Spring-applied brake

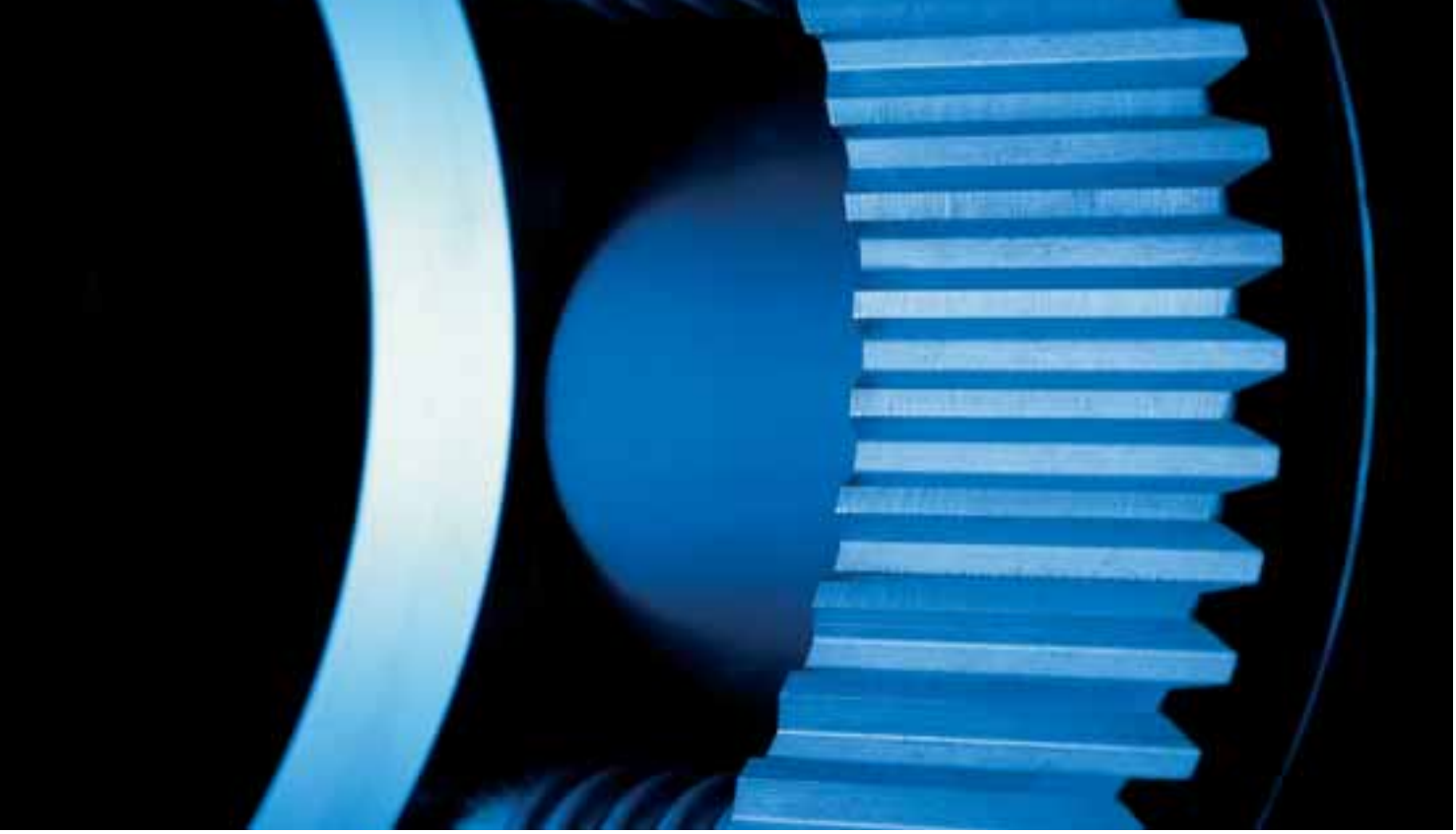
INTORQ BFK468

The new performance standard 100 – 2400 Nm

INTORQ

setting the standard

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

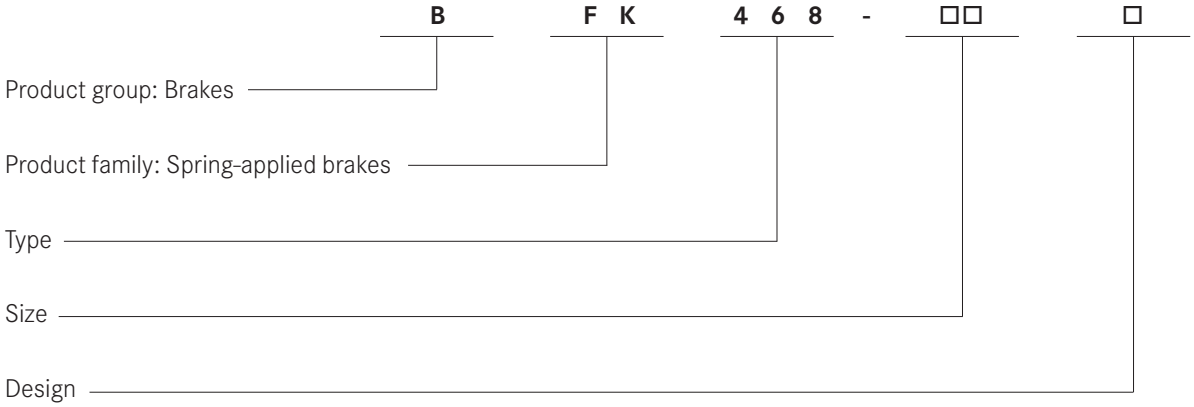
Contents

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

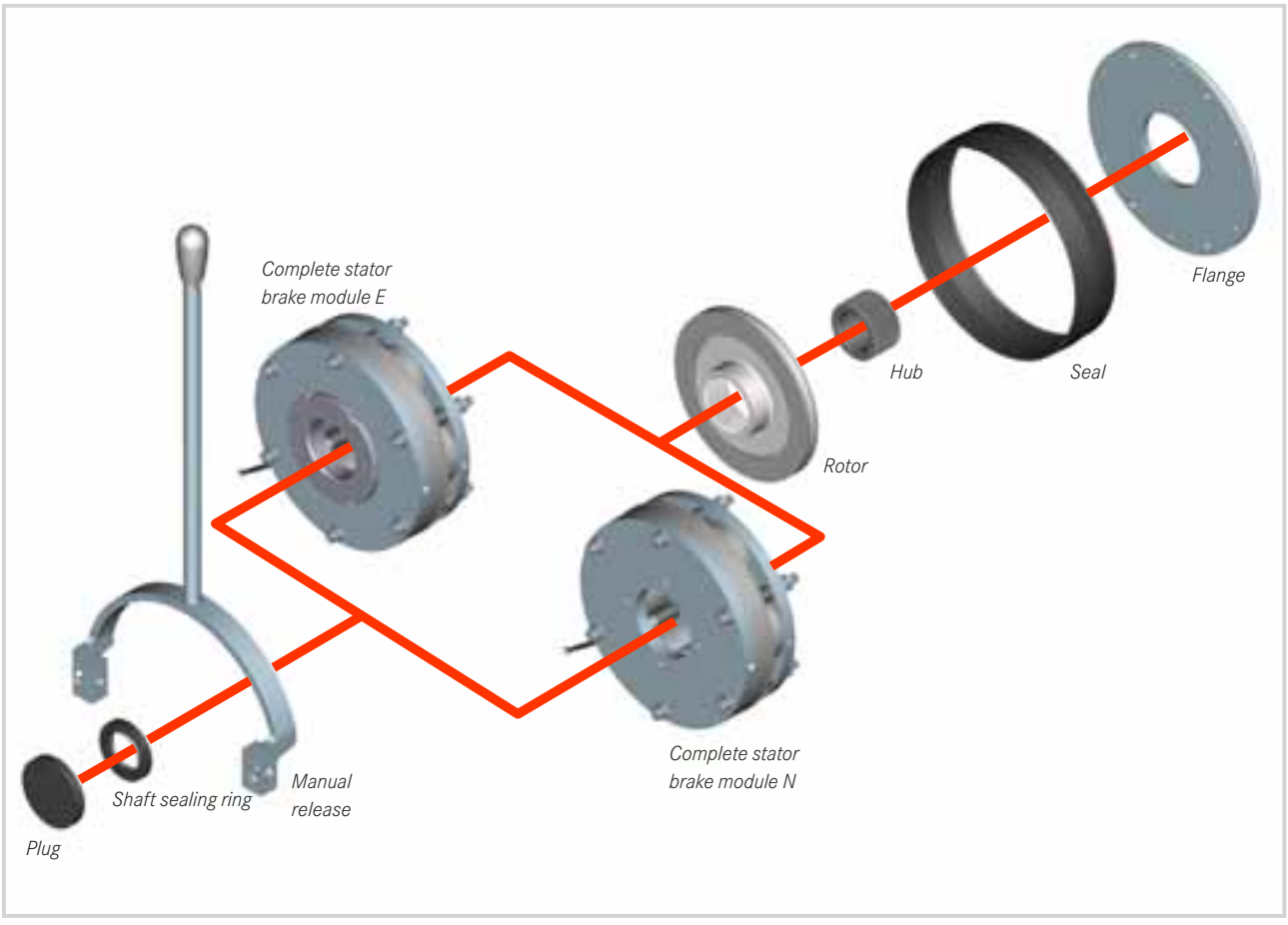
18, 20, 25, 31

Stator design

E – Adjustable (braking torque can be reduced using torque adjustment ring)

N – Non-adjustable

Not included:
Supply voltage, hub bore, options



List of abbreviations

P	[kW]	Drive motor power
P_{max}	[W]	Maximum power when releasing the brake with overexcitation
P_{20}	[W]	Coil power at 20 °C in continuous operation with holding current derating
M_K	[Nm]	Characteristic torque of brake
Δn_0	[min^{-1}]	Initial relative speed of the brake
t_1	[s]	Engagement time, $t_1 = t_{11} + t_{12}$
t_2	[s]	Disengagement time (time from the beginning of the torque drop until 0.1 M_K is reached)
t_3	[s]	Slipping time (time during which a relative movement occurs between drive and output with brake applied)
t_{11}	[s]	Delay time (time from disconnecting the voltage until the torque begins to rise)
t_{12}	[s]	Rise time of braking torque
Q_{perm}	[J]	Max. permissible friction energy per switching cycle
S_h	[h^{-1}]	Operating frequency, i. e. the number of periodical brake operations
S_{air}		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 fiction 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

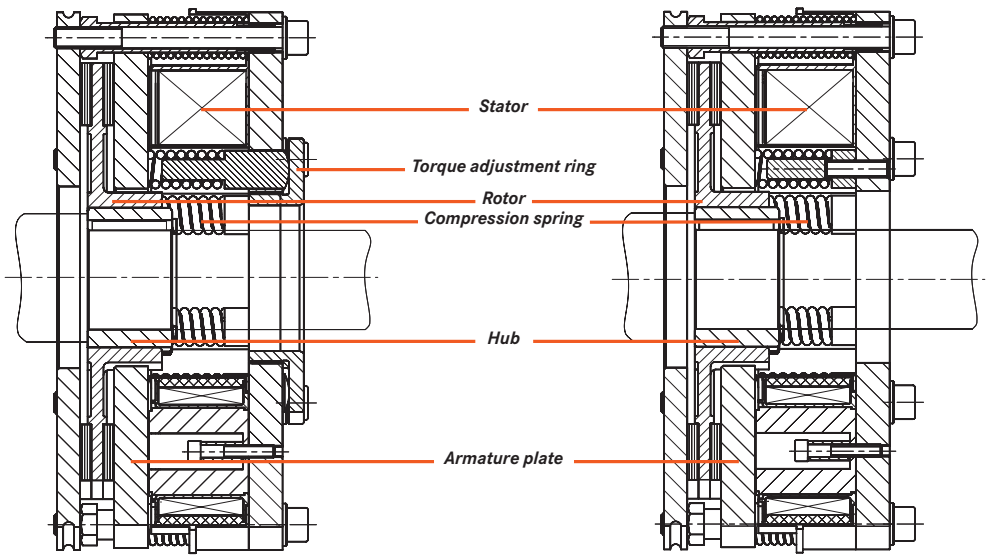
- Manual release for sizes 18–25, both directions can be used for release and mounting
- Noise-reduced designs
- Different types of corrosion protection and enclosures
- Microswitches used to monitor air gap and wear

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 $h_{1\,max}$ (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]
					230 N	16.5	
Rated torque [Nm] in relation to relative speed Δn = 100 min^{-1}	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
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°	130 N/E	6.4	230 N/E	9.9	350 N/E	8.2	960 N
	150 N/E	**3.2**	**260 N/E**	**9.9**	**400 N/E**	**8.2**	**1200 N**
	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 x s_{air})

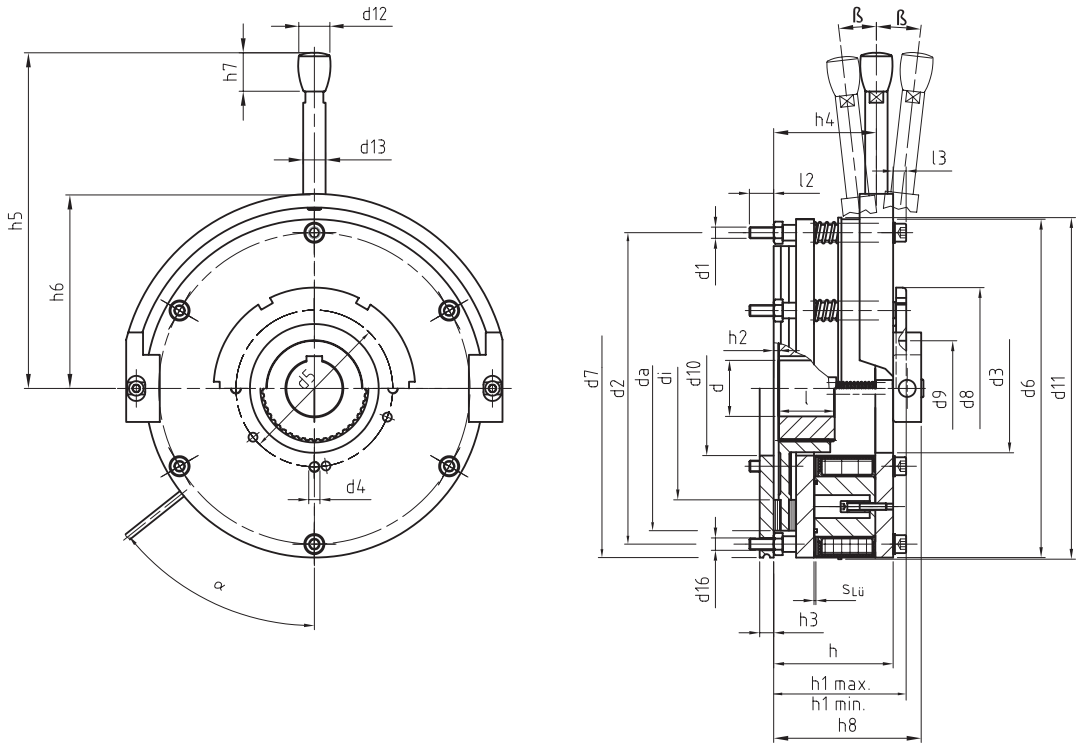
Service brake (s_{airmax} approx. 4.0 x s_{air})

Standard braking torque

Technical data

BFK468 with manual release and flange

Dimensions



Size	d_{H7} max.	d_1	d_2	d_3	d_4	d_5	d_6	d_7	d_8	d_9	d_{10}	d_{11}	d_{12}	d_{13}	d_i	d_a	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_1 min.	h_1 max.	h_2	h_3	h_4	h_5 max.	h_6	h_7	h_8	l	l_1	l_2	l_3	s_{air}	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_K: Rated torque of the brake in Nm at n = 100 rpm
- P_{20}: Coil power at 20 °C in W
- l_1: 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_{20} holding [W]	P_{20} releasing [W]	$s_{air\ max}$ to standard torque [mm]	$s_{air\ max}$ increased torque [mm]	max. adjustment [mm]	min.[2] rotor thickness [mm]	$J_{Alurotor}$ [kgcm^2]	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

[1] with holding current derating, possible deviation of up to + 10 % depending on supply voltage selected

[2] 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_0 [rpm]			Max. speed Δn_{0max} [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.

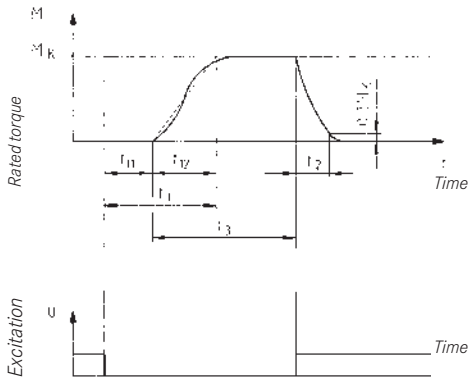
Technical data

Operating times

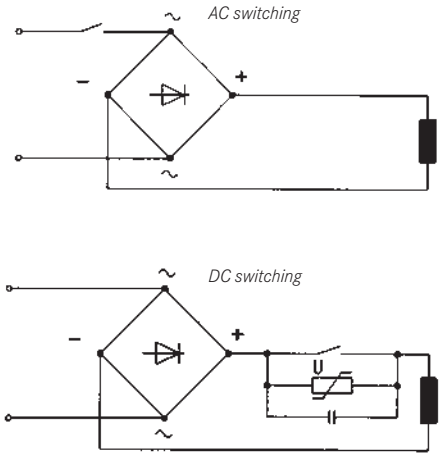
The listed operating times apply to DC switching with rated air gap s_{air}, a warm coil and standard rated torque. The times shown are mean values. The engagement time t_1 is approximately 5 times higher for AC switching.

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 Δn = 100 rpm M_K [1]	Maximum permissible switching energy with single operating Q_E	Transition operating frequency frequency $S_{hü}$	Operating times [ms] [2] at $S_{airRated}$ Switching on DC side			Disengagement
	[Nm]	[J]	[h^{-1}]	[t_{11}]	[t_{12}]	[t_1]	[t_2]
18	150	60.000	20				
20	260	80.000	19				
25	400	120.000	15				
31	1200	–	–				

[1] Minimum braking torque for run-in friction surfaces.
[2] Operating times valid for 205 V DC coils

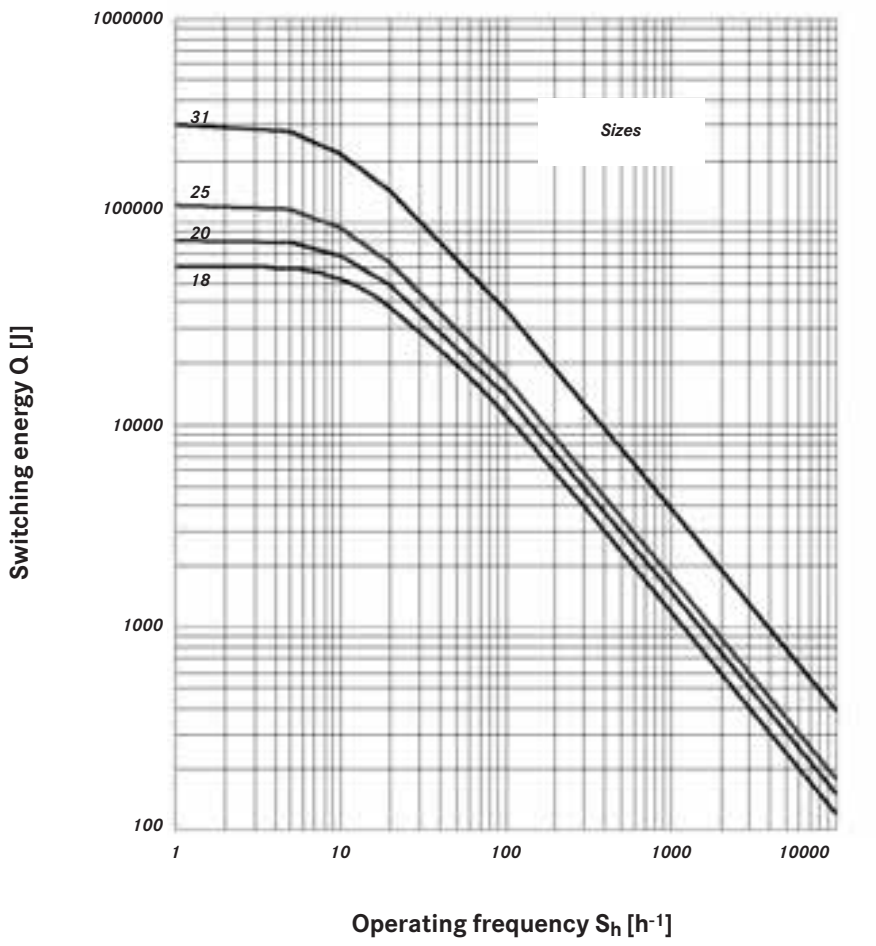
Technical data

Service life

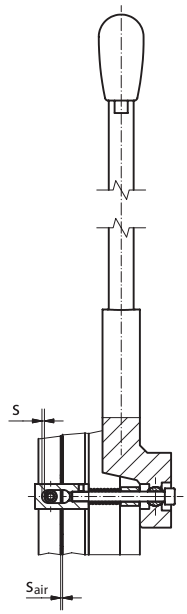
The brake has to be adjusted on reaching s_{airmax}. The required friction energy depends on various factors, namely the inertias to be braked, the shaft speed, the operating frequency and the resulting temperature on the friction surfaces.For these reasons, no general statement can be made about the 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

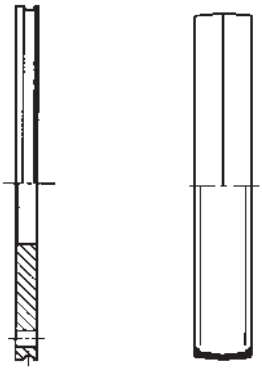
The manual release is used to release the brake by hand and can be retrofitted. The manual release springs back to its base position (0 setting) automatically after operation. The release screws are carried in ball joints and are only tensioned. The air gap "s" is the distance between the armature plate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

Size	s_{air} $^{+0.1}_{-0.05}$ [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

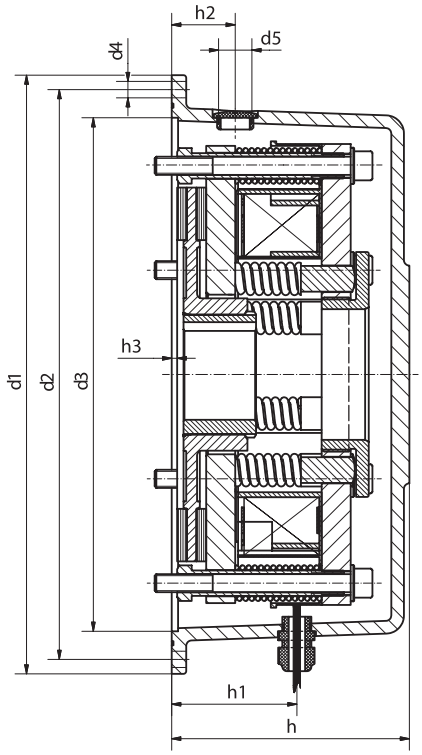
To a large extent, the seal prevents the exit or ingress of dust, humidity, dirt, etc., out of or into the braking area. The seal is inserted into the groove on the stator. If no suitable groove is available on the counter friction face, we recommend the use of a flange.

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_1	d_2	d_3 H8	d_4	d_5	h	h_1	h_2	h_3 [1]
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).

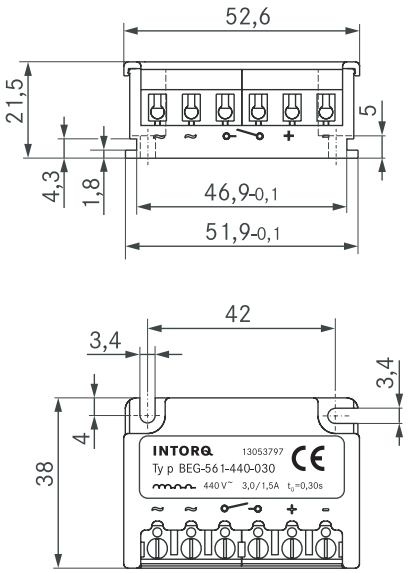
Bridge/half-wave rectifier

INTORQ

BEG-561-□□□-□□□

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

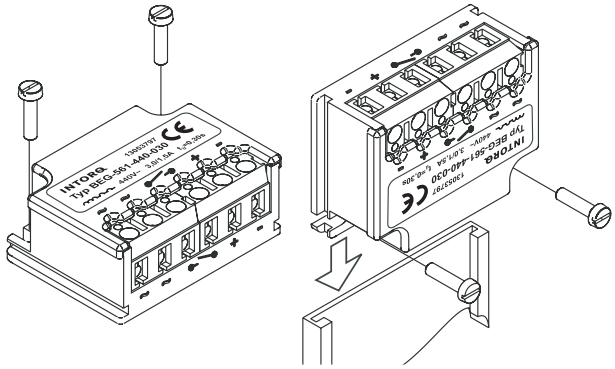
Rectifier type		Bridge/half-wave rectifier
Output voltage with bridge rectification		$0.9xU_1$
Output voltage with half-wave rectification		$0.45xU_1$
I_{max} with bridge rectification	[A]	3.0
I_{max} with half-wave rectification	[A]	1.0
Ambient temperature (storage/operation)	[°C]	-25...+70
U input voltage (40...60Hz)		

Type	Input voltage U_1 (40 Hz...60 Hz)			Overexcitation time $t_{ü}$ (±20%)		
	min. [V~]	rated [V~]	max. [V~]	at U_{1min} [s]	at U_{1rated} [s]	at U_{1max} [s]
BEG-561-255-030	160	230	255	0.430	0.300	0.270
BEG-561-255-130				1.870	1.300	1.170
BEG-561-440-006	230	400	440	0.110	0.060	0.060
BEG-561-440-030				0.500	0.300	0.270
BEG-561-440-130				2.300	1.300	1.200

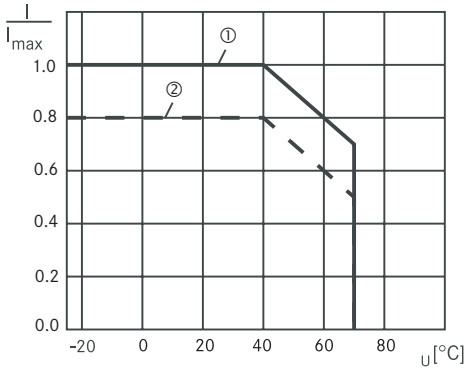
Bridge/half-wave rectifier

BEG-561-□□□-□□□

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.

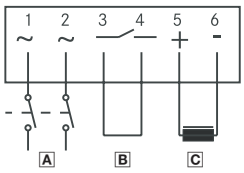
Coil voltage selection

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

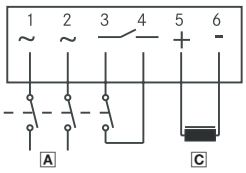
U_{Sp} = coil rated voltage U_1 = input voltage 840...60 Hz

Connection

Normal release times



Shortened release times



A Mains B Bridge C Coil

Available variants

INTORQ BFK468☐☐☐
Complete stator

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

Accessories

Rotor	☐ Standard ☐ Noise-reduced (rotor with sleeve)
Hub	_____ mm (for bore diameter, see Dimensions)
Fixing screw set	☐ For mounting onto the flange ☐ For mounting on the motor
Sealing	☐ Seal ☐ Shaft sealing ring (shaft diameter on request) ☐ Cap
Brake cover	☐ 18 ☐ 20 ☐ 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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