

**WEAR AND MAINTENANCE FREE.**

# LINE SHAFTS

<b>SERIES</b>	<b>ZA / ZAE</b>		<b>10 – 4,000 Nm</b>
	<b>EZ2 / EZV</b>		<b>10 – 2,150 Nm</b>



**R+W**<sup>®</sup>  
COUPLING TECHNOLOGY

THE ULTIMATE COUPLING FROM 10 – 4,000 Nm

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# TORSION RESISTANT LINE SHAFTS

## Application Examples:

Spanning of larger axial distances

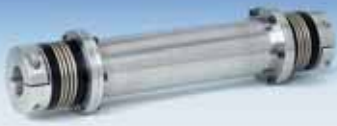
- Palletizers
- Screw jack systems
- Multi-axis linear modules
- Printing machinery
- Pulp and paper machinery
- Packaging machinery
- Conveyor systems
- Textile machinery
- Crane gantry systems
- Automated assembly systems
- Woodworking machinery
- Food processing machinery

## MODEL

## PROPERTIES

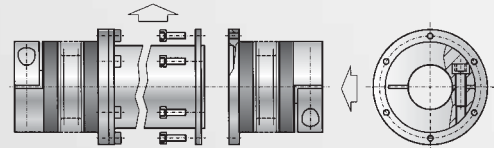
## APPLICATION EXAMPLES

### ZA



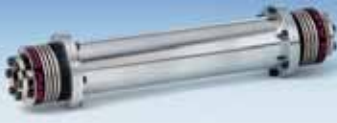
from 10 – 800 Nm

- Mounting + dismounting without moving the aligned shafts
- Standard lengths up to 6 m (19.68 ft.)
- No intermediate bearing support required



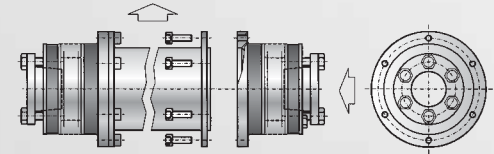
see page 3

### ZA



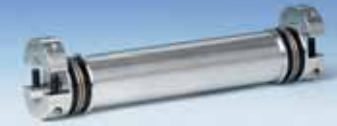
from 1,500 – 4,000 Nm

- Mounting + dismounting without moving the aligned shafts
- Standard lengths up to 3 m (9.84 ft.)
- No intermediate bearing support required



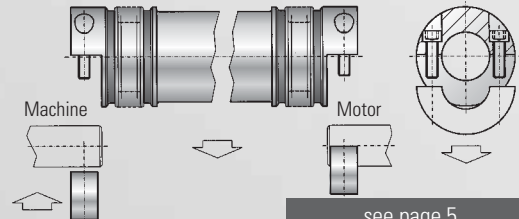
see page 4

### ZAE



from 10 – 800 Nm

- Coupling radially removable
- easy mounting and dismounting with split hubs
- Standard lengths up to 6 m (19.68 ft.)
- No intermediate bearing support required



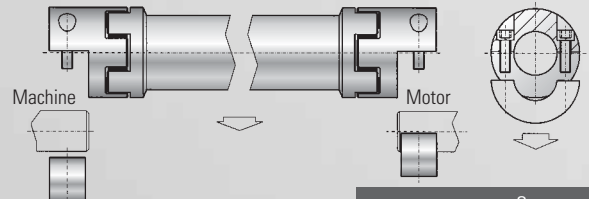
see page 5

### EZ 2



line shaft with split clamping hub

- vibration damping
- easy mounting and dismounting with split hubs
- length up to 4 m (13.12 ft.)
- no intermediate bearing support required
- radial mounting due to split hubs



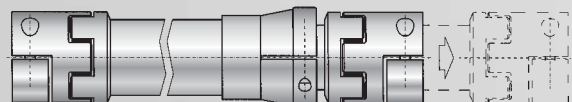
see page 8

### EZV



from 10 – 800 Nm

- continuously adjustable within length range
- vibration damping
- easy mounting and dismounting with split hubs
- length up to 4 m (13.12 ft.)
- no intermediate bearing support required
- radial mounting due to split hubs



see page 9

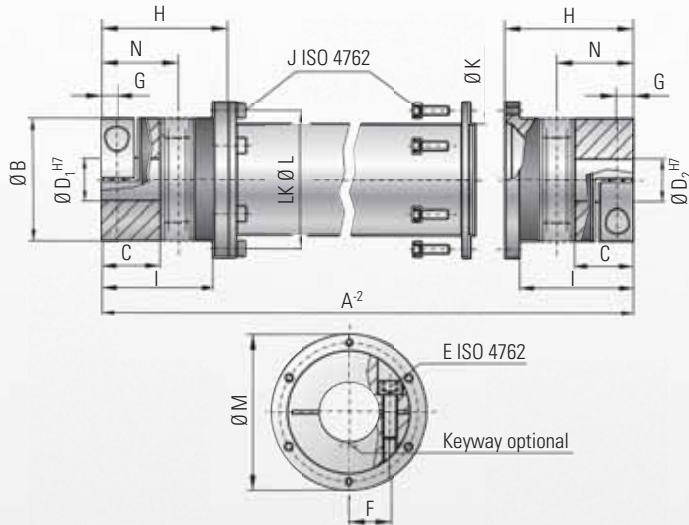
optional  
stainless steel

# MODEL ZA 10-800 Nm

## BACKLASH FREE LINE SHAFTS



with clamping hub



### Ordering example

ZA / 10 / 1551 / 18 / 19.05 / XX

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

All data is subject to change without notice.

### Properties:

- Compensation for misalignment
- Backlash-free and torsionally rigid
- Able to span long distances
- Standard lengths up to 6 m (19.68 ft.)
- No intermediate bearing support required
- Intermediate tube removable for easy mounting

### Material:

- Bellows made of flexible high grade stainless steel
- Aluminum intermediate tube section through size 200, size 300 and up steel
- **Optional composite CFK tube**
- Clamping hubs through size 60 aluminum; size 150 and up steel

### Design:

- Balanced clamping hubs with one radial screw per ISO 4762
- Intermediate tube section supported by gimbals within the clamping hub
- Mounting and dismounting accomplished through the removal of the intermediate tube section

### Temperature range:

-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.

### Backlash:

Absolutely backlash-free due to frictional clamp connection

### Fit tolerance:

Shaft/hub connection 0.01 to 0.05 mm

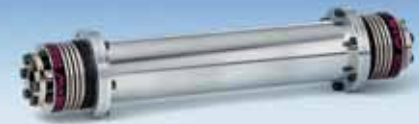
Model ZA 10 - 800 Nm		Series							
		10	30	60	150	200	300	500	800
Rated torque (Nm)	T <sub>KN</sub>	10	30	60	150	200	300	500	800
Overall length min. to max. (mm)	A	110 to 6,000	140 to 6,000	170 to 6,000	190 to 6,000	210 to 6,000	250 to 6,000	260 to 6,000	260 to 6,000
Outer diameter clamping hub (mm)	B	40	55	66	81	90	110	123	134
Fit length (mm)	C	16	27	31	35.5	40.5	43	50	48
Inner diameter from Ø to Ø H7 (mm)	D <sub>1/2</sub>	5 to 20	10 to 28	12 to 32	19 to 42	22 to 45	30 to 60	35 to 60	40 to 72
With keyway max. Ø H7 (mm)	D <sub>1/2</sub>	17	23	29	36	45	60	60	66
ISO 4762 clamping screw	E	M4	M6	M8	M10	M12	M12	M16	2x M16
Tightening torque (Nm)	E	5	15	40	70	110	130	200	250
Distance between centers (mm)	F	15	19	23	27	31	39	41	48
Distance (mm)	G	5	7.5	9.5	11	12.5	13	17	18
Length bellows body (mm)	H	44.5	57.5	71	78	86	94	110	101
Distance (mm)	I	38.5	51	61	69	75.5	81	96	89
ISO 4762 screw	J	4x M4	6x M4	6x M5	8x M6	8x M6	8x M8	8x M8	10x M8
Tightening torque of the assembly screws (Nm)	J	3	4	7	10	12	30	30	40
Outer diameter tube section (mm)	K	35	50	60	76	90	100	110	120
Bolt hole circle Ø (mm)	L	45	62.5	71.5	88	100	120	132	138
Outer diameter flange (mm)	M	52	70	80	98	110	135	148	153
Shaft average value (mm)	N	25	34	41	47	52	56	66	64

1Nm = 8.85 in lbs max. permissible misalignment page 6

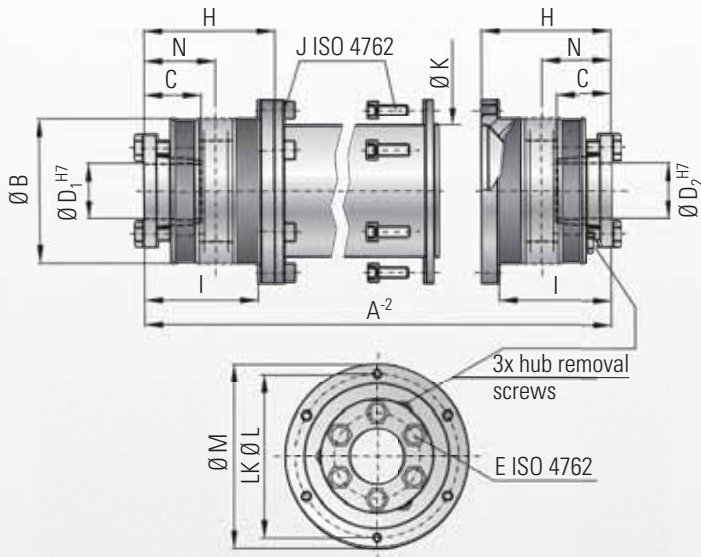


# MODEL ZA 1500-4000 Nm

## BACKLASH FREE LINE SHAFTS



with tapered conical sleeves



### Ordering example

ZA / 1500 / 2551 / 65 / 70 / XX

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

All data is subject to change without notice.

Model ZA 1500 - 4000 Nm		Series	
		1500	4000
Rated torque (Nm)	T <sub>KN</sub>	1500	4000
Overall length min. to max. (mm)	A	280 to 6,000	280 to 6,000
Outer diameter (mm)	B	157	200
Fit length (mm)	C	61	80,5
Inner diameter from Ø to Ø H7 (mm)	D <sub>1/2</sub>	35 to 70	40 to 100
ISO 4017 clamping screws	6x	M12	M16
Tightening torque (Nm)	E	70	120
Length bellows body (mm)	H	98	103,5
Distance (mm)	I	82	84
ISO 4762 screw		10x M10	12x M12
Tightening torque of the assembly screws (Nm)	J	70	120
Outer diameter tube section (mm)	K	150	160
Bolt hole circle Ø (mm)	L	168	193
Outer diameter flange (mm)	M	184	213
Shaft average value (mm)	N	56	61

max. permissible misalignment page 6

### Properties:

- Compensation for misalignment
- Backlash-free and torsionally rigid
- Able to span long distances
- Standard lengths up to 3 m (9.84 ft)
- No intermediate bearing support required
- Intermediate tube removable for easy mounting

### Material:

- Bellows made of flexible high grade stainless steel
- Intermediate tube section: steel, **optional composite CFK tube**
- Clamping hubs: steel

### Design:

- With tapered conical sleeves and captive jack screws
- Intermediate tube section supported by gimbals within the clamping hub.
- Lateral mounting and dismounting accomplished through the removal of the intermediate tube section.

### Temperature range:

-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

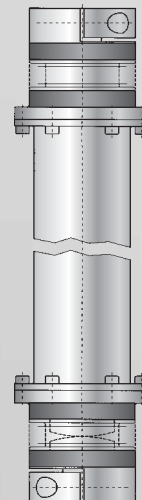
### Backlash:

Absolutely backlash-free due to frictional clamp connection

### Fit tolerance:

Shaft/hub connection 0.01 to 0.05 mm

### Vertical installation ZA/ZE

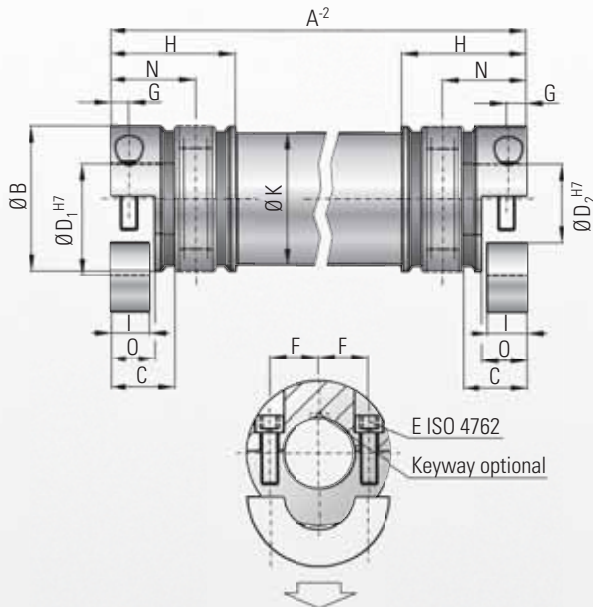


- When mounting vertically, additional support of the lower bellows body is necessary.
- A special bellows body for vertical mounting is available upon request.
- Please note „vertical mounting“ when ordering.

optional  
stainless  
steel

# MODEL ZAE 10-800 Nm

## BACKLASH FREE LINE SHAFTS



### Ordering example

ZAE / 10 / 1551 / 18/19.05/XX

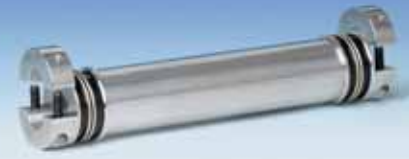
Model  
Series/rated torque  
Overall length  
Ø D1 H7  
Ø D2 H7  
Non-Standard e.g. carbon tube

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	100 to 6,000	130 to 6,000	160 to 6,000	180 to 6,000	240 to 6,000	250 to 6,000	250 to 6,000
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 diameter from Ø to Ø H7 (mm)	$D_{1/2}$	5 to 20	10 to 28	12 to 32	19 to 42	30 to 60	35 to 60	40 to 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)		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 misalignment page 6



with split hub

### Properties:

- Compensation for misalignment
- Backlash-free and torsionally rigid
- Able to span long distances
- Standard lengths up to 6 m (19.68 ft)
- No intermediate bearing support 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

### Temperature range:

-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.

### Backlash:

Absolutely backlash-free through frictional clamp connection

### Fit tolerance:

Shaft/hub connection 0.01 to 0.05 mm

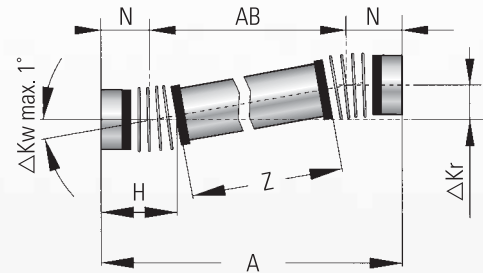


# NOTES

## SELECTION PROCESS FOR LINE SHAFTS MODELS ZA / ZAE

Series	Torsional stiffness of both bellows bodies combined $C_T^B$ (Nm/rad)	Torsional stiffness per 1m tube $C_T^{ZWR}$ (Nm <sup>2</sup> /rad)	Length of bellows body ZA H (mm)	Length of bellows body ZAE H (mm)	Distance between center lines N (mm)	max. axial misalignment $\Delta Ka$ (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
- $\phi$  Angle of twist degree
- $C_T^B$  Torsional stiffness of both bellows bodies 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)

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

**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 =  $A - (2xH) = 1.344$  m

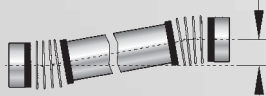
$$(C_T^{ZA}) = \frac{87500 \text{ Nm/rad} \times (20230 \text{ Nm/rad} / 1.344 \text{ m})}{87500 \text{ Nm/rad} + (20230 \text{ Nm/rad} / 1.344 \text{ m})} = 12842.8 \text{ [Nm/rad]}$$

$$\phi = \frac{180 \times 150 \text{ Nm}}{\pi \times 12842.8 \text{ Nm/rad}} = 0.669^\circ$$

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

### Max. possible misalignment

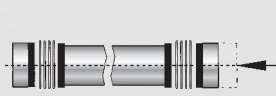
Lateral misalignment  $\Delta Kr$



$$\Delta Kr = \tan \times AB$$

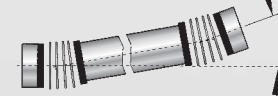
$$AB = A - 2 \times N$$

Axial misalignment  $\Delta Ka$



see Table 1

Angular misalignment  $\Delta Kw$



$$\Delta Kw = 2^\circ \text{ max.}$$

### 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 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  $n_k = 1/\text{min.}$
- Torsional stiffness tube ZA/ZAE  $C_T^{ZWR} = \text{Nm/rad}$
- Total stiffness ZA/ZAE  $C_T^{ZA} = \text{Nm/rad}$
- Angle of twist  $\phi = \text{degree-min-sec}$
- Weight of total axes  $m = \text{kg}$
- Mass moment of inertia  $J = \text{kgm}^2$
- Permissible lateral misalignment  $\Delta Kr = \text{mm}$

optional  
stainless  
steel

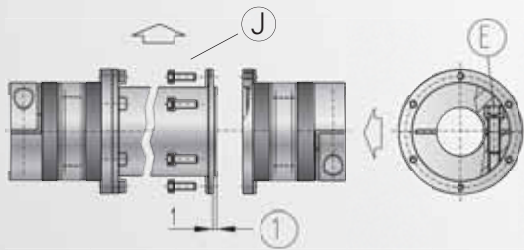
# ASSEMBLY INSTRUCTIONS

## Alignment

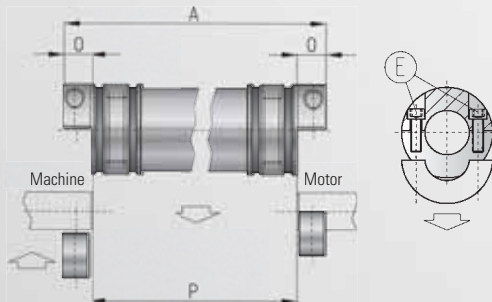
R+W ZA and ZAE line shaft couplings are available in lengths up to 6 meters (19.7 feet) without intermediate bearing support required. Proper alignment is necessary to ensure maximum life. We recommend laser alignment whenever possible. Other alignment techniques are also appropriate as long as the maximum permissible misalignment values listed on page 6 are not exceeded.

## Clamping hub

### ■ Model ZA (series 10 - 800 Nm)



### ■ Model ZAE (series 10 - 800 Nm)



**Mounting:** Loosen screw E and slide the metal bellows coupling segments onto each shaft end. Now insert the intermediate tube and assemble onto both metal bellows 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 by using a torque wrench to ensure the correct torque as indicated in the specification table.

**Dismounting:** Loosen screw E on one end of the line shaft coupling. Remove assembly screws J on both ends of the line shaft 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 bellows coupling segment and slide both segments off.

**Mounting:** First ensure that the distance between shaft ends exceeds the dimension P.

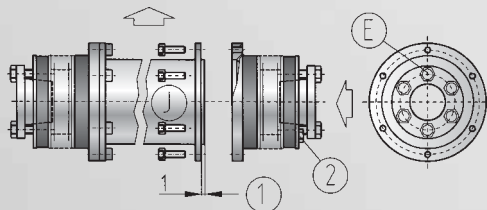
$$\text{Length P} = \text{length A} - 2 \times 0 \text{ [mm]}$$

Insert the line shaft coupling and assemble the split hubs with assembly screws E. Using a torque wrench to tighten screws E to 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.

## Conical sleeve

### ■ Model ZA (series 1500 - 4000 Nm)



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



**CAUTION! An over tightening of the screws E may destroy the tapered bushing connection. Do not exceed the tightening torque listed in the specification table.**

**Dismounting:** Loosen the screws E on one side of the line shaft coupling. Use the three jack screws F to 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. Ensure that the tube is supported during removal. Depending on the length of the tube this may require two people. Repeat the earlier procedure to remove the second metal bellows coupling segment.

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

## Maintenance

R+W line shafts are maintenance free. During routine maintenance the line shafts should be visibly inspected.



# MODEL EZ2

## BACKLASH FREE LINE SHAFTS

with split clamping hubs

### Properties:

- Radial mounting possible with split hubs
- Spans distances of up to 4 m (13.12 ft)
- No intermediate bearing support required
- Low moment of inertia
- Damps vibration
- Press-fit design
- Backlash-free

### Material:

Clamping hub: up to series 450 high strength aluminum, from series 800 and up steel  
 Elastomer insert: precision molded, wear resistant, and thermally stable polymer  
 Intermediate tube: precision machined aluminum tube; steel and composite tubes are also available

### Design:

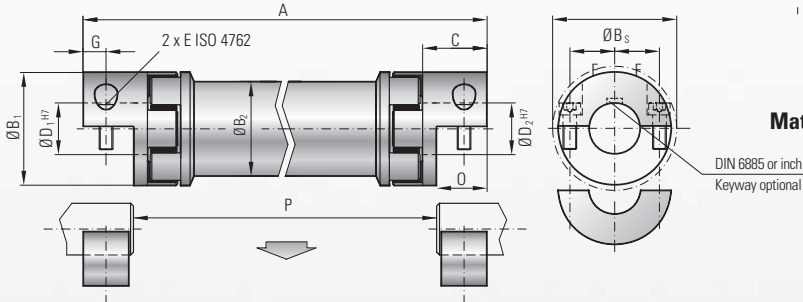
Two coupling hubs are concentrically machined with concave driving jaws  
 Elastomer inserts are available in type A or B  
 The two coupling elements are connected with a precise and concentrically machined aluminum tube

### Speed:

Please advise the application speed when ordering or inquiring about EZ Line shafts

### Tolerance:

On the hub/shaft connection 0.01 to 0.05 mm



### Ordering example

EZ2 / 020 / 1200 / A / 24 / 19.05 / XX

Model  
 Series  
 Overall length  
 Type Elastomer insert  
 Bore Ø D1 H7  
 Bore Ø D2 H7  
 Non standard e.g. finely balanced

All data is subject to change without notice.

Model EZ 2			Series													
			10		20		60		150		300		450		800	
Type (Elastomer insert)			A	B	A	B	A	B	A	B	A	B	A	B	A	B
Rated torque (Nm)	$T_{KN}$		12,5	16	17	21	60	75	160	200	325	405	530	660	950	1100
Max. torque** (Nm)	$T_{Kmax}$		25	32	34	42	120	150	320	400	650	810	1060	1350	1900	2150
Overall length (mm)	A		95 - 4,000		130 - 4,000		175 - 4,000		200 - 4,000		245 - 4,000		280 - 4,000		320 - 4,000	
Outer diameter hub (mm)	$B_1$		32	42	56	66.5	82	102	136.5							
Outer diameter tube (mm)	$B_2$		28	35	50	60	76	90	120							
Outer diameter with screwhead (mm)	$B_3$		32	44.5	57	68	85	105	139							
Fit length (mm)	C		20	25	40	47	55	65	79							
Inner diameter range from Ø to Ø H7 (mm)	$D_{1/2}$		5 - 16	8 - 25	14 - 32	19 - 36	19 - 45	24 - 60	35 - 80							
Mounting screw (ISO 4762/12.9)			M4	M5	M6	M8	M10	M12	M16							
Tightening torque of the mounting screw (Nm)	E		4	8	15	35	70	120	290							
Distance between centers (mm)	F		10.5	15.5	21	24	29	38	50.5							
Distance (mm)	G		7.5	8.5	15	17.5	20	25	30							
Mounting length (mm)	O		16.6	18.6	32	37	42	52	62							
Moment of inertia per hub half ( $10^{-3}$ kgm <sup>2</sup> )	$J_1/J_2$		0.01	0.02	0.15	0.21	1.02	2.3	17							
Inertia of tube per meter ( $10^{-3}$ kgm <sup>2</sup> )	$J_3$		0.075	0.183	0.66	1.18	2.48	10.6	38							

\*\* Max. transferable torque of the clamping hub see table 3 (page 10)



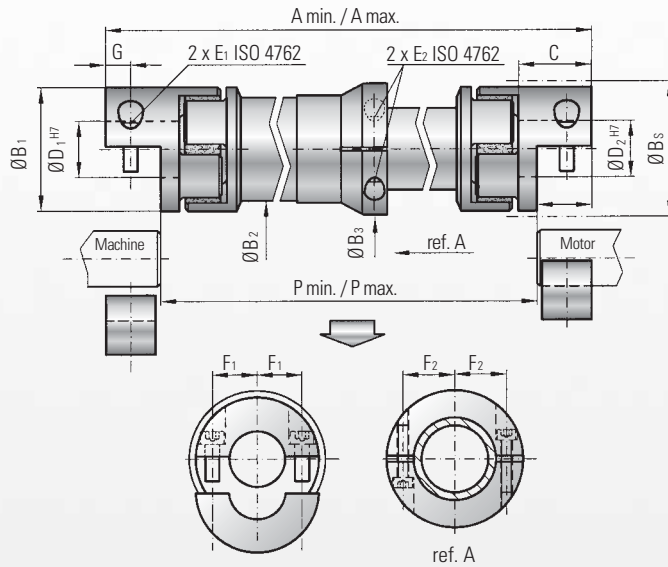


# MODEL EZV

## BACKLASH FREE LINE SHAFTS



variable length



### Ordering example

EZV / 020 / 1200 / A / 24 / 19 / XX

Model  
Series  
inserted min. length  
Type Elastomer insert  
Bore  $\varnothing D1$  H7  
Bore  $\varnothing D2$  H7  
Non standard e.g. finely balanced

All data is subject to change without notice.

### Properties:

- Lateral mounting due to split hubs
- Spans distances of up to 4 m (13.12 ft)
- Low moment of inertia
- Vibration damping
- Press fit designs
- Backlash free line shaft

### Material:

Clamping hub: high strength aluminum.  
Elastomer insert: precision molded wear resistant, and thermally stable polymer.  
Intermediate tubes: precision machined aluminum tube, steel or composite tube are available upon request.

### Design:

Two split coupling hubs are concentrically machined with concave driving jaws. Both coupling bodies are rigidly mounted to tubes with high concentricity. After loosening the tube clamping, a length variation is possible within the given range. Elastomer inserts are available in type A or B.

### Speed:

To find out about the critical resonant speed please advise the application speed when ordering or inquiring about EZV line shafts.

### Tolerance:

On the hub/shaft connection 0.01 to 0.05 mm.

Model EZV	Series											
	10		20		60		150		300		450	
Type (Elastomer insert)	A	B	A	B	A	B	A	B	A	B	A	B
Rated torque (Nm)	$T_{KN}$ 12.5	16	17	21	60	75	160	200	325	405	530	660
Max. torque** (Nm)	$T_{Kmax}$ 25	32	34	42	120	150	320	400	650	810	1060	1200
Inserted min. length from - to (mm)	$A_{min}$ 150 to 2,055		200 to 2,075		250 to 2,095		300 to 2,115		350 to 2,130		400 to 2,150	
Extended over all length from - to (mm)	$A_{max}$ 190 to 4000		250 to 4000		310 to 4000		370 to 4000		440 to 4000		500 to 4000	
Outer diameter hub (mm)	$B_1$	32	42		56		66.5		82		102	
Outer diameter tube (mm)	$B_2$	28	35		50		60		80		90	
Outer diameter with screwhead (mm)	$B_s$	32	44.5		57		68		85		105	
Fit length (mm)	C	20	25		40		47		55		65	
Inner diameter possible from $\varnothing$ to $\varnothing$ H7 (mm)	$D_{1/2}$	5 to 16	8 to 25		14 to 32		19 to 35		19 to 45		24 to 60	
Screw (ISO 4762/12.9)	$E_1$	M4	M5		M6		M8		M10		M12	
Tighting torque of the mounting screw(Nm)	$E_1$	4	8		15		35		70		120	
Distance between centers (mm)	$F_1$	10.5	15.5		21		24		29		38	
Distance between centers (mm)	$F_2$	15	18		26		31		41		45	
Distance (mm)	G	7.5	8.5		15		17.5		20		25	
Mounting length (mm)	O	16.6	18.6		32		37		42		52	
Moment of inertia coupling half ( $10^{-3}$ kgm <sup>2</sup> )	$J_1/J_2$	0.01	0.02		0.15		0.21		1.02		2.3	
Inertia of tube per meter ( $10^{-3}$ kgm <sup>2</sup> )	$J_3$	0.075	0.183		0.66		1.18		2.48		10.6	
Measurement (mm)	X1+X2	110	150		190		230		270		300	

\*\* Max. transferable torque of the clamping hub see table 3 (page 10)

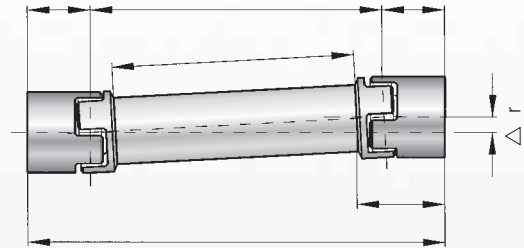


# NOTES

## TECHNICAL SPECIFICATIONS

Series	Torsional stiffness of both coupling parts elastomer insert A	Torsional stiffness of both coupling parts elastomer insert B	Torsional stiffness per 1 m tube	Length of the coupling EZ	Distance between center lines	Max. axial misalignment
$T_{KN}$ (Nm)	$C_T^A$ (Nm/rad)	$C_T^B$ (Nm/rad)	$C_T^{ZWR}$ (Nm/rad)	H (mm)	N (mm)	$\Delta Ka$ (mm)
10	270	825	321	34	26	2
20	1270	2220	1530	46	33	4
60	3970	5950	6632	63	49	4
150	6700	14650	11810	73	57	4
300	11850	20200	20230	86	67	4
450	27700	40600	65340	99	78	4
800	41300	90000	392800	125	94	4

Table 2



- A Overall length m
- AB Length AB = (A - 2xN) m
- Z Tube length Z = (A - 2xH) m
- H Length of the coupling mm
- N Distance between center lines mm
- $T_{AS}$  Max. torque Nm
- $\varphi$  Angle of twist degree
- $C_{Tdyn}^E$  Torsional stiffness of both elastomer inserts Nm/rad
- $C_T^{ZWR}$  Torsional stiffness of tube Nm/rad per meter
- $C_{Tdyn}^{EZ}$  Torsional stiffness of entire coupling Nm/rad

### Torsional stiffness

$$(C_{Tdyn}^{EZ}) = \frac{C_{Tdyn}^E \times (C_T^{ZWR}/Z)}{C_{Tdyn}^E + (C_T^{ZWR}/Z)} \text{ [Nm/rad]}$$

### Angle of twist

$$\varphi = \frac{180 \times T_{AS}}{\pi \times C_{Tdyn}^{EZ}} \text{ [degree]}$$

**Example:** Line shaft EZ2, series 150  $T_{AS} = 160$  Nm  
To search: Angle of twist at maximal rated torque  $T_{AS}$

Length (A) of the shaft = 1.5 m  
Length (Z) of the tube = A - (2xH) = 1.354 m

$$(C_{Tdyn}^{EZ}) = \frac{6700 \text{ Nm/rad} \times (11810 \text{ Nm/rad} / 1.354 \text{ m})}{6700 \text{ Nm/rad} + (11810 \text{ Nm/rad} / 1.354 \text{ m})} = 3789 \text{ [Nm/rad]}$$

$$\varphi = \frac{180 \times 160 \text{ Nm}}{\pi \times 3789 \text{ Nm/rad}} = 2.42^\circ$$

The result with a max. torque of 160 Nm in an angle of twist of 2.42°

### Max. possible misalignment

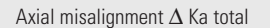


$$\Delta Kr_{max} = \tan \Delta \frac{Kw}{2} \cdot AB$$

$$AB = A - 2xN$$



$$\Delta Kw_{max} = \text{ca. } 2^\circ$$



See table 2

Series	Ø5	Ø8	Ø16	Ø19	Ø25	Ø30	Ø32	Ø35	Ø45	Ø50	Ø55	Ø60	Ø65	Ø70	Ø75	Ø80
10	4	12	32													
20		30	40	50	65											
60			65	120	150	180	200									
150				180	240	270	300	330								
300				300	340	450	520	570	630							
450					630	720	770	900	1120	1180	1350					
800							1050	1125	1200	1300	1400	1450	1500	1550	1600	

Table 3

### Temperature factor S in ° Celsius

Temperature (v)	Sh 98 A	Sh 64 D
> -30° to -10°	1.5	1.7
> -10° to +30°	1.0	1.0
> +30° to +40°	1.2	1.1
> +40° to +60°	1.4	1.3
> +60° to +80°	1.7	1.5
> +80° to +100°	2.0	1.8
> +100° to +120°	-	2.4

Table 4

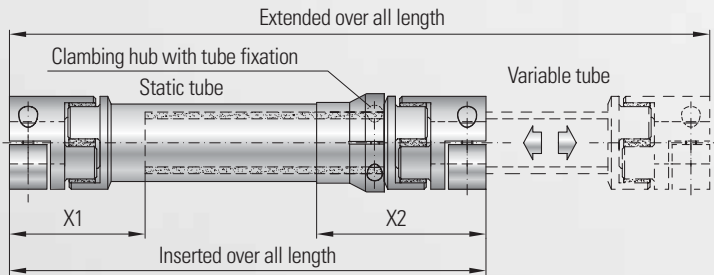
Please note for every design (see brochure EK).  
1° C = 33,8° F



# ASSEMBLY INSTRUCTIONS

## Function

$$\text{Extended overall length} = (\text{Inserted overall length} \times 2) - \text{Measurement} (X1 + X2)$$



$$\text{Inserted overall length} = \frac{\text{Extended over all length} + \text{Measurement} (X1 + X2)}{2}$$

The extended overall length and the inserted over all length are related. Depending on the requirements, the coupling length can be calculated using the two formulas shown here to receive the extended or the inserted overall length.

## Alignment

To ensure 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 on table 2 (page 10) are not exceeded.

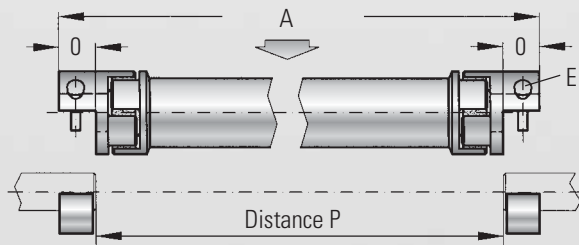
## Specification of the elastomer inserts

Type	Shore hardness	Color	Material	Relative damping ( $\psi$ )	Temperature range	Features
A	98 Sh A	red	TPU	0.4 - 0.5	-30°C to +100°C	high damping
B	64 Sh D	green	TPU	0.3 - 0.45	-30°C to +120°C	high torsional stiffness

The values of the relative damping were determined at 10 Hz and +20° C.

## Clamping hub

### Model EZ2 / EZV



The total length of the axis is defined by the distance  $P + 2 \times 0$ .

**Mounting:** First ensure that the distance between shaft ends exceeds dimension P.

$$\text{Distance } P = \text{Length } A - 2 \times 0 \text{ [mm]}$$

Insert the line shaft coupling and assemble the split hubs with assembly screws E. Using a torque wrench to tighten screws E to 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.

## Maintenance

R+W line shafts are maintenance free. During routine maintenance the line shafts should be visibly inspected.

**Experience and  
 Know-how  
 for your special  
 requirements.**

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**QUALITY  
 MANAGEMENT**  
 We are certified  
 according to ISO 9001-2008



TGA-ZM-05-91-00  
 Registration No. 40503432/2

The information mentioned in this document is based on our present knowledge and experiences and does not exclude the manufacturer's own substantial testing of the equipment. So this is no obligatory assurance even with regard to protection rights of Third Parties. The sale of our products is subject to our General Conditions of Sale and Delivery.

## THE R+W-PRODUCT RANGE



### **TORQUE LIMITERS** **Series SK + ST**

From 0.1 – 160,000 Nm, Bore diameters 3 – 290 mm  
 Available as a single position, multi-position, load holding, or full disengagement version  
 Single piece or press-fit design



### **BELLOWS COUPLINGS** **Series BK**

From 2 – 10,000 Nm  
 Bore diameters 10 – 180 mm  
 Single piece or press-fit design



### **LINE SHAFTS** **Series ZA /ZAE /EZ /EZV**

From 10 – 4,000 Nm  
 Bore diameters 10 – 100 mm  
 Available up to 6 m length



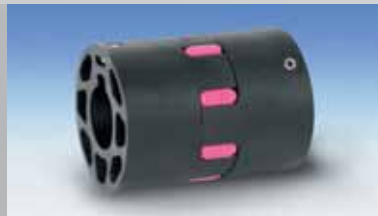
### **MINIATURE BELLOWS COUPLINGS** **Series MK**

From 0.05 – 10 Nm  
 Bore diameters 1 – 28 mm  
 Single piece or press-fit design



### **SERVOMAX® ELASTOMER COUPLINGS** **Series EK**

From 2 – 2,000 Nm, Shaft diameters 3 – 170 mm  
 backlash-free, press-fit design



### **ECOLIGHT® ELASTOMER COUPLINGS** **Series TX 1**

From 2 – 810 Nm  
 Shaft diameters 3 – 45 mm



### **LINEAR COUPLINGS** **Series LK**

From 70 – 2,000 N  
 Thread M5 – M16



### **POLYAMIDE COUPLINGS** **MICROFLEX** **Series FK 1**

Rated torque 1 Ncm  
 Bore diameters 1 – 1.5 mm