ROBUST AND COMPACT

Full disengagement

ST

TORQUE LIMITERS

SERIES ST | 1,000 – 160,000 Nm

R+W®
COUPLING TECHNOLOGY

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

www.rwcouplings.com

optional stainless steel

Series **ST**

TORQUE LIMITERS

Areas of application for the ST

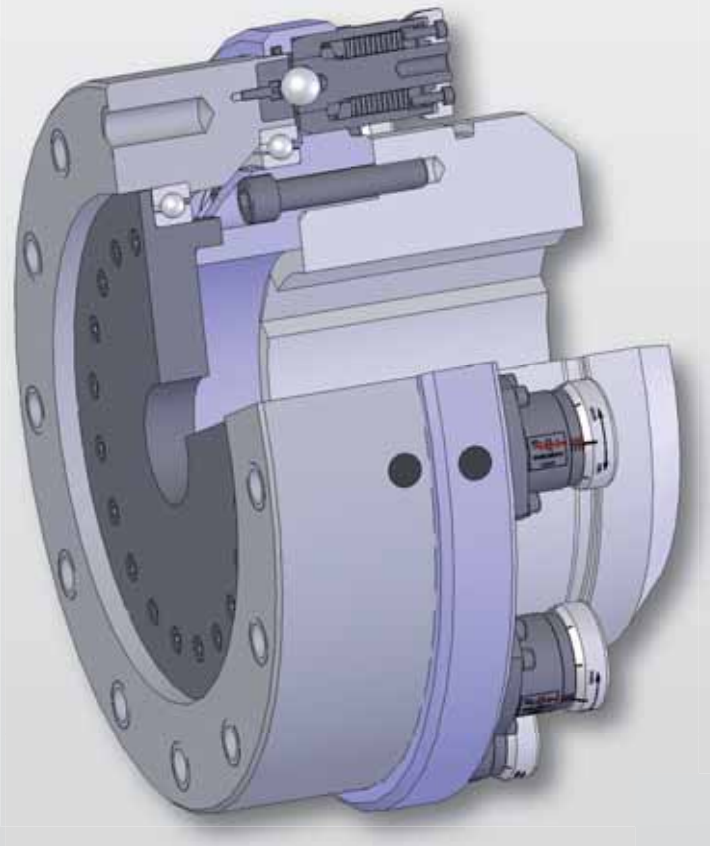
Heavy duty applications

- 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.

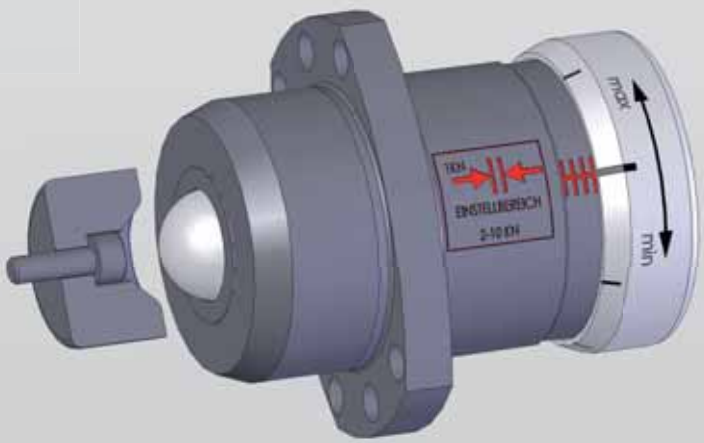
The ST torque limiter is based on a spring loaded, ball-detent design.

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.

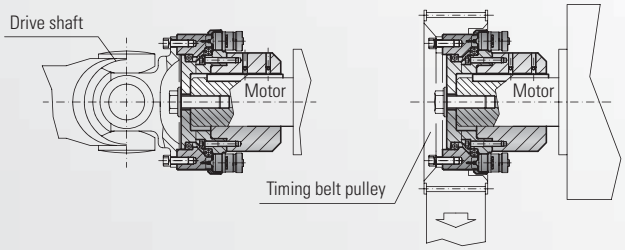
optional stainless steel

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

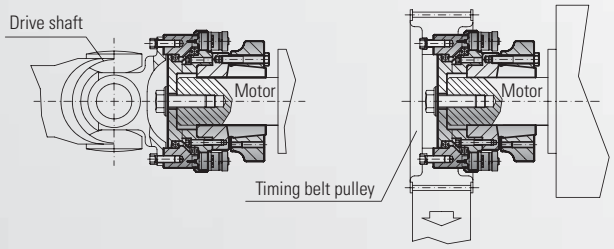


see page 4

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

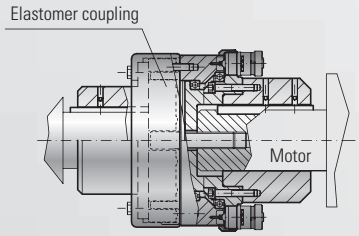


see page 5

ST 2

with keyway connection and elastomer coupling

- Vibration damping
- Compensation for misalignment
- Precise overload protection

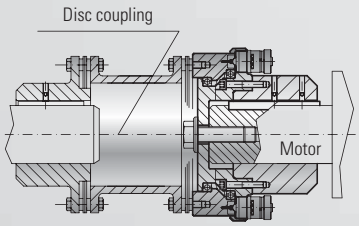


see page 8

ST 3

with keyway connection and disc coupling

- Torsionally rigid
- Compensation for misalignment
- Precise overload protection

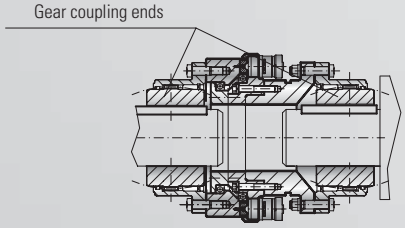


see page 7

ST 4

with keyway connection and gear coupling

- High torque density
- Compensation for misalignment
- Precise overload protection



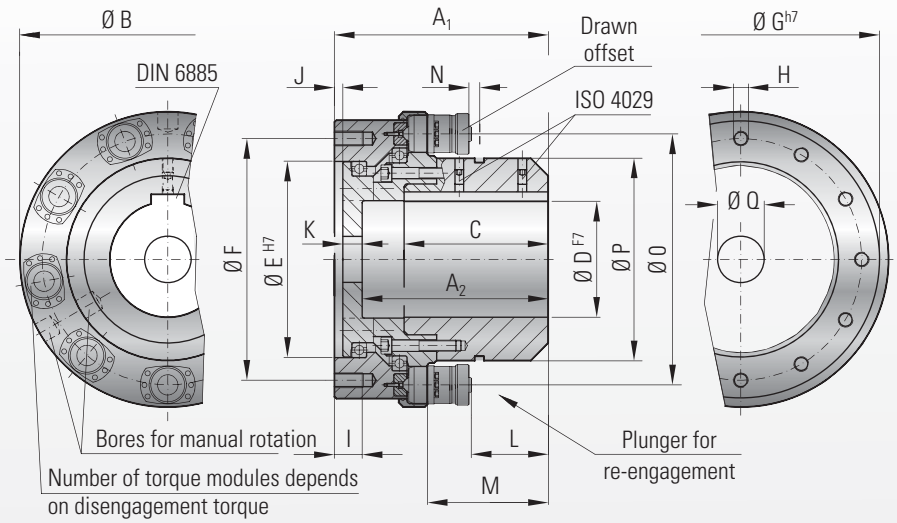
see page 10

optional stainless steel

MODEL **ST 1**

TORQUE LIMITER

with keyway connection



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

MODEL ST 1			Series											
			10			25			60			160		
Adjustment range available from - to	(KNm)		1-6	2-10	6-18	2-8	4-15	10-25	8-18	15-35	30-60	20-50	40-100	80-160
			3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length	(mm)	A_1	183			230			320			410		
Bore depth	(mm)	A_2	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 to Ø F7	(mm)	D	40-110			60-140			80-200			100-290		
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 290		
Moment of inertia (approx.) D max.	(10^{-3} kgm²)		370			780			4600			24600		
Speed max.	(1/min.)		4200			3800			2500			2000		
Allowable max. radial force standard*	(KN)		40			60			100			200		
Approx. weight at D max.	(kg)		40			63			179			463		

* higher radial force through additional bearing support.

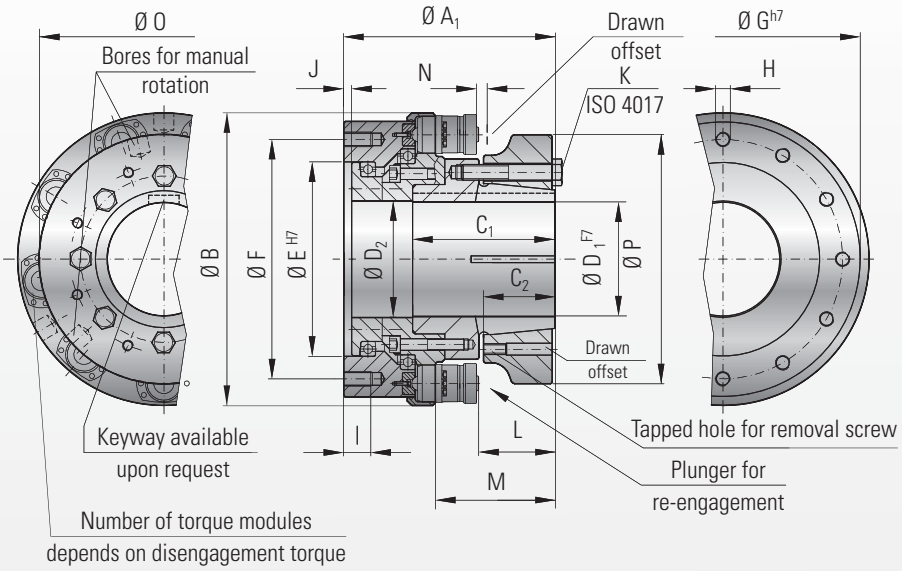
Full disengagement

optional stainless steel

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

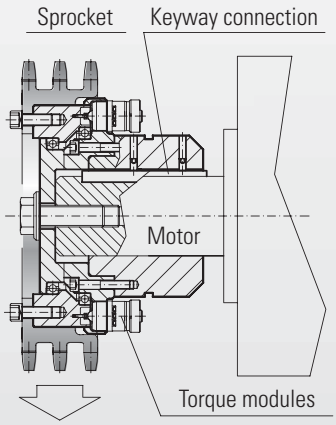
MODEL STN			Series											
			10			25			60			160		
Adjustment range available from - to	(KNm)		1-6	2-10	6-18	2-8	4-15	10-25	8-18	15-35	30-60	20-50	40-100	80-160
			3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length	(mm)	A_1	210			227			318			425		
Flange outside diameter	(mm)	B	270			318			459			648		
Fit length / keyway length	(mm)	C_1	147			152			218			305		
Effective clamping length	(mm)	C_2	62			67			93			125		
Bore diameter possible Ø to Ø F7	(mm)	D_1	65 - 110			70 - 150			80 - 200			140 - 290		
Bore diameter max. Ø F7 with keyway	(mm)	D_1	100			140			180			270		
Inside diameter	(mm)	D_2	110,2			140,2			200,2			290,2		
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		
Tightening screw ISO 4017		K	8 x M16			9 x M16			8 x M20			8 x M24		
Tightening torque	(Nm)		180			180			300			710		
Distance	(mm)	L	72			80			94			151		
Distance	(mm)	M	122			127			163			240		
Actuation path	(mm)	N	4			4			7,5			10		
Bolt circle diameter - modules	(mm)	O	220			270			376			532		
Hub outside diameter	(mm)	P	218			278			378			535		
Moment of inertia (approx.) D max.	(10^{-3} kgm²)		446			789			5700			30700		
Speed max.	(1/min.)		4200			3800			2500			2000		
Allowable max. radial force standard*	(KN)		40			60			100			200		
Approx. weight at D max.	(kg)		50			65			200			550		

* higher radial force through additional bearing support.

optional stainless steel

MODEL **ST 1 / STN**

Mounting example with sprocket and keyway connection

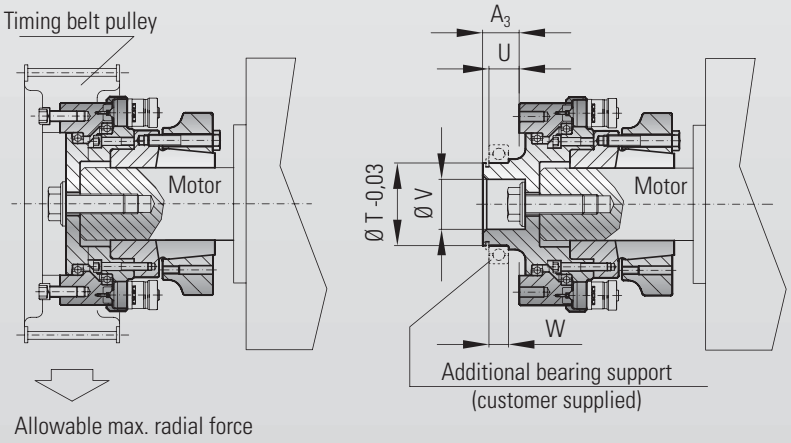


Ordering example

ST1 /025 /4-15/12 /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

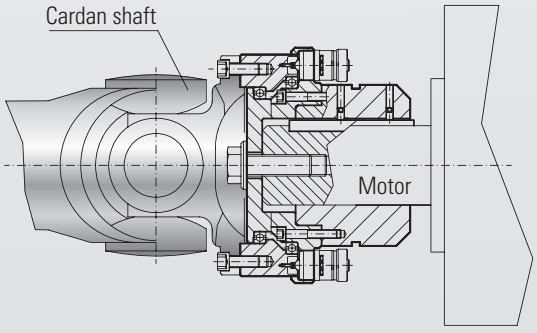


Ordering example

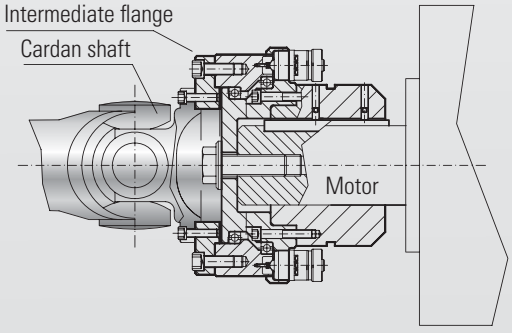
STN /025 /4-15/12 /120 /25 / xx

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

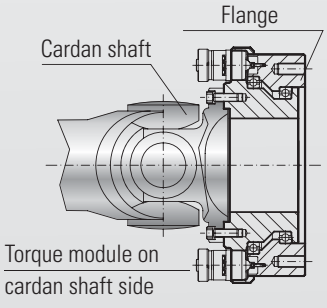
Mounting example for cardan shafts



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



Mounting with intermediate flange.



Flange mounting on both sides possible.

Designs for Direct Drives

optional stainless steel

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

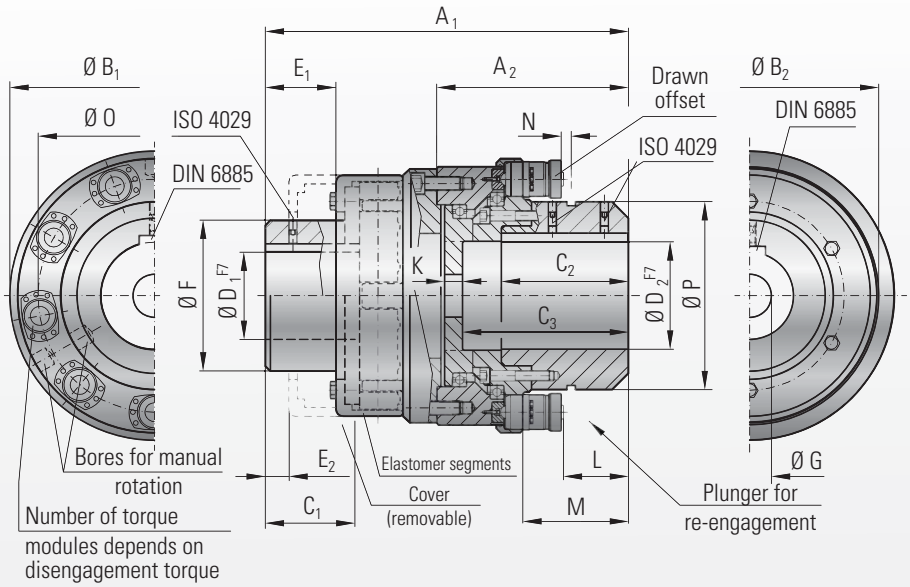
see page 10

optional stainless steel

MODEL **ST 2**

TORQUE LIMITER

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			Series											
			10			25			60			160		
Adjustment range available from - to	(KNm)		1-6	2-10	6-18	2-8	4-15	10-25	8-18	15-35	30-60	20-50	40-100	80-160
			3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length ±2	(mm)	A_1	360			437			580			730		
Length of torque limiting portion	(mm)	A_2	183			230			320			410		
Flange OD (ST portion)	(mm)	B_1	270			318			459			648		
Flange OD (elastomer portion)	(mm)	B_2	290			330			432			553		
Fit length/keyway length D1	(mm)	C_1	97			116			160			230		
Fit length/keyway length D2	(mm)	C_2	120			155			220			290		
Bore depth (torque limiting portion)	(mm)	C_3	158			200			275			360		
Bore diameter (elastomer portion) Ø – Ø F7	(mm)	D_1	40-105*			60-130*			80-160*			100-200*		
Bore diameter (torque limiting portion) Ø – Ø F7	(mm)	D_2	40-110			60-140			80-200			100-290		
Length to cover	(mm)	E_1	70			87			112			152		
Length to (cover removed)	(mm)	E_2	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. 290		
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 ST	(mm)	O	220			270			376			532		
Hub outside diameter	(mm)	P	170			218			295			418		
Moment of inertia (approx.) D max.	(10^{-3} kgm²)		854			1850			8960			36858		
Speed max.	(1/min.)		2700			2300			1800			1500		
Approx. weight at D max.	(kg)		80			115			287			729		
Axial	(mm)		1.5			1.5			2			2.5		
Lateral	(mm)		0.4			0.5			0.6			0.7		
Angular	(Degrees)		1			1			1			1		
Dynamic torsional stiffness at T_{KN} (Standard A Insert)	(10^3 Nm/rad)		145			230			580			1000		

* larger bore diameters upon request.

optional stainless steel

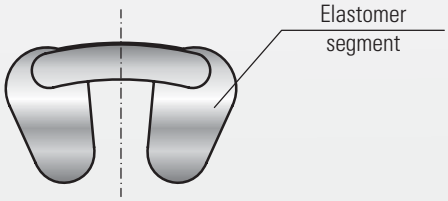
MODEL **ST 2**

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.

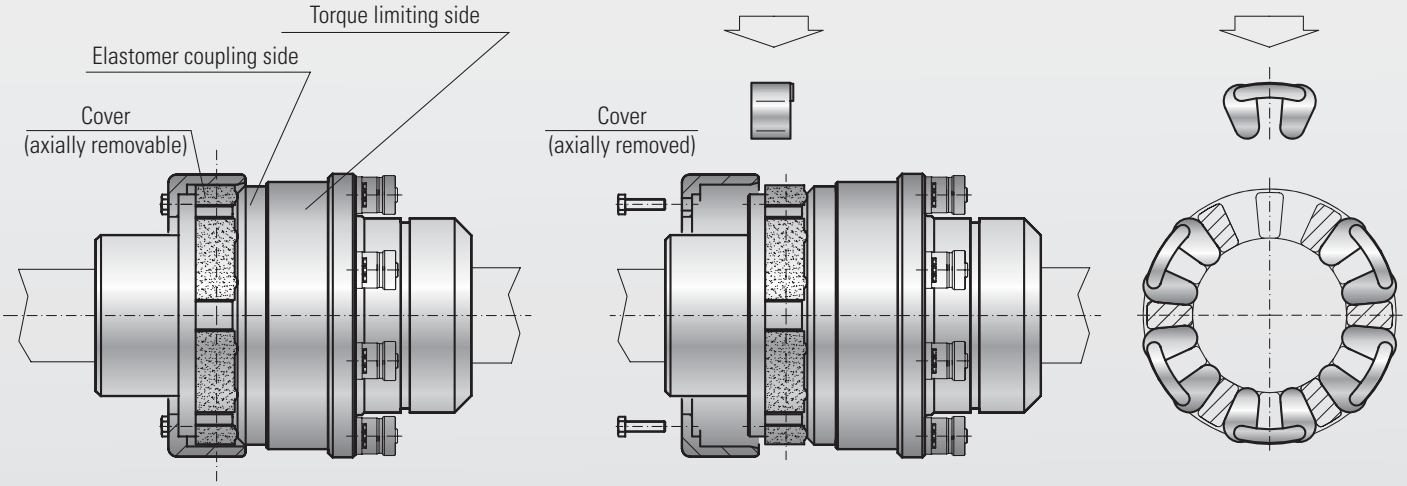
The standard elastomer segment is the type "A". Three different types are available.

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



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

ST2 / 025 / 10-25 / 15 / 100 / 120 / xx

- Model
- Series
- Adjustment range (KNm)
- Disengagement torque (KNm)
- Bore Ø D_1 F7
- Bore Ø D_2 F7
- Non-standard (e.g. stainless steel)

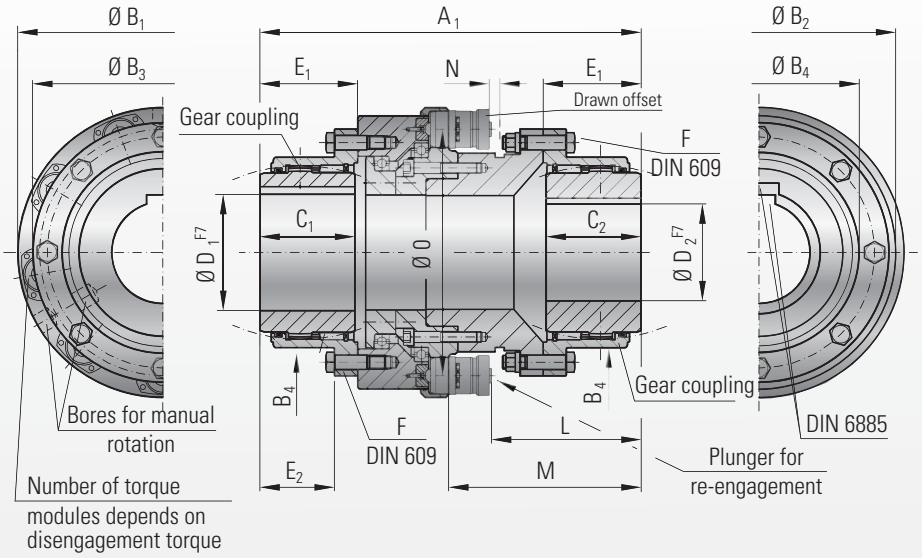
For easier handling, the coupling will be shipped unassembled.

optional stainless steel

MODEL **ST 4**

TORQUE LIMITER

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			Series										
			10			25			60			160		
Adjustment range available from - to	(KNm)		1-6	2-10	6-18	2-8	4-15	10-25	8-18	15-35	30-60	20-50	40-100	80-160
			3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 15	6 x ST 15	9 x ST 15	3 x ST 30	6 x ST 30	9 x ST 30	3 x ST 70	6 x ST 70	9 x ST 70
Overall length	(mm)	A_1	377			430			615			850		
Flange OD (ST portion)	(mm)	B_1	270			318			459			648		
Mounting flange (ST portion)	(mm)	B_2	259			298			418			618		
Flange diameter (gear coupling)	(mm)	B_3	234			274			380			506		
Hub diameter (gear coupling)	(mm)	B_4	181			209			307			426		
Fit length/keyway length	(mm)	$C_{1/2}$	90			105			150			220		
Bore diameter Ø – Ø F7	(mm)	$D_{1/2}$	40-112*			55-132*			90-198*			150-275*		
Length	(mm)	E_1	92.5			108			154			225		
Length	(mm)	E_2	70			79			116			196		
Screw DIN 609 12.9	(mm)	F	8 x M16			8 x M20			10 x M20			16 x M24		
Tightening torque	(Nm)		280			650			650			1100		
Distance	(mm)	L	146			172			237			320		
Distance	(mm)	M	196			222			306			412		
Actuation path	(mm)	N	4			4			7.5			10		
Bolt circle diameter ST	(mm)	O	220			270			376			532		
Moment of inertia (approx.) D max.	(10^{-3} kgm²)		545			1298			7547			39742		
Speed max.	(1/min.)		2700			2300			1800			1500		
Approx. weight at D max.	(kg)		69			115			325			870		
Axial	(mm)		4			5			6			8		
Lateral	(mm)		6			7			8			10		
Angular	(Degrees)		1.2			1.2			1.2			1.2		

* larger bore diameters upon request.

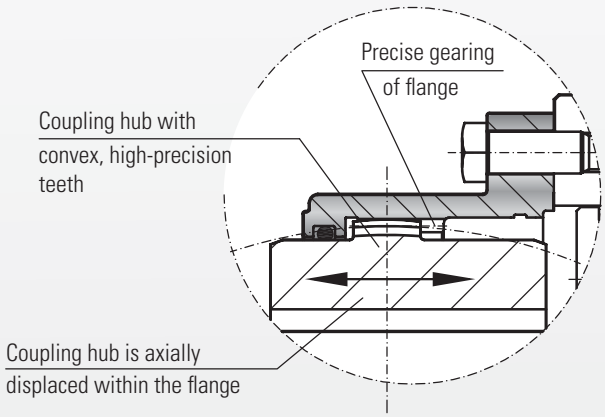
optional stainless steel

MODEL **ST 4**

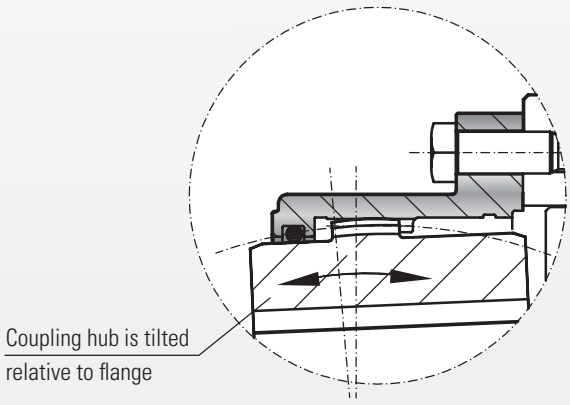
Function of the gear coupling

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.

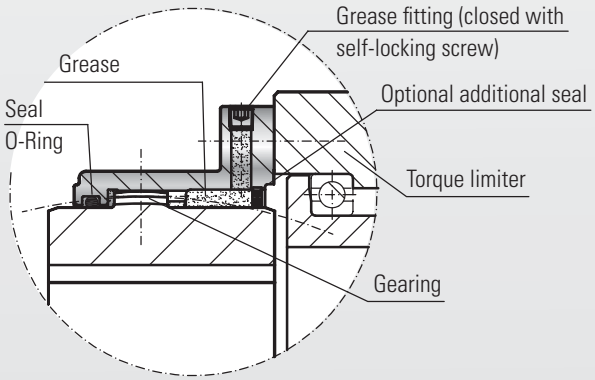


Axial misalignment



Angular and lateral misalignment

Maintenance and lubrication



Ordering example

ST4 / 025 / 10-25 / 15 / 100 / 120 / xx

- Model
- Series
- Adjustment range (KNm)
- Disengagement torque (KNm)
- Bore Ø D_1 F7
- Bore Ø D_2 F7
- Non-standard (e.g. stainless steel)

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

Normal speed and operating load		High speed and operating load	
Castrol	Impervia MDX	Caltex	Coupling Grease
Esso	Fibrax 370	Klüber	Klüberplex GE 11-680
Klüber	Klüberplex GE 11-680	Mobil	Mobilgrease XTC
Mobil	Mobilux EPO	Shell	Albida GC1
Shell	Alvania grease EP R-O or ER 1	Texaco	Coupling Grease
Total	Specis EPG		

For easier handling, the coupling will be shipped unassembled.

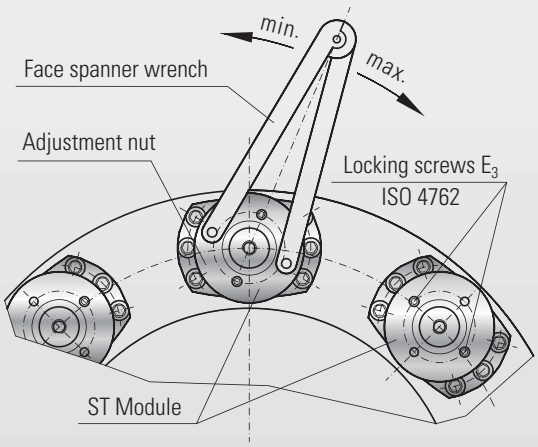
optional stainless steel

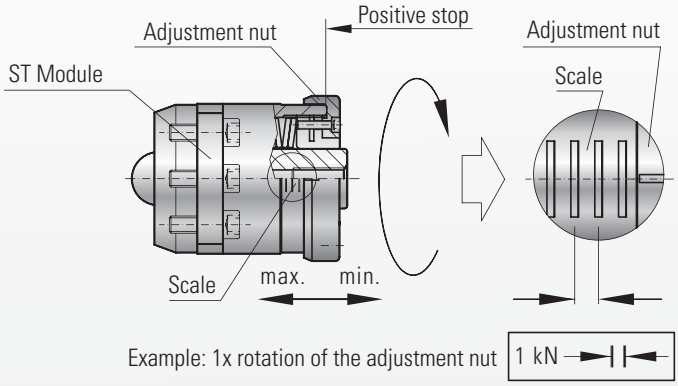
MODEL **ST 1 / STN / ST 2 / ST 3 / ST 4**

TORQUE LIMITEREN

Mounting Instructions

Torque adjustment





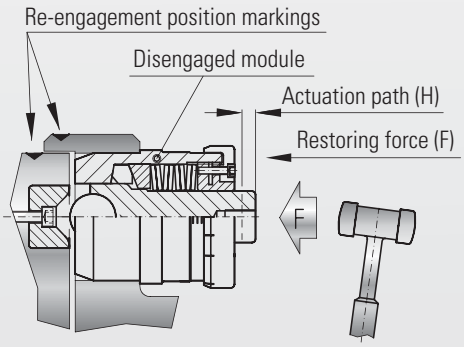
Example: 1x rotation of the adjustment nut 1 kN

After loosening (approx. 1 rotation) the locking screws (E_3), 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 (E_3).

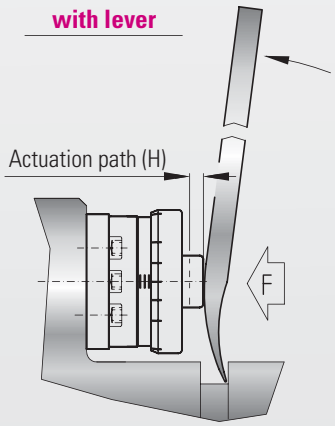
Note: All torque modules must be set to the same value.

Re-engagement of the torque modules

with rubber mallet



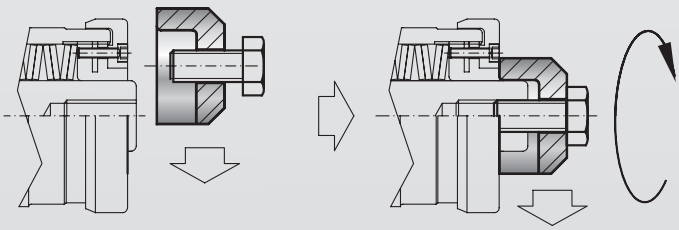
with lever



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).

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.

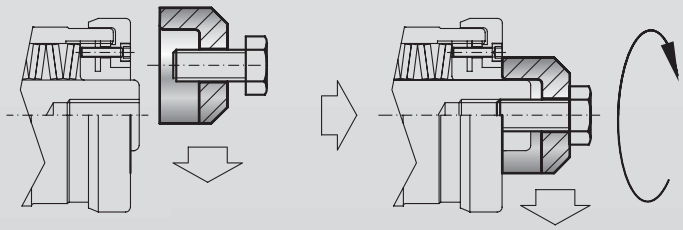
Accreditation information example:

Typ: ST4 25 EEx-2009
II 2 G D
EEx fr c T3 / 135°C
Ser.No.: A 200101.1
Tech.Ref.No.:2009/008RW

ACCESSORIES

Engagement / disengagement tool

Order-No.: see table



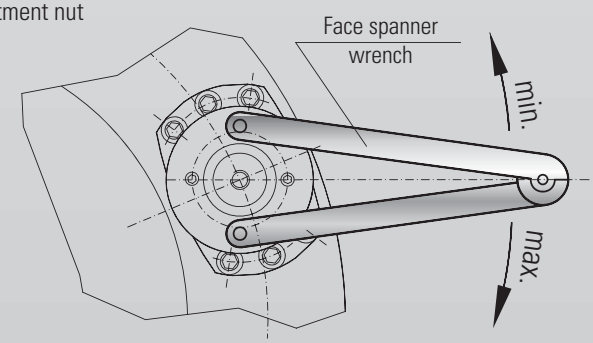
Engaged module | Disengaged module

Series	Engagement / disengagement tool
15	Order-No. AV/0015
30	Order-No. AV/0030
70	Order-No. AV/0070

Face spanner wrench

Order-No.: see table

For rotation of adjustment nut

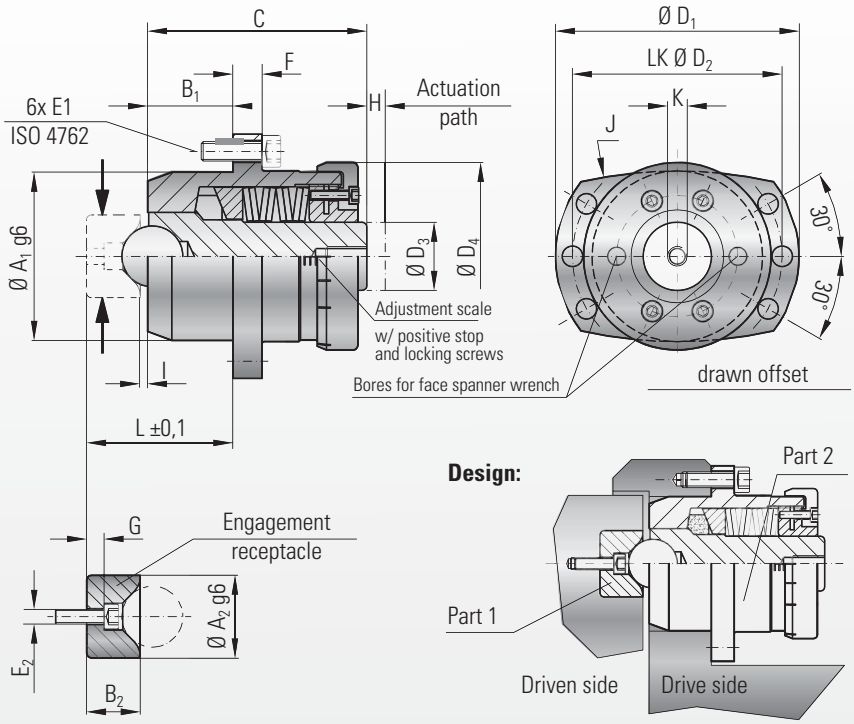


Series	Face spanner wrench
15	Order-No. SLS/0015
30	Order-No. SLS/0030
70	Order-No. SLS/0070

optional stainless steel

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.

MODEL ST			Series		
			15	30	70
Tangential force (KN) Adjustment range available from - to	(ranges)	1	1-4	5-10	8-20
		2	2-8	10-20	15-40
		3	6-20	20-35	30-70
Centering diameter torque module g6	(mm)	A_1	40	70	90
Centering diameter engagement receptacle g6	(mm)	A_2	24	34	44
Centering length torque module	(mm)	B_1	20	35	45
Centering length engagement receptacle	(mm)	B_2	14	22	30
Overall length	(mm)	C	70	103	135
Outside diameter	(mm)	D_1	59	100	129
Bolt circle diameter	(mm)	D_2	50	86	110
Diameter plunger	(mm)	D_3	16	28	35
Diameter adjustment nut	(mm)	D_4	44	75	92
Screw / tightening torque ISO 4762	(mm)	E_1	6 x M5 x 16 / 10 Nm	6 x M8 x 25 / 40 Nm	6 x M12 x 35 / 120 Nm
Screw / tightening torque ISO 4762	(mm)	E_2	M4 x 14 4.5 Nm	M6 x 20 15.5 Nm	M8 x 25 38 Nm
Flange thickness	(mm)	F	7	12	16
Distance	(mm)	G	5	8	10
Actuation path	(mm)	H	4	7.5	10
Distance	(mm)	I	2	3	4
Radius	(mm)	J	110	200	250
Inner thread	(mm)	K	M8 x 15	M10 x 25	M16 x 30
Distance ± 0,1	(mm)	L	36	60	79
Weight	(kg)		0.65	2.7	6

axial spring force ≈ tangential force/1.4

MODEL **ST**

optional stainless steel

Ordering example

ST / 30 / 2 / 12 / xx

- Model
- Series
- Adjustment range 1/2/3
- Tangential force (KN)
- Non-standard (e.g. stainless steel)

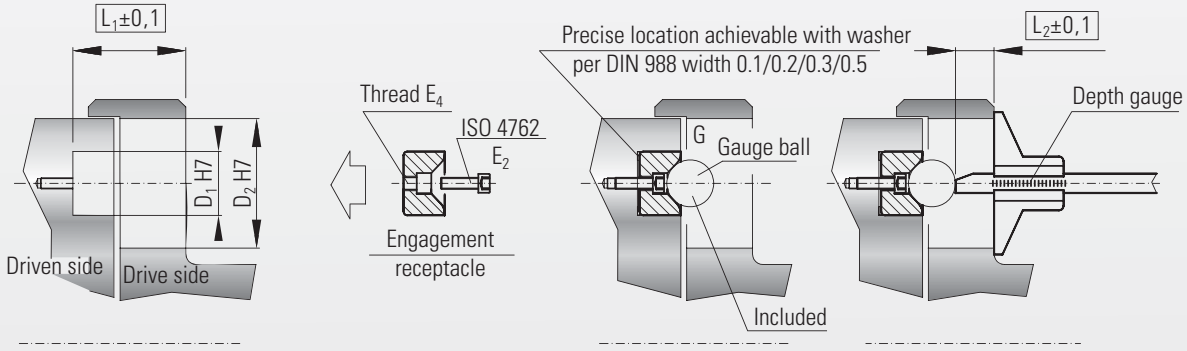
Maintenance

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.

Mounting instructions ST

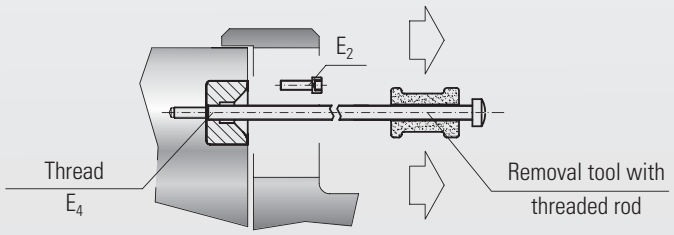
Mounting engagement receptacle

Note: Measurements L1 and L2 must be checked prior to installing the torque modules.

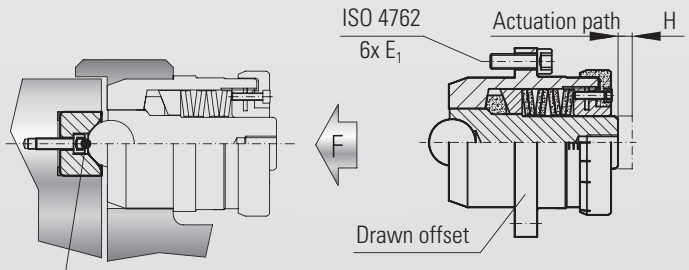


Dismounting of engagement receptacle

After loosening the mounting screw E2, the engagement receptacle can re 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 NB 52).

MODEL ST		Series 15	Series 30	Series 70
Screws	E_1	6 x M5 x 16 (12.9)	6 x M8 x 25 (12.9)	6 x M12 x 35 (12.9)
Tightening torque		10 Nm	40 Nm	120 Nm
Screws	E_2	1 x M4 x 12	1 x M6 x 20	1 x M8 x 25
Tightening torque		4,5 Nm	15,5 Nm	38 Nm
Screws	E_3	4 x M4 x 14	4 x M4 x 16	4 x M5 x 20
Tightening torque		4,5 Nm	4,5 Nm	10 Nm
Thread	E_4	M5	M8	M10
Actuation path	H	4 mm	7,5 mm	10 mm
Restoring force	F	max. 2 KN	max. 4 KN	max. 6 KN
Fit length	L_1 ±0,1	36	60	79
Depth measurement	L_2 ±0,1	10	20,5	29
Gauge ball	Ø G	16	25	30

optional stainless steel

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:

$$T_{AR} \geqq K \cdot T_{max} \quad (Nm)$$

K = 1,3 uniform load
K = 1,5 light, non-uniform load
K = 1,8 sheavy, non-uniform load

or

$$T_{Drive} \geqq 9550 \cdot \frac{P_{Drive}}{n} \quad (Nm)$$

T_{AR}	=	Disengagement torque of coupling	(Nm)
K	=	service factor	
T_{max}	=	peak operating torque	(Nm)
T_{Drive}	=	Nominal torque of drive	(Nm)
P_{Drive}	=	Drive power	(kW)
n	=	Drive speed	(min^{-1})

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

S_A = Shock or load factor
S_A = 1 (uniform load)
S_A = 2 (non-uniform load)
S_A = 3 (highly dynamic load)

$$T_{AR} \geqq \alpha \cdot J_L \geqq \frac{J_L}{J_A + J_L} \cdot T_{AS} \cdot S_A \quad (Nm)$$

T_{AR}	=	Disengagement torque of coupling	(Nm)
α	=	Angular acceleration $\alpha = \frac{\omega}{t} = \frac{\pi \cdot n}{t \cdot 30}$	$\frac{1}{s^2}$
t	=	Acceleration time	(sec.)
ω	=	Angular velocity	(1/s)
n	=	Drive speed	(min^{-1})
J_L	=	Moment of inertia on load side	(kgm^2)
J_A	=	Moment of inertia on drive side	(kgm^2)
T_{AS}	=	Peak torque of motor	(Nm)

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

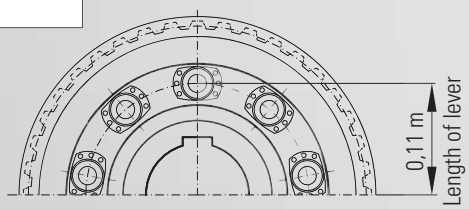
$$T_{AR} \geqq \alpha \cdot J_L + T_{AN} \geqq \left[\frac{J_L}{J_A + J_L} \cdot (T_{AS} - T_{AN}) + T_{AN}\right] \cdot S_A \quad (Nm)$$

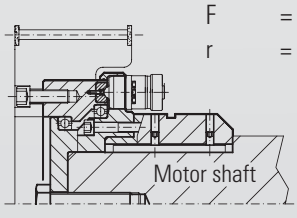
S_A = Shock or load factor
S_A = 1 (uniform load)
S_A = 2 (non-uniform load)
S_A = 3 (highly dynamic load)

T_{AR}	=	Disengagement torque of coupling	(Nm)
α	=	Angular acceleration $\alpha = \frac{\omega}{t} = \frac{\pi \cdot n}{t \cdot 30}$	$\frac{1}{s^2}$
t	=	Acceleration time	(s)
ω	=	Angular velocity	(1/s)
n	=	Drive speed	(min^{-1})
J_L	=	Moment of inertia on load side	(kgm^2)
T_{AN}	=	Load torque	(Nm)
J_A	=	Moment of inertia on drive side	(kgm^2)
T_{AS}	=	Peak torque of motor	(Nm)

According to number of torque modules

$$T_{AR} = S \cdot F \cdot r$$





T_{AR}	=	Disengagement torque of coupling	(Nm)
S	=	Number of torque modules	
F	=	Tangential force	(kN)
r	=	Length of lever	(m)

SELECTION

According to linear feed force

Spindle drive

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

T_{AN}	=	Load torque	(Nm)
S	=	Pitch	(mm)
F_V	=	Linear feed force	(N)
η	=	Efficiency factor	

Timing belt drive

$$T_{AN} = \frac{d_0 \cdot F_V}{2000} \quad (Nm)$$

T_{AN}	=	Load torque	(Nm)
d_0	=	Gear diameter (timing belt pulley)	(mm)
F_V	=	Linear feed force	(N)

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:

$$f_e = \frac{1}{2 \cdot \pi} \sqrt{C_T \times \frac{J_{Machine} + J_{Mot}}{J_{Machine} \cdot J_{Mot}}} \quad (Hz)$$

C_T	=	Torsional stiffness of coupling	(Nm/rad)
$J_{Masch.}$	=	Moment of inertia total machine (Spindle + carriage + components + coupling half)	(kgm^2)
$J_{Mot.}$	=	Moment of inertia motor (Rotor + coupling half)	(kgm^2)
f_e	=	Resonant frequency of 2 mass system	(Hz)

Specifications of elastomer jaw coupling ST2

Series	ST2 / 10	ST2 / 25	ST2 / 60	ST2 / 160
T_{KN} Rated torque (Nm)	10,000	15,000	40,000	80,000
T_{Kmax} Peak torque (Nm)	22,000	33,000	88,000	176,000
Dynamic torsional stiffness (10^3 Nm/rad)	145	230	580	1000
Relative damping	1	1	1	1

Rating factors

Shock or load factor S_A

Drive	Load variables of machine		
	G	M	S
Electric motors, turbines, hydraulic motors	1.25	1.6	2.0
Internal combustion engines ≥ 4 cylinders Degree of uniformity ≥ 1:100	1.5	2.2	2.5

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

Temperature factor S_υ

Ambient temperature	-40 C° +30 C°	+40 C°	+60 C°	+80 C°	> +80 C°
S_t	1.0	1.1	1.4	1.8	upon request

Start factor S_z

Start frequency per hour	30	60	120	240	>240
S_Z	1.0	1.1	1.2	1.3	upon request

optional stainless steel

SELECTION

According to torque

1. Calculation of drive torque T_{DR}.

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

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

$$T_{KN} \geq T_{DR} \times S_A \times S_\upsilon \times S_z$$

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°C	:	S_υ	=	1.1
Start frequency	30/h	:	S_z	=	1.0

$$T_{DR} = 9550 \frac{450\ kW}{980\ rpm} = 4385.2\ Nm$$

$$T_{KN} \geq T_{DR} \times S_A \times S_\upsilon \times S_z$$
$$T_{KN} \geq 4385.2\ Nm \times 1.25 \times 1.1 \times 1.0 = 6029.7\ Nm$$

Selected coupling: ST2/10 with T_{KN} = 6030 Nm

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[1]
G blowers (axial/radial) P:n ≤ 0.007
M blowers (axial/radial) P:n ≤ 0.007
S blowers (axial/radial) P:n ≤ 0.007
G cooling tower fans P:n ≤ 0.007
M cooling tower fans P:n ≤ 0.007
S cooling tower fans P:n ≤ 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
M shears
S stamp punches
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

[1]) P = Power of drive in kW
n = speed in rpm

SELECTION

Specifications of gear coupling ST4

Series		ST4 / 10	ST4 / 25	ST4 / 60	ST4 / 160
T_{KN} Rated torque	(Nm)	16,000	22,000	62,000	174,000
T_{Kmax} Peak torque	(Nm)	32,000	44,000	124,000	348,000
Grease	(dm^3)	0.5	0.8	1.5	3.3
n Ref (Speed max.)	(1/min.)	6,050	5,150	3,600	3,050

* only allowable at reduced torque and misalignment

Selection based on torque

1. Calculation of drive torque T_{DR}.

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

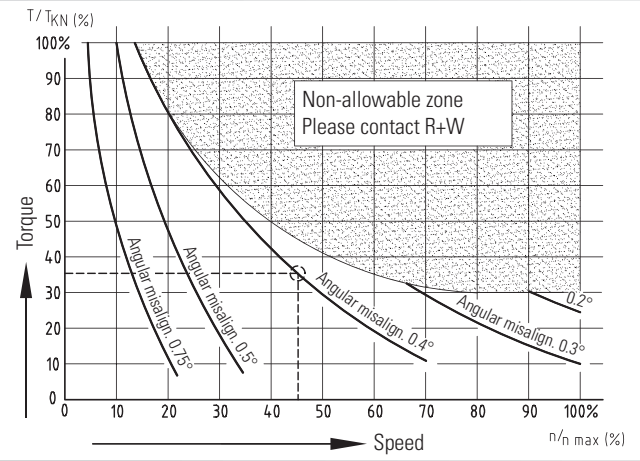
2. Calculation of the rated torque of the coupling based on drive torque T_{DR} considering all rating factors (Shock or load factor S_A, see page 17)

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

Application graph

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

Calculation of T / T_{KN} and n / n_{max} ▶ Calculate values and enter and check in the diagram below.



Example: Coupling ST4/10

T = 5600 Nm $\quad T/_{TKN} = \frac{5600}{16000} \cdot 100 = 35\%$

n = 2700 rpm $\quad n/_{n_{max}} = \frac{2700}{6050} \cdot 100 = 45\%$

Angular misalignment: 0.4°

➤ In allowable zone; selected coupling ST4 can be used.

Selection example:

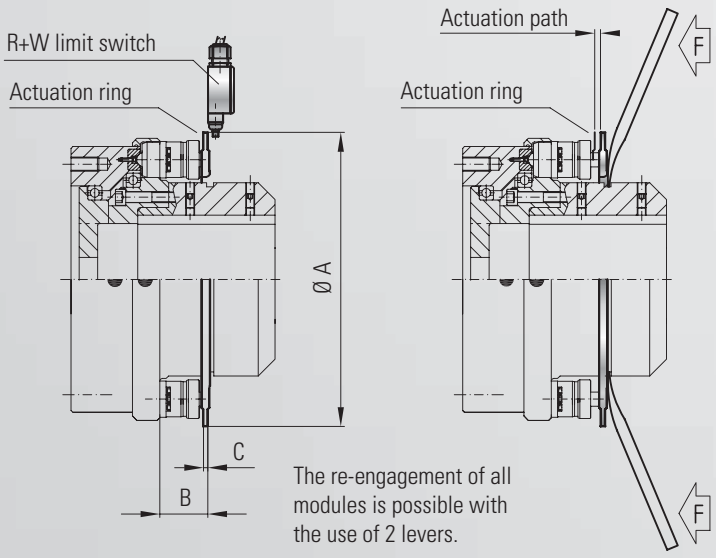
Calculation of a coupling for use between an electric motor (P= 1000 kW at 980 rpm) and screw conveyor (S_A= 1.6).

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

$$T_{KN} \geq T_{AN} \times S_A$$
$$T_{KN} \geq 9744\ Nm \times 1.6 = 15{,}591\ Nm$$

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

Optional actuation ring



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

MODEL ST 1		Series 10	25	60	160
Outside diameter	A	278	328	upon request	upon request
Distance	B	57	57	upon request	upon request
Actuation ring thickness	C	4.5	4.5	upon request	upon request

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Single piece or press-fit design

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Series BK

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Bore diameters 10 – 180 mm
Single piece or press-fit design

LINE SHAFTS
Series ZA/ZAE

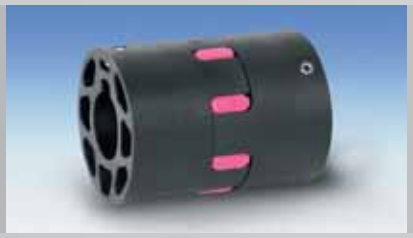
From 10 – 4,000 Nm
Bore diameters 10 – 100 mm
Available up to 6 mtr. length

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

528/02/10/2.000