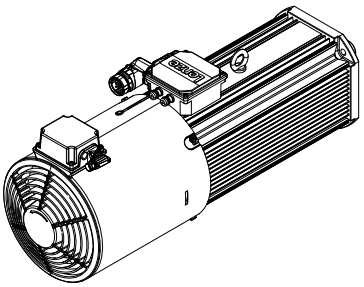


M...

MCA19, MCA21

Asynchronous servo motors with spring-applied brake mounted on the B-bearing side

Supplement to Operating Instructions EN

13570089

Lenze

Please read these instructions before you start working!
Follow the safety instructions enclosed.

Important notes

This supplement is only valid together with the general motor operating instructions, see Internet!

Invalid chapters of the motor operating instructions: none

Additions to the "Maintenance and repair" section:

Stop!

When replacing the brake, complete rotor or the hub, the spare part from the corresponding **Lenze repair kit** must always be used.

Characteristics and maintenance of the BFK457-16 R and BFK458-18 spring-applied brakes.

Encoder dismounting and mounting.

1.1 Important notes

The brake that is mounted here is specially adapted to the use on the MCA 19 and 21.

Stop!

If the wear air gap of a spring-applied brake is reached, the brake will no longer be released. In this case, the complete rotor of the brake must be replaced.

Note!

- BFK457-16R: It is not possible to re-adjust the brake. The complete rotor must be replaced.
- BFK458-18: When the wear limit has been reached, the brake must be re-adjusted, or the complete rotor must be replaced.

Safety system

Stop!

If a safety encoder is used, all maintenance and installation work must be performed at the Lenze site.

Otherwise any warranty will expire and Lenze GmbH will not accept any liability for consequential damage.

The **IG2048-5V-V3** **safety encoder** **can** be mounted on the brakes described here and must not be dismounted and mounted. This service work is performed by Lenze.

1.2 Spring-applied brake - holding brake

1.2.1 Characteristics

Motor type	Type of brake	s_{Lrated} +0.1 / -0.05	$s_{Lmax.}$ holding brake	Max. adjustment, permissible wear path	Rotor thickness		Tightening torque of the fixing screws	Fixing screws
		[mm]	[mm]	[mm]	min. [mm]	max. [mm]	[Nm]	No. of pieces
MCA19	BFK457-16R	0.3	0.6	---	---	---	24.6	4
MCA21	BFK458-18	0.4	0.6	3.0	10.0	13.0	24.6	6

1.2.2 BFK457-16R design - non-adjustable

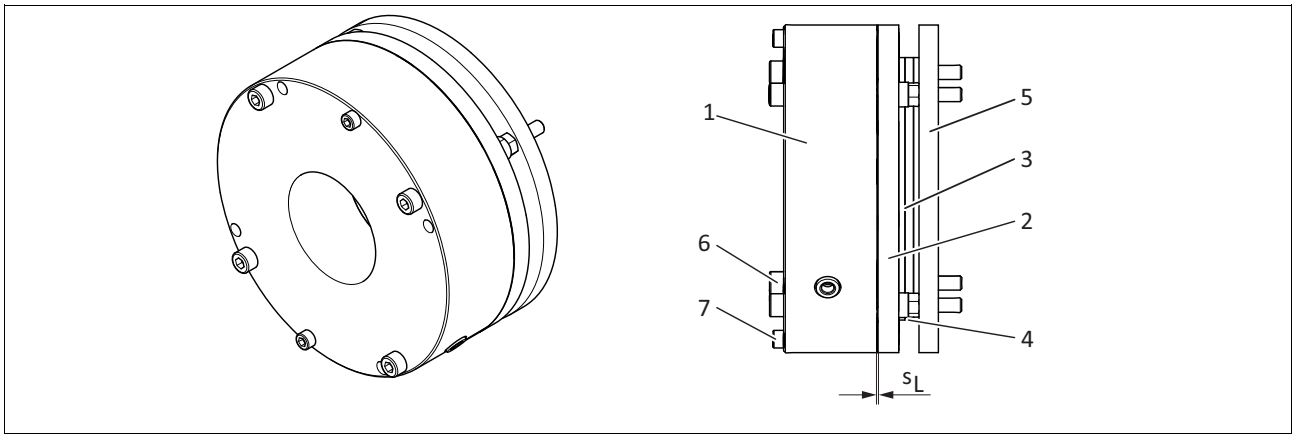


Fig. 1 Design of an INTORQ BFK457-16 Compact spring-applied brake, fully mounted rotor and flange

1 Stator
2 Armature plate
3 Rotor with friction lining
4 Spacer bush
5 Flange
6 Fixing screws
7 Screws of the emergency manual release
s_L Air gap

1.2.3 BFK458-18 design - adjustable

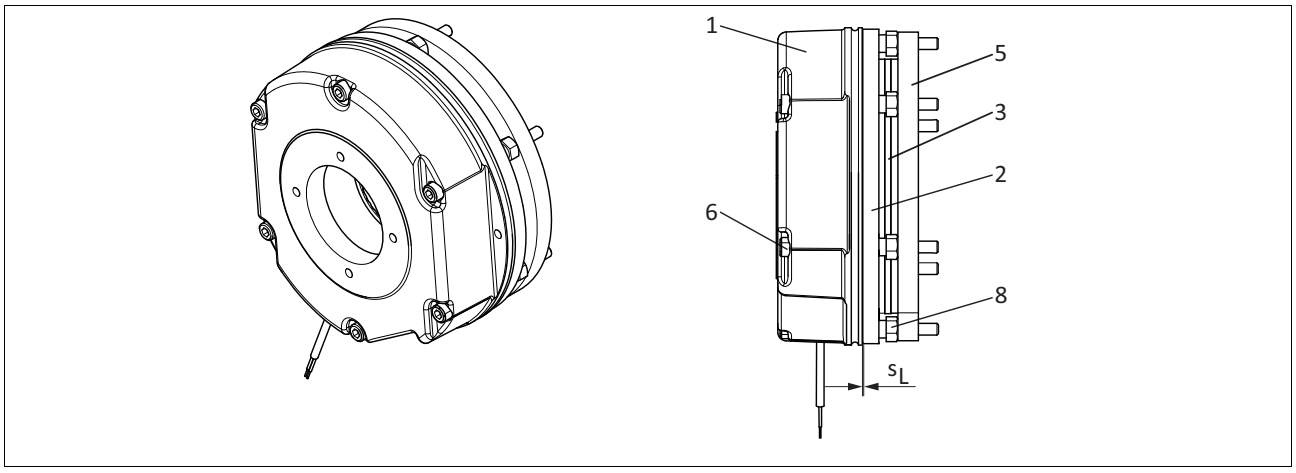


Fig. 2 Design of an INTORQ BFK458 spring-applied brake: basic module E (complete stator) + rotor + hub + flange

1 Stator
2 Armature plate
3 Rotor with friction lining
5 Flange
6 Fixing screws
8 Sleeve bolts
s_L Air gap

2.1 Spring-applied brake - holding brake

The brakes need to be checked on a regular basis to ensure safe and trouble-free operation.

The necessary maintenance intervals primarily depend on the stress to which the brake is subjected in an application. When a maintenance interval is being calculated, all causes of wear must be taken into account (see notes "Wear on spring-applied brakes"). In the case of brakes which are subjected to low levels of stress, e.g. holding brakes with emergency stop function, regular inspections at a fixed time interval are recommended. In order to reduce the amount of work involved in maintenance, perform the inspection at the same time as other maintenance work carried out cyclically on the machine if possible.

If the brakes are not properly serviced, operating faults, production outages or damage to machinery can occur. A maintenance concept adapted to the operating conditions and the stresses to which the brakes are subjected must therefore be drawn up for every application. For brakes, the maintenance intervals and servicing work listed in the following table are necessary.

Maintenance interval for holding brake with emergency stop	Maintenance work
At least every 2 years	Inspection of the brake integrated in the motor: • Check ventilation function and activation/deactivation • Measure air gap (re-adjust air gap, if necessary), 📖 2.1.4
After 1 million cycles at the latest	
Shorter intervals in the case of frequent emergency stops!	

2.1.1 Wear on spring-applied brakes

Causes of wear

Component	Effect	Influencing factors	Cause
Friction lining	Wear on the friction lining	Applied friction energy	Braking during operation (impermissible, holding brakes!)
			Emergency stops
			Overlapping wear when the drive starts and stops
			Active braking by the drive motor with the help of the brake (quick stop)
		Number of start-stop cycles	Starting wear if motor is mounted in a position with the shaft vertical, even if the brake is open
Armature plate and flange	Running-in of armature plate and flange	Applied friction energy	Friction between the brake lining and the armature plate or flange e.g. during emergency braking or service brake operation
Teeth of the brake rotor	Teeth wear (primarily at the rotor end)	Number of start-stop cycles, Level of the braking torque, Dynamics of the application, Speed fins in operation	Relative movement and impacts between brake rotor and brake hub
Armature plate bracket	Armature plate, cap screws and bolts are deflected	Number of start-stop cycles, Level of braking torque	Load changes and impacts due to reversal error during interaction between armature plate, cap screws and guide bolts
Springs	Fatigue failure of the springs	Number of switching operations of the brake	Axial load cycle and shearing stress on the springs due to radial reversing error of the armature plate

Inspection of the individual parts

With a mounted brake	• Check release function and control • Measure air gap (re-adjust, if necessary) • Measure rotor thickness (replace rotor, if necessary) • Thermal damage of armature plate or flange (tarnished dark blue)
With a dismounted brake	• Check clearance of the rotor gear teeth (replace rotors that are damaged by vibration) • Damage by vibration of the torque support at the sleeve bolts, cylindrical pins, and armature plate • Check springs for damage • Check armature plate and flange or end shield – Max. run-in depth = rated air gap of the design size

2.1.2 Maintenance

Stop!
The brakes must not be actuated without blowers.

Danger!
- Only work on the drive system when it is in a deenergised state!
- Hot motor surfaces of up to 140 °C. Observe cooling times!
- Remove loads acting on motors or secure loads acting on the drive!

Note!
Always fully replace brakes with defective armature plates, cylinder head screws, springs or counter friction faces.
- The brakes used are not fail-safe because interference factors which cannot be influenced (e.g. oil ingress) may lead to a reduction in torque.
- When the rotor has been replaced, the original braking torque is only attained after the friction surfaces have run in. After the rotor replacement, increased initial wear will occur if the armature plate and counter friction faces are not run in.

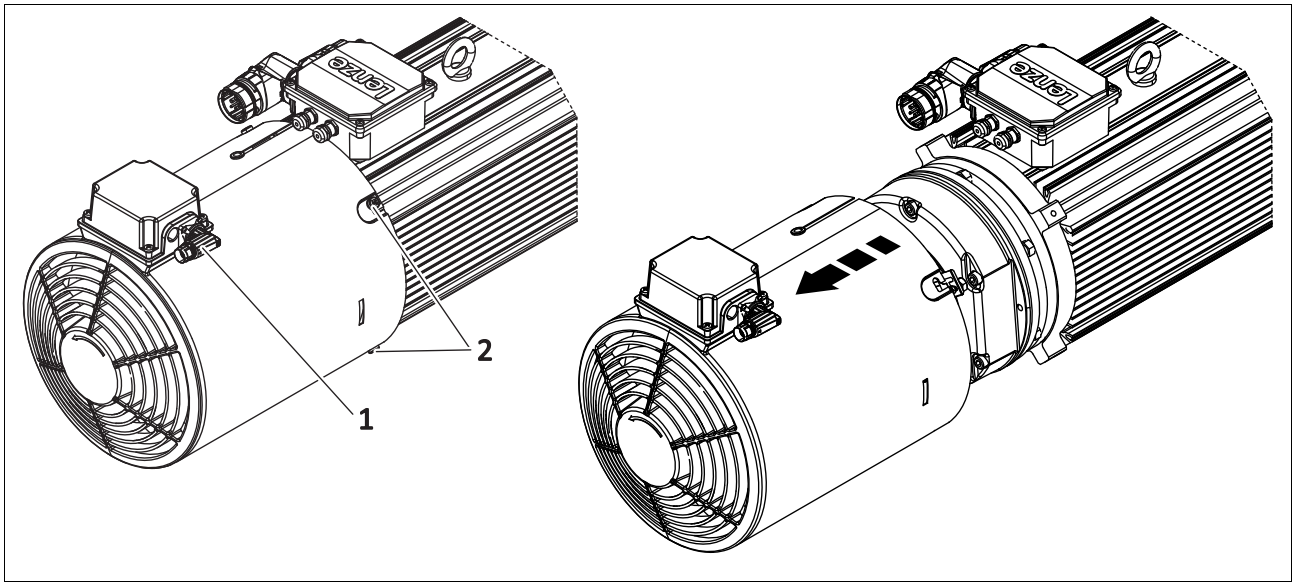
Tools required

Type	Torque key Use for hexagon socket screws		Open-jawed spanner width across flats [mm]		Box spanner for flange mounting on the outside	Feeler gauge
	Measuring range [Nm]	Width across flats [mm]	Sleeve bolts	Two-flat lever	Width across flats [mm]	
						
BFK457-16	20 to 100	6 x 1/2" square	-----	-----	-----	
BFK458-18	20 to 100	6 x 1/2" square	15	10	13 x 1/2" square	

2.1.3 Dismounting the MCA19 and 21 fan cover

The brake is mounted to the N-end shield of the motor. Remove the fan cover to check, maintain, or set the brake.

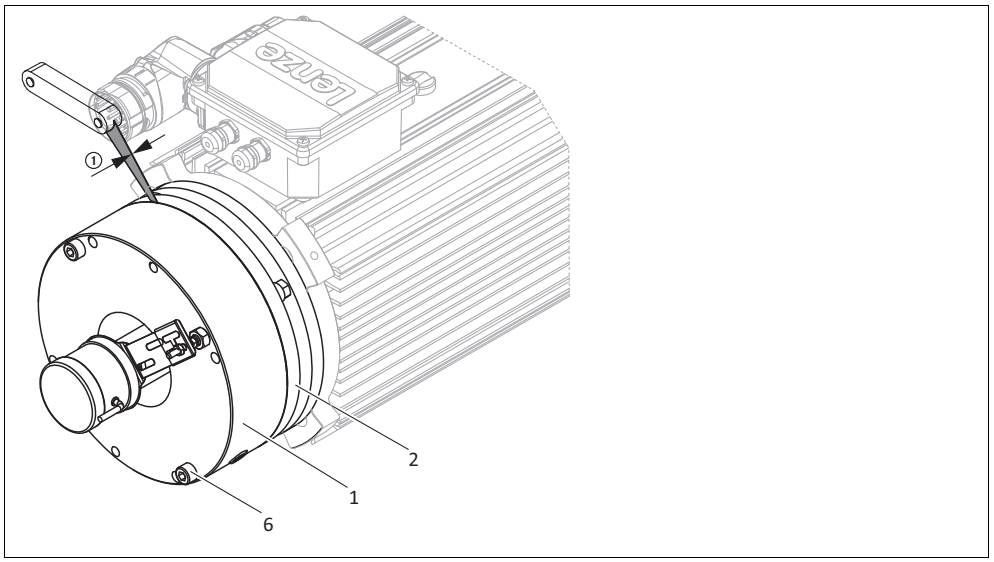
1. Disconnect the mains plug (1) of the fan.
2. Loosen the four screws (2) with which the fan is fitted onto the non-drive end shield and remove the fan.



2.1.4 BFK457-16R air gap

Stop!

- The motor must not run whilst the air gap is checked.
- Do not insert feeler gauge further than 10 mm between the armature plate (2) and stator (1)!



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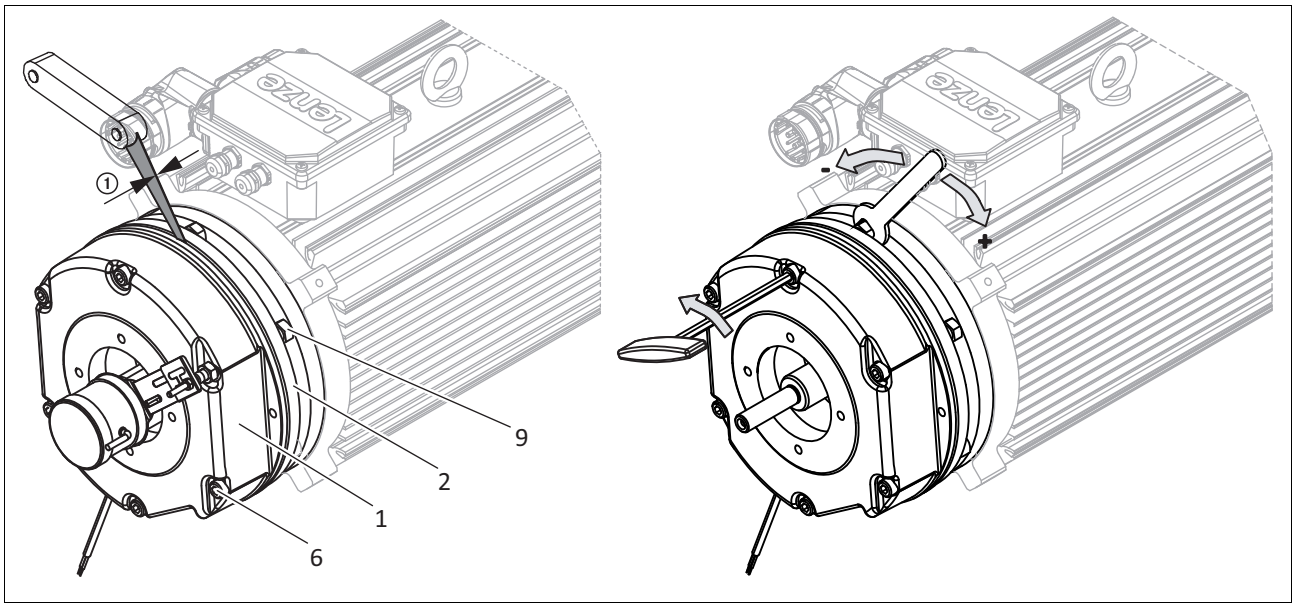
1. Check air gap near the fixing screws (6) between the armature plate (2) and the stator (1) using a feeler gauge and compare the values to the data "s_{Lrated}" in the table, 🕮 5.

If the value measured, "s_{Lrated}", is outside the tolerance (🕮 5), the rotor must be replaced (🕮 12).

2.1.5 Checking and re-adjusting the BFK458-18 air gap

Stop!

- The motor must not run whilst the air gap is checked.
- Do not insert feeler gauge further than 10 mm between the armature plate (2) and stator (1)!



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1. Check air gap near the fixing screws (6) between the armature plate (2) and the stator (1) using a feeler gauge and compare the values to the data "s_{Lrated}" in the table, 🕮 5.

If the value measured, "s_{Lrated}", is outside the tolerance of "s_{Lrated}" (🕮 5), the air gap must be re-adjusted!

2. Slightly loosen the six fixing screws (6).
3. Slightly adjust the sleeve bolts (9) by rotation using the open-jawed spanner.
   – If the air gap is too large, **into** the complete stator (1).
   – If the air gap is too small, **out of** the complete stator (1).
   – 1/6 revolution changes the air gap by approx. 0.15 mm
4. Tighten the fixing screws (6) with 24.6 Nm.
5. Repeat the air gap check and re-adjust the air gap again, if necessary, or replace the brake.

2.2 Replacing the brake

2.2.1 Dismounting the MCA 19 and 21 encoder

Stop!

If a safety encoder is used, all maintenance and installation work must be performed at the Lenze site.

Otherwise any warranty will expire and Lenze GmbH will not accept any liability for consequential damage.

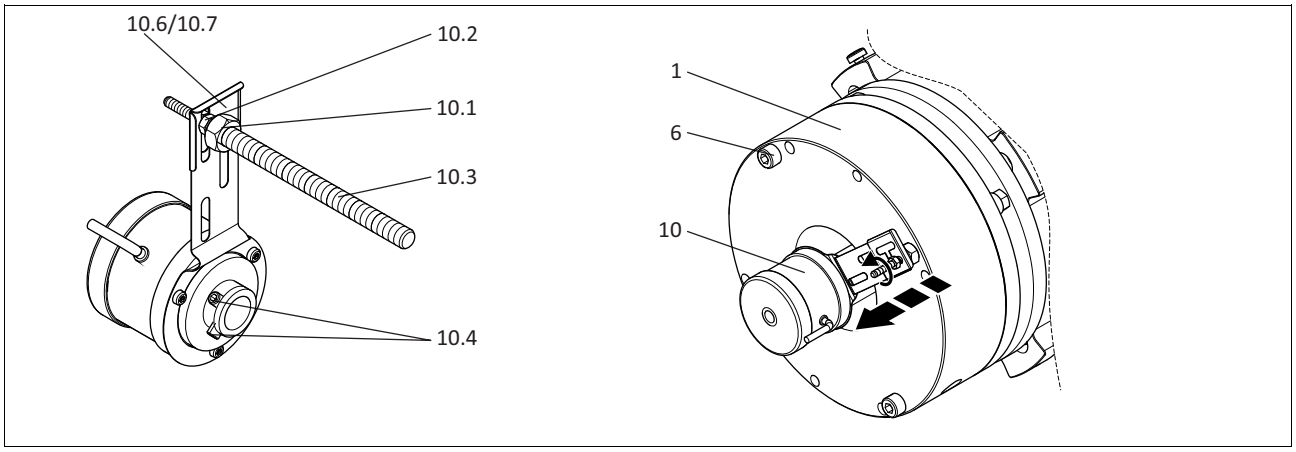
Tools required

- Allen key width across flats 1.5
- Open-jawed spanner width across flats 7
- Open-jawed spanner width across flats 13

Danger!

Risk of injury!

There may be sharp edges on the metal sheet of the torque plate.



1	Complete stator	10.1	M8 nut	10.4	Stud bolts
6	Fixing screws	10.2	M4 nut	10.6	Protective plate
10	Encoder	10.3	Threaded bolt	10.7	Torque plate

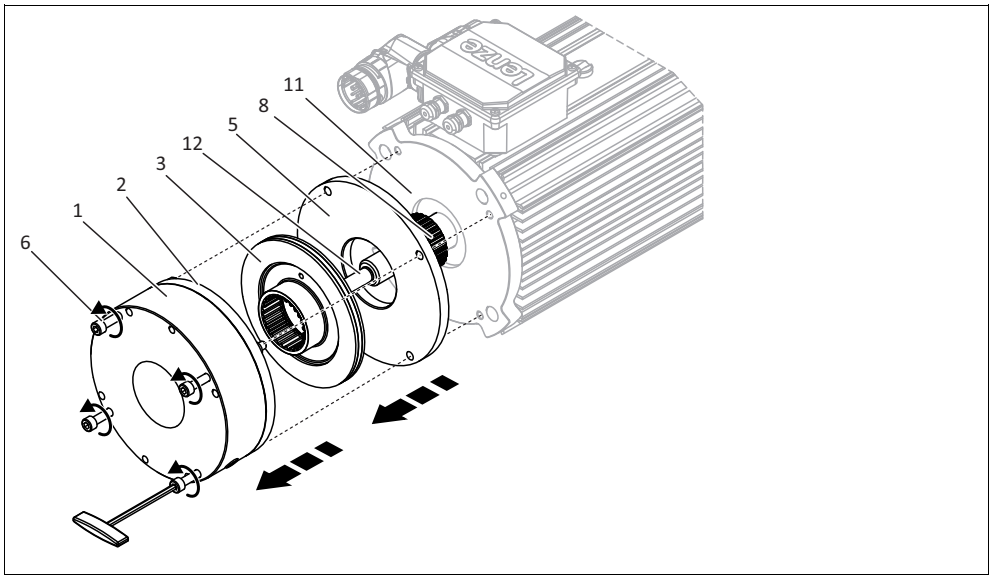
1. Loosen brake cable in the terminal box.
2. Loosen two stud bolts (10.4) on the motor shaft. In the case of an incremental encoder, loosen the clamping hub.
3. Unscrew the upper M4 nut (10.2) of the torque plate (10.6) of the encoder.
4. Carefully slide the encoder (10) off the motor shaft and make sure that you do not loose the protective plate (10.7) of the torque plate.
5. Loosen the M8 nut (10.1) of the threaded bolt (10.3). The threaded bolt remains in the end shield.
6. Now the brake can be dismounted.

2.3 BFK457-16R

2.3.1 Dismounting and mounting

Stop!

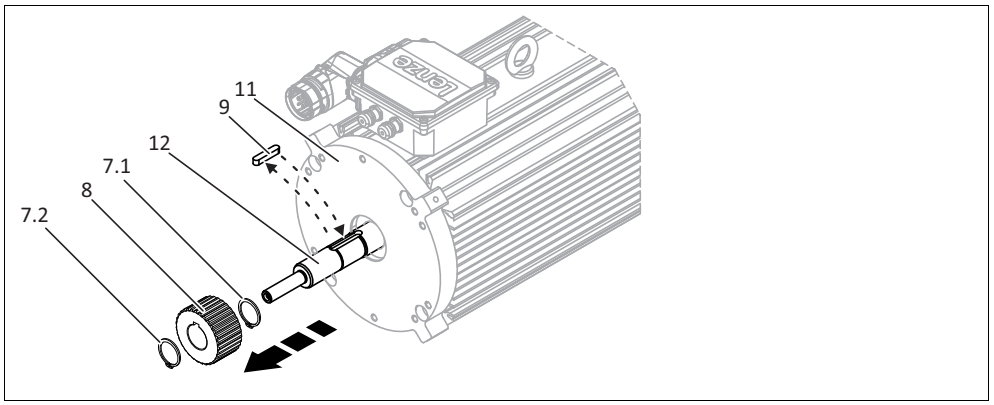
When replacing the brake, the complete rotor or the hub, the spare part from the corresponding **Lenze repair kit** must always be used. It can be ordered from the Lenze Service, specifying the motor serial number and the motor material number.



1	Complete stator	6	Fixing screws	11	Motor end shield
5	Flange	8	Hub		

1. Loosen brake cable.
2. Evenly loosen and fully unscrew the four fixing screws (6).
3. Remove stator (1) with complete rotor from end shield (11). Observe brake cable!
4. Check toothing of the hub (2). If it shows signs of wear, it has to be replaced.

Dismounting and mounting the hub



7.1 7.2	Circlip/retaining ring	8 9	Hub Keyway	11 12	Motor end shield Motor shaft

1. Remove circlip (7.2)

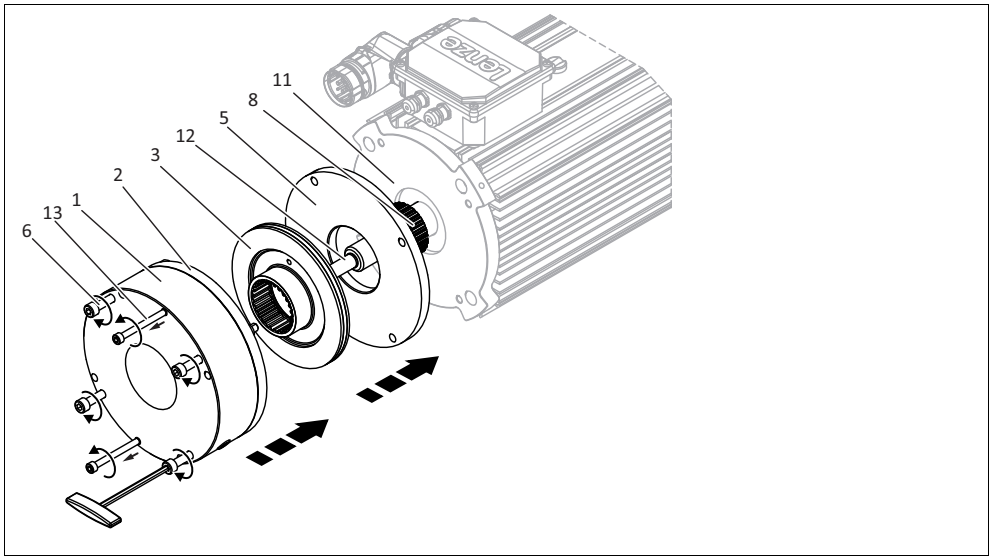
In order to provide for more stability (alternating load), the hub is additionally glued to the shaft.

2. The hub (8) must be heated to 150 - 160 °C and then removed from the shaft by means of an extractor. (If necessary, have this work carried out by the Lenze Service staff).
3. Remove circlip (7.1)
4. The seat of the hub must be cleaned, ensuring that an adhesive bond between the shaft and hub can be re-established afterwards.
5. Fit a circlip (7.1) in order to provide for horizontal fixation and fit the featherkey (9) onto the shaft.
6. Heat the hub (8) to 120°C and slide it onto the shaft while it is warm.
   – With an alternating load, we recommend securing the hub on the shaft using a high-strength adhesive (Loctite 603 or Weicon 306-03).
7. Fit the circlip (7.2) onto the hub.

Stop!

Check the condition of the brake flange (5) and armature plate (2)!

- In the case of heavy scoring, the parts must be replaced.
- Both parts must be free from grease and oil!



1	Complete stator	5	Flange	11	Motor end shield
2	Armature plate	6	Fixing screws	12	Shaft
3	Complete rotor	8	Hub	13	M6 cylinder head screw

1. Slide the new rotor (3) with the toothed intermediate ring onto the hub and check whether it can be shifted manually.
2. Align and position the drill holes of the brake flange (5) towards the threaded holes in the non-drive end shield (11).
3. Fit the complete stator with rotor (1) and tighten it with 24.6 Nm using the four fixing screws (6).
4. Remove two M6 cylinder head screws (13) for the emergency manual release/transport locking device, thus enabling the armature plate (2) to move freely.
5. Measure the air gap between the stator (1) and armature plate (2) (0.3 +0.1/-0.05 mm).
6. Reconnect the brake cable.
7. Perform a functional check of the brake. When the power is switched on, the air gap between the magnet housing and the armature plate must be SL = 0, i.e. the rotor must be enabled to move freely.

Stop!

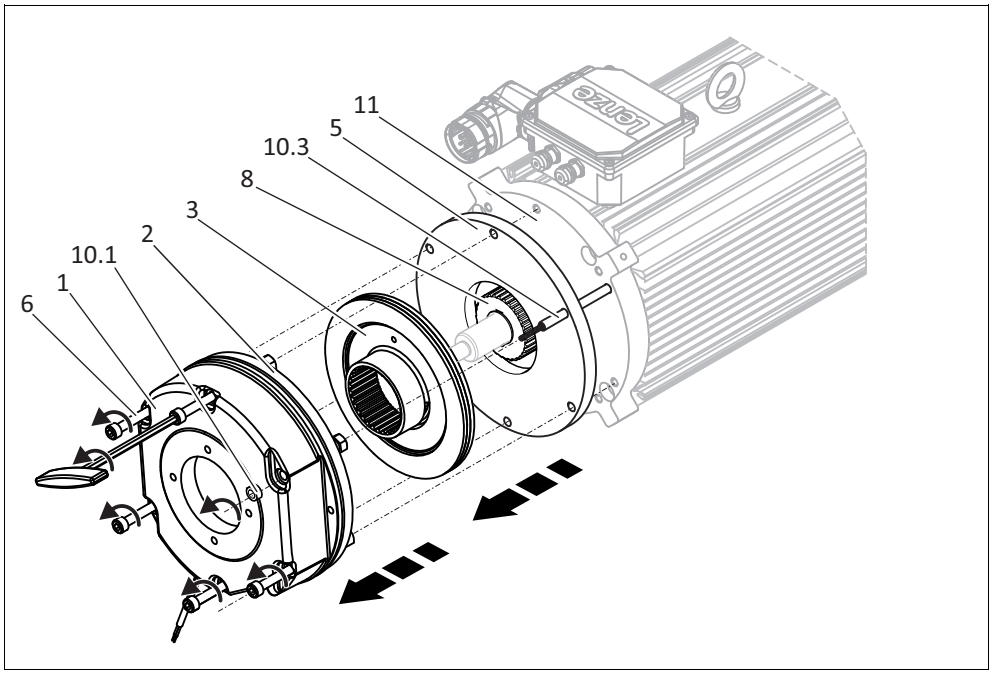
Ensure that the screws of the emergency manual release/transport locking device have been removed!

2.4 BFK458-18

2.4.1 Dismounting and mounting

Stop!

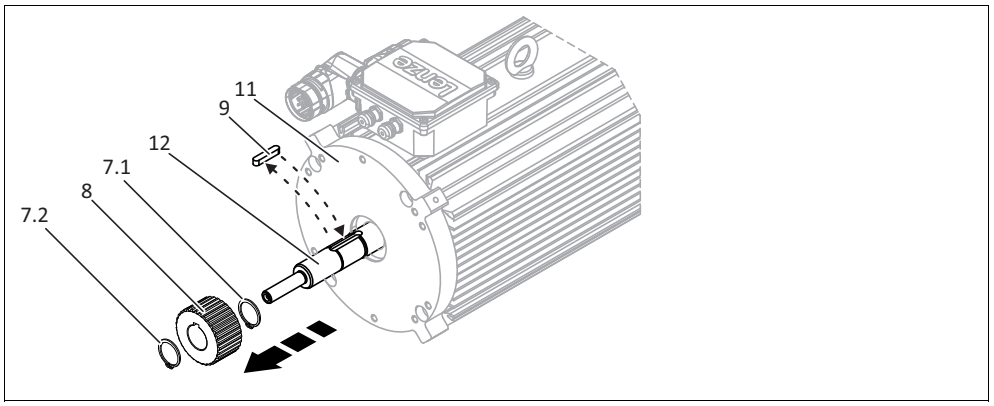
When replacing the brake, complete rotor or the hub, the spare part from the corresponding **Lenze repair kit** must always be used. It can be ordered from the Lenze Service, specifying the motor serial number and the motor material number.



1	Complete stator	5	Flange	10.1	M8 nut
2	Armature plate	6	Fixing screws	10.3	Threaded bolt
3	Complete rotor	8	Hub	11	Motor end shield

1. Loosen brake cable.
2. Loosen the five fixing screws (6) and the nut (10.1) evenly and fully uncrew them. The threaded bolt (10.3) remains in the motor end shield as a guide.
3. Remove complete stator (1) from the motor end shield (11). Observe brake cable!
4. Remove complete rotor (3) from the hub (8).
5. Check toothing of the hub (8). If it shows signs of wear, it has to be replaced.

Dismounting and mounting the hub



7.1 7.2	Circlip/retaining ring	8 9	Hub Keyway	11 12	Motor end shield Motor shaft

1. Remove circlip (7.2)

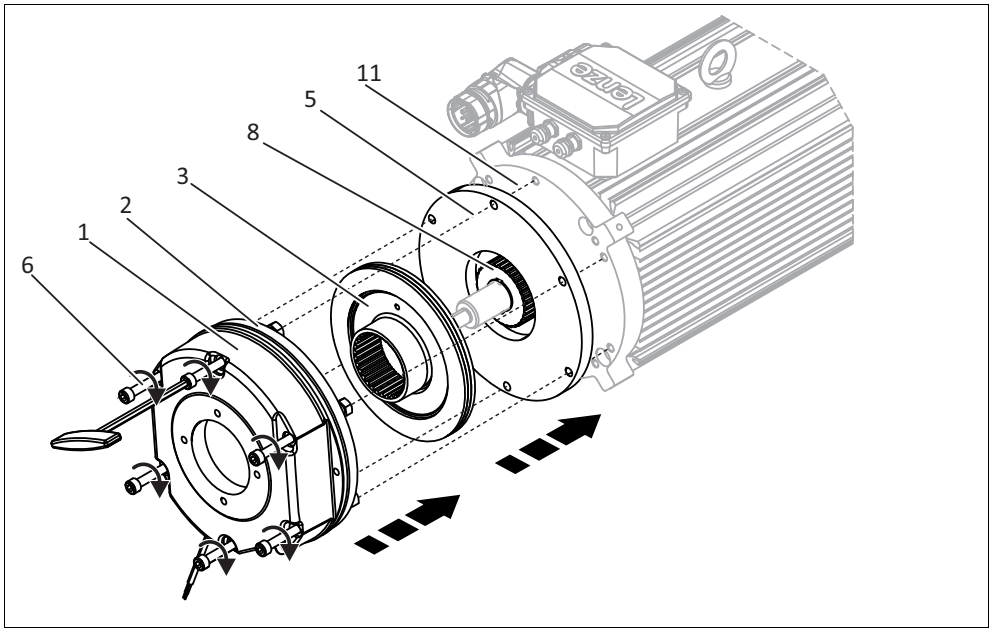
In order to provide for more stability (alternating load), the hub is additionally glued to the shaft.

2. The hub (8) must be heated to 150 - 160 °C and then removed from the shaft by means of an extractor. (If necessary, have this work carried out by the Lenze Service staff).
3. Remove circlip (7.1)
4. The seat of the hub must be cleaned, ensuring that an adhesive bond between the shaft and hub can be re-established afterwards.
5. Fit a circlip (7.1) in order to provide for horizontal fixation and fit the featherkey (9) onto the shaft.
6. Heat the hub (8) to 120°C and slide it onto the shaft while it is warm.
   – With an alternating load, we recommend securing the hub on the shaft using a high-strength adhesive (Loctite 603 or Weicon 306-03).
7. Fit the circlip (7.2) onto the hub.

Stop!

Check the condition of the brake flange (5) and armature plate (2)!

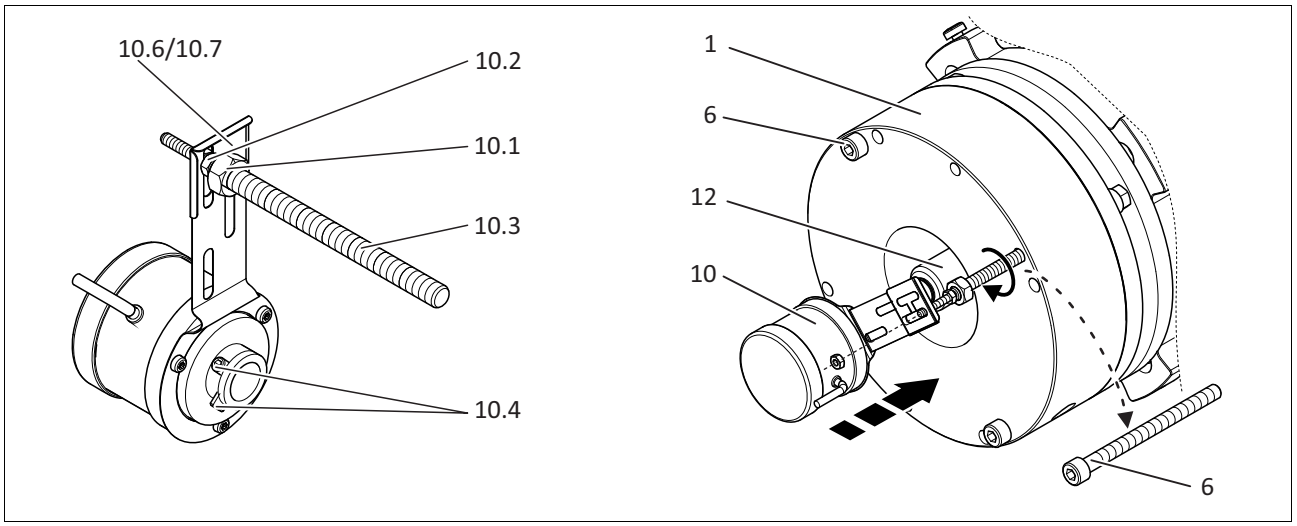
- In the case of heavy scoring, the parts must be replaced.
- Both parts must be free from grease and oil!



1	Complete stator	5	Flange	11	Motor end shield
2	Armature plate	6	Fixing screws		
3	Complete rotor	8	Hub		

1. Slide the new rotor (3) with the toothed intermediate ring onto the hub and check whether it can be shifted manually.
2. Align and position the drill holes of the brake flange (5) towards the threaded holes in the non-drive end shield (11).
3. Fit the stator (1) and tighten it with 24.6 Nm using the six fixing screws (6).
4. Measure the air gap between the stator and armature plate (2) (0.4 +0.1/-0.05 mm).
5. Reconnect the brake cable.
6. Perform a functional check of the brake. When the voltage is switched on, the air gap between the magnet housing and the armature plate must be SL = 0, i.e. the rotor must be enabled to move freely.

2.4.2 Encoder mounting



1	Complete stator	10.1	M8 nut	10.4	Stud bolts	12	Motor shaft
6	Fixing screws	10.2	M4 nut	10.6	Protective plate		
10	Encoder	10.3	Threaded bolt	10.7	Torque plate		

Stop!

After having dismounted and mounted the encoder, it is absolutely necessary to perform a reference run. If this step is ignored, collision damage may be the consequence.

1. After the brake has been mounted successfully, screw the threaded bolt (10.3) into the non-drive end shield first and then counter it using the M8 nut (10.1), tightening torque = 24.6 Nm.
2. Carefully slide the encoder (10) onto the shaft (12), fitting the torque plate (10.7) with the protective plate (10.6) onto the threaded bolt (10.3). Then tighten the two stud bolts on the motor shaft (10.4) with 1.5 Nm and secure them by means of medium-strength screw glue or locking varnish.
3. Mount the upper M4 nut (10.2) in order to axially secure the torque plate and tighten it with 3 Nm, clamping the torque plate against the lower M4 nut (10.2).

Stop!

The torque plate must be tension-free and has to be positioned at right angles to the motor-encoder shaft. Otherwise the service life of the encoder bearings may be reduced!

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