Installation and Operating Instructions for ROBA-stop®-S Sizes 8, 9 and 10 (B.8.3.GB)

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

Table of contents:

Manufacturer 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 73/23/EEC.

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

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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 or other liquids.
- ❒ The braking torque does not exist any more, if the friction lining and/or 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. (EN 50144-1, classification VDE 0740-1).

Protection IP 67:

Dust-tight and protection against contact as well as protection against temporary submerging into water.

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

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Necessary protective measures to be undertaken by the user:

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

Standards and Instructions

The brakes are developed and manufactured in conformance with the national standard DIN VDE 0580, according to the low-voltage directive 73/23/EEC.

Following directives have been used:

98/37/EC	Machinery directive
73/23/EEC	Low-voltage directive
89/336/EEC	EMV-guideline

Following standards are to be observed:

EN292-1 and 2	Security of machines
DIN EN61000-6-4	Interference emission
DIN EN61000-6-2	Interference resistance
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 73/23/EEC.

Marking

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

Manufacturer

mayr®

Designation/Type

Article No.

Series number

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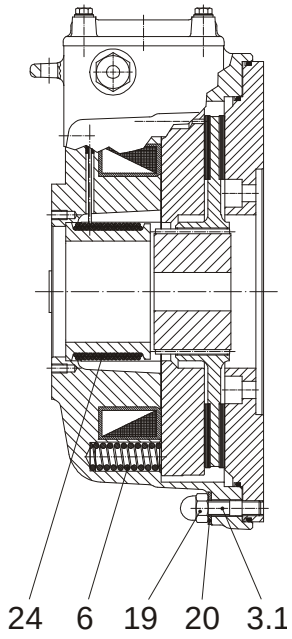

Fig. 1

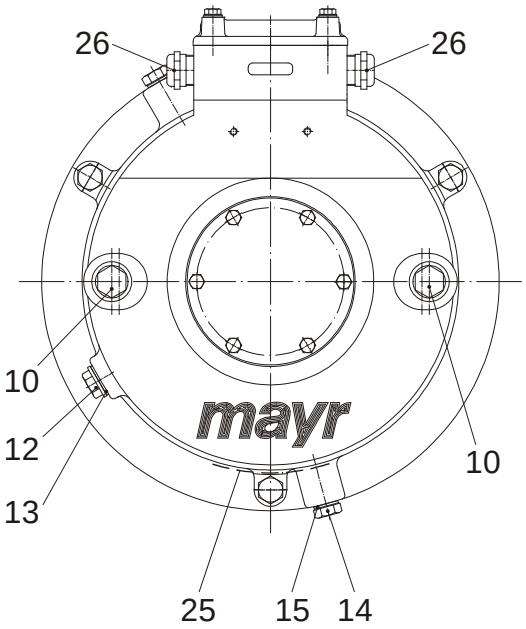

Fig. 2

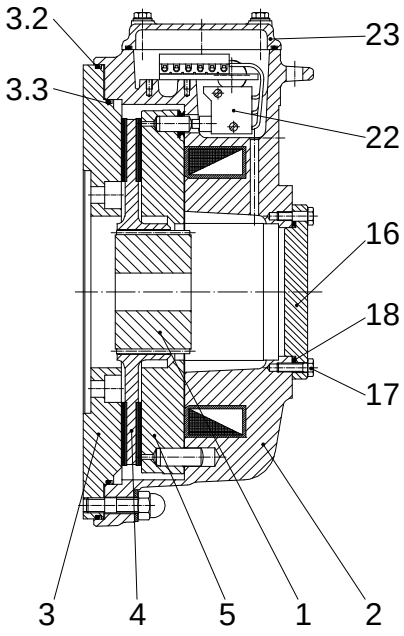

Fig. 3

Parts List

(Only mayr® original parts are to be used)

1. **Gear hub**
2. **Coil carrier, assembly**
3. **Flange plate, assembly**
- 3.1. **Setscrews**
- 3.2. **O-ring**
- 3.3. **O-ring**
4. **Rotor, assembly**
5. **Armature disc, assembly**
6. **Thrust spring**
7. **Cap screw**
8. **Washer**
9. **Thrust spring**
10. **Screw plug**
11. **Copper seal ring**
12. **Screw plug**
13. **Copper seal ring**
14. **Screw plug**
15. **Copper seal ring**
16. **Sealing cover**
17. **Hexagon head cap screw**
18. **O-ring**
19. **cap nut**
20. **Washer**
21. **Distance rings complete with cap screw**
22. **Micro switch, assembly**
23. **Terminal box, assembly**
24. **Heating, assembly**
25. **Type tag**
26. **PG-screwed connection**

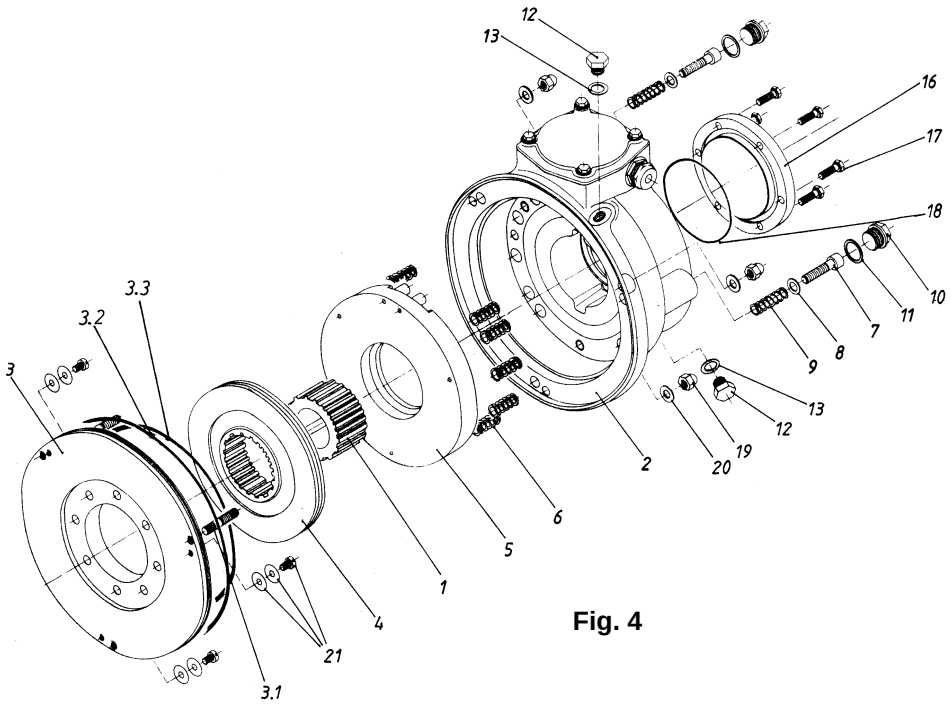

Fig. 4

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Design

ROBA-stop®-S brakes are spring loaded electromagnetic fail safe brakes.

The ROBA-stop®-S is completely closed in an attached condition and fulfils the protection IP 67.

Standard features:
- micro switch for release monitoring
- emergency hand release
- condensation discharging screw
- air gap inspection hole
- tacho attachment possibility

Options:
- built-in rectifier
- micro switch for wear control
- anti-condensation heating

Function

The ROBA-stop®-S brake is a spring loaded electromagnetic safety brake.

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

Electromagnetic:
When power is switched on, a magnetic field is built up. The armature disc (5) is attracted to the coil carrier (2) against the spring pressure. The brake is released and the shaft is then able to rotate freely.

Safety brakes:
The ROBA-stop®-S brakes reliably and safely when the current has been switched off, in case of “emergency OFF”, or through power failure.

Supply condition (Figs. 1 – 4)

The ROBA-stop®-S is supplied pre-assembled and screwed together with the flange plate (3).
The emergency release screws (7) are screwed into the armature disc to serve as security during shipment. The technical data are given on the Type tag (25).
Check supply condition!

Assembly conditions

Before mounting the ROBA-stop®-S following points are to be observed in any case:

- ❒ The eccentricity of the shaft against the fixing hole P.C.D. must not exceed 0.4 mm. (Fig. 5).
- ❒ The deviation of the concentric running of the bolt-on surface with respect to the shaft must not exceed the permissible tolerance of the mounting surface according to DIN 42955. Larger deviations may result in a lower braking torque, permanent friction of the rotor and overheating.

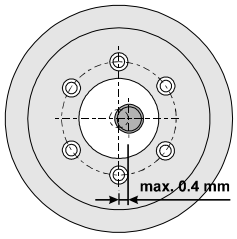
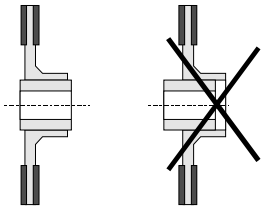


Fig. 5

- ❒ The hub (1) and shaft fits are to be selected to avoid any distortion of the hub splines (1) (observe the max. jointing temperature of +200 °C). A widening of the splines causes a clamping of the rotor (4) on the hub impairing the brake function (recommended hub – shaft fit H7/k6).
- ❒ Rotor and braking surfaces must be free of oil and grease.

Brake attachment

1. Release cap nuts (19) and remove washers (20).
2. Take off flange plate (3) from brake by light taps with a plastic hammer on locking screws (3.1).
3. Screw on flange plate (3) at the bearing bracket of the motor or at the machine wall (seal has to be made by the customer; in case of questions as to the seal please contact the factory).
4. Mount gear hub (1) to the shaft, bring it to the correct position (observe the complete supporting length of the keyway) and lock it axially (e.g. with a retaining ring).
5. Manually push rotor (4) onto the gear hub (1). An easy running of the toothing must be observed. **No damage! Important! The rotor (4) must be located on the hub (1) in such a way that the toothing remains completely engaged even after wear of the friction linings (Fig. 6).**



6. Push brake over the setscrews (3.1) and locate it at the flange plate (3).
No damage of the O-rings (3.2 and 3.3)!
7. Attach the brake by means of cap nuts (19) and washers (20) (Fig. 7). **A tilting must be avoided! Tightening torques $T^{1)}$ for sizes 8 and 9 = 13 Nm and for size 10 = 26 Nm must be observed!**

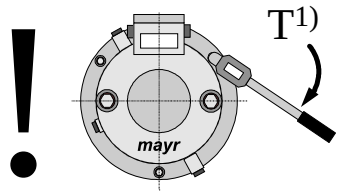


Fig. 7

8. Unscrew screw plugs (10) with copper sealing rings (11).
9. **Important!**
Unscrew both emergency release screws (7) out of the armature disc (5) (unscrew screws only; do not remove them).
10. Screw in screw plugs (10) with copper seal rings (11), whereby the emergency release screws (7) are spring contacted.
11. Check the air gap acc. to „air gap inspection“.

Tacho - attachment (option)

The sealing cover (16) must be unscrewed for the attachment of the tacho generator. A suitable seal between tacho generator and coil carrier (2) has to be observed.

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Air gap – inspection (Figs. 8 and 9)

The air gap between coil carrier (2) and armature disc (5) is increased if the friction linings are worn down. The wear condition of the rotor (4) must be monitored by a regular air gap inspection.
Air gap inspection with de-energised brake.

1. Unscrew screw plug (12) incl. copper seal ring (13).
2. Check the air gap by means of a feeler gauge.
   The air gap must be between nominal air gap and max. air gap. If the max. air gap is achieved, re-adjust the air gap (see Table 1).

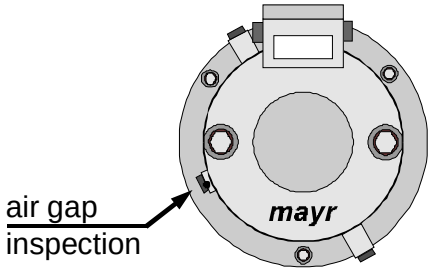

Fig. 8

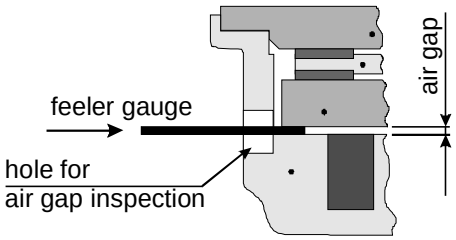

Fig. 9

Table 1

Size	8	9	10
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

Air gap – Adjustment (Figs. 3, 4, 9 and 10)

The air gap can be re-adjusted once by removing the distance rings (pos. 21) (size 8: 6 pcs., sizes 9 and 10: 3 pcs.) between the flange plate (3) and the coil carrier (2).
If the air gap exceeds the max. value again and the distance rings (21) have been already removed, the rotor (4) must be exchanged.
(see chapter Exchange of the rotor (4)).
Attention!
The brake must not be re-adjusted before the max. air gap is achieved.

1. Unscrew screw plugs (10) with copper seal rings (11).
2. Uniformly screw in both emergency release screws (7) until contact at the coil carrier (2).

Attention with hoisting drives!
The braking torque does not exist any more, when the emergency release has been actuated.
A fall of the load must be avoided.

3. Unscrew the cap nuts (19) with its washers (20).
4. Remove the brake from the flange plate (3).
   No damage of the O-rings (3.2 and 3.3)!
   Remove abrasion from the rotor – clean brake (do not use any grease or oil).
5. Unscrew the distance rings (21) from the flange plate (3).

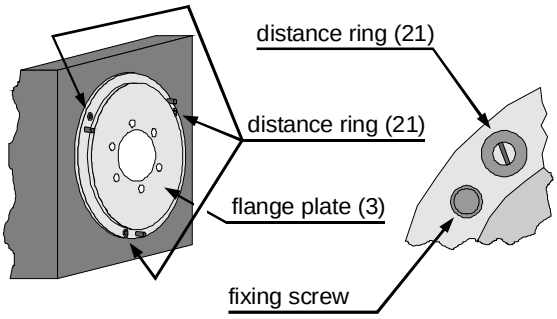

Fig. 10

6. Clean the interior of the brake!
7. Push brake over the setscrews (3.1) locate it at the flange plate (3).
   No damage of the O-rings (3.2 and 3.3)!
8. Attach the brake by means of the cap nuts (19) or washers (20).
   A tilting must be avoided!
   Observe tightening torques (sizes 8 and 9 = 13 Nm, size 10 = 26 Nm)!
9. **Important!**
   Unscrew both emergency release screws (7) from the armature disc (5) (unscrew the screws only; do not remove them).
10. Screw in screw plugs (10) with copper seal rings (11) again, whereby the emergency release screws (7) are spring contacted.
11. Check the air gap.

Exchange of the rotor (4)

1. First same procedure as air gap adjustment, according to items 1 - 4.
2. Exchange rotor (4).
   Observe an easy running of the toothing.
   Important!
   The rotor (4) must be located onto the hub in such a way that the toothing remains engaged completely even if the friction linings are worn down.
3. Attach distance rings (21) by means of cap screws M6 x 8 DIN 84 at the flange plate (3).
   (Distance rings and cap screws belong to the delivery range: spare – rotor).
4. Attach the brake according to air gap adjustment items 6 – 10.
5. Check the air gap acc. to air gap inspection.
   In case of ordering spare rotors, please mention following article no.:
   size 8 1924657
   size 9: 1924350
   size 10: 1924494
6. Check function of the release monitoring
   (see item release monitoring) and adjust it, if necessary.

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Electric connection (Figs. 11 and 12)

The coil voltage is indicated on the Type tag (25) of the brake. A DC current is necessary for the operation. This can be generated via Trafo-rectifiers or half-wave rectifiers. The *mayr*® rectifiers already include varistors to protect the switching contacts and the coil.
A wiring diagram fitted for the corresponding brake design is glued onto the cover of the terminal box (23).
Minimum cable cross-section for coil connection: 1,5 mm²

Example for an electric connection

- ❑ With terminal block
- ❑ With micro switch for release monitoring
- ❑ With anti condensation heating

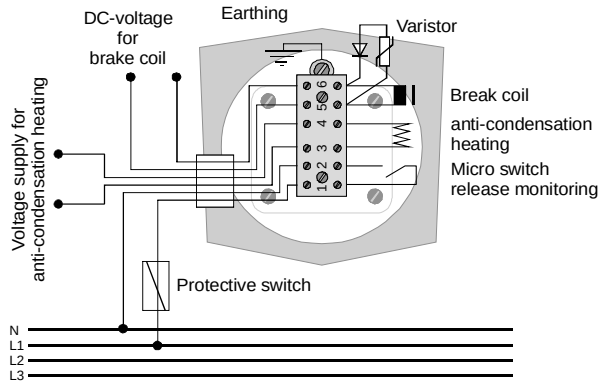

Fig. 11

Example for an electric connection

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

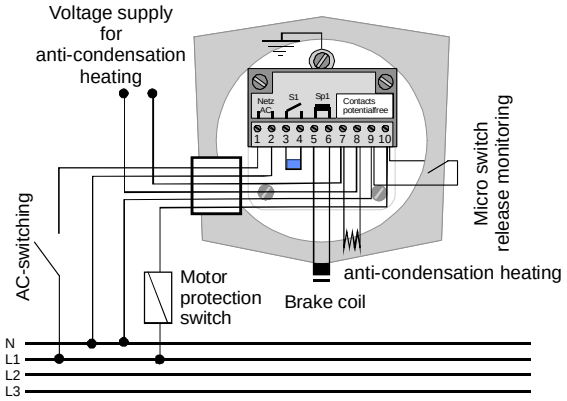

Fig. 12

Release monitoring (Fig. 13)

The release monitoring system gives a signal when the brake is released, i. e. the switch is actuated with:

a) energized coil (electromagnetic release)

b) actuation of emergency release system

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.

The adjustment of the micro switch (22) is made at the factory. If a re-adjustment is necessary (no change of the signal when energised/de-energised, or actuation emergency hand release) it can be arranged directly from the terminal box (23).

Adjustment of the micro switch
The micro switch is located inside the terminal box (23) beneath the terminal block (rectifier).
The adjustment of the micro switch is done with de-energized coil. The air gap must be according to the nominal air gap (see Table 1).
Procedure for adjustment:

1. Check air gap between coil carrier (2) and armature disc (5). In case of an increased nominal air gap (compare Table 1) first the setting values for the feeler gauge (dim. "X") are to be determined and used according to example mentioned below.
2. Dismount terminal block (rectifier).
3. Slightly unscrew fixing screws of the holding bracket at the micro switch (22).
4. Use feeler gauge to adjust the micro switch position axially.

Observe following:

   a. feeler gauge „X“ = 0,1 mm: micro switch must not switch (contact red - blue open)
   b. feeler gauge „X“ = 0,15 mm: micro switch must switch (connection red - blue closed).

5. Tighten fixing screw of the holding bracket at the micro switch (22).
6. Attach terminal block (rectifier).

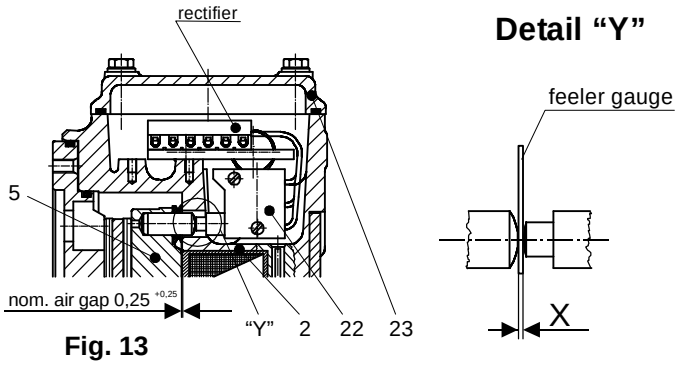

Fig. 13

Attention!
If the air gap between the coil carrier (2) and the armature disc (5) exceeded the nominal value by wear of the rotor, the difference has to be considered with the micro switch adjustment.
Example: Air gap = 0,75 mm

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

Adjustment for:

Switching		non 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

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Adjusting the braking torque (Fig. 14)

The adjustment of the braking torque can be done by various assembly variations of the thrust springs (6) in the coil carrier (2) according to Table 2.

Procedure:

1. Unscrew screw plugs (10) with copper seal rings (11).
2. Uniformly turn in both emergency release screws (7) until contact at the coil carrier (2).
3. Unscrew the cap nuts (19) with 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 disc (5).
7. Remove the wear particles and clean the brake.
   Do not use any grease or oil!
8. Set the number of the thrust springs (6) according to Table 2
   The thrust springs (6) must be distributed uniformly in the coil carrier (2). Always two springs lying opposite must be taken out or put in respectively to guarantee that the armature disc (5) is uniformly loaded.
   Use only *mayr*® thrust springs!
9. Put in the armature disc (5).
   Take care that the two pins lying next to each other for actuation of the micro switch project into the terminal box.
10. Uniformly turn in both emergency release screws (7) into the armature disc (5) until contact at the coil carrier (2).
    The armature disc must be slightly pressed onto the coil carrier, if necessary, so that the emergency release screws can be located.
11. Push the brake over the setscrews (3.1) and locate it at the flange plate (3).
    Do not damage the O-rings (3.2 and 3.3)!
12. Attach the brake by means of cap nuts (19) and washers (20).
    A tilting must be avoided!
    Observe tightening torques:
    Sizes 8 and 9 = 13 Nm, size 10 = 26 Nm
13. **Important!**
    Unscrew both emergency release screws (7) from the armature disc (5) (unscrew screws only; do not remove them).
14. Screw in screw plugs (10) incl. copper seal rings (11), whereby the emergency release screws (7) are spring contacted.

Table 2: Spring assembly

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

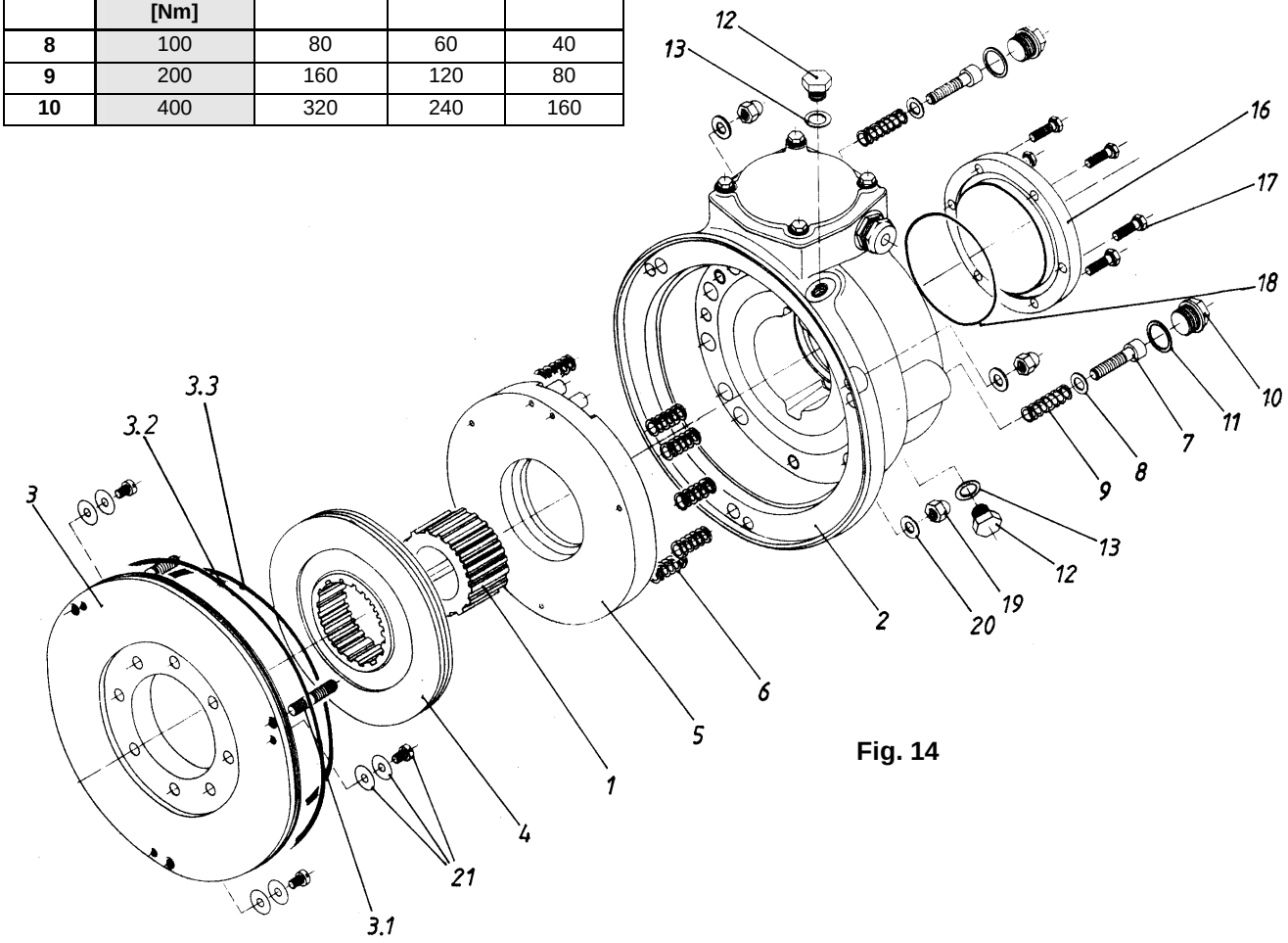

Fig. 14

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mayr® Antriebstechnik

Emergency release system (Fig. 15)

In case of a breakdown or power failure the brake remains engaged and cannot be released electrically any more. In this case an emergency release actuated manually can be carried out.

1. Unscrew screw plugs (10) with copper seal rings (11).
2. Uniformly screw in both emergency release screws (7) into the armature disc (5), until the load contacting the motor starts to move.
   Interrupt release proceeding by single stops (untighten the emergency release screws), to prevent too large accelerations and heating of the brake.

Attention with hoisting drives!
The braking torque does not exist any more, when the emergency release has been actuated.
A fall of the load must be avoided.

3. After the emergency release operation has been finished unscrew both emergency screws (7) from the armature disc, but do not remove them.
4. Screw in screw plugs (10) incl. copper seal rings (11), whereby the emergency release screws (7) are spring contacted.

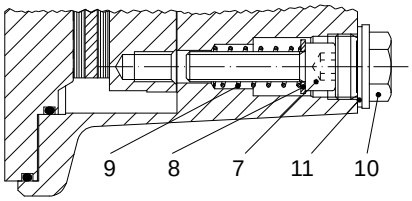

Fig. 15

Anti-condensation heating (option)

The anti-condensation heating is used to eliminate any condensation inside the brake. Connection of the anti-condensation heating according to the wiring diagram.

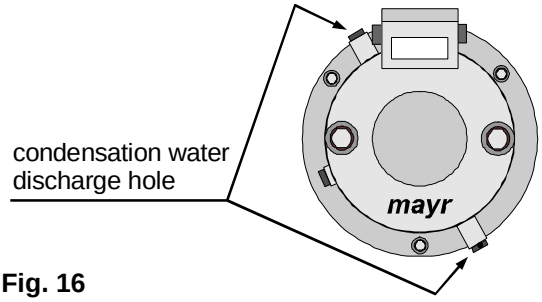

Fig. 16

Condensation water (Fig. 16)

A regular condensation water – inspection must be made by means of the screw plug (14) with its copper seal ring (15).

Disposal

Electronic components
(rectifier / ROBA®-switch / 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	❑ Wear between armature disc and coil carrier	❑ Clean brake
	❑ Air gap too big	❑ Adjust the brake; replace the rotor
	❑ Air gap too small (distance rings have been removed before max. air gap was achieved)	❑ Mount distance rings between coil carrier and flange plate
	❑ Coil interrupted	❑ Replace brake
	❑ Rectifier failed	❑ Replace rectifier
	❑ False voltage measured at the rectifier	❑ Provide correct voltage
Brake does not brake	❑ Emergency release screws are not unscrewed	❑ Unscrew emergency release screws
	❑ Oil or grease not on the friction linings	❑ Replace rotor
Signal for release monitoring not provided	❑ Wear between armature disc and coil carrier	❑ Clean brake
	❑ Switching position not correct	❑ Newly adjust switch
	❑ Micro switch defective	❑ Replace switch

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