

Installation and operating instructions for alpha Torque Limiting couplings TL1, TL2, TL3



Please read carefully and completely the following installation, operation and maintenance procedures for the alpha 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.

General functioning

alpha 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 off 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

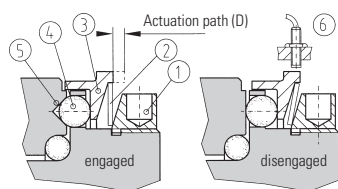


Figure 1

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.



CAUTION: Re-engagement may only be effected at low speed.



Note: Re-engagement of the coupling is not automatic and must be performed manually (Figure 3).

Full-disengage

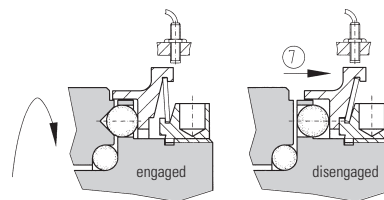


Figure 2

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: Full disengagement

The alpha 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.

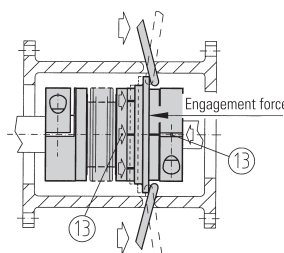


Figure 3a

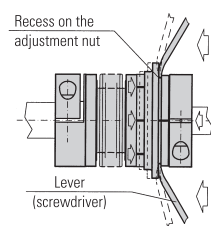


Figure 3b

Transport

alpha 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



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.



WITTENSTEIN

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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 alpha 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 TL1

Series	A	B	conical sleeve	Clamping hub	ISO 4762		ISO 4017 ISO 4762	
					Fastening screws	Tightening torque (Nm)	Fastening screws	Tightening torque (Nm)
1,5	50	3-6	M2.5	1	x	x		
2	100	5-8	M3	2	x	x		
4,5	200	6-11	M4	4	x	x		
10	500	6-14	M4	4.5	x	x		
15	1400	7-17	M5	8	M4	4		
30	1800	10-24	M6	15	M5	6		
60	2300	10-24	M8	40	M5	8		
80/150	3000	10-24	M10	70	M6	12		
200	3500	12-26	M12	120	M6	14		
300	4500	12-28	M12	130	M8	18		
500	5600	16-38	M16	200	M8	25		
800	8000	16-42	2xM16	250	M10	40		
1500	12000	20-50	2xM20	470	M12	70		
2500	20000	28-60	x	x	M16	120		

Table 1

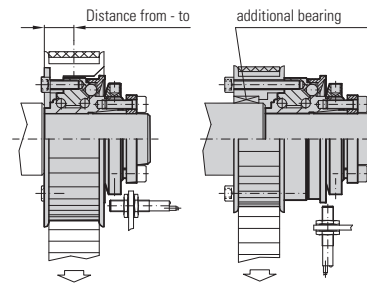


Figure 4

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: Model TL1

TL1 with clamping hub

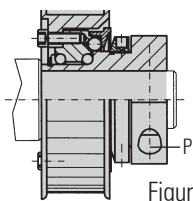


Figure 7

Mounting:

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

Dismounting:

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

TL1 with tapered bushing

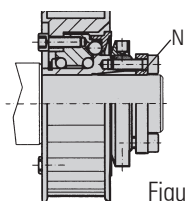


Figure 8

Mounting:

Slide the coupling onto the shaft to the proper axial position. Using a torque wrench, uniformly tighten the clamping screws 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.

NOTE: 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.

Mounting and dismounting: Models TL2 / TL3

TL2 with clamping hub

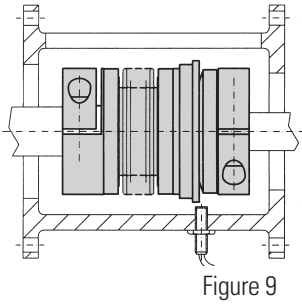


Figure 9

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.

TL3 with tapered bushing

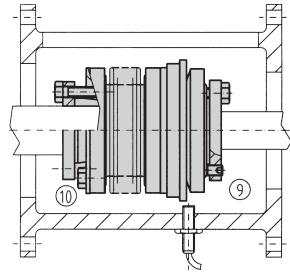


Figure 10

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. Using a torque wrench, uniformly tighten the clamping screws using a cross-wise tightening pattern until all the clamping screws are evenly tightened to the correct tightening torque as given in 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.

Axial misalignment

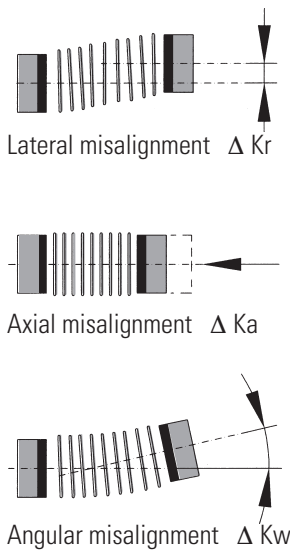


Figure 11

Maximum shaft misalignment

In addition to torque overload protection alpha torque limiters combined with a metal bellows 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.

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

Series	Lateral misalignment x/x (mm)		Axial misalignment x/x (mm)		Angular x/x (degree)		Actuation path (mm)	
	Δ Kr	Δ Ka	Δ Kw	D	E	Engagement force approx. (full disengage design) (N)		
1.5	0.15/0.20	1/1.5	1/1.5	0.7	5-10			
2	0.15/0.20	1/2	1/1.5	0.8	8-15			
4.5	0.20/0.25	1/2	1/1.5	0.8	10-20			
10	0.20/0.30	1/2	1/1.5	1.2	15-30			
15	0.15/0.20	1/2	1/1.5	1.5	20-40			
30	0.20/0.25	1/2	1/1.5	1.5	25-50			
60	0.20/0.25	1.5/2	1/1.5	1.7	40-80			
80/150	0.20/0.25	2/3	1/1.5	1.9	50-100			
200	0.25/0.30	2/3	1.5/2	2.2	80-150			
300	0.25/0.30	2.5/3.5	1.5/2	2.2	100-220			
500	0.30/0.35	2.5/3.5	2/2.5	2.2	250-700			
800	0.35	3.5	2.5	2.2	800-1200			
1500	0.35	3.5	2.5	3	2000-3000			
2500	0.4	4	2.5	3	3000-4000			

Table 2



CAUTION: Exact alignment of the alpha metal bellows 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.



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Emergency switch function

Mechanical switch

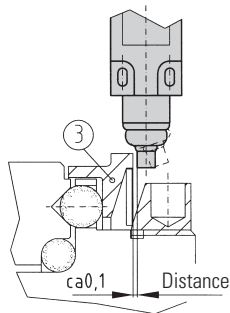
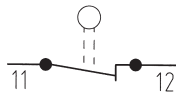


Figure 13

Technical Data

Max. Voltage:	500 V AC
Max. Permanent current:	10 A
Protection type:	IP 65
Type of contact:	Opener
Ambient temperature:	-30°C to +80°C
Confirmation:	(metal)

Switch symbol



Proximity switch

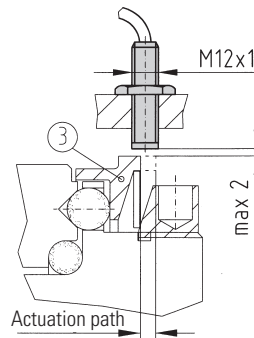
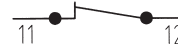


Figure 14

Technical Data

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



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 alpha torque limiters of the serie TL without end switch. In case of an electronic circuit collapse, the coupling had to be checked visually right after the first disengagement for the preassigned disengagement torque. Here for 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

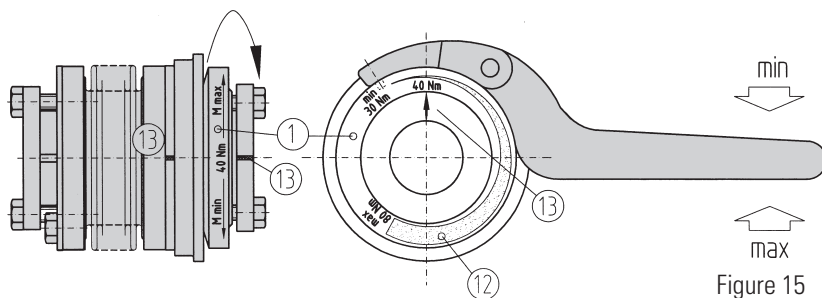


Figure 15

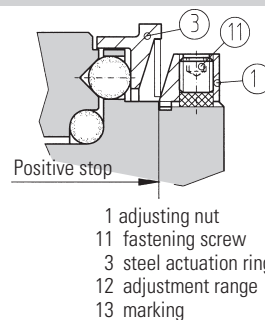


Figure 16

alpha torque limiters are factory set to the customer specified disengagement torque, which is marked onto the coupling. For TL2 couplings and for TL1 miniature versions (series 1.5 to 10), the slot of the clamping hub serves as the reference for the marking. For TL3 couplings and TL1 couplings from Series 15 onwards, a reference mark (13) is attached to the cone clamping hub in the factory. 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: alpha torque limiters incorporate disc springs that exhibit a special spring characteristic. It is important to stay in the max-min range of the coupling.

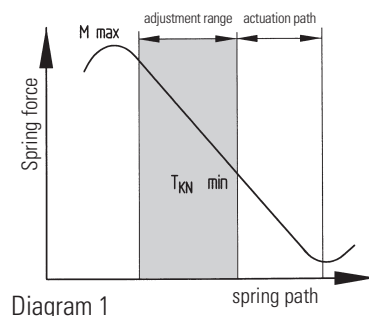


Diagram 1

Maintenance



alpha torque limiters are maintenance free as long as they are properly mounted and the maximum misalignment and radial load values are not exceeded. The internal components are permanently greased for lifetime lubrication.

CAUTION: Disassembly of the coupling will void the warranty.

The above-mentioned information is based on our present knowledge and experiences and does not free the user of his own regular checks. A legally binding guarantee is not given even in regard to protection rights of Third parties.