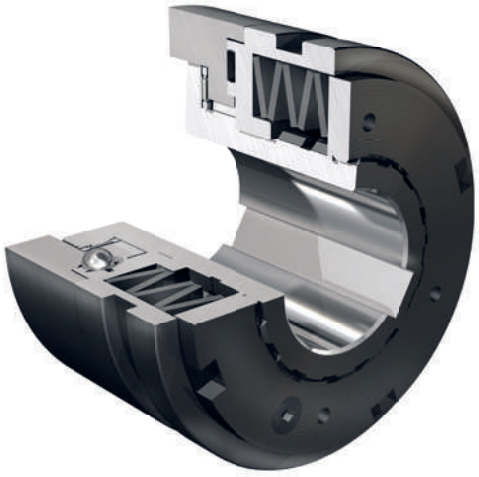
Structure and operation

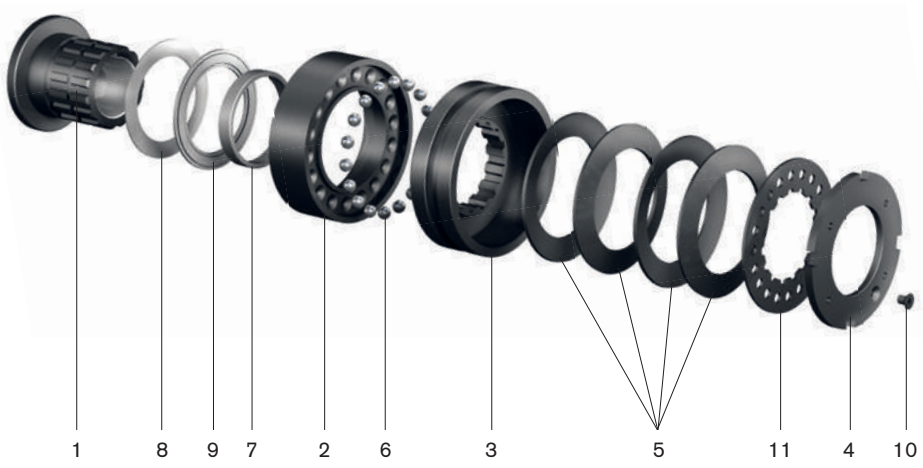
- Overload protection up to 8,200 Nm
- Available as a ratchet, synchronous, idle rotating and fail-safe design having the same dimensions
- Reduction of torque peaks
- High response accuracy, even after a long operating period
- Disconnection of the drive with overload by retrieving limit switch
- Automatically operative (DK, SR, SGR)



- Available in various designs (e. g. with needle bearing) and combinations (e. g. with torsionally flexible ROTEX®)
- Easy assembly and torque setting
- Maintenance-free
- Insensitive to oil and grease
- Long service life due to high-quality materials

In case of overload the ratchet components (balls or rollers) leave their indentations, and a relative motion between the driving and driven side is generated. Damages caused by overload are reliably prevented in this way. The shift ring (3) makes an axial motion to the engagement travel „H“ activating the limit switch or proximity initiator. The signal can be used for controlling or disconnecting the drive. For restarting we would recommend to bypass the limit switch or proximity switch electrically for a short time.

Component	Description
1	Hub
2	Flange ring
3	Shifting ring
4	Setting nut
5	Disk spring
6	Ball bearing cage
7	Slide bush
8	Axial disk
9	Axial needle bearing
10	Setscrew
11	Lock washer

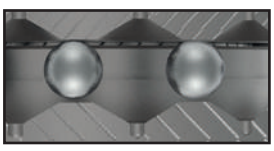


No signal with normal operation

Engaged

Limit switch

Signal with overload



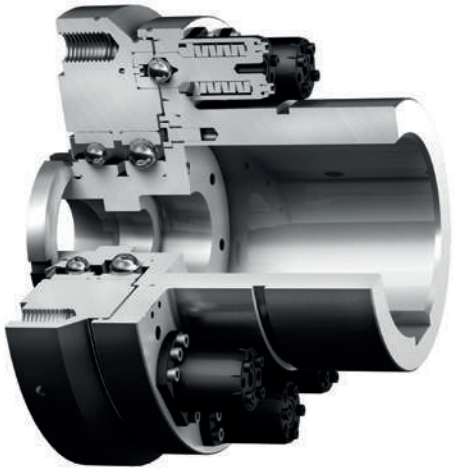
Disengaged

Limit switch

KTR-SI FRE
Idle rotating overload system

Structure and operation

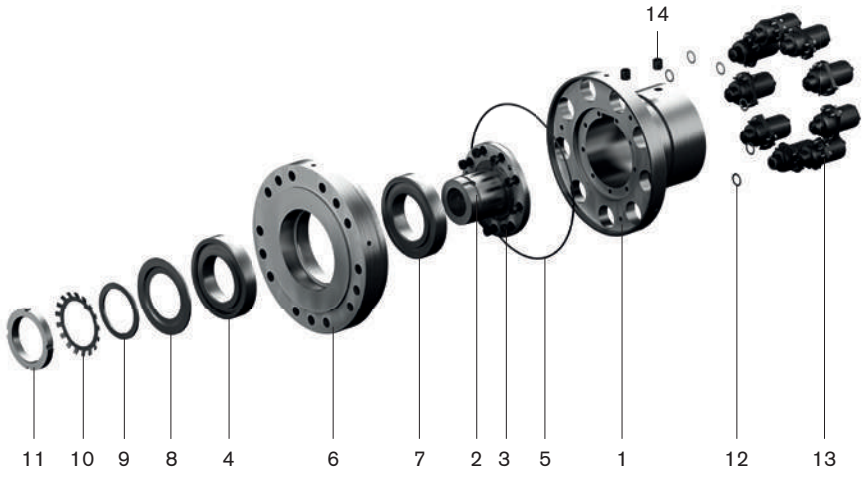
- Setting range up to 60,000 Nm (higher torques available on request)
- Idle rotating overload system (load-separating)
- High repeatability



- Flange type to connect toothed belt pulleys or sprockets
- Combination with ROTEX®, GEARex® or RADEX®-N as a shaft-to-shaft connection
- The intelligent further development of shear pin couplings and hydraulic clamping sets

The core of the overload system is formed by the idle rotation elements. They uncouple the driving and driven side in case of overload while protecting the drive train from damages. After eliminating the overload, the rotation segments are manually re-engaged so that the drive is released again. In order to set the coupling to the requested release torque, a defined pre-stress is generated on the disk springs in each idle rotation element via the setting nut. The number of idle rotation elements varies depending on the release torque specified. If requested, the coupling can be preset by the manufacturer. It is also possible to adapt the coupling while in place.

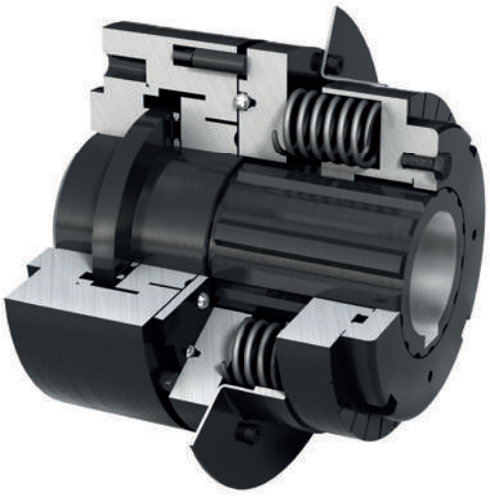
Component	Description
1	Hub
2	Bearing flange
3	Cap screw
4	Angular ball bearing
5	O-ring
6	KTR-SI FRE connection flange
7	Groove ball bearing
8	NILOS ring
9	Supporting disk
10	Safety plate
11	Groove nut
12	Adjusting washer
13	Idle rotation element
14	Locking screw



KTR-SI FRA
Idle rotating overload system with automatic re-engagement when reversing the direction of rotation

Structure and operation

- Overload protection up to 3,000 Nm
- Idle rotating overload system (load-separating)
- Re-engagement by reversing the direction of rotation, thus optimally suitable for positions difficult to accesss

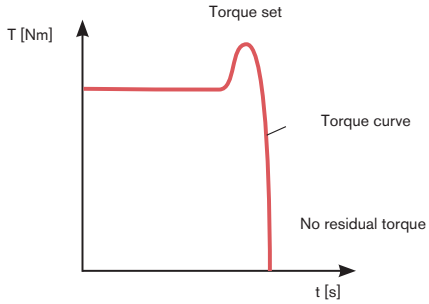


- Flange type to connect toothed belt pulleys or sprockets
- Combination with torsionally flexible POLY-NORM® as a shaft-to-shaft connection

Component	Description
1	Connection flange
2	Slide bearing
3	Axial disk
4	Hub
5	Axial bearing
6	Bearing flange
7	Flange ring
8	Balls
9	Shifting ring
10	Disk springs
11	Pressure ring
12	Lock washer
13	Setting nut

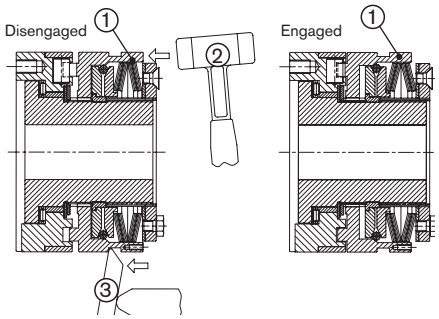
Operating principles

1. Idle rotating design FR/FRE/FRA



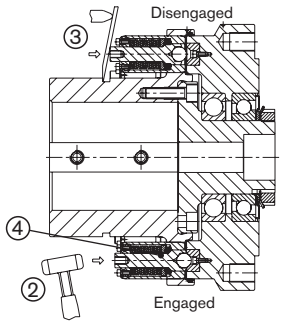
Operating principle of KTR-SI idle rotating couplings:
When achieving the torque set, the coupling rotates. Subject to the idle rotation mechanism driving and driven side remain separated. The resulting flywheel mass can slow down in idle state. After eliminating the overload, the coupling can be re-engaged. The re-engagement is effected manually or via a device respectively automatically.

Re-engagement of FR



Re-engagement of the idle rotating coupling:
Re-engagement is generated by axial pressure on the shifting ring (1). Dependent on the existing resources, accessibility etc., re-engagement can be effected in different ways: By several blows of a plastic hammer (2) axially on the shifting ring (see above), via assembly levers (3) or a pneumatic or hydraulic engagement device (automated engagement procedure).

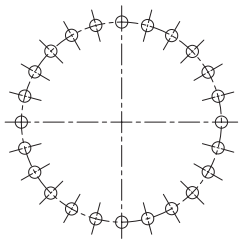
Re-engagement of FRE



Re-engagement of idle rotating elements:
After eliminating the overload, driving and driven side are aligned to each other. By means of a plastic hammer (2) or a tyre lever (3) the idle rotation elements (4) are manually re-engaged. Re-engagement can be heard loudly. The overload coupling is ready for use again.

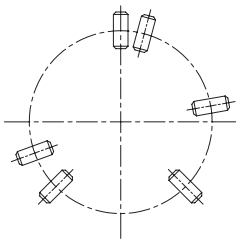
Re-engagement of FRA
After eliminating the overload the KTR-SI FRA can be re-engaged by reversing the direction of rotation with slow speed (>100 rpm).

2. Ratchet design DK



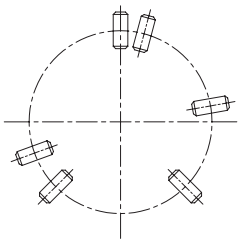
Any engagement after an overload. After eliminating the overload, the balls engage automatically with the next following ball indentation.

3. Synchronous design SR



Synchronous engagement after an overload. After eliminating the overload, the balls re-engage automatically with the disk springs after a rotation of 360°. Driving and driven side are always placed in the same position to each other. Other degrees of re-engagement, for example 180°, are also possible.

4. Fail-safe design SGR

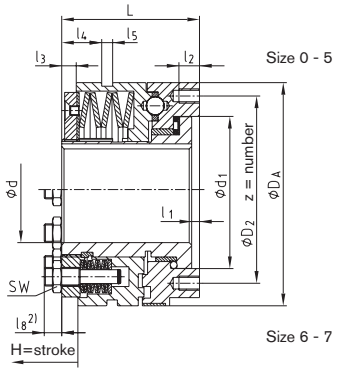


The fail-safe design is purely intended for torque measurement without any ratchet operation. In case of overload a signal is generated by a limit switch along with mechanical separation of driving and driven side = ratching is not possible.

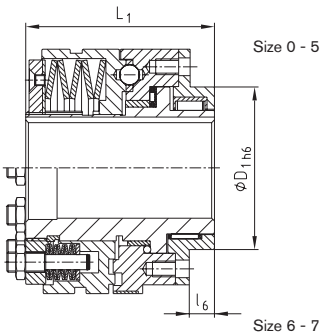
KTR-SI
Overload systems

Flange type

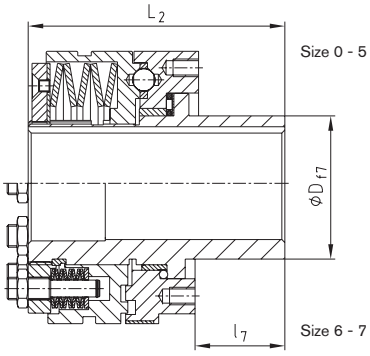
Type FT



Type KT



Type LT



Technical data

Size	Torques [Nm]												Weight with max. bore [kg]
	Type DK				Type SR and SGR				Type FR				
	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	$n_{max.}$ [3] [rpm]	
0	2.5-5	5-20	–	20-40	5-10	10-40	–	–	5-10	10-20	20-40	6000	0.41
1	6-12	12-25	25-55	55-100	12-25	25-50	50-100	–	12-25	25-50	50-100	5000	1.30
2	12-25	25-50	50-120	120-200	25-50	50-100	100-200	–	25-50	50-100	100-200	4000	2.27
3	25-50	50-100	100-250	200-450	50-100	100-200	200-450	–	50-100	100-200	200-450	3500	3.88
4	50-100	100-200	200-500	500-1000	100-200	200-400	400-800	800-2000	100-200	200-400	400-800	3000	8.34
5	85-250	230-600	300-1000	600-2000	170-450	350-900	600-1800	1200-3400	170-450	350-900	600-1800	2300	13.51
6	180-480	360-960	720-1950	1600-3300	300-750	600-1500	1200-3000	2900-5800	–	–	–	–	21
7	250-520	500-1050	1000-2100	2000-3600	550-1100	1100-2200	2200-4400	3000-8200	–	–	–	–	37

Dimensions [mm]

Size	Bore d		d_1	D	D_1	D_2	D_A	l_1	l_2	l_3	l_4	l_5	l_6	l_7	L	L_1	L_2	z	H=stroke			
	Pilot bore	Max.																	DK	SR	SGR	FR
0	7	20	41.0	28	38	48	55	4.0	6.5	3.0	7.5	9	8	27.5	38.5	51.0	66.0	6xM5	1.4	1.2	0.6	1.6
1	10	25	60.0	38	50	70	82	4.0	8.0	6.0	11.5	9	10	33.0	52.0	70.0	85.0	6xM5	2.3	1.8	0.8	2.3
2	14	35	78.0	52	60	89	100	5.0	10.0	5.0	12.0	9	12	39.0	61.0	78.0	100.0	6xM6	2.4	2.0	1.1	3.0
3	18	45	90.5	65	80	105	120	5.0	12.0	8.5	21.0	10	12	47.0	78.0	96.0	125.0	6xM8	2.7	2.2	1.2	3.5
4	24	55	105.0	78	100	125	146	6.5	15.0	11.0	27.0	9	16	52.5	100.0	124.5	152.5	6xM10 [1]	3.7	2.5	1.2	3.8
5	30	65 (70)[4]	120.5	90	120	155	176	6.5	17.0	12.0	33.0	9	18	57.5	113.5	140.0	171.0	6xM12 [1]	4.6	3.0	1.6	4.5
6 [2]	40	80	136.0	108	130	160	200	7.0	20.0	14.0	39.0	9	20	64.0	119.0	150.0	183.0	6xM12 [1]	5.0	3.5	2.5	–
7 [2]	50	100 (110) [4]	168.0	135	160	200	240	8.0	25.0	15.0	46.0	9	25	72.0	141.0	175.0	213.0	6xM16 [1]	5.5	4.0	2.7	–

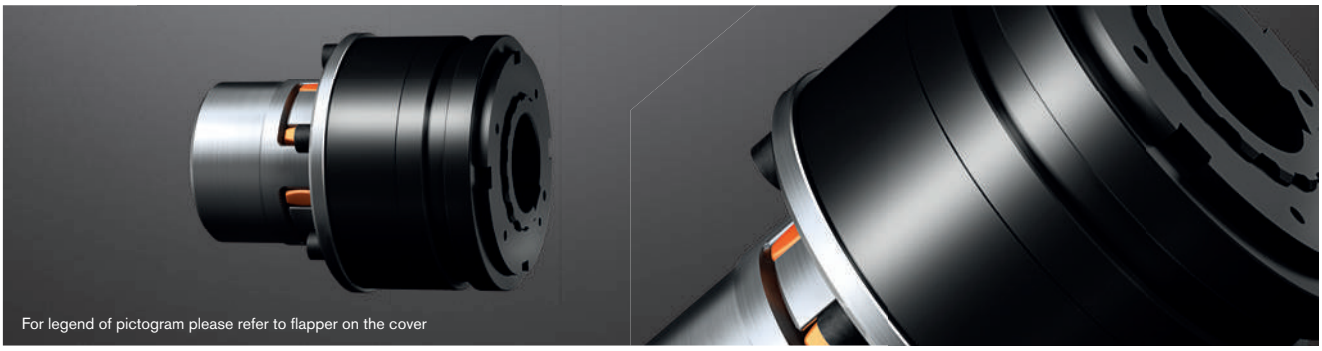
[1] Type T4 SR and SGR: tightening torques according to 12.9
[2] Size 6: dimension l_8 = 15 mm, size 7: dimension l_8 = 21 mm
[3] See comments on page 245
[4] The figure in brackets specifies the max. bore with keyway to DIN 6885 sheet 3 (low-rise design)

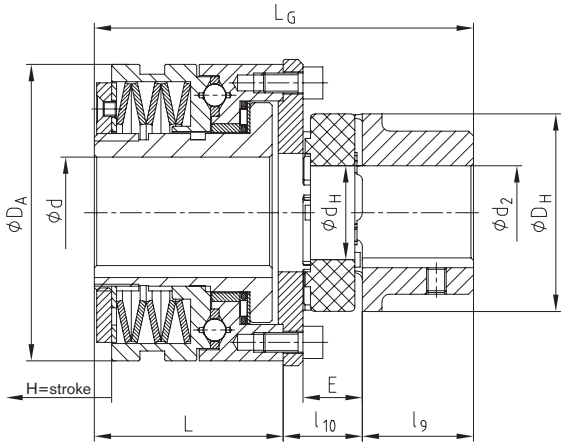
Ordering example:

KTR-SI 2	FR	FT	T2	d Ø20	40 Nm
Type/size	Type (DK/SR/SGR/FR)	Type	Disk spring layering	Bore	Torque set

Morskate®

With torsionally flexible ROTEX®





Technical data

KTR-SI size	Torques [Nm]										
	Type DK				Type SR and SGR				Type FR		
	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3
0	2.5-5	5-20	–	20-40	5-10	10-40	–	–	5-10	10-20	20-40
1	6-12	12-25	25-55	55-100	12-25	25-50	50-100	–	12-25	25-50	50-100
2	12-25	25-50	50-120	120-200	25-50	50-100	100-200	–	25-50	50-100	100-200
3	25-50	50-100	100-250	200-450	50-100	100-200	200-450	–	50-100	100-200	200-450
4	50-100	100-200	200-500	500-1000	100-200	200-400	400-800	800-2000	100-200	200-400	400-800
5	85-250	230-600	300-1000	600-2000	170-450	350-900	600-1800	1200-3400	170-450	350-900	600-1800
6	180-480	360-960	720-1950	1600-3300	300-750	600-1500	1200-3000	2900-5800	–	–	–
7	250-520	500-1050	1000-2100	2000-3600	550-1100	1100-2200	2200-4400	3000-8200	–	–	–

Technical data – dimensions

KTR-SI size	ROTEX® size	ROTEX® [1] Torque [Nm] 98 ShA		Max. bore		Dimensions [mm]								H=stroke Type		
		T_{KN}	$T_{K\,max}$	d	d_2	d_H	D_H	D_A	l_9	l_{10}	E	L	L_G	DK	SR	FR
0	19	17	34	20	25	18	40	55	25	22	16	38.5	85.5	1.4	1.2	1.6
	28	160	320		40	30	65		35	28.5	20		102			
1	24	60	120	25	35	27	55	82	30	24	18	52	106	2.3	1.8	2.3
	38	325	650		48	38	80		45	32.5	24		129.5			
2	28	160	320	35	40	30	65	100	35	28	20	61	124	2.4	2.0	3.0
	48	525	1050		62	51	105		56	38	28		155			
3	38	325	650	45	48	38	80	120	45	32	24	78	155	2.7	2.2	3.5
	55	685	1370		74	60	120		65	43	30		186			
4	48	525	1050	55	62	51	105	146	56	38	28	100	194	3.7	2.5	3.8
	75	1920	3840		95	80	160		85	56.5	40		241.5			
5	55	685	1370	65 (70) [2]	70	60	120	176	65	44	30	113.5	222.5	4.6	3.0	4.5
	90	3600	7200		110	100	200		100	62	45		275.5			
6	100	4950	9900	80	115	113	225	200	110	72	50	119	301	5.0	3.5	–
7	110	7200	14400	100 (110) [2]	125	127	255	240	120	78	55	141	339	5.5	4.0	–

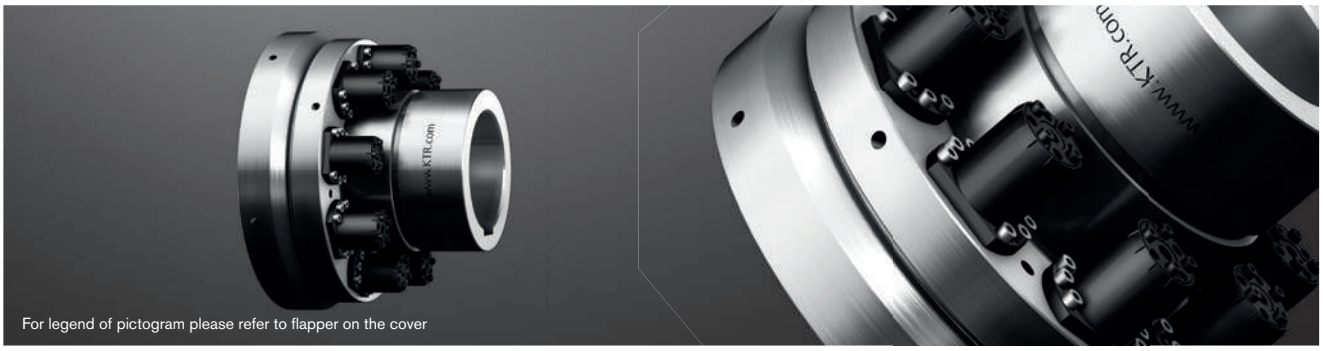
[1] See selection of ROTEX® couplings on page 14 et seqq.
[2] The figure in brackets specifies the max. bore with keyway to DIN 6885 sheet 3 (low-rise design)

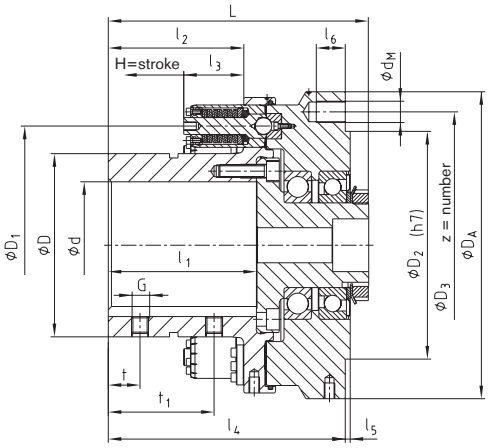
Ordering example:

KTR-SI 2	DK	T2	d Ø20	ROTEX® 28	98 ShA	d_2 Ø25	40 Nm
Type/size	Type (DK/SR/SGR/FR)	Disk spring layering	KTR-SI bore	Type/size	Spider	ROTEX® bore	Torque set

KTR-SI FRE
Idle rotating overload system

Flange type





Torques [Nm]

Size	Type of element	3 idle rotation elements		6 idle rotation elements		9 idle rotation elements	
		Min.	Max.	Min.	Max.	Min.	Max.
9	1T2	1000	4000	2000	8000	–	–
	1T3	2400	5500	4800	11000		
12	1T2	1300	5000	2600	10000	3900	15000
	1T3	2900	6700	5800	13400	8700	20100
15	1T2	1700	6000	3400	12000	5100	18000
	1T3	3500	8200	7000	16400	10500	24600
20	2T2	5000	15000	10000	30000	15000	45000
	2T3	13100	20000	26300	40000	39400	60000

Technical data – dimensions

Size [1]	Max. bore	Dimensions [mm]																		Max. permissible forces on the flange connection [2] [kN]		Speed [3] [rpm]	Weight with max. bore [kg]
	d	D	D_1	D_2	D_3	D_A	l_1	l_2	l_3	l_4	l_5	l_6	G	t	t_1	L	d_M	z	Pitch	H=stroke	Radial	Axial		
9	90	135	185	200	225	260	120	110	56.7	197	2.5	17.5	M12	25	75	213.5	12	12	12x30°	5.2	18	13	3300	38
12	120	173	225	215	252	290	140	128	56.7	224	4.5	27.5	M16	30	100	246	20	15	20x18°	5.2	26	18	2300	57
15	150	215	270	245	282	324	170	160	56.7	258	4.5	27.5	M20	40	120	281	20	15	20x18°	5.2	30	20	2050	81
20	200	285	370	330	375	460	220	200	88.4	341	5	33.0	M20	50	150	366	24	18	24x15°	8.9	50	40	1550	211

[1] Other sizes on request
[2] Larger forces on request
[3] Higher speeds on request, see comments on page 245

Special type:

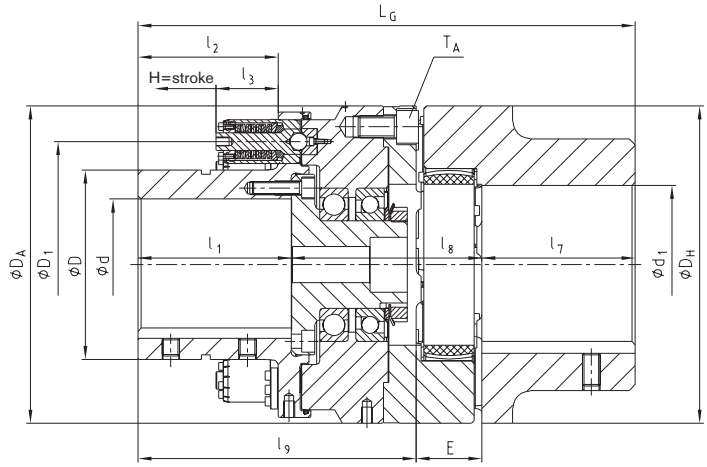
- KTR-SI FRE with sprocket
- Available as a complete subassembly with torque preset

Ordering example:

KTR-SI FRE 12	1T2	9	d Ø85	7500 Nm
Type/size	Type of element	Number of idle rotating elements	KTR-SI FRE bore	Torque set

KTR-SI FRE
Idle rotating overload system

With torsionally flexible ROTEX®



Torques [Nm]

Size	Type of element	3 idle rotation elements		6 idle rotation elements		9 idle rotation elements	
		Min.	Max.	Min.	Max.	Min.	Max.
9	1T2	1000	4000	2000	8000	–	–
	1T3	2400	5500	4800	11000		
12	1T2	1300	5000	2600	10000	3900	15000
	1T3	2900	6700	5800	13400	8700	20100
15	1T2	1700	6000	3400	12000	5100	18000
	1T3	3500	8200	7000	16400	10500	24600
20	2T2	5000	15000	10000	30000	15000	45000
	2T3	13100	20000	26300	40000	39400	60000

Technical data – dimensions

Size [1]	ROTEX® Size	ROTEX® Torque [3] [Nm] 64 ShD T_{KN}	ROTEX® Torque [3] [Nm] 64 ShD $T_{K\,max}$	Max. bore d	Max. bore d_1	Dimensions [mm] D	D_1	D_H	D_A	l_1	l_2	l_3	l_7	l_8	l_9	E	L_G	H=stroke	T_A [Nm]	Speed [2] [rpm]	Weight with max. bore [kg]
9	90	4500	9000	90	110	135	185	200	260	120	110	56.7	100	133	217	45	362	5.2	117	3300	59
12	125	12500	25000	120	145	173	225	290	290	146	130	56.7	140	165	254	60	454	5.2	560	2300	106
15	140	16000	32000	150	160	215	270	320	324	170	160	56.7	155	176	292	65	512	5.2	560	2050	147
20	180	35000	70000	200	200	285	370	420	460	220	200	88.4	195	227	381	85	661	8.9	970	1550	349

[1] Other sizes on request
[2] Higher speeds on request, see comments on page 245
[3] See selection of ROTEX® couplings on page 14 et seqq.

Special type:

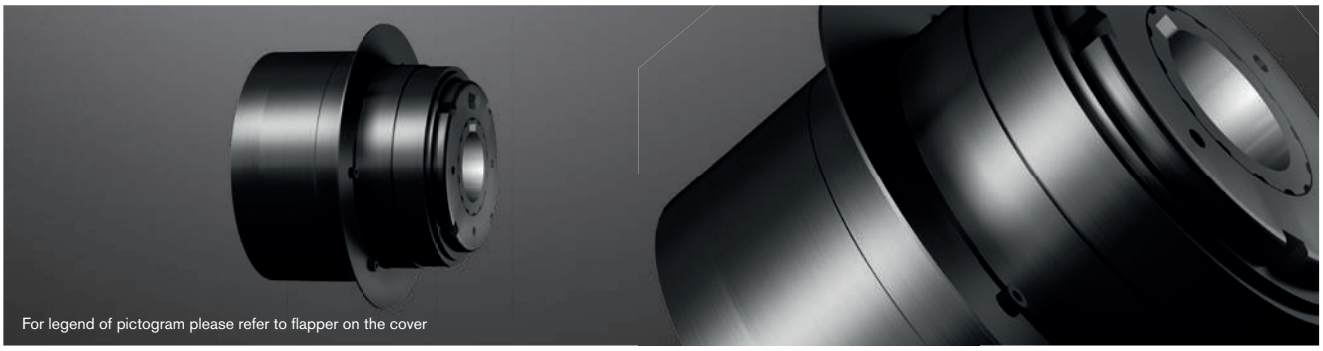
- KTR-SI FRE with torsionally flexible pin & bush coupling REVOLEX® KX-D and limitation of axial backlash
- KTR-SI FRE with torsionally rigid all-steel gear coupling GEARex® and integrated brake disk
- KTR-SI FRE with torsionally rigid lamina coupling RADEX®-N and integrated brake disk

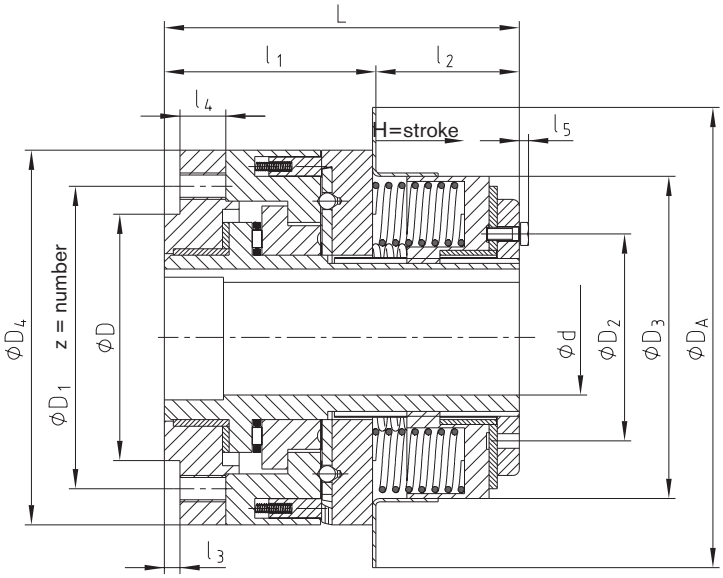
Ordering example:

KTR-SI FRE 12	1T3	9	d Ø85	ROTEX® 125	98 ShA	d_1 Ø85	12000 Nm
Type/size	Type of element	Number of idle rotation elements	KTR-SI FRE bore	Type/size	Spider	ROTEX® bore	Torque set

KTR-SI FRA
Idle rotating overload system with automatic re-engagement when reversing the direction of rotation

Flange type FT





Torques [Nm]				
Size	T1	T2	T3	T4
2	5-20	15-70	40-135	80-260
3	24-104	57-360	110-540	245-730
4	45-210	145-435	340-960	465-1320
5	90-415	240-640	490-1880	1060-3000

Technical data – dimensions																	
Size	Max. bore	Dimensions [mm]														Speed [1] [rpm]	Weight with max. bore [kg]
	d	D_{j7}	D_1	D_2	D_3	D_4	D_A	l_1	l_2	l_3	l_4	l_5	L	z	H=stroke		
2	35	75	92	70	98	114	140	63	45	4.7	14	-	108	6xM8	2.8	3600	5
3	45	95	114	77	131	149	184	69	42	4.7	15	3.5	111	7xM10	3.5	3600	10
4	55	122	144	88	147	166	203	75	46	4.7	15	4.0	121	8xM12	3.5	2000	13
5	80	155	184	152	196	223	279	94	70	6.3	23	2.3	164	8xM16	4.4	2000	32

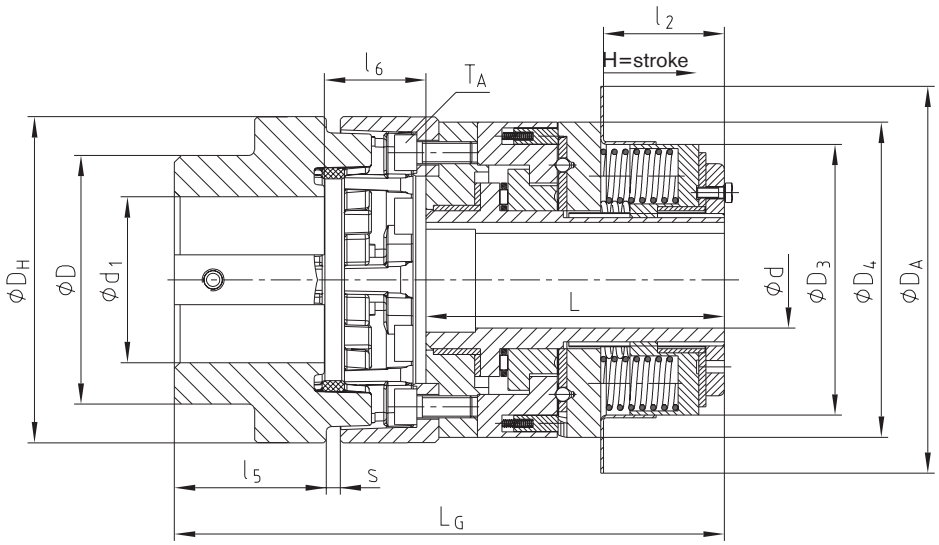
[1] See comments on page 245

Ordering example:	KTR-SI FRA 3	FT	T3	d Ø35	300 Nm
	Type/size	Type	Torque setting range	KTR-SI FRE bore	Torque set

KTR-SI FRA

Idle rotating overload system with automatic re-engagement when reversing the direction of rotation

With torsionally flexible POLY-NORM®



Torques [Nm]				
KTR-SI FRA size	T1	T2	T3	T4
2	5-20	15-70	40-135	80-260
3	24-104	57-360	110-540	245-730
4	45-210	145-435	340-960	465-1320
5	90-415	240-640	490-1880	1060-3000

Technical data – dimensions

KTR-SI FRA size	POLY-NORM®			Max. bore		Dimensions [mm]													T_A [Nm]	Speed [1] [rpm]	Weight with max. bore [kg]
	Size	Torque [Nm]		d	d_1	D	D_3	D_4	D_H	D_A	l_1	l_2	l_5	l_6	s	L_G	L	H=stroke			
		T_{KN}	$T_{K\,max}$																		
2	55	300	600	35	60	90	98	114	118	140	108	45	55	27	5	189.3	108	2.8	23	3600	9
3	75	850	1700	45	70	123	131	149	158	184	111	42	75	33.8	5	218.8	111	3.5	46	3600	18
4	85	1350	2700	55	80	139	147	166	182	203	121	46	85	52.6	5	257.6	121	3.5	79	2000	25
5	100	3900	7800	80	90	165	196	223	224	279	164	70	100	63.2	6	326.2	164	4.4	195	2000	51

[1] See comments on page 245

Ordering example:

KTR-SI FRA 3	T3	d Ø35	POLY-NORM® 75	AR	d_1 Ø45	300 Nm
Type/size	Torque setting range	KTR-SI FRA bore	Type/size	Type	POLY-NORM® bore	Torque set

Morskate®

Any questions? Please contact us.

Morskate Aandrijvingen BV
Oosterveldsingel 47A
7558 PJ Hengelo (Ov)
The Netherlands

NL
T +31 (0)74 - 760 11 11
info@morskateaandrijvingen.nl
www.morskateaandrijvingen.nl

DE
T +49 692 - 222 34 95
info@morskateantriebstechnik.de
www.morskateantriebstechnik.de

EN
T +31 (0)74 - 760 11 11
info@morskatedrivetechnology.com
www.morskatedrivetechnology.com