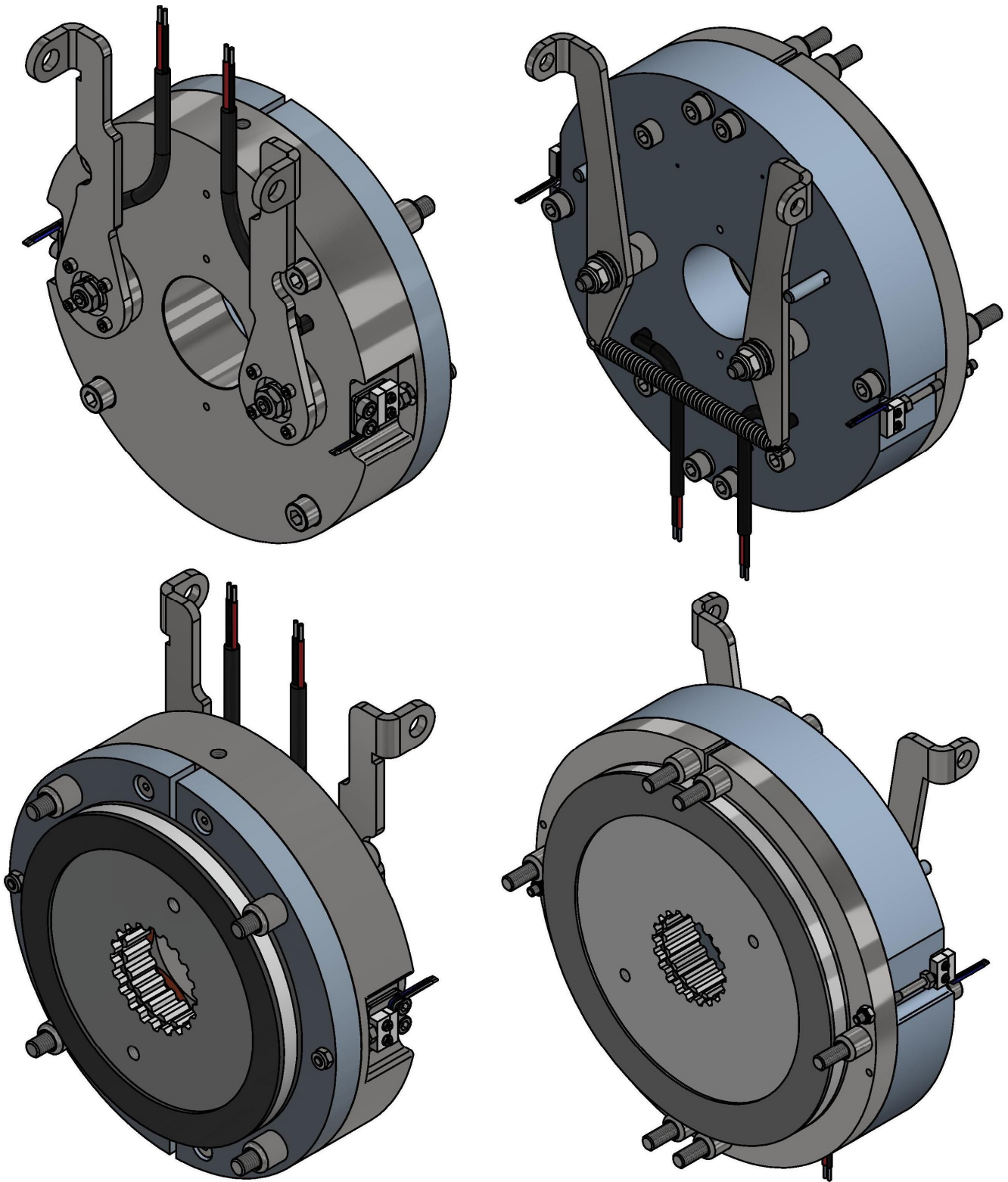




Emco Dynatorq Pvt. Ltd.

(Formerly Emco Lenze Pvt. Ltd.)

Operating, Installation & Servicing Instructions Manual



1 Preface and general information

1.1 About these Operating Instructions

- | These Operating Instructions will help you to work safely on and with the spring-applied brake with electromagnetic release. They contain safety instructions that must be followed.
- | All Persons working on or with the electromagnetically released spring-applied brakes must have the Operating Instructions available and observe the information and notes relevant for them.
- | The Operating Instructions must always be in a complete and perfectly readable condition.

1.2 Terminology used

Term	In the following text used for
Spring-applied brake	Spring-applied brake with electromagnetic release
Drive system	Drive systems with spring-applied brakes and other drive components

Operating & Installation manual for brake EDCB

1.3 Abbreviations used

Abbreviation	Unit	Designation
P ₂₀	[kW]	Electrical power at 20°C
M _t	[Nm]	Tightening torque
I	[A]	Current
S _h	[h ⁻¹]	Operating frequency, i.e. the number of periodical braking
a	[mm]	Rated air gap
S _{hü}	[h ⁻¹]	Transition operating frequency, i.e. the maximally permissible number of braking per unit time
R ₂₀	[Ohm]	Coil resistance at 20°C
V	[V]	Voltage
N _{max}	[rpm]	Maximum speed

1.4 Scope of supply

- The drive systems are combined individually according to a modular design. The scope of delivery is indicated in the accompanying papers.
- After receipt of the delivery, check immediately whether it corresponds to the accompanying papers. EMCO does not grant any warranty for deficiencies claimed subsequently.

Claim

- Visible transport damage immediately to the forwarder.
- Visible deficiencies / incompleteness immediately to Emco Dynatorq Pvt. Ltd.

1.5 Disposal

- The spring-applied brake consists of different types of material.
- Recycle metals and plastics.

1.6 Drive systems

1.6.1 Labelling

Drive systems and components are unambiguously designated by the indications on the nameplate.

Manufacturer: EMCO Dynatorq Pvt. Ltd, 1002 – 1003, GIDC, Waghodia, Dist Vadodara, India

The spring-applied EMCO brake is also delivered in single modules and individually combined to its modular design. The data – package labels, nameplate, and type code in particular – apply to the complete stator.

1.7 Legal regulations

Liability

- The information, data and notes in these Operating Instructions met the state of the art at the time of printing. Claims referring to drive systems which have already been supplied cannot be derived from the information, illustrations and descriptions.
- We do not accept any liability for damage and operating interference caused by:
 - inappropriate use
 - un-authorized modifications to the drive system
 - improper working on and with the drive system
 - operating faults
 - disregarding these Operating Instructions

Warranty

- Terms of warranty: see terms of sale and delivery of Emco Dynatorq Pvt. Ltd.
- Warranty claims must be made to EMCO immediately after detecting defects or faults.
- The warranty is void in all cases where liability claims cannot be made.

2 Safety instructions

2.1 General safety information

- EMCO components ...
 - ... must only be applied as directed.
 - ... must not be commissioned if they are noticeably damaged.
 - ... must not be technically modified.
 - ... must not be commissioned if they are incompletely mounted.
 - ... must not be operated without the required covers.
 - ... can hold live as well as moving or rotary parts during operation according to their degree of protection. Surfaces may be hot.
- For EMCO components ...
 - ... the documentation must always be kept at the installation site.
 - ... only permitted accessories are allowed to be used.
 - ... only original spare parts of the manufacturer are allowed to be used.
- Observe all specifications given in the attached documentation.
 - This is the prerequisite for safe and trouble-free operation and achieving the specified product features.
- Only qualified, skilled personnel are permitted to work on and with EMCO components.

According to IEC 60364, qualified, skilled personnel are persons ...

 - ... who are familiar with the installation, mounting, commissioning, and operation of the product.
 - ... who have the qualifications necessary for their occupation.
 - ... who know and apply all regulations for the prevention of accidents, directives, and laws relevant on site.
- Risk of burns!

Surfaces may be hot during operation (provide for protection against accidental contact)
- Risk of injury due to a rotating shaft!

Wait until the motor is at standstill before you start working on the motor.
- The friction lining and the friction surfaces must by no means have contact to oil or grease since even small amounts reduce the brake torque considerably.
- Because of the numerous possibilities of using the brake, it is however necessary to check the functionality of all mechanical components under the corresponding operating conditions.

2.2 Application as directed

- EMCO components ...
 - ... are intended for use in machinery and systems.
 - ... must only be used for the purposes ordered and confirmed.
 - ... must only be operated under the ambient conditions prescribed in these Operating Instructions.
 - ... must not be operated beyond their corresponding power limits.
Any other use shall be deemed inappropriate!

Possible applications of the EMCO spring-applied brake

- Humidity: no restrictions
 - In case of formation of condensed water and moisture: provide for appropriate ventilation to ensure that all components will dry quickly.
- Ambient temperature:
 - 5°C to +45°C
- At high humidity and low temperature:
 - Take measures to protect armature plate and rotor from freezing.
- Protect electrical connections against contact.

2.3

Notes used

The following pictographs and signal words are used in this documentation to indicate dangers and important information:

Safety instructions

Structure of safety instructions:

<p>" Danger!</p> <p>Characterizes the type and severity of danger</p> <p>Note</p> <p>Describes the danger</p> <p>Possible consequences:</p> <p>List of possible consequences if the safety instructions are disregarded.</p> <p>Protective measure:</p> <p>List of protective measures to avoid the danger.</p>
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Pictograph and signal word Meaning

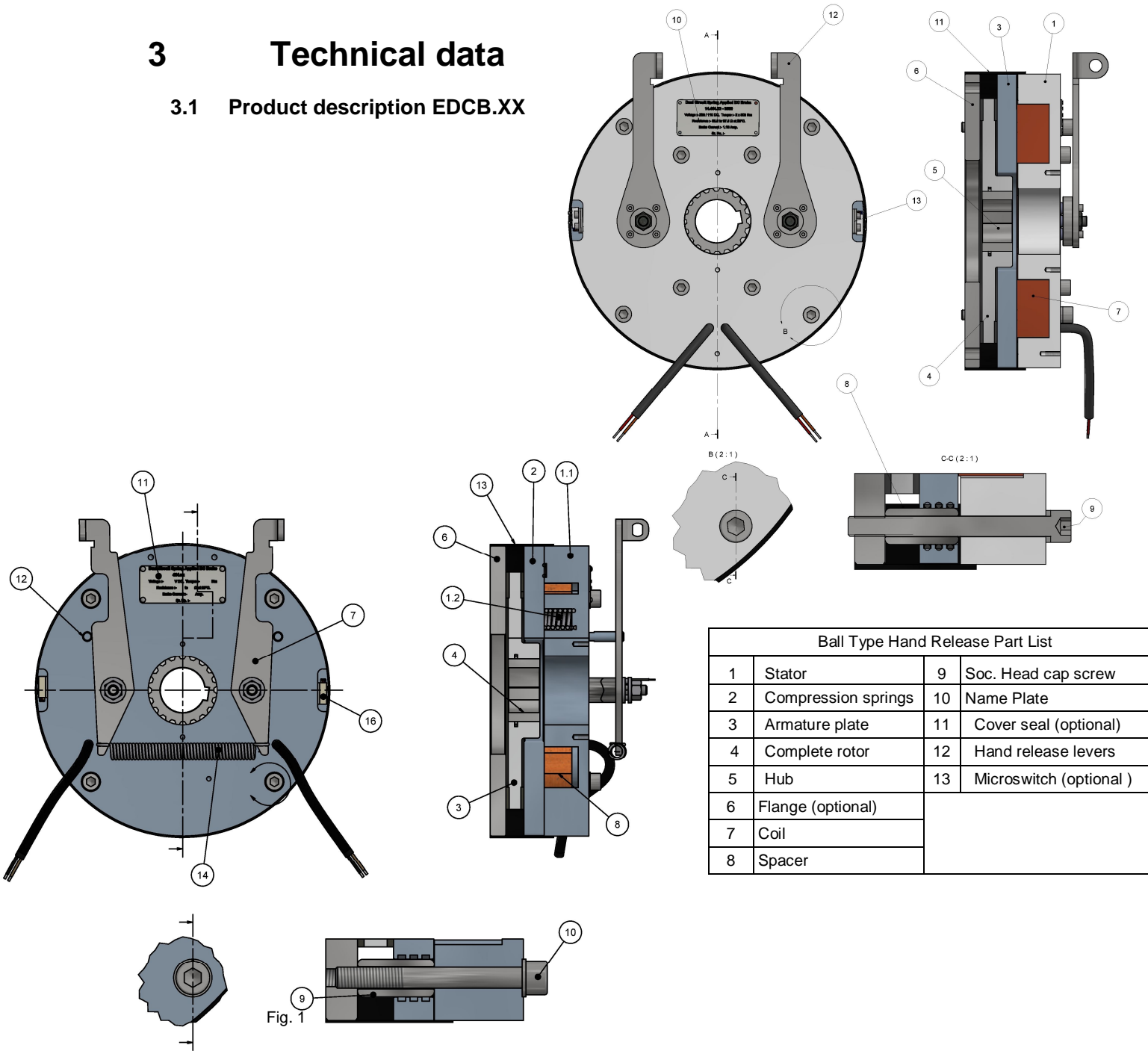
# Danger!	Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
" Danger!	Danger of personal injury through a general source of danger
\$ Stop!	Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
	Danger of property damage
	Reference to a possible danger that may result in property damage if the corresponding measures are not taken.

Application notes

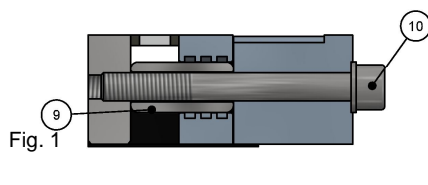
Pictograph and signal word	Meaning
% Note!	Important note to ensure trouble free operation
& Tip!	Useful tip for simple handling

3 Technical data

3.1 Product description EDCB.XX



Ball Type Hand Release Part List			
1	Stator	9	Soc. Head cap screw
2	Compression springs	10	Name Plate
3	Armature plate	11	Cover seal (optional)
4	Complete rotor	12	Hand release levers
5	Hub	13	Microswitch (optional)
6	Flange (optional)		
7	Coil		
8	Spacer		



Cam Type Hand Release part List			
1.1	Stator	12	Stopper pin
1.2	Compression springs	13	Cover seal (optional)
2	Armature plate	14	Lever Spring
3	Complete rotor	16	Microswitch
6	Flange (optional)		
8	Coil		
9	Sleeve bolts		
10	Cheese head screws		

3 Technical data

3.1.1 General information

The spring-applied brake is designed for the conversion of mechanical work and kinetic energy into heat. Due to the static brake torque, the brake can hold loads without speed difference. Emergency braking is possible at high speed, rated data. The more friction work, higher the wear.

The spring-applied brake EDCB is a single-disk brake with two friction surfaces. The brake torque is generated in two electrically and mechanically separated braking circuits by several compression springs (2) by friction. The braking circuits are released electromagnetically. With its two braking circuits, the brake is particularly suitable for lift and stage technology. The brake is selected according to the rated torque for one braking circuit. The second braking circuit full fills the demand for redundancy.

By dividing the armature plate (3) with the corresponding compression springs (2) and electromagnetic coils (7) into two parts, the braking circuits are divided. Through the separate connection cables for each coil group and the armature plate segment, each braking circuit can be switched individually. Each braking circuit is equipped with a micro-switch (12) that monitors the switching status of the spring-applied brake. The supply voltage (AC voltage) is rectified by the corresponding switchgears and after brake release reduced after a short time. In this way, the mean electrical brake power is reduced.

The stator (1) is designed in thermal class F. The limit temperature of the coils (7) is 155°C. The spring-applied brake EDCB is designed for a maximum operating time of 60 % with holding current reduction.

3.1.2 Braking

During braking, the rotor (4), which is axially movable on the hub (5), is rested against the friction surface via the armature plates (3) by means of the springs (2). The asbestos-free friction linings ensure a high braking torque with low wear. The braking torque is transmitted between hub (5) and rotor (4) via the spline

3.1.3 Brake release

In braked state, there is an air gap "a" between the stator (1) and the armature plate segments (3). To release the brake, the coils (7) of the two magnetic circuits are excited with the DC voltage provided. The magnetic force generated attracts the armature plate segments (3) towards the stator (1) against the spring forces. The rotor (4) is then released and can rotate freely.

3.1.4 Release monitoring

The spring-applied brake EDCB is equipped with one micro-switch (12) each per braking circuit for Monitoring the switching status. When the braking circuits are released, the micro-switches (12) change over. This means that the operation of the drive against the applied brake can be excluded. The micro-switches can be connected both as NO and NC contacts. For checking the correct functioning of the micro-switches, we recommend to check the switching status both when the brake is released and when the brake is applied.

3.1.5 Manual release (optional)

Instead of the transport safety bolts usually used, a manual release is optionally available for short-term release when no voltage is applied. The manual release is used for both braking circuits.

Note!

- The manual release is designed for operation using a Bowden cable.
- The braking circuits can only be released electrically.

Tip!

The manual release can be retrofitted.

3.1.6 Encapsulated design (optional)

This design not only avoids the penetration of spray water and dust, but also the spreading of abrasion particles outside the brake. This is achieved by a cover seal over the armature plate and rotor

3.1.7 Noise reduction (optional)

In addition to the standard noise reduction, the armature plates can be equipped with noise reducers. Thus, switching noises will be reduced.

3.2 Rated data

3.2.1 Dimensions



Type	Airgap		Perm. wear [mm]	Rotor thickness		Weight complete stator m [kg]
	"a" rated +0.05 [mm]	"a"(Wear) [mm]		Rated [mm]	After wear [mm]	
EDCB-2x120/250	0.15	0.3	0.3	16.9	16.55	11.0
EDCB-2x300/350	0.15	0.3	0.3	16.9	16.55	14.5
EDCB-2x600/800	0.15	0.3	0.3	16.9	16.55	19.8

Operating & Installation manual for brake EDCB

Type	Pitch circle		Fixing screws		Minimum thread depth +1.0 mm		Tightening torque
	[mm]	Threads	With flange [mm]	Without Flange [mm]	With Flange [mm]	Without Flange [mm]	Mt [Nm]
EDCB-2x120/250	215	M10	4 x M10x85	4 x M10x90	12	15	35
EDCB-2x300/350	245	M10	4 x M10x85	4 x M10x90	12	15	35
EDCB-2x600/800	275	M10	6 x M10x100	6 x M10x110	15	17	35

Tab. 1 Dimensions of EDCB.XX

3.2.2 Electrical data

Type	Voltage 1)		Power 2)		Coil Resistance R20"5% [Ω]	Current 3) I _{max} [A]
	Release "10% V DC	Holding "10% V DC	Release P _{max} [W]	Holding P ₂₀ [W]		
EDCB-2x120/250	220	110	2 x 100	2 x 50	114 to 128	0.90
EDCB-2x300/350	220	110	2 x 130	2 x 65	88.5 to 97.5	1.18
EDCB-2x600/800	220	110	2 x 240	2 x 120	47.5 to 52.5	2.1

Tab. 2 Coil power ratings of EDCB – 2 x XXX

- 1) Voltage at 20 °C
- 2) Power at 20 °C
- 3) Current at 20 °C

3.3 Rated data

Engagement time

Short brake engagement times are vital for emergency braking. DC switching together with a suitable spark suppressor must therefore be provided.

If the drive system includes a frequency inverter so that the brake is de-energized only when the motor is at standstill, switching on the AC side is also possible (not valid for emergency braking). In this case, engagement times will be approx. 8 to 10 times longer.

3.4 Operating frequency / friction work

The permissible operating frequency " S_{hperm} " depends on the friction work " Q ". An operating frequency of " S_h " results in the permissible friction work " Q_{perm} ". With high speed and friction work, the wear increases strongly, because very high temperatures occur at the friction faces for a short time.

3.5 Emission

Electromagnetic compatibility

%

Note!

The user must ensure compliance with EMC Directive 2004/108/EC using appropriate controls and switching devices.

If an EMCO rectifier is used for the AC switching of an EMCO spring-applied brake and if the operating frequency exceeds five switching operations per minute, the use of a mains filter is required. If the EMCO spring-applied brake uses a rectifier of another manufacturer for the switching, it may become necessary to connect a spark suppressor in parallel with the AC voltage. Spark suppressor according to coil voltage on request.

Heat

Since the brake converts kinetic energy as well as mechanical and electrical energy into heat, the surface temperature varies considerably, depending on the operating conditions and possible heat dissipation under un-favourable conditions the surface temperature can reach 120°C.

Noise

The switching noise during engagement and disengagement varies depending on the air gap "a" and the brake size.

For switching on the AC side, the switching noise is between approx. 55 and 60 db (A).

For switching on the DC side, the switching noise is between approx. 68 and 74 db (A).

Depending on the natural oscillation after installation, operating conditions and state of the friction faces, the brake may squeak during braking.

Others

The abrasion of the friction parts produces dust.

In case of high load, the friction face will become so hot that odours may occur.



4 Mechanical installation




4.1 Important notes

\$ Stop!

Toothed hub and screws must not be lubricated with grease or oil!

4.2 Necessary tools

Type	Torque wrench Insert for hexagon socket screws		Open-jawed planner Manual release – nuts Wrench size - mm		Allen key for transport safety bolts
	Measuring range [Nm]	Wrench size [mm]			 Wrench size [mm]
EDCB-2x120/250	20-100	8	17	1	6
EDCB-2x300/350		8	17	1	6
EDCB-2x600/800		8	17	1	6

Feeler	Vernier Caliper	Multimeter
		

4.3 Mounting

4.3.1 Important notes

Minimum requirements of the end shield:

--- Material FG 250 or C15

 If different materials are used, contact EMCO.

--- Evenness – < 0.05 mm

--- Axial run-out 0.08 mm max,

--- Roughness Rz 10 max,

--- The threaded holes must have the minimum thread depth as stated in table.

--- The end shield must be free of grease and oil.

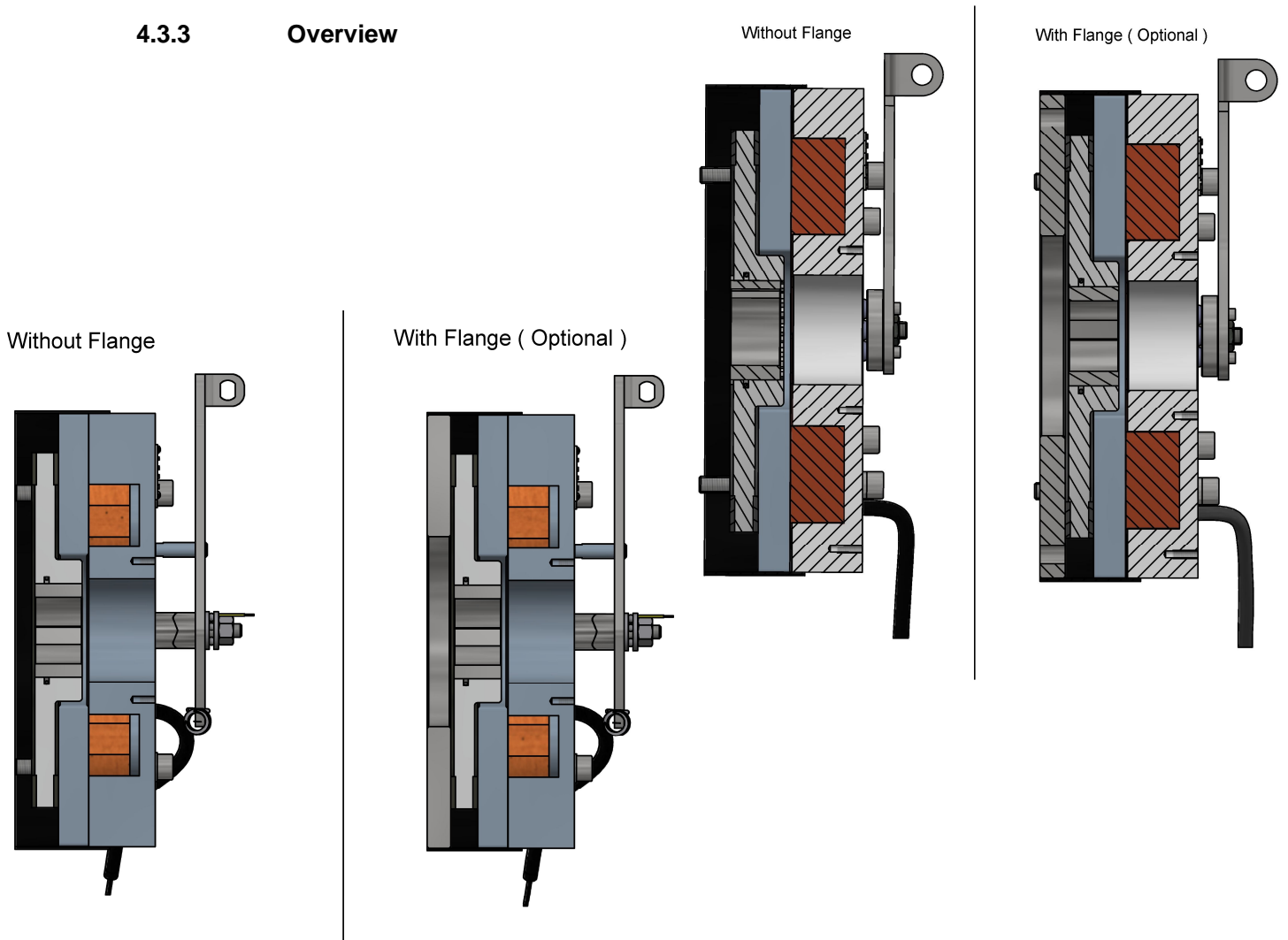
--- Minimum requirements of the motor shaft:- The diameter of the shaft shoulder must not be bigger than the tooth root diameter of the hub.

4.3.2 Preparation

1. Unpack spring-applied brake.
2. Check for completeness.
3. Check nameplate data, especially rated voltage.

4 Mechanical installation

4.3.3 Overview



4.4 Installation

\$ Stop!

Toothed hub and screws must not be lubricated with grease or oil!

% Note!

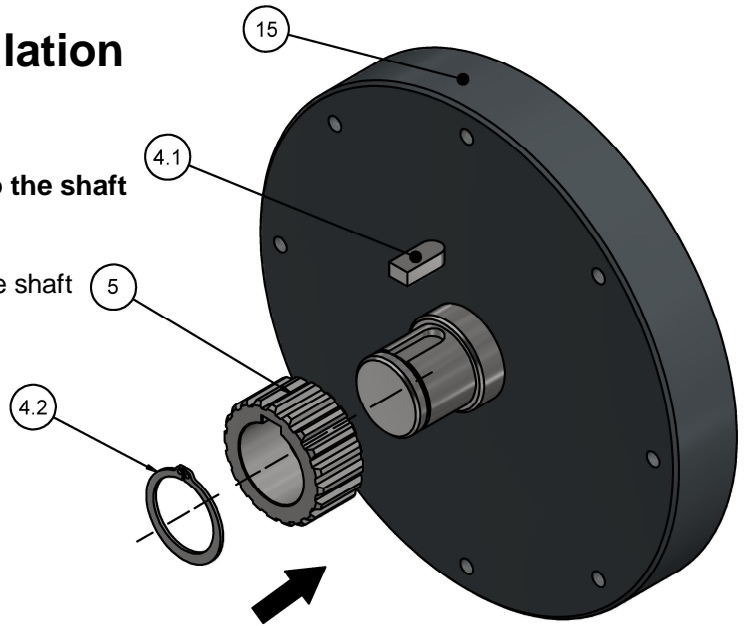
When you have ordered a version with flange, attach the hub first , then continue with the "Assembly of the counter friction faces".

4 Mechanical installation

4.4.1 Installation of the hub onto the shaft

Fig. 4 Installation of the hub onto the shaft

- 5 Hub
- 4.1 Key
- 4.2 External Circlip
- 15 End shield



1. Insert key (4.1) into the shaft.
2. Press hub (5) onto the shaft.
3. Secure hub against axial displacement, e.g. using a Circlip (4.2).

4.4.2 Brake assembly

Assembly without counter friction face

- 5 Hub
- 15 End shield

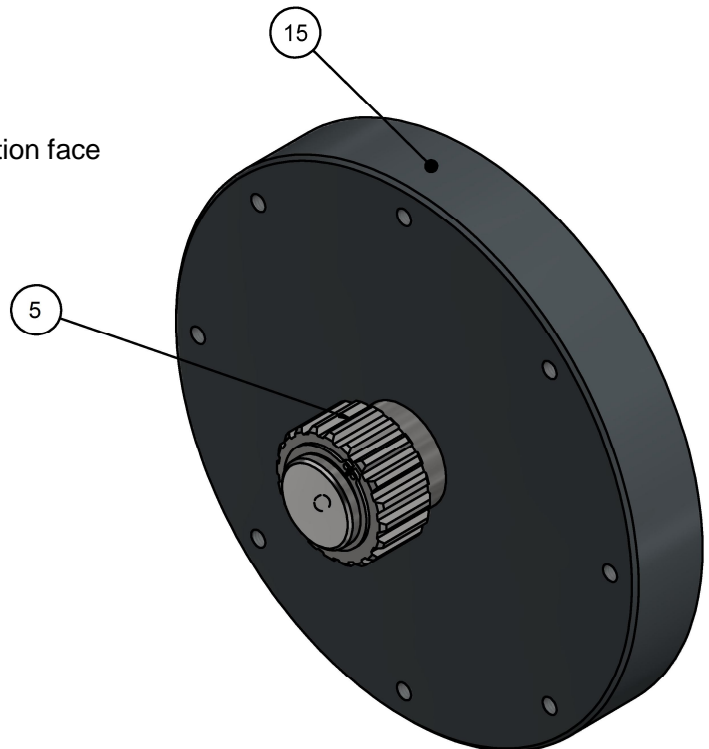


Fig. 5 Assembly without counter friction face

4 Mechanical installation

Assembly of the counter friction faces Flange (optional)

- 5 Hub
- 6 Flange
- 15 End shield

1. Hold the flange (6) to the end shield (15).
2. Align the through holes in the flange and the threads of the fastening bolt holes.

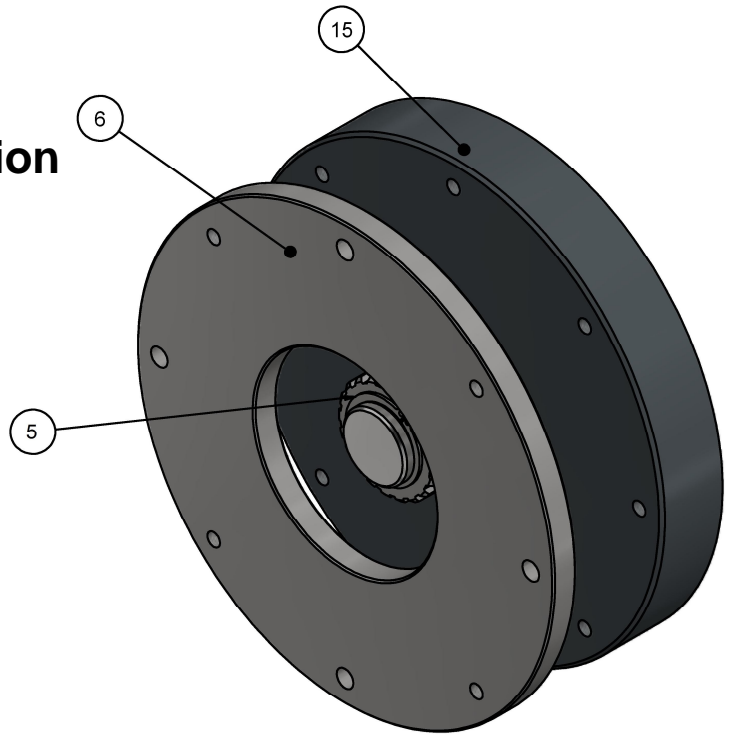


Fig. 6 Assembly of the flange

Assembly of the rotor

- 4 Complete rotor
- 5 Hub
- 6 Flange
- 15 End shield

1. Push the complete rotor (4) onto the hub (5) and check whether it can be moved by hand. Do not use any lubricant!
2. In the following sections, only assembly for the versions with flange will be described.

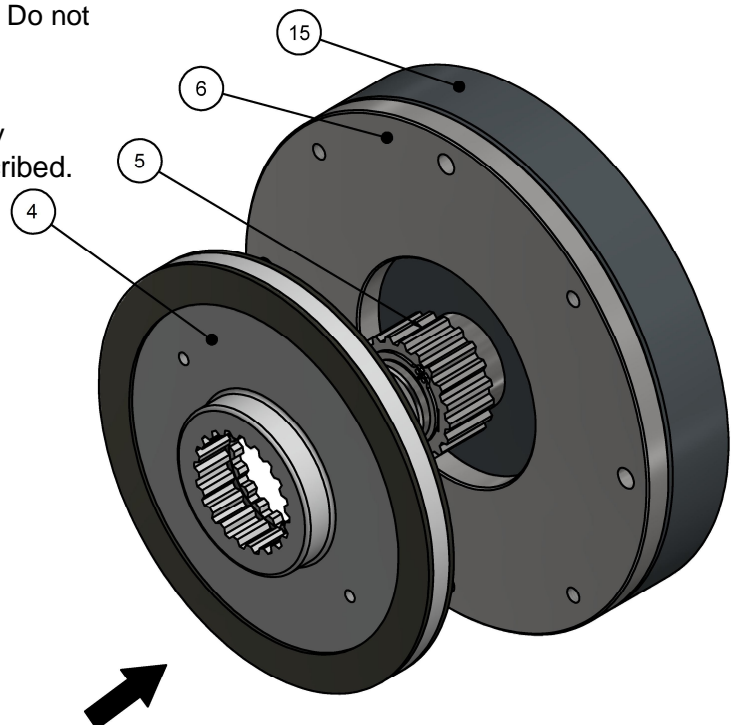


Fig. 7 Assembly of the complete rotor

4 Mechanical installation

Assembly of the complete stator

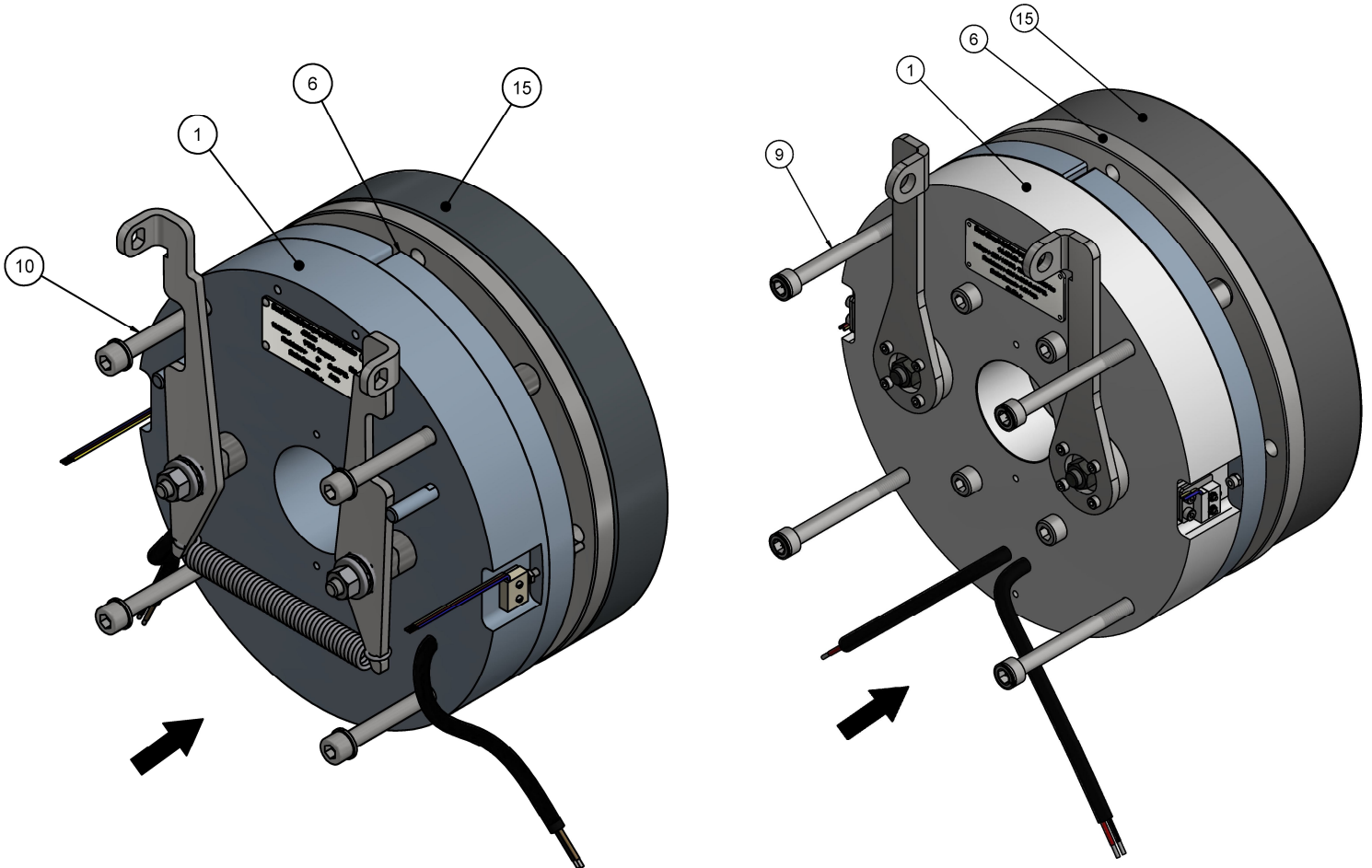


Fig. 8 Assembly of the complete stator

- 1 Complete stator
- 6 Flange
- 9 / 10 Socket head cap screw
- 15 End shield

1. Push the complete stator (1) onto the shaft.
 - For versions with shaft seal, the shaft should be located concentrically to the shaft seal.
2. Screw the complete stator (1) onto the end shield (15) using the screws (9).

4 Mechanical installation

4.4.3 Check air gap

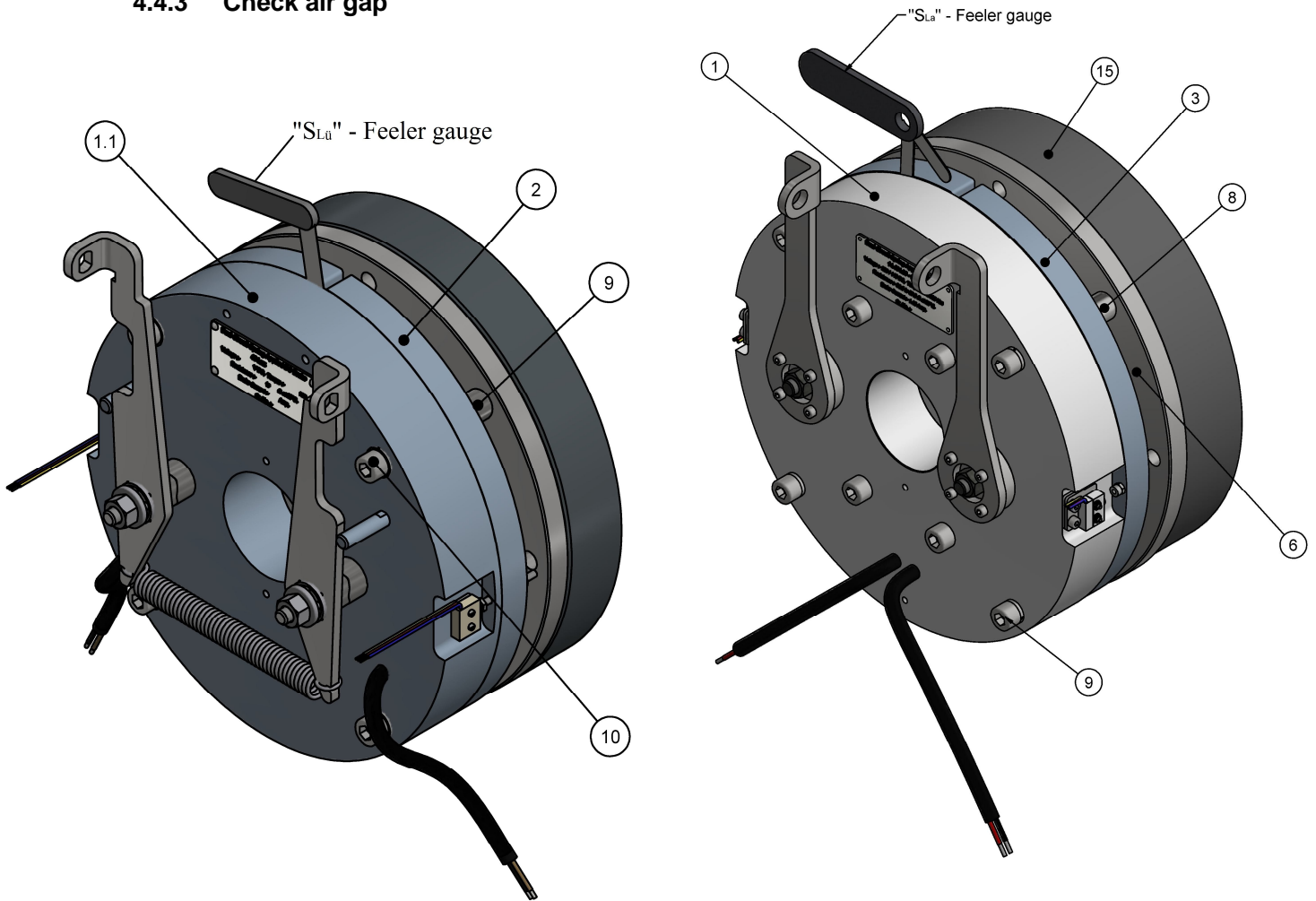


Fig. 9 Checking "a"

1.1 / 1	Stator	6	Flange	9	Soc. head cap screw
2 / 3	Armature plate	8	Spacer	15	End shield

1. Check the air gap "a" near the screws (9) using a feeler gauge and compare the values to the values for "a_{rated}" in the table.

% Note!

Do not insert feeler gauge more than 10 mm between armature plate (3) and stator (1)

If "a" is not within the tolerance, check perpendicularity of motor shaft with respect to its end shield.

\$ Stop!

Only for brakes with manual release
| Also check dimension "b" and readjust.

" Danger!

Brake may fail
If the manual release is not adjusted correctly the brake may fail.
Possible consequences:
| Severe injuries or material damage.
Protective measure:
| Observe dimension "b".

4 Mechanical installation

4.4.5 Assembly of the cover seal

\$ Stop!

Brakes without flange require a groove at the end shield for the lip of the cover seal.

- 1 Complete stator,
- 2 / 3 Armature plate,
- 6 Flange ,
- 9 Soc. Head cap screw
- 11 / 13 Cover seal

1. Pull the cable through the seal (11).
2. Push the seal (11) over the complete stator (1).
3. Press the lips of the cover seal (11) into the groove of complete stator (1) and flange (6) /end shield.

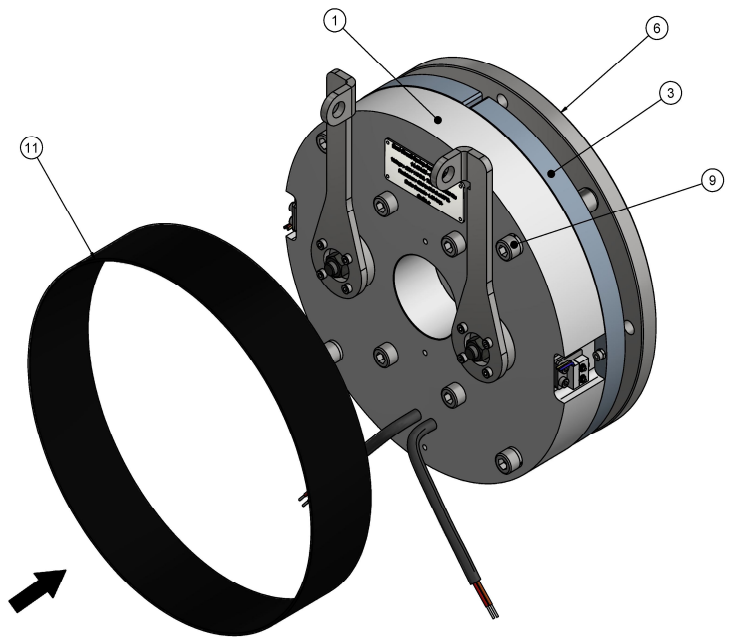
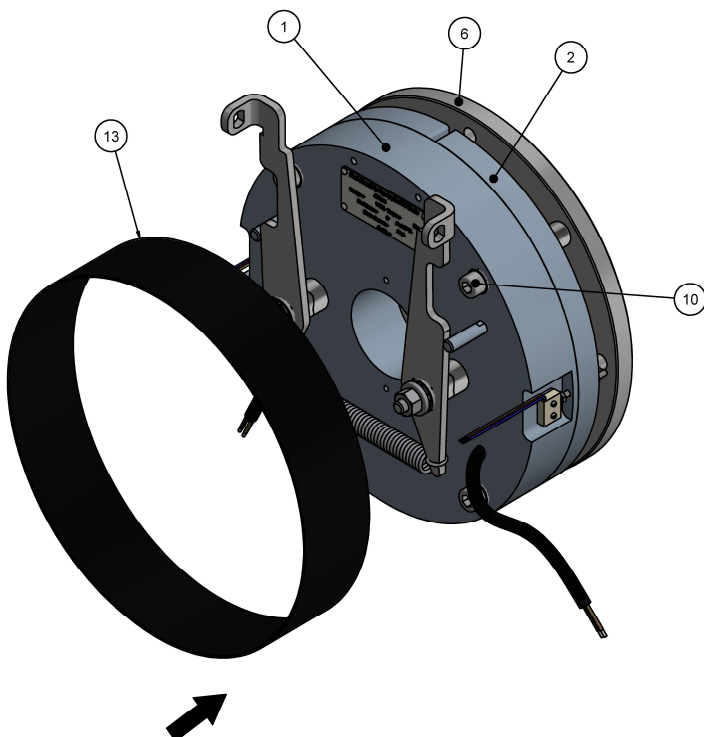


Fig. 11 Assembly of the cover seal

\$ Stop!

Cover seal with condensation drain hole:
Attach cover seal such that condensate can run off through hole.

5 Electrical installation

5.1 Electrical connection

5.1.1 Important notes

Danger!

- | Perform electrical connection only when no voltage is applied.
- | If an "emergency stop" is carried out without the protective circuit provided, the control device may be destroyed. Observe the correct polarity of the protective circuit!

\$ Stop!

- | For checking the individual braking circuits, it must be possible to switch off the power supply separately for each braking circuit.
- | The suppressor circuit included in EMCO rectifier UM101A-4T.

Danger!

- | Electrical connection must only be carried out by skilled personnel!
- | Connections must only be made when the equipment is de-energised! Danger through unintended starts or electric shocks.

\$ Stop!

- | It must be ensured that the supply voltage corresponds to the nameplate data.
- | Voltages must be adapted to the local environment!

5 Electrical installation

5.1.2 Circuit proposals

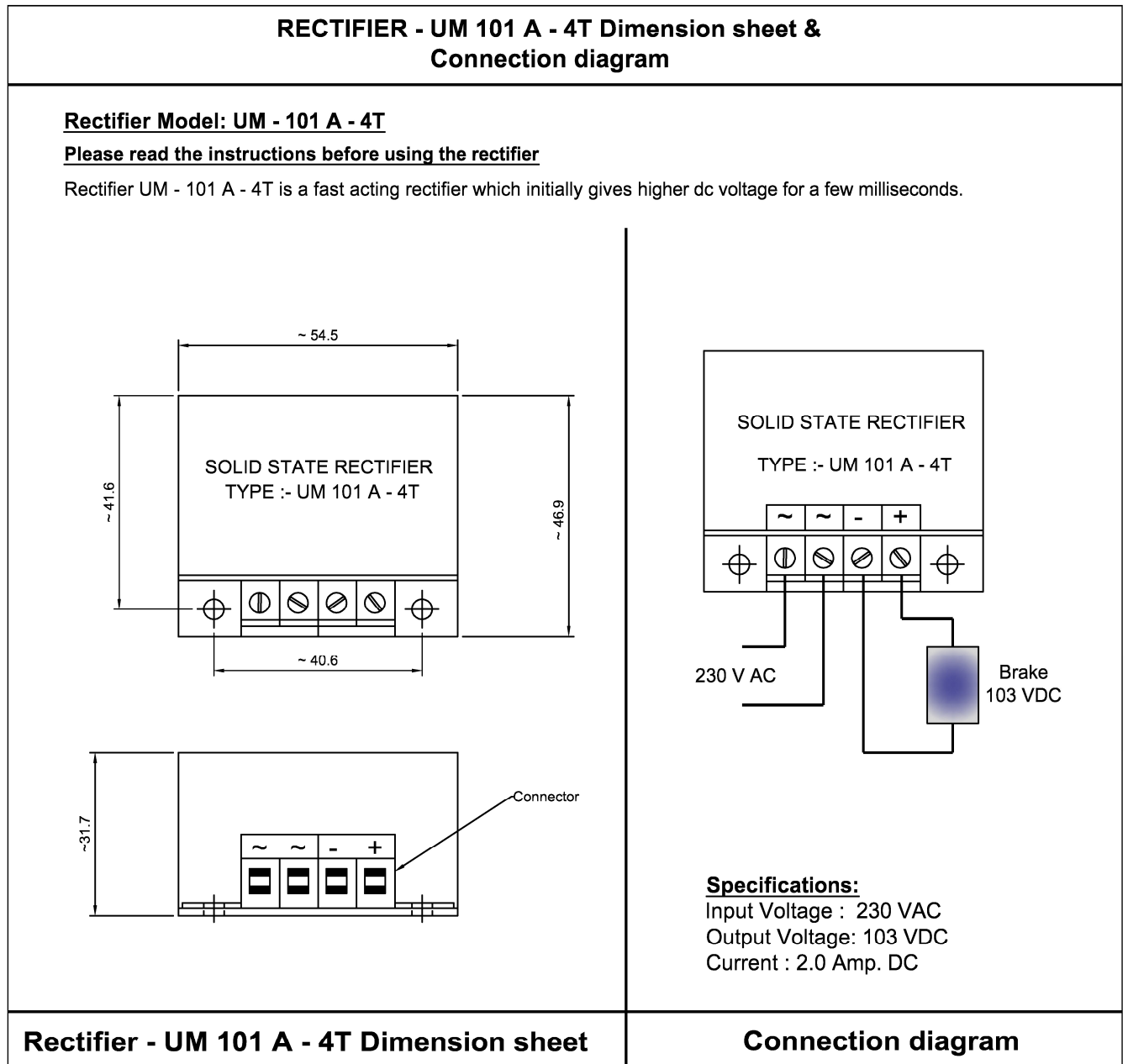


Fig. 14 EMCO, EDCB.XX Connection diagram.

5.2 Bridge/half-wave rectifiers (option)

UM101 A- 4T

Bridge/half-wave rectifiers are used for the supply of electromagnetic spring-applied DC brakes which have been released for operation with such rectifiers. Any other use is only permitted with the explicit written approval of EMCO.

After a defined over excitation time, the bridge/half-wave rectifiers change from bridge rectification to half-wave rectification. Depending on the dimensioning of the load, the switching performance can thus be improved or the power can be de-rated.

5.2.2 Technical data

Rectifier type	Bridge / half – wave rectifier
Output voltage for bridge rectification	0.9 x U1
Output voltage for half – wave rectification	0.45 x U1
Ambient temperature (storage / operation) [C°]	-25.....+70

Danger!

The brake must only be electrically connected when no voltage is applied!

& Tip!

Compare the coil voltage of the stator to the DC voltage of the installed rectifier.

6 Commissioning and operation

6.1 Important notes

" Danger!

The live connections and the rotating rotor must not be touched.
The drive must not be running when checking the brake.

The brakes are designed such that the specified rated torques will usually be safely reached after a short run-in process.

Due to the varying properties of the organic friction linings and changing environmental conditions, the specified rated torques may, however, differ. The deviations must be considered appropriately during dimensioning.

In particular in the case of humidity and changing temperatures, the break away torque may be higher after long down times.

6.2 Function checks before commissioning

6.2.1 Operational check

Brake with micro-switch

Contact type	Connection	Brake released	Microswitch closed
NC contact	Yellow / Red OR Yellow / Black	Yes	No
		No	Yes
NO contact	Blue / Red OR Blue / Black	Yes	Yes
		No	No

Tab. 5 Switching status of micro-switch

6 Commissioning and operation

" Danger!

The brake must be free of residual torque. The motor must not rotate.

Danger!

Live connections must not be touched.

1. The switching contact for the brake must be open.
2. Remove two bridges from the motor terminals to de-energize the motor.
 - Do not switch off the DC brake supply.
3. Apply DC voltage to the brake.
4. Measure the AC voltage at the motor terminals. It must be zero.
5. Close the switching contact for the brake.
 - The brake is released.
6. Measure the DC voltage at the brake:
 - The DC voltage measured after the over excitation time (see bridge/half-wave rectifier, must correspond to the holding voltage $\pm 10\%$ deviation is permissible.)
7. Check air gap " a".
 - It must be zero and the rotor must rotate freely.
8. Check the switch position of the micro-switch.
9. Open the switching contact for the brake.
 - The brake is applied.
10. Check the switch position of the micro-switch.
11. Switch off DC voltage for the brake.

6 Commissioning and operation

6.2.2 Checking the Manual release function

% Note!

- The manual release is designed for operation using a Bowden cable.
- The braking circuits can only be released electrically.

" Danger!

The drive system must be load-free. The motor must not rotate.



Fig. 16 Operating direction of the lever

1. Motor and brake de-energized.
2. Suspend Bowden cable (not included in the delivery package) and pull with force
 - The rotor must rotate freely. A small residual torque is permissible.
3. Release the lever.
 - Torque must be available!

The preparations for commissioning are completed.

6 Commissioning and operation

6.3 Commissioning

1. Switch on drive system.
2. Carry out a braking test.

6.4 During operation

" Danger!

The running rotor must not be touched.

Danger!

Live connections must not be touched.

- Check the brake regularly during operation. Take special care of:
 - unusual noises or temperatures
 - loose fixing elements
 - the condition of the electrical cables.
- The armature plate must be attracted and the rotor must move without residual torque.
- Measure the DC voltage at the brake.
 - The DC voltage measured after the over excitation time must correspond to the holding voltage $V \pm 10\%$ deviation is permissible.
- In the event of failures, refer to the troubleshooting table in chapter 8. If the fault cannot be eliminated, please contact the aftersales service.

7 Maintenance/repair

7.1 Wear of spring-applied brakes

EMCO spring-applied brakes are wear-resistant and designed for long maintenance intervals. The friction lining and the mechanical brake components are subject to function-related wear. For safe and trouble-free operation, the brake must be checked at regular intervals, and, if necessary, be replaced.

The following table describes different causes of wear and their effects on the components of the spring-applied brake. For calculating the service life of rotor and brake and determining the maintenance intervals to be observed, the relevant factors of influence must be quantified. The most important factors are the friction work, initial speed of braking and the operating frequency. If several of the causes of wear indicated for the friction lining occur in an application at the same time, the influencing factors must be added for calculating the wear.

Component	Cause	Effect	Influencing factors
Friction lining	Braking during operation	Wear of friction lining	Friction work
	Emergency stops		
	Overlapping wear during start and stop of drive		Number of start/stop cycles
	Active braking via the drive motor with support of brake		
	Starting wear in case of motor mounting position with vertical shaft, even when the brake is not applied		
Armature plate and flange	Rubbing of brake lining	Armature plate and flange are run in	Friction work
Splining of brake rotor	Relative movements and shocks between brake rotor and brake shaft	Wear of splining (primarily on the rotor side)	Number of start/stop cycles
Armature plate support	Load alternation and jerks in the backlash between armature plate, sleeve bolts	Breaking of armature plate, sleeve bolts and guide bolt	Number of start/stop cycles, braking torque
Springs	Axial load cycle and shear stress of springs through radial backlash on reversal of	Reduced spring force or fatigue failure	Number of switching operations of brake

7 Maintenance/repair

7.2 Inspections

To ensure safe and trouble-free operation, spring-applied brakes must be checked and maintained at regular intervals. Servicing can be made easier if good access-ability of the brakes is provided in the plant. This must be considered when installing the drives in the plant.

Primarily, the necessary maintenance intervals for industrial brakes result from the load during operation. When calculating the maintenance interval, all causes for wear must be taken into account (see chapter 7.1). For brakes with low loads such as holding brakes with emergency stop, we recommend a regular inspection at a fixed time interval. To reduce the cost, the inspection can be carried out along with other regular maintenance work in the plant if necessary.

\$ Stop!

Stable properties of the organic friction lining are only achieved in the case of continuous use. The readiness for operation of the brake has to be ensured with a braking energy that is equivalent to one emergency stop per week. Unplanned emergency stops occurring at a sufficient frequency have the same effect.

If the brakes are not maintained, failures, production losses or damage to the system may occur. Therefore, a maintenance concept adapted to the particular operating conditions and brake loads must be defined for every application. For the EMCO spring-applied brakes, the maintenance intervals and maintenance operations listed in the below table must be provided. The maintenance operations must be carried out as described in the detailed descriptions.

Type EDCB.XX	Time interval	
	For service brakes:	For holding brakes with emergency stop:
<ul style="list-style-type: none"> according to service life calculation otherwise every six months after 4000 operating hours at the latest 	<ul style="list-style-type: none"> at least every years after 1 million cycles at the latest 	
Inspections with assembled brake:		Inspections after removing the brake:
<ul style="list-style-type: none"> Check release function and control Measure air gap Measure rotor thickness (replace rotor, if necessary) Thermal damage of armature plate or flange (dark-blue tarnishing) 	<ul style="list-style-type: none"> Check clearance of the rotor gearing (replace worn-out rotors) Play of torque plate at sleeve bolts and armature plate Check springs for damage Check armature plate and flange/end shield <ul style="list-style-type: none"> – Evenness < 0.1 mm – Max. run-in depth = rated air gap of brake size 	

7 Maintenance/repair

7.3 Maintenance

% Note!

Brakes with defective armature plates, springs or flanges must be replaced completely.

Please observe the following for inspections and maintenance operations:

- Remove impurities through oil and grease using brake cleaning agents, if necessary, replace brake after finding out the cause of the contamination. Dirt deposits in the air gap between stator and armature plate impair the function of the brake and must be removed.
- After replacing the rotor, the original braking torque will not be reached until the run-in operation of the friction surfaces has been completed. After replacing the rotor, run-in armature plates have an increased initial rate of wear.

7.3.1 Checking the rotor thickness

" Danger!

The motor must not run during the check.

1. Stop motor and control system.
2. Remove the motor cover and seal ring, if mounted.
3. Measure the rotor thickness using a calliper gauge.
4. Compare the measured rotor thickness with the minimally permissible rotor thickness.
5. If necessary, replace the complete rotor.

7.3.2 Check air gap

" Danger!

The motor must not run during the check.

1. Stop motor and control system.
2. Check the air gap "a" near the fixing screws between armature plate and stator using a feeler gauge.
3. Compare the measured air gap with the maximum permissible air gap "a_{max}".

7 Maintenance/repair

7.3.3 Release / voltage

1. Start motor and control system!

" Danger!

The running rotor must not be touched.

Danger!

Live connections must not be touched.

2. Observe air gap "a" during operation of the drive. The air gap must be zero.
3. Measure the DC voltage at the brake.
 - The DC voltage measured after the over-excitation time (see bridge/half-wave rectifier, must correspond to the holding voltage $\pm 10\%$ deviation is permissible.

7 Maintenance / repair

7.4 Maintenance operations

7.4.1 Rotor replacement

" Danger!

Disconnect voltage. The brake must be free of residual torque.

1. Switch off voltage!
2. Disconnect the supply cable.
3. Loosen the screws evenly and remove them completely.
4. Remove the complete stator from the end shield. Observe the supply cable.
5. Pull the complete rotor off the hub.
6. Check hub teeth.
7. Replace the hub as well if worn.
8. Check the friction surface at the end shield. In case of strong scoring at the flange, replace the flange. If scoring occurs at the end shield, re-finish end shield.
9. Measure rotor thickness (new rotor) and sleeve bolt head with a Vernier caliper.
10. Install and adjust new rotor and stator (see chapter 4.4.2).
11. Reconnect the supply cable.

7 Maintenance/repair

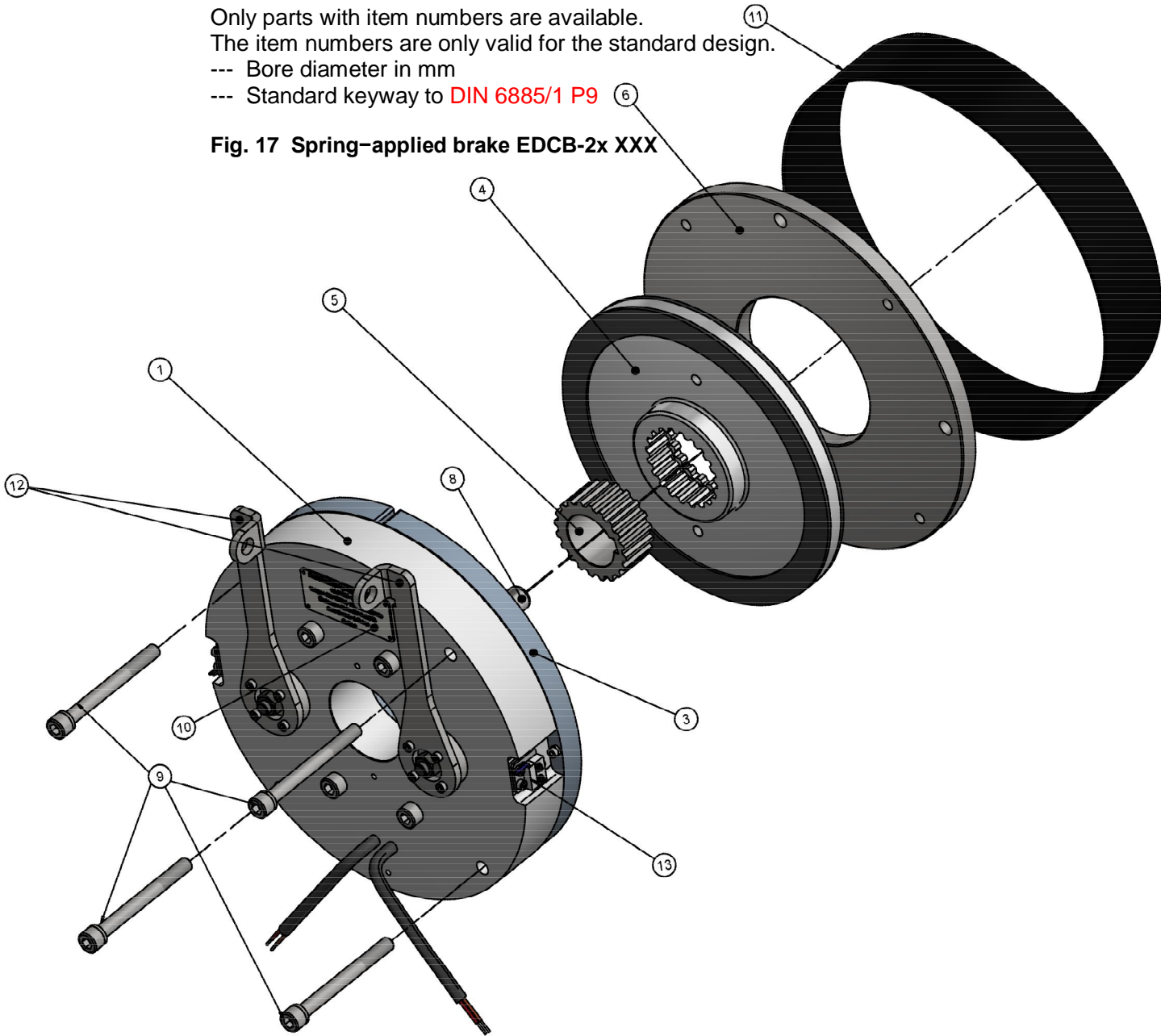
7.5 Spare-parts list for Ball Type Brake hand release

Only parts with item numbers are available.
The item numbers are only valid for the standard design.

--- Bore diameter in mm

--- Standard keyway to **DIN 6885/1 P9**

Fig. 17 Spring-applied brake EDCB-2x XXX



Item	Designation
1	Complete stator
2	Compression spring
3	Armature plate
4	Complete rotor
5	Hub
6	Flange (Optional item)
7	Brake Coil
8	Spacer
9	Socket head cap screw (Brake mounting screw)
10	Name plate
11	Cover seal (Optional item)
12	Hand release levers
13	Microswitch (Optional item)

7 Maintenance/repair

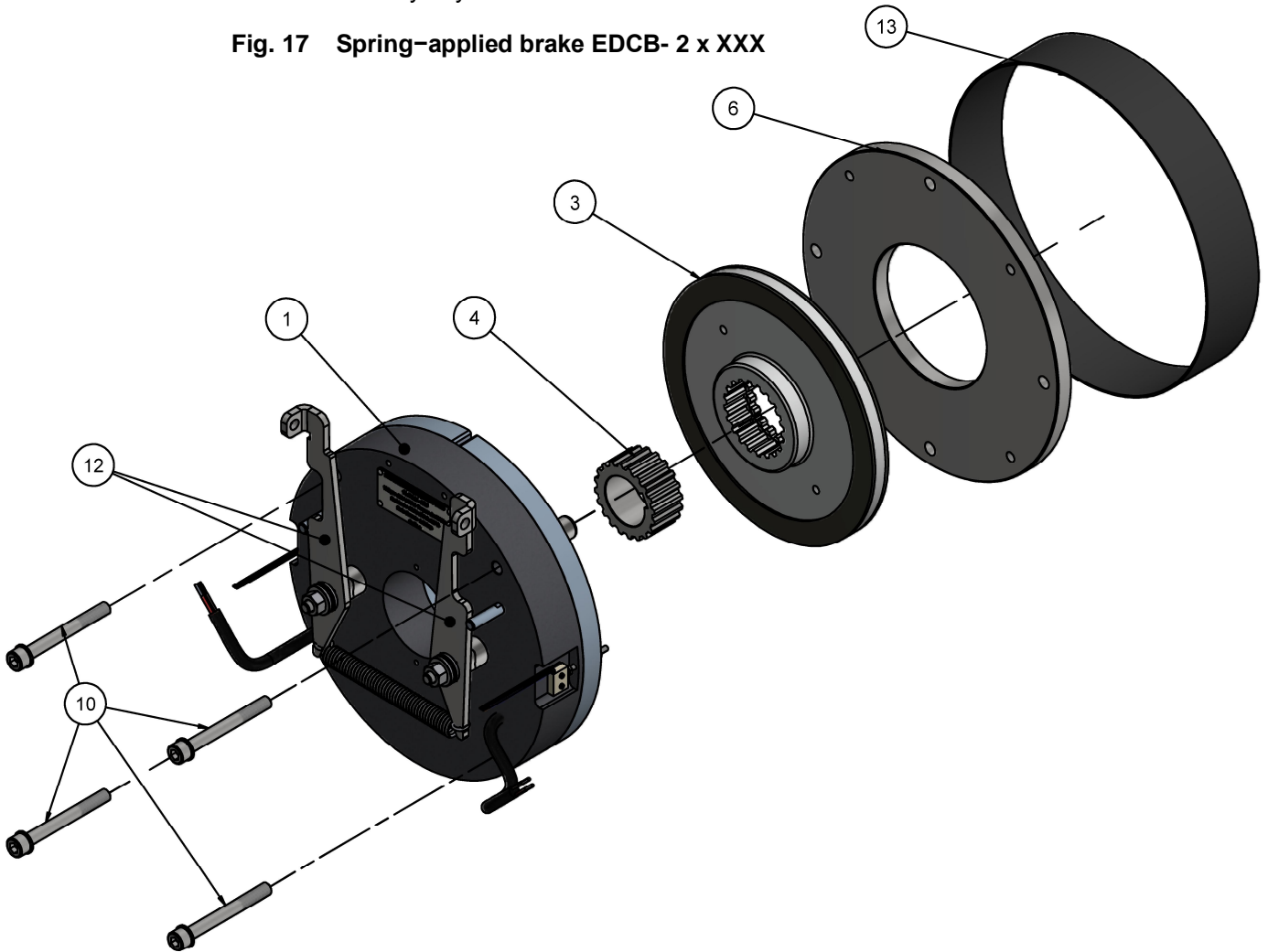
7.5 Spare-parts list Cam Type Brake hand Release

Only parts with item numbers are available.
The item numbers are only valid for the standard design.

--- Bore diameter in mm

--- Standard keyway to **DIN 6885/1 P9**

Fig. 17 Spring-applied brake EDCB- 2 x XXX



Item	Designation
1	Complete stator & Armature Plate
2	Compression spring
3	Complete rotor
4	Hub
6	Flange (Optional item)
10	Socket head cap screw (Brake mounting screw)
10	Name plate
12	Hand release levers
13	Cover seal (Optional item)

8 Troubleshooting and fault elimination

If any malfunctions should occur during operation of the drive system, please check the possible causes using the following table. If the fault cannot be eliminated by one of the listed measures, please contact the aftersales service.

Fault	Cause	Remedy
Brake does not release	Coil is interrupted	Measure coil resistance using multi-meter: – If resistance is too high, replace the complete stator.
	Coil has inter-turn fault or short circuit to ground	Measure coil resistance using multi-meter: – Compare measured resistance to rated resistance. If the resistance is too low, replace the complete stator. Check coil for short circuit to ground using a multi-meter: – Replace the complete stator if short circuit to ground is detected. Check brake voltage (see "defective rectifier, voltage too low").
	Wiring incorrect or defective	Check and correct wiring. Check cable continuity using a multi-meter: – Replace defective cable.
	Rectifier defective or wrong	Measure the DC voltage at the rectifier using a multi-meter. If DC voltage is zero: Measure AC voltage at the rectifier. If AC voltage is zero: – Apply voltage – Check fuse – Check wiring If AC voltage is ok: – Check rectifier – Replace defective rectifier Check coil for fault between turns and short circuit to ground. If the rectifier defect occurs again, replace the complete stator, even if no fault between turns or short circuit to ground can be detected. The fault may only occur when warm.
	Incorrect wiring of micro-switch	Check the wiring of the micro-switch and correct it.
	Incorrect setting of micro-switch	Replace the complete stator and advise the manufacturer of incorrect micro-switch setting.
	Air gap too large	Measure rotor thickness and compare with minimum rotor thickness. If necessary, replace rotor.
Rotor cannot rotate freely	Wrong setting of manual release	Check dimension "b+a" with energized brake. The dimension must be identical at both sides. Correct if necessary.
	Air gap "a" too small	
Fault	Cause	Remedy
Rotor not thick enough	Rotor has not been replaced in time	Replace rotor
Voltage is not zero during functional test	Incorrect wiring of micro-switch	Check and correct the micro-switch wiring.
	Defective micro-switch or incorrect setting	Replace the entire stator and send the defective stator to the manufacturer.
Voltage too high	Brake voltage does not match the rectifier	Adapt rectifier and brake voltage to each other.
Voltage too low	Brake voltage does not match the rectifier	Adapt rectifier and brake voltage to each other.
AC voltage is not mains voltage	Fuse missing or defective	Select a connection with proper fusing.
	Incorrect wiring of micro-switch	Check the micro-switch wiring and correct it.
	Defective micro-switch or incorrect setting	Replace the entire stator and send the defective stator to the manufacturer.

*****END*****



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