RUFLEX®
Torque limiter

RUFLEX®

RUFLEX® with sprocket

RUFLEX® max.

RUFLEX® with ROTEX®

RUFLEX® with BoWex®

RUFLEX® is a torque limiting and load-holding overload system with positive locking. It protects adjacent components in the drive train from damage.

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1 Technical data

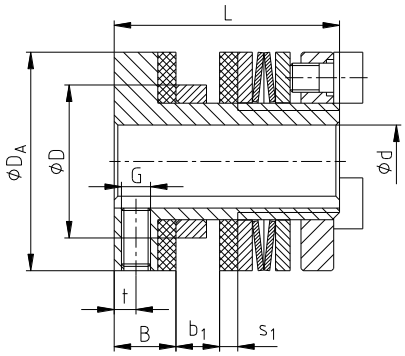

Illustration 1: RUFLEX® size 00

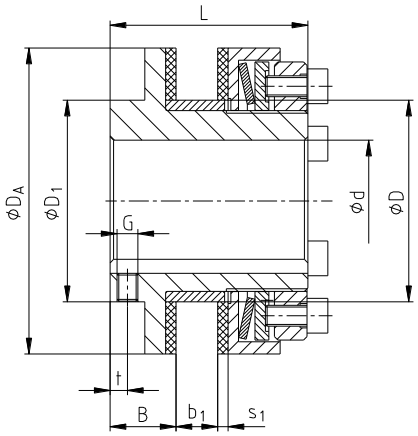

Illustration 2: RUFLEX® size 0 to 5

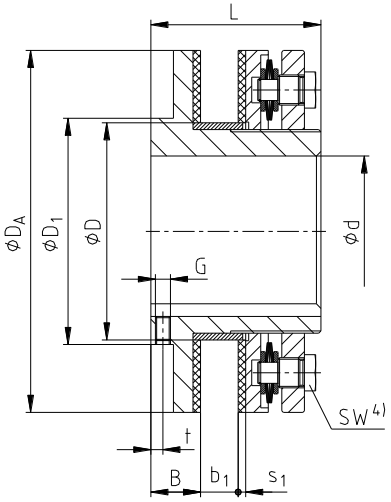

Illustration 3: RUFLEX® size 6 to 9

Table 1: Technical data and dimensions

Size	Max. speed [rpm]	Torque [Nm]			Dimensions [mm]			
					Bore d		D 2)	D_1
		1TF	2TF	3TF 3)	Pilot bore	Max.		
00	10000	(0.5) 5) 1 - 3	2 - 5	-	-	10	21	-
0	8500	2 - 10	4 - 20	-	-	20 1)	35	45
01	6600	5 - 35	10 - 70	-	-	22	40	40
1	5600	20 - 75	40 - 150	130 - 200	-	25	44	45
2	4300	25 - 140	50 - 280	250 - 400	-	35	58	58
3	3300	50 - 300	100 - 600	550 - 800	-	45	72	75
4	2700	90 - 600	180 - 1200	1100 - 1600	-	55	85	90
5	2200	400 - 800	800 - 1600	1400 - 2100	-	65	98	102
6	1900	300 - 1200	600 - 2400	-	38	80	116	120
7	1600	600 - 2200	1200 - 4400	-	45	100	144	150
8	1300	900 - 3400	1800 - 6800	-	58	120	170	180
9	1000	2500 - 6000	6000 - 12000	-	65	140	237	225

Size	Dimensions [mm]							
	D_A	B	Drive component b_1		s_1	L	Thread for setscrews	
			Min.	Max.			t	G
00	30	8.5	2	6	2.5	31	3	M4
0	45	8.5	2	6	2.5	33	3	M4
01	58	16	3	8	3	45	4	M5
1	68	17	3	10	3	52	5	M5
2	88	19	4	12	3	57	5	M6
3	115	21	5	15	4	68	5	M6
4	140	23	6	18	4	78	5	M8
5	170	29	8	20	5	92	8	M8
6	200	31	8	23	5	102	8	M8
7	240	33	8	25	5	113	8	M10
8	285	35	8	25	5	115	8	M10
9	350	53	16	28	6	162	11	M12

1) Finish bore exceeding Ø19, feather keyway according to DIN 6885 sheet 3
2) Bore tolerance (drive component): F8 with size 00 - 4
   H8 with size 5 - 9
3) With clamping setting nut to be used on types limited in dimensions only
4) Hexagon nuts with size 9
5) With special disk spring

1 Technical data

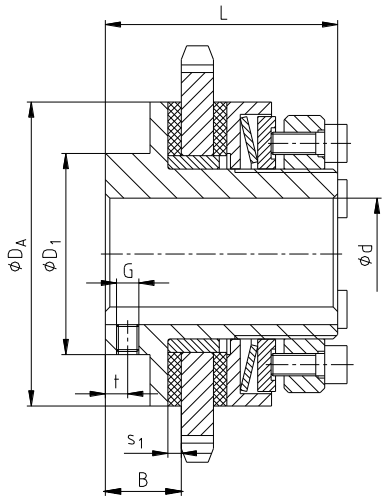

Illustration 4: RUFLEX® with sprocket

Table 2: Technical data and dimensions

Size	Max. speed [rpm]	Torque [Nm]			Dimensions [mm]		
		1TF	2TF	3TF 1)	Max. bore d	D_1	D_A
01	6600	5 - 35	10 - 70	-	22	40	58
1	5600	20 - 75	40 - 150	130 - 200	25	45	68
2	4300	25 - 140	50 - 280	250 - 400	35	58	88
3	3300	50 - 300	100 - 600	550 - 800	45	75	115
4	2700	90 - 600	180 - 1200	1100 - 1600	55	90	140

Size	Dimensions [mm]					
	B	s_1	L	Thread for setscrews		Standard sprocket 2)
				t	G	
01	16	3	45	4	M5	06 B-1 ($^3/_8$ x $^7/_{32}$) z = 23
1	17	3	52	5	M5	08 B-1 ($^1/_2$ x $^5/_{16}$) z = 22
2	19	3	57	5	M6	08 B-1 ($^1/_2$ x $^5/_{16}$) z = 27
3	21	4	68	5	M6	12 B-1 ($^3/_4$ x $^7/_{16}$) z = 22
4	23	4	78	5	M8	16 B-1 (1 x 17,02) z = 21

1) With clamping setting nut to be used on types limited in dimensions only
2) Number of teeth required at the minimum. Other sprockets available on request.

1 Technical data

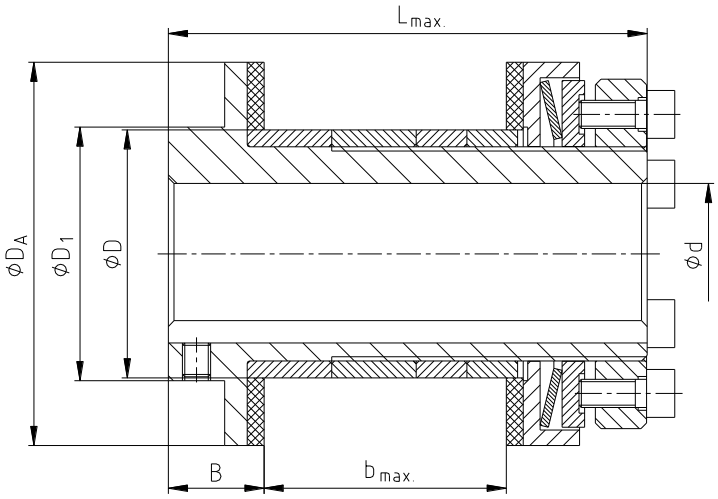

Illustration 5: RUFLEX® max.

Table 3: Technical data and dimensions

Size	Max. speed [rpm]	Torque [Nm]		
		1TF	2TF	3TF 2)
01	6600	5 - 35	10 - 70	-
1	5600	20 - 75	40 - 150	130 - 200
2	4300	25 - 140	50 - 280	250 - 400
3	3300	50 - 300	100 - 600	550 - 800
4	2700	90 - 600	180 - 1200	1100 - 1600

Size	Dimensions [mm]						
	Max. bore d	D_1	D_A	B	Max. b	D 1)	Max. L
01	22	40	58	16	33.0	40	70
1	25	45	68	17	43.0	44	85
2	35	58	88	19	54.0	58	100
3	45	75	115	21	62.0	72	115
4	55	90	140	23	91.5	85	154

1) Bore tolerance (drive component): F8
2) With clamping setting nut to be used on types limited in dimensions only

1 Technical data

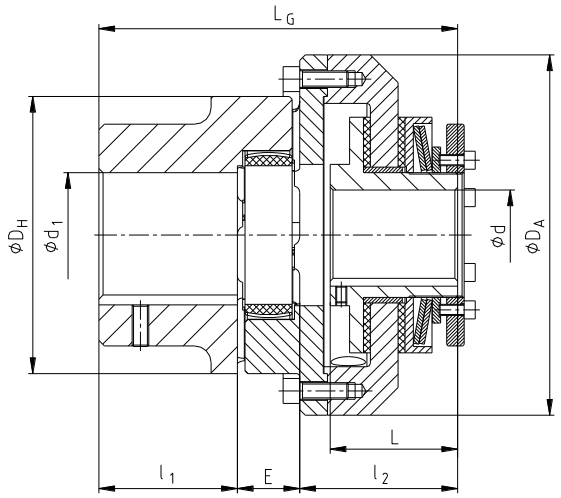

Illustration 6: RUFLEX® with ROTEX®

Table 4: Technical data and dimensions

Size	ROTEX® size	Torque [Nm]			ROTEX® torque [Nm] 98 ShA	
		1TF	2TF	3TF [1]	T_{KN}	$T_{K\,max}$
00	14	(0.5) [3] 1 - 3	2 - 5	-	12.5	25
0	19	2 - 10	4 - 20	-	17	34
01	24	5 - 35	10 - 70	-	60	120
1	28	20 - 75	40 - 150	130 - 200	160	320
2	38	25 - 140	50 - 280	250 - 400	325	650
3	48	50 - 300	100 - 600	550 - 800	525	1050
4	75	90 - 600	180 - 1200	1100 - 1600	1920	3840
5	90	400 - 800	800 - 1600	1400 - 2100	3600	7200
6	100	300 - 1200	600 - 2400	-	4950	9900
7	110	600 - 2200	1200 - 4400	-	7200	14400
8	140	900 - 3400	1800 - 6800	-	12800	25600
9	160	2500 - 6000	6000 - 12000	-	19200	38400

Size	Dimensions [mm]									
	Bore d		Max. bore d_1	D_H	D_A	l_1	l_2	E	L	L_G
	Pilot bore	Max.								
00	-	10	16	30	44	11	35	13	31	59.5
0	-	20 [2]	25	40	63	25	37	16	33	78
01	-	22	35	55	80	30	50	18	45	98
1	-	25	40	65	98	35	58	20	52	113
2	-	35	48	80	120	45	64	24	57	133
3	-	45	62	105	162	56	82	28	68	166
4	-	55	95	160	185	85	80	40	78	205
5	-	65	110	200	260	100	114	45	92	259
6	38	80	115	225	285	110	130	50	102	290
7	45	100	125	255	330	120	142	55	113	317
8	58	120	160	320	410	155	152	65	115	372
9	65	140	185	370	460	175	199	75	161	449

1) With clamping setting nut to be used on types limited in dimensions only
2) Finish bore exceeding Ø19, feather keyway according to DIN 6885 sheet 3
3) With special disk spring

1 Technical data

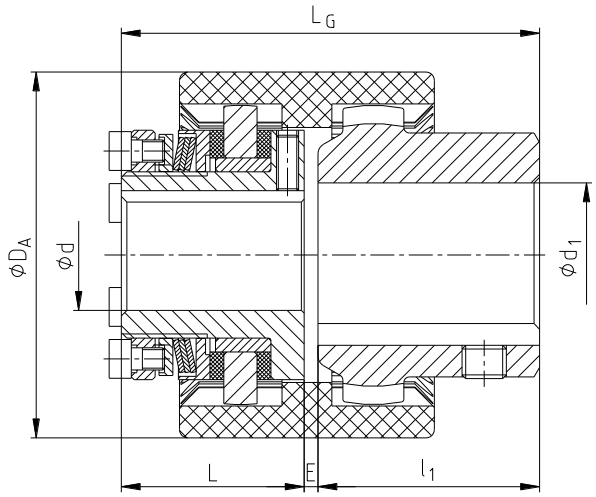

Illustration 7: RUFLEX® with BoWex®

Table 5: Technical data and dimensions

Size	BoWex® size	Torque [Nm]			BoWex® torque [Nm]	
		1TF	2TF	3TF [1]	T_{KN}	$T_{K\,max}$
00	19	(0.5) [3] 1 - 3	2 - 5	-	16	32
0	28	2 - 10	4 - 20	-	45	90
01	38	5 - 35	10 - 70	-	80	160
1	48	20 - 75	40 - 150	130 - 200	140	280
2	65	25 - 140	50 - 280	250 - 400	380	760

Size	Dimensions [mm]						
	Max. bore d	Max. bore d_1	D_A	l_1	L	E	L_G
00	10	19	48	25.0	31	2.5	58.5
0	20 [2]	28	66	40.0	33	2.5	75.5
01	22	38	83	35.5	45	1.0	81.5
1	25	48	95	45.5	52	1.0	98.5
2	35	65	132	64.0	57	1.0	122.0

1) With clamping setting nut to be used on types limited in dimensions only
2) Finish bore exceeding Ø19, feather keyway according to DIN 6885 sheet 3
3) With special disk spring

2 Advice

2.1 General advice

Please read through these operating/assembly instructions carefully before you start up the torque limiter.
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 torque limiter. 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 torque limiter 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 torque limiter have to be performed taking into account "safety first".
- Make sure to switch off the power pack before you perform your work on the torque limiter.
- 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 torque limiter as long as it is in operation.
- Please secure the torque limiter 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 torque limiter if you

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

The torque limiter may only be used in accordance with the technical data (see chapter 1). Unauthorized modifications on the torque limiter 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 **RUFLEX®** described in here corresponds to the technical status at the time of printing of these operating/assembly instructions.

2.5 Selection of torque limiter

For a long-lasting and failure-free operation of the torque limiter it must be selected according to the respective application (see catalogue drive technology „RUFLEX®“).
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.

2.6 Reference to EC Machinery Directive 2006/42/EC

The torque limiters 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 torque limiters 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 torque limiters 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 torque limiter is supplied in assembled condition.

4.1 Components of RUFLEX®

Subassembly 1: Components of RUFLEX® torque limiter size 00 to 5

Component	Number	Description
1.1	1	Hub
1.2	1	Pressure ring
1.3	1	Setting nut
1.4	6 1)	Torque setting screws
1.5	see table 7	Disk spring
1.6	2	Friction lining
1.7	1 2)	Centering plain bush
1.8	1	Setscrews DIN EN ISO 4029
1.9	1	Lock washer
1.10	1	Drive component e. g. sprocket (optional)

1) With size 00 number = 3
2) The number of plain bushes of RUFLEX® max. depends on the width of drive component (customized).

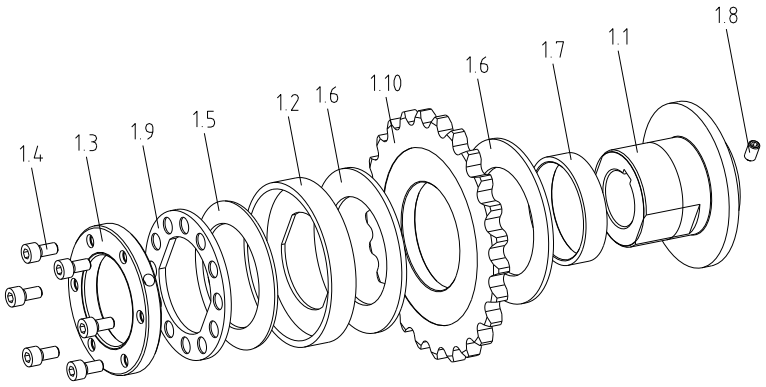

Illustration 8: RUFLEX® size 00 to 5

Subassembly 2: Components of RUFLEX® torque limiter size 6 to 8

Component	Number	Description
2.1	1	Hub
2.2	1	Pressure ring
2.3	1	Setting nut
2.4	see table 6	Setting screws for disk springs
2.5	see table 7	Disk spring
2.6	2	Friction lining
2.7	1 1)	Centering plain bush
2.8	1	Setscrews DIN EN ISO 4029
2.9	1	Cap screw DIN EN ISO 4762
2.10	1	Drive component e. g. sprocket (optional)
2.11	see table 6	Disk DIN 1440
2.12		Snap ring DIN 7993

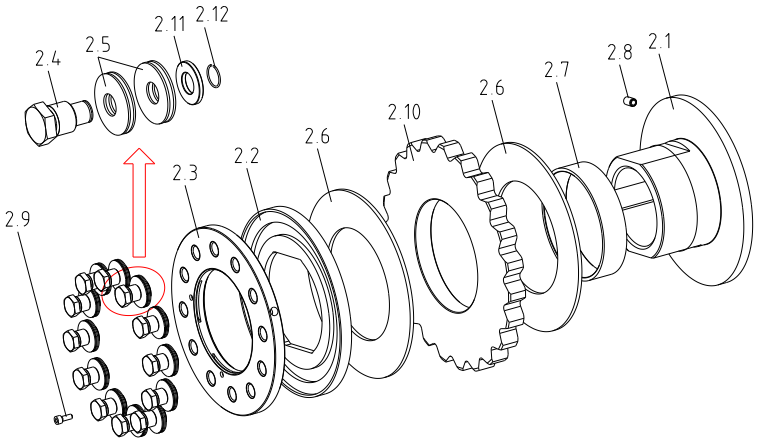

Illustration 9: RUFLEX® size 6 to 8

1) The number of plain bushes of RUFLEX® max. depends on the width of drive component (customized).

Table 6:

Size	6	7	8
Number of setting screws for disk springs (component 2.4)	8	12	16
Number of disks (component 2.11)	8	12	16
Number of snap rings (component 2.12)	8	12	16

4 Assembly

4.1 Components of RUFLEX®

Subassembly 3: Components of RUFLEX® torque limiter size 9

Component	Number	Description
3.1	1	Hub
3.2	1	Pressure ring
3.3	1	Setting nut
3.4	15	Setting screws for disk springs
3.5	see table 7	Disk spring
3.6	2	Friction lining
3.7	1 1)	Centering plain bush
3.8	1	Setscrews DIN EN ISO 4029
3.9	1	Setscrews DIN EN ISO 4029
3.10	1	Drive component e. g. sprocket (optional)
3.11	2)	Lock washer
3.12	15	Circlip DIN 471
3.13	15	Hexagon nut DIN EN ISO 4035

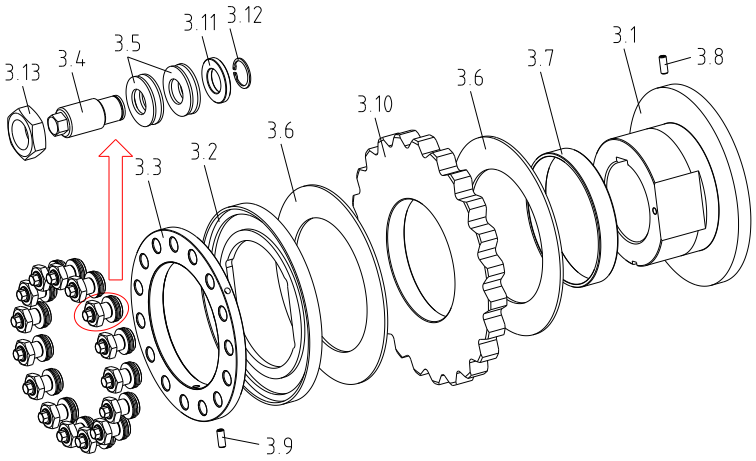

Illustration 10: RUFLEX® size 9

1) The number of plain bushes of RUFLEX® max. depends on the width of drive component (customized).
2) Number with 1 TF = 30, with 2TFD = 15

Components of RUFLEX® torque limiter with ROTEX® coupling

Component/ sub-assembly	Number	Description
1/2/3	1	RUFLEX® (complete torque limiter) with driving component (friction flange)
4	1	ROTEX® driving flange
5	1	ROTEX® hub
6	1	ROTEX® spider
7	1)	Cap screws DIN EN ISO 4762 - 12.9
8	1	Setscrews DIN EN ISO 4029

1) depending on the size of ROTEX® coupling

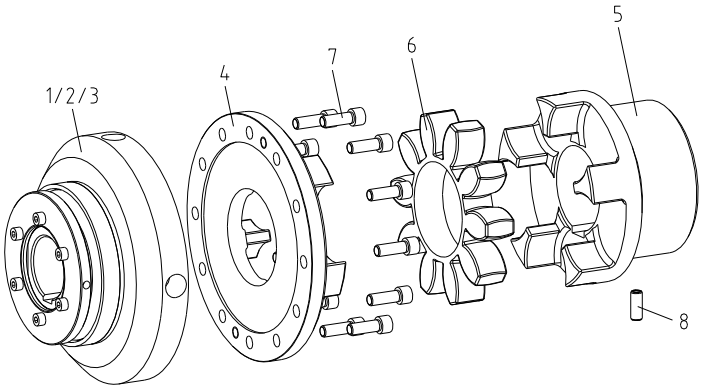

Illustration 11: RUFLEX® with ROTEX®

Components of RUFLEX® torque limiter with BoWex® coupling

Component/ sub-assembly	Number	Description
1/2	1	RUFLEX® (complete torque limiter) with driving component (friction flange)
5	1	BoWex® hub
6	1	BoWex® sleeve
8	1	Setscrews DIN EN ISO 4029

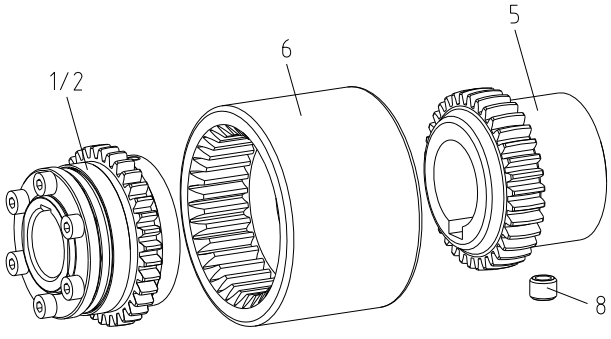

Illustration 12: RUFLEX® with BoWex®

4 Assembly

4.2 Layering of disk springs

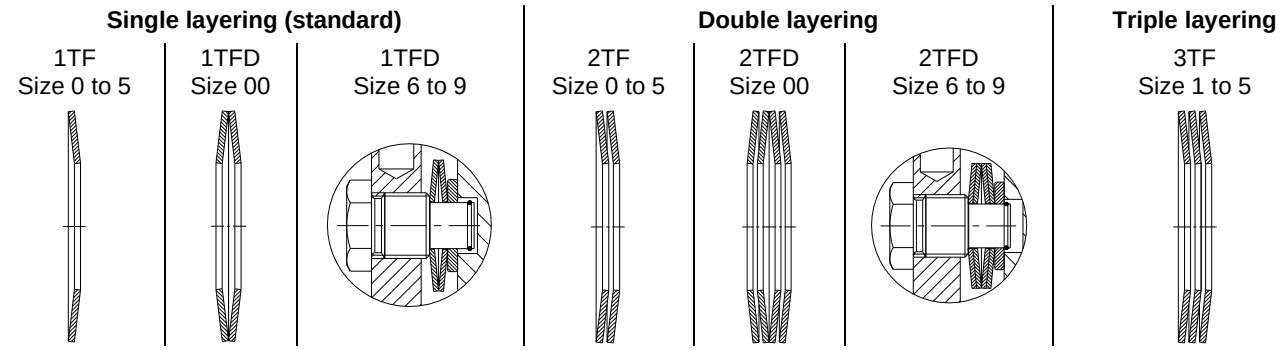

Table 7: Disk springs

Size	00	0	01	1	2	3	4	5	6	7	8	9
Number of disk springs												
1TF	-	1	1	1	1	1	1	1	-	-	-	-
1TFD	2	-	-	-	-	-	-	-	16	24	32	30
2TF	-	2	2	2	2	2	2	2	-	-	-	-
2TFD	4	-	-	-	-	-	-	-	32	48	64	60
3TF	-	-	-	3	3	3	3	3	-	-	-	-

4.3 Advice for finish bore

STOP

The maximum permissible bore diameters d (see table 1 to 5 in chapter 1 - technical data) must not be exceeded. If these figures are disregarded, the torque limiter may tear. Rotating particles may cause danger to life.

- If the bore of the hub is machined by the customer, the torque limiter needs to be disassembled (see chapter 4.6).
- Axial run-out or concentricity (see illustration 13) must 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.
- Please provide for a setscrew according to DIN EN ISO 4029 with a cup point or an end plate to fasten the hubs axially.

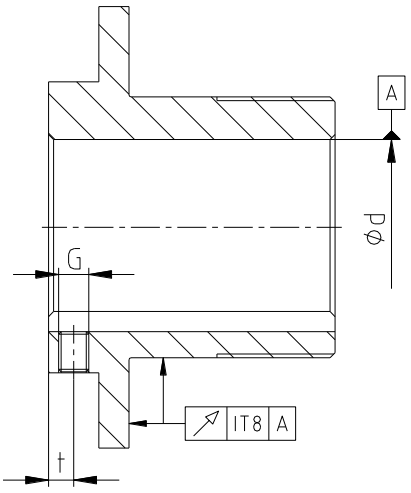

Illustration 13: Concentricity and axial run-out

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 8: Setscrews DIN EN ISO 4029

Size	00	0	01	1	2	3	4	5	6	7	8	9
Dimension G	M4	M4	M5	M5	M6	M6	M8	M8	M8	M10	M10	M12
Dimension t	3	3	4	6	6	6	6	8	8	8	8	11

4 Assembly

4.3 Advice for finish bore

Table 9: 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 standard operating conditions or ISO P9 with complicated 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.

4.4 Assembly (general)

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

Heating the RUFLEX® torque limiter respectively ROTEX® or BoWex® hub lightly (approx. 80 °C) allows for easier mounting onto the shaft.

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

The mounting process of the torque limiter via a mounting device should be done through the hub (component 1.1, 2.1 or 3.1).

- Please make sure the perfect technical condition of the **RUFLEX®** torque limiter.
- Clean the bores, shafts, sliding surfaces of the hub, driving component, thrust washer and friction linings from dirt, oil and grease.
- Please only use original **KTR** components (no purchased parts).

Dirty friction surfaces affect the torque limiter's functioning.The friction linings must not get in contact with oil or grease.

4 Assembly

4.5 Centering plain bush

- Inspect the width of the centering plain bush.

Only valid for size 00:
Centering plain bush = b_1 - 0.5 to 1.0

Only valid for size 0 to 9:
Centering plain bush = 1.5 x s_1 + b_1

Example:
RUFLEX® torque limiter size 1
Width of driving component e. g.
b_1 = 8 mm
Width of friction lining s_1 = 3 mm

Centering plain bush =
1.5 x 3 + 8 = 12.5 mm

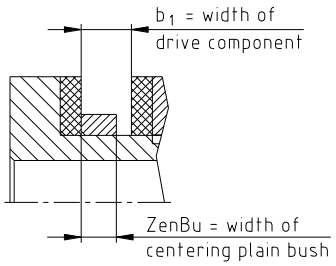

Illustration 14: Centering plain bush with RUFLEX® size 00

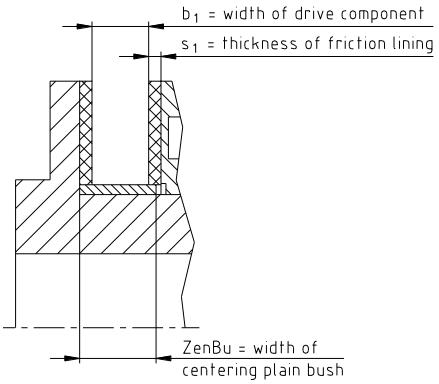

Illustration 15: Centering plain bush with RUFLEX® size 0 to 9

Centering plain bush = Unless any width of driving component is specified in the order, the centering plain bush is supplied with maximum width.

If the specified width of the centering plain bush is not observed, the functioning of the torque limiter is not ensured.

Table 10: Width of centering plain bush

Size	00	0	01	1	2	3	4	5	6	7	8	9
Max. width of centering plain bush	4.2	10	13	15	17	21.5	24.5	28	31	33	33	33

4.6 Assembly of RUFLEX® torque limiter

- Mount the RUFLEX® torque limiter (subassembly 1, 2 or 3) onto the shaft of the driving or driven side.
- Fasten the RUFLEX® torque limiter by tightening the setscrew DIN EN ISO 4029 with a cup point (component 1.8, 2.8 resp. 3.8) (tightening torques see table 11).

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

Table 11: Tightening torques of setscrews DIN EN ISO 4029 (component 1.8, 2.8 and 3.8)

Size	00	0	01	1	2	3	4	5	6	7	8	9
Dimension G	M4	M4	M5	M5	M6	M6	M8	M8	M8	M10	M10	M12
Tightening torque T_A [Nm]	1.5	1.5	2	2	4.8	4.8	10	10	10	17	17	40

4 Assembly

4.7 Assembly of RUFLEX® torque limiter with ROTEX® coupling

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

- Mount the RUFLEX® torque limiter (subassembly 1, 2 or 3) resp. ROTEX® hub (component 5) onto the shafts of the driving and driven side).
- Fasten the RUFLEX® torque limiter (subassembly 1, 2 resp. 3) by tightening the setscrew (component 1.8, 2.8 resp. 3.8) DIN EN ISO 4029 with a cup point (tightening torques see table 11).
- Hand-tighten the ROTEX® driving flange (component 4) and RUFLEX® torque limiter with the cap screws (component 7) first.

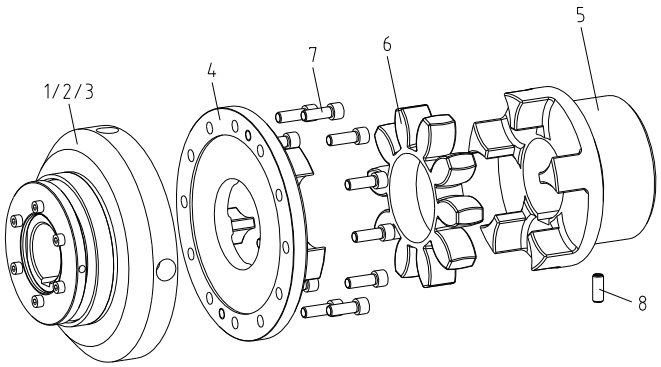

Illustration 16: RUFLEX® with ROTEX®

- Tighten the cap screws (component 7) crosswise via a suitable torque key to the tightening torques T_A specified in table 12.
- Insert the ROTEX® spider (component 6) into the cam section of the ROTEX® hub (component 5).
- Shift the power packs in axial direction until the distance dimension E has been achieved (see illustration 6 or table 4).
- 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 (component 5) by tightening the setscrews (component 8) DIN EN ISO 4029 with a cup point (tightening torque see KTR-N 40210).

With the assembly make sure that the distance dimension E (see illustration 6 and table 4) is observed so that the components are not in contact with each other during the operation. Disregarding this advice may cause damage to the torque limiter resp. coupling.

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

Table 12: Tightening torques of the cap screws DIN EN ISO 4762 (component 7)

Size	00	0	01	1	2	3	4	5	6	7	8	9
Screw size	M3	M4	M4	M5	M5	M6	M12	M12	M12	M16	M20	M20
Tightening torque T_A [Nm]	1.2	2.8	2.8	5.5	5.5	14	115	115	115	290	560	560

4 Assembly

4.8 Assembly of RUFLEX® torque limiter with BoWex® coupling

Please consider our operating/assembly instructions KTR-N 40110 additionally when using the BoWex® coupling.

- Mount the RUFLEX® torque limiter (subassembly 1 or 2) resp. BoWex® hub (component 5) onto the driving or driven side.
- Fasten the hub of the RUFLEX® torque limiter by tightening the setscrew (component 1.8 or 2.8) DIN EN ISO 4029 with a cup point (tightening torques see table 11).
- Put the BoWex® sleeve (component 6) onto the spline of the BoWex® hub (component 5).
- Shift the power packs in axial direction until the distance dimension E has been achieved (see illustration 7 or table 5).

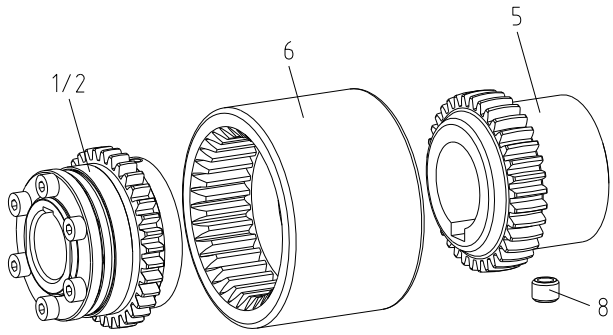

Illustration 17: RUFLEX® with BoWex®

- If the power packs are already firmly assembled, shifting the hubs axially on the shafts allows for setting the distance dimension E.
- Fasten the BoWex® hub (component 5) by tightening the setscrew (component 8) DIN EN ISO 4029 with a cup point (tightening torque see KTR-N 40110).

With the assembly make sure that the distance dimension E (see illustration 7 and table 5) is observed to allow for axial clearance of the BoWex® sleeve (component 6) when in operation.
Disregarding this advice may cause damage to the torque limiter resp. coupling.

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

4.9 Disassembly of the torque limiter / replacement of single parts

Only valid for size 00 to 5:

- Unscrew the torque setting screws (component 1.4) evenly sequentially. During every revolution every screw may only be unscrewed by half a turn. Unscrew all clamping screws until they do no longer protrude in the locking washer.
- Disassemble the setting nut (component 1.3) from the hub (component 1.1).
- Remove the disk springs (component 1.5).

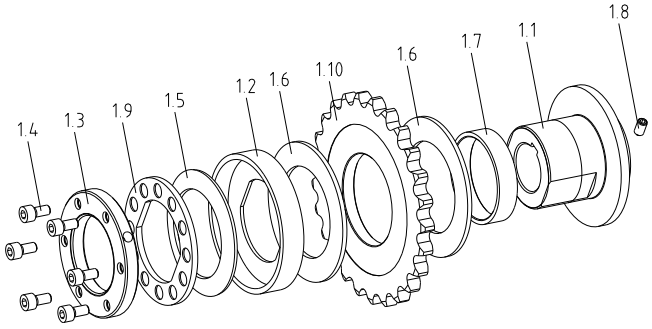

Illustration 18: RUFLEX® size 00 to 5

Please note the disk spring layer for assembly.

4 Assembly

4.9 Disassembly of the torque limiter / replacement of single parts

Only valid for size 6 to 9:

- Turn back the setting screws for disk springs (component 2.4 resp. 3.4) until the disk springs (component 2.5 resp. 3.5) fit the interior of the setting nut (component 2.3 resp. 3.3).
- Only valid for size 6 to 8:
  Unscrew the cap screw (component 2.9) from the setting nut (component 2.3).
  Only valid for size 9:
  Unscrew the setscrew (component 3.9) from the setting nut (component 3.3).
- Disassemble the setting nut (component 2.3 resp. 3.3) from the hub (component 2.1 resp. 3.1).
- Screw the setting screws for disk springs (component 2.4 resp. 3.4) into the setting nut (component 2.3 resp. 3.3) until there is no pressure on the disk springs (component 2.5 resp. 3.5).
- Only valid for size 6 to 8:
  Remove the snap ring (component 2.12) from the setting screws for disk springs (component 2.4).
  Only valid for size 9:
  Remove the snap ring (component 3.12) from the setting screws for disk springs (componenent 3.4).
- Only valid for size 6 to 8:
  Take the locking washer (component 2.11) and disk springs (component 2.5) from the setting screws for disk springs (component 2.4).
  Only valid for size 9:
  Take the locking washer (component 3.11) and disk springs (component 3.5) from the setting screws for disk springs (component 3.4).

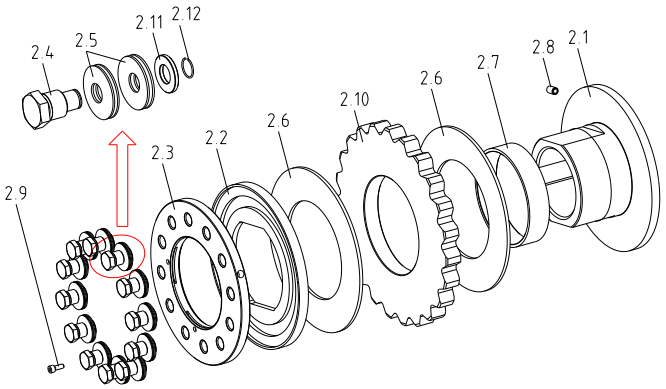

Illustration 19: RUFLEX® size 6 to 8

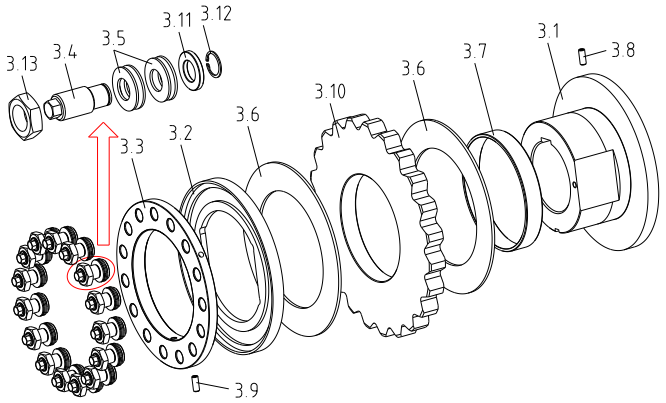

Illustration 20: RUFLEX® size 9

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

Continuation of disassembly with all sizes:

- Remove the thrust ring (componen 1.2, 2.2 resp. 3.2).
- Take the friction linings (component 1.6, 2.6 resp. 3.6) and the driving component (component 1.10, 2.10 resp. 3.10) from the hub (1.1, 2.1 resp. 3.1).
- Remove the centering plain bushes (component 1.7, 2.7 resp. 3.7).

☞ **A needle bearing can be installed instead of the centering plain bush (component 1.7, 2.7 resp. 3.7).**

4 Assembly

4.10 Assembly of the torque limiter

The assembly is done in reverse order with the disassembly (see chapter 4.9). For that purpose observe the exploded-view drawings illustration 8 to 10 resp. 18 to 20. Components lubricated by the manufacturer may have to be re-lubricated.

Lubrication by usual greases has to be done. Make sure that the friction linings remain free from grease.

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

Table 13: Tightening torques of torque setting screws (component 1.4) resp. setting screw for disk springs (component 2.4)

Size	00	0	01	1	2	3	4	5	6	7	8
Width across flats SW	3	3	3	4	5	6	6	6	24	24	24
Tightening torque T_A [Nm]	2.5	2.5	2.5	5	8.5	21	21	21	200	200	200

5 Adjustment of torque

5.1 Initial setting resp. re-setting of slipping torque

Setting a slipping torque not covered by the slipping torque as per table 1 may cause failure and damage of the torque limiter.

The slipping torques specified in the diagrammes refer to driving components made of steel or cast iron as well as friction linings run in. For torque limiters supplied by KTR without being set, run in of the friction linings must be done by the customer. Please contact KTR for further details.
When being set the RUFLEX® torque limiter should slip at approx. 50 % of the respective maximum torque several times to achieve a maximum contact ratio of the friction lining. To achieve the maximum slipping torques specified the contact ratio must be at least 50 %.
The level of the slipping torque set depends on several factors and may vary heavily. That is why we recommend to inspect the slipping torque set of the torque limiter via suitable tools. During the operation there may be bigger deviations from the slipping torque set subject to environmental influences, operating conditions or wear.

5 Adjustment of torque

5.1 Initial setting resp. re-setting of slipping torque

Table 14: Tools for torque setting

Size	Hook spanner DIN 1810-A	Jointed pin wrench	Jointed face wrench
0	Ø40-42	Ø35-60x4	Ø18-40x4
1	Ø52-55		Ø40-80x5
2	Ø68-75	Ø60-90x5	
3	Ø80-90		Ø80-125x6
4	Ø110-115	Ø90-155x8	
5	Ø120-130		Ø125-200x8

RUFLEX® size 00 to 5:

1) Fix the hub (component 1.1) to avoid twisting.
2) Turn back the torque setting screws (component 1.4) until they no longer protrude through the setting nut (component 1.3).
3) Turn the setting nut (component 1.3) manually until it fits with the locking washer (component 1.9). Now you have achieved zero position.
4) To achieve the maxium slippling torque fully screw in the torque setting screws (component 1.4).
5) For a smaller slipping torque unscrew the setting nut (component 1.3) pursuant to the setting diagramme (see diagramme 1 to 8, chapter 5.2) by the angle of setting specified before starting with step 4. Afterwards fully screw in the torque setting screws (component 1.3) (tightening torque T_A see table 13).

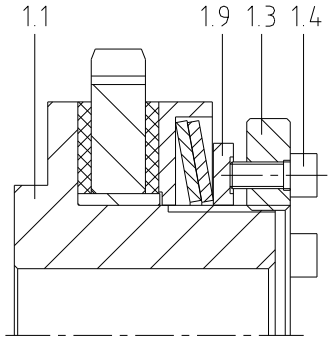

Illustration 21: Torque setting RUFLEX® size 00 to 5

RUFLEX® size 6 to 8:

1) Fix the hub (component 2.1) to avoid twisting.
2) Turn back the setting screws for disk springs (component 2.4) until the disk springs (component 2.5) fit the interior of the setting nut (component 2.3).

The setting screw for disk springs (component 2.4) must not be unscrewed exceeding the resistance of the snap ring (component 2.12).

3) Screw in the setting nut (component 2.3) until the disk (component 2.11) is in contact with the front surface of the thrust ring (component 2.2). Now you have achieved zero position. Fasten the setting nut (component 2.3) via the cap screw (component 2.9) (tightening torque see table 15).

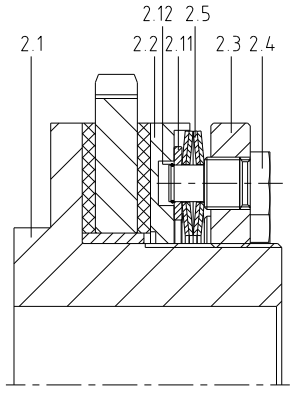

Illustration 22: Torque setting RUFLEX® size 6 to 8

4) To achieve the maximum slippling torque tighten the setting screws for disk springs (component 2.4) evenly (tightening torque see table 13).
5) For a smaller slipping torque unscrew the setting nut (component 2.3) pursuant to the setting diagramme (see diagramme 9 to 11, chapter 5.2) by the angle of setting specified before starting with step 4.

5 Adjustment of torque

5.1 Initial setting resp. re-setting of slipping torque

Table 15: Tightening torques of cap screws (component 2.9)

Size	6	7	8
Screw size	M6x16	M6x16	M6x16
Tightening torque T_A [Nm]	14	14	14

RUFLEX® size 9:

1) Fix the hub (component 3.1) to avoid twisting.
2) Unscrew the hexagon nuts (component 3.13).
3) Turn back the setting screws for disk springs (component 3.4) until the disk springs (component 3.5) fit the interior of the setting nut (component 3.3).

☞ **The setting screw for disk springs (component 3.4) must not exceed the resistance of the snap ring (component 3.12).**

4) Remove the setscrew (component 3.9) from the safety groove of the hub (component 3.1).
5) Screw in the setting nut (component 3.3) until the locking washer (component 3.11) is in contact with the front surface of the thrust ring (component 3.2).
6) Afterwards turn the setting nut (component 3.3) counterclockwise until the setscrew (component 3.9) is flush with the safety groove of the hub (component 3.1).
7) Tighten the setscrew (component 3.9) to the tightening torque T_A = 40 Nm.
8) Hand-tighten the setting screws for disk springs (component 3.4) clockwise until the locking washer (component 3.11) is in contact with the front surface of the thrust ring (component 3.2).
   Now you have achieved zero position.
9) Afterwards turn the setting screw for disk springs (component 3.4) evenly clockwise by the number of setting points (each 3 setting points at the maximum) pursuant to the setting diagramme (see diagramme 12).
   One revolution corresponds to 12 setting points (see illustration 24).
10) Having set the torque, fasten the setting screw for disk springs (component 3.4) by tightening the hexagon nuts (component 3.13) at the tightening torque T_A = 300 Nm.

☞ **One revolution of the setting screw for disk springs (component 3.4) corresponds to 12 setting points (see illustration 24).**

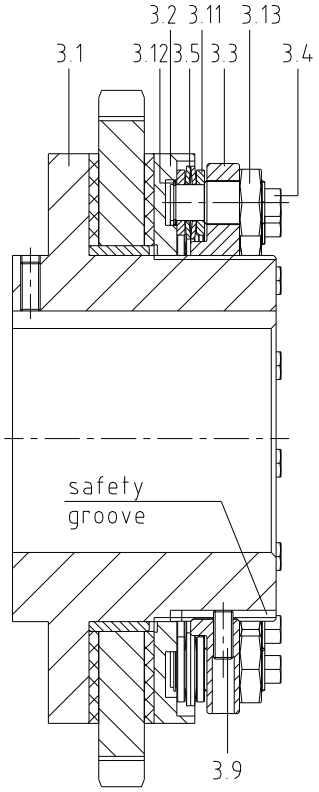

Illustration 23: Torque setting RUFLEX® size 9

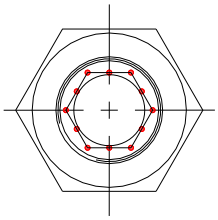

Illustration 23: Setting points

5 Adjustment of torque

5.2 Setting diagrammes

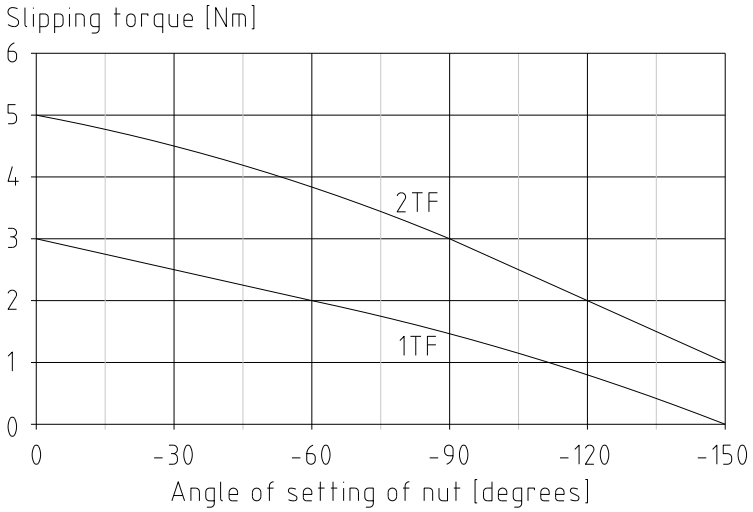

Diagramme 1: RUFLEX® size 00

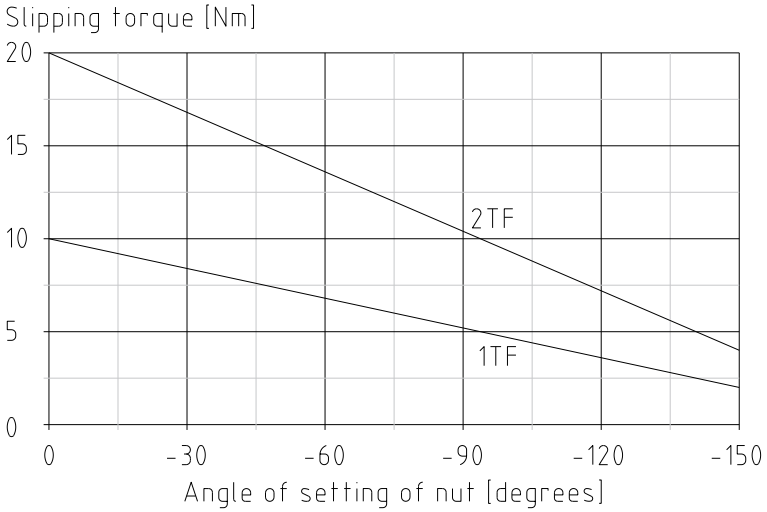

Diagramme 2: RUFLEX® size 0

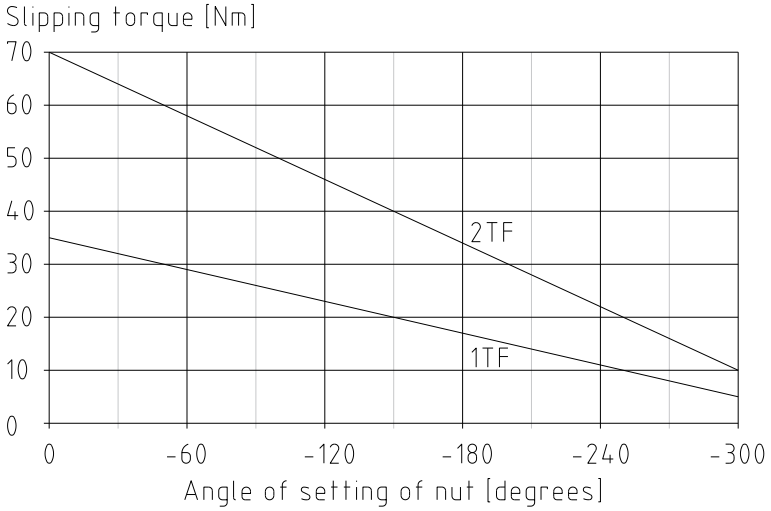

Diagramme 3: RUFLEX® size 01

5 Adjustment of torque

5.2 Setting diagrammes

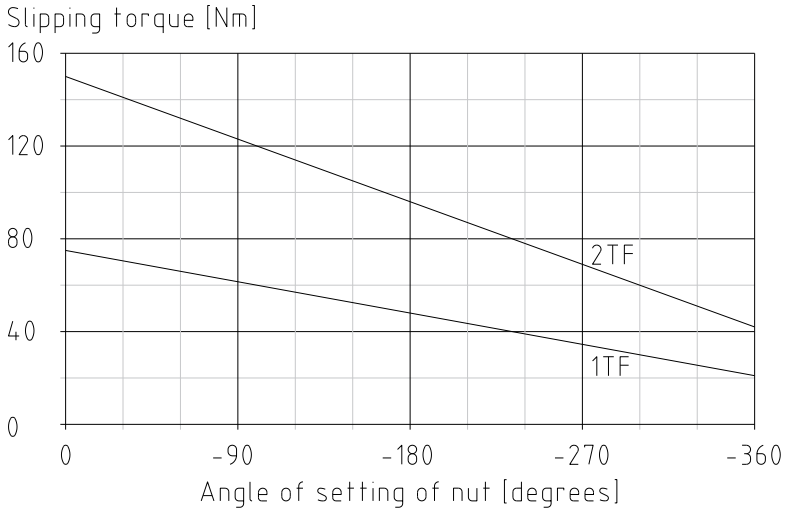

Diagramme 4: RUFLEX® size 1

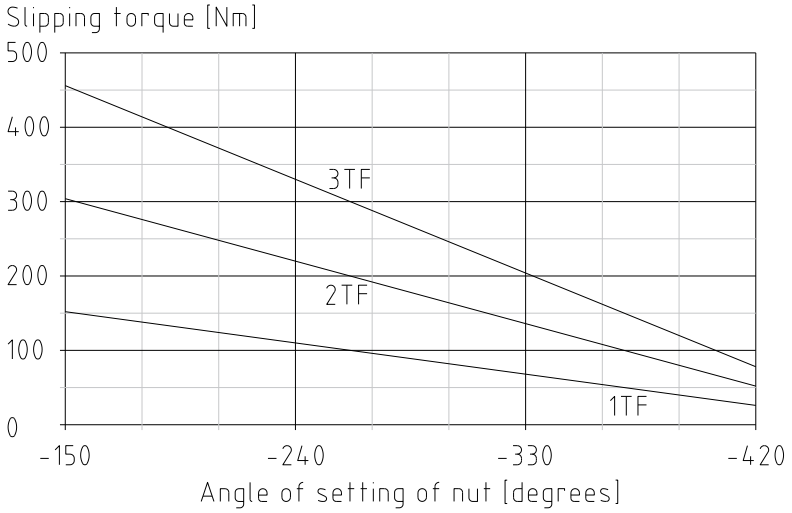

Diagramme 5: RUFLEX® size 2

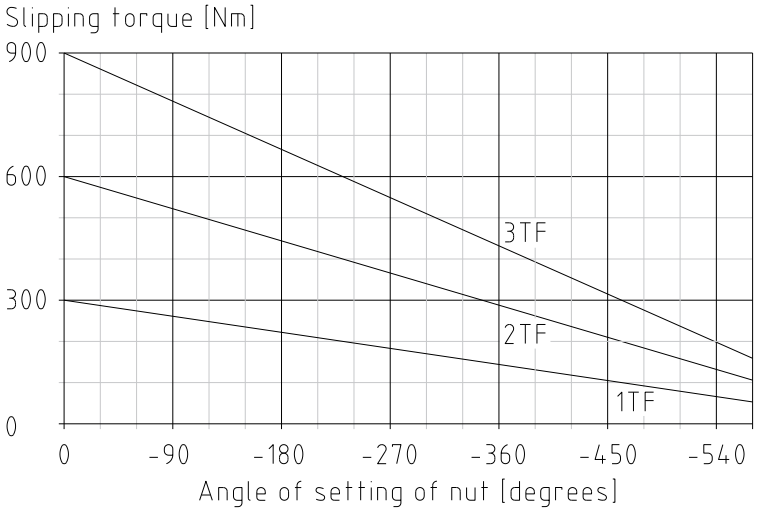

Diagramme 6: RUFLEX® size 3

5 Adjustment of torque

5.2 Setting diagrammes

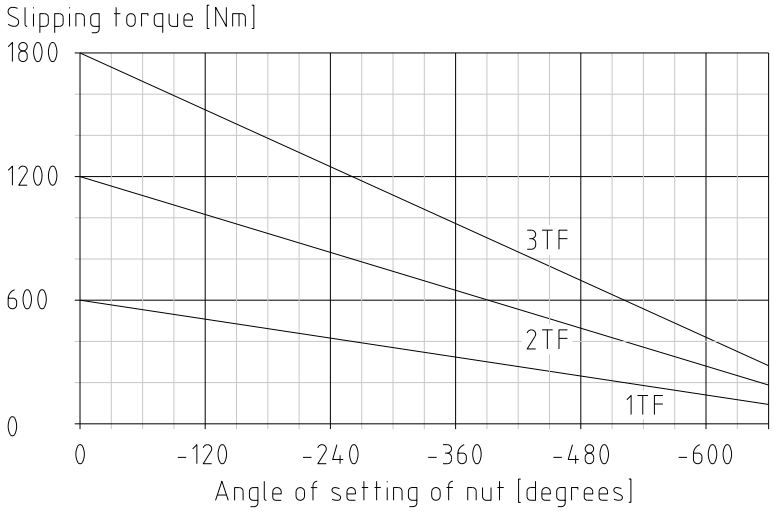

Diagramme 7: RUFLEX® size 4

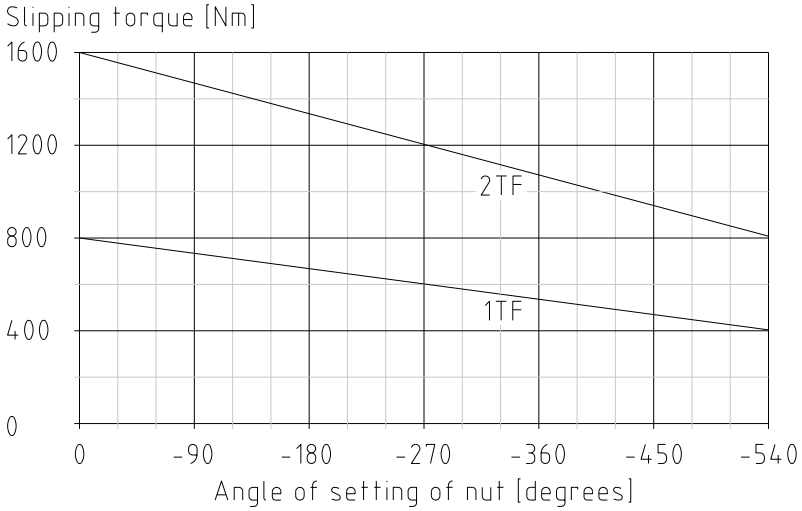

Diagramme 8: RUFLEX® size 5

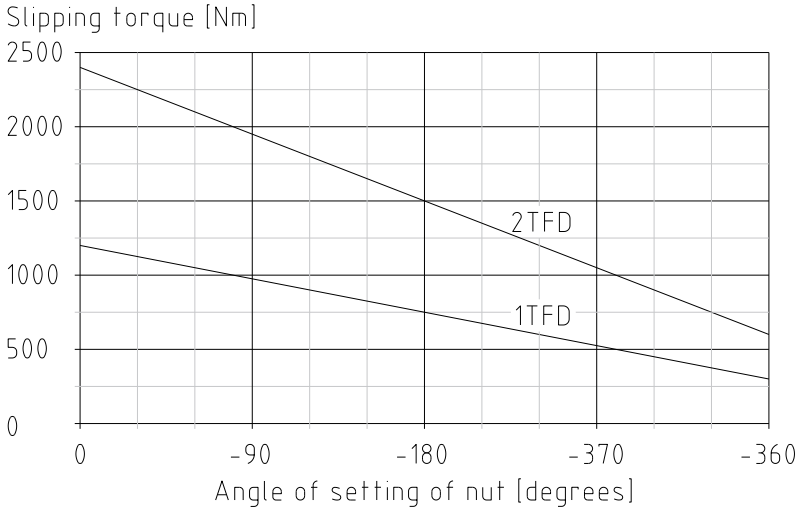

Diagramme 9: RUFLEX® size 6

5 Adjustment of torque

5.2 Setting diagrammes

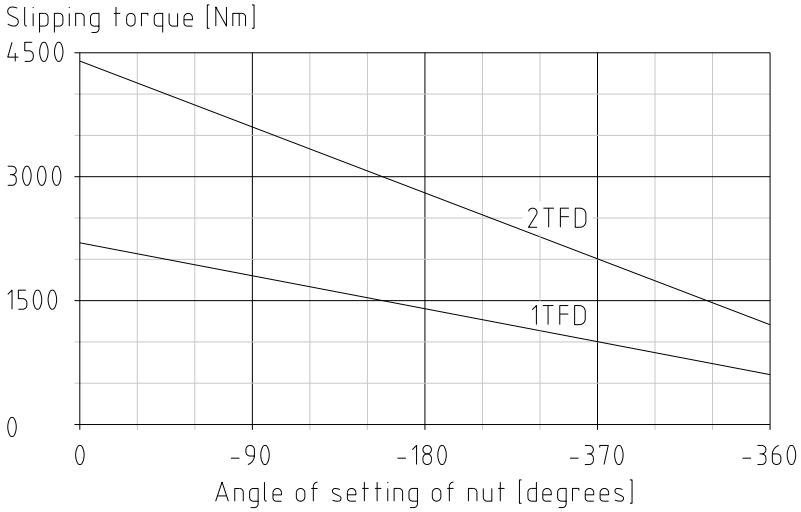

Diagramme 10: RUFLEX® size 7

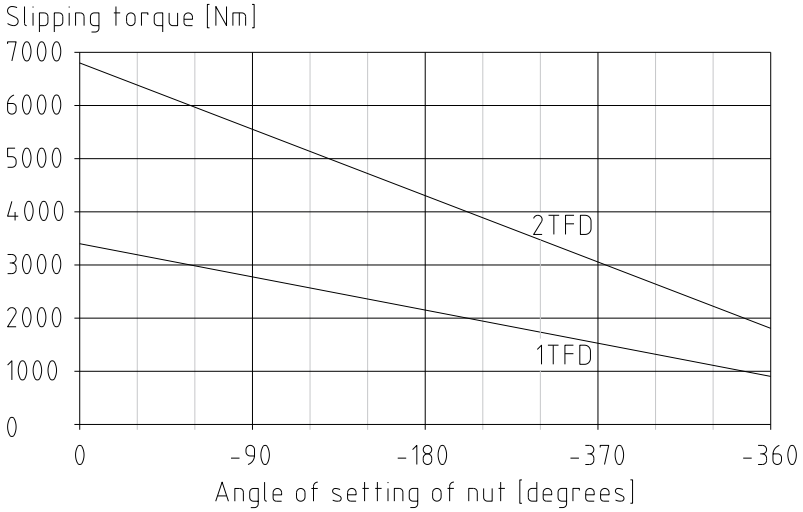

Diagramme 11: RUFLEX® size 8

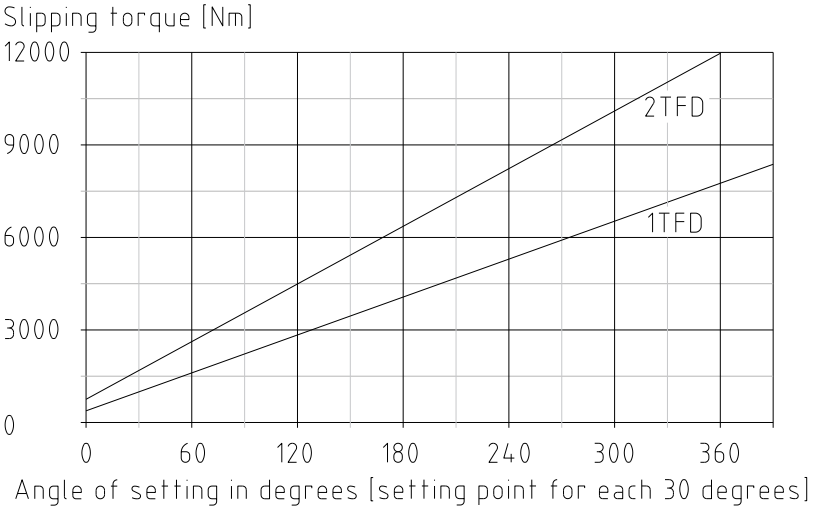

Diagramme 12: RUFLEX® size 9

6 Breakdowns, causes and elimination

The below-mentioned failures can lead to a use of the **RUFLEX®** torque limiter 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 use other than intended:

- Important data for the torque limiter selection 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.

Breakdowns	Causes	Elimination
The torque limiter releases in an undefined position. The torque limiter does not release in case of overload.	Torque is not set	1) Set the unit out of operation 2) Adjust torque, see chapter 5
	Torque set incorrectly	
	Setting nut resp. setting screws have worked loose	
	Wear	1) Set the unit out of operation 2) Send the torque limiter to KTR for inspection/repair
	Oily friction linings	1) Replace friction linings
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 torque limiter)
	Screws working loose	1) Set the unit out of operation 2) Inspect components and replace components that have been damaged 3) Tighten the dowel screws to the tightening torque specified 4) Inspect alignment, adjust if necessary
	Screws/setscrew for axial fastening of flange hubs working loose	1) Set the unit out of operation 2) Inspect alignment 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 torque limiter to KTR for inspection/repair
RUFLEX® with ROTEX® torque is no longer transmitted	ROTEX® driving flange has worked loose	1) Set the unit out of operation 2) Tighten the cap screws
	Torque is not set	1) Set the unit out of operation 2) Adjust torque, see chapter 5
	Torque set incorrectly	
	Setting nut resp. setting screws have worked loose	
	Wear	1) Set the unit out of operation 2) Send the torque limiter to KTR for inspection/repair
	Oily friction linings	Replace friction linings
ROTEX®	Please consider our operating/assembly instructions KTR-N 40210 additionally when using the ROTEX® coupling. See chapter 6 *Breakdowns, causes and elimination*	
BoWex®	Please consider our operating/assembly instructions KTR-N 40110 additionally when using the BoWex® 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.
- **Friction linings**
  Friction linings can be disposed of by residual waste.
- **Greases/oils**
  Greases and oils have to be collected and disposed of by a waste disposal company.

8 Maintenance and service

RUFLEX® is a low-maintenance torque limiter. We recommend to perform a visual inspection on the torque limiter **at least once a year**. In case of extreme drive conditions or heavy dirt, respectively, the RUFLEX® has to be regularly inspected for its operation. If RUFLEX® is ordered in a pilot bored design, the customer has to disassemble it in order to machine a finish bore.

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

Having started up the torque limiter 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 torque limiter 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.