

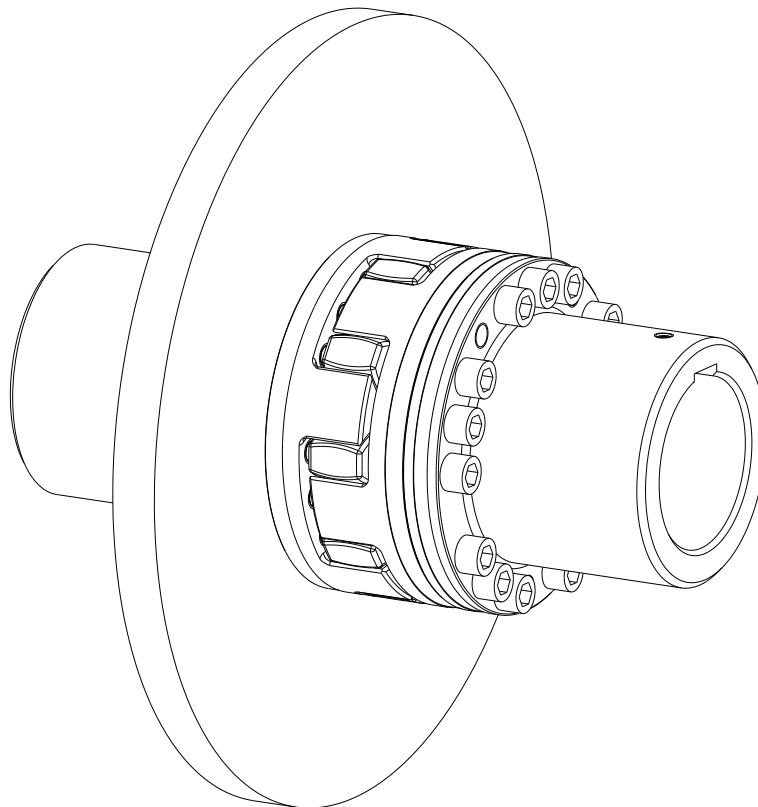
# ROTEX®

Torsionally flexible jaw-type couplings

AFN-SB spec.

and their combinations

for finish bored, pilot bored and unbored couplings



	<b>ROTEX®</b>	KTR-N	40223 EN
	<b>Operating/Assembly instructions</b>	Sheet:	2 of 13
	<b>Type AFN-SB spec.</b>	Edition:	5

**ROTEX®** is a torsionally flexible jaw coupling. It is able to compensate for shaft misalignment, for example caused by manufacturing inaccuracies, thermal expansion, etc.  
Type AFN-SB spec. allows to replace the spider or brake disk without dismounting the driving or driven machine.

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Please observe protection note ISO 16016.	Drawn:	2018-08-29 Pz	Replacing:	KTR-N dated 2017-07-18
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**1 Technical data**

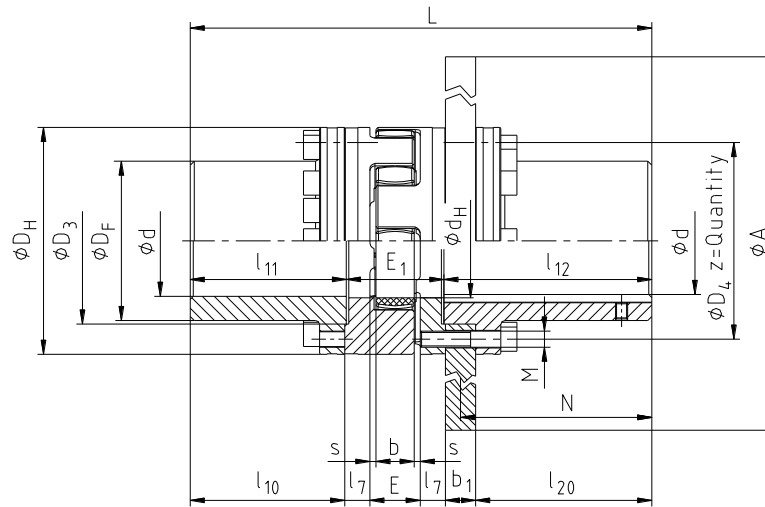


Illustration 1: ROTEX®, type AFN-SB spec.

**Table 1: Dimensions and technical data**

Size	Dimensions [mm]														
	d		D <sub>H</sub>	D <sub>F</sub>	D <sub>3</sub> H7/h7	D <sub>4</sub>	d <sub>H</sub>	E	E <sub>1</sub>	b	s	M	z	Pitch (z x angle)	T <sub>A</sub> [Nm]
65	22	70	135	94	96	116	68	35	65	26	4.5	M10	12	16 x 22.5°	83
75	30	80	160	108	112	136	80	40	75	30	5.0	M12	15	20 x 18°	120
90	40	105	200	142	145	172	100	45	82	34	5.5	M16			295
100	46	115	225	158	165	195	113	50	97	38	6.0	M20			580
110	60	130	255	178	180	218	127	55	103	42	6.5	M24	18	24 x 15°	1000
125	60	150	290	206	215	252	147	60	116	46	7.0				
140	60	170	320	235	245	282	165	65	128	50	7.5	M24	18	24 x 15°	
160	80	200	370	270	280	325	190	75	146	57	9.0				M20
180	85	230	420	315	330	375	220	85	159	64	10.5	M24	18	24 x 15°	1000

Size	Spider <sup>1)</sup> (component 2) Torque [Nm]		Max. speed [rpm]	Max. braking torque <sup>2)</sup> [Nm]	Dimensions [mm]						
	T <sub>KN</sub>	T <sub>Kmax</sub>			l <sub>7</sub>	l <sub>10</sub>	l <sub>11</sub>	l <sub>12</sub>	l <sub>20</sub>	N	L
65	940	1880	3450	1880	16	112.5	113.5	166.0	135	150	344.5
75	1920	3840	3250	3840	19	131.5	133.0	166.5	135	150	374.5
90	3600	7200	3000	7200	20	164.0	165.5	206.5	175	190	454.0
100	4950	9900	2800	9900	25	153.5	155.0	206.5	175	190	458.5
110	7200	14400	2600	14400	26	201.5	203.5	212.5	180	195	518.5
125	10000	20000	2250	20000	30	198.5	200.5	212.5	180	195	528.5
140	12800	25600	1800	25600	34	244.5	247.0	252.5	220 210 <sup>3)</sup>	235 230 <sup>3)</sup>	627.5
160	19200	38400	1500	38400	38	226.5	229.0	252.5	220 210 <sup>3)</sup>	235 230 <sup>3)</sup>	627.5
180	28000	56000	1350	56000	40	195.0	198.0	252.5	220	235	609.5

- Spider 98 ShA
- The maximum braking torque must not exceed the maximum torque (T<sub>Kmax</sub>) of the coupling.
- Dimensions with a width of brake disk b<sub>1</sub> = 40 mm

**Table 2: Selection of brake disk with coupling**

Size	Brake disk ØA x b <sub>1</sub>										
	355 x 30	400 x 30	450 x 30	500 x 30	560 x 30	630 x 30	710 x 30	800 x 30	900 x 30	900 x 40	1000 x 40
65	●	●	●								
75		●	●	●							
90			●	●	●	●					
100				●	●	●					
110				●	●	●	●				
125						●	●	●			
140							●	●	●	●	●
160							●	●	●	●	●
180							●	●	●	●	●

## 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 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 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 **ROTEX® AFN-SB spec.** described in here corresponds to the technical status at the time of printing of these operating/assembly instructions.

### 2.5 Coupling selection



**For a permanent and failure-free operation of the coupling it must be selected according to the selection instructions (according to DIN 740 part 2) for the particular application (see catalogue drive technology "ROTEX®").**

**If the operating conditions (performance, speed, modifications on engine and machine) change, the coupling selection must be reviewed.**

**Please make sure that the technical data regarding torque refer to the spider only. The transmittable torque of the shaft-hub-connection must be reviewed by the customer and is subject to his responsibility.**

For drives subject to torsional vibrations (drives with cyclic stress due to torsional vibrations) it is necessary to perform a torsional vibration calculation to ensure a reliable selection. Typical drives subject to torsional vibrations are e. g. drives with diesel engines, piston pumps, piston compressors etc. If requested, KTR will perform the coupling selection and the torsional vibration calculation.

### 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. The features of the coupling spiders (elastomers) remain unchanged for up to 5 years with favourable storage conditions.



**The storage rooms must not include any ozone-generating devices like e. g. fluorescent light sources, mercury-vapour lamps or electrical high-voltage appliances. Humid storage rooms are not suitable.**

**Please make sure that condensation is not generated. The best relative air humidity is less than 65 %.**



**3 Storage, transport and packaging**

**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 generally supplied in individual parts. Before assembly the coupling has to be inspected for completeness.

**4.1 Components of the coupling**

**Components of ROTEX®, shaft coupling type No. 001**

Component	Quantity	Description
1a	see table 1	Cap screws DIN EN ISO 4762 - Mxl
1b	see table 1	Cap screws DIN EN ISO 4762 - Mxl <sub>1</sub>
2	1	Spider
3Na	2	Driving flange N type A
4Nv	1	Coupling flange N lengthened
4Nx	1	Coupling flange N spec.
5	2	Setscrews DIN EN ISO 4029
15Nx	1	SB brake disk N

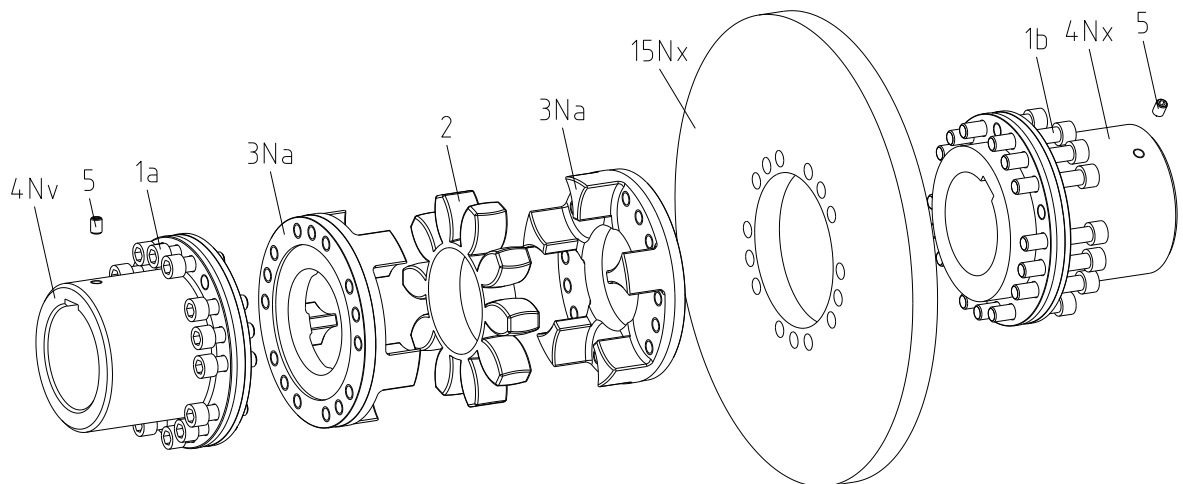




Illustration 2: ROTEX®, type AFN-SB spec.

**Features of standard spiders**

Spider hardness (Shore)	98 Shore A	
	T-PUR® (purple)	PUR (red)
Marking (colour)		

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## 4 Assembly

### 4.2 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 coupling may tear. Rotating particles may cause danger to life.

- Bores on the coupling flange machined by the customer have to observe concentricity or axial runout, respectively (see illustration 3).
- Please make absolutely sure to observe the figures for  $\varnothing d_{max}$ .
- Please review the length of the centering spigot  $l_x$  (see table 3).  $l_x = b_1 + l_z$
- Carefully align the coupling flanges 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 coupling flanges axially.

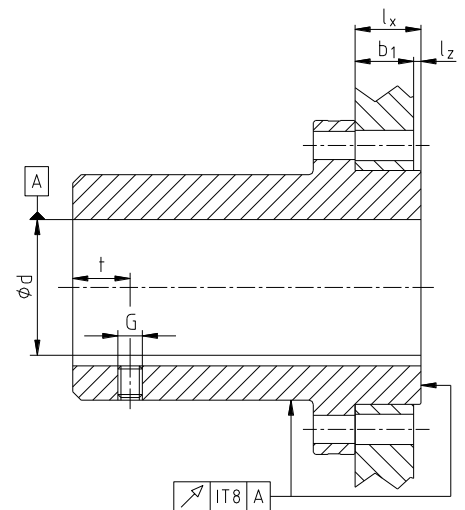


Illustration 3: Concentricity and axial runout

$b_1$  = width of brake disk

$l_z$  = pilot length of driving flange



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 3: Dimensions  $l_z$**

Size	65	75	90	100	110	125	140	160	180
Dimension $l_z$	1.0 +0.2	1.5 +0.2	1.5 +0.2	1.5 +0.2	2.0 +0.2	2.0 +0.2	2.5 +0.2	2.5 +0.2	3.0 +0.2

**Table 4: Setscrews DIN EN ISO 4029**

Size	65	75	90	100	110	125	140	160	180
Dimension G	M10	M10	M12	M12	M16	M16	M20	M20	M20
Dimension t	20	25	30	30	35	40	45	50	50
Tightening torque $T_A$ [Nm]	17	17	40	40	80	80	140	140	140

**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.).

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

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## 4 Assembly

### 4.3 Assembly of the coupling



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



Heating the coupling flanges lightly (approx. 80 °C) allows for an easier mounting on the shaft.



Touching the heated coupling flanges causes burns. Please wear safety gloves.



With the assembly please make sure that the distance dimension  $E$  or  $E_1$  (see table 1) is observed to allow for axial clearance of the spider when in operation. Disregarding this advice may cause damage to the coupling.

- Mount the coupling flanges (component 4Nv and 4Nx) onto the shaft of driving and driven side. The coupling flange (component 4Nx) for the assembly of the brake disk (component 15Nx) has to be mounted to the shaft end which has the bigger mass moment of inertia (see illustration 4).
- The internal sides of the coupling flanges (component 4Nv and 4Nx) must be flush with the front sides of the shafts (see illustration 4).
- Shift the power packs in axial direction until the distance dimension  $E_1$  is achieved (see illustration 4).
- Fasten the coupling flanges (component 4Nv and 4Nx) by tightening the setscrews DIN EN ISO 4029 with a cup point (tightening torque see table 4) or an end plate.
- Mount the brake disk (component 15Nx) onto the centering shoulder of the coupling flange (component 4Nx) (see illustration 5).
- Stick the driving flanges (component 3Na) and the spider (component 2) together (see illustration 6).
- Install the components stuck together between the coupling flanges (component 4Nv and 4Nx) (see illustration 7) and hand-tighten the components with the cap screws (component 1a and 1b) first.
- Tighten the screws at the tightening torques  $T_A$  specified in table 1 by means of a suitable torque key.
- Center the spider (component 2) between the driving flanges (component 3Na) and check the dimensions  $E$  and  $s$  (see illustration 1).

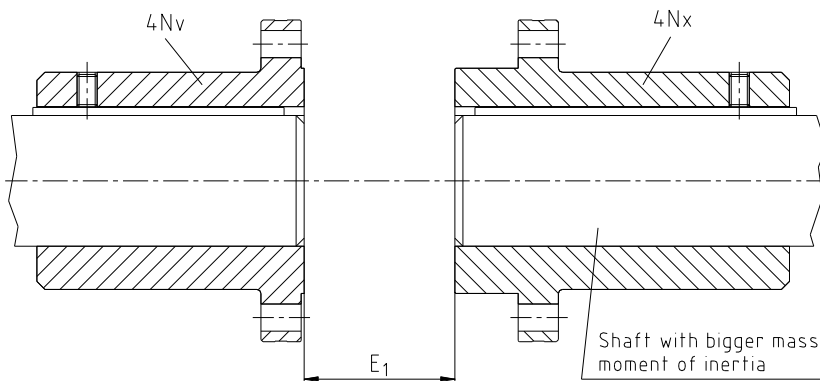


Illustration 4: Assembly of coupling flanges

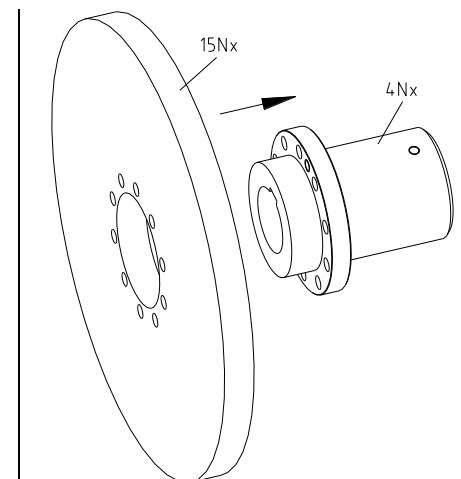


Illustration 5





4 Assembly

4.3 Assembly of the coupling

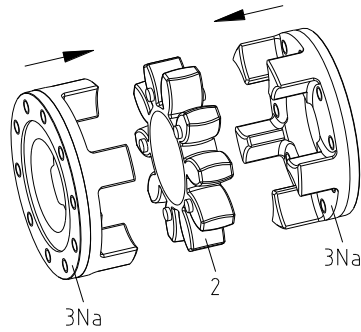


Illustration 6

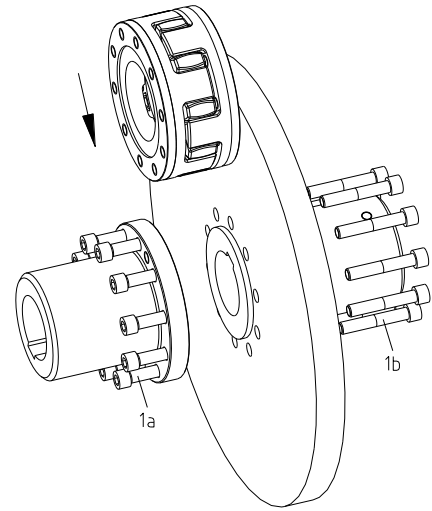


Illustration 7



Having started up the coupling, the tightening torque of the screws and the wear of spider have to be inspected at regular maintenance intervals and the spider has to be replaced, if necessary.

4.4 Displacements - alignment of the couplings

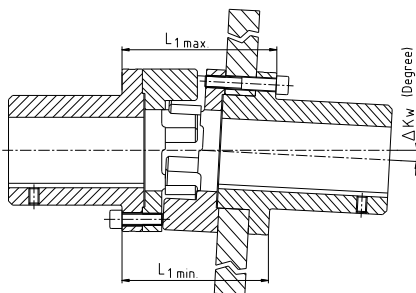
The displacement figures specified in table 6 provide for sufficient safety to compensate for external influences like, for example, thermal expansion or foundation settling.



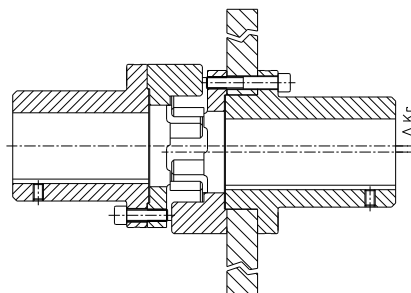
In order to ensure a long service life of the coupling, the shaft ends have to be accurately aligned. Please absolutely observe the displacement figures specified (see table 6). If the figures are exceeded, the coupling will be damaged. The more accurate the alignment of the coupling, the longer is its service life.

Please note:

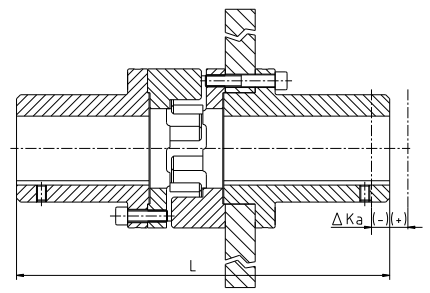
- The displacement figures specified in table 6 are maximum figures which must not arise in parallel. If radial and angular displacements arise at the same time, the permissible displacement values may only be used proportionally (see illustration 9).
- Please inspect with a dial gauge, ruler or feeler gauge whether the permissible displacement figures specified in table 6 can be observed.



Angular displacements



Radial displacements



Axial displacements

$$\Delta K_w = L_{1max} - L_{1min} \quad [mm]$$

Illustration 8: Displacements

$$L_{max} = L + \Delta K_a \quad [mm]$$

Please observe protection note ISO 16016.

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## 4 Assembly

### 4.4 Displacements - alignment of the couplings

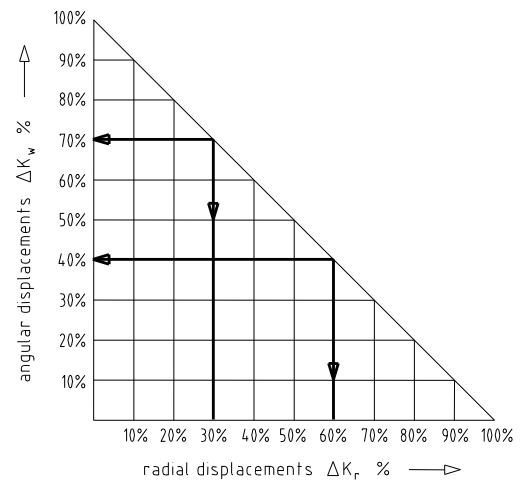
Examples of the displacement combinations specified in illustration 9:

Example 1:  
 $\Delta K_r = 30 \%$   
 $\Delta K_w = 70 \%$

Example 2:  
 $\Delta K_r = 60 \%$   
 $\Delta K_w = 40 \%$

$$\Delta K_{\text{total}} = \Delta K_r + \Delta K_w \leq 100 \%$$

Illustration 9:  
Combinations of displacement



**Table 6: Displacement figures for 98 Shore A**

Size		65	75	90	100	110	125	140	160	180
Max. axial displacement $\Delta K_a$ [mm]		-1.0	-1.5	-1.5	-1.5	-2.0	-2.0	-2.0	-2.5	-3.0
		+2.6	+3.0	+3.4	+3.8	+4.2	+4.6	+5.0	+5.7	+6.4
Max. radial displacement $\Delta K_r$ [mm] with	1500 rpm	0.42	0.48	0.50	0.52	0.55	0.60	0.62	0.64	0.68
	3000 rpm	0.28	0.32	0.34	0.36	0.38	-	-	-	-
$\Delta K_w$ [degree]		1.2	1.2	1.2	1.2	1.3	1.3	1.2	1.2	1.2
Max. angular displacement with $n=1500$ rpm $\Delta K_w$ [mm]		2.70	3.30	4.30	4.80	5.60	6.50	6.60	7.60	9.00
$\Delta K_w$ [degree]		1.1	1.1	1.1	1.1	1.2	-	-	-	-
Max. angular displacement with $n=3000$ rpm $\Delta K_w$ [mm]		2.30	2.90	3.80	4.20	5.00	-	-	-	-

## 5 Start-up

Before start-up of the coupling, inspect the tightening of the setscrews in the coupling flanges, the alignment and the distance dimension E or E<sub>1</sub> and adjust, if necessary, and also inspect all screw connections for the tightening torques specified, dependent on the type of coupling.



**The setscrews to fasten the flange hubs as well as all screw connections must be secured against working loose additionally, e. g. conglomerating with Loctite (average strength).**

Finally the coupling protection against accidental contact must be fitted. It is required in accordance with DIN EN ISO 12100 (Safety of Machinery) and must protect against

- access with the little finger
- falling down of solid foreign objects.

The cover may provide for openings intended for necessary heat dissipation. These openings have to comply with DIN EN ISO 13857.

The cover must be electrically conductive and included in the equipotential bonding. Bell housings (magnesium share below 7.5 %) made of aluminium and damping rings (NBR) can be used as connecting element between pump and electric motor. The cover may only be taken off with standstill of the unit.



**5 Start-up**

During operation of the coupling, please pay attention to

- different operating noise
- vibrations occurring.



**If you note any irregularities with the coupling during operation, the drive unit must be switched off immediately. The cause of the breakdown must be specified by means of the table „Breakdowns“ and, if possible, be eliminated according to the proposals. The potential breakdowns specified can be hints only. To find out the cause all operating factors and machine components must be considered.**

**6 Breakdowns, causes and elimination**

The below-mentioned failures can lead to a use of the **ROTEX®** 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 coupling flanges 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 spider is inserted in the coupling.
- No original **KTR** components (purchased parts) are used.
- Old/already worn out spiders or spiders stored for too long are used.
- Maintenance intervals are not observed.

Breakdowns	Causes	Elimination
Different operating noise and/or vibrations occurring	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) 3) For inspection of wear see item inspection
	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 for axial fastening of hubs working loose	1) Set the unit out of operation 2) Inspect alignment of coupling 3) Tighten the screws to fasten the hubs and secure against working loose 4) For inspection of wear see item inspection



**6 Breakdowns, causes and elimination**

Breakdowns	Causes	Elimination
Breaking of cams	Wear of spider, torque transmission due to metal contact	1) Set the unit out of operation 2) Replace complete coupling 3) Inspect alignment
	Breaking of the cams due to high impact energy/overload	1) Set the unit out of operation 2) Replace complete coupling 3) Inspect alignment 4) Find out the reason for overload
	Operating parameters do not meet with the performance of the coupling	1) Set the unit out of operation 2) Review the operating parameters and select a bigger coupling (consider mounting space) 3) Assemble new coupling size 4) Inspect alignment
	Operating error of the unit	1) Set the unit out of operation 2) Replace complete coupling 3) Inspect alignment 4) Instruct and train the service staff
Early wear of spider	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) 3) For inspection of wear see item inspection
	e. g. contact with aggressive liquids/oils, ozone influence, too high/low ambient temperatures etc. causing physical modification of the spider	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 6) Make sure that further physical modifications of the spider are excluded
	Ambient/contact temperatures which are too high for the spider, max. permissible e. g. with T-PUR® T4 = - 50 °C/ + 120 °C	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 6) Inspect and adjust ambient/contact temperature (possibly corrective by using other spider materials)
Early wear of spider (liquefaction of material inside the spider cam)	Vibrations of drive	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 6) Find out the reason for the vibrations (possibly corrective by spider with lower or higher Shore hardness)

**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.
- **Nylon materials**  
Nylon materials have to be collected and disposed of by a waste disposal company.

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 <b>KTR KTR-Group</b>	<b>ROTEX<sup>®</sup></b> <b>Operating/Assembly instructions</b> <b>Type AFN-SB spec.</b>	KTR-N 40223 EN Sheet: 13 of 13 Edition: 5
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## 8 Maintenance and service

**ROTEX<sup>®</sup>** is a low-maintenance coupling. We recommend to perform a visual inspection on the coupling **at least once a year**. Please pay special attention to the condition of the coupling spiders.

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



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

## 9 Spares inventory, customer service addresses

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

Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage at [www.ktr.com](http://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.**

Please observe protection note ISO 16016.	Drawn: 2018-08-29 Pz	Replacing: KTR-N dated 2017-07-18
	Verified: 2018-09-07 Pz	Replaced by: