

# **ROBA<sup>®</sup>-alphastop<sup>®</sup>**

## **Electromagnetic Safety Brake**



- *Easy installation between motor and flange*
- *Complete with backlash-free coupling*
- *Insulation class F, designed for 100 % duty cycle*

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P.897.V03.GB

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# Safety brake for vertical and slant feed axes in machine tools

## Characteristics

- **Easy installation between servo motor and mounting flange**
- **Completely enclosed around outer diameter**
- **Complete unit with backlash-free coupling**
- **Insulation class F, designed for 100 % duty cycle**

## Concept

The ROBA®-alphastop® is a safety brake, installed between the servo motor and a bell housing (see Figs. 1 and 2). The brake gear hub is combined with smartflex®, a backlash-free metal bellows coupling. Frictionally locked clamping rings ensure backlash-free torque transmission between motor and the ball screw spindle.

Both sizes of the ROBA®-alphastop® are suitable for Fanuc servo motors, sizes 6 to 30, or for other motors with the same frame size. The brake is delivered with a connecting plug and a bushing. The standard coil voltages are 24 VDC and 90 VDC. Other voltages are available on request.

The brake can easily be installed into pre-existing designs. Different coupling sizes and a special adaptor kit (see Fig. 1 centre and page 5) help to fit the device to the varying shaft distances.

## Design

Installation into pre-existing designs between the servo motor and the bell housing is simple and possible without alterations. However, altering the bell housing can optimize the length of the drive, and therefore, on vertical axes, the machine height.

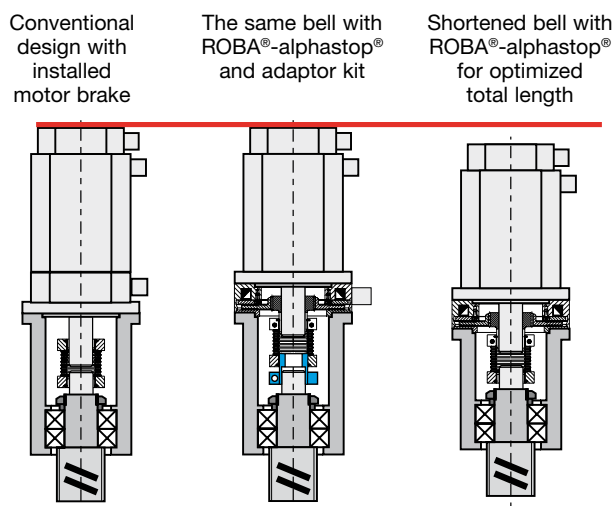


Fig. 1



## Function

The ROBA®-alphastop® is a spring applied electromagnetic safety brake.

### Spring applied function:

When the brake is de-energised, the helical springs press against the armature disk. The rotor is held between the armature disk and the flange plate. The shaft is braked via the gear hub.

### Electromagnetic function:

When the power is switched on, a magnetic field is built up. The armature disk is pulled against the spring force to the coil carrier. The brake is released and the shaft can rotate freely.

### Safety brake function:

The brake holds the coupled masses and loads safely and reliably in case of power switched-off, power failure or EMERGENCY STOP.



On request, it is also possible to deliver ROBA®-alphastop® brakes with UL approval.

Standard servo motor

ROBA®-alphastop® with smartflex®

Bell housing with ball screw spindle

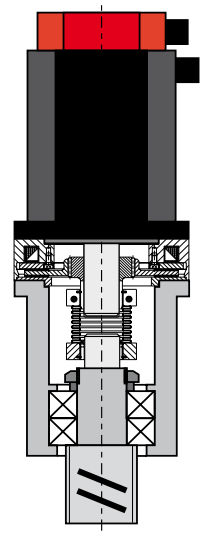
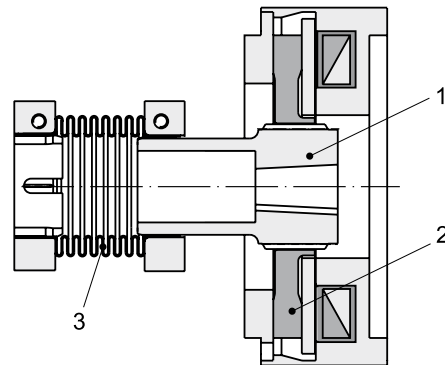


Fig. 2

## Installation Instructions

### Installation Conditions

- The permitted shaft misalignments must not under any circumstances be exceeded!
- The axial run-out deviation of the screw-on surface to the shaft may not exceed the permitted axial run-out tolerance of 0,1 mm according to DIN 42955. Larger deviations can lead to a drop in torque, to continuous slipping of the rotor (2) and to over-heating.
- Please select the tolerances of the hub (1, Size 100) and the shaft so that the hub toothing (1, Size 100) is not widened. Widening of the toothing leads to the rotor (2) jamming on the hub (1) and therefore to brake malfunctions.
- The rotor (2) and the brake surfaces must be oil and grease-free.



Size 32

### Installation

The brake must not be energised before installation, as the manufacturer-side rotor (2) centering can then no longer be guaranteed.

- Push the brake without Parts 1 and 3 onto the motor centering.
- For Size 32:**

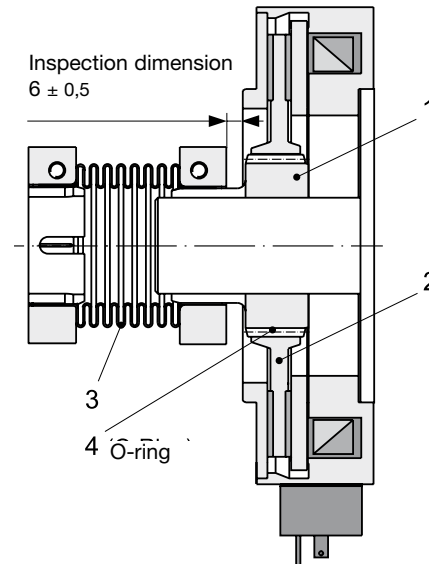
Mount the gear hub (1) through the rotor (2) toothing onto the shaft cone (please make sure that the entire length of the key-way lies over the entire hub (1)), and secure axially.

#### For size 100 with aluminium rotor:

Install the gear hub (1) including the O-ring (4, lightly greased) via the rotor (2) toothing onto the motor shaft.

Bring the hub (1) into position so that the inspection dimension  $6 \pm 0,5$  mm (Fig.) is produced, and so that the O-ring (4) lies in the rotor (2) toothing.

- Install the shaft coupling (3) according to the Installation and Operational Instructions.



Size 100

### Electrical Connection

The coil voltage is indicated on the Type tag as well as on the brake. DC current is necessary for operation. This can be produced via a transformer rectifier, a half-wave rectifier or a bridge rectifier. Switching can take place DC-side or AC-side. However, DC-side switching has a faster connection time (brake engagement). If a faster disconnection time is required, a special fast acting rectifier is necessary (please contact the manufacturers if this is the case).



#### Please Observe

For an overview of fast acting rectifiers including detailed Technical Data, please see our product catalogue K.001.V\_

#### Please Observe:

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

We reserve the right to make dimensional and constructional alterations.

## Size 32

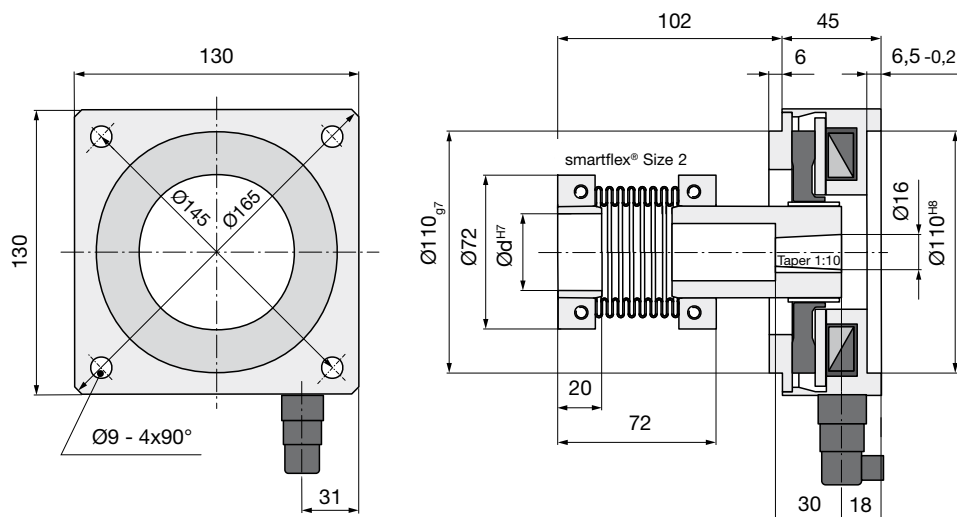


Fig. 3

| Brake             |         |                         |
|-------------------|---------|-------------------------|
| Braking torque    | [Nm]    | 12                      |
| Max. speed        | [U/rpm] | 3000/4000 <sup>1)</sup> |
| Coil voltage      | [VDC]   | 24/90                   |
| Power consumption | [W]     | 33                      |

| Flexible Coupling smartflex®   |                              |          | Size    |
|--------------------------------|------------------------------|----------|---------|
|                                |                              |          | 2       |
| Nominal torque                 |                              | [Nm]     | 100     |
| Torsional rigidity             |                              | [Nm/rad] | 22000   |
| Bore                           | d <sup>H7</sup>              | [mm]     | 16 - 36 |
| Bore adaptor kit <sup>2)</sup> | d <sub>1</sub> <sup>H7</sup> | [mm]     | 20 - 28 |

### Additional Options (on request)

Design with flexible shaft coupling

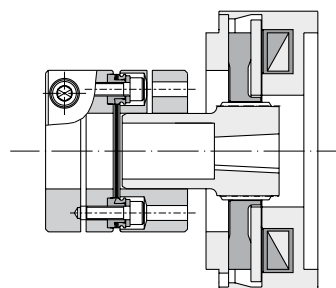
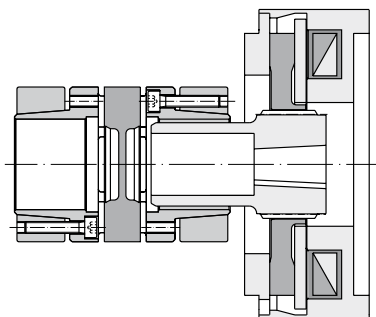
#### ROBA®-ES

- Shaft misalignment compensation
- Backlash-free
- Torsionally flexible
- Vibration-damping

Design with all-metal coupling

#### ROBA®-DS

- Shaft misalignment compensation
- Backlash-free
- Torsionally rigid
- High alternating torques



## Order number

| — / 8 9 7 . — 0 — . 0 / |                                      |        |        |                                                         |                                                  |
|-------------------------|--------------------------------------|--------|--------|---------------------------------------------------------|--------------------------------------------------|
| ▲                       |                                      | ▲      | ▲      |                                                         | ▲                                                |
| Size<br>32              | Metal rotor<br>Friction lining rotor | 0<br>1 | 1<br>3 | smartflex® Size 2<br>smartflex® Size 2 +<br>adaptor kit | Bore<br>Ø d <sup>H7</sup><br>(According to Size) |

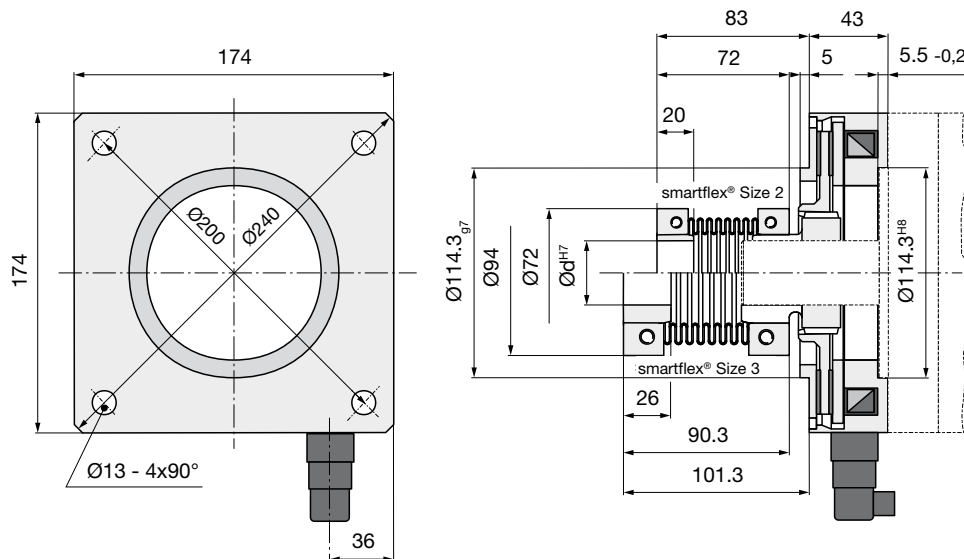
Order Example: Order number 32 / 897.001.0 / 20

1) 4000 rpm, only in connection with metal rotor

2) See page 5 "Design with adaptor kit"

# Size 100

Fig. 4



| Brake             |         |                         |
|-------------------|---------|-------------------------|
| Braking torque    | [Nm]    | 35                      |
| Max. speed        | [U/rpm] | 3000/4000 <sup>1)</sup> |
| Coil voltage      | [VDC]   | 24/90                   |
| Power consumption | [W]     | 53                      |

| Flexible Coupling smartflex® |                                   | Size    |         |
|------------------------------|-----------------------------------|---------|---------|
|                              |                                   | 2       | 3       |
| Nominal torque               | [Nm]                              | 100     | 200     |
| Torsional rigidity           | [Nm/rad]                          | 22000   | 50000   |
| Bore                         | d <sup>H7</sup> [mm]              | 16 - 36 | 18 - 50 |
| Bore adaptor kit             | d <sub>i</sub> <sup>H7</sup> [mm] | 20 - 28 | 31 - 35 |

## Design with Adaptor Kit

Design with metal bellows coupling **smartflex®** and **adaptor kit**

- Fits to varying shaft distances using adaptor kit
- Shaft misalignment compensation
- Backlash-free
- Torsionally rigid

## Additional Options (on request)

Design with flexible shaft coupling

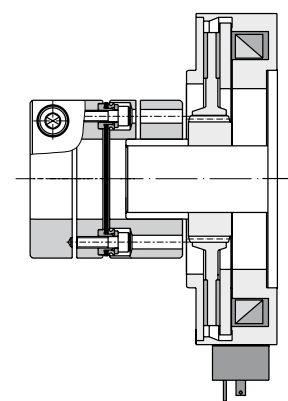
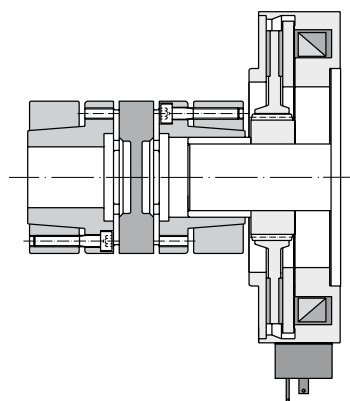
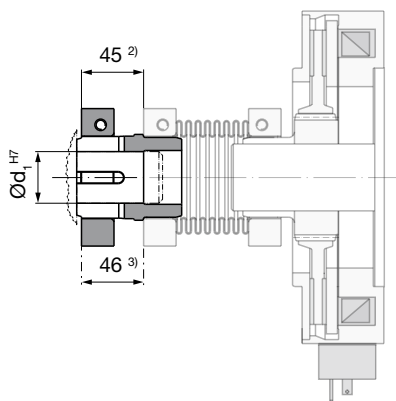
**ROBA®-ES**

- Shaft misalignment compensation
- Backlash-free
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Design with all-metal coupling

**ROBA®-DS**

- Shaft misalignment compensation
- Backlash-free
- Torsionally rigid
- High alternating torques



## Order number

| — / 8 9 7 . — 0 — . 0 / |  |  |               |                                   |                     |
|-------------------------|--|--|---------------|-----------------------------------|---------------------|
| ▲                       |  |  | ▲             | ▲                                 | ▲                   |
| Size                    |  |  | Metal rotor   | 0                                 | Bore                |
| 100                     |  |  | Plastic rotor | 2                                 | Ø d <sup>H7</sup>   |
|                         |  |  |               | 1 smartflex® Size 2               | (According to Size) |
|                         |  |  |               | 2 smartflex® Size 3               |                     |
|                         |  |  |               | 3 smartflex® Size 2 + adaptor kit |                     |
|                         |  |  |               | 4 smartflex® Size 3 + adaptor kit |                     |

Order Example: Order number 100 / 897.001.0 / 20

1) 4000 rpm, only in connection with metal rotor

2) Length compensation using adaptor kit for **smartflex®** 2

3) Length compensation using adaptor kit for **smartflex®** 3

## Further Options

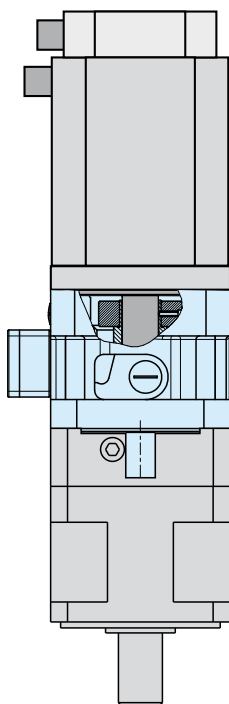
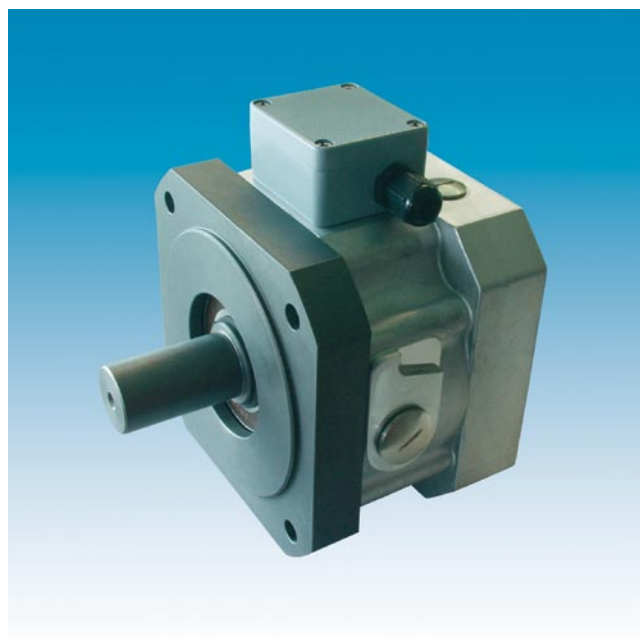
### ROBA®-topstop®

#### Modular Safety System for A-Bearing-side Servo Motor Attachment

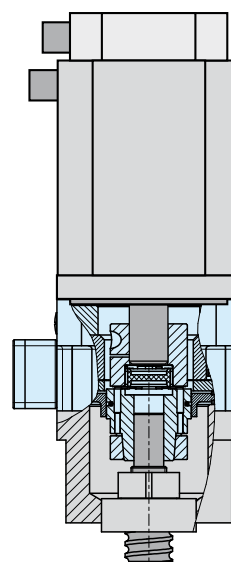
ROBA®-topstop® safety brakes were developed for operation in gravity-loaded axes. They hold the axes safely in any position, even if the servo motor is dismantled, for example during maintenance work.

Due to their fitted flange dimensions, ROBA®-topstop® safety brakes can be easily integrated into pre-existing constructions between the servo motor and the counterflange. Five standard sizes for braking torques between 12 to 400 Nm can be delivered at short notice.

For detailed technical data and dimensions, please see the latest ROBA®-topstop® catalogue.



ROBA®-topstop® with output shaft for direct attachment to gearbox with hollow shaft.



Brake system with integrated, insertable shaft coupling. Separate coupling and coupling housing are not necessary. Very short design.

### Guidelines on the Declaration of Conformity

A conformity evaluation has been carried out for the product (electromagnetic safety brake) acc. the EC Low Voltage Directive 2006/95/EC. The conformity evaluation 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 according to the EMC directive. Due to their passive state, brakes are also non-critical equipment acc. 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)

This product is a component for installation into machines acc. the Machinery Directive 2006/42/EC. The brakes are able to fulfil safety-orientated applications with relation to other elements. The type and scope of necessary measures result from a risk analysis of the machine. The brake is then part of the machine, and the machine manufacturer evaluates the conformity of the safety device according to the directive. It is forbidden to start use of the product until you have ensured that the machine accords with the specification laid down 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 high danger of explosion. Classification and marking acc. directive 94/9/EC must be carried out if this product is to be used in areas where there is a danger of explosion..



## Safety Guidelines

Brakes may generate the following risks, among other things:



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 should 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.

## 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 connecting dimensions must be adjusted according to the size of the brake at the place of installation.
- ☐ The magnetic coils are designed for a relative duty cycle of 100 %, if no deviating values are stated.
- ☐ The braking torque is dependent on the present run-in condition of the brakes.
- ☐ 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, such as other foreign substances.
- ☐ Manufacturer-side corrosion protection of the metal surfaces.
- ☐ The rotors may rust up and block in corrosive ambient conditions and/or after long periods of storage.

## Ambient Temperature – 20 °C to + 40 °C

### 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.

### Protection

**(Mechanical) IP10:** Protection against large body surfaces and large foreign bodies > 50 mm in diameter. Not protected against water.

**(Electrical) IP54:** Dust-proof and protected against contact as well as against water spray from all directions.

## Appointed Use

mayr®-brakes have been developed, manufactured and tested in compliance with the VDE 0580 standard, in accordance with the EU Low Voltage Directive. During installation, operation and maintenance of the product, the standard requirements 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.

## 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 brakes with rectifiers, phase demodulators, ROBA®-switch devices or similar controls can produce disturbance which lies above the allowed limit values. For this reason, please read the Installation and Operational Instructions carefully and ensure that the EMC directives are maintained.

## Regulations, Standards and Directives Used

|                       |                                                            |
|-----------------------|------------------------------------------------------------|
| VDE 0580              | Electromagnetic devices and components, general directives |
| 2006/95/EC            | Low voltage directive                                      |
| 2004/108/EG           | EMC directive                                              |
| CSA C22.2 No. 14-2010 | Industrial Control Equipment                               |
| UL 508 (Edition 17)   | Industrial Control Equipment                               |

### Please observe the following standards:

|                  |                                                                                  |
|------------------|----------------------------------------------------------------------------------|
| EN ISO 12100     | Safety of Machinery – General principles<br>– Risk assessment and risk reduction |
| DIN EN 61000-6-4 | Noise 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 brakes are not valid.
- Liability for damage and operational malfunction 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.



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