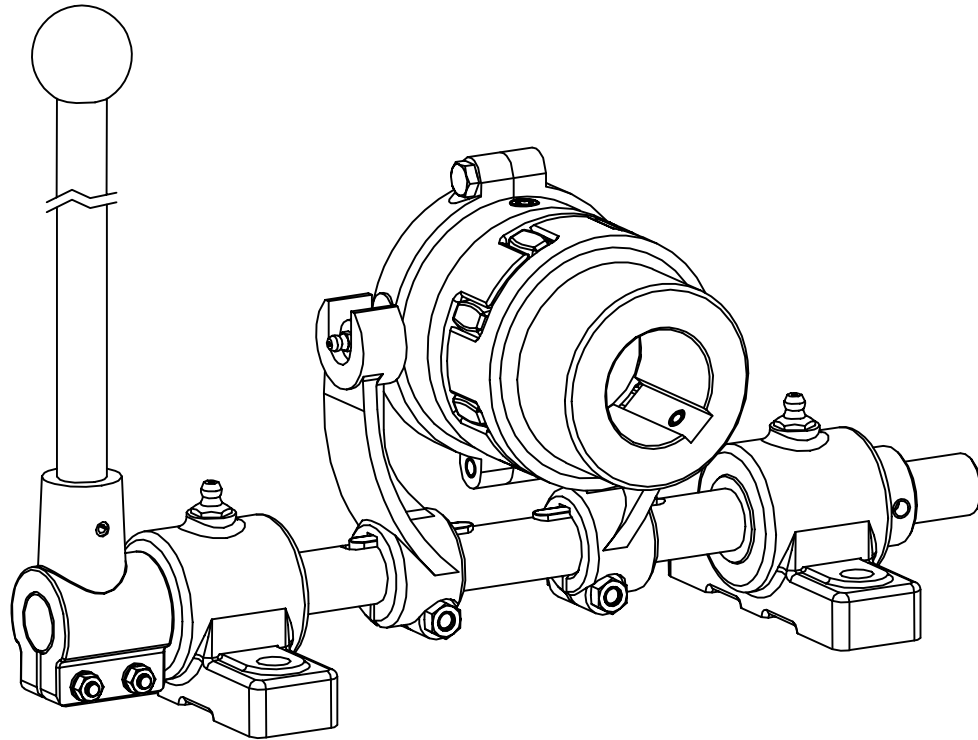




KTR Kupplungstechnik
GmbH
D-48407 Rheine

ROTEX®
Operating-/Assembly instructions
design SD with shiftable linkage

KTR-N 40214 E
sheet: 1
edition: 2



ROTEX® SD
shiftable jaw coupling

| | | |
|--------------------------------------|--------------------------|--------------------------------|
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|  KTR KTR Kupplungstechnik GmbH D-48407 Rheine | ROTEX[®] | | KTR-N 40214 E |
| | Operating-/Assembly instructions design SD with shiftable linkage | | sheet: 2 |
| | | | edition: 2 |

ROTEX[®] SD is a torsionally flexible jaw coupling shiftable at standstill. It is able to compensate for shaft displacement caused by, as an example, inaccuracies in production, heat expansion, etc.

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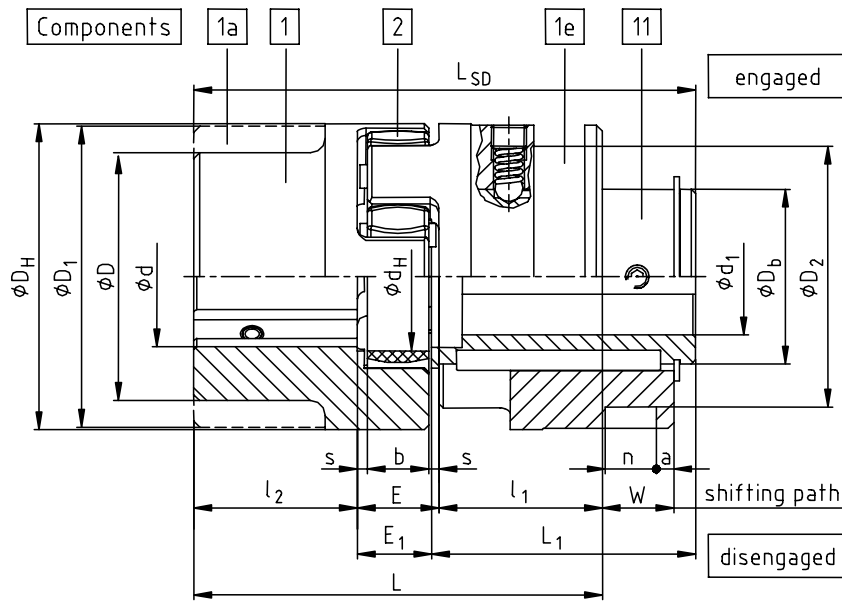
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1 Technical Data



Components

- 1 = standard hub
- 1a = large hub
- 1e = SD shifting hub
- 2 = spider
- 11 = shifting bush SD

picture 1: ROTEX® SD

Table 1: dimensions

| ROTEX® size | dimensions [mm] | | | | | | | | | | | | | | | | |
|-------------|-----------------|-----|----------------|---------------------|----------------|----------------|---------------------------------|----|-----|----|----------------|-----|----------------|------|------|--------|-----------------|
| | D _H | D | D ₁ | D ₂ ±0,1 | D _b | d _H | l ₁ ; l ₂ | E | s | b | E ₁ | L | L ₁ | W | a | n ±0,1 | L _{SD} |
| 24 | 55 | 40 | 56 | 41 | 30 | 27 | 30 | 18 | 2 | 14 | 16,5 | 78 | 51,5 | 16 | 6 | 6 | 98 |
| 28 | 65 | 48 | 67 | 58 | 36 | 30 | 35 | 20 | 2,5 | 15 | 18 | 90 | 60 | 17,5 | 8 | 8 | 113 |
| 38 | 80 | 66 | 78 | 70,5 | 45 | 38 | 45 | 24 | 3 | 18 | 22 | 114 | 73 | 21 | 8 | 12,5 | 140 |
| 42 | 95 | 75 | 94 | 70,5 | 50 | 46 | 50 | 26 | 3 | 20 | 24 | 126 | 82 | 23 | 8 | 12,5 | 156 |
| 48 | 105 | 85 | 104 | 89,5 | 60 | 51 | 56 | 28 | 3,5 | 21 | 25,5 | 140 | 90,5 | 24,5 | 6 | 17,5 | 172 |
| 55 | 120 | 98 | 118 | 112,5 | 70 | 60 | 65 | 30 | 4 | 22 | 27 | 160 | 103 | 26 | 6 | 18 | 195 |
| 65 | 135 | 115 | - | 112,5 | 80 | 68 | 75 | 35 | 4,5 | 26 | 32 | 185 | 120 | 30,5 | 7 | 18 | 227 |
| 75 | 160 | 135 | - | 130,5 | 95 | 80 | 85 | 40 | 5 | 30 | 37 | 210 | 135 | 35 | 6 | 20,5 | 257 |
| 90 | 200 | 160 | - | 164,5 | 110 | 100 | 100 | 45 | 5,5 | 34 | 41 | 245 | 152 | 39,5 | 8 | 25,5 | 293 |
| 100 | 225 | 180 | - | 164,5 | 115 | 113 | 110 | 50 | 6 | 38 | 46 | 270 | 169 | 44 | 14 | 25,5 | 325 |
| 110 | 255 | 200 | - | 164,5 | 125 | 127 | 120 | 55 | 6,5 | 42 | 51 | 295 | 184 | 48,5 | 18,5 | 25,5 | 355 |
| 125 | 290 | 230 | - | 210,5 | 145 | 147 | 140 | 60 | 7 | 46 | 55,5 | 340 | 208,5 | 53 | 18,5 | 30,5 | 404 |

Table 2: finish bore and general

| ROTEX® size | finish bore ¹⁾ [mm] | | | | shifting power set [Nm] | shiftable linkage size | slip ring size |
|-------------|--------------------------------|------|----------------|------|-------------------------|------------------------|----------------|
| | d | | d ₁ | | | | |
| | min. | max. | min. | max. | | | |
| 24 | 8 | 35 | 8 | 18 | 110 | 2) | 2) |
| 28 | 10 | 40 | 10 | 22 | 130 | 2) | 2) |
| 38 | 12 | 48 | 12 | 28 | 150 | 1 | 1.1 |
| 42 | 14 | 55 | 14 | 32 | 180 | 1 | 1.1 |
| 48 | 15 | 62 | 15 | 40 | 200 | 2 | 2.2 |
| 55 | 20 | 74 | 18 | 48 | 250 | 3 | 3.3 |
| 65 | 22 | 82 | 20 | 55 | 280 | 3 | 3.3 |
| 75 | 30 | 98 | 25 | 65 | 350 | 3 | 4.4 |
| 90 | 40 | 120 | 28 | 75 | 350 | 4 | 5.5 |
| 100 | 50 | 115 | 30 | 80 | 380 | 4 | 5.5 |
| 110 | 60 | 125 | 35 | 85 | 450 | 4 | 5.5 |
| 125 | 60 | 145 | 40 | 100 | 500 | 5 | 6.6 |

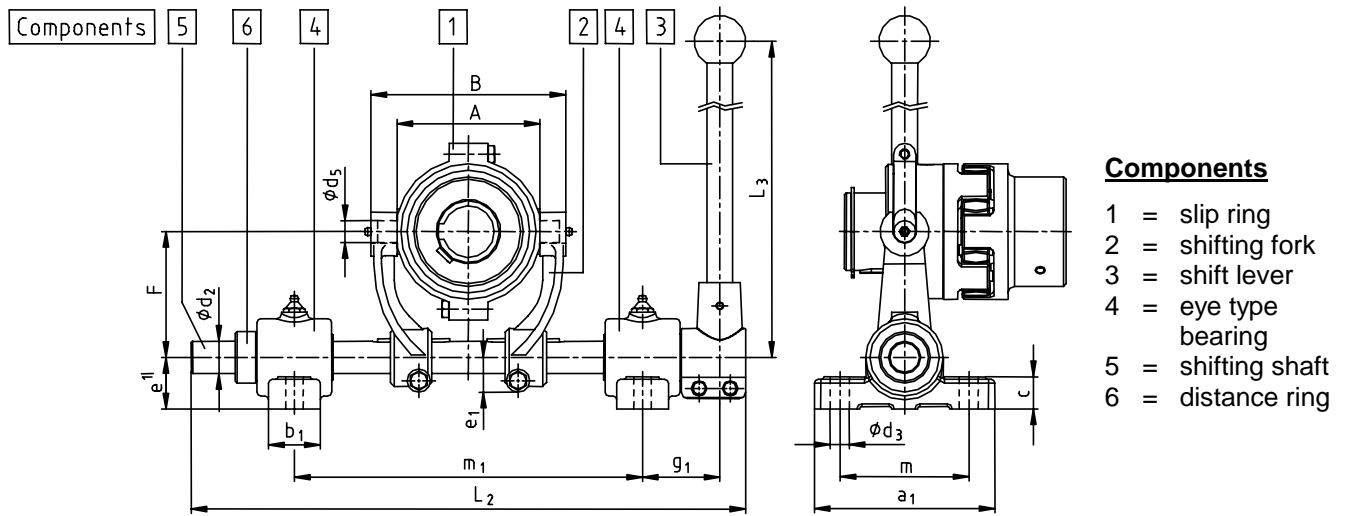
1) finish bore according to ISO fit H7, feather keyway according to DIN 6885, sheet 1 – JS9
2) slip ring and shiftable linkage only on request

Coupling sizes 140 up to 180 only on request according to drawing M 370266!

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1 Technical Data



picture 2: ROTEX® SD with shiftable linkage

Table 3: dimensions of shiftable linkage

| ROTEX® size | dimensions of slip ring and shiftable linkage [mm] | | | | | | | | | |
|-------------|--|----------------|----------------|----|----------------|----------------|----------------|----------------|----------------|-------|
| | shiftable linkage size | a ₁ | b ₁ | c | d ₂ | d ₃ | d ₅ | e ¹ | e ₁ | F |
| 38 | 1 | 110 | 35 | 18 | 20 | 11 | 12 | 30 | 25 | 70 |
| 42 | 1 | 110 | 35 | 18 | 20 | 11 | 12 | 30 | 25 | 70 |
| 48 | 2 | 140 | 40 | 25 | 25 | 13,5 | 17 | 40 | 27 | 97,5 |
| 55 | 3 | 140 | 40 | 25 | 30 | 13,5 | 17 | 40 | 32,5 | 120 |
| 65 | 3 | 140 | 40 | 25 | 30 | 13,5 | 17 | 40 | 32,5 | 120 |
| 75 | 3 | 140 | 40 | 25 | 30 | 13,5 | 17 | 40 | 32,5 | 120 |
| 90 | 4 | 160 | 45 | 25 | 35 | 13,5 | 21 | 50 | 37,5 | 147,5 |
| 100 | 4 | 160 | 45 | 25 | 35 | 13,5 | 21 | 50 | 37,5 | 147,5 |
| 110 | 4 | 160 | 45 | 25 | 35 | 13,5 | 21 | 50 | 37,5 | 147,5 |
| 125 | 5 | 160 | 45 | 25 | 40 | 13,5 | 25 | 50 | 46 | 190 |

| ROTEX® size | dimensions of slip ring and shiftable linkage [mm] | | | | | | | | |
|-------------|--|----------------|----------------|-----|---------------------|---------------------|-----|-----|------------------------------------|
| | g ₁ | L ₂ | L ₃ | m | m ₁ min. | m ₁ max. | A | B | max. speed n for slip ring [1/min] |
| 38 | 55 | 320 | 400 | 75 | 180 | 190 | 90 | 114 | 3280 |
| 42 | 55 | 320 | 400 | 75 | 180 | 190 | 90 | 114 | 3280 |
| 48 | 60 | 430 | 450 | 100 | 240 | 270 | 111 | 151 | 2550 |
| 55 | 70 | 490 | 600 | 100 | 280 | 310 | 140 | 180 | 2120 |
| 65 | 70 | 490 | 600 | 100 | 280 | 310 | 140 | 180 | 2120 |
| 75 | 70 | 490 | 600 | 100 | 280 | 310 | 170 | 210 | 1710 |
| 90 | 70 | 565 | 750 | 120 | 321 | 365 | 200 | 244 | 1360 |
| 100 | 70 | 565 | 750 | 120 | 321 | 365 | 200 | 244 | 1360 |
| 110 | 70 | 565 | 750 | 120 | 321 | 365 | 200 | 244 | 1360 |
| 125 | 80 | 630 | 1068 | 120 | 365 | 410 | 250 | 300 | 855 |

1) m₁ max. and g₁ = standard



2 Hints

2.1 Coupling Selection



CAUTION!

For a continuous and troublefree operation of the coupling it must be designed according to the selection instructions (according to DIN 740 part 2) for the particular application (see ROTEX® catalogue).

If the operating conditions (performance, speed, changes at engine and machine) change, the coupling selection must be checked again.

Please make sure that the technical data regarding torque only refers to the spider. The transmissible torque of the shaft/hub connection must be checked by the orderer, and he is responsible for the same.

For drives with endangered torsional vibration (drives with periodical load on torsional vibration) it is necessary to make a torsional vibration calculation to ensure a perfect selection. Typical drives with endangered torsional vibration are e. g. drives with diesel engines, piston pumps, piston compressors etc. On request KTR makes the coupling selection and the torsional vibration calculation.

2.2 General Hints

Please read through these mounting instructions carefully before you set the coupling into operation.

Please pay special attention to the safety instructions!

The mounting instructions are part of your product. Please keep them carefully and close to the coupling.

The copyright for these mounting instructions remains with **KTR** Kupplungstechnik GmbH.

2.3 Safety and Advice Hints



DANGER!

Danger of injury to persons.



CAUTION!

Damages on the machine possible.



ATTENTION!

Pointing to important items.

2.4 General Hints of Danger



DANGER!

With assembly, operation and maintenance of the coupling it has to be made sure that the entire drive train is protected against unintentional engagement. You can be seriously hurt by rotating parts. Please make absolutely sure to read through and observe the following safety instructions.

- All operations on and with the coupling have to be performed taking into account "safety first".
- Please make sure to disengage the power pack before you perform your work.
- Protect the power pack against unintentional engagement, e. g. by providing hints at the place of engagement or removing the fuse for current supply.
- Do not touch the operation area of the coupling as long as it is in operation.
- Please protect the coupling against unintentional touch. Please provide for the necessary protection devices and caps.

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2 Hints

2.5 Proper Use

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

- carefully read through the mounting instructions and understood them
- had technical training
- are authorized to do so by your company

The coupling may only be used in accordance with the technical data (see table 1 to 3 in chapter 1). Unauthorized modifications on the coupling design are not admissible. We do not take any warranty for resulting damages. To further develop the product we reserve the right for technical modifications.

The **ROTEX® SD** described in here corresponds to the technical status at the time of printing of these mounting instructions.

3 Storage

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

The features of the coupling spiders (elastomers) remain unchanged for up to 5 years in case of favourable stock conditions.



CAUTION!

The storage rooms may 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 there is no condensation. The best relative air humidity is under 65%.

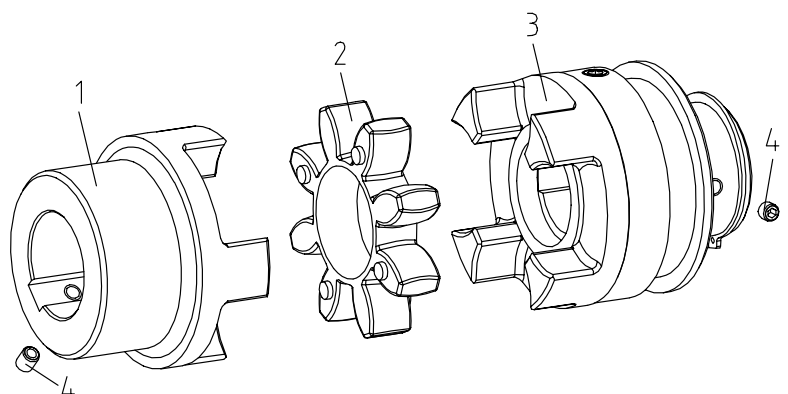
4 Assembly

The coupling is delivered in preassembled condition. Before assembly the coupling has to be controlled for completeness.

4.1 Components of the Couplings

Components of ROTEX®, design SD

| Component | Quantity | Designation |
|-----------|----------|-----------------------------|
| 1 | 1 | hub |
| 2 | 1 | spider |
| 3 | 1 | shifting part |
| 4 | 2 | setscrew DIN EN ISO 4029 |



picture 3: ROTEX® SD

| | | |
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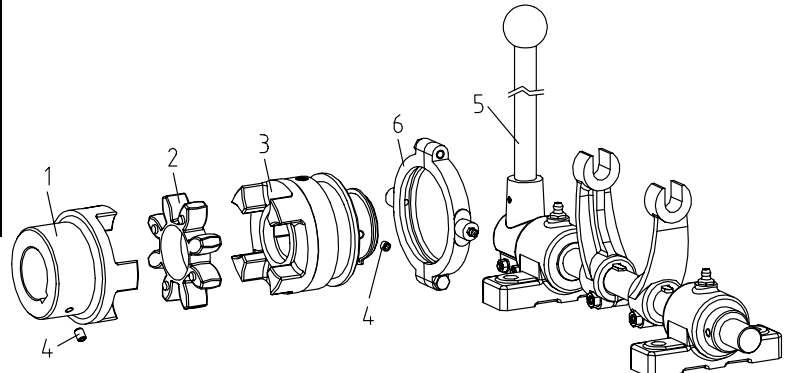


4 Assembly

4.1 Components of the Couplings

Components of ROTEX®, design SD with shiftable linkage

| Component | Quantity | Designation |
|-----------|----------|-----------------------------|
| 1 | 1 | hub |
| 2 | 1 | spider |
| 3 | 1 | shifting part |
| 4 | 2 | setscrew DIN EN ISO 4029 |
| 5 | 1 | shiftable linkage |
| 6 | 1 | slip ring |



picture 4: ROTEX® SD with shiftable linkage

Features of the standard spiders

| spider hardness (Shore) | marking (colour) |
|----------------------------|--|
| 92 Sh A | yellow |
| 95/98 Sh A | red |
| 64 Sh D-F | natural white with green marking of teeth |

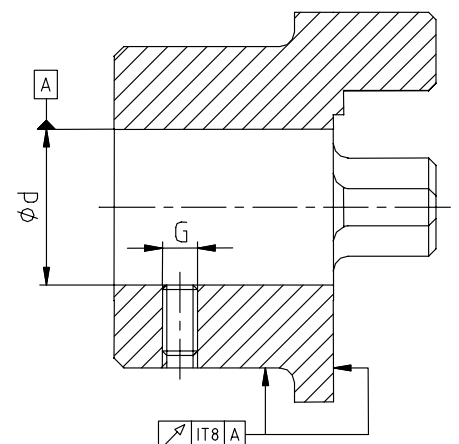
4.2 Hint Regarding the Finish Bore



DANGER!

The maximum permissible bore diameters d (see table 2 in chapter 1 - Technical Data) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause serious danger.

- Hub bores machined by the customer have to observe concentric running or axial running, respectively (see picture 5).
- Please make absolutely sure to observe the figures for d_{max} .
- Carefully align the hubs when the finish bores are brought in.
- Please use a setscrew according to DIN EN ISO 4029 with a cup point or an end plate to fasten the hubs axially.



picture 5: concentric running and axial running



CAUTION!

The orderer is responsible for all subsequently made machinings to unbored or pilot bored and to finish machined coupling parts and spare parts. KTR does not assume any warranty claims resulting from insufficient refinish.

Table 4: setscrews – DIN EN ISO 4029

| ROTEX® size | 24 | 28 | 38 | 42 | 48 | 55 | 65 | 75 | 90 | 100 | 110 | 125 |
|---------------------------------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|
| dimension G | M5 | M8 | M8 | M8 | M8 | M10 | M10 | M10 | M12 | M12 | M16 | M16 |
| tightening torque T_A [Nm] | 2 | 10 | 10 | 10 | 10 | 17 | 17 | 17 | 40 | 40 | 80 | 80 |

| | | | | |
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4.3 Information about Shifting Power



ATTENTION!

Before delivery the shifting power is adjusted and the screw plug is marked with marking lacquer.

4.4 Assembly of the Hubs



ATTENTION!

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

Heating the hubs slightly (approx. 80 °C) allows for an easier installation onto the shaft.



DANGER!

Touching the heated hubs causes burns.
We would recommend to wear safety gloves.



CAUTION!

For the assembly please make sure that the distance dimension E (see table 1) is kept to ensure that the spider can be moved axially.
Disregarding this hint may cause damage on the coupling.

- Assemble the hubs onto the shaft of driving and driven side.
- Move the power packs in axial direction until the dimension E is achieved.
- If the power packs are already firmly assembled, axial movement of the hubs on the shafts allows for adjusting the dimension E.
- Fasten the hubs by tightening the setscrews DIN EN ISO 4029 with cup point (tightening torque see table 4).



ATTENTION!

If the shaft diameters with inserted feather key are smaller than the dimension d_H (see table 1) of the spider, one or both shaft ends may protrude into the spider.

4.5 Displacements - Alignment of the Couplings

The displacement figures shown in table 5 offer sufficient safety to compensate for environmental influences like, for example, heat expansion or lowering of foundation.



CAUTION!

In order to ensure a long lifetime of the coupling, the shaft ends must be accurately aligned. Please absolutely observe the displacement figures indicated (see table 5). If the figures are exceeded, the coupling is damaged.
The exacter the alignment of the coupling, the higher is its lifetime.

Please note:

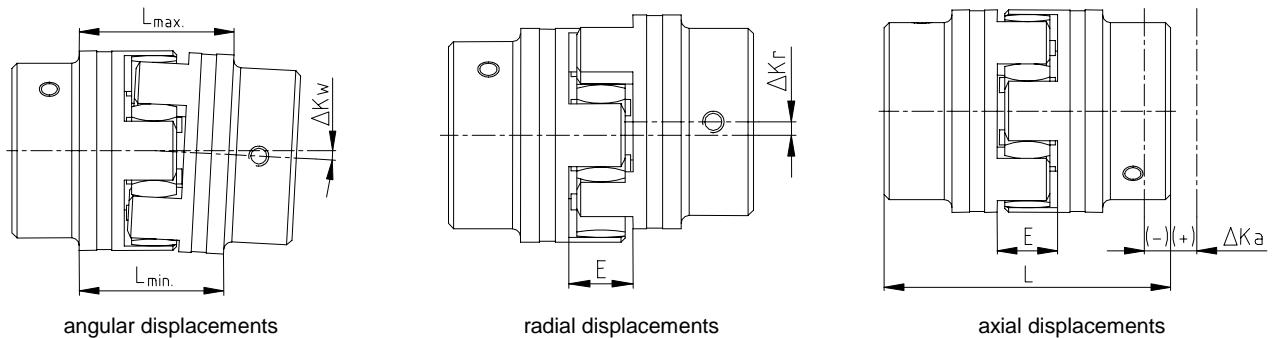
- The displacement figures mentioned in table 5 are maximum figures which must not arise in parallel. If radial and angular displacement arises at the same time, the permissible displacement values may only be used in part (see picture 7).
- Please check with a dial gauge, ruler or feeler whether the permissible displacement figures of table 5 can be observed.

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4.5 Displacements - Alignment of the Couplings



$$\Delta K_W = L_{1max.} - L_{1min.} \text{ [mm]}$$

$$L_{max} = L + \Delta K_A \text{ [mm]}$$

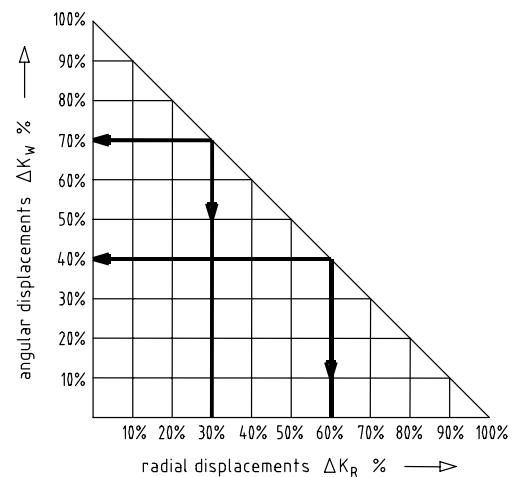
picture 6: displacements

Example for the misalignment combinations given in picture 7:

Example 1:
 $\Delta K_R = 30\%$
 $\Delta K_W = 70\%$

Example 2:
 $\Delta K_R = 60\%$
 $\Delta K_W = 40\%$

picture 7:
combinations of
displacement



$$\Delta K_{total} = \Delta K_R + \Delta K_W \leq 100 \%$$

Table 5: displacement figures

| ROTEX® size | 24 | 28 | 38 | 42 | 48 | 55 | 65 | 75 | 90 | 100 | 110 | 125 |
|---|-------------|------|------|------|------|------|------|------|------|------|------|------|
| max. axial displacement ΔK_A [mm] | 1,4 | 1,5 | 1,8 | 2,0 | 2,1 | 2,2 | 2,6 | 3,0 | 3,4 | 3,8 | 4,2 | 4,6 |
| max. radial displacement ΔK_R [mm] with | 1500 1/min. | 0,22 | 0,25 | 0,28 | 0,32 | 0,36 | 0,38 | 0,42 | 0,48 | 0,50 | 0,52 | 0,60 |
| | 3000 1/min. | 0,15 | 0,17 | 0,19 | 0,21 | 0,25 | 0,26 | 0,28 | 0,32 | 0,34 | 0,36 | - |
| ΔK_W [degree] max. angular displacement with n = 1500 1/min ΔK_W [mm] | | 0,9 | 0,9 | 1,0 | 1,0 | 1,1 | 1,1 | 1,2 | 1,2 | 1,2 | 1,2 | 1,3 |
| | | 0,85 | 1,05 | 1,35 | 1,70 | 2,00 | 2,30 | 2,70 | 3,30 | 4,30 | 4,80 | 6,50 |
| ΔK_W [degree] max. angular displacement with n = 3000 1/min ΔK_W [mm] | | 0,8 | 0,8 | 0,8 | 0,8 | 0,9 | 1,0 | 1,0 | 1,1 | 1,1 | 1,1 | - |
| | | 0,75 | 0,84 | 1,10 | 1,40 | 1,60 | 2,00 | 2,30 | 2,90 | 3,80 | 4,20 | 5,00 |

4.6 Assembly of Slip Ring

- Before assembly please inspect the slip ring (component 1, picture 8) to see whether a lubricating nipple/Stauffer lubricator or damages exist.
- Before separating the slip ring halves please mark the position of the slip ring halves screwed by the manufacturer.
- Please insert the untightened slip ring halves into the shifting keyway of the coupling.



CAUTION!

For the assembly please pay attention to the position of the slip ring halves marked.

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4 Assembly

4.6 Assembly of Slip Ring

Continuation:

- Please tighten the connection screws with a dynamometric screwdriver. For tightening torques see table 6.



CAUTION!

After assembly the slip ring has to be in a position to be turned manually.

Table 6:

| slip ring size | 1.1 | 2.2 | 3.3 | 4.4 | 5.5 | 6.6 | 7.7 | 8.8 |
|--|------|------|------|------|------|------|------|-----|
| hexagon head screws DIN EN ISO 4017 - 8.8 | M6 | M8 | M8 | M10 | M12 | M16 | M16 | M16 |
| tightening torque T_A [Nm] | 10 | 25 | 25 | 49 | 86 | 210 | 210 | 210 |
| max. perm. speed 1/min | 3200 | 2500 | 2100 | 1700 | 1300 | 1200 | 1000 | 850 |

- Grease the slip ring through the lubricating nipple/Stauffer lubricator with a heat resistant bearing grease while turning the slip ring manually repeatedly.
Slip ring – max. permissible speed see table 6.

4.7 Maintenance Intervals

Shifting hub:

- Within the framework of the machine inspection periods the fit of the shifting hub has to be cleaned and lubricated (e. g. with a Molykote MoS₂, copper paste, anti-seize by company Weicon).
- With a high shifting frequency of the coupling we would recommend one visual inspection and lubricating of the shifting hub monthly.
- In case of an operation with dust and granular material as well as high air moisture one visual inspection and lubricating per month and an operational inspection every three months has to be performed (engagement/disengagement of the coupling during standstill).

Slip ring:

- Before every lubricating the slip ring has to be inspected for damages (visual inspection).
- The shifting hub part has to be in a position to be turned manually in the slip ring.
- The lubrication of the slip ring depends on the speed and the operating periods of the machine (see table 7).
- The intervals for inspection and lubrication mentioned apply for drives with standard load.



ATTENTION!

For drives with high load, e. g. permanent operation during 3 shifts, hot operation, etc., please consult with our engineers.

Table 7:

| max. perm. speed (1/min) of the slip ring | 3200 to 2100 | | 1700 to 1000 | | 850 to 700 | |
|--|--------------|------|--------------|------------|------------|----------|
| daily operating period of machines (h) | 8 h | 16 h | 8 h | 16 h | 8 h | 16 h |
| visual inspection and lubrication intervals | 0,5 months | | 1 months | 0,5 months | 1,5 months | 1 months |



CAUTION!

For certain applications, e. g. operation with dust and granulated materials, high air moisture, high ambient temperatures, outdoor operations, etc., the intervals of visual inspections and lubrication have to be reduced.

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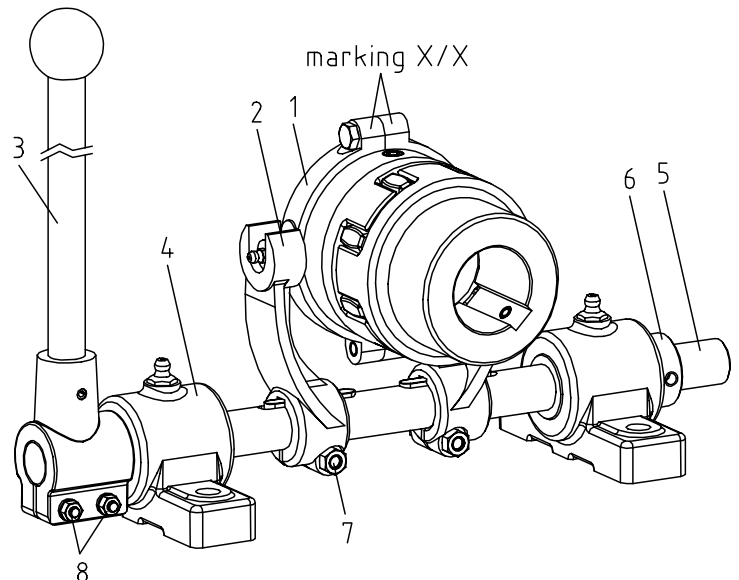


4 Assembly

4.8 Assembly of Shiftable Linkage

Before starting the assembly the coupling/shiftable linkage have to be inspected with regard to completeness.

| Component | Quantity | Designation |
|-----------|----------|--|
| 1 | 1 | slip ring with lubricating nipple |
| 2 | 2 | shifting fork |
| 3 | 1 | shift lever with clamping element |
| 4 | 2 | eye type bearing DIN 504 with lubricating nipple |
| 5 | 1 | shifting shaft |
| 6 | 1 | clamping ring |
| 7 | 2 | clamping screws of shifting forks |
| 8 | 2 | clamping screws of shift lever |



picture 8: ROTEX® SD with shiftable linkage

- Please insert the shifting plug/slip ring into the shifting forks (component 2, picture 8).
- Assemble the shifting forks, shifting shaft and eye type bearings in alignment with the slip ring. The dimensions F and A have to be adhered to (see table 3). Please make sure that the shifting forks fit with the shifting spigots evenly.



ATTENTION!

For setting please untighten the clamping screws of the shifting forks, if necessary.



CAUTION!

The shifting forks have to be installed vertically to the base plate.



DANGER!

Getting stuck and jamming of the slip ring during operation.

- Please tighten the shifting forks as per table 8.
- Fasten the eye type bearing to the base plate.



CAUTION!

With a continuous base plate the dimension e (see table 3) with shiftable linkage size 5 has to be increased by 10 mm at the minimum and with shiftable linkage size 6 by 15 mm at the minimum. The brackets of the driving and driven side have to be adjusted accordingly.



4 Assembly

4.8 Assembly of Shiftable Linkage

Continuation:

- Fasten the shift lever to the shifting shaft.
- When the coupling is engaged, the shifting lever has to be installed vertically.



CAUTION!

When the coupling hub is in operation the slip ring has to be disengaged. Support or secure the shifting lever in vertical position.



DANGER!

Getting stuck and jamming of the slip ring during operation.

- Please tighten the clamping screws of the shift lever as per table 8.
- Axially fasten the shifting shaft via clamping element, shift lever and clamping ring (component 6, picture 8).
- Having finished the assembly please lubricate the eye type bearing with bearing lubricant.

Table 8:

| shiftable linkage size | 1 | 2 | 3 | 4 | 5 | 6 |
|---|----|----|----|-----|-----|-----|
| clamping screw of shifting fork (component 7, picture 8) | M6 | M8 | M8 | M12 | M12 | M12 |
| tightening torque T_A [Nm] | 10 | 25 | 25 | 86 | 86 | 86 |
| clamping screw of shift lever (component 8, picture 8) | M6 | M6 | M8 | M12 | M12 | M12 |
| tightening torque T_A [Nm] | 10 | 10 | 25 | 86 | 86 | 86 |

4.9 Spares Inventory, Customer Service Addresses

A basic requirement to guarantee the operational readiness 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 under www.ktr.com.

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| Schutzvermerk ISO 16016 beachten. | Gezeichnet: 14.08.06 Sha | Ersatz für: KTR-N vom 29.07.85 |
| | Geprüft: 17.08.06 Sha | Ersetzt durch: |