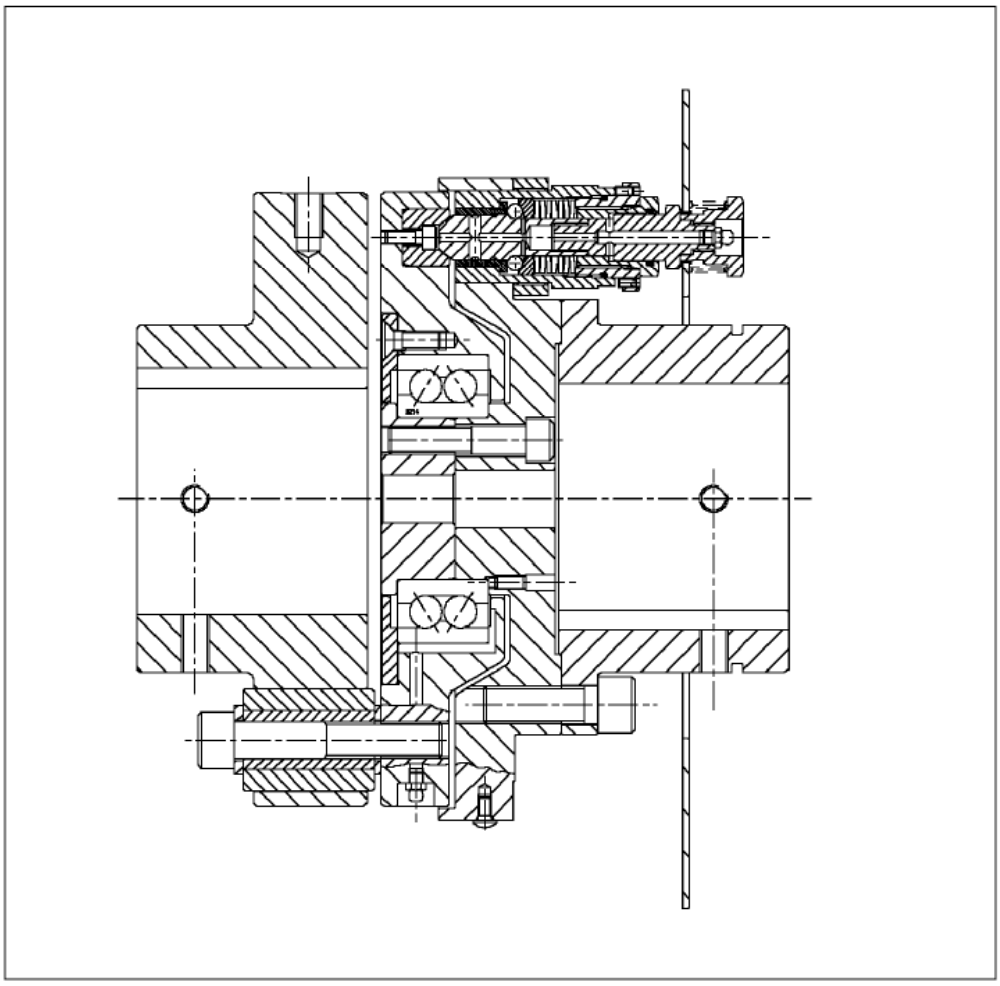
Installation and Maintenance Instructions

AUTOGARD SERIES 820 TORQUE LIMITER



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AUTOGARD 820 SERIES MODULAR TORQUE LIMITER
OPERATION AND MAINTENANCE MANUAL Issue 4

Contents

1) Operation

The 820 series modular torque limiters include hardened seats in one half of the unit and module sub-assemblies in the other half such that torque is transmitted between the plunger and seat (see figs 1 and 2). This produces an end thrust in the plunger in proportion to the applied torque. This force is resisted by a ring of segments trapped between a flat surface and a conical washer loaded by disc springs. When the axial force reaches a level greater than the reaction through the spring mechanism, the plunger will retract forcing the segments up the plunger slope and allowing it to disengage from the seat. The segments are then located on the larger diameter of the plunger and all forces are balanced internally allowing the torque limiter to run free and unloaded (except for the auto-reset version, which maintains some axial force on the plunger at all times).

The trip torque is externally adjustable and resetting may be manual or automatic, depending on the application. Some 820 series units incorporate a limit switch plate, which moves on trip and can operate a switch to stop the drive.

A complete 820 series torque limiter may be supplied, in which case the modules will be already fitted, or loose modules may be supplied as components to be incorporated into the customer's own design of torque limiter.

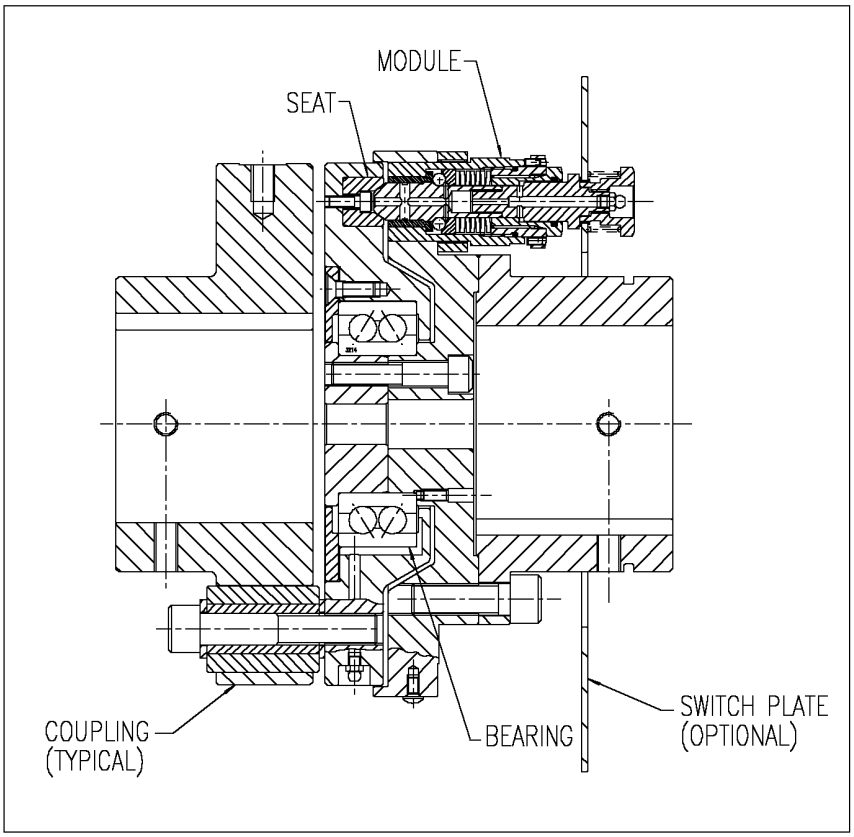

Fig. 1 Typical 820 Series Torque Limiter

2) Installation – 820 Series Torque Limiter

2.1) There are a number of different arrangements depending on the application. Refer to the specific assembly drawing for the unit. Unless stated otherwise the following will generally apply:

2.2) On large units tapped holes are provided to allow the use of lifting eyes for safe handling. The threads are M12, M16, 1/2" UNC or 5/8" UNC, depending on application.

2.3) For keyed hubs the standard clearance-fit bore should permit the hub to be pushed, pressed or lightly tapped in place on the shaft. Do not strike heavy hammer blows on the hub as this could damage the torque limiter. Always use a soft-faced hammer.

2.4) Most units have two set screws to lock each hub in position on the shaft. When the hub is correctly positioned on the shaft and the key is fitted, apply Loctite 243 or equivalent to the set screws and tighten.

2.5) On manual reset versions ensure there is sufficient clearance at the end of the modules to allow the use of a mallet to strike the reset pin (see fig. 2). Also note the reset pins extend on trip by the dimensions shown in Table 1. Check for adequate clearance in the tripped condition.

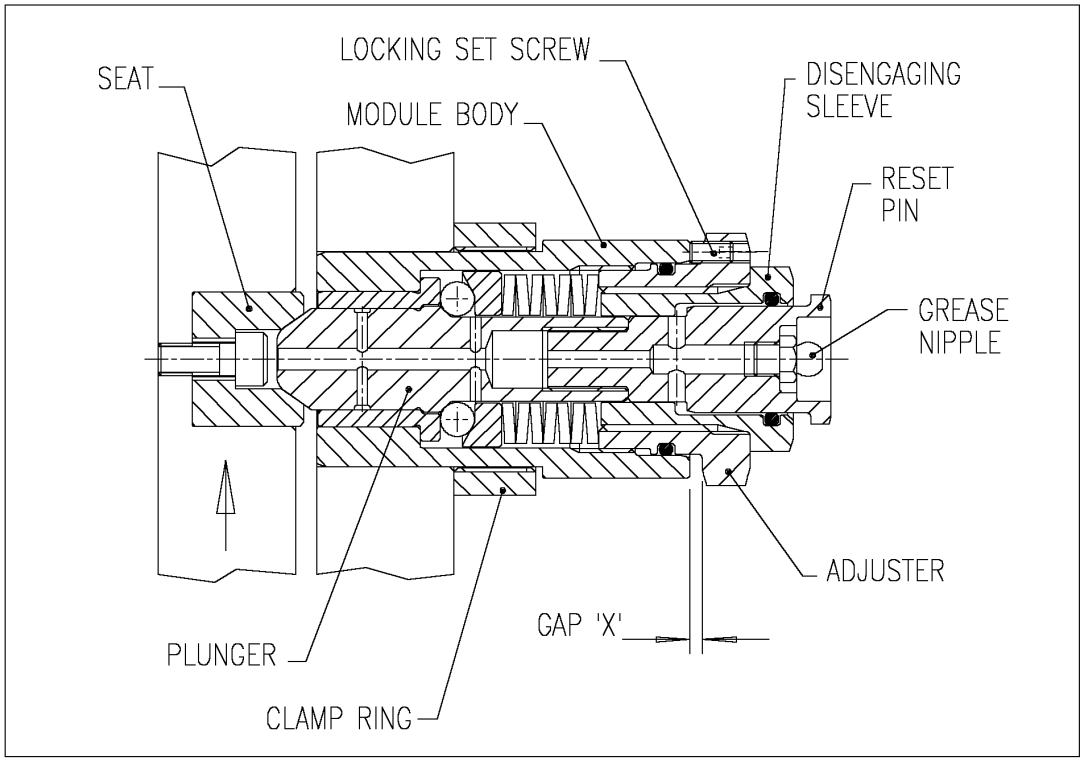

Fig. 2 Typical module sub-assembly

Table 1.

Module size	Reset pin/switch plate movement on trip
1	3.7mm (0.145")
2	5.0mm (0.197")
3	6.0mm (0.236")
4	8.0mm (0.315")

2.6) On all versions ensure that access to the grease nipples in the end of the modules is possible (see fig. 2).

2.7) Threaded fasteners on flanges etc. should be secured with Loctite 243 or equivalent and torque tightened to the values given in table 2, unless otherwise specified on the specific assembly drawing for the unit.

Table 2.

Thread Size	Tightening Torque (Nm)	Tightening Torque (lbf.ft)
M6	11	8
M8	28	20
M10	55	40
M12	95	70
M16	276	174
M20	461	340
M24	797	588
1/4" UNF	13	10
5/16" UNF	27	20
3/8" UNF	49	36
1/2" UNF	117	86
5/8" UNF	233	172
3/4" UNF	407	300

2.8) If the unit was supplied to a set torque this will be stated on the label. Otherwise see section 3 'Torque Adjustment'.

2.9) Some units are fitted with a limit switch plate, which moves axially on trip and can be used to operate a switch to stop the drive. The movement on trip is shown in table 1.

2.10) With auto-reset units the drive should be stopped within a few seconds after trip, to minimise wear of the plungers and seats (use limit switch, speed sensors or other methods). For manual reset versions the drive may continue to run after trip.

2.11) 820 series units may be supplied with some unused module ports, which are fitted with blanking plates. This is often the case when the torque requirement is uncertain, as it allows the torque capacity to be increased by adding extra modules. Additional modules should be positioned such that they will not cause out-of-balance forces (eg. add 2 off modules diametrically opposite each other).

2.12) General Safety: In common with all mechanical devices, the user must ensure safe application and use of the product with respect to local conditions, e.g. lifting applications, explosive environments etc. As a rotating component, adequate guarding must be provided, in accordance with current codes of practice.

3) Torque Adjustment

3.1) The torque limiter trip torque should be set high enough so that tripping does not occur under normal start-up and running conditions, (noting that the start-up torque is often greater than the running torque), but not so high as to reduce the level of protection against overload.

This may be achieved by trial and adjustment on site, or, if the required trip torque is known, by reference to the calibration curve supplied with the unit. Some units are supplied factory-set to a specific trip torque (+/- 10%), which will be stated on the label. (Factory-set units can be adjusted on-site if necessary).

3.2) The trip torque can be adjusted by turning the adjuster (see fig. 2), clockwise to increase torque and vice versa. If the required trip torque is known then the gap 'X' can be obtained from the calibration curve supplied with the unit. Alternatively the setting can be determined on site, starting with a low setting, and progressively increasing it until the unit starts and runs without tripping under normal load. In some applications it may be more convenient to reverse this, starting with a high setting and progressively reducing it until tripping occurs on start-up or running, then increasing it until the unit starts and runs without tripping.

Proceed as follows;

3.2.1) Ensure the torque limiter is engaged before adjusting the torque (see section 5).

3.2.2) Unscrew the three unpainted set screws which lock the adjuster hexagon on each module. Do not disturb the three set screws which are sealed with red paint. On some units access to the set screws will be easier if the switch plate is removed (see section 9).

3.2.3) Adjust the gap 'X' by turning the adjuster on each module (ensure the module body does not turn) to give the required torque as indicated by the calibration curve. Alternatively, if setting by trial, change the setting in increments of 1/4 turn of the adjusters.

3.2.4) When the correct setting has been achieved apply Loctite 243 or equivalent to the locking set screws and re-fit. If the switch plate was removed re-fit it (see section 9).

4) Manual Disengagement (not applicable to Auto-Reset versions)

To manually disengage the torque limiter rotate the disengaging sleeve (smaller of the two hexagons – see fig. 2) on each module in a **clockwise** direction through several turns until it reaches its stop (note this is a left-hand thread).

5) Resetting

5.1) Manual Reset versions: Ensure that the disengaging sleeve (smaller hexagon) is tightened **anti-clockwise** against the adjuster (larger hexagon) on each module. Rotate either the input or output member of the torque limiter until the markers on the periphery of both members are in alignment. Tap the reset pins with a soft-faced mallet until they spring back to the engaged position.

5.2) Auto-Reset versions: The torque limiter will reset automatically with a loud 'click' each time the modules are aligned with their corresponding seats.

6) Removing Modules

6.1) Reset the torque limiter before removing the modules (see section 5). **Do not attempt to remove a module which has not been reset. The energy stored in the spring when the module is tripped could cause injury or damage to the module.**

6.2) If the modules are to be re-used, mark them to identify which port they fit into.

6.3) If a switch plate is fitted, remove it, referring to section 9.

6.4) Remove the four fixing screws from each module clamp ring, but do not disturb the single clamp screw which locks the clamp ring to the module body.

6.5) Withdraw the module, complete with clamp ring, from the unit. If it is tight, use levers under the chamfered edges of the clamp ring.

6.6) **Do not attempt to trip or reset a module which is not fitted into a torque limiter. The energy stored in the spring when the module is tripped could cause injury or damage to the module.**

7) Re-fitting of Existing Modules into a Torque Limiter

7.1) If existing modules are to be re-fitted into their original ports, and the clamp screws have not been disturbed, proceed as follows;

7.2) Rotate either the input or output member of the torque limiter until the module ports are aligned with the seats. Apply grease to the seats (see section 11 for suitable grease).

7.3) Fit the first module, complete with clamp ring, into its original port. Apply Loctite 243 or equivalent to the mounting ring fixing screws and tighten progressively to the torque shown in table 2.

7.4) Fit the remaining modules in a diametrically opposite sequence to reduce unbalanced loading of the bearing.

7.5) If a switch plate was fitted, re-fit it, referring to section 9.

7.6) Lubricate the modules as described in section 11.1.1.

8) Fitting New Modules to a Torque Limiter

8.1) **Do not attempt to trip or reset a module which is not fitted into a torque limiter. The energy stored in the spring when the module is tripped could cause injury or damage to the module.**

8.2) Rotate either the input or output member of the torque limiter until the module ports are aligned with the seats. Apply grease to the seats (see section 11.1.1 for suitable grease).

8.3) The axial position of the module bodies in relation to the main unit is important, to obtain the correct preload of the plungers. Proceed as follows for each module:

8.4) Ensure that the manual disengage sleeve (see fig. 2) is tightened (left hand thread) against the adjuster. If the modules are not pre-set for a specific torque, it is important to ensure that there is some preload in the module. To achieve this, back off the adjuster locking set screws, then turn the adjuster clockwise until resistance is felt, plus one further turn.

8.5) Take the module and place under a hand press, supported on the adjuster, with the plunger uppermost (see fig. 3).

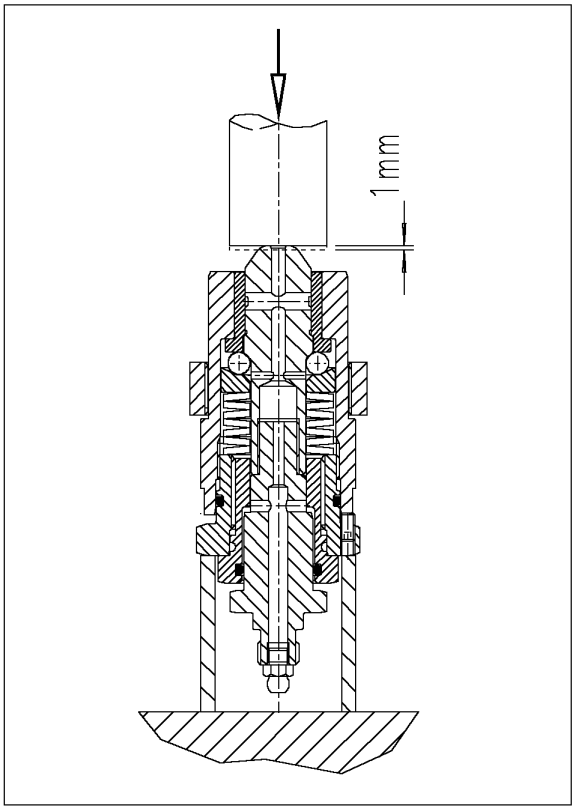

Fig.3 Preparing a module for fitting

8.6) Press on the plunger so that it moves approximately 1mm and then slowly release the force so the plunger springs back. This ensures the segments inside the module are in contact with the cone of the plunger.

8.7) Screw the clamp ring onto the module as far as it will go by hand, with the chamfers towards the plunger end of the module. Fit the clamp screw without Loctite, tighten, then loosen slightly so the module can just rotate in the clamp ring.
8.8) Fit the module into its port, and tap on the end of the adjuster hexagon (not the reset pin) with a mallet to make sure the module is fully seated (see fig. 4).

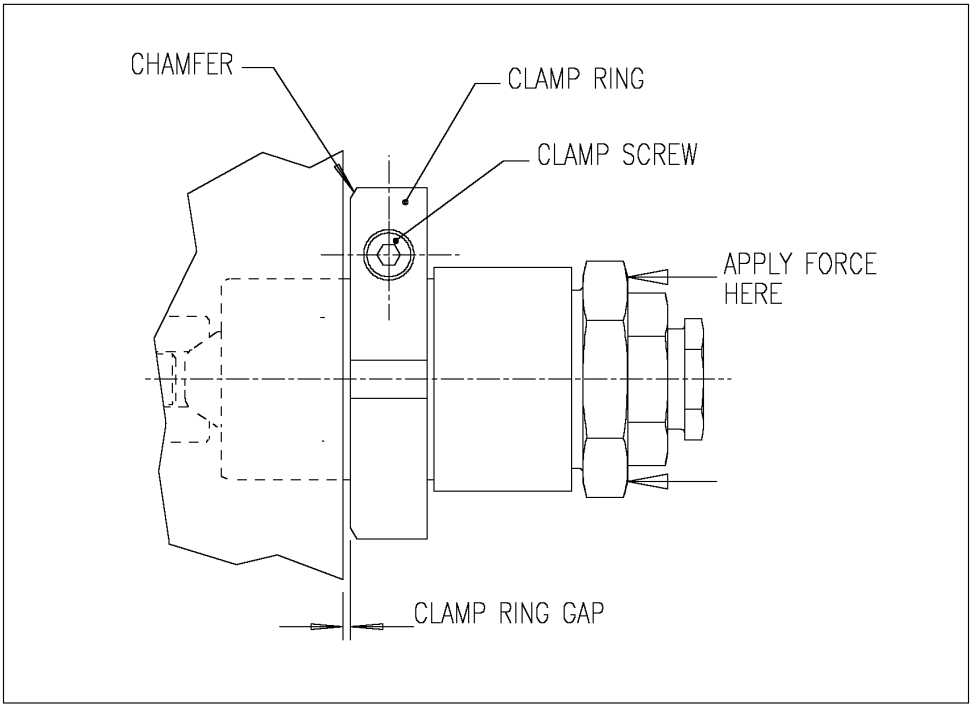

Fig.4 Fitting a new module

8.9) Rotate the clamp ring or module body and use feeler gauges to obtain the specified gap between the ring and the main unit (see table 3), whilst maintaining hand pressure on the adjuster or module body to keep the module seated.

Table 3.

Module Size	Clamp Ring Gap (except Auto-Reset)	Clamp Ring Gap Auto-Reset	Clamp Screw Torque
1	0.20mm (0.008”)	0.25mm (0.010”)	3.3 Nm (2.4 lbf.ft)
2	0.25mm (0.010”)	0.38mm (0.015”)	6.7 Nm (4.9 lbf.ft)
3	0.38mm (0.015”)	0.51mm (0.020”)	28.0 Nm (20.6 lbf.ft)
4	0.51mm (0.020”)	0.76mm (0.030”)	55.0 Nm (40.6 lbf.ft)

8.10) Mark the position of the module body in the clamp ring. Remove the clamp screw, apply Loctite 243 or equivalent and refit, tightening to the torque specified in table 3, without rotating the clamp ring relative to the module body.
8.11) Repeat stages 8.4 to 8.10 for each module.

8.12) For each module, align the four holes in the clamp ring with those in the main unit, apply Loctite 243 or equivalent to the four screws and tighten progressively to the torque specified in table 2.
Repeat in a diametrically opposite sequence for the remaining modules.
8.13) If a switch plate was fitted, re-fit it, referring to section 9.
8.14) Lubricate the modules as described in section 11.1.1.
8.15) Adjust the torque setting of the modules if necessary (see section 3).

9) Switch Plate Removal and Refitting

9.1) Some units are fitted with a limit switch plate. A typical arrangement is shown in fig .5. Refer to the specific assembly drawing for further detail. To remove the switch plate, use a spanner on the reset pin flats (behind the switch plate) to prevent rotation, and remove the retaining nuts, taking care to retain the springs and plastic bushes.

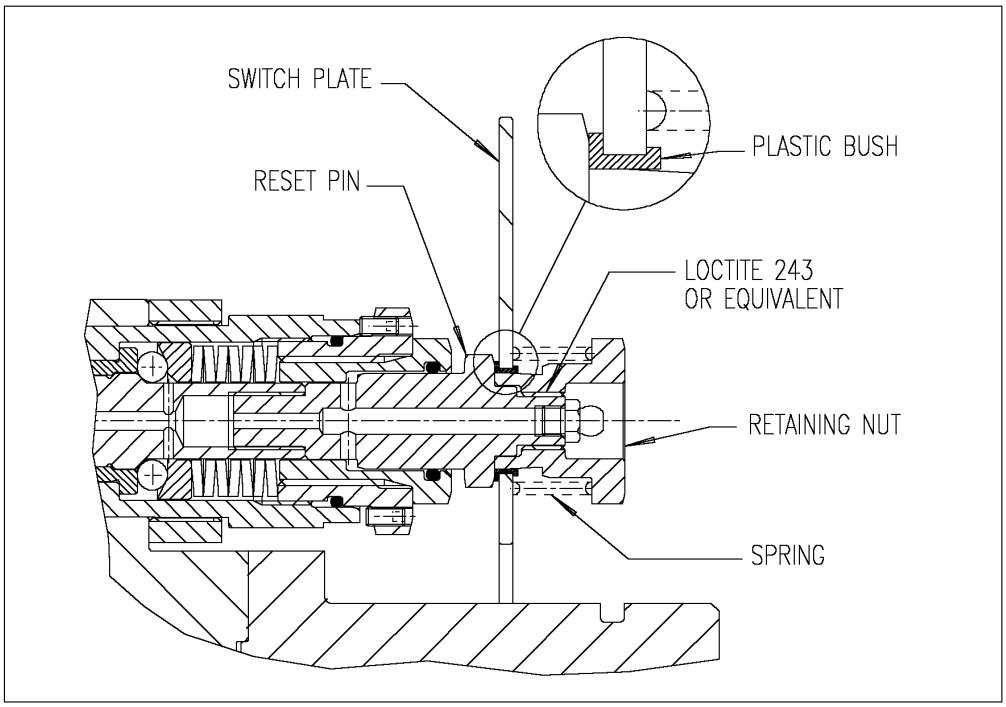

Fig.5 Typical switch plate mounting

9.2) On re-assembly, ensure that the parts are fitted in the correct positions. Apply Loctite 243 or equivalent to the switch plate retaining nuts. Hold the reset pin hexagon with a spanner to prevent rotation, and ensure that the retaining nuts are pushed through the plastic bushes as they are tightened, to avoid trapping the plastic bush between the retaining nut and reset pin. Torque tighten to the value specified on the specific assembly drawing.

10) Seat Replacement

10.1) Remove the modules as described in section 6.

10.2) Remove the screw from the centre of the seat. Remove the seat using an extractor screwed into the tapped hole in the centre of the seat (see table 4 for thread size). The force from the extractor should be reacted by the metal surrounding the seat, so that the torque limiter bearing is not loaded. A suitable arrangement is shown in fig. 6.

Table 4.

Module size	Thread size in seat
1	M6
2	M8
3	M12
4	M16

10.3) To fit the new seat first ensure that the hole is free from old adhesive. Degrease the hole and the new seat, and apply Loctite 641 or equivalent to the outside diameter of the seat. Push the new seat fully home and fit the seat retaining screw, using Loctite 243 or equivalent on the thread, and torque tighten to the value given in table 2. Remove any excess adhesive.

10.4) Fit modules, referring to sections 7 or 8 as appropriate.

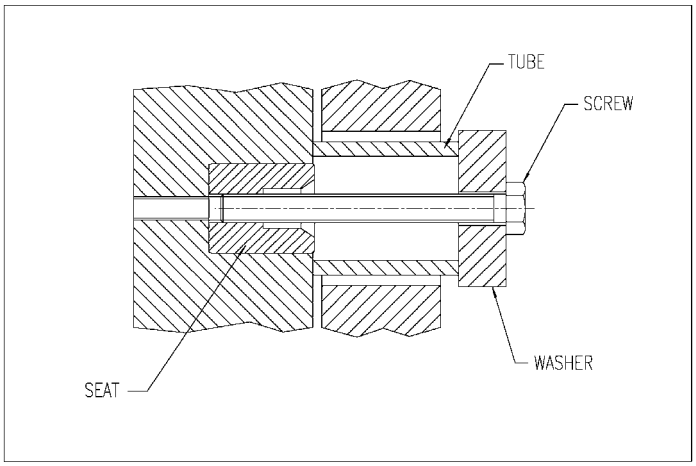

Fig.6 Method of removing seat

11) Routine Maintenance

11.1) The frequency of maintenance will depend on the operating environment and number of trips, but once every three months should be adequate in most applications. Proceed as follows:

11.1.1) A grease nipple is located in the end of each module, and some units have additional grease nipples for the bearings and the module seats. Apply a good quality lithium grease such as Shell Alvania R3 or BP Energrease LS3 to all grease points. A general inspection of the unit should also be performed at this time, checking that all fasteners are tight etc.

11.1.2) For manual disengage versions each module should be manually disengaged then reset as part of the maintenance procedure.

11.2) For unusual conditions such as high ambient temperatures, high vibration or dirty environment, special maintenance may be required. Please consult Autogard.

12) Fault-Finding

See table 5. If in doubt consult Autogard.

13) Spare Parts

For spare module sub-assemblies or other parts, consult Autogard, quoting the part number and serial number from the label on the torque limiter body.

If the modules are being replaced because they are worn it is also advisable to replace the seats.

Table 5: Fault-finding

Fault	Possible Cause	Action
Frequent tripping	Fault in driven machine	Rectify
	Torque setting too low	Adjust trip torque
	All modules not reset (manual reset)	Reset all modules
	module not resetting (auto-reset) (possible lack of lubrication)	lubricate or replace module
	Worn module plungers or seats	Replace worn parts
Failure to trip on overload	Torque setting too high	Adjust trip torque
	Module seized (possible lack of lubrication)	manually disengage (not auto-reset) lubricate or replace module
	Torque limiter bearing seized	Replace bearing
Excessive backlash	Modules loose or incorrectly fitted	Follow installation procedure
	Worn module plungers or seats	Replace worn parts
	Worn torque limiter bearing	Replace bearing
	Worn coupling or loose fasteners	Replace worn parts, tighten fasteners

Notes

Notes

Addresses of spare parts stockists and service facilities

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