KTR-SI Compact

Type DK
(ratchet design)

Type SK
(synchronous design)

KTR-SI Compact

KTR-SI Compact with ROTEX® GS coupling

KTR-SI Compact is a torque limiting, backlash-free overload system operating with positive locking. It protects adjacent components from damage.
In case of overload on the overload system the torque is considerably reduced to a lower residual torque. **KTR-SI Compact** is a not load holding overload system.

- In case of overload **type DK** (ratchet design) re-engages every 15° with the next following ball indentation.
- In case of overload **type SK** (synchronous design) re-engages after a rotation of 360°.

Table of contents

1 Technical data

Hub type 1.0

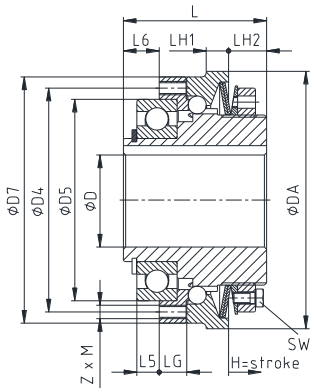


Illustration 1: KTR-SI Compact size 01 to 3

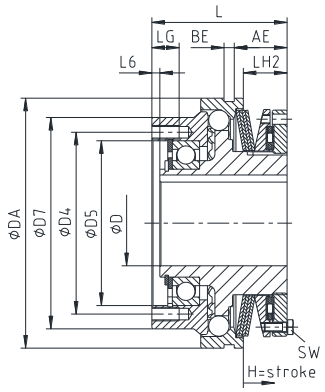


Illustration 2: KTR-SI Compact size 4

Hub type 4.5 with taper bush

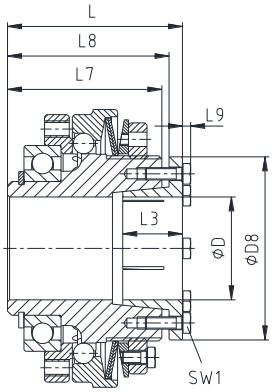


Illustration 3: KTR-SI Compact size 01 to 3

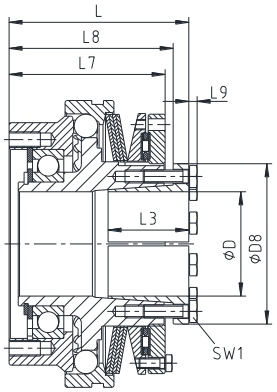


Illustration 4: KTR-SI Compact size 4

Table 1: Technical data and dimensions

Size	Speed in rpm	Torques in Nm			Bore Ø D		Dimensions in mm						
		T1	T2	T3	1.0	4.5	L 1.0	L 4.5	DA	D4	D5 h5	D7	D8
01	4000	3-14	6-28	13-56	8-20	10-20 19-25	40	47	70	56	47	65	40.5 42.0
0	3000	9-35	18-70	40-140	10-25 (30) 1)	15-20 19-30	48	53 56	85	71	62	80	40.5 57.0
1	2500	19-65	38-130	78-260	14-30 (35) 1)	19-30 32-40	59	67	100	85	75	95	57.0 64.0
2	2000	35-110	80-220	160-440	18-40 (45) 1)	32-50	64	73	115	100	90	110	73.5
3	1200	80-210	160-400	320-800	24-50	32-50 55-60	75	85 86	135	116	100	130	73.5 89.0
4	400	230-730	460-1590	960-3100	40-75	50-60 65-80	119	133.5 138	220	160	145H7	186	96.5 123.0

Size	Dimensions in mm														
	AE	BE	LG	LH1	LH2	L3	L5	L6	L7	L8	L9	Z x M	SW	SW1	H = stroke
01	-	7	7.5	7	12.0	26	5	8	40	42.0	2.8	8 x M4	7	7	1.2
0	-	8	8.0	8	14.0	26 31	7	11	46	48.0 49.0	2.8 4.0	8 x M5	7	7 10	1.5
1	-	9	10.5	9	16.0	40 31	9	14	57	60.0	4.0 3.5	8 x M6	8	10 8	1.8
2	-	10	12.0	10	17.0	29	10	16	63	66.5	4.0	8 x M6	10	10	2.0
3	-	12	12.0	12	21.0	29 44	10	18	75	78.5 78.0	4.0	8 x M8	10	10	2.2
4	46.5	9	24.0	9	38.5	54 62	-	7	119	125.5 126.0	5.5 7.0	6 x M12	13	13 16	3.5

1) Max. bore with keyway acc. to DIN 6885 sheet 3 (low-rise design) with size 0 = d > 28 mm, with size 1 = d > 32 mm and with size 2 = d > 42 mm

1 Technical data

KTR-SI Compact with ROTEX® GS coupling

Hub type 1.0 Hub type 1.0

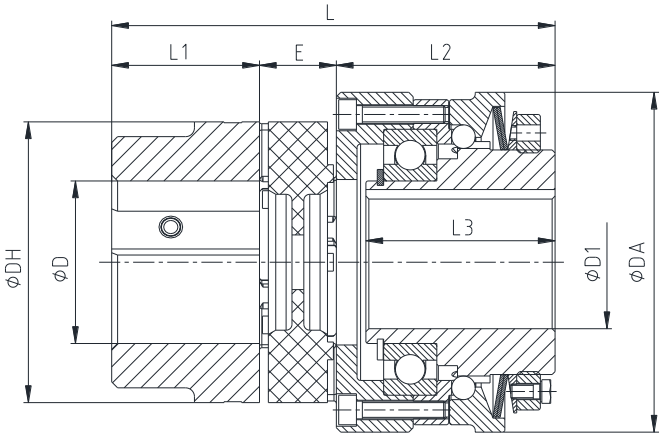


Illustration 5: KTR-SI Compact (hub type 1.0/1.0)

Hub type 6.0 Hub type 4.5

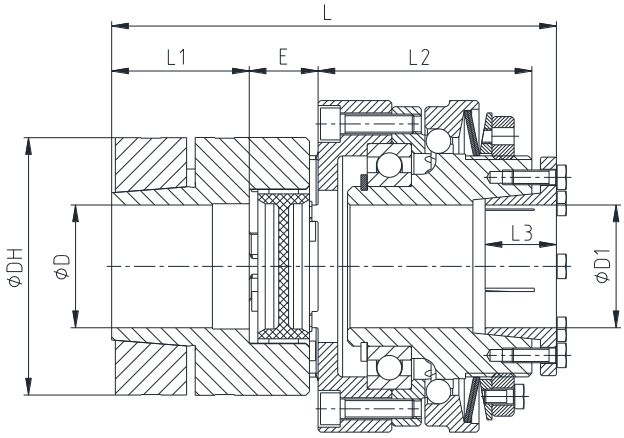


Illustration 6: KTR-SI Compact (hub type 6.0/4.5)

Table 2: Technical data and dimensions

Size	Speed in rpm]	Torques in Nm			ROTEX® GS size	Max. finish bore			
		T1	T2	T3		D		D1	
						1.0	6.0 [2]	1.0	4.5
01	4000	3-14	6-28	13-56	24	28	28	20	25
0	3000	9-35	18-70	40-140	28	38	38	30 [1]	30
1	2500	19-65	38-130	78-260	38	45	45	35 [1]	40
2	2000	35-110	80-220	160-440	42	55	55	45 [1]	50
3	1200	80-210	160-400	320-800	48	62	62	50	60
4	400	230-730	460-1590	960-3100	75	80	80	75	80

Size	Dimensions in mm										
	L		L1		L2		L3		DA	DH	E
	1.0/1.0	6.0/4.5	1.0/1.0	6.0/4.5	1.0/1.0	6.0/4.5	1.0/1.0	6.0/4.5			
01	95.0	102.0	30	30	47.0	47.0	40	26	70	55	18
0	111.5	119.5	35	35	56.5	54.5	48	26 31	85	65	20
1	138.0	146.0	45	45	69.0	67.0	59	40 31	100	80	24
2	150.0	159.0	50	50	74.0	73.0	64	29	115	95	26
3	171.0	182.0	56	56	87.0	87.0	75	29 44	135	105	28
4	283.5	302.5	85	85	158.5	158.5	112	54 62	220	160	40

1) Max. bore with keyway acc. to DIN 6885 sheet 3 (low-rise design) with size 0 = d > 28 mm, with size 1 = d > 32 mm and with size 2 = d > 42 mm
2) For friction torques see operating/assembly instructions of ROTEX® GS (ROTEX® GS hub type 6.0)

1 Technical data

Table 3: Friction torque and surface pressure of hub type 4.5 (without feather keyway)

Size	01	0		1		2	3	4	
Clamping screw SW1	M4	M4	M6	M6	M5	M6	M6	M8	M10
Tightening torque T_A in Nm	4.6	4.6	10	10	5.9	10	10	28	49
Bore Ø D	Transmittable friction torque T_R in Nm Surface pressure in N/mm2								
Ø10	65								
	133								
Ø11	70								
	118								
Ø12	75								
	106								
Ø14	90								
	94								
Ø15	95	120							
	86	109							
Ø16	100	130							
	80	104							
Ø18	115	150							
	72	94							
Ø19	120		160	240					
	68		76	88					
Ø20	130		180	260					
	66		77	86					
Ø22	140		190	290					
	59		67	79					
Ø24	150		210	310					
	53		62	71					
Ø25	160		220	320					
	52		62	71					
Ø28			240	360					
			52	61					
Ø30			260	390					
			49	57					
Ø32					330	550	680		
					55	98	121		
Ø35					360	600	700		
					50	90	105		
Ø38					390	650	740		
					46	82	94		
Ø40					410	690	780		
					44	79	89		
Ø42						720	820		
						75	85		
Ø45						770	870		
						70	79		
Ø48						820	930		
						65	74		
Ø50						860	970	2500	
						63	71	98	
Ø55							1070	2750	
							43	89	
Ø60							1160	3000	
							39	82	
Ø65									3300
									67
Ø70									3600
									63
Ø75									3800
									58
Ø80									4100
									55

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.

2.2 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. 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. Provide for the necessary protection devices and covers.

2 Advice

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 Compact** described in here corresponds to the state of the art at the time of printing of these operating/assembly instructions.

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 Compact").
If the operating conditions (performance, speed, modifications on engine and machine) change, the 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 -20 °C to +90 °C of KTR-SI Compact.

We recommend to use 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 other components.
As soon as the limit switch or sensor is activated (overload: release of overload system) the drive should immediately be stopped.
With higher speeds respective braking devices may be necessary.

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 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 in a dry and roofed place for 6 - 9 months.

Humid storage rooms are not suitable.
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 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 fully assembled with finish bore (as specified by the customer) and optionally with the torque set.

4.1 Components of overload systems

Subassembly 1: Components of KTR-SI Compact (hub type 1.0)

Component	Quantity	Description
1.1	1	Hub 1.0
1.2	1	Flange ring DK or SK
1.3	1	Shifting ring
1.4	see table 4	Disk springs (set)
1.6.1	1	Setting nut
1.6.2		Hexagon screw DIN EN ISO 4017 - 12.9
1.7	1	Lock washer
1.8	1 [1)]	Balls
1.9	1	Groove ball bearing DIN 625
1.10	1	Circlip DIN 471
1.11	1	Supporting disk
1.12	1	Circlip DIN 472
1.13	1	Axial needle bearing
1.14	2	Axial disk

1) Complete set

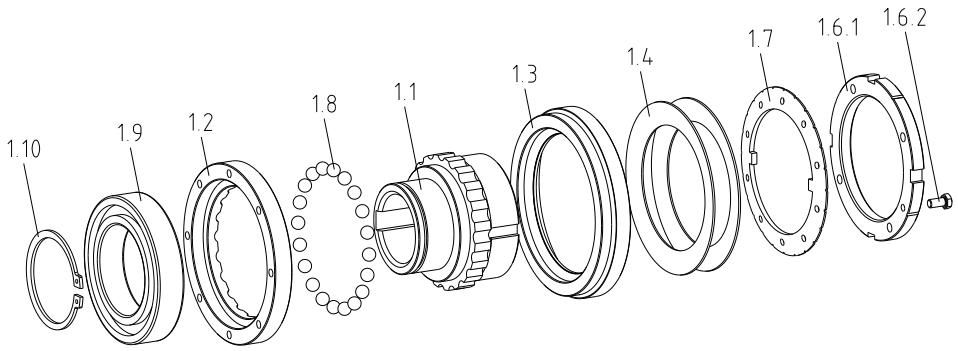


Illustration 7: KTR-SI Compact size 01 to 3

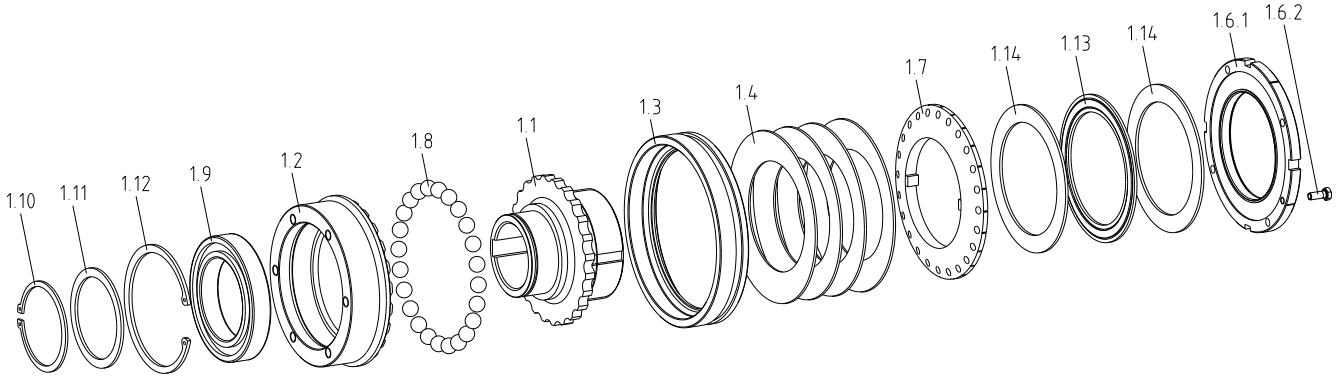


Illustration 8: KTR-SI Compact size 4

4 Assembly

4.1 Components of overload systems

Subassembly 2: Components of KTR-SI Compact (hub type 4.5 with taper bush)

Component	Quantity	Description
2.1	1	Hub 4.5
2.2	1	Flange ring DK or SK
2.3	1	Shifting ring
2.4	see table 4	Disk springs (set)
2.5.1	1	Taper bush
2.5.2		Hexagon screws DIN EN ISO 4017 - 12.9
2.6.1		Setting nut
2.6.2	1	Hexagon screw DIN EN ISO 4017 - 12.9
2.7	1	Lock washer
2.8	1 [1)]	Balls
2.9	1	Groove ball bearing DIN 625
2.10	1	Circlip DIN 471
2.11	1	Supporting disk
2.12	1	Circlip DIN 472
2.13	1	Axial needle bearing
2.14	2	Axial disk

1) Complete set

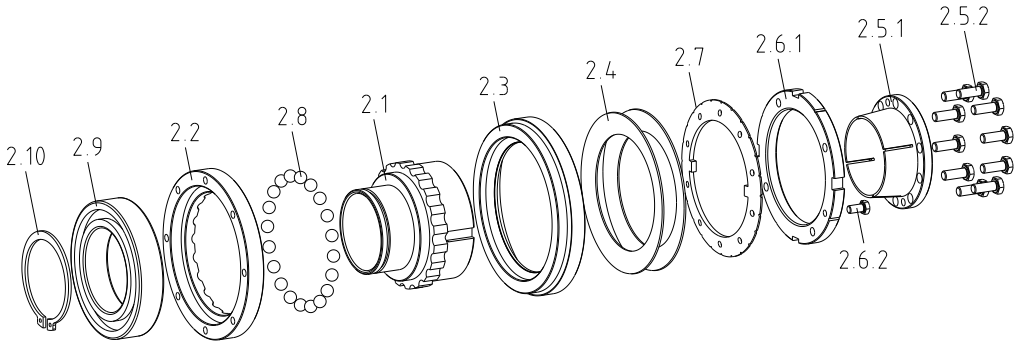


Illustration 9: KTR-SI Compact size 01 to 3

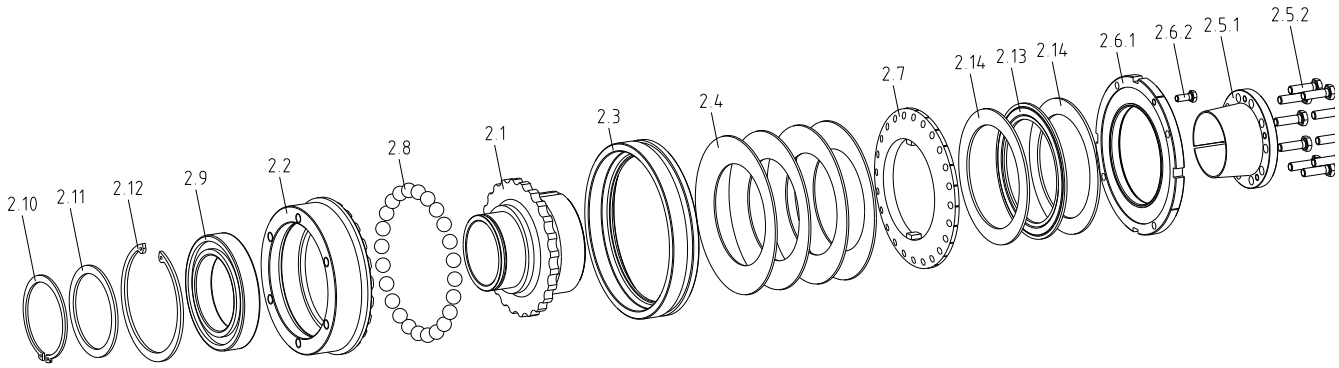


Illustration 10: KTR-SI Compact size 4

4 Assembly

4.1 Components of overload systems

Components of KTR-SI Compact with ROTEX® GS coupling

Components/ subassemblies	Quantity	Description
1/2	1	KTR-SI Compact (complete overload system)
3	1	ROTEX® GS driving flange
4	1	ROTEX® GS spider
5	1	ROTEX® GS hub
6	1)	Cap screws DIN EN ISO 4762 - 12.9
7	1	Setscrew DIN EN ISO 4029

1) see number Z in table 1

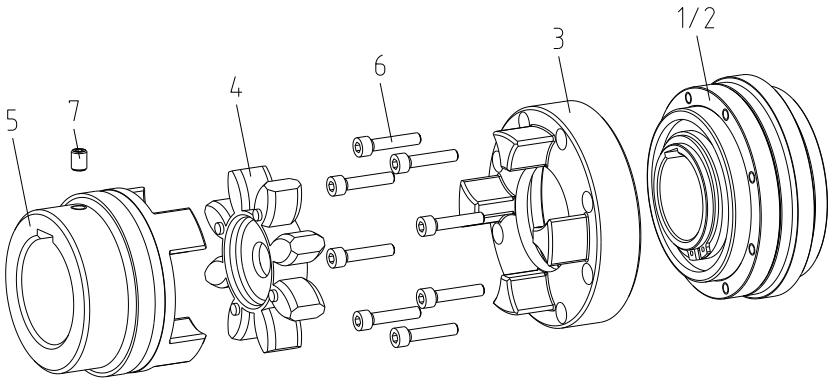
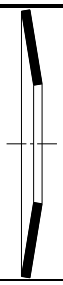
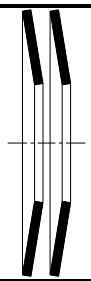
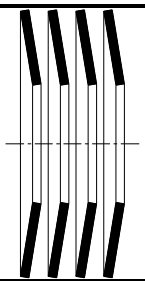


Illustration 11: KTR-SI Compact with ROTEX® GS

4.2 Layering of disk springs

Layering of disk springs with KTR-SI Compact

Table 4:

Layering of disk springs	Design DK and SK		
	T1	T2	T3
Illustration			
Description	1x1	1x2	1x4

4 Assembly

4.3 Advice for finish bore

The maximum permissible bore diameters D (see table 1 and 2 in chapter 1 - technical data) must not be exceeded. If these figures are disregarded, the overload system may tear. Rotating particles may cause danger to life.

- If the bore of the hub is machined by the customer, the overload system needs to be disassembled (see chapter 4.6).
- Axial run-out or concentricity (see illustration 12) 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.

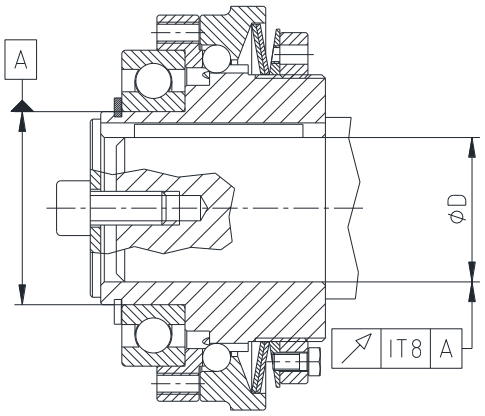


Illustration 12: Concentricity and axial runout

The customer bears the sole responsibility for all machining processes performed subsequently on unbored or pilot bored as well as finish machined 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 in 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.).

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

4 Assembly

4.4 Assembly (general)

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

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

STOP

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

With assembly of the overload system it is not allowed to generate any forces (e. g. by hammer blows or mounting equipment) on the flange ring (component 1.2 or 2.2) and groove ball bearing (component 1.9 or 2.9).

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

4.5 Assembly of the KTR-SI Compact overload system (hub type 1.0)

- Clean the hub bore and shaft and review for dimensional accuracy, 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.

- Mount the KTR-SI Compact flange type (component 1) on the shaft of the driving or driven side.
- Provide for an end plate to fasten the KTR-SI Compact overload system axially (see illustration 13).

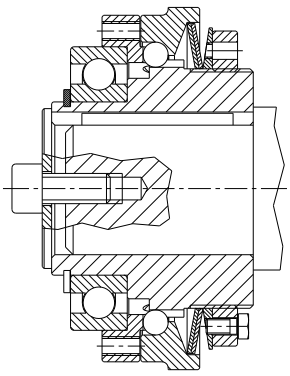


Illustration 13: axial locking

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

4 Assembly

4.6 Assembly of the KTR-SI Compact overload system (hub type 4.5)

☞ **With the use of hollow shafts please observe chapter 4.7 before assembly of KTR-SI Compact.**

- Unscrew the hexagon screws in the taper sleeve (component 2.5.1).
- Clean the hub bore and shaft and review for dimensional accuracy, 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.**

- Mount the KTR-SI Compact flange type (component 2) on the shaft of the driving or driven side.
- Tighten the hexagon screws (component 2.5.2) in the taper sleeve (component 2.5.1) to the tightening torque TA specified in table 3..

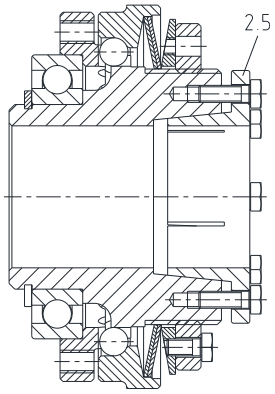


Illustration 14

☞ **If the assembly is repeated the bore of the hub and shaft have to be cleaned and afterwards lubricated with a thin-fluid oil (e. g. Castrol 4 in 1 or Klüber Quietsch-Ex).**

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

4.7 Notes with the use of hollow shafts

The power transmission of **KTR-SI Compact** with hub type 4.5 is frictionally engaged. The necessary surface pressure is transmitted via the hub 4.5 (component 2.1) resp. taper sleeve (component 2.5.1) and consequently to the shaft. The torques or surface pressure specified in table 3 have to be considered.

The strength and dimensions of the shafts (specifically hollow shafts) have to be defined such that sufficient safety against plastic deformation is ensured. This may roughly be reviewed as per the following criterion.

For clamping connections with hollow shafts the required internal diameter of the hollow shaft d_{iW} is calculated based on the following formula:

$$d_{iW} \leq d \cdot \sqrt{\frac{R_{p0,2} - 2 \cdot p_W}{R_{p0,2}}} \quad [mm]$$

Shear stress on the internal shaft diameter for hollow shaft:

$$\sigma_{tiW} \approx - \frac{2 \cdot p_W}{1 - C_W^2} \quad [N / mm^2]$$

Shear stress for solid shaft:

$$\sigma_{tW} = - p_W \quad [N / mm^2]$$

$R_{p0.2}$ = yield strength of shaft material in N/mm²
p_W = surface pressure of hub/shaft in N/mm²
d_{iW} = internal diameter of hollow shaft in mm
d = shaft diameter in mm
C_W = d_{iW} / d

The strength required is not provided if the hollow shaft bore is bigger than the max. internal bore calculated or if the shear stress exceeds the yield strength of the material.
For a detailed calculation please contact KTR.

4 Assembly

4.8 Assembly of KTR-SI Compact with ROTEX® GS coupling

Please consider our operating/assembly instructions KTR-N 45510 additionally when using the ROTEX® GS coupling.

- Mount the KTR-SI Compact overload system (subassembly 1 or 2) on the shaft of the driving or driven side depending on the hub type as per chapter 4.5 resp. 4.6.
- Clean the hub bore and shaft of the ROTEX® GS hub (component 5) and review for dimensional accuracy, afterwards lubricate with a thin oil (e. g. Castrol 4 in 1 or Klüber Quietsch-Ex).

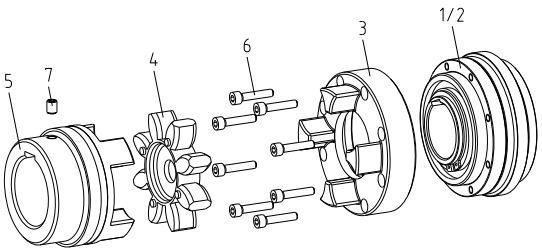


Illustration 15: KTR-SI Compact with ROTEX® GS coupling

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

- Mount the ROTEX® GS hub (component 5) on the shaft of the driving or driven side.
- Hand-tighten the ROTEX® GS driving flange (component 3) with the KTR-SI Compact overload system (subassembly 1 or 2) first.
- Tighten the cap screws (component 6) crosswise to the tightening torques T_A specified in table 6.
- Insert the ROTEX® GS spider (component 4) into the cam section of the ROTEX® GS hub (component 5).
- Shift the power packs in axial direction until the distance dimension E has been achieved (see illustration 16).
- 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® GS hub (component 5) by tightening the setscrew DIN EN ISO 4029 with a cup point (tightening torques T_A see KTR-N 45510).

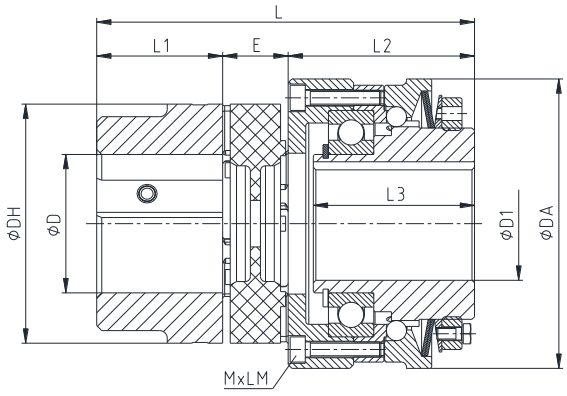


Illustration 16: Assembly of overload system with coupling

With the assembly make sure that the distance dimension E (see table 2) is observed so that the components are not in contact with each other during the operation.
Disregarding this advice may cause damage to the overload system resp. coupling.

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

Table 6: Cap screws DIN EN ISO 4762 (component 6)

Size	01	0	1	2	3	4
Screw size M	M4	M5	M6	M6	M8	M12
Tightening torque T_A in Nm	2.8	5.5	9.6	14	34	115

4 Assembly

4.9 Disassembly of overload system / replacement of single parts (size 01 to 3)

Applies with hub type 4.5 only:

- Unscrew and remove the hexagon screws (component 2.5.2) from the taper sleeve (component 2.5.1).
- Screw the 4-off hexagon screws (component 2.5.2) into the tapped holes of the taper sleeve (component 2.5.1) and lever the taper sleeve from the hub 4.5 (component 2.1) by tightening the hexagon screws. Afterwards remove the hexagon screws from the taper sleeve.

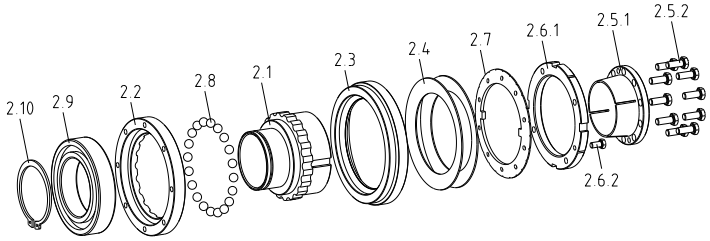


Illustration 17: KTR-SI Compact (hub type 4.5)

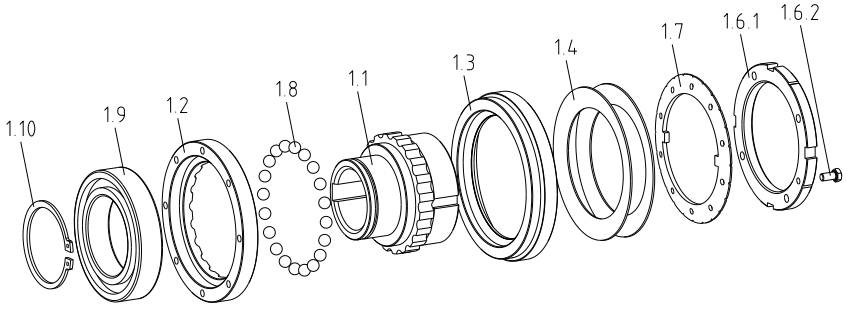


Illustration 18: KTR-SI Compact (hub type 1.0)

Continuation of disassembly with all hub types:

- Unscrew the hexagon screw (component 1.6.2 resp. 2.6.2) from the setting nut (component 1.6.1 resp. 2.6.1), afterwards disassemble the setting nut.
- Remove the locking washer (component 1.7 or 2.7) from the hub (component 1.1 or 2.1).
- Remove the disk springs (component 1.4 or 2.4) and the shifting ring (component 1.3 or 2.3).

☞ **Please note the disk spring layer for the assembly.**

☞ **Please note that the balls (component 1.8 or 2.8) can be omitted when removing the shifting ring (component 1.3 or 2.3).**

- Remove the circlip (component 1.10 or 2.10) from the hub.
- Disassemble the deep groove ball bearing (component 1.9 or 2.9) by means of a suitable puller.
- Remove the flange ring (component 1.2 or 2.2) from the hub (component 1.1 or 2.1).

4 Assembly

4.10 Disassembly of overload system / replacement of single parts (size 4)

Applies with hub type 4.5 only:

- Unscrew and remove the hexagon screws (component 2.5.2) from the taper sleeve (component 2.5.1).
- Screw the 4-off hexagon screws (component 2.5.2) into the tapped holes of the taper sleeve (component 2.5.1) and lever the taper sleeve from the hub 4.5 (component 2.1) by tightening the hexagon screws. Afterwards remove the hexagon screws from the taper sleeve.

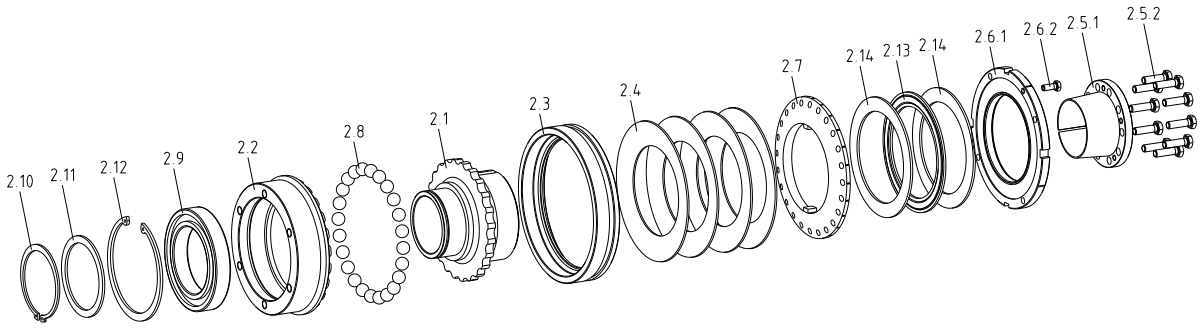


Illustration 19: KTR-SI Compact (hub type 4.5)

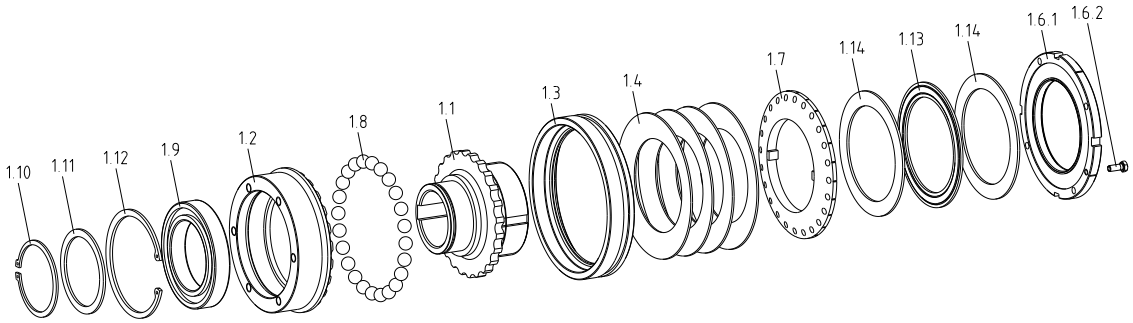


Illustration 20: KTR-SI Compact (hub type 1.0)

Continuation of disassembly with all hub types:

- Unscrew the hexagon screw (component 1.6.2 resp. 2.6.2) from the setting nut (component 1.6.1 resp. 2.6.1), afterwards disassemble the setting nut.
- Remove the axial washers (component 1.14 or 2.14), the axial needle bearing (component 1.13 or 2.13) and the safety disk (component 1.7 or 2.7) from the hub (component 1.1 or 2.1).
- Remove the disk springs (component 1.4 or 2.4) and the shifting ring (component 1.3 or 2.3).

☞ **Please note the disk spring layer for the assembly.**

☞ **Please note that the balls (component 1.8 or 2.8) can be omitted when removing the shifting ring (component 1.3 or 2.3).**

- Remove the locking rings (component 1.10 and 1.12 resp. 2.10 and 2.12) and support disk (component 1.11 resp. 2.11) from the hub (component 1.1 resp. 2.1).
- Disassemble the deep groove ball bearing (component 1.9 or 2.9) by means of a suitable puller.
- Remove the flange ring (component 1.2 or 2.2) from the hub (component 1.1 or 2.1).

4 Assembly

4.11 Assembly of the overload system

The assembly is done in reverse order with the disassembly (see chapter 4.9 and 4.10). For that purpose observe the exploded-view drawings illustration 17 to 20. Components lubricated by the manufacturer may have to be re-lubricated.

☞ **Greasing by usual greases has to be done.**

⚠ **Please note the disk spring layer for the assembly as per chapter 4.2.**

5 Adjustment of torque

☞ **If the torque pre-set cannot be modified by the customer any more, the hexagon screw (component 1.6.2 or 2.6.2) of the setting nut (component 1.6.1 or 2.6.1) has to be removed and coated with Loctite (average strength). Afterwards tighten the hexagon screw at the tightening torque T_A specified in table 7.**

5.1 Torque setting - KTR-SI Compact

Modifying the torque pre-set (release torque)

☞ **The right disk spring layering is a pre-condition to perform a correct torque adjusting. Please use the respective disk spring layering as per table 4 each depending on the setting range (chapter 1).**

☞ **The disk springs are operated in the negative sector of the characteristic curve. Tightening the setting nut causes a reduced release torque. The release torque is increased by un-tightening the setting nut.**

- Unscrew the hexagon screws (see illustration 21) in the taper bush (component 2.5.1).
- Unscrew the locking screw in the setting nut (component 2.7).
- Choose any reference point of the setting nut (component 1.6.1 or 2.6.1) versus a scale mark of the shifting ring (component 1.3 or 2.3).
- Insert the face spanner of table 8 into the respective bores of the setting nut (component 1.6.1 resp. 2.6.1) resp. one of the hook spanners into one of the keyways intended (see illustration 24).
- Turn the setting nut by the number of notches while respecting the torsional direction (see chapter 5.3).

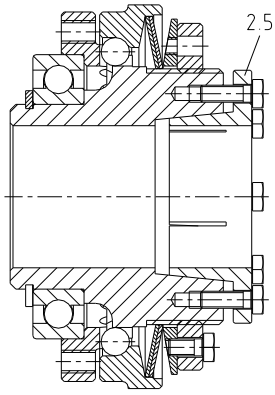


Illustration 21

5 Adjustment of torque

5.1 Torque setting - KTR-SI Compact

☞ **With torque setting please note the setting diagrammes of the respective sizes (see chapter 5.3).**

- Make sure that the tapped hole in the setting nut (component 1.6.1 resp. 2.6.1) is centered towards a through hole in the locking washer (component 1.7 resp. 2.7).
- Having set the torque fasten the setting nut (component 1.6.1 resp. 2.6.1) against working loose via the hexagon screw (component 1.6.2 resp. 2.6.2).
- Remove the torque figure entered from the label.
- Mark the overload system with the new torque pre-set.

Table 7: Hexagon screw DIN EN ISO 4017 (component 1.6.2 or 2.6.2)

Size	01	0	1	2	3	4
Screw size of width across flats	M4	M4	M45	M6	M6	M8
Tightening torque T_A in Nm	4.1	4.1	8.1	14	14	34

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

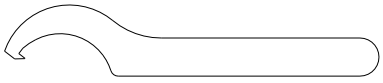
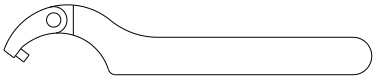
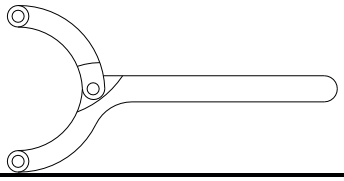
⚠ **Please bear in mind that setting the torque beyond the torque range (see chapter 5.1) may result in misoperation and damage of the overload system.**

☞ **In order to ensure optimum torque setting, KTR-SI Compact should be inspected after initial disengagement processes and reset, if necessary.**

☞ **If KTR-SI Compact was set to the requested torque as per the present operating/assembly instructions, the torque should be considered as a reference value only. For accurate torque setting we would recommend to inspect the torque by means of a suitable measuring system and reset, if necessary.**

☞ **We basically recommend to perform torque setting on KTR's test benches in order to ensure the optimum accuracy of torque setting.**

Table 8: Tools for torque setting

Size	Hook spanner DIN 1810-A	Jointed pin wrench	Jointed face wrench
			
01	Ø65-70	Ø60-90x5	Ø40-80x5
0	Ø80-90		
1			
2	Ø98-105	Ø90-155x6	Ø80-125x6
3	Ø120-130		
4	Ø205-220	Ø155-230x8	Ø125-200x8

5 Adjustment of torque

5.2 Replacement of layering of disk springs

If torque setting is beyond the requested torque range as per chapter 1, the overload system can be reset to the requested torque by adapting the disk spring layering.
We recommend to have the modification and resetting of the overload system performed by KTR's qualified staff.

Driving components falling down may cause injury to persons or damage on the machine.
Secure the driving components during disassembly.

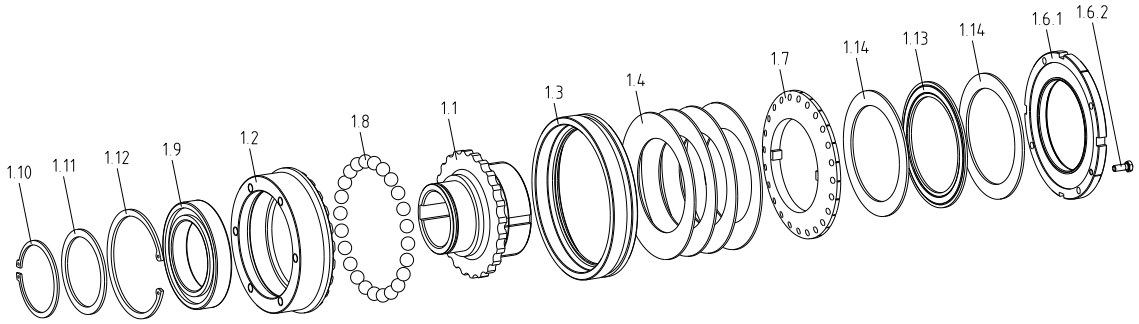


Illustration 22: Example - KTR-SI Compact 4 (hub type 1.0)

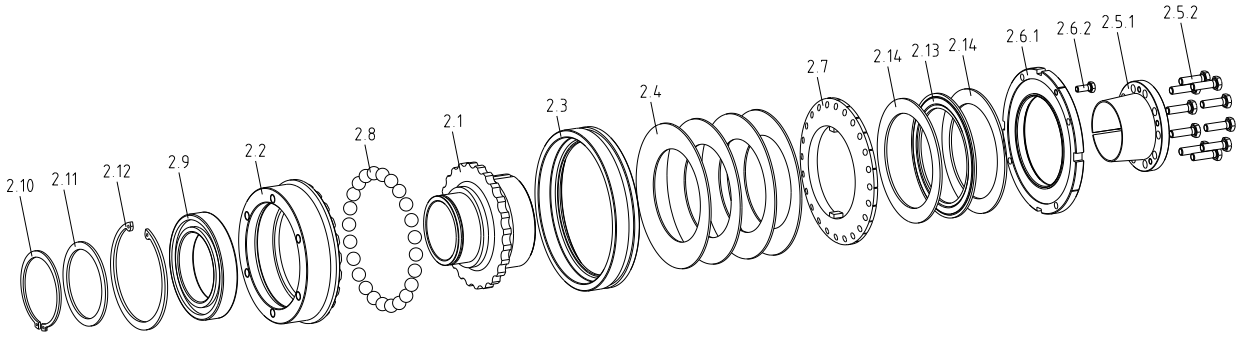


Illustration 23: Example - Assembly of KTR-SI Compact 4

- Disassemble the overload system from the machine and mount it onto a suitable auxiliary shaft.
- Unscrew the hexagon screw (component 1.6.2 resp. 2.6.2) in the setting nut (component 1.6.1 resp. 2.6.1). Do not fully unscrew the hexagon screw.
- Turn back the setting nut (component 1.6.1 resp. 2.6.1) by means of a mounting key (see table 8) until the disk springs (component 1.4 resp. 2.4) are fully released.
- Remove the setting nut (component 1.6.1 resp. 2.6.1) and the locking washer (component 1.7 resp. 2.7) from the hub (component 1.1 resp. 2.1).
- Adjust the disk spring layering as per table 4 (see chapter 4.2) to the requested torque (see chapter 1).
- First mount the locking washer (component 1.7 resp. 2.7), afterwards the setting nut (component 1.6.1 resp. 2.6.1) onto the hub (component 1.1 resp. 2.1).
- Insert the face spanner from table 8 respectively one of the hook spanners into the respective bores of the setting nut (component 1.6.1 resp. 2.6.1).

5 Adjustment of torque

5.2 Replacement of layering of disk springs

- Tighten the setting nut (component 1.6.1 resp. 2.6.1) until it cannot be tightened any more. Afterwards turn back the setting nut by one notch.
- The torque pre-set corresponds to the minimum release torque now.
- Twist the setting nut counterclockwise (component 1.6.1 resp. 2.6.1) by the number of notches.

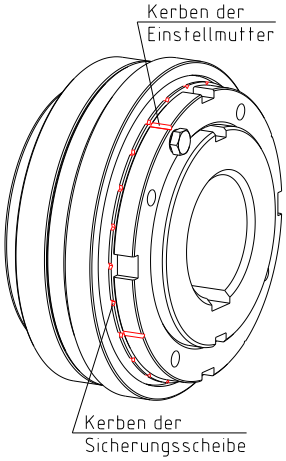


Illustration 24: Notches of setting nut

The disk springs (component 1.4 or 2.4) are operated in the negative sector of the characteristic curve. Tightening the setting nut (component 1.6.1 or 2.6.1) causes a reduced release torque. The release torque is increased by untightening the setting nut.

With torque setting please note the setting diagrammes of the respective sizes (see chapter 5.3).

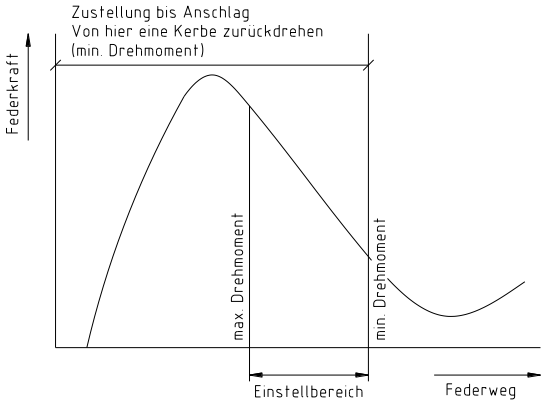


Illustration 25: Spring characteristic

- Make sure that the tapped hole in the setting nut (component 1.6.1 resp. 2.6.1) is centered towards a through hole in the locking washer (component 1.7 resp. 2.7).
- Having set the torque fasten the setting nut (component 1.6.1 resp. 2.6.1) against working loose via the hexagon screw (component 1.6.2 resp. 2.6.2).
- Mark the overload system with the new torque set.
- Disassemble the overload system from the auxiliary shaft.

Driving components falling down may cause injury to persons or damage on the machine. Secure the driving components during disassembly.

In order to ensure optimum torque setting, KTR-SI Compact should be inspected after initial disengagement processes and reset, if necessary.

If KTR-SI Compact was pre-set only or set to the requested torque as per these operating/assembly instructions, the torque should be considered as a reference value only. For accurate torque setting we would recommend to inspect the torque by means of a suitable measuring system and reset, if necessary.

We basically recommend to perform torque setting on KTR's test benches in order to ensure the optimum accuracy of torque setting.

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

5 Adjustment of torque

5.3 Setting diagrammes

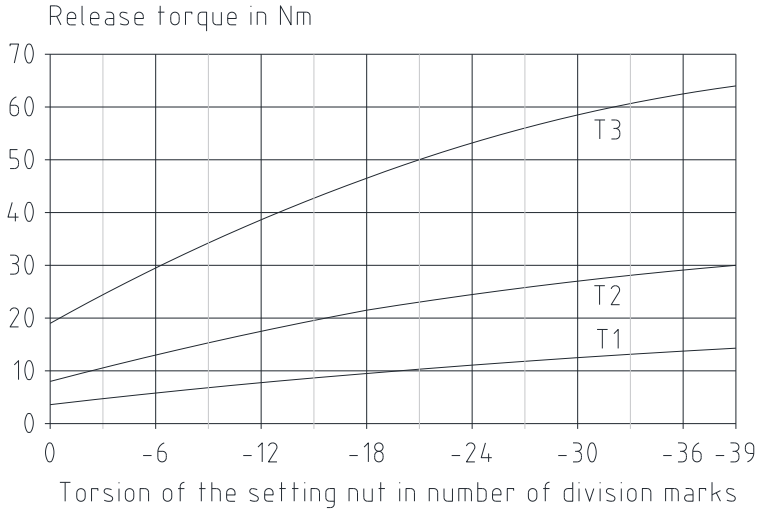


Diagramme 1: KTR-SI Compact 01

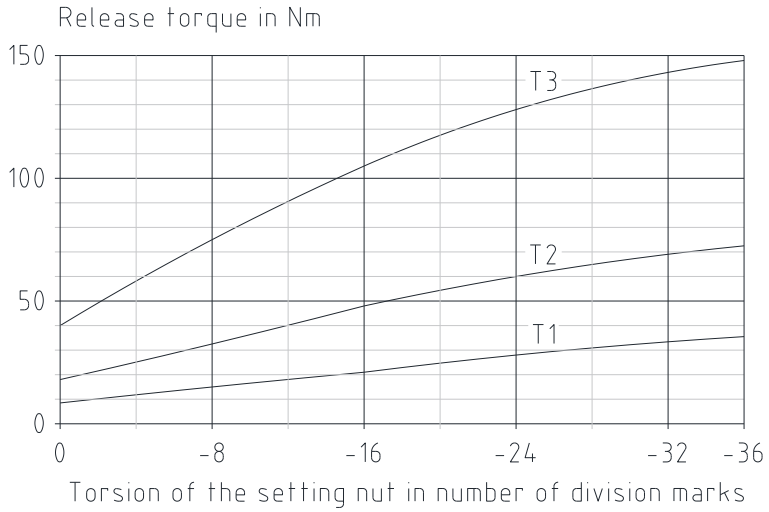


Diagramme 2: KTR-SI Compact 0

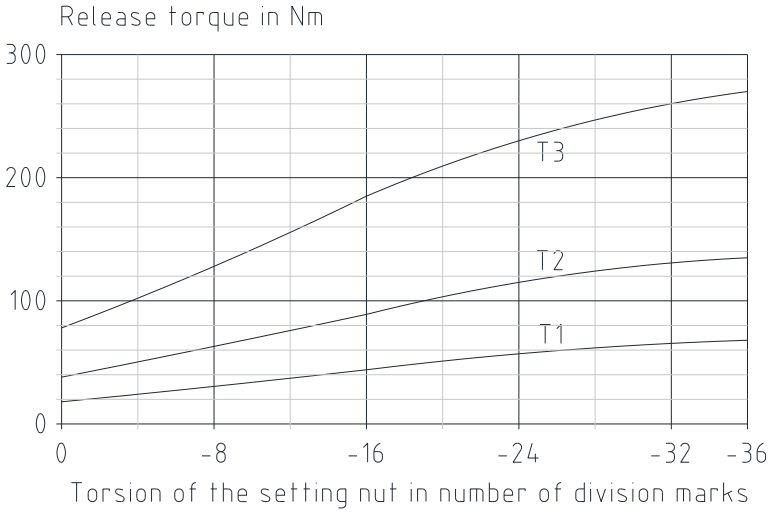


Diagramme 3: KTR-SI Compact 1

5 Adjustment of torque

5.3 Setting diagrammes

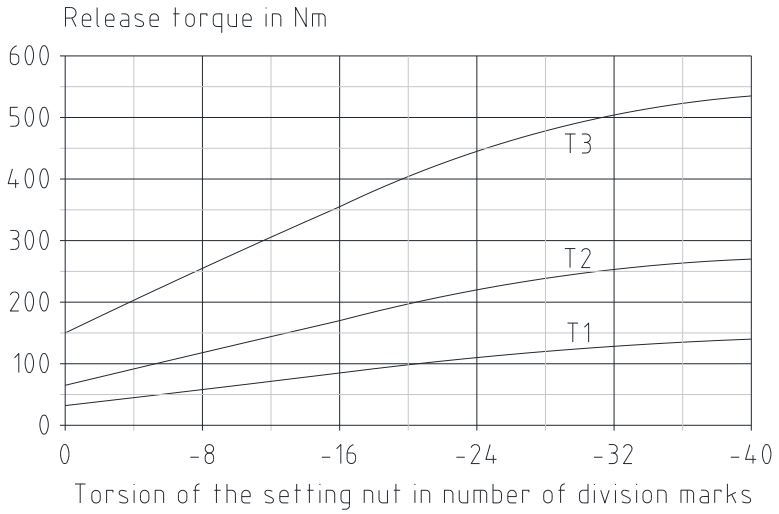


Diagramme 4: KTR-SI Compact 2

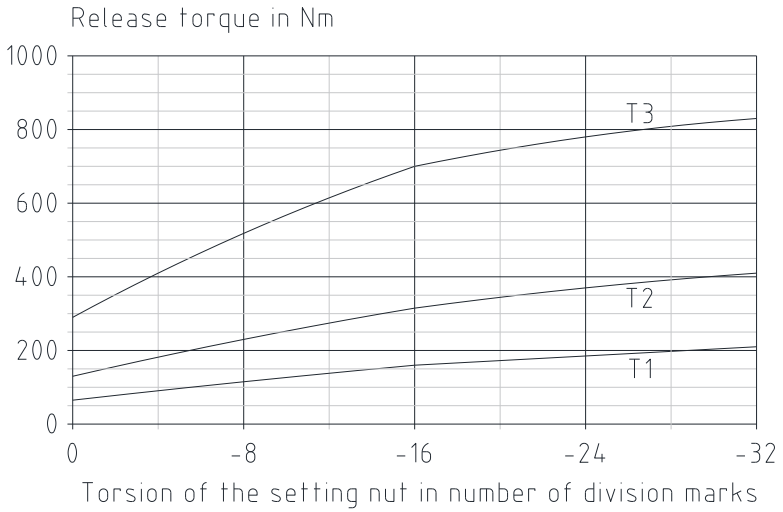


Diagramme 5: KTR-SI Compact 3

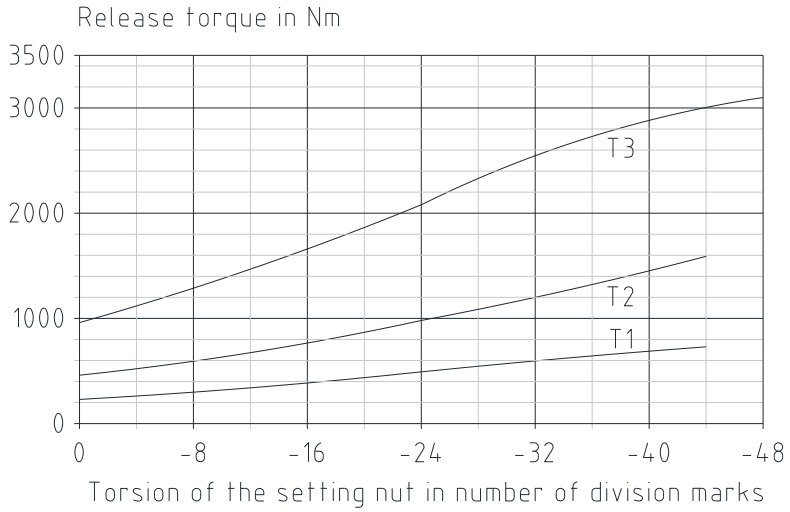


Diagramme 6: KTR-SI Compact 4

6 Assembly of limit switch

If the torque set is exceeded, the overload system disengages with the shifting ring being moved back axially by dimension H (see table 9).
The sensor or limit switch has to be mounted such that signal recording is ensured in this shifting range.

The sensor or limit switch has to be aligned versus KTR-SI Compact such that signal recording of the disengagement process is ensured.

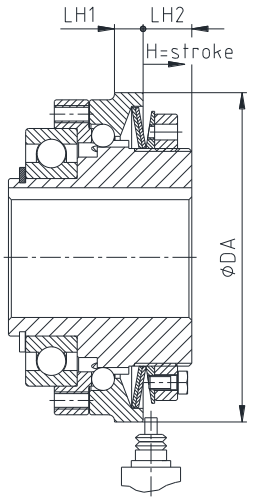


Illustration 26: Mechanical limit switch

Table 9: Position of limit switch

Size	Dimensions in mm			
	LH1	LH2	DA	H = stroke
01	7	12.0	70	1.2
0	8	14.0	85	1.5
1	9	16.0	100	1.8
2	10	17.0	115	2.0
3	12	21.0	135	2.2
4	9 [1)]	38.5	220	3.5

1) Width of keyway (see illustration 2)

Function

The axial stroke of the shifting 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 smooth operation. The sensor should be protected from dirt and potential mechanical failure.

We recommend to use 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 other components.
As soon as the limit switch or sensor is activated (overload: release of overload system) the drive should immediately be stopped.
With higher speeds respective braking devices may be necessary.

7 Breakdowns, causes and elimination

The below-mentioned failures can result in a use of the **KTR-SI Compact** overload system other than intended. In addition to the specifications given in these operating/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 improper use:

- Important data for the selection of the overload system are not forwarded.
- The calculation of the shaft-hub-connection was disregarded.
- 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 are fallen below/exceeded.
- Components are mixed up by mistake/assembled incorrectly.
- No original **KTR** components (purchased parts) are used.
- Maintenance intervals are not observed.

Breakdowns	Causes	Elimination
Different operating noise and/or vibrations occuring	Screws working loose	1) Set the unit out of operation 2) Inspect tightening torque of screws. 3) Inspect torque setting. 4) If you cannot find out the cause of the failure, return the overload system to KTR for inspection
	Setting nut has worked loose	
The overload system releases undefinedly	Torque is not set	1) Set the unit out of operation 2) Adjust torque 3) If you cannot find out the cause of the failure, return the overload system to KTR for inspection
	Torque set incorrectly	
	Setting nut has worked loose	
	Wear	1) Set the unit out of operation 2) Send the overload system to KTR for inspection/repair
Torque is no longer transmitted	Setting nut has worked loose	1) Set the unit out of operation 2) Reset the release torque 3) Tighten and fasten hexagon screw of setting nut
	Wear	1) Set the unit out of operation 2) Send the overload system to KTR for inspection/repair
The torque of KTR SI Compact with ROTEX® GS is no longer transmitted	ROTEX® GS driving flange has worked loose	1) Set the unit out of operation 2) Tighten the fastening screws
ROTEX® GS	Please consider our operating/assembly instructions KTR-N 45510 additionally when using the ROTEX® GS coupling. See chapter 6 *Breakdowns, causes and elimination*	

8 Disposal

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

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

9 Maintenance and service

KTR-SI Compact is a low-maintenance overload system. We recommend to perform a visual inspection on the overload system **at least once a year**. Please pay special attention to the condition, alignment and screw connection of the overload system and the condition of the spider.

The **KTR-SI Compact** overload system is finish bored and provided with grease filling. 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 Compact** has to be regularly inspected for its operation.

In case of overload the drive should be stopped by return.

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

Please consider our operating/assembly instructions KTR-N 45510 additionally when using the ROTEX® GS coupling.

10 Advices for the use of drive components

- Insert the drive element such as belt pulleys or gear wheels with the centering (H7 fit) on the deep groove ball bearing (component 1.9 or 2.9).
- Design the deep groove ball bearing (component 1.9 or 2.9) as a fixed bearing.
- Screw the drive component to the flange ring (component 1.2 or 2.2).

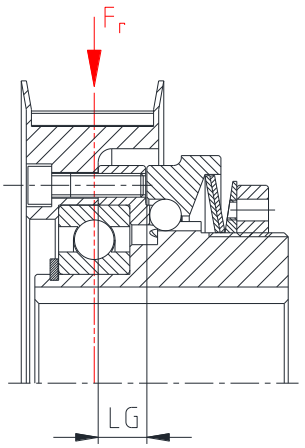


Illustration 27

With the asssembly the maximum depth of engagement LG (see table 1, illustration 27) needs to be observed.
The customer needs to select the screw connection for transmitting the torque.

The pitch line of radial forces F_r arising has to lead through the center of the bearing (see illustration 27).

The radial and axial forces passed into the bearing of the overload system must not exceed the maximum permissible figures (see table 10).

Table 10: Max. bearing load

Size	01	0	1	2	3	4
Axial force in N	670	980	1460	2480	4300	7200
Radial force in N	670	980	1460	2480	4300	7200

11 Spares inventory, customer service addresses

A basic requirement to ensure the readiness for use of the overload system 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.

KTR Systems GmbH
Carl-Zeiss-Str. 25
D-48432 Rheine
Phone: +49 5971 798-0
E-mail: mail@ktr.com