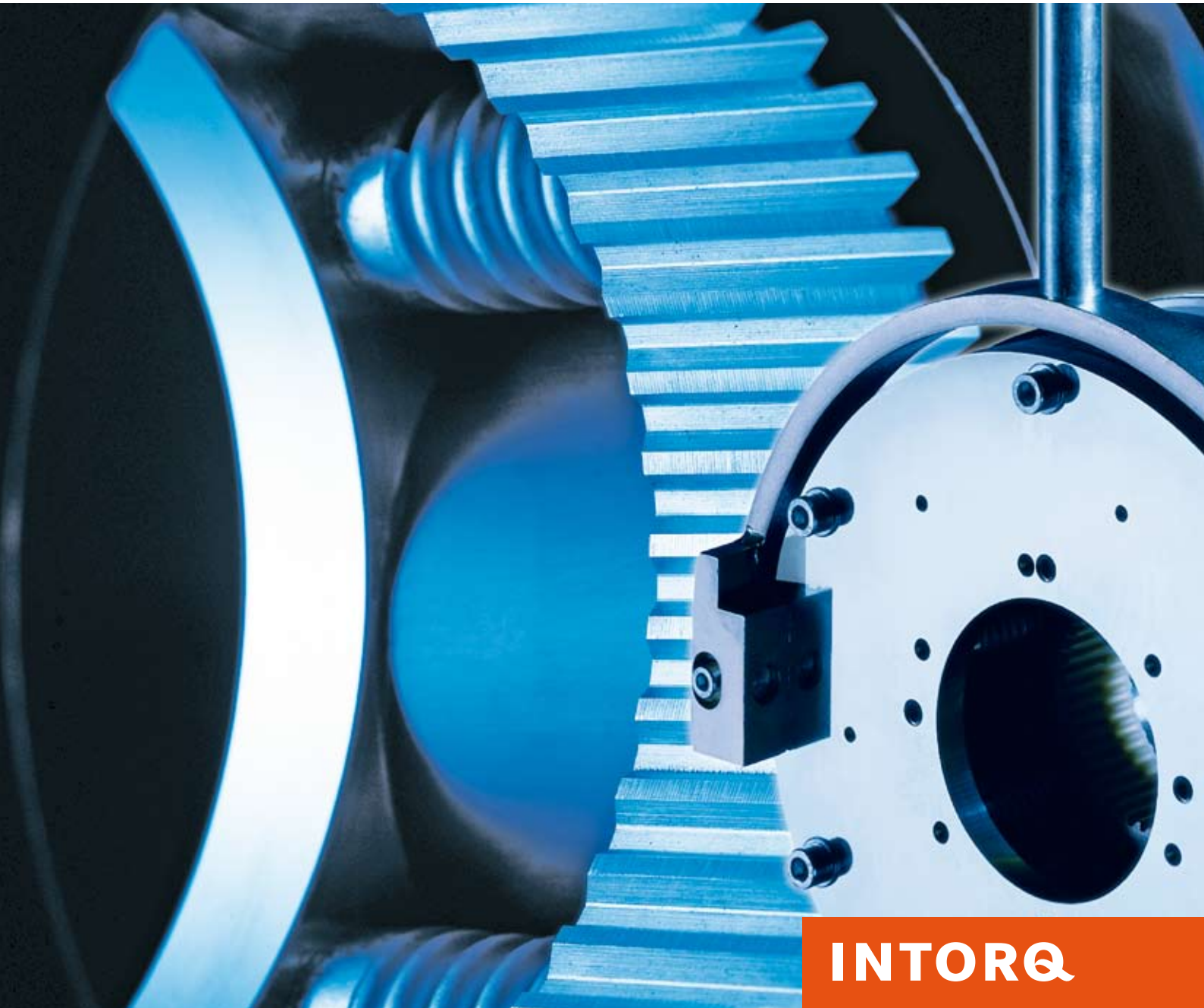


Spring-applied brake
INTORQ BFK468

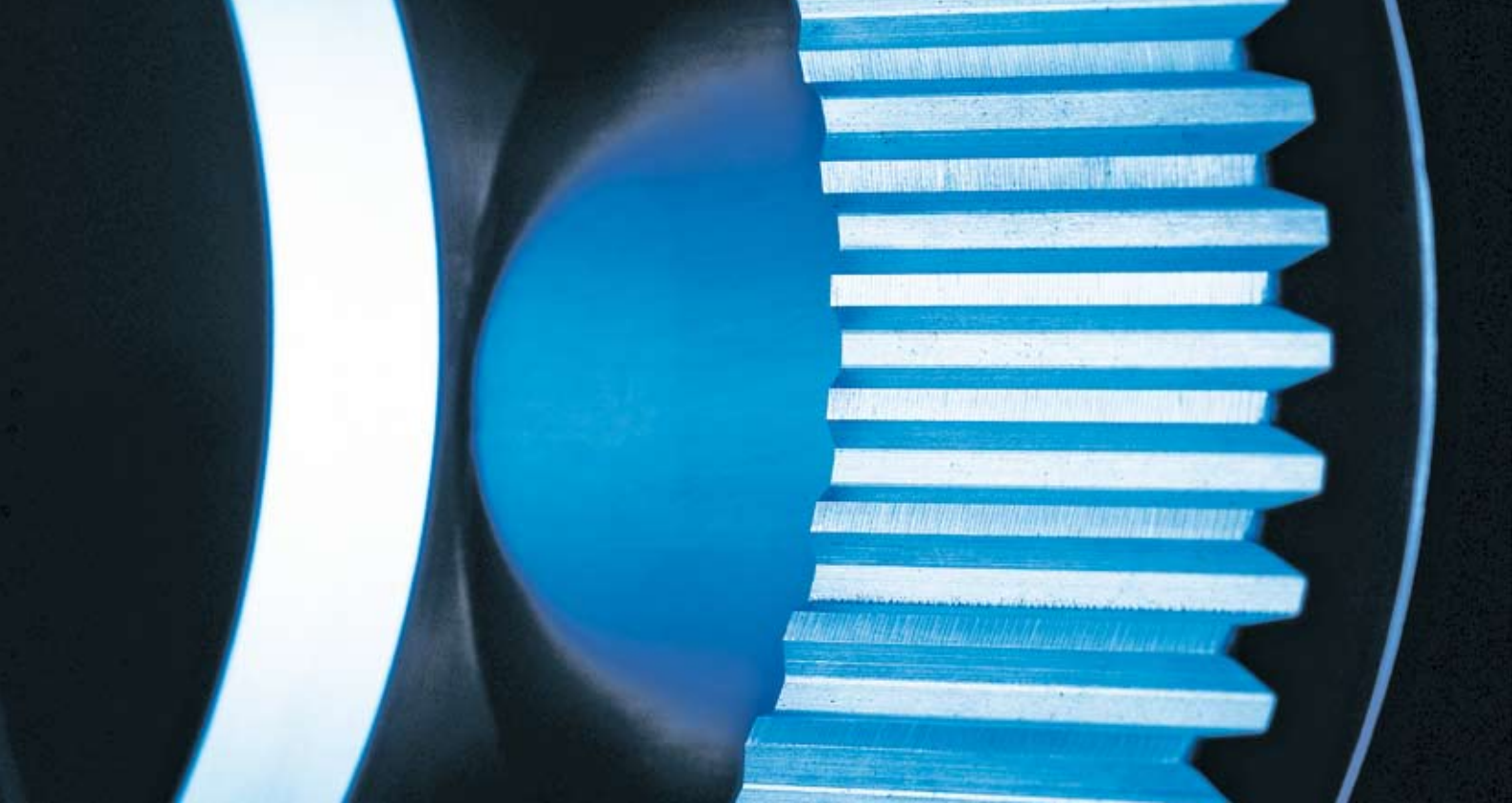
The new performance standard
100 – 2400 Nm



INTORQ

setting the standard

www.intorq.de



BFK468 spring-applied brake

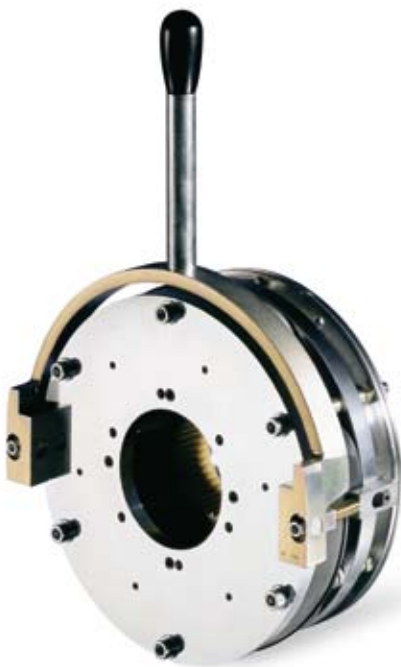
High-power drives are achieving higher and higher motor speeds and drive torques. Despite having to deliver more and more power, the space available to the brake continues to shrink. Innovative multi-pin technology forms the basis for a new power class.

Features

- Up to twice the braking torque of the BFK458
- Fixed or adjustable braking torque
- Short operating times
- Long maintenance intervals thanks to large working air gap

Example applications

- Brake motors
- Cranes
- Dockyards
- Stage machinery
- Storage technology
- Escalators





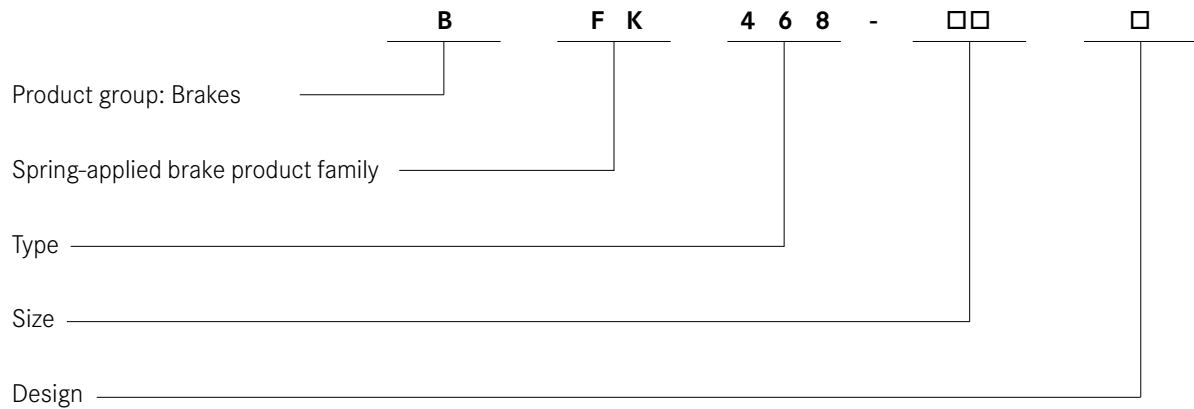
Contents

| | |
|-----------------------------------|----|
| Product information | 5 |
| Functional principle | 6 |
| Technical data | |
| Braking torques | 7 |
| Rated data | 9 |
| Operating times | 9 |
| Service life and wear | 10 |
| Accessories | |
| Manual release/flange/cover ring | 11 |
| Brake cover | 12 |
| Microswitch | 12 |
| Bridge/half-wave rectifier | 14 |
| Available variants | 15 |

List of abbreviations

| | | | | | |
|------------------------|-------|--|-------------------------|--------------------|---|
| P | [kW] | Drive motor power | t₁₁ | [s] | Delay time on engagement (time from disconnecting the voltage until the torque begins to rise) |
| P_{max} | [W] | Maximum power when releasing the brake with over-excitation | t₁₂ | [s] | Rise time of braking torque |
| P₂₀ | [W] | Coil power at 20 °C in continuous operation with holding current derating | Q_{perm} | [J] | Max. permissible friction energy per switching cycle |
| M_k | [Nm] | Characteristic torque of brake | S_h | [h ⁻¹] | Operating frequency, i.e. the number of braking instances evenly distributed across the time unit |
| Δr₀ | [rpm] | Initial relative speed of brake | S_{lü} | | Rated air gap |
| t₁ | [s] | Engagement time, t ₁ = t ₁₁ + t ₁₂ | | | |
| t₂ | [s] | Disengagement time (time from when the torque starts to drop until 0.1 M _k is reached) | | | |
| t₃ | [s] | Slipping time (time during which a relative motion occurs between the input and output, with brake applied) | | | |

Product key, INTORQ BFK468-□□□



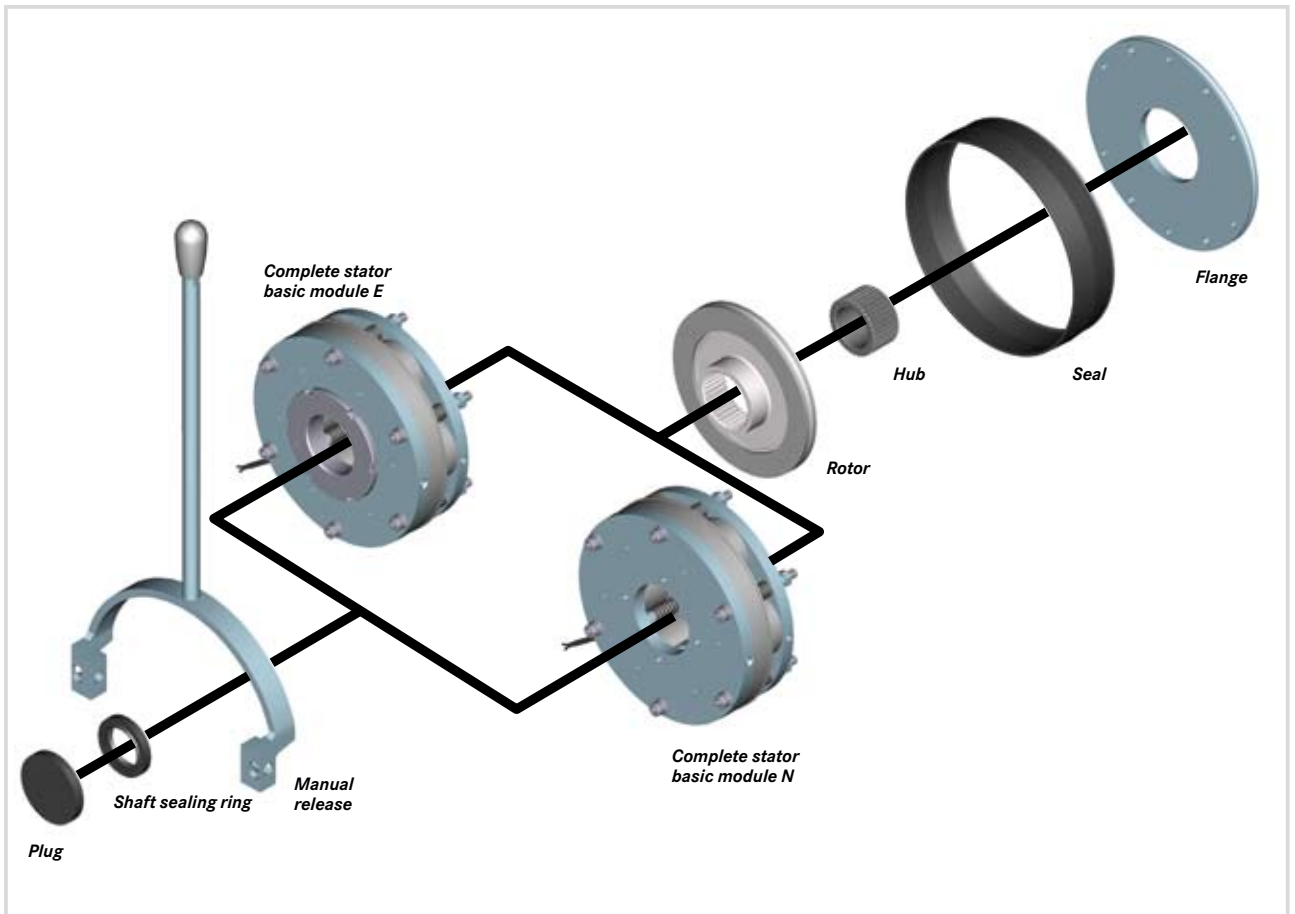
Size

18, 20, 25, 31

Stator design

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

N - Non-adjustable



BFK468 modular system

Product information

A powerful and complete range

- 4 sizes
- Standard voltages 205/103 V, 360/180 V (release voltage/holding voltage)
- Torque range from 100–2400 Nm

Versatile

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

Torque transmission

- Designed for dry running
- Special machining of the friction surfaces ensures that the characteristic torques are achieved after very few switching operations
- No fixed bearing is required on the brake

Quick and easy to install

- Preset air gap

Durable

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

Low maintenance

- Long rotor/hub connection with low rate of wear and a tried-and-tested evolvent tooth profile
- Standard model has asbestos-free friction linings with low rate of wear

Reliable

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

Options

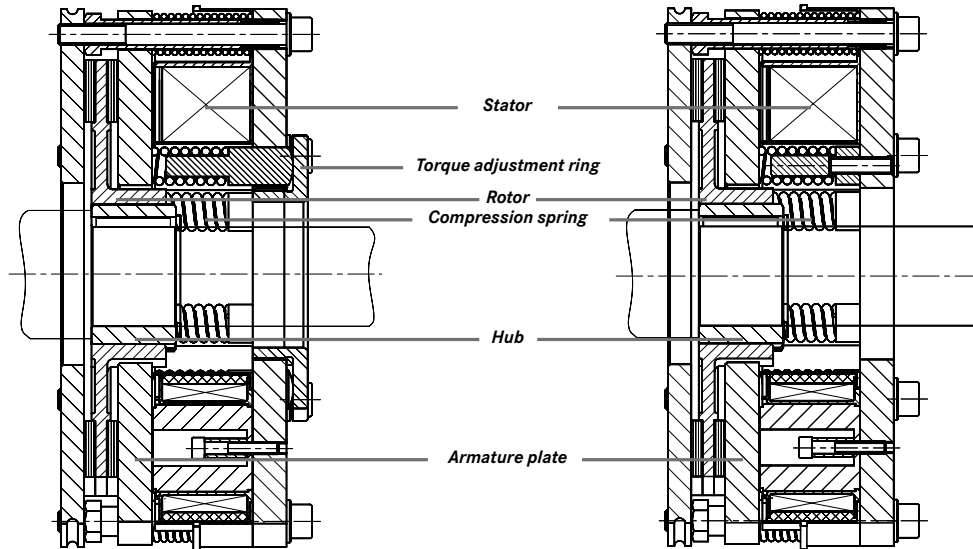
- Manual release for sizes 18–25, both directions can be used for release
- Noise-reduced designs
- Different types of corrosion protection and enclosures
- Microswitches used to monitor air gap and wear



Principle of operation

Basic module E + rotor + hub + flange

Basic module N + rotor + hub + flange



INTORQ BFK468 spring-applied brakes are single-disc brakes with two friction surfaces. When deenergised, several compression springs are used to generate the braking torque through friction locking. The brake is released electromagnetically with holding current derating using an INTORQ bridge/half-wave rectifier. During the braking procedure, the rotor, which can be shifted axially on the hub, is pressed against the counter friction face via the armature plate by means of the compression springs. When the brakes are applied, an air gap s_{ij} is present between the armature plate and the stator. The stator's coil is energised with DC voltage in order to release the brake.

The resulting magnetic flux works against the spring force to draw the armature plate to the stator. This releases the rotor from the spring force and allows it to rotate freely. Brake module E supports the use of the torque adjustment ring (8) to reduce the braking torque.

Technical data

Braking torques

Basic modules E and N are available with the torque ratings listed below. At low torques, an intermediate plate (brass sheet) needs to be inserted between the stator and armature plate in order to achieve short operating times. INTORQ brakes are designed to ensure the specified characteristic torques are usually achieved after a short running-in period. However, as the characteristics of the organic friction linings used and the environmental conditions may vary, the braking torques specified may be subject to some deviation. Appropriate safety features should be considered at design stage to deal with these issues. In particular, humidity and fluctuating temperatures after long periods of downtime may lead to a

higher level of breakaway torque. The braking torque needs to be checked if the brake is being used against friction surfaces at customer premises. If the brake is only being used as a holding brake without any dynamic load, the friction lining must be reactivated at regular intervals.

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 8). It should be noted that the engagement and disengagement times change in accordance with the braking torque.

| Size | 18 | | 20 | | 25 | | 31 |
|--|---|---------------------------------------|---|---------------------------------------|---|---------------------------------------|---|
| | Characteristic torque ¹⁾ [Nm] | Torque reduction E per detent [Nm] | Characteristic torque ¹⁾ [Nm] | Torque reduction E per detent [Nm] | Characteristic torque ¹⁾ [Nm] | Torque reduction E per detent [Nm] | Characteristic torque ¹⁾ [Nm] |
| Characteristic torques in relation to the relative speed $\Delta r = 100 \text{ rpm}$ Depending on the characteristic torque (spring configuration), the angle of rotation for reducing the braking torque on basic module E can be 60°, 120° or 180° | | | | | 230 N | | |
| | 100 N/E | 6.4 | 170 N/E | 19.8 | 260 N/E | 16.5 | |
| | 115 N/E | 6.4 | 200 N/E | 19.8 | 300 N/E | 8.2 | 720 N |
| | 130 N/E | 6.4 | 230 N/E | 9.9 | 350 N/E | 8.2 | 960 N |
| | 150 N/E | 3.2 | 260 N/E | 9.9 | 400 N/E | 8.2 | 1200 N |
| | 165 N/E | 3.2 | 300 N/E | 19.8 | 445 N/E | 16.5 | 1440 N |
| | 185 N/E | 6.4 | 345 N/E | 19.8 | 490 N/E | 8.2 | 1680 N |
| | 200 N/E | 6.4 | 400 N/E | 19.8 | 520 N/E | 16.5 | 1920 N |
| | 235 N/E | 6.4 | 440 N/E | 19.8 | 600 N/E | 16.5 | 2160 N |
| | 265 N/E | 6.4 | 480 N/E | 19.8 | 700 N/E | 16.5 | 2400 N |
| | 300 N/E | 6.4 | 520 N/E | 19.8 | 800 N/E | 16.5 | |

■ N ... Braking torque for design N (without torque adjustment ring)

¹⁾ Minimum braking torque for run-in friction pairs

■ E ... Braking torque for design E (with torque adjustment ring)

Holding brake with emergency stop operation
($S_{ij \text{ max}}$ approx. $2.0 \times S_{ij}$)

Service brake
($S_{ij \text{ max}}$ approx. $4.0 \times S_{ij}$)

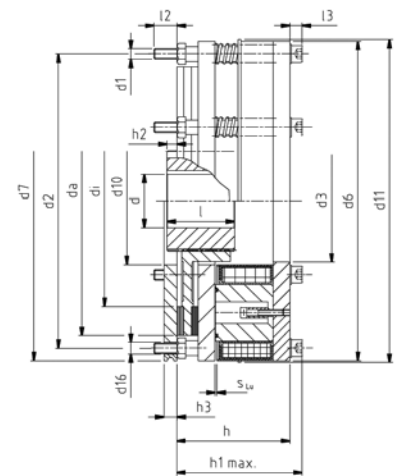
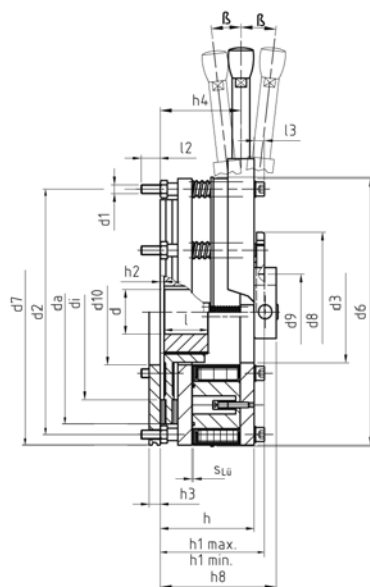
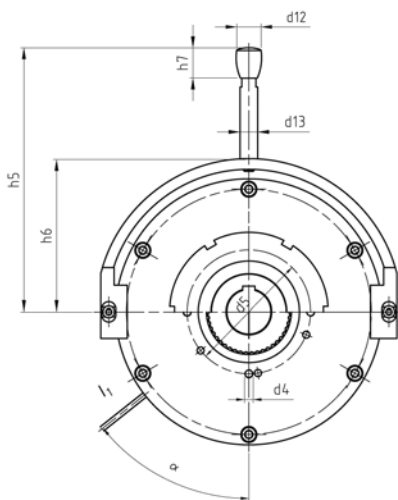
Standard braking torque

Technical data

Dimensions

Sizes 18-25

Size 31



| Size | d _{H7} | d ₁ | d ₂ | d ₃ | d ₄ | d ₅ | d ₆ | d ₇ | d ₈ | d ₉ | d ₁₀ | d ₁₁ | d ₁₂ | d ₁₃ | d _i |
|------|------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|----------------|
| 18 | 30/35/40/45 | 6xM8 | 196 | 75 | 4xM8 | 95 | 217 | 217 | 116 | 62 | 77 | 220 | 24 | 14 | 129 |
| 20 | 35/40/45/50 | 6xM10 | 230 | 85 | 4xM10 | 110 | 254 | 254 | 135 | 72 | 90 | 257 | 36 | 20 | 148 |
| 25 | 40/45/50/55/60/65/70** | 6xM10 | 278 | 115 | 4xM10 | 140 | 302 | 302 | 180 | 85 | 120 | 305 | 36 | 25 | 199 |
| 31 | 80 | 8xM16 | 360 | 150 | 4xM16* | 200 | 390 | 390 | - | - | 150 | - | - | - | 243 |

| Size | d _a | h | h _{1 min.} | h _{1 max.} | h ₂ | h ₃ | h ₄ | h _{5 max.} | h ₆ | h ₇ | h ₈ | l | l ₁ | l ₂ | l ₃ | s _{Lu} | a | b |
|------|----------------|-------|---------------------|---------------------|----------------|----------------|------------------------------|---------------------|----------------|----------------|----------------|----|----------------|----------------|----------------|-----------------|-------|------|
| 18 | 174 | 83.1 | 89.1 | 96.5 | 2.75 | 11 | 70.6 | 385 | 128 | 34 | 108.1 | 35 | 600 | 16.3 | 9.6 | 0.4 | 51.5° | 8° |
| 20 | 206 | 95.6 | 105.6 | 111.6 | 3.5 | 11 | 80.6 | 650 | 150 | 69 | 120.6 | 40 | 600 | 12.4 | 12 | 0.4 | 51.5° | 8° |
| 25 | 254 | 110.7 | 121.7 | 131.7 | 4.5 | 12.5 | 95.7 | 1045 | 173.5 | 69 | 135.7 | 50 | 600 | 17.3 | 12 | 0.5 | 51.5° | 6.5° |
| 31 | 330 | 149 | 173 | - | 5 | 15 | Manual release not available | | | | | 70 | 600 | 18 | 24 | 0.5 | 5° | - |

- d_{H7}: Hubs with a keyway in accordance with DIN 6885/1-P9 can only be used for the bore diameter indicated (d) up to the maximum standard braking torque. The dimensions of the shaft/hub connection for higher braking torques are to be determined in conjunction with the manufacturer.
- Standard keyway according to DIN 6885/1-P9
- * 4xM16 rotated by an angle of 45° in relation to illustration

- ** Ø 70 mm, slot in accordance with DIN 6885/3P9
- l₁: Connecting cable length
- m: Mass in kg
- All 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 act as shock absorbers between the pole face and the armature plate.

2. Noise-reduced aluminium rotor

The rotor with its plastic sleeve offers numerous advantages and reduces rattling noises in the rotor/hub connection.

The evolute tooth profile, tried-and-tested over many years, ensures the rotor/hub connection is stable. The plastic sleeve reduces backlash, thereby increasing the brake's service life. With size 31, noise is minimised by an O-ring between the rotor and the hub.



Technical data

Rated data

| Size | P ₂₀ ¹⁾ holding 2) | P ₂₀ release 2) | S _{lū} max to standard torque [mm] | S _{lū} max increased torque [mm] | max. readjustment [mm] | min. ³⁾ rotor thickness [mm] | J _{alu rotor} [kgcm ²] | Mass brake assembly [kg] | Mass stator assembly [kg] |
|------|---|-------------------------------|---|---|------------------------------|---|--|--------------------------------|---------------------------------|
| 18 | 85 | 340 | 1.5 | 1.0 | 3.0 | 10.0 | 29 | 19 | 14.9 |
| 20 | 100 | 408 | 1.5 | 1.0 | 4.0 | 12.0 | 73 | 32 | 22.8 |
| 25 | 132 | 528 | 1.8 | 1.2 | 4.5 | 15.5 | 200 | 50 | 38.6 |
| 31 | 230 | 920 | 2 | 1.5 | 3 | 15 | 457 | 85.3 | 68.8 |

■ P₂₀: Coil power at 20 °C in W
 ■ ¹⁾ with holding current derating
 ■ ²⁾ possible deviation of up to + 10 %, depending on voltage selected

■ ³⁾ The friction lining is dimensioned so that the brake can be readjusted at least 2 times.

Braking torques, depending on speed and permissible limit speeds

| Size | Reference variable for characteristic torque at Δr = 100 rpm [%] | Braking torque at Δr ₀ [rpm] | | | Max. speed Δr _{0max} [rpm] |
|------|---|---|-------------|-------------|---|
| | | 1500 [%] | 3000 [%] | max. [%] | |
| 18 | 100 | 77 | 70 | 66 | 4.400 |
| 20 | 100 | 75 | 68 | 66 | 3.700 |
| 25 | 100 | 73 | 66 | 66 | 3.000 |
| 31 | 100 | 69 | – | – | 2.300 |

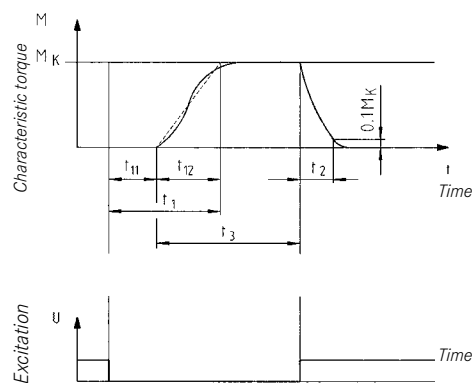
■ As speed increases, so does wear

Operating times

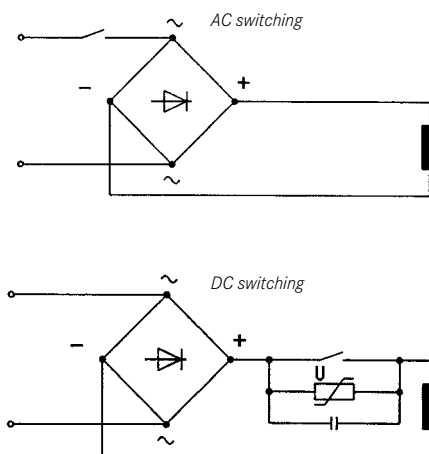
The operating times listed are guide values. They are relevant for DC switching when the rated air gap s_{lū} and standard characteristic torque apply and the coil is warm. The operating times specified are subject to leakages. During AC switching,

the engagement time t₁ increases by a factor of 5 (approximately). The engagement time t₁ increases if inching mode is shorter than the over-excitation time of the bridge/half-wave rectifier.

Torque time characteristic, dependent on excitation voltage



t₁₁ = Delay time
 t₁₂ = Rise time of braking torque
 t₁ = Engagement time
 t₂ = Disengagement time
 t₃ = Slipping time



| Size | Braking torque rated value at Δr = 100 rpm M _K [Nm] | Maximum permissible switching energy with single Q _E [J] | Transition operating frequency connection S _h [h ⁻¹] | Operating times [ms] ¹⁾ at S _{lū r} Engagement on DC side | | | |
|------|--|---|---|---|---------------|------------|---------------|
| | | | | Engagement | Disengagement | Engagement | Disengagement |
| 18 | 150 | 60.000 | 20 | 26 | 30 | 56 | 70 |
| 20 | 260 | 80.000 | 19 | 56 | 112 | 168 | 106 |
| 25 | 400 | 120.000 | 15 | 62 | 135 | 197 | 120 |
| 31 | 1200 | 300.000 | 13 | 65 | 133 | 198 | 250 |

■ ¹⁾ Operating times valid for 205 V DC coils

Technical data

Service life and wear

The brake has to be adjusted when $s_{i\ddot{u}}_{max}$ 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 at 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.

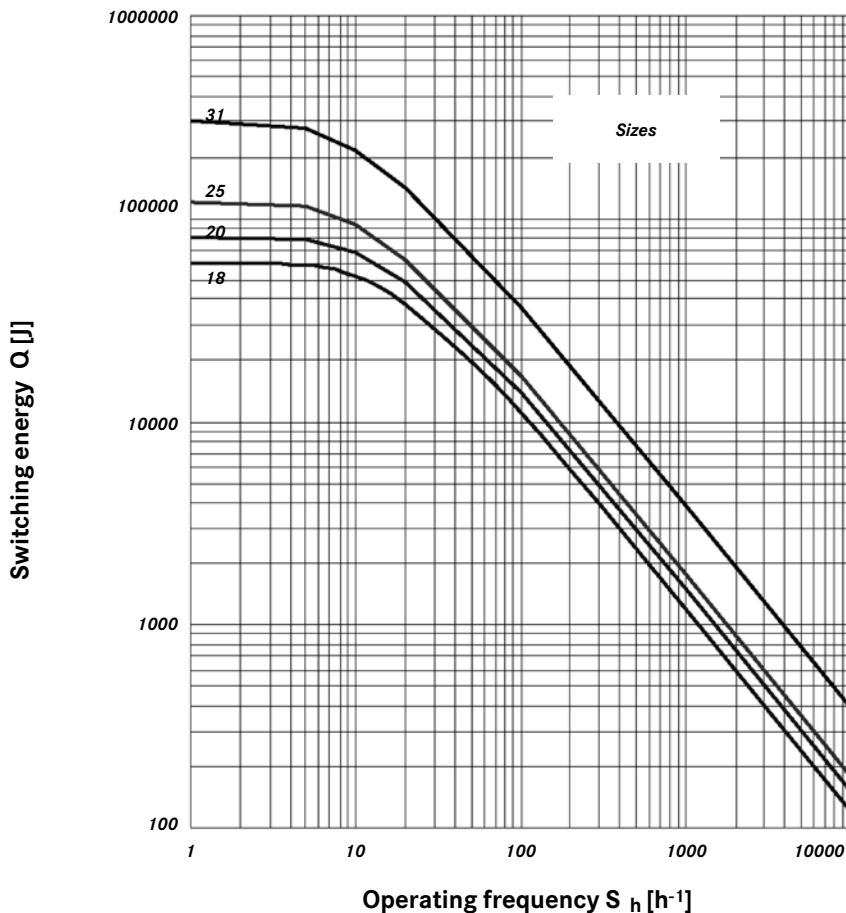
The BFK468 can be adjusted when the maximum permissible working air gap is reached ($s_{i\ddot{u}}_{max}$). The dimensioning of the friction lining allows adjustment to be carried out at least twice.

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).

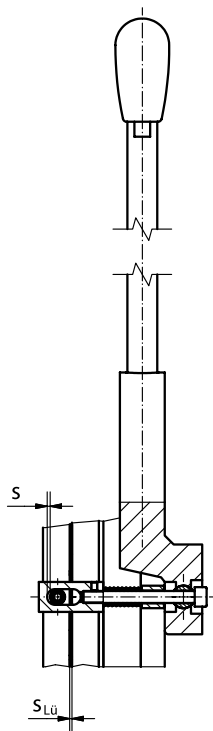
Maintenance

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_{perm} depending on operating frequency S_h



Accessories



Manual release

Manual release

The manual release is used to release the brake by hand and can also be retrofitted. It springs back into its original position (0 setting) automatically after operation. The release screws that are carried in a ball joint are only just tensioned. When installing the manual releases, care must be taken when setting dimension "s":

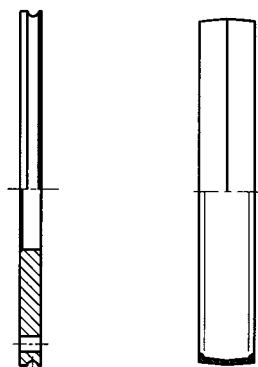
| Size | $s_{Lü}^{+0.1}_{-0.05}$ [mm] | $s^{+0.1}$ [mm] |
|------|---------------------------------|--------------------|
| 18 | 0.4 | 2 |
| 20 | 0.4 | 2 |
| 25 | 0.5 | 2.5 |
| 31 | - | - |

Caution:

Even with a reduced characteristic torque, the air gap must be readjusted when $s_{Lü\ max}$ is reached for safety reasons.

Flange

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



Flange

Seal

Seal

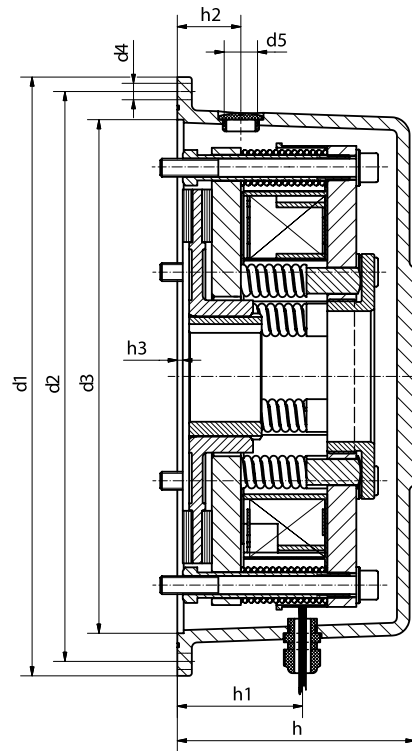
To a large extent, the cover ring prevents the exit or ingress of dust, humidity, dirt, etc. out of or into the braking area. The cover ring is inserted into the groove on the stator. If no suitable groove is available on the counter friction face, we recommend the use of a flange.

Accessories

Brake cover

Basic module E, N + cover = encapsulated design

A cover can be mounted onto brake module E and basic module N as an option, to protect the brake from water and dust (enclosure acc. to IP 65). This cover cannot be combined with a manual release.



| Size | d ₁ | d ₂ | d ₃ H8 | d ₄ | d ₅ | h | h ₁ | h ₂ | h ₃ 1) |
|------|----------------|----------------|-------------------|----------------|----------------|-----|----------------|----------------|-------------------|
| 18 | 285 | 268 | 238 | 4x6.6 | M20x1.5 | 115 | 60 | 29 | 3 |
| 20 | 330 | 314 | 283 | 4x9 | M20x1.5 | 131 | 69 | 35 | 3 |
| 25 | 390 | 368 | 328 | 4x9 | M20x1.5 | 142 | 78 | 40 | 3 |

1) Recommended recess length on motor endshield

Microswitch

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.

Bridge/half-wave rectifier

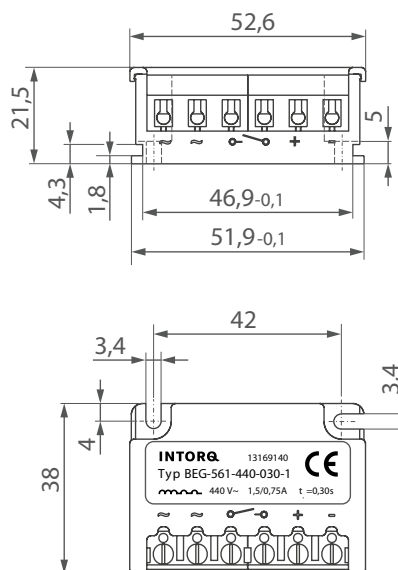
BEG-561-□□□-□□□

BFK468 brakes must only be operated with a bridge/half-wave rectifier.

Following a fixed over-excitation time, the bridge/half-wave rectifiers switch from bridge rectification to half-wave rectification.

Terminals 3 and 4 are in the DC circuit of the brake. With switching on the DC side, integrated overvoltage protection at terminals 5 and 6 limits the induced voltage peak (see "Reduced break times" circuit diagram).

Dimensions



Technical data

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

U_1 = Input voltage (40 to 60 Hz)

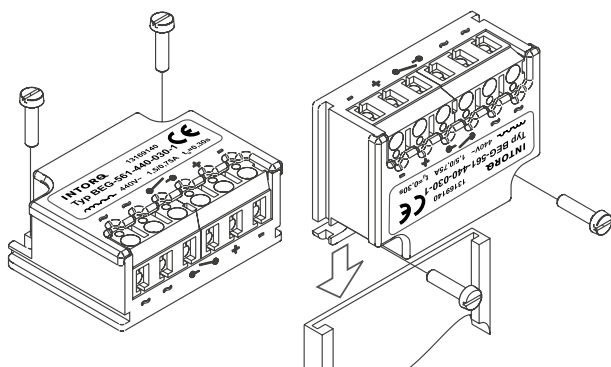
| Type | Input voltage U_1 (40 Hz to 60 Hz) | | | Max. current I_{max} | | Over-excitation time t_o ($\pm 20\%$) | | |
|-------------------|--------------------------------------|------------|-----------|------------------------|---------------|---|-----------------|-------------------|
| | Min. [V~]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



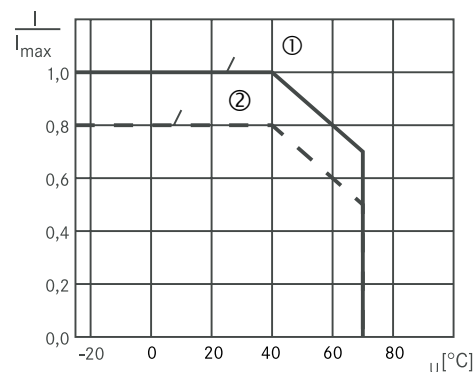
Bridge/half-wave rectifier

BEG-561-□□□-□□□

Fastening options



Permissible current load – ambient temperature



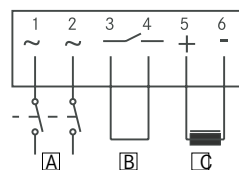
① Screw mounting with metal surface (good heat dissipation)
 ② Other mounting (e.g. adhesive)

Reduced break times

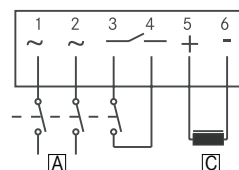
In the case of switching on the DC side (reduced break times), switching must also occur on the AC side. Otherwise, over-excitation will not occur on restarting.

Connection

AC-side break times



DC-side break times



[A] Mains [B] Bridge [C] Coil

Assignment of the bridge/half-wave rectifier to the brake size

| Brakes type | Half-wave rectifier type | Supply voltage [V AC] | Coil voltage release/hold [V DC] |
|-------------|--------------------------|-----------------------|----------------------------------|
| BFK458-18 | BEG-561-255-030 | 230 ±10 % | 205/103 |
| BFK468-20 | | | |
| BFK468-25 | BEG-561-255-130 | | |
| BFK458-18 | BEG-561-440-030-1 | 400 ±10 % | 360/180 |
| BFK468-20 | | | |
| BFK468-25 | BEG-561-440-130 | | |
| BFK468-31 | | | |



Overview of variants

INTORQ BFK468-□□□

Complete stator

| | |
|------------------------------|--|
| Size | <ul style="list-style-type: none"> ■ 18 ■ 20 ■ 25 ■ 31 |
| Design | <ul style="list-style-type: none"> ■ E (with torque adjustment ring, sizes 18, 20, 25) ■ N (without torque adjustment ring) |
| Brake voltage | <ul style="list-style-type: none"> ■ 205 V/103 V DC for 230 V AC supply voltage (not available for size 31) ■ 360 V/180 V DC for 400 V AC supply voltage |
| Braking torque | Nm (see torque ratings) |
| Cable length | <ul style="list-style-type: none"> ■ Standard <p>(from 100 mm to 1000 mm in 100 mm steps, from 1000 mm to 2500 mm in 250 mm steps)</p> |
| Manual release fitted | <ul style="list-style-type: none"> ■ (not available for size 31) |
| Armature plate | <ul style="list-style-type: none"> ■ Standard ■ Chromium-plated |
| Microswitch | <ul style="list-style-type: none"> ■ Switching function monitoring (release control) ■ Wear monitoring |
| Operating noise | <ul style="list-style-type: none"> ■ Reduced |

Accessories

| | |
|--------------------------|---|
| Rotor | <ul style="list-style-type: none"> ■ Standard ■ Noise-reduced (rotor with sleeve) |
| Hub | (for bore diameter, see Dimensions) |
| Fixing screws set | <ul style="list-style-type: none"> ■ For mounting on flange/motor ■ For mounting on flange with through holes |
| Sealing | <ul style="list-style-type: none"> ■ Cover ring ■ Shaft sealing ring (shaft diameter on request) ■ Cap |
| Brake cover | <ul style="list-style-type: none"> ■ 18 ■ 20 ■ 25 |

Electrical accessories

| | |
|------------------------------------|--|
| Bridge/half-wave rectifiers | <ul style="list-style-type: none"> ■ BEG-561-255-030 ■ BEG-561-255-130 ■ BEG-561-440-030-1 ■ BEG-561-440-130 |
|------------------------------------|--|



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).

INTORQ GmbH & Co. KG

PO Box 1103
D-31849 Aerzen, Germany

Wülmser Weg 5
D-31855 Aerzen

Tel.: +49 (0)5154 9539-01

Fax: +49 (0)5154 9539-10

E-mail: info@intorq.de

www.intorq.de

INTORQ

setting the standard

www.intorq.de