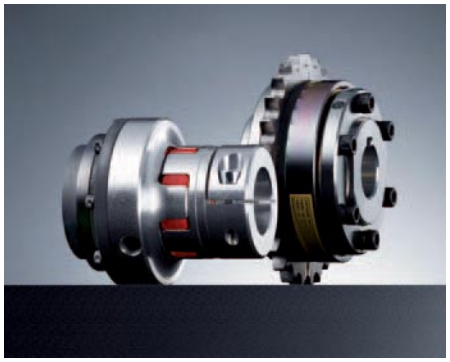
RUFLEX®
Torque limiter

SYNTEX®
Backlash-free Overload System

KTR-SI
Safety system

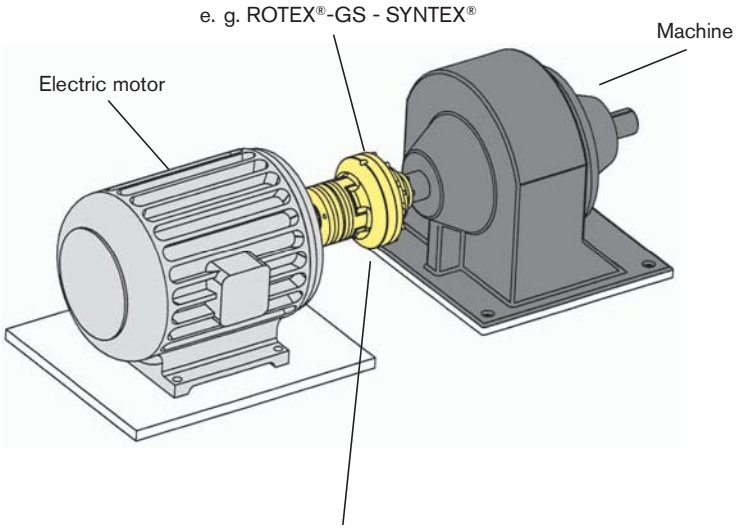
Made for Motion KTR

Table of contents



Overload protection for direct and indirect drives

Direct drives



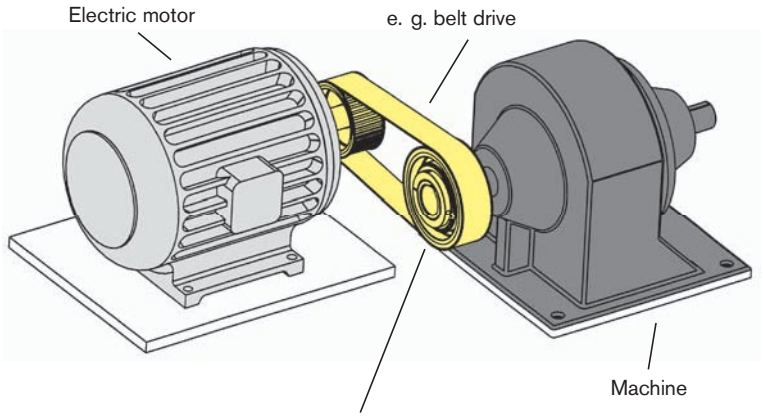
Torque limiter as shaft-to-shaft connection, for example:
- **ball spindles**
- **axle drives**
- **between motor and gearbox**

RUFLEX® - Torque limiter with ROTEX®

SYNTEX® - Safety coupling with ROTEX® GS

KTR-SI - Safety coupling with ROTEX®

Indirect drives



Shaft-to-flange connection, for example:
- **sprockets**
- **belt drives**
- **crank gears**

RUFLEX® - Torque limiter with sprocket

SYNTEX® - Safety coupling with sprocket

KTR-SI - Safety coupling with mounting flange

Types and applications

Type	Characteristics	Applications
 **RUFLEX® standard**	● Torque limiter with high capacity due to high-quality materials ● Overload protection up to 6800 Nm ● High capacity of wear for a long service life ● Surfaces zinc-coated and passivated ● See page 245	● Conveyors ● Packaging machines ● Textile machines ● Gear motors
 **RUFLEX® with sprocket**	● Torque limiter with sprocket ● Design ready for assembly ● Customer's torque is set ● Available from stock with standard sprockets ● Other sprockets available according to customer's requests ● See page 246	● Conveyors ● Automatisation systems ● Actuators
 **RUFLEX® max.**	● Torque limiter in a lengthened design for assemblies with wide driving elements (e.g. double or triple sprockets) ● Detailed adjustment to customer's mounting dimensions possible ● Also available as a sprocket ● See page 247	● Multiple sprocket drives ● Multiple groove V-belt pulleys ● Conveyors ● Packaging machines
 **RUFLEX® with ROTEX®**	● Torque limiter for shaft-to-shaft connection ● Torsionally flexible torque limiter able to compensate for misalignment ● Axial plug-in ● Various elastomers available each adjusted to the application ● See page 248	● Gear motors ● Axle drives ● High-quality pumps ● Printing machines
 **RUFLEX® with BoWex®**	● Torque limiter as a torsionally rigid, double-cardanic shaft-to-shaft connection ● Low-cost shaft-to-shaft connection ● Axial plug-in ● Compensation for high misalignment due to double-cardanic design ● See page 249	● Simple applications ● Low speeds ● High misalignment

Types and applications

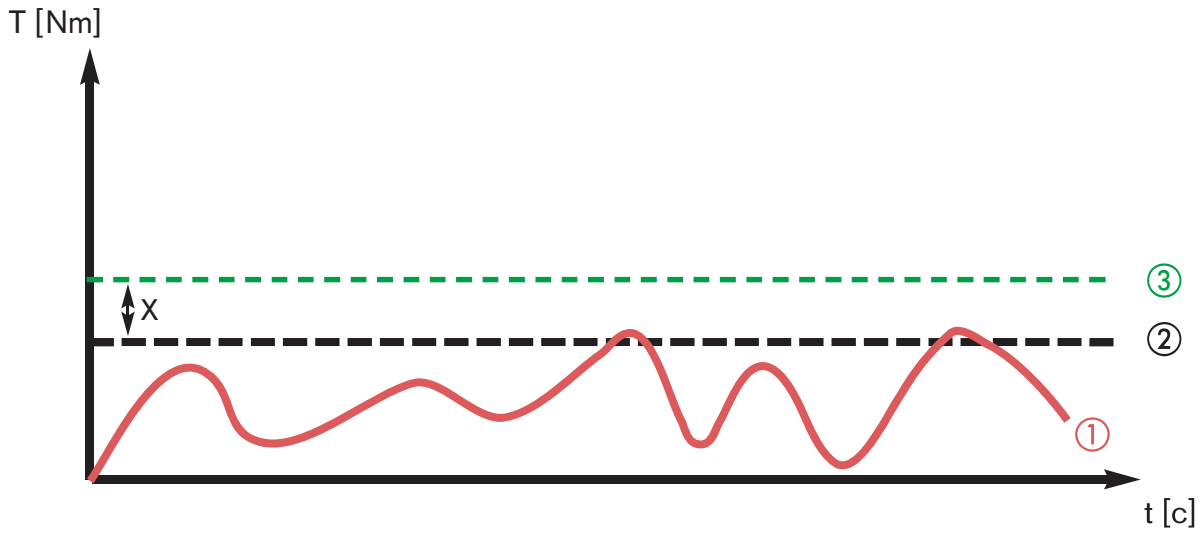
Type	Characteristics	Applications
 **SYNTEX® standard**	● Safety clutch up to 400 Nm ● Backlash-free, torsionally rigid ● Available as a synchronous or ratchet design ● For mounting of customer's components ● See page 252	● Packaging machines ● Machine tools ● X-Y-Z – axle drives ● Linear drives
 **SYNTEX® with sprocket**	● Safety clutch with integrated sprocket ● Customer's torque is set ● Reduction of components and costs ● Standard sprockets available from stock ● Alternatively available with belt pulley instead of sprocket ● See pages 253 and 254	● Conveyors for packaging machines ● Textile machines ● With belt pulley for linear drives
 **SYNTEX® with ROTEX® GS**	● Safety clutch as a shaft-to-shaft connection ● Combination with the backlash-free ROTEX® GS ● Torsionally flexible, able to compensate for misalignment ● Axial plug-in ● Various elastomers available ● See page 255	● Axle drives on machine tools ● Gear motors ● Woodworking machinery ● Linear drives
 **KTR-SI standard**	● Safety clutch up to 8200 Nm ● Available as a ratchet, synchronous and failsafe design ● **New: Furthermore available as a free switching design (no residual torque)** ● See page 260 and 261	● For rugged drives e.g. crushers ● In combination with coupling or belt pulleys, sprockets, etc.
 **KTR-SI with ROTEX®**	● Safety clutch as a shaft-to-shaft connection ● Torsionally flexible, able to compensate for misalignment ● Axial plug-in ● Various elastomers available ● See page 262	● Axle drives as a shaft-to-shaft connection ● Combinations for motor and gearbox ● Bottle filling machines ● Extruders (as a free switching coupling)

Information for selection torque limiters

- For exact dimensioning torque limiters latest simulation and calculation programmes are available. Therefore let us know many data of your drive. The more precise these data are, the more precise are the results of calculation. Make use of this possibility and discuss with us the application in advance.
- Please notice: High masses at the drive or driven end can mean long slow-down times also in case of torque limiters entered in function. This can cause increased wear at the coupling. Therefore in case of high speeds we recommend to use a free-rotating (load-separating) safety clutch (KTR-SI idle rotation coupling). If required, please contact KTR's engineering department.
- Besides it is important fo the failure-free operation to define the engaging torque definitely above the max. operating torque of the unit. Therefore we recommend to set the coupling at least 30% above the max. operating torque (also refer ti diagram below)
- For all torque limiters an electrical disconnection of the drive should be provided. Long slipping or locking times can destroy the coupling. We kindly assist you when selecting sensors, end switches or speed controls.

Important factors for the selection of torque limiters:

A smooth operation is only guaranteed if the overload torque set exceeds the maximum operating torque of the machine (see diagram below).



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

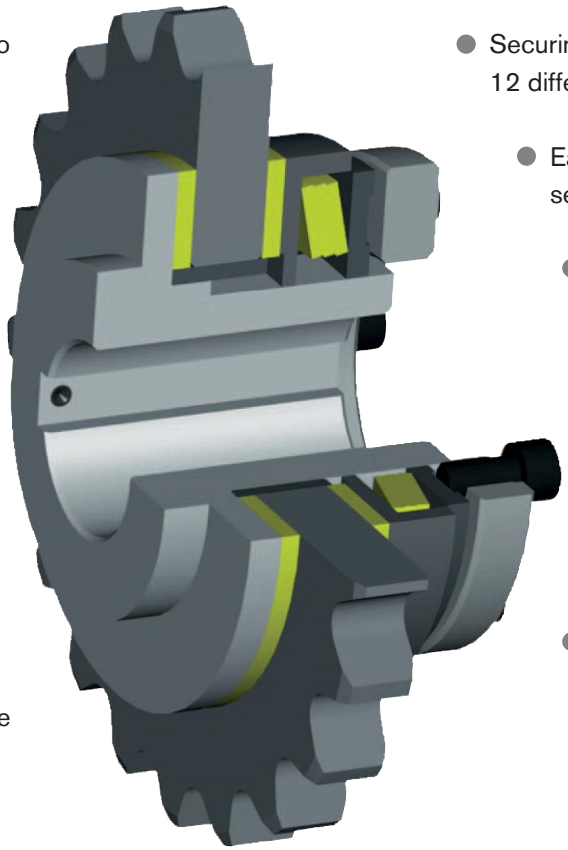
Assembly and operation

RUFLEX® standard

RUFLEX® with sprocket

RUFLEX® with ROTEX®

- Overload protection up to 6800 Nm (standard)
- Available with sprocket assembled
- Asbestos-free and rust-resistant friction lining for dry running
  Ex (ATEX possible on request)
- High wear capacity, long service life
- High-quality slide bush with dry-film lubricant
- Torque setting while in place



- Securing of the nut by locking in 12 different positions
- Easy assembly and torque setting
- Coupling components from steel, high safety reserves
- Corrosion protection by zinc-coated and passivated surfaces
- Rust-resistant and acid-proof design on request
- High capacity due to high-quality disk springs and friction linings

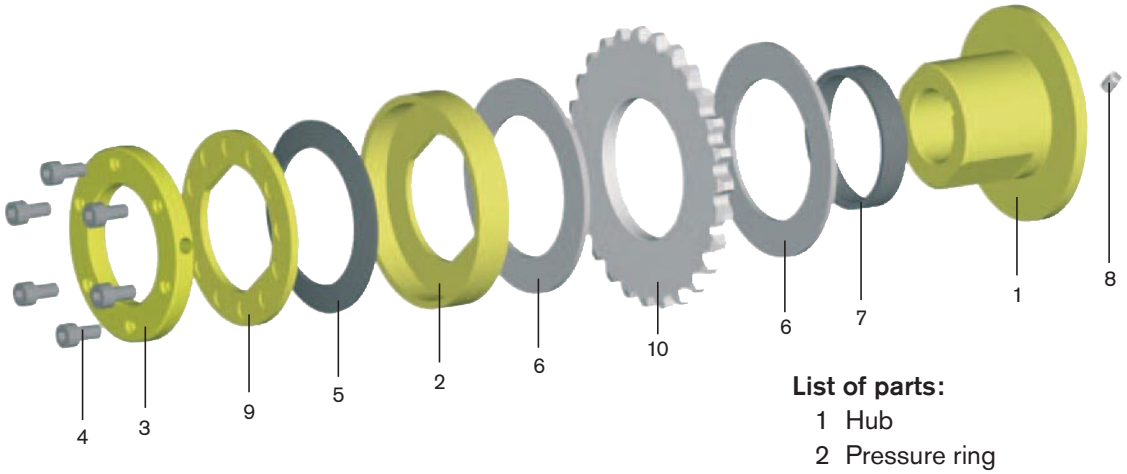
The RUFLEX® modular system is able to offer a solution for your drive, too.

The combination with the well-approved KTR couplings and the integration of customer-specific drive elements (e. g. sprockets) provides for an overload protection adapted to every application in an optimum way.

Various layers of disk springs and high-quality friction linings ensure a high capacity even for only a small mounting space.

Assembly and operation

RUFLEX® consists of the following components:



List of parts:

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

Layers of disk springs:

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

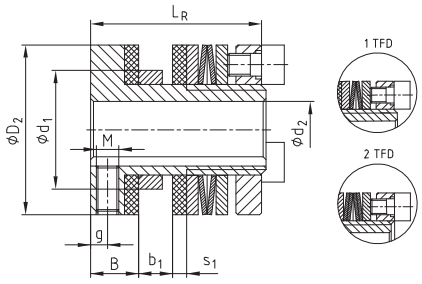
1 TFD
- Small specific load on the friction linings
- Torques as with design 1TF
- Only small decrease of the torque even during a longer period of friction
- Precision torque adjustment due to a double spring excursion

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

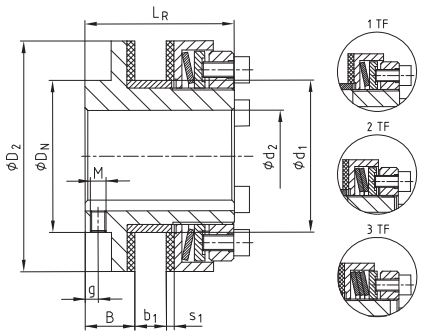
3 TF
- High specific load on the friction linings
- High wear and decrease of torque with longer slipping periods
- Suitable only in special cases for designs with only limited dimensions

Standard RUFLEX®

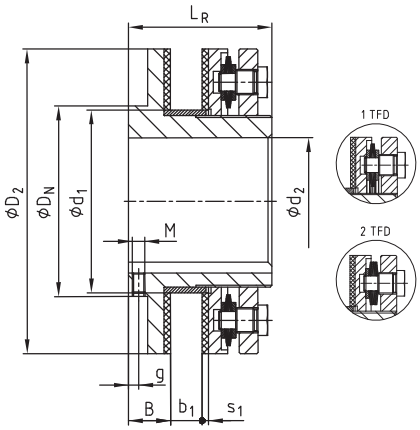
- Torque limiter for a torque range up to 6800 Nm
- Standard RUFLEX® zinc-coated and passivated
- Torque setting possible while in place
- Asbestos-free and rust-resistant friction linings
- Finish bore according to ISO fit H7,
  feather keyway according to DIN 6885 sheet 1 - JS9
- Securing of the setting nut by locking in 12 different positions
- All components are made from high-quality steel



Size 00



Size 0 - 5



Size 6 - 8

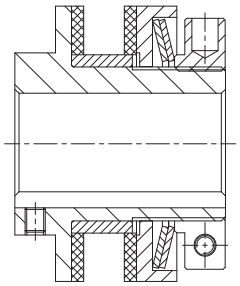
Technical data

Size	Max. speed [rpm]	Torques [Nm]			Dimension [mm]											
		1TF	2TF	3TF [3]	Bore d_2		D_2	D_N	d_1 [2]	B	Driving component b_1		S_1	L_R	Setscrew	
					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	M4
0	8500	2-10	4-20	–	–	20 [1]	45	45	35	8,5	2	6	2,5	33	3	M4
01	6600	5-35	10-70	–	–	22	58	40	40	16	3	8	3	45	4	M5
1	5600	20-75	40-150	130-200	–	25	68	45	44	17	3	10	3	52	5	M5
2	4300	25-140	50-280	250-400	–	35	88	58	58	19	4	12	3	57	5	M6
3	3300	50-300	100-600	550-800	–	45	115	75	72	21	5	15	4	68	5	M6
4	2700	90-600	180-1200	1100-1600	–	55	140	90	85	23	6	18	4	78	5	M8
5	2200	400-800	800-1600	1400-2100	–	65	170	102	98	29	8	20	5	92	8	M8
6	1900	300-1200	600-2400	–	38	80	200	120	116	31	8	23	5	102	8	M8
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

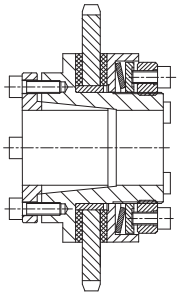
[1] Finish bore larger than Ø 19, keyway to DIN 6885 sheet 3

[2] Bore tolerance (drive component): F8 at size 00-4
H8 at size 5-8

[3] To use only for designs with limited dimensions



- with clamping setting nut
- for radial torque setting



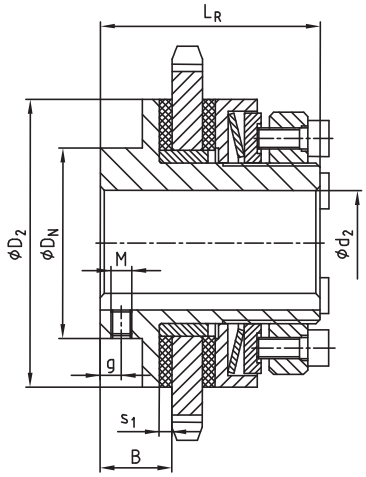
- with taper bush (hub design 4.5)
- frictionally engaged shaft-hub-connection

Order form:

RUFLEX®	1	2TF	10	Ø 20
Coupling type	Size	Disk spring layer	Width of driving components	Bore

RUFLEX® with sprocket

- RUFLEX® torque limiter with sprocket mounted
- Available from stock with standard sprocket (see table below)
- Other sprockets on request
- Complete unit with torque pre-set
- On request also available from stainless material
- Finish bore according to ISO fit H7,
  feather keyway according to DIN 6885 sheet 1 - JS9

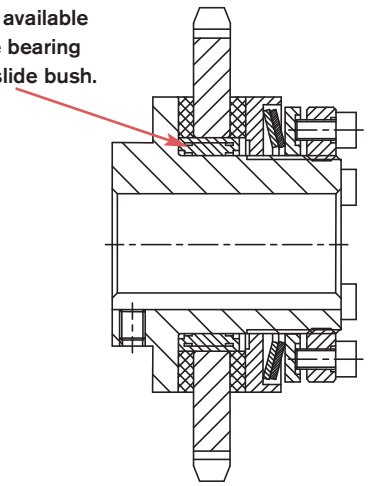


Technical data

Size	Max. speed [rpm]	Torques [Nm]			Dimensions [mm]									
		1TF	2TF	3TF [1]	Bore d_2		D_2	D_N	B	s_1	L_R	Setscrew		Standard sprocket
					Pilot bore	max.						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 use only for designs with limited dimensions

On request available with needle bearing instead of slide bush.



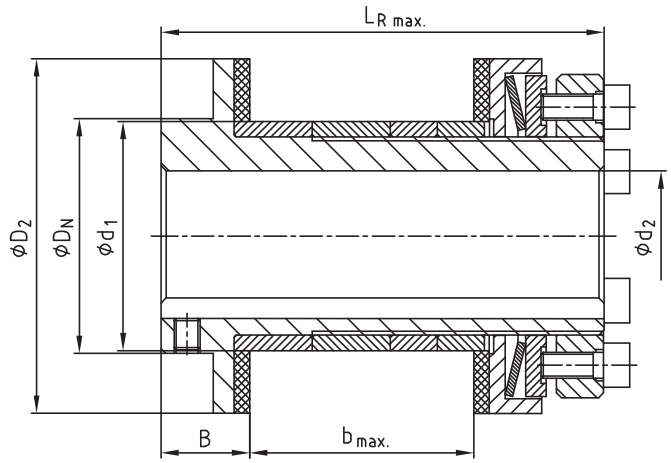
- available with needle bearing
- for high radial load on the sprocket
- for high torques or long slipping periods

Order form:

RUFLEX®	1	2TF	08 B1, z=24	Ø 20	100 Nm
Coupling type	Size	Disk spring layer	Sprocket	Bore	Torque set

RUFLEX® max.

- RUFLEX® for assemblies with wide driving components
- E. g. double and triple sprockets
- Detailed adjustment to the customer's dimensions possible
- Also available as a complete unit with sprocket
- Other sizes of RUFLEX® max. on request
- Please mention the width of driving component "b" in your order
- Finish bore according to ISO fit H7, feather keyway according to DIN 6885 sheet 1 - JS9

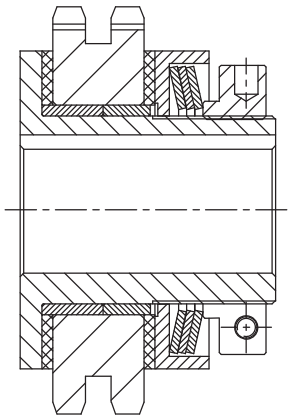


Technical data

Size	Max. speed [rpm]	Torques [Nm]			Dimensions [mm]							
		1TF	2TF	3TF [2]	Bore d_2		D_2	D_N	B	$b_{max.}$	d_1 [1]	$L_{R\ max.}$
					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
4	2700	90-600	180-1200	1100-1600	-	55	140	90	23	91,5	85	154

[1] Bore tolerance (drive component): F8

[2] To use only for designs with limited dimensions



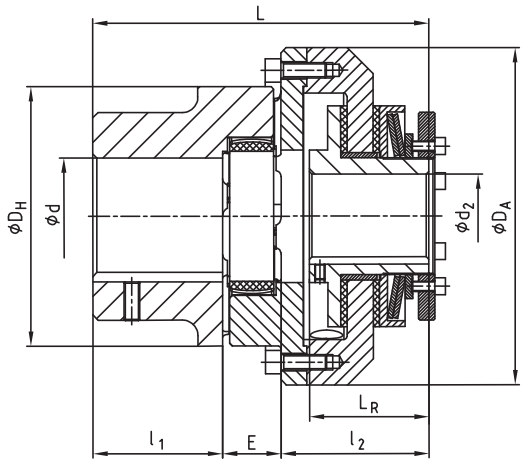
- RUFLEX® max. with sprocket mounted
- available as a complete unit with torque pre-set

Order form:

RUFLEX® max.	1	2TF	35	Ø 20
Coupling type	Size	Disk spring layer	Width of driving components "b"	Bore

RUFLEX® with torsionally flexible ROTEX®

- RUFLEX® with ROTEX® as shaft-to-shaft-connection
- Torsionally flexible safety clutch
- Axial plug-in
- Able to compensate for misalignment
- Various kinds of elastomer hardness available
- Torque can be set while in place
- Easy assembly
- Finish bore according to ISO fit H7, feather keyway according to DIN 6885 sheet 1 - JS9

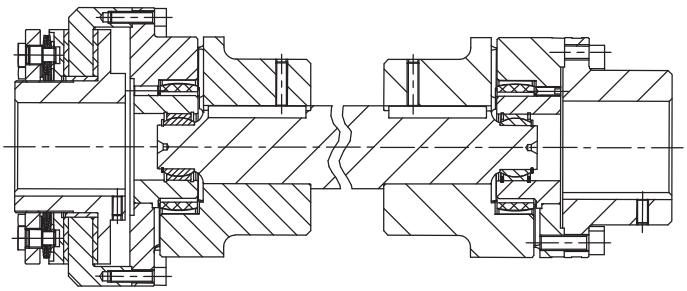


Technical data

RUFLEX® size	ROTEX® size	RUFLEX® torques [Nm]			ROTEX® torques [Nm]		Dimension [mm]									
		1TF	2TF	3TF [2]	95/98 Shore A		Bore d_2		Bore $d_{max.}$	L	D_A	L_R	E	l_1	l_2	D_H
					T_{KN}	$T_{K\ max.}$	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 [1]	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	95	205	185	78	40	85	80	160
5	90	400-800	800-1600	1400-2100	3600	7200	–	65	110	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] Finish bore larger than Ø 19, keyway to DIN 6885 sheet 3

[2] To use only for designs with limited dimensions



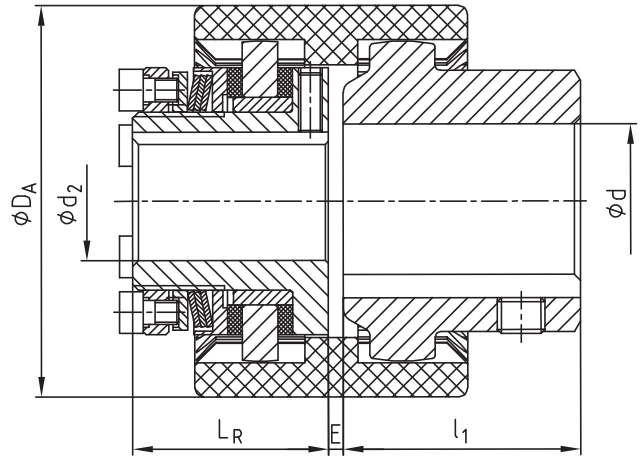
- RUFLEX® as intermediate shaft coupling
- for large shaft distance dimensions
- available in combination with ROTEX® or RADEX-N® steel laminae couplings

Order form:

RUFLEX®	1	2TF	Ø 20	ROTEX®	28	98 Sh A	Ø 25	100 Nm
Coupling type	Size	Disk spring layer	RUFLEX® bore	Coupling type	Size	Spider	ROTEX® bore	Torque set

RUFLEX® with torsionally rigid BoWex®

- RUFLEX® with BoWex® as shaft-to-shaft-connection
- Torsionally rigid safety clutch
- Axial plug-in
- Double-cardanic, able to compensate for misalignment
- For simple drives (low speeds, etc.)
- Easy assembly
- Finish bore according to ISO fit H7,
  feather keyway according to DIN 6885 sheet 1 - JS9

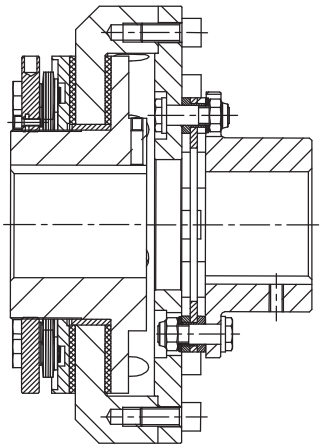


Technical data

RUFLEX® size	BoWex® size	RUFLEX® torques [Nm]			BoWex® torques [Nm]		Dimensions [mm]						
		1TF	2TF	3TF 2)	T_{KN}	$T_{K\,max.}$	Bore d_2 Pilot bore	Bore d_2 max.	Bore $d_{max.}$	D_A	L_R	E	l_1
00	19	0,5-3	1-5	–	16	32	–	10	19	48	31	2,5	25,0
0	28	2-10	4-20	–	45	90	–	20 1)	28	66	33	2,5	40,0
01	38	5-35	10-70	–	80	160	–	22	38	83	45	1,0	35,5
1	48	20-75	40-150	130-200	140	280	–	25	48	95	52	1,0	45,5
2	65	25-140	50-280	250-400	380	760	–	35	65	132	57	1,0	64,0

1) Finish bores larger than Ø 19 mm, keyway to DIN 6885 sheet 3

2) To use only for designs with limited dimensions



- RUFLEX® with torsionally rigid, backlash-free RADEX®-N steel laminae coupling
- suitable for high operating temperatures (up to 280 °C)
- with variable spacers for different shaft distance dimensions

Order form:

RUFLEX®	1	1TF	BoWex®	38	Ø 20	Ø 25	50 Nm
Coupling type	Size	Disk spring layer	Coupling type	Size	RUFLEX® bore	BoWex® bore	Torque set

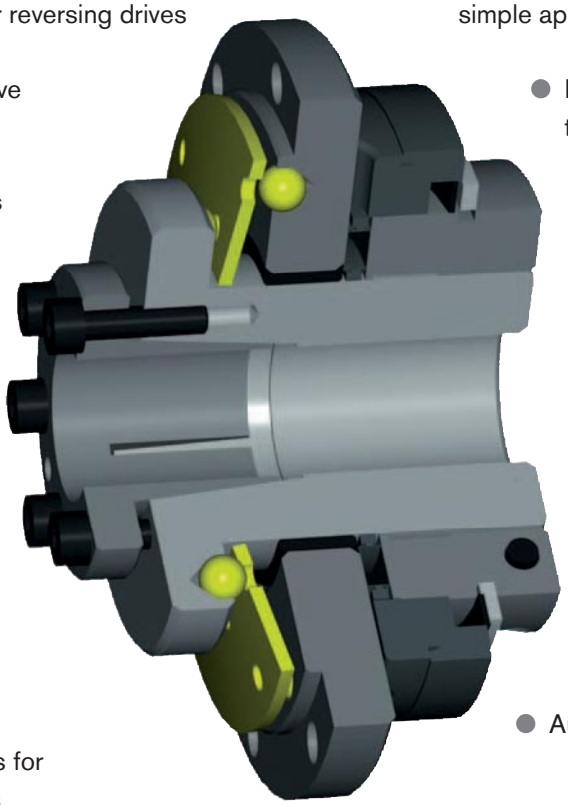
A good idea - The punched disk spring

SYNTEX® - Safety clutch with mounting flange

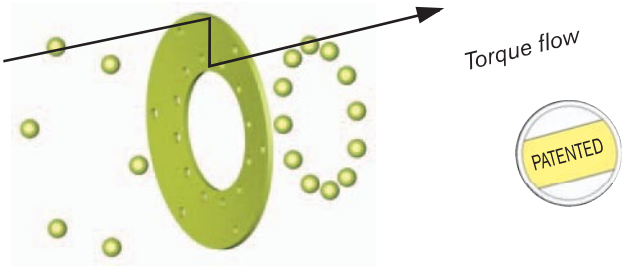
SYNTEX® - Safety clutch with sprocket

SYNTEX® - Safety clutch with ROTEX® GS

- Backlash-free, torsionally stiff overload protection, suitable for reversing drives
- Disconnection of the drive in case of overload
- Reduction of torque peaks
- High repeating accuracy even after a long operation period
- Easy integration of customer components
- Compact design, low mass moment of inertia
- Variable due to modular system
- Special disk springs for special applications



- Low-cost protection even for simple applications
- Easy assembly and torque setting
- Maintenance-free
- Insensitive to oil and grease
- Long service life due to low internal loads
- Backlash-free shaft-hub-connections
- Any or synchronous re-engagement
- Automatically operative

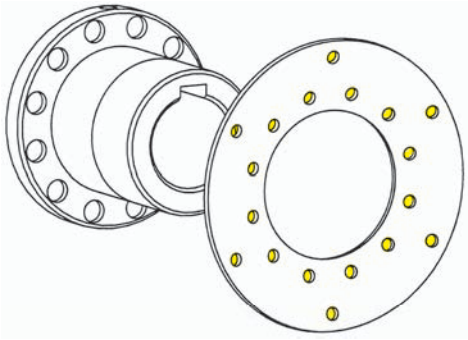


SYNTEX® is an overload system with positive operation.

The punched disk spring serves as the component for torque transmission (registered patent).

Operating principle

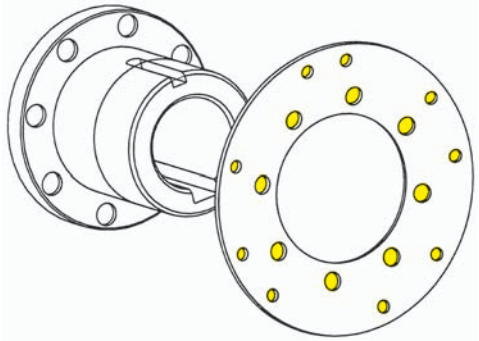
Ratchet design DK



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.

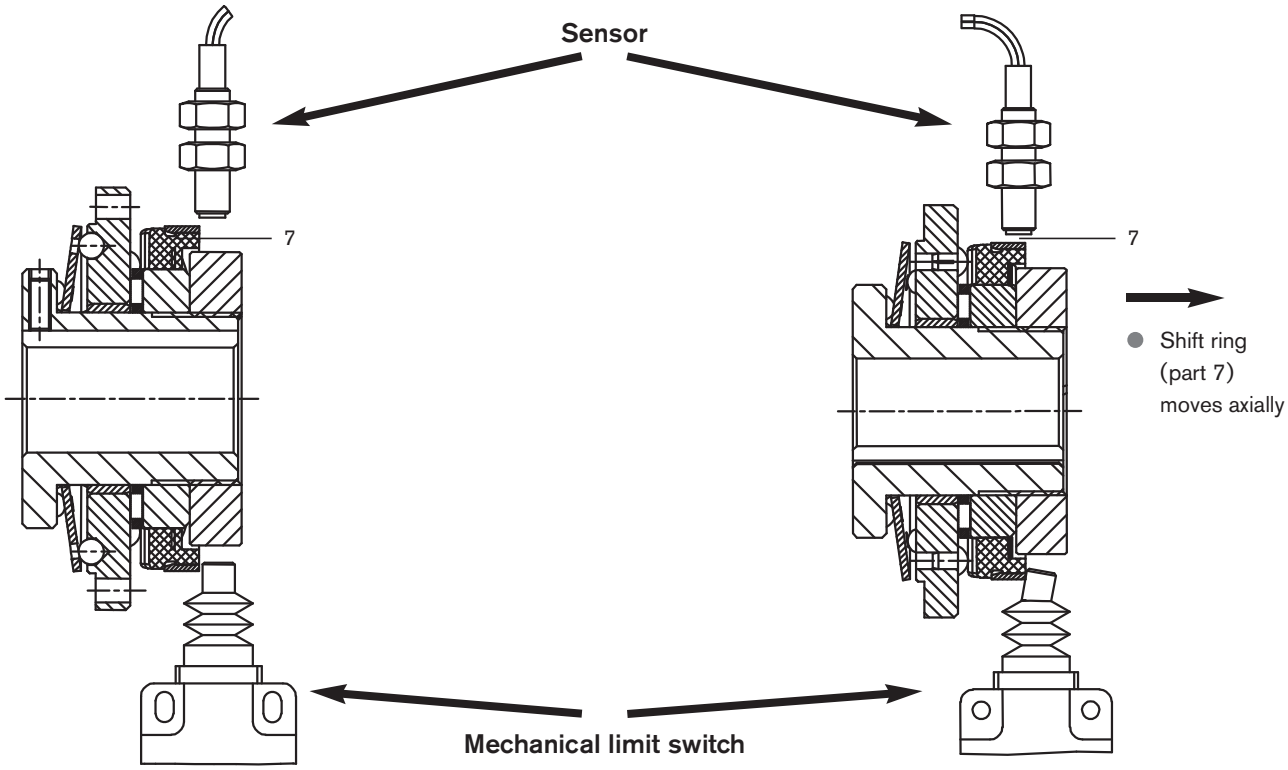
Synchronous design SK



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 always placed in the same position to each other (other degrees of re-engagement, for example 180°, are also possible).

Signal by limit switch or sensor in case of overload



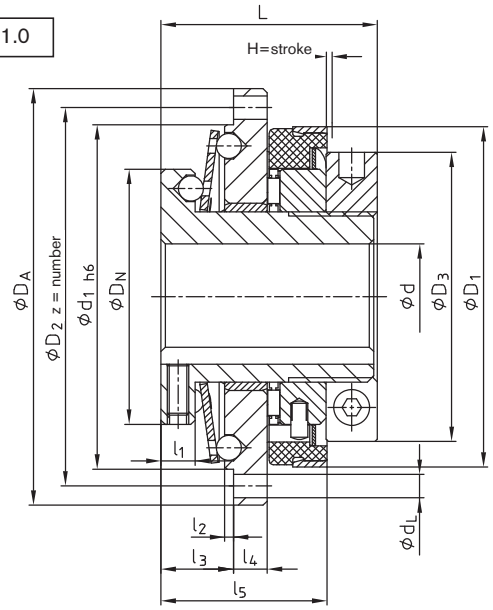
Normal operation:
No signal by sensor or mechanical limit switch

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

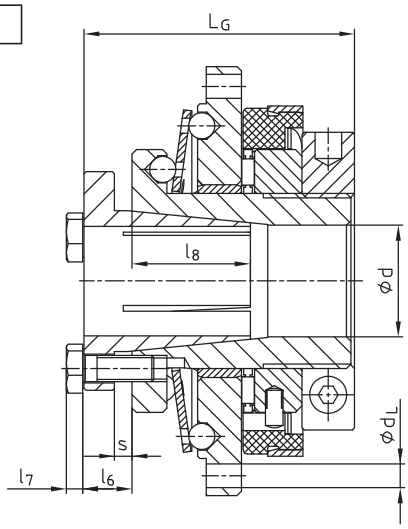
SYNTEX® standard flange coupling

- SYNTEX® standard safety clutch applicable up to 400 Nm
- Flange design
- Easy mounting of customers' components
- Available both as a ratchet and synchronous design
- Torque setting possible while in place
- Finish bore according to ISO fit H7,
  feather keyway according to DIN 6885 sheet 1 - JS9
- Also available with a frictionally engaged shaft-hub-connection
  (hub design 4.5)

Hub design 1.0



Hub design 4.5



Technical data

Size	Torques [Nm]				Max. speed [rpm]	Bore d		D_A	D_2	d_1	D_N	D_3	D_1	d_L	L	l_1	l_2	l_3	l_4	l_5	z	H=stroke
	Ratchet design DK		Synchronous design SK																			
	DK1	DK2	SK1	SK2		Pilot bore	max.															
20	6-20	15-30	10-20	20-65	1500	–	20	80	71	65	48	54	61,5	4,5	45	8	2	16	6	35	8	2
25	20-60	45-90	25-65	40-100	1500	–	25	98	89	81	60	68	80	5,5	50	8	2	17	8	39	8	2
35	25-80	75-150	30-100	70-180	1000	–	35	120	110	102	75	78	91	5,5	60	10	2	21	10	42	12	2
50	60-180	175-300	80-280	160-400	1000	–	50	162	152	142	105	108	121	6,6	70	12	2	25	13	56	12	2

Technical data – Hub design 4.5

Size	Dimensions [mm]							Tightening torque T_A [Nm]
	$d_{max.}$	l_6	l_7	l_8	L_G	s	Clamping screw	
20	20	9	3,5	23	54	3	4 x M5	8,5
25	25	11	4,0	28	61	4	4 x M6	14
35	35	10	4,0	31	70	4	4 x M6	14
50	50	12	4,0	37	82	6	4 x M6	14

Bores (fitting tolerance H7/h6) and the corresponding transmittable torques T_R [Nm]

Size	Ø12	Ø14	Ø15	Ø16	Ø17	Ø18	Ø19	Ø20	Ø22	Ø23	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50
20	45	62	71	81	92	103	115	127														
25		72	83	95	107	120	133	148	179	196	213	231										
35									127	139	152	165	207	237	270	323						
50																238	281	311	343	394	448	486

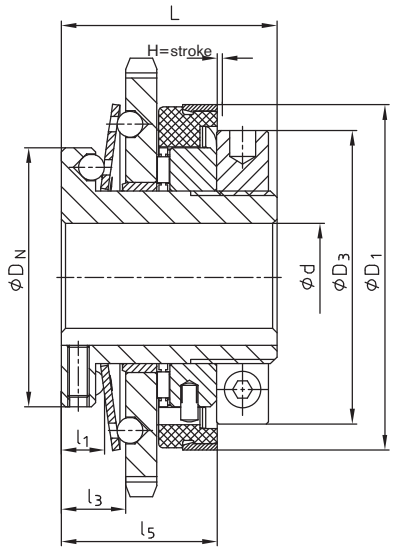
Order form:

SYNTEX®	25	DK1	Ø 20	1.0	45 Nm
Coupling type	Size	Design	Bore	Hub design	Torque set

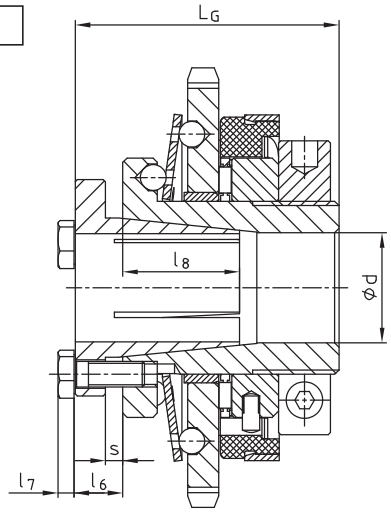
Standard SYNTEX® with integrated sprocket

- Standard SYNTEX® with integrated sprocket
- Available ready to be installed with the torque set
- Reduction of components by integration of parts
- Available both as a ratchet and synchronous design
- Torque setting possible while in place
- Finish bore according to ISO fit H7, feather keyway according to DIN 6885 sheet 1 - JS9
- Also available with a frictionally engaged shaft-hub-connection (hub design 4.5)

Hub design 1.0



Hub design 4.5



Technical data

Size	Torques [Nm]				Max. speed [rpm]	Dimensions [mm]									
	Ratchet design DK		Synchronous design SK			Bore d		Standard sprocket	D_N	D_3	D_1	L	l_1	l_3	l_5	H=stroke
	DK1	DK2	SK1	SK2		Pilot bore	max.									
20	6-20	15-30	10-20	20-65	1500	–	20	$^3/_8$ x $^7/_{32}$, z = 25	48	54	61,5	45	8	14	35	2
25	20-60	45-90	25-65	40-100	1500	–	25	$^1/_2$ x $^5/_{16}$, z = 24	60	68	80	50	8	15	39	2
35	25-80	75-150	30-100	70-180	1000	–	35	$^1/_2$ x $^5/_{16}$, z = 29	75	78	91	60	10	19	42	2
50	60-180	175-300	80-280	160-400	1000	–	50	$^3/_4$ x $^7/_{16}$, z = 27	105	108	121	70	12	23	56	2

Technical data – Hub design 4.5

Size	Dimensions [mm]							Tightening torque T_A [Nm]
	$d_{max.}$	l_6	l_7	l_8	L_G	s	Clamping screws	
20	20	9	3,5	23	54	3	4 x M5	8,5
25	25	11	4,0	28	61	4	4 x M6	14
35	35	10	4,0	31	70	4	4 x M6	14
50	50	12	4,0	37	82	6	4 x M6	14

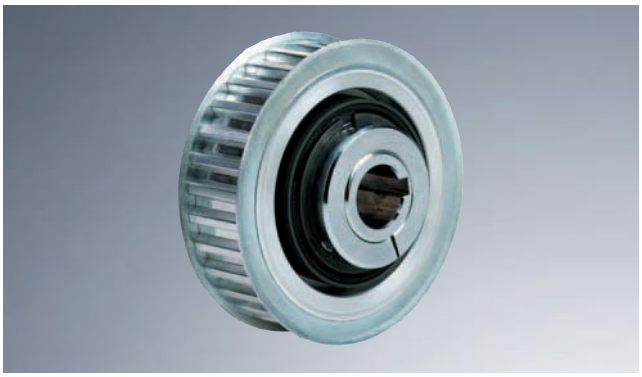
Bores (fitting tolerance H7/h6) and the corresponding transmittable torques T_R [Nm]

Size	Ø12	Ø14	Ø15	Ø16	Ø17	Ø18	Ø19	Ø20	Ø22	Ø23	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50
20	45	62	71	81	92	103	115	127														
25		72	83	95	107	120	133	148	179	196	213	231										
35									127	139	152	165	207	237	270	323						
50																238	281	311	343	394	448	486

Order form:

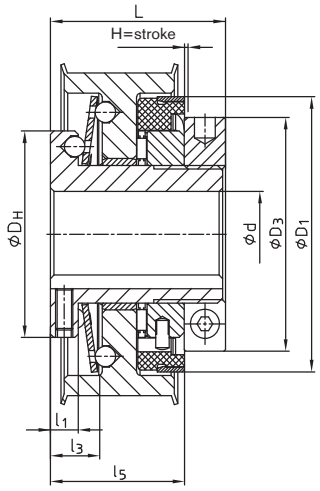
SYNTEX®	25	DK1	Ø 20	1.0	$^1/_2$ x $^5/_{16}$, z = 29	45 Nm
Coupling type	Size	Design	Bore	Hub design	Sprocket	Torque set

Standard SYNTEX® with belt drive

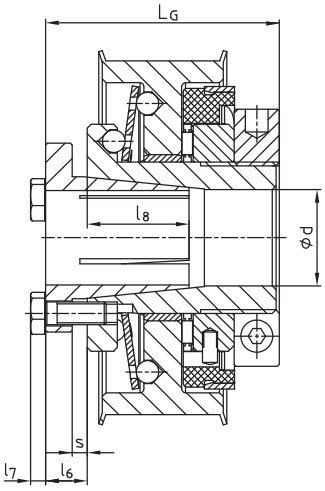


- Standard SYNTEX® with integrated belt drive
- Available ready to be installed with the torque set
- Reduction of components by integration of parts
- Available both as a ratchet and synchronous design
- Torque setting possible while in place
- Finish bore according to ISO fit H7,
  feather keyway according to DIN 6885 sheet 1 - JS9
- Also available with a frictionally engaged shaft-hub-connection
  (hub design 4.5)

Hub design 1.0



Hub design 4.5



Technical data

Size	Torques [Nm]				Max. speed [rpm]	Bore d		Belt drive		D_N	D_3	D_1	L	l_1	l_3	l_5	H=stroke
	Ratchet design DK		Synchronous design SK														
	DK1	DK2	SK1	SK2		Pilot bore	max.	T10 [1]	AT10 [1]								
20	6-20	15-30	10-20	20-65	1500	–	20	T10, z=24	AT10, z=24	48	54	61,5	45	8	14	35	2
25	20-60	45-90	25-65	40-100	1500	–	25	T10, z=30	AT10, z=30	60	68	80	50	8	15	39	2
35	25-80	75-150	30-100	70-180	1000	–	35	T10, z=36	AT10, z=36	75	78	91	60	10	19	42	2
50	60-180	175-300	80-280	160-400	1000	–	50	T10, z=48	AT10, z=48	105	108	121	70	12	23	56	2

[1] z = min. number of teeth necessary

Technical data – Hub design 4.5

Size	Dimensions [mm]							Tightening torque T_A [Nm]
	$d_{max.}$	l_6	l_7	l_8	L_G	s	Clamping screw	
20	20	9	3,5	23	54	3	4 x M5	8,5
25	25	11	4,0	28	61	4	4 x M6	14
35	35	10	4,0	31	70	4	4 x M6	14
50	50	12	4,0	37	82	6	4 x M6	14

Bores (fitting tolerance H7/h6) and the corresponding transmittable torques T_R [Nm]

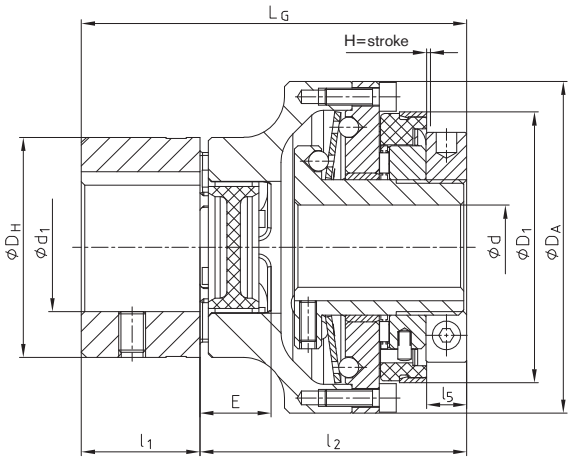
Size	Ø12	Ø14	Ø15	Ø16	Ø17	Ø18	Ø19	Ø20	Ø22	Ø23	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50
20	45	62	71	81	92	103	115	127														
25		72	83	95	107	120	133	148	179	196	213	231										
35									127	139	152	165	207	237	270	323						
50																238	281	311	343	394	448	486

Order form:

SYNTEX®	25	DK1	Ø 20	1.0	AT10, z=24	30	45 Nm
Coupling type	Size	Design	Bore	Hub design	Belt drive	Width of synchronous belt	Torque set

SYNTEX® with shaft coupling ROTEX® GS

- Backlash-free, axially rigid safety clutch
- Axial plug-in
- Low mass moments of inertia by using aluminium components
- Available both as a ratchet or synchronous design
- Torque setting possible while in place
- Finish bore according to ISO fit H7, feather keyway according to DIN 6885 sheet 1 - JS9
- Also available with a frictionally engaged shaft-hub-connection (hub design 4.5)



Technical data

SYNTEX® size	ROTEX® GS size	Torques [Nm]						Max. speed [rpm]	Dimensions [mm]											
		Ratchet design DK		Synchronous design SK		ROTEX® GS 98 Sh A-GS			Max. bore		D_A	D_H	l_1	E	l_2	l_5	L	L_G	D_1	H=stroke
		DK1	DK2	SK1	SK2	T_{KN}	$T_{Kmax.}$		d	d_1										
20	24	6-20	15-30	10-20	20-65	60	120	1500	20	28	80	55	30	18	70	10	45	100	61,5	2
25	28	20-60	45-90	25-65	40-100	160	320	1500	25	38	98	65	35	20	78	11	50	113	80	2
35	38	25-80	75-150	30-100	70-180	325	650	1000	35	45	120	80	45	24	91	13	60	136	91	2
50	48	60-180	175-300	80-280	160-400	525	1050	1000	50	62	162	105	56	28	111	14	70	167	121	2

Order form:

SYNTEX®	25	DK1	1.0	Ø 20	ROTEX® GS	28	98 Sh A-GS	1.0	Ø 25	50 Nm
Coupling type	Size	Design	Hub design	SYNTEX® bore	Coupling type	Size	Spider	Hub design	ROTEX® GS bore	Torque set

Assembly / Limit switch / Proximity initiator

Please order our separate mounting instructions KTR-N 46210!
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.
By using a clamping **setting nut**, the ratchet torque can be set according to the partition of the plastic shift ring.

- Fix the hub against twisting.
- Unscrew the setscrew in the setting nut.
- Turn the setting nut clockwise with a sickle spanner in order to increase the ratchet torque; turn the setting nut anticlockwise in order to reduce the ratchet torque.
- If the requested ratchet torque is set, fix the setting nut again by screwing down the setscrew on the thread of the hub.

Limit switch

Operation

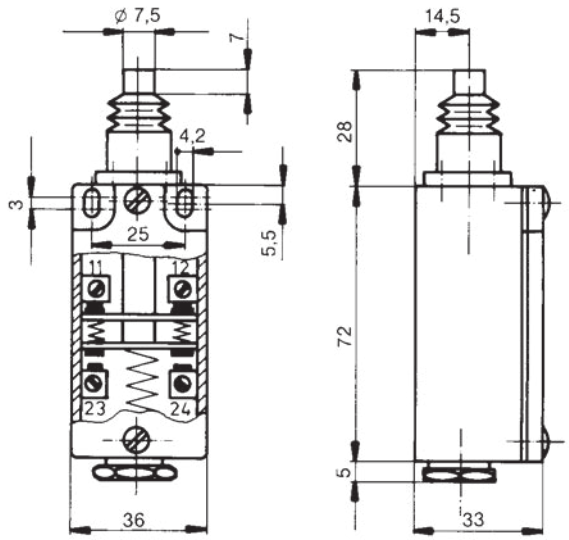
A mechanical limit switch or an inductive sensor is actuated by the axial stroke of the shift ring arising in case of overload. In this way a control signal is produced disconnecting the drive.

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.

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 make absolutely sure to check the operativeness of the limit switch before delivery of the unit.



Shifting

On Off

Degrees	0	3	8	12	16	20
11–12 Break contact	■					
23–24 Make contact						

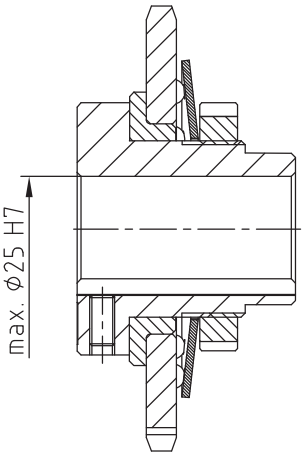
Technical data:

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 °C to + 80 °C
Kind of contact	:	1 break contact, 1 make contact
Mechanical service life	:	10^7 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!

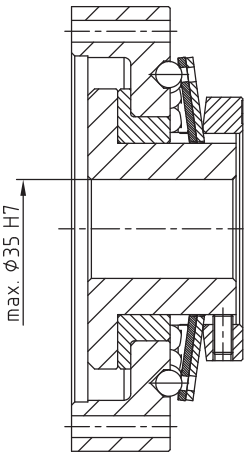
Cost-optimised version

- Low-cost version with high power density
- Ideal for higher quantities e. g. for conveyor belt drives
- Use of optimised manufacturing processes, e. g. sintering
- Please ask for our detailed documentations

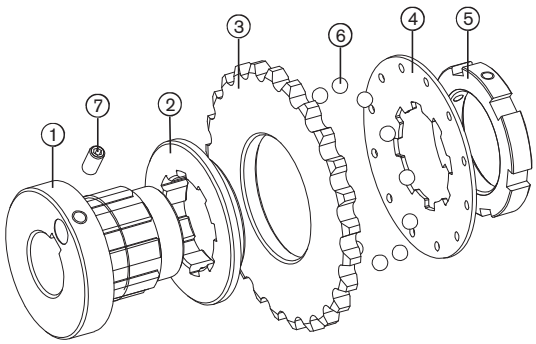


- Spec. SYNTEX® 25 with integrated sprocket
- Performance range with 1 disk spring up to 80 Nm, in case of 2 disk springs up to 160 Nm
- Use of different sprockets possible
- Ideal for „simple“ drives like e. g. in the conveyor technology

---



- Spec. SYNTEX® 35 with integrated flange
- Performance range with 1 disk spring up to 200 Nm, in case of 2 disk springs up to 400 Nm
- Adjustment of the flange to ambient construction possible

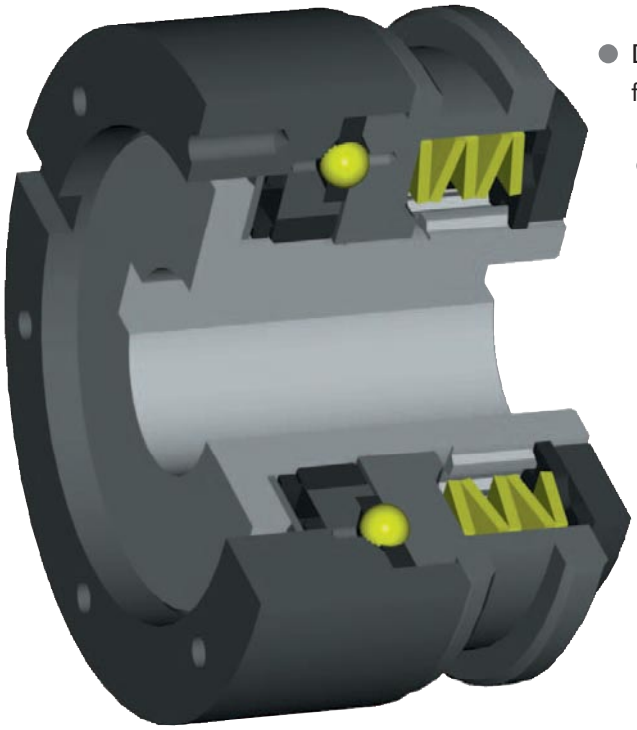


Components:

① Hub with external spline to support the disk spring (torque transmission)
② Plain bearing sleeve to support the axial and radial forces
③ Sprocket with cylinder bores to support the balls
④ Disk spring with internal spline and bores for balls (torque transmission and axial prestress, **KTR Patent**)
⑤ Keyway nut for torque setting
⑥ Ratchet balls for torque transmisson
⑦ Set screw for axial fixing onto the shaft

We provide safety

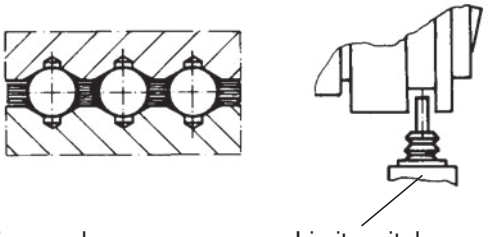
- Overload protection up to 8200 Nm
- Available with same dimensions as a ratchet, synchronous and fail-safe design
- Reduction of torque peaks
- High repeating accuracy, even after a long operating period
- Disconnection of the drive in case of overload
- Automatically operative



- Different designs also suitable for your application
- Easy assembly and torque setting
- Maintenance-free
- Insensitive to oil and grease
- High service life due to high-quality materials
- Backlash-free shaft-hub-connections

In case of overload the ratchet parts (balls or rollers) leave their indentations, and a relative motion between the driving and driven side is produced. In this way damages due to overload are avoided. The shift ring (3) makes an axial motion to the shifting way "S" and activates the limit switch or proximity initiator. The signal can be used for control functions or for disconnection of the drive. For the restart we would recommend to electrically bypass the limit switch or proximity initiator for a short time.

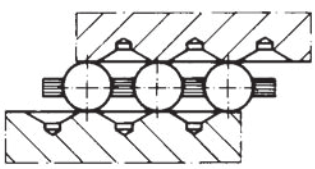
No signal in case of normal operation



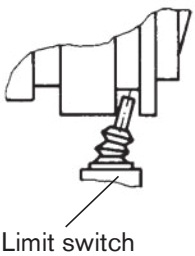
Engaged

Limit switch

Signal in case of overload

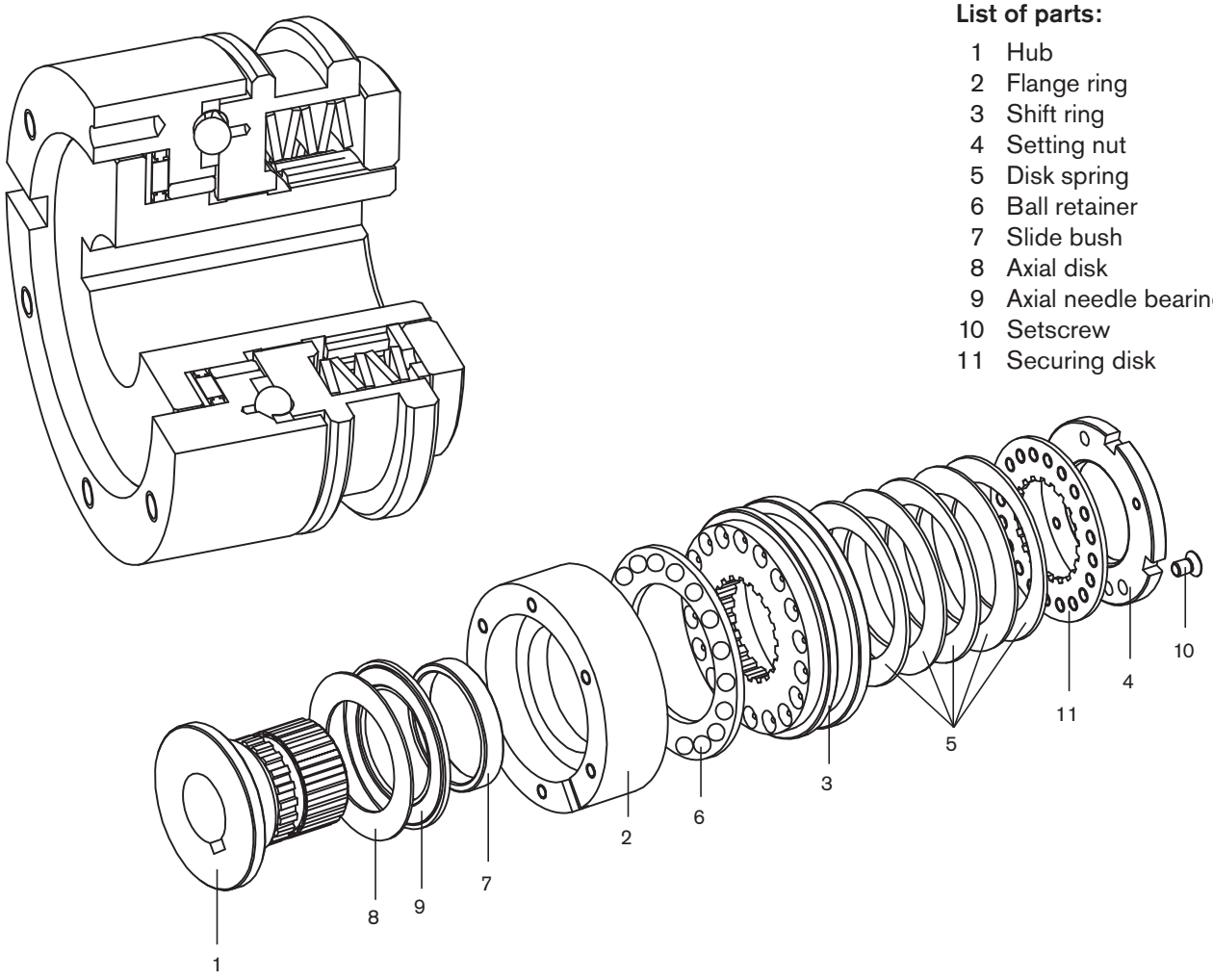


Disengaged



Limit switch

Variable applications by modular system

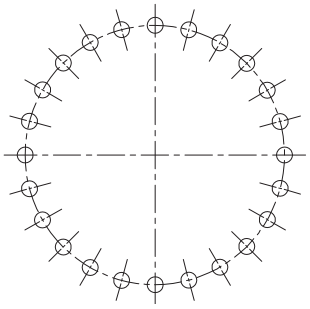


List of parts:

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

Three operating principles with the same mounting space

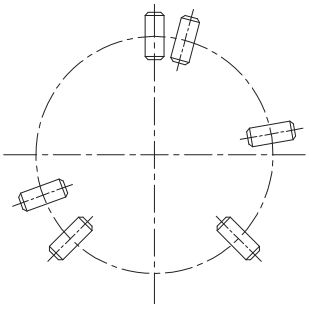
Ratchet design DK



Any engagement after an overload.

After eliminating the overload, the balls automatically engage in the next indentation.

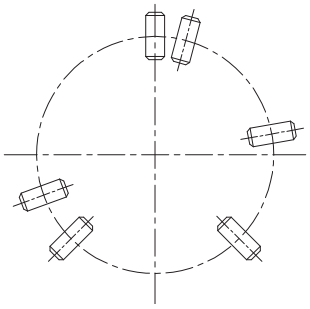
Synchronous design SR



Synchronous engagement after an overload.

After eliminating the overload the rollers automatically engage after a rotation of 360°. Driving and driven side are always placed in the same position to each other. Other degrees of engagement, e. g. 180°, are also possible.

Fail-safe design SGR

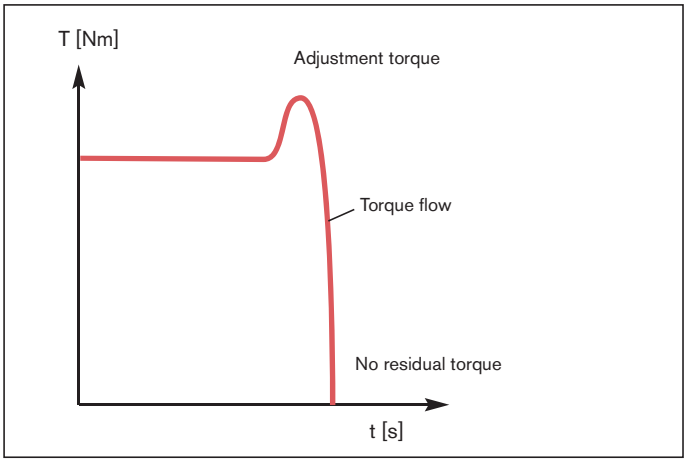


The fail-safe design is a pure torque measurement without any ratchet operation.

In case of overload a signal is given by the limit switch, producing a mechanical separation of driving and driven side = disengagement is not possible.

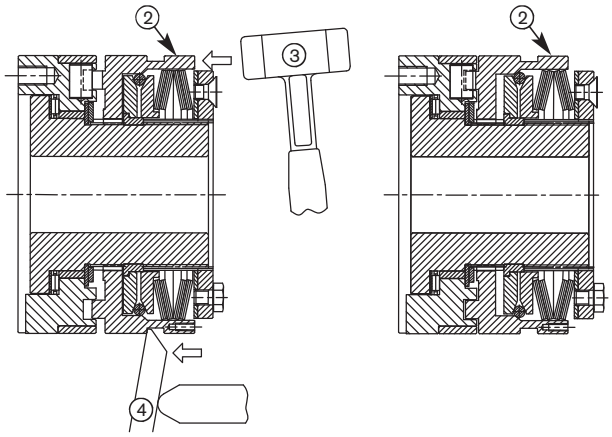
Idle rotation coupling (load-separating)

- Free-rotating safety clutch up to 1800 Nm torque
- Max. speed up to 5000 rpm (see table)
- Drive end and driven end are permanently separated
- Manual re-engagement
- Optional overload recognition by limit switch or sensor
- Combination with ROTEX® coupling as shaft-to-shaft connection
- Easy assembly and torque adjustment



Operating principle of the KTR-SI idle-rotation couplings:

– When achieving the torque setting, the coupling rotates.
– Subject to the idle rotation mechanism driving and driven side remain separated. The resulting flywheel mass may run out in idle state.
– After having removed the overload, the coupling re-engages.
– The re-engagement happens automatically.



Re-engagement Instructions:

Re-engagement of the free-rotating coupling is effected by axial pressure on the shifting ring (2). Dependent on the existing media, accessability etc., the re-engagement can be effected in different ways:

– by several shocks with a plastic hammer (3) axially on the shifting ring (see on the left)
– with mounting levers (4)
– with a pneumatic or hydraulic engagement device (automated process of engagement)

Torques

Size	Torque [Nm]		
	Spring layer		
	T1	T2	T3
1	12-25	25-50	50-100
2	25-50	50-100	100-200
3	50-100	100-200	200-450
4	100-200	200-400	400-800
5	170-450	350-900	600-1800

Max. speeds

Max. speed [rpm]	
Size	$n_{max.}$
1	5000
2	4000
3	3500
4	3000
5	2300

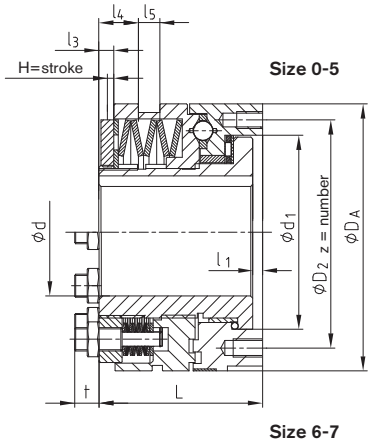
Dimensions like KTR-SI design DK, SR and SGR
(see following pages)

Order form:

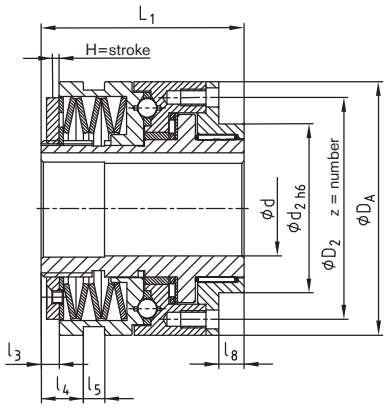
KTR-SI	2	FR	FT	T2	Ø 20	40 Nm
Coupling type	Size	Design	Design	Disk springs	Bore	Torque set

Type FT, KT and LT

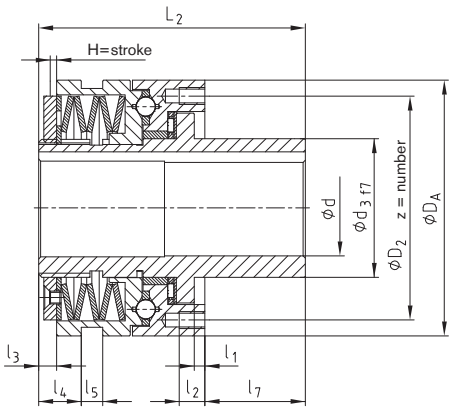
- Standard KTR-SI safety clutch suitable up to 8200 Nm
- Available ready for assembly with the torque set
- For direct mounting of customers' components
- Available as a ratchet, synchronous and fail-safe design
- Torque setting possible while in place
- Finish bore according to ISO fit H7, feather keyway according to DIN 6885 sheet 1 - JS9
- Surface protection by phosphating



Type FT



Type KT



Type LT

Technical data – Torques, weights

Size	Torques [Nm]								Weight with max. bore [kg]
	Disk spring layers design DK				Disk spring layers design SR and SGR				
	T1	T2	T3	T4	T1	T2	T3	T4	
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	800-2000	8,34
5	85-250	230-600	300-1000	600-2000	170-450	350-900	600-1800	1200-3400	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

Technical data – Dimensions

Size	Dimensions [mm]																				
	Bore d		d_1	D_2	D_A	d_2	d_3	l_1	l_2	l_3	l_4	l_5	l_7	l_8	L	L_1	L_2	z	H=stroke			
	Pilot bore	max.																	DK	SR	SGR	FR
0	7	20	41,0	48	55	38	28	4,0	6,5	3,0	7,5	9	27,5	8	38,5	51,0	66,0	6xM5	1,4	1,2	0,6	1,6
1	10	25	60,0	70	82	50	38	4,0	8,0	6,0	11,5	9	33,0	10	52,0	70,0	85,0	6xM5	2,3	1,8	0,8	2,3
2	14	35	78,0	89	100	60	52	5,0	10,0	5,0	12,0	9	39,0	12	61,0	78,0	100,0	6xM6	2,4	2,0	1,1	3,0
3	18	45	90,5	105	120	80	65	5,0	12,0	8,5	21,0	10	47,0	12	78,0	96,0	125,0	6xM8	2,7	2,2	1,2	3,5
4	24	55	105,0	125	146	100	78	6,5	15,0	11,0	27,0	9	52,5	16	100,0	124,5	152,5	6xM10[1]	3,7	2,5	1,2	3,8
5	30	65	120,5	155	176	120	90	6,5	17,0	12,0	33,0	9	57,5	18	113,5	140,0	171,0	6xM12[1]	4,6	3,0	1,6	4,5
6 [2]	40	80	136,0	160	200	130	108	7,0	20,0	14,0	39,0	9	64,0	20	119,0	150,0	183,0	6xM12[1]	5,0	3,5	2,5	–
7 [2]	50	100	168,0	200	240	160	135	8,0	25,0	15,0	46,0	9	72,0	25	141,0	175,0	213,0	6xM16[1]	5,5	4,0	2,7	–

[1] Type T4 SR and SRG: tightening torques according to 12.9

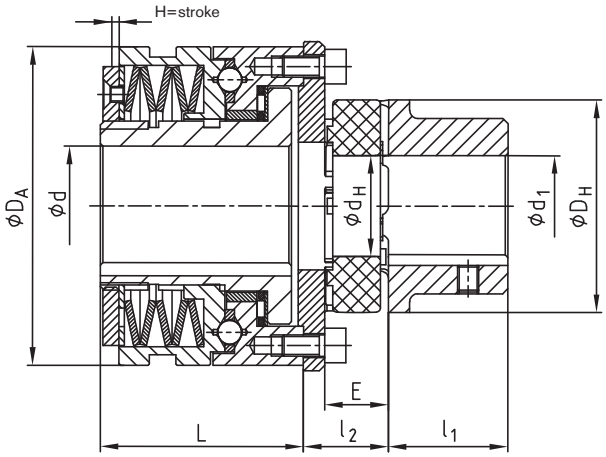
[2] Size 6: dimension t= 15 mm, Size 7: dimension t= 21 mm

Order form:

KTR-SI	2	DK	FT	T2	Ø 20	40 Nm
Coupling type	Size	Design	Design	Disk springs	Bore	Torque set

With torsionally flexible ROTEX®

- KTR-SI safety clutch as a shaft-to-shaft connection
- Axial plug-in
- Able to compensate for misalignment
- Available as a ratchet, synchronous and fail-safe design
- Torque setting possible while in place
- Various kinds of elastomer hardness available
- Finish bore according to ISO fit H7,
  feather keyway according to DIN 6885 sheet 1 - JS9



Technical data – Torques

Design DK						Design SR and SGR					
KTR-SI Size	ROTEX® Size	Torques [Nm] KTR-SI disk spring layer				KTR-SI Size	ROTEX® Size	Torques [Nm] KTR-SI disk spring layer			
		T1	T2	T3	T4			T1	T2	T3	T4
0	19	2,5-5	5-20	–	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	800-2000
5	55	85-250	230-600	300-1000	600-2000	5	90	170-450	350-900	600-1800	1200-3400
6	100	180-480	360-960	720-1950	1600-3300	6	100	300-750	600-1500	1200-3000	2900-5800
7	110	250-520	500-1050	1000-2100	2000-3600	7	110	550-1100	1100-2200	2200-4400	3000-8200

Technical data – Dimensions

KTR-SI Size	ROTEX® Size	Dimensions [mm] Max. Bore d	Max. Bore d_1	D_A	D_H	d_H	E	l_1	l_2	L	H=stroke [mm] Design DK	Design 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		95		160	80	40	85	56,5			
5	55	65	70	176	120	60	30	65	44	113,5	4,6	3,0
	90		110		200	100	45	100	62			
6	100	80	115	200	225	113	50	110	72	119	5,0	3,5
7	110	100	125	240	255	127	55	120	78	141	5,5	4,0

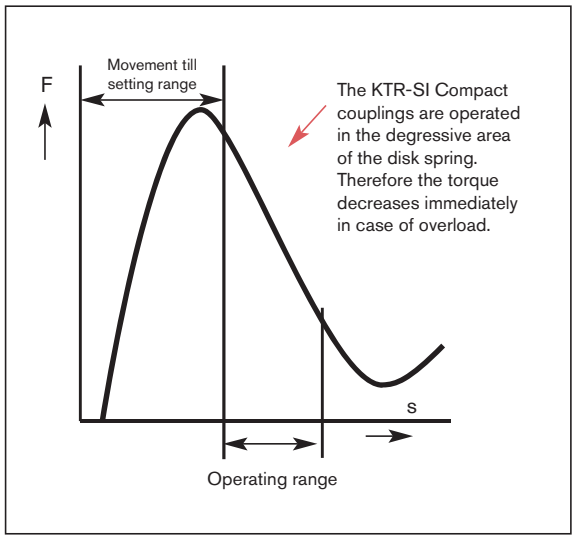
Order form:

KTR-SI 2	28	DK	T2	Ø 25	Ø 20	40 Nm
Coupling type	ROTEX® Size	Design	Disk springs	ROTEX® Bore	KTR-SI Bore	Torque set

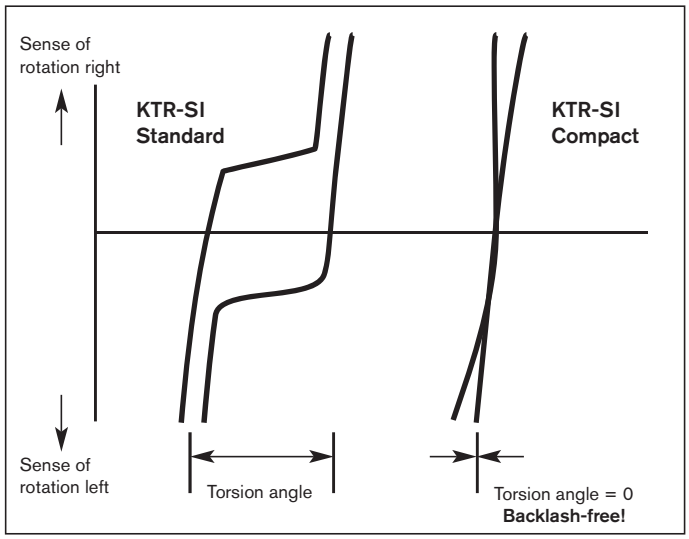
Backlash-free, torsionally stiff safety clutch

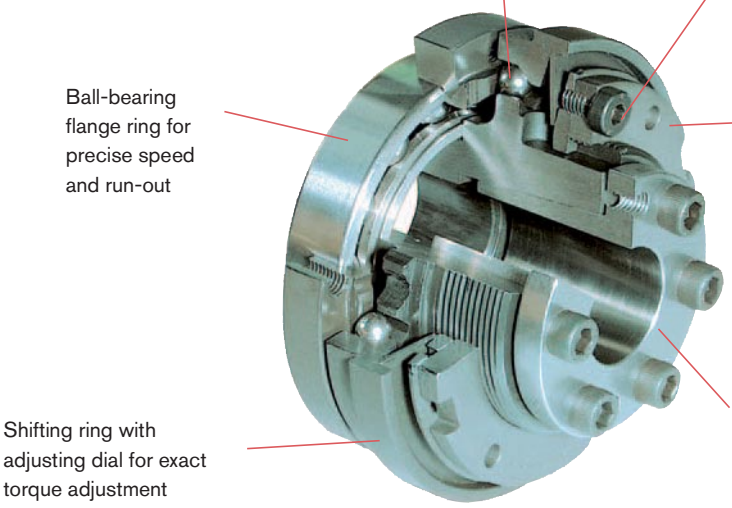
- Backlash-free safety clutch with patented curve spring design
- Precise switch-off with high repeating accuracy
- Exact, backlash-free torque transmission, even in case of wear
- Easy torque setting
- Ball-bearing connection flange
- Hardened ratchet surfaces for long lifespan
- Backlash-free shaft-hub connection due to taper sleeve
- Can be used with proven ROTEX® GS as shaft-to-shaft connection

Characteristic special curve



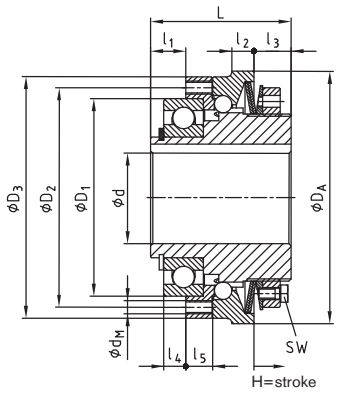
What is backlash-free?



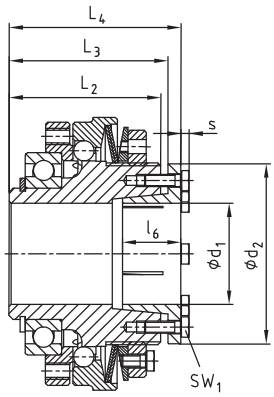


Type FT, FT-4.5 and FT with ROTEX® GS

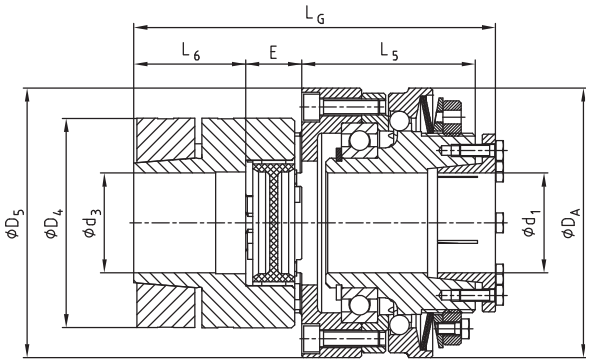
- Torque up to 740 Nm
- Maximum shaft diameter up to 60 mm
- Backlash-free and vibration-reducing in combination with ROTEX® GS
- Drive and driven-sided with backlash-free, frictionally engaged shaft-hub connection
- Synchronous and ratchet design
- Also available in combination with torsionally stiff RADEX®-N or RADEX®-NC
- Finish bore according to ISO fit H7, feather keyway according to DIN 6885 sheet 1 - JS9



Type FT



**Type FT-4.5
with clamping connection**



**Type FT with ROTEX® GS
as shaft-to-shaft connection**

Technical data

Size	Speed [rpm]	Torques [Nm]			Dimensions [mm]													
		T1	T2	T3	$d_{max.}$	D_1^{h5}	D_2	D_3	D_A	d_M	L	l_1	l_2	l_3	l_4	l_5	SW	H-stroke
01	4000	3-14	6-28	13-56	20	47	56	65	70	8xM4	40	8	7	12	5	7,5	7	1,2
0	3000	9-35	18-70	40-140	30 [1]	62	71	80	85	8xM5	48	11	8	14	7	8,0	7	1,5
1	2500	19-65	38-130	78-260	35 [1]	75	85	95	100	8xM6	59	14	9	16	9	10,5	8	1,8
2	2000	35-110	80-220	160-440	45 [1]	90	100	110	115	8xM6	64	16	10	17	10	12	10	2,0
3	1200	80-185	160-370	320-740	50	100	116	130	135	8xM8	75	18	12	21	10	12	10	2,2

[1] max. finish bore, keyway to DIN 6885 sheet 3

Dimensions with taper sleeve type 4.5 [mm]

Size	Dimensions [mm]								
	$d_{1max.}$	L_2	L_3	L_4	l_6	d_2	s	SW_1	T_A [Nm]
01	10-20	40	42	47	26	40,5	2,8	7	3
	19-25					42,0			
0	30	46	49	56	31	57	4,0	10	10
1	19-30	57	60	67	40	57	4,0	10	10
	32-40				31	64	3,5	8	5,9
2	50	63	68,5	73	29	73,5	4,0	10	10
3	32-50	75	78,5	85	29	73,5	4,0	10	10
	55-60		78,0	86	44	89			

Dimensions type FT with ROTEX® GS [mm]

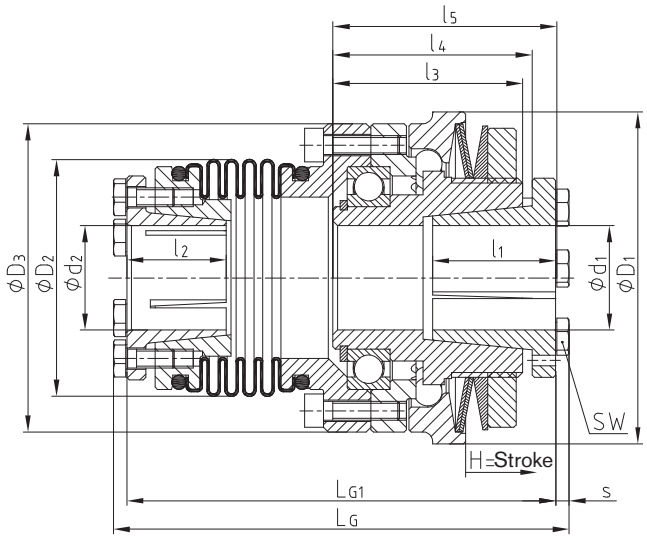
Size	ROTEX® GS Size	Dimensions [mm]								
		$d_{1max.}$	$d_{3max.}$	D_4	D_5	L_G	L_5	L_6	D_A	E
01	24	25	28	55	70	102	47	30	70	18
0	28	30	38	65	85	119,5	54,5	35	85	20
1	38	40	45	80	100	146	67	45	100	24
2	42	50	55	95	115	159	73	50	115	26
3	48	60	62	105	135	182	87	56	135	28

Order form:

KTR-SI Compact	2	DK	T2	Ø 40	4.5	150 Nm
Coupling type	Size	Design	Disk springs	Bore	Hub design	Torque set

with a torsionally stiff TOOLFLEX® S-KN

- Max. shaft diameter up to 56 mm
- Non-positive bellow-hub connection
- Maintenance-free
- Good properties of concentric running with high speeds
- Optionally available as design M (6 shafts) or design S (4 shafts, short version)



KTR-SI Compact with TOOLFLEX® S-KN

Technical data – Speeds, torques, dimensions

KTR-SI Compact Size	TOOLFLEX® S-KN [1] Size	Max. speed [rpm]	TOOLFLEX® S-KN Torques [Nm]	KTR-SI Compact Torques [Nm]		Dimensions [mm]				
				T1	T2	$d_{1\ max.}$	$d_{2\ max.}$	D_1	L_G [2]	L_{G1} [2]
01	30	4000	35	3-14	6-28	25	22	70	96	90,5
0	38	3000	65	9-35	18-70	30	28	85	109	102,0
1	45	2500	150	19-65	38-130	40	40	100	145	137,5
2	55	2000	340	35-110	80-220	50	56	115	170	159,5

Technical data – Dimensions

KTR-SI Compact Size	TOOLFLEX® S-KN [1] Size	Dimensions [mm]									
		D_2	D_3	l_1	l_2	l_3	l_4	l_5	s	SW_1	H
01	30	50,0	65	26	22	40	42,0	47	2,8	7	1,2
0	38	60,5	80	31	26	46	49,0	56	4,0	7	1,5
1	45	82,0	95	40	34	57	60,0	67	4,0	8	1,8
2	55	97,0	110	29	40	63	68,5	73	3,5	10	2,0

[1] Optionally available with clamping hub

[2] Depending on the type of TOOLFLEX®, M (6 shafts) or S (4 shafts)

Order form:

KTR-SI Compact	1	45	DK	T2	d_1 Ø 40	d_2 Ø 40	100 Nm
Coupling type	KTR-SI Compact Size	TOOLFLEX® S-KN Size	Design	Disk springs	Bore KTR-SI Compact	Bore TOOLFLEX® S-KN	Torque set