Installation and Operational Instructions for ROBA®-diskstop®
Type 894. $\frac{5}{6}$ _ _ . _ _ Sizes 6, 7 and 8 (B.8.4.3.GB)

Please read these Operational Instructions carefully and follow them accordingly!

Ignoring these Instructions can lead to lethal accidents, malfunctions, brake failure and damage to other parts.
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:

Page 1: - Contents
- Safety and Guideline Signs
- License (Inspecta)
- Guidelines on EU Directives

Page 2: - Safety Regulations

Page 3: - Safety Regulations

Page 4: - Safety Regulations

Page 5: - Brake Illustrations

Page 6: - Brake Illustrations

Page 7: - Parts List
- Table 1: Dimensions
- Table 2: Dimensions
- Table 3: Technical Data
- Table 4: Technical Data

Page 8: Diagram 1: Braking Torques at max. Spring Force Dependent on the Brake Disk Diameter
- Table 5: Transverse Forces and Dimension Z1 at max. Spring Force
- Torque-Time Diagram
- Brake Temperature

Page 9: - Design
- Function
- Scope of Delivery
- Installation Conditions

Page 10: - Brake Installation Type 894. $\frac{5}{6}$ _ _.0_
- Brake Installation Type 894. $\frac{5}{6}$ _ _.1_
- Brake Installation Type 894. $\frac{5}{6}$ _ _.2_
- Brake Installation Type 894. $\frac{5}{6}$ _ _.3_
- Brake Installation Type 894. $\frac{5}{6}$ _ _.4_
- Installation of Bowden Cable Hand Release

Page 11: - Electrical Connection and Wiring

Page 12: - Brake Inspection
- Release Monitoring
- Noise Damping
- Maintenance
- Disposal

Page 13: - Malfunctions / Breakdowns

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.

License (Inspecta)

License number: **08495/2**

Guidelines on the Declaration of Conformity
A conformity declaration has been carried out for the product (electromagnetic safety brake) according to the Low Voltage Directive 2006/95/EC. The conformity declaration is set out in writing in a separate document and can be requested if required.

Guidelines on the EMC Directive (2004/108/EC)
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 Machine 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 all applicable EU directives and directives for the machine or system into which the product has been installed have been fulfilled.

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 94/9/EC.

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Safety Regulations

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

General Guidelines

DANGER

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

Brakes may generate further risks, among other things:


Hand injuries


Danger of seizure


Contact with hot surfaces


Magnetic fields

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

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

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

To prevent injury or damage, only professionals and specialists are allowed to work on the devices. They must be familiar with the dimensioning, transport, installation, initial operation, maintenance and disposal according to the relevant standards and regulations.

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

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

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

Guidelines for Electromagnetic Compatibility (EMC)

In accordance with the EMC directives 2004/108/EC, the individual components produce no emissions. However, functional components e.g. mains-side energisation of the brakes with rectifiers, phase demodulators, ROBA®-switch devices or similar controls can produce disturbance which lies above the allowed limit values.
For this reason it is important to read the Installation and Operational Instructions very carefully and to keep to the EMC directives.

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, run-in behaviour and wear as well as general ambient conditions can all affect the given values. These factors should therefore be carefully assessed, and alignments made accordingly

- ❒ Mounting dimensions and connecting dimensions must be adjusted according to the size of the brake at the place of installation.
- ❒ Use of the brake in extreme environmental conditions or outdoors, directly exposed to the weather, is not permitted.
- ❒ The magnetic coils are designed for a relative duty cycle of 100 %. However, a duty cycle > 60 % leads to higher temperatures, which cause premature ageing of the noise damping and therefore lead to an increase in switching noises. The max. permitted switching frequency is 240 1/h. On overexcited brakes, the switching frequency must not exceed 180 1/h.
  These values are valid for intermittent operation S3 60 %. The permitted surface temperature on the mounting surface must not exceed 70 °C at a max. ambient temperature of 45 °C. The overexcitation time must be at least dou ble the separation time t_2.
- ❒ The braking torque is dependent on the present run-in condition of the brakes.
- ❒ 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.
- ❒ The surfaces of the outer components have been zinc phosphated manufacturer-side to form a basic corrosion protection.

CAUTION

The rotors may rust up and block in corrosive ambient conditions and/or after long periods of storage.
The user is responsible for taking appropriate counter measures.

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Safety Regulations

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Ambient Temperature: – 10 °C up to + 45 °C

CAUTION

At temperatures of around or under freezing point, condensation can strongly reduce the torque, or the friction surfaces can freeze up. The user is responsible for taking appropriate counter measures.

Appointed Use

This safety brake is intended for use in electrically operated elevators and goods elevators according to EN 81-1/1998 / A3: 2009.
The safety brake corresponds to DIN EN 81, Part 1 [Sections 12.4.2.1 (2nd paragraph), 12.4.2.2, and 12.4.2.5] in its general design and its mode of operation.

Earthing Connection

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

Insulation Material Class F (+155 °C)

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

Protection

(mechanical) IP12: Protection against large body surfaces and large foreign bodies > 50 mm in diameter. Protection against dripping water if the housing is inclined by up to 15°.

(electrical) IP54: Dust-proof and protected against contact as well as against water spray coming 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 – 20 °up to +60°C.
- ❑ Do not store in direct sunlight or UV light.
- ❑ Do not store aggressive, corrosive substances (solvents / acids / lyes / salts etc.) near to the brakes.

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

Handling

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

User-implemented Protective Measures:

- ❒ Please cover moving parts to protect against **injury through seizure**.
- ❒ Place a cover on the magnetic part to protect **against injury through high temperatures**.
- ❒ **Protective circuit:** When using DC-side switching, the coil must be protected by a suitable protective circuit according to VDE 0580, which is integrated in *mayr* ®-rectifiers. To protect the switching contact from consumption when using DC-side switching, additional protective measures are necessary (e.g. series connection of switching contacts). The switching contacts used should have a minimum contact opening of 3 mm and should be suitable for inductive load switching. Please make sure on selection that the rated voltage and the rated operation current are sufficient. Depending on the application, the switching contact can also be protected by other protective circuits (e.g. *mayr* ® spark quenching unit, 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.

Regulations, Standards and Directives Used:

DIN VDE 0580	Electromagnetic devices and components, general directives
2006/95/EC	Low voltage directive
CSA C22.2 No. 14-2010	Industrial Control Equipment
UL 508 (Edition 17)	Industrial Control Equipment
95/16/EC	Elevator directive
EN 81-1	Safety regulations for the construction and installation of elevators and small goods elevators
BGV C1	(previously VGB 70) Safety regulations for theatre stage technical systems
EN ISO 12100	Safety of machinery – General principles - Risk assessment and risk reduction
DIN EN 61000-6-4	Noise emission
EN12016	Interference resistance (for elevators, escalators and moving walkways)
EN 60204-1	Electrical machine equipment

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Liability

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

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

Guarantee

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

CE Identification

CE According to the Low Voltage Directive 2006/95/EC

Conformity Markings

C SP US In terms of the Canadian and American approval

Identification

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

Manufacturer
mayr®
Name/Type
Article number
Serial number

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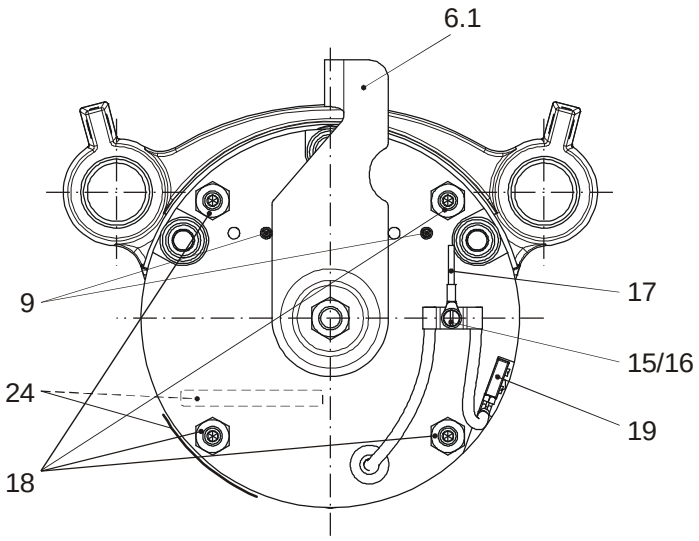

Fig. 1: Type 894. $\frac{5}{6}$ _ _.0_

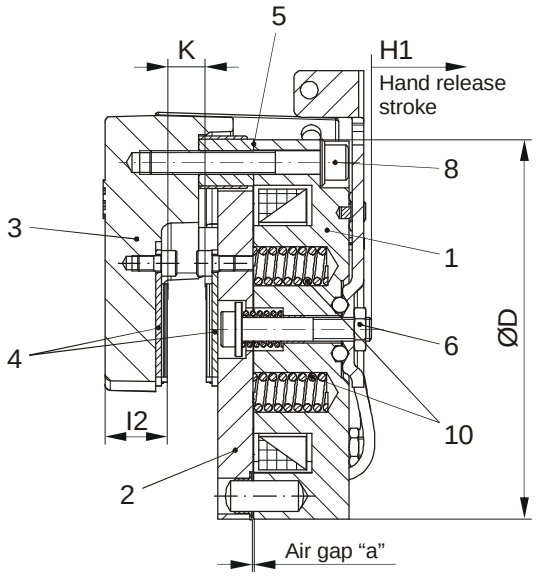

Fig. 2: Type 894. $\frac{5}{6}$ _ _.0_

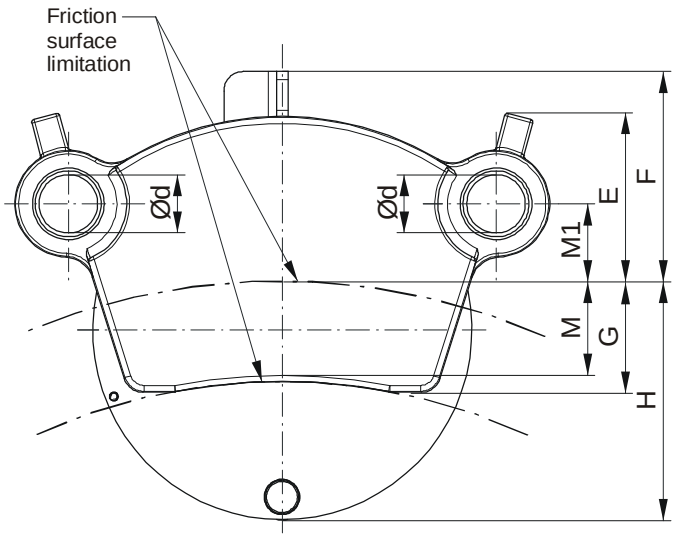

Fig. 3: Type 894. $\frac{5}{6}$ _ _.0_

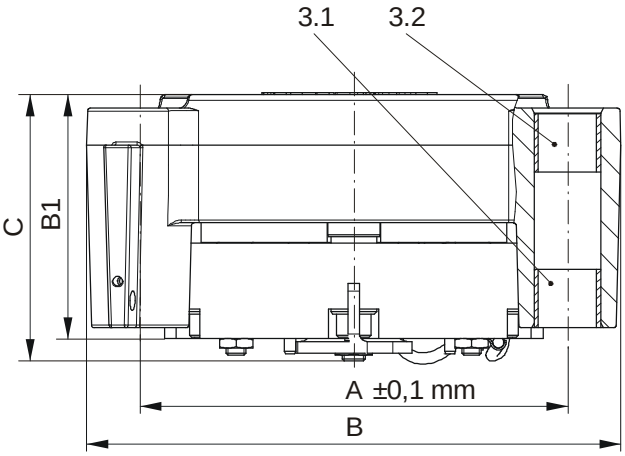

Fig. 4: Type 894. $\frac{5}{6}$ _ _.0_

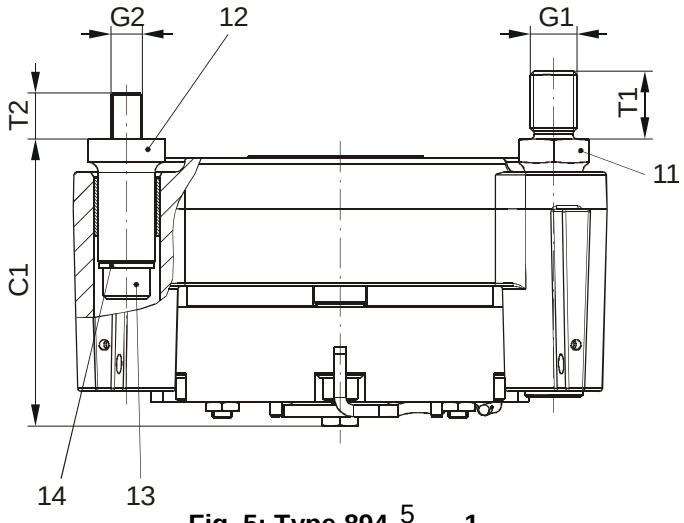

Fig. 5: Type 894. $\frac{5}{6}$ _ _.1_

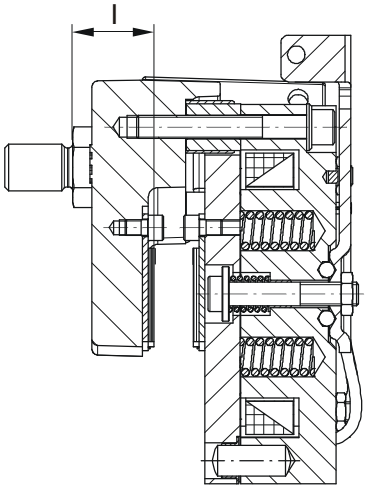

Fig. 6: Type 894. $\frac{5}{6}$ _ _.1_

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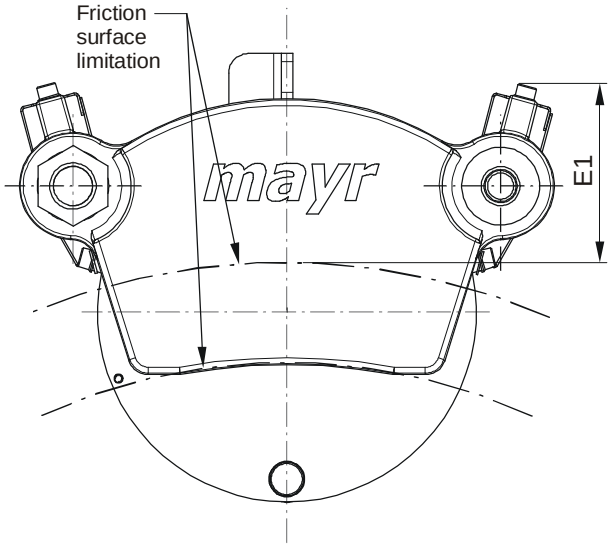

Fig. 7: Type 894. $\frac{5}{6}$ _ _.2_

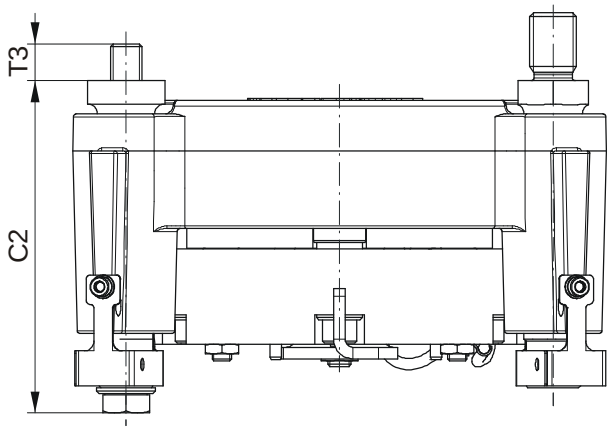

Fig. 8: Type 894. $\frac{5}{6}$ _ _.2_

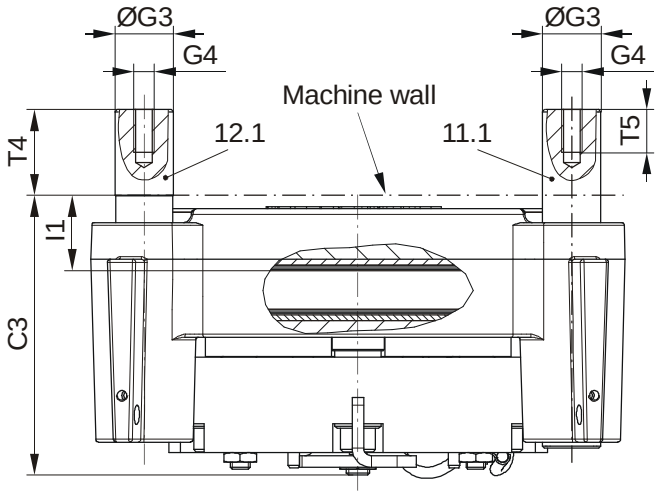

Fig. 9: Type 894. $\frac{5}{6}$ _ _.3_

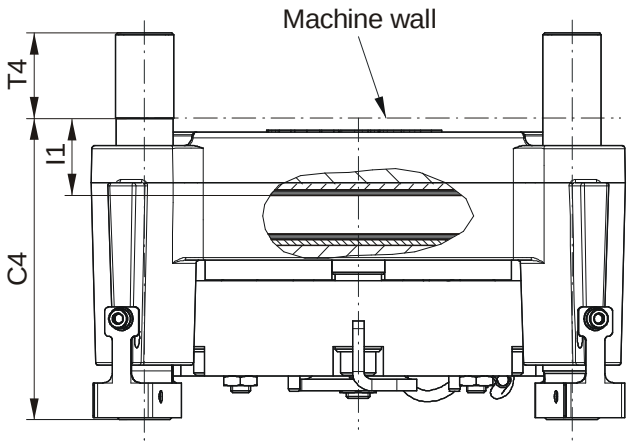

Fig. 10: Type 894. $\frac{5}{6}$ _ _.4

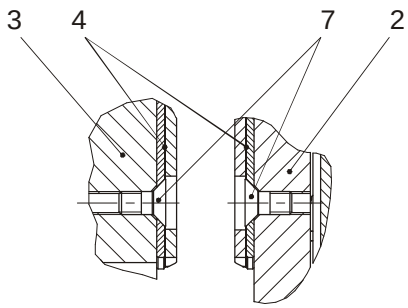

Fig. 11 (Friction pads)

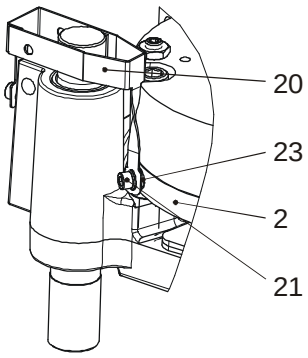

Fig. 12 (Alignment mechanism)

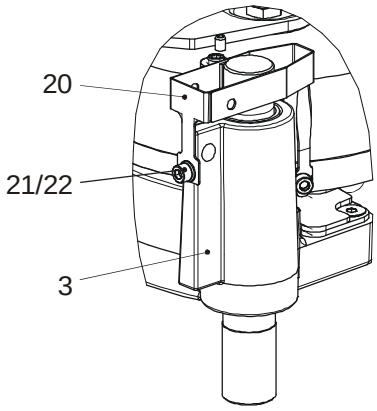

Fig. 13 (Alignment mechanism)

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

Item	Name
1	Coil carrier assembly with coil
2	Armature disk
3	Brake calliper
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_)

Item	Name
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	Strands 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	B1	C	C1	C2	C3	C4	Ød	ØD	E	E1	F
6	894.6__.__	140	184	102	108,7	127,5	154,5	113,6	135	25	156	88	95	97
6	894.5__.__	140	184	110,5	124	139	161	129	141	25	156	86	95	98
7	894.5__.__	180	229	110,5	126	135	161	135	150	28	185	89	92,5	105
8	894.5__.__	220	275	126,5	139	148	173	148	160	30	195	86,5	92,5	108

[1)] The tolerance for dimension "A" is ±0,1 mm.

Table 2: Dimensions

Size	Type	G	G1	G2	ØG3	G4	H	I	I1	I2	M	M1	T1	T2	T3	T4	T5
6	894.6__.__	52,5	M24	M12	25h6	M8	101	37	27	22	47	48	25	20	23	45	15
6	894.5__.__	55	M24	M12	25h6	M8	100	37	27	22	46	46	25	23	17	45	19
7	894.5__.__	54	M24	M16	28h6	M8	120,5	37	37	28	50	44	30	30	29	38	19
8	894.5__.__	57	M24	M16	30h6	M8	122,5	42	42	33	51	40	35	24	27	41	19

Table 3: Technical Data

Size	Type	Hand release stroke H1 [mm]	Brake disk width K -0,05 [mm]	Braking torque [Nm]	Max. circumferential speed [ms^{-1}]	Electrical voltage [V]	Electrical power [W]
6	894.6__.__	2	10 – 15	see Diagrams ½	15	see Type tag	see Type tag
6	894.5__.__	2	10 – 15				
7	894.5__.__	2,2	15 – 20				
8	894.5__.__	2,2	15 – 20				

Table 4: Technical Data

Size	Type	Max. air gap "a" after wear (Fig. 2) [mm]	Duty cycle	Electrical connection	Max. hand release force [N]	Max. friction work $Q_{r\ max.}$ per braking [J]	Tightening torque [Nm]			Weight [kg]
							Item 11	Item 13	Item 21	
6	894.6__.__	1,0	60 %	2x0,88 mm²	450	100 000	475	83	10	14
6	894.5__.__	1,0	60 %	2x0,88 mm²	450	100 000	475	83	10	14,6
7	894.5__.__	1,0	60 %	2x0,88 mm²	800	120 000	500	210	10	19,4
8	894.5__.__	1,0	60 %	2x0,88 mm²	600	130 000	600	210	10	23,5

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DANGER

If the brake is operated with air gap "a" > 1,0 mm, it becomes a **safety risk** as the braking effect generated by the armature disk (2) contacting the hand release (6) is no longer given.

* 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.

Diagram 1: Braking Torques at max. Spring Force dependent on the Brake Disk Diameter

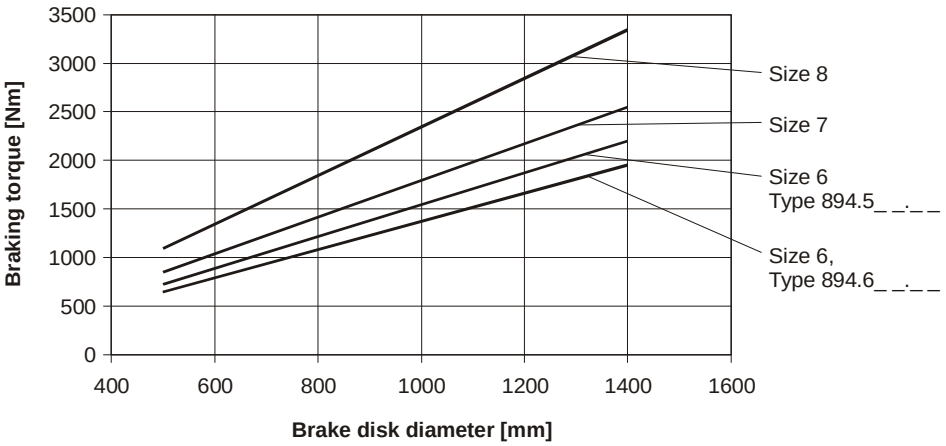


Table 5:
Transverse Forces and Dimension Z1 (at max. Spring Force)

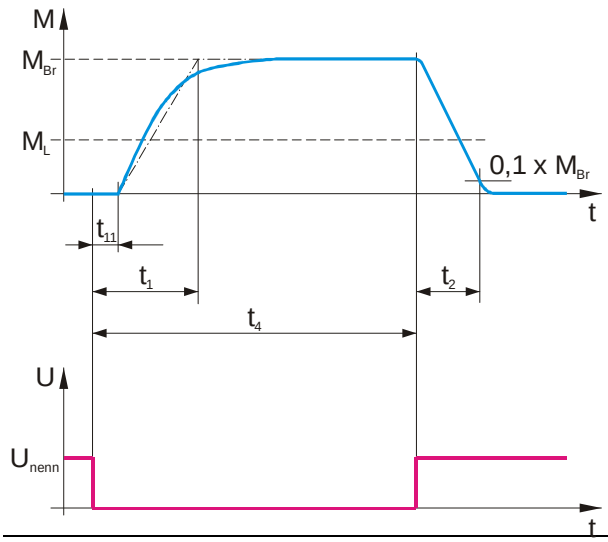
Size/Type	Transverse force F1 (on bolt 1) [N]	Transverse force F2 (on bolt 2) [N]	Dimension Z1 [mm]
6/894.6_ _._ _	5154	2331	2
6/894.5_ _._ _	5749	2512	5
7/894.5_ _._ _	6436	2390	7
8/894.5_ _._ _	8167	2314	12

Brake Temperature

DANGER

At an ambient temperature of +40 ℃ and a duty cycle of 60 %, the brake can heat up to +65 ℃.
Do not touch the brake
=> Danger of burns!

Torque-Time Diagram



Key:

M_{Br}	=	Braking torque
M_L	=	Load torque
t_1	=	Connection time
t_{11}	=	Response delay on connection
t_2	=	Disconnection time
t_4	=	Slipping time + t_{11}
U_{nenn}	=	Coil nominal voltage

The switching times are dependent on the respective spring pressure.

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Design

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

Function

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

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

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

State of Delivery:

The brake is partly assembled.

Included loose in delivery are (options dependent on Type):
Guide bolt 1 (11 / 11.1), guide bolt 2 (12 / 12.1),
hexagon head screw (13), washer (14) and components for the alignment mechanism (Items 20 to 23).

Please check the state of delivery immediately!
***mayr*® will take no responsibility for belated complaints.**

Please report:
- **Transport damage immediately to the deliverer.**
- **Incomplete delivery and obvious defects to the manufacturer.**

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, the brake disk may grind against the friction linings.

- ❑ Brake disk surface quality (friction surfaces): Ra = 3,2 µm
- ❑ Brake disk material: Steel or cast iron.
- ❑ For brake disk width K, see Table 3.
- ❑ Please keep to the distances I or l1 (Figs. 6 or 9 / Table 1) between the screw-on surface and the brake disk.
  (not valid for Type 894. $\frac{5}{6}$ _ _.0 _).
- ❑ Brake disk deformation or bearing backlash must not influence the set air gap.
- ❑ In order to guarantee grind-free operation, a squareness of 0,04 mm to the brake disk must be maintained at guide bolt 1 or at the bore axes.
- ❑ The screw-on surface in the ∅ 50 mm range (Fig. 14) must be 0,04 mm parallel to the brake disk if screw-in guide bolts (Type 894. $\frac{5}{6}$ _ _. $\frac{2}{1}$ _) are used.
- ❑ Keep the brake surfaces and the friction linings grease-free!
- ❑ Please ensure a suitable protective cover on the open brake.
- ❑ For mounting using guide bolts which are to be pressed in (Type 894. $\frac{5}{6}$ _ _. $\frac{3}{4}$), please produce the adaptor bores as follows:

  ➔ Bore for guide bolt 1:
  Ø G3 P7 with surface quality Ra 0,8.

  ➔ Bore for guide bolt 2:
  Ø G3 H7 with surface quality Ra 0,8.

  ➔ The distance dimension "A" of the bores for the guide bolts must have a tolerance of ±0,1 mm.

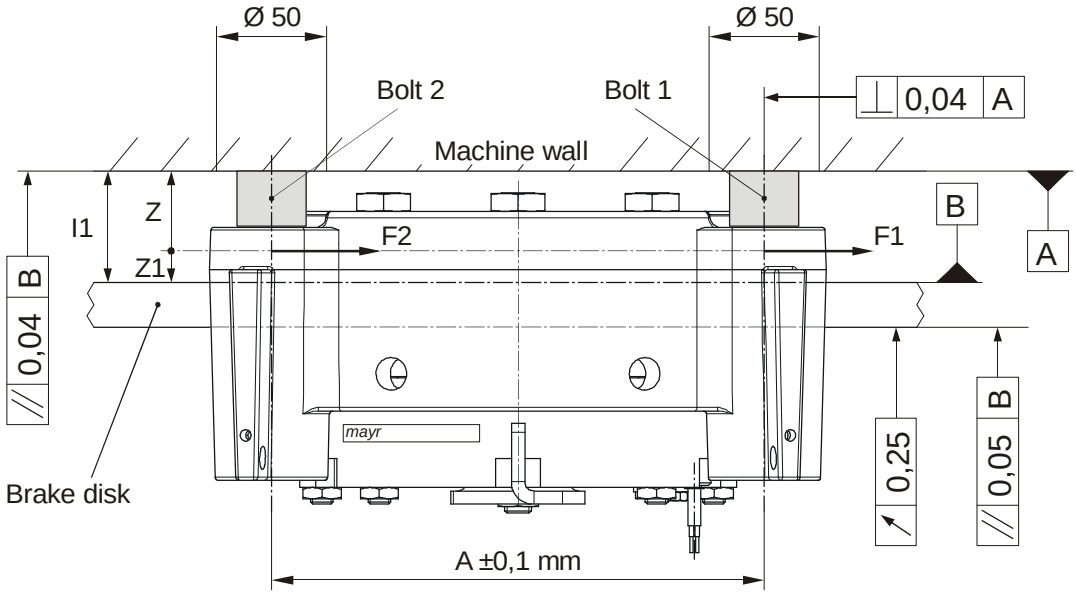

Fig. 14

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Brake Installation Type 894. 5/6 _ _.0 _ (Figs. page 4)

The brake is partly assembled manufacturer-side.

- ❑ Guide bolt 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 (12 / 12.1) must be 0,6 - 1,0 mm smaller in the bearing bushing 1 (Item 3.1 / Fig. 4) than the bore nominal dimension in the bearing bushing, so that no guide bolt distortion can occur due to production and installation tolerances and heat expansion. In the area of the bearing bushing 2 (Item 3.2 / Fig. 4), 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 bearing bushing 1 (3.1). The lever arm which has an effect on the guide bolts is Z = l1 - Z1 (Fig. 14.)
- ❑ After installing the brake onto the machine wall, please check that the brake can move axially.

Brake Installation Type 894. 5/6 _ _.1 _ (Figs. pages 4 and 5)

The brake is partly assembled manufacturer-side.

Prerequisite: **The tensile strength of the machine wall material $R_m \geq 400$ N/mm².**

1. Screw the guide bolt 1 (11) onto the machine wall. **Observe the tightening torque acc. Table 4. Secure with Loctite 243!**
2. Insert guide bolt 2 (12) into the brake calliper (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 4. Secure with Loctite 243!**
6. **Check the brake for axial smooth running on the guide bolt!**
7. Turn the brake disk, making sure that the brake disk does not grind.

Brake Installation Type 894. 5/6 _ _.2 _ (Figs. pages 4/5 and Fig. 15)

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

Brake Installation Type 894. 5/6 _ _.3 _ (Figs. pages 4 and 5)

The brake is partly assembled manufacturer-side.

Prerequisite: **The tensile strength of the machine wall material $R_m \geq 500$ N/mm².**

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 in up to its limit in the bore.
2. Insert guide bolt 2 (12.1) into the brake calliper (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. Press in 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 in up to its limit in the bore.
6. **Check the brake for axial smooth running on the guide bolt!**
7. Turn the brake disk, making sure that the brake disk does not grind.

Brake Installation Type 894. 5/6 _ _.4 _ (Figs. pages 4/5 and Fig. 15)

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

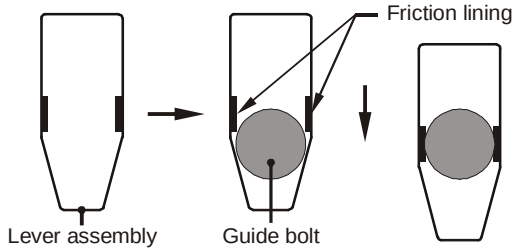

Fig. 15

Installation Bowden Cable Hand Release

The hand release is partly assembled manufacturer-side.

For the max. hand release forces, see Table 4, page 7.
For the Bowden cable installation, one bore is provided on the brake calliper and on the hand release lever. The hand release can be moved by c. 18°, at the latest when the spri ng pins (9) limit the stroke. Adjust the Bowden cable so that the hand release (after actuation) returns to its limit **=> Functional inspection**.

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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). AC current operation can take place using a rectifier or another suitable DC power supply. Dependent on the brake equipment, the connection possibilities can vary. Please follow the exact connections according to the Wiring Diagram. The manufacturer and the user must observe the applicable directives and standards (e.g. DIN EN 60204-1 and DIN VDE 0580).
Their observance must be guaranteed and double-checked!

Earthing Connection

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

Device Fuses

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

Switching Behaviour

The operational behaviour of a brake is to a large extent dependent on the switching mode used. Furthermore, the switching times are influenced by the temperature and the air gap between the armature disk 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.

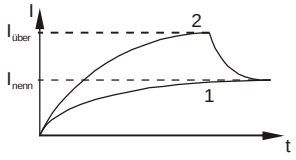
- **Field Build-up with Normal Excitation**

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

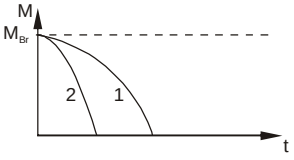
- **Field Build-up with Overexcitation**

A quicker and safer drop in braking torque is achieved if the coil is temporarily placed under a higher voltage than the nominal voltage, as the current then increases more quickly. Once the brake is released, it needs to be switched over to the nominal voltage (curve 2). The relationship between overexcitation and separation time t_2 is roughly indirectly proportional, meaning that at doubled nominal voltage the separation time t_2 for release of the brake is halved. The ROBA®-(multi)switch fast acting rectifier and phase demodulator work on this principle.

Current path

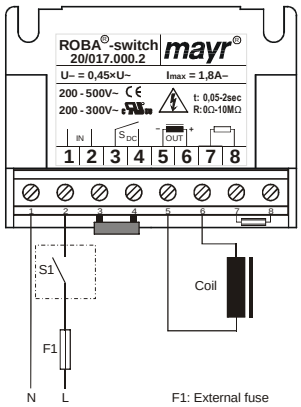


Braking torque path



Magnetic Field Removal

- **AC-side Switching**

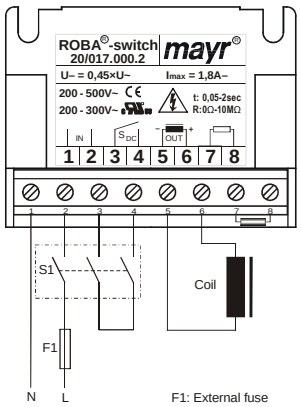


The power circuit is interrupted before the rectifier. The magnetic field slowly reduces. This delays the rise in braking torque.

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

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

- **DC-side Switching**



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

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

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

Protective Circuit

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

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Brake Inspection

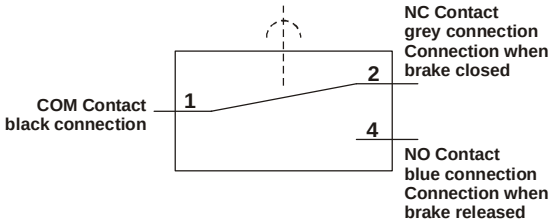
The full set braking torque is not achieved until after the run-in procedure has been carried out.
The braking torque is the torque effective in the shaft train on slipping brakes, with a sliding speed of 1 m/s referring to the mean friction radius (acc. DIN VDE 0580/ 10.94).

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

Please carry out a functional inspection before brake initial operation!

The ROBA®-diskstop® is supplied optionally with manufacturer-side adjusted release monitoring.
A microswitch 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.

Microswitch Wiring Diagram:



Function

When the magnetic coil is energised in the coil carrier (1), the armature disk (2) is attracted to the coil carrier (1), a microswitch emits a signal and the brake is released.

Microswitch Specifications

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

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

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 capacities and medium ones. However, after switching a medium switching capacity, small switching capacities are no longer reliably possible.
In order to switch inductive, capacitative and non-linear loads, please use the appropriate protective circuit to protect against electric arcs and unpermitted loads!

Noise Damping (Item 18 / Fig. 1)

The noise damping used here was set and adjusted manufacturer-side.
However, this component is subject to aging dependent on the application or operational conditions (torque adjustment, switching frequency, ambient conditions, system vibrations etc.) and must be re-adjusted or replaced as a routine measure or if the switching noise becomes too loud.
This must only be carried out by qualified and authorised specialist personnel, and should therefore be undertaken in the place of manufacture.

Maintenance

The ROBA®-diskstop® is mainly maintenance-free.
The friction linings are robust and wear-resistant. This ensures a particularly long lifetime of the brake.
However, the friction linings are subject to operational wear.
Therefore, please carry out regular friction lining inspections.
For the max. air gap between the coil carrier (1) and the armature disk (2) on a warm brake, see Table 4.

Air gap replacement as well as all other maintenance work must be carried out at the place of manufacture.

Disposal

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

Electronic Components
(Rectifier / ROBA®- switch / microswitch):
Products which have not been disassembled can be disposed of under the Code 160214 (mixed materials) or Components under Code. No. 160216, or can be disposed of by a certified disposal firm.

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

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

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

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

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Malfunctions / Breakdowns:

Malfunction	Possible Causes	Solutions
Brake does not release	Incorrect voltage on rectifier	Apply correct voltage
	Rectifier failure	Replace rectifier
	Air gap too large (worn friction lining)	Replace rotor
	Coil interruption	Replace brake
	Incorrect rectifier (e.g. normal rectifier without overexcitation)	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.

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