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Cold mounting of bearings
Incorrect mounting can lead to damages and to an early breakdown of the bearing. Reasons for this can be:

- Damages caused during the mounting process
- Wrong tolerances of the bearing carrier on the shaft or inside the housing
- Loosening of the locknut during operation
- Burrs and damages on the shaft and the housing seats and shoulders

Interference fits - cylindrical bearing shaft
For most bearings either the inner or the outer ring (in certain cases even both) are mounted onto the shaft or into the housing with an interference fit. Please review the documentation of the bearing manufacturer for information.

Improper mounting
During cold mounting of a roller bearing, it must be made sure that the mounting forces are always applied to the ring with the interference fit. Mounting forces should never go through the rolling elements.

- The raceway can be damaged by application of force on the wrong bearing ring.

Proper mounting
The danger of damaging raceways can be minimised by the use of the specifically designed simatool fitting tools (FT 33, MK 10-30).

- Raceway damages can be prevented with the correct tools.

Bearing Fitting Tool FT 33
Minimised danger of damaging the bearing
The simatool bearing fitting tools are designed for the fast, precise and secure mounting of bearings with bore diameters from 10 to 50mm. The right combination of impact rings and impact sleeves makes sure that the mounting forces never go through the rolling elements of a bearing.

- Impact rings are made of extremely shock-resistant material
- Even power transmission to the bearing rings due to the special construction of the impact rings
- Nylon double-sided hammer head prevents damage of the bearings effectively
- Also suitable for the fitting of bushings, seals, pulleys, etc.
- Suitable for a wide range of bearing sizes
- Impact rings and impact sleeves are also available individually
- Blow-back proof hammer FT 33-H included
- No mechanical damage of the bearing during the cold mounting process

Fitting tools for bearings and seals
Fitting Tool FT 33
### Selection table Fitting Tool FT 33

#### Table

<table>
<thead>
<tr>
<th>d / D</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 / 26</td>
<td>6000</td>
<td>129</td>
<td>2200</td>
</tr>
<tr>
<td>10 / 30</td>
<td>6200</td>
<td>1200</td>
<td>2300</td>
</tr>
<tr>
<td>10 / 35</td>
<td>6300</td>
<td>1300</td>
<td></td>
</tr>
<tr>
<td>12 / 28</td>
<td>6001</td>
<td>1201</td>
<td></td>
</tr>
<tr>
<td>12 / 32</td>
<td>6001</td>
<td>1201</td>
<td>2201</td>
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<td>12 / 37</td>
<td>6301</td>
<td>1301</td>
<td>2301</td>
</tr>
<tr>
<td>15 / 32</td>
<td>6002</td>
<td>1202</td>
<td>2202</td>
</tr>
<tr>
<td>15 / 35</td>
<td>6202</td>
<td>1302</td>
<td></td>
</tr>
<tr>
<td>15 / 42</td>
<td>6302</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 / 35</td>
<td>6003</td>
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<td>2203</td>
</tr>
<tr>
<td>17 / 40</td>
<td>6303</td>
<td>1303</td>
<td></td>
</tr>
</tbody>
</table>

#### Notes

- *outer ring fitting only
- **inner ring fitting only
Maintenance Kit MK 10-30

Universal tool kit for the easy and quick mounting and dismounting of bearings

With the MK10-30 Maintenance-Kit, grützner introduces a new tool kit, which is especially designed for users of smaller bearings, such as car and motorcycle shops, service plants for electro motors or maintenance companies. The Maintenance-Kit MK 10-30 consists of a total of 50 components. It enables a quick, precise and secure mounting and dismounting of most common bearings with a bore diameter from 10 to 30 mm. For mounting, a multifunctional fitting tool with impact sleeve and impact rings is included, which is suitable for the mounting of bearings as well as bushings, sealings, belt pulleys or similar products.

For dismounting, a three-armed bearing puller is included. With the five attached puller arm sets, the puller even fits bearings with a bore diameter up to 85 mm.

The bearing puller is suitable for deep groove ball bearings with an interference fit on both rings or on the outer-ring without a shaft. All parts are neatly arranged in a display case. A selection table for the choice of the correct tool and a pictured instruction sheet are displayed in the case as well.

Dismounting tool benefits
- Power transmission onto the bearing by the use of hinged puller arms
- User friendly elastic locking ring, that keeps the puller arms in position
- All arms are clearly marked on each leg with their size
- Puller arms are made of high quality steel

Fitting tool benefits
- Impact damages to bearings are prevented effectively
- Impact rings are made of shock-resistant acetal resin, resulting in high mechanical strength
- Blow-back proof hammer with an impact surface made of nylon and a fibreglass handle for safe and ergonomic grip

Selection chart MK 10-30
Ball Bearing Puller BP 61

Bearing Puller Tool Kit

Easy dismounting of ball bearings in blind housings

The tool kit BP 61 enables the dismounting of ball bearings in blind housings. It consists of 6 puller arm sets and 2 supporting spindles and is suitable for deep groove ball bearings from 10 to 100 mm shaft diameter.

- 6 puller arm sets and 2 spindles in a display case weighing only 3.2 kg
- Hinged puller arms for power transmission to the bearing
- User-friendly because of the elastic locking ring, which keeps the puller arms in the right position
- Puller arms made of high quality steel
- Selection chart for deep groove ball bearings inside the case

Selection chart BP 61

<table>
<thead>
<tr>
<th>Ball bearing type</th>
<th>puller arm</th>
<th>spindle</th>
</tr>
</thead>
<tbody>
<tr>
<td>60.. 62.. 63.. 64..</td>
<td>BP A1</td>
<td>BP A2 BP M12</td>
</tr>
<tr>
<td>6000 6001 6002 6003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6004 6005 6006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6200 6201 6202 6203</td>
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<td></td>
</tr>
<tr>
<td>6007 6008 6009 6010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6204 6205</td>
<td>6300 6301 6302</td>
<td></td>
</tr>
<tr>
<td>6011 6012 6013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6206 6207 6208 6209</td>
<td>6303 6304 6305</td>
<td></td>
</tr>
<tr>
<td>6014 6015 6016 6017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6210 6211 6212 6213</td>
<td>6306 6307 6403</td>
<td></td>
</tr>
<tr>
<td>6018 6019 6020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6214 6215 6216 6217</td>
<td>6310 6311 6312 6313</td>
<td></td>
</tr>
<tr>
<td>BP A5 BP A6</td>
<td>6404 6405 6406 6407</td>
<td>6408 6409 6410</td>
</tr>
</tbody>
</table>
Seal Puller SP 50

Dismounting rotary shaft seals

The toolkit SP 50 provides a simple method for dismounting rotary shaft seals in a wide variety of applications. It consists of a sliding hammer, 2 extensions and 50 spare screws. With this basic equipment 50 seals can be dismounted.

Process of dismounting:

1. Hit the screw into the seal with 3 impulses.

2. Turn in the screw with 3 turns.

3. Pull the seal out of its original position by 3 impulses into the opposite direction.
Mounting bearings using heat

The force needed to mount a bearing increases considerably with the size of the bearing. If the heat expansion of metals is made use of, bearings or other ring-shaped parts can easily be mounted onto a shaft or into a housing. For the fast warm-up of bearings, you can use an induction heater where a hot oil bath was often used in the past.

Induction Heater

Its function equals that of an electric transformer. With an induction coil, a very high amperage with a low voltage is induced into a ring-shaped workpiece. Thereby, it is heated consistently within minutes. Heat is only induced to the workpiece whereas the heater itself remains at ambient temperature and can be touched without risk at any time. The inductive heating is very efficient, as the workpiece is being heated directly with the inductive flow. Non-metallic parts such as sealings, lubricant and cages are not heated. The advantage is that the cold bearings can be lubricated before mounting. Since inductively heated bearings become magnetised, the simatherm induction heaters are always equipped with a demagnetisation unit. It prevents the bearings from attracting metal particles which could cause long-term damage to the bearing.

Mounting of the heated workpiece

In order to mount a bearing to its seat, a heating temperature of 110 °C (230 °F) is recommended. Higher temperatures are not necessary and must be prohibited. Temperatures higher than 125°C (257°F) can cause structural changes of the bearing material. The bearing temperature must therefore be observed with a temperature probe. Shrink collars or other ring-shaped parts, however, can be heated up to a temperature of about 400 °C (752 °F) with an induction heater.

During mounting hot bearings, clean protective gloves must be worn. The mounted bearing must be pushed along the shaft up to the abutment and held in this position until a tight fit is obtained. For heating of bearings and other ring-shaped workpieces, simatec supplies a wide range of simatherm induction heaters for almost all mounting requirements.
The latest generation of simatherm induction heaters
IH 070 / IH 090 / IH 210

Heating bearings can cost a lot of time and energy, however, with the latest simatherm induction heaters from simatec you can save both. A workpiece of 210 kg (460 lb) can be heated up to a temperature of 110 °C (230°F) in less than 20 minutes. The new generation of induction heaters includes three different sizes. To obtain maximum heating efficiency, the induction coil was transferred to the outside of the heaters housing allowing the bearing to be placed around it. This improvement results in a reduction of the heating time and the power consumption by up to 80%, ultimately saving up to 70% on heating cost. All heaters are provided with the following technical characteristics:

- Four-step power reduction in the range of 20 - 80%. In combination with smaller yokes, smaller bearings can be heated securely at lower power consumption.
- Thermal overheating protection of the induction coil and electronics
- Automatic time and temperature control for the heating of bearings and other ring-shaped metal parts
- Automatic demagnetisation
- Compact construction, modern design
- Light weight
- A range of standard yoke sizes is included with every induction heater

**Induction Heater IH 070**

**simatherm IH 070**
For heating small and medium size bearings with a weight up to 80 kg (176 lb), the IH 070 is the perfect choice.

- Available in two power versions: 230V/50Hz and 110V/60Hz
- Three yokes are included
- Very compact design, 35 kg (77 lb) overall weight including three yokes
- Swivel arm is available as an option
- Other power versions are available on request

**Induction Heater IH 090**

**simatherm IH 090**
For heating small and medium sized bearings with a weight up to 120 kg (260 lb) and for permanent operation, the IH 090 is the best solution.

- Available in the power versions 400V/50Hz and 460V/60 Hz
- Three yokes are included
- Very compact design, 35 kg (77 lb) overall weight including three yokes
- Swivel arm is included
- Fan radiator for permanent operation is included
- Other power versions are available on request
**Induction Heater IH 210**

The IH 210 is a large and exceptionally powerful high end induction heater suitable for workpieces up to 300 kg (660 lb) of weight.

- Available in the power versions 400V/50Hz or 460V/60Hz
- A sliding arm permits easy placement and removal of the bearing
- Two yokes are included
- Compact design, 75 kg (165 lb) overall weight including two yokes
- A fan version IH 210F for permanent operation is available
- Other power versions are available on request

**Induction Heater IH 240**

Fast and safe heating of large workpieces

The simatherm induction heater IH 240 is designed for the heating of large size bearings up to 800 kg (1777 lb) or other large metal components with a weight up to 300 kg (660 lb) (depending on bearing and workpiece geometry and material). The control system is equipped with all operational functions of the smaller heaters.

- Fast heating of extremely large size components, e.g. a bearing of 445 kg (980 lb) weight can be heated up to 110 °C (230°F) in only 10 minutes (temperature at the inner ring)
- Designed for easy transport using a fork lift truck
- Automatic demagnetisation of the workpiece

**Special heaters for large components**

Simatec can also offer custom-made special heaters for large size components. In order to provide a quotation we would need the following information from you:

- Dimensions of the component to be heated (d x D x H)
- Sketch or drawing of the workpiece to be heated
- Weight and material of the workpiece
- Desired heating time
- Available mains voltage
- Stationary or mobile use
**Induction Heater IH 030**

**Compact and electronically controlled**

Most powerful induction heater in the category for small workpieces up to 30kg (66 lb). Thousands of this reliable heater are in use around the globe today.

- Available in the power versions 230V/50Hz and 110V/60Hz
- Fast reacting temperature probe for temperature control between 0 - 250°C (32 - 482 ºF)
- Electronic timer (0 - 60 minutes)
- Digital display
- Three yokes are included

**Hot Plate HP 200C**

**Electric hot plate with thermostat-controlled bearing heating**

The electric hot plate HP 200C is especially suitable for heating small bearings or small machine parts. The temperature is infinitely variable from 50°C to 200°C (122°F to 392°F).

- Available in the power versions 230V/50Hz and 110V/60Hz
- Temperature adjustable from 50°C to 200°C (122°F to 392°F)
- Protective cover prevents from contamination of the workpieces during the heating process. Additionally, the parts are heated faster if the cover is closed
- With temperature display
- Contact surface: 380 x 180 mm
## Technical Data of the Induction Heaters

<table>
<thead>
<tr>
<th>Designation</th>
<th>IH 030</th>
<th>IH 070</th>
<th>IH 090</th>
<th>IH 210</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Designation</strong></td>
<td>Heater for small and medium sized workpieces</td>
<td>Heater for small and medium sized workpieces</td>
<td>Heater with fan cooling for permanent operation and small and medium sized workpieces</td>
<td>Heater for big workpieces</td>
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<td><strong>Voltage V/Hz</strong> *</td>
<td>230V/50Hz or 110 V/60 Hz</td>
<td>230 V/50 Hz or 110 V/60 Hz</td>
<td>400 V/50Hz – 460 V/60Hz</td>
<td>400 V/50Hz – 460 V/60Hz</td>
</tr>
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<td><strong>Workpiece</strong></td>
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<tr>
<td>- <strong>maximum weight</strong></td>
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<td>80 kg</td>
<td>120 kg</td>
<td>300 kg</td>
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<tr>
<td>- <strong>bore diameter</strong></td>
<td>20 – 400 mm</td>
<td>20 – 400 mm</td>
<td>20 – 400 mm</td>
<td>60 – 600 mm</td>
</tr>
<tr>
<td><strong>Temperature control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- <strong>range</strong></td>
<td>0 – 250 °C</td>
<td>0 – 250 °C</td>
<td>0 – 250 °C</td>
<td>0 – 250 °C</td>
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<tr>
<td>- <strong>magnetic probe</strong></td>
<td>yes, type J</td>
<td>yes, type K</td>
<td>yes, type K</td>
<td>yes, type J</td>
</tr>
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<td>- <strong>accuracy (electronics)</strong></td>
<td>±3 °C</td>
<td>±3 °C</td>
<td>±3 °C</td>
<td>±3 °C</td>
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<tr>
<td><strong>Time control</strong></td>
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</tr>
<tr>
<td>- <strong>range</strong></td>
<td>0 – 60 minutes</td>
<td>0 – 60 minutes</td>
<td>0 – 60 minutes</td>
<td>0 – 60 minutes</td>
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<td>- <strong>accuracy</strong></td>
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<td>± 0.01 seconds</td>
<td>± 0.01 seconds</td>
<td>± 0.01 seconds</td>
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<td>400 °C</td>
<td>400 °C</td>
<td>400 °C</td>
<td>400 °C</td>
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<td><strong>Thermometer mode</strong></td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
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<td><strong>Bearing temperature mode</strong></td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td><strong>Power reduction</strong></td>
<td>No</td>
<td>4-step / 20-40-60-80 %</td>
<td>4-step / 20-40-60-80 %</td>
<td>4-step / 20-40-60-80 %</td>
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<td>yes</td>
<td>yes</td>
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<td>- <strong>range</strong></td>
<td>&lt;2A/cm</td>
<td>&lt;2A/cm</td>
<td>&lt;2A/cm</td>
<td>&lt;2A/cm</td>
</tr>
<tr>
<td><strong>Can heat sealed bearings</strong></td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td><strong>Can heat pre-greased bearings</strong></td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td><strong>Error guiding codes</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td><strong>Thermal overload protection</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td><strong>Maximum magnetic flux</strong></td>
<td>1,5 T</td>
<td>1,5 T</td>
<td>1,5 T</td>
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<tr>
<td><strong>Control panel</strong></td>
<td>Keyboard with LED-display</td>
<td>Keyboard with LED-display</td>
<td>Keyboard with LED-display</td>
<td>Keyboard with LED-display</td>
</tr>
<tr>
<td><strong>Size of the operating area (WxH)</strong></td>
<td>130 x 95 mm</td>
<td>145 x 205 mm</td>
<td>145 x 205 mm</td>
<td>250 x 250 mm</td>
</tr>
<tr>
<td><strong>Coil diameter</strong></td>
<td>–</td>
<td>115 mm</td>
<td>115 mm</td>
<td>135 mm</td>
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<tr>
<td><strong>Dimensions (WxDxH)</strong></td>
<td>290 x 255 x 255 mm</td>
<td>420 x 280 x 345 mm</td>
<td>420 x 280 x 420 mm</td>
<td>600 x 350 x 420 mm</td>
</tr>
<tr>
<td><strong>Overall weight including yokes</strong></td>
<td>27 kg</td>
<td>35 kg</td>
<td>38 kg</td>
<td>75 kg</td>
</tr>
<tr>
<td><strong>Maximum power consumption</strong></td>
<td>3,7 / 2,2 kVA</td>
<td>3,7 / 2,2 kVA</td>
<td>6,4 kVA / 7,4 kVA</td>
<td>10 kVA / 11.5 kVA</td>
</tr>
<tr>
<td><strong>Number of standard yokes</strong></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
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<tr>
<td><strong>Standard yokes</strong></td>
<td>55 x 55 x 245 mm for bearings with bore diameters of 78mm</td>
<td>55 x 55 x 275 mm for bearings with bore diameters of 78mm</td>
<td>55 x 55 x 275 mm for bearings with bore diameters of 78mm</td>
<td>70 x 70 x 420 mm for bearings with bore diameters of 100mm</td>
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<td>28 x 28 x 240 mm for bearings with bore diameters of 40mm</td>
<td>28 x 28 x 275 mm for bearings with bore diameters of 40mm</td>
<td>28 x 28 x 275 mm for bearings with bore diameters of 40mm</td>
<td>40 x 40 x 420 mm for bearings with bore diameters of 60mm</td>
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<tr>
<td></td>
<td>14 x 14 x 240 mm for bearings with bore diameters of 20mm</td>
<td>14 x 14 x 275 mm for bearings with bore diameters of 20mm</td>
<td>14 x 14 x 275 mm for bearings with bore diameters of 20mm</td>
<td></td>
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<tr>
<td><strong>Core cross section</strong></td>
<td>55 x 55 mm</td>
<td>55 x 55 mm</td>
<td>55 x 55 mm</td>
<td>70 x 70 mm</td>
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<td><strong>Yoke storage</strong></td>
<td>yes</td>
<td>yes, internal</td>
<td>yes, internal</td>
<td>yes, internal</td>
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<tr>
<td><strong>Sliding arm</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Swivel arm</strong></td>
<td>–</td>
<td>optional</td>
<td>yes</td>
<td>–</td>
</tr>
<tr>
<td><strong>Cooling fan</strong></td>
<td>–</td>
<td>no</td>
<td>standard</td>
<td>optional</td>
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<tr>
<td><strong>Housing material</strong></td>
<td>Glass-fibre reinforced polyester</td>
<td>Aluminium</td>
<td>Aluminium</td>
<td>Aluminium</td>
</tr>
</tbody>
</table>

*Other power versions are available on request
### IM 240

**Heater for big and very big workpieces**

- **Voltage Range:**
  - 400 V/50Hz – 460 V/60Hz
  - 500 V/50Hz – 575 V/60Hz

- **Capacity:** up to 800 kg
  - 142 – 850 mm

- **Temperature Range:**
  - 0 – 250 °C
  - ±3 °C

- **Heating Time:**
  - 0 – 60 minutes
  - ± 0,01 seconds

- **Temperature:**
  - 400 °C
  - yes

- **Precision:**
  - yes
  - ± / 50 %

- **Humidity:**
  - yes
  - <2A/cm

- **Magnetization:**
  - yes

- **Type:**
  - Steel

- **Weight:**
  - 300 kg

- **Dimensions:**
  - 330 x 355 mm
  - 186 mm
  - 750 x 400 x 935 mm

- **Power Rating:**
  - 24 kVA / 27.6 kVA
  - 1

- **Additional Feature:**
  - 100 x 100 x 570 mm for bearings with bore diameters of 142mm

- **Optional:**
  - 100 x 100 mm

- **Keyboard with LED-display:**
  - 100 x 100 mm

Subject to change without notice.