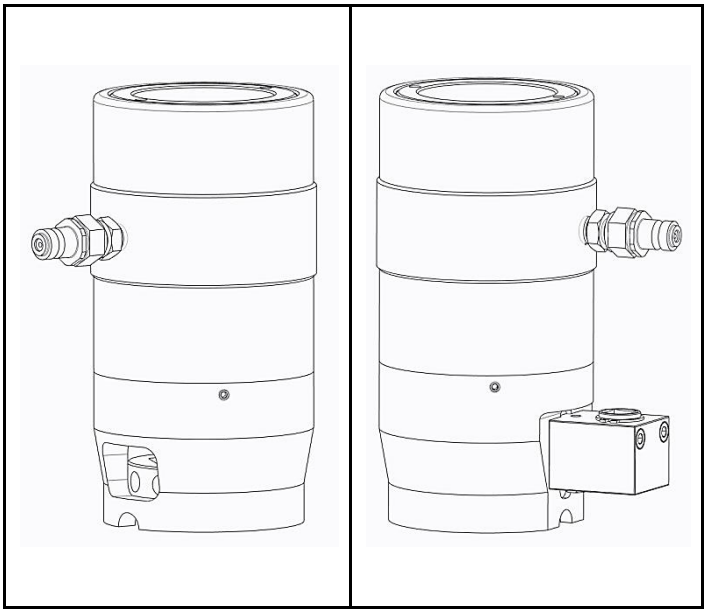
ENERPAC

Instruction Sheet

FTR-Series Foundation Tensioners, Round

L4238 Rev D 09/21 **EN**

Contents



1.0 IMPORTANT RECEIVING INSTRUCTIONS

Visually inspect all components for shipping damage. Shipping damage is not covered by warranty. If shipping damage found, notify carrier at once. The carrier is responsible for all repair and replacement costs resulting from damage in shipment.

2.0 SAFETY

2.1 Introduction

Read all introductions carefully. Follow all recommended safety precautions to avoid personal injury as well as damage to the product and / or damage to other property. Enerpac cannot be responsible for any damage or injury from unsafe use, lack of maintenance, or incorrect operation. Do not remove warning labels, tags, or decals. In the event of any questions or concerns arising, contact Enerpac or a local Enerpac distributor for clarification.

If you have never been trained on high-pressure hydraulic safety, consult your distributor or service centre for information about Enerpac Hydraulic Safety Courses.

This manual follows a system of safety alert symbols, signals, words, and safety messages to warn the user of specific hazards. Failure to comply with these warnings could result in death or serious personal injury, as well as damage to the equipment or other property.

The Safety Alert Symbol appears throughout this manual. It is used to alert you to potential physical injury hazards. Pay close attention to Safety Alert Symbols and obey all safety messages that follow this symbol to avoid the possibility of death or serious injury.

Safety Alert Symbols are used in conjunction with certain Signal Words that call attention to safety messages or property damage messages and designate a degree or level of hazard seriousness. The Signal Words used in this manual are WARNING, CAUTION, and NOTICE.

⚠ WARNING Indicates a hazardous situation that, if not avoided, **could** result in death or serious personal injury.

⚠ CAUTION Indicates a hazardous situation that, if not avoided, **could** result in minor or moderate personal injury.

NOTICE Indicates information considered important, but not hazard related (e.g. messages relation to property damage). Please note that Safety Alert Symbol will **not** be used with the signal word.

2.2 General Hydraulic Safety Precautions

⚠ WARNING

Failure to observe and comply with the following precautions could result in death or serious personal injury. Property damage could also occur.

- Read and completely understand the safety precautions and instructions in this manual before operating the tensioners or preparing them for use. Always follow all safety precautions and instructions, including those that are contained within the procedures of this manual.
- When the system is under pressure **DO NOT STAND IN LINE** with the direction of force of the tensioners. Keep this area clear of personnel at all times when the system is under pressure. If the bolt should fail, serious personal injury or death could result if loose or broken parts become projectiles.
- Operating procedures will vary, depending on the system arrangement. Always read, follow and completely understand all manufacturers' instructions when operating pumps, valves and all other devices used with the tensioners. Follow all safety precautions contained in the manufacturer's manuals. Use only for intended purpose.
- Wear personal protective gear when operating hydraulic equipment. Always wear eye protection. Safety equipment such as dust mask, non-skid safety shoes, hard hats, gloves or hearing protection (used as appropriate) will reduced personal injuries.
- Ensure that the strengths of the bolts are known and that the recommended tensioning applied loads are well within the safe limits.
- Do not handle pressurized hoses. Escaping oil under pressure can penetrate the skin. If oil is injected under the skin, see a doctor immediately.
- Do not pressurize disconnected couplers.
- The system operating pressure must not exceed the pressure rating of the lowest rated component in the system.
- Install pressure gauge(s) in the system to monitor operating pressure. It is your window to see what is happening in the system.
- Never set a relief valve to a higher pressure than the maximum rated pressure of the pump and tensioner. If ratings are different, relief valve setting should not exceed the setting of the lowest rated component (pump or tensioner).
- Do not exceed equipment ratings. Never attempt to apply more load to a bolt than the maximum capacity of the tensioner. Overloading may cause equipment failure and possible personal injury.
- Do not drop heavy objects on hoses. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.
- Be sure setup is stable before applying load. Tensioners should be located on a firm and level surface capable of supporting the full load.
- Always perform a visual inspection of the tensioner before placing it into operation. If any problems are found, do not use the tensioner. Have the tensioner repaired and tested by an Enerpac Authorized Service Centre before it is returned to service.
- Never use a tensioner that is leaking oil. Do not use a tensioner that is damaged, altered or in need of repair.
- Allow only trained and experienced personnel to supervise and perform tensioning procedures.
- Always be certain that hydraulic pressure is fully relieved and that the load is fully removed from the tensioner(s) before disconnecting hydraulic hoses, loosening hydraulic fittings, or performing any tensioner disassembly or repair procedures.
- Ensure that the bolt protrusion is at least the amount stated in the applicable General Arrangement Drawing.
- Do not exceed the indicated maximum stroke of the tool.
- Never leave the system unattended when under pressure.

⚠ CAUTION

Failure to observe and comply with the following precautions could result in minor or moderate personal injury. Property damage could also occur.

- Be careful to avoid damaging hydraulic hoses. Avoid sharp bends and kinks when routing hydraulic hoses.
- Do not bend beyond the minimum bend radius specified by the hose manufacturer. Using a bent or kinked hose will cause severe back-pressure. Sharp bends and kinks will internally damage the hose, leading to premature hose failure.
- Do not lift hydraulic equipment by the hoses or couplers. Use the tensioner lifting eyes-bolts and appropriately rated lifting equipment, where appropriate.
- Keep hydraulic equipment away from flames and heat. Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings.
- For optimum performance, do not expose hydraulic equipment to temperatures of 150˚F [65˚C] or higher.

- Immediately replace worn or damaged parts with genuine Enerpac parts. Enerpac parts are designed to fit properly and to withstand high loads. Non-Enerpac parts may break or cause the product to malfunction.
- Use hydraulic tensioners only in a coupled system. Never use a tensioner with uncoupled couplers.

NOTICE

- Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Enerpac Authorized Service Centre in your area.
- Rope off working area and place warning signs.
- To help ensure proper operation and best performance, use of Enerpac oil is strongly recommended.

2.3 Additional References

Consult the applicable industry and/or government standards in your country or region for additional safety precautions and work rules applicable to hydraulic tensioners, and other similar tensioning equipment.

In the USA, refer to the following publication:

- Code of Federal Regulations - Title 29 Occupational Safety and Health Standards (U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001. www.gpo.gov).

In the European Union, refer to the standards and directives listed in the product's EU Declaration of Conformity. A copy of this document is packed separately with the tensioner.

3.0 CONFORMANCE TO NATIONAL AND INTERNATIONAL STANDARDS

CE UK CA — These tools conform with the requirements for CE and UKCA.

Enerpac declares that the product(s) have been tested and conforms to applicable standards and the product(s) are compatible to all EU and UK Requirements.

Copies of the EU Declaration as well as the UK Self-Declaration are enclosed with each shipment.

4.0 PRODUCT DESCRIPTION

4.1 Introduction

NOTICE

The Enerpac FTR-Series Foundation Round Tensioners are designed for the precision tensioning of bolted joints in an industrial environment. Due to the high degree of competency required to safely operate this type of device, the tensioners and ancillary equipment are intended to be used by trained professional operators only. The equipment is not intended to be used by untrained operators or in a non-industrial environment. The equipment is designed to be operated within an ambient temperature range of -10°C to +50°C and should not be used in a corrosive or explosive atmosphere.

⚠ WARNING

Modification to any part of the equipment outlined in this manual should not be attempted, nor any component part be replaced without first consulting Enerpac. Modifications may render the equipment dangerous. Component parts are each rated to suit the demands of the overall equipment design and replacement with similar items without provenance may lead to unexpected and dangerous accidental failures. Failure to observe these instructions and precautions could result in death or serious injury.

If any equipment abuse is evident, the warranty will be invalidated and Enerpac will not be made responsible for an injury due to misuse or failure to comply with the above safety precautions.

4.2 Pump Requirements

This bolt tensioning equipment has been designed to be used in conjunction with a hydraulic pump unit. Enerpac can offer a range of pump options to suit particular applications and thus operators should refer to the specific instruction manual for the pump to be used. The safety rationale used in the design of this tensioner has assumed a pump maximum working pressure appropriate for the tool and using hydraulic oil between ISO 22 and ISO 68, which are available as part of the Enerpac HF Series of hydraulic fluids. Enerpac HF oil is available at your local Enerpac Distributor or Authorized Service Centre.

Hydraulic connection is made using quick disconnect male & female couplings. In the event an alternative pump unit is used, additional safety measures such as pressure relief valves or bursting discs must be considered to ensure over-pressurisation cannot occur.

See pump manual for operating instructions.

4.3 FTR-Series Foundation Round Tensioners Major Features and Components

1. Head assembly
2. Bridge assembly
3. Adaptor
4. Quick disconnect coupler
5. Socket
6. Gearbox assembly

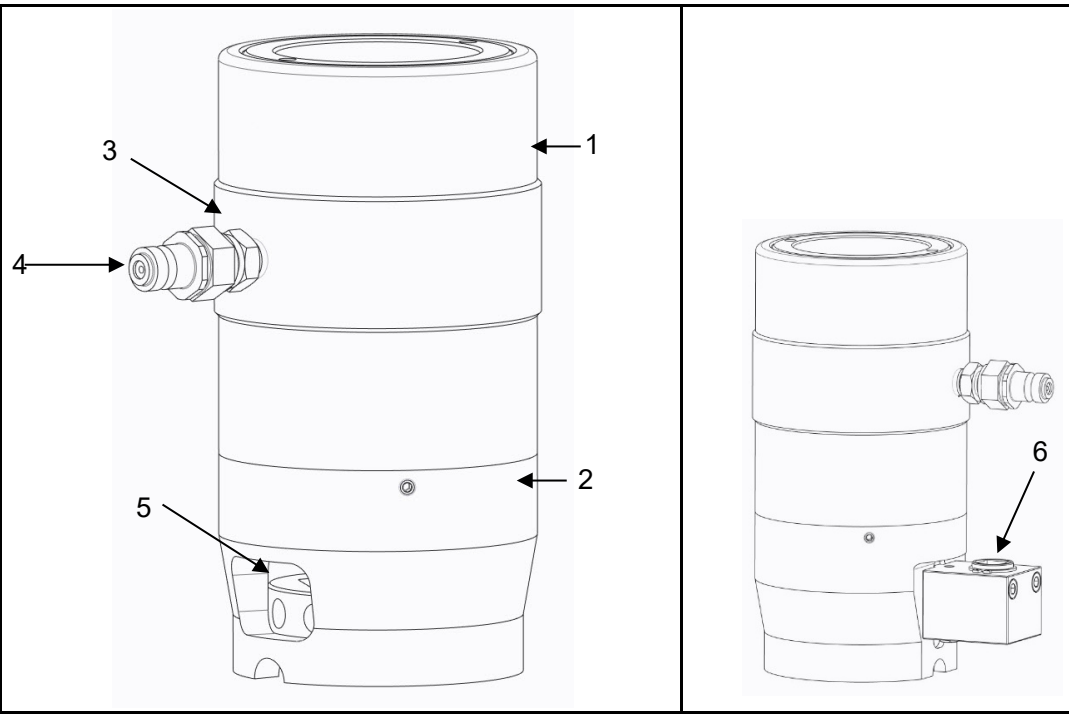


Fig. 1.1 Major features and components of FTR-Series Foundation Tensioners, Round

5.0 ASSEMBLY

5.1 Bolt Preparation

Simple bolt preparation will significantly reduce the risk of problems occurring during tensioner application and operation. Therefore, we would recommend that the following preparations and checks are adopted whenever possible.

To accommodate the Enerpac FTR-Series Foundation Round Tensioners, an extended portion of bolt is required above the nut. The recommended maximum and minimum protrusion is detailed in the applicable General Arrangement Drawing

The tensioner must be able to be freely threaded onto all bolts over the length protruding through the flange faces. The reaction nut must be free running on all bolts over the extended portion above the nut.

Protect the bolt protrusion using sleeves, adhesive tape, etc. This will protect the threads from knocks and damage during installation.

It is advisable that upon completion of the tensioning operation protector caps be fitted to the nut/thread protrusion. This will minimise corrosion and therefore assist in future disassembly.

5.2 Hose Connection

Ensure the pump hydraulic oil return valve is fully open.

Connect the hose from the pump to the male coupling of the first tensioner. If multiple tensioners will be used, attach a manifold to the tensioner male fitting, and connect the feed hose to the male coupling of the manifold. Attach a hose to the female coupler of the manifold on the first tensioner, and to the male coupler of the second tensioner. Follow this process for all subsequent tensioners.

When the hydraulic circuit is complete, no unconnected couplings should exist.

NOTICE

- Ensure that the hoses are free of obstructions and do not cross such that upon pressurisation, detrimental loads will be induced on the connectors and adaptors potentially leading to failure.
- Quick-disconnect couplings are susceptible to knocks and damage therefore, take care when handling the equipment. A damaged coupling may prove very difficult to connect.
- Ensure hose(s) have been filled with hydraulic oil and all air has been purged from the system in preparation for tensioning.

6.0 OPERATION

6.1 General

To achieve the correct final tension when using FTR-Series Foundation Round Tensioning tools, each bolt must be tensioned as often as required until application of the calculated oil pressure results in no further bolt extension (i.e. until the nuts cannot be turned any further whilst the tools are at the calculated working pressure).

If during application of pressure the tools attain their maximum permissible stroke before the calculated working pressure is reached, then the nuts must be tightened down at this point and the tools retracted before the pressure is reapplied.

6.2 Tightening Procedure

NOTICE There is a yellow coloured indicator groove marked around the top of the piston which indicates that the tensioner has reached its maximum stroke. If this line is observed, stop the pump and do not continue to pressurise the tool(s). It will be necessary to tighten the nut(s) down, and retract the tool(s) before continuing. (Fig. 2.1)

To tighten a bolt proceed as follows; refer also to the applicable General Arrangement Drawing as necessary.

Check that the bolts have been assembled correctly. Refer to the General Arrangement drawing for the required thread extension above the joint face.

Tighten all nuts down hand tight using a standard wrench. Excessive force is unnecessary as the tensioner will do the work. (Fig. 2.2)

Place the socket, bridge and hydraulic head assembly over the nut. Ensure that the tool is seated squarely on the joint face and that the access slot is facing outwards to gain access to the nut. (Fig. 2.3)

Screw the reaction nut on to the bolt protrusion until it seats on the hydraulic head assembly and tighten down hand-tight. (Fig. 2.4)

It is advised that the hydraulic fitting is offset to the gearbox to allow access to the gearbox-input drive, where applicable.

Assemble any further tools as described above.

NOTICE If multiple tools are used; tools should be equally spaced and a sensible tightening sequence used. If in doubt consult Enerpac for advice.

⚠ CAUTION

- The contact area for the bridge must be flat and complete. If washers are used, they must not interfere with the location of the bridge.
- Do not use if the bridge is not sitting squarely on the flange surface i.e. the axis of the tool is not parallel to the axis of the bolt. Possible causes are due to the flange/tower weld obstructing the head assembly or the flange hub radius obstructing the bridge. Upon pressurisation the tensioner will have a tendency to self-align which may result in damage to the tensioner or plant.
- Do not use on applications that have insufficient bolt protrusion, as indicated on the applicable General Arrangement drawing.

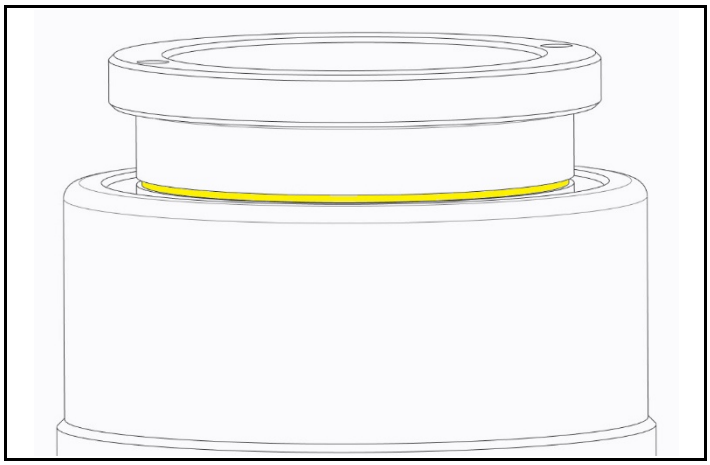


Fig. 2.1 Piston indicator groove

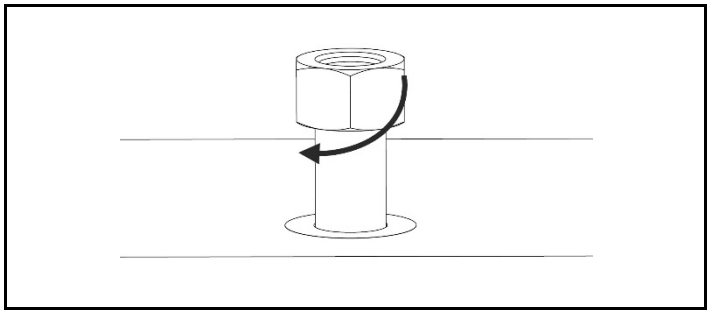


Fig. 2.2 Preparation of the application

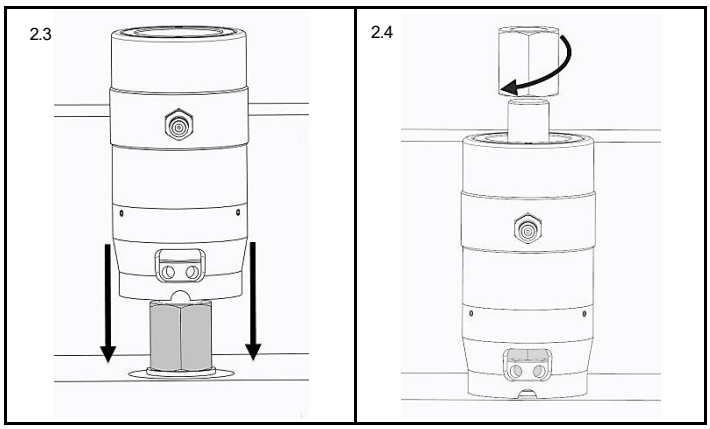


Fig. 2.3 Place Tensioner on application
Fig. 2.4 Screw reaction nut into place

Connect the hose from the pump to the male coupling of the first tensioner. If multiple tensioners will be used, attach a manifold to the tensioner male fitting, and connect the feed hose to the male coupling of the manifold. Attach a hose to the female coupler of the manifold on the first tensioner, and to the male coupler of the second tensioner. Follow this process for all subsequent tensioners. (Fig. 2.5)

Ensure there is no pressure in the hydraulic pump and connect the tensioner(s) to the pump using a hydraulic hose(s) as appropriate. Ensure that the couplings are securely connected using the male/ female coupling.

Operate the hydraulic pump to pressurise the tensioner(s). Observe the extension constantly during this operation, the coloured indicator groove on the piston will appear from the body at full stroke. Do not exceed the maximum stroke indicated on the applicable General Arrangement Drawing, and stop pressurisation as soon as this is observed.

The application nut must be wound down to the joint face before continuing with the tensioning procedure. Tensioners fitted with a gearbox assembly tighten the nut down to the joint face by rotating the gearbox input drive clockwise using a ratchet wrench (1/2" or 13mm male square/ 3/8" or 10mm square) (Fig. 2.6a). Tensioners without a gearbox assembly fitted tighten the nut down using a tommy bar to turn the socket. (Fig. 2.6b)

When the desired operating pressure is reached, stop the pump and whilst holding the pressure constant, tighten the nut down. Check that the nut is properly seated. (Fig. 2.6a+b/ Fig. 2.7)

Release the hydraulic pressure by slowly turning the return-to-tank valve on the pump unit. When the gauge on the pump unit shows zero pressure open the return-to-tank valve fully.

NOTICE The hydraulic hose(s) should always remain coupled to the tensioner(s) whilst the insert is being retracted. This allows the oil to flow back to the pump.

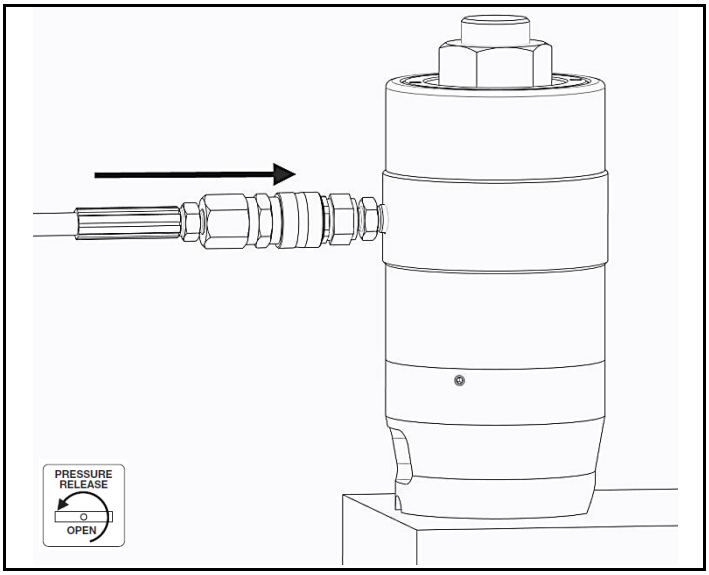


Fig. 2.5 Hose connection

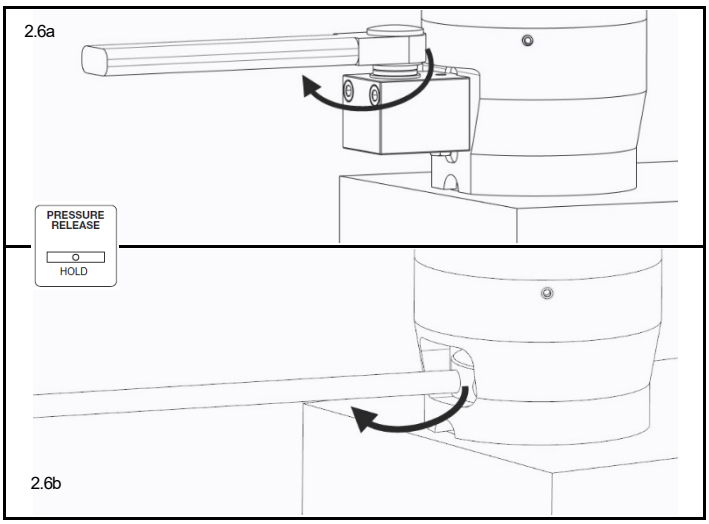


Fig. 2.6a Tighten applicate socket with gearbox
Fig. 2.6b Tighten applicate socket with tommy bar

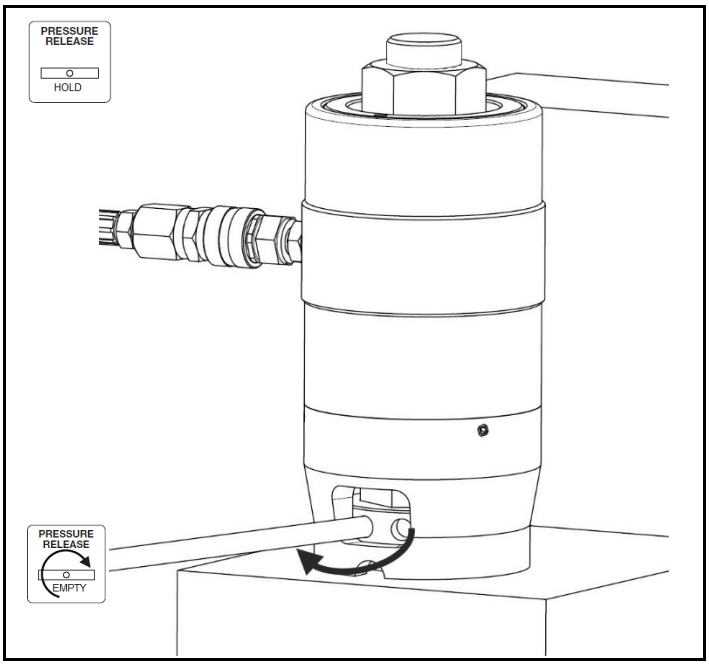


Fig. 2.7 Hold pressure to tighten nut

Disconnect the hydraulic hose(s) and unscrew and remove the reaction nut, hydraulic head assembly, bridge and socket from the bolt. (Fig. 2.8)

Reposition the tools over the next set of bolts to be tensioned and continue as above until all the bolts have been tensioned once. This will complete the first cycle. (Fig. 2.8)

Check that the nut is tight at the required operating pressure. If the drive gear (available on select models) can be turned by more than a 45° (15 degrees of nut rotation) (Fig. 2.9a), then another complete tensioning cycle must be performed. (Fig. 2.9b)

When the nut is tight on testing the bolt, the tensioning process is complete.

When all tools are fully retracted disconnect the hose(s) from the tensioner(s).

Unscrew the reaction nut(s) from the bolt(s) and lift the tensioner(s) off the bolt(s).

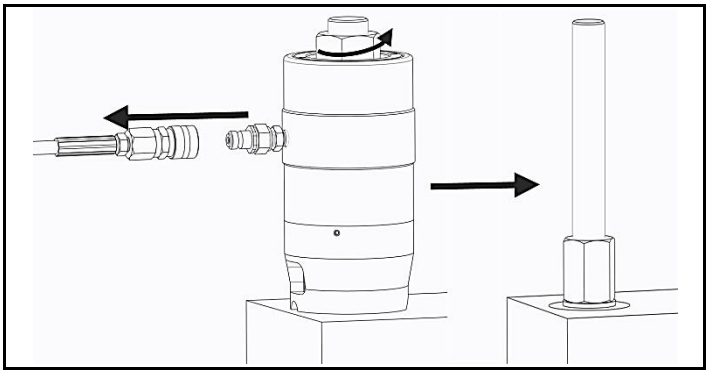


Fig. 2.8 Detach hose, remove and reposition tensioner

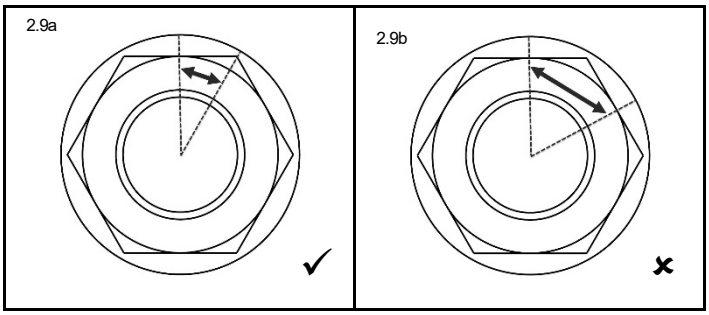


Fig. 2.9a Bolt tensioning complete
Fig. 2.9b Bolt tensioning incomplete

6.3 Detensioning Procedure

The detensioning procedure for FTR-Series Foundation Round Tensioners is identical to the tightening procedure with the following important exceptions:

When screwing the tensioner onto the bolt the reaction nut must be screwed down until the base of the bridge mates with the joint face, the reaction nut must then be turned back by 1/2 a turn. (Fig. 3.1)

NOTICE This procedure is to prevent the tensioner becoming locked on to the bolt. One half turn is usually sufficient, but if for any reason the tensioner is locked on to the bolt then retighten as per the tightening procedure and repeat but unscrew by 3/4 of a turn.

When the required pressure is reached the application nut must be unscrewed by approximately half a complete turn. Use a suitable wrench for models with a gearbox fitted, when using models without a gearbox use a tommy bar. (Fig. 3.2) The nut should turn freely without excessive torque being applied. If for any reason (principally corrosion or thread damage), the nut will not unscrew, **DO NOT** increase the pressure beyond the recommended maximum operating pressure. Once the nut has been lifted off the face of the application a further increase in pressure will not help.

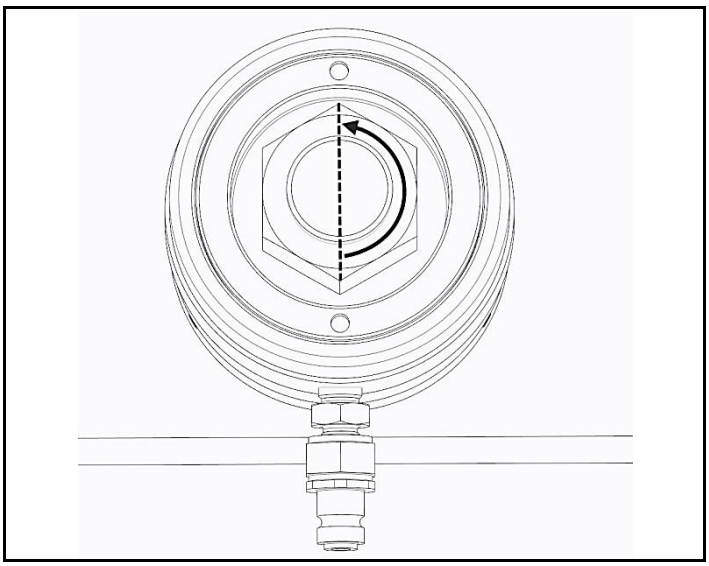


Fig 3.1 Tighten reaction nut, and turn back ½ turn

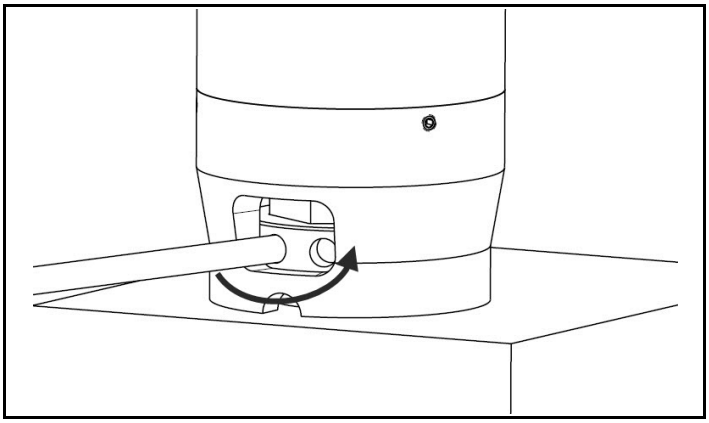


Fig 3.2 Turn reaction nut anti-clockwise

7.0 MAINTENANCE

It is recommended that servicing be carried out by an Enerpac Authorized Service Centre. All parts must be thoroughly inspected and replaced where necessary.

NOTICE All parts will have been manufactured, inspected and tested in accordance with Enerpac's stringent requirements. Product failures that result from the use of spare parts that are not genuine Enerpac spare parts will not be covered by warranty.

⚠ CAUTION The instructions below have been included primarily for the purpose of accessing the Internal running surfaces of the tensioner which may require additional lubrication from time to time. Unless personnel have been specifically trained to change the hydraulic seals, it is strongly recommended that the tensioners be returned to Enerpac Authorized Service Centre if seal replacement is required.

7.1 Dismantlement of the Hydraulic Head Assembly

To dismantle and re-assemble the hydraulic head assembly, proceed as follows. Refer also to the applicable General Arrangement Drawing as necessary.

Position the head assembly vertically in a soft jaw vice holding onto the outer body. Remove the hydraulic head assembly from the bridge assembly by unscrewing the set screws holding the two assemblies together. (Fig. 4.1)

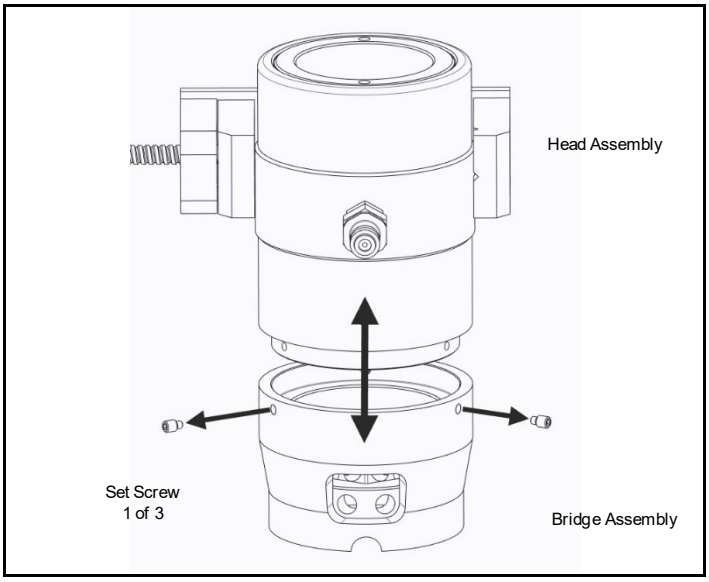


Fig. 4.1 Separation of head assembly and bridge assembly

Reverse the head assembly in the soft vice. Remove the small set screw which securing the spring collar to the piston. Using two tommy bars into the holes located on the spring collar and unscrew the spring collar in an anticlockwise direction, lifting it away from the head assembly. (Fig. 4.2)

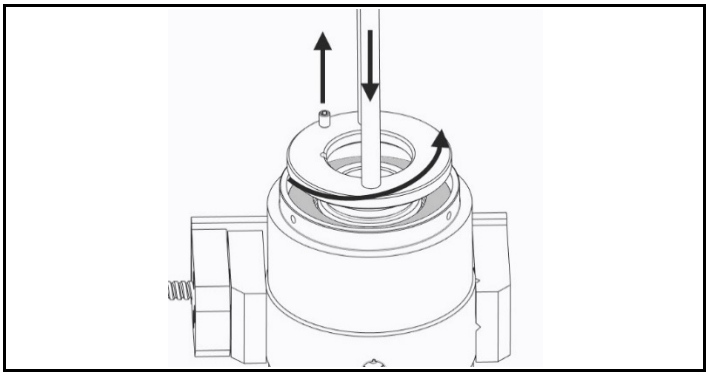


Fig. 4.2 Remove spring collar

⚠ CAUTION Take care when unscrewing the spring collar. As the internal pressure is released from the disc springs, the spring collar will be pushed away from the body with a quick sudden movement.

The piston will now be free and easily removed from the body for cleaning and replacement of seals. (Fig. 4.3)

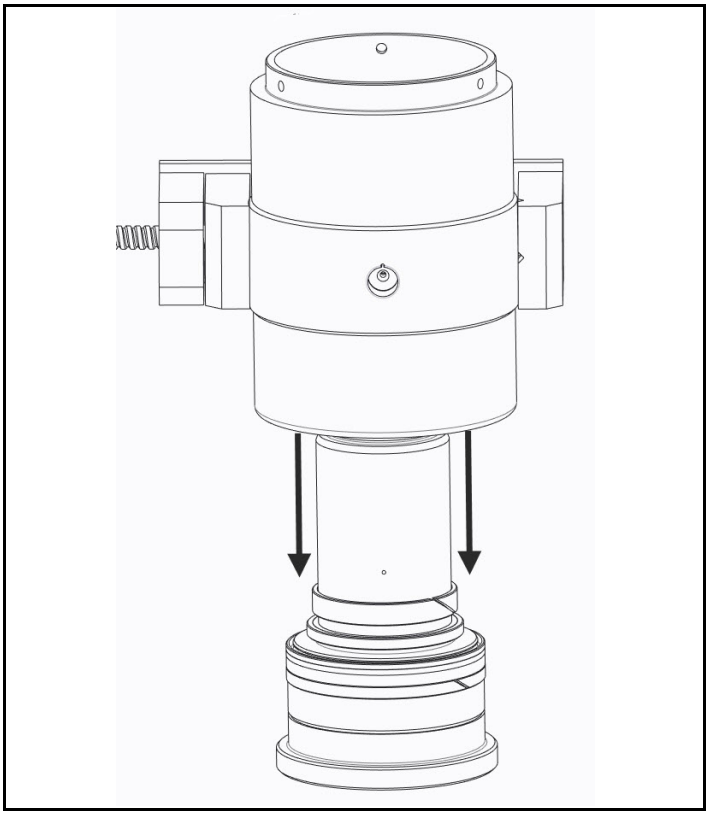


Fig. 4.3 Piston removed from body

NOTICE If disc springs are removed during maintenance, be sure to note the stacking arrangement of the disc springs as this will need to be maintained for re-assembly.

The tool is now dismantled to such an extent that all internal running surfaces will be accessible. Clean these surfaces as necessary.

7.2 Replacing Hydraulic Seals

Precautions

The following precautions must be taken with the assembly of the hydraulic seals:

- Avoid sharp edges (cover thread areas)
- Remove all dust, dirt, swarf and foreign particles.
- Do not use sharp edged tools.
- Lubricate all components before assembly.

Hydraulic seal replacement must only be carried out should the seals become damaged. The seals should not be removed during routine maintenance.

Hydraulic Seals - Component Parts

The seal kit comprises an inner and outer seal, both of which are comprised of two parts; the main seal is a red polyurethane elastomer and is very flexible and an anti-extrusion ring which is manufactured from a harder material. Care must be taken to ensure that the anti-extrusion ring is not damaged or kinked before or during assembly. (Fig. 4.4)

NOTICE Figures 4.4 to 4.6 are provided for guidance only. Parts shown may appear slightly different in appearance than the actual parts used on your tensioner.

Outer Seal Assembly

Place the piston on a clean flat surface with the small end facing upwards.

Carefully, stretch bearing strip and place into groove below the maximum stroke indicator line.

Place the anti-extrusion ring into the rearmost position of the seal groove ensuring it is the correct way round to mate with the seal.

Gently stretch the main seal over the retaining lip of the piston applying gentle finger pressure to ensure the main seal seats fully and correctly into its groove with the anti-extrusion ring seated in place behind it. (Fig. 4.5)

Inner Seal Assembly

Place bearing strip into the lower groove inside the body.

Insert the main seal inside the retaining lip of the body, applying gentle finger pressure to ensure it is seated fully and correctly into its groove.

Turn the body over and piston and direct the anti-extrusion ring at a slight angle to the main seal and starting from one side using gentle finger pressure push and seat the anti-extrusion ring into position behind the main seal. (Fig. 4.6)

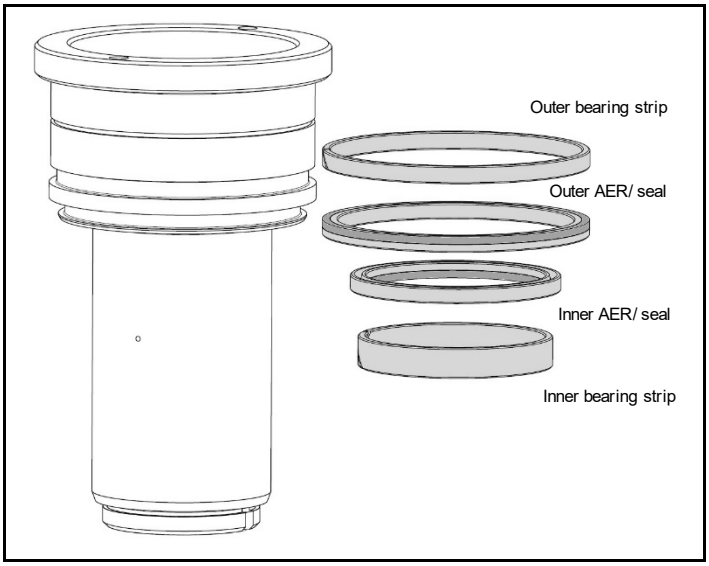


Fig. 4.4 Piston, outer AER/ seal, inner AER/ seal, bearing strips

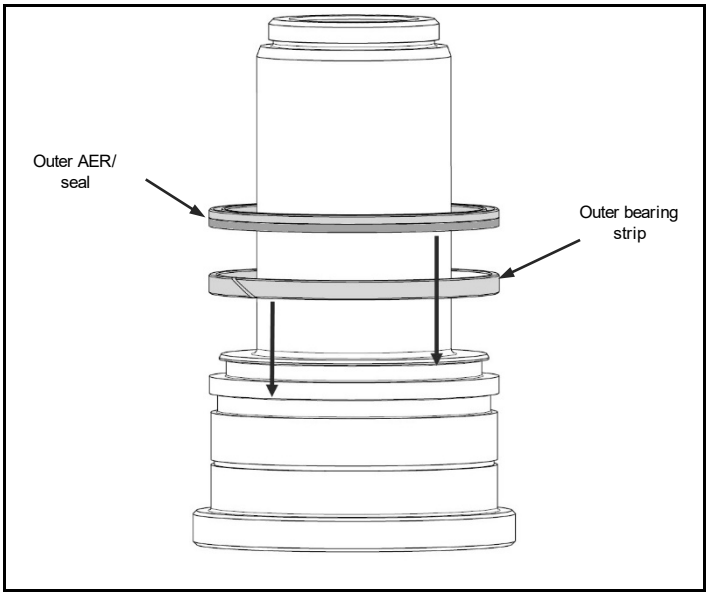


Fig. 4.5 Insert Outer AER, followed by the outer seal

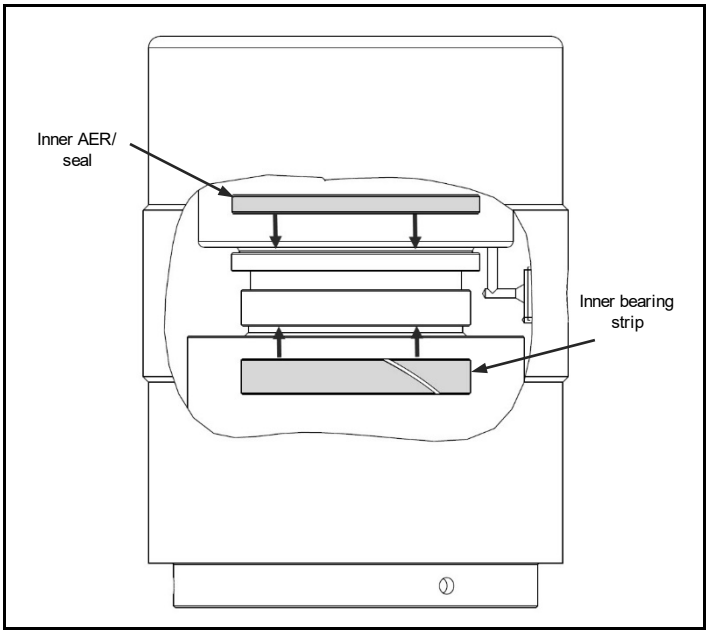


Fig. 4.6 Insert inner seal followed by the inner AER

7.3 Re-assembly of the Hydraulic Head

Having dismantled the hydraulic head assembly as above, proceed as follows to re-assemble the hydraulic head:

Ensure that all the exposed internal faces are in good condition and free from dirt and other foreign particles.

Apply a medium coat of suitable grease (as recommended in Section 10.0) to these surfaces. Pay particular attention to the internal mating / running surfaces between the piston and the tensioner body, and those between the tensioner body and spring collar.

Continue in reverse order of the dismantlement instructions bearing in mind the following additional notes:-

a) When sliding the piston assembly into the body, take care not to damage any of the internal surfaces. (Fig. 4.7)

b) Ensure that the disc spring stacking arrangement is maintained.

c) Position head assembly in the soft jaw vice as necessary during assembly.

⚠ CAUTION Under no circumstances should a damaged cap screw be re-used. If a tensioner is being re-furbished, **ALWAYS** check the cap screws for damage or fatigue and replace with new ones where required.

7.4 Bridge (without gearbox) Maintenance

After separating hydraulic head assembly and bridge assembly. Separate the bridge and socket, inspect for damage and clean down with light oil before storing. (Fig. 4.9)

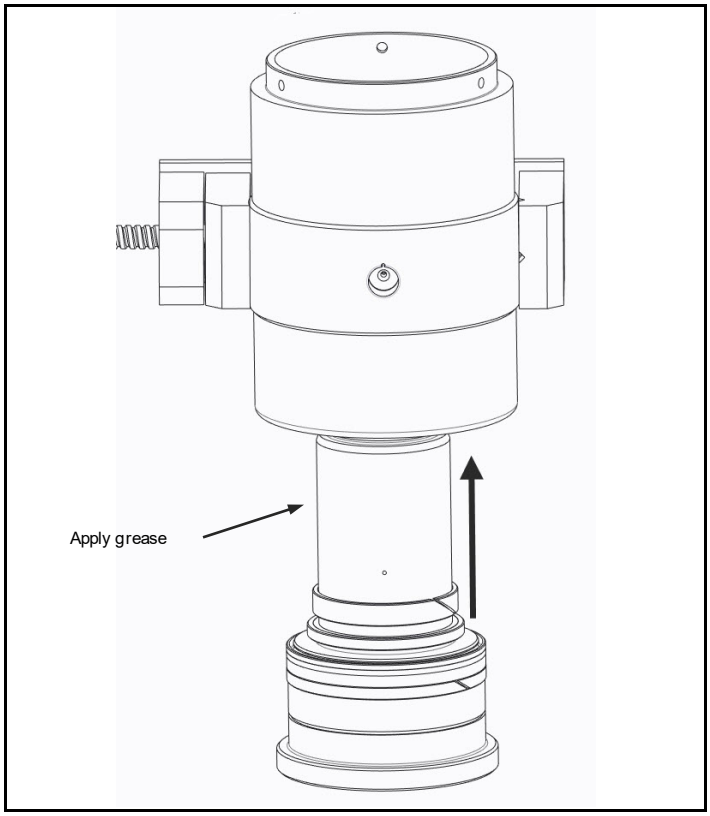


Fig. 4.7 Apply grease and install piston

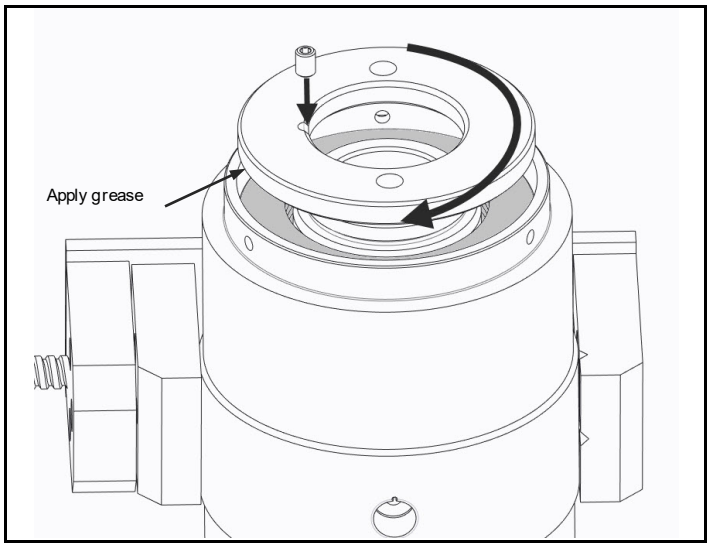


Fig. 4.8 Screw spring collar in place. Secure with set screw

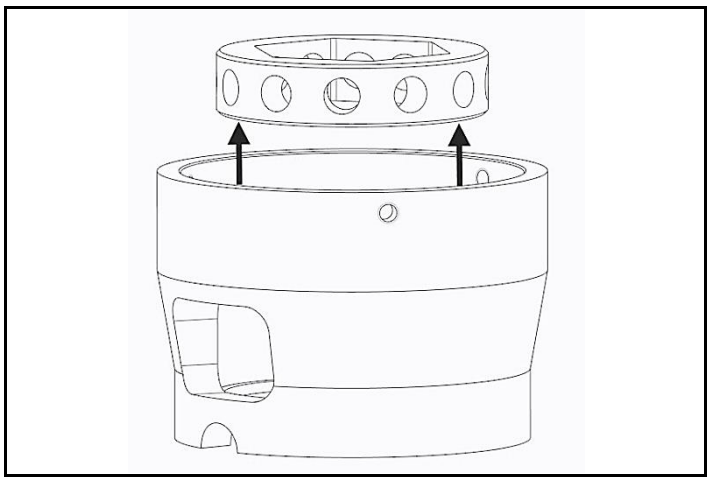


Fig. 4.9 Remove socket from bridge

7.5 Dismantlement of the Bridge Assembly and Gearbox

After separating hydraulic the head assembly and the bridge assembly, proceed as follows to dismantle the bridge assembly for cleaning. Refer also to the applicable General Arrangement Drawing as necessary.

Ensure that all the exposed internal faces are in good condition and free from dirt and other foreign particles.

Remove the two cap screws holding the gearbox to the bridge. The gearbox will come away from the bridge easily. (Fig. 4.10)

Remove the cover from the gearbox by bending it gently over the intermediate gear location pin and sliding it out of the retaining groove. (Fig. 4.11)

Remove the circlip from the top face of the drive gear and push the drive gear downwards to remove it. (Fig. 4.12)

With the drive gear removed, tip the gearbox housing onto its front face and gently tap it to allow the dowel pin to drop free. The intermediate gear location pin can now be removed by gently pushing it out of the housing. (Fig. 4.13)

NOTICE Ensure that the orientation of the intermediate gear is maintained. One of the faces will be recessed to allow correct engagement with the geared socket in the bridge.

The gearbox components can now be degreased as required. Use a suitable degreasing agent. Use a brush to help clean the gear forms. Allow the gearbox components to dry thoroughly.

Remove geared socket and compression springs (if originally fitted) from the bridge (Fig. 4.14)

Degrease all remaining components as described above and dry thoroughly.

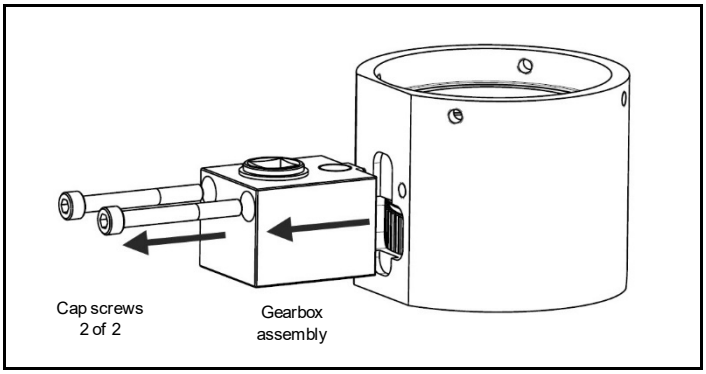


Fig. 4.10 Separation of bridge assembly and gearbox assembly

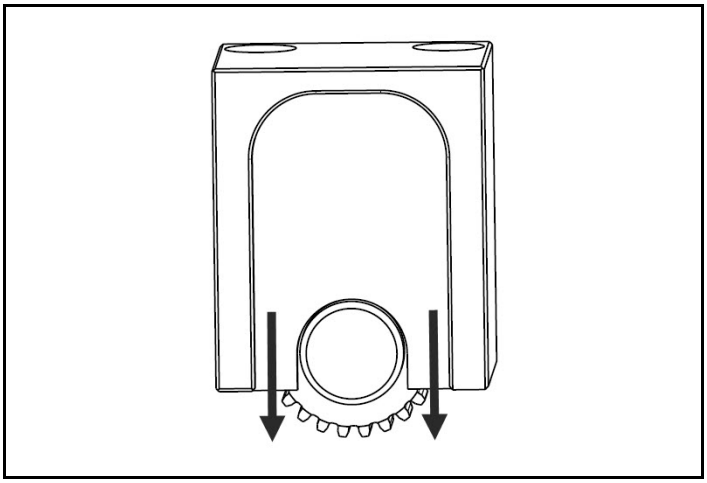


Fig. 4.11 Remove Gearbox Cover

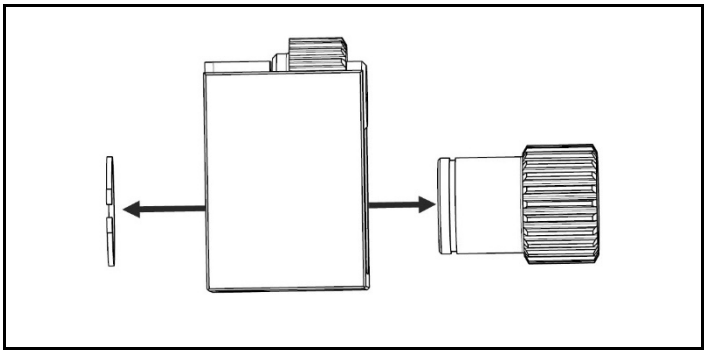


Fig. 4.12 Remove Drive Gear Circlip and Drive Gear

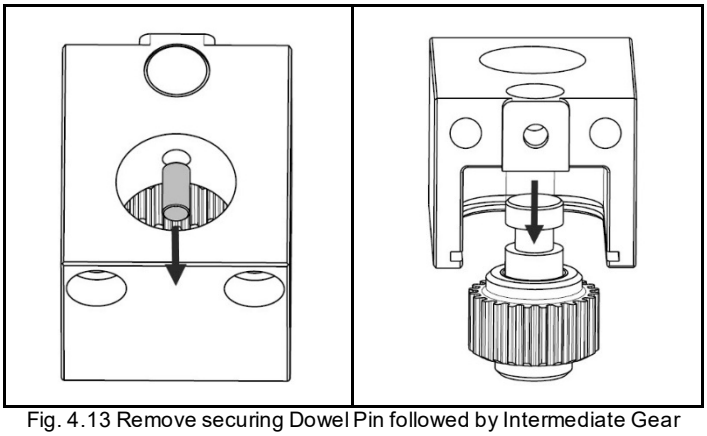


Fig. 4.13 Remove securing Dowel Pin followed by Intermediate Gear Assembly

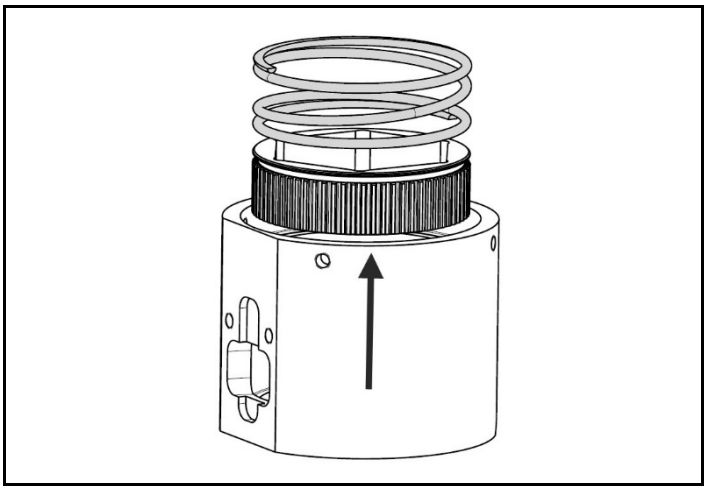


Fig. 4.14 Remove geared socket

7.6 Re-assembly of the Bridge Assembly and Gearbox

Proceed as follows to re-assemble the bridge:

Ensure all bridge assembly components have been cleaned and dried and are free from oil and grease. Prior to applying fresh grease, check that all components will fit and assemble together. (Fig. 4.15)

Lightly grease the internal faces of the gearbox housing with suitable grease (as recommended in Section 10.0). (Fig. 4.16)

Lightly grease the intermediate gear location pin shaft and assemble the intermediate gear over the gear location pin, remembering to maintain the correct orientation of the recessed face on the intermediate gear. (Fig. 4.17/ Fig. 4.18)

Push the gear location pin up into its bore in the housing until the top face of the location pin is aligned with the top face of the housing. Carefully insert the small dowel pin into position so that it sits in the internal hole between the two bores in the housing and locates in the radial groove in the end of the location pin. (Fig. 4.19)

Lightly grease the drive gear shaft and gear form and push the drive gear fully up into its bore within the shrouding of the gearbox housing so that the gear teeth mesh correctly. (Fig. 4.20)

Fit the external circlip into the groove on the drive gear shaft which should now be sitting proud of the upper face of the gearbox housing. (Fig. 4.21)

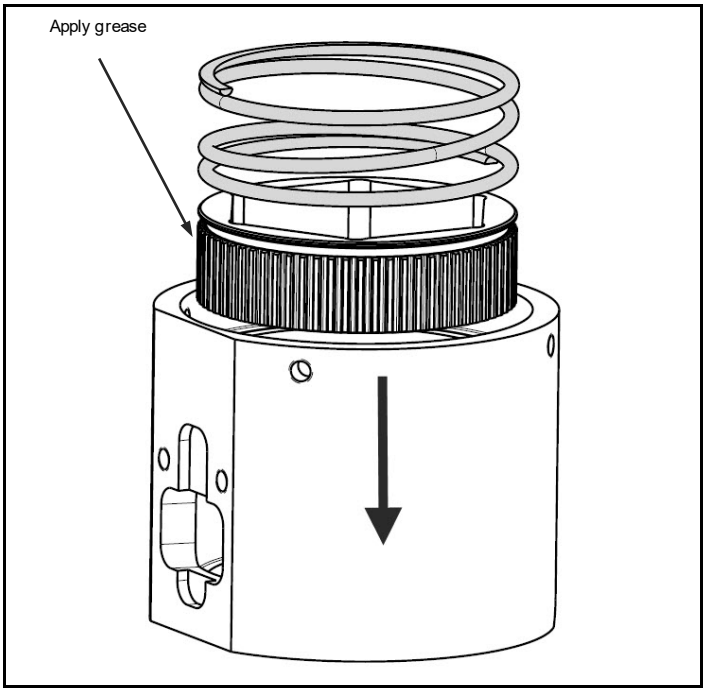


Fig. 4.15 Check bridge internal parts fit correctly, apply grease

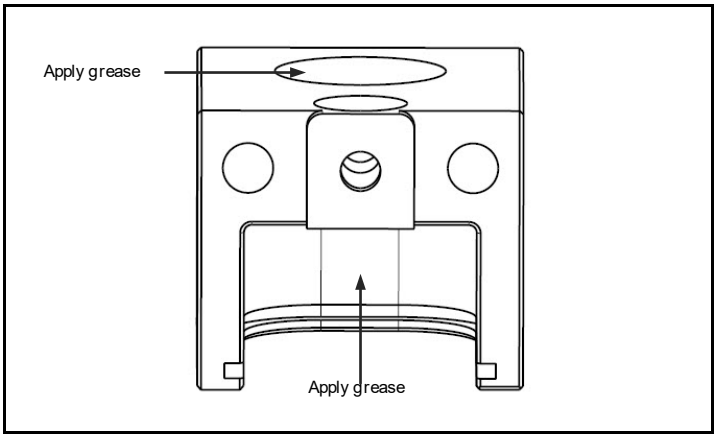


Fig. 4.16 Prepare Gearbox Housing

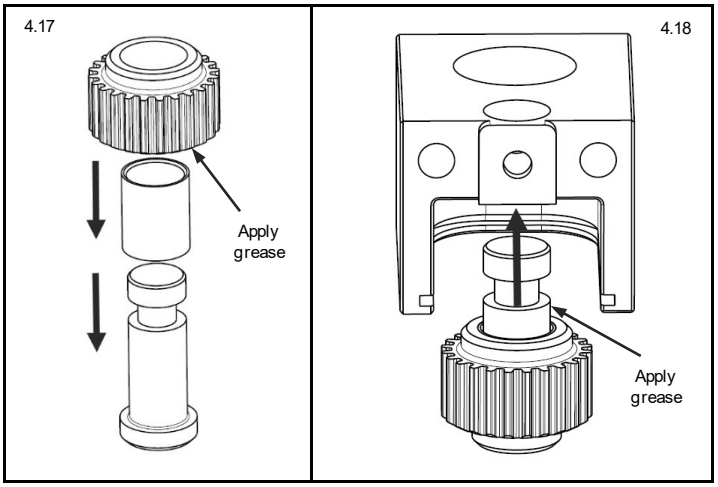


Fig. 4.17 Grease and assembly Intermediate Gear
Fig. 4.18 Insert Intermediate Gear

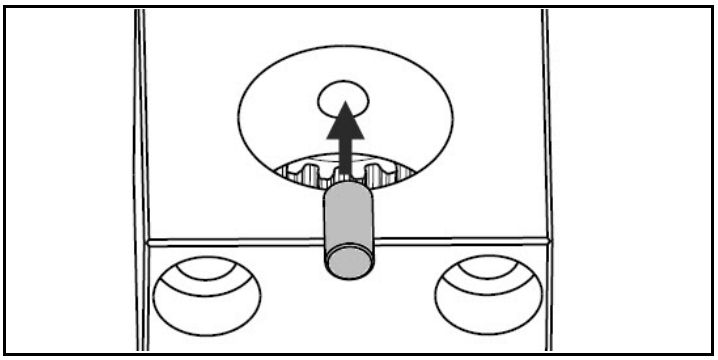


Fig. 4.19 Insert securing Dowel Pin

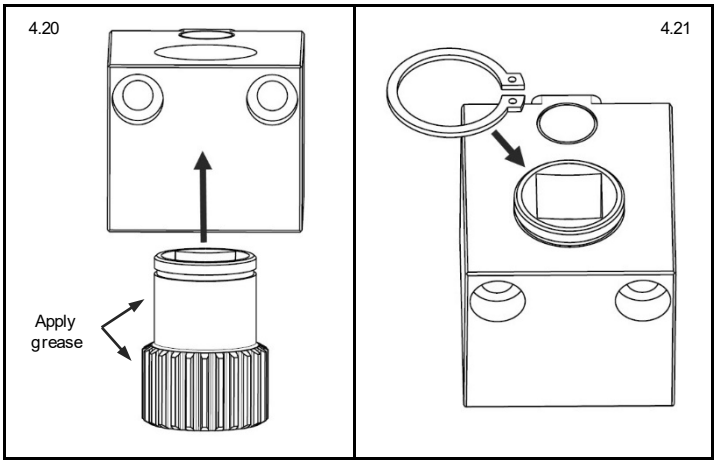


Fig. 4.20 Prepare and Install Drive Gear

Once both gears are fitted, apply a medium coat of grease to the intermediate gear form before sliding the gearbox cover into place. (Fig. 4.22)

NOTICE It will be necessary to bend the gearbox cover slightly in order to manoeuvre it into position over the end of the intermediate gear pin.

Clean off any excess grease from the external faces of the gearbox housing and cover and check that the two gears run freely together. (Fig. 4.23)

Assemble the gearbox to the bridge using the two socket head cap screws and tighten the screws to a torque value of 13Nm/ 9.5ft lb. (Fig. 4.24)

Lightly grease the outside of the geared socket and fit it into the bridge bore from the top end of the bridge. Refer also to the applicable General Arrangement Drawing for the correct orientation of the geared socket. Rotate the gearbox input drive to allow the socket to drop down into position, and ensure that the gearbox functions correctly. Fit compression springs (if part of model assembly) (Fig. 4.25)

Degrease all external faces, and then place the tensioner head assembly over the bridge assembly and screw in the socket head set screws into the top of the bridge to secure the complete assembly together. (Fig. 4.26)

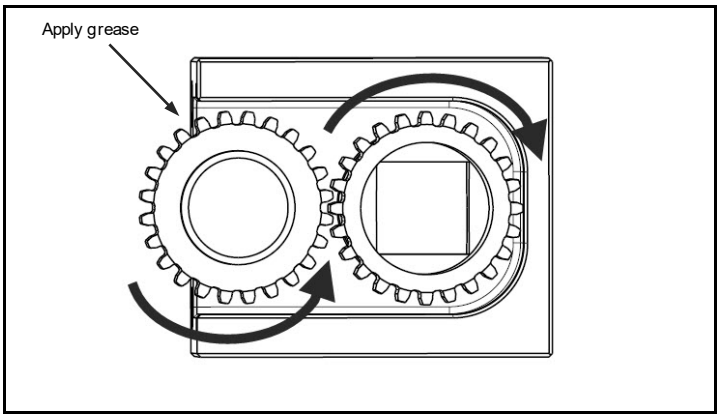


Fig. 4.22 Check fitted gears run smoothly, apply grease

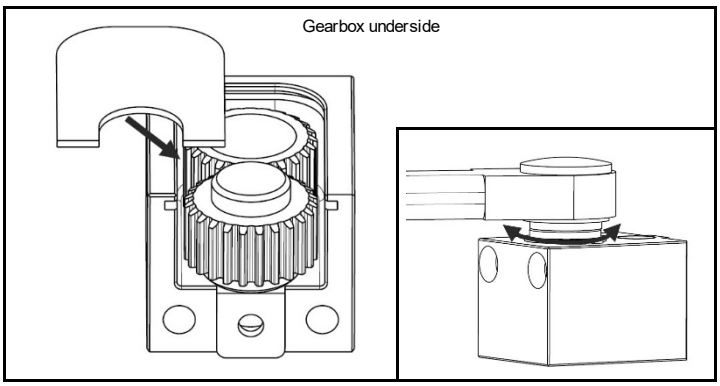


Fig. 4.23 Fit gearbox cover, check gears run smoothly

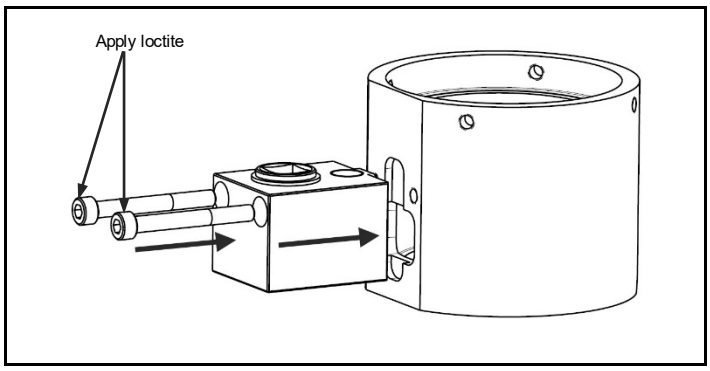


Fig. 4.24 Apply loctite to cap screws, secure assembled gearbox to bridge

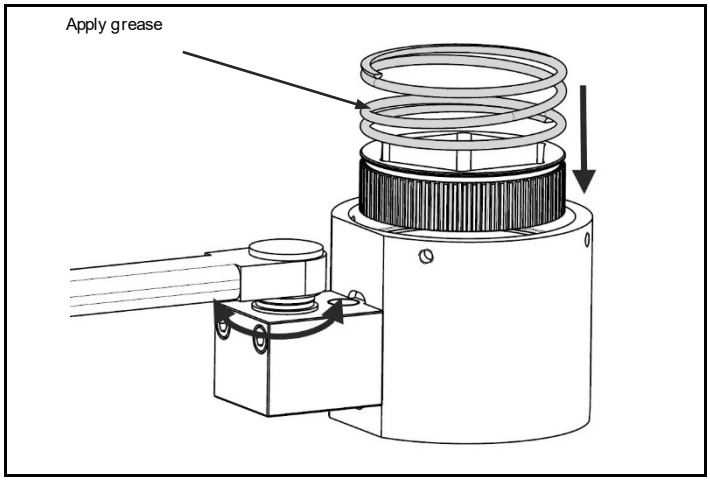


Fig. 4.25 Apply grease, insert geared socket followed by compression springs

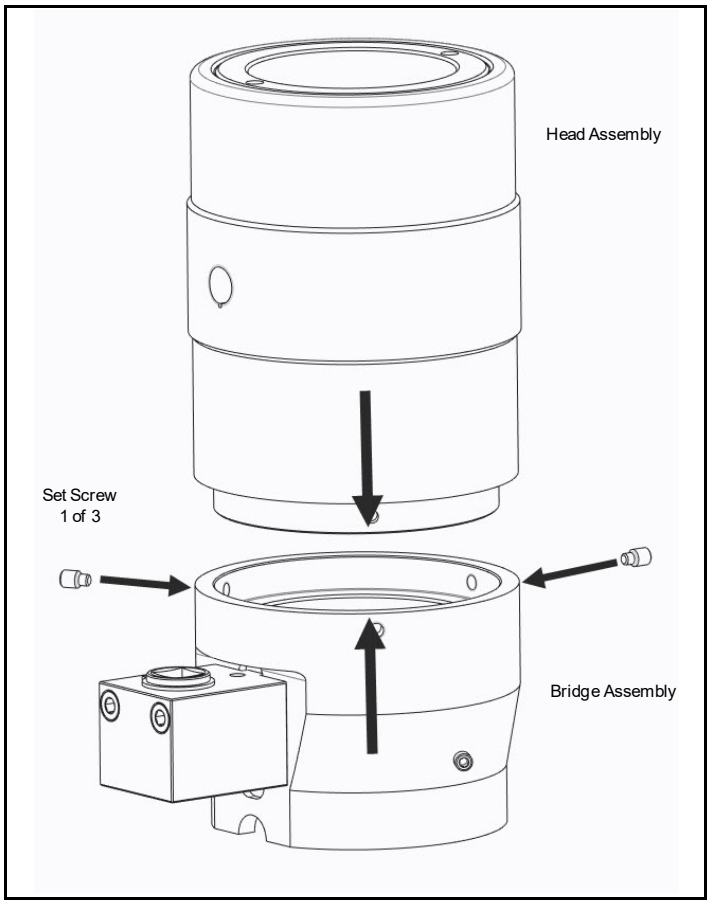


Fig. 4.26 Place head assembly onto bridge assembly, secure with set screws

7.7 Hydraulic Fittings

Hydraulic connections are of the following types:

Hydraulic head assembly – the connection in the tool is coned with 9/16"-UNF female thread. If there is a slight leak, it can usually be solved by applying the correct torque of 29.5-36.9ft lb or 40-50Nm.

Hose – the hose end connection is a 1/4" BSP. The assembly adaptors and fittings must be fastened to a torque value of 29.5-36.9ft lb or 40-50 Nm.

NOTICE In case of performance issues not resolved by previous measures, check threads and repair or replace as needed. In the event of any further problems please consult with an Enerpac Authorized Service Centre.

Hoses and Ancillaries Maintenance

Clean, then coat each quick disconnect coupling in a water repellent spray, WD40 or local equivalent is recommended, retracting and releasing the collars several times. Ensure that the collars do not seize in the retracted position. Visually inspect the entire length of the hose for damage. Test to maximum working pressure (ensure blanking plugs are inserted into end of the coupling).

8.0 STORAGE

Hydraulic Bolt Tensioners

Store tools fully retracted.

The finish will protect the tools from rust etc. but for added protection a light coating of oil or rust inhibitor should be applied to all plated surfaces.

Cover the internal threads on the inside of the piston and reaction nuts with a rust inhibitor.

Store tools upright.

Keep dust caps on the oil inlet nipples.

Hydraulic Hose(s)

Wipe all hoses clean and apply a light coating of oil or suitable rust inhibitor to all couplings and tee blocks.

Always keep dust caps fitted to couplings.

Pump Unit

Always store the pump upright.

Apply a light oil coating or suitable rust inhibitor to all exposed unplated metal items.

Leave the oil return to tank valve in the open position.

Always keep dust caps on inlet and outlet hydraulic fittings.

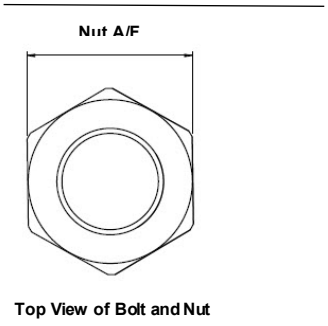
9.0 TROUBLESHOOTING

Troubleshooting Guide		
Symptom	Possible Cause	Solution
Oil is leaking from the hydraulic connection.	Connection is not seating properly.	Tighten the connection to 40-50Nm/ 29.5-36.9ft lb. Where applicable replace connection components.
Oil is leaking from the tensioner body.	Seal failure.	Replace seals.
When detensioning the bolt, the tool becomes locked onto the bolt (nut loose).	Insufficient allowance has been made for the bolt contraction.	Re-pressurise the tool to the pressure initially applied. Retighten the nut and refer to the detensioning procedure.
When detensioning the bolt the tool becomes locked onto the bolt (nut tight).	Too much allowance has been made for bolt contraction.	Re-pressurise the tool to the pressure initially applied. Rewind the nut down before turning it back one complete turn. On releasing pressure the tensioner will be free.
The nut on application is not turning when the system is under pressure.	The hydraulic hose is not connected properly to the tool.	Release the pressure and check the hose connection.
	The bolt thread may be damaged.	Release the pressure, remove the tool and rectify.
Tensioner head assembly will not retract.	Oil return to tank valve is not open.	Ensure that the oil return to tank valve is fully open.
	Coupling not assembled	Check couplings
Tensioners do not stroke (with no gauge pressure build up)	Open pump hydraulic oil return valve	Close valve
	Leaking/burst hose	Replace hose
	Leaking coupling/seals	Replace coupling/seals
	Leaking tensioner seals	Replace seals
	Defective pump unit	Check pump for oil delivery
Tensioners do not stroke (with gauge pressure build up)	Coupling not assembled	Check couplings
	Incorrect hose assembly	Check hose(s)
Hoses difficult to assemble	Damaged coupling	Replace coupling
	Coupling locking collars not fully screwed back	Screw back collars
	Internal pressure in head assembly due to over tightening piston	Unscrew piston
The hydraulic hose will not couple together with the tool at zero pressure.	Slight hydraulic pressure inside the hose caused by previously disconnecting the hose before the oil pressure had reached zero. Oil return to tank valve may be defective.	Release the pressure inside the hose by loosening the swivel end fitting.
Maximum pressure cannot be achieved, even when pump is running continuously	Leaking couplings	Replace suspect couplings
	Leaking tensioner seals	Replace suspect seals
	Hydraulic oil return valve	Fully close valve or replace
	Air in system	Run pump for short period with oil return valve open

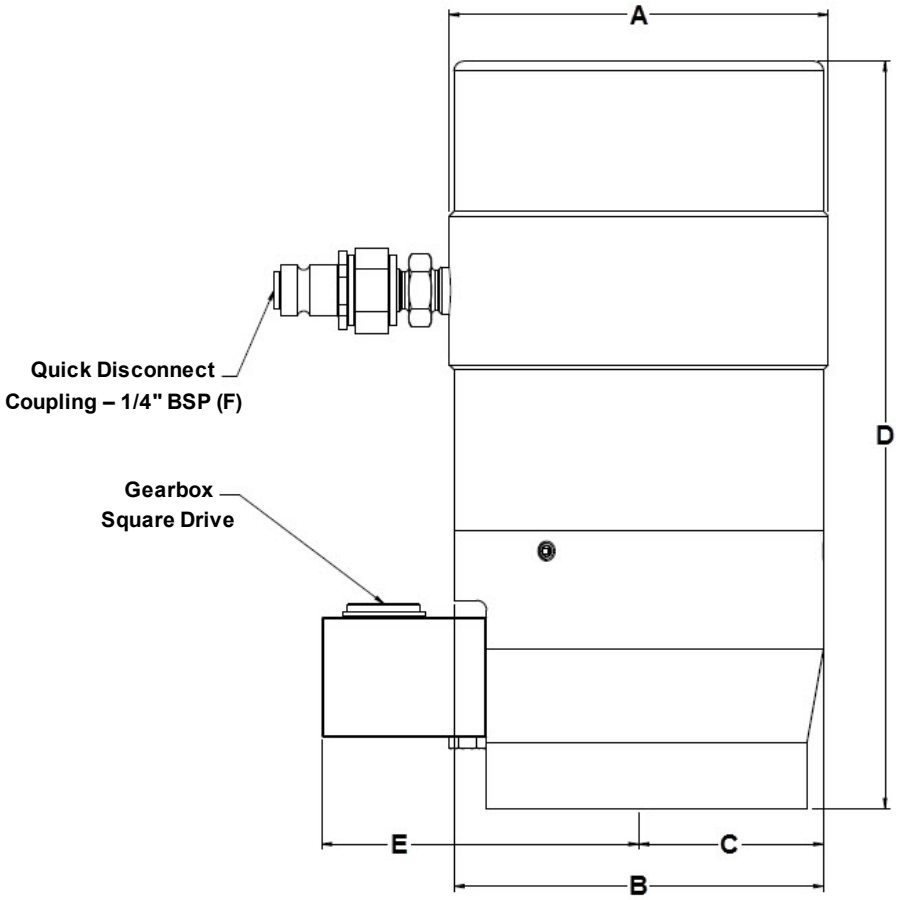
10.0 TECHNICAL SPECIFICATION

Recommended lubricant to be used:
Molybdenum disulphide based thread lubricant with a co-efficient of friction of 0.12 or similar

Gearbox Square Drive Size	
FTR751125SWG	1/2"/ 13mm
FTR1093610SWG	1/2"/ 13mm



Top View of Bolt and Nut



Side View

Table 1, Technical Data, FTR-Series Foundation Tensioners, Round

Model Number	Measurement	Bolt Diameter	Bar Size Designation	Nut A/F	Maximum Pressure		Hydraulic Pressure Area (sq)	Load Capacity	Stroke	Dimension					Weight	Minimum Bolt Protrusion	Maximum Bolt Protrusion
					psi	bar				A	B	C	D	E			
FTR751010S FTR751010SW	in	1.38	#10	2.00	17400	1200	4.86	84546 lbsf	0.39	3.90	3.48	1.74	6.42	n/a	12.9 lbs	7.87	n/a
	mm	35		50.8			3134	376.1 kN	10	99	88.5	44.3	163	n/a	5.83 kgs	200	n/a
FTR751025S FTR751025SW	In	1.38	#10	2.00	17400	1200	4.84	84249 lbsf	0.98	4.53	4.02	1.65	8.64	n/a	24.1 lbs	9.84	n/a
	mm	35		50.8			3123	374.8 kN	25	115	102	42	219.5	n/a	10.94 kgs	250	n/a
FTR751110S FTR751110SW	in	1.50	#11	2.25	21750	1500	4.86	105683 lbsf	0.39	3.90	3.86	1.50	7.01	n/a	12.1 lbs	8.66	n/a
	mm	38		57.2			3134	470.1 kN	10	99	98	38	178	n/a	5.49 kgs	220	n/a

S = Straight Nipple	SW = Swivel Nipple	G = Gear Box	C = Counter

Model Number	Measurement	Bolt Diameter	Bar Size Designation	Nut A/F	Maximum Pressure		Hydraulic Pressure Area (^{2})	Load Capacity	Stroke	Dimension					Weight	Minimum Bolt Protrusion	Maximum Bolt Protrusion
					psi	bar				A	B	C	D	E			
FTR751125SG FTR751125SWG	in	1.50	#11	2.25	21750	1500	4.84	105312 lbsf	0.98	4.53	4.02	2.01	8.92	3.79	25.3 lbs	10.24	n/a
	mm	38		57.2			3123	468.5 kN	25	115	102.0	51	226	96.2	11.48 kgs	260	n/a
FTR751420S FTR751420SW	in	1.88	#14	2.75	16965	1170	9.44	160262 lbsf	0.79	5.20	5.20	2.60	10.55	n/a	40.2 lbs	12.40	n/a
	mm	48		69.9			6093	712.9 kN	20	132	132	66	268	n/a	18.24 kgs	315	n/a
FTR15012510S FTR15012510SW	in	1.44	1.25	2.25	16965	1170	8.34	141587 lbsf	0.39	4.37	4.33	1.57	7.01	n/a	18.2 lbs	8.66	n/a
	mm	37		57.2			5383	629.8 kN	10	111	110	40	178	n/a	8.24 kgs	220	n/a
FTR15013810S FTR15013810SW	In	1.56	1.375	2.50	21750	1500	8.34	181522 lbsf	0.39	4.37	4.33	1.50	7.01	n/a	17.8 lbs	8.86	n/a
	mm	40		63.5			5383	807.5 kN	10	111	110	38	178	n/a	8.06 kgs	225	n/a
FTR15025025S FTR15025025SW	in	2.75	2.500	4.25	21750	1500	28.27	615010 lbsf	1.00	8.44	8.35	3.39	13.68	n/a	127.8 lbs	17.72	n/a
	mm	70		108.0			18238	2736 kN	25.4	214.5	212	86	347.4	n/a	57.97 kgs	450	n/a
FTR1093610SG FTR1093610SWG	in	1.42	36	2.36	21750	1500	5.92	128815 lbsf	0.39	4.02	3.90	1.57	6.93	3.75	19.0 lbs	7.68	n/a
	mm	36		60			3820	573.0 kN	10	102	99	40	176	95.2	8.63 kgs	195	n/a

S = Straight Nipple	SW = Swivel Nipple	G = Gear Box	C = Counter

Notes

Notes

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