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INTORQ

setting the standard



BFK468 spring-applied brake

The Performance Standard

100 - 2,400 Nm

www.intorq.com

We set the standards

INTORQ stands for reliable brake solutions with the highest product standards. Whether in crane and lift systems, wind turbines, industrial trucks or brake motors, we offer you the right solutions for your drive – individual and safe.

The INTORQ module system with its broad range of different versions has set standards worldwide. We have a global presence, with sites in Shanghai, Atlanta and Pune. Our sales network and service are available for you locally, all across the world.

INTORQ at a glance

- Sales volume >55 million euros per year
- 800,000 units per year
- 13,000 square metres of production space
- 275 employees
- Market leader with 63 sales partners in 49 countries



INTORQ quality worldwide

We manufacture our products with the same processes and the same quality at all INTORQ sites. The basis for this is provided by our international production network. We can react flexibly in production thanks to our versatile assembly structure.

INTORQ test laboratory

The main focus in our development work is on the quality and safety of our brakes. Our products are thoroughly tested, and function-relevant values are continuously documented.

In Germany, we have the honour of being one of only three firms worldwide that are allowed to carry out online tests on behalf of the TÜV-SÜD/Deutschland inspection agency.

INTORQ logistics certified

Our approval as a “Known Consignor” carries the number DE/KC/0898-01. Our freight consignments now do not have to be checked at airports, so they can be delivered more quickly and more cost-effectively.

INTORQ is an AEO

An AEO is an authorised economic operator in the European Union who has been checked by the Customs Office and consequently enjoys certain privileges (simplified customs procedures, preferential treatment etc.). The AEO programme is recognised by numerous other countries (for example, the USA and China).

BFK468 spring-applied brake

High-power drives are achieving higher and higher motor speeds and drive torque levels. However, despite the increased performance requirements, the installation space allocated for brakes is actually getting smaller. The innovative multi-coil technology forms the basis for this performance class.

Properties

- Up to twice the braking torque in comparison with the BFK458
- Fixed or adjustable braking torque
- Fast operating times
- Long maintenance intervals thanks to large working air gap

Fields of application

- Brake motors
- Cranes
- Port facilities
- Stage machinery
- Storage technology
- Escalators



Stage machinery

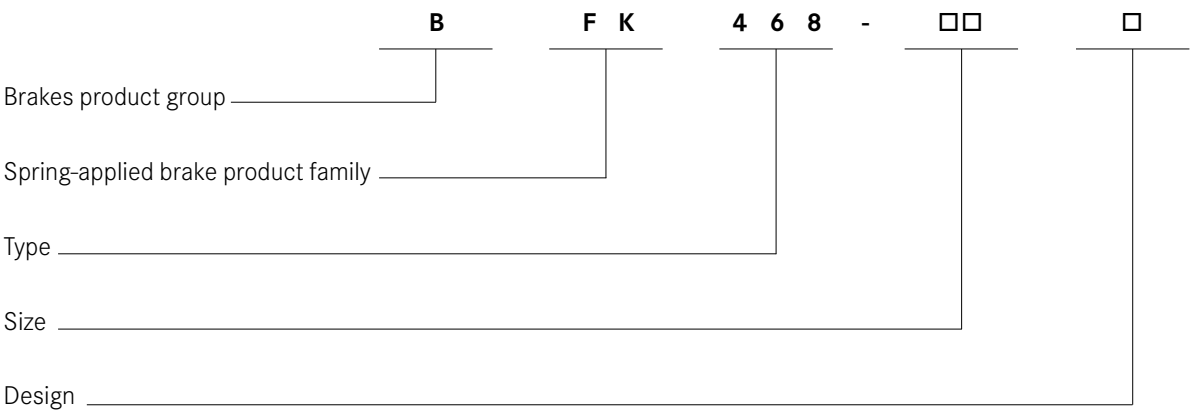


Cranes



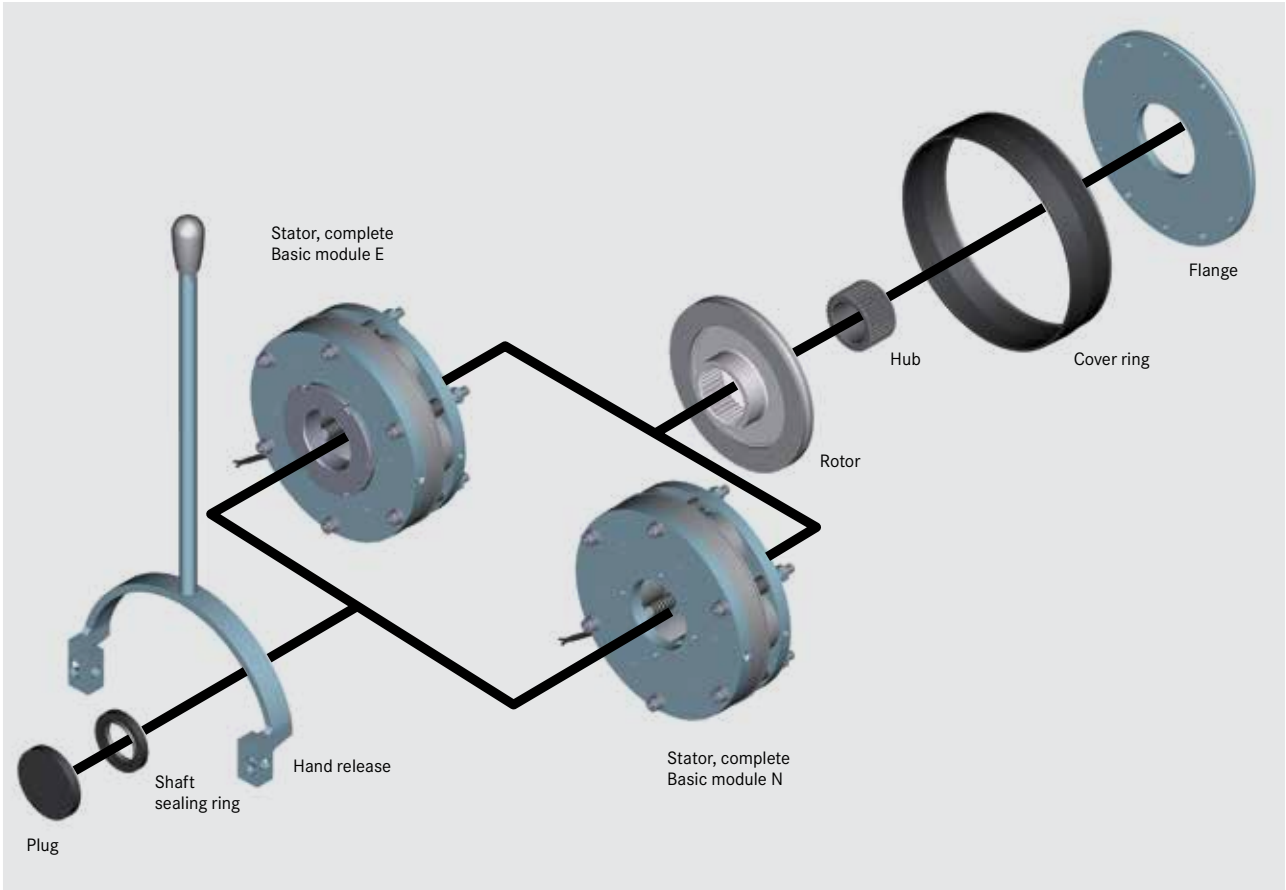
Port facilities

INTORQ BFK468- product key



Size
18, 20, 25, 31

Stator design
E – Adjustable (braking torque can be reduced using torque adjustment ring)
N – not adjustable



Modular system BFK468

Product information

A powerful and complete range

- 4 sizes
- Standard voltages 205/103 V, 360/180 V (release voltage/holding voltage)
- Torque ranges from 100 to 2,400 Nm

Versatile

- Modular structure for virtually all applications
- Connection compatible with the BFK458 range of brakes

Torque transmission

- Can be frictionally engaged during dry running
- Special machining of the friction surfaces ensures that the characteristic torques are already achieved after just a few switching operations
- Fixed bearing is not required on the brake

Durable

- The insulation system in line with temperature class F (155°C) ensures that the winding has a long service life
- The brakes are designed for 100 % duty time (with holding current reduction) with an INTORQ half-wave bridge rectifier

Quick and easy mounting

- Preset air gap

Low maintenance

- Long rotor/hub connection with low rate of wear and tried-and-tested involute gear
- Low-wear, asbestos-free friction lining comes as standard

Reliable

- The certified ISO 9001 and ISO 14001 quality assurance system provides the basis for consistently high-quality products
- Production and testing in accordance with VDE 0580

Options

- Manual release for sizes 18–25, release on both sides
- Noise-reduced designs
- Various types of corrosion protection and enclosures
- Air gap or wear monitoring via microswitch

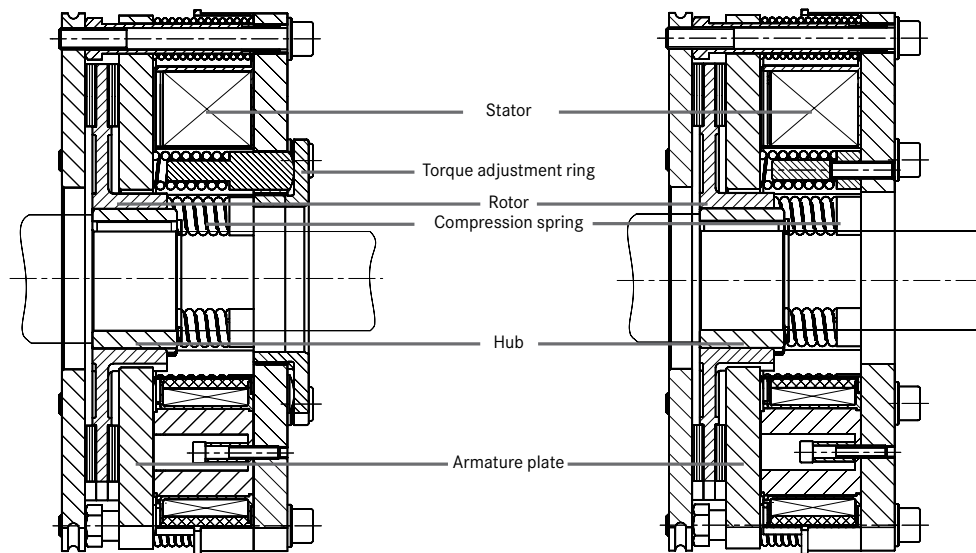
List of abbreviations

P_N	[W]	Rated coil power at rated voltage and 20°C	t₁	[s]	Engagement time, the sum of the delay time plus the braking torque rise time
U_N	[V DC]	Rated coil voltage			
M_K	[Nm]	Rated torque of the brake at a relative speed of 100 r/min	t₂	[s]	Disengagement time, time from switching the stator until the torque has reduced to 0.1 M _K
Δn₀	[r/min]	Initial relative speed of the brake	t₃	[s]	Slipping time, engagement time of the brake (after t ₁₁) to standstill
Q	[J]	Heat/energy	t₁₁	[s]	Delay time when connecting, time from disconnecting the voltage until the torque begins to rise
Q_E	[J]	Maximum permissible friction work per switching cycle, thermal rating of the brake	t₁₂	[s]	Rise time of rated torque, time from beginning of rise of torque until rated torque is reached
S_h	[1/h]	Operating frequency, the number of repeated operations per unit time	t_{ue}	[s]	Overexcitation time
S_{hmax}	[1/h]	Maximum permissible operating frequency, depending on the friction work per operation			
S_{hue}	[1/h]	Transitional operating frequency, thermal rating of the brake depending on the friction work per operation			
s_{LN}	[mm]	Rated air gap			
s_{HL}	[mm]	Hand-release air gap, setting dimension of hand-release			

Functional principle

Basic module E + rotor + hub + flange

Basic module N + rotor + hub + flange



INTORQ BFK468 spring-applied brakes are single-disk brakes with two friction surfaces. When deenergised, several compression springs are used to generate the braking torque through friction locking. The brake is released electromagnetically with holding-current reduction via an INTORQ half-wave bridge rectifier. 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, the air gap s_{LN} is present between the armature plate and the stator. A DC voltage is applied to the stator's coil 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. The DC voltage is then reduced to half by the accompanying switching device. Basic module E supports the use of the torque adjustment ring to reduce the braking torque.

Technical data

Characteristic torques


Basic modules E and N can be supplied in the torque ratings listed below. INTORQ brakes are designed in such a way that the stated characteristic torque levels can generally be securely achieved following a brief running-in period. However, deviations from the stated braking torques can occur due to the fluctuating properties of the organic friction linings used and changing environmental conditions. These must be taken into account by means of corresponding safety measures during the design phase. Increased breakaway torques can occur after long downtimes, particularly in humid environments or areas subject to


changes in temperature. The braking torque should always be checked when using the brake on customers' friction surfaces. If the brake is to be used purely as a holding brake without any dynamic load, the friction lining needs to be reactivated at regular intervals. On basic module E, the braking torque can be reduced using the torque adjustment ring included in the stator. However, the torque adjustment ring may only be unscrewed up to the limit h_{1max} . It is important to note that the engagement and disengagement times vary, depending on the braking torque being used.


Size	18		20		25		31
	Rated torque	Torque reduction E per detent	Rated torque	Torque reduction E per detent	Rated torque	Torque reduction E per detent	Rated torque
	[Nm]	[Nm]	[Nm]	[Nm]	[Nm]	[Nm]	[Nm]
Rated torques, with reference to the relative speed $\Delta n = 100$ rpm Depending on the rated torque (spring configuration), the angle of rotation for the braking torque reduction on basic module E can be 60°; 120° or 180°					230 N		
	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
	150 N/E	3.2	260 N/E	9.9	400 N/E	8.2	1,200 N
	165 N/E	3.2	300 N/E	19.8	445 N/E	16.5	1,440 N
	185 N/E	6.4	345 N/E	19.8	490 N/E	8.2	1,680 N
	200 N/E	6.4	400 N/E	19.8	520 N/E	16.5	1,920 N
	235 N/E	6.4	440 N/E	19.8	600 N/E	16.5	2,160 N
	265 N/E	6.4	480 N/E	19.8	700 N/E	16.5	2,400 N
	300 N/E	6.4	520 N/E	19.8	800 N/E	16.5	

N ... Braking torque for the N model (without torque adjustment ring)

E ... Braking torque for the E model (with torque adjustment ring)

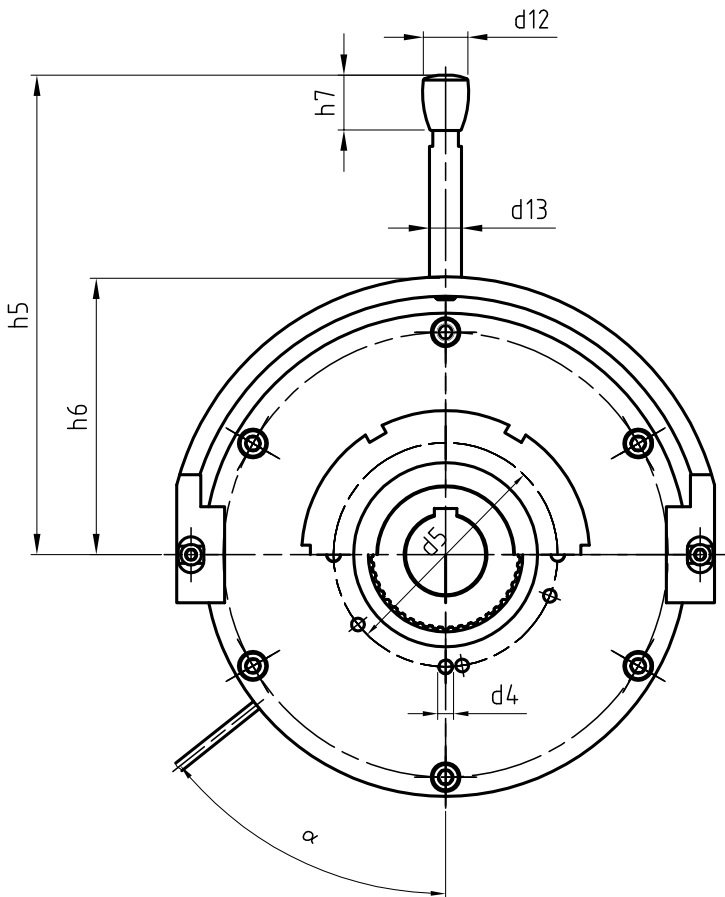
 Holding brake with emergency stop operation
(s_{Lmax} approximately $2.0 \times s_{LN}$)

 Service brake
(s_{Lmax} approximately $4.0 \times s_{LN}$)

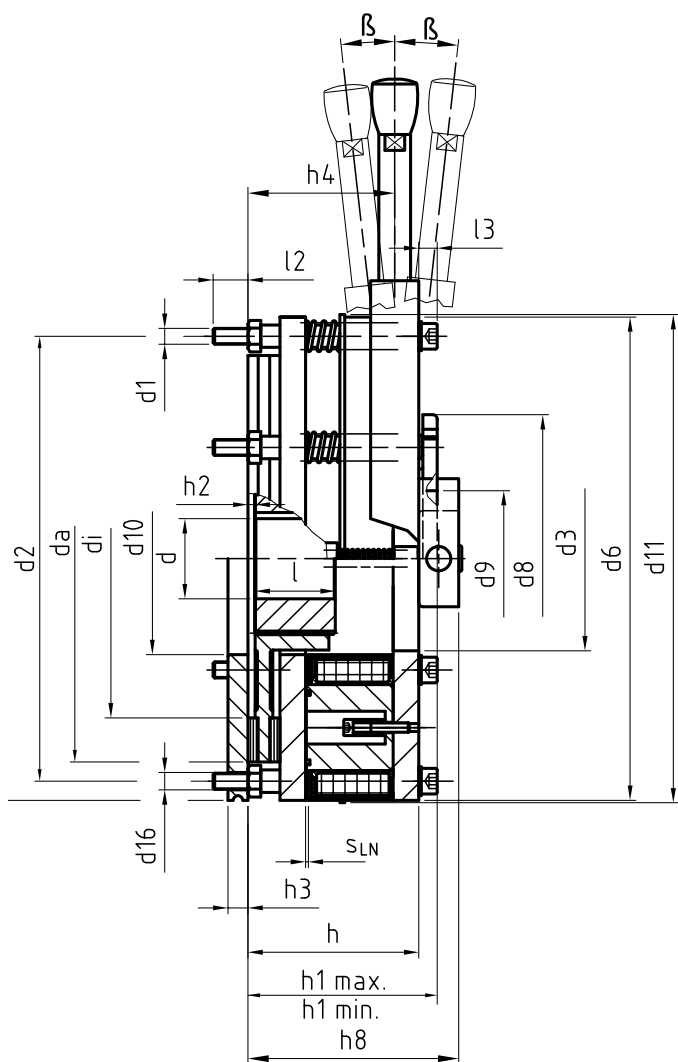
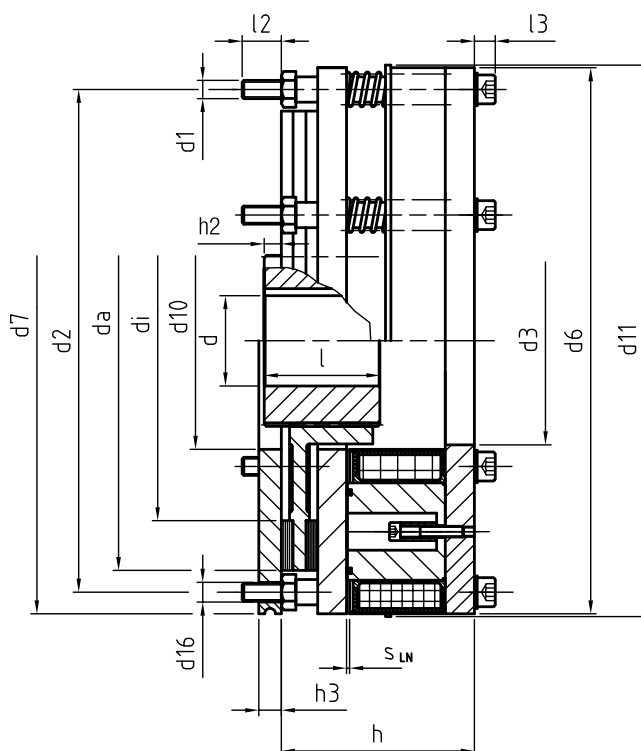
 Standard braking torque

Technical data

Dimensions



Size	d ^{H7}	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 ₁₆	d _i	d _a
18	30/35/40/45	6 x M8	196	75	4 x M8	95	217	217	116	62	77	220	24	14	6 x 9	129	174
20	35/40/45/50	6 x M10	230	85	4 x M10	110	254	254	135	72	90	257	36	20	6 x 11	148	206
25	40/45/50/55/60/65/70**	6 x M10	278	115	4 x M10	140	302	302	180	85	120	305	36	25	6 x 11	199	254
31	80	8 x M16	360	150	4 x M16*	200	390	390	-	-	150	-	-	-	8 x 17	243	330

Sizes 18-25

Size 31


Size	h	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 _{LN}	α	β
18	83,1	89,1	96,5	3	11	70,6	385	128	34	108,1	35	600	15,3	9,6	0,4	54°	8°
20	95,6	105,6	111,6	3,5	11	80,6	650	150	69	120,6	40	600	12,4	12	0,4	54°	8°
25	110,7	121,7	131,7	4,5	12,5	95,7	1045	173,5	69	135,7	50	600	17,3	12	0,5	51,5°	6,5°
31	149	-	-	10	10	Manual release not available					70	600	33	24	0,5	5°	-

■ d_{H7}: Hubs with a keyway as per DIN 6885/1-P9 can only be used for the stated bore diameter (d) up to the max. standard braking torque. Shaft-hub joint designs for higher levels of braking torque must first be clarified with the manufacturer.

■ Standard keyway as per DIN 6885/1-P9

■ * 4xM16, rotated through 45° for display purposes

■ ** Ø 70 mm, keyway as per DIN 6885/3P9

■ l₁: Length of the connection cable

■ m: Mass in kg

■ All dimensions in mm

Technical data

Rated data

Size	P ₂₀ ¹⁾ Hold ²⁾	P ₂₀ Release ²⁾	S _L max Up to standard torque [mm]	S _L max Increased torque [mm]	Max. adjustment [mm]	Min. ³⁾ rotor thickness [mm]	Aluminium rotor [kgcm ²]	Mass of brake cpl. [kg]	Mass of stator cpl. [kg]
18	85	340	1,5	1,0	3,0	10,0	29	19	14,9
20	102	408	1,5	1,0	4,0	12,0	73	32	22,8
25	132	528	1,8	1,2	4,5	15,5	200	50	38,6
31	230	920	2	1,5	3	15	457	85,3	68,8

■ P₂₀: Coil power at 20 °C in W

■ ¹⁾ With holding-current reduction

■ ²⁾ Deviation of up to + 10%, depending on the voltage selected

■ ³⁾ The friction lining is dimensioned in such a way that the brake can be readjusted at least two times

Braking torques based on speed and permissible limiting speeds

Size	Reference value rated torque at Δn = 100 min ⁻¹ [%]	Braking torque at Δn ₀ [rpm]			Max. speed Δn _{0max} [rpm]
		1,500 [%]	3,000 [%]	Max. [%]	
18	100	77	70	66	4.400
20	100	75	68	66	3.700
25	100	73	66	66	3.000
31	100	69	—	65	2.300

■ As speed increases, so does wear



Whenever and wherever cranes move, INTORQ brakes ensure secure braking and precise stops

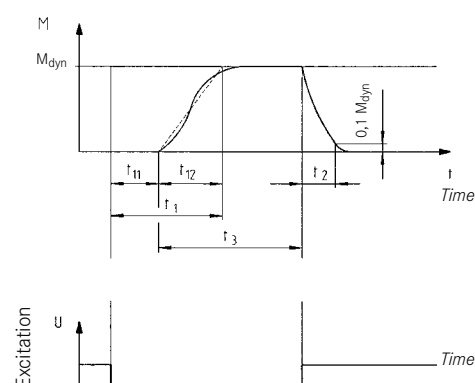


Operating times

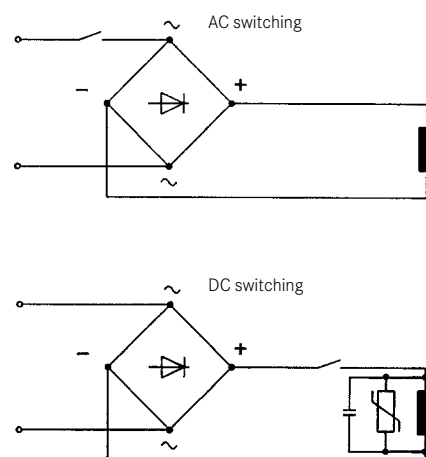
The operating times listed are guide values for DC switching, rated air gap s_{LN} , warm coil and standard rated torque. The operating times stated are subject to a certain degree of variance. When using AC switching, the

engagement time t_1 is extended by approximately a factor of 5. When using inching mode beyond the overexcitation time of the half-wave bridge rectifier, the engagement time t_1 is also extended.

Torque time characteristic dependent on excitation voltage



t_{11} = Delay time on engagement
 t_{12} = Rise time of the braking torque
 t_1 = Engagement time
 t_2 = Disengagement time
 t_3 = Slipping time



Size	Braking torque rated value for $\Delta n = 100 \text{ min}^{-1}$ M_K	Maximally permissible friction energy for one-time operation Q_E	Transitional operating frequency S_{hue}	Operating times [ms] ¹⁾ at s_{LN} Engagement on the DC side				Release
	[Nm]	[J]	[1/h]	[t_{11}]	[t_{12}]	[t_1]	[t_2]	
18	150	60.000	20	26	30	56	70	
20	260	80.000	19	56	112	168	106	
25	400	120.000	15	62	135	197	120	
31	1200	300.000	13	65	133	198	250	

¹⁾ Operating times valid for 205 V DC coils

Technical data

Service life and wear

The friction energy to be expended before the brake needs to be readjusted when reaching s_{Lmax} depends on various factors, in particular the masses to be braked, the braking speed, the operating frequency and the resulting temperature on the friction linings. As such, it is impossible to state any general values for all operating conditions regarding the friction energy that is expended before readjustment becomes necessary.

Vertical installation also generally generates increased wear.

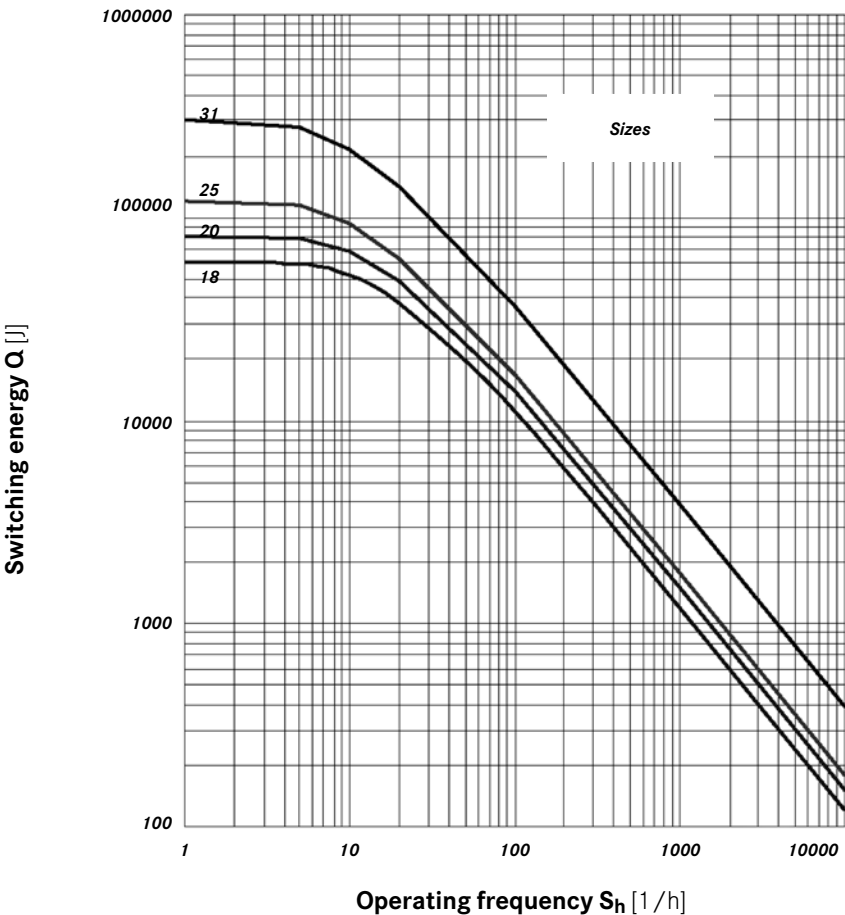
The BFK468 can be readjusted when the maximum permitted working air gap (s_{Lmax}) is reached. The dimensioning of the friction lining allows it to be readjusted at least two times.

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 reversals. Endurance-optimised solutions are available in cases where a longer service life is required (consult the manufacturer).

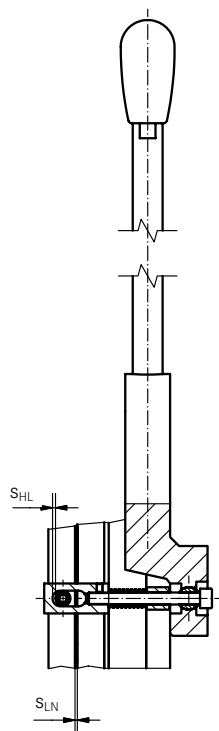
Maintenance

Brakes are components which are subject to a great deal of wear. When installing the brake, it is vital to ensure 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 based on operating frequency S_h



Accessories



Manual release

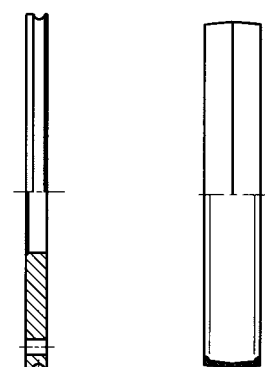
Manual release

The manual release is used to manually release the brake and can also be retrofitted. After being actuated, it automatically springs back into its original position (0-position). The release screws used at the centre of rotation are only subject to tensile loading. The distance s_{HL} must always be set very carefully during installation of the manual releases:

Size	$s_{LN} \begin{smallmatrix} +0.1 \\ -0.05 \end{smallmatrix}$ [mm]	$s_{HL} \begin{smallmatrix} +0.1 \\ -0.1 \end{smallmatrix}$ [mm]
18	0.4	2
20	0.4	2
25	0.5	2.5
31	–	–

Caution:

For safety reasons, the readjustment of the air gap when the mass s_{Lmax} has been reached must also be performed when using reduced rated torque.



Flange

Seal

Flange

A flange can be used if no suitable counter friction face is available. The flange can also be fitted with a seal.

Cover ring

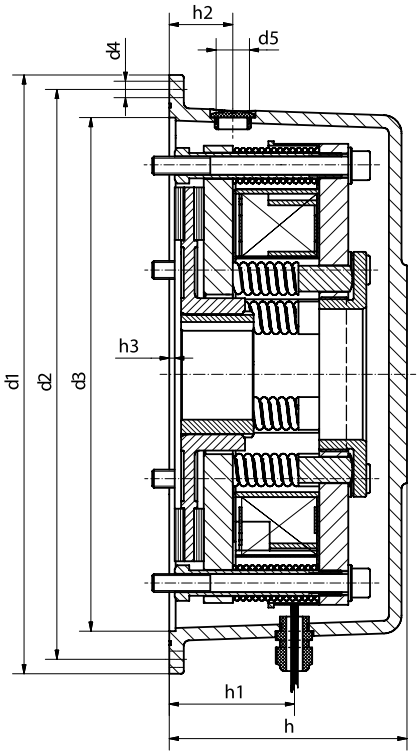
The seal largely prevents any dust, humidity and dirt from getting out of or into the braking area. The seal is inserted into the groove provided on the stator. If no suitable groove is available on the counter friction face, we recommend the use of a flange.

Accessories

Brake cover

Basic module E, N + cover = encapsulated model

A brake cover can be fitted to basic module E and basic module N to protect the brake from water and dust (IP65 protection). However, the cover cannot be combined with a 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	4 x 6.6	M20 x 1.5	115	60	29	3
20	330	314	283	4 x 9	M20 x 1.5	131	69	35	3
25	390	368	328	4 x 9	M20 x 1.5	142	78	40	3

¹⁾ Recommended recess length on motor end shield

Microswitch

The brake can be fitted with a microswitch for the purpose of monitoring the release or wear. The microswitch can be built into the circuit as a normally open or a normally closed contact.

Half-wave bridge rectifier

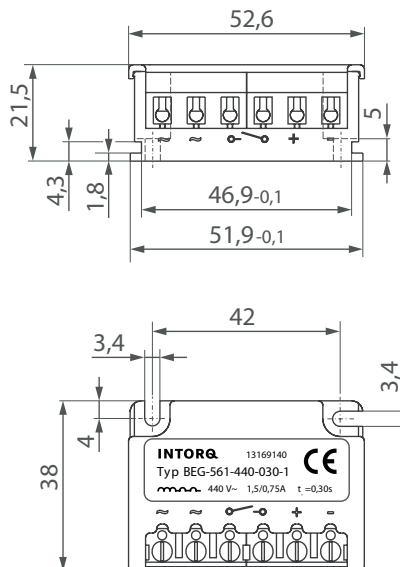
BEG-561-□□□-□□□

The BFK468 models may only be operated with a half-wave bridge rectifier.

The half-wave bridge rectifiers switch from bridge rectification to half-wave rectification after a fixed overexcitation time. Terminals 3 and 4 are connected to the brake's DC circuit, while the induced voltage peak during DC operation (please refer to the circuit diagram entitled "Abbreviated switch-off times") is limited by an integrated overvoltage protection on terminals 5 and 6.



Dimensions



Technical data

Rectifier type	Forced voltage rectifier
Output voltage with bridge rectification	$0.9 \times U_1$
Output voltage with half-wave rectification	$0.45 \times U_1$
Ambient temperature (storage/operation) [°C]	-25 to +70

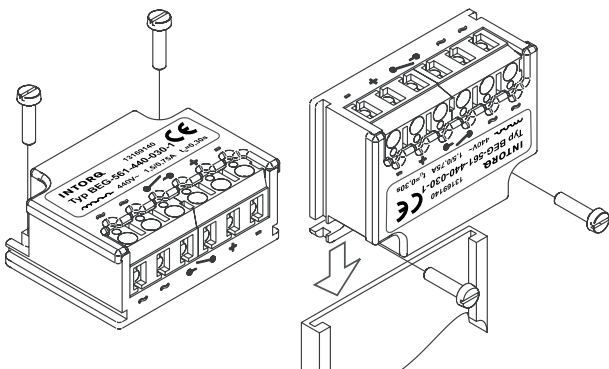
U_1 = Input voltage (40 to 60 Hz)

Type	Input voltage U_1 (40 Hz...60 Hz)			Max. current $I_{Max.}$		Overexcitation time t_{ue} ($\pm 20\%$)		
	Min. [V~]	Rated [V~]	Max. [V~]	Bridge [A]	Half-wave [A]	At U_{rpm} [s]	At U_{1Rated} [s]	At U_{1max} [s]
BEG-561-255-030	160	230	255	3.0	1.5	0.430	0.300	0.270
BEG-561-255-130				3.0	1.5	1.870	1.300	1.170
BEG-561-440-030-1	230	400	440	1.5	0.75	0.500	0.300	0.270
BEG-561-440-130				3.0	1.5	2.300	1.300	1.200

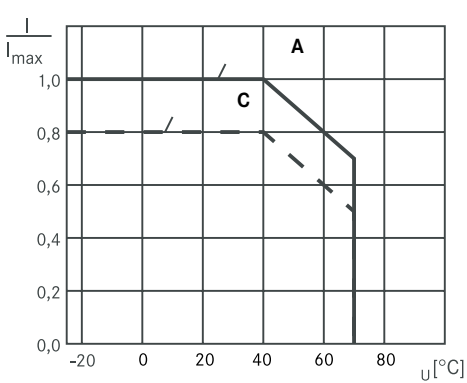
Half-wave bridge rectifier

BEG-561-□□□-□□□

Fastening options



Permissible current load – ambient temperature



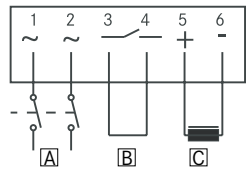
A For screw-on installation with metal surface (good heat dissipation)
C For other installation (e.g. adhesive)

Abbreviated switch-off times

When using DC-side operation (abbreviated switch-off times), the AC-side must also be operated! Otherwise there will not be any overexcitation when switching back on.

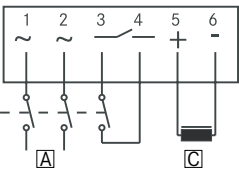
Connection

AC-side
switch-off times



A Mains **B** Bridge **C** Coil

DC-side
switch-off times



Assignment of the the half-wave bridge rectifiers to the brake size

Brakes type	Rectifiers type	Connection voltage [V AC]	Coil voltage release/hold [V DC]
BFK468-18	BEG-561-255-030	230 +10%	205/103
BFK468-20	BEG-561-255-130		
BFK468-25	BEG-561-440-030-1	400 +10%	360/180
BFK468-18	BEG-561-440-030-1		
BFK468-20	BEG-561-440-030-1		
BFK468-25	BEG-561-440-130		
BFK468-31			



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 special damping elements, which are installed between the pole face and the armature plate as shock absorbers.

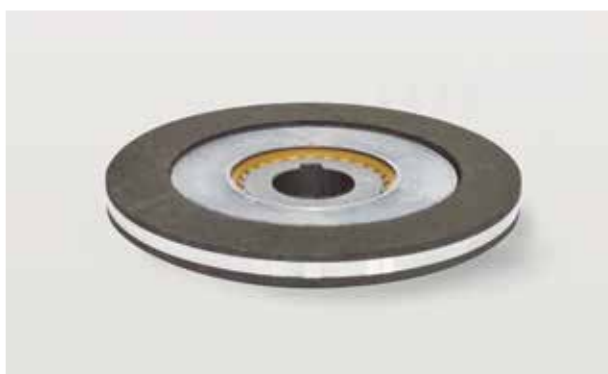
2. Noise-reduced aluminium rotor

The rotor with plastic sleeve reduces the rattling noises in the rotor/hub connection. At the same time, this increases the service life of this connection.

Features and advantages

- Low rate of wear between rotor and hub
- Recommended for frequency inverter operation
- Noise-reduced design
- Also available in combination with CCV

With size 31, noise is minimised through use of an O-ring between the rotor and hub.



Product overview

INTORQ BFK468-□□□

Stator, complete

Size	<input type="checkbox"/> 18	<input type="checkbox"/> 20	<input type="checkbox"/> 25	<input type="checkbox"/> 31
Model	<input type="checkbox"/> E (with torque adjustment ring, sizes 18, 20, 25) <input type="checkbox"/> N (without torque adjustment ring)			
Brake voltage	<input type="checkbox"/> 205 V/103 V DC for supply voltage of 230 V AC (not available for size 31) <input type="checkbox"/> 360 V/180 V DC for supply voltage of 400 V AC			
Braking torque	Nm (see torque ratings)			
Cable length	<input type="checkbox"/> Standard (from 100 mm to 1,000 mm in 100-mm steps, from 1,000 mm to 2,500 mm in 250-mm steps)			
Manual release fitted	<input type="checkbox"/> (not available for size 31)			
Armature plate	<input type="checkbox"/> Standard	<input type="checkbox"/> Hard-chrome plated		
Counter friction face	<input type="checkbox"/> Flange	<input type="checkbox"/> Hard-chrome plated flange		
Microswitch	<input type="checkbox"/> Monitoring operation (release control) <input type="checkbox"/> Wear monitor			
Operating noise	<input type="checkbox"/> Reduced			

Accessories

Rotor	<input type="checkbox"/> Standard	<input type="checkbox"/> Noise-reduced (rotor with sleeve)
Hub	(Please refer to the dimensions for details on bore diameters)	
Set of fixing screws	<input type="checkbox"/> For fitting to the flange/motor <input type="checkbox"/> For fitting to the flange with through holes	
Sealing	<input type="checkbox"/> Seal (not available for size 31) <input type="checkbox"/> Shaft seal (shaft diameters on request, not available for size 31) <input type="checkbox"/> Cap (not available for size 31)	
Brake cover	<input type="checkbox"/> 18	<input type="checkbox"/> 20 <input type="checkbox"/> 25

Electrical accessories

Half-wave bridge rectifier	<input type="checkbox"/> BEG-561-255-030	<input type="checkbox"/> BEG-561-255-130
	<input type="checkbox"/> BEG-561-440-030-1	<input type="checkbox"/> BEG-561-440-130

Service and sales, 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), Atlanta (USA) and Pune (India).

In addition to this, we work with a global network of local trading partners and cooperate with Lenze's global sales organisation. Please send service requests directly to your local sales partner or to our HQ in Aerzen, Germany:

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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.com



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