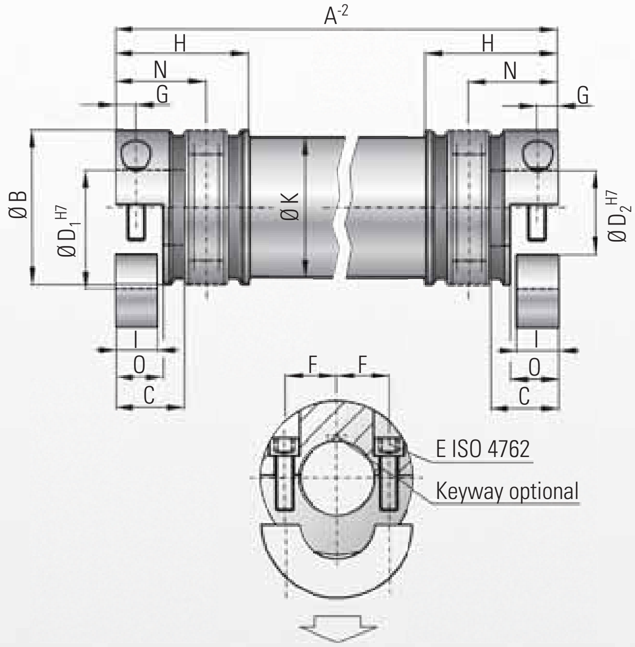
MODEL **ZAE 10-800 Nm**

BACKLASH FREE LINE SHAFTS

with split hub



Properties:

- Compensation for misalignment
- Backlash-free and torsionally rigid
- Able to span longer distances
- Standard lengths up to 6 m (19.68 ft)
- No intermediate support bearing required
- Split hubs for easy mounting and dismounting

Material:
Bellows made of flexible high grade stainless steel. Aluminum intermediate tube section through size 150, size 300 and up steel **optional composite CFK tube**. Clamping hubs through size 60 aluminum, size 150 and up steel.

Design:
Balanced split clamping hubs with two radial clamping screws ISO 4762.
Intermediate tube section supported by gimbals within the bellows.
Lateral mounting and dismounting accomplished due to split hubs. Absolutely backlash-free through frictional clamp connection.

Temperaturerange:
-30 to +100° C (-22° F to 212° F)

Speed:
Depending on length A, please contact R+W

Service life:
These couplings have an infinite life and are maintenance-free if the technical ratings are not exceeded.

Fit tolerance:
Shaft/hub connection 0.01 to 0.05 mm

Ordering example

ZAE / 10 / 1551 /18/19.05/XX

- Model
- Series/rated torque Nm
- Overall length mm
- Bore Ø D1 H7
- Bore Ø D2 H7
- Non-Standard e.g. carbon tube

All data is subject to change without notice.

Model ZAE 10 - 800 Nm			Series						
			10	30	60	150	300	500	800
Rated torque	(Nm)	T_{KN}	10	30	60	150	300	500	800
Overall length min. to max.	(mm)	A^{-2}	100 - 6000	130 - 6000	160 - 6000	180 - 6000	240 - 6000	250 - 6000	250 - 6000
Outer diameter clamping hub	(mm)	B	40	55	66	81	110	123	133
Fit length	(mm)	C	16	27	31	34.5	42	50	47
Inner diamter from Ø to Ø H7	(mm)	$D_{1/2}$	5 - 20	10 - 28	12 - 32	19 - 42	30 - 60	35 - 60	40 - 72
Max.inner diameter clamping hub	(mm)	D_{max}	24	30	32	42	60	60	75
with keyway - max Ø H7	(mm)	$D_{1/2}$	17	23	29	36	60	60	66
ISO 4762 clamping screws		E	M4	M6	M8	M10	M12	M16	M16
Tightening torque	(Nm)	E	5	15	40	70	130	200	250
Distance between centers	(mm)	F	15	19	23	27	39	41	48
Distance	(mm)	G	5	7.5	9.5	12	14	17	19
Length bellows body	(mm)	H	39.5	52	64	72	83	96	95
Clamping length	(mm)	I	10	15	19	22	28	33.5	37.5
Outer diameter tube section	(mm)	K	35	50	60	76	100	110	120
Length	(mm)	O	11.5	17	21	24	30	35	40
Shaft average value	(mm)	N	25	34	41	47	56	66	65

1Nm = 8.85 in lbs

max. permissible misalignments page 6

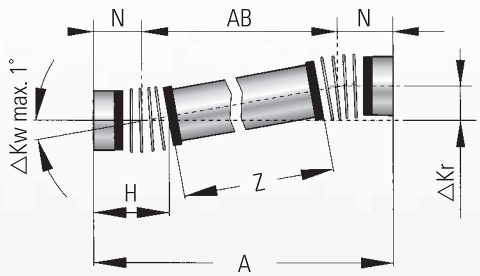
optional stainless steel

NOTES

SELECTION PROCESS FOR LINE SHAFTS MODELS ZA / ZAE

Series T_{KN} (Nm)	Torsional stiffness of both bellows bodies combined C_T^B (Nm/rad)	Torsional stiffness per 1m tube C_T^{ZWR} (Nm²/rad)	Length of bellows body ZA H (mm)	Length of bellows body ZAE H (mm)	Distance between center lines N (mm)	max. axial misalignment △ Ka (mm)
10	4,525	1,530	44.5	39.5	25	2
30	19,500	6,632	57.5	52	34	2
60	38,000	11,810	71	64	41	3
150	87,500	20,230	78	72	47	4
200	95,500	65,340	86	–	52	4
300	250,500	222,700	94	83	56	4
500	255,000	292,800	110	96	66	5
800	475,000	392,800	101	89	64	6
1500	1,400,000	728,800	92	–	56	4
4000	4,850,000	1,171,000	102	–	61	4

Table 1



A	Overall length ZA	mm
AB	AB = (A – 2xN)	mm
Z	Tube length Z = (A – 2xH)	mm
H	Length of the bellows body	mm
N	Distance between center lines	mm
M_{max}	Max. torque	Nm
φ	Angle of twist	degree
C_T^B	Torsional stiffness of both bellows bodys	Nm/rad
C_T^{ZWR}	Torsional stiffness of tube per meter	Nm/rad
C_T^{ZA}	Torsional stiffness of entire coupling	Nm/rad

Torsional stiffness:

$$(C_T^{ZA}) = \frac{C_T^B \times (C_T^{ZWR}/Z)}{C_T^B + (C_T^{ZWR}/Z)} \text{ [Nm/rad]}$$

Torsional deflection (twist)

$$\varphi = \frac{180 \times T_{AS}}{\pi \times C_T^{ZA}} \text{ [degree]}$$

Example: Line shaft ZA 150 T_{KN} = 150 Nm
Wanted: Deflection at max. rated torque T_{KN}

Length (A) of the shaft = 1.5 m
Length (Z) of the tube = A – (2xH) = 1.344m

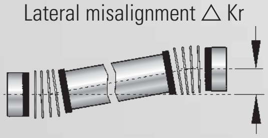
$$(C_T^{ZA}) = \frac{87500 \text{ Nm/rad} \times (20230 \text{ Nm/rad} / 1.344 \text{ m})}{87500 \text{ Nm/rad} + (20230 \text{ Nm/rad} / 1.344 \text{ m})} = 12842.8 \text{ [Nm/rad]}$$

$$\varphi = \frac{180 \times 150 \text{ Nm}}{\pi \times 12842.8 \text{ Nm/rad}} = 0.669°$$

The result with a max. torque of 150 Nm is an angle of twist of 0.669°.

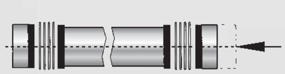
Max. possible misalignment

Lateral misalignment △ Kr



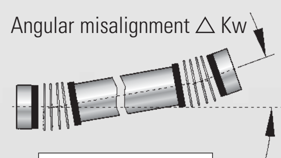
△ Kr = tan x AB
AB = A – 2 x N

Axial misalignment △ Ka



see Table 1

Angular misalignment △ Kw



△ Kw = 2° max.

R+W calculation programm for critical resonant speeds

With specially developed software R+W can calculate the critical resonant speeds for each application. The critical speed can be altered by changing the tube material and/or other parameters.
Results of a calculation are shown on the right.

Critical resonant speed	n_k	=	1/min.
Torsional stiffness tube ZA/ZAE	C_T^{ZWR}	=	Nm/rad
Total stiffness ZA/ZAE	C_T^{ZA}	=	Nm/rad
Angle of twist	φ	=	degree-min-sec
Weight of total axes	m	=	kg
Mass moment of inertia	J	=	kgm²
Permissible lateral misalignment	△ Kr	=	mm