Since 1989, Svendborg Brakes has been recognized as a leading global expert in intelligent braking solutions for industrial applications. Extensive application knowledge, innovative design, fast prototyping and exhaustive testing ensures that customers get the most technically advanced, most durable and safest braking systems to meet their specific requirements.

Svendborg offers a wide range of highly engineered products including hydraulic brakes and power units, thruster brakes, soft braking controls and couplings. Svendborg braking solutions are hard at work in key markets including renewable energy, mining, hydropower, cranes and oil & gas, mining, and marine & offshore on applications such as wind and tidal turbines, overland conveyors, propulsion systems, deck equipment, hoists, drawworks, elevators & escalators and dam turbines.

**Contact Us**

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Email: sb@svendborg-brakes.com

[www.svendborg-brakes.com](http://www.svendborg-brakes.com)
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| BSFA        | |
| BSAB        | |
| BSAK        | |
| BSAL        | |
| BSAC        | |
| YSAA        | |
| BSAH        | |

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### Turbines

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<td>BSAH</td>
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| DISC BRAKES | |
| BSFI        | |
| BSFB        | |
| BSFA        | |
| BSAB        | |
| BSAK        | |
| BSAL        | |
| BSAC        | |
| YSAA        | |
| BSAH        | |

| Direct Drive | 82-88 |
| Conventional | 89-94 |
| Compact      | 96-106 |

### Turbines

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<td>BSAH</td>
<td>67-68</td>
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| DISC BRAKES | |
| BSFI        | |
| BSFB        | |
| BSFA        | |
| BSAB        | |
| BSAK        | |
| BSAL        | |
| BSAC        | |
| YSAA        | |
| BSAH        | |

| Direct Drive | 82-88 |
| Conventional | 89-94 |
| Compact      | 96-106 |

### Turbines

| BSFI        | 3-4   |
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| BSFA        | 39-40 |
| BSAB        | 41-42 |
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| BSAL        | 55-56 |
| BSAC        | 57-58 |
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| DISC BRAKES | |
| BSFI        | |
| BSFB        | |
| BSFA        | |
| BSAB        | |
| BSAK        | |
| BSAL        | |
| BSAC        | |
| YSAA        | |
| BSAH        | |

| Direct Drive | 82-88 |
| Conventional | 89-94 |
| Compact      | 96-106 |
# Disc Brake: BSFI 100 MONOspring

## Specification

Name: DEB-0100-010-MS-MAR  
Date: 24.04.2012  
Revision: F

---

### TECHNICAL DATA AND CALCULATION FUNDAMENTALS

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE ¹</th>
<th>BRAKING FORCE ²</th>
<th>LOSS OF FORCE PER 1MM</th>
<th>OPERATING PRESSURE ³</th>
<th>BALANCING PRESSURE ¹</th>
<th>PAD SURFACE PRESSURE ⁴</th>
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</table>

¹ All figures are based on 1 mm air gap (total)  
² Braking force is based on a min clamping force, nominal coefficient of friction $\mu = 0.4$ and 2 brake surfaces.  
³ The operating pressure is the minimum needed for operating the brake  
⁴ Pad pressure for organic / sintered pads respectively (based on max. clamping force)
Disc brake: BSFI 100 MONOspring

Specifications:

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from the following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to the table above [N] or calculated from the formula
- $D_0$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on the adjustment of the brake and friction coefficient.

$$M_B = a \cdot F_B \cdot \left(\frac{D_0 - 0.023}{2}\right) \text{ [Nm]}$$

$$F_B = F_C \cdot 2 \cdot \mu$$

**CALCULATION FUNDAMENTALS**

- **MONOSPRING**
  - Weight of caliper without bracket: Approx. 7 kg
  - Overall dimensions: 131 x 129 x 147 mm
  - Pad width (width for heat calculation): 56 mm (organic) 53 mm (sintered)
  - Pad area: (organic) 3350 mm$^2$ (*)
  - Max. wear of pad: (organic) 4 mm (*) (=7.0 mm thick)
  - Pad area: (sintered) 2205 mm$^2$ (*)
  - Max. wear of pad: (sintered) 4 mm (*) (=7.0 mm thick)
  - Nominal coefficient of friction: $\mu = 0.4$
  - Total piston area - each caliper half: 334 cm$^2$
  - Total piston area - each caliper: 334 cm$^2$
  - Actuating time (guide value for calculation): 0.4 sec
  - Pressure connection/port: 1/8" BSP
  - Recommended pipe size: 6 mm
  - Maximum operating pressure: 23.0 MPa
  - Operating temperature range - general: from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
### Specifikationen

**Diskbremse: BSFI 200 DUALspring - HIGH pressure**

#### Tekniske data og beregningsfunde

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<th>CALIPER TYPE</th>
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<th>BRAKING FORCE ²</th>
<th>LOSS OF FORCE PER 1MM</th>
<th>OPERATING PRESSURE ³</th>
<th>BALANCING PRESSURE ¹</th>
<th>PAD SURFACE PRESSURE ⁴</th>
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¹) Alle figurer er baseret på 1 mm luftgær (hver side)

²) Bremskraft baseres på en mindre klampingkraft, nominal koeficient af friktion μ = 0.4 og 2 bremsflad.

³) Betjeningstryk er det mindste nødvendigt for at betjene bremsen

⁴) Pad tryk for organisk / sinterede pad respektivel (baseret på maks. klampingkraft)

⁵) Ikke anbefalet for generel brug - hydraulisk balanceringskraft er lav
The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_0$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_0 - 0.07)^2}{2} [Nm]$$

$$F_B = F_C \cdot 2 \cdot \mu$$

---

**Disc Brake: BSFI 200 DUALspring - HIGH pressure**

**Specification**

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
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$$M_B = a \cdot F_B \cdot \frac{(D_0 - 0.07)^2}{2} [Nm]$$

$$F_B = F_C \cdot 2 \cdot \mu$$

---

**CALCULATION FUNDAMENTALS**

**Weight of caliper without bracket:** Approx. 19 kg

**Overall dimensions:** 195 x 220 x 260 mm

**Pad width:** 70 mm

**Pad area:** (organic) 8,000 mm² (*)

**Max. wear of pad:** (organic) 7.5 mm (*)(=8 mm thick)

**Pad area:** (sintered) 5,450 mm² (*)

**Max. wear of pad:** (sintered) 7.5mm (*) (=8 mm thick)

**Nominal coefficient of friction:** $\mu = 0.4$

**Total piston area - each caliper half:** 8.67 cm²

**Total piston area - each caliper:** 17.34 cm²

**Volume for each caliper at 1 mm stroke:** 1.7 cm³

**Volume for each caliper at 3 mm stroke:** 5.2 cm³

**Actuating time (guide value for calculation):** 0.3 sec

**Pressure connection/port:** 1/8” BSP

**Drain connection port:** 1/8” BSP

**Recommended pipe size:** 10/8 mm

**Maximum operating pressure:** 23.0 MPa

**Operating temperature range - general:** from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
## Disc Brake: BSFI 200 MONOspring - HIGH pressure

### Specification

#### TECHNICAL DATA AND CALCULATION FUNDAMENTALS

**High pressure (option 400)**

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<th>LOSS OF FORCE PER 1MM</th>
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<td>MAX</td>
<td>[N]</td>
<td>[N]</td>
<td>[%]</td>
<td>MPa</td>
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<tr>
<td>BSFI 210</td>
<td>10,000</td>
<td>10,840</td>
<td>8,000</td>
<td>7.0</td>
<td>18.0</td>
<td>11.54</td>
</tr>
<tr>
<td>BSFI 211</td>
<td>11,000</td>
<td>11,960</td>
<td>8,800</td>
<td>6.0</td>
<td>19.5</td>
<td>12.69</td>
</tr>
<tr>
<td>BSFI 212</td>
<td>12,000</td>
<td>12,920</td>
<td>9,600</td>
<td>6.0</td>
<td>21.0</td>
<td>13.85</td>
</tr>
</tbody>
</table>

1) All figures are based on 1 mm air gap (total)
2) Braking force is based on a min clamping force, nominal coefficient of friction $\mu = 0.4$ and 2 brake surfaces.
3) The operating pressure is the minimum needed for operating the brake
4) Pad pressure for organic / sintered pads respectively (based on max. clamping force)
5) Not recommended for general usage - hydraulic balancing pressure is low
Disc Brake: **BSFI 200 MONOspring - HIGH pressure**

**Specification**

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_o$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \left( \frac{D_o - 0.07}{2} \right) [Nm]
\]

\[
F_B = F_C \cdot 2 \cdot \mu
\]

**CALCULATION FUNDAMENTALS**

<table>
<thead>
<tr>
<th></th>
<th>MONOspring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of caliper without bracket:</td>
<td>Approx. 19 kg</td>
</tr>
<tr>
<td>Overall dimensions:</td>
<td>240 x 180 x 190 mm</td>
</tr>
<tr>
<td>Pad width:</td>
<td>70 mm</td>
</tr>
<tr>
<td>Pad area: (organic)</td>
<td>8,000 mm² (*)</td>
</tr>
<tr>
<td>Max. wear of pad: (organic)</td>
<td>5 mm (*) &quot;(=10,5 mm thick)&quot;</td>
</tr>
<tr>
<td>Pad area: (sintered)</td>
<td>5,450 mm² (*)</td>
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<tr>
<td>Max. wear of pad: (sintered)</td>
<td>5 mm (*) &quot;(=10,5 mm thick)&quot;</td>
</tr>
<tr>
<td>Nominal coefficient of friction:</td>
<td>$\mu = 0.4$</td>
</tr>
<tr>
<td>Total piston area - each caliper half:</td>
<td>8.67 cm²</td>
</tr>
<tr>
<td>Total piston area - each caliper:</td>
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</tr>
<tr>
<td>Volume for each caliper at 1 mm stroke:</td>
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</tr>
<tr>
<td>Volume for each caliper at 3 mm stroke:</td>
<td>1.73 cm³</td>
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<tr>
<td>Actuating time (guide value for calculation):</td>
<td>0.3 sec</td>
</tr>
<tr>
<td>Pressure connection/port:</td>
<td>1/8&quot; BSP</td>
</tr>
<tr>
<td>Drain connection port:</td>
<td>1/8&quot; BSP</td>
</tr>
<tr>
<td>Recommended pipe size:</td>
<td>10/8 mm</td>
</tr>
<tr>
<td>Maximum operating pressure</td>
<td>23.0 MPa</td>
</tr>
<tr>
<td>Operating temperature range - general</td>
<td>from -20°C to +70°C</td>
</tr>
</tbody>
</table>

(*) On each brake pad.

(For temperatures outside this range contact Svendborg Brakes)
**Disc Brake: BSFI 200 DUALspring - low pressure**

**Specification**

Name: DEB-0200-004-DS-MAR  
Date: 24.01.2012  
Revision: C

---

**Low pressure (option 300)**

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE (^1) [N]</th>
<th>BRAKING FORCE (^2) [N]</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE (^3) MPa</th>
<th>BALANCING PRESSURE (^1) MPa</th>
<th>PAD SURFACE PRESSURE (^4) [N/mm(^2)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFI 202</td>
<td>2,000 - 2,340</td>
<td>1,600 - 10.0</td>
<td>4.0</td>
<td>1.82</td>
<td>0.29 - 0.43</td>
<td></td>
</tr>
<tr>
<td>BSFI 203</td>
<td>3,000 - 3,470</td>
<td>2,400 - 6.0</td>
<td>5.5</td>
<td>2.73</td>
<td>0.43 - 0.64</td>
<td></td>
</tr>
<tr>
<td>BSFI 204</td>
<td>4,000 - 4,500</td>
<td>3,200 - 13.0</td>
<td>6.5</td>
<td>3.64</td>
<td>0.56 - 0.83</td>
<td></td>
</tr>
<tr>
<td>BSFI 205</td>
<td>5,000 - 5,640</td>
<td>4,000 - 9.0</td>
<td>8.0</td>
<td>4.55</td>
<td>0.71 - 1.03</td>
<td></td>
</tr>
<tr>
<td>BSFI 206</td>
<td>6,000 - 6,750</td>
<td>4,800 - 7.0</td>
<td>9.0</td>
<td>5.46</td>
<td>0.85 - 1.24</td>
<td></td>
</tr>
<tr>
<td>BSFI 207</td>
<td>7,000 - 7,720</td>
<td>5,600 - 5.0</td>
<td>10.5</td>
<td>6.37</td>
<td>0.97 - 1.42</td>
<td></td>
</tr>
<tr>
<td>BSFI 208</td>
<td>8,000 - 8,930</td>
<td>6,400 - 4.0</td>
<td>11.5</td>
<td>7.28</td>
<td>1.12 - 1.64</td>
<td></td>
</tr>
<tr>
<td>BSFI 209</td>
<td>9,000 - 9,970</td>
<td>7,200 - 8.0</td>
<td>13.0</td>
<td>8.19</td>
<td>1.25 - 1.83</td>
<td></td>
</tr>
<tr>
<td>BSFI 210</td>
<td>10,000 - 10,840</td>
<td>8,000 - 7.0</td>
<td>14.0</td>
<td>9.10</td>
<td>1.36 - 1.99</td>
<td></td>
</tr>
<tr>
<td>BSFI 211</td>
<td>11,000 - 11,960</td>
<td>8,800 - 6.0</td>
<td>15.5</td>
<td>10.01</td>
<td>1.50 - 2.19</td>
<td></td>
</tr>
<tr>
<td>BSFI 212</td>
<td>12,000 - 12,920</td>
<td>9,600 - 6.0</td>
<td>17.0</td>
<td>10.92</td>
<td>1.62 - 2.37</td>
<td></td>
</tr>
<tr>
<td>BSFI 213</td>
<td>13,000 - 14,000</td>
<td>10,400 - 11.0</td>
<td>18.0</td>
<td>11.83</td>
<td>1.75 - 2.57</td>
<td></td>
</tr>
</tbody>
</table>

---

\(^1\) All figures are based on 1 mm air gap (each side)  
\(^2\) Braking force is based on a min clamping force, nominal coefficient of friction \(\mu = 0.4\) and 2 brake surfaces.  
\(^3\) The operating pressure is the minimum needed for operating the brake  
\(^4\) Pad pressure for organic / sintered pads respectively (based on max. clamping force)
The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_o$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_o - 0.07)^2}{2} [\text{Nm}]$$

$$F_B = F_C \cdot 2 \cdot \mu$$

**Calculation Fundamentals**

**Disc Brake: BSFI 200 DUAL spring - low pressure**

- **Weight of caliper without bracket**: Approx. 19 kg
- **Overall dimensions**: 195 x 220 x 260 mm
- **Pad width**: 70 mm
- **Pad area: (organic)**: 8,000 mm$^2$ (*)
- **Max. wear of pad: (organic)**: 7.5 mm (*) "(=8 mm thick)"
- **Pad area: (sintered)**: 5,450 mm$^2$ (*)
- **Max. wear of pad: (sintered)**: 7.5mm (*) "(=8 mm thick)"
- **Nominal coefficient of friction**: $\mu = 0.4$
- **Total piston area - each caliper half**: 11.0 cm$^2$
- **Total piston area - each caliper**: 22.0 cm$^2$
- **Volume for each caliper at 1 mm stroke**: 2.2 cm$^3$
- **Volume for each caliper at 3 mm stroke**: 6.6 cm$^3$
- **Actuating time (guide value for calculation)**: 0.3 sec
- **Pressure connection/port**: 1/8" BSP
- **Drain connection port**: 1/8" BSP
- **Recommended pipe size**: 10/8 mm
- **Maximum operating pressure**: 23.0 MPa
- **Operating temperature range - general**: from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
## Specification

### Low pressure (option 300)

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE [N]</th>
<th>BRAKING FORCE [N]</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE MPa</th>
<th>BALANCING PRESSURE MIN MPa</th>
<th>BALANCING PRESSURE MAX MPa</th>
<th>PAD SURFACE PRESSURE [N/mm²]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFI 202</td>
<td>2,000</td>
<td>2,340</td>
<td>1,600</td>
<td>10.0</td>
<td>4.0</td>
<td>1.82</td>
<td>0.29 - 0.43</td>
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<td>BSFI 203</td>
<td>3,000</td>
<td>3,470</td>
<td>2,400</td>
<td>6.0</td>
<td>5.5</td>
<td>2.73</td>
<td>0.43 - 0.64</td>
</tr>
<tr>
<td>BSFI 204</td>
<td>4,000</td>
<td>4,500</td>
<td>3,200</td>
<td>9.0</td>
<td>8.0</td>
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<td>6,750</td>
<td>4,800</td>
<td>7.0</td>
<td>9.0</td>
<td>5.46</td>
<td>0.85 - 1.24</td>
</tr>
<tr>
<td>BSFI 207</td>
<td>7,000</td>
<td>7,720</td>
<td>5,600</td>
<td>5.0</td>
<td>10.5</td>
<td>6.37</td>
<td>0.97 - 1.42</td>
</tr>
<tr>
<td>BSFI 208</td>
<td>8,000</td>
<td>8,930</td>
<td>6,400</td>
<td>4.0</td>
<td>11.5</td>
<td>7.28</td>
<td>1.12 - 1.64</td>
</tr>
<tr>
<td>BSFI 209</td>
<td>9,000</td>
<td>9,970</td>
<td>7,200</td>
<td>8.0</td>
<td>13.0</td>
<td>8.19</td>
<td>1.25 - 1.85</td>
</tr>
<tr>
<td>BSFI 210</td>
<td>10,000</td>
<td>10,840</td>
<td>8,000</td>
<td>7.0</td>
<td>14.0</td>
<td>9.10</td>
<td>1.36 - 1.99</td>
</tr>
<tr>
<td>BSFI 211</td>
<td>11,000</td>
<td>11,960</td>
<td>8,800</td>
<td>6.0</td>
<td>15.5</td>
<td>10.01</td>
<td>1.50 - 2.19</td>
</tr>
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<td>BSFI 212</td>
<td>12,000</td>
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</tr>
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<td>BSFI 213</td>
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<td>14,000</td>
<td>10,400</td>
<td>11.0</td>
<td>18.0</td>
<td>11.83</td>
<td>1.75 - 2.57</td>
</tr>
</tbody>
</table>

1) All figures are based on 1 mm air gap (total)
2) Braking force is based on a min clamping force, nominal coefficient of friction $\mu = 0.4$ and 2 brake surfaces.
3) The operating pressure is the minimum needed for operating the brake
4) Pad pressure for organic / sintered pads respectively (based on max. clamping force)
Disc Brake: BSFI 200 MONOspring - low pressure

Specification

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_0$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{D_0 - 0.07}{2} \quad [Nm]$$

$$F_B = F_C \cdot 2 \cdot \mu$$

**CALCULATION FUNDAMENTALS**

<table>
<thead>
<tr>
<th>Weight of caliper without bracket</th>
<th>MONOSPRING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. 17 kg</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall dimensions</th>
<th>240 x 180 x 190 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pad width</td>
<td>70 mm</td>
</tr>
<tr>
<td>Pad area: (organic)</td>
<td>8,000 mm² (*)</td>
</tr>
<tr>
<td>Max. wear of pad: (organic)</td>
<td>5 mm (*) &quot;(≤10.5 mm thick)&quot;</td>
</tr>
<tr>
<td>Pad area: (sintered)</td>
<td>5,450 mm² (*)</td>
</tr>
<tr>
<td>Max. wear of pad: (sintered)</td>
<td>5 mm (*) &quot;(≤10.5 mm thick)&quot;</td>
</tr>
</tbody>
</table>

| Nominal coefficient of friction | μ = 0.4 |
| Total piston area - each caliper half: | 11.0 cm² |
| Total piston area - each caliper: | 11.0 cm² |
| Volume for each caliper at 1 mm stroke: | 1.1 cm³ |
| Volume for each caliper at 3 mm stroke: | 3.3 cm³ |
| Actuating time (guide value for calculation): | 0.3 sec |
| Pressure connection/port: | 1/8" BSP |
| Drain connection port: | 1/8" BSP |
| Recommended pipe size: | 10/8 mm |
| Maximum operating pressure | 23.0 MPa |
| Operating temperature range - general | from -20°C to +70°C |

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
## Specification

Disc Brake: **BSFI 300-X-200 ("E") DUALspring**

Name: DEB-0300-016-DS-MAR  
Date: 15.07.2011R  
Revision: F

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### TECHNICAL DATA AND CALCULATION FUNDAMENTALS

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE (^1) [N]</th>
<th>BRAKING FORCE (^2) [N]</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE (^3) MPa</th>
<th>BALANCING PRESSURE (^1) MPa</th>
<th>PAD SURFACE PRESSURE (^4) [N/mm²]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFI 317</td>
<td>17,000</td>
<td>19,000</td>
<td>13,600</td>
<td>4.0</td>
<td>4.2</td>
<td>2.46</td>
</tr>
<tr>
<td>BSFI 318</td>
<td>18,000</td>
<td>19,500</td>
<td>14,400</td>
<td>4.0</td>
<td>4.2</td>
<td>2.61</td>
</tr>
<tr>
<td>BSFI 320</td>
<td>20,000</td>
<td>22,200</td>
<td>16,000</td>
<td>3.0</td>
<td>4.5</td>
<td>2.90</td>
</tr>
<tr>
<td>BSFI 322</td>
<td>22,000</td>
<td>24,500</td>
<td>17,600</td>
<td>3.0</td>
<td>5.0</td>
<td>3.19</td>
</tr>
<tr>
<td>BSFI 325</td>
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<td>27,800</td>
<td>20,000</td>
<td>10.0</td>
<td>7.0</td>
<td>4.35</td>
</tr>
<tr>
<td>BSFI 330</td>
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<td>33,100</td>
<td>24,000</td>
<td>10.0</td>
<td>7.0</td>
<td>4.63</td>
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<tr>
<td>BSFI 332</td>
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<td>9.5</td>
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<td>BSFI 345</td>
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<td>5.0</td>
<td>10.5</td>
<td>7.24</td>
</tr>
<tr>
<td>BSFI 350</td>
<td>50,000</td>
<td>55,000</td>
<td>40,000</td>
<td>5.0</td>
<td>11.0</td>
<td>7.69</td>
</tr>
<tr>
<td>BSFI 355</td>
<td>55,000</td>
<td>59,300</td>
<td>44,000</td>
<td>5.0</td>
<td>12.0</td>
<td>8.69</td>
</tr>
<tr>
<td>BSFI 360</td>
<td>60,000</td>
<td>65,000</td>
<td>48,000</td>
<td>5.0</td>
<td>13.0</td>
<td>7.69 - 3.70</td>
</tr>
</tbody>
</table>

\(^1\) All figures are based on 1 mm air gap. (Each side)  
\(^2\) Braking force is based on a min clamping force, nominal coefficient of friction \(\mu = 0.4\) and 2 brake surfaces.  
\(^3\) The operating pressure is the minimum needed for operating the brake  
\(^4\) Pad pressure for organic / sintered pads respectively (based on max. clamping force)
Disc Brake: BSFI 300-X-200 ("E") DUALspring

**Specification**

**BRAKING TORQUE**

The braking torque \( M_B \) is calculated from following formula where:

a is the number of brakes acting on the disc

\( F_B \) is the braking force according to table above \([N]\) or calculated from formula

\( D_o \) is the brake disc outer diameter \([m]\)

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_o - 0.13)}{2} \quad \text{[Nm]}
\]

\[
F_B = F_C \cdot 2 \cdot \mu
\]

**CALCULATION FUNDAMENTALS**

| Weight of caliper without bracket: | Approx. 65 kg |
| Overall dimensions: | 326 x 316 x 379 mm |
| Pad width: | 130 mm |
| Pad area: (organic) | 29,000 mm\(^2\) (*) |
| Max. wear of pad: (organic) | 10 mm (*) "(=14 mm thick)" |
| Pad area: (sintered) | 20,000 mm\(^2\) (*) |
| Max. wear of pad: (sintered) | 7 mm (*) "(=17 mm thick)" |
| Nominal coefficient of friction: | \( \mu = 0.4 \) |
| Total piston area - each caliper half: | 69.1 cm\(^2\) |
| Total piston area - each caliper: | 138.2 cm\(^2\) |
| Volume for each caliper at 1 mm stroke: | 13.8 cm\(^3\) |
| Volume for each caliper at 3 mm stroke: | 41.4 cm\(^3\) |
| Actuating time (guide value for calculation): | 0.3 sec |
| Pressure connection/port: | 1/4" BSP |
| Drain connection port: | 1/8" BSP |
| Recommended pipe size: | 10/8 mm |
| Maximum operating pressure | 23.0 MPa |
| Operating temperature range - general | from -20°C to +70°C |

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
**Disc Brake: BSFI 300-MSXX-200 (“E”) MONOspring**

**Specification**

Name: DEB-0300-016-MS-MAR  
Date: 15.07.2011  
Revision: F

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### TECHNICAL DATA AND CALCULATION FUNDAMENTALS

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE ¹ [N]</th>
<th>BRAKING FORCE ² [N]</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE ³ MPa</th>
<th>BALANCING PRESSURE ¹ MPa</th>
<th>PAD SURFACE PRESSURE ⁴ [N/mm²]</th>
</tr>
</thead>
<tbody>
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<td>BSFI 317</td>
<td>17,000</td>
<td>19,000</td>
<td>13,600</td>
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¹ All figures are based on 1 mm air gap. (Total)  
² Braking force is based on a min clamping force, nominal coefficient of friction \( \mu = 0.4 \) and 2 brake surfaces.  
³ The operating pressure is the minimum needed for operating the brake  
⁴ Pad pressure for organic / sintered pads respectively (based on max. clamping force)
Disc Brake: BSFI 300-MSXX-200 ("E") MONOspring

### Specification

#### BRAKING TORQUE

The braking torque \( M_B \) is calculated from following formula where:
- \( a \) is the number of brakes acting on the disc
- \( F_B \) is the braking force according to table above [N] or calculated from formula
- \( D_o \) is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_o - 0.13)}{2} \quad [\text{Nm}]
\]

\[
F_B = F_C \cdot 2 \cdot \mu
\]

#### CALCULATION FUNDAMENTALS

**MONOSPRING**

- **Weight of caliper without bracket:** Approx. 85 kg
- **Overall dimensions:** 279 x 420 x 299 mm
- **Pad width:** 130 mm
- **Pad area: (organic)** 29,000 mm\(^2\) (*)
- **Max. wear of pad: (organic)** 5 mm (*) "(=19 mm thick)"
- **Pad area: (sintered)** 20,000 mm\(^2\) (*)
- **Max. wear of pad: (sintered)** 5 mm (*) "(=19 mm thick)"
- **Nominal coefficient of friction:** \( \mu = 0.4 \)
- **Total piston area - each caliper half:** 69.1 cm\(^2\)
- **Total piston area - each caliper:** 69.1 cm\(^2\)
- **Volume for each caliper at 1 mm stroke:** 6.9 cm\(^3\)
- **Volume for each caliper at 3 mm stroke:** 20.7 cm\(^3\)
- **Actuating time (guide value for calculation):** 0.3 sec
- **Pressure connection/port:** 1/4" BSP
- **Drain connection port:** 1/8" BSP
- **Recommended pipe size:** 10/8 mm
- **Maximum operating pressure:** 23.0 MPa
- **Operating temperature range - general:** from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
## Disc Brake: BSFI 300-X-300 ("EE") DUALspring

### Specification

Name: DEB-0300-DS-MAR  
Date: 21.03.2013  
Revision: D

### Technical Data and Calculation Fundamentals

<table>
<thead>
<tr>
<th>Caliper Type</th>
<th>Clamping Force 1) [N]</th>
<th>Braking Force 2) [N]</th>
<th>Loss of Force Per 1mm [%]</th>
<th>Operating Pressure 3) MPa</th>
<th>Balancing Pressure 1) Min MPa</th>
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<td>8.69</td>
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</table>

1) All figures are based on 1 mm air gap. (Each side)  
2) Braking force is based on a min clamping force, nominal coefficient of friction μ = 0.4 and 2 brake surfaces.  
3) The operating pressure is the minimum needed for operating the brake  
4) Pad pressure for organic / sintered pads respectively (based on max. clamping force)
Disc Brake: BSFI 300-X-300 ("EE") DUALspring

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_o$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_o - 0.13)}{2} \text{ [Nm]}$$

$$F_B = F_C \cdot 2 \cdot \mu$$

**CALCULATION FUNDAMENTALS**

- Weight of caliper without bracket: Approx. 80 kg
- Overall dimensions: 326 x 316 x 540 mm
- Pad width: 130 mm
- Pad area: (organic) 29,000 mm$^2$ (*)
- Max. wear of pad: (organic) 10 mm (*) "(=14 mm thick)"
- Pad area: (sintered) 20,000 mm$^2$ (*)
- Max. wear of pad: (sintered) 7 mm (*) "(=17 mm thick)"
- Nominal coefficient of friction: $\mu = 0.4$
- Total piston area - each caliper half: 69.1 cm$^2$
- Total piston area - each caliper: 138.2 cm$^2$
- Volume for each caliper at 1 mm stroke: 13.8 cm$^3$
- Volume for each caliper at 3 mm stroke: 41.4 cm$^3$
- Actuating time (guide value for calculation): 0.3 sec
- Pressure connection/port: 1/4” BSP
- Drain connection port: 1/8” BSP
- Recommended pipe size: 10/8 mm
- Maximum operating pressure: 23.0 MPa
- Operating temperature range - general: from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Disc Brake: **BSFI 300-MSXX-300 ("EE") MONOspring**

**Specification**

Name: DEB-0300-MS-MAR  
Date: 21.03.2013  
Revision: D

---

### Technical Data and Calculation Fundamentals

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<th>CLAMPING FORCE</th>
<th>BRAKING FORCE</th>
<th>LOSS OF FORCE</th>
<th>OPERATING PRESSURE</th>
<th>BALANCING PRESSURE</th>
<th>PAD SURFACE PRESSURE</th>
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<td>PER 1MM [N]</td>
<td>MPa</td>
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<td>[N/mm²]</td>
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<td>6.0</td>
<td>13.0</td>
<td>8.69</td>
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</tbody>
</table>

1) All figures are based on 1 mm air gap. (Total)  
2) Braking force is based on min clamping force, nominal coefficient of friction $\mu = 0.4$ and 2 brake surfaces.  
3) The operating pressure is the minimum needed for operating the brake  
4) Pad pressure for organic / sintered pads respectively (based on max. clamping force)
The braking torque $M_B$ is calculated from the following formula:

$$M_B = a \cdot F_B \cdot \frac{(D_0 - 0.13)}{2} \text{ [Nm]}$$

$$F_B = F_C \cdot 2 \cdot \mu$$

**MONOSPRING**

- **Weight of caliper without bracket:** Approx. 85 kg
- **Overall dimensions:** 326 x 316 x 540 mm
- **Pad width:** 130 mm
- **Pad area (organic):** 29,000 mm$^2$ (*)
- **Max. wear of pad (organic):** 5 mm (*) *(=19 mm thick)*
- **Pad area (sintered):** 20,000 mm$^2$ (*)
- **Max. wear of pad (sintered):** 5 mm (*) *(=19 mm thick)*
- **Nominal coefficient of friction:** $\mu = 0.4$
- **Total piston area - each caliper half:** 69.1 cm$^2$
- **Total piston area - each caliper:** 69.1 cm$^2$
- **Volume for each caliper at 1 mm stroke:** 6.9 cm$^3$
- **Volume for each caliper at 3 mm stroke:** 20.7 cm$^3$
- **Actuating time (guide value for calculation):** 0.3 sec
- **Pressure connection/port:** 1/4” BSP
- **Drain connection port:** 1/8” BSP
- **Recommended pipe size:** 10/8 mm
- **Maximum operating pressure:** 23.0 MPa
- **Operating temperature range - general:** from -20°C to +70°C

(*) On each brake pad.

(For temperatures outside this range contact Svendborg Brakes)
TECHNICAL DATA AND CALCULATION FUNDAMENTALS

<table>
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<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE ¹ [N]</th>
<th>BRAKING FORCE ² [N]</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE ³ MPa</th>
<th>BALANCING PRESSURE ⁴ MIN MPa</th>
<th>PAD SURFACE PRESSURE ⁵ [N/mm²]</th>
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</table>

¹ All figures are based on 1 mm air gap. (Each side)
² Braking force is based on a min clamping force, nominal coefficient of friction \( \mu = 0.4 \) and 2 brake surfaces.
³ The operating pressure is the minimum needed for operating the brake
⁴ Pad pressure for organic / sintered pads respectively (based on max. clamping force)
Disc Brake: BSFI 3000 DUALspring

Specification

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_o$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_o - 0.20)}{2} [Nm]$$

$$F_B = F_C \cdot 2 \cdot \mu$$

**CALCULATION FUNDAMENTALS**

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<th>Weight of caliper without bracket:</th>
<th>Approx. 170 kg</th>
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<tbody>
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<td>Max. wear of pad: (organic)</td>
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<tr>
<td>Pad area: (sintered)</td>
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<td>Max. wear of pad: (sintered)</td>
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<td>Nominal coefficient of friction:</td>
<td>$\mu = 0.4$</td>
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<td>Total piston area - each caliper half:</td>
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<td>Drain connection port:</td>
<td>1/8&quot; BSP</td>
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<tr>
<td>Maximum operating pressure</td>
<td>23.0 MPa</td>
</tr>
<tr>
<td>Operating temperature range - general</td>
<td>from -20°C to +70°C</td>
</tr>
</tbody>
</table>

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
**Disc Brake: BSFI 3000 MONoSpring**

**Specification**

Name: DEB-3000-001-MS-MAR  
Date: 23.01.2012  
Revision: B

### TECHNICAL DATA AND CALCULATION FUNDAMENTALS

<table>
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<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE (N)</th>
<th>BRAKING FORCE (N)</th>
<th>LOSS OF FORCE PER 1MM (%)</th>
<th>OPERATING PRESSURE (MPa)</th>
<th>BALANCING PRESSURE (MPa)</th>
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<td>3.61</td>
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</tbody>
</table>

1) All figures are based on 1 mm air gap. (Total)  
2) Braking force is based on a min clamping force, nominal coefficient of friction μ = 0.4 and 2 brake surfaces.  
3) The operating pressure is the minimum needed for operating the brake.  
4) Pad pressure for organic / sintered pads respectively (based on max. clamping force)
Disc Brake: BSFI 3000 MONOspring

**Specification**

**BRAKING TORQUE**

The braking torque \( M_B \) is calculated from following formula where:
- \( a \) is the number of brakes acting on the disc
- \( F_B \) is the braking force according to table above \([N]\) or calculated from formula
- \( D_0 \) is the brake disc outer diameter \([m]\)

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_0 - 0.20)}{2} \quad [Nm]
\]

\[
F_B = F_C \cdot 2 \cdot \mu
\]

**CALCULATION FUNDAMENTALS**

- Weight of caliper without bracket: 175 kg
- Pad width: 200 mm
- Pad area: (organic) 59,600 mm\(^2\) (*)
- Max. wear of pad: (organic) 5 mm (*) "(≈27 mm thick)"
- Pad area: (sintered) 36,000 mm\(^2\) (*)
- Max. wear of pad: (sintered) 5 mm (*) "(≈27 mm thick)"
- Nominal coefficient of friction: \( \mu = 0.4 \)
- Total piston area - each caliper half: 88 cm\(^2\)
- Total piston area - each caliper: 88 cm\(^2\)
- Volume for each caliper at 1 mm stroke: 8.8 cm\(^3\)
- Volume for each caliper at 3 mm stroke: 26.4 cm\(^3\)
- Actuating time (guide value for calculation): 0.3 sec
- Pressure connection/port: 1/4" BSP
- Drain connection port: 1/8" BSP
- Recommended pipe size: 10/8 mm
- Maximum operating pressure: 23.0 MPa
- Operating temperature range - general: from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Disc Brake: BSFG 400 DUAL spring

**Specification**

Name: DEB-0400-001-DS-MAR  
Date: 24.04.2007  
Revision: A

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**TECHNICAL DATA AND CALCULATION FUNDAMENTALS**

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE $^1$ [N]</th>
<th>BRAKING FORCE $^3$ [N]</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE $^3$ MPa</th>
<th>PAD SURFACE PRESSURE $^4$ MPa</th>
<th>PAD SURFACE PRESSURE $^5$ [N/mm²]</th>
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</thead>
<tbody>
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<td>34,300</td>
<td>38,400</td>
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<td>62,600</td>
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</table>

$^1$ All figures are based on 1 mm air gap. (Each side)

$^2$ Braking force is based on a min clamping force, nominal coefficient of friction $\mu = 0.4$ and 2 brake surfaces.

$^3$ The operating pressure is the minimum needed for operating the brake

$^4$ Pad pressure for organic pads (based on max. clamping force)

$^5$ Not recommended for general usage - special high pressure version
The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_o$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_o - 0.22)}{2} \text{ [Nm]}$$

$$F_B = F_C \cdot 2 \cdot \mu$$

**Calculation Fundamentals**

- **Weight of caliper without bracket**: Approx. 280 kg
- **Overall dimensions**: 520 x 570 x 590 mm
- **Pad width (width for heat calculation)**: 220 mm
- **Pad area: (organic)**: 63,000 mm$^2$ (*)
- **Max. wear of pad: (organic)**: "11 mm (*) (=14 mm thick - lining)"
- **Nominal coefficient of friction**: $\mu = 0.4$
- **Total piston area - each caliper half**: 74.5 cm$^2$
- **Total piston area - each caliper**: 149 cm$^2$
- **Volume for each caliper at 1 mm stroke**: 15 cm$^3$
- **Volume for each caliper at 3 mm stroke**: 45 cm$^3$
- **Actuating time (guide value for calculation)**: 0.4 sec
- **Pressure connection/port**: 3/8” BSP
- **Drain connection port**: 1/4” BSP
- **Recommended pipe size**: 16/12 mm
- **Maximum operating pressure**: 23.0 MPa
- **Operating temperature range - general**: from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
# Disc Brake: BSFH 500 DUALspring

## Specification

Name: DEB-0500-001-DS-MAR  
Date: 23.01.2012  
Revision: G

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### TECHNICAL DATA AND CALCULATION FUNDAMENTALS

#### CALIPER TYPE

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>MIN</th>
<th>MAX</th>
<th>CLAMPING FORCE ¹</th>
<th>BRAKING FORCE ²</th>
<th>LOSS OF FORCE PER 1MM</th>
<th>OPERATING PRESSURE ³</th>
<th>BALANCING PRESSURE ¹</th>
<th>PAD SURFACE PRESSURE ⁴</th>
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<td>74,000</td>
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<td>8.5</td>
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<td>11.0</td>
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<td>1.83 - 2.64</td>
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¹ All figures are based on 1 mm air gap. (Each side)
² Braking force is based on a min clamping force, nominal coefficient of friction $\mu = 0.4$ and 2 brake surfaces.
³ The operating pressure is the minimum needed for operating the brake
⁴ Pad pressure for organic / sintered pads respectively (based on max. clamping force)
**Disc Brake: BSFH 500 DUALspring**

**Specification**

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_0$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_0 - 0.22)}{2} \text{ [Nm]}$$

$$F_B = F_C \cdot 2 \cdot \mu$$

**CALCULATION FUNDAMENTALS**

Weight of caliper without bracket: Approx. 330 kg

Overall dimensions: 430 x 465 x 490 mm

Pad width (width for heat calculation): 220 mm

Pad area: (organic) 63,000 mm$^2$ (*)

Max. wear of pad: (organic) 10 mm (*) (*=37 mm thick incl. brake shoe)

Pad area: (sintered) 43,600 mm$^2$ (*)

Max. wear of pad: (sintered) 5 mm (*) (*=42 mm thick incl. brake shoe)

Nominal coefficient of friction: $\mu = 0.4$

Total piston area - each caliper half: 145 cm$^2$

Total piston area - each caliper: 290 cm$^2$

Volume for each caliper at 1 mm stroke: 30 cm$^3$

Volume for each caliper at 3 mm stroke: 90 cm$^3$

Actuating time (guide value for calculation): 0.4 sec

Pressure connection/port: 3/8” BSP

Drain connection port: 1/4” BSP

Recommended pipe size: 16/12 mm

Maximum operating pressure 23.0 MPa

Operating temperature range - general from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.

Disc Brake: BSFH 500 DUALspring
**Disc Brake: BSFH 500 MONOspring**

**Specification**

Name: DEB-0500-001-MS-MAR  
Date: 23.01.2012  
Revision: G

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### TECHNICAL DATA AND CALCULATION FUNDAMENTALS

#### CALIPER TYPE

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<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE [N]</th>
<th>BRAKING FORCE 2) [N]</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE 3) MPa</th>
<th>BALANCING PRESSURE 1) MIN MPa</th>
<th>PAD SURFACE PRESSURE 4) [N/mm²]</th>
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<tbody>
<tr>
<td>BSFH 507</td>
<td>MIN 70,000</td>
<td>MAX 74,000</td>
<td>56,000</td>
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<td>8.0</td>
<td>4.82</td>
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<td>9.0</td>
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<td>6.89</td>
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<td>BSFH 512</td>
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<tr>
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<td>19.0</td>
<td>13.77</td>
</tr>
</tbody>
</table>

1) All figures are based on 1 mm air gap. (Total)  
2) Braking force is based on a min clamping force, nominal coefficient of friction $\mu = 0.4$ and 2 brake surfaces.  
3) The operating pressure is the minimum needed for operating the brake  
4) Pad pressure for organic / sintered pads respectively (based on max. clamping force)
# BRAKING TORQUE

The braking torque $M_B$ is calculated from following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_o$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_o - 0.22)^2}{2} \quad [Nm]
\]

\[
F_B = F_C \cdot 2 \cdot \mu
\]

---

## MONOSPRING

<table>
<thead>
<tr>
<th>Specification</th>
<th>MONOSPRING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of caliper without bracket:</td>
<td>Approx. 500 kg</td>
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<tr>
<td>Overall dimensions:</td>
<td>720 x 540 x 470 mm</td>
</tr>
<tr>
<td>Pad width (width for heat calculation):</td>
<td>220 mm</td>
</tr>
<tr>
<td>Pad area: (organic)</td>
<td>63,000 mm² (*)</td>
</tr>
<tr>
<td>Max. wear of pad: (organic)</td>
<td>5 mm (*) &quot;(=42 mm thick incl. brake shoe)&quot;</td>
</tr>
<tr>
<td>Pad area: (sintered)</td>
<td>43,600 mm² (*)</td>
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<tr>
<td>Max. wear of pad: (sintered)</td>
<td>5 mm (*) &quot;(=42 mm thick incl. brake shoe)&quot;</td>
</tr>
<tr>
<td>Nominal coefficient of friction:</td>
<td>$\mu = 0.4$</td>
</tr>
<tr>
<td>Total piston area - each caliper half:</td>
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<td>Total piston area - each caliper:</td>
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<td>Volume for each caliper at 1 mm stroke:</td>
<td>15 cm³</td>
</tr>
<tr>
<td>Volume for each caliper at 3 mm stroke:</td>
<td>45 cm³</td>
</tr>
<tr>
<td>Actuating time (guide value for calculation):</td>
<td>0.4 sec</td>
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<tr>
<td>Pressure connection/port:</td>
<td>3/8&quot; BSP</td>
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<tr>
<td>Drain connection port:</td>
<td>1/4&quot; BSP</td>
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<tr>
<td>Recommended pipe size:</td>
<td>16/12 mm</td>
</tr>
<tr>
<td>Maximum operating pressure</td>
<td>23.0 MPa</td>
</tr>
<tr>
<td>Operating temperature range - general</td>
<td>from -20°C to +70°C</td>
</tr>
</tbody>
</table>

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Specification

Name: DEB-0500-027-DS-MAR
Date: 23.01.2012
Revision: A

Disc Brake: BSFK 500 DUALspring

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE ¹ [N]</th>
<th>BRAKING FORCE ² [N]</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE ³ MPa</th>
<th>BALANCING PRESSURE ⁴ MIN MPa</th>
<th>PADSURFACE PRESSURE ⁵ [N/mm²]</th>
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<tbody>
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<td>230,000 - 250,000</td>
<td>184,000 - 216,000</td>
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<td>BSFK 525</td>
<td>250,000 - 270,000</td>
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<td>BSFK 527</td>
<td>270,000 - 295,000</td>
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<td>15.5 - 19.0</td>
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<td>21.0 - 25.0</td>
<td>15.00 - 5.30</td>
<td>5.30 - 5.25</td>
</tr>
</tbody>
</table>

¹ All figures are based on 1 mm air gap (Each side)
² Braking force is based on a min clamping force, nominal coefficient of friction $\mu = 0.4$ and 2 brake surfaces.
³ The operating pressure is the minimum needed for operating the brake
⁴ Pad pressure for organic / sintered pads respectively (based on max. clamping force)
⁵ Not recommended for general usage
Disc Brake: BSFK 500 DUALspring

Specification

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_0$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_0 - 0.23)}{2} \quad [Nm]
\]

\[
F_B = F_C \cdot 2 \cdot \mu
\]

**CALCULATION FUNDAMENTALS**

**DUALSPRING**

Weight of caliper without bracket: Approx. 420 kg
Overall dimensions: 720 x 472 x 490 mm
Pad width (width for heat calculation): 230 mm (205 mm)
Pad area: (organic) 71,750 mm$^2$ (*)
Max. wear of pad: (organic) 10 mm (*) "(=47mm thick)"
Pad area: (sintered) 72,400 mm$^2$ (*)
Max. wear of pad: (sintered) 10 mm (*) "(=47mm thick)"
Nominal coefficient of friction: $\mu = 0.4$
Total piston area - each caliper half: 233 cm$^2$
Total piston area - each caliper: 466 cm$^2$
Volume for each caliper at 1 mm stroke: 47 cm$^3$
Volume for each caliper at 3 mm stroke: 140 cm$^3$
Actuating time (guide value for calculation): 0.4sec
Pressure connection/port: 3/8" BSP
Drain connection port: 1/4" BSP
Recommended pipe size: 16/12 mm
Maximum operating pressure 23.0 MPa
Operating temperature range - general from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Disc Brake: BSFK 500 MONOspring

Specification

Name: DEB-0500-027-MS-MAR
Date: 23.01.2012
Revision: A

1) All figures are based on 1 mm air gap (Total)
2) Braking force is based on min clamping force, nominal coefficient of friction $\mu = 0.4$ and 2 brake surfaces.
3) The operating pressure is the minimum needed for operating the brake
4) Pad pressure for organic / sintered pads respectively (based on max. clamping force)
5) Not recommended for general usage
**Disc Brake: BSFK 500 MONOspring**

### Specification

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_o$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_o - 0.23)}{2} [Nm]
\]

\[
F_B = F_C \cdot 2 \cdot \mu
\]

**CALCULATION FUNDAMENTALS**

<table>
<thead>
<tr>
<th>Weight of caliper without bracket:</th>
<th>Approx. 550 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall dimensions:</td>
<td>710 x 532 x 565 mm</td>
</tr>
<tr>
<td>Pad width (width for heat calculation):</td>
<td>230 mm (205 mm)</td>
</tr>
<tr>
<td>Pad area: (organic)</td>
<td>71,750 mm² (*)</td>
</tr>
<tr>
<td>Max. wear of pad: (organic)</td>
<td>5 mm (*) &quot;(=52mm thick)&quot;</td>
</tr>
<tr>
<td>Pad area: (sintered)</td>
<td>72,400 mm² (*)</td>
</tr>
<tr>
<td>Max. wear of pad: (sintered)</td>
<td>5 mm (*) &quot;(=52mm thick)&quot;</td>
</tr>
<tr>
<td>Nominal coefficient of friction:</td>
<td>$\mu = 0.4$</td>
</tr>
<tr>
<td>Total piston area - each caliper half:</td>
<td>233 cm²</td>
</tr>
<tr>
<td>Total piston area - each caliper:</td>
<td>233 cm²</td>
</tr>
<tr>
<td>Volume for each caliper at 1 mm stroke:</td>
<td>23 cm³</td>
</tr>
<tr>
<td>Volume for each caliper at 3 mm stroke:</td>
<td>70 cm³</td>
</tr>
<tr>
<td>Actuating time (guide value for calculation):</td>
<td>0.4sec</td>
</tr>
<tr>
<td>Pressure connection/port:</td>
<td>3/8&quot; BSP</td>
</tr>
<tr>
<td>Drain connection port:</td>
<td>1/4&quot; BSP</td>
</tr>
<tr>
<td>Recommended pipe size:</td>
<td>16/12 mm</td>
</tr>
<tr>
<td>Maximum operating pressure</td>
<td>23.0 MPa</td>
</tr>
<tr>
<td>Maximum operating pressure BSFK 535</td>
<td>26.0 MPa</td>
</tr>
<tr>
<td>Operating temperature range - general</td>
<td>from -20°C to +70°C</td>
</tr>
</tbody>
</table>

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Disc Brake: **BSFB 600 DUALspring**

**Specification**

Name: DEB-0600-016-DS-MAR  
Date: 24.05.2012  
Revision: A

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>MIN [N]</th>
<th>MAX [N]</th>
<th>CLAMPING FORCE ¹</th>
<th>BRAKING FORCE ²</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE [MPa]</th>
<th>BALANCING PRESSURE MIN [MPa]</th>
<th>PADSURFACE PRESSURE [N/mm²]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFB 630</td>
<td>300,000</td>
<td>320,000</td>
<td></td>
<td>240,000</td>
<td>4.5</td>
<td>11.0</td>
<td>7.23</td>
<td>2.71 - 3.05</td>
</tr>
<tr>
<td>BSFB 635</td>
<td>350,000</td>
<td>380,000</td>
<td></td>
<td>280,000</td>
<td>5.5</td>
<td>12.5</td>
<td>8.44</td>
<td>3.05 - 3.22</td>
</tr>
<tr>
<td>BSFB 640</td>
<td>400,000</td>
<td>430,000</td>
<td></td>
<td>320,000</td>
<td>4.5</td>
<td>13.5</td>
<td>9.65</td>
<td>3.64 - 4.10</td>
</tr>
<tr>
<td>BSFB 645</td>
<td>450,000</td>
<td>490,000</td>
<td></td>
<td>360,000</td>
<td>8.5</td>
<td>16.0</td>
<td>10.85</td>
<td>3.81 - 4.29</td>
</tr>
<tr>
<td>BSFB 650</td>
<td>500,000</td>
<td>540,000</td>
<td></td>
<td>400,000</td>
<td>7.5</td>
<td>17.5</td>
<td>12.06</td>
<td>4.58 - 5.14</td>
</tr>
</tbody>
</table>

¹) All figures are based on 2 mm air gap (Each side)  
²) Braking force is based on a min clamping force, nominal coefficient of friction $\mu = 0.4$ and 2 brake surfaces.  
³) The operating pressure is the minimum needed for operating the brake  
⁴) Pad pressure for organic / sintered pads respectively (based on max. clamping force)
The braking torque $M_B$ is calculated from the following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to the table above [N] or calculated from the formula
- $D_o$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \left(\frac{D_o - 0.3}{2}\right) \quad [Nm]
\]

\[
F_B = F_C \cdot 2 \cdot \mu
\]

**BRAKING TORQUE**

**CALCULATION FUNDAMENTALS**

<table>
<thead>
<tr>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disc Brake: BSFB 600 DUALspring</strong></td>
</tr>
</tbody>
</table>

**Weight of caliper without bracket:** Approx. 765 kg

**Overall dimensions:** 584 x 565 x 797 mm

**Pad width (width for heat calculation):** 300 mm

**Pad area: (organic):** 118,000 mm² (*)

**Max. wear of pad: (organic):** 10 mm (*) "(≈37 mm thick)"

**Pad area: (sintered):** 105,000 mm² (*)

**Max. wear of pad: (sintered):** 10 mm (*) "(≈37 mm thick)"

**Nominal coefficient of friction:** $\mu = 0.4$

**Total piston area - each caliper half:** 415 cm²

**Total piston area - each caliper:** 830 cm²

**Volume for each caliper at 1 mm stroke:** 83 cm³

**Volume for each caliper at 3 mm stroke:** 249 cm³

**Actuating time (guide value for calculation):** 0.3 - 0.5 sec

**Pressure connection/port:** 1/2" BSP

**Drain connection port:** 1/4" BSP

**Recommended pipe size:** 16 mm

**Maximum operating pressure:** 18.5 MPa

**Operating temperature range - general:** from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.

(C = disc thickness)
**Disc Brake: BSFB 600 MONOspring**

**Specification**

Name: DEB-0600-016-MS-MAR  
Date: 24.05.2012  
Revision: A

---

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE 1) [N]</th>
<th>BRAKING FORCE 2) [N]</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE 3) MPa</th>
<th>BALANCING PRESSURE 1) MIN MPa</th>
<th>PAD SURFACE PRESSURE 4) [N/mm²]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFB 630</td>
<td>300,000 - 330,000</td>
<td>240,000</td>
<td>7.5</td>
<td>12.5</td>
<td>7.23</td>
<td>2.80 - 3.14</td>
</tr>
<tr>
<td>BSFB 635</td>
<td>350,000 - 380,000</td>
<td>280,000</td>
<td>5.0</td>
<td>13.5</td>
<td>8.44</td>
<td>3.05 - 3.22</td>
</tr>
<tr>
<td>BSFB 638</td>
<td>350,000 - 380,000</td>
<td>280,000</td>
<td>5.0</td>
<td>13.5</td>
<td>8.44</td>
<td>3.05 - 3.22</td>
</tr>
<tr>
<td>BSFB 640</td>
<td>400,000 - 430,000</td>
<td>320,000</td>
<td>4.5</td>
<td>15.0</td>
<td>9.65</td>
<td>3.64 - 4.10</td>
</tr>
</tbody>
</table>

1) All figures are based on 3 mm air gap (Total)  
2) Braking force is based on a min clamping force, nominal coefficient of friction $\mu = 0.4$ and 2 brake surfaces.  
3) The operating pressure is the minimum needed for operating the brake  
4) Pad pressure for organic / sintered pads respectively (based on max. clamping force)
**Specification**

**Disc Brake: BSFB 600 MONOspring**

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_0$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_0 - 0.3)}{2} \quad [Nm]
\]

\[
F_B = F_C \cdot 2 \cdot \mu
\]

**MONOSPRING**

Weight of caliper without bracket: Approx. 850 kg
Overall dimensions: 840 x 620 x 620 mm
Pad width (width for heat calculation): 300 mm
Pad area: (organic) 118,000 mm$^2$ (*)
Max. wear of pad: (organic) 10 mm (*) (=37 mm thick)
Pad area: (sintered) 105,000 mm$^2$ (*)
Max. wear of pad: (sintered) 10 mm (*) (=37 mm thick)
Nominal coefficient of friction: $\mu = 0.4$
Total piston area - each caliper half: 415 cm$^2$
Total piston area - each caliper: 415 cm$^2$
Volume for each caliper at 1 mm stroke: 41 cm$^3$
Volume for each caliper at 3 mm stroke: 124 cm$^3$
Actuating time (guide value for calculation): 0.3 - 0.5 sec
Pressure connection/port: 1/2" BSP
Drain connection port: 1/4" BSP
Recommended pipe size: 16 mm
Maximum operating pressure 18.5 MPa
Operating temperature range - general from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
## Disc Brake: BSFA 1000 MONOspring

### Specification

Name: DEB-1000-001-MS-MAR  
Date: 17.05.2010  
Revision: A

---

### Technical Data and Calculation Fundamentals

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE (^1) [N]</th>
<th>BRAKING FORCE (^2) [N]</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE (^3) MPa</th>
<th>BALANCING PRESSURE (^1) MPa</th>
<th>PAD SURFACE PRESSURE (^4) [N/mm²]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFA 1060</td>
<td>600,000</td>
<td>480,000</td>
<td>8.5</td>
<td>13.0</td>
<td>7.36</td>
<td>4.18</td>
</tr>
<tr>
<td>BSFA 1070</td>
<td>700,000</td>
<td>560,000</td>
<td>8.5</td>
<td>14.0</td>
<td>8.58</td>
<td>4.84</td>
</tr>
<tr>
<td>BSFA 1080</td>
<td>800,000</td>
<td>640,000</td>
<td>10.5</td>
<td>17.0</td>
<td>9.81</td>
<td>5.56</td>
</tr>
<tr>
<td>BSFA 1090</td>
<td>900,000</td>
<td>720,000</td>
<td>9.5</td>
<td>18.0</td>
<td>11.03</td>
<td>6.21</td>
</tr>
<tr>
<td>BSFA 1100</td>
<td>1,000,000</td>
<td>800,000</td>
<td>8.5</td>
<td>20.5</td>
<td>12.26</td>
<td>6.86</td>
</tr>
<tr>
<td>BSFA 1110</td>
<td>1,100,000</td>
<td>880,000</td>
<td>8.0</td>
<td>23.5</td>
<td>13.49</td>
<td>7.58</td>
</tr>
</tbody>
</table>

\(^1\) All figures are based on 2 mm air gap (total) and 2 spring packs.  
\(^2\) Braking force is based on a min clamping force, nominal coefficient of friction \(\mu = 0.4\) and 2 brake surfaces.  
\(^3\) The operating pressure is the minimum needed for operating the brake  
\(^4\) Pad pressure for organic / sintered pads respectively (based on max. clamping force)

Bracket is not part of brake.
Disc Brake: BSFA 1000 MONOSpring

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from the following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to the table above [N] or calculated from formula
- $D_0$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_0 - 0.3)^2}{2} \text{ [Nm]}$$

$$F_B = F_C \cdot 2 \cdot \mu$$

**CALCULATION FUNDAMENTALS**

- Weight of complete caliper incl. pads and without bracket: 1,400 - 1,600 kg depending on the disc thickness
- Disc thickness: 80 - 135 mm (depending on type)
- Overall caliper dimensions: 766 - 859 x 800 x 615mm (depending on disc thickness)
- Pad width: 300 mm
- Pad friction area: (organic) 153,000 mm$^2$ (*)
- Max. wear of pad: 5 mm (*)
- Nominal coefficient of friction: $\mu = 0.4$
- Total piston area - each caliper half: $2 \times 40,800 \text{ mm}^2 = 81,600 \text{ mm}^2$
- Volume for each caliper half at 1 mm stroke: 81.6 cm$^3$
- Volume for each caliper at 3 mm stroke: 245 cm$^3$
- Actuating time (guide value for calculation): 0.4 sec
- Pressure connection (port size): 3/4” BSP
- Drain connection R (port size): 1/4” BSP
- Recommended hydraulic pipe size OD: 16 mm
- Max. operating pressure: 23.0 MPa
- Operating temperature range - general: from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Disc Brake: BSAB 75 DUAL-ACTION

Specification

Name: DEB-0075-002-DA-MAR
Date: 07.03.2008
Revision: A

Disc Brake: BSAB 75 DUAL-ACTION

TECHNICAL DATA AND CALCULATION FUNDAMENTALS

Oper. Pressure [BAR] vs. FC [kN] Clamping force

Nominal braking force [kN] vs. FB [kN]
### Braking Torque

The braking torque \( M_B \) is calculated from the following formula where:
- \( a \) is the number of brakes acting on the disc
- \( F_B \) is the braking force according to the table above [N] or calculated from the formula
- \( D_0 \) is the brake disc outer diameter [m]
- \( F_C \) is the clamping force [N]
- \( A \) [cm\(^2\)], \( P \) [bar] and \( \mu \) see values below

The actual braking torque may vary depending on the friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_0 - 0.102)}{2} \quad \text{[Nm]}
\]

\[
F_B = F_C \cdot 2 \cdot \mu \quad \text{[N]}
\]

\[
F_C = A \cdot P \cdot 10 \quad \text{[N]}
\]

### Calculation Fundamentals

- **Weight of caliper without bracket:** Approx. 60 kg
- **Overall dimensions:** 220 x 240 x 260 mm
- **Pad width:** 102 mm
- **Pad area: (organic)** 20,300 mm\(^2\) (*)
- **Max. wear of pad: (organic)** 7 mm (*) "(=11 mm thick)"
- **Pad area: (sinter)** 16,350 mm\(^2\) (*)
- **Max. wear of pad: (sinter)** 6 mm (*) "(=12 mm thick)"
- **Nominal coefficient of friction:** \( \mu = 0.4 \)
- **Total piston area - each caliper half:** \( A = 88 \text{ cm}^2 \)
- **Total piston area - each caliper:** 176 cm\(^2\)
- **Volume for each caliper at 1 mm stroke:** 18 cm\(^3\)
- **Volume for each caliper at 3 mm stroke:** 54 cm\(^3\)
- **Actuating time (guide value for calculation):** 0.4 sec
- **Pressure connection/port:** 1/4” BSP
- **Drain connection/port:** 1/4” BSP
- **Max. operating pressure:** 16 MPa
- **Recommended pipe size:** 10/8 mm

**Operating temperature range - general** from -20°C to +70°C

**Operating temperature range - wind turbine** from -40°C to +60°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Disc Brake: **BSAB 90 DUAL-ACTION**

**Specification**

Name: DEB-0090-001-DA-MAR  
Date: 09.12.2009  
Revision: B

**Disc Brake:** BSAB 90 DUAL-ACTION

**Technical Data and Calculation Fundamentals**
**Disc Brake: BSAB 90 DUAL-ACTION**

**Specification**

**Braking Torque**

The braking torque $M_b$ is calculated from following formula where:
- $a$ is the number of brakes acting on the disc
- $F_b$ is the braking force according to table above [N] or calculated from formula
- $D_o$ is the brake disc outer diameter [m]
- $F_c$ is the clamping force [N]
- $A$ [cm²], $P$ [bar] and $\mu$ see values below

The actual braking torque may vary depending on friction coefficient.

$$M_b = a \cdot F_b \cdot \frac{(D_o - 0.102)^2}{2} \text{ [Nm]}$$

$$F_b = F_c \cdot 2 \cdot \mu \text{ [N]}$$

$$F_c = A \cdot P \cdot 10 \text{ [N]}$$

**Calculation Fundamentals**

- Weight of caliper without bracket: Approx. 60 kg
- Overall dimensions: 220 x 240 x 260 mm
- Pad width: 102 mm
- Pad area: (organic) 20,300 mm² (*)
- Max. wear of pad: (organic) 7 mm (*) "(=14 mm thick)"
- Pad area: (sinter) 16,350 mm² (*)
- Max. wear of pad: (sinter) 6 mm (*) "(=12 mm thick)"
- Nominal coefficient of friction: $\mu = 0.4$
- Total piston area - each caliper half: $A = 127 \text{ cm}^2$
- Total piston area - each caliper: 254 cm²
- Volume for each caliper at 1 mm stroke: 25 cm³
- Volume for each caliper at 3 mm stroke: 76 cm³
- Actuating time (guide value for calculation): 0.4 sec
- Pressure connection/port: 1/4" BSP
- Drain connection/port: 1/4" BSP
- Max. operating pressure: 15.7 MPa
- Recommended pipe size: 10/8 mm
- Operating temperature range - general from -20°C to +70°C
- Operating temperature range - wind turbine from -40°C to +60°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Disc Brake: **BSAB 120 DUAL-ACTION**

**Specification**

Name: DEB-0120-001-DA-MAR  
Date: 03.12.2009  
Revision: B

**Disc Brake:** BSAB 120 DUAL-ACTION

**TECHNICAL DATA AND CALCULATION FUNDAMENTALS**
The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_0$ is the brake disc outer diameter [m]
- $F_C$ is the clamping force [N]
- $A$ [cm$^2$], $P$ [bar] and $\mu$ see values below

The actual braking torque may vary depending on friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_0 - 0.136)^2}{2} [Nm]$$

$$F_B = F_C \cdot 2 \cdot \mu [N]$$

$$F_C = A \cdot P \cdot 10 [N]$$
Disc Brake: **BSAK 300 DUAL-ACTION**

**Specification**

Name: DEB-0300-043-DA-MAR  
Date: 15.05.2009  
Revision: A

**TECHNICAL DATA AND CALCULATION FUNDAMENTALS**

![Graph of Braking Force vs Pressure]

- The braking force is based on coefficient $\mu = 0.4$
Disc Brake: **BSAK 300 DUAL-ACTION**

**Specification**

**BRAKING TORQUE**

The braking torque $M_b$ is calculated from following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_o$ is the brake disc outer diameter [m]
- $F_c$ is the clamping force [N]
- $A$ [cm$^2$], $P$ [bar] and $\mu$ see values below

The actual braking torque may vary depending on friction coefficient.

\[
M_b = a \cdot F_B \cdot \frac{(D_o - 0.13)^2}{2} \text{ [Nm]}
\]

\[
F_B = F_c \cdot 2 \cdot \mu \text{ [N]}
\]

\[
F_c = A \cdot P \cdot 10 \text{ [N]}
\]

**CALCULATION FUNDAMENTALS**

<table>
<thead>
<tr>
<th>DUAL-ACTION</th>
<th><strong>Weight of caliper without bracket:</strong> Approx. 55 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall dimensions:</strong></td>
<td>331 x 320 x 321 mm</td>
</tr>
<tr>
<td><strong>Pad width:</strong></td>
<td>130 mm</td>
</tr>
<tr>
<td><strong>Pad area: (organic)</strong></td>
<td>29,000 mm$^2$ (*)</td>
</tr>
<tr>
<td><strong>Max. wear of pad: (organic)</strong></td>
<td>10 mm (*) <em>(=14 mm thick)</em></td>
</tr>
<tr>
<td><strong>Pad area: (sinter)</strong></td>
<td>20,000 mm$^2$ (*)</td>
</tr>
<tr>
<td><strong>Max. wear of pad: (sinter)</strong></td>
<td>7 mm (*) <em>(=17 mm thick)</em></td>
</tr>
<tr>
<td><strong>Nominal coefficient of friction:</strong></td>
<td>$\mu = 0.4$</td>
</tr>
<tr>
<td><strong>Total piston area - each caliper half:</strong></td>
<td>$A=44.2 \text{ cm}^2$</td>
</tr>
<tr>
<td><strong>Total piston area - each caliper:</strong></td>
<td>$88.4 \text{ cm}^2$</td>
</tr>
<tr>
<td><strong>Volume for each caliper at 1 mm stroke:</strong></td>
<td>$8.8 \text{ cm}^3$</td>
</tr>
<tr>
<td><strong>Volume for each caliper at 3 mm stroke:</strong></td>
<td>$24.6 \text{ cm}^3$</td>
</tr>
<tr>
<td><strong>Actuating time (guide value for calculation):</strong></td>
<td>0.3 sec</td>
</tr>
<tr>
<td><strong>Pressure connection/port:</strong></td>
<td>1/4&quot; BSP</td>
</tr>
<tr>
<td><strong>Drain connection/port:</strong></td>
<td>1/8&quot; BSP</td>
</tr>
<tr>
<td><strong>Max. operating pressure:</strong></td>
<td>12.5 MPa</td>
</tr>
<tr>
<td><strong>Recommended pipe size:</strong></td>
<td>10/8 mm</td>
</tr>
</tbody>
</table>

| **Disc Brake:** **BSAK 300 DUAL-ACTION** |
| **Operating temperature range - general** | from -20°C to +70°C |
| **Operating temperature range - wind turbine** | from -40°C to +60°C |

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Disc Brake: **BSAK 300 MONO-ACTION**

**Specification**

Name: DEB-0300-043-DA-MAR  
Date: 15.05.2009  
Revision: A

**TECHNICAL DATA AND CALCULATION FUNDAMENTALS**

![Diagram of BSAK 300 MONO-ACTION brake]

**Braking Force** $F_b$ [kN]

- The braking force is based on coefficient $\mu = 0.4$

<table>
<thead>
<tr>
<th>Pressure [bar]</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F_b$ [kN]</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Disc Brake: BSAK 300 MONO-ACTION

**Specification**

#### BRAKING TORQUE

The braking torque $M_B$ is calculated from following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_0$ is the brake disc outer diameter [m]
- $F_C$ is the clamping force [N]
- $A$ [cm²], $P$ [bar] and $\mu$ see values below

The actual braking torque may vary depending on friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_0 \cdot 0.13)}{2} \text{[Nm]}$$

$$F_B = F_C \cdot 2 \cdot \mu \text{[N]}$$

$$F_C = A \cdot P \cdot 10 \text{[N]}$$

#### CALCULATION FUNDAMENTALS

<table>
<thead>
<tr>
<th>MONO-ACTION</th>
<th>Weight of caliper without bracket: Approx. 75 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall dimensions: 260 x 420 x 300 mm</td>
<td></td>
</tr>
<tr>
<td>Pad width: 130 mm</td>
<td></td>
</tr>
<tr>
<td>Pad area: (organic) 29,000 mm² (*)</td>
<td></td>
</tr>
</tbody>
</table>
| Max. wear of pad: (organic) 5 mm (*) 
  "(=19 mm thick)"
| Pad area: (sinter) 20,000 mm² (*) |
| Max. wear of pad: (sinter) 5 mm (*) 
  "(=19 mm thick)"
| Nominal coefficient of friction: $\mu = 0.4$ |
| Total piston area - each caliper half: $A = 44.2 \text{ cm}^2$ |
| Total piston area - each caliper: 44.2 cm² |
| Volume for each caliper at 1 mm stroke: 4.4 cm³ |
| Volume for each caliper at 3 mm stroke: 13.2 cm³ |
| Actuating time (guide value for calculation): 0.3 sec |
| Pressure connection/port: 1/4" BSP |
| Drain connection/port: 1/8" BSP |
| Max. operating pressure: 12.5 MPa |
| Recommended pipe size: 10/8 mm |

Operating temperature range - general from -20°C to +70°C

Operating temperature range - wind turbine from -40°C to +60°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Disc Brake: **BSAK 3000 DUAL-ACTION**

**Specification**

Name: DEB-3000-020-DA-MAR  
Date: 15.05.2009  
Revision: A

**TECHNICAL DATA AND CALCULATION FUNDAMENTALS**
Disc Brake: **BSAK 3000 DUAL-ACTION**

**Specification**

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from the following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to the table above [N] or calculated from the formula
- $D_o$ is the brake disc outer diameter [m]
- $F_c$ is the clamping force [N]
- $A$ [cm²], $P$ [bar] and $\mu$ see values below

The actual braking torque may vary depending on friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_o - 0.2)}{2} [Nm]$$

**CALCULATION FUNDAMENTALS**

**DUAL-ACTION**

- Weight of caliper without bracket: Approx. 130 kg
- Pad width: 200 mm
- Pad area: (organic) 59,600 mm² (*)
- Max. wear of pad: (organic) 10 mm (*) " (=22 mm thick)"
- Pad area: (sinter) 36,000 mm² (*)
- Max. wear of pad: (sinter) 10 mm (*) " (=22 mm thick)"
- Nominal coefficient of friction: $\mu = 0.4$
- Total piston area - each caliper half: $A=113.1 \ \text{cm}^2$
- Total piston area - each caliper: 226.2 cm²
- Volume for each caliper at 1 mm stroke: 22.6 cm³
- Volume for each caliper at 3 mm stroke: 67.9 cm³
- Actuating time (guide value for calculation): 0.3 sec
- Pressure connection/port: 1/4" BSP
- Max. operating pressure: 11.5 MPa

Operating temperature range - general from -20°C to +70°C
Operating temperature range - wind turbine from -40°C to +60°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Disc Brake: **BSAK 3000 MONO-ACTION**

**Specification**

Name: DEB-0300-043-DA-MAR  
Date: 15.05.2009  
Revision: A

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**TECHNICAL DATA AND CALCULATION FUNDAMENTALS**

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**Diagram showing relationship between force and pressure**

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**Graph showing force vs. pressure for different friction coefficients: μ=0.40, μ=0.35, μ=0.30, μ=0.25**
**Specification**

**MONO-ACTION**

The braking torque $M_B$ is calculated from following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_o$ is the brake disc outer diameter [m]
- $F_C$ is the clamping force [N]
- $A$ [cm²], $P$ [bar] and $\mu$ see values below

The actual braking torque may vary depending on friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_o - 0.2)}{2} \text{ [Nm]}
\]

\[
F_B = F_C \cdot 2 \cdot \mu \text{ [N]}
\]

\[
F_C = A \cdot P \cdot 10 \text{ [N]}
\]

**CALCULATION FUNDAMENTALS**

- Weight of caliper without bracket: Approx. 160 kg
- Pad width: 200 mm
- Pad area: (organic) 59,600 mm² (*)
- Max. wear of pad: (organic) 5 mm (*) "(23 mm thick)"
- Pad area: (sinter) 36,000 mm² (*)
- Max. wear of pad: (sinter) 5 mm (*) "(23 mm thick)"
- Nominal coefficient of friction: $\mu = 0.4$
- Total piston area - each caliper half: $A = 113.1$ cm²
- Total piston area - each caliper: 113.1 cm²
- Volume for each caliper at 1 mm stroke: 11.31 cm³
- Volume for each caliper at 3 mm stroke: 33.9 cm³
- Actuating time (guide value for calculation): 0.3 sec
- Pressure connection/port: 1/4" BSP
- Max. operating pressure: 11.5 MPa

**Disc Brake: BSAK 3000 MONO-ACTION**

Operating temperature range - general from -20°C to +70°C
Operating temperature range - wind turbine from -40°C to +60°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
Disc Brake: **BSAL 3000 MONO-ACTION**

**Specification**

Name: DEB-3000-030-MA-MAR  
Date: 07.03.2012  
Revision: -
**Specification**

**MONO-ACTION**

- **Weight of caliper without bracket:** Approx. 180 kg
- **Pad width:** 200 mm
- **Pad area: (organic)** 59,600 mm² (*)
- **Max. wear of pad: (organic)** 5 mm (*) "(23 mm thick)"
- **Pad area: (sinter)** 36,000 mm² (*)
- **Max. wear of pad: (sinter)** 5 mm (*) "(23 mm thick)"
- **Nominal coefficient of friction:** $\mu = 0.4$
- **Total piston area - each caliper half:** $A = 113.1 \text{ cm}^2$
- **Total piston area - each caliper:** 113.1 cm²
- **Volume for each caliper at 1 mm stroke:** 11.31 cm³
- **Volume for each caliper at 3 mm stroke:** 33.9 cm³
- **Actuating time (guide value for calculation):** 0.3 sec
- **Pressure connection/port:** 1/4” BSP, 1/8” BSP
- **Max. operating pressure:** 11.5 MPa
- **Operating temperature range - general:** from -20°C to +70°C
- **Operating temperature range - wind turbine:** from -40°C to +60°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.

**Braking Torque**

The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_0$ is the brake disc outer diameter [m]
- $F_C$ is the clamping force [N]
- $A$ [cm²], P [bar] and $\mu$ see values below

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_0 - 0.2)}{2} \quad \text{[Nm]}
\]

\[
F_B = F_C \cdot 2 \cdot \mu \quad \text{[N]}
\]

\[
F_C = A \cdot P \cdot 10 \quad \text{[N]}
\]
Disc Brake: **BSAC 120  DUAL-ACTION**

### Specification

Name: DEB-0120-004-DA-MAR  
Date: 03.07.2012  
Revision: -

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**TECHNICAL DATA AND CALCULATION FUNDAMENTALS**

![Disc Brake: BSAC 120 DUAL-ACTION](image)

![Graph](image)
Disc Brake: **BSAC 120  DUAL-ACTION**

**Specification**

---

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from following formula where:
- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_0$ is the brake disc outer diameter [m]
- $F_C$ is the clamping force [N]
- $A$ [cm$^2$], $P$ [bar] and $\mu$ see values below

The actual braking torque may vary depending on friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_0 - 0.136)}{2} \quad [Nm]
\]

\[
F_B = F_C \cdot 2 \cdot \mu \quad [N]
\]

---

**CALCULATION FUNDAMENTALS**

| **Weight of caliper without bracket:** | Approx. 850 kg |
| **Overall dimensions:** | 572 x 318 x 278 mm |
| **Pad width:** | 138 mm |
| **Pad area (organic):** | 58,500 mm$^2$ (*) |
| **Max. wear of pad (organic):** | 7 mm (*) “(=14 mm thick)” |
| **Nominal coefficient of friction:** | $\mu$ = 0.4 |
| **Total piston area - each caliper half:** | $A$ = 339.3 cm$^2$ |
| **Total piston area - each caliper:** | 678.6 cm$^2$ |
| **Volume for each caliper at 1 mm stroke:** | 67.8 cm$^3$ |
| **Volume for each caliper at 3 mm stroke:** | 203.5 cm$^3$ |
| **Actuating time (guide value for calculation):** | 0.8 sec |
| **Pressure connection/port:** | 1/4” BSP |
| **Drain connection port:** | 1/4” BSP |
| **Max. operating pressure $P_{\text{max}}$:** | 20.5 MPa |
| **Min. operating pressure $P_{\text{min}}$:** | 9.0 MPa |
| **Recommended pipe size:** | 10 mm |

Operating temperature range:
- General: from -20°C to +70°C
- Wind turbine: from -40°C to +60°C

(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad.
**Disc Brake: YSAA 60**

### Specification

Name: DEB-0060-001- MAR  
Date: 10.09.2012  
Revision: -

**TECHNICAL DATA AND CALCULATION FUNDAMENTALS**

- Weight of calliper (incl. organic pads): Approx. 51 kg
- Overall dimensions: H=171 x W=265 x D=278 mm
- Pad diameter: B=3xØ63 mm + S=2xØ93mm
- Pad area: B=9,352mm² + S=13,586mm²
- Max. wear of Slide/Brake material: TBD
- Nominal coefficient of friction: \( \mu = 0.4 \)
- Total piston area - each caliper: 85 cm²
- Volume for each caliper at 1 mm stroke: 8,5 cm³
- Actuating time (guide value for calculation): 0.4 sec
- Pressure connection/port: 1/4” BSP
- Drain connection port: 1/8” BSP
- Recommended pipe size: 8-10 mm
- Max. operating pressure: P=200 bar
- Operating temperature range:
  - General usage: -40°C to +70°C
  - For brake applications in wind turbines: -40°C to +70°C
  - (For temperatures outside this range contact Svendborg Brakes)

### Calculation Fundamentals

\[
FB = \frac{\mu F_C \cdot D_O \cdot a}{A \cdot P} 
\]

Where:

- \( \mu \): Nominal friction between brake pad material and brake disc.
- \( F_B \): Braking Force
- \( F_C \): Clamping force
- \( D_O \): Disc outer diameter
- \( A \): Pad area
- \( P \): Pressure

The actual braking torque may vary, depending on friction coefficient.
**BRAKING TORQUE**

The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N]
- $D_o$ is the brake disc outer diameter [m]
- $F_C$ is the clamping force [N]
- $A$ [cm²], $P$ [bar] and $\mu$ see values below

The actual braking torque may vary depending on friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_o - 0.102)}{2} [Nm]$$

$$F_B = F_C \cdot 2 \cdot \mu [N]$$

$$F_C = A \cdot P \cdot 10 [N]$$

**CALCULATION FUNDAMENTALS**

- Weight of caliper without bracket incl. pads: Approx. 51 kg
- Overall dimensions: 171 x 265 x 278 mm
- Pad diameter: 3x$\phi$ 63 mm + 2x$\phi$ 93 mm
- Pad area: 9,352 mm² + 13,586 mm²
- Max. wear of Slide/brake material: TBD
- Nominal coefficient of friction: $\mu = 0.4$
- Total piston area - each caliper: 85 cm²
- Volume for each caliper at 1 mm stroke: 8.5 cm³
- Actuating time (guide value for calculation): 0.4 sec
- Pressure connection/port: 1/4" BSP
- Drain connection port: 1/8" BSP
- Max. operating pressure: 200 bar
- Recommended pipe size: 8-10 mm

Operating temperature range - general from -40°C to +70°C
Operating temperature range - wind turbine from -40°C to +60°C

(For temperatures outside this range contact Svendborg Brakes)
SVENDBORG NEW BRAKES

Svendborg Brakes is the global market leader in intelligent braking solutions. This is why.
# Specification

**Name:** DEB-0500-029-DS-MAR  
**Date:** 20.05.2013  
**Revision:** -

## Disc Brake: BSFH D500 (DOUBLE PISTON) DUAL spring

### Technical Data and Calculation Fundamentals

<table>
<thead>
<tr>
<th>CALIPER TYPE</th>
<th>CLAMPING FORCE (^1) [N]</th>
<th>BRAKING FORCE (^2) [N]</th>
<th>LOSS OF FORCE PER 1MM [%]</th>
<th>OPERATING PRESSURE [MPa]</th>
<th>BALANCING PRESSURE MIN [MPa]</th>
<th>PAD SURFACE PRESSURE (^5) [N/mm(^2)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSFH D524</td>
<td>240,000</td>
<td>192,000</td>
<td>8.0</td>
<td>12.0</td>
<td>8.3</td>
<td>2.4</td>
</tr>
<tr>
<td>BSFH D528</td>
<td>280,000</td>
<td>224,000</td>
<td>7.0</td>
<td>14.0</td>
<td>9.7</td>
<td>2.8</td>
</tr>
<tr>
<td>BSFH D530</td>
<td>300,000</td>
<td>240,000</td>
<td>6.0</td>
<td>14.5</td>
<td>10.3</td>
<td>3.0</td>
</tr>
<tr>
<td>BSFH D532</td>
<td>320,000</td>
<td>256,000</td>
<td>6.0</td>
<td>15.0</td>
<td>11.0</td>
<td>3.2</td>
</tr>
<tr>
<td>BSFH D540</td>
<td>400,000</td>
<td>320,000</td>
<td>10.0</td>
<td>19.0</td>
<td>13.8</td>
<td>4.0</td>
</tr>
</tbody>
</table>

\(^1\) All figures are based on 1 mm air gap (Total) and 2 spring packs  
\(^2\) Braking force is based on a min clamping force, nominal coefficient of friction \(\mu = 0.4\) and 2 brake surfaces.  
\(^3\) The piston travel at which the pressure limits is measured - the nominal pressure limits is identical to balancing pressure values  
\(^5\) Pad pressure for organic pads respectively (based on max. clamping force)
**Disc Brake: BSFH D500 (DOUBLE PISTON) DUALspring**

**Specification**

**Braking Torque**

The braking torque \( M_B \) is calculated from the following formula where:

- \( a \) is the number of brakes acting on the disc.
- \( F_B \) is the braking force according to the table above [N] or calculated from the formula.
- \( D_0 \) is the brake disc outer diameter [m].

The actual braking torque may vary depending on the adjustment of the brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_0 - 0.2)}{2} \quad [\text{Nm}]
\]

\[
F_B = F_C \cdot 2 \cdot \mu
\]

**Calculation Fundamentals**

- **Weight of caliper without bracket**: Approx. 780 kg
- **Overall dimensions without base plate**: 698 x 530 x 533 (+C) mm
- **Pad width**: 200 mm
- **Pad area (organic)**: 110,000 mm\(^2\) (*)
- **Max. wear of pad (organic)**: 10 mm (*)
- **Nominal coefficient of friction**: \( \mu = 0.4 \)
- **Total piston area - each caliper half**: 2 x 145 cm\(^2\) = 290 cm\(^2\)
- **Total piston area - each caliper**: 4 x 145 cm\(^2\) = 580 cm\(^2\)
- **Volume for each caliper at 1 mm stroke**: 60 cm\(^3\)
- **Volume for each caliper at 3 mm stroke**: 180 cm\(^3\)
- **Actuating time (guide value for calculation)**: 0.4 sec
- **Pressure connection/P-port**: G3/8, ISO 288
- **Air breathing connection/A-port**: G3/8, ISO 288
- **Drain connection/L-port**: G1/4, ISO 288
- **Recommended pipe size**: 16/12 mm
- **Operating temperature range - general**: from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)

(*C = Brake disc thickness)

(*) On each brake pad.
Disc Brake: BSFH D500 (DOUBLE PISTON) MONOspring

Specification

Name: DEB-0500-029-MS-MAR  
Date: 20.05.2013  
Revision: -

### TECHNICAL DATA AND CALCULATION FUNDAMENTALS

| CALIPER TYPE | CLAMPING FORCE | BRAKING FORCE
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIN [N]</td>
<td>MAX [N]</td>
</tr>
<tr>
<td>BSFH D524</td>
<td>240,000</td>
<td>260,000</td>
</tr>
<tr>
<td>BSFH D528</td>
<td>280,000</td>
<td>306,000</td>
</tr>
<tr>
<td>BSFH D530</td>
<td>300,000</td>
<td>328,000</td>
</tr>
<tr>
<td>BSFH D532</td>
<td>320,000</td>
<td>350,000</td>
</tr>
<tr>
<td>BSFH D540</td>
<td>400,000</td>
<td>436,000</td>
</tr>
</tbody>
</table>

1) All figures are based on 1 mm air gap (Total) and 2 spring packs
2) Braking force is based on a min clamping force, nominal coefficient of friction μ = 0.4 and 2 brake surfaces.
3) The piston travel at which the pressure limits is measured - the nominal pressure limits is identical to balancing pressure values
5) Pad pressure for organic pads respectively (based on max. clamping force)
The braking torque $M_B$ is calculated from following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force according to table above [N] or calculated from formula
- $D_o$ is the brake disc outer diameter [m]

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

\[
M_B = a \cdot F_B \cdot \frac{(D_o - 0.2)}{2} \text{ [Nm]}
\]

\[
F_B = F_C \cdot 2 \cdot \mu
\]
Disc Brake: BSAH D500 (DOUBLE PISTON) DUAL-ACTION

Specification

Name: DEB-0500-030-DA-MAR
Date: 20.05.2013
Revision: -

TECHNICAL DATA AND CALCULATION FUNDAMENTALS

BRAKING TORQUE

The braking torque MB is calculated from the following formulas:

\[ MB = \mu \times F_C \times A \times D \times \frac{F_B}{D_O} \times \frac{F_r}{P} \]

Where:

- \( a \) is the number of calipers acting on the disc
- \( F_B [N] \) is the braking force
- \( D_O [m] \) is the disc outer diameter
- \( F_C [N] \) is the clamping force
- \( F_r [N] \) is the piston retraction force
- \( A [cm^2] \) is the active piston area
- \( A_r [cm^2] \) is the retraction piston area
- \( P [bar] \) hydraulic pressure
- \( P_r [bar] \) hydraulic retraction pressure
- \( \mu \) is the coefficient of friction - see values below

The actual braking torque may vary, depending on adjustment of brake and friction coefficient.

CALCULATION FUNDAMENTALS  Mono Spring (MS) Dual Spring (DS)

Disc thickness ………………………………………......................... 32-101,6 mm 32-101,6 mm

Weight of caliper incl. base plate (approx dep. of disc thickness).. 910-1000 kg  780 kg

Overall caliper dimensions (incl. base plate) HxDxW..................... 930x637x431(+C) mm 698x530x351(+C) mm
Overall caliper dimensions (excl. base plate) HxDxW ................... 698x530x533(+C) mm

Pad width …………………………………………….......................... 200 mm  200 mm

Pad friction area (organic) …………………………......................... 110,000 mm^2 (*) 110,000 mm^2 (*)

Max. wear of pad ………………………………….…........................ 6 mm (*)  8 mm (*)

Nominal coefficient of friction ………………………............ ............ \( \mu = 0.4 \) \( \mu = 0.4 \)

Total piston area for each caliper half – “A” (active braking) .......... 2x145 cm^2 = 290 cm^2 2x145 cm^2 = 290 cm^2
Total piston area for each caliper – “A” (active braking)................. 2x145 cm^2 = 290 cm^2 4x145 cm^2 = 580 cm^2
Total piston area for each caliper half – “Ar” (retraction)................ 2x145 cm^2 = 290 cm^2 2x145 cm^2 = 290 cm^2
Total piston area for each caliper – “Ar” (retraction)....................... 2x145 cm^2 = 290 cm^2 4x145 cm^2 = 580 cm^2

Fluid volume for each caliper at 1 mm stroke (active braking).... ....30 cm^3  60 cm^3
Fluid volume for each caliper at 3 mm stroke (active braking)....... 90 cm^3  180 cm^3
Fluid volume for each caliper at 1 mm stroke (retraction)..... ......... 30 cm^3  60 cm^3
Fluid volume for each caliper at 3 mm stroke (retraction).............. 90 cm^3  180 cm^3

Actuating time (guide value for calculation) ……............. ............... 0,4 sec.  0,4 sec.

Active pressure connection size (A-port)............ ............................ G3/8, ISO 228  G3/8, ISO 228
Retraction connection size (P-port)...………………........................ G3/8, ISO 228  G3/8, ISO 228
Drain connection size (L-port) ...…………………........................... G1/4, ISO 228  G1/4, ISO 228

Max operating pressure.................................................................. 15.0 MPa (150 bar) 15.0 MPa (150 bar)
Recommended pipe size................................................................ 16/12 mm 16/12 mm

Operating temperature range ……………………........................... from -20 to +70 \( ^\circ \)C  from -20 to +70 \( ^\circ \)C
(For temperatures outside this range contact Svendborg Brakes)

(*) On each brake pad

Valid for \( P = D \)
Disc Brake: **BSAH D500 (DOUBLE PISTON) DUAL-ACTION**

**Specification**

**BRAKING TORQUE**

The braking torque $M_b$ is calculated from following formula where:
- $a$ is the number of brakes acting on the disc
- $F_b$ is the braking force [N]
- $D_0$ is the brake disc outer diameter [m]
- $F_c$ is the clamping force [N]
- $F_r$ is the piston retraction force [N]
- $A$ is the active piston area [cm$^2$]
- $A_r$ is the retraction piston area [cm$^2$]
- $P$ is the hydraulic pressure [bar]
- $P_r$ is the hydraulic retraction pressure [bar]
- $\mu$ is the coefficient of friction - see values below

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

$$M_b = a \cdot F_b \cdot \frac{(D_0 - 0.2)^2}{2} \text{ [Nm]}$$

<table>
<thead>
<tr>
<th>$F_b$</th>
<th>$F_c$</th>
<th>$F_r$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$= (F_c - F_r) \cdot 2 \cdot \mu$ [N]</td>
<td>$= A \cdot P \cdot 10$ [N]</td>
<td>$= A_r \cdot P_r \cdot 10$ [N]</td>
</tr>
</tbody>
</table>

For temperatures outside this range contact Svendborg Brakes

(C = Brake disc thickness)

(*) On each brake pad.

---

**CALCULATION FUNDAMENTALS**

- Weight of caliper without bracket: Approx. 780 kg
- Overall dimensions excl. base plate: 698 x 530 x 533 (+C) mm
- Pad width: 200 mm
- Pad area: (organic) 110,000 mm$^2$ (*)
- Max. wear of pad: (organic) 8 mm (*)
- Nominal coefficient of friction: $\mu = 0.4$
- Total piston area - each caliper half "A" (active braking): $2 \times 145$ cm$^2 = 290$ cm$^2$
- Total piston area - each caliper "A" (active braking): $4 \times 145$ cm$^2 = 580$ cm$^2$
- Total piston area - each caliper half "A" (retraction): $2 \times 145$ cm$^2 = 290$ cm$^2$
- Total piston area - each caliper "A" (retraction): $4 \times 145$ cm$^2 = 580$ cm$^2$
- Volume for each caliper at 1 mm stroke (active braking): 60 cm$^3$
- Volume for each caliper at 3 mm stroke (active braking): 180 cm$^3$
- Volume for each caliper at 1 mm stroke (retraction): 60 cm$^3$
- Volume for each caliper at 3 mm stroke (retraction): 180 cm$^3$
- Actuating time (guide value for calculation): 0.4 sec
- Active pressure connection size (A-port): G3/8, ISO 228
- Retraction connection size (P-port): G3/8, ISO 228
- Drain connection size (L-port): G1/4, ISO 228
- Max. operating pressure $P_{\text{max}}$: 15.0 MPa (150 bar)
- Recommended pipe size: 16/12 mm
- Operating temperature range - general: from -20°C to +70°C

---

**DUAL-ACTION**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Approx. 780 kg</td>
</tr>
</tbody>
</table>
**Technological data and calculation fundamentals**

**Disc Brake:** BSAH D500 (DOUBLE PISTON) MONO-ACTION

**Specification**

Name: DEB-0500-030-MA-MAR  
Date: 20.05.2013  
Revision: -

**BRAKING TORQUE**

The braking torque MB is calculated from the following formulas:

\[
MB = a \times \left( F_B \times D_O \times \mu - F_C - F_r \right) \times \left( A \times 10^{-4} - A_r \times 10^{-4} \right)
\]

Where:
- \(a\) is the number of calipers acting on the disc
- \(F_B\) [N] is the braking force
- \(D_O\) [m] is the disc outer diameter
- \(F_C\) [N] is the clamping force
- \(F_r\) [N] is the piston retraction force
- \(A\) [cm\(^2\)] is the active piston area
- \(A_r\) [cm\(^2\)] is the retraction piston area
- \(P\) [bar] is the hydraulic pressure
- \(P_r\) [bar] is the hydraulic retraction pressure
- \(\mu\) is the coefficient of friction – see values below

The actual braking torque may vary, depending on adjustment of brake and friction coefficient.

**CALCULATION FUNDAMENTALS  Mono Spring (MS) Dual Spring (DS)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mono Spring (MS)</th>
<th>Dual Spring (DS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disc thickness</td>
<td>32-101.6 mm</td>
<td>32-101.6 mm</td>
</tr>
<tr>
<td>Weight of caliper incl. base plate (approx dep. of disc thickness)</td>
<td>910-1000 kg</td>
<td>780 kg</td>
</tr>
<tr>
<td>Overall caliper dimensions (incl. base plate) HxDxW</td>
<td>930x637x431(+C) mm</td>
<td>698x530x351(+C) mm</td>
</tr>
<tr>
<td>Overall caliper dimensions (excl. base plate) HxDxW</td>
<td>698x530x533(+C) mm</td>
<td>698x530x533(+C) mm</td>
</tr>
<tr>
<td>Pad width</td>
<td>200 mm</td>
<td>200 mm</td>
</tr>
<tr>
<td>Pad friction area (organic)</td>
<td>110,000 mm(^2)</td>
<td>110,000 mm(^2)</td>
</tr>
<tr>
<td>Max. wear of pad</td>
<td>6 mm (*)</td>
<td>8 mm (*)</td>
</tr>
<tr>
<td>Nominal coefficient of friction</td>
<td>(\mu = 0.4)</td>
<td>(\mu = 0.4)</td>
</tr>
<tr>
<td>Total piston area for each caliper half – “A” (active braking)</td>
<td>2x145 cm(^2) = 290 cm(^2)</td>
<td>2x145 cm(^2) = 290 cm(^2)</td>
</tr>
<tr>
<td>Total piston area for each caliper – “A” (active braking)</td>
<td>2x145 cm(^2) = 290 cm(^2)</td>
<td>4x145 cm(^2) = 580 cm(^2)</td>
</tr>
<tr>
<td>Total piston area for each caliper half – “Ar” (retraction)</td>
<td>2x145 cm(^2) = 290 cm(^2)</td>
<td>2x145 cm(^2) = 290 cm(^2)</td>
</tr>
<tr>
<td>Total piston area for each caliper – “Ar” (retraction)</td>
<td>2x145 cm(^2) = 290 cm(^2)</td>
<td>4x145 cm(^2) = 580 cm(^2)</td>
</tr>
<tr>
<td>Fluid volume for each caliper at 1 mm stroke (active braking)</td>
<td>30 cm(^3)</td>
<td>60 cm(^3)</td>
</tr>
<tr>
<td>Fluid volume for each caliper at 3 mm stroke (active braking)</td>
<td>90 cm(^3)</td>
<td>180 cm(^3)</td>
</tr>
<tr>
<td>Fluid volume for each caliper at 1 mm stroke (retraction)</td>
<td>30 cm(^3)</td>
<td>60 cm(^3)</td>
</tr>
<tr>
<td>Fluid volume for each caliper at 3 mm stroke (retraction)</td>
<td>90 cm(^3)</td>
<td>180 cm(^3)</td>
</tr>
<tr>
<td>Actuating time (guide value for calculation)</td>
<td>0.4 sec.</td>
<td>0.4 sec.</td>
</tr>
<tr>
<td>Active pressure connection size (A-port)</td>
<td>G3/8, ISO 228</td>
<td>G3/8, ISO 228</td>
</tr>
<tr>
<td>Retraction connection size (P-port)</td>
<td>G3/8, ISO 228</td>
<td>G3/8, ISO 228</td>
</tr>
<tr>
<td>Drain connection size (L-port)</td>
<td>G1/4, ISO 228</td>
<td>G1/4, ISO 228</td>
</tr>
<tr>
<td>Max operating pressure</td>
<td>15.0 MPa (150 bar)</td>
<td>15.0 MPa (150 bar)</td>
</tr>
<tr>
<td>Recommended pipe size</td>
<td>16/12 mm</td>
<td>16/12 mm</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>from -20 to +70 °C</td>
<td>from -20 to +70 °C</td>
</tr>
</tbody>
</table>

*Contact Svendborg Brakes for temperatures outside this range.*

(C = Brake disc thickness)

(*) On each brake pad
Disc Brake: **BSAH D500 (DOUBLE PISTON) MONO-ACTION**

**Specification**

**BRAKING TORQUE**

The braking torque $M_B$ is calculated from the following formula where:

- $a$ is the number of brakes acting on the disc
- $F_B$ is the braking force [N]
- $D_o$ is the brake disc outer diameter [m]
- $F_c$ is the clamping force [N]
- $F_r$ is the piston retraction force [N]
- $A$ is the active piston area [cm$^2$]
- $A_r$ is the retraction piston area [cm$^2$]
- $P$ is the hydraulic pressure [bar]
- $P_r$ is the hydraulic retraction pressure [bar]
- $\mu$ is the coefficient of friction - see values below

The actual braking torque may vary depending on adjustment of brake and friction coefficient.

$$M_B = a \cdot F_B \cdot \frac{(D_o - 0.2)^2}{2} \text{ [Nm]}$$

**CALCULATION FUNDAMENTALS**

- **MONO-ACTION**
  - Weight of caliper without bracket: Approx. 910-1000 kg
  - Overall dimensions excl. base plate: 698 x 530 x 351 (+C) mm
  - Pad width: 200 mm
  - Pad area: (organic) 110,000 mm$^2$ (*)
  - Max. wear of pad: (organic) 6 mm (*)
  - Nominal coefficient of friction: $\mu = 0.4$
  - Total piston area - each caliper half "A" (active braking): 2 x 145 cm$^2$ = 290 cm$^2$
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  - Volume for each caliper at 1 mm stroke (retraction): 30 cm$^3$
  - Volume for each caliper at 3 mm stroke (retraction): 90 cm$^3$
  - Actuating time (guide value for calculation): 0.4 sec
  - Active pressure connection size (A-port): G3/8, ISO 228
  - Retraction connection size (P-port): G3/8, ISO 228
  - Drain connection size (L-port): G1/4, ISO 228
  - Max. operating pressure $P_{max}$: 15.0 MPa (150 bar)
  - Recommended pipe size: 16/12 mm
  - Operating temperature range - general: from -20°C to +70°C

(For temperatures outside this range contact Svendborg Brakes)
(C = Brake disc thickness)
(*) On each brake pad.
Svendborg Brakes is the global market leader in intelligent braking solutions.
Svendborg Brakes – drum brakes are built in their details and connecting dimensions according to DIN 15435.

All pin joints are furnished with maintenance-free, self-lubricating bearing bushes.

The braking torques are stepless adjustable with a screw and will be read directly on spring tube.

Svendborg Brakes – drum brakes are delivered with aluminium brake shoes and sticked-on brake linings, if not other requested.
Specification

Designation of a drum brake Ø 400 for brake lifter Ed 80/6:
SB – Drum brake 400-80/6 NO 18735

1) Settings in accordance with the optimal nominal running parameters of the thruster. Other settings on request.

Application with other lifting devices by order agreed.
SB – Brake shoes see NO 18800
SB – Brake linings see NO 18812
Electro-Hydraulic Brake: LIFTING Devices 18830

Specification

Designation of an electro-hydraulic brake lifting device with three phase alternating current design (Ed) with a nominal lifting force of 220 N, a stroke B of 50 mm, with countersunk valve S for operating voltage 3 AC 50 Hz 500 V:

<table>
<thead>
<tr>
<th>Nenngröße</th>
<th>Abmessungen - Dimensions (mm)</th>
<th>Stück-</th>
<th>gewicht unit weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed</td>
<td>A B C D E F G H I K L M N O P a b c d e z kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23/5</td>
<td>286 50 34 15 16 25 18 160 80 40 205 16 100 35 55 85 75 15 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30/5</td>
<td>370 60 46 15 16 25 18 160 80 40 205 16 100 35 55 85 75 15 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50/6</td>
<td>435 60 56 18 20 30 23 195 120 60 254 22 - - - -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50/12</td>
<td>510 120 66 18 20 30 23 195 120 60 254 22 - - - -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80/6</td>
<td>450 60 46 15 16 25 18 160 80 40 205 16 100 35 55 85 75 15 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80/12</td>
<td>530 120 66 18 20 30 23 195 120 60 254 22 - - - -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>121/6</td>
<td>645 60 88 25 25 40 25 35 117 240 112 90 40 360 25 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>121/12</td>
<td>705 120 88 25 25 40 25 35 117 240 112 90 40 360 25 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>201/6</td>
<td>845 60 111 25 25 40 25 35 117 240 112 90 40 360 25 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>201/12</td>
<td>705 120 111 25 25 40 25 35 117 240 112 90 40 360 25 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>301/6</td>
<td>945 60 147 35 80 130 120 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>301/12</td>
<td>705 120 147 35 80 130 120 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>301/12</td>
<td>705 120 147 35 80 130 120 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>301/12</td>
<td>705 120 147 35 80 130 120 20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Electro-Hydraulic Brake: LIFTING Devices 18830

**Specification**

<table>
<thead>
<tr>
<th>Nenngröße (size)</th>
<th>Hubkraft (stroke power)</th>
<th>Hubweg (stroke distance)</th>
<th>Hubarbeit (stroke operating)</th>
<th>Bremsfederkraft (c - Feder) (brake spring power)</th>
<th>Leistungs-aufnahme (power input)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 23/5</td>
<td>220</td>
<td>50</td>
<td>1100</td>
<td>180</td>
<td>165</td>
</tr>
<tr>
<td>30/5</td>
<td>300</td>
<td>60</td>
<td>3000</td>
<td>460</td>
<td></td>
</tr>
<tr>
<td>50/6</td>
<td>500</td>
<td>60</td>
<td>6000</td>
<td>-</td>
<td>210</td>
</tr>
<tr>
<td>50/12</td>
<td>120</td>
<td>9000</td>
<td>-</td>
<td>120</td>
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</tr>
<tr>
<td>80/6</td>
<td>800</td>
<td>60</td>
<td>4800</td>
<td>750</td>
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<td>80/12</td>
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<td>9600</td>
<td>-</td>
<td>120</td>
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<tr>
<td>121/6</td>
<td>1250</td>
<td>60</td>
<td>7500</td>
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</tr>
<tr>
<td>121/12</td>
<td>120</td>
<td>15000</td>
<td>-</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>201/6</td>
<td>2000</td>
<td>60</td>
<td>12000</td>
<td>1900</td>
<td>450</td>
</tr>
<tr>
<td>201/12</td>
<td>120</td>
<td>24000</td>
<td>-</td>
<td>1900</td>
<td></td>
</tr>
<tr>
<td>301/6</td>
<td>3000</td>
<td>60</td>
<td>18000</td>
<td>2700</td>
<td>550</td>
</tr>
<tr>
<td>301/12</td>
<td>120</td>
<td>36000</td>
<td>-</td>
<td>2700</td>
<td></td>
</tr>
</tbody>
</table>

**Brake lifting device Ed 23/5–S 50 Hz 500 V–NO 18830**
Electro-Hydraulic Brake: **BRAKE Shoes 18800**

**Specification**

Measuring points for determination of form variation.

Designation of a brake shoe without rivet holes with stuck on brake lining (form C) for brake drum diameter \( d_1 = 500 \text{ mm} \):

\[ \text{SB} - \text{brake shoe C 500 NO 18800 with lining} \]

Name: 18800-MAR  
Date: 24.05.2012  
Revision: A
### Electro-Hydraulic Brake: BRAKE Shoes 18800

**Specification**

1. Admissible deviation of parallelism related to bores d2 and sticking area.
2. Admissible form deviation related to friction area between brake lining and brake drum (with tolerance range h11) related to measuring points n, o, p and n’, o’, p’.
3. SB – Brake lining according to NO 18812 respectively by choice of purchaser.

Material: Aluminium – sand-casting

SB – Drum brakes see NO 18735

**Calculation Fundamentals**

<table>
<thead>
<tr>
<th>Nenngröße (size)</th>
<th>Abmessungen - Dimensions (mm)</th>
<th>Stückgewicht (unit weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>d₁, b₂, c, d₂/r, e, f₁, f₂, g₁</td>
<td>gₑ, mₑₑ, n-p, n’-p’ᵃ, kg</td>
</tr>
<tr>
<td>200</td>
<td>70, 8, 20, 140, 65, 35, 32</td>
<td>0,1, 24, 17, 0,15, 0,5</td>
</tr>
<tr>
<td>250</td>
<td>90, 8, 25, 170, 80, 40, 37</td>
<td>0,1, 29, 22, 0,15, 0,8</td>
</tr>
<tr>
<td>315</td>
<td>110, 10, 30, 212, 100, 50, 44,5</td>
<td>0,1, 34, 25, 1,4</td>
</tr>
<tr>
<td>400</td>
<td>140, 10, 35, 260, 125, 62, 50</td>
<td>0,15, 40, 30, 0,2, 2,1</td>
</tr>
<tr>
<td>500</td>
<td>180, 12, 40, 320, 160, 80, 58</td>
<td>0,15, 46, 33, 3,8</td>
</tr>
<tr>
<td>630</td>
<td>225, 12, 45, 390, 200, 100, 63</td>
<td>0,2, 51, 38, 0,3, 5,5</td>
</tr>
<tr>
<td>710</td>
<td>255, 15, 50, 440, 224, 112, 70</td>
<td>0,2, 56, 40, 8,2</td>
</tr>
</tbody>
</table>
Notes:
Svendborg Brakes is the global market leader in intelligent braking solutions. This is why.
Example for a Direct Drive Wind Turbine

Specification

Combined hydraulic power unit for active rotor brake and rotor lock control

Stand alone hydraulic power unit for yaw brake control
Example for a Direct Drive Wind Turbine

**Specification**

**SYSTEM CIRCUIT**

The electrical motor drives a hydraulic gearpump. The Pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The System pressure can be released manually by shut-off cock or manual override of the valves. A High pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. A Certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

- fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- delay time according to customer demands
- pressure switch or transmitter for brake status control
- flushing function with filter in return line
- adjustable pressure for rotor lock
- 4/3 valve for rotor lock control is protected by additional 2/2 valves
- 24h / 7 days pressure holding capacity
- ‘cylinder holding function’ included

**ROTOR BRAKE CIRCUIT:**

Combined hydraulic power unit for active rotor brakes and rotor lock control 1010-0124-8XX

**GENERAL FEATURES:**
- compact and cost efficient design mounted on 20 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

**OPTIONAL FEATURES:**
- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V electrical motor
- 60Hz
- Handpump
- pressure guage for visual inspection

**ROTOR LOCK CIRCUIT:**

Combined hydraulic power unit for active rotor brakes and rotor lock control 1010-0124-8XX

**GENERAL FEATURES:**
- compact and cost efficient design mounted on 20 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

**OPTIONAL FEATURES:**
- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V electrical motor
- 60Hz
- Handpump
- pressure guage for visual inspection

Example for a Direct Drive Wind Turbine

Combined hydraulic power unit for active rotor brakes and rotor lock control 1010-0124-8XX

**GENERAL FEATURES:**
- compact and cost efficient design mounted on 20 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

**OPTIONAL FEATURES:**
- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V electrical motor
- 60Hz
- Handpump
- pressure guage for visual inspection

Example for a Direct Drive Wind Turbine
Functions:

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The Pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The System pressure can be released manually by cock or a manual override of the valves. A High pressure filter between the pump and the system ensures cleanliness of the hydraulic system. A Certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

-_yaw brakes with 3 pressure levels, i.e.
  - 160 bar for holding function
  - 30 bar for slewing
  - 0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

YAW BRAKE CIRCUIT:

Specification

Stand-alone hydraulic power unit for yaw brakes control
1010-0084-8XX

GENERAL FEATURES:
- compact and cost efficient design
- mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:
- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- pressure guage for visual inspection

www.svendborg-brakes.com

P-7575-SV-A4  3/18
Example for a Direct Drive Wind Turbine

Specification

Combined hydraulic power unit for active rotor brake and yaw brake control
SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The Pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulical system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

- fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

ROTOR BRAKE CIRCUIT:

- yaw brakes with 3 pressure levels, i.e.
  - 160 bar for holding function
  - 30 bar for yaw operation
  - 0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

GENERAL FEATURES:

- compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:

- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- Pressure gauge for visual inspection

YAW BRAKE CIRCUIT:

Combined hydraulic power unit for active rotor brakes of BSAB series and yaw brake control

1010-0099-8XX

TYPICAL APPLICATION:

- hydraulic Power pack for gearless turbines.

Example for a Direct Drive Wind Turbine
Example for a Direct Drive Wind Turbine

Specification

Stand alone hydraulic power unit for yaw brake control
SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or by manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on the system accumulator for checking the nitrogen pre-charge.

- yaw brakes with 3 pressure levels, i.e.
  1) 160 bar for holding function
  2) 30 bar for yaw operation
  3) 0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

YAW BRAKE CIRCUIT

Stand-alone hydraulic power unit for yaw brakes control
1010-0084-8XX

GENERAL FEATURES:
- compact and cost efficient design
- mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:
- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- pressure gauge for visual inspection

Example for a Direct Drive Wind Turbine
Example for a Conventional Wind Turbine

Combined hydraulic power unit for active rotor brake and yaw brake control
Example for a Conventional Wind Turbine

**SYSTEM CIRCUIT**

The electrical motor drives a hydraulic gear pump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

- Fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- Delay time according to customer demands
- Pressure switch or transmitter for brake status control

**ROTOR BRAKE CIRCUIT:**

- Yaw brakes with 3 pressure levels, i.e.
  - 160 bar for holding function
  - 30 bar for yaw operation
  - 0 bar for cable loop unwinding operation
- Flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- Pressure switch or transmitter for brake status control

**YAW BRAKE CIRCUIT:**

Combined hydraulic power unit for active rotor brakes and yaw brake control

1010-0139-8XX

**GENERAL FEATURES:**

- Compact and cost efficient design mounted on 10 liter tank
- 2/2 seat valve technology, leak oil free
- Sub components from qualified suppliers
- Universal manifold
- Robust asynchronous 400V/50Hz el. motor
- Oil level + temperature control

**OPTIONAL FEATURES:**

- UL approved electrical components
- Drip pan
- Electrical cabinet
- Customer specific electrical plug connection
- Cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- Pressure gauge for visual inspection
Notes:

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Example for a Conventional Wind Turbine

Specification

Stand alone hydraulic power unit for active rotor brake control

Combined hydraulic power unit for yaw brake and rotor lock control

www.svendborg-brakes.com
**Example for a Conventional Wind Turbine**

**Specification**

**SYSTEM CIRCUIT**

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures cleanliness of hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

- adjustable pressure for rotor lock
- 4/3 valve for rotor lock control is protected by additional 2/2 valves
- 24h / 7 days pressure holding capacity
- ‘cylinder holding function’ included

**ROTOR LOCK CIRCUIT:**

- yaw brakes with 3 pressure levels, i.e. 160 bar for holding function, 30 bar for yaw operation, 0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

**YAW BRAKE CIRCUIT:**

Combined hydraulic power unit for yaw brake and rotor lock control

1010-0124-802

**GENERAL FEATURES:**

- compact and cost efficient design
- mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

**OPTIONAL FEATURES:**

- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- handpump
- pressure gauge for visual inspection

![Diagram of hydraulic system](image)
Example for a Conventional Wind Turbine

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gear pump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

- fail safe brake activation or idling function in case of power loss
- 2 modes of brake activation, with and without delay
- 2 step braking torque, i.e. reduced torque for braking, full torque for holding function
- 24h / 7 days pressure holding capacity
- delay time according to customer demands
- pressure switch or transmitter for brake status control

ROTOR BRAKE CIRCUIT

Stand-alone hydraulic power unit for active rotor brakes (on hss)

1010-006X-8XX

GENERAL FEATURES:
- compact and cost efficient design
- mounted on 3 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:
- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- pressure gauge for visual inspection
Example for a Compact Drive Wind Turbine

Specification

Combined hydraulic power unit for rotor lock and roof hatch control

Combined hydraulic power unit for yaw brake and rotor brake control
Example for a Compact Drive Wind Turbine

**Specification**

**SYSTEM CIRCUIT**

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or by manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures.

- adjustable pressure for rotor lock
- 4/3 valve for rotor lock control is protected by additional 2/2 valves
- 24h / 7 days pressure holding capacity
- ‘cylinder holding function’ included
- over pressure protection with pressure relief valves
- manual activation of the valve or via remote control
- ‘Auto-Rolo’ capable

**ROTOR LOCK CIRCUIT:**

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or by manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures.

- adjustable pressure for rotor lock
- 4/3 valve for rotor lock control is protected by additional 2/2 valves
- 24h / 7 days pressure holding capacity
- ‘cylinder holding function’ included
- over pressure protection with pressure relief valves
- manual activation of the valve or via remote control
- ‘Auto-Rolo’ capable

- hyd. cylinder for hatches can be operated separately
- adjustable pressure
- manual activation of the valves or via remote control

**TYPICAL APPLICATION:**

- Service hydraulic for multi-megawatt turbines

**GENERAL FEATURES:**

- compact and cost efficient design
- mounted on 25 liter tank
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

**OPTIONAL FEATURES:**

- UL-approved electrical components
- drip pan
- electrical cabinet
- remote control operating panel
- customer specific electrical plugconnection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- pressure gauge for visual inspection

**Combined hydraulic power unit for activating rotor locks and roof hatch control**

1110-0002-8XX
The electrical motor drives a hydraulic gear pump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

- fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

- yaw brakes with 3 pressure levels, i.e.
  1) 160 bar for holding function
  2) 30 bar for yaw operation
  3) 0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

**SYSTEM CIRCUIT**

**GENERAL FEATURES:**
- compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universe manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

**OPTIONAL FEATURES:**
- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- Pressure gauge for visual inspection

**Specification**

Combined hydraulic power unit for active rotor brakes of BSAB series and yaw brake control 1010-0099-8XX

**GENERAL FEATURES:**
- compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universe manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

**OPTIONAL FEATURES:**
- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- Pressure gauge for visual inspection

**Example for a Compact Drive Wind Turbine**
Example for a Compact Drive Wind Turbine

Specification

Stand alone hydraulic power unit for active rotor lock control

Combined hydraulic power unit for yaw brake and rotor brake control
Example for a Compact Drive Wind Turbine

Specification

SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by shut-off cock or manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

- fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

CIRCUIT:

COMBINED HYDRAULIC POWER UNIT FOR ACTIVE ROTOR BRAKES OF BSAB SERIES AND YAW BRAKE CONTROL

1010-0099-8XX

GENERAL FEATURES:
- compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universal manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:
- UL-approved electrical components
- drip pan
- electrical cabinet
- customer specific electrical plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- Pressure gauge for visual inspection connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- pressure gauge for visual inspection

ROTOR BRAKE CIRCUIT:

- yaw brakes with 3 pressure levels, i.e.
  160 bar for holding function
  30 bar for yaw operation
  0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control

YAW BRAKE CIRCUIT:

- yaw brakes with 3 pressure levels, i.e.
  160 bar for holding function
  30 bar for yaw operation
  0 bar for cable loop unwinding operation
- flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- pressure switch or transmitter for brake status control
**SYSTEM CIRCUIT**

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or by manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures.

- Control valve is protected by additional 2/2 valve
- 24h / 7 days pressure holding capacity
- ‘cylinder holding function’ included
- Manual activation of the valve or via remote control

**REGISTER LOCK CIRCUIT:**

**Specification**

Stand-alone hydraulic power unit for rotor lock control

1110-0012-8XX

**TYPICAL APPLICATION:**

- Service hydraulic for multi-megawatt turbines

**GENERAL FEATURES:**

- Compact and cost efficient design mounted on 20 liter tank
- Sub components from qualified suppliers
- Universal manifold
- Robust asynchronous 400V/50Hz el. motor
- Oil level + temperature control

**OPTIONAL FEATURES:**

- UL-approved electrical components
- Drip pan
- Electrical cabinet
- Remote control operating panel
- Customer specific electrical plug connection
- Cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- Pressure gauge for visual inspection

Example for a Compact Drive Wind Turbine
Notes:

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Example for a Compact Drive Wind Turbine

**Specification**

Combined hydraulic power unit for active rotor lock and rotor brake control

Stand alone hydraulic power unit for yaw brake control
Example for a Compact Drive Wind Turbine

### Specification

#### SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. The pump feeds the system accumulator, controlled by a pressure switch or a transmitter. The system pressure can be released manually by a shut-off cock or by manual override of valves. The high pressure filter between the pump and the system ensures the cleanliness of the hydraulic system. The certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on the system accumulator for checking the nitrogen pre-charge.

- Yaw brakes with 3 pressure levels, i.e.
  - 160 bar for holding function
  - 30 bar for yaw operation
  - 0 bar for cable loop unwinding operation
- Flushing function with filter in return line
- 24h / 7 days pressure holding capacity
- Pressure switch or transmitter for brake status control

#### YAW BRAKE CIRCUIT:

Stand-alone hydraulic power unit for yaw brakes control

1010-0084-8XX

#### GENERAL FEATURES:

- Compact and cost efficient design mounted on 6 liter tank
- 2/2 seat valve technology, leak oil free
- Sub components from qualified suppliers
- Universal manifold
- Robust asynchronous 400V/50Hz el. motor
- Oil level + temperature control

#### OPTIONAL FEATURES:

- UL-approved electrical components
- Drip pan
- Electrical cabinet
- Customer specific electrical plug connection
- Cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- Pressure gauge for visual inspection
SYSTEM CIRCUIT

The electrical motor drives a hydraulic gearpump. Pump feeds the system accumulator, controlled by pressure switch or transmitter. System pressure can be released manually by cock or manual override on valves. High pressure filter between pump and system ensures cleanliness of hyd. system. Certified pressure control valve ensures pressure relief in case of control failures. Optional transmitter on system accumulator for checking the nitrogen pre-charge.

- fail safe brake activation or idling function in case of power loss
- 24h / 7 days pressure holding capacity
- delay time according to customer demands
- pressure switch or transmitter for brake status control
- flushing function with filter in return line

- adjustable pressure for rotor lock
- 4/3 valve for rotor lock control is protected by additional 2/2 valves
- 24h / 7 days pressure holding capacity
- ‘cylinder holding function’ included

ROTOR BRAKE CIRCUIT:

Combined hydraulic power unit for active rotor brakes and rotor lock control
1010-0124-804

GENERAL FEATURES:
- compact and cost efficient design mounted on 20 liter tank
- 2/2 seat valve technology, leak oil free
- sub components from qualified suppliers
- universe manifold
- robust asynchronous 400V/50Hz el. motor
- oil level + temperature control

OPTIONAL FEATURES:
- UL el. components
- drip pan
- el. cabinet
- customer specific el. plug connection
- cold climate version
- 690 V el. motor
- 60Hz
- Handpump
- manometer for visual inspection

ROTOR LOCK CIRCUIT:

Example for a Compact Drive Wind Turbine
OTHER PRODUCT SOLUTIONS FROM
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Our comprehensive product offerings include various types of clutches and brakes, overrunning clutches, engineered bearing assemblies, gearing and gear motors along with linear products, belted drives, couplings and limit switches. With thousands of product solutions available, Altra provides true single source convenience while meeting specific customer requirements. Many major OEMs and end users prefer Altra products as their No. 1 choice for performance and reliability.

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Guardian Couplings
Huco
Lamiflex Couplings
Stromag
TB Wood’s

GEAR DRIVES
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Huco

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Stromag

OVERRUNNING CLUTCHES
Formsprag Clutch
Marland Clutch
Stieber

ELECTRIC CLUTCHES AND BRAKES
Inertia Dynamics
Matrix
Stromag
Warner Electric

HEAVY DUTY CLUTCHES AND BRakes
Industrial Clutch
Stromag
Svendborg Brakes
Twiflex
Wichita Clutch

ENGINEERED COUPLINGS AND UNIVERSAL JOINTS
Ameridrives
Bibby Turboflex
Guardian Couplings
Huco
Lamiflex Couplings
Stromag
TB Wood’s

GEAR DRIVES
Bauer Gear Motor
Boston Gear
Delroyd Worm Gear
Nuttall Gear

POWER TRANSMISSION COMPONENTS
LINEAR ACTUATORS AND CONTROLS
Warner Linear

ENGINEERED BEARING ASSEMBLIES
Kilian

AIR MOTORS
Huco

BELTED DRIVES AND SHEAVES
TB Wood’s

GEARED CAM LIMIT SWITCHES
Stromag

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