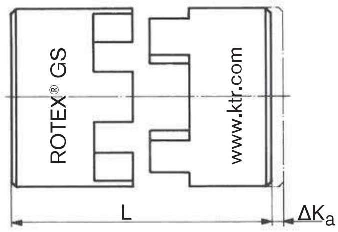
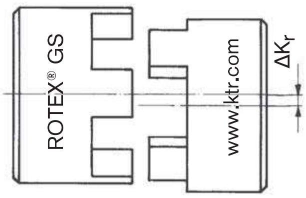
ROTEX® GS
Backlash-free jaw couplings

Notes for displacements

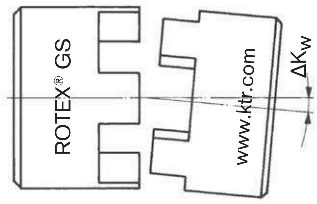
Axial displacement



Radial displacement



Angular displacement



Due to its design the ROTEX® GS is able to absorb axial, angular and radial displacement, without causing any wear or premature failure of the coupling. As the spider is only stressed under pressure it is ensured that the coupling remains backlash-free even after a longer operation period.

For instance, axial displacement may be generated by different tolerances of the connecting elements with assembly or by alteration of the shaft lengths if temperature fluctuations occur. As the shaft bearings usually cannot be axially stressed to a big extent, it is the task of the coupling to compensate for this axial displacement and keep the reaction forces low.

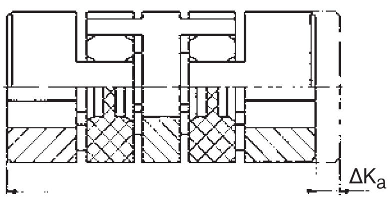
In case of pure angular displacement the imaginary bisecting lines of the shafts intersect in the centre of the coupling. Within a permissible range this displacement can be absorbed by the coupling without extensive restoring forces being generated.

Radial displacement results from parallel displacement of the shafts to one another, caused by different tolerances on the centerings or by mounting the power packs on different levels. Due to the kind of displacement the largest restoring forces are generated here, consequently causing the highest stresses on adjacent components.

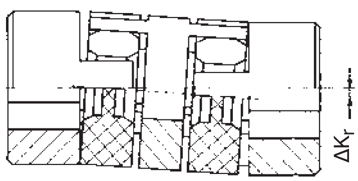
In case of larger displacements (especially radial displacements) the ROTEX® GS type DKM double-cardanic system should be used in order to avoid excessive restoring forces.

The permissible displacement figures of the flexible ROTEX® GS couplings specified are general standard values taking into account the load of the coupling up to the rated torque TKN of the coupling and an ambient temperature of +30 °C. The displacement figures may only be used one by one, if they appear simultaneously, they must be limited in proportion. The ROTEX® GS couplings are able to absorb axial, radial and angular displacements. Careful and accurate alignment of the shafts increases the service life of the coupling.

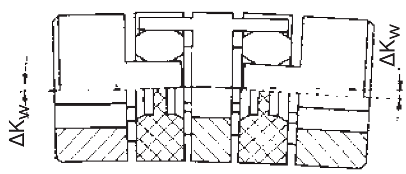
Axial displacement



Radial displacement



Angular displacement



Shaft misalignment of ROTEX® GS type DKM
This design reduces the restoring forces arising with radial displacement to a minimum, due to the double-jointed operation, additionally the coupling is able to compensate for higher axial and angular misalignment.

Displacements

Size	Spider GS	Standard displacements			DKM displacements		
		Axial ΔK_a [1] [mm]	Radial ΔK_r [mm]	Angular ΔK_w [degree]	Axial ΔK_a [1] [mm]	Radial ΔK_r [mm]	Angular ΔK_w [degree]
5	80 ShA	-0.2	0.12	1.1°	-0.4	0.15	1.1°
	92 ShA		0.06	1.0°		0.14	1.0°
	98 ShA		0.04	0.9°		0.13	0.9°
7	80 ShA	+0.6 -0.3	0.15	1.1°	+0.6 -0.6	0.23	1.1°
	92 ShA		0.10	1.0°		0.21	1.0°
	98 ShA		0.06	0.9°		0.19	0.9°
	64 ShD		0.04	0.8°		0.17	0.8°
8	80 ShA	+0.6 -0.5	0.15	1.1°	—	—	—
	98 ShA		0.08	0.9°			
	64 ShD		0.06	0.8°			
9	80 ShA	+0.8 -0.4	0.19	1.1°	+0.8 -0.8	0.29	1.1°
	92 ShA		0.13	1.0°		0.26	1.0°
	98 ShA		0.08	0.9°		0.24	0.9°
	64 ShD		0.05	0.8°		0.21	0.8°
12	80 ShA	+0.9 -0.4	0.20	1.1°	+0.9 -0.9	0.35	1.1°
	92 ShA		0.14	1.0°		0.32	1.0°
	98 ShA		0.08	0.9°		0.29	0.9°
	64 ShD		0.05	0.8°		0.25	0.8°
13	80 ShA	+0.9 -0.8	0.20	1.1°	—	—	—
	98 ShA		0.08	0.9°			
	64 ShD		0.05	0.8°			
14	80 ShA	+1.0 -0.5	0.21	1.1°	+1.0 -1.0	0.40	1.1°
	92 ShA		0.15	1.0°		0.37	1.0°
	98 ShA		0.09	0.9°		0.33	0.9°
	64 ShD		0.06	0.8°		0.29	0.8°
16	80 ShA	+1.0 -0.8	0.21	1.1°	—	—	—
	98 ShA		0.10	0.9°			
	64 ShD		0.08	0.8°			
19	80 ShA	+1.2 -0.5	0.15	1.1°	+1.2 -1.0	0.49	1.1°
	92 ShA		0.10	1.0°		0.45	1.0°
	98 ShA		0.06	0.9°		0.41	0.9°
	57 ShD		0.05	0.85°		0.38	0.85°
	64 ShD		0.04	0.8°		0.36	0.8°
24	92 ShA	+1.4 -0.5	0.14	1.0°	+1.4 -1.0	0.59	1.0°
	98 ShA		0.10	0.9°		0.53	0.9°
	57 ShD		0.08	0.85		0.50	0.85
	64 ShD		0.07	0.8°		0.47	0.8°
	72 ShD		0.04	0.7°		0.42	0.7°
28	92 ShA	+1.5 -0.7	0.15	1.0°	+1.5 -1.4	0.66	1.0°
	98 ShA		0.11	0.9°		0.60	0.9°
	57 ShD		0.09	0.85		0.56	0.85
	64 ShD		0.08	0.8°		0.53	0.8°
	72 ShD		0.05	0.7°		0.46	0.7°
38	92 ShA	+1.8 -0.7	0.17	1.0°	+1.8 -1.4	0.77	1.0°
	98 ShA		0.12	0.9°		0.69	0.9°
	57 ShD		0.10	0.85		0.65	0.85
	64 ShD		0.09	0.8°		0.61	0.8°
	72 ShD		0.06	0.7°		0.54	0.7°
42	98 ShA	+2,0 -1,0	0,14	0,9°	+2,0 -2,0	0,75	0,9°
	57 ShD		0,12	0,85		0,71	0,85
	64 ShD		0,10	0,8°		0,67	0,8°
	72 ShD		0,07	0,7°		0,59	0,7°
48	98 ShA	+2,1 -1,0	0,16	0,9°	+2,1 -2,0	0,82	0,9°
	57 ShD		0,13	0,85		0,77	0,85
	64 ShD		0,11	0,8°		0,73	0,8°
	72 ShD		0,08	0,7°		0,64	0,7°
55	98 ShA	+2,2 -1,0	0,17	0,9°	+2,2 -2,0	0,91	0,9°
	64 ShD		0,12	0,8°		0,81	0,8°
	72 ShD		0,09	0,7°		0,71	0,7°
65	98 ShA	+2.6 -1.0	0.18	0.9°	—	—	—
	64 ShD		0.13	0.8°			
	72 ShD		0.10	0.7°			
75	98 ShA	+3.0 -1.5	0.21	0.9°	—	—	—
	64 ShD		0.15	0.8°			
	72 ShD		0.11	0.7°			
90	98 ShA	+3.4 -1.5	0.23	0.9°	—	—	—
	64 ShD		0.17	0.8°			
	72 ShD		0.13	0.7°			

[1] The Ka figures specified have to be added to the length of the respective coupling type.
The displacement figures may only be used one by one, if they appear simultaneously, they must be limited in proportion. Care should be taken to maintain the distance dimension E accurately in order to allow for axial clearance of the coupling while in operation. Detailed mounting instructions are shown on our homepage www.ktr.com.
For technical data of type HP see page 142.

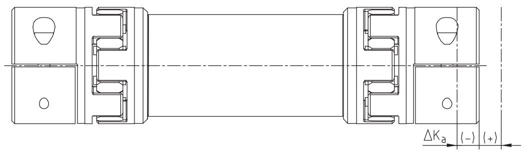
ROTEX® GS
Backlash-free jaw couplings

Displacements of intermediate shaft coupling

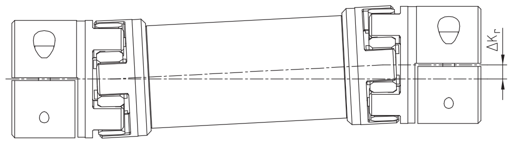
Displacements of intermediate shaft couplings			
ROTEX® GS size (with 98 ShA-GS)	Axial ΔK_a [mm]	Radial ΔKr [1] [mm]	Angular ΔK_W [degree]
14	+1.0 -1.0	15	0.9°
19	+1.2 -1.0	14	0.9°
24	+1.4 -1.0	14	0.9°
28	+1.5 -1.4	14	0.9°
38	+1.8 -1.4	14	0.9°
42	+2.0 -2.0	14	0.9°
48	+2.1 -2.0	13	0.9°
55	+2.2 -2.0	13	0.9°
65	+2.6 -2.0	13	0.9°

[1] Radial displacements based on a coupling length L_{ZR} = 1000 mm

Axial displacement

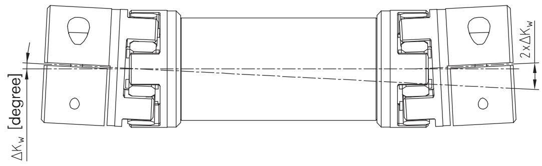


Radial displacement



$$\Delta Kr = (L_{ZR} - 2 \bullet l_1 - E) \cdot \tan \Delta Kw$$

Angular displacement



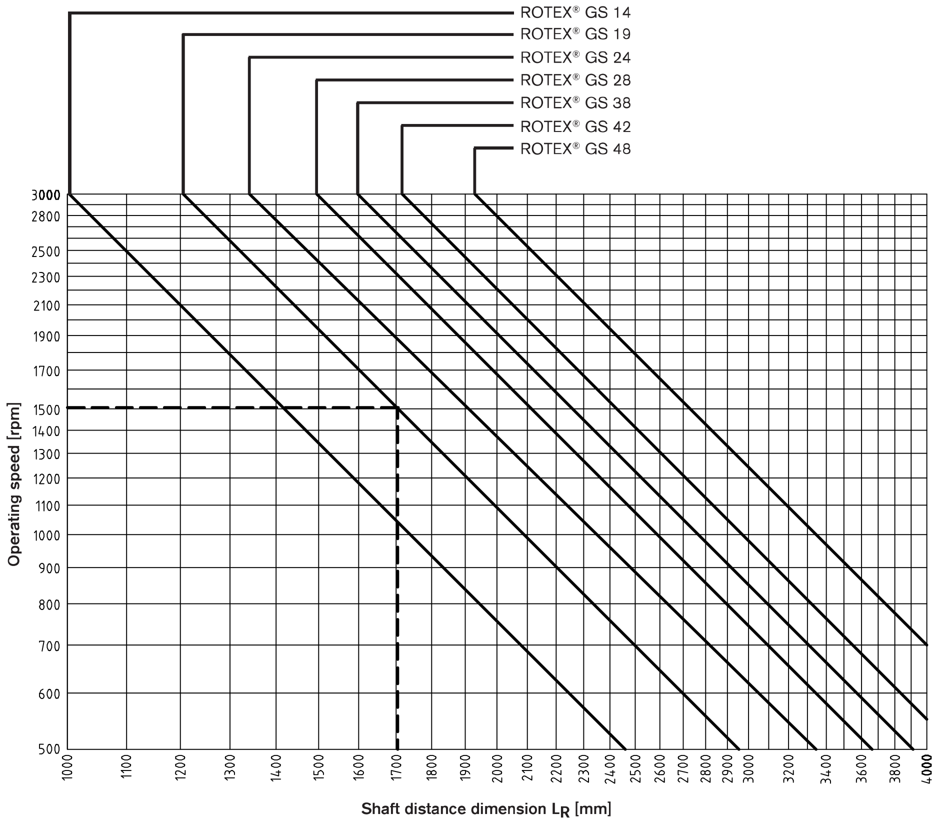
Calculation of overall torsion spring stiffness:

$$C_{tot.} = \frac{1}{2 \bullet \frac{1}{C_1} + \frac{L_{pipe}}{C_2}} \quad [\mathrm{Nm/rad}]$$

$$\text{with } L_{pipe} = \frac{L_{ZR} - 2 \bullet L}{1000\ [\mathrm{m}]}$$

C_1 = torsion spring stiffness for spider see page 128
C_2 = from table on page 150 - 152

Chart of critical bending speeds for type ZR3



Example:
ROTEX® GS 19
Operating speed: 1500 rpm
Max. perm. shaft distance dimension: 1700 mm
Operating speed = n_{crit}/1.4