

INSTALLATION AND OPERATING INSTRUCTIONS FOR R+W TORQUE LIMITING COUPLINGS: SERIES SK



GENERAL FUNCTIONING



Please carefully and completely read the following installation, operation and maintenance procedures for the R+W torque limiting couplings. Failure to comply with these procedures may result in poor performance and/or the failure of the coupling. **Installation of the couplings should be performed by a qualified technician.**

TRANSPORT

R+W couplings are delivered ready for installation. After incoming inspection the coupling should be stored in its original packaging until it is ready for installation. A copy of this installation, operation and maintenance manual should be kept with the coupling.

SAFETY ALERT



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 IIB. 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.

GENERAL FUNCTIONING

R+W torque limiting couplings are ball detent style overload couplings. They protect drive and driven mechanical components from damage associated with torque overloads. Backlash free torque transmission is accomplished by a series of steel balls (4) nested in hardened detents (5). See figure 1. Disc springs push against an actuation ring (3) keeping the balls nested. The

disengagement torque is adjustable by means of an adjustment ring (1). In the event of an overload, the actuation ring moves axially allowing the balls to come out of the detents separating the drive and driven elements. The movement of the actuation ring can be sensed by means of a mechanical switch or proximity sensor triggering the drive to shut down.

SINGLE-POSITION / MULTI-POSITION

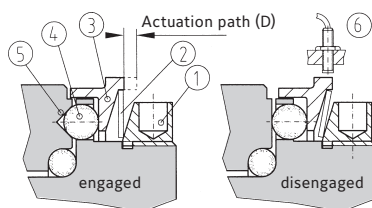


Figure 1

In a torque overload, for 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. See diagram 1 too.



Re-engagement may only be effected at low speed.

Re-engagement: Full disengagement

The R+W Torque Limiter can be re-engaged with a low engagement force E (Table 2) on six positions within a 360° circle. The markings of the re-engagement positions had to be lined up. Starting on series 60, the re-engagement can be done with 2 levers, which must be strutted on the adjustment nut. Also two screwdrivers can be used as levers. (see Pic. 3b)



Important: Re-engagement must happen on shutdown only.

FULL-DISENGAGE

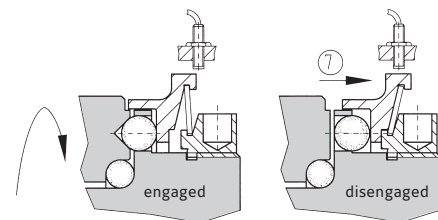


Figure 2

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 (Figure 3).

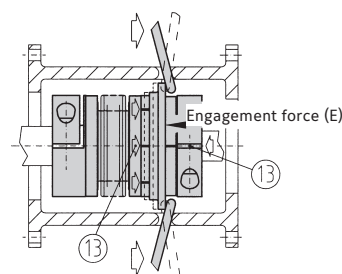


Figure 3a

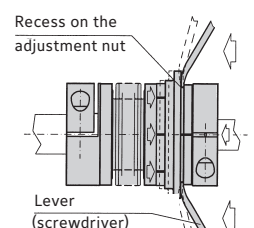


Figure 3b

MOUNTING PREPARATION

All mounting surfaces including shafts, bores, keys, and key ways, must be clean and free of burrs, nicks, or 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 shaft and hub bores are maintained to 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 and grease with molybdenum disulfide or other high-pressure additives.

MOUNTING DRIVE ELEMENTS TO SK 1/SKP/SKN COUPLINGS + TIGHTENING TORQUE SK COMPLETE

SERIES		1,5	2	4,5	10	15	30	60	80/150	200	300	500	800	1500	2500
Belt pre-tensioning force max. (N)	A	25	50	100	300	700	900	1100	1500	1700	2200	2800	4000	5000	7000
Distance from - to (mm)	B	3-6	5-8	6-11	6-14	7-17	10-24	10-24	10-24	12-26	12-28	16-38	16-42	20-50	28-60
Fastening screws ISO 4762 Clamping hub		M2,5	M3	M4	M4	M5	M6	M8	M10	M12	M12	M16	2xM16	2xM20	x
Tightening torque (Nm)		1	2	4	4,5	8	15	40	50/70	120	130	200	250	470	x
Fastening screws ISO 4762 Clamping hub SKN		x	x	x	x	M5	M6	M8	M10	M12	M12	M14	M16	M20	x
Tightening torque Clamping hub SKN (Nm)		x	x	x	x	8	15	40	70	120	130	210	270	500	x
Fastening screws ISO 4762 Tapered bushing		x	x	x	x	M4	M5	M5	M6	M6	M8	M8	M10	M12	M16
Tightening torque Tapered bushing SKN (Nm)		x	x	x	x	4	6	8	12	14	18	25	40	70	120

Table 1

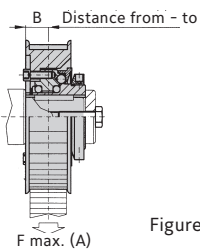


Figure 4

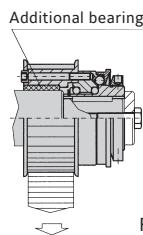


Figure 5

Mounting of the drive element:

Center the drive element (i.e. timing belt pulley or gear) onto the connecting flange of the coupling and fasten with screws. If the center of the radial load falls over the middle of the coupling an additional support bearing is not required (figure 4). If the radial load is not centered over the coupling an additional support bearing is required (figure 5). Please observe the maximum allowable radial load for each coupling size as indicated (Table 1). Excess radial load will affect the performance of the coupling.

MOUNTING AND DISMOUNTING: MODELS SKP / SK1 / SKN

SKP with key

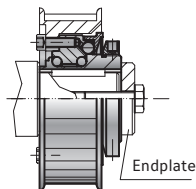


Figure 6

Mounting:

Slide the coupling onto the shaft. Lock it in position, with an end plate (8) for example. Figure 6.

Dismounting:

Remove the end plate and slide the coupling off the shaft using an appropriate tool.

SK1 / SKN with clamping hub

SK1 Series 1,5 - 10
SKN Series 15 - 2500

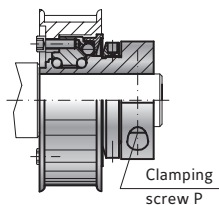


Figure 7

Mounting:

Slide the coupling onto the shaft to the proper axial position. Using a torque wrench tighten the clamp screw (P) to the proper tightening torque as indicated in Table 1.

Dismounting:

Simply loosen the clamp screw (P) and remove the coupling.

SK1 with tapered bushing

Series 15 - 2500

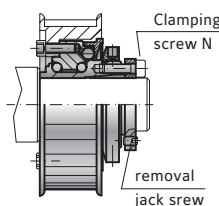


Figure 8

Mounting:

Slide the coupling onto the shaft to the proper axial position. Using a torque wrench, uniformly tighten the clamping screws (N) using a cross-wise tightening pattern until all the clamping screws are evenly tightened to the correct tightening torque as given in Table 1. While tightening the coupling may move slightly towards the tapered bushing.



CAUTION: Further tightening of the clamping screws may destroy the tapered bushing connection.

Prior to reassembly make sure that the jack-screws are raised to their original position.

Dismounting: Loosen the clamping screw (N). Insert the three jack screws into the taped holes on the tapered segment apply even pressure to remove the tapered segment. Remove the coupling.

SK2 with clamping hub

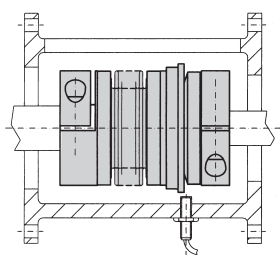


Figure 9

Mounting:

Prior to mounting make sure that the shaft to be connected do not exceed the angular or lateral misalignment limits for the coupling size to be used. This data can be found in the catalog. Slide the coupling on the first shaft end to the proper axial position. Using a torque wrench, tighten the clamp screw to the correct tightening torque as indicated in Table 1. Insert the second shaft into the other end of the coupling to the proper axial position. Make sure that the coupling is free of any axial forces before tightening. Tighten the clamp screw as above using a torque wrench.

Dismounting:

Simply loosen the clamp screw and remove the coupling.

SK3 with tapered bushing

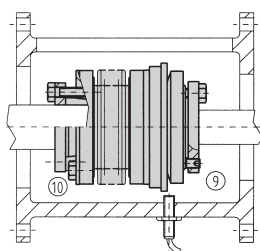


Figure 10

Mounting:

Prior to mounting make sure that the shaft to be connected do not exceed the angular or lateral misalignment limits for the coupling size to be used. This data can be found in the catalog. Slide the coupling onto the first shaft to the proper axial position. If the axial position is correct, use a torque wrench to tighten the clamping screws in 3 cycles with 1/3, 2/3 and the full tightening torque according Table 1.



CAUTION: Further tightening of the clamp screws may destroy the tapered bushing connection.

Dismounting:

Loosen the clamping screws. Use the three jackscrews conveniently mounted in the taper segment to evenly back out the tapered segment. Remove the coupling.



CAUTION: Prior to reassembly make sure that the jackscrews are raised to their original position.

SK5 with press-fit tapered bushings

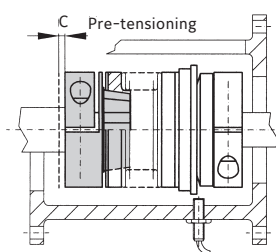


Figure 11

Mounting:

Prior to mounting it is necessary to consider the overall length of the assembled coupling. The press-fit coupling requires a specific pre-tensioning (C) between the two coupling halves to ensure backlash free operation. Mount the „female“ coupling half containing the bellow onto the first shaft end to the proper axial position. Using a torque wrench tighten the clamp screw to the proper tightening torque. Mount the „male“ coupling segment onto the second shaft end. The proper axial position is when the two couplings come together and coupling is compressed by the proper pre-tension distance (C). See Table 2. When the coupling segment is properly positioned tighten the clamp screw to the proper torque.

Dismounting:

Pull the coupling apart. Simply loosen the clamp screws and remove the coupling from the shaft.

AXIAL MISALIGNMENT

R+W bellows couplings compensate for lateral, axial and angular misalignment simultaneously.



Lateral misalignment ΔK_r



Axial misalignment ΔK_a



Angular misalignment ΔK_w

Figure 12

Maximum shaft misalignment

In addition to torque overload protection R+W torque limiters combined with a metal bellow compensate for lateral, axial and angular misalignment. Table 2 contains the maximum allowable values for each axis of misalignment for the different size couplings. It is important to remain within these limits to ensure maximum life and proper operation of the coupling.



CAUTION: Exact alignment of the R+W metal bellow coupling considerably increases the service life of the coupling. Reducing or eliminating lateral misalignment eliminates the radial loading of the adjacent bearings, increasing service life and reducing heat. For drives running at high speed it is recommended to align the coupling with a dial indicator.

SERIES		1,5	2	4,5	10	15	30	60	80/150	200	300	500	800	1500	2500
Lateral misalignment x/x (mm)	ΔK_r	0.15/0.20	0.15/0.20	0.20/0.25	0.20/0.30	0.15/0.20	0.20/0.25	0.20/0.25	0.20/0.25	0.25/0.30	0.25/0.30	0.30/0.35	0.35	0.35	0.4
Axial misalignment x/x (mm)	ΔK_a	1/1.5	1/2	1/2	1/2	1/2	1/2	1.5/2	2/3	2/3	2.5/3.5	2.5/3.5	3.5	3.5	4
Angular misalignment x/x (Degree)	ΔK_w	1/1.5	1/1.5	1/1.5	1/1.5	1/1.5	1/1.5	1/1.5	1/1.5	1.5/2	1.5/2	2/2.5	2.5	2.5	2.5
Pre-tensioning (mm)	C	0.1-0.5	0.2-0.7	0.2-0.7	0.2-1.0	0.2-1.0	0.3-1.5	0.5-1.5	0.5-1.0	x	0.5-1.5	0.5-2.0	0.8-2.0	0.8-2.2	1-2.5
Actuation path (mm)	D	0.7	0.8	0.8	1.2	1.5	1.5	1.7	1.9	2.2	2.2	22	2.2	3	3
Engagement force approx. (full disengage design) (N)	E	5-10	8-15	10-20	15-30	20-40	25-50	40-80	50-100	80-150	100-220	250-700	800-1200	2000-3000	3000-4000

Table 2 x/x First values are for bellows with 4-5 corrugations. Second values are for bellows with 6-8 corrugations.

Mechanical switch (Order No. 618.6740.644)

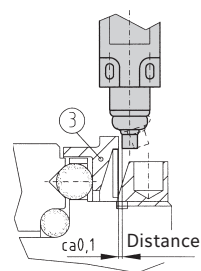


Figure 13

TECHNICAL DATA	SK, ES2, SL
Max. Voltage	250 V AC
Max. Permanent current	10 A
Protection type	IP 65
Type of contact	Opener
Ambient temperature	-30° to +80° C
Confirmation	(metal)
SWITCH SYMBOL	

The axial movement of the actuation ring (3) can be sensed by either a mechanical switch or a proximity sensor. The distance the actuation ring moves is given in Table 2 and is important for the selection of the appropriate sensing device. Mount the sensing device on a solid support keeping the distance shown in figure 13+14. Without prior agreement it is not allowed to operate R+W torque limiters of the series SK and ES without end

Proximity switch (Order No. 650.2703.001)

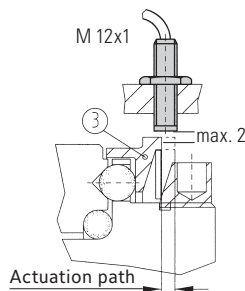


Figure 14

TECHNICAL DATA	SK, ES2
Voltage range:	10 to 30 V DC
Initial current max.	200 mA
Switch frequency:	800 Hz
Temperature range	-25°C to +70°C
Protection type	IP 67
Switching type	PNP opener
Switch distance:	max. 2 mm
SWITCH SYMBOL	

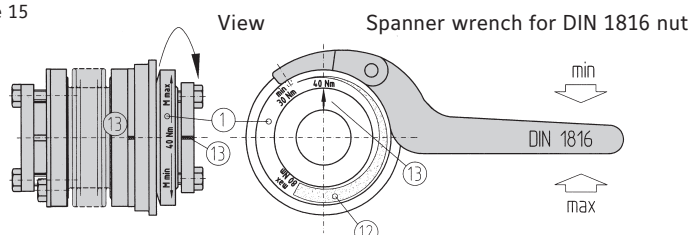
switch. In case of a electronic circuit collapse, the coupling had to be checked visually right after the first disengagement for the preassigned disengagement torque. Here fore the marks on the adjustment nut are the reference value.



Note! Test the switch prior to the delivery of a machine using this device.

DISENGAGEMENT TORQUE SETTING

Figure 15



With SK 2/5 couplings the groove of the clamping hub serves as a marking (3)

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 ring. The customer can adjust the disengagement torque as long as it falls into the range indicated on the adjustment ring.



The adjustment range may not be left during setting.

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 locking screws 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 courding.

Figure 16

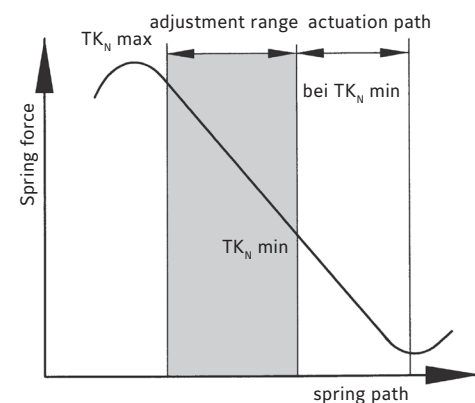
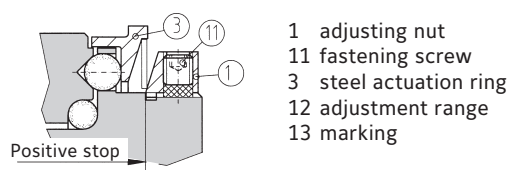


Diagram 1

MAINTENANCE

After 2200 hours of operation, 100 disengagements, or no more than 1 year of service, the following maintenance work should be performed: • Visual inspection • Check of the shaft-hub connection • Verification of the screw tightening torques

Further maintenance work is recommended to be performed at the manufacturing facility: • Verification of the disengagement torque • Release of the clutch • Inspection of the bearing (bearing preload) • Re-lubrication of the internal mechanical components