

ROTEX® GS

Backlash-free flexible shaft coupling

COUNTEX®

Backlash-free shaft encoder coupling

TOOLFLEX®

Backlash-free torsionally stiff metal bellow-type coupling

RADEX®-NC

Backlash-free torsionally stiff servo lamina coupling

Made for Motion



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Application recommendation

The user has the choice as to which backlash-free shaft coupling is used on a servo drive. For that purpose KTR provides for four different types of couplings: ROTEX® GS, COUNTEX®, TOOLFLEX® and RADEX®-NC. Dependent on the required torsional stiffness of the complete system you choose the best coupling for your individual application.



ROTEX® GS Backlash-free, flexible jaw-type coupling

- ability for axial plug-in
- high power density
- adjustment of damping through different elastomer hardness of the spiders

Shaft encoders, miniature drives		+	● compact design, easy assembly/disassembly, electric insulation
Ball screws, synchronous belt drives			● high power density, adapted torsional stiffness, damping vibrations, for thread drives with pitch < 40 (otherwise an inspection by KTR is necessary)
Low backlash/backlash-free gears			● high power density, easy blind assembly/disassembly, fail-safe, suitable for average to high gear ratios $i \geq 7$, temperature range 80 °C at the maximum
Main spindle drives			● high power density, good concentric running properties of the clamping ring hubs, damping vibrations with interrupted cutting, higher accuracy of the ROTEX® GS-P design for HSC machining



COUNTEX® Backlash-free shaft encoder coupling

- ability for axial plug-in
- double-cardanic
- temperature-resistant

Shaft encoders, miniature drives		+	● double-cardanic type to compensate for larger displacements, constant torsion spring stiffness also with higher temperatures
Ball screws, synchronous belt drives			
Low backlash/backlash-free gears			
Main spindle drives			



TOOLFLEX® Backlash-free, torsionally stiff metal bellow-type coupling

- non-positive bellow-hub connection
- frictionally engaged clamping hubs

Shaft encoders, miniature drives		+	● compact flexible coupling with low radial restoring forces
Ball screws, synchronous belt drives			● suitable if higher torsional stiffness is required, e. g. high pitch with threaded spindle drives $s \geq 40$, constant torsional stiffness with high temperatures
Low backlash/backlash-free gears			● suitable if higher torsional stiffness is required, e. g. gear ratios $i < 7$, constant torsional stiffness with high temperatures
Main spindle drives			● high torsional stiffness, for main spindle drives subject to critical resonances

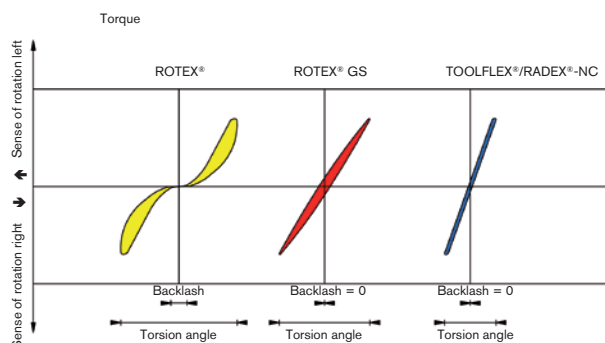


RADEX®-NC Backlash-free, torsionally rigid servo lamina coupling

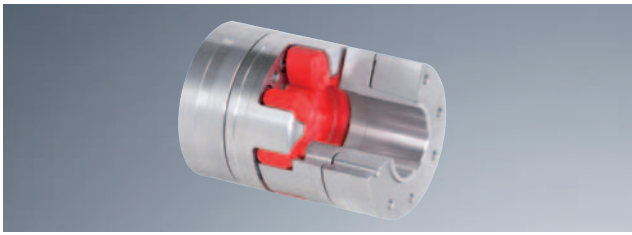
- compact design
- higher torsional stiffness
- frictionally engaged clamping hubs

Shaft encoders, miniature drives		+	● double-cardanic design to compensate for bigger displacements
Ball screws, synchronous belt drives			● suitable if higher torsional stiffness is required, e. g. high pitch with threaded spindle drives $s \geq 40$, constant torsional stiffness with high temperatures
Low backlash/backlash-free gears			● suitable if higher torsional stiffness is required, e. g. gear ratios $i < 7$, constant torsional stiffness with high temperatures
Main spindle drives			● high torsional stiffness, for main spindle drives subject to critical resonances, for high torques type RADEX®-N is available: TKN up to 280.000 Nm

The diagram alongside this text clarifies the influence of the ROTEX®, ROTEX® GS, RADEX®-NC and the TOOLFLEX® couplings regarding backlash and torsion angle. Due to the high stiffness of the RADEX®-NC and the TOOLFLEX® the torsion angle is very low under torque. However, contrary to the flexible ROTEX® and the backlash-free ROTEX® GS a damping of torsional vibrations etc. is not possible.



Technical description



ROTEX® GS is a 3-part, axial plug-in coupling backlash-free under prestress. 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.

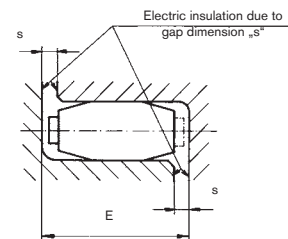
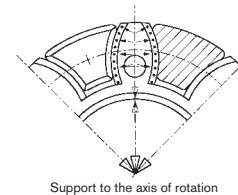
ROTEX® GS (straight tooth, backlash-free)

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.

The pegs arranged reciprocally on the spider prevent the spider from touching the hub over the entire surface. Observing the distance dimension E ensures the ability of the coupling to compensate for displacements.

By observing the gap dimension „s“ the electrical insulation 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.

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










Explosion protection use

ROTEX® GS couplings are suitable for power transmission in drives in hazardous areas. The couplings are certified and confirmed according to EC standard 94/9/EC (ATEX 95) as units of category 2G/2D and thus suitable for the use in hazardous areas of zone 1, 2, 21 and 22. Please read through our information included in the respective Type Examination Certificate and the operating and mounting instructions at 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.



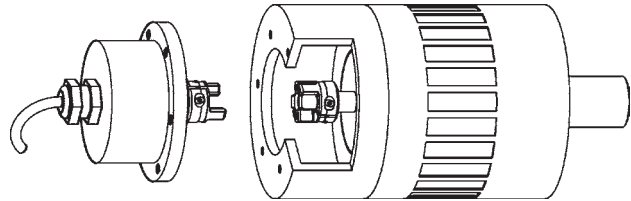
Spider						
Description of spider hardness [Shore]	Identification Colour	Material	Permissible temperature range [° C]		Available for coupling size	Typical applications
			Permanent temperature	Max. temperature short-term		
80 Sh-A-GS		Polyurethane	- 50 to + 80	- 60 to + 120	size 5 to 24	- drives of electric measuring systems
92 Sh-A-GS		Polyurethane	- 40 to + 90	- 50 to + 120	size 5 to 55	- drives of electric measuring and control systems - main spindle drives
95/98-Sh A-GS		Polyurethane	- 30 to + 90	- 40 to + 120	size 5 to 90	- positioning drives - main spindle drives - high load
64 Sh-D-H-GS		Hytrel	- 50 to + 120	- 60 to + 150	size 7 to 38	- planetary gears / backlash-free gears - higher torsional stiffness / high ambient temperature
64 Sh-D-GS		Polyurethane	- 20 to + 110	- 30 to + 120	size 42 to 90	- higher load - higher torsional stiffness
72 Sh-D-H-GS		Hytrel	- 50 to + 120	- 60 to + 150	size 24 to 38	- very high torsional stiffness / high ambient temperature - very high load
72 Sh-D-GS		Polyurethane	- 20 to + 110	- 30 to + 120	size 42 to 65	- very high torsional stiffness - very high load

The elastic spiders of the GS line are available in five different kinds of Shore hardness, identified by colour, the material being soft to hard. Due to these five 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. The flexible prestress varies depending on the coupling size, the spiders/material and the production tolerances. Resulting herefrom is the axial plug-in force starting from low as a close sliding fit or with torsionally soft spider, respectively, to heavy with high prestress or torsionally rigid spider (see mounting instruction KTR-N 45510 at www.ktr.com).

Application recommendation

Measurement and control systems

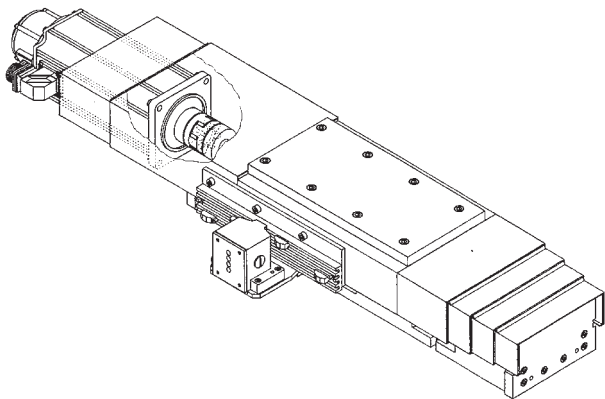
For measurement and control systems a high torsional stiffness of the coupling is required in order to obtain positioning repeatability. The torques that arise are relatively small so that backlash-free, torsionally stiff power transmission is achieved by the elastomer prestress. In order to minimize 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

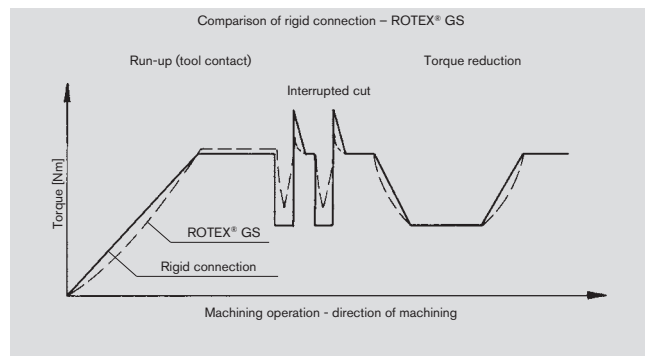
Torsionally rigid shaft-to-shaft connections do not only transmit the torque backlash-free and non-rigid, but also torque peaks and vibrations. For driving systems with critical vibrations, the benefit of high stiffness for torque transmission soon becomes a serious disadvantage. For applications on 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.



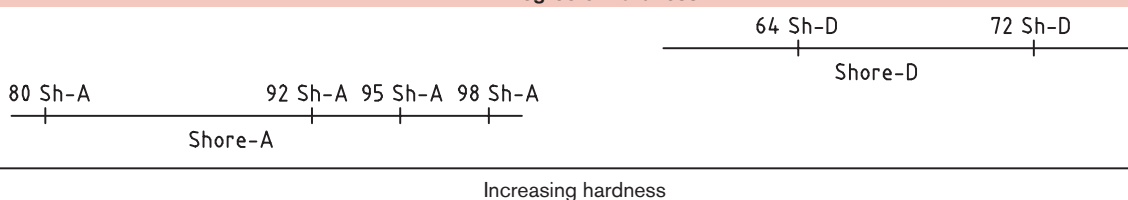
Main spindle drives

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 50 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.



Degree of hardness



Spider from Polyurethane	92 Shore-A	95/98 Shore-A	64 Shore-D
Relative Damping ψ [-]	0,80	0,80	0,75
Resonance factor V_R [-]	7,90	7,90	8,50

Technical data

Size	Spider Shore-GS	Shore range	Max. speed [rpm] for hub design					Torque [Nm]		Static torsion spring stiffness ¹⁾ [Nm/rad]	Dynamic torsion spring stiffness ¹⁾ [Nm/rad]	Radial spring stiffness C _r [N/mm]	Weight [kg]		Mass moment of inertia J [kgm ²]	
			2.0 / 2.1 2.5 / 2.6	2.8 2.9	1.0 1.1	6.0 light ²⁾	6.0 P ²⁾	T _{KN}	T _{K max}				Each hub ⁵⁾	Spider	Each hub ⁵⁾	Spider
5	70	A	38000	38000	47700			0,2	0,3	1,78	5	43	0,001	0,2 x 10 ⁻³	0,015 0,015	0,002 x 10 ⁻⁶
	80	A						0,3	0,6	3,15	10	82				
	92	A						0,5	1,0	5,16	16	154				
7	80	A	27000	27000	34100			0,7	1,4	8,6	26	114	0,003	0,5 x 10 ⁻³	0,085 x 10 ⁻⁶	0,01 x 10 ⁻⁶
	92	A						1,2	2,4	14,3	43	219				
	98	A						2,0	4,0	22,9	69	421				
9	64	D	19000	19000	23800			2,4	4,8	34,3	103	630	0,01	1,7 x 10 ⁻³	0,48 x 10 ⁻⁶	0,085 x 10 ⁻⁶
	80	A						1,8	3,6	17,2	52	125				
	92	A						3,0	6,0	31,5	95	262				
12	98	A	15200	15200	19100			5,0	10,0	51,6	155	518	0,02	2,3 x 10 ⁻³	1,5 x 10 ⁻⁶	0,139 x 10 ⁻⁶
	80	A						3,0	6,0	84,3	252	274				
	92	A						5,0	10,0	160,4	482	470				
14	98	A	12700	12700	15900	32000	47700	9,0	18,0	240,7	718	846	0,02	4,7 x 10 ⁻³	2,8 x 10 ⁻⁶	0,509 x 10 ⁻⁶
	80	A						4,0	8,0	60,2	180	153				
	92	A						7,5	15,0	114,6	344	336				
19	64	D	9550	9550	11900	24000	35800	12,5	25,0	171,9	513	654	0,09	7 x 10 ⁻³	19,5 x 10 ⁻⁶	1,35 x 10 ⁻⁶
	80	A						4,9	9,8	61,8	1065	582				
	92	A						10,0	20,0	109,0	1815	1120				
24	98	A	6950	10400	8650	17000	26000	17,0	34,0	151,2	254,0	2010	0,2	0,02	81,9 x 10 ⁻⁶	6,7 x 10 ⁻⁶
	64	D						21,0	42,0	256,0	381,0	2930				
	72 ³⁾	D						35	70	228,0	401,0	1480				
28	92	A	5850	8800	7350	15000	22000	60	120	364,0	598,0	2560	0,3	0,03	184,2 x 10 ⁻⁶	14,85 x 10 ⁻⁶
	98	A						95	190	408,0	674,5	1780				
	64	D						160	320	641,0	992,0	3200				
38	72 ³⁾	D	4750	7150	5950	12000	17900	200	400	1026,0	2017,7	4348	0,6	0,05	542,7 x 10 ⁻⁶	39,4 x 10 ⁻⁶
	92	A						260	520	2152,6	3654,7	7876				
	98	A						190	380	652,5	1105,0	2350				
42	64	D	4000		5000	10000 8050 ⁴⁾	15000	405	810	2630,0	4033,5	6474	2,4	0,08	2802 x 10 ⁻⁶	85 x 10 ⁻⁶
	92	A						525	1050	4458,4	7118,0	11425				
	98	A						265	530	1087,0	1568,0	2430				
48	72 ³⁾	D	3600		4550	9100 7200 ⁴⁾	13600	728	1456	5860,0	9380,0	9766	3,3	0,09	4709 x 10 ⁻⁶	135 x 10 ⁻⁶
	92	A						310	620	1296,8	1840,0	2580				
	98	A						525	1050	2575,9	4562,0	5930				
55	64	D	3150		3950	6350 ⁴⁾	11900	655	1310	5763,0	9975,0	8274	5,1	0,12	9460 x 10 ⁻⁶	229 x 10 ⁻⁶
	92	A						410	820	1548,2	2137,5	2980				
	98	A						685	1370	4211,7	6155,0	6686				
65	72 ³⁾	D	2800		3500	5650 ⁴⁾	11000	1072	2144	15000,0	20953,0	14883	6,7	0,2	15143 x 10 ⁻⁶	437 x 10 ⁻⁶
	95	A						940	1880	4852,0	7166,0	6418				
	64	D						1175	2350	11851,0	18918,9	8870				
75	95	A	2350		2950	4750 ⁴⁾	8950	1527	3054	16000,0	31000,0	11826	10,5	0,3	32750 x 10 ⁻⁶	1179 x 10 ⁻⁶
	64	D						1920	3840	7915,0	15045,0	8650				
90	95	A	1900		2380	3800 ⁴⁾	-	2400	4800	18232,0	31637,7	11923	18,2	0,6	87099 x 10 ⁻⁶	3362 x 10 ⁻⁶
	64	D						3600	7200	20450,0	30290,0	10700				
								4500	9000	42945,0	90870,0	14700				

NEW

¹⁾ Static and dynamic torsional stiffness with 0,5 x T_{KN}

²⁾ Higher speeds on request

³⁾ With the use of the 72 Sh-D spider we would recommend to use hubs from steel

⁴⁾ Clamping ring hubs 6.0 from steel

⁵⁾ Hubs with average bore type 1.0

The coupling has to be dimensioned such that the permissible coupling load is not exceeded during any operating condition (see coupling selection on page 149-151).

The torques T_{KN}/T_{Kmax} mentioned refer to the spider. The shaft-hub-connection has to be investigated by the customer.

Coupling selection

1. Definitions for coupling selection

- 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).
- $T_{K \max}$ – **Maximum torque of coupling [Nm]** – Torque which can be transmitted over the entire 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 driving torque [Nm]** as per the data indicated by the engine manufacturer
- T_{AS} – **Maximum driving torque [Nm] as per the data indicated by the engine manufacturer** – 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 operating 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/TOOLFLEX®
- 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 being at least 4 has to be selected in case of couplings made of aluminium. For positioning drives with increased demand on torsional stiffness (e. g. gearboxes with low transmission) we would recommend the use of the TOOLFLEX® or RADEX®-NC.
- S_A – **Operating factor** – Factor taking into account the shocks or with positioning drives the starts per minute, respectively, each depending on the application.
- $m_A(L)$ – **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.
- J_A/J_L – **Moment of inertia of the driving side/moment of inertia of the load side**
- $J_K/J_{M_{ot}}/J_{Sp}$ – **Moment of inertia of the coupling/moment of inertia of the motor/moment of inertia of the spindle**
- T_A – **Screw tightening torque [Nm]**

2. Factors

Temperature factor S_t for spiders made of Polyurethane				
	-30 °C +30 °C	+40 °C	+60 °C	+80 °C
S_t	1,0	1,2	1,4	1,8

Temperature factor S_t for spiders made of Hytrel						
	-30 °C +30 °C	+40 °C	+60 °C	+80 °C	+100 °C	+120 °C
S_t	1,0	1,2	1,4	1,6	2,0	2,8

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 →

Operating factor S_A		
main spindle drive	positioning drive*	S_A
gentle shocks	≤ 60	1,0
average shocks	$\geq 60 \leq 300$	1,4
heavy shocks	≥ 300	1,8

*When using the spider 64 Sh-D-GS or 72 Sh-D-GS A factor of at least 4 or steel hubs have to be considered.

*Starts/minute

3. Calculation formula

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

$$T_{KN} \geq T_N \cdot S_t \cdot S_d$$

and

$$T_{KN} \geq T_S \cdot S_t \cdot S_d$$

Peak torque T_S

For the factors please see the tables at the top.

Shock on driving side $T_S = T_{AS} \cdot m_A \cdot S_A$
Shock on load side $T_S = T_{LS} \cdot m_L \cdot S_L$

$$m_A = J_L / (J_A + J_L)$$

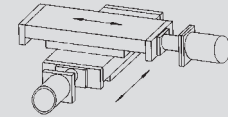
$$m_L = J_A / (J_A + J_L)$$

Coupling selection

4.1 Example of calculation for positioning drives

Given: Details of driving side

Servo Motor
 Rated torque $T_{AN} = 43 \text{ Nm}$
 Max. drive torque $T_{AS} = 144 \text{ Nm}$
 Moment of inertia $J_{Mot} = 108 \cdot 10^{-4} \text{ kgm}^2$
 Driving shaft $d = 32 \text{ k6}$ without feather keyway



Ball screw

Ambient temperature $t = 40 \text{ °C} \rightarrow S_t = 1,2$
 60 starts / min $\rightarrow S_A = 1,0$

Machine data of driving side

Ball spindle $J_{Sp} = 38 \cdot 10^{-4} \text{ kgm}^2$
 Screw pitch $s = 10 \text{ mm}$
 Driven shaft $d = 30 \text{ k6}$ without feather keyway
 Mass of slide + work piece $m_{Schl} = 1030 \text{ kg}$

Required:

high torsional stiffness $\rightarrow S_d = 4$

Preliminary consideration:

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

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

$$J_{Schl} = m_{Schl} \cdot (s / (2 \cdot \pi))^2 \text{ [kgm}^2\text{]}$$

$$J_{Schl} = 1030 \text{ kg} \cdot (0,01 \text{ m} / (2 \cdot \pi))^2 = 26 \cdot 10^{-4} \text{ kgm}^2$$

Coupling selection

Selection according to rated torque (preliminary consideration)

$$T_{KN} \geq T_{AN} \cdot S_t \cdot S_d$$

$$T_{KN} \geq 43 \text{ Nm} \cdot 1,2 \cdot 4$$

$$T_{KN} \geq 206,4 \text{ Nm}$$

Coupling selection: ROTEX® GS 38 - 98 Sh-A-GS - T_{KN} 325 Nm with clamping ring hubs 6.0 light

Review of maximum driving torque

$$T_{KN} \geq T_S \cdot S_t \cdot S_d$$

$$T_S = T_{AS} \cdot m_A \cdot S_A$$

$$m_A = J_L / (J_A + J_L)$$

$$= 69,17 \cdot 10^{-4} / (113,17 + 69,17) \cdot 10^{-4} = 0,379$$

$$J_L = (J_{Sp} + J_{Schl} + 1/2 J_K) = (38 + 26 + 5,17) \cdot 10^{-4} \text{ kgm}^2 = 69,17 \cdot 10^{-4} \text{ kgm}^2$$

$$J_A = J_{Mot} + 1/2 J_K = (108 + 5,17) \cdot 10^{-4} \text{ kgm}^2 = 113,17 \cdot 10^{-4} \text{ kgm}^2$$

$$T_S = 144 \text{ Nm} \cdot 0,379 \cdot 1,0 = 54,58 \text{ Nm}$$

$$T_{KN} \geq 54,58 \text{ Nm} \cdot 1,2 \cdot 4 \rightarrow 261,9 \text{ Nm}$$

ROTEX® GS 38 98 Sh-A-GS $T_{KN} = 325 \text{ Nm}$

Review of torque transmission of clamping ring hub 6.0 light for shaft diameter Ø30

$$T_R > T_{AS}$$

For figures for T_R see table on catalogue page 156.

Transmittable torque $T_R \text{ Ø } 30 \text{ H7/k6} = 443 \text{ Nm} > 144 \text{ Nm} \checkmark$

The coupling has to be dimensioned such that the permissible coupling load is not exceeded during any operating condition.

Coupling selection

4.2 Example of calculation for main spindle drives

Given: Details of driving side

Servo Motor

Operating torque $T_{AN} = 154 \text{ Nm}$

Max. driving torque $T_{AS} = 190 \text{ Nm}$

Max. speed = 6000 rpm

Moment of inertia $J_{Mot} = 0,316 \text{ kgm}^2$

Driving shaft $d = 38 \text{ k6}$ without feather keyway

Ambient temperature $t = 60 \text{ °C} \rightarrow S_t = 1,4$

Moderate shocks $\rightarrow S_A = 1,0$

Details of driven side

Moment of inertia of driven side $J_L = 0,1094 \text{ kgm}^2$

Driven shaft $d = 30 \text{ k6}$ without keyway

Required:

no special demands on torsional stiffness $\rightarrow S_d = 2$

Preliminary consideration:

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

Coupling selection

Selection according to rated torque (preliminary consideration)

$$T_{KN} \geq T_{AN} \cdot S_t \cdot S_d$$

$$T_{KN} \geq 154 \text{ Nm} \cdot 1,4 \cdot 2$$

$$T_{KN} \geq 431,2 \text{ Nm}$$

Coupling selection: ROTEX® GS 42 - 98 Sh-A-GS $T_{KN} 450 \text{ Nm}$ with clamping ring hubs 6.0 light

Review of max. driving torque

$$T_{KN} \geq T_S \cdot S_t \cdot S_d$$

$$T_S = T_{AS} \cdot m_A \cdot S_A$$

$$m_A = J_L / (J_A + J_L)$$

$$= 0,1094 / (0,1094 + 0,316) = 0,257$$

$$T_S = 190 \text{ Nm} \cdot 0,257 \cdot 1,0 = 48,83 \text{ Nm}$$

$$T_{KN} \geq 48,83 \text{ Nm} \cdot 1,4 \cdot 2 \rightarrow 136,7 \text{ Nm}$$

ROTEX® GS 42 98 Sh-A-GS $T_{KN} = 450 \text{ Nm}$

Review of torque transmission of clamping ring hub 6.0 light for shaft diameter Ø30

$$T_R > T_{AS}$$

For figures for T_R see table on catalogue page 156.

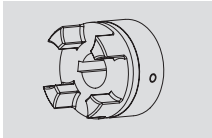
Transmittable torque $T_R \text{ Ø } 30 \text{ H7/k6} = 507 \text{ Nm} > 190 \text{ Nm} \checkmark$

The coupling has to be dimensioned such that the permissible coupling load is not exceeded during any operating condition.

Hub designs

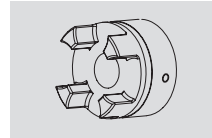
Due to the numerous applications of ROTEX® GS for many different mounting situations, this coupling system is available with various hub designs.

The different hub designs can be combined optionally within one size.



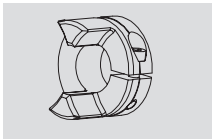
Design 1.0 with keyway and set screw

Positive locking power transmission, permissible torque depending on the permissible surface pressure. Not suitable for backlash-free power transmission with heavily reversing operation.



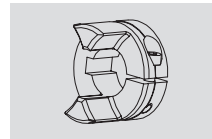
Design 1.1 without feather keyway with setscrew

Non-positive torque transmission, suitable for backlash-free transmission of very small torques. (Only for ATEX category 3)



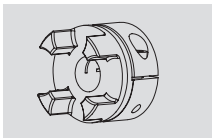
Design 2.0 clamping hub, single slotted, without feather keyway

Frictionally engaged, backlash-free shaft-hub-connection. Transmittable torques depending on bore diameter Design 2.0 up to size 14 as standard. (Only for ATEX category 3)



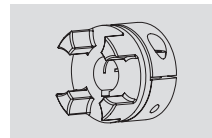
Design 2.1 clamping hub, single slotted, with feather keyway

Positive locking power transmission with additional frictionally engaged condition. The frictionally engaged condition prevents or reduces reverse backlash, respectively. Surface pressure of the keyway connection is reduced. Design 2.1 up to size 14 as standard.



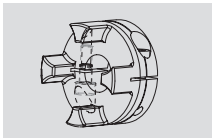
Design 2.5 clamping hub, double slotted, without feather keyway

Frictionally engaged, backlash-free shaft-hub-connection. Transmittable torques depending on bore diameter Design 2.5 from size 19 as standard. (Only for ATEX category 3)



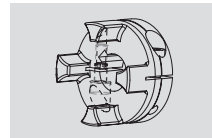
Design 2.6 clamping hub, double slotted, with feather keyway

Positive locking power transmission with additional frictionally engaged condition. The frictionally engaged condition prevents or reduces reverse backlash, respectively. Surface pressure of the keyway connection is reduced. Design 2.6 from size 19 as standard.



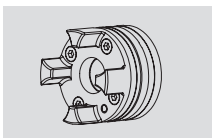
Design 2.8 short clamping hub C with axial slots without feather keyway

Frictionally engaged, backlash-free shaft-hub-connection, good properties of concentric running. Transmittable torques depending on bore diameter Design 2.8 up to size 24 as standard. Size 7-19 type 2.8 single slotted (Only for ATEX category 3)



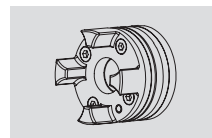
Design 2.9 short clamping hub C with axial slots with feather keyway

Positive locking power transmission with additional frictionally engaged condition. The surface pressure of the feather key combination is reduced. Type 2.9 from size 24 as standard. Size 7-19 type 2.9 single slotted.



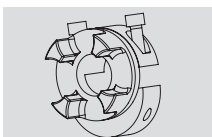
Design 6.0 clamping ring hub

Integrated frictionally engaged shaft-hub-connection for the transmission of higher torques. Screwing on elastomer side. For torques and dimensions see page 156/157. Suitable for high speeds.



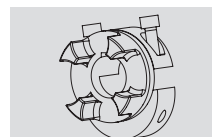
Design 6.0 P precision clamping ring hub

Design equal to 6.0, but highly accurate machining with slight modifications of design, see page 158.



Design 7.5 clamping hub type DH without feather keyway for double-cardanic connections

Frictionally engaged, backlash-free shaft-hub-connection for radial assembly of coupling. Transmittable torques depending on bore diameter For torques see page 162.



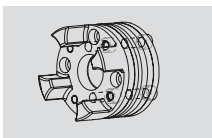
Design 7.6 clamping hub type DH with feather keyway for double-cardanic connections

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.

Design 7.8 clamping hub type H without feather keyway, single-cardanic connection

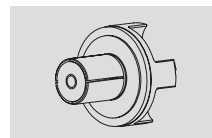
Design 7.9 clamping hub type H with feather keyway for single-cardanic connection

Special designs on request of customers



Design 6.5 clamping ring hub

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



Design 9.0 Expansion hub

Frictionally engaged connection for hollow shaft. Transmittable torques depend on the bore diameter and the hollow shaft.

Stock programme

		Finish bore [mm] according to ISO fit H7 / feather keyway with thread according to DIN 6885 sheet 1 - JS9																														
Size	Hub design	un-/pilot bored	Ø2	Ø3	Ø4	Ø5	Ø6	Ø6.35	Ø7	Ø8	Ø9	Ø9.5	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	
7	1.1	●			●	●	●																									
	2.0	●		●	●	●	●	●	●																							
	2.8	●																														
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	●													●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	2.8	●													●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
19	6.0 light														●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	6.0 P														●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	1.0	●													●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	2.5	●				■				●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	2.6	●								●					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	2.8	●									●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
24	6.0 light														●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	6.0 steel														●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	6.0 P37.5																															
	6.0 P																															
	1.0	●													●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	2.5	●									■				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
28	2.6	●													●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	2.8	●													●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	6.0 light																															
	6.0 steel																															
	6.0 P																															
	38	1.0	●																													
2.5		●																														
2.6		●																														
2.8		●																														
6.0 light																																
38	6.0 steel																															
	6.0 P																															

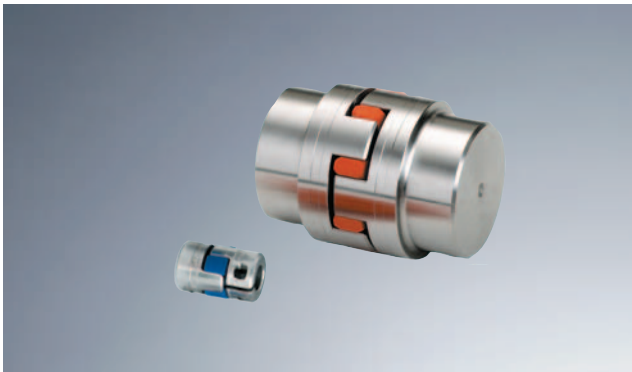
Taper bores for Fanuc motors:
 GS 19 1:10 Ø 11
 GS 24 1:10 Ø 16


		Finish bores [mm]														
Size	Hub design	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55	Ø60	Ø65	Ø70	Ø80
42	6.0 light	●	●	●	●	●	●	●	●	●	●					
	6.0 steel	●	●	●	●	●	●	●	●	●	●					
48	6.0 light			●	●	●	●	●	●	●		●				
	6.0 steel			●	●	●	●	●	●	●		●				
55	6.0 steel					●	●	●	●	●	●	●	●			
65	6.0 steel							●	●	●	●	●	●	●	●	
75	6.0 steel								●	●	●	●	●	●	●	●
90	6.0 steel															

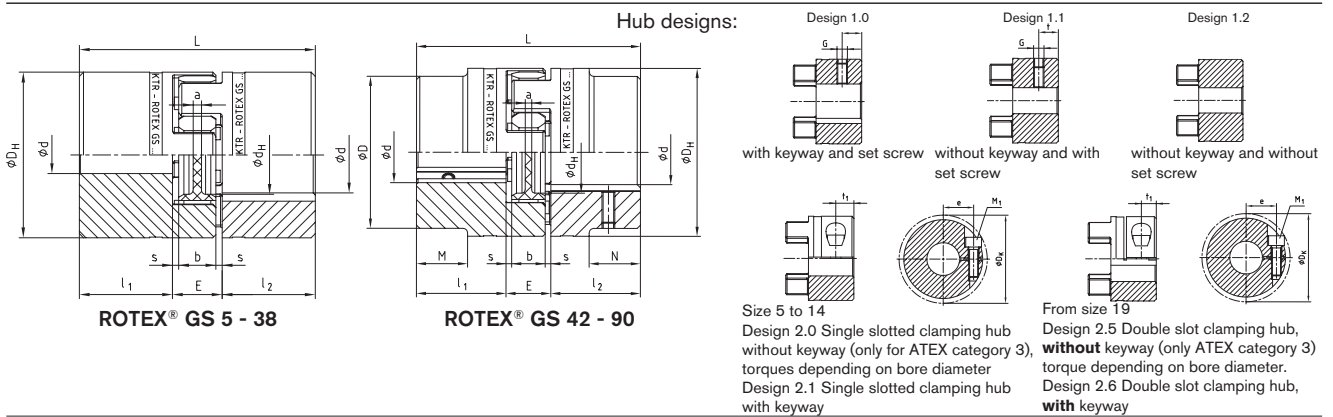
Bores on demand

■ = Pilot bored clamping hubs
 ● = Standard bore from stock
 Unbored hubs up to size 65 available from stock.
 Further dimensions on request

Standard types



- Backlash-free shaft connection under prestress
- Small dimensions – low flywheel mass
- Maintenance-free, easy to check visually
- Various kinds of elastomer hardness of spiders (see page 146)
- Finish bore according to ISO fit H7 (except for clamping hub), feather key optionally available from Ø 6 mm according to DIN 6885 sheet 1 – JS9.
-  Approved according to EC Standard 94/9/EC (without feather key according to category 3)



ROTEX® GS standard types For size 5 to 38 hub material aluminium/for size 42 to 90 hub material steel																					
Size	Spider torque T _{KN} [Nm] for 95/98Sh-A ¹⁾	Maximum finish bore Ød for hub design			Dimensions [mm]										Setscrew DIN EN ISO 4029 Hub design 1.0/1.1		Clamping screw DIN EN ISO 4762 (ROTEX® 5 DIN 84) Hub design 2.0/2.1/2.5/2.6				
		1.0-1.2	2.0/2.5	2.1/2.6 ³⁾	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]
5	0,9	6	5	5	—	10	—	15	5	—	5	4	0,5	4,0	M2	2,5	M1,2	2,5	3,5	11,4	— ²⁾
7	2,0	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	5,0	11	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	9,0	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	12,5	16	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
19	17	24	24	24	—	40	18	66	25	—	16	12	2,0	3,0	M5	10	M6	11,0	14,5	46	10,5
24	60	28	28	28	—	55	27	78	30	—	18	14	2,0	3,0	M5	10	M6	10,5	20,0	57,5	10,5
28	160	38	38	38	—	65	30	90	35	—	20	15	2,5	4,0	M8	15	M8	11,5	25,0	73	25
38	325	45	45	45	—	80	38	114	45	—	24	18	3,0	4,0	M8	15	M8	15,5	30,0	83,5	25
42	450	55	50	45	85	95	46	126	50	28	26	20	3,0	4,0	M8	20	M10	18	32,0	93,5	69
48	525	62	55	55	95	105	51	140	56	32	28	21	3,5	4,0	M8	20	M12	21	36,0	105	120
55	685	74	68	68	110	120	60	160	65	37	30	22	4,0	4,5	M10	20	M12	26	42,5	119,5	120
65	940	80	70	70	115	135	68	185	75	47	35	26	4,5	4,5	M10	20	M12	33	45,0	124	120
75	1920	95	80	80	135	160	80	210	85	53	40	30	5,0	5,0	M10	25	M16	36	51,0	147,5	295
NEW 90	3600	110	90	90	160	200	104	245	100	62	45	34	5,5	6,5	M12	30	M20	40	60,0	192	580

¹⁾ Further spiders/selection see page 148-151 ²⁾ tightening torque T_A not defined (slotted screw) ³⁾ from Ø65 keyway opposite to the clamping screw ⁴⁾ clamping hub single slotted 2 x clamping screw M4 and dimension e=15

Transmittable friction torques T _R [Nm] of the clamping hub without keyway design 2.0 ¹⁾																
Size	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16		
7		0,8		0,9	0,95	1,0	1,1									
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		

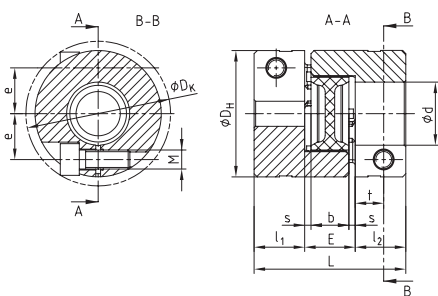
Transmittable friction torques T _R [Nm] of the clamping hub without keyway hub design 2.5 ¹⁾																														
Size	Ø8	Ø10	Ø11	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55	Ø60	Ø65	Ø70	Ø75	Ø80	Ø90	
19	25	27	29	30	31	32	32	34	30 ⁴⁾	32 ⁴⁾																				
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																			
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	
NEW 90																				1944	1980	2016	2040	2100	2160	2220	2280	2340	2400	2520

Ordering example:	ROTEX® GS 24	98 Sh-A-GS	d20	2.5 – Ø 24	1.0 – Ø 20	
	Coupling size	Spider hardness	Optional: Bore diameter in spider	Hub design	Finish bore	Hub design

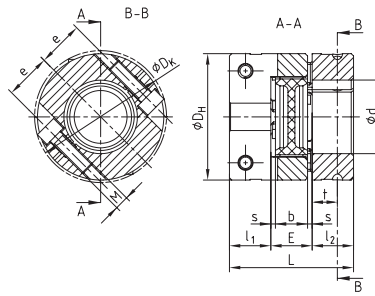
Compact



- Shorter by up to 1/3
- High power density, design with axial slot, patent pending (from size 24)
 - Good concentric running properties
 - Uniform power transmission due to cams without slots
 - Improved balancing quality
- Finish bore according to ISO fit H7, feather key optionally available from Ø 6 mm according to DIN 6885 sheet 1 – JS9.
- Ex Approved according to EC Standard 94/9/EC (hubs without feather key according to category 3)



ROTEX® GS 7 - 19 Compact single slotted design 2.8



ROTEX® GS 24 - 38 Compact axially slotted design 2.8

ROTEX® GS Compact Hub material aluminium															
Size	Spider torque [Nm] T_{KN}^1			Dimensions [mm]											T_A [Nm]
	92Sh-A	98Sh-A	64Sh-D	max. d	D_H	D_K	L	l_1, l_2	E	b	s	t	e	M	
Single slotted hub design 2.8/2.9															
7	1,2	2,0	2,4	7	14	16,6	18	5	8	6	1	2,5	5,0	M2	0,37
9	3,0	5,0	6	9	20	21,3	24	7	10	8	1	3,5	6,7	M2,5	0,76
12	5,0	9,0	12	12	25	26,2	26	7	12	10	1	3,5	8,3	M3	1,34
14	7,5	12,5	16	16 ²⁾	30	30,5	32	9,5	13	10	1,5	4,5	9,6	M4	2,9
19	10	17	21	24 ²⁾	40	45,0	50	17	16	12	2	9	14,0	M6	10
Axially slotted hub design 2.8/2.9															
24	35	60	75	32	55	57,5	54	18	18	14	2	11	20,0	M6	10
28	95	160	200	35	65	69,0	62	21	20	15	2,5	12	23,8	M8	25
38	190	325	405	45	80	86,0	76	26	24	18	3	16	30,5	M10	49

Transmittable friction torques T_R [Nm] of clamping hub without keyway type 2.8 ¹⁾																											
Size	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	
Hub design 2.8 single slotted																											
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						24,3	25,0	25,7	26,3	27,0	28,4	29,0	29,7	31,1	31,7	32,4	25,0 ²⁾										
Hub design 2.8 axially slotted																											
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⁾ Further spiders/selection see page 148-151

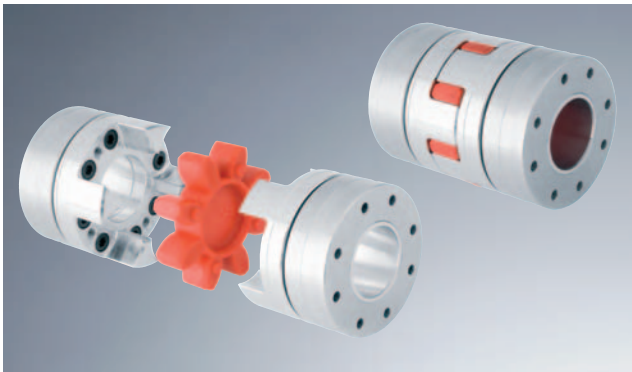
²⁾ Size 14 with screw M3 and dimension e=10.4, size 19 with screw M5 and dimension e=15.5


2.8 = without feather key

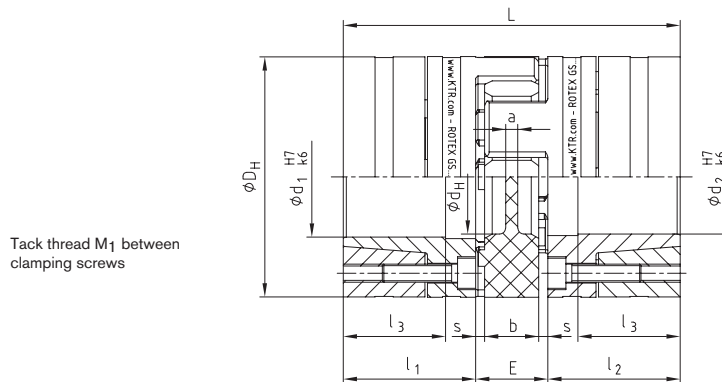
2.9 = with feather key

Ordering example:	ROTEX® GS 38	Compact	98 Sh-A-GS	d28	2.8 - Ø28		2.8 - Ø45	
	Coupling size	Type	Spider hardness	Optional: Bore diameter in spider	Hub design	Finish bore	Hub design	Finish bore

Clamping ring hubs light



- Backlash-free shaft coupling with integrated clamping system
- As an example, use on feed/main spindles, drives on machine tools, handling units, etc.
- Low weight and low mass moment of inertia due to a design fully made from aluminium
- Easy assembly due to internal clamping screws and block assembly
- High friction torques
- High smoothness of running, application up to a peripheral speed of 50 m/s
-  Approved and certified according to EC Standard 94/9/EC



ROTEX® GS clamping ring hubs light Hub and clamping ring material aluminium																				
Size	Spider torque T_{KN} [Nm] ¹⁾			Dimensions [mm]										Clamping screws DIN EN ISO 4762				Weight per hub with max. bore [kg]	Mass moment of inertia per hub with max. bore [kgm ²]	
	92 Sh-A	98Sh-A	64 Sh-D	maxi.d	D_H ²⁾	d_H	L	$l_1; l_2$	l_3	E	b	s	a	M	number z	T_A [Nm]	M_1			
14	7,5	12,5	16,0	14	30	10,5	50	18,5	13,5	13	10	1,5	2,0	M3	4	1,34	M3	0,032	$0,04 \times 10^{-4}$	
19	10	17	21	20	40	18	66	25	18	16	12	2,0	3,0	M4	6	3	M4	0,077	$0,19 \times 10^{-4}$	
24	35	60	75	32	55	27	78	30	22	18	14	2,0	3,0	M5	4	6	M5	0,162	$0,78 \times 10^{-4}$	
28	95	160	200	38	65	30	90	35	27	20	15	2,5	4,0	M5	8	6	M5	0,240	$1,70 \times 10^{-4}$	
38	190	325	405	48	80	38	114	45	35	24	18	3,0	4,0	M6	8	10	M6	0,490	$5,17 \times 10^{-4}$	
42	265	450	560	51	95	46	126	50	35	26	20	3,0	4,0	M8	4	25	M8	0,772	$11,17 \times 10^{-4}$	
48	310	525	655	55	105	51	140	56	41	28	21	3,5	4,0	M10	4	49	M10	1,066	$18,81 \times 10^{-4}$	

¹⁾ Further spiders/selection see page 148-151
²⁾ $\varnothing D_H + 2$ mm with high speeds for expansion of spider


Transmittable friction torques T_R [Nm] of clamping ring hub type 6.0 light *																					
Size	Ø6	Ø10	Ø11	Ø14	Ø15	Ø16	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55
14	5,1	8,5	10,7	24																	
19		16	19	39	47	34	54	62													
24				55	57	66	94	106	121	133	169										
28							139	130	198	216	244	281	248	302	324						
38								198	297	324	386	443	443	532	538	597	656	609			
42											443	507	533	637	689	761	750	856	963	974	
48												566	632	757	835	922	935	1066	1200	1125	1326

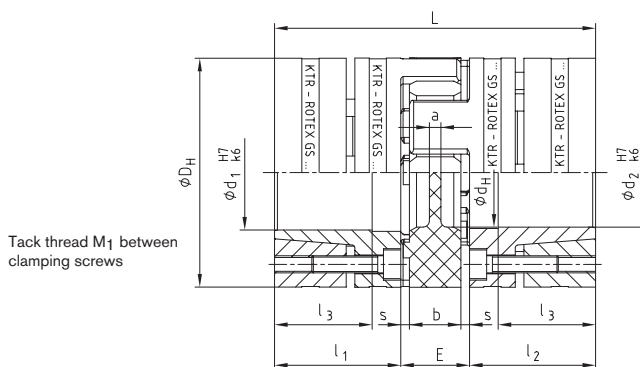
* The transmittable torques of the clamping connection consider the max. clearance with shaft fit k6 / bore H7. With bigger clearance the torque is reduced. As shaft material steel or nodular iron with a yield point of approx. 250 N/mm² or more can be used. For the stiffness calculation of the shaft/hollow shaft see KTR standard 45510 at our homepage www.ktr.com.

Ordering example:	ROTEX® GS 24	98 Sh-A-GS	d20	6.0 light – Ø 24		6.0 light – Ø 20	
	Coupling size	Spider hardness	Optional: Bore diameter in spider	Hub design	Finish bore	Hub design	Finish bore

Clamping ring hubs steel



- Backlash-free shaft coupling with integrated clamping system
- As an example, use on gearboxes and other drives with high torque shocks
- High running smoothness, 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
-  Approved and certified according to EC Standard 94/9/EC



ROTEX® GS clamping ring hubs steel Hub and clamping ring material steel

Size	Spider torque T_{KN} [Nm] ¹⁾			Dimensions [mm]										Clamping screws DIN EN ISO 4762			Weight per hub with max. bore [kg]	Mass moment of inertia per hub with max. bore [kg m ²]	
	98 Sh-A	64 Sh-D	72 Sh-D	maxi.d	D_H ³⁾	d_H	L	$l_1; l_2$	l_3	E	b	s	a	M	num-ber z	T_A [Nm]			M_1
19	17	21	—	20	40	18	66	25	18	16	12	2,0	3,0	M4	6	4,1	M4	0,179	$0,44 \times 10^{-4}$
24	60	75	97	28	55	27	78	30	22	18	14	2,0	3,0	M5	4	8,5	M5	0,399	$1,91 \times 10^{-4}$
28	160	200	260	38	65	30	90	35	27	20	15	2,5	4,0	M5	8	8,5	M5	0,592	$4,18 \times 10^{-4}$
38	325	405	525	48	80	38	114	45	35	24	18	3,0	4,0	M6	8	14	M6	1,225	$12,9 \times 10^{-4}$
42	450	560	728	51	95	46	126	50	35	26	20	3,0	4,0	M8	4	35	M8	2,30	$31,7 \times 10^{-4}$
48	525	655	852	55	105	51	140	56	41	28	21	3,5	4,0	M10	4	69	M10	3,08	$52,0 \times 10^{-4}$
55	685	825	1072	70	120	60	160	65	45	30	22	4,0	4,5	M10	4	69	M10	4,67	$103,0 \times 10^{-4}$
65	940 ²⁾	1175	1527	70	135	68	185	75	55	35	26	4,5	4,5	M12	4	120	M12	6,70	$191,0 \times 10^{-4}$
75	1920 ²⁾	2400	—	80	160	80	210	85	63	40	30	5,0	5,0	M12	5	120	M12	9,90	$396,8 \times 10^{-4}$
90	3600 ²⁾	4500	—	105	200	104	245	100	75	45	34	5,5	6,5	M16	5	295	M16	17,7	1136×10^{-4}

¹⁾ Further spiders/selection see page 148-151

²⁾ Figures for 95 Sh-A-GS

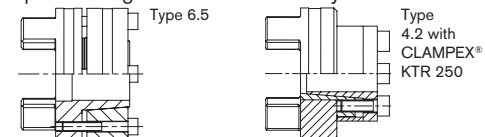
³⁾ $\phi D_H + 2$ mm with high speeds for expansion of spider

Transmittable friction torques T_R [Nm] of clamping ring hub type 6.0 steel *

Size	Ø10	Ø11	Ø14	Ø15	Ø16	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55	Ø60	Ø65	Ø70	Ø80	Ø90	Ø95	Ø100	Ø105
19	27	32	69	84	57	94	110																					
24			70	87	56	97	114	116	133	192																		
28				108	131	207	148	253	285	315	382	330	433	503														
38							208	353	395	439	531	463	603	593	689	793	776											
42									358	398	483	416	547	536	625	571	704	851	865									
48											616	704	899	896	1030	962	1160	1379	1222	1543								
55													863	856	991	918	1119	1110	1247	1277	1672	1605	2008					
65															1446	1355	1637	1635	1827	1887	2429	2368	2930					
75																1710	2053	2059	2294	2384	3040	2983	3664	4148				
90																			3845	4249	4794	5858	5900	7036	8047	9247	9575	10845

* The transmittable torques of the clamping connection take into account the max. clearance with shaft fit k6 / bore H7, from Ø55 G7/m6. With bigger clearance the torque is reduced. For the stiffness calculation of the shaft/hollow shaft see KTR standard 45510 at our homepage at www.ktr.com.

Special design for external assembly of the screws




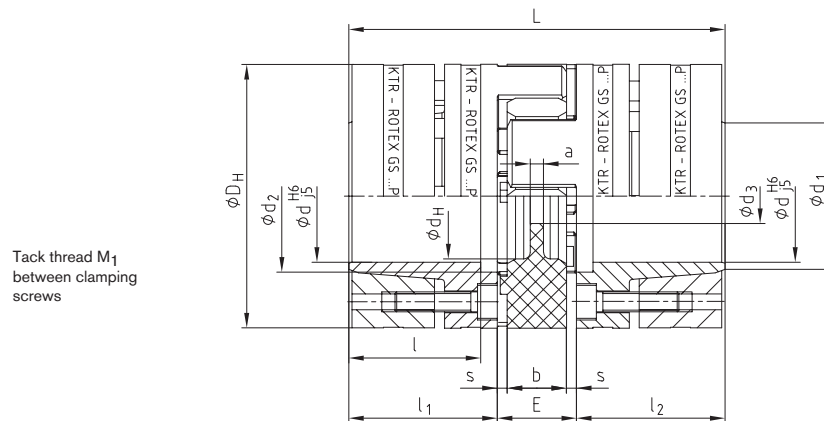
Ordering example:

ROTEX® GS 24	98 Sh-A-GS	d20	6.0 Steel	Ø24	6.0 Steel	Ø20
Coupling size	Spider hardness	Optional: Bore diameter in spider	Hub design	Finish bore	Hub design	Finish bore

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 due to internal clamping screws
-  Approved and certified according to EC Standard 94/9/ EC Certificate ATEX 95)



ROTEX® GS type P Hub and clamping ring material steel																			
Size	Spider torque T _{KN} [Nm] ¹⁾		Dimensions [mm]											Transmittable torque T[R] with Ø d ²⁾ [Nm]	Tightening torque of clamping screws T _A [Nm]	Weight per hub with bore Ød standard [kg]	Mass moment of inertia with bore Ø d standard [kgm ²]		
	98 Sh-A	64 Sh-D	d ³⁾	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	16	14*	32	10,5	50	18,5	15,5	13	10	1,5	2	17	17	8,5	25	1,89	0,08	0,011x10 ⁻³
19 P 37,5	14	17	16*	37,5	18	66	25	21	16	12	2	3	20	19	9,5	60	3,05	0,16	0,037x10 ⁻³
19 P	17	21	19*	40	18	66	25	21	16	12	2	3	23	22	9,5	71	3,05	0,19	0,046x10 ⁻³
24 P 50	43	54	24*	50	27	78	30	25	18	14	2	3	28	29	12,5	108	4,9	0,331	0,136x10 ⁻³
24 P	60	75	25*	55	27	78	30	25	18	14	2	3	30	30	12,5	170	8,5	0,44	0,201x10 ⁻³
28 P	160	200	35*	65	30	90	35	30	20	15	2,5	4	40	40	14,5	506	8,5	0,64	0,438x10 ⁻³
38 P	325	405	40*	80	38	114	45	40	24	18	3	4	46	46	16,5	821	14	1,32	1,325x10 ⁻³
42 P	450	560	42	95	46	126	50	45	26	20	3	4	52	55	18,5	709	35	2,23	3,003x10 ⁻³
48 P	525	655	45	105	51	140	56	50	28	21	3,5	4	52	60	20,5	1340	69	3,09	5,043x10 ⁻³
55 P	685	825	50	120	60	160	65	58	30	22	4	4,5	55	72	22,5	1510	69	4,74	10,02x10 ⁻³

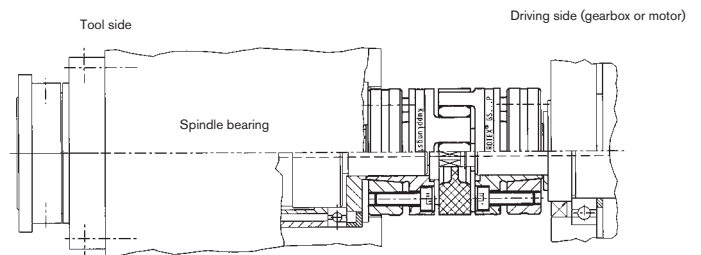
¹⁾ Further spiders/selection see page 148-151

²⁾ * Standard spindle shaft diameter

³⁾ Ø D_H + 2 mm with high speed for expansion of spider

For the stiffness calculation of the shaft/hollow shaft see KTR standard 45510 on our homepage www.ktr.com

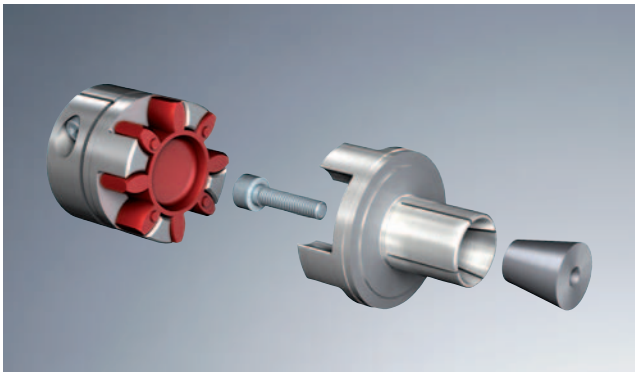
Selection for stub spindles						
Spindle drive	ROTEX® GS P size	Dimensions				
		d	D _H	l ₁ ; l ₂	L	E
25 x 20	14 P	14	32	18,5	50	13
32k x 25	19 P37.5	16	37,5	25	66	16
32g x 30	19 P	19	40	25	66	16
40 x 35	24 P50	24	50	30	78	18
50 x 45	24 P	25	55	30	78	18
63 x 55	28 P	35	65	35	90	20
80 x 75	38 P	40	80	45	114	24



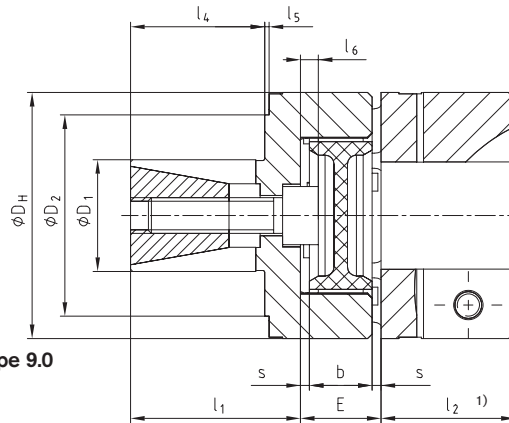
ROTEX® GS type P with central coolant supply for stub spindles and multiple spindle heads

Ordering example:	ROTEX® GS 24	P	98 Sh-A-GS	6.0 - Ø25	6.0 - Ø25
	Coupling size	Type	Spider hardness	Hub design	Finish bore

Expansion hub for hollow shaft connection



- Backlash-free shaft coupling with integrated clamping system for hollow shaft connections
- Short design
- Electric insulation
- Quick assembly
- Good concentricity
- Can be combined with various hub designs
- Self-centering clamping connection



ROTEX® GS expansion hub type 9.0 with clamping hub ¹⁾

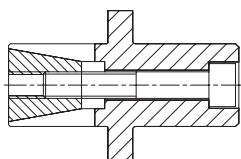
Size	ROTEX® GS expansion hub					Material of expansion hub aluminium/material of clamp pin stainless steel										
	Spider torque T_{KN} [Nm] ²⁾					Dimensions										
	80 Sh-A	92 Sh-A	98 Sh-A	64 Sh-D	72 Sh-D	D ₁	D ₂	D _H	l ₁	l ₄	l ₅	l ₆	E	b	s	
9	1,8	3,0	5,0	6,0	–	10	–	20	20	11	–	0	10	8	1,0	
12	3,0	5,0	9,0	12,0	–	10	20	25	19	14	1,5	2	12	10	1,0	
14	4,0	7,5	12,5	16,0	–	12	24	30	18,5	12,5	3	2	13	10	1,5	
19	4,9	10,0	17,0	21,0	–	20	35	40	28	20	1	0	16	12	2,0	
24	–	35	60	75	97	25	45	55	38	30	1	4	18	14	2,0	
28	–	95	160	200	260	35	55	65	44	36	1	5	20	15	2,5	

¹⁾ Expansion hub can be combined with other hub designs as a counter side, too. l_2 depending on hub design. Further hub designs see page 152

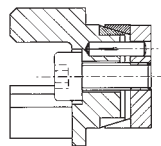
²⁾ For selection see page 148-151

Transmittable friction torques for D_1 on request (depending on the hollow shaft)

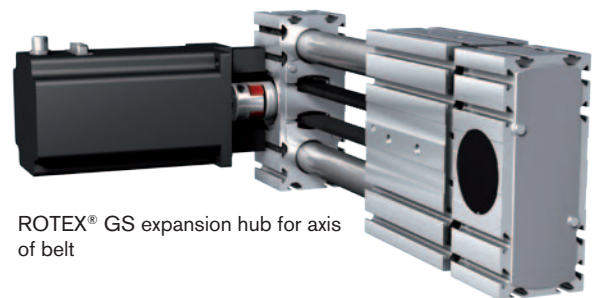
Special type



Shaft extension



ROTEX® GS hub with CLAMPEX® KTR 150



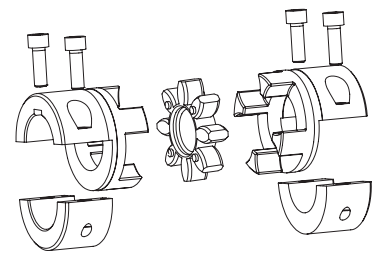
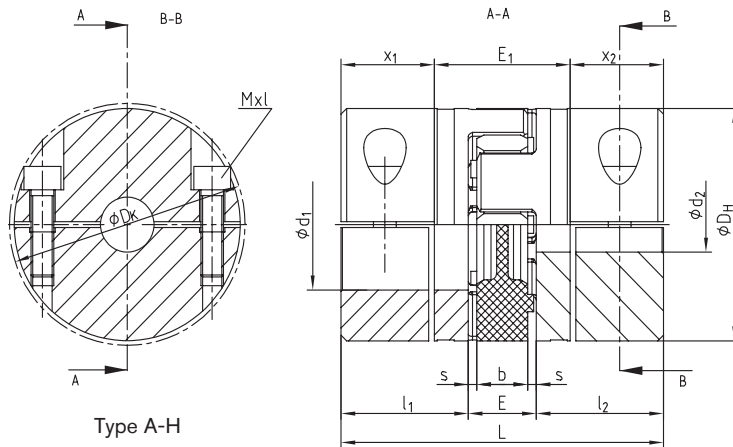
ROTEX® GS expansion hub for axis of belt

Ordering example:	ROTEX® GS 24	98 Sh-A-GS	d20	9.0 – Ø 24	2.5 – Ø 20	
	Coupling size	Spider hardness	Optional: Bore diameter in spider	Hub design	D ₁	Hub design

Drop-out center design coupling type A-H



- Backlash-free shaft connection under prestress
- Maintenance-free, easy to inspect visually
- Different elastomer hardness of spiders
- Assembly/disassembly by means of 4 screws only
- Radial disassembly/assembly of spider with no need to shift the driving and driven side
- Finish bore according to ISO fit H7, keyway, from Ø 6 mm according to DIN 6885 sheet 1 - JS9
- Approved and certified according to EC Standard 94/9/ EC (type 7.8 shell clamping hub without feather key according to category 3)



Please note:
The feather keys are offset to each other by approx. 5°
Hub material: Al-H
Hub design 7.8 clamping hub type H without feather keyway
Hub design 7.9 clamping hub type H with feather keyway

ROTEX® GS Type A-H hub material aluminium													
Size	Max. finish bore Ød [mm]	Dimensions [mm]										Cyl. screw DIN EN ISO 4762	
		L	l ₁ ; l ₂	E	b	s	D _H	D _K	x ₁ /x ₂	E ₁	MxL	T _A [Nm]	
19	20	66	25	16	12	2,0	40	46	17,5	31	M6x16	10	
24	28	78	30	18	14	2,0	55	57,5	22,0	34	M6x20	10	
28	38	90	35	20	15	2,5	65	73	25,0	40	M8x25	25	
38	45	114	45	24	18	3,0	80	83,5	33,0	48	M8x30	25	
42	50	126	50	26	20	3,0	95	93,5	39	48	M10x30	49	

Technical data																			
Size	Spider Shore-GS ¹⁾	Shore range	Max. speed [rpm]	Torque [Nm]			Static torsion spring stiffness ²⁾ [Nm/rad]	Weight of each hub with max. bore diameter [kg]	Mass moment of inertia J of each hub with max. bore diameter [kgm ²]	Size	Spider Shore-GS	Shore range	Max. speed [rpm]	Torque [Nm]			Static torsion spring stiffness ²⁾ [Nm/rad]	Weight of each hub with max. bore diameter [kg]	Mass moment of inertia J of each hub with max. bore diameter [kgm ²]
				T _{KN}	T _{Kmax}	T _{KN}								T _{Kmax}					
19	80	A	9550	4,9	9,8	618	77 x 10 ⁻³	19,6 x 10 ⁻⁶	38	92	A	4750	190	380	6525	470 x 10 ⁻³	496 x 10 ⁻⁶		
	92	A		10,0	20,0	1090							325	650	11800				
	98	A		17,0	34,0	1512							405	810	26300				
	64	D		21,0	42,0	2560							560	1120	36860				
24	92	A	6950	35	70	2280	161 x 10 ⁻³	77,3 x 10 ⁻⁶	42	92	A	4000	265	530	10870	1770 x 10 ⁻³	2409 x 10 ⁻⁶		
	98	A		60	120	3640							450	900	21594				
	64	D		75	150	5030							560	1120	36860				
28	92	A	5850	95	190	4080	240 x 10 ⁻³	173 x 10 ⁻⁶											
	98	A		160	320	6410													
	64	D		200	400	10260													

¹⁾ Further spiders/selection see page 148-151 ²⁾ static torsion stiffness with 0,5 x T_{KN}

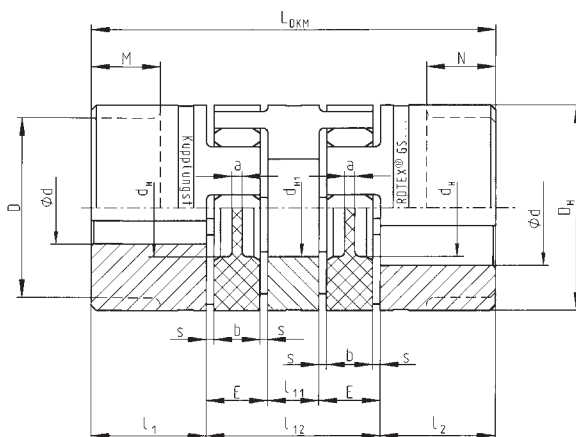
Bores and related transmittable friction torques of clamping hub type H without feather keyway [mm] type 7.8																							
Size	Ø8	Ø10	Ø11	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø46	Ø48	Ø50
19	17	21	23	30	32	34	38	40	42														
24		21	23	30	32	34	38	40	42	47	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

Ordering example:	ROTEX® GS 38	A-H	98 Sh-A-GS	7.8 - Ø 38	7.9 - Ø 30
	Coupling size	Type	Spider hardness	Hub design	Finish bore
				Hub design	Finish bore

DKM (double cardanic)



- Backlash-free, double cardanic shaft connection
- Double cardanic design allowing to compensate for larger radial displacements
- Axial plug-in - easy blind assembly
- Maintenance-free
- Easy to inspect visually
- For applications up to circumferential speeds of 30 m/s please also consider the hub design
- Finish bore according to ISO fit H7 (apart from clamping hub), keyway, from Ø 6 mm according to DIN 6885 sheet 1 - JS9
- Approved and certified according to EC standard 94/9/EC



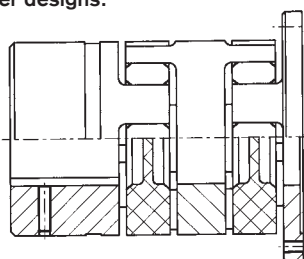
ROTEX® GS DKM Spacer material aluminium/hub material depends on hub design

Size	Spider torque T _{KN} [Nm] ¹⁾		Dimensions [mm]													
	98 Sh-A	64 Sh-D	max. d ²⁾	D	D _H	d _H	d _{H1}	l ₁ ; l ₂	M; N	l ₁₁	l ₁₂	L _{DKM}	E	b	s	a
5	0,9	—	5	—	10	—	—	5	—	3	13	23	5	4	0,5	4,0
7	2,0	2,4	7	—	14	—	—	7	—	4	20	34	8	6	1,0	6,0
9	5,0	6,0	11	—	20	7,2	—	10	—	5	25	45	10	8	1,0	1,5
12	9,0	12,0	12	—	25	8,5	—	11	—	6	30	52	12	10	1,0	3,5
14	12,5	16,0	16	—	30	10,5	—	11	—	8	34	56	13	10	1,5	2,0
19	17,0	21,0	24	—	40	18,0	18	25	—	10	42	92	16	12	2,0	3,0
24	60	75	28	—	55	27,0	27	30	—	16	52	112	18	14	2,0	3,0
28	160	200	38	—	65	30,0	30	35	—	18	58	128	20	15	2,5	4,0
38	325	405	45	—	80	38,0	38	45	—	20	68	158	24	18	3,0	4,0
42	450	560	55	85	95	46	46	50	28	22	74	174	26	20	3,0	4,0
48	525	655	62	95	105	51	51	56	32	24	80	192	28	21	3,5	4,0
55	685	825	74	110	120	60	60	65	37	28	88	218	30	22	4,0	4,5

¹⁾ Further spiders/selection see page 148-151

²⁾ Depending on hub design; hub designs see page 152

Other designs:

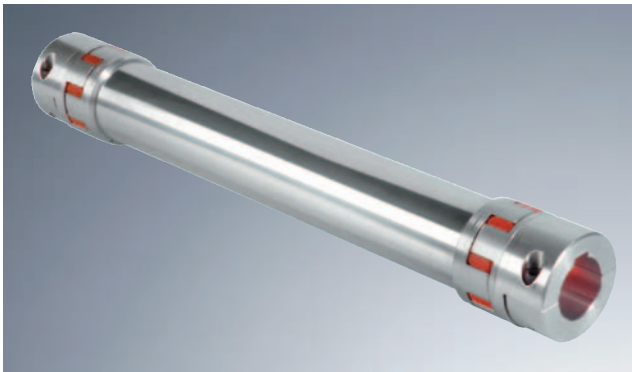


ROTEX® GS - CF - DKM

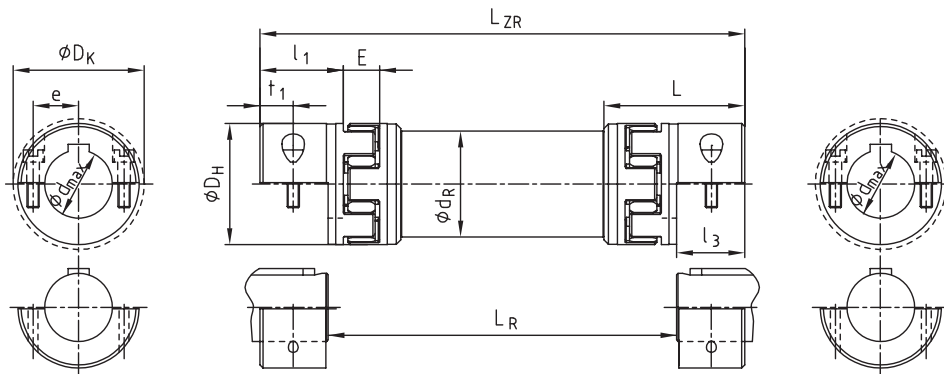
Ordering example:

ROTEX® GS 24	DKM	92 Sh-A-GS	d25	1.0 - Ø38	2.5 - Ø25		
Coupling size	Type	Spider hardness	Optionally: Bore Ø in spider	Hub design	Finish bore	Hub design	Finish bore

Intermediate shaft coupling



- Use with lifting machines, in handling units, robotic palletisers etc.
- Easy, radial coupling assembly because of split coupling hub, replacement of spiders without shifting the driving and driven side
- Lengths are possible up to 4 m without intermediate bearing dependent on speed and size
- Low mass moment of inertia by using aluminium
- Can be combined with other hub designs
- Finish bore according to ISO fit H7, keyway according to DIN 6885 sheet 1 - JS9



ROTEX® GS type ZR3 hub material aluminium/intermediate pipe material aluminium

Size	Dimensions [mm]																	Cyl screw DIN EN ISO 4762	
	Minimum and maximum finish bore		General													8.8	T _A [Nm]		
	d _{min.}	d _{max.}	D _H	l ₁	L	l ₃	E	L _R		L _{ZR}		d _R	D _K	t ₁	e				
NEW 14	5	16	30	18,5	36,0	14,5	13	min. 72	max. 2971	min. 101	max. 3000	28	32,5	7,5	11,5	M6	1,34		
19	8	20	40	25	49,0	17,5	16	98	2965	133	3000	40	46	8,0	14,5	M6	10		
24	10	28	55	30	59,0	22,0	18	113	3456	157	3500	50	57,5	10,5	20	M6	10		
28	14	38	65	35	67,0	25,0	20	131	3950	181	4000	60	73	11,5	25	M8	25		
38	18	45	80	45	83,5	33,0	24	163	3934	229	4000	70	83,5	15,5	30	M8	25		
42	22	50	95	50	93,0	36,5	26	180	3927	253	4000	80	93,5	18,0	32	M10	49		
48	22	55	105	56	100,0	39,5	28	202	3921	281	4000	100	105	18,5	36	M12	86		

Technical data of type ZR3

Size	Torques spider T _{KN} ¹⁾ [Nm]		Moment of inertia [10 ⁻³ kgm ²]			Stat. torsion spring stiffness [Nm ² /rad]	Size	Spider torque T _{KN} ¹⁾ [Nm]		Moment of inertia [10 ⁻³ kgm ²]			Stat. torsion spring stiffness [Nm ² /rad]
	98 Sh-A	64 Sh-D	Hub ²⁾	ZR hub	Pipe/meter	ZW C ₂ ³⁾		98 Sh A	64 Sh D	Hub ²⁾	ZR hub	Pipe/meter	ZW C ₂ ³⁾
NEW 14	12,5	16	0,00406	0,00238	0,088	858	38	325	405	0,50385	0,2572	2,972	29290,4
19	17	21	0,02002	0,01304	0,329	3243,6	42	450	560	1,12166	0,5523	4,560	44929,7
24	60	75	0,07625	0,04481	0,673	6631,8	48	525	655	1,87044	1,1834	9,251	91158,2
28	160	200	0,17629	0,10950	1,199	11814,1							

Transmittable friction torques T_R [Nm] of hub DH without keyway type 7.5

Size	Ø5	Ø6	Ø8	Ø10	Ø11	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø46	Ø48	Ø50	Ø55
14	2,6	3,1	4,2	5,2	5,7	7,3	7,8	8,3																		
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⁾ Further spiders/selection see page 148-151

²⁾ With d_{max.}

³⁾ Torsion spring stiffness with an intermediate pipe of a length of 1 m, L_{Pipe} being = L_{ZR} - 2 · L

For enquiries and orders please mention the shaft distance dimension L_R along with the maximum speed to review the critical bending speed.

The intermediate pipe could be combined with other hub designs, but in that case it can no longer be radially disassembled. Please mention the shaft distance dimension required in your order.

Hub design 7.5 clamping hub type DH without feather keyway

Hub design 7.6 clamping hub type DH with feather keyway

With vertical application a support washer has to be used (please mention in your order).

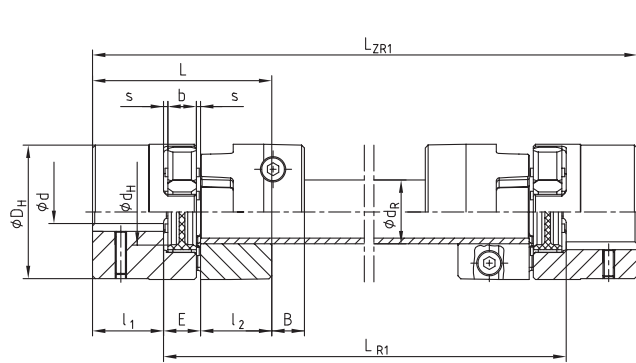
Ordering example:

ROTEX® GS 24	ZR3	1200 mm	98 Sh A-GS	7.5 - Ø24	7.5 - Ø24
Coupling size	Type	Shaft distance dimension (L _R)	Spider hardness	Hub design	Finish bore
				Hub design	Finish bore

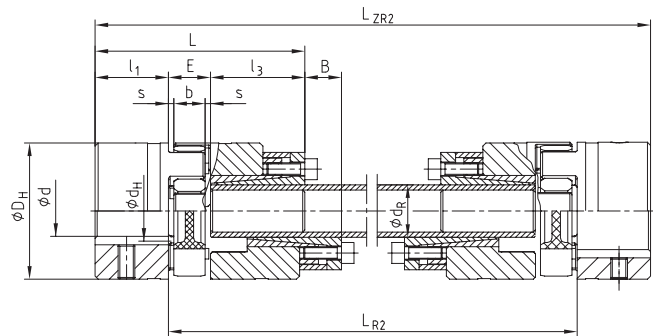
Intermediate shaft coupling



- 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 rpm
- 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



Type ZR1



Type ZR2

ROTEX® GS Type ZR1																	
Size	Spider torque T_{KN} [Nm] ¹⁾		Max. finish bore $d^{2)}$	Dimensions [mm]								Cyl. screw DIN EN ISO 4762 – 8.8	Tightening torque T_A [Nm]	Friction torque T_F [Nm]			
	98 Sh-A	64 Sh-D		D_H	$l_1; l_2$	L	E	b	s	B	L_{R1}				L_{R1} min.	L_{ZR1}	$d_R^{3)}$
14 ZR1	12,5	16,0	16	30	11	35	13	10	1,5	11,5	Please mention with inquiries and orders	71	$L_{R1}+22$	14x2,5	M3x12	1,34	6,1
19 ZR1	17,0	34,0	24	40	25	66	16	12	2,0	14,0		110	$L_{R1}+50$	20x3,0	M6x16	10,5	34
24 ZR1	60	75	28	55	30	78	18	14	2,0	16,0		128	$L_{R1}+60$	25x2,5	M6x20	10,5	45
28 ZR1	160	200	38	65	35	90	20	15	2,5	17,5		145	$L_{R1}+70$	35x4,0	M8x25	25	105
38 ZR1	325	405	45	80	45	114	24	18	3,0	21,0		180	$L_{R1}+90$	40x4,0	M8x30	25	123

ROTEX® GS Type ZR2																			
Size	Spider torque T_{KN} [Nm] ¹⁾		Max. finish bore $d^{2)}$	Dimensions [mm]										Precision tube [mm] [Nm ² /rad]		Clamping set size KTR 250	Cyl. screws DIN EN ISO 4762	Tightening torque T_A [Nm]	
	98 Sh-A	64 Sh-D		D_H	$l_1; l_2$	l_3	L	E	b	s	B	L_{R2}	L_{R2} min.	L_{ZR2}	d_R				$C_2^{4)}$
14 ZR2	12,5	16,0	16	30	11	26	50	13	10	1,5	11,5	Please mention with inquiries and orders	109	$L_{R2}+22$	10x2,0	68,36	10x16	M4x10	5,2
19 ZR2	17,0	34,0	24	40	25	26	67	16	12	2,0	14,0		120	$L_{R2}+50$	12x2,0	130	12x18	M4x10	5,2
24 ZR2	60	75	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	160	200	38	65	35	45	100	20	15	2,5	17,5		177	$L_{R2}+70$	25x2,5	1811	25x34	M6x18	17,0
38 ZR2	325	405	45	80	45	45	114	24	18	3,0	21,0		192	$L_{R2}+90$	32x3,5	5167	32x43	M6x18	17,0
42 ZR2	450	560	55	95	50	52	128	26	20	3,0	23,0		214	$L_{R2}+100$	40x4,0	11870	40x53	M6x18	17,0
48 ZR2	525	655	62	105	56	70	154	28	21	3,5	24,5		261	$L_{R2}+112$	45x4,0	17486	45x59	M8x22	41,0
55 ZR2	685	825	74	120	65	80	175	30	22	4,0	26,0		288	$L_{R2}+130$	55x4,0	33543	55x71	M8x22	41,0
65 ZR2	940	1175	80	135	75	80	185	35	26	4,5	30,5		387	$L_{R2}+150$	60x4,0	44362	60x77	M8x22	41,0

¹⁾ Further spiders/selection see page 148-151

²⁾ Depending on hub design

³⁾ Has to be remachined, if necessary

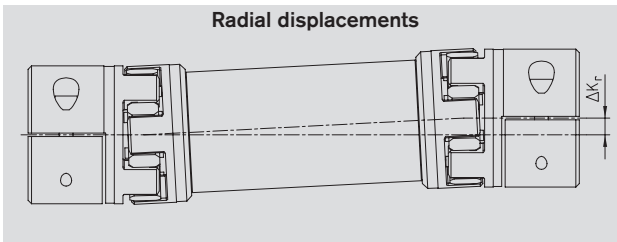
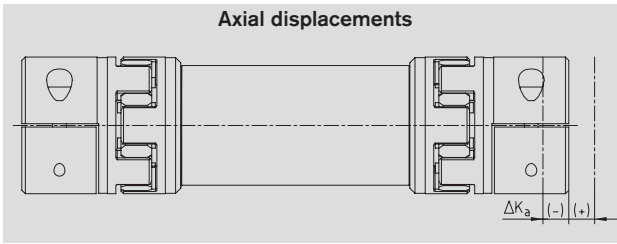
⁴⁾ Torsion spring stiffness with an intermediate pipe of a length of 1 m

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

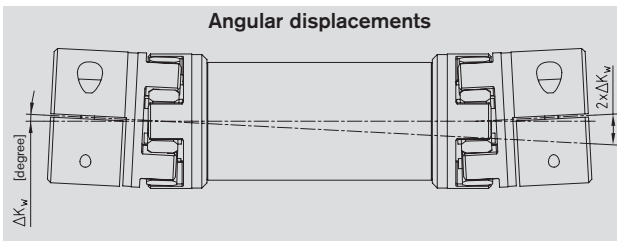
With vertical application a support washer has to be used (please mention in your order).

Ordering example:	ROTEX® GS 24	ZR1	1000 mm	98 Sh-A-GS	1.0 - Ø24	2.5 - Ø24
	Coupling size	Type	Shaft distance dimension (L_R)	Spider hardness	Hub design	Finish bore

Displacements and technical data



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



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

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

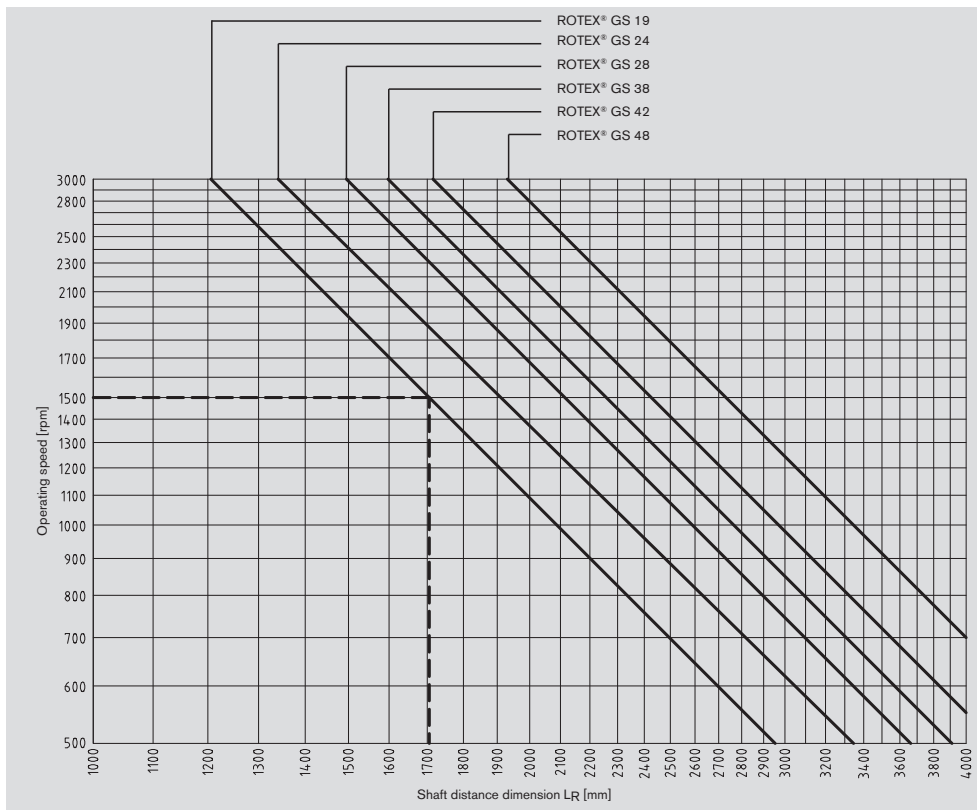
Calculation of overall torsion spring stiffness:

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

with $L_{pipe} = (L_{ZR} - 2 \cdot L) / 1000$ [m]

C_1 = torsion spring stiffness for spider see page 148
 C_2 = refer to table on page 162/163

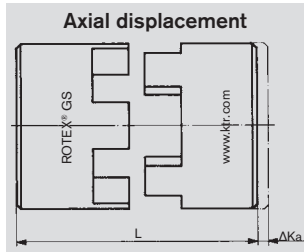
Chart of critical bending speeds for design ZR3



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

Displacements

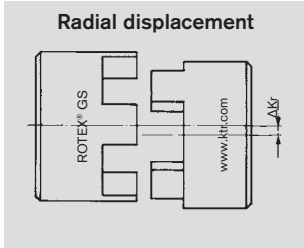
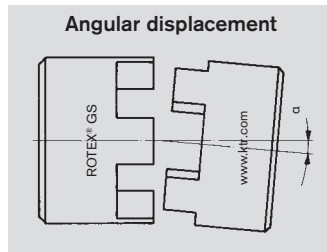
Due to its design the ROTEX® GS is able to absorb axial, angular and radial displacement, without causing any wear or premature failure of the coupling. As the spider is only stressed under pressure it is ensured that the coupling will remain backlash-free even after a longer operation period.



As an example, axial displacement 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 displacement and to keep the reaction forces low.

In case of pure angular displacement 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 displacement 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 displacement 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.

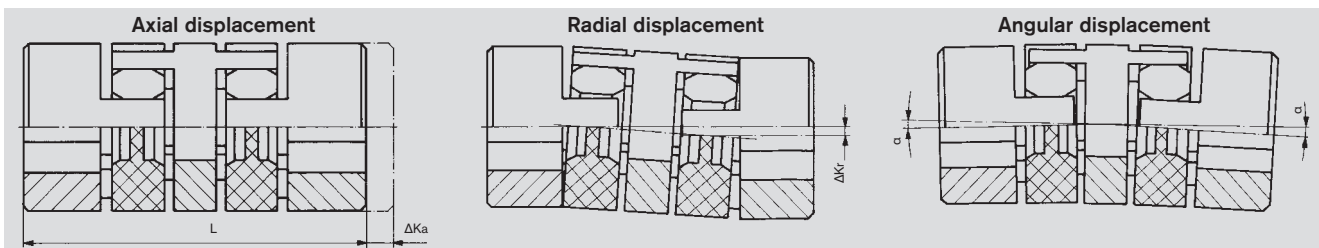
The above-mentioned permissible displacement figures of the flexible ROTEX® GS couplings are standard values, taking into account the coupling load up to the rated torque T_{KN} of the coupling and with an ambient temperature of + 30 °C. The displacement figures may only be used individually - if they arise simultaneously, they must be used proportionately. The ROTEX® GS 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.

Displacements							
Size	Spider GS	Displacements standard			Displacements DKM		
		[mm] Axial $\Delta Ka^1)$	[mm] Radial ΔKr	[degree] Angular α	[mm] Axial $\Delta Ka^1)$	[mm] Radial ΔKr	[degree] Angular α
5	70 Sh-A		0,14	1,2°		0,17	1,2°
	80 Sh-A	+0,4	0,12	1,1°	+0,4	0,15	1,1°
	92 Sh-A	-0,2	0,06	1,0°	-0,4	0,14	1,0°
	98 Sh-A		0,04	0,9°		0,13	0,9°
7	80 Sh-A		0,15	1,1°		0,23	1,1°
	92 Sh-A	+0,6	0,10	1,0°	+0,6	0,21	1,0°
	98 Sh-A	-0,3	0,06	0,9°	-0,6	0,19	0,9°
	64 Sh-D		0,04	0,8°		0,17	0,8°
9	80 Sh-A		0,19	1,1°		0,29	1,1°
	92 Sh-A	+0,8	0,13	1,0°	+0,8	0,26	1,0°
	98 Sh-A	-0,4	0,08	0,9°	-0,8	0,24	0,9°
	64 Sh-D		0,05	0,8°		0,21	0,8°
12	80 Sh-A		0,20	1,1°		0,35	1,1°
	92 Sh-A	+0,9	0,14	1,0°	+0,9	0,32	1,0°
	98 Sh-A	-0,4	0,08	0,9°	-0,9	0,29	0,9°
	64 Sh-D		0,05	0,8°		0,25	0,8°
14	80 Sh-A		0,21	1,1°		0,40	1,1°
	92 Sh-A	+1,0	0,15	1,0°	+1,0	0,37	1,0°
	98 Sh-A	-0,5	0,09	0,9°	-1,0	0,33	0,9°
	64 Sh-D		0,06	0,8°		0,29	0,8°
19	80 Sh-A		0,15	1,1°		0,49	1,1°
	92 Sh-A	+1,2	0,10	1,0°	+1,2	0,45	1,0°
	98 Sh-A	-0,5	0,06	0,9°	-1,0	0,41	0,9°
	64 Sh-D		0,04	0,8°		0,36	0,8°
24	92 Sh-A		0,14	1,0°		0,59	1,0°
	98 Sh-A	+1,4	0,10	0,9°	+1,4	0,53	0,9°
	64 Sh-D	-0,5	0,07	0,8°	-1,0	0,47	0,8°
	72 Sh-D		0,04	0,7°		0,42	0,7°
28	92 Sh-A		0,15	1,0°		0,66	1,0°
	98 Sh-A	+1,5	0,11	0,9°	+1,5	0,60	0,9°
	64 Sh-D	-0,7	0,08	0,8°	-1,4	0,53	0,8°
	72 Sh-D		0,05	0,7°		0,46	0,7°
38	92 Sh-A		0,17	1,0°		0,77	1,0°
	98 Sh-A	+1,8	0,12	0,9°	+1,8	0,69	0,9°
	64 Sh-D	-0,7	0,09	0,8°	-1,4	0,61	0,8°
	72 Sh-D		0,06	0,7°		0,54	0,7°
42	92 Sh-A		0,19	1,0°		0,84	1,0°
	98 Sh-A	+2,0	0,14	0,9°	+2,0	0,75	0,9°
	64 Sh-D	-1,0	0,10	0,8°	-2,0	0,67	0,8°
	72 Sh-D		0,07	0,7°		0,59	0,7°
48	92 Sh-A		0,23	1,0°		0,91	1,0°
	98 Sh-A	+2,1	0,16	0,9°	+2,1	0,82	0,9°
	64 Sh-D	-1,0	0,11	0,8°	-2,0	0,73	0,8°
	72 Sh-D		0,08	0,7°		0,64	0,7°
55	92 Sh-A		0,24	1,0°		1,01	1,0°
	98 Sh-A	+2,2	0,17	0,9°	+2,2	0,91	0,9°
	64 Sh-D	-1,0	0,12	0,8°	-2,0	0,81	0,8°
	72 Sh-D		0,09	0,7°		0,71	0,7°
65	95Sh-A	+2,6	0,18	0,9°			
	64 Sh-D		0,13	0,8°			
	72 Sh-D	-1,0	0,10	0,7°			
75	95 Sh-A	+3,0	0,21	0,9°			
	64 Sh-D	-1,5	0,15	0,8°			
90	95 Sh-A	+3,4	0,23	0,9°			
	64 Sh-D	-1,5	0,17	0,8°			

¹⁾ The Ka figures mentioned above have to be added to the length of the corresponding coupling type.

Shaft misalignment ROTEX® GS type DKM

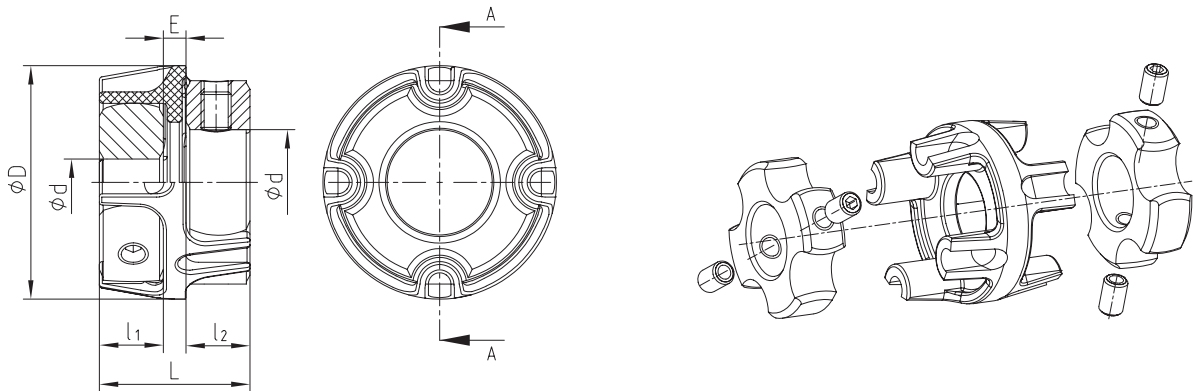
This design reduces the restoring forces arising with radial displacement to a minimum, due to the double-jointed operation, additionally the coupling is able to compensate for higher axial and angular misalignment.



Double-cardanic for measuring drives



- Backlash-free shaft coupling for measurement drives with small torques
- 3-parted double-cardanic coupling
- Small dimensions - low flywheel mass
- Axial plug-in – easy blind assembly
- Available from stock with usual shaft dimensions
- Temperature range -40 °C to +160 °C
- Electric insulation
- Finish bore acc. to ISO fit H7, keyway from Ø 6 mm acc. to DIN 6885 sheet 1 - JS9
- Applicable to circumferential speeds up to 40 m/s (higher speeds on request)



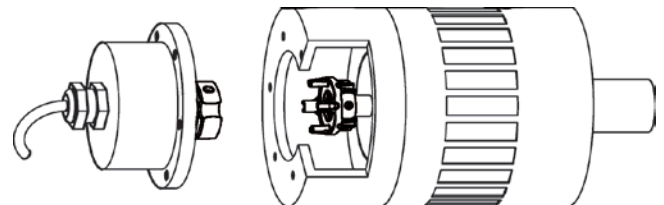
COUNTEX® Hub material aluminium/spacer PEEK															
Size	Torque [Nm]		Dimensions [mm]						Displacements			Torsional stiffness CT [Nm/rad]	Radial stiffness CR [N/mm]	Axial restoring force CA [N]	
	T _{KN}	T _{Kmax.}	min. d	max. d	D	l ₁ /l ₂	E	L	radial ΔK _r [mm]	axial ΔK _a [mm]	angular ΔK _w [°]				
6	0,3	0,6	2	6	15	4	4	12	0,05	-0,3/+0,6	0,36	48	26	10	
NEW 12	0,5	1,0	2	12	22	6	3,5	15,5	0,10	-0,5/+1,0	0,45	120	65	25	
14	1,0	2,0	5	14	31	8	4	20	0,12	-0,5/+1,0	0,57	235	70	27	

General description

COUNTEX® is a three-parted, backlash-free and torsionally stiff coupling mainly used in measuring and control technology. Its axial plug-in ability combined with the geometry of hubs results in a coupling system with a specifically easy assembly offering options of mounting fitting with processing. The material of the spacer is resistant to high temperatures ensuring almost continuous properties of the coupling system even with temperatures up to 160 °C.

Measuring and control technology

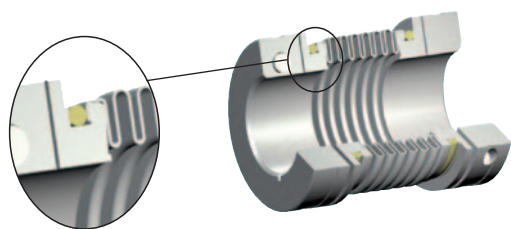
The measuring and control technology demands for a high torsion spring stiffness of the coupling in order to realize reproduceable positioning. The torques that arise are relatively low so that a backlash-free, torsional stiff power transmission is achieved subject to the prestress. The double-cardanic principle of COUNTEX® reduces the restoring forces to a minimum.



Ordering example:	COUNTEX® 14	Ø6,35	Ø10
	Coupling size	Finish bore Ød ₁	Finish bore Ød ₂

Coupling description

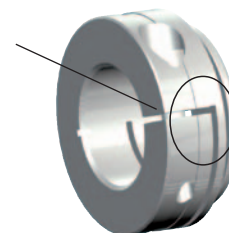
TOOLFLEX® is a metal bellow-type coupling, a coupling system which has proven its worth in the field in many cases. The metal bellow compensates perfectly for axial, radial and angular displacements. At the same time its geometric shape allows for high torsional stiffness and a low mass moment of inertia. TOOLFLEX® is manufactured in twelve sizes for maximum torques up to 600 Nm. Its main application ranges are both positioning drives, e. g. ball spindles with a high incline, and indexing tables or planetary and worm gears with small gear ratios.



Subject to its well-proven joint procedure a non-positive, backlash-free connection of the aluminium hubs with the multilayer bellows made from stainless steel is produced. The flanged insert connection for sizes 16 to 45 ensures a torque transmission of every single bellow layer. Since TOOLFLEX® is a metal coupling, it remains fatigue-endurable in the high temperature range up to a maximum of 200 °C. Apart from that it is resistant to the effect of media or critical operating conditions, respectively.

The well-known shaft-hub-connection by means of clamping hubs ensures an easy assembly by a radial clamping screw. Subject to two slots in the hub there is no deformation of the bellow when tightening the clamping screw. For higher friction torques type KN with taper hubs can be used.

clamping hub with two slots



Types



Type with thread for setscrews

Type with clamping hubs

Type KN

Type PI

Type CF

Summary													
Size	Type	Bellow-hub-connection	Thread for setscrews (hub type 1.0/1.1)		Clamping hubs (hub type 2.5/2.6)		KN		PI		CF		
			Torque of bellow T _{KN} [Nm]	Max. speed [rpm]	Torque of bellow T _{KN} [Nm]	Max. speed [rpm]	Torque of bellow T _{KN} [Nm]	Max. speed [rpm]	Torque of bellow T _{KN} [Nm]	Max. speed [rpm]	Torque of bellow T _{KN} [Nm]	Max. speed [rpm]	
5	S	Bonded Maximum ambient temperature 100°C	0,1	47700									
	M												
7	S		1	31800	1	31800							
	M												
9	S		1,5	23800	1,5	23800							
	M												
12	S	2	19000	2	19100								
	M												
16	S	Flanged Maximum ambient temperature 200°C	5	14900	5	14900							
	M												
20	S		15	11900	10	11950			10	11950			
	M												
30	S		35	8700	35	15280	35	8700	35	8700	35	8700	
	M												
38	S		65	7350	65	12600	65	7350	65	7350	65	7350	
	M												
42	S		95	6820	95	11580	95	6820	95	6820	95	6820	
	M												
45	S		150	5750	150	9300	150	5750	150	5750	150	5750	
	M												
55	S	340	4800	340	7870								
	M												
65	S	600	3850										
	M												

Coupling selection

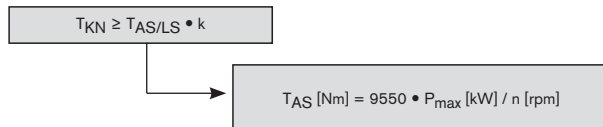
Normally the TOOLFLEX® is selected according to the nominal torque (T_{KN}) shown in the list of technical data, like all other coupling systems. In all cases the torque (T_{KN}) must exceed the maximum peak torque of the machine to be transmitted (accelerating or peak torque). This should mainly be considered in connection with servo motors because their accelerating torques both positive and negative can exceed the nominal torque of the coupling by a significant amount. In case of values exceeding T_{KN} (collision, trouble) only limited alternating load figures are possible. In this torque range there can be permanent deformation of the bellow and fatigue fractures can occur. The torques T_{KN}/T_{Kmax} mentioned refer to the bellow. The shaft-hub-connection has to be investigated by the customer.

Description	Symbol	Definition or explanation
Rated torque of coupling	T_{KN}	Torque that can continuously be transmitted over the entire permissible speed range
Maximum torque of coupling	T_{Kmax}	Torque which can be transmitted short-term (e.g. emergency shut down). $T_{Kmax} = 1,5 \cdot T_{KN}$
Peak torque of machine	T_S	Peak torque on the coupling
Peak torque on the driving side	T_{AS}	Peak torque with torque shock on the driving side, e. g. breakdown torque of the electric motor
Peak torque of load side	T_{LS}	Peak torque with torque shock on load side, e. g. braking
Moment of inertia	$J_{A/L}$	Total of moments of inertia existing on the driving or load side referring to the coupling speed
Rotational inertia coefficient of driving side	m_A	Factor taking into account the mass distribution with shocks and vibrations produced on the driving side
Rotational inertia coefficient of load side	m_L	Factor taking into account the mass distribution with shocks and vibrations produced on the load side
Friction torque	T_R	Torque that can be transmitted through the frictionally engaged shaft-hub-connection

Description	Symbol	Definition or explanation
max. engine performance	P_{max}	max. power in kW which the engine may produce
engine speed	n	Rated speed in rpm of the engine
Twisting angle	ϕ	Transmission error in degrees of the metal bellow due to torsional strain
Torsional stiffness	C_T	Torsional stiffness of the coupling in Nm/rad. for data see tables shown on the following pages.
Frequency of the 2-mass-system	f_e	in s^{-1}
Exciting frequency of the drive	f_r	in s^{-1}
Operating factor	k	$k = 1.5$ with uniform movement $k = 2.0$ with nonuniform movement $k = 2.5 - 4$ with shocking movement For drives on machine tools (servo motors) k values of $1.5 - 2$ must be used.
Screw tightening torque	T_A	Tightening torque of screw

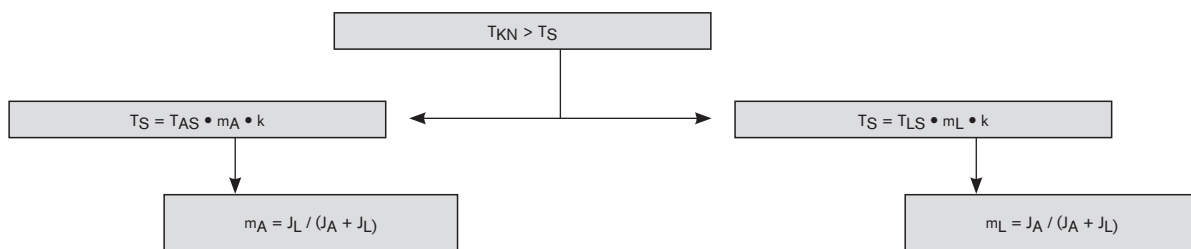
Approximate calculation

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



When selecting servo motors the calculations are made with the torque values of the engine suppliers and not with P_{max} . When dimensioning the coupling please use the respective data of the manufacturer considering the servo controller to be used.

Calculation based on accelerating torque (drive side / load side)



Inspection of torsional stiffness

$$\phi = (180 \cdot T_{AS}) / (\pi \cdot C_T)$$

Inspection of resonance frequency

The natural frequency of the coupling must be above or below the frequency of the machine. The following applies for the mechanical homologous model of the 2-mass-system:

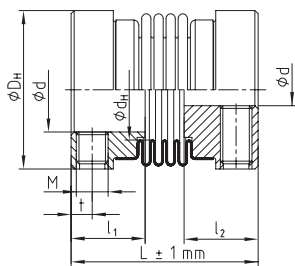
$$f_e = 1 / (2 \cdot \pi) \cdot \sqrt{C_T \cdot (J_L + J_A) / (J_L \cdot J_A)} [Hz]$$

Valid in practice: $f_e \geq 2 \cdot f_r$

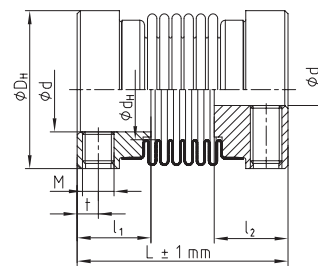
Type S and M with thread for setscrews



- Backlash-free, torsionally stiff
- Maintenance-free
- Low mass moment of inertia
- Easy assembly due to tolerance F7
- Temperature range for size 5 to 12: -30 °C to +100 °C
Temperature range for size 16 to 20: max. 200 °C
- Finish bore from Ø 6 mm also available with feather key acc. to DIN 6885 sheet 1 – JS9



TOOLFLEX® S Type 1.1.



TOOLFLEX® M type 1.1

TOOLFLEX® S/M with thread for set screw (type 1.1) Hub material aluminium/bellow material stainless steel																	
Size	Type ^{1/2)}	Bellow-hub-connection	Bellow torque TKN ³⁾ [Nm]	Dimensions [mm]									Perm. displacements			Torsional stiffness C _T [Nm/rad]	Weight ⁵⁾ [kg]
				Finish bore		General				Set screw			Axial [mm]	Radial [mm]	Angular [degrees]		
				min. d	max. d	D _H	d _H	L	l ₁ ; l ₂	M	t	number ⁴⁾ z					
5	S	Bonded	0,1	2	5	10	6	15 ¹⁾	6	M2	1,8	1	±0,30	0,10	0,7	97	0,0027
	M							17 ²⁾					±0,40	0,15	1,0	75	0,003
7	S		1,0	3	8	15	9	18 ¹⁾	7	M3	2,0	1	±0,30	0,10	0,7	390	0,005
	M							20 ²⁾					±0,40	0,15	1,0	300	0,006
9	S		1,5	4	10	20	12	21 ¹⁾	8	M3	2,2	2	±0,35	0,15	1,0	750	0,010
	M							24 ²⁾					±0,50	0,20	1,5	580	0,011
12	S		2,0	5	14	25	16	27,5 ¹⁾	11	M4	2,8	2	±0,40	0,15	1,0	1270	0,017
	M							31 ²⁾					±0,60	0,20	1,5	980	0,019
16	S	5,0	6	18	32	20	37 ¹⁾	13	M5	4	2	±0,30	0,15	1,0	4500	0,046	
	M						41 ²⁾					±0,50	0,20	1,5	3050	0,049	
20	S	15	6	25	40	27	42 ¹⁾	15	M5	5	2	±0,40	0,15	1,0	9600	0,076	
	M						49 ²⁾					±0,60	0,20	1,5	6600	0,082	

¹⁾ Design S = 4 section bellows

²⁾ Design M = 6 section bellows

³⁾ For selection see page 168

⁴⁾ Quantity each hub, from size 9: 2x120° offset

⁵⁾ Figures refer to the complete coupling with max. bores

Circumferential speed v_{max} = 20 m/s

Hub design 1.1 = hub without keyway with thread for set screws.

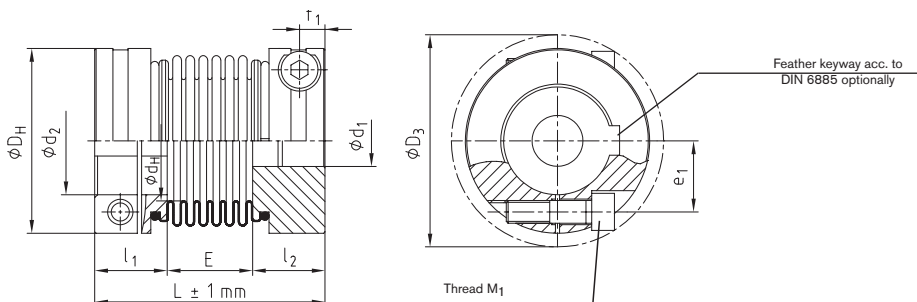
Hub design 1.0 = hub with keyway with thread for set screws.

Ordering example:	TOOLFLEX® 7 M		1.1 - Ø4		1.1 - Ø6	
	Coupling size	Hub design	Finish bore	Hub design	Finish bore	

Type M with clamping hubs



- Backlash-free, torsionally stiff
- Frictionally engaged clamping hubs
- Maintenance-free
- Temperature range:
for size 5 to 12: -30 °C to +100 °C
from size 16: suitable for high temperatures due to flanged insert connection (max. 200 °C)
- Good resistance to corrosion
- Finish bore from Ø 6 mm also available with feather key acc. to DIN 6885 sheet 1 – JS9



TOOLFLEX type M with clamping hubs Hub material aluminium (size 55/65 steel)/bellow material stainless steel

Size	Finish bore		Dimensions [mm]					Clamping screws DIN EN ISO 4762				
	min. d	max. d	L	$l_1; l_2$	E	D_H	d_H	M_1	D_3	t_1	e_1	T_A [Nm]
7	3	7	26	9	8	15	9	M2	16,5	3,2	5	0,37
9	3	9	32	11	10	20	12	M2,5	21,5	3,5	7,1	0,76
12	4	12	38	13	12	25	16	M3	26,5	4	8,5	1,34
16	5	16	49	17,0	15	32	20	M4	35,0	5	12	2,9
20	8	20	62	21,5	19	40	27	M5	43,5	6	14,5	6
30	10	30	72	23,0	26	55	33	M6	58,0	7	19	10
38	12	38	81	25,5	30	65	42	M8	72,6	9	25	25
42	14	42	95	30,0	35	70	46	M8	76,1	9	27	25
45	14	45	103	32,0	39	83	58	M10	89,0	11	30	49
55 ⁴⁾	20	55	125	40,0	45	100	73	M12	106,0	14	37	120
65 ⁴⁾	30	65	142	45,0	52	125	95	M14	127,2	15	45	185

NEW

Technical data

Size	Bellow hub connection	Bellow torque T_{KN} [Nm] ¹⁾	Speed n ²⁾ [rpm]	Moment of inertia ³⁾ $[x10^{-6} \text{kgm}^2]$	Torsional stiffness C_T [Nm/rad]	Axial spring stiffness [N/mm]	Radial spring stiffness [N/mm]	Perm. displacements			Weight ³⁾ [kg]
								Axial [mm]	Radial [mm]	Angular [°]	
7	Bonded	1	31800	0,3	300	—	—	±0,4	0,15	1,0	0,008
9		1,5	23800	1,0	580	—	—	±0,5	0,20	1,5	0,015
12		2	19100	2,7	980	—	—	±0,6	0,20	1,5	0,03
16		5	14900	10	3050	29	92	±0,5	0,20	1,5	0,06
20	Flanged	15	11950	32	6600	42	126	±0,6	0,20	1,5	0,14
30		35	8700	123	14800	65	155	±0,8	0,25	2,0	0,31
38		65	7350	262	24900	72	212	±0,8	0,25	2,0	0,45
42		95	6820	427	36500	80	333	±0,8	0,25	2,0	0,52
45		150	5750	1020	64000	88	492	±1,0	0,30	2,0	1,13
55 ⁴⁾		340	4800	5118	96100	107	598	±1,0	0,30	2,0	3,3
65 ⁴⁾	600	3850	13727	226550	135	910	±2,0	0,35	2,0	5,6	

NEW

Transmittable friction torques T_T [Nm] of the clamping hub without keyway type 2.5

Size	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	Ø50	Ø55	Ø60	Ø65	
7	0,84	0,91	0,97	1,04	1,10																										
9	1,87	1,98	2,09	2,20	2,31	2,41	2,52																								
12		3,48	3,65	3,81	3,98	4,14	4,31	4,48	4,64	4,81																					
16			8,5	8,8	9,1	9,4	9,7	9,9	10,2	10,5	11,1	11,4	11,7																		
20						17,6	18,1	18,6	19,1	19,5	20,5	21,0	21,4	22,4	22,9	23,3															
30											33,1	33,8	35,1	35,8	36,5	37,8	38,5	39,2	41,9	42,5	44,6	45,9									
38												79,2	80,4	81,7	84,2	85,4	86,6	91,6	92,8	96,5	99,0	102	105	109							
42												84,2	85,4	86,6	89,1	90,3	91,6	96,5	97,8	102	104	106	110	114	116	119					
45																157	165	167	173	177	181	187	193	197	200	206					
55 ⁴⁾																	397	401	413	421	429	442	454	462	470	482	502	523			
65 ⁴⁾																					720	732	750	768	780	792	810	840	870	900	930

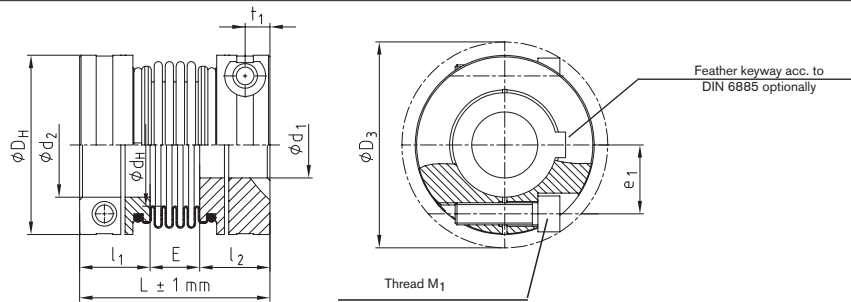
NEW

Ordering example:	TOOLFLEX® 30 M	2.5	Ø25	2.5	Ø30
	Coupling size	Hub design	Finish bore	Hub design	Finish bore

Type S with clamping hubs



- Short design
- Higher stiffness of torsion spring
- Lower mass moment of inertia
- Temperature range: for size 5 to 12: -30 °C to +100 °C
from size 16: suitable for high temperatures due to flanged insert connection (max. 200 °C)
- Good resistance to corrosion
- Finish bore from Ø 6 mm also available with feather key acc. to DIN 6885 sheet 1 – JS9



TOOLFLEX type S with clamping hubs Hub material aluminium (size 55/65 steel)/bellow material stainless steel

Size	min./max. finish bore		Dimensions [mm]						Clamping screws DIN EN ISO 4762				
	min. d	max. d	L	$l_1; l_2$	E	D_H	d_H	M_1	D_3	t_1	e_1	T_A [Nm]	
7	3	7	24	9	6	15	9	M2	16,5	3,2	5	0,37	
9	3	9	29	11	7	20	12	M2,5	21,5	3,5	7,1	0,76	
12	4	12	34,5	13	8,5	25	16	M3	26,5	4	8,5	1,34	
16	5	16	45	17,0	11	32	20	M4	35,0	5	12,0	2,9	
20	8	20	55	21,5	12	40	27	M5	43,5	6	14,5	6	
30	10	30	63	23,0	17	55	33	M6	58,0	7	19	10	
38	12	38	69	25,5	18	65	42	M8	72,6	9	25	25	
42	14	42	84	30,0	24	70	46	M8	76,1	9	27	25	
45	14	45	86,5	32,0	22,5	83	58	M10	89,0	11	30	49	
55 ⁴⁾	20	55	111	40,0	31	100	73	M12	106,0	14	37	120	
65 ⁴⁾	30	65	126	45,0	36	125	95	M14	127,2	15	45	185	

Technical data

Size	Bellow-hub-connection	Bellow torque $T_{KN}^{1)}$ [Nm]	Speed $n^{2)}$ [rpm]	Moment of inertia ³⁾ [$\times 10^{-6} \text{kgm}^2$]	Torsional stiffness C_T [Nm/rad]	Axial spring stiffness [N/mm]	Radial spring stiffness [N/mm]	Perm. displacements			Weight ³⁾ [kg]
								Axial [mm]	Radial [mm]	Angular [°]	
7	Bonded	1	31800	0,26	390	—	—	$\pm 0,3$	0,10	0,7	0,007
9		1,5	23800	0,97	750	—	—	$\pm 0,35$	0,15	1,0	0,014
12		2	19100	2,6	1270	—	—	$\pm 0,4$	0,15	1,0	0,025
16		5	14900	9	4500	43	138	$\pm 0,3$	0,15	1,0	0,06
20	Flanged	15	11950	30	9600	63	189	$\pm 0,4$	0,15	1,0	0,12
30		35	8700	114	17800	97	233	$\pm 0,5$	0,20	1,5	0,24
38		65	7350	245	37400	108	318	$\pm 0,6$	0,20	1,5	0,35
42		95	6820	396	54700	120	499	$\pm 0,6$	0,20	1,5	0,49
45		150	5750	931	95800	132	738	$\pm 0,9$	0,25	1,5	0,82
55 ⁴⁾		340	4800	4996	144100	160	894	$\pm 1,0$	0,25	1,5	3,2
65 ⁴⁾	600	3850	13318	322740	212	1365	$\pm 1,0$	0,30	1,5	5,5	

¹⁾ For selection see page 168

²⁾ With $v = 25 \text{ m/s}$

³⁾ Figures refer to the complete coupling with max. bores

⁴⁾ Hub made of steel welded to bellow

Hub design 2.5 = clamping hub without feather keyway

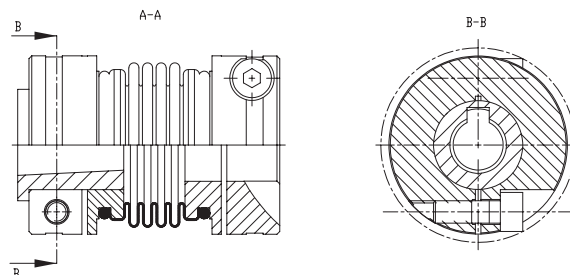
Hub design 2.6 = clamping hub with feather keyway

Please note:

For friction torque T_R of clamping hub see type M on page 170

Other types:

Type for FANUC motors



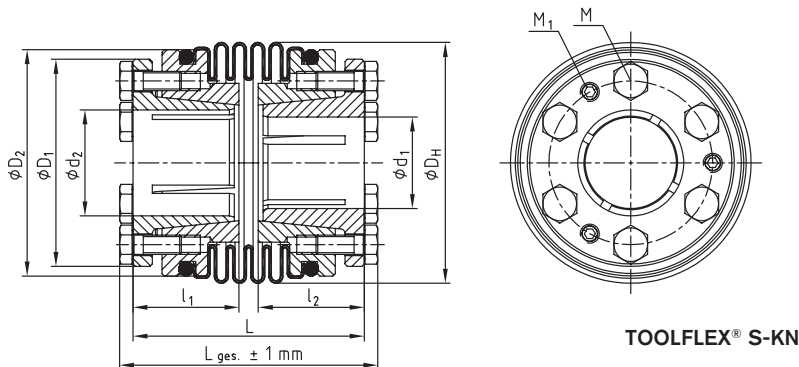
Ordering example:

TOOLFLEX® 30 S	2.5	Ø25	2.5	Ø30
Coupling size	Hub design	Finish bore	Hub design	Finish bore

Type KN



- Backlash-free, torsionally stiff
- Non-positive bellow-hub connection
- High friction torques
- Maintenance-free
- Good properties of concentric running with high speeds
- Maximum speed up to 40 m/s circumferential speed



TOOLFLEX® S-KN

TOOLFLEX® Type KN Hub material steel / bellow material stainless steel

Size	Bellow torque $T_{KN}^{1)}$ [Nm]	Dimensions [mm]															
		Finish bore		L		$L_{ges.}$		$l_1; l_2$			Clamping screws			Pull-off threads			
		min. d	max. d	4 ²⁾	6 ³⁾	4 ²⁾	6 ³⁾	l_1	l_2	D_H	D_1	D_2	M	T_A [Nm]	number z	M_1	number z
30	35	12	22	48	57	54	63	22	50	43	47	M4	2,9	12	M4	6	1,2
38	65	12	28	56	68	63	75	26	60,5	52	56	M5	6	12	M5	6	1,4
42	95	14	35	64	75	71	82	29	66	60	63	M5	6	12	M5	6	1,4
45	150	15	40	74,5	91	82,5	99	34	82	68	77	M6	14	12	M6	6	3
55 ⁴⁾	340	15	56	95,5	109	106	120	40	97	95	95	M8	35	12	M8	6	6

Transmittable friction torques T_R [Nm] of the taper hubs KN

Size	Ø14	Ø15	Ø16	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55
30	50	58	66	71	79													
38		81	92	130	103	149	161	202										
42				105	117	168	131	164	189	215	257							
45					230	332	230	288	331	376	451	531	589					
55 ⁴⁾							483	606	696	792	585	690	764	843	967	1101	1194	1445

¹⁾ For selection see page 168

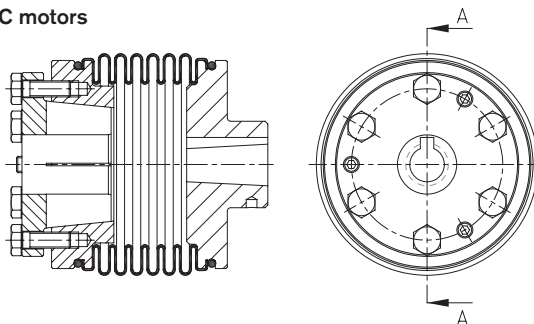
²⁾ Design S = 4 section bellows

³⁾ Design M = 6 section bellows

⁴⁾ Hubs from steel welded with bellow

⁵⁾ After assembly of the clamping screws (M) tighten the pull-off thread (M_1) to the torque T_{A1} indicated.

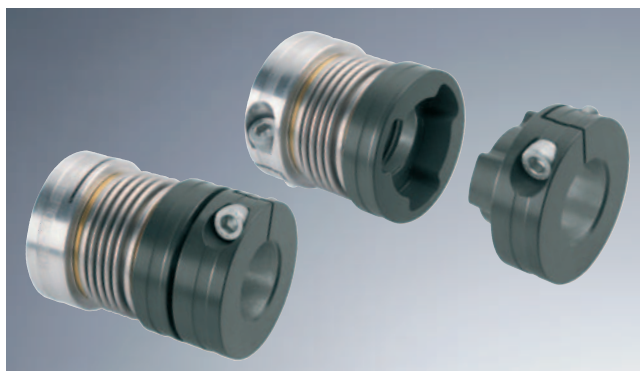
Other types: TOOLFLEX® KN for FANUC motors



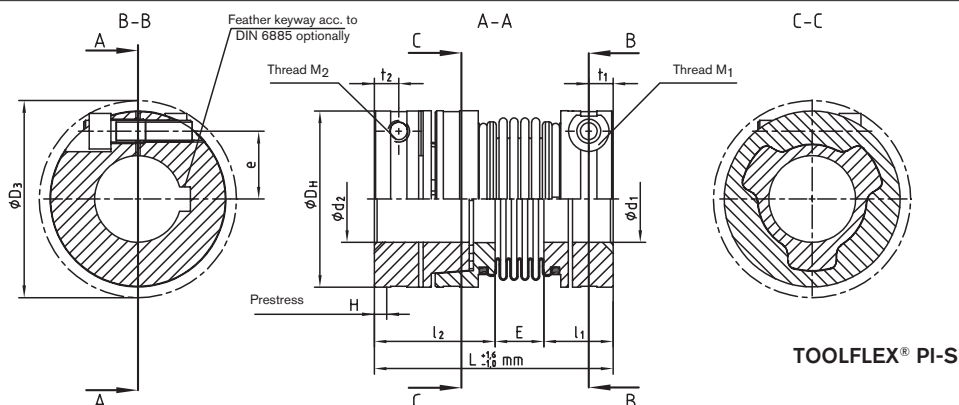
Ordering example:

TOOLFLEX® 38 S-KN	Ø15	Ø22
Coupling size	Finish bore	Finish bore

Type PI



- Axial plug-in
- Backlash-free, torsionally stiff
- Maintenance-free
- Suitable for high temperatures due to flanged insert connection
- Good resistance to corrosion due to bellow made of stainless steel and aluminium clamping hubs
- Optionally type M (6 section bellows)
 - higher perm. displacements
- or Type S (4 section bellows, short design)
 - higher stiffness of torsion spring
 - lower mass moment of inertia



TOOLFLEX® PI-S

TOOLFLEX® Type PI Hub material aluminium / bellow material stainless steel

Size	Type	Dimensions [mm]											TA [Nm]	
		General							Clamping screw					
		min. d ₁ ; d ₂	max. d ₁	max. d ₂	L ¹⁾	l ₁	l ₂	E	D _H	H	M ₁ ; M ₂	D ₃	e	t ₁ ; t ₂
20	S	8	20	20	67,0	21,5	33,5	12,0	40	0,5 - 1	M5	43,5	14,5	6
	M				74,0			19,0						
30	S	10	30	28	73,5	23,0	33,5	17,0	55	0,5 - 1	M6	58,0	19,0	7
	M				82,5			26,0						
38	S	12	38	32	87,5	25,5	44,0	18,0	65	0,5 - 1,5	M8	72,6	25,0	9
	M				99,5			30,0						
42	S	14	42	35	93,0	30	39,0	24,0	70	0,5 - 1,5	M8	76,1	25,0	9
	M				104,0			35,0						
45	S	14	45	42	96,0	32,0	41,5	22,5	83	0,5 - 1,5	M10	89,0	30,0	11
	M				112,5			39,0						

Technical data

Size	Type	Bellow torque T _{KN} [Nm] ²⁾	Speed n ³⁾ [rpm]	Moment of inertia ⁴⁾ [x10 ⁻⁶ kgm ²]	Torsional stiffness C _T [Nm/rad]	Axial spring stiffness [N/mm]	Radial spring stiffness [N/mm]	Perm. displacements		Weight ⁴⁾ [kg]
								Radial [mm]	Angular [degrees]	
20	S	15	11950	37	6600	63	189	0,15	1,0	0,15
	M							0,20	1,5	0,16
30	S	35	8700	140	11500	97	233	0,20	1,5	0,29
	M							0,25	2,0	0,31
38	S	65	7350	329	21500	108	318	0,20	1,5	0,50
	M							0,25	2,0	0,52
42	S	95	6820	396	31500	120	499	0,20	1,5	0,49
	M							0,25	2,0	0,52
45	S	150	5750	1031	55000	132	738	0,25	1,5	0,93
	M							0,30	2,0	1,00

Transmittable friction torque T_R [Nm] of clamping hub without keyway type 2.5 for Ød₁/Ød₂

Size	Ø8	Ø9	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42
20	17,6	18,1	18,6	19,1	19,5	20,5	21,0	21,4	22,4	22,9	23,3									
30				33,1	33,8	35,1	35,8	36,5	37,8	38,5	39,2	41,9	42,5	44,6	45,9					
38						79,2	80,4	81,7	84,2	85,4	86,6	91,6	92,8	96,5	99,0	102				
42						79,2	80,4	81,7	84,2	85,4	86,6	91,6	92,8	96,5	99,0	102	105			
45										157	165	167	173	177	181	187	193	197	200	

¹⁾ When being plugged in

²⁾ For selection see page 168

³⁾ With v = 25 m/s

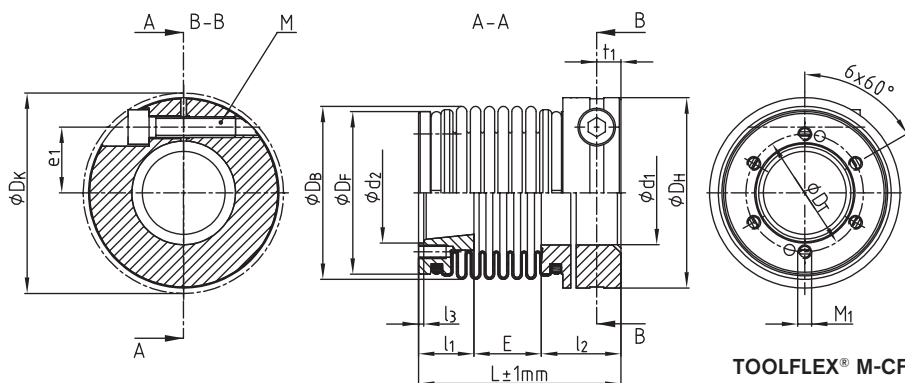
⁴⁾ Figures refer to the complete coupling with max. bores

Ordering example:	TOOLFLEX® 30 PI-S	d ₁ - Ø22	d ₂ - Ø18
	Coupling size	Finish bore	Finish bore

Type CF



- Backlash-free, torsionally stiff
- Maintenance-free
- Non-positive bellow-hub connection
- Suitable for high temperatures due to flanged insert connection (max. 200 °C)
- Available as type M (6 section bellows) and S (4 section bellows)
- Available as special design with 1, 2 or 3 section bellows



TOOLFLEX® M-CF

TOOLFLEX® Type M-CF and S-CF Hub material aluminium (size 55 steel)/bellow material stainless steel																			
Size	Finish bore		Dimensions [mm]										Clamping screw				Flange		
	min. d ₁	max. d ₁	D _H	D _B	D _F	d ₂ H7	l ₃	l ₁	l ₂	E	L	D _K	e ₁	t ₁	M	T _A [Nm]	D _T	M ₁	
30	10	20	55	50	47	25	1,5	16	23,0	17,0 ¹⁾	56,0 ¹⁾	58,0	19	7	M6	10	30	M4	
						29				26,0 ²⁾	65,0 ²⁾						34		
38	12	38	65	60,5	55,75	29	1,5	18	25,5	18,0 ¹⁾	61,5 ¹⁾	72,6	25	9	M8	25	35	M5	
						36				30,0 ²⁾	73,5 ²⁾						42		
42	14	42	70	66	62,95	36	1,5	21	30,0	24,0 ¹⁾	75,0 ¹⁾	76,1	27	9	M8	25	42	M5	
						43				35,0 ²⁾	86,0 ²⁾						49		
45	14	45	83	82	77	38	1,5	23	32,0	22,5 ¹⁾	77,5 ¹⁾	89,0	30	11	M10	49	45	M6	
						49				39,0 ²⁾	94,0 ²⁾						56		
55 ⁴⁾	20	55	100	97	95	51	1,5	28	40,0	31,0 ¹⁾	99,0 ¹⁾	106,0	37	14	M12	120	60	M8	
						68				45,0 ²⁾	113,0 ²⁾						78		

Technical data									
Size	Type	Bellow torque T _{KN} [Nm] ³⁾	Speed n ⁵⁾ [rpm]	Torsional stiffness C _T [Nm/rad]	Axial spring stiffness [N/mm]	Radial spring stiffness [N/mm]	Perm. displacements		
							Axial [mm]	Radial [mm]	Angular [degrees]
30	S	35	8700	14800	97	233	±0,5	0,20	1,5
	M				65	155	±0,8	0,25	2,0
38	S	65	7350	24900	108	318	±0,6	0,20	1,5
	M				72	212	±0,8	0,25	2,0
42	S	95	6820	36500	120	499	±0,6	0,20	1,5
	M				80	333	±0,8	0,25	2,0
45	S	150	5750	64000	132	738	±0,9	0,25	1,5
	M				88	492	±1,0	0,30	2,0
55 ⁴⁾	S	340	4800	96100	160	894	±1,0	0,25	1,5
	M				107	598	±1,0	0,30	2,0

Transmittable friction torque T _R [Nm] of the clamping hub without keyway type 2.5																					
Size	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø50	Ø55
30		33,1	33,8	35,1	35,8	36,5	37,8	38,5	39,2	41,9	42,5	44,6	45,9								
38							84,2	85,4	86,6	91,6	92,8	96,5	99,0	102	105	109					
42				84,2	85,4	86,6	89,1	90,3	91,6	96,5	97,8	102	104	106	110	114	116	119			
45									157	165	167	173	177	181	187	193	197	200	206		
55 ⁴⁾										397	401	413	421	429	442	454	462	470	482	502	523

¹⁾ Design S = 4 section bellows
²⁾ Design M = 6 section bellows
³⁾ For selection see page 168
⁴⁾ Hubs from steel welded with bellow
⁵⁾ With v = 25m/s

Ordering example:	TOOLFLEX® 38 M-CF	Ø15	Ø29 - Ø35 - 6xM5
	Coupling size	Finish bore	Flange dimensions (d ₂ - D _T - M ₁)

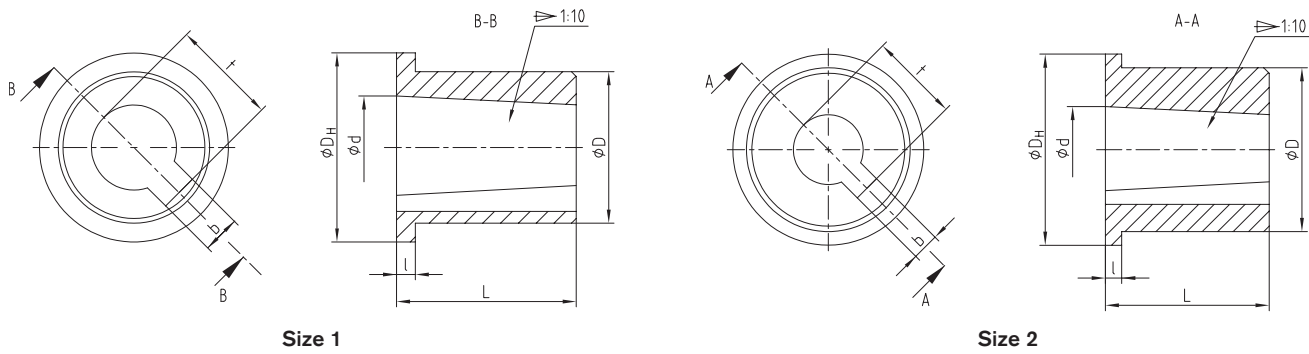
Basic programme

Basic assortment of TOOLFLEX® type S and M with thread for setscrews (finish bore [mm] with ISO tolerance F7)

Size	Hub design	Ø2	Ø3	Ø4	Ø5	Ø6	Ø6,35	Ø7	Ø8	Ø9	Ø9,52	Ø10	Ø11	Ø12	Ø14	Ø16
5	1.1	●	●	●	●											
7	1.1		●	●	●	●		●	●							
9	1.1			●	●	●		●	●	●						
12	1.1				●	●		●	●	●	●	●		●	●	
16	1.1					●		●	●	●		●	●	●	●	
20	1.1					●		●	●	●		●	●	●	●	●

Basic assortment of TOOLFLEX® type M and S with clamping hubs (finish bore [mm] with ISO tolerance F7)

Size		Ø3	Ø4	Ø5	Ø6	Ø6,35	Ø7	Ø8	Ø9	Ø9,52	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55
7		●	●	●	●	●	●																										
9		●	●	●	●	●	●	●	●	●																							
12			●	●	●	●	●	●	●	●	●	●	●																				
16	■		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
20	■										●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
30	■										●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
38	■																																
42	■																																
45	■																																
55	■																																
65	■																																



Type M and S sleeve dimensions [mm] for FANUC engines

Sleeve size	L	l	D _H	D	d ^{+0,05}	b ^{JS9}	t ^{+0,1}	Taper	Comment
1	16	2	20	16	10,9	4	12,2	1:10	For TOOLFLEX® size 16-20
2	30	3	35	30	15,8	5	17,9	1:10	For TOOLFLEX® size 30-45

Basic assortment of TOOLFLEX® KN (finish bore [mm] with ISO tolerance F7)

Size		Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48
30	■	●	●	●	●	●	●	●											
38	■	●	●	●	●	●	●	●	●	●	●								
42	■				●	●	●	●	●	●	●	●	●	●					
45	■				●	●	●	●	●	●	●	●	●	●	●				
55	■										●	●	●	●	●	●	●	●	●

■ Pilot bore
Further dimensions on request

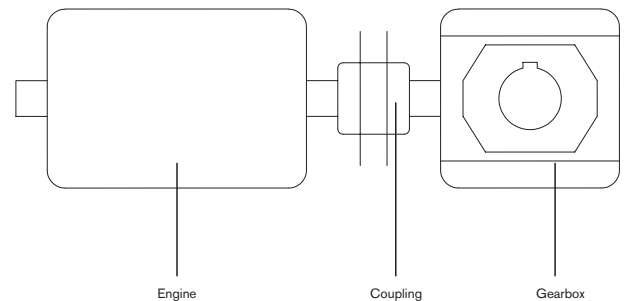
ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC

Coupling description

RADEX®-NC is a line particularly developed for servo technology. In this coupling a package of torsionally rigid steel laminas that are soft in bending ensures a reliable compensation for axial, angular and radial shaft displacements. As an all-metal coupling - the laminas are made of stainless steel - RADEX®-NC can even be used with high temperatures (up to 200 °C) and under aggressive ambient conditions. The RADEX®-NC is manufactured in 7 sizes from size 5 to 42 for max. torques of up to 360 Nm. The hubs are frictionally engaged clamping hubs made of aluminium (size 42 made of steel) and are thus backlash-free even in a reversing drive.



A typical application of the RADEX®-NC are backlash-free worm gear pairs with low transmissions. The rigidity of the coupling must be converted by reason of the transmission of the gearbox from the drive side to the driven side. Here the transmission itself has a decisive influence because it is squarely included in the calculation. This converted rigidity is added in line to the gearbox stiffness in order to get the total rigidity. In case of transmissions that are lower than $i = 8$ we recommend to use the RADEX®-NC due to the loss of rigidity of the total system arising if flexible couplings are used.



Explosion protection use

RADEX®-NC couplings are suitable for power transmission in drives in hazardous areas. The couplings are certified and confirmed according to EC standard 94/9/EC (ATEX 95) as units of category 2G/2D and thus suitable for the use in hazardous areas of zone 1, 2, 21 and 22. Please read through our information included in the respective Type Examination Certificate and the operating and mounting instructions at www.ktr.com.

Selection:

In case of use in hazardous areas the clamping hubs without feather key, only for use in category 3 (with feather key for category 2), must be selected in a way 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.



Coupling selection

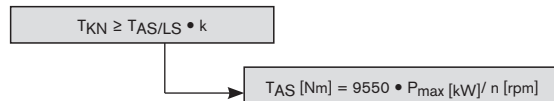
Normally the RADEX®-NC is selected according to the nominal torque (T_{KN}) shown in the list of technical data, like all other coupling systems. In all cases the torque (T_{KN}) must exceed the maximum peak torque of the machine to be transmitted (accelerating or peak torque). This should mainly be considered in connection with servo motors because their accelerating torques both positive and negative can exceed the nominal torque of the coupling by a significant amount. In case of values exceeding T_{KN} (collision, trouble) only limited alternating load figures are possible. The torques T_{KN}/T_{Kmax} mentioned refer to the lamina set. The shaft-hub-connection has to be investigated by the customer.

Description	Symbol	Definition or explanation
Rated torque of coupling	T_{KN}	Torque that can be continuously transmitted over the entire permissible speed range.
Maximum torque of coupling	T_{Kmax}	Torque which can be transmitted short-term (e.g. emergency shut down) $T_{Kmax} = 1,5 \cdot T_{KN}$
Peak torque of machine	T_S	Peak torque on the coupling
Peak torque on the driving side	T_{AS}	Peak torque with torque shock on driving side, e. g. breakdown torque of the electric motor.
Peak torque of load side	T_{LS}	Peak torque with torque shock on load side, e. g. braking
Moment of inertia	$J_{A/L}$	Total of moments of inertia existing on the driving or load side referring to the coupling speed
Rotational inertia coefficient of driving side	m_A	Factor taking into account the mass distribution with shocks and vibrations produced on the driving side
Rotational inertia coefficient of load side	m_L	Factor taking into account the mass distribution with shocks and vibrations produced on the load side
Friction torque	T_R	Torque that can be transmitted through the frictionally engaged shaft-hub-connection

Description	Symbol	Definition or explanation
max. engine performance	P_{max}	Maximum power in kW that can be produced by the motor
engine speed	n	Rated speed in rpm of the engine
Twisting angle	ϕ	Transmission error in degrees of the metal bellow due to torsional strain
Torsional stiffness	C_T	Torsional stiffness of the coupling in Nm/rad. For data see tables shown on the following pages.
Excitation frequency of the 2-mass-system	f_e	in s-1
Exciting frequency of the drive	f_r	in s-1
Operating factor	k	$k = 1.5$ with uniform movement $k = 2.0$ with nonuniform movement $k = 2.5 - 4$ with shocking movement For drives on machine tools (servo motors) k values of $1.5 - 2$ must be used.
Screw tightening torque	T_A	Tightening torque of screw

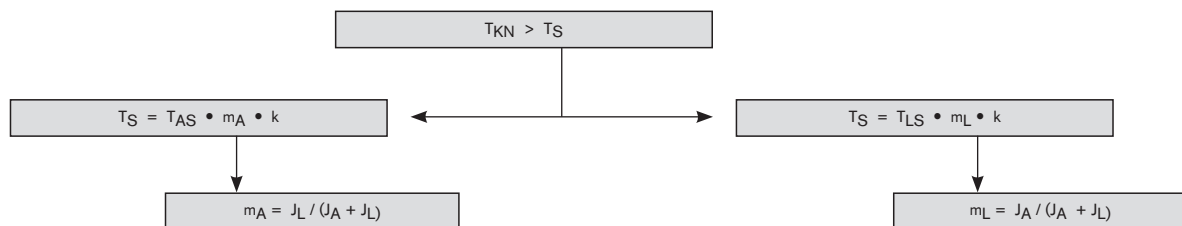
Approximate calculation

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



When selecting servo motors the calculations are made with the torque values of the engine suppliers and not with P_{max} . When dimensioning the coupling please use the respective data of the manufacturer considering the servo controller to be used.

Calculation of accelerating torque (drive side / load side)



Inspection of torsional stiffness

$$\phi = (180 \cdot T_{AS}) / (\pi \cdot C_T)$$

Inspection of resonance frequency

The resonance frequency of the coupling must be above or below the frequency of the machine. Valid for the mechanical spare model of the 2-mass-system:

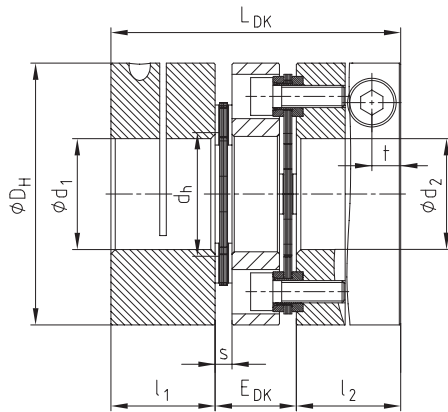
$$f_e = 1 / (2 \cdot \pi) \cdot \sqrt{C_T \cdot ((J_L + J_A) / (J_L \cdot J_A))} [Hz]$$

Valid in practice: $f_e \geq 2 \cdot f_r$

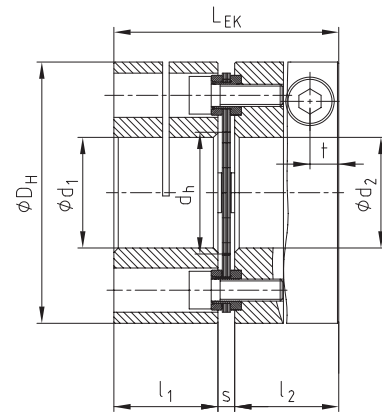
Standard types



- Backlash-free torque transmission
- Higher torsional rigidity
- Backlash-free shaft-hub-connection
- Low mass moment of inertia
- High speeds
- Operating temperature up to 200 °C
- Compact type
- Finish bore from Ø 6 mm also available with feather key acc. to DIN 6885 sheet 1 – JS9
- Approved and confirmed according to EC Standard 94/9/ EC (Explosion Certificate ATEX 95) (without feather key only for category 3)



Type DK



Type EK

RADEX®-NC types DK and EK Hub and spacer material aluminium (size 42 steel) / laminas stainless steel

Size	Dimensions [mm]									Clamping screw		Mass moment of inertia	
	max. d ₁ /d ₂	D _H	l ₁ :l ₂	L _{DK}	E _{DK}	L _{EK}	d _h	s	t	M	T _A [Nm]	DK [kgm ²]	EK [kgm ²]
5	12	26	12	34	10	26,5	12	2,5	3,5	M2,5	0,8	0,000004	0,000003
10	15	35	16	44	12	35	14,5	3	5,0	M4	3	0,000016	0,000012
15	20	47	21	55	13	45	19,5	3	6,8	M6	10	0,000065	0,000053
20	25	59	24	67	19	52	24	4	6,5	M6	10	0,000199	0,000154
25	35	70	32	88	24	69	30	5	9,0	M8	25	0,000508	0,000393
35	40	84	35	98	28	77	38	7	10,5	M10	49	0,001153	0,000911
42	55	104	40	116	36	91	48	11	10,5	M10	69	0,007458	0,006153

Technical data

Size	T _{KN} ¹⁾ [Nm]	T _{K max} ¹⁾ [Nm]	max. speed [rpm]	Torsional rigidity [Nm/rad]		Displacement type DK			Displacement type EK		
				Type EK	Type DK	Radial [mm]	Axial [mm]	Angular [°]	Radial [mm]	Axial [mm]	Angular [°]
5	2,5	5	25000	2400	1200	0,10	0,4	1	—	0,2	1
10	7,5	15	20000	5600	2800	0,14	0,8	1	—	0,4	1
15	20	40	16000	12000	6000	0,16	1,0	1	—	0,5	1
20	30	60	12000	30000	15000	0,25	1,2	1	—	0,6	1
25	60	120	10000	60000	30000	0,30	1,6	1	—	0,8	1
35	100	200	9000	72000	36000	0,40	2,0	1	—	1,0	1
42	180	360	7000	120000	60000	0,50	2,8	1	—	1,4	1

Transmittable friction torque T_F [Nm] of the clamping hub without feather key type 2.5

Size	Pilot bore	Ø3	Ø5	Ø8	Ø10	Ø12	Ø14	Ø15	Ø16	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø45	Ø50	Ø55
5	2,5	2,2	2,3	2,4	2,5																	
10	4,5		8	9	10	10	11	11														
15	5,5				28	30	31	32	32	34	35											
20	7,5					36	37		38	39	40	41	44	45								
25	9,5							82	83	87	88	93	94	98	100	103	106					
35	11,5									155	157	165	167	173	177	181	187	193	197			
42	15,0											285	287	296	301	307	315	323	329	343	357	370

¹⁾ See page 177

Hub design 2.5 = clamping hub without feather keyway
Hub design 2.6 = clamping hub with feather keyway

Ordering example:

RADEX®-NC 20	DK	Ø20	Ø25
Coupling size	Type	Finish bore	Finish bore