

# KTR Torque Limiters

## Overload Protection Systems



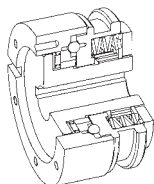
- RUFLEX® - Friction Disk**
- SYNTEX® - Zero Backlash Ball Detent**
- KTR SI - Ball/Roller Bearing Style**
- KTR SI Compact - Zero Backlash Ball Detent**



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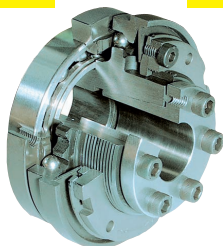
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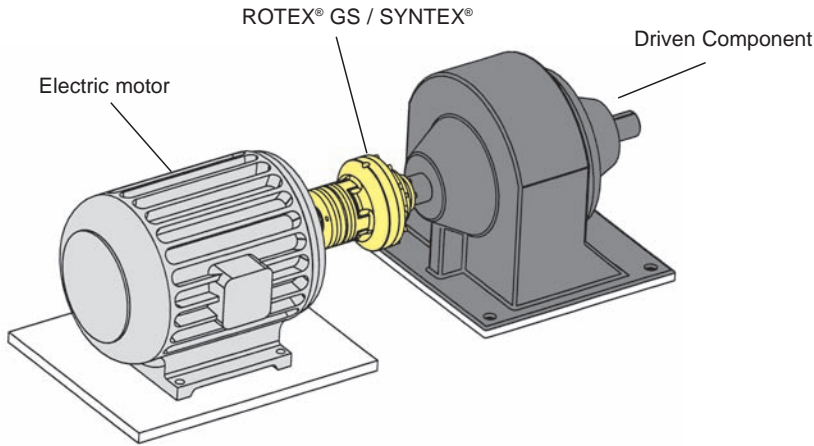
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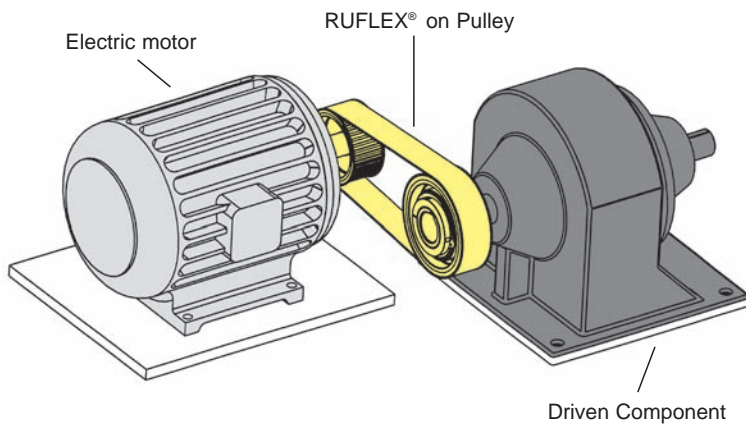


## Summary of Overload Protection Overload protection for direct and indirect drives

### Direct drives



### Indirect drives



RUFLEX® - Friction Disk Torque limiter with ROTEX®



SYNTEX® - Zero-Backlash Torque Limiter with ROTEX® GS



KTR SI - High Capacity Torque Limiter with ROTEX®



RUFLEX® - torque limiter with sprocket








SYNTEX® - Torque Limiter with sprocket



SYNTEX® - Torque Limiter with pulley



## Designs and Applications

Design	Characteristics	Applications
 <p>RUFLEX® standard</p>	<ul style="list-style-type: none"> <li>• Torque Limiter, high-capacity, high-quality</li> <li>• Overload protection up to 6800 Nm</li> <li>• High-capacity wear for long service life</li> <li>• Zinc, yellow chromated coating</li> <li>• Economical</li> <li>• See page 142</li> </ul>	<ul style="list-style-type: none"> <li>• Conveyors</li> <li>• Packaging machines</li> <li>• Textile machines</li> <li>• Gear motors</li> </ul>
 <p>RUFLEX® with sprocket</p>	<ul style="list-style-type: none"> <li>• Torque limiter with sprocket</li> <li>• Design ready for assembly</li> <li>• Torque pre-set to customer specifications</li> <li>• Available from stock with standard sprockets</li> <li>• Other sprockets available on request</li> <li>• See page 143</li> </ul>	<ul style="list-style-type: none"> <li>• Conveyors</li> <li>• Automation systems</li> <li>• Actuators</li> </ul>
 <p>RUFLEX® max.</p>	<ul style="list-style-type: none"> <li>• Torque limiter in a lengthened design for assemblies with wide driving elements (i.e. double or triple sprockets)</li> <li>• Detailed adjustment to customer's mounting dimensions</li> <li>• Also available with a sprocket</li> <li>• See page 144</li> </ul>	<ul style="list-style-type: none"> <li>• Multiple sprocket drives</li> <li>• Multiple groove V-belt pulleys</li> <li>• Conveyors</li> <li>• Packaging machines</li> </ul>
 <p>RUFLEX® with ROTEX®</p>	<ul style="list-style-type: none"> <li>• Torque limiter for shaft-to-shaft connection</li> <li>• Torsionally flexible torque limiter able to compensate for misalignment</li> <li>• Axial plug-in</li> <li>• Various elastomers available, each adjusted to the application</li> <li>• See page 145</li> </ul>	<ul style="list-style-type: none"> <li>• Gear motors</li> <li>• Axle drives</li> <li>• High-quality pumps</li> <li>• Printing machines</li> </ul>
 <p>RUFLEX® with BoWex®</p>	<ul style="list-style-type: none"> <li>• Torque limiter, torsionally rigid, double-cardanic shaft-to-shaft design</li> <li>• Low cost</li> <li>• Axial plug-in</li> <li>• Double-cardanic design compensates for high misalignment</li> <li>• See page 146</li> </ul>	<ul style="list-style-type: none"> <li>• General equipment</li> <li>• Low speeds</li> <li>• High misalignment</li> <li>• Conveyors</li> </ul>

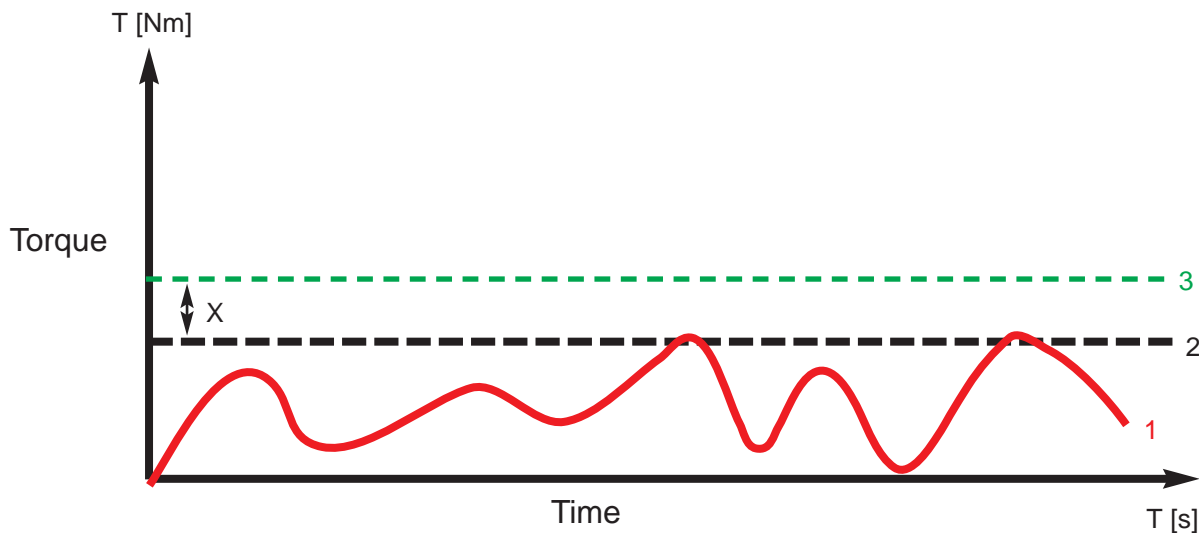
## Designs and Applications

Design	Characteristics	Applications
 <p>SYNTEX® standard</p>	<ul style="list-style-type: none"> <li>• Torque Limiter up to 400 Nm</li> <li>• Zero Backlash, torsionally rigid, ball-detent design</li> <li>• Standard or synchronous</li> <li>• Includes flange for mounting of customer's components</li> <li>• See page 149</li> </ul>	<ul style="list-style-type: none"> <li>• Packaging machines</li> <li>• Machine tools</li> <li>• X-Y-Z – axle drives</li> <li>• Linear drives</li> </ul>
 <p>SYNTEX® with sprocket or pulley</p>	<ul style="list-style-type: none"> <li>• Torque Limiter with integrated sprocket</li> <li>• Torque pre-set to customer specifications</li> <li>• Reduces component costs</li> <li>• Standard sprockets available from stock</li> <li>• Also available with belt pulley</li> <li>• See pages 150 and 151</li> </ul>	<ul style="list-style-type: none"> <li>• Conveyors for packaging machines</li> <li>• Textile machines</li> <li>• With belt pulley for linear drives</li> </ul>
 <p>SYNTEX® with ROTEX® GS</p>	<ul style="list-style-type: none"> <li>• Torque Limiter as a shaft-to-shaft coupling</li> <li>• Combination with backlash-free ROTEX® GS</li> <li>• Torsionally flexible, able to compensate for misalignment</li> <li>• Axial plug-in</li> <li>• Various elastomers available</li> <li>• See page 152</li> </ul>	<ul style="list-style-type: none"> <li>• Axle drives on machine tools</li> <li>• Gear motors</li> <li>• Woodworking machinery</li> <li>• Linear drives</li> </ul>
 <p>KTR SI standard</p>	<ul style="list-style-type: none"> <li>• High Capacity Torque Limiter up to 13000 Nm</li> <li>• Available as a ratchet, synchronous and fail-safe design</li> <li>• <u>New</u>: Free-spinning design (no residual torque)</li> <li>• See page 156</li> </ul>	<ul style="list-style-type: none"> <li>• For rugged drives, e.g. crushers</li> <li>• In combination with coupling or belt pulleys, sprockets, etc.</li> </ul>
 <p>KTR SI with ROTEX®</p>	<ul style="list-style-type: none"> <li>• High Capacity Torque Limiter as a shaft-to-shaft coupling</li> <li>• Torsionally flexible, able to compensate for misalignment</li> <li>• Axial plug-in</li> <li>• Various elastomers available</li> <li>• See page 157</li> </ul>	<ul style="list-style-type: none"> <li>• Combinations for motor and gearbox, e.g. bottle filling machines or extruders (free-spinning design)</li> </ul>
 <p>KTR SI Compact</p>	<ul style="list-style-type: none"> <li>• New Zero-Backlash ball-detent torque limiter</li> <li>• Torsionally stiff, able to compensate for misalignment</li> <li>• Combines with Rotex GS or Radex-NC for a high precision shaft to shaft connection</li> <li>• Frictionally engaged keyless hubs</li> <li>• Maintenance free</li> <li>• See pages 158-159</li> </ul>	<ul style="list-style-type: none"> <li>• Axle drives on machine tools</li> <li>• Gear motors</li> <li>• Woodworking machinery</li> <li>• Linear drives</li> <li>• High precision / high torque applications</li> </ul>

## Selection Guidelines

### Important factors to consider when selecting a torque limiter:

- Proper operation is possible only if the overload torque setting exceeds the maximum normal operating torque of the machine as shown in the chart below. The torque limiter setting should be set 30% higher than the maximum operating torque of the drive. (see chart below)
- Accelerating and start-up torques should be considered when calculating maximum operating torque of the drive.
- KTR manufactures several types of torque limiting components. Each design has a different amount of residual torque once it disengages. To determine the proper design, please consider the following guidelines:
  - Is there a limit switch or proximity switch being used to shut down the drive?
  - How frequently would the torque limiting device be disengaged?
  - What amount of residual torque can the drive accept?
- If possible, the torque limiter should be placed between the electric motor and driven component. This ensures that torque transmission is stopped as soon as an overload occurs.



- 1 Torque curve of the machine
  - 2 Maximum operating torque of the machine
  - 3 Torque limiter setting
- X Safety margin between 2 and 3 (should be at least 30 % of the maximum operating torque of the machine).

## Product Features and Components

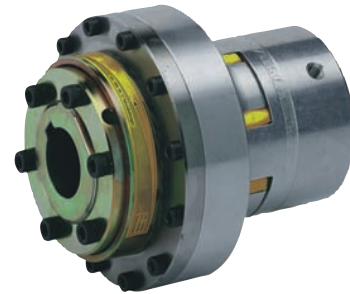
RUFLEX® Standard



RUFLEX® with sprocket



RUFLEX® with ROTEX®



- Overload protection up to 6800 Nm (standard)

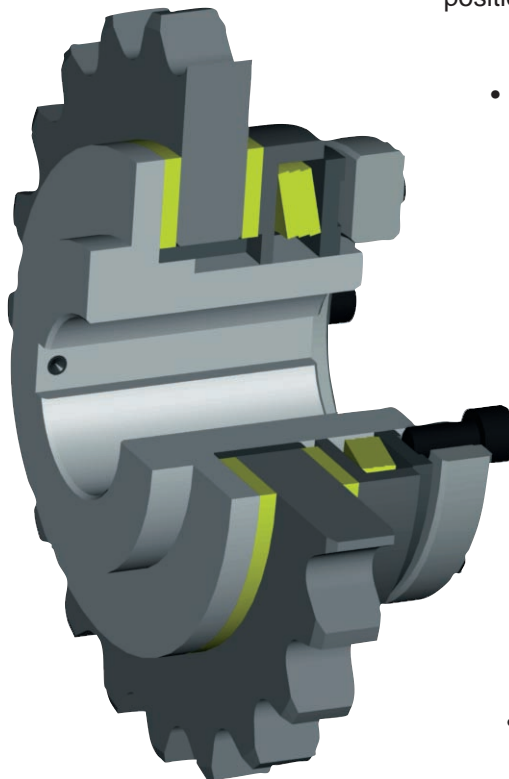
- Available with sprocket included

- Asbestos-free and rust-resistant friction lining for dry running (approved for explosion-proof applications)

- High-quality materials for durability and long life

- High-quality slide bush with dry-film lubricant

- Torque can be adjusted while assembled



- Easy to assemble with 12 locking positions

- Economical, high-capacity friction disk design

- High grade steel components

- Corrosion protection with zinc-yellow-dichromate coating

- Rust-resistant and acid-proof design available on request

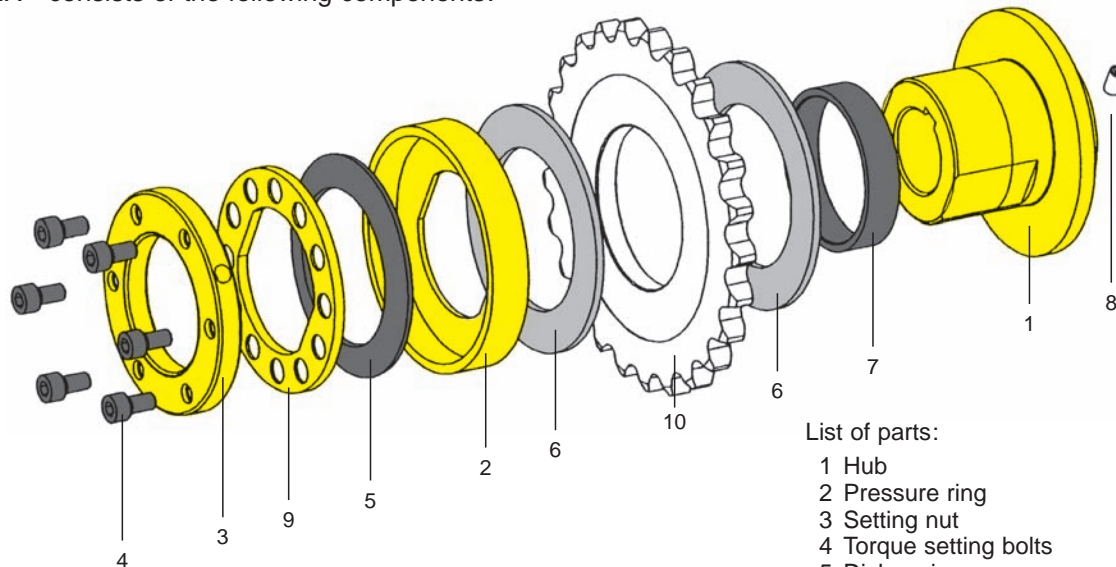
- High-quality disk springs and friction linings

The combination of proven RUFLEX® and customer-specific drive elements (i. e. sprockets) provides overload protection for every application.

Layers of disk springs and high-quality friction linings ensure a high capacity - even in small mounting spaces.

## Product Features and Components

RUFLEX® consists of the following components:



### List of parts:

- 1 Hub
- 2 Pressure ring
- 3 Setting nut
- 4 Torque setting bolts
- 5 Disk spring
- 6 Friction lining
- 7 Slide bushing
- 8 Setscrew
- 9 Locking washer
- 10 Drive component (i. e. sprocket)

### Disk spring arrangements:



- 1 TF**
- Small load on friction linings
  - For small to average torques
  - High service life of friction linings



- 1 TFD**
- Small load on the friction linings
  - Torques as with design 1TF
  - Insignificant decrease of torque even during extended period of disengagement
  - Precision torque adjustment due to double spring arrangement



- 2 TF**
- Average load on friction linings
  - Average wear and decrease of torque with longer slipping periods
  - Double torque due to double layer of the disk springs

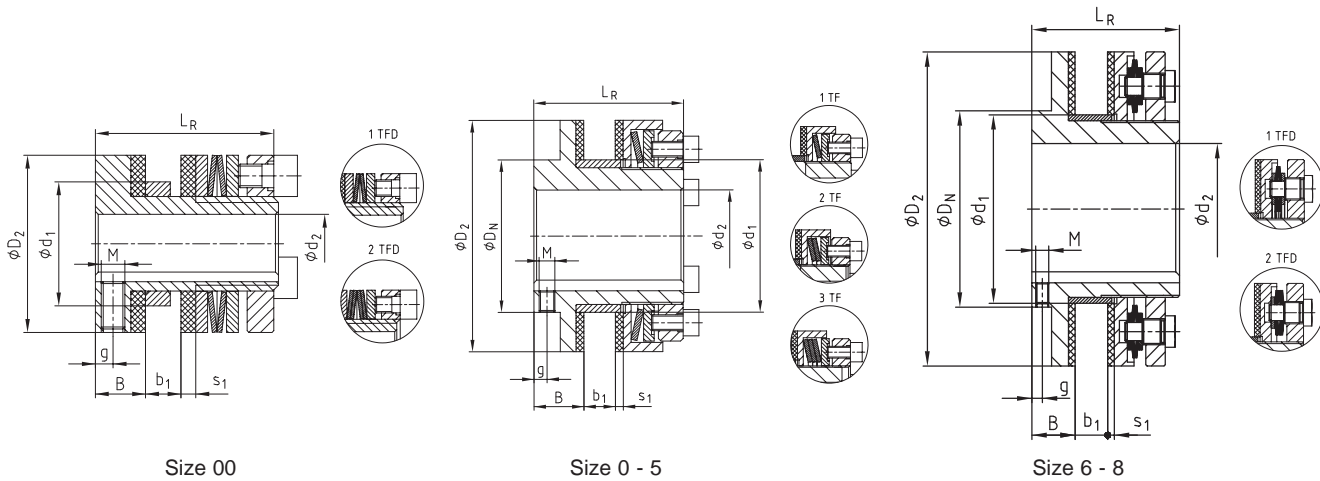


- 3 TF**
- High load on friction linings
  - High wear and decreased torque with longer slipping periods
  - Not available in all sizes

## Standard Design

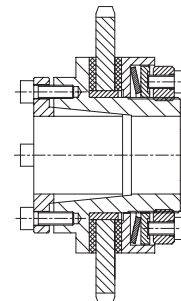
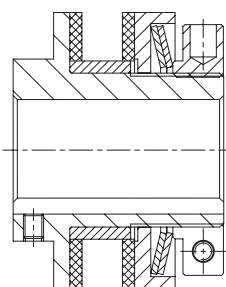


- Torque limiter for a torque range up to 6800 Nm
- Standard RUFLEX® zinc-coated and yellow chromated
- Torque adjustable after assembly
- Asbestos-free and rust-resistant friction linings
- Finished bores to tolerance H7, keyway to DIN 6885/1
- Easy locking system (12 different positions on locking washer)
- All components are made of high-quality steel



RUFLEX® size	Max. speed [RPM]	Torques [Nm] <sup>1)</sup>			Dimensions [mm]												
		1TF	2TF	3TF <sup>2)</sup>	Bore $d_2$		$D_2$	$D_N$	$d_1$ <sup>4)</sup>	B	Driving component $b_1$		$s_1$	$L_R$	Set-screw		
					Pilot bore	max.					min.	max.			g	M	
00	10000	0,5–3	1–5	–	–	10	30	30	21	8.5	2	6	2.5	31	3	M 4	
0	8500	2–10	4–20	–	–	20 <sup>3)</sup>	45	45	35	8.5	2	6	2.5	33	3	M 4	
01	6600	5–35	10–70	–	–	22	58	40	40	16	3	8	3	45	4	M 5	
1	5600	20–75	40–150	130–200	–	25	68	45	44	17	3	10	3	52	5	M 5	
2	4300	25–140	50–280	250–400	–	35	88	58	58	19	4	12	3	57	5	M 6	
3	3300	50–300	100–600	550–800	–	45	115	75	72	21	5	15	4	68	5	M 6	
4	2700	90–600	180–1200	1100–1600	–	55	140	90	85	23	6	18	4	78	5	M 8	
5	2200	400–800	800–1600	1400–2100	–	65	170	102	98	29	8	20	5	92	8	M 8	
6	1900	300–1200	600–2400	–	38	80	200	120	116	31	8	23	5	102	8	M 8	
7	1600	600–2200	1200–4400	–	45	100	240	150	144	33	8	25	5	113	8	M10	
8	1300	900–3400	1800–6800	–	58	120	285	180	170	35	8	25	5	115	8	M10	

1) To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 3Nm x 8.85 = 26.55 lb in)  
 2) Not available in all sizes.  
 3) Bore sizes larger than  $\phi$  19 mm will have reduced size keyway. Please consult KTR Corporation.  
 4) Dimension  $d_1$  is machined to accept a component with bore ISO - F8 tolerance. For additional information, contact KTR.



– Cross clamping nut for limited axial space applications

– Keyless clamping ring hub (design 4.5) friction connection

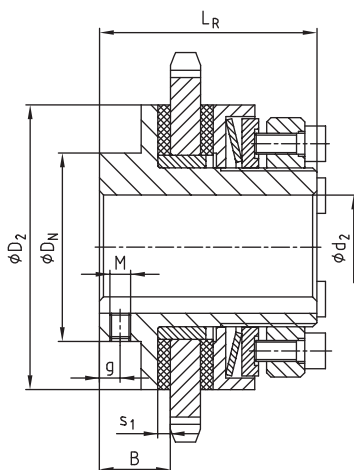


## RUFLEX® with sprocket



- RUFLEX® torque limiter with sprocket
- Available from stock with standard sprocket (see table below)
- Other sprockets on request
- Available ready to be installed with the torque pre-set
- Stainless steel available on request

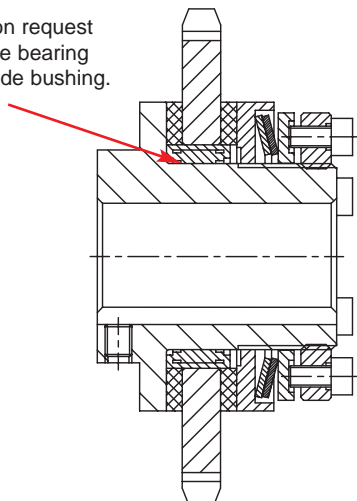
*Call KTR for Availability*



RUFLEX® Size	Max. speed [RPM]	Torques [Nm] <sup>1)</sup>			Dimensions [mm]									
					Bore d <sub>2</sub>							Setscrew		Standard sprocket
		1TF	2TF	3TF	Pilot bore	Max.	D <sub>2</sub>	D <sub>N</sub>	B	s <sub>1</sub>	LR	g	M	
01	6600	5– 35	10– 70	–	–	22	58	40	16	3	45	4	M5	3/8 x 7/32, z = 23
1	5600	20– 75	40–150	130–200	–	25	68	45	17	3	52	6	M5	1/2 x 5/16, z = 22
2	4300	25–140	50–280	250–400	–	35	88	58	19	3	57	6	M6	1/2 x 5/16, z = 27
3	3300	50–300	100–600	550–800	–	45	115	75	21	4	68	6	M6	3/4 x 7/16, z = 22

1) To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 3Nm x 8.85 = 26.55 lb in)

Available on request with needle bearing instead of slide bushing.



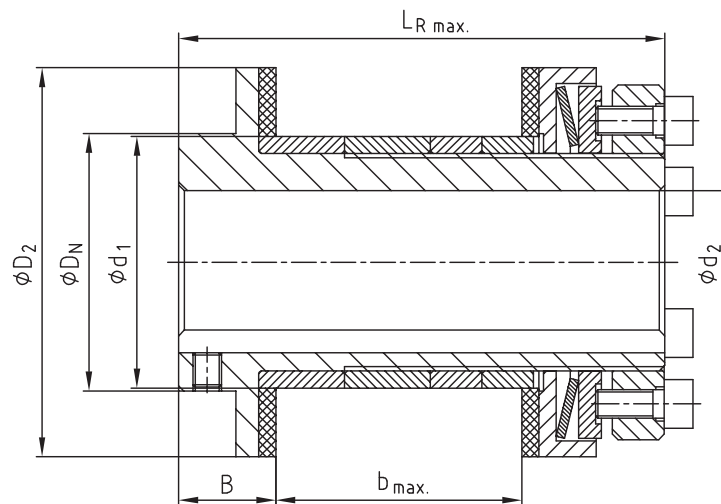
- Available with needle bearing for high radial load, high torque or long slipping periods

## RUFLEX® max. Design



- RUFLEX® for assemblies with wide driving components such as double or triple sprockets
- Can be adjusted to customer's dimensions
- Also available as a complete unit with sprocket
- Other sizes of RUFLEX® max. on request (please mention the width of driving component "b")

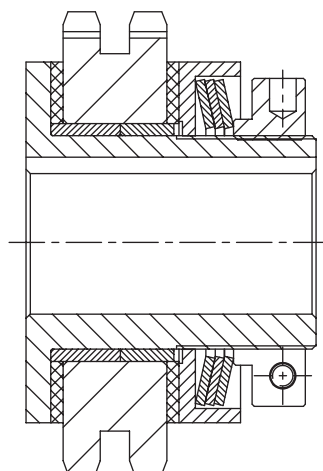
*Call KTR for Availability*



RUFLEX® Size	Max. speed [RPM]	Torques [Nm] 1)			Dimensions [mm]							
		1TF	2TF	3TF	Bore $d_2$		$D_2$	$D_N$	B	$b_{\text{max}}$	$d_1$ 2)	$L_{R \text{ max}}$
					Pilot bore	max.						
01	6600	5-35	10-70	–	–	22	58	40	16	33	40	70
1	5600	20– 75	40–150	130–200	–	25	68	45	17	43	44	85
2	4300	25–140	50–280	250–400	–	35	88	58	19	54	58	100
3	3300	50–300	100–600	550–800	–	45	115	75	21	62	72	115

1) To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 3Nm x 8.85 = 26.55 lb in)

2) Dimension  $d_1$  is machined to accept a component with bore ISO - F8 tolerance. For additional information, contact KTR.

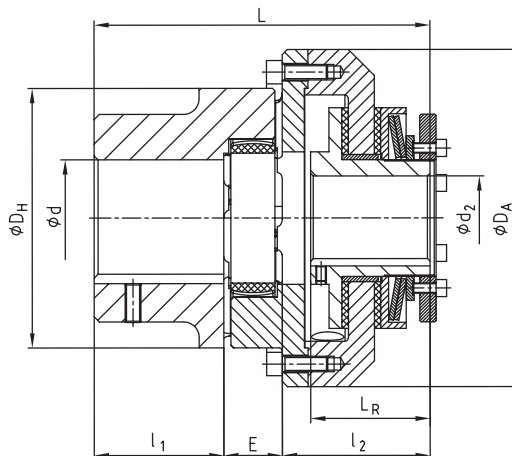


– RUFLEX® max. with mounted sprocket and pre-set torque

## RUFLEX® with ROTEX® coupling

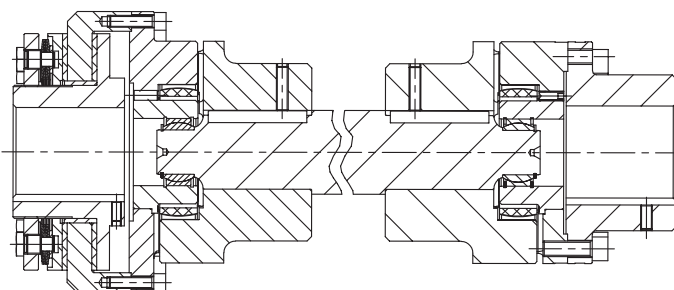


- RUFLEX® with ROTEX® for shaft-to-shaft connections
- Torsionally flexible torque limiter
- Axial plug-in
- Torque adjustable after assembly
- Able to compensate for misalignment
- Various elastomer hardnesses available
- Easy assembly



RUFLEX® Size	ROTEX® Size	RUFLEX® torques [Nm] 1)			ROTEX® torques [Nm] 1)		Dimensions [mm]									
		1TF	2TF	3TF	95/98 Shore A		Bore d <sub>2</sub>		Bore d max.	L	D <sub>A</sub>	L <sub>R</sub>	E	l <sub>1</sub>	l <sub>2</sub>	D <sub>H</sub>
					T <sub>KN</sub>	T <sub>Kmax</sub>	Pilot bore	max.								
00	14	0.5–3	1–5	–	12.5	25	–	10	16	59	44	31	13	11	35	30
0	19	2–10	4–20	–	17	34	–	20	25	78	63	33	16	25	37	40
01	24	5–35	10–70	–	60	120	–	22	35	98	80	45	18	30	50	55
1	28	20–75	40–150	130–200	160	320	–	25	40	113	98	52	20	35	58	65
2	38	25–140	50–280	250–400	325	650	–	35	48	133	120	57	24	45	64	80
3	48	50–300	100–600	550–800	525	1050	–	45	62	166	162	68	28	56	82	105
4	75	90–600	180–1200	1100–1600	1465	2930	–	55	98	205	185	78	40	85	80	160
5	90	400–800	800–1600	1400–2100	3600	7200	–	65	120	259	260	92	45	100	114	200
6	100	300–1200	600–2400	–	4950	9900	38	80	115	290	285	102	50	110	130	225
7	110	600–2200	1200–4400	–	6000	12000	45	100	125	317	330	113	55	120	142	255
8	140	900–3400	1800–6800	–	11000	22000	58	120	160	372	410	115	65	155	152	320

1) To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 3Nm x 8.85 = 26.55 lb in)



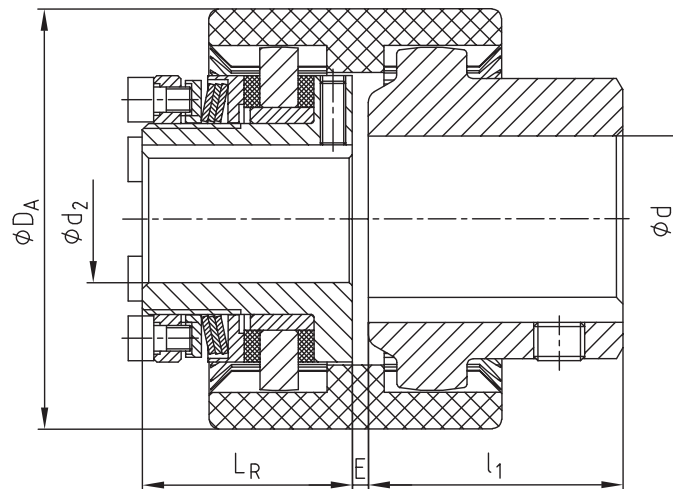
- RUFLEX® as intermediate shaft coupling for extended shaft gaps
- Available in combination with ROTEX® or RADEX®-N couplings

## RUFLEX® with BoWex® coupling



- RUFLEX® with BoWex® for shaft-to-shaft connections
- Torsionally rigid torque limiter
- Axial plug-in
- Double-cardanic, able to compensate for misalignment
- For simple drives (low speeds, etc.)
- Easy assembly

*Call KTR for Availability*

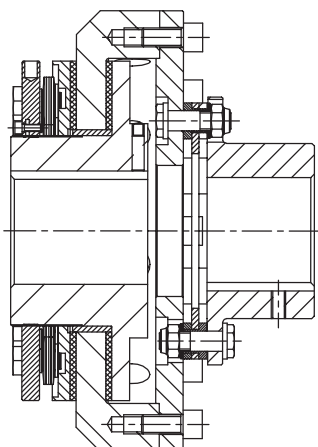


RUFLEX® Size	BoWex® Size	RUFLEX® torques [Nm] <sup>1)</sup>			BoWex® torques [Nm]		Dimensions [mm]						
		1 TF	2 TF	3 TF <sup>2)</sup>	T <sub>KN</sub>	T <sub>K max</sub>	Bore d <sub>2</sub>		Bore d max.	D <sub>A</sub>	L <sub>R</sub>	E	l <sub>1</sub>
00	19	0.5–3	1–5	–	16	32	–	10	19	48	31	2.5	25
0	28	2–10	4–20	–	45	90	–	20 <sup>3)</sup>	28	66	33	2.5	40
01	38	5–35	1–70	–	80	160	–	22	38	83	45	1	35.5
1	48	20–75	40–150	130–200	140	280	–	25	48	95	52	1	45.5
2	65	25–140	50–280	250–400	380	760	–	35	65	132	57	1	64

1) To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 3Nm x 8.85 = 26.55 lb in)

2) Not available in all sizes.

3) Bore sizes larger than Ø 19 mm will have reduced size keyway. Please consult KTR Corporation.



- RUFLEX® with backlash-free RADEX®-N steel disc coupling
- Suitable for high operating temperatures (up to 536° F)
- Custom adaptors are available for a wide range of shaft gaps

## Product Features and Components

SYNTEX® - Torque Limiter with mounting flange



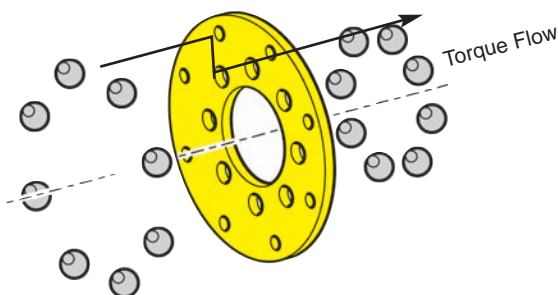
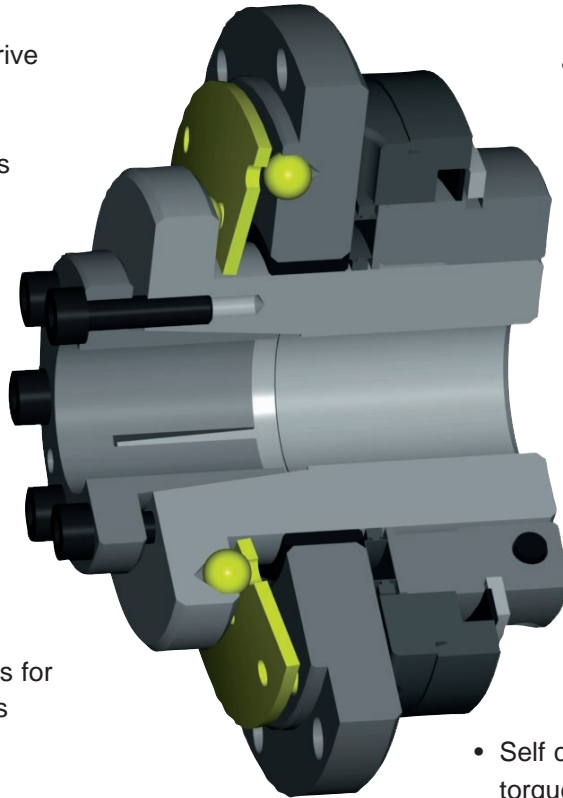
SYNTEX® - Torque Limiter with sprocket



SYNTEX® - Torque Limiter with ROTEX® GS



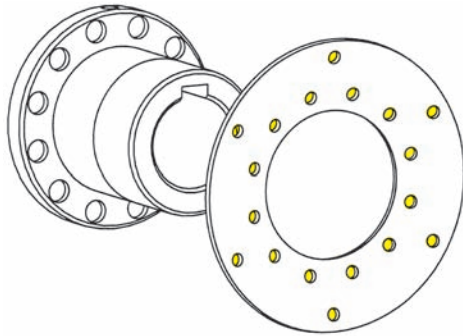
- Zero-Backlash, torsionally stiff overload protection, suitable for reversing drives
- Disconnection of the drive in case of overload
- Reduction of torque peaks
- Highly repeatable release point even after extended operation
- Easy integration of customer components
- Compact size, low mass moment of inertia
- Flexible modular design
- Special disk springs for special applications
- Low-cost protection even for general applications
- Easy assembly and torque setting
- Maintenance-free
- Insensitive to oil and grease
- High-quality materials for durability and long life
- Zero-Backlash shaft-hub connections
- Standard or synchronous re-engagement
- Self contained and compatible with torque and limit switches



SYNTEX® zero-backlash overload system. Torque is transmitted through the perforated disk spring (**patented design**).

## Product Features and Components

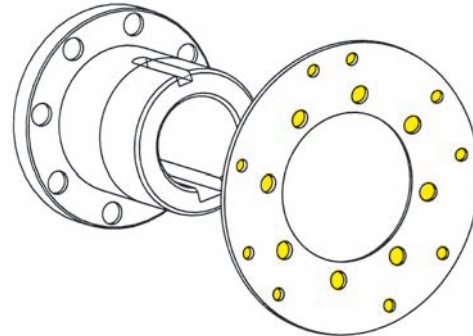
Standard design DK



If the torque set is exceeded, there is a relative movement between the driving and driven side. The transmittable torque is decreased to a minimum.

The balls leave the indentations of the disk springs. After eliminating the overload, the balls engage automatically with the next following ball indentation of the disk springs.

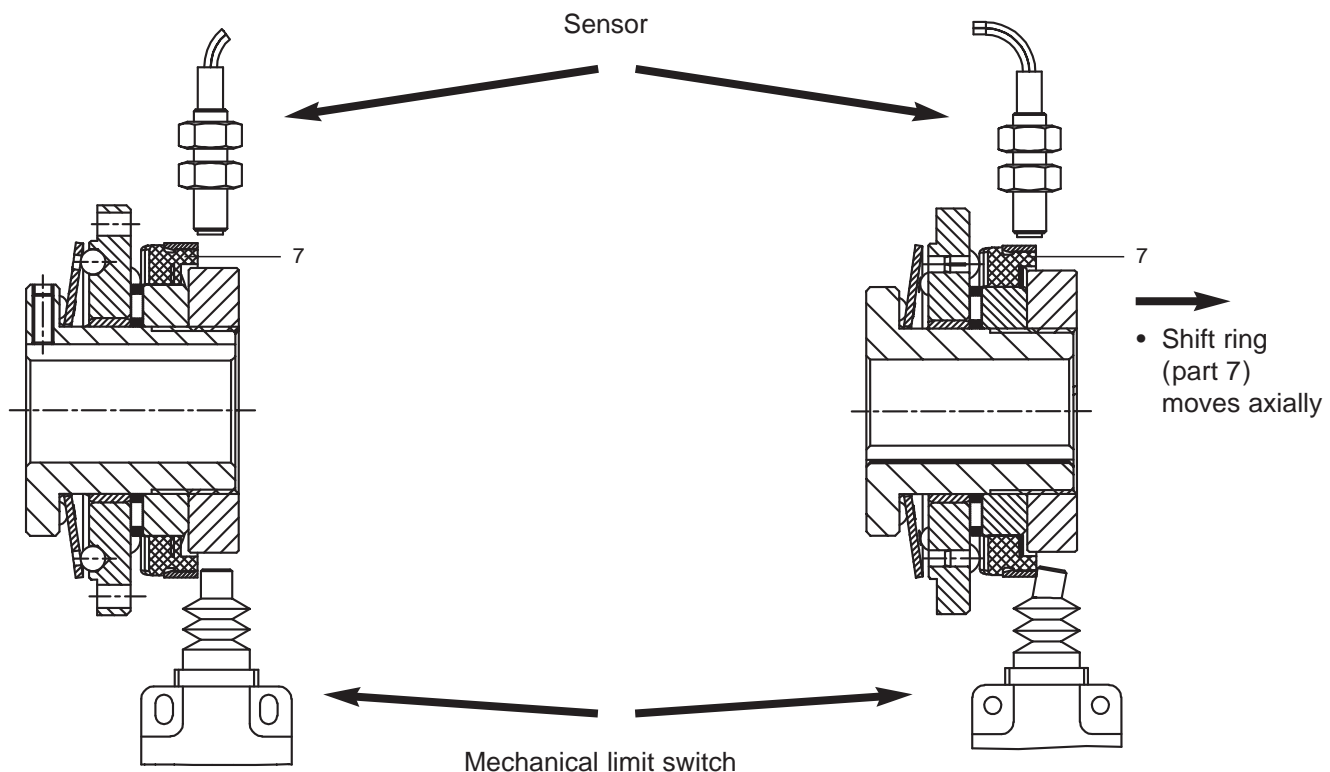
Synchronous design SK



If the torque set is exceeded, there is a relative movement between the driving and driven side. The transmittable torque is decreased to a minimum.

The balls leave the indentations of the disk springs. After eliminating the overload, the balls re-engage automatically with the disk springs after a rotation of 360°. Driving and driven side are re-engaged in the same orientation to each other (other degrees of re-engagement, for example 180°, are also possible).

### Compatible with limit switch or sensor in case of overload



Normal operation:

No signal by sensor or mechanical limit switch

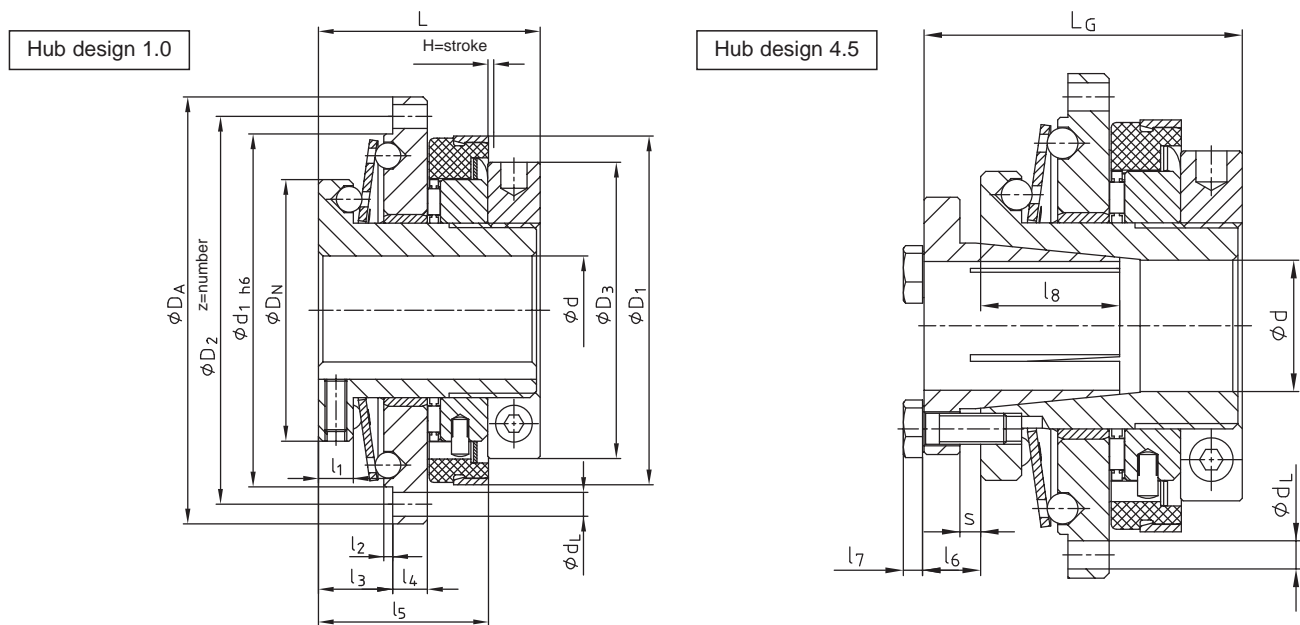
In case of overload:

The axial movement of the shift ring activates the sensor or mechanical limit switch. The resulting signal may be used for control operation (e. g. motor stop).

## Standard Flange Design



- SYNTEX® standard torque limiter applicable up to 400 Nm Flange design
- Easy mounting of customers' components
- Standard or synchronous designs available
- Torque adjustable after assembly
- Finish bores according to tolerance H7, keyway to DIN 6885/1
- Also available with a keyless frictional shaft-hub-connection (hub design 4.5)



SYNTEX® Size	Torques [Nm] <sup>1)</sup>				Dimensions [mm]																
	Standard design DK DK1	Standard design DK DK2	Synchr. design SK SK 1	Synchr. design SK SK 2	Bore d		D <sub>A</sub>	D <sub>2</sub>	d <sub>1</sub>	D <sub>N</sub>	D <sub>3</sub>	D <sub>1</sub>	d <sub>1</sub>	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>5</sub>	z	H = Stroke
20	6-20	15-30	10-35	20-65	-	20	80	71	65	48	47	61	4.5	45	8	2	16	6	35	8	2
25	20-60	45-90	25-65	40-100	-	25	98	89	81	60	60	78	5.5	50	8	2	17	8	39	8	2
35	25-80	75-150	30-100	70-180	-	35	120	110	102	75	70	90	5.5	60	10	2	21	10	42	12	2
50	60-180	175-300	80-280	160-400	-	50	162	152	142	105	98	120	6.6	70	12	2	25	13	56	12	2

### Hub design 4.5

SYNTEX® Size	Dimensions [mm]							Clamping screws	Tightening torques TA [Nm] <sup>1)</sup>
	d <sub>max.</sub>	l <sub>6</sub>	l <sub>7</sub>	l <sub>8</sub>	L <sub>G</sub>	s			
20	20	9	3.5	24	54	3	4 x M 5	8.5	
25	25	11	4	28	61	4	4 x M 6	14	
35	35	10	4	31	70	4	4 x M 6	14	
50	50	12	4	37	82	6	4 x M 6	14	

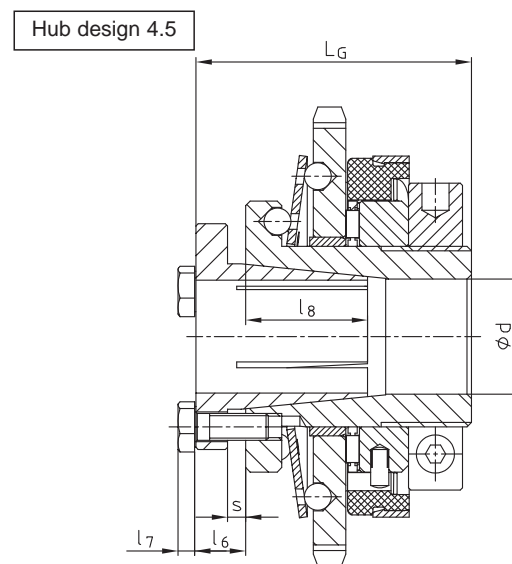
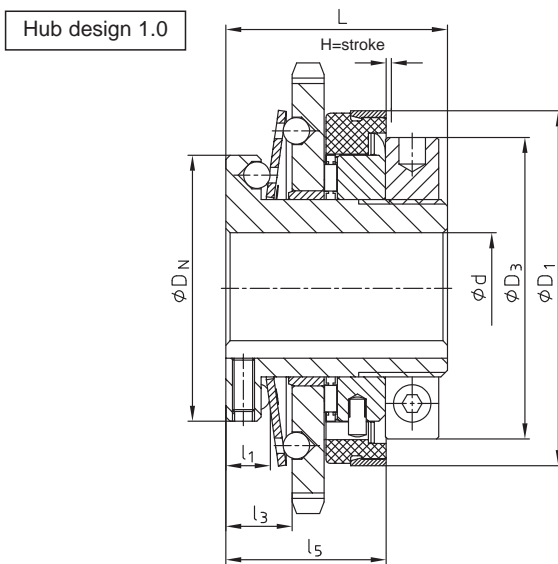
1) To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 3Nm x 8.85 = 26.55 lb in)

## SYNTEX® with Sprocket



- Standard SYNTEX® with integrated sprocket
- Available ready to be installed with the torque pre-set
- Reduction of components by integration of parts
- Standard or synchronous designs available
- Torque adjustable after assembly
- Finish bores according to tolerance H7, keyway to DIN 6885/1
- Also available with a keyless frictional shaft-hub-connection (hub design 4.5)

Call KTR for Availability



SYNTEX® Size	Torques [Nm] <sup>1)</sup>				Dimensions [mm]										
	Standard design DK		Synchr. design SK		Bore d		Standard sprocket	D <sub>N</sub>	D <sub>3</sub>	D <sub>1</sub>	L	l <sub>1</sub>	l <sub>3</sub>	l <sub>5</sub>	H = Stroke
	DK1	DK2	SK 1	SK 2	Pilot bore	max.									
20	6–20	15–30	10–35	20–65	–	20	3/8 x 7/32, z = 25	48	47	61	45	8	16	35	2
25	20–60	45–90	25–65	40–100	–	25	1/2 x 5/16, z = 24	60	60	78	50	8	17	39	2
35	25–80	75–150	30–100	70–180	–	35	1/2 x 5/16, z = 29	75	70	90	60	10	21	42	2
50	60–180	175–300	80–280	160–400	–	50	3/4 x 7/16, z = 27	105	98	120	70	12	25	56	2

### Hub Design 4.5

SYNTEX® Size	Dimensions [mm]							Tightening torque TA [Nm] <sup>1)</sup>
	d	l <sub>6</sub>	l <sub>7</sub>	l <sub>8</sub>	L <sub>G</sub>	s	Clamping screws	
20	20	9	3.5	24	54	3	4 x M 5	8.5
25	25	11	4	28	61	4	4 x M 6	14
35	35	10	4	31	70	4	4 x M 6	14
50	50	12	4	37	82	6	4 x M 6	14

1) To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 3Nm x 8.85 = 26.55 lb in)



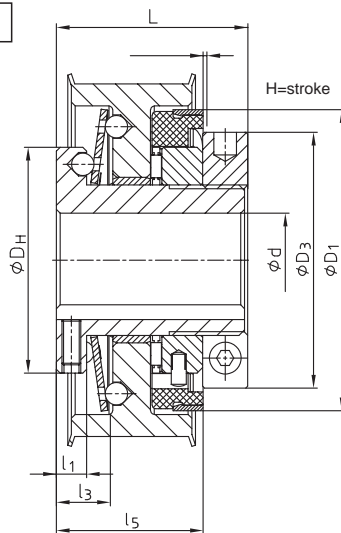
## SYNTEX® with Pulley



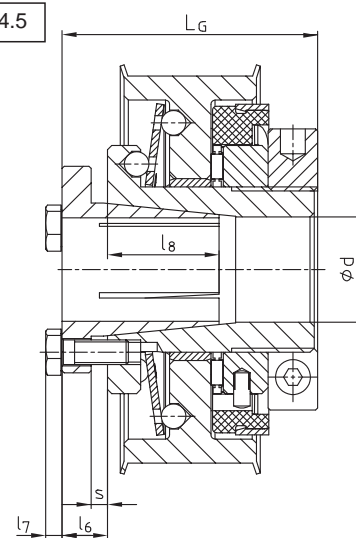
- Standard SYNTEX® with integrated belt drive
- Available ready to be installed with the torque pre-set
- Reduction of components by integration of parts
- Standard or synchronous designs available
- Torque adjustable after assembly
- Finish bores according to tolerance H7, keyway to DIN 6885/1
- Also available with a keyless frictional shaft-hub-connection (hub design 4.5)

Call KTR for Availability

Hub design 1.0



Hub design 4.5



SYNTEX® Size	Torques [Nm] <sup>1)</sup>				Dimensions [mm]											
	Standard design DK		Synchr. design SK		Bored		Belt drive T10 <sup>2)</sup>	Belt drive AT10 <sup>2)</sup>	D <sub>N</sub>	D <sub>3</sub>	D <sub>1</sub>	L	l <sub>1</sub>	l <sub>3</sub>	l <sub>5</sub>	H = Stroke
	DK1	DK2	SK 1	SK 2	Pilot bore	max.										
20	6-20	15-30	10-35	20-65	-	20	T10, z=24	AT10, z=24	48	47	61	45	8	16	35	2
25	20-60	45-90	25-65	40-100	-	25	T10, z=30	AT10, z=30	60	60	78	50	8	17	39	2
35	25-80	75-150	30-100	70-180	-	35	T10, z=36	AT10, z=36	75	70	90	60	10	21	42	2
50	60-180	175-300	80-280	160-400	-	50	T10, z=48	AT10, z=48	105	98	120	70	12	25	56	2

### Hub design 4.5

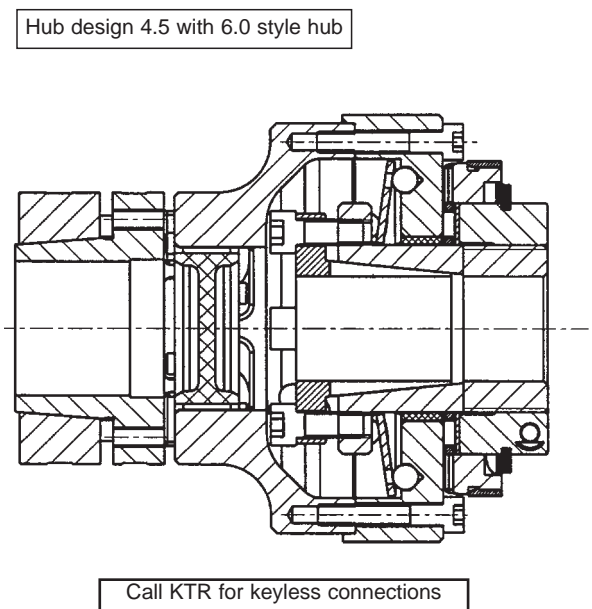
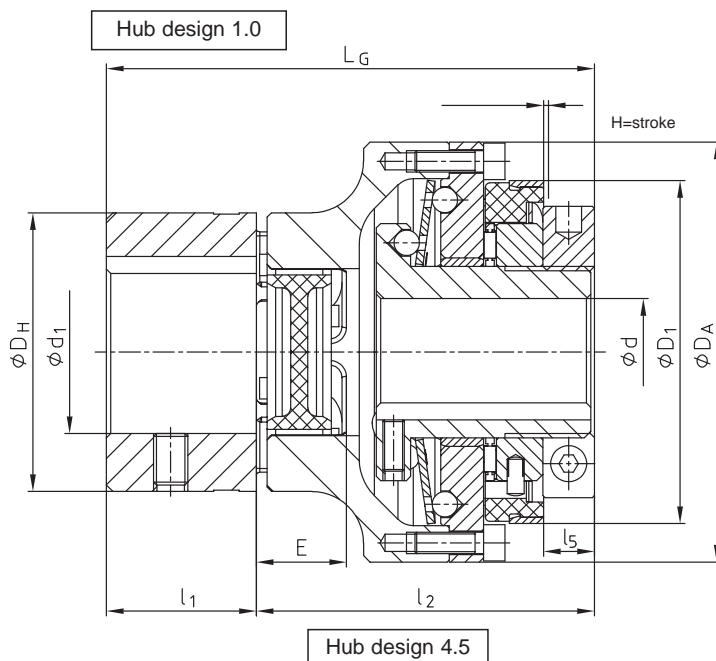
SYNTEX® Size	Dimensions [mm]						Clamping screws	Tightening torque T <sub>A</sub> [Nm] <sup>1)</sup>
	d	l <sub>6</sub>	l <sub>7</sub>	l <sub>8</sub>	L <sub>G</sub>	s		
20	20	9	3,5	24	54	3	4 x M 5	8,5
25	25	11	4	28	61	4	4 x M 6	14
35	35	10	4	31	70	4	4 x M 6	14
50	50	12	4	37	82	6	4 x M 6	14

1) To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 3Nm x 8.85 = 26.55 lb in)  
2) Number of teeth on belt pulley

## SYNTEX® with ROTEX® GS Coupling



- Backlash-free, axially rigid torque limiter coupling
- Axial plug-in
- Aluminium components provide low mass moment of inertia
- Standard or synchronous designs available
- Torque adjustable after assembly
- Also available with a keyless frictional shaft-hub-connection (hub design 4.5)



SYNTEX®	ROTEX® GS	Torques [Nm] <sup>1)</sup>						Dimensions [mm]											
		Standard design DK		Synchronous design SK		ROTEX® GS 98 ShA-GS		max. Bore	$D_A$	$D_H$	$l_1$	$E$	$l_2$	$l_5$	$L$	$L_G$	$D_1$	$H = \text{Stroke}$	
Size	Size	DK1	DK2	SK1	SK2	$T_{KN}$	$T_{Kmax}$	$d$	$d_1$										
20	24	6-20	15-30	10-35	20-65	60	120	20	28	80	55	30	18	70	10	45	100	61	2
25	28	20-60	45-90	25-65	40-100	160	320	25	38	98	65	35	20	78	11	50	113	78	2
35	38	25-80	75-150	30-100	70-180	325	650	35	45	120	70	45	24	91	13	60	136	90	2
50	48	60-180	175-300	50-280	160-400	525	1050	50	62	162	105	56	28	111	14	70	167	120	2

<sup>1)</sup> To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 3Nm x 8.85 = 26.55 lb in)

## Assembly / Limiter Switch / Proximity Switch

Mounting instructions available on request.

The SYNTEX® overload system is pre-set at our factory. Unless specific instructions are given by the customer, the torque is set to about 70 % of the maximum torque.

The operating principle of the SYNTEX® overload system enables backlash-free torque transmission by positive locking.

The torque is transmitted by balls and disk springs. By the prestressed force of the disk spring, the balls engage in the respective ball position of the disk spring.

The disengaging torque can be set using the lable attached to the outer diameter of the SYNTEX® unit as follows:

- Lock the hub against twisting.
- Unscrew the socket head bolt in the setting nut.
- Note the reference position (colored marking on the hub).
- Turn the setting nut clockwise with a spanner wrench to increase the disengaging torque; turn the setting nut counterclockwise in order to reduce the disengaging torque.
- When the desired disengaging torque is reached, lock the setting nut again by tightening down the socket head bolt in the setting nut.

### Limit switch / Proximity Switch

#### Operation

A mechanical limit switch or a proximity switch is actuated by the axial movement of the shift ring arising in case of overload. In this way, a control signal is produced disconnecting the drive.

#### Assembly

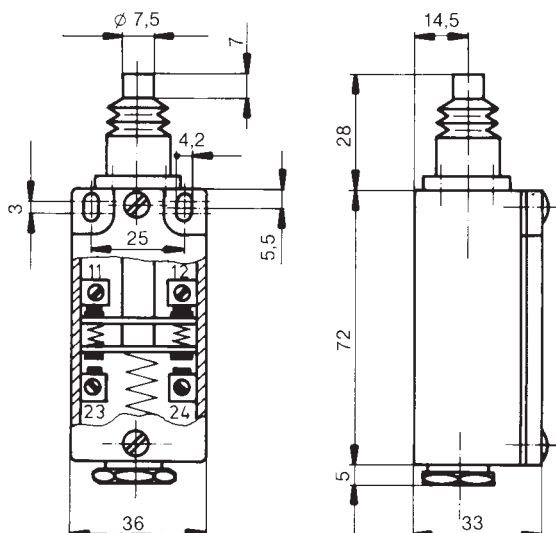
The sensor has to be mounted in a solid device in order to ensure a smooth operation. The sensor should be protected against dirt and potential mechanical troubles.

#### Recommended Adjustment

On engagement of the overload coupling, the shift ring realizes an axial stroke movement of about 2 mm. The sensor or the limit switch must be assembled in this shifting range. In order to adapt the mechanical limit switch and the shifting way to the unit, the limit switch has to be adjusted accordingly. For that purpose the shifting way can be changed at the tappet after opening the cover plate.

Please be sure to check the operation of the limit switch before delivery of the unit. Please observe the operating instructions for the sensor or limit switch.

(KTR Corp. does not furnish prox./limit switches)



#### Shifting

■ On □ Off

Degrees	0	3	8	12	16	20
11-12 Break contact	Off	On	Off	Off	Off	Off
23-24 Make contact	Off	Off	Off	Off	Off	Off

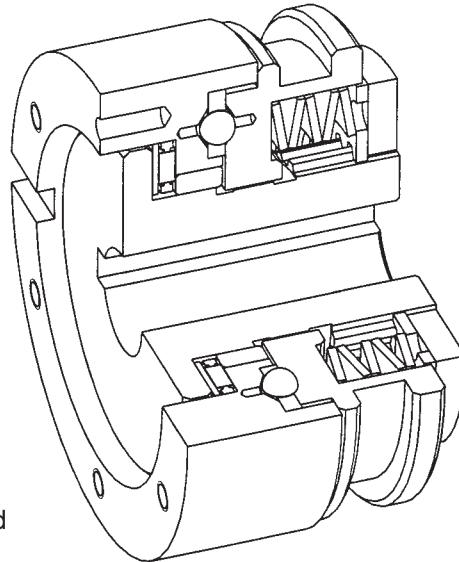
#### Technical data:

Maximum voltage: 500 V AC  
 Maximum constant current: 10 A  
 Kind of protection: IP 65 acc. to DIN 40050  
 Switching frequency: 6.000/h  
 Operating temperature:  $-30^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$   
 Kind of contact: 1 break contact, 1 make contact  
 Mechanical service life: 107 switches  
 Housing: Aluminium diecast  
 Cover: Aluminium sheet steel  
 Switching direction: Possible from all directions

After opening the cover plate a change of the shifting way is possible!

## Product Features and Components

- High Capacity Overload protection up to 13000 Nm
- Available with same dimensions as a ratchet, synchronous and fail-safe design
- Reduces torque peaks
- Highly repeatable release point even after extended operation
- Disconnection of the drive in case of overload
- Maintenance-free



- Various designs available to fit your application
- Easy assembly and torque setting
- Self contained and compatible with prox. and limit switches
- Insensitive to oil and grease
- High-quality materials for durability and long life
- Backlash-free shaft-hub-connections

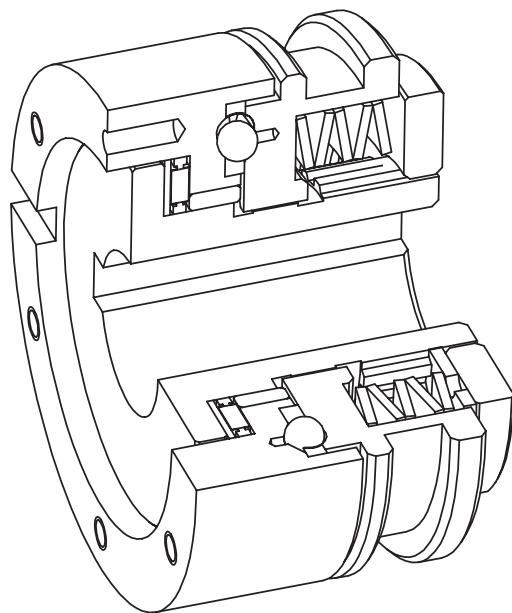
Upon overload, balls and/or rollers disengage discontinuing the torque between driving and driven side. The shift ring moves axially activating a limit switch or proximity switch. The output signal shuts down the drive.

No signal in case of normal operation

Signal in case of overload

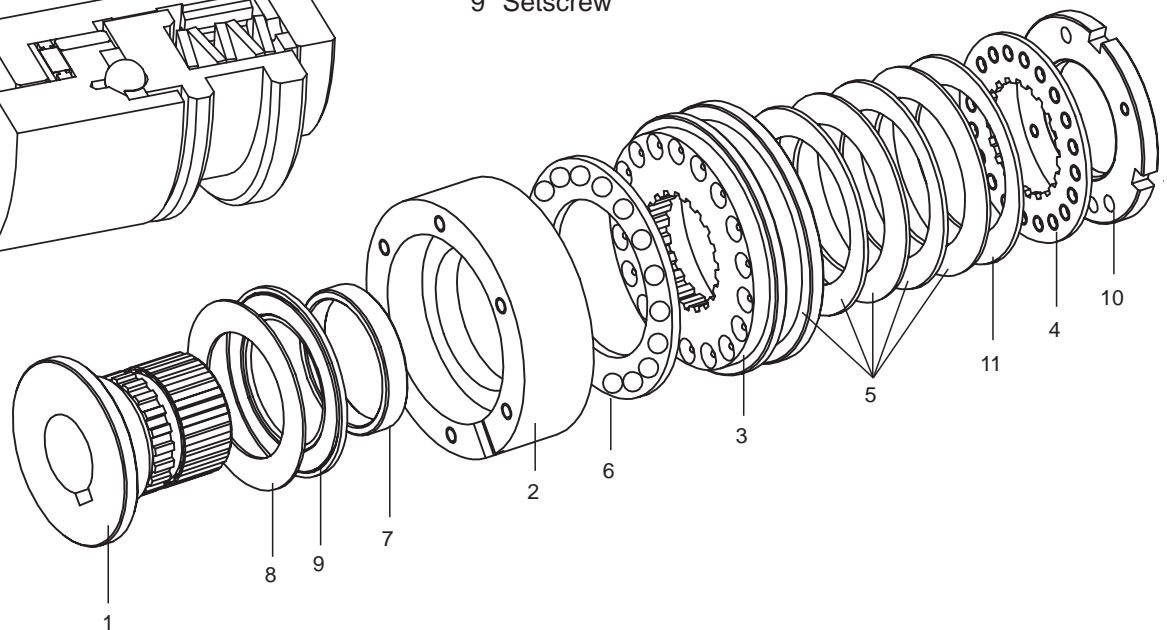


## Product Features and Components



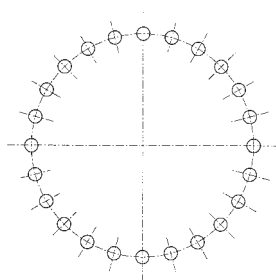
### List of parts:

- 1 Hub
- 2 Flange ring
- 3 Shift ring
- 4 Setting nut
- 5 Disk spring
- 6 Ball retainer
- 7 Slide bush
- 8 Axial needle bearing
- 9 Setscrew



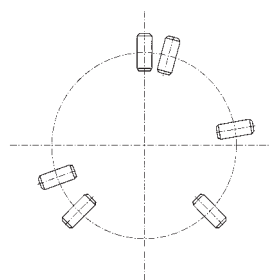
## Three operating principles with the same mounting space

### Standard design DK



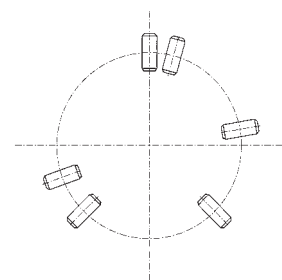
Any engagement after an overload.  
After eliminating the overload, the balls automatically engage in the next indentation.

### Synchronous design SR



Synchronous engagement after an overload.  
After eliminating the overload the rollers automatically engage after a rotation of 360°. Driving and driven side are re-engaged in the same orientation to each other. Other degrees of engagement, i. e. 180°, are also possible.

### Fail-safe design SGR



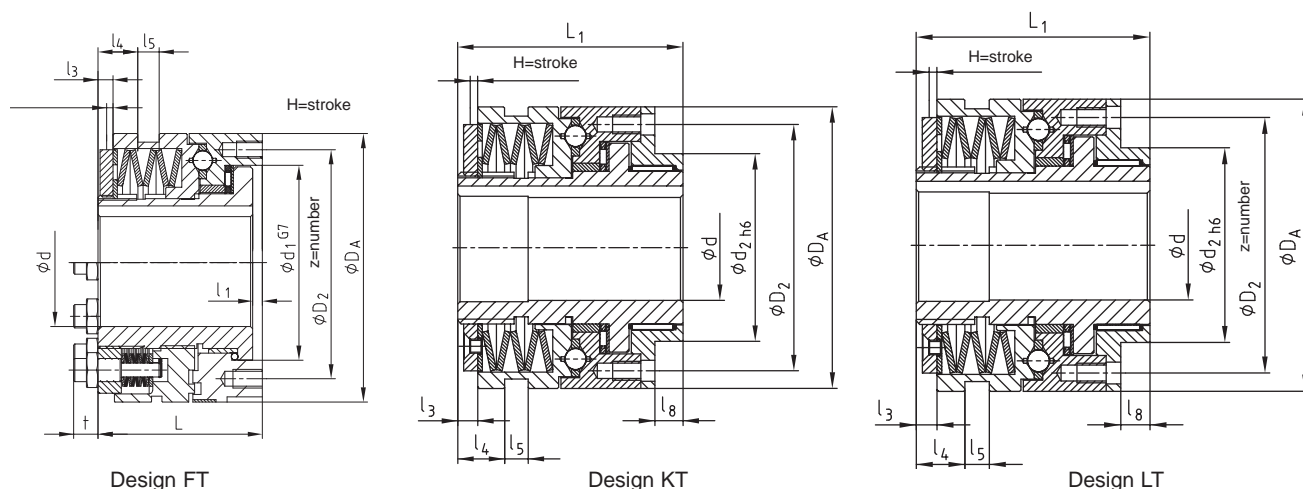
The fail-safe design is a pure torque measurement without any ratchet function.  
In this case an overload will trigger an audible or visual signal by a sensor (i.e. limit switch - not included) and the mechanical components will continue to drive.

## Design FT, KT and LT



- Standard KTR-SI torque limiter handles torques up to 13000 Nm
- Available ready to be installed with the torque pre-set
- For direct mounting of customers' components
- Standard (Ball Detent), Synchronous (Roller Bearing) and Fail-Safe designs available
- Torque adjustable after assembly
- Finish bores according to tolerance H7, keyway to DIN 6885/1 and AGMA 9002-A86 CL-1 fit
- Phosphate coated

Call KTR for Availability



KTR-SI Size	Torques [Nm] <sup>1)</sup>							Weight with max. bore kg
	Disk spring layers design DK (Standard)				Disk spring layers design SR and SGR (Synchronous)			
	T1	T2	T3	T4	T1	T2	T3	
0	2.5-5	5-20	-	20-40	5-10	10-40	-	0.41
1	6-12	12-25	25-55	55-100	12-25	25-50	50-100	1.30
2	12-25	25-50	50-120	120-200	25-50	50-100	100-200	2.27
3	25-50	50-100	100-250	200-450	50-100	100-200	200-450	3.88
4	50-100	100-200	200-500	500-1000	100-200	200-400	400-800	8.34
5	35-250	230-600	300-1000	600-2000	170-450	350-900	600-1800	13.51
6	-	-	-	-	-	1500-3000	2250-3100	30.60
7	-	-	-	-	-	2250-7500	3600-19500	43.20

<sup>1)</sup> To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 5Nm x 8.85 = 44.25 lb in)

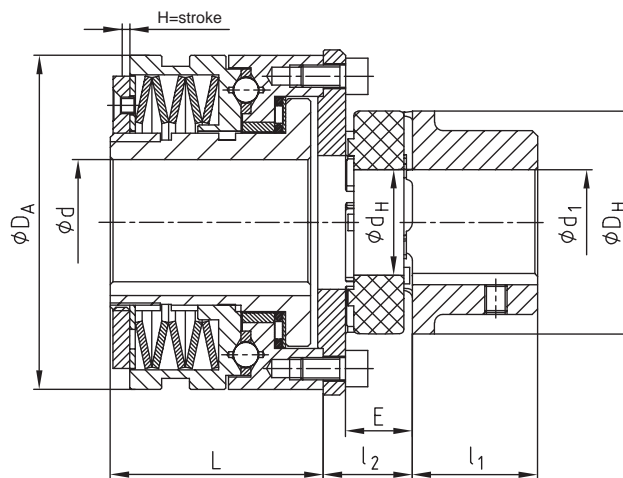
KTR-SI Size	Dimensions [mm]																			
	Bore d		d <sub>1</sub>	D <sub>2</sub>	D <sub>A</sub>	d <sub>2</sub>	d <sub>3</sub>	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>5</sub>	l <sub>7</sub>	l <sub>8</sub>	L	L <sub>1</sub>	L <sub>2</sub>	z	H = Stroke	
	Pilot bore	max.																	DK	SR
0	7	20	41	48	55	38	28	4	6.5	3	7.5	9	27.5	8	38.5	51.5	66	6xM5	1.4	1.2
1	10	25	60	70	82	50	38	4	8	6	11.5	9	33	10	52	70	85	6xM5	2.3	1.8
2	14	35	78	89	100	60	52	5	10	6	12	9	39	12	61	78	100	6xM6	2.4	2.0
3	18	45	90.5	105	120	80	65	5	12	8.5	20	10	47	12	78	96	125	6xM8	2.7	2.2
4	24	55	105	125	146	100	78	6.5	15	11	27	9	52.5	16	100	124.5	152.5	6xM10	3.7	2.5
5	28	65	120.5	155	194	120	90	6.5	17	12	33	9	57.5	18	113.5	140	171	6xM12	4.7	3.0
6	40	90	136	200	240	236	110	8	19	25	73	11	64	20	141	172	205	6xM16	-	3.5
7	40	120	198	230	280	190	160	8	26	41	107	11	82	30	200	248	282	6xM20	-	4.0

## KTR-SI with ROTEX® coupling



- KTR-SI torque limiter for shaft-to-shaft connections
- Axial plug-in
- Compensates for misalignment
- Standard (Ball Detent), Synchronous (Roller Bearing) and Fail-Safe designs available
- Torque adjustable after assembly
- Easily tuned to you system by changing spider hardness

Call KTR for Availability

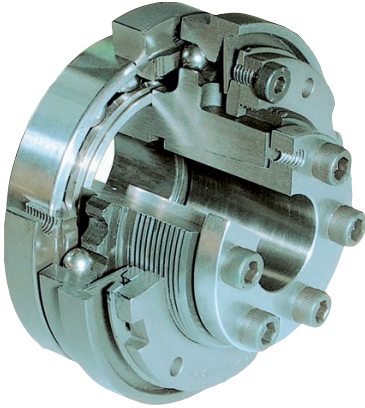


KTR-SI Size	ROTEX® Size	Design DK (Standard)				Design SR (Synchronous)				
		Torques [Nm] <sup>1)</sup>				KTR-SI Size	ROTEX® Size	Torques [Nm] <sup>1)</sup>		
		KTR-SI disk spring layer						KTR-SI disk spring layer		
T1	T2	T3	T4	T1	T2	T3				
0	19	2.5– 5	5– 10	–	20– 40	0	28	5– 10	10– 40	–
1	24	6– 12	12– 25	25– 55	55– 100	1	38	12– 25	25– 50	50– 100
2	28	12– 25	25– 50	50– 120	120– 200	2	48	25– 50	50– 100	100– 200
3	38	25– 50	50– 100	100– 250	200– 450	3	55	50– 100	100– 200	200– 450
4	48	50– 100	100– 200	200– 500	500– 1000	4	75	100– 200	200– 400	400– 800
5	55	35– 250	230– 600	300– 1000	600– 2000	5	90	120– 450	350– 800	600– 1800
6	–	–	–	–	–	6	90	–	1500– 3000	2250– 8100
7	–	–	–	–	–	7	140	–	2250– 7500	3600– 19500

1) To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 5Nm x 8.85 = 44.25 lb in)

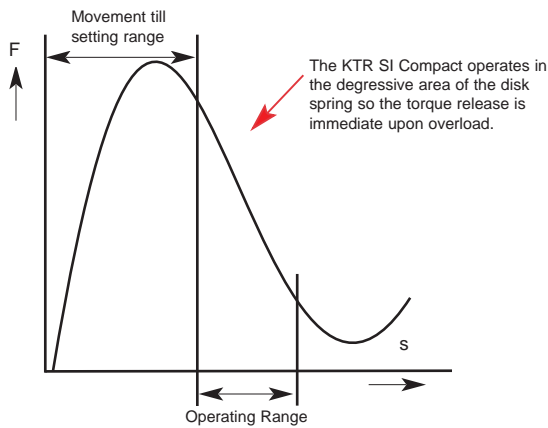
KTR-SI Size	ROTEX® Size	Dimensions [mm]										H = Stroke [mm]	
		Max. bore [mm]		$\phi DA$	$\phi DH$	$\phi d_H$	E	$l_1$	$l_2$	L	Design		
		$d_{max.}$	$d_1$								DK	SR	
0	19	20	24	55	40	18	16	25	22	38.5	1.4	1.2	
	28		38		65	30	20	35	28.5				
1	24	25	28	82	55	27	18	30	24	52	2.3	1.8	
	38		45		80	38	24	45	32.5				
2	28	35	38	100	65	30	20	35	28	61	2.4	2.0	
	48		60		105	51	28	56	38				
3	38	45	45	120	80	38	24	45	32	78	2.7	2.2	
	55		70		120	60	30	65	43				
4	48	55	60	146	105	51	28	56	38	100	3.7	2.5	
	75		90		160	80	40	85	56.5				
5	55	65	70	176	120	60	30	65	44	124.5	4.7	3.0	
	90		100		200	100	45	100	64.5				
6	90	90	100	240	200	100	45	100	92.5	141	–	3.5	
	140		160		320	165	65	155	130				200
7	140	120	160	280	320	165	65	155	130	200	–	4.0	

## Product Features and Components

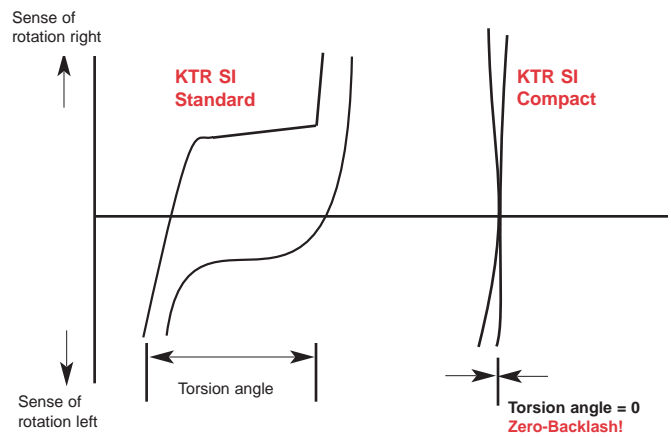


- **Zero-Backlash** with curved spring design
- Precision breakaway with highly repeatable accuracy
- Ball-Bearing connection flange
- Hardened contact surfaces for long-life and durability
- Zero-Backlash keyless shaft connection
- Many sizes available from stock
- Maintenance Free

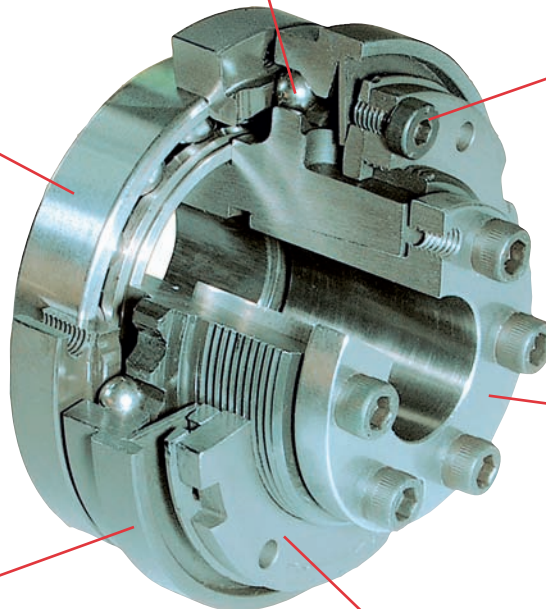
### Design of spring



### Zero-Backlash comparison

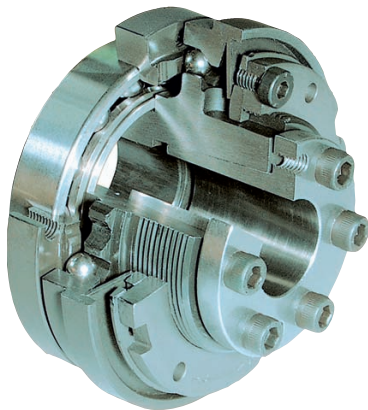


- Zero-Backlash ball detent design
- Locking-screw assures adjustment of torque setting
- Ball-bearing flange ring for precise speed and run-out
- Zero-Backlash keyless shaft friction connection with tapered sleeve
- Shifting ring with adjusting dial for exact torque adjustment
- Setting ring with fine pitch threads for precise torque adjustment



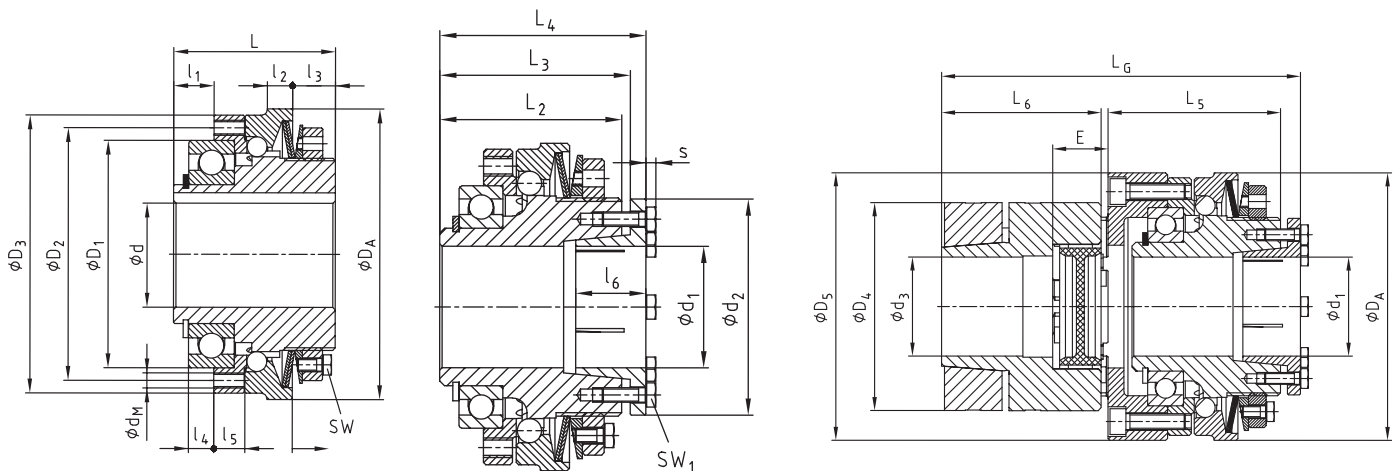


## Zero-Backlash, torsionally stiff torque limiter



- Zero-Backlash with torque up to 1050Nm
- Maximum shaft diameter up to 60mm
- Fits a wide variety of applications
- Standard FT or with FT-4.5 frictionally engaged keyless hub-shaft connection
- Standard and synchronous designs available
- Combine with ROTEX® GS for zero-backlash vibration dampening
- Combine with RADEX®-NC Servo coupling for higher stiffness

Call KTR for Availability



Design FT

Design FT-4.5 Keyless Connection

Design FT-4.5 Keyless with ROTEX® GS 6.0 hub shaft connection

Size	Speed RPM	Torques [Nm] <sup>1)</sup>			Dimensions Type FT (mm)													
		KTR-SI Compact disk spring layer			d <sub>max.</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>A</sub>	d <sub>M</sub>	L	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>4</sub>	l <sub>5</sub>	SW	H = Hub
		T1	T2	T3														
01		5–14	10–28	20–60	20	47	56	65	70	8xM4	40	8	7	12	5	7.5	7	1.2
0		9–27	18–54	38–115	30	62	71	80	85	8xM5	48	11	8	14	7	8	7	1.5
1		19–60	38–125	70–255	35	75	85	95	100	8xM6	59	14	9	16	9	10.5	8	1.8
2		35–110	80–220	160–440	45	90	100	110	115	8xM6	64	16	10	17	10	12	10	2.0
3		80–185	160–370	320–740	50	100	116	130	135	8xM8	75	18	12	21	10	12	10	2.2

1) To convert torque from Nm to lb in please multiply Nm values above by 8.85. (For example: 5Nm x 8.85 = 44.25 lb in)

Size	Dimensions with taper sleeve type 4.5						
	d <sub>1max.</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	d <sub>2</sub>	S	SW1
01	25	40	42	47	42	2.8	7
0	30	46	49	56	57	4	10
1	40	57	60	67	67	4	10
2	50	63	66.5	73	73.5	4	10
3	60	75	78.5	86	89	4	10

Size	ROTEX® GS Size	Dimensions type FT with ROTEX® GS (mm)							
		d <sub>1max.</sub>	d <sub>3max.</sub>	D <sub>4</sub>	D <sub>5</sub>	L <sub>6</sub>	L <sub>5</sub>	L <sub>6</sub>	D <sub>A</sub>
01	24	25	28	55	70	102	47	30	70
0	28	30	38	65	85	119.5	54.5	35	85
1	38	40	45	80	100	146	67	45	100
2	42	50	55	95	115	159	73	50	115
3	48	60	62	105	135	182	87	56	135