

Distance Couplings



Distance Couplings | General

Definition - Distance Couplings:

This category is comprised of several backlash-free coupling series with metal bellows or elastomer spider which can cover axial distances of up to 6 m of length. The common main feature of all types is an intermediate part, which is variable in length and can precisely fit the required specifications of the customer. In many cases, they can be used as connecting shaft (synchronizing shaft) and can substitute for conventional constructions of connecting shafts with complicated additional intermediate bearings.

Misalignments, especially parallel misalignments, can be compensated to a higher extent. Furthermore, the stainless material and the easy assembly of all series are valuable assets. A secure, frictional connection with easy operation is assured because of the design in split-hub version (series WD) or with sliding hub (series EKHZ).



Characteristics – JAKOB Distance Couplings:

- /// as connecting shaft without additional intermediate bearing
- /// up to 6 m axial distance // high operational speed
- /// high torsional stiffness // backlash-free, precise torque transfer
- /// compensation of misalignments
- /// very easy to fit split-hub design
- /// optional stainless design // maintenance free

Series EKHZ - Elastomer spider

- /// length L = 0,2 - 3 m
- /// 7 sizes up to 1600 Nm
- /// T max = 90°C
- /// cost-effective type for medium speeds

Series WDZ - Metal bellows

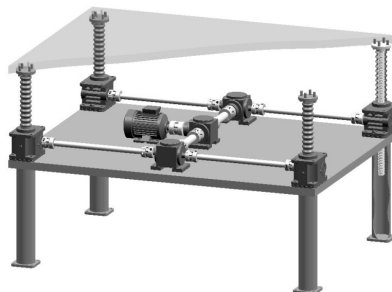
- /// lengths from 105 to 450 mm
- /// 7 sizes up to 1600 Nm
- /// T max = 200°C
- /// alternative to WD / WDS for short lengths

Series WD-VA - Metal bellows

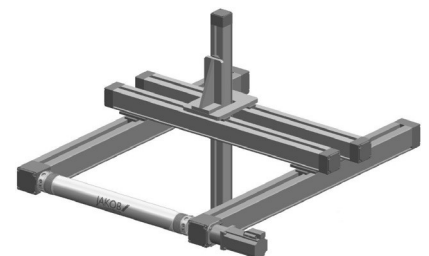
- /// length L = 0,2 - 3 m
- /// 7 sizes up to 1200 Nm
- /// T max = 350°C
- /// stainless steel version

Series WD/WDS - Metal bellows

- /// WD: length L = 0,2 - 4 m | T max = 90°C
- /// WDS: length L = 0,2 - 6 m | T max = 200°C
- /// 7 sizes up to 1600 Nm
- /// integrated gimbal / cardan support
- /// big pipe diameter for max. speeds
- /// high torsional stiffness



EKHZ - coupling for efficient torque transfer



WDS - coupling for multi-axis misalignment

Distance Couplings I Installation

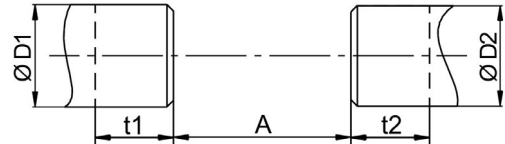
Installation:

The split-hub design allows for easy assembly. Further simplification during installation is provided because one half of the split hub is screwed onto the pipe. This allows resting the coupling 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 even with extremely long couplings. During maintenance, EKZ/WDS/WDE couplings can be exchanged without disassembling the drive or output units.

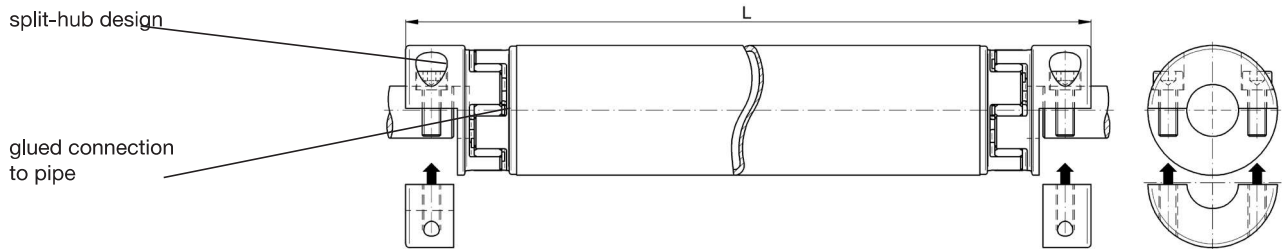
Formula for length determination:

$$L = A + t_1 + t_2 \quad [\text{mm}]$$

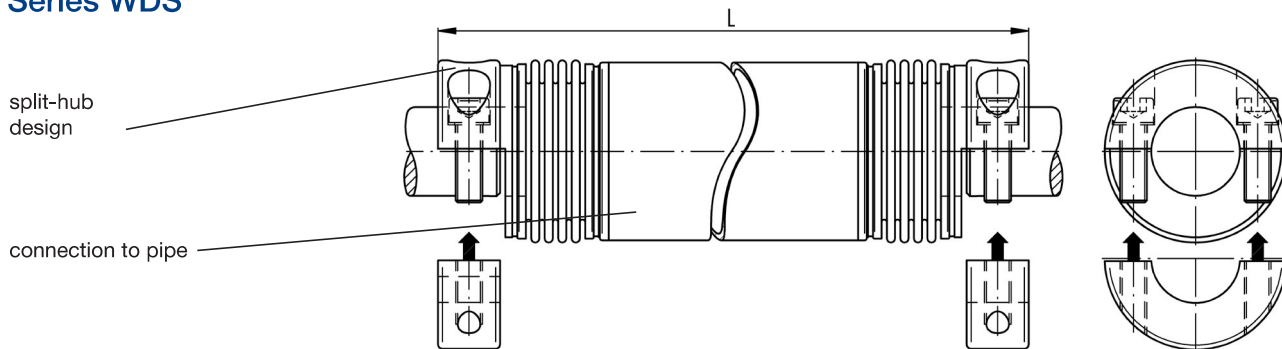
A = shaft separation ± 1
 t = plug in depth ± 1
 (see data sheets)



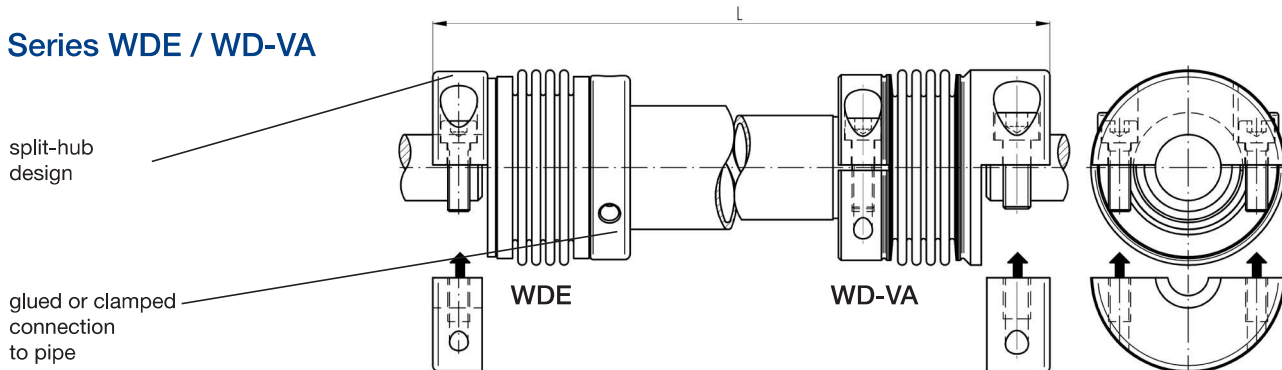
Series EKHZ



Series WDS



Series WDE / WD-VA



Note: The intermediate pipe can be delivered in different materials and section thicknesses, as well as in straightened and balanced quality for high speeds.

Metal Bellows Coupling with Intermediate Pipe | WD / WDS

- backlash-free, precise torque transfer
- no additional intermediate bearing
- high-speed and torsional stiffness
- simple installation

series WD: Variable length up to 4 m / Tmax = 90°C

series WDS: Variable length up to 6 m / Tmax = 200°C

technical data:

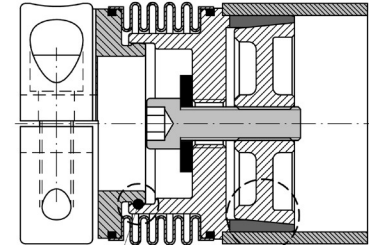
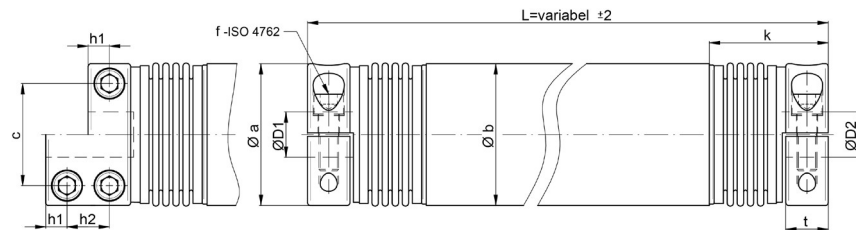
WD WDS size	T _N [Nm]	torsional stiffness [Nm/arcmin]				moment of inertia [10 ⁻³ kgm ²]				max. speed approx. [min ⁻¹]				mass approx. [kg]			
		1m	2m	3m	4m	1m	2m	3m	4m	1m	2m	3m	4m	1m	2m	3m	4m
15	15	0,4	0,2	0,15	-	0,2	0,4	0,6	-	3900	880	370	-	0,9	1,5	2,3	-
50	50	1,5	0,8	0,6	0,5	0,9	1,6	2,2	2,9	6000	1300	550	300	1,8	3	4,3	5,5
100	100	2,6	1,5	1,0	0,8	1,8	2,9	4,1	5,3	7300	1600	670	360	2,5	4	5,5	7
200	200	5,9	3,5	2,5	1,9	5,3	9,1	13	17	8000	2100	900	500	3,8	6	8	10
400	400	17	10	7,5	6	12	21	31	40	8000	2700	1100	600	7	11	15	19
800	800	26	16	11	9	32	48	64	80	8000	3400	1400	760	15	20	25	30
1600	1600	61	37	27	21	116	150	190	230	8000	4800	2000	1100	31	38	44	51

maximum temperature range: -40°C up to +200°C | series WD: -40°C up to +90°C

maximum axial shaft misalignment: $\Delta A = \pm 1,5 \text{ mm}$ maximum angular shaft misalignment: $\alpha = 1^\circ$

maximum lateral shaft misalignment: $\Delta R = \tan \alpha \cdot L_x$ with $L_x = L - (2 \cdot k) / \tan 1^\circ = 0,0174$

note: lengths of over 4 m and in-house production of intermediate pipe are possible on request



integrated gimbal
intermediate tube
support

Coupling pipe connection
WDS: Expansion cone clamping
WD: high-strength adhesive

material:

bellows: stainless steel

hubs: sizes 15 - 400: high-tensile aluminum / sizes 800-1600: steel - oxidized

precision intermediate pipe: high tensile aluminum

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

WD/ WDS size	Øa	Øb	c	f-tightening- torque*	h1	h2	k	t	L _{min}	ØD1/2 min	ØD1/2 max(*)
15	36	35	21	2x M5 - 8Nm	9	-	54	18	160	6	15
50	58	50	36	2x M8 - 35Nm	13	-	67	26	190	9	25
100	75	60	47	2x M10 - 65Nm (50)*	13	-	69	26	210	12,5	31 (35)*
200	89	80	56	2x M12 - 115Nm (80)*	14	-	77	28	220	19	34 (42)*
400	109	100	72	2x M14 - 180Nm (140)*	15	-	84	30	240	24	48 (55)*
800	123	120	80	4x M12 - 115Nm	13	22	101	45	300	24	65
1600	158	160	108	4x M16 - 290Nm	18	30	125	64	360	35	85

• Øa: interfering edge - bolt head

• (*) note: reduced tightening torque (see brackets) for bigger hub bore diameter - see also Ø D 1/2max!

• Size 15 only as WDS type / pipe diameter Øb with WD-800 = 110mm or WD 1600 = 150mm

order example: WDS 400 - D1 = 28^{F6} D2 = 38^{F6} L = 1850
WD 100 - D1 = 18^{F6} D2 = 24^{F6} L = 1220

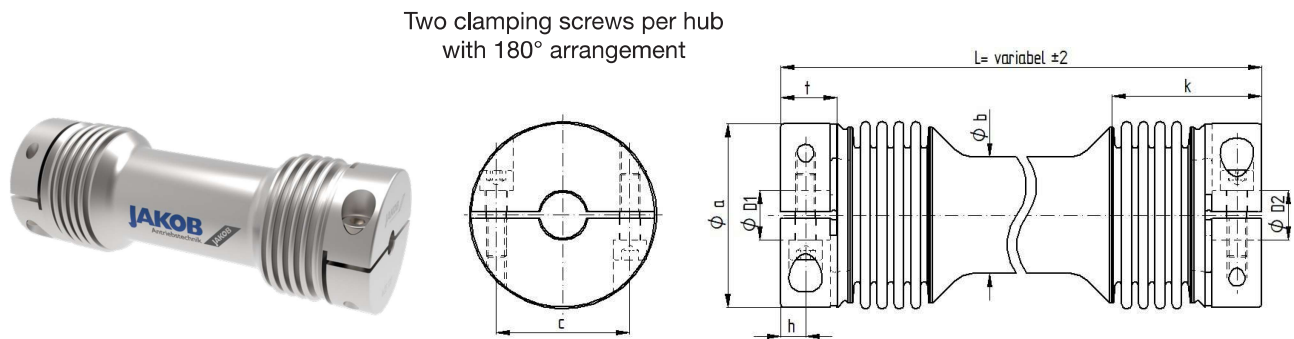
Metal bellows coupling with intermediate pipe | Series WDB

- variable lengths from 55 to 260 mm // without additional intermediate storage
- backlash-free, precise torque transmission // low mass moment of inertia
- special symmetrical clamping hub with high balancing quality and for high operating speeds

technical data:

WDB	nominal torque	torsional stiffness	moment of inertia	mass. approx.	max. operating speed	max. lateral shaft misalignment [mm]		f-tightening torque*
Größe	[Nm]	[Nm/arcmin]	[10 ⁻³ kgm ²]	[kg]	[min ⁻¹]	L _{min}	L _{max}	
4	4	0,3	0,008	0,1	20.000	0,4	2,9	2x M3 - 2 Nm
16	16	1	0,04	0,3	20.000	0,5	2,7	2x M5 - 8 Nm
40	40	4	0,4	1,0	17.000	0,7	2,6	2x M6 - 14 Nm
100	100	7	0,9	1,5	14.000	0,9	2,8	2x M8 - 35 Nm
200	200	13	2,4	2,7	12.000	0,9	2,9	2x M10 - 65 Nm
400	400	22	5	4	10.000	1,1	3,0	2x M12 - 115 Nm
1000	1000	62	15	6,8	8.000	1,3	3,7	2x M14 - 185 Nm

max. permissible axial misalignment: $\Delta A = \pm 1,5$ mm / maximum angular shaft misalignment: $\alpha = 1^\circ$



material:

Metal bellows: stainless steel 1.4571 / A4

Hubs: size 4 - 16: stainless steel 1.4301 / size 40-400: steel (S 355)

Intermediate pipe: stainless steel 1.4301

Screws: ISO 4762 Q 12.9 - coated

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

WDB	Øa	Øb	c	h	k ± 1	t	L		ØD1/2		Øprebored min.
size							min	max	min	max(*)	
4	26	15	16	5	24	10	55	200	6	12	6
16	37	22	22	6,5	35	13	75	200	8	16	6
40	57	35	40	7,5	45	15	95	200	12	32	9
100	68	48	46	9,5	49	18,5	110	220	16	35	11
200	84	58	58	12	59	22,5	125	240	20	45	15
400	101	70	65	13	68	26	145	260	28	50	19
1000	132	95	92	15	75	28	160	300	35	75	23

Øa: interfering edge – screw head

order example: WDB 200 L = 180 D1 = 32^{G7} D2 = 35^{G7}

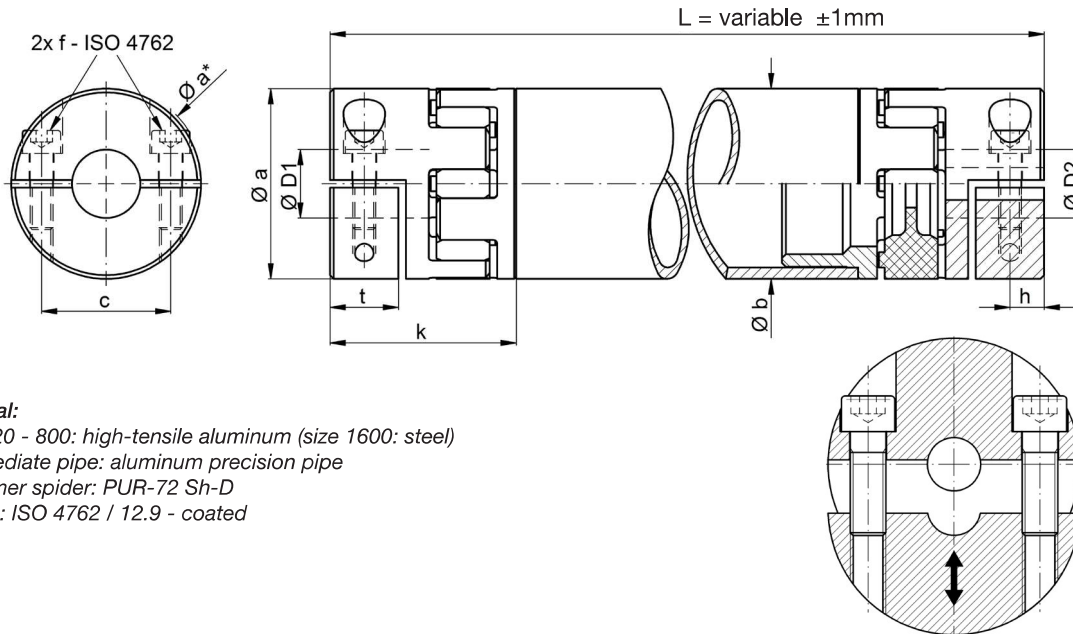
Elastomer Coupling with Intermediate Pipe I EKHZ

// variable length of up to 3 m // plug-in // backlash-free // oscillation dampening
 // rust-proof version // split-hub design - simple installation

technical data:

EKHZ	T _N size [Nm]	torsional stiffness (stat. at 0,5xT _N) [Nm/arcmin]				moment of inertia [10 ⁻³ kgm ²]				max. speed approx. [min ⁻¹]				mass approx. [kg]			
		0,5m	1m	2m	3m	0,5m	1m	2m	3m	0,5m	1m	2m	3m	0,5m	1m	2m	3m
20	20	0,19	0,16	0,13	0,1	0,14	0,23	0,42	0,61	3.500	2.700	680	300	0,5	0,9	1,6	2,3
45	45	0,49	0,44	0,35	0,3	0,48	0,82	1,53	2,2	3.500	3.500	990	440	0,9	1,5	2,8	4,0
90	90	0,9	0,8	0,64	0,54	0,8	1,4	2,6	3,8	3.500	3.500	1200	530	1,3	2,0	3,5	5,0
200	200	1,05	0,95	0,79	0,68	1,4	2,4	4,3	6,2	3.500	3.500	1.400	600	1,7	2,5	4,3	6,0
400	400	2,9	2,5	1,9	1,57	3,2	5,1	8,9	12,7	3.500	3.500	1.600	700	2,5	3,5	5,5	7,5
800	800	5,7	5,3	4,7	4,2	14,7	22,9	39,3	55,7	3.500	3.500	2.400	1070	5,8	8,2	13,1	18
1600	1600	10,2	9,7	8,8	8,1	87	107	147	187	3.500	3.500	2.000	1650	22	25	32	39

maximum axial shaft misalignment ± 1 mm maximum lateral shaft misalignment 5 mm per meter overall length
 maximum temperature range: -30°C up to +90°C



material:
 hubs: 20 - 800: high-tensile aluminum (size 1600: steel)
 intermediate pipe: aluminum precision pipe
 elastomer spider: PUR-72 Sh-D
 screws: ISO 4762 / 12.9 - coated

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

EKHZ size	Øa	Øa*	Øb	c	f-tightening-torque	h	k	L _{min}	t	ØD1/2 min	ØD1/2 max
20	40	42	35	27	M5 - 8 Nm	8,5	43	130	16	10	20
45	50	52	50	34	M6 - 14 Nm	10	50	140	19	15	26
90	60	63	60	41	M8 - 35 Nm	11,5	53	155	22	16	30
200	70	76	70	48	M10 - 65 Nm	14	59	170	26	20	35
400	85	91	80	58	M12 - 115 Nm	15	71	215	28	24	42
800	120	126	120	90	M14 - 180 Nm	18	85	250	34	32	70
1600	160	165	160	122	M16 - 290 Nm	24	105	320	43	48	100

note: Øa* = interfering edge screw head

order example: EKHZ 90 - D1 = 28^{F6} D2 = 24^{F6} L = 1250

Metal Bellows Couplings with intermediate pipe | WD-VA

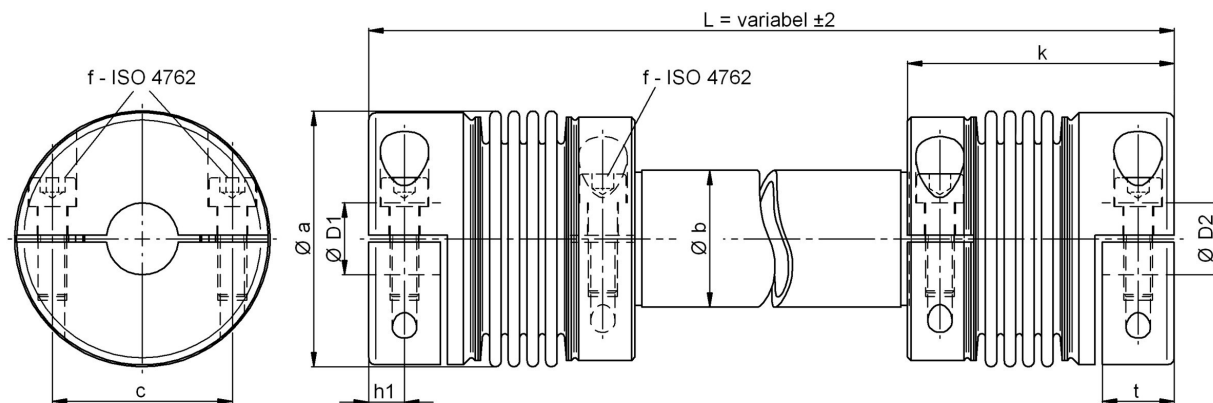
- stainless steel design up to 350°C
- backlash free, exact torque transfer
- variable length up to 3 m
- very easy to fit with splitted hub design

stainless steel

technical data:

WD-VA size	T _N [Nm]	T _{max} [Nm]	torsional stiffness [Nm/arcmin]				moment of inertia [10 ⁻³ kgm ²]				mass [kg]				max. speed approx. [min ⁻¹]			
			0,5m	1m	2m	3m	0,5m	1m	2m	3m	0,5m	1m	2m	3m	0,5m	1m	2m	3m
10	10	14	0,22	0,11	0,06	0,04	0,07	0,09	0,13	0,17	0,8	1,2	2,2	3,1	6000	1550	350	150
50	50	70	1,6	0,88	0,46	0,31	0,63	0,81	1,18	1,55	1,9	2,9	5,0	7,0	6000	3400	740	310
120	120	160	3,7	2,0	1,0	0,7	2,1	2,5	3,2	3,9	3,3	4,6	7,3	9,9	6000	4700	1000	400
200	200	280	5,7	3,0	1,5	1,0	3,9	4,5	5,7	6,9	4,7	6,5	10	13	6000	5500	1100	470
350	350	480	9,7	4,8	2,4	1,6	8,4	9,3	11	13	8,4	9,3	12,3	16	6000	6000	1300	550
600	600	750	22	11	5,3	3,5	20	22	26	30	11,5	14	19	24	6000	6000	1700	700
1200	1200	1600	66	36	19	13	66	74	89	104	21	25	33	42	6000	6000	2650	1050

maximum axial shaft misalignment: $\Delta A = \pm 1,5 \text{ mm}$ / maximum angular shaft misalignment: $\alpha = 1^\circ$
 maximum lateral shaft misalignment: $\Delta R = \tan \alpha \times L_x$ with $L_x = L - (2 \times k) / \tan 1^\circ = 0,0174$



material:

- bellows: stainless steel 1.4571 / A4
- hubs: stainless steel 1.4301 / A2
- intermediate pipe: stainless steel A2 bzw. A4
- screws: ISO 4762 stainless steel / A4-80.
- optional: ISO 4762 / 12.9

notice: connection between bellows and hub with plasma welding-process

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

WD-VA size	Øa	Øa*	Øb	c	f-tightening torque	h	L _{min}	k ±1	t	ØD1/2 min	ØD1/2 max
10	34	36	16	21	M5 - 5 Nm	6,5	92	46	13	7	15
50	56	60	30	28	M8 - 24 Nm	9	126	63	17	12	28
120	71	76	38	38	M10 - 45 Nm	12	154	77	23	19	38
200	82	86	42	56	M12 - 80 Nm	13	173	86,5	25,5	22	42
350	101	103	48	68	M14 - 110Nm	15	194	97	30	30	50
600	122	124	60	80	M16 - 180 Nm	18	230	115	36	32	60
1200	157	161	89	110	M20 - 350 Nm	20	256	128	40	48	85

Øa: interfering edge – screw head

- clamping hubs with stainless steel screws A4/80 without EASY pin – regard reduced tightening torque!
- check torque transmission of shaft-hub-connection for shaft diameter smaller Dmin (request possible).
- optional coated screws of strength class 12.9 for higher clamping forces or torque - (see value in brackets).
- variable length up to 6m, and higher rotational speed on request

order example: WD - VA 200 D1 = 32 F6 D2 = 35 F6 L = 800

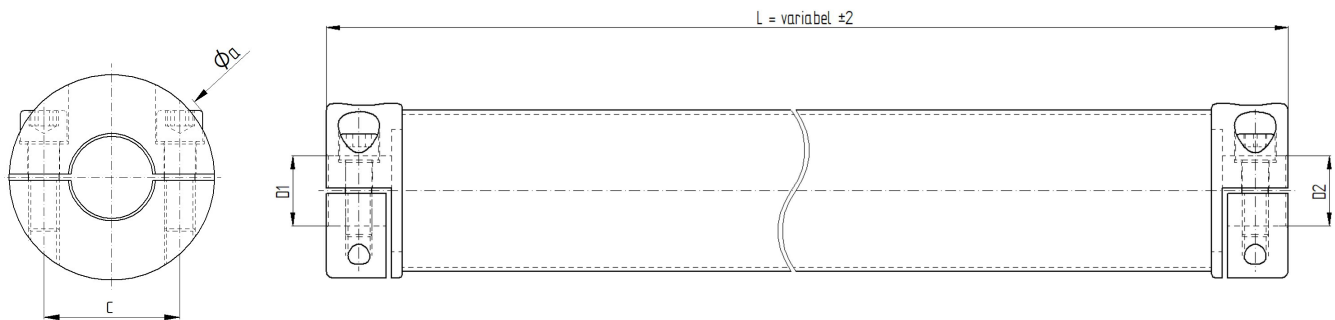
Simple-Flex distance coupling | Series SF

- /// variable lengths from 0,5 to 6 m
- /// suitable for high operating speeds
- /// very low weight without compensating coupling elements
- /// transmission of high torsional moments with small pipe diameter

Dimensions [mm]: length dimensions according to DIN

SF size	Øa	Øb	Øc	e	f-tightening torque	h ₁	h ₂	k	t	ØD1/2 min	ØD1/2 max
SF 40-KF	75	44	62	-	6x M6 - 14 Nm	-	-	40	30	15	38
SF 40-H	96	44	-	70	2x M10 - 65 Nm	13	-	-	24	25	50
SF 70-KF	102	74	84	-	6x M8 - 30 Nm	-	-	46	37	18	55
SF 70-H	119	74	-	90	2x M12 - 115 Nm	15	-	-	28	45	70
SF 125-H	150	129	-	110	4x M16 - 300 Nm	20	42	-	80	46	80

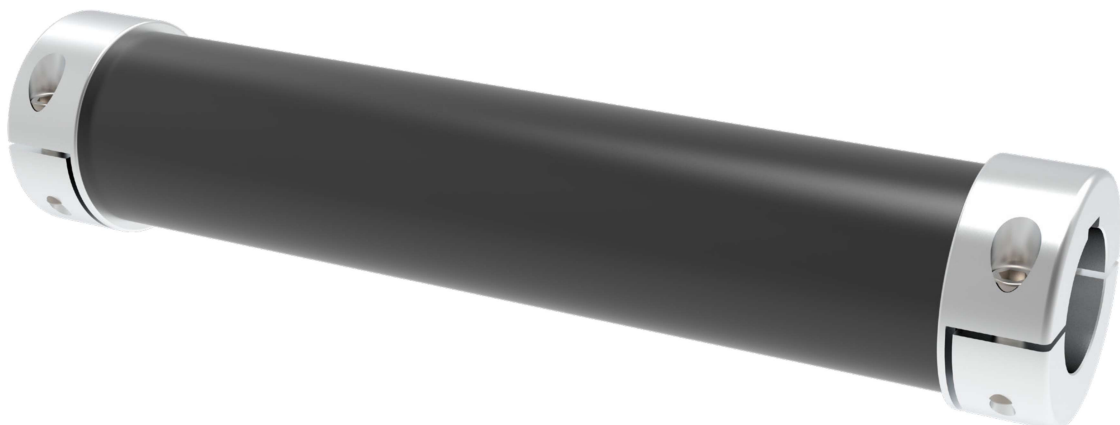
Øa: interfering edge – screw head at half-shell clamping hub



material: hub: high-tensile aluminum intermediate pipe: CFK

max. operating speed:

SF size	max. operating speed [min ⁻¹]					
	1 m	2 m	3 m	4 m	5 m	6 m
SF 40-KF	9000	2000	900	500	300	200
SF 40-H	6500	1500	650	360	230	160
SF 70-KF	15500	3500	1500	850	550	370
SF 70-H	11100	2600	1200	620	400	280
SF 125-H	11300	2600	1100	620	400	280



technical data:

SF size	nominal torque / max. torque [Nm]					
	1 m	2 m	3 m	4 m	5 m	6 m
SF 40-KF	250 / 500	220 / 350	180 / 300	150 / 250	130 / 220	120 / 200
SF 40-H	250 / 500	220 / 350	180 / 300	150 / 250	130 / 220	120 / 200
SF 70-KF	600 / 1000	450 / 700	350 / 500	300 / 500	270 / 450	250 / 400
SF 70-H	600 / 1000	450 / 700	350 / 500	300 / 500	270 / 450	250 / 400
SF 125-H	2900 / 4700	2000 / 3300	1700 / 2700	1500 / 2300	1300 / 2100	1200 / 1900

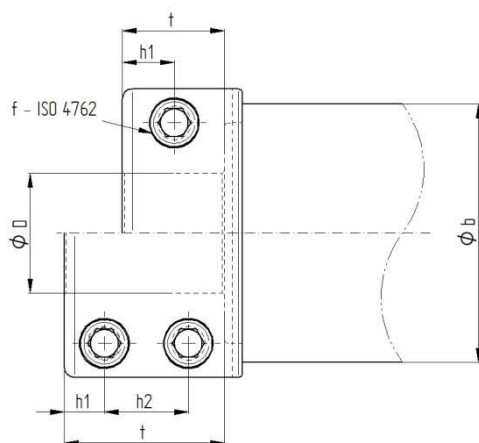
SF size	moment of inertia [10^{-3}kgm^2]						mass [kg]					
	1 m	2 m	3 m	4 m	5 m	6 m	1 m	2 m	3 m	4 m	5 m	6 m
SF 40-KF	1,3	1,5	1,7	1,8	2,0	2,2	1,7	2,1	2,5	2,9	3,3	3,7
SF 40-H	0,7	0,9	1,1	1,2	1,4	1,6	1,1	1,5	1,9	2,3	2,7	3,1
SF 70-KF	6,2	7,1	7,9	8,8	9,7	10,5	3,6	4,3	5,0	5,6	6,3	7,0
SF 70-H	4,0	4,9	5,8	6,7	7,5	8,4	2,2	2,9	3,6	4,3	4,9	5,6
SF 125-H	28,4	33,4	38,4	43,4	48,5	53,5	8,7	10,0	11,2	12,5	13,7	14,9

SF size	torsional stiffness [Nm/arcmin]						max. lateral shaft misalignment [mm]					
	1m	2m	3m	4m	5m	6m	1m	2m	3m	4m	5m	6m
40-KF 40-H	0,65	0,32	0,22	0,16	0,13	0,11	4	15	25	35	45	50
70-KF 70-H	3,32	1,66	1,11	0,83	0,66	0,55	2	8	15	20	25	30
SF 125-H	18,12	9,05	6,05	4,54	3,62	3,02	1	5	10	15	20	25

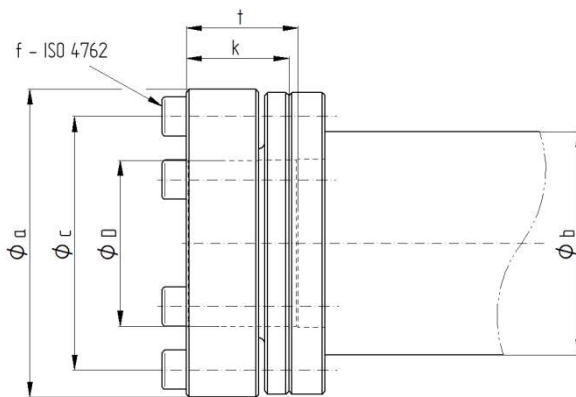
temperature range: -10°C up to $+60^{\circ}\text{C}$

hub design::

size SF 40-H, SF 70-H



size SF 125-H



Version SF-H: half-shell hub

- easy to assemble with two radial clamping screws
- inexpensive execution
- lowest mass and moments of inertia

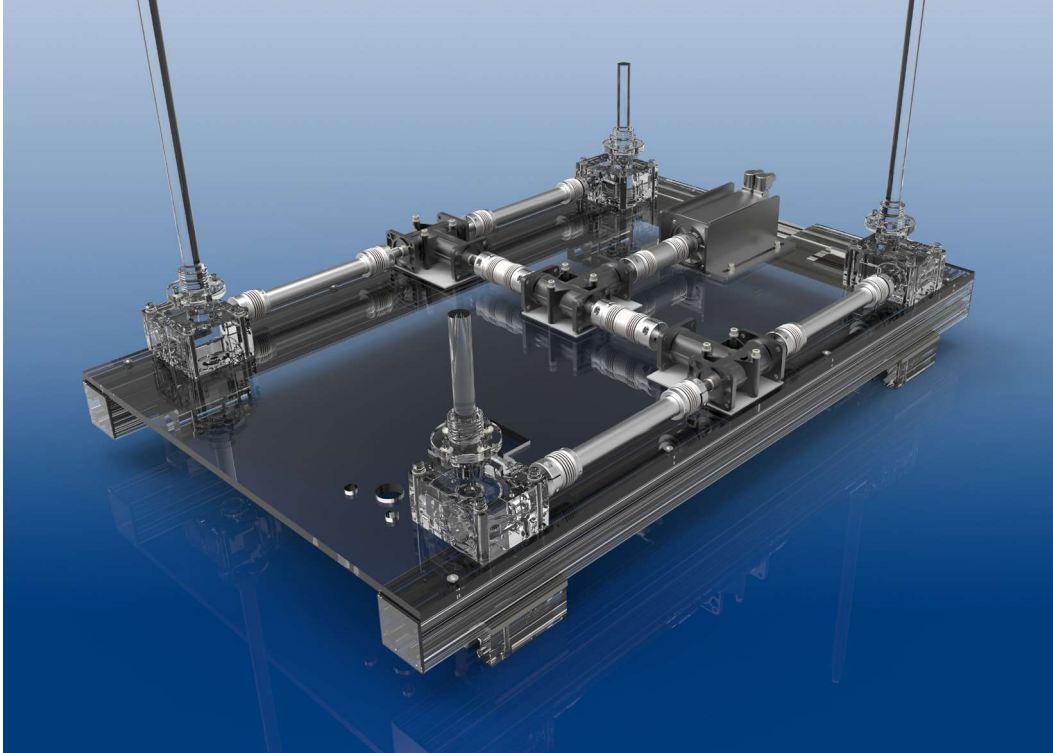
Version SF-KF conical clamping ring hub

- excellent balance quality / highest speeds
- high clamping forces for high torques
- rotationally symmetrical construction

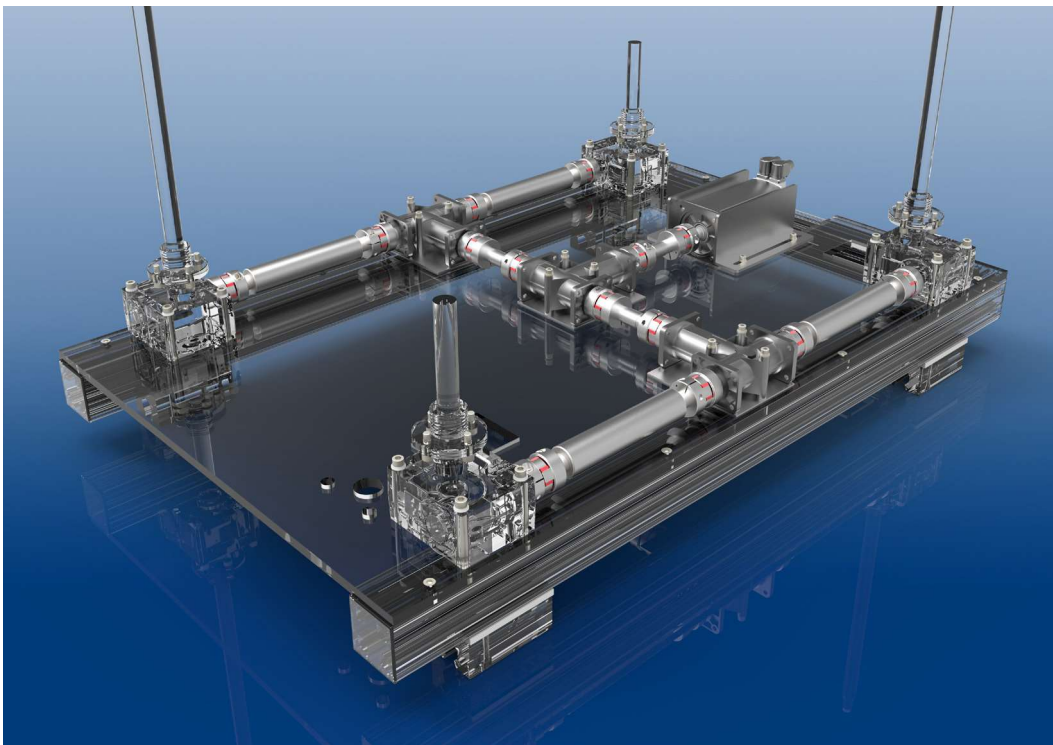
order example: SF 70-H; $D1 = 28^{F6}$; $D2 = 35^{F6}$; $L = 3200$

Distance Couplings with Intermediate Pipe

Application example - Lifting table



Linear system with metal bellows distance couplings of the WDS series



Linear system with elastomer distance couplings of the EKZ series