BFK458 spring-applied brake
The versatile modular system
1.5 – 600 Nm
We set the standards

The INTORQ brand stands for reliable brake solutions with the highest product standards. INTORQ products are used in a very diverse range of applications, from brake motors and industrial trucks to hoists, cranes and wind turbines. We can create the right solution for you and your drive – individually and reliably.

The INTORQ module system offers numerous variants that can be used in many motors and geared motors, setting standards worldwide. We have been increasing our international presence step by step, establishing sites in Shanghai, Atlanta and Pune. So our network of sales and service staff is close at hand all over the world, ready to support you.

INTORQ at a glance

- Electromagnetic brakes and clutches
- Flexibility with standard options as well as customised solutions
- Centralised product development and production located in aerzen
- Fast response and delivery times globally thanks to production and warehousing in Shanghai, Atlanta and Pune.
- Over 50 million euros a year sales volume
- 800,000 units a year
- 13,000 square metres production area
- 250 employees
- Market leader with 63 sales partners in 49 countries
BFK458 – The modular system

This 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 tappet 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 greatest degree of flexibility is achieved for a broad range of applications by combining the basic modules with specific modules. This catalogue is designed to assist you in selecting and ordering your desired spring-applied brake quickly and easily.

**Fields of application**

- Brake motors
- Conveyors
- Cranes
- Storage technology
- Industrial trucks
- Wood working machines
- Stage machinery
- Vehicles for the disabled
- Automation technology
- Controlled drives
- Gate drives
- Escalators
INTORQ BFK458-□□□ product key

<table>
<thead>
<tr>
<th>B</th>
<th>F</th>
<th>K</th>
<th>4</th>
<th>5</th>
<th>8</th>
<th>□</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brakes product group</td>
<td>Spring-applied brake product family</td>
<td>Type</td>
<td>Size</td>
<td>Design</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Size**
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

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Friction plate
Flange
Connection flange (double brake)
Cover ring
Stator, complete Basic module E
Rotor
Stator, complete Basic module N
Hub
Centring flange (tacho flange)
Shaft sealing ring
Sealing cap
Hand release
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## List of abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>PN [W]</td>
<td>Rated coil power at rated voltage and 20°C</td>
</tr>
<tr>
<td>UN [V DC]</td>
<td>Rated coil voltage</td>
</tr>
<tr>
<td>MK [Nm]</td>
<td>Rated torque of the brake at a relative speed of 100 r/min</td>
</tr>
<tr>
<td>Mdyn [Nm]</td>
<td>Dynamic brake torque, measured at constant speed of rotation</td>
</tr>
<tr>
<td>ML [Nm]</td>
<td>Load torque, torque that the static load produces at the motor shaft</td>
</tr>
<tr>
<td>Δn0 [r/min]</td>
<td>Initial relative speed of the brake</td>
</tr>
<tr>
<td>JL [kgm²]</td>
<td>Moment of inertia of the load, referred to the output shaft (load shaft)</td>
</tr>
<tr>
<td>Q [J]</td>
<td>Heat/energy</td>
</tr>
<tr>
<td>Qₑ [J]</td>
<td>Maximum permissible friction work per switching cycle, thermal rating of the brake</td>
</tr>
<tr>
<td>Qₛₘₐₓ [J]</td>
<td>Maximum permissible friction work during cyclic switching, depending on the operating frequency</td>
</tr>
<tr>
<td>Sh [1/h]</td>
<td>Operating frequency, the number of repeated operations per unit time</td>
</tr>
<tr>
<td>Shue [1/h]</td>
<td>Transitional operating frequency, thermal rating of the brake/clutch</td>
</tr>
<tr>
<td>Shₘₐₓ [1/h]</td>
<td>Maximum permissible operating frequency, depending on the friction work per operation</td>
</tr>
<tr>
<td>sLN [mm]</td>
<td>Rated air gap</td>
</tr>
<tr>
<td>sHL [mm]</td>
<td>Hand-release air gap, setting dimension of hand-release</td>
</tr>
<tr>
<td>t₁ [s]</td>
<td>Engagement time, the total of the reaction delay and torque rise time</td>
</tr>
<tr>
<td>t₂ [s]</td>
<td>Disengagement time, time from switching the stator until the torque has reduced to 0.1 MK</td>
</tr>
<tr>
<td>t₃ [s]</td>
<td>Slipping time to standstill (after t₁₁)</td>
</tr>
<tr>
<td>t₁₁ [s]</td>
<td>Delay time when connecting, time from disconnecting the voltage until the torque begins to rise</td>
</tr>
<tr>
<td>t₁₂ [s]</td>
<td>Rise time of braking torque, time from beginning of rise of torque until braking torque is reached</td>
</tr>
</tbody>
</table>
Product information

A powerful and complete range
- 9 sizes
- Standard voltages [V DC] 24, 96, 103, 170, 180, 190, 205
- Graduated torque range from 1.5 - 600 Nm
- Short delivery times for the complete range thanks to optimised logistics
- Enclosure according to IP00 ... IP55, depending on the special operating conditions, see technical data sheet
- ATEX: In accordance with Group II, Category 3G/D, the product is suitable for use in potentially explosive atmosphere of zone 2 (gases and vapours) and zone 22 (dust) for steady-state operation (holding or parking brake) and temperature class T4.

Options
- Hand release for all sizes, both directions can be used for release and mounting (exception: tacho brake)
- Noise-reduced designs
- Various types of corrosion protection and enclosures
- Microswitches used to monitor air gap and wear (size 12 and above)
- Monitoring of Hand release function
- Non-standard voltages and bores on request
- Pulse width modulation (PWM), sizes 06 – 18

Partial discharge free brake has been developed for operation with the pulse width modulated DC bus voltage of a frequency inverter
Rated coil voltage \( U_{N} = 103V \) DC

LongLife design BFK458-L
- Armature plate with low backlash and reinforced torque support
- Tappet springs with guide pins for protection against shearing forces
- Aluminium rotor with toothed intermediate ring: friction lining and tooth system with low rates of wear

CCV (Cold Climate Version), temperature-resistant up to -40 °C
- CCV design configurable for all sizes in the modular system
  - Use of chrome-plated friction surfaces (armature plate and flange)
  - The following components are also approved for use up to -40 °C
    - Rotor with sleeve (noise-reduced)
    - Hand release
    - Terminal box
    - Microswitch
    - Caps E and N
    - Shaft sealing rings (available on request)

Versatile
- Modular structure for virtually all applications

Torque transmission
- Designed for dry running

Quick and easy mounting
- Preset air gap
- Special machining of the friction surfaces ensures that the rated torques are achieved after very few switching operations
- No locating 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
- The 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 and solvent-free friction lining with low rate of wear

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

The brake is an electrically releasable spring-applied brake with a rotating braking disk (rotor) that is equipped with friction linings on both sides. In a de-energised state, the rotor is stretched between the armature plate and a counter friction face by a normal brake force that is produced by pressure springs. The function thus corresponds to the failsafe principle. The braking torque that is applied to the rotor is transmitted via an axially toothed hub to the input shaft.

The brake can be used as a holding brake, as an operating brake and for emergency stops from a high speed.

The asbestos-free friction linings ensure a safe braking torque and low wear. In addition to the powerful standard friction lining, there are also special friction linings for a range of different applications, e.g. with high wear resistance or an increased friction coefficient.

To release the brake, the armature plate is lifted electromagnetically from the rotor. The rotor, shifted axially and balanced by the spring force, can turn freely.

Project planning notes

- When designing a brake for specific applications, torque tolerances, the limiting speeds of the rotors, the thermal resistance of the brake, and the effect of environmental influences must be taken into account.
- The brakes are designed so that the stated rated torques can normally be safely achieved after a short run-in period.
- As a result of the fluctuating properties of the organic friction linings and changing environmental conditions, however, deviations in the stated torques can occur. These deviations should be taken into account in the dimensioning by means of relevant safety measures. Especially when there is dampness and changing temperatures, an increase in breakaway torque can occur after periods of non-operation.
- When the brake is used purely as a holding brake without any dynamic load, the friction lining must be reactivated at regular intervals.

Reducing braking torque

Basic module E: unscrewing the centrally located torque adjustment ring can reduce the spring force and, with it, the braking torque.
Technical data

Rated torques

The basic modules E and N are available in the graduated torques listed below. A pole shim (brass film) must be placed between the stator and the armature plate if you want to achieve short engagement times at low torques. INTORQ brakes are dimensioned so that the specified rated torques can usually be achieved reliably after a short running-in period. However, as the organic friction linings used do not all have identical properties and because environmental conditions can vary, deviations from the specified braking torques are possible. These must be taken into account in the form of appropriate dimensioning tolerances. Increased breakaway torque is common in particular after long downtimes in humid environments where temperatures vary. If the brake is being used on friction surfaces provided by the customer, the rated torque must be checked. If the brake is to be used solely as a holding brake without dynamic load, the friction lining must be reactivated at regular intervals.

<table>
<thead>
<tr>
<th>Size</th>
<th>06</th>
<th>08</th>
<th>10</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 E</td>
<td>3.5 N/E/L</td>
<td>4 E</td>
<td>7 N/E/L</td>
<td>14 N/E/L</td>
<td>35 N</td>
<td>40 N</td>
<td>40 N</td>
<td>115 N/E</td>
<td>175 N/E</td>
</tr>
<tr>
<td>2 N/E/L</td>
<td>4 E</td>
<td>7 N/E/L</td>
<td>14 N/E/L</td>
<td>35 N</td>
<td>40 N</td>
<td>40 N</td>
<td>115 N/E</td>
<td>175 N/E</td>
<td></td>
</tr>
<tr>
<td>2.5 N/E/L</td>
<td>5 N/E/L</td>
<td>9 N/E/L</td>
<td>18 N/E/L</td>
<td>40 N</td>
<td>55 N</td>
<td>60 N</td>
<td>115 N/E</td>
<td>175 N/E</td>
<td></td>
</tr>
<tr>
<td>3 N/E/L</td>
<td>6 N/E/L</td>
<td>11 N/E/L</td>
<td>23 N/E/L</td>
<td>45 N</td>
<td>60 N</td>
<td>70 N</td>
<td>130 N/E</td>
<td>230 N/E</td>
<td></td>
</tr>
<tr>
<td>3.5 N/E/L</td>
<td>7 N/E/L</td>
<td>14 N/E/L</td>
<td>27 N/E/L</td>
<td>55 N</td>
<td>70 N</td>
<td>70 N</td>
<td>130 N/E</td>
<td>230 N/E</td>
<td></td>
</tr>
<tr>
<td>4 N/E/L</td>
<td>8 N/E/L</td>
<td>16 N/E/L</td>
<td>32 N/E/L</td>
<td>60 N</td>
<td>80 N</td>
<td>80 N</td>
<td>150 N/E</td>
<td>260 N/E</td>
<td></td>
</tr>
<tr>
<td>4.5 N/E</td>
<td>9 N/E</td>
<td>18 N/E</td>
<td>36 N/E</td>
<td>65 N</td>
<td>90 N</td>
<td>90 N</td>
<td>165 N/E</td>
<td>290 N/E</td>
<td></td>
</tr>
<tr>
<td>5 E</td>
<td>10 E</td>
<td>20 E</td>
<td>40 E</td>
<td>75 N/E</td>
<td>100 N/E</td>
<td>100 N/E</td>
<td>185 N/E</td>
<td>315 N/E</td>
<td></td>
</tr>
<tr>
<td>5.5 E</td>
<td>11 E</td>
<td>23 N/E</td>
<td>46 N/E</td>
<td>80 N</td>
<td>105 N/E</td>
<td>105 N/E</td>
<td>200 N/E</td>
<td>345 N/E</td>
<td></td>
</tr>
<tr>
<td>6 N/E</td>
<td>12 N/E</td>
<td>24 N/E</td>
<td>48 N/E</td>
<td>80 N</td>
<td>125 N/E</td>
<td>125 N/E</td>
<td>235 N/E</td>
<td>400 N/E</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Basic module L, LongLife design</th>
</tr>
</thead>
<tbody>
<tr>
<td>The LongLife design can be configured for sizes 06 to 12 in combination with the specified rated torques in the modular system. The stator corresponds to design N; bores and built-on accessories are not possible at the rear side. It is not possible to configure a microswitch for size 12.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating brake</th>
</tr>
</thead>
<tbody>
<tr>
<td>($s_{L_{max}}$ approx. 2.5 x $s_N$)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard braking torque</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Holding brake with emergency stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>($s_{L_{max}}$ approx. 1.5 x $s_N$)</td>
</tr>
</tbody>
</table>
Basic module E, reduced rated torque

The rated torque on basic module E can be reduced using the torque adjustment ring located in the stator. The torque adjustment ring may only be unscrewed to a maximum dimension of $h_{1\text{max}}$ (see table on page 11).

<table>
<thead>
<tr>
<th>Size</th>
<th>06</th>
<th>08</th>
<th>10</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque reduction per detent position [Nm]</td>
<td>0.2</td>
<td>0.35</td>
<td>0.8</td>
<td>1.3</td>
<td>1.7</td>
<td>1.6</td>
<td>3.6</td>
<td>5.6</td>
<td>6.2</td>
</tr>
</tbody>
</table>

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

Friction lining variants

**Standard and wear-resistant linings**

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

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

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

**Project solutions**

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

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

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

**Basic module E (with torque adjustment ring)**

![Diagram of basic module E](image1)

**Without counter friction surface, hand release (as option)**

![Diagram of hand release](image2)

### Table: Dimensions in mm

<table>
<thead>
<tr>
<th>Size</th>
<th>b</th>
<th>d1 f7</th>
<th>d2 f7</th>
<th>d12 f7</th>
<th>d13 f7</th>
<th>d16 f7</th>
<th>d17 f7</th>
<th>d8</th>
<th>d9</th>
<th>d10</th>
<th>d11</th>
<th>d12</th>
<th>d13</th>
<th>d14</th>
<th>d15</th>
<th>d16</th>
<th>d17</th>
<th>d18</th>
<th>di</th>
<th>da</th>
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</thead>
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<tr>
<td>06</td>
<td>88</td>
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<td>12/14</td>
<td>15</td>
<td>3xM4</td>
<td>72</td>
<td>91</td>
<td>87</td>
<td>87</td>
<td>52</td>
<td>24</td>
<td>51</td>
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<td>9.6</td>
<td>3x4.4</td>
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<td>40</td>
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<tr>
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<td>106.5</td>
<td>10/11</td>
<td>12/14</td>
<td>15/20</td>
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<td>-</td>
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<td>4x11</td>
<td>-</td>
<td>-</td>
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<tr>
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<td>297.6</td>
<td>30/40/45/50/55/60/65/70</td>
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<td>254</td>
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1. **Pilot bored without keyway**
2. **Standard keyway in accordance with DIN 6885/1 P9, selection of the shaft diameter dependent upon type of load (see the operating instructions)**
3. **Ø 38 and Ø 70 mm, keyway in accordance with DIN 6885/3 P9**
4. **Hand release angle tolerance +3°**

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**Notes:**
- **Gr. b d J7 vorg. d H7 Standard d1 d2 d5 d6 j7 d7 d8 d9 H9 d10 d11 d12 d13 d16 d17 d18 d19 d20**
- **Hand release mounted in standard direction**
- **+5°, +5°, +5°, +5°**
- **The thread in the mounting surface is offset by 30° in relation to the centre axis of the manual release lever**
- ** Recommended ISO shaft tolerances: up to Ø 50 mm = k6**
- **over Ø 50 mm = m6**
- **Dimensions in mm**
With flange, hand release and seal ring (as option)

Hand release mounted in a rotated position

Not possible for sizes 18 and 20

With friction plate, hand release (as option)

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Technical data

Basic module N (without torque adjustment ring)

Without counter friction face, hand release (as option)

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1) Pilot bored without keyway
2) Standard keyway in accordance with DIN 6885/1 P9, selection of the shaft diameter dependent upon type of load (see the operating instructions)
3) \(\Omega 38\) and \(\Omega 70\) mm, keyway in accordance with DIN 6885/3 P9
4) Bores are made on customer request for sizes 06 - 12
5) Hand release angle tolerance +3°
6) Recommended lever length for 1.5 MK on flange in standard mounted hand release (as option)
7) The thread in the mounting surface is offset by 30° in relation to the centre axis of the manual release lever
8) Recommended ISO shaft tolerances: up to \(\Omega 50\) mm = k6 over \(\Omega 50\) mm = m6
9) Dimensions in mm
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**With flange, hand release and seal ring (as option)**

- Hand release mounted in a rotated position

**With flange, hand release (as option), mounted on flange**

- Hand release mounted in a rotated position

**With friction plate, hand release (as option)**

- Not possible for sizes 18 and 20

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**With flange, hand release and seal ring (as option)**

- Hand release mounted in a rotated position

**With flange, hand release (as option), mounted on flange**

- Hand release mounted in a rotated position

**With friction plate, hand release (as option)**

- Not possible for sizes 18 and 20
**Technical data**

**2 x basic module N + connection flange**

Double brake as redundant braking system, suitable for use in stage machinery and many other areas of application. Available with hand release as an option.

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</tbody>
</table>

1) Pilot bored without keyway
2) Standard keyway in accordance with DIN 6885/1 P9, selection of the shaft diameter dependent upon type of load (see the operating instructions)
3) Ø 38 and Ø 70 mm, keyway in accordance with DIN 6885/3 P9

Dimensions in mm

---

- Pficht bored without keyway
- Standard keyway in accordance with DIN 6885/1 P9, selection of the shaft diameter dependent upon type of load (see the operating instructions)
- Ø 38 and Ø 70 mm, keyway in accordance with DIN 6885/3 P9
- Dimensions in mm
## Technical data

**Basic module N + tacho flange**

<table>
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<th>( d_{1H7} )</th>
<th>( d_{17} )</th>
<th>( d_{14} )</th>
<th>( d_{15} )</th>
<th>( d_{19H7} )</th>
<th>( d_{21} )</th>
<th>( d_{21H7} )</th>
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<th>( d_{25} )</th>
<th>( h )</th>
<th>( h_2 )</th>
<th>( h_{12} )</th>
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<th>( l_{21} )</th>
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<td>4.5</td>
<td>119.2</td>
<td>4</td>
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</tbody>
</table>

\(^1\)\(^1\) Slot bored in accordance with DIN 6885/1 P9, selection of the shaft diameter dependent upon type of load (see the operating instructions)

\(^1\)\(^2\) Standard keyway in accordance with DIN 6885/1 P9

\(^1\)\(^3\) \( \Omega \ 38 \) and \( \Omega \ 70 \) mm, keyway in accordance with DIN 6885/3 P9

\(^4\) The thread in the mounting surface is offset by 30° in relation to the centre axis of the manual release lever

\(^6\) Dimensions in mm
Technical data

Rated data

<table>
<thead>
<tr>
<th>Size</th>
<th>$P_0$ [W]</th>
<th>$s_{L, \text{op}}$ [mm]</th>
<th>$s_{L, \text{min}}$ [mm]</th>
<th>$s_{L, \text{max}}$ [mm]</th>
<th>Adjustment [mm]</th>
<th>min.</th>
<th>$\text{Motor thickness} [\text{mm}]$</th>
<th>$\text{Rotor thickness} [\text{mm}]$</th>
<th>$\text{Mass stator compl.} [\text{kg}]$</th>
</tr>
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<tbody>
<tr>
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<td>0.15</td>
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<td>5.2</td>
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<tr>
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<td>0.75</td>
<td>4.5</td>
<td>15.5</td>
<td>200</td>
<td>29.1</td>
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<td></td>
</tr>
</tbody>
</table>

1) Coil power at 20°C in watts, deviation of up to ±10% possible dependent on the selected coil voltage.

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

Rated torques

<table>
<thead>
<tr>
<th>Size</th>
<th>Rated torque $M_0$ [Nm]</th>
<th>Reduction of rated torque at specified speed to x%</th>
<th>Maximum speed $n_{\text{max}}$ [r/min]</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>[1000 r/min]</td>
<td>$1500$ r/min</td>
<td>$3000$ r/min</td>
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<td>06</td>
<td>4</td>
<td>87%</td>
<td>80%</td>
</tr>
<tr>
<td>08</td>
<td>8</td>
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<td>76%</td>
</tr>
<tr>
<td>12</td>
<td>32</td>
<td>81%</td>
<td>74%</td>
</tr>
<tr>
<td>14</td>
<td>60</td>
<td>80%</td>
<td>73%</td>
</tr>
<tr>
<td>16</td>
<td>80</td>
<td>79%</td>
<td>72%</td>
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<tr>
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<td>150</td>
<td>77%</td>
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<td>68%</td>
</tr>
<tr>
<td>25</td>
<td>400</td>
<td>73%</td>
<td>66%</td>
</tr>
</tbody>
</table>

1) As speed increases, so does wear

Operating times

The listed operating times are guide values which apply to DC switching with rated air gap $s_0$, warm coil and standard rated torque. The times specified are mean values. The engagement time $t_1$ is approximately 8 to 10 times longer for AC switching.

Torque time rated dependent on excitation voltage

$t_1$ = Delay time when connecting
$t_2$ = Rise time of braking torque
$t_3$ = Engagement time
$t_4$ = Disengagement time
$t_5$ = Slipping time
### Technical data

#### Operating times

<table>
<thead>
<tr>
<th>Size</th>
<th>Rated torque $M_T$ [Nm]</th>
<th>$Q_E$ [J]</th>
<th>$S_{max}$ [/h]</th>
<th>Operating times $t$ [s]</th>
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</thead>
<tbody>
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<td></td>
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<td></td>
<td></td>
<td>$t_{11}$</td>
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<tr>
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<td>4</td>
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<td>79</td>
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<td>8</td>
<td>7500</td>
<td>50</td>
<td>15</td>
</tr>
<tr>
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<td>14</td>
<td>60</td>
<td>30,000</td>
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<td>17</td>
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<td>36,000</td>
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<td>60,000</td>
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<td>260</td>
<td>80,000</td>
<td>19</td>
<td>65</td>
</tr>
<tr>
<td>25</td>
<td>400</td>
<td>120,000</td>
<td>15</td>
<td>110</td>
</tr>
</tbody>
</table>

1) The operating times specified relate to the use of INTORQ rectifiers and coils with a supply voltage of 205 V DC.

2) The maximum permissible friction work per switching cycle $Q_E$ relates to the standard friction lining.

#### Aluminium rotor design with low rate of wear

The wear values in the table apply to the friction lining with low rate of wear and to the standard rated torque. The friction energies specified up to the point of maintenance are rough guide values that are subject to a high degree of variation depending on various influencing factors.

<table>
<thead>
<tr>
<th>Size</th>
<th>$Q_{BW}$ [10^6 J]</th>
<th>$S_{max}$ [/h]</th>
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<td>3522</td>
<td>15</td>
</tr>
</tbody>
</table>

$Q_{BW}$ = Friction energy of brake until maintenance

$S_{max}$ = Transitional operating frequency

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

Service life and wear

Friction energy and operating frequency

The brake has to be adjusted when $s_{L_{\text{max}}}$ 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 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 a vertical brake shaft. The BFK458 can be adjusted when the maximum permissible working air gap is reached ($s_{L_{\text{max}}}$). The dimensioning of the friction lining allows it to be readjusted at least 5 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).

BFK458-L

Guaranteed performance data for the LongLife design

- Guaranteed service life of brake mechanism: $10 \times 10^6$ repetitive cycles of operation
- $15 \times 10^6$ reversing cycles of operation
- The brake warranty covers either a period of 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

Hand release

The hand release is used to release the brake by hand and can be retrofitted. The hand release springs back to its base position automatically after operation (1). The hand release requires an additional air gap $S_{HL}$ in order to function; this is factory-set prior to delivery. Dimension $S_{HL}$ (see the mounting instructions) must be checked once the equipment has been mounted.

<table>
<thead>
<tr>
<th>Size</th>
<th>$S_{HL}^0.1$</th>
<th>$S_{HL}^{+0.1}$</th>
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</thead>
<tbody>
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<td>0.2</td>
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</tr>
<tr>
<td>08</td>
<td>0.3</td>
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</tr>
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<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Flange

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

Friction plate

A friction plate is available 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. The plate can be combined with a cover ring.

Noise-reduced designs

The noise reduction required in many applications can be achieved in two ways:

1. Impact-noise-reduced armature plate
   The brake's operating noise can be minimised using special damping elements, which are installed between the pole face and the armature plate as shock absorbers.

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

Features and advantages

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

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 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.

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

Centring flange (tacho brake)
Basic module N combined with a centring flange is suitable for mounting a tacho generator.
## Accessories

### Brake cover

A brake cover can be mounted onto basic module E and basic module N as an option, to protect the brake from water and dust (degree of protection acc. to IP65). This design is not available in conjunction with a hand release and a flange.

### Dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>(d_1)</th>
<th>(d_2)</th>
<th>(d_\text{3H6})</th>
<th>(d_4)</th>
<th>(d_5)</th>
<th>(h)</th>
<th>(h_1)</th>
<th>(h_2)</th>
<th>(h_3)</th>
</tr>
</thead>
<tbody>
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<td>120</td>
<td>98</td>
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<td>142</td>
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<td>4x5.5</td>
<td>M20x1.5</td>
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<td>166</td>
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<td>21</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>205</td>
<td>192</td>
<td>163</td>
<td>4x6.6</td>
<td>M20x1.5</td>
<td>82</td>
<td>42</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>225</td>
<td>212</td>
<td>183</td>
<td>4x6.6</td>
<td>M20x1.5</td>
<td>92</td>
<td>51</td>
<td>24</td>
<td>3</td>
</tr>
<tr>
<td>16</td>
<td>250</td>
<td>236</td>
<td>208</td>
<td>4x6.6</td>
<td>M20x1.5</td>
<td>98</td>
<td>52</td>
<td>25</td>
<td>3</td>
</tr>
<tr>
<td>18</td>
<td>285</td>
<td>268</td>
<td>238</td>
<td>4x6.6</td>
<td>M20x1.5</td>
<td>115</td>
<td>60</td>
<td>29</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>330</td>
<td>314</td>
<td>283</td>
<td>4x9</td>
<td>M20x1.5</td>
<td>131</td>
<td>69</td>
<td>35</td>
<td>3</td>
</tr>
<tr>
<td>25</td>
<td>390</td>
<td>368</td>
<td>328</td>
<td>4x9</td>
<td>M20x1.5</td>
<td>142</td>
<td>78</td>
<td>40</td>
<td>3</td>
</tr>
</tbody>
</table>

1) Recommended recess length on motor end shield.
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.

As of June 2012, a new small microswitch (with UL acceptance) is in use, which is perfectly adapted to the contour of the brake. The old switch design can be converted by connecting an adapter to the same threaded holes.

Microswitch for hand release monitoring in combination with basic module N

Gate drives, for instance, are provided with brakes with hand release, and a microswitch for monitoring the hand release. In this case, the hand 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 hand release monitoring is a built-on option.

The fixing bracket is screwed onto the stator via the threaded holes 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 in combination with basic module N

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 (total of 3 inputs/outputs). 2/4-pole terminal strips, 4-pole half-wave and bridge rectifiers and a microswitch connection can be integrated into the terminal box at the customer’s request.

The terminal box is mounted on 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.

<table>
<thead>
<tr>
<th>Size</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>5</td>
<td>5.5</td>
<td>12.5</td>
<td>23</td>
<td>37.5</td>
<td>45.5</td>
</tr>
<tr>
<td>h</td>
<td>122</td>
<td>130</td>
<td>142</td>
<td>155</td>
<td>174</td>
<td>198</td>
</tr>
<tr>
<td>r</td>
<td>126</td>
<td>134</td>
<td>146</td>
<td>158.5</td>
<td>177</td>
<td>201</td>
</tr>
</tbody>
</table>

*Dimensions in mm*
## Accessories

### Bridge rectifiers and half-wave rectifiers

<table>
<thead>
<tr>
<th>Type code</th>
<th>B</th>
<th>E</th>
<th>G</th>
<th>5</th>
<th>6</th>
<th>1</th>
<th>440</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Bridge rectifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Half-wave rectifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-Bridge/half-wave rectifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-pole</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-pole</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Mounting position horizontal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Mounting position vertical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Mounting position horizontal with snap-in stud</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### INTORQ 14.198.00 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:

<table>
<thead>
<tr>
<th>INTORQ 14.198.00.XX</th>
<th>Coil voltage [V]</th>
<th>Max. connection voltage [V]</th>
<th>Max. coil power [W]</th>
<th>Capacitor-voltage</th>
<th>b</th>
<th>b₁ approx.</th>
<th>d</th>
<th>e approx.</th>
<th>h</th>
<th>l</th>
<th>b₂ approx.</th>
<th>m [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.198.00.01</td>
<td>24 - 50</td>
<td>60 V–</td>
<td>110</td>
<td>250 V–</td>
<td>7</td>
<td>11</td>
<td>0.7</td>
<td>20</td>
<td>17</td>
<td>26.5</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>14.198.00.02</td>
<td>50 - 120</td>
<td>250 V–</td>
<td>110</td>
<td>630 V–</td>
<td>15</td>
<td>19</td>
<td>0.7</td>
<td>22.5</td>
<td>25</td>
<td>31.5</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td>14.198.00.03</td>
<td>120 - 200</td>
<td>400 V–</td>
<td>110</td>
<td>1000 V–</td>
<td>8.5</td>
<td>15</td>
<td>0.7</td>
<td>20</td>
<td>19</td>
<td>26.5</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>14.198.00.04</td>
<td>200 - 250</td>
<td>555 V–</td>
<td>110</td>
<td>1000 V–</td>
<td>8.5</td>
<td>15</td>
<td>0.7</td>
<td>20</td>
<td>19</td>
<td>26.5</td>
<td>16</td>
<td>10</td>
</tr>
</tbody>
</table>

### Dimensions

![Spark suppressor diagram](image)

### Wiring example

#### Parallel to contact

![Parallel to contact diagram](image)

#### Parallel to coil

![Parallel to coil diagram](image)
**Accessories**

**Bridge rectifiers and half-wave rectifiers, 4-pole**

**Dimensions**

BEG-142/143-270 vertical mounting position
BEG-242/243-555 horizontal mounting position with snap-in stud

**Application area**

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

**Technical data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BEG-142/143-270</th>
<th>BEG-242/243-555</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. supply voltage</td>
<td>270 V~</td>
<td>555 V~</td>
</tr>
<tr>
<td>Max. DC current at 60°C</td>
<td>1.0 A</td>
<td>1.0 A</td>
</tr>
<tr>
<td>Max. ambient temperature</td>
<td>-25°C to +80°C</td>
<td>-25°C to +80°C</td>
</tr>
</tbody>
</table>

For the selection of associated coil voltages, please refer to the table.

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

**Bridge rectifiers, 4-pole**

BEG-142-270 vertical mounting position
BEG-143-270 horizontal mounting position with snap-in stud

**Application area**

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

**Technical data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BEG-142-270</th>
<th>BEG-242-555</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. supply voltage</td>
<td>270 V~</td>
<td>555 V~</td>
</tr>
<tr>
<td>Max. DC current at 60°C</td>
<td>1.0 A</td>
<td>1.0 A</td>
</tr>
<tr>
<td>Max. ambient temperature</td>
<td>-25°C to +80°C</td>
<td>-25°C to +80°C</td>
</tr>
</tbody>
</table>

For the selection of associated coil voltages, please refer to the table.

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

**Half-wave rectifiers, 4-pole**

BEG-242-555 vertical mounting position
BEG-243-555 horizontal mounting position with snap-in stud

**Application area**

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

**Technical data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BEG-242-555</th>
<th>BEG-243-555</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. supply voltage</td>
<td>555 V~</td>
<td>555 V~</td>
</tr>
<tr>
<td>Max. DC current at 60°C</td>
<td>1.0 A</td>
<td>1.0 A</td>
</tr>
<tr>
<td>Max. ambient temperature</td>
<td>-25°C to +80°C</td>
<td>-25°C to +80°C</td>
</tr>
</tbody>
</table>

For the selection of associated coil voltages, please refer to the table.

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

**Bridge rectifiers, 6-pole**

**Dimensions**

<table>
<thead>
<tr>
<th>Bridge rectifiers, 6-pole</th>
<th>BEG-162-270</th>
<th>BEG-161-270</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEG-162-270 vertical mounting position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEG-161-270 horizontal mounting position</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Application area**

Current supply for spring-applied brakes from AC mains (normal excitation)

Example: 205 V DC coil on 230 V AC mains

**Technical data**

- Max. supply voltage: 270 V~
- Max. DC current at 60°C: 0.75 A
- Max. ambient temperature: -25°C to +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 required spark suppressor. |
| For the selection of associated coil voltages, please refer to the table |
Accessories

**Half-wave rectifiers, 6-pole**

**Dimensions**

<table>
<thead>
<tr>
<th>Model</th>
<th>Vertical Mounting Position</th>
<th>Horizontal Mounting Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEG-262-460</td>
<td>![Image] (52.6x21.5)</td>
<td>![Image] (52.6x21.5)</td>
</tr>
<tr>
<td>BEG-262-555</td>
<td>![Image] (51.9x46.9)</td>
<td>![Image] (51.9x46.9)</td>
</tr>
</tbody>
</table>

**Application area**

Current supply for spring-applied brakes from AC mains (normal excitation)

Example: 180 V DC coil on 400 V AC mains

**Technical data**

- Max. supply voltage: 460 V~/555 V~
- Max. DC current at 60°C: 0.75 A
- Max. ambient temperature: -25°C to +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 required spark suppressor.

For the selection of associated coil voltages, please refer to the table.

\[ U_{dc} = \frac{U_{ac}}{2.22} = \frac{460 \text{ V}}{2.22} = 180 \text{ V DC} \]
Accessories

Bridge/half-wave rectifier

Once a set overexcitation time has elapsed, the bridge/half-wave rectifiers switch from bridge rectification to half-wave rectification. This makes it possible to improve switching performance or reduce power in accordance with coil dimensioning.

<table>
<thead>
<tr>
<th>Rectifier type</th>
<th>Supply voltage</th>
<th>Overexcitation</th>
<th>Holding current reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[V AC]</td>
<td>[V DC]</td>
<td>[V DC]</td>
</tr>
<tr>
<td>BEG-561-255-030</td>
<td>230</td>
<td>103</td>
<td>06 to 25</td>
</tr>
<tr>
<td>BEG-561-255-130</td>
<td>16 to 25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEG-561-440-030-1</td>
<td>400</td>
<td>180</td>
<td>06 to 25</td>
</tr>
</tbody>
</table>

The information in this table is valid for the BFK458 with standard rated torque and for designs without pole shim (assignment for other brakes on request).

Technical data

<table>
<thead>
<tr>
<th>Rectifier type</th>
<th>Output voltage with bridge rectification</th>
<th>Output voltage with half-wave rectification</th>
<th>Ambient temperature (storage/operation) [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.9xU1</td>
<td>0.45xU1</td>
<td>-25 to +70</td>
</tr>
</tbody>
</table>

In the case of switching on the DC side (fast engagement), switching must also occur on the supply side. Otherwise, overexcitation will not occur on restarting.
Accessories

Connection diagrams

AC switching parallel to the motor – strong delayed engagement

Supply: Phase-Starpoint

Supply: Phase-Phase

DC switching parallel to the motor – fast engagement

Supply: Phase-Starpoint

Supply: Phase-Phase
Accessories

**Connection diagrams**

**AC switching by mains – delayed engagement**

Supply: Phase-N

![Diagram of AC switching by mains - delayed engagement: Phase-N supply](image1)

Supply: Phase-Phase

![Diagram of AC switching by mains - delayed engagement: Phase-Phase supply](image2)

**DC switching by mains – fast engagement**

Supply: Phase-Phase or Phase-N by 6-pole rectifier

![Diagram of DC switching by mains - fast engagement: Phase-Phase or Phase-N supply by 6-pole rectifier](image3)

Supply: Phase-Phase or Phase-N by 4-pole rectifier

![Diagram of DC switching by mains - fast engagement: Phase-Phase or Phase-N supply by 4-pole rectifier](image4)
## Accessories

### Supply voltage selection table for bridge rectifiers and half-wave rectifiers

#### Rectifier type and rated coil voltage for mains voltage

<table>
<thead>
<tr>
<th>AC voltage V AC</th>
<th>Rectifier type</th>
<th>Rectifier type</th>
<th>Spark suppressor</th>
<th>Rectifier type</th>
<th>Rated coil voltage ± 10% V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>42 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.01</td>
<td>BEG-262/261-460</td>
<td>20 V</td>
</tr>
<tr>
<td>48 V</td>
<td>Bridge</td>
<td>BEG-142/143-270</td>
<td>14.198.00.01</td>
<td>BEG-162/161-270</td>
<td>42 V</td>
</tr>
<tr>
<td></td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.01</td>
<td>BEG-262/261-460</td>
<td>20 V</td>
</tr>
<tr>
<td>110 V</td>
<td>Bridge</td>
<td>BEG-142/143-270</td>
<td>14.198.00.02</td>
<td>BEG-162/161-270</td>
<td>103 V</td>
</tr>
<tr>
<td>220 V</td>
<td>Bridge</td>
<td>BEG-142/143-270</td>
<td>14.198.00.04</td>
<td>BEG-162/161-270</td>
<td>205 V</td>
</tr>
<tr>
<td></td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.02</td>
<td>BEG-262/261-460</td>
<td>103 V</td>
</tr>
<tr>
<td>230 V</td>
<td>Bridge</td>
<td>BEG-142/143-270</td>
<td>14.198.00.04</td>
<td>BEG-162/161-270</td>
<td>205 V</td>
</tr>
<tr>
<td></td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.02</td>
<td>BEG-262/261-460</td>
<td>103 V</td>
</tr>
<tr>
<td>240 V</td>
<td>Bridge</td>
<td>BEG-142/143-270</td>
<td>14.198.00.04</td>
<td>BEG-162/161-270</td>
<td>225 V</td>
</tr>
<tr>
<td></td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.03</td>
<td>BEG-262/261-460</td>
<td>127 V</td>
</tr>
<tr>
<td>255 V</td>
<td>Bridge</td>
<td>BEG-142/143-270</td>
<td>14.198.00.03</td>
<td>BEG-262/261-460</td>
<td>127 V</td>
</tr>
<tr>
<td>277 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.03</td>
<td>BEG-262/261-460</td>
<td>180 V</td>
</tr>
<tr>
<td>290 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.03</td>
<td>BEG-262/261-460</td>
<td>180 V</td>
</tr>
<tr>
<td>380 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.03</td>
<td>BEG-262/261-460</td>
<td>180 V</td>
</tr>
<tr>
<td>400 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.03</td>
<td>BEG-262/261-460</td>
<td>180 V</td>
</tr>
<tr>
<td>415 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.03</td>
<td>BEG-262/261-460</td>
<td>180 V</td>
</tr>
<tr>
<td>420 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.03</td>
<td>BEG-262/261-460</td>
<td>180 V</td>
</tr>
<tr>
<td>440 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.04</td>
<td>BEG-262/261-460</td>
<td>205 V</td>
</tr>
<tr>
<td>460 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.04</td>
<td>BEG-262/261-460</td>
<td>205 V</td>
</tr>
<tr>
<td>480 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.04</td>
<td>BEG-262/261-555</td>
<td>275 V</td>
</tr>
<tr>
<td>500 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.04</td>
<td>BEG-262/261-555</td>
<td>225 V</td>
</tr>
<tr>
<td>555 V</td>
<td>Half-wave</td>
<td>BEG-243/242-555</td>
<td>14.198.00.04</td>
<td>BEG-262/261-555</td>
<td>250 V</td>
</tr>
</tbody>
</table>

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

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

Basics

A brake is dimensioned essentially on the basis of the required braking torque \( M_{\text{eff}} \).

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. The brake is dimensioned in accordance with VDI guideline 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, braking torque need to include the safety factor \( K \), the value of which should be set dependent upon the operating conditions.

\[ K \geq 2 \]

Load types

The following load types are primarily encountered in practice:

\[ M_{\text{eff}} = M_a - K \leq M_K \]

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

\[ M_{\text{eff}} = \frac{J_L \cdot \Delta n_0}{9.55 \cdot \left( \frac{t_3 - t_{12}}{2} \right)} - K \]

Dynamic and static load

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

\[ M_{\text{eff}} = (M_a \pm M_L) \cdot K \leq M_K \]

\[ M_{\text{eff}} = \left( \frac{J_L \cdot \Delta n_0}{9.55 \cdot \left( \frac{t_3 - t_{12}}{2} \right)} \pm M_L \right) \cdot K \leq M_K \]

+ \( M_L \) = To be used with driving load torque (e.g. when lowering a load)

- \( M_L \) = For braking operation

Estimating the required braking torque and/or size

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

\[ M_{\text{eff}} = 9550 \cdot \frac{P}{\Delta n_0} - K \leq M_K \]

Thermal load

If high operating frequencies and friction energy/switching cycle are to be expected, we recommend recalculating the thermal data for the brake. 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 the load, for example

+ \( M_L \) = For braking operation

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

Example calculation

The following technical data is known:

- \( P = 3 \text{ kW} \)
- \( \Delta n_0 = 1450 \text{ rpm} \)
- \( J_L = 0.13 \text{ kgm}^2 \) total
- \( t_3 = 2 \text{ s} \)
- \( M_L = 15 \text{ Nm} \)
- \( S_h = 100 \text{ switching operations/h} \)

Estimating the required braking torque and/or size

\[
M_{\text{erf}} = 9550 \frac{P}{\Delta n_0} \cdot K
\]

\[
M_{\text{erf}} = 9550 \frac{3}{1450} = 40 \text{ Nm}
\]

Assume BFK458-14

Determining the required braking torque

\[
M_{\text{erf}} = \left( \frac{J_L \cdot \Delta n_0}{9.55 \left( \frac{t_3}{12} \cdot \frac{t_{12}}{2} \right)} + M_L \right) \cdot K
\]

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

\[
M_{\text{erf}} = \left( \frac{0.13 \cdot 1450^2}{9.55 \left( \frac{2}{12} \cdot \frac{0.025}{2} \right) + 15} \right) \cdot 2 = 50 \text{ Nm}
\]

Therefore, BFK458-14 is chosen.

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

Thermal recalculation

\[
Q = \frac{J_L \cdot \Delta n_0^2}{182.5} \cdot \frac{M_K - M_L}{M_K - M_L + M_L}
\]

\[
Q = \frac{0.13 \cdot 1450^2}{182.5} \cdot \frac{60}{(60 - 15)} = 1997 \text{ J}
\]

Calculated switching energy \( Q = 1997 \text{ J/switching cycle.} \)

The diagram on page 18 shows a max. permissible friction work of 7,326 J for size 14 at \( S_h = 100 \text{ h}^{-1}. \)

\( Q = 1997 < Q_{\text{max}} = 7326 \text{ J} \)

The brake is correctly dimensioned.

Example order

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

Supply voltage 205 V =, shaft diameter 25 mm.

BFK458-14E, 205 V =, d = 25 mm
Product overview

BFK458 spring-applied brake

INTORQ BFK458-

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

1.5 – 600 Nm (see torque graduations)

Cable length

- Standard from 100 mm – 1000 mm in 100 mm steps,
  from 1000 mm – 3000 mm in 250 mm steps

Hand release

- Mounted
- As mounting kit

Armature plate

- Standard
- Hard chrome-plated (size 06 and above)
- With pole shim/brass film
- Noise-reduced (O-ring design)

Microswitch

- Switching function monitoring (size 12 and above)
- Wear monitoring (size 12 and above)
- Hand release monitoring, direction of release away from motor (sizes 06-25)
- Hand release monitoring, direction of release towards motor (sizes 06-10)

Terminal box

- Mounted (size 12 and above)

Temperature resistance –40°C

- With hard chrome-plated friction surfaces (armature plate and flange are essential)
- With temperature-resistant fixing screws

Rotor

- Aluminium
- Noise-reduced (rotor with toothed intermediate ring)

Rotor with low rate of wear

- Aluminium
- Noise-reduced (rotor with toothed intermediate ring)

Hub

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

Terminal box

- As mounting kit

Counter friction face

- Friction plate (up to and including size 16)
- Flange
- Flange hard chrome-plated
- Tacho flange
- Connecting 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
- 6-pole vertical, integrated spark suppressor
- 4-pole with snap-in stud
- 6-pole horizontal, integrated spark suppressor

Half-wave rectifier

- 4-pole without snap-in stud
- 6-pole vertical, integrated spark suppressor
- 4-pole with snap-in stud
- 6-pole horizontal, integrated spark suppressor

Spark suppressor

- Yes
We are available to our customers at all times and in all locations. Major customers and projects are supported directly by our Key Account Sales Team at our HQ in Aerzen (Germany) or by our locations in Shanghai (China), Atlanta (USA) and Pune (India).

In addition to this, we work with a global network of local trading partners and cooperate with Lenze’s global sales organisation.

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