

# Installation and Operational Instructions for ROBATIC<sup>®</sup>-clutch Type 500.30\_.0 Sizes 3 – 7 (double-flow)

(B.5.5.GB)

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

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

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## Declaration of Conformity

A conformity evaluation for the applicable EU directives has been carried out for this product.

The conformity evaluation is set out in writing in a separate document and can be requested if required.

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 all applicable EU directives.

Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion.

This statement is based on the ATEX directive.

## 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).

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## 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 clutch is used incorrectly.
- the electromagnetic clutch is 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 clutches have been developed in accordance with the latest technology regulations and are, at the point of delivery, operationally safe.

### Please Observe!

- Only specialists who are trained in the 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 torque is lost if the friction linings come into contact with oil or grease.

### Appointed Use

ROBATIC®-clutches 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 for mains-side energisation of the clutches, e.g. 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.

### Device Conditions



#### Please Observe!

The catalogue values are standards which can, in certain cases, vary. When dimensioning the clutches, please remember that installation situations, torque fluctuations, permitted friction work, run-in behaviour and wear as well as general ambient conditions can all affect the given values. These factors should therefore be carefully assessed, and alignments made accordingly.

### Please Observe!

- Mounting dimensions and connecting dimensions must be adjusted according to the size of the clutch at the place of installation.
- The clutches are designed for a relative duty cycle of 100 %.
- The clutches 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 torque is dependent on the present run-in condition of the clutches.
- 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 on the permanent installation. Should the basic insulation fail, the contact voltage cannot remain (VDE 0580).

### Protection (electrical) IP 54:

Dust-proof and protected against contact as well as against splashing water from all directions.  
Valid for coil, casting compound and connection strands.

### 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 surfaces can stick. The user is responsible for taking appropriate counter measures.

### Insulation Material Class F (+155 °C)

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

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## Safety Regulations

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### 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*® rectifiers).
- The connection cable or connection strands on the clutches have a sheathing, which is not resistant against all materials. On contact with chemical materials, please check for compatibility.
- 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:

DIN VDE 0580	Electromagnetic devices and components, general directives
2006/95/EC	Low voltage directive
98/37/EC	Machine directive
89/336/EEC	EMC directive

### Please Observe the Following Standards:

DIN EN ISO	
12100-1 and 2	Machine safety
DIN EN 61000-6-4	Noise emission
DIN EN 61000-6-2	Interference immunity
EN 60204	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 clutches are not valid.
- Liability for damage and operational malfunctions will not be taken if
  - the Installation and Operational Instructions are ignored or neglected.
  - the clutches are used inappropriately.
  - the clutches are modified.
  - the clutches are worked on unprofessionally.
  - the clutches are handled or operated incorrectly.

### Guarantee

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

### Conformity Markings

The product conforms to the CE according to the low voltage directive 2006/95/EC.

### Identification

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

Manufacturer

***mayr*®**

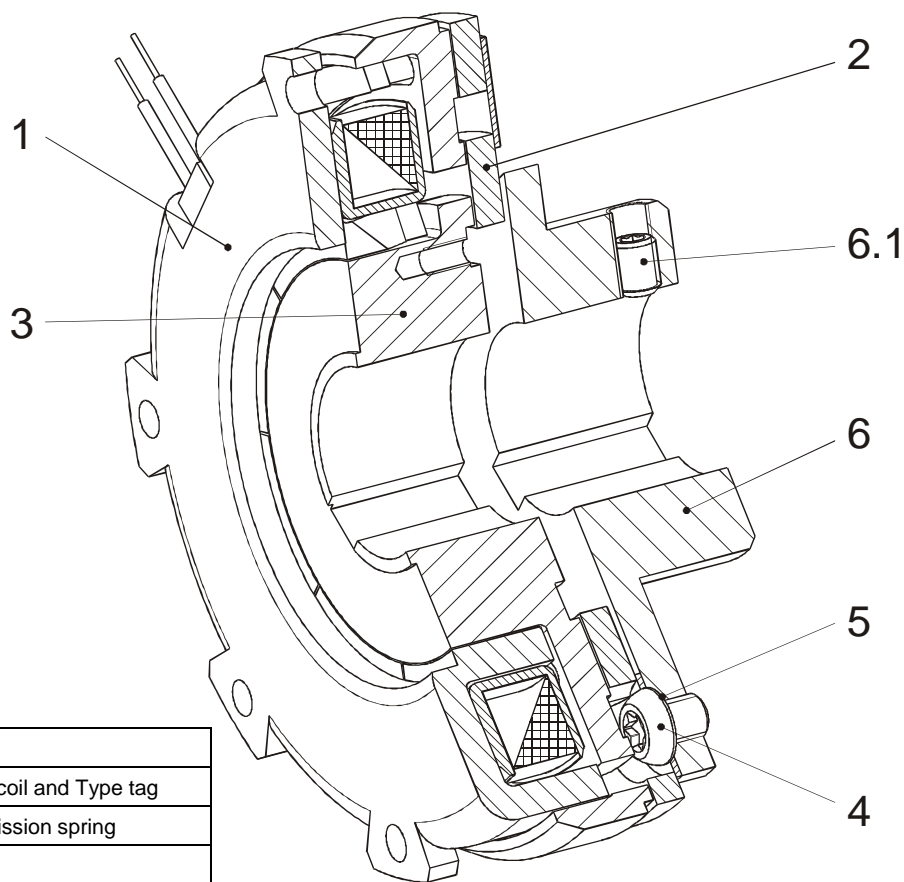
Name / Type

Article number

Serial number

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## Parts List

(Only use mayr® original parts)

Item	Name
1	Coil carrier assembly with magnetic coil and Type tag
2	Armature disk assembly incl. transmission spring
3	Rotor
4	Flat headed screw with Torx
5	Spring washer
6	Flange hub (dependent on Type)
6.1	Set screw (dependent on Type)

Fig. 1

Table 1: Technical Data

	Size	3	4	5	6	7
Torque before run-in	[Nm]	ca. 6	ca. 20	ca. 45	ca. 80	ca. 160
Nominal torque $M_2$ <sup>1)</sup> , once run in (+50 % / -12 %)	[Nm]	20	40	90	160	320
Maximum bore $d_{max}$ in rotor (3)	[mm]	25	35	42	55	65
Air gap "a" (Figs. 3 / 4)	[mm]	0,2 <sup>+0,1</sup> <sub>-0,05</sub>	0,2 <sup>+0,15</sup> <sub>-0,05</sub>	0,2 <sup>+0,15</sup> <sub>-0,05</sub>	0,3 <sup>+0,15</sup> <sub>-0,05</sub>	0,3 <sup>+0,15</sup> <sub>-0,05</sub>
Max. air gap "a" (Fig. 3 / 4)	[mm]	0,6	0,8	1,0	1,2	1,5
Max. permitted centre offset "V" (Figs. 5 / 6)	[mm]	0,05	0,05	0,05	0,05	0,1
Max. permitted centre offset "V <sub>1</sub> " (Figs. 5 / 6)	[mm]	0,1	0,15	0,15	0,15	0,2
Diameter "H" (Fig. 5)	[mm]	80 h9	100 h9	125 h9	150 h9	190 h9
Diameter "Z" (Fig. 5)	[mm]	42 H8	52 H8	62 H8	80 H8	100 H8
Dimension "z" (Fig. 6)	[mm]	3,5	4,5	5	6	6
Tightening torque, flat headed screws (4)	[Nm]	4,3	8,5	14,9	36	36
Tightening torque, fixing screws <sup>2)</sup> for coil carrier	[Nm]	2,9	5,7	9,9	9,9	24

<sup>1)</sup> Please observe run-in specifications and minimum speed acc. Table 2.

<sup>2)</sup> Not included in standard delivery.

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## State of Delivery

Please check the state of delivery immediately according to the Parts List!

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.

## Function

ROBATIC®-clutch devices are energised to engage, electromagnetic pole face clutches. By applying DC voltage to the magnetic coil in the coil carrier (1), a magnetic field is built up. This pulls the armature disk (2) against the rotor (3). The torque is transmitted via frictional locking.



### Please Observe!

In new condition, torque transmission first takes place via the metal outer pole on the rotor (3) and, after a short operation period, then additionally via the inner pole. After the entire run-in procedure, even friction occurs on the metal poles.

## Torque Characteristics

**In new condition, c. 50 % of the catalogue nominal torque ( $M_2$ ) is transmitted.**

In order to reach the nominal torque, the clutch must be run in.

## Run-in Conditions

- Apply a voltage 1/3 of  $U_{Nom}$ .
- 3 minutes of continuous slipping against a blocked drive.

Speed for	Size 3:	60 rpm
	Size 4:	50 rpm
	Size 5:	40 rpm
	Size 6:	30 rpm
	Size 7:	25 rpm



### Please Observe!

Only carry out the torque inspection in static operation with nominal energisation – no slipping (danger of scoring)

When there is constant synchronisation below the parameters in Table 2, the torque can drop c. 50 to 60 % of the nominal torque.

## Design

ROBATIC®-clutches have Electrical Protection IP 54 and Insulation Class F (up to 155 °C) for coil, casting compound and connection strands. At 100 % duty cycle, the coil has a temperature of c. 65 °C.

The surfaces on the coil carrier (1), rotor (3) and the flange hub (6) are phosphated, the armature disk (2) is gas nitro-carburized (friction surfaces are ground), and the transmission spring is made of stainless steel.

The clutch rotor (3) is pilot bored or finish bored with a keyway acc. DIN 6885. When the rotor bore and keyway are produced customer-side, the Guidelines on page 6 of the Installation and Operational Instructions, "Boring the Rotor Hub" must be followed!

## Explanation of Terms

The **nominal torque  $M_2$**  is the largest transmittable torque (after run-in has been completed), with which the closed clutch can be loaded without slipping occurring.

The **relative duty cycle** is the ratio of duty cycle to backlash duration in percent (% duty cycle).

Table 2

Size	Friction work $Q_a$ [J]	Clutch speed $n_{min}$ [rpm]
3	16	300
4	29	250
5	55	200
6	105	160
7	200	130

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## Installation Example 1 (Fig. 3)

Please Observe: Items 7 to 10 are customer-side mounting components, which are not included in delivery.

In operation, the armature disk (2) is pulled against the rotor (3). The torque is transmitted via frictional locking from the drive shaft (8) via the rotor (3) and the armature disk (2) onto the V-belt disk (7).

The coil carrier (1) is screwed onto the machine wall, centred onto the shaft bearing (9).

The air gap "a" between the rotor (3) and the armature disk (2) is defined via the distance ring (10) between the rotor (3) and the V-belt disk (7) bearing.

The V-belt disk (7) should be made from a material which is a poor magnetic conductor, in order to prevent magnetic loss due to leaking flux and therefore loss of force.

## Installation Example 2 (Fig. 4)

Electromagnetic clutch with flange hub (6) for the connection of two aligning shafts.

### Torque Procedure:

Input shaft – rotor (3) – armature disk (2) – flange hub (6) – output shaft.

The coil carrier (1) and the rotor (3) are mounted input-side, the flange hub (6) with the screwed-on armature disk (2) is mounted onto the output shaft.

Axial securement of the rotor (3) takes place via a press cover and a screw, screwed into the central shaft thread. A set screw (6.1) secures the flange hub (6) onto the output shaft. For adjustment of air gap "a" between the rotor (3) and the armature disk (2), the set screw (6.1) is loosened and the flange hub (6) is moved onto the output shaft.

## Boring the Rotor Hub (Fig. 2)

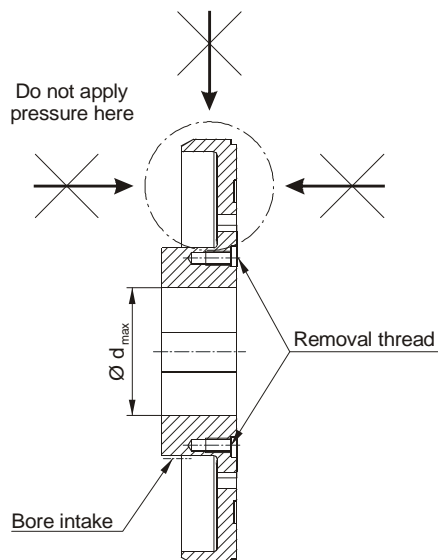


Fig. 2

The rotor (3) must not be bent during boring. Do not place pressure on the outer, thin-walled rotor area, see Fig. 2.

To bore, clamp on the rotor hub.

The maximum permitted bore diameter  $d_{max.1}$  acc. Table 1, must not be exceeded. The keyway is produced acc. DIN 6885/1.

We recommend H7/k6 as a suitable hub-shaft tolerance.

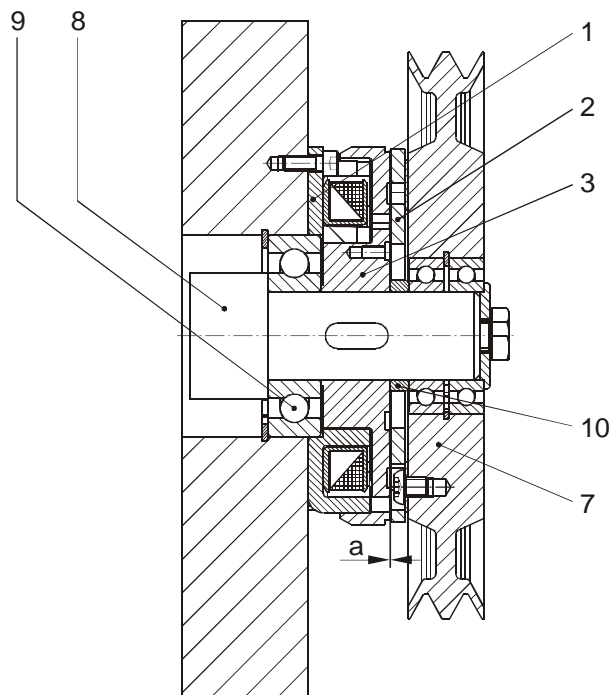


Fig. 3

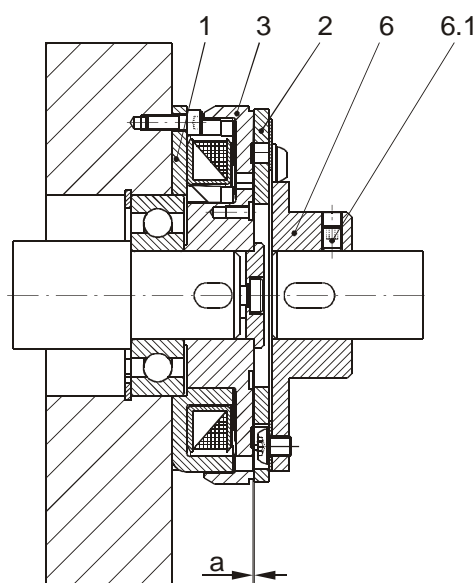


Fig. 4

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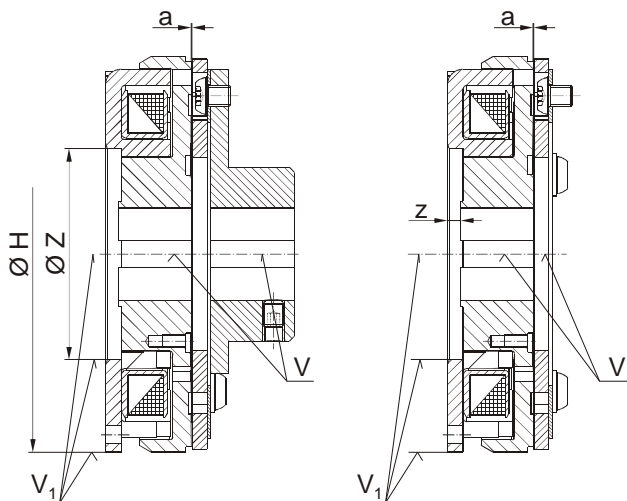


Fig. 5

Fig. 6

## Installation

### 1. Mounting the Coil Carrier (1):

Screw the coil carrier (1) onto the machine wall (please observe the tightening torque acc. Table 1).

- Centred by a ball bearing (9), Figs. 3/4.
- Centred on diameter "Z", Fig. 5 and Table 1.
- Centred on outer diameter "H", Fig. 5.

The maximum permitted centre offset "V<sub>1</sub>" acc. Table 1 must not be exceeded (Figs. 5 and 6).

### 2. Installation of the Rotor (3):

The rotor (3) is mounted onto the shaft using a suitable mounting device.

#### Please Observe:

- Do not place pressure on the outer area of the rotor (3) (Fig. 2).
- Do not mount by hitting with a hammer.
- Keep to dimension "z", Table 1 and Fig. 6.

The rotor (3) must be kept grease-free.

The rotor (3) must be secured axially in operation, see Installation Examples Figs. 3 and 4.

Axial backlash can lead to the rotor (3) rubbing against the armature disk (2) or the coil carrier (1).

### 3. Installation of the Armature Disk (2):

- 3.1. Align the armature disk (2) on the mounting part or on the flange hub (max. permitted radial run-out 0,15 mm).
- 3.2. Lay the spring washers (5) under the flat headed screws (4) and secure the screws with Loctite 243.
- 3.3. Mount the armature disk (2) onto the mounting part or onto the flange hub (6) (observe the tightening torque acc. Table 1).

#### Please Observe:

The armature disk (2) must be kept grease-free.

### 4. Installation of the Mounting Part or the Flange Hub (6):

- 4.1. Adjust the air gap "a" according to Table 1 and Figs. 3/4.
- 4.2. Secure the mounting part or flange hub (6) axially backlash-free.  
Axial backlash changes the air gap "a" and can lead to the rotor (3) rubbing against the armature disk (2) (see Installation Examples Figs. 3 and 4).  
Please observe the maximum permitted centre offset "V" according to Table 1 and Figs. 5 or 6.

## Rotor De-installation (Fig. 2 / Page 6)

In order to remove the rotor (3) from the shaft, there are threaded holes in the rotor hub.  
Do not place pressure on the outer, thin-walled rotor area (3).

## Electrical Connection

The clutch coil is connected to DC voltage.  
The voltage value is shown on the Type tag.

## Maintenance and Inspection

Please inspect the air gap "a" and the permitted centre offsets "V" and "V<sub>1</sub>" according to Table 1 at regular intervals.  
Bearing backlash and wear on the friction surfaces alter the permitted Table values. Apart from this, ROBATIC<sup>®</sup>-electromagnetic clutches are maintenance-free.

## Disposal

Our electromagnetic clutch 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<sup>®</sup>-switch):

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.

### Coil carriers (coil carriers with coil and strands) and all other steel components:

Steel scrap

(Code No. 160117)

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## Malfunctions / Breakdowns:

Malfunction	Possible Causes	Solutions
Clutch does not switch	<ul style="list-style-type: none"><li><input type="checkbox"/> Incorrect voltage applied</li><li><input type="checkbox"/> Rectifier failure</li><li><input type="checkbox"/> Air gap too large</li><li><input type="checkbox"/> Interrupted coil</li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/> Apply correct voltage</li><li><input type="checkbox"/> Replace rectifier</li><li><input type="checkbox"/> Re-adjust air gap</li><li><input type="checkbox"/> Replace clutch</li></ul>
Clutch does not couple	<ul style="list-style-type: none"><li><input type="checkbox"/> Grease and / or oil on the friction surfaces</li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/> De-grease friction surfaces / run in clutch again</li></ul>