

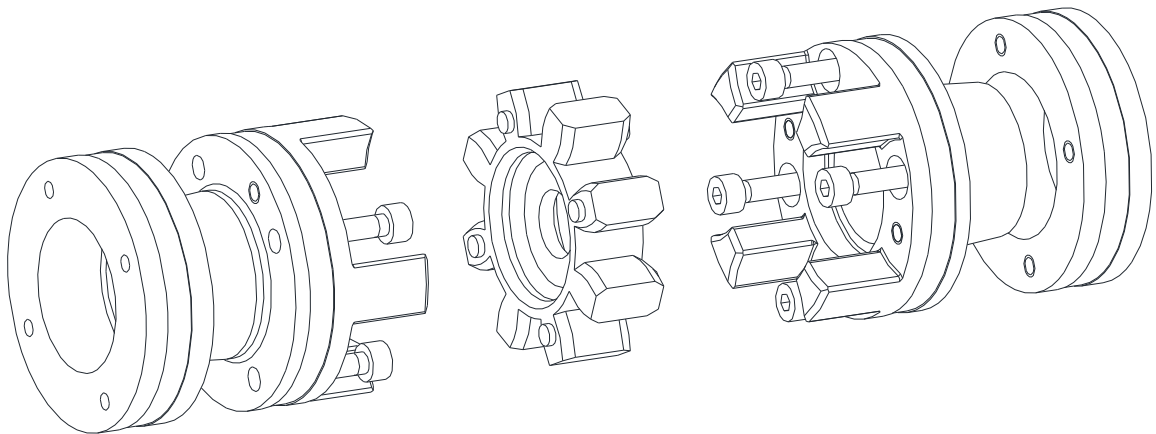


# ROTEX® GS P

## according to DIN 69002

Torsionally flexible jaw-type couplings






according to directive 2014/34/EU  
for finish-bored couplings



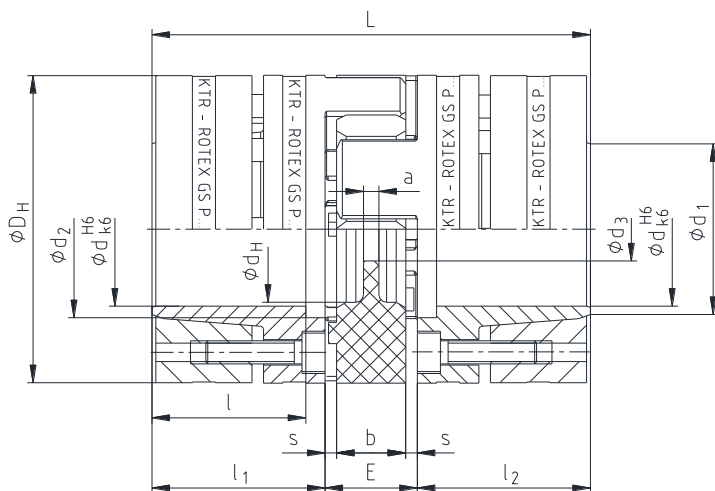
**ROTEX® GS P** is a highly accurate plug-in shaft coupling for spindle drives in machine tools. It is able to compensate for shaft misalignment, for example caused by manufacturing inaccuracies, thermal expansion, etc.

With the designing of our **ROTEX® GS P** coupling, the applicable engineering standards and regulations, in particular DIN 69002, DIN EN 12100, part 2 as well as DIN EN ISO 13849, part 1 and 2 „Safety of Machinery” have been taken into account.

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**1 Technical data**



Pull-off thread M between clamping screws.

Illustration 1: Dimensions

**Table 1: Dimensions**

| Hub and clamping ring material - steel |  |           |                 |                     |       |     |            |      |    |    |     |     |       |
|--|--|-----------|-----------------|---------------------|-------|-----|------------|------|----|----|-----|-----|-------|
| Size                                   | Torque of spider $T_{KN}$ [Nm] <sup>1)</sup> |           | Dimensions [mm] |                     |       |     |            |      |    |    |     |     |       |
|  | 98 ShA-GS                                    | 64 ShD-GS | $d_{max.}$      | $D_H$ <sup>2)</sup> | $d_H$ | L   | $l_1; l_2$ | l    | E  | b  | s   | a   | $d_3$ |
| 14                                     | 12.5   | 16        | 15              | 32                  | 10.5  | 50  | 18.5       | 15.5 | 13 | 10 | 1.5 | 2   | -     |
| 19                                     | 21   | 26        | 20              | 40                  | 18    | 66  | 25         | 21   | 16 | 12 | 2   | 3   | -     |
| 24                                     | 60   | 75        | 28              | 55                  | 27    | 78  | 30         | 25   | 18 | 14 | 2   | 3   | -     |
| 28                                     | 160  | 200       | 38              | 65                  | 30    | 90  | 35         | 30   | 20 | 15 | 2.5 | 4   | -     |
| 38                                     | 325  | 405       | 48              | 80                  | 38    | 114 | 45         | 40   | 24 | 18 | 3   | 4   | -     |
| 42                                     | 450  | 560       | 51              | 95                  | 46    | 126 | 50         | 45   | 26 | 20 | 3   | 4   | 18.5  |
| 48                                     | 525  | 655       | 55              | 105                 | 51    | 140 | 56         | 50   | 28 | 21 | 3.5 | 4   | 20.5  |
| 55                                     | 685  | 825       | 70              | 120                 | 60    | 160 | 65         | 58   | 30 | 22 | 4   | 4.5 | 22.5  |
| 65                                     | 940  | 1175      | 70              | 135                 | 68    | 185 | 75         | 55   | 35 | 26 | 4.5 | 4.5 | 30    |
| 75                                     | 1920   | 2400      | 80              | 160                 | 80    | 210 | 85         | 63   | 40 | 30 | 5.0 | 5.0 | 40    |
| 90                                     | 3600   | 4500      | 105             | 200                 | 104   | 245 | 100        | 75   | 45 | 34 | 5.5 | 6.5 | 50    |

<sup>1)</sup> For further spiders/selection of spider see catalogue Drive Technology „ROTEX® GS“.

<sup>2)</sup>  $\phi D_H + 2$  mm with high speeds for expansion of spider

<sup>3)</sup> **If used in potentially explosive atmospheres all screw connections must be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).**



**Subject to the increased safety with the assembly (several screws are tightened) and the high friction torque of the clamping ring hub, this type is permissible for applications according to DIN EN ISO 13849, part 2.**

**Table 2: Assignment for stub spindles according to DIN 69002**

| Hub and clamping ring material - steel |                  |  |       |       |       |                     |            |     |    |      |                              |   |  |
|--|------------------|--|-------|-------|-------|---------------------|------------|-----|----|------|------------------------------|---|--|
| Spindle drive                          | ROTEX® GS P size | Dimensions according to DIN 69002 [mm] |       |       |       |                     |            |     |    |      | Tightening torque $T_A$ [Nm] | Friction torque $T_R$ with bore $\phi d^*$ [Nm] |  |
|  |                  | $d^*$                                  | $d_1$ | $d_2$ | $d_3$ | $D_H$ <sup>3)</sup> | $l_1; l_2$ | L   | E  |      |                              |   |  |
| 25 x 20                                | 14               | 14                                     | 17    | 17    | 8.5   | 32                  | 18.5       | 50  | 13 | 1.89 | 25                           |   |  |
| 32k x 25                               | 19 / 37.5        | 16                                     | 20    | 19    | 9.5   | 37.5                | 25         | 66  | 16 | 3.05 | 60                           |   |  |
| 32g x 30                               | 19               | 19                                     | 23    | 22    | 9.5   | 40                  | 25         | 66  | 16 | 3.05 | 71                           |   |  |
| 40 x 35                                | 24 / 50          | 24                                     | 28    | 29    | 12.5  | 50                  | 30         | 78  | 18 | 4.9  | 108                          |   |  |
| 50 x 45                                | 24               | 25                                     | 30    | 30    | 12.5  | 55                  | 30         | 78  | 18 | 8.5  | 170                          |   |  |
| 63 x 55                                | 28               | 35                                     | 40    | 40    | 14.5  | 65                  | 35         | 90  | 20 | 8.5  | 506                          |   |  |
| 80 x 75                                | 38               | 40                                     | 46    | 46    | 16.5  | 80                  | 45         | 114 | 24 | 14   | 821                          |   |  |

\* standard spindle shaft diameter with tolerance H6/5

|   |           |               |              |             |
|---|-----------|---------------|--------------|-------------|
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**1 Technical data**

**Table 3: Friction torque and surface pressure of ROTEX® GS P clamping ring hubs**

| Size                                    | 14   | 19   | 24  | 28  | 38  | 42  | 48   | 55   | 65   | 75   | 90    |
|---|--|------|-----|-----|-----|-----|------|------|------|------|-------|
| Clamping screw M <sup>1)</sup>          | M3   | M4   | M5  | M5  | M6  | M8  | M10  | M10  | M12  | M12  | M16   |
| Quantity z (for each clamping ring hub) | 4  | 6    | 4   | 8   | 8   | 4   | 4    | 4    | 4    | 5    | 5     |
| Tightening torque T <sub>A</sub> [Nm]   | Hub and clamping ring material - steel                                 |      |     |     |     |     |      |      |      |      |       |
|   | 1.89   | 3.05 | 8.5 | 8.5 | 14  | 35  | 69   | 69   | 120  | 120  | 295   |
| Bore Ø d                                | Transmittable friction torque T <sub>R</sub> of clamping ring hub [Nm] |      |     |     |     |     |      |      |      |      |       |
|   | Surface pressure [N/mm <sup>2</sup> ]                                  |      |     |     |     |     |      |      |      |      |       |
| Ø10                                     | 11   | 34   |     |     |     |     |      |      |      |      |       |
|   | 93   | 204  |     |     |     |     |      |      |      |      |       |
| Ø11                                     | 13   | 41   |     |     |     |     |      |      |      |      |       |
|   | 93   | 202  |     |     |     |     |      |      |      |      |       |
| Ø14                                     | 29   | 75   | 79  |     |     |     |      |      |      |      |       |
|   | 124  | 232  | 191 |     |     |     |      |      |      |      |       |
| Ø15                                     |  | 90   | 95  | 128 |     |     |      |      |      |      |       |
|   |  | 240  | 200 | 199 |     |     |      |      |      |      |       |
| Ø16                                     |  | 68   | 70  | 150 |     |     |      |      |      |      |       |
|   |  | 160  | 130 | 205 |     |     |      |      |      |      |       |
| Ø19                                     |  | 104  | 110 | 225 |     |     |      |      |      |      |       |
|   |  | 174  | 144 | 218 |     |     |      |      |      |      |       |
| Ø20                                     |  | 119  | 126 | 177 | 247 |     |      |      |      |      |       |
|   |  | 179  | 149 | 154 | 164 |     |      |      |      |      |       |
| Ø24                                     |  |      | 134 | 278 | 386 |     |      |      |      |      |       |
|   |  |      | 110 | 169 | 178 |     |      |      |      |      |       |
| Ø25                                     |  |      | 149 | 307 | 426 | 389 |      |      |      |      |       |
|   |  |      | 113 | 172 | 181 | 165 |      |      |      |      |       |
| Ø28                                     |  |      | 201 | 341 | 475 | 433 |      |      |      |      |       |
|   |  |      | 122 | 152 | 161 | 147 |      |      |      |      |       |
| Ø30                                     |  |      |     | 403 | 560 | 512 | 672  |      |      |      |       |
|   |  |      |     | 157 | 165 | 151 | 171  |      |      |      |       |
| Ø32                                     |  |      |     | 366 | 511 | 464 | 762  |      |      |      |       |
|   |  |      |     | 125 | 133 | 120 | 170  |      |      |      |       |
| Ø35                                     |  |      |     | 461 | 641 | 585 | 945  | 920  |      |      |       |
|   |  |      |     | 131 | 139 | 127 | 177  | 147  |      |      |       |
| Ø38                                     |  |      |     | 528 | 644 | 586 | 957  | 929  |      |      |       |
|   |  |      |     | 128 | 118 | 108 | 152  | 126  |      |      |       |
| Ø40                                     |  |      |     |     | 733 | 669 | 1082 | 1055 | 1532 |      |       |
|   |  |      |     |     | 122 | 111 | 155  | 129  | 148  |      |       |
| Ø42                                     |  |      |     |     | 828 | 631 | 1033 | 1002 | 1465 | 1835 |       |
|   |  |      |     |     | 125 | 95  | 134  | 111  | 128  | 144  |       |
| Ø45                                     |  |      |     |     | 825 | 753 | 1219 | 1190 | 1731 | 2161 |       |
|   |  |      |     |     | 108 | 99  | 138  | 115  | 132  | 148  |       |
| Ø48                                     |  |      |     |     |     | 888 | 1423 | 1198 | 1750 | 2190 |       |
|   |  |      |     |     |     | 102 | 141  | 102  | 117  | 132  |       |
| Ø50                                     |  |      |     |     |     | 906 | 1296 | 1325 | 1931 | 2413 | 4046  |
|   |  |      |     |     |     | 96  | 119  | 104  | 119  | 134  | 186   |
| Ø55*                                    |  |      |     |     |     |     | 1606 | 1388 | 2034 | 2551 | 4503  |
|   |  |      |     |     |     |     | 122  | 90   | 104  | 117  | 171   |
| Ø60*                                    |  |      |     |     |     |     |      | 1743 | 2534 | 3161 | 5057  |
|   |  |      |     |     |     |     |      | 95   | 109  | 122  | 161   |
| Ø65*                                    |  |      |     |     |     |     |      | 1722 | 2521 | 3158 | 6079  |
|   |  |      |     |     |     |     |      | 80   | 92   | 104  | 165   |
| Ø70*                                    |  |      |     |     |     |     |      | 2088 | 3038 | 3789 | 6181  |
|   |  |      |     |     |     |     |      | 83   | 96   | 107  | 145   |
| Ø80*                                    |  |      |     |     |     |     |      |      |      | 4421 | 7324  |
|   |  |      |     |     |     |     |      |      |      | 96   | 131   |
| Ø90*                                    |  |      |     |     |     |     |      |      |      |      | 8398  |
|   |  |      |     |     |     |     |      |      |      |      | 119   |
| Ø95*                                    |  |      |     |     |     |     |      |      |      |      | 9530  |
|   |  |      |     |     |     |     |      |      |      |      | 121   |
| Ø100*                                   |  |      |     |     |     |     |      |      |      |      | 9892  |
|   |  |      |     |     |     |     |      |      |      |      | 114   |
| Ø105*                                   |  |      |     |     |     |     |      |      |      |      | 11084 |
|   |  |      |     |     |     |     |      |      |      |      | 116   |

\* From Ø55 G6/m6.

The transmittable friction torques and surface pressure of the clamping connection consider the max. clearance with shaft tolerance k6/bore H6. The friction torque is reduced with with a bigger clearance (see chapter 4.3).

|   |           |               |              |             |
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1 Technical data

1)  If used in potentially explosive atmospheres all screw connections must be secured against working loose additionally, e. g. conglomerating with Loctite (average strength).



A calculation is necessary if hollow shafts are used!

2 Advice

The ROTEX® GS P coupling was developed for a backlash-free power transmission and easy plug-in assembly. This backlash-free power transmission arises in the area of prestress (see illustration 2). The big concave surface contact results in a lower surface pressure on the involute tooth. Consequently the tooth can be overloaded many times over with no wear/deformation.

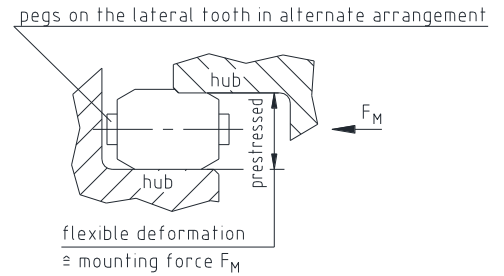


Illustration 2: Prestress of spider

Safe operation in the range of prestress is ensured, because the coupling operates according to the principle of positive-locking rubber spring prestress with high damping features. The star-shape coupling spider is inserted in the cams of the hubs which are machined specifically accurately with a small amount of prestress, resulting in the necessary backlash-free power transmission.

The flexible teeth compensating for misalignment are radially supported in the internal diameter by means of a web. An external deformation is limited by the concave shape of the cams, ensuring a smooth operation even with bigger masses (e. g. machine tables, articulated arms, etc.).

The flexible spiders for the GS series are available in five different kinds of Shore hardness, injected in different colours, either as a torsionally soft or hard material.

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 ROTEX® GS P coupling is suitable and approved for the use in potentially explosive atmospheres. When using the coupling in potentially explosive atmospheres, please observe the special advice and instructions regarding safety in enclosure A.

In order to ensure the operating principle of ROTEX® GS P and avoid early wear of the coupling, a respective operating factor „S<sub>B</sub>“ has to be considered with the selection, each depending on the application (see catalogue Drive Technology). Temperatures and shocks are provided with the corresponding factors, too (see catalogue Drive Technology).

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 potentially explosive atmospheres

This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death caused by explosion.



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.

|   |                         |                        |
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## 2 Advice

### 2.2 Safety and advice symbols



#### General advice

This symbol indicates notes which may contribute to preventing adverse results or conditions.

### 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 remove the safety device 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.

### 2.4 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® GS P** described in here corresponds to the technical status at the time of printing of these operating/assembly instructions.

### 2.5 Coupling selection



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

|   |           |               |              |             |
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**2 Advice**

**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 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 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 %.**

**3.2 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.

|   |                         |                        |
|---|-------------------------|------------------------|
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4 Assembly

4.1 Components of the coupling

Components of ROTEX® GS P, clamping ring hub

| Component | Quantity    | Description                |
|-----------|-------------|----------------------------|
| 1         | 2           | Clamping ring              |
| 2         | 2           | Clamping ring hub          |
| 3         | 1           | Spider                     |
| 4         | see table 1 | Cap screws DIN EN ISO 4762 |

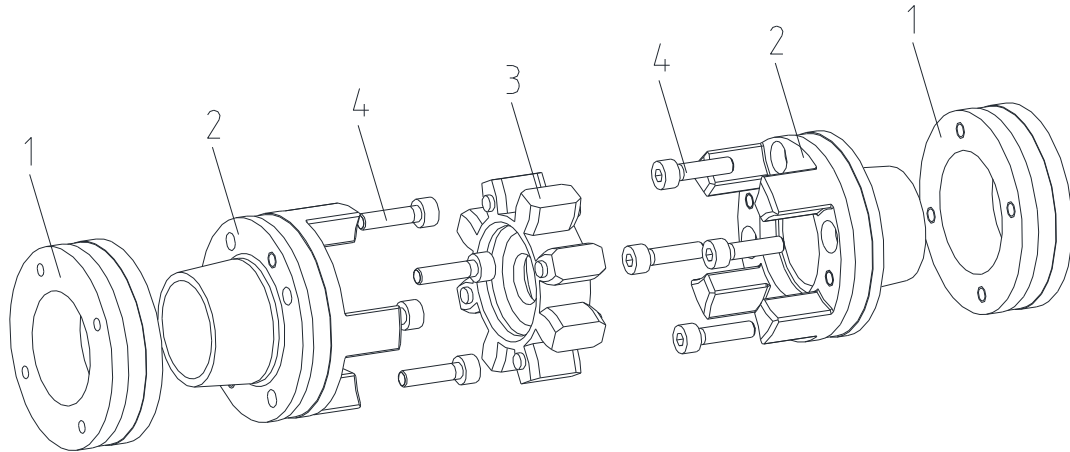


Illustration 3: ROTEX® GS P, clamping ring hub



Subject to the increased safety with the assembly (several screws are tightened) and the high friction torque of the clamping ring hub, this type is permissible for applications according to DIN EN ISO 13849, part 2.

Features of standard spiders

| Spider hardness (Shore) | Increasing hardness |                 |                     |
|-------------------------|---------------------|-----------------|---------------------|
|                         |                     | 98 ShA-GS (red) | 64 ShD-H-GS (green) |
| Size                    | 14-90               | 14 - 38         | 42 – 90             |
| Material                | Polyurethane        | Hytrel          | Polyurethane        |
| Marking (colour)        |                     |                 |                     |



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





## 4 Assembly

### 4.2 Advice for assembly

Subject to its design the **ROTEX® GS P** allows to axially plug in the coupling after having assembled the hubs onto the shaft journal. Consequently there is no need for subsequent screwing and the respective mounting holes in the housing.

The pegs on the spider arranged reciprocally prevent a contact between the spider and the hubs over the full surface. Observing the distance dimension E, the ability for displacement of the coupling is ensured in this way. All teeth are chamfered on the face which allows for blind assembly. When the coupling hubs are combined with the **ROTEX® GS** spider an axial assembly force is generated resulting from the flexible prestress of the star-shape elastomer. This assembly force varies depending on the coupling size, spider hardness and machining tolerances.

The axial insertion force is offset after having pushed together the hubs and consequently does not mean any risk of axial load affecting adjacent bearings.

The mounting force can be reduced by lightly greasing or lubricating the elastomer or the hubs. For this purpose please only use oils and greases on a mineral oil basis without any additives. Lubricants on a silicone basis (e. g. Optimol Optisit WX) or vaseline have proven their worth, too.

### 4.3 Assembly of clamping ring hubs type 6.0

The power transmission of the **ROTEX® GS P** clamping ring hub is frictionally engaged. The necessary surface pressure is transmitted via the clamping ring with internal taper to the taper hub and consequently to the shaft. The friction torques specified in table 3 consider a fit pair H6/k6 from Ø 55 G6/m6; with a bigger clearance the friction torques specified in table 3 are reduced.

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



**If used in potentially explosive atmospheres all screw connections must be secured against working loose additionally, e. g. conglutinating with Loctite (average strength).**

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

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

Shear stress on the internal shaft diameter for hollow shaft:

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

Shear stress for solid shaft:

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

$R_{p0,2}$  = yield strength of shaft material  $[\text{N/mm}^2]$   
 $p_W$  = surface pressure of hub/shaft  $[\text{N/mm}^2]$

$d_{iW}$  = internal diameter of hollow shaft [mm]  
 $d$  = shaft diameter [mm]  
 $C_W$  =  $d_{iW} / d$

The strength required is not provided if the hollow shaft bore is bigger than the max. internal bore calculated or if the shear stress exceeds the yield strength of the material.

For a detailed calculation please contact KTR's engineering department.

|   |                         |                        |
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## 4 Assembly

### 4.3 Assembly of clamping ring hubs type 6.0

- Clean the hub bore and shaft and review for dimensional accuracy, afterwards lubricate with a thin-fluid oil (e. g. Castrol 4 in 1, Klüber Quietsch-Ex or WD 40).



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

- Lightly untighten the clamping screw and pull the clamping ring from the hub only marginally to make sure that the clamping ring is loosened.
- Shift the clamping ring hub onto the shaft.
- Tighten the clamping screws evenly crosswise step by step to the tightening torque specified in table 3. Repeat this process until all clamping screws have reached the tightening torque.

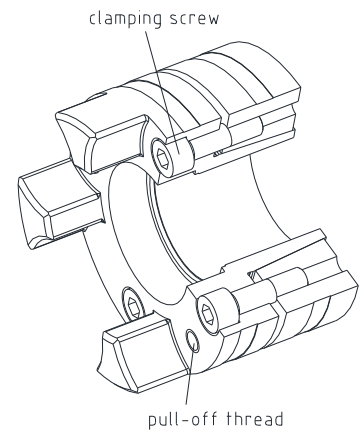


Illustration 4: Assembly of clamping ring hub with clamping ring



**If the clamping screws are not tightened at the correct tightening torque, there is the risk of**  
**a) a fracture of the hub and plastic deformation with a too high tightening torque  $T_A$**   
**b) early slipping, untightening of the screws with a too low tightening torque  $T_A$**

#### Disassembly:

Unscrew the clamping screws evenly one after another. During every revolution every screw may only be unscrewed by half a turn. Unscrew all clamping screws by 3 - 4 pitches.

Remove the screws located next to the pull-off threads and screw them into the respective pull-off threads until they fit.

The clamping ring is released by tightening the screws in the pull-off threads evenly gradually and crosswise.



**If these hints are not observed, the operation of the coupling may be affected.**

If the assembly is repeated the bore of the hub and shafts have to be cleaned and afterwards lubricated with a thin-fluid oil (e. g. Castrol 4 in 1, Klüber Quietsch-Ex or WD 40). The same applies for the taper surfaces of clamping ring hub and clamping ring.

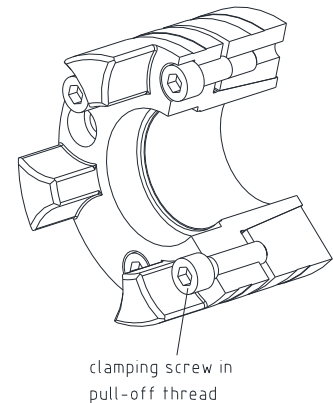


Illustration 5: Disassembly of clamping ring hub with clamping ring



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



4 Assembly

4.4 Displacements - alignment of the couplings

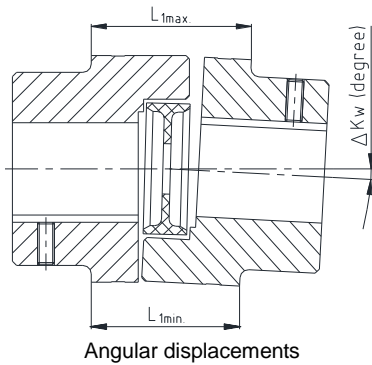
The displacement figures specified in table 4 provide for sufficient safety to compensate for external influences like, for example, thermal expansion or foundation settling.



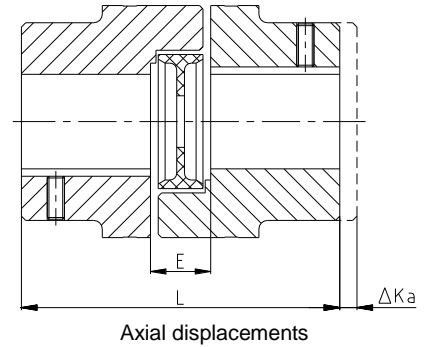
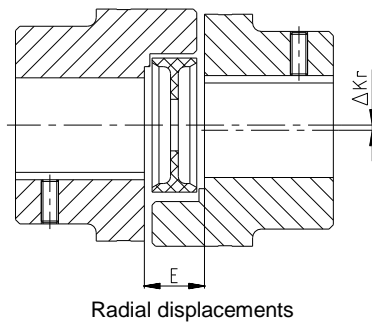
In order to ensure a long service life of the coupling and avoid dangers with the use in potentially explosive atmospheres, the shaft ends must be accurately aligned. Please absolutely observe the displacement figures specified (see table 4). If the figures are exceeded, the coupling will be damaged. The more accurate the alignment of the coupling, the longer is its service life. If used in potentially explosive atmospheres for the explosion group IIC (marking II 2GD c IIC T X), only half of the displacement figures (see table 4) are permissible.

Please note:

- The displacement figures specified in table 4 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 7).
- Please inspect with a dial gauge, ruler or feeler gauge whether the permissible displacement figures specified in table 4 can be observed.



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



$$L_{max} = L + \Delta K_a$$

Illustration 6: Displacements

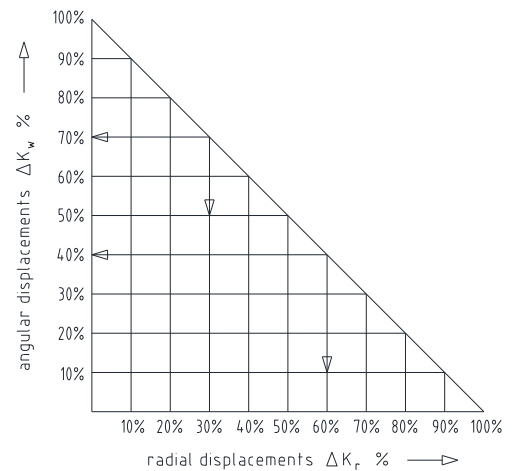
Examples of the displacement combinations specified in illustration 7:

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

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

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

Illustration 7: Combinations of displacement





## 4 Assembly

### 4.4 Displacements - alignment of the couplings

**Table 4: Displacement figures**

| Size | Max. axial displacement $\Delta K_a$ [mm] | Max. radial displacement $\Delta K_r$ [mm] |                         | Max. angular displacement $\Delta K_w$ |      |                         |      |
|------|---|--|-------------------------|--|------|-------------------------|------|
|      |   | 98 ShA-GS <sup>1)</sup>                    | 64 ShD-GS <sup>1)</sup> | 98 ShA-GS <sup>1)</sup>                |      | 64 ShD-GS <sup>1)</sup> |      |
|      |   |  |                         | Degrees [°]                            | [mm] | Degrees [°]             | [mm] |
| 14   | +1.0 / -0.5                               | 0.09                                       | 0.06                    | 0.9                                    | 0.5  | 0.8                     | 0.4  |
| 19   | +1.2 / -0.5                               | 0.06                                       | 0.04                    | 0.9                                    | 0.6  | 0.8                     | 0.55 |
| 24   | +1.4 / -0.5                               | 0.10                                       | 0.07                    | 0.9                                    | 0.85 | 0.8                     | 0.75 |
| 28   | +1.5 / -0.7                               | 0.11                                       | 0.08                    | 0.9                                    | 1.0  | 0.8                     | 0.9  |
| 38   | +1.8 / -0.7                               | 0.12                                       | 0.09                    | 0.9                                    | 1.25 | 0.8                     | 1.1  |
| 42   | +2.0 / -1.0                               | 0.14                                       | 0.10                    | 0.9                                    | 1.5  | 0.8                     | 1.3  |
| 48   | +2.1 / -1.0                               | 0.16                                       | 0.11                    | 0.9                                    | 1.65 | 0.8                     | 1.45 |
| 55   | +2.2 / -1.0                               | 0.17                                       | 0.12                    | 0.9                                    | 1.85 | 0.8                     | 1.7  |
| 65   | +2.6 / -1.0                               | 0.18                                       | 0.13                    | 0.9                                    | 2.1  | 0.8                     | 1.9  |
| 75   | +3.0 / -1.5                               | 0.21                                       | 0.15                    | 0.9                                    | 2.5  | 0.8                     | 2.2  |
| 90   | +3.4 / -1.5                               | 0.23                                       | 0.17                    | 0.9                                    | 3.1  | 0.8                     | 2.8  |

<sup>1)</sup> For further spiders/displacement figures of spiders refer to catalogue Drive Technology „ROTEX® GS“.

The permissible displacement figures of the flexible **ROTEX® GS P** couplings specified are general standard values considering the load of the coupling up to the rated torque  $T_{KN}$  of the coupling and an ambient temperature of + 30 °C.

## 5 Start-up

Before start-up of the coupling, please inspect the alignment and the distance dimension E and adjust, if necessary, and also inspect all screw connections for the tightening torques specified.



If used in potentially explosive atmospheres 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 directive 2014/14/EU 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.



**If the couplings are used in locations subject to dust explosion and in mining the user must make sure that there is no accumulation of dust in a dangerous volume between the cover and the coupling. The coupling must not operate in an accumulation of dust.**

**For covers with unlocked openings on the top face no light metals must be used if the couplings are used as equipment of equipment group II (if possible, from stainless steel). If the couplings are used in mining (equipment group I M2), the cover must not be made of light metal. In addition, it must be resistant to higher mechanical loads than with use as equipment of equipment group II.**

|   |                         |                        |
|---|-------------------------|------------------------|
| Please observe protection note ISO 16016. | Drawn: 2017-09-20 Kb    | Replacing: KTR-N 45611 |
|   | Verified: 2017-09-28 Kb | Replaced by:           |

## 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.**

### Coating of coupling:



If coated (priming, paintings, etc.) couplings are used in potentially explosive atmospheres, the requirements on conductivity and coating thickness must be considered. With paintings up to 200 µm electrostatic load does not have to be expected. Multiple coatings exceeding 200 µm are prohibited for explosion group IIC.


## 6 Breakdowns, causes and elimination

The failures specified below can lead to a use of the ROTEX® GS P coupling other than intended. In addition to the specifications given in these operating and assembly instructions please 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.



**If used other than intended the coupling can become a source of ignition. EU directive 2014/34/EU requires special care by the manufacturer and the user.**

### General failures with use other than intended:

- Important data for the coupling selection were not forwarded.
- The calculation of the shaft-hub-connection was not considered.
- Coupling 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.
- 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.
- : The coupling used/the coupling protection used is not suitable for the operation in potentially explosive atmospheres and does not correspond to EU directive 2014/34/EU, respectively.
- Maintenance intervals are not observed.



**6 Breakdowns, causes and elimination**

| Breakdowns  | Causes  | Hazard notes for potentially explosive atmospheres                         | Elimination   |
|---|---|--|---|
| Different operating noise and/or vibrations occurring | Misalignment  | Increased temperature on the spider surface; ignition risk by hot surfaces | <ol style="list-style-type: none"> <li>1) Set the unit out of operation</li> <li>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)</li> <li>3) For inspection of wear see item inspection</li> </ol>   |
|   | Wear of spider, short-term torque transmission due to metal contact   | Ignition risk due to sparking  | <ol style="list-style-type: none"> <li>1) Set the unit out of operation</li> <li>2) Disassemble the coupling and remove remainders of the spider</li> <li>3) Inspect coupling components and replace coupling components that are damaged</li> <li>4) Insert spider, assemble coupling components</li> <li>5) Inspect alignment, adjust if necessary</li> </ol> |
|   | Screws for axial fastening of hubs working loose                      | Ignition risk due to hot surfaces and sparking                             | <ol style="list-style-type: none"> <li>1) Set the unit out of operation</li> <li>2) Inspect alignment of coupling</li> <li>3) Tighten the screws to fasten the hubs and secure against working loose</li> <li>4) For inspection of wear see item inspection</li> </ol>  |
| Breaking of cams                                      | Wear of spider, torque transmission due to metal contact              | Ignition risk due to sparking  | <ol style="list-style-type: none"> <li>1) Set the unit out of operation</li> <li>2) Replace complete coupling</li> <li>3) Inspect alignment</li> </ol>  |
|   | Breaking of the cams due to high impact energy/overload               |  | <ol style="list-style-type: none"> <li>1) Set the unit out of operation</li> <li>2) Replace complete coupling</li> <li>3) Inspect alignment</li> <li>4) Find out the reason for overload</li> </ol>   |
|   | Operating parameters do not meet with the performance of the coupling |  | <ol style="list-style-type: none"> <li>1) Set the unit out of operation</li> <li>2) Review the operating parameters and select a bigger coupling (consider mounting space)</li> <li>3) Assemble new coupling size</li> <li>4) Inspect alignment</li> </ol>  |
|   | Operating error of the unit   |  | <ol style="list-style-type: none"> <li>1) Set the unit out of operation</li> <li>2) Replace complete coupling</li> <li>3) Inspect alignment</li> <li>4) Instruct and train the service staff</li> </ol>   |
| Early wear of spider or reverse backlash              | Misalignment  | Increased temperature on the spider surface; ignition risk by hot surfaces | <ol style="list-style-type: none"> <li>1) Set the unit out of operation</li> <li>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)</li> <li>3) For inspection of wear see item inspection</li> </ol>   |

**6 Breakdowns, causes and elimination**

| Breakdowns  | Causes  | Hazard notes for potentially explosive atmospheres              | Elimination  |
|---|---|---|--|
| Early wear of spider or reverse backlash                              | e. g. contact with aggressive liquids/oils, ozone influence, too high/low ambient temperatures etc. causing physical modification of the spider | Ignition risk due to sparking with metallic contact of the cams | <ol style="list-style-type: none"> <li>1) Set the unit out of operation</li> <li>2) Disassemble the coupling and remove remainders of the spider</li> <li>3) Inspect coupling components and replace coupling components that are damaged</li> <li>4) Insert spider, assemble coupling components</li> <li>5) Inspect alignment, adjust if necessary</li> <li>6) Make sure that further physical modifications of the spider are excluded</li> </ol>                                   |
|   | excessively high/low ambient/contact temperatures for the spider; max. permissible e. g. T4 = - 30 °C/+ 90 °C                                   |   | <ol style="list-style-type: none"> <li>1) Set the unit out of operation</li> <li>2) Disassemble the coupling and remove remainders of the spider</li> <li>3) Inspect coupling components and replace coupling components that are damaged</li> <li>4) Insert spider, assemble coupling components</li> <li>5) Inspect alignment, adjust if necessary</li> <li>6) Inspect and adjust ambient/contact temperature (possibly corrective by using different spider materials)</li> </ol>   |
| Early wear of spider (liquefaction of material inside the spider cam) | Vibrations of drive   |   | <ol style="list-style-type: none"> <li>1) Set the unit out of operation</li> <li>2) Disassemble the coupling and remove remainders of the spider</li> <li>3) Inspect coupling components and replace coupling components that are damaged</li> <li>4) Insert spider, assemble coupling components</li> <li>5) Inspect alignment, adjust if necessary</li> <li>6) Find out the reason for the vibrations (possibly corrective by spider with lower or higher Shore hardness)</li> </ol> |



If you operate with a worn spider (see item 10.2) and with subsequent contact of metal parts a proper operation meeting the explosion protection requirements and acc. to directive 2014/34/EU is not ensured.

**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.



## 8 Maintenance and service

**ROTEX® GS P** 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 spider of the coupling.

- Since the flexible machine bearings of the driving and driven side settle during the course of load, please 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.**



**With the use in potentially explosive atmospheres please observe chapter 10.2 *Inspection intervals for couplings in Ex potentially explosive atmospheres.***

## 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.**

## 10 Enclosure A

Advice and instructions regarding the use in potentially explosive atmospheres

### 10.1 Intended use in potentially explosive atmospheres

Conditions of operation in potentially explosive atmospheres

**ROTEX® GS P** couplings are suitable for the use according to EU directive 2014/34/EU.

#### 1. Industry (with the exception of mining)

- Equipment group II of category 2 and 3 (*coupling is not approved for equipment group 1*)
- Media class G (*gases, fogs, steams*), zone 1 and 2 (*coupling is not approved for zone 0*)
- Media class D (*dusts*), zone 21 and 22 (*coupling is not approved for zone 20*)
- Explosion group IIC (*explosion class IIA and IIB are included in IIC*)



## 10 Enclosure A

Advice and instructions regarding the use in  potentially explosive atmospheres

### 10.1 Intended use in potentially explosive atmospheres

#### Temperature class:

| Temperature class | Ambient or operating temperature T <sub>a</sub> | Max. surface temperature |
|-------------------|---|--------------------------|
| T4, T3, T2, T1    | - 30 °C to + 90 °C <sup>1)</sup>                | + 110 °C <sup>2)</sup>   |
| T5                | - 30 °C to + 80 °C                              | + 100 °C                 |
| T6                | - 30 °C to + 65 °C                              | + 85 °C                  |

#### Explanation:

The maximum surface temperatures each result from the maximum permissible ambient or operating temperature T<sub>a</sub> plus the maximum temperature increase ΔT of 20 K which has to be taken into account.

- 1) The ambient or operating temperature T<sub>a</sub> is limited to + 90 °C due to the permissible permanent operating temperature of the elastomers used.
- 2) The maximum surface temperature of + 110 °C applies for the use in locations which are potentially subject to dust explosion, too.

## 2. Mining

Equipment group I of category M2 (coupling is not approved for equipment group M1).  
 Permissible ambient temperature - 30 °C to + 90 °C.


### 10.2 Inspection intervals for couplings in potentially explosive atmospheres

| Explosion group            | Inspection intervals  |
|----------------------------|---|
| 3G<br>3D                   | For couplings which are classified in category 3G or 3D the operating and assembly instructions that are usual for standard operation apply. During the standard operation which has to be subject to the ignition risk analysis the couplings are free from any ignition source. Merely the temperature increase produced by self-heating and depending on the coupling type has to be considered: for ROTEX® GS P: ΔT = 20 K  |
| II 2GD c IIB<br>T4, T5, T6 | An inspection of the torsional backlash and a visual inspection of the flexible spider must be performed after 3,000 operating hours for the first time, at the latest after 6 months after start-up of the coupling.<br>If you note insignificant or no wear on the spider upon this initial inspection, further inspections can each be performed after 6,000 operating hours or at the latest after 18 months, provided that the operating parameters remain the same.<br>If you note significant wear during the initial inspection so that it would be recommendable to replace the spider, please find out the cause according to the table „Breakdowns“, if possible.<br>The maintenance intervals must be adjusted to the modified operating parameters without fail. |
| II 2GD c IIC<br>T4, T5, T6 | An inspection of the torsional backlash and a visual inspection of the flexible spider must be performed after 2,000 operating hours for the first time, at the latest after 3 months after start-up of the coupling.<br>If you note insignificant or no wear on the spider upon this initial inspection, further inspections can each be performed after 4,000 operating hours or at the latest after 12 months, provided that the operating parameters remain the same.<br>If you note significant wear during the initial inspection so that it would be recommendable to replace the spider, please find out the cause according to the table „Breakdowns“, if possible.<br>The maintenance intervals must be adjusted to the modified operating parameters without fail. |



10 Enclosure A

Advice and instructions regarding the use in  potentially explosive atmospheres

10.2 Inspection intervals for couplings in  potentially explosive atmospheres

ROTEX® GS P backlash-free shaft couplings

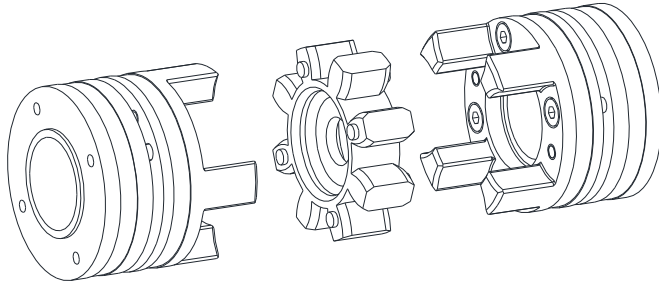


Illustration 8: ROTEX® GS P backlash-free shaft coupling

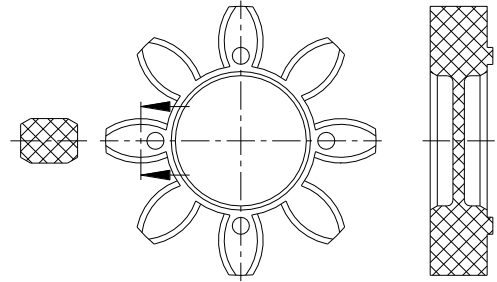


Illustration 9: ROTEX® GS spider

If the drive permits, the backlash between the cams of the coupling and the flexible spider has to be measured by means of a feeler gauge.

When reaching the wear limit **maximum friction**, the spider must be replaced immediately, irrespective of the inspection intervals.

10.3 Standard values of wear

In case of a backlash > X mm, the flexible spider must be replaced.

Reaching the limits for replacing depends on the operating conditions and the existing operating parameters.



In order to ensure a long service life of the coupling and avoid dangers with the use in potentially explosive atmospheres, the shaft ends must be accurately aligned. Please absolutely observe the displacement figures specified (see table 4). If the figures are exceeded, the coupling will be damaged.

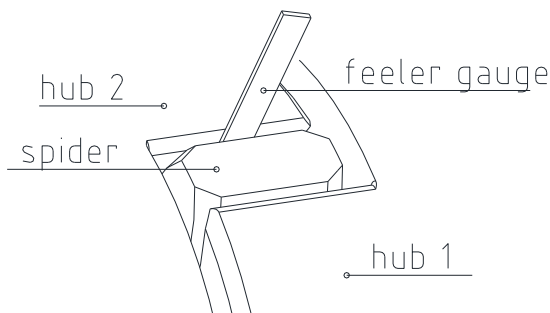


Illustration 10: Inspection of the limit of wear

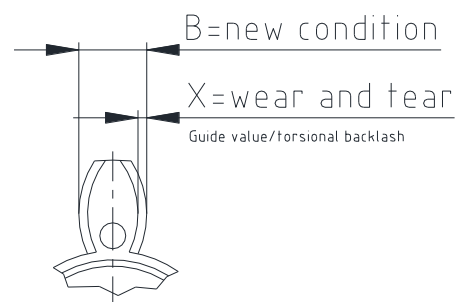


Illustration 11: Wear of spider



For backlash-free applications no wear is permitted, since otherwise the operating principle of the coupling (backlash-free condition) is no longer ensured. If a backlash-free operation is not required, the following figures apply:

|   |                         |                        |
|---|-------------------------|------------------------|
| Please observe protection note ISO 16016. | Drawn: 2017-09-20 Kb    | Replacing: KTR-N 45611 |
|   | Verified: 2017-09-28 Kb | Replaced by:           |

## 10 Enclosure A

Advice and instructions regarding the use in  potentially explosive atmospheres

### 10.3 Standard values of wear

**Table 5:**

| ROTEX® GS P<br>Size | Limits of wear (friction)<br>$X_{max.}$ [mm] | ROTEX® GS P<br>Size | Limits of wear (friction)<br>$X_{max.}$ [mm] |
|---------------------|--|---------------------|--|
| 14                  | 1.25   | 48                  | 2.25   |
| 19                  | 0.9  | 55                  | 2.50   |
| 24                  | 1.0  | 65                  | 2.75   |
| 28                  | 1.4  | 75                  | 3.00   |
| 38                  | 1.7  | 90                  | 3.25   |
| 42                  | 2.0  |                     |  |

### 10.4 Permissible coupling materials in potentially explosive atmospheres



In the explosion groups **IIA**, **IIB** and **IIC** the following materials may be combined:

- Steel
- Stainless steel
- Aluminium wrought products

Semifinished products made of aluminium with a magnesium share of up to 7.5% and a yield point of  $R_{p0.2} \geq 250 \text{ N/mm}^2$  are permitted for the use in potentially explosive atmospheres.

**Aluminium diecast** is generally excluded for potentially explosive atmospheres.



### 10.5 marking of couplings for potentially explosive atmospheres

Couplings for the use in potentially explosive atmospheres are marked on at least one component completely and on the remaining components by an  label on the outside diameter of the hub or on the front side each for the operating conditions permitted. The flexible spider is excluded. For reason of limited space only the symbol  is stamped up to size 19.



Short labelling:  
(standard)

  II 2GD c IIC T X/I M2 c X

Category 3:

  II 3G c IIC T6, T5 resp. T4 -  $30 \text{ °C} \leq T_a \leq +65 \text{ °C}$ ,  $+80 \text{ °C}$  resp.  $+90 \text{ °C}$   
II 3D c T  $110 \text{ °C}$  -  $30 \text{ °C} \leq T_a \leq +90 \text{ °C}$


Complete labelling:

  II 2G c IIC T6, T5 resp. T4 -  $30 \text{ °C} \leq T_a \leq +65 \text{ °C}$ ,  $+80 \text{ °C}$  resp.  $+90 \text{ °C}$   
II 2D c T  $110 \text{ °C}$ /I M2 c -  $30 \text{ °C} \leq T_a \leq +90 \text{ °C}$

The labelling with explosion group IIC includes the explosion groups IIA and IIB.



10 Enclosure A

Advice and instructions regarding the use in  potentially explosive atmospheres

10.6 EU Certificate of conformity

### EU Certificate of conformity

corresponding to EU directive 2014/34/EU dated 26 February 2014  
and to the legal regulations

The manufacturer - KTR Systems GmbH, D-48432 Rheine - states that the

#### ROTEX® GS P backlash-free shaft couplings

in an explosion-proof design described in these operating/assembly instructions are devices corresponding to article 1 (3) b) of directive 2014/34/EU and comply with the general safety and health requirements according to enclosure II of directive 2014/34/EU.

The coupling described in here complies with the specifications of the following standards/guidelines:

- DIN EN 1127-1
- DIN EN 1127-2
- DIN EN 13463-1
- DIN EN 13463-5
- CLC/TR 50404

The ROTEX® GS P coupling complies with the specifications of directive 2014/34/EU. One or several directives specified in the corresponding type examination certificate IBExU03ATEXB002\_05 X were in part replaced by updated versions.


KTR Systems GmbH being the manufacturer confirms that the product specified above is in accordance with the specifications of the new directives, too.

According to article 8 (1) b) ii) of directive 2014/34/EU the technical documentation is deposited with the institution:

IBExU  
Institut für Sicherheitstechnik GmbH  
Fuchsmühlenweg 7  
  
09599 Freiberg

Rheine,  
Place

2017-01-02  
Date

i. V.   
Reinhard Wibbeling  
Engineering/R&D

i. V.   
Johannes Deister  
Product Manager