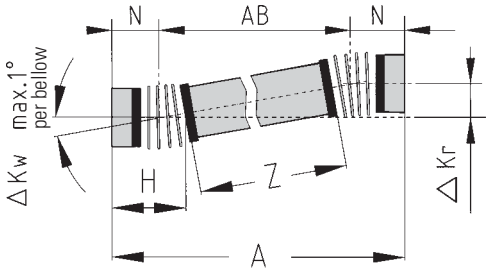
Series T_{KN} [Nm]	Torsional stiffness of both bellow bodies C_T^B [Nm/rad]	Torsional stiffness per 1 m tube C_T^{ZWR} [Nm²/rad]	Length of bellow body ZA H [mm]	Length of bellow body ZAE H [mm]	Distance between center lines N [mm]	max. axial misalignment △ Ka [mm]
10	4,525	1,530	44.5	39.5	25	2
30	19,500	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	m
AB	AB = (A – 2xN)	m
Z	tube length Z = (A – 2xH)	m
H	Length of the bellow 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 bellow bodies	Nm/rad
C_T^{ZWR}	Torsional stiffness of tube per meter	Nm/rad
C_T^{ZA}	Torsionel stiffness of entire coupling	Nm/rad

Torsional stiffness:

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

Angle of twist:

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

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

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

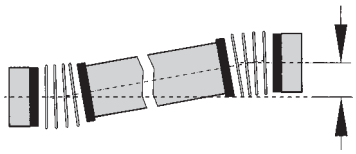
$$(C_T^{ZA}) = \frac{87{,}500 \text{ Nm/rad} \times (20{,}230 \text{ Nm/rad} / 1.344 \text{ m})}{87{,}500 \text{ Nm/rad} + (20{,}230 \text{ Nm/rad} / 1.344 \text{ m})} = 12.842{,}8 \text{ [Nm/rad]}$$

$$\varphi = \frac{180 \times 150 \text{ Nm}}{\pi \times 12{,}842.8 \text{ Nm/rad}} = 0.669°$$

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

Max. possible misalignment

Lateral misalignment △ Kr

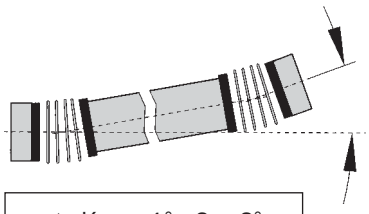


△ Kr = tan △ Kw x AB
AB = A – 2 x N

Axial misalignment △ Ka

see table 1

Angular misalignment △ Kw



△ Kw = 1° x 2 = 2° max.

R+W calculation program for critical resonant speeds

With specially developed software R+W can calculate the critical resonant speeds for each application. The critical speeds can be altered by changing the tub material and/or other parameters.

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

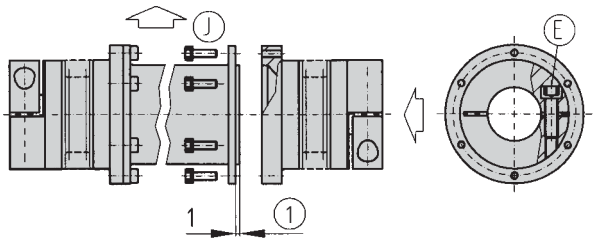
Alignment and Assembly instuctions

Alignment

R+W ZA und ZAE line shaft couplings are available in lengths up to 6 meters (19.7 feet) without intermediate support bearings. To insure maximum life proper alignment is necessary. We recommend laser alignment whenever possible. Other alignment techniques are also appropriate as long as the maximum permissible misalignment values listed in Table 1 are not exceeded.

Assembly and mounting instructions

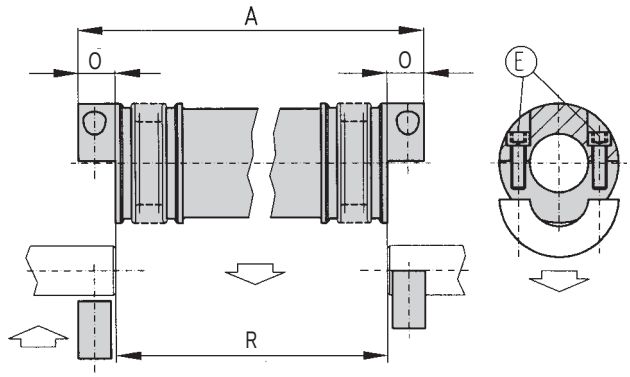
Model ZA (series 10 - 800 Nm)



Mounting: Loosen Screw E and slide the metal bellow coupling segments onto each shaft end. Now insert the intermediate tube and assemble onto both metal bellow coupling segments using the assembly screws J. Tighten the assembly screws J to the correct torque indicated in the specification table. Center the entire line shaft coupling onto the shaft ends and tighten screw E using a torque wrench to the correct torque as indicated in the specification table.

Dismounting: Loosen Screw E on one end of the line shaft coupling. Remove assebly screws J on both ends of the line shaft coupling and remove the intermediate tube. Be sure to support the intermediate tube during removal. Depending on length this may require two people. Loosen Screw E on the second metal bellow couling segment and slide both segments off.

Model ZAE (series 10 - 800 Nm)



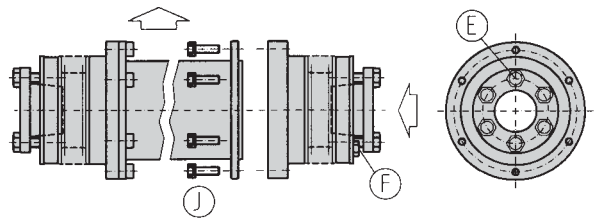
Mounting: First make sure that the distance between shaft ends exceeds the dimension R.

Length R = length A – (2xO)

Insert the line shaft coupling and assemble the split hubs with assembly scews E. Using a torque wrench tighten screws E the correct torque indicated in the specification table.

Dismounting: Remove the split hubs by removing the assembly screws E. Lift the line shaft coupling off the shaft ends.

Model ZA (series 1500 - 4000 Nm)



Mounting: Loosen Screws E (Do not remove!) and slide the metal bellow coupling segments onto each shaft end. Now insert the intermediate tube and assemble onto both metal bellow coupling segments using the assembly screws J. Tighten the assembly screws J to the correct torque indicated in the specification table. Center the entire line shaft coupling onto the shaft ends and evenly tighten screws E using a torque wrench to the correct torque as indicated in the specification table. Even tightening of screws E is critical to ensure that the shaft and metal bellow coupling segment are parallel.

CAUTION! Over tightening of the screws E may destroy the tapered bushing connection. Do not exceed the tightening torque as specified in the specification table.

Dismounting: Loosen the scews E on one side of the line shaft coupling. Using the three jack screws F loosen the tapered segment so that it slides freely on the shaft. Remove the assembly screws J from both sides of the coupling and remove the intermediate tube. Be careful to support the tube during removal. Depending on the length of the tube this may require two people. Repeat the earlier procedure to remove the second metal bellow coupling segment.

CAUTION! Be sure to lower the jack screws F before reassembly.