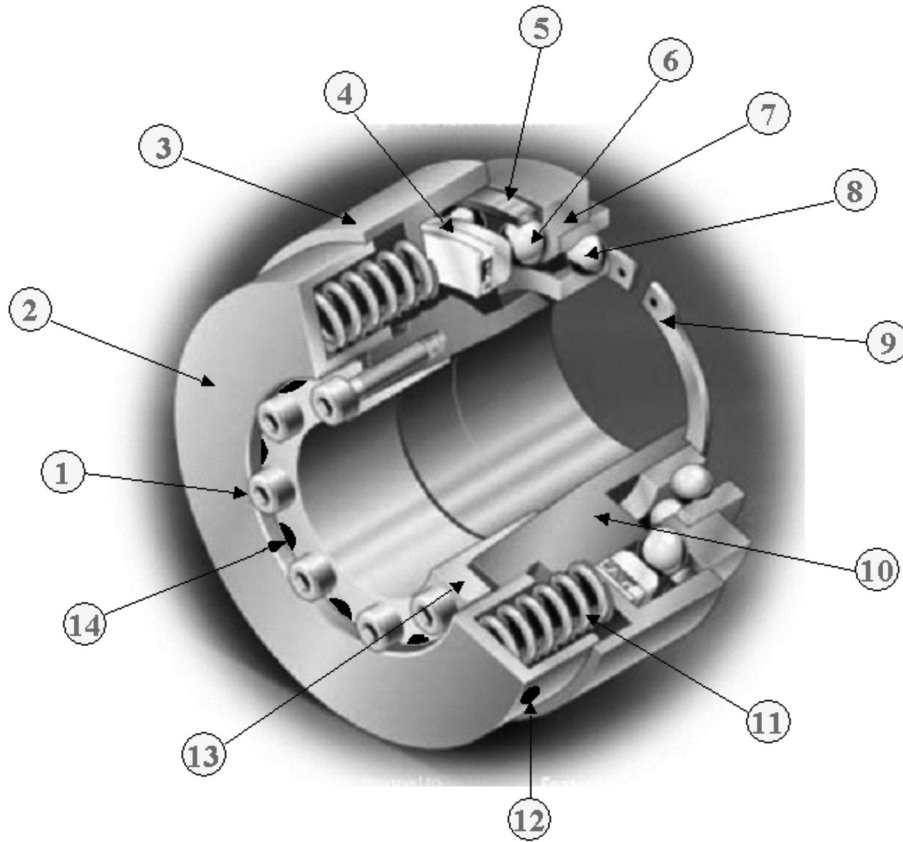


AUTOGARD 320 SERIES TORQUE LIMITER INSTALLATION AND MAINTENANCE



Part	Description	Part	Description
1	Clamp Screw	8	Deep Groove Ball Bearing
2	Adjustment Nut	9	Circlip / Snap Ring
3	Cover	10	Hub
4	Thrust Bearing	11	Compression Spring
5	Hub Flange	12	Nut Locking Screw
6	Drive Balls	13	Clamp Sleeve
7	Drive Plate	14	Nut Locking Detents

PRINCIPLE OF OPERATION

When the 320 unit is installed in a drive train, torque is transmitted through the hardened steel drive balls which are located in holes in the hub flange and engage with conical seats in the hardened steel drive plate. The tendency of the torque to cause the balls to ride out of their seats is opposed by an adjustable spring load. The setting of this spring load gives the desired tripping torque for overload protection. When the unit trips, the cover is displaced axially, which facilitates the use of a proximity sensor (or optionally, a mechanical limit switch) to sense the overload. When the overload is removed, the 320 unit re-engages automatically, when the drive balls next coincide with the seats in the drive plate. In the synchronous reset (SR) version, the unit resets in the original angular position. Rapid reset versions (RR) reset every 15 degrees.

INSTALLATION

General

Prior to installation, ensure that the bore is clean and free of debris. For clamp sleeve versions, ensure that the clamp screws are loose. The clamp sleeve bore and the mating shaft must be free from oil and grease. The clamp screws should be lightly oiled. DO NOT use grease or any lubricant containing molybdenum disulphide or high-pressure additives. With the torque limiter completely assembled (but excluding any coupling hub supplied), carefully slide the hub onto the shaft. The standard clearance bore should permit the hub to be pushed into place on the shaft. When required, it is recommended that a jacking arrangement is used to draw the 320 onto the shaft (Threaded rod, nut and an end plate). DO NOT strike with heavy hammer blows.

Bored and Keyed Hubs

Where a key is used and an extended hub with set screws has been supplied, the 320 unit may be clamped in place by tightening the set screws provided which are normally positioned over the key and at 90 degrees.

Clamp Sleeve Hubs

For clamp sleeve versions, tighten the clamp screws progressively in a diagonal (criss-cross) sequence to the specified torque. (See Table 1)

Table 1

Series 320 Size	Clamp Bolts		Tightening Torque	
	Number	Size	(Nm)	(in-lbs)
01	6	M4	3.3 *	29.2
0	8	M5	5.5	48.7
1	8	M6	9.6	85.0
2	8	M6	12.0	106
3	8	M6	15.0	133
4	8	M8	28.0	248

* Max transmissible torque 40 Nm (354 in-lbs) for shaft sizes under 12.7 mm (0.5") diameter.

After tightening the clamp sleeve, the adjusting nut locking screws must be tightened to engage centrally with the anti-rotation detents in the clamp sleeve flange.

Units with Couplings

For shaft to shaft installations, the couplings supplied as standard are the Autogard Autoflex membrane coupling or the Autogard Samiflex elastomeric coupling. Mount the coupling hub and ensure that the shafts are aligned within the permitted tolerances. (See Table 2)

Table 2

Series 320 Size	Autoflex (Figure 1)		Samiflex (Figure 1a)		
	Axial mm / in	Angular (°)	Axial mm / in	Radial mm / in	Angular (°)
01	0.66 / 0.025	0.5	+0.5 / +0.02	0.10 / 0.004	2.0
0	0.66 / 0.025	0.5	+0.5 / +0.02	0.10 / 0.004	2.0
1	0.76 / 0.030	0.5	+0.7 / +0.03	0.15 / 0.006	2.0
2	0.97 / 0.038	0.5	+0.7 / +0.03	0.15 / 0.006	2.0
3	1.12 / 0.044	0.5	+0.8 / +0.03	0.20 / 0.008	1.3
4	1.47 / 0.058	0.5	+1.0 / +0.04	0.20 / 0.008	1.3

Autoflex Coupling Hubs

Coupling hubs are supplied with the membrane pack assembled to the hub. A set of bolts and washers is supplied for connection to the torque limiter. When the hubs are aligned and in position, insert the bolts with the thick and thin washers positioned as shown in Figure 1, either side of the membrane pack and tighten evenly to the specified torque. (See Table 3). Ensure that the rounded faces of the washers face the membrane pack.

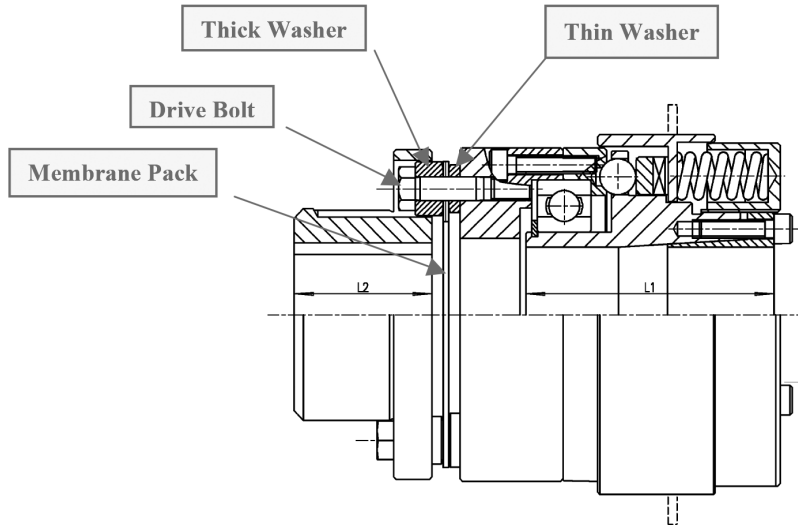


Figure 1

Table 3

Series 320 Size	Autoflex Coupling	Thread Size	Bolt Tightening Torque	
			(Nm – dry)	(in-lbs – dry)
01	8 HV	M6	11	97
0	8 HV	M6	11	97
1	15 HVII	M6	11	97
2	35 HVII	M8	24	212
3	70 HVII	M8	24	212
4	150 HVII	M12	71	628

Samiflex Coupling Hubs

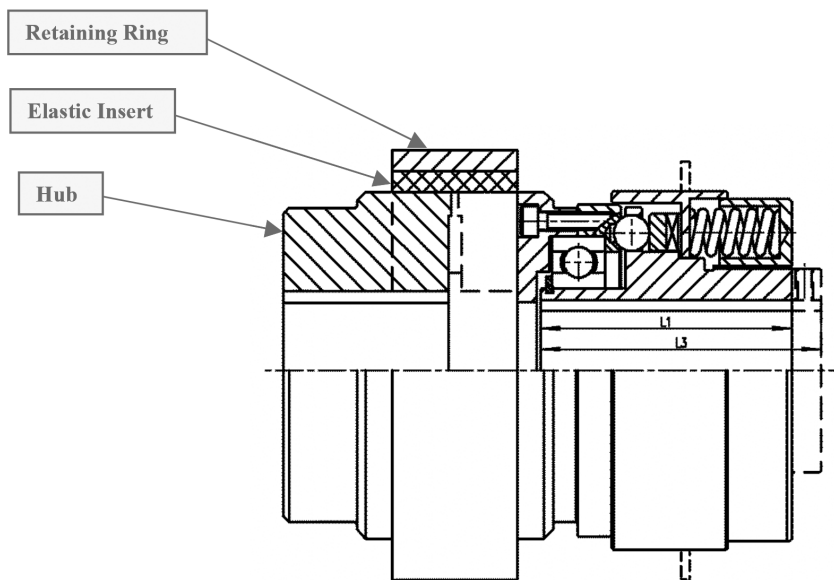


Figure 1a

Units with Drive Media

If a drive medium (pulley, sprocket, gear, sheave etc.) is to be fitted by the customer, it must be bored and drilled to suit the torque limiter with reference to Figures 2 / 2a and Table 4. Short hub units as shown in figure 2 are suitable for drive media where the side load can be reacted on the integral deep groove ball bearing. The best fit on the bearing will depend on the application but if no fit is specified, we recommend H7 for the drive media bore. (Shown as M2 in table 4.) Where the load is overhung, a long hub unit as shown in figure 2a is used and the customer must supply suitable bearings mounted on the hub extension diameter 'K'.

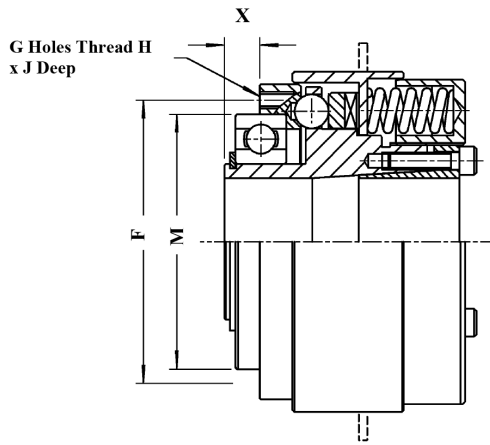


Figure 2

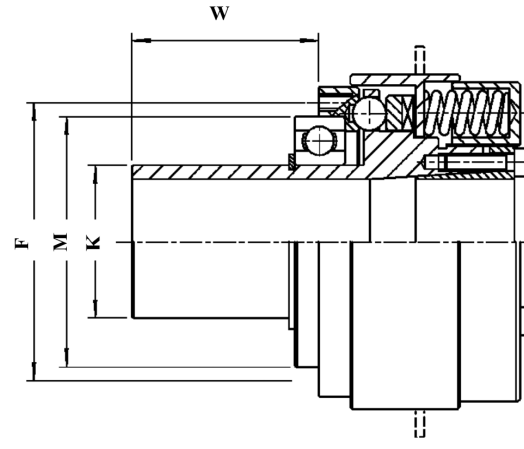


Figure 2a

Table 4

Series 320 Size	G	H	J mm (in)	F mm (in)	K h6 mm (in)	M h6 mm (in)	M2 H7 mm (in)	W mm (in)	X mm (in)
01	8	M4	6 (0.24)	56 (2.20)	30 (1.1811)	47 (1.8503)	47.000 / 47.025 (1.8504 / 1.8513)	33 (1.30)	5 (0.20)
0	8	M5	8 (0.31)	75 (2.95)	40 (1.5748)	62 (2.4409)	62.000 / 62.030 (2.4409 / 2.4420)	43 (1.69)	7 (0.28)
1	8	M6	10 (0.39)	85 (3.35)	45 (1.7716)	75 (2.9527)	75.000 / 75.080 (2.9528 / 2.9539)	55 (2.17)	7 (0.28)
2	8	M6	12 (0.47)	100 (3.94)	55 (2.1654)	90 (3.5433)	90.000 / 90.035 (3.5433 / 3.5447)	67 (2.64)	8 (0.31)
3	8	M8	12 (0.47)	116 (4.57)	65 (2.5590)	100 (3.9370)	100.000 / 100.035 (3.9370 / 3.9383)	73 (2.87)	8 (0.31)
4	8	M10	18 (0.71)	144 (5.67)	75 (2.9528)	115 (4.5276)	115.000 / 115.035 (4.5276 / 4.5289)	91 (3.58)	8 (0.31)

DISENGAGEMENT SENSORS

General

As with all ratcheting torque limiters, it is important to shut down the drive quickly when disengagement occurs. It is recommended that a disengagement sensor be used to activate an alarm and switch off the drive.

Proximity Sensors

Inductive proximity sensors may be used with standard 320 units, to detect the axial movement of the cover, which occurs on disengagement. See Figure 3. The metalised label acts as a target – either edge can be used to detect tripping. A fail-safe switching arrangement is recommended.

Limit Switches

If the unit has been supplied with the optional switch plate cover, a mechanical limit switch may be used to detect the axial movement of the flange on disengagement. See Figure 3a. Note that the “switch plate cover” is not suitable for use with inductive proximity sensors.

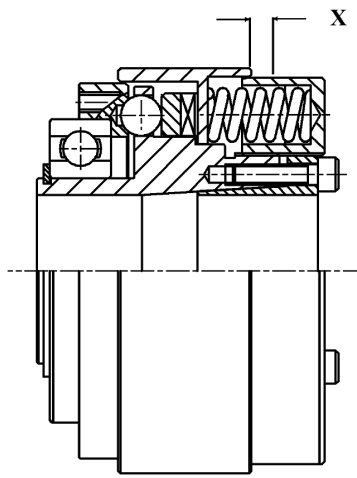


Figure 3

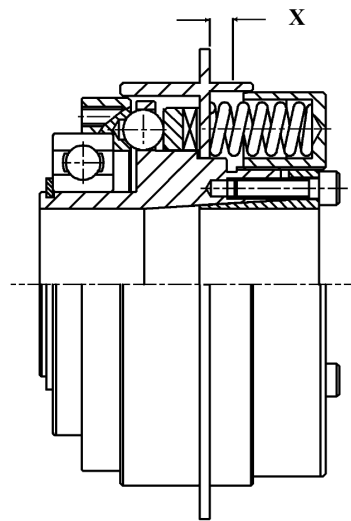


Figure 3a

Series 320 Size	01	0	1	2	3	4
Movement on break 'X'	1.2 mm	1.6 mm	1.7 mm	2.2 mm	2.4 mm	2.8 mm
	0.047 in	0.063 in	0.067 in	0.087 in	0.094 in	0.110 in

TORQUE SETTING

General

The torque at which the 320 unit will disengage is determined by the position of the adjusting nut. The scale marked on the nut gives an indication of the set torque as a proportion of full torque.

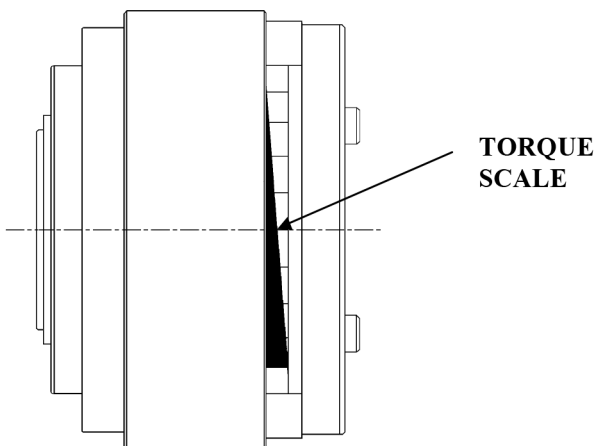


Figure 4

The full torque will depend on the number of springs fitted. A full complement of springs gives the catalogue maximum values. See Table 5.

Table 5

Series 320 Size:		01	0	1	2	3	4
No. of Springs	Torque Range						
2	(Nm)	3 – 12	5 – 17	10 – 30	10 – 70	20 – 100	50 – 250
	(in-lbs)	26 - 106	44 – 150	88 – 265	88 – 620	177 - 885	443 - 2212
4	(Nm)	5 – 25	10 – 35	20 – 60	20 – 140	50 – 225	100 – 500
	(in-lbs)	44 - 221	88 – 310	177 – 531	177 – 1239	445 – 1991	885 – 4425
8	(Nm)	10 – 50	20 – 70	40 – 120	40 – 260	100 – 450	200 – 1000
	(in-lbs)	88 - 443	177 – 620	354 – 1062	354 – 2301	885 – 3983	1770 – 8850
12	(Nm)	...	30 – 100	60 – 200	60 – 400	200 – 700	300 – 1500
	(in-lbs)	...	265 - 885	531 - 1770	531 - 3540	1770 - 6195	2655 – 13275

Factory set units

Units which have been ordered to a factory pre-set torque, will have been adjusted to the specified value within +/- 10%. Normally, a full set of springs will be fitted but fewer than the maximum may be fitted for low torque settings.

The nut will be positioned so that the locking screws engage centrally with anti-rotation detents on the periphery of the clamp sleeve flange or hub.

WARNING: *The locking screws must be released before any change of setting and re-locked centrally with the detents, after adjustment.*

Torque Adjustment

If it is necessary to re-adjust the torque, release the locking screws and turn the nut clockwise to increase torque. Use a suitable adjustment tool which engages securely with the barring holes in the periphery of the nut. When the desired setting is reached, ensure that the locking screws will align centrally with the detents in the hub or collar. Apply a maintainable thread locking agent (e.g. Loctite 242, 243) to the locking screws and tighten them down.

WARNING: *When the maximum value on the label has been reached, then so too has the maximum torque setting. It is important that the nut is not adjusted beyond this position, as there may then be insufficient internal clearance for the springs to deflect. In this condition, the unit may be prevented from disengaging on overload and is likely to suffer damage.*

If fewer than the maximum number of springs is fitted, higher torques may be obtained by fitting extra springs. Springs may also be removed to achieve lower torque settings. The remaining springs should be evenly spaced and a minimum of 2 used. The adjustment nut is backed off and withdrawn from the unit to permit the fitting or removal of springs. Pockets within the nut locate the springs. Ensure that all springs fitted remain properly seated. It may be convenient to apply some general-purpose grease to the end of each spring to hold it in position during assembly.

Un-set Units

If the unit has been supplied “un-set” the nut will be positioned near the minimum torque setting and the locking screws loosely fitted. A full set of springs will have been provided. If the required torque is known, then the unit may be adjusted as above.

For low torques, it is recommended that springs are removed so that the required setting is reached with the minimum number of springs fitted. They should be equi-spaced with a minimum of 2 being used.

If the required torque setting is not known with sufficient accuracy, it may be determined by trial adjustment. With the torque set at a low value, start the drive. If the unit does not disengage, the setting may be too high. Set to a lower torque or reduce the number of springs if possible. If the unit trips, repeat the procedure at progressively higher torque settings until the drive will start and run without tripping. DO NOT over-tighten. See warning under “Torque Adjustment”. Higher torque setting will only be possible if extra springs can be fitted.

MAINTENANCE

Periodic maintenance will help extend the operating life of the torque limiter. As a matter of good practice, it is advisable to check the security of fasteners, the fitting of the hub to the shaft, the position of the adjusting nut and any external damage to the unit in conjunction with other planned maintenance.

If the unit is dismantled for any reason, parts should be cleaned and inspected for wear. If parts are to be re-used, a general purpose grease such as Shell Alvania R3, BP Energrease LS3 or Power Up Thixogrease (NGLI #2) should be applied to the

ball seats, the ball retaining holes in the hub flange and the needle thrust bearing.

Disassembly procedure

*For types 3&4 (Figure 2a), remove the drive media and disassemble the torque limiter from the shafts

*For types 5&6 (Figure 1), disassemble from the shafts and on the Autoflex side remove the three bolts (the bolts with the clearance holes) to decouple the Autoflex from the adaptor plate. Then remove the bolts which hold the adaptor plate to the torque limiter.

*For types 7&8 (Figure 1a), remove from the shafts. Undo the grub screws from the retaining ring and slide to one side. Unravel the Elastic insert and unscrew the bolts from the adaptor plate.

1. Unscrew the grub screws from the locking nut
2. Unscrew the locking nut remove completely and remove the springs (see Torque Adjustment)
3. Remove the cover. Note that the cover on the side of the thrust bearing has a very thin thrust washer which is located on a thin recess purposefully machined on the cover.
4. Remove the thin thrust washer
5. Remove the needle bearing (thrust bearing)
6. Remove the thick thrust bearing washer
7. Remove the balls and the hub flange
8. Rotate the torque limiter so that the cir-clip is accessible on the drive plate side
9. Remove the cir-clip
10. Remove the ball bearing with the drive plate. Note that the bearing is glued to the drive plate with Loctite 641

Inspect and replace all parts as necessary. Assembly is the reversal of the above.

On re-assembly, if the ball bearing is replaced, apply a bearing retaining adhesive (e.g. Loctite 603,641) to the outer diameter of the bearing before fitting the drive plate. Slide the bearing assembly on to the hub and fit the circlip (refer to the picture on the front page). Rotate the torque limiter. Align the ball seats with the holes in the hub. Insert the balls into the holes in the hub. Note that the original balls are a matched set. If they are to be replaced, only use close fitting balls from a single "lot". (Precision bearing balls are normally packed in "lots" of the same gauge interval). Fit the thrust bearing ensuring that the bearing is fitted with the thick washer facing the balls, apply a small amount of grease to the thin washer and locate it in the matching cover recess. Fit the cover with the deeper recess over the thrust bearing and balls. Use some general purpose grease to retain the springs in the pockets in the adjusting nut and screw the nut onto the hub until the torque scale minimum value is aligned with the edge of the cover. Refer to the torque setting section for details on setting the torque to the required value.

Adverse Conditions

Under adverse operating conditions (e.g. high speed, high temperature, dust, dirt or abrasive contamination, wet or humid environments), units may require periodic maintenance or replacement. Use only authorized Autogard replacement parts.

PRIOR TO START-UP

- Guarding must be provided in accordance with local and national regulations.
- Ensure all fasteners have been properly installed and tightened.
- Check that the torque limiter is engaged with the balls fully seated.
- Ensure that all drive elements are properly aligned.

If in any doubt, consult Autogard.