

DURAPAC
ENGINEERED FOR RELIABILITY

Instruction Manual

Hydraulic Bolt Tensioners
Model – DMS Series



Maximum Operating Pressure – 1,500 bar



This is a safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid injury or death

1.0 Product Information

DURAPAC – Hydraulic Bolt Tensioners are engineered to meet Industrial Standards for Performance and Safety. The DMS Series are a multi-stage spring return tensioner, designed to fit into compact applications on grade 10.9 bolts.

- Ratchet wind down for the change bushing
- Nut turning sleeve
- Nickel coated for longevity

Special skill, knowledge and training may be required for a specific task and the product may not be suitable for all jobs. The user must ultimately make the decision regarding suitability of the product for any given task and assume the responsibility of safety for all in the work area. Contact a Durapac representative if you are unsure of your bolt tensioner's suitability for a particular application.

2.0 Receiving Instructions

It is recommended prior to use that an inspection be done by qualified personnel and that any missing or damaged parts, decals, warning/safety labels or signs are replaced with Durapac authorised replacement parts only. Any bolt tensioner that appears to be damaged in any way, is worn, leaking or operates abnormally should be removed from service immediately until such time as repairs can be made. Any bolt tensioner that has been or suspected to have been subject to a shock load should be removed from service immediately until inspected by a Durapac authorised service centre. Owners and operators of this equipment should be aware that the use and subsequent repair of this equipment may require specialised training and knowledge.

3.0 Safety

Save these instructions. For your safety, read and understand the information contained within. The owner and operator should understand this product and safe operating procedures before attempting to use this product. Instructions and safety information should be conveyed in the operator's native language before use of this product is authorised. Make certain that the operator thoroughly understands the inherent dangers associated with the use and misuse of the product. If any doubt exists as to the safe and proper use of this product as outlined in this factory authorised manual, remove from service immediately.



DANGER:

- **Never** stand in-line with the bolt axis while tensioning or de-tensioning is in progress. If the bolt should fail, serious personal injury or death could result if loose or broken parts become projectiles. All personnel must be aware of this potential hazard at all times
- To avoid personal injury keep hands and feet away from work area during operation
- **Do NOT** handle pressurised hoses. Escaping oil under pressure can penetrate the skin causing serious injury. If oil is injected under the skin, see a doctor immediately

**WARNING:**

- All hydraulic hoses and fittings used in the circuit must be rated at or above the maximum working pressure of the tensioner - 1500 bar [21,750 psi]. Install pressure gauges in the system to monitor operating pressure. It is your window to what is happening in the system
- Always wear appropriate personal protective equipment (PPE) when operating hydraulic equipment. The operator must take precaution against injury due to failure of the tool or work piece(s)
- **Do NOT** hold or stand directly in line with any hydraulic connections while pressurising
- **Do NOT** attempt to disconnect hydraulic connections under pressure. Release all line pressure before disconnecting hoses
- All personnel must be clear before pressurising or depressurising the system

**IMPORTANT:**

- If at any stage, the safety related decals become hard to read, these must be replaced
- Minimum age of the operator must be 18 years. The operator must have read and understood all instructions, safety issues, cautions and warnings before starting to operate the equipment. The operator is responsible for this activity towards other persons
- **Do NOT** lift hydraulic equipment by the hoses or couplers. Use the carrying handle or other means of safe transport
- Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Durapac authorised service centre in your area. To protect your warranty, use only high-quality hydraulic oil

**CAUTION:**

- **KEEP HYDRAULIC EQUIPMENT AWAY FROM FLAMES AND HEAT.** Hydraulic fluid can ignite and burn. Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings. For optimum performance do not expose equipment to temperatures of 65°C (150°F) or higher. Protect all equipment from weld spatter
- No alteration should be made to this device

3.1 Bolt Tensioners

- **Only** allow personnel to be near pressurised hydraulic tensioners when it is absolutely necessary and only when the pressure is steady. Keep an eye on the pump pressure gauge
- **Do NOT** exceed the rated capacity of the bolt tensioner or any equipment in the system. Burst hazard exists if connection pressure exceeds rated pressure
- **Do NOT** exceed the maximum extension for the equipment
- **Do** use a gauge or other load measuring instrument to verify load
- **Do NOT** leave the pressurised system unattended

- **Do NOT** operate the system with bent or damaged couplers or damaged threads
- **Use only** Durapac approved accessories and components
- **Do NOT** overload equipment. Overloading can cause equipment failure and possible personal injury

3.2 Hydraulic Hoses & Fluid Transmission Lines

- Avoid short runs of straight-line tubing. Straight line runs do not provide for expansion and contraction due to pressure and/or temperature changes
- Reduce stress in tube lines. Long tubing runs should be supported by brackets or clips. Before operating the pump, connections should be tightened securely and leak-free. Over tightening can cause premature thread failure or high-pressure fittings to burst
- Should a hydraulic hose ever rupture, burst or need to be disconnected, immediately shut off the pump and release all pressure. Never attempt to grasp a leaking pressurised hose with your hands. The force of escaping hydraulic fluid can inflict injury
- **Do NOT** subject the hose to potential hazard such as fire, sharp objects, extreme heat or cold or heavy impact
- **Do NOT** allow the hose to kink, twist, curl, crush, cut or bend so tightly that the fluid flow within the hose is blocked or reduced. Periodically inspect the hose for wear
- **Ensure** that the bend radius is not less than the manufacturer's specified minimum bend radius for the type of hose being used
- Hose material and coupler seals must be compatible with the hydraulic fluid used. Hoses also must not come in contact with corrosive materials such as battery acid, creosote-impregnated objects and wet paint. Never paint a coupler or hose

FAILURE TO HEED THESE WARNINGS MAY RESULT IN PERSONAL INJURY AS WELL AS PROPERTY DAMAGE.

4.0 Installation

- 4.1 Ensure that all personnel involved in this procedure are trained and understand bolt tightening procedures and the tensioning equipment being used. Ensure that all personnel read and understand the safety information contained within this document.
- 4.2 Familiarise yourself with the specifications and illustrations in this owner’s manual. Know your bolt tensioner, its limitations and how it operates before attempting to use. Refer to the specification chart below or if in doubt, contact a Durapac representative.

Model No.	Pre-load Force		Thread		A/F width		Diameter A		Height B	
	(kN)	(lbs)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)
DMS-M20	200	44,962	M20	3/4	30	1 1/4	47	1.9	169	6.7
DMS-M24	290	65,195	M24	7/8	36	1 7/16	60	2.4	200	7.9
DMS-M27	380	85,427	M27	1	41	1 5/8	65	2.6	210	8.3
DMS-M30	460	103,412	M30	1 1/8	46	1 13/16	72	2.8	204	8.0
DMS-M33	570	128,141	M33	1 1/4	50	2 13/16	79	3.1	216	8.5
DMS-M36	670	150,622	M36	1 3/8	55	2 3/16	83	3.3	250	9.8
DMS-M39	800	179,847	M39	1 1/2	60	2 3/8	91	3.6	265	10.4
DMS-M42	920	206,824	M42	1 5/8	65	2 9/16	98	3.9	272	10.7
DMS-M45	1,080	242,794	M45	1 3/4	70	2 3/4	106	4.2	273	10.7
DMS-M48	1,220	274,267	M48	1 7/8	75	2 15/16	112	4.4	290	11.4
DMS-M52	1,450	325,973	M52	2	80	3 1/8	123	4.8	336	13.2
DMS-M56	1,680	377,679	M56	2 1/4	85	3 1/2	131	5.2	356	14.0
DMS-M64	2,210	496,828	M64	2 1/2	95	3 7/8	150	5.9	357	14.1
DMS-M72	2,880	647,450	M72	3	105	4 5/8	168	6.6	406	16.0

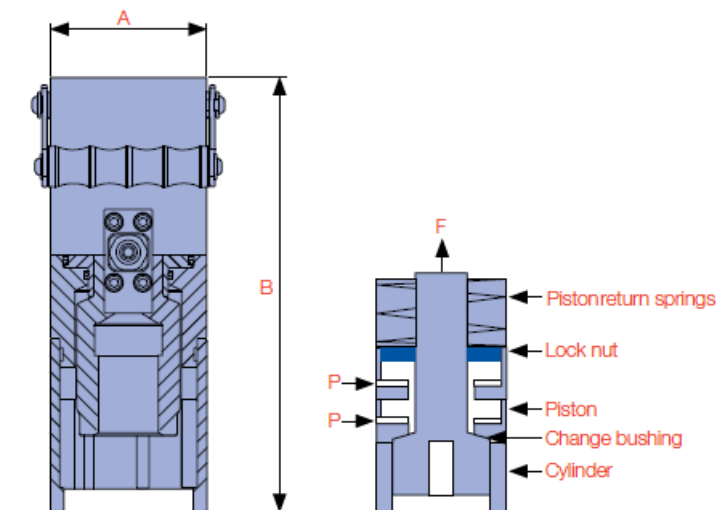


Figure 1 – Bolt Tensioner Diameters

- 4.3 Check all system fittings and connections to be sure they are tight and leak free.
- 4.4 Check oil level in reservoir before operating pump.

5.0 Operation



IMPORTANT:

- Ensure that the bolt material can take the initial load to be applied. DMS-Series tensioners are powerful tools that are capable of yielding or breaking studs/bolts if bolt material properties are not sufficient to support the load being applied
- Ensure that all calculations (bolt load, hydraulic pressure, etc.) have been made prior to starting the tensioning process and that they have been reviewed and approved by a qualified engineer
- Check that the hydraulic hoses are fully connected. There should be no loose ends and every male nipple should be connected to a corresponding female connector
- Check that each female connector is securely locked in position on the corresponding nipple by physically pulling the connection
- Check that the threaded portion of the tensioning tool is screwed on the stud and that the thread engagement is sufficient. Note: The thread projection of the stud above the top of the nut should be sufficient to allow the tensioning tool to engage the stud a minimum of one stud diameter

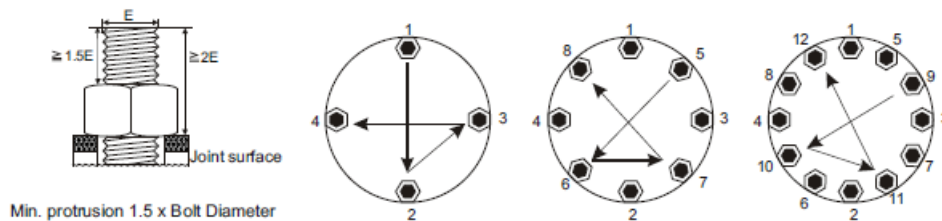


Figure 2 – Safety Precautions

- **Do NOT** exceed the maximum working pressure for each stud size or tensioner. Maximum working pressure for standard tensioners is 21,750 psi (1,500 bar / kg/cm²)
- **Do NOT** exceed the maximum extension for the equipment
- When pressurizing the system, observe the gauge, and be ready to stop, at the required pressure
- **Do NOT** leave the pressurized system unattended. If you must leave the area release the pressure and ensure that the return to tank valve on the pump unit is fully open
- **Do NOT** pressurize the Control Console or Hand / Air Pump unless the outlet is either connected to the tensioning system or is safely blanked with a blanking plug
- **ONLY** an unused female coupler or a blanking plug is to be used at the end of end of the tensioner circuit. A female coupler can remain disconnected (open ended) while under pressure. However, as a precaution, it is strongly recommended that a blanking plug be installed in the coupler before beginning pressurisation
- **Do NOT** pressurize the back of a disconnected male coupler. Male couplers cannot withstand high pressures when disconnected. Only the female coupler on the **last** tensioner in the circuit can remain uncoupled. All other couplers must be connected
- **Ensure** no personnel are in-line with the bolt axis when system is under pressure, failure to do so could result in death or personal injury

		DMS-M42		DMS-M45		DMS-M48		DMS-M52		DMS-M56		DMS-M64		DMS-M72	
bar	psi	kN	lbf	kN	lbf	kN	lbf	kN	lbf	kN	lbf	kN	lbf	kN	lbf
1,350	19,575	828	185,992	972	218,457	1,098	246,674	1,305	293,400	1,512	339,822	1,989	446,927	2,592	582,552
1,400	20,300	858	192,880	1,008	226,548	1,138	255,810	1,354	304,267	1,568	352,408	2,062	463,479	2,688	604,128
1,450	21,025	889	199,769	1,044	234,639	1,179	264,947	1,402	315,133	1,624	364,994	2,136	480,032	2,784	625,704
1,500	21,750	920	206,658	1,080	242,730	1,220	274,083	1,451	326,000	1,680	377,580	2,210	496,585	2,880	647,280

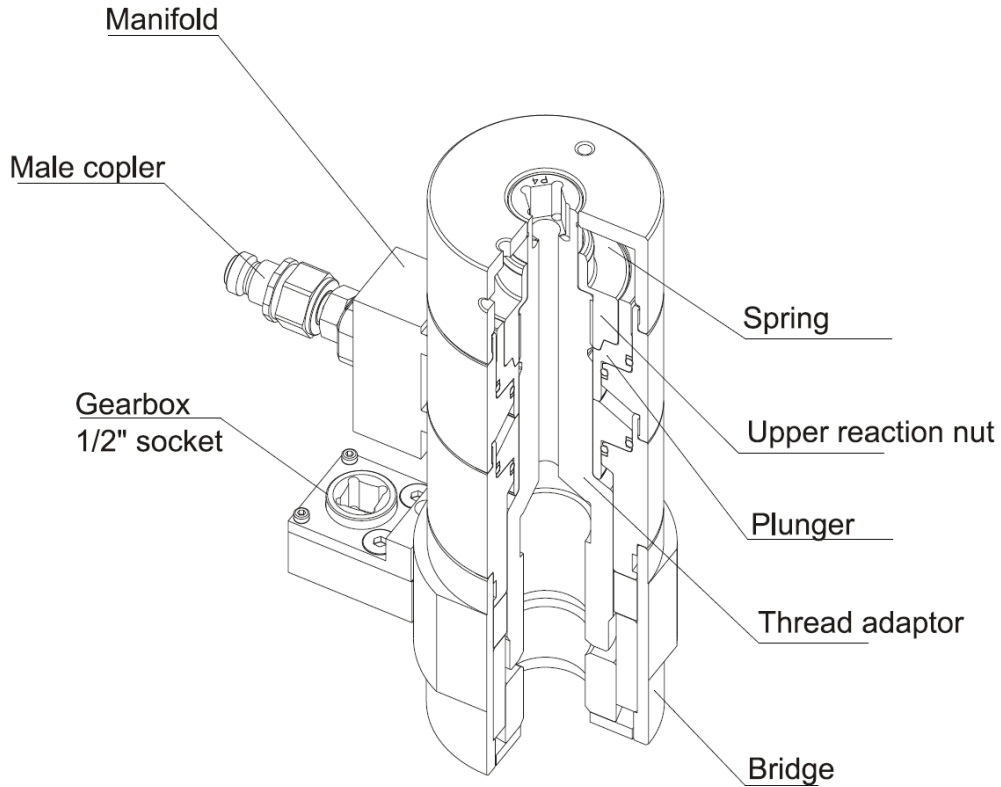


Figure 3 – Bolt Tensioner Assembly

5.2 Pre-operation

- 5.2.1 Determine the correct pump pressure as per 5.1 Force / Pressure Table.
- 5.2.2 Connect the hydraulic hoses as shown in Figure 4.

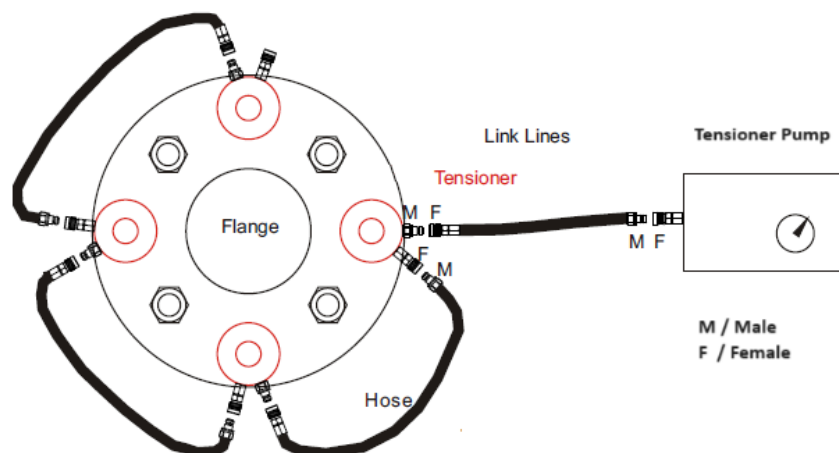


Figure 4 – Typical Hydraulic Hose Arrangement

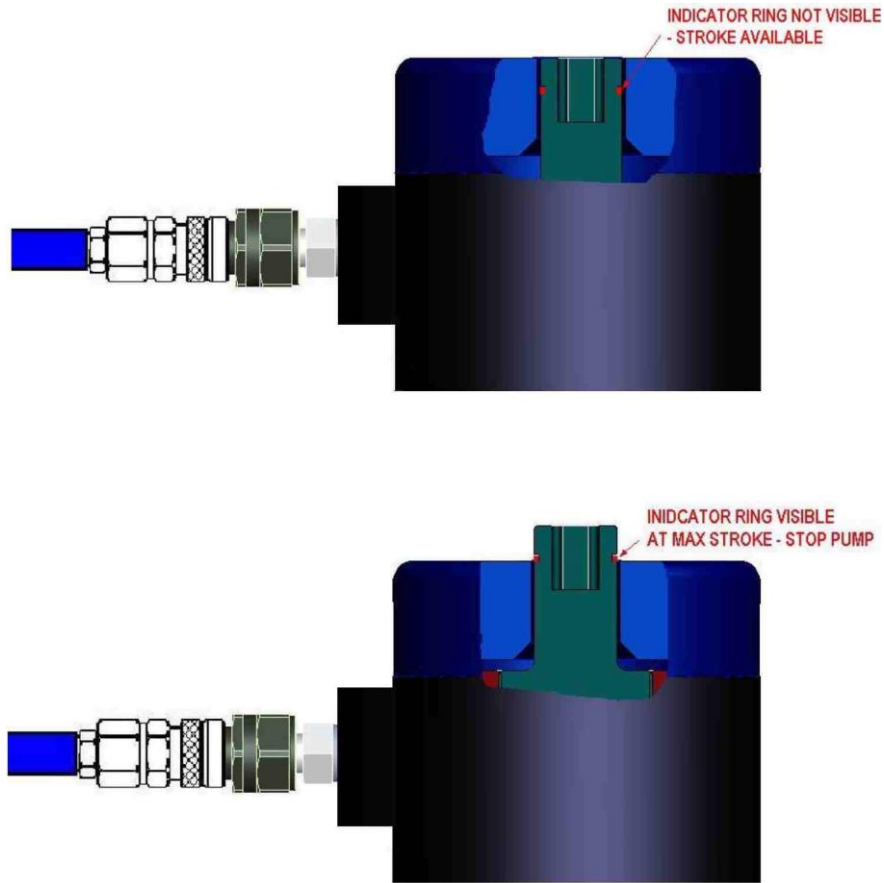


Figure 5 & 6 – Safety Precautions

5.3 Tensioning Procedure

5.3.1 Before commencing the bolt tensioning operation, read and comply with all of the SAFETY PRECAUTIONS. This includes understanding the minimum protrusion 1.5 x Bolt Diameter.

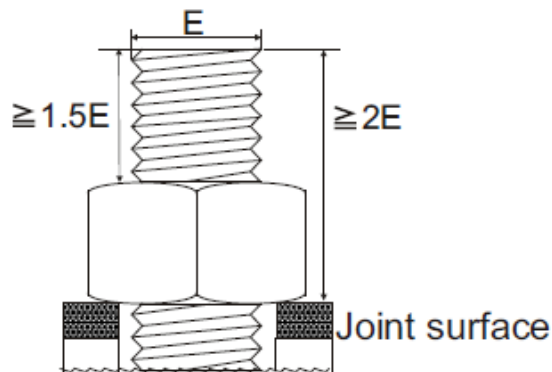


Figure 7 – Minimum Bolt Protrusion

5.3.2 Position the Tensioner over the bolt to be tightened.

- 5.3.3 Engage the plunger with the bolt. A 1/2" Square Socket is provided in the top of the puller bar so that the Tensioner orientation can be maintained whilst the plunger engages the bolt.

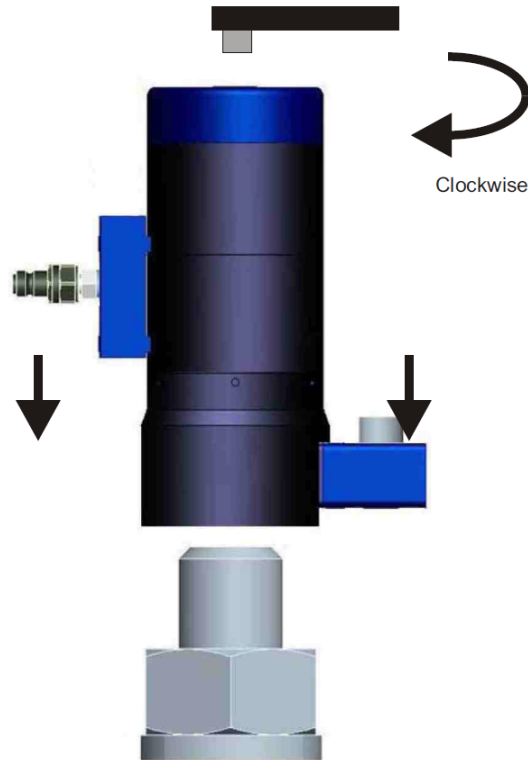


Figure 8 – Tightening the Bolt

- 5.3.4 Continue rotating the plunger, increasing its engagement with the bolt until the bridge is flush with the washer. To ensure the tool is fully flush, it may be necessary to rotate the gearbox slightly whilst lowering to fully engage the gear driven socket with the nut.

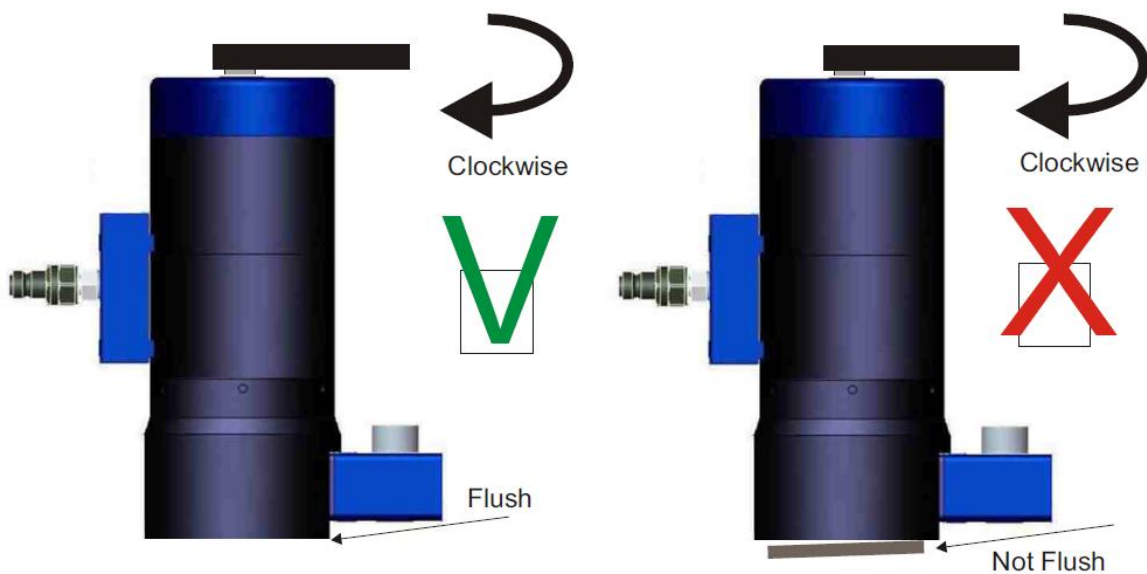


Figure 9 & 10 – Correct Tool Engagement

- 5.3.5 Once the Tensioner is in situ, it should still be possible to rotate the bridge to a suitable angle to access the bolt if required.

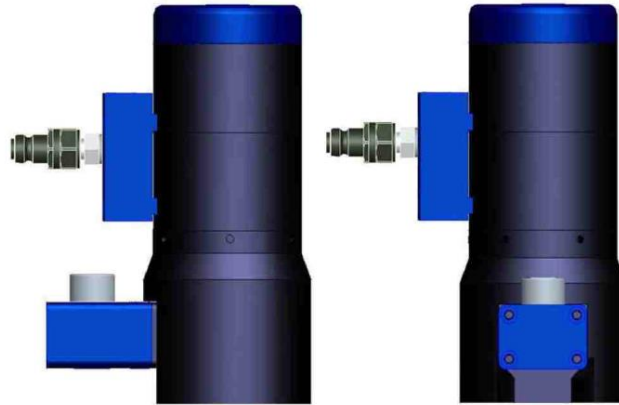


Figure 11 & 12 – Rotate for Access (if needed)

- 5.3.6 Connect SUITABLE high pressure hydraulic hose. Make sure the quick connect coupling is fully engaged.

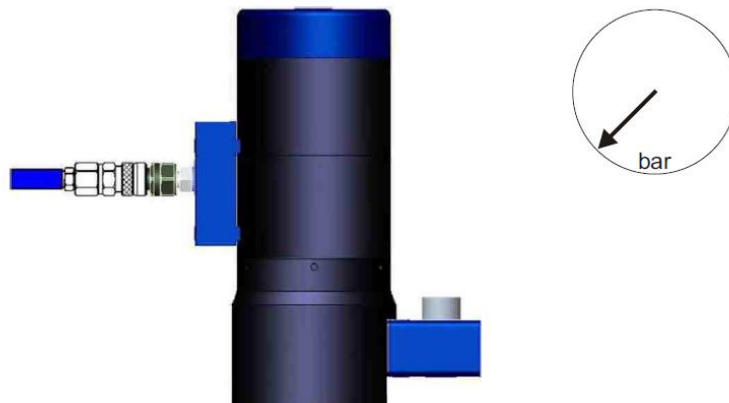


Figure 13 – Engage Quick Coupling

- 5.3.7 Apply the correct hydraulic pressure. The tool will begin to stroke and the operator should observe the top of the plunger ascending through the top of the tool.

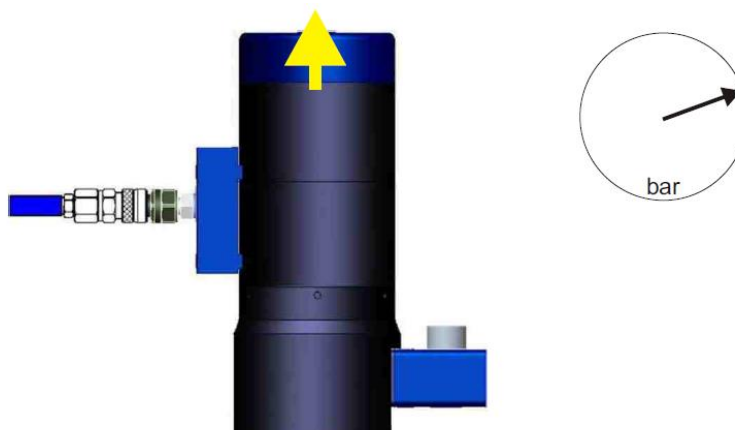


Figure 14 – Tightening the Bolt

If the stroke indicators show the tensioner has reached maximum stroke before the correct hydraulic pressure has been achieved, follow these steps:

- A. **Tighten the Bolt** - Use a 1/2" Drive. Insert the Drive into the Drive Socket on the top of the Gearbox. Rotate the Socket until the nut is tight.

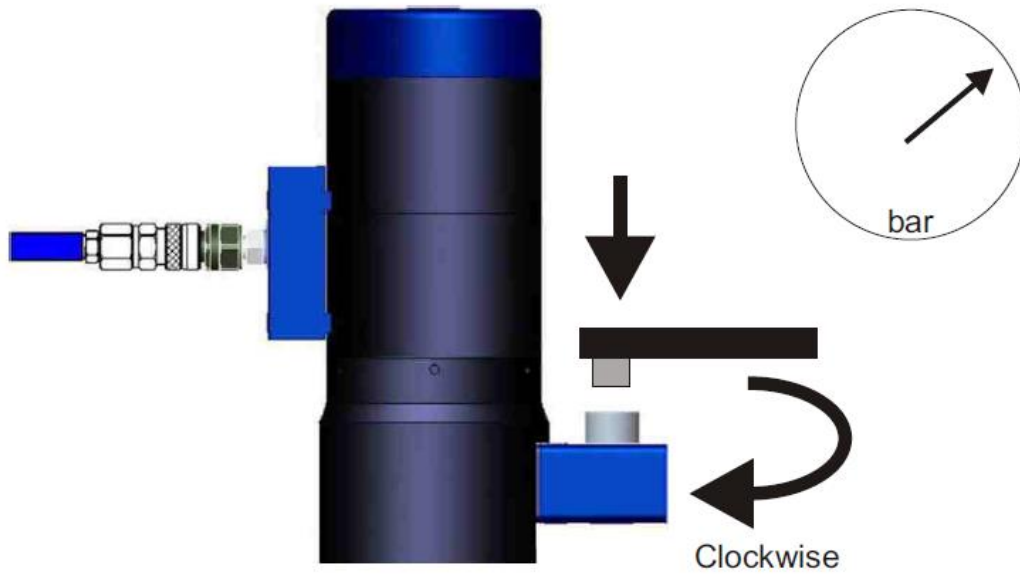


Figure 15 – Tighten the Bolt

- B. **Release the Pressure** - Slowly release the hydraulic pressure. If available, connect a low-pressure oil return hose. This will allow the tool to retract more quickly.

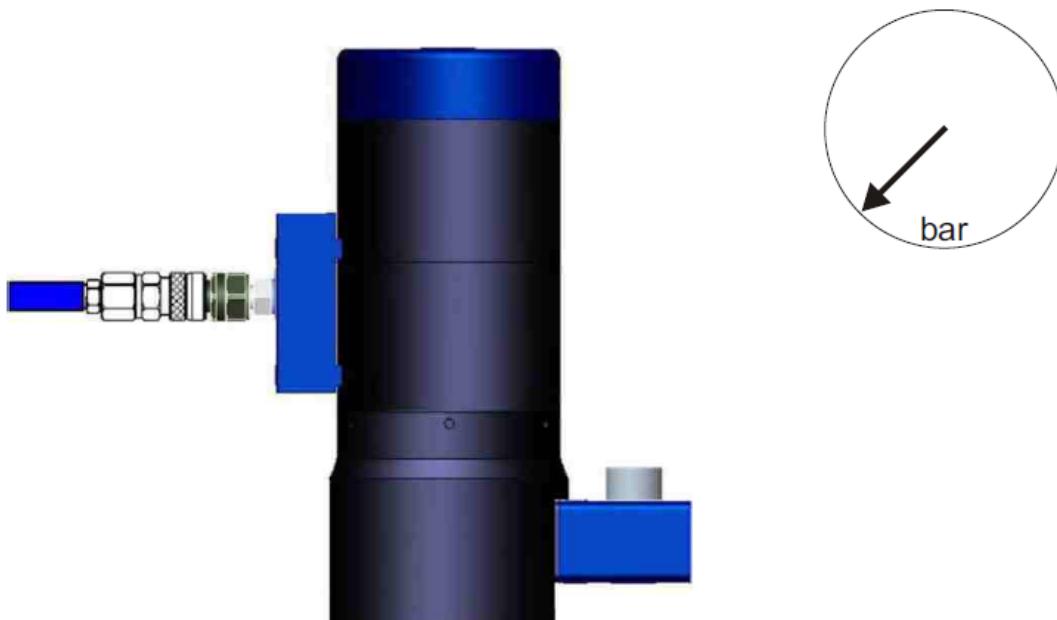


Figure 16 – Release the Pressure

- C. **Retract the Tensioner** - The spring retract system will now fully retract the tensioning tool.

- D. **Reengage the Tool** - The tensioner will have retracted upwards since the bolt will have elongated. The tool will need reengaging onto the flange.

Use a 1/2" Square Drive Socket, reengage the plunger onto the stud until the tool is flush with the flange. After the tensioner is flush, continue to turn the plunger ONE HALF TURN FURTHER to fully reset the tool.

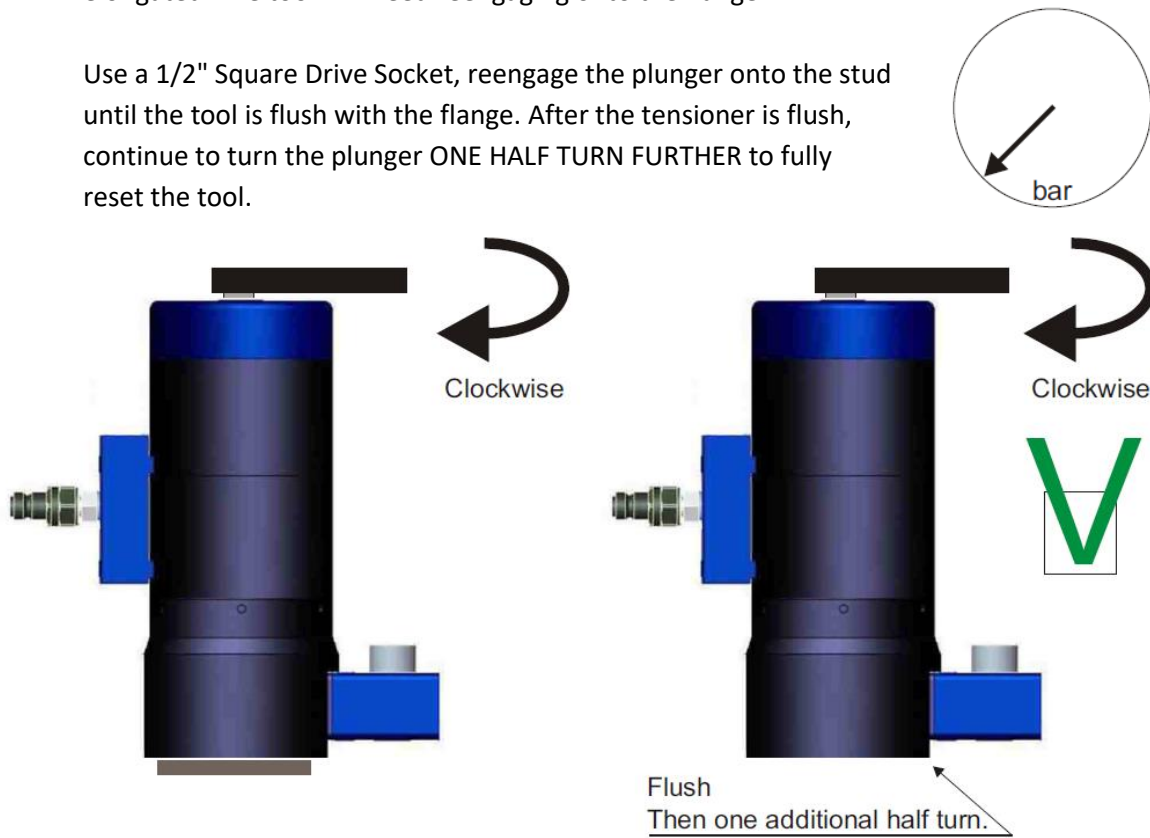


Figure 17 & 18 – Reengage the Tool

- E. **Reconnect the Hose.**

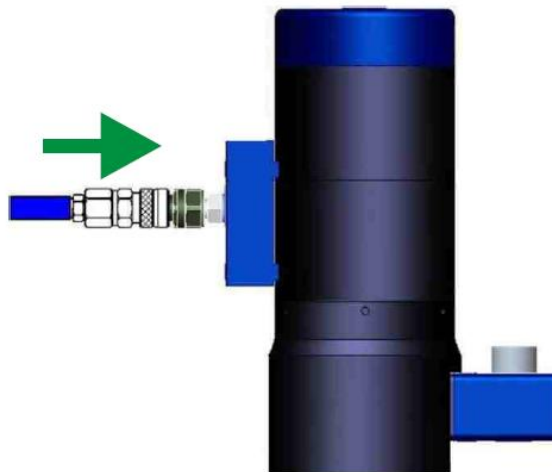


Figure 19 – Reconnect the Hose

- F. **Return to Step 5.3.6** to Apply the correct pressure.

If necessary, repeat this sequence until the bolt tensioning tool reaches the correct oil pressure without reaching the maximum piston stroke.

- 5.3.8 Apply the correct hydraulic pressure again. Wind the nut once this is achieved. **Do NOT** exceed the maximum stroke. This is indicated by stroke indicators around the top of the plunger.

Do NOT exceed pressure of 1,500 bar.

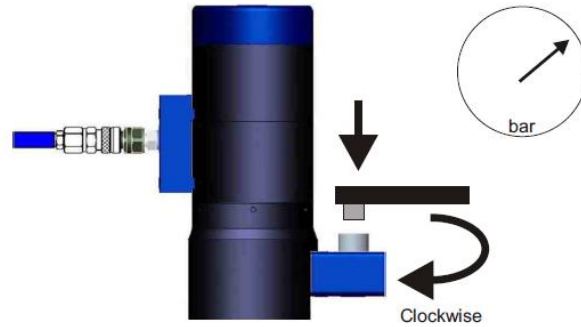


Figure 20 – Tightening the Bolt

- 5.3.9 Slowly release the hydraulic pressure. If a low-pressure oil return hose is available, attach it to accelerate retraction. Otherwise, allow the tool to retract through the hydraulic hose.

Remove hose once the stroke has returned to zero.

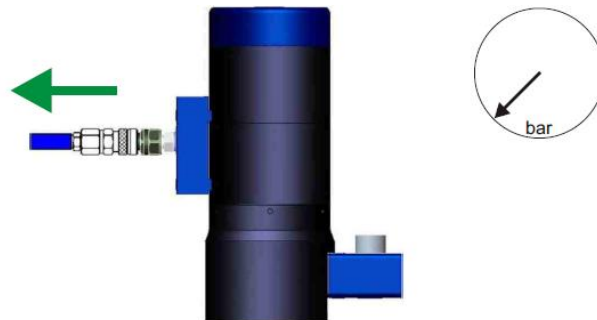


Figure 21 – Release the Pressure

- 5.3.10 Remove the tensioner using the 1/2" Square Drive in the top of the plunger.

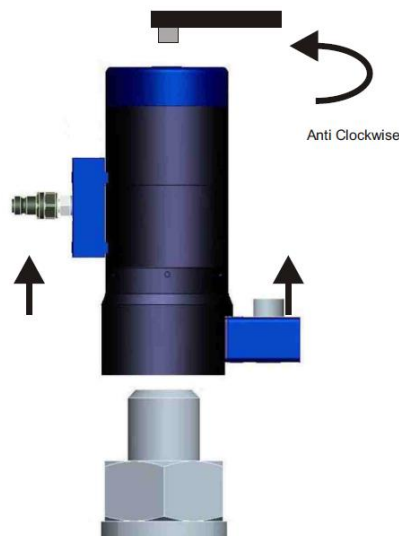


Figure 22 – Remove the Tensioner

5.4 De-tensioning Procedure

5.4.1 Before commencing the bolt de-tensioning operation, read and comply with all of the SAFETY PRECAUTIONS. This includes understanding the minimum protrusion 1.5 x Bolt Diameter.

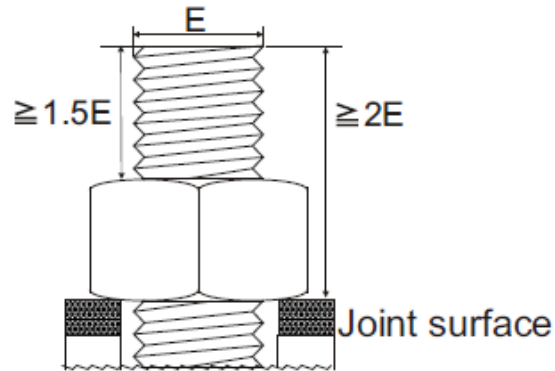


Figure 23 – Minimum Bolt Protrusion

5.4.2 Position the Tensioner over the bolt to be tightened. Orient the tensioner so that manifold is accessible, and the bridge window allows tommy bar access to the nut. Engage the plunger with the bolt. A 1/2" Square Socket is provided in the top of the puller bar so that the Tensioner orientation can be maintained whilst the plunger engages the bolt.

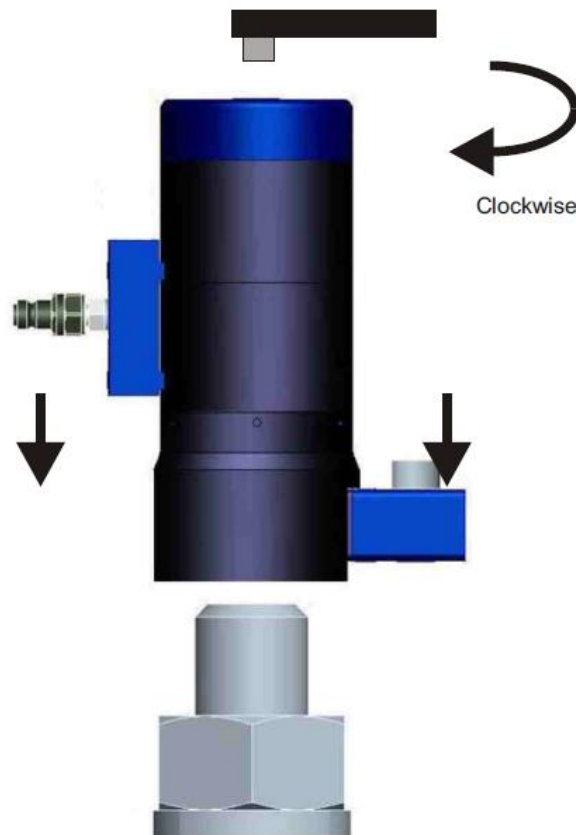


Figure 24 – Loosening the Bolt

- 5.4.3 Continue rotating the plunger, increasing its engagement with the bolt until the bridge is flush with the washer. To ensure the tool is fully flush, it may be necessary to rotate the gearbox slightly whilst lowering to fully engage the gear driven socket with the nut.

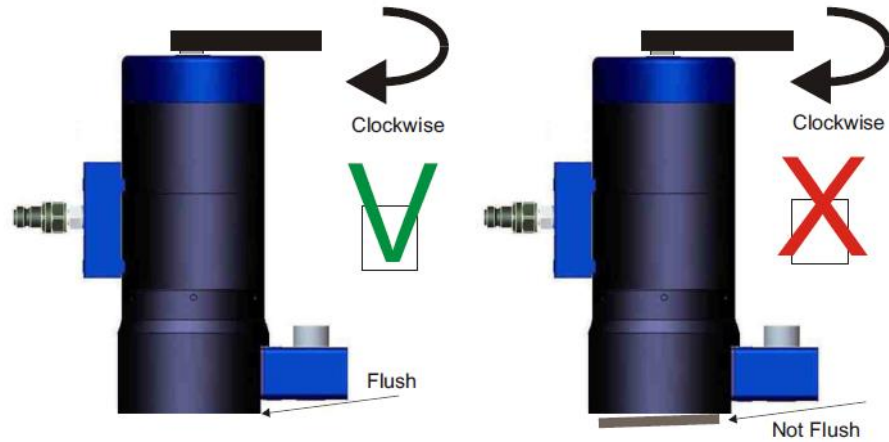


Figure 25 & 26 – Correct Tool Engagement

- 5.4.4 Rotate the plunger Anti-Clockwise by half a turn. This is to prevent the tensioner from locking onto the stud.

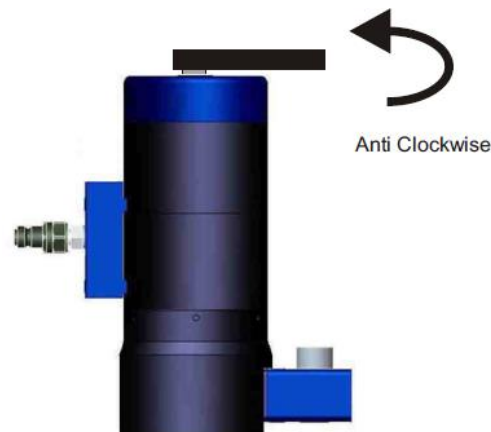


Figure 27 – Loosening the Bolt

- 5.4.5 Once the Tensioner is in situ, it should still be possible to rotate the bridge to a suitable angle to access the bolt if required.

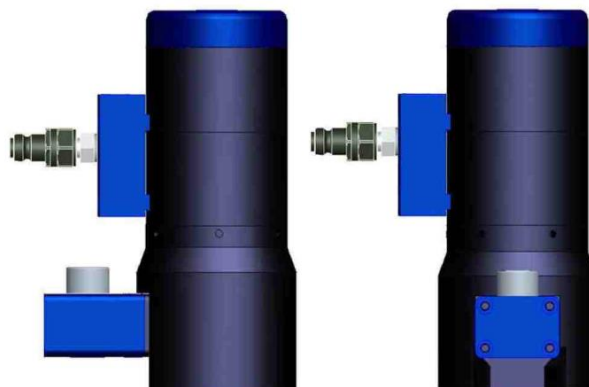


Figure 28 & 29 – Rotate for Access (if needed)

- 5.4.6 Connect SUITABLE high pressure hydraulic hose. Make sure the quick connect coupling is fully engaged.

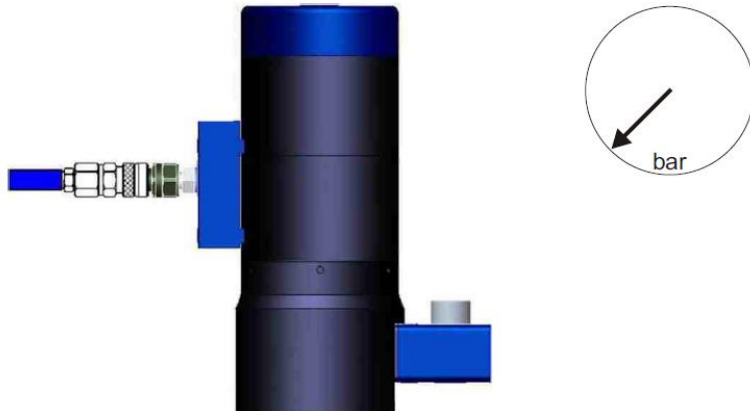


Figure 30 – Engage Quick Coupling

- 5.4.7 Apply the correct hydraulic pressure. The tool will begin to stroke and the operator should observe the top of the puller ascending through the top of the tool.

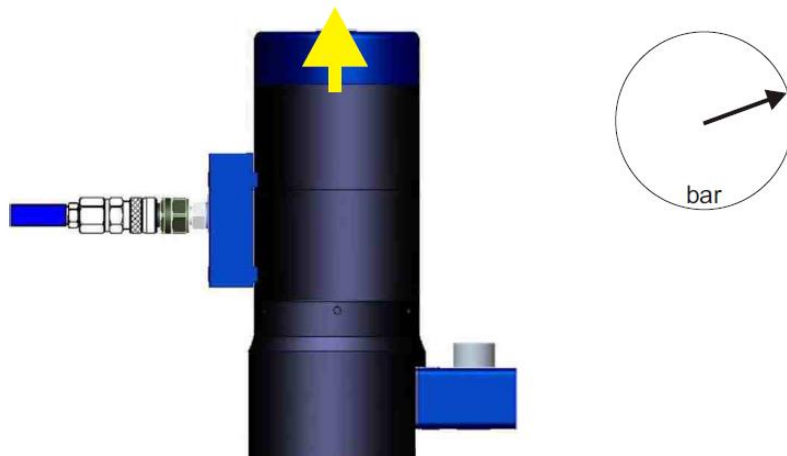


Figure 31 – Loosening the Bolt

- 5.4.8 Use a 1/2" Drive. Insert the Drive into Drive Socket on the top of the Gearbox. Rotate the Socket until the nut is loose.

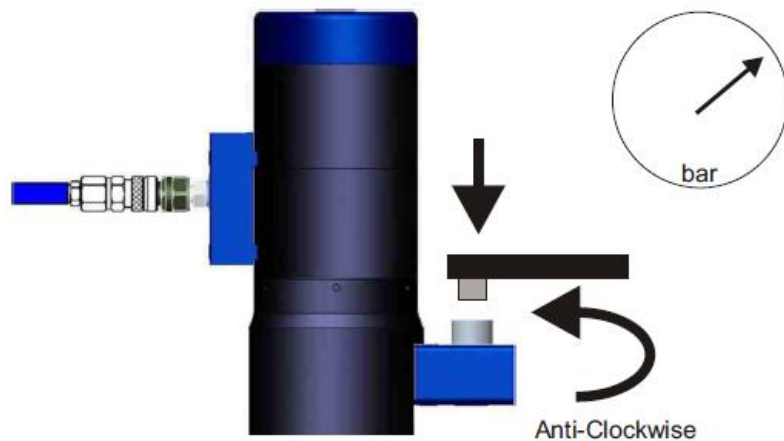


Figure 32 – Loosening the Bolt

- 5.4.9 Slowly release the hydraulic pressure. If available, connect a low-pressure oil return hose. This will allow the tool to retract more quickly.

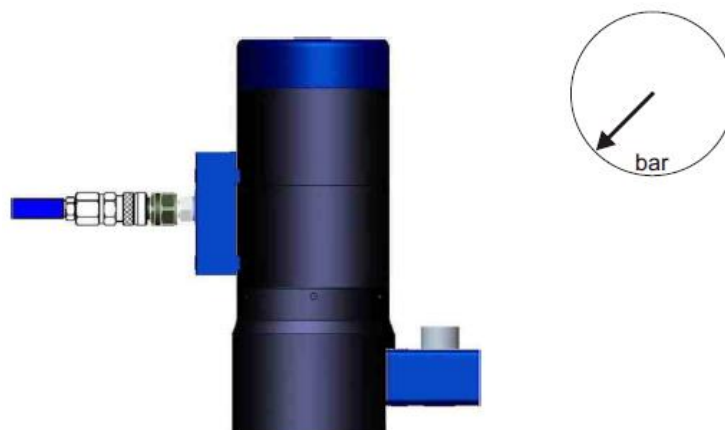


Figure 33 – Release the Pressure

- 5.4.10 The spring retract system will now fully retract the tensioning tool.
- 5.4.11 Remove the tensioner using the 1/2" Square Drive in the top of the plunger.

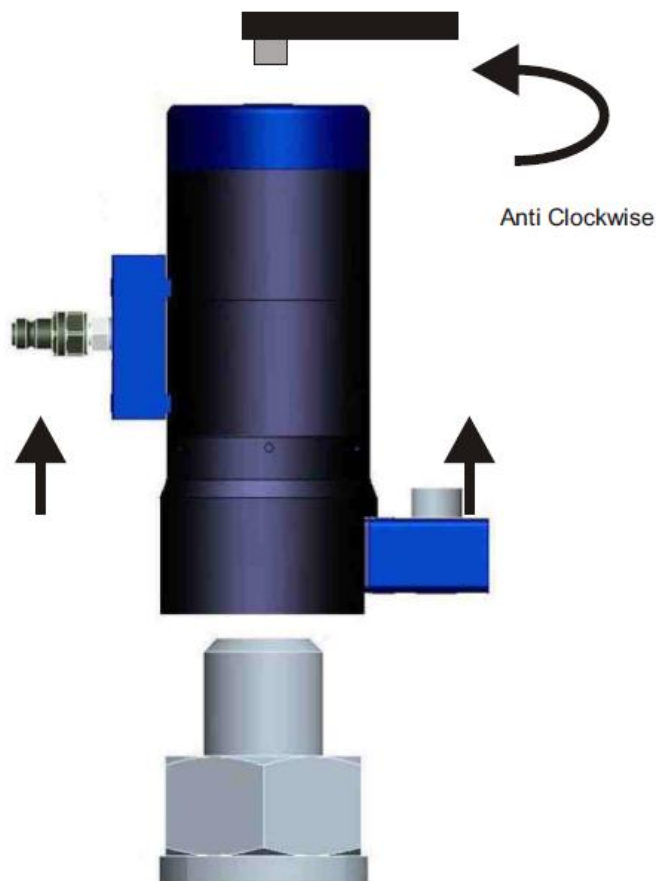


Figure 34 – Remove the Tensioner

6.0 Maintenance



IMPORTANT:

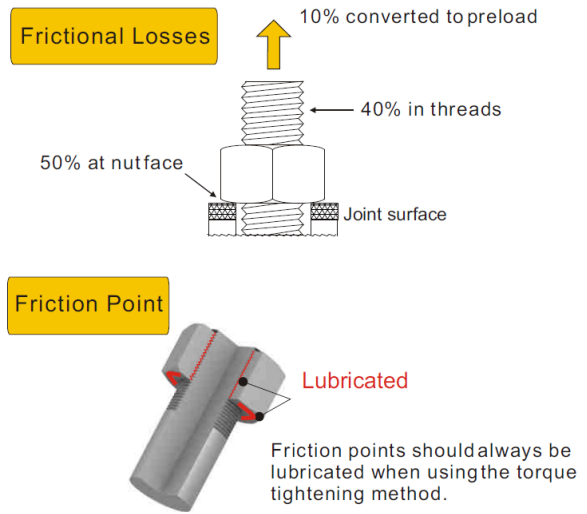
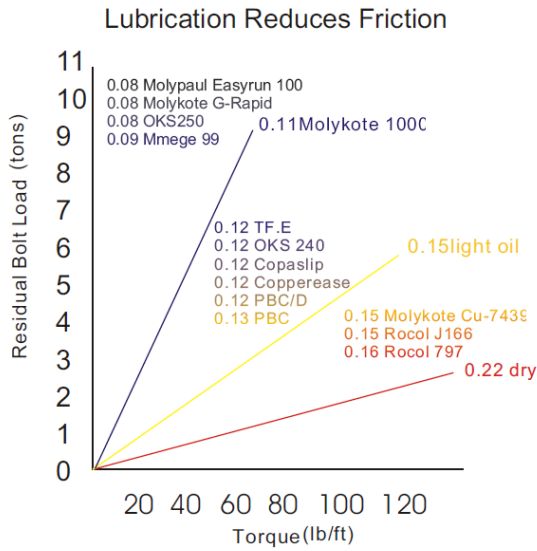
- Check oil level regularly
- Use only good quality hydraulic fluid. **Do NOT** use brake fluid, transmission fluid, turbine oil, motor oil, alcohol, glycerine etc. Use of anything other than good quality hydraulic oil will void warranty and damage the pump, hose, and application. We recommend Durapac Hydraulic Oil or equivalent
- Equipment must only be serviced by a qualified hydraulic technician. For repair service, contact your local Durapac authorised service centre
- Damage to hydraulic hoses may not be detected during visual inspections. For this reason, Durapac recommends that hydraulic hoses be replaced on a regular basis
- Tighten connections as needed. Use non-hardening pipe thread compound when servicing connections

The tensioner is of a rugged construction and utilises reliable seals. The only maintenance that may occasionally be required is the repair of a hydraulic fitting or the replacement of a seal and the quick connect fittings.

7.0 Troubleshooting

Problem	Cause	Solution
Pump loses pressure	Leaking system components	<ul style="list-style-type: none"> • Repair or replace as necessary
Pump not delivering fluid	Low fluid level in reservoir	<ul style="list-style-type: none"> • Check fluid level
	Worn seats	<ul style="list-style-type: none"> • Repair seats • Replace pump body
Pump does not reach rated capacity	Low fluid level in reservoir	<ul style="list-style-type: none"> • Check fluid level
	Leaking system components	<ul style="list-style-type: none"> • Repair or replace as necessary
	Fluid leaking past inlet or outlet checks	<ul style="list-style-type: none"> • Repair inlet or outlet checks • Replace high pressure piston seal
Tensioner will not extend	Loose couplers	<ul style="list-style-type: none"> • Tighten couplers
	Low fluid level in pump reservoir	<ul style="list-style-type: none"> • Fill and bleed the system
	Leaking tensioner seals	<ul style="list-style-type: none"> • Replace worn seals • Look for excessive contamination or wear
Tensioner extends only partially	Low fluid level in pump reservoir	<ul style="list-style-type: none"> • Fill and bleed the system
	Load above capacity of system	<ul style="list-style-type: none"> • Use correct equipment
Tensioner extends slower than normal	Loose couplers	<ul style="list-style-type: none"> • Tighten couplers
	Restricted hydraulic line or fitting	<ul style="list-style-type: none"> • Clean and replace if damaged
	Pump not operating correctly	<ul style="list-style-type: none"> • Check pump's operating instructions • Repair or replace as necessary
	Low fluid level in pump reservoir	<ul style="list-style-type: none"> • Fill and bleed the system
Tensioner does not hold pressure	Leaky connection	<ul style="list-style-type: none"> • Clean, reseal with thread sealant, and tighten connection
	Leaking tensioner seals	<ul style="list-style-type: none"> • Replace worn seals • Look for excessive contamination or wear • Replace contaminated fluid
	Pump or valve not operating correctly	<ul style="list-style-type: none"> • Repair or replace as necessary
Tensioner will not retract	Closed pump release valve	<ul style="list-style-type: none"> • Open pump release valve
	Loose couplers	<ul style="list-style-type: none"> • Tighten couplers
	Blocked hydraulic lines	<ul style="list-style-type: none"> • Clean and flush lines
	Pump reservoir too full	<ul style="list-style-type: none"> • Drain fluid to correct level

Appendix A – Specifications for Bolt Tensioning



Advantages of Lubrication

1. Reduces the friction during tightening.
2. Increases bolt service life.
3. Decreases bolt failure during installation.
4. Higher friction results in less conversion of torque to preload.

Metric

Bolt	M	6	8	10	12	14	16	18	20	22	24	27	30	33	36	39	42	45	48	52
Hexagon	mm	10	13	17	19	22	24	27	30	32	36	41	46	50	55	60	65	70	75	80
Thickness	mm	5	6.5	8	10	11	13	15	16	18	19	22	24	26	29	31	34	36	38	42
Bolt	M	56	60	64	68	72	76	80	85	90	95	100	105	110	115	120	125	130	140	150
Hexagon	mm	85	90	95	100	105	110	115	120	130	135	145	150	155	165	170	180	185	200	210
Thickness	mm	45	48	51	54	58	61	64	72	84										

Imperial

Bolt	Inch	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/4
Hexagon	mm	17	22	27	32	36	41	46	50	55	60	65	70	75	80	90
Thickness	mm	9.5	12.5	15.8	19	22	25	28	32	35	38	41	44	47	50	57
Hexagon	in	11/16	7/8	1-1/16	1 1/4	1 7/16	1 5/8	1 13/16	2	2 3/16	2 3/8	2 9/16	2 3/4	2 15/16	3 1/8	3 1/2
Thickness	in	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/4
Bolt	Inch	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5	5 1/4	5 1/2	5 3/4	6
Hexagon	mm	100	108	118	127	137	146	156	165	175	184	194	203	213	222	232
Thickness	mm	63	70	76												
Hexagon	in	3 7/8	4 1/4	4 5/8	5	5 3/8	5 3/4	6 1/8	6 1/2	6 7/8	7 1/4	7 5/8	8	8 3/8	8 3/4	9 1/8
Thickness	in	2 1/4	2 1/2	3												