

# Installation and Operational Instructions for ROBA-stop<sup>®</sup>-tacho brake Type 83\_.41\_. and ROBA-stop<sup>®</sup>-tacho peak load brake Type 883.41 \_.

(B.1110.3.GB)

## Please read the Operational Instructions carefully and follow them accordingly!

Ignoring these Instructions may lead to malfunctions or to brake failure, resulting in damage to other parts.

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### Manufacturer's Declaration

This product is intended for installation in a machine or system, based on the machine directive 98/37/EC.

It is forbidden to start use of the product until the machine or system into which it should be built is operating in accordance with the EC directives.

The product corresponds to the low voltage directive 73/23/EEC.

The customer is responsible for compliance with the EMC directive 89/336/EEC.

### Safety and Guideline Signs



#### **Danger!**

Danger of injury to personnel and damage to machines.



#### **Please Observe!**

Guidelines on important points.



#### **Please Observe:**

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

# Installation and Operational Instructions for ROBA-stop®-tacho brake Type 83\_.41\_. and ROBA-stop®-tacho peak load brake Type 883.41\_. \_.

(B.1110.3.GB)

## Safety Regulations

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



### Danger!

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

**To prevent injury or damage, only professionals and specialists should work on the devices.**

### Danger!

**This warning applies if:**

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



### Warning!

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.

The electromagnetic brakes have been developed in accordance with the latest technology regulations and are, at the point of delivery, operationally safe.

### Warning:

Without a conformity inspection, this product is not suitable for use in areas where there is a high danger of explosion. This statement is based on the directive 94/9/EC (ATEX directive).

### Please Observe!

- ☐ Only specialists who are trained in transport, installation, operation, maintenance and general operation of these devices and who are aware of the relevant standards should be allowed to carry out this work.
- ☐ Technical data and specifications (Type tags and documentation) must be followed.
- ☐ The correct connection voltage must be connected according to the Type tag.
- ☐ Never loosen electrical connections or carry out installations, maintenance or repairs while the voltage connection is energised!
- ☐ 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.
- ☐ The braking torque is lost if the friction lining and / or the friction surface come into contact with oil or grease.

### Appointed Use

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!

### Guidelines for Electromagnetic Compatibility (EMC)



In accordance with the EMC directives 89/336/EEC, the individual components produce no emissions. However, functional components e.g. rectifiers, phase demodulators, ROBA®-switch devices or similar controls for mains-side energisation of the brakes 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.

### Device Conditions



The catalogue values are standards which can, in certain cases, vary. 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.

### Please Observe!

- ☐ 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 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.
- ☐ The braking torque is dependent on the present run-in condition of the brakes.
- ☐ Manufacturer-side corrosion protection of the metallic surface is provided.

### Protection Class I

This protection can only be guaranteed if the basic insulation is intact and if all conductive parts are connected to the PE conductor. Should the basic insulation fail, the contact voltage cannot remain (VDE 0580).

### Protection (Mechanical) IP 54:

When installed, protected against dust, contact and splashing water from all directions (dependent on customer-side mounting arrangements).

### Protection (Electrical) IP 54:

Dust-proof and protected against contact as well as against splashing water from all directions.

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

#### Warning!

At temperatures of around or under freezing point, condensation can strongly reduce the torque. During longer downtimes, the friction linings can stick to the friction surfaces.

The user is responsible for taking appropriate countermeasures.

### Thermic Class F (+155 °C)

The magnetic coil and the casting compound are suitable for use up to a maximum operating temperature of +155 °C.

# Installation and Operational Instructions for ROBA-stop<sup>®</sup>-tacho brake Type 83\_.41\_. and ROBA-stop<sup>®</sup>-tacho peak load brake Type 883.41 \_.

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## Safety Regulations

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

### User-implemented Protective Measures:

- ☐ Please cover moving parts to protect against injury through seizure and catapulted objects.
- ☐ Place a cover on the magnetic part to protect against injury through high temperatures.
- ☐ Protect against electric shocks by installing a conductive connection between the magnetic component and the PE conductor on the permanent installation (Protection Class I) and by carrying out a standardised inspection of the continuous PE conductor connection to all contactable metal parts.
- ☐ Protect against highly inductive switch-off peaks by installing varistors, spark quenching units or similar devices according to VDE 0580/2000-07, Paragraph 4.6, to prevent damage to the coil insulations or switch contact consumption in extreme conditions (this protection is contained in *mayr*<sup>®</sup> rectifiers).
- ☐ 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 armature disk and the rotor in high humidity and at low temperatures.

### Regulations, Standards and Directives Used:

98/37/EC	Machine directive
73/23/EEC	Low voltage directive
89/336/EEC	EMC directive
DIN VDE 0580	Electromagnetic devices and components, general directives

### Please Observe the Following Standards:

DIN EN ISO 12100-1 and 2	Machine safety
DIN EN61000-6-4	Noise emission
DIN EN61000-6-2	Interference immunity
EN60204	Electrical machine equipment

### 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*<sup>®</sup> at once!

### Conformity Markings

The product conforms to the CE according to the low voltage directive 73/23/EEC.

### Identification

*mayr*<sup>®</sup> components are clearly marked and described on the Type tag:

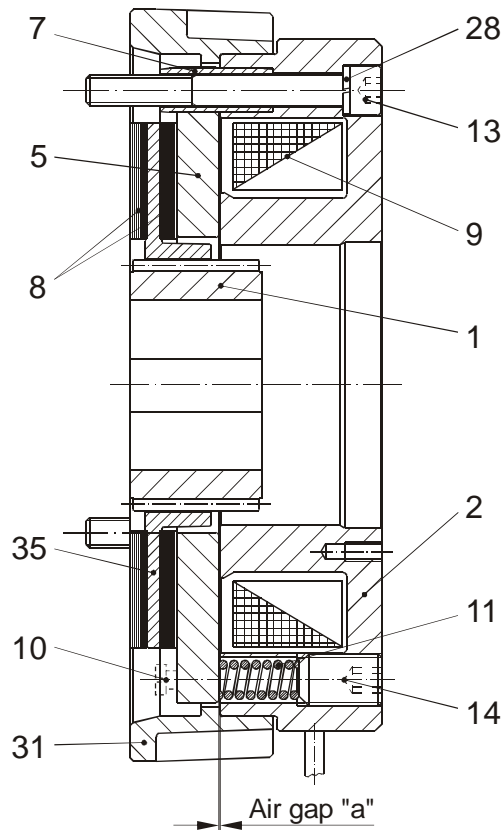
Manufacturer

***mayr*<sup>®</sup>**

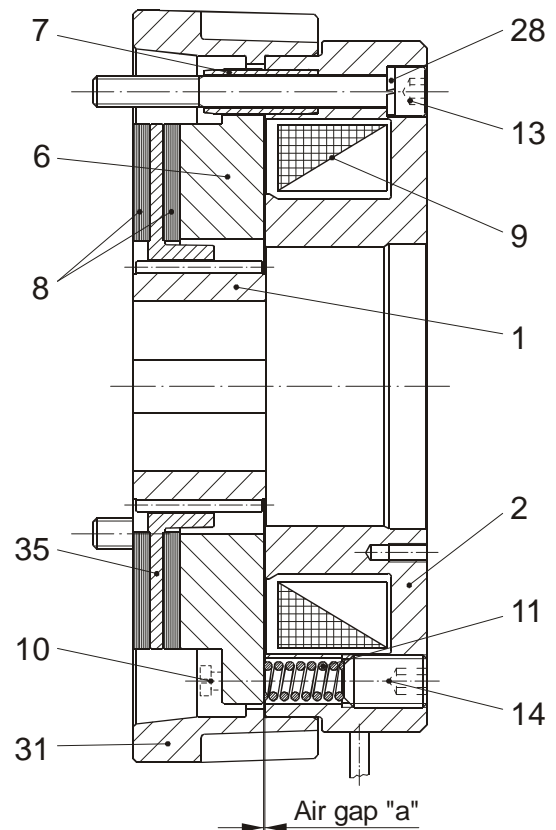
Product name / Type

Article number

Serial number



**Fig. 1: Type 83\_.41\_.**



**Fig. 2: Type 883.41\_.**

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

Item	Name
1	Hub
2	Coil carrier assembly with magnetic coil (9) and guide bushing (7)
5	Armature disk
6	Fast acting shear connector
7	Guide bushing
8	Friction lining
9	Magnetic coil
10	Shoulder screw
11	Thrust spring
13	Fixing screw
14	Set screw
28	Spring ring
31	Distance ring
35	Rotor with friction linings (8)

# Installation and Operational Instructions for ROBA-stop®-tacho brake Type 83.41 and ROBA-stop®-tacho peak load brake Type 883.41

(B.1110.3.GB)

Table 1: Technical Data

Size	3	4	5	6	7	8	9	10	11
Nominal air gap "a" [mm]	0,2	0,2	0,25	0,25	0,35	0,35	0,4	0,4	0,5
Fixing screws (Item 13)	3 x M4	3 x M4	3 x M5	3 x M6	3 x M6	3 x M8	6 x M8	6 x M8	6 x M12
Tightening torque (Item 13) [Nm]	3	3	6	8	8	10	10	10	40
Tightening torque (Item 10) [Nm]	0,5	1,5	1,5	2	3,5	8	8	18,5	30
Rotor thickness new condition (+ 0,05) [mm]	4,95	5,95	7	8,45	11	12,5	15	17	24
Min. rotor thickness after wear [mm]	4,75	5,65	6,55	7,95	10,4	11,85	14,1	15,8	22,7

## Design

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

## Function

ROBA-stop®-tacho brakes or tacho peak load brakes are spring applied, electromagnetic safety brakes.

### Spring applied function (braking):

When the brake is de-energised, the braking torque is produced by the pressure force of several thrust rings (11) via frictional locking between the rotor (35), the armature disk (5/6) and a customer-side flange. The brake is released electromagnetically. The braking torque is transmitted via the rotor (35) to the hub (1) into the drive line.

### Electromagnetic function (release):

Due to the magnetic force of the coil (9) in the coil carrier, the armature disk (5/6) is pulled against the spring force to the coil carrier (2). The brake is released and the rotor (35) with the hub (1) can run free.

### Safety Brakes:

After power switch-off, on power failure or on emergency OFF, the ROBA-stop®-brake brakes reliably and safely.

## State of Delivery

The brake is manufacture-assembled and set to the braking torque shown on the Type tag.

Included loose in delivery:

Hub (1), rotor (35), fixing screws (13) and spring rings (28).

Please check the state of delivery immediately!

mayr® will take no responsibility for belated complaints.

Please report transport damage immediately to the deliverer.

Please report incomplete delivery and obvious defects to the manufacturer.

## Installation Conditions

- ❑ The eccentricity of the shaft end in relation to the fixing hole may not exceed 0,2 mm for sizes 3 to 6, and 0,4 mm for larger brakes.
- ❑ The position tolerance of the tapped holes for the hexagon head screws (13) may not exceed 0,2 mm.
- ❑ The axial run-out deviation of the screw-on surface to the shaft may not exceed the permitted axial run-out tolerance according to DIN 42955. Larger deviations can lead to a drop in torque, to continuous slipping on the rotor (35) and to overheating.
- ❑ Rotors (35) 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 surface are to be avoided.  
Recommended surface quality in the friction surface area:  
Ra = 1,6 µm.  
**Friction surfaces made of grey cast iron are to be rubbed down with fine sandpaper (grain ≈ 400).**
- ❑ The tolerances of the hub (1) and the shaft are to be chosen so that the hub tooting (1) is not widened. Tooting widening leads to the rotor (35) clamping on the hub (1) and therefore to brake malfunctions.  
Recommended hub – shaft tolerance H7/k6.  
The maximum permitted joint temperature of 200 °C may not be exceeded.
- ❑ The brake is centred on the outer diameter of the distance ring (31). The shaft run-out deviation of the centering to the shaft end may be max. 0,03 mm.  
The outer diameter of the distance ring (31) has a tolerance of g7.  
For centering, please choose tolerance H8.  
Please ensure that the tolerance moves easily in order to avoid problems during installation / disassembly.

## Installation (Figs. 1 and 2)

1. Mount the hub (1) onto the shaft, bring into the correct position and secure it axially (e.g. using a locking ring).  
The key should lie over the entire length of the hub.
2. Push the rotor (35) by hand onto the hub (1).  
The rotor collar should face away from the customer flange.  
Please make sure that the tooting moves easily.  
**Do not cause damage.**  
The rotor tooting should lie over the entire length of the hub (1).
3. Screw on the brake using the fixing screws (13) and spring rings (28) onto the customer flange evenly all round with a **tightening torque according to Table 1**.  
The shoulder screws (10), see Figs. 1 and 2, prevent the individual parts from falling apart. They do not affect the brake function and must not be removed during installation.

# Installation and Operational Instructions for ROBA-stop®-tacho brake Type 83\_.41\_. and ROBA-stop®-tacho peak load brake Type 883.41\_.

(B.1110.3.GB)

## Braking Torque Adjustment

ROBA-stop®-tacho brakes or tacho peak load brakes are set manufacturer side to the braking torque specified on order. By turning the set screw (14) to the left, the braking torque is reduced. By turning the set screw to the right, it is increased. During braking torque adjustment, all set screws (14) must be evenly adjusted.



### Please Observe!

Do not confuse the set screws (14) with the locking screws (13)!

If the braking torque has to be appreciably reduced, thrust springs (11) have to be removed. To do this, two springs lying opposite each other should always be taken, to ensure that the armature disk (5/6) remains evenly loaded.

## Brake Inspection (before brake initial operation)

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

The brake torque (Catalogue value) is not reached until after the initial run-in procedure. The braking torque (switching torque) is the torque in the shaft train having an effect on the slipping brake at a sliding speed of 1 m/s with reference to the mean friction radius (acc. DIN VDE 0580/07.2000).

## Replacing Worn Parts

Due to wear on the rotor (35), the air gap between the armature disk (5/6) and the coil carrier (2) increases.

If it can no longer be guaranteed that the magnetic coil (9) in the coil carrier (2) attracts the armature disk (5/6), the rotor (35) must be replaced.

For rotor thickness in new condition and minimum rotor thickness after wear, please see Table 1.

In order to replace the rotor (35), the brake must be screwed off the customer flange.

1. Remove the fixing screws (13).
2. Remove abraded particles using compressed air.
3. Remove the rotor (35) from the hub (1).
4. Inspect the armature disk (5/6) for wear and plan parallelity (on sizes 3 to 7: 0,03 mm; on sizes 8 to 11: 0,05 mm). There must be no heavy scoring.  
Replace the armature disk (5/6) if necessary.

- 4.1. To do this, the shoulder screws (10) must be removed.  
**Please Observe!** In order to avoid sudden relaxation of the thrust springs (11), the armature disk (5/6) must be pressed against the coil carrier (2).  
The armature disk (5/6) can vary according to the brake Type. Please observe the installation position (Fig. 3):

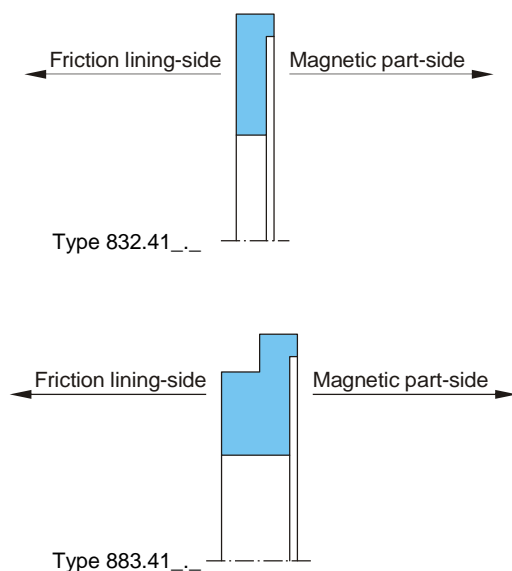


Fig. 3

Please also ensure that no thrust springs (11) fall out.

- 4.2. Lay the new armature disk (5/6) onto the coil carrier (2) or thrust springs (11) (observe the installation position), press the armature disk (5/6) down against the spring force and screw the shoulder screws (10) in up to their limits (observe the tightening torques acc. Table 1).
5. Measure the rotor thickness on the new rotor (35), and compare it to the values given in Table 1.
6. Push the rotor (35) 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 (35), please remove the hub (1) from the shaft and replace it.
7. Screw the brake onto the customer flange using the fixing screws (13) (observe the tightening torque acc. Table 1).



# Installation and Operational Instructions for ROBA-stop®-tacho brake Type 83\_41\_ and ROBA-stop®-tacho peak load brake Type 883.41\_

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## Electrical Connection

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

## Earthing Connection

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

## Device Fuses

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

## Switching Behaviour

The operational behaviour of a brake is to a large extent dependent on the switching mode used. Furthermore, the switching times are influenced by the temperature and the air gap between the armature disk (5/6) and the coil carrier (2) (dependent on the wear condition of the linings).

## Magnetic Field Build-up

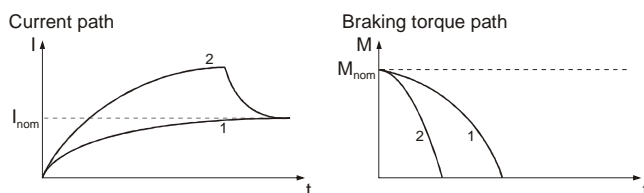
When the voltage is switched on, a magnetic field is built up in the brake coil, which attracts the armature disk (5/6) to the coil carrier (2) and releases the brake.

## Field Build-up with Normal Excitation

If we energise the magnetic coil (9) with nominal voltage, the coil voltage does not immediately reach its nominal value. The coil inductivity causes the current to rise slowly as an exponential function. Accordingly, the build-up of the magnetic field happens more slowly and the braking torque drop (curve 1) is also delayed.

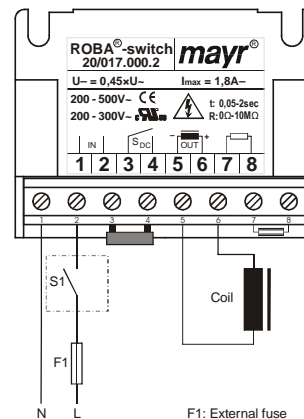
## Field Build-up with Overexcitation

A quicker and safer drop in braking torque is achieved if the coil is temporarily placed under a higher voltage than the nominal voltage, as the current then increases more quickly. Once the brake is released, it is possible to switch to the nominal voltage (curve 2). The relationship between the overexcitation and the switching time is roughly proportional at up to four times the nominal voltage: this means that at doubled nominal voltage, the switching time for brake release is halved. The effective capacity may however not be larger than the nominal capacity of the coil. The ROBA®-switch fast acting rectifier and the phase demodulator work on this principle.



## Magnetic Field Removal

### AC-side switching

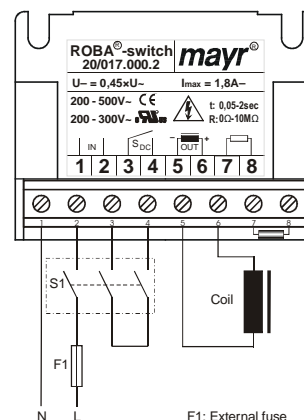


The power circuit is interrupted before the rectifier. The magnetic field slowly reduces. This delays the rise in braking torque.

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

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

### DC-side switching



The power circuit is interrupted between the rectifier and the coil as well as mains-side. The magnetic field is removed very rapidly, resulting in a rapid 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.

→ short brake engagement (e.g. for emergency OFF); however, louder switching noises

## Protective Circuit

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

# Installation and Operational Instructions for ROBA-stop®-tacho brake Type 83.41.\_. and ROBA-stop®-tacho peak load brake Type 883.41.\_.

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## Installation Terminal Box (Figs. 4 and 5)

Base plate (44) optionally fitted with:

1. Terminal 2-pole
2. Terminal 4-pole
3. Terminal 6-pole
4. Half-wave rectifier
5. Bridge rectifier

### Parts List Terminal Box

- 37 Holding bracket
- 38 Cap screw M3 x 12
- 39 Terminal box - base
- 40 O-ring
- 41 Sealing plate
- 42 Hexagon nut M3
- 43 Cable gland
- 44 Base plate
- 45 Countersunk screw M4 x 8
- 46 Terminal
- 47 Terminal description
- 48 Cap screw M2,5 x 12
- 49 Cap screw M4 x 8
- 50 Terminal box lid
- 51 Sealing ring
- 52 Cap screw M4 x 30
- 53 Sealing washer

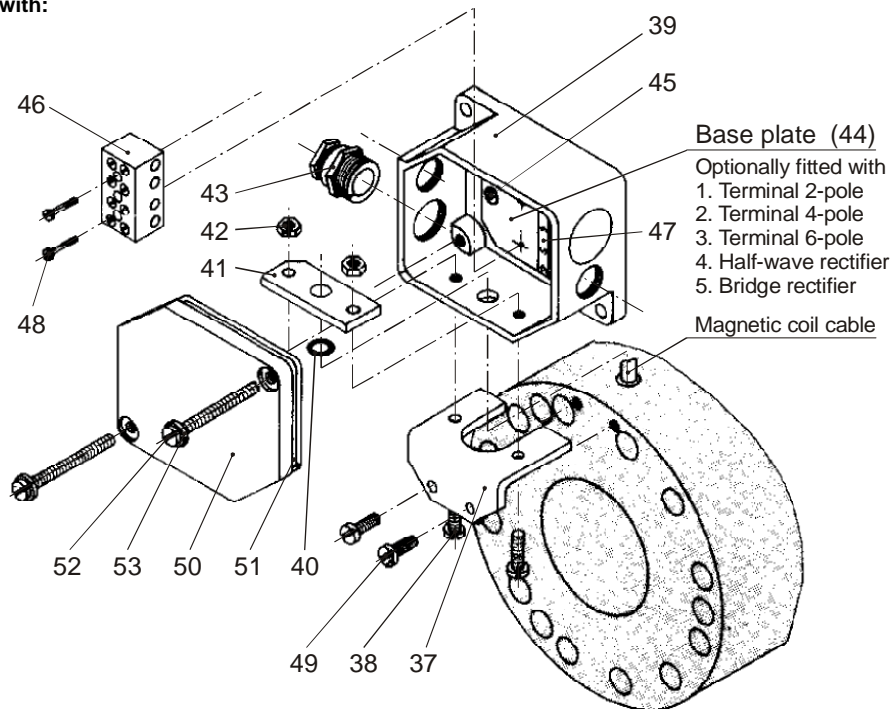


Fig. 4

### Terminal Box Installation

(Parts 37 to 43 on the Parts List are partly assembled):

- 1.a Screw the rectifier into the terminal box base (39) or
- 1.b Screw the base plate (44) into the terminal box base (39) with the countersunk screws (45). Mount 2, 4 or 6-pole terminals (46) using cap screws (48) onto the base plate (44). Adhere the terminal description (47) to the base plate (44). Please observe the position of the terminal description acc. Fig.5.
2. Shorten and insulate the brake coil cable to suit requirements. Insert the cable through parts 39, 40 and 41 in the terminal box.
3. Screw the holding bracket (37) with the cap screws (49) to the rear side of the brake.
4. Re-tighten the brake coil cable, tighten the hexagon nut (42).
5. Connect the brake according to the "Installation and Operational Instructions B.1110.4.GB for ROBA-stop®-brakes / electrical connection".
6. Close the terminal box. Be careful with the sealing ring (51) and sealing washer (53).

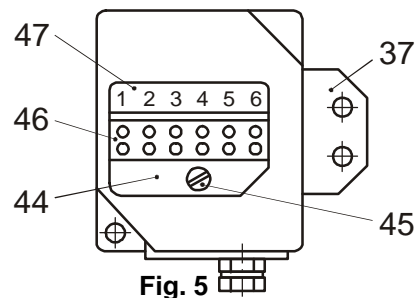


Fig. 5



# Installation and Operational Instructions for ROBA-stop®-tacho brake Type 83\_.41\_. and ROBA-stop®-tacho peak load brake Type 883.41 \_.

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## Hand Release Installation

Hand release installation takes place according to an extra Installation and Operational Instruction Sheet B.1110.5.GB.

## Maintenance

The rotor (35) is robust and wear-resistant. This ensures a particularly long service lifetime. However, the gear hub (1), the armature disk (5/6) and the rotor (35) with the friction linings (8) are all subject to functional wear, and must be regularly inspected and replaced if necessary. For this, please see section "Replacing Worn Parts".

## Disposal

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

### Electronic components

(Rectifier / ROBA®-switch / Microswitch):

Products which have not been dismantled can be disposed of under the Code No. 160214 (Mixed Materials) or Components under Code No. 160216; or the objects can be disposed of by a certified waste disposal firm.

### Brake bodies made of steel girders with coil / cable and all other steel components:

Steel scrap (Code No. 160117)

### Aluminium components:

Non-ferrous metals (Code No. 160118)

### Brake rotors (steel or aluminium girders with friction linings):

Brake linings (Code No. 160112)

### Seals, O-rings, V-seals, elastomere, terminal boxes (PVC):

Plastics (Code No. 160119)

## Malfunctions / Breakdowns:

Malfunction	Possible Causes	Solutions
Brake does not release	<input type="checkbox"/> Incorrect voltage on rectifier <input type="checkbox"/> Rectifier failure <input type="checkbox"/> Air gap too large (worn rotor) <input type="checkbox"/> Air gap too large (metal particles between the armature disk and the coil carrier) <input type="checkbox"/> Interrupted coil <input type="checkbox"/> Overheated brake	<input type="checkbox"/> Apply correct voltage <input type="checkbox"/> Replace rectifier <input type="checkbox"/> Replace rotor <input type="checkbox"/> Clean brake  <input type="checkbox"/> Replace brake <input type="checkbox"/> Use a fast acting rectifier
Motor does not brake	<input type="checkbox"/> Incorrectly adjusted hand release <input type="checkbox"/> Hand release backlash; (possible with decreased torque or operation with fast acting rectifier)	<input type="checkbox"/> Align the distance <input type="checkbox"/> Replace rotor
Delayed brake engagement	<input type="checkbox"/> Brake is switched AC-side	<input type="checkbox"/> Switch DC-side