ROBUST AND COMPACT

TORQSET®
TORQUE LIMITERS

SERIES ST  |  2,000 – 165,000 Nm

Full disengagement

THE ULTIMATE COUPLING FROM 2,000 – 165,000 Nm

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SERIES ST

TORQUE LIMITERS

Areas of application for the ST

- Rolling mills
- Levelers
- Marine propulsion
- Industrial shredders
- Industrial conveyors
- Test stands
- Extruders
- Wastewater treatment
- Tunnel boring machines
- and many 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

ST series safety couplings are designed to decouple machine drives in the event of torque overload, preventing damage and downtime.

A series of ball bearings are spring loaded into detents on an otherwise freely spinning output plate. In the case of the ST series, these ball bearings are mounted onto plungers which are individually loaded in order to generate high clutching forces while maintaining a relatively small profile.

The transmittable torque is determined by the number and force setting of the plunger modules and their distance from the center of the rotational axis. In the event of an overload, the force applied by the detents causes the plungers to overcome the spring loading and retract into the housings, resulting in a complete separation of the driving and driven hubs. They will not re-engage automatically. After the overload condition has passed, an axial force must be applied in order to re-engage the plunger modules into the detents of the output plate.

This is normally accomplished without any special tools, simply requiring a mallet or pry bar.

For disengagement torque values ranging from 1,000 to 160,000 Nm, the ST series comes from the factory preset to the required disengagement torque value. They are also adjustable, with incremental markings to indicate the force setting of each plunger module. Plunger modules can be added and removed in sets of three for larger adjustments.

Custom flanges, materials, and mounting arrangements are available upon request.

Contact R+W with your application details and requirements.
<table>
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<tr>
<th>MODELS</th>
<th>FEATURES</th>
<th>POSSIBLE APPLICATIONS</th>
</tr>
</thead>
</table>
| **ST 1** | with keyway connection for indirect drives  
- Compact, simple design  
- Precise overload protection  
- Torsionally rigid  
- Integral bearings for sprocket or sheave | ![Diagram](image1.jpg)  
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 sprocket or sheave | ![Diagram](image2.jpg)  
see page 5 |
| **ST 2** | with keyway connection and elastomer coupling  
- Vibration damping  
- Compensation for misalignment  
- Precise overload protection | ![Diagram](image3.jpg)  
see page 8 |
| **ST 3** | with keyway connection and disc coupling  
- Torsionally rigid  
- Compensation for misalignment  
- Precise overload protection | ![Diagram](image4.jpg)  
see page 7 |
| **ST 4** | with keyway connection and gear coupling  
- High torque density  
- Compensation for misalignment  
- Precise overload protection | ![Diagram](image5.jpg)  
see page 10 |

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Full disengagement

MODEL ST1
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

Non standard applications:
Automatic re-engagement, ATEX certified, stainless steel construction

### MODEL ST 1

<table>
<thead>
<tr>
<th>Adjustment range available from - to (KNm)</th>
<th>Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-6</td>
<td>10</td>
</tr>
<tr>
<td>3 x ST 15</td>
<td>6 x ST 15</td>
</tr>
<tr>
<td>3-8</td>
<td>5-16</td>
</tr>
</tbody>
</table>

| Overall length (mm) | A | 183 | 230 | 320 | 410 |
| Bore depth (mm) | Aₙ | 158 | 200 | 275 | 360 |
| Flange outside diameter (mm) | B | 270 | 318 | 459 | 648 |
| Fit length (mm) | C | 120 | 155 | 220 | 290 |
| Bore diameter possible Ø F7 (mm) | D | 40-110 | 60-140 | 80-200 | 100-250 |
| Flange centering diameter H7 (mm) | E | 170 | 210 | 300 | 450 |
| Bolt circle diameter ±0.3 (mm) | F | 220 | 260 | 360 | 570 |
| Outside diameter h7 (mm) | G | 259 | 298 | 418 | 618 |
| Fastening threads | H | 12 x M16 | 12 x M16 | 12 x M20 | 12 x M24 |
| Thread depth (mm) | I | 25 | 30 | 35 | 40 |
| Fit length (mm) | J | 6 | 8 | 8 | 10 |
| Wall thickness (mm) | K | 17 | 20 | 30 | 38 |
| Distance (mm) | L | 45 | 83 | 96 | 136 |
| Distance (mm) | M | 95 | 130 | 165 | 225 |
| Actuation path (mm) | N | 4 | 4 | 7.5 | 10 |
| Bolt circle diameter - modules (mm) | O | 220 | 270 | 376 | 532 |
| Hub outside diameter (mm) | P | 170 | 218 | 295 | 418 |
| Bore for fastening screw (mm) | Q | max. 110 | max. Ø 140 | max. Ø 200 | max. Ø 218 |
| Moment of inertia (approx.) D max. (10⁻³ kgm²) | R | 370 | 780 | 4600 | 24600 |
| Speed max. (rpm) | S | 4200 | 3800 | 2500 | 2000 |
| Allowable max. radial force standard* (KN) | T | 40 | 60 | 100 | 200 |
| Approx. weight at D max. (kg) | U | 40 | 63 | 179 | 463 |

* higher radial force through additional bearing support.
Full disengagement

MODEL STN

TORQUE LIMITER

with backlash free conical clamping connection

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

Non standard applications:
Automatic re-engagement, ATEX certified, stainless steel construction

<table>
<thead>
<tr>
<th>MODEL STN</th>
<th>Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment range available from - to (KNm)</td>
<td>10</td>
</tr>
<tr>
<td>Overall length (mm)</td>
<td>2 6</td>
</tr>
<tr>
<td>Flange outside diameter (mm)</td>
<td>A1</td>
</tr>
<tr>
<td>Flange length/keyway length (mm)</td>
<td>C1</td>
</tr>
<tr>
<td>Effective clamping length (mm)</td>
<td>D1</td>
</tr>
<tr>
<td>Bore diameter possible Ø F7 (mm)</td>
<td>D2</td>
</tr>
<tr>
<td>Bore diameter max. Ø F7 with keyway (mm)</td>
<td>D3</td>
</tr>
<tr>
<td>Inside diameter (mm)</td>
<td>D4</td>
</tr>
<tr>
<td>Flange centering diameter H7 (mm)</td>
<td>E</td>
</tr>
<tr>
<td>Bolt circle diameter ±0.3 (mm)</td>
<td>F</td>
</tr>
<tr>
<td>Outside diameter h7 (mm)</td>
<td>G</td>
</tr>
<tr>
<td>Fastening threads</td>
<td>H</td>
</tr>
<tr>
<td>Thread depth (mm)</td>
<td>I</td>
</tr>
<tr>
<td>Fit length (mm)</td>
<td>J</td>
</tr>
<tr>
<td>Tightening screw ISO 4017</td>
<td>K</td>
</tr>
<tr>
<td>Tightening torque (Nm)</td>
<td>L</td>
</tr>
<tr>
<td>Distance (mm)</td>
<td>M</td>
</tr>
<tr>
<td>Distance (mm)</td>
<td>N</td>
</tr>
<tr>
<td>Actuation path (mm)</td>
<td>O</td>
</tr>
<tr>
<td>Bolt circle diameter - modules (mm)</td>
<td>P</td>
</tr>
<tr>
<td>Hub outside diameter (mm)</td>
<td>Q</td>
</tr>
<tr>
<td>Moment of inertia (approx.) D max. (10⁻³ kgm²)</td>
<td>R</td>
</tr>
<tr>
<td>Speed max. (rpm)</td>
<td>S</td>
</tr>
<tr>
<td>Allowable max. radial force standard* (KN)</td>
<td>T</td>
</tr>
<tr>
<td>Approx. weight at D max. (kg)</td>
<td>U</td>
</tr>
</tbody>
</table>

* Higher radial force through additional bearing support.

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MODEL ST 1 / STN

Mounting example with sprocket and keyway connection

Ordering example

ST1 /025 /5-16  / 12 /120 / 25 / xx

Model
Series
Adjustment range (KNm)
Disengagement torque (KNm)
Bore Ø D F7
Bore for fastening screw Ø Q
Non-standard (e.g. stainless steel)

Mounting example with timing belt sprocket and conical clamping hub

Ordering example

STN /025 /5-16/ 12 /120 / 25 / xx

Model
Series
Adjustment range (KNm)
Disengagement torque (KNm)
Bore Ø D1 F7
Bore for fastening screw
Non-standard (e.g. stainless steel)

Mounting example with universal drive shaft

Ordering example

STN /025 /5-16/ 12 /120 / 25 / xx

Model
Series
Adjustment range (KNm)
Disengagement torque (KNm)
Bore Ø D1 F7
Bore for fastening screw
Non-standard (e.g. stainless steel)

Bolt circle and centering diameter are matched to the drive shaft.

Mounting with intermediate flange.

Flange mounting on both sides possible.

Allowable max. radial force

Additional bearing support (customer supplied)

Customer supplied
Designs for Direct Drives

**with integral elastomer jaw coupling**

**MODEL ST 2**

Torque 2,000 – 165,000 Nm

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

see page 8/9

**with integral disc pack coupling**

**MODEL ST 3**

Torque 2,000 – 165,000 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 2,000 – 165,000 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)

**Non standard applications:**
- Automatic re-engagement

---

### Mechanical and Technical Specifications

<table>
<thead>
<tr>
<th>Material</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque limiter</td>
<td>High-strength, nitro-carburized steel</td>
</tr>
<tr>
<td>Elastomer segments</td>
<td>Precision molded, wear resistant rubber compound (75-80 Shore A)</td>
</tr>
<tr>
<td>Elastomer coupling</td>
<td>Coupling hubs made from high-strength, cast steel (coated)</td>
</tr>
</tbody>
</table>

### Design Features
- With keyway or spline connection.
- Elastomer segments for misalignment compensation. Torque modules evenly spaced around the circumference. Field adjustable within the selected range.

### Technical Data

<table>
<thead>
<tr>
<th>Series</th>
<th>10 (KNm)</th>
<th>25 (KNm)</th>
<th>60 (KNm)</th>
<th>160 (KNm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 x ST 15</td>
<td>2-6</td>
<td>4-12</td>
<td>6-18</td>
<td>10-25</td>
</tr>
<tr>
<td>6 x ST 15</td>
<td>11-20</td>
<td>22-40</td>
<td>35-60</td>
<td>50-110</td>
</tr>
<tr>
<td>9 x ST 15</td>
<td>70-165</td>
<td>80-165</td>
<td>110-200</td>
<td>165-300</td>
</tr>
</tbody>
</table>

**Overall length ±2 (mm):**
- A1: 360 437 580 730

**Length of torque limiting portion (mm):**
- B1: 183 230 320 410

**Flange OD (ST portion) (mm):**
- B2: 270 318 459 648

**Flange OD (elastomer portion) (mm):**
- B2: 290 330 432 553

**Fit length/keyway length D1 (mm):**
- C1: 97 116 160 230

**Fit length/keyway length D2 (mm):**
- C2: 120 155 220 290

**Bore depth (torque limiting portion) (mm):**
- C3: 158 200 275 360

**Bore diameter (torque limiting portion) Ø – Ø F7 (mm):**
- D2: 40-110* 60-140* 80-200* 100-290*

**Length to cover (mm):**
- E1: 70 87 112 152

**Length to (cover removed) (mm):**
- E2: 22 26 40 65

**Hub diameter (mm):**
- F: 160 200 255 300

**Bore for fastening screw (mm):**
- G: max. 110 max. 140 max. 200 max. 250

**Distance (mm):**
- L: 45 63 96 136

**Distance (mm):**
- M: 96 130 165 225

**Actuation path (mm):**
- N: 4 4 7.5 10

**Bolt circle diameter ST (mm):**
- D1: ISO 4029

**Bore depth (torque limiting portion) (mm):**
- D2: ISO 4029

**Hub outside diameter (mm):**
- P: 160 200 255 300

**Moment of inertia (approx.) D max. (10⁻³ kgm²):**
- 854 1850 8960 36858

**Speed max. (rpm):**
- 2700 2300 1800 1500

**Approx. weight at D max. (kg):**
- 80 115 257 729

**Angular (Degrees):**
- 1 1 1 1

**Dynamic torsional stiffness at TKN (Standard A Insert) (10⁵ Nm/rad):**
- 145 150 230 580 1600

---

*larger bore diameters upon request.*
The elastomer segments

The compensating elements of the ST2 safety couplings are the elastomer segments. They transmit torque while damping vibration and compensating 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 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, +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, +120°C</td>
<td>Synthetic rubber</td>
<td>73-78 Shore A</td>
<td>Resistant to many oils and fuels</td>
</tr>
<tr>
<td>C</td>
<td>1.0</td>
<td>-70°C to +120°C, +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 be easily changed after installation.
Every coupling utilizes 6x elastomer segments.
The elastomer segments do not need to be installed prior to coupling mounting.

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 hubs: Extremely wear resistant tooth geometry made from high-strength alloy 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 when properly maintained and 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)

Non standard applications:
Automatic re-engagement

Number of torque modules depends on disengagement torque

<table>
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<th>MODEL ST 4</th>
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</thead>
<tbody>
<tr>
<td>Adjustment range available from - to (KNm)</td>
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<tr>
<td>Overall length (mm)</td>
</tr>
<tr>
<td>Flange OD (ST portion) (mm)</td>
</tr>
<tr>
<td>Mounting flange (ST portion) (mm)</td>
</tr>
<tr>
<td>Flange diameter (gear coupling) (mm)</td>
</tr>
<tr>
<td>Hub diameter (gear coupling) (mm)</td>
</tr>
<tr>
<td>Fit length/keyway length (mm)</td>
</tr>
<tr>
<td>Bore diameter Ø D1 F7 (mm)</td>
</tr>
<tr>
<td>Length (mm)</td>
</tr>
<tr>
<td>Length (mm)</td>
</tr>
<tr>
<td>Screw DIN 609 12.9 (mm)</td>
</tr>
<tr>
<td>Tightening torque (Nm)</td>
</tr>
<tr>
<td>Distance (mm)</td>
</tr>
<tr>
<td>Actuation path (mm)</td>
</tr>
<tr>
<td>Bolt circle diameter ST (mm)</td>
</tr>
<tr>
<td>Moment of inertia (approx.) D max. (10^-3 kgm²)</td>
</tr>
<tr>
<td>Speed max. (rpm)</td>
</tr>
<tr>
<td>Approx. weight at D max. (kg)</td>
</tr>
<tr>
<td>Axial fit Ø (mm)</td>
</tr>
<tr>
<td>Lateral Ø (mm)</td>
</tr>
<tr>
<td>Angular (Degrees)</td>
</tr>
</tbody>
</table>

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

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

**Maintenance and lubrication**

Grease fitting (closed with self-locking screw)

Optional additional seal

Seal

Grease

**Recommended lubricants**

**Note:** Lubrication of the gearing is very important to the service life of the coupling.

An additional seal (optional) ensures the lubrication of the gearing over a long period of time.

<table>
<thead>
<tr>
<th>Normal speed</th>
<th>High speed</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 EP0</td>
<td>Shell Albida GC1</td>
</tr>
<tr>
<td>Shell Alvania grease EP R-0 or ER 1</td>
<td>Texaco Coupling Grease</td>
</tr>
<tr>
<td>Total</td>
<td>Specis EPG</td>
</tr>
</tbody>
</table>

**Ordering example**

ST4/025/10-25/100/120/xx

Model
Series
Adjustment range (KNm)
Disengagement torque (KNm)
Bore Ø D: F7
Bore Ø D: F7
Non-standard (e.g., stainless steel)

For easier handling, the coupling will be shipped unassembled.
Mounting Instructions

Torque adjustment

After loosening (approx. 1 rotation) the locking screws (E3), the adjustment nut can be turned to adjust the disengagement setting. Incremental values are 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

After the overload has been cleared, the drive or 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. Re-engagement is audible. Once this is complete, the torque limiter is ready for operation.

Manual disengagement of modules

Prior to machine start-up, the individual modules can be manually disengaged. A manual disengagement tool is available from R+W (see page 13).
MODEL ATEX

FOR USE IN EXPLOSIVE ATMOSPHERES

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 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 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:

Typ: ST 125 EEx-2009
II 2 G D
Ex c T3 / 200°C
Ser.No.: A 200101.1
Tech.Ref.No.:2009/008RW

ACCESSORIES

Disengagement/re-engagement tool

Order-No.: see table

<table>
<thead>
<tr>
<th>Series</th>
<th>Disengagement/re-engagement 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>

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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:** Self-contained, spring loaded plunger module

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 modules are aligned with engagement receptacles.

---

### MODEL ST

<table>
<thead>
<tr>
<th></th>
<th>15</th>
<th>30</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tangential force (Kn)</strong></td>
<td>1-4</td>
<td>5-10</td>
<td>8-20</td>
</tr>
<tr>
<td><strong>Adjustment range available from - to (ranges)</strong></td>
<td>2-8</td>
<td>10-20</td>
<td>15-40</td>
</tr>
<tr>
<td><strong>Centering diameter torque module g6</strong> (mm)</td>
<td>A1</td>
<td>40</td>
<td>70</td>
</tr>
<tr>
<td><strong>Centering diameter engagement receptacle g6</strong> (mm)</td>
<td>A2</td>
<td>24</td>
<td>34</td>
</tr>
<tr>
<td><strong>Centering length torque module</strong> (mm)</td>
<td>B1</td>
<td>20</td>
<td>35</td>
</tr>
<tr>
<td><strong>Centering length engagement receptacle</strong> (mm)</td>
<td>B2</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td><strong>Overall length</strong> (mm)</td>
<td>C</td>
<td>70</td>
<td>103</td>
</tr>
<tr>
<td><strong>Outside diameter</strong> (mm)</td>
<td>D1</td>
<td>59</td>
<td>100</td>
</tr>
<tr>
<td><strong>Bolt circle diameter</strong> (mm)</td>
<td>D2</td>
<td>50</td>
<td>86</td>
</tr>
<tr>
<td><strong>Diameter plunger</strong> (mm)</td>
<td>D3</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td><strong>Diameter adjustment nut</strong> (mm)</td>
<td>D4</td>
<td>44</td>
<td>75</td>
</tr>
<tr>
<td><strong>Screw / tightening torque ISO 4762</strong> (mm)</td>
<td>E1</td>
<td>6 x M5 x 16 / 10 Nm</td>
<td>6 x M8 x 25 / 40 Nm</td>
</tr>
<tr>
<td><strong>Screw / tightening torque ISO 4762</strong> (mm)</td>
<td>E2</td>
<td>1x M4 x 14 / 4.5 Nm</td>
<td>1x M6 x 20 / 15.5 Nm</td>
</tr>
<tr>
<td><strong>Flange thickness</strong> (mm)</td>
<td>F</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td><strong>Distance</strong> (mm)</td>
<td>G</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td><strong>Actuation path</strong> (mm)</td>
<td>H</td>
<td>4</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>Distance</strong> (mm)</td>
<td>I</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Radius</strong> (mm)</td>
<td>J</td>
<td>110</td>
<td>200</td>
</tr>
<tr>
<td><strong>Inner thread</strong> (mm)</td>
<td>K</td>
<td>M8 x 15</td>
<td>M10 x 25</td>
</tr>
<tr>
<td><strong>Distance x 0,1</strong> (mm)</td>
<td>L</td>
<td>36</td>
<td>60</td>
</tr>
<tr>
<td><strong>Weight</strong> (kg)</td>
<td>0.65</td>
<td>2.7</td>
<td>6</td>
</tr>
</tbody>
</table>

---

axial spring force ≈ tangential force / 1.4
MODEL ST

Ordering example

ST / 30 / 2 / 12 / xx

Maintenance

The ST modules are lubricated and sealed for life. Routine maintenance is not required. While the modules have an extreme service life, they should be periodically checked to ensure proper functionality.

Dismounting of engagement receptacle

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

Mounting of torque module

Note: Prior to mounting the torque module, the ball seat must be lubricated (e.g. Klüber Isoflex Topas N8 52).

<table>
<thead>
<tr>
<th>MODEL ST</th>
<th>15</th>
<th>30</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screws</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tightening torque</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>10 Nm</td>
<td>40 Nm</td>
<td>120 Nm</td>
</tr>
<tr>
<td>E2</td>
<td>4.5 Nm</td>
<td>15.5 Nm</td>
<td>38 Nm</td>
</tr>
<tr>
<td>E3</td>
<td>4.5 Nm</td>
<td>5 Nm</td>
<td>10 Nm</td>
</tr>
<tr>
<td>Thread</td>
<td>M5</td>
<td>MB</td>
<td>M10</td>
</tr>
<tr>
<td>Actuation path</td>
<td>4 mm</td>
<td>7.5 mm</td>
<td>10 mm</td>
</tr>
<tr>
<td>Restoring force</td>
<td>max. 2 KN</td>
<td>max. 4 KN</td>
<td>max. 6 KN</td>
</tr>
<tr>
<td>Fit length L1</td>
<td>36</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>Depth measurement L2</td>
<td>10</td>
<td>20.5</td>
<td>29</td>
</tr>
<tr>
<td>Gauge ball Ø G</td>
<td>16</td>
<td>25</td>
<td>30</td>
</tr>
</tbody>
</table>

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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:

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

where:
- \( T_{AR} \) = Disengagement torque of coupling (Nm)
- \( K \) = service factor
- \( T_{max} \) = peak operating torque (Nm)

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

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

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

where:
- \( T_{AR} \) = Disengagement torque of coupling (Nm)
- \( \alpha \) = Angular acceleration
- \( J_L \) = Moment of inertia on load side (kgm²)
- \( J_A \) = Moment of inertia on drive side (kgm²)
- \( T_{AS} \) = Peak torque of motor (Nm)
- \( T_{AN} \) = Load torque (Nm)
- \( S_A \) = Shock or load factor

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

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

where:
- \( T_{AR} \) = Disengagement torque of coupling (Nm)
- \( \alpha \) = Angular acceleration
- \( J_L \) = Moment of inertia on load side (kgm²)
- \( J_A \) = Moment of inertia on drive side (kgm²)
- \( T_{AS} \) = Peak torque of motor (Nm)
- \( T_{AN} \) = Load torque (Nm)
- \( S_A \) = Shock or load factor

According to number of torque modules

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

where:
- \( T_{AR} \) = Disengagement torque of coupling (Nm)
- \( S \) = Number of torque modules
- \( F \) = Tangential force (KN)
- \( r \) = Radius to torque module (m)
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:

\[ f_r = \frac{1}{2\pi} \sqrt{\frac{C_T}{J_{\text{Total}}}} \] (Hz)

where:
- \( f_r \) is the resonant frequency of the 2 mass system (Hz)
- \( C_T \) is the torsional stiffness of the coupling (Nm/rad)
- \( J_{\text{Total}} \) is the total moment of inertia of the machine (kgm²)

### Specifications of elastomer jaw coupling ST2

<table>
<thead>
<tr>
<th>Series</th>
<th>ST2 / 10 (Nm)</th>
<th>ST2 / 25 (Nm)</th>
<th>ST2 / 60 (Nm)</th>
<th>ST2 / 160 (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T_{in} Rated torque</td>
<td>10,000</td>
<td>15,000</td>
<td>40,000</td>
<td>80,000</td>
</tr>
<tr>
<td>T_{max} Peak torque</td>
<td>22,000</td>
<td>33,000</td>
<td>88,000</td>
<td>176,000</td>
</tr>
<tr>
<td>Dynamic torsional stiffness (10³ Nm/rad)</td>
<td>145</td>
<td>230</td>
<td>580</td>
<td>1000</td>
</tr>
<tr>
<td>Relative damping</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Rating factors for elastomer jaw coupling ST2

<table>
<thead>
<tr>
<th>Shock or load factor ( S_A )</th>
<th>Load variables of machine</th>
<th>Temperature factor ( S )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive</td>
<td>G</td>
<td>M</td>
</tr>
<tr>
<td>Electric motors, turbines, hydraulic motors</td>
<td>1.25</td>
<td>1.6</td>
</tr>
<tr>
<td>Internal combustion engines ≥ 4 cylinders</td>
<td>1.5</td>
<td>2.2</td>
</tr>
</tbody>
</table>

\( G = \) Uniform load, \( M = \) Average load, \( S = \) Heavy load

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

\[ S_A = \text{Degree of uniformity} \times \frac{1}{100} \]

### Start factor \( S_s \)

\[ S_s = \text{Start frequency per hour} \]

<table>
<thead>
<tr>
<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_s )</td>
<td>1.0</td>
<td>1.1</td>
<td>1.2</td>
<td>1.3</td>
<td>upon request</td>
</tr>
</tbody>
</table>
SELECTION

According to torque

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

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

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

$$T_{tr} \geq T_{DR} \times S_A \times S \times S_z$$

Selection example:
Calculation of coupling for use between an electric motor ($P = 450$ kW at $980$ rpm) and belt conveyor.

Uniform load present $= G : S_A = 1.25$
Ambient temperature $40^\circ C : S = 1.1$
Start frequency $30/h : S_z = 1.0$

$$T_{tr} = \frac{9550 \cdot 450 \text{ kW}}{980 \text{ rpm}} = 4385.2 \text{ Nm}$$

$$T_{tr} \geq 4385.2 \text{ Nm} \times 1.25 \times 1.1 \times 1.0 = 6029.7 \text{ Nm}$$

Selected coupling: ST2/10 with $T_{tr} = 6030 \text{ Nm}$

Classification of load by type of machine

<table>
<thead>
<tr>
<th>Excavators</th>
<th>S bucket-chain excavators</th>
<th>S traveling gear (caterpillar)</th>
<th>M traveling gear (rails)</th>
<th>M suction pumps</th>
<th>S bucket wheels</th>
<th>M slewing mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction machines</td>
<td>M concrete mixers</td>
<td>M road construction machines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical industry</td>
<td>M mixers</td>
<td>G agitators (light fluids)</td>
<td>M dryer drums</td>
<td>G centrifuges</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conveyor systems</td>
<td>S conveyor machines</td>
<td>G belt conveyors (bulk materials)</td>
<td>M band pocket conveyors</td>
<td>M circular conveyors</td>
<td>M hoists</td>
<td>G flour bucket conveyors</td>
</tr>
<tr>
<td>Blowers, ventilators$^1$</td>
<td>G blowers (axial/radial) $P_n \leq 0.007$</td>
<td>M blowers (axial/radial) $P_n \leq 0.007$</td>
<td>S blowers (axial/radial) $P_n \leq 0.007$</td>
<td>G cooling tower fans $P_n \leq 0.007$</td>
<td>M cooling tower fans $P_n \leq 0.007$</td>
<td>S cooling tower fans $P_n \leq 0.007$</td>
</tr>
<tr>
<td>Generators, converters</td>
<td>S generators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber machinery</td>
<td>S extruders</td>
<td>S kneading mills</td>
<td>M mixers</td>
<td>S rolling mills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woodworking machines</td>
<td>G woodworking machines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cranes</td>
<td>S traveling gear</td>
<td>S lifting gear</td>
<td>M slewing mechanisms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastics machines</td>
<td>M mixers</td>
<td>M shredders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metalworking machines</td>
<td>M sheet metal bending machines</td>
<td>S plate straightening machines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S presses</td>
<td>M shears</td>
<td>S stamp punches</td>
<td>M machine tools, main drives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food processing machines</td>
<td>G filling machines</td>
<td>M kneading machines</td>
<td>M sugarcane crushers</td>
<td>M sugarcane cutters</td>
<td>S sugarcane mills</td>
<td>M sugar beet cutters</td>
</tr>
<tr>
<td>Paper machines</td>
<td>S wood cutters</td>
<td>S calenders</td>
<td>S wet presses</td>
<td>S suction presses</td>
<td>S suction rollers</td>
<td>S drying cylinders</td>
</tr>
<tr>
<td>S pumps</td>
<td>G rotary pumps</td>
<td>S plunger pumps</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S pumps</td>
<td>G rotary pumps</td>
<td>S plunger pumps</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stone, clay</td>
<td>S crushers</td>
<td>S rotary kilns</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textile machines</td>
<td>S hammer mills</td>
<td>S brick presses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compressors</td>
<td>M piston compressors</td>
<td>M turbo-compressors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rolling mills</td>
<td>M plate turner</td>
<td>M wire drawing mills</td>
<td>S descaling breakers</td>
<td>S cold-roll mills</td>
<td>M chain drags</td>
<td>M traverse drags</td>
</tr>
<tr>
<td>Laundry machines</td>
<td>M drum dryers</td>
<td>M washing machines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water treatment</td>
<td>M aerators</td>
<td>G water screw conveyors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Specifications of gear coupling ST4

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_{K\text{N}}$ Rated torque (Nm)</td>
<td>16,000</td>
<td>22,000</td>
<td>62,000</td>
<td>174,000</td>
</tr>
<tr>
<td>$T_{K\text{max}}$ Peak torque (Nm)</td>
<td>32,000</td>
<td>44,000</td>
<td>124,000</td>
<td>348,000</td>
</tr>
<tr>
<td>Grease (dm³)</td>
<td>0.52</td>
<td>0.8</td>
<td>1.51</td>
<td>3.29</td>
</tr>
<tr>
<td>$n_{\text{Ref}}$ (Speed max.) (1/min.)</td>
<td>6,050</td>
<td>5,150</td>
<td>3,600</td>
<td>3,050</td>
</tr>
</tbody>
</table>

* only allowable at reduced torque and misalignment

Selection based on torque

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

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

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)

$$T_{K\text{N}} \geq T_{\text{DR}} \cdot S_A$$

Application graph

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

Calculation of $T / T_{K\text{N}}$ and $n / n_{\text{max}}$ Calculate values and enter and check in the diagram below.

Optional actuation plate

R+W limit switch

Actuation path

Actuation plate

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

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>278</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 plate thickness (C)</td>
<td>4.5</td>
<td>4.5</td>
<td>upon request</td>
<td>upon request</td>
</tr>
</tbody>
</table>

Example: Coupling ST4/10

$$T = 5600 \text{ Nm} \Rightarrow \frac{T_{K\text{N}}}{100 \times 35\%} = \frac{5600}{1600} = 35\%$$

$$n = 2700 \text{ rpm} \Rightarrow \frac{n_{\text{max}}}{100 \times 35\%} = \frac{2700}{1600} = 16.8\%$$

Angular misalignment: 0.4°

In allowable zone; selected coupling ST4 can be used.
Experience and Know-how for your special requirements.

R+W America
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Fax: 630-521-0366
info@rw-america.com
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Single piece or press fit design

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Series TX 1
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Shaft diameters 3 – 45 mm

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

POLYAMIDE COUPLINGS
MICROFLEX
Series FK 1
Rated torque 1 Ncm
Bore diameters 1.5 – 2 mm

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