

# Installation and operating instructions for R+W Servomax®- Elastomer couplings



Please carefully and completely read the following installation, operation and maintenance procedures for the R+W SERVOMAX elastomer couplings. Failure to comply with these procedures may result in the failure of the coupling. Installation of the couplings should be performed by a qualified technician. SERVOMAX couplings may only be used in accordance with the technical data supplied in the catalog.

**This installation and operation instruction does not apply for ATEX-Elastomer couplings.**

See additional instruction for these couplings.

## General functioning



### Safety warning

Rotating couplings can be very dangerous. Proper guarding should be in place at all times and is the responsibility of the machine builder, user or operator. Do not approach or touch a coupling while it is rotating. Make sure that the machine is „locked out“ and cannot be accidentally started during installation or maintenance of the coupling.

### Manufacturer's declaration

**According to EG guidelines for machinery 2006/42/EG Appendix II B**

In the sense of machine guidelines (MR) shaft couplings are no machines, but components for the installation in machines. Their putting into operation is subject to the fulfillment of all requirements of machine guidelines by or after integration in the final product.

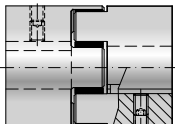


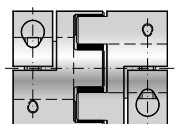
**Indicates important points**

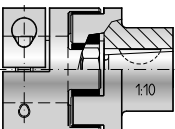



**Warning against danger**

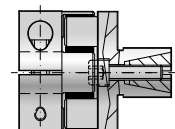
## Models

	<b>Model EK 1</b>
	2 x EK 1-Hub
	1 x Elastomer insert
	2 x Set screws DIN 916

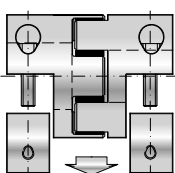
	<b>Model EK 2</b>
	2 x EK 2-Clamping hub
	1 x Elastomer insert
	2 x Screws ISO 4762

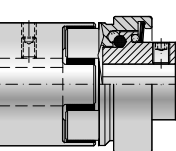
	<b>Model EK 4</b>
	1 x EK2-Clamping hub
	1 x Elastomer insert
	1 x Conical hub
	1 x Screws ISO 4762

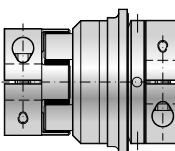
	<b>Model EK 6</b>
	2 x Conical clamping ring
	2 x Conical clamping hub
	1 x Elastomer insert
	12-20 x Screws ISO 4762

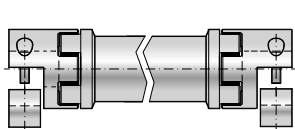
	<b>Model EK 7</b>
	1 x EKL-Clamping hub
	1 x Expanding hub shaft
	1 x Elastomer insert
	2 x Screws ISO 4762

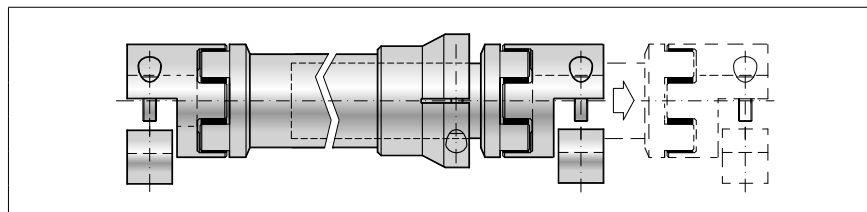
	<b>Model EKL</b>
	2 x EKL-Clamping hub
	1 x Elastomer insert
	2 x Screws ISO 4762

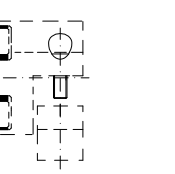
	<b>Model EKH</b>
	2 x Clamping split hubs
	1 x Elastomer insert
	4 x Screws ISO 4762 (8 x)

	<b>Model ESL</b>
	1 x EK 1-Hub
	1 x Elastomer insert
	3 x Screws DIN 916
	1 x Safety part

	<b>Model ES 2</b>
	1 x EKL-Clamping hub
	1 x Torque limiter section with clamping hub
	1 x Elastomer insert
	2 x Screws ISO 4762

	<b>Model EZ 2</b>
	2 x Clamping split hubs
	2 x Elastomer insert
	1 x Intermediate tube
	4 x Screws ISO 4762 (8 x)



	<b>Model EZV</b>
	2 x Clamping split hubs
	2 x Elastomer inserts
	1 x Intermediate tube with clamping hub
	1 x Expanding intermediate tube
	6 x Screws ISO 4762

Pictures 1

## Function

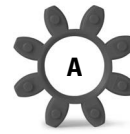
The equalizing element of EK couplings is the elastomer insert. It transmits torque without backlash or vibration. The elastomer insert defines the characteristics of the entire drive system.

The coupling is backlash free due to a pretension of the elastomer insert between the two coupling halves. SERVOMAX couplings compensate for lateral, angular and axial misalignment.

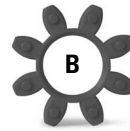
## Specifications of the elastomer inserts

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
C	80 Sh A	yellow	TPU	0.3 - 0.4	-30°C to +100°C	very high damping

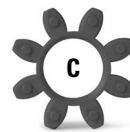
### Series 2-800



Shore hardness 98 Sh A

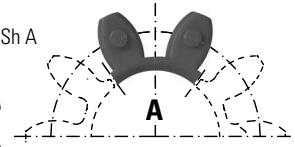


Shore hardness 64 Sh D

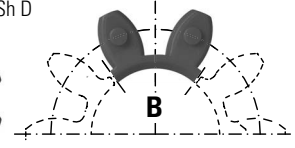


Shore hardness 80 Sh A

### Series 2500 - 9500 coupling assembly includes 5 individual elastomer segments






Shore hardness 98 Sh A



Shore hardness 64 Sh D

## Maximum transmittable torques / Misalignment values

Model series EK		Series																		
		2			5			10			20			60			150			
Type (Elastomer insert)		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
Nominal torque (Nm)	$T_{KN}$	2	2.4	0.5	9	12	2	12.5	16	4	17	21	6	60	75	20	160	200	42	
Max. torque (Nm)	$T_{Kmax}$	4	4.8	1	18	24	4	25	32	6	34	42	12	120	150	35	320	400	85	
Distance (mm)	A	7			9			11.5			16			18			20			
lateral 	(mm)	Max. values	0.08	0.06	0.2	0.08	0.06	0.2	0.1	0.08	0.22	0.1	0.08	0.25	0.12	0.1	0.25	0.15	0.12	0.3
angular 	(degree)		1	0.8	1.2	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2	1	0.8	1.2
axial 	(mm)		$\pm 1$			$\pm 1$			$\pm 1$			$\pm 2$			$\pm 2$			$\pm 2$		




Model series EK		Series															
		300			450			800			2500		4500		9500		
Type (Elastomer insert)		A	B	C	A	B	C	A	B	C	A	B	A	B	A	B	
Nominal torque (Nm)	$T_{KN}$	325	405	84	530	660	95	950	1100	240	1950	2450	5000	6200	10000	12500	
Max. torque (Nm)	$T_{Kmax}$	650	810	170	1060	1350	190	1900	2150	400	3900	4900	10000	12400	20000	25000	
Distance (mm)	A	24			26			31			37		46		57		
lateral 	(mm)	Max. values	0.18	0.14	0.35	0.2	0.18	0.35	0.25	0.2	0.4	0.5	0.3	0.5	0.3	0.6	0.4
angular 	(degree)		1	0.8	1.2	1	0.8	1.2	1	0.8	1.2	1.5	1	1.5	1	1.5	1
axial 	(mm)		$\pm 2$			$\pm 2$			$\pm 2$			$\pm 3$		$\pm 4$		$\pm 5$	

Table 2



**CAUTION!** The maximum permissible misalignment values in the chart are based on the following parameters: Nominal torque  $T_{KN}$ , rational speed  $n = 1500$  rpm- and a ambient temperatur of  $-10^\circ$  to  $+30^\circ$  C.

## Mounting preparation



All mounting surfaces including shafts, bores, keys and key ways, must be clean and free of burrs, nicks and dents. Inspect shaft diameters, coupling bore diameters, key and key-way dimensions and tolerances. All R+W coupling bores are machined to ISO tolerance H7. Clearances between the shaft and hub are maintained to be within 0.01 and 0.05 mm. A light coating of oil is recommended to ease the mounting process and will not affect the clamping force of the hub.



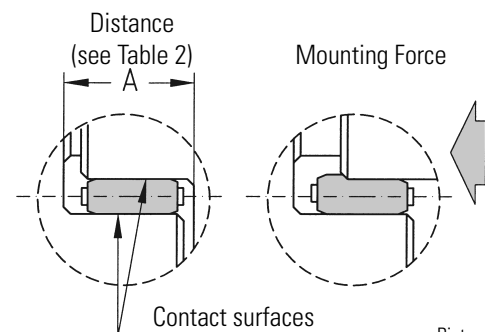
### CAUTION:

Do not use sliding grease, or oils or grease with molybdenum disulfide or other high pressure additives.

To achieve zero backlash the coupling hubs must be pressed together with an axial force (F) compressing the elastomer ring. Cleaning the elastomer ring and hubs and applying a light film of oil will aid in the assembly process. (Picture 3).

### Caution!

Use PU – compatible greases such as e.g. vaseline.



Picture 3

## Machining the pre bored hubs

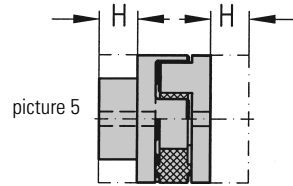
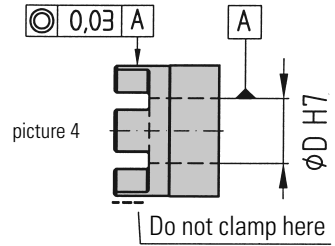


### CAUTION:

The maximum permissible bore diameters D1 and D2 (see catalog) must not be exceeded! The coupling may burst if these values are exceeded. Serious injury or death may result from flying debris.

During manufacturing the concentricity and run-out of the coupling hub are precisely controlled. Applying excess forces on the jaw end of the hub will deform the coupling negatively affecting its performance.

Custom modification of the coupling hub is possible by the customer. The hub may be custom machined to a maximum dimension (H) (see catalog for specific values). The customer assumes all responsibility for the performance of the coupling anytime a modification is made. R+W cannot guarantee the performance of the coupling once the customer performs any modification to the original design. Consult your R+W representative for custom design technical assistance.

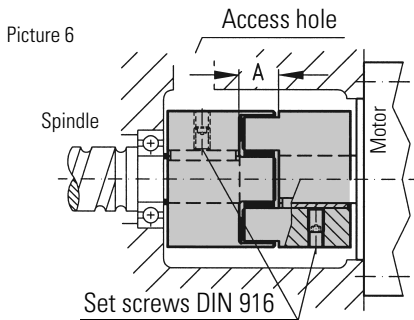


## Screws / Tightening torque

Series	2	5	10	20	60	150	300	450	800	1500	2500	4500	9500
Clamping models EK2 / EKL / EKH / EZ2 / EZV	<b>E1</b> M2 0.6 Nm	M3 2 Nm	M4 4 Nm	M5 8 Nm	M6 15 Nm	M8 35 Nm	M10 70 Nm	M12 120 Nm	M16 290 Nm	M16 300 Nm	M16 300 Nm	M16 300 Nm	M24 980 Nm
Conical clamping hubs Model EK6	<b>E2</b>		M3 2 Nm	M4 3 Nm	M5 6 Nm	M5 7 Nm	M6 12 Nm	M8 35 Nm	M10 55 Nm		M10 60 Nm	M12 100 Nm	M16 160 Nm
Expanding hub shaft Model EK7	<b>E3</b>	M4 4 Nm	M5 9 Nm	M6 12 Nm	M8 32 Nm	M10 60 Nm	M12 110 Nm	M16 240 Nm	M16 300 Nm				
Torque limiter section with clamping hub Model ES2	<b>E4</b>	M4 4 Nm	M4 4.5 Nm	M6 15 Nm	M8 40 Nm	M10 70 Nm	M12 130 Nm	M16 200 Nm	M16 250 Nm	M20 470 Nm			
Tube clamping hub EZV	<b>E5</b>		M4 4 Nm	M4 4.5 Nm	M5 8 Nm	M6 18 Nm	M8 35 Nm	M10 70 Nm					
Press in force ES2 (full disengagement)	<b>N</b>	10 - 20 N	15 - 30 N	25 - 50 N	30 - 60 N	35 - 70 N	80 - 200 N	200 - 500 N	500 - 1000 N				
Distance ES2	<b>O</b>	0.7	1.1	0.7	1.3	1.3							

Table 3

## Mounting EK 1

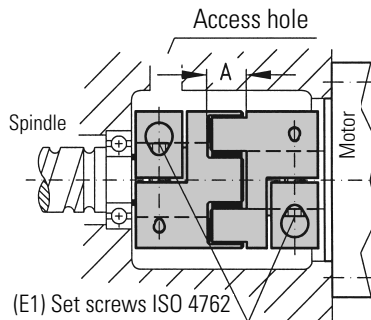
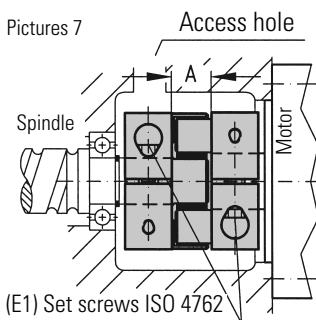


Slide a coupling half onto the shaft to the correct axial position. Tighten the set screw(s) to the appropriate torque using a torque wrench. Insert the elastomer ring and press the two coupling halves together. Make sure that the fit length (A) is maintained. (See table 1) Mount the assembled coupling onto the second shaft and tighten the set screw(s).

### Dismounting:

Loosen the set screws and remove the coupling. Use an appropriate tool that will not damage the coupling to pry the coupling halves apart.

## Mounting EKL / EK 2

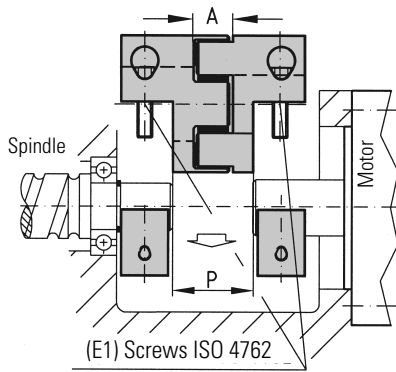


Slide a coupling half onto the shaft to the correct axial position. Using a torque wrench, tighten the clamp screw (E) to the appropriate torque indicated in Table 2. Insert the elastomer ring and press the two coupling halves together. Ensure that the fit length (A) is maintained. (See table 1). Mount the assembled coupling onto the second shaft and tighten the clamp screw (E).

### Dismounting:

Simply loosen the clamp screw (E) and remove the coupling. Use an appropriate tool that will not damage the coupling to pry the coupling halves apart.

## Mounting EKH



Picture 8

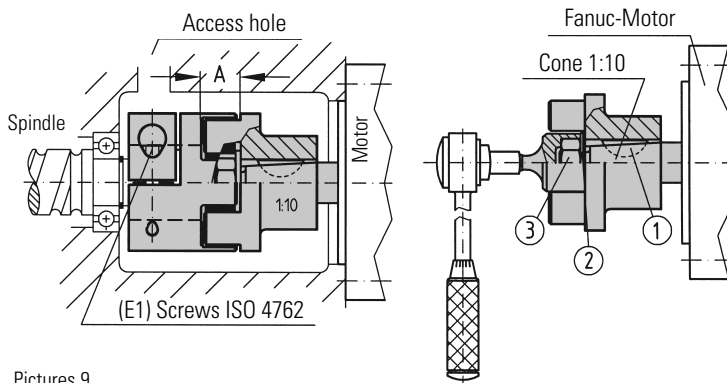
The coupling needs to be pre-mounted.

The pre-mounted coupling can be set in place radially under consideration of distance P. Now the two split hubs can be mounted while using the locking screws E1, applying the right tightening torque. Distance A, as shown on table 2 must be kept.

### Dismounting:

For dismounting simply loosen the screws E1.

## Mounting EK 4



Pictures 9

### Mounting of the clamping hub:

Slide the coupling on the shaft ends, at the right axial position tighten the mounting screw E1 to the specified tightening torque as shown in the table 3.

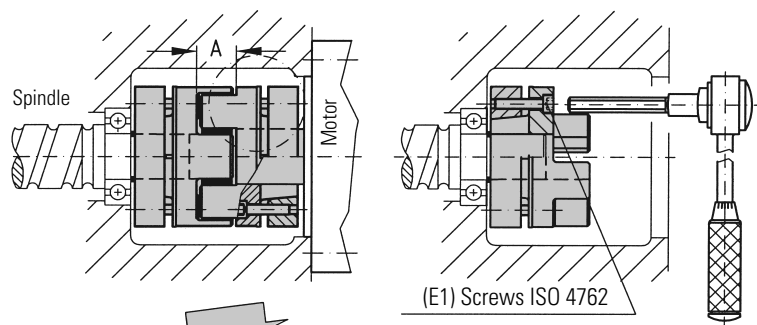
### Mounting of the conical hub:

After inserting the key into the keyway of the motor shaft slide the coupling hub on the shaft. Check if the conical hub has a proper seat on the shaft. Now the nut (3) can be tightened on the motor shaft using the exact tightening torque specified by the motor manufacturer.

### Dismounting:

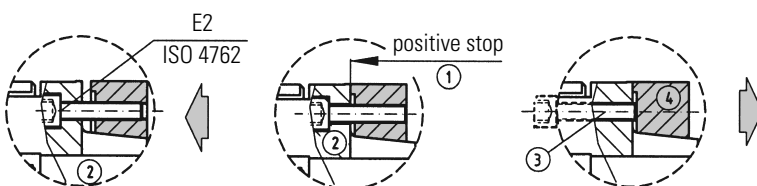
Loosen the screws of the clamping hub and demount the coupling with the proper tool.

## Mounting EK 6



Pictures 10

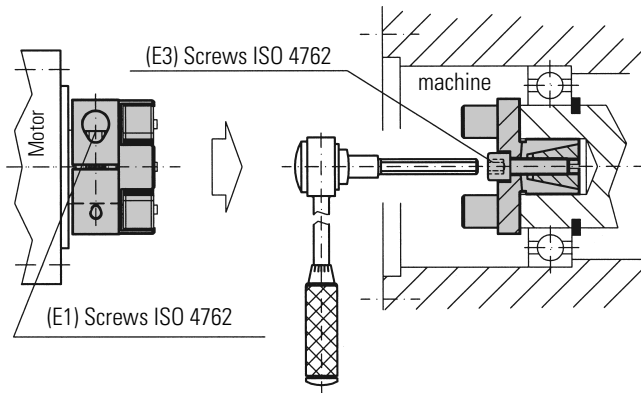
The EK6 uses a clamping ring with axial fastening screws (E). Slide the coupling hub onto the first shaft, using a torque wrench, uniformly tighten the clamping screws (E) using a cross-wise tightening pattern until all the clamping screws are evenly tightened to the correct tightening torque as given in table 3. The clamping ring will come to a positive stop (1). This avoids excessive loading of the clamping ring and improves the TIR (Total Indicator Run-out) of the coupling on the shaft. Insert the elastomer ring. The other coupling hub is mounted onto the second shaft using the same procedure. Press the two coupling halves together and ensure that the fit length (A) is maintained (See Table 1).



### Dismounting:

Pull the coupling halves apart and remove the axial fastening screws (E2). Threaded holes (3) have been machined into the hub to accept the fastening screws which will now be used to push off the tapered ring (picture 4). **CAUTION:** Prior to re-assembly make sure the fastening screws are in the proper holes to draw in the taper ring.

## Mounting EK 7



Pictures 11

### Mounting of the clamping hub:

Slide the coupling onto the shaft ends, at the right axial position tighten the mounting screw to the specified tightening torque.

### Dismounting of the clamping hub:

For dismounting loosen the mountingscrew E3.

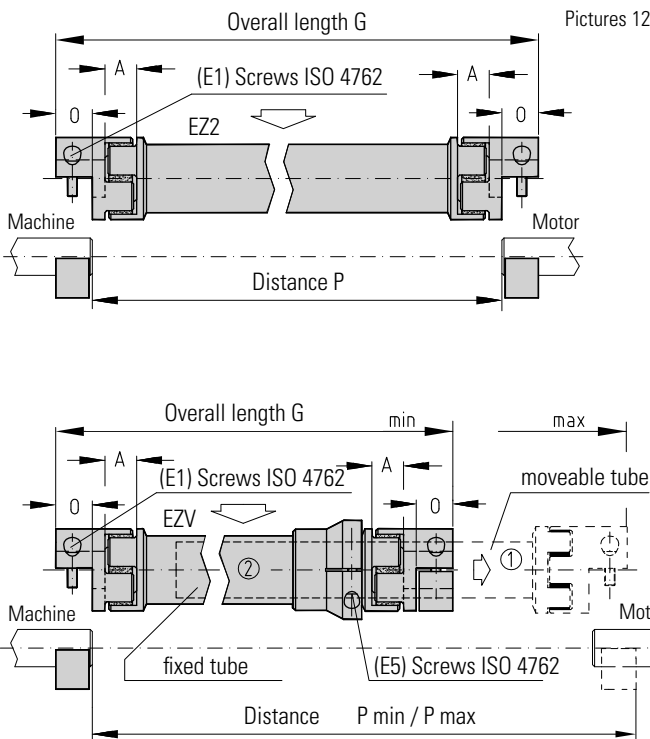
### Mounting of the expanding shaft:

Push the shaft hub into the bore, at the right axial position tighten the mountingscrew E3 to the specified tightening torque.

### Dismounting of the expanding shaft:

For dismounting loosen the screw E3 a few turns. By putting pressure on the screwhead, the inner cone slides out of its sleeve. The shaft is now loose.

## Mounting EZ 2 / EZV



Pictures 12

### Mounting:

The coupling needs to be pre-mounted. The pre-mounted coupling can be set in place radial under consideration of distance P. Now the two split hubs can be mounted while using the locking screws E1 applying the right tightening torque. Distance A, as shown on table 2 must be kept.

### Adjusting the length of the EZV

After loosen the screws (E5), the axial adjustable tube 1 can be pushed into the other intermediate tube 2. After receiving the wanted axial position, the fastening screws E1 + E5 can be fastened under consideration of the specific tightening torque (see table 3). The tube of the moving part is exactly conducted in the fixed part of the coupling. A high concentricity is ensured.

### Dismounting:

Loosen the screws E1 of the hubs and demount the shaft.

Series	10	20	60	150	300	450	800	2500	4500	9500	
Distance	0	16.6	18.6	32	37	42	52	62	67	84	105

The installation length G results out of the distance  $P+2 \times 0$



### ATTENTION

Do always notice the max. critical speed given by the manufacturer. An abrasion of the elastomer insert can decrease the max. critical speed. Do constantly check the elastomer inserts for abrasion.

A fast turning bended tube can cause a major oscillation (Rework or replacement of the tube).

Lateral misalignment  $\Delta Kr$



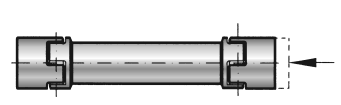
$$\Delta Kr_{\max} = \text{ca. } (10 \text{ mm}) \times G \text{ (m)}$$

Angular misalignment  $\Delta Kw$



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

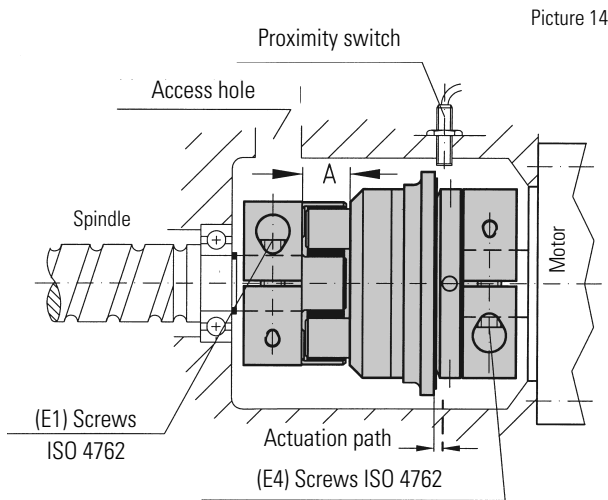
Axial misalignment  $\Delta Ka$



$$\Delta Ka_{\max} = \text{ca. } \pm 2 \text{ (mm)}$$

Pictures 13

## Mounting instructions ES 2



Picture 14

### Mounting:

Slide the coupling on the shaft ends to the proper axial position. Using a torque wrench, tighten the clamp screws (E1/E4) to the correct tightening torque as indicated (in the table page 3)



**CAUTION!** Both clamping hubs have different screws and different tightening torques.

**Dismounting:** Simply loosen the clamp screw E1, E4 and remove the safety coupling.

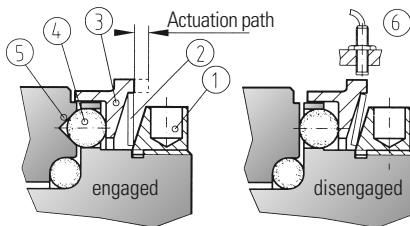
**Emergency cut off:** The axial path of the actuation ring activates the mechanical switch or the proximity sensor.



**CAUTION!** Upon assembly, it is absolutely necessary to check the function of the switch 100%

## Single-position / Multi-position

- 1 Adjustment nut
- 2 Spring
- 3 Actuation ring
- 4 Balls
- 5 Detents
- 6 Proximity switch



Picture 15

In a torque overload, with the single-position design (standard) and multi-position design, the spring disengages to allow the balls to come out of their detents, separating the drive and driven elements. Very low residual spring pressure remains so that the coupling will re-engage once the torque is reduced below the overload setting.)



**Re-engagement may only be effected at low speed.**

### Full-disengagement

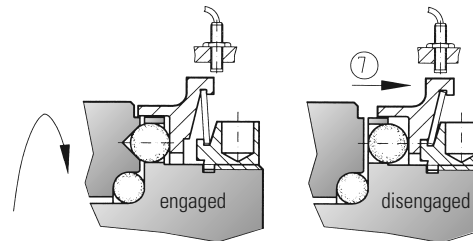
The R+W full-disengage torque limiting coupling can be re-engaged in six different positions or every 60 degrees with low „press-in“ force (E). Marks on the actuation ring and body (13) of the coupling must line up and indicate the re-engagement points (17).

As of size 60 and up the re-engagement can be done with 2 lever which will be supported at a recess on the adjustment nut (picture 18). Screwdrivers can be used as a lever.



**CAUTION: Re-engagement should only be performed when the coupling stands still and not rotating!**

## Full-disengagement

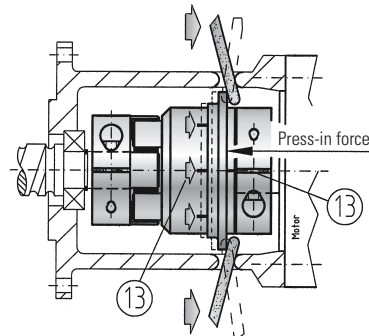


Picture 16

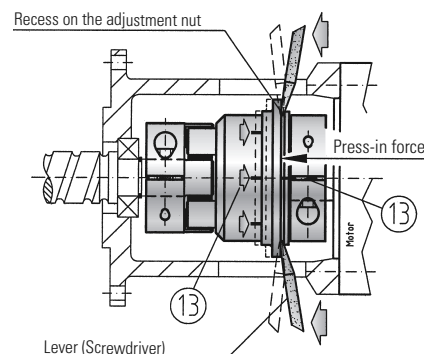
With this design, when a torque overload is detected, the disc spring completely flips over and places no residual spring pressure on the actuation ring. The drive and driven elements are completely separated.



**Re-engagement of the coupling is not automatic and must be performed manually (Picture 17 + 18).**



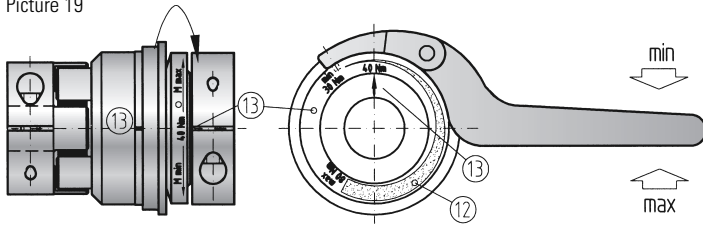
Picture 17



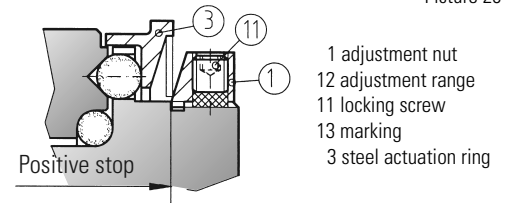
Picture 18

## Disengagement torque setting

Picture 19



Picture 20



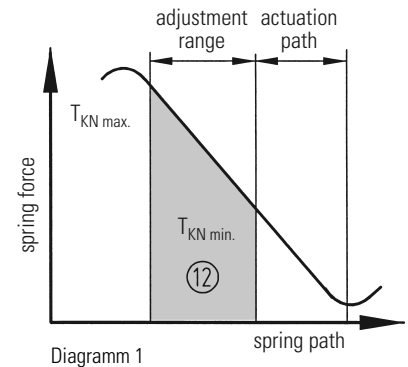
At ES 2 couplings, the slot of the clamping hub serves as a marking (13).

R+W torque limiters are factory set to the customer specified disengagement torque, which is marked onto the coupling. The adjustment range (min/max) is also marked on the adjustment nut (1). The customer can adjust the disengagement torque as long as it is in the range (12) indicated on the adjustment nut.



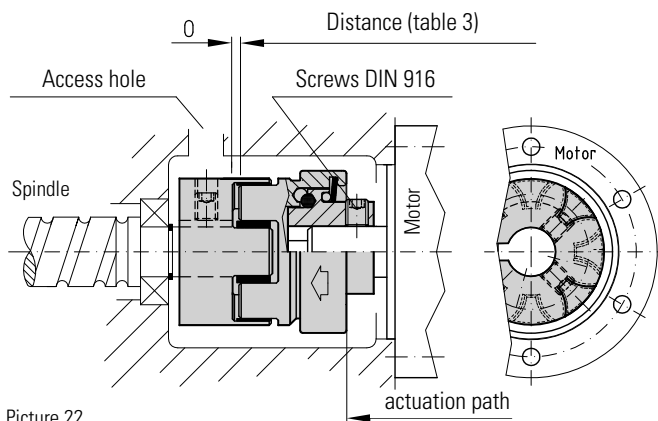
**The adjustment range may not be exceeded while re-adjusting.**

To adjust the disengagement torque, loosen the locking screws (11) and rotate the adjustment ring using a spanner wrench to the desired new setting. Tighten the 3 locking screws (11) and test the coupling.



**Caution: R+W torque limiters incorporate disc springs that exhibit a special spring characteristic. It is important to stay in the max-min range of the coupling. (Diagramm 1)**

## Mounting instructions ESL



Picture 22

### Mounting:

Slide hub on to shaft and tighten at specific position with fastening screws DIN 916. The screws are for the axial fixation of the hub.

The distance 0 regarding table 3 page 3 must be met at any time, because the safety part is moving after disengagement along the actuation path.

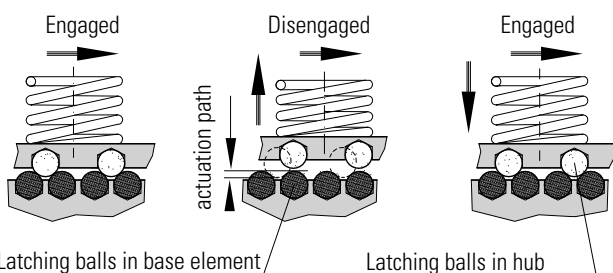
### Dismounting:

Loosen the screws. And pull of the hubs while using an appropriate tool.

**CAUTION! The point of disengagement must be tested before shipping the machine.**

## Latching function

Picture 23



This safety coupling works at a ball latching system. High durable hardened steel balls are latching into each other. A latch is followed by another (Multi position).

## Disengagement torque setting

The ESL torque limiter is exactly pre adjusted by the manufacturer and is permanent secured against readjusting. (The steel adjustment nut will be solid connected to the base element)



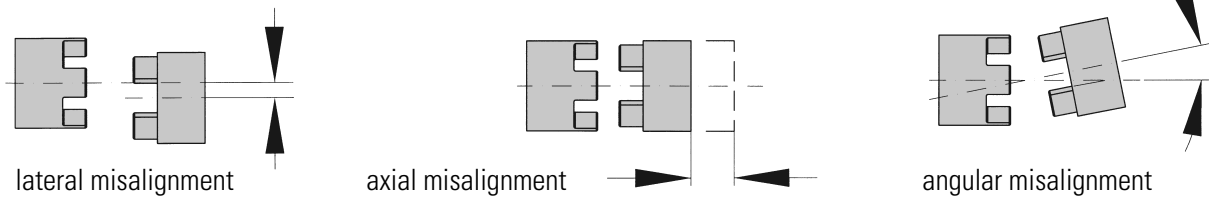
**A re-adjusting of the desengagement torque is not possible.**




**The overdrive must be shut of immediately.**

## Maximum Shaft misalignment

R+W SERVOMAX elastomer couplings compensate for lateral, axial, and angular shaft misalignment.



 In Table 2 you will find the maximum permissible values for the three axis of misalignment. It is important to remain within these limits to ensure long life and proper operation of the coupling. If several misalignment types occur at the same time, it is necessary to reduce the maximum permissible misalignment values. The percentage of the maximum value summing up actual misalignments must not exceed 100 %.

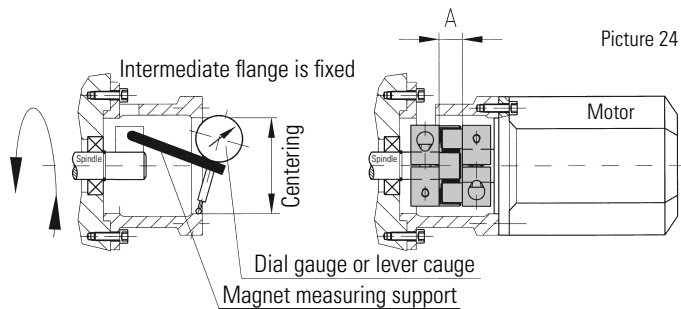


### CAUTION:

Lateral misalignment has a negative effect on the service life of the elastomer. Exact alignment of the coupling considerably increases the service life of the elastomer. By reducing or eliminating lateral misalignment the radial load of the adjacent bearings is eliminated, increasing service life and reducing heat. For drives running at high speed we recommend the alignment of the R+W coupling with a dial indicator (Picture 23/24).

## Mounting with intermediate flange

If an R+W SERVOMAX coupling is to be installed within an intermediate flange, it is important that the drive and driven shafts align as precisely as possible. The flange must be precision machined with centering pilots, and the mounting surfaces must be parallel to each other and perpendicular to the shaft axis.



Picture 24

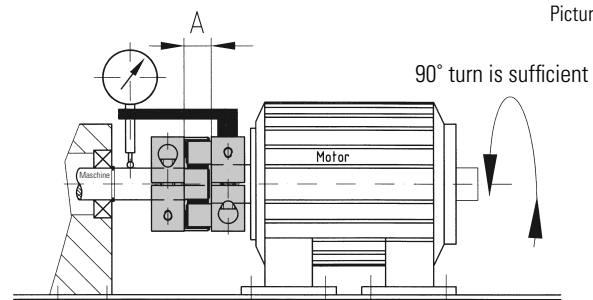


### Caution!

Do check fit length (A) indicated in table 2. The elastomer insert must be axially movable.

## Open installation

If the R+W SERVOMAX coupling is to be mounted between a foot mounted motor and a gearbox for example, care must be taken to ensure that the gearbox and motor shafts are in alignment and the devices are permanently mounted.



Picture 25



### Caution!

Do check the fit length A indicated in table 2. The elastomer insert must be axially movable.

## Maintenance

R+W SERVOMAX couplings are maintenance-free as long as they are properly mounted and the maximum misalignment values are not exceeded. Extreme ambient or installed conditions such as very high or low temperatures, acidic or basic solutions, cutting fluids, etc. may cause wear and tear on the elastomer insert. Regular inspection of the insert is recommended. If replacement is required use only R+W original spare parts.