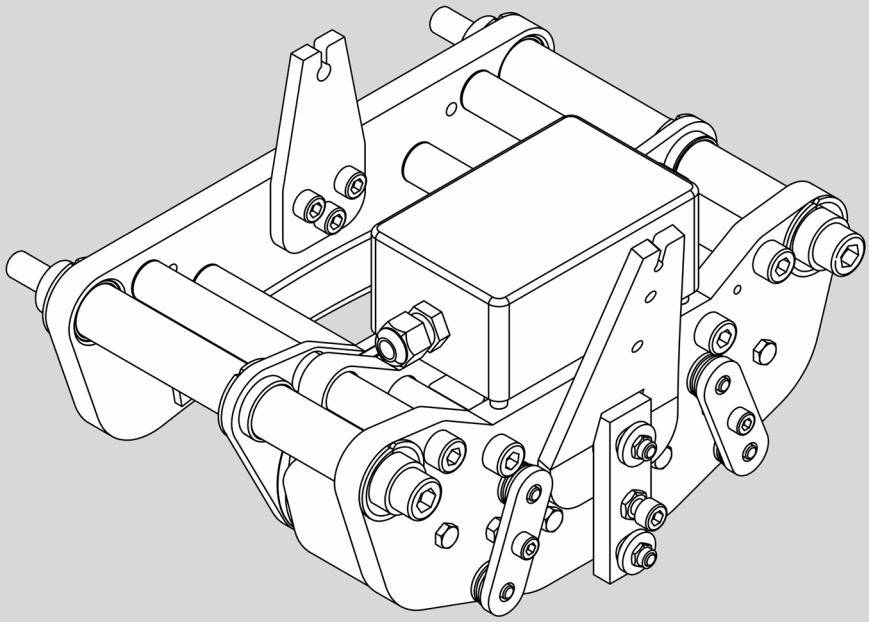
# Operating Instructions INTORQ BFK466-12

Segment spring-applied brake



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## Product key

INTORQ **B** **FK** **466** - **12**


### Legend for the INTORQ BFK466 product key

| | | |
|---|---|---|
| A | Product group | Braking |
| B | Product family | Spring-applied brake |
| C | Type | 466 |
| D | Size | 12 |

Not coded: Supply voltage, hub bore, options

### Nameplate

| Field | Content | | Example |
|---|---|---|---|
| 1 | Manufacturer | CE mark | INTORQ D - Aerzen CE |
| 2 | Brake type | Model identification | BFK466-12 0036 ABV 741/1 |
| 3 | Rated voltage | Rated power / Desired customer no. | 205/130 V DC 367/92 W XX XXXX |
| 4 | Order no. | Friction force / Date of manufacture | Nr.: XXXXXXXX 1172 N 21.08.09 |

### Packaging sticker

| Field | Content | | Example |
|---|---|---|---|
| 1 | Manufacturer | Bar code of no. | INTORQ D - Aerzen |
| 2 | Designation | Order no. | Typ: BFK466-12 Nr. XXXXXXXX |
| 3 | Type see product key | Qty per box | FEDERKRAFTBREMSE 1 Stück |
| 4 | Rated voltage / Rated power / Friction force | Date of packaging | 205/103 V DC 367/92 W 1172 N 21.08.09 |
| 5 | Model identification | Desired customer no. | 0036 ABV 741/1 XX XXXX |
| 6 | Supplement | CE mark | Rostschutzverpackung-Reibfläche fettfrei halten CE |

# Document history

| Material number | Version | | | Description |
|---|---|---|---|---|
| 13313979 | 1.0 | 08/2009 | TD09 | First edition |

# i Contents

# 1 Preface and general information



## 1.1 About these Operating Instructions

- These Operating Instructions will help you to work safely on and with the multi-pole spring-applied brake. They contain safety instructions that must be followed.
- All persons working on or with the multi-pole spring-applied brake must have these Operating Instructions available and observe the information and notes relevant for their work.
- 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 | Multi-pole spring-applied brake |
| Drive system | Drive systems with spring-applied brakes and other drive components |

## 1.3 Scope of supply

- The spring-applied brakes are delivered preassembled, the brake disc is not included in the scope of supply.
- After receipt of the delivery, check immediately whether the items delivered match the accompanying papers. INTORQ does not accept any liability for deficiencies claimed subsequently. Claim
  - visible transport damage immediately to the forwarder.
  - visible deficiencies / incompleteness immediately to INTORQ GmbH & Co. KG.

# 1 Preface and general information

## 1.4 Labelling

Drive systems and drive components are clearly labelled and defined by the indications on the nameplates.

Manufacturer: INTORQ GmbH & Co KG, Wülmser Weg 5, D-31855 Aerzen

## 1.5 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
  - unauthorised 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 INTORQ GmbH & Co. KG.
- Warranty claims must be made to INTORQ 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

- These safety notes do not claim to be complete. If any questions or problems occur, please contact INTORQ GmbH & Co. KG.
- The spring-applied brake met the state of the art at the time of delivery.
- The spring-applied brake endangers persons, the spring-applied brake itself and other properties of the user if
  - unqualified personnel work on and with the spring-applied brake.
  - the spring-applied brake is used inappropriately.
- The spring-applied brakes must be planned in such a way that if they are correctly installed and used for their designed purpose in fault-free operation, they fulfil their function and do not put any persons at risk. This also applies to the interaction thereof with the overall system.
- Make sure by appropriate measures that in case of failure of the spring-applied brake no material damage is caused.
- Do not operate the spring-applied brake unless it is in perfect condition.
- Retrofitting, modifications and changes of the drive system are generally forbidden. In any case, INTORQ GmbH & Co. KG must be contacted beforehand.
- The friction lining and the friction surfaces must by no means have contact to oil or grease since even small amounts reduce the braking torque considerably.
- The braking torque will usually not be influenced if the brake is used under the environmental conditions that apply to IP54. 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 Safety instructions

### 2.1.1 Personnel responsible for safety

**Operator**

- An operator is any natural or legal person who uses the spring-applied brake or on whose behalf the spring-applied brake is used.
- The operator or his safety personnel must ensure
  - that all relevant regulations, notes and laws will be complied with,
  - that only qualified personnel will work on and with the drive system,
  - that the Operating Instructions will be available to the personnel working on and with the brake at all times,
  - that unqualified personnel will not be allowed to work on and with the spring-applied brake.

**Skilled personnel**

Skilled personnel are persons who - because of their education, experience, instructions, and knowledge about corresponding standards and regulations, rules for the prevention of accidents, and operating conditions - are authorised by the person responsible for the safety of the plant to perform the required actions and who are able to recognise potential hazards. (See IEC 364, definition of skilled personnel)

**Application as directed**

- Drive systems
  - 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 INTORQ spring-applied brake**

- No explosive or aggressive atmosphere.
- Humidity, no restrictions.
- Ambient temperature -20°C to +40°C.
- With high humidity and low temperatures
  - Take measures to protect armature plate and rotor from freezing.
- Protect electrical connections against contact.

# 2 Safety instructions



## 2.2 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:

**Danger!**

Characterises the type and severity of danger

**Note**

Describes the danger

**Possible consequences:**

- List of possible consequences if the safety instructions are disregarded.

**Protective measure:**

- List of protective measures to avoid the danger.

| Pictograph and signal word | Meaning |
|---|---|
|  **Danger!** | **Danger of personal injury through dangerous electrical voltage** 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** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken. |
|  **Stop!** | **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 troublefree operation |
|  **Tip!** | Useful tip for simple handling |
|  | Reference to another documentation |

# 3 Technical data

## 3.1 Product description

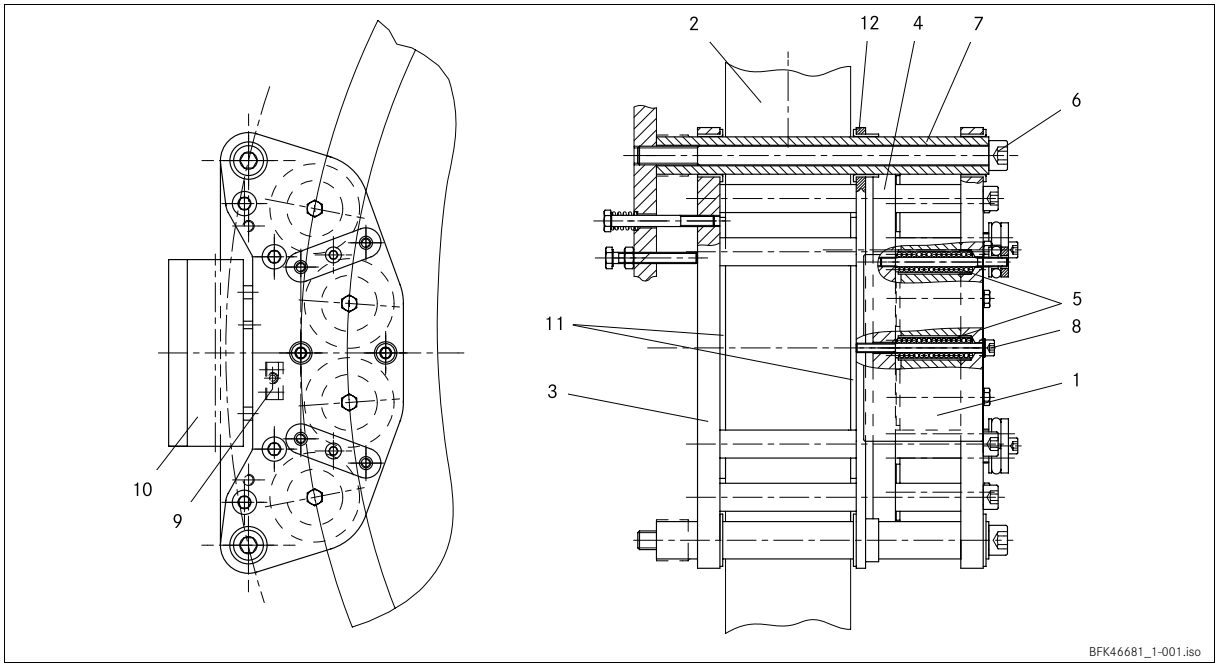



**Fig. 1 Design of an INTORQ BFK466-12 spring-applied brake with noise reduction**

| | | | | | |
|---|---|---|---|---|---|
| 1 | Stator | 5 | Compression spring | 9 | Microswitch |
| 2 | Brake disk | 6 | Cheese head screw | 10 | Terminal box |
| 3 | Flange | 7 | Guide sleeve | 11 | Friction lining |
| 4 | Armature plate | 8 | Cheese head screw | 12 | Support of friction lining |

### 3.1.1 General information

The INTORQ BFK466 spring-applied brake is designed as a floating caliper brake for mounting on direct drive motors. The brake disk (2) is not included in the scope of supply. By using two or more spring-applied brakes on one brake disk, the demand for redundancy can be fulfilled for special applications such as lift and stage technology.

The braking torque is generated by the pressure of several compression springs (5) via friction locking between the two friction linings (11) of the armature plate (12) and the flange (3) and the brake disk (2). The brake is released electromagnetically. The suitable switching device rectifies the supply voltage (AC voltage) and decreases it after a short time when the brake is released. Thus, the medium electrical brake power is reduced. As an option, the switching device can be installed into the terminal box (10).

The INTORQ BFK466 spring-applied brake is designed for converting mechanical work and kinetic energy into heat energy. Thanks to the static breakaway torque, loads can be held at standstill.

Emergency braking at higher speeds is possible. Here, the maximum permissible speed (see chapter 3.2) must not be exceeded.

The stator (1) is designed to be of thermal class F. The limit temperature of the coils is 155°C.

The spring-applied brake is designed for a maximum operating time of 60%.

# 3 Technical data



### 3.1.2 Braking

During braking, the support of the friction lining (12) and the affixed friction lining (11) are pressed against the axially fixed brake disc (2). Nearly at the same time, the caliper moves on the guide sleeves (7) in the opposite direction, so that the friction lining (11) on the flange (3) is pressed against the brake disc, too. The braking torque is supported by the mounting flange via the guide sleeves (7). The asbestos-free friction linings ensure a high braking torque with low wear.

### 3.1.3 Brake release

When the brake is applied, there is an air gap “sair” between the armature plate (4) and the pole faces of the stator (1). To release the brake, the respective switching device supplies the coils of the stator (1) with the overexcitation voltage. The resulting magnetic force draws the armature plate (4) against the spring force towards the pole faces of the stator (1). Now, the spring force is taken from the support of the friction lining (12). The caliper can move on the guide sleeves (7) until the brake disk (2) is relieved and can rotate freely.After approx. 1...2 seconds, the supply voltage is decreased to 50%.

### 3.1.4 Release monitoring

The INTORQ BFK466 spring-applied brake is equipped with a microswitch (changeover contact) which monitors the switching status. During brake release, the microswitch (9) changes over. This must exclude drive operation against the applied brake.

## 3.2 Rated data

| Type | Friction force | Brake disk radius | Max. sliding speed | Voltage 1), 3) | Power 2) | Coil resistance | Max. current | Overexcitation time |
|---|---|---|---|---|---|---|---|---|
| | $F_R$ [N] | $R_a$ [mm] min./max. | $V_{max.}$ [m/s] | U ±10% [V] DC | $P_{20}$ [W] | R20±5% [Ω] | $I_{max.}$ [A] | sec. |
| INTORQ BFK466-12 | 1172 | 250/500 | 9.65 | 205/103 | 367/92 | 114.5 | 1.79 | 1...2 |

| Type | Air gap | Max. air gap | Fixing screws | Tightening torque | Max. perm. switching energy | Transition operating frequency | Weight (without brake disk) |
|---|---|---|---|---|---|---|---|
| | $s_{Lü\ nom.}$ [mm] | $s_{air\ max.}$ [mm] | | $M_a$ [Nm] | $Q_E$ [J] | $S_{fo}$ [$h^{-1}$] | m [kg] |
| INTORQ BFK466-12 | 0.4± 0.1 | 0.8 | 2 x M10 - 10.9 | 46 | 15000 | 38 | 7.5 |

1) Voltage for releasing / holding
2) Coil power at 20°C when releasing / holding
3) With 230 V AC rectifier installed in terminal box

# 3 Technical data

## 3.3 Operating times

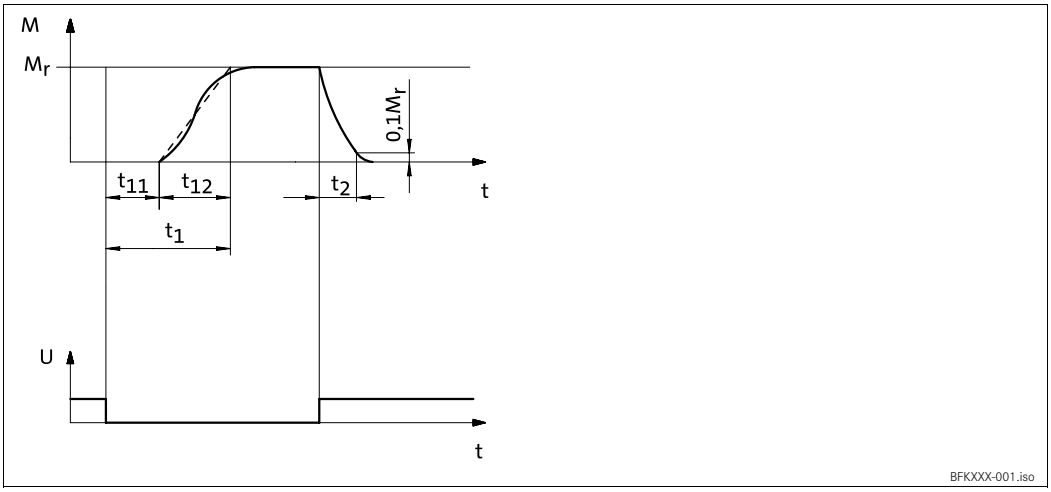



**Fig. 2 Operating times of the INTORQ spring-applied brakes**

| | | | |
|---|---|---|---|
| $t_1$ | Engagement time | $t_{11}$ | Reaction delay during engagement |
| $t_2$ | Disengagement time (up to M = 0.1 $M_r$) | $t_{12}$ | Rise time of the braking torque |

| Type | Operating times [ms] at $s_{airrated}$ | | | |
|---|---|---|---|---|
| | Engaging | | | Disengaging |
| | $t_{11}$ | $t_{12}$ | $t_1$ | $t_2$ |
| INTORQ BFK466-12 | 12 | 18 | 30 | 50 |

**Tab. 1 Switching energy - operating frequency - operating times**

The transition from the state without brake torque to the steady brake torque is not without delay. The engagement times are valid for switching on the DC side with an induction voltage of approx. 5 to 10 times nominal voltage. The chart shows the delay during engagement $t_{11}$, the rise time of the brake torque $t_{12}$ and the engagement time $t_1 = t_{11} + t_{12}$, as well as the disengagement time $t_2$.

### Disengagement time

The disengagement time is not affected by DC or AC switching. The indicated disengagement time applies to an air gap of 0.4 mm. When the air gap is larger (as a result of wear), the disengagement time increases.

### 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 deenergised 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 5 times longer.

# 3 Technical data



## 3.4 Operating frequency / friction work

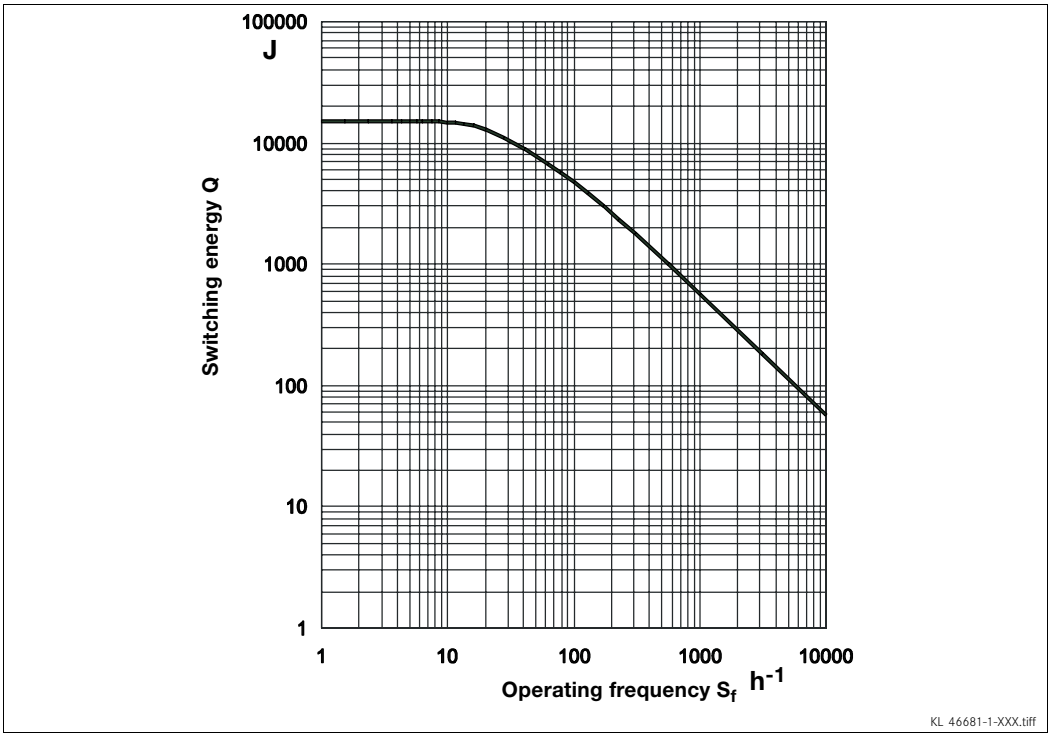



**Fig. 3 Switching energy as a function of the operating frequency**

$$S_{fperm} = \frac{-S_{fo}}{\ln\left(1 - \frac{Q}{Q_E}\right)} \qquad Q_{perm} = Q_E\left(1 - e^{\frac{-S_{fo}}{S_f}}\right)$$

The permissible operating frequency "$S_{fperm}$" depends on the friction work "Q" (see Fig. 3). At a preset operating frequency "$S_f$", the permissible friction work is "$Q_{perm}$".

For "$S_{fo}$" and "$Q_E$", please see chapter 3.2.

# 3 Technical data

## 3.5 Emission

### 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 unfavourable conditions, the surface temperature can reach 130°C.

**Danger!**
Risk of burns on brake and brake disc!

### Noises

The switching noise during engagement and disengagement varies depending on the air gap "$s_{air}$" and the brake size. It is between approx. 50 and 55 dB [A].

### Others

Abrasion due to braking occurs in the form of dust.

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

# 4 Mechanical installation

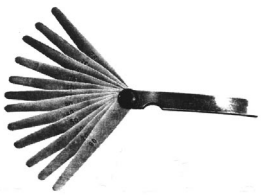
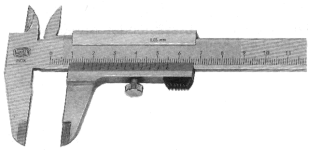


**Stop!**

- Do not lubricate the screws with oil or grease.

## 4.1 Necessary tools

| Type | Torque wrench | Insertion for hexagon socket screws | Transport screw | Crosstip screwdriver |
|---|---|---|---|---|
| |  |  |  |  |
| | Measuring range [Nm] | Spanner width [mm] | Spanner width [mm] | Crosstip size |
| INTORQ BFK466-12 | 120 | 8 x 1/2” square | 4 x 1/4” square | 2 |

| Feeler gauge | Caliper gauge | Multimeter |
|---|---|---|
|  |  |  |

## 4.2 Mounting

### 4.2.1 Preparation

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

# 4 Mechanical installation

## 4.3 Installation

**Stop!**

The transport protection may differ depending on the type of brake.

The brake is delivered preassembled with two transport screws (1).

1. Position the brake radially over the brake disk (3).
2. Insert the mounting screws (2) and tighten them with the torque given (chapter 3.2).

**Stop!**

The sum total of the distances measured must not exceed "$s_{airmax}$"!

3. Remove the transport screws (1).

- Brake **without** emergency manual release
  - Remove transport screws (1) Fig. 4.
- Brake **with** emergency manual release
  - Undo lock nut and slacken transport screw (6)Fig. 4, until screw is approx. 1 mm from the stator.
  - Re-tighten lock nut

4. Switch the current on and off several times, checking the movability of the brake on the guide sleeves.
5. Check the clearance of the brake disk and the air gap "$s_{air}$" between the two friction linings (5) and the brake disk (3) with a feeler gauge (6).

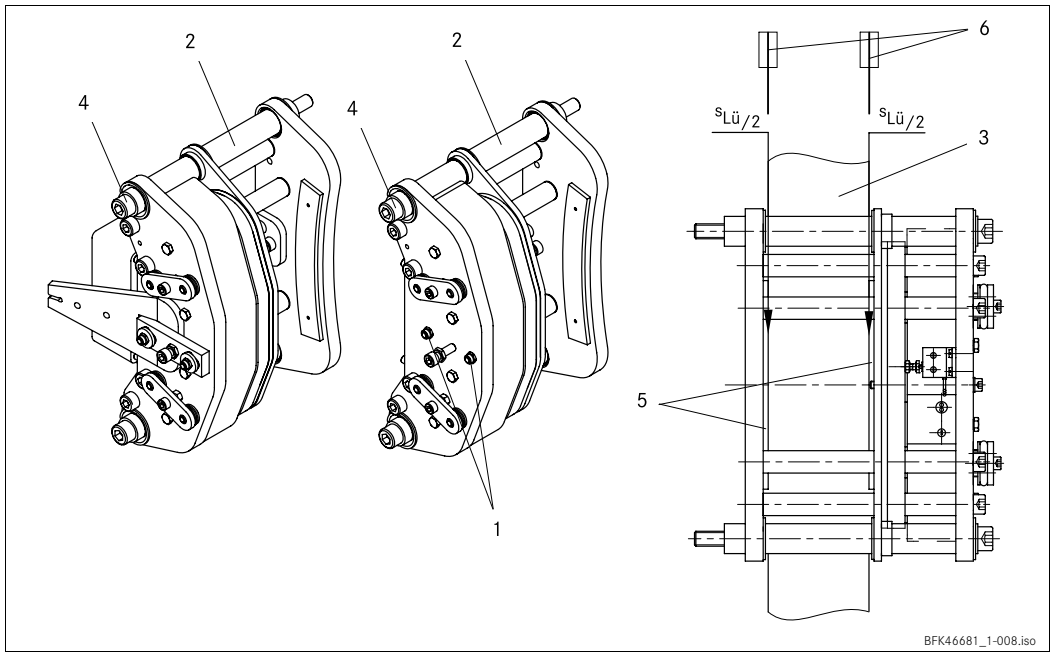



**Fig. 4 Installation of the INTORQ BFK466-12 spring-applied brake with and without manual release**

# 5 Electrical installation

## 5.1 Electrical connection

**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!

**Note!**

The suppressor circuit is already included in the INTORQ BEG-561-255-130 switchgear.

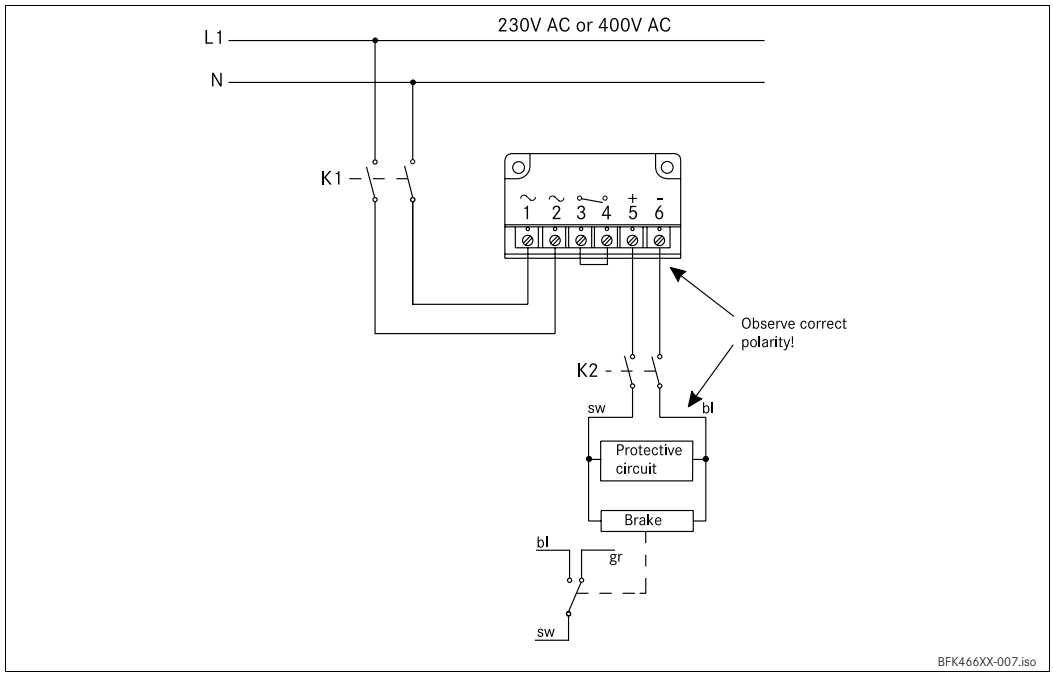



**Fig. 5 INTORQ BFK466 connection diagram (circuit proposal for switching on the DC side)**

**Switch on**

- K2 must be closed before K1!

**Switch off**

- Normal - AC switching
  - K2 remains closed
  - Open K1
- Emergency stop - DC switching
  - K1 and K2 are opened at the same time

| | |
|---|---|
| bl | blue |
| gr | grey |
| bk | black |

# 5 Electrical installation

### Pin assignment for microswitch

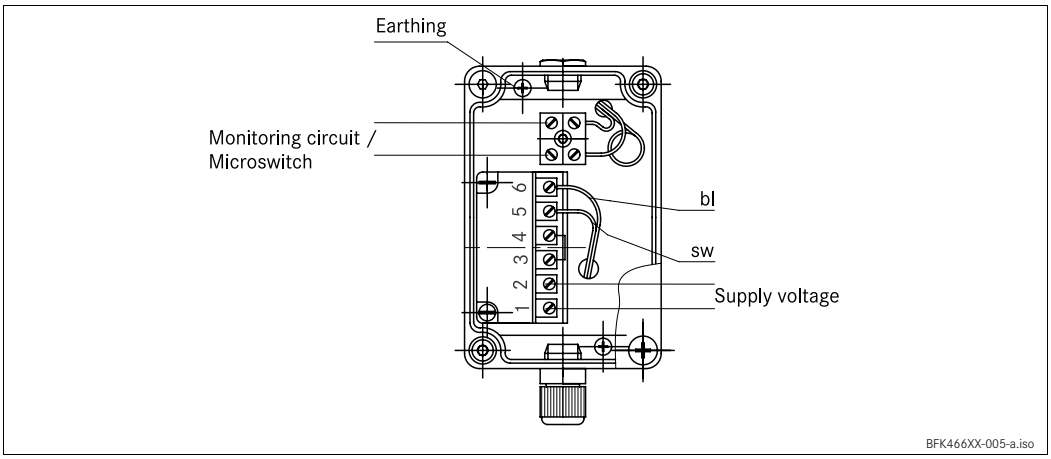



**Fig. 6 INTORQ BFK466 terminal box (optional with integrated switching device)**

| | | |
|---|---|---|
| Microswitch: | Input connection | black |
| | NO contact | blue connection |
| | NC contact | grey connection |

When current is fed to the spring-applied brake, the armature plate is released. The microswitch is actuated and outputs the “Spring-applied brake released” signal.

**Note!**

Application range recommended for the microswitch

- DC current: 10 mA to 100 mA at 12 V
- AC current: 10 mA to 5 A at 12 V / max. 250 V

### Earthing

Earthing must be provided via an earthing screw in the terminal box (Fig. 6) or via an M4 thread in the stator.

**Note!**

PE connection via the fixing screws on the motor is not permitted because there is no electrically conductive connection between the brake and the guide sleeves!

### Temperature sensor connection (optional)

The spring-applied brake can be delivered with PTC sensors according to DIN 44082 for temperature monitoring (reference temperature 130°C). The signal is evaluated via a PTC thermistor tripping device provided by the customer.

Connection: AWG 26 blue/blue

# 6 Commissioning and operation



## 6.1 Functional test

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

**Danger!**
Live connections must not be touched.

In the event of failures, refer to the troubleshooting table in chapter 8. If the fault cannot be eliminated, please contact the aftersales service.

### 6.1.1 Release / voltage check

1. Remove two bridges from the motor terminals. Do not switch off the voltage supply for the brake.
2. Measure the AC voltage at the motor terminals. It must be zero!
3. Switch on the current for the brake.
4. Measure the AC voltage at the motor terminals. It must be equal to the mains voltage!
5. Starting at the stator's side, move the brake toward the brake disk until the friction lining carrier is fully placed on the armature plate and the friction lining is on the brake disk.
6. Check the air gap "$s_{air}$" between the brake disk and the friction lining at the flange end. It must amount to 0.4 ±0.1 mm. The brake disk must rotate freely!
7. Switch off the power supply.
8. Screw the bridges onto the motor terminals.

# 6 Commissioning and operation

### 6.1.2 Manual release

**Stop!**

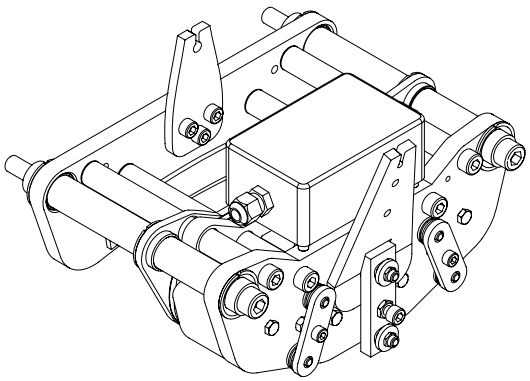
This operational test is to be carried out additionally!

The installed manual release is designed for operation using a Bowden cable. The support at the spring-applied brake is used to suspend the Bowden cable. If no Bowden cable is being used, the lever must be extended to a total length of approx. 800 mm.

**Danger!**

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

1. Pull lever with approx. 800 N ( approx. 200 N with extension ) until considerable increase in resistance is felt.
2. The rotor must be freely rotatable. A low residual torque is permissible.
3. Release the lever.



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# 6 Commissioning and operation

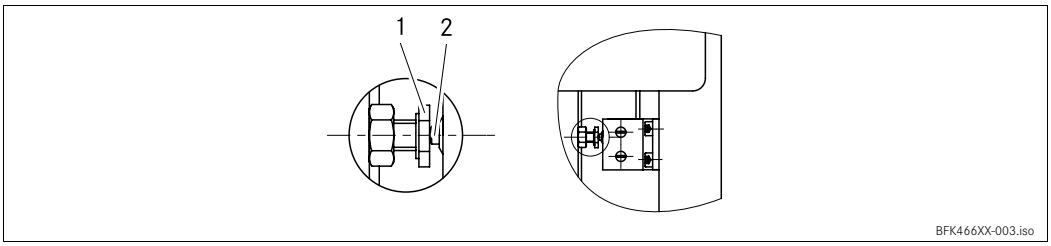


### 6.1.3 Microswitch

#### Checking the release monitoring

**Note!**

The brake is deenergised, the transport screws are removed.




1 Hexagon head cap screw
2 Microswitch tappet

Check the setting of the microswitch for release monitoring using a feeler gauge with thickness "$Y_{max.}$ and $Y_{min.}$" between hexagon head cap screw (1) and microswitch tappet (2).

| Feeler gauge thickness | NC contact | NO contact |
|---|---|---|
| $Y_{max.} = s_{air} - 0.10$ | Opened switch | Closed switch |
| $Y_{min.} = s_{air} - 0.20$ | Closed switch | Opened switch |

## 6.2 During operation

- Check the brake regularly during operation. Take special care of:
  - unusual noises and temperatures
  - loose fixing elements
  - the state of the cables.
- 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

INTORQ 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 and readjusted 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. The INTORQ Select dimensioning program can be used to calculate the maintenance intervals.

| 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 | | |
| | Active braking via the drive motor with support of brake (quick stop) | | |
| | Starting wear in case of motor mounting position with vertical shaft, even when the brake is not applied | | Number of start/stop cycles |
| Brake disc | Rubbing of brake lining | Brake disc is run in | Friction work |
| Guide sleeve | Relative movements and shocks between brake and guide sleeve | Wear of guide sleeve and friction bearing bushes | Number of start/stop cycles |
| Support of armature plate | Changing load cycles and shocks in backlash on reversal between armature plate and pins | Play of armature plate and pins | Number of start/stop cycles, braking torque |
| Springs | Axial load cycle and shear stress of springs through radial backlash on reversal of armature plate | Reduced spring force or fatigue failure | Number of switching operations of brake |

# 7 Maintenance/repair



## 7.2 Inspections

For safe and trouble-free operation, the spring-applied brakes must be checked and maintained at regular intervals. On the plant side, the service costs can be reduced by a good accessibility of the brakes. This is to be considered when integrating the drives into the system and installing the system.

For working brakes, the maintenance intervals mainly result from the brake load in the application. When the maintenance intervals are calculated, all causes of wear must be considered (see chapter 7.1). For brakes with low brake loads, e.g. holding brakes with emergency stop, we recommend regular inspections at fixed intervals. To reduce costs, the inspections can be carried out together with other cyclic maintenance works for the system, if necessary.

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 INTORQ 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** | **Time interval** | |
|---|---|---|
| INTORQ BFK466-12 | for service brakes: | for holding brakes with emergency stop: |
| | ▮ according to service life calculation<br>▮ or else every six months<br>▮ after 4000 operating hours at the latest | ▮ at least every two years<br>▮ after 1 m cycles at the latest |
| | **Maintenance** | |
| | Inspections if brake is built-on: | Inspections after brake has been removed: |
| | ▮ Check release and control functions (see chap. 6.1.1)<br>▮ Measure air gap (adjust if necessary, see chap. 4.3)<br>▮ Thermal damages of the friction linings or the brake disk | ▮ Breaking out of the torque support at the sleeve bolts and the armature plate<br>▮ Check springs for damage<br>▮ Check brake disk and friction linings<br>– Evenness > 0.1 mm<br>– Max. run-in depth = Rated air gap of the size |

**Note!**

Brakes with defective components or fixings must be replaced completely.

In general, the following must be observed when carrying out inspection or maintenance work:

- Contamination due to oils and grease must be removed using cleaning agents suitable for brakes. Replace the brake if necessary after the cause of the defect has been identified. Pollution and dust in the air gap between stator and armature plate put trouble-free operation at risk and must be removed.
- After replacing the friction parts, the original braking torque will not be reached until the run-in operation of the friction surfaces has been completed. After replacing the friction parts, run-in counter friction faces have an increased initial rate of wear. In this case, adjust the air gap at an early stage if necessary.

# 7 Maintenance/repair

### 7.2.1 Braking torque / delay check

For important information, please see the Operating Instructions for the plant in which the brake is installed.

**Danger!**

Disconnect the drive from the load to prevent accidents. During the next inspection steps of the spring-applied brake, the motor must not run!

1. Switch on the current for the brake (see chapter 6.1.1).
2. Measure the air gap "$s_{air}$" between brake disc and friction lining with a feeler gauge (Fig. 4). The maximum permissible air gap "$s_{air\ max.}$" (see chapter 3.2) must not be exceeded! Readjust the air gap, if necessary (see chapter 4.3).

**Stop!**

If the maximum permissible air gap "$s_{air\ max.}$" (see chapter 3.2) is exceeded during operation, the braking torque may get lost!

3. Switch off the power supply.
4. Screw the bridges onto the motor terminals.

In case of drives with several brakes, one brake at a time can be released with the cheese head screws of the transport locking device when checking redundancy. The screws must be removed again after checking.

**Stop!**

The screws of the transport locking device must not be used for releasing the brake during evacuation!

# 7 Maintenance/repair



## 7.3 Maintenance operations

Under the operating conditions as a holding brake, the brake does not require any maintenance. Replacing the brake is made in reverse order of assembly (chapter 4.2).

**Danger!**

Disconnect the drive from the load to prevent accidents. During the next inspection steps of the spring-applied brake, the motor must not run!

1. Switch on the current for the brake or screw in the transport screws (M5x70 with washer).
2. Loosen the fixing screws at the guide sleeves (Fig. 4).
3. Remove the brake radially from the brake disk.
4. Switch off the power supply and disconnect the connecting cables.

## 7.4 Spare parts order

### INTORQ BFK466spring-applied brake

| | | |
|---|---|---|
| **Order quantity** | _____ pcs. | |
| **Size** | ☐ 12 | |
| **Voltage** | ☐ 103/52 V | ☐ 205/103 V |
| **Cable length** | ☐ Standard | |
| | _____ mm | (from 100 mm - 1000 mm in steps of 100 mm, from 1000 mm - 2500 mm in steps of 250 mm) |
| **Terminal box mounted** | ☐ | |
| **Manual release mounted** | ☐ | |

### Electrical accessories

| | |
|---|---|
| **Rectifier with overexcitation** | ☐ |

# 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.

| Error | Cause | Remedy |
|---|---|---|
| Brake cannot be released, air gap is zero | Coil is interrupted | ▮ Measure coil resistance using multimeter:<br>– Compare the measured resistance with the rated resistance (chapter 3.2).<br>– Replace the brake when the resistance is too high. |
| | Coil has interturn fault or short circuit to ground | ▮ Measure coil resistance using multimeter:<br>– Compare the measured resistance with the rated resistance. The rated data is given in chapter 3.2. Replace the brake when the resistance is too low.<br>▮ Test the coil for short circuit to ground using a multimeter:<br>– Replace the brake in case of short circuit to ground.<br>▮ Check the brake voltage (see defective rectifier, voltage too low). |
| | Defective or wrong wiring | ▮ Check and correct the wiring.<br>▮ Check the cable using a multimeter:<br>– Replace the defective cable. |
| | Defective or wrong rectifier | ▮ Measure the DC voltage at the rectifier using a multimeter.<br>When the DC voltage is zero:<br>▮ Measure the AC voltage at the rectifier.<br>When the AC voltage is zero:<br>– Switch on the voltage,<br>– Check the fusing,<br>– Check the wiring<br>– Check the microswitch<br>When the AC voltage is OK:<br>– Check the rectifier<br>– Replace the defective rectifier<br>Measure the DC voltage:<br>– Overexcitation 90 V (approx. 1 sec.) holding voltage 45 V (tolerance ±10 %)<br>▮ Check the coil for fault between turns and short circuit to ground.<br>▮ If the rectifier defect occurs again, replace the brake even if you cannot find any fault between turns or short circuit to ground. The defect may occur later during heating-up. |
| | Air gap too big | Replace the brake (chapter 7.3) |
| Brake disc cannot rotate freely | Air gap "$s_{air}$" too short | ▮ Check the air gap "$s_{air}$" and replace the brake, if necessary.<br>▮ Check the thickness of the brake disc and replace the brake disc, if necessary.<br>▮ Check the movability of the brake on the guide sleeves and, if necessary, replace the guide sleeves. |
| Brake cannot be released with manual release | Wrong setting of manual release | Replace the brake and complain about the manual release setting to the manufacturer. |
| Microswitch furnishes wrong signal despite correct function of the brake | Wrong wiring of microswitch | Check and correct the microswitch wiring. |
| | Microswitch defective or set incorrectly | Replace the brake and send the defective brake to the manufacturer. |

# 8 Troubleshooting and fault elimination



| Error | Cause | Remedy |
|---|---|---|
| Voltage too high | Supply voltage too high | Adapt the coil voltage to the supply voltage. |
| | Rectifier defective | Replace the rectifier |
| | Bridge rectifier used instead of bridge/half-wave rectifier | Replace the bridge rectifier by a bridge/half-wave rectifier. |
| Voltage too low | Supply voltage too low | Adapt the coil voltage to the supply voltage. |
| AC voltage is not mains voltage | Fuse is missing or defective | Select a connection with proper fusing. |
| | Wrong wiring of microswitch | Check and correct the microswitch wiring. |
| | Microswitch defective or set incorrectly | Replace the brake and send the defective brake to the manufacturer. |

# 9 Disposal

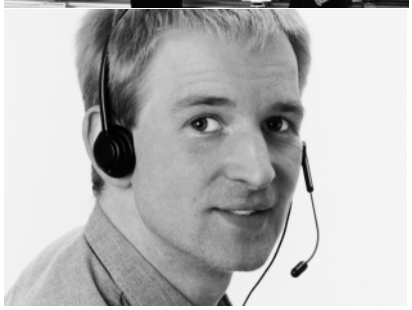
Protect the environment! Packing material can be recycled.

| What? | Where? | | |
|---|---|---|---|
| Transport material | Pallets | | Return to the manufacturer or forwarder |
| | Packing material | | Cardboard boxes to waste paper<br>Plastics to plastics recycling or waste material<br>Reuse or dispose of wood wool |
| Components | Mounting plate, armature plate, flange, sleeves | Steel | Separate valuable substances and dispose |
| | Seals, friction lining, coil housing | Hazardous waste | |

# Notes

# Notes

# Notes



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**INTORQ customers can reach us at any time and from anywhere in the world. Our Key Account Sales Team looks after key account customers and project business.**

In addition, we co-operate with Lenze's global sales organisation. You can contact us via Lenze Service by calling the 24-hour helpline (008000 24 46177).


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