ROTEX® GS
Backlash-free flexible shaft coupling

COUNTEX®
Backlash-free shaft encoder coupling

TOOLFLEX®
Backlash-free torsionally stiff bellow-type coupling

RADEX®-NC
Backlash-free torsionally stiff servo laminae coupling

Made for Motion **KTR**

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Backlash-free shaft coupling

Application recommendation

If a shaft coupling is needed for a servo drive, three different backlash-free coupling types are available: ROTEX® GS, 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
- axially plug-in ability
- high power density
- adjustment of damping through different elastomer hardness of the spiders

−		+
Shaft encoders, miniature drives		
Ball screws, synchronous belt drives		
Low backlash/backlash-free gears		
Main spindle drives		

- compact design, easy assembly/disassembly, electric insulation
- high power density, adapted torsional stiffness, damping vibrations, for thread drives with pitch < 40 (otherwise an inspection by KTR is necessary)
- high power density, easy blind assembly/disassembly, fail-safe, suitable for average to high gear ratios i≥ 7, temperature range 80 °C at the maximum
- 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

TOOLFLEX® Backlash-free, torsionally stiff metal bellow-type coupling
- non-positive bellow-hub connection
- frictionally engaged clamping hubs

−		+
Shaft encoders, miniature drives		
Ball screws, synchronous belt drives		
Low backlash/backlash-free gears		
Main spindle drives		

- compact flexible coupling with low radial restoring forces
- suitable if higher torsional stiffness is required, e. g. high pitch with threaded spindle drives s ≥ 40, constant torsional stiffness with high temperatures
- suitable if higher torsional stiffness is required, e. g. gear ratios i < 7, constant torsional stiffness with high temperatures
- high torsional stiffness, for main spindle drives subject to critical resonances

RADEX®-NC Backlash-free, torsionally rigid servo laminae coupling
- compact design
- higher torsional stiffness
- frictionally engaged clamping hubs

−		+
Shaft encoders, miniature drives		
Ball screws, synchronous belt drives		
Low backlash/backlash-free gears		
Main spindle drives		

- double-cardanic design to compensate for bigger displacements
- suitable if higher torsional stiffness is required, e. g. high pitch with threaded spindle drives s ≥ 40, constant torsional stiffness with high temperatures
- suitable if higher torsional stiffness is required, e. g. gear ratios i < 7 , constant torsional stiffness with high temperatures
- high torsional stiffness, for main spindle drives subject to critical resonances, for high torques type RADEX®-N is available: T_{KN} up to 280.000 Nm

ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC

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 is not possible.
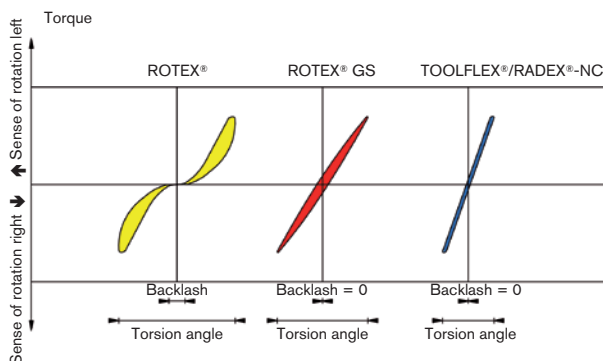
Technical description
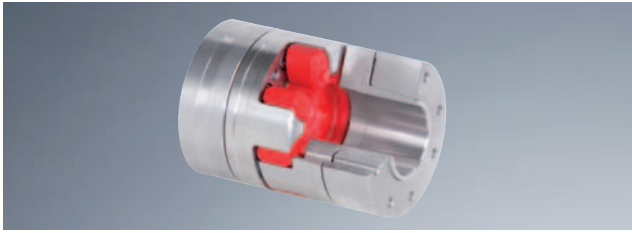
ROTEX® GS is a 3-part, axial plug-in coupling backlash-free under prestress. It is convincing even with critical applications by its backlash-free power transmission, its stiffness which is each adapted to the application and its optimum damping of vibrations. This principle of installation offers significant 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 isolation is ensured, as well as a high service life of the coupling. This fact is gaining more and more importance, due to the increasing precision of shaft encoders and the existing demand for electro-magnetic compatibility.

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

Support to the axis of rotation

Electric isolation due to gap dimension „s"
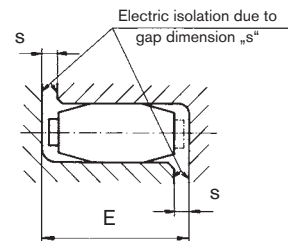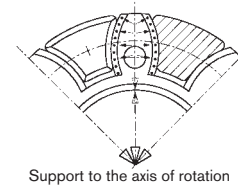
Explosion protection use

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 – heighten torsional stiffness / high ambient temperature
64 Sh-D-GS		Polyurethane	- 20 to + 110	- 30 to + 120	size 42 to 90	– heighten load – heighten torsional stiffness
72 Sh-D-H-GS		Hytrel	- 50 to + 120	- 60 to + 150	size 24 to 38	– very high torsional stiffness – 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).

You will find continuously updated data in our online catalogue 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.
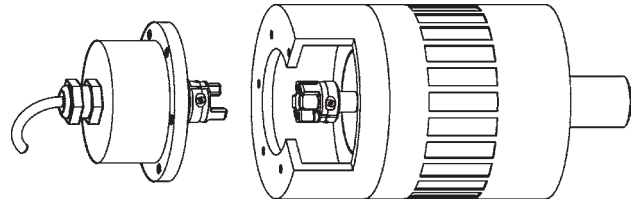
Servo and positioning drives

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.
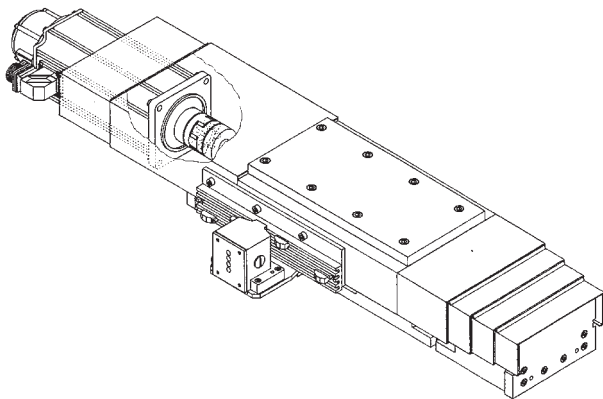
Main spindle drives

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.

Comparison of rigid connection – ROTEX® GS

Run-up (tool contact) — Torque reduction — Interrupted cut

Torque [Nm]

ROTEX® GS
Rigid connection

Machining operation - direction of machining

ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC

Degree of hardness

64 Sh-D   72 Sh-D
Shore-D

80 Sh-A   92 Sh-A 95 Sh-A 98 Sh-A
Shore-A

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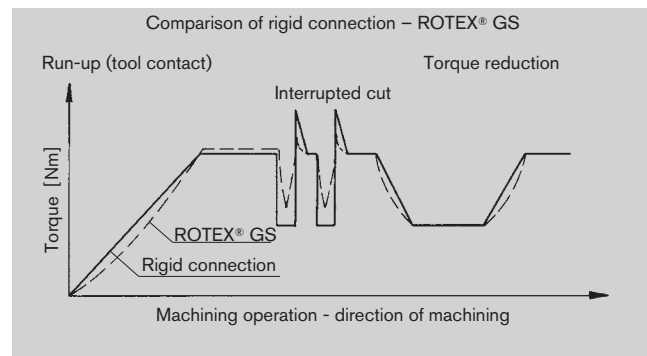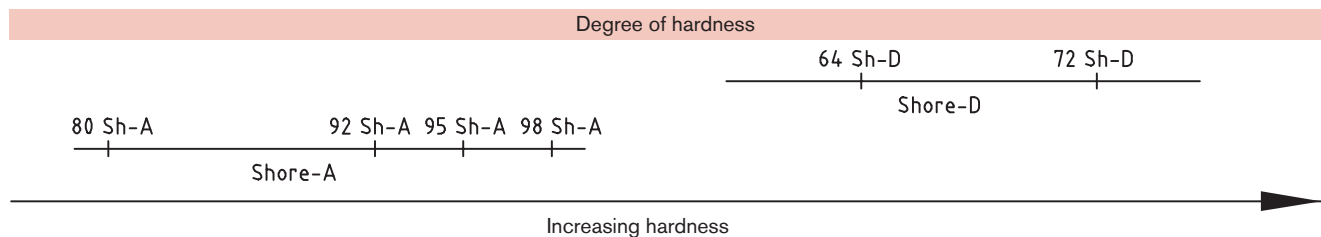
Spider from polyurethane	92 Shore-A	95/98 Shore-A	64 Shore-D
Relative Damping ψ [-]	0,80	0,80	0,75
Resonance factor V_R [-]	7,90	7,90	8,50

ROTEX® GS
Backlash-free shaft coupling

Made for Motion KTR

Technical data

Size	Spider Shore-GS	Shore range	Max. speed [rpm] for hub design 2.0/2.1 2.5/2.6	1.0 1.1	6.0 light [2]	6.0 P [2]	Torque [Nm] T_{KN}	$T_{K\,max}$	Static torsion spring stiffness [1] [Nm/rad]	Dynamic torsion spring stiffness [1] [Nm/rad]	Radial stiffness C_r [N/mm]	Weight [kg] Each hub [5]	Spider	Mass moment of inertia J [kgm²] Each hub [5]	Spider
5	70	A	38000	47700			0,2	0,3	1,78	5	43	0,001	0,2 x 10⁻³	0,015 x 10⁻⁶	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				
	98	A					0,9	1,7	8,3	25	296				
7	80	A	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				
	64	D					2,4	4,8	34,3	103	630				
9	80	A	19000	23800			1,8	3,6	17,2	52	125	0,01	1,7 x 10⁻³	0,48 x 10⁻⁶	0,085 x 10⁻⁶
	92	A					3,0	6,0	31,5	95	262				
	98	A					5,0	10,0	51,6	155	518				
	64	D					6,0	12,0	74,6	224	739				
12	80	A	15200	19100			3,0	6,0	84,3	252	274	0,02	2,3 x 10⁻³	1,5 x 10⁻⁶	0,139 x 10⁻⁶
	92	A					5,0	10,0	160,4	482	470				
	98	A					9,0	18,0	240,7	718	846				
	64	D					12,0	24,0	327,9	982	1198				
14	80	A	12700	15900	32000	47700	4,0	8,0	60,2	180	153	0,02	4,7 x 10⁻³	2,8 x 10⁻⁶	0,509 x 10⁻⁶
	92	A					7,5	15,0	114,6	344	336				
	98	A					12,5	25,0	171,9	513	654				
	64	D					16,0	32,0	234,2	702	856				
19	80	A	9550	11900	24000	35800	4,9	9,8	618	1065	582	0,09	7 x 10⁻³	19,5 x 10⁻⁶	1,35 x 10⁻⁶
	92	A					10,0	20,0	1090	1815	1120				
	98	A					17,0	34,0	1512	2540	2010				
	64	D					21,0	42,0	2560	3810	2930				
24	92	A	6950	8650	17000	26000	35	70	2280	4010	1480	0,2	0,02	81,9 x 10⁻⁶	6,7 x 10⁻⁶
	98	A					60	120	3640	5980	2560				
	64	D					75	150	5030	10896	3696				
	72 [3]	D					97	194	9944	17095	5799				
28	92	A	5850	7350	15000	22000	95	190	4080	6745	1780	0,3	0,03	184,2 x 10⁻⁶	14,85 x 10⁻⁶
	98	A					160	320	6410	9920	3200				
	64	D					200	400	10260	20177	4348				
	72 [3]	D					260	520	21526	36547	7876				
38	92	A	4750	5950	12000	17900	190	380	6525	11050	2350	0,6	0,05	542,7 x 10⁻⁶	39,4 x 10⁻⁶
	98	A					325	650	11800	17160	4400				
	64	D					405	810	26300	40335	6474				
	72 [3]	D					525	1050	44584	71180	11425				
42	92	A	4000	5000	10000 8050 [4]	15000	265	530	10870	15680	2430	2,4	0,08	2802 x 10⁻⁶	85 x 10⁻⁶
	98	A					450	900	21594	37692	5570				
	64	D					560	1120	36860	69825	7270				
	72 [3]	D					728	1456	58600	93800	9766				
48	92	A	3600	4550	9100 7200 [4]	13600	310	620	12968	18400	2580	3,3	0,09	4709 x 10⁻⁶	135 x 10⁻⁶
	98	A					525	1050	25759	45620	5930				
	64	D					655	1310	57630	99750	8274				
	72 [3]	D					852	1704	80000	136948	11359				
55	92	A	3150	3950	6350 [4]	11900	410	820	15482	21375	2980	5,1	0,12	9460 x 10⁻⁶	229 x 10⁻⁶
	98	A					685	1370	42117	61550	6686				
	64	D					825	1650	105730	130200	9248				
	72 [3]	D					1072	2144	150000	209530	14883				
65	95	A	2800	3500	5650 [4]	11000	940	1880	48520	71660	6418	6,7	0,2	15143 x 10⁻⁶	437 x 10⁻⁶
	64	D					1175	2350	118510	189189	8870				
	72 [3]	D					1527	3054	160000	310000	11826				
75	95	A	2350	2950	4750 [4]	8950	1920	3840	79150	150450	8650	10,5	0,3	32750 x 10⁻⁶	1179 x 10⁻⁶
	64	D					2400	4800	182320	316377	11923				
NEW 90	95	A	1900	2380	3800 [4]	–	3600	7200	204500	302900	10700	18,2	0,6	87099 x 10⁻⁶	3362 x 10⁻⁶
	64	D					4500	9000	429450	908700	14700				

[1] Static and dynamic torsional stiffness with $0,5 \times T_{KN}$
[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 size of the coupling has to be such that the permissible coupling load is not exceeded in any operating condition (see coupling selection on page 143).
The torques T_{KN}/T_{Kmax} mentioned refer to the spider. The shaft-hub-connection has to be investigated by the customer.

ROTEX® GS
Backlash-free shaft coupling

Made for Motion **KTR**

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

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

T_{AN} Constantly occurring driving torque 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.

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

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

$J_K/J_{Mot}/J_{Sp}$ Moment of inertia of the coupling/moment of inertia of the motor/moment of inertia of the spindle

2. Factors

Temperature factor S_t				
	-30 °C +30 °C	+40 °C	+60 °C	+80 °C
S_t	1,0	1,2	1,4	1,8

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 →

*When using the 64 Sh-D-GS spider at least factor 4
With the use of the spider 72-Sh D-GS with a minimum factor 4 and steel hubs.

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

*Starts/minute

3. Calculation formula

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

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

For the factors please see the tables at the top.

Peak torque T_S

| Shock on driving side $T_S = T_{AS} \bullet m_A \bullet S_A$	$m_A = \dfrac{J_L}{J_A + J_L}$
Shock on load side $T_S = T_{LS} \bullet m_L \bullet S_L$	$m_L = \dfrac{J_A}{J_A + J_L}$

4. Example of calculation (positioning drive)

Given: Details of driving side
Servo Motor
Rated torque T_{AN} = 43 Nm
Max. drive torque T_{AS} = 144 Nm
Moment of inertia J_{Mot} = 108 • 10⁻⁴ kgm²
Driving shaft d = 32 k6 without keyway

Details of driven side

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

Ball screw
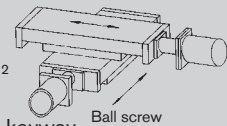
Ambient temperature t = 40 °C   → S_t = 1,4   required:
60 starts/minute require   → S_A = 1,0   high torsional stiffness   → Sd = 4

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

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

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

Coupling selection
● Selection according to rated torque (pre-selection)

$$T_{KN} \geq T_{AN} \bullet S_t \bullet S_d \qquad T_{KN} \geq 43 \text{ Nm} \bullet 1,2 \bullet 4 \qquad T_{KN} \geq 206,4 \text{ Nm}$$

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

● Review of max. deiving torque

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

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

$$m_A = \frac{J_L}{J_A + J_L} = \frac{66,6 \bullet 10^{-4}}{(110,6 + 66,6) \bullet 10^{-4}} = 0,376$$

$$J_L = (J_{Sp} + J_{Schl} + 1/_2 J_K) = (38 + 26 + 2,6) \bullet 10^{-4} \text{ kgm}^2 = 66,6 \bullet 10^{-4} \text{ kgm}^2$$

$$J_A = J_{Mot} + 1/_2 J_K = (108 + 2,6) \bullet 10^{-4} \text{ kgm}^2 = 110,6 \bullet 10^{-4} \text{ kgm}^2$$

T_S = 144 Nm • 0,376 • 1,0 = 54,14 Nm
T_{KN} ≥ 54,14 Nm • 1,2 • 4

ROTEX® GS 38   98 Sh-A-GS T_{KN} = 325 Nm
T_{KN} ≥ 259,8 Nm

● Check of torque transmission of clamping ring hub light for shaft diameter Ø 30

$$T_R > T_{AS}$$ Figures for T_R see table on catalogue page 148.
Transmittable torque T_R Ø 30 H7/k6 = 452 Nm > 144 Nm ✓

ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC

You will find continuously updated data in our online catalogue at www.ktr.com.   143

Hub designs

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

### Design 1.0 with keyway and fixing screw
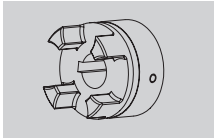
Positive power transmission; permissible torque depends on the permissible surface pressure. Not suitable for backlash-free power transmission for heavily reversing operation.

Design 1.1 without keyway, with setscrew
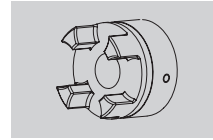
Non-positive torque transmission, suitable for backlash-free transmission of very small torques. (Only for ATEX category 3)

Design 2.0 clamping hub, single slotted, without keyway
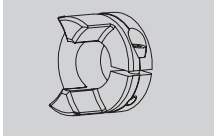
Frictionally engaged, backlash-free shaft-hub-connection. Transmittable torques depend on the bore diameter. Design 2.0 up to size 14 as standard. (Only for ATEX category 3)

Design 2.1 clamping hub, single slotted, with keyway
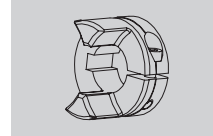
Positive power transmission with additional frictional tightness. The frictional tightness avoids or reduces reversal backlash. Surface pressure of the keyway connection is reduced. Design 2.1 up to size 14 as standard.

Design 2.5 clamping hub, double slotted, without keyway
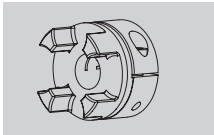
Frictionally engaged, backlash-free shaft-hub-connection. Transmittable torques depend on the bore diameter. Design 2.5 from size 19 as standard. (Only for ATEX category 3)

Design 2.6 clamping hub, double slotted, with keyway
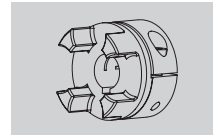
Positive power transmission with additional frictional tightness. The frictional tightness prevents or reduces reversal backlash. Surface pressure of the keyway connection is reduced. Design 2.6 from size 19 as standard.

Type 2.8 short clamping hub with axial slots without feather key
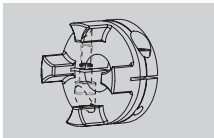
Frictionally engaged, backlash-free shaft-hub-connection, good properties of concentric running. Design 2.8 up to size 24 as standard. Size 7-19 type 2.8 single slotted (Only for ATEX category 3)

Type 2.9 short clamping hub with axial slots with feather key
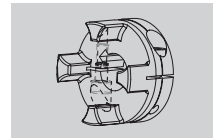
Positive-locking power transmission in addition frictionally engaged. The surface pressure of the feather key combination is reduced. Type 2.9 from size 24 as standard. Size 7-19 type 2.9 single slotted.

Design 6.0 clamping ring hub
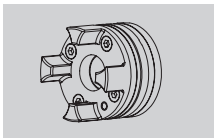
Integrated frictionally engaged shaft-hub-connection for transmission of higher torques. Screw fitting on elastomer side. For details about torques and dimensions see page 148/149. Suitable for high speeds.

Design 6.0 P precision clamping ring hub
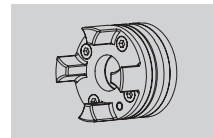
Design equal to 6.0, but highly accurate machining with slight modifications of design, see page 150.

Design 7.5 shell clamping hub without feather keyway for double-cardanic connections
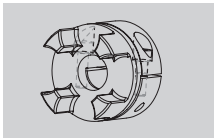
Frictionally engaged, backlash-free shaft-hub connection for the radial assembly of the coupling. Transmittable torques dependent on bore diameter. Torque indicated on page 154.

Design 7.6 shell clamping hub with feather keyway for double-cardanic connections
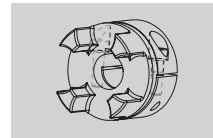
Positive shaft-hub connection with additional frictional engagement for the radial assembly of the coupling. The frictional engagement avoids or reduces the reverse backlash. The surface pressure of the feather key connection is reduced.

Design 7.8 shell clamping hub without feather keyway for single-cardanic connection

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

Special designs on request of customers

Design 6.5 clamping ring hub
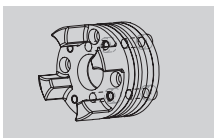
Design equal to 6.0, but clamping screws on the outside. For example for radial disassembly of the intermediate tube (special design).

Design 9.0 Expansion hub

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

Stock programme

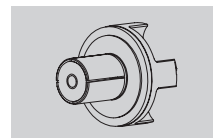| Finish bore [mm] according to ISO fit H7 / feather keyway with thread according to DIN 6885 sheet 1 - JS9																															
Size	Hub design	un-/pilot bored	Ø2	Ø3	Ø4	Ø5	Ø6	Ø6,35	Ø7	Ø8	Ø9	Ø9,5	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42
7	1.1	●			●	●	●		●																							
	2.0	●		●	●	●	●	●	●																							
	2.8	●																														
9	1.0	●					●		●	●	●			●																		
	1.1	●			●	●	●		●	●				●																		
	2.0	●		●	●	●	●	●	●	●	●	●		●	●																	
	2.1	●					●			●	●			●																		
	2.8	●																														
12	1.0	●											●																			
	1.1	●																														
	2.0	●			●	●	●	●		●	●			●	●	●																
	2.1	●												●		●																
	2.8	●																														
14	1.0	●					●			●	●			●	●	●	●	●	●													
	1.1	●					●			●				●	●	●	●															
	2.0	●			●	●	●	●	●	●	●	●		●	●	●	●	●														
	2.1	●								●	●			●	●	●	●	●	●													
	2.8	●								●	●			●	●																	
	6.0 light									●				●	●	●	●															
	6.0 P														●																	
19	1.0	●											●	●	●	●	●	●	●	●	●	●	●								
	2.5	●				■				●			●	●	●	●	●	●	●	●	●	●	●								
	2.6	●								●			●	●	●	●	●	●	●	●	●		●								
	2.8	●									●		●	●		●	●	●	●	●			●								
	6.0 light												●		●	●	●	●	●	●	●										
	6.0 Steel													●				●		●											
	6.0 P37.5																		●												
	6.0 P																			●											
24	1.0	●											●	●	●	●	●	●	●	●	●	●	●	●	●						
	2.5	●								■			●	●	●	●	●	●	●	●	●	●	●	●	●						
	2.6	●											●	●		●	●	●	●	●	●	●	●	●	●						
	2.8														●	●	●	●		●	●		●	●	●	●					
	6.0 light													●	●	●	●	●	●	●	●	●	●								
	6.0 Steel																●			●		●	●	●	●						
	6.0 P 50																							●							
	6.0 P																						●								
28	1.0	●																		●	●	●	●	●	●	●	●	●			
	2.5	●											■							●	●	●	●	●	●	●	●	●	●		
	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																			●	●	●	●	●	●	●	●	●	●	●	●
	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										●	●	●	●	●	●

■ = Pilot bored clamping hubs   ● = Standard bore

Unbored hubs up to size 65 available from stock.

Further dimensions on request

ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC

Standard types
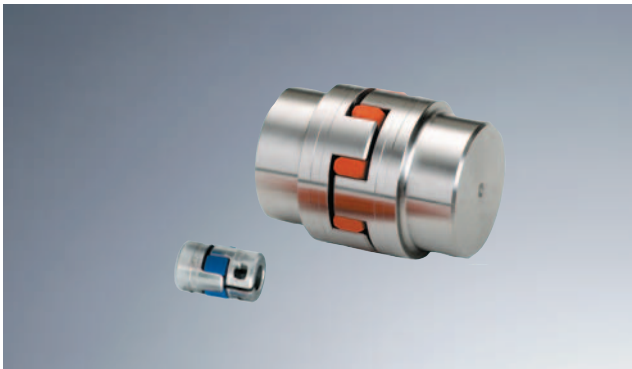
- Backlash-free shaft connection under prestress
- Small dimensions - low flywheel mass
- Maintenance-free, easy to check visually
- Different elastomer hardness of spiders (page 1460)
- Finish bore according to ISO fit H7 (except for clamping hub), feather key optionally available from Ø 6 mm according to DIN 6885 sheet 1 – JS9.
- ⟨Ex⟩ Approved according to EC Standard 94/9/EC (without feather key according to category 3)

Hub design:

ROTEX® GS 5 - 38

ROTEX® GS 42 - 90

Design 1.0 — with keyway and threade

Design 1.1 — without keyway and with thread

Design 1.2 — without keyway and without thread

Size 5 to 14
Design 2.0 Single slotted clamping hub **without** keyway (only ATEX category 3), torques depending on bore diameter
Design 2.1 Single slotted clamping hub **with** keyway

From size Gr. 19
Design 2.5 Double slot clamping hub, **without** keyway (only ATEX category 3), torques depending on bore diameter.
Desiogn 2.6 Double slot clamping hub, **with** keyway
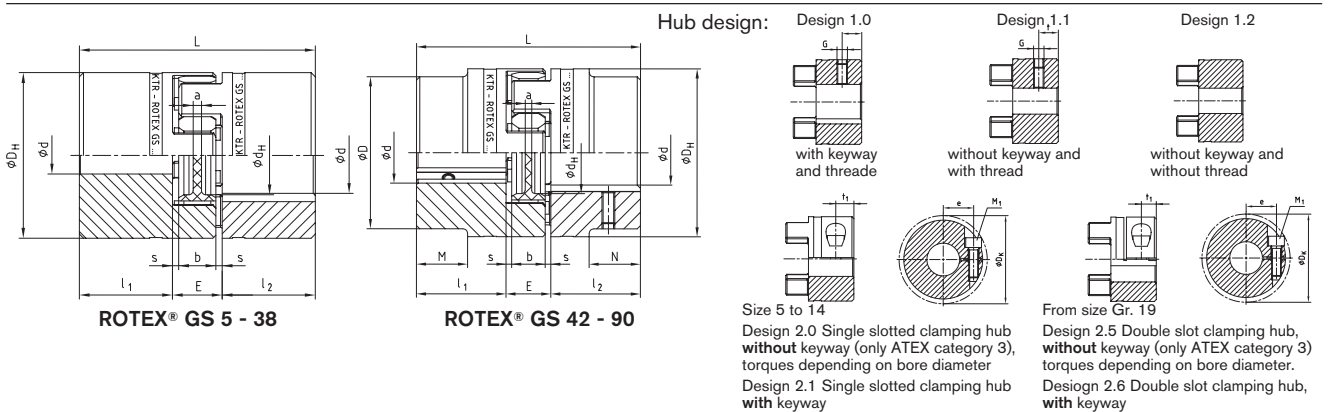
ROTEX® GS Standard types   For size 5 to 38 hub material aluminium/for size 42 to 90 hub material steel

Size	Spider torque T_{KN} [Nm] for 95/98Sh-A[1]	Maximal 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	–	8	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	1175	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] For further spiders/selection see 142/143   [2] tightening torque T_A not defined   [3] from Ø65 keyway opposite to the clamping screw   [4] clamping hub single slotted 2 x clamping screw M4 and dimension e=15

Transmittable 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 torques T_R [Nm] of the clamping 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	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	246	255	260	266	274	283	288	294	301	309	315									
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	

Order form:

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		Finish bore

ROTEX® GS
# Backlash-free shaft coupling

Made for Motion

KTR

Compact

- Up to 1/3 shorter
- High performance

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 (without feather key according to category 3)
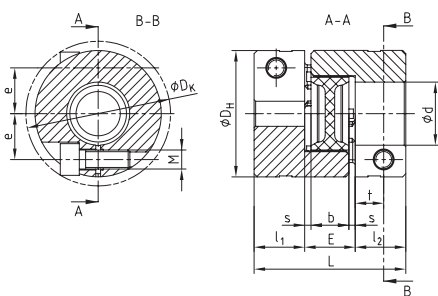
ROTEX® GS 7 - 19 Compact
single slotted design 2.8
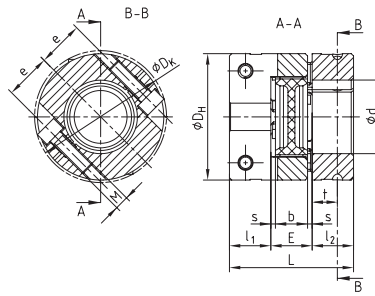
ROTEX® GS 24 - 38 Compact
axially slotted design 2.8

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	16	17	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 torques T_R [Nm] of clamping hub without keyway design 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
							Single slotted hub design 2.8/2.9																			
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]									
							Axially slotted hub design 2.8/2.9																			
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] For further spiders/selection see 142/143 [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

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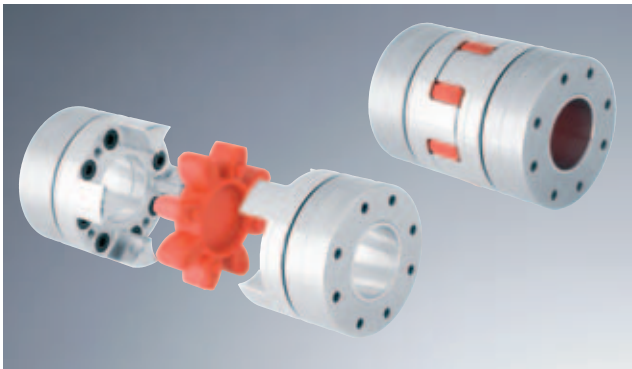
- Backlash-free shaft coupling with integrated clamping system
- As an example, use on feed/main spindles, drives on machine tools, handling units, etc.
- Low weight and low mass moment of inertia due to a design fully made from aluminium
- Easy assembly due to internal clamping screws and block assembly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

Tack thread M_1 between clamping screws

Size	Spider Torque T_{KN} [Nm] [1]			Dimensions [mm]										Clamping screws				Weight per hub with max. bore [kg]	Mass moment of inertia per hub with max. bore [kgm²]
	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 x 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 x 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 x 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 x 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 x 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 x 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 x 10⁻⁴

ROTEX® GS clamping ring hubs light Hub and clamping ring material aluminium

[1] For further spiders/selection see page 142/143   [2] $ØD_H$ + 2 mm with high speeds for expansion of spider

Transmittable friction torques T_R [Nm] of clamping ring hub 6.0 light [1]

Size	Ø6	Ø10	Ø11	Ø14	Ø15	Ø16	Ø19	Ø20	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55
14	5,4	7,5	11,3	24,7																	
19		17	20	41	49	36	56	64													
24				47	57	67	98	110	127	139	175										
28							121	133	201	219	248	285	253	307	329						
38								203	304	331	394	452	453	543	550	609	669	634			
42											444	508	535	638	692	763	754	858	964	976	
48												572	638	762	842	929	943	1074	1208	1136	1336

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 spheroïdal 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.

Order form:

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

Made for Motion **KTR**

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 smoothness of running, application up to a peripheral speed of 40 m/s
- For high friction torques (consider the selection in case of explosion protection use)
- Easy to assemble due to internal clamping screws
- Finish bore up to Ø 50 mm according to ISO fit H7, from Ø 55 mm according to ISO fit G7
- ⟨Ex⟩ Approved according to EC Standard 94/9/EC

Tack thread M_1 between clamping screws
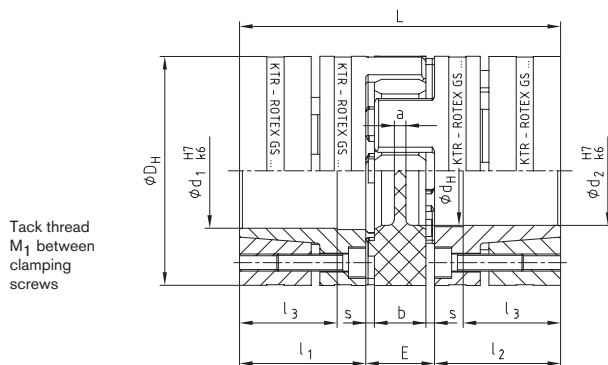
ROTEX® GS clamping ring hubs steel — Hub and clamping ring material steel

Size	Spider Torque T_{KN} [Nm] [1]			Dimensions [mm]										Clamping screws				Weight per hub with max. bore [kg]	Mass moment of inertia per hub with max. bore [kgm²]
	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	number 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 x 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 x 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 x 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 x 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 x 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 x 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 x 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 x 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 x 10⁻⁴
NEW 90	3600 [2]	4500	–	105	200	104	245	100	75	45	34	5,5	6,5	M16	5	295	M16	17,7	1136 x 10⁻⁴

[1] For further spiders/selection see page 142/143 [2] Figures for 95 Sh-A-GS [3] $ØD_H$ + 2 mm with high speeds for expansion of spider

Transmittable friction torques T_R [Nm] of clamping ring hub 6.0 steel [1]

| 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				
NEW 90																			3845	4249	4794	5858	5900	7036	8047	9247	9575	10845

The transmittable torques of the clamping connection consider 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 www.ktr.com.

Special design for external assembly of the screws

Type 6.5

Type 4.2 with CLAMPEX® KTR 250
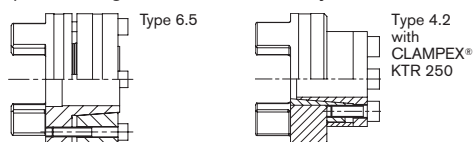
Order form:	ROTEX®GS 24	98 Sh-A-GS	d20	6.0 Steel	Ø24	6.0 Steel	Ø20
	Coupling size	Spider hardness	Optional: Bore diameter in spider	Hub design	Finish bore	Hub design	Finish bore

You will find continuously updated data in our online catalogue at www.ktr.com.

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ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC

ROTEX® GS
Backlash-free shaft coupling

Type P according to DIN 69002

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

Tack thread M_1 between clamping screws

	Spider Torque T_{KN} [Nm] [1]		Dimensions [mm]															Transmittable torque of clamping ring hub Ø d [Nm] [2]	Tightening torque of clamping screws T_A [Nm]	Weight per hub with bore Ø d [kg]	Mass moment of inertia with bore Ø d norm [kgm²]
Size	98 Sh-A	64 Sh-D	d [2]	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

Table title: **ROTEX® GS type P** Hub and clamping ring material steel

[1] For further spiders/selection see page 142/143   [2] * Standard spindle shaft diameter   [3] Ø DH + 2 mm with higher speed for expansion of spider
For the stiffness calculation of the shaft/hollow shaft see KTR standard 45510 at our homepage www.ktr.com).
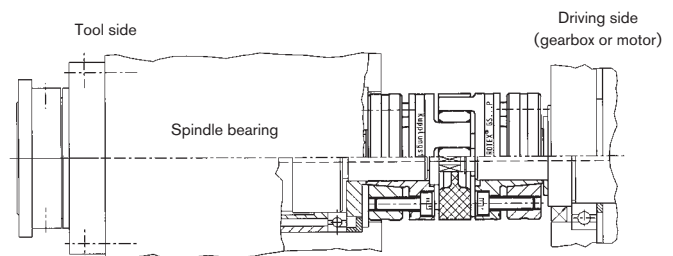
Selection for stub spindles

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

Tool side
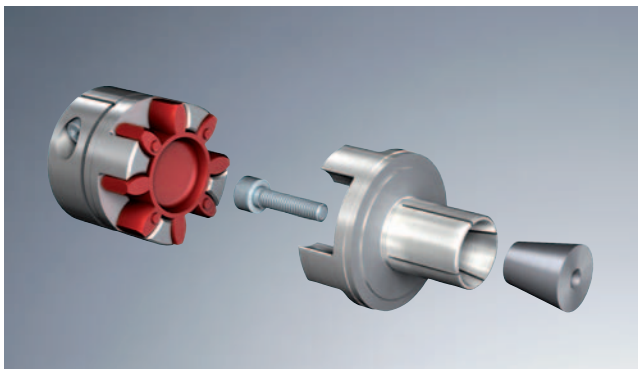
Spindle bearing

Driving side (gearbox or motor)

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

Order form:	ROTEX®GS 24	P	98 Sh-A-GS	6.0	-	[25	6.0	-	[25
	Coupling size	Type	Spieder hardness	Hub-design		Finish bore	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
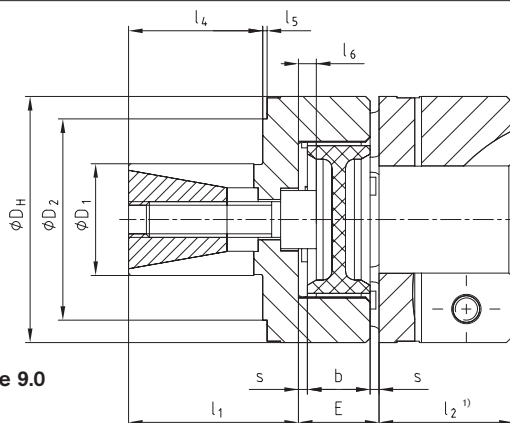
**ROTEX® GS expansion hub type 9.0 with clamping hub [1]**

| Size | 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

ROTEX® GS expansion hub   Material of expansion hub aluminium/material of clamp bolt stainless steel

[1] Expansion hub can be combined with other hub designs as a counter side, too. l_2 depending on hub design. For further hub designs see page 144
[2] For selection see page 143
Transmittable friction torques for D_1 on request (depending on the hollow shaft)

Special type
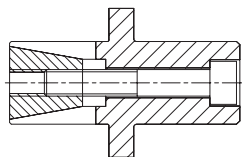
Shaft extension
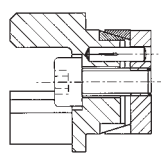
ROTEX® GS hub with CLAMPEX® KTR 150
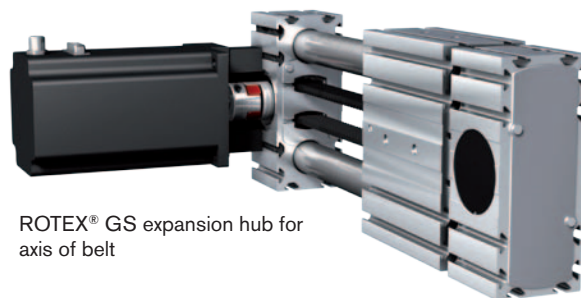
ROTEX® GS expansion hub for axis of belt

Order form	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	Finish bore	

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Drop-out center design coupling type A-H

- Backlash-free shaft connection under prestress
- Maintenance-free, easy to check visually
- Different elastomer hardness of spiders
- Assembly/disassembly by means of 4 screws only
- Exchange 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
- ⟨Ex⟩ Approved according to EC Standard 94/9/EC (type 7.8 shell clamping hub without feather key according to category 3)
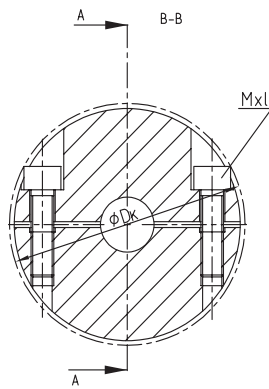
Type A-H

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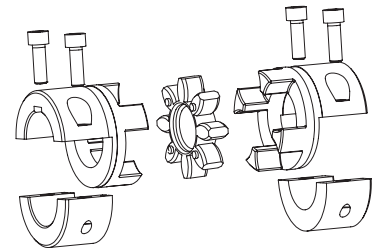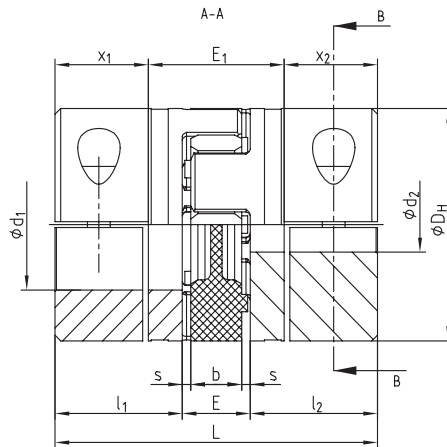The feather keys are offset to each other by approx. 5°!
Hub material: Al-H
Hub design 7.8 shell clamping hub without keyway
Hub design 7.9 shell clamping hubs with keyway

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] T_{KN}	Torque [Nm] $T_{K max}$	Static torsion spring stiffness [2] [Nm/rad]	Weight of each hub with max. bore diameter [kg]	Mass moment of inertia of each hub with max. bore diameter [kgm²]	Size	Spider Shore-GS	Shore-range	Max. speed [rpm]	Torque [Nm] T_{KN}	Torque [Nm] $T_{K max}$	Static torsion spring stiffness [2] [Nm/rad]	Weight of each hub with max. bore diameter [kg]	Mass moment of inertia of each hub with max. bore diameter [kgm²]
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				98	A		325	650	11800		
	98	A		17,0	34,0	1512				64	D		405	810	26300		
	64	D		21,0	42,0	2560											
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				98	A		450	900	21594		
	64	D		75	150	5030				64	D		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] For further spiders/selection see page 142/143   [2] static stiffness with 0,5 x T_{KN}

Bores and the corresponding transmittable torques of the Shell clamping hub without feather keyway [mm] design 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		

Order form:	ROTEX®GS 38	A-H	98 Sh-A-GS	7.8	–	Ø 38	7.9	–	Ø 30
	Coupling size	Type	Spider hardness	Components		Finish bore	Hub design		Finish bore

Typ DKM (double cardanic)

- Backlash-free, double cardanic shaft connection
- Double cardanic design allowing for absorption of larger radial displacements
- Axial plug-in ability - easy blind assembly
- Maintenance-free
- Simple to check visually
- Finish bore according to ISO fit H7 (apart from clamping hub), keyway, from Ø 6 mm according to DIN 6885 sheet 1 - JS9
- ⟨Ex⟩ Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95)
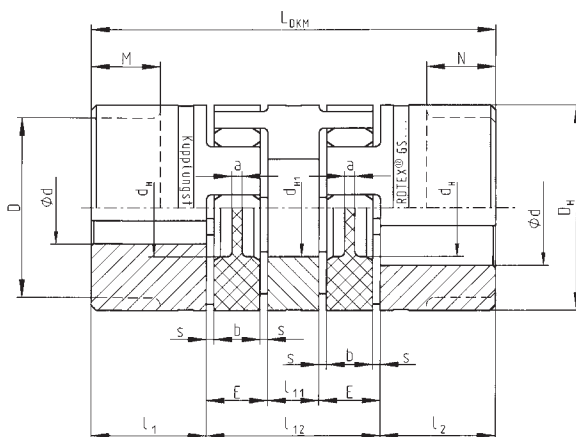
| ROTEX® GS DKM		Spacer material aluminium/hub material depends on hub design													
Size	Spider Torque T_{KN} [Nm] [1]		Dimensions [mm]												
	98 Sh-A	64 Sh-D	max. d [2]	D	D_H	d_H	d_{H1}	$l_1; l_2$	M; N	l_{11}	l_{12}	L_{DKM}	E	b	s	a
5	0,9	—	5	—	10	—	—	5	—	3	13	23	5	4	0,5	4,0
7	2,0	2,4	7	—	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] For further spiders/selection see page 142/143   [2] depend on hub design, hub design page 144

Other designs:
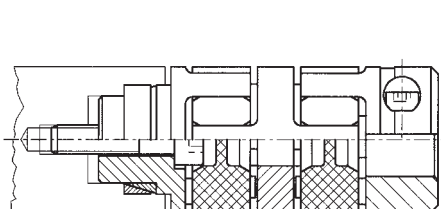
ROTEX® GS - DKM as hollow shaft design
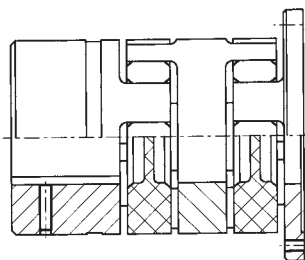
ROTEX® GS - CF - DKM
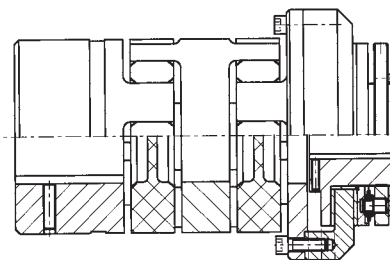
ROTEX® GS - DKM in combination with torque limiter KTR-RU

Order form:								
ROTEX®GS 24	DKM	92 Sh-A-GS	d25	1.0	-	Ø38	2.5	-	Ø25
Coupling size	Type	Spider hard-ness	Optional: Bore diameter in spider	Hub design		Finish bore	Hub design		Finish bore

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ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC

Intermediate shaft coupling
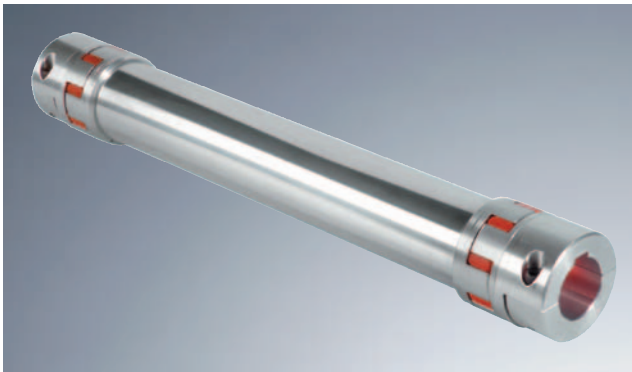
- Use with lifting machines, in handling units, robotic palletisers etc.
- Easy, radial coupling assembly because of split coupling hub
- Exchange of spiders without displacing the drive and driven side
- Lengths are possible up to 4 m without intermediate bearing dependent on speed and size
- Positive and frictionally engaged torque transmission
- Low mass moment of inertia due to use of aluminium
- Can be combined with other hub forms (clamping or clamping ring hubs)
- Finish bore according to ISO fit H7, keyway according to DIN 6885 sheet 1 - JS9
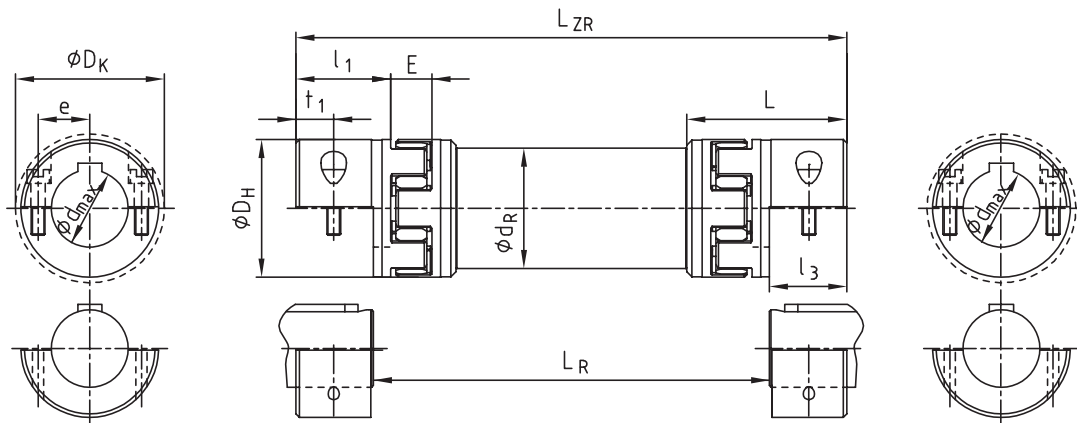
ROTEX® GS type ZR3 — Hub material aluminium/Intermediate pipe material aluminium

Size	Minimal and maximal finish bore		Dimensions [mm] General						L_R		L_{ZR}						Cap screw DIN EN ISO 4762	
	$d_{min.}$	$d_{max.}$	D_H	l_1	L	l_3	E	min.	max.	min.	max.	d_R	D_K	t_1	e	8.8	T_A [Nm]
19	8	20	40	25	49,0	17,5	16	98	2965	133	3000	40	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]		Mass moment of inertia [10^{-3} kgm²]			Stat. torsion spring stiffness [Nm²/rad]	Size	Torques Spider T_{KN} [1] [Nm]		Mass moment of inertia [10^{-3} kgm²]			Stat. torsion spring stiffness [Nm²/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]
19	17	21	0,02002	0,01304	0,329	3243,6	38	325	405	0,50385	0,2572	2,972	29290,4
24	60	75	0,07625	0,04481	0,673	6631,8	42	450	560	1,12166	0,5523	4,560	44929,7
28	160	200	0,17629	0,10950	1,199	11814,1	48	525	655	1,87044	1,1834	9,251	91158,2

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

Size	Ø8	Ø10	Ø11	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø46	Ø48	Ø50	Ø55
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] For further spiders/selection see page 142/143   [2] At $d_{max.}$ [3] Torsional 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 speed.
The intermediate pipe could be combined with other hub designs, but in that case it can no longer be radially disassembled. Please indicate the required shaft distance dimension in your order.
Hub design 7.5 shell clamping hub without keyway
Hub Design 7.6 shell clamping hubs with keyway

Order form:	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

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You will find continuously updated data in our online catalogue at www.ktr.com.

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
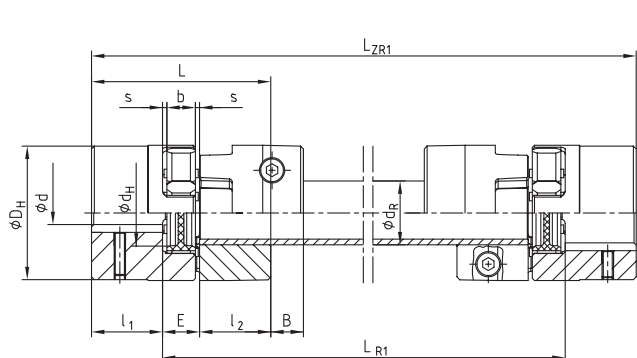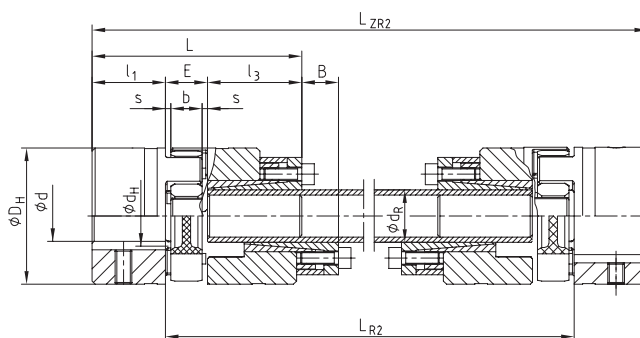
Type ZR1

Type ZR2

ROTEX® GS Type ZR1

Size	Torque Spider T_{KN} [Nm] [1]		Max. finish bore	Dimensions [mm]											Cap screw DIN EN ISO 4762 – 8.8	Tightening torque T_A [Nm]	Friction torque T_R [Nm]
	98 Sh-A	64 Sh-D	d [2]	D_H	l_1; l_2	L	E	b	s	B	L_{R1}	L_{R1} min.	L_{ZR1}	d_R [3]	Mxl		
14 ZR1	12,5	16,0	16	30	11	35	13	10	1,5	11,5	please mention for 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	Torque Spider T_{KN} [Nm] [1]		Max. finish bore	Dimensions [mm]										Precision tube		Clamping set size	Clamping screws DIN EN ISO 4762–12.9	Tightening torque T_A [Nm]
	98 Sh-A	64 Sh-D	d [2]	D_H	l_1; l_2	l_3	L	E	b	s	B	L_{R2}	L_{R2} min	L_{ZR2}	d_R [mm]	C_2 [4] $\frac{Nm^2}{rad}$	dxD	Mxl	
14 ZR2	12,5	16,0	16	30	11	26	50	13	10	1,5	11,5	please mention for inquiries and orders	109	L_{R2}+22	10x2,0	68,36	10x16	M4x10	5,2
19 ZR2	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] For further spiders/selection see page 142/143   [2] Depends on hub design   [3] Has to be remachined, if necessary   [4] Torsional 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 whirling speed.

Other designs:
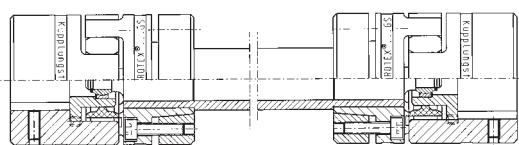
ROTEX® ZRG with bearing for higher speeds
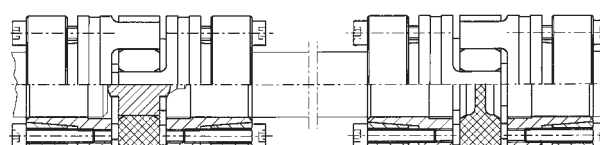
ROTEX® GS ZR for vertical assembly

Order form:	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 hardnes	Hub design		Finish bore	Hub design		Finish bore

ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC

Displacements and technical data

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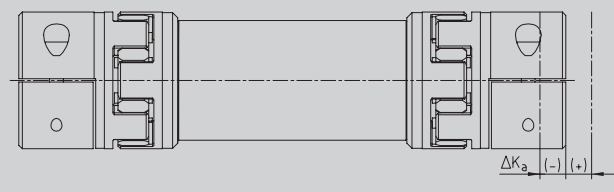
Radial displacements
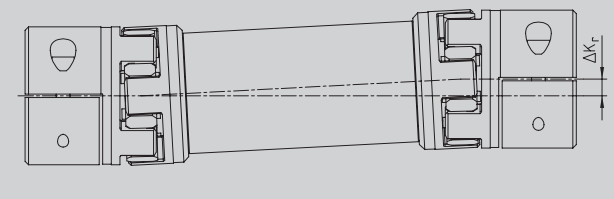
$$\Delta K_r = (L_{ZR} - 2 \cdot l_1 - E) \cdot \tan \alpha$$

Angular displacements

ROTEX® GS Size 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		
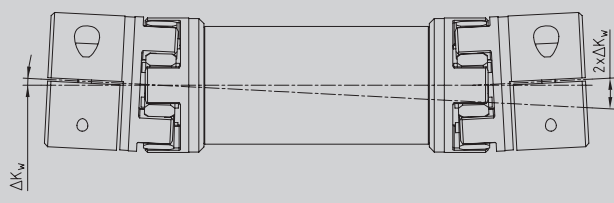
Displacements intermediate shaft coupling

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

Calculation of total torsion spring stiffness:

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

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

C_1 = torsion spring stiffness for spider page 142
C_2 = from table page 154/155

Chart of critical speeds for design ZR3
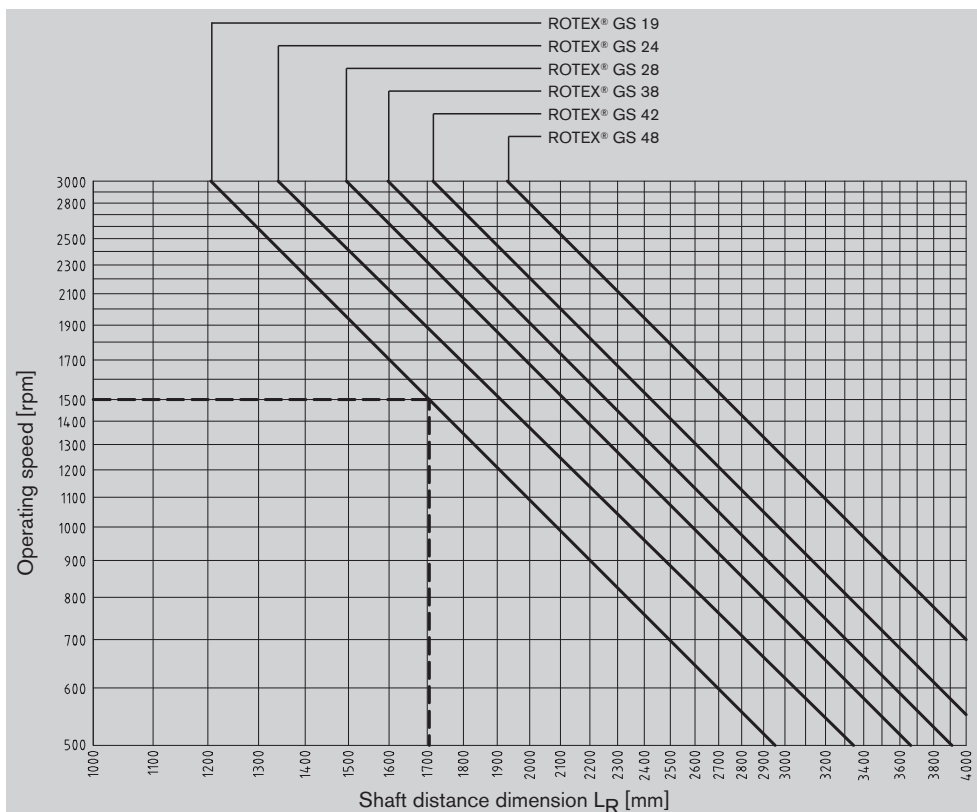
Example:

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.

Axial displacement

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 o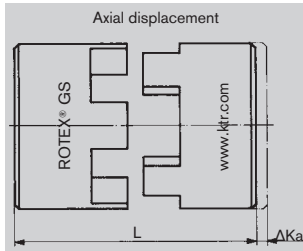f temperature occurs. As the shaft bearings usually cannot be axially stressed to a big extent, it is the task of the coupling to compensate for this axial displacement and to keep the reaction forces low.

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.

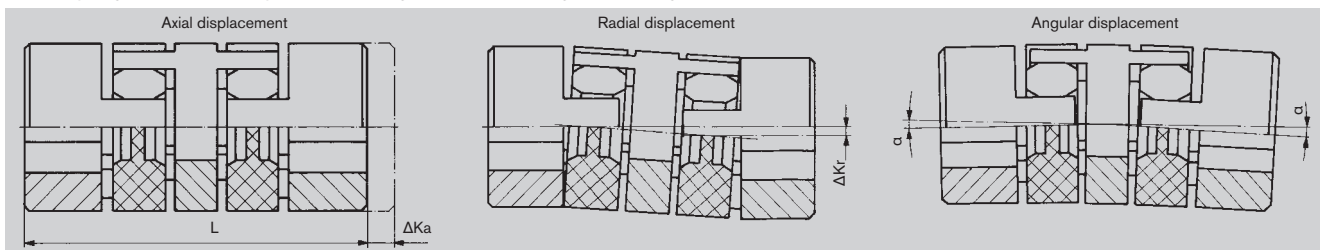Angular displacement

Radial displacement
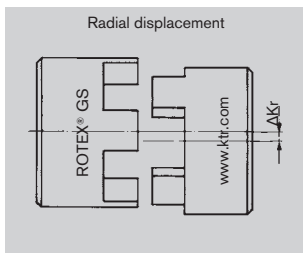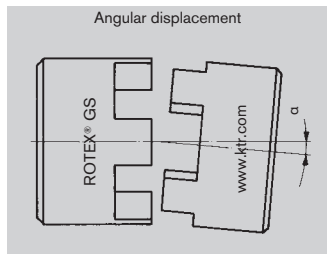
Radial displacement results from parallel displacement of the shafts towards each other, caused by different tolerances at the centerings or by mounting of the power packs on different levels. Due to the kind of displacement the largest restoring forces are produced here, consequently causing the highest 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, in each case, merely be used individually - if they occur simultaneously they may only 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						
		Displacements standard			Displacements DKM		
Size	Spider GS	[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 -0,2	0,12	1,1°	+0,4 -0,4	0,15	1,1°
	92 Sh-A		0,06	1,0°		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 -0,3	0,10	1,0°	+0,6 -0,6	0,21	1,0°
	98 Sh-A		0,06	0,9°		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 -0,4	0,13	1,0°	+0,8 -0,8	0,26	1,0°
	98 Sh-A		0,08	0,9°		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 -0,4	0,14	1,0°	+0,9 -0,9	0,32	1,0°
	98 Sh-A		0,08	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 -0,5	0,15	1,0°	+1,0 -1,0	0,37	1,0°
	98 Sh-A		0,09	0,9°		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 -0,5	0,10	1,0°	+1,2 -1,0	0,45	1,0°
	98 Sh-A		0,06	0,9°		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 -0,5	0,10	0,9°	+1,4 -1,0	0,53	0,9°
	64 Sh-D		0,07	0,8°		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 -0,7	0,11	0,9°	+1,5 -1,4	0,60	0,9°
	64 Sh-D		0,08	0,8°		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 -0,7	0,12	0,9°	+1,8 -1,4	0,69	0,9°
	64 Sh-D		0,09	0,8°		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 -1,0	0,14	0,9°	+2,0 -2,0	0,75	0,9°
	64 Sh-D		0,10	0,8°		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 -1,0	0,16	0,9°	+2,1 -2,0	0,82	0,9°
	64 Sh-D		0,11	0,8°		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 -1,0	0,17	0,9°	+2,2 -2,0	0,91	0,9°
	64 Sh-D		0,12	0,8°		0,81	0,8°
	72 Sh-D		0,09	0,7°		0,71	0,7°
65	95Sh-A		0,18	0,9°	—	—	—
	64 Sh-D	+2,6 -1,0	0,13	0,8°			
	72 Sh-D		0,10	0,7°			
75	95 Sh-A	+3,0 -1,5	0,21	0,9°	—	—	—
	64 Sh-D		0,15	0,8°			
90	95 Sh-A	+3,4 -1,5	0,23	0,9°	—	—	—
	64 Sh-D		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.
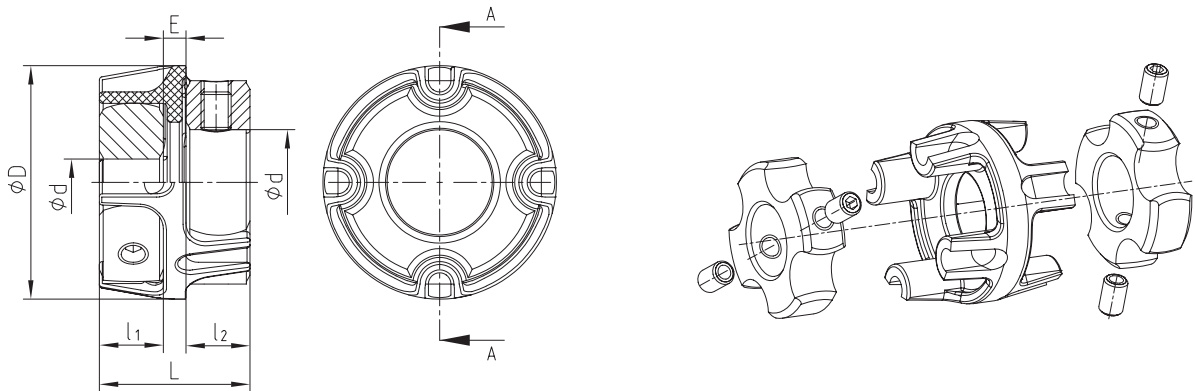

Axial displacement

Radial displacement

Angular displacement

ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC

You will find continuously updated data in our online catalogue at www.ktr.com.

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Double-cardanic for measuring drives

- Backlash-free shaft connections for measurement drive swith 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
- Temperatur range -40 °C to +160 °C
- Finish bore acc. to ISO fit H7, keyway from Ø 6 mm acc. to DIN 6885 sheet 1 - JS9

	COUNTEX®												
Size	Torque [Nm]		Dimensions [mm]						Displacements			Torsional stiffness C_T [Nm/rad]	Radial stiffness C_R [N/mm]	Axial restoring force C_A [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
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

NEW

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.
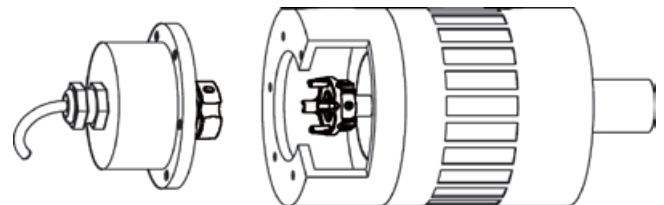
Order form:	COUNTEX® 14	Ø6,35	Ø10
	Coupling size	Finish bore Ød_1	Finish bore Ød_2

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 produced in eleven sizes for maximum torques up to 340 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.
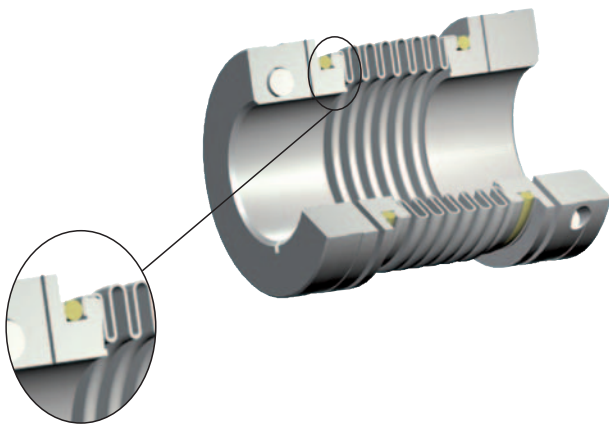
Subject to its well-approved joint procedure a non-positive connection of the aluminium hubs with the multilayer bellows made from stainless steel is produced.
The flanged insert connection sizes 16 to 45 ensures a torque transmission of every single bellow layer.
Since Toolflex is a metal coupling, it remains fatigue-endurable in the high temperature range up to a maximum of 200 °C.
Moreover, it is resistant to influences 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

ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC

Types

Type M and S   Type KN   Type PI   Type CF

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 torque 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	$T_{K\,max}$	Torque which can be transmitted temporary (e.g. emergency shut down). $T_{K\,max} = 1,5 \cdot T_{KN}$
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

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
Torsional angle	ϕ	Transmission error 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}
Eexciting frequency of the drive	f_r	in s^{-1}
Operating factor	k	k = 1.5 with uniform movement k = 2,0 with ununiform movement k = 2.5 - 4 with shocking movement For drives in machine tools (servo motors) k values of 1.5 - 2 must be used.

Judgement calculation

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

$$T_{KN} \geq T_{AS/LS} \cdot k$$

$$T_{AS}\,[Nm] = 9550 \cdot \frac{P_{max}\,[kW]}{n\,[rpm]}$$

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.

Accelerating torque (drive side / load side)

$$T_{KN} > T_S$$

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

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

$$T_S = T_{LS} \cdot m_L \cdot k$$

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

Inspection of torsional stiffness

$$\phi = \frac{180 \cdot T_{AS}}{\pi \cdot C_T}$$

Inspection of resonance frequency

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

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

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

TOOLFLEX®
Metal bellow-type coupling

Made for Motion

KTR

- 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

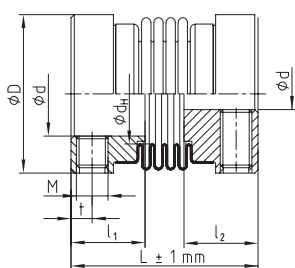|				Dimensions [mm]									Perm. displacements			Torsional stiffness C_T	Weight [4]
				Finish bore		General				Set screw							
Size	Design [1/2]	Bellow-hub-connection	Bellow torque T_{KN} [Nm]	min. d	max. d	D_H	d_H	L	l_1; l_2	M	t	number [3] z	Axial [mm]	Radial [mm]	Angular [degrees]	[Nm/rad]	[kg]
5	S		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	Bonded						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	Flanged						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

TOOLFLEX® S/M with set screw (type 1.1) Hub material aluminium/bellow material stainless steel

[1] Design S = 4 section bellows   [2] Design M = 6 section bellows   [3] For selection please have a look on page 160   [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 withouth keyway with set screw. Hub design 1.0= hub with keyway with set screw.

**ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC**

Order form:	TOOLFLEX®7 M	1.1	-	Ø4	1.1	-	Ø6
	Coupling size	Hub design		Finish bore	Hub design		Finish bore

You will find continuously updated data in our online catalogue at www.ktr.com.

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TOOLFLEX®
Metal bellow-type coupling

Made for Motion   KTR

Type M with clamping hubs

- Backlash-free, torsionally stiff
- Non-positive bellow-hub connection
- 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)
- Well-resistant to corrosion
- Finish bore from Ø 6 mm also available with feather key acc. to DIN 6885 sheet 1 – JS9

Thread M_1 t_1

Feather keyway acc. to DIN 6885 optionally

$\varnothing D_H$ $\varnothing d_2$ $\varnothing d_H$ $\varnothing d_1$ $\varnothing D_3$ e_1

l_1 E l_2

L ± 1 mm

G (DIN EN ISO 4762)

TOOLFLEX Type M with clamping hubs   Hub material aluminium / bellow material stainless steel

| Size | Finish bore | | Dimensions [mm] | | | | | | Clamping screws DIN EN ISO 4762 | | | | |
| | | | General | | | | | | | | | | |
	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

Technical data

| Size | Bellow-hub-connection | Bellow torque T_{KN} [1] [Nm] | Speed n [2] [rpm] | Moment of inertia [3] [x10⁻⁶kgm²] | Torsional stiffness C_T [Nm/rad] | Axial spring stiffness [N/mm] | Radial spring stiffness [N/mm] | Perm. displacements | | | Mass [3] [x10⁻³kg] |
								Axial [mm]	Radial [mm]	Angular [degrees]	
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	0015
12		2	19100	2,7	980	—	—	±0,6	0,20	1,5	0,027
16		5	14900	10	3050	29	92	±0,5	0,20	1,5	0,061
20		15	11950	32	6600	42	126	±0,6	0,20	1,5	0,144
30	Flanged	35	8700	123	14800	65	155	±0,8	0,25	2,0	0,306
38		65	7350	262	24900	72	212	±0,8	0,25	2,0	0,448
42		95	6820	427	36500	80	333	±0,8	0,25	2,0	0,520
45		150	5750	1020	64000	88	492	±1,0	0,30	2,0	1,125
55 [4]		340	4800	5118	96100	107	598	±1,0	0,30	2,0	3,300

Transmittable friction torque T_R [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
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

[1] For selection please see page 160   [2] With v= 25 m/s   [3] Figures refer to the complete coupling with max. bores   [4] Hubs from steel welded with bellow
Hub design 2.5= clamping hub without keyway, Hub design 2.6 = clamping hub with keyway

Order form:	TOOLFLEX®30 M	2.5	Ø25	2.5	Ø30
	Coupling size	Hub design	Finish bore	Hub design	Finish bore

162   You will find continuously updated data in our online catalogue at www.ktr.com.

TOOLFLEX®
Metal bellow-type coupling

Type S with clamping hubs

- Short design
- Higher stiffness of torsion spring
- Lower mass moment of inertia
- Temperatur 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)
- Well-resistant to corrosion
- Finish bore from Ø 6 mm also available with feather key acc. to DIN 6885 sheet 1 – JS9

Thread M_1 t_1 Feather keyway acc. to DIN 6885 optionally

G (DIN EN ISO 4762)

Size	Finish bore		General					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

TOOLFLEX Type S with clamping hubs Hub material aluminium / bellow material stainless steel — Dimensions [mm]

Technical data

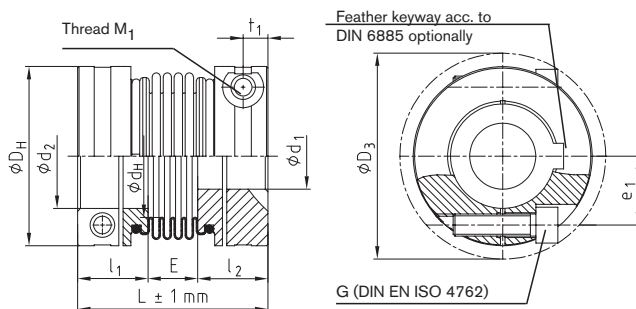| Size	Bellow-hub-connection	Bellow torque T_{KN} [1] [Nm]	Speed n [2] [rpm]	Moment of inertia [3] [x10⁻⁶kgm²]	Torsional stiffness C_T [Nm/rad]	Axial spring stiffness [N/mm]	Radial spring stiffness [N/mm]	Perm. displacements			Mass [3] [x10⁻³kg]
								Axial [mm]	Radial [mm]	Angular [degrees]	
7	Bonded	1	31800	0,26	390	—	—	±0,3	0,10	0,7	0,007
9	Bonded	1,5	23800	0,97	750	—	—	±0,35	0,15	1,0	0,014
12	Bonded	2	19100	2,6	1270	—	—	±0,4	0,15	1,0	0,025
16		5	14900	9	4500	43	138	±0,3	0,15	1,0	0,061
20		15	11950	30	9600	63	189	±0,4	0,15	1,0	0,121
30	Flanged	35	8700	114	17800	97	233	±0,5	0,20	1,5	0,243
38	Flanged	65	7350	245	37400	108	318	±0,6	0,20	1,5	0,351
42		95	6820	396	54700	120	499	±0,6	0,20	1,5	0,485
45		150	5750	931	95800	132	738	±0,9	0,25	1,5	0,824
55 [4]		340	4800	4996	144100	160	894	±1,0	0,25	1,5	3,213

[1] For selection please see page 160   [2] With v= 25 m/s   [3] Figures refer to the complete coupling with max. bores   [4] Hubs from steel welded with bellow
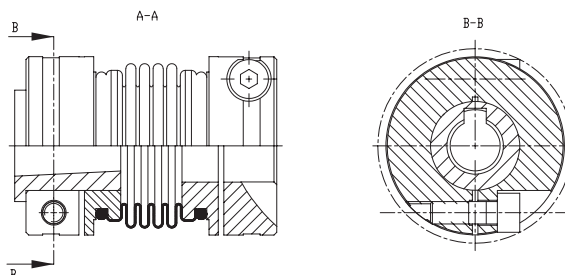Hub design 2.5= clamping hub without keyway, Hub design 2.6 = clamping hub with keyway

Info:
Torques of frictional engagement of the clamping hub shown under Type M (page 161)
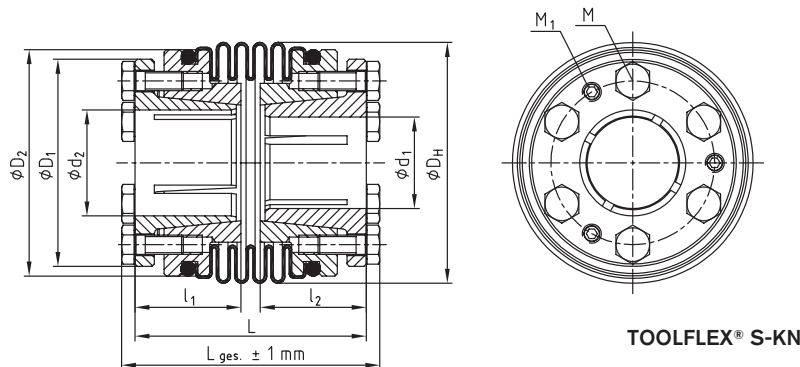
Other designs: Type for FANUC-Motors

A–A   B–B

Order form:	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											
						Dimensions [mm]										
Size	Bellow torque T_{KN} [1] [Nm]	Finish bore		L		$L_{ges.}$		$l_1; l_2$	D_H	D_1	D_2	Clamping screw			Pull-off threads	
		min. d	max.d	4 [2]	6 [3]	4 [2]	6 [3]					M	T_A [Nm]	Number z	M_1	Number z	T_{A1} [5] [Nm]
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 hub 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

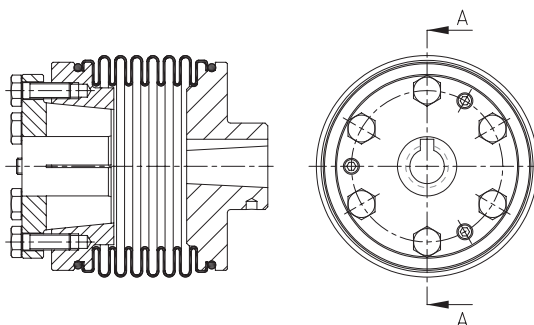[1] Selection please see page 160   [2] Design S = 4 section bellows   [3] Design M = 6 section bellows   [4] Hubs from steel welded with bellow
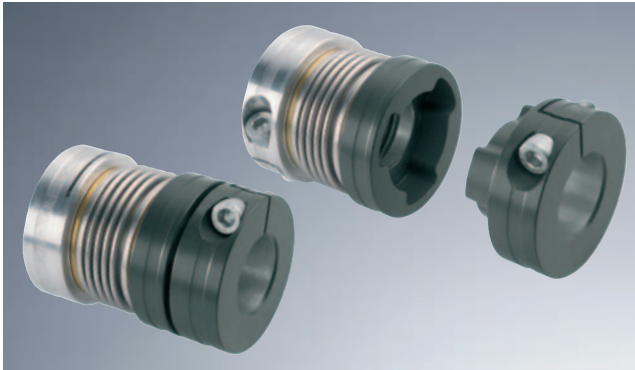[5] After assembly of the clamping screws (M) tighten the pull-off thread (M_1) to the torque T_{A1} indicated.

**Other designs:** TOOLFLEX® KN for FANUC engines

Order form:	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
- Well-resistant to corrosion due to bellow made from 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
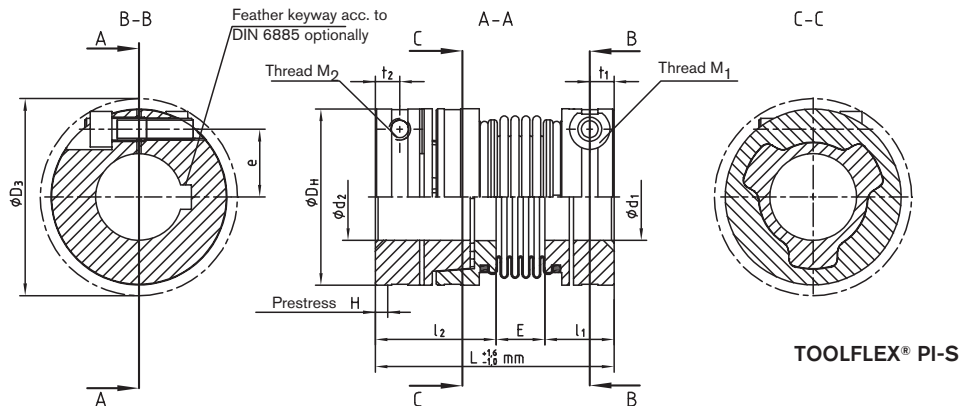
TOOLFLEX® PI-S

		Plug in metal bellow-type coupling type PI								Hub material aluminium / bellow material stainless steel					
Size	Design	Dimensions [mm]													
		General									Clamping screws				
		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	$t_1; t_2$	T_A [Nm]
20	S	8	20	20	67,0	21,5	33,5	12,0	40	0,5 - 1	M5	43,5	14,5	6	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	10
	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	25
	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	25
	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	49
	M				112,5			39,0							

		Technical data								
Size	Design	Bellow torque $T_{KN}^{2)}$ [Nm]	Speed $n^{3)}$ [min⁻¹]	Moment of inertia $^{4)}$ [x10⁻⁶kgm²]	Torsional stiffness C_T [Nm/rad]	Axial spring stiffness [N/mm]	Radial spring stiffness [N/mm]	Perm. displacements		Mass $^{4)}$ [x10⁻³kg]
								Radial [mm]	Angular [degrees]	
20	S	15	11950	37	6600	63	189	0,15	1,0	0,15
	M			38	4900	42	126	0,20	1,5	0,16
30	S	35	8700	140	11500	97	233	0,20	1,5	0,29
	M			145	10200	65	155	0,25	2,0	0,31
38	S	65	7350	329	21500	108	318	0,20	1,5	0,50
	M			346	15100	72	212	0,25	2,0	0,52
42	S	95	6820	396	31500	120	499	0,20	1,5	0,49
	M			427	22000	80	333	0,25	2,0	0,52
45	S	150	5750	1031	55000	132	738	0,25	1,5	0,93
	M			1127	41000	88	492	0,30	2,0	1,00

Transmittable friction torque T_R [Nm] of clamping hubs without keyway type 2.5 for $Ød_1/Ød_2$																					
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 $^{2)}$ Selection please see page 160 $^{3)}$ With v= 25 m/s $^{4)}$ Figures refer to the complete coupling with max. bores

Order form:			
	TOOLFLEX®30 PI-S	d_1 - Ø22	d_2 - Ø18
	Coupling size	Finish bore	Finish bore

You will find continuously updated data in our online catalogue at www.ktr.com.

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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

Size	Finish bore		Dimensions [mm]										Clamping screw					Flange	
	min. d1	max. d1	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	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	14	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	

TOOLFLEX® Type M-CF and S-CF Hub material aluminium/bellow material stainless steel

Technical data

Size	Design	Torque T_{KN} [3] [Nm]	Speed [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] Selection please see page 160   [4] Hubs from steel welded with bellow
[5] With v= 25m/s

Order form:	TOOLFLEX®38 M-CF	Ø15	Ø29 - Ø35 - 6xM5

TOOLFLEX®
Metal bellow-type coupling

Made for Motion **KTR**

Basic programme

Basic programme TOOLFLEX® miniature (Finish bore [mm] according to ISO fit 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		●	●	●	●		●	●							
7	2.5			●	●	●	●	●								
9	1.1			●	●	●		●	●	●		●				
9	2.5		●	●	●	●	●	●	●	●	●					
12	1.1				●	●		●	●	●		●			●	●
12	2.5			●	●	●	●		●	●		●	●	●		
16	1.1					●			●			●	●	●	●	
20	1.1					●			●			●	●	●	●	●

Basic programme TOOLFLEX® type M and S (Finish bore [mm] according to ISO fit F7)																														
Size		Ø5	Ø6	Ø6,35	Ø7	Ø8	Ø9	Ø10	Ø11	Ø12	Ø14	Ø15	Ø16	Ø18	Ø19	Ø20	Ø22	Ø24	Ø25	Ø28	Ø30	Ø32	Ø35	Ø38	Ø40	Ø42	Ø45	Ø48	Ø50	Ø55
16	■		●	●	●	●	●	●	●	●	●	●	●																	
20	■							●	●	●	●	●	●	●	●	●														
30	■										●	●	●	●	●	●	●	●	●	●	●									
38	■														●	●	●	●	●	●	●	●	●	●						
42	■														●	●	●	●	●	●	●	●	●	●	●	●				
45	■																●		●	●	●	●	●	●	●	●	●			
55	■																					●	●	●	●	●	●	●	●	●

Size 1

Size 2

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	Notice
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 programme TOOLFLEX® type KN (Finish bore [mm] according to ISO fit 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

The RADEX®-NC is a line particularly developed for the servo technology. In this coupling a package of torsionally rigid steel laminae that are soft in bending ensures a reliable compensation for axial, angular and radial shaft displacements. As an all-metal coupling - the laminae are made from stainless steel - the 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 from aluminium (size 42 made from 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 if flexible couplings are used.

Engine   Coupling   Gearbox
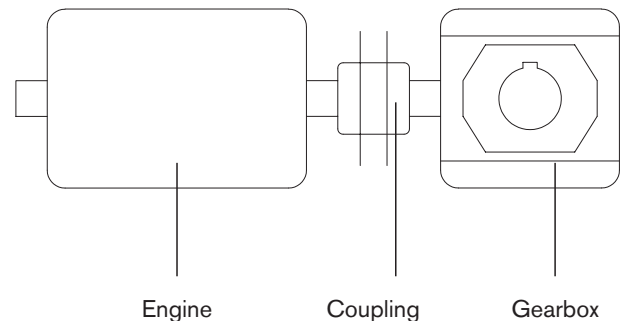
Explosion protection use

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 torque 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 laminae. 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	$T_{K\,max}$	Torque which can be transmitted temporary (e.g. emergency shut down)
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

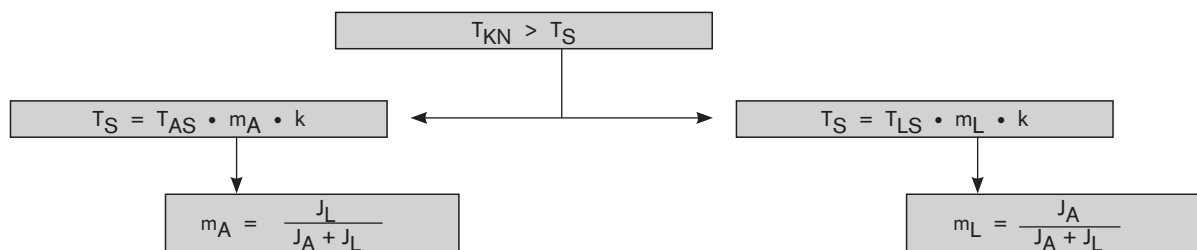| Description	Symbol	Definition or explanation
max. engine performance	$P_{max.}$	max. power in kW which the engine may produce
engine speed	n	Rated speed in rpm of the engine
Torsional angle	ϕ	Transmission error of the metal bellow due to torsional strain
Torsional stiffness	C_T	Torsional stiffness 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}
Eexciting frequency of the drive	f_r	in s^{-1}
Operating factor	k	k = 1.5 with uniform movement k = 2,0 with ununiform movement k = 2.5 - 4 with shocking movement For drives in machine tools (servo motors) k values of 1.5 - 2 must be used.

Judgement calculation

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

$$T_{KN} \geq T_{AS/LS} \cdot k$$

$$T_{AS}\ [Nm] = 9550 \cdot \frac{P_{max}\ [kW]}{n\ [rpm]}$$

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.

Accelerating torque (drive side / load side)

$$T_{KN} > T_S$$

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

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

$$T_S = T_{LS} \cdot m_L \cdot k$$

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

Inspection of torsional stiffness

$$\phi = \frac{180 \cdot T_{AS}}{\pi \cdot C_T}$$

## Inspection of resonance frequency

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

$$f_e = \frac{1}{2 \cdot \pi} \sqrt{\left(C_T \frac{(J_L + J_A)}{J_L \cdot J_A}\right)}\ [Hz]$$ Valid in practice: $f_e \geq 2 \cdot f_r$

ROTEX® GS
COUNTEX®
TOOLFLEX®
RADEX®-NC

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
- (Ex) Approved according to EC Standard 94/9/EC (Explosion Certificate ATEX 95) (without feather key only for category 3)

Type DK

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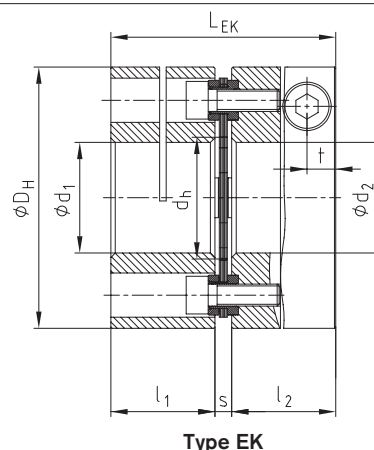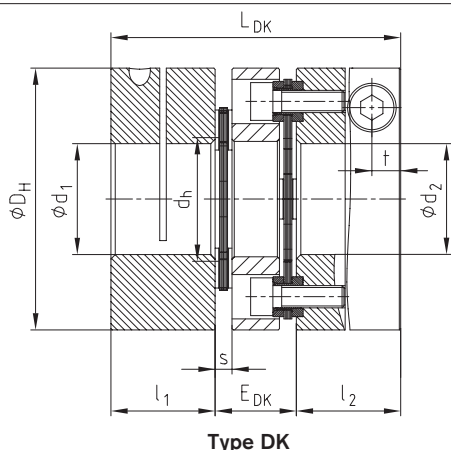
RADEX®-NC types DK and EK   Hub and spacer material aluminium (size 42 steel) / laminae stainless steel

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 [kgm²]	EK [kgm²]
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 [°] [2]	Radial [mm]	Axial [mm]	Angular [°] [2]
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 torque T_R [Nm] of the RADEX®-NC clamping hub 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 169   [2] for each laminae

Order form:

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