Installation and Operational Instructions for ROBA-stop®-S brake Type 856. _ _ _ . _ Sizes 8, 9 and 10

(B.8.3.EN)

Please read these Operational Instructions carefully and follow them accordingly!

Ignoring these Instructions may lead to malfunctions or to brake failure, resulting in 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:

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.

According to German notation, decimal points in this document are represented with a comma (e.g. 0,5 instead of 0.5).

Guidelines on the Declaration of Conformity
A conformity evaluation has been carried out for the product (electromagnetic safety brake) in terms of the EC Low Voltage Directive 2006/95/EC. The declaration of conformity 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 in terms of the EMC directive.
Due to their passive quality, brakes are also non-critical equipment according to the EMC.
Only after integration of the product into an overall system can it 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 connection with other elements.
The type and scope of the required measures result from the machine risk analysis. The brake then becomes a machine component and the machine manufacturer assesses the conformity of the safety device to the directive.
It is forbidden to start use of the product until you have ensured that the machine accords with the regulations stated in the directive.

Guidelines on the 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.

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

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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 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 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 directive 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, 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 connection dimensions must be adjusted according to the size of the brake at the place of installation.
- ❒ The magnetic coils are designed for a relative duty cycle of 100 %.
- ❒ 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 seize up in corrosive ambient conditions and/or after long periods of storage.
The user is responsible for taking appropriate counter measures.

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany

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Ambient Temperature: – 20 °C up to + 40 °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

mayr ®-brakes have been developed, manufactured and tested in compliance with the DIN VDE 0580 standard and in accordance with the EU Low Voltage Directive as electromagnetic components. During installation, operation and maintenance of the product, the requirements for the standard must be observed.
mayr ®-brakes are for use in machines and systems and must only be used in the situations for which they are ordered and confirmed. Using them for any other purpose is not allowed!

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 IP67

When installed, dust-proof and protected against contact as well as against temporary submersion under water.

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 dangerously 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.
- ❒ Install additional protective measures **against corrosion** if the brake is subject to extreme ambient conditions or is installed in open air conditions, unprotected from the weather.
- ❒ 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

Please Observe the Following Standards:

DIN EN ISO 12100-1 and 2	Machine safety
DIN EN ISO 14121-1	Risk assessment
DIN EN 61000-6-4	Noise emission
DIN EN 61000-6-2	Interference immunity
EN 60204	Electrical machine equipment

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
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E-Mail: info@mayr.de

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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!

Conformity Markings

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

CSA/UL in terms of the Canadian and American standards

Identification

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

Manufacturer
mayr®
Name/Type
Article Number
Serial number

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

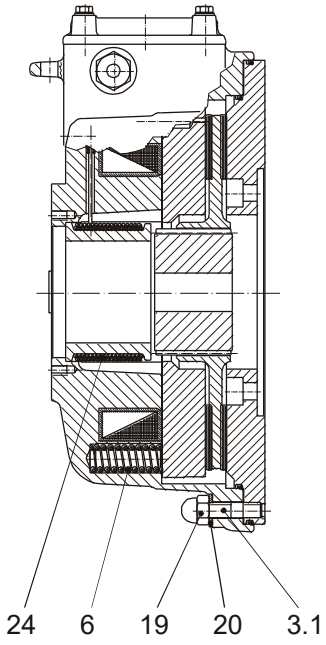

Fig. 1

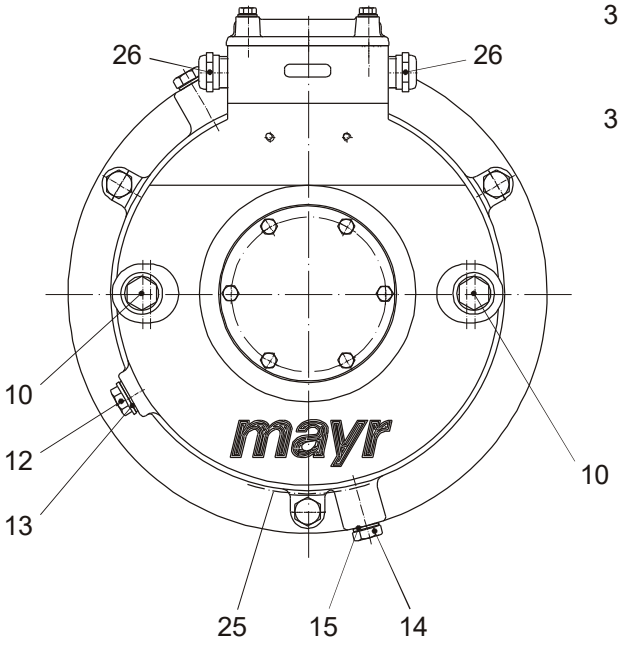

Fig. 2

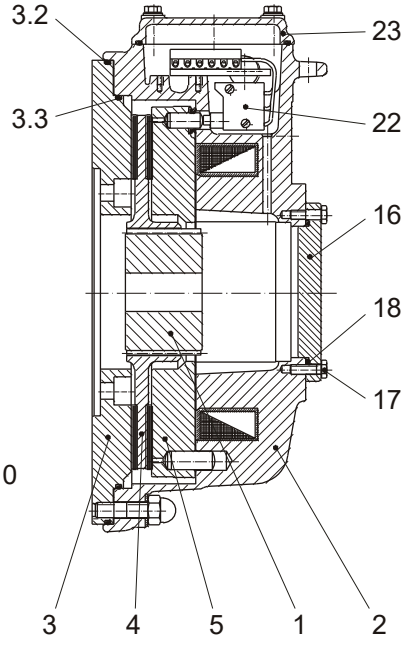

Fig. 3

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

Item	Name
1	Gear hub
2	Coil carrier assembly
3	Flange plate assembly
3.1	Stud screws
3.2	O-ring
3.3	O-ring
4	Rotor assembly
5	Armature disk assembly
6	Thrust spring
7	Cap screw
8	Washer
9	Thrust spring
10	Screw plug
11	Copper sealing ring
12	Screw plug
13	Copper sealing ring
14	Screw plug
15	Copper sealing ring
16	Sealing cover
17	Hexagon head screw
18	O-ring
19	Cap nut
20	Washer
21	Distance washer assembly inc. cap screw
22	Microswitch assembly
23	Terminal box assembly
24	Heating assembly
25	Type tag
26	Cable screw connection

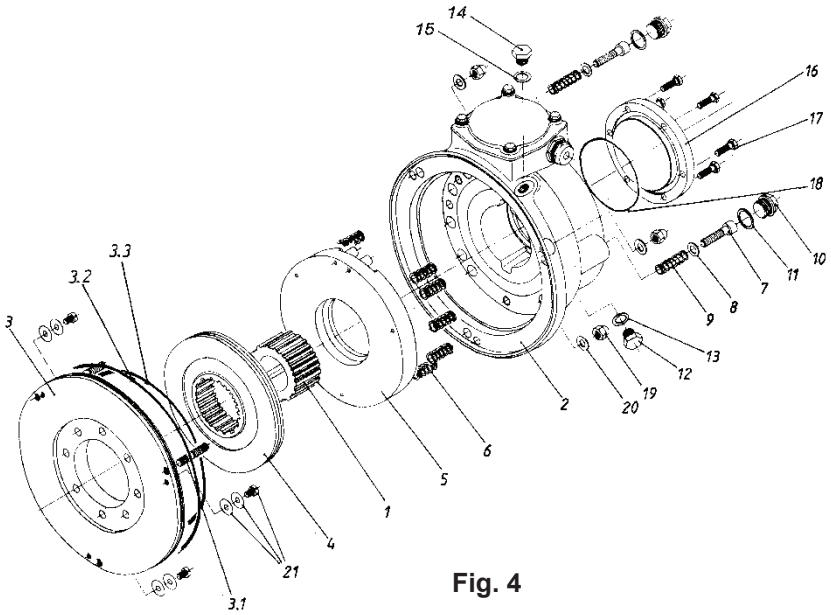

Fig. 4

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Eichenstraße 1
D-87665 Mauerstetten
Germany
Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

Installation and Operational Instructions for ROBA-stop®-S brake Type 856. _ _ _ . _ Sizes 8, 9 and 10

(B.8.3.EN)

Design

ROBA-stop®-S brakes are spring applied, electromagnetic safety brakes.
When installed, the ROBA-stop®-S brakes are completely closed and therefore comply with Protection IP 67.

Standard equipment:
- Microswitch for release monitoring
- Emergency hand release
- Condensate drain screw
- Air gap checks opening
- Tacho attachment possibility

Options:
- Installed rectifier
- Microswitch for wear inspections
- Anti-condensation heating

Function

Spring applied function:
In de-energised condition, thrust springs (6) press against the armature disk (5). The rotor (4) is held between the armature disk (5) and the flange plate (3).
The shaft is braked via the gear hub (1).

Electromagnetic function:
Due to the magnetic force of the coil in the coil carrier (2), the armature disk (5) is attracted against the spring force to the coil carrier (2).
The brake is released and the shaft can rotate freely.

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

State of Delivery (Figs. 1 - 4)

The ROBA-stop®-S brake is pre-assembled and screwed together with the flange plate (3).
The emergency release screws (7) are screwed into the armature disk (5) and serve as a shipping brace.
The Technical Data is stated on the Type tag (25).
Please check state of delivery!

Installation Conditions

Before installing the ROBA-stop®-S brake, please observe the following points:

- ❑ The eccentricity of the shaft end in relation to the mounting pitch circle must not exceed 0,4 mm (Fig. 5).

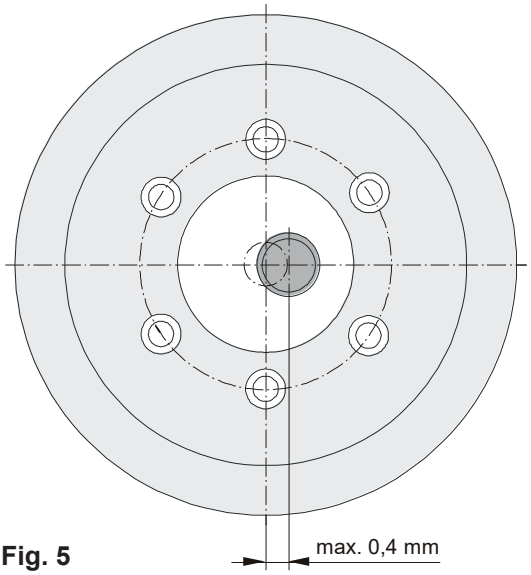

Fig. 5

- ❑ The axial run out deviation of the screw-on surface to the shaft must not exceed the permitted axial run out tolerance according to DIN 42955.
  Larger deviations can lead to a drop in torque, to continuous slipping on the rotor and to overheating.
- ❑ The tolerances of the hub (8) and the shaft must be selected so that the hub toothing (1) is not widened (please observe the max. joining temperature of +200 °C). Widening of the toothing leads to the rotor (4) jamming on the hub (8) and therefore to brake malfunctions (recommended hub - shaft tolerance H7/k6).
- ❑ The rotor and brake surfaces must be oil and grease-free.
- ❑ Please abstain from using cleaning agents containing solvents, as they could affect the friction material.

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Eichenstraße 1
D-87665 Mauerstetten
Germany

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E-Mail: info@mayr.de

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Brake Attachment

1. Loosen the cap nuts (19) and remove the washers (20).
2. Remove the flange plate (3) from the brake by lightly tapping the stud screws (3.1) with a plastic hammer.
3. Screw the flange plate (3) onto the motor bearing shield or onto the machine wall (sealing must be carried out customer-side; if there are any questions concerning sealing, please contact the manufacturers).
4. Mount the gear hub (1) onto the shaft, bring it into the correct position (the length of the key should lie over the entire hub) and secure it axially (e.g. using a locking ring).
5. Push the rotor (4) by hand onto the gear (1).
   Check that the toothing moves easily.
   Do not cause any damage!

The rotor (4) must be placed onto the hub (1) so that the toothing remains engaged even after wear on the friction linings (Fig. 6).

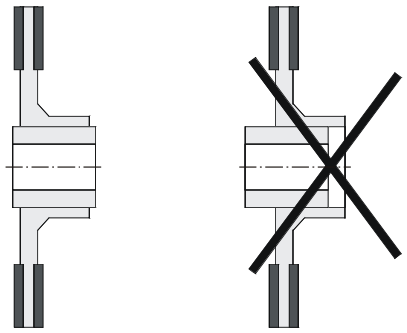

Fig. 6

6. Push the brake over the stud screws (3.1) and join it with the flange plate (3).
   Do not damage the O-rings (3.2 and 3.3)!
7. Screw on the brake using the cap nuts (19) and the washers (20). **Do not tilt!**
   Observe the tightening torque acc. Table 1!

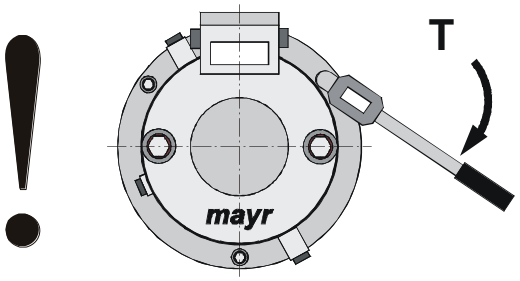

Fig. 7

Table 1

Size	8	9	10
Tightening torque for cap nuts (19) [Nm]	13	13	26
Nominal air gap [mm]	0,20 $^{+0,25}$	0,25 $^{+0,25}$	0,25 $^{+0,25}$
Max. air gap [mm]	0,75	1,0	1,1
Min. air gap for re-adjustment [mm]	0,65	0,8	0,8

8. Unscrew the screw plugs (10) inc. the copper sealing rings (11).
9. **Important!**

Unscrew both emergency release screws (7) in the armature disk (5).
Unscrew the screws, but do not remove them.

10. Screw the screw plugs (10) inc. the copper sealing rings (11) back in. The emergency release screws (7) are spring applied.
11. Check the air gap acc. section "Air Gap Inspection".

Air Gap Inspection (Figs. 8 and 9)

Due to wear on the friction linings, the air gap between the coil carrier (2) and the armature disk (5) increases.
The wear condition of the rotor (4) can be monitored in regular air gap inspections.
Air gap inspection on a de-energised brake.

Air gap inspection on a de-energised brake:

1. Unscrew the screw plug (12) inc. the copper sealing ring (13).
2. Check the air gap by means of a feeler gauge.
   The air gap must lie between the nominal air gap and the max. air gap. Once the max. air gap has been reached, the air gap must be re-adjusted (see Table 1).

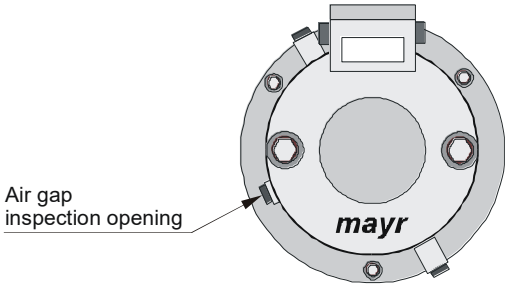

Fig. 8

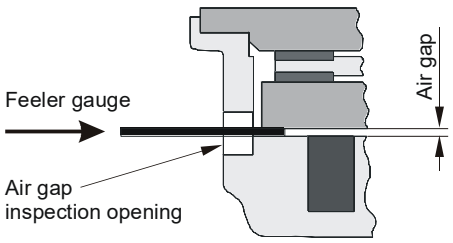

Fig. 9

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Eichenstraße 1
D-87665 Mauerstetten
Germany
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Fax: 08341 / 804-421
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E-Mail: info@mayr.de

Air Gap Re-adjustment (Figs. 3, 4, 9 and 10)

It is possible to re-adjust the air gap once by removing the distance washers (Item 21, on Size 8: 6 pieces, on Sizes 9 and 10: 3 pieces) between the flange plate (3) and the coil carrier (2). If the air gap exceeds the max. value (acc. Table 1) again and the distance washers (21) have already been removed, the rotor (4) must be replaced (see section "Replacing the Rotor" (4)).

Please observe the min. air gap for re-adjustment acc. Table 1.

1. Unscrew the screw plugs (10) inc. the copper sealing rings (11).
2. Screw in both emergency release screws (7) up to contact on the coil carrier (2)

DANGER

Caution with hoist drives!
Actuating the emergency release nullifies the braking torque.
Load crashes must be prevented.

3. Loosen the cap nuts (19) inc. the washers (20).
4. Remove the brake from the flange plate (3).
   Do not damage the O-rings (3.2 and 3.3)! Remove abraded particles from the rotor - clean the brake (do not use grease or oil).
5. Remove the distance washers (21) from the flange plate (3).

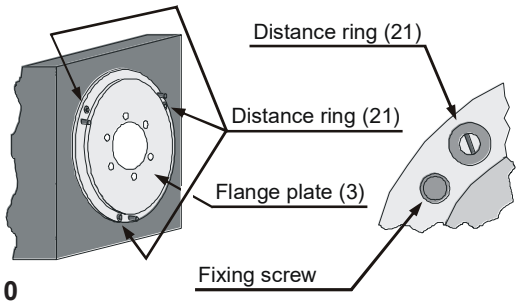

Fig. 10

6. Clean the brake interior!
7. Push the brake over the stud screws (3.1) and join it with the flange plate (3).
   Do not damage the O-rings (3.2 and 3.3)!
8. Screw on the brake using the cap nuts (19) or the washers (20).
   Please make sure that there is no tilting!
   Observe the tightening torque acc. Table 1!
9. **Important!**

Unscrew both emergency release screws (7) in the armature disk (5).
Unscrew the screws, but do not remove them.

10. Screw the screw plugs (10) inc. the copper sealing rings (11) back in. The emergency release screws (7) are spring applied.
11. Check the air gap.

Replacing the Rotor (4)

1. Follow the procedure as described in section "Air Gap Re-adjustment", points 1 - 4.
2. Replace the rotor (4).
   Check that the toothing moves easily.

The rotor (4) must be placed onto the hub so that the toothing remains engaged even after wear on the friction linings.

3. Screw the distance washers (21) onto the flange plate (3) using the cap screws M6 x 8 DIN 84.
   (The distance washers and the cap screws are part of the delivery set: replacement rotor).
4. Attach the brake following the procedure as described in section "Air Gap Re-adjustment", points 6 - 10.
5. Check the air gap acc. "Air Gap Inspection".
   When ordering replacement rotors, please state the following Article Numbers:
   Size 8: 1924657
   Size 9: 1924350
   Size 10: 1924494
6. Check the release monitoring device
   (see section "Release Monitoring") and re-adjust it if necessary.

Tacho Attachment (Option)

For tacho generator attachment, the sealing cover (16) must be removed.
Please make sure that there is appropriate sealing between the tacho generator and the coil carrier (2).

Electrical Connection and Wiring

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

For brake release at max. air gap and with a braking torque adjustment > 100 % of the nominal value stated in the catalogue, overexcitation is mandatory.

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Eichenstraße 1
D-87665 Mauerstetten
Germany
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Earthing Connection

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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

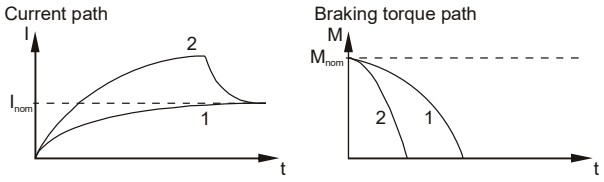
When the voltage is switched on, a magnetic field is built up in the brake coil, which attracts the armature disk to the coil carrier and releases the brake.

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.



Operation with overexcitation requires an inspection of :
- the required overexcitation time*
- as well as the RMS coil capacity** with a cycle frequency higher than 1 cycle per minute.

* Overexcitation time t_{over}

Increased wear, and therefore an increasing air gap as well as coil heating lengthen the separation time t_2 for the brake. For this reason, at least double the separation time t_2 at nominal voltage must be selected as overexcitation time t_{over} on each brake size. The spring forces also influence the brake separation times t_2: Higher spring forces increase the separation times t_2 and lower spring forces reduce the separation times t_2.

➔ Spring force (braking torque adjustment) < 100 % (Tab. 2):
The overexcitation time t_{over} is less than the doubled separation time t_2.

➔ Spring force (braking torque adjustment) = 100 %:
The overexcitation time t_{over} equals the doubled separation time t_2.

➔ Spring force (braking torque adjustment) > 100 %:
The overexcitation time t_{over} is higher than the doubled separation time t_2.

** RMS coil capacity P_{RMS}

$P_{RMS} \leq P_{nom}$
The coil capacity P_{RMS} must not be larger than P_{nom}. Otherwise the coil may fail due to thermal overload.

Calculations:

P_{RMS} [W] RMS coil capacity dependent on switching frequency, overexcitation, reductions in capacity and duty cycle

$$P_{RMS} = \frac{P_{over} \times t_{over} + P_{hold} \times t_{hold}}{t_{tot}}$$

P_{nom} [W] Coil nominal capacity (Catalogue information, Type tag)

P_{over} [W] Coil capacity on overexcitation

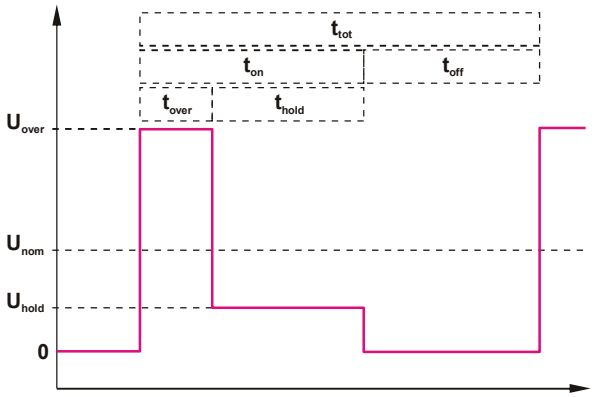
$$P_{over} = \left(\frac{U_{over}}{U_{nom}}\right)^2 \times P_{nom}$$

P_{hold} [W] Coil capacity at reduced capacity

$$P_{hold} = \left(\frac{U_{hold}}{U_{nom}}\right)^2 \times P_{nom}$$

t_{over} [s] Overexcitation time
t_{hold} [s] Time of operation with reduction in capacity
t_{off} [s] De-energised time
t_{tot} [s] Total time ($t_{over} + t_{hold} + t_{off}$)
U_{over} [V] Overexcitation voltage (bridge voltage)
U_{hold} [V] Holding voltage (one-way voltage)
U_{nom} [V] Coil nominal voltage

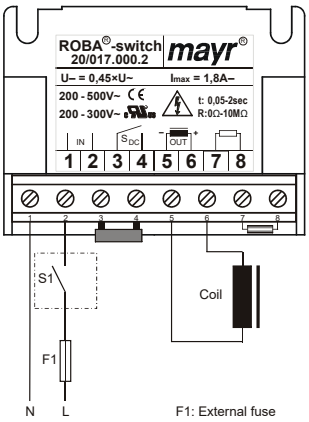
Time Diagram:



Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany
Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

Magnetic Field Removal

AC-side Switching



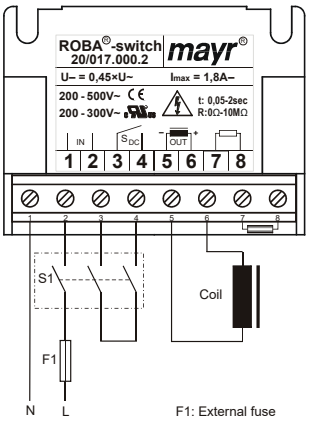
F1: External fuse

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



F1: External fuse

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

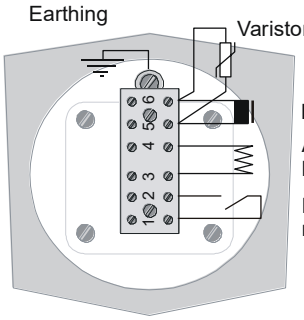
When using DC-side switching, the coil must be protected by a suitable protective circuit according to VDE 0580, which is integrated in *mayr*® rectifiers. To protect the switching contact from consumption when using DC-side switching, additional protective measures are necessary (e.g. series connection 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.

Connection Examples

The coil voltage and - if applicable - the voltage of the option "Anti-condensation heating" are stated on the brake Type tag (25). A Wiring Diagram is glued to the terminal box cover (23). **Min. conductor cross-section for coil connection: 1,5 mm².** The anti-condensation heating is powered by alternating current.

Example of an electrical connection

- ❑ With terminal block
- ❑ With microswitch for release monitoring
- ❑ With anti-condensation heating



Terminal assignment:

1/2: Release monitoring

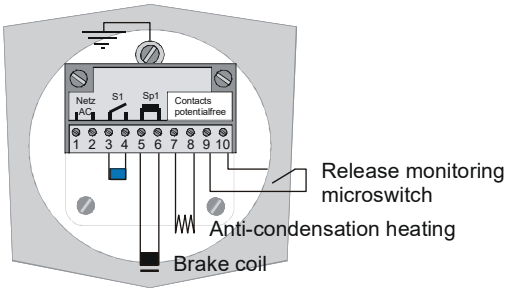
3/4: AC voltage supply (AC voltage) for anti-condensation heating

5/6: DC voltage supply (DC voltage) for brake coil

Fig. 11

Example of an electrical connection

- ❑ With *mayr*® rectifier
- ❑ With microswitch for release monitoring
- ❑ With anti-condensation heating



Terminal assignment:

1/2: AC voltage supply (AC voltage) for brake coil

7/8: AC voltage supply (AC voltage) for anti-condensation heating

9/10: Release monitoring

Fig. 12

For short engagement times, a switching contact at "S_1" is necessary, which means DC-side switching.

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

Release Monitoring (Fig. 13)

The release monitoring device emits a signal on brake release, which means the switch is actuated at:

- ❑ energised coil (electromagnetic release)
- ❑ emergency release actuation

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.

The microswitch (22) is adjusted manufacturer-side.
If re-adjustment is necessary (no signal change for energised / de-energised condition, or on actuating the emergency hand release), it can be carried out directly from the terminal box (23).

Microswitch Adjustment

The microswitch is located in the terminal box (23) under the terminal block (rectifier).
Microswitch adjustment is carried out on a de-energised coil. The air gap must correspond to the nominal air gap (see Table 1).

Procedural Method for Adjustment:

1. Check the air gap between the coil carrier (2) and the armature disk (5). On increased nominal air gap (see Table 1), first determine and use the adjustment values for the feeler gauge (dimension "X") according to the example listed below.
2. Remove the terminal block (rectifier).
3. Loosen the fixing screws of the microswitch (22) holding bracket slightly.
4. Change the microswitch position axially using a feeler gauge.
   Here, please observe the following:
   a) Feeler gauge "X" = 0,1 mm: Microswitch must not switch (contact brown-blue opened).
   b) Feeler gauge "X" = 0,15 mm: Microswitch must switch (contact brown-blue closed).
5. Tighten the fixing screws of the microswitch (22) holding bracket.
6. Attach the terminal block (rectifier).

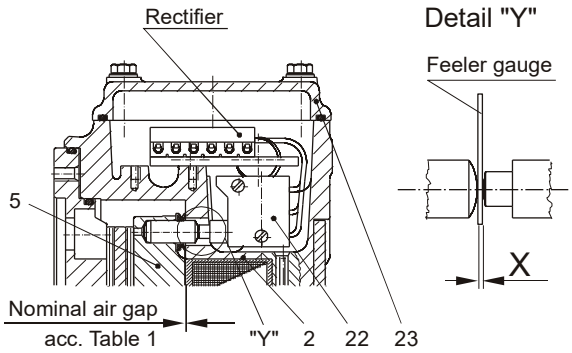


Fig. 13

If the air gap between the coil carrier (2) and the armature disk (5) is larger than the nominal value due to rotor (4) wear, this increased value must be taken into consideration when adjusting the microswitch.

Example: Air gap = 0,75 mm

Determined air gap	0,75 mm
Nominal air gap (acc. Table 1)	- 0,25 mm
Wear	= 0,50 mm

Adjustment for Switching:		**Not switching:**	
Wear	0,50 mm	Wear	0,50 mm
Limit	+ 0,15 mm	Limit	+0,10 mm
Feeler gauge (X) = 0,65 mm		Feeler gauge (X)	0,60 mm

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!

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany
Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

Braking Torque Adjustment (Fig. 14)

Braking torque adjustment is carried out via various thrust spring (6) assembly variants in the coil carrier (2) acc. Table 2.

Procedural Method:

1. Unscrew the screw plugs (10) inc. the copper sealing rings (11).
2. Screw in both emergency release screws (7) up to contact on the coil carrier (2)
3. Loosen the cap nuts (19) inc. the washers (20).
4. Remove the brake from the flange plate (3).
   Do not damage the O-rings (3.2 and 3.3)!
5. Remove the emergency release screws (7).
6. Remove the armature disk (5).
7. Remove abraded particles from the rotor and clean the brake.
   Do not use grease or oil.
8. Change the number of thrust springs (6) acc. Table 2.

The thrust springs must be distributed evenly in the coil carrier (2). Always remove or insert two springs located opposite each other to make sure that the armature disk (5) is loaded evenly.
Only use *mayr*® thrust springs!

9. Insert the armature disk (5).
   Please make sure that the two pins for actuating the microswitch situated next to each other protrude into the terminal box.
10. Screw both emergency release screws (7) into the armature disk (5) up to contact on the coil carrier (2).
    If necessary, push the armature disk lightly onto the coil carrier, so that the emergency release screws can be joined.
11. Push the brake over the stud screws (3.1) and join it with the flange plate (3).
    Do not damage the O-rings (3.2 and 3.3)!
12. Screw on the brake using the cap nuts (19) and the washers (20).
    Do not tilt!
    Observe the tightening torque acc. Table 1!
13. **Important!**

Unscrew both emergency release screws (7) in the armature disk (5).
Unscrew the screws, but do not remove them.

14. Screw the screw plugs (10) inc. the copper sealing rings (11) back in. The emergency release screws (7) are spring applied.

Table 2: Spring Configuration

Size	Nominal torque 10 springs [Nm]	8 springs [Nm]	6 springs [Nm]	4 springs [Nm]
8	100	80	60	40
9	200	160	120	80
10	400	320	240	160

Torque tolerance: +40 % / -20 %
Further spring configurations or braking torques on request.

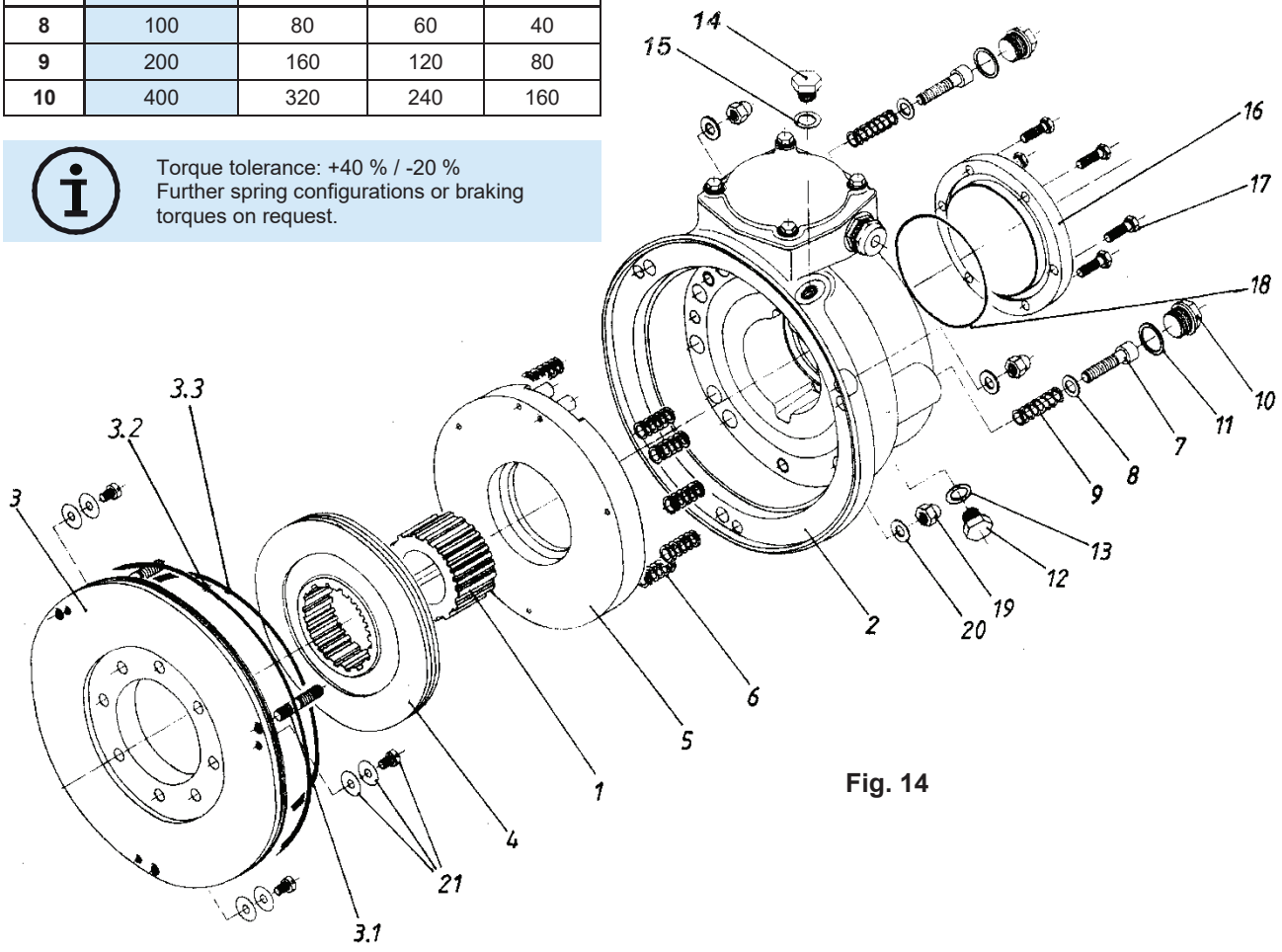


Fig. 14

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Eichenstraße 1
D-87665 Mauerstetten
Germany
Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

Emergency Release (Fig. 15)

In case of malfunction or power failure, the brake remains closed; it cannot be released electrically. Emergency release can be carried out manually.

1. Unscrew the screw plugs (10) inc. the copper sealing rings (11).
2. Screw both emergency release screws (7) into the armature disk (5) until the load on the motor starts moving. Interrupt the release procedure with individual stops (turning back the emergency release screws), so that there is no high load acceleration and brake heating occurrence.

DANGER

Warning for hoist drives!
Actuating the emergency release nullifies the braking torque.
Load crashes must be prevented.

3. After completing the release procedure, unscrew both emergency release screws (7) in the armature disk (5). However, do not remove the screws.
4. Screw the screw plugs (10) inc. the copper sealing rings (11) back in. The emergency release screws (7) are spring applied.

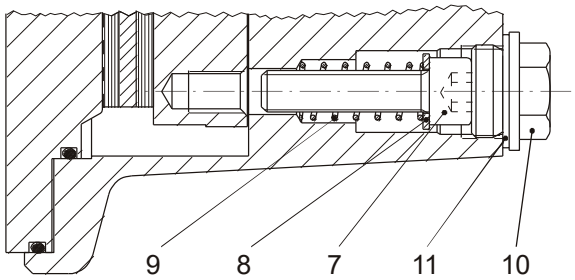

Fig. 15

Anti-Condensation Heating (Option)

The anti-condensation heating is used for preventing condensation precipitate in the brake interior.
For connecting the anti-condensation heating (AC voltage), see the Wiring Diagram.

Condensation (Fig. 16)

The condensation must be checked regularly via the screw plug (14) with the copper sealing ring (15).

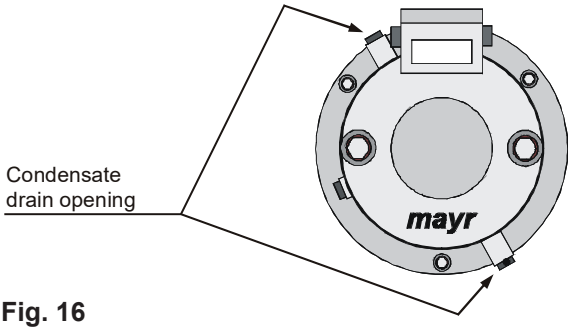

Fig. 16

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

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

Brake rotor (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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Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

mayr® Antriebstechnik

Malfunctions / Breakdowns:

Results of Malfunction	Possible Causes	Solutions
Brake does not release	❑ Abraded particles between the armature disk and the coil carrier. ❑ Air gap too large ❑ Air gap too small (remove the distance washers before reaching the max. air gap) ❑ Coil interruption ❑ Rectifier failure ❑ Incorrect voltage on rectifier	❑ Clean the brake ❑ Re-adjust the brake; replace the brake ❑ Insert distance washers between the coil carrier and the flange plate ❑ Replace brake ❑ Replace rectifier ❑ Apply correct voltage
Brake does not brake	❑ Emergency release screws are not loosened ❑ Grease or oil on the friction surfaces	❑ Loosen the emergency release screws ❑ Replace rotor
Release monitoring does not emit a signal	❑ Abraded particles between the armature disk and the coil carrier. ❑ Switching position misaligned ❑ Defective microswitch	❑ Clean the brake ❑ Adjust the switch again ❑ Replace the switch

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