

# Installation and Operational Instructions for ROBA<sup>®</sup>-takt clutch brake unit with 'energise to engage' brake Type 67\_0\_\_

(B.6.1.GB)

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

Ignoring these Instructions may lead to malfunctions or to failure of the clutch brake unit, resulting in damage to other parts.  
These Installation and Operational Instructions (I + O) are part of the clutch brake unit delivery.  
Please keep them handy and near to the clutch brake unit at all times.

### Contents:

- Page 1:** - Contents  
- Safety and Guideline Signs  
- Guidelines on the Declaration of Conformity
- Page 2:** - Safety Regulations
- Page 3:** - Safety Regulations
- Page 4:** - Clutch Illustration  
- Parts List  
- Design  
- Function  
- Ambient Conditions  
- Torque
- Page 5:** - Electrical Connection  
- Installation
- Page 6:** - Permitted Shaft Load  
- Disposal

### 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.



Guidelines on important points.



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



#### Guidelines on the Declaration of Conformity

A conformity evaluation has been carried out for the product in terms of the EC Low Voltage Directive 2006/95/EC. The declaration of conformity is set out in writing in a separate document and can be requested if required.

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

The product cannot be operated independently in terms of the EMC directive.

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

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

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

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

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

The product can fulfil the specifications for safety-related applications in connection with other elements.

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

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

#### Guidelines on the ATEX Directive

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

For application of this product in areas where there is a high danger of explosion, it must be classified and marked according to directive 94/9/EC.

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## Safety Regulations

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

### General Guidelines

#### DANGER



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

The clutch brake units may generate further risks, among other things:



Hand injuries



Danger of seizure



Contact with hot



Magnetic fields

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

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

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

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



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

The clutch brake units have been developed and produced according to the known technical specifications and are operationally safe at the time of delivery.

- Technical data and specifications (Type tags and documentation) must be followed.
- The correct connection voltage must be connected according to the Type tag.
- Check electrical components for signs of damage before putting them into operation. Never bring them into contact with water or other fluids.
- Please observe the EN 60204-1 requirements for electrical connection when using in machines.



Only carry out installation, maintenance and repairs in a de-energised, released state and secure the system against inadvertent switch-on.

### Guidelines for Electromagnetic Compatibility (EMC)

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

### Appointed Use

mayr<sup>®</sup>-clutch brake units 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<sup>®</sup> clutch brake units 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!

### Application Conditions



The catalogue values are guideline values, which can vary in certain cases. When dimensioning the clutch brake units, 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 connecting dimensions must be adjusted according to the size of the clutch brake unit at the place of installation.
- The magnetic coils are designed for a relative duty cycle of 100 %.
- The braking torque is dependent on the present run-in condition of the brakes.
- The clutch brake units are only designed for dry running. The torque is lost if the friction surfaces come into contact with oil, grease, water or similar substances or foreign bodies.
- The surfaces of the outer components have been zinc phosphated manufacturer-side to form a basic corrosion protection.

#### CAUTION



The rotors may rust up and seize up in corrosive ambient conditions and/or after long periods of storage.  
The user is responsible for taking appropriate counter measures.

### Ambient Temperature -20 °C up to +35 °C

#### CAUTION



At temperatures of around or under freezing point, condensation can strongly reduce the torque, or the rotors can freeze up.  
The user is responsible for taking appropriate counter measures.

### Earthing Connection

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

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

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

### Protection IP55

Dust-proof and protected against contact as well as against jet water from a nozzle coming from all directions.

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## Safety Regulations

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

### Clutch Brake Unit Storage

- Store the clutch brake units in a horizontal position, in dry rooms and dust and vibration-free.
- Relative air humidity < 50 %.
- Temperature without major fluctuations within a range from -20 ° up to +60 °C.
- Do not store in direct sunlight or UV light.
- Do not store aggressive, corrosive substances (solvents / acids / lyes / salts etc.) near to the brakes.

For longer periods of storage of more than 2 years, special measures are required (please contact the manufacturer).

### Handling

**Before installation**, the clutch brake unit must be inspected and found to be in proper condition.

The clutch brake unit function must be inspected both **once installation has taken place** as well as **after longer system downtimes**, in order to prevent the drive starting up against possibly seized linings.

### User-implemented Protective Measures:

- Please cover moving parts to protect **against injury through seizure**.
- Place a cover on the housing to protect **against injury through high temperatures**.
- Protective circuit:** When using DC-side switching, the coil must be protected by a suitable protective circuit according to VDE 0580, which is integrated in *mayr*<sup>®</sup>-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 protective circuits (e.g. *mayr*<sup>®</sup> 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 clutch brake unit is subject to extreme ambient conditions or is installed in open air conditions, unprotected from the weather.
- Take precautions **against freeze-up of the friction surfaces** in high humidity and at low temperatures.

### Regulations, Standards and Directives Used:

DIN VDE 0580	Electromagnetic devices and components, general directives
2006/95/EC	Low voltage directive
EN ISO 12100	Safety of machinery – General principles - Risk assessment and risk reduction
DIN EN 61000-6-4	Interference emission
DIN EN 61000-6-2	Interference immunity
EN 60204-1	Electrical machine equipment

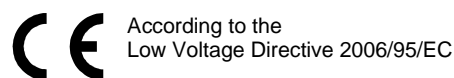
### Liability

- The information, guidelines and technical data in these documents were up to date at the time of printing. Demands on previously delivered clutch brake units are not valid.
- Liability for damage and operational malfunctions will not be taken if
  - the Installation and Operational Instructions are ignored or neglected.
  - the clutch brake units are used inappropriately.
  - the clutch brake units are modified.
  - the clutch brake units are worked on unprofessionally.
  - the clutch brake units 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!

### CE Identification



### Identification

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

Manufacturer

*mayr*<sup>®</sup>

Name/Type

Article number

Serial number

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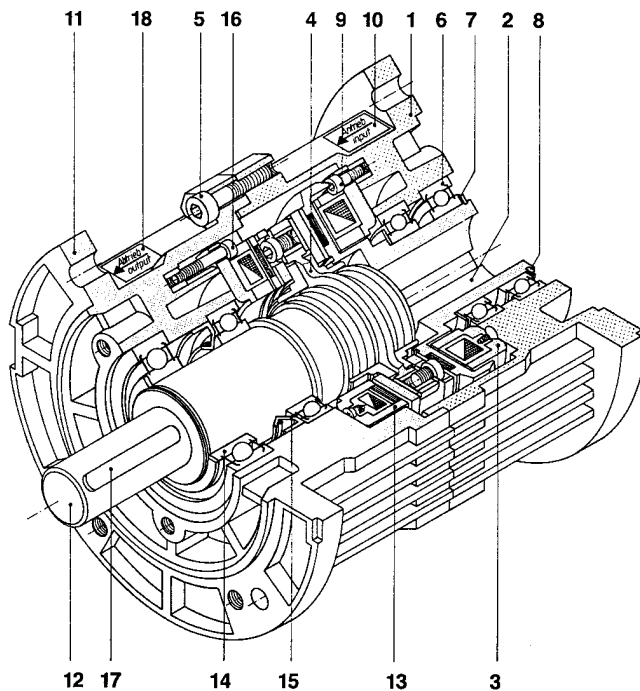


Fig. 1

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

1	Housing "Input"
2	Drive shaft
3	Coil carrier, clutch
4	Automatic re-adjustment
5	Cap screw
6	Deep groove ball bearing
7	Shim rings
8	Locking ring
9	Cap screw
10	Guideline sign, input
11	Housing "Output"
12	Output shaft
13	Coil carrier, brake
14	Deep groove ball bearing
15	Radial shaft sealing ring (depending on the design)
16	Cap screw
17	Key
18	Guideline sign, output

## Design

The ROBA®-takt clutch brake unit consists of an 'energise to engage' clutch and an 'energise to engage' brake. The electrical connection is produced via a terminal box with a 4-pole terminal. The clutch brake unit is completely enclosed and corresponds to Protection Class IP 55, the dimensions of the flanges and shafts correspond to the IEC dimensions.

Due to the patented principle of automatic re-adjustment, the ROBA®-takt clutch brake unit is maintenance-free for the entire service lifetime of the clutch and brake.

The clutch brake unit is delivered assembled and set ready for installation.

## Function

On continuously running drive machines, the output is coupled and braked alternately.

### Coupling:

The magnetic coil in the clutch is energised, the magnetic coil in the brake must be voltage-free. The rotating drive shaft (2) attracts the armature disk. The torque is transmitted from the drive shaft (2) via the armature disk onto the output shaft (12) using frictional locking.

### Braking:

The brake coil is energised, the clutch coil must be voltage-free. The armature disk is attracted by the fixed brake coil carrier (13). The output shaft (12), which is connected with the armature disk via disks, is braked. The drive shaft (12) runs continuously.

## Ambient Conditions

- ROBA®-takt clutch brake units are designed for **dry running**.
- Ambient temperature: **-20 °C up to +35 °C**

### CAUTION



At temperatures of around or under freezing point (**ambient temperature -20 °C up to +5 °C**), 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 counter measures.

An ambient temperature of +35 °C should not be exceeded if the device is run with friction work in the area of the max. permitted values.

### CAUTION



Higher temperatures lead to unpermitted heat-up with friction work in the limit area.

With low friction work values, the ambient temperature can be +70 °C.

## Torque

The torque (catalogue value) is not achieved until after the run-in procedure has been carried out. Normally, this requires approx. 100 switching actions in dynamic operation. In new condition, approx. 50 % of the torque stated in the catalogue ( $M_2$ ) are transmitted. Clutch brake units in static or virtually static operation (i.e. low friction work) do not transmit the full torque stated in the catalogue ( $M_2$ ).

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## Electrical Connection

The electrical connection of the clutch and brake coil is produced in the standard series via a 4-pole terminal, which is installed in a terminal box.

When wiring the clutch brake unit, please make sure that the clutch and brake are not energised at the same time.

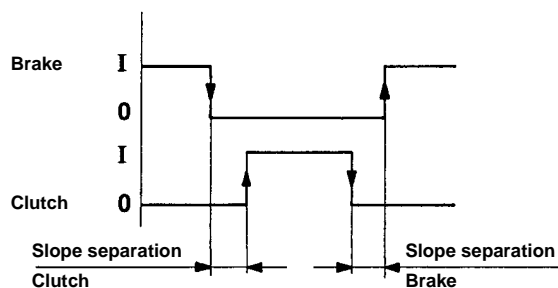
Both coils can be energised either directly via a present source of DC voltage while observing the required slope separation, or by using a ROBA<sup>®</sup>-takt control unit or ROBA<sup>®</sup>-takt circuit module.

The ROBA<sup>®</sup>-takt control unit and the ROBA<sup>®</sup>-takt circuit module are supply and control devices for quick switching of the clutch and brake coils:

- The ROBA<sup>®</sup>-takt control unit is mains connection-side (230 VAC) and offers adjustable slope separation between the clutch and the brake as well the possibility to switch the 24V coils quickly via overexcitation.
- The ROBA<sup>®</sup>-takt circuit module does not have an overexcitation function and requires a coil voltage of 24 VDC supply-side.

Both Wiring Diagrams and Installation and Operational Instructions are part of the device delivery.

The following sequence must be observed for the electrical control:



The slope separation prevents the simultaneous occurrence of clutch and brake torques.

Fig. 2

ROBA <sup>®</sup> -takt	Size	3	4	5	6	7
Slope separation with overexcitation	[ms]	20	25	30	80	120
Slope separation without overexcitation	[ms]	0	0	15	50	80

Table 1

When electromagnetic devices are switched off, switch-off peaks may occur. These can lead to destruction of the device and must therefore be damped. The damping might cause the connection times stated in the catalogue to deteriorate. Ensure that the voltage supply maintains the current values.

## Installation

### Clutch Brake Unit with Flange:

The shafts, centring, screw-on pitch circles and flange diameters are produced acc. IEC standard.

The input and output sides can be screwed together with the respective flanges of the motor, the gearbox or other clutch brake units without any problems, see Fig. 3.

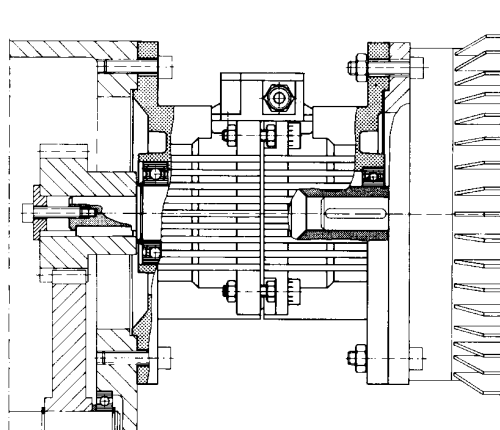


Fig. 3

### Installation of the Input Elements:

The input elements are mounted onto the shaft and secured axially. Axial securement takes place using a press cover and a screw, screwed into the shaft threaded centre hole, see Fig. 4.

On the pairing motor shaft-ROBA<sup>®</sup>-takt hollow shaft, the motor shaft must be lightly greased to protect against fretting corrosion (copper paste is recommended).

Pressing the input elements or mounting via hammer blows are not permitted, as the shaft bearings might be damaged.

The radial forces occurring on the input element must not exceed the permitted values (see chapter "Permitted Shaft Load").

If both radial and axial forces occur simultaneously, the permitted values for both forces must be determined in each case (please contact the manufacturers).

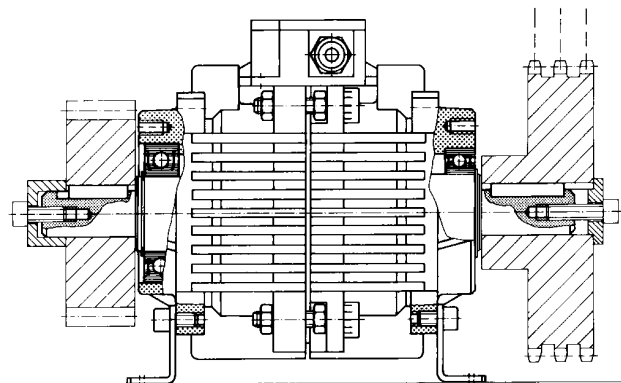


Fig. 4



# Installation and Operational Instructions for ROBA®-takt clutch brake unit with 'energise to engage' brake Type 67\_0\_.\_.

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## Permitted Shaft Load

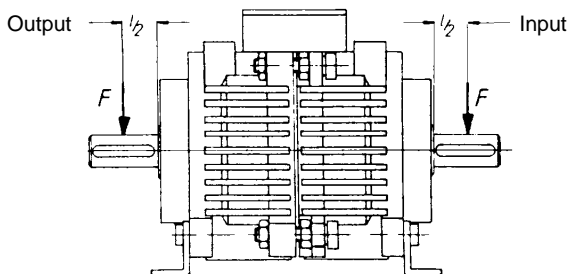


Fig. 5

During operation, the input elements on the shafts produce a radial force, which must be absorbed by the clutch brake unit bearings.

The force value is limited by the required bearing service lifetime and by the shaft strength, see Table 2.

For determining the permitted radial force, the force is assumed to apply in the centre of the shaft. If additional axial forces occur, extensive calculation is necessary (please contact the manufacturers).

In Table 3, the permitted radial forces are stated for a speed of  $n = 1500$  rpm and a bearing service lifetime of  $L_h = 10.000$  hours.

For different speed or bearing service lifetime values, the permitted force  $F$  can be calculated using the factor  $k$ . The factor  $k$  can be determined using Diagram 1.

$F = k \times F_N \leq F_{max}$ [N]	
$F$ [N] = Permitted radial force	
$k$ [-] = Correction factor	Diagram 1
$F_N$ [N] = Permitted radial force at speed $n = 1500$ rpm and bearing service lifetime $L_h = 10.000$ h	Table 3
$F_{max}$ [N] = Max. permitted radial force limited by the shaft strength	Table 2

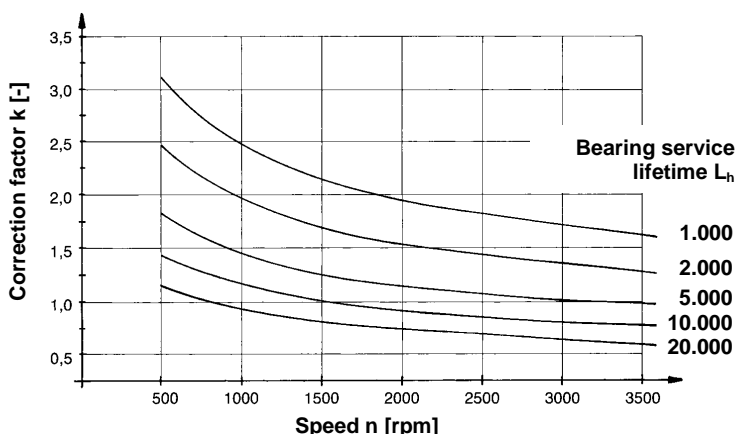


Diagram 1

## Disposal

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

### Electronic Components (Limit switch / ROBA-switch):

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.

### Coil carriers (steel pads with coil / cable) and all other steel components:

Steel scrap (Code No. 160117)

### Brake and clutch rotors (steel pads with friction linings):

Brake linings (Code No. 160112)

ROBA®-takt	Size	3	4	5	6	7
Max. permitted radial force $F_{max}$ [N]	Input flange without IEC flange	333	995	2150	2705	5355
	Output flange without IEC flange	333	1105	2331	2950	6211
	Output flange small IEC flange	-	-	-	-	-
	Output flange large IEC flange	333	1105	2331	2950	6211

Table 2: Max. permitted radial force  $F_{max}$  limited by the shaft strength, force application in shaft centre

ROBA®-takt	Size	3	4	5	6	7
Radial force $F_N$ [N]	Input flange without IEC flange	436	547	681	819	1149
	Output flange without IEC flange	788	1052	1484	1685	2861
	Output flange small IEC flange	840	1134	1586	1785	3115
	Output flange large IEC flange	788	1052	1484	1685	2861

Table 3: Permitted radial force  $F_N$  at speed  $n = 1.500$  rpm, bearing service lifetime  $L_h = 10.000$  h and force application in the shaft centre