ROBUST AND COMPACT

Full disengagement

TORQUE LIMITERS

SERIES ST | 1,000 – 160,000 Nm

THE ULTIMATE COUPLING FROM 1,000 – 160,000 NM

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Series ST

TORQUE LIMITERS

Areas of application for the ST
Heavy duty applications
- Rolling mills
- Dredgers
- Steel mills
- Industrial shredders
- Industrial conveyors
- Wind turbines
- Extruders
- Wastewater management
- Tunnel boring machines
- and much more

Features of the ST
- Compact, simple design
- Full disengagement
- Robust
- Precise overload protection
- Torsionally rigid
- Adjustable torque setting
- Infinite life and maintenance free

RELIABLE TORQUE OVERLOAD PROTECTION

Use of ST torque limiters will minimize machine downtime due to crashes and increase the availability and productivity of your machine.

ST torque limiters are designed for high torque applications. This is achieved through the use of individual torque modules evenly spaced around the circumference of the coupling.

The ST torque limiter is based on a spring loaded, ball-detent design.

The transmittable torque is determined by the number of torque modules and their distance from the center of the coupling.

In the event of an overload, the balls exit the detents in the axial direction, resulting in a permanent separation of the drive and driven elements.

An axial force on the plunger re-engages the torque module.

The sealed torque module design prevents contamination by dirt and debris.

The torque module consists of two components. These include the adjustable housing and plunger core. The set torque is easily visible on a scale.
MODELS | FEATURES | POSSIBLE APPLICATIONS
---|---|---
**ST 1** | with keyway connection for indirect drives  ■ Compact, simple design  ■ Precise overload protection  ■ Torsionally rigid  ■ Integral bearings for timing belt pulley or sprocket | see page 4

**STN** | with conical clamp connection for indirect drives  ■ High clamping force  ■ Compact, simple design  ■ Precise overload protection  ■ Torsionally rigid  ■ Integral bearings for timing belt pulley or sprocket | see page 5

**ST 2** | with keyway connection and elastomer coupling  ■ Vibration damping  ■ Compensation for misalignment  ■ Precise overload protection | see page 8

**ST 3** | with keyway connection and disc coupling  ■ Torsionally rigid  ■ Compensation for misalignment  ■ Precise overload protection | see page 7

**ST 4** | with keyway connection and gear coupling  ■ High torque density  ■ Compensation for misalignment  ■ Precise overload protection | see page 10

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### Model ST 1

**Torque Limiter**

- **Material:** High-strength, nitro-carburized steel
- **Design:**
  - **Drive side:** Coupling hub with keyway connection or spline profile.
  - **Driven side:** Output flange with 12x fastening threads and integral bearings.
  - **Torque modules:** Evenly spaced around the circumference. Field adjustable within the selected range.
- **Temperature range:** -30 to +120° C
- **Service life:** Infinite life and maintenance free when operated within the technical specifications.
- **Fit tolerance:** Tolerance between hub and shaft 0.02 – 0.07 mm

### Technical Specifications

<table>
<thead>
<tr>
<th>Dimension/Property</th>
<th>ST 10</th>
<th>ST 25</th>
<th>ST 60</th>
<th>ST 160</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall length (mm)</td>
<td>A₁</td>
<td>A₂</td>
<td>A₁</td>
<td>A₂</td>
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<tr>
<td>Bore depth (mm)</td>
<td>B₁</td>
<td>B₂</td>
<td>B₁</td>
<td>B₂</td>
</tr>
<tr>
<td>Flange outside diameter (mm)</td>
<td>B</td>
<td></td>
<td></td>
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<tr>
<td>Fit length (mm)</td>
<td>C</td>
<td></td>
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<tr>
<td>Bore diameter possible Ø to Ø F7 (mm)</td>
<td>D₁</td>
<td>D₂</td>
<td>D₁</td>
<td>D₂</td>
</tr>
<tr>
<td>Flange centering diameter H7 (mm)</td>
<td>E₁</td>
<td>E₂</td>
<td>E₁</td>
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</tr>
<tr>
<td>Bolt circle diameter ±0.3 (mm)</td>
<td>F₁</td>
<td>F₂</td>
<td>F₁</td>
<td>F₂</td>
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<td>Outside diameter h7 (mm)</td>
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<td>G₂</td>
<td>G₁</td>
<td>G₂</td>
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<tr>
<td>Fastening threads Ø to Ø M16</td>
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<td>H₂</td>
<td>H₁</td>
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<tr>
<td>Thread depth (mm)</td>
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<td>I₂</td>
<td>I₁</td>
<td>I₂</td>
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<td>Distance (mm)</td>
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<td>M₁</td>
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<td>Actuation path (mm)</td>
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<td>N₂</td>
<td>N₁</td>
<td>N₂</td>
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<tr>
<td>Bolt circle diameter - modules (mm)</td>
<td>O₁</td>
<td>O₂</td>
<td>O₁</td>
<td>O₂</td>
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<tr>
<td>Hub outside diameter (mm)</td>
<td>P₁</td>
<td>P₂</td>
<td>P₁</td>
<td>P₂</td>
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<tr>
<td>Bore for fastening screw (mm)</td>
<td>Q₁</td>
<td>Q₂</td>
<td>Q₁</td>
<td>Q₂</td>
</tr>
<tr>
<td>Moment of inertia (approx.) D max. (10⁻⁶ kgm²)</td>
<td>R₁</td>
<td>R₂</td>
<td>R₁</td>
<td>R₂</td>
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<tr>
<td>Speed max. (1/min.)</td>
<td>S₁</td>
<td>S₂</td>
<td>S₁</td>
<td>S₂</td>
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<tr>
<td>Allowable max. radial force standard* (KN)</td>
<td>T₁</td>
<td>T₂</td>
<td>T₁</td>
<td>T₂</td>
</tr>
<tr>
<td>Approx. weight at D max. (kg)</td>
<td>U₁</td>
<td>U₂</td>
<td>U₁</td>
<td>U₂</td>
</tr>
</tbody>
</table>

* higher radial force through additional bearing support.
### MODEL STN

**TORQUE LIMITER**

**Material:**
High-strength, nitro-carburized steel

**Design:**
- **Drive side:** Coupling hub with tapered conical clamping connection
- **Driven side:** Output flange with 12x fastening threads and integral bearings.
- **Torque modules:** Evenly spaced around the circumference. Field adjustable within the selected range.

**Temperature range:**
-30 to +120° C

**Service life:**
Infinite life and maintenance free when operated within the technical specifications.

**Fit tolerance:**
Tolerance between hub and shaft 0.02 – 0.07 mm

---

#### MODEL STN

<table>
<thead>
<tr>
<th>Adjustment range available from - to (KNm)</th>
<th>Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6</td>
<td>10</td>
</tr>
<tr>
<td>2-10</td>
<td>15-25</td>
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<tr>
<td>2-8</td>
<td>15-35</td>
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<tr>
<td>4-15</td>
<td>30-60</td>
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<tr>
<td>8-18</td>
<td>40-100</td>
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<tr>
<td>10-25</td>
<td>80-160</td>
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</tbody>
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---

####Torque Limiters

<table>
<thead>
<tr>
<th>Component</th>
<th>10</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall length (mm)</td>
<td>A₀</td>
<td>210</td>
</tr>
<tr>
<td>Flange outside diameter (mm)</td>
<td>B</td>
<td>270</td>
</tr>
<tr>
<td>Fit length / keyway length (mm)</td>
<td>C₁</td>
<td>147</td>
</tr>
<tr>
<td>Effective clamping length (mm)</td>
<td>C₂</td>
<td>62</td>
</tr>
<tr>
<td>Bore diameter possible Ø to Ø F7 (mm)</td>
<td>D₁</td>
<td>65 - 110</td>
</tr>
<tr>
<td>Bore diameter max. Ø F7 with keyway (mm)</td>
<td>D₂</td>
<td>100</td>
</tr>
<tr>
<td>Inside diameter (mm)</td>
<td>D₃</td>
<td>110.2</td>
</tr>
<tr>
<td>Flange centering diameter H7 (mm)</td>
<td>E</td>
<td>170</td>
</tr>
<tr>
<td>Bolt circle diameter ø0.3 (mm)</td>
<td>F</td>
<td>220</td>
</tr>
<tr>
<td>Outside diameter H7 (mm)</td>
<td>G</td>
<td>209</td>
</tr>
<tr>
<td>Fastening threads</td>
<td>H</td>
<td>12 x M16</td>
</tr>
<tr>
<td>Thread depth (mm)</td>
<td>I</td>
<td>25</td>
</tr>
<tr>
<td>Fit length (mm)</td>
<td>J</td>
<td>6</td>
</tr>
<tr>
<td>Tightening screw ISO 4017</td>
<td>K</td>
<td>8 x M16</td>
</tr>
<tr>
<td>Tightening torque (Nm)</td>
<td>L</td>
<td>180</td>
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<tr>
<td>Distance (mm)</td>
<td>M</td>
<td>72</td>
</tr>
<tr>
<td>Actuation path (mm)</td>
<td>N</td>
<td>4</td>
</tr>
<tr>
<td>Bolt circle diameter - modules (mm)</td>
<td>O</td>
<td>220</td>
</tr>
<tr>
<td>Hub outside diameter (mm)</td>
<td>P</td>
<td>218</td>
</tr>
<tr>
<td>Moment of inertia (approx.) D max. (10⁻³ kgm²)</td>
<td>Q</td>
<td>446</td>
</tr>
<tr>
<td>Speed max. (1/min.)</td>
<td>R</td>
<td>4200</td>
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<tr>
<td>Allowable max. radial force standard* (KN)</td>
<td>S</td>
<td>40</td>
</tr>
<tr>
<td>Approx. weight at D max. (Kg)</td>
<td>T</td>
<td>50</td>
</tr>
</tbody>
</table>

---

*higher radial force through additional bearing support.

---

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Full disengagement

MODEL ST1 / STN

Mounting example with sprocket and keyway connection

Ordering example

```
ST1 /025 / 4-15 / 120 / 25 / xx
```

- **Model**
- **Series**
- **Adjustment range (KNm)**
- **Disengagement torque (KNm)**
- **Bore Ø D H7**
- **Bore for fastening screw (Ø Q)**
- **Non-standard (e.g. stainless steel)**

Mounting example with timing belt pulley and conical clamping hub

Ordering example

```
STN /025 / 4-15 / 120 / 25 / xx
```

- **Model**
- **Series**
- **Bore Ø D H7**
- **Bore for fastening screw (Ø Q)**
- **Adjustment range (KNm)**
- **Disengagement torque (KNm)**
- **Non-standard (e.g. stainless steel)**

Mounting example for cardan shafts

- **Bolt circle and centering diameter are matched to the cardan shaft.**
- **Mounting with intermediate flange.**
- **Flange mounting on both sides possible.**

Bolt circle and centering diameter are matched to the cardan shaft.
Designs for Direct Drives

with integral elastomer jaw coupling

MODEL ST 2

Torque 1,000 – 160,000 Nm

Features

■ Vibration damping
■ Compensation for axial, lateral, and angular misalignment
■ Robust
■ Mounts axially

see pages 8/9

with integral disc pack coupling

MODEL ST 3

Torque 1,000 – 160,000 Nm

Features

■ Torsionally rigid for precise torque transmission
■ Compensation for axial, lateral, and angular misalignment
■ Low restoring forces
■ Wear and maintenance free

upon request

with integral gear coupling

MODEL ST 4

Torque 1,000 – 160,000 Nm

Features

■ High torque density
■ Compensation for axial, lateral, and angular misalignment
■ Low restoring forces
■ Robust

see page 10

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MODEL ST 2
TORQUE LIMITER

Full disengagement

with integral elastomer coupling

Material:
Torque limiter: High-strength, nitro-carburized steel
Elastomer segments: precision molded, wear resistant rubber compound (75-80 Shore A)
Elastomer coupling: coupling hubs made from high-strength, cast steel (coated)

Design: with keyway or spline connection.
Elastomer segments for misalignment compensation. Torque modules evenly spaced around the circumference. Field adjustable within the selected range.

Temperature range: see page 9
Service life: Infinite life and maintenance free when operated within the technical specifications.

Fit tolerance:
Tolerance between hub and shaft 0.02 – 0.07 mm

Balancing: Standard balancing G16 (higher speeds upon request)

### MODEL ST 2

<table>
<thead>
<tr>
<th>Adjustment range available from - to (KNm)</th>
<th>1-6</th>
<th>2-10</th>
<th>6-18</th>
<th>2-8</th>
<th>4-15</th>
<th>10-25</th>
<th>8-18</th>
<th>15-35</th>
<th>30-60</th>
<th>20-50</th>
<th>40-100</th>
<th>80-160</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall length ±2 (mm) A1</td>
<td>360</td>
<td>437</td>
<td>580</td>
<td>730</td>
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<tr>
<td>Length of torque limiting portion (mm) A2</td>
<td>183</td>
<td>230</td>
<td>320</td>
<td>410</td>
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<tr>
<td>Flange OD (ST portion) (mm) B1</td>
<td>270</td>
<td>318</td>
<td>459</td>
<td>648</td>
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<tr>
<td>Flange OD (elastomer portion) (mm) B2</td>
<td>290</td>
<td>330</td>
<td>432</td>
<td>553</td>
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<tr>
<td>Fit length/keyway length D1 (mm) C1</td>
<td>97</td>
<td>116</td>
<td>160</td>
<td>230</td>
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<td>Fit length/keyway length D2 (mm) C2</td>
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<td>220</td>
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<tr>
<td>Bore depth (torque limiting portion) (mm) C3</td>
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<td>275</td>
<td>360</td>
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<tr>
<td>Bore diameter (elastomer portion) Ø B1 F7</td>
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<td>60-130*</td>
<td>80-160*</td>
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<tr>
<td>Bore diameter (torque limiting portion) Ø D1 F7</td>
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<td>112</td>
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<td>Length to (cover removed) (mm) E2</td>
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<td>Hub diameter (mm) F</td>
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<td>Bore for fastening screw (mm) G</td>
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<td>max. 140</td>
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<td>Distance (mm) L</td>
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<td>Distance (mm) M</td>
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<td>Bolt circle diameter ST (mm) Q</td>
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<td>Hub outside diameter (mm) P</td>
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<tr>
<td>Moment of inertia (approx. [D max. 10⁻³ kgm²])</td>
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<td>Speed max. (1/min.)</td>
<td>2700</td>
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<td>1800</td>
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<tr>
<td>Approx. weight at D max. (kg)</td>
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<td>115</td>
<td>287</td>
<td>729</td>
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<td>Axial (mm) D</td>
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<td>Lateral (mm) D</td>
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<td>1</td>
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<tr>
<td>Dynamic torsional stiffness at T₉₀(Standard A Insert) (1UP Nm/rad)</td>
<td>145</td>
<td>230</td>
<td>580</td>
<td>1000</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

* larger bore diameters upon request.
The elastomer segments

The compensating element of the ST2 torque limiters are the elastomer segments. These transmit the torque, while damping vibrations. The elastomer segments determine the properties of the entire coupling. The elastomer segments will also compensate for lateral, axial, and angular misalignment.

The standard elastomer segment is the type "A". Three different types are available.

<table>
<thead>
<tr>
<th>Type</th>
<th>Relative damping (ψ)</th>
<th>Temperature range constant</th>
<th>Peak</th>
<th>Material</th>
<th>Shore hardness</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Standard)</td>
<td>1,0</td>
<td>-40°C to +80°C</td>
<td>+90°C</td>
<td>Natural and synthetic rubber</td>
<td>75-80 Shore A</td>
<td>Very high wear resistance</td>
</tr>
<tr>
<td>B</td>
<td>1,0</td>
<td>-40°C to +100°C</td>
<td>+120°C</td>
<td>Synthetic rubber</td>
<td>73-78 Shore A</td>
<td>Resistant to mineral oils and power fuel</td>
</tr>
<tr>
<td>C</td>
<td>1,0</td>
<td>-70°C to +120°C</td>
<td>+140°C</td>
<td>Silicone rubber</td>
<td>70-75 Shore A</td>
<td>High temperature range</td>
</tr>
</tbody>
</table>

Note: Elastomer segments can easily be changed after installation. Every coupling utilizes 6x elastomer segments. The elastomer segments do not need to be installed prior to installation.

Changing the elastomer segments

Ordering example

For easier handling, the coupling will be shipped unassembled.

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**MODEL ST 4**

**TORQUE LIMITER**

**Full disengagement**

**with integral gear coupling**

**Material:**
Torque limiter: High-strength, nitro-carburized steel
Gear coupling ends: Extremely wear resistant tooth geometry made from high-strength alloyed steel (surface nitro-carburized)

**Design:**
with keyway or spline connection. Gear coupling for misalignment compensation. Torque modules evenly spaced around the circumference. Field adjustable within the selected range.

**Temperature range:**
-30 to +120° C

**Service life:**
Infinite life and maintenance free when operated within the technical specifications.

**Fit tolerance:**
Tolerance between hub and shaft 0.02 – 0.07 mm

**Balancing:**
Standard balancing G16 (higher speeds upon request)

---

**MODEL ST 4**

<table>
<thead>
<tr>
<th>Adjustment range available from - to (KNm)</th>
<th>Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall length [mm] A₁</td>
<td>10</td>
</tr>
<tr>
<td>Flange OD (ST portion) [mm] B₁</td>
<td>3 x ST 15</td>
</tr>
<tr>
<td>Mounting flange (ST portion) [mm] B₂</td>
<td>3 x ST 15</td>
</tr>
<tr>
<td>Flange diameter (gear coupling) [mm] B₃</td>
<td>90-112*</td>
</tr>
<tr>
<td>Hub diameter (gear coupling) [mm] B₄</td>
<td>377</td>
</tr>
<tr>
<td>Fit length/keyway length [mm] C₁</td>
<td>3 x ST 15</td>
</tr>
<tr>
<td>Bore diameter Ø – Ø F₇ [mm] D₁</td>
<td>92.5</td>
</tr>
<tr>
<td>Length [mm] E₁</td>
<td>270</td>
</tr>
<tr>
<td>Length [mm] E₂</td>
<td>259</td>
</tr>
<tr>
<td>Bore diameter Ø – Ø F₇ [mm] D₂</td>
<td>234</td>
</tr>
<tr>
<td>Hub diameter (gear coupling) [mm] B₄</td>
<td>234</td>
</tr>
<tr>
<td>Fit length/keyway length [mm] C₂</td>
<td>181</td>
</tr>
<tr>
<td>Bore diameter Ø – Ø F₇ [mm] D₃</td>
<td>90</td>
</tr>
<tr>
<td>Length [mm] E₃</td>
<td>3 x ST 15</td>
</tr>
<tr>
<td>Length [mm] E₄</td>
<td>70</td>
</tr>
<tr>
<td>Screw DIN 609 12.9 [mm] F</td>
<td>3 x ST 15</td>
</tr>
<tr>
<td>Tightening torque (Nm)</td>
<td>8 x M16</td>
</tr>
<tr>
<td>Distance [mm] L</td>
<td>280</td>
</tr>
<tr>
<td>Distance [mm] M</td>
<td>146</td>
</tr>
<tr>
<td>Actuation path [mm] N</td>
<td>196</td>
</tr>
<tr>
<td>Bolt circle diameter ST [mm] O</td>
<td>4</td>
</tr>
<tr>
<td>Moment of inertia (approx.) D max. (10⁻³ kgm²)</td>
<td>220</td>
</tr>
<tr>
<td>Speed max. (1/min.)</td>
<td>545</td>
</tr>
<tr>
<td>Approx. weight at D max. [kg]</td>
<td>2700</td>
</tr>
<tr>
<td>Axial [mm] C</td>
<td>89</td>
</tr>
<tr>
<td>Lateral [mm]</td>
<td>4</td>
</tr>
<tr>
<td>Angular (Degrees)</td>
<td>6</td>
</tr>
</tbody>
</table>

* larger bore diameters upon request.
Function of the gear coupling

Shaft misalignment is compensated for through the high precision gearing of the coupling hub and flange. The gearing transmits the torque with minimal backlash and a high degree of torsional rigidity. The precise geometry of the gearing ensures the performance of the coupling. The gearing compensates for lateral, angular, and axial misalignment.

Maintenance and lubrication

Grease fitting (closed with self-locking screw)
Optional additional seal
Grease
Seal
O-Ring
Torque limiter
Gearing

Recommended lubricants

Note: The lubrication of the gearing is very important to the service life of the gear coupling.
An additional seal (optional) ensures the lubrication of the gearing over a long period of time.
Lubricant: High performance grease

<table>
<thead>
<tr>
<th>Normal speed and operating load</th>
<th>High speed and operating load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castrol Impervia MDX</td>
<td>Caltex Coupling Grease</td>
</tr>
<tr>
<td>Esso Fibrax 370</td>
<td>Klüber Klüberplex GE 11-680</td>
</tr>
<tr>
<td>Klüber Klüberplex GE 11-680</td>
<td>Mobil Mobilgrease XTC</td>
</tr>
<tr>
<td>Mobil Mobilux EPO</td>
<td>Shell Albida GC1</td>
</tr>
<tr>
<td>Shell Alvana grease EP R-O or ER 1</td>
<td>Texaco Coupling Grease</td>
</tr>
<tr>
<td>Total Specis EPG</td>
<td></td>
</tr>
</tbody>
</table>

For easier handling, the coupling will be shipped unassembled.

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Mounting Instructions

Torque adjustment

Face spanner wrench
Adjustment nut
Locking screws E3
ISO 4762

ST Module

Adjustment nut
Positive stop
Adjustment nut
Scale

Example: 1x rotation of the adjustment nut 1 kN

After loosening (approx. 1 rotation) the locking screws (E3), the adjustment nut be turned to adjust the disengagement setting. The adjustment is limited by a positive stop at the max setting. The upper value at min. is marked on the adjustment scale. After adjustment, the torque setting is secured by tightening the locking screws (E3).

Note: All torque modules must be set to the same value.

Re-engagement of the torque modules

with rubber mallet

Re-engagement position markings
Disengaged module
Actuation path (H)
Restoring force (F)

with lever

Actuation path (H)

After the overload has been cleared, the drive and driven side must be rotated until the re-engagement position markings are lined up. The modules can only be re-engaged in this position.

The module is re-engaged through applying an axial force to the plunger. You will hear the module re-engage. Once this is complete, the torque limiter is ready for operation.

Manual disengagement of modules

Engaged module
Disengaged module

Prior to machine start-up, the individual modules can be manually disengaged in an assembled state. A manual disengagement tool is available from R+W for this task (see page 13).
Regulated under the new European directive, ATEX 95a. Explosive atmospheres are classified into 3 different zones.

Zone 0: An explosive atmosphere consisting of a mixture of air and flammable substances, in the form of a gas, vapor, or mist, that is present frequently, continuously, or for extended periods of time.

Zone 20: An explosive atmosphere consisting of clouds of combustible dust in the air under the same conditions above.

Zone 1: An explosive atmosphere consisting of a mixture of air and flammable substances, in the form of gas, vapor, or mist, that is likely to occur in normal operation occasionally.

Zone 21: An explosive atmosphere consisting of clouds of combustible dust in the air under the same conditions above.

Zone 2: An explosive atmosphere consisting of a mixture of air and flammable substances, in the form of gas, vapor, or mist, that is unlikely to occur in normal operation, but would only persist for a short period of time if it were to occur.

Zone 22: An explosive atmosphere consisting of clouds of combustible dust in the air under the same conditions above.

For zones 1/21 and 2/22, ST-EEx torque limiters can be supplied with ATEX 95a accreditation.

Mounting and operating instructions:
Detailed mounting and instruction manuals are supplied with the ST-EEx torque limiters. The following information is included:
- Assembly of the ST-EEx torque limiter
- Precise tightening torques and misalignment ratings
- Details covering proper implementation
- Maintenance
- Inspection intervals
- Troubleshooting
- Coupling identification markings
- Certificate of conformance

Identification:
All ST-EEx torque limiters are inscribed with manufacturer and accreditation information.

Accreditation information example:

![Accreditation information example](image)

ACCESSORIES

**Engagement / disengagement tool**

Order-No.: see table

<table>
<thead>
<tr>
<th>Series</th>
<th>Engagement / disengagement tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Order-No. AV/0015</td>
</tr>
<tr>
<td>30</td>
<td>Order-No. AV/0030</td>
</tr>
<tr>
<td>70</td>
<td>Order-No. AV/0070</td>
</tr>
</tbody>
</table>

**Face spanner wrench**

For rotation of adjustment nut

Order-No.: see table

<table>
<thead>
<tr>
<th>Series</th>
<th>Face spanner wrench</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Order-No. SLS/0015</td>
</tr>
<tr>
<td>30</td>
<td>Order-No. SLS/0030</td>
</tr>
<tr>
<td>70</td>
<td>Order-No. SLS/0070</td>
</tr>
</tbody>
</table>

www.rwcouplings.com
Full disengagement

MODEL ST
TORQUE MODULE

Material: High-strength, nitro-carburized steel
Design: Two part assembly for installation into prefabricated coupling components.

Part 1: Engagement receptacle
Part 2: Module with self-contained, spring loaded plunger.

The spring tension is adjustable in the field. The set force is visible on the adjustment scale.

Temperature range: -30 to +120° C
Service life: Infinite life and maintenance free when operated within the technical specifications.
Fit tolerance: For mounting of the ST torque modules, an H7 bore tolerance is required.
Re-engagement: The modules are re-engaged by applying an axial force to the plunger when a synchronized angularity of the drive and driven side is present.

<table>
<thead>
<tr>
<th>MODEL ST</th>
<th>15</th>
<th>30</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tangential force (KN)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Adjustment range available from - to (ranges)</td>
<td>1-4</td>
<td>5-10</td>
<td>8-20</td>
</tr>
<tr>
<td>Centering diameter torque module g6 (mm) A1</td>
<td>40</td>
<td>70</td>
<td>90</td>
</tr>
<tr>
<td>Centering diameter engagement receptacle g6 (mm) A2</td>
<td>24</td>
<td>34</td>
<td>44</td>
</tr>
<tr>
<td>Centering length torque module (mm) B1</td>
<td>20</td>
<td>35</td>
<td>46</td>
</tr>
<tr>
<td>Centering length engagement receptacle (mm) B2</td>
<td>14</td>
<td>22</td>
<td>30</td>
</tr>
<tr>
<td>Overall length (mm) C</td>
<td>70</td>
<td>103</td>
<td>135</td>
</tr>
<tr>
<td>Outside diameter (mm) D1</td>
<td>59</td>
<td>100</td>
<td>129</td>
</tr>
<tr>
<td>Bolt circle diameter (mm) D2</td>
<td>50</td>
<td>86</td>
<td>110</td>
</tr>
<tr>
<td>Diameter plunger (mm) D3</td>
<td>16</td>
<td>28</td>
<td>36</td>
</tr>
<tr>
<td>Diameter adjustment nut (mm) D4</td>
<td>44</td>
<td>75</td>
<td>92</td>
</tr>
<tr>
<td>Screw / tightening torque ISO 4762 (mm) E1</td>
<td>6 x M5 x 16 / 10 Nm</td>
<td>6 x M8 x 25 / 40 Nm</td>
<td>6 x M12 x 35 / 120 Nm</td>
</tr>
<tr>
<td>Screw / tightening torque ISO 4762 (mm) E2</td>
<td>M4 x 14 4.5 Nm</td>
<td>M6 x 20 15.5 Nm</td>
<td>M8 x 25 38 Nm</td>
</tr>
<tr>
<td>Flange thickness (mm) F</td>
<td>7</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Distance (mm) G</td>
<td>5</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Actuation path (mm) H</td>
<td>4</td>
<td>7.5</td>
<td>10</td>
</tr>
<tr>
<td>Distance (mm) I</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Radius (mm) J</td>
<td>110</td>
<td>200</td>
<td>250</td>
</tr>
<tr>
<td>Inner thread (mm) K</td>
<td>M8 x 15</td>
<td>M10 x 25</td>
<td>M16 x 30</td>
</tr>
<tr>
<td>Distance x 0.1 (mm) L</td>
<td>36</td>
<td>60</td>
<td>79</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>0.65</td>
<td>2.7</td>
<td>6</td>
</tr>
</tbody>
</table>

axial spring force = tangential force/1.4

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Prior to mounting the torque module, the ball seat must be lubricated (e.g. Klüber Isoflex Topas NB 52).

The ST modules are lubricated and sealed for life. Routine maintenance is not required. The modules have an extreme service life, however, after several disengagements, the function of the modules should be checked.

After loosening the mounting screw E2, the engagement receptacle can be dismounted with a removal tool.

Prior to mounting the torque module, the ball seat must be lubricated (e.g. Klüber Isoflex Topas NB 52).
### SELECTION

#### According to disengagement torque

As a rule, torque limiters are rated according to the required disengagement torque, which must be greater than the necessary operating torque.

The disengagement torque is determined according to the drive specifications.

The following formula provides a basis for calculation:

\[
T_{AR} \geq K \cdot T_{max} \quad \text{(Nm)}
\]

- \( K = 1.3 \) uniform load
- \( K = 1.5 \) light, non-uniform load
- \( K = 1.8 \) heavy, non-uniform load

\[
T_{Drive} \geq 9550 \cdot \frac{P_{Drive}}{n} \quad \text{(Nm)}
\]

<table>
<thead>
<tr>
<th>( S_A )</th>
<th>Shock or load factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(uniform load)</td>
</tr>
<tr>
<td>2</td>
<td>(non-uniform load)</td>
</tr>
<tr>
<td>3</td>
<td>(highly dynamic load)</td>
</tr>
</tbody>
</table>

#### According to acceleration torque (start-up at no load)

\[
T_{AR} \geq \alpha \cdot J_L + \frac{\alpha \cdot J_A \cdot T_{AS} \cdot S_A}{J_L + J_A} \quad \text{(Nm)}
\]

- \( \alpha = \frac{n}{t} \frac{1}{s^2} \)
- \( t = \) Acceleration time \( \text{(sec.)} \)
- \( n = \) Drive speed \( \text{(min}^{-1}) \)
- \( J_L = \) Moment of inertia on load side \( \text{(kgm}^2) \)
- \( J_A = \) Moment of inertia on drive side \( \text{(kgm}^2) \)
- \( T_{AS} = \) Peak torque of motor \( \text{(Nm)} \)

#### According to acceleration and load torque (start-up with load)

\[
T_{AR} \geq \alpha \cdot J_L + \frac{\alpha \cdot J_A \cdot (T_{AS} - T_{AN}) + T_{AN} \cdot S_A}{J_L + J_A} \quad \text{(Nm)}
\]

#### According to number of torque modules

\[
T_{AR} = S \cdot F \cdot r
\]

- \( T_{AR} = \) Disengagement torque of coupling \( \text{(Nm)} \)
- \( K = \) Service factor
- \( T_{max} = \) Peak operating torque \( \text{(Nm)} \)
- \( T_{Drive} = \) Nominal torque of drive \( \text{(Nm)} \)
- \( P_{Drive} = \) Drive power \( \text{(kW)} \)
- \( n = \) Drive speed \( \text{(min}^{-1}) \)
- \( J_L = \) Moment of inertia on load side \( \text{(kgm}^2) \)
- \( J_A = \) Moment of inertia on drive side \( \text{(kgm}^2) \)
- \( T_{AS} = \) Peak torque of motor \( \text{(Nm)} \)

- \( S = \) Number of torque modules
- \( F = \) Tangential force \( \text{(kN)} \)
- \( r = \) Length of lever \( \text{(m)} \)

---

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According to linear feed force

Spindle drive

\[ T_{AN} = \frac{s \cdot F_V}{2000 \cdot \pi \cdot \eta} \quad \text{(Nm)} \]

Timing belt drive

\[ T_{AN} = \frac{d_0 \cdot F_V}{2000} \quad \text{(Nm)} \]

According to resonant frequency

The resonant frequency of the coupling must be higher or lower than the frequency of the machine.

The following calculation is used for a 2 mass system:

\[ f_s = \frac{1}{2 \cdot \pi} \sqrt{C_T \cdot \frac{J_{\text{Machine}} + J_{\text{Motor}}}{J_{\text{Motor}}}} \quad \text{(Hz)} \]

Specifications of elastomer jaw coupling ST2

<table>
<thead>
<tr>
<th>Series</th>
<th>ST2 / 10</th>
<th>ST2 / 25</th>
<th>ST2 / 60</th>
<th>ST2 / 160</th>
</tr>
</thead>
<tbody>
<tr>
<td>( T_{AN} )</td>
<td>Rated torque (Nm)</td>
<td>10,000</td>
<td>15,000</td>
<td>40,000</td>
</tr>
<tr>
<td>( T_{\text{max}} )</td>
<td>Peak torque (Nm)</td>
<td>22,000</td>
<td>33,000</td>
<td>88,000</td>
</tr>
<tr>
<td>Dynamic torsional stiffness ((10^3 \text{Nm/rad}))</td>
<td></td>
<td>145</td>
<td>230</td>
<td>580</td>
</tr>
<tr>
<td>Relative damping</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Rating factors

**Shock or load factor \( S_A \)**

<table>
<thead>
<tr>
<th>Drive</th>
<th>Load variables of machine</th>
<th>G</th>
<th>M</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric motors, turbines, hydraulic motors</td>
<td></td>
<td>1.25</td>
<td>1.6</td>
<td>2.0</td>
</tr>
<tr>
<td>Internal combustion engines ≥ 4 cylinders Degree of uniformity ≥ 1:100</td>
<td></td>
<td>1.5</td>
<td>2.2</td>
<td>2.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature factor ( S_u )</th>
<th></th>
<th>Ambient temperature</th>
<th>-40 °C</th>
<th>+40 °C</th>
<th>+60 °C</th>
<th>+80 °C</th>
<th>&gt; +80 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>( S_u )</td>
<td>1.0</td>
<td>1.1</td>
<td>1.4</td>
<td>1.8</td>
<td>upon request</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Start factor ( S_z )</th>
<th>Start frequency per hour</th>
<th>30</th>
<th>60</th>
<th>120</th>
<th>240</th>
<th>&gt;240</th>
</tr>
</thead>
<tbody>
<tr>
<td>( S_z )</td>
<td>1.0</td>
<td>1.1</td>
<td>1.2</td>
<td>1.3</td>
<td>upon request</td>
<td></td>
</tr>
</tbody>
</table>

G = Uniform load, M = Average load, S = Heavy load

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1. Calculation of drive torque $T_{DR}$:

$$ T_{DR} [Nm] = \frac{P [kW]}{n [rpm]} $$

2. Calculation of the rated torque of the coupling based on drive torque $T_{DR}$ considering all rating factors:

$$ T_{KN} \geq T_{DR} \times S_A \times S_B \times S_z $$

**Classification of load by type of machine**

- **Excavators**
  - S bucket-chain excavators
  - S traveling gear (caterpillar)
  - M traveling gear (rails)
  - M suction pumps
  - S bucket wheels
  - M slewing mechanisms
- **Construction machines**
  - M concrete mixers
  - M road construction machines
- **Chemical industry**
  - M mixers
  - G agitators (light fluids)
  - M dryer drums
  - G centrifuges
- **Conveyor systems**
  - S conveyor machines
  - G belt conveyors (bulk materials)
  - M band pocket conveyors
  - M chain conveyors
  - M circular conveyors
  - M hoists
  - G flour bucket conveyors
  - M screw conveyors
  - M gravel bucket conveyors
  - M steel belt conveyors
- **Blowers, ventilators**
  - G blowers (axial/radial) $P : n \leq 0.007$
  - M blowers (axial/radial) $P : n \leq 0.007$
  - G blowers (axial/radial) $P : n \leq 0.007$
  - M cooling tower fans $P : n \leq 0.007$
  - M cooling tower fans $P : n \leq 0.007$
  - S cooling tower fans $P : n \leq 0.007$
- **Generators, converters**
  - S generators
- **Rubber machinery**
  - S extruders
  - S kneading mills
  - M mixers
  - S rolling mills
- **Woodworking machines**
  - G woodworking machines
- **Cranes**
  - S traveling gear
  - S lifting gear
  - M slewing mechanisms
- **Plastics machines**
  - M mixers
  - M shredders
- **Metalworking machines**
  - M sheet metal bending machines
  - S plate straightening machines
- **S presses**
- **S shears**
- **S stamping machines**
- **M machine tools, main drives**
- **Foodstuffs machines**
  - G filling machines
  - M kneading machines
  - M sugarcane crushers
  - M sugarcane cutters
  - S sugarcane mills
  - M sugar beet cutters
  - M sugar beet washers
- **Paper machines**
  - S wood cutters
  - S calenders
  - S wet presses
  - S suction presses
  - S suction rollers
  - S drying cylinders
- **Pumps**
  - S piston pumps
  - G rotary pumps
  - S plunger pumps
- **Stone, clay**
  - S crushers
  - S rotary kilns
- **S hammer mills**
- **S brick presses**
- **Textile machines**
  - M tanning vats
  - M willows
  - M looms
- **Compressors**
  - S piston compressors
  - M turbo-compressors
- **Rolling mills**
  - M plate turner
  - S pig transport equipment
  - M wire drawing mills
  - S descaling breakers
  - S cold-roll mills
  - M chain drags
  - M traverse drags
  - M roller tables
  - S pipe welding machines
  - S continuous casting machines
  - M roller adjust mechanisms
- **Laundry machines**
  - M drum dryers
  - M washing machines
- **Water treatment**
  - M aerators
  - G water screw conveyors
Specifications of gear coupling ST4

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_{\text{AN}}$ Rated torque (Nm)</td>
<td>16,000</td>
<td>22,000</td>
<td>62,000</td>
<td>174,000</td>
</tr>
<tr>
<td>$T_{\text{KN}}$ Peak torque (Nm)</td>
<td>32,000</td>
<td>44,000</td>
<td>124,000</td>
<td>346,000</td>
</tr>
<tr>
<td>Grease (dm³)</td>
<td>0.5</td>
<td>0.8</td>
<td>1.5</td>
<td>3.3</td>
</tr>
<tr>
<td>$n_{\text{Ref}}$ (Speed max.) (1/min.)</td>
<td>6,050</td>
<td>5,150</td>
<td>3,800</td>
<td>3,050</td>
</tr>
</tbody>
</table>

* only allowable at reduced torque and misalignment

### Selection based on torque

1. Calculation of drive torque $T_{\text{DR}}$:

   $$ T_{\text{AN}} \ [\text{Nm}] = \frac{9550 \cdot P \ [\text{kW}]}{n \ [\text{rpm}]} $$

2. Calculation of the rated torque of the coupling based on drive torque $T_{\text{DR}}$ considering all rating factors (Shock or load factor $S_A$, see page 17)

   $$ T_{\text{KN}} \geq T_{\text{DR}} \cdot S_A $$

### Application graph

Max torque, max speed, and max misalignment should never occur at the same time.

Calculation of $T_{\text{DR}}$, $T_{\text{KN}}$, and $n_{\text{max}}$ ➔ Calculate values and enter and check in the diagram below.

**Selection example:**

Calculation of a coupling for use between an electric motor ($P= 1000 \ \text{kW}$ at $980 \ \text{rpm}$) and screw conveyor ($S_A = 1.6$).

$$ T_{\text{DR}} = \frac{9550 \cdot 1000 \ \text{kW}}{980 \ \text{rpm}} = 9744 \ \text{Nm} $$

$$ T_{\text{KN}} \geq T_{\text{AN}} \cdot S_A $$

$$ T_{\text{KN}} \geq 9744 \ \text{Nm} \cdot 1.6 = 15,591 \ \text{Nm} $$

Selected coupling: ST4/10 with $T_{\text{KN}} = 16,000 \ \text{Nm}$

### Optional actuation ring

R+W limit switch

Actuation ring

Actuation path

The re-engagement of all modules is possible with the use of 2 levers.

**Example: Coupling ST4/10**

$$ T = 5600 \ \text{Nm} \quad T_{\text{KIN}} = \frac{5600}{16000} = 100 \cdot 35\% $$

$$ n = 2700 \ \text{rpm} \quad n_{\text{KIN}} = \frac{2700}{6050} = 100 \cdot 45\% $$

Angular misalignment: $0.4°$ ➔ In allowable zone; selected coupling ST4 can be used.

**MODEL ST 1**

<table>
<thead>
<tr>
<th>Series</th>
<th>10</th>
<th>25</th>
<th>60</th>
<th>160</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside diameter A</td>
<td>218</td>
<td>328</td>
<td>upon request</td>
<td>upon request</td>
</tr>
<tr>
<td>Distance B</td>
<td>57</td>
<td>57</td>
<td>upon request</td>
<td>upon request</td>
</tr>
<tr>
<td>Actuation ring thickness C</td>
<td>4.5</td>
<td>4.5</td>
<td>upon request</td>
<td>upon request</td>
</tr>
</tbody>
</table>
THE R+W-PRODUCT RANGE

TORQUE LIMITERS
Series SK/ST
From 0.1 – 160,000 Nm, Bore diameters 3 – 290 mm
Available as a single position, multi-position,
load holding, or full disengagement version
Single piece or press-fit design

BELLOWS COUPLINGS
Series BK
From 2 – 10,000 Nm
Bore diameters 10 – 180 mm
Single piece or press-fit design

LINE SHAFTS
Series ZA/ZAE
From 10 – 4,000 Nm
Bore diameters 10 – 100 mm
Available up to 6 mtr. length

MINIATURE BELLOWS COUPLINGS
Series MK
From 0.05 – 10 Nm
Bore diameters 1 – 28 mm
Single piece or press-fit design

SERVOMAX®
ELASTOMER COUPLINGS
Series EK
From 2 – 2,000 Nm, Shaft diameters 3 – 80 mm
backlash-free, press-fit design

ECOLIGHT®
ELASTOMER COUPLINGS
Series TX 1
From 2 – 810 Nm
Shaft diameters 3 – 45 mm

LINEAR COUPLINGS
Series LK
From 70 – 2,000 N
Thread M5 – M16

POLYAMID COUPLINGS
MICROFLEX
Series FK 1
Rated torque 1 Ncm
Bore diameters 1 – 1.5 mm

Experience and
Know-how
for your special
requirements.