

## 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.

**The product must be specially marked for use in areas where there is a danger of explosion.**

**The product will only be marked if it is ordered specially for an Ex-area.**

## Contents

<b>Page 1:</b> - Contents - Guidelines on EU Directives - Safety and Guideline Signs	<b>Page 11:</b> - Electrical Connection and Wiring
<b>Page 2:</b> - Safety Regulations	<b>Page 12:</b> - Electrical Connection and Wiring
<b>Page 3:</b> - Safety Regulations	<b>Page 13:</b> - Maintenance
<b>Page 4:</b> - Safety Regulations	<b>Page 14:</b> - Disposal - Permitted Friction Work
<b>Page 5:</b> - Brake Illustrations	<b>Page 15:</b> - Friction Power Diagrams
<b>Page 6:</b> - Parts List	<b>Pages 16 and 17:</b> <b>Guidelines and Directives for Operation</b>
<b>Page 7:</b> - Table 1: Technical Data - Table 2: Braking Torque Graduations	 <b>in Ex Areas Where There is a Danger of Explosion (Dependent on Type)</b> - Classification of Areas Where There is a Danger of Explosion and Permitted Types - Initial Operation in Areas Where There is a Danger of Explosion - Dangerous Operating Conditions in Areas Where There is a Danger of Explosion
<b>Page 8:</b> - Design - Function - Scope of Delivery / State of Delivery - Installation Conditions	<b>Pages 18 – 20:</b> - Malfunctions / Breakdowns
<b>Page 9:</b> - Installation - Braking Torque Adjustment - Brake Inspection	<b>Page 21:</b> - ATEX Declaration of Conformity
<b>Page 10:</b> - Emergency Hand Release Actuation - Switching Times	



### 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 laid out in writing in a separate document and can be requested if required.

### Guidelines on the EMC Directive (2004/108/EC)

The product cannot be operated independently according to the EMC directive.

Due to their passive state, brakes are also non-critical equipment according to the EMC.

Only after integration of the product into an overall system can this be evaluated in terms of the EMC.

For electronic equipment, the evaluation has been verified for the individual product in laboratory conditions, but not in the overall system.

### Guidelines on the Machinery Directive (2006/42/EC)

The product is a component for installation into machines according to the machinery directive 2006/42/EC.

The brakes can fulfil the specifications for safety-related applications in coordination with other elements.

The type and scope of the required measures result from the machine risk analysis. The brake then becomes a machine component and the machine manufacturer assesses the conformity of the safety device to the directive.

It is forbidden to start use of the product until you have ensured that the machine accords with the regulations stated in the directive.

## 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.



Guidelines on explosion protection

## Safety Regulations

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

### General Guidelines

#### DANGER



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

Brakes may generate further risks, among other things:



Hand-  
injuries



Danger of  
seizure



Contact with  
hot  
surfaces



Magnetic  
fields

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

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

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

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



Before product installation and initial operation, please read the Installation and Operational Instructions carefully and observe the Safety Regulations. Incorrect operation can cause injury or damage.

At the time these Installation and Operational Instructions go to print, the electromagnetic brakes accord with the known technical specifications and are operationally safe at the time of delivery.



ROBA-stop®-M brakes are permitted in ATEX designs for use in areas where there is a danger of explosion for zones 2/22 and are classified as

**II3G Ex nA IIC T3 Gc X**

**II3D Ex tc IIIC T120°C IP65/IP54 Dc X.**

For application in Ex-areas, please observe the special safety-related guidelines and directives.



Explosive gas mixtures or dust concentrations can ignite if they come into contact with hot, live and moving parts of electrical components and cause severe or lethal injuries.

- ☐ 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.
- ☐ Connect the protective earth conductor.
- ☐ Cable connections must not be placed under mechanical strain.
- ☐ 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, disengaged state and secure the system against inadvertent switch-on.

### Guidelines for Electromagnetic Compatibility (EMC)

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

### Application Conditions



The catalogue values are guideline values which have been determined in test facilities. It may be necessary to carry out your own tests for the intended application. When dimensioning the brakes, please remember that installation situations, braking torque fluctuations, permitted friction work, run-in behaviour and wear as well as general ambient conditions can all affect the given values. These factors should therefore be carefully assessed, and alignments made accordingly.

- ☐ Mounting dimensions and connection dimensions must be adjusted according to the size of the brake at the place of installation.
- ☐ The brakes are designed for a relative duty cycle of 100 %.
- ☐ The braking torque is dependent on the present run-in condition of the brake.
- ☐ The brakes are only designed for dry running. The torque is lost if the friction surfaces come into contact with oil, grease, water or similar substances or any other foreign bodies.
- ☐ The surfaces of the outer components have been phosphated manufacturer-side to form a basic corrosion protection. Special protective measures are possible on customer request.

#### CAUTION



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

## Safety Regulations

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

### Ambient Temperature: -20 °C up to +40 °C

#### CAUTION



At temperatures of around or under freezing point, both condensation and the special characteristics of the linings (lower friction values at lower temperatures) can strongly reduce the braking torque.

The user is responsible for taking respective countermeasures, e.g. selecting brakes with higher nominal braking torques. Frequent and extensive temperature fluctuations at high humidity promote the formation of corrosion, which can lead to seized linings. The brake function must be inspected both once attachment has taken place as well as after longer system downtimes, in order to prevent the drive starting up against possibly seized linings. The customer is responsible for providing a protective cover against contamination caused by construction sites.

Temperatures of over 80 °C on the brake mounting flange can have a negative effect on the switching times, the braking torque levels and the noise damping behaviour.

### 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 protective conductor (PE) on the fixed installation. If the basic insulation fails, no contact voltage will remain. Please carry out a standardised inspection of the protective conductor connections to all contactable metal parts!

### Class of Insulation F (+155 °C)

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

### Protection IP65 (design without hand release)

When installed, dust-proof and protected against contact as well as against jet water from a nozzle coming from any direction.

### Protection IP54 (design with hand release)

Dust-proof and protected against contact as well as against water spray from any direction.



The IP protection types are only fulfilled if the brake is mounted correctly onto the motor bearing plate with sealing elements. Please observe the Installation Conditions on page 8.

### 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 °C 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 attachment has taken place** as well as **after longer system downtimes**, in order to prevent the drive starting up against possibly seized linings.

### User-implemented Protective Measures:

- ☐ Please cover moving parts to protect **against injury through seizure**.
- ☐ Place a cover on the magnetic part to protect **against injury through high temperatures**.
- ☐ **Protection circuit:** When using DC-side switching, the coil must be protected by a suitable protection circuit according to VDE 0580, which is integrated in mayr®-rectifiers. To protect the switching contact from consumption when using DC-side switching, additional protective measures are necessary (e.g. series connection of switching contacts). The switching contacts used should have a minimum contact opening of 3 mm and should be suitable for inductive load switching. Please make sure on selection that the rated voltage and the rated operating current are sufficient. Depending on the application, the switching contact can also be protected by other protection circuits (e.g. mayr®-spark quenching unit, half-wave and bridge rectifiers), although this may of course then alter the switching times.
- ☐ 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 specifications
2006/95/EC	Low voltage directive
CSA C22.2 No. 14-2010	Industrial Control Equipment
UL 508 (Edition 17)	Industrial Control Equipment
94/9/EC	EC directive for the approximation of the laws and regulations for member states concerning devices and protective systems intended for use in areas where there is a danger of explosion

# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_\_\_.1X Size 1000

(B.8.1.1.ATEX.EN)

## Safety Regulations

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

### Please Observe the Following Standards:

DIN VDE 0580	Electromagnetic devices and components - General specifications
EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
DIN EN 61000-6-4	Emission standard for industrial environments
DIN EN 61000-6-2	Immunity for industrial environments
EN 60204-1	Safety of machinery - Electrical equipment of machines - General requirements
DIN EN 60079-0	Explosive atmospheres - Part 0: Equipment - General requirements
DIN EN 60079-10-1	Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres
DIN EN 60079-10-2	Explosive atmospheres - Part 10-2: Classification of areas - Combustible dust atmospheres
DIN EN 60079-14	Explosive atmospheres - Part 14: Electrical installations design, selection and erection
DIN EN 60079-15	Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
DIN EN 60079-17	Explosive atmospheres - Part 17: Electrical installations inspection and maintenance
DIN EN 60079-31	Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

### Liability

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

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

### Guarantee

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

### CE Identification



according to the Low Voltage Directive 2006/95/EC and the ATEX directive 94/9/EC (ATEX 95)

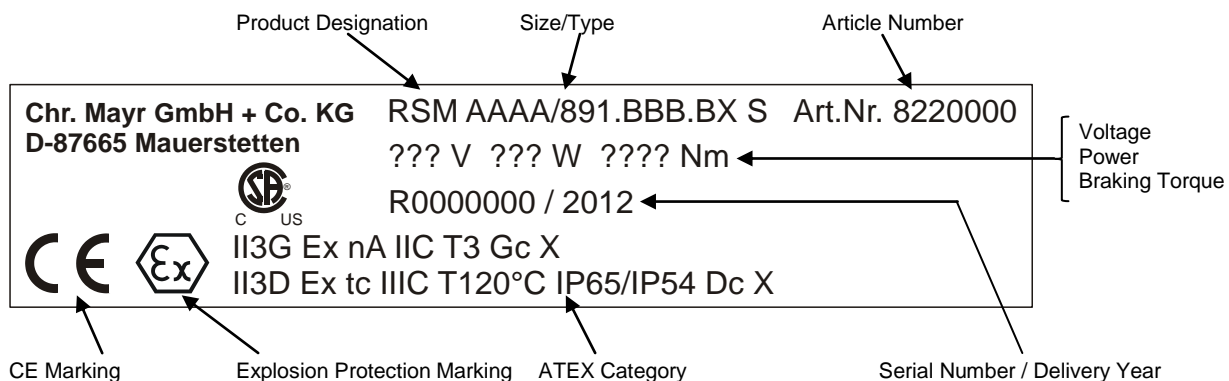
### Conformity Markings



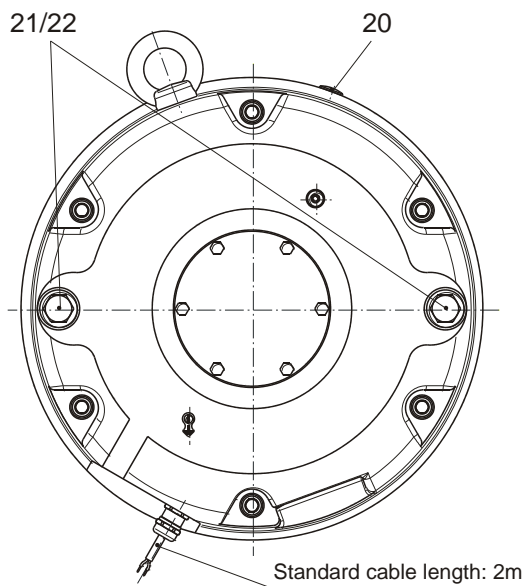
in terms of the Canadian and American approval

### Identification

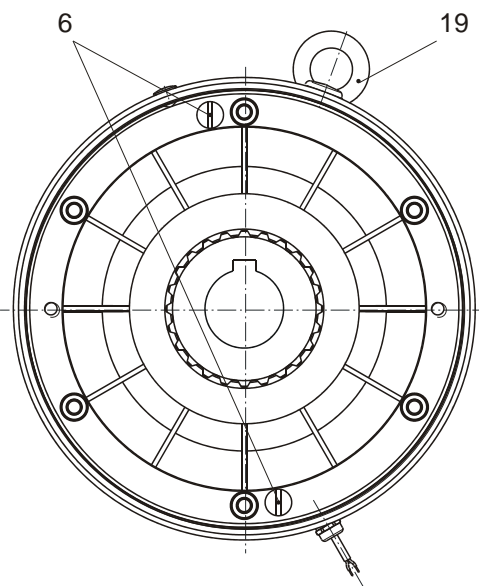
*mayr*® components with ATEX approval are clearly marked and described on the Type tag or engraving:



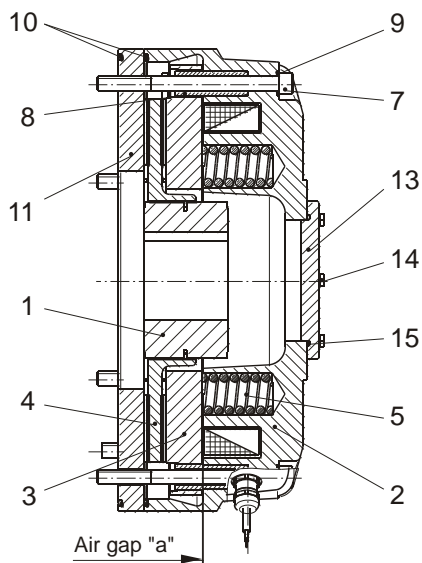
This marking can also be engraved directly onto the coil carrier (2).



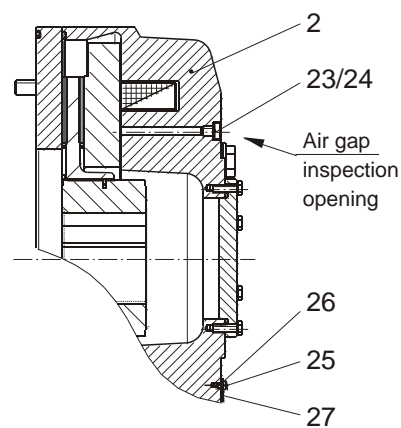
**Fig. 1**



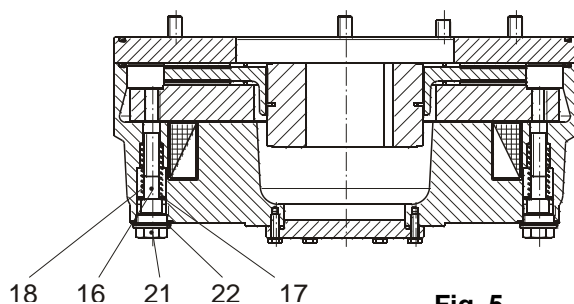
**Fig. 2**  
(Design without flange plate)



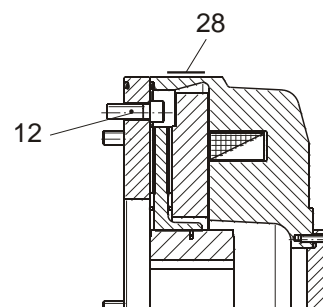
**Fig. 3**



**Fig. 4**



**Fig. 5**  
(Design with emergency hand release)



**Fig. 6**  
(Design with flange plate)



# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_\_\_.1X Size 1000

(B.8.1.1.ATEX.EN)



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

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

Item	Name	Pcs.
1	Hub	1
2	Coil carrier assembly (with magnetic coil)	1
3	Armature disk	1
4	Rotor	1
5	Thrust spring (braking torque)	Dependent on Type
6	Shoulder screw D22 x 55	2
7	Cap screw M12 x 130 (only for design without a flange plate)	6
	Cap screw M12 x 150 (only for design with a flange plate)	6
8	Bushing	6
9	Flat sealing ring (U-Seal) D13,7 x 20 x 1,5	6
10	O-ring D360 x 4 (for design without a flange plate)	1
	O-ring D360 x 4 (for design with a flange plate)	2
11	Flange plate	1
12	Cap screw M12 x 35 (only for design with flange plate)	2
13	Sealing cover	1
14	Hexagon head screw	6
15	O-ring	1
16	Cap screw M12 x 55 (only for design with emergency hand release)	2
17	Washer A13 (only for design with emergency hand release)	2
18	Thrust spring (only for design with emergency hand release)	2
19	Eyebolt M16	1
20	Screw plug M16 x 1,5 (with O-ring)	1
21	Screw plug M26 x 1,5	2
22	Copper sealing ring D26 x 31 x 2	2
23	Cap screw M8 x 10	1
24	Copper sealing ring D8 x 14 x 1	1
25	Cap screw M4 x 5	1
26	Contact washer M4 / D7,8 HI 1.4	1
27	Earthing sign 5976 – 4,3	1
28	Type tag	1



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

# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_\_1X Size 1000

(B.8.1.1.ATEX.EN)

Table 1: Technical Data

Nominal braking torque	Dependent on Type, see Table 2
Braking torque tolerance	+40 % / -20 %
Max. speed / Application field: gas	500 rpm
Max. speed / Application field: dust	750 rpm
Nominal voltages	104 V / 180 V / 207 V
P <sub>N</sub> Electrical nominal power	160 W
Electrical connection cross-section	2 x 0,88 mm <sup>2</sup>
Weight without flange plate	79 kg
Nominal air gap "a" +0,2 (Fig. 3)	0,5 mm
Max. permitted air gap "a" after wear (Fig. 3)	1,6 mm
Fixing screw Item 7 for design without flange plate (Item 11)	6 x M12 x 130
Fixing screw Item 7 for design with flange plate (Item 11)	6 x M12 x 150
Cap screws Item 12 (Fig. 6) for flange plate (Item 11)	2 x M12 x 35
Tightening torque Item 6	30 Nm
Tightening torque Item 7	83 Nm
Tightening torque Item 12	83 Nm
Mass moment of inertia J (hub + rotor with d <sub>max</sub> )	424 x 10 <sup>-4</sup> kgm <sup>2</sup>
Friction work Q <sub>r 0,1</sub> (per 0,1 mm wear)	180 x 10 <sup>6</sup> J
Friction work Q <sub>r ges.</sub> (max. possible friction work related to nominal air gap)	2000 x 10 <sup>6</sup> J
Rotor thickness "new" (-0,08 mm)	18,5 mm
Minimum rotor thickness (limit value at nominal torque 1000 Nm)	17,4 mm
Permitted hub bores (with keyway acc. DIN 6885)	75 – 90 mm
Min. thickness of the counter friction surface	35 mm
Through hole (coil carrier back)	100 mm H7
Protection	IP 65
Ambient Temperature	-20 °C to +40 °C
Max. continuous operating temperature measured on the coil carrier (2)	85 °C



The stated values Q<sub>r 0,1</sub> and Q<sub>r ges.</sub> are only reference values for specific friction work values < 0,5 J/mm<sup>2</sup> and sliding speeds < 10 m/s.

Table 2: Braking Torque Graduations

Braking torque with tolerance +40 % / -20 %				
100 % braking torque Type 891.01__1X	84 % braking torque Type 891.02__1X	68 % braking torque Type 891.03__1X	50 % braking torque Type 891.04__1X	34 % braking torque Type 891.05__1X
1000 Nm	800 Nm	700 Nm	500 Nm	400 Nm

# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_\_\_.1X Size 1000

(B.8.1.1.ATEX.EN)

## 1. Design

ROBA-stop®-M brakes are spring applied, electromagnetic safety brakes, which apply a defined braking effect after the voltage is switched off or after a voltage failure.

## 2. Function

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

### Spring applied function (brake):

In de-energised condition, thrust springs (5) press against the armature disk (3). The rotor (4) is held between the armature disk (3) and the flange plate (Item 11 / dependent on Type) or the customer-side machine wall via frictional locking. The braking torque is introduced into the drive line via the toothing of the rotor (4) and the hub (1).

### Electromagnetic function (release):

Due to the magnetic force of the coil in the coil carrier (2), the armature disk (3) is attracted against the spring pressure to the coil carrier (2). The brake is released and the brake rotor (4) with the hub (1) can rotate freely.

### Safety brake function:

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

## 3. Scope of Delivery / State of Delivery

Please check the state of delivery immediately! *mayr®* will grant no guarantee for belated complaints. Please report transport damage immediately to the deliverer. Please report incomplete delivery and obvious defects immediately to the manufacturer.

## 4. Installation Conditions

- ❑ The eccentricity of the shaft end in relation to the mounting pitch circle must not exceed 0,2 mm.
- ❑ The positional tolerance of the threads for the cap screws (7) must not exceed 0,2 mm.
- ❑ The axial run-out deviation of the screw-on surface to the shaft must not exceed the permitted axial run-out tolerance of **0,125 mm** acc. DIN 42955.  
The reference diameter is the pitch circle diameter for securement of the brakes.  
Larger deviations can lead to a drop in torque, to continuous grinding of the rotor (4) and to overheating.
- ❑ The tolerances of the hub bore (1) and the shaft must be selected so that the hub toothing (1) is not widened. Widening of the toothing leads to the rotor (4) jamming on the hub (1) and therefore to brake malfunctions.  
Recommended hub – shaft tolerance H7/k6.  
The max. permitted joining temperature of 200 °C must not be exceeded.

- ❑ The rotor (4) and brake surfaces must be oil and grease-free.
- ❑ A suitable counter friction surface (steel or cast iron) must be used. Sharp-edged interruptions on the friction surfaces must be avoided. These increase the friction temperature and therefore are an ignition hazard. Recommended surface quality in the area of the friction surface  $R_a = 1,6 \mu\text{m}$ .  
**Friction surfaces made of grey cast iron are to be rubbed down additionally with fine sandpaper (grain  $\approx 400$ ).**
- ❑ Friction value-increasing surface treatments are not permitted.
- ❑ The counter friction surface must be at least 35 mm thick. The generated friction temperatures must be effectively conducted from the friction surface onto neighbouring housing components.  
The housing components must ensure good temperature radiation into the ambient air.  
In limit areas of operation with regard to ambient conditions, friction work and heat dissipation, a temperature monitoring device must be provided on the housing.
- ❑ Dimensioning of the key connection according to the requirements shaft diameter, transmittable torque and operating conditions must be carried out. For this, the corresponding user data must be known or the customer must carry out the dimensioning according to the valid calculation basis DIN 6892.  
For the calculation, a hub quality of  $R_e = 300 \text{ N/mm}^2$  should be used.  
The length of the key should lie over the entire hub (1).
- ❑ For the dimensioning of the key connections, the permitted tensions common in machine construction must be considered. During initial operation, check whether the key is inserted correctly and whether the cap screws (Items 7 and 12) are tightened to a **tightening torque of 83 Nm**.
- ❑ The sealing cover (13) in the coil carrier (2) must be removed on the continuous motor shaft including the hexagon head screws (14) and the O-ring (15), and a suitable radial shaft sealing ring must be inserted.  
For this, please observe the Guidelines on page 16 for application of the brake in ATEX areas.
- ❑ The ignition protection type "tD, Zone A22" in dusty conditions is achieved via the dust-proof housing and the dust-proof brake installation.  
The brake must be secured to the motor bearing plate using a sealing element (e.g. O-ring, Fig. 2, Item 10).  
Please observe the guidelines provided by the sealing element manufacturer on static sealing and the guidelines from the standards DIN EN 60079-0 or DIN EN 60079-31.
- ❑ Please abstain from using cleaning agents containing solvents, as they could affect the friction material.



### Danger of ignition!

Danger of ignition if the Installation Conditions are ignored.



# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_\_\_.1X Size 1000

(B.8.1.1.ATEX.EN)

## 5. Installation (Figs. 1 to 6)

- 5.1. Mount the hub (1) onto the shaft, bring it into the correct position and secure it axially, e.g. using a locking ring.
- 5.2. If necessary (dependent on Type), guide the flange plate (11) with the inserted O-ring (Item 10 / please make sure that it is positioned properly) over the shaft and secure it to the machine wall using 2 cap screws (12) M12 x 35 with a **tightening torque of 83 Nm**.  
Please make sure that the bores in the flange plate (11) and the threaded holes in the machine wall align.
- 5.3. Measure the rotor thickness (nominal dimension in new condition 18,5<sub>-0,08</sub> mm).
- 5.4. Push the rotor (4) onto the hub (1) by hand (the rotor collar should be facing away from the machine wall or flange plate (11)). The rotor toothing must lie over the entire length of the hub (1).  
Check that the toothing moves easily.
- 5.5. Please make sure that the O-ring (10) is inserted properly into the coil carrier (2).
- 5.6. Push the rest of the brake over the hub (1) and the rotor collar (4) (the fixing holes should align with the bores on the flange plate (11) or the machine wall).  
The shoulder screws (Item 6 / Fig. 2) prevent the individual components from falling apart when the brake is not mounted.  
They do not affect the brake function and must not be removed during installation.
- 5.7. Secure the brake evenly all around using the cap screws (7) inc. the manufacturer-side mounted flat sealing rings (9) **with a torque wrench and a tightening torque of 83 Nm**.
- 5.8. Check air gap, see page 13.



### Danger of ignition!

Danger of ignition if the installation instructions are not followed carefully.

## 6. Braking Torque Adjustment

The ROBA-stop®-M brakes are set manufacturer-side to the braking torque stipulated on order. Different braking torque adjustments can be made using different spring configurations (5) in the coil carrier (2) (see Table 2). The respective thrust spring set (5) for the requested braking torque adjustment (acc. Table 2) is to be installed at the place of manufacture.  
If installation by the user is unavoidable, the required thrust spring set (5) must be ordered stating the exact construction size and braking torque adjustment values.



### Attention!

The ATEX brake and Type must be stated.

When determining the brake torque, please take into account that the friction behaviour and therefore the braking torque tolerance is dependent on the interactions between application conditions, ambient conditions and the ageing or wear condition of the synthetic resin bonded friction linings.  
In extreme application conditions or in an unfavourable constellation of the application parameters, increased torque tolerances might occur.  
Our experience has shown that a tolerance of +40 % / -20 % of the nominal value is to be assumed.

## Thrust Springs (5) Replacement: (Attention: The brake must be load-free)



Replacement is only permitted at the place of manufacture or by specially trained personnel.

In order to replace the thrust springs (5), the brake must be unscrewed from the machine wall or the flange plate (11).

- 6.1. Remove the fixing screws (7).
- 6.2. Unscrew the shoulder screws (6) from the coil carrier (2) and remove the armature disk (3),  
**Attention:** The thrust springs (5) press against the armature disk (3). In order to remove the shoulder screws (6), the armature disk (3) must be pressed against the coil carrier (2), if necessary using an auxiliary tool, to avoid immediate relaxation of the thrust springs (5).  
Observe the installation position of the armature disk (3), or ensure that no thrust springs (5) fall out.

### CAUTION



Danger of injury

- 6.3. Replace the thrust springs (5).  
**Attention!** Insert the new thrust spring set (5) in symmetrical order.
- 6.4. Place the armature disk (3) onto the coil carrier (2) or the thrust springs (5) (observe installation position).
- 6.5. Press the armature disk (3) down against the spring force, if necessary using an auxiliary tool, and screw in the shoulder screws (6) up to their limits using a **tightening torque of 30 Nm**.
- 6.6. Screw the brake onto the machine wall or the flange plate (11) using fixing screws (7).  
**Please observe the tightening torque of 83 Nm!**
- 6.7. Please check that the sealing elements (Items 9 and 11) are positioned properly.



Installation errors lead to **danger of ignition**.

## 7. Brake Inspection (before brake initial operation)

- **Braking torque inspection:**  
Please compare the requested braking torque with the torque stated on the Type tag (28).
- **Carry out a release inspection:**  
by energising the brake or manually using the emergency hand release (dependent on Type).

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

The braking torque (switching torque) is the torque effective in the shaft train on slipping brakes, with a sliding speed of 1 m/s referring to the mean friction radius (acc. DIN VDE 0580/07.2000).

## 8. Emergency Hand Release Actuation (Fig. 7)



Installation is only permitted at the place of manufacture or by specially trained personnel.

### DANGER



Before actuating the emergency hand release, ensure that the brake is load-free.

- 8.1. Remove the screw plugs (Item 21 / wrench opening 22) inc. copper sealing rings (22) on the brake facing-side, so that both cap screws (16) become accessible.
- 8.2. Slowly and evenly screw in both cap screws (16) simultaneously using two hexagon socket wrenches, wrench opening 10 against the pressure of the thrust springs (18) up to their limits into the armature disk (3) until the brake releases.
- 8.3. Once the emergency release procedure has ended, both cap screws (16) are completely screwed out of the armature disk (3) again and the openings are closed again using the screw plugs (21) and copper sealing rings (22).

### DANGER



If both cap screws (16) are not completely screwed out of the armature disk (3) again, the function of the brake can no longer be guaranteed.



### Danger of ignition!

If permanent grinding of the rotor (4) results from incorrect actuation of the emergency hand release.

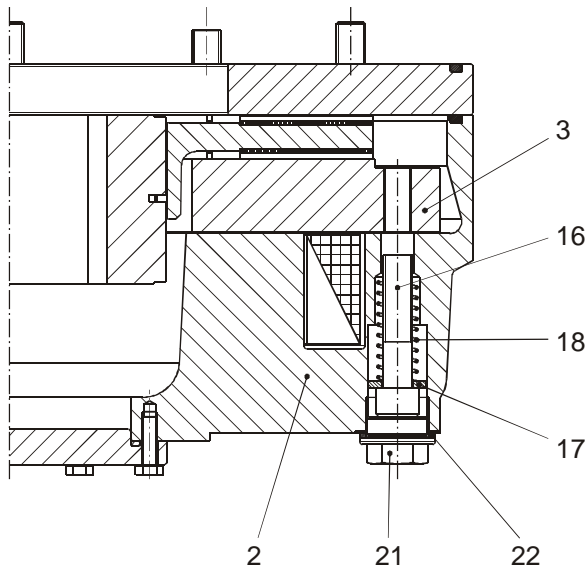
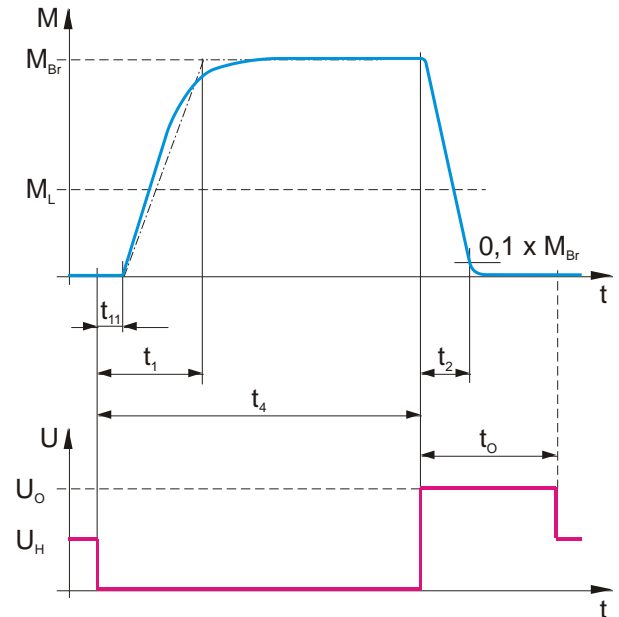


Fig. 7

## 9. Switching Times

### Torque-Time Diagram



### Key

- $M_{Br}$  = Braking torque
- $M_L$  = Load torque
- $t_1$  = Connection time
- $t_{11}$  = Response delay on connection
- $t_2$  = Separation time
- $t_4$  = Slip time +  $t_{11}$
- $t_o$  = Overexcitation time
- $U_H$  = Holding voltage
- $U_O$  = Overexcitation voltage

Table 3: Switching Times (with 1 sec overexcitation)

Separation time $t_2$	270 ms
Connection time $t_1$ DC	180 ms
Connection time $t_1$ AC	1200 ms
Response delay $t_{11}$ DC	70 ms
Response delay on separation $t_{21}$	30 ms

These values are mean values referring to a nominal air gap and a braking torque (100 %) on a warm brake. For other braking torque adjustments, see the Diagram on page 12: "Separation time  $t_2$  dependent on the spring configuration".

## 10. Electrical Connection and Wiring



The brake must be operated with overexcitation.

DC current is necessary for operation of the brake. The coil nominal voltage is indicated on the Type tag as well as on the brake body and is designed according to the DIN IEC 60038 ( $\pm 10\%$  tolerance).

The brake must only be released with overexcitation ( $U_O = 2 \times U_N$ ) (e.g. using a ROBA®-switch or -multiswitch fast acting rectifier or phase demodulator). The connection possibilities can vary dependent on the brake equipment. Please follow the exact connections according to the Wiring Diagram. The manufacturer and the user must observe the applicable regulations and standards (e.g. DIN EN 60204-1 and DIN VDE 0580). Their observance must be guaranteed and double-checked!



The brake connection cable is designed with free cable ends.

The cable must be inserted into a suitable terminal box via a cable gland with strain relief according to the ATEX directive.

The designation "X" after the ATEX classification refers to the measures required for clamping the free line ends acc. the ATEX directive.

### Earthing Connection

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

### Device Fuses

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

### Switching Behaviour

The safe 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

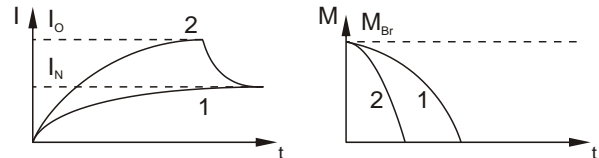
If the magnetic coil is energised with nominal voltage, the coil current does not immediately reach its nominal value. The coil inductivity causes the current to increase slowly as an exponential function. Accordingly, the build-up of the magnetic field takes place more slowly and the braking torque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



On ROBA-stop®-M Size 1000, safe brake release with normal excitation cannot be guaranteed for all braking torque variants and wear conditions. Therefore, brake release must be carried out using overexcitation ( $U_O = 2 \times U_N$ ).

#### • Field Build-up with Overexcitation

A quick and safe 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 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.



**Attention!** ROBA®-switch fast-acting rectifiers and phase demodulators are not suitable for use in areas where there is a danger of explosion.

It is possible to mount such rectifiers in a control cabinet outside the area where there is a danger of explosion.

You must provide wiring for this purpose in accordance with the ATEX directive.

#### \* Overexcitation time $t_O$

Increased wear, and therefore an increasing air gap as well as coil heating lengthen the separation times  $t_2$  for the brake. Please select 1 s with 2x overexcitation as a reference value for the overexcitation time  $t_O$ .

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  $t_2$ . Please observe the Diagram on page 12.

☐ Spring force (braking torque adjustment) < 100 %:  
The required overexcitation time  $t_O < 1$  sec.

☐ Spring force (braking torque adjustment) = 100 %:  
The required overexcitation time  $t_O = 1$  sec.

#### \*\* RMS coil capacity P



$P \leq P_N$

The coil capacity P must not be larger than  $P_N$ . Otherwise the coil may fail due to thermic overload.

# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_\_1X Size 1000

(B.8.1.1.ATEX.EN)

## Key and Calculations:

P [W] RMS coil capacity dependent on switching frequency, overexcitation, reduction in capacity and duty cycle

$$P = \frac{P_O \times t_O + P_H \times t_H}{T}$$

P<sub>N</sub> [W] Coil nominal capacity (catalogue values, Type tag)

P<sub>O</sub> [W] Coil capacity on overexcitation

$$P_O = \left(\frac{U_O}{U_N}\right)^2 \times P_N$$

P<sub>H</sub> [W] Coil capacity at reduced capacity

$$P_H = \left(\frac{U_H}{U_N}\right)^2 \times P_N$$

t<sub>O</sub> [s] Overexcitation time

t<sub>H</sub> [s] Time of operation with reduction in capacity

t<sub>on</sub> [s] Time with voltage

t<sub>off</sub> [s] Time without voltage

T [s] Total time (t<sub>O</sub> + t<sub>H</sub> + t<sub>off</sub>)

U<sub>O</sub> [V] Overexcitation voltage (bridge voltage)

U<sub>H</sub> [V] Holding voltage (half-wave voltage)

U<sub>N</sub> [V] Coil nominal voltage

## Time Diagram

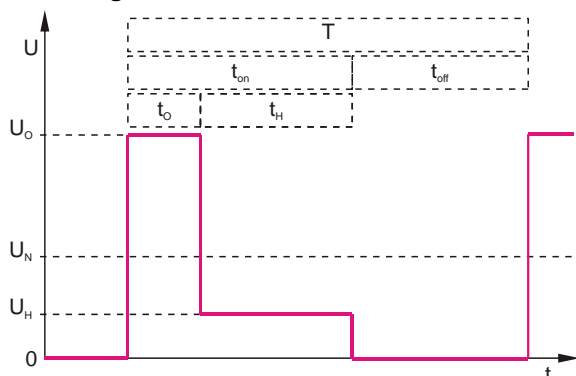
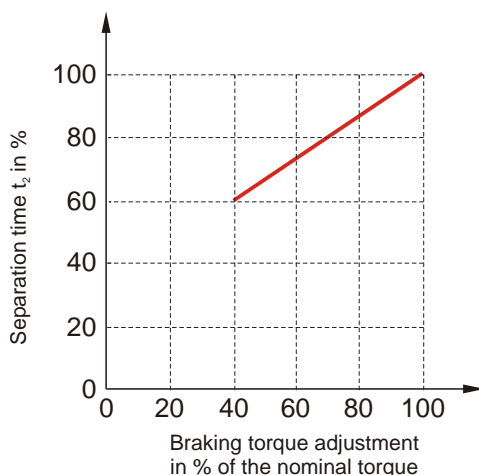
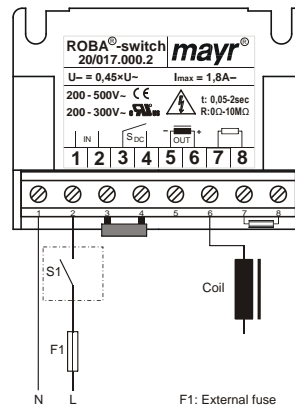


Diagram: Brake separation time t<sub>2</sub>, dependent on the spring configuration



## Magnetic Field Removal

### AC-side Switching

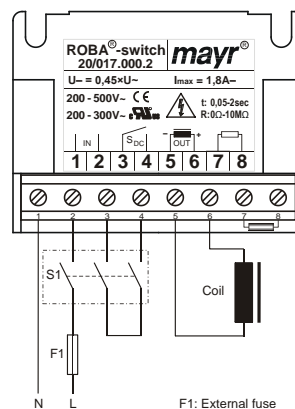


The power circuit is interrupted before the rectifier. The magnetic field slowly reduces. This delays the rise in braking torque.

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

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

### DC-side Switching



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

When switching DC-side, high voltage peaks are produced in the coil, which 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 operation)**; however, louder switching noises.

## Protection Circuit

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



**Attention!** mayr®-spark quenching units, half-wave and bridge rectifiers are not suitable for use in areas where there is a danger of explosion.

# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_\_\_.1X Size 1000

(B.8.1.1.ATEX.EN)

## 11. Maintenance

ROBA-stop®-M brakes are mainly maintenance-free. However, the rotor (4) is subject to operational wear. The rotor (4) is robust and wear-resistant. This ensures a particularly long lifetime of the brake. If the rotor (4) does become worn due to the high total friction work, and the function of the brake can no longer be guaranteed, the brake can be re-set to its functional state by replacing the rotor. The quality of the counter friction surface must be checked. The wear condition of the rotor (4) can be determined by removing the cap screw (23) including the copper sealing ring (24) and then measuring dimension "z" (Fig. 8) once in energised and once in de-energised condition:

$$\Rightarrow Z_{\text{de-energised}} - Z_{\text{energised}} = \text{Air gap "a"}$$

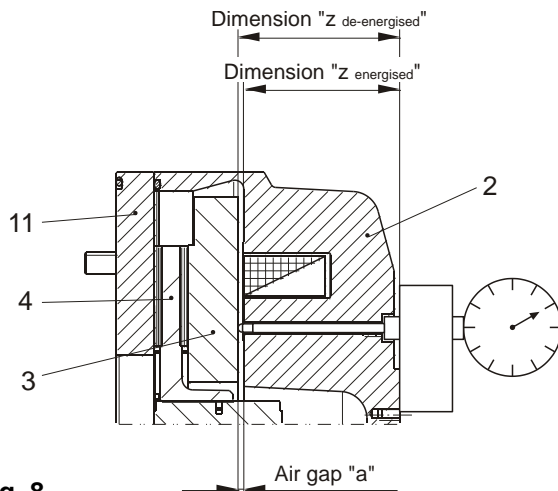


Fig. 8



### Attention!

The maximum air gap "a" of 1,6 mm must not be exceeded. If the measured maximum air gap "a" lies above 1,6 mm, the rotor (4) must be replaced. Please ensure that the counter friction surface is of the correct quality. If the friction surface is not of the quality described, replace the armature disk (3) and also the flange plate (11).

The amount of wear on the rotor (4) must be examined during the regular inspection intervals:

**At least half-yearly or  
at the latest after 1000 operating hours.**

The inspection should include:

- ☐ Inspection of the rotor thickness (wear).
- ☐ Inspection of the toothings of the rotor (4) and the hub (1) for ease of movement, increased backlash and damage. The max. permitted rotor torsional backlash on the hub → 0,3° (equals approx. 0,8 mm on the circumference). Inspection on an engaged brake and load-free output by turning the motor shaft.
- ☐ Inspection of the armature disk (3) and the flange plate (11) or the friction surface of the motor plate for plane parallelism and wear (excessive formation of grooves).
- ☐ Remove any layers of dust on the brake.
- ☐ Clean the brake.

Wear times are influenced by many factors and can vary substantially. The required inspection and maintenance intervals must be calculated individually according to the system manufacturer's planning documentation.



Unpermitted wear can cause a change in the brake braking and release behaviour, resulting in a substantial **danger of ignition**.



### Attention!

Before the brake is removed from the bearing shield, the parts inside the brake must have cooled down so that there is no danger of ignition or of injury. This is achieved by leaving the brake shut down for half an hour, de-energised, between the last braking action and de-installation.

### Replacing the Rotor (4):

#### DANGER



The brake must be load-free. Please check that it is load-free before de-installation. In order to replace the rotor (4), the brake must be unscrewed from the motor bearing shield or from the machine wall.

- 11.1. Remove the fixing screw (7).
- 11.2. Remove the brake and clean it. (Use an industrial vacuum and wear a dust mask).
- 11.3. Remove the rotor (4) from the hub (1).
- 11.4. Check the hub (1) for damage and replace if necessary.
- 11.5. Check the armature disk (3) and the counter friction surface for signs of wear and plane parallelism (0,08 mm). There must be no excessive formation of grooves. If necessary, replace the armature disk (3) and the flange plate (11).  
For replacement or installation of the armature disk (3) see points 6.2, 6.4 and 6.5.  
For replacement or installation of the flange plate (11) see point 5.2.
- 11.6. Measure the rotor thickness of the new rotor (4). Nominal dimension 18,5<sub>-0,08</sub> mm.
- 11.7. Push the rotor (4) onto the hub (1) and check for radial backlash. If there is a larger amount of backlash in the toothing between the hub (1) and the rotor (4), the hub (1) must be removed from the shaft and replaced.
- 11.8. Screw the brake onto the machine wall or the flange plate (11) using fixing screws (7) (observe the tightening torque of **83 Nm**).
- 11.9. For brake inspection and run-in procedure, see point 7 on page 9.
- 11.10. Please check that the sealing elements (Items 9 and 11) are positioned properly.



On brakes with reduced braking torque and/or operation with fast acting rectifiers, unpermittedly high wear values will not be noticed via the brake switching behaviour, as the magnetic coil is, in this case, capable of allowing a very large tension path for the armature disk (3). Unpermittedly high wear relaxes the thrust springs (5), leading to a drop in torque.



# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_\_\_.1X Size 1000

(B.8.1.1.ATEX.EN)

## 12. Permitted Brake Friction Work

The permitted friction work values dependent on the switching frequency shown in the characteristic curves on page 15 must not be exceeded, not even in EMERGENCY STOP operation.



### **Danger of ignition!**

If the maximum friction work is exceeded and/or at increased switching frequency.

The following diagrams show the permitted friction work values  $Q_r$  referring to the respective switching frequency.

The max. permitted continuous operating temperature for the brake core is 100 °C.

The core temperature of the magnetic coil in energised condition is higher than the exterior temperature of the brake.

So that the core temperature of 100 °C is not exceeded, a max. exterior temperature on the coil carrier (2) of 85 °C (without layers of dust / temporary 110 °C) is permitted and must be checked by taking measurements.

The max. temperatures are acc. DIN EN 60079-14 only permitted for dust deposits < 5mm.

### **Example (application field dust):**

The rated speed is 750 rpm.

At 40 switchings per hour, the permitted friction work per switching is approx. 30000 J (see page 15, Diagram 2).



### **Dust Atmosphere:**

A temperature monitoring device must be mounted onto the brake coil carrier (2) if during the function sequence of the brake application it cannot be guaranteed that the friction work values and switching frequencies defined in the Installation and Operational Instructions are observed.



### **Gas Atmosphere:**

The temperature generated and relevant for a possible danger of ignition cannot be measured on the brake using a temperature monitoring system, as this temperature is only produced temporarily between the friction surfaces during the brake procedure. This temperature represents a potential danger of ignition in gas atmosphere. The defined friction work values and switching frequencies for gas must not under any circumstances be exceeded, even if the brake exterior temperature lies well below the max. permitted surface temperature. If it cannot be guaranteed during function of the brake application that the max. permitted friction work values and switching frequencies are maintained, this brake must not be used.

## 13. Disposal

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

### **Electronic components**

(Rectifier / 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)

### **All aluminium components:**

Non-ferrous metals (Code No. 160118)

### **Brake rotor (steel or aluminium pads with friction linings):**

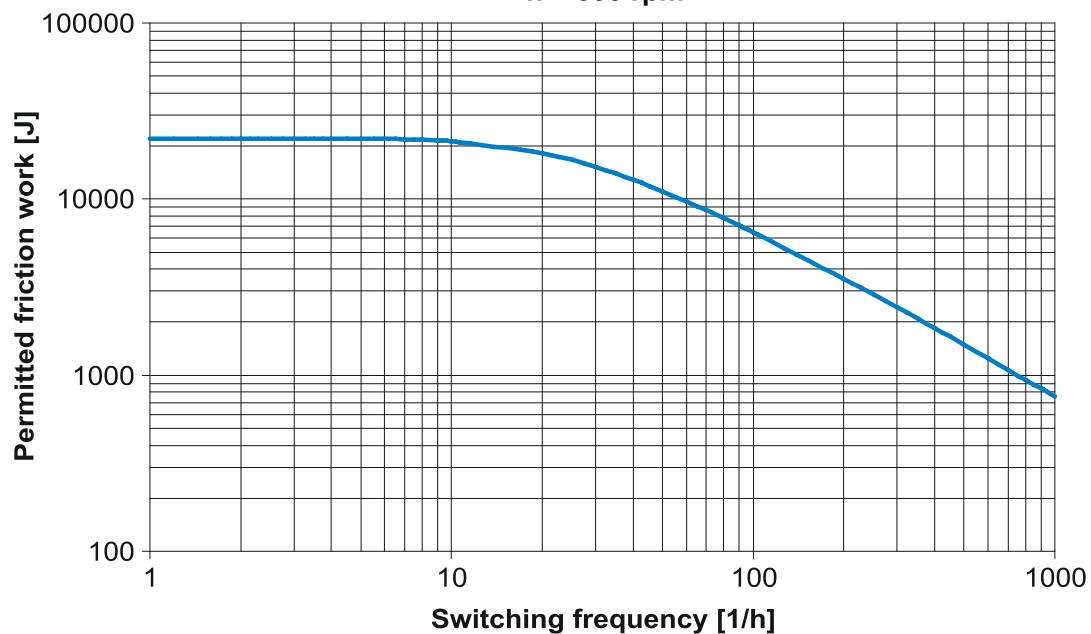
Brake linings (Code No. 160112)

### **Seals, O-rings, V-seals, elastomers:**

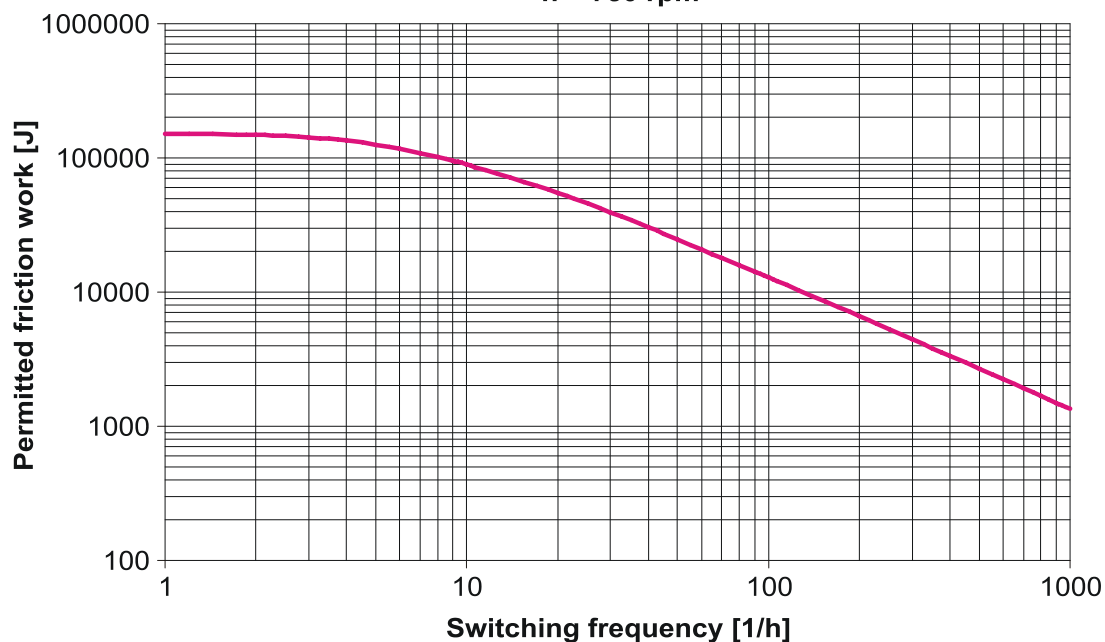
Plastic (Code No. 160119)

Friction Power Diagrams

Friction Power Diagram 1  
Application field: Gas  
n = 500 rpm



Friction Power Diagram 2  
Application field: Dust  
n = 750 rpm



# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_ \_1X Size 1000

(B.8.1.1.ATEX.EN)

## Guidelines and Directives for Operation in Areas Where There is a Danger of Explosion

### Classification of Areas Where There is a Danger of Explosion and Permitted Types

If the measures and guidelines described in the Installation and Operational Instructions are observed, the ROBA-stop®-M brake is suitable for use in areas where there is a danger of explosion according to the category:



II3G Ex nA IIC T3 Gc X  
II3D Ex tc IIIC T120°C IP65/IP54 Dc X

Permitted Types: 891.010.1X

891.011.1X

891.014.1X

891.015.1X

891.020.1X

891.021.1X

891.024.1X

891.025.1X

891.030.1X

891.031.1X

891.034.1X

891.035.1X

891.040.1X

891.041.1X

891.044.1X

891.045.1X

891.050.1X

891.051.1X

891.054.1X

891.055.1X

Mounting the brake onto a system with a shaft guided through the brake is permitted.

For this, the sealing cover (13) must be removed and a suitable sealing element must be inserted between the shaft provided by the operator and the coil carrier (2).

The bore in the coil carrier is produced to Ø 100 H7.

The surface quality of the coil carrier end face is

Ra = 1,6 µm.

If these connection geometries cannot be used, suitable special turned grooves must be made at the site of manufacture.

**Attention:** Dust must be prevented from entering the brake.

Protection IP 65 must be guaranteed.

No unpermitted high temperatures must be generated by the sealing element due to friction. The resulting temperature at the sealing point must be inspected during initial operation.

### Initial Operation in Areas Where There is a Danger of Explosion

For malfunction-free brake operation, it is necessary to keep to the brake characteristic values (Technical Data) indicated on page 7 and the Friction Power Diagrams on page 15. The brake must be dimensioned according to the application. The Dimensions Tables in Catalogue K.891.V\_ must be observed.

#### CAUTION



Operation outside of the indicated characteristic data is not permitted. There is a danger of brake destruction and of ignition.

When the brake is delivered, it must be checked for ATEX-conform labelling according to the application area for which it is intended; for alignment of the order information; for completeness and for any transport damage. Damage to the cable insulation in particular will lead to **danger of ignition**.

The functional capability and the correct dimensioning of the brake must be ensured and confirmed during initial operation. Furthermore, the device must be inspected for correct function with the components within the system such as the motor, control unit, inertia of masses and possible loads. For application at the maximum performance limits of the brake, the max. continuous operating temperature for the intended load (exterior, measured on the brake coil carrier (2)) of 85 °C (temporarily 110 °C) must be checked. The wear condition of the brake and the toothing backlash must be inspected at regular intervals. Please observe section 11 "Maintenance". It is expedient to make the inspection intervals shorter during the first period after initial operation; should the inspection results prove positive, the inspection intervals can then be extended accordingly (e.g. 2 days, 2 weeks, 2 months, after positive wear condition half-yearly or after 1000 operating hours).

The free axial mobility of the brake rotor (4) on the hub toothing (1) must be ensured and checked.

The values  $Q_{r0,1}$  and  $Q_{r\text{ges}}$ , stated in Table 1 are only approximate values for specific friction work values  $< 0,5 \text{ J/mm}^2$  and sliding speeds  $< 10 \text{ m/s}$ .

During operating conditions with higher specific loads, the wear values can increase dramatically. The wear condition of the brake can be measured through the inspection opening in the coil carrier (2), see section 11 "Maintenance" and Figs. 4/8.

In limit areas of operation with regard to ambient conditions, friction work and heat dissipation, a temperature monitoring device must be provided on the coil carrier (2).

When mounting the brake or during installation work, the guidelines, tightening torques and dimension information given in the Installation and Operational Instructions must be observed.

**Attention: Danger of ignition**

There is a **danger of ignition** if the brake is electrically wired deviating from the measures described.

## Guidelines and Directives for Operation in Areas Where There is a Danger of Explosion

### Dangerous Operating Conditions in Areas Where There is a Danger of Explosion

If the rotor (4) becomes excessively worn, the brake coil is no longer able to attract the armature disk (3) against the spring force and release the brake. Furthermore, the braking torque drops during this wear condition as the thrust springs (5) relax. This unpermitted operating condition could cause unnoticed permanent grinding on the brake or cause a load to drop.

#### **Attention: Danger of ignition, danger of injury**

The control bore on the brake can be used to inspect the brake air gap or the wear condition. During initial operation, the required air gap dimensions "a" must be checked. Attention: If the air gap is too small, changes in operating conditions, e.g. temperature expansion, swelling of friction linings or layers of abraded particles will cause the rotor to grind.

#### **Attention: Danger of ignition**

Continuous grinding of the rotor (4), independent of the defined friction work dependent on the switching frequency, leads to excessive wear on the friction linings.

#### **Attention: Danger of ignition**

Abraded metal particles are attracted to the magnetic coil and can lead to malfunctions, impairing the brake release behaviour.

#### **Attention: Danger of ignition**

Operating conditions which cause friction work independent of the brake dimensioning must be avoided or taken into account during dimensioning. If the motor starts up against a closed brake, this will be placed under strain accordingly.

#### **Attention: Danger of ignition**

Due to the brake switching times, the drive can be accelerated by a load or a load torque when the motor is switched off. This means that the brake is subjected to a higher level of friction work during the brake procedure than may be intended in terms of dimensioning.

#### **Attention: Danger of ignition**

During motor braking procedures, there is a risk of the brake having to take on part of the motor braking work due to incorrect wiring, meaning that it is subjected to a higher load than intended in terms of dimensioning.

#### **Attention: Danger of ignition**

Ambient influences, long downtimes and condensation inside the brake due to temperature fluctuations and corrosion change the friction behaviour on the friction linings and therefore the braking torque. In extreme cases, the friction linings can stick, corrode up or freeze up. The brake must be protected from damaging ambient influences. The braking torque must be inspected at regular intervals.

#### **Attention: Danger of ignition**

Different operating conditions, particularly strong oscillations, vibrations and different sliding speeds will change the braking behaviour of the brake. Oscillations and vibrations during the braking procedure, which are often indicated by squeaking, can lead to wear on the rotor (4) and to the rotor toothing being knocked out. Regular inspection of the rotor wear and the toothing backlash between the rotor (4) and the hub (1) is required in order to inspect the wear condition of the brake.

#### **Attention: Danger of ignition**

Changes to the system operating parameters such as speeds, inertia of masses, cycle frequencies and load torques change the load on the brake during braking procedures. If these parameters are changed in the system, the brake must be re-dimensioned.

#### **Attention: Danger of ignition**

Impacts on the brake components and the brake hand release can destroy these components.

#### **Attention: Danger of ignition**

Metal components grinding against or impacting brakes will lead to spark formation or heating and therefore to **danger of ignition**. Components made of aluminium or rusty parts represent a particularly high risk potential. Covering material made of stainless steel can minimise this risk. Operator mounting parts such as covers, fans etc. must be mounted maintaining sufficient distance to the brake in order to avoid potential sparks caused by contact between the metals, for example due to chafing caused by vibrations.

Rotating or moving parts must be protected against impacts from objects.


#### **Attention: Danger of ignition**

During installation or de-installation and re-installation, please ensure that the sealing elements provided are installed correctly. For the ROBA-stop®-M brake in areas where there is a danger of explosion, at least IP Protection 65 is provided. Layers of dust inside the brake lead to a **danger of ignition**.

# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_\_1X Size 1000

(B.8.1.1.ATEX.EN)

## Malfunctions / Breakdowns


Malfunction	Result of Malfunction	Possible Causes	Danger Guidelines for  Areas	<b>Solutions</b>  <input type="checkbox"/> The brake must always be dismantled in order to remove damage and malfunctions. <input type="checkbox"/> Damaged parts must be replaced in order to solve the respective problem. <input type="checkbox"/> The brake must be cleaned before re-installation.
<b>The brake does not release completely; permanent grinding of the rotor</b>	The axial flexibility of the rotor is limited; rotor is jammed axially	Incorrect tolerance constellation on the shaft-hub connection	Danger of ignition	Check tolerances
		Tolerance errors on the key connection	Danger of ignition	
		Broken hub due to installation error when mounting	Danger of ignition	Suitable mounting method
		Poor shaft quality	Danger of ignition	Check the shaft quality
		Poor key dimensioning	Danger of ignition	Carry out a key calculation
		Hub toothing dirty due to abraded or worn particles	Danger of ignition	Check the hub and rotor toothing; maintain suitable maintenance intervals
		Worn, knocked out hub and rotor toothing	Danger of ignition	
		Toothings breakage	Danger of ignition	
		Damaged / deformed hub and rotor toothing	Danger of ignition	
<b>Attention: During installation and/or initial operation, the free axial mobility of the rotor must be checked; a clamped rotor means danger of ignition</b>				
<b>The brake does not release completely; permanent grinding of the rotor</b>	Wiring error on the brake	Incorrect voltage; no DC voltage	Danger of ignition	Check voltage; observe the wiring guidelines
		Defective electrical wiring	Danger of ignition	Check electrical wiring
		Defective coil; coil is electrically or thermally overloaded	Danger of ignition	Check coil capacity; check insulation resistance
<b>Attention: Incorrect electrical wiring of the brake means danger of ignition</b>				
<b>The brake does not release completely; permanent grinding of the rotor</b>	Air gap too small in released condition	Due to installation	Danger of ignition	Air gap inspection
		Penetration of foreign bodies into the brake, in particular magnetisable particles	Danger of ignition	Check the brake interior for dirt and clean it
		Excessive component temperatures; temperature expansion	Danger of ignition	Temperature inspection



# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_\_\_.1X Size 1000

(B.8.1.1.ATEX.EN)


## Malfunctions / Breakdowns

Malfunction	Result of Malfunction	Possible Causes	Danger Guidelines for  Areas	Solutions  <input type="checkbox"/> The brake must always be dismantled in order to remove damage and malfunctions. <input type="checkbox"/> Damaged parts must be replaced in order to solve the respective problem. <input type="checkbox"/> The brake must be cleaned before re-installation.
<b>Slipping; permanent grinding of the brake under load; increase in friction work</b>	Braking torque too low	Incorrect dimensioning	Danger of ignition	Check the required braking torque
		Incorrect spring configuration	Danger of ignition	Check the spring configuration; have the brake checked at the place of manufacture
	Drop in braking torque	Excessive wear on the rotor	Danger of ignition	Wear inspection
		Changes to the friction behaviour on the friction lining due to the maximum sliding speed being exceeded	Danger of ignition	Check for correct wiring, switching times and dimensioning
	Changes in braking torque	Unpermittedly high friction work, squeaking, type and quality of the counter friction surface	Danger of ignition	Check for correct wiring, switching times and dimensioning
		Corrosion on the counter friction surface	Danger of ignition	Check the brake for corrosion
		Ambient influences, oil, water, cleaning media, condensation formation	Danger of ignition	Check protection against environmental influences
		Type and quality of the counter friction surface	Danger of ignition	Check the counter friction surface
		Extremely low friction speeds	Danger of ignition	Check the dimensioning
	Brake cannot be released	Excessive tension path due to unpermitted wear	Danger of ignition	Wear inspection; replace the rotor
		No voltage connection	Danger of ignition	Check the voltage connection
<b>Increased friction work; brake grinds</b>	Excessively long engagement times	Load accelerates the drive line during the brake engagement time	Danger of ignition	Check for correct wiring, switching times and dimensioning
	Drop in braking torque	Excessive wear on the rotor	Danger of ignition	Wear inspection; replace the rotor
	Motor starts up against closed brake	Excessive brake attraction times	Danger of ignition	Check for correct wiring, switching times; check dimensioning; check motor controls

# Installation and Operational Instructions for ROBA-stop®-M brake Type 891.0\_\_1X Size 1000

(B.8.1.1.ATEX.EN)

## Malfunctions / Breakdowns

Malfunction	Result of Malfunction	Possible Causes	Danger Guidelines for  Areas	Solutions  <input type="checkbox"/> The brake must always be dismantled in order to remove damage and malfunctions. <input type="checkbox"/> Damaged parts must be replaced in order to solve the respective problem. <input type="checkbox"/> The brake must be cleaned before re-installation.
Component breakage	Operating conditions	Oscillations, vibrations, overload, unpermittedly high speeds	Danger of ignition	Check operating conditions and dimensioning
	Ambient influences, temperature, fluids, media, corrosion	Friction linings sticking, settling or swelling; changes in friction lining friction behaviour	Danger of ignition	Check protection against environmental influences
	Deviations, adjustment dimensions and the screw tightening torques	Brake securement, hand release, actuation lever, screws	Danger of ignition	Check the guidelines and values according to the information in the Installation and Operational Instructions
Unpermittedly high surface temperatures on the brake	Unpermittedly high friction work, switching frequency "dust atmosphere"	Deviations from the defined permitted friction power curves "dust"	Danger of ignition	Check dimensioning; measure the temperature on the brake; check the actual friction work and the switching frequency.
	Unpermittedly high coil overexcitation times	Deviations from the defined permitted overexcitation times	Danger of ignition	Check the brake wiring; measure the temperature on the brake; check the actual overexcitation times
	Unpermittedly high friction work, switching frequency "gas atmosphere"	Deviations from the defined permitted friction power curves "gas"	Danger of ignition	Attention: The temperature generated and relevant for a possible danger of ignition cannot be measured on the brake, as this temperature is only produced temporarily between the friction surfaces until the brake is released. This temperature represents a potential danger of ignition in gas atmosphere. The defined friction work values and switching frequencies for gas must not under any circumstances be exceeded, even if the brake exterior temperature lies well below the max. permitted surface temperature.
	Defective coil	Shorted coil; earth short-circuit	Danger of ignition	Check coil capacity; check insulation resistance; have the brake inspected at the place of manufacture
	Wiring error on the brake	No voltage applied	Danger of ignition	Check the brake wiring

## **Declaration of Conformity**

According to the EC directive for the approximation of the laws and regulations for member states concerning devices and protective systems intended for use in areas where there is a danger of explosion (ATEX) 94/9/EC, we:

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

hereby declare that the product described in these Installation and Operational Instructions


**ROBA-stop<sup>®</sup>-M brake  
Type 891.0\_\_\_.1X  
Sizes 1000**

has been developed, constructed and produced by us in accordance with the EC directive named above.

### **Applied Standards, Regulations and Inspections (ANVP)**

- 1 DIN EN 1127-1: 2011-10  
Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology
- 2 DIN EN 60079-0: 2013-04  
Explosive atmospheres - Part 0: Equipment - General requirements
- 3 DIN EN 60079-15: 2011/02  
Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
- 4 DIN EN 60079-31: 2010/07  
Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

Mauerstetten, September 11, 2013  
Place / Date

  
Graduate Engineer (FH, University of Applied  
Science) Günther Klingler  
(Managing Director ppa.)