



COMBINORM TYPE B

INSTRUCTIONS FOR USE | INSTALLATION

Translation of the original manual
Document 20229885 EN 03



Preface

The described devices or add-on parts are products of the KEB Automation KG. The enclosed documents correspond to conditions valid at printing. Misprint, mistakes and technical changes reserved.

Signal words and symbols

Certain operations can cause hazards during the installation, operation or thereafter. There are safety informations in the documentation in front of these operations. Security signs are located on the device or machine. A warning contains signal words which are explained in the following table:

| | |
|----------------|---|
| DANGER | Dangerous situation, which will cause death or serious injury in case of non-observance of this safety instruction. |
| WARNING | Dangerous situation, which may cause death or serious injury in case of non-observance of this safety instruction. |
| CAUTION | Dangerous situation, which may cause minor injury in case of non-observance of this safety instruction. |
| NOTICE | Situation, which can cause damage to property in case of non-observance. |

RESTRICTION

Is used when certain conditions must meet the validity of statements or the result is limited to a certain validity range.

| | |
|--|--|
| | Is used when the result will be better, more economic or trouble-free by following these procedures. |
|--|--|

More symbols

- ▶ This arrow starts an action step.
- / - Enumerations are marked with dots or indents.
- => Cross reference to another chapter or another page.



Note to further documentation.
www.keb.de/service/downloads



Laws and guidelines

KEB Automation KG confirms with the EU declaration of conformity and the CE mark on the device nameplate or the signing that it complies with the essential safety requirements.

The EC declaration of conformity can be downloaded on demand via our website.

Warranty and liability

The warranty and liability on design, material or workmanship for the acquired device is given in the general sales conditions.



Here you will find our general sales conditions.
www.keb.de/terms-and-conditions



Further agreements or specifications require a written confirmation.

Support

Through multiple applications not every imaginable case has been taken into account. If you require further information or if problems occur which are not treated detailed in the documentation, you can request the necessary information via the local KEB Automation KG agency.

The use of our units in the target products is outside of our control and therefore lies exclusively in the area of responsibility of the customer.

The information contained in the technical documentation, as well as any user-specific advice in spoken and written and through tests, are made to best of our knowledge and information about the intended use. However, they are regarded as being only informal and changes are expressly reserved, in particular due to technical changes. This also applies to any violation of industrial property rights of a third-party. Selection of our units in view of their suitability for the intended use must be done generally by the user.

Tests can only be done within the intended end use of the product (application) by the customer. They must be repeated, even if only parts of hardware, software or the unit adjustment are modified.

Copyright

The customer may use the instructions for use as well as further documents or parts from it for internal purposes. Copyrights are with KEB Automation KG and remain valid in its entirety.

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Glossary

| | |
|--------------|---|
| 0V | Earth-potential-free common point |
| 1ph | 1-phase mains |
| 3ph | 3-phase mains |
| AC | AC current or voltage |
| Application | The application is the intended use of the KEB product. |
| AWG | American coding for cable cross-sections |
| B2B | Business-to-business |
| DC | DC current or voltage |
| DIN | German Institute for Standardization |
| EMC | Electromagnetic compatibility |
| EN | European standard |
| End customer | The end customer is the user of the customer product. |
| FE | Functional earth |
| GND | Reference potential, ground |
| Manufacturer | The manufacturer is KEB unless otherwise specified (e.g. as a manufacturer of machines, motors, vehicles or adhesives). |
| IEC | International standard |
| IP xx | Degree of protection (xx for level) |
| KEB product | The KEB product is the product which is subject of this manual. |
| Customer | The customer has purchased a KEB product from KEB and integrates the KEB product into his product (customer product) or resells the KEB product (dealer). |
| MCM | American measuring unit for large cable cross-sections |
| MTTF | Mean service life to failure |
| NN | Sea level |
| PE | Protective earth |
| PELV | Safe protective low voltage, earthed |
| SELV | Safety extra-low voltage, unearthed (<60V) |

List of standards

| | |
|--------------------|---|
| VDE 0580 | Electromagnetic Devices and Components |
| DGUV Regulation 3 | Electrical systems and equipment |
| DIN 46228-1 | Wire-end ferrules; Tubular end-sleeves without plastic sleeve |
| DIN 46228-4 | Wire-end ferrules; Tubular end-sleeves with plastic sleeve |
| DIN IEC 60364-5-54 | Low-voltage electrical installations - Part 5-54: Selection and installation of electrical equipment - Earthing systems, protective conductors and protective bonding conductors (IEC 64/1610/CD) |
| EN 60204-1 | Safety of machinery - Electrical equipment of machines Part 1: General requirements (VDE 0113-1, IEC 44/709/CDV) |
| EN 60529 | Degrees of protection provided by enclosures (IP code) (VDE 0470, IEC 60529) |
| EN 60664-1 | Insulation coordination for equipment within low-voltage systems Part 1: Principles, requirements and tests (IEC 60664-1) |
| EN 60721-3-1 | Classification of environmental conditions - Part 3-1: Classification of groups of environmental parameters and their severities - Section 1: Storage (IEC 104/648/CD) |
| EN 60721-3-2 | Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities; Section 2: Transport (IEC 104/670/CD) |
| EN 60721-3-3 | Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities; Section 3: Stationary use at weatherprotected locations (IEC 60721-3-3) |
| DIN 748-3 | Cylindrical shaft ends - Part 3: For rotating electrical machinery |
| DIN SPEC 42955 | Shaft extension run out and of mounting flanges for rotating electrical machinery, frame size larger than 315 - Tolerances, test |
| DIN EN 50347 | General purpose three-phase induction motors having standard dimensions and outputs - Frame numbers 56 to 315 and flange numbers 65 to 740; German version EN 50347 |
| DIN 6885-1 | Drive Type Fastenings without Taper Action; Parallel Keys, Keyways, Deep Pattern |
| DIN 6885-3 | Drive Type Fastenings without Taper Action, Parallel Keys, Keyways, Shallow Pattern |
| DIN 332-2 | Center holes 60° with thread for shaft ends for rotating electrical machines |
| DIN EN ISO 4029 | Hexagon socket set screws with cup point (ISO 4029:2003); German version EN ISO 4029:2003 |

1 Basic Safety Instructions

The following safety instructions have been created by the manufacturer for the area of drive technology. They can be supplemented by local, country- or application-specific safety instructions. This list is not exhaustive. Non-observance will lead to the loss of any liability claims.

NOTICE



Hazards and risks through ignorance.

- ▶ Read the instructions for use!
- ▶ Observe the safety and warning instructions !
- ▶ If anything is unclear, please contact KEB !

1.1 Target group

This manual is determined exclusively for technical staff. Technical staff for the purpose of this manual must have the following qualifications:

- Knowledge and understanding of the safety instructions.
- Skills for installation and assembly, start-up, operation and maintenance of the product.
- Understanding of the function in the used machine.
- Detection of hazards and risks of the drive technology.
- Knowledge about work safety and accident prevention (e.g. *DGUV Regulation 3*).

1.2 Transport, storage and proper use

The transport is carried out by qualified persons in accordance with the environmental conditions specified in this manual.

On arrival the brake needs to be checked for visible transport damages. Immediately report transport damages to the transport company and the manufacturer.

Depending on its design and weight appropriate lifting devices must be used for handling.

In case of improper storage, no liability is assumed for resulting damages!

Don't store devices or parts

- in the environment of aggressive and/or conductive liquids or gases.
- with direct sunlight.
- outside the specified environmental conditions.
- in environments that can lead to corrosion and contamination.

1.3 Installation and mounting

NOTICE

Squeezing and pinching of fingers by self-rotation.

- ▶ Before installation, make sure that the drive is load-free.
- ▶ Secure drive against rotation.

Consider the following installation measures to prevent faults

- ▶ Do not operate the brake in an explosive environment.
- ▶ Provide measures against freezing or ice formation on the friction surfaces.
- ▶ Take appropriate measures against high air humidity, aggressive vapours/liquids or similar that lead to corrosion and 'rusting' of the pole surfaces.

1.4 Electrical connection

⚠ DANGER



Electrical voltage at brake and motor!

Danger to life due to electric shock!

- ▶ Any work on the electrical power supply may only be carried out by a qualified electrician.
- ▶ When carrying out any work on the coupling, switch off the supply voltage to the motor and secure it against switching on.
- ▶ Never bridge upstream protective devices, not even for test purposes.
- ▶ Standard-compliant testing of the protective conductor connection to all touchable metal parts.

1.5 Start-up and operation

The operation must not be started until it is determined that the installation complies with the machine directive; Account is to be taken of [EN 60204-1](#).

⚠ CAUTION

Pay attention to friction work (speed and the frequency of operation)!

Loss or drop of the braking torque!

- ▶ Exceeding the technical specifications may result in thermal overload at the braking surface or magnet. This may lead to failure of the brake.

⚠ CAUTION



High temperatures due to braking

Burning of the skin!

- ▶ Cover hot surfaces safe-to-touch.
- ▶ If necessary, attach warning signs on the system.
- ▶ Check temperature and allow coupling to cool down if necessary.

⚠ CAUTION

Rotating Parts

Shock or crushing of body parts!

- ▶ Wear protective goggles against ejected parts and dirt particles, especially during first start-up.
- ▶ Take measures against being pulled into the machine.

1.6 Maintenance

- ▶ Secure the brake against being switched on accidentally during maintenance work.
- ▶ Make the brake load-free during maintenance work to avoid uncontrolled movements.
- ▶ Protection against the ingress of foreign particles into the air gap. These particles may impede the movement of the armature.
- ▶ When carrying out maintenance and repair work, the brake must not be energised.
- ▶ The brake lining must not come into contact with cleaning agents or solvents.

In case of malfunction, unusual noises or smells inform a person in charge!

⚠ DANGER



Unauthorized exchange, repair and modifications!

Unpredictable malfunctions!

- ▶ The brake must not be converted, modified or misused.
- ▶ Only use original manufacturer parts.
- ▶ Infringement will annul the liability for resulting consequences.

2 Product description

The brake COMBINORM Type B is a working current operated brake, which frictionally uses the concentrated force flow of an electromagnet on two pole faces for holding shafts and the loads connected to them. COMBINORM brakes are the most economical solution for braking and holding loads for flange- and shaft-mounted installation in machines and systems.

2.1 Intended use

The operational reliability of the brake is only guaranteed when used according to specified application. In this context, specified application means that the brake is used for the ordered and confirmed purpose.

Any other use is considered a breach of specified application. It may pose unforeseeable risks and is solely and exclusively the responsibility of the operating company.

Technical data and information for connection conditions shall be taken from the magnetization and the instructions for use and must be strictly observed. Any use beyond the technical specifications is also considered as not specified.

The actual use of the brake in the target products is beyond KEB Automation KG's control and, therefore, shall be exclusively within the operating company's responsibility.

Restriction

If the product is used in machines which work under exceptional conditions or if essential functions, life-supporting measures or an extraordinary safety step must be fulfilled, the necessary reliability and security must be ensured by the machine builder.

2.2 Residual risks

The brake can overheat or be damaged due to wrong design, improper handling or changed operating requirements. This may lead to failure of the brake.

2.3 Improper use

Improper use exists, if

- the product is operated outside the limit values specified in the technical data.
- unauthorized structural changes have been made to the brake.
- improper repairs have been carried out.
- the product has been incorrectly installed or serviced.

In case of infringements, the brake loses its EU conformity and the liability claims against KEB Automation KG expire.

2.4 Type code COMBINORM Type B

| | | | | | |
|--|-----------|------------|-------------|---------|--|
| xx | 02 | xxx | -xxx | | |
| | | | | Variant | Customer versions |
| | | | | Design | 110: Flange mounted, armature element in standard design 120: Flange mounted, armature element with internal hub 130: Flange mounted, armature element with external hub 320: Shaft-mounted |
| | | | | Type | COMBINORM Type B |
| | | | | Size | 01...12 |
| <i>Table 1: Type code COMBINORM Type B</i> | | | | | |



The complete material number is not printed on the brake. Only the magnet is marked with a material number. An assignment of the brake based on the magnet marking is only possible to a limited extent.

2.5 Type code magnet

Magnet designation can be taken from the signing.

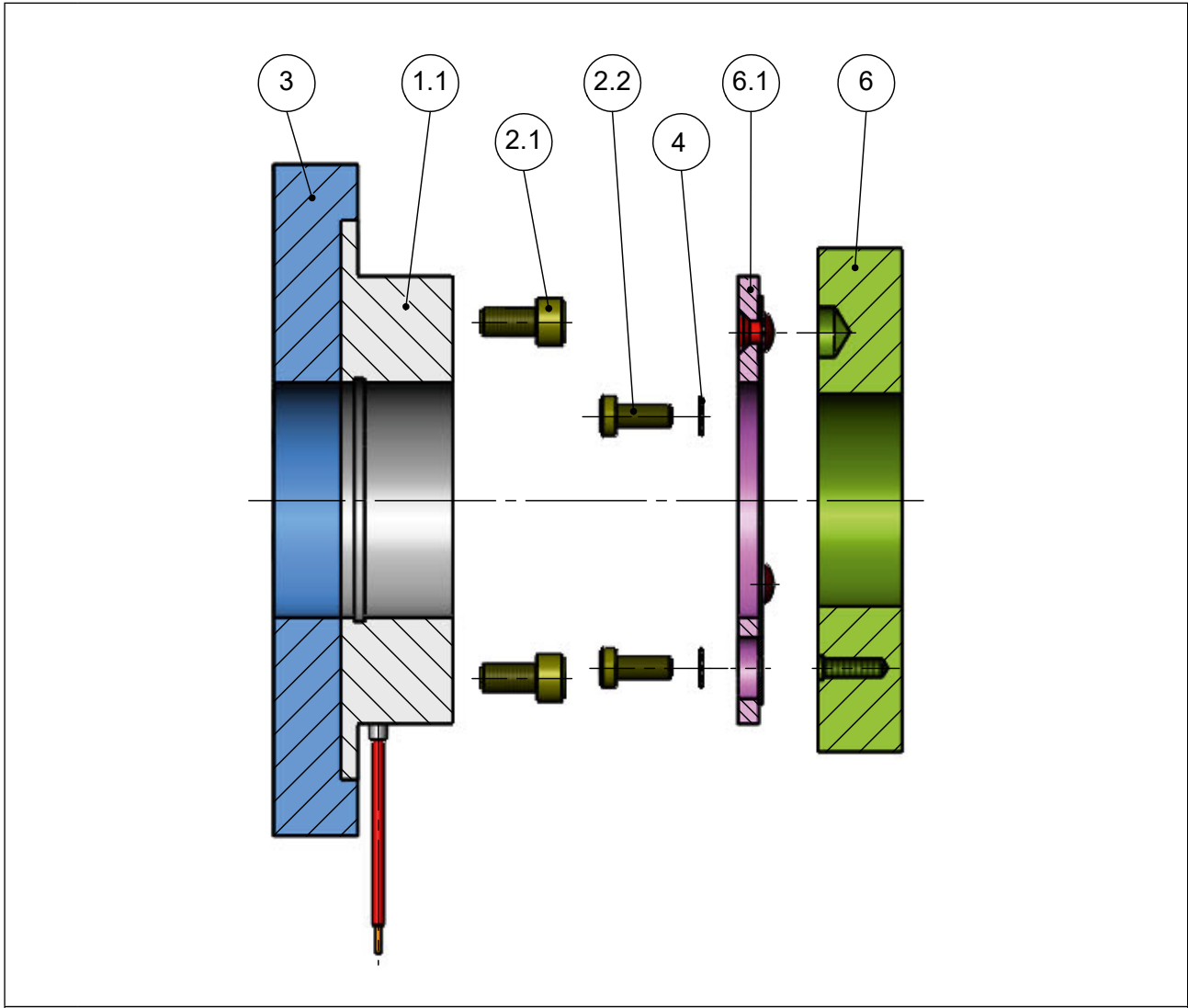
| | | | | | |
|----------------------------------|-----------|------------|-------------|---------|--|
| xx | 02 | xxx | -xxx | | |
| | | | | Strands | Material and length |
| | | | | Voltage | e.g. DC 24 V |
| | | | | Design | 100: Brake magnet with round flange 200: Brake magnet with round flange, ball bearing |
| | | | | Type | COMBINORM Type B |
| | | | | Size | 01...12 |
| <i>Table 2: Type code magnet</i> | | | | | |



The type codes are not used as order codes, but only for identification purposes!

2.6 Overview COMBINORM Type B

2.6.1 Version 110 - Flange mounted, armature element in standard design

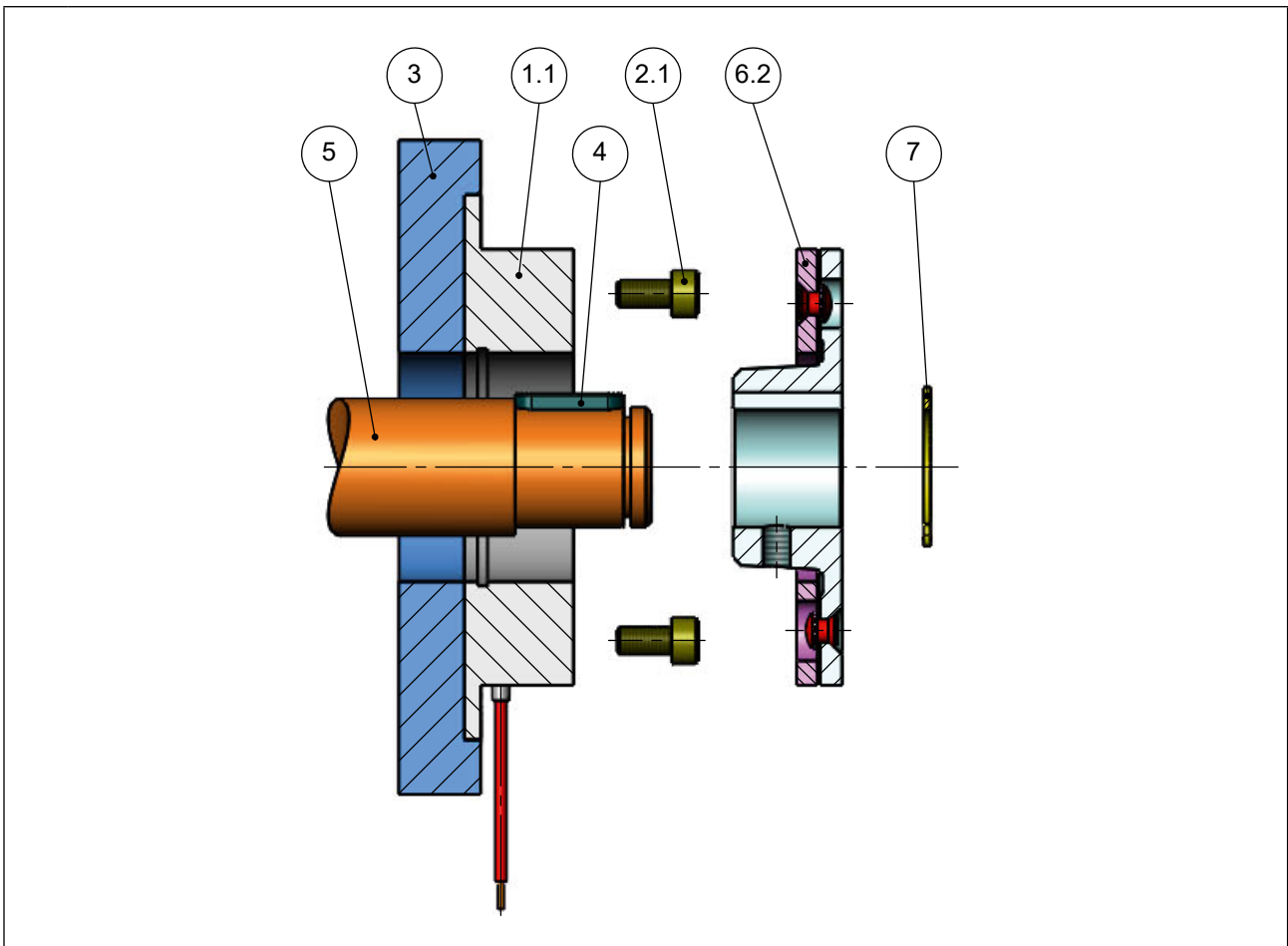


Legend

| | |
|-----|--|
| 1.1 | Magnet |
| 2.1 | Socket head screws (e.g. ISO 4762) |
| 2.2 | Socket head screws (e.g. ISO 6912) |
| 3 | Mounting surface (e.g. motor) |
| 4 | Schnorr-lock washers |
| 6 | Mounting surface evaluated by the customer (e.g. belt pulley, pinion etc.) |
| 6.1 | Armature element without hub |

Figure 1: Version 110 - Flange mounted, armature element in standard design

2.6.2 Version 120 - Flange mounted, armature element with internal hub

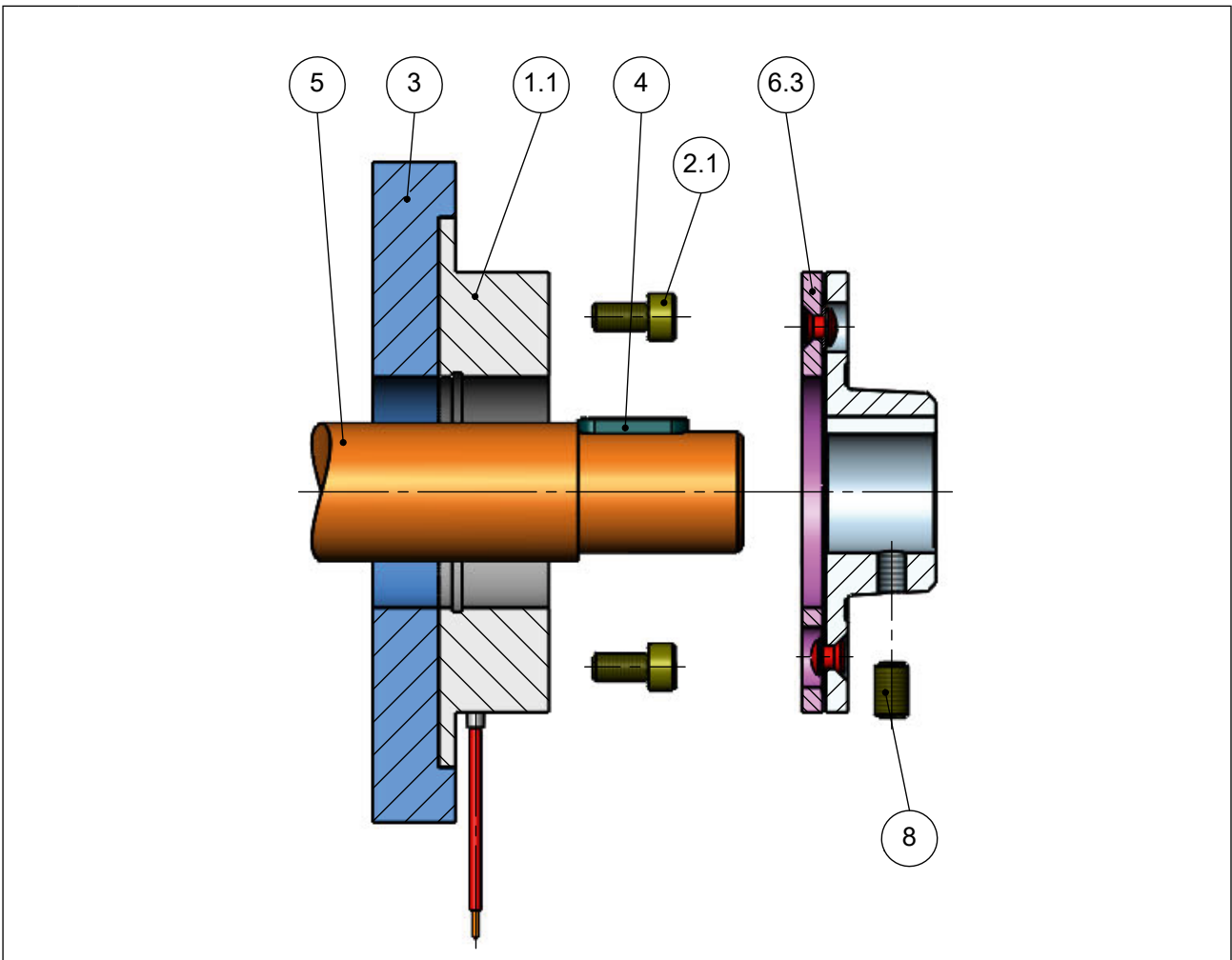


Legend

| | |
|-----|------------------------------------|
| 1.1 | Magnet |
| 2.1 | Socket head screws (e.g. ISO 4762) |
| 3 | Mounting surface (e.g. motor) |
| 4 | Feather key |
| 5 | Shaft |
| 6.2 | Armature element - hub neck inside |
| 7 | Locking ring |

Figure 2: Version 120 - Flange mounted, armature element with internal hub

2.6.3 Version 130 - Flange mounted, armature element with external hub

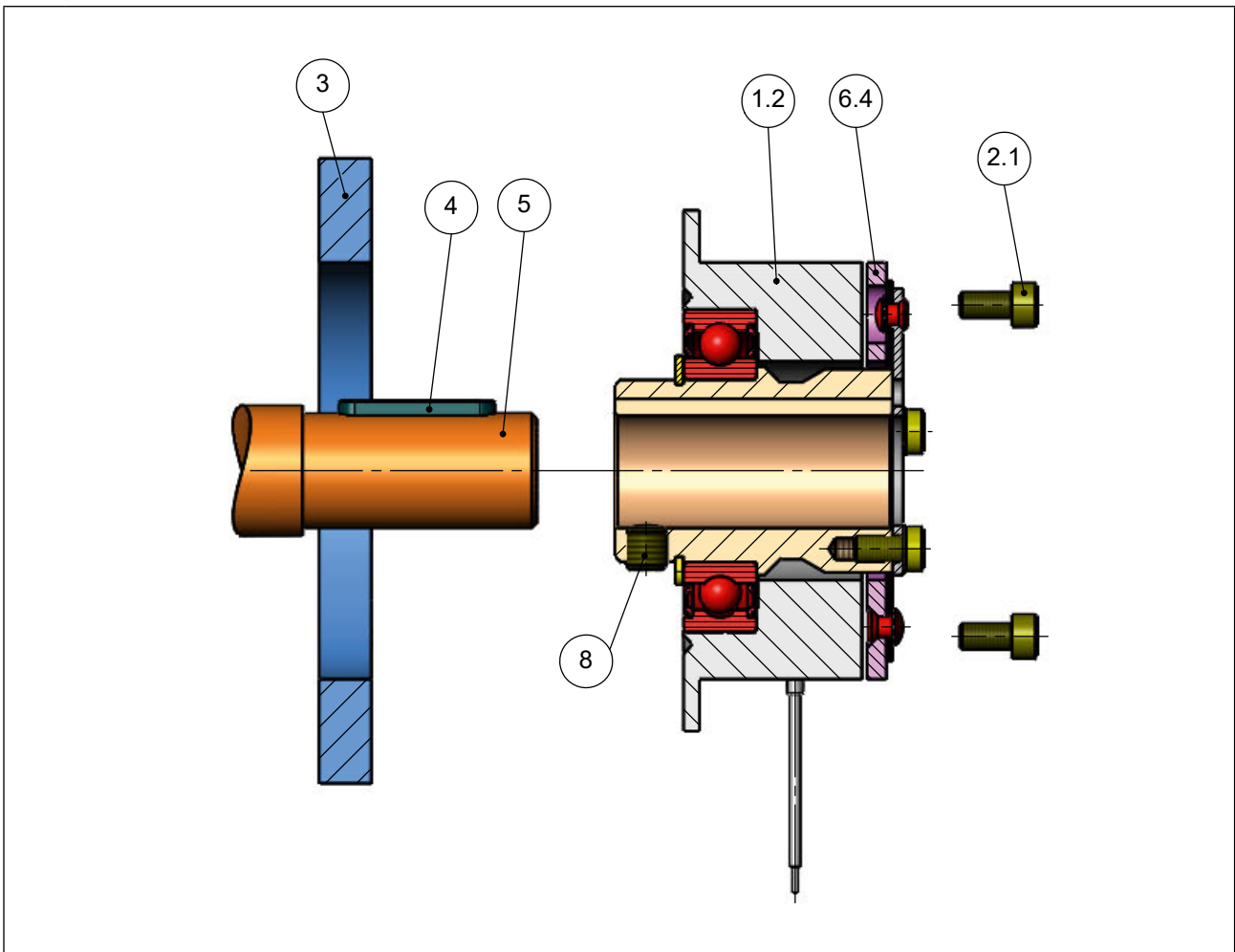


Legend

| | |
|-----|-------------------------------------|
| 1.1 | Magnet |
| 2.1 | Socket head screws (e.g. ISO 4762) |
| 3 | Mounting surface (e.g. motor) |
| 4 | Feather key |
| 5 | Shaft |
| 6.3 | Armature element - hub neck outside |
| 8 | Threaded pin |

Figure 3: Version 130 - Flange mounted, armature element with external hub

2.6.4 Version 320 - Shaft mounted



Legend

| | |
|-----|------------------------------------|
| 1.2 | Magnet |
| 2.1 | Socket head screws (e.g. ISO 4762) |
| 3 | Mounting surface (e.g. motor) |
| 4 | Feather key |
| 5 | Shaft |
| 6.4 | Armature element for brake |
| 8 | Threaded pin |

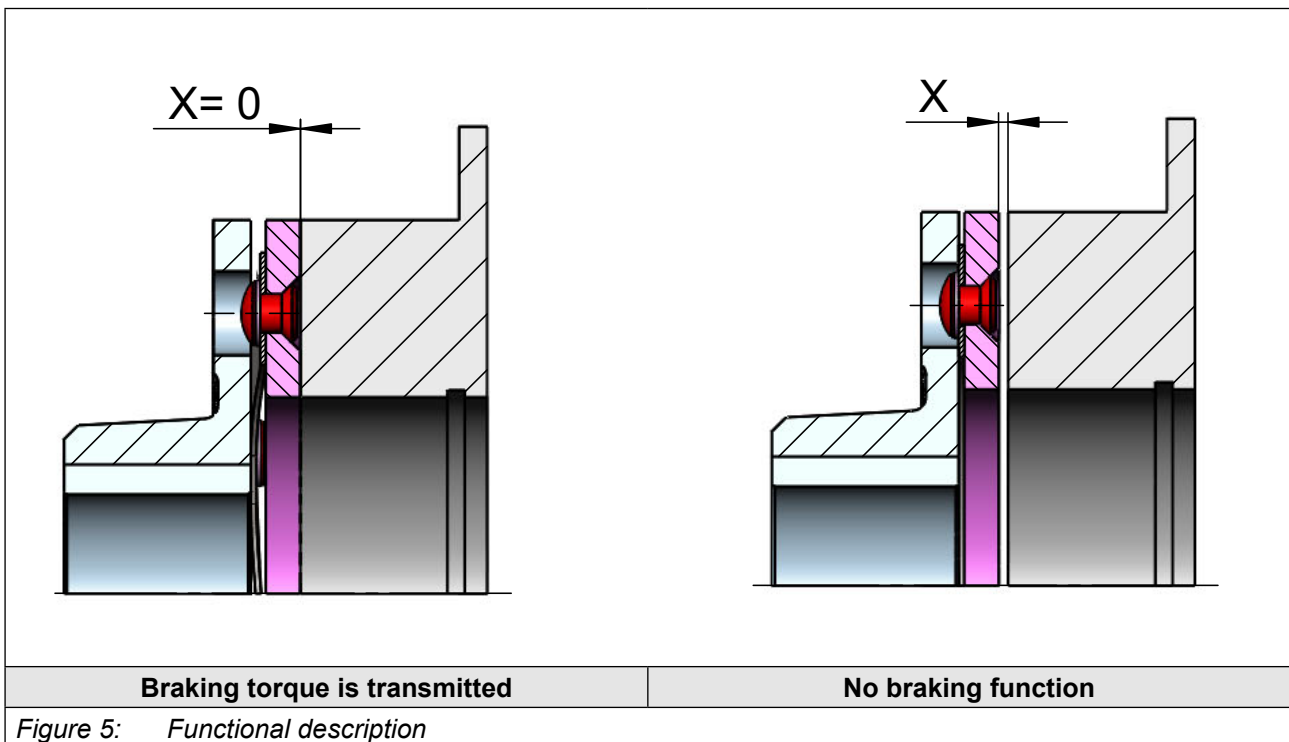
Figure 4: Version 320 - Shaft mounted

2.7 Functional description

The COMBINORM type B is a single-surface brake for dry running.

When energised, the force of a magnetic field is used frictionally to build up torque. The armature disk is attracted to the brake magnet and the torque is transmitted by a diaphragm spring without torsional backlash and without wear.

After switching off the rated voltage, the force effect of the magnetic field is cancelled and the torque is reduced.



3 Technical data

3.1 Operating conditions

3.1.1 Climatic environmental conditions

| Operation | Standard | Class | Notes |
|---------------------------------------|--------------------------|-------|------------|
| Ambient temperature | VDE 0580 | – | -5...35 °C |
| Construction and degree of protection | EN 60529 | IP40 | Standard |

Table 3: *Climatic environmental conditions*

3.1.2 Electrical operating conditions

3.1.2.1 Device classification

| Requirement | Standard | Class | Notes |
|----------------------|----------------------------|-------|-------|
| Overvoltage category | EN 60664-1 | III | – |

Table 4: *Device classification*

3.2 Device data COMBINORM Type B

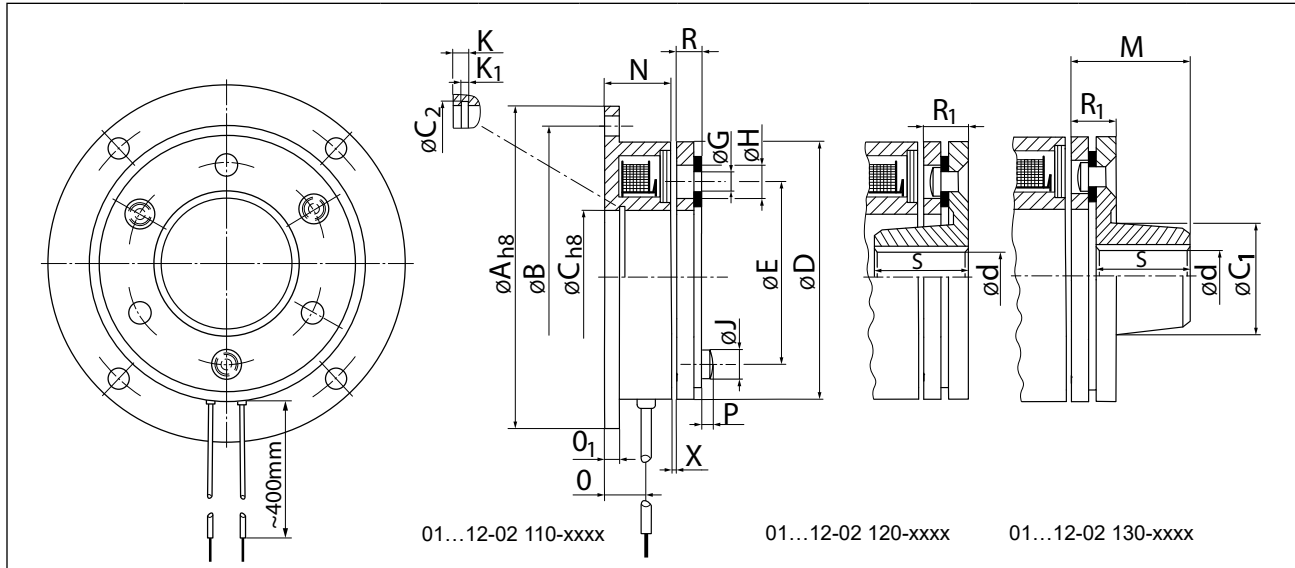
| Device size | | 01 | 02 | 03 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 |
|---|--|----------------------|-------|-------|-------|--------|--------|-------|-------|-------|-------|------|
| Characteristic torque after run in at 20 °C | ¹⁾ M_2 / Nm | 0.5 | 0.75 | 1.5 | 3 | 7 | 15 | 30 | 65 | 130 | 250 | 500 |
| Rated power | P_{20} / W | 6 | 6 | 8 | 10 | 12 | 16 | 21 | 28 | 38 | 50 | 65 |
| Rated voltage | ²⁾ U_{N_dc} / V | 6...205 | | | | | | | | | | |
| Operating voltage range | U_{A_dc} / V | $U_{N_dc} \pm 10\%$ | | | | | | | | | | |
| Cyclic duration factor | $ED / \%$ | 100 | | | | | | | | | | |
| Friction work | $W_{R_max} / 10^4 \text{J}$ | 0.04 | 0.05 | 0.08 | 0.12 | 0.19 | 0.31 | 0.48 | 0.75 | 1.25 | 2 | 2.9 |
| | ³⁾ $W_{R_0.1mm} / 10^7 \text{J}$ | 0.23 | 0.3 | 0.43 | 0.63 | 0.95 | 1.63 | 2.53 | 4.09 | 6.66 | 10.4 | 16.3 |
| | $P_{R_max} / \text{J/s}$ | 12.8 | 18.6 | 26.9 | 38.9 | 58.3 | 79.2 | 114 | 164 | 236 | 339 | 489 |
| Max. operating speed | n_{max} / rpm | 15,000 | | | | 12,000 | 10,000 | 8,000 | 6,500 | 5,000 | 3,500 | |
| Max. brake speed | n_{B_max} / rpm | 10,000 | | | | 8,000 | 6,000 | 5,000 | 4,000 | 3,000 | 2,000 | |
| Mass moment of inertia Armature element B.110 | $J / 10^{-4} \text{kgm}^2$ | 0.010 | 0.014 | 0.045 | 0.122 | 0.366 | 1.07 | 3.72 | 10.6 | 40 | 115 | 311 |
| Mass moment of inertia Armature element B.120/130 | $J / 10^{-4} \text{kgm}^2$ | 0.013 | 0.021 | 0.068 | 0.18 | 0.53 | 1.57 | 5.29 | 15.1 | 50.1 | 159 | 437 |
| Mass moment of inertia Armature element B.320 | $J / 10^{-4} \text{kgm}^2$ | — | — | — | — | 0.82 | 2.6 | 10.3 | 27 | 101 | — | — |
| Nominal air gap | X / mm | 0.1 | 0.15 | 0.15 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.4 |
| Separation time | ⁴⁾ t_{2_dc} / ms | 3 | 4 | 5 | 8 | 10 | 15 | 50 | 85 | 100 | 140 | 200 |
| | ⁵⁾ t_{2_ac} / ms | 17 | 20 | 25 | 40 | 70 | 95 | 240 | 300 | 400 | 600 | 800 |
| Response delay DC | ⁵⁾ t_{11_dc} / ms | 2 | 3 | 3 | 5 | 6 | 8 | 10 | 13 | 15 | 23 | 35 |
| Linking time DC | ⁵⁾ t_{1_dc} / ms | 5 | 8 | 8 | 17 | 24 | 38 | 42 | 48 | 85 | 118 | 155 |
| Feather key | according to DIN 6885-1 | | | | | | | | | | | |
| Keyway | according to DIN 6885-1 | | | | | | | | | | | |
| ISO class | B | | | | | | | | | | | |

Table 5: Device data COMBINORM Type B

- ¹⁾ The torques are based on a quasi-static measurement with a differential speed of 25 rpm.
- ²⁾ Special voltage upon request.
- ³⁾ W_{R_max} = permissible friction work per switching cycle; $W_{R_0.1mm}$ = friction work up to 0.1mm abrasion; P_{R_max} = permissible friction work per second.
- ⁴⁾ Time from switching off the current to reach 0.1 M_2 .
- ⁵⁾ Values for version 320 deviate.
- ⁶⁾ Time from switching on the current to the increase of the torque.
- ⁷⁾ Time from switching on the current to reach 0.9 x M_2 .

3.3 Dimensions and weights

3.3.1 Flange mounted brakes



| Dimensions / mm | Size | | | | | | | | | | | |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--|
| | 01 | 02 | 03 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | |
| A_{h8} | 39 | 45 | 54 | 65 | 80 | 100 | 125 | 150 | 190 | 230 | 290 | |
| B | 33.5 | 38 | 47 | 58 | 72 | 90 | 112 | 137 | 175 | 215 | 270 | |
| C_{h8} | 11 | 13 | 19 | 26 | 35 | 42 | 52 | 62 | 80 | 100 | 125 | |
| C₁ | 13.5 | 16 | 22 | 24 | 32 | 38 | 48 | 58 | 73 | 92 | 112 | |
| C₂ | - | 13.6 | 20 | 27 | 36 | 43.5 | 53.8 | 63.8 | 82.1 | 102.1 | 127.4 | |
| D | 28 | 32 | 40 | 50 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | |
| E | 19.5 | 23 | 30 | 38 | 50 | 60 | 76 | 95 | 120 | 158 | 210 | |
| G | 2x2.1 | 3x2.6 | 3x3.1 | 3x3.1 | 3x4.1 | 3x4.1 | 3x5.1 | 3x6.1 | 3x8.1 | 3x10.1 | 4x12.1 | |
| H | 5.3 | 6 | 6 | 6.5 | 10 | 11 | 11.5 | 15 | 21 | 19 | 28 | |
| J | 4.5 | 5 | 5.5 | 5.5 | 8 | 8 | 10 | 11.5 | 14.5 | 17.5 | 20.5 | |
| K | - | 3 | 3 | 3.2 | 3.5 | 4.25 | 5 | 5.5 | 6 | 7 | 8 | |
| K₁ | - | 1.1 | 1.1 | 1.3 | 1.6 | 1.85 | 2.15 | 2.15 | 2.65 | 3.15 | 4.15 | |
| M | 9.3 | 12.1 | 14.7 | 15 | 18.8 | 24.3 | 31 | 36.9 | 46.9 | 59.2 | 68 | |
| N | 13.7 | 17 | 20 | 22 | 18 | 20 | 22 | 24 | 26 | 30 | 35 | |
| O | 5 | 7.5 | 7 | 7.5 | 6 | 7 | 8 | 9 | 11 | 12 | 15 | |
| O₁ | 1.5 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | |
| P | 1 | 1.3 | 1.5 | 1.5 | 2 | 2 | 2.5 | 3 | 4 | 4.5 | 5 | |
| R | 2.3 | 2.1 | 2.7 | 3 | 3.8 | 4.3 | 6 | 6.9 | 8.9 | 11.2 | 13 | |
| R₁ | 4.3 | 4.1 | 5.3 | 6 | 7.3 | 8.3 | 11 | 12.9 | 15.9 | 20.2 | 24 | |
| S | 7 | 10 | 12 | 12 | 15 | 20 | 25 | 30 | 38 | 48 | 55 | |
| X | 0.1 | 0.15 | 0.15 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.4 | |
| d | 6 | 8 | 10 | 15 | 20 | 22 | 30 | 35 | 45 | 60 | 70 | |

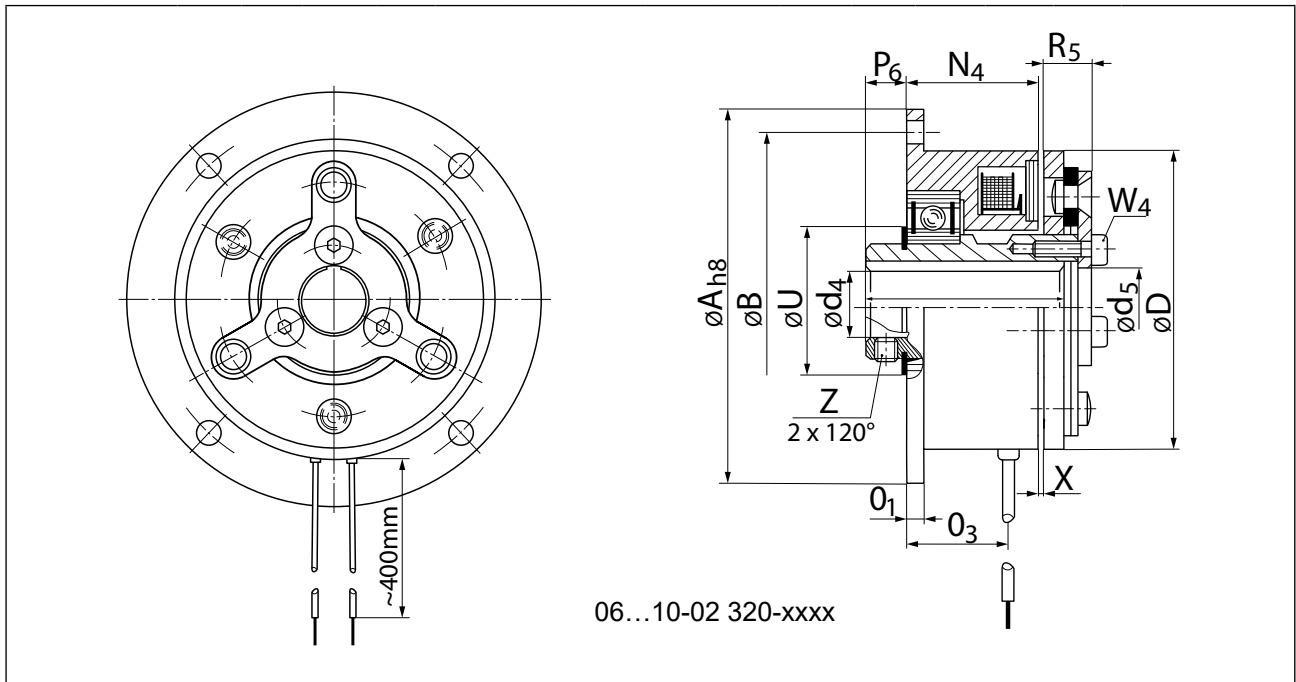
Figure 6: Dimensions flange mounted brakes

continued on the next page

| Weight / kg | | | | | | | | | | | |
|---------------------|------|-----|------|------|-----|-----|-----|-----|-----|-----|------|
| ..02 110... | 0.05 | 0.1 | 0.15 | 0.2 | 0.3 | 0.5 | 0.9 | 1.7 | 3.2 | 5.9 | 11.2 |
| ..02 120/130.... | 0.05 | 0.1 | 0.15 | 0.25 | 0.3 | 0.6 | 1.1 | 2 | 4 | 7 | 13.5 |

Keyway according to *DIN 6885-1*.

3.3.2 Shaft mounted brakes



| Size | Dimensions / mm | | | | | | | | | | | | | | | Weight / kg ...02 320.... |
|------|-----------------|-----|-----|-------|-------|-------|-------|-------|-------|----|-------|-----|-----|-------|-------|------------------------------|
| | A | B | D | N_4 | O_1 | O_3 | P_6 | R_5 | S_4 | U | W_4 | X | Z | d_4 | d_5 | |
| 06 | 80 | 72 | 63 | 31.2 | 3 | 19 | 9.3 | 6.3 | 45 | 39 | M4 | 0.2 | M6 | 20 | 18 | 0.8 |
| 07 | 100 | 90 | 80 | 34.2 | 3 | 21.5 | 13.2 | 6.9 | 52.5 | 45 | M5 | 0.2 | M8 | 22 | 21 | 1.5 |
| 08 | 125 | 112 | 100 | 38 | 4 | 24 | 13.5 | 9.3 | 58.5 | 56 | M6 | 0.2 | M8 | 30 | 28 | 2.7 |
| 09 | 150 | 137 | 125 | 40 | 4 | 25 | 13.8 | 10.9 | 62 | 61 | M8 | 0.3 | M8 | 35 | 35 | 4.2 |
| 10 | 190 | 175 | 160 | 46.3 | 5 | 31.5 | 17.3 | 14.1 | 74 | 84 | M10 | 0.3 | M10 | 45 | 44 | 7.8 |

Keyway according to *DIN 6885-1*.

Figure 7: Dimensions shaft mounted brakes

4 Mounting

4.1 Notes on mounting

Checks before mounting the brake

Before mounting the brake, check the following:

- ▶ Compliance of the ordered voltage and performance data with the type plate data or magnetic marking.
- ▶ No damage to the brake or contamination by foreign particles in the area of operation or in the air gap of the brake.
- ▶ The friction surfaces must be free from grease and oil.
- ▶ Air humidity, aggressive vapours/liquids or the like may lead to corrosion and cause the lining to stick. In this case, the user needs to provide appropriate measures!
- ▶ The brake must be de-energised when being mounted.
- ▶ Readjustment of the air gap is not possible! If necessary, check the air gap before mounting (=> „9.2.2 Check air gap“).

Observe during mounting

NOTICE

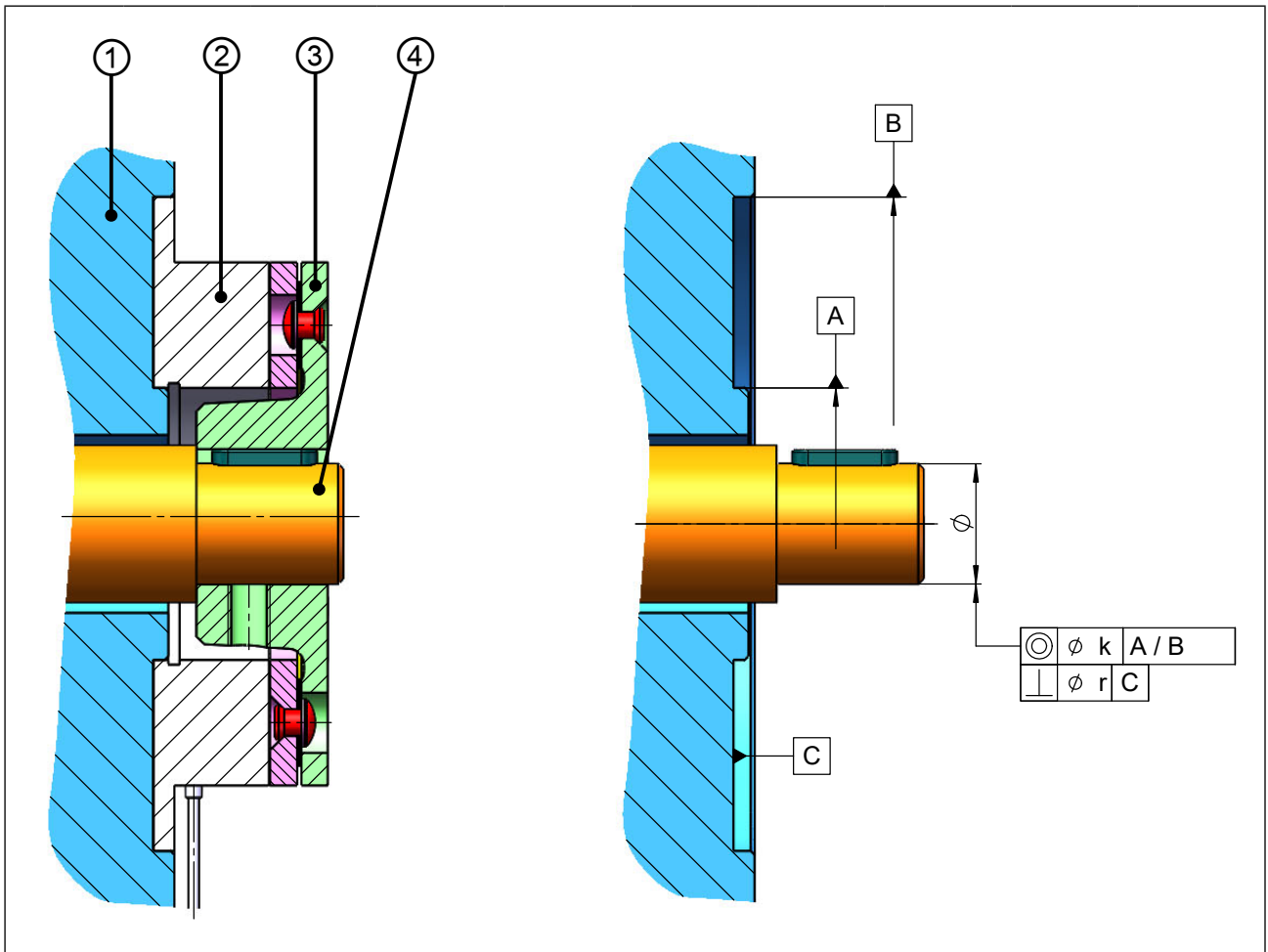
Overexpansion of the diaphragm spring

Damage of the brake

Mounting of the armature element is permitted only when the supply voltage is disconnected to avoid overexpansion of the diaphragm spring at the armature element. Magnet and armature element must be centered at mounted brakes. Axial and radial run-out deviations lead to premature failure.

During mounting, please observe the following notes/instructions:

- ▶ The friction surfaces of the brake must not come into contact with oil, grease, water or other fluids. Any contamination will result in loss of torque.
- ▶ Never use aggressive fluids (for example, cleaning agents) or the like to clean the brake.
- ▶ The movement of the armature must not be impeded by the ingress of foreign particles into the air gap. Take appropriate safety measures as required.
- ▶ The armature element of the brake is mounted on a shaft. The armature may not be centered at the in and outside diameter. It must be able to move free, because it must be placed through the riveted spring. This shaft must maintain the concentricity (to A or B) and perpendicularity (to C) (=> „Figure 1: Concentricity k between magnet centering and shaft (armature bore)“).



Legend

| | | | | | | | | | |
|-------------|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1 | Customer flange | | | | | | | | |
| 2 | Magnet | | | | | | | | |
| 3 | Armature element | | | | | | | | |
| 4 | Customer shaft | | | | | | | | |
| Size | 01 | 02 | 03 | 05 | 06 | 07 | 08 | 09 | 10 |
| k / mm | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 |
| r / mm | 0.04 | 0.04 | 0.04 | 0.06 | 0.06 | 0.06 | 0.06 | 0.08 | 0.08 |

Figure 1: Concentricity k between magnet centering and shaft (armature bore)

4.2 Mounting the brake

4.2.1 Mounting the magnets for flange-mounted brake

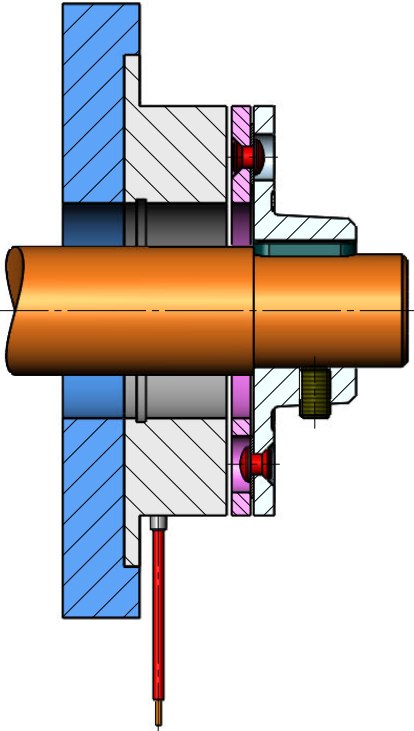
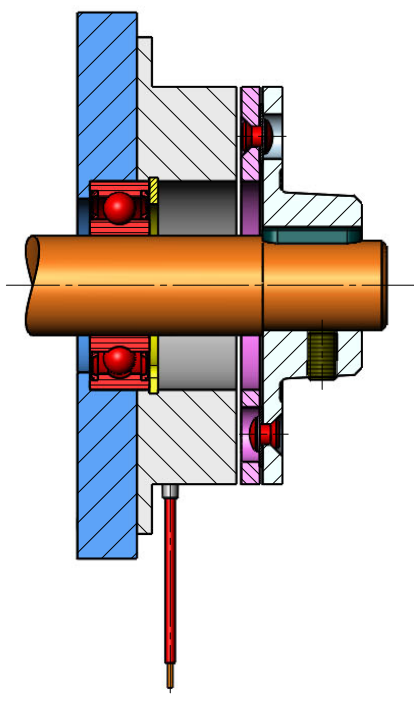
| | |
|---|---|
|  | <p>Outside centering (e.g. 01...12-02-110/120/130/320-xxxx)</p> <p>The magnet can be centered via the outside diameter of the magnet and screwed to the mounting surface with socket head screws (e.g. DIN 4762, 8.8).</p> |
|  | <p>Inside centering (e.g. 01...12-02-110/120/130-xxxx)</p> <p>The magnet can be centered via the inside diameter of the magnet and screwed to the mounting surface with socket head screws (e.g. DIN 4762, 8.8). During mounting, insert the circlip into the magnet if the bearing is to be axially fixed.</p> |

Figure 2: Mounting the magnets for flange-mounted brake

4.2.2 Example 1: Brake without hub (e.g. 01...12-02-110xxxx)

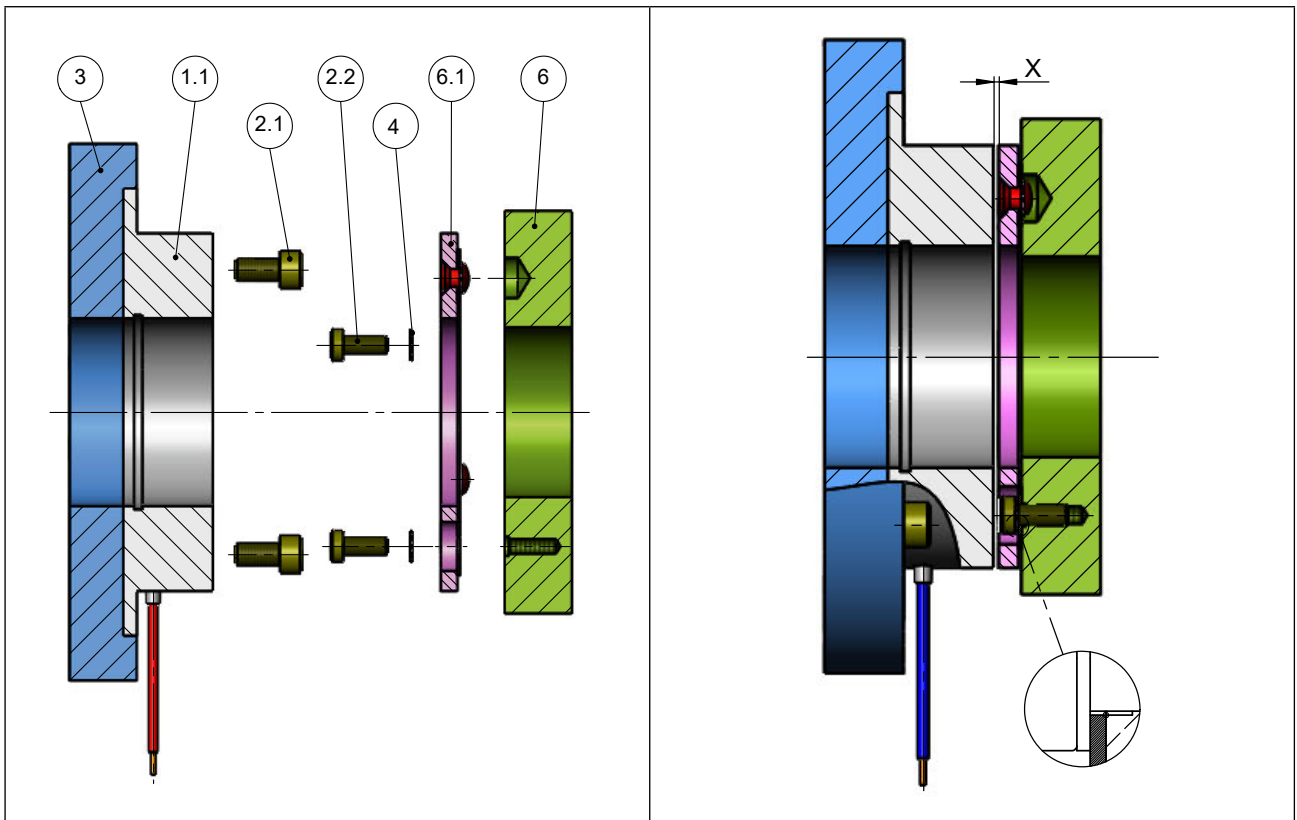


Figure 3: Example 1: Brake without hub (e.g. 01...12-02-110xxxx)

- ▶ The screw-on surfaces (3, 6) must be designed by way that the air gap X is automatically created during assembly.
- ▶ If necessary, the air gap X can be adjusted with adjusting washers between armature element (6.1) and screw-on surface.
- ▶ Mount the magnet (1.1) with the socket head screws (2.1) to the mounting surface (3).
- ▶ Place the armature element (6.1) against the screw mounting surface on the customer side (6) and tighten the socket head screws (2.2) lightly with the Schnorr lock washers (4).
- ▶ Align the armature element and tighten the socket head screws.
- ▶ Mount the component (6).
- ▶ Secure the component (6) axially.
- ▶ Check the air gap X. Adjust it, if necessary.

4.2.3 Example 2: Brake with armature element - hub neck inside (e.g. 01...12-02-120-xxxx)

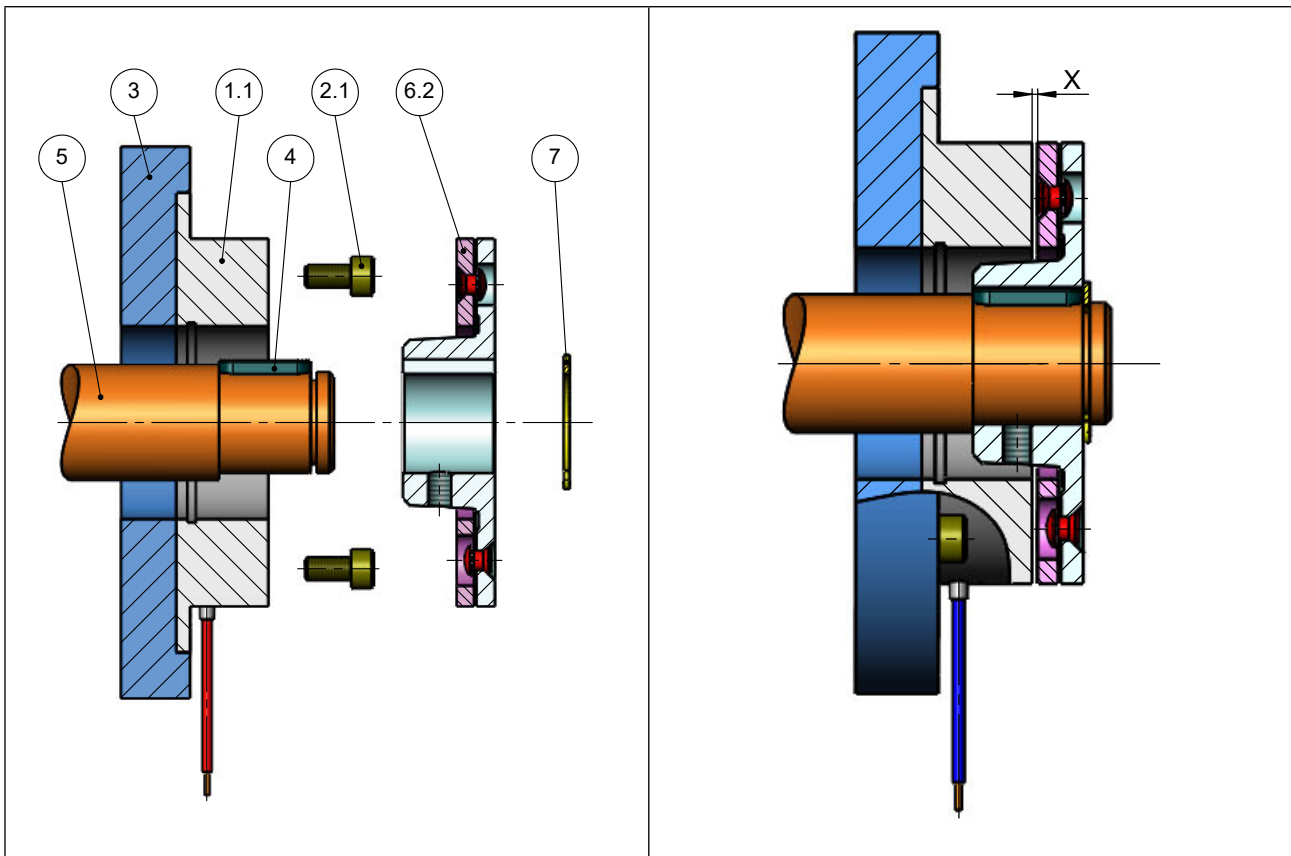


Figure 4: Example 2: Brake with armature element - hub neck inside (e.g. 01...12-02-120-xxxx)

- ▶ The shaft of the motor and the mounting surface (3) must be constructed by way, that during mounting the air gap X occurs automatically.
- ▶ If necessary, the air gap X can be adjusted with adjusting washers between armature element (6.2) and shaft (5).
- ▶ Mount the feather key (4) into the shaft (5).
- ▶ Mount the magnet (1.1) with the socket head screws (2.1) to the mounting surface (3).
- ▶ Push the armature element (6.2) onto the motor shaft (5) with mounted feather key (4).
- ▶ Secure the armature element (6.2) with a retaining ring (7) axial onto the motor shaft (5).
- ▶ Check the air gap X. Adjust it, if necessary.

4.2.4 Example 3: Brake with armature element - hub neck outside (e.g. 01...12-02-130-xxxx)

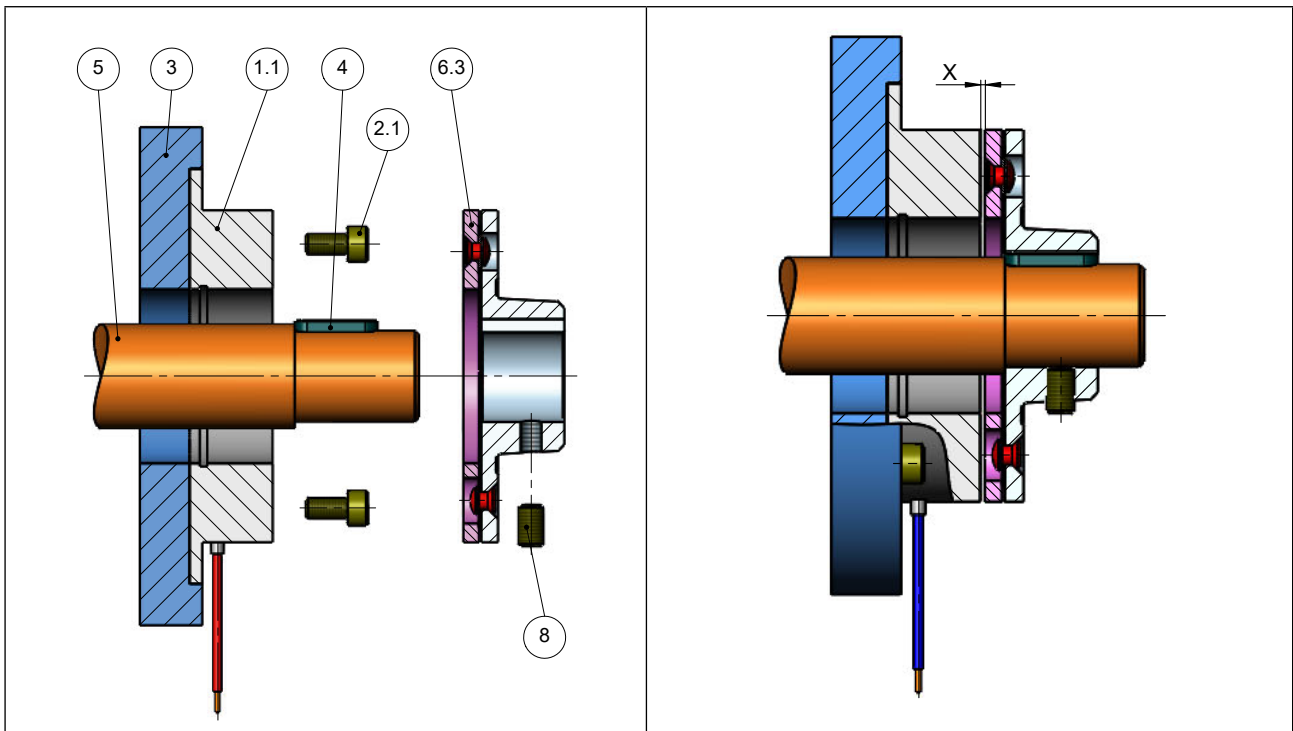


Figure 5: Example 3: Brake with armature element - hub neck outside (e.g. 01...12-02-130-xxxx)

- ▶ The shaft of the motor and the mounting surface (3) must be constructed by way, that during mounting the air gap X occurs automatically.
- ▶ If necessary, the air gap X can be adjusted with adjusting washers between armature element (6.3) and shaft (5).
- ▶ Mount the feather key (4) into the shaft (5).
- ▶ Mount the magnet (1.1) with the socket head screws (2.1) to the mounting surface (3).
- ▶ Push the armature element (6.3) onto the motor shaft (5) with mounted feather key (4).
- ▶ Secure the armature element (6.3) with a shaft-end disc or retaining ring or with a threaded pin (8) axially onto the motor shaft (5). Check the air gap X. Adjust it, if necessary.

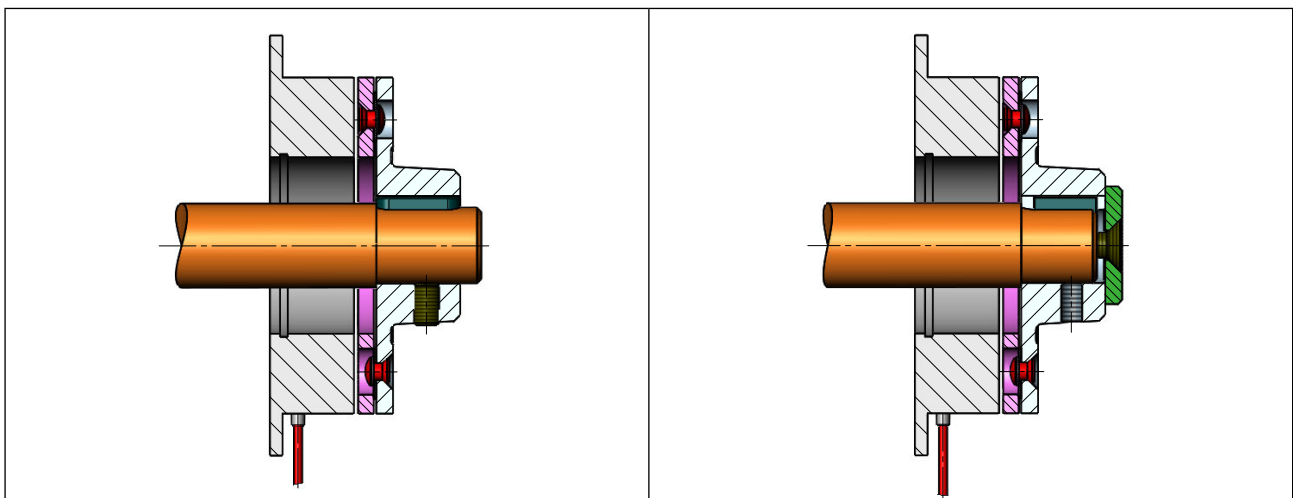


Figure 6: Mounting with threaded pin

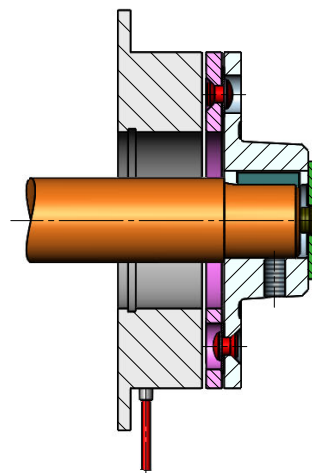


Figure 7: Mounting with shaft-end disc

4.2.5 Example 4: Brake with armature element - hub neck inside (e.g. 06...10-02-320-xxxx)

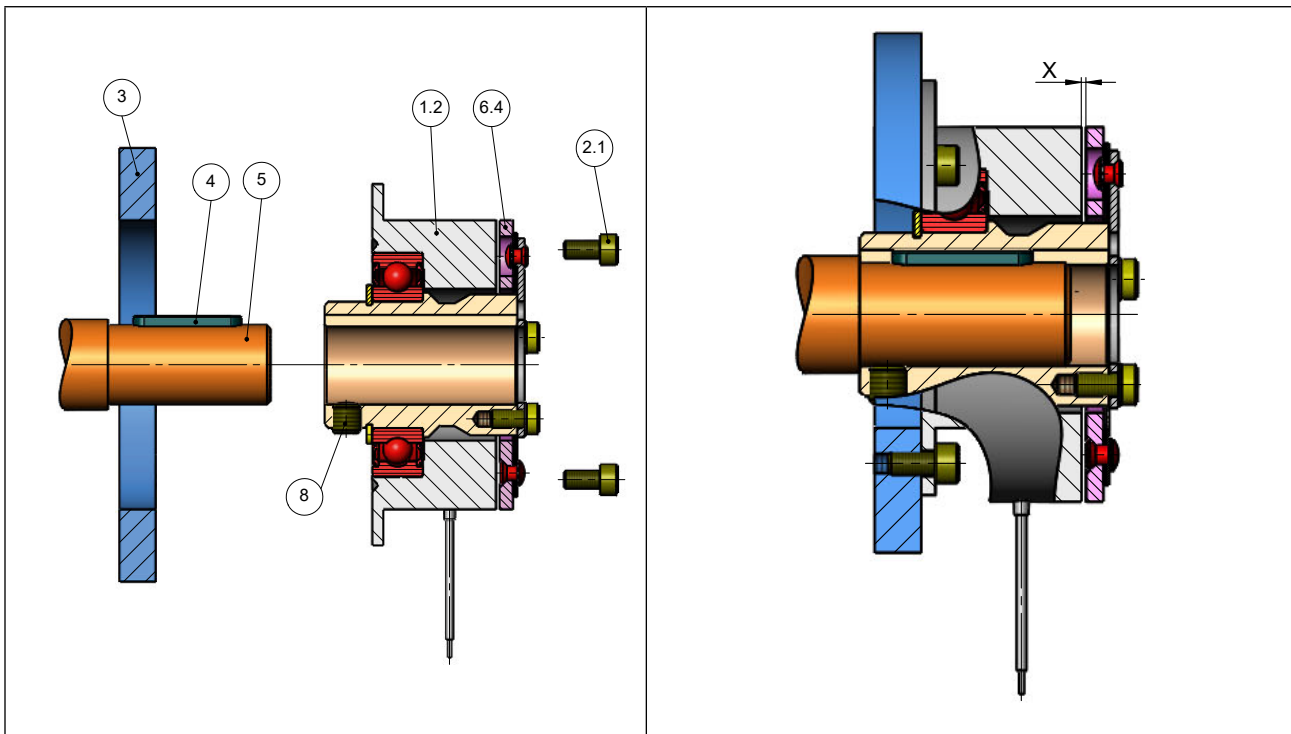


Figure 8: Example 4: Brake with armature element - hub neck inside (e.g. 06...10-02-320-xxxx)

- ▶ The shaft mounted brake is pre-assembled. Adjustment of the air gap X is not required.
- ▶ Mount the feather key (4) into the shaft (5).
- ▶ Push the complete brake (1.2, 6.4, 8) onto the shaft (5) with mounted feather key (4).
- ▶ Mount the magnet (1.2) with the socket head screws (2.1) to the mounting surface (3).
- ▶ If the magnet flange shall be used as torque arm, the hub is pushed onto the motor shaft (5) with mounted feather key (4) and secured axially on the shaft (5) with the mounted threaded pins (8). The mounting holes are used to secure the flange to the torque arm.

4.2.5.1 Check air gap X.

Further information on the air gap which becomes larger as a result of wear => „9.2.2 Check air gap“.

4.3 Tightening torques of the threaded pins

Tightening torques of the threaded pins according to *DIN EN ISO 4029*.

| Threaded pin | Tightening torque in Nm |
|--------------|-------------------------|
| M3 | 0.9 |
| M4 | 2.5 |
| M5 | 5 |
| M6 | 8.5 |
| M8 | 20 |
| M10 | 40 |
| M12 | 65 |

Table 6: Tightening torques of the threaded pins

5 Electrical connection

⚠ DANGER



Electrical voltage at brake and motor!

Danger to life due to electric shock!

- ▶ When carrying out any work on the brake, switch off the supply voltage and secure it against switching on.

NOTICE

Voltage peaks when switching off!

- ▶ Install protective circuit for brake and control.
- ▶ The protective circuit extends the connection times.

5.1 Connection of the brake

NOTICE

Destruction of the brake in case of incorrect voltage supply

- ▶ The brake is operated with DC voltage.
- ▶ Read the rated voltage from the magnet marking or the nameplate of the brake.
- ▶ Compare with existing voltage source.
- ▶ The maximum input voltage U_{in} must not be exceeded.
- ▶ Only connect if the values match.

If no suitable DC voltage is available for DC 105V, or DC 205V, the following KEB accessories can be used:

- Half and full-wave rectifier (COMBITRON 91)
- Fast acting rectifier (COMBITRON 98)

The brake COMBINORM Type B is delivered with factory-preassembled connecting cables:

| COMBINORM Type B | 01...06 | 07...12 |
|--|---------------------|---------|
| Strand cross-sections in mm ² | 0.25 | 0.75 |
| Strand length standard in mm | 400 ⁺¹⁰⁰ | |
| <i>Table 7: Connection of the brake</i> | | |

6 Start-up

6.1 Inspections prior to start-up of the brake

6.1.1 Visual inspection

- Do the connection and rated voltage (nameplate / magnet labelling) match?
- Are external damages visible?
- Are there impurities in the functional area or foreign bodies in the air gap of the brake?

6.1.2 Load-free testing

- Ensure that the brake is unloaded.
- Release/close the brake by switching the voltage supply.

NOTICE**Damage due to non-observance!**

- ▶ Do not put into operation if one of the tests is not OK.

6.1.3 Run in of the brake

NOTICE**Damage due to insufficient torque!**

- ▶ The torque is only reached after the brake has run in.

Notes on run in process:

- Do not energise the magnet.
- Let the drive/motor rotate with a speed of 25 rpm.
- Carry out the following function run in:
 - ▶ See „6.1.3.1 Function run in“.
- Stop the drive / motor.
- Check the torque.
- If the torque is not reached, the cycle must be repeated.

NOTICE

Lower braking torque than holding brake!

- ▶ If the brake is only used as a holding brake without dynamic load, the braking torque may drop. A new run in (refreshment) must be done within the scope of maintenance.

6.1.3.1 Function run in

Application: First run in at the customer, 100% run in at KEB.

| Device size | 01 | 02 | 03 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 |
|-------------------|----|----|----|----|-----|----|----|----|----|----|----|
| Slip time t / s | 1 | | | | | | | | | | |
| Idle time t / s | 1 | | | | 0.5 | | | | | | |
| Speed n / rpm | 25 | | | | | | | | | | |
| Switching cycles | 20 | | | | | | | | | 15 | |

Table 8: *Function run in*

6.1.3.2 Maintenance run in

Application: Brake recovery due to unfavorable operating conditions.

| Device size | 01 | 02 | 03 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 |
|-------------------|----|----|----|----|-----|----|----|----|----|----|----|
| Slip time t / s | 1 | | | | | | | | | | |
| Idle time t / s | 1 | | | | 0.5 | | | | | | |
| Speed n / rpm | 25 | | | | | | | | | | |
| Switching cycles | 3 | | | | | | | | | | |

Table 9: *Maintenance run in*



A maintenance interval of 4 weeks is recommended for normal industrial applications.

NOTICE

Lower braking torque than holding brake!

- ▶ If the brake is only used as a holding brake without dynamic load, the braking torque may drop. A new run in (refreshment) must be done within the scope of maintenance.

7 Operation

The brake is only electrically controlled.
There are no manual operating options.

8 Troubleshooting

The following table shows some causes and solutions of malfunctions during brake operation. If this does not solve the problem or if other malfunctions occur, please contact our service department.

| Malfunction | Cause | Measures |
|--|---|--|
| Brake does not close | Incorrect voltage | Only operate the brake with the correct voltage (=> Magnet marking) |
| | Air gap too large, maximum air gap reached | Replace the brake |
| | Foreign objects between armature and magnet | Remove the foreign objects |
| | Magnet coil or connection cable defective | Replace the magnet |
| | Excessive heating | Install a high-speed circuit breaker (for example, KEB Powerbox) |
| No braking function | Friction surfaces contaminated | Replace the brake |
| Brake does not open | Foreign objects between hub and armature | Remove the foreign objects |
| Brake opens with a delay, long release time. | Brake is switched on the AC side | Switch the brake on DC side |
| <i>Table 10: Troubleshooting</i> | | |

9 Maintenance and service

- Observe the general safety instructions.
- The brake must not be under voltage during maintenance and repair work!
- Protect electrical and electronic components from splash water.

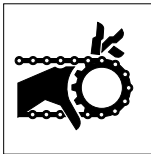
9.1 Maintenance intervals

The brake COMBINORM type B is mainly maintenance-free. As a result of wear occurring during operation, the air gap increases. The function of the brake can only be ensured when the air gap X is checked at regular intervals.

9.2 Service

Service is required if, in accordance with the fault table, there are symptoms of damaged or soiled friction surfaces, unusual noises or smells.

⚠ CAUTION



Limbs crushed!

Securing the load!

- ▶ Mechanically secure the load against unintended movement.
- ▶ Release brake from load.
- ▶ Dismounting of the brake according to manual.

9.2.1 Dismount the brake

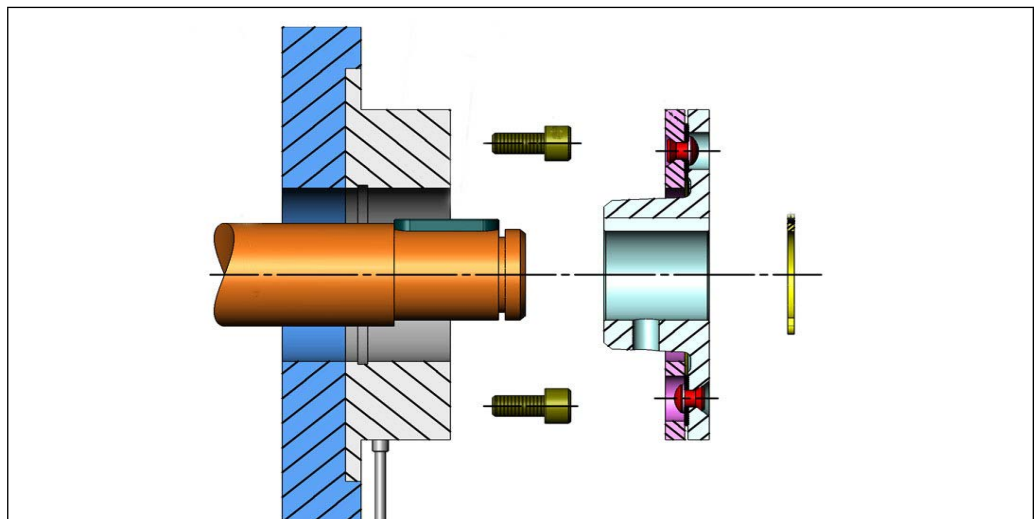


Figure 9: Dismount the brake

- ▶ Disconnect the connection cables from the voltage supply.
- ▶ Dismount armature element from the shaft (=> Instruction manual of the motor).
- ▶ Remove the four socket head screws.
- ▶ Remove the brake from the shaft backwards.

9.2.2 Check air gap

As a result of wear occurring during operation, the air gap increases. To ensure proper functioning, the air gap X needs to be checked at regular intervals. When checking the air gap pay attention that parallelism and axial run-out tolerances must be added to the rated air gap X.

| Size | Air gap | |
|------|---------------|----------------------------|
| | Rated value X | Limit value $X_{max}^{1)}$ |
| | mm | mm |
| 01 | 0.1 | 0.3 |
| 02 | 0.15 | 0.35 |
| 03 | 0.15 | 0.35 |
| 05 | 0.2 | 0.5 |
| 06 | 0.2 | 0.6 |
| 07 | 0.2 | 0.7 |
| 08 | 0.2 | 0.8 |
| 09 | 0.3 | 0.9 |
| 10 | 0.3 | 1.0 |
| 11 | 0.4 | 1.2 |
| 12 | 0.4 | 1.4 |

Table 11: Check air gap

¹⁾ The air gap where replacement is recommended.

9.2.2.1 Checking the air gap X

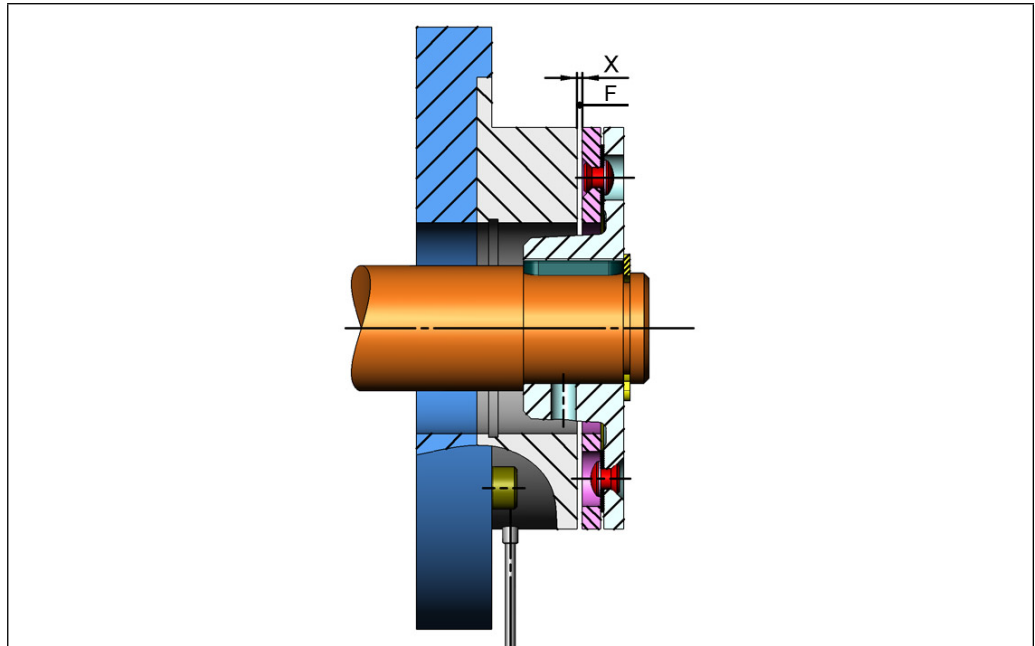


Figure 10: Checking the air gap

- ▶ Use a feeler gauge (F) to check the air gap X.
- ▶ The brake must be replaced if the air gap X is greater than X_{max} .

9.2.3 Exchange the brake

- ▶ On exchange the brake with armature element must be completely replaced.
- ▶ Disconnect the connecting cable(s) from the voltage supply.
- ▶ Dismount the brake (=> "9.2.1 Dismount the brake").
- ▶ The brake is assembled in reverse order (=> "4.2 Mounting the brake").
- ▶ Functional test and start-up (=> "6 Start-up").

10 Dismounting and disposal

10.1 Dismounting

For dismounting the brake => „9.2.1 Dismount the brake“.

10.2 Disposal



Separated according to the materials used, dispose of the electromagnetic brake components in compliance with the applicable local environmental regulations.

The corresponding key numbers are subject to change depending on the disassembling process (metals, plastics and cables).

The components can be disposed of as follows:

Magnet with coil, lining, cables and all other steel parts:

Core scrap

(Key No.: EAK 12 01 02)

Aluminium components:

Nonferrous metals (this includes copper) (Key No.: EAK 16 01 18)

11 Certifications

11.1 EU declaration of conformity

EU KONFORMITÄTSERKLÄRUNG



Dokument-Nr. / Monat.Jahr: ce_bc_rns-bc-b_de.docx / 01.2022

| | | |
|---------------------|--|---|
| Hersteller: | KEB Automation KG Südstraße 38 32683 BARNTRUP | |
| Produktbezeichnung: | Federdruck - Bremsen Permanentmagnet Bremsen Elektromagnet Kupplung und Bremsen Kupplungs – Bremsen Kombinationen in einem Gehäuse | COMBISTOP COMBIPERM COMBINORM COMBIBOX |
| | Größe Spannungsklassen | 01 bis 14 71...440Vdc / 50 ... 690Vac |

Diese Konformitätserklärung ist unter alleiniger Verantwortung der KEB Automation KG erstellt worden

Das bezeichnete Produkt stimmt mit den Vorschriften folgender Europäischer Richtlinien überein:

| | |
|---------|---|
| Number: | Niederspannung : 2014 / 35 / EU |
| Text: | Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedsstaaten betreffend elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen. |
| Number: | Gefährliche Substanzen: 2011 / 65 / EU (inkl. 2015 / 863 / EU) |
| Text: | Richtlinie des Rates zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten. |

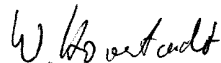
Weitere Angaben zur Einhaltung dieser Richtlinien enthält der Anhang.

Anbringung der CE-Kennzeichnung: ja

Aussteller: KEB Automation KG
Südstraße 38
32683 BARNTRUP

Ort, Datum Barntrup, 28.12.2021

Rechtsverbindliche Unterschrift:



i. A. W. Hovestadt / Normenbeauftragter



W. Wiele / Technischer Leiter

Die Anhänge sind Bestandteil dieser Erklärung.
Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften.

Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

EU DECLARATION OF CONFORMITY



ANHANG 1

Dokument-Nr. / Monat.Jahr: ce_bc_rms-bc-b_de.docx / 01.2022

| | | |
|---------------------|---|-----------------------------|
| Produktbezeichnung: | Federdruck - Bremsen | COMBISTOP |
| | Permanentmagnet Bremsen | COMBIPERM |
| | Elektromagnet Kupplung und Bremsen | COMBINORM |
| | Kupplungs – Bremsen Kombinationen in einem Gehäuse | COMBIBOX |
| Größe | | 01 bis 14 |
| Spannungsklassen | | 71...440Vdc (50 ... 690Vac) |

Die Übereinstimmung des bezeichneten Produktes mit den Vorschriften der Richtlinie 2014/35/EU wird nachgewiesen durch die vollständige Einhaltung der folgend angegebenen harmonisierten Normen.

| EN - Norm | Text | Referenz | Ausgabe |
|--------------------------|---|----------|-----------|
| ----- | Elektromagnetische Geräte und Komponenten | VDE 0580 | 11 / 2011 |
| Informativ | | | |
| EN 50178 Ausgabe 1997 | Ausrüstung von Starkstromanlagen mit elektronischen Betriebsmitteln | VDE 0160 | 04 / 1998 |

Richtlinie 2011/65/EG und der Änderung über 2015/863/EU wird nachgewiesen durch die Qualifikation von Bauteilen und Fertigungsverfahren im Rahmen der durch ISO 9001 vorgegebene Qualitätssicherung. Die entsprechenden Informationen und Beschreibungen sind dokumentiert und abgelegt.

| | |
|----------------|---|
| EN 63000: 2018 | Technische Dokumentation zur Beurteilung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe |
|----------------|---|

Das bezeichnete Produkt wurde unter einem umfassenden Qualitätsmanagementsystem entwickelt, hergestellt und geprüft.

Die Konformität des Qualitätsmanagementsystems nach DIN ISO 9001 wurde bescheinigt durch:

| | |
|-------------------------------|---|
| Notifizierte Stelle: | TÜV - CERT |
| Anschrift: | Zertifizierungsstelle des RWTÜV Steubenstrasse 53 D - 45138 Essen |
| Nummer der Bescheinigung | 041 004 500 |
| Ausstelldatum: | 20.10.94 |
| Gültig durch Nachprüfung bis: | 12.2024 |

Figure 11: EU declaration of conformity

11.2 CSA Certificat



Certificate of Compliance

| | | | |
|---------------------|--|-------------------------|-----------------------|
| Certificate: | 1267150 (LR49670) | Master Contract: | 172220 (049670_0_000) |
| Project: | 70199031 | Date Issued: | 2018-10-05 |
| Issued to: | KEB Automation KG Suedstrasse 38 32683 Barntrop, GERMANY | | |

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.



Issued by: *Khalil Ouldchama*
Khalil Ouldchama

PRODUCTS

CLASS - C321107 - INDUSTRIAL CONTROL EQUIPMENT-Miscellaneous Apparatus
 CLASS - C321187 - INDUSTRIAL CONTROL EQUIPMENT-Miscellaneous Apparatus - Certified to US Standards

Spring Applied Brakes, COMBISTOP, open type, 290 VDC de or less, insulation Class B or F: Type 08 (dimensions OB - 10), 6 - 180 W

Type 28 (dimensions 01 - 10), 16 - 130 W
 Type 31 (dimensions 01 - 08), 16 - 75 W
 Type 38 (dimensions 02 - 11), 25 - 280 W
 Type 71 (dimensions 00 - 11), 6 - 300 W

Permanent Magnet Brakes, COMBIPERM, open type, 205 VDC or less, insulation Class F:
 Type P1 (dimensions 01 - 10), 8 - 50 W
 Type 15 (dimension 02-10), 8 - 50 W

Electromagnetic Clutches and Brakes, COMBINORM, open type, 205 VDC or less, insulation Class B or F:
 Type 02 (dimensions 01 - 13), 6 - 85 W
 Type 03 (dimensions 01 - 13), 6 - 85 W
 Type 04 (dimensions 05 - 12), clutches 15 - 85 W; brakes 15 - 85 W



Certificate: 70199031

Master Contract: 172220

Project: 70199031

Date Issued: 2018-10-05

Notes:

1. The first two figures define the size of the product. The next two figures describe the product type, e.g. COMBISTOP. The following three figures describe the design and the last four figures describe the layout of the product type.
2. Component magnets equipped with not certified leads are supplied with levels acceptable for extra low Voltage, energy limited circuits only. Final acceptability is subjected to re-evaluation by CSA in the end use.

APPLICABLE REQUIREMENTS

CSA-C22.2 No. 14-18 - Industrial Control Equipment
ANSI/UL 508, Ed.17 - Industrial Control Equipment



Supplement to Certificate of Compliance

Certificate: 1267150 (LR49670)

Master Contract: 172220 (049670_0_000)

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

| Project | Date | Description |
|----------------|-------------|--|
| 70199031 | 2018-10-05 | Update of report to cover correction of issued address and to update report in accordance with CSA-C22.2 No. 14-18 and Certification notice Industrial Control Equipment No. 60 , dated at April 26, 2018. |
| 1817504 | 2006-08-25 | Alternate construction and re-testing of brakes and clutches, series Combistop, Combiperm and Combinom. Rated voltage raised to 205 Vdc for Combiperm and Combinom. |
| 1267150 | 2002-04-08 | cCSAus Certification on Electromagnetic brakes and clutches; COMBISTOP, Types 08, 28, 31, 38, 71; COMBIPERM, Types PI, 15; COMBINORM, Types 02, 03, 04. |

Figure 12: CSA Certificat

12 Revision history

| Version | Date | Description |
|---------|---------|---|
| 01 | 2011-09 | First edition |
| 02 | 2021-06 | Complete editorial revision, change of cover picture, content adjustments |
| 03 | 2023-09 | Technical adjustments |

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