KTR-SI FRA

Type FT
(Flange type)

KTR-SI FRA
Type FT

KTR-SI FRA
Type FT with torsionally flexible POLY-NORM®

KTR-SI FRA is a torque limiting and idle rotating overload system with positive locking. It protects adjacent components from damage.
Re-engagement is generated by reversing the direction of rotation.

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1 Technical data

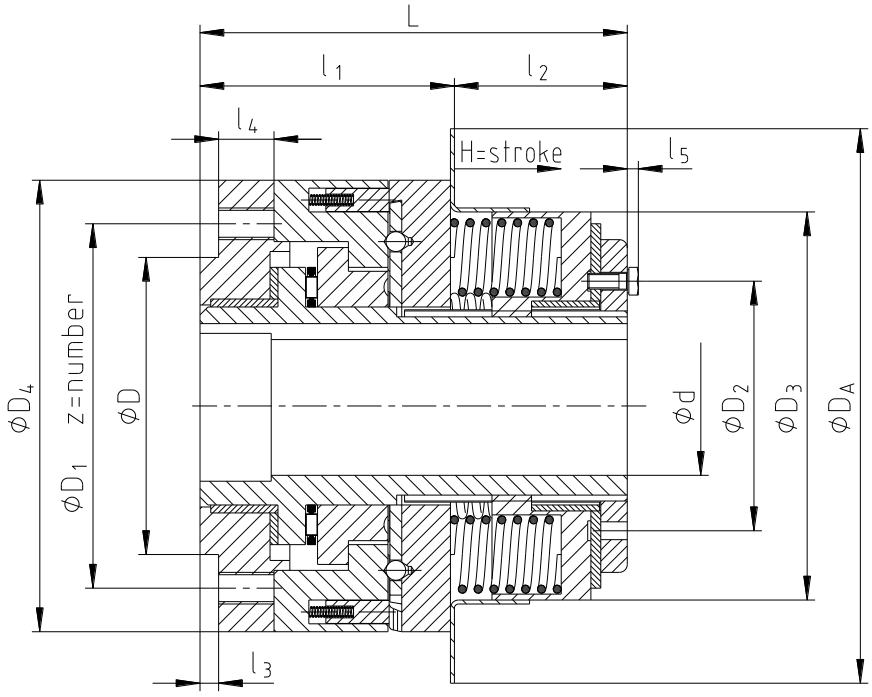

Illustration 1: KTR-SI FRA - type FT

Table 1: Dimensions and weights

Size	Dimensions [mm]						
	Max. bore d	D_{j7}	D_1	D_2	D_3	D_4	D_A
2	35	75	92	70	98	114	140
3	45	95	114	77	131	149	184
4	55	122	144	88	147	166	203
5	80	155	184	152	196	223	279

Size	Dimensions [mm]							Weight with max. bore [kg]
	l_1	l_2	l_3	l_4	l_5	L	z	
2	63	45	4.7	14	-	108	6xM8	5
3	69	42	4.7	15	3.5	111	7xM10	10
4	75	46	4.7	15	4.0	121	8xM12	13
5	94	70	6.3	23	2.3	164	8xM16	32

1) Dimensions H=stroke see table 7

Table 2: Torques and speed

Size	Adjustable torques [Nm] of disk spring layers				Max. speed [rpm]
	T1	T2	T3	T4	
2	5-20	15-70	40-135	80-260	3600
3	24-104	57-360	110-540	245-730	3600
4	45-210	145-435	340-960	465-1320	2000
5	90-415	240-640	490-1880	1060-3000	2000

1 Technical data

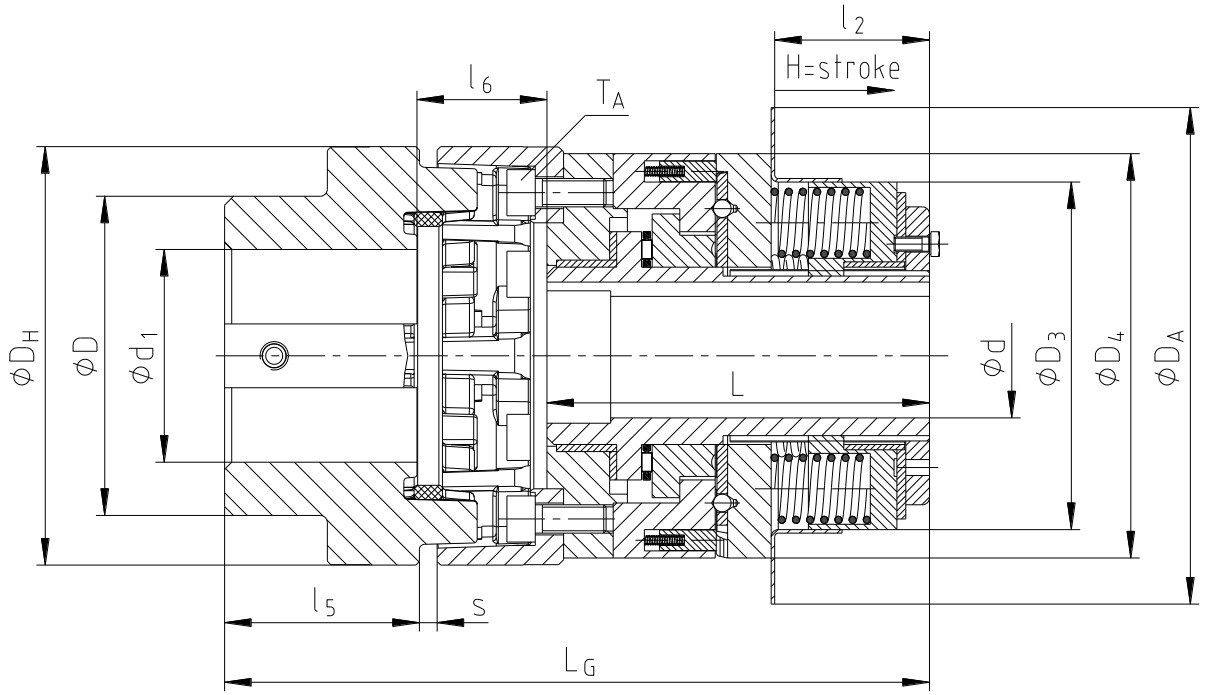

Illustration 2: KTR-SI FRA - type FT with torsionally flexible POLY-NORM® coupling

Table 3: Dimensions and torques

Size	POLY-NORM®			Dimensions [mm]							Cap screws DIN 7984 - 8.8	
	Size	Torque [Nm]		Max. bore		D	D_H	l_5	s	L_G	M x l	T_A [Nm]
		T_{KN}	T_{Kmax}	d	d_1							
2	55	300	600	35	60	90	118	55	5	189.3	M8x20	23
3	75	850	1700	45	70	123	158	75	5	218.8	M10x20	46
4	85	1350	2700	55	90	139	182	85	5	257.6	M12x25	79
5	100	2900	5800	80	110	165	224	100	6	326.2	M16x30	195

1) Dimensions H=stroke see table 7

Table 4: Torques and speed

Size	Adjustable torques [Nm] of disk spring layers				Max. speed [rpm]
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2 Advice

2.1 General advice

Please read through these operating/assembly instructions carefully before you start up the overload system. Please pay special attention to the safety instructions!
The operating/assembly instructions are part of your product. Please store them carefully and close to the overload system. The copyright for these operating/assembly instructions remains with KTR.

2 Advice

2.2 Safety and advice symbols

	**Warning of personal injury**	This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death.
	**Warning of product damages**	This symbol indicates notes which may contribute to preventing material or machine damage.
	**General advice**	This symbol indicates notes which may contribute to preventing adverse results or conditions.
	**Warning of hot surfaces**	This symbol indicates notes which may contribute to preventing burns with hot surfaces resulting in light to serious bodily injuries.

2.3 General hazard warnings

With assembly, operation and maintenance of the overload system it has to be made sure that the entire drive train is secured against accidental switch-on. You may be seriously hurt by rotating parts. Please make absolutely sure to read through and observe the following safety indications.

- All operations on and with the overload system have to be performed taking into account "safety first".
- Please make sure to switch off the power pack before you perform your work on the overload system.
- Secure the power pack against accidental switch-on, e. g. by providing warning signs at the place of switch-on or removing the fuse for current supply.
- Do not reach into the operating area of the overload system as long as it is in operation.
- Please secure the overload system against accidental contact. Please provide for the necessary protection devices and covers.

2.4 Intended use

You may only assemble, operate and maintain the overload system if you

- have carefully read through the operating/assembly instructions and understood them
- had technical training
- are authorized by your company

The overload system may only be used in accordance with the technical data (see chapter 1). Unauthorized modifications on the overload system are not admissible. We will not assume liability for any damage that may arise. In the interest of further development we reserve the right for technical modifications.
The **KTR-SI FRA** described in here corresponds to the state of the art at the time of printing of these operating/assembly instructions.

2 Advice

2.5 Selection of overload system

For a long-lasting and failure-free operation of the overload system the overload system (with coupling, where appropriate) must be selected according to the selection instructions for the particular application (see catalogue drive technology "KTR-SI").
If the operating conditions (performance, speed, modifications on engine and machine) change, the coupling selection must be reviewed.
The transmittable torque of the shaft-hub-connection must be reviewed by the customer and is subject to his responsibility.

Please observe the potential operating temperature from -30 °C to +90 °C of KTR-SI FRA.

We recommend to use a limit switch or something similar to switch off the drive in case of overload as quickly as possible.

2.6 Reference to EC Machinery Directive 2006/42/EC

The overload systems supplied by KTR should be considered as components, not machines or partly completed machines according to EC Machinery Directive 2006/42/EC. Consequently KTR does not have to issue a declaration of incorporation. For details about safe assembly, start-up and safe operation please refer to the present operating/assembly instructions considering the warnings.

3 Storage, transport and packaging

3.1 Storage

The overload systems are supplied in preserved condition and can be stored at a dry and roofed place for 6 - 9 months.

Humid storage rooms are not suitable.
Please make sure that condensation is not generated. The best relative air humidity is less than 65 %.

3.2 Transport and packaging

In order to avoid any injuries and any kind of damage please always make use of proper transport and lifting equipment.

The overload systems/couplings are packed differently each depending on size, number and kind of transport. Unless otherwise contractually agreed, packaging will follow the in-house packaging specifications of KTR.

4 Assembly

The overload system is supplied in assembled condition.

4.1 Components of the couplings

Component asssembly 1: Components of KTR-SI FRA - type FT

Component	Quantity	Description	Component	Quantity	Description
1	1	Connection flange	8	1	Balls (set)
2	1	Slide bearing	9	1	Shifting ring
3	1	Axial disk	10	1	Springs (set)
4	1	Hub	11	1	Pressure ring
5	1	Axial bearing	12	1	Lock washer
6	1	Bearing flange	13	1	Setting nut
7	1	Flange ring	14	1	Locking screw

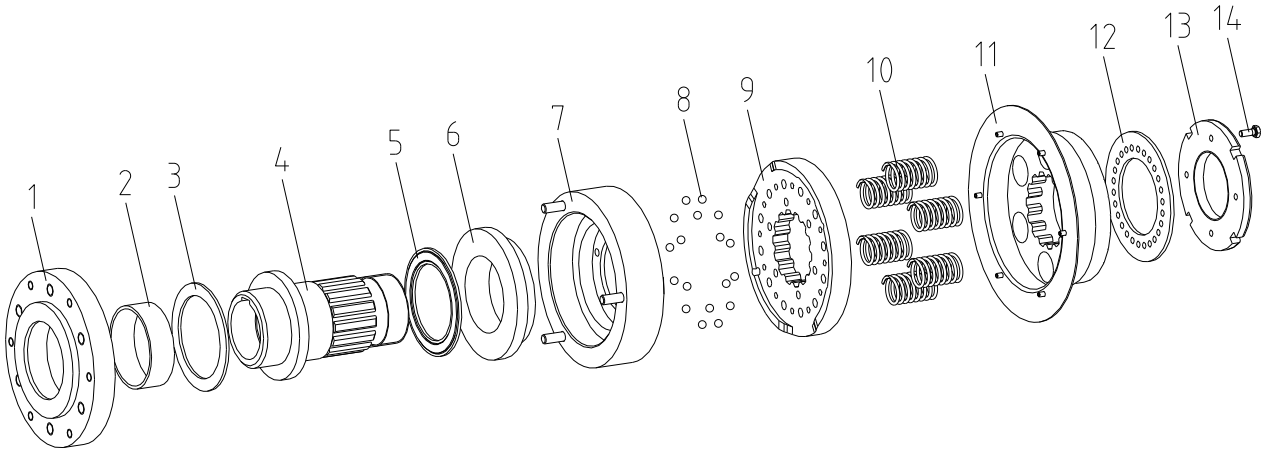

Illustration 3: KTR-SI FRA - type FT

Components of KTR-SI FRA - type FT with torsionally flexible POLY-NORM® coupling

Component/ subassembly	Quantity	Description	Component/ subassembly	Quantity	Description
1	1	KTR-SI FRA (complete overload system)	4	1	POLY-NORM® hub
2	1	POLY-NORM® SI flange	5	6	Cap screws DIN 7984 - 8.8
3	1	POLY-NORM® elastomer ring	6	1	Setscrew DIN EN ISO 4029

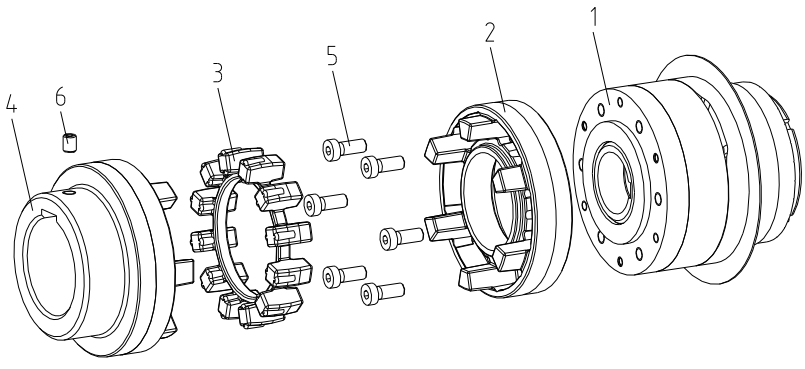

Illustration 4: KTR-SI FRA - type FT with torsionally flexible POLY-NORM® coupling

4 Assembly

4.2 Advice for finish bore

A subsequent modification of the finish bore by the customer is not permissible.

Table 5: Recommended fit pairs acc. to DIN 748/1

Bore [mm]		Shaft tolerance	Bore tolerance
above	up to		
	50	k6	H7
50		m6	(KTR standard)

If a feather keyway is intended to be used in the hub, it should correspond to the tolerance ISO JS9 (KTR standard) with normal operating conditions or ISO P9 with difficult operating conditions (frequently alternating torsional direction, shock loads, etc.).

The transmittable torque of the shaft-hub-connection must be reviewed by the customer and is subject to his responsibility.

4.3 Assembly (general)

We recommend to inspect bores, shaft, keyway and feather key for dimensional accuracy before assembly.

Heating the KTR-SI FRA overload system respectively POLY-NORM® hub lightly (approx. 80 °C) allows for easier mounting on the shafts.

Touching the heated coupling or hub causes burns.
Please wear safety gloves.

During assembly of the overload system it is not allowed to generate any forces (e. g. by hammer blows or mounting equipment) on the pressure ring (component 11) or setting nut (component 13) (see illustration 5).

- Please make sure the perfect technical condition of the **KTR-SI FRA** overload system.
- Please only use original **KTR** components (no purchased parts).

4 Assembly

4.4 Assembly of the KTR-SI FRA overload system

- Mount the KTR-SI FRA flange type (component 1) on the shaft of the driving or driven side.
- Provide for an end plate to fasten the KTR-SI FRA overload system axially (see illustration 5).

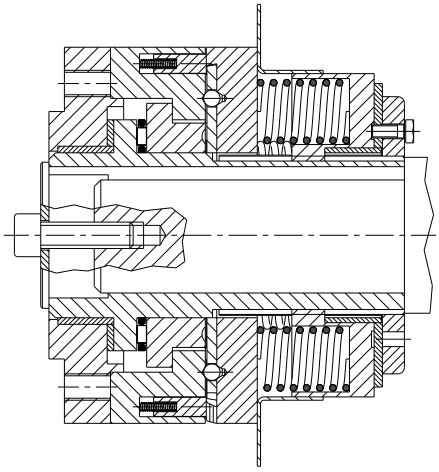

Illustration 5

4.5 Assembly of KTR-SI FRA with torsionally flexible POLY-NORM® coupling

Please consider our operating/assembly instructions KTR-N 49510 additionally when using the POLY-NORM® coupling.

- Mount the KTR-SI FRA overload system (subassembly 1) respectively POLY-NORM® hub (component 4) on the shafts of the driving or driven side.
- Provide for an end plate to fasten the KTR-SI FRA overload system axially (see illustration 5 in chapter 4.4).
- Hand-tighten the POLY-NORM®-SI flange (component 2) with the KTR-SI FRA overload system first.
- Tighten the cap screws crosswise by a suitable torque key to the tightening torques T_A specified in table 3 (see chapter 1).
- Insert the POLY-NORM® elastomer ring (component 3) into the cam section of the POLY-NORM® hub.
- Shift the power packs in axial direction until the distance dimension s is achieved (see illustration 7).
- If the power packs are already firmly assembled, shifting the POLY-NORM® hub axially on the shaft allows for setting the dimension s.
- Fasten the POLY-NORM® hub by tightening the setscrew DIN EN ISO 4029 with a cup point (tightening torques T_A see KTR-N 49510).

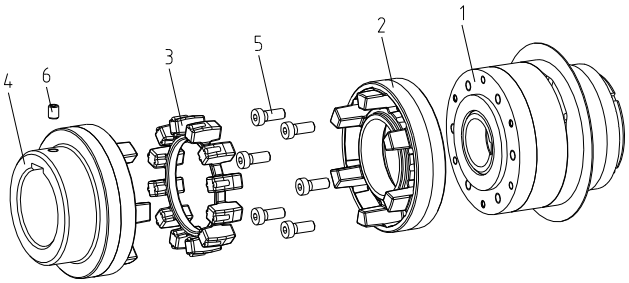

Illustration 6: KTR-SI FRA -
Type FT with torsionally flexible POLY-NORM® coupling

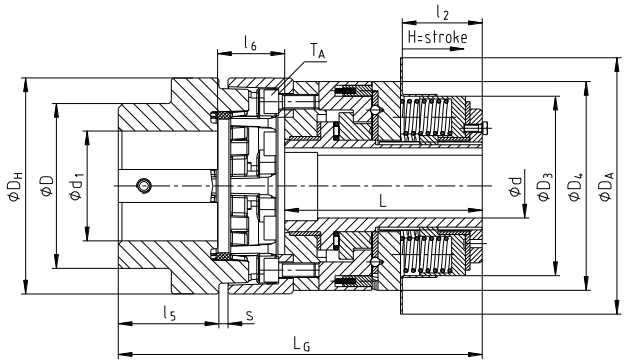

Illustration 7: Assembly of coupling

With the assembly please make sure that the distance dimension s (see table 3) is observed so that the coupling components are not in contact with each other during the operation. Disregarding this advice may cause damage to the coupling.

4 Assembly

4.6 Torque setting - KTR-SI FRA

Depending on the layering of the disk springs used the requested torque can be set by adjusting the torque of the setting nut:

- Fix the hub (component 4) to avoid twisting.
- Unscrew the locking screw (component 14).

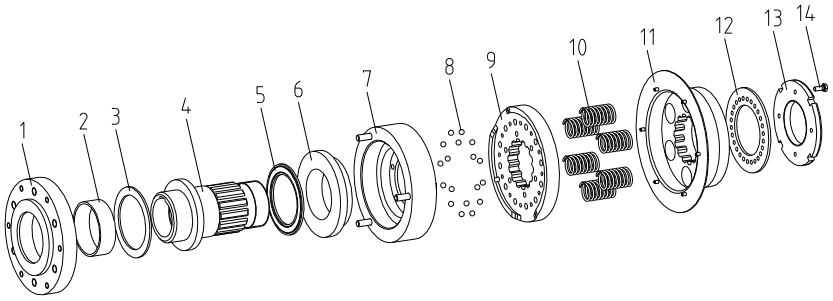

Illustration 8: KTR-SI FRA - type FT

- Screw the setting nut (component 13) manually to the springs (component 10) against a stop (zero point ➔ backlash-free prestress of spring).
- Choose any reference point of the setting nut (component 13) versus a scale mark of the lock washer (component 12, with size 2 scale marks on the pressure ring (component 11).
- Insert the face spanner (see table 6) into the respective bores of the setting nut (see illustration 14).
- The accurate torque is adjusted by turning the setting nut (component 13) clockwise.

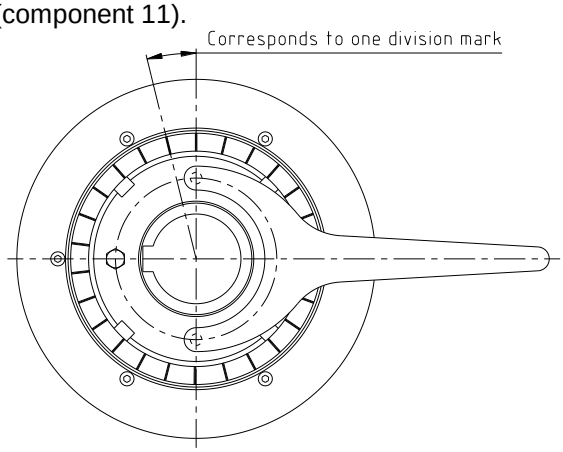

Illustration 9: Torque setting

With torque setting please observe the setting diagrammes of the respective sizes (see diagramme 1 to 4 in chapter 4.7).

- Having set the torque the setting nut (component 13) is secured against working loose by means of the locking screw (component 14).

Once the **KTR-SI FRA** has been set to the required torque as per these operating/mounting instructions, the figure of the ratchet torque can be considered as a reference value only. For a more accurate setting the ratchet torque should be inspected by means of a suitable measuring system. In order to achieve the optimum accuracy, the ratchet torque has to be reinspected after the initial ratchings and reset, if necessary.

Table 6: Tools for torque setting

Size	Hook spanner DIN 1810-A	Jointed pin wrench	Jointed face wrench
2 3	Ø80-90	Ø60-90x4	Ø40-80x5
4	Ø95-100	Ø90-155x8	Ø80-125x6
5	Ø180-195	Ø165-230x10	Ø125-200x8

4 Assembly

4.7 Torque setting diagrammes

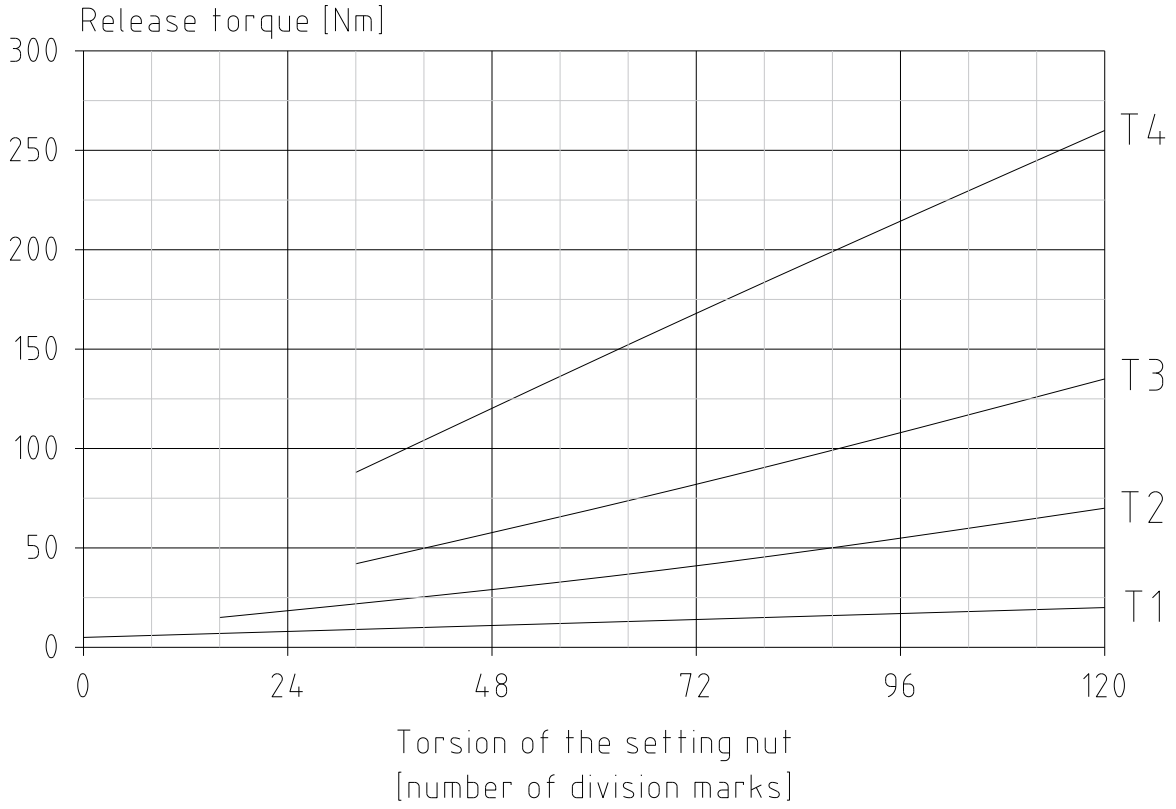

Diagramme 1: KTR-SI FRA - size 2

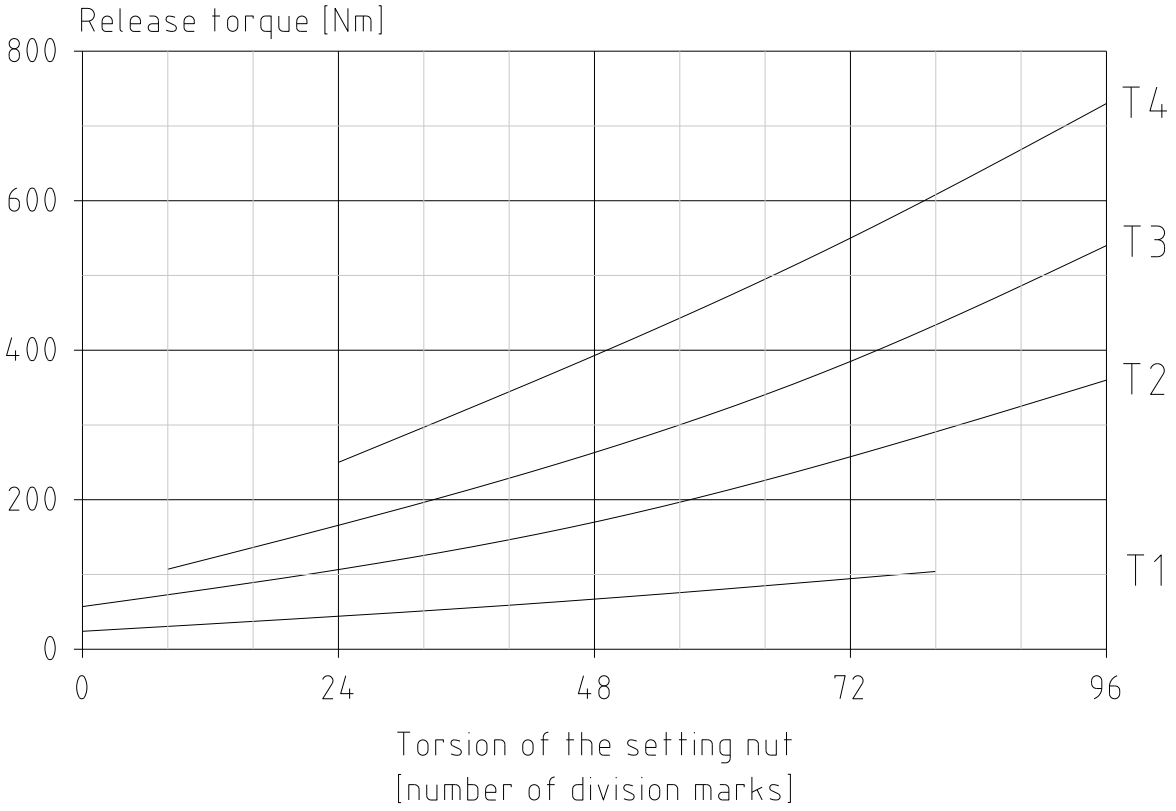

Diagramme 2: KTR-SI FRA - size 3

4 Assembly

4.7 Torque setting diagrammes

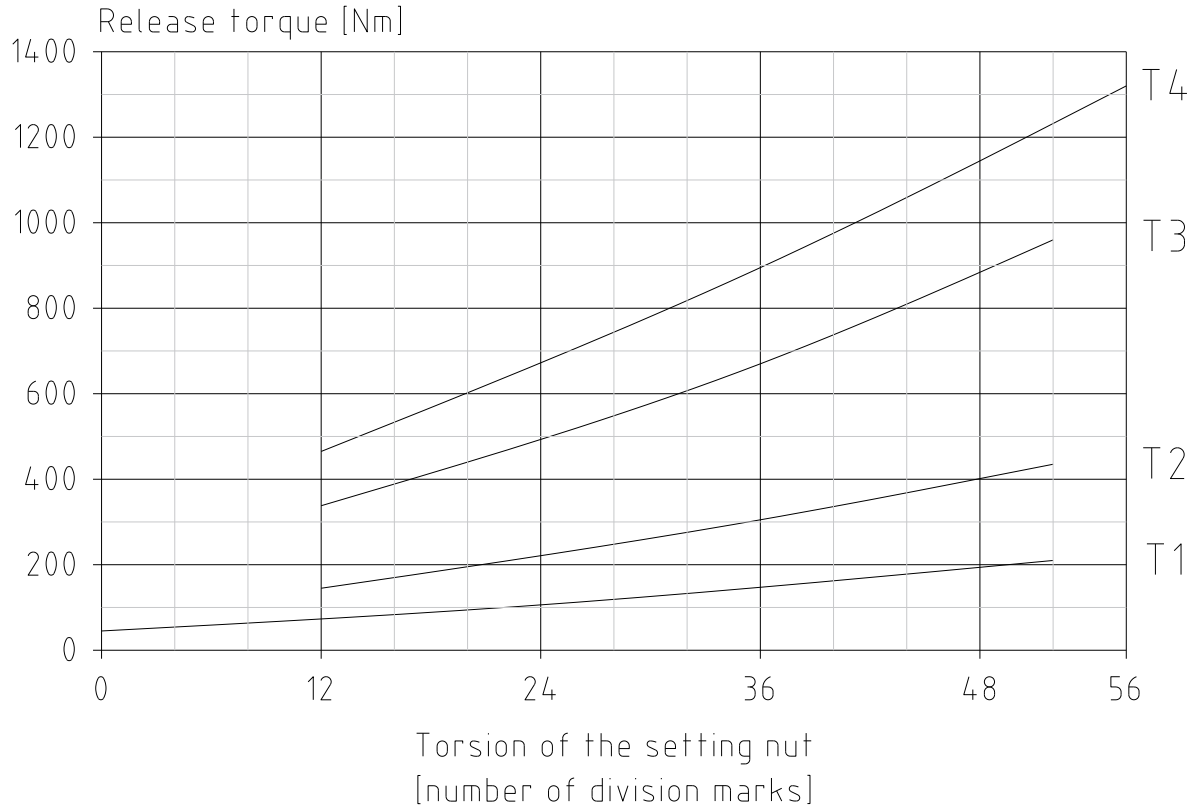

Diagramme 3: KTR-SI FRA - size 4

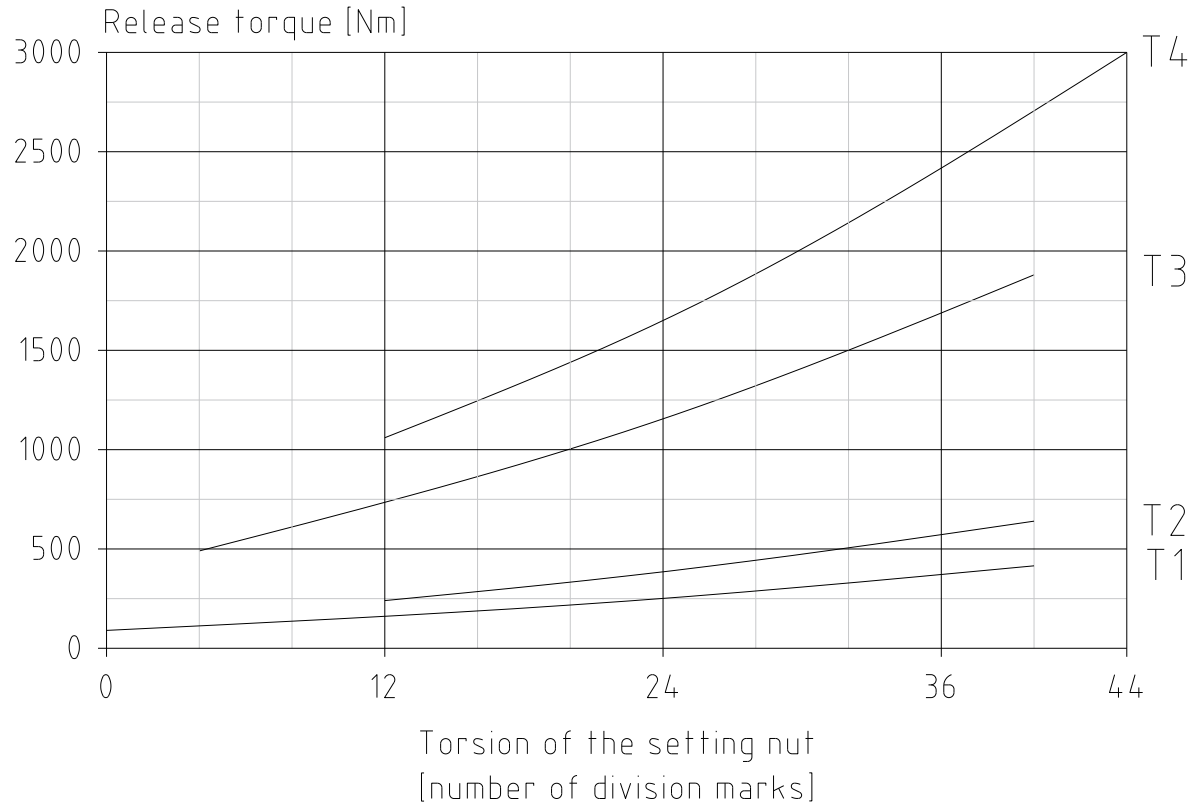

Diagramme 4: KTR-SI FRA - size 5

4 Assembly

4.8 Advice for the use of drive components

With the use of drive components such as sprockets, belt pulleys or gear wheels radial forces may be expected during operation. The customer should provide for a separate bearing of the drive component. The non-positive connection of the drive components with the overload hub is done by screwing using usual standard screws of property class 10.9.

- If torsional vibrations of the overall drive have to be expected, we would recommend to lock the screw by means of a suitable screw lock.
- Do not give any axial pressure on the overload system. The drive element needs a corresponding bearing.

4.9 Assembly of limit switch

The limit switch should be mounted to the washer of the pressure ring (component 11) (see illustration 10). The position and dimensions of the pressure ring are specified in table 7.

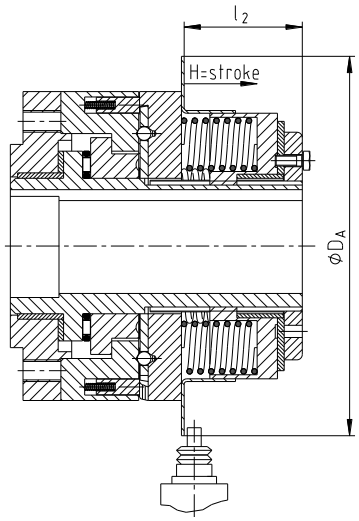

Illustration 10: Mechanical limit switch

Table 7: Position of limit switch

Size	Dimensions [mm]		
	l_2	$ØD_A$	H=stroke
2	45	140	2.8
3	42	184	3.5
4	46	203	3.5
5	70	279	4.4

Function

The axial stroke of the pressure ring generated with overload may activate a mechanical limit switch or an inductive sensor. As a result a control signal is generated which can be evaluated for disengaging the drive.

Assembly

The sensor needs to be mounted in a solid device to ensure a smooth operation. The sensor should be protected from dirt and potential mechanical faults.

4 Assembly

4.9 Assembly of limit switch

Adjustment

When the overload system disengages, the pressure ring makes an axial thrust (see table 7). The sensor or limit switch, respectively, has to be mounted within this shifting range. In order to adapt the mechanical limit switch and the shifting travel to the machine, the limit switch has to be adjusted accordingly.

We recommend using a limit switch!
Please absolutely observe the operation of the limit switch before the machine is supplied.
Please also observe the operating instructions for the sensor or limit switch, respectively.
The axial stroke of the shifting ring must not be blocked by any other components.
As soon as the limit switch or sensor is activated (overload: release of overload system) the drive should immediately be stopped (< 1 minute).
With higher speeds respective braking devices may be necessary.

5 Re-engagement of overload system

We recommend to switch off the drive as quickly as possible once an overload occurs.
The KTR-SI FRA is re-engaged by reversing the direction of rotation. In this case it is important to make sure that re-engagement is generated with a slow speed (< 50 rpm).

6 Breakdowns, causes and elimination

The below-mentioned failures can result in a use of the **KTR-SI FRA** overload system other than intended. In addition to the specifications given in these operating and assembly instructions please make sure to avoid such failures.
The errors listed can only be clues to search for the failures. When searching for the failure the adjacent components must generally be considered.

General failures with improper use:

- Important data for the selection of the overload system were not forwarded.
- The calculation of the shaft-hub-connection was not considered.
- Components with damage occurred during transport are assembled.
- If the heated hubs are assembled, the permissible temperature is exceeded.
- The clearance of the components to be assembled is not coordinated with one another.
- Tightening torques have been fallen below/exceeded.
- Components are mixed up by mistake/assembled incorrectly.
- No original **KTR** components (purchased parts) are used.
- Maintenance intervals are not observed.

6 Breakdowns, causes and elimination

Breakdowns	Causes	Elimination
Different operating noise and/or vibrations occuring	Misalignment	1) Set the unit out of operation 2) Eliminate the reason for the misalignment (e. g. loose foundation bolts, breaking of the engine mount, heat expansion of unit components, modification of the mounting dimension s of the coupling)
	Screws working loose	1) Set the unit out of operation 2) Inspect coupling components and replace coupling components that have been damaged 3) Tighten the dowel screws until the permissible tightening torque has been reached 4) Inspect alignment, adjust if necessary
	Screws/fastening screw for axial fastening of flange hubs working loose	1) Set the unit out of operation 2) Inspect alignment of coupling 3) Tighten the screws to fasten the flange hubs and secure against working loose
	Faulty storage	1) Set the unit out of operation 2) Send the overload system to KTR for inspection/repair.
	Wear of elastomer ring, short-term torque transmission due to metal contact	1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomer ring 3) Inspect coupling components and replace components that have been damaged 4) Insert elastomer ring, assemble components 5) Inspect alignment, adjust if necessary
The overload system releases in an undefined position. The overload system does not release in case of overload.	Torque is not set Torque set incorrectly Setting nut has worked loose	1) Set the unit out of operation 2) Adjust torque, see chapter 4.6 and 4.7
	Wear	1) Set the unit out of operation 2) Send the overload system to KTR for inspection/repair.
KTR-SI FRA with POLY-NORM® Torque is no longer transmitted	POLY-NORM® flange has worked loose	1) Set the unit out of operation 2) Tighten the fastening screws
POLY-NORM®	Please consider our operating/assembly instructions KTR-N 49510 additionally when using the POLY-NORM® coupling. See chapter 6 *Breakdowns, causes and elimination*	

7 Disposal

In respect of environmental protection we would ask you to dispose of the packaging or products on termination of their service life in accordance with the legal regulations and standards that apply, respectively.

- **Metal**
  Any metal components have to be cleaned and disposed of by scrap metal.

8 Maintenance and service

KTR-SI FRA is a low-maintenance overload system. It is finish bored and provided with grease filling. We recommend to perform a visual inspection on the overload system **at least once a year**. With normal drive conditions this grease filling is sufficient during the overall service life. In case of extreme drive conditions or heavy dirt, respectively, the KTR-SI FRA has to be regularly inspected for its operation.

- Since the flexible machine bearings of the driving and driven side settle during the course of load, inspect the alignment and re-align the coupling/the overload system, if necessary.
- The components have to be inspected for damages.
- The screw connections have to be inspected visually.

Having started up the overload system the tightening torques of the screws have to be inspected during the usual inspection intervals.

9 Spares inventory, customer service addresses

A basic requirement to ensure the readiness for use of the coupling is a stock of the most important spare parts on site.

Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage at www.ktr.com.

KTR does not assume any liability or warranty for the use of spare parts and accessories which are not provided by KTR and for the damages which may incur as a result.