JAKOB
Antriebstechnik

Servo couplings
Safety couplings

The company JAKOB

JAKOB Antriebstechnik GmbH is an internationally leading manufacturer of servo couplings, safety couplings, and mechanical clamping elements.

For almost 50 years JAKOB has been developing and producing various types of torsionally stiff metal bellows couplings and safety couplings for the servo drive industry. Throughout our history we have earned ourselves a reputation of being a reliable and competent partner in the motion and drive industry.

JAKOB is the market leader in the area of mechanical tool and component clamping with its innovative and unique clamping technology.

The JAKOB wedge clamping technology provides the highest clamping forces with low actuation torques and, at the same time, maximum operational safety.

The goal of our servo and safety coupling catalog is to provide a general overview over our standard product range. More detailed information can be obtained at our homepage www.jakobantriebstechnik.de.

Highly trained engineers and technicians at our facility in Kleinwallstadt are always ready with a solution to best meet your requirements.

3D-models in STEP format are available for download at the corresponding site of our homepage. For special dimensions or different drawing types please contact JAKOB. Our other catalogs are also available upon request.

Telephone +49(0)6022 2208-0
www.jakobantriebstechnik.de, info@jakobantriebstechnik.de

All technical details are subject to change. For the most up-to-date data sheets, please check our website.

Servo Couplings I Contents

Metal Bellows Couplings

Servo Couplings I Contents

Safety Couplings I Contents

Distance couplings

Safety Couplings – indirect drives

Safety Couplings – direct drives

Servo Couplings I General

Definition - Servo Couplings:

Servo couplings are compensating couplings with a backlash free and conformal torque transfer providing high torsional stiffness and a low moment of inertia. According to these requirements, JAKOB metal bellows couplings can be regarded as the ideal solution. For more than 40 years, they have proven themselves in numerous servo drives as an excellent choice. Elastomer couplings with a flexible polyurethane spider can also represent a perfect alternative for different applications because of their product-specific advantages.

All JAKOB servo couplings are backlash-free and flexible to allow for compensation of shaft misalignments. Because of the unique characteristics of the different series, the designer will most likely find the best solution within the large-scale JAKOB coupling program. The area of application ranges from highly dynamic feed drives of the axes in machine tools to high performance drives in machine tool design.

Characteristics - JAKOB Servo Couplings:

- absolutely backlash-free, precise torque transfer
- low moment of inertia ◢ high balancing quality
- excellent operational characteristics ◢ high speed
- compensation of shaft misalignments ◢ low restoring forces
- frictional, easy-to-fit shaft-hub-connection
- metal bellows: max. torsional stiffness, wear-free, up to 350°C
- elastomer spider: plug-in, oscillation dampening, up to 120°C
- compact dimensions, flexible areas of applications
- large number of types and sizes available (modular system)
- precise production ◢ best quality ◢ long life

The JAKOB Modular System:

As flexible compensating parts, stainless steel bellows are used in different forms as well as polyurethane spiders with different shore hardnesses, oldham-type spacer as polyacetal and stainless steel membrane hubs. Another important aspect is the kind of connection between the drive shafts or the primary shafts and the coupling hubs. Several versions of backlash-free frictional clamping hubs or conical hubs are available.

In this catalog, the most important and widely used series of compensating elements and kinds of hubs, derived from the numerous possibilities of combinations, are described. A well-contrived modular system, which provides multiple uses for many parts, enables production in cost-effective batch sizes and very short delivery periods.

The JAKOB coupling program is devided into the following four main groups:

- metal bellows couplings
- elastomer couplings
- miniature couplings
- distance couplings

For decades, the center of the JAKOB coupling program has been a large variety of different metal bellows couplings.

Safety Couplings I General

Definition – Safety Couplings:

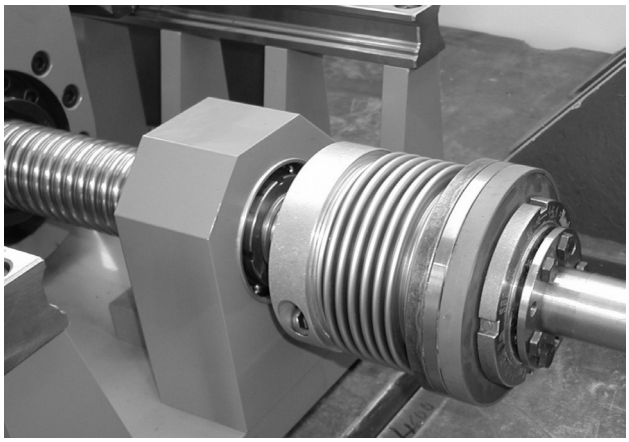
Due to the constantly increasing automation and dynamics of modern work processes, the devices which protect the complex and expensive units against damages in case of errors are becoming more important. JAKOB safety couplings reduce expensive machine damages, repairs and downtime by acting as torque limiters and overload protection absolutely reliably. JAKOB safety couplings are the life insurance for your machines, no matter whether the error occurs due to incorrect operation, programming error, material overload or tool breakage.

JAKOB safety couplings are the result of decades of continuous research and development as well as the experience gained from numerous different applications worldwide.
Unique design aspects, high-quality materials, precision machining of the individual components are some of the factors which make JAKOB couplings some of the leading couplings today. The safety couplings are used in all areas of the machine tool industry, ranging from critical servo drive applications to overload protection in conveyor systems.

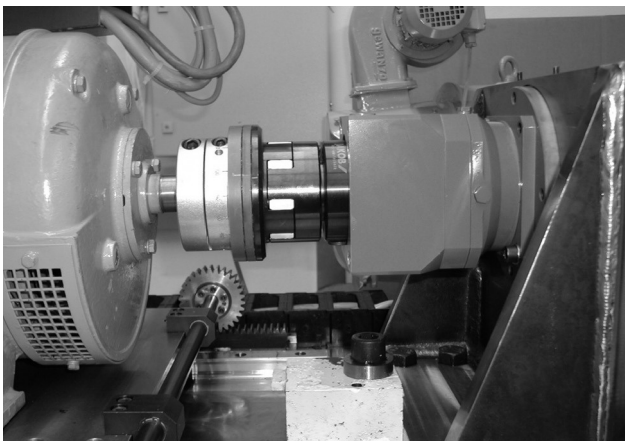
Performance Characteristics – JAKOB Safety Couplings:

- optimal overload and crash protection
- backlash-free, precise torque transfer
- stepless disengagement torque adjustment
- fixed point reengagement (360° synchronised position)
- automatic reengaging (optional feature)
- degressive spring characteristic ◢ precise disengagement function
- excellent dynamic functional characteristics
- low moments of inertia ◢ high-speed
- large selection of types (modular system)
- integral fitting of pulleys or gear wheels
- stop-signal (emergency stop) by use of a proximity switch

Application examples:



Collision protection of a drive spindle with safety coupling series SKB-K with bellows attachment



Safety coupling series SKB-E with elastomer attachment for overload protection of a planetary gearbox

Technical Information - Definitions / Details:

Nominal torque of the coupling: T_N - [Nm]
The nominal torque of the coupling defines the max. load of the prolonged alternating-stress strength. If in normal operation, T_N is not exceeded, an infinite number of operation cycles can be carried out (see d „durability“).

Moment of inertia: J_K - [10^{-3}kgm^2]
The values for the moment of inertia are defined for medium hub-bores in the given diameter range Dmin/Dmax. Conversion: [kgcm^2] = [10^{-4}kgm^2]

Torsional stiffness: C_{TK} - [Nm/arc min]
The values for the specific torsional stiffness of all couplings are converted from the existing values [103 Nm/rad] to “Newton meter per angular minute”. This enables the constructor to determine the torsion angle failure quite easily (see b below) under consideration of the operating torque. 60 angular minutes (resp. arc minutes) correspond to one angular degree. This defines the conversion factor 1 rad = 57,3° = 3438 arcmin.

Conversion: [103Nm/rad = 0,291 Nm/arcmin] resp. [1Nm/arcmin = 3438 Nm/rad=3,44 kNm/rad]
Example: Size KM 170: 17,5 Nm/arcmin= 60 kNm/rad

Max. misalignment of shafts: [mm]
The maximum misalignment of shafts is the largest allowed misalignment between drive and output shaft, which results from the calculation of the prolonged alternating-stress strength for compensating elements. If the allowed misalignment values are not exceeded, an infinite number of load alternations can be carried out. In exceptional cases (e.g. during fixing) particularly at reduced numbers of load alternations, the misalignment values may be considerably higher (please contact for further consultation).

- **axial misalignment:** usually without problems (expansion due to temperature)
- **angular misalignment:** usually without problems - allowed max. value: 1 to 2 degrees
- **lateral or parallel misalignment:** If the admissible values are considerably exceeded, permanent distortion at the bellows and higher wear of the elastomer spider can occur. Special care must be taken during fitting!

Spring stiffness - axial / lateral: [N/mm]
Restoring forces of metal bellows or elastomer spiders, caused by shaft misalignments.

Dimensioning of the coupling

a) according to torque:

Usually, the size of the coupling is chosen according to the required torque. For exact determination of the necessary drive torque, difficult calculations are neccessary (see formularies). If the size of the motor is fixed, the necessary nominal torque of the coupling T_{KN} can be calculated as follows:

$$T_N > 1{,}25 \cdot T_A \text{ max} \cdot i$$

T_A max = peak torque of the motor
i = transmission / reduction of the toothed belt drive or the spur-toothed wheel

b) according to torsional stiffness:

For applications with very precise requirements (position control, transmitter), transfer errors due to high elastic deformation can be an important criterion for selection of the coupling. The torsional angle “αT” is calculated as follows:

$$\alpha T = \frac{T_A}{C_{TK}}$$

[arc minutes] with T_A= drive torque [Nm] C_{TK}= torsional stiffness of the coupling [Nm/arcmin]

Very seldomly, metal bellows couplings may have resonance sounds (e.g. a whistling or a humming), when coupling types with a higher torsional stiffness or vibration reducing elastomer couplings are recommended.

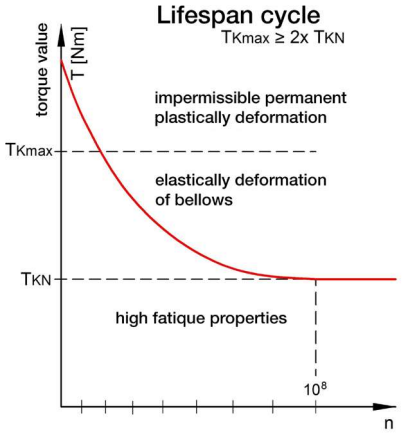
c) according to shaft diameter:

After selecting the coupling type, it must be checked whether the requested shaft diameter corresponds with the allowed diameter (Dmin / Dmax) of the hub bores. Another coupling type or size must be chosen, if the shaft diameter is overdimensioned in relation to the torque, which means it is larger than Dmax of the hub.

note: hub bores which are smaller than “Dmin” are possible, but an optimal transfer of the nominal torque cannot be guaranteed in this case, so a reduction of the drive torque is necessary.

d) durability:

The durability of JAKOB compensating couplings is basically determined by the peak torque and the existing shaft misalignment. If the admissible maximum values for the axial, lateral and angular misalignment are not exceeded and the operating torque is below the nominal torque T_{KN}, then the coupling is within the range of fatigue limit. An infinite number of start-stop-cycles or accelerations and decelerations can be carried out without having to expect a breakdown of the coupling during operation.

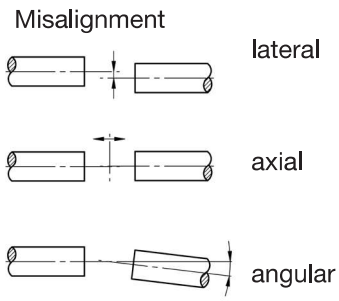


e) max. load:

In special cases, couplings can be overloaded for a short time with twice the nominal torque (2 x T_{KN}). This applies unless otherwise stated on the data sheet for the respective series. The shaft-hub-connection, however, must then be calculated seperately.

f) bearing load:

Due to the flexibility of the compensating couplings in all directions, considerable bearing loads are prevented, in spite of possible axial, lateral or angular misalignment from drive to output shaft. Therefore, an early breakdown or higher wear of the rolling bearing can be prevented. This means less difficult and expensive repairs.



g) operating temperatures:

Metal bellows couplings are, as whole metal couplings, extremely insensitive to temperature. Series with aluminum clamping hubs can be used without restriction from -40 ° C to + 150 ° C, short-term up to + 200 ° C. For models with welded steel or stainless steel hubs, the application temperature is a maximum of 350 ° C. The temperature limits of the elastomer spider are at 90°C (98 Sh-A) and 120°C (72 Sh-D).

h) speeds:

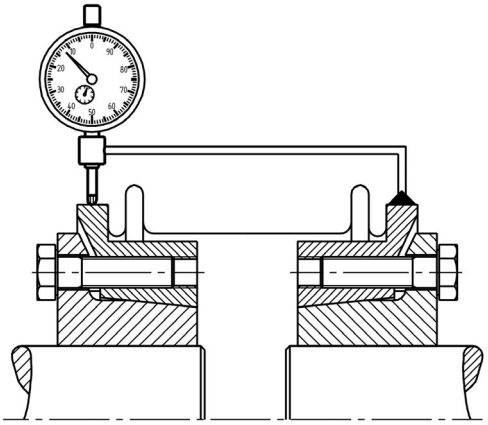
Due to precision machining, the rotation symmetry, and the additional balance pin, the compensating couplings are generally suitable for high speeds up to 20,000 min-1 even without additional balancing. The standard balancing quality is approx. Q6.3 to Q16. Couplings with conical hubs or hubs with tapered ring can be operated with speeds of over 25,000 min-1 (please contact us for further information). The low moment of inertia also has a positive effect.

i) maintenance and wear:

Compensating couplings are maintenance and wear free under normal conditions. The polyurethane spiders of the elastomer couplings should be changed in suitable periods, if critical operation parameters are given.

Alignment of shafts:

Axial and angle misalignment are usually without problems and also simple to measure. To obtain the lateral misalignment, it is recommended to proceed as follows: Fit a dial gauge with an appropriate holding device on one shaft end or on one hub of the coupling and bring the feeler onto the second shaft end or onto the second coupling half (sketch). Now the shafts are turned with the dial gauge and the deflection is read. One half of the total deflection is the lateral misalignment. The admissible value for the shaft misalignments must be taken from the technical data sheets of the appropriate series.



Shaft-hub connection

The couplings are generally supplied with finished bores, in exceptional cases they are also supplied prebored. The seat shaft / hub is to be selected as a transitional seat (example: hub bore diameter 28 G6 - shaft diameter 28 k6). Prior to mounting, the finished bore shaft end conical sleeve should be oiled to prevent fretting corrosion. The coupling is then ready for assembly between the two shafts. An existing keyway in the shaft will not affect the frictional connection.

a) lateral clamping hub

Admissible seat clearance shaft hub: **min. 0,01mm / max. 0,04mm**. Very simple fitting by tightening only one laterally arranged clamping screw (DIN 912). The value for the relevant tightening torques can be found in the data sheets. One hole in the housing is sufficient to tighten the clamping screw (see EASY-clamp sytem).

b) conical hub / conical ring hub

Admissible seat clearance shaft-hub: **max. 0,02 mm.** Assembly of the conical bush or of the conical clamping ring with several, concentrically arranged mounting screws (as a rule 6x DIN 933). One side of the coupling is fit onto the shaft end by evenly tightening the screws crosswise (to prevent uneven draw-on). The drive or output is now turned by a few revolutions, so that the shaft pinion turns in the second hub and the hub can move on the shaft for axial release. Now the six screws of the second hub are also evenly tightened.

c) split-hub

Admissible seat clearance shaft-hub: **min. 0,01mm / max. 0,04mm**. Two lateral clamping screws (DIN 912) are arranged oppositely. The hubs or couplings are split and consist of two loose halves. One of the split-hubs can be put onto the aligned shaft. Tighten clamping screws evenly, alternating between both sides (note specified tightening torques). A larger opening must be provided in the housing for easy installation.

d) disassembly

After releasing the six retaining screws, the hubs are released with three push-off threads each. In axially tight space conditions, it is advisable to screw in and secure the push-off-screws before fitting. For disassembly an opening in the housing should be provided. Disassembly of lateral clamping hub: see EASY-clamp System page 7!

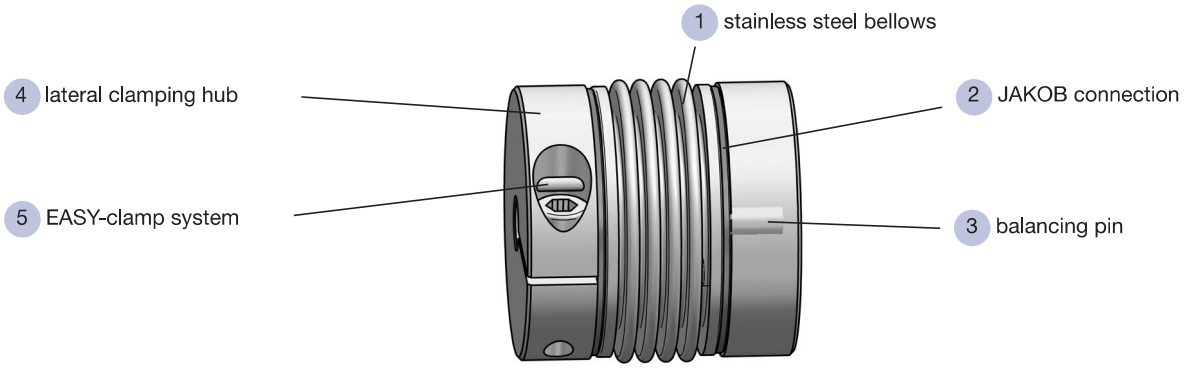
e) special notes

- As the metal bellows consist of thin stainless steel sheeting, special care during fitting and disassembly is necessary. Damages to the bellows can render the coupling useless
- **hub bores which are smaller than "Dmin"** are possible, but an optimal transfer of the nominal torque cannot be guaranteed in this case
- at smaller shaft diameters, the conical hub (larger section thickness) is slotted additionally
- you will find further type specific technical details and characteristics in the data sheets

JAKOB Antriebstechnik

Metal Bellows Couplings

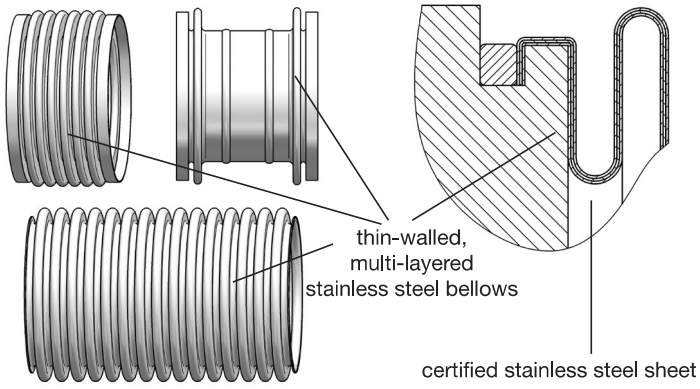
Metal Bellows Servo Couplings I Technical Details



1. Stainless Steel Bellows

advantages:

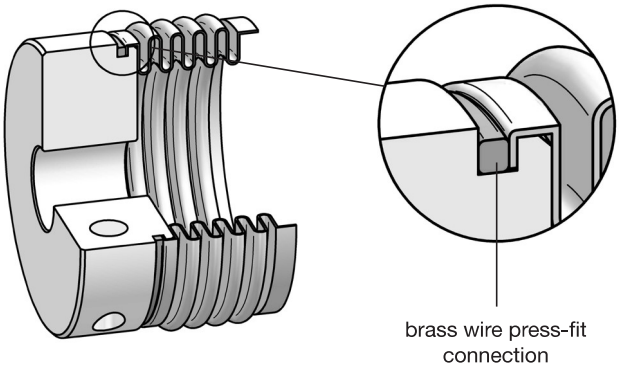
- absolutely backlash-free, precise torque transmission
- extremely high torsional stiffness
- high flexibility for compensation of shaft misalignments
- minimized moment of inertia
- maintenance and wear-free up to 300°C
- high-quality precision manufacture
- system modules with a multitude of different bellows variations
- maximized JAKOB-KNOW-HOW of the specific bellows dimensioning
- 100% final inspection



2. Connection Method

advantages:

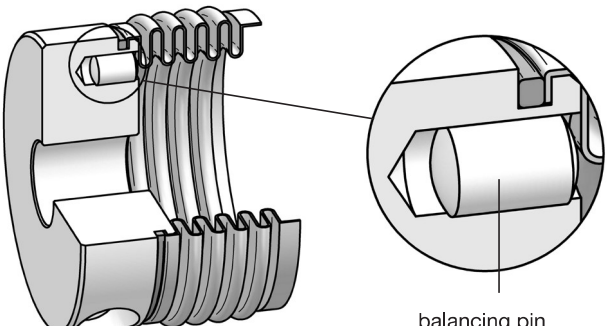
- JAKOB developed and patented the brass-wire press-fit method in 1974, which is the optimal, backlash-free connection of aluminum hubs with multi-layered stainless steel bellows. Alternatively, the steel or stainless steel hubs are connected to the metal bellows via plasma welding
- in contrast to glue connections, these methods are long-life and the torque is safely induced into the hubs



3. Balancing of the Hub

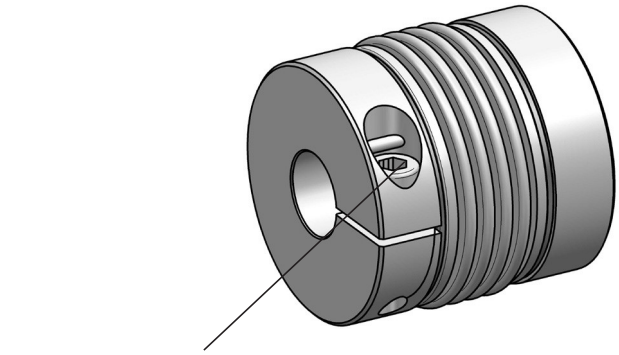
advantages:

- the balancing pin ensures a standard balancing quality of Q16
- high speeds of up to 20.000 rpm
- smooth running to prevent oscillations
- can be specially balanced for balancing quality Q1 - Q2,5



4. Lateral Clamping Hub

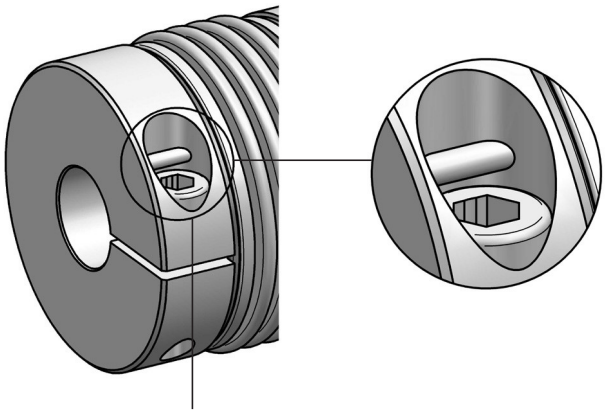
advantages:
- clamping hub made from high-tensile aluminum
- simple lateral fitting of shaft-hub-connection
- ensures the backlash-free, force-fitted transfer of the declared nominal torque value (no keyway necessary)
- minimized moment of inertia, low mass, stainless design
- short delivery time due to modulary system
- hub bores (D1/D2 standard tolerance G6); customization possible
- keyway possible on request



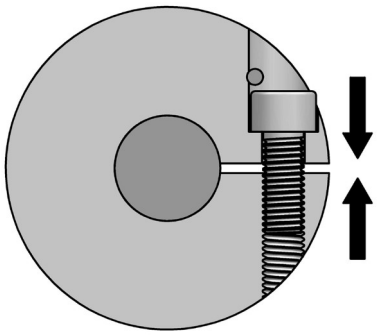
cylinder hex socket screw *ISO 4762 / 12.9*
zinc flake coating

5. EASY-Clamp System

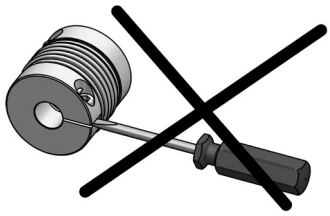
advantages:
- revolution of coupling fitting
- no shortening or extension of bellows
- grave time saving, no reworking
- blind assembly possible, hole in bell housing is enough
- compensation of tolerance deviation of shaft-hub-fit
- no additional tools necessary
- no damage of hub bores and bellows at demounting of motor

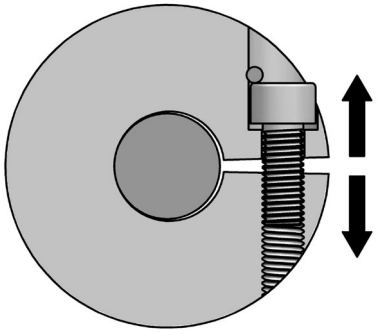


EASY-clamp system



The clamping hub is backlash-free and force-fitted with the shaft.

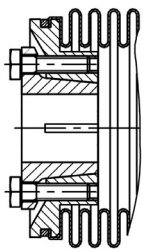




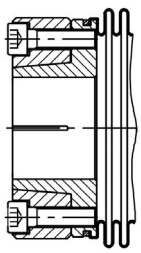
For assembly and disassembly, the hub has to be expanded elastically.

6. Conical Connection

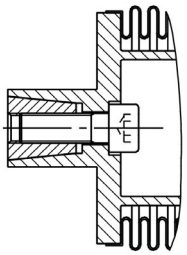
advantages:
- through force amplification (wedge principal), a safe transmission of torque for smaller bore sizes (hub additionally sliced) can be guaranteed
- backlash- and maintenance-free, force-fitted
- no keyway necessary
- rotational symmetry, good balancing for high speed
- expanding conical hub for axial mounting in hollow shaft



conical clamping hub



conical ring hub



expanding conical hub

Metal Bellows Coupling I Series KM

6-corrugation bellows | simple installation with lateral EASY-clamping hub | low-cost standard series

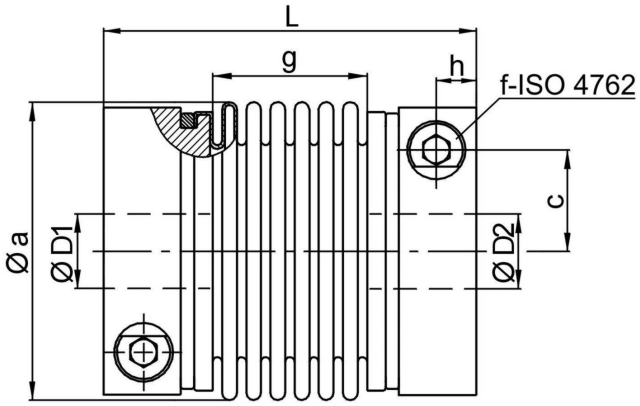
technical data:

KM size	TN [Nm]	moment of inertia [10^{-3}kgm^2]	torsional stiffness [Nm/arcmin]	max. shaft misalignment (mm) axial±	lateral	axial spring rate [N/mm]	lateral spring rate [N/mm]	tightening torque of screws [Nm] (*)	nmax. [upm]
20	20	0,14	5,2	0,8	0,25	51	190	14 -	17000
35	35	0,14	5,8	0,8	0,25	51	190	14 -	17000
60	60	0,29	8,7	0,9	0,3	49	260	35 (30)*	16000
80	80	0,79	14	1	0,3	45	280	65 (50)*	12000
170	170	0,83	17	1	0,3	80	470	65 (50)*	12000
270	270	2,2	32	1	0,3	70	450	115 (90)*	10000
400	400	2,4	47	1	0,3	100	640	115 (90)*	10000
600	600	5,3	67	1	0,3	100	980	180(140)*	8000
900	900	9	105	1	0,3	145	1000	180(140)*	7500
1300	1300	14	170	1	0,3	130	920	290 (240)*	6500

smaller couplings from 0,4 Nm - 12 Nm see series MKM

(*) note: reduced tightening torque for bigger hub bore diameter - see also Ø D 1/2max!
temperature range: -40°C up to +200°C

material:
hubs: high-tensile strength aluminum
screws: ISO 4762 / 12.9
bellows: stainless steel



Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

KM	Øa	c	f	g	h	L	L*	mass ~ [kg]	ØD1/2 min	ØD1/2 max
20	56	19	M 6	30	8	70	81	0,3	8	32 -
35	56	19	M 6	30	8	70	81	0,3	10	32 -
60	66	22	M 8	33	9	77	87	0,5	13	28 (35)*
80	82	28,5	M 10	38	11,5	90	102	0,8	16	32 (43)*
170	82	28,5	M 10	40	11,5	92	104	0,8	18	32 (43)*
270	101	35	M 12	42	13	100	106	1,4	25	42 (55)*
400	101	35	M 12	48	13	106	112	1,5	28	42 (55)*
600	122	42	M 14	52	16	120	-	2,4	32	55 (68)*
900	133	47	M 14	53	18,5	143	-	3,5	40	65 (75)*
1300	157	54	M 16	55	20	145	-	4,2	48	70 (85)*

note: L* ≙ variable length with bigger clamping hub size (see order example)
· version with steel hub and plasma welded joint, as well as higher torques see series „KG“

order example: KM 170 - D1 = 30 ^{G7} D2 = 35 ^{H6}
KM 170 | 104 - D1 = 28 G^6 D2 = 42 G^6

Metal Bellows Coupling I Series KP

- 4-corrugation bellows
- short design
- high torsional stiffness
- simple installation with lateral EASY-clamping hub

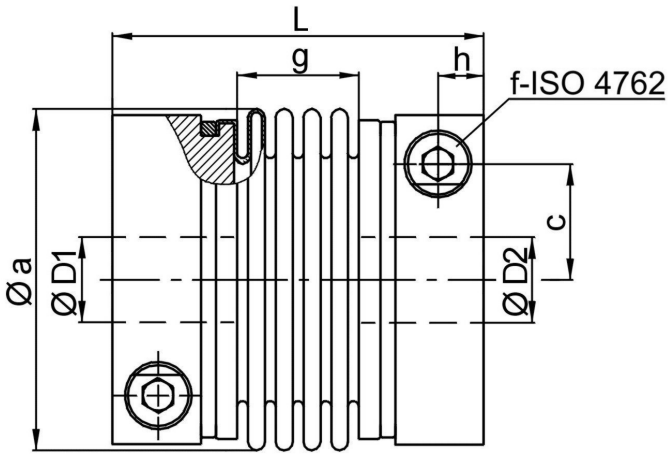
technical data:

KP	TN	moment of inertia	torsional stiffness	max. shaft misalignment (mm)		axial spring rate	lateral spring rate	tightening torque of screws	nmax
size	[Nm]	[10^{-3}kgm^2]	[Nm/arcmin]	axial±	lateral	[N/mm]	[N/mm]	[Nm] (*)	[upm]
25	25	0,064	4	0,5	0,15	36	180	8	19000
35	35	0,13	9	0,5	0,2	70	450	14	17000
60	60	0,27	14	0,6	0,2	70	650	35 (30)*	16000
100	100	0,35	20	0,6	0,2	110	1200	35 (30)*	13500
170	170	0,76	28	0,8	0,2	98	1000	65 (50)*	12000
270	270	2	52	0,8	0,2	90	1300	115 (90)*	10000
400	400	2,15	74	0,7	0,2	135	1500	115 (90)*	10000
600	600	5,0	106	0,7	0,2	140	2800	180 (140)*	8000
900	900	9,0	156	0,8	0,2	210	3050	180 (140)*	7500

smaller couplings from 2 Nm - 12 Nm see series MKP

(*) note: reduced tightening torque for bigger hub bore diameter - see also Ø D 1/2max!
size **KP 25** - with 5-corrugation bellow and optional with EASY-PIN.
temperature range: -40°C up to +200°C

material:
hubs: high-tensile strength aluminum
bellows: stainless steel
screws: ISO 4762 / 12.9



Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

KP	Øa	c	f	g	h	L	L*	mass ~ [kg]	ØD1/2 min	ØD1/2 max
25	50	17	M 5	24	6	58	-	0,18	10	28
35	56	19	M 6	21	8	61	72	0,3	10	32
60	66	22	M 8	23	9	67	77	0,4	13	28 (35)*
100	71	25	M 8	23	9	68	-	0,5	14	30 (38)*
170	82	28,5	M 10	28	11,5	80	92	0,8	18	32 (43)*
270	101	35	M 12	29	13	87	93	1,3	25	42 (55)*
400	101	35	M 12	33	13	91	97	1,4	28	42 (55)*
600	122	42	M14	36	16	104	-	2,3	32	55 (68)*
900	133	47	M14	37	18,5	127	-	3,3	40	65 (75)*

note: L* ≙ variable length with bigger clamping hub size (see order example)

order example: KP 170 - D1 = Ø 28 ^{G6} D2 = 35 ^{G6}
KP 170 | 92 - D1 = 32 ^{G6} D2 = 42 ^{G6}

Metal Bellows Coupling I Series KR

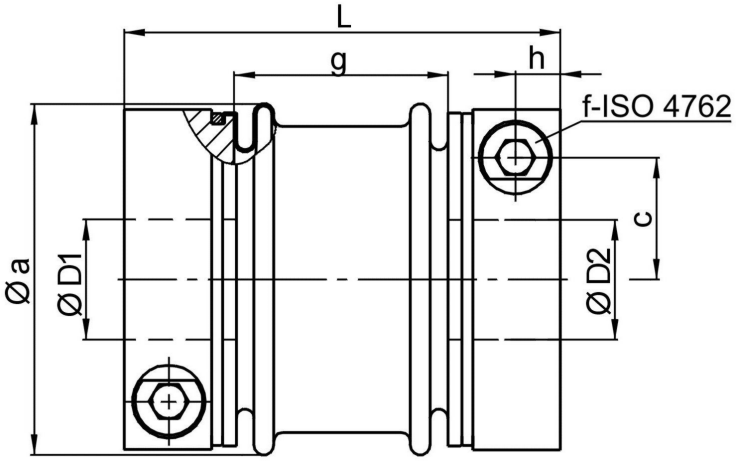
straight bellows ◢ simple installation with lateral EASY-clamping hub
low restoring forces ◢ high torsional stiffness ◢ long design

technical data:

KR size	T_N [Nm]	moment of inertia [10^{-3}kgm^2]	torsional stiffness [Nm/arcmin]	max. shaft misalignment [mm] axial±	lateral	axial spring rate [N/mm]	lateral spring rate [N/mm]	tightening torque of screws [Nm] (*)	nmax. [upm]
25	25	0,12	9	0,3	0,2	150	150	14 -	17000
50	50	0,12	10	0,3	0,2	160	160	14 -	17000
65	65	0,25	12	0,3	0,3	90	90	35 (30)*	16000
100	100	0,7	23	0,5	0,4	100	100	65 (50)*	12000
200	200	0,84	30	0,3	0,3	220	220	65 (50)*	12000
300	300	2	53	0,4	0,3	210	210	115 (90)*	10000
450	450	2,15	80	0,4	0,3	300	300	115 (90)*	10000
550	550	4,7	98	0,5	0,5	300	300	180 (140)*	8000
1500	1500	13	280	0,6	0,5	520	520	290 (240)*	6500

(*) note: reduced tightening torque for bigger hub bore diameter - see also Ø D 1/2max!
temperature range: -40°C up to +200°C

material:
bellows: stainless steel
hubs: high-tensile strength aluminum
screws: ISO 4762 / 12.9



Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

KR	Øa	c	f	g	h	L	L*	mass ~ [kg]	ØD1/2 min	ØD1/2 max
25	56	19	M 6	33	8	73	84	0,3	8	32 -
50	56	19	M 6	33	8	73	84	0,3	10	32 -
65	66	22	M 8	41	9	85	95	0,4	13	28 (35)*
100	82	28,5	M 10	50	11,5	102	114	0,75	16	32 (43)*
200	82	28,5	M 10	56	11,5	108	120	0,8	18	32 (43)*
300	101	35	M 12	65	13	123	129	1,3	28	42 (55)*
450	101	35	M 12	65	13	123	129	1,4	35	42 (55)*
550	122	42	M 14	72	16	140	-	2,2	32	55 (68)*
1500	157	54	M 16	96	20	186	-	4,4	48	70 (85)*

note: L* ≙ variable length with bigger clamping hub size (see order example)

order example: KR 100 - D1 = 35 ^{G7} D2 = 35 ^{G7}
KR 200 | 120 - D1 = 32 ^{G6} D2 = 42 ^{G6}

Metal Bellows Coupling I Series KPH / KMH / KRH

simple installation · split-hub design · backlash-free · torsionally stiff · flexible
stainless design · variable length

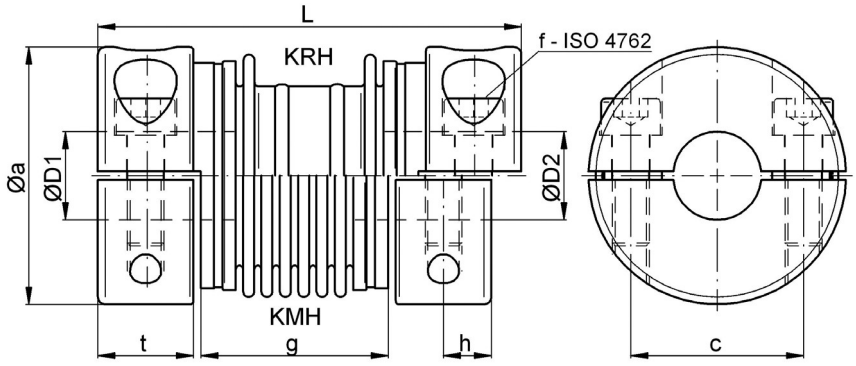
technical data:

KPH/KMH/ KRH Size	nominal torque [Nm]	moment of inertia [10^{-3}kgm^2]	torsional stiffness [Nm/arcmin]			max. lateral shaft misalign-ment [mm]			axial spring rate [N/mm]			lateral spring rate [N/mm]			nmax [upm]
			KPH	KMH	KRH	KPH	KMH	KRH	KPH	KMH	KRH	KPH	KMH	KRH	
10	10	0,02	1,7	1,1	-	0,15	0,25	-	70	45	-	224	60	-	28000
40	40	0,2	9	5,8	10	0,2	0,25	0,2	70	51	170	450	190	170	17000
80	80	0,5	14	8,7	12	0,2	0,3	0,3	70	49	95	650	260	80	13000
200	200	1,2	25	17	30	0,2	0,3	0,3	98	80	120	1000	470	120	11000
400	400	3,0	74	47	80	0,2	0,3	0,3	135	100	260	1500	640	260	9500
900	900	8,0	156	105	-	0,2	0,3	-	210	145	-	3050	1000	-	7000

* KRH not available in this size
• three types: type **KPH** with 4-corrugation bellows / type **KMH** mit 6-corrugation bellows / type **KRH** mit 2x 1-corrugation bellows.
• note: for coupling types in split-hub design for higher torques and shorter length see series KGH.

material:
bellows*: stainless steel*
hubs: high-tensile strength aluminum
screws: ISO 4762 / 12.9
temperature range: -40°C up to 200°C

KMH



Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

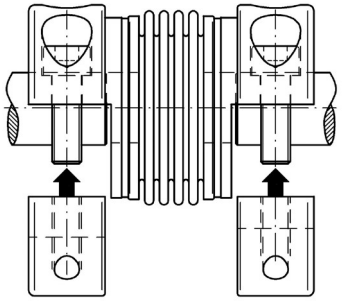
KPH/KMH/ KRH	Øa**	c	f-TA	g			h	L			t	mass ~ [kg]	ØD1/2 min	ØD1/2 max
				KPH	KMH	KRH		KPH	KMH	KRH				
10	35	21	M5 - 8 Nm	33	43	-	9	73	83	-	18	0,1	6	15
40	58	36	M8 - 35Nm	39	48	51	13	95	104	107	26	0,5	9	25
80	75	47	M10 - 65Nm	41	51	59	13	97	107	115	26	0,8	12,5	35
200	89	56	M12 - 115Nm	45,5	57,5	73	14	106	118	134	28	1,2	19	42
400	109	72	M14 - 180Nm	52,5	67,5	84	15	117	132	149	30	2,0	24	55
900	132	94	M14 - 180Nm	62	78	-	16	132	148	-	31	3,3	32	75

** the projecting edge of the screw head is taken into consideration for outer diameter ‘a’

Mounting Instructions:

The split-hub design allows for easy assembly. Further simplification during installation is provided because one half of the split hub can be put onto the shaft. The coupling can rest on the two shaft ends. The second half of the split-hub can then be mounted to the coupling by screwing it on from below with the specified tightening torque. This feature makes a “one man assembly” possible.

Important: the distance between the shafts must be bigger than ‘g’!



order example: KPH 80 - D1 = 24 ^{G7} D2 = 30 ^{G7}
KMH 400 - D1 = 38 ^{F6} D2 = 48 ^{F6}

Metal Bellows Coupling I Series KPP

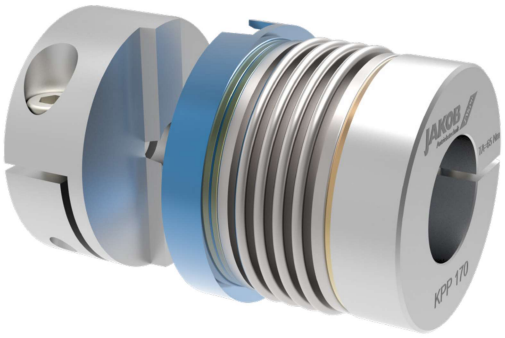
- plug-in design
- simple installation
- EASY-clamping hub
- high torsional stiffness
- backlash-free, precise torque transmission
- sturdy whole metal version

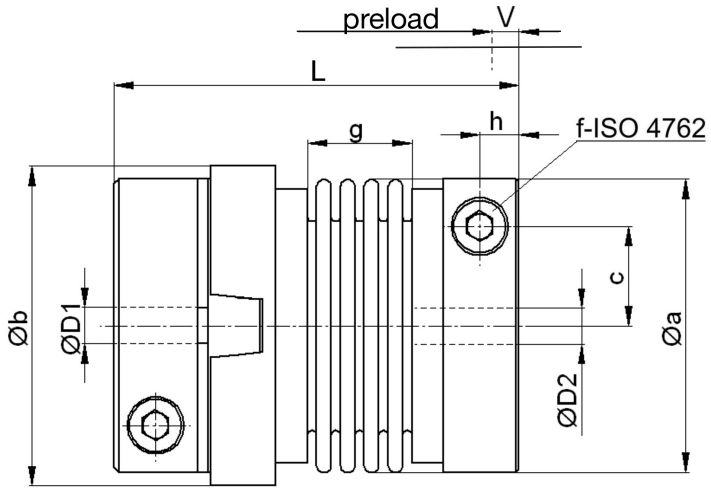
technical data:

KPP size	T_N [Nm]	moment of inertia [10^{-3}kgm^2]	torsional stiffness [Nm/arcmin]	max. shaft misalignment [mm] axial±	lateral	axial spring rate [N/mm]	lateral spring rate [N/mm]	tightening torque screw f | i [Nm] (*)	axial pre-load force ca. [N]	nmax. [upm]
10	10	0,033	2	0,6	0,15	20	93	8 -	30	23000
20	20	0,17	4,6	0,5	0,2	70	480	14 -	110	17000
35	35	0,17	5	0,5	0,2	70	480	14 -	110	17000
60	60	0,34	8	0,6	0,2	70	650	35 (30)*	110	14000
100	100	0,46	12	0,6	0,2	120	1200	35 (30)*	180	13000
170	170	0,90	19	0,8	0,2	100	1000	65 (50)*	150	11000
270	270	2,2	31	0,8	0,2	95	1350	115 (90)*	140	9500
400	400	2,4	45	0,7	0,2	135	1500	115 (90)*	200	9500
600	600	5,8	67	0,7	0,2	145	3000	180 (140)*	220	8000

(*) note: reduced tightening torque for bigger hub bore diameter - see also Ø D 1/2max!
temperature range: -40°C up to +200°C

material:
bellows: stainless steel
hubs: high-tensile strength aluminum
screws: ISO 4762 / 12.9





Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

KPP	Øa	Øb	c1/c2	f	g	h1/h2	V	L**	mass ~ [kg]	ØD1 min-max	ØD2 min-max
10	40	43	13/13	M 5	18	6/6	1-1,5	62	0,15	6-20	6-19
20	56	61	19/19	M 6	21	8/8	1-1,5	77,5	0,38	8-30	8-32
35	56	61	19/19	M 6	21	8/8	1-1,5	77,5	0,38	10-30	10-32
60	66	71	22/22	M 8	23	8,5/9	1-1,5	85,5	0,60	13-28 (34)*	13-28 (35)*
100	71	75	25/25	M 8	23,5	8,5/9	1-1,5	86	0,66	14-34 (38)*	14-34 (38)*
170	82	87	28,5/28,5	M 10	28	11/11,5	1-1,5	99,5	0,95	18-35 (43)*	18-35 (43)*
270	101	106	35/35	M 12	29	12/15	1-1,5	106,5	1,6	25-45 (55)*	25-45 (55)*
400	101	106	35/35	M 12	33	12/13	1-1,5	110,5	1,7	28-45 (55)*	28-45 (55)*
600	122	126	43,5/42	M 14	36	13,5/16	1-1,5	122,5	2,7	32-55 (70)*	32-55 (68)*

* note: reduced tightening torque for bigger hub bore diameter - see also Ø D 1/2max!
**delivery length (± 1mm) – without preload -> see function description. Further sizes and lengths available on request.

note: size KPP 1300 with conical clamping hub on request

order example: KPP 170 - D1 = 28 ^{G7} D2 = 35 ^{H7}

Metal Bellows Coupling I Series KPP I Technical Details

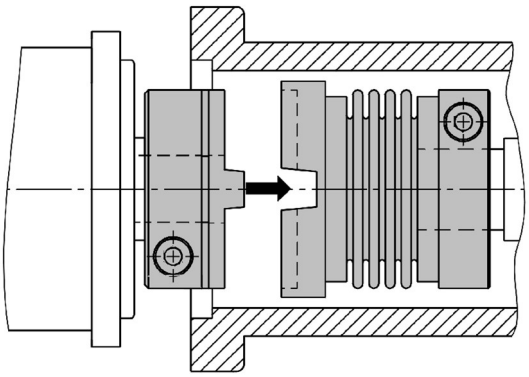
General:

The pluggable, two-part metal bellows couplings are constructed for applications which are difficult to reach, applications without assembly boring for the clamping screws of the coupling hubs or where only blind fitting is possible. For such applications, the assembly is faciliated by the plug-in capability. Also, in case of service, the disassembly is much easier, because the drive unit can be pulled off without the difficult loosening of the hubs.

Product specific characteristics, which define the metal bellows couplings, apply to the KPP couplings as well. These are: absolutely no backlash, high torsional stiffness, low moment of inertia, compensation of misalignments, as well as high operating speeds and high operating temperatures. Depending on special operation parameters, plug-in elastomer couplings of series EKM & ESM provide a good alternative.

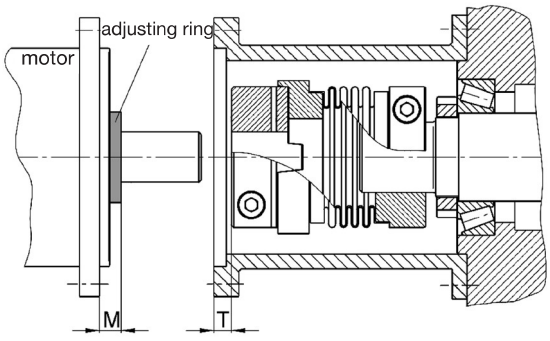
Function:

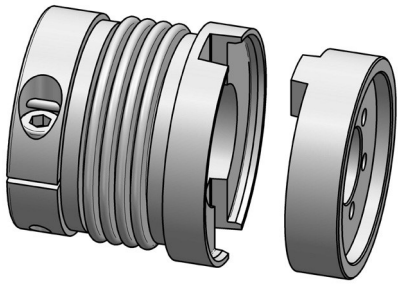
The axial pluggability is achieved by a backlash-free keyway connection in whole metal version (aluminum anodized). For this, one part of the hub is delivered as a conical carrier, the counterpart with a congruent conical keyway. An additional centering element guarantees an exact alignment of both hub halves. To achieve the necessary axial preload of the plug-in connection, the spring tension of the metal bellows is used. For this, the bellow is compressed by 1-1.5 mm during assembly. This means that the unstressed coupling length 'L' (see measuring table) is reduced by the preload value 'V' after assembly. Because of the low preload, the operational values of the metal bellows are not reduced. The resulting residual forces usually have no negative influence on the shaft bearing.



Assembly Notes:

To guarantee optimal performance of the plug-in connection, the preload value of 1-1.5 mm at the metal bellows must be given special care. In most cases, it is sufficient if the designer considers this. Another possibility for the mechanic is, to mount the whole coupling onto the drive shaft before fitting it to the motor (see drawing). With a depth gauge, the distance value 'T' from the bearing surface of the bell to the front-part of the plug-in hub can be measured. The mounting value 'M' on the motor shaft is given by adding the distance value 'T' to the preload value 'V'. In series application, the mounting can be facilitated by a great extent by using a corresponding adjustment ring. If the angular position of the carrier to the keyway does not fit during the plugging-in, the metal bellows may be compressed by some more millimeters (this bellows deformation is allowed in exceptional cases). By slow turning of the drive shaft, the carrier fits the keyway in synchronous position and the coupling is ready for use.





application examble: KPP-flange type for direct gear extension

Metal Bellows Coupling I Series KG

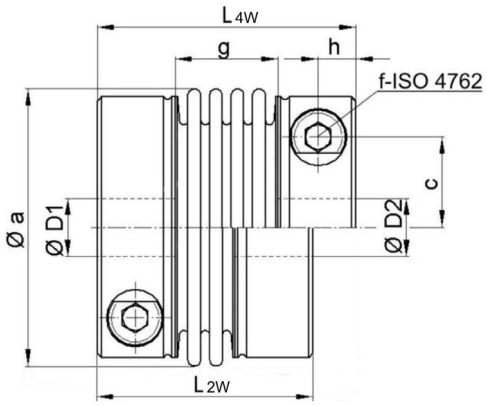
- all-metal version up to 300°C
- wear and maintenance free
- very short and variable design
- torsionally stiff
- simple installation with EASY-clamping hub

technical data:

KG size	T_N [Nm]	moment of inertia [10^{-3}kgm^2]	torsional stiffness [Nm/arcmin]			max. shaft misalignment [mm] axial±			max. shaft misalignment [mm] lateral			axial spring rate [N/mm]			lateral spring rate [N/mm]			nmax. [upm]
			2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	
40	40	0,18	16	9	6	0,3	0,6	0,8	0,1	0,2	0,3	130	70	50	2500	490	190	23000
80	80	0,44	26	14	9	0,3	0,6	0,8	0,1	0,2	0,3	120	70	50	3500	600	260	20000
140	140	0,74	32	20	13	0,3	0,6	1	0,1	0,2	0,3	210	110	80	7000	1200	400	18000
220	220	1,2	50	28	17	0,4	0,7	1	0,1	0,2	0,3	170	95	70	5000	1000	470	16000
400	400	2,6	93	74	47	0,4	0,7	1	0,1	0,2	0,3	170	130	95	7000	1500	500	13000
700	700	5,4	190	106	68	0,4	0,8	1	0,1	0,2	0,3	260	140	100	15000	2800	980	11000
900	900	11	280	156	105	0,4	0,8	1	0,1	0,2	0,3	380	210	140	18000	3050	1000	10000
1300	1300	24	400	225	170	0,4	0,7	1	0,1	0,2	0,3	310	160	120	13000	2100	920	8500
2000	2000	40	400	340	260	0,4	1	1	0,1	0,2	0,3	310	340	250	13000	4800	1600	8500
3000	3000	75	-	700	490	-	1,5	2	-	0,2	0,4	-	290	200	-	4900	1600	6500

Sizes for smaller nominal torques see miniature couplings series MKG
temperature range: -40°C up to +300°C

material:
bellows: stainless steel 1.4571
hubs: steel St 52 - burnished
screws:
ISO 4762 / 12.9



note: connection between bellows and hub by plasma welding
Three standard versions with 2-corrugated metal bellows 2W, 4-corrugated metal bellows 4W or 6-corrugated metal bellows 6W.• Note for size KG 2000/3000: Technical data for bellows version 4W / 6W instead of 2W / 4W

Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

KG	Ø a	c	f-TA	g			h	L			mass	Ø D1/2	Ø D1/2
				2W	4W	6W		2W	4W	6W	~[kg]	min	max
40	56	18	M6-16 Nm	13	23	34	7,5	45	55	66	0,5	12	32
80	66	22,5	M8-40 Nm	16	24	35	9	53	61	72	0,9	14	35
140	71	27	M8-40 Nm	15	25	36	9	52	62	73	1,1	18	42
220	82	27,5	M10-65 Nm	18	28	41	11,5	63	73	86	1,5	20	42
400	101	32	M12-135 Nm	19	30	49	12,5	71	82	101	2,4	22	50
700	122	40	M12-115 Nm	22	37	52	11,5	70	85	100	3,4	42	64
900	132	45	M14-200 Nm	22	38	54	15,5	86	102	118	5,5	42	70
1300	157	54	M16-290 Nm	24	40	56	17,5	95	111	127	8,5	50	90
2000	157	58	M20-450 Nm	24	40	56	22	113	130	146	12	60	90
3000	203	61	2xM16-300 Nm	-	43	61	18/32	-	187	205	19	60	100

• alternative lengths and hub versions are possible on request

order example: KG 40 / 4W D1 = 16 ^{G7} D2 = 24 ^{H7}
KG 400 / 2W D1 = 32 ^{G7} D2 = 35 ^{G7}
KG 2000 / 6W D1 = 65 ^{G7} D2 = 75 ^{G7}

Metal Bellows Coupling I Series KG-VA

- all-stainless steel version up to 350°C
- wear and maintenance free
- very short and variable design
- torsionally stiff
- simple installation with clamping hub

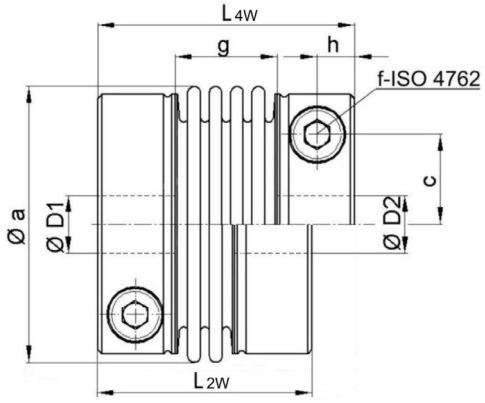
stainless steel

technical data:

KG-VA size	T_N [Nm]	moment of inertia [10^{-3}kgm^2]	torsional stiffness [Nm/arcmin]			max. shaft misalignment [mm] axial±			max. shaft misalignment [mm] lateral			axiale spring rate [N/mm]			lateral spring rate [N/mm]			nmax. [upm]
			2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	
30	30	0,18	16	9	6	0,3	0,6	0,8	0,1	0,2	0,3	130	70	50	2500	450	190	23000
60	60	0,44	26	14	9	0,3	0,6	0,8	0,1	0,2	0,3	120	70	50	3500	600	260	20000
100	100	0,74	32	20	13	0,3	0,6	1	0,1	0,2	0,3	210	110	80	7000	1200	400	18000
180	180	1,22	50	28	17	0,4	0,7	1	0,1	0,2	0,3	170	95	70	5000	1000	470	16000
280	280	2,6	93	52	47	0,4	0,8	1	0,1	0,2	0,3	170	90	95	7000	1300	500	13000
500	500	6,0	190	106	68	0,4	0,8	1	0,1	0,2	0,3	260	140	100	15000	2800	980	11000
1000	1000	24	400	225	170	0,4	0,7	1	0,1	0,2	0,3	310	160	120	13000	2100	920	8500

Sizes for smaller nominal torque see miniature couplings series MKG-VA
temperature range: -40°C up to +350°C

material:
bellows: stainless steel 1.4571 / A4
hubs: 1.4301 / A2
screws: ISO 4762
stainless steel / A4-80
optional: ISO 4762 / 12.9



note: connection between bellows and hub by plasma welding
Three standard variants with 6-corrugated metal bellows 6W, 4-corrugated metal bellows 4W or 2-corrugated metal bellows 2W

Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

KG-VA	Ø a	c	f-TA	g			h	L			mass	Ø D1/2	Ø D1/2
				2W	4W	6W		2W	4W	6W	~[kg]	min	max
30	56	18,5	M6-9(14)	14	23	34	7,5	46	55	66	0,5	14(10)	28
60	66	22,5	M8-24(35)	16	24	35	9	53	61	72	0,9	16(11)	35
100	71	25	M8-24(35)	15	25	36	9	52	62	73	1,1	24(17)	40
180	82	27,5	M10-45(65)	18	28	41	11,5	63	73	86	1,5	28(20)	42
280	101	32	M12-80(115)	19	30	49	12,5	71	82	101	2,4	30(22)	50
500	122	39,5	M14-110(180)	22	37	52	15	82	97	112	3,8	42(28)	62
1000	157	54	M16-180(280)	23	40	56	17,5	94	111	127	8,5	54(42)	90

- clamping hubs generally with stainless steel screws A4-80 without EASY-pin - mind reduced actuation torques
- check transmission torques of hub-shaft connection for diameters below Dmin (further inquiry possible)
- optional: coated screws of property class 12.9 for higher clamping forces or torques see values in brackets
- alternative lenghts or hub versions available on request

order example:	KG-VA 180 / 4W	D1 = 32 G7	D2 = 35 G7	-	stainless steel screws
	KG-VA 30 / 2W	D1 = 16 G7	D2 = 19 G7	-	screws - 12.9 - coated

Metal Bellows Coupling I Series KGH

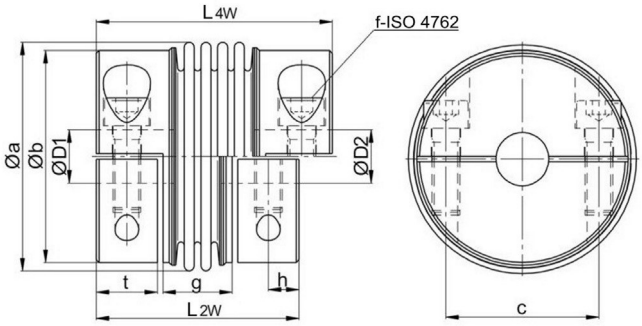
- simple installation - split-hub design
- backlash free - torsionally stiff - wear and maintenance free
- variable length - all-steel-version - up to 350°C

technical data:

KGH size	T_N [Nm]	moment of inertia [10^{-3}kgm^2]	torsional stiffness [Nm/arcmin]			max. shaft misalignment [mm] axial±			max. shaft misalignment [mm] lateral			axial spring rate [N/mm]			lateral spring rate [N/mm]			nmax [upm]
			2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	
20	20	0,045	6	3,4	2,4	0,3	0,4	0,5	0,1	0,15	0,25	100	55	50	2100	360	110	23000
40	40	0,2	9	16	6	0,3	0,6	0,8	0,1	0,2	0,25	130	70	50	2500	450	190	17000
80	80	0,5	26	14	9	0,3	0,6	0,8	0,1	0,2	0,3	120	70	50	3500	600	260	14000
140	140	0,8	32	20	13	0,3	0,6	1	0,1	0,2	0,3	110	210	80	7000	1200	400	13000
220	220	1,4	50	28	17	0,4	0,7	1	0,1	0,2	0,3	170	95	70	5000	1000	470	11000
350	350	3,0	93	52	47	0,4	0,8	1	0,1	0,2	0,3	170	90	95	7000	1300	500	9500
700	700	7,3	190	106	68	0,4	0,8	1	0,1	0,2	0,3	260	140	100	15000	2800	980	8000
1800	1800	46	-	300	260	-	1	1	-	0,2	0,3	-	340	250	-	4700	1600	6000

maximum temperature range: -40°C up to +350°C

material:
bellows: stainless steel 1.4571
hubs: steel St 52
screws: ISO 4762 / 12.9



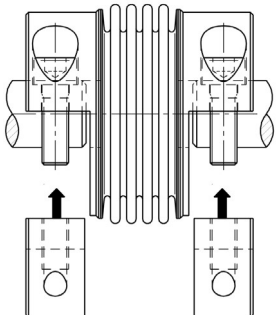
note: Standard versions with 6-corrugated metal bellows 6W, 4-corrugated metal bellows 4W or with 2-corrugated metal bellows 2W -> see values in brackets. Connection of bellows and hubs by micro-plasma welding process.

Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

KGH	Ø a	Ø b	c	f-TA	g			h	L			t	mass	Ø D1/2	Ø D1/2
					2W	4W	6W		2W	4W	6W		~[kg]	min	max
20	40	38	25,5	M5 - 10 Nm	17	22	28	6	45	50	56	12	0,25	8	19
40	56	51	36	M6 - 16 Nm	22	32	42	7,5	56	66	76	15	0,6	12	28
80	66	62	45	M8 - 40 Nm	24	32	43	8	60	68	79	16	0,9	14	35
140	71	71	54	M8 - 40 Nm	23	33	44	8,5	61	71	82	17	1,25	14	42
220	82	76	55	M10 - 80 Nm	27	37	49	11	75	85	97	22	1,8	20	42
350	101	89	64	M12 - 135 Nm	29	40	59	13	83	94	113	24	2,8	22	48
700	122	108	78	M14 - 200 Nm	31	47	62	15	91	107	122	27	4,5	35	62
1800	157	145	108	2x M16 - 300 Nm	-	55	70	18/30	-	190	206	64	15	35	85

Mounting Instructions:

The split-hub design allows for a easy assembly. Further simplification during installation is provided because one half of the split hub is put onto the shaft. This allows that the coupling can rest on the two shaft ends. The second half of the split hub can then be mounted to the coupling by screwing it on from below with the specified tightening torque. This feature makes “one man assembly” possible.



order example: KGH 220 / 4W - D1 = 24 ^{G7} D2 = 30 ^{G7}

Metal Bellows Coupling I Series KG-HS

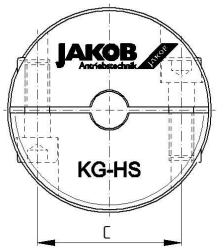
- High-speed version for the highest operating speeds
- Rotationally symmetrical clamping hub for optimum balancing quality

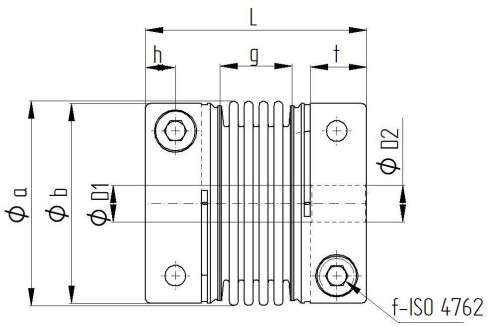
technical data:

KG-HS size	T_N [Nm]	moment of inertia [10^{-3}kgm^2]	torsional stiffness [Nm/arcmin]			max. shaft misalignment [mm] axial±				lateral		axial spring rate [N/mm]			lateral spring rate [N/mm]			nmax [upm]
			2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	
5	5	0,006	1,3	0,9	0,6	0,2	0,3	0,5	0,05	0,1	0,2	135	75	45	2500	400	140	95.000
10	10	0,035	3,3	2,1	1,3	0,3	0,4	0,5	0,1	0,15	0,25	150	85	60	2300	400	130	78.000
40	40	0,27	16	9	6	0,3	0,6	0,8	0,1	0,2	0,25	130	70	50	2500	450	190	40.000
80	80	0,6	26	14	9	0,3	0,6	0,8	0,1	0,2	0,3	120	70	50	3500	600	260	35.000
220	220	1,7	50	28	17	0,4	0,7	1	0,1	0,2	0,3	170	95	70	5000	1000	470	27.000
400	400	3,3	93	74	47	0,4	0,7	1	0,1	0,2	0,3	170	130	95	7000	1500	500	23.000
1000	1000	11	280	156	105	0,4	0,8	1	0,1	0,2	0,3	380	210	146	18000	3050	1000	17.000

maximum temperature range: -40°C up to +350°C

material:
bellows: stainless steel 1.4571
hubs : Size 5 – 10 stainless steel 1.4301 / size 40 – 400 steel (St52)
screws: ISO 4762 / 12.9





note: Connection of bellows and hubs by micro-plasma welding process.
Three standard variants with 2-corrugated metal bellows 2W, 4-corrugated metal bellows 4W or 6-corrugated metal bellows 6W.

Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

KG-HS	Ø a	Ø b	c	f-TA	g			h	L			t	mass approx.	Ø D1/2	Ø D1/2
					2W	4W	6W		2W	4W	6W		[kg]	min	max
5	24	25,5	16	M3 - 2 Nm	6	11	14	5	33	38	41	10	0,073	6	12
10	34	37	22	M5 - 8 Nm	11	16	23	6,5	48	53	60	13	0,21	8	16
40	56	57	40	M6 - 14 Nm	14	24	34	7,5	56	66	76	15	0,62	10	32
80	66	67	46	M8 - 35 Nm	16	24	35	9,5	66	74	85	18,5	1	12	35
220	82	84	58	M10 - 65 Nm	19	29	41	12	79	89	101	22,5	1,8	16	45
400	101	92	65	M12 - 115 Nm	19	34	49	13	88	103	118	26	2,5	20	50
1000	132	123	92	M14 - 185 Nm	22	38	54	15	96	112	128	28	5,5	32	75

Øb: Projecting edge - screw head
Note: We recommend additional balancing from an operating speed of around 0.3 x nmax. This allows a balancing quality of G 2.5 can be achieved.

order example: KG-HS 5 / 4W - D1 = 8 ^{G7} D2 = 10 ^{G7}
KG-HS 220 / 6W - D1 = 24 ^{G7} D2 = 30 ^{G7}

Metal Bellows Coupling I Series KSD

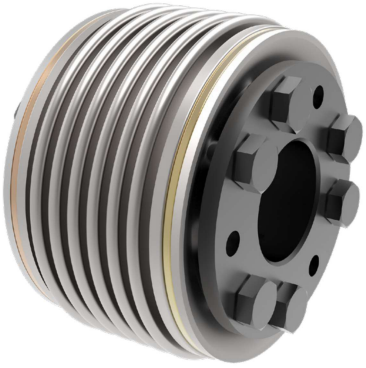
6-corrugation bellows ◢ short design ◢ conical bush on both sides

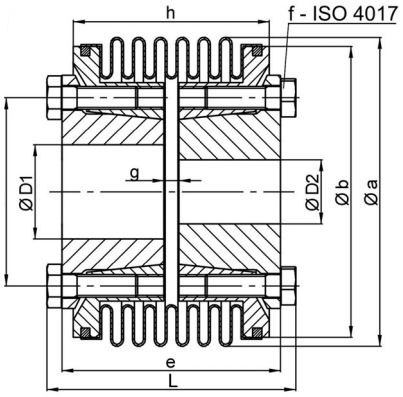
technical data:

KSD size	T_N [Nm]	moment of inertia [10^{-3}kgm^2]	torsional stiffness [Nm/arcmin]	max. shaft misalignment [mm] axial±	lateral	axial spring rate [N/mm]	lateral spring rate [N/mm]	tightening torque screws "f" [Nm] (*)	nmax. [upm]
10	10	0,03	2,1	0,6	0,15	20	93	3	30000
20	20	0,1	5,5	0,8	0,25	51	190	3	23000
35	35	0,1	6	0,8	0,25	51	190	3	23000
60	60	0,3	9	0,9	0,3	49	260	10	20000
80	80	0,9	14	1	0,3	48	220	10	16000
170	170	0,9	18	1	0,3	80	400	10	16000
270	270	2,5	32	1	0,3	70	450	25	13000
400	400	2,8	47	1	0,3	100	640	25	13000
600	600	5,5	67	1	0,3	100	980	50	11000
900	900	10	105	1	0,3	145	1000	50	10000
1300	1300	20	170	1	0,3	130	920	90	8500
2500	2500	103	450	1	0,3	170	1350	210	6500
4000	4000	110	700	3	1,2	480	5000	210	6500

note: KSD size 4000 with 4-corrugation-bellows and shrink disc clamping hub (up to Dmax = **Ø 130mm**)
temperature range: -40°C up to +300°C
• for higher torques see series KXL

material:
bellows: stainless steel
hubs: heat treated steel
screws: ISO 4017 / 10.9





Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

KSD	Øa	Øb	Øc	e	6 x f	g	h	L	mass ~ [kg]	ØD1/2 min	ØD1/2 max	prebored
10	40	34	27	45	M 4	7	33	51	0,22	6	16	5
20	56	52	30	48	M 4	12	44	54	0,4	10	19	8
35	56	52	30	48	M 4	12	44	54	0,4	10	19	8
60	66	62	36	53	M 6	5	47	61	0,8	12	24	11
80	82	78	50	58	M 6	4	52	66	1,3	18	35	17
170	82	78	50	60	M 6	6	54	68	1,3	20	35	17
270	101	96	62	68	M 8	2	58	79	2,4	28	42	25
400	101	96	62	74	M 8	8	64	85	2,5	30	42	25
600	122	112	70	78	M 10	6	68	91	3,6	35	50	28
900	132	127	83	94	M 10	6	76	107	5,5	40	60	34
1300	157	140	98	96	M 12	6	78	111	7,7	40	75	38
2500	203	194	144	147	M 16	8	97	167	22	50	102	49
4000	203	173	144	223	M 16	84	174	243	23	60	102	49

order example: KSD 270 - D1 = 42 ^{G6} D2 = 30 ^{H7}

Metal Bellows Coupling I Series KSS

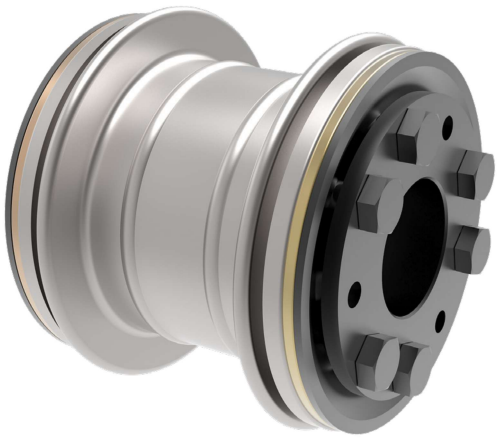
straight bellows ◢ conical bush on both sides ◢ low restoring forces ◢ high torsional stiffness

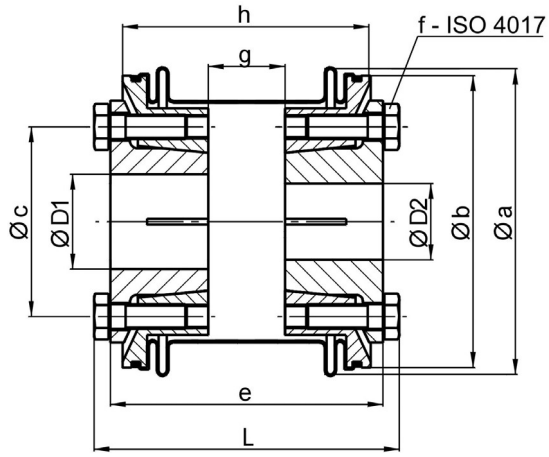
technical data:

KSS	T_N	moment of inertia	torsional stiffness	max. shaft misalignment [mm]		axial spring rate	lateral spring rate	tightening torque screws "f"	nmax.
size	[Nm]	[10^{-3}kgm^2]	[Nm/arcmin]	axial±	lateral	[N/mm]	[N/mm]	[Nm] (*)	[upm]
25	25	0,1	10	0,3	0,2	150	150	3	23000
50	50	0,1	11	0,3	0,2	160	170	3	23000
65	65	0,3	13	0,3	0,3	90	80	10	20000
100	100	0,75	24	0,5	0,4	100	95	10	18000
200	200	0,84	30	0,3	0,3	220	120	10	16000
300	300	2,3	53	0,4	0,3	210	160	25	13000
450	450	2,4	80	0,4	0,3	300	260	25	13000
540	540	4,8	100	0,5	0,5	300	360	50	11000
850	850	18	160	0,7	0,6	200	170	90	8500
1500	1500	19	290	0,6	0,5	520	490	90	8500
2500	2500	100	700	0,4	0,5	520	590	210	6500

temperature range: -40°C up to +300°C
for higher torques see series KXL

material: *hubs: heat treated steel*
screws: ISO 4017 / 10.9 *bellows: stainless steel*





Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

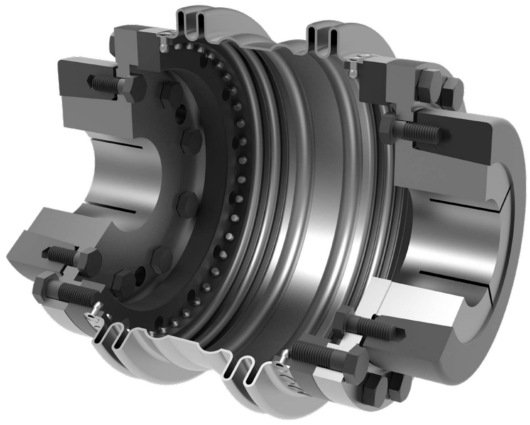
KSS	Øa	Øb	Øc	e	6 x f	g	h	L	mass ~ [kg]	ØD1/2 min	ØD1/2 max	prebored
25	56	52	30	51	M 4	15	47	57	0,4	10	19	8
50	56	52	30	51	M 4	15	47	57	0,4	12	19	8
65	66	62	36	61	M 6	13	55	69	0,7	12	24	11
100	82	78	50	70	M 6	16	64	78	1,2	18	35	17
200	82	78	50	76	M 6	22	70	84	1,25	22	35	17
300	101	96	62	89	M 8	25	81	101	2,2	28	42	25
450	101	96	62	89	M 8	25	81	101	2,3	28	42	25
540	122	112	70	98	M 10	26	88	111	3,4	35	48	28
850	157	140	98	137	M 12	44	119	152	7,5	40	70	38
1500	157	140	98	137	M 12	44	119	152	7,7	42	70	38
2500	203	194	138	211	M 16	72	161	231	23	50	102	49

order example: KSS 450 - D1 = 28 ^{H7} D2 = 35 ^{F6}

Metal Bellows Coupling I Series KXL

for high torques up to 70.000 Nm ◢ backlash-free, exact torque transfer ◢ high torsional stiffness ◢ low moments of inertia ◢ high tolerance of shaft misalignments ◢ three-part construction ◢ easy to fit ◢ variable in use

The metal bellows couplings of the series KXL are constructed for medium size to big drives of up to 70.000 Nm. Although this type of coupling has proven itself reliable for years, the series was completely redesigned in order to make it even more attractive regarding technical parameters as well as the aspect of costs. It is very special because of the three-part construction with a flexible intermediate piece (bellows). This intermediate piece can be disassembled. It consists of an optimal torsionally stiff stainless steel bellows with 2 bellows shafts on each side and an intermediate pipe which is variable in length. The connection with the two hubs is frictionally engaged (screws acc. to ISO 4017/10.9). Therefore, assembly is much easier, as in case of inspection or service, the heavy drive unit or the output unit need not be disassembled. The designer can choose between several hub variations (see selection table). The very good moment of inertia and the rotation symmetrical design ensure good dynamic operation characteristics. KXL couplings are most suitable for precise drives, such as those used in printing machines, cross cutters, main spindle drives, transfer axes or used in combination with gearboxes. Medium transport or a parallel drive chain through the coupling interior is possible.



material:
bellows: stainless steel
flange: heat-treated steel - oxidized
hubs: heat-treated steel - oxidized

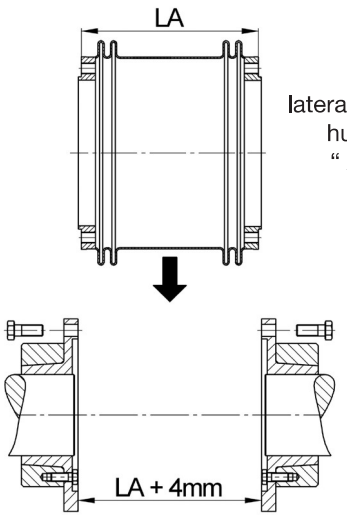
technical data:

KXL	nominal torque	maximum torque	torsional stiffness CT	spring rate		max. shaft misalignment [mm]			nmax.
				axial	angular	axial±	angular	lateral	
Size	T_N [Nm]	T_{max} [Nm]	[Nm/arcmin]	C_a[N/mm]	C_W [N/°]	d_a [mm]	d_W [°]	d_r [mm]	[upm]
4	4000	7000	620	480	35	2,5	1,4	1,0	6000
6,5	6500	11000	1100	550	55	2,5	1,3	1,1	5000
9	9000	15000	1800	550	60	2,5	1,4	1,1	4500
12	12000	17000	2200	490	85	3,5	1,4	1,5	4000
18	18000	26000	3900	530	130	4	1,5	1,6	3500
32	32000	45000	7200	900	180	4	1,4	1,6	2500
50	50000	70000	13500	950	230	4	1,5	1,6	2000

maximum temperature range: -40°C up to +300°C

KXL	mass			moments of inertia		
	per hub A/B	per hub F/G	bellows	per hub A/B	per hub F/G	bellows
Size	m_A/m_B [kg]	m_F/m_G [kg]	m_{BP} [kg]	J_A/J_B [kgm²]	J_F/F_G [kgm²]	J_{BP} [kgm²]
4	8	3	5,7	0,04	0,02	0,04
6,5	12	5	8,0	0,07	0,04	0,08
9	16	6,5	10,5	0,12	0,07	0,14
12	21	8	14	0,17	0,08	0,24
18	31	11	20	0,37	0,18	0,47
32	52	20	30	0,94	0,53	1,12
50	95	30	45	2,5	1,4	2,65

note: The technical data corresponds to bellows with standard length ‘L16’ or ‘LA’. Different lengths are available on request



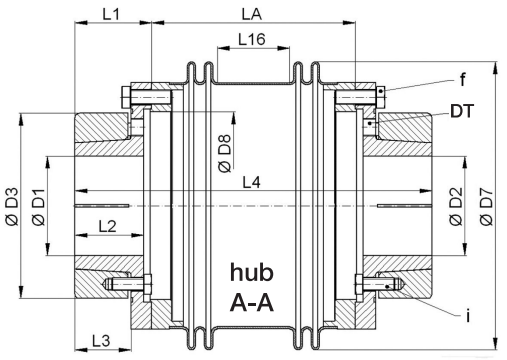
lateral mounting hub type “ A - A “

Metal Bellows Coupling I Series KXL

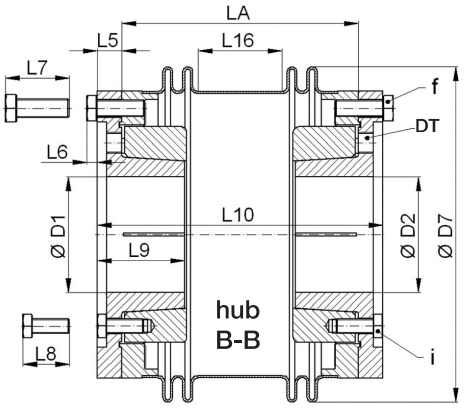
Dimensions [mm]:
length dimensions according to DIN ISO 2768 cH

Size	4	6,5	9	12	18	32	50
D1 min	60	60	70	80	100	120	140
D2 max	90	100	108	130	150	170	220
D3	157	168	190	205	247	296	380
D5	167	198	256	273	322	406	505
D7	203	236	259	319	372	460	561
D8	152	183	193	208	250	325	416
L1	62	70	77	85	91	105	120
L2	53,5	60,5	66	74	79	93	108
L3	46	50	54	62	66	78	88
L4**	286	321	351	399	442	497	537
L5	-	20	23	23	25	27	30
L6	-	7,5	8,8	10	11,5	12,5	12,5
L7	-	43	48,8	55	62	68	72,5
L8	-	38	48,8	44	55	55	66,5
L9	-	68	75	83	89	103	118
L10**	-	217	239	271	306	337	357
L12**	-	267	293	333	372	415	447
L16*	41	50	59	80	100	110	120
LA ±2	158	177	193	225	256	283	297
L18	21	24	25	25	30	30	34
L20**	164	188	200	232	266	288	304
L21	21	24	25	25	30	30	34
f	12 x M10	12 x M12	12 x M14	14 x M16	12 x M18	12 x M20	16x M20
i	10x M10	8x M12	8x M14	9x M14	8x M16	10x M16	12x M20
DT***	4x M10	4x M12	8x M14	9x M14	8x M16	5x M20	6x M20
TA-f [Nm]	65	115	180	250	350	500	500
TA-i [Nm]	65	115	180	180	250	250	400

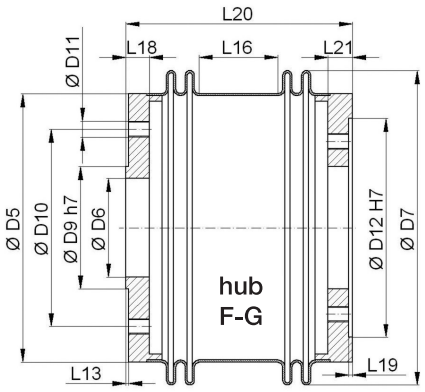
*standard length - intermediate part
**overall length for standard length L16
***draw-off thread



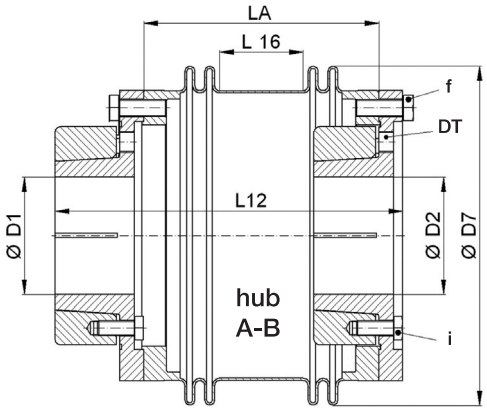
hub type A:
frictional, backlash-free conical clamping ring connection, external free lateral disassembly of the bellow part. The elongation of total length "L4" of the intermediate pice of 4 mm at mounting is already taken into consideration (see mounting picture)



hub type B:
frictional, backlash-free conical clamping ring connection, internal free lateral disassembly of the bellows part is NOT possible



hub type F/G:
attached flange acc. to ISO 9409 or customer requirements - center outside or inside. Dimensions of flange hub types F and G of L13, L19 and D6, D9, D10, D11, D12 customized



hub type A/B:
frictional, backlash-free conical clamping ring connection - external - internal - free lateral disassembly of the bellows part is NOT possible

order example: KXL 6,5 – AA / L4 = 318 / D1 = 80^{H7} / D2 = 90^{H7}
KXL 13,5 – BG / L16 = 200 / D1 = 120^{G6} / D2 = customer specific

Metall Bellows Coupling I Series KPS

- 4-corrugation bellows
- simple installation with lateral EASY-clamping hub
- expanding cone hub for direct mounting

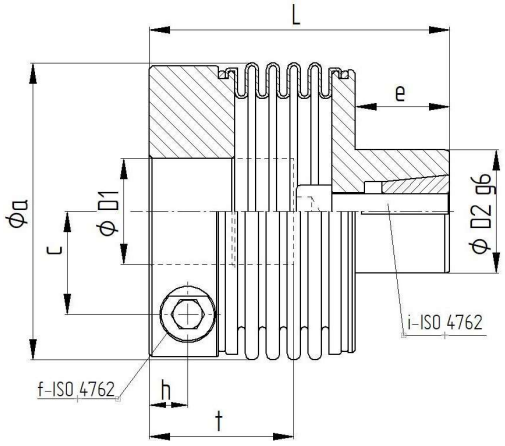
technical data:

KPS	T_N	moment of inertia	torsional stiffness	max. shaft misalignment (mm)		axial spring rate	lateral spring rate	tightening torque of screws	nmax.
size	[Nm]	[10^{-3}kgm^2]	[Nm/arcmin]	axial±	lateral	[N/mm]	[N/mm]	[Nm] (*)	[upm]
2	2	0,01	0,4	0,25	0,1	32	100	2/2	38000
8	8	0,026	1,9	0,5	0,15	20	90	8/8	24000
20	20	0,13	7	0,5	0,2	70	480	14/14	17000
60	60	0,25	13	0,6	0,2	70	650	35(30)*/35	16000
170	170	0,71	27	0,8	0,2	100	1000	65(50)*/65	12000
400	400	1,9	64	0,7	0,2	135	1500	115(90)*/115	10000
600	600	4,1	107	0,7	0,2	145	3000	180(140)*/180	8000

(*) note: reduced tightening torque for bigger hub bore diameter - see also Ø D 1max!

material:
bellows: stainless steel
hubs: high-tensile aluminum
expanding cone: heat-treated steel

screws: ISO 4762 / 12.9
temperature range:
-40°C up to +200°C

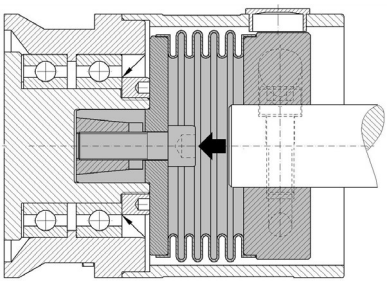


Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

KPS	Ø a	c	e	f/i	h	L	tmin	tmax	mass	Ø D1		Ø D2	
									~ [kg]	min	max	min	max
2	24,5 [27,5]	7,5	10	M 3	4,4	38	10,5	18	0,03	3	10 [14]	8	12
8	39,5 [44,5]	13	20	M 5	6	61	14	31,5	0,16	6	19 [24]	13	20
20	56	19	23	M 6	8	71,5	17	34	0,38	8	32	15	24
60	66	22	26	M 8	9	78	19	36	0,5	13	28 (35)	20	28
170	82	28,5	30	M 10	11,5	92	23	43	0,9	18	32 (43)	24	35
400	101	35	32	M 12	13	102	28	50	1,5	28	42 (55)	32	42
600	122	42	42	M 14	16	120,5	30	55	2,5	32	55 (68)	35	48

note: The corresponding shaft bores for the expansion cone pin Ø D2 g6 with manufacturing tolerance H7.
Size KPS2 / KPS 8 without EASY version available with larger hub bores [see square brackets]

mounting instructions: To avoid damage to the metal bellows during installation avoid, the axial assembly force should not act on the clamping hub, but on the conical screw are exercised.



application example: compact and integrated attachment of a KPS

order example: KPS 20 - D1 = 15 ^{H7} - D2 = 20 g6

Metal Bellows Coupling I Series KHS

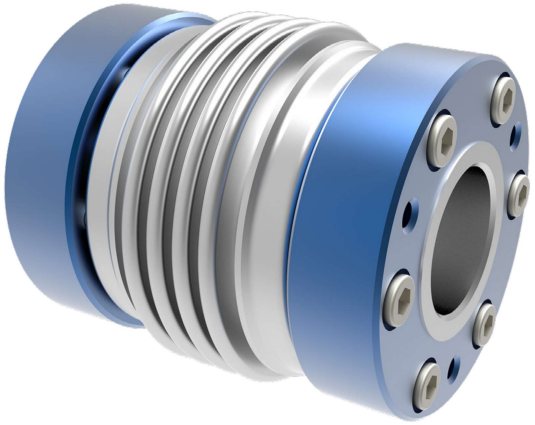
- high-speed version for highest operating speeds
- rotationally symmetrical construction - optimum balance quality
- conical clamping ring hubs on both sides / 4-bladed metal bellows
- corrosion-resistant material version

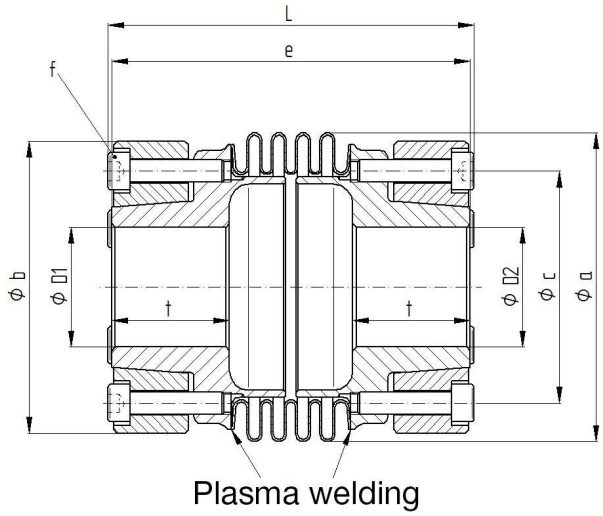
technical data:

KHS Size	nominal torque [Nm]	moment of inertia [10-3kgm2]	torsional stiffness (stat. 0,5 x T_N) [Nm/arcmin]	max. shaft displacement (mm) axial	± lateral	axial spring rate [N/mm]	lateral spring rate [N/mm]	mass approx. [kg]	maximum rotational speed [Upm]
25	25	0,04	3,4	0,5	0,1	55	360	0.25	57000
50	50	0,18	9	0,6	0,1	70	450	0,5	40000
80	80	0,5	26	0,6	0,1	70	600	1,0	35000
220	220	1,1	37	0,6	0,1	150	1600	1,5	28000
450	450	3,0	70	0,7	0,1	135	1500	3,0	23000
700	700	7,0	100	0,7	0,1	145	3000	4,5	19000

temperature range: -40°C up to +200°C

material:
bellows: stainless steel 1.4571
conical hub: stainless steel 1.4301
conical ring: high-tensile aluminum
screws: ISO 4762





Dimensions [mm]: length dimensions accoring to DIN ISO 2768 cH

KHS size	Øa	Øb	Øc	L ±1	e ±1	f-max. torque	t1 / t2	ØD1/2 min	ØD1/2 max
25	40	38	27	67	63	6x M4 - 3Nm	22	5	15
50	56	53	40	74	72	6x M4 - 4Nm	23	9	22
80	66	66	52	81	80	6x M5 - 8Nm	27,5	11	32
220	82,5	78	62	98	95	6x M6 - 14Nm	31,5	14	40
450	101	98	78	113	109	6x M8 - 30Nm	38	15	48
700	122	113	91	132	129	6x M10 - 50Nm	45	19	60

note: Optionally balanced with balancing quality „Q1“. Larger sizes on request.

order example: KHS 80 - D1 = 16 ^{G7} D2 = 24 ^{H7}

Metal Bellows Coupling I Series KGE

- for standardized interface connection DIN - EN - ISO 9409 - 1
- two-part connection flange - compact design - temperatures up to 300°C
- simple installation with lateral EASY-clamping hub at output side

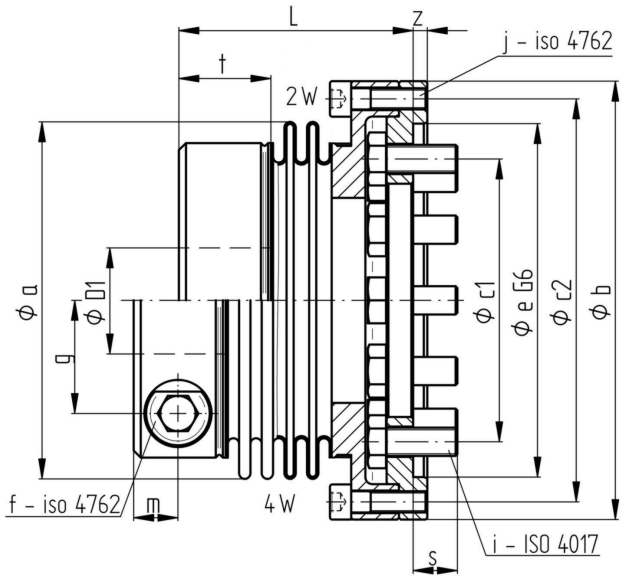
technical data:

KGE size	nominal torque [Nm]	ISO 9409 inter-face	moment of inertia [10^{-3}kgm^2]	torsional stiffness [Nm/arcmin]			max. shaft misalignment [mm] axial±				lateral		axial spring rate [N/mm]			lateral spring rate [N/mm]			tightening torque screws [Nm]			nmax [upm]
				2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	f	i	j	
40	40	A-31,5	0,2	6	3,4	6	0,3	0,5	0,8	0,1	0,15	0,25	100	55	50	2100	360	190	16	8	4	23000
140	140	A-50	1,2	32	20	13	0,3	0,6	1	0,1	0,2	0,25	210	110	80	7000	1200	400	40	14	8	18000
220	220	A-63	2	50	28	17	0,4	0,7	1	0,1	0,2	0,3	170	95	70	5000	1000	470	80	14	14	16000
350	350	A-80	4,2	93	52	47	0,4	0,8	1	0,1	0,2	0,3	170	90	95	7000	1300	500	135	35	14	13000
700	700	A-100	9,1	190	106	68	0,4	0,8	1	0,1	0,2	0,3	260	140	100	15000	2800	980	115	65	35	11000
1300	1300	A-125	34	400	225	170	0,4	0,7	1	0,1	0,2	0,3	310	160	120	4700	1900	920	300	65	35	8500
2000	2000	A-125	42	-	300	260	-	1	1	-	0,2	0,3	-	340	250	-	4700	1900	450	65	35	8500

Standard versions „6W“ with 6-corrugated metal bellows „4W“ with 4-corrugated metal bellows; „2W“ with 2 corrugated metal bellows

• permissible maximum torque = 2 x nominal torque • maximum permissible operating speeds up to 20,000 rpm size

Material:
bellows: stainless steel
flange ring: heat treated steel - carbonized
clamping hub / flange hub: steel (St 52)
screws: ISO 4762/12.9
ISO 4017/10.9



Dimensions [mm]: length dimensions according to DIN ISO 2768 cH

KGE	Ø a	Ø b	Ø c1	Ø c2	e	f-TA	g	i	j	L			m	s	t	z	mass	Ø D1	
										2W	4W	6W					~ [kg]	min	max
40	56	63,5	31,5	56,5	40	M6	18	8xM5	8xM4	46	57	67	7,5	7	16	2,5	0,6	12	32
140	71	88,5	50	80	63	M8	27	8xM6	8xM5	54	64	74	9	9,5	18,5	4	1,3	18	42
220	82	104	63	94	80	M10	27,5	12xM6	8xM6	59	71	84	11,5	10,5	22,5	4	1,7	20	42
350	101	124	80	114	100	M12	32	12xM8	12xM6	67	79	98	12,5	12,5	26	4	2,6	22	50
700	122	155	100	142	130	M12	40	12xM10	12xM8	73	89	103	11,5	15,5	24	4	4,3	42	64
1300	157	184	125	171	160	M16	54	12xM10	16xM8	90	107	124	17,5	18,5	35	4	7,5	45	90
2000	157	184	125	171	160	M20	58	12xM10	16xM8	-	117	133	22	18,5	45	4	9	60	90

order example:	KGE 350 / 4W	ØD1 = 38 G7	/	for ISO 9409 - interface A-80
	KGE 140 / 2W	ØD1 = 28 G7	/	for ISO 9409 - interface A-50

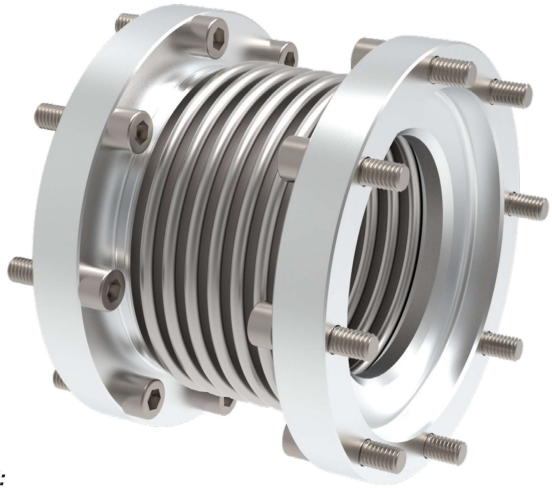
Metal Bellows Couplings I Series KE

- with flange hub on both sides for variable attachment / 2 - 4 - 6 corrugated metal bellows
- optimal balance quality / high operating speeds / rotationally symmetrical design

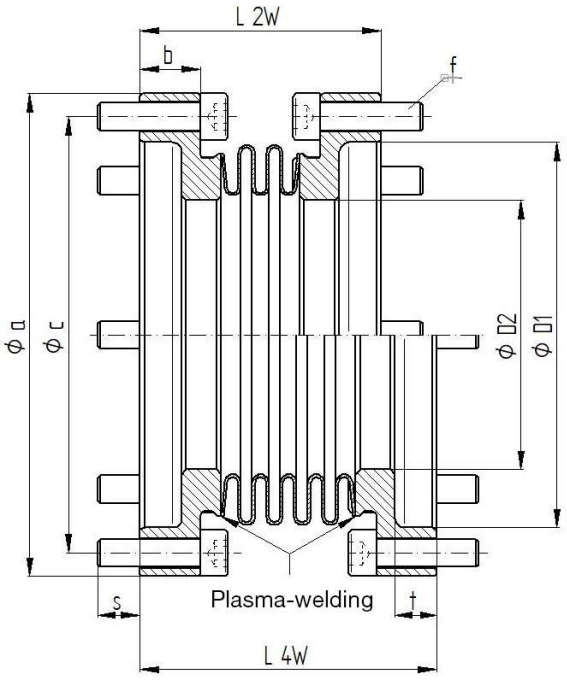
technical data:

KE	nominal torque	moment of inertia	torsional stiffness [Nm/arcmin]			max. shaft displacement (mm) axial ±			lateral			axial spring rate [N/mm]			lateral spring rate [N/mm]			nmax
size	[Nm]	[10-³kgm²]	2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	2W	4W	6W	[upm]
40	40	0,17	16	9	6	0,3	0,5	0,8	0,1	0,15	0,3	130	75	50	2800	490	160	40000
80	80	1,0	26	14	9	0,3	0,6	0,8	0,1	0,2	0,3	120	70	50	3500	600	260	35000
140	140	1,0	32	20	13	0,3	0,6	1,0	0,1	0,2	0,25	210	110	80	7000	1200	400	32000
220	220	2,1	50	28	20	0,4	0,7	1,0	0,1	0,2	0,25	170	95	70	5000	1000	330	27000
400	400	4,0	93	68	47	0,4	0,8	1,0	0,1	0,15	0,3	170	135	95	7900	1500	500	22000
700	700	11,6	190	106	68	0,4	0,8	1,0	0,1	0,2	0,3	260	140	100	15000	2800	980	18000
2000	2000	25	430	325	225	0,4	1,0	1,0	0,1	0,25	0,4	310	340	250	13000	4700	1600	14000

temperature range: -40°C up to +300°C



material:
bellows: stainless steel 1.4571
flange hub: Steel (St 52)
screws: ISO 4762
optional ISO 4017



Dimensions [mm]: length dimensions accoring to DIN ISO 2768 cH

KE	Øa	Øb	Øc	L ±1			f	max. torque	s	t	mass	ØD1	ØD2
size				2W	4W	6W		[Nm]			~ [kg]	(G7)	(G7)
40	63,5	3,5	56,5	42	52	62	8x M4	4	6,5	6,5	0,29	43	35
80	88,5	11	80	57	65	76	8x M5	8	9	7,5	0,85	68	45
140	88,5	11	80	48	58	69	8x M5	8	9	7,5	0,8	68	48
220	104	13	94	54	64	76	8x M6	14	9	9	1,1	83	58
400	124	13,5	114	57	72	87	12x M6	14	8,5	9,5	1,5	104	70
700	155	15	142	64	80	94	12x M8	35	10	10,5	2,8	125	90
2000	184	16	171	72	88	105	16x M8	35	14	11	4,1	156	120

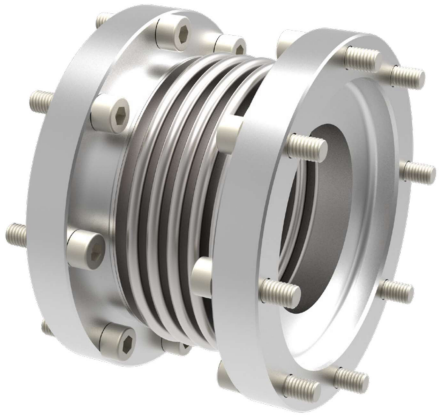
note: Special flange designs with customer-specific dimensions are possible on request.

order example: KE 400 / 4W D1=110 ^{G6} / D2=50 ^{G6} / t=5 / b=15 / c=120 - 8xM8 / L=75

Metal Bellows Couplings I Further Series

Based on series KE with flange hubs

- screw connection - external or internal
- customized version on request
- variable dimension / all metal bellow versions possible



Combination KM/KSD

- for connection of drive shafts with different shaft diameters - clamping hub for big diameters,
- conical clamping hub for small diameters

Form-fitted hub version

- clamping hub additional with keyway
- special hubs with internal toothing such as DIN 5480
- low-backlash pluggable or slide mounting for profile shafts
- as forced rotation due to overload (observe Tmax of metal bellow)
- optional for all series on request

Forced rotation for bellow breaking protection

- bellow breaking protection by intern forced rotation (claw stop) for increased system stability in case of malfunction of the metal bellow due to overload or incorrect high shaft misalignment, Generally possible as special solution for all series