Spring-applied brake
INTORQ BFK458

The versatile modular system
1.5 – 600 Nm

INTORQ

setting the standard

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INTORQ BFK458 - The modular system

Our modular system forms the basis for a product range that offers versions tailored for almost any task. The BFK458 spring-applied brake, as a standard product, can be used anywhere, but its modular structure also meets the requirements of specific industries. Its strength lies in its versatility.

Electromagnetically released spring-applied brakes are used wherever masses in motion have to be decelerated as quickly as possible or where masses must be held in a defined position. The braking force is applied by compression springs. Thus the braking torque generated by friction locking remains available in the deenergised status – even in the event of mains failure. The brake is released electromagnetically.

The INTORQ BFK458 range replaces the 14.448/14.449 and 14.450 models of spring-applied brake. The main components of the modular system are the two basic modules E (adjustable braking torque) and N (braking torque not adjustable). The greatest degree of flexibility is achieved for a broad range of applications by the combination of the basic module with specific modules. This catalogue is intended to help you to select and to order the spring-applied brake you require quickly and easily.

The modular system for all applications

- Brake motors
- Materials handling technology
- Cranes
- Storage technology
- Industrial trucks
- Wood working machines
- Stage machinery
- Vehicles for the disabled
- Automation technology
- Regulated drives
- Gate drives
- Escalators

NEW: LongLife design INTORQ BFK458-L

In high-cycle applications, spring-applied brakes are subject to two kinds of stress. Due to the large number of load alternations, the service life of the brake is determined both by the mechanical components of the brake itself and the useful life of the rotor, which is based on friction energy. In particular, the rotor/hub connection, the springs and the sleeve bolts are subject to wear due to the number of load cycles. Based on the components mentioned, without additional measures the service life of spring-applied brakes is limited to $1x10^6$ to $4x10^6$ load cycles depending on the load. The new LongLife design guarantees a service life of the brake mechanism at least $10x10^6$ switching cycles.

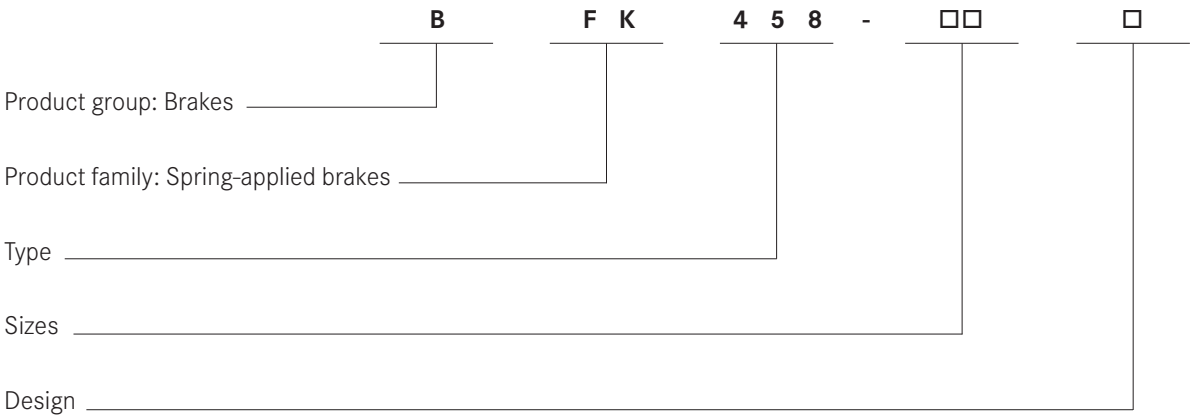
Contents

Double spring-applied brakes INTORQ BFK458, noise-reduced in the theatre

Spring-applied brakes INTORQ BFK458, corrosion-resistant in cranes

LongLife spring-applied brakes INTORQ BFK458-□□L in materials handling technology

INTORQ BFK458-□□□ product key



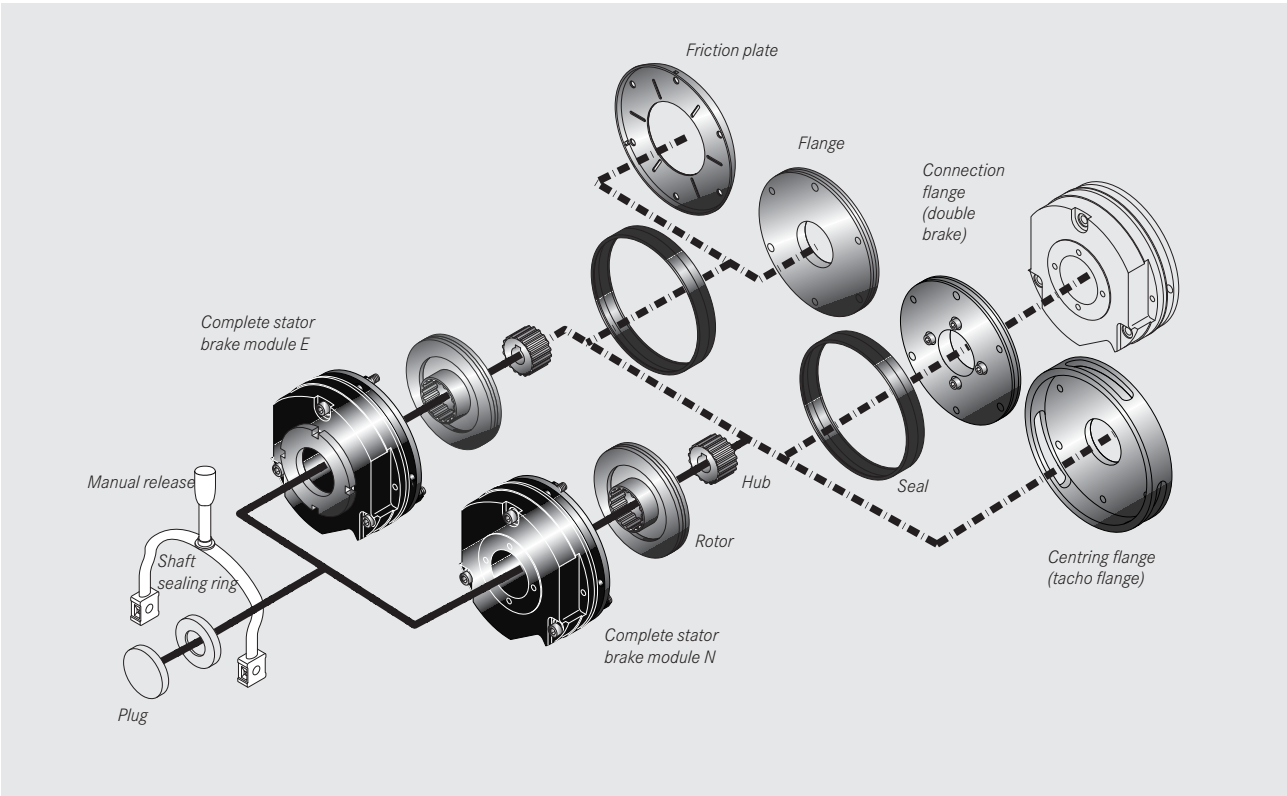
Sizes

06, 08, 10, 12, 14, 16, 18, 20, 25

Stator design

E – Adjustable (braking torque can be reduced using torque adjustment ring)
N – Non-adjustable
L – Non-adjustable, LongLife design

Not coded:
Supply voltage, hub bore,
Options



List of abbreviations

P	[kW]	Drive power
M_K	[Nm]	Rated torque of brake
M_L	[Nm]	Load torque
M_{erf}	[Nm]	Required braking torque
M_a	[Nm]	Deceleration torque
Δn_0	[rpm]	Initial relative speed of the brake
J_L	[kgm^2]	Moment of inertia of all driven parts, referred to the shaft to be braked
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 motion occurs between the input 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
K		Safety factor
Q	[J]	Calculated friction energy per switching cycle
Q_{zul}	[J]	Maximum permissible friction energy per switching cycle
S_h	[h^{-1}]	Operating frequency, i.e. the number of periodical brake operations
$S_{lü}$		Rated air gap

Product information

INTORQ BFK458 spring-applied brake

A powerful and complete range

- 9 sizes
- Standard voltages 24 V, 96 V, 103 V, 170 V, 180 V, 190 V, 205 V
- Graduated torque range from 1.5 – 600 Nm
- Short delivery times for the complete range, thanks to optimised logistics
- IP54 enclosure, depending on the particular operating conditions
- CSA and UL over all sizes
- ATEX:
  The product is suitable for use in potentially explosive atmospheres in zone II for stationary operation (holding or parking brake), explosion group II and temperature class T4.

Versatile

- Modular structure for virtually all applications
- Interchangeable with brake models 14.448 and 14.450

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
- No fixed bearing is required on the brake

Durable

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

Low maintenance

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

Reliable

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

Options

- Manual release for all sizes, both directions can be used for release and mounting (one exception is the tacho brake)
- Noise-reduced design
- Various types of corrosion protection and enclosures
- Microswitches used to monitor air gap and wear (size 12 and above)
- Monitoring of manual release function (page 19)
- Non-standard voltages and bores on request

NEW: LongLife design INTORQ BFK458-L

Characteristics

- Armature plate with low backlash and reinforced torque support
- Compression springs with guide pins for protection against shearing forces
- Aluminium rotor with toothed intermediate ring:
  Both the friction lining and the tooth system have a low rate of wear

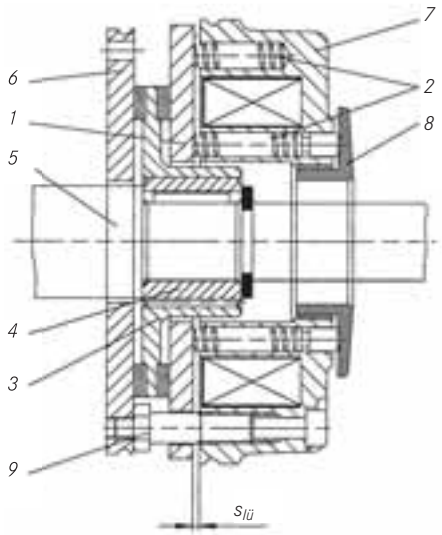
Designs

- Sizes 06, 08, 10, 12
- Stator in line with the “N design”
- Braking torques up to standard torque available according to the catalogue
- Low braking torques also configurable without pole shim
- Microswitches not configurable
- Rear face bores and built-on rear face accessories not possible

Principle of operation

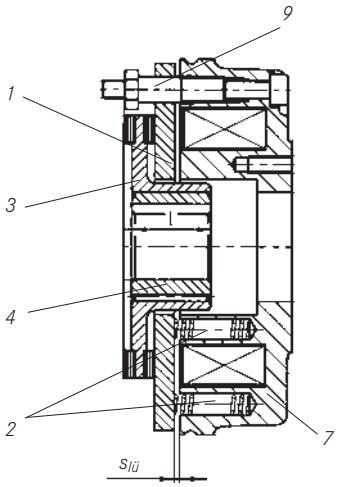
INTORQ BFK458 spring-applied brake

Brake module E + rotor + hub + flange



1 = Armature plate
2 = Compression springs
3 = Rotor
4 = Hub
5 = Shaft
6 = Flange
7 = Stator
8 = Torque adjustment ring
9 = Sleeve bolts
$s_{lü}$ = Air gap

Brake module N + rotor + hub



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 (3), which can be shifted axially on the hub (4), is pressed against the counter friction face (6) via the armature plate (1), by means of the compression springs (2). When the brakes are applied, an air gap $s_{lü}$ is present between the armature plate and the stator (7). 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 (8) to reduce the braking torque.

Industrial trucks are fitted with spring-applied brakes on the travel motor and with electromagnetic load wheel brakes.

Example applications

INTORQ BFK458 spring-applied brake

Curtain up for INTORQ brakes
A silenced version of the double spring-applied brake is used in the theatre as a redundant braking system.

INTORQ opens and closes gates and doors
Spring-applied brakes with manual release monitoring via microswitches and electromagnetic clutches ensure safe operation of door drives and automatic doors.

Rotate, lift, move – whenever cranes are in motion, INTORQ spring-applied brakes are never far away
Corrosion resistant designs and various sealing variants for spring-applied brakes in cranes.

Technical data

Braking torques

Depending on the individual application, the graduated torques listed in the tables below are available. A pole shim (brass film) must be placed between the stator and the armature plate if you want to achieve short operating times with low torques.

Size	06	08	10	12	14	16	18	20	25
								80 E	
	1,5 E	3,5 N/E			25 N/E	35 N/E	65 N/E	115 N/E	175 N/E
	2 N/E	4 E	7 N/E	14 N/E	35 N	45 N/E	80 N/E	145 N/E	220 N
	2,5 N/E	5 N/E	9 N/E	18 N/E	40 N/E	55 N/E	100 N/E	170 N/E	265 N/E
	3 N/E	6 N/E	11 N/E	23 N/E	45 N/E	60 N/E	115 N/E	200 N/E	300 N/E
Characteristic torques [Nm], related to the relative speed Δn = 100 rpm	3,5 N/E	7 N/E	14 N/E	27 N/E	55 N/E	70 N/E	130 N/E	230 N/E	350 N/E
	4 N/E	**8 N/E**	**16 N/E**	**32 N/E**	**60 N/E**	**80 N/E**	**150 N/E**	**260 N/E**	**400 N/E**
	4,5 N/E	9 N/E	18 N/E	36 N/E	65 N/E	90 N/E	165 N/E	290 N/E	445 N/E
	5 E	10 E	20 E	40 E	75 N/E	100 N/E	185 N/E	315 N/E	490 N/E
	5,5 E	11 E	23 N/E	46 N/E	80 N/E	105 N/E	200 N/E	345 N/E	530 N/E
	6 N/E	12 N/E				125 N/E	235 N/E	400 N/E	600 N/E

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

Service brake
($s_{lümax}$ approximately 2.5 x $s_{lü}$)

Standard braking torque

Holding brake with emergency stop
($s_{lümax}$ approximately 1.5 x $s_{lü}$)

NEW: LongLife BFK458-L

Designs

- Sizes 06, 08, 10, 12
- Stator in line with the “N design”
- Braking torques up to standard torque available according to the catalogue
- Low braking torques also configurable without pole shim
- Microswitches not configurable
- Rear face bores and built-on rear face accessories not possible

Brake module E, reduced braking torque

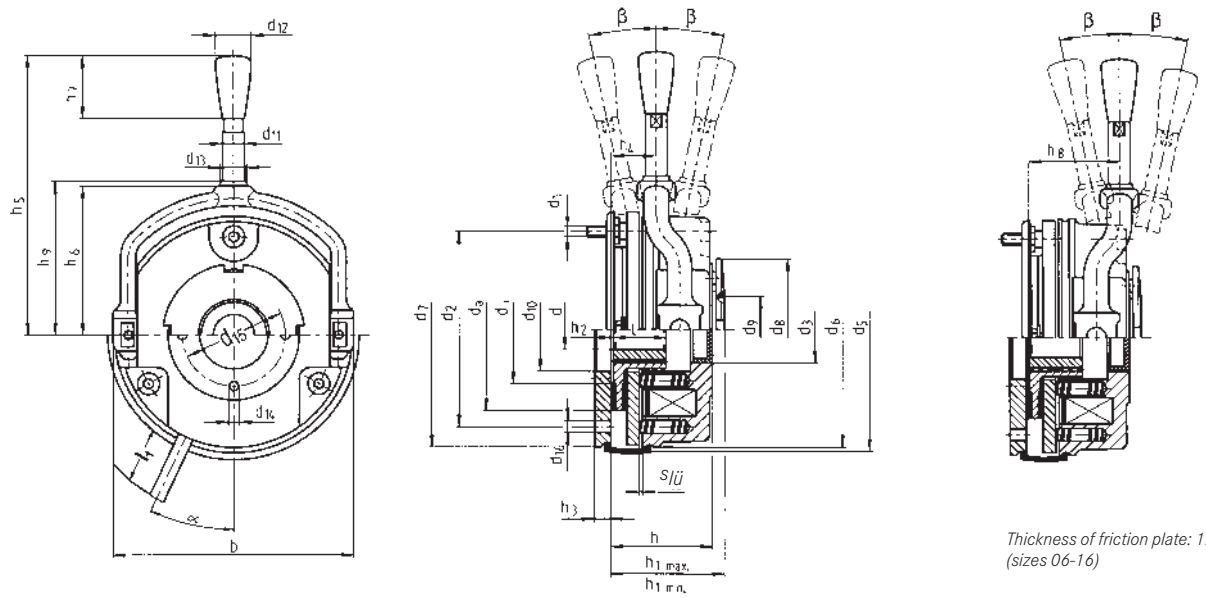
The braking torque on brake module E can be reduced using the torque adjustment ring located in the stator. The torque adjustment ring can be unscrewed to a maximum dimension of h_{1max} (see table on page 10).

It should be noted that the engagement and disengagement times change in accordance with the braking torque. Torque reduction is independent of the rated torque used.

Size	06	08	10	12	14	16	18	20	25
Torque reduction per detent position [Nm]	0.2	0.35	0.8	1.3	1.7	1.6	3.6	5.6	6.2

Technical data

Brake module E/N + flange + manual release



Thickness of friction plate: 1.5 mm (sizes 06-16)

Size	b	d^{J7} 1) spec.	d^{H7} 2) standard	d_1	d_2	d_3^{H7}	d_5	d_{6j7}	d_7	d_8	d_9^{H8}	d_{10}	d_{11}	d_{12}	d_{13}	d_{14} 3)	d_{15} 3)	d_{16}	di	da
06	88	10	10/11/12/14/15	3xM4	72	25	91	87	87	52	24	31	8	13	9.6	4xM4	37.7	3x4.5	40	60
08	106.5	10	11/12/14/15/20	3xM5	90	32	109	105	105	60	26	41	8	13	9.6	4xM5	49	3x5.5	47	77
10	132	10	11/12/14/15/20	3xM6	112	42	134	130	130	68	35	45	10	13	12	4xM5	54	3x6.6	66	95
12	152	14	20/25	3xM6	132	50	155	150	150	82	40	52	10	13	12	4xM5	64	3x6.6	70	115
14	169	14	20/25/30	3xM8	145	60	169	165	165	92	52	55	12	24	14	4xM6	75	3x9	80	124
16	194.5	15	25/30/35/38*	3xM8	170	68	195	190	190	102	52	70	12	24	14	4xM6	85	3x9	104	149
18	222	20	30/35/40/45	6xM8	196	75	222	217	217	116	62	77	14	24	15.5	4xM8	95	4x9 4)	129	174
20	258	25	35/40/45/50	6xM10	230	85	259	254	254	135	72	90	14	24	16.5	4xM10	110	4x11 4)	148	206
25	302	30	40/45/50/55/60/65/70*	6xM10	278	115	307	302	302	165	85	120	16	24	18.4	4xM10	140	6x11	199	254

- 1) pre-drilled without keyway
- 2) Standard keyway in accordance with DIN 6885/1 P9, selection of the shaft diameter depending on the type of loading (see Operating Instructions)
- * Ø 38 and Ø 70 mm, keyway in accordance with DIN 6885/3 P9
- 3) Bores are made on customer request for sizes 06–12
- 4) The thread in the mounting surface is offset by 30° in relation to the centre axle of the manual release lever
- Dimensions in mm

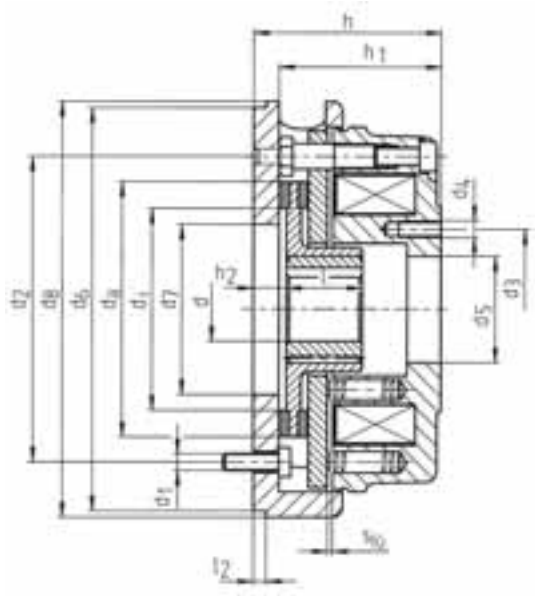
Size	h	h_1 min.	h_1 max.	h_2	h_3	h_4	h_5 standard	h_5 7) max.	h_6	h_7	h_8	h_9	l	l_1 5)	$s_{lü}$	α	β 6)
06	36.3	39.3	43.25	1	6	15.8	107	–	54.5	23	32.8	56.3	18	400	0.2	25°	12°
08	42.8	46.8	50.8	1.5	7	16.3	116	–	63	23	41.3	65	20	400	0.2	25°	10°
10	48.4	52.4	55.9	2	9	27.4	132	–	73.8	23	42.4	77.8	20	400	0.2	25°	9°
12	54.9	58.9	67.53	2	9	29.4	161	–	85	23	47.4	88.5	25	400	0.3	25°	10°
14	66.3	71.3	77.3	2	11	33	195	–	98	32	50	101.5	30	400	0.3	25°	9°
16	72.5	77.5	85.5	2.25	11	37.5	240	–	113	32	53.5	116	30	600	0.3	25°	10°
18	83.1	89.1	97.09	2.75	11	41.1	279	394	124	32	59.1	128.5	35	600	0.4	25°	9°
20	97.6	104.6	114.6	3.5	11	47.6	319	416	146	32	68.6	149.5	40	600	0.4	25°	10°
25	106.7	115.7	127.7	4.5	12.5	57.7	445	501	170	32	88.7	175.5	50	600	0.5	25°	10°

- 5) Length of the connecting cable
- 6) Manual release angle tolerance +3°
- 7) Recommended lever length for 1.5 M_K
- Recommended ISO shaft tolerances: up to Ø 50 mm = k6
  over Ø 50 mm = m6

Technical data

Brake module N + centring flange

Brake suitable for mounting a speed or angle sensor



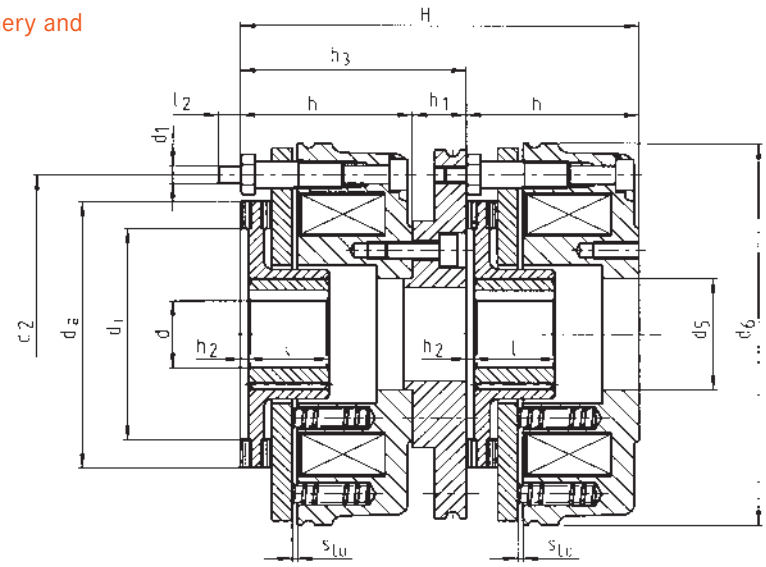
Size	h	h_1	h_2	d^{H7} max.	d_1 1)	d_2	d_3	d_4 5)	d_5^{H7}	d_6^{h7}	d_7^{H7}	d_8	di	da	l	l_1 2)	l_2	$s_{lü}$
06	42.3	36.3	7	15	3xM4	72	37.7	4xM4	25	95	40	98	40	60	18	400	2	0.2
08	49.8	42.8	8.5	20	3xM5	90	49	4xM5	32	115	50	116	47	77	20	400	2	0.2
10	57.4	48.4	11	20	3xM6	112	54	4xM5	42	140	60	141	66	95	20	400	2	0.2
12	63.9	54.9	11	25	3xM6	132	64	4xM5	50	162	60	165	70	115	25	400	2	0.3
14	76.5	65.5	13	30	3xM8	145	75	4xM6	60	177	80	181	80	124	30	400	2	0.3
16	83.5	72.5	13.25	38 4)	3xM8	170	85	4xM6	68	204	85	206	104	149	30	600	2	0.3
18	94.1	83.1	13.75	45	6xM8	196	95	4xM8	75	233	90	237	129	174	35	600	2	0.4
20	108.6	97.6	14.5	50	6xM10	230	110	4xM10	85	271	90	274	148	206	40	600	2	0.4
25	118.2	106.7	17	70 4)	6xM10	278	140	4xM10	115	322	120	324	199	254	50	600	2	0.5

1) Use DIN 6912 fixing screws
2) Cable length
3) Manual release can be mounted as an option, as shown on right of page 10
4) Keyway in accordance with DIN 6885/3-P9
5) Bores are made on customer request for sizes 06-12
Dimensions in mm

Technical data

Brake module N + connection flange + brake module N

Double brake (double braking torque) as redundant braking system, suitable for use in stage machinery and many other areas of application



Size	d^{H7} max.	d_1	d_2	d_5^{H7}	d_{6j7}	di	da	H	h	h_1	h_2	h_3	l	l_1 [1]	l_2	$s_{lü}$
06	15	3xM4	72	25	87	40	60	84.6	36.3	12	1	48.3	18	400	8.7	0.2
08	20	3xM5	90	32	105	47	77	97.6	42.8	12	1.5	54.8	20	400	9.8	0.2
10	20	3xM6	112	42	130	66	95	109.8	48.4	13	2	61.4	20	400	12.7	0.2
12	25	3xM6	132	50	150	70	115	125.8	54.9	16	2	70.9	25	400	13.1	0.3
14	30	3xM8	145	60	165	80	124	148	65.5	17	2	82.5	30	400	13.1	0.3
16	382)	3xM8	170	68	190	104	149	165	72.5	20	2.25	92.5	30	600	16.4	0.3
18	45	6xM8	196	75	217	129	174	186.2	83.1	20	2.75	103.1	35	600	17.5	0.4
20	50	6xM10	230	85	254	148	206	215.2	97.6	20	3.5	117.6	40	600	17.8	0.4
25	70	6xM10	278	115	302	199	254	238.4	106.7	25	4.5	130.7	50	600	21.5	0.5

- [1] Cable length
- [2] Keyway in accordance with DIN 6885/3-P9
- Manual release as an option
- Dimensions in mm

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

Rattling noises, which can occur in the rotor/hub connection, for example, during frequency inverter operation, or as a result of load alternation, or non-constant speeds, are reduced by using a rotor with a plastic sleeve.
The noise-reduced aluminium rotor is for the LongLife design obligatory.

Technical data

Rated data

Size	P[1] [20 °C] [W]	$s_{lü\ max}$ service brake [mm]	$s_{lü\ max}$ holding brake [mm]	max. adjustment [mm]	min.[2] rotor thickness [mm]	$J_{plastic\ rotor}$ [kgcm²]	$J_{aluminium\ rotor}$ [kgcm²]	Mass of stator assy [kg]
06	20	0.5	0.3	1.5	4.5	0.11	0.15	0.75
08	25	0.5	0.3	1.5	5.5	0.34	0.61	1.2
10	30	0.5	0.3	1.5	7.5	–	2.0	2.1
12	40	0.75	0.45	2.0	8.0	–	4.5	3.5
14	50	0.75	0.45	2.5	7.5	–	6.3	5.2
16	55	0.75	0.45	3.5	8.0	–	15	7.9
18	85	1.0	0.6	3.0	10.0	–	29	12
20	100	1.0	0.6	4.0	12.0	–	73	19.3
25	110	1.25	0.75	4.5	15.5	–	200	29.1

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

[2] The friction lining is dimensioned so that the brake can be readjusted at least five times.

Braking torques, depending on speed and permissible limit speeds

Size	Average braking torque on braking off Δn_0 to a standstill [%]	braking torque at Δ_{n0} [rpm] [%]			max. speed Δn_{0max} [rpm]
		1500	3000	max.	
06	100	87	80	65	12400
08	100	85	78	66	10100
10	100	83	76	66	8300
12	100	81	74	66	6700
14	100	80	73	67	6000
16	100	79	72	66	5300
18	100	77	70	66	4400
20	100	75	68	66	3700
25	100	73	66	66	3000

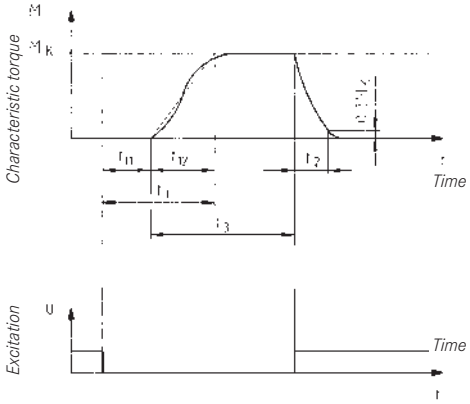
As speed increases, so does wear.

Technical data

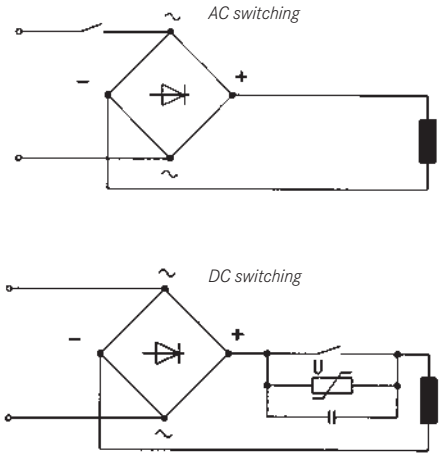
Operating times

The listed operating times apply to DC switching with rated air gap $s_{lü}$ and a warm coil. The times are mean values which may vary depending on the method of rectification and the air gap $s_{lü}$. The engagement time t_1 is approximately 10 times higher for AC switching than for DC switching.

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 rating at Δn = 100 rpm M_K [1]	Maximum permissible switching energy at single switching operation Q_E	Transitional-switching frequency $S_{hü}$	Switching times [ms] [2] at $s_{lüRated}$ Connection on the DC side			Disconnect
	[Nm]	[J]	[h^{-1}]	t_{11}	t_{12}	t_1	t_2
06	4	3000	79	15	13	28	45
08	8	7500	50	15	16	31	57
10	16	12000	40	28	19	47	76
12	32	24000	30	28	25	53	115
14	60	30000	28	17	25	42	210
16	80	36000	27	27	30	57	220
18	150	60000	20	33	45	78	270
20	260	80000	19	65	100	165	340
25	400	120000	15	110	120	230	390

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

Technical data

Service life and wear

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

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

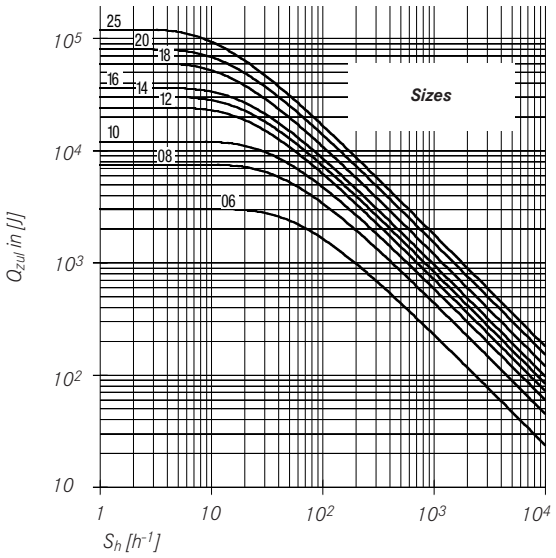
The BFK458 can be adjusted when the maximum permissible working air gap is reached ($s_{lümax}$). The dimensioning of the friction lining allows adjustment to be carried out at least five times.

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 alternations. Solutions that are optimised in terms of service life are available in cases where a longer service life is required (consult the manufacturer).

Maintenance

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

Permissible friction energy Q_{zul} depending on operating frequency S_h

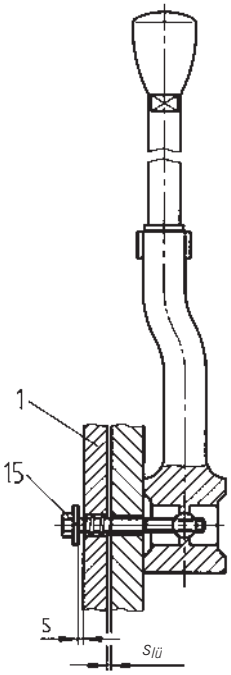


LongLife Spring-applied brake INTORQ BFK458-L

Guaranteed performance data

- Guaranteed service life of brake mechanism:
  $10x10^6$ repetitive cycles of operation
  $15x10^6$ reversing cycles of operation
- The brake warranty covers either two years or the guaranteed number of cycles – whichever is reached first.
- The scope of the warranty in the event of premature failure covers replacement of the brake, including a flat-rate replacement fee.

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 (1) and the washer (15). The dimension "s" must be maintained when installing the manual release.

Size	$s_{lü}$ $^{+0.1}_{-0.05}$ [mm]	s $^{+0.1}$ [mm]
06 08 10	0.2	1
12 14 16	0.3	1.5
18 20	0.4	2
25	0.5	2.5

Flange

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

Friction plate

A friction plate may be supplied for sizes 06 up to and including 16. This should be used if the counter face is smooth and machined, but is not suitable as a friction surface. Combination with a cover ring is provided.

Flange

Friction plate (sizes 06 – 16)

Accessories

Centring flange

Connection flange

Seal

Centring flange (tacho brake)

Brake module N combined with a centring flange is suitable for mounting a tachogenerator.

Connection flange (double brake)

The connection flange can be used to adapt a second brake module to brake module N; the resulting double brake is suitable for use in stage machinery or other applications with increased safety requirements.

Seal

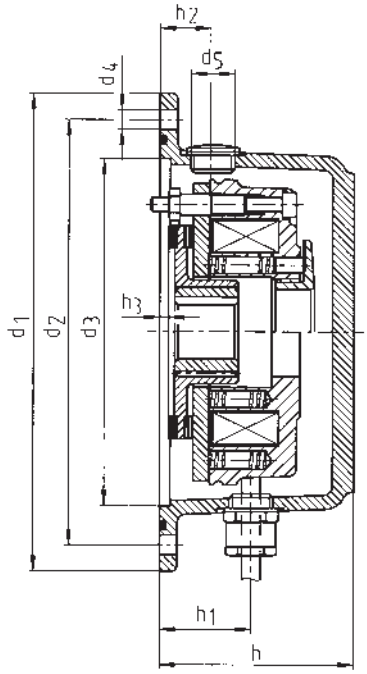
To a large extent, the seal prevents the exit or ingress of dust, humidity, dirt, etc., out of or into the braking area. The seal is inserted into the groove on the stator. If no suitable groove is available on the counter friction face, we recommend the use of a flange.

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)]
06	135	120	98	4x5.5	M16x1.5	55	28	16.5	3
08	155	142	118	4x5.5	M20x1.5	61	34	20	3
10	185	166	143	4x5.5	M20x1.5	72	39	21	3
12	205	192	163	4x6.6	M20x1.5	82	42	23	3
14	225	212	183	4x6.6	M20x1.5	92	51	24	3
16	250	236	208	4x6.6	M20x1.5	98	52	25	3
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

Accessories

Microswitch

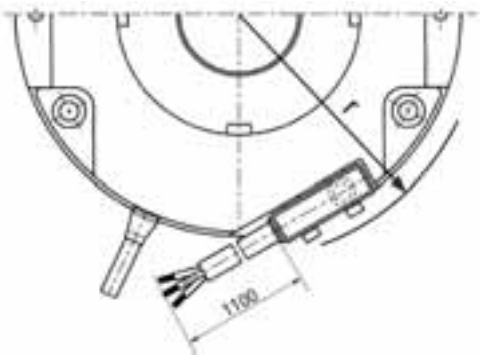
The brake can be fitted with a microswitch for the purpose of monitoring the release or wear. The microswitch can be built into the circuit as an NC contact or an NO contact. For the LongLife design the microswitch is not available.

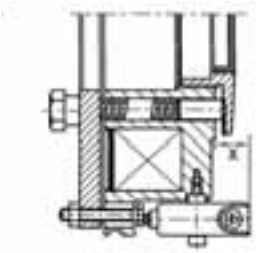
Dimensions

Size	12	14	16	18	20	25
Dimension x	13	11.5	11	7	*	*
Overall radius r	80.5	88.5	99	112.5	*	155

* no projection
Dimensions in mm

Mounting the microswitch onto brake module E





Microswitch for manual release monitoring

Gate drives, for instance, are provided with brakes with manual release, and a microswitch for monitoring the manual release. In this case, the manual release must make it possible to move the gate to the desired position in manual operation, e.g. using a crank. This manual operation has to be detected via a microswitch, whose switching signal must be combined with the motor control, so that the motor can be prevented from starting (thus also preventing any possible injury to the operator). The microswitch for manual release monitoring is a built-on option.

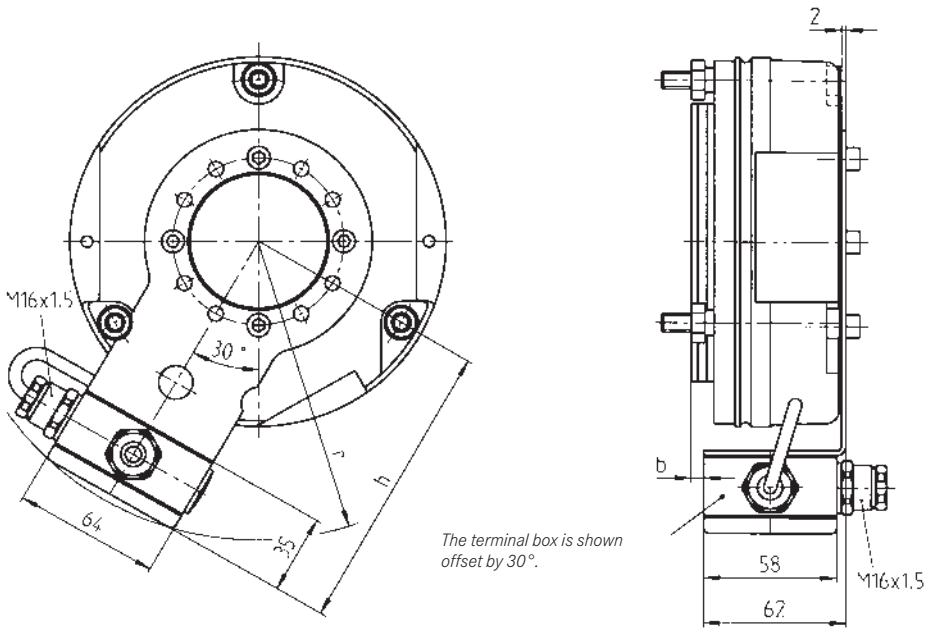
The fixing bracket is screwed onto the magnet housing or stator via the bores on the rear face. The fixing bracket enables a microswitch to be fastened to it. The two directions of release, towards and away from the motor, can be implemented by using different fixing brackets and microswitch settings.

Accessories

Terminal box

The connecting cables can easily be integrated into higher-level controls via the terminal box (brake sizes 12-25) in order to support different wiring options (three inputs/outputs). 2/4-pole terminal strips, half-wave and bridge rectifiers and a microswitch connection can be integrated into the terminal box.

The terminal box is mounted onto the spring-applied brake using a fixing bracket and screws, as shown in the illustration. You can select the mounting angle according to your requirements by using the assembly kit.



The terminal box is shown offset by 30°.

Size	12	14	16	18	20	25
b	-5	5.5	12.5	23	37.5	45.5
h	122	130	142	155	174	198
r	126	134	146	158.5	177	201

Dimensions in mm

Accessories

Bridge rectifiers and half-wave rectifiers

Type code

B E G – 5 6 1 – 440

Brake
Electronic
Rectifier

1 Bridge rectifier
2 Half-wave rectifier
5 Bridge rectifier/half-wave rectifier

4-pole
6-pole

1-Mounting position horizontal
2-Mounting position vertical
3-Mounting position horizontal with snap-in stud

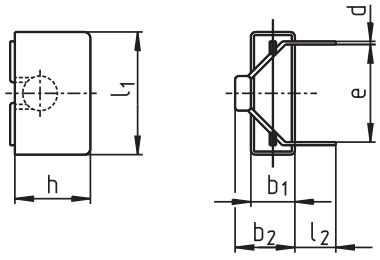
440 440 V voltage

INTORQ 14.198.00.0☐ universal spark suppressor

The universal spark suppressor limits the induced voltage arising when inductive direct current consumers are switched off on the DC side. These induced voltages can damage coils and switches. VDE 0580 therefore requires that, in order to avoid impermissibly high switch off voltages and overvoltages, suitable protective measures must be provided by the user. The universal spark suppressor is available in 4 versions for the following voltage ranges:

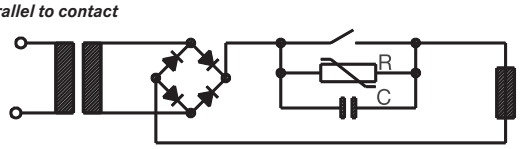
INTORQ	Coil voltage	Max. mains voltage	Max. coil power	Capacitor voltage	b_1	b_2 approx.	d	e approx.	h	l_1	l_2 approx.	m [g]
14.198.00.01	24 V – 50 V	60 V~	110 W	250 V-	8.5	12.5	0.7	22.5	18.5	26.5	25	7
14.198.00.02	50 V – 120 V	250 V~	110 W	630 V-	15	21	0.7	37.5	26	41.5	20	22
14.198.00.03	120 V – 200 V	400 V~	110 W	1000 V-	13	20	0.7	37.5	24	41.5	15	17
14.198.00.04	200 V – 250 V	555 V~	110 W	1000 V-	13	20	0.7	37.5	24	41.5	15	10

Dimensions

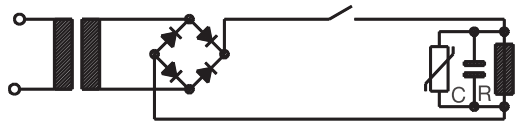


Wiring example

Parallel to contact



Parallel to coil

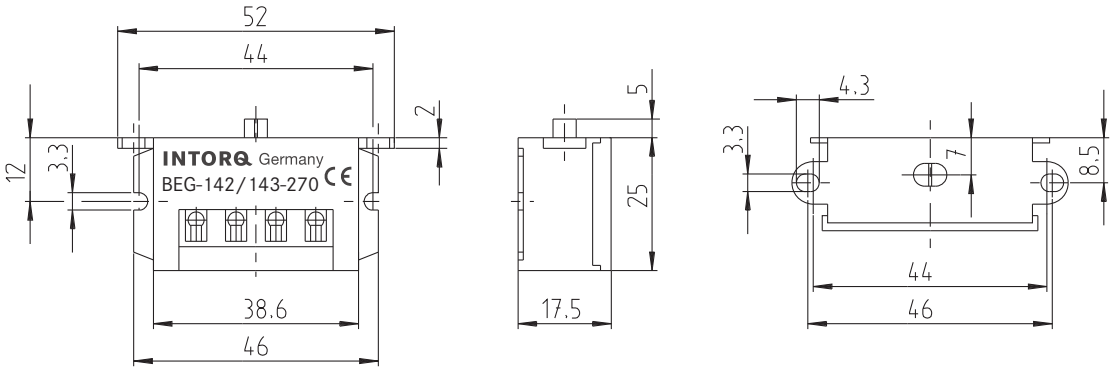


Accessories

4-pole bridge rectifier and 4-pole half-wave rectifier

Dimensions

BEG-142/143-270
BEG-242/243-555



4-pole bridge rectifier

BEG-142-270
BEG-143-270

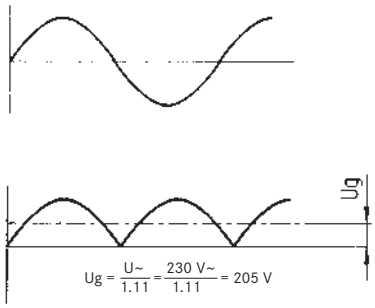
Application area

Current supply for spring-applied brakes from AC mains (normal excitation).
Example: 205 V coil on 230 V mains

Technical data

Max. mains voltage	270 V~
Max. DC current at 60°C	1.0 A
Max. ambient temperature	80°C

The rectifiers are protected against overvoltage by input and output varistors.



4-pole half-wave rectifier

BEG-242-555
BEG-243-555

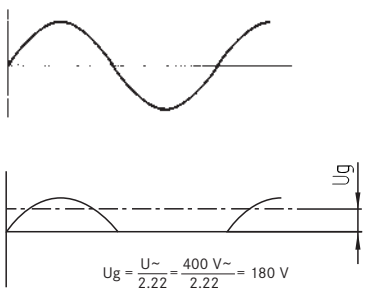
Application area

Current supply for spring-applied brakes from AC mains (normal excitation).
Example: 180 V coil on 400 V mains

Technical data

Max. mains voltage	555 V~
Max. DC current at 60°C	1.0 A
Max. ambient temperature	80°C

The rectifiers are protected against overvoltage by input and output varistors.

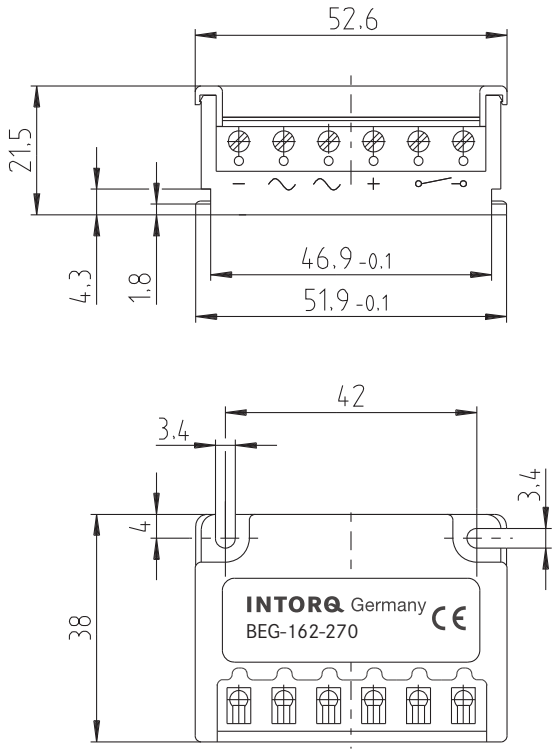


Accessories

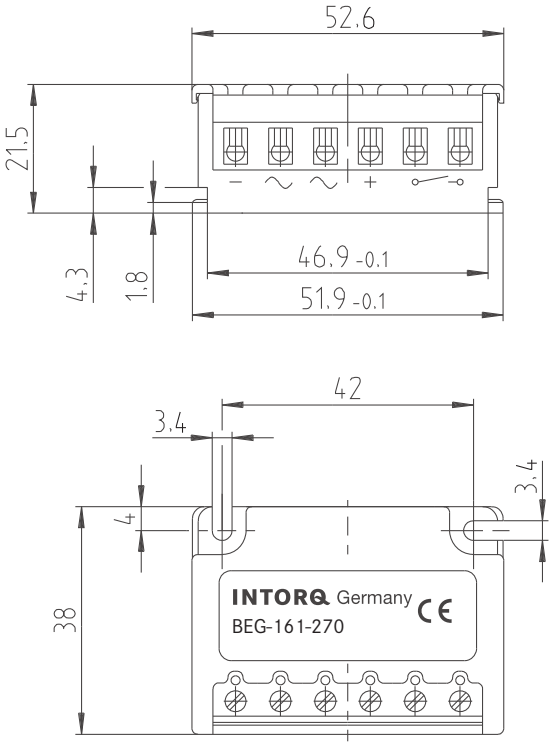
6-pole bridge rectifier

Dimensions

BEG-162-270



BEG-161-270



6-pole bridge rectifier

BEG-162-270
BEG-161-270

Application area

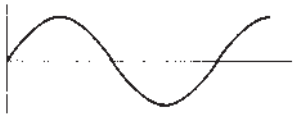
Current supply for spring-applied brakes from AC mains (normal excitation).
Example: 205 V coil on 230 V mains

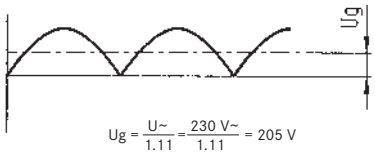
Technical data

Max. mains voltage	270 V~
Max. DC current at 60°C	0.75 A
Max. ambient temperature	80°C

The rectifiers are protected against overvoltage by input and output varistors.

BEG-162-270/161-270/262-460/261-460 rectifiers also contain the spark suppressors required by VDE 0580 Section 26.



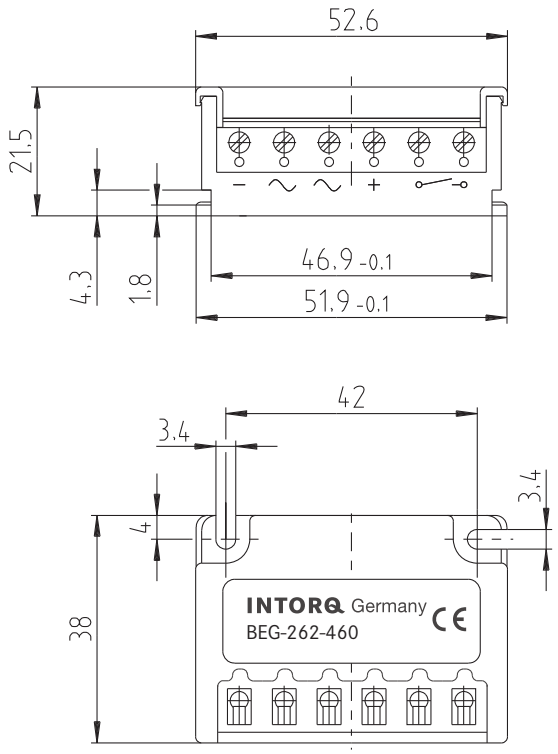


Accessories

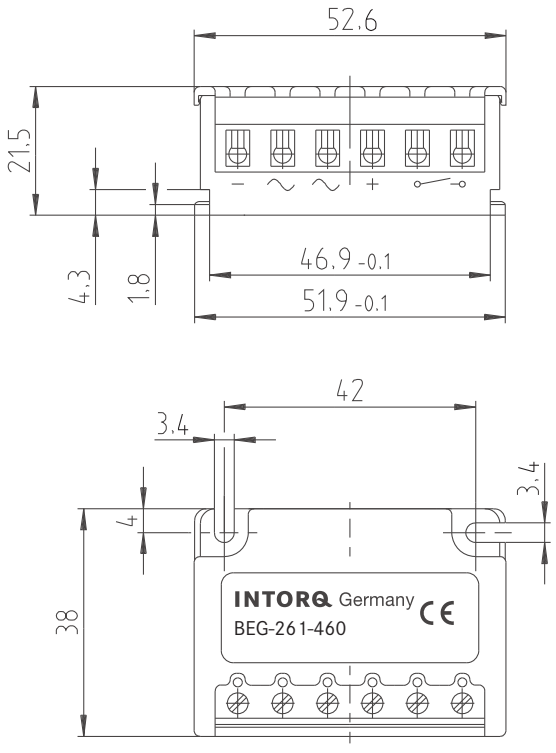
6-pole half-wave rectifier

Dimensions

BEG-262-460
BEG-262-555



BEG-261-460
BEG-261-555

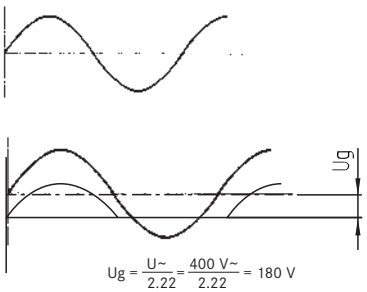


6-pole half-wave rectifier

BEG-262-460
BEG-261-460
BEG-262-555
BEG-261-555

Application area

Current supply for spring-applied brakes from AC mains (normal excitation).
Example: 180 V coil on 400 V mains



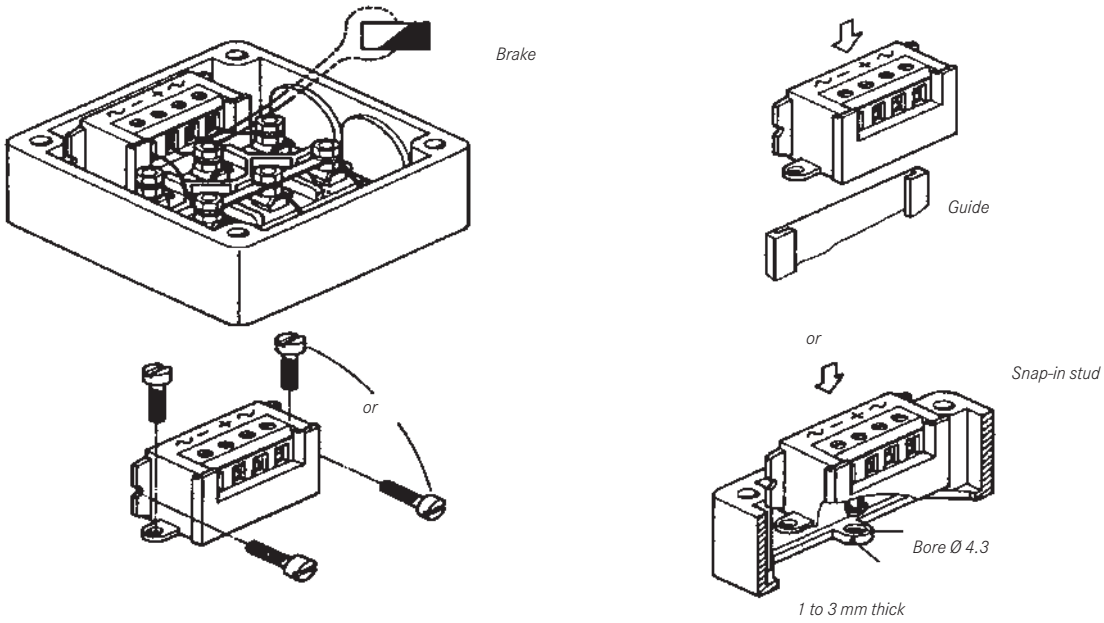
Technical data

Max. mains voltage	555 V~ / 460 V~
Max. DC current at 60°C	0.75 A
Max. ambient temperature	80°C

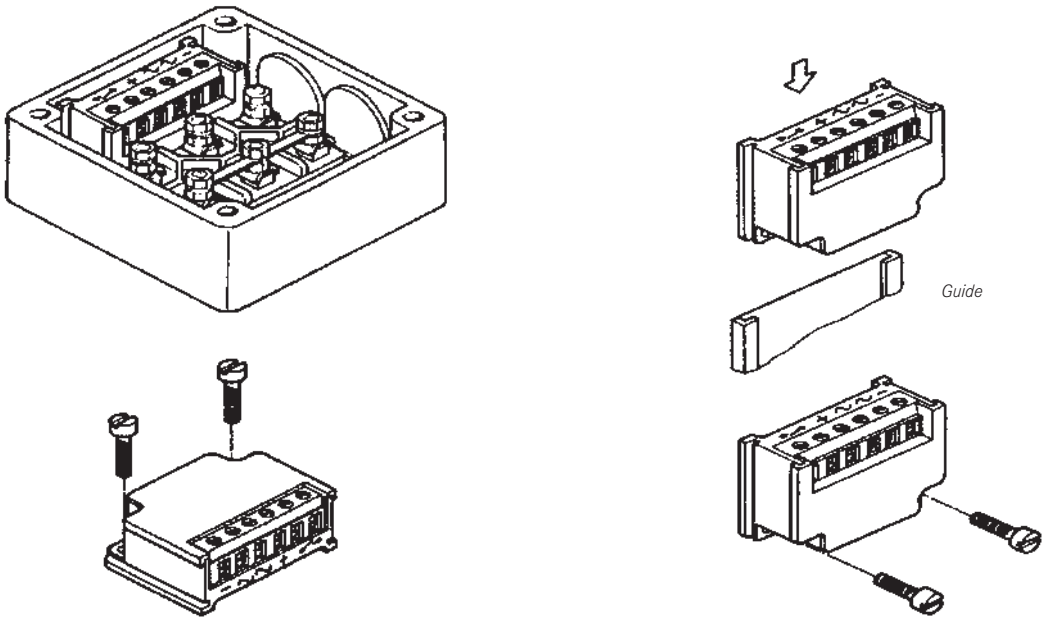
The rectifiers are protected against overvoltage by input and output varistors. BEG-162-270/161-270/262-460/261-460 rectifiers also contain the spark suppressor required by VDE 0580 Section 26.

Accessories

Fixing options
4-pole rectifier



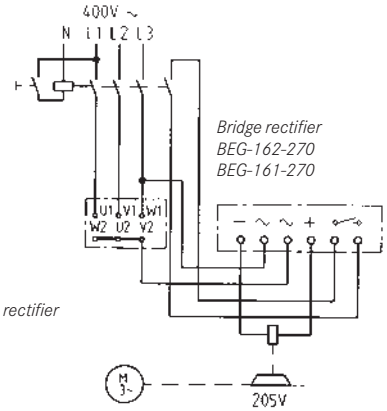
Fixing options
6-pole rectifier



Accessories

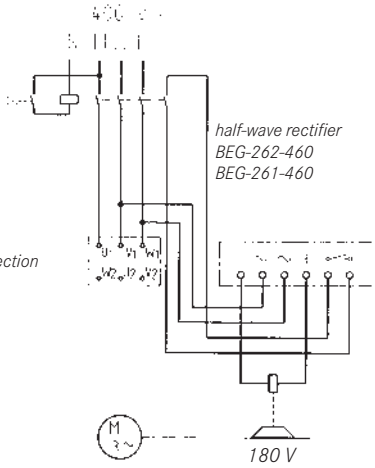
Connection diagrams

DC switching



Bridge rectifier
BEG-162-270
BEG-161-270

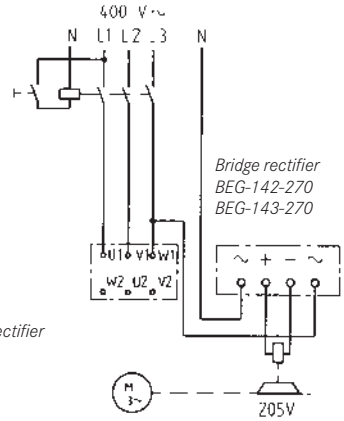
with half-wave rectifier
BEG-262-460
BEG-261-460
Coil 103 V



half-wave rectifier
BEG-262-460
BEG-261-460

Also for
star connection

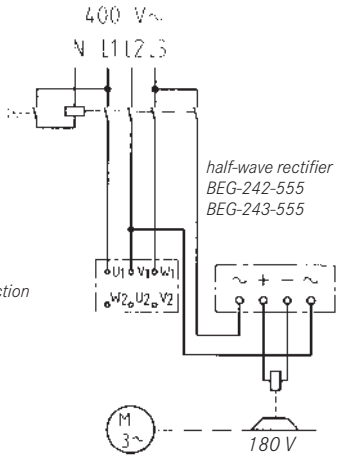
AC switching



Bridge rectifier
BEG-142-270
BEG-143-270

Also for
star connection

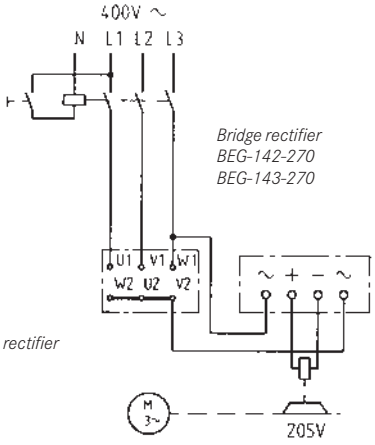
with half-wave rectifier
BEG-242-555
BEG-243-555
Coil 103 V



half-wave rectifier
BEG-242-555
BEG-243-555

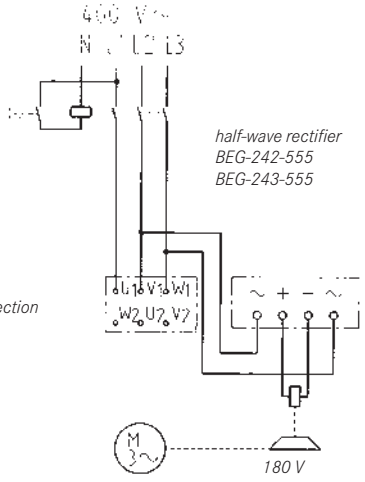
Also for
star connection

AC switching parallel to the motor



Bridge rectifier
BEG-142-270
BEG-143-270

with half-wave rectifier
BEG-242-555
BEG-243-555
Coil 103 V



half-wave rectifier
BEG-242-555
BEG-243-555

Also for
star connection

Accessories

Mains voltage selection table

Rectifier type and rated coil voltage for mains voltage

AC voltage [V]	Rectifier	Rectifier type 4-pole 1 A at 60°C	Spark suppressor INTORQ	Rectifier type 6-pole 0.75 A at 60°C	Coil rated voltage [V]
42 V	Half-wave	BEG-243/242-555	14.198.00.01	BEG-262/261-460	20 **V**
48 V	Bridge Half-wave	BEG-142/143-270 BEG-243/242-555	14.198.00.01 14.198.00.01	BEG-162/161-270 BEG-262/261-460	42 V 20 V
110 V	Bridge	BEG-142/143-270	14.198.00.02	BEG-162/161-270	103 V
220 V	Bridge Half-wave	BEG-142/143-270 BEG-243/242-555	14.198.00.04 14.198.00.02	BEG-162/161-270 BEG-262/261-460	205 V 103 V
230 V	Bridge Half-wave	BEG-142/143-270 BEG-243/242-555	14.198.00.04 14.198.00.02	BEG-162/161-270 BEG-262/261-460	205 V 103 V
240 V	Bridge Half-wave	BEG-142/143-270 BEG-243/242-555	14.198.00.04 14.198.00.02	BEG-162/161-270 BEG-262/261-460	215 V 103 V
255 V	Bridge	BEG-142/143-270	14.198.00.04	BEG-162/161-270	225 V
277 V	Half-wave	BEG-243/242-555	14.198.00.03	BEG-262/261-460	127 V
290 V	Half-wave	BEG-243/242-555	14.198.00.03	BEG-262/261-460	127 V
380 V	Half-wave	BEG-243/242-555	14.198.00.03	BEG-262/261-460	180 V
400 V	Half-wave	BEG-243/242-555	14.198.00.03	BEG-262/261-460	180 V
415 V	Half-wave	BEG-243/242-555	14.198.00.03	BEG-262/261-460	180 V
420 V	Half-wave	BEG-243/242-555	14.198.00.03	BEG-262/261-460	180 V
440 V	Half-wave	BEG-243/242-555	14.198.00.04	BEG-262/261-460	205 V
460 V	Half-wave	BEG-243/242-555	14.198.00.04	BEG-262/261-460	205 V
480 V	Half-wave	BEG-243/242-555	14.198.00.04	BEG-262/261-555*	215 V
500 V	Half-wave	BEG-243/242-555	14.198.00.04	BEG-262/261-555*	225 V
555 V	Half-wave	BEG-243/242-555	14.198.00.04	BEG-262/261-555*	250 V

* Spark suppressor without capacitor. For optimum interference suppression, we recommend the use of spark suppressor 14.198.00.04.

Max. rated coil voltage: 250 V

Standard coil rated voltages: 24, 96, 103, 170, 180, 190, 205 V

Dimensioning

Basic information

The size of a brake is largely determined by the required braking torque M_{erf}. The inertias to be braked (moments of inertia), the relative speeds, the braking times and the operating frequencies also have to be considered in the calculations. Marginal conditions, such as ambient temperature, air humidity, dust and mounting position should be known. In the event of extreme/critical operating conditions, please consult the manufacturer. Selection takes place in accordance with VDI rule 2241.

Friction surfaces must always be kept free of oil and grease.

For explanations of the terms used in the calculation, please refer to the list of abbreviations on page 5.

Safety factor

To ensure the necessary transmission security even under extreme operating conditions, the calculated braking torque is multiplied by safety factor K, which depends on the operating conditions.

$$K \geqq 2$$

Load types

In practice, the following load types mainly occur:

$$M_{erf} = M_a \cdot K \leqq M_K$$

$$M_a = \frac{J_L \cdot \Delta n_0}{9.55 \cdot \left(t_3 - \frac{t_{12}}{2}\right)}$$

$$M_{erf} = \frac{J_L \cdot \Delta n_0}{9.55 \cdot \left(t_3 - \frac{t_{12}}{2}\right)} \cdot K$$

Dynamic plus static load

Most applications belong to this category, as in most cases there is not only a static torque but also a dynamic load.

$$M_{erf} = (M_a \pm M_L) \cdot K \leqq M_K$$

$$M_{erf} = \left(\frac{J_L \cdot \Delta n_0}{9.55 \cdot \left(t_3 \frac{t_{12}}{2}\right)} \pm M_L\right) \cdot K \leqq M_K$$

+ M_L = to be used when lowering a load, for example
– M_L = for normal braking

Approximate determination of the required braking torque and the size

If only the drive power to be transmitted is known, the required torque or braking torque can be determined as follows:

$$M_{erf} = 9550 \frac{P}{\Delta n_0} \cdot K \leqq MK$$

Thermal load

For high operating frequencies and friction energy/switching cycle, the brake should be subject to thermal checking. The friction energy per switching cycle is calculated as follows:

$$Q = \frac{J_L \cdot \Delta n_0^2}{182.5} \cdot \frac{M_K}{M_K \pm M_L}$$

– M_L = to be used when lowering a load, for example
+ M_L = for normal braking

The permissible friction energy per switching cycle at a given operating frequency can be taken from the diagrams on page 14. If the friction energy per switching cycle is known, the permissible operating frequency can be taken from the diagrams mentioned above.

Dimensioning

Calculation example

The following technical data is known:

P = 3 kW
Δn_0 = 1450 rpm
J_L = 0.52 kgm^2 total
t_3 = 2 s
M_L = 15 Nm
S_h = 6 operations/h

Approximate determination of the required braking torque and the size:

$$M_{erf} = 9550 \frac{P}{\Delta n_0} \cdot K$$

$$M_{erf} = 9550 \frac{3}{1450} \cdot 2 = 40 \text{ N}$$

Assume INTORQ BFK458-14

Calculating the required braking torque

$$M_{erf} = \left(\frac{J_L \cdot \Delta n_0}{9.55 \cdot \left(t_3 - \frac{t_{12}}{2} \right)} - M_L \right) \cdot K$$

t_{12} = 0.025 s (see page 14)

$$M_{erf} = \left(\frac{0.52 \cdot 1450}{9.55 \cdot 2 - \frac{0.025}{2}} - 15 \right) \cdot 2 = 50 \text{ Nm}$$

Therefore, INTORQ BFK458-14 is chosen.

$$M_K = 60 \text{ Nm} > M_{erf} = 50 \text{ Nm}$$

Thermal checking

$$Q = \frac{J_L \cdot \Delta n_0^2}{182.5} \cdot \frac{M_K}{M_K \pm M_L}$$

$$Q = \frac{0.52 \cdot 1450^2}{182.5} \cdot \frac{60}{(60 + 15)} = 4792 \text{ J}$$

Calculated switching energy Q = 4792 J/switching cycle
The diagram on page 14 shows a permissible switching energy of 30,000 J for size 14 at S_h = 6 h^{-1}.

$$Q = 4792 \text{ J} < Q_{zul} = 30000 \text{ J}$$

Therefore, the brake has been selected correctly.

Ordering example

Brake type INTORQ BFK458-14E or design N (with or without torque adjustment ring) is required, with additional manual release and seal.

Supply voltage 205 V = shaft diameter 25 mm.

INTORQ BFK458-14E, 205 V =, d = 25 mm

Order form

Recipient: **INTORQ GmbH & Co. KG**
Wülmser Weg 5 · D-31855 Aerzen
Fax +49 (0)51 54 95 39 10

INTORQ BFK458 spring-applied brake with accessories

Sender

Company _____ Customer no. _____

Street/PO Box _____ Order no. _____

Post code/City _____ Issuer _____

Delivery address* _____ Telephone _____

_____ Fax _____

Invoice recipient* _____ Date of delivery _____

* Please specify, if different from sender. Date _____ Signature _____

INTORQ BFK458-□□□
Complete stator

Order quantity _____ Number

Size ☐ 06 ☐ 08 ☐ **10** ☐ 12 ☐ 14 ☐ 16 ☐ 18 ☐ 20 ☐ 25

Type
☐ E (with torque adjustment ring)
☐ N (without torque adjustment ring)
☐ L (LongLife design)

Voltage ☐ 24 V ☐ 96 V ☐ 103 V ☐ 170 V ☐ 180 V ☐ 190 V ☐ 205 V

Braking torque _____ Nm (see graduated torques)

Cable length
☐ Standard
_____ mm (from 100 mm – 1000 mm in 100 mm steps,
from 1000 mm – 2500 mm in 250 mm steps)

Manual release ☐ Assembled

Armature plate ☐ Standard ☐ Hard-chromium plated (from size 06) ☐ Noise-reduced* (O-ring design)
☐ With pole shim/brass film

Microswitch*
☐ Operation monitoring (size 12 and above)
☐ Wear monitoring (size 12 and above)
☐ Manual release monitoring, direction of release away from motor (sizes 06-25)
☐ Manual release monitoring, direction of release towards motor (sizes 06-10)

Terminal box* ☐ Mounted (from size 12)

* not available for LongLife design

Order form

INTORQ

Accessories

Rotor	☐ Plastic (only for size 06/08)	☐ Aluminium	☐ Silenced (rotor with sleeve)
Low wear rotor		☐ Aluminium	☐ Silenced (rotor with sleeve) **for LongLife design obligatory**
Hub	_____ mm (for bore diameter, see Dimensions)		
Fixing screw set	☐ For mounting onto the flange ☐ For mounting onto the motor/friction plate ☐ For flange with through hole (up to and including size 16) ☐ For connection flange/double brake		
Manual release	☐ as mounting kit		
Terminal box*	☐ as mounting kit		
Flange	☐ Friction plate (up to and including size 16) ☐ Flange ☐ Tachometer flange ☐ Connection flange double brake		
Sealing	☐ Seal ☐ Shaft sealing ring (shaft diameter on request) ☐ Cap ☐ Brake cover		

Electrical accessories

Bridge rectifier	☐ 4-pole without snap-in stud ☐ 4-pole with snap-in stud ☐ 6-pole vertical, integrated spark suppressor ☐ 6-pole horizontal, integrated spark suppressor		
Half-wave rectifier	☐ 4-pole without snap-in stud ☐ 4-pole with snap-in stud ☐ 6-pole vertical, integrated spark suppressor ☐ 6-pole horizontal, integrated spark suppressor		
Spark suppressor	☐		

* not available for LongLife design

INTORQ – Sales and Service around the world

INTORQ customers can reach us at any time and from anywhere in the world. Our Key Account Sales Team looks after key account customers and project business.

In addition, we co-operate with Lenze's global sales organisation. You can contact us via Lenze Service by calling the 24-hour helpline (008000 24 46177).

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