**Introduction**

When speed of an inverter-controlled ac motor is reduced, the motor acts as a generator, feeding back energy to the frequency converter. As a result, voltage in the intermediate circuit of the inverter increases. When a specific threshold is exceeded, the energy must flow to an external braking system in order to avoid drive failures. Braking resistors are designed to absorb such energy and to dissipate it into heating. The use of brake resistors allows drives to fulfil the requirements of particularly severe duty cycles, for example those featured by frequent braking, long lasting braking or impulsive braking.

**Bonfiglioli resistors**

Bonfiglioli Vectron offers a wide range of safe and compact braking resistors with IP20 degree of protection: “BR series”. BR series are designed for panel mounting. Mostly, they are equipped with built-in thermal protection. BR models have been thoroughly tested with Bonfiglioli frequency converters, therefore they can be used together with all Active, Synplus, and VCB models.

<table>
<thead>
<tr>
<th>Drive power supply (V)</th>
<th>Size – Model</th>
<th>Bonfiglioli braking resistor</th>
<th>Resistance, rated power*</th>
<th>Continuous rated power (W)</th>
<th>Max supply voltage (V)</th>
<th>Thermal protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>230</td>
<td>1</td>
<td>BR 160/100</td>
<td>1,6kW 100ohm</td>
<td>160</td>
<td>500</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>BR 432/37</td>
<td>4,3kW 37ohm</td>
<td>432</td>
<td>500</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>BR 667/24</td>
<td>6,7kW 24ohm</td>
<td>667</td>
<td>500</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>BR 1333/12</td>
<td>13,3kW 12ohm</td>
<td>1333</td>
<td>500</td>
<td>Y</td>
</tr>
<tr>
<td>400</td>
<td>2</td>
<td>BR 213/300</td>
<td>2,1kW 300ohm</td>
<td>213</td>
<td>900</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>BR 471/136</td>
<td>4,7kW 136ohm</td>
<td>471</td>
<td>900</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>BR 696/92</td>
<td>6,9kW 92ohm</td>
<td>696</td>
<td>900</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>BR 1330/48</td>
<td>13,3kW 48ohm</td>
<td>1330</td>
<td>900</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>BR 2000/32</td>
<td>20kW 32ohm</td>
<td>2000</td>
<td>900</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>BR 4000/16</td>
<td>40kW 16ohm</td>
<td>4000</td>
<td>900</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>BR 8000/7</td>
<td>80kW 7,5ohm</td>
<td>8000</td>
<td>900</td>
<td>Y</td>
</tr>
</tbody>
</table>

* Rated power is calculated on the basis of intermittent use with a duty cycle of 10%.
Correct selection of a resistor within BR series should take into account the actual braking function of application, both in terms of intensity and of frequency. Bonfiglioli proposes two different approaches for selection:

1. Below charts show easy drive-resistor combinations granting at least 10% duty cycle (with the exception of some sizes in the VCB range). These combinations usually accomplish the needs of the majority of applications.

2. In case of processes requiring “unusual” duty cycles, with heavy or frequent braking, selection should be “tailored” to the application. The Drive Service Center of your Bonfiglioli subsidiary has got qualified staff available to perform a detailed analysis of your application and detect most suitable resistor to meet your requirements.

The charts show recommended matches of Bonfiglioli brake resistors Vs. each drive of the ranges Active, Synplus and VCB. Duty cycles listed in last columns of charts are calculated assuming that resistor is absorbing 100% of drive power. Contact your nearest Bonfiglioli Drive Service Center for any doubt, or in case customization is required.

**ACTIVE Series**

<table>
<thead>
<tr>
<th>kW</th>
<th>Bonfiglioli braking resistor</th>
<th>Duty cycle* at the drive’s rated power</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.55</td>
<td>BR 160/100</td>
<td>29%</td>
</tr>
<tr>
<td>0.75</td>
<td>BR 160/100</td>
<td>21%</td>
</tr>
<tr>
<td>1.1</td>
<td>BR 160/100</td>
<td>15%</td>
</tr>
<tr>
<td>1.5</td>
<td>BR 432/37</td>
<td>29%</td>
</tr>
<tr>
<td>2.2</td>
<td>BR 432/37</td>
<td>20%</td>
</tr>
<tr>
<td>3</td>
<td>BR 432/37</td>
<td>14%</td>
</tr>
<tr>
<td>4</td>
<td>BR 667/24</td>
<td>17%</td>
</tr>
<tr>
<td>5.5</td>
<td>BR 667/24</td>
<td>12%</td>
</tr>
<tr>
<td>7.5</td>
<td>BR 1333/12</td>
<td>18%</td>
</tr>
<tr>
<td>9.2</td>
<td>BR 1333/12</td>
<td>14%</td>
</tr>
<tr>
<td>0.55</td>
<td>BR 213/300</td>
<td>39%</td>
</tr>
<tr>
<td>0.75</td>
<td>BR 213/300</td>
<td>28%</td>
</tr>
<tr>
<td>1.1</td>
<td>BR 213/300</td>
<td>19%</td>
</tr>
<tr>
<td>1.5</td>
<td>BR 471/136</td>
<td>14%</td>
</tr>
<tr>
<td>1.85</td>
<td>BR 471/136</td>
<td>25%</td>
</tr>
<tr>
<td>2.2</td>
<td>BR 471/136</td>
<td>21%</td>
</tr>
<tr>
<td>3</td>
<td>BR 471/136</td>
<td>16%</td>
</tr>
<tr>
<td>4</td>
<td>BR 696/92</td>
<td>17%</td>
</tr>
<tr>
<td>5.5</td>
<td>BR 1330/48</td>
<td>24%</td>
</tr>
<tr>
<td>7.5</td>
<td>BR 1330/48</td>
<td>18%</td>
</tr>
<tr>
<td>9.2</td>
<td>BR 1330/48</td>
<td>14%</td>
</tr>
<tr>
<td>11</td>
<td>BR 2000/32</td>
<td>18%</td>
</tr>
<tr>
<td>15</td>
<td>BR 2000/32</td>
<td>13%</td>
</tr>
<tr>
<td>18.5</td>
<td>BR 4000/16</td>
<td>22%</td>
</tr>
<tr>
<td>22</td>
<td>BR 4000/16</td>
<td>18%</td>
</tr>
<tr>
<td>30</td>
<td>BR 4000/16</td>
<td>13%</td>
</tr>
<tr>
<td>37</td>
<td>BR 8000/7</td>
<td>22%</td>
</tr>
<tr>
<td>45</td>
<td>BR 8000/7</td>
<td>18%</td>
</tr>
<tr>
<td>55</td>
<td>BR 8000/7</td>
<td>15%</td>
</tr>
<tr>
<td>65</td>
<td>BR 8000/7</td>
<td>12%</td>
</tr>
</tbody>
</table>

**SYNPLUS Series**

<table>
<thead>
<tr>
<th>kW</th>
<th>Bonfiglioli braking resistor</th>
<th>Duty cycle* at the drive’s rated power</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4</td>
<td>BR 160/100</td>
<td>40%</td>
</tr>
<tr>
<td>0.75</td>
<td>BR 160/100</td>
<td>21%</td>
</tr>
<tr>
<td>1.1</td>
<td>BR 160/100</td>
<td>11%</td>
</tr>
<tr>
<td>1.5</td>
<td>BR 432/37</td>
<td>20%</td>
</tr>
<tr>
<td>0.75</td>
<td>BR 213/300</td>
<td>28%</td>
</tr>
<tr>
<td>1.5</td>
<td>BR 213/300</td>
<td>14%</td>
</tr>
<tr>
<td>2.2</td>
<td>BR 471/136</td>
<td>21%</td>
</tr>
<tr>
<td>3.7</td>
<td>BR 696/92</td>
<td>19%</td>
</tr>
<tr>
<td>5.5</td>
<td>BR 696/92</td>
<td>13%</td>
</tr>
<tr>
<td>7.5</td>
<td>BR 1330/48</td>
<td>18%</td>
</tr>
<tr>
<td>11</td>
<td>BR 2000/32</td>
<td>18%</td>
</tr>
</tbody>
</table>

**VCB 400 Series**

<table>
<thead>
<tr>
<th>kW</th>
<th>Bonfiglioli braking resistor</th>
<th>Duty cycle* at the drive’s rated power</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>BR 4000/16</td>
<td>13%</td>
</tr>
<tr>
<td>37</td>
<td>BR 4000/16</td>
<td>11%</td>
</tr>
<tr>
<td>45</td>
<td>BR 4000/16</td>
<td>9%</td>
</tr>
<tr>
<td>55</td>
<td>BR 4000/16</td>
<td>7%</td>
</tr>
<tr>
<td>65</td>
<td>BR 4000/16</td>
<td>6%</td>
</tr>
<tr>
<td>75</td>
<td>BR 8000/7</td>
<td>11%</td>
</tr>
<tr>
<td>90</td>
<td>BR 8000/7</td>
<td>9%</td>
</tr>
<tr>
<td>110</td>
<td>2x BR 8000/7</td>
<td>15%</td>
</tr>
<tr>
<td>132</td>
<td>2x BR 8000/7</td>
<td>12%</td>
</tr>
</tbody>
</table>

* The duty cycle refers to a period of 120 seconds.
**Bonfiglioli braking resistor**

<table>
<thead>
<tr>
<th>Size</th>
<th>Dimensions</th>
<th>Fixing holes</th>
<th>Cable section</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR 160/100</td>
<td>B1</td>
<td>21</td>
<td>210</td>
<td>B2</td>
</tr>
<tr>
<td>BR 432/37</td>
<td>1</td>
<td>30</td>
<td>200</td>
<td>70</td>
</tr>
<tr>
<td>BR 667/24</td>
<td>4</td>
<td>40</td>
<td>215</td>
<td>70</td>
</tr>
<tr>
<td>BR 1333/12</td>
<td>5</td>
<td>50</td>
<td>225</td>
<td>165</td>
</tr>
<tr>
<td>BR 213/300</td>
<td>2</td>
<td>60</td>
<td>235</td>
<td>70</td>
</tr>
<tr>
<td>BR 471/136</td>
<td>3</td>
<td>70</td>
<td>245</td>
<td>70</td>
</tr>
<tr>
<td>BR 696/92</td>
<td>4</td>
<td>80</td>
<td>255</td>
<td>70</td>
</tr>
<tr>
<td>BR 1330/48</td>
<td>5</td>
<td>90</td>
<td>265</td>
<td>165</td>
</tr>
<tr>
<td>BR 2000/32</td>
<td>6</td>
<td>100</td>
<td>275</td>
<td>165</td>
</tr>
<tr>
<td>BR 4000/16</td>
<td>7</td>
<td>110</td>
<td>285</td>
<td>165</td>
</tr>
<tr>
<td>BR 8000/7</td>
<td>8</td>
<td>120</td>
<td>295</td>
<td>165</td>
</tr>
</tbody>
</table>

**Note:** For more detailed information please contact your nearest Bonfiglioli Vectron Drive Service Centre.