



# COMBISTOP T

INSTRUCTIONS FOR USE | INSTALLATION TYPE 28

Translation of the original manual  
Document 20193433 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:

<b>DANGER</b>	Dangerous situation, which will cause death or serious injury in case of non-observance of this safety instruction.
<b>WARNING</b>	Dangerous situation, which may cause death or serious injury in case of non-observance of this safety instruction.
<b>CAUTION</b>	Dangerous situation, which may cause minor injury in case of non-observance of this safety instruction.
<b>NOTICE</b>	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](http://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](http://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 wire gauge
B2B	Business-to-business
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)
DC	DC current or voltage
DIN	German Institut 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
IEC	International standard
IP xx	Degree of protection (xx for level)
KEB product	The KEB product is subject of this manual.
Manufacturer	The manufacturer is KEB, unless otherwise specified (e.g. as manufacturer of machines, engines, vehicles or adhesives).
MCM	American unit for large wire cross sections
MTTF	Mean service life to failure
NN	Sea level
PE	Protective earth
PELV	Protective Extra Low Voltage
SELV	Safety Extra Low Voltage (< 60 V)

## Standards for mechanical components

VDE 0580	Electro magnetic devices and components
DGUV regulation 3	Electrical installations and equipment
DIN 46228-1	Tubular end-sleeves without plastic sleeve
DIN 46228-4	Tubular end-sleeves with plastic sleeve
DIN IEC 60364-5-54	Low-voltage electrical installations - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements, protective conductors and protective bonding conductors
EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 44/709/CDV)
EN 60529	Degrees of protection provided by enclosures (IP Code) (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: 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: Transportation and handling (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 then 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
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, low pattern
DIN 332-2	Center holes 60° with thread for shaft ends for rotating electrical machines

# 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 use for handling.

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

Don't storage 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.
- ▶ Measures against freezing and/or formation of ice on the friction surfaces.
- ▶ Take suitable measures against high humidity, aggressive vapors/liquids or similar that lead to corrosion and 'sticking' of the surface.

### 1.4 Electrical Connection

#### **⚠DANGER**



#### **Electrical voltage at brake and motor!**

#### **Danger to life due to electric shock!**

- ▶ Only an electrician may work on the electrical power supply.
- ▶ When carrying out any work on the brake, switch off the supply voltage and secure it against switching on.
- ▶ Never bridge upstream protective devices (also not for test purposes).
- ▶ Standardised inspection of the protective earth conductor connection to all exposed 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 brake 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 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 COMBISTOP type 28 brake is an electromagnetically actuated dual-surface spring-applied brake for dry running. It can be used for applications where high demands to the degree of protection are made.

The brake is optionally completely closed on the back (version G10/G20) or prepared for the installation of tachogenerators (type G1T/G2T) or equipped with a shaft sealing ring (version G1W/G2T).

Using the optional hand release (version G20, G2T and G2W) the brake can be manually opened even in the event of a malfunction.

### 2.1 Intended use

Spring-applied brakes are used to brake rotating masses or to hold the shafts.

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.

The technical data and information for connection conditions can be found on the nameplate and in the instructions for use and must be 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 may overheat due to wrong design 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.

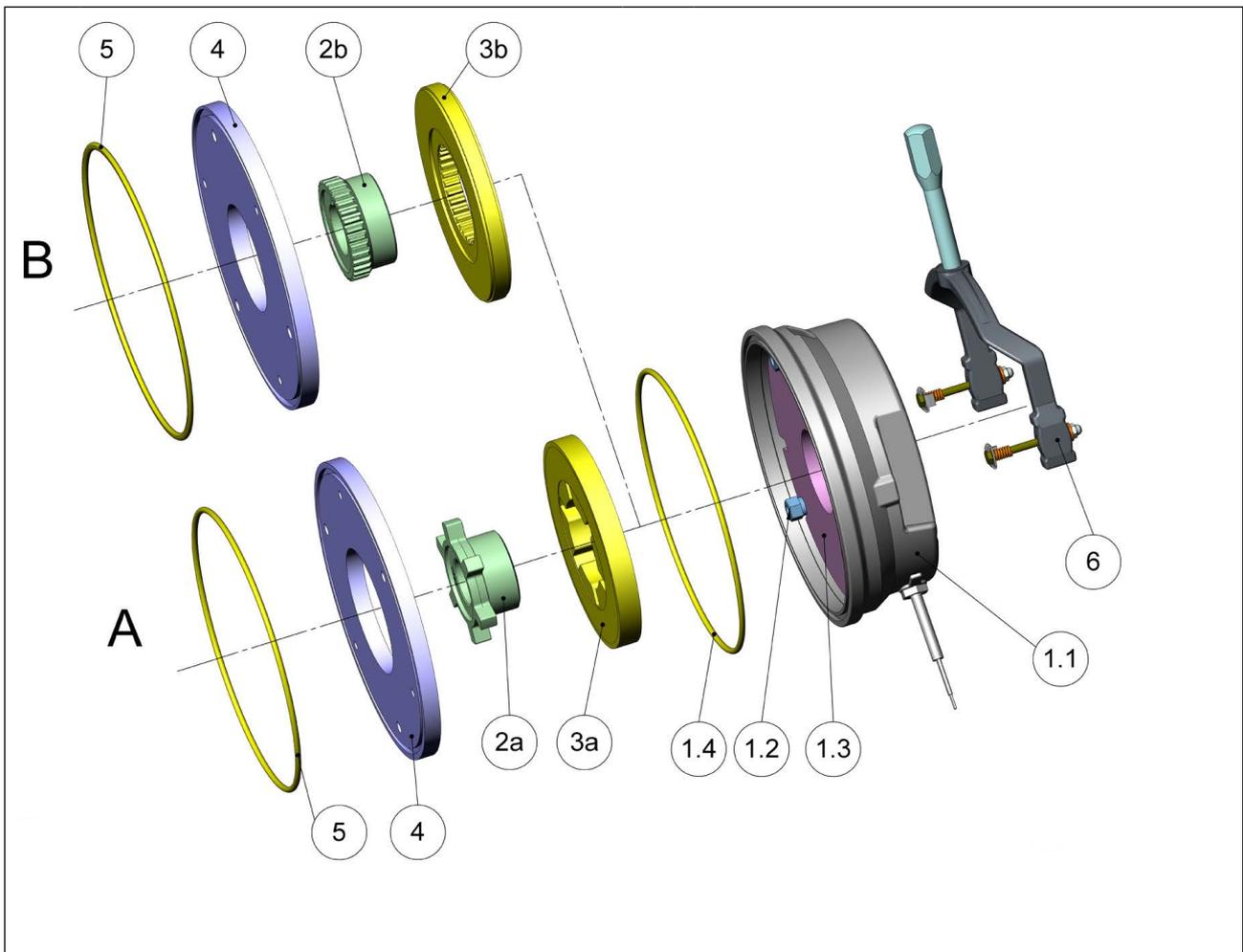
## 2.4 Type code

The type designation and the version can be found on the nameplate or on the marking.

<b>x x</b>	<b>2 8</b>	<b>G</b>	<b>x</b>	<b>x</b>	<b>-</b>	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
					Version	Customer versions			
					Housing	0: completely closed			
						T: for tacho mounting			
						W: Shaft sealing ring			
					hand release	1: without hand release			
						2: with hand release			
					Type	G: Holding brake IP65 <sup>1)</sup>			
					Series	COMBISTOP Type 28			
					Size	02...09			
<b>Table 1: Type code</b>									

<sup>1)</sup> IP65 only possible without manual release or micro switch.

### 2.5 Overview/Parts List



**Legend**

A	Size 02 to 06	1.4	Seal ring
B	Size 07 to 08	2	Hub
1	Magnetic system	3	Lining
1.1	Magnet	4	Flange (optional)
1.2	Adjusting spacer	5	Seal ring
1.3	Armature	6	Hand release (optional)

Figure 1: Parts list COMBISTOP Type 28

## 2.6 Functional description

The braking force is generated in de-energised state by pressure springs which press the armature and the lining against the friction surfaces. The lining is twist-proof but can be axially moved while connected to the shaft.

After applying the rated voltage, the coil inside the magnet creates a magnetic field which attracts the armature against the spring force. In this way, the linings are released and the shaft can rotate freely.

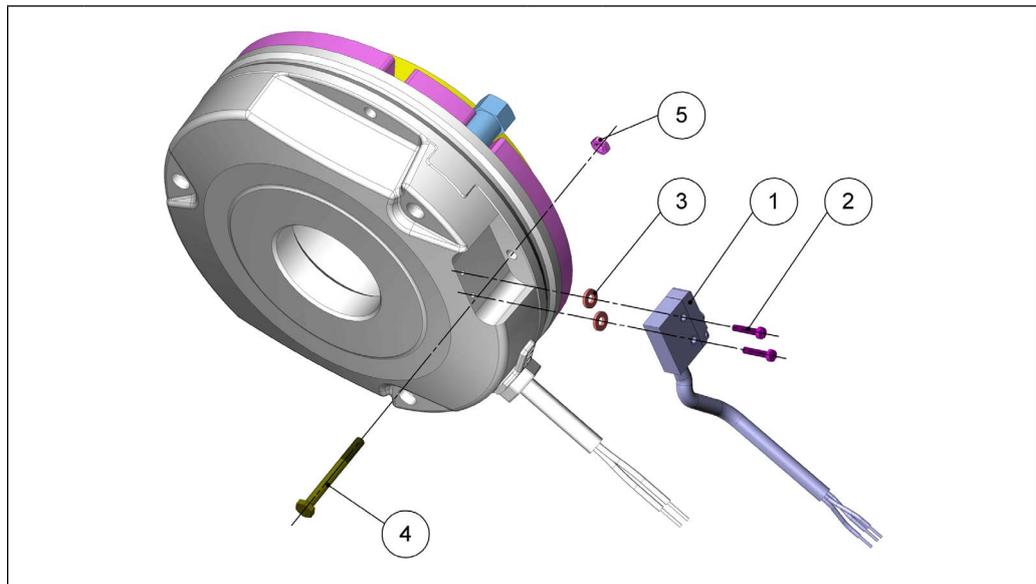
After disconnecting the voltage, the armature is de-energised. The pressure springs press the armature against the linings which generate the braking torque on the friction surfaces. This allows for decelerating downstream elements.

### 2.6.1 Micro switch



- A micro switch can only be retrofitted if the brake is prepared for it. For this reason, the variant must be ordered ex works.
- Protection class IP65 is no longer given if the brake is equipped with a micro switch!

A micro switch can be used to monitor the switching state of the armature (brake open/closed). The user is responsible to connect the electrical equipment and to evaluate the signals! The drive control must not allow the motor to start until the armature was attracted by the magnet, i. e., the lining can rotate freely.



**Legend**

1	Micro switch	4	Hexagon head screw
2	Socket head screw	5	Hexagon nut
3	Disc		

Figure 2: Brake with micro switch

For mor information on how to check and replace the micro switch, refer to section => „4.3 Micro switch (option)“.

## 3 Technical data

### 3.1 Operating conditions

#### 3.1.1 Climatic environmental conditions

Operation	Standard	Class	Notes
Ambient temperature	VDE 0580	–	-5...60°C (standard) -40...60°C (CCV: Cold Climate Version)

Table 2: Ambient temperature

Operation	Standard	Installation situation <sup>1)</sup>	Class	Notes
Construction and degree of protection	EN 60529	On free machine wall without hand release	IP66	–
		On free machine wall with hand release	IP65	
		Under fan cover without hand release	IP66	
		Under fan cover with hand release	IP66	

Table 3: Construction and degree of protection

<sup>1)</sup> However, due to the large number of possible applications, the functionality of the mechanical components must be tested under the specific operating conditions.

#### 3.1.2 Electrical operating conditions

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

Table 4: Device classification

### 3.2 Device data COMBISTOP T Type 28

#### 3.2.1 Overview

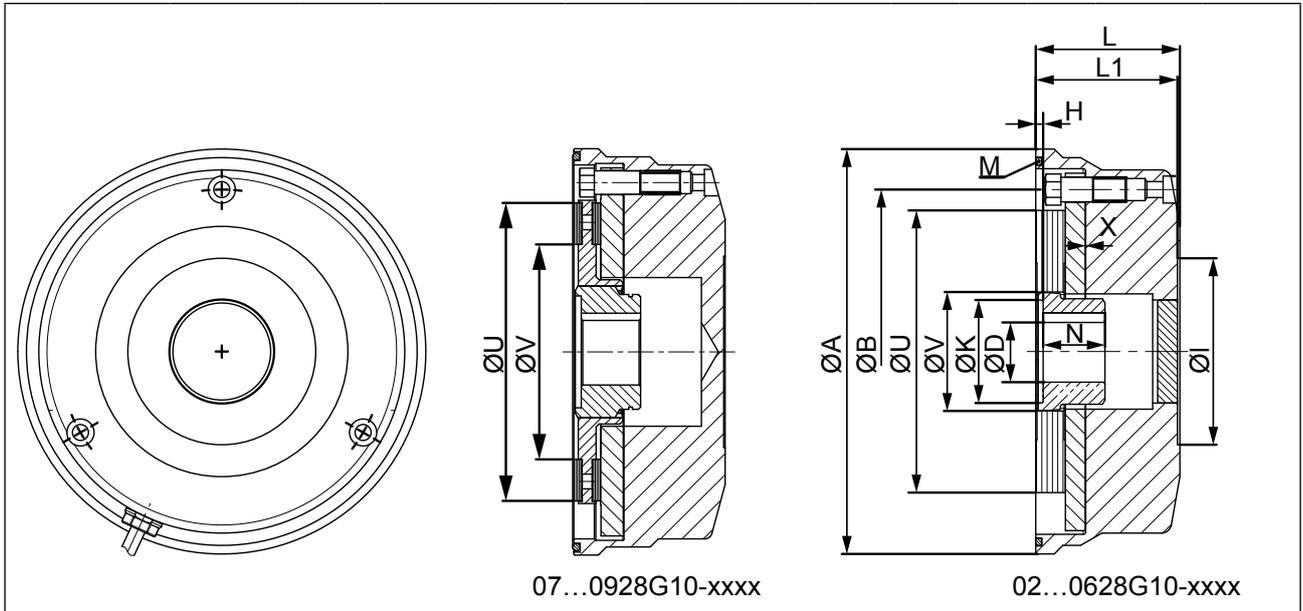
Device size		02	03	04	05	06	07	08	09
Characteristic torque	<sup>1)</sup> $M_2 / \text{Nm}$	6.5	13	25	45	90	130	200	330
Rated power	$P_{20} / \text{W}$	25	30	30	48	62	65	75	80
Rated voltage	<sup>2)</sup> $U_{N\_dc} / \text{V}$	24 / 105 / 180 / 205 <sup>3)</sup>							
Cyclic duration factor	$c.d.f. / \%$	100							
Speed for service braking	rpm	3000							1500
Max. speed for emergency braking	rpm	6000			5000		4500	3500	3000
Mass moment of inertia	$J / 10^{-3} \text{kgm}^2$	0.025	0.072	0.136	0.35	0.56	1.57	5.92	7.38
Air gap	$XN / \text{mm}$	0.4	0.5	0.6		1		1.2	
Switching cycles for half-wave rectifier	<sup>4)</sup> $SC1 / \text{rpm}$	60	40		25	5			2
Switching cycles for bridge rectifier	<sup>4)</sup> $SC2 / \text{rpm}$	120	75		50	10			5
Switching cycles with power box DC	$SC3 / \text{rpm}$	55	40		25	5			2
Separation time	<sup>5)</sup> $t_2 / \text{ms}$	40	60	100	120	240		300	350
Separation time with powerbox	<sup>5)</sup> $t_2 / \text{ms}$	20	35	50	60	120		150	170
Response delay AC	<sup>6)</sup> $t_{1\_ac} / \text{ms}$	40	80	140	180	200	400	700	900
Response delay DC	<sup>6)</sup> $t_{1\_dc} / \text{ms}$	10	15	20	25		50	60	
Linking time AC	<sup>7)</sup> $t_{1\_ac} / \text{ms}$	90	140	200	240	330	650	900	1200
Linking time DC	<sup>7)</sup> $t_{1\_dc} / \text{ms}$	20	30	50	55	90	150	180	220
Feather key	according to <i>DIN 6885-1</i>								
Keyway									
ISO class									

Table 5: Device data COMBISTOP T Type 28

- <sup>1)</sup> Measured at quasi-static differential speed 25rpm and 20 °C. Torque tolerance ±25% after conditioning run-in of the friction partners.
- <sup>2)</sup> Voltage tolerance ± 10%. Special voltages upon request.
- <sup>3)</sup> 105V/180V/205V fall under the Low-Voltage Directive => „11.1 EU Declaration of Conformity“.
- <sup>4)</sup> Maximum permissible switching cycles for DC side switching, continuous operation (100% c.d.f.) and max. operating temperature of 80 °C.
- <sup>5)</sup> Separation time from switching on the current to the beginning of the torque reduction. The values are to be regarded as guidelines.
- <sup>6)</sup> Time from switching off the current until the torque increases. The values are to be regarded as guidelines.
- <sup>7)</sup> Time from switching off the current until reaching 0.9 x rated torque  $M_2$ . The values are to be regarded as guidelines.

### 3.3 Dimensions and weights

#### 3.3.1 Version without options



Size	Dimensions / mm													Weight / kg	
	A	B	D <sub>max.</sub>	H	K	L	L1	M	N	U	V	X	I	28.G1	28.G2
02	98	72	15 <sup>1)</sup>	1-1.5	22	39	38	88x3	18	60	38	0.2	41	1.1	1.2
03	118	90	20	2-2.5	31	42.8	41.8	110x3	20	77	49	0.2	52	1.9	2.0
04	143	112	25	2-2.5	37	52.8	51.8	132x3	20	96	61.5	0.2	66	3.4	3.5
05	165	132	30	2.5-3	42	58.3	57.3	152x3	25	115	72	0.2	76	5.9	5.8
06	180	145	35 <sup>1)</sup>	2.5-3	42	68.8	67.8	170x3	30	115	72	0.3	88	8.3	8.5
07	210	170	45	3	57	74.2	73.2	196x4	30	150	93	0.3	100	12.6	13.4
08	240	196	60	4.5	57/76 <sup>2)</sup>	86.5	85.5	225x4	35	172	120	0.4	120	19.4	20.3
09	276	230	60	5	76	102	101	260x5	40	203	146	0.5	130	28.7	30.0

Figure 3: Dimensions without options

<sup>1)</sup> Keyway according to DIN 6885-3.

<sup>2)</sup> With hub bore > Ø45.

**3.3.2 Dimensions shaft sealing ring**

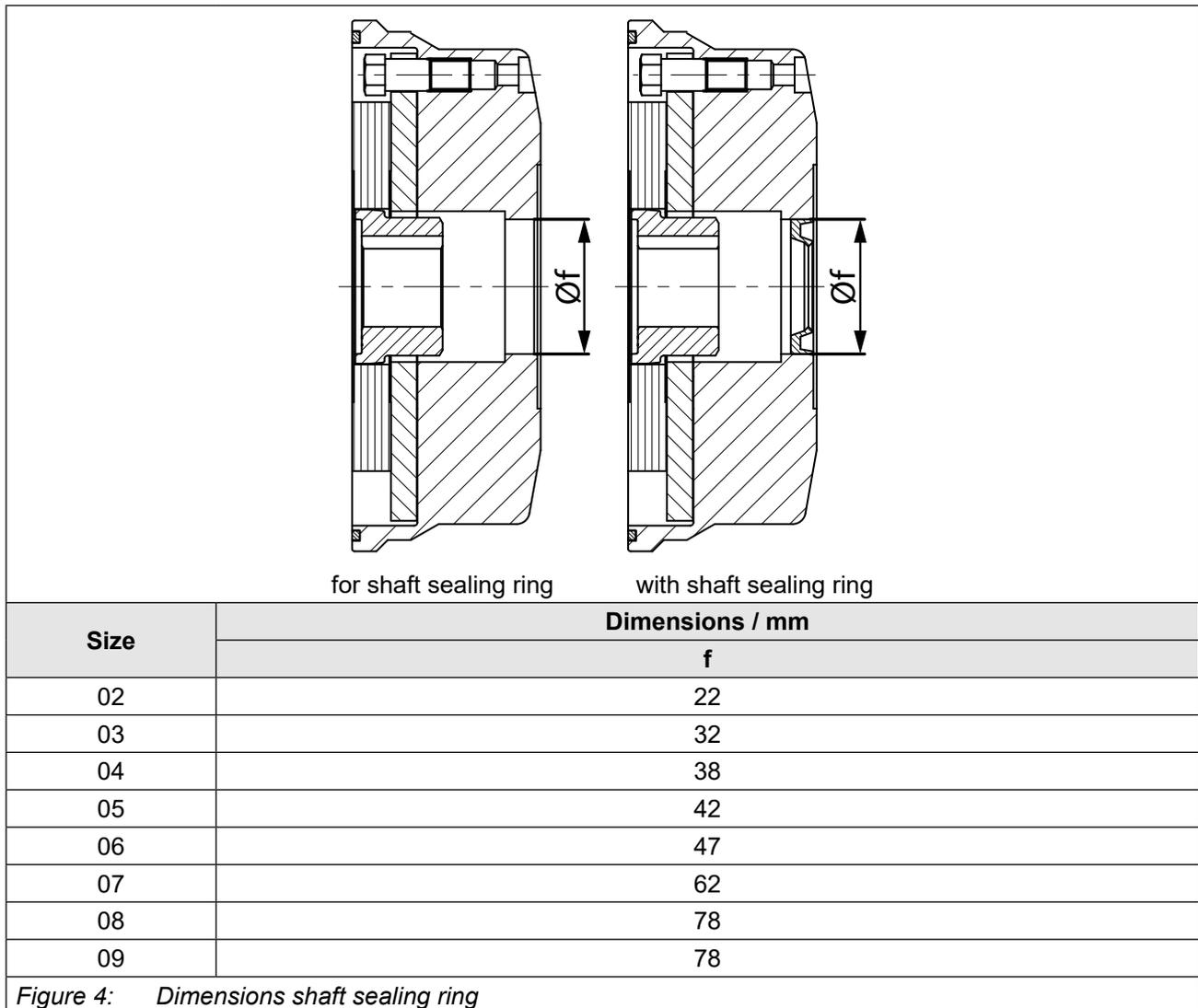
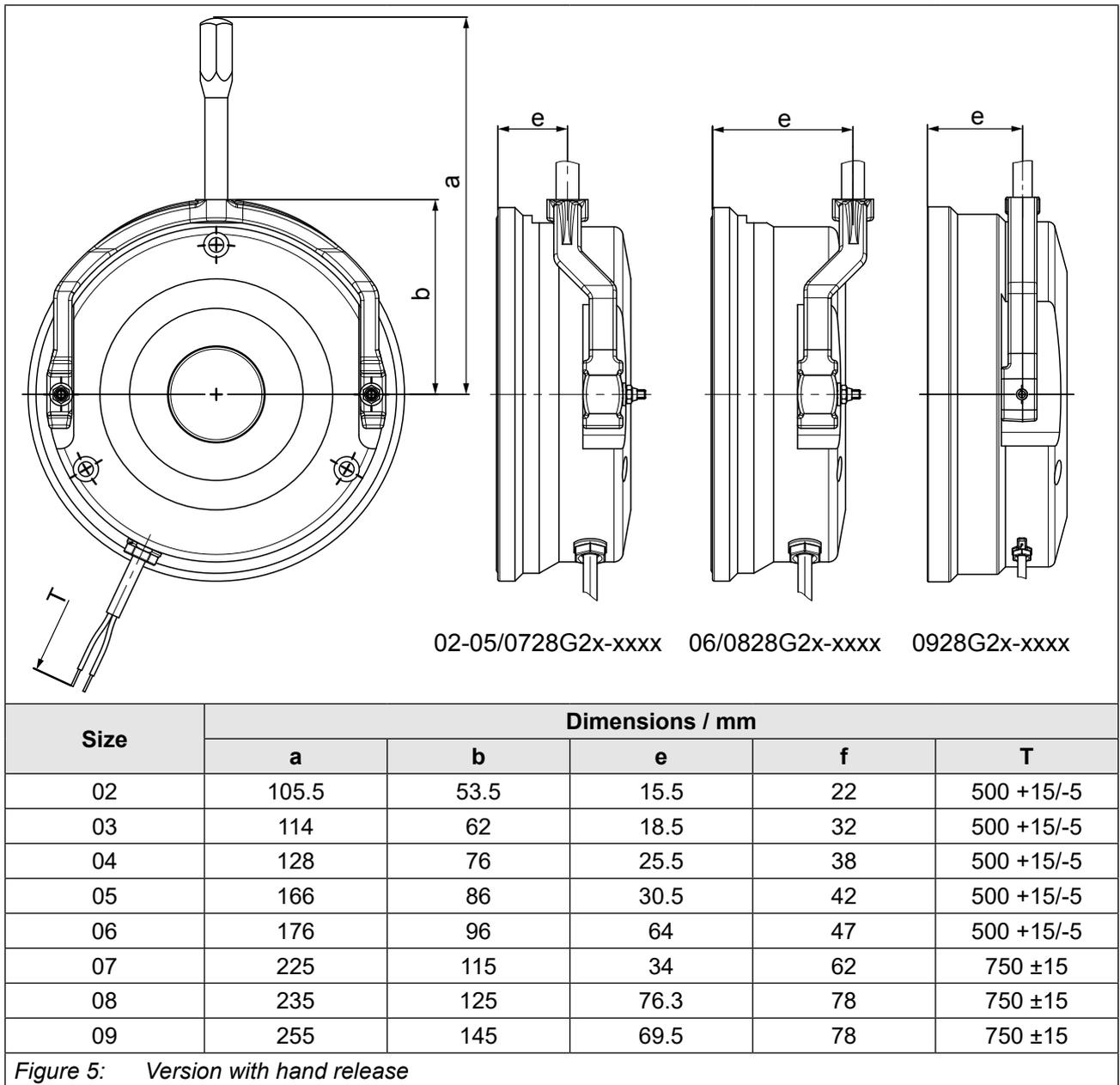
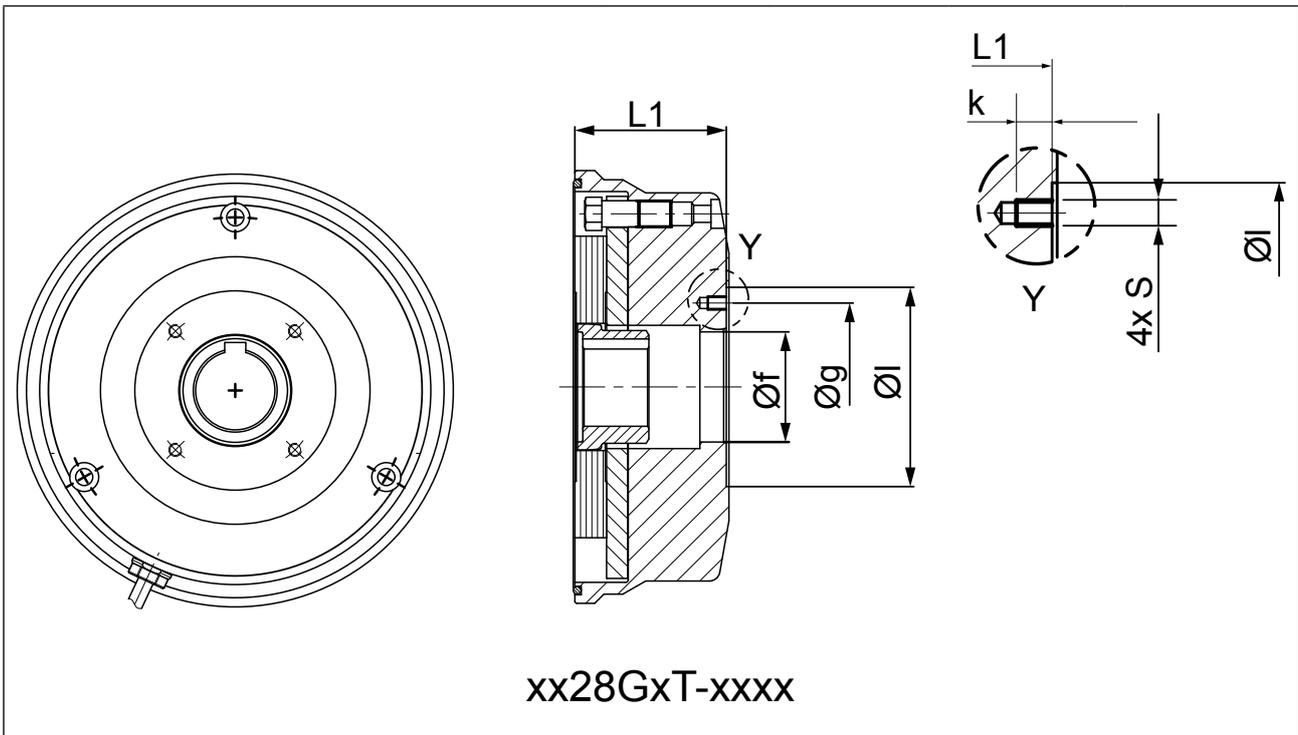


Figure 4: Dimensions shaft sealing ring

3.3.3 Version with hand release



3.3.4 Version for tachometer



Size	Dimensions / mm					
	f	g	k	l	L1	S
02	22	34	7	41	38	M4
03	32	40	7	52	41.8	M5
04	38	54	7	66	51.8	M5
05	42	64	7	76	57.3	M5
06	47	75	7	88	67.8	M5
07	62	85	8	100	73.2	M6
08	78	100	8	120	85.5	M6
09	78	110	8	130	101	M6

Figure 6: Version for tachometer

## 4 Mounting



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Unless otherwise stated, the numbers mentioned in this chapter refer to => „*Figure 1: Parts list COMBISTOP Type 28*“.

---

### 4.1 Notes on mounting

#### 4.1.1 Inspections to be done prior to mounting the brake

Before mounting the brake, check the following:

- ▶ Compliance of the ordered voltage and performance data with the type plate data.
- ▶ No damage to the brake or contamination by foreign particles in the area of operation or in the air gap of the brake.
- ▶ Provide a suitable second friction surface. The type of counter friction surface affects the torque. Avoid sharp-edged interruptions in the friction surface. If such a surface is not available, a friction disc or a flange (available as an accessory) can be used.
- ▶ 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*“.

### 4.1.2 Observe during mounting

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.
- ▶ When mounting the hub and the magnetic system, the teeth of the hub and the lining must not be damaged.
- ▶ The lining must be easily movable on the hub.
- ▶ 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 eccentricity of the mounting hole circle relative to the shaft end must not exceed the following values:

COMBISTOP 28	02	03...06	07...09
Eccentricity / mm	0.2	0.4	0.5

- ▶ The angular deviation of the mounting surface relative to the shaft must not exceed the following values (in relation to the mounting hole diameter):

COMBISTOP 28	02...03	03...05	06...07	08...09
Angular deviation / mm	0.04	0.05	0.06	0.08

## 4.2 Mounting the brake

### NOTICE

If no suitable friction surface is available.

- ▶ Install the optional flange (4) on the motor bearing shield  
=> „Figure 7: Mounting the hub on the motor shaft“.

#### 4.2.1 Step 1: Installing the hub

- ▶ Mount the hub on the motor shaft.
- ▶ Secure the hub axially on the motor shaft.
- ▶ The hub and the linings must not be damaged!

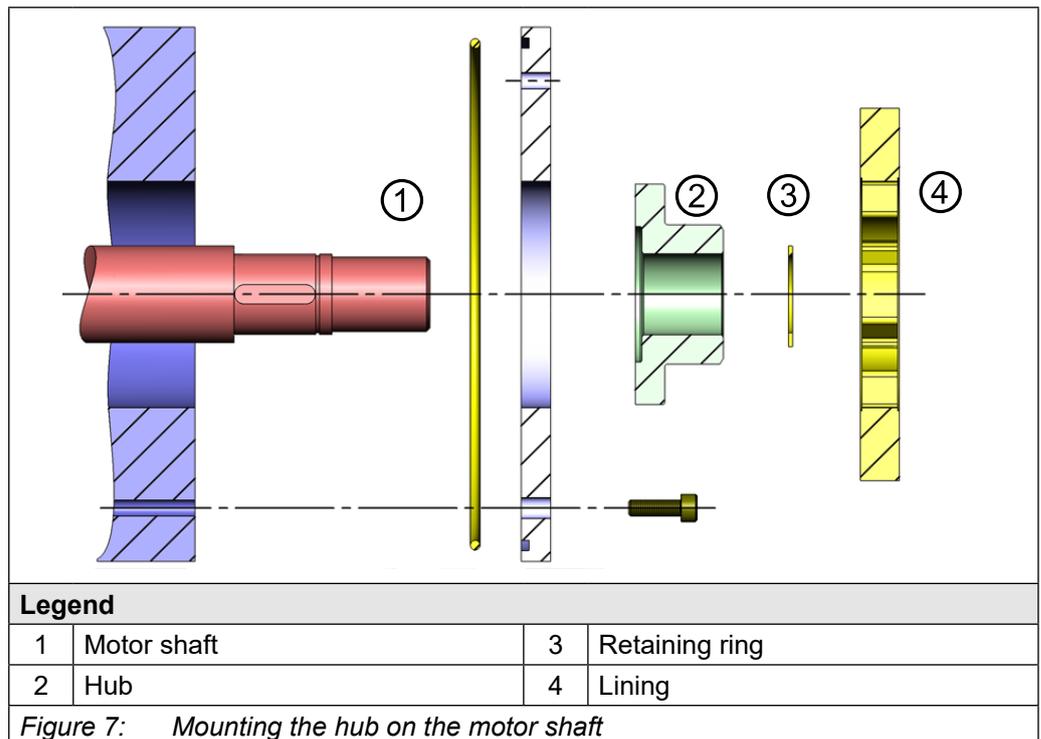


Figure 7: Mounting the hub on the motor shaft

Make sure that the hub cannot run against the second friction surface. Taking into account the axial clearance of the motor shaft, we recommend a distance of 0.5 mm to 1 mm.

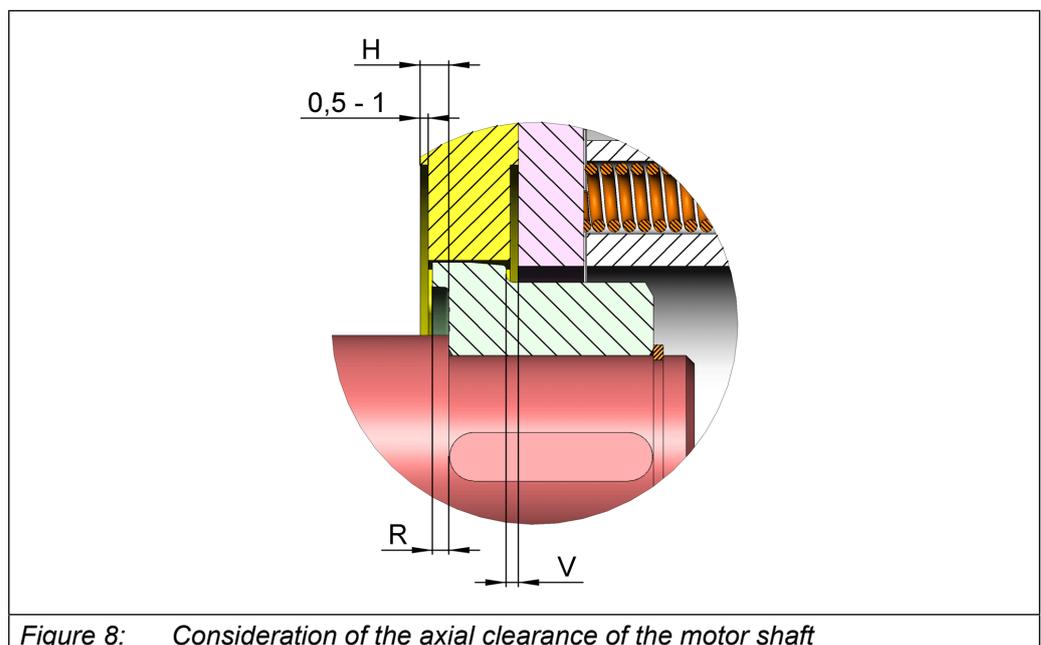
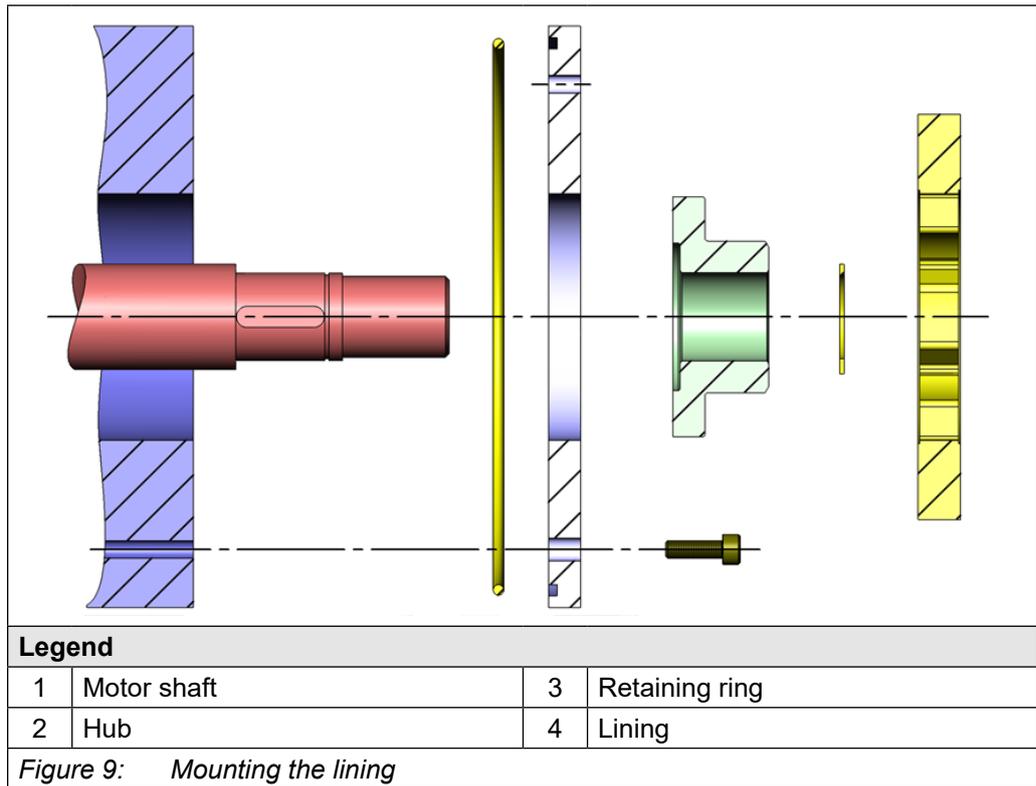


Figure 8: Consideration of the axial clearance of the motor shaft

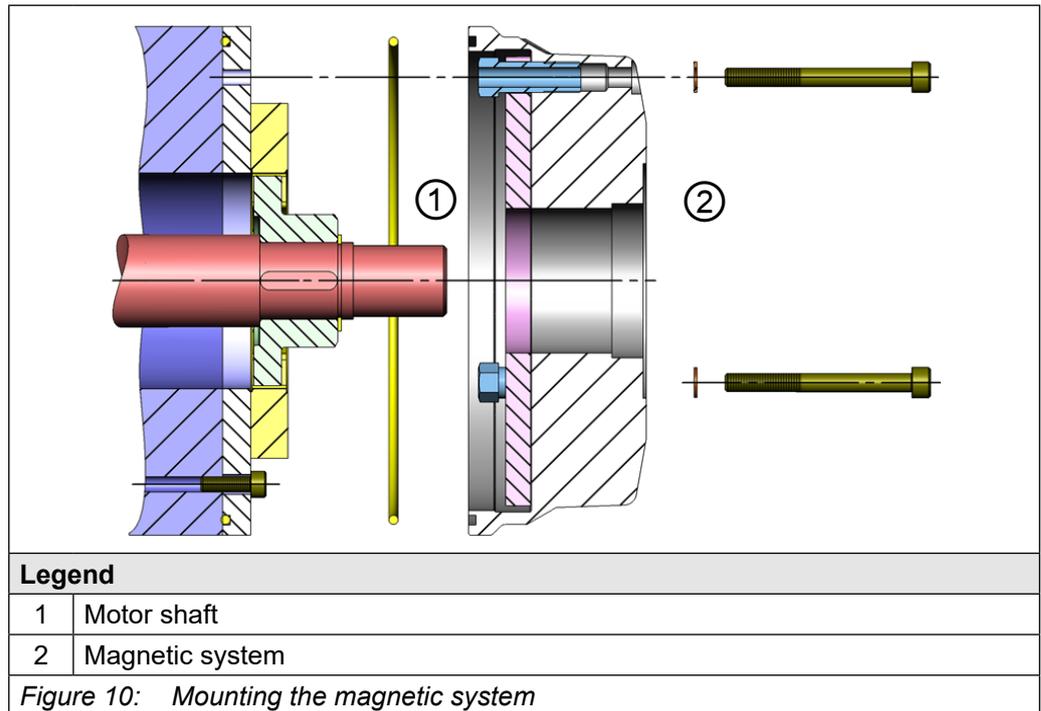
**4.2.2 Step 2: Mounting the lining**

- ▶ Slide the lining onto the hub.
- ▶ While doing so, be careful not to damage the lining by misaligned or tilted positioning.
- ▶ The lining must be easily movable on the hub.



**4.2.3 Mounting the magnetic system**

- ▶ Slide the fully assembled magnetic system over the hub and the lining.
- ▶ While doing so, make sure that the lining is easily movable
- ▶ Fix the magnet system with three socket head screws without defined torque.
- ▶ Apply rated voltage. Thus the armature is pulled towards the housing in the opposite direction to the spring forces.
- ▶ Tighten the screws to the defined tightening torque. Observe the notes to the socket head screws!



#### Notes to the socket head screws

For fastening the magnetic system, we recommend socket head screws of strength class 8.8, which should be tightened with the tightening torques recommended by the manufacturer.



With a brake construction in degree of protection IP65 (e.g. type 28.G10 / G20, G1W / G2W) use additionally sealing washers (e.g. DIN 7603 form A) or USIT sealing washers under the socket head screws!

#### 4.2.3.1 Check air gap X

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

### 4.3 Micro switch (option)



A microswitch can only be retrofitted if the brake is prepared for it. That is why the variant must be ordered already ex factory.

The microswitch can be used for armature position monitoring or as wear control.

#### 4.3.1 Microswitch as armature position monitoring (default setting)

A micro switch can be used to monitor the switching state of the armature (brake open/closed). The user is responsible to connect the electrical equipment and to evaluate the signals! The drive control must not allow the motor to start until the armature was attracted by the magnet, i. e., the lining can rotate freely.

The micro switch is factory-mounted to the brake as well as factory-set and secured.

#### ⚠ CAUTION

##### Malfunction of the brake!

Changing the settings of the micro switch may cause drive / brake malfunctions.

In the event of any malfunction affecting the switching function, check the micro switch settings and, if necessary, replace the micro switch (see sections below).

##### 4.3.1.1 Checking the microswitch setting for armature position monitoring

#### ⚠ CAUTION

##### Loss of braking efficiency!

Before checking the micro switch settings, mechanically secure the load against unintended movements and disconnect the brake from load!

##### **By repeatedly switching the brake, check the two switching states:**

- ▶ Brake energised: ON signal (micro switch closed)
- ▶ Brake de-energised: OFF signal (micro switch open)

#### 4.3.2 Microswitch as wear control

The wear of the brake can be monitored by a microswitch. The switching point of the microswitch is set below the wear limit, by way the microswitch emits a signal before brake malfunction.

The user is responsible to connect the electrical equipment and to evaluate the signals! The micro switch is factory pre-assembled on the brake, preset and secured

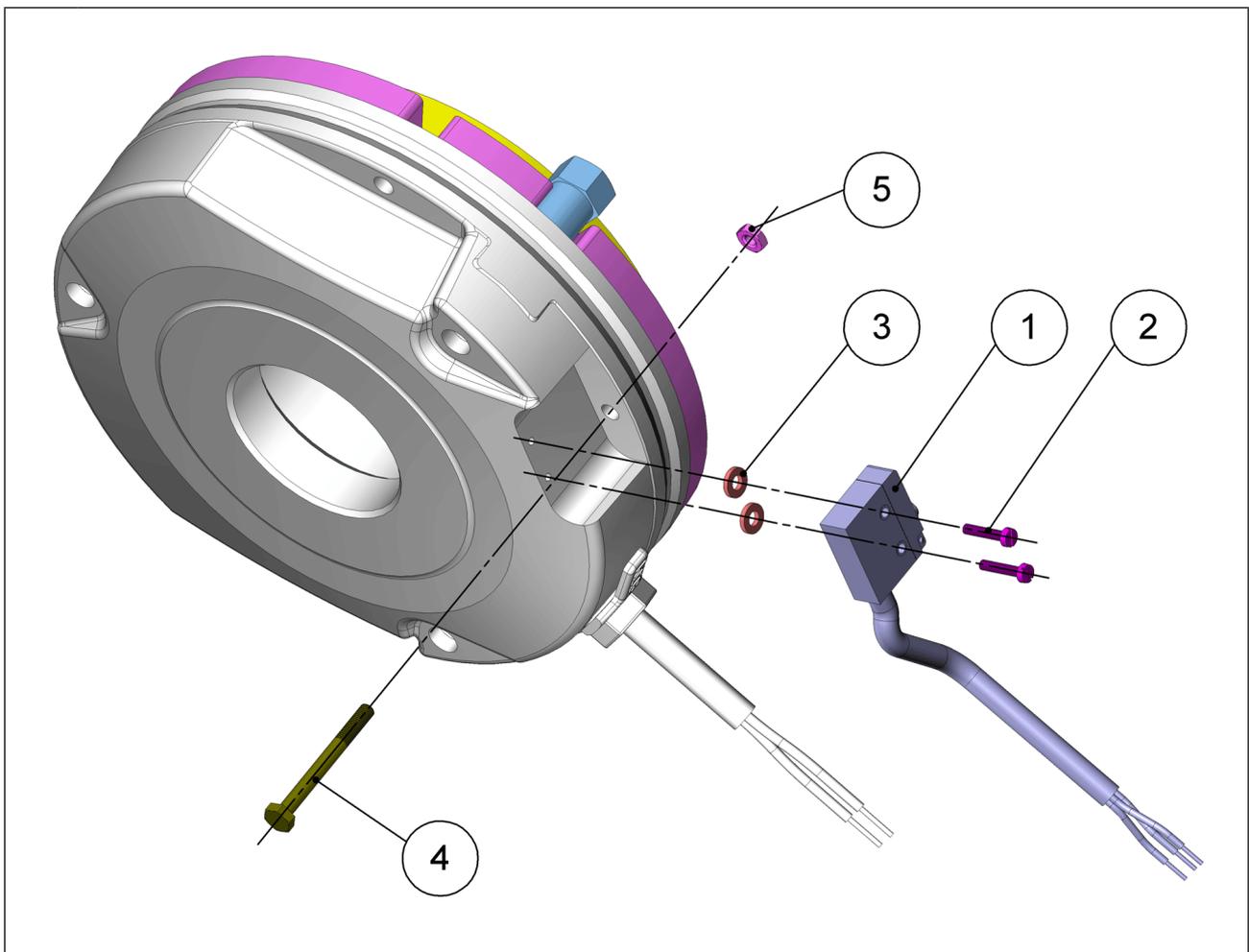
## 4.3.3 Adjustment and change of the microswitch

**NOTICE****Unauthorized exchange, repair and modifications!**

Adjustment and change of the microswitch may only be carried out by qualified personnel!

**⚠ CAUTION****Loss of braking efficiency!**

Before replacing the microswitch, mechanically secure the load against unintended movements and disconnect the brake from load!

**Legend**

1	Micro switch
2	Socket head screw
3	Washers
4	Hexagon head screw
5	Hexagon nut

Figure 11: Replacing the microswitch

## 4.3.3.1 Dismounting

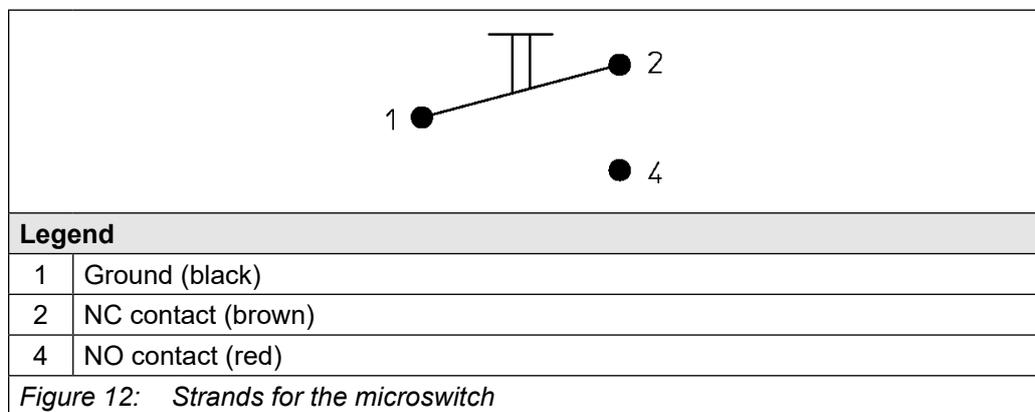
- ▶ Remove the two socket head screws.
- ▶ Remove the microswitch.

## 4.3.3.2 Mounting

- ▶ The micro switch is mounted in reverse order.
- ▶ Connect the micro switch according to the following connection diagram:

## 4.3.3.3 Connecting the microswitch

Connect the micro switch as a normally open contact (terminal 1 and 4).

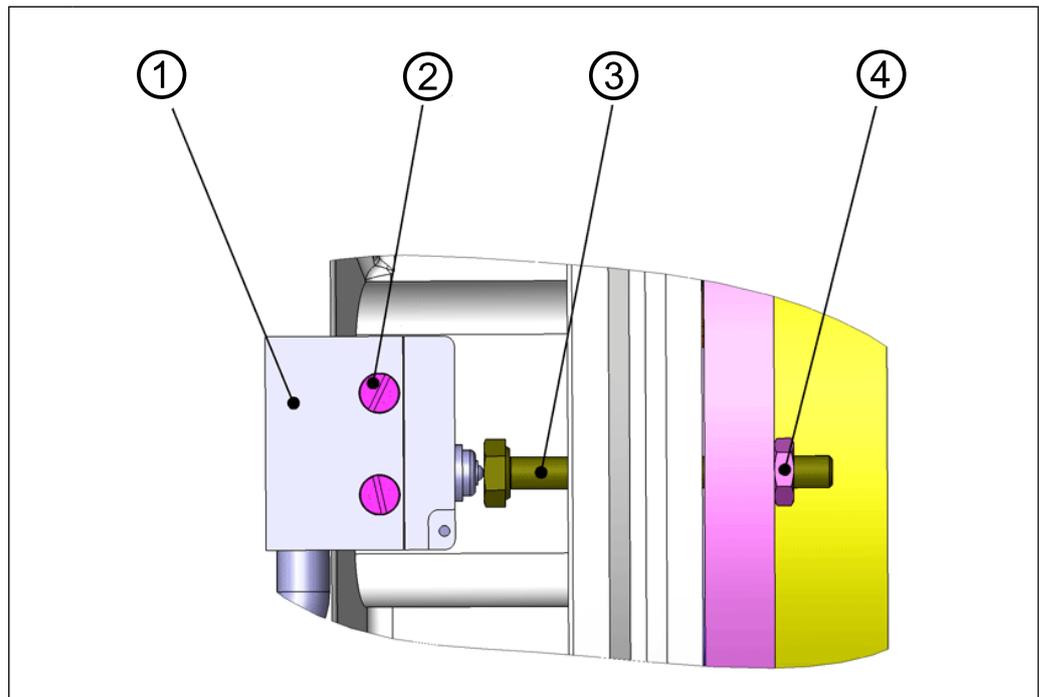


Check the switching point of the microswitch after installation. If an adjustment of the microswitch is necessary => „4.3.3.4 Adjustment of the microswitch“.

## 4.3.3.4 Adjustment of the microswitch

**⚠ CAUTION****Loss of braking efficiency!**

Before checking the micro switch settings, mechanically secure the load against unintended movements and disconnect the brake from load!

**Legend**

1	Microswitch
2	Socket head screw
3	Hexagon head screw
4	Hexagon nut

Figure 13: Adjustment of the microswitch

- ▶ Loosen the hexagon nut.
- ▶ Turn the hexagon head screw towards the microswitch until it contacts the microswitch tappet.
- ▶ Connect the measuring instrument to terminal 1 and 4 (normally open contact) of the microswitch.
- ▶ Turn the hexagon head screw towards the microswitch until the normally open contact is closed (ON signal).
- ▶ Turn back the hexagon head screw until the normally open contact opens again (OFF signal).
- ▶ Lock the hexagon head screw with the hexagon nut.
- ▶ Check the setting again. If the ON signal does not properly switch to the OFF signal, repeat the readjustment of the microswitch.

## 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 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, the following KEB accessories can be used:

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

The brake COMBISTOP Type 28 is delivered with factory-preassembled connecting cables:

COMBISTOP 28	02...06	07...09
Connection cross section	2x 0.75 mm <sup>2</sup>	2x 0.75 mm <sup>2</sup>
Connection length	500 mm	750 mm
<i>Table 6: Pre-assembled connection cables</i>		

**NOTICE****Connection for drive controller operation.**

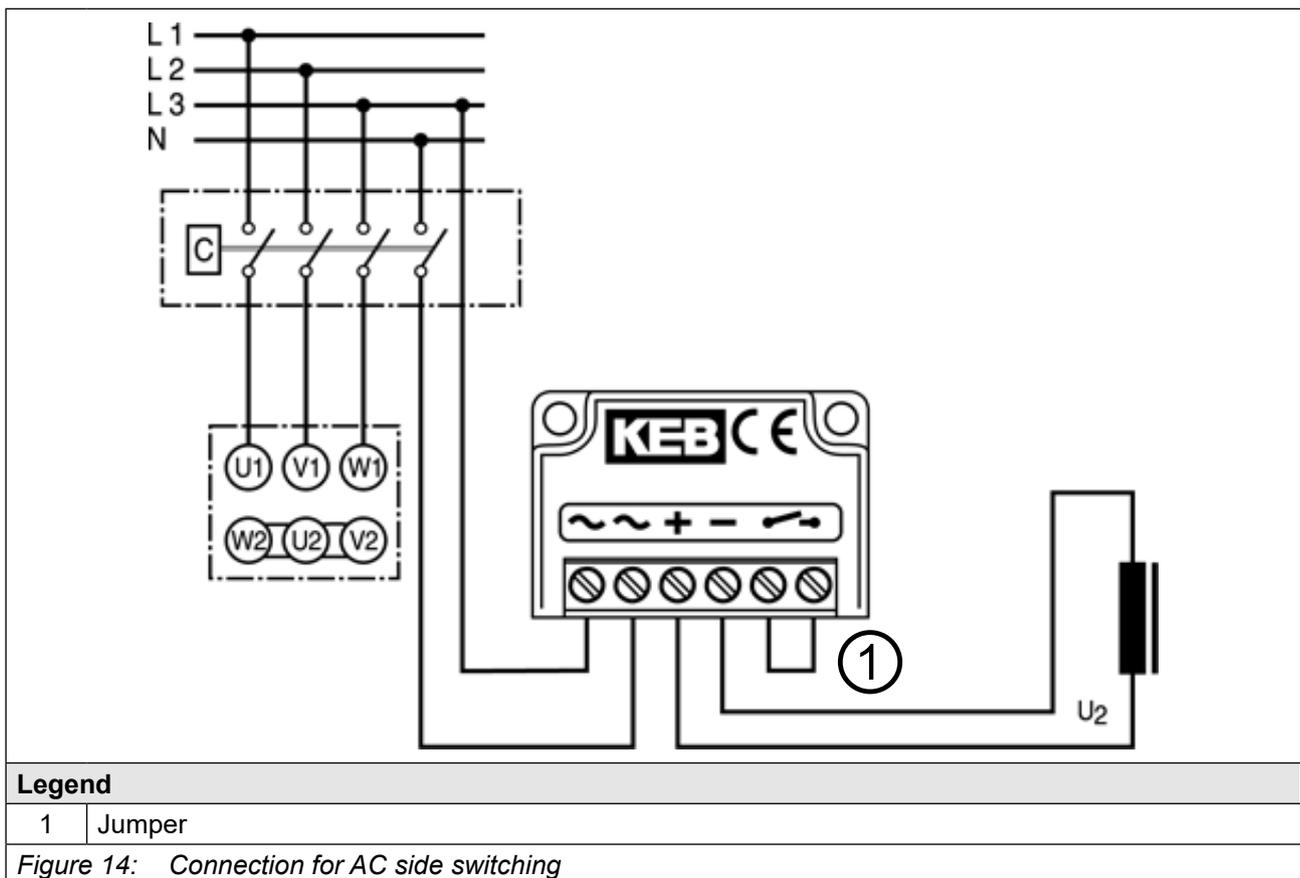
- ▶ Rectifiers or power boxes are destroyed when operated on drive controllers.
- ▶ Rectifiers or power boxes may only be connected directly to the mains.

**Influence on the connection time!**

The brake can be switched off on the DC side or on the AC side. Switching off on the DC side reduces the connection time, i.e. the period of time until the torque is reached to decelerate.

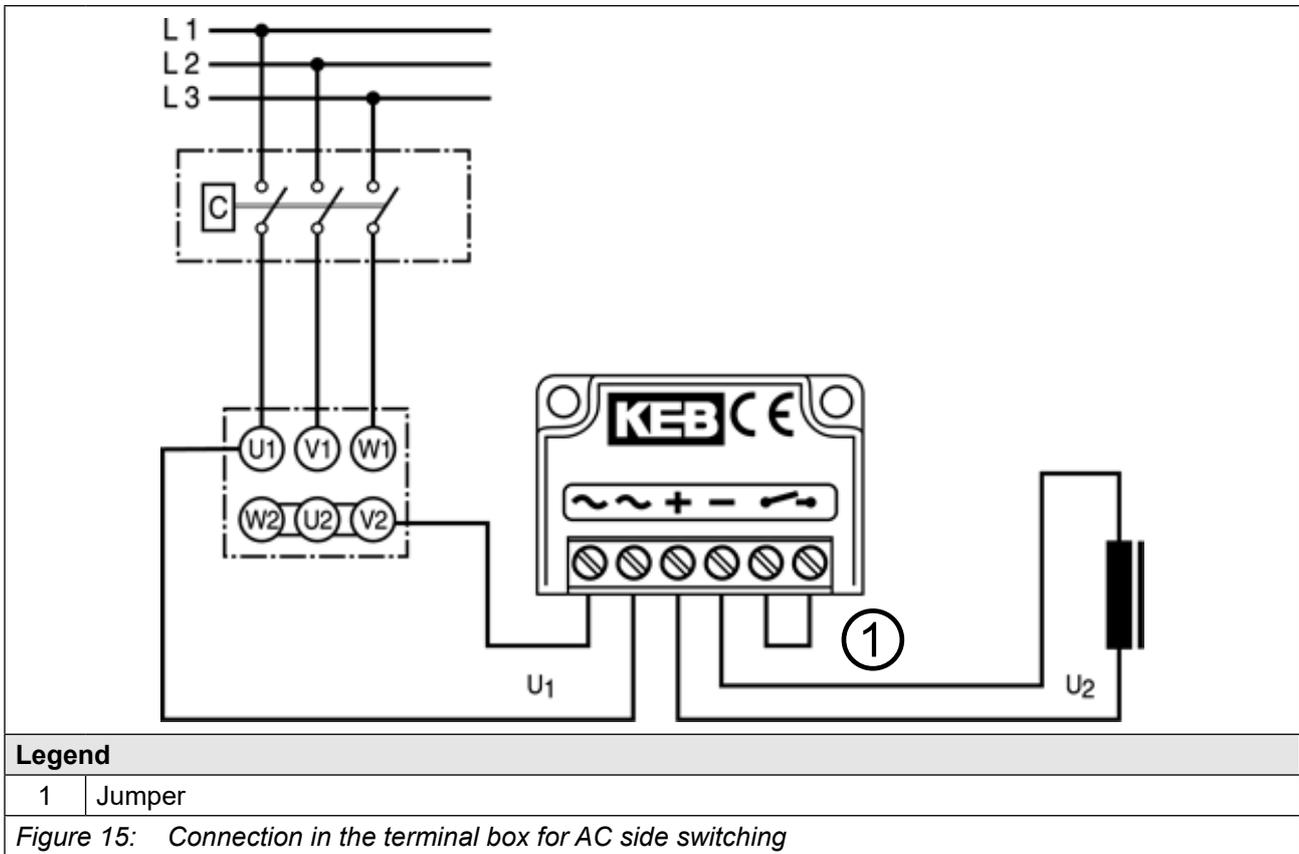
**5.1.1 AC side switching**

## 5.1.1.1 Connection for AC side switching



- For cables longer than 10 m between rectifier and brake, an appropriate switch is mandatory.
- Drive controller operation possible, because the power box or the rectifier is supplied from the mains.
- Install wire jumper so that the motor does not work against the brake. For drive controller operation, switch the switch via digital output during ramp-up => „[Figure 17: Connection for DC and AC switching](#)“.

5.1.1.2 Connection in the terminal box for AC side switching



- Not permitted for drive controller operation, since the power box or the rectifier would be destroyed.
- Install wire jumper so that the motor does not work against the brake.

### 5.1.2 DC side switching

Switching occurs between rectifier and brake. KEB rectifiers and power boxes are protected against the voltage peaks resulting from the switching.

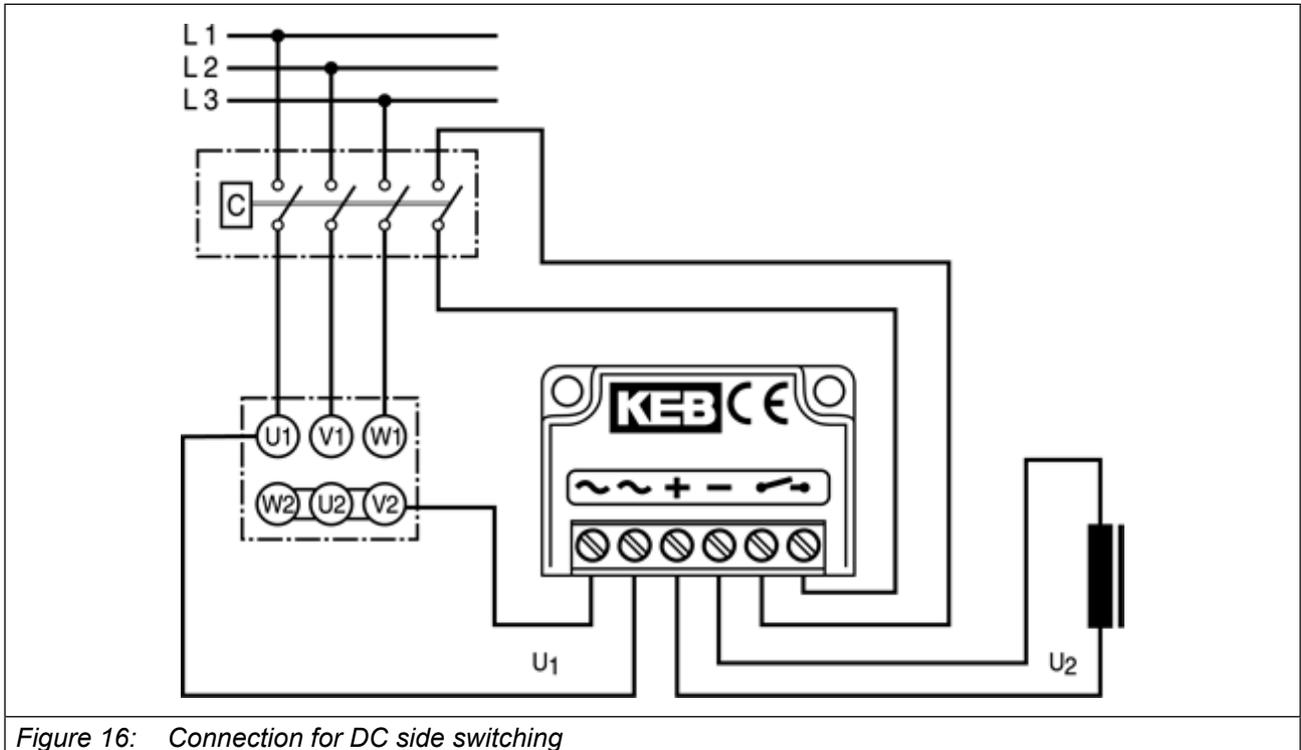


Figure 16: Connection for DC side switching

- Not permitted for drive controller operation, since the power box or the rectifier would be destroyed..

## 5.1.3 DC and AC side switching

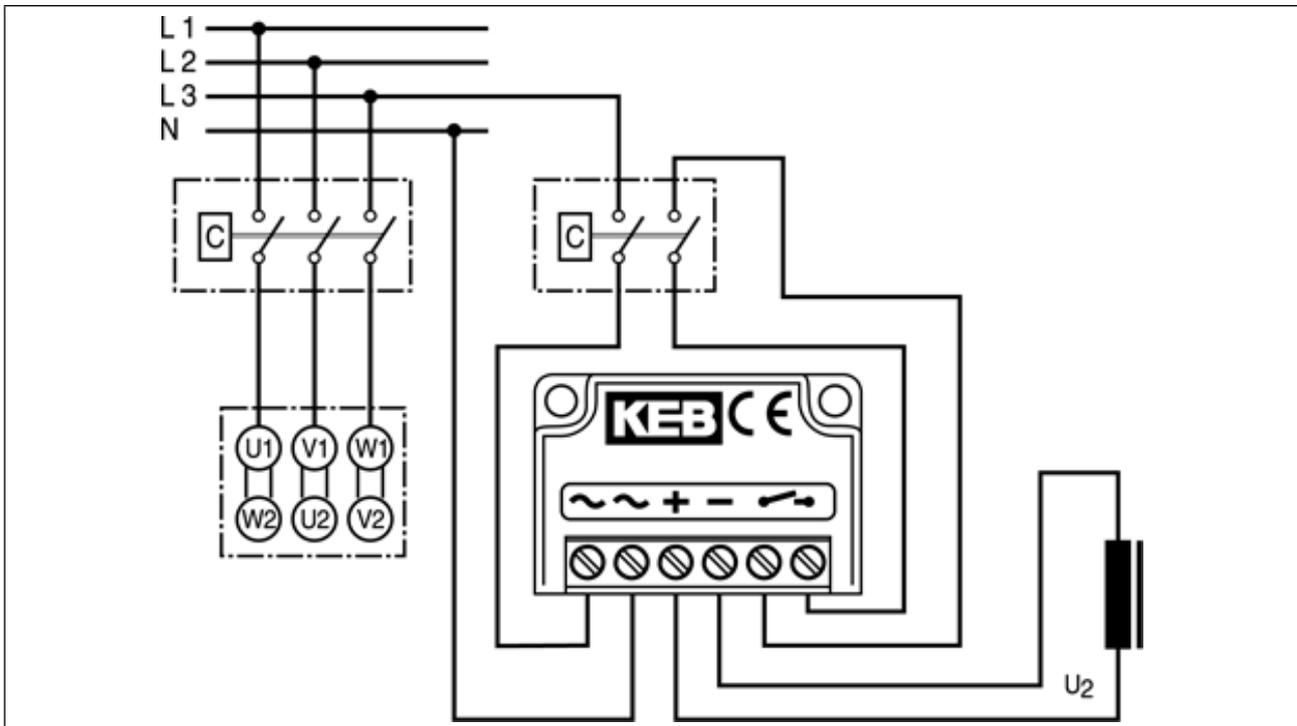


Figure 17: Connection for DC and AC switching

- Drive controller operation possible, because the power box or the rectifier is supplied from the mains.
- For drive controller operation, switch the switch via digital output during ramp-up.
- Enables the shortest switch-off times.
- Reduces the contact erosion.

## 5.1.4 Protective earth

The brake does not have its own PE connection. The low-resistance connection required for this must be made via the metallic attachment to the grounded motor housing. If necessary, this must be checked by a measurement. In addition, the brake is usually covered by the mounted fan cover and can therefore not be touched directly.

## 6 Start-up

### 6.1 Inspections prior to start-up of the brake

#### 6.1.1 Visual inspection

- Do connection and rated voltage (magnet marking) agree?
- 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 characteristic torque is only reached after the brake has run in.

To run in the brake, some dynamic braking must be carried out. Depending on the brake size and corresponding speed, we recommend a slip and idle time of 2 seconds each for 10 switching operations.

Size	02	03	04	05	06	07	08	09
Speed in rpm	175	150	125	100	100	80	60	50

Table 7: Run in of the brake

#### NOTICE

##### Influences on the brake torque!

- ▶ The braking torque may deviate from the specified values depending on the mounting situation as well as the environmental conditions such as temperature, contamination or corresponding ageing.
- ▶ Using the brake purely as a holding brake can lead to a drop in braking torque, so that regular refreshment must be carried out as part of maintenance.



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

## 7 Operation

The brake is switched via the voltage supply => „5.1 Connection of the brake“. The max. number of switching cycles must not be exceeded => „3.2 Device data COMBIS-TOP T Type 28“.

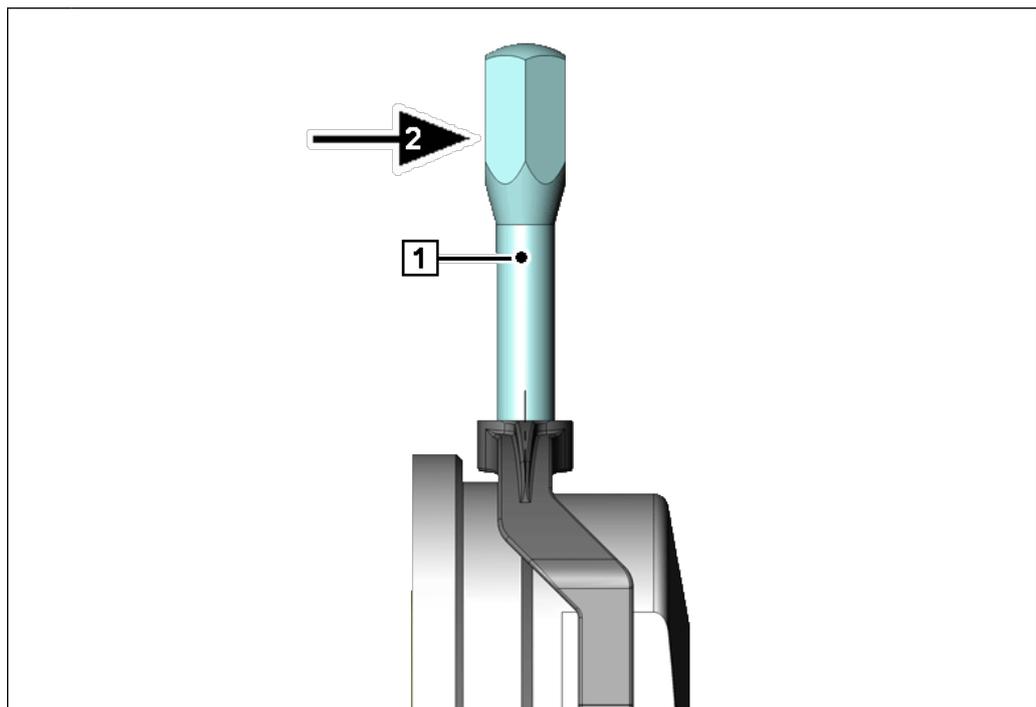
### 7.1 Hand release (option)

As an option, the brake can be delivered with a hand release. In the event of malfunctions, the brake can be actuated using the hand release.

#### ⚠ CAUTION

#### Loss of braking effect due to actuation of the hand release!

- ▶ Before actuating the hand release, secure the load mechanically against unintended movement.
- ▶ If necessary, secure the elevator car against falling down.



#### Legend

1	Lever
2	Arrow direction

Figure 18: Operation of the hand release

- ▶ To release the brake, pull / press the lever of the hand release evenly in arrow direction.
- ▶ The lever does not engage. To engage the brake, simply release the lever.

## 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
Coupling does not release	Incorrect voltage	Operate the coupling with the correct voltage (see nameplate of the brake).
	Rectifier failed	Replace the rectifier.
	Air gap too large, maximum air gap reached	Change wearing parts.
	Foreign particles between armature and lining	Remove the foreign particles. Clean the coupling with non-greasy cleaning agents.
	Magnet coil or connecting cable defective	Replace the coupling.
	Excessive heating	Install a high-speed circuit breaker (for example, KEB Powerbox).
No braking function	Damaged teeth impede movement of armature	Replace the lining and the hub.
	Friction surfaces contaminated	Clean the friction surfaces, replace them if necessary.
Coupling engages with delay, long connection time	Coupling is switched on the AC side	Switch the coupling on the DC side.
<i>Table 8: 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

Due to the design, the brake COMBISTOP Type 28 can only be checked when it is removed. If correctly designed, the brake COMBISTOP Type 28 is maintenance-free.

### 9.2 Service

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

#### ⚠ CAUTION



**Limbs crushed!**

**Securing the load!**

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

#### 9.2.1 Dismount the brake

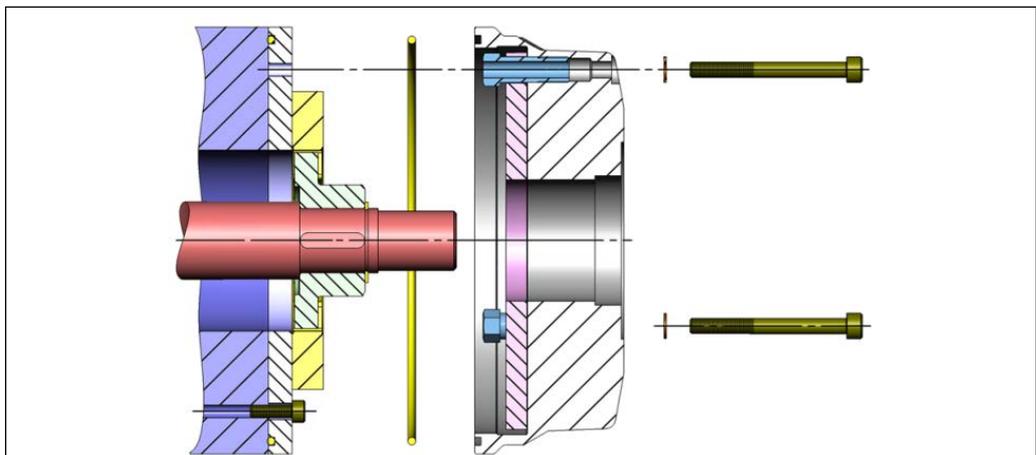


Figure 19: Dismount the brake

- ▶ Disconnect the connecting cables from the voltage supply.
- ▶ If necessary, dismount the fan from the shaft (=> instruction manual of the motor).
- ▶ Loosen and remove the three socket head screws alternately piece by piece.
- ▶ Remove the brake from the shaft backwards.

**9.2.2 Check air gap**

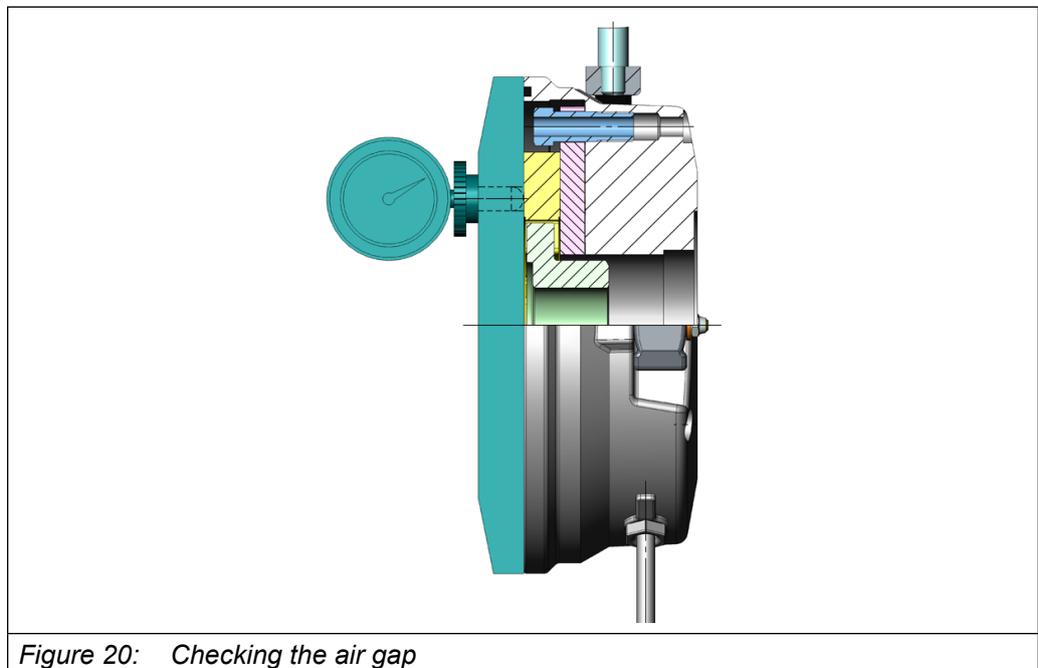
The brakes are delivered ex works with preset air gap "X" (nominal air gap) ready for installation. As a result of wear, the air gap increases. To ensure proper functioning, the air gap (distance between magnet housing on lining) needs to be checked in regular intervals in energized state with dial gauge (measuring bridge). An adjustment of the air gap is not possible. The wearing parts must be replaced on exceeding of value "X<sub>N</sub>".

Size	Air gap		Minimum permissible Lining thickness g
	Rated value X	Limit value X <sub>N</sub>	
	mm	mm	mm
02	0.2	0.4	7.5
03	0.2	0.5	8.0
04	0.2	0.6	10.5
05	0.2	0.6	12.0
06	0.3	1.0	12.0
07	0.3	1.0	14.0
08	0.4	1.2	16.0
09	0.4	1.2	18.0
10	0.5	1.5	22.0

*Table 9: Check air gap*

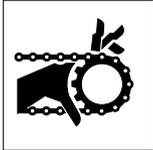
9.2.2.1 Checking the air gap X

- ▶ Connect the brake to rated voltage (the armature must be in contact with the magnet).
- ▶ The supply voltage can be found in the performance data on the type plate at the magnet or in the drawings.
- ▶ Adjust the measuring bridge with dial gauge (zero setting).
- ▶ Place the measuring bridge as shown in the figure.
- ▶ The air gap X is the difference between zero setting and displayed value.
- ▶ Repeat the measurement at three different positions (approx.  $3 \times 120^\circ$ ).
- ▶ If a value greater than 'XN' is measured, the wearing parts must be replaced => „9.2.3 Replacing the lining“.
- ▶ The teeth of the lining and the hub must be checked regularly. Worn parts must be replaced.



9.2.3 Replacing the lining

**CAUTION**



**Loss of braking efficiency!**

**Securing the load!**

- ▶ Prevent damage to the hub by all means.
- ▶ Be careful not to damage the lining by misaligned or tilted positioning.
- ▶ The lining must not come into contact with cleaning agents or solvents.
- ▶ As a general rule, contaminated linings must be replaced

- ▶ Dismount the brake => „9.2.1 Dismount the brake“.
- ▶ Remove the lining (3) from the hub (2).
- ▶ Place the lining straight and slide it onto the hub.
- ▶ The lining must slide smoothly onto the hub! The teeth of the hub and the lining must not be damaged!
- ▶ Check the air gap X with dial gauge => „9.2.2 Check air gap“.
- ▶ The brake is mounted in reverse order => „4.2 Mounting the brake“.
- ▶ Functional test and start-up => „6 Start-up“.

9.2.4 Check the function hand release (option)

This section describes the subsequent check of the optional hand release to the brake.



The type of hand release attachment to the brake may vary depending on the ordered design and size of the brake

Size	02	03	04	05	05	06	06	07	08	09	10
Dimension <i>m</i> / mm	0.8	1.0	1.4	1.5	1.5	1.8	1.8	2.0	2.0	2.3	2.7

Table 10: Check the function hand release

**NOTICE**

**Loss of braking efficiency!**

- ▶ For safe operation of the brake, it is absolutely necessary to check the setting dimension 'm'.
- ▶ Improper adjustment and operation with overexcitation may result in loss of braking efficiency.

9.2.4.1 Checking the adjustment dimension

The adjustment dimension 'm' must be checked/adjusted with attracted armature. The adjustment dimension applies to characteristic torque and operation with rated voltage.

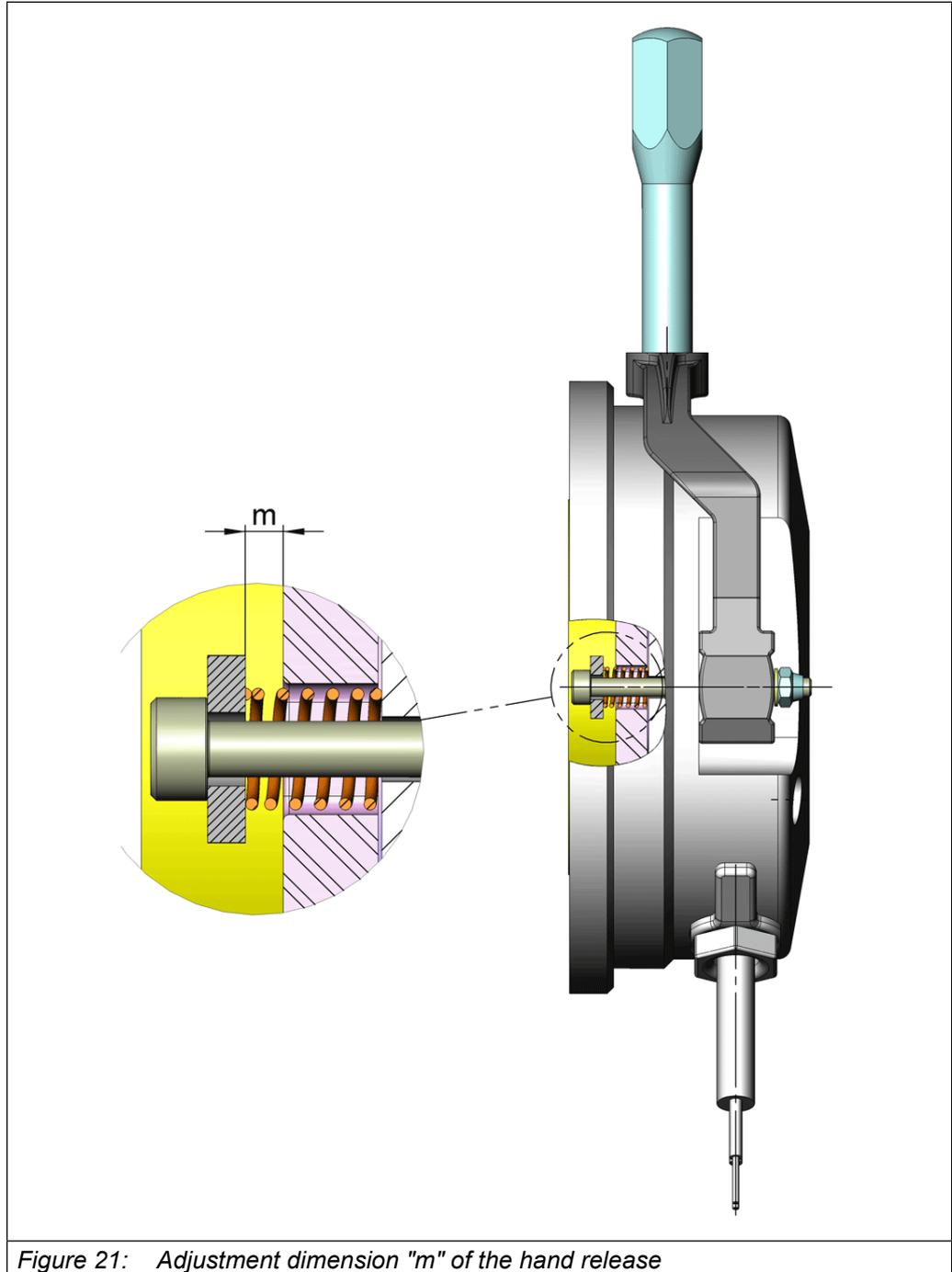


Figure 21: Adjustment dimension "m" of the hand release

## 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, cables and all other steel parts:**

Steel scrap (Key No.: EAK 12 01 02)

**Aluminium components:**

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

**Lining (incl. steel or aluminium beams):**

Brake linings (Key No.: EAK 16 01 12)

# 11 Certification

## 11.1 EU Declaration of Conformity

### EU DECLARATION OF CONFORMITY



Document No. / month.year: ce\_bc\_rns-bc-b\_en.docx / 01.2022

Manufacturer:	KEB Automation KG Südstraße 38 32683 BARNTRUP Germany	
Product type:	spring applied fail safe brake permanent magnet - brake electromagnet – clutch and brake clutch – brake –combinations in one housing Size Voltage category	COMBISTOP COMBIperm COMBINORM COMBIBOX 01 up to 14 71...440Vdc ( 50 ... 690 Vac)

This declaration of conformity is issued under the sole responsibility of KEB Automation KG.

The above given product is in accordance with the following directives of the European Union

Number:	<b>Low voltage : 2014 / 35 / EU</b>
Text:	Directive on the approximation of the laws of the Member States relating to all electrical equipment that has a voltage rating between 50V and 1000V AC or 75V and 1500V DC.
Number:	<b>Hazardous Substances: 2011 / 65 / EEC ( incl. 2015 / 863 / EU )</b>
Text:	Directive on the approximation of the laws of the Member States relating on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Responsible: KEB Automation KG  
Südstraße 38  
32683 BARNTRUP

Place, date Bartrup, 28. December 2021

Issued by:

i. A. W. Hovestadt / Conformance Officer

W. Wiele / Technical Manager

This declaration certifies the conformity with the named directives, but does not contain any assurance of quality.

The safety instructions, described in the instruction manual are to be followed.

# EU DECLARATION OF CONFORMITY



## Annex 1

Document-Nr. / Month.year: ce\_bc\_rms-bc-b\_en.docx / 01.2022

Product type:	spring applied fail safe brake	COMBISTOP
	permanent magnet - brake	COMBIPERM
	electromagnet – clutch and brake	COMBINORM
	clutch – brake –combinations in one housing	COMBIBOX
	Size	01 up to 14
	Voltage category	71...440Vdc ( 50 ... 690 Vac )

The conformity of the above given product to the European Directive 2014/35/EU ( for electrical equipment designed for use within certain voltage limits ) is given by complete approval / testing to the following European harmonized standards:

EN - standard	
VDE 0580, Version 2011	Electromagnetic devices and components – General specifications
Informative:	Electronic equipment for use in power installations
EN 50178, Version 1997	

The conformity of the above given product to the European Directive 2011/65/EU with changes of 2015/863/EU ( for restrictions of the use for certain hazardous substances in electrical and electronic equipment ) is given by qualification of components and manufacturing process within the ISO 9001 QM system. The necessary information and declarations are documented and memorized.

EN 63000: 2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

The above given product was developed, manufactured and tested within an internal quality management system. This ISO 9001 QM system was approved by:

Notified body:	TÜV - CERT
Address:	Zertifizierungsstelle des RWTÜV Steubenstrasse 53 D - 45138 Essen
No. of approval	041 004 500
Dated:	20.10.1994
Valid until:	December 2024

Figure 22: EU declaration of conformity

11.2 CSA Certificat



# Certificate of Compliance

<b>Certificate:</b>	1267150 (LR49670)	<b>Master Contract:</b>	172220 (049670_0_000)
<b>Project:</b>	70199031	<b>Date Issued:</b>	2018-10-05
<b>Issued to:</b>	<b>KEB Automation KG</b> 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**

<b>Project</b>	<b>Date</b>	<b>Description</b>
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 23: CSA Certificat

## 12 Revision history

Version	Date	Description
01	2011-09	First edition
02	2019-10	Complete editorial revision
03	2023-11	Adaptation of designations and values



**Austria** | KEB Automation GmbH

Ritzstraße 8 4614 Marchtrenk Austria  
Tel: +43 7243 53586-0 Fax: +43 7243 53586-21  
E-Mail: info@keb.at Internet: www.keb.at

**Benelux** | KEB Automation KG

Bd Paapsemiaan 20 1070 Anderlecht Belgium  
Tel: +32 2 447 8580  
E-Mail: info.benelux@keb.de Internet: www.keb.de

**Brazil** | KEB South America - Regional Manager

Rua Dr. Omar Pacheco Souza Riberio, 70  
CEP 13569-430 Portal do Sol, São Carlos Brazil  
Tel: +55 16 31161294 E-Mail: roberto.arias@keb.de

**Czech Republic** | KEB Automation GmbH

Videnska 188/119d 61900 Brno Czech Republic  
Tel: +420 544 212 008  
E-Mail: info@keb.cz Internet: www.keb.cz

**France** | Société Française KEB SASU

Z.I. de la Croix St. Nicolas 14, rue Gustave Eiffel  
94510 La Queue en Brie France  
Tel: +33 149620101 Fax: +33 145767495  
E-Mail: info@keb.fr Internet: www.keb.fr

**Germany | Geared Motors**

KEB Antriebstechnik GmbH  
Wildbacher Straße 5 08289 Schneeberg Germany  
Telefon +49 3772 67-0 Telefax +49 3772 67-281  
Internet: www.keb-drive.de E-Mail: info@keb-drive.de

**Italy** | KEB Italia S.r.l. Unipersonale

Via Newton, 2 20019 Settimo Milanese (Milano) Italia  
Tel: +39 02 3353531 Fax: +39 02 33500790  
E-Mail: info@keb.it Internet: www.keb.it

**Japan** | KEB Japan Ltd.

41-1-601 Kanda, Higashimatsushitacho, Chiyoda Ward  
Tokyo 101 - 0042 Japan  
Tel: +81 3 3525-7351 Fax: +81 3 3525-7352  
E-Mail: info@keb.jp Internet: www.keb.jp

**P. R. China** | KEB Power Transmission Technology (Shanghai) Co. Ltd.

No. 435 QianPu Road Chedun Town Songjiang District  
201611 Shanghai P.R. China  
Tel: +86 21 37746688 Fax: +86 21 37746600  
E-Mail: info@keb.cn Internet: www.keb.cn

**Poland** | KEB Automation KG

Tel: +48 60407727  
E-Mail: roman.trinczek@keb.de Internet: www.keb.de

**Republic of Korea** | KEB Automation KG

Deoksan-Besttel 1132 ho Sangnam-ro 37  
Seongsan-gu Changwon-si Gyeongsangnam-do Republic of Korea  
Tel: +82 55 601 5505 Fax: +82 55 601 5506  
E-Mail: jaeok.kim@keb.de Internet: www.keb.de

**Spain** | KEB Automation KG

c / Mitjer, Nave 8 - Pol. Ind. LA MASIA  
08798 Sant Cugat Sesgarrigues (Barcelona) Spain  
Tel: +34 93 8970268 Fax: +34 93 8992035 E-Mail: vb.espana@keb.de

**Switzerland** | KEB Automation AG

Witzbergstrasse 24 8330 Pfaeffikon/ZH Switzerland  
Tel: +41 43 2886060 Fax: +41 43 2886088  
E-Mail: info@keb.ch Internet: www.keb.ch

**United Kingdom** | KEB (UK) Ltd.

5 Morris Close Park Farm Industrial Estate  
Wellingborough, Northants, NN8 6 XF United Kingdom  
Tel: +44 1933 402220 Fax: +44 1933 400724  
E-Mail: info@keb.co.uk Internet: www.keb.co.uk

**United States** | KEB America, Inc

5100 Valley Industrial Blvd. South  
Shakopee, MN 55379 United States  
Tel: +1 952 2241400 Fax: +1 952 2241499  
E-Mail: info@kebamerica.com Internet: www.kebamerica.com

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**[www.keb.de](http://www.keb.de)**

KEB Automation KG Suedstrasse 38 32683 Barntrup Tel. +49 5263 401-0 E-Mail: [info@keb.de](mailto:info@keb.de)