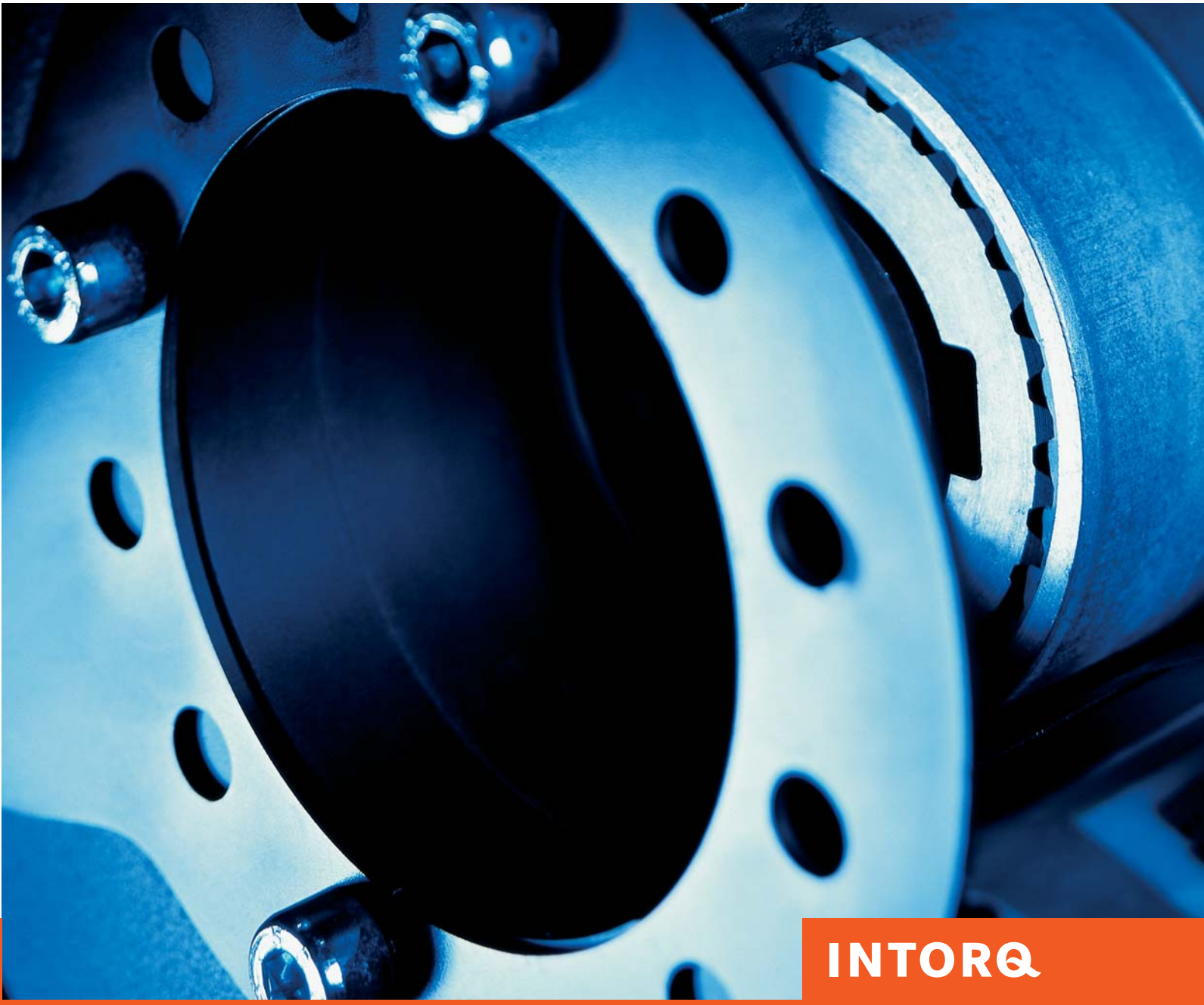
Spring-applied brake
INTORQ BFK458

The versatile modular system
2 – 600 Nm



INTORQ

setting the standard

INTORQ – A new name with tradition

INTORQ is a young company that has been spun off from Lenze Bremsen GmbH to take over the production of brakes and clutches. Lenze no longer manufactures these products.

You can now obtain identical products with the same designations and order numbers from INTORQ.

The background of INTORQ demands that it continues to set the international standard for brakes and clutches – after all, our motto is: "Setting the standard". The INTORQ name also stands for innovation and performance and, as before, for quality, reliability and mature technology.

INTORQ puts the customer first. As an independent company we now want to concentrate more on our customers in the drives sector and pass on our know-how in the development, manufacture and application of brakes and clutches. As far as our international activities are concerned, we shall continue to work closely with the worldwide sales organisation and service teams of Lenze.

INTORQ

INTORQ BFK458 – The modular system

Our modular system forms the basis of a product range that can be adapted to suit virtually any application. The BFK458 spring-applied brake is a standard product that can be used anywhere, but its modular design means it can also be used for special applications. Its versatility is its strength.

These electromagnetically released spring-applied brakes can be used wherever rapid deceleration or controlled holding of moving masses is required.

Since the braking force comes from pressure springs, the braking torque, which is generated by friction, is available when no current is applied – even in the event of a mains failure. The brake is released electromagnetically.

The INTORQ BFK458 product range replaces the 14.448/14.449 and 14.450 spring-applied brake types. The main components of the new modular system are the two basic modules E (adjustable braking torque) and N (non-adjustable braking torque).

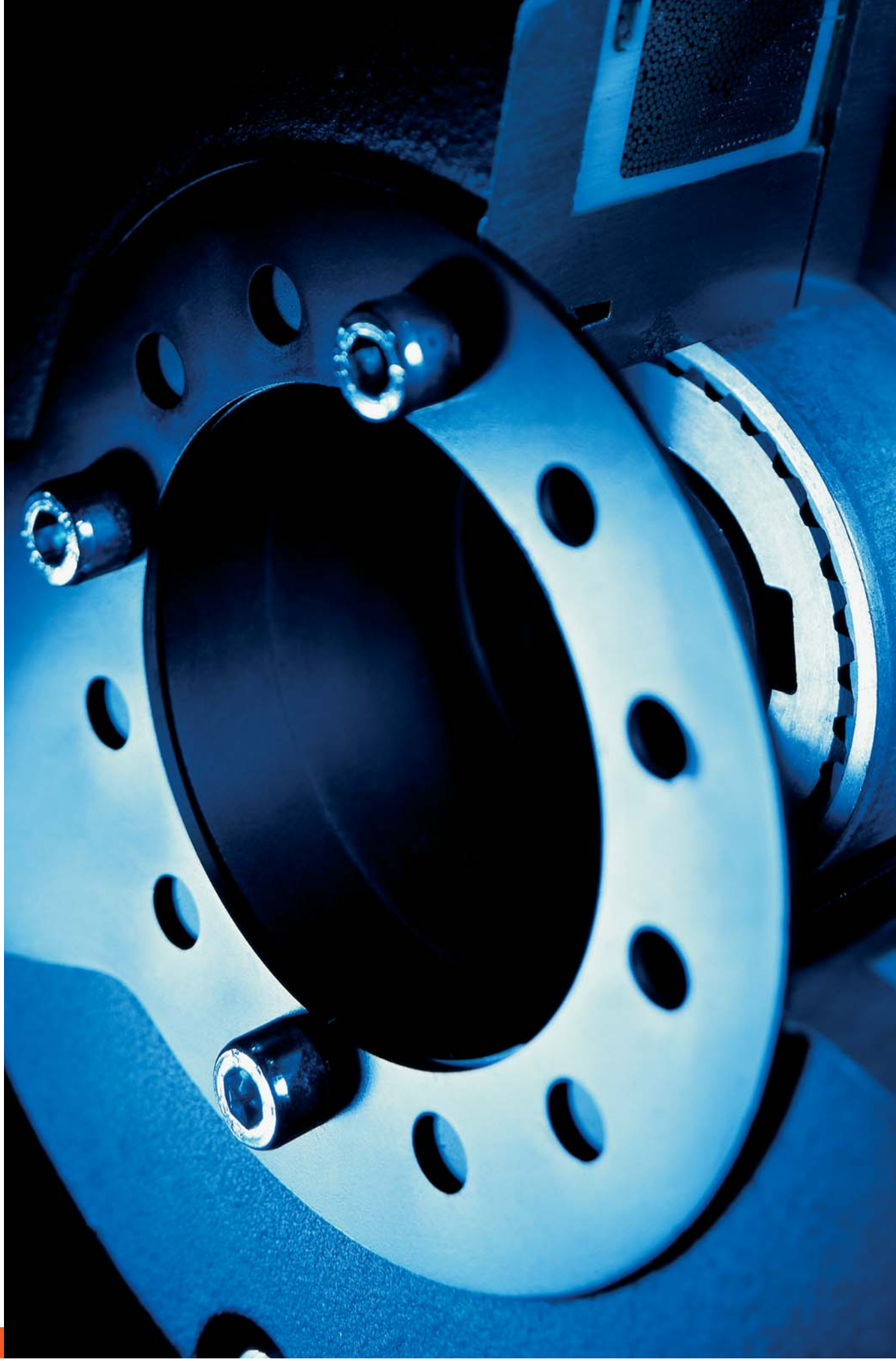
This system offers flexibility by combining the basic modules with additional components to cover the widest possible range of applications. This catalogue is designed to assist you in selecting and ordering your desired spring-applied brake quickly and easily.

This catalogue contains

- Spring-applied brakes in nine different sizes
- Electrical accessories
- Calculation example
- Order form

The modular system for all applications

- Brake motors
- Cranes
- Warehousing
- Industrial trucks
- Wood working machines
- Stage machinery
- Vehicles for the disabled
- Automation technology
- Drives with controlled torque
- Gate drives
- Escalators



Contents

INTORQ BFK458-□□□ product key

B FK 458 - □□ □

Product group: Brakes

Product family: Spring-applied brakes

Type

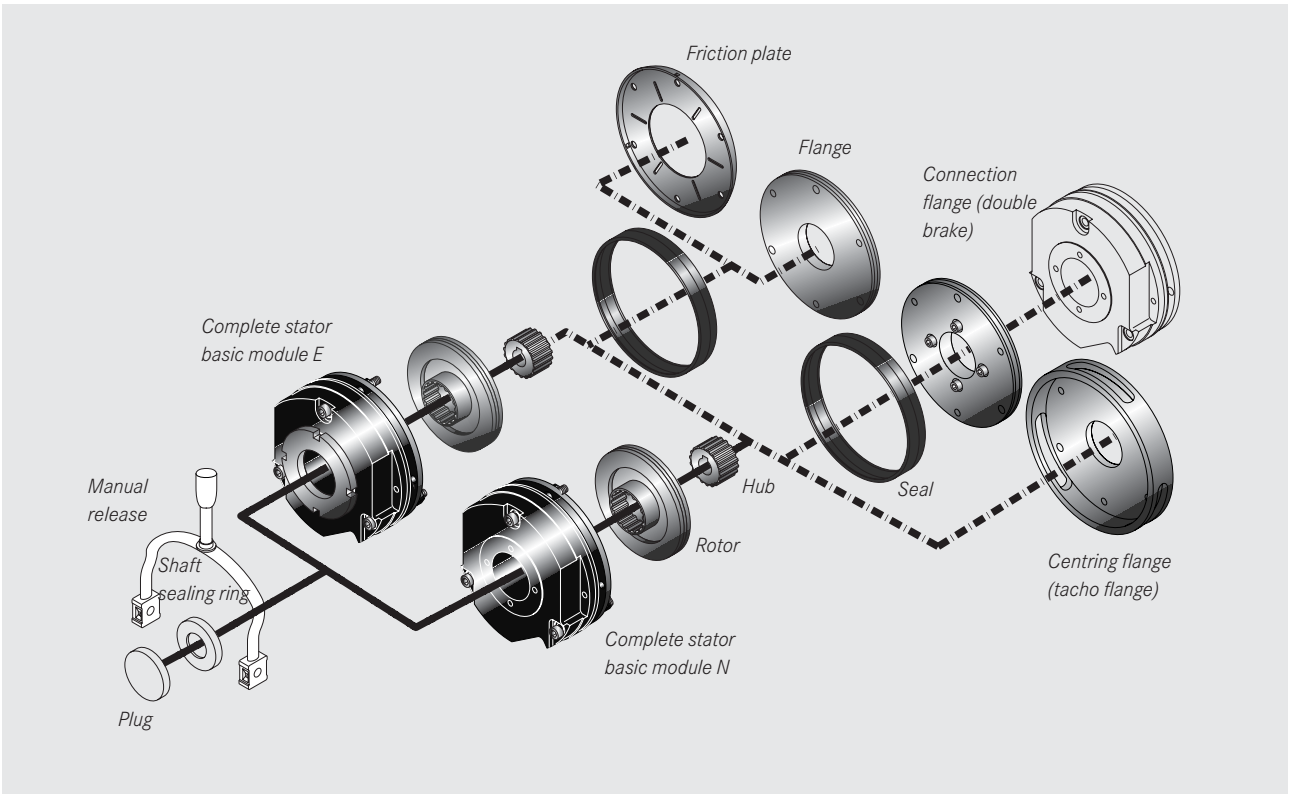
Size

Design

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

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

Not encrypted:
Supply voltage, hub bore, options



List of abbreviations

P	[kW]	Drive power
M_K	[Nm]	Rated torque of brake
M_{load}	[Nm]	Load torque
M_{req}	[Nm]	Required braking torque
M_a	[Nm]	Deceleration torque
Δn_0	[rpm]	Initial relative speed of the brake
J_{load}	[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 reduction 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_{perm}	[J]	Max. permissible friction energy per switching cycle
S_h	[h^{-1}]	Operating frequency, i.e. the number of periodical brake operations
S_{air}		Rated air gap

Product information

INTORQ 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 torques from 2 to 600 Nm
- Short delivery times for the complete range, thanks to optimised logistics
- IP 54 enclosure, depending on the specific operating conditions
- CSA-CUS (UL) design as standard
- 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
- Replacement product for the14.448 and 14.450 brake ranges

Torque transmission

- designed for dry running

Ready for operation immediately

- Preset air gap, easy and quick mounting
- Special machining of the friction surfaces ensures that the rated torques are achieved after very few switching operations without a run-in procedure
- No fixed bearing is required on the brake

Durable

- The insulation system to temperature class F (155°C) ensures that the winding has a long service life
- Brakes are designed for 100% duty time (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 depending on the friction energy used

Reliable

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

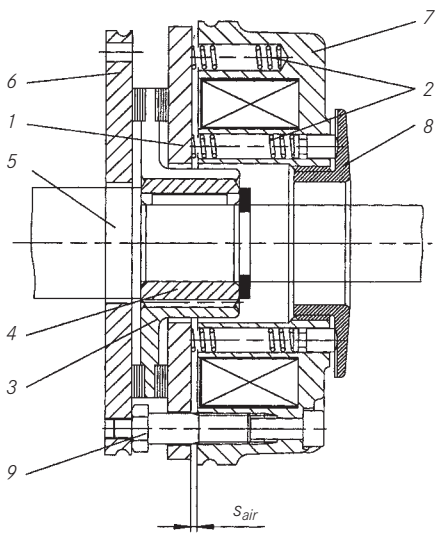
Options

- Manual release for all sizes, both directions can be used for release and mounting (one exception is the tacho brake)
- Noise-reduced designs
- Different types of corrosion protection and enclosures
- Microswitches used to monitor air gap and wear (size 12 and above)
- Monitoring of manual release function (page 22)
- Non-standard voltages and bores on request

Principle of operation

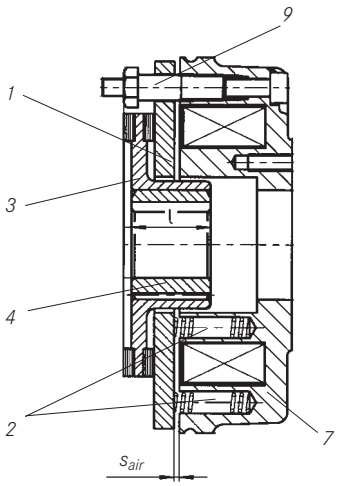
INTORQ BFK458 spring-applied brake

Basic 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_{air} = Air gap

Basic 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_{air} 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. Basic module E supports the use of the torque adjustment ring (8) to reduce the braking torque.

Example applications

INTORQ BFK458 spring-applied brake

Curtain up for INTORQ brakes
Noise-reduced double-spring-applied brakes are used in stage machinery for redundant braking systems.

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 options 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
Rated torques [Nm], related to the relative speed Δn = 100 rpm								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
	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)

Holding brake with emergency stop operation (s_{airmax} approx. 1.5 x s_{air})

Operating brake (s_{airmax} approx. 2.5 x s_{air})

Standard braking torque

Basic module E, reduced braking torque

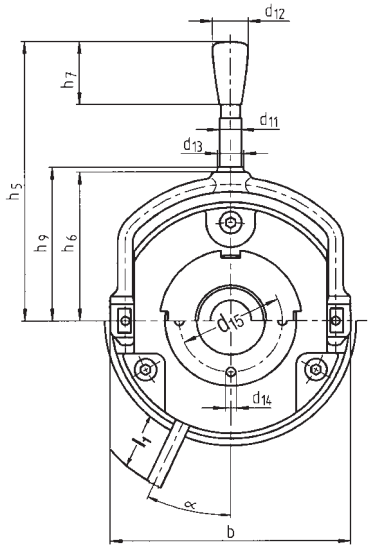
The braking torque on basic module E can be reduced using the torque adjustment ring located in the stator. The torque adjustment ring can be unscrewed to a maximum dimension of h_{1max} (see table on page 12).

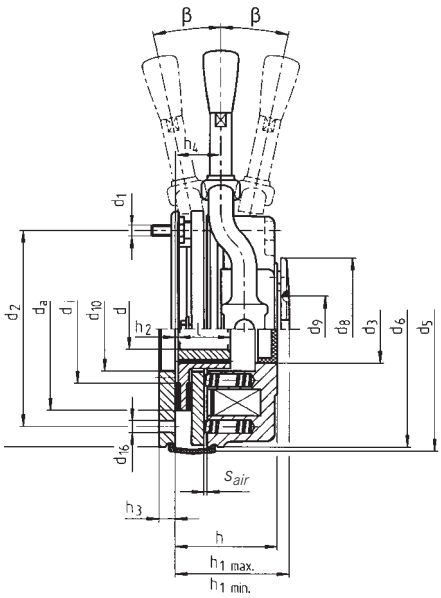
It should be noted that the engagement and disengagement times change in accordance with the braking torque. Torque reduction is independent of the rated torque used.

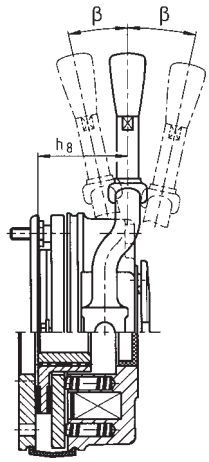
Size	06	08	10	12	14	16	18	20	25
Torque reduction per detent position [Nm]	0.2	0.35	0.8	1.3	1.7	1.6	3.6	5.6	6.2

Technical data

Basic module E/N + flange + manual release







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

Size	b	d^{J7} 1) pilot	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) Pilot bore without keyway
- 2) Standard keyway to DIN 6885/1 P9, selection of shaft diameter depends on load type (see Operating Instructions)
- * Bore diameter Ø 38, DIN 6885/3 P9 keyway
- 3) Bores are added 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

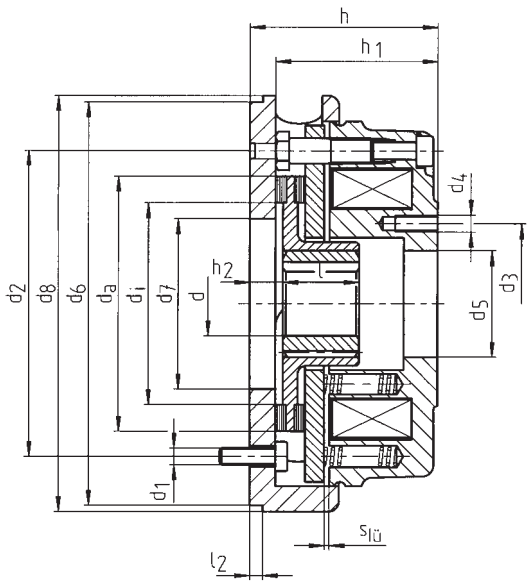
Size	h	h_1 min.	h_1 max.	h_2	h_3	h_4	h_5 standard	h_5 max.	h_6	h_7	h_8	h_9	l	l_1 5)	s_{air}	α	β 6)
06	36.3	39.3	43.25	1	6	15.8	107	–	54.5	23	32.8	56.3	18	400	0.2	25°	12°
08	42.8	46.8	50.8	1.5	7	16.3	116	–	63	23	41.3	65	20	400	0.2	25°	10°
10	48.4	52.4	55.9	2	9	27.4	132	–	73.8	23	42.4	77.8	20	400	0.2	25°	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 7)	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 7)	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 7)	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

Basic module N + centring flange

Brake suitable for mounting a speed or angle sensor



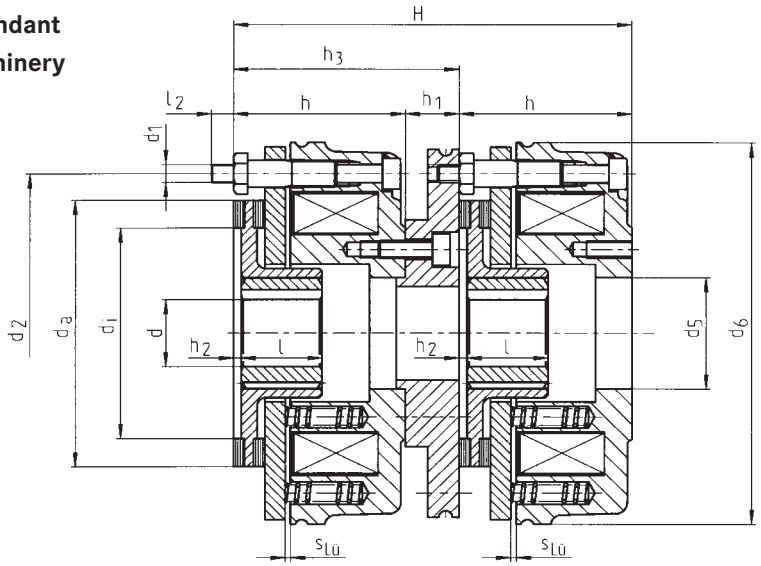
Size	h	h_1	h_2	d^{H7} max.	d_1 [1]	d_2	d_3	d_4 [5]	d_5^{H7}	d_6^{h7}	d_7^{H7}	d_8	di	da	l	l_1 [2]	l_2	s_{air}
06	42.3	36.3	7	15	3xM4	72	37.7	4xM4	25	95	40	98	40	60	18	400	2	0.2
08	49.8	42.8	8.5	20	3xM5	90	49	4xM5	32	115	50	116	47	77	20	400	2	0.2
10	57.4	48.4	11	20	3xM6	112	54	4xM5	42	140	60	141	66	95	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	105.7	17	70	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 12
[4] DIN 6885/3-P9 slot
[5] Bores are added on customer request for sizes 06–12
Dimensions in mm

Technical data

Basic module N + connection flange + basic 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_{air}
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	38 [2]	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	236.4	105.7	25	4.5	130.7	50	600	21.5	0.5

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

Noise-reduced designs

The noise reduction required for stage machinery and in many other example applications can be achieved in two ways:

1. Impact-noise-reduced armature plate

The brake's operating noise can be minimised using O rings, which are installed between the magnet housing and the armature plate as shock absorbers.

2. Noise-reduced aluminium rotor

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

Technical data

Rated data

Size	P[1] [20 °C] [W]	s_{airmax} operating brake [mm]	s_{airmax} holding brake [mm]	Max. adjustment [mm]	Min.[2] rotor thickness [mm]	$J_{plastic\ rotor}$ [kgcm²]	$J_{aluminium\ rotor}$ [kgcm²]	Mass stator assembly [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 5 times.

Braking torques, depending on speed and permissible limit speeds

Size	Reference variable rated torque at Δn=100 rpm [%]	Braking torque at Δn_0 [rpm] [%] 1500	3000	max.	Max. speed Δn_{0max} [rpm]
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

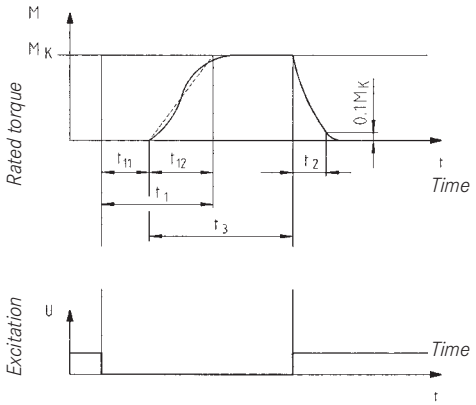
As speed increases, so does wear.

Technical data

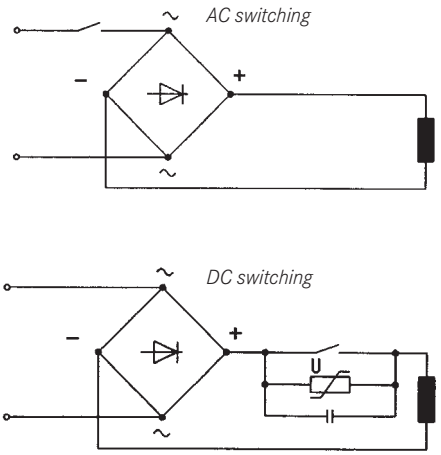
Operating times

The listed operating times apply to DC switching with rated air gap s_{air} and a warm coil. The times are mean values which may vary depending on the method of rectification and the air gap s_{air}. 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

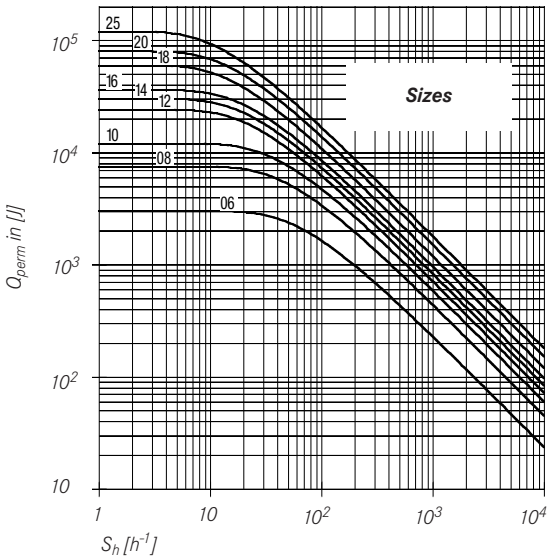


Size	Braking rated torque value at Δn = 100 rpm M_K [1] [Nm]	Maximum permissible switching energy with single operating Q_E [J]	Transition operating frequency $S_{hü}$ [h^{-1}]	Operating times [ms] [2] at $s_{airRated}$ engagement on DC side t_{11}	t_{12}	t_1	Disengagement t_2
06	4	3000	79	15	13	28	45
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

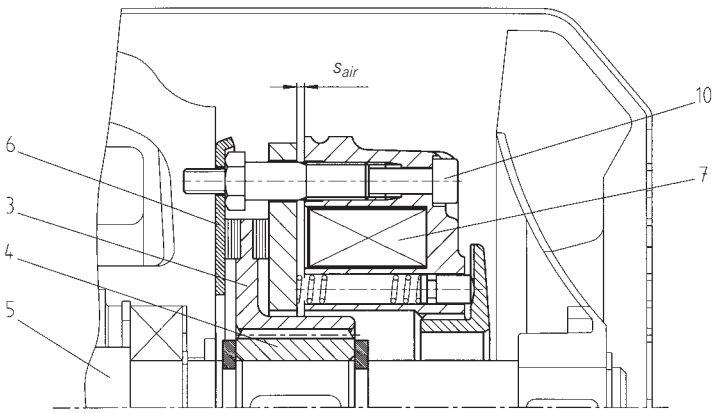
Permissible friction energy Q_{perm} depending on operating frequency S_h



Mounting instructions

If no suitable counter friction face is available, a flange or a friction plate (6) can be used.

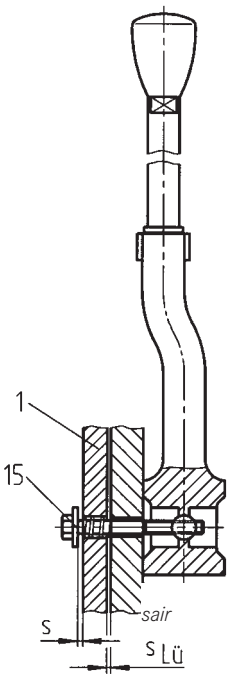
- Mount the hub (4) onto the shaft (5) and secure against axial movement.
- Push the rotor (3) onto the hub (4).
- Insert the fixing screws (10) into the stator through the bores and screw into the threaded holes on the counter friction face.
- Remove the transport clips.
- Check air gap s_{air}.
- Friction surfaces should be kept free of oil and grease.
- Make electrical connection.



Service life

The brake has to be adjusted on reaching s_{airmax}. The required friction energy depends on various factors, namely the inertias to be braked, the shaft speed, the operating frequency and the resulting temperature on the friction surfaces. For these reasons, no general statement can be made about the friction energy available until adjustment, which applies to all operating conditions. For more detailed information, please indicate the specific operating conditions (consult manufacturer).

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

Caution:

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

Flange

Friction plate (sizes 06 – 16)

Flange

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

Friction plate

If a plain machined counter face is available, but cannot be used as a friction surface (for example in the case of aluminium), we recommend the use of a friction plate, which can also be combined with a seal. The friction plate is made of non-rusting material and can be supplied up to and including size 16.

Accessories

Centring flange

Connection flange

Seal

Centring flange (tacho brake)
Basic 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.

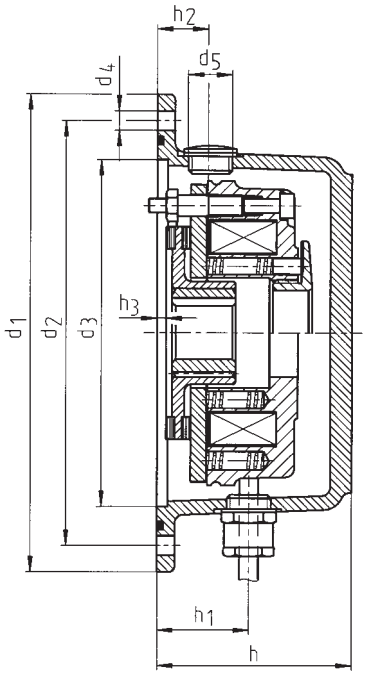
Seal
To a large extent, the seal prevents the exit or ingress of dust, humidity, dirt, etc., out of or into the braking area. The seal is inserted into the groove on the stator. If no suitable groove is available on the counter friction face, we recommend the use of a flange or a friction plate.

Accessories

Brake cover

Basic 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 acc. 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

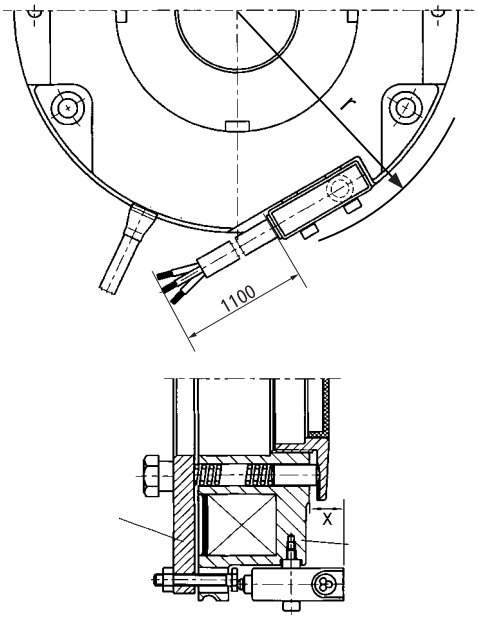
Accessories

Microswitch

The microswitch is used to monitor the air gap and is available for sizes 12 – 25 on request. When the armature plate (1) makes contact with the stator (7), the motor contactor is controlled via the microswitch. The motor can only start if the brake is released. If the maximum air gap s_{airmax} is reached, the stator no longer attracts the armature plate. If the motor contactor is not activated, the motor will not start.

The air gap s_{air} can be readjusted if using brake module E or brake module N. The microswitch can also be set such that a signal is output before the wear reserve is reached (wear monitoring).

Mounting the microswitch onto brake module E



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

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.

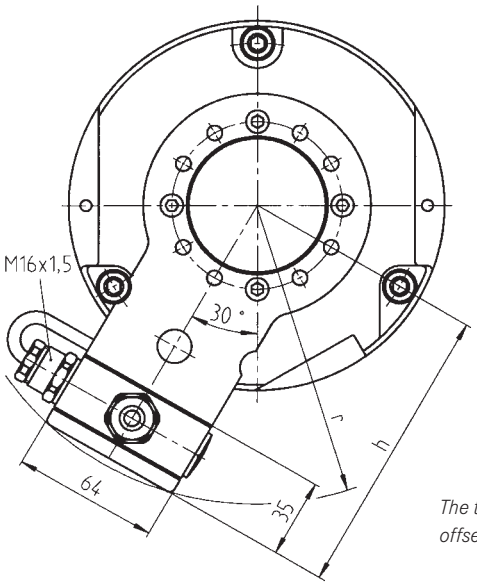
The fixing bracket is screwed onto the magnet housing or stator via the bores on the face. The fixing bracket enables a microswitch to be fastened to it. Both directions of release, towards and away from the motor, can be implemented by using different fixing brackets and microswitch settings.

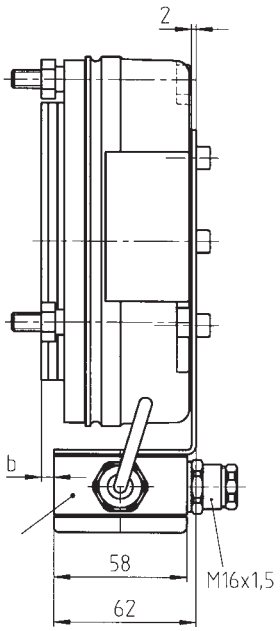
Accessories

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

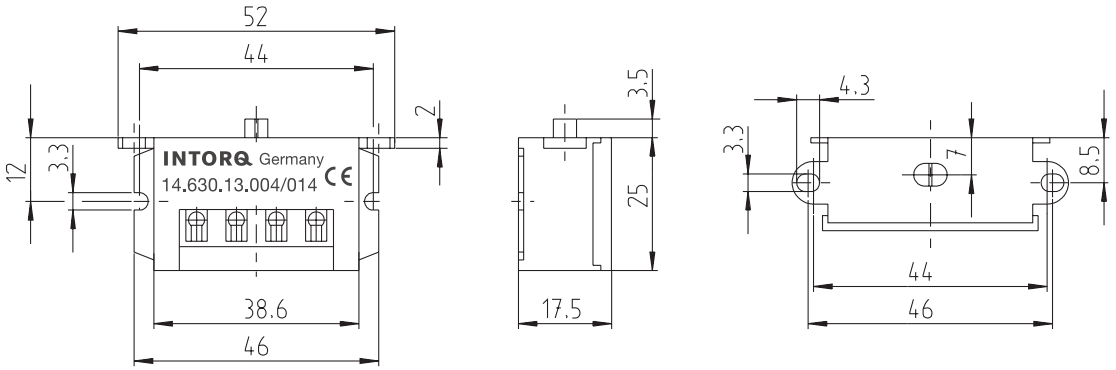
Dimensions in mm

Accessories

4-pole bridge rectifiers and half-wave rectifiers

Dimensions

INTORQ 14.630.13.004/14
INTORQ 14.630.14.004/14



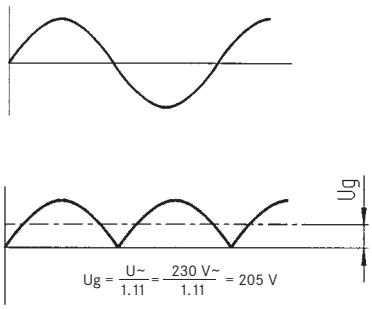
4-pole bridge rectifier
INTORQ 14.630.13.004 without snap-in stud
INTORQ 14.630.13.014 with snap-in stud

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

Technical data

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

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



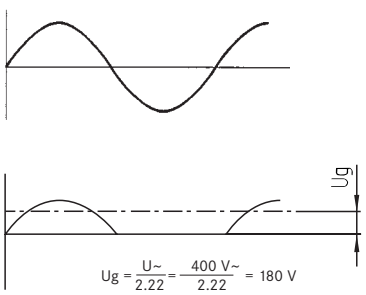
4-pole half-wave rectifier
INTORQ 14.630.14.004 without snap-in stud
INTORQ 14.630.14.014 with snap-in stud

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

Technical data

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

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



Accessories

Bridge rectifiers and half-wave rectifiers

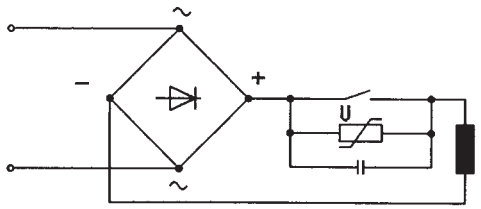
INTORQ 14.198.00.0☐ universal spark suppressor

The universal spark suppressor limits the inductive voltages which appear when switching off clutches and brakes on the DC side. These inductive voltages can otherwise damage coils and switches. Therefore, VDE 0580 requires appropriate protective measures to avoid excessive switch-off surges and overvoltages. Four types of universal spark suppressors are available for the following voltage ranges:

Type	Coil voltage U	Coil power P_{max}
INTORQ 14.198.00.01	24 V – 50 V	110 W
INTORQ 14.198.00.02	50 V – 120 V	110 W
INTORQ 14.198.00.03	120 V – 200 V	110 W
INTORQ 14.198.00.04	200 V – 250 V	110 W

DC switching

Connection example

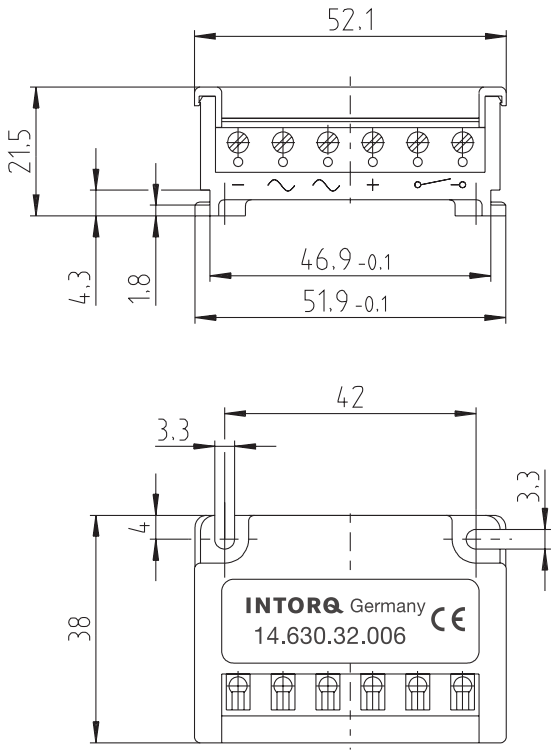


Accessories

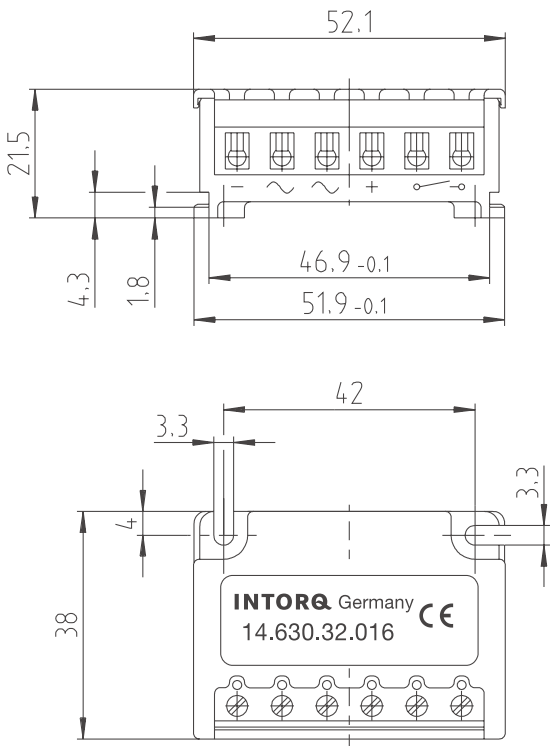
6-pole bridge rectifier

Dimensions

INTORQ 14.630.32.006
INTORQ 14.630.33.006



INTORQ 14.630.32.016
INTORQ 14.630.33.016



6-pole bridge rectifier
INTORQ 14.630.32.006 vertical
INTORQ 14.630.32.016 horizontal

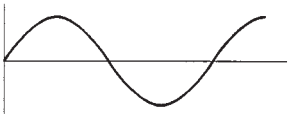
Application:
Current supply of spring-applied brakes from AC mains (for normal excitation)
Example: 205 V coil on 230 V mains

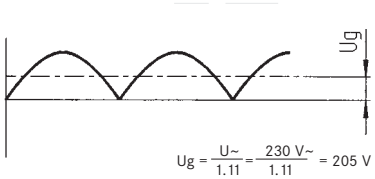
Technical data

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

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

The INTORQ 14.630.32/33.006/16 rectifiers contain the spark suppressor required by VDE 0580 Section 26.



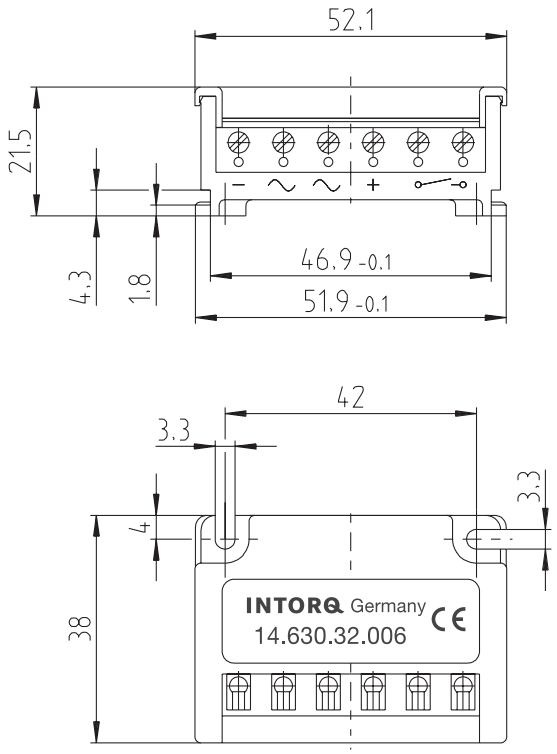


Accessories

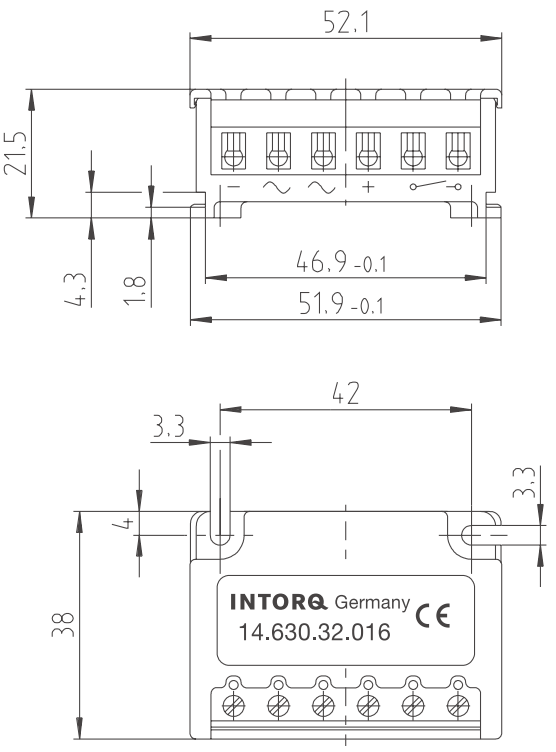
6-pole half-wave rectifier

Dimensions

INTORQ 14.630.32.006
INTORQ 14.630.33.006



INTORQ 14.630.32.016
INTORQ 14.630.33.016



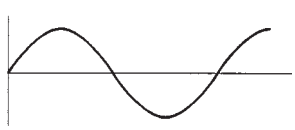
6-pole half-wave rectifier
INTORQ 14.630.33.006 vertical (460 V)
INTORQ 14.630.33.016 horizontal (460 V)
INTORQ 14.630.34.006 vertical (555 V)
INTORQ 14.630.34.016 horizontal (555 V)

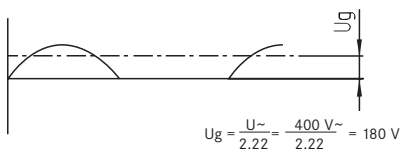
Application:
Current supply of spring-applied brakes from AC mains (for normal excitation)
Example: 180 V coil on 400 V mains

Technical data

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

The rectifiers are protected against overvoltage by varistors in the input and output. INTORQ 14.630.32/33.006/16 rectifiers also contain the spark suppressor required by VDE 0580 Section 26.

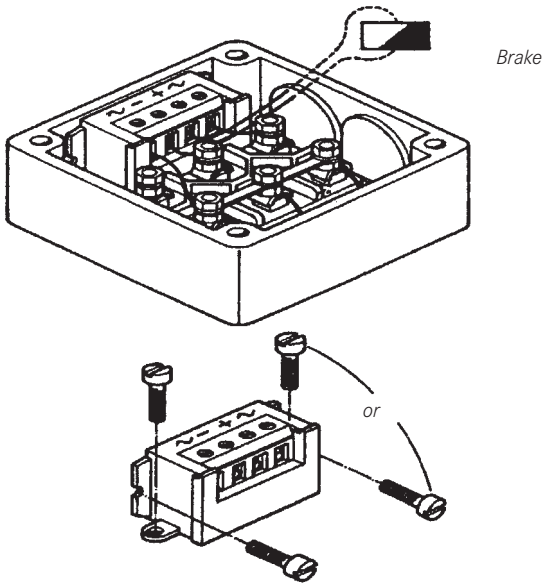




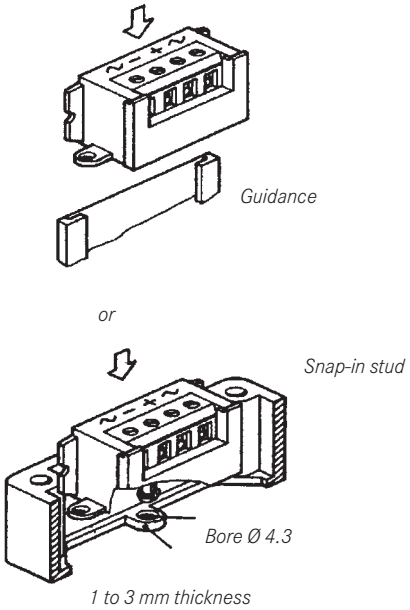
Accessories

Fastening options

4-pole bridge rectifier
INTORQ 14.630.13.004
INTORQ 14.630.13.014 with snap-in stud

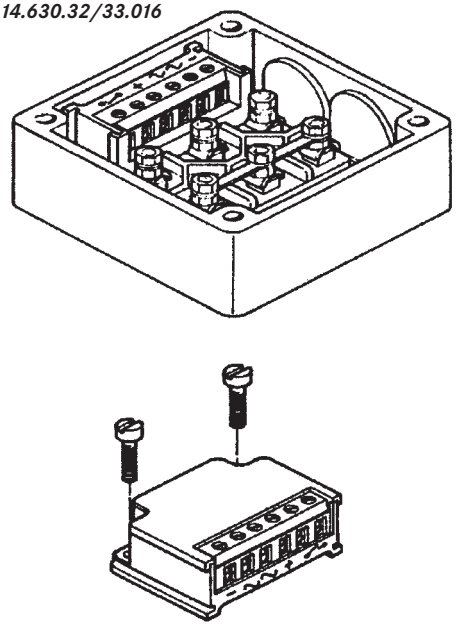


4-pole half-wave rectifier
INTORQ 14.630.14.004
INTORQ 14.630.14.014 with snap-in stud



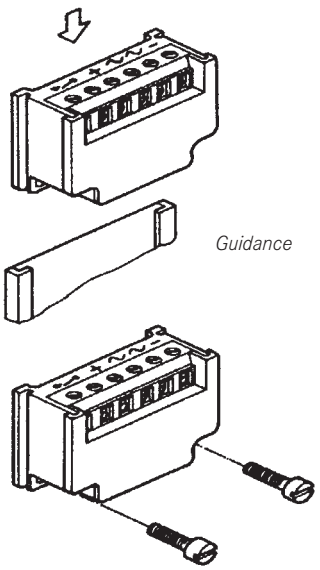
6-pole bridge rectifier
INTORQ 14.630.32.006 vertical
INTORQ 14.630.32.016 horizontal

INTORQ 14.630.32/33.016



6-pole half-wave rectifier
INTORQ 14.630.33.006 vertical
INTORQ 14.630.33.016 horizontal

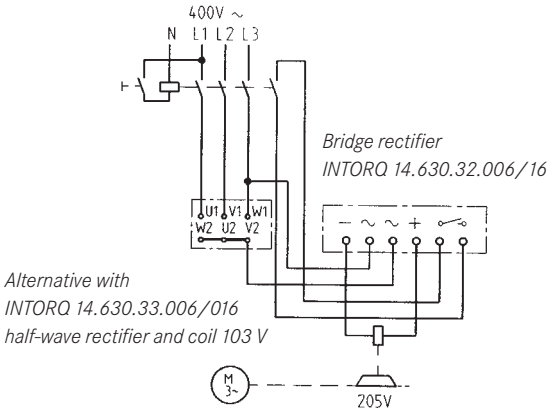
INTORQ 14.630.32/33.006



Accessories

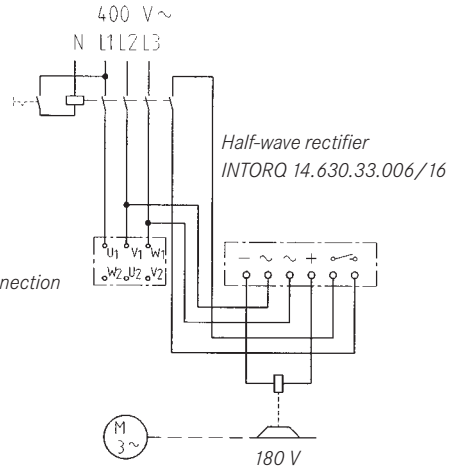
Connection diagrams

DC switching



Bridge rectifier
INTORQ 14.630.32.006/16

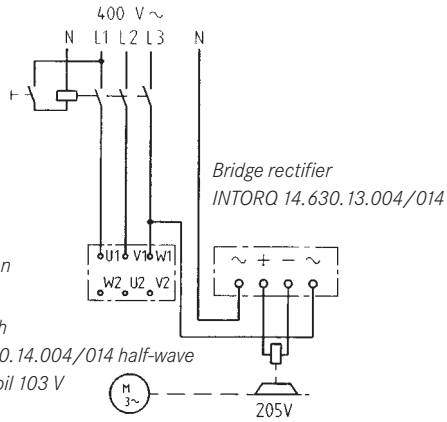
Alternative with
INTORQ 14.630.33.006/016
half-wave rectifier and coil 103 V



Half-wave rectifier
INTORQ 14.630.33.006/16

Also for
star connection

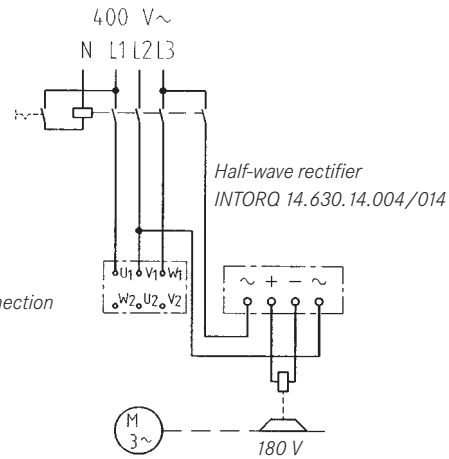
AC switching



Bridge rectifier
INTORQ 14.630. 13.004/014

Also for
star connection

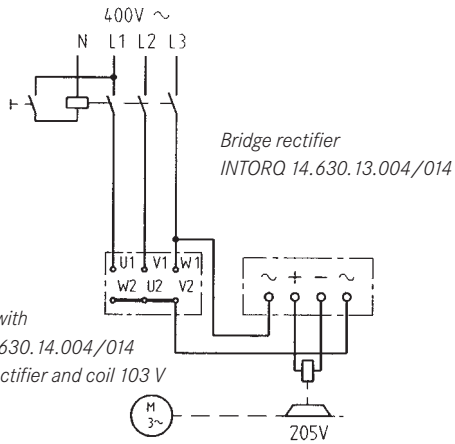
Alternative with
INTORQ 14.630.14.004/014 half-wave
rectifier and coil 103 V



Half-wave rectifier
INTORQ 14.630.14.004/014

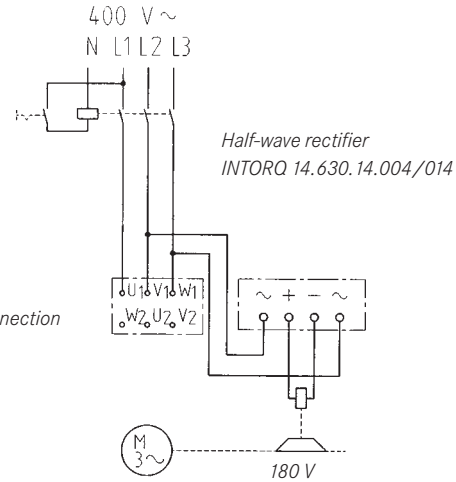
Also for
star connection

AC switching parallel to the motor



Bridge rectifier
INTORQ 14.630. 13.004/014

Alternative with
INTORQ 14.630. 14.004/014
half-wave rectifier and coil 103 V



Half-wave rectifier
INTORQ 14.630. 14.004/014

Also for
star connection

Accessories

Supply voltage selection table

Rectifier type and rated coil voltage for mains voltage

AC voltage [V]	Rectifier	Rectifier type 4-pole INTORQ	Spark suppressor INTORQ	Rectifier type 6-pole (with integrated spark suppressor) INTORQ	Coil rated voltage [V]
42 V	Half wave	14.630.14.004/014	14.198.00.01	14.630.33.006/016	20 V
48 V	Bridge Half wave	14.630.13.004/014 14.630.14.004/014	14.198.00.01 14.198.00.01	14.630.32.006/016 14.630.33.006/016	42 V 20 V
110 V	Bridge	14.630.13.004/014	14.198.00.02	14.630.32.006/016	103 V
220 V	Bridge Half wave	14.630.13.004/014 14.630.14.004/014	14.198.00.04 14.198.00.02	14.630.32.006/016 14.630.33.006/016	205 V 103 V
230 V	Bridge Half wave	14.630.13.004/014 14.630.14.004/014	14.198.00.04 14.198.00.02	14.630.32.006/016 14.630.33.006/016	205 V 103 V
240 V	Bridge Half wave	14.630.13.004/014 14.630.14.004/014	14.198.00.04 14.198.00.02	14.630.32.006/016 14.630.33.006/016	215 V 103 V
255 V	Bridge	14.630.13.004/014	14.198.00.04	14.630.32.006/016	225 V
277 V	Half wave	14.630.14.004/014	14.198.00.03	14.630.33.006/016	127 V
290 V	Half wave	14.630.14.004/014	14.198.00.03	14.630.33.006/016	127 V
380 V	Half wave	14.630.14.004/014	14.198.00.03	14.630.33.006/016	180 V
400 V	Half wave	14.630.14.004/014	14.198.00.03	14.630.33.006/016	180 V
415 V	Half wave	14.630.14.004/014	14.198.00.03	14.630.33.006/016	180 V
420 V	Half wave	14.630.14.004/014	14.198.00.03	14.630.33.006/016	180 V
440 V	Half wave	14.630.14.004/014	14.198.00.04	14.630.33.006/016	205 V
460 V	Half wave	14.630.14.004/014	14.198.00.04	14.630.33.006/016	205 V
480 V	Half wave	14.630.14.004/014	14.198.00.04	14.630.34.006/016*	215 V
500 V	Half wave	14.630.14.004/014	14.198.00.04	14.630.34.006/016*	225 V
555 V	Half wave	14.630.14.004/014	14.198.00.04	14.630.34.006/016*	250 V

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

Note

Max. DC current:
INTORQ 14.630.13/14.004/014: 1A at 60°C
INTORQ 14.630.32/33/34.006/016: 0.75 A at 60°C

Max. rated coil voltage: 250 V
Standard rated voltages:
24, 96, 103, 170, 180, 190, 205 V

Selection

Basic information

The size of a brake is largely determined by the required braking torque M_{req}.
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 7.

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:

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

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

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

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.

$$M_{req} = (M_a \pm M_{load}) \cdot K \leqq M_K$$

$$M_{req} = \left(\frac{J_{load} \cdot \Delta n_0}{9.55 \cdot \left(t_3 - \frac{t_{12}}{2} \right)} \pm M_{load} \right) \cdot K \leqq M_K$$

+ M_{load} = to be used when lowering a load, for example
– M_{load} = 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:

$$M_{reqf} = 9550 \frac{P}{\Delta n_0} K \leqq M_K$$

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:

$$Q = \frac{J_{load} \cdot \Delta n_0^2}{182.5} \cdot \frac{M_K}{M_K \pm M_{load}}$$

– M_{load} = to be used when lowering a load, for example
+ M_{load} = for normal braking

The permissible friction energy per switching cycle at a given operating frequency can be taken from the diagrams on page 16. If the friction energy per switching cycle is known, the permissible operating frequency can be taken from the diagrams mentioned above.

Selection

Calculation example

The following technical data is known:

P = 3 kW

Δn_0 = 1450 rpm

J_{load} = 0.52 kgm^2 total

t_3 = 2 s

M_{load} = 15 Nm

S_h = 6 operations/h

Approximate determination of the required braking torque and the size:

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

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

Assume INTORQ BFK458-14

Calculating the required braking torque

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

t_{12} = 0.025 s (see page 16)

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

Therefore, INTORQ BFK458-14 is chosen.

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

Thermal checking

$$Q = \frac{J_{load} \cdot \Delta n_0^2}{182.5} \cdot \frac{M_K}{M_K \pm M_{load}}$$

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

Calculated switching energy Q = 4792 J/switching cycle
The diagram on page 16 shows a permissible switching energy of 30,000 J for size 14 at S_h = 6 h^{-1}.

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

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 DC

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 _____ pieces

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

Design
☐ **E** (with torque adjustment ring)
☐ **N** (without torque adjustment ring)

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

Braking torque _____ Nm (see torque gradings)

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

Manual release ☐ Assembled

Armature plate ☐ Standard ☐ Chromium-plated (size 06 and above) ☐ 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 (size 12 and above)

Order form

Accessories

Rotor ☐ **Plastic** (size 06/08 only) ☐ **Aluminium** ☐ **Noise-reduced** (rotor with sleeve)

Rotor with low rate of wear ☐ **Aluminium** ☐ **Noise-reduced** (rotor with sleeve)

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
- ☐ Tacho flange
- ☐ Connection flange double brake

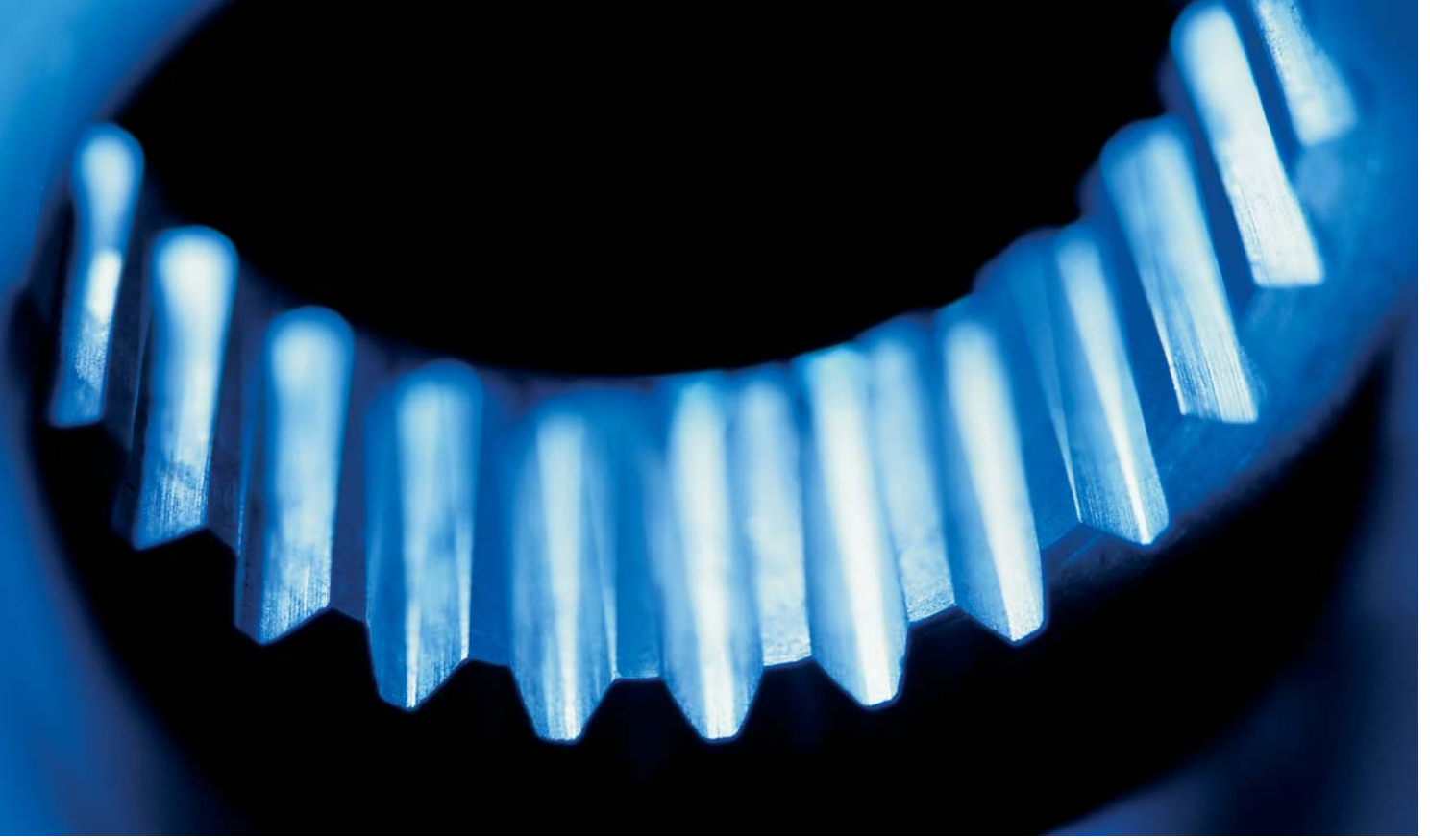
Seal
- ☐ Seal
- ☐ Shaft sealing ring (shaft diameter on request)
- ☐ Cap
- ☐ Brake cover

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 ☐



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Contact the Lenze service centres and sales partners through the Lenze website **www.Lenze.com.**

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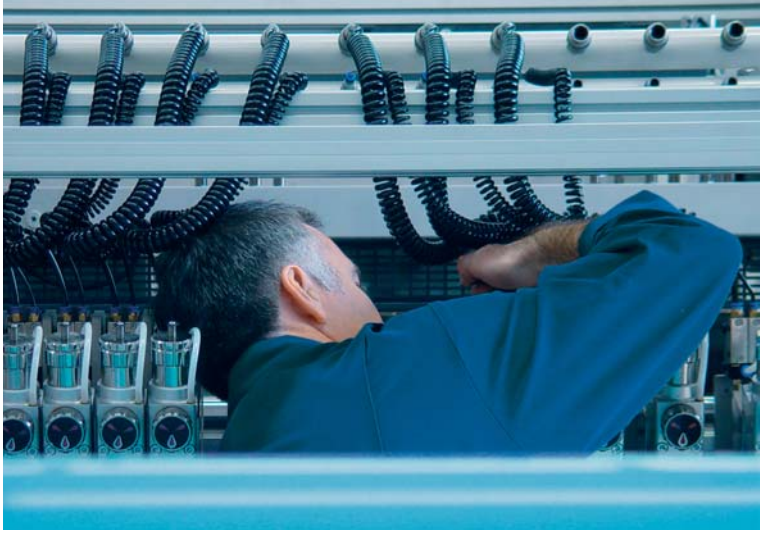

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