INTORQ

setting the standard

# Spring-applied brake BFK461

Degree of protection up to IP65 equivalent

4 – 46 Nm

www.intorq.de

# We set the standards

The INTORQ brand stands for reliable brake solutions of the highest standard. Whether in cranes, wind turbines or lift systems – INTORQ products are used in the most diverse of applications. Rely on us to create the right solution for your drive – individually and reliably.

With its broad scope of different versions, the modular range of INTORQ products is used in many motors and geared motors and has set standards worldwide. With the establishment of facilities in Shanghai and Atlanta, we have also consistently expanded our international presence. So wherever you are in the world, our network of sales and service staff is always close at hand to support you.


## INTORQ at a glance

- Electromagnetic brakes and clutches
- Configurable standard solutions and custom-made solutions
- Development and production centred in Aerzen
- Fast delivery times worldwide thanks to production sites in Shanghai and Atlanta
- 45 million euros a year sales volume
- 800,000 units a year
- 10,000 square metres production area
- 220 employees
- Market leader with 63 sales partners in 49 countries

Quality Management ISO 9001

Environmental Management ISO 14001

# For high degree of protection – BFK461 in sealed design

The INTORQ range of spring-applied brakes is being expanded with the addition of the new BFK461 series of sealed designs. This brake has been specifically developed for application areas with high enclosure requirements. It is a self-contained system available in four sizes and with braking torquesof 4 - 46 Nm is ideal for use in wind turbines, cranes and textile machines.

## Features

- Spring-applied brake, sealed design, IP65 enclosure
- Designs with and without flange
- Long maintenance intervals

## Example applications

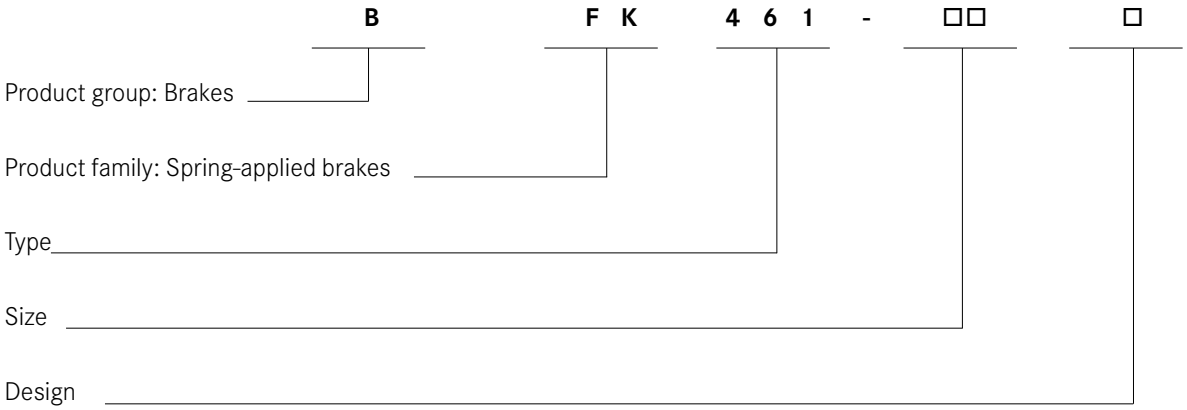
- Brake motors
- Wind power plants
- Car wash systems
- Cranes
- Hoists
- Textile machines

Wind turbines

Cranes

Car wash systems

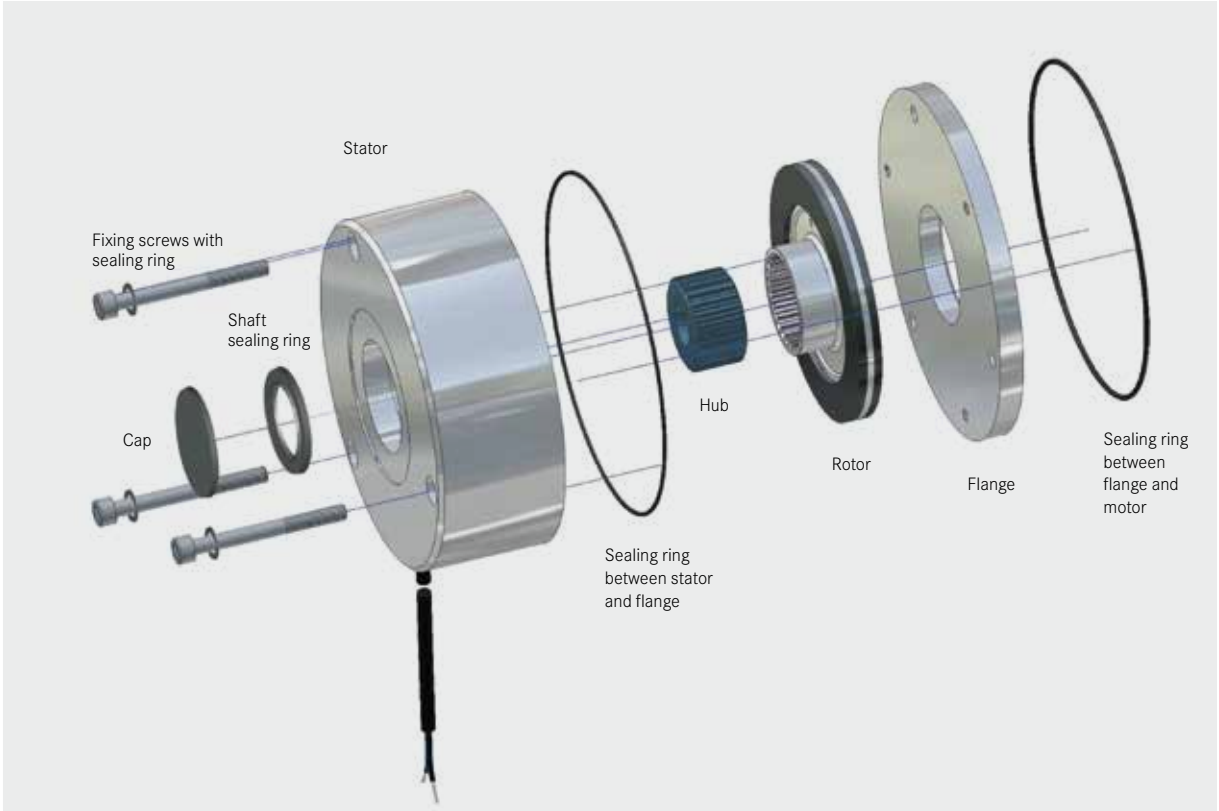
# Product key INTORQ BFK461-□□□




**Sizes**
06, 08, 10, 12

**Stator design**
N – Non-adjustable in the sealed design

Not coded:
Supply voltage, hub bore, options



# Product information

**A powerful and complete range**
- 4 sizes
- Standard voltages 20 V, 24 V, 42 V, 103 V, 180 V, 205 V
- Torque range 4 – 46 Nm

**Versatile**
- Modular structure for virtually all applications
- Dimensions identical to the BFK458 range

**Torque transmission**
- Designed for dry running

**Ready for operation immediately**
- Preset air gap, quick and easy mounting
- Special machining of the friction surfaces ensures that the characteristic torques are achieved after very few switching operations.
- No fixed bearing is required on the brake

**Durable**
- The insulation system to temperature class F (155°C) ensures that the winding has a long service life
- These brakes are designed for 100% operating time (current applied to the brake)

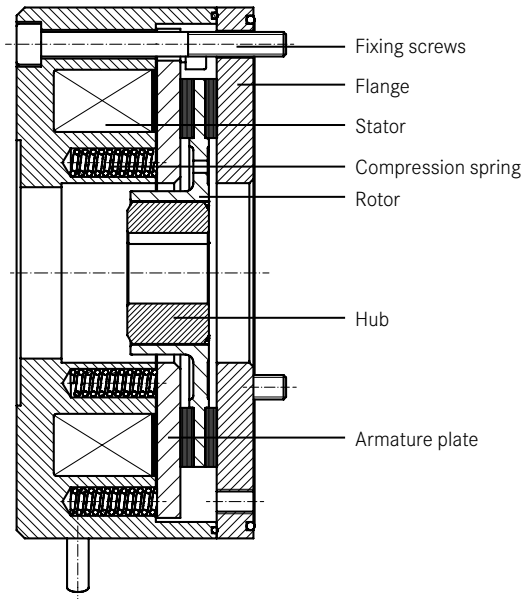
**Low maintenance**
- Long rotor/hub connection with low rate of wear and a tried-and-tested involute gear
- Asbestos-free fiction linings with low rate of wear

**Reliable**
- The certified ISO-9001 and ISO 14001 quality system provides the basis for consistently high-quality products
- Manufacture and testing to VDE 0580

# Principle of operation

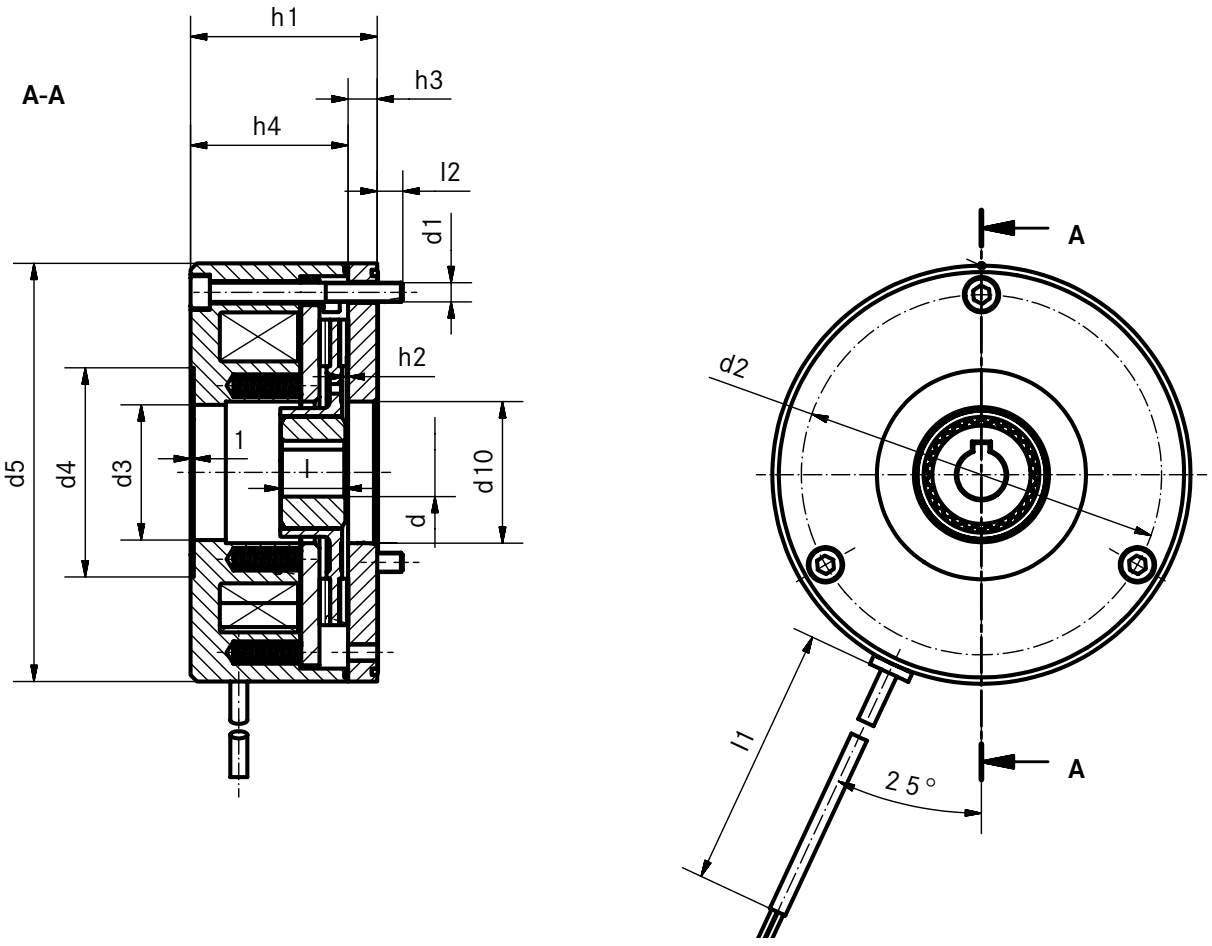
**Brake module + Rotor + Hub + Flange**

INTORQ BFK461 spring-applied brakes are single-disc brakes with two friction surfaces. When de-energised, several compression springs are used to generate the braking torque through friction locking. The brake is released electromagnetically. During braking, the compression springs use the armature plate to press the rotor (which can be shifted axially on the hub) against the counter friction face. When the brakes are applied, an air gap $s_{air}$ is present between the armature plate and the stator. The stator's coil is energised with DC voltage in order to release the brake.
The resulting magnetic force works against the spring force to pull the armature plate towards the stator. This relieves the spring force on the rotor which can then rotate freely.



# Technical data

## BFK461, sealed design with rotor and flange




| Size | $M_k$ default | $M_k$ max. | $P_{20}$ | dH7 max. | $d_1$ | $d_2$ | $d_3$ H7 | $d_4$ | $d_5$ | $d_{10}$ | $h_1$ | $h_2$ | $h_3$ | $h_4$ | l | $l_1$ | $l_2$ | $s_{LN}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **06** | 4 | 6 | 20 | 15 | 3-x-M4 | 72 | 24 | 45 | 87 | 31 | 42 | 1 | 6 | 36 | 18 | 400 | 7 | 0,2 |
| **08** | 8 | 12 | 25 | 20 | 3-x-M5 | 90 | 32 | 55 | 103 | 41,5 | 50 | 1,5 | 7 | 43 | 20 | 400 | 9 | 0,2 |
| **10** | 16 | 23 | 30 | 20 | 3-x-M6 | 112 | 42 | 65 | 130 | 44 | 58 | 2 | 9 | 49 | 20 | 400 | 12 | 0,2 |
| **12** | 32 | 46 | 40 | 25 | 3-x-M6 | 132 | 52 | 75 | 148 | 52,5 | 63,5 | 2 | 9 | 54,5 | 25 | 400 | 11,5 | 0,2 |

- $M_K$: Rated torque of the brake in Nm at n = 100 rpm
- $P_{20}$: Coil power at 20 °C in W
- 1) Standard keyway to DIN 6885/1-P9
- All dimensions in mm

# Technical data

## Rated data

| Size | p [1] [20 °C] [W] | $s_{L\ max}$ service brake [mm] | $s_{L\ max}$ holding brake [mm] | $J_{Alu\ rotor}$ [kgcm²] | Mass of stator Assembly [kg] |
|---|---|---|---|---|---|
| **06** | 20 | 0,5 | 0,3 | 0,15 | 0,75 |
| **08** | 25 | 0,5 | 0,3 | 0,61 | 1,2 |
| **10** | 30 | 0,5 | 0,3 | 2,0 | 2,1 |
| **12** | 40 | 0,5 | 0,3 | 4,5 | 3,5 |

[1] Coil power at 20°C in W, possible deviation up to +10%, depending on supply voltage selected

## Braking torques, depending on speed and permissible limit speeds

| Size | Average braking torque when decelerating from $\Delta n_0$ to a standstill [%] | Braking torque at $\Delta n_0$-[rpm] 1.500 [%] | 3.000 [%] | max. [%] | Max. speed $\Delta n_{0max}$ [rpm] |
|---|---|---|---|---|---|
| **06** | 100 | 87 | 80 | 74 | 6000 |
| **08** | 100 | 85 | 78 | 73 | 5000 |
| **10** | 100 | 83 | 76 | 73 | 4000 |
| **12** | 100 | 81 | 74 | 73 | 3600 |

As speed increases, so does wear

## Rotor with plastic sleeve

The rotor with the plastic sleeve reduces the necessary backlash to a minimum and thus increases the service life.

### Features and benefits

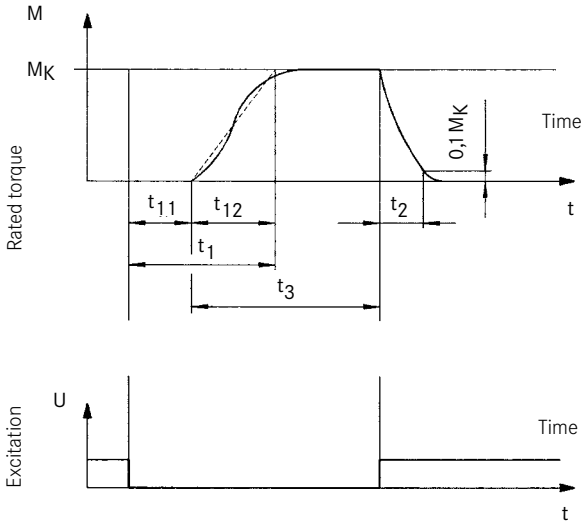
- Low rate of wear between rotor and hub
- Recommended for operation with frequency inverter
- Also suitable for CCV

# Technical data

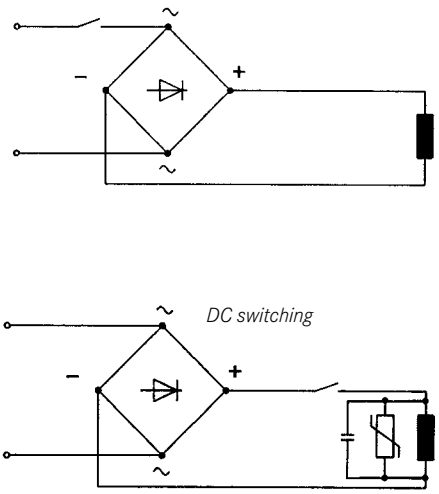
## Operating times

The listed operating times are guide values which apply to DC switching with rated air gap $sL_N$, warm coil and standard characteristic torque. The times shown are mean values. The engagement time $t_1$ is approximately 8 to 10 times longer for AC switching.

Torque time characteristic, dependent on excitation voltage




AC switching




## Explanations

| | | |
|---|---|---|
| **$t_1$** | [s] | engagement time, the total of the reaction delay and torque rise time t1=t11+ t12 |
| **$t_2$** | [s] | disengagement time, time from switching the stator until the torque has reduced to 0,1 $M_K$ |
| **$t_3$** | [s] | slipping time to standstill (after $t_{11}$) |
| **$t_{11}$** | [s] | delay time when connecting, time from disconnecting the voltage until the torque begins to rise |
| **$t_{12}$** | [s] | rise time of braking torque, time from beginning of rise of torque until braking torque is reached |
| **$Q_E$** | [J] | max. permissible friction work per switching cycle, thermal rating of the brake /clutch |
| **$S_h$** | [1/h] | operating frequency, the number of repeated operations per unit time |
| **$S_{LN}$** | | rated air gap |

| Size | Braking torque rated value at Δn-=100 rpm $M_K$- | Maximum permissible switching energy with single operating $Q_E$ | Transition operating frequency frequency $S_{hue}$ | Operating times [ms] [1] at $S_{LN}$ Engagement on DC side | | | Disengagement |
|---|---|---|---|---|---|---|---|
| | [Nm] | [J] | [1/h] | [$t_{11}$] | [$t_{12}$] | [$t_1$] | [$t_2$] |
| **06** | 4 | 3000 | 79 | 14 | 30 | 44 | 62 |
| **08** | 8 | 7500 | 50 | 39 | 27 | 66 | 61 |
| **10** | 16 | 12000 | 40 | 29 | 41 | 70 | 100 |
| **12** | 32 | 24000 | 30 | 40 | 38 | 78 | 150 |

[1] Operating times valid for 205 V DC coils

# Technical data

### Service life and wear

The friction energy to be withstood until $s_{Lmax}$ is reached is dependent on a number of factors: in particular, the inertias to be braked, the braking speed, the operating frequency and the resulting temperature on the friction surfaces. For this reason, no universal value for all operating conditions can be given in respect of the amount of friction energy that can be handled.

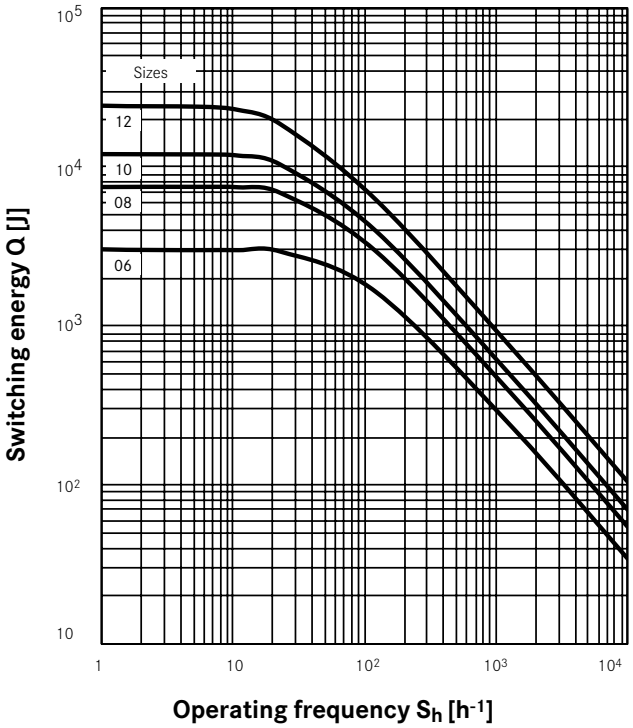
In addition, increased wear should be expected with vertical mounting.

When the maximum permissible working air gap ($s_{Lmax}$) is reached, the rotor must be replaced. Where the amount of friction energy per switching operation is low, the brake's mechanical components can impose limitations in terms of service life. In particular, the rotor/hub connection, springs, armature plate and sleeves are subject to operational wear. The expected service life of the standard design is around 1 million load alternations. Solutions that are optimised in terms of service life are available in cases where a longer service life is required (consult the manufacturer).

### Maintenance

Brakes are components which are subject to a great deal of wear. When installing the brake, it must be ensured that it can be easily accessed for inspection and maintenance purposes. Intervals between inspections should be set in accordance with the expected service life and load. For more information, please see the Operating Instructions.

**Permissible friction energy $Q_{perm}$ depending on operating frequency $S_h$**




# General information

INTORQ brakes are designed so that the stated rated torques are reliably attained after a short run-in operation. Given the fluctuating properties of the organic friction linings used and changing environmental conditions, there may however be deviations from the stated braking torques. Appropriate safety factors in the design must take this into account.

An increased breakaway torque may in particular be experienced in damp conditions and with changing temperatures after long downtimes.

The braking torque should be checked when using the brake on the customer's friction surfaces. If the brake is being used solely as a holding brake without any dynamic load, the friction lining must be reactivated regularly.

# Model overview

## INTORQ BFK461-☐☐☐
## Complete stator

| | |
|---|---|
| **Size** | ☐ 06 ☐ 08 ☐ 10 ☐ 12 |
| **Design** | ☐ With flange<br>☐ Without flange |
| **Brake voltage** | ☐ 24 V ☐ 96 V ☐ 103 V ☐ 170 V ☐ 180 V ☐ 190 V ☐ 205 V |
| **Braking torque** | 4 – 46 Nm (see torque ratings) |
| **Cable length** | ☐ Standard<br>(from 100 mm to 1000 mm in 100 mm steps,<br>from 1000 mm to 2500 mm in 250 mm steps) |
| **Rotor** | ☐ Standard ☐ Noise-reduced (rotor with sleeve) |
| **Hub** | (for bore diameter, see Dimensions) |
| **Fixing screw set** | ☐ For mounting onto the flange<br>☐ For mounting on the motor |
| **Sealing of the back wall of the housing** | ☐ Shaft sealing ring (shaft diameter on request)<br>☐ Cap |
| **Bridge rectifier** | ☐ 4-pole without snap-in stud<br>☐ 4-pole with snap-in stud<br>☐ 6-pole vertical, integrated spark suppressor<br>☐ 6-pole horizontal, integrated spark suppressor |
| **Half-wave rectifier** | ☐ 4-pole without snap-in stud<br>☐ 4-pole with snap-in stud<br>☐ 6-pole vertical, integrated spark suppressor<br>☐ 6-pole horizontal, integrated spark suppressor |
| **Spark suppressor** | ☐ |

## Setting standards in the market, worldwide

We are available to our customers at all times and in all locations. Major customers and projects are supported directly by our Key Account Sales Team at our HQ in Aerzen (Germany) or by our locations in Shanghai (China) and Atlanta (USA).

In addition to this, we work with a global network of local trading partners and cooperate with Lenze's global sales organisation.

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You can find more information on our products, as well as catalogues and operating instructions available for download, on our website at www.intorq.de

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