The company Hommel + Keller was founded in 1926 by the precision technician Jakob Keller and his business partner Georg Hommel. During the first years of its operation, the company specialised in the development, manufacture and sales of measuring instruments. Already in the early stages, the two founders recognized a considerable demand for knurling tools and knurling wheels and consequently focused increasingly on customer orientated product developments and the brand name ZEUS.

Today, the dominant part of the business continues to be the development of knurling technology, resulting in continued sales through a long-term strategic marketing focus by the company.

Apart from a continuing process of product optimization, providing the user with new and innovative solutions, Hommel + Keller reinforces its service offerings on all markets.

Apart from its core competence in knurling technology, Hommel and Keller’s diversification strategy has led to an expansion of its product portfolio. The product fields marking technology, profile marking technology, wobble broaching and contract manufacture constitute an important part of the company’s activities today.

Hommel + Keller places great emphasis on a strong partnership with its qualified distributors around the world, but also supplies directly to a diversity of industries, such as the high technology industry, the aviation industry or the medical engineering industry.
Our affiliate company „H+K Härte- und Oberflächenotechnik“ has specialised in the treatment of high-quality precision parts. With its full service in electroplating, salt bath and vacuum hardening, H+K offers its customers a professional and economic solution for any requirements in surface treatment and hardening.

Our aim is to offer all our customers an optimal level of product benefits, product advice and customer service.

We therefore place great emphasis on further education and product training programmes, allowing our staff to keep up to date with the newest market developments and technologies.

We are looking forward to a good cooperation with our partners and customers in the future!
Knurling Wheels
Experience the broad product range of high precision ZEUS knurling wheels for form and cut knurling tools.
ZEUS: Customer specific solutions? Rely on us.

Page 16 - 23

Form Knurling Tools
Convince yourself of the superior quality of ZEUS form knurling tools.
ZEUS: For all applications the perfect tool.

Page 24 - 36

Cut Knurling Tools
Discover best results with ZEUS cut knurling tools.
ZEUS: For excellent visual quality knurl profile.

Page 37 - 46

Special Tools
Economize with ZEUS special knurling tools according to your specifications.
ZEUS: Individuality is our strength

Page 47 - 50

Marking Tools
Capture new cost advantages with the innovative ZEUS marking tools.
ZEUS: The best solution for every application.
Order our special product catalogue for ZEUS marking tools today.
Application Examples

Knurling profile (DIN 82)

- RGE 30° milled
- Front knurl RAA
- Form knurl C *
- Marking
- Form knurl HV
- RGE 45° (milled)
- Form knurl E
- Marking
- RAA
- RKV
- RAA (milled)

Knurling tool with knurling wheel (DIN 403)

- Tool 291-...M (AA)
- Tool 311-...RH 45° (KAA)
- Tool 131-...U (Form knurling wheel C) *
- Tool 131-...U (Marking roll)
- Tool 131-...U (Form knurling wheel HE) *
- Tool 241-...M (1 x BL 15°, 1 x BR 15°)
- Tool 131-...U (Form knurling wheel E) *
- Tool 131-...U (Marking roll)
- Tool 312 (KAA)
- Tool 131-...U (KE)
- Tool 231-...R (BR30°)

Note: Knurling wheels marked with * are not standardized
**Knurling Techniques**

- **Form Knurling**
  - Without swarf removal

- **Cut Knurling**
  - Swarf removal

  - **Plunge Knurling**
    - Radial / tangential tool direction

  - **Feed Knurling**
    - Axial tool direction

  - **Plunge and Feed Knurling**
    - Radial and axial tool direction

  - **Feed Knurling**
    - Axial tool direction
## Knurling Techniques Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Form Knurling</th>
<th>Cut Knurling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application</strong></td>
<td>• Processing of cold deformable material</td>
<td>• Suitable for all materials</td>
</tr>
<tr>
<td></td>
<td>• Form knurling of thin-walled work pieces can cause difficulties</td>
<td>• Suitable for thin-walled material</td>
</tr>
<tr>
<td></td>
<td>• Broad range of applications</td>
<td>• Suitable for excellent visual profiles</td>
</tr>
<tr>
<td></td>
<td>• Suitable for all knurling patterns, profiles and markings</td>
<td>• Limited range of applications</td>
</tr>
<tr>
<td></td>
<td>• Suitable for front and internal knurling</td>
<td>• Only suitable for profiles RAA and RGE</td>
</tr>
<tr>
<td></td>
<td>• Knurling to a shoulder</td>
<td>• Only suitable for cylindrical work pieces in axial tool direction</td>
</tr>
<tr>
<td></td>
<td>• Tool can be started at any position of the work piece</td>
<td>• Knurling to be started at work piece end or in the middle after a groove</td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td>• Work piece diameter is increased through displacement</td>
<td>• No major change in diameter after knurling</td>
</tr>
<tr>
<td></td>
<td>• Surface is compressed</td>
<td>• Minimal surface compression</td>
</tr>
<tr>
<td></td>
<td>• More strain on machine compared to cut knurling</td>
<td>• Excellent visual knurling profile</td>
</tr>
<tr>
<td><strong>Handling</strong></td>
<td>• Preparation of work piece generally not required</td>
<td>• Less strain on machine compared to form knurling</td>
</tr>
<tr>
<td></td>
<td>• Easy tool handling</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Precise setting of work tool and fine adjustment required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Precise setting of work piece required</td>
</tr>
</tbody>
</table>
Material Displacement through Form Knurling

Our experience values for the increase in material diameter through form knurling:

Knurling profile according to DIN 82: RAA (Profile on work piece)
Knurling wheels according to DIN 403: AA (Profile for knurling wheels)

<table>
<thead>
<tr>
<th>Pitch</th>
<th>Material</th>
<th>Work Piece-ø</th>
<th>Increase in work piece diameter-ø in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>Free-cutting Steel</td>
<td>5</td>
<td>0.08, 0.14, 0.18, 0.22, 0.27, 0.29, 0.33, 0.35, 0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0.08, 0.14, 0.18, 0.23, 0.30, 0.40, 0.41, 0.44, 0.50, 0.60, 0.65, 0.67, 0.70</td>
</tr>
<tr>
<td></td>
<td>Stainless Steel</td>
<td>5</td>
<td>0.10, 0.15, 0.20, 0.25, 0.28, 0.30, 0.35, 0.42, 0.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0.10, 0.15, 0.19, 0.25, 0.30, 0.34, 0.40, 0.45, 0.51, 0.60</td>
</tr>
<tr>
<td></td>
<td>Brass</td>
<td>5</td>
<td>0.10, 0.14, 0.20, 0.26, 0.31, 0.33, 0.38, 0.43, 0.50, 0.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0.10, 0.14, 0.20, 0.26, 0.28, 0.29, 0.31, 0.35, 0.41, 0.44, 0.48, 0.50, 0.55</td>
</tr>
<tr>
<td></td>
<td>Aluminium</td>
<td>5</td>
<td>0.09, 0.15, 0.19, 0.23, 0.28, 0.30, 0.34, 0.41, 0.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0.10, 0.15, 0.19, 0.26, 0.29, 0.33, 0.39, 0.45, 0.51, 0.57, 0.65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>0.09, 0.15, 0.19, 0.26, 0.29, 0.32, 0.37, 0.45, 0.52, 0.59, 0.65, 0.78, 0.75</td>
</tr>
</tbody>
</table>

Knurling profile according to DIN 82: RBL 30°/RBR 30° (Profile on work piece)
Knurling wheels according to DIN 403: BR 30°/BL 30° (Profile for knurling wheels)

<table>
<thead>
<tr>
<th>Pitch</th>
<th>Material</th>
<th>Work Piece-ø</th>
<th>Increase in work piece diameter-ø in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>Free-cutting Steel</td>
<td>5</td>
<td>0.11, 0.15, 0.20, 0.24, 0.28, 0.34, 0.38, 0.45, 0.55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0.11, 0.15, 0.22, 0.26, 0.30, 0.35, 0.42, 0.45, 0.52, 0.67, 0.73, 0.75, 0.85</td>
</tr>
<tr>
<td></td>
<td>Stainless Steel</td>
<td>5</td>
<td>0.09, 0.14, 0.23, 0.25, 0.28, 0.36, 0.42, 0.45, 0.56, 0.70, 0.72, 0.78, 0.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0.12, 0.20, 0.23, 0.31, 0.35, 0.40, 0.45, 0.51, 0.62, 0.66, 0.73, 0.85, 0.97</td>
</tr>
<tr>
<td></td>
<td>Brass</td>
<td>5</td>
<td>0.12, 0.18, 0.24, 0.27, 0.37, 0.39, 0.43, 0.49, 0.59, 0.80, 0.84, 0.93, 0.96</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0.10, 0.14, 0.20, 0.23, 0.24, 0.31, 0.36, 0.41, 0.47, 0.53, 0.55, 0.64, 0.63</td>
</tr>
<tr>
<td></td>
<td>Aluminium</td>
<td>5</td>
<td>0.12, 0.18, 0.23, 0.26, 0.36, 0.40, 0.43, 0.50, 0.56, 0.62, 0.74, 0.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0.12, 0.16, 0.25, 0.28, 0.37, 0.39, 0.46, 0.50, 0.58, 0.77, 0.82, 0.84, 0.96</td>
</tr>
</tbody>
</table>

Knurling profile according to DIN 82: RGE 30° (Profile on work piece)
Knurling wheels according to DIN 403: BR 30° + BL 30° (Profile for knurling wheels)

<table>
<thead>
<tr>
<th>Pitch</th>
<th>Material</th>
<th>Work Piece-ø</th>
<th>Increase in work piece diameter-ø in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>Free-cutting Steel</td>
<td>5</td>
<td>0.12, 0.16, 0.20, 0.25, 0.33, 0.41, 0.45, 0.55, 0.65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0.13, 0.22, 0.30, 0.32, 0.35, 0.41, 0.43, 0.52, 0.62, 0.67, 0.81, 0.86, 0.95</td>
</tr>
<tr>
<td></td>
<td>Stainless Steel</td>
<td>5</td>
<td>0.12, 0.18, 0.28, 0.32, 0.35, 0.38, 0.43, 0.55, 0.67, 0.77, 0.87, 0.98, 0.98</td>
</tr>
<tr>
<td></td>
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<td>15</td>
<td>0.10, 0.14, 0.21, 0.24, 0.29, 0.34, 0.40, 0.43, 0.53, 0.66, 0.72, 0.70, 0.88</td>
</tr>
<tr>
<td></td>
<td>Brass</td>
<td>5</td>
<td>0.12, 0.13, 0.16, 0.20, 0.24, 0.28, 0.30, 0.32, 0.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0.12, 0.16, 0.18, 0.24, 0.28, 0.30, 0.37, 0.39, 0.40, 0.48, 0.52, 0.65, 0.63</td>
</tr>
<tr>
<td></td>
<td>Aluminium</td>
<td>5</td>
<td>0.10, 0.15, 0.20, 0.25, 0.33, 0.36, 0.41, 0.50, 0.57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0.11, 0.14, 0.20, 0.25, 0.28, 0.33, 0.39, 0.43, 0.54, 0.67, 0.71, 0.76, 0.89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>0.11, 0.15, 0.22, 0.25, 0.29, 0.34, 0.40, 0.44, 0.53, 0.68, 0.69, 0.71, 0.88</td>
</tr>
</tbody>
</table>

NOTE: These values are guidelines only. Minor deviations may occur depending on material. Applies only to form knurling.
# Approximate Values for Speed and Feed Rate

## Cut Knurling

<table>
<thead>
<tr>
<th>Material</th>
<th>Work Piece-ø</th>
<th>Knurling Wheel ø (mm)</th>
<th>Vc (m/min) Radial</th>
<th>f (mm/rev.) Axial Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>from to</td>
<td>from to</td>
<td>&gt; 0.3 &lt; 0.5</td>
<td>&gt; 0.5 &lt; 1.0</td>
</tr>
<tr>
<td>Free-cutting Steel</td>
<td>&lt; 10 10 / 15</td>
<td>40 70</td>
<td>0.04 0.08</td>
<td>0.14 0.09</td>
</tr>
<tr>
<td></td>
<td>10 - 40</td>
<td>60 90</td>
<td>0.05 0.10</td>
<td>0.20 0.13</td>
</tr>
<tr>
<td></td>
<td>40 - 100</td>
<td>65 110</td>
<td>0.05 0.10</td>
<td>0.25 0.18</td>
</tr>
<tr>
<td></td>
<td>100 - 250</td>
<td>65 110</td>
<td>0.05 0.10</td>
<td>0.30 0.20</td>
</tr>
<tr>
<td></td>
<td>&gt; 250</td>
<td>80 100</td>
<td>0.05 0.10</td>
<td>0.32 0.21</td>
</tr>
<tr>
<td>Stainless Steel</td>
<td>&lt; 10 10 / 15</td>
<td>22 40</td>
<td>0.04 0.08</td>
<td>0.12 0.08</td>
</tr>
<tr>
<td></td>
<td>10 - 40</td>
<td>30 50</td>
<td>0.05 0.10</td>
<td>0.17 0.11</td>
</tr>
<tr>
<td></td>
<td>40 - 100</td>
<td>35 60</td>
<td>0.05 0.10</td>
<td>0.21 0.15</td>
</tr>
<tr>
<td></td>
<td>100 - 250</td>
<td>35 60</td>
<td>0.05 0.10</td>
<td>0.26 0.17</td>
</tr>
<tr>
<td></td>
<td>&gt; 250</td>
<td>45 55</td>
<td>0.05 0.10</td>
<td>0.27 0.18</td>
</tr>
<tr>
<td>Brass</td>
<td>&lt; 10 10 / 15</td>
<td>55 100</td>
<td>0.04 0.08</td>
<td>0.15 0.09</td>
</tr>
<tr>
<td></td>
<td>10 - 40</td>
<td>70 125</td>
<td>0.05 0.10</td>
<td>0.21 0.14</td>
</tr>
<tr>
<td></td>
<td>40 - 100</td>
<td>90 155</td>
<td>0.05 0.10</td>
<td>0.26 0.19</td>
</tr>
<tr>
<td></td>
<td>100 - 250</td>
<td>90 155</td>
<td>0.05 0.10</td>
<td>0.32 0.21</td>
</tr>
<tr>
<td></td>
<td>&gt; 250</td>
<td>115 140</td>
<td>0.05 0.10</td>
<td>0.34 0.22</td>
</tr>
<tr>
<td>Aluminium</td>
<td>&lt; 10 10 / 15</td>
<td>70 120</td>
<td>0.04 0.08</td>
<td>0.18 0.11</td>
</tr>
<tr>
<td></td>
<td>10 - 40</td>
<td>80 150</td>
<td>0.05 0.10</td>
<td>0.25 0.16</td>
</tr>
<tr>
<td></td>
<td>40 - 100</td>
<td>110 160</td>
<td>0.05 0.10</td>
<td>0.31 0.23</td>
</tr>
<tr>
<td></td>
<td>100 - 250</td>
<td>110 160</td>
<td>0.05 0.10</td>
<td>0.38 0.25</td>
</tr>
<tr>
<td></td>
<td>&gt; 250</td>
<td>130 150</td>
<td>0.05 0.10</td>
<td>0.40 0.26</td>
</tr>
</tbody>
</table>

## Form Knurling

<table>
<thead>
<tr>
<th>Material</th>
<th>Work Piece-ø</th>
<th>Knurling Wheel ø (mm)</th>
<th>Vc (m/min) Radial</th>
<th>f (mm/rev.) Axial Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>from to</td>
<td>from to</td>
<td>&gt; 0.3 &lt; 0.5</td>
<td>&gt; 0.5 &lt; 1.0</td>
</tr>
<tr>
<td>Free-cutting Steel</td>
<td>&lt; 10 10 / 15</td>
<td>20 50</td>
<td>0.04 0.08</td>
<td>0.20 0.13</td>
</tr>
<tr>
<td></td>
<td>10 - 40</td>
<td>25 55</td>
<td>0.05 0.10</td>
<td>0.28 0.18</td>
</tr>
<tr>
<td></td>
<td>40 - 100</td>
<td>30 60</td>
<td>0.05 0.10</td>
<td>0.35 0.25</td>
</tr>
<tr>
<td></td>
<td>100 - 250</td>
<td>30 60</td>
<td>0.05 0.10</td>
<td>0.42 0.28</td>
</tr>
<tr>
<td></td>
<td>&gt; 250</td>
<td>30 60</td>
<td>0.05 0.10</td>
<td>0.45 0.29</td>
</tr>
<tr>
<td>Stainless Steel</td>
<td>&lt; 10 10 / 15</td>
<td>15 40</td>
<td>0.04 0.08</td>
<td>0.14 0.09</td>
</tr>
<tr>
<td></td>
<td>10 - 40</td>
<td>20 50</td>
<td>0.05 0.10</td>
<td>0.20 0.13</td>
</tr>
<tr>
<td></td>
<td>40 - 100</td>
<td>25 55</td>
<td>0.05 0.10</td>
<td>0.25 0.18</td>
</tr>
<tr>
<td></td>
<td>100 - 250</td>
<td>25 55</td>
<td>0.05 0.10</td>
<td>0.29 0.20</td>
</tr>
<tr>
<td></td>
<td>&gt; 250</td>
<td>25 55</td>
<td>0.05 0.10</td>
<td>0.31 0.21</td>
</tr>
<tr>
<td>Brass</td>
<td>&lt; 10 10 / 15</td>
<td>30 75</td>
<td>0.04 0.08</td>
<td>0.22 0.14</td>
</tr>
<tr>
<td></td>
<td>10 - 40</td>
<td>40 85</td>
<td>0.05 0.10</td>
<td>0.31 0.20</td>
</tr>
<tr>
<td></td>
<td>40 - 100</td>
<td>45 90</td>
<td>0.05 0.10</td>
<td>0.39 0.28</td>
</tr>
<tr>
<td></td>
<td>100 - 250</td>
<td>45 90</td>
<td>0.05 0.10</td>
<td>0.46 0.31</td>
</tr>
<tr>
<td></td>
<td>&gt; 250</td>
<td>45 90</td>
<td>0.05 0.10</td>
<td>0.49 0.32</td>
</tr>
<tr>
<td>Aluminium</td>
<td>&lt; 10 10 / 15</td>
<td>25 60</td>
<td>0.04 0.08</td>
<td>0.12 0.08</td>
</tr>
<tr>
<td></td>
<td>10 - 40</td>
<td>30 65</td>
<td>0.05 0.10</td>
<td>0.17 0.11</td>
</tr>
<tr>
<td></td>
<td>40 - 100</td>
<td>35 70</td>
<td>0.05 0.10</td>
<td>0.21 0.15</td>
</tr>
<tr>
<td></td>
<td>100 - 250</td>
<td>35 70</td>
<td>0.05 0.10</td>
<td>0.25 0.17</td>
</tr>
<tr>
<td></td>
<td>&gt; 250</td>
<td>35 70</td>
<td>0.05 0.10</td>
<td>0.27 0.18</td>
</tr>
</tbody>
</table>

**NOTE:** These values are approximate values only. Sufficient cooling and lubrication is necessary to prevent chips from being rolled in and to increase tool life of knurling wheels.
Knurling Profiles on Work Piece (DIN 82)

Illustration

RAA
Knurl with straight pattern

Profile can only be produced in radial tool direction (plunge knurling)

Profile can only be produced in axial tool direction (feed knurling)

Profile can be produced in axial and radial tool direction

Possible manufacturing methods with knurling wheels according to DIN 403

RAA
Knurling profile RAA

Work piece

Knurling wheel AA

Work piece

Knurling wheel BL swivelled 30°

K Bl

Work piece

Knurling profile RAA

Knurling profile RAA

Knurling wheel BL swivelled 30°

Explanation of symbols:

↑ Profile can only be produced in radial tool direction (plunge knurling)

← Profile can only be produced in axial tool direction (feed knurling)

←↑ Profile can be produced in axial and radial tool direction
**RGE**
Diamond knurl/left hand/right-hand knurl, points raised (male), 30°

**Explanations**
- Profile can only be produced in radial tool direction (plunge knurling)
- Profile can only be produced in axial tool direction (feed knurling)
- Profile can be produced in axial and radial tool direction
Knurling Profiles on Work Piece (DIN 82)

Illustration

**RKE**
Cross-knurl, points raised (male), 90°

**RKV**
Cross knurl, points indented (female), 90°

Possible manufacturing methods with knurling wheels according to DIN 403

Explanation of symbols:
- Profile can only be produced in radial tool direction (plunge knurling)
- Profile can only be produced in axial tool direction (feed knurling)
- Profile can be produced in axial and radial tool direction
**Tool Characteristics**

**Characteristics according to machine type**

- **Lathe machines and auto lathes – conventional – centre height to be adjusted**
  - Tool holder adjustable. Centre height to be adjusted.

- **Lathe machines and auto lathes – CNC and conventional – centre height is integrated**
  - Tool holder fixed. Height is not adjustable. Centre height is integrated.

**Illustration: Right-hand/left-hand turning machine**

- **R = right**
- **L = left**

**Sliding head auto lathes (screw machines) and small auto lathes – CNC and conventional – centre height is integrated**

- Guide bushing
- Knurling wheel is not fixed above shank front edge
- Centre height is integrated

View x
### Knurling Applications

**Allocation of the ZEUS knurling tool type to the knurling profile on the work piece (DIN 82)**

**Form Knurling – (without swarf removal)**

Suitable for all profiles. 
Radial and / or axial tool direction.

<table>
<thead>
<tr>
<th>Knurling Tool Type</th>
<th>Tool Direction</th>
<th>Knurling profile on work piece (DIN 82)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RAA</td>
<td>RBL</td>
</tr>
<tr>
<td>ZEUS RD1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radial (Plunge knurling)</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Axial (Feed knurling)</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Radial and Axial</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>ZEUS RD2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radial (Plunge knurling)</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Axial (Feed knurling)</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Radial and Axial</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>ZEUS RD3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radial (Plunge knurling)</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Axial (Feed knurling)</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Radial and Axial</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

**Cut Knurling – (swarf removal)**

Only suitable for some profiles. 
Axial tool direction only.

<table>
<thead>
<tr>
<th>Knurling Tool Type</th>
<th>Tool Direction</th>
<th>Knurling profile on work piece (DIN 82)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RAA</td>
<td>RBL</td>
</tr>
<tr>
<td>ZEUS RF1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axial (Feed knurling)</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>ZEUS RF2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axial (Feed knurling)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>ZEUS RF3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axial (Feed knurling)</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

* When cut knurling restrictions apply with regard to profile possibilities

**Note:**

Knurling profiles marked with x cannot be produced with this tool type or in this machining plane. Conical knurls, certain profiles and markings can only be produced through axial machining with form knurling.
## Knurling Applications

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Knurling Techniques / Comment</th>
<th>Tool Direction ▲</th>
<th>Knurling profile (DIN 82)</th>
<th>Tool No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Form Knurling</td>
<td>Radial</td>
<td>RAA, RBL, RBR</td>
<td>130, 131, 141, 151, 161</td>
</tr>
<tr>
<td>2</td>
<td>Form Knurling</td>
<td>Radial</td>
<td>RGE, RGV, RKE, RKV</td>
<td>130, 131, 141, 151, 161, 192, 231, 391</td>
</tr>
<tr>
<td>3</td>
<td>Form or Cut Knurling / Pattern starts at work piece</td>
<td>Axial</td>
<td>RAA, RBL*, RBR*</td>
<td>130, 131, 141, 151, 161, 192, 240, 241, 251, 291, 391</td>
</tr>
<tr>
<td>4</td>
<td>Form or Cut Knurling / Pattern starts at work piece</td>
<td>Axial</td>
<td>RGE</td>
<td>141, 151, 161, 192, 240, 241, 251, 291, 391</td>
</tr>
<tr>
<td>5</td>
<td>Cut Knurling / Pattern starts in the middle of the work piece (groove required)</td>
<td>Axial</td>
<td>RAA, RBL*, RBR*</td>
<td>231</td>
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<tr>
<td>6</td>
<td>Cut Knurling / Pattern starts in the middle of the work piece (groove required)</td>
<td>Axial</td>
<td>RGE</td>
<td>240, 241, 251</td>
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<tr>
<td>7</td>
<td>Form Knurling / Pattern starts in the middle of the work piece</td>
<td>Radial and Axial</td>
<td>RAA, RBL, RBR</td>
<td>130, 131, 141, 151, 161</td>
</tr>
<tr>
<td>8</td>
<td>Form Knurling / Pattern starts in the middle of the work piece</td>
<td>Radial and Axial</td>
<td>RGE</td>
<td>141, 151, 161</td>
</tr>
<tr>
<td>9</td>
<td>Form Knurling / Knurling to a shoulder</td>
<td>Radial</td>
<td>RAA, RBL, RBR</td>
<td>132, 142</td>
</tr>
<tr>
<td>10</td>
<td>Form Knurling / Knurling to a shoulder</td>
<td>Radial</td>
<td>RGE, RGV, RKE, RKV</td>
<td>132, 142</td>
</tr>
<tr>
<td>11</td>
<td>Form Knurling / Knurling to a shoulder</td>
<td>Radial and/or Axial</td>
<td>RAA, RBL, RBR</td>
<td>132, 142, 192</td>
</tr>
<tr>
<td>12</td>
<td>Form Knurling / Knurling to a shoulder</td>
<td>Radial and/or Axial</td>
<td>RGE</td>
<td>142, 192</td>
</tr>
<tr>
<td>13</td>
<td>Form Knurling / Conical knurling profile</td>
<td>Radial or Axial</td>
<td>RAA, RBL, RBR</td>
<td>311, 312</td>
</tr>
<tr>
<td>14</td>
<td>Form Knurling / Conical knurling profile</td>
<td>Radial or Axial</td>
<td>RGE, RGV</td>
<td>311, 312</td>
</tr>
<tr>
<td>15</td>
<td>Form Knurling / Face knurling</td>
<td>Axial</td>
<td>RAA, RBL, RBR</td>
<td>311, 312</td>
</tr>
<tr>
<td>16</td>
<td>Form Knurling / Face knurling</td>
<td>Axial</td>
<td>RGE, RGV</td>
<td>311, 312</td>
</tr>
<tr>
<td>17</td>
<td>Form Knurling / Knurling pattern within a bore</td>
<td>Radial and/or Axial</td>
<td>RAA, RBL, RBR</td>
<td>330</td>
</tr>
<tr>
<td>18</td>
<td>Form Knurling / Knurling pattern within a bore</td>
<td>Radial</td>
<td>RGE, RGV, RKE, RKV</td>
<td>330</td>
</tr>
</tbody>
</table>

▲ Tool direction see page 6 “Knurling Techniques”  ★ When cut knurling, restrictions can apply; see page 38/39  ★ Only suitable for RGE
Knurling Wheels
The following coatings and treatments are available at an additional cost:

- Nitrited knurling wheels (surface hardening)
- TiN-coated knurling wheels
- TiAlN-coated knurling wheels
- TiCN-coated knurling wheels
**Knurling Wheels DIN 403 – Form Knurling**

<table>
<thead>
<tr>
<th>Variations</th>
<th>Type</th>
<th>Ø x width x bore</th>
<th>Pitch p</th>
<th>Profile angle α</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 10 / milled, with chamfer, HSS</td>
<td>AA</td>
<td>8 x 3 x 3</td>
<td>0.3 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 11 / milled, with chamfer, PM</td>
<td>BL30</td>
<td>8 x 4 x 3</td>
<td>0.4 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 12 / milled, without chamfer, HSS</td>
<td>BL45</td>
<td>10 x 2 x 3</td>
<td>0.5 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 13 / milled, without chamfer, PM</td>
<td>BR30</td>
<td>10 x 3 x 3</td>
<td>0.6 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 30 / ground, with chamfer, PM</td>
<td>BR45</td>
<td>10 x 3 x 6*</td>
<td>0.7 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 32 / ground, without chamfer, PM</td>
<td>GE30</td>
<td>10 x 4 x 3</td>
<td>0.8 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 50 / ground, with chamfer, HM</td>
<td>GE45</td>
<td>10 x 4 x 4</td>
<td>0.9 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 52 / ground, without chamfer, HM</td>
<td>KE</td>
<td>10 x 5 x 4</td>
<td>1.0 – 90°</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variations</th>
<th>Type</th>
<th>Ø x width x bore</th>
<th>Pitch p</th>
<th>Profile angle α</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 10 / milled, with chamfer, HSS</td>
<td>AA</td>
<td>8 x 3 x 3</td>
<td>0.3 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 11 / milled, with chamfer, PM</td>
<td>BL30</td>
<td>8 x 4 x 3</td>
<td>0.4 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 12 / milled, without chamfer, HSS</td>
<td>BL45</td>
<td>10 x 2 x 3</td>
<td>0.5 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 13 / milled, without chamfer, PM</td>
<td>BR30</td>
<td>10 x 3 x 3</td>
<td>0.6 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 30 / ground, with chamfer, PM</td>
<td>BR45</td>
<td>10 x 3 x 6*</td>
<td>0.7 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 32 / ground, without chamfer, PM</td>
<td>GE30</td>
<td>10 x 4 x 3</td>
<td>0.8 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 50 / ground, with chamfer, HM</td>
<td>GE45</td>
<td>10 x 4 x 4</td>
<td>0.9 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 52 / ground, without chamfer, HM</td>
<td>KE</td>
<td>10 x 5 x 4</td>
<td>1.0 – 90°</td>
<td></td>
</tr>
</tbody>
</table>

* Chamfer 60° for tool No 192 – (only types AA/BL/BR)
**Knurling Wheels DIN 403 – Form Knurling**

<table>
<thead>
<tr>
<th>Variations</th>
<th>Type</th>
<th>ø x width x bore</th>
<th>Pitch p</th>
<th>Profile angle a</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 10 / milled, with chamfer, HSS</td>
<td>AA</td>
<td>5/16 x 5/32 x 1/8</td>
<td>cp 8</td>
<td>90°</td>
</tr>
<tr>
<td>No. 11 / milled, with chamfer, PM</td>
<td>BL30</td>
<td>1/2 x 3/16 x 3/16</td>
<td>cp 10</td>
<td>90°</td>
</tr>
<tr>
<td>No. 12 / milled, without chamfer, HSS</td>
<td>BL45</td>
<td>1/2 x 1/4 x 3/16</td>
<td>cp 12</td>
<td>90°</td>
</tr>
<tr>
<td>No. 13 / milled, without chamfer, PM</td>
<td>BR30</td>
<td>5/8 x 1/4 x 1/4</td>
<td>cp 14</td>
<td>90°</td>
</tr>
<tr>
<td>No. 30 / ground, with chamfer, PM</td>
<td>BR45</td>
<td>5/8 x 5/16 x 7/32</td>
<td>cp 16</td>
<td>90°</td>
</tr>
<tr>
<td>No. 32 / ground, without chamfer, PM</td>
<td>GE30</td>
<td>3/4 x 1/4 x 1/4</td>
<td>cp 18</td>
<td>90°</td>
</tr>
<tr>
<td>No. 50 / ground, with chamfer, HM</td>
<td>GE45</td>
<td>3/4 x 3/8 x 1/4</td>
<td>cp 19</td>
<td>90°</td>
</tr>
<tr>
<td>No. 52 / ground, without chamfer, HM</td>
<td>KE</td>
<td>3/4 x 1/2 x 1/4</td>
<td>cp 20</td>
<td>90°</td>
</tr>
</tbody>
</table>

- HSS = High Speed Steel, PM = Powder-Metallurgy Steel, HM = Carbide

![Diagram of knurling wheels with dimensions and angles]
### Knurling Wheels DIN 403 – Form Knurling

**GV 30**

**GV 45°**

**KV**

---

**Variations**

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Ø x width x bore</th>
<th>Pitch p</th>
<th>Profile angle a</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>GV30</td>
<td>d1 x b1 x d2</td>
<td>10 x 4 x 4</td>
<td>0,3 – 90°</td>
</tr>
<tr>
<td>21</td>
<td>GV45</td>
<td>d1 x b1 x d2</td>
<td>15 x 4 x 4</td>
<td>0,4 – 90°</td>
</tr>
<tr>
<td>22</td>
<td>KV</td>
<td>d1 x b1 x d2</td>
<td>15 x 6 x 4</td>
<td>0,5 – 90°</td>
</tr>
<tr>
<td>23</td>
<td>PM</td>
<td>d1 x b1 x d2/d5</td>
<td>15 x 6 x 6/11</td>
<td>0,6 – 90°</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15 x 6 x 6/8</td>
<td>0,7 – 90°</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 x 6 x 6</td>
<td>0,8 – 90°</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 x 8 x 6</td>
<td>0,9 – 90°</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 x 8 x 6/13</td>
<td>1,0 – 90°</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 x 8 x 10/12</td>
<td>1,2 – 90°</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 x 10 x 6</td>
<td>1,5 – 90°</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25 x 6 x 6</td>
<td>1,6 – 90°</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25 x 8 x 6</td>
<td>1,8 – 90°</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25 x 10 x 6</td>
<td>2,0 – 90°</td>
</tr>
</tbody>
</table>

HSS = High Speed Steel, PM = Powder-Metallurgy Steel, HM = Carbide
## Knurling Wheels DIN 403 – Cut Knurling

<table>
<thead>
<tr>
<th>Variations</th>
<th>Type</th>
<th>Ø x width x bore d1 x b1 x d2</th>
<th>Pitch p</th>
<th>Profile angle α</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 15 / milled, without chamfer, HSS</td>
<td>AA</td>
<td>8,9 x 2,5 x 4</td>
<td>0,3 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 16 / milled, without chamfer, PM</td>
<td>BL15</td>
<td>10 x 3 x 6</td>
<td>0,4 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 17 / milled, with chamfer, HSS</td>
<td>BL30</td>
<td>14,5 x 3 x 5</td>
<td>0,5 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 18 / milled, with chamfer, PM</td>
<td>BR15</td>
<td>15 x 4 x 8</td>
<td>0,6 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 35 / ground, without chamfer, PM</td>
<td>BR30</td>
<td>21,5 x 5 x 8</td>
<td>0,7 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 37 / ground, with chamfer, PM</td>
<td>BR30</td>
<td>25 x 6 x 8</td>
<td>0,8 – 90°</td>
<td></td>
</tr>
<tr>
<td>No. 55 / ground, without chamfer, HM</td>
<td>32 x 13 x 16</td>
<td>0,9 – 90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 57 / ground, with chamfer, HM</td>
<td>42 x 13 x 16</td>
<td>1,0 – 90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1,2 – 90°</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1,5 – 90°</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1,6 – 90°</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1,8 – 90°</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2,0 – 90°</td>
<td></td>
</tr>
</tbody>
</table>

HSS = High Speed Steel, PM = Powder-Metallurgy Steel, HM = Carbide
## Knurling Wheels to Customer Design

<table>
<thead>
<tr>
<th>Knurling wheels</th>
<th>With/without chamfer</th>
<th>HSS/PM</th>
<th>Type</th>
<th>$\phi \times$ width $\times$ bore</th>
<th>Pitch p</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 60</td>
<td></td>
<td></td>
<td>HE</td>
<td>$d_1 \times b_1 \times d_2$</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HHE</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HV</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HHV</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knurling wheels</th>
<th>With/without chamfer</th>
<th>HSS/PM</th>
<th>Type</th>
<th>$\phi \times$ width $\times$ bore</th>
<th>Full angle $\beta^\circ$</th>
<th>Pitch p</th>
<th>Profile angle $\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 70</td>
<td></td>
<td>KAA</td>
<td></td>
<td>$d_1 \times b_1 \times d_2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KBL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KBR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>KGV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knurling wheels</th>
<th>With/without chamfer</th>
<th>HSS/PM</th>
<th>Type</th>
<th>$\phi \times$ width $\times$ bore</th>
<th>Radius $R$</th>
<th>Pitch p</th>
<th>Profile angle $\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 80</td>
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</table>

HSS = High Speed Steel, PM = Powder-Metallurgy Steel

Please fill in table and send to Hommel + Keller.
Knurling Wheels to Customer Design

Please fill in table and send to Hommel + Keller.

<table>
<thead>
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<th>Knurling wheels</th>
<th>With/without chamfer</th>
<th>HSS / PM Type</th>
<th>Ø x width x bore d1 x b1 x d2</th>
<th>b2</th>
<th>d3</th>
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<th>d4</th>
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<th>Profile angle α</th>
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</table>
ZEUS Knurling Tool No. 130-08/10/12/14/16/20/70/75/80/85/90

**Application:** Form knurling (without swarf removal), Plunge knurling (feeding possible for RAA, RBL and RBR)
Suitable for all knurling patterns, profiles and markings

**Knurling Wheels:** All forms suitable

**Type of Machine:**
- Lathe machines and auto lathes
- Conventional
- Centre height to be adjusted

**Features:**
- Higher speed rates
- Faster production
- Prolonged life

**Knurling profile on work piece DIN 82**

---

**Knurling profile on work piece DIN 82**

---

**Form Knurling Tools RD 1**

---

**Name:** Threaded ring

**Material:** Brass (CuZn38Pb1,5)

**Application:**
- Form knurling, without swarf removal
- Plunge knurling

**Speed rate m/min:** 72

**Feed rate mm/rev:** 0.08

**Machine:** Boley lathe machine

**Tool:**
- Knurling tool 130-20U25106
- Knurling wheel AA 25x10x6

---

**Your individual tool measurements:**
Form Knurling Tools RD 1

ZEUS Knurling Tool No. 131-08/10/12/16

Application: Form knurling (without swarf removal), Plunge knurling (feeding possible for RAA; RBL and RBR)
Suitable for all knurling patterns, profiles and markings

Knurling Wheels: All forms suitable

Type of Machine:
- Sliding head auto lathes (screw machines) and small auto lathes
- CNC and conventional
- Centre height is integrated

Features:
- Knurl pins fixed by a screw – for a quick replacement of knurling wheels
- Special surface hardening for longer tool life time
- Carbide pins:
  - higher speed rates
  - faster production
  - prolonged life

Knurling profile on work piece DIN 82

<table>
<thead>
<tr>
<th>No.</th>
<th>Working area ø mm</th>
<th>α mm</th>
<th>b mm</th>
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<th>d mm</th>
<th>e with ø 15 mm</th>
<th>x with ø 15 mm</th>
<th>Knurling wheel size</th>
<th>Spare parts Carbide pins No.</th>
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<td>8</td>
<td>99</td>
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<td>10 x 4 x 4 / 15 x 4 x 4</td>
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<td>10 x 4 x 4 / 15 x 4 x 4</td>
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Your individual tool measurements:

Name: Threaded bushing Ø 10 mm
Material: Brass (CuZn39Pb3)
Application: Plunge knurling, without swarf removal
75
Feed rate mm/rev: 0.06
Machine: Gildemeister GM16
Tool: Knurling tool 131-166150404
Knurling wheel AA15x4x4 P0.8

Knurling profile on work piece DIN 82

RAA RBL RBR RGE RGV RKE RKV
## Form Knurling Tools RD 1

**ZEUS Knurling Tool No. 131-20/25/85/90**

**Application:** Form knurling (without swarf removal), Plunge knurling (feeding possible for RAA, RBL and RBR)

Suitable for all knurling patterns, profiles and markings

**Knurling Wheels:** All forms suitable

**Type of Machine:**
- Lathe machines and auto lathes
- CNC and conventional
- Centre height is integrated

**Features:**
- Knurl pins fixed by a screw – for a quick replacement of knurling wheels
- Special surface hardening for longer tool life time
- Carbide pins:
  - higher speed rates
  - faster production
  - prolonged life

### Knurling profile on work piece DIN 82

![Knurling profile diagram](image)

<table>
<thead>
<tr>
<th>No.</th>
<th>Working area ø mm</th>
<th>a mm/inch</th>
<th>b mm</th>
<th>c with ø 25 mm</th>
<th>e with ø 25 mm</th>
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<th>x with ø 25 mm</th>
<th>Knurling wheel size mm/inch</th>
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<td>20</td>
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<tr>
<td>131-25U250806</td>
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<td>25</td>
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<td>20 x 8 x 6 / 25 x 8 x 6</td>
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<tr>
<td>131-85U343814</td>
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<td>3/4&quot;</td>
<td>20</td>
<td>114,5</td>
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<td>3/4&quot; x 3/8&quot; x 1/4&quot;</td>
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</tr>
</tbody>
</table>

**Your individual tool measurements:**

### Your individual tool measurements:

#### Name:
- Housing: Brass (CuZn39Pb3)
- Knurling profile on work piece (DIN 82): RGV 0.6 (30°) / RAA 0.6
- Application: Plunge knurling, without swarf removal
- Speed rate m/min: 78
- Feed rate mm/rev: 0.09
- Machine: Index G200
- Tool: Knurling tool 131-20U250806
- Knurling wheel GE30° 25x8x6 P0,6 / AA 25x8x6 P0,6
ZEUS Knurling Tool No. 132-08/10/12/16

Application: Form knurling (without swarf removal), Plunge knurling (feeding possible for RAA, RBL and RBR)
Suitable for all knurling patterns, profiles and markings
Knurling to a shoulder

Knurling Wheels: All forms suitable
Type of Machine:
• Sliding head auto lathes (screw machines) and small auto lathes
• CNC and conventional
• Centre height is integrated

Features:
• Special surface hardening for longer tool life time
• Knurl pins fixed by a screw – for a quick replacement of knurling wheels
• Fitting of the knurling wheels on the pin adjustable

Name: Housing
Material: Stainless Steel (1.4305)
Knurling profile on work piece (DIN 82):
Application:
Speed rate m/min: 22
Feed rate mm/rev: 0.05
Machine: Star 5806
Tool:

No. | Working area | a mm | b mm | c mm | d mm | e mm | f mm | Knurling wheel size mm | Bolt | Run disk
---|-------------|-----|-----|-----|-----|-----|-----|------------------------|------|--------
132-08L150611 | 3 - 50 | 8 | 8 | 103 | 19 | 23 | 16 | 15 x 6 x 6 /11 | 06TER0380 | 21BHR0375
132-08R150611 | 3 - 50 | 8 | 8 | 103 | 19 | 23 | 16 | 15 x 6 x 6 /11 | 06TER0380 | 21BHR0375
132-10L150611 | 3 - 50 | 10 | 10 | 103 | 19 | 23 | 18 | 15 x 6 x 6 /11 | 06TER0380 | 21BHR0375
132-10R150611 | 3 - 50 | 10 | 10 | 103 | 19 | 23 | 18 | 15 x 6 x 6 /11 | 06TER0380 | 21BHR0375
132-12L150611 | 3 - 50 | 12 | 12 | 103 | 19 | 23 | 20 | 15 x 6 x 6 /11 | 06TER0380 | 21BHR0375
132-12R150611 | 3 - 50 | 12 | 12 | 103 | 19 | 23 | 20 | 15 x 6 x 6 /11 | 06TER0380 | 21BHR0375
132-16L150611 | 3 - 50 | 16 | 16 | 113 | 19 | 23 | 24 | 15 x 6 x 6 /11 | 06TER0380 | 21BHR0375
132-16R150611 | 3 - 50 | 16 | 16 | 113 | 19 | 23 | 24 | 15 x 6 x 6 /11 | 06TER0380 | 21BHR0375

Your individual tool measurements:

Form Knurling Tools RD 1
**Form Knurling Tools**

**RD 1**

**ZEUS Knurling Tool No. 132-20/25/85/90**

**Application:**
- Form knurling (without swarf removal), Plunge knurling (feeding possible for RAA, RBL and RBR)
- Suitable for all knurling patterns, profiles and markings
- Knurling to a shoulder

**Knurling Wheels:**
- All forms suitable

**Type of Machine:**
- Lathe machines and auto lathes
- CNC and conventional
- Centre height is integrated

**Features:**
- Special surface hardening for longer tool life time
- Knurl pins fixed by a screw – for a quick replacement of knurling wheels
- Fitting of the knurling wheels on the pin adjustable

### Table

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<thead>
<tr>
<th>No.</th>
<th>Working area</th>
<th>ø mm</th>
<th>a mm/</th>
<th>b mm</th>
<th>c mm</th>
<th>d mm</th>
<th>e mm</th>
<th>f mm</th>
<th>Knurling wheel size mm</th>
<th>Bolt</th>
<th>Rund disk</th>
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<td>20 x 8 x 6/13</td>
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<td>20 x 8 x 6/13</td>
<td>06TER0383</td>
<td>21BHR0380</td>
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</table>

**Your individual tool measurements:**

**Name:**

**Material:**

**Knurling profile on work piece (DIN 82):**

**Application:**

**Speed rate m/min:** 75

**Feed rate mm/rev:** 0.08

**Machine:**

**Tool:**

**Housing**

Brass (CuZn39Pb3)

**Knurling tool 132-2002200813**

**Knurling wheel GE30° 20x8x6/13 P0.8**
### Form Knurling Tools RD 2

**ZEUS Knurling Tool No. 141-08/10/12/16**

**Application:** Form knurling (without swarf removal), Plunge and feed knurling  
For knurling on work piece according to DIN 82: RAA; RGE 30°; RGE 45°

**Knurling Wheels:**  
RAA – 2 pieces AA  
RGE 30° – 1 piece BL 30° / 1 piece BR 30°  
RGE 45° – 1 piece BL 45° / 1 piece BR 45°

**Type of Machine:**  
- Sliding head auto lathes (screw machines) and small auto lathes  
- CNC and conventional  
- Centre height is integrated

**Features:**  
- Modular system – universal knurling tool for both left and right hand orientation  
- Easy handling by moving the knurling head to the reverse side  
- With flexible centering  
- Knurl pins and pivot pin fixed by a screw – for a quick replacement of knurling wheels / knurling head  
- Special surface hardening for longer tool life time  
- Carbide pins:  
  - higher speed rates  
  - faster production  
  - prolonged life

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<table>
<thead>
<tr>
<th>No.</th>
<th>Working area ø mm</th>
<th>a mm</th>
<th>b mm</th>
<th>c mm</th>
<th>d mm</th>
<th>e mm</th>
<th>f mm</th>
<th>x mm</th>
<th>Knurling wheels size mm</th>
<th>Spare parts Carbide pins No.</th>
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<td>06TER0964</td>
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</table>

**Your individual tool measurements:**

---

**Name:** 
Namaki (AMgSiPb)

**Material:** 
Aluminium (AMgSiPb)

**Application:** 
Knurling tool 141-12M10404  
Knurling wheel BL 30° / 10x4x4 P0,3  
Knurling wheel BR 30° / 10x4x4 P0,3

**Speed rate m/min:**  
40

**Feed rate mm/rev:**  
0.05 / 0.1

**Machine:**  
Tornos ENC 164

**Tool:**  
Knurling tool 141-12M10404  
Knurling wheel BL 30° / 10x4x4 P0,3  
Knurling wheel BR 30° / 10x4x4 P0,3
### ZEUS Knurling Tool No. 141-20/25/80/85/90

**Application:** Form knurling (without swarf removal), plunge and feed knurling

For knurling on work piece according to DIN 82: RAA; RGE 30°; RGE 45°

**Knurling Wheels:**
- RAA – 2 pieces AA
- RGE 30° – 1 piece BL 30° / 1 piece BR 30°
- RGE 45° – 1 piece BL 45° / 1 piece BR 45°

**Type of Machine:**
- Lathe machines and auto lathes
- CNC and conventional
- Centre height is integrated

**Features:**
- Modular system – universal knurling tool for both left and right hand orientation
- Easy handling by moving the knurling head to the reverse side
- With flexible centering
- Knurl pins and pivot pin fixed by a screw for a quick replacement of knurling wheels/knurling head
- Special surface hardening for longer tool life time
- Carbide pins:
  - higher speed rates
  - faster production
  - prolonged life

---

### Table: Tool Measurements

| No.                  | Working area | a (mm) | b (mm) | c (mm) | d (mm) | e (mm) | f (mm) | x (mm) | Knurl wheel size | Replacement parts
|----------------------|--------------|--------|--------|--------|--------|--------|--------|--------|-----------------|----------------------
| 141-20M200806        | 10 - 80      | 20     | 20     | 140    | 20     | 50     | 42     | 2,5    | 20 x 8 x 6      | 06TER0965            |
| 141-25M250806        | 50 - 200     | 25     | 20     | 166    | 20     | 56     | 55     | 2,5    | 25 x 8 x 6      | 06TER0965            |
| 141-80M581414        | 6 - 15       | 5/8"   | 16     | 129    | 16     | 39     | 34     | 2      | 5/8" x 1/4" x 1/4" | 06TER0969            |
| 141-85M343814        | 10 - 80      | 3/4"   | 140    | 20     | 20     | 50     | 41     | 2      | 3/4" x 3/8" x 1/4" | 06TER0989            |
| 141-90M343814        | 10 - 80      | 1"     | 160    | 20     | 20     | 50     | 41     | 2      | 3/4" x 3/8" x 1/4" | 06TER0989            |

Your individual tool measurements:

---

**Name:** Union Nut

**Material:** Brass (CuZn39Pb3)

**Application:**
- Plunge and feed knurling, without swarf removal
- Weiler – Lathe machine

**Speed rate m/min:** 82

**Feed rate mm/rev:** 0.08 / 0.18

**Machine:** Weiler – Lathe machine

**Tool:** Knurling tool 141-20M200806

Knurling wheel BL 30° 20x8x6 P0.6
Knurling wheel BR 30° 20x8x6 P0.6

---

[Diagram of knurling tool and measurements]
**Form Knurling Tools RD 2**

**ZEUS Knurling Tool No. 142-16/20/25/80/85/90**

**Application:** Form knurling (without swarf removal), Plunge and feed knurling. For knurling on work piece according to DIN 82: RAA; RGE 30°; RGE 45°. Knurling to a shoulder.

**Knurling Wheels:** RAA – 2 pieces AA. RGE 30° – 1 piece BL 30° / 1 piece BR 30°. RGE 45° – 1 piece BL 45° / 1 piece BR 45°.

**Type of Machine:** • Lathe machines and auto lathes. • CNC and conventional. • Centre height is integrated.

**Features:** • Modular system – universal knurling tool for both left and right hand orientation. • Easy handling by moving the knurling head to the reverse side. • With flexible centering. • Knurl pins fixed by a screw – for a quick replacement of knurling wheels. • Special surface hardening for longer tool life time. • Fitting of the knurling wheels on the pin adjustable.

**No.**

<table>
<thead>
<tr>
<th>Working area</th>
<th>ø mm</th>
<th>a mm/inch</th>
<th>b mm</th>
<th>c mm</th>
<th>d mm</th>
<th>e mm</th>
<th>f mm</th>
<th>Knurling wheels size mm</th>
<th>Bolt</th>
<th>Run disk</th>
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Your individual tool measurements:

---

**Knurling profile on work piece DIN 82**

RAA  | RGE

---

**Type of Machine:** • Lathe machines and auto lathes. • CNC and conventional. • Centre height is integrated.

**Features:** • Modular system – universal knurling tool for both left and right hand orientation. • Easy handling by moving the knurling head to the reverse side. • With flexible centering. • Knurl pins fixed by a screw – for a quick replacement of knurling wheels. • Special surface hardening for longer tool life time. • Fitting of the knurling wheels on the pin adjustable.

---

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### Form Knurling Tools RD 2

**ZEUS Knurling Tool No. 151-08/10/12/16**

**Application:** Form knurling (without swarf removal),
Plunge and feed knurling
For knurling on components according to DIN 82: RAA; RGE 30°; RGE 45°

**Knurling Wheels:**
- RAA – 2 pieces AA
- RGE 30° – 1 piece BL 30° / 1 piece BR 30°
- RGE 45° – 1 piece BL 45° / 1 piece BR 45°

**Type of Machine:**
- Sliding head auto lathes (screw machines) and small auto lathes
- CNC and conventional
- Centre height is integrated

**Features:**
- Knurl pins fixed by a screw – for a quick replacement of knurling wheels
- Special surface hardening for longer tool life time
- Fitting of the knurling wheels on the pin adjustable
- Carbide pins
  - higher speed rates
  - faster production
  - prolonged life

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<th>a mm</th>
<th>b mm</th>
<th>c mm</th>
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**Your individual tool measurements:**

**Name:**
**Pin**
**Material:**
**CuBe**
**Knurling profile on work piece (DIN 82):**
**RAA**
**RGE**

**Application:**
- Plunge and feed knurling
- without swarf removal

**Speed rate m/min:**
**89**

**Feed rate mm/rev:**
**0.11**

**Machine:**
**Strohm M125**

**Tool:**
- Knurling tool 151-08L100404
- Knurling wheel BL 30°: 10x4x4 P0,5
- Knurling wheel BL 45°: 10x4x4 P0,5

![Knurling profile on work piece DIN 82](imageURL)
**Form Knurling Tools RD 2**

**ZEUS Knurling Tool No. 161-08/10/12**

**Application:** Form knurling (without swarf removal), Plunge and feed knurling

For knurling on work piece according to DIN 82: RAA; RGE 30°; RGE 45°

**Knurling Wheels:**
- RAA – 2 pieces AA
- RGE 30° – 1 piece BL 30° / 1 piece BR 30°
- RGE 45° – 1 piece BL 45° / 1 piece BR 45°

**Type of Machine:**
- Sliding head auto lathes (screw machines) and small auto lathes
- CNC and conventional
- Centre height is integrated

**Features:**
- Low radial pressure on the work piece
- Easy setting of the knurl holder to diameter and center line
- Knurl pins fixed by a screw – for a quick replacement of knurling wheels
- Special surface hardening for longer tool life time
- Carbide pins:
  - higher speed rates
  - faster production
  - prolonged life

<table>
<thead>
<tr>
<th>No.</th>
<th>Working area</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
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Your individual tool measurements:

---

**Name:** Spindle

**Material:** Stainless Steel (1.4104)

**Application:**
- Plunge knurling, without swarf removal
- 23
- Richt TNL

**Machine:** Knurling tool 161-12L100404

**Tool:** Knurling wheel 10x4x4 P0,4
Form Knurling Tools RD 2

ZEUS Knurling Tool No. 161-16/20/25

Application: Form knurling (without swarf removal), Plunge and feed knurling
For knurling on work piece according to DIN 82: RAA; RGE 30°; RGE 45°

Knurling Wheels: RAA – 2 pieces AA
RGE 30° – 1 piece BL 30° / 1 piece BR 30°
RGE 45° – 1 piece BL 45° / 1 piece BR 45°

Type of Machine:
• Lathe machines and auto lathes
• CNC and conventional
• Centre height is integrated

Features:
• Low radial pressure on the work piece
• Easy setting of the knurl holder to diameter and center line
• Knurl pins fixed by a screw – for a quick replacement of knurling wheels
• Special surface hardening for longer tool life time
• Carbide pins:
  – higher speed rates
  – faster production
  – prolonged life
• Different specifications available on demand:
  – Feed knurling with knurl-length > 100 mm

Knurling profile on work piece DIN 82

RAA  RGE

No. Working area ø mm a mm b mm c mm d mm e mm f mm g mm Knurling wheels size mm Spare parts Carbide pins No.
161-16L200606 5 - 25 16 16 134 48 37 96 104 20 x 6 x 6 06TER0965
161-16R200606 5 - 25 16 16 134 48 37 96 104 20 x 6 x 6 06TER0965
161-16L250606 25 - 50 16 16 136,5 48 39,5 101 106,5 25 x 6 x 6 06TER0965
161-16R250606 25 - 50 16 16 136,5 48 39,5 101 106,5 25 x 6 x 6 06TER0965
161-20L200606 5 - 25 20 20 134 52 37 96 104 20 x 6 x 6 06TER0965
161-20R200606 5 - 25 20 20 134 52 37 96 104 20 x 6 x 6 06TER0965
161-20L250606 25 - 50 20 20 136,5 52 39,5 101 106,5 25 x 6 x 6 06TER0965
161-20R250606 25 - 50 20 20 136,5 52 39,5 101 106,5 25 x 6 x 6 06TER0965
161-25L200606 5 - 25 25 20 134 52 37 96 104 20 x 6 x 6 06TER0965
161-25R200606 5 - 25 25 20 134 52 37 96 104 20 x 6 x 6 06TER0965
161-25L250606 25 - 50 25 20 136,5 52 39,5 101 106,5 25 x 6 x 6 06TER0965
161-25R250606 25 - 50 25 20 136,5 52 39,5 101 106,5 25 x 6 x 6 06TER0965

Your individual tool measurements:

No. Working area ø mm a mm b mm c mm d mm e mm f mm g mm Knurling wheels size mm Spare parts Carbide pins No.
161-16L200606 5 - 25 16 16 134 48 37 96 104 20 x 6 x 6 06TER0965
161-16R200606 5 - 25 16 16 134 48 37 96 104 20 x 6 x 6 06TER0965
161-16L250606 25 - 50 16 16 136,5 48 39,5 101 106,5 25 x 6 x 6 06TER0965
161-16R250606 25 - 50 16 16 136,5 48 39,5 101 106,5 25 x 6 x 6 06TER0965
161-20L200606 5 - 25 20 20 134 52 37 96 104 20 x 6 x 6 06TER0965
161-20R200606 5 - 25 20 20 134 52 37 96 104 20 x 6 x 6 06TER0965
161-20L250606 25 - 50 20 20 136,5 52 39,5 101 106,5 25 x 6 x 6 06TER0965
161-20R250606 25 - 50 20 20 136,5 52 39,5 101 106,5 25 x 6 x 6 06TER0965
161-25L200606 5 - 25 25 20 134 52 37 96 104 20 x 6 x 6 06TER0965
161-25R200606 5 - 25 25 20 134 52 37 96 104 20 x 6 x 6 06TER0965
161-25L250606 25 - 50 25 20 136,5 52 39,5 101 106,5 25 x 6 x 6 06TER0965
161-25R250606 25 - 50 25 20 136,5 52 39,5 101 106,5 25 x 6 x 6 06TER0965

Your individual tool measurements:
Form Knurling Tools

ZEUS Knurling Tool No. 192-12/15/20

Application: Form knurling (without swarf removal), Feed knurling. For knurling on work piece according to DIN 82: RAA; RGE 30°, RGE 45°. Knurling to a shoulder.

Knurling Wheels: RAA – 3 pieces AA. RGE 30° – 2 pieces BL 30°/1 piece BR 30°. RGE 45° – 2 pieces BL 45°/1 piece BR 45°.

Type of Machine:
- Lathe machines, auto lathes, sliding head auto lathes (screw machines).
- Rotary transfer machines.
- CNC and conventional.

Features:
- Two working areas by changing the position of the knurl holder.
- Working area 1 = AB1
- Working area 2 = AB2
- Scale for setting the work piece diameter.
- Fixing screws to set the diameter of the work piece.
- Available as a spare part: 1 set jaws for Tool No. 291 – herewith the tool can be modified to a cut knurling tool.
- Further shank sizes and shank according to DIN 69880 I available on demand.
- Low radial pressure on the work piece.

No. | Working area ø mm | a ø mm | d ø mm | e mm | h mm | i ø mm | j ø mm | k ø mm | l mm | Knurling wheels size mm | Spare part set
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
192-12M150668 with AB1 Ø 2,5 - 15 12 46 46 40 9 11 46 14 10 x 3 x 6 21BHR0502 –
with AB2 Ø 4 - 15 12 46 48 40 9 11 46 16 15 x 6 x 6/8 – 21BHR0510
192-15M250608 with AB1 Ø 5 - 26 15 70 75 50 8,5 16 70 26 25 x 6 x 8 21BHR0506 –
with AB2 Ø 4 - 30 15 70 74 50 8,5 16 70 25 20 x 8 x 10/12 – 21BHR0511
192-20M250608 with AB1 Ø 5 - 26 20 70 75 50 14 16 70 26 25 x 6 x 8 21BHR0506 –
with AB2 Ø 4 - 30 20 70 74 50 14 16 70 25 20 x 8 x 10/12 – 21BHR0511

Your individual tool measurements:

Name: Hose fitting
Material: Brass (CuZn38Pb1,5)
Application: Feed knurling, without swarf removal
Speed rate m/min: 76
Feed rate mm/rev: 0,25
Machine: Spinner – Lathe machine
Knurling tool 192-12M150668
Knurling wheel 2xBL30° 15x6x6/8 P0,4
Knurling wheel 1xBR30° 15x6x6/8 P0,4

No. 1
---
192-12M150668 21BHR0519
192-15M250608 21BHR0520
192-20M250608 21BHR0520
Bezeichnung: Überwurfmutter
Werkstoff: Messing (CuZn39Pb3)
Rändelprofil am Werkstück (DIN82): RGE 0,8 (30°)
Anwendung: Einstich- und Längsrändeln
- spanlose Umformung
Schnittgeschwindigkeit: 82
Vorschub: 0,08 / 0,18
Maschine: Weiser - Drehmaschine
Eingesetztes Werkzeug: Rändelwerkzeug 14-1-20M200806
Rändelrad BL30° 20x8x6 T0,8
Rändelrad BR30° 20x8x6 T0,8

Cut Knurling Tools
ZEUS Cut Knurling Tool No. 231-08/10/12/16

Application:
Cut knurling (swarf removal), Feed knurling
For knurling on work piece according to DIN 82: RAA; RBR; RBL

Knurling Wheels:
RAA – 1 piece BL 30° (for 231-L); RAA – 1 piece BR 30° (for 231-R)
RBR 30° – Form AA (for 231-R); RBL 30° – Form AA (for 231-L)

Type of Machine:
• Sliding head auto lathes (screw machines) and small auto lathes
• CNC and conventional
• Centre height is integrated

Features:
• Adjustment of the clearance angle with set screws in the shank
• Fine adjustment for straight knurling with adjustable knurling head
• Special surface hardening for longer tool life time
• Carbide bushings:
  – higher speed rates
  – faster production
  – prolonged life

<table>
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<th>Working area</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
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<td>28</td>
<td>15 x 4 x 8 BR 30°</td>
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Your individual tool measurements:

No. Working area ø mm ZEUS Cut Knurling Tools RF 1

Knurling profile on work piece DIN 82

RAA RBL RBR
### ZEUS Cut Knurling Tool No. 231-20/25

**Application:** Cut knurling (swarf removal), Feed knurling

For knurling on work piece according to DIN 82: RAA, RBR, RBL

**Knurling Wheels:**
- RAA – 1 piece BL 30° (for 231-L)
- RAA – 1 piece BR 30° (for 231-R)
- RBR 30° – Form AA (for 231-R)
- RBL 30° – Form AA (for 231-L)

**Type of Machine:**
- Lathe machines and auto lathes
- CNC and conventional
- Centre height is integrated

**Features:**
- Modular system – cut knurling head for right and left-hand versions are interchangeable
- Adjustment of the clearance angle with set screws in the shank
- Fine adjustment for straight knurling with adjustable knurling head
- Special surface hardening for longer tool life time
- Carbide bushings: * – higher speed rates
  - faster production
  - prolonged life

### Knurling profile on work piece DIN 82

- RAA
- RBL
- RBR

---

### Cut Knurling Tools

#### No. 231-20L250608

- Ø mm: 20
- a mm: 25
- b mm: 25
- c mm: 129
- d mm: 31
- e mm: 49
- f mm: 32
- Knurling wheel size: 25 x 6 x 8
- Spare part set: 21BHR0506

#### No. 231-20R250608

- Ø mm: 20
- a mm: 25
- b mm: 25
- c mm: 129
- d mm: 31
- e mm: 49
- f mm: 32
- Knurling wheel size: 25 x 6 x 8
- Spare part set: 21BHR0507

#### No. 231-25L250608

- Ø mm: 25
- a mm: 25
- b mm: 25
- c mm: 129
- d mm: 31
- e mm: 49
- f mm: 37.5
- Knurling wheel size: 25 x 6 x 8
- Spare part set: 21BHR0506

#### No. 231-25R250608

- Ø mm: 25
- a mm: 25
- b mm: 25
- c mm: 129
- d mm: 31
- e mm: 49
- f mm: 37.5
- Knurling wheel size: 25 x 6 x 8
- Spare part set: 21BHR0507

#### No. 231-25L421316

- Ø mm: 25
- a mm: 25
- b mm: 25
- c mm: 171
- d mm: 46
- e mm: 81
- f mm: 46
- Knurling wheel size: 42 x 13 x 16
- Spare part set: 21BHR0508

#### No. 231-25R421316

- Ø mm: 25
- a mm: 25
- b mm: 25
- c mm: 171
- d mm: 46
- e mm: 81
- f mm: 46
- Knurling wheel size: 42 x 13 x 16
- Spare part set: 21BHR0509

---

### Your individual tool measurements:

- No. 1:
  - 231-20L250608
  - 21BHR0187
  - 21BHR0506

- No. 2:
  - 231-20R250608
  - 21BHR0187
  - 21BHR0507

---

**Name:** Housing ring

**Material:** Brass (CuZn39Pb3)

**Application:**
- Feed knurling, swarf removal

**Speed rate m/min:** 95

**Feed rate mm/rev:** 0.16

**Machine:** Mazak QT

**Tool:** Knurling tool 231-20L250608
  - Knurling wheel BL30° 25x6x8 P0.6
ZEUS Cut Knurling Tool No. 240-16/20

Application: Cut knurling (swarf removal), Feed knurling
For knurling on work piece according to DIN 82: RGE 30°; RGE 45°

Knurling Wheels:
- RGE 30° – 2 pieces AA
- RGE 45° – 1 piece BL 15° / 1 piece BR 15°

Type of Machine: • Lathes machines and auto lathes
• Conventional
• Centre height to be adjusted

Features:
• Easy setting and adjustment
• Adjustment of diameter is made at central setting screw with setting scale
• Scale for setting the work piece diameter – for an even profil depth
• Fine adjustment for positioning the cut knurling head
• Special surface hardening for longer tool life time
• Carbide bushings:
  – higher speed rates
  – faster production
  – prolonged life

<table>
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<th>No.</th>
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<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
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Your individual tool measurements:

Name: Nut
Material: Brass (CuZn39Pb3)
Application:
- Feed knurling, swarf removal
Speed rate m/min:
- 90
Feed rate mm/rev:
- 0,14

Gildemeister NEF
Knurling tool 240-20M250608
Knurling wheel 2xAA 25x6x8 P0,8

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Cut Knurling Tools RF 2

ZEUS Cut Knurling Tool No. 240-40/60

Application: Cut knurling (swarf removal), Feed knurling
For knurling on work piece according to DIN 82: RGE 30°, RGE 45°

Knurling Wheels:
- RGE 30° – 2 pieces AA
- RGE 45° – 1 piece BL 15° / 1 piece BR 15°

Type of Machine:
- Lathe machines and auto lathes
- Conventional
- Centre height to be adjusted

Features:
- Scale for setting the work piece diameter
- Fine adjustment for positioning the cut knurling head – for an even profile depth

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<th>c mm</th>
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Your individual tool measurements:

Knurling profile on work piece DIN 82

Application:
- Cut knurling (swarf removal), Feed knurling
- For knurling on work piece according to DIN 82: RGE 30°, RGE 45°

Knurling Wheels:
- RGE 30° – 2 pieces AA
- RGE 45° – 1 piece BL 15° / 1 piece BR 15°

Type of Machine:
- Lathe machines and auto lathes
- Conventional
- Centre height to be adjusted

Features:
- Scale for setting the work piece diameter
- Fine adjustment for positioning the cut knurling head – for an even profile depth

Name: Roll
Material: Steel ST56
Application: Feed knurling, swarf removal
Speed rate m/min: 71
Feed rate mm/rev: 0.2
Machine: Böhinger V6
Tool:
- Knurling tool 240-40U321316
- Knurling wheel 2xA32x13x16 P1.6
**Cut Knurling Tools**

**Name:** Handle for medical instrument

**Material:** Titanium

**Application:** Feed knurling

For knurling on work piece according to DIN 82: RGE 30°; RGE 45°

**Knurling Wheels:**
- RGE 30° – 2 pieces AA
- RGE 45° – 1 piece BL 15° / 1 piece BR 15°

**Type of Machine:**
- Sliding head auto lathes (screw machines) and small auto lathes
- CNC and conventional
- Centre height is integrated

**Features:**
- Easy setting and adjustment
- Adjustment of diameter is made at central setting screw with setting scale
- Scale for setting the work piece diameter
- Fine adjustment for positioning the cut knurling head – for an even profile depth
- Special surface hardening for longer tool life time
- Carbide bushings: – higher speed rates
  - faster production – prolonged life

**Knurling profile on work piece**

**DIN 82**

**RGE**

---

**ZEUS Cut Knurling Tool No. 241-08/10/12/16**

**Application:**
- Cut knurling (swarf removal), Feed knurling

**For knurling on work piece according to DIN 82: RGE 30°; RGE 45°**

**Knurling Wheels:**
- RGE 30° – 2 pieces AA
- RGE 45° – 1 piece BL 15° / 1 piece BR 15°

**Type of Machine:**
- Sliding head auto lathes (screw machines) and small auto lathes
- CNC and conventional
- Centre height is integrated

**Features:**
- Easy setting and adjustment
- Adjustment of diameter is made at central setting screw with setting scale
- Scale for setting the work piece diameter
- Fine adjustment for positioning the cut knurling head – for an even profile depth
- Special surface hardening for longer tool life time
- Carbide bushings: – higher speed rates
  - faster production – prolonged life

**Knurling profile on work piece**

**DIN 82**

**RGE**

---

### Cut Knurling Tools RF 2

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* Tool design differs from tool pictured above.

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---

**name**: Handle for medical instrument

**Material**: Titanium

**Application**: Feed knurling, swarf removal

**Speed rate m/min**: 30

**Feed rate mm/rev**: 0.06

**Machine**: Star RNC 16

**Tool**: Knurling tool 241-10R100306

Knurling wheel 2xAA 10x3x6 P1,0

---
**Cut Knurling Tools RF 2**

**ZEUS Cut Knurling Tool No. 241-16/20/25**

**Application:** Cut knurling (swarf removal), Feed knurling

For knurling on work piece according to DIN 82: RGE 30°; RGE 45°

**Knurling Wheels:**
- RGE 30° – 2 pieces AA / RGE 45° – 1 piece BL 15° / 1 piece BR 15°

**Type of Machine:**
- CNC and conventional
- Centre height is integrated
- Easy setting and adjustment
- Adjustment of diameter is made at central setting screw with setting scale
- Scale for setting the work piece diameter
- Fine adjustment for positioning the cut knurling head
- Detachable setting aid for optical pre-setting
- Modular system – universal cut knurling tool for both left and right hand orientation
- Easy handling by moving the knurling head to the reverse side
- Special surface hardening for longer tool life time
- Carbide bushings: - higher speed rates – faster production – prolonged life

**Features:**
- Easy setting and adjustment
- Adjustment of diameter is made at central setting screw with setting scale
- Scale for setting the work piece diameter
- Fine adjustment for positioning the cut knurling head
- Detachable setting aid for optical pre-setting
- Modular system – universal cut knurling tool for both left and right hand orientation
- Easy handling by moving the knurling head to the reverse side
- Special surface hardening for longer tool life time
- Carbide bushings: - higher speed rates – faster production – prolonged life

---

### Table: Cut Knurling Tool No. 241-16/20/25

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</table>

**Your individual tool measurements:**

### Diagram: Cut Knurling Tool No. 241-16/20/25

---

**Name:** Union Nut

**Material:** Brass (CuZn36Pb3)

**Application:**
- Feed knurling, swarf removal
- 113

**Speed rate m/min:**
- 0.14

**Feed rate mm/rev:**
- Index ABC

**Tool:**
- Knurling tool 241-16M150408
- Knurling wheel 2xAA 15x4x8 P0.8

---

**Table: Individual Tool Measurements**

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Cut Knurling Tools

ZEUS Cut Knurling Tool No. 241-30/40/50

Application:

- Cut knurling (swarf removal), Feed knurling
- For knurling on work piece according to DIN 82: RGE 30°, RGE 45°

Knurling Wheels:

- RGE 30° – 2 pieces AA
- RGE 45° – 1 piece BL 15° / 1 piece BR 15°

Type of Machine:

- Lathe machines and auto lathes
- CNC

Features:

- Easy setting and adjustment
- Adjustment of diameter is made at central setting screw with setting scale
- Scale for setting the work piece diameter
- Fine adjustment for positioning the cut knurling head
- Detachable setting aid for optical pre-setting
- Connection for coolant
- Shank according to DIN 69880 l
- Special surface hardening for longer tool life time
- Carbide bushings:
  - higher speed rates
  - faster production
  - prolonged life

<table>
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Your individual tool measurements:

Name: Nut
Material: Brass (CuZn39Pb3)
Knurling profile on work piece (DIN 82):
Application:
Speed rate m/min:
Feed rate mm/rev:
Machine:
Tool:
Knurling tool 241-30R250608
Knurling wheel 2xAA 25x6x8 PO,8
### Cut Knurling Tools RF2

**Application:** Cut knurling (swarf removal), Feed knurling

**Knurling Wheels:**
- RGE 30° – 2 pieces AA
- RGE 45° – 1 piece BL 15° / 1 piece BR 15°

**Type of Machine:**
- Sliding head auto lathes (screw machines) and small auto lathes
- CNC and conventional
- Centre height is integrated

**Features:**
- Special surface hardening for longer tool life time
- Carbide bushings:
  - higher speed rates
  - faster production
  - prolonged life

---

### Table: ZEUS Cut Knurling Tools No. 251-08/10/12/16

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<td>10 x 3 x 6</td>
<td>21BHR0502</td>
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<tr>
<td>251-12L100306</td>
<td>2 - 15</td>
<td>12</td>
<td>12</td>
<td>98,5</td>
<td>23</td>
<td>18,5</td>
<td>24</td>
<td>10 x 3 x 6</td>
<td>21BHR0502</td>
</tr>
<tr>
<td>251-12R100306</td>
<td>2 - 15</td>
<td>12</td>
<td>12</td>
<td>98,5</td>
<td>23</td>
<td>18,5</td>
<td>24</td>
<td>10 x 3 x 6</td>
<td>21BHR0502</td>
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<tr>
<td>251-16L150408</td>
<td>3 - 50</td>
<td>16</td>
<td>16</td>
<td>108</td>
<td>34</td>
<td>28</td>
<td>32</td>
<td>15 x 4 x 8</td>
<td>21BHR0504</td>
</tr>
<tr>
<td>251-16R150408</td>
<td>3 - 50</td>
<td>16</td>
<td>16</td>
<td>108</td>
<td>34</td>
<td>28</td>
<td>32</td>
<td>15 x 4 x 8</td>
<td>21BHR0504</td>
</tr>
</tbody>
</table>

Your individual tool measurements:

**Name:** Housing

**Material:** Brass (CuZn39Pb3)

**Application:** Feed knurling, swarf removal

**Speed rate m/min:**
- 118

**Feed rate mm/rev:**
- 0.18

**Machine:**
- Gildemeister GLD 20

**Tool:**
- Knurling tool 251-129100306
- Knurling wheel BL 30° 10x3x6
- Knurling wheel BR 30° 10x3x6
**Cut Knurling Tools RF 3**

**ZEUS Cut Knurling Tool No. 291-12/15/20**

*Application:* Cut knurling (swarf removal), Feed knurling

For knurling on work piece according to DIN 82: RGE 30°, RGE 45°

*Knurling Wheels:*
- RGE 30° – 3 pieces AA
- RGE 45° – 1 piece BL 15° / 2 piece BR 15°

*Type of Machine:* • Lathe machines, auto lathes, sliding head auto lathes (screw machines), rotary transfer machines
• CNC and conventional

*Features:* • Two working areas by changing the position of the knurl holder
  - working area 1 = AB1
  - working area 2 = AB2
• Scale for setting the work piece diameter
• Fixing screws to set the diameter of the work piece
• Available as a spare part: 1 set jaws for tool No. 192 – herewith the tool can be modified to a form knurling tool
• Further shank sizes and shank according to DIN 69880 I available on demand
• Low radial pressure on the workpiece
• Carbide bushings:
  - higher speed rates
  - faster production
  - prolonged life

---

**No.** | **Working area** | **a** | **d** | **e** | **h** | **i** | **j** | **k** | **l** | **Knurling wheels** | **Spare part set**
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
291-12M100306 | AB1 | 3 - 15 | 12 | 46 | 46 | 40 | 9 | 11 | 46 | 14 | 10 x 3 x 6 | 21BHR0502 ¹
291-15M150408 | AB1 | 6 - 30 | 15 | 70 | 75 | 50 | 8,5 | 16 | 70 | 26 | 15 x 4 x 8 | 21BHR0504 ²
| AB2 | 25 - 55 | 15 | 70 | 74 | 50 | 8,5 | 16 | 70 | 25 | 15 x 4 x 8 | 21BHR0504 ²
291-20M150408 | AB1 | 6 - 30 | 20 | 70 | 75 | 50 | 14 | 16 | 70 | 26 | 15 x 4 x 8 | 21BHR0504 ²
| AB2 | 25 - 55 | 20 | 70 | 74 | 50 | 14 | 16 | 70 | 25 | 15 x 4 x 8 | 21BHR0504 ²

*Your individual tool measurements:*
Special Tools
**Special Tools**

**ZEUS Knurling Tool No. 311/312**

Application:  
- Form knurling (without swarf removal),  
- Face knurling, Conical knurling

Knurling Wheels:  
- RAA – 1 piece KAA  
- RBR – 1 piece KBL  
- RBL – 1 piece KBR  
- ROE 30°/45° – 1 piece KGV  
- RGV 30°/45° – 1 piece KGE

Custom made knurling wheels – see page 22

Type of Machine:  
- Tool design according to machine requirements

Features:  
- Special surface hardening for longer tool life time

---

**Enquiry Form:**

(Please tick/complete as required)

**Required information for tool holder:**

- 311-xxL/Rxxxxxx  
- 312-xxL/Rxxxxxx

Full angle of work piece: ______°

Holder for:  
- CNC  
- conventional  
- sliding head auto lathe

With CNC / sliding head auto lathe:  
- right-turning  
- or left-turning

Required shank size (a x b): _____ x _____ mm

**Required information for knurling wheels:**

Knurling profile on component:  
- RAA  
- other profile: ______

Pitch: _____ mm  
- TPI/CP  
- _____ DP

Profile angle: 90° (DIN403)  
- or other angle: ______

Please submit work piece drawing!

---

**Note:**

Position of required pitch

---

Name:  
- Windscreen wiper spindle

Material:  
- C45Pb

Profile on work piece (DIN82):  
- AA 0.6

Application:  
- Plunge knurling – without swarf removal

Speed rate m/min:  
- 28

Feed rate mm/rev:  
- 0.08

Machine type:  
- CitizenC16

Tool:  
- Knurling tool 311-10
  - Knurling KAA 15x6x4 P0.6
### ZEUS Knurling Tool No. 330-10/14/16 U

**Application:** Form knurling (without swarf removal), Internal knurling
Suitable for all knurling patterns, profiles and markings

**Knurling Wheels:** All forms suitable

**Type of Machine:**
- Lathe machines and auto lathes
- Conventional
- Centre height is integrated

**Features:**
- Special surface hardening for longer tool life time
- Carbide pins:
  - higher speed rates
  - faster production
  - prolonged life

---

**Table: Knurling Wheel Specifications**

<table>
<thead>
<tr>
<th>No.</th>
<th>Working area</th>
<th>a mm</th>
<th>b mm</th>
<th>c mm</th>
<th>d mm</th>
<th>x mm</th>
<th>Knurling wheel size mm</th>
<th>Spare parts Carbide pins No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>330-10U100404</td>
<td>&gt; Ø 19</td>
<td>10</td>
<td>12</td>
<td>160</td>
<td>17.5</td>
<td>1.5</td>
<td>10 x 4 x 4</td>
<td>06TER0973</td>
</tr>
<tr>
<td>330-14U150604</td>
<td>&gt; Ø 26</td>
<td>14</td>
<td>14</td>
<td>160</td>
<td>24</td>
<td>2</td>
<td>15 x 4 x 4</td>
<td>06TER0973</td>
</tr>
<tr>
<td>330-14U150404</td>
<td>&gt; Ø 26</td>
<td>14</td>
<td>14</td>
<td>160</td>
<td>24</td>
<td>2</td>
<td>15 x 6 x 4</td>
<td>06TER0979</td>
</tr>
<tr>
<td>330-14U250606</td>
<td>&gt; Ø 30/33</td>
<td>14</td>
<td>14</td>
<td>160</td>
<td>31.5</td>
<td>5.5</td>
<td>20 x 6 x 6 / 25 x 6 x 6</td>
<td>06TER0979</td>
</tr>
<tr>
<td>330-16U250806</td>
<td>&gt; Ø 30/33</td>
<td>16</td>
<td>16</td>
<td>160</td>
<td>31.5</td>
<td>5.5</td>
<td>20 x 8 x 6 / 25 x 8 x 6</td>
<td>06TER0980</td>
</tr>
</tbody>
</table>

**Your individual tool measurements:**
Zeus Knurling Tool No. 391-00

Application:
- Form knurling (without swarf removal), Feed knurling
- For knurling on work piece according to DIN 82: RAA; RGE 30°; RGE 45°

Knurling Wheels:
- RAA – 3 pieces AA
- RGE 30° – 2 pieces BL 30° / 1 piece BR 30°
- RGE 45° – 2 pieces BL 45° / 1 piece BR 45°

Type of Machine:
- Lathe machines, auto lathes, sliding head auto lathes (screw machines), rotary transfer machines
- CNC and conventional

Features:
- To insert into hand or machine die holder
- The die dimensions are in keeping with those of standard threading dies
- According to customer requirements – Designed according to exact diameter and pitch of the work piece
- Low radial pressure on the work piece
- Special surface hardening for longer tool life time

Enquiry Form:
(Please tick/compleate as required)

Application for variable work piece-Ø (Provide Ø of work piece provided by Hommel + Keller):

Tool holder (Ø):
- Ø25
- Ø30
- Ø38
- Ø45
- Ø55

Knurling profile:
- RAA
- RGE30°
- RGE45°
- RBL
- RBR

Pitch: ______ mm _____ TPI/CP ______ DP

Work piece-Ø after knurling (da): ______ mm Material of work piece: ________________

Application for preset work piece-Ø (e.g. blank bars):

Tool holder (Ø):
- Ø25
- Ø30
- Ø38
- Ø45
- Ø55

Knurling profile:
- RAA
- RGE30°
- RGE45°
- RBL
- RBR

Pitch: ______ mm _____ TPI/CP ______ DP

Work piece-Ø ______ mm Material of work piece: ________________

Note: Measurement “a” depends partly on work piece diameter. Please submit work piece drawing!
As a leading company in knurling technology, Hommel + Keller have followed a path of international expansion and are today present on all major international markets.

To think globally and act locally – this philosophy is conveyed daily through our qualified agents across the globe.

The close contact to our customers is important to us. Our customer-care hotline, with experienced technicians in the field, will be able to assist you and give you individual advice on even the most complex application problems. To provide a continued level of customer service, our website is continually updated and provides a valuable source of information, also outside office-hours.

ZEUS.
Experience knurling technology at its best!

www.hommel-keller.de
Success through synergies!
Quality is the source of our success.
Flexibility and speed to market ensure your success.

High profile tools!
Knurling wheels, knurling tools, cut knurling tools, marking tools, special tools. Individual, customized tool solutions from engineering to prototyping.

Hardening is our job!
Full hardening service with over 30 years of experience and all heat treatment processes. State of the art hardening plants and technologies ensure absolute efficiency and quality.

High-tech PVD coatings!
Innovative surface technology for cutting and forming tools with qualified advice.