KENDRION

INTORQ

POWERED BY KENDRION

BFK 470 spring-applied brake

The IP66 modular system

2 – 370 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).

BFK470 – for harsh operating conditions

With the BFK470, the INTORQ product portfolio now offers a modular series of spring-applied brakes sealed by an IP66 enclosure. This new series was developed for operating conditions that require a high level of ingress protection against dust and/or dampness.

The BFK470 comes in 7 sizes from 2 – 370 Nm. As a self-contained system, it is predestined for use in wind turbines and cranes. This brake can also be used in extreme ambient temperatures.

The modular system

Our modular solutions are unique in the market, and they have been put to successful use for decades. The BFK470 also comes with a guarantee of maximum flexibility and fast worldwide availability.

Features

- Enclosure complies with IP66, also available with hand-release
- Mountable rotary traducer (optional)
- Can be used in temperatures up to minus 40°C (Cold Climate Version, CCV)
- Inductive proximity sensor for function monitoring
- Increased maximum torques and long life cycle through the refined mechanical structure
- Compatible with corrosion protection class C4 or C5

Fields of application

- Brake motors
- Wind turbines
- Car wash systems
- Cranes
- Hoists
- Textile machines

INTORQ BFK470-□□ product key

B F K 4 7 0 - □□

Brakes product group

Spring-applied brake product family

Type

Size

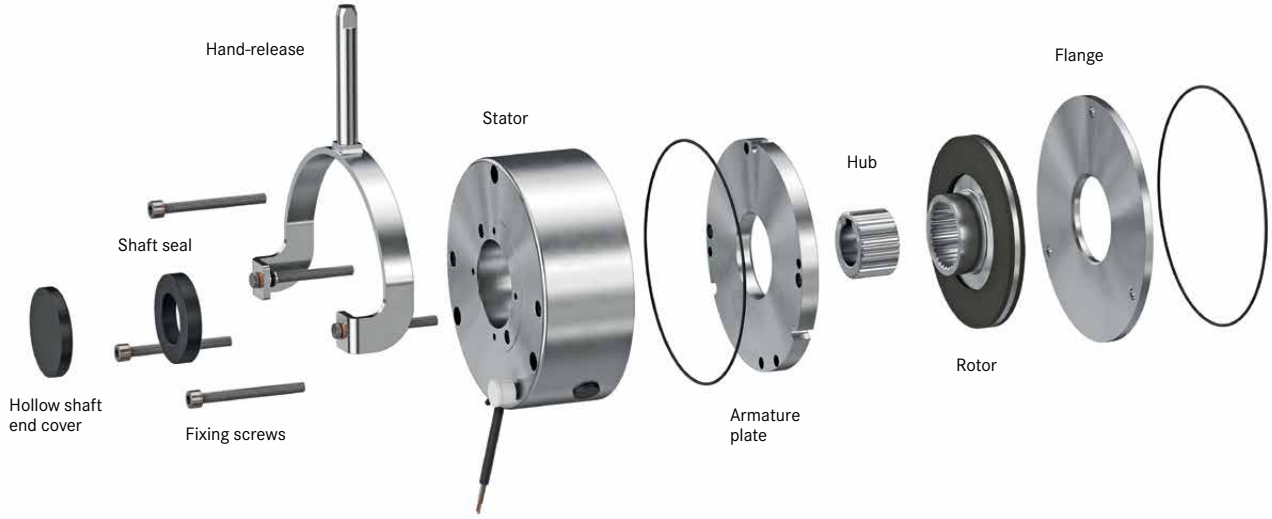
Sizes

06, 08, 10, 12, 14, 16, 18

Certificates

INTORQ 155-1

E318895



List of abbreviations

P_N	[W]	Rated coil power at rated voltage and 20°C
U_N	[V DC]	Rated coil voltage
M_{dyn}	[Nm]	Dynamic brake torque, measured at constant speed of rotation
M_K	[Nm]	Rated torque of the brake, at a relative speed of 100 r/min
Δn_0	[r/min]	Initial relative speed of the brake
Q	[J]	Heat/energy
Q_E	[J]	Maximum permissible friction work per switching cycle, thermal rating of the brake
Q_{smax}	[J]	maximum permissible friction work during cyclic switching, depending on the operating frequency
S_h	[1/h]	Operating frequency, the number of repeated operations per unit time
S_{hmax}	[1/h]	Maximum permissible operating frequency, depending on the friction work per operation
s_{LN}	[mm]	Rated air gap
s_{Lmax}	[mm]	Maximum air gap
t_1	[s]	Engagement time, the total of the reaction delay and torque rise time $t_1 = t_{11} + t_{12}$
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

Product information

Powerful portfolio
- 7 sizes
- Standard voltages [V DC] 24, 103, 180, 205
- Graduated torque range from 2 - 370 Nm
- Enclosure complies with up to IP66

Torque transmission
- Friction locking in dry running

Fast and easy mounting
- Air gap preset
- Rated torques are achieved after only a few switching cycles, thanks to special machining of the friction surfaces
- Fixed bearing is not required on the brake

Mechanical design
- Insulation system complies with temperature class F (155 °C) and ensures that the winding has a long service life
- The brakes are designed for 100 % duty cycle
- Long, low-wear rotor-hub connection with tried and tested involute gear
- Low-wear, asbestos-free, solvent-free friction linings

Options
- Hand-release complying with IP66 enclosure for manual release over all sizes, release is possible in both directions
- Noise-reduced rotor
- Function monitoring through inductive proximity sensor complying with IP66, ambient temperature range: -25°C to +120°C (available from size 12)
- Non-standard voltages and bores on request
- Pulse width modulation (PWM)
  Partial discharge free brake has been developed for operation with the pulse width modulated DC bus voltage of a frequency inverter
  Rated coil voltage U_N=103V DC

Temperature-resistant up to minus 40˚C
- CCV (Cold Climate Version) optional
- Option for inductive proximity sensor:
  Information evaluation only for range -25°C to +120°C

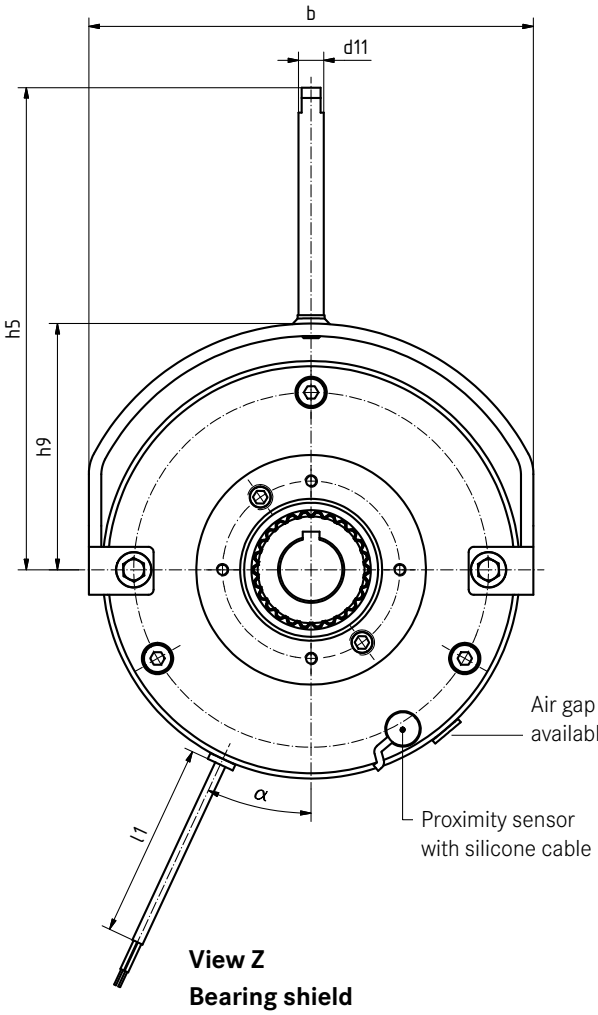
Corrosion protection up to class C5
- Ready for coating, in accordance with norm EN ISO 12944
- Corrosion protection class C4 or C5, depending on the coating system used

BFK470 with shaft seal

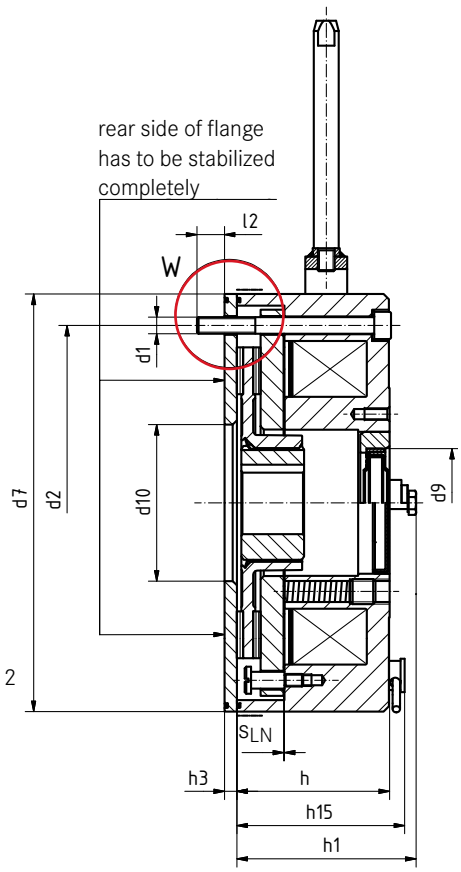
BFK470 with hand-release

Technical data

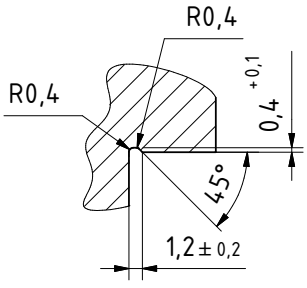
BFK470 spring-applied brake



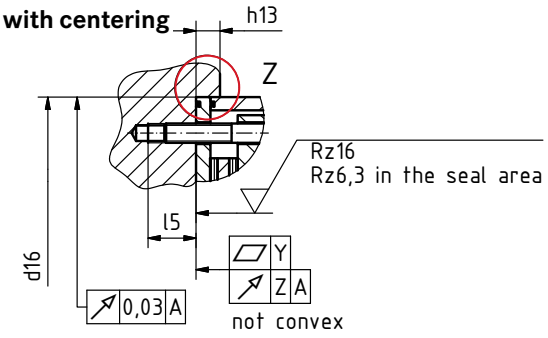
Brake with flange



View Z
Bearing shield



View W
with centering



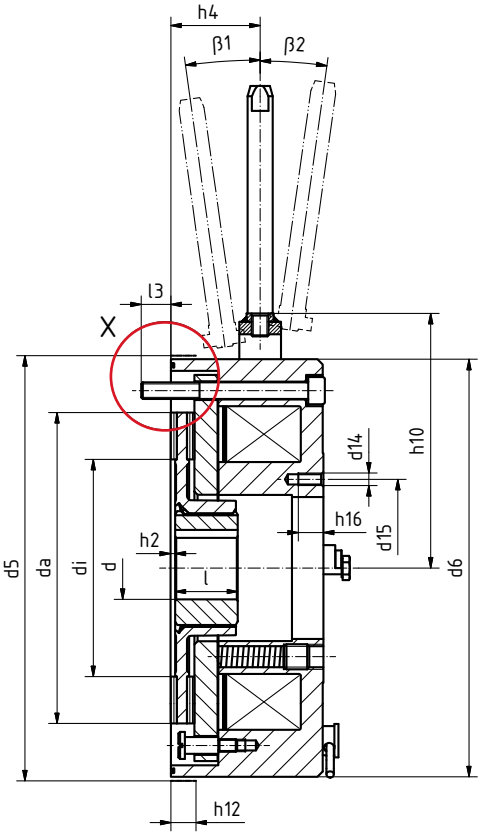
Size	b	d^{J7} 1) spec.	d^{H7} 2) standard	d_1	d_2	d_3	d_4	d_5^{h7}	d_6	$d_{7(-0,2/-0,3)}$	d_9	d_{10}	d_{11}	d_{14}	d_{15}	d_{16}^{H8}	d_{17}^{H8}	d_{18}^{h8}	d_{19}	d_i	d_a	h	h_1
06	95	10	10/11/12/14/15	3xM4	72	24 H8	48	89	89	89	-	31	8	4xM4	37,7	89	35	89	94	40	60	39	45,2
08	112	10	10/11/12/14/15/16/17/18/19/20	3xM5	90	32 H8	58	106	106	106	-	42	8	4xM5	49	106	42	106	111	56,1	76,5	43	50
10	137	10	10/11/12/14/15/16/17/18/19/20	3xM6	112	42 H8	68	130	130	130	-	44	10	4xM5	54	130	44	130	136	66,1	95	51,2	59,35
12	157	14	14/15/18/20/22/24/25	3xM6	132	52 H7	82	148	148	148	-	52	12	4xM5	64	148	55	148	154	70,1	115	57,2	65,4
14	179	14	20/22/24/25/28/30	3xM8	145	60 H7	100	168	168	168	52	64	12	4xM6	75	168	70	168	175	80	124	67,1	75,3
16	213	15	22/25/28/30/32/35	3xM8	170	68 H7	110	200	200	200	52	74	12	4xM6	85	200	75	200	208	104	149	73,1	85,8
18	243	20	25/28/30/32/35/38/40/42/45	6xM8	196	75 H7	125	h8	226	226	62	95	14	4xM8	95	226	95	226	235	129	174	83,1	96,4

1) Predrilled without keyway

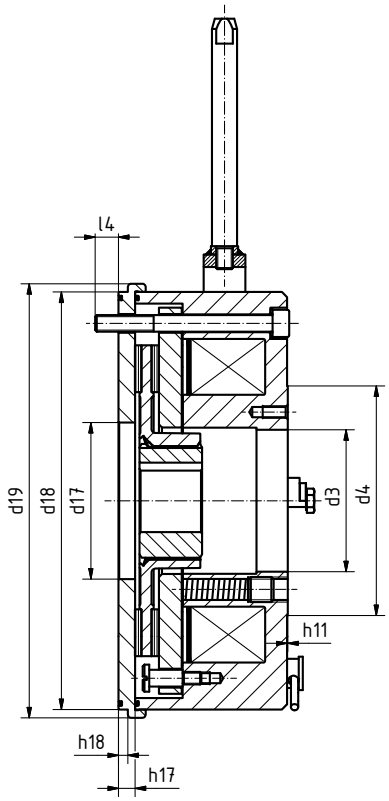
2) Standard keyway in accordance with DIN 6885/1 P9
not all hub diameter for every rated torque available

For high torques and/or reversing mode it is necessary to use a special hub

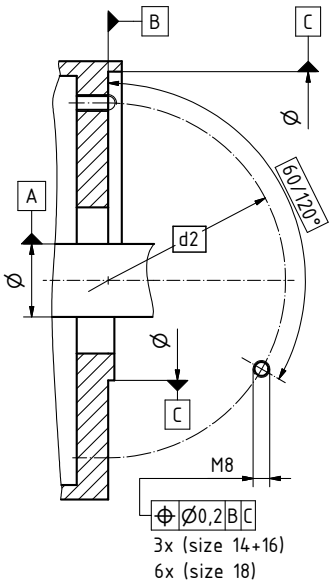
Brake without flange



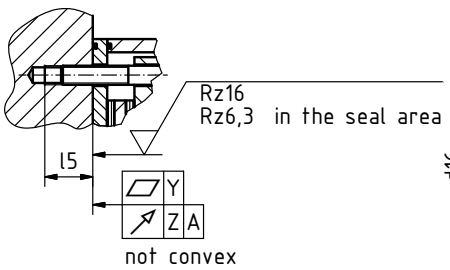
Brake with centering flange



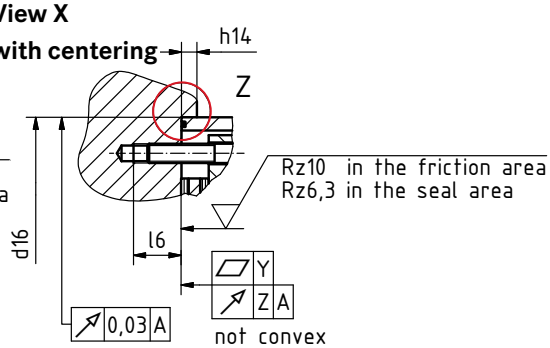
Motor mounting plate (position tolerance of the screw holes)



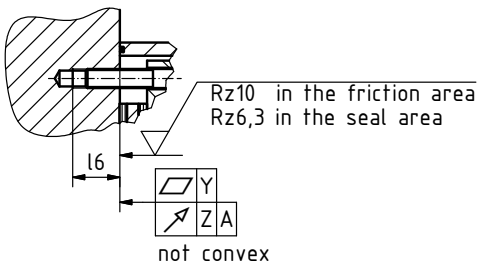
View W without centering



View X with centering



View X without centering



Size	h_2	h_3	h_4	h_5	h_9	h_{10}	h_{11}	h_{12}	$h_{13\ min.}$	$h_{13\ max.}$	$h_{14\ min.}$	$h_{14\ max.}$	h_{15}	h_{16}	h_{17}	h_{18}	l	l_1	l_2	l_3	l_4	$l_{5\ min}$	$l_{6\ min}$	s_{LN}	α	β_1 +3°	β_2+3°	Y	Z
06	1	3,5	20,7	112	54,5	57	0,3	8	6,5	9,5	4,5	6	-	10	4,5	3	18	400	6,8	5,3	5,8	9	7,5	0,2 (+0,08/-0,05)	25°	8,5°	8°	0,03	0,05
08	1	4,5	24,7	119,5	62	64,5	0,3	8	7,5	10,5	4,5	6	-	12	4,5	3	20	400	7,3	7,8	7,8	10	10,5	0,2 (+0,08/-0,05)	25°	8,5°	8°	0,03	0,05
10	2	4,5	26,9	143	77	80	0,3	10	8	12,5	4,5	8	-	12	6,5	4	20	400	10,2	10,7	8,7	13,5	14	0,2 (+0,13/-0,05)	25°	8°	7°	0,03	0,05
12	2	5	30,4	175	90	94	0,3	12	8,5	15	5,0	10	72,0	12	6,5	4	25	400	9,1	9,1	7,6	12,5	12,5	0,3 (+0,08/-0,10)	25°	8,5°	8°	0,05	0,05
14	2	6	38,8	185,5	100,5	104,5	0,3	12	10	16	6,5	10	79,4	12	8	4,5	30	400	14,3	15,3	12,3	19	20	0,3 (+0,10/-0,10)	25°	9°	8°	0,05	0,05
16	2.25	6	42,8	231	118	122	0,3	12	10	16	6,5	10	81,5	12	8	4,5	30	600	13,2	14,2	11,2	17	18	0,3 (+0,15/-0,05)	25°	8°	8°	0,08	0,05
18	3	6	47,8	290	135	140	0,3	12	10	16	6,5	10	91,6	16	10	5	35	600	19,3	15,3	15,3	23	19	0,4 (+0,20/-0,10)	25°	10°	9°	0,1	0,08

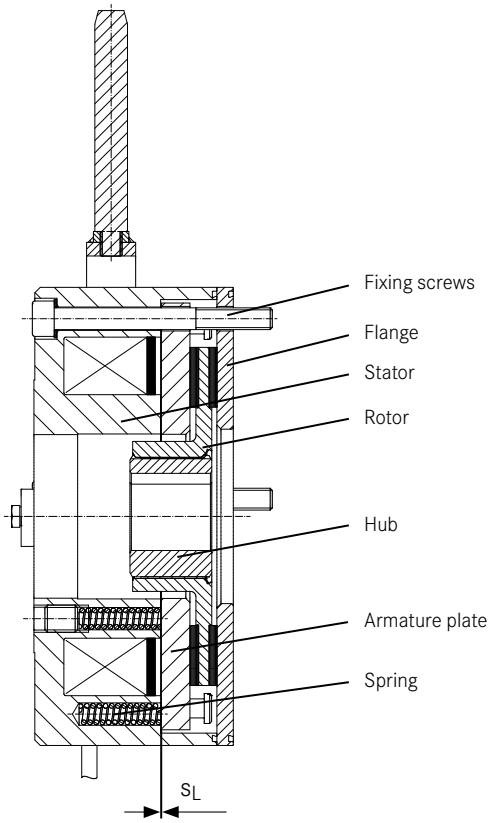
Measurements in mm

For a key to abbreviations see page 4

Principle of operation

BFK470 spring-applied brake

BFK470 spring-applied brakes are electrically releasable single disc brakes with two friction surfaces. In a de-energised state, the two friction surfaces of the rotor are stretched between the armature plate and flange by the force of the pressure springs. The braking torque comes from the friction radius of the rotor and is transmitted to the shaft via a hub with axial gear teeth. In this braked state, there is an sL air gap between the armature plate and the stator. To release the brake, the coil of the stator is excited with DC voltage. The resulting magnetic flux acts against the spring force and pulls the armature plate onto the stator. This releases the rotor from the spring force, allowing it to move freely.



Noise-reduced aluminium rotor

The rotor with a toothed intermediate ring made of plastic reduces the rattling that can occur in the rotor-hub connection as a result of load oscillations or untrue running in the motor. At the same time this increases the service life of the connection.

Features and benefits

- Low wear between rotor and hub
- Recommended for frequency inverter operation
- Noise-reduced design
- Can also be combined with the CCV option

Rated torques

General information

INTORQ brakes are designed so that the rated torques specified for 100r/min can be achieved after a short run-in period. This is ensured by using tightly toleranced components and a controlled assembly process.

Deviations from the specified braking torques are possible as a result of varying environmental conditions and fluctuations in the properties of the organic friction linings being used. These possible deviations should be allowed for by taking the appropriate precautions in the dimensioning process.

Increased breakaway can occur especially after long downtimes where there are damp conditions and varying temperatures. The rated torque must be checked if the brake is being used on the customer's own friction surfaces. If the brake is to be used purely as a holding brake with no dynamic load, the friction lining must be reactivated at regular intervals.

Tolerances in the braking torque

Due to the tolerances of springs and friction linings, the tolerance range of the braking torque for the BFK470 under defined test conditions is as follows

- -15%/+25% for brakes with adjustable spring force (sizes 12 ... 18) and
- -25%/+35% for brakes without adjustable spring force (sizes 06 ... 10).

Speed, temperature and dampness are factors that influence the braking torque. The ideal run-in process requires 10 full cycles of the brake from a speed of 1500r/min with friction work of 50% QE each time. If an adequate run-in process is not possible during commissioning, especially with holding brakes, the braking torque must be increased accordingly in the dimensioning process. INTORQ offers special friction linings for increased torques, quick running-in periods or high braking energies. We welcome the opportunity to review your application and show you how INTORQ can add value to your system and meet any special demands you may have.

Rated torques

Rated torque M_K [Nm] of the brake, rated value at a relative speed of 100 r/min

Size	06	08	10	12	14	16	18
Operating brake				12			
				14	25		
				15	35	35	65
	2	3,5	7	16	40	45	80
	2,5	5	9	18	45	55	100
	3	6	11	23	50	60	125
	3,5	7	14	27	55	70	130
	4	**8**	**16**	**32**	**60**	**80**	**150**
Holding brake with emergency stops	4,5	9	18	36	65	90	165
	5,5	10	21	40	70	100	185
	6	11	23	45	75	105	200
	6,5	12	25	46	80	125	235
	7	14	28	48	100	150	250
	7,5	15	30	50	110		
			33	55			
			36				
On request for project solutions	up to 10	up to 17	up to 46	up to 68	up to 150	up to 200	up to 370

Operating brake (s_{Lmax} ca. 2.5 x s_{LN})

Standard braking torque

Holding brake with emergency stop (s_{Lmax} ca. 1.5 x s_{LN})

For a key to abbreviations see page 4

Characteristic torques

Rated torques characteristics

Size	Rated torque M_K [Nm]	Reduction of rated torque at specified speed to x%			Maximum speed n_{max} [r/min]
		1500 r/min	3000 r/min	max.	
06	4	87%	80%	74%	6,000
08	8	85%	78%	73%	5,000
10	16	83%	76%	73%	4,000
12	32	81%	74%	73%	3,600
14	60	80%	73%	72%	3,600
16	80	79%	72%	70%	3,600
18	150	77%	70%	68%	3,600

- Speed reduction applies to Standard and WR. For WR linings, see the permissible switching energies listed on page 12.
- The permissible maximum speed relates to the standard friction lining
- For a key to abbreviations, see page 4

Friction lining variants

Standard and wear-resistant linings

The listed torque ratings and permissible friction work can be combined with any of the brake design options. The catalogue variants are available from a quantity of 1 up to series production levels.

ST (Standard)
- For universal use
- Large speed range
- Short run-in process required
- Can be used as holding brakes or operating brakes

WR (wear-resistant)
- Long service life
- Can be used in standard applications
- Restricted maximum speed
- Short run-in process required
- Best for use as a an operating brake

Project solutions

For project solutions INTORQ develops customised series production products on the basis of the customer's technical specifications. The following friction lining qualities are available for project solutions in addition to the catalogue variants:

HFC (high friction coefficient)
- For higher braking torques
- For use as a holding brake
- Short run-in process required

RIF (run in free)
- Stable static torque
- For use as a holding brake
- No run-in needed
- Developed for high demands
- Restricted maximum speed

HT (high temperature)
- Friction lining resistant to high temperatures to allow friction work up to a factor of 5 (compared with the standard aluminium rotor)
- Stable static torque
- Resistant to the effects of dampness and humidity

Technical data

Rated data

Size	P_N [W]	S_{LN} [mm]	$S_{L\ max}$ [mm] Operating brake	$S_{L\ max}$ [mm] Holding brake
06	20 – 23	0,2	0,5	0,3
08	25 – 27	0,2	0,5	0,3
10	30 – 33	0,2	0,5	0,35
12	40 – 42	0,3	0,6	0,45
14	60 – 63	0,3	0,75	0,45
16	68	0,3	0,80	0,50
18	85	0,4	1,0	0,65

For a key to abbreviations see page 4

Operating times

The switching times listed are guide values for brakes with standard characteristic torques for switching on the DC side, with rated air gap s_{LN} and warm coil. Brakes with a lower characteristic torque enable the brakes to open more quickly (t_2), but also take longer to build up torque (t_1). Brakes with a higher characteristic torque exhibit the reverse behavior. If the brake is using AC-side switching, the engagement time increases approximately by a factor of 8 to 10 when the disengagement time is unchanged (t_2).

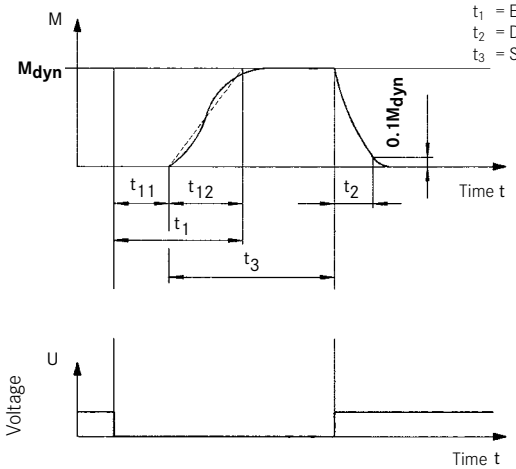
Size	Characteristic torque M_K [Nm]	Q_E [J]	S_{hue} [1/h]	Operating times [ms]			
				Connection on the DC side			Disconnection
				t_{11}	t_{12}	$t_1 = t_{11} + t_{12}$	t_2
06	4	3.000	79	16	25	41	32
08	8	7.500	50	30	26	56	52
10	16	12.000	40	40	46	86	107
12	32	24.000	30	47	34	81	121
14	60	30.000	28	30	47	77	162
16	80	36.000	27	46	62	108	225
18	150	60.000	20	62	92	154	343

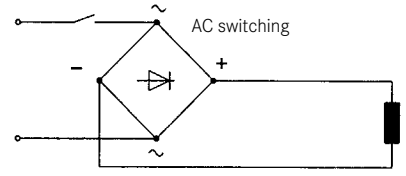
Maximum permissible rotational speed referred on standard friction lining

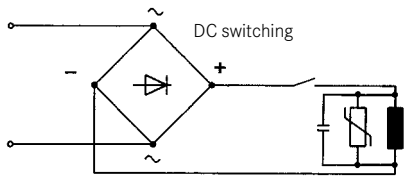
For a key to abbreviations see page 4

Torque time characteristic dependent on excitation voltage

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







For a key to abbreviations see page 4

Technical data

Standard aluminium rotor

The standard rotor can be used without restriction inside the permissible speed and load range. The wear values are dependent on load and speed and can be worked out by using the INTORQ-Select dimensioning tool.

Aluminium rotor with low rate of wear (WR)

Size		**06**	**08**	**10**	**12**	**14**	**16**	**18**
Q_E Maximum permissible friction work per switching cycle [J]								
	100 r/min	3,000	7,500	12,000	24,000	30,000	36,000	60,000
	1.000 r/min	3,000	7,500	12,000	24,000	30,000	36,000	60,000
	1.200 r/min	3,000	7,500	12,000	24,000	30,000	36,000	60,000
	1.500 r/min	3,000	7,500	12,000	24,000	30,000	36,000	60,000
	1.800 r/min	3,000	7,500	12,000	24,000	30,000	36,000	36,000
	3.000 r/min	3,000	7,500	12,000	24,000	18,000	11,000	on request
	3.600 r/min	3,000	7,500	12,000	7,000		on request	
Q_{BW}	[10^6 J]	85	158	264	530	571	966	1542
S_{hue}	[h^{-1}]	79	50	40	30	28	27	20

Q_{BW} = Friction energy of brake until maintenance
S_{hue} = Transitional operating frequency

In the region of the load limit (operation > 50 % Q_E) the value for Q_{BW} can drop as low as 40%.

For a key to abbreviations see page 4

Wind turbines

Industrial trucks

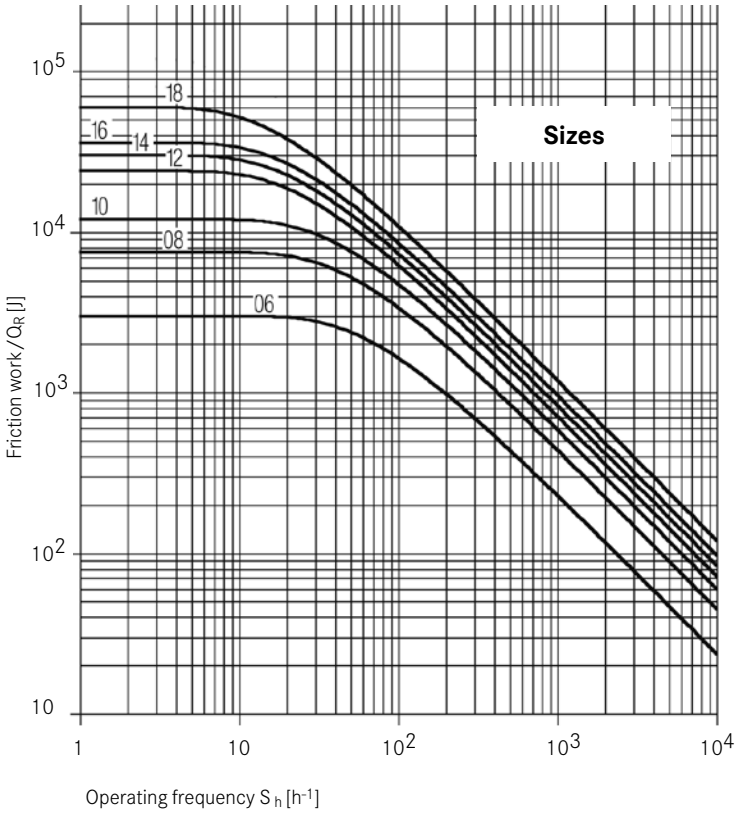
Car wash systems

Technical data

Service life and wear

Friction energy and operating frequency

For the standard (**ST**) and low-wear (**WR**) friction linings



$$S_{hmax} = \frac{-S_{hue}}{\ln\left(1 - \frac{Q_R}{Q_E}\right)} \qquad Q_{smax} = Q_E \left(1 - e^{-\frac{S_{hue}}{S_h}}\right)$$

The maximum permissible operating frequency, Shmax, depends on the friction work, Q_R. A specified operating frequency, S_h, determines the maximum permissible friction work, Q_{smax}. Wear increases with high speeds and switching energy because very high temperatures occur for a short time on the friction surfaces.

For a key to abbreviations see page 4

Maintenance

Brakes are components that are susceptible to wear. When the brake is installed, care must be taken to ensure that it is easily accessible for servicing and maintenance work. The service intervals are to be fixed in accordance with the projected service life and load. Please check the operating instructions for more information.

The friction work that can be accomplished up to the wear limit of the brake depends on a number of factors, especially on the mass to be braked, the braking speed, the operating frequency and the resulting temperature on the friction surfaces. Also, a vertical brake shaft can be expected to increase wear.

The mechanical components of the brake can also limit the service life when there is a low amount of friction work per operation. In particular, the rotor-hub connection, the armature plate and the cylinder pins are subject to operational wear. The expected service life of the standard design is around 2 million load reversals. If a longer service life is required, please contact INTORQ.

Product overview

BFK470 spring-applied brake

Size
☐ 06 ☐ 08 ☐ 10 ☐ 12 ☐ 14 ☐ 16 ☐ 18

Design
☐ without flange ☐ standard flange ☐ centering flange

Voltage
Size 6 – 12
☐ 24 V ☐ 96 V ☐ 103 V ☐ 170 V ☐ 180 V ☐ 190 V ☐ 205 V

Size 14 – 18
☐ 24 V ☐ 103 V ☐ 180 V ☐ 205 V
additional voltages available per request

Characteristic torque
☐ 2 - 370 Nm (see torque ratings on page 9) _____ Nm

Cable length
☐ Size 6 – 14: 400 mm ☐ Size 16 – 18: 600 mm
☐ Special lengths: _____ from 100 – 1000 mm in 100 mm graduations
_____ from 1000 – 2500 mm in 250 mm graduations

Temperature range
☐ Standard -20 to +50˚C
☐ CCV, Cold Climate Version -40 to +50˚C

Hand release mounted
☐ Standard mounting

Tacho mounting
☐ Bores on rear side

Contactless proximity sensor (available from size 12)
☐ Switching function monitoring only available as holding brake
(wear monitoring not possible)
Information evaluation only for range -25°C to +120°C

Cap
☐ Basic version ☐ Metal version type

Shaft sealing ring
☐ On request _____ mm

Rotor
☐ Aluminium
☐ Aluminium, noise reduced (with toothed intermediate ring)

Hub
☐ Bore diameter (see measurements d^{H7} on page 6) ∅_____mm

Fixing srew set
☐ For mounting with flange ☐ For mounting without flange

PRECISION. SAFETY. MOTION.

› *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**

INTORQ GmbH & Co. KG
Germany

Postfach 1103, D-31849 Aerzen, Germany
Wülmser Weg 5, D-31855 Aerzen, Germany

Tel, Head office: +49 5154 70534-0
Tel, Sales department: +49 5154 70534-222
Fax: +49 5154 70534-200
E-mail info@intorq.de

INTORQ (Shanghai) CO., LTD
China

No. 600, Xin Yuan Nan Road,
Building No. 6 / Zone B
Nicheng town, Pudong
Shanghai, China 201306

Tel: +86 21 20363-810
Fax: +86 21 20363-805
E-mail info@cn.intorq.com

INTORQ US INC.
USA

300 Lake Ridge Drive SE
Smyrna, GA 30082, USA

Tel: +1 678 236-0555
Fax: +1 678 309-1157
E-mail info@us.intorq.com

INTORQ India Pvt. Ltd.
India

Plot No. E-7/3, Chakan
Industrial Area, Phase 3,
Nighoje, Taluka-Khed,
Pune, 410501 Maharashtra

Tel: +91 21 3562-5500
E-mail info@intorq.in

www.intorq.com

33002343 Subject to technical alterations I Printed in Germany 11.2020 en I 6.3