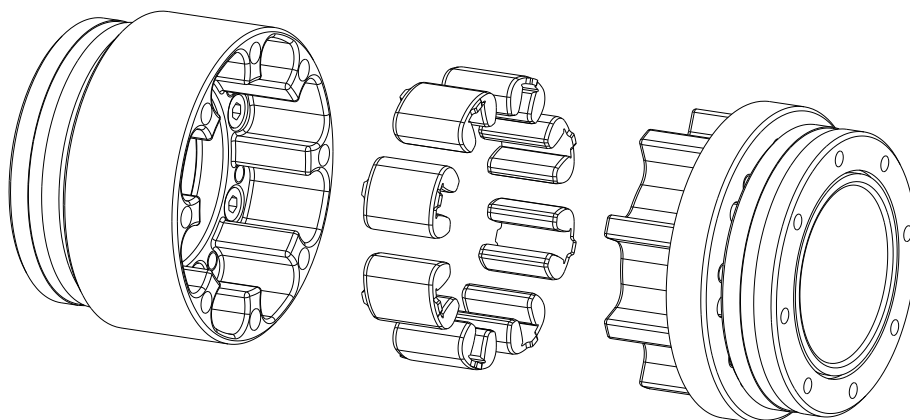


ROTEX® GS HP

Torsionally flexible coupling type
Clamping ring hubs and their combinations
for finish bored, pilot bored and unbored couplings



ROTEX® GS HP, clamping ring hubs steel



ROTEX® GS HP is a plug-in shaft coupling for spindle drives in machine tools, test benches as well as measuring, control and regulation technology. It is able to compensate for shaft misalignment, for example caused by manufacturing inaccuracies, thermal expansion, etc.

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

Table of contents

1	Technical data	3
2	Advice	5
2.1	General advice	5
2.2	Safety and advice symbols	5
2.3	General hazard warnings	6
2.4	Intended use	6
2.5	Coupling selection	6
2.6	Reference to EC Machinery Directive 2006/42/EC	6
3	Storage, transport and packaging	7
3.1	Storage	7
3.2	Transport and packaging	7
4	Assembly	7
4.1	Components of the coupling	7
4.2	Advice for assembly	8
4.3	Advice for finish bore	9
4.4	Assembly of the coupling	9
4.5	Disassembly of the coupling	11
4.6	Displacements - alignment of the couplings	11
5	Start-up	13
6	Breakdowns, causes and elimination	13
7	Disposal	15
8	Maintenance and service	15
9	Spares inventory, customer service addresses	15



1 Technical data

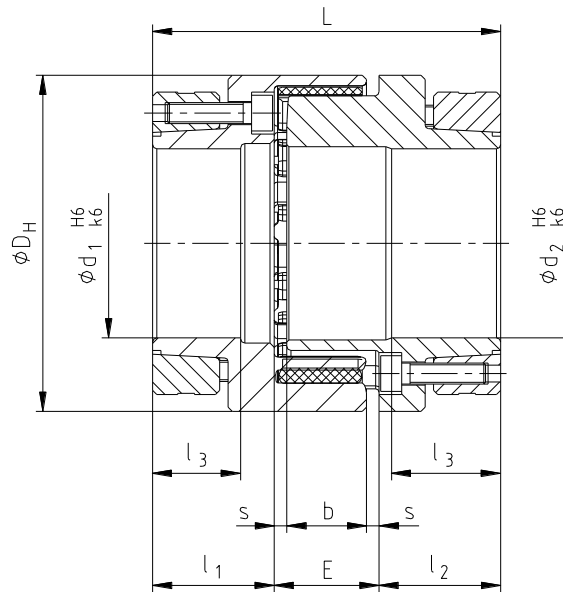


Illustration 1: ROTEX® GS HP, clamping ring hubs

Table 1: Dimensions - clamping ring hubs 6.0 steel
(clamping ring, cam and pocket element made of material - steel)

Size	Elastomer ¹⁾ (component 4) Torque [Nm]		Dimensions [mm]											Clamping screws DIN EN ISO 4762		Weight ²⁾ [kg]	Mass moment of inertia ²⁾ [kgm ²]	
	T _{KN}	T _{Kmax.}	d _{1max.} ; d _{2max.}	D	D _H	L	l ₁ ; l ₂	l ₃	l ₄	N	E	b	s	M	Quantity z			T _A [Nm]
24	100	200	25	48	55	73	25	17.5	17.5	15	24	20	2.0	M5	5	7.7	0.74	0.000317
28	160	320	35	58	65	78	27	20	20	17	24	20	2.0	M5	6	7.7	1.02	0.000653
38	400	800	45	76	80	83	29	21	26	18	24	20	2.0	M5	8	7.7	1.54	0.001534
42	475	950	51	82	95	99	36	27	30	24	27	22	2.5	M6	8	13	2.59	0.003441
48	550	1100	55	92	105	101	37	30	31	25	27	22	2.5	M6	9	13	3.39	0.005481
55	725	1450	60	105	120	103	38	31	32	26	27	22	2.5	M6	10	13	6.84	0.009172

- 1) For coupling selection see catalogue Drive Technology "ROTEX® GS".
Consider transmittable friction torques of the clamping connection (see table 2).
- 2) Apply for the coupling with max. bore diameter.



Subject to the increased safety with 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.

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	Verified:	2018-03-26 Pz	Replaced by:	

1 Technical data

Table 2: Friction torque and surface pressure of clamping ring hubs 6.0 steel

Size	24	28	38	42	48	55
Clamping screw M	M5	M5	M5	M6	M6	M6
Quantity z (for each clamping ring hub)	5	6	8	8	9	10
Tightening torque T _A [Nm]	Clamping ring, cam and pocket element made of material steel					
	7.7	7.7	7.7	13	13	13
Bore Ø d ₁	Transmittable friction torque T _R of clamping ring hub [Nm]					
	Surface pressure [N/mm ²]					
Ø12	55					
	189					
Ø15	102	125				
	226	245				
Ø18	165	199				
	253	271				
Ø19	115	226				
	159	277				
Ø20	133	158	216			
	165	174	224			
Ø22	172	202	274			
	177	185	235			
Ø25	241	280	376			
	192	198	249			
Ø27		340	343			
		206	195			
Ø28		246	374			
		139	198			
Ø32		340	508	665		
		147	206	196		
Ø35		432	635	830		
		156	215	204		
Ø36			511	889		
			163	207		
Ø38			586	1015		
			168	212		
Ø40			666	770		
			173	145		
Ø42			752	871	957	1220
			177	149	156	191
Ø44			613	979	1074	1364
			131	152	160	195
Ø45			649	1035	1135	1440
			133	154	162	196
Ø48				1215	1330	1455
				159	166	175
Ø50				1153	1132	1604
				139	131	177
Ø51				1201	1189	1681
				139	132	179
Ø54					1358	1562
					134	148
Ø55					1424	1635
					136	149
Ø60						2026
						156

The transmittable friction torques of the clamping connection consider the max. clearance with shaft tolerance k6/bore H6. The torque is reduced with bigger fitting tolerances. The friction torque was calculated regardless of speed.



A calculation is necessary if hollow shafts are used!

2 Advice

The **ROTEX® GS HP** 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 surface contact results in a lower surface pressure on the elastomer. Consequently the elastomer can be overloaded many times with no wear/deformation.

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 cam and pocket element are machined with special accuracy.

The elastomers are inserted in the pocket element.

The cam element is inserted in the pocket element with a small amount of prestress, resulting in the necessary backlash-free power transmission.

The elastomers compensate for displacements. An external deformation is limited by the shape of pocket elements, ensuring a smooth operation even with bigger masses to be accelerated (e. g. machine tables, articulated arms, etc.).

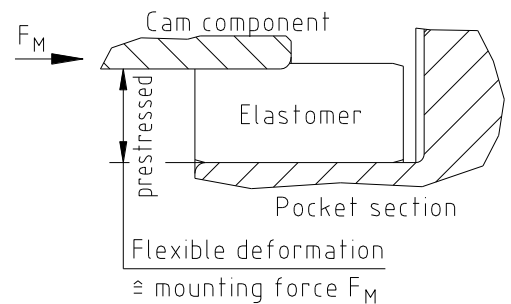


Illustration 2: Prestress of elastomers

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!

In order to ensure the operating principle of **ROTEX® GS HP** and avoid early wear of the coupling, a corresponding operating factor „SB“ has to be considered for the selection, each depending on the application (see catalogue). Temperatures and shocks are provided with the corresponding factors, too (see catalogue).

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.

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2 Advice

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.

2.4 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 HP** 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 elastomers 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.

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	Verified:	2018-03-26 Pz	Replaced by:	



3 Storage, transport and packaging

3.1 Storage

The cam or pocket elements are supplied in preserved condition and can be stored in a roofed, dry place for 6 - 9 months.

The features of the 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.

4.1 Components of the coupling

Features of standard elastomers

Elastomer hardness (Shore)	98 ShA (PUR) ¹⁾ (black)
Size	24 - 55
Material	PUR
Marking (colour)	

1) Other elastomer hardness on request



4 Assembly

4.1 Components of the coupling

Components of ROTEX® GS HP, clamping ring hubs (types 6.0 steel)

Component	Quantity	Description
1	2	Clamping ring
2	1	Cam element
3	1	Pocket element
4	1	Double tooth element DZ (1 set)
5	see table 2	Cap screws DIN EN ISO 4762

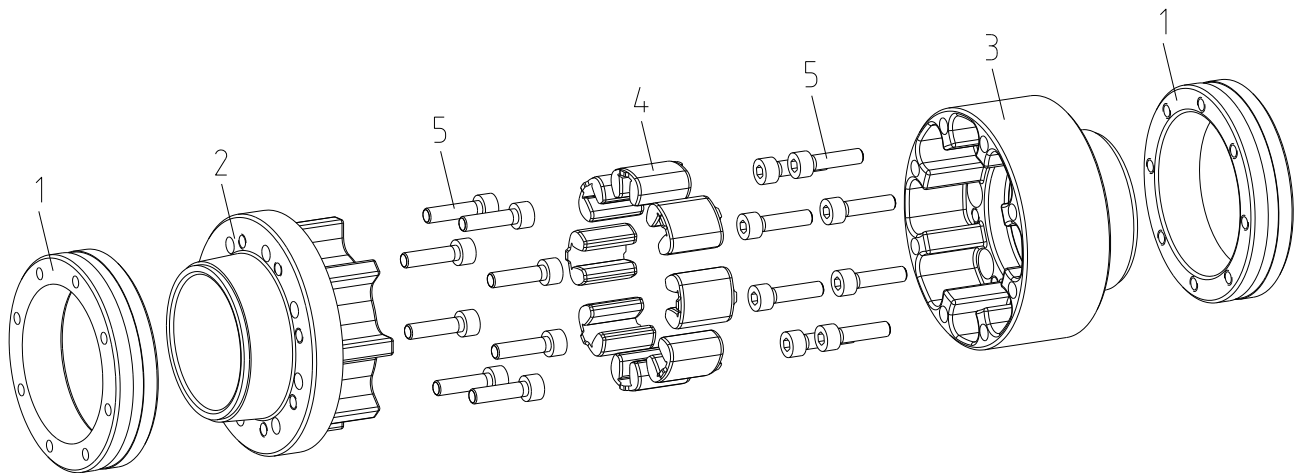


Illustration 3: ROTEX® GS HP, clamping ring hub



Subject to the increased safety with 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.

4.2 Advice for assembly

Subject to its design the **ROTEX® GS HP** allows to plug in the coupling axially after having assembled the cam or pocket element on the shaft journal. Consequently there is no need for subsequent screwing and the respective mounting holes in the housing.

The pegs on the elastomer prevent a contact of the elastomers on the cam or pocket element over the full surface. Observing the distance dimension E, the ability for displacement of the coupling is ensured in this way. All elastomers are chamfered on the face which allows for blind assembly. When the cam and pocket element are shifted together with the elastomer of **ROTEX® GS HP**, an axial mounting force is generated resulting from the flexible prestress of the elastomer. This assembly force varies depending on the coupling size, elastomer hardness and machining tolerances.

The axial insertion force is offset after having shifted together the cam and pocket element and consequently does not mean any risk of axial load on the adjacent bearings.

The mounting force can be reduced by lightly greasing or lubricating the elastomer or the cam or pocket element. 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 Assembly

4.3 Advice for finish bore



The maximum permissible bore diameters d (see table 1 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 machined or remachined by the customer have to observe concentricity or axial runout, respectively (see illustration 4).
- Please make absolutely sure to observe the figures for $\varnothing d_{\max}$.
- Carefully align the cam or pocket element when the finish bores are machined..

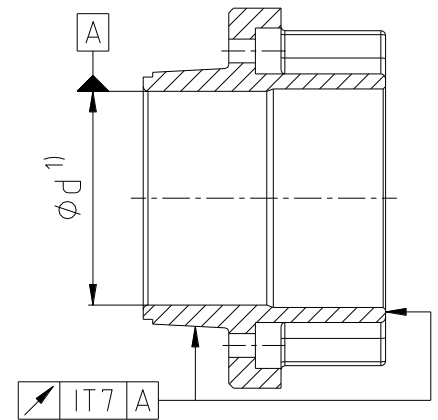


Illustration 4: Concentricity and axial runout

- 1) The max. bore for each taper must be considered with remachining.



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.

4.4 Assembly of the coupling



We recommend to inspect bores and shafts for dimensional accuracy before assembly.



Please note the manufacturer's instructions regarding the use of detergents.



Heating the cam or pocket elements lightly (approx. 80 °C) allows for an easier mounting on the shaft.



Touching the heated cam or pocket elements causes burns.
Please wear safety gloves.



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

The power transmission of the **ROTEX® GS HP** is frictionally engaged. The necessary surface pressure is transmitted via the clamping ring with internal taper to the external taper of the cam or pocket element and consequently to the shaft. The friction torques specified in table 2 consider a fit pair H6/k6. With a bigger fit clearance the friction torques specified in table 2 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.

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	Verified:	2018-03-26 Pz	Replaced by:	

4 Assembly

4.4 Assembly of the coupling

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 [N/mm²]
 p_W = surface pressure of hub/shaft [N/mm²]

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.



Do not lubricate taper surfaces of the cam or pocket element with initial assembly, since the components are coated with lubricant when being supplied. For re-lubrication, for example after disassembly, the multi-purpose fat Molykote G Rapid plus should be used on the taper surfaces. Only use thin-fluid oil for the threads of the clamping screws.

- Clean and degrease the bore of cam and pocket element and the shaft.
- Lightly untighten the clamping screws and pull the clamping ring down from the cam or pocket element only marginally to make sure that the clamping ring is installed loosely.
- Shift the cam or pocket element onto the shaft. The dimension l_3 or l_4 should at least be observed (see table 1).
- Tighten the clamping screws evenly crosswise gradually to the tightening torque specified in table 2. Repeat this process until all clamping screws have reached the tightening torque.
- No gap allowed between cam or pocket element and clamping ring after tightening of all clamping screws (see illustration 6).

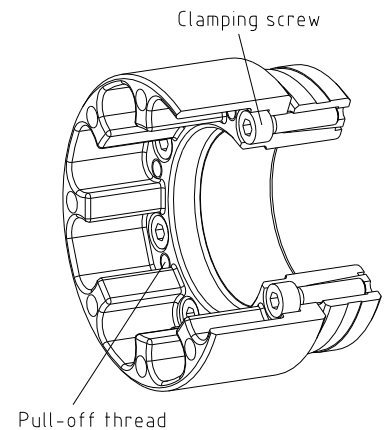


Illustration 5: Assembly
Pocket element with clamping ring



- If the clamping screws are not tightened at the correct tightening torque, there is the risk of**
- a) a fracture of the cam element 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

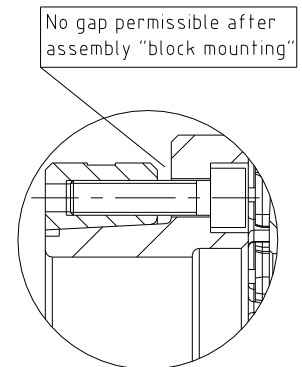


Illustration 6: Block assembly



4 Assembly

4.5 Disassembly of the coupling

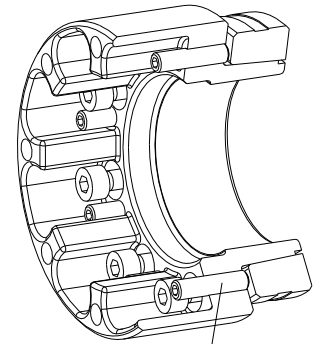
Unscrew the clamping screws evenly one after another. During every revolution every screw may only be unscrewed by half a turn. Unscrew all clamping screws by 3 - 4 pitches.

Screw the setscrews into the respective extraction threads until contact (setscrews are not part of the scope of delivery).

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



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



Setscrew in the pull-off thread

Illustration 7: Disassembly Pocket element with clamping ring

Table 3: Setscrews for extraction threads

Size	24	28	38	42	48	55
Pull-off thread M ₁	M5	M5	M5	M6	M6	M6



For re-lubrication, for example after disassembly of clamping rings, the multi-purpose fat Molykote G Rapid plus should be used on the taper surfaces. Only use thin-fluid oil for the threads of the clamping screws.

4.6 Displacements - alignment of the couplings

The displacement figures specified in table 3 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 3). 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:

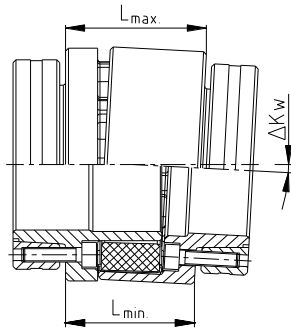
- The displacement figures specified in table 3 are maximum figures which must not arise in parallel. If radial and angular displacements arise at the same time, the permissible displacement values may only be used proportionally (see illustration 9).
- Please inspect with a dial gauge, ruler or feeler gauge whether the permissible displacement figures specified in table 3 can be observed.

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	Verified:	2018-03-26 Pz	Replaced by:	



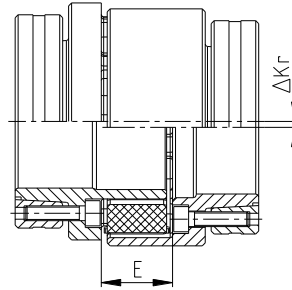
4 Assembly

4.6 Displacements - alignment of the couplings

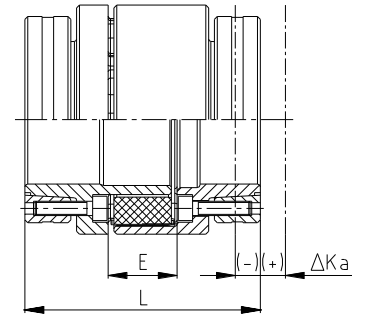


Angular displacements

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



Radial displacements



Axial displacements

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

Illustration 8: Displacements

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

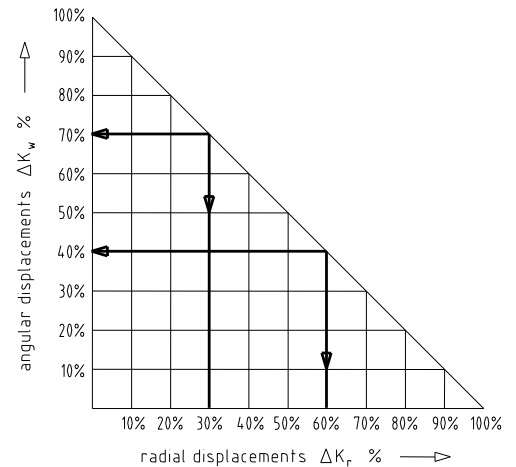


Table 3: Displacement figures

Size	24	28	38	42	48	55
Max. axial displacement ΔK_a [mm]	+1.0 / -0.8			+1.4 / -1.0		
Max. radial displacement ΔK_r [mm] (98 ShA)	0.10			0.14		
Max. angular displacement ΔK_w [degree] (98 ShA)	0.9					

The permissible displacement figures of the flexible ROTEX® GS HP 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.

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. Bellhousings (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.

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 failures specified below can lead to a use of the **ROTEX® GS HP** 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.

General failures with improper use:

- 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.
- When mounting the cam or pocket element in a heated condition, 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.
- Wrong or no elastomers are inserted in the coupling.
- No original **KTR** components (purchased parts) are used.
- Old/already worn out elastomers or those stored for too long are used.
- Maintenance intervals are not observed.

6 Breakdowns, causes and elimination

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 elastomers, short-term torque transmission due to metal contact	1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomers 3) Inspect coupling components and replace coupling components that are damaged 4) Insert elastomers, assemble coupling components 5) Inspect alignment, adjust if necessary
Breaking of cams	Wear of elastomers, torque transmission by 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 elastomers or reverse backlash	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 elastomer	1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomers 3) Inspect coupling components and replace coupling components that are damaged 4) Insert elastomers, assemble coupling components 5) Inspect alignment, adjust if necessary 6) Make sure that further physical modifications of the elastomers are excluded
	excessively high/low ambient/contact temperatures for the elastomer; max. permissible e. g. T4 = -30 °C/+ 90 °C	1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomers 3) Inspect coupling components and replace coupling components that are damaged 4) Insert elastomers, assemble coupling components 5) Inspect alignment, adjust if necessary 6) Inspect and adjust ambient/contact temperature (possibly corrective by using different elastomer materials)
Early wear of elastomers (liquefaction of material inside the elastomer)	Vibrations of drive	1) Set the unit out of operation 2) Disassemble the coupling and remove remainders of the elastomers 3) Inspect coupling components and replace coupling components that are damaged 4) Insert elastomers, assemble coupling components 5) Inspect alignment, adjust if necessary 6) Find out the reason for the vibrations (possibly corrective by elastomer 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.

8 Maintenance and service

ROTEX® GS HP 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 elastomers 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 parts 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.



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: 2018-03-26 Pz/No	Replacing: KTR-N dated 2017-11-30
	Verified: 2018-03-26 Pz	Replaced by: