Operating and Installation Instructions

for the electromagnetically released

Spring-Applied Brakes BRE 5 … BRE 1000 — Protective Rating IP55 —
(Precima FDB 08 … FDB 40)
Document history

<table>
<thead>
<tr>
<th>Ausgabe</th>
<th>Version</th>
<th>Beschreibung</th>
</tr>
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<tbody>
<tr>
<td>08.2011</td>
<td>0.0</td>
<td>Current version</td>
</tr>
<tr>
<td>04.2016</td>
<td>1.0</td>
<td>Description of the directives and standards updated Pt. 2.4.3</td>
</tr>
<tr>
<td>03.2018</td>
<td>2.1</td>
<td>Adapting to nomenclature of Getriebebau NORD Complements and corrections; formal revision</td>
</tr>
<tr>
<td>09.2018</td>
<td>2.2</td>
<td>3.2.2.4: variant air gap at FDB 20/23 with options RG or SR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1.2.2: no separate mounting of friction plate and flange</td>
</tr>
<tr>
<td>10.2018</td>
<td>2.3</td>
<td>3.2.2.4: BRE 250, BRE 400 $n_{\text{max}} = 1800 \text{ min}^{-1}$</td>
</tr>
</tbody>
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1. Information on Operating and Assembly Instructions

1.1 Validity

These operating and assembly instruction (in accordance with their title) are generally valid only for the electromagnetically released spring-applied brakes BRE 5 to BRE 1000 (Precima FDB 08 to FDB 40) of M/s. PRECIMA Magnettechnik GmbH. Moreover, they are a necessary element of every brake delivery and generally only valid for such simultaneously delivered brakes. The operating and assembly instruction will even continue to be valid for such brakes, if a later version of the instructions exists, unless M/s. PRECIMA expressly declares to the customer that the later version replaces the older one.

In individual cases, the above mentioned principles may be deviated from (e.g. in case of special designs or repeated deliveries). In any case, an indicative or supplementing information of M/s. PRECIMA will be required.

1.2 Purpose and Use

These operating and assembly instructions are to contribute to a safe and proper assembly and operation of the spring-applied brake.

In order to meet this requirement and purpose, all the persons dealing with the assembly and the operation of the brake (qualified according to 2.1.2) have to completely and thoroughly read these instructions before carrying out their respective activities (assembly, commissioning, operation, maintenance, etc.). Furthermore, said persons of course have to observe and implement the given instructions when carrying out their respective activities. The instructions themselves must be accessible any time (even after completion of the respective activity) and within short time in a clean, complete and well legible condition.

Despite careful and thorough elaboration of the instructions, mistakes, defects and incompleteness in the operating and assembly instructions cannot be excluded. For this reason, please consult M/s. PRECIMA if in doubt. Other technical questions, notes and suggestions for improvement can also be directed to the following address:

Precima Magnettechnik GmbH
Röcker Straße 16
D – 31675 Bückeburg
Telefon Nr.: +49 (0) 57 22 / 89 33 2 -0
Telefax Nr.: +49 (0) 57 22 / 89 33 2 -2
E-mail: info@precima.de
1.3 Terms and Identification of Notices

Important notices in Chapter 4 (Assembly), Chapter 5 (Operation) and Chapter 6 (Disassembly / Exchange) referring to technical security as well as to industrial safety are particularly highlighted by the following signal words:

**Danger!** Refers to processes and operation procedures which are to be thoroughly observed in order to exclude a hazard to persons.

**Attention!** Refers to safety measures which must absolutely be followed in order to avoid brake failures.

**Stop!** Refers to instructions that have to be particularly observed when carrying out the work described.

In order to simplify the text of these operating and assembly instructions, certain longer and complicated terms are replaced by shorter ones which will have the following meanings in the scope of these instructions:

**Instructions** = Operating and assembly instruction

**Working brake** = Brake which implements friction work in regular operation, i.e. performs a braking function

**Brake** = Spring-applied brake = electromagnetically released spring-applied brake

**Data sheet** = Technical data sheet

**Holding brake** = Brake which does not perform friction work in regular operation but merely holds the load in position. In case of an emergency, however, it may also perform a braking function.

**End plate** = Motor end plate = end plate of an electric motor

**Dimension sheet** = Dimension drawing

**PRECIMA** = M/s. PRECIMA = PRECIMA Magnettechnik GmbH, Bückeburg

**Shaft** = Motor shaft = shaft of an electric motor

In the scope of these operating and assembly instructions, the spring-applied brake is considered to be a machine element to be connected to an electric motor since this combination represents the most frequently used variant. Accordingly, certain designations refer to said fact (motor shaft, motor end plate ➔ see above). However, this is no general limitation of the validity of these instructions to such combinations - just as there is no comparable limitation to the application of the spring-applied brake at all.
2. Conditions for Assembly and Operation

2.1 Persons

2.1.1 Operator

Operator is that natural person or entity using the spring-applied brake or instructing the spring-applied brake to be used. The operator and/or a person assigned by him must safeguard the proper use according to 2.3 and the observance of relevant standards and provisions, regulations and laws. In particular, he has to take care of the fact that only qualified personnel according to 2.1.2 are entrusted with work at the brake.

2.1.2 Personnel

Personnel to carry out work at the brake must exclusively be qualified personnel who - based upon their education, experience, instructions as well as knowledge concerning relevant standards and provisions, accident prevention, regulations and operating conditions - have been authorised by the person being responsible for safety, to carry out the activities described in these instructions and who - when doing so - are in a position to recognise possible risks early and to avoid them.

2.2 Product

2.2.1 Area of Application

The area of application of the brake is limited to plants and machines and is defined by the general operating conditions stated in 2.2.4 as well as by the boundary conditions, performance data and dimensions indicated in the dimension drawing and on the name plate (lettering) of the brake (see: 3.1). Any deviation from these directives require a particular agreement with PRECIMA. Particularly pay attention to the application as a working and an application as a holding brake (definition: see 1.3).

2.2.2 Environment of Application

The environment of application of the spring-applied brake must be designed such that after its proper assembly the brake may fulfil its function in perfect operation and will not pose any risk for persons and material assets. Changes in the environment of application (e.g. at the machine or plant which the brake is connected with) must only be carried out, if they have no influence on the first mentioned condition.

2.2.3 State of Application

The permissible state of application of the brake includes the operationally perfect state of all components (in case of worn parts: exchange in time) and the observance of the operating and assembly requirements specified in these instructions as well as the omission of any retrofits, changes or modification of the brake, unless authorised by PRECIMA. The latter also includes the use of only original spare and exchange parts.
Attention!
Friction surfaces and the friction lining should not under any circumstances be in contact with oil or grease since already small quantities reduce the braking torque considerably!

2.2.4 General Operating Conditions

Operating time: 100%
Ambient temperature: -20…+40°C

Should any of the above parameters be exceeded, M/s. PRECIMA should be contacted for advice.

2.3 Proper Use

At the time of delivery, the spring-applied brake represents the state of the art technology, and is generally considered to be reliable in operation. Only use it properly in order to avoid any risk to persons and material assets.

The spring-applied brake is properly used, if qualified personnel (according to 2.1.2) by applying the valid operating and assembly instructions (as per 1.1, according to 1.2) produces and maintains a permissible state of application (according to 2.2.3) in an admissible environment of application (according to 2.21).

The improper (inappropriate) use includes hazards which could not be completely taken into account when designing and construction the brake and which are unforeseeable in this sense.

2.4 Legal Aspects

2.4.1 Liability

On the basis of the information, data and directions given and of the illustrations and descriptions included in these operating and assembly instructions, no claims for brakes outside the area of application of these instructions (compare 1.1) may be submitted.

In general, an inappropriate use of the brake (compare 2.3) will exclude the liability of M/s. PRECIMA.

2.4.2 Warranty

For the warranty terms refer to the General Terms of Sales and Delivery of M/s. PRECIMA (www.precima.de / AGB). In all cases, warranty claims are to be submitted to PRECIMA immediately after establishing a deficiency or a defect. The exclusion of liability according to 2.4.1 simultaneously means that no warranty claim exists.
2.4.3 Directives and Standards

The spring-applied brake was produced in accordance with the following EC directives and standards:

- EC Directive Machinery (2006/42/EC)
- EN ISO 12100: Safety of Machinery
- EU Directive Electromagnetic Compatibility (2014/30/EU). Compliance with this directive has to be safeguarded with the appropriate switchgear of the user.

The spring-applied brake is not an independently operable machine but intended to be installed in other machinery. Its commissioning is prohibited until the establishment is reached that the machines comply with the provisions of the EC Directive.

2.5 Delivery Scope and State

Check the delivery scope and state immediately upon receipt of the brake.

M/s. Precima will not assume any warranty for subsequently claimed defects (refer to 2.4.2).

Immediately report damage in transit to the forwarders and the incompleteness of the delivery and visible defects to the manufacturer plant.

➔ Attention!

Should any uncertainties or discrepancies occur during the examination or should the delivery be incomplete or defective, the brake must not be installed or commissioned without previously contacting PRECIMA.
3. Product Description

3.1 Labelling

3.1.1 Lettering

The lettering of the spring-pressure brake includes all important data. These data and the contractual provisions for the brakes establish the limits of their use.

Lettering on the brake housing:

103V 12 09 40

- Braking torque in Nm
- Year of manufacture
- Week of manufacture
- Operating voltage (DC) in Volt

3.1.2 Type Designation Code of Brakes FDB (PRECIMA)

Example:

<table>
<thead>
<tr>
<th>FDB</th>
<th>15</th>
<th>N</th>
<th>H</th>
<th>F</th>
<th>R</th>
<th>T</th>
<th>S</th>
<th>M</th>
<th>20 H7</th>
<th>24 VDC</th>
</tr>
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<tbody>
<tr>
<td></td>
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</tbody>
</table>

- Operating voltage
- Hub bore
- Micro switch
- Dust guard ring
- Tapped bores for encoder mounting
- Friction plate
- Flange
- Manual release
- Without code: Operating noise-damped
- Brake type: N – standard; C – adjustable
- Brake size (sizes: 08, 10, 13, 15, 17, 20, 23, 26, 30, 40)

*) The Options I are specified in this Operating and Installation Instructions. These options, if required, have to be indicated at the time of order (e.g. by using the code).

**) The Options II are not specified in this Operating and Installation Instructions. At FDB series it is only the option M (=Micro switch). This option, if required, has also to be indicated at the time of order and it is not retrofittable. There are separate Operating and Installation Instructions for Options II which have to be observed.
3.1.3 Nomenclature of Brakes IP55 (Getriebbau NORD)

<table>
<thead>
<tr>
<th>BRE</th>
<th>150</th>
<th>HL</th>
<th>FHL</th>
<th>RG</th>
<th>SR</th>
<th>MIK</th>
<th>NRB1</th>
<th>NRB2</th>
<th>IR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Current measuring relay
- Noise-reduced brake / Brake coupling
- Noise-reduced brake / Switching noise
- Micro switch
- Dust and corrosion protected
- Rustproof
- Manual release
- Lockable manual release
- Brake size / Braking torque (sizes: 5, 10, 20, 40, 60, 100, 150, 250, 400, 1000)

Example: 150 Brake

*) BRE 5 … BRE 40: Precima FDB, Type C
   BRE 60 … BRE 1000: Precima FDB, Type N

3.2 Technical Information

3.2.1 Operation of the Brake (Illustration 3.1)

The electromagnetically released spring-applied brakes of the FDB series are fail-safe brakes, this means that the braking torque is generated by means of spring force, and released by magnetic force.

During braking, the pressure springs (item 4, illustration 3.1) apply pressure to the armature plate (item 2) trapping the rotor (item 3.1 / 3.2) which is keyed to the machine shaft, against the counter-friction surface (flange (item 7), friction plate (item 8) or motor flange). The two friction sides of the rotor and the armature disk and/or the counter-friction surface produces the braking torque.

During releasing, a magnetic force is produced through applying a direct voltage to the magnet body (item 1.1 / 1.2) via the field winding. Said magnetic force draws the armature disk (item 2) to the magnet body and the brake rotor is released.

During manual releasing (only if brakes are designed with manual release), the armature disk is mechanically pulled against the magnet body by pulling the manual release handle (item 5, with screwed-in manual releasing lever (item 5.1)) and thus the rotor is released. This enables you to release the brake, for example, even if there is a power failure.

➤ Attention!
For safety reasons, the adjustment of the manual release must not be changed!
Brake type N (Illustration 3.1 top)
The standard type of the spring-pressure brake is delivered with a fixed braking torque \( M_{brN} \). Via the number of springs (item 4), this torque can be varied as per 3.2.2.1. The brakes BRE 60 ... 1000 (Precima FDB 17 ... 40) are standardly delivered as type N.

Brake type C (Illustration 3.1 bottom)
The braking torque for this brake type with central adjusting ring (item 10) is also adjustable via the number of springs as per 3.2.2.1 similar to type N. Furthermore, it can additionally be adjusted by screwing in and screwing out the adjusting ring. The nominal braking torque has been adjusted as soon as the ring firmly contacts the magnet housing (item 1.2). Screwing out will result in a step-by-step reduction of the braking torque as per 3.2.2.2. The brakes BRE 5 ... 40 (Precima FDB 08 ... 15) are standardly delivered as type C.
### 3.2.2.2 Torque reduction (design C)

<table>
<thead>
<tr>
<th>Size</th>
<th>BRE 5 FDB 08</th>
<th>BRE 10 FDB 10</th>
<th>BRE 20 FDB 13</th>
<th>BRE 40 FDB 15</th>
<th>BRE 60 FDB 17</th>
<th>BRE 100 FDB 20 N/C</th>
<th>BRE 150 FDB 23 N/C</th>
<th>BRE 250 FDB 26</th>
<th>BRE 400 FDB 30</th>
<th>BRE 1000 FDB 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque reduction / latching step [Nm]</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
<td>1</td>
<td>1.3</td>
<td>1.5</td>
<td>2</td>
<td>no standard design C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of usable latching steps (max. permissible turning out the threaded ring)</td>
<td>6</td>
<td>12</td>
<td>12</td>
<td>9</td>
<td>12</td>
<td>18</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3.2.2.3 Dimensions, masses, attachment (illustration 3.2)

<table>
<thead>
<tr>
<th>Size</th>
<th>Hub dimensions [mm]</th>
<th>General brake dimensions [mm]</th>
<th>Dimensions of tapped bores [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hexagon hub Ød H7</td>
<td>Toothed hub Ød H7</td>
<td>Mounting dimensions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRE 5 FDB 08</td>
<td>11/14/15</td>
<td>11/14*/15°</td>
<td>20 18 1.5 0.5</td>
</tr>
<tr>
<td>BRE 10 FDB 10</td>
<td>15/19/20*</td>
<td>14/15</td>
<td>25 20 2.5 1</td>
</tr>
<tr>
<td>BRE 20 FDB 13</td>
<td>15/20/25</td>
<td>15/20</td>
<td>33 20 3.5 1.5</td>
</tr>
<tr>
<td>BRE 40 FDB 15</td>
<td>20/25/30</td>
<td>20/25</td>
<td>42 25 3 2</td>
</tr>
<tr>
<td>BRE 60 FDB 17</td>
<td>25/30/35*</td>
<td>35/40</td>
<td>- 30 3</td>
</tr>
<tr>
<td>BRE 100 FDB 20</td>
<td>30/35/40</td>
<td>-</td>
<td>30 3</td>
</tr>
<tr>
<td>BRE 150 FDB 23</td>
<td>35/40/45</td>
<td>-</td>
<td>35 4</td>
</tr>
<tr>
<td>BRE 250 FDB 26</td>
<td>40/45/50*</td>
<td>-</td>
<td>40 4</td>
</tr>
<tr>
<td>BRE 400 FDB 30</td>
<td>50/55/60*</td>
<td>-</td>
<td>50 4</td>
</tr>
<tr>
<td>BRE 1000 FDB 40</td>
<td>65/70/75*</td>
<td>-</td>
<td>70 4</td>
</tr>
</tbody>
</table>

* Standard feather key groove of the hub as per DIN 6885/1-JS9
* deviating feather key groove as per DIN 6885/3-JS9
** no option Friction plate; dimension h2 (Flange)
*** separate inner pole: 8 mm without thread (through-hole)
### Size | Masses [kg] | Attachment dimensions [mm] | Tightening torque [Nm] | Adjusting dimensions [mm] |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BRE 5 FDB 08</td>
<td>1.10</td>
<td>0.05</td>
<td>0.20</td>
<td>72 (3 x) M4</td>
</tr>
<tr>
<td>BRE 10 FDB 10</td>
<td>1.90</td>
<td>0.08</td>
<td>0.34</td>
<td>90 (3 x) M5</td>
</tr>
<tr>
<td>BRE 20 FDB 13</td>
<td>3.10</td>
<td>0.10</td>
<td>0.68</td>
<td>112 (3 x) M6</td>
</tr>
<tr>
<td>BRE 40 FDB 15</td>
<td>4.60</td>
<td>0.13</td>
<td>0.90</td>
<td>132 (3 x) M6</td>
</tr>
<tr>
<td>BRE 60 FDB 17</td>
<td>6.30</td>
<td>0.17</td>
<td>1.40</td>
<td>145 (3 x) M8</td>
</tr>
<tr>
<td>BRE 100 FDB 20</td>
<td>10.00</td>
<td>0.24</td>
<td>1.90</td>
<td>170 (3 x) M8</td>
</tr>
<tr>
<td>BRE 150 FDB 23</td>
<td>14.70</td>
<td>0.29</td>
<td>2.50</td>
<td>196 (3 x) M8</td>
</tr>
<tr>
<td>BRE 250 FDB 26</td>
<td>21.50</td>
<td>0.80</td>
<td>3.50</td>
<td>230 (3 x) M10</td>
</tr>
<tr>
<td>BRE 400 FDB 30</td>
<td>35.00</td>
<td>0.90</td>
<td>5.20</td>
<td>278 (6 x) M10</td>
</tr>
<tr>
<td>BRE 1000 FDB 40</td>
<td>60.00</td>
<td>0.90</td>
<td>13.10</td>
<td>360 (6 x) M12</td>
</tr>
</tbody>
</table>

** no option Friction plate; thread depth for option Flange

Dimension y see 4.3.2 or illustration 4.2

#### 3.2.2.4 Air gaps, rotor values

<table>
<thead>
<tr>
<th>Size</th>
<th>Nominal air gap [mm]</th>
<th>max. air gap [mm]</th>
<th>Rotor size (new state) [mm]</th>
<th>Rotor size (minimum) [mm]</th>
<th>Mass moment of inertia rotor [kgm²]</th>
<th>Max. speed rotor [min⁻¹]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRE 5 FDB 08</td>
<td>0.2 +0.15</td>
<td>0.60</td>
<td>0.45*</td>
<td>7.5 -0.1</td>
<td>4.5</td>
<td>0.015 x 10⁻³</td>
</tr>
<tr>
<td>BRE 10 FDB 10</td>
<td>0.2 +0.15</td>
<td>0.70</td>
<td>0.45*</td>
<td>8.5 -0.1</td>
<td>5.5</td>
<td>0.045 x 10⁻³</td>
</tr>
<tr>
<td>BRE 20 FDB 13</td>
<td>0.3 +0.15</td>
<td>0.80</td>
<td>0.55*</td>
<td>10.3 -0.1</td>
<td>7.5</td>
<td>0.173 x 10⁻³</td>
</tr>
<tr>
<td>BRE 40 FDB 15</td>
<td>0.3 +0.15</td>
<td>0.90</td>
<td>0.60*</td>
<td>12.5 -0.1</td>
<td>9.5</td>
<td>0.45 x 10⁻³</td>
</tr>
<tr>
<td>BRE 60 FDB 17</td>
<td>0.3 +0.15</td>
<td>1.00</td>
<td>0.60*</td>
<td>14.5 -0.1</td>
<td>11.5</td>
<td>0.86 x 10⁻³</td>
</tr>
<tr>
<td>BRE 100 FDB 20</td>
<td>0.4 +0.15 ***</td>
<td>1.10</td>
<td>0.80*</td>
<td>16.0 -0.1</td>
<td>12.5</td>
<td>1.22 x 10⁻³</td>
</tr>
<tr>
<td>BRE 150 FDB 23</td>
<td>0.4 +0.15 ***</td>
<td>1.10</td>
<td>0.80*</td>
<td>18.0 -0.1</td>
<td>14.5</td>
<td>2.85 x 10⁻³</td>
</tr>
<tr>
<td>BRE 250 FDB 26</td>
<td>0.5 +0.2</td>
<td>1.20</td>
<td>0.90*</td>
<td>20.0 -0.1</td>
<td>16.5</td>
<td>6.65 x 10⁻³</td>
</tr>
<tr>
<td>BRE 400 FDB 30</td>
<td>0.5 +0.2</td>
<td>1.20</td>
<td>0.90*</td>
<td>20.0 -0.1</td>
<td>16.5</td>
<td>19.5 x 10⁻³</td>
</tr>
<tr>
<td>BRE 1000 FDB 40 **</td>
<td>0.6 +0.2</td>
<td>1.20</td>
<td>1.20*</td>
<td>22.0 -0.1</td>
<td>18.5</td>
<td>44.5 x 10⁻³</td>
</tr>
</tbody>
</table>

* Holding brakes with emergency-stop properties

** Switched with fast acting rectifier (over-excitation)

*** Brake with option RG or SR: 0,6 +0,15
### 3.2.2.5 Friction work, friction capacity

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Working brake</td>
<td>( P_{R_{\text{max}}} )</td>
<td>( W_{R_{\text{max}}} )</td>
<td>( P_{R_{\text{max}}} )</td>
<td>( W_{R_{\text{max}}} )</td>
<td>( Q_r 0.1 )</td>
</tr>
<tr>
<td>BRE 5 / FDB 08</td>
<td>288 x 10³</td>
<td>3 x 10³</td>
<td>144 x 10³</td>
<td>1.5 x 10³</td>
<td>16 x 10⁶</td>
</tr>
<tr>
<td>BRE 10 / FDB 10</td>
<td>360 x 10³</td>
<td>6 x 10³</td>
<td>180 x 10³</td>
<td>3 x 10³</td>
<td>30 x 10⁶</td>
</tr>
<tr>
<td>BRE 20 / FDB 13</td>
<td>468 x 10³</td>
<td>12 x 10³</td>
<td>234 x 10³</td>
<td>6 x 10³</td>
<td>42 x 10⁶</td>
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<tr>
<td>BRE 40 / FDB 15</td>
<td>576 x 10³</td>
<td>25 x 10³</td>
<td>288 x 10³</td>
<td>12 x 10³</td>
<td>70 x 10⁶</td>
</tr>
<tr>
<td>BRE 60 / FDB 17</td>
<td>720 x 10³</td>
<td>35 x 10³</td>
<td>360 x 10³</td>
<td>17 x 10³</td>
<td>85 x 10⁶</td>
</tr>
<tr>
<td>BRE 100 / FDB 20</td>
<td>900 x 10³</td>
<td>50 x 10³</td>
<td>450 x 10³</td>
<td>25 x 10³</td>
<td>140 x 10⁶</td>
</tr>
<tr>
<td>BRE 150 / FDB 23</td>
<td>1080 x 10³</td>
<td>75 x 10³</td>
<td>540 x 10³</td>
<td>37 x 10³</td>
<td>170 x 10⁶</td>
</tr>
<tr>
<td>BRE 250 / FDB 26</td>
<td>1260 x 10³</td>
<td>105 x 10³</td>
<td>630 x 10³</td>
<td>52 x 10³</td>
<td>230 x 10⁶</td>
</tr>
<tr>
<td>BRE 400 / FDB 30</td>
<td>1440 x 10³</td>
<td>150 x 10³</td>
<td>720 x 10³</td>
<td>75 x 10³</td>
<td>310 x 10⁶</td>
</tr>
<tr>
<td>BRE 1000 / FDB 40</td>
<td>1620 x 10³</td>
<td>200 x 10³</td>
<td>810 x 10³</td>
<td>100 x 10³</td>
<td>400 x 10⁶</td>
</tr>
</tbody>
</table>

** in case of a uniform timely distribution of brakings

*** with sizes 08…13: Lining HT; with sizes 15…40: Lining HD

### 3.2.2.6 Electrical specific values

<table>
<thead>
<tr>
<th>Size</th>
<th>Electric power (average) [W]</th>
<th>Voltage [VDC]</th>
<th>Nominal current (guide value) [A]</th>
<th>Size</th>
<th>Electric power (average) [W]</th>
<th>Voltage [VDC]</th>
<th>Nominal current (guide value) [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRE 5 / FDB 08</td>
<td>22 24</td>
<td>0.92</td>
<td></td>
<td>BRE 100 / FDB 20</td>
<td>85 24</td>
<td>3.30</td>
<td></td>
</tr>
<tr>
<td>BRE 10 / FDB 10</td>
<td>28 24</td>
<td>1.17</td>
<td></td>
<td>BRE 150 / FDB 23</td>
<td>76 24</td>
<td>3.20</td>
<td></td>
</tr>
<tr>
<td>BRE 20 / FDB 13</td>
<td>34 24</td>
<td>1.42</td>
<td></td>
<td>BRE 250 / FDB 26</td>
<td>105 24</td>
<td>4.17</td>
<td></td>
</tr>
<tr>
<td>BRE 40 / FDB 15</td>
<td>45 24</td>
<td>1.69</td>
<td></td>
<td>BRE 400 / FDB 30</td>
<td>140 24</td>
<td>5.90</td>
<td></td>
</tr>
<tr>
<td>BRE 60 / FDB 17</td>
<td>55 24</td>
<td>2.18</td>
<td></td>
<td>BRE 1000 / FDB 40</td>
<td>144 24</td>
<td>7.77</td>
<td></td>
</tr>
</tbody>
</table>
### 3.2.2.7 Switching times

<table>
<thead>
<tr>
<th>Size</th>
<th>Nominal braking torque [Nm]</th>
<th>Separating time [ms]</th>
<th>Response delay [ms]</th>
<th>Linkage time [ms]</th>
<th>Response delay [ms]</th>
<th>Linkage time [ms]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRE 5 FDB 08</td>
<td>7.5*</td>
<td>60*</td>
<td>12*</td>
<td>32*</td>
<td>40*</td>
<td>70*</td>
</tr>
<tr>
<td>BRE 10 FDB 10</td>
<td>15*</td>
<td>85*</td>
<td>15*</td>
<td>45*</td>
<td>80*</td>
<td>125*</td>
</tr>
<tr>
<td>BRE 20 FDB 13</td>
<td>30*</td>
<td>125*</td>
<td>20*</td>
<td>60*</td>
<td>140*</td>
<td>200*</td>
</tr>
<tr>
<td>BRE 40 FDB 15</td>
<td>60*</td>
<td>140*</td>
<td>18*</td>
<td>68*</td>
<td>80*</td>
<td>155*</td>
</tr>
<tr>
<td>BRE 60 FDB 17</td>
<td>90*</td>
<td>190*</td>
<td>18*</td>
<td>78*</td>
<td>120*</td>
<td>210*</td>
</tr>
<tr>
<td>BRE 100 FDB 20</td>
<td>150*</td>
<td>175*</td>
<td>26*</td>
<td>106*</td>
<td>160*</td>
<td>280*</td>
</tr>
<tr>
<td>BRE 150 FDB 23</td>
<td>225*</td>
<td>290*</td>
<td>40*</td>
<td>140*</td>
<td>250*</td>
<td>400*</td>
</tr>
<tr>
<td>BRE 250 FDB 26</td>
<td>375*</td>
<td>360*</td>
<td>46*</td>
<td>166*</td>
<td>200*</td>
<td>400*</td>
</tr>
<tr>
<td>BRE 400 FDB 30</td>
<td>600*</td>
<td>450*</td>
<td>50*</td>
<td>180*</td>
<td>250*</td>
<td>600*</td>
</tr>
<tr>
<td>BRE 1000 FDB 40 **</td>
<td>1500*</td>
<td>450*</td>
<td>120*</td>
<td>280*</td>
<td>2500*</td>
<td>2950*</td>
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<tr>
<td>BRE 1000 FDB 40 **</td>
<td>1000</td>
<td>320</td>
<td>160</td>
<td>320</td>
<td>3000</td>
<td>3450</td>
</tr>
</tbody>
</table>

* Holding brakes with emergency-stop properties

** Switched with fast acting rectifier (over-excitation)

— The switching times indicated are to be understood as tolerance-afflicted guide values with nominal air gap —

\[ t_2 \] = separating time = time from switching on the current to cessation of braking torque \( (M_b \leq 0.1 \times M_{bn}) \)

– Over-excitation by fast acting rectifier results in approx. half the separating times –

\[ t_{1DC} \] = linkage time = response time when braking with interruption at d.c. side by mechanical switches = time from switching off current to reaching the full braking torque \( (M_b \geq 0.9 \times M_{bn}) \)

\[ t_{1AC} \] = linkage time = response time when braking with shutdown at a.c. side, i.e. by interrupting a separately supplied rectifier

\[ t_{11DC} / t_{11AC} \] = response delay = time from switching off current to the rising of the braking torque (included in the respective linkage time)

– Depending on operating temperature and wear of the brake disks, the real response times \( (t_2, t_{1DC}, t_{1AC}) \) may deviate from the guide values indicated here. In case of a voltage reduction by a fast acting rectifier, there will be reduced linkage times –
4. Assembly

4.1 Mechanical Installation

4.1.1 Prerequisites and Preparation

- When unpacking the spring-applied brake check for damage, and missing parts (according to delivery note). Complaints regarding damages in transit have to be immediately made with the supplier, complaints of missing parts or short supply have to be made with PRECIMA (also refer to 2.5).
- Compare the data on the name plate of the brake with the suppliers invoice and customers order.

➤ Attention!
Should the checks result in any uncertainties or discrepancies, the brake must not be installed and commissioned without prior consultation with PRECIMA.

4.1.2 Counter-friction surface

4.1.2.1 Motor endshield or adaptor, etc. as counter-friction surface

- Check whether the existing counter-friction surface meets the relevant requirements (material: steel, steel casting, grey cast iron - no aluminium / stainless steel with limitations - surface quality Rz 6.3 and whether it is free from grease and oil.

4.1.2.2 Flange, friction plate

- If the counter friction surface is supplied in the form of a flange (item 7, illustration 4.1) or a friction plate (item 8), this part will be mounted together with the brake at the motor endshield (see also 4.1.3, 4.1.4 and illustration 4.1)

➤ Attention!
Should the counter-friction surface not meet the relevant requirements, the brake must not be installed and commissioned without prior consultation with PRECIMA. Completely remove grease and oil from the counter-friction surface before processing the brake further!

4.1.3 Hub and rotor (illustration 4.1)

➤ Stop!
Before actually mounting the rotor, its thickness has to be checked in accordance with 3.2.2.4. \( s_{\text{new}} \) is the value for a new rotor (tolerance = 0/-0.1 mm), \( s_{\text{min}} \) is the minimum permissible rotor thickness. When installing a new rotor, \( s = s_{\text{new}} \) must be guaranteed. In case of a reassembly (e.g. after a dismounting caused by maintenance work), \( s > s_{\text{min}} \) must be guaranteed, otherwise the rotor has to be replaced.

The rotor is fixed to the motor shaft and revolves with the motor shaft and brakes the shaft when power is removed from the brake:
- Insert the first circlip (item 14) into the rear radial groove of the shaft
- Insert the feather key (item 15) into the axial groove of the shaft
- Push the toothed hub (item 6.1) or the hexagon hub (item 6.2) onto the shaft and over the feather key
- Axially fix the hub by inserting the second circlip (item 16) into the front radial groove of the shaft
- If necessary attach the counter friction surface (flange (item 7) or friction plate (item 8))
- Push the rotor (item 3.1 or 3.2) onto the hub. The rotor must be able to move axially on the hub.

**Attention!** Pay attention to the smooth running of the rotor/hub pair!

![Illustration 4.1: Brake assembly (sectional view)](image)

### 4.1.4 Brake (illustration 4.1)

The brake is attached to the motor flange (with or without an intermediate flange or friction plate). The important adjustments need to be made for safe operation of the brake, if necessary, the brake will be supplemented by additional component parts:

- Fit the brake onto the rotor, insert the fastening screws (item 11) until hollow screws (item 12) rest on the counter-friction surface.
- Check the size of air gap $a$ in order to keep the nominal value (+ tolerance) by means of a feeler gauge at three positions on the circumference and, if necessary, correct it by turning the hollow screws (for values of nominal air gap and tolerance: see 3.2.2.4).

**How to proceed in order to correct the air gap** refer to 5.1.3.1.
- Tighten the fastening screws with the tightening torque according to 3.2.2.3
- Position the O-ring (item 13; only for brakes with option “Operating noise-damped”)
- Position the dust ring (item 9; only for brakes with option S)
- Screw the manual release lever (item 5.1) with the washer in position into manual release bracket (item 5) and tighten it at the hexagon faces (only brakes with manual release = option H)
- Adjust the braking torque by means of the threaded ring (item 10). Adjusting values: refer to 3.2.2.2 (only brakes according to design C)

4.2 Electrical Installation

Carry out the electrical connection with power off. The operating voltage (DC) of the brake is indicated on the magnet housing (see 3.1.1 and illustration 3.2).

4.3 Conversions and Supplements

4.3.1 Change of Braking Torque

A change of the braking torque (with design C in addition to the adjusting ring as per 3.2.2.2) can be carried out by changing the number of springs according to table 3.2.2.1. In doing so, pay attention to the uniform distribution of the externally arranged springs.

4.3.2 Subsequent Assembly of Manual Release (illustration 4.2)

Brakes that were directly ordered as brakes with a manual release (option H), have already a manual release mounted and the adjustment must not be changed (refer to safety information unders 3.2.1).

A manual release handle can be fitted by the customer using the procedure below:

- Place the manual release handle (item 5) onto the magnet body (item 1.1 / 1.2) and insert the two pins with cross threaded hole (item 23) in the appropriate bores of the manual release handle.
- Insert the screw (item 20) with the washer in position (item 21) and the pressure spring (item 22) into the bores of the armature disk. The screws will pass through the armature plate and magnet body; the washer is positioned between the head of the screw and the armature plate. The pressure spring runs through the armature and is held by the washer and magnet body on the other side.
- Screw the screws into the pins (item 23) and adjust the dimension $y$ according to 3.2.2.3. Lock both screws in the correct adjusting position by means of screw sealing wax.

—he Attention!

For safety reasons, the adjustment of the manual release must not be changed even after a subsequent mounting by the customer! A readjustment of the braking air gap $a$ (refer to 5.1.3.1) does not require any adjustment of dimension $y$!
5. Operation

5.1 Brake in Operation

5.1.1 Commissioning

Before commissioning the brake, a functional test has to be carried out. This can normally be carried out together with the motor & brake attached. For possible malfunctions refer to: 5.2.

⇒ Stop!
The complete braking torque will only be effective after the brake linings at the rotor have run in! ⇒ For deviation values to $M_{BN}$: see 3.2.2.1

5.1.2 Running Operation

Without any malfunctions occurring, the running operation does not require any maintenance except for checking the size of the air gap (this increases as the lining on the rotor wears). This has to be checked in accordance with the following schedule (also refer to 5.1.3), unless a particular sensor for wear monitoring has been included in the brake. In case of malfunctions, proceed according to 5.2.

Check intervals:

- Working brake: + according to service life calculation
  + according to specifications made by the customer
**Holding brake:**

+ at least every two years
+ according to specifications made by the customer
+ use shorter intervals in case of frequent emergency stops

Furthermore, check the **rotor size** after a number of re-adjustments of the air gap \(a\) (see 5.1.3). A suitable control interval results from the relation of the difference \(s_{\text{new}} - s_{\text{min}}\) to difference \(s_{\text{new}} - a_{\text{max}}\) considering the respective tolerances.

### 5.1.3 Maintenance

#### 5.1.3.1 Readjusting the air gap (illustration 5.1)

The spring-applied brake is virtually maintenance-free. However, when the **maximum air gap** stated under 3.2.2.4 is reached, a **re-adjustment (new adjustment) of the air gap \(a\)** will be required for the safe operation of the brake. The functional capability of the brake which may in certain cases go beyond the maximum air gap does not change the aforesaid requirement: “a proper use” will no longer exist in such a case. In this case, functional capability and safety function of the brake will be compromised with a further increase in wear.

How to proceed when readjusting the air gap:
- Viewing in direction of the brake (see **illustration 5.1**) loosen the fastening screws (item 11) by turning them half a rotation counter-clockwise.
- Turn the hollow screws (item 12) into the magnet body by also turning them counter-clockwise.
- Turn the fastening screws (clockwise) into the (motor) flange until the **nominal air gap** is reached (to be measured with feeling gauge) at three positions on the circumference.
- Reset the hollow screws, i.e. turn them out of the magnet body (clockwise) until locked against the counter-friction surface.
- Tighten the fastening screws with the **tightening torque as per 3.2.2.3**.
- Subsequently control of the air gap, if necessary, carry out a readjustment.
5.1.3.2 Replace the rotor

When the minimum rotor size $s_{\text{min}}$ according to 3.2.2.4 is reached, a re-adjustment of the air gap “a” is no longer possible and the rotor has to be replaced. An operative readiness of the brake in certain cases falling below the minimum rotor size does not change the above statement; in such a case “a proper use” is no longer existing.

⇒ Stop!

Even after an exchange of the rotor, the complete braking torque will only be effective after the brake linings at the rotor have run in!

⇒ For deviation values to $M_{\text{bn}}$: see 3.2.2.1

⇒ Attention!

During the task of replacing the rotor, all the mechanical parts associated with the transmission of the braking torque have to checked for excessive wear (armature disc, hollow screws) and/or integrity (springs) and, if required, to be replaced!

5.2 Brake out of Operation (Malfunctions)

The following table includes typical problems during commissioning or running in, their possible causes and instructions on solving them.

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible causes</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake does not release</td>
<td>Air gap too large</td>
<td>Check and readjust air gap</td>
</tr>
<tr>
<td></td>
<td>Brake is not supplied with voltage</td>
<td>Check electrical connection</td>
</tr>
<tr>
<td></td>
<td>Voltage at the coil too low</td>
<td>Check the supply voltage of the coil</td>
</tr>
<tr>
<td></td>
<td>Armature plate obstructed</td>
<td>Remove obstruction</td>
</tr>
<tr>
<td>Brake releases with delay</td>
<td>Air gap too large</td>
<td>Check and readjust air gap</td>
</tr>
<tr>
<td></td>
<td>Voltage at the coil too low</td>
<td>Check the supply voltage of the coil</td>
</tr>
<tr>
<td>Brake does not apply</td>
<td>Voltage at the coil too large</td>
<td>Check the supply voltage of the coil</td>
</tr>
<tr>
<td></td>
<td>Armature plate obstructed</td>
<td>Remove obstruction</td>
</tr>
<tr>
<td>Brake applies with delay</td>
<td>Voltage at the coil too large</td>
<td>Check the supply voltage of the coil</td>
</tr>
</tbody>
</table>
6. Disassembly / Exchange

6.1 Removing the Brake

Removing the brake is the reverse of the assembly must only be done with the brake and motor being switched off, de-energised and torque-free.

➤ Danger!
The disassembly of the brake will result in a suspension of its holding torque. No risks must be taken with said suspension!

6.2 Exchange of Components

The only component to be regularly exchanged on site is the rotor when it reaches the wear limit (refer to 5.1.3.1); and if the hub shows signs of noticeable wear, it may be exchanged as well. Furthermore, however, all the other components indicated under 6.4 Spare Parts may generally be exchanged.

➤ Attention!
Before any re-assembly of the brake, check the fastening screws for damage and, if necessary, exchange them!

6.3 Exchange of Brake / Disposal

Because of the different material components, the components of our spring-applied brakes have to be disposed of for recycling separately. Moreover, pay attention to the official regulations. Important AAV (List of Wastes Ordinance) key numbers are indicated below. Depending on the material connection and the kind of separation, other key numbers may apply to components made of such materials.

- Ferrous metals (key number 160117)
- Non-ferrous metals (key number 160118)
- Brake linings (key number 160112)
- Plastics (key number 160119)

6.4 Spare Parts

Illustration 6.1 shows all the spare parts that you can order for the spring-applied brakes BRE (Precima FDB) indicated in the list below it.

When ordering spare parts, please always state the data from the brake lettering (see 3.1.1)!

➤ Attention!
For damage caused by other than original spare parts and accessories any liability and warranty on behalf of PRECIMA Magnettechnik GmbH shall be excluded (refer to 2.3.3).
Illustration 6.1: Spare parts (Sectional view)

<table>
<thead>
<tr>
<th>Item</th>
<th>Designation</th>
<th>Item</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Magnet part cpl. design N</td>
<td>6.2</td>
<td>Hub for rotor 3.2</td>
</tr>
<tr>
<td>1.2</td>
<td>Magnet part cpl. design C</td>
<td>7</td>
<td>Flange</td>
</tr>
<tr>
<td>2</td>
<td>Armature plate</td>
<td>8</td>
<td>Friction plate</td>
</tr>
<tr>
<td>3.1</td>
<td>Rotor cpl. (Alu design)</td>
<td>9</td>
<td>Dust guard ring</td>
</tr>
<tr>
<td>3.2</td>
<td>Rotor cpl. (plastic design)</td>
<td>10</td>
<td>Adjusting ring</td>
</tr>
<tr>
<td>4</td>
<td>Springs</td>
<td>11</td>
<td>Fastening screw</td>
</tr>
<tr>
<td>5</td>
<td>Manual release cpl.</td>
<td>12</td>
<td>Hollow screws</td>
</tr>
<tr>
<td>5.1</td>
<td>Manual release lever</td>
<td>13</td>
<td>O-ring</td>
</tr>
<tr>
<td>6.1</td>
<td>Hub for rotor 3.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>