plate (1.1) is parallel to the armature disk (7).
   Please observe the tightening torque of 2.9 Nm.
6. Re-install the cable clamp (8) using the cap screw (9).

Adjustment of the New Microswitch

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

1. Take the loose adjustment plate **0.15 mm** from a standard feeler gauge set and join it between the hexagon head screw (3) and the microswitch tappet (1).
2. Connect the inspection lamp or measuring device (adjustment diode inspection) to the microswitch (1) (connection as NO contact => black and blue).
3. Hold the hexagon nut (4) using an open-end wrench, wrench opening 8, and turn the hexagon head screw (3) in the direction of the microswitch (1) using a second open-end wrench, wrench opening 8, until **the inspection lamp signals "ON"**.
4. Hold the hexagon nut (4) using an open-end wrench, wrench opening 8, and screw the hexagon head screw (3) **slowly** in the direction of the armature disk (7) using a second open-end wrench, wrench opening 8, until **the inspection lamp signals "OFF".**

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

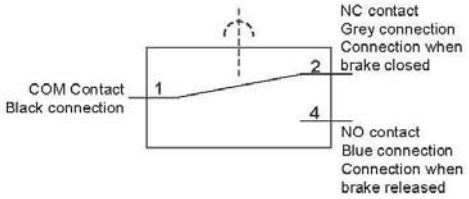
5. Hold the hexagon head screw (3) using an open-end wrench, wrench opening 8, and counter the hexagon nut (4) using a second open-end wrench, wrench opening 8.
6. Remove the adjustment plate.

Functional Inspection

Carry out a functional inspection before brake initial operation.

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

Microswitch Wiring Diagram (1):



Microswitch Specification

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

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

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

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

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

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

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

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

(E028 12 209 001 4 EN)

For designs by company Ziehl-Abegg

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

Proximity Switch Assembly:

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

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

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

Components:

Item	Name
A	Coil carrier assembly
B	Armature disk
C	Rotor

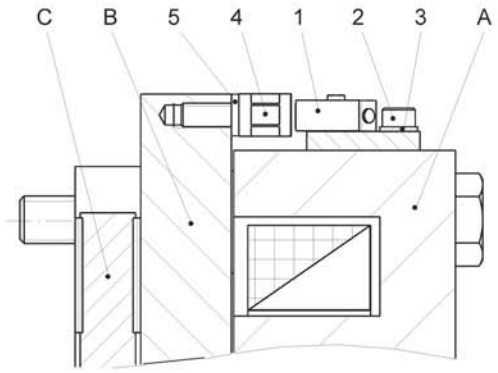

Fig. 1

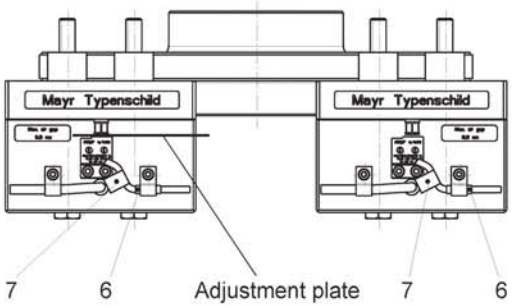

Fig. 2 (ROBA®-duplostop®)

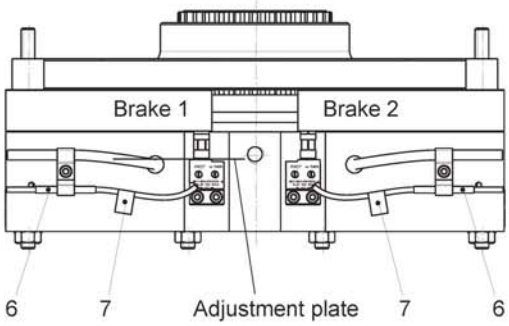

Fig. 3 (ROBA®-twinstop®)

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

(E028 12 209 001 4 EN)

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

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

Function

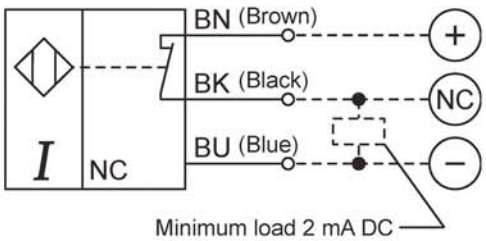
When the magnetic coil is energised in the coil carrier (A), the armature disk (B) is attracted to the coil carrier (A).
The proximity switch (1) emits a signal and the brake is released.

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

Technical Data

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

Proximity Switch (1) Wiring Diagram:



Installation and Adjustment

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

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

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

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

Customer-side Inspection after Attachment

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

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

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

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

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

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9.5 EU Declaration of Conformity for Brake

mayr® Antriebstechnik

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

Im Sinne der gekennzeichneten Richtlinien erklären wir
In accordance with the marked directives, we
Conformément aux directives désignées, nous
In conformità con le direttive designate dichiariamo,
De acuerdo con las directivas designadas declaramos,
De acordo com as diretrizes designadas que declaramos,

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D-87665 Mauerstetten

dass die angeführten Produkte den Anforderungen entsprechen
declare that the listed products meet the requirements.
déclarons que les produits listés répondent aux exigences.
che i prodotti elencati soddisfano i requisiti.
que los productos listados cumplan con los requisitos.
que os produtos listados atendem aos requisitos

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

Produkt / *Product* / **Produit** / *Prodotto* / **Producto** / *Produto*	**Größen** / *Sizes* / **Tailles** / *Grandezze* / **Dimensión** / *Dimensão*	**Typen** / *Types* / **Types** / *Serie* / **Tipos** / *Tipos*	**ANVP**
ROBA®-twinstop®	800	8012._ _ _ _ _	1,2

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

	EG-Maschinenrichtlinie 2006/42/EG	*EC-Machinery directive 2006/42/EC*
X	**Richtlinie Niederspannung 2014/35/EU**	*EC-Low voltage directive 2014/35/EU*
X	**Elektromagnetische Verträglichkeit 2014/30/EU**	*Electromagnetic compatibility directive 2014/30/EU*
X	**EU-Richtlinie Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten 2011/65/EU (RoHs II) inkl. delegierte Richtlinie 2015/863/EU zur Änderung von Anhang II der Richtlinie 2011/65/EU (RoHs III)**	*EU Directive Restriction of use of certain hazardous substances in electrical and electronic equipment 2011/65 / EU (RoHs II) including delegated Directive 2015/863 / EU amending Annex II to Directive 2011/65 / EU (RoHs III)*
X	**Aufzüge und Sicherheitsbauteile für Aufzüge 2014/33/EU**	*Lifts and safety components for lifts 2014/33 / EU*

8012 (4) **Seite** / *Page* / **Page** / *Pagina* / **Página** / *Página* 1 / 2 *09.12.2020*

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

1 EN 81-20:2014 / EN 81-50:2014

2 DIN EN IEC 63000:2019-05 / VDE 0042-12:2019-05

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

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Westendstraße 199
D-80686 München

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

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

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

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

EU-BD 1112

Mauerstetten, 09.12.2020 Ort und Datum / place and date / Lieu et date / luogo – data / fecha y lugar / Lugar e data	Dipl. Ing. (FH) / graduate engineer / Engenheiro graduado Geschäftsführer / Managing Director / Directeur Général / Gerente / Gerente Günther Klingler

9.6 EU Type Examination Certificate

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

TÜV SÜD Industrie Service

EU-TYPE EXAMINATION CERTIFICATE

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

Certificate No.:	EU-BD 1112
Notified Body:	TÜV SÜD Industrie Service GmbH Westendstr. 199 80686 Munich - Germany Identification No. 0036
Certificate Holder:	Chr. Mayr GmbH & Co. KG Eichenstr. 1 87665 Mauerstetten - Germany
Manufacturer of the Test Sample: (Manufacturer of Serial Production – see Enclosure)	Chr. Mayr GmbH & Co. KG Eichenstr. 1 87665 Mauerstetten - Germany
Product:	Braking device acting on the shaft of the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and braking element against unintended car movement
Type:	RTW 800 / 8012._ _ _ _ _
Directive:	2014/33/EU
Reference Standards:	EN 81-20:2020 EN 81-50:2020
Test Report:	EU-BD 1112 of 2020-11-19
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:	2020-11-19

Achim Janocha
Notified Body LCC

TÜV SÜD Industrie Service GmbH 00 36 Notified Body

TÜV®

Annex to the EU Type-Examination Certificate No. EU-BD 1112 of 2020-11-19

Industrie Service

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 torque when the braking device acts on the shaft of the traction sheave while the car is moving upward

Permissible brake torque [Nm]	Max. tripping rotary speed of the traction sheave [rpm]
1200 - 1840	500

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

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

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

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

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

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

Type 8012._4_ _ oder 8012._5_ _

Min. nominal brake torque* [Nm]	Mid. nominal brake torque* [Nm]	Max. nominal brake torque * [Nm]	Max. tripping rotary speed [rpm]	Maximum response times** [ms] without / with overexcitation		
				t_0	t_{50}	t_{90}
2 x 600 = 1200			500	50 / --	85 / --	160 / ---
	2 x 800 = 1600			30 / ---	60 / --	100 / ---
		2 x 920 = 1840		-- / 45	-- / 70	--- / 120

Type 8012._0_ _ oder 8012._1_ _

Min. nominal brake torque* [Nm]	Mid. nominal brake torque* [Nm]	Max. nominal brake torque * [Nm]	Max. tripping rotary speed [rpm]	Maximum response times** [ms] without / with overexcitation		
				t_0	t_{50}	t_{90}
2 x 600 = 1200			500	120 / ---	175 / ---	265 / ---
	2 x 800 = 1600			75 / --	110 / ---	215 / ---
		2 x 920 = 1840		-- / 85	--- / 110	--- / 200

Interim values can be interpolated

Explanations:

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

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

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

Annex to the EU Type-Examination Certificate No. EU-BD 1112 of 2020-11-19

Industrie Service

1.2.2 Assigned execution features

Type of powering / deactivation	continuous current / continuous current end
Brake control	parallel
Nominal air gap	0.45 mm
Damping elements	YES
Overexcitation	at double non-release voltage

2 Conditions

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

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

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

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

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

2.5 The identification drawing no. E02810410000260 including stamp dated 2020-11-19 shall be included to the EU type-examination for the identification and information of the general construction and operation and distinctness of the approved type.

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

3 Remarks

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

3.2 Checking whether the requirements as per section 5.9.2.2 of EN 81-20:2020 (D) have been complied with is not part of this type examination.

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

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

- EN 81-1:1998 + A3:2009 (D), Annex F.7 and F.8
- EN 81-20:2014 (D), part 5.6.6.11, 5.6.7.13 - EN 81-50:2014 (D), part 5.7 and 5.8
- EN 81-20:2020 (D), part 5.6.6.11, 5.6.7.13 - EN 81-50:2020 (D), part 5.7 and 5.8

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

Note: The English text is a translation of the German original. In case of any discrepancy, the German version is valid only. Page 2 of 2

Enclosure to the EU-Type Examination Certificate No. EU-BD 1112 of 2020-11-19

Industrie Service

Authorised Manufacturer of Serial Production – Production Sites (valid from: 2020-07-23):

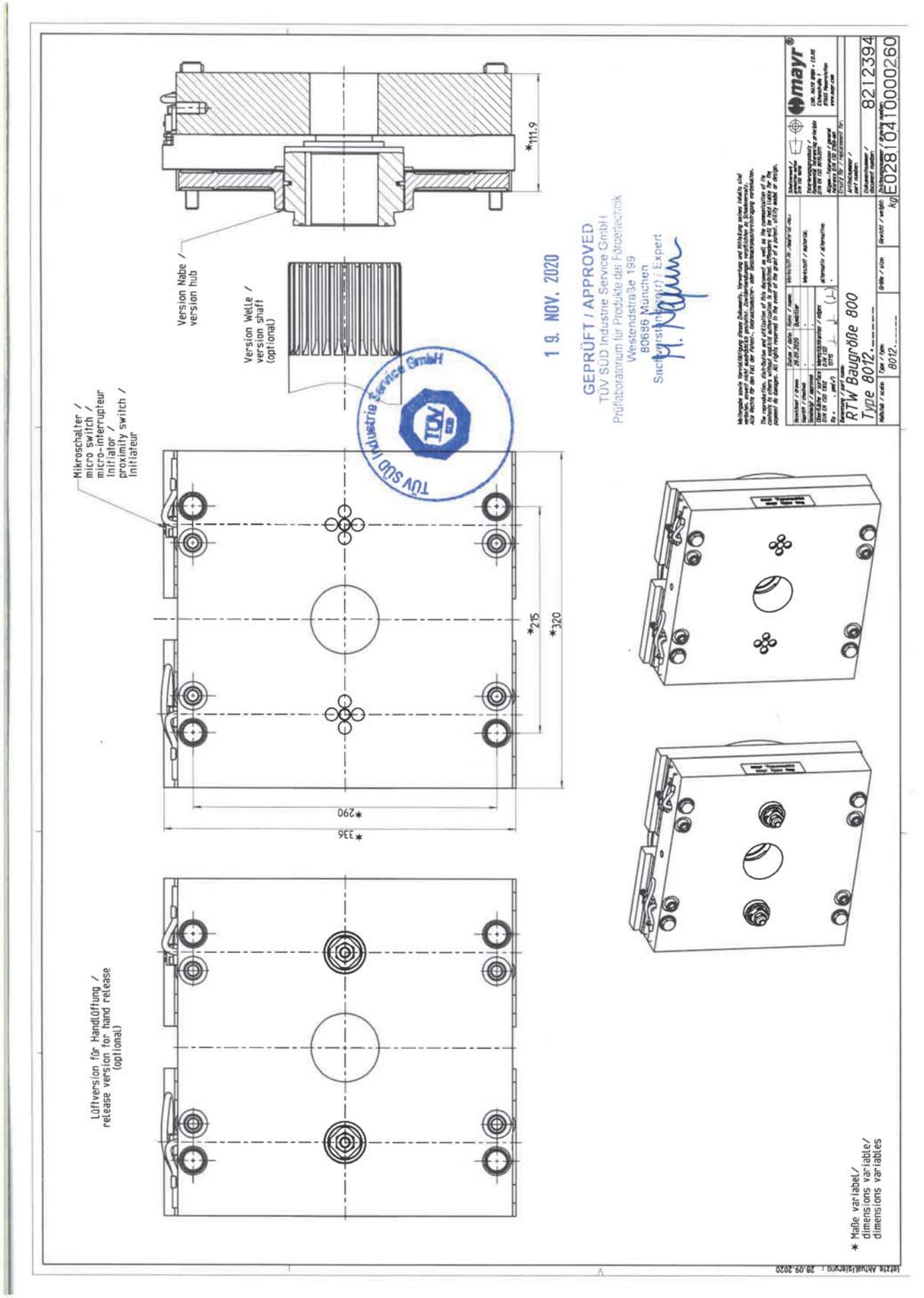
Company	Chr. Mayr GmbH & Co. KG
Address	Eichenstr. 1 87665 Mauerstetten - Germany

Company	Mayr Polska Sp. z. o. o.
Address	Rojów, ul. Hetmanska 1 63-500 Ostrzesów - Poland

- END OF DOCUMENT -

Based on: Application letter from Chr. Mayr GmbH & Co. KG of 2020-07-23

Page 1 of 1


Version Nabe / version hub
Version Welle / version shaft (optional)
Mikroschalter / micro switch / micro-interrupteur Initiator / proximity switch / Initiateur
Lüftversion für Handlüftung / release version for hand release (optional)
*111.9
*215
*320
*290
*336
GEPRÜFT / APPROVED
TÜV SÜD Industrie Service GmbH
Prüflaboratorium für Produkte der Fördertechnik
Westendstraße 199
80686 München
19. NOV. 2020
RTW Baugröße 800
Type 8012.
8212394
E028104100002 60 kg
* Maße variabel/ dimensions variable/ dimensions variables

9.6.1 Statement on type examination certificates

The rated brake torques can be found on the name plate. The switching times are assigned to the brake torque in the type examination certificate.
Increases in the index (added with "/") for a type examination certificate are only used for technical improvements and are approved by the authorised body with this condition.

9.7 Calculation of tripping speed

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

Type	DTS	Nbn	Nbmax	Vn (1:1)	Vmax (1:1)	Vn (2:1)	Vmax (2:1)
	[mm]	[min^{-1}]	[min^{-1}]	[m/s]	[m/s]	[m/s]	[m/s]
SM200.40E/SM200.45E	160	435	500	3.64	4.19	1.82	2.09
SM200.40E/SM200.45E	200	435	500	4.56	5.24	2.28	2.62
SM200.40E/SM200.45E	240	435	500	5.47	6.28	2.73	3.14
SM200.40E/SM200.45E	320	435	500	7.29	8.38	3.64	4.19
SM200.40E/SM200.45E	400	435	500	9.11	10.47	4.56	5.24
SM200.40E/SM200.45E	500	435	500	11.39	13.09	5.69	6.54

9.8 Calculation proof

- Translation -
(english)

A-BN21_01-GB
2021/09 Index 001

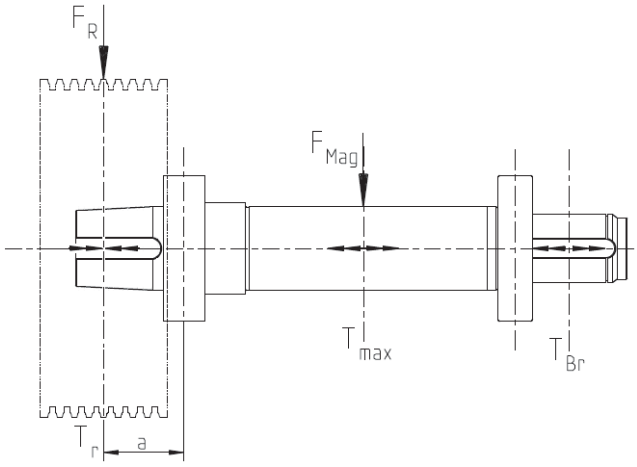
Manufacturer: **ZIEHL-ABEGG SE**
Heinz-Ziehl-Straße
74653 Künzelsau
Germany

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

Type of the gearless maschine: **ZAtop SM200.40E**
ZAtop SM200.45E

Object examined: Calculation of traction sheave shaft including shaft-hub-connections by IFF ENGINEERING & CONSULTING GmbH No. 20.1.552.3 dated 27.08.2020

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



Construction drawing:	A-20-121-0031, Index 000, dated 05.08.2020
Permissible shaft materials:	Steel DIN EN 10083-3:2007-01 – 42CrMo4+QT (1.7225+QT) Steel DIN EN 10083-3:2007-01 – 42CrMo4+QT (1.7227+QT) Steel DIN EN 10083-3:2007-01 – 50CrMo4+QT (1.7228+QT)
Permissible traction sheave hub materials:	Steel DIN EN 10083-2:2006-10 – C45+N (1.0503+N) Cast iron DIN EN 1561:2012-01 – EN-GJL-300 (GG-30)
Permissible feather key traction sheave materials:	Steel DIN EN 10083-3:2007-01 – 42CrMo4+QT (1.7225+QT)
Permitted materials brake hub:	Steel DIN EN 10083-3:2007-01 – 42CrMo4+QT (1.7225+QT)
Permissible parallel key brake hub materials:	Steel DIN EN 10083-1 – 42CrMoS4+QT (1.7227+QT)

Load data:

Maximum permissible static operating shaft load	F_R	32.4 kN	36 kN
Distance from bearing A to centre traction sheave	a	96.5 mm	77 mm
Rated torque	T_r	710 Nm	
Maximum torque	T_{max}	1200 Nm	
Magnetic force	F_{Mag}	9945 N	
Nominal brake torque	T_{Br}	1600 Nm (2 x 800 Nm)	
Maximum brake torque	2 x T_{Br}	3200 Nm	
Rated speed	n_r	510 rpm	

Examination result:

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

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

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

Künzelsau, 01.03.2021
(place and date of issue)

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

i.V. R. Hoppenstedt

(signature)

ZIEHL-ABEGG SE
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