KTR-SI FRE

Idle rotation overload system

KTR-SI FRE with flange type

KTR-SI FRE with ROTEX®

KTR-SI FRE idle rotation elements 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 demanded.

- The **flange type** is intended for a combination with belt pulleys or similar drive components.
- The **type with ROTEX®** signifies the combination and selection with a torsionally flexible coupling provided by the manufacturer.

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1 Technical data

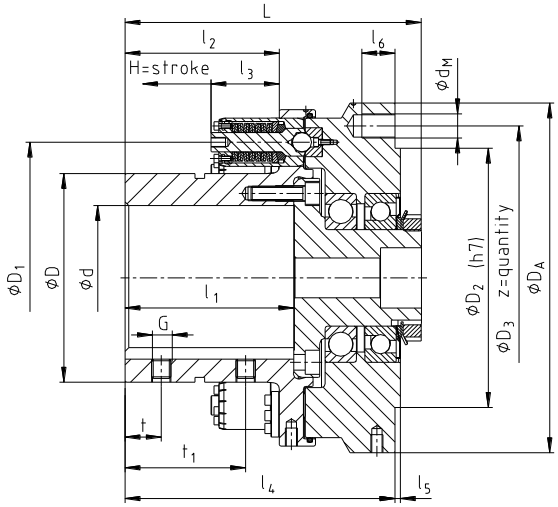


Illustration 1: KTR-SI FRE flange type

Table 1: Dimensions and weights - flange type

Size	Dimensions [mm]												
	Max. bore d	D	D_1	D_2	D_3	D_A	l_1	l_2	l_3	l_4	l_5	l_6	G
9	90	135	185	200	225	260	120	110	56.7	197	2.5	17.5	M12
12	120	173	225	215	252	290	140	128	56.7	224	4.5	27.5	M16
15	150	215	270	245	282	324	170	160	56.7	258	4.5	27.5	M20
20	200	285	370	330	375	460	220	200	88.4	341	5.0	33.0	M20

Size	Dimensions [mm]							Max. permissible forces on the flange connection [2] [kN]		Speed [rpm]	Weight [1] [kg]
	t	t_1	L	d_M	z	pitch	H=stroke	radial force	axial force		
9	25	75	213.5	12	12	12 x 30°	5.2	18	13	3300	38
12	30	100	246.0	20	15	20 x 18°	5.2	26	18	2300	57
15	40	120	281.0	20	15	20 x 18°	5.2	30	20	2050	81
20	50	150	366.0	24	18	24 x 15°	8.9	50	40	1550	211

1) Weight with max. bore
2) Larger forces on request

Table 2: Torques - flange type

Size	Type of element	Torques [Nm]					
		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

Breakdown of type designation of idle rotation elements:

1	-	T2	-	3
Size of idle rotation elements (see table 8)		Layering of disk springs (see table 8)		Type of element (see table 2)

1 Technical data

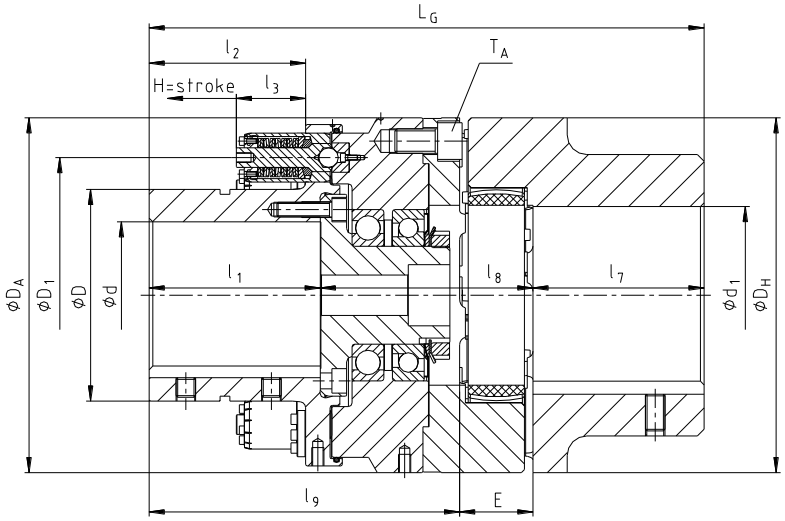


Illustration 2: KTR-SI FRE with ROTEX® coupling

Table 3: Dimensions and weights - with ROTEX® coupling

Size	ROTEX®			Dimensions [mm]								
	Size	Torque [Nm] 64 ShD		Max. bore		D	D_1	D_H	D_A	l_1	l_2	l_3
		T_{KN}	T_{Kmax}	d	d_1							
9	90	4500	9000	90	110	135	185	200	260	120	110	56.7
12	125	12500	25000	120	145	173	225	290	290	140	128	56.7
15	140	16000	32000	150	160	215	270	320	324	170	160	56.7
20	180	35000	70000	200	200	285	370	420	460	220	200	88.4

Size	Dimensions [mm]						T_A [Nm]	Speed [2] [rpm]	Weight [1] [kg]
	l_7	l_8	l_9	E	L_G	H=stroke			
9	100	133	217	45	362	5.2	117	3300	57
12	140	165	254	60	454	5.2	560	2300	103
15	155	176	292	65	512	5.2	560	2050	142
20	195	227	381	85	661	8.9	970	1550	331

1) Weight with max. bore
2) Higher torques on request

Table 4: Torques - with ROTEX® coupling

Size	Type of element	Torques [Nm]					
		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

Breakdown of type designation of idle rotation elements:

1	-	T2	-	3
Size of idle rotation elements (see table 8)		Layering of disk springs (see table 8)		Type of element (see table 2)

2 Advice

2.1 General advice

Please read through these operating/assembly instructions carefully before you start up the coupling.
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 coupling. The copyright for these assembly instructions remains with KTR.

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 coupling 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 coupling 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 coupling.
- 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 coupling as long as it is in operation.
- Please secure the coupling against accidental contact. Please provide for the necessary protection devices and covers.

2 Advice

2.4 Intended use

You may only assemble, operate and maintain the coupling if you

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

The coupling may only be used in accordance with the technical data (see chapter 1). Unauthorized modifications on the coupling design 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 FRE** described in here corresponds to the technical status at the time of printing of these assembly instructions.

2.5 Coupling selection

For a long-lasting and failure-free operation of the coupling it 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.

2.6 Reference to EC Machinery Directive 2006/42/EC

The couplings 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 couplings are supplied in preserved condition and can be stored at a dry and covered 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 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 coupling is supplied in assembled condition.

4.1 Components of the couplings

Component asssembly 1: Components of KTR-SI FRE flange type

Component	Quantity	Description
1.1	1	Hub
1.2	1	Bearing flange
1.3	1)	Cap screw DIN 7984 - 8.8
1.4	1	Groove ball bearing
1.5	1	O-Ring NBR 70 ShA
1.6	1	KTR-SI FRE connection flange
1.7	1	Angular ball bearing
1.8	1	NILOS ring AVH
1.9	1	Supporting disk DIN 988
1.10	1	Safety plate DIN 5406
1.11	1	Groove nut DIN 981
1.12	1)	Adjusting washer DIN 988
1.13	1)	Idle rotation element
1.14	2	Setscrew DIN EN ISO 4029

1) Quantity depends on coupling size

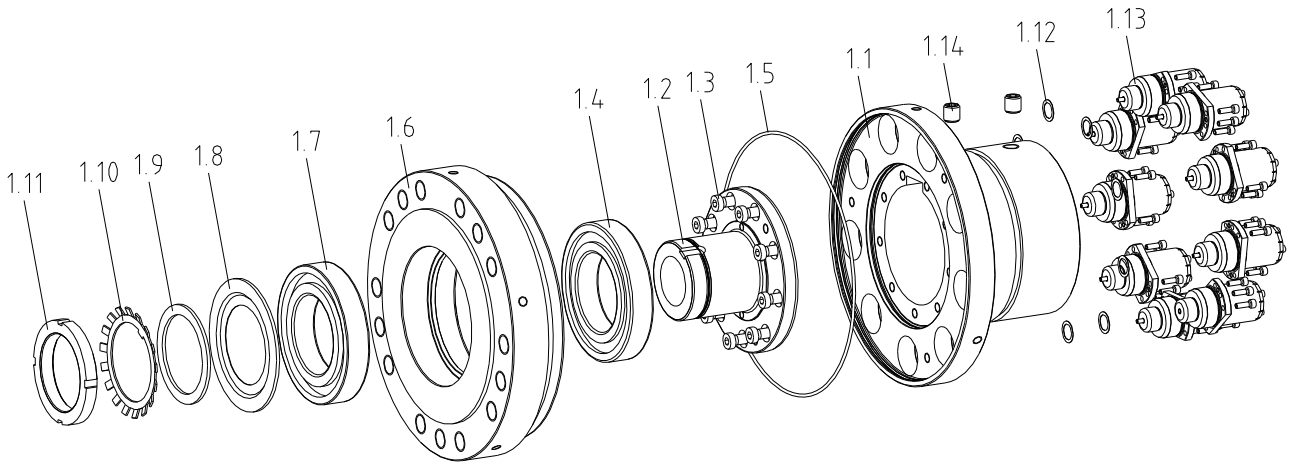


Illustration 3: KTR-SI FRE flange type

Components of KTR-SI FRE with ROTEX® coupling

Component/ component assembly	Quantity	Description
1	1	KTR-SI FRE flange type
2	1	ROTEX® driving flange
3	1	ROTEX® hub
4	1	ROTEX® spider
5	1	Cap screw DIN EN ISO 4762 - 12.9
6	1	Setscrew DIN EN ISO 4029

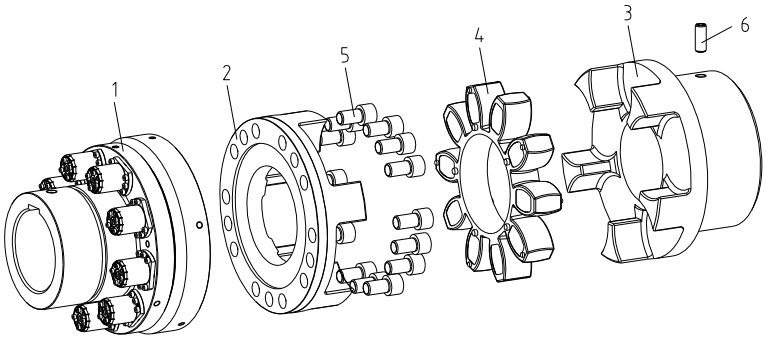


Illustration 4: KTR-SI FRE with ROTEX® coupling

4 Assembly

4.2 Advice for finish bore

The maximum permissible bore diameters d (see table 1 and 3 in chapter 1 - technical data) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause danger to life.

- If the bore of the hub is machined by the customer, the coupling needs to be disassembled (see chapter 4.6).
- Axial run-out or concentricity (see illustration 5) need to be adhered to.
- Please make absolutely sure to observe the figures for Ø d_{max}.
- Carefully align the hubs when the finish bores are drilled.

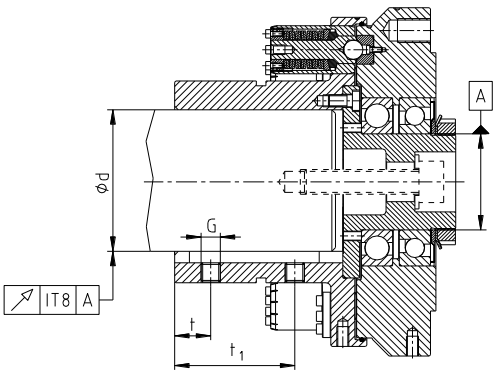


Illustration 5: Concentricity and axial runout

The customer bears the sole responsibility for all machining processes performed subsequently on unbored or pilot bored as well as finish machined coupling components and spare parts. KTR does not assume any warranty claims resulting from insufficient remachining.

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

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

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.). (Applies only in combination with a ROTEX® coupling: The keyway should preferably be located between the cams. With axial fastening by setscrews the tapping should be located on the keyway with the exception of Al-D which should be located opposite to the keyway.)

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

4 Assembly

4.3 Assembly (general)

We recommend to clean bores, shaft, keyway and feather key and inspect for dimensional accuracy before assembly and afterwards lubricate with a thin-fluid oil (e. g. Castrol 4 in 1 or Klüber Quietsch-Ex).

Oils and greases containing molybdenum disulfide or other high-pressure additives as well as internal lubricants must not be used.

Heating the KTR-SI FRE coupling or ROTEX® hub lightly (approx. 80 °C) allows for an easier mounting on the shaft.

STOP

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

- Please make sure the perfect technical condition of the **KTR-SI FRE** overload system.
- Please only use original **KTR** components (no purchased parts).
- Please provide for a setscrew according to DIN EN ISO 4029 with a cup point or an end plate to fasten the hubs axially (see illustration 6).

All screw connections can be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).

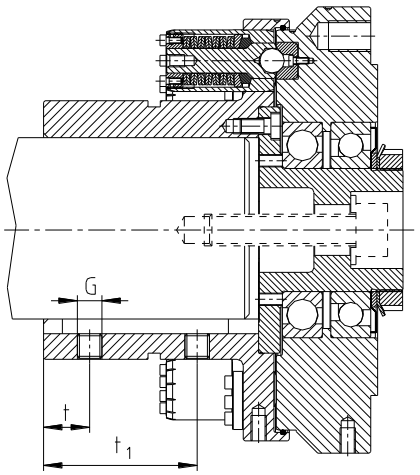


Illustration 6

Table 6: Setscrews DIN EN ISO 4029

Size	9	12	15	20
Dimension G	M12	M16	M20	M20
Dimension t	25	30	40	50
Dimension t_1	75	100	120	150
Tightening torque T_A [Nm]	40	80	140	140

4 Assembly

4.4 Assembly of the KTR-SI FRE flange type

- Assemble the KTR-SI FRE flange type (component 1) on the shaft of the driving or driven side.
- Fasten the hubs by tightening the setscrew DIN EN ISO 4029 with a cup point (tightening torque see table 6).

☞ **All screw connections can be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).**

4.5 Assembly of the KTR-SI FRE with ROTEX® coupling

☞ **Please consider our operating/assembly instructions KTR-N 40210 additionally when using the ROTEX® coupling.**

- Assemble the KTR-SI FRE flange type (component 1) or ROTEX® hub (component 3) on the shafts of the driving or driven side.
- Fasten the KTR-SI FRE flange type by tightening the setscrews (component 1.14) DIN EN ISO 4029 with a cup point (tightening torque see table 6).
- Screw together the ROTEX® driving flange (component 2) and the KTR-SI FRE flange type via the cap screws (component 5) hand- tight for the time being.

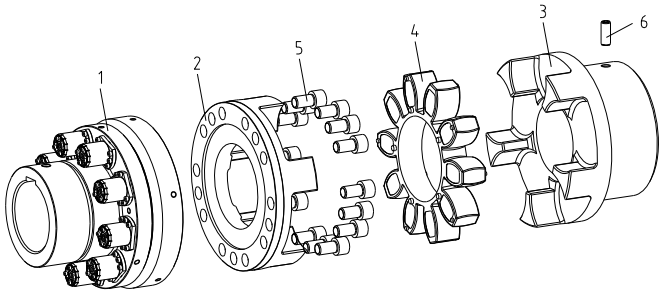


Illustration 7: KTR-SI FRE with ROTEX® coupling

- Tighten the cap screws crosswise by a suitable torque key to the tightening torques T_A specified in table 3.
- Insert the ROTEX® spider (component 4) into the cam section of the ROTEX® hub.
- Shift the power packs in axial direction until the distance dimension E has been achieved (see illustration 2 or table 3).
- If the power packs are already firmly assembled, shifting the hubs axially on the shafts allows for setting the distance dimension E.
- Fasten the ROTEX® hub by tightening the setscrews (component 6) DIN EN ISO 4029 with a cup point (tightening torque see KTR-N 40210).

⚠ **With the assembly please make sure that the distance dimension E (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.**

☞ **All screw connections can be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).**

5 Adjustment of torque

5.1 Preparation for assembly of further idle rotation elements

Please make sure the transport lock is installed.

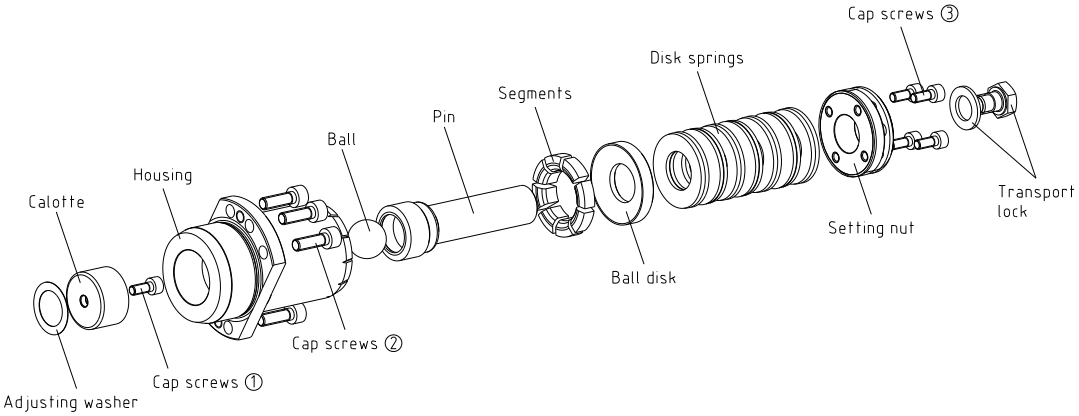


Illustration 8: Components of idle rotation element

- Please inspect if the idle rotation elements were supplied when engaged.
- Please measure the reference dimension a, re-adjust the dimension, if necessary (see illustration 9 and table 7).

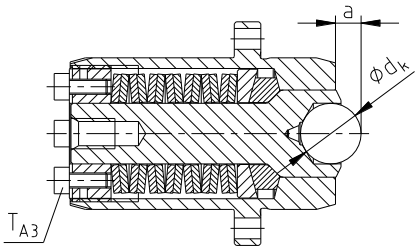


Illustration 9

For re-setting release the transport lock and setting nut.

- Set dimension a. Afterwards hand-tighten the setting nut and transport lock.
- Insert the adjusting washer (0.3 mm) in the calotte hole of the connection flange.
- Insert the calotte in the calotte hole of the connection flange (component 1.6). To facilitate the assembly lubricate the calotte with fitting grease.
- Tighten the cap screw ① in the calotte to the tightening torques T_{A1} specified in table 7.
- Insert the test ball Ød_k (see illustration 9 and 10 as well as table 7).
- Inspect the reference dimension p (see illustration 10 and table 7).

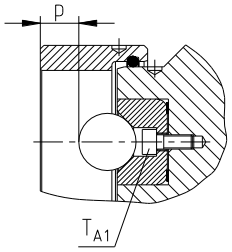


Illustration 10

- If the reference dimension p differs, disassemble the calotte and balance by means of adjusting washers with the thickness 0.2 mm or 0.3 mm. Re-inspect the reference dimension p.

All screw connections can be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).

Table 7: Technical data of idle rotation elements

Size	Dimensions [mm]			Tightening torque [Nm]		
	a	d_k	p	T_{A1}	T_{A2}	T_{A3}
9	6.76 ±0.2	16.0	10.76 -0.1	2.8	8.6	4.4
12						
15						
20	10.9 ±0.2	25.4	20.5 -0.1	9.6	34	14

5 Adjustment of torque

5.2 Assembly of further idle rotation elements

- Lubricate the idle rotation elements (component 1.13) with fitting grease and afterwards insert in the bores intended (see illustration 11 and 12).
- Tighten the cap screws ② (see illustration 8) to the tightening torques T_{A2} specified in table 7.
- Remove the transport lock (see illustration 8).

☞ **All screw connections can be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).**

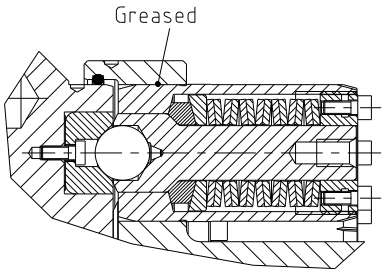


Illustration 11

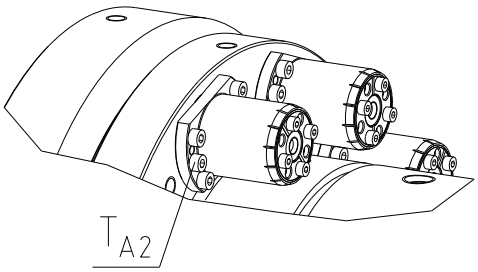


Illustration 12

5.3 Zeroing

- Untighten the setting nut by means of a face spanner until manual twisting is possible.
- Screw in the setting nut manually until it fits with the disk spring.
- Tighten the setting nut by means of a face spanner until the notches of housing and setting nut lie on top of each other (see illustration 13 and 14).
- Mark this position on the housing and the setting nut (see illustration 13 and 14).

☞ **All screw connections can be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).**

☞ **We recommend to order the tool from KTR for zeroing.**

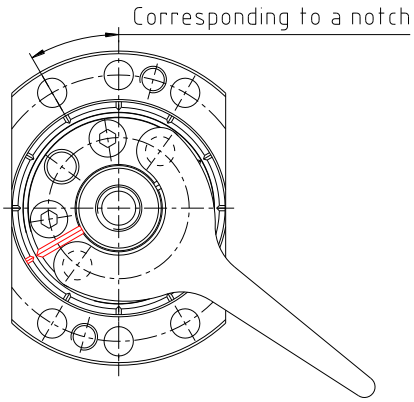


Illustration 13

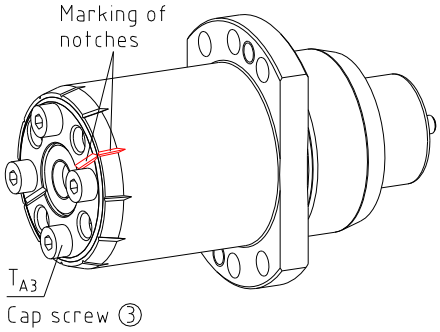


Illustration 14

5 Adjustment of torque

5.4 Torque setting of idle rotation elements

- Twist the setting nut by the requested number of notches in the housing.

☞ **With torque setting please note the setting diagrammes of the respective sizes (see chapter 5.7).**
During each revolution every setting nut may only be twisted by a maximum of 3 notches (quarter of a turn).

- Set the idle rotation elements crosswise one after another until the setting nut was twisted by the respective number of notches.
- Afterwards tighten the cap screws ③ of the setting nut to the tightening torques T_{A3} specified in table 7 (see illustration 14).

⚠ **With assembly make sure that setting of the setting nut is performed evenly and crosswise with all idle rotation elements.**

☞ **All screw connections can be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).**

Once the KTR-SI FRE 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.

5.5 Re-setting of torque of idle rotation elements

- Untighten the cap screws ③ of the setting nut (see illustration 8).
- Determine the difference of the number of notches based on the setting diagrammes (see chapter 5.7) and re-set the setting nut accordingly.

☞ **During each revolution every setting nut may only be twisted by a maximum of 3 notches (quarter of a turn).**

- Set the idle rotation elements crosswise one after another until the setting nut was twisted by the respective number of notches.
- Afterwards tighten the cap screws ③ of the setting nut to the tightening torques T_{A3} specified in table 7 (see illustration 8).

⚠ **With assembly make sure that setting of the setting nut is performed evenly and crosswise with all idle rotation elements.**

☞ **All screw connections can be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).**

5 Adjustment of torque

5.6 Replacement of layering of disk springs

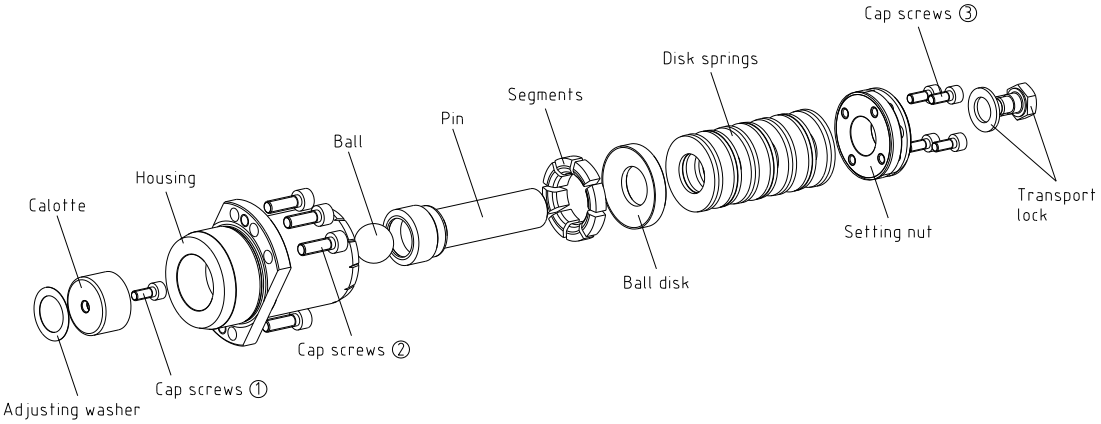


Illustration 15: Components of idle rotation element

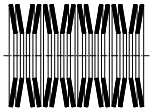
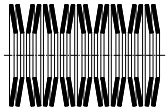
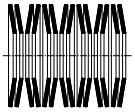
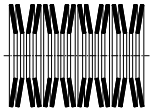
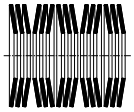
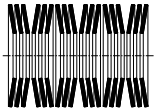
- Untighten the cap screws ③ of the setting nut (see illustration 15).
- Unscrew the setting nut out of the housing.
- Disassemble the idle rotation elements in reverse order of chapter 5.2.
- Take the sets of disk springs including pins, segments and ball disk out of the housing.
- Modify the layering of disk springs as per table 8 and lubricate each disk spring with Molykote on both sides.
- Lubricate the calotte, ball, pin, segments and ball disk with Molykote. Assemble the idle rotation element as per illustration 9 or 15.

With assembly make sure to align the segments accurately.

- Repeat chapter 5.2 *Assembly of further idle rotation elements,* chapter 5.3 *Zeroing* and chapter 5.4 *Torque setting of idle rotation elements.*

All screw connections can be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).

Table 8: Disk springs

Layering of disk springs	T1 [1]		T2		T3	
KTR-SI FRE size	**9, 12, 15**	**20**	**9, 12, 15**	**20**	**9, 12, 15**	**20**
Size of idle rotation elements	**1**	**2**	**1**	**2**	**1**	**2**
Illustration						
Designation	8x2M	9x2M	7x2L	8x2L	5x3L	6x3L

1) The disk spring layering T1 is only possible on consultation with KTR.

5 Adjustment of torque

5.7 Setting Diagrammes

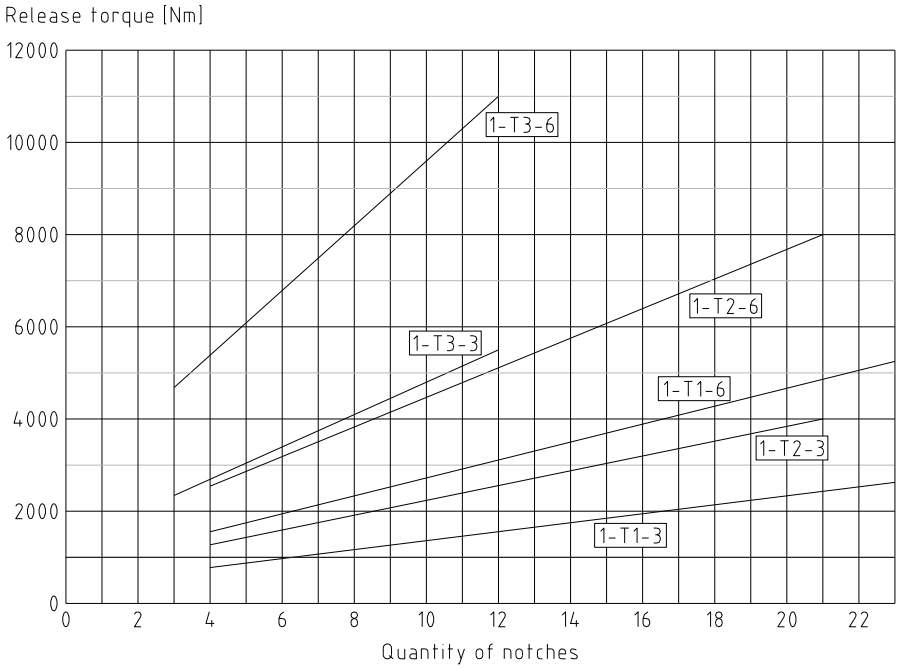


Diagram 1: KTR-SI FRE 9

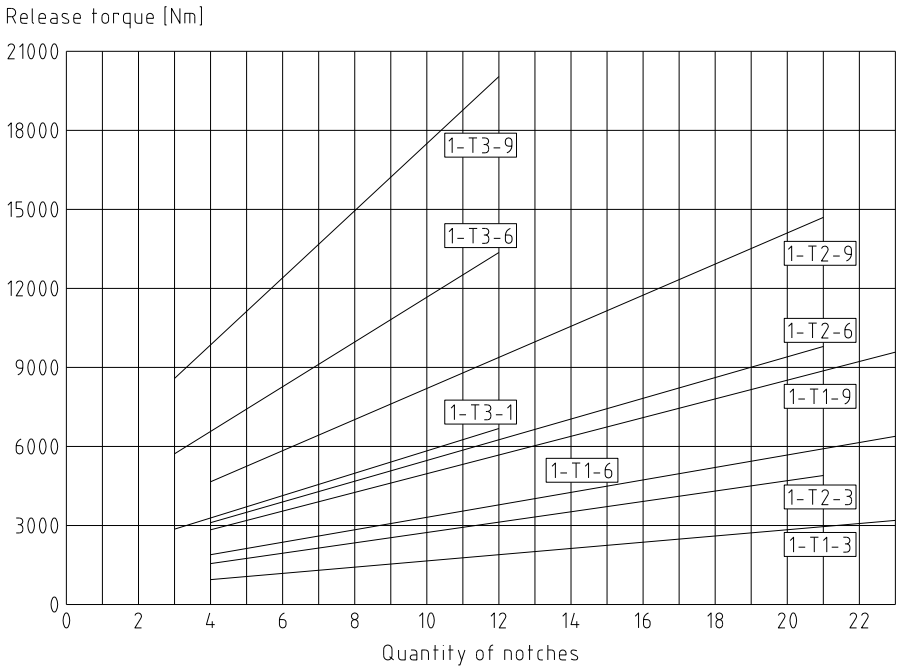


Diagram 2: KTR-SI FRE 12

Breakdown of type designation of idle rotation elements:

1	-	T2	-	3
Size of idle rotation elements (see table 8)		Layering of disk springs (see table 8)		Type of element (see table 2)

5 Adjustment of torque

5.7 Setting Diagrammes

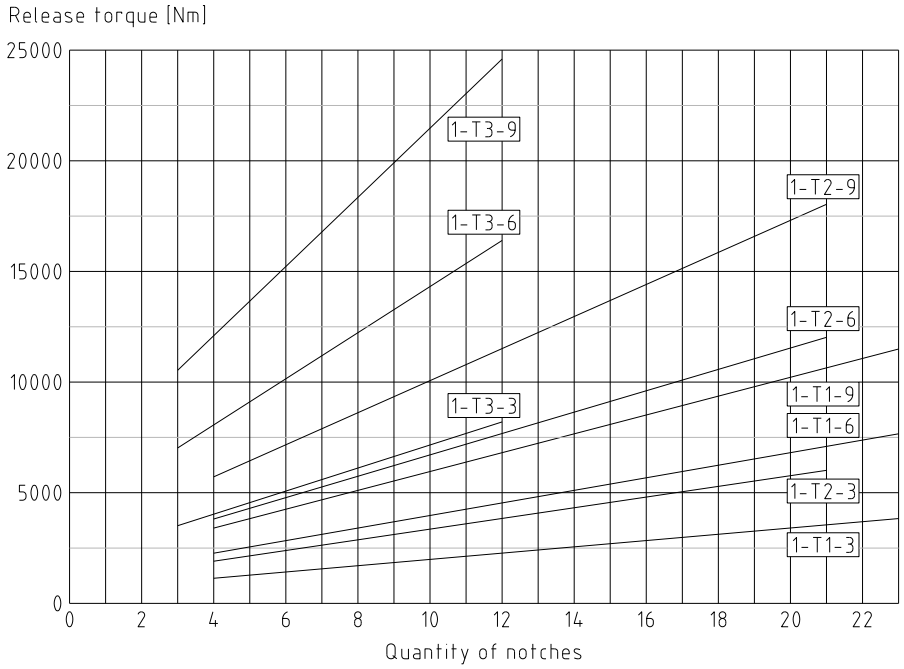


Diagram 3: KTR-SI FRE 15

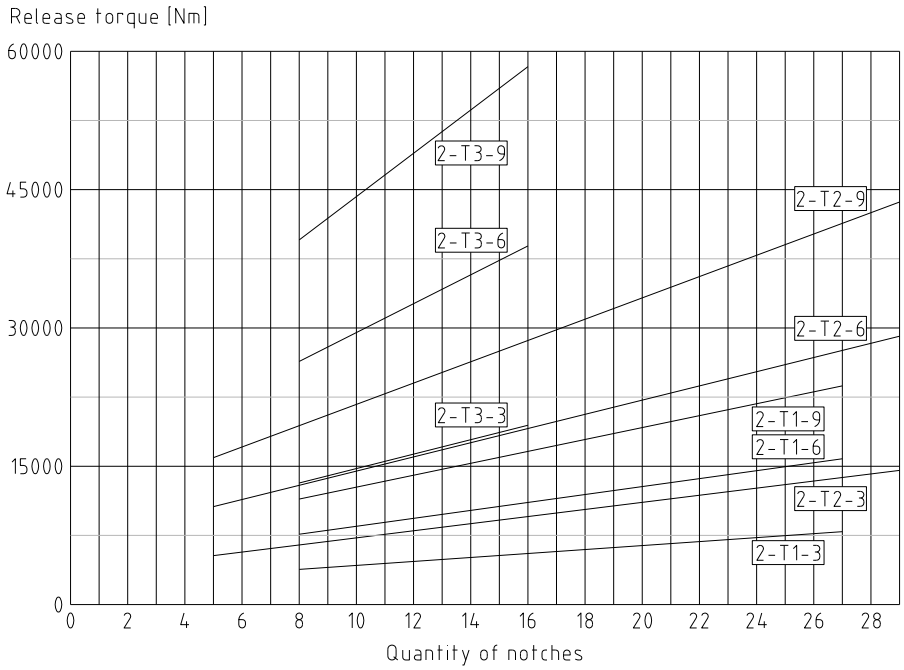


Diagram 4: KTR-SI FRE 20

Breakdown of type designation of idle rotation elements:

1	-	T2	-	3
Size of idle rotation elements (see table 8)		Layering of disk springs (see table 8)		Type of element (see table 2)

5 Adjustment of torque

5.8 Re-engagement of idle rotation elements

Eliminate the failure in the drive train, afterwards the coupling can be re-engaged.

- Turn back the driving and driven side of the coupling into its original position until the markings are flush with each other (see illustration 16 and 17). The idle rotation elements can be re-engaged in this position by axial pressure.

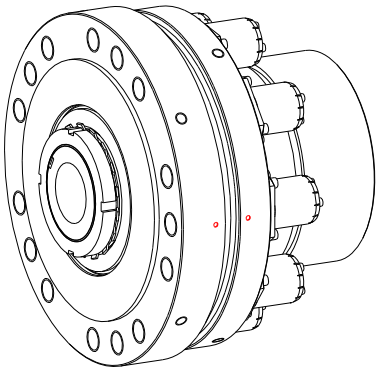


Illustration 16

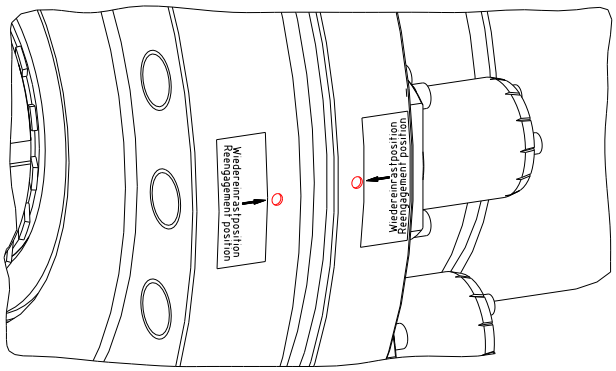


Illustration 17

- The coupling can be re-engaged by axial beats with a plastic hammer on the pin, a lever or by means of a hydraulic or pneumatic engagement device (see illustration 18).

With re-engagement please make sure that the pins are re-engaged crosswise. The engagement process can clearly be heard.

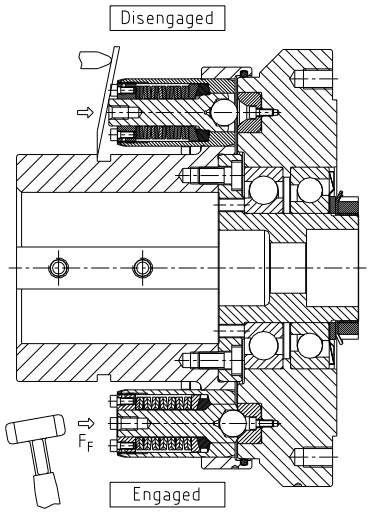


Illustration 18

In order to define the amount of engagement force F_F of your KTR-SI FRE, you can apply the following formula for a rough estimate:

$$F_F = \frac{F_{total}}{n} \qquad F_{total}[N] = M_A[Nm] \times k$$

M_A = eingestelltes Auslösemoment [Nm]
n = Number of idle rotation elements
k = Calculation factor [m^{-1}] according to table 9
F_F = Engagement force per idle rotation element [N]

Example of calculation for the following idle rotation coupling:

KTR-SI FRE 12 1T2 6 Ø85H7 NnD 7,000 Nm

M_A = 7,000 Nm
n = 6 idle rotation elements
k = 0.86
F_{total} = 7,000 Nm x 0.86 m^{-1} = ca. 6,020 N
F_F = 6,020 N : 6 = ca. 1,000 N

Table 9: Calculation factor

Size	Calculation factor k [m^{-1}]
9	1.05
12	0.86
15	0.72
20	0.53

6 Breakdowns, causes and elimination

The below-mentioned failures can result in a use of the **KTR-SI FRE** coupling other than intended. In addition to the specifications given in these operating and assembly instructions 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 use other than intended:

- Important data for the coupling selection were not forwarded.
- The calculation of the shaft-hub-connection was disregarded.
- Coupling components with damage occurred during transport are assembled.
- If the heated hubs are assembled, the permissible temperature is exceeded.
- The fit 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.
- A wrong or no idle rotation element is inserted in the coupling.
- A wrong or no spider is inserted in the coupling.
- No original **KTR** components (purchased parts) are used.
- Maintenance intervals are not observed.

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 installation dimension E of the coupling)
	Wear of spider, short-term torque transmission due to metal contact	1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the spider 3) Inspect coupling components and replace coupling components that have been damaged 4) Insert spider, assemble coupling components 5) Inspect alignment, adjust if necessary
	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 coupling to KTR for inspection/repair.
The coupling releases undefinedly	Torque is not set	1) Set the unit out of operation 2) Adjust torque, see chapter 5
	Torque set incorrectly	
	Setting nut has worked loose	
	Wear	1) Set the unit out of operation 2) Send the coupling to KTR for inspection/repair.
Torque is no longer transmitted	ROTEX® driving flange has worked loose	1) Set the unit out of operation

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.
- **Gaskets**
  Gaskets can be disposed of by residual waste.
- **Nylon materials**
  Nylon materials have to be collected and disposed of by a waste disposal company.
- **Greases/oils**
  Greases and oils have to be collected and disposed of by a waste disposal company.

8 Maintenance and service

KTR-SI FRE is a low-maintenance coupling. We recommend to perform a visual inspection on the coupling **after 2000 hours of operation, 100 disengagements or at least once a year**. Please pay special attention to the condition, alignment, bearing respectively bearing prestress, releasing of KTR-SI FRE and screw connection of the coupling and the condition of the spider. If severely heavy dirt and dust accrues or with severe environmental conditions such intervals can be considerably reduced. We recommend to have the maintenance operations performed by KTR.

The **KTR-SI FRE** idle rotating overload system is finish bored and provided with grease filling (Molykote).

- With a torque reduction re-set the setting nut after the first 25 releases.
- Lubricate the calotte and ball with Molykote.

In case of overload the drive should be stopped by return.
With higher speeds respective braking devices may be necessary.

With subsequent assembly please lubricate with standard bearing greases.

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

Please consider our operating/assembly instructions KTR-N 40210 additionally when using the ROTEX® coupling.

9 Advices 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 non-positive connection of the drive components with the connection flange is done via screwing by using standard screws.

The resulting radial force on the drive element should be within the flange level (see table 1).

☞ **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.**

10 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.