Installation and Operating Instructions for ROBA-stop®-silenzio® Type 896.2_ _._ _ Sizes 300 – 1800

(B.8.7.1.GB)

Please read and observe this Operating Instruction carefully!
A possible malfunction or failure of the clutch and damage may be caused by not observing it.

Table of contents:

Manufacturer's declaration

The product is to be seen as an option or component for installation into machines or equipment according to the machinery directive 98/37 EC. The machinery (product) must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the applicable EC-directives.

The product corresponds to the low voltage directives 2006/95/EC.

The product corresponds to the elevator guideline 95/16/EC.

The observance of the relevant EMV-guideline 89/336/EEC is to be guaranteed.

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(B.8.7.1.GB)

Safety Regulations

With this safety regulations no claim on completeness is raised!

Attention!
Hazardous conditions when contacting hot connections and components.

Only qualified and well-trained specialists should work on the units to avoid any personal injury or damage to machinery.

Danger!

If the electromagnetic brake is used in an improper way.

If the electromagnetic brake has been modified or reconverted.

If the relevant standards of the safety or installation conditions are not observed.

Attention!
The installation and operating instructions must be read carefully and all safety regulations observed before installation and initial operation as danger to personnel and damage to machinery may be caused.
The electromagnetic brakes are developed and manufactured in conformance with the temporally known rules of the technology and they are basically considered as fail-safe at the time of the delivery.

Attention:

Based on the guideline 94/9/EC (ATEX-guideline) this product is not suitable for the application in potential explosive areas without evaluation of the conformity.

Observe!

- ❒ Only qualified and well trained specialists who are familiar with the transport, installation, initial start-up, maintenance and operation of the units as well as with the relevant standards may carry out the corresponding works.
- ❒ Technical data and indications (Type tag and documentation) are to be kept absolutely.
- ❒ Correct supply connection according to Type tag.
- ❒ Supply connections must not be released and assembly, maintenance or repair must not be made when the unit is energized.
- ❒ Electrical leads must not be under tension when connected.
- ❒ Check current carrying components regarding damage before installation. Current carrying components must not be in contact with water.
- ❒ The braking torque does not exist any more, if the friction lining and friction surface come into contact with oil or grease.

Intended use

mayr®-brakes are determined for the use in machines and equipment and may only be used for the ordered and confirmed purpose.

The use beyond of the corresponding technical indications is considered as incorrect.

Notes to the electromagnetic compatibility (EMV)

There are no emissions from the listed single components within the meaning of the EMV-guideline 89/336/EEC, however, increased interference levels can occur when working components are operated outside their specification limits as for example, energising the brake with rectifiers, phase demodulators or ROBA®-switch in the line side.
Therefore, the installation and operating instructions must be read carefully the EMV-guidelines are to be observed.

Conditions of the unit

The catalogue values are reference values, which can deviate in some cases. When selecting the brake, site of installation, braking fluctuations, permissible friction work, behaviour during run-in, wear and ambient conditions are to be carefully checked and agreed with the unit manufacturer.

Observe!

- ❒ The mounting and connecting dimensions at the site of installation must match to the size of the brake.
- ❒ The brakes are designed for a relative switch on period of 100 %.
- ❒ The brakes are designed for a dry running only. Should oil, grease, water or similar materials come in contact with the friction surfaces the braking torque could be reduced.
- ❒ The braking torque depends on the corresponding running-in condition of the brake.
- ❒ The metallic surface of the brake is protected against corrosion arranged by the factory.

Protection class I

The protection is not only based on the basis isolation, but that all conductive components must be connected with the protective conductor (PE) of the fixed installation. In case the basis isolation fails, no contact voltage can remain existing. (VDE 0580).

Protection (mechanical) IP 20:

Protection against fingers or similar large objects, against medium-sized foreign bodies > 12 mm diameter.
No water protection.

Protection (electrical) IP 54:

Dust-tight and protection against contact as well protection against splashing water from all directions.

Ambient temperature –20 °C up to +40 °C

Attention!

The torque could be severely reduced in case of temperatures over or under the freezing point due to dewing. The user must provide corresponding counter measures.

Thermal class F (+155 °C)

The magnetic coil as well as the casting compound is designed for a max. operating temperature of +155 °C.

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Safety Regulations

With this safety regulations no claim on completeness is raised!

Necessary protective measures to be undertaken by the user:

Cover all moving parts to prevent personnel injury as squeezing and seizing and centrifuging out.

Cover dangerously hot magnetic parts to prevent contact.
Attach a conductive connection between magnetic part and electrical conductor (PE) of the fixed installation (protection class I) to prevent electrical shock and inspection conforming to standards of the unified protective connection to all contactable metallic components.
Protection against high inductive cut-off peaks according to VDE 0580/2000-07, par. 4.6 by fitting varistors, spark quenching units or similar, in order to prevent damage of coil insulations or the burn-off of the switching contact (this protection is included in *mayr*®-rectifiers).
Provide additional necessary safety measures against corrosion of the brake, if they are used in extreme ambient conditions or in the open with direct atmospheric influences. Measures against freezing from armature disc and rotor with high humidity and deep temperatures.

Following directives, standards and guidelines have been used:

98/37/EC	Machinery directive
2006/95/EC	Low-voltage directive
89/336/EEC	EMV-guideline
95/16/EC	Elevator guidelines
EN 81-1	Safety regulations for the design and Installation of elevators and small goods elevators
DIN VDE 0580	Electromagnetic units and components, general regulations

Following standards are to be observed:

DIN EN ISO 12100-1 and 2	Security of machines
DIN EN61000-6-4	Interference emission
EN12016	Interference resistance (for elevators, escalators and moving sidewalks)
EN60204	Electrical equipment of machines

Liability

- The information, notes and technical data indicated in the documentation were at the time of printing on the latest state.
  Claims on brakes already supplied cannot be made valid from it.
- Liability for damages and breakdowns is not taken over, with
  - ignoring the installation and operating instructions,
  - improper use of the brakes,
  - arbitrary modification of the brakes,
  - inappropriate working at the brakes,
  - handling or operating errors.

Guarantee

- The warranty conditions correspond to the sales and supply conditions of Chr. Mayr GmbH + Co. KG.
- Defects are to be advised immediately after detection to *mayr*®.

Test mark

CE corresponding to the low voltage directive 2006/95/EC.

Marking

mayr®-components are clearly identified by means of the content of the Type tags.

Manufacturer

mayr®

Designation/Type

Article No.

Series number

TÜV-Approvals:

The sizes 300 to 1800 shown here with a microswitch for release monitoring have been prototype-inspected by the South German TÜV as brake systems having an effect on the drive sheave shaft and as part of a protective system for the upwards-moving elevator cage against excessive speed. These brakes are single-circuit brakes.
An operational brake (dual circuit brake) is not required in elevators.

Approval number: **ABV 762/1**

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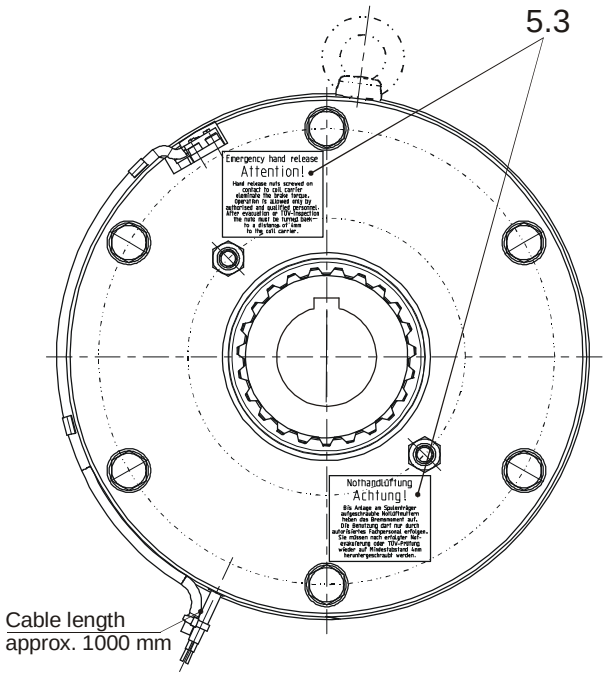

Fig. 1

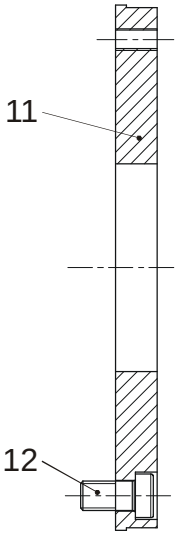

Fig. 2

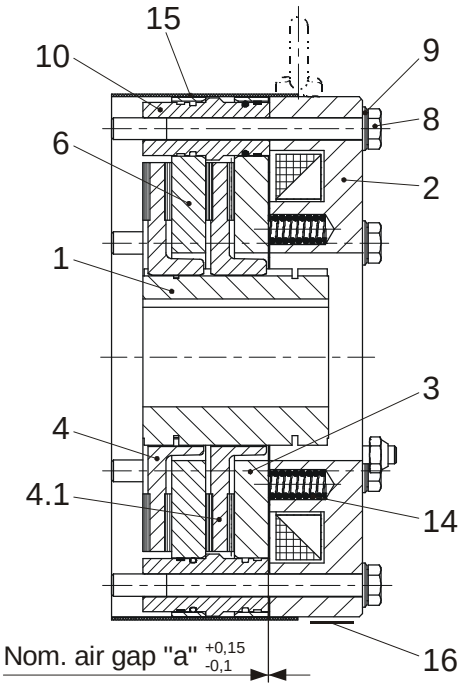

Fig. 3

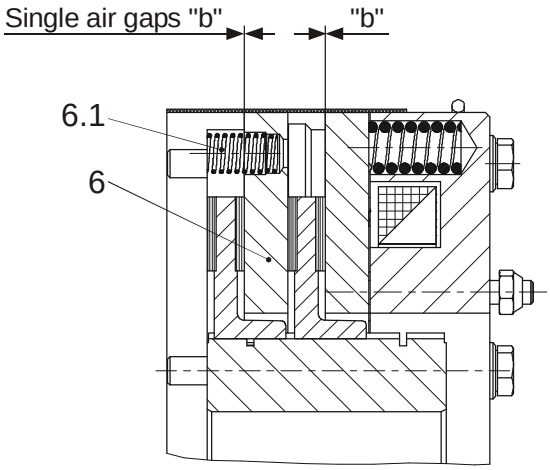

Fig. 4

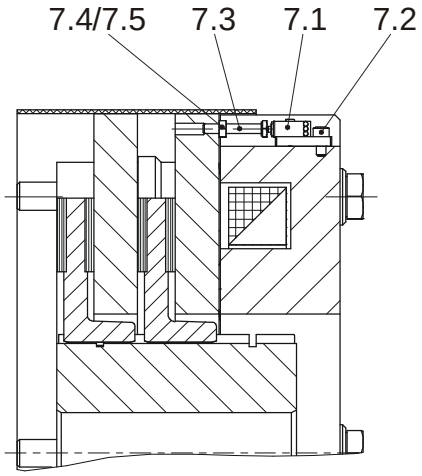

Fig. 5

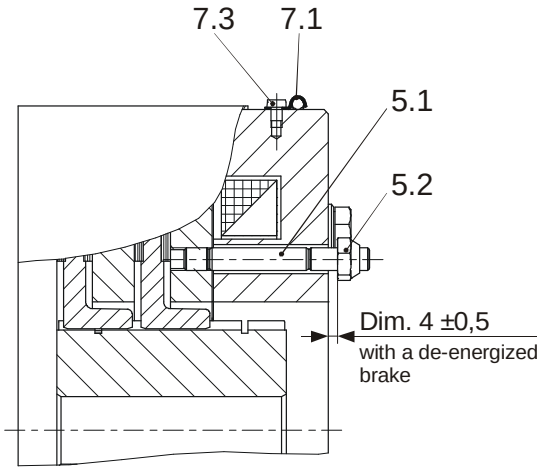

Fig. 6

Safety and information signs

Attention!
Risk of injury for persons and damage at the machine possible.

Note!
Reference to important points which are to be considered.

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Parts List *(Only mayr® original parts are to be used)*

1	**Hub**	**6**	**Intermediate washer**	**8**	**Hexagon head cap screw**
2	**Coil carrier (assembly)**	**6.1**	**Thrust spring**	**9**	**Washer**
3	**Armature disc**	**7.**	**Release monitoring (assembly)**	**10**	**Distance bolts**
4	**Rotor 1**	**7.1**	**Micro switch**	**11**	**Flange plate**
4.1	**Rotor 2**	**7.2**	**Cap screw**	**12**	**Cap screw**
5	**Emergency hand release (assembly)**	**7.3**	**Hexagon head cap screw**	**13**	**Noise damping**
5.1	**Stud bolt**	**7.4**	**Hexagon nut**	**14**	**Thrust spring**
5.2	**Hexagon nut**	**7.5**	**Spring washer**	**15**	**Cover**
5.3	**Safety information label German and English**	**7.6**	**Cap screw**	**16**	**Type tag**
		7.7	**Cable clip**		

Technical data

Nominal voltages:	24 V/104 V/180 V/207 V
Protection (electrical)	IP54
Protection (mechanical)	IP10
Duty cycle:	100 %
Connection:	2 x 0,88 mm²
Ambient temperature:	-20 °C up to +40 °C

Table 1: Technical data (size-dependently)

Size	Braking torque (tolerance +60 %) [Nm]			Maximum speed [rpm]	Electric rated power [W]	Mass* [kg]	Number of the thrust springs (Pos. 6.1) in the intermediate washer (Pos. 6)	Switching times with nom. braking torque 100 %		
	Nominal torque 100 % Type 896.20_._ _	Increased torque 120 % Type 896.21_._ _	Reduced torque 75 % Type 896.22_._ _					Pick up t_2 [ms]	Drop t_1 (AC) [ms]	Drop t_1 (DC) [ms]
300	600	700	450	300	86	40,5	2	308	1087	246
500	1000	1200	760	300	90	53	3	444	1023	193
800	1600	2000	1200	300	107	80	6	581	1231	267
1300	2600	3120	1960	250	130	113	8	589	1464	266
1800	3600	4300	2700	250	150	153	4	850	1920	420

***** Mass incl. flange plate with screws

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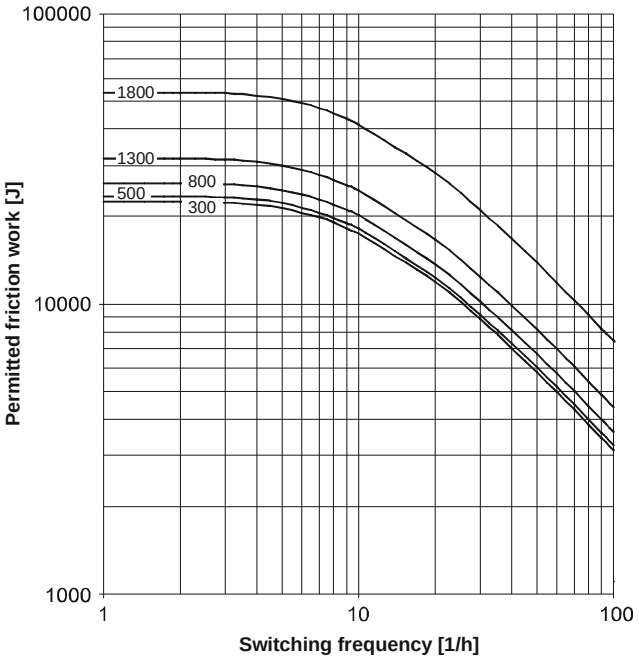
Friction power diagram
with n = 300 rpm for sizes 300 up to 800
with n = 250 rpm for sizes 1300 up to 1800



Delivery range / Delivery condition

Brake pre-assembled.
Supplied loose:
Flange plate (11 / type dependent option) with cap screws (12), hexagon head cap screws (8) with washers (9), cover (15), hub (1) , thrust springs (6.1) and rotor 1 (4).
The scope of supply or the delivery condition must immediately be checked after receipt of the shipment.
mayr® does not overtake any guarantee for faults complained subsequently.

Transportation damages must immediately be advised to the forwarder.
Recognizable faults / incompleteness of the shipment must immediately be advised to the manufacturing company.

Application

As a holding brake with emergency-stop

- ❒ **Attachment to slowly running machine shaft, for example gearbox output shaft.**
- ❒ **In enclosed buildings (in tropical area, with high air humidity with long downtimes and sea climate only with special measurements).**
- ❒ **In a dry running environment.**
- ❒ **Horizontal and vertical mounting positions.**
- ❒ **In a clean environment (coarse dust as well as liquids of all kinds impair the brake function, ⇒ fit a cover).**

Functional description

The ROBA-stop®-silenzio® Type 896.2_ _._ is designed a dual disc brake.
The braking torque is generated by the applied force of several thrust springs (14) by means of a frictional locking between the friction linings of the rotors (4 and 4.1), the armature disc (3), the intermediate washer (6) and the flange plate (11) or machine wall.
The brake is electromechanically released.
For the functional test (TÜV-inspection) of an additional dual circuit brake or for an emergency-evacuation, the torque of this brake can be set mechanically to 0 with the emergency hand release (5) for the duration of the functional test or for the duration of the emergency-evacuation.
Alternatively this can also be achieved by energising the magnetic coil.
See also item emergency hand release => observe warning information!

Assembly conditions

- ❑ The eccentricity of the shaft end relative to the fixing hole P.C.D. must not exceed 0,2 mm.
- ❑ The positioning tolerance of the threads for the hexagon head cap screws (8) must not exceed 0,2 mm.
- ❑ The deviation in the true running of the screw-on surface to the shaft must not exceed the permissible true running tolerance acc. to DIN 42955 R of **0,05 mm** with size 300, and **0,063 mm** with sizes 500 up to 1800.
  Reference diameter is the pitch circle diameter for brake attachment.
  Larger deviations can cause a drop of the torque, continuous wear of the rotor and overheating.
- ❑ The hub (1) and shaft fits are to be selected to avoid any distortion of the hub splines (1). It can clamp the rotors (4 and 4.1) on the hub (1) impairing the brake function, (recommended hub-shaft fit H7/k6).
  The max. joining temperature of 200 °C must not be exceeded.
- ❑ When the brake has been supplied without flange plate (11), a geometry of the screw-on surface, as described in the catalogue P.896.V__.GB, is to be provided (corresponding diameter and contact for cover).
- ❑ Rotors (4 and 4.1) and braking surfaces must be free of oil and grease. There has to be a suitable counter friction face (steel or cast iron). Sharp-edged interruptions of the friction face must be avoided.
  Recommended surface quality of the friction surface Ra = 1,6 µm.
  Especially mounting areas made of cast iron arranged by the customer are additionally to be drawn off with a fine abrasive paper (granulation ≈ 400).

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Table 2

Size	Rotor thickness new condition - 0,05 [mm]	Nominal air gap "a" de-energized + 0,15 / - 0,1 [mm]	Single air gaps "b" released min. [mm]	Maximum air gap * "$a_{max.}$" with nominal torque 100 % [mm]	Maximum-air gap * "$a_{max.}$" with torque 75 % or 120 % ** [mm]	Fixing screws with spanner gaps and tightening torques					
						Brake			Flange plate (11)		
						Pos. 8	SW	[Nm]	Pos. 12	SW	[Nm]
300	13,9	0,60	0,15	1,0	1,3	3 x M12	18	123	6 x M12	10	123
500	16	0,60	0,15	1,0	1,3	6 x M12	18	123	6 x M16	14	200
800	18	0,65	0,18	1,0	1,3	6 x M16	24	250	6 x M16	14	300
1300	18	0,70	0,20	1,1	1,5	8 x M16	24	250	8 x M16	14	300
1800	18	0,70	0,20	1,1	1,5	8 x M16	24	300	8 x M20	17	470

***** The rotors must be exchanged when the maximum air gap is achieved. However the brake is already getting louder with an air gap > "a" +0,2 mm.

****** In case of an increased torque (120 %) it must be released with overexcitation (if necessary contact company *mayr*®).

Attention!
The braking function is not guaranteed any more with air gap > max. air gap for brakes with a reduced braking torque or operation with overexcitation.

Assembly (Figs. 1 to 6)

1. If necessary, assemble flange plate (11 / type dependent option) using cap screws (12) at the mounting surface (observe tightening torque according to Table 2).
2. Assemble hub (1) onto the shaft and bring it to the correct position (supporting length of the keyway over the complete hub and lock it axially (e.g. with a locking ring).
3. Push rotor 1 (4) manually onto the gear hub (1) (rotor collar pointing away from the machine wall or flange plate).
   Ensure that the splines slide easily.
4. Screw the thrust springs (6.1) into the step bores of the intermediate washer (6) in a counter-clockwise direction (number of pieces see Table 1).
5. Push brake body with intermediate washer (6) and rotor 2 (4.1) over hub (1) and rotor collar from the rotor 1 (4).
   Carefully joint the splines.
   Ensure that the splines slide easily.
   No damage to the splines.
   Insert the hexagon cap head screws (8) uniformly distributed into the brake body and uniformly tighten them all around **with a torque wrench and tightening torque (according to Table 2)**.
6. **Check air gaps "a" according to Table 2.**
   A nominal air gap "a" with de-energised brake and the single air gaps "b" with released brake must be given.

Brake inspection (Before initial start of the brake)

- **Inspection of the braking torque:**
  compare ordered braking torque with the braking torque indicated on the type tag.
- **Release inspection:**
  by energising the brake.
- **Inspection of the hand release function:**
  see page 9 (Type dependently).

Emergency hand release (Pos. 5 / Fig. 6)

The brakes have an emergency hand release (5) to be able to drive the lift cage up or down in case of an emergency-evacuation with the aid of an additional dual circuit brake, or to set the torque of this brake to 0 in case of a TÜV-inspection of the additional dual circuit brake.
For this, both hexagon nuts (5.2) must be uniformly tightened so long until the armature disc (3) contacts the coil carrier (2) against the force of the thrust springs (14).
In case of a restart of the elevator or equipment the distance between both hexagon nuts (5.2) and coil carrier (2), as described on Fig. 6, must absolutely be reset to 4 ±0,5 mm (with a de-energised brake).
Observe both yellow warning instruction labels in German and English near by both hexagon nuts (5.2).

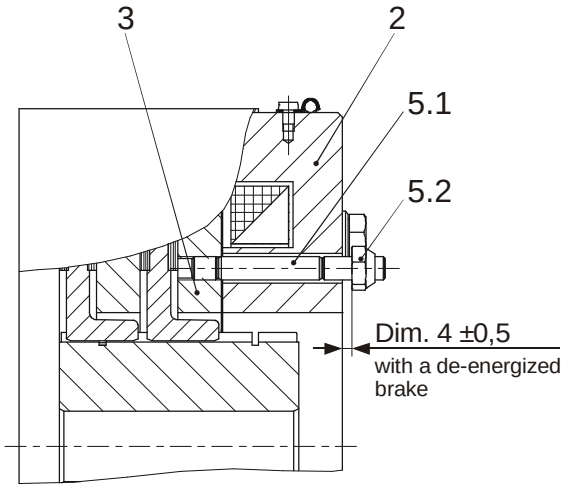

Fig. 7

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Noise damping

Important note:

An exchange of the damping elements is only permissible at the factory *mayr*®.

The noise damping is factory set. The noise damping is subject to a certain aging depending, however, on the application or operational condition (torque adjustment, switching frequency, ambient conditions, natural vibration of the operational equipment etc.).

Electrical connection

The coil voltage is indicated on the Type tag. Additionally it is stamped on the coil carriers (2).
The brakes are designed acc. to Euro-voltage DIN IEC 60038.
DC current is necessary for the operation.
It can be generated via transformer-rectifiers or bridge connected rectifiers.
DC or AC current switchings are possible.
DC current switching, however, gains a faster engaging time (engagement of the brake).
Attention!
Cut-off peaks may arise during switching-off of electromagnetic units. These can cause damage to the units and are, therefore, to be damped.
The connection times indicated in the catalogue can be deteriorated by this damping.
A protection of the voltage supply according to the current values is to be provided.
The brakes are designed for a relative duty cycle of 100 %.

Switching-ON

Switching-ON is either only made on the AC current side with the switch S3 and a bridge via the terminals 3 and 4.
(in this case there are no switches S1 and S2),
or
on the AC and DC sides with the switches S1 and S2
(in this case there is no switch S3).

Switching-OFF
On the AC current side with the switch S3 and a bridge via the terminals 3 and 4.

Observe!
- ❑ **Application** for **standard operation**
- ❑ **Silent switching,** but longer engaging time of the brake (approx. 6-8 times longer than with switching-OFF on the DC current side).

Switching-OFF
On the DC current side with the switches S1 and S2

Observe!
- ❑ **Noisy switching but short engaging time of the brake**
- ❑ **Application for emergency-OFF-operation!**

Important!
In case of switching-OFF on the DC side the coil must be protected against transient overvoltages by means of a suitable protective wiring according to VDE 0580 (included in *mayr*®-rectifiers).

Miniature fuse F1

A miniature fuse for protection against short circuits must be provided in the supply mains by the customer.

Switching example (Fig. 8)

Note!
We recommend to use the bridge connected rectifier shown on Fig. 8 (noise reduction).
Wiring should be made with a series-connected fuse F1.

Bridge connected rectifier:

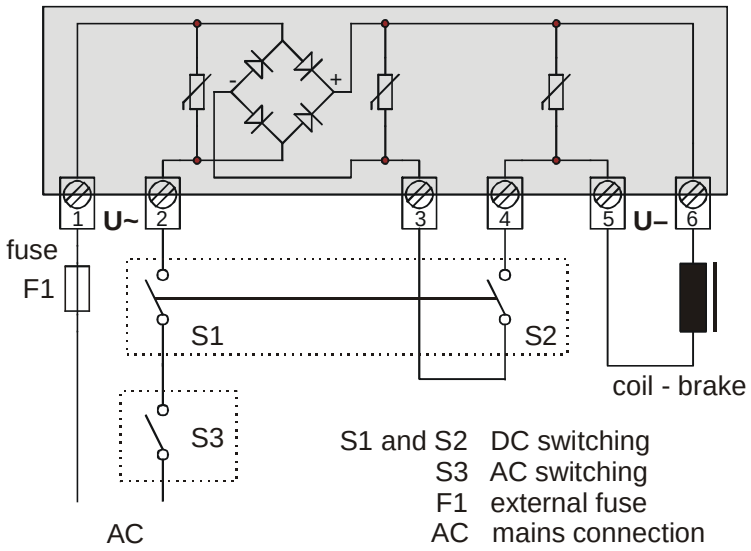

Fig. 8

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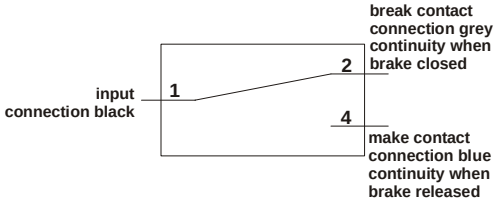
Release monitoring (7) Fig. 9 (type dependently option)

The **ROBA-stop®-silenzio®** brakes are supplied with factory set release monitoring units.
A micro switch each (pos. 7.1) per brake circuit gives signal for every change of the brake condition:
"brake released" or "brake closed"

An evaluation of the signal of both conditions must be made by the customer.
From the time when the brake is energised a period of three times the separation time must be passed, before the micro switch signal of the release monitoring system is evaluated.

Wiring diagram of each micro switch (7.1):



Function.

When the magnetic coil is energised in the coil carrier (2) the armature disc (3) is attracted to the coil carrier (2), a micro switch (7.1) gives signal, the brake is released.

Table 3: Maximum switch capacity

AC switch capacity		DC switch capacity	
Voltage [VAC]	**Resistance load [A/R load]**	**Voltage [VDC]**	**Resistance load [A/R load]**
125	**5**	**up to 30**	**5**
		125	**0,5**
250	**5**	**250**	**0,25**

Minimum switch capacity: 0,12VA (> 12V, > 10mA)
Contact material: silver

Assembly and adjustment (at the factory Fig. 9)

Attention!
Brake bolted at the assembly device with a tightening torque according to Table 2 and coil de-energized.

1. Joint the hexagon head cap screw (7.3) with hexagon nut (7.4) and spring washer (7.5), put LOCTITE 243 at the beginning of the thread and screw them into the armature disc (4).
2. Screw the micro switch (7.1) with cap screws (7.2) to the pre-assembled brake body
   (secure it with LOCTITE 243).

Adjustment of the switch

3. Turn hexagon head cap screw (7.3) towards the switch (7.1) until contact of the micro switch ram.
4. Connect test or measuring devices (diode inspection) at the make contact black/blue.
5. Joint feeler gauge 0,2 mm (loose feeler sheet) between switch ram (7.1) and hexagon-head screw (7.3).
6. Turn hexagon head cap screw (7.3) towards the switch (7.1) until s**ignal "ON"**, return it until **signal "OFF"**, lock hexagon head cap screw (7.3) with hexagon nut (7.4).
7. Energise brake ➔ **signal "ON"**.
   De-energise brake ➔ **signal "OFF"**.
   If necessary, re-adjust it and repeat inspection.
   (clock 3 up to 5 times).
8. Inspection with feeler gauge 0,25 mm
   Brake energised ➔ **signal "ON"**,
   Brake de-energised ➔ **signal "ON"**
9. Inspection with feeler gauge 0,20 mm
   Brake energised ➔ **signal "ON"**,
   Brake de-energised ➔ **signal "OFF"**
10. Joint feeler gauge 0,3 mm between armature disc (4) and coil carrier (3) in the range of the switches (7.1), energise brake, **signal must be "ON"**.
11. Provide positions 7.4 and 7.2 with securing lacquer.

Inspection after attachment

The connection at the customer is made as make contact.
The release monitoring are to be checked:
brake de-energised ➔ Signal "OFF",
brake energised ➔ Signal "ON"

Micro switches are not considered as fail safe, an appropriate access for the exchange or adjustment must be possible.

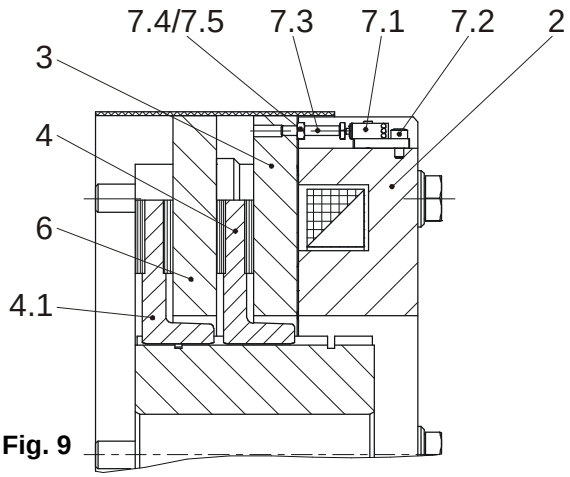


Fig. 9

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mayr® Antriebstechnik

Maintenance

ROBA-stop®-silenzio® brakes are virtually maintenance free. The friction linings are robust and wear resistant ensuring a very long brake service life.
However, the friction lining are subject to wear as a result of emergency stops. Therefore, the following inspections must be carried out at regular intervals:

- Inspection of the braking torque or deceleration (Brake circuit individually) (min. once a year)
- Inspection of the air gap "a" braked (min. once a year)

The inspection of the wear on the rotors 1 (4) and 2 (4.1) is carried out by measuring the air gap "a" (Fig. 3 and Table 2). At the latest after achieving the maximum air gap the rotors are to be exchanged (Table 2).

Before replacing the rotors (pos. 4 and 4.1):

- ❒ Clean brake, remove abrasive dust. (provide exhaust, wear dust respirator)
- ❒ Measure rotor thickness (new), rotor thickness according to Table 2 must be available.

Rotor replacement (pos. 4 and 4.1)

When replacing the rotors the brake should be dismantled by reversing the assembly sequence.

Attention!
In case of hoisting drives the drive-brake must be free of any load, otherwise there is the danger of the load falling.

Disposal

Electronic components
(rectifier / micro switch):

The not disassembled products can be supplied to the material utilization according to EAK 150106 (mixed material) or via the household waste (code No. 200301) to the disposal.

The components of our Electromagnetic Brakes must separately be supplied to the utilisation due to the different material components. Additionally the legal instructions are to be observed. Code numbers can change with the kind of the separation (metal, plastic and cable).

Brake body made of steel with coil/cable and all other steel components:
Scrap (Code No. 160117)

Distance ring made of aluminium:
Non iron metal (Code No. 160118)

Brake rotor (steel or aluminium with friction lining):
Brake linings (Code No. 160112)

Seals, O-rings, V-Seal, Elastomere, Terminal boxes (PVC):
Plastic (Code No. 160119)

Breakdowns:

Failures	Possible reasons	Solution
Brake does not release	❑ False voltage measured at the rectifier	❑ Apply correct voltage
	❑ Air gap too big (rotor worn down)	❑ Replace rotor
	❑ Coil interrupted	❑ Replace brake
Brake engages with delay in case of Emergency stop.	❑ Brake is switched to AC switching side	❑ Switch to DC switching side

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