

Translation of the Original Operational Instructions

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.

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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):

- Certificate No. 15656/1 (15656)

Guidelines on EU Directives



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 initial operation 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 (REACH). This regulation governs the manufacture, placing on the market and use of chemical substances in preparations and, under certain conditions, also of substances in finished products.

mayr® power transmission exclusively manufactures products (articles: overload clutches, shaft couplings, electromagnetic brakes / clutches, permanent magnet motors and the appropriate control modules / rectifiers) in accordance with the definition in Article 3 of the REACH Regulation.

mayr® power transmission is aware of its responsibility towards the environment and society. As a matter of precaution, we pay attention to particularly critical substances in the supply chain and strive to avoid using any such substances completely or to replace them in the near future.

In compliance with Article 33 of the REACH Regulation, we would like to inform you that in our overload clutches and shaft couplings, electromagnetic brakes / clutches as well as permanent magnet motors, subcomponents with a lead content of > 0.1% are or may be used. These are manufactured from raw materials such as machining steel / copper alloys (e.g. brass, bronze) or aluminum alloys.

Besides high-melting-point (HMP) solders (electronics), this also affects integrated machine elements as well as standard parts (screws / nuts / set screws / pins / etc.) among others, provided that the relevant standards allow this.

For example, lead can occur as an alloying element with more than 0.1 mass percent, based on the respective total mass, in screws and set screws of the following property classes: 4.6, 4.8, 5.8, 6.8, 04, 4, 5, 6, 14H, 17H, 22H, 33H, 45H.

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 on the Classification, Labeling and Packaging of Substances and Mixtures (CLP Regulation) and are therefore not subject to the classification and labeling obligations.

To our knowledge, when used for their intended purpose and disposed of correctly (recycling), the contained substances pose no threat to health or environment.

We would 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.

Installation and Operational Instructions for ROBA®-diskstop® Type 894.⁵/₆ – _._ _ Sizes 6 – 8

(B.8.4.3.EN)

Guidelines on UK Directives / Conformity

Products / components from *mayr*® power transmission fulfill the requirements for the British economic area due to currently identical UK and EU directives.

In addition to the CE identification, the UKCA identification is attached to the product.

The UK Declaration of Conformity is available in a separate document.

Directives under EU Law	Directives under UK Law
Machinery Directive 2006/42/EC	Supply of Machinery (Safety) Regulations UK 2008 No. 1597
EMC Directive 2014/30/EU	Electromagnetic Compatibility Regulations UK 2016 No. 1091
EU Low Voltage Directive 2014/35/EU	Electrical Equipment (Safety) Regulations UK 2016 No. 1101
RoHS II 2011/65/EU	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations UK 2012 No. 3032
Elevator Directive 2014/33/EU	Lifts Regulations UK 2016 No. 1093

Guidelines on EU and UK REACH

According to the European Union (Withdrawal) Act 2018, the EU REACH Regulation was transposed into UK law on January 1, 2021, and is known as UK REACH.

REACH and related legislation have been replicated in the UK with the necessary changes to make it workable in a domestic context.

The fundamental principles of the EU REACH Regulation have been retained in UK REACH.

The remarks on the information obligation according to UK-REACH correspond in content to the REACH Regulation (EC) No. 1907/2006.

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 aging 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 180 1/h. These values are valid for intermittent periodic duty S3 60 %. The permitted surface temperature on the mounting surface must not exceed 80 °C at a max. ambient temperature of 40 °C.
- ☐ The braking torque is dependent on the current bedding-in condition of the brake. Bedding in / conditioning of the friction linings is necessary.
- ☐ The brakes are only designed for dry running. The torque is lost if the friction surfaces come into contact with oil, grease, water or similar substances or any other foreign bodies.



Please ensure that the brake is clean and oil-free. 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.

CAUTION



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

Safety Regulations

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

Dimensioning

Attention!

When dimensioning the brake, please take into consideration that 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 mounting / operation on electromotive elevator machinery in enclosed places of installation 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 friction linings can seize up to the brake disk after longer downtimes.

CAUTION



Temperatures of over 70 °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 upward-moving car and as a braking element against inadvertent movement of the car.

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): classes 1K21; 1Z1; 1B1; 1C2; 1S11; 1M11

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.

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
DIN EN 61140	Protection against electric shock - Common aspects for installation and equipment
DIN EN IEC 63000	Technical documentation for the assessment of electrical and electronic equipment regarding the restriction of hazardous substances
DIN EN IEC 60529	Degrees of protection provided by enclosures (IP Code)
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:

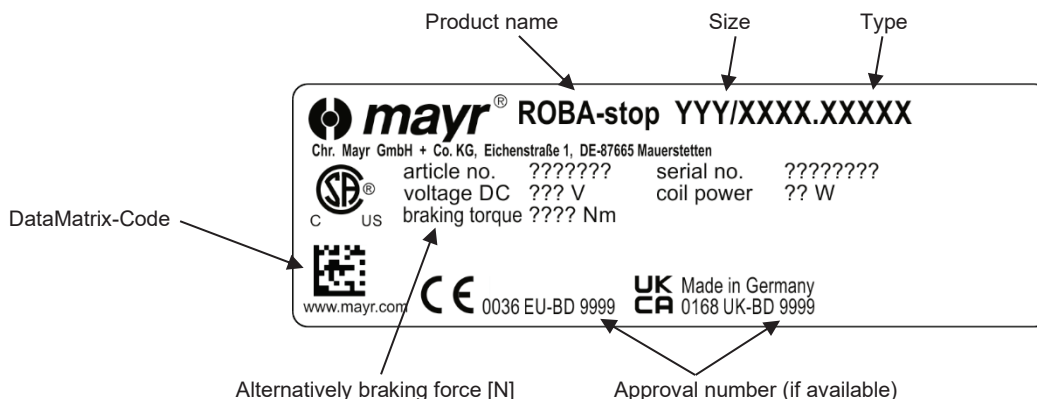
- the Installation and Operational Instructions are ignored or neglected.
- the brakes are used inappropriately.
- the brakes are modified.
- the brakes are worked on unprofessionally.
- the brakes are handled or operated incorrectly.

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!

Identification

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



CE Identification



according to the Low Voltage Directive 2014/35/EU (only for DC voltage > 75 V) and/or 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)

UKCA Identification



according to the Low Voltage Directive UK 2016 No. 1101 (only for DC voltage > 75 V) and/or RoHS Directive UK 2012 No. 3032, and the Elevator Directive UK 2016 No. 1093 (with the ID number of the respective inspection authority, for type examination tested brakes only)

Conformity Markings



in terms of the Canadian and American approval

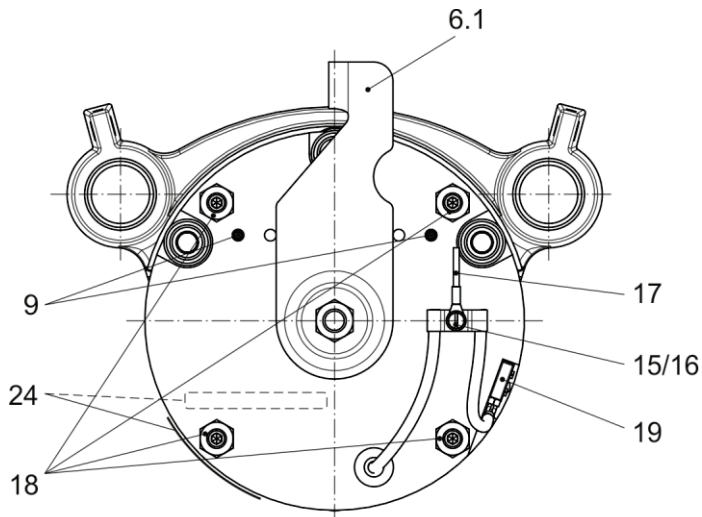


Fig. 1: Type 894._ _ _ .0_

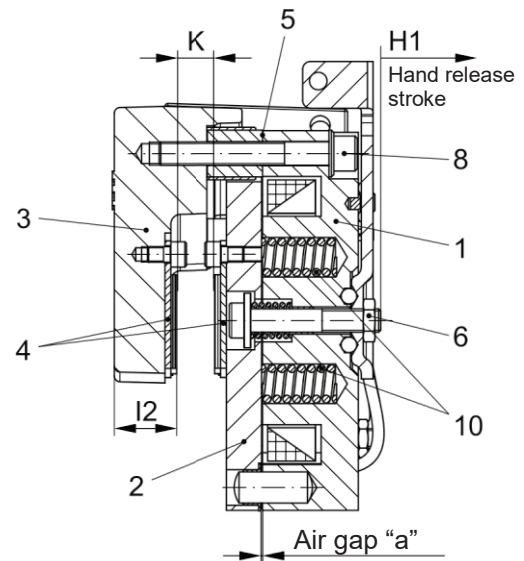


Fig. 2: Type 894._ _ _ .0_

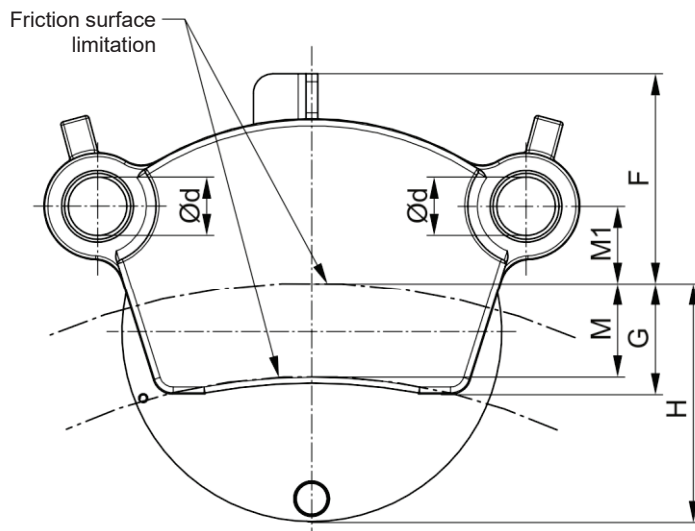


Fig. 3: Type 894._ _ _ .0_

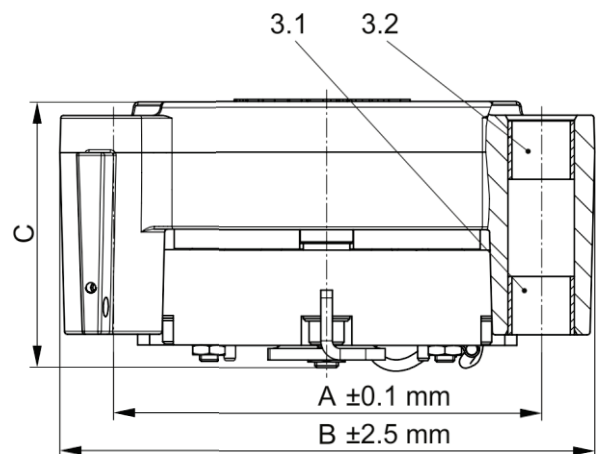


Fig. 4: Type 894._ _ _ .0_

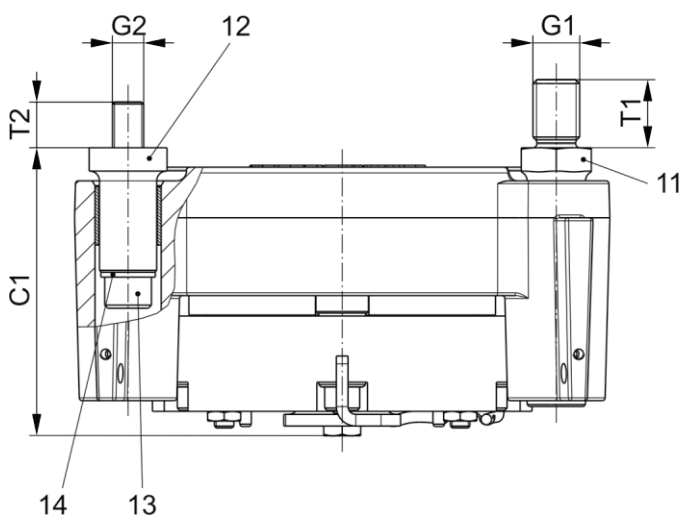


Fig. 5: Type 894._ _ _ .1_

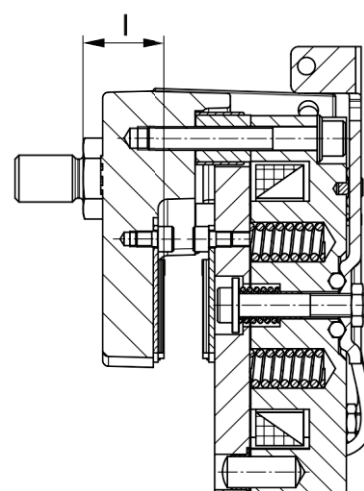


Fig. 6: Type 894._ _ _ .1_

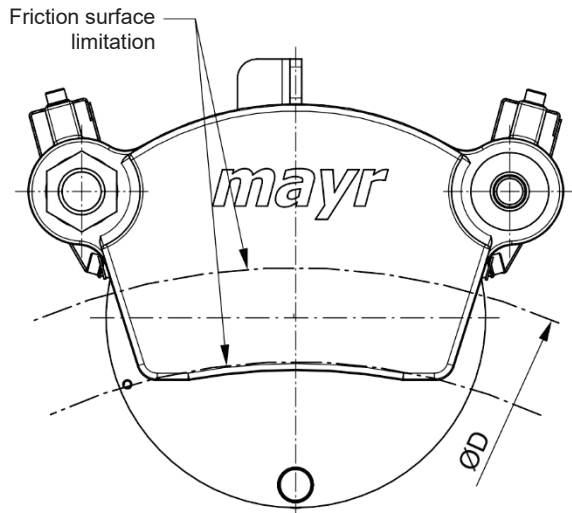


Fig. 7: Type 894.5 6 _ _ _ 2

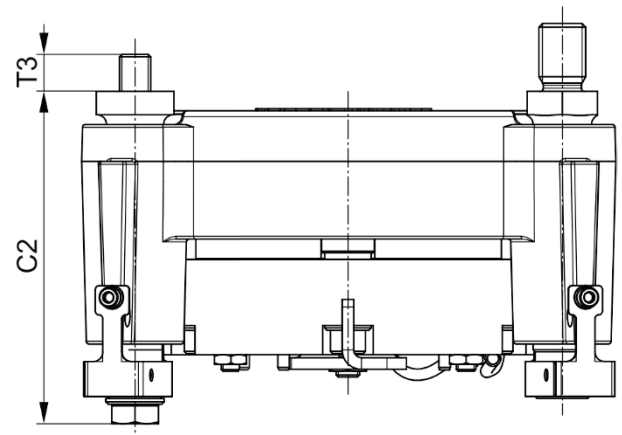


Fig. 8: Type 894.5 6 _ _ _ 2

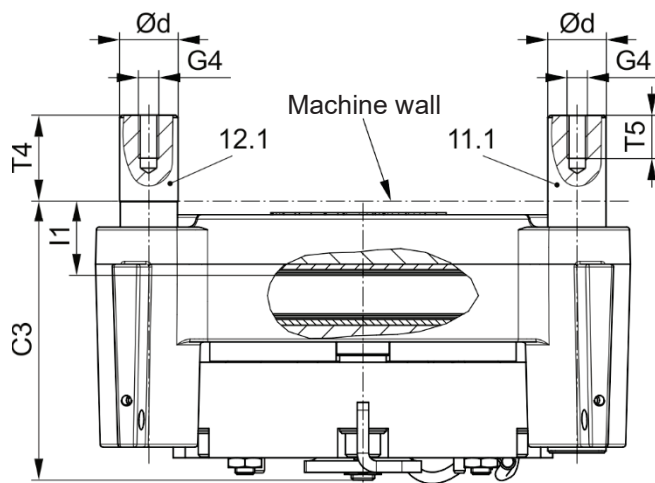


Fig. 9: Type 894.5 6 _ _ _ 3

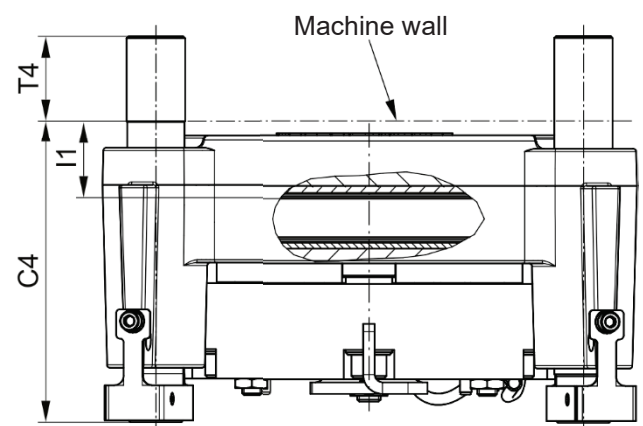


Fig. 10: Type 894.5 6 _ _ _ 4

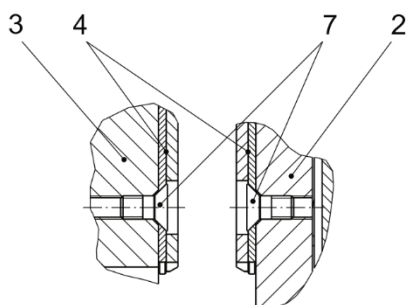


Fig. 11 (friction pads)

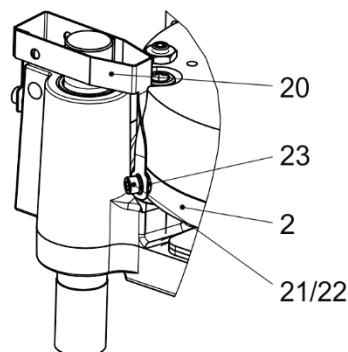


Fig. 12 (alignment mechanism)

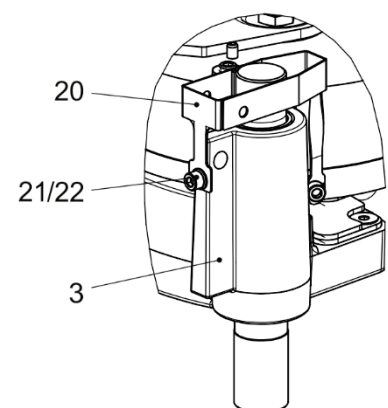


Fig. 13 (alignment mechanism)

Parts List (Only use mayr® original parts)

Item	Name
1	Coil carrier assembly with coil
2	Armature disk
3	Brake caliper
3.1	Bearing bushing 1
3.2	Bearing bushing 2
4	Friction pad assembly
5	Shim rings (if necessary)
6	Hand release assembly
6.1	Hand release lever
7	Countersunk screw
8	Cap screw
9	Spring pin
10	Thrust spring
11	Guide bolt 1 (Type 894._ _ _ 1/2 _)
11.1	Guide bolt 1 (Type 894._ _ _ 3/4 _)
12	Guide bolt 2 (Type 894._ _ _ 1/2 _)
12.1	Guide bolt 2 (Type 894._ _ _ 3/4 _)
13	Cap screw
14	Washer
15	Contact washer
16	Cap screw
17	Strand tailored (green/yellow)
18	Noise damping assembly
19	Release monitoring assembly
20	Lever assembly (for alignment mechanism)
21	Cap screw (for alignment mechanism)
22	Washer (for alignment mechanism)
23	Bushing (for alignment mechanism)
24	Type tag

Table 1: Dimensions

Size	Type	A ¹⁾	B ²⁾	C	C1	C2	C3	C4	Ød	F	G	G1	G2
6	894.6 _ _ _	140	184	108.7	127.5	154.5	113.6	135	25	97	52.5	M24	M12
6	894.5 _ _ _	140	184	124	139	161	129	141	25	98	55	M24	M12
7	894.5 _ _ _	180	229	126	135	161	135	150	28	105	54	M24	M16
8	894.5 _ _ _	220	275	141	150	173	146	160	30	108	57	M24	M16

¹⁾ The tolerance for dimension "A" is ±0.1 mm.

²⁾ The tolerance for dimension "B" is ±2.5 mm.

Table 2: Dimensions

Size	Type	G4	H	I	I1	I2	M	M1	T1	T2	T3	T4	T5
6	894.6 _ _ _	M8	101	37	27	22	47	48	25	20	23	45	15
6	894.5 _ _ _	M8	100	37	27	22	46	46	25	23	17	45	19
7	894.5 _ _ _	M8	120.5	37	37	28	50	44	30	30	29	45	19
8	894.5 _ _ _	M8	122.5	42	38	33	51	40	35	24	27	45	19

Table 3: Technical Data

Design:	performance-optimized	noise-optimized
Nominal DC voltage U_N :	see Type tag	see Type tag
Overexcitation DC voltage U_O :	$2 \times U_N$	$2 \times U_N$
Overexcitation time t_O :	≥ 1 s	≥ 1 s
Coil capacity at nominal voltage P_N :	see Type tag	see Type tag
Coil power at overexcitation P_O :	$4 \times P_N$	$4 \times P_N$
Max. circumferential speed for Sizes 6 and 7:	15 m/s	15 m/s
Max. circumferential speed for Size 8:	20 m/s	20 m/s

Table 4: Technical Data

Size	Type	Hand release stroke H1 [mm]	Brake disk width $K - 0.05$ ³⁾ [mm]	Braking force $F_{Br.}$ for performance-optimized design [N]	Braking force $F_{Br.}$ for noise-optimized design [N]	Effective friction diameter [mm]
6	894.6 _ _ _	2	15	2873	2270	$D_{eff} = D^{4)} - 40$
6	894.5 _ _ _	2	15	3232	2586	
7	894.5 _ _ _	2.2	15	3735	2992	$D_{eff} = D^{4)} - 50$
8	894.5 _ _ _	2.2	20	4973	3978	

³⁾ Other brake disk widths available on request.

⁴⁾ D = brake disk diameter (Fig. 7)

Table 5: Technical Data

Size	Type	Max. air gap "a" (Fig. 2) after wear [mm]	Duty cycle	Electrical connection	Max. hand release force [N]	Max. friction work $Q_r^{max.}$ per braking action [J]	Tightening torque [Nm]			Weight [kg]
							Item 11	Item 13	Item 21	
6	894.6 _ _ _	0.8	60 %	$2 \times 0.88 \text{ mm}^2$	450	100 000	475	83	10	14
6	894.5 _ _ _	0.8	60 %	$2 \times 0.88 \text{ mm}^2$	450	100 000	475	83	10	14.6
7	894.5 _ _ _	0.8	60 %	$2 \times 0.88 \text{ mm}^2$	800	120 000	500	210	10	19.4
8	894.5 _ _ _	0.8	60 %	$2 \times 0.88 \text{ mm}^2$	600	130 000	600	210	10	23.5

DANGER



If the brake is operated with an air gap "a" > 1.0 mm, it becomes a **safety risk** as the braking effect is no longer given because the armature disk (2) lies again the hand release (6).



⁵⁾ The thermal load for a brake cannot be stated. Most of the brake energy is transferred onto the brake disk. The thermal load capability is dependent on the heat dissipation capacities of the brake disk.

Table 6: Transverse Forces and Dimension Z1 (at max. Spring Force)

Size	Type	Transverse force F1 (on bolt 1) [N]	Transverse force F2 (on bolt 2) [N]	Dimension Z1 [mm]
6	894.6 _ _ _	5154	2331	2
6	894.5 _ _ _	5749	2512	5
7	894.5 _ _ _	6436	2390	7
8	894.5 _ _ _	8297	2351	12

Table 7: Switching Times [ms]

Performance-optimized designs							
Size	Type	Attraction t_2	Drop-out t_0 DC	Drop-out $t_{50}^{6)}$ DC	Drop-out $t_{90}^{6)}$ DC	Drop-out t_{11} AC	Drop-out $t_1^{7)}$ AC
6	894.6 _ _ _	200	40	85	115	150	450
6	894.5 _ _ _	150	40	100	150	150	500
7	894.5 _ _ _	180	45	100	135	125	500
8	894.5 _ _ _	300	40	95	160	125	400
Noise-optimized designs							
Size	Type	Attraction t_2	Drop-out t_0 DC	Drop-out $t_{50}^{6)}$ DC	Drop-out $t_{90}^{6)}$ DC	Drop-out t_{11} AC	Drop-out $t_1^{7)}$ AC
6	894.6 _ _ _	200	60	125	155	190	520
6	894.5 _ _ _	150	60	130	175	190	600
7	894.5 _ _ _	180	70	135	175	160	650
8	894.5 _ _ _	250	60	130	185	160	450

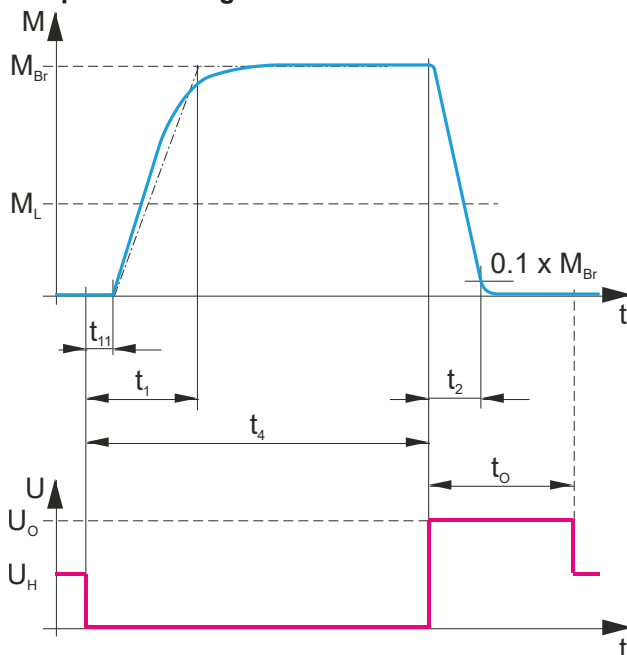


⁶⁾ Referring to the nominal braking force

⁷⁾ Referring to the effective braking force

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.

Torque-Time Diagram



Key

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



The switching times are dependent on the respective spring pressure.

Application

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

Design

The ROBA®-diskstop® is a spring applied, electromagnetically releasing 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®-diskstop® 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 upward-moving car and as a braking element against inadvertent movement of the car.

For a dual-circuit brake system, at least two brakes are necessary.

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

The ROBA®-diskstop® brake is a spring applied, electromagnetic safety brake.

Spring applied function:

In de-energized condition, thrust springs (10) press the armature disk (2) against the brake disk. The brake disk is held between the friction pads (4).

Electromagnetic function:

Due to the magnetic force of the coil in the coil carrier (1), the armature disk (2) is attracted against the spring pressure to the coil carrier (1).

The brake is released and the brake disk can rotate freely.

Safety brake function:

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

Scope of Delivery / State of Delivery:

The brake is pre-assembled.

Included loose in delivery are (options dependent on Type):

- Guide bolt 1 (Items 11 / 11.1)
- Guide bolt 2 (Items 12 / 12.1)
- Cap screw (13)
- Washer (14)
- Components for alignment mechanism (Items 20 to 23)

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.

Brake Temperature

DANGER



At an ambient temperature of +40 °C and a duty cycle of 60 %, the brake can heat up to +65 °C.

Do not touch the brake
=> Danger of burns!

Adjustment



The brakes are equipped manufacturer-side with the respective springs for the braking force stated on the Type tag. Adjustment is not necessary. Adaptions or modifications are not

permitted as a rule. This rule also applies to the manufacturer-side adjusted noise damping.

The microswitches are also adjusted manufacturer-side.

Despite great care during the manufacturer-side adjustment, re-adjustment might be necessary after installation due to transportation and handling. Furthermore, such switches cannot be considered fail-safe.

Please also observe the section 'Release Monitoring'.

Noise Damping (Item 18 / Fig. 1):



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

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

Installation Conditions

Before mounting the brake, please observe:

- ❑ Axial run-out deviation of the brake disk: max. 0.25 mm



Due to axial run-out deviations or tilting between the brake and the brake disk, the brake disk may rub against the friction linings.

- ❑ Brake disk surface quality (friction surfaces): $R_a = 3.2 \mu\text{m}$
- ❑ Brake disk material: steel or cast iron.
- ❑ For brake disk width K, see Table 4.
- ❑ Please keep to the distances I or I1 (Figs. 6 or 9 / Table 2) between the screw-on surface and the brake disk (not valid for Type 894. _ _ _ 0 _).
- ❑ Brake disk deformation or bearing backlash must not influence the set air gap.
- ❑ Keep the brake surfaces and the friction linings grease-free at all times.
- ❑ Please ensure a suitable protective cover on the open brake.
- ❑ In order to guarantee rub-free operation, a perpendicularity of 0.04 mm to the brake disk must be maintained on guide bolt 1 or on the bore axes.
- ❑ The screw-on surface in the $\varnothing 50$ mm range (Fig. 14) must be 0.04 mm parallel to the brake disk when the guide bolts are **bolted** (Type 894. _ _ _ 1/2 _).
- ❑ For mounting using guide bolts which are to be **pressed in** (Type 894. _ _ _ 3/4 _), please produce the adaptor bores as follows:
 - ➔ Bore for guide bolt 1: $\varnothing d$ P7 with surface quality $R_a 0.8$.
 - ➔ Bore for guide bolt 2: $\varnothing d$ H7 with surface quality $R_a 0.8$.
 - ➔ The distance dimension "A" of the bores for the guide bolts must have a tolerance of ± 0.1 mm.
 - ➔ The axes of the bores must be 0.04 mm perpendicular to the brake disk.

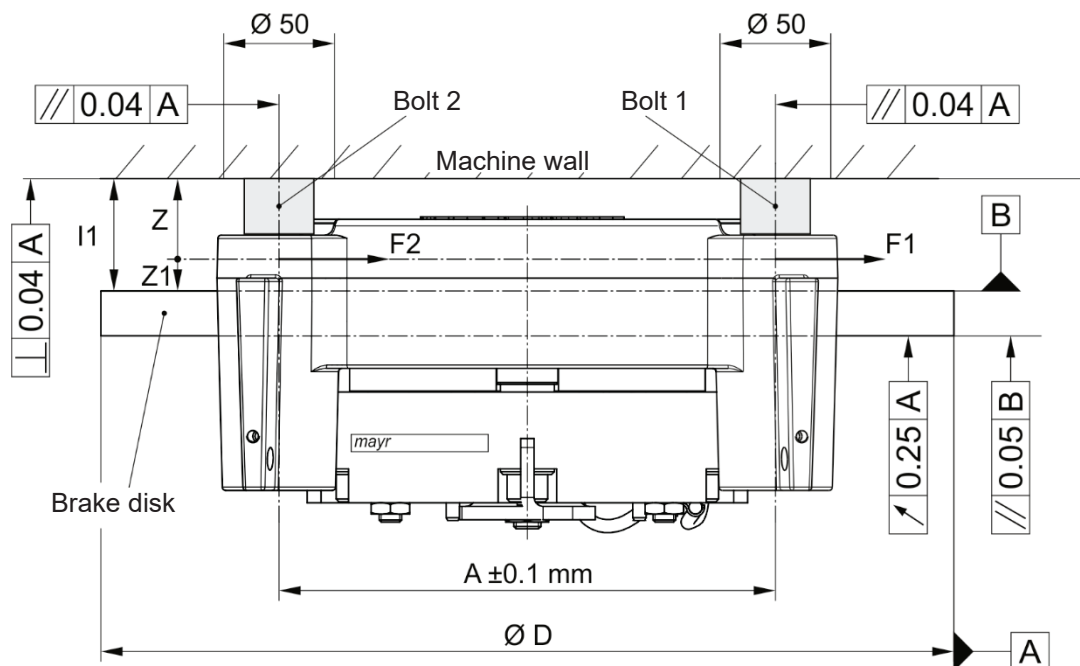


Fig. 14

Brake Installation Type 894._ _ _0_ (Figs. page 8)

The brake is pre-assembled manufacturer-side.

- ❑ Guide bolt 1 (Items 11 / 11.1) must keep to a diameter tolerance of +0.02 / -0.033 mm to the nominal dimension and a surface quality of Ra 1.6 in the area of both bearing bushings. In installed condition, guide bolt 1 must be 0.04 mm right-angled to the brake disk.
- ❑ Guide bolt 2 (Items 12 / 12.1) must be 0.6 – 1.0 mm smaller in the bearing bushing 1 (Item 3.1 / Fig. 4) area than the bore nominal dimension in the bearing bushing, so that no guide bolt tension can develop due to production and installation tolerances and warmth expansion. In the bearing bushing 2 (Item 3.2 / Fig. 4) area, the bolt should be even more undersized.
- ❑ The guide bolts must transmit the occurring transverse forces safely. The stability of the attachment wall must also be observed.
- ❑ The transverse force occurs on the guide bolt of the bearing bushing 1 (3.1). The lever arm which is responsible for the effect on the guide bolt is $Z = I1 - Z1$ (Fig. 14).
- ❑ After mounting the brake to the machine wall, check the axial mobility of the brake.

Brake Installation Type 894._ _ _1_ (Figs. page 8)

The brake is pre-assembled manufacturer-side.

Prerequisite: Tensile strength of the machine wall material $R_m \geq 400 \text{ N/mm}^2$

1. Screw guide bolt 1 (11) onto the machine wall. **Observe the tightening torque acc. Table 5. Secure with Loctite 243!**
2. Insert guide bolt 2 (12) into the brake caliper (3) at the back of the brake.
3. Release the brake mechanically (if necessary using a suitable device).
4. Push the released brake over guide bolt 1 (11) and slew it over the brake disk.
5. Insert the cap screw (13) with mounted washer (14) into guide bolt 2 (12) and screw the brake onto the machine wall. **Observe the tightening torque acc. Table 5. Secure with Loctite 243!**
6. **Check the brake for axial smooth running on the guide bolts!**
7. Turn the brake disk, making sure that the brake disk does not rub.

Brake Installation Type 894._ _ _2_ (Figs. pages 8/9 and Fig. 15)

1. For installation, see Brake Installation Type 894._ _ _1_ / steps 1 – 6.
2. Guide the lever assemblies (20) outside the friction linings over guide bolts 1 and 2 and slide them on radially.
3. Secure the lever assemblies (20) with the cap screw (21) via the intermediate bushing (23) onto the armature disk (2). **Please observe the tightening torque acc. Table 5!**
4. Secure the lever assemblies (20) with the cap screw (21) and the washer (22) to the brake caliper assembly (3). **Please observe the tightening torque acc. Table 5!**
5. Check the function of the alignment mechanism: It must be possible to turn the brake disk without rubbing noise.

Brake Installation Type 894._ _ _3_ (Figs. pages 8 and 9)

The brake is pre-assembled manufacturer-side.

Prerequisite: Tensile strength of the machine wall material $R_m \geq 500 \text{ N/mm}^2$

1. Press in the guide bolt 1 (11.1) and screw it on from the back via the thread G4 (Fig. 9) with a **tightening torque of 24 Nm**. Please make sure that guide bolt 1 (11.1) is inserted into the bore up to its limit.
2. Insert guide bolt 2 (12.1) into the brake caliper (3) at the back of the brake.
3. Release the brake mechanically (if necessary using a suitable device).
4. Push the released brake over guide bolt 1 (11.1) and slew it over the brake disk.
5. Insert guide bolt 2 (12.1) and screw it on from the back via the thread G4 (Fig. 9) with a **tightening torque of 24 Nm**. Please make sure that guide bolt 2 (12.1) is inserted into the bore up to its limit.
6. **Check the brake for axial smooth running on the guide bolts!**
7. Turn the brake disk, making sure that the brake disk does not rub.

Brake Installation Type 894._ _ _4_ (Figs. pages 8/9 and Fig. 15)

1. For installation, see Brake Installation Type 894._ _ _3_ steps 1 – 6.
2. Guide the lever assemblies (20) outside the friction linings over guide bolts 1 and 2 and slide them on radially.
3. Secure the lever assemblies (20) with the cap screw (21) via the intermediate bushing (23) onto the armature disk (2). **Please observe the tightening torque acc. Table 5!**
4. Secure the lever assemblies (20) with the cap screw (21) and the washer (22) to the brake caliper assembly (3). **Please observe the tightening torque acc. Table 5!**
5. Check the function of the alignment mechanism: It must be possible to turn the brake disk without rubbing noise.

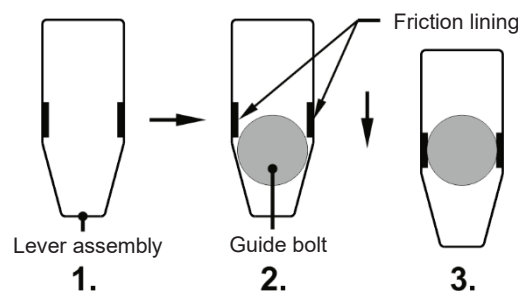


Fig. 15

Installation of Bowden Cable Hand Release

The hand release is pre-assembled manufacturer-side.

For the max. hand release forces, see Table 5, page 11.
For the Bowden cable installation, a bore is provided on the brake caliper (3) on both sides and on the hand release lever (6.1). The hand release can be pivoted by approx. 18°, at the latest until the spring pins (9) limit the stroke.

Adjust the Bowden cable so that the hand release (after actuation) can pivot back to the unreleased neutral position => **functional inspection**.

DANGER



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



Do not push the hand release lever (6.1) up to the stop pins (spring pins Item 9), but carefully only to the point, at which the traction sheave or the car starts moving.

The stop pins are only used to prevent blockage of the hand release.

A substantially increased force acting on the hand release lever (6.1) may lead to component destruction.

Bowden cable designs must be designed with an end stop for the Bowden cable lever as soon as release of the brake is residual torque-free.

In addition, a suitable return spring must be installed by the customer on Bowden cable designs in order to compensate for friction forces in the Bowden cable.

Adjust the Bowden cable length so that the hand release lever (6.1), after actuation, pivots back to the unreleased neutral position.



When actuating the hand release, a switching signal of the release monitoring device cannot be guaranteed.

The hand release is subject to wear and is not suitable for constant release.

A sufficient number of emergency releases is possible (approx. 1000 x).

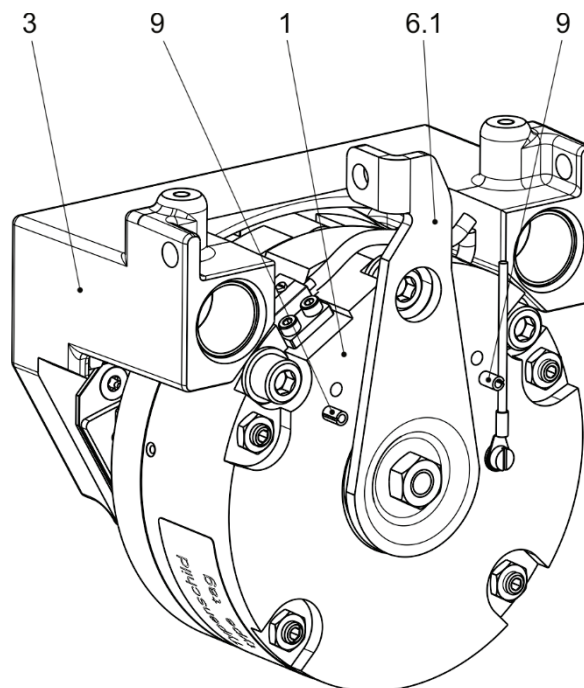


Fig. 16 (Depicted in the unreleased neutral position)

Brake Inspection (before brake initial operation)

- **Visual inspection:**
for proper condition of the brake (rust etc.) and no grinding
- **Carry out a release inspection:**
by energizing the brake or manually by actuating the hand release.
- **Switch functions inspection of the release monitoring / for connection as NC contact:**
 - Brake energized → Signal "OFF"
 - Brake de-energized → Signal "ON"
- for connection as NO contact:**
 - Brake energized → Signal "ON"
 - Brake de-energized → Signal "OFF"

The braking torque is not achieved until after the run-in procedure has been carried out.

The run-in conditions must be aligned with the manufacturer.

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. The braking torque is dependent on the respective run-in condition of the friction surfaces.

We recommend allowing the friction surfaces to run in when installed and under permitted loads.

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). Furthermore, friction materials (synthetic resin bonded rubber mixtures) are subject to aging, 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.

Release Monitoring (Item 19 / Fig. 1 / optional)



Please carry out a functional inspection before brake initial operation!

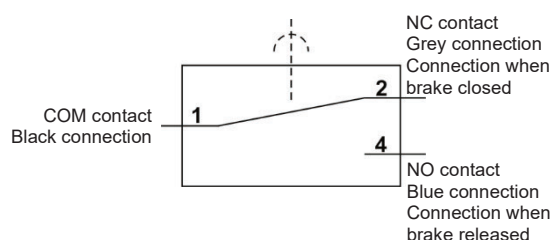
The ROBA®-diskstop® brakes are supplied optionally with manufacturer-side installed and adjusted release monitoring device.

A microswitch 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 microswitch signal on the release monitoring is evaluated.

Microswitch 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 emits a signal, the brake is released.

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!

Electrical Connection and Wiring



The brake must only be operated with overexcitation.

DC current is necessary for operation of the brake. The coil nominal voltage is indicated on the Type tag as well as on the brake body and is designed according to the DIN IEC 60038 (+10 % / -20 % tolerance). The brake must only be operated with overexcitation (e.g. using a ROBA®-switch or -multiswitch fast acting rectifier or phase demodulator). 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!

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.

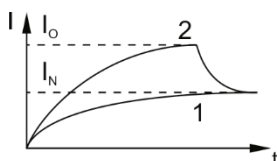
Field build-up with normal excitation

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

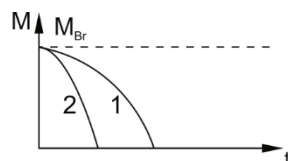
Field Build-up with Overexcitation

A quicker in braking torque is achieved if the coil is temporarily placed under a higher voltage than the nominal voltage, as the current then increases more quickly. Once the brake is released, it needs to be switched over to the nominal voltage (curve 2). The ROBA®-(multi)switch fast acting rectifier and phase demodulator work on this principle.

Current path

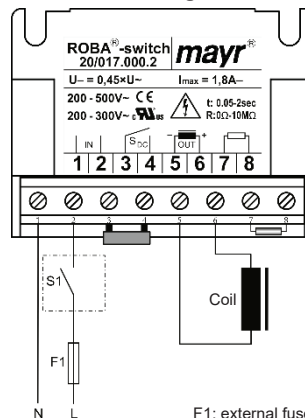


Braking torque path



Magnetic Field Removal

AC-side switching

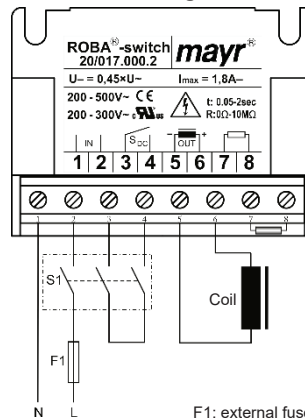


The power circuit is interrupted in front of the rectifier. The magnetic field slowly reduces. This delays the rise in braking torque.

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 can lead to wear on the switching 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 necessary 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.

Maintenance

The ROBA®-diskstop® is largely maintenance-free. The friction lining pairing is robust and wear-resistant. This ensures a particularly long service lifetime of the brake. However, the friction linings are subject to functional wear. Therefore, please carry out regular friction lining inspections.



The friction pads (4) must be replaced when air gap "a" > 0.8 mm (Fig. 2) is reached between the coil carrier (1) and the armature disk (2) on a warm brake.

Replacement of the friction pads (4) and all other maintenance work must be carried out at the place of manufacture.

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.

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 lining carrier (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	<ul style="list-style-type: none"> <input type="checkbox"/> Incorrect voltage on rectifier <input type="checkbox"/> Rectifier failure <input type="checkbox"/> Air gap too large (worn friction lining) <input type="checkbox"/> Coil interrupted <input type="checkbox"/> Incorrect rectifier (e.g. normal rectifier without overexcitation) 	<ul style="list-style-type: none"> <input type="checkbox"/> Apply correct voltage <input type="checkbox"/> Replace rectifier <input type="checkbox"/> Replace the friction pads <input type="checkbox"/> Replace brake <input type="checkbox"/> Use the correct, appropriate rectifier



mayr® will take no responsibility or guarantee for replacement parts and accessories which have not been delivered by mayr®, or for damage resulting from the use of these products.