

## Spring-applied brake

### **INTORQ BFK468**

The new performance standard 100 – 2400 Nm



**INTORQ**

setting the standard

[www.intorq.de](http://www.intorq.de)



## INTORQ BFK468 - the new performance standard

High-performance drives are generating ever higher motor speeds and drive torques.

Although performance requirements are increasing, less and less space is available for the brake. The INTORQ spring-applied brake for high-performance applications is the BFK468. The innovative multipole technology allows it to be released through a large air gap, even when forces are high.

### Features

- Spring-applied brake with multipole system
- Up to twice the braking torque compared to the BFK458

- Fixed or adjustable braking torque
- Short operating times on AC side
- Large working air gap means long maintenance intervals

### This catalogue contains

- Spring-applied brakes in four different sizes
- Electrical accessories
- Available variants



# Contents

<b>Product key</b>	4
<b>List of abbreviations</b>	5
<b>Product information</b>	6
<b>Principle of operation</b>	7
<b>Technical data</b>	
Braking torques	8
Rated data	10
Operating times	11
Service life	12
<b>Accessories</b>	
Manual release/flange/seal	13
Brake cover	14
Microswitch	14
<b>Bridge/half-wave rectifier</b>	15
<b>Available variants</b>	17
<b>Sales and service around the world</b>	18

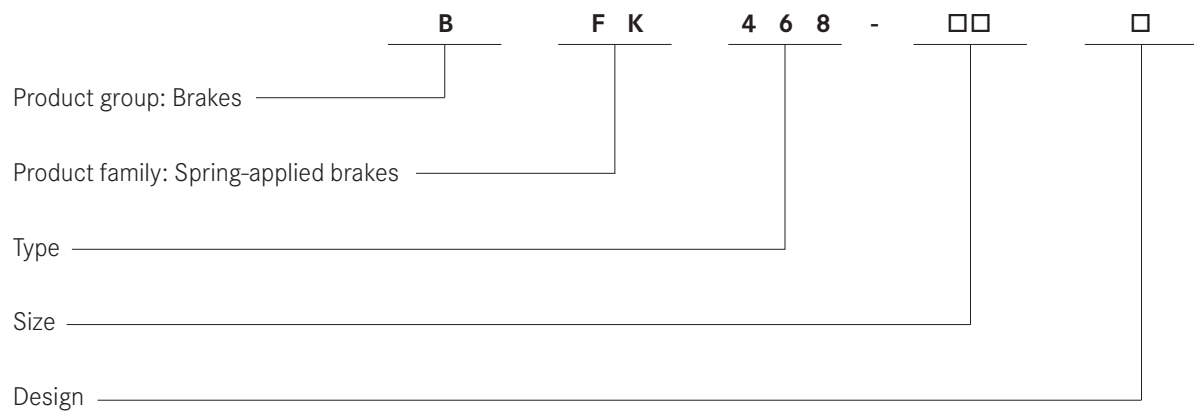
## Example applications

Slew, lift, move – whenever cranes are in motion, INTORQ BFK468 spring-applied brakes are never far away. A special version is also available for theatre applications.

- Brake motors
- Storage technology
- Escalators
- Cranes
- Dockyards
- Stage machinery



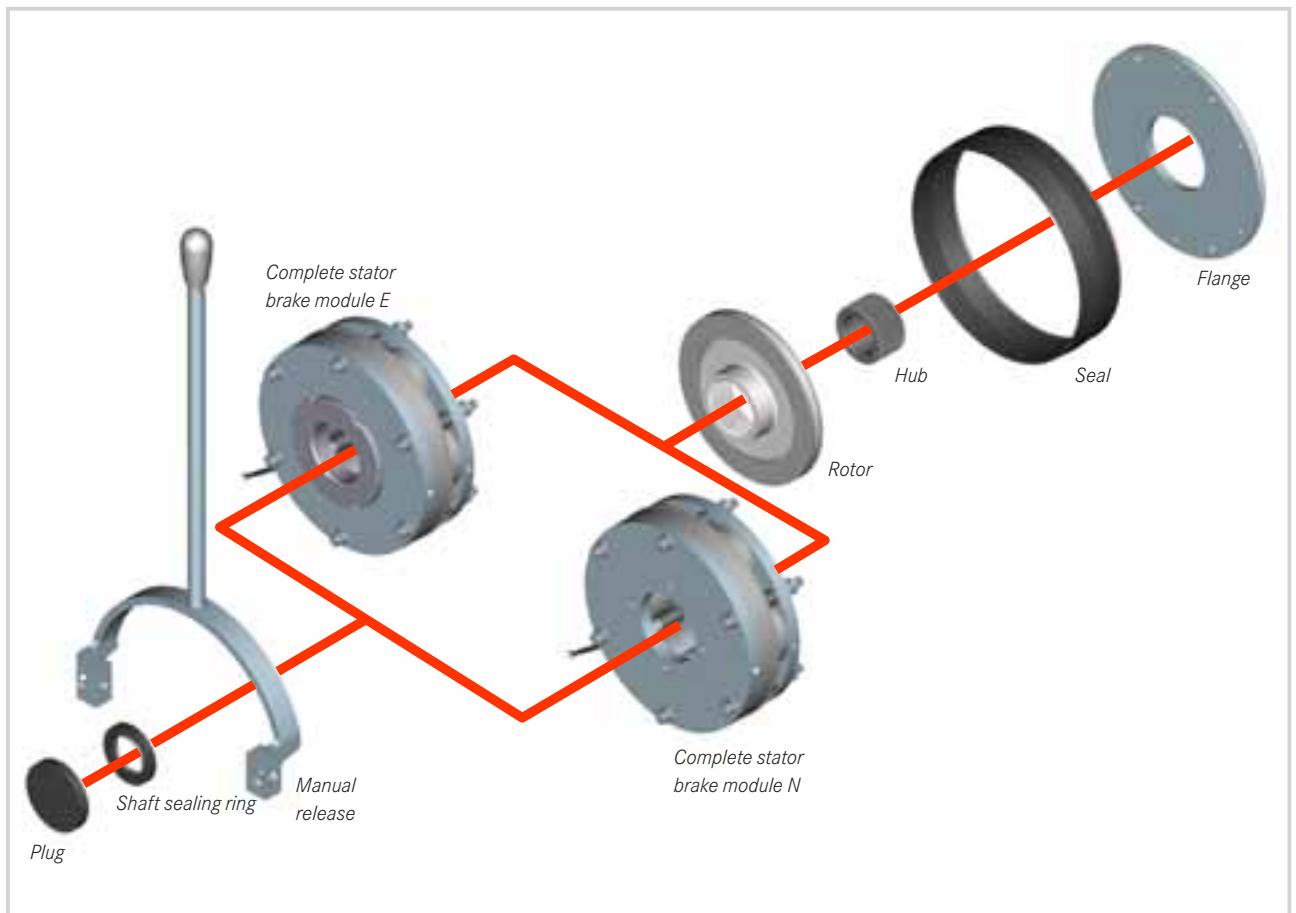
# Product key INTORQ BFK468-□□□



**Size**  
18, 20, 25, 31

Not included:  
Supply voltage, hub bore,  
options

**Stator design**  
E – Adjustable (braking torque can be reduced using torque adjustment ring)  
N – Non-adjustable



## List of abbreviations

<b>P</b>	[kW]	Drive motor power
<b>P<sub>max</sub></b>	[W]	Maximum power when releasing the brake with overexcitation
<b>P<sub>20</sub></b>	[W]	Coil power at 20 °C in continuous operation with holding current derating
<b>M<sub>K</sub></b>	[Nm]	Characteristic torque of brake
<b>Δn<sub>0</sub></b>	[min <sup>-1</sup> ]	Initial relative speed of the brake
<b>t<sub>1</sub></b>	[s]	Engagement time, $t_1 = t_{11} + t_{12}$
<b>t<sub>2</sub></b>	[s]	Disengagement time (time from the beginning of the torque drop until 0.1 M <sub>K</sub> is reached)
<b>t<sub>3</sub></b>	[s]	Slipping time (time during which a relative movement occurs between drive and output with brake applied)
<b>t<sub>11</sub></b>	[s]	Delay time (time from disconnecting the voltage until the torque begins to rise)
<b>t<sub>12</sub></b>	[s]	Rise time of braking torque
<b>Q<sub>perm</sub></b>	[J]	Max. permissible friction energy per switching cycle
<b>S<sub>h</sub></b>	[h <sup>-1</sup> ]	Operating frequency, i. e. the number of periodical brake operations
<b>S<sub>air</sub></b>		Rated air gap



# Product information

## INTORQ BFK468 spring-applied brake

### A powerful and complete range

- 4 sizes
- Standard voltages 103 V, 205 V, 360 V
- Graduated torques from 100 – 2400 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 rated torques are achieved after very few switching operations without a run-in procedure

- 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
- Brakes are designed for 100 % duty time (with holding current derating) using an INTORQ bridge/half-wave rectifier

### Low maintenance

- Long rotor/hub connection with low rate of wear and a tried-and-tested involute gear
- Asbestos-free friction linings with low rate of wear
- Air gap must be checked depending on the friction energy used

### Reliable

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

### Options

- Manual release for sizes 18–25, both directions can be used for release and mounting
- Noise-reduced designs
- Different types of corrosion protection and enclosures
- Microswitches used to monitor air gap and wear

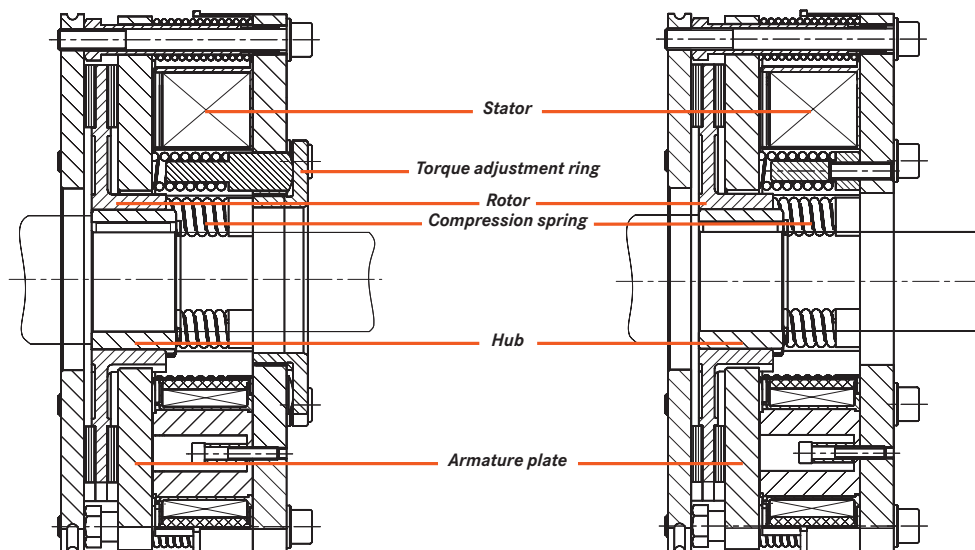


# Principle of operation

## INTORQ BFK468 spring-applied brake

Brake module E + rotor + hub + flange

Brake module N + rotor + hub + flange



INTORQ BFK458 spring-applied brakes are single-disc brakes with two friction surfaces. When a de-energised, several compression springs are used to generate the braking torque through friction locking. The brake is released electromagnetically. During the braking procedure, the rotor, which can be shifted axially on the hub, is pressed against the counter friction face via the armature plate, by means of the compression springs. 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 flux works against the spring force to draw the armature plate to the stator. This releases the rotor from the spring force and allows it to rotate freely. Brake module E supports the use of the torque adjustment ring to reduce the braking torque.

# Technical data




## Braking torques

Depending on the individual application, the graduated torques listed in the tables below are available. The braking torque on brake module E can be reduced using the torque adjustment ring located in the stator. The torque adjustment ring can be unscrewed to a maximum dimension of  $h_{1max}$  (see table on page 9).

It should be noted that the engagement and disengagement times change in accordance with the braking torque.

Size	18		20		25		31
	Rated torque [Nm]	Torque reduction E per detent [Nm]	Rated torque [Nm]	Torque reduction E per detent [Nm]	Rated torque [Nm]	Torque reduction E per detent [Nm]	Rated torque [Nm]
<b>Rated torque [Nm] in relation to relative speed <math>\Delta n = 100 \text{ min}^{-1}</math></b>  <b>Depending on the rated torque (spring configuration), the angle of rotation for reducing the braking torque on brake module E can be 60°; 120° or 180°</b>					230 N	16.5	
	100 N/E	6.4	170 N/E	19.8	260 N/E	16.5	
	115 N/E	6.4	200 N/E	19.8	300 N/E	8.2	720 N
	130 N/E	6.4	230 N/E	9.9	350 N/E	8.2	960 N
	<b>150 N/E</b>	<b>3.2</b>	<b>260 N/E</b>	<b>9.9</b>	<b>400 N/E</b>	<b>8.2</b>	<b>1200 N</b>
	165 N/E	3.2	300 N/E	19.8	445 N/E	16.5	1440 N
	185 N/E	6.4	345 N/E	19.8	490 N/E	8.2	1680 N
	200 N/E	6.4	400 N/E	19.8	520 N/E	16.5	1920 N
	235 N/E	6.4	440 N/E	19.8	600 N/E	16.5	2160 N
	265 N/E	6.4	480 N/E	19.8	700 N/E	16.5	2400 N
	300 N/E	6.4	520 N/E	19.8	800 N/E	16.5	
				19,8		16,5	

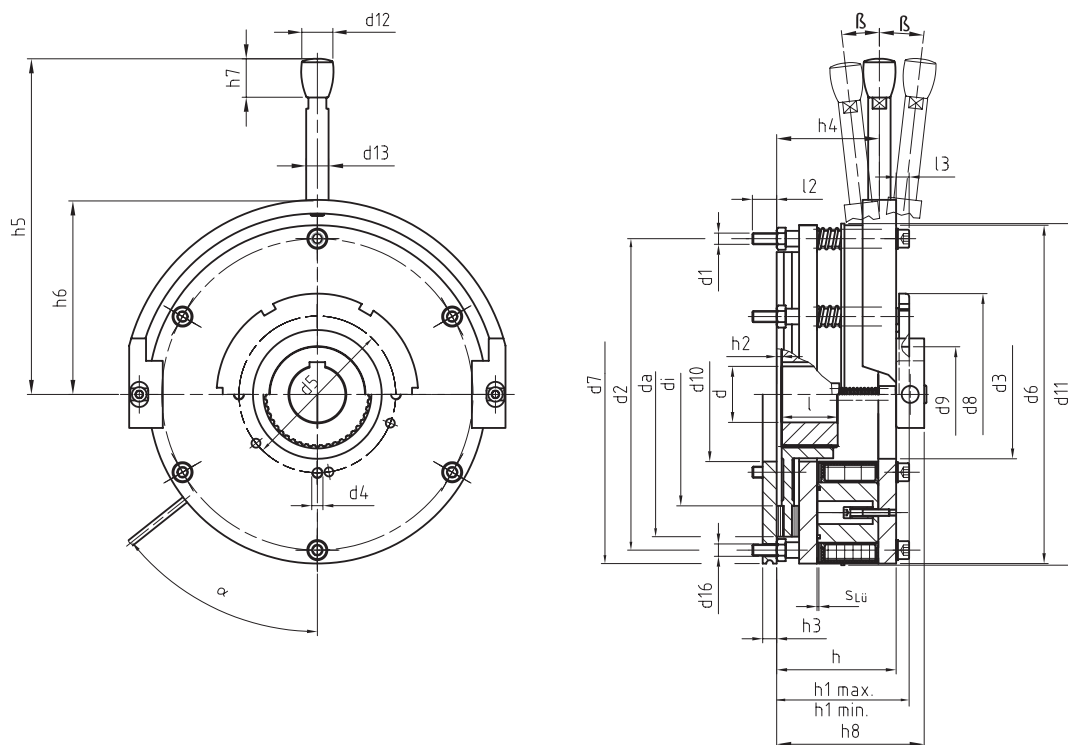
- N ... Braking torque for design N (without torque adjustment ring)
- E ... Braking torque for design E (with torque adjustment ring)

-  Holding brake with emergency stop operation ( $s_{airmax}$  approx.  $2.0 \times s_{air}$ )
-  Service brake ( $s_{airmax}$  approx.  $4.0 \times s_{air}$ )
-  Standard braking torque

# Technical data

## BFK468 with manual release and flange

### Dimensions



Size	d <sub>H7 max.</sub>	d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	d <sub>6</sub>	d <sub>7</sub>	d <sub>8</sub>	d <sub>9</sub>	d <sub>10</sub>	d <sub>11</sub>	d <sub>12</sub>	d <sub>13</sub>	d <sub>i</sub>	d <sub>a</sub>	h
18	45	6xM8	196	75	4xM8	95	217	217	116	62	77	220	24	14	129	174	83.1
20	50	6xM10	230	85	4xM10	110	254	254	135	72	90	257	36	20	148	206	97.6
25	70	6xM10	278	115	4xM10	140	302	302	180	85	120	305	36	25	199	254	110.7
31	80	8xM16	360	150	4xM16	200	390	390	200	110	150	-	-	-	243	330	149

Size	h <sub>1 min.</sub>	h <sub>1 max.</sub>	h <sub>2</sub>	h <sub>3</sub>	h <sub>4</sub>	h <sub>5 max.</sub>	h <sub>6</sub>	h <sub>7</sub>	h <sub>8</sub>	l	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	s <sub>air</sub>	α	β
18	89	96.5	2.75	11	70.6	385	128	34	108.1	35	600	15.3	9.6	0.4	51.5°	8°
20	104	110	3.5	11	82.6	650	150	69	122.6	40	600	10.4	12	0.4	51.5°	8°
25	118	128	4.5	12.5	95.7	1045	173.5	69	135.7	50	600	17.3	12	0.5	51.5°	6.5°
31	173	-	5	15	-	-	-	-	-	70	600	18	19	0.5	5°	-

■ Standard voltages for sizes 18, 20, 25: 103 V; 205 V; 230 V  
Standard voltage for the size 31: 360 V

■ M<sub>K</sub>: Rated torque of the brake in Nm at n = 100 rpm

■ P<sub>20</sub>: Coil power at 20 °C in W

■ l<sub>1</sub>: Cable length

■ m: Mass in kg

■ d: Max. bore diameter for service brake  
(for holding brakes, please consult the manufacturer)

■ Standard keyway according to DIN 6885/1-P9

■ All dimensions in mm

# Technical data

## Rated data

Size	P <sub>20</sub> holding [W]	P <sub>20</sub> releasing [W]	s <sub>air max</sub> to standard torque [mm]	s <sub>air max</sub> increased torque [mm]	max. adjustment [mm]	min. <sup>2)</sup> rotor thickness [mm]	J <sub>A</sub> rotor [kgcm <sup>2</sup> ]	Mass brake	Mass stator assembly [kg]
18	88	352	1.5	1.0	3.0	10.0	29	19	13.4
20	99	396	1.5	1.0	4.0	12.0	73	32	20
25	117	469	1.8	1.2	4.5	15.5	200	50	31
31	221	884	2	1.5	3	15	-	73.2	55.1

■ <sup>1)</sup> with holding current derating, possible deviation of up to + 10 % depending on supply voltage selected

■ <sup>2)</sup> The friction lining is dimensioned so that the brake can be readjusted at least 5 times

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

Size	Reference variable rated torque at Δn = 100 rpm [%]	Braking torque at Δn <sub>0</sub> [rpm]			Max. speed Δn <sub>0max</sub> [rpm]
		1500 [%]	3000 [%]	max. [%]	
18	100	77	70	66	4400
20	100	75	68	66	3700
25	100	73	66	66	3000
31	100	69	-	-	2300

■ As speed increases, so does wear

## Noise-reduced designs

The noise reduction required in many applications can be achieved in two ways:

### 1. Impact-noise-reduced armature plate

The brake's operating noise can be minimised using suitable damping elements, which are installed between the pole face and the armature plate as shock absorbers.

### 2. Noise-reduced aluminium rotor

Rattling noises, which can occur in the rotor/hub connection during frequency inverter operation (changing loads), for example, are reduced by using a rotor with a plastic sleeve.

With size 31, the noise is reduced by inserting an O-ring between the rotor and the hub.



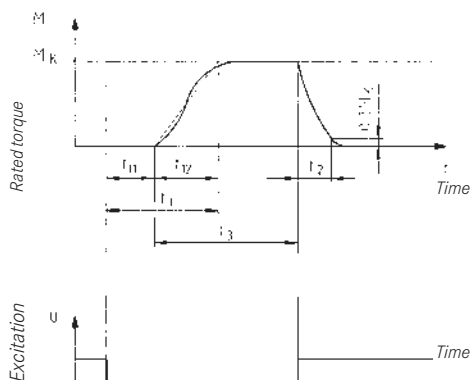
# Technical data

## Operating times

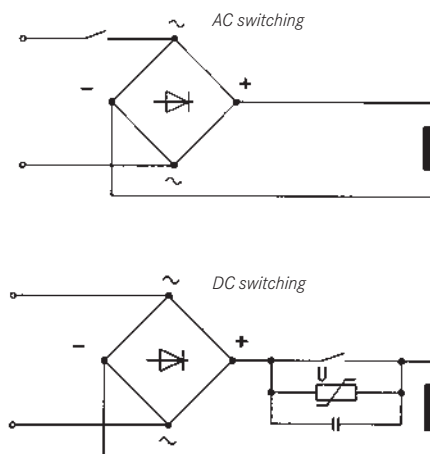
The listed operating times apply to DC switching with rated air gap  $s_{air}$ , a warm coil and standard rated torque. The times shown are mean values. The engagement time  $t_1$  is approximately 5 times higher for AC switching.

The engagement time  $t_1$  increases if inching mode is shorter than the overexcitation time of the bridge/half-wave rectifier.

Torque time characteristic, dependent on excitation voltage



- $t_{11}$  = Delay time
- $t_{12}$  = Rise time of braking torque
- $t_1$  = Engagement time
- $t_2$  = Disengagement time
- $t_3$  = Slipping time



Size	Braking torque rated value at $\Delta n = 100$ rpm $M_K^{1)}$ [Nm]	Maximum permissible switching energy with single operating $Q_E$ [J]	Transition operating frequency $S_{Hü}$ [h <sup>-1</sup> ]	Operating times [ms] <sup>2)</sup> at $S_{airRated}$ Switching on DC side			
				[ $t_{11}$ ]	[ $t_{12}$ ]	[ $t_1$ ]	Disengagement [ $t_2$ ]
18	150	60.000	20				
20	260	80.000	19				
25	400	120.000	15				
31	1200	-	-				

<sup>1)</sup> Minimum braking torque for run-in friction surfaces.  
<sup>2)</sup> Operating times valid for 205 V DC coils

# Technical data

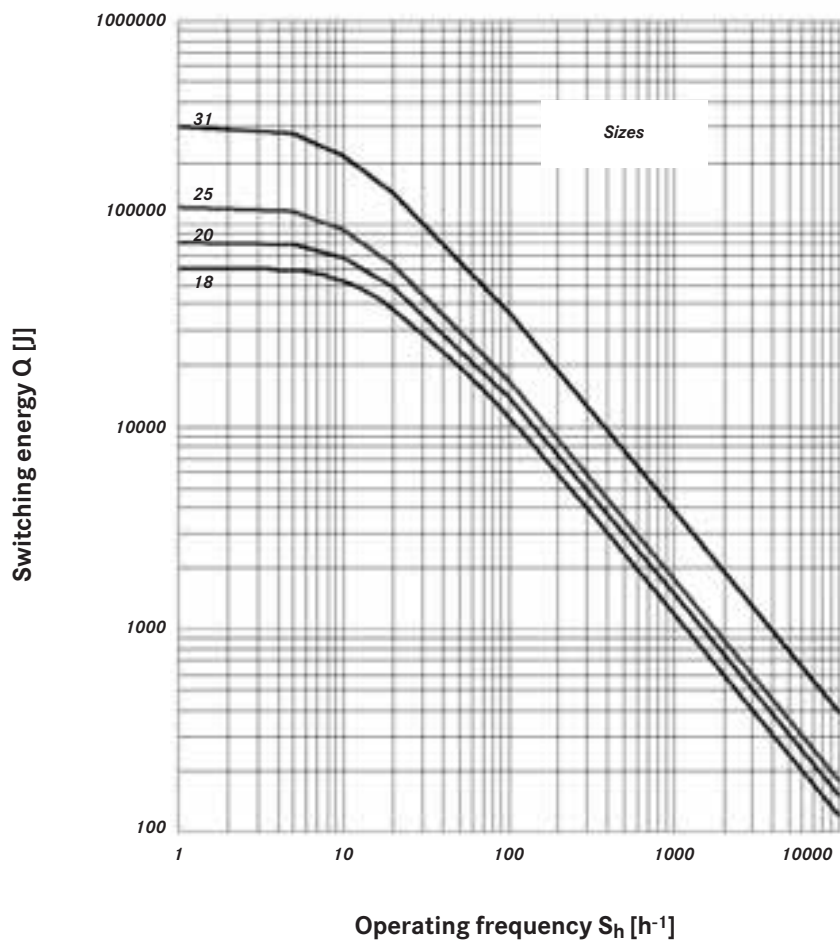
## Service life

The brake has to be adjusted on reaching  $s_{airmax}$ . The required friction energy depends on various factors, namely the inertias to be braked, the shaft speed, the operating frequency and the resulting temperature on the friction surfaces. For these reasons, no general statement can be made about the friction energy available until adjustment that would apply under all operating conditions. The mounting position of the brake will also affect the service life: increased wear is likely if it is mounted vertically.

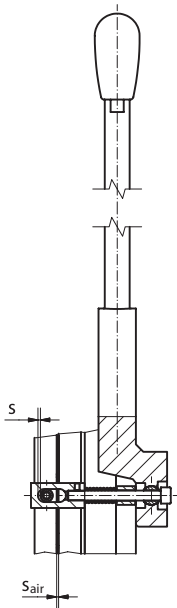
For more detailed information, please indicate the specific operating conditions (consult manufacturer).

BFK468 spring-applied brakes are dimensioned so that the rotor can be replaced up to 5 times. If the rotor then needs to be replaced again, the complete brake must be replaced.

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



# Accessories



Manual release

## Manual release

The manual release is used to release the brake by hand and can be retrofitted. The manual release springs back to its base position (0 setting) automatically after operation. The release screws are carried in ball joints and are only tensioned. The air gap "s" is the distance between the armature plate and the washer. The dimension "s" must be maintained when installing the manual release.

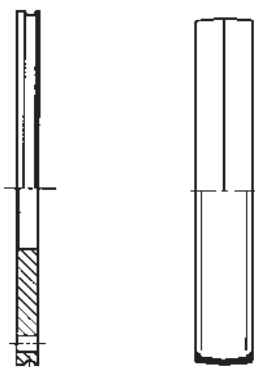
Size	$s_{air} \begin{smallmatrix} +0.1 \\ -0.05 \end{smallmatrix}$ [mm]	$s + 0.1$ [mm]
18	0.4	2
20	0.4	2
25	0.5	2,5
31	-	-

### Caution:

Even with a reduced rated torque, the air gap must be readjusted on reaching dimension  $s_{airmax}$ , for reasons of safety.

## Flange

If no suitable counter friction face is available, a flange on which the seal can be installed can be used.



Flange

Seal

## Seal

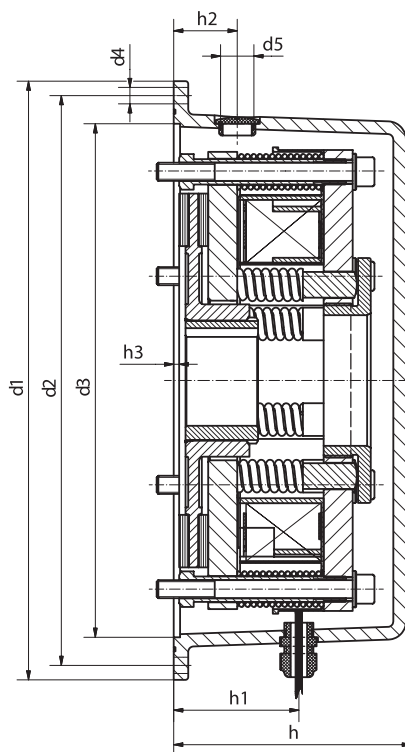
To a large extent, the seal prevents the exit or ingress of dust, humidity, dirt, etc., out of or into the braking area. The seal is inserted into the groove on the stator. If no suitable groove is available on the counter friction face, we recommend the use of a flange.

# Accessories

## Brake cover

### Brake module E, N + cover = encapsulated design

A cover can be mounted onto brake module E and brake module N as an option, to protect the brake from water and dust (enclosure to IP 65). This design is not available in conjunction with manual release.



Size	d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub> <sup>H8</sup>	d <sub>4</sub>	d <sub>5</sub>	h	h <sub>1</sub>	h <sub>2</sub>	h <sub>3</sub> <sup>1)</sup>
18	285	268	238	4x6.6	M20x1.5	115	60	29	3
20	330	314	283	4x9	M20x1.5	131	69	35	3
25	390	368	328	4x9	M20x1.5	142	78	40	3

1) Recommended recess length on motor endshield

## Microswitch (on request)

The microswitch is used to monitor the air gap and is available for all sizes on request. When the armature plate makes contact with the stator, the motor contactor is controlled via the microswitch. The motor can only start if the brake is released. If the maximum air gap  $s_{airmax}$  is reached, the stator no longer attracts the armature plate. If the motor contactor is not activated, the motor will not start. The air gap  $s_{air}$  can be readjusted if using brake module E or brake module N. The microswitch can also be set such that a signal is output before the wear reserve is reached (wear monitoring).

# Bridge/half-wave rectifier

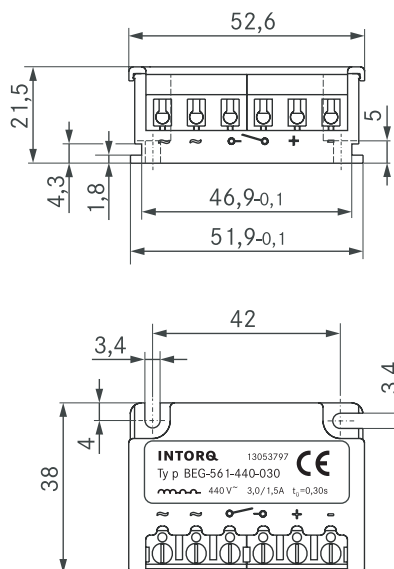
## BEG-56 1-□□□-□□□

The bridge/half-wave rectifiers are used to supply a DC current to electromagnetic spring-applied brakes that are approved for operation with these rectifiers. Any other usage is only permitted with the approval of INTORQ.

The bridge/half-wave rectifiers switch from bridge rectification to half-wave rectification after a fixed overexcitation time. Depending on the size of the load, this improves the switching performance or brings about a power reduction.

Terminals 3 and 4 are in the DC circuit of the brake. The induction voltage peak that occurs during DC switching (see "Shortened release times" circuit diagram) is limited by an integrated overvoltage protection on terminals 5 and 6.

### Dimensions



### Technical data

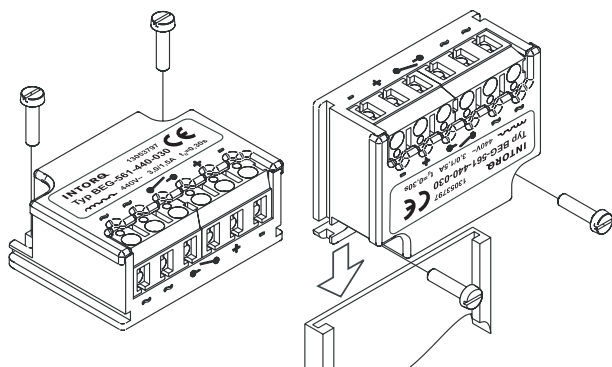
Rectifier type	Bridge/half-wave rectifier
Output voltage with bridge rectification	$0.9 \times U_1$
Output voltage with half-wave rectification	$0.45 \times U_1$
$I_{max}$ with bridge rectification [A]	3.0
$I_{max}$ with half-wave rectification [A]	1.0
Ambient temperature (storage/operation) [°C]	-25...+70
U input voltage (40...60Hz)	

Type	Input voltage $U_1$ (40 Hz...60 Hz)			Overexcitation time $t_{\bar{u}}$ ( $\pm 20\%$ )		
	min. [V~]	rated [V~]	max. [V~]	at $U_{1min}$ [s]	at $U_{1rated}$ [s]	at $U_{1max}$ [s]
BEG-56 1-255-030	160	230	255	0.430	0.300	0.270
BEG-56 1-255-130				1.870	1.300	1.170
BEG-56 1-440-006	230	400	440	0.110	0.060	0.060
BEG-56 1-440-030				0.500	0.300	0.270
BEG-56 1-440-130				2.300	1.300	1.200

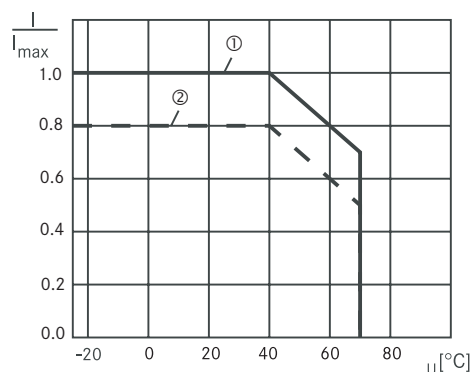
# Bridge/half-wave rectifier

BEG-56 1-□□□-□□□

## Fastening options



## Permissible current load – ambient temperature



- ① Screw mounting with metal surface (good heat dissipation)
- ② Other mounting (e.g. glue)

## Shortened release times

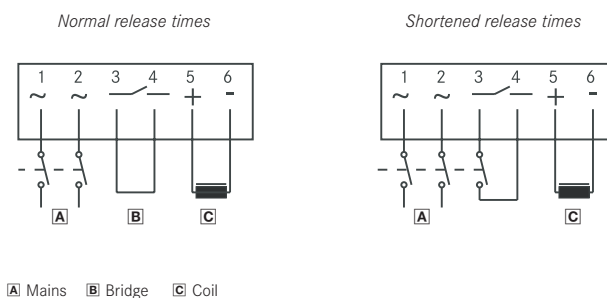
In the case of DC switching (shortened release times) AC switching must also take place, otherwise there will be no overexcitation when the rectifier is switched on again.

## Coil voltage selection

Coil rated voltage	Function
$U_{Sp} = 0.45 \times U_1$	Maximum overexcitation No holding current derating
$0.45 \times U_1 = < U_{Sp} < 0.90 \times U_1$	Partial overexcitation Some holding current derating
$U_{Sp} = 0.90 \times U_1$	No overexcitation Maximum holding current derating

$U_{Sp}$  = coil rated voltage     $U_1$  = input voltage 840...60 Hz

## Connection



## Available variants

### INTORQ BFK468□□□

#### Complete stator

<b>Size</b>	<input type="checkbox"/> 18 <input type="checkbox"/> 20 <input type="checkbox"/> 25 <input type="checkbox"/> 31
<b>Design</b>	<input type="checkbox"/> E (with torque adjustment ring, sizes 18, 20, 25) <input type="checkbox"/> N (without torque adjustment ring)
<b>Brake voltage</b>	<input type="checkbox"/> 205 V/103 V (not available for size 31) <input type="checkbox"/> 360 V/180 V
<b>Braking torque</b>	_____ Nm (see torque ratings)
<b>Cable length</b>	<input type="checkbox"/> Standard _____ mm (from 100 mm to 1000 mm in 100 mm steps, from 1000 mm to 2500 mm in 250 mm steps)
<b>Manual release fitted</b>	<input type="checkbox"/> (not available for size 31)
<b>Armature plate</b>	<input type="checkbox"/> Standard <input type="checkbox"/> Chromium-plated
<b>Microswitch</b>	<input type="checkbox"/> Operation monitoring <input type="checkbox"/> Wear monitoring
<b>Operating noise</b>	<input type="checkbox"/> Reduced

#### Accessories

<b>Rotor</b>	<input type="checkbox"/> Standard <input type="checkbox"/> Noise-reduced (rotor with sleeve)
<b>Hub</b>	_____ mm (for bore diameter, see Dimensions)
<b>Fixing screw set</b>	<input type="checkbox"/> For mounting onto the flange <input type="checkbox"/> For mounting on the motor
<b>Sealing</b>	<input type="checkbox"/> Seal <input type="checkbox"/> Shaft sealing ring (shaft diameter on request) <input type="checkbox"/> Cap
<b>Brake cover</b>	<input type="checkbox"/> 18 <input type="checkbox"/> 20 <input type="checkbox"/> 25

#### Electrical accessories

**Bridge/half-wave rectifier**



## INTORQ – Sales and Service around the world



**Our customers can reach us at any time from anywhere in the world. Key accounts and project business are handled by our Key Accounts department.**

We are also partners in Lenze's network of worldwide sales offices.

Our Lenze Service helpline (008000 24 46877) will provide you with expert advice 24 hours a day.





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**INTORQ**

setting the standard

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