Backlash-free shaft couplings:

ROTEX® GS
Backlash-free shaft couplings

TOOLFLEX®
Metal bellow-type couplings

ROTEX® GS

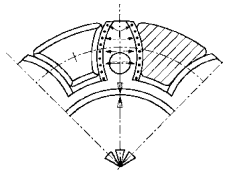
Backlash-free shaft coupling

Technical description

ROTEX® GS is a 3-part, axial plug-in coupling backlash-free under pre-stress. It is convincing even with critical applications by its backlash-free power transmission, its stiffness which is each adapted to the application and its optimum damping of vibrations. This principle of installation offers significant assembly possibilities which optimize the assembly times in production.

ROTEX® GS (straight tooth, backlash-free)
The straight toothing of the spider mounted under prestress results in a smaller surface pressure and consequently higher stiffness of the coupling system. The flexible teeth compensate for misalignment but are supported radially in the inside diameter by a central web. This avoids too high internal or external deformation by high acceleration or high speeds. This is vital for a smooth operation and long service life of the coupling.

Limitation by concave cams in case of too high speeds/centrifugal forces and prestress of elastomer parts

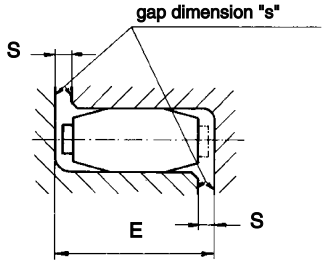


Support to the axis of rotation

The hub claws and the nylon teeth are chamfered to enable easy plug-in and "blind assembly". The ends of the teeth have pegs to limit this axial positioning and simplify assembly.

By observing the gap dimension "s" the electrical isolation is ensured, as well as a high service life of the coupling. This fact is gaining more and more importance, due to the increasing precision of shaft encoders and the existing demand for electro-magnetic compatibility.

Electric isolation due to gap dimension "s"



The elastic spiders of the GS line are available in three different kinds of Shore hardness, identified by colour, the material being soft to hard. Due to these four spiders with different kinds of Shore hardness it is easily possible to adjust the **ROTEX® GS** regarding the torsional stiffness and the vibration behaviour to the individual conditions of an application.

Description of spider hardness [Shore]	Identification Colour	Material	Permissible temperature range [° C] Permanent temperature	Max. temperature short-term	Available for coupling size	Typical applications
80 Sh A-GS	blue	Polyurethane	– 50 to + 80	– 60 to + 120	size 5 to 24	– drives of electric measuring systems – backlash-free in the range of prestress
92 Sh A-GS	yellow	Polyurethane	– 40 to + 90	– 50 to + 120	size 5 to 55	– drives of electric measuring and control systems – main spindle drives - backlash-free in the range of prestress
95/98 Sh A-GS	red	Polyurethane	– 30 to + 90	– 40 to + 120	size 5 to 75	– drives, positioning drives, main spindle drives – high load – backlash-free in the range of prestress
64 Sh D-H-GS	green	Hytrel	– 50 to + 120	– 60 to + 150	size 7 to 38	– control drives / tool spindles planetary gears / feed drives – high load, torsionally stiff – high ambient temperat. / resistant to hydrolysis
64 Sh D-GS	pale green	Polyurethane	– 20 to + 110	– 30 to + 120	size 42 to 55	

ROTEX® GS

Backlash-free shaft coupling

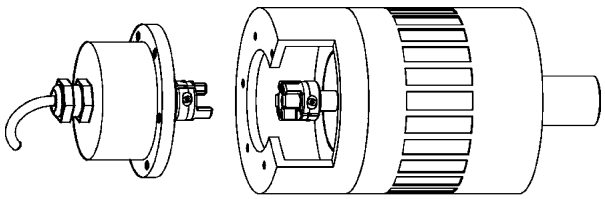
Application recommendation

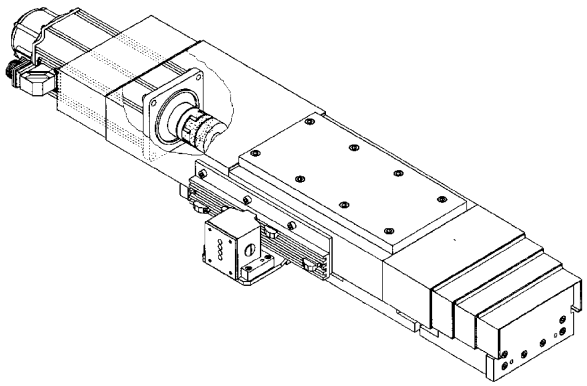
Measurement and control systems

For measurement and control systems a high torsional stiffness of the coupling is required in order to obtain positioning repeatability.

The torques that arise are relatively small so that backlash-free, torsionally stiff power transmission is achieved by the elastomer pre-stress.

In order to minimize the restoring forces we would recommend the spider 80 Sh A GS for such applications.





Servo and positioning drives

ROTEX® GS as an alternative to torsionally rigid couplings

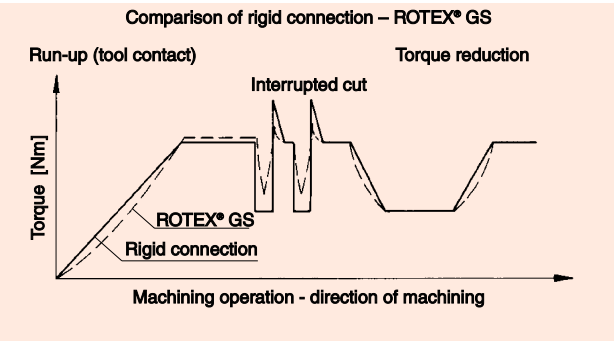
Torsionally rigid shaft-to-shaft connections do not only transmit the torque backlash-free and non-rigid, but also torque peaks and vibrations. For driving systems with critical vibrations, the benefit of high stiffness for torque transmission soon becomes a serious disadvantage. For applications on which torsionally rigid shaft-to-shaft connections may cause a problematic torque transmission, the optimum alternative is ROTEX® GS.

Backlash-free, damping vibrations, yet sufficiently torsionally rigid so that even highly dynamic servo drives must not suffer from lower precision with the right sizing of the coupling.

Main spindle drives

With the high torques in the field of machine tools, e. g. direct spindle drives, initial small twisting (under prestress) and damping dependent on the elastomer hardness is achieved. Peak tensions and shock loads are reduced or the resonance range is shifted to non-critical speed ranges, respectively.

For peripheral speeds up to 40 m/s (referred to the outside diameter of the coupling) we would recommend to use our ROTEX® GS clamping ring hub. For peripheral speeds exceeding 50 m/s, ROTEX® GS...P should be used. We have on hand experiences from industrial applications for peripheral speeds up to 80 m/s.



Explosion protection use

ROTEX® GS couplings are suitable for power transmission in drives in hazardous areas. The couplings are certified according to EC Standard 94/9/EC (ATEX 95) as units of category 2G and thus suitable for the use in hazardous areas of zone 1 and 2. Please read our information in the respective Type Examination Certificate and the operating and mounting instructions under www.ktr.com.

Selection: In case of use in hazardous areas the clamping ring hubs (clamping hubs without feather keyway only for use in category 3) must be selected so that there is a minimum safety factor of s = 2 between the peak torque (including all operating parameters) and the nominal torque and frictional torque of engagement of the coupling.

ROTEX® GS

Backlash-free shaft coupling

Technical data

ROTEX® GS Size	Spider Shore GS	Shore range	Max. speed [min⁻¹] for hub design 2.0 / 2.1 2.5 / 2.6	1.0 1.1	6.0 [2]	6.0 P [2]	Torque [Nm] T_{KN}	T_{Kmax}	Static torsion spring stiffness [Nm/rad]	Dynamic torsion spring stiffness [1] [Nm/rad]	Radial stiffness C_r [N/mm]	Weight [kg] each hub	spider	Mass moment of inertia J [kgm²] each hub	spider
5	70	A	38000	47700			0,2	0,3	1,78	5	43	1 x 10⁻³	0,2 x 10⁻³	0,016 x 10⁻⁶	0,002 x10⁻⁶
	80	A					0,3	0,6	3,15	10	82				
	92	A					0,5	1,0	5,16	16	154				
	98	A					0,9	1,7	8,3	25	296				
7	80	A	27000	34100			0,7	1,4	8,6	26	114	3 x 10⁻³	0,7 x 10⁻³	0,085 x 10⁻⁶	0,014 x10⁻⁶
	92	A					1,2	2,4	14,3	43	219				
	98	A					2,0	4,0	22,9	69	421				
	64	D					2,4	4,8	34,3	103	630				
9	80	A	19000	23800			1,8	3,6	17,2	52	125	9 x 10⁻³	1,8 x 10⁻³	0,49 x 10⁻⁶	0,079 x10⁻⁶
	92	A					3,0	6,0	31,5	95	262				
	98	A					5,0	10,0	51,6	155	518				
	64	D					6,0	12,0	74,6	224	739				
12	80	A	15200	19100			3,0	6,0	84,3	252	274	14 x 10⁻³	2,3 x 10⁻³	1,3 x 10⁻⁶	0,139 x10⁻⁶
	92	A					5,0	10,0	160,4	482	470				
	98	A					9,0	18,0	240,7	718	846				
	64	D					12,0	24,0	327,9	982	1198				
14	80	A	12700	15900	25400	31800	4,0	8,0	60,2	180	153	20 x 10⁻³	4,6 x 10⁻³	2,8 x 10⁻⁶	0,457 x10⁻⁶
	92	A					7,5	15,0	114,6	344	336				
	98	A					12,5	25,0	171,9	513	654				
	64	D					16,0	32,0	234,2	702	856				
19	80	A	9550	11900	19000	23800	4,9	9,8	343,8	1030	582	66 x 10⁻³	7 x 10⁻³	20,4 x 10⁻⁶	1,49 x10⁻⁶
	92	A					10,0	20,0	573,0	1720	1120				
	98	A					17,0	34,0	859,5	2580	2010				
	64	D					21,0	42,0	1240,3	3720	2930				
24	92	A	6950	8650	13800	17300	35	70	1432	4296	1480	132 x 10⁻³	18 x 10⁻³	50,8 x 10⁻⁶	7,5 x10⁻⁶
	98	A					60	120	2063	6189	2560				
	64	D					75	150	2978	8934	3696				
28	92	A	5850	7350	11700	14700	95	190	2292	6876	1780	253 x 10⁻³	29 x 10⁻³	200,3 x 10⁻⁶	16,5 x10⁻⁶
	98	A					160	320	3438	10314	3200				
	64	D					200	400	4350	13050	4348				
38	92	A	4750	5950	9550	11900	190	380	4584	13752	2350	455 x 10⁻³	49 x 10⁻³	400,6 x 10⁻⁶	44,6 x10⁻⁶
	98	A					325	650	7160	21486	4400				
	64	D					405	810	10540	31620	6474				
42	92	A	4000	5000	8050	10000	265	530	6300	14490	2430	1850 x 10⁻³	79 x 10⁻³	2246 x 10⁻⁶	100 x10⁻⁶
	98	A					450	900	19200	48000	5570				
	64	D					560	1120	27580	68950	7270				
48	92	A	3600	4550	7200	9100	310	620	7850	18055	2580	2520 x 10⁻³	98 x 10⁻³	3786 x 10⁻⁶	200 x10⁻⁶
	98	A					525	1050	22370	55925	5930				
	64	D					655	1310	36200	90500	8274				
55	92	A	3150	3950	6350	7950	410	820	9500	21850	2980	3800 x 10⁻³	115 x 10⁻³	7496 x 10⁻⁶	300 x10⁻⁶
	98	A					685	1370	23800	59500	6686				
	64	D					825	1650	41460	103650	9248				
65	95	A	2800	3500	5650	7050	940	1880	38200	95500	6418	4500 x 10⁻³	210 x 10⁻³	12000 x 10⁻⁶	500 x10⁻⁶
	64	D					1175	2350	66200	165500	8870				
75	95	A	2350	2950	4750	5950	1920	3840	63030	157500	8650	7180 x 10⁻³	340 x 10⁻³	26000 x 10⁻⁶	2000 x10⁻⁶
	64	D					2400	4800	108230	273075	11923				

1) Dynamic torsional stiffness with 0,5 x T_{KN} 2) Higher speeds on request

The size of the coupling has to be such that the permissible coupling load is not exceeded in any operating condition (see coupling selection on page 99).

1. Definitions and factors for coupling selection

Prestress: The flexible prestress varies depending on the coupling size, the spiders/spider material and the production tolerances. As a result there is the axial plug-in force varying from low as sliding seat or with a torsionally soft spider to heavy with a high amount of prestress or torsionally rigid spider.

T_{KN} Rated torque of coupling [Nm]
Torque which can be transmitted continuously over the entire permissible speed range, taking into account the operating factors (S_t, S_d).

T_{Kmax} Maximum torque of coupling [Nm]
Torque which can be transmitted during the full service life of the coupling as dynamic load $\geq 10^5$ or as alternating load $5 \cdot 10^4$, taking into account the operating factors (S_t, S_d, S_A).

T_R Friction torque [Nm]
Torque which can be transmitted by the frictionally engaged shaft-hub-connection.

T_{AN} Constantly occurring max. driving torque

T_{AS} Maximum driving torque [Nm]
Peak torque in case of shock by the driving A. C. motor, for example during acceleration or breakdown torque of the A. C. motor.

T_S Peak torque [Nm]
Peak torque on the coupling, calculated from max. driving torque T_{AS}, rotational inertia coefficient m_A or m_L and opertaing factor S_A.

S_t Temperature factor
Factor considering the lower loading capacity or larger deformation of an elastomer part under load particularly in case of increased temperatures. In case of temperatures exceeding 80 °C we would recommend to use the RADEX®-NC (see page 133).

S_d Torsional stiffness factor
Factor considering the different demands on the torsional stiffness and fatigue strength of the coupling dependent on the application. In case of using the spider 64 Sh D-GS and reversing drive S_d has to selected in case of couplings made of aluminium. For positioning drives with increased demand on torsional stiffness (e.g. gearbox with low transmission) we would recommend the use of the TOOLFLEX® or RADEX®-NC (see page 114 and 133).

S_A Operating factor
Factor considering the occurring shocks or starts each minute, depending on the use

$m_{A(L)}$ Rotational inertia coefficient of driving side (load side)
Factor taking into account the distribution of masses in case of drive and load side shocks and vibration excitation.

ROTEX® GS

Backlash-free shaft coupling

Coupling selection

2. Factors

Temperature factor S_t

	– 30 °C + 30 °C	+ 40 °C	+ 60 °C	+ 80 °C
S_t	1	1,2	1,4	1,8

See note on page 100.

Torsional stiffness factor S_d

Main spindle drive of machine tool	Positioning drive (x - y axis)	Shaft encoders Angle encoders
2 – 5*	3 – 8*	10 →

See note on page 100.
*When using the 64 Sh D-GS spider at least factor 4

Operating factor S_A

main spindle drive	positioning drive*	S_A
light shock loads	≤ 60	1,0
average shock loads	≥ 60 ≤ 300	1,4
heavy shock loads	≤ 300	1,8

*Starts/minute

3. Calculation formula

Rated driving torque

$$T_N\ [Nm] = 9550 \cdot \frac{P_{AN/LN}\ [kW]}{n\ [1/min]}$$

Peak torque

Shock on driving side
$T_S = T_{AS} \cdot m_A \cdot S_A$

Shock on load side
$T_S = T_{LS} \cdot m_L \cdot S_L$

$$m_A = \frac{J_L}{J_A + J_L} \qquad m_L = \frac{J_A}{J_A + J_L}$$

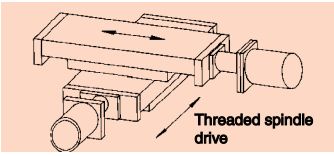
J_A = Moment of inertia of driving side
J_L = Moment of inertia of load side

The size of the coupling must be selected so that the following conditions are met.

$$T_{KN} \geq T_N \cdot S_t \cdot S_d \quad \text{and} \quad T_{KN} \geq T_S \cdot S_t \cdot S_d$$

For the factors please see the tables at the top.

4. Example of calculation (positioning drive)



Details of driving side
Servo motor
Rated torque T_{AN} = 43 Nm
Max. drive torque T_{AS} = 144 Nm
Moment of inertia J_{Mot} = 108 · 10^{-4} kgm²
Driving shaft d = 32 k6 without feather key

Details of driven side
Ball spindle J_{SP} = 38 · 10^{-4} kgm²
Screw pitch s = 10 mm
Driven shaft d = 30 k6 without keyway
Mass of slide and work piece m_{Schl} = 1030 kg

Ambient temperature 40 °C, 60 starts/minute required, high torsional stiffness.

Coupling selection: ROTEX® GS clamping ring hub - axial plug-in jaw coupling backlash-free under prestress with frictionally engaged shaft-hub-connection.

Moment of inertia of slide and work piece reduced to driving axis.

$$J_{Schl} = m_{Schl} \left(\frac{S}{2 \cdot \pi}\right)^2\ [kgm^2] \qquad J_{Schl} = 1030\ kg \left(\frac{0{,}01\ m}{2 \cdot \pi}\right)^2 = 26 \cdot 10^{-4}\ kgm^2$$

Selection of temperature, stiffness and operating factor:

S_t (40° C) = 1,2 | S_d = 4 | S_A = 1,0

Coupling selection:

Selection according to rated torque (pre-selection)

$T_{KN} \geq T_{AN} \cdot S_t \cdot S_d$ | $T_{KN} \geq 43\ Nm \cdot 1{,}2 \cdot 4$ | $T_{KN} \geq 206{,}4\ Nm$

Coupling selection: ROTEX® GS 38 - 98 Sh A-GS - clamping ring hub design T_{KN} 325 Nm

Review of max. driving torque

$T_{KN} \geq T_S \cdot S_t \cdot S_d$ with $T_S = T_{AS} \cdot m_A \cdot S_A$ and $m_A = \frac{J_L}{J_A + J_L}$

$J_L = (J_{Sp} + J_{Schl} + 1/2\ J_K)$ $\quad J_L = (38 + 26 + 9{,}6) \cdot 10^{-4}\ kgm^2 = 73{,}8 \cdot 10^{-4}\ kgm^2$

$J_A = J_{Mot} + 1/2\ J_K = (108 + 9{,}6) \cdot 10^{-4}\ kgm^2 = 117{,}6 \cdot 10^{-4}\ kgm^2$

$$m_A = \frac{J_L}{J_A + J_L} = \frac{73{,}8 \cdot 10^{-4}}{(117{,}6 + 73{,}8) \cdot 10^{-4}} \qquad m_A = 0{,}385$$

$T_S = T_{AS} \cdot m_A \cdot S_A = 144\ Nm \cdot 0{,}385 \cdot 1{,}0 = 55{,}44\ Nm$ $\quad$ ROTEX® GS 38 98 Sh A-GS T_{KN} = 325 Nm

$T_{KN} = T_S \cdot S_t \cdot S_d = 55{,}44\ Nm \cdot 1{,}2 \cdot 4$ $\quad T_{KN} \geq 266{,}11\ Nm$

Check of torque transmission of clamping ring hub for shaft diameter ø 30.

$T_R > T_{AS}$ Figures for T_R see table on catalogue page 106.

Transmittable torque Ø 30 H7 / k6 = 436 Nm > 144 Nm

Selection of ROTEX® GS 38 98 Sh A-GS, clamping ring hub design is permissible.

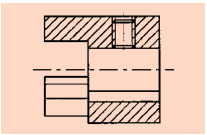
ROTEX® GS

Backlash-free shaft coupling

Hub designs

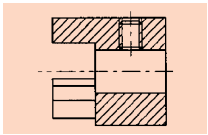
Due to the numerous applications of ROTEX® GS for many different mounting situations, this coupling system is available with various hub designs. These designs mainly differ in that they offer either positive or frictionally engaged (backlash-free) connections, but mounting situations like, for example, hollow shaft tacho, shaft encoder installation or similar applications are covered, too.

Design 1.0 with keyway and fixing screw



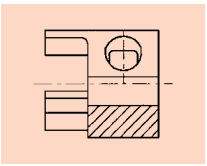
Positive power transmission; permissible torque depends on the permissible surface pressure. Not suitable for backlash-free power transmission for heavily reversing operation.

Design 1.1 without keyway, with setscrew



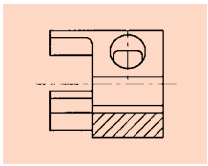
Non-positive torque transmission, suitable for backlash-free transmission of very small torques.
(No ATEX release)

Design 2.0 clamping hub, single slotted, without keyway



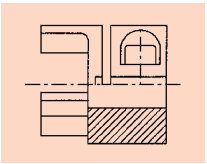
Frictionally engaged, backlash-free shaft-hub-connection. Transmittable torques depend on the bore diameter. Design 2.0 up to size 19 as standard.
(Only for ATEX category 3)

Design 2.1 clamping hub, single slotted, with keyway



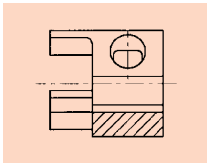
Positive power transmission with additional frictional tightness. The frictional tightness avoids or reduces reversal backlash. Surface pressure of the keyway connection is reduced. Design 2.1 up to size 19 as standard.

Design 2.5 clamping hub, double slotted, without keyway



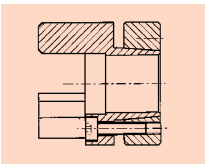
Frictionally engaged, backlash-free shaft-hub-connection. Transmittable torques depend on the bore diameter. Design 2.5 from size 24 as standard.
(Only for ATEX category 3)

Design 2.6 clamping hub, double slotted, with keyway



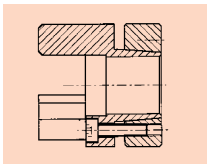
Positive power transmission with additional frictional tightness.
The frictional tightness prevents or reduces reversal backlash.
Surface pressure of the keyway connection is reduced.
Design 2.6 from size 24 as standard.

Design 6.0 clamping ring hub



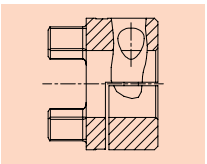
Integrated frictionally engaged shaft-hub-connection for transmission of higher torques. Screw fitting on elastomer side. For details about torques and dimensions see page 106. Suitable for high speeds.

Design 6.0 P precision clamping ring hub



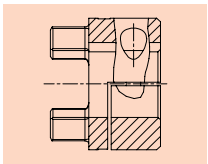
Design equal to 6.0, but highly accurate machining with slight modifications of design, see page 107.

Design 7.5 split claming hub without feather keyway for double-cardanic connections



Frictionally engaged, backlash-free shaft-hub connection for the radial assembly of the coupling. Transmittable torques dependent on bore diameter. Torque indicated on page 111.

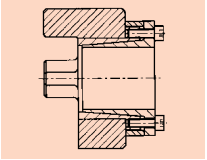
Design 7.6 split clamping hub with feather keyway for double-cardanic connections



Positive shaft-hub connection with additional frictional engagement for the radial assembly of the coupling. The frictional engagement avoids or reduces the reverse backlash. The surface pressure of the feather key connection is reduced.

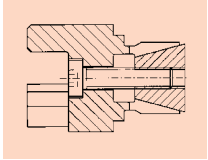
Special designs on request of customers

Design 4.2 with CLAMPEX® clamping set KTR 250

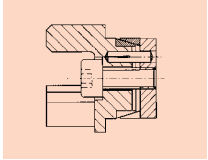


Frictionally engaged, backlash-free shaft-hub-connection for transmission of higher torques.

Special hub designs for hollow shaft drives

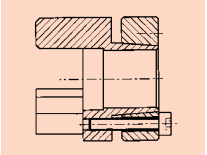


Expansion hub

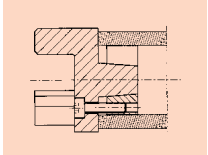


ROTEX® GS hub with CLAMPEX® KTR 150

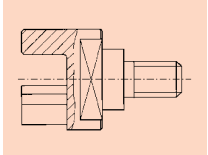
Design 6.5 clamping ring hub



Design equal to 6.0, but clamping screws on the outside. For example for radial disassembly of the intermediate tube (special design).



External clamping ring hub



Threaded stem hub

ROTEX® GS

Backlash-free shaft coupling

Basic programme

Size	Hub design	Finish bore [mm] according to ISO fit H7 / feather keyway with thread according to DIN 6885 sheet 1 - JS9																												
		un-/pilot bored	2	3	4	5	6	6,35	7	8	9	9,5	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40
7	1.1	●			●	●	●		●																					
	2.0	●			●	●	●	●	●																					
9	1.0	●					●			●	●		●																	
	1.1	●				●	●			●			●																	
	2.0	●			●	●	●	●	●	●			●																	
	2.1	●								●			●																	
12	1.0	●																												
	1.1	●																												
	2.0	●			●	●	●	●		●	●		●	●	●															
	2.1	●																												
14	1.0	●					●			●	●		●	●	●	●	●													
	1.1	●					●			●			●	●	●															
	2.0	●				●	●	●		●	●	●	●	●	●	●	●	●												
	2.1	●								●			●	●	●	●		●												
	6.0									●			●	●	●	●														
	6.0 P															●														
19	1.0	●											●	●	●	●	●	●	●	●	●		●							
	2.0	●				■				●		●	●	●	●	●	●	●	●	●	●	●	●							
	2.1	●													●	●	●	●	●	●	●		●							
	6.0												●		●	●	●	●	●	●	●									
	P 37.5																	●												
	6.0 P																			●										
24	1.0	●														●		●	●	●	●	●	●	●	●					
	2.5	●								■					●		●	●	●	●	●	●	●	●	●					
	2.6	●													●			●	●	●	●	●	●	●	●					
	6.0																●	●	●	●	●	●	●	●	●					
	P 50																						●							
	6.0 P																							●						
28	1.0	●																		●		●	●	●	●	●				
	2.5	●											■								●	●	●	●	●	●	●	●		
	2.6	●																			●	●	●	●	●	●	●	●		
	6.0																		●	●	●	●	●	●	●	●	●	●		
	P 50																													
	6.0 P																							●						
38	1.0	●																						●	●	●	●	●	●	●
	2.5	●													■									●			●	●	●	●
	6.0																				●	●	●	●	●	●	●	●	●	●

Taper bores for Fanuc motors: GS 19 1:10 Ø 11; GS 24 1:10 Ø 16

Size	Hub design	Finish bores [mm]											
		28	30	32	35	38	40	42	45	48	50	55	60
42	6.0	●	●	●	●	●	●	●	●	●	●		
48	6.0			●	●	●	●	●	●	●		●	
55	6.0						●	●	●	●	●	●	●
65	6.0							●		●		●	●
75	6.0	on request											

■ = Pilot bored clamping hubs ● = Standard bore

Unbored hubs up to size 65 available from stock.

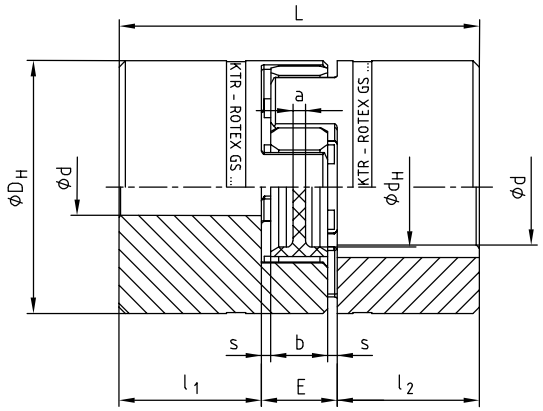
Further dimensions on request

ROTEX® GS

Backlash-free shaft coupling

Miniature couplings

- Backlash-free shaft connections for measurement drive swith small torques
- Single cardanic coupling in three parts
- Axial plug-in ability - easy blind assembly, without any time-consuming screw connections
- Small dimensions - low flywheel mass
- Maintenance-free, easy to check visually
- Different elastomer hardness of spiders
- Available from stock for all usual shaft dimensions
- Finish bore acc. to ISO fit H7 (apart from clamping hub), keyway, from Ø 6 mm acc. to DIN 6885 sheet 1 - JS9
- Ex Approved according to EC Standard 94/9/EC (only for hub design 1.0 and 2.1)
- Basic programme see page 103



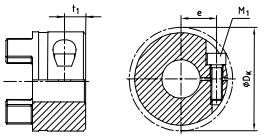
Hub designs (see page 102):

Design 1.0 — with keyway and setscrew

Design 1.1 — without keyway with setscrew

Design 1.2 — without keyway without setscrew

Setscrew to DIN 916



Clamping hub with capscrew DIN EN ISO 4762 (ROTEX® 5 DIN 84)

Design 2.0 Clamping hub without keyway, (only category 3), torques depending on bore diameter

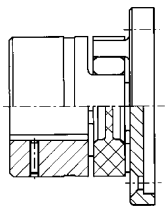
Design 2.1 Clamping hub with keyway

Size	Finish bore				Dimensions [mm]								Setscrew		Clamping screw				
	d_{min}	Hub design 1.0 d_{max}	1.1, 1.2 d_{max}	2.0, 2.1 d_{max}	D_H	d_H	L	$l_1; l_2$	E	b	s	a	G	t	M_1	t_1	e	Ø D_K	T_A [Nm]
Hub material – Aluminium (Al - H)																			
5	2	-	5	5	10	-	15	5	5	4	0,5	4,0	M2	2,5	M1,2	2,5	3,5	11,4	-
7	3	7	7	7	14	-	22	7	8	6	1,0	6,0	M3	3,5	M2	3,5	5,0	16,5	0,37
9	4	10	11	11	20	7,2	30	10	10	8	1,0	1,5	M4	5,0	M2,5	5,0	7,5	23,4	0,76
12	4	12	12	12	25	8,5	34	11	12	10	1,0	3,5	M4	5,0	M3	5,0	9,0	27,5	1,34
14	5	15	16	16	30	10,5	35	11	13	10	1,5	2,0	M4	5,0	M3	5,0	11,5	32,2	1,34

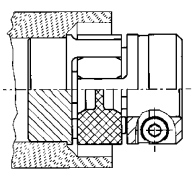
Size	Bores and the corresponding transmittable torques of the clamping hub design 2.0 [Nm]												
	Ø 2	Ø 3	Ø 4	Ø5	Ø 6	Ø 7	Ø 8	Ø 9	Ø 10	Ø 11	Ø 12	Ø 14	Ø 15	Ø 16
5	*	*	*	*										
7		0,8	0,9	0,95	1,00	1,10								
9			2,1	2,2	2,3	2,4	2,5	2,6	2,7	2,8				
12			3,6	3,8	4,0	4,1	4,3	4,5	4,7	4,8	5,0			
14				4,7	4,8	5,0	5,1	5,3	5,5	5,6	5,8	6,1	6,3	6,5

Other designs

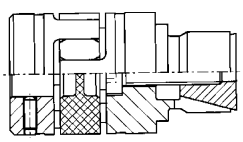
ROTEX® GS for hollow shaft connections



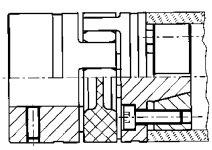
ROTEX® GS-CF



ROTEX® GS with interference fit hub



ROTEX® GS with expansion hub



ROTEX® GS with external clamping ring hub

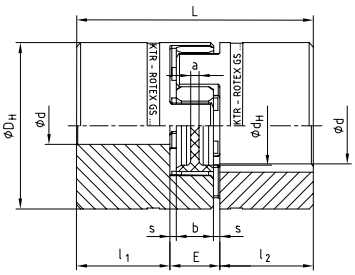
Order form:

ROTEX® GS 14	80 Sh A- GS	1.0 – Ø 12		2.0 – Ø 10	
Coupling size	Spider hardness	Hub design	Finish bore	Hub design	Finish bore

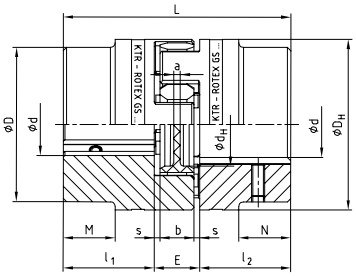
ROTEX® GS

Backlash-free shaft coupling

- Backlash-free shaft connection under prestress for spindle drives, elevating platforms, machine tool drives, etc.
- Single cardanic coupling in three parts
- Axial plug-in ability - easy blind assembly, without any time-consuming screw connections
- Small dimensions - low flywheel mass
- Maintenance-free, easy to check visually
- Different elastomer hardness of spiders
- Available from stock for all usual shaft dimensions
- Finish bore acc. to ISO fit H7 (apart from clamping hub), keyway, from Ø 6 mm acc. to DIN 6885 sheet 1 - JS9
- Approved according to EC Standard 94/9/EC (only for hub design 1.0 and 2.1/2.6)
- Basic programme see page 103

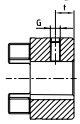


ROTEX® GS 5 - 38

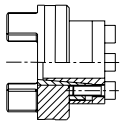


ROTEX® GS 42 - 75

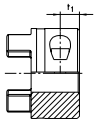
Hub designs: (see page 102)



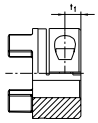
Design
1.0 with keyway and thread
1.1 without keyway, with thread



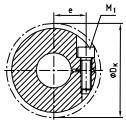
Design 4.2
with
CLAMPEX®
KTR 250



Design up to size 19
as standard
2.0 single slot without key-way (only for category 3)
2.1 single slot, with keyway



Design from size 24
as standard
2.5 double slot, without key-way (only for category 3)
2.6 double slot with keyway



Design 2.0, 2.5
Torque depending
on bore diameter

Size	Un-bored	Finish bores 1)		Dimensions [mm]										Setscrew		Clamping screws				
		d_{min}	d_{max}	D	D_H	d_H	L	l_1; l_2	M/N	E	b	s	a	G	t	M_1	t_1	e	D_K	T_A [Nm]
Hub material – Aluminium (Al - H)																				
19	●	6	24	–	40	18	66	25	–	16	12	2,0	3	M5	10	M6	12	14,5	46	10,5
24	●	8	28	–	55	27	78	30	–	18	14	2,0	3	M5	10	M6	10,5	20	57	10,5
28	●	10	38	–	65	30	90	35	–	20	15	2,5	4	M8	15	M8	11,5	25	73	25,0
38	●	12	45	–	80	38	114	45	–	24	18	3,0	4	M8	15	M8	15,5	30	83	25,0
Hub material – (Steel St - H)																				
42	●	14	55	85	95	46	126	50	28	26	20	3,0	4,0	M8	20	M10	18	32	94	69
48	●	15	62	95	105	51	140	56	32	28	21	3,5	4,0	M8	20	M12	21	36	105	120
55	●	20	74	110	120	60	160	65	37	30	22	4,0	4,5	M10	20	M12	26	42,5	120	120
65	●	22	80	115	135	68	185	75	47	35	26	4,5	4,5	M10	20	M12	33	45	124	120
75	●	30	95	135	160	80	210	85	53	40	30	5	5	M10	25	M16	36	51	147,5	295

Size	Bores and the corresponding transmittable torques of the clamping hub design 2.0/2.5 [Nm]																												
	Ø8	Ø10	Ø11	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55	Ø60	Ø65	Ø70	Ø75	Ø80
19	25	27	27	29	30	31	32	32	34		32 2)																	
24		34	35	36	38	38	39	40	41	42	43	45	46															
28				80	81	81	84	85	87	89	91	92	97	99	102	105	109											
38					92	94	97	98	99	102	104	105	109	112	113	118	122	123	126	130								
42									232	238	244	246	255	260	266	274	283	288	294	301	309							
48												393	405	413	421	434	445	454	462	473	486	494	514					
55															473	486	498	507	514	526	539	547	567	587	608			
65																507	518	526	535	547	559	567	587	608	627	648		
75																			1102	1124	1148	1163	1201	1239	1278	1316	1354	1393

1) depending on hub design 2) 2 x clamping screw M4

Order form:

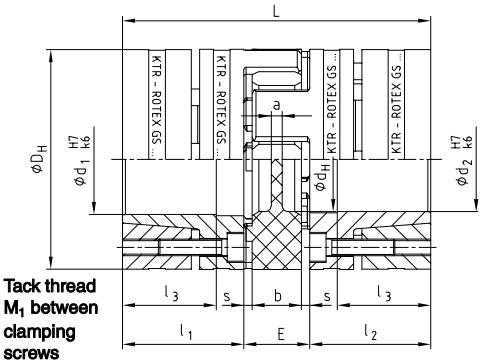
ROTEX® GS 24	98 Sh A-GS	2.5 – Ø 24		1.0 – Ø 20	
Coupling size	Spider hardness	Hub design	Finish bore	Hub design	Finish bore

ROTEX® GS

Backlash-free shaft coupling

Clamping ring hubs

- Backlash-free shaft coupling with integrated clamping system
- Applicable to, for example, forward feed main spindle drives of machine tools, press rollers, etc.
- High smoothness of running, application up to a peripheral speed of 40 m/s
- For high friction torques (consider the selection in case of explosion protection use)
- Easy to assemble due to internal clamping screws
- Finish bore up to Ø 50 mm according to ISO fit H7, from Ø 55 mm according to ISO fit G7
- Ⓔx Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95)



Tack thread M_1 between clamping screws

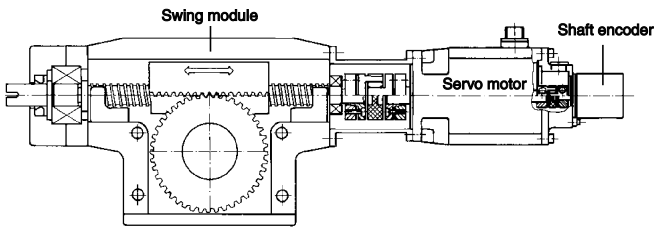
Size	Bores d_1/d_2 and the corresponding transmittable friction torques TR of clamping ring hub in [Nm] 1)																								
	Ø6	Ø10	Ø11	Ø14	Ø15	Ø16	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55	Ø60	Ø65	Ø70	Ø80
14	8,6	13,8	14,7	22,7																					
19		41	45	62	68	67	83	90																	
24			48	67	74	72	90	97	112	120	143														
28					142	154	189	188	237	250	280	307	310	353	389										
38								269	337	356	398	436	442	501	533	572	615	644							
42										399	445	506	470	566	581	647	630	728	836	858					
48												650	685	809	841	926	916	1042	1181	1125	1311				
55														918	954	1052	1040	1185	1220	1318	1359	1646	1662	1960	
65																1568	1569	1768	1833	1968	2049	2438	2495	2898	
75																		2246	2338	2500	2620	3082	3179	3657	4235

The transmittable torques of the clamping connection consider the max. clearance with shaft fit k6 / bore H7, from Ø 55 G7/m6. With bigger clearance the torque is reduced.

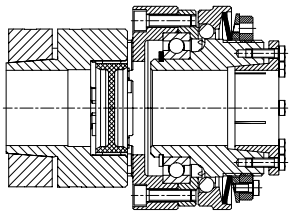
As shaft material – steel or spheroïdal iron with a yield point of approx. 250 N/mm² or more can be used.
If hollow shafts are used, the strength must be checked (see KTR mounting instructions, KTR Standard 45510 at our homepage www.ktr.com).

Size	Torques [Nm] 1) 92 Sh A - GS		98 Sh A - GS		Dimensions [mm]									Clamping screws				Weight per hub with max. bore	Mass moment of inertia per hub with max. bore
	T_{KN}	T_{Kmax}	T_{KN}	T_{Kmax}	D_H 3)	d_H	L	$l_1; l_2$	l_3	E	b	s	a	M	Number z	T_A [Nm]	M_1	[kg]	[kg m²]
Hub material – Aluminium (Al-H) opionally steel Clamping ring material – Steel (St-H)																			
14	7,5	15	12,5	25	30	10,5	50	18,5	13,5	13	10	1,5	2	M3	4	1,34	M3	0,049	0,07 x 10⁻⁴
19	10,0	20	17	34	40	18	66	25,0	18	16	12	2,0	3	M4	6	3	M4	0,120	0,31 x 10⁻⁴
24	35,0	70	60	120	55	27	78	30,0	22	18	14	2,0	3	M5	4	6	M5	0,280	1,35 x 10⁻⁴
28	95,0	190	160	320	65	30	90	35,0	27	20	15	2,5	4	M5	8	6	M5	0,450	3,13 x 10⁻⁴
38	190,0	380	325	650	80	38	114	45,0	35	24	18	3,0	4	M6	8	10	M6	0,950	9,60 x 10⁻⁴
Hub and clamping ring material – Steel (St-H)																			
42	265	530	450	900	95	46	126	50	35	26	20	3,0	4,0	M 8	4	35	M 8	2,30	31,7 x 10⁻⁴
48	310	620	525	1050	105	51	140	56	41	28	21	3,5	4,0	M10	4	69	M10	3,08	52,0 x 10⁻⁴
55	375	750	685	1370	120	60	160	65	45	30	22	4,0	4,5	M10	4	69	M10	4,67	103,0 x 10⁻⁴
65	–	–	940 2)	1880 2)	135	68	185	75	55	35	26	4,5	4,5	M12	4	120	M12	6,7	191,0 x 10⁻⁴
75	–	–	1920 2)	3840 2)	160	80	210	85	63	40	30	5	5	M12	5	120	M12	9,9	396,8 x 10⁻⁴

1) Please note coupling selection on pages 100, 101, 112 · 2) Figures for 95 Sh A - GS · 3) $ØD_H$ + 2 mm with high speeds for expansion of spider
4) In case of using the spider 64 Sh D-GS resp. short dimensioning we recommend the application of clamping ring hubs made of steel.



ROTEX® GS for connection of swing module – servo motor – shaft encoder



ROTEX® GS with clamping ring hub and torque limiter KTR-SI

Order form:

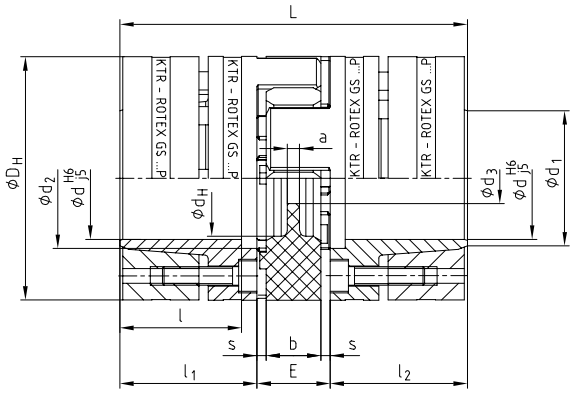
ROTEX® GS 24	98 Sh A-GS	6.0 – Ø 24		6.0 – Ø 20	
Coupling size	Spider hardness	Hub design	Finish bore	Hub design	Finish bore

ROTEX® GS

Backlash-free shaft coupling

Type P according to DIN 69002

- Backlash-free, highly accurate shaft coupling with integrated clamping system
- Developed specifically for stub spindles on multiple spindle heads according to DIN 69002
- Application on main spindle drives with high speeds, peripheral speeds of 50 m/s and more (please consult with KTR Engineering Department)
- For high friction torques (consider the selection in case of explosion protection use)
- Easy to assemble to due internal clamping screws
- Ex Approved according to EC Standard 94/9/EC Certificate ATEX 95)



Tack thread M1 between clamping screws

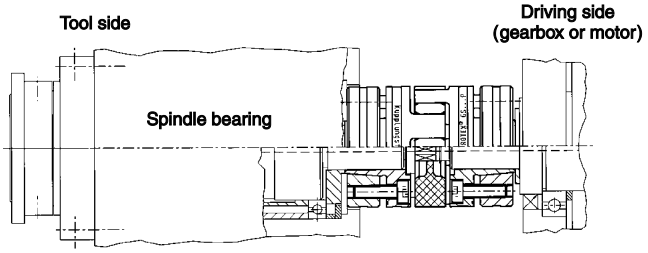
As shaft material – steel or spheroidal iron with a yield point of approx. 250 N/mm² or more can be used. If hollow shafts are used, the strength must be checked (see KTR mounting instructions, KTR Standard 45510 at our homepage www.ktr.com).

Size	Torque [Nm] 2)				Dimensions [mm] Hub and clamping ring material – steel (St-H)													Transmittable torque of clamping ring hub Ø d [Nm] 1)	Tightening torque of clamping screws T_A [Nm]	Weight per hub with bore Ø d norm [kg]	Mass moment of inertia J with bore Ø d norm [kg m²]
	98 Sh A-GS		64 Sh D-GS																		
	T_{KN}	T_{Kmax}	T_{KN}	T_{Kmax}	d 1)	D_H 3)	d_H	L	$l_1; l_2$	l	E	b	s	a	d_1	d_2	d_3				
14 P	12,5	25	16	32	14*	32	10,5	50	18,5	15,5	13	10	1,5	2	17	17	8,5	25	1,89	0,08	0,011·10⁻³
19 P 37,5	14	28	17	34	16*	37,5	18	66	25	21	16	12	2	3	20	19	9,5	60	3,05	0,16	0,037·10⁻³
19 P	17	34	21	42	19*	40	18	66	25	21	16	12	2	3	23	22	9,5	71	3,05	0,19	0,046·10⁻³
24 P 50	43	86	54	108	24*	50	27	78	30	25	18	14	2	3	28	29	12,5	108	4,9	0,331	0,136·10⁻³
24 P	60	120	75	150	25*	55	27	78	30	25	18	14	2	3	30	30	12,5	170	8,5	0,44	0,201·10⁻³
28 P	160	320	200	400	35*	65	30	90	35	30	20	15	2,5	4	40	40	14,5	506	8,5	0,64	0,438·10⁻³
38 P	325	650	405	810	40	80	38	114	45	40	24	18	3	4	46	46	16,5	821	14	1,32	1,325·10⁻³
42 P	450	900	560	1120	42	95	46	126	50	45	26	20	3	4	52	55	18,5	709	35	2,23	3,003·10⁻³
48 P	525	1050	655	1310	45	105	51	140	56	50	28	21	3,5	4	52	60	20,5	1340	69	3,09	5,043·10⁻³
55 P	685	1370	825	1650	50	120	60	160	65	58	30	22	4	4,5	55	72	22,5	1510	69	4,74	10,02·10⁻³

1) * Standard spindle shaft diameter · 2) Please note coupling selection on pages 100, 101, 112 · 3) Ø D_H + 2 mm with higher speed for expansion of spider

Selection for stub spindles

Spindle drive Size	ROTEX® GS P Size	Dimensions				
		d	D_H	l_1/l_2	L	E
25 x 20	14 P	14	32	18.5	50	13
32k x 25	19 P37.5	16	37.5	25	66	16
32g x 30	19 P	19	40	25	66	16
40 x 35	24 P50	24	50	30	78	18
50 x 45	24 P	25	55	30	78	18
63 x 55	28 P	35	65	35	90	20



ROTEX® GS type P with central coolant supply for stub spindles and multiple spindle heads

Order form:

ROTEX® GS 24	P	98 Sh A-GS	6.0 – Ø 25		6.0 – Ø 25	
Coupling size	Type	Spider hardness	Hub design	Finish bore	Hub design	Finish bore

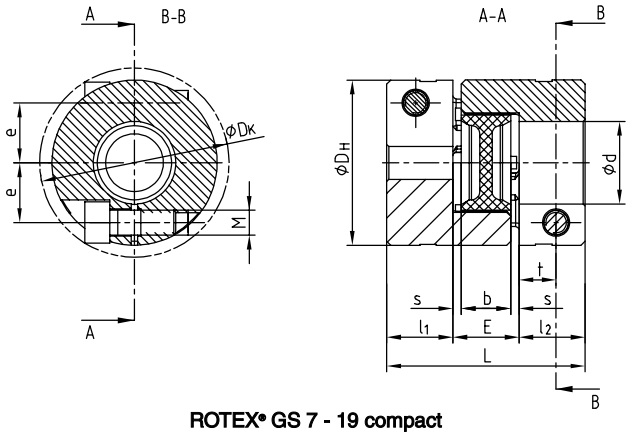
ROTEX® GS

Compact design

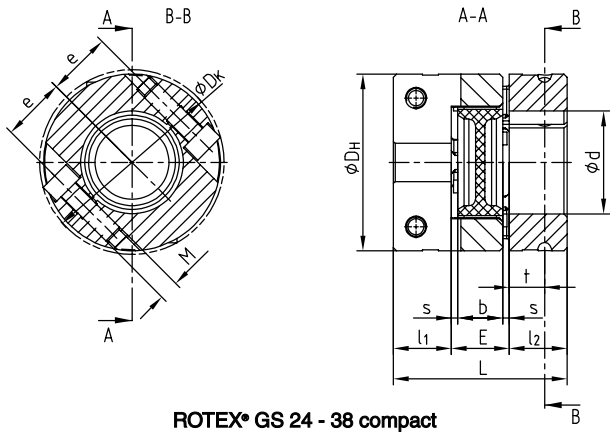
- Up to 1/3 shorter
- High performance

Design with axial slot, patent pending

- Good concentric running properties
- Uniform power transmission due to cams without slots
- Improved balancing quality



ROTEX® GS 7 - 19 compact
single slotted[1] design 2.0



ROTEX® GS 24 - 38 compact
axially slotted design 2.8

Size	Torque [Nm]			Dimensions [mm]												T_A [Nm]
	92Sh A	98Sh A	64Sh D	$d_{max.}$	D_H	D_K	L	l_1	l_2	E	b	s	t	e	M	
7	1,2	2,0	2,4	8	14	16,6	18	5	5	8	6	1	2,5	5	M2	0,37
9	3,0	5,0	6	8	20	21,3	24	7	7	10	8	1	3,5	6,7	M2,5	0,76
12	5,0	9,0	12	12	25	26,2	26	7	7	12	10	1	3,5	8,3	M3	1,34
14	7,5	12,5	16	12	30	30,5	32	9,5	9,5	13	10	1,5	4,5	9,6	M4	9,2
19	10	17	21	20	40	45,0	50	17	17	16	12	2	9	14	M6	10
24	35	60	75	32	55	57,5	54	18	18	18	14	2	11	20	M6	10
28	95	160	200	35	65	69	62	21	21	20	15	2,5	12	23,8	M8	25
38	190	325	405	45	80	86	76	26	26	24	18	3	16	30,5	M10	49

Size	Bores and the corresponding transmittable torques of clamping hub design 2.0/2.8																								
	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45
7	0,8	0,9	1,0	1,0	1,1																					
9		1,9	2,0	2,1	2,2	2,3	2,4																			
12		3,4	3,6	3,7	3,9	4,1	4,2	4,4	4,6	4,7																
14			7,1	7,4	7,7	8,0	8,2	8,5	8,8	9,1	5,8[2]	5,9[2]	6,1[2]													
19						24	25,7	26,3	28,4	27	28,4	29	29,7	31,1	31,7	32,4	25,9[2]									
24								21	23	25	30	32	34	38	40	42	51	53	59	63	68					
28											54	58	62	70	74	78	93	97	109	116	124	136				
38												92	99	111	117	123	148	154	173	185	197	216	234	247	259	278

[1] ROTEX® GS compact size 7 to 19 axially slotted on request
[2] Size 14 with screw M3, size 19 with screw M5

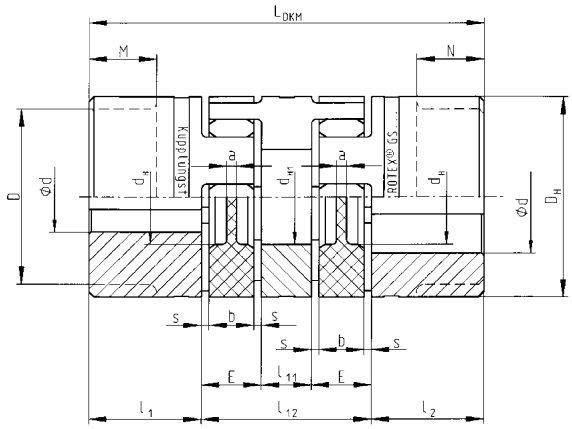
Order form:

ROTEX® GS 38	Compact	98 Sh A-GS	Design 2.8	Ø 28	Design 2.8	Ø 45
Coupling size	Design	Spider	Hub design	Finish bore	Hub design	Finish bore

ROTEX® GS

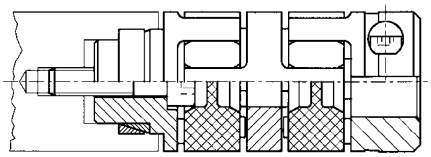
Design DKM double cardanic

- Backlash-free, double cardanic shaft connection
- Double cardanic design allowing for absorption of larger radial displacements
- Axial plug-in ability - easy blind assembly
- Maintenance-free
- Simple to check visually
- Finish bore according to ISO fit H7 (apart from clamping hub), keyway, from Ø 6 mm according to DIN 6885 sheet 1 - JS9
- Ex Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95)
- Hub designs see page 102

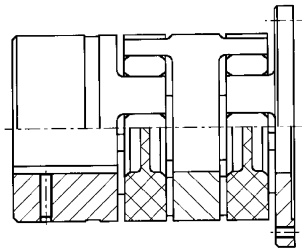


Size	Un-bored	Finish bore d_{min}	Finish bore d_{max}	D	D_H	d_H	d_{H1}	l_1; l_2	M; N	l_{11}	l_{12}	L_{DKM}	E	b	s	a
Hub material – Aluminium (Al-H) Spacer material – Aluminium (Al-H)																
5 DKM	●	2	5	–	10	–	–	5	–	3	13	23	5	4	0,5	4,0
7 DKM	●	3	7	–	14	–	–	7	–	4	20	34	8	6	1,0	6,0
9 DKM	●	4	9	–	20	7,2	–	10	–	5	25	45	10	8	1,0	1,5
12 DKM	●	4	12	–	25	8,5	–	11	–	6	30	52	12	10	1,0	3,5
14 DKM	●	4	15	–	30	10,5	–	11	–	8	34	56	13	10	1,5	2,0
19 DKM	●	6	24	–	40	18,0	18	25	–	10	42	92	16	12	2,0	3,0
24 DKM	●	8	28	–	55	27,0	27	30	–	16	52	112	18	14	2,0	3,0
28 DKM	●	10	38	–	65	30,0	30	35	–	18	58	128	20	15	2,5	4,0
38 DKM	●	12	45	–	80	38,0	38	45	–	20	68	158	24	18	3,0	4,0
Hub material – Steel (St-H) Spacer material – Aluminium (Al-H)																
42 DKM	●	14	55	85	95	46	46	50	28	22	74	174	26	20	3,0	4,0
48 DKM	●	15	62	95	105	51	51	56	32	24	80	192	28	21	3,5	4,0
55 DKM	●	20	74	110	120	60	60	65	37	28	88	218	30	22	4,0	4,5

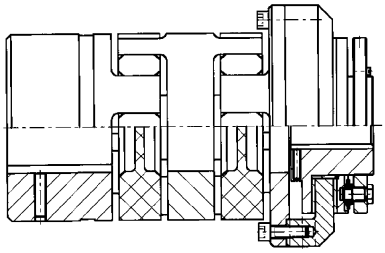
Other designs:



ROTEX® GS - DKM as hollow shaft design



ROTEX® GS - CF - DKM



ROTEX® GS - DKM in combination with torque limiter KTR-RU

Order form:

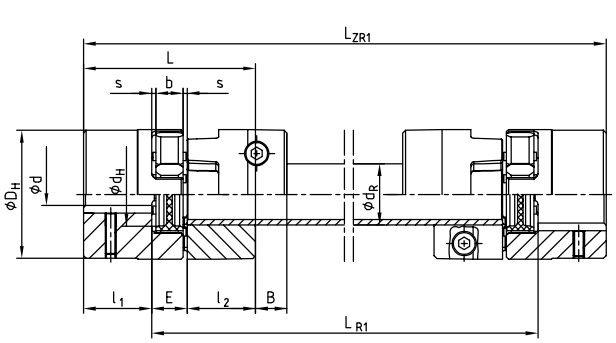
ROTEX® GS 38	DKM	92 Sh A-GS	1.0 – Ø 38		2.5 – Ø 32	
Coupling size	Design	Spider hardness	Hub design	Finish bore	Hub design	Finish bore

ROTEX® GS

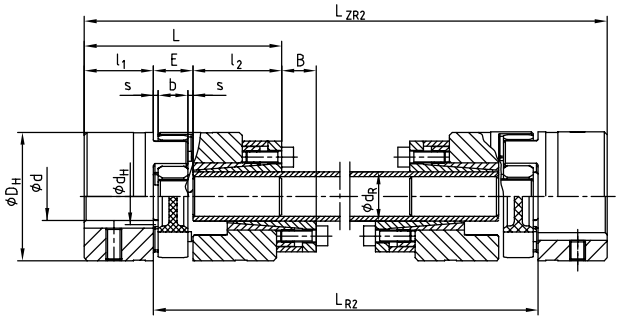
Intermediate shaft couplings

Design ZR1/ZR2

- Backlash-free intermediate shaft coupling
- Application, for example, on lifting spindle elements, parallel linear systems, overhead gantry robots, handling machines
- For connection of larger shaft distances and a maximum speed of 1500 1/min
- Spacer part to be disassembled radially
- Design ZR1 for torques up to the maximum friction torque of clamping hub, design ZR2 for higher torques
- Finish bore according to ISO fit H7 (apart from clamping hub), keyway, from Ø 6 mm according to DIN 6885 sheet 1 - JS9
- Hub designs see on page 102



Design ZR1



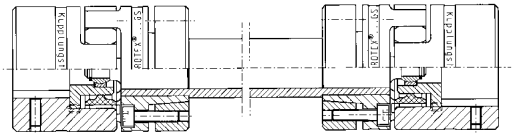
Design ZR2

Size	Finish bore			Dimensions [mm] ZR1											Cap screw DIN EN ISO 4762 – 8.8	Tightening torque	Friction torque
	Unbored	d min	d max	D_H	$l_1; l_2$	L	E	b	s	B	L_{R1}	L_{R1} min.	L_{ZR1}	d_R	M x l	T_A [Nm]	T_R [Nm]
14 ZR1	●	4	15	30	11	35	13	10	1,5	11,5	please mention for inquiries and orders	65	L_{R1}+22	14x2,5	M3x12	1,34	6,1
19 ZR1	●	6	24	40	25	66	16	12	2,0	14,0		82	L_{R1}+50	20x3,0	M6x16	10,5	34
24 ZR1	●	8	28	55	30	78	18	14	2,0	16,0		96	L_{R1}+60	25x2,5	M6x20	10,5	45
28 ZR1	●	10	38	65	35	90	20	15	2,5	17,5		111	L_{R1}+70	35x4,0	M8x25	25	105
38 ZR1	●	12	45	80	45	114	24	18	3,0	21,0		126	L_{R1}+90	40x4,0	M8x30	25	123

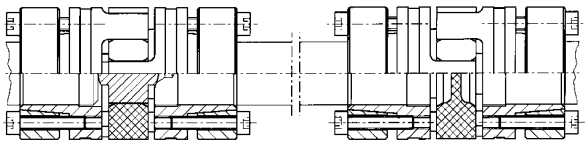
Size	Finish bore			Dimensions [mm] ZR2													CLAMPEX® KTR 250		
	Unbored	d min.	d max.	D_H	$l_1; l_2$	l_3	L	E	b	s	B	L_{R2}	L_{R2} min.	L_{ZR2}	Precision tube d_R	C_2 [Nm/rad]	Clamping set size	Clamping screws DIN EN ISO 4762-12.9 µtot. = 0,14 M x l	Tightening torque T_A [Nm]
14 ZR2	●	4	15	30	11	26	50	13	10	1,5	11,5	please mention for inquiries and orders	109	L_{R2} + 22	10x2,0	68,36	10x16	M4x10	5,2
19 ZR2	●	6	24	40	25	26	67	16	12	2,0	14,0		120	L_{R2} + 50	12x2,0	130	12x18	M4x10	5,2
24 ZR2	●	8	28	55	30	38	86	18	14	2,0	16,0		156	L_{R2} + 60	20x3,0	954,9	20x28	M6x18	17,0
28 ZR2	●	10	38	65	35	45	100	20	15	2,5	17,5		177	L_{R2} + 70	25x2,5	1811	25x34	M6x18	17,0
38 ZR2	●	12	45	80	45	45	114	24	18	3,0	21,0		192	L_{R2} + 90	32x3,5	5167	32x43	M6x18	17,0
42 ZR2	●	14	55	95	50	52	128	26	20	3,0	23,0		214	L_{R2} + 100	40x4,0	11870	40x53	M6x18	17,0
48 ZR2	●	15	62	105	56	70	154	28	21	3,5	24,5		261	L_{R2} + 112	45x4,0	17486	45x59	M8x22	41,0
55 ZR2	●	20	74	120	65	80	175	30	22	4,0	26,0		288	L_{R2} +130	55x4,0	33543	55x71	M8x22	41,0
65 ZR2	●	22	80	135	75	80	185	35	26	4,5	30,5		387	L_{R2} + 150	60x4,0	44362	60x77	M8x22	41,0

1) For inquiries and orders please mention the shaft distance dimension L_{R1}/L_{R2} along with the maximum speed to review the critical whirling speed.

Other designs:



ROTEX® ZRG with bearing for higher speeds



ROTEX® GS ZR for vertical assembly

Order form:

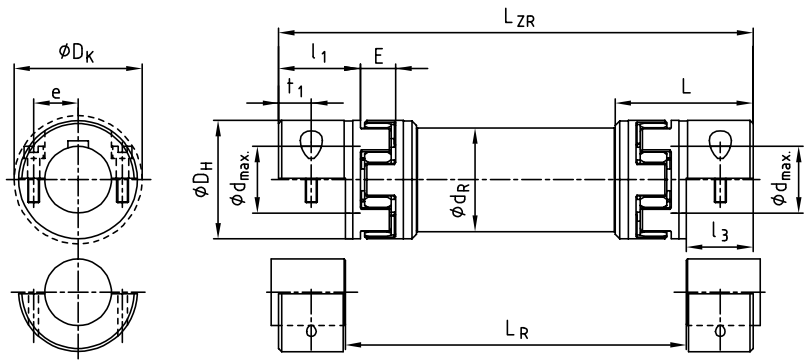
ROTEX® GS 24	ZR1	1200	98 Sh A-GS	1.0 – Ø 24		2.5 – Ø24	
Coupling size	Design	Shaft distance dimension [L_{R1}/L_{R2}]	Spider hardness	Hub design	Finish bore	Hub design	Finish bore

ROTEX® GS

Intermediate Shaft Couplings with Aluminium Tube

Design ZR3

- Use with lifting machines, in handling units, robotic palletisers etc.
- Easy, radial coupling assembly because of split coupling hub
- Exchange of spiders without displacing the drive and driven side
- Standard lengths are possible up to 4 m without intermediate bearing dependent on speed and size
- Positive and frictionally engaged torque transmission
- Low mass moment of inertia due to use of aluminium
- Can be combined with other hub forms (clamping or clamping ring hubs)
- Finish bore according to ISO fit H7, keyway according to DIN 6885 sheet 1 - JS9



Size	Dimensions [mm]																	
	Finish bore		General														Capscrew DIN EN ISO 4762	
								L_R		L_{ZR}								
	$d_{min.}$	$d_{max.}$	D_H	l_1	L	l_3	E	min.	max.	min.	max.	d_R	D_K	t_1	e	8.8	T_A [Nm]
19	8	20	40	25	49,0	17,5	16	98	2965	133	3000	40	47	8,0	14,5	M 6	10
24	10	28	55	30	59,0	22,0	18	113	3456	157	3500	50	57	10,5	20	M 6	10
28	14	38	65	35	67,0	25,0	20	131	3950	181	4000	60	73	11,5	25	M 8	25
38	18	45	80	45	83,5	33,0	24	163	3934	229	4000	70	84	15,5	30	M 8	25
42	22	50	95	50	93,0	36,5	26	180	3927	253	4000	80	94	18,0	32	M10	49
48	22	55	105	56	103,0	39,5	28	202	3921	281	4000	100	105	18,5	36	M12	86

Size 98 Sh A-GS	Coupling torques [Nm] 1)		Mass moment of intertia [10^3 kgm²]			stat. torsion spring stiffness	ROTEX® GS Size 98 Sh A-GS	Coupling torques [Nm] 1)		Mass moment of intertia [10^3 kgm²]			stat. torsion spring stiffness
	T_{KN}	$T_{K\,max.}$	GTS-hub 2) J_1	ZR-hub J_2	Pipe/ meter J_3	ZW 3) C_2 [Nm²/rad]		T_{KN}	$T_{K\,max.}$	GTS-hub 2) J_1	ZR-hub J_2	Pipe/ meter J_3	ZW 3) C_2 [Nm²/rad]
19	10	20	0,02002	0,01304	0,329	3243,6	**38**	190	380	0,50385	0,2572	2,972	29290,4
24	35	70	0,07625	0,04481	0,673	6631,8	**42**	265	530	1,12166	0,5523	4,560	44929,7
28	95	190	0,17629	0,1095	1,199	11814,1	**48**	310	620	1,87044	1,1834	9,251	91158,2

ROTEX® GS Size	Bores and the corresponding transmittable friction torques of split hub without keyway [mm]																							
	Ø 8	Ø 10	Ø 11	Ø 14	Ø 15	Ø 16	Ø 18	Ø 19	Ø 20	Ø 22	Ø 24	Ø 25	Ø 28	Ø 30	Ø 32	Ø 35	Ø 38	Ø 40	Ø 42	Ø 45	Ø 46	Ø 48	Ø 50	Ø 55
19	17	21	23	30	32	34	38	40	42															
24		21	23	30	32	34	38	40	42	47	51	53	59											
28				54	58	62	70	74	78	86	93	97	109	117	124	136	148							
38							70	74	78	86	93	97	109	117	124	136	148	156	163	175				
42										136	149	155	174	186	198	217	235	248	260	279	285	297	310	
48										199	217	226	253	271	290	317	344	362	380	407	416	434	452	498

1) Transmissible torque acc. to 92 Sh-A GS. The coupling is normally supplied with 98 Sh-A GS.
2) At $d_{max.}$ 3) intermediate shaft at L = 1000 mm with $L_{Rohr} = L_{ZR} - 2 \cdot L$
For enquiries and orders please mention the shaft distance dimension L_R along with the maximum speed to review the critical speed.

Order form:

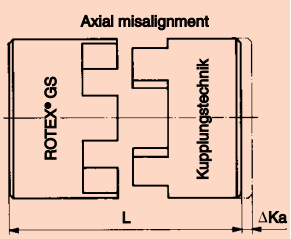
ROTEX® GS 24	ZR3	1200 mm	98 Sh A-GS	7.5 – Ø 24 mm		7.5 – Ø 24 mm	
Coupling size	Type	Shaft distance dimension [L_R]	Spider hardness	Hub design without keyway	Finish bore	Hub design without keyway	Finish bore

ROTEX® GS

Backlash-free shaft coupling

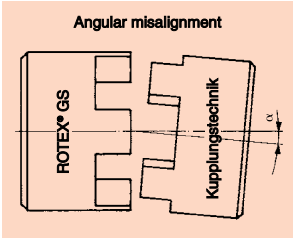
Displacements

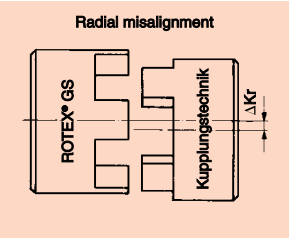
Due to its design the ROTEX® GS is able to absorb axial, angular and radial misalignment, without causing any wear or premature failure of the coupling. As the spider is only stressed under pressure it is ensured that the coupling will remain backlash-free even after a longer operation period.



As an example, axial misalignment may be produced by different tolerances of the connecting elements during the assembly or by alteration of the shaft length if fluctuation of temperature occurs.
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 misalignment and to keep the reaction forces low.

In case of pure angular misalignment the imagined bisecting lines of the shafts intersect in the middle of the coupling. Up to a certain permissible extent this displacement can be absorbed by the coupling without any danger of extensive restoring forces.





Radial misalignment results from parallel displacement of the shafts towards each other, caused by different tolerances at the centerings or by mounting of the power packs on different levels.

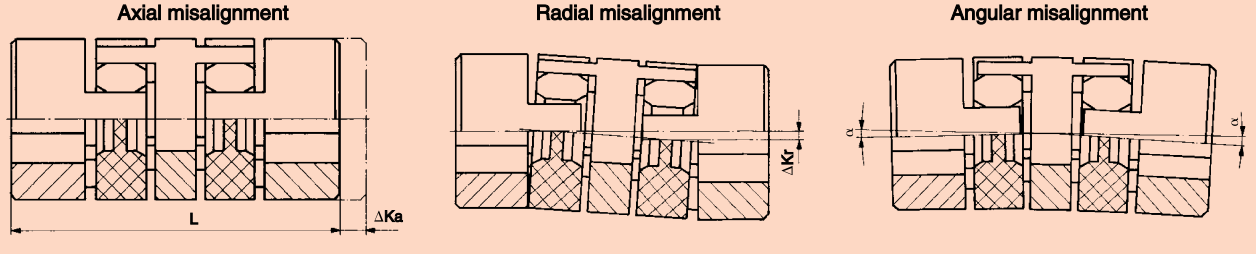
Due to the kind of misalignment the largest restoring forces are produced here, consequently causing the highest stresses for the adjacent components.

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

ROTEX® GS Size	GS spider	Displacement standard design [mm] Axial ΔKa²)	[mm] Radial ΔKr	[degrees] Angular α	Displacements DKM [mm] Axial ΔKa²)	[mm] Radial ΔKr	[degrees] Angular α
	70		0,14	1,2°		0,17	1,2°
	80	+ 0,4	0,12	1,1°	+ 0,4	0,15	1,1°
5	92	– 0,2	0,06	1,0°	– 0,4	0,14	1,0°
	98		0,04	0,9°		0,13	0,9°
	80		0,15	1,1°		0,23	1,1°
	92	+ 0,6	0,10	1,0°	+ 0,6	0,21	1,0°
7	98	– 0,3	0,06	0,9°	– 0,6	0,19	0,9°
	64		0,04	0,8°		0,17	0,8°
	80		0,19	1,1°		0,29	1,1°
	92	+ 0,8	0,13	1,0°	+ 0,8	0,26	1,0°
9	98	– 0,4	0,08	0,9°	– 0,8	0,24	0,9°
	64		0,05	0,8°		0,21	0,8°
	80		0,20	1,0°		0,35	1,1°
	92	+ 0,9	0,14	1,0°	+ 0,9	0,32	1,0°
12	98	– 0,4	0,08	0,9°	– 0,9	0,29	0,9°
	64		0,05	0,8°		0,25	0,8°
	80		0,21	1,1°		0,40	1,1°
	92	+ 1,0	0,15	1,0°	+ 1,0	0,37	1,0°
14	98	– 0,5	0,09	0,9°	– 1,0	0,33	0,9°
	64		0,06	0,8°		0,29	0,8°
	80		0,15	1,1°		0,49	1,1°
	92	+ 1,2	0,10	1,0°	+ 1,2	0,45	1,0°
19	98	– 0,5	0,06	0,9°	– 1,0	0,41	0,9°
	64		0,04	0,8°		0,36	0,8°
	92	+ 1,4	0,14	1,0°	+ 1,4	0,59	1,0°
24	98	– 0,5	0,10	0,9°	– 1,0	0,53	0,9°
	64		0,07	0,8°		0,47	0,8°
	92	+ 1,5	0,15	1,0°	+ 1,5	0,66	1,0°
28	98	– 0,7	0,11	0,9°	– 1,4	0,60	0,9°
	64		0,08	0,8°		0,53	0,8°
	92	+ 1,8	0,17	1,0°	+ 1,8	0,77	1,0°
38	98	– 0,7	0,12	0,9°	– 1,4	0,69	0,9°
	64		0,09	0,8°		0,61	0,8°
	92	+ 2,0	0,19	1,0°	+ 2,0	0,84	1,0°
42	98	– 1,0	0,14	0,9°	– 2,0	0,75	0,9°
	64		0,10	0,8°		0,67	0,8°
	92	+ 2,1	0,23	1,0°	+ 2,1	0,91	1,0°
48	98	– 1,0	0,16	0,9°	– 2,0	0,82	0,9°
	64		0,11	0,8°		0,73	0,8°
	92	+ 2,2	0,24	1,0°	+ 2,2	1,01	1,0°
55	98	– 1,0	0,17	0,9°	– 2,0	0,91	0,9°
	64		0,12	0,8°		0,81	0,8°
65	95	+ 2,6	0,18	0,9°	–	–	–
	64	– 1,0	0,13	0,8°			
75	95	+ 3,0	0,21	0,9°	–	–	–
	64	– 1,5	0,15	0,8°			

2) The Ka figures mentioned above have to be added to the length of the corresponding coupling type.

Shaft misalignment ROTEX® GS … DKM



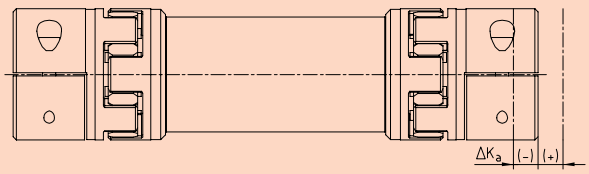
This design reduces the restoring forces arising with radial misalignment to a minimum, due to the double-jointed operation, additionally the coupling is able to compensate for higher axial and angular misalignment.

The above-mentioned permissible displacement figures of the flexible ROTEX® GS couplings are standard values, taking into account the coupling load up to the rated torque T_{KN} of the coupling and an operating speed n = 1500 min^{-1} along with an ambient temperature of + 30 °C.

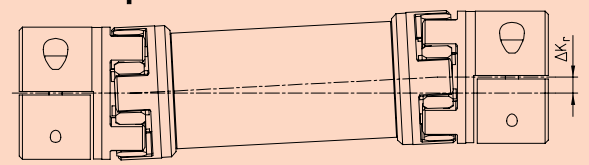
The displacement figures may, in each case, merely be used individually - if they occur simultaneously they may only be used proportionately.
The ROTEX® couplings are in a position to compensate for radial and angular displacements. Careful and accurate alignment of the shafts increases the service life of the coupling.

ROTEX® GS
Design ZR1-ZR3
Displacements and technical data

Axial displacements

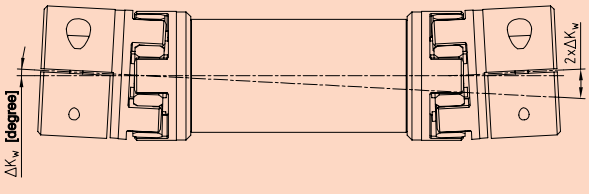


Radial displacements



$$\Delta K_r = (L_{ZR} - 2 \cdot l_1 - E) \cdot \tan \alpha$$

Angular displacements



ROTEX® GS Size 98Sh A-GS	Displacements [mm] Axial ΔK_a	[mm] Radial ΔK_r 1)	[degrees] Angular α
14	+1,0 / -1,0	15,16	0,9°
19	+1,2 / -1,0	14,67	0,9°
24	+1,4 / -1,0	14,48	0,9°
28	+1,5 / -1,4	14,30	0,9°
38	+1,8 / -1,4	13,92	0,9°
42	+2,0 / -2,0	13,73	0,9°
48	+2,1 / -2,0	13,51	0,9°
55	+2,2 / -2,0	13,19	0,9°
65	+2,6 / -2,0	12,80	0,9°

1) Radial displacements based on coupling length L_{ZR} = 1000 mm

2) $L = L_{ZR} - 2 \cdot l_2$

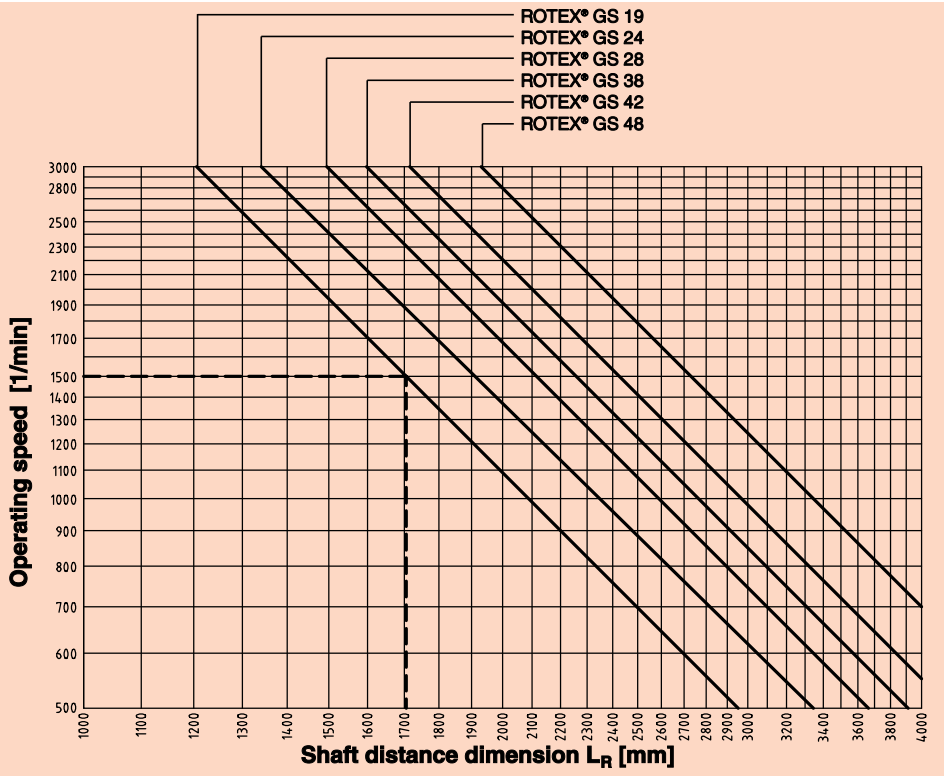
Calculation of total torsion spring stiffness:

$$C_{total} = \frac{1}{2 \cdot \frac{1}{C_1} + \frac{L_{pipe}}{C_2}} \quad [Nm/rad]$$

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

C_1 = torsion spring stiffness for spider page 100
C_2 = from table page 110/111

Chart of critical speeds for design ZR3



Example:

ROTEX® GS 19
Operating speed: 1500 1/min
Max. permissible shaft distance dimension: 1700 mm
Operating speed = n_{krit}/1,4