How to calculate the power of capacitors (continued)

CAPACITOR POWER CALCULATION TABLE

> Conversion table

Based on the power of a receiver in kW, this table can be used to calculate the power of the capacitors to change from an initial power factor to a required power factor. It also gives the equivalence between $\cos \phi$ and $\tan \phi$.

<table>
<thead>
<tr>
<th>Final power factor</th>
<th>Capacitor power in kVAR to be installed per kW of load to increase the power factor to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\cos \phi$</td>
<td>0.90</td>
</tr>
<tr>
<td>0.90</td>
<td>0.48</td>
</tr>
<tr>
<td>0.91</td>
<td>1.805</td>
</tr>
<tr>
<td>0.92</td>
<td>2.12</td>
</tr>
<tr>
<td>0.93</td>
<td>2.161</td>
</tr>
<tr>
<td>0.94</td>
<td>2.173</td>
</tr>
<tr>
<td>0.95</td>
<td>2.180</td>
</tr>
<tr>
<td>0.96</td>
<td>2.185</td>
</tr>
<tr>
<td>0.97</td>
<td>2.190</td>
</tr>
<tr>
<td>0.98</td>
<td>2.198</td>
</tr>
<tr>
<td>0.99</td>
<td>2.208</td>
</tr>
</tbody>
</table>

Example: 200 kW motor - $\cos \phi = 0.75$ - required $\cos \phi = 0.93$ - Qc = 200 x 0.487 = 98 kVAR

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ALPES-TECH-EP2
The table below gives, for information purposes only, the maximum power of the capacitor that can be connected directly to the terminals of an asynchronous motor with no risk of self-excitation. It will be necessary to check in all cases that the maximum current of the capacitor does not exceed 90% of the magnetising current (off-load) of the motor.

If the capacitor power required to compensate the motor is greater than the values given in the above table or if, more generally: \( Q_c > 90\% I_o \sqrt{3} U \), compensation at the motor terminals will however remain possible by inserting a contactor [C.2], controlled by an auxiliary contact of the motor contactor [C.1], in series with the capacitor.

<table>
<thead>
<tr>
<th>HP</th>
<th>kW</th>
<th>3000 Max. power in kVAR</th>
<th>1500</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>11</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>15</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>25</td>
<td>18</td>
<td>5</td>
<td>7</td>
<td>7.5</td>
</tr>
<tr>
<td>30</td>
<td>22</td>
<td>6</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>40</td>
<td>30</td>
<td>7.5</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>50</td>
<td>37</td>
<td>9</td>
<td>11</td>
<td>12.5</td>
</tr>
<tr>
<td>60</td>
<td>45</td>
<td>11</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>100</td>
<td>75</td>
<td>17</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td>150</td>
<td>110</td>
<td>24</td>
<td>29</td>
<td>33</td>
</tr>
<tr>
<td>180</td>
<td>132</td>
<td>31</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>218</td>
<td>160</td>
<td>35</td>
<td>41</td>
<td>44</td>
</tr>
<tr>
<td>274</td>
<td>200</td>
<td>43</td>
<td>47</td>
<td>53</td>
</tr>
<tr>
<td>340</td>
<td>250</td>
<td>52</td>
<td>57</td>
<td>63</td>
</tr>
<tr>
<td>380</td>
<td>280</td>
<td>57</td>
<td>63</td>
<td>70</td>
</tr>
<tr>
<td>482</td>
<td>355</td>
<td>67</td>
<td>76</td>
<td>86</td>
</tr>
</tbody>
</table>

Io: motor off-load current  
U: supply voltage
How to calculate the power of capacitors (continued)

When defining a reactive energy compensation installation, it is advisable to provide a fixed capacitor corresponding to the internal reactive consumption of the transformer at 75% load.

In order to operate correctly, a transformer requires internal reactive energy to magnetise its windings. The table opposite gives, for information purposes only, the value of the fixed capacitor bank to be installed according to the powers and loads of the transformer. These values may change, depending on the technology of the device. Each manufacturer can provide their own precise values.

<table>
<thead>
<tr>
<th>Nominal power of the transformer kVA</th>
<th>KVAR power to be provided for the internal consumption of the transformer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operation</td>
</tr>
<tr>
<td></td>
<td>off-load</td>
</tr>
<tr>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>160</td>
<td>4</td>
</tr>
<tr>
<td>200</td>
<td>4</td>
</tr>
<tr>
<td>250</td>
<td>5</td>
</tr>
<tr>
<td>315</td>
<td>6</td>
</tr>
<tr>
<td>400</td>
<td>8</td>
</tr>
<tr>
<td>500</td>
<td>10</td>
</tr>
<tr>
<td>630</td>
<td>12</td>
</tr>
<tr>
<td>800</td>
<td>20</td>
</tr>
<tr>
<td>1000</td>
<td>25</td>
</tr>
<tr>
<td>1250</td>
<td>30</td>
</tr>
<tr>
<td>2000</td>
<td>50</td>
</tr>
<tr>
<td>2500</td>
<td>60</td>
</tr>
<tr>
<td>3150</td>
<td>90</td>
</tr>
<tr>
<td>4000</td>
<td>160</td>
</tr>
<tr>
<td>5000</td>
<td>200</td>
</tr>
</tbody>
</table>