



HEALTH & SAFETY, OPERATING AND MAINTENANCE INSTRUCTION MANUAL



M30 Multi-Stage Tensioner
TTM-M030-05-00
TTM-M030-21-00

BOLTIGHT®

HYDRAULIC BOLT TENSIONING

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SECTION 1

TECHNICAL INFORMATION

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M30 x 3.5 Multi-Stage Tensioner TTM-M030-05-00

General Description of the Boltight Tensioner

The purpose of this tool is the tightening of M30 x 3.5 diameter bolts, of minimum stud protrusion 62mm above the bridge footprint and maximum 72mm. When reading this description it is helpful to have Drawing Number TTM-M030-05-00 at hand.

The pressure equipment covered by this operating manual is a multi-stage hydraulic bolt tensioning tool. The tensioner comprises two axially-stacked interlocking load cells (each comprising a body, piston, inner/outer seal and reaction nut), a common central puller bar with ½" drive socket, a spring retraction mechanism and interconnecting bridge. The bridge incorporates a spring-loaded gear-driven nut rundown mechanism for convenience, also incorporating a ½" drive socket.

The load cells are pressurised via a radial manifold block, using a CEJN 116 high pressure nipple. Each load cell is fitted with hybrid composite plastic and rubber hydraulic seals. These components are rated for use up to 1350 bar and are therefore safe for use at (but not above) the maximum operating pressure. The user must ensure that the hoses and pumps utilised to pressurise the tool are suitable for compatibility with the bolt tensioners supplied, and also rated for safe usage at this pressure. Where in doubt the operator must contact Boltight for further information.

Within the tensioner, the upper and lower Hydraulic Load Cells are interlocked for simultaneous pressurisation and are supported by the Bridge. Both load cells engage a common puller bar, whose design has been configured in conjunction with the Bridge design to provide optimum engagement with the customer's application. On M30 applications for which this tool is designed, the permanent nuts are hex nuts. The gear driven socket within the bridge has been designed to interface snugly with the across flats dimensions of these hex nuts as supplied by the customer, and nut rundown following pressurisation is achieved by rotating the gear driven socket. This is performed via the ½" square drive socket located at the top of the gearbox. This gearbox and geared socket mechanism can also be utilised to unwind nuts during de-tensioning procedures.

The mass of the tensioner is approximately 5.7 kgs. Thusly, it is suitable for manual handling.

The M30 tensioner TTM-M030-05-00 has a maximum stroke of 7mm A visual indicator ring mounted near the top of the puller allows the operator to determine when this maximum stroke has been reached. Although the tensioner has been designed with a positive stop to prevent over-stroking, the tool should never be over-stroked beyond its maximum working pressure of 1350 bar. Whenever the visual indicator ring can be seen protruding through the top of the tool, the operator should immediately shut-off the pump and reset the tool to zero stroke before tensioning/de-tensioning is resumed (see Section 3 for full instructions).

The tool features a spring-actuated piston return facility. The spring retraction system comprises heavy duty springs, which are contained within the spring cap. The spring system should not require attention during the working life of the tool. When the pressure within the tool is returned to zero the spring force will retract the pistons fully back into the outer bodies. As mentioned above, care should be taken not to stroke the tool beyond its maximum stroke.

The tool also features a safe failure mechanism. In the event that the fatigue life of the tool expires, it has been engineered to fail safely and remain in-situ upon the bolt, posing no threat to adjacent personnel or equipment.

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The maximum tool pressure cycles is indicated with the tool technical data. A record of pressure cycles should be kept and the tool returned for puller replacement before reaching this limit.

The tensioner must not be modified by any type of machining and no attachment can be made to the tools by any form of welding or brazing.

The tensioner has been subjected to a one-off pressure test at 1350 bar prior to despatch, and a test certificate has been issued to certify this. Please note that this is not the maximum operating pressure and it is strongly advised that the tool is NEVER operated above its maximum operating pressure of 1350 bar. The tool does not require re-testing during its working life, even after fitting new sealing elements. If the user wishes to conduct a pressure test, the tensioner should returned to the manufacturer's works for recertification.

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Tool Specification

M30 x 3.5

Tool No	**TTM-M030-05-00 & TTM-M030-21-00**	
Thread Size	**M30 x 3.5**	
Tensioner Outer Diameter	**72 mm**	**(2.83 in)**
Bridge Outer Diameter	**83.5 mm**	**(3.29 in)**
Tensioner Height	**206 mm**	**(8.11 in)**
Hydraulic Pressure Area	**3422 mm^2**	**(5.30 in^2)**
Maximum Pressure	**1350 bar**	**(19580 psi)**
Maximum Load @ 1350 bar	**462.0 kN**	**(104 klbf)**
Maximum Stroke	**7 mm**	**(0.276 in)**
Tensioner Weight	**5.7 kg**	**(12.6 lb)**
Maximum Pressure Cycles	**10,000**	

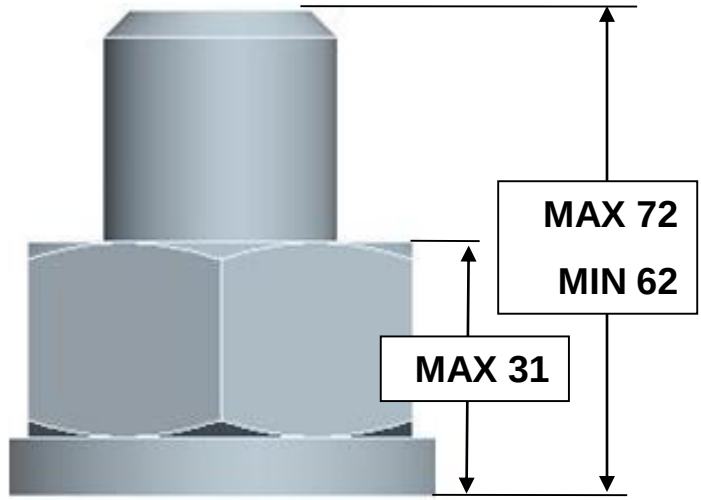


M30 x 3.5 Multi-Stage Tensioner

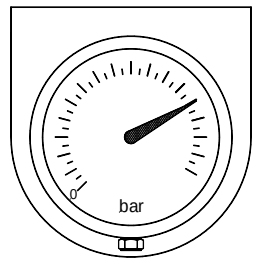
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IMPORTANT INFORMATION

1. ONLY EVER USE THE TOOL WHERE THE STUD PROTRUSION IS BETWEEN 62 AND 72mm, AND WHERE THE COMBINED NUT AND WASHER HEIGHT IS NO GREATER THAN 31mm.



2. NEVER PRESSURISE THE TOOL BEYOND ITS MAXIMUM WORKING PRESSURE OF 1350 bar (19580 psi).

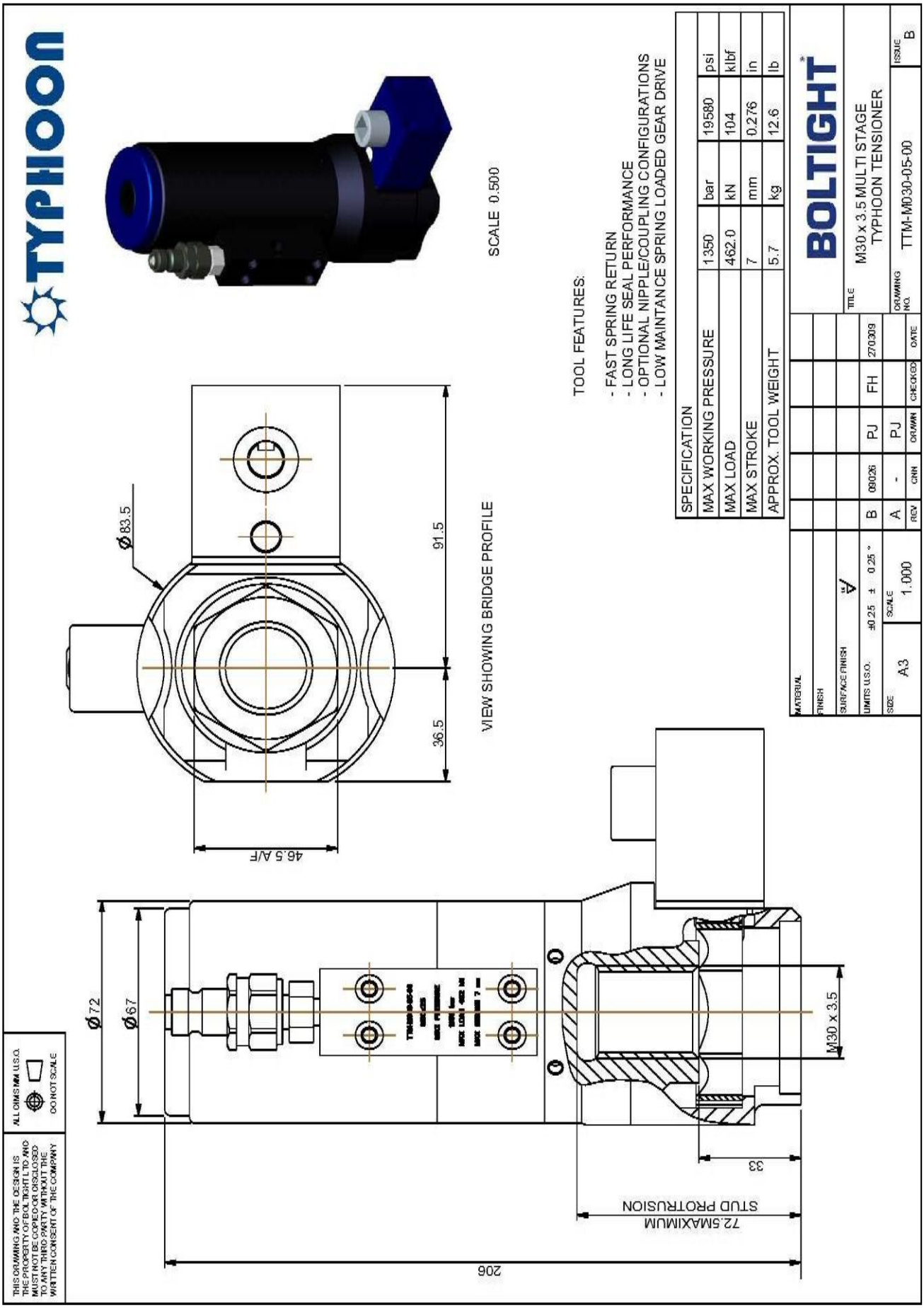


> 1350 bar



3. DO NOT EXCEED THE MAXIMUM STROKE OF 7mm. EVEN THOUGH THE TOOL FEATURES AN ANTI-OVERSTROKE FACILITY, THE OPERATOR SHOULD NEVER INTENTIONALLY OVERSTROKE THE TOOL.

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SECTION 2

HEALTH & SAFETY INSTRUCTIONS

Persons using hydraulic bolt tensioning tools must read and understand this section before starting to use the equipment. Your attention is particularly drawn to the instructions in RED on Page 2 and Page 5

Important Notice	Page 2
Using Bolt Tensioning Tools	Page 3

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HEALTH & SAFETY INSTRUCTIONS

IMPORTANT NOTICE

Thank you for purchasing or renting your hydraulic bolt tensioning equipment from **Boltight**. Bolt tensioning tools are very powerful and capable of inducing very high bolt stresses. This equipment has been designed to give many years of safe tightening of bolted connections when used in accordance with these instructions.

Persons using hydraulic bolt tensioning tools must be properly trained in the correct use of the equipment and must also take adequate steps to ensure their own safety, and the Health and Safety of others working in the area where bolt tensioning operations are being performed. **Boltight** will be pleased to quote for the provision of training courses either at their Houston base or on site anywhere in the world.

Operators must read all of this instruction and maintenance manual before attempting to use the equipment. Do not use the equipment if you are not already an experienced user of hydraulic bolt tensioning tools or if you have not already received proper training. Your attention is particularly drawn to the notes in **RED**.

When tightening/loosening bolts using tensioners, extremely high loads are induced. If the bolt material is incorrectly specified or the bolt has been subjected to any damage, it is possible that the bolt may shear. This could also occur if the tool is incorrectly installed (i.e. if there is insufficient thread engagement between the tensioner and the bolt). In these scenarios the tool could be launched at high speed along the axis of the bolt. This is an extremely rare occurrence provided that procedures are followed correctly, however in the event of failure anyone standing in line with the axis of the bolt during the tensioning operation will suffer critical injury or even be killed. It is therefore essential that anyone operating this equipment is properly trained in its safe use and takes every precaution to ensure that nobody is allowed to stand, work or stray near to or into line with the axis of any bolt tensioning tool during the bolt tensioning operation.

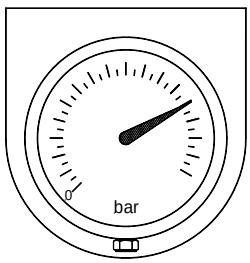
Bolt tensioning tools are powerful and when using high pressure hydraulics it is essential that you are trained in the correct use of the equipment and adhere fully with the Health and Safety Instructions.

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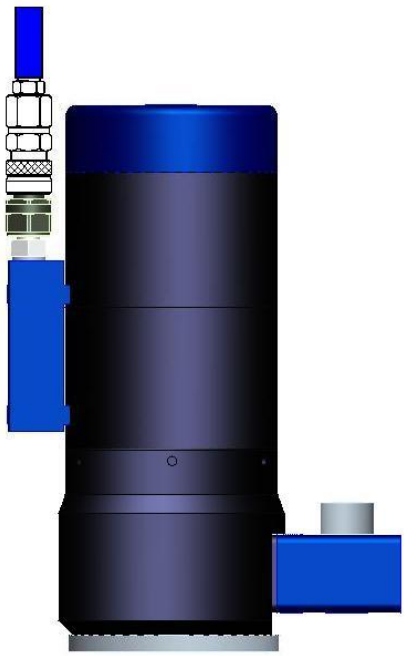
HEALTH & SAFETY INSTRUCTIONS

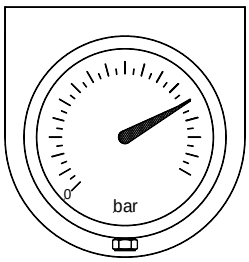
Bolt Tensioning Tools

DO NOT exceed 1350 bar Pressure

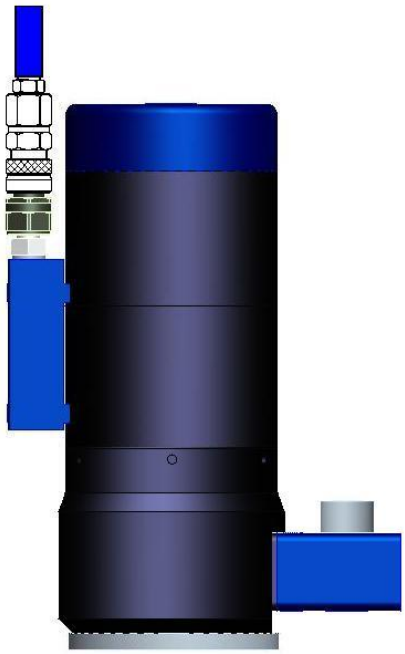


<= 1350 bar





> 1350 bar

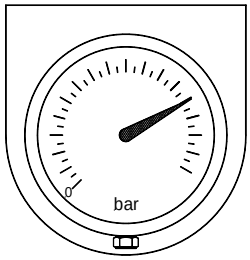


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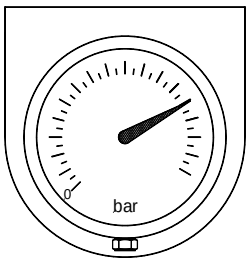
HEALTH & SAFETY INSTRUCTIONS

Bolt Tensioning Tools

DO NOT pressurise the bolt tensioning tool unless it is attached to a fully engaged bolt.









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HEALTH & SAFETY INSTRUCTIONS

Bolt Tensioning Tools



Bolt tensioning tools MUST always be used with a hydraulic pump which has a pressure limiting device. Always check that the pump stall pressure is set at or below the maximum working pressure for the tool being used.



Clear all personnel from the area where the bolt tensioning operation is to be performed. Position the pump a safe distance away from the bolt tensioning tools. Set up barriers and warning signs, or make other adequate arrangements to prevent unauthorised personnel from accidentally straying into the bolt tensioning area.



Ensure that nobody is allowed to stand near to a bolt tensioning tool during pressurisation. At no time should anyone allow any part of their body to be positioned over the bolt axis of a bolt tensioner whilst the pressure is rising or when it is pressurised.



Do not approach a bolt tensioning tool whilst it is being pressurised. Remember that a damaged bolt or tool is most likely to fail at this critical time. When the operating pressure has been reached, approach a pressurised bolt tensioning tool only for as long as is necessary to rotate the ring nut. Ensure that when rotating the nut you are well outside of the tensioners vertical axis.

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HEALTH & SAFETY INSTRUCTIONS

Bolt Tensioning Tools



Never leave a pressurised bolt tensioning tool unattended. Keep the bolt tensioning tools under pressure for the minimum time necessary to complete the bolt tightening operation.



Always ensure adequate PPE (Personal Protective Equipment) is worn by all personnel using bolt tensioning tools. SAFETY GLASSES and GLOVES are essential. OVERALLS and a HARD HAT are recommended.



The equipment supplied should only be used as intended (i.e. as a bolt tensioning tool). DO NOT use the tools as hydraulic jacks or for any other purpose.



Take care when handling the tools. Damage can occur through mishandling.



Do not pick up or carry bolt tensioning tools using flexible hydraulic hoses as a handle.



Do not try to tighten a leaking hydraulic connection when it is under pressure. First release the pressure, then repair the leak.



NEVER touch a hydraulic hose under pressure or allow it to rest across any part of the body. Do not pressurise a hydraulic hose if any person is or is likely to come into contact with it during pressurisation. If it requires moving or repositioning, ALWAYS release the pressure beforehand.

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SECTION 3

OPERATING INSTRUCTIONS

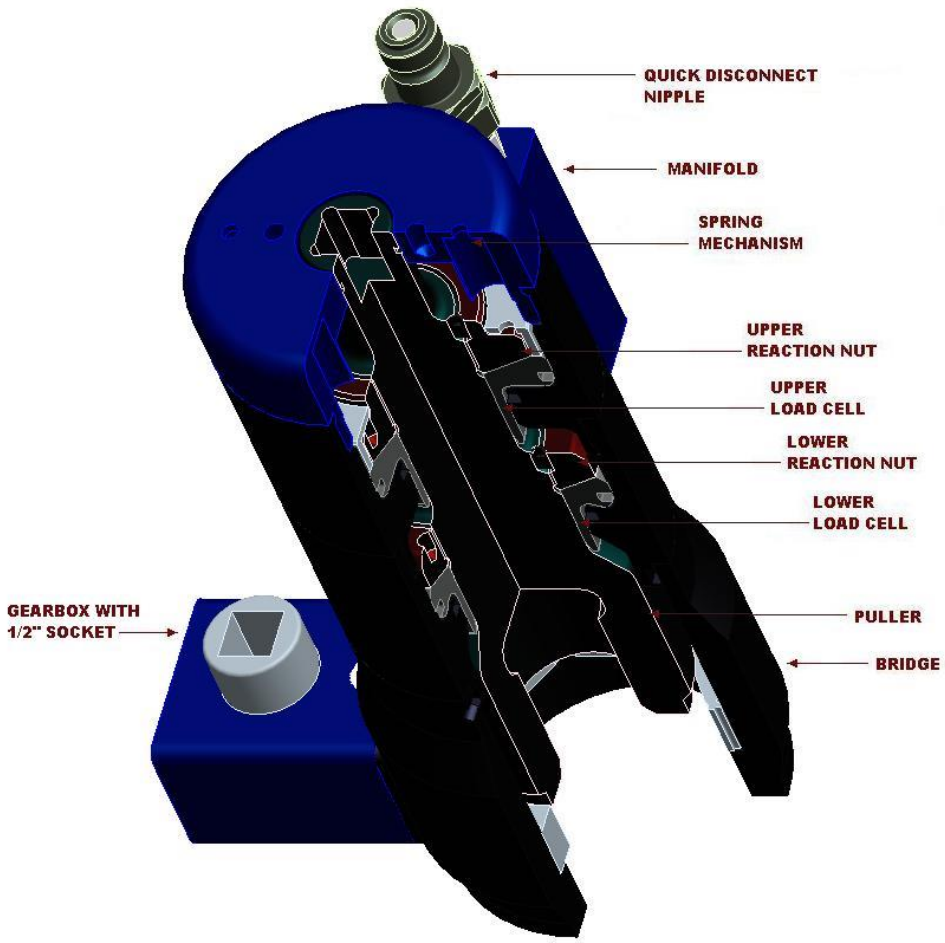
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Introduction

A hydraulic bolt tensioning tool provides a quick and easy method for tightening large diameter bolts to high and accurate pre-loads. Unlike conventional methods, it does not use torque and does not require any forceful turning of the nut or bolt (as is the case using impact wrenches, flogging spanners or hydraulic torque wrenches). All of these methods have one common drawback: FRICTION. Overcoming thread friction and friction between the nut and the washer uses up over 80% of the torque energy applied to the nut or bolt, leaving less than 20% of the energy to produce useful tension in the shank of the bolt. Variations in this friction loss from bolt to bolt causes non-uniform tension in bolts that have been tightened to the same torque or impact wrench setting.



A hydraulic bolt tensioner is an annular jack which fits over the bolt and nut to be tightened. The jack pushes against the bolted joint and pulls on the end of the bolt, which typically needs to be at least one diameter longer to accommodate the bolt tensioning tool (although this varies according to the load and bolt material specified). Because the tensioner force produced is applied directly to the end of the bolt, a tension equal to the load generated by the tensioner is developed in the shank of the bolt. With the tool applying this tension, it is possible to turn the nut with zero torque until it is tight. The load applied by the tensioner is then relaxed and a known percentage (depending on the length of the bolt and its diameter) is retained within the bolt. This proportion of load retained is usually very high; thusly tensioning method offers significantly better efficiency as well as accuracy compared to other bolt tightening methods.

Bolt tensioning tools can be grouped to enable multiple bolts to be tightened simultaneously, to the same high and accurate pre-load. This is particularly useful when compressing gaskets in pipeline or pressure vessel flanged connections. The high load developed by the multiple bolt tensioning tools is evenly distributed around the joint causing the gasket to flow into the surface irregularities of the flange, resulting in a much better seal.

Flexible hoses with self sealing quick disconnect couplings are used to connect the bolt tensioning tools together to form a hydraulic ring main. The ring main and tensioning tools are usually pressurised using an air driven pump working from a compressed air supply, although hand pumps are also permissible.

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OPERATING INSTRUCTIONS

Description of Tensioning Tool TTM-M030-05-00

The Boltight Multi-stage Tensioner TTM-M030-05-00 has been designed specifically for use with M30 x 3.5 bolts, in conjunction with hex nuts of dimensions specified by the customer. The Multi-Stage Range has been engineered to provide maximum load capacity under minimal radial envelope conditions.

A multi-stage bolt tensioning tool comprises two axially-stacked interlocking load cells (each comprising a body, piston, inner/outer seal and reaction nut), a common central puller bar with ½" drive socket, a spring retraction mechanism and interconnecting bridge. The bridge incorporates a gear-driven nut rundown mechanism for convenience, also incorporating a ½" drive socket. The tensioner incorporates a mechanical anti-overstroke protection facility, and also features a maximum stroke indicator. The load cells are pressurised simultaneously via a radially mounted manifold block of vertical CEJN 116 nipple configuration.

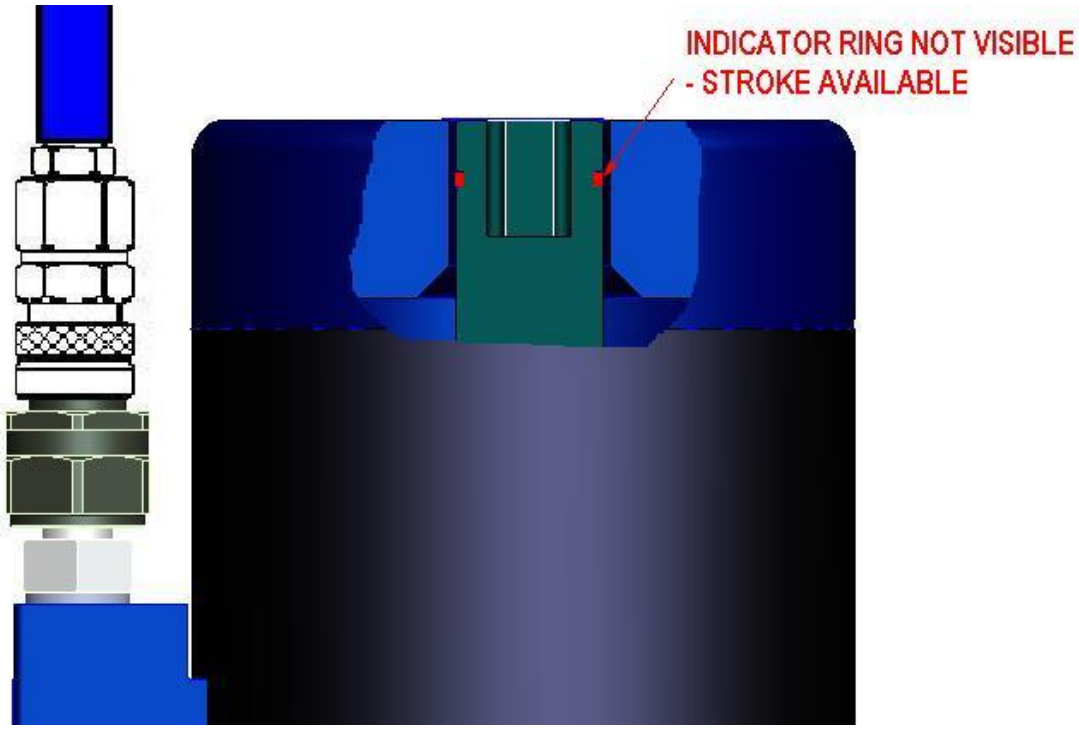
The tool has a maximum operating pressure of 1350 bar (19580 psi), at which it develops a maximum tensioning force of 462 kN (104klbf). The maximum stroke for this tensioner is 7mm (0.276in).

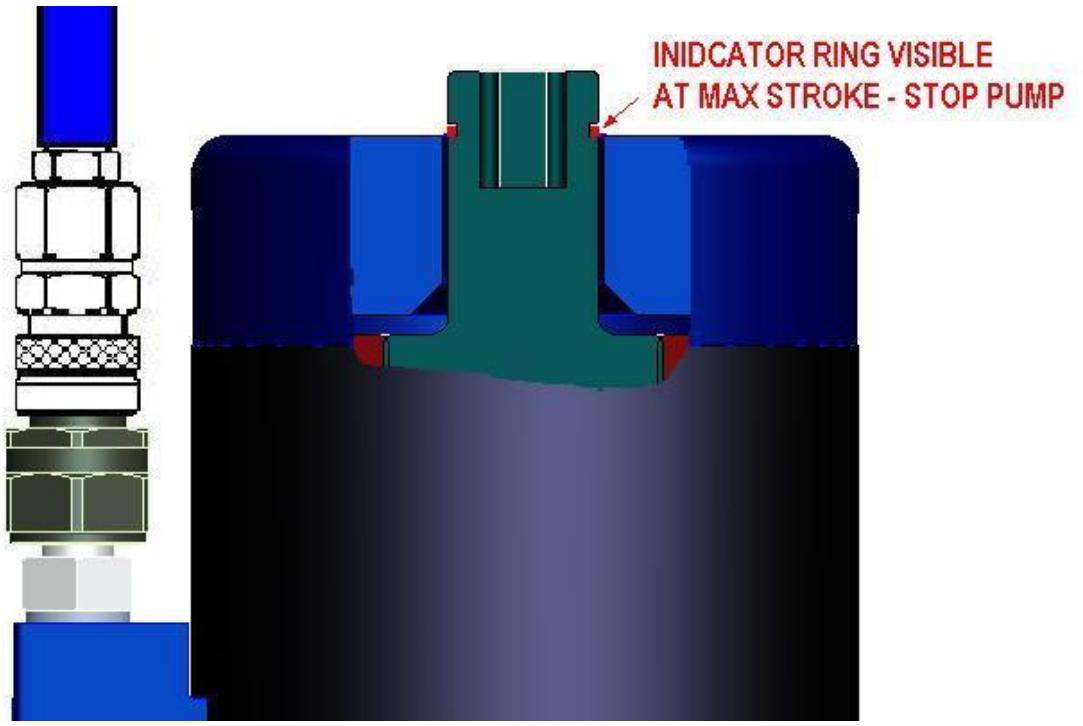
Stroke Indicator

The diagram (page 5) shows a section through the stroke indicator. The operator is alerted that maximum stroke has been achieved by the indicator ring which is mounted in the shaft of the puller

When the tool reaches maximum stroke; i.e. when this indicator is visible to the operator, the operator should stop the pump and tighten the nut. No further benefit is gained by increasing the pressure at maximum stoke as the bolt cannot be stretched any further.

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OPERATING INSTRUCTIONS

HOW TO TIGHTEN A BOLT

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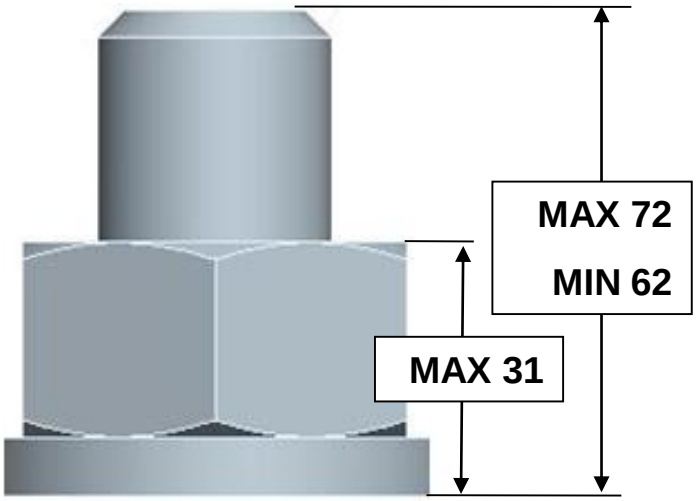
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STEP 1 TIGHTENING A BOLT

Before commencing the bolt tensioning operation read and comply with all of the Health & Safety Instructions in Section 2. Operators should also be familiar with the 'Important Information' literature in Sections 1 and 5.

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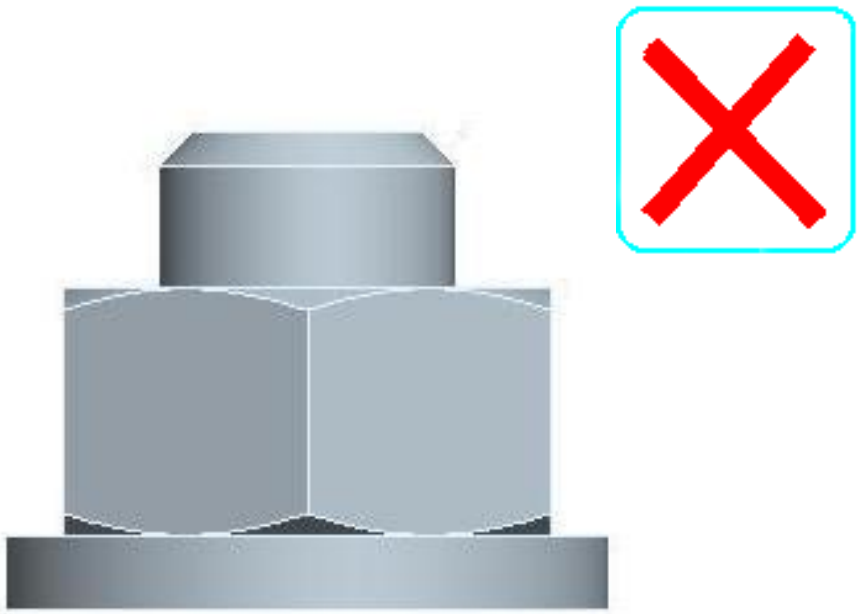
STEP 2 TIGHTENING A BOLT





Ensure that there is a minimum of 62 mm protruding bolt for the Tensioner to engage with.

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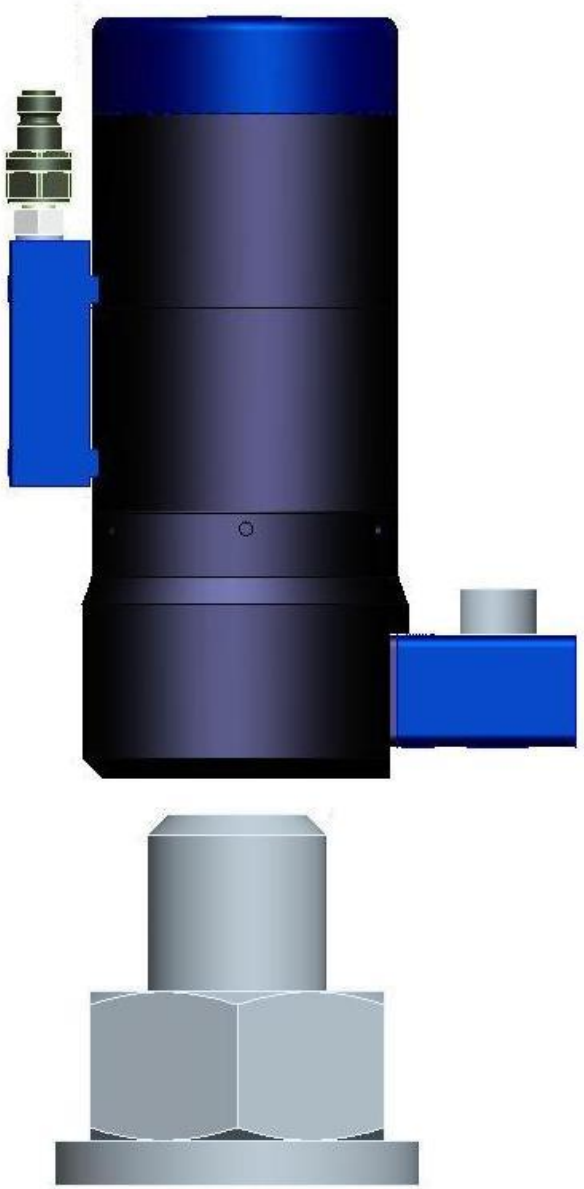


Either the stud protrusion is too short or the nut is too high up the bolt. Engagement with the Tensioner is insufficient – the bolt threads may strip and cause injury.

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STEP 3 TIGHTENING A BOLT

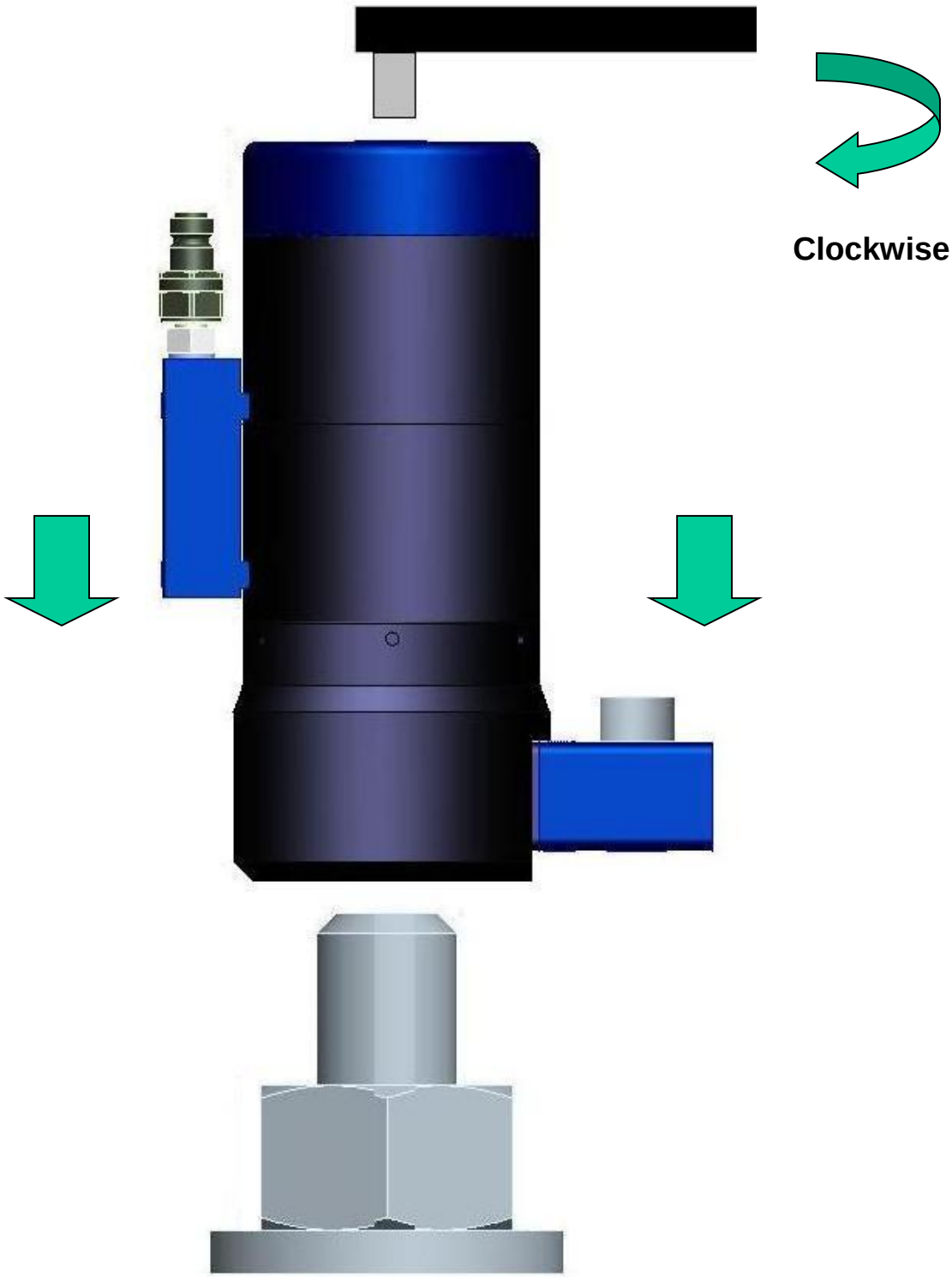
Position the Tensioner over the bolt to be tightened. Orient the tensioner so that manifold is accessible, and such that the bridge window allows tommy bar access to the nut.



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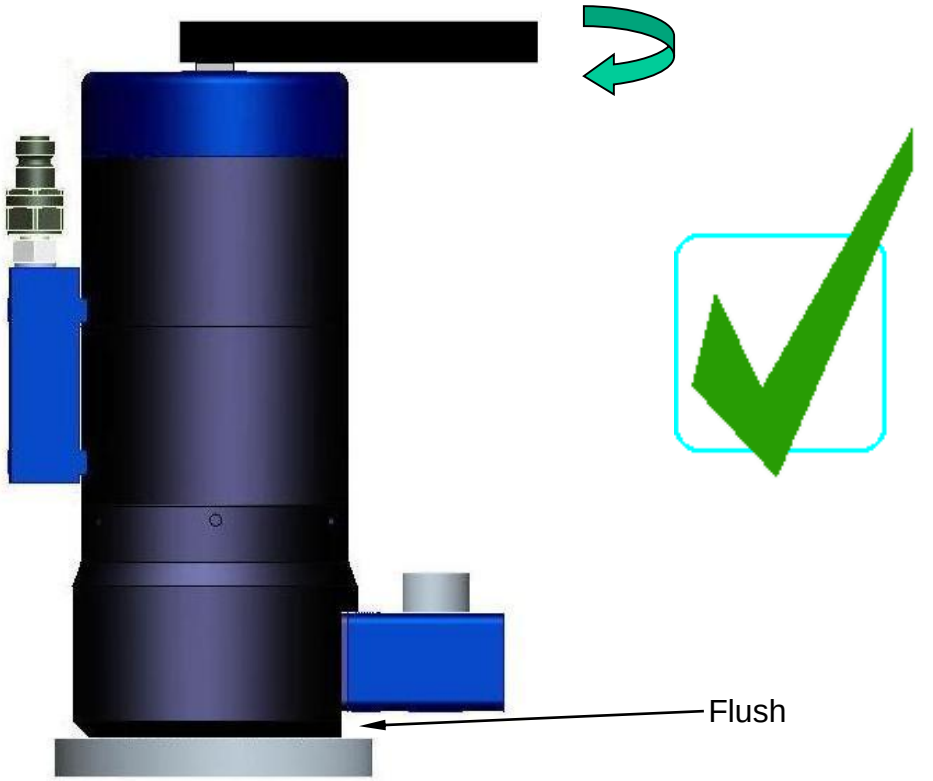
STEP 4 TIGHTENING A BOLT

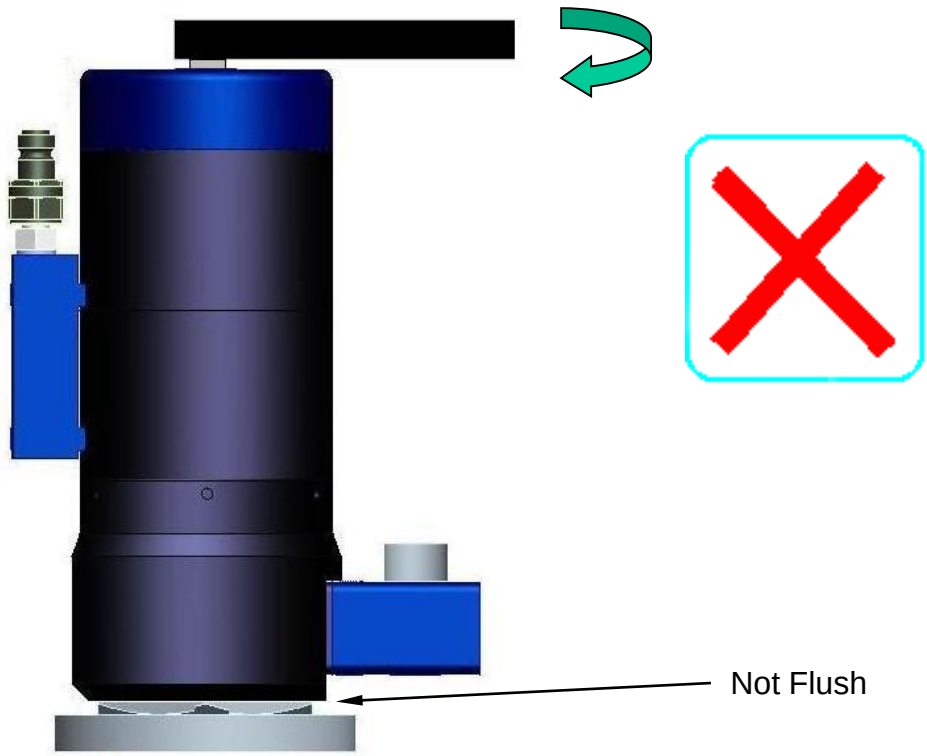
Engage the Puller with the bolt. A 1/2in Square Socket is provided in the top of the Puller Bar so that the Tensioner orientation can be maintained whilst the Puller engages the bolt.



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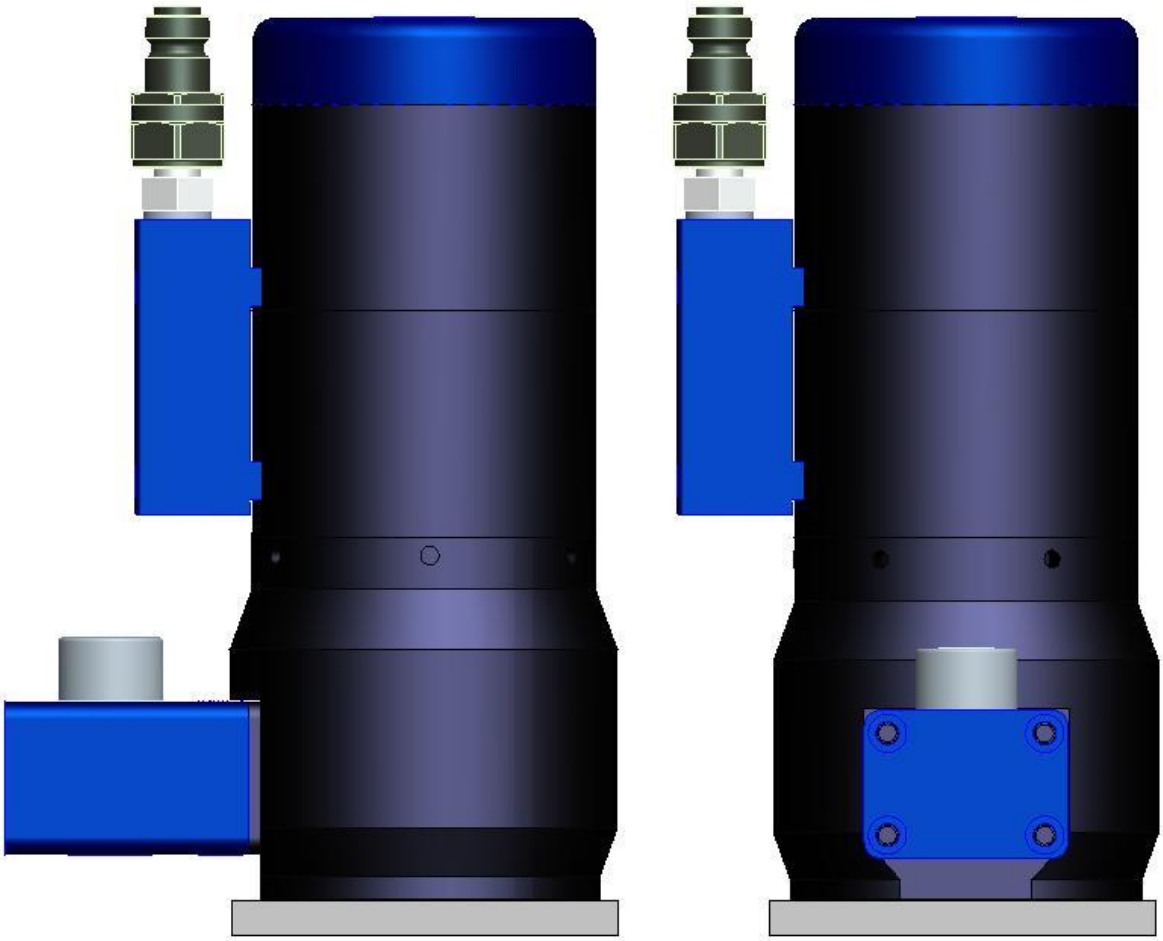
Continue rotating the Puller, increasing its engagement with the bolt until the bridge is flush with the washer. To ensure the tool is fully flush, it may be necessary to rotate the gearbox slightly whilst lowering to fully engage the gear driven socket with the nut.





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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.



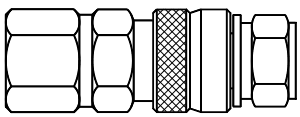
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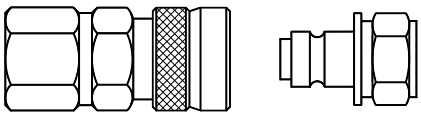
Using Quick Connect Couplings

YOU MUST ENSURE YOUR COUPLINGS ARE COMPATIBLE WITH THE CEJN 116 NIPPLE FEATURED ON THIS TENSIONER!

DO NOT pressurise the connectors when they are disconnected

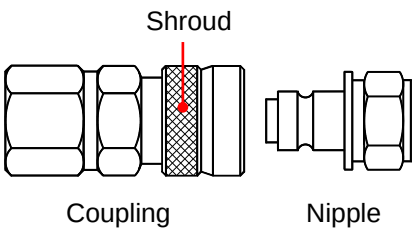
Check there is no pressure in the system before attempting to connect or disconnect the couplings.



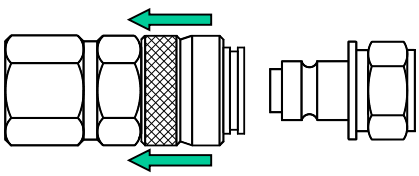


To connect the Quick Connect Coupling and Nipple, first check there is no pressure in the system. Then pull back the shroud by hand and push the coupling onto the nipple. When together, release the shroud which will spring back to lock the Coupling and Nipple together. To disconnect, first check there is no pressure in the system. Pull back the shroud, by hand, and pull the coupling and nipple apart. Release the shroud when apart.



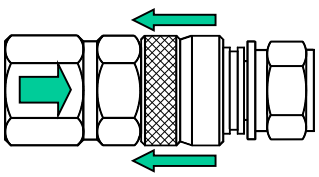
Pull the shroud back to retract





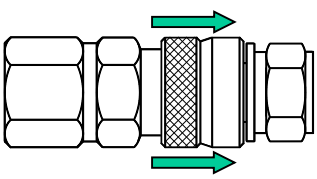
Coupling and Nipple with the shroud retracted





Coupling and nipple pushed together with the shroud still retracted



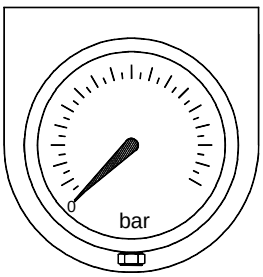


Shroud released - Coupling and Nipple are now locked together and safe to use.



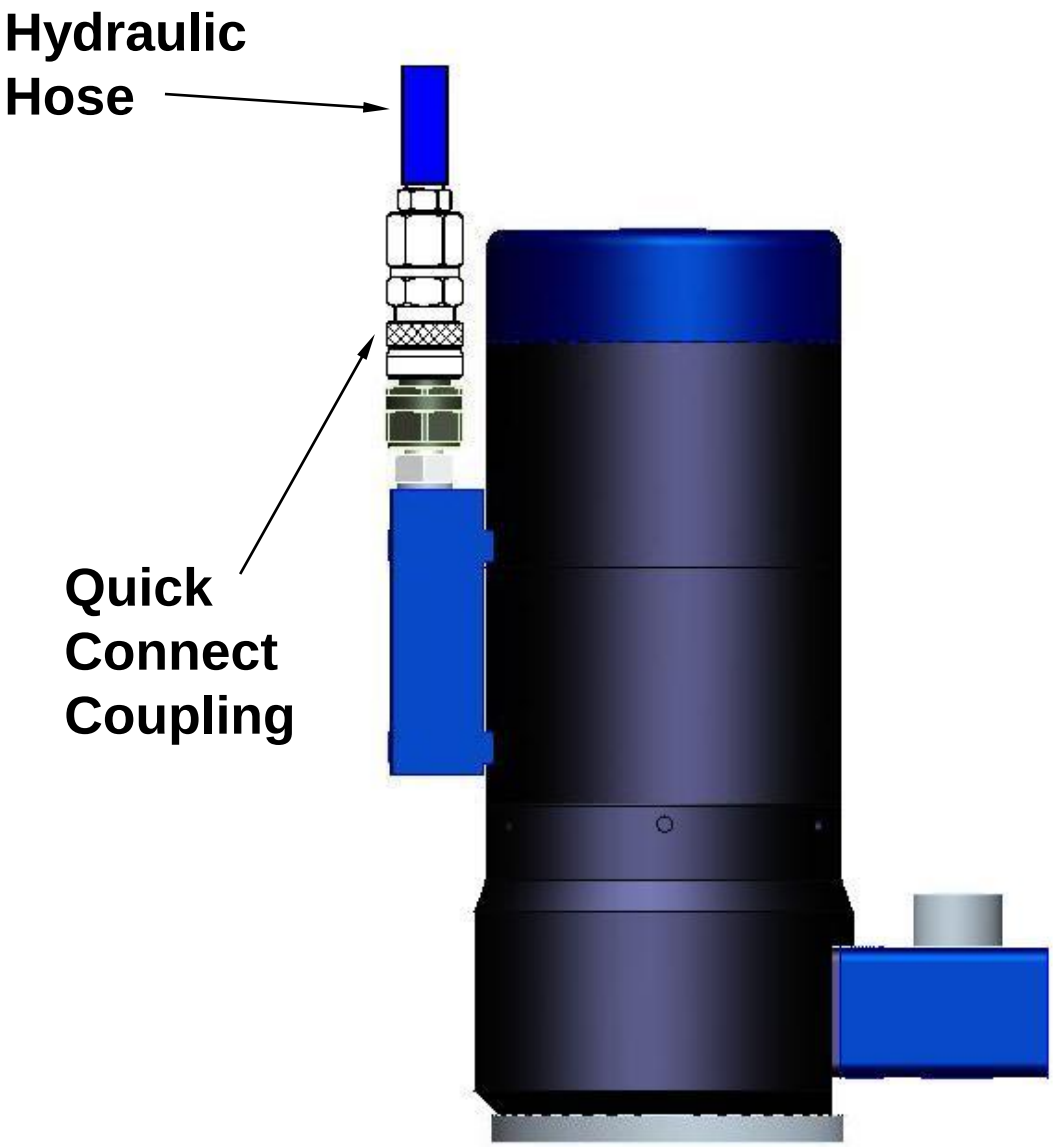
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STEP 5 TIGHTENING A BOLT



Connect a SUITABLE high pressure hydraulic hose.

Make sure the quick connect coupling is fully engaged.



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THINK SAFETY

MOST IMPORTANT - HEALTH & SAFETY

The Tensioner is now ready to be pressurised. Before proceeding, operators must familiarise themselves with the Health & Safety Instructions given in this manual, and proceed as follows:-

Clear all personnel from the area where the bolt tensioning operation is to be performed. Position the pump a safe distance away from the bolt tensioners. Set up barriers and warning signs, or make other adequate arrangements to prevent unauthorised personnel from accidentally straying into the bolt tensioning area.

Ensure that nobody is allowed to stand near to a bolt tensioning tool during pressurisation. At no time should anyone allow any part of their body to be positioned over the bolt axis of a bolt tensioner whilst the pressure is rising or when it is pressurised. Do not allow anyone to stand anywhere in or near the axis of a bolt during the tensioning operation.

Do not approach a bolt tensioning tool whilst it is being pressurised. Remember that a damaged bolt or tool is most likely to fail at this critical time. When the operating pressure has been reached, approach a pressurised bolt tensioning tool only for as long as is necessary to rotate the ring nut. Ensure that when rotating the nut you are well outside of the tensioner's vertical axis.

PPE (Personal Protective Equipment) must be worn by all personnel using bolt tensioning tools. SAFETY GLASSES and GLOVES are essential. OVERALLS and a HARD HAT are recommended.

Never leave a pressurised bolt tensioning tool unattended.

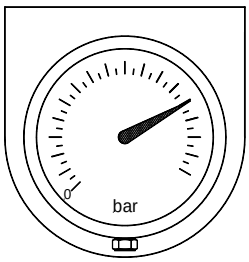
Release the oil pressure immediately if any unauthorised person moves into the bolt tensioning area and especially if anyone stands in the axis of a bolt being tensioned.

Determine the correct working pressure for the bolts to be tightened.

Proceed with the following operations keeping the bolt tensioning tools under pressure for the minimum time necessary to complete the bolt tightening operation.

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STEP 6 TIGHTENING A BOLT



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.

DO NOT exceed the maximum stroke of 7mm . This is indicated by stroke indicators around the top of the Puller.

DO NOT exceed 1350 bar pressure.



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If the stroke indicators show the tensioner has reached maximum stroke before the correct hydraulic pressure has been achieved, proceed as follows :-

Go to Step 7 - Tighten the Nut

Go to Step 8 - Release the Pressure

Go to Step 9 - Retracting the Tensioner

Go to Step 10 - Reengage the tool

Go to Step 6 - Apply the correct Pressure

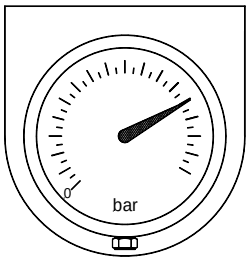
If necessary repeat this sequence until the bolt tensioning tool reaches the correct oil pressure without reaching the maximum piston stroke.



Do not continue increasing the oil pressure when the bolt tensioning tool has reached maximum stroke. Increasing the pressure achieves no increase in bolt tension because no further elongation can be achieved.

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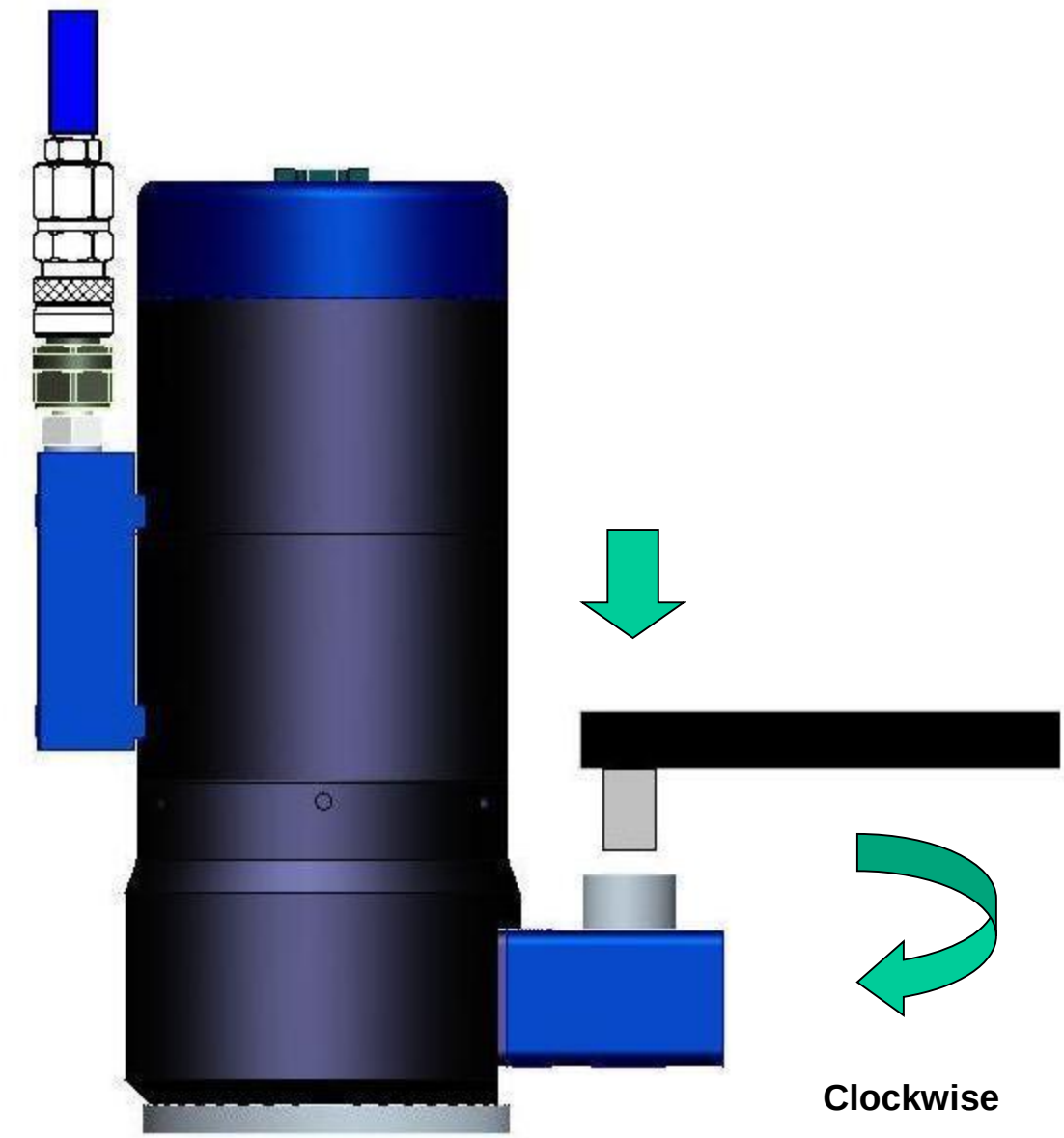
STEP 7 TIGHTENING A BOLT



Use a ½” Drive

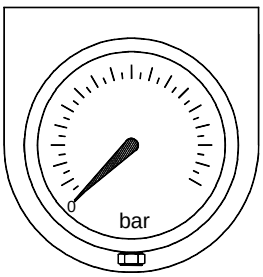
Insert the Drive into Drive Socket on the top of the Gearbox.

Rotate the Socket until the Nut is tight.

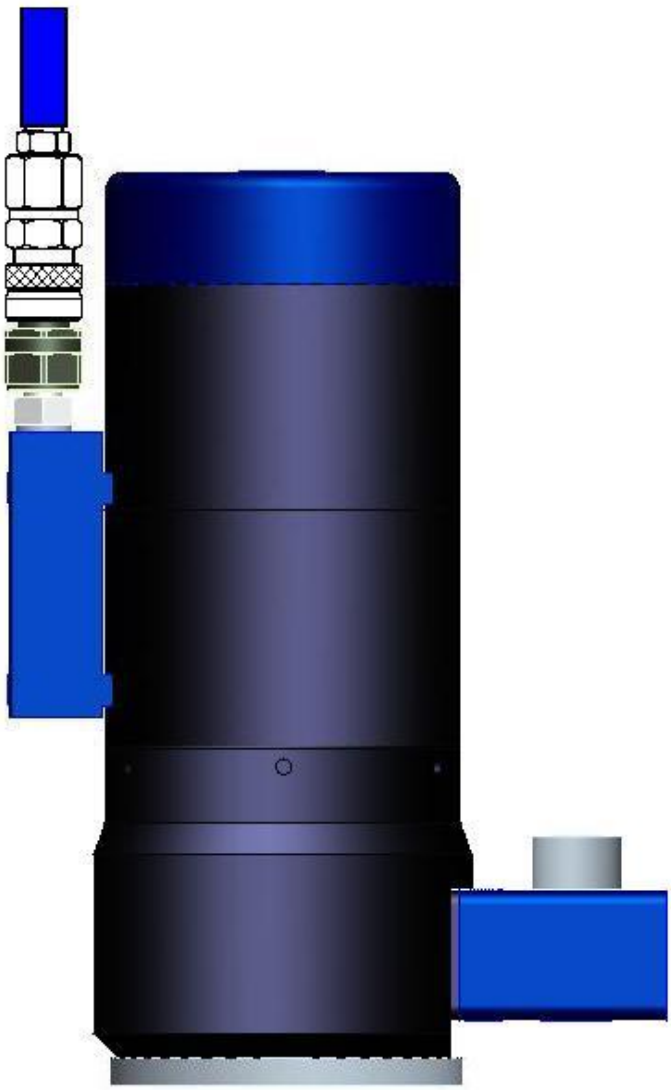


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STEP 8 TIGHTENING A BOLT

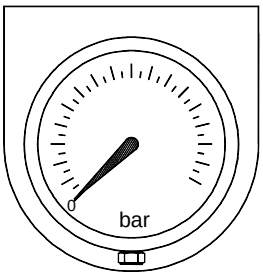


Slowly release the hydraulic pressure.



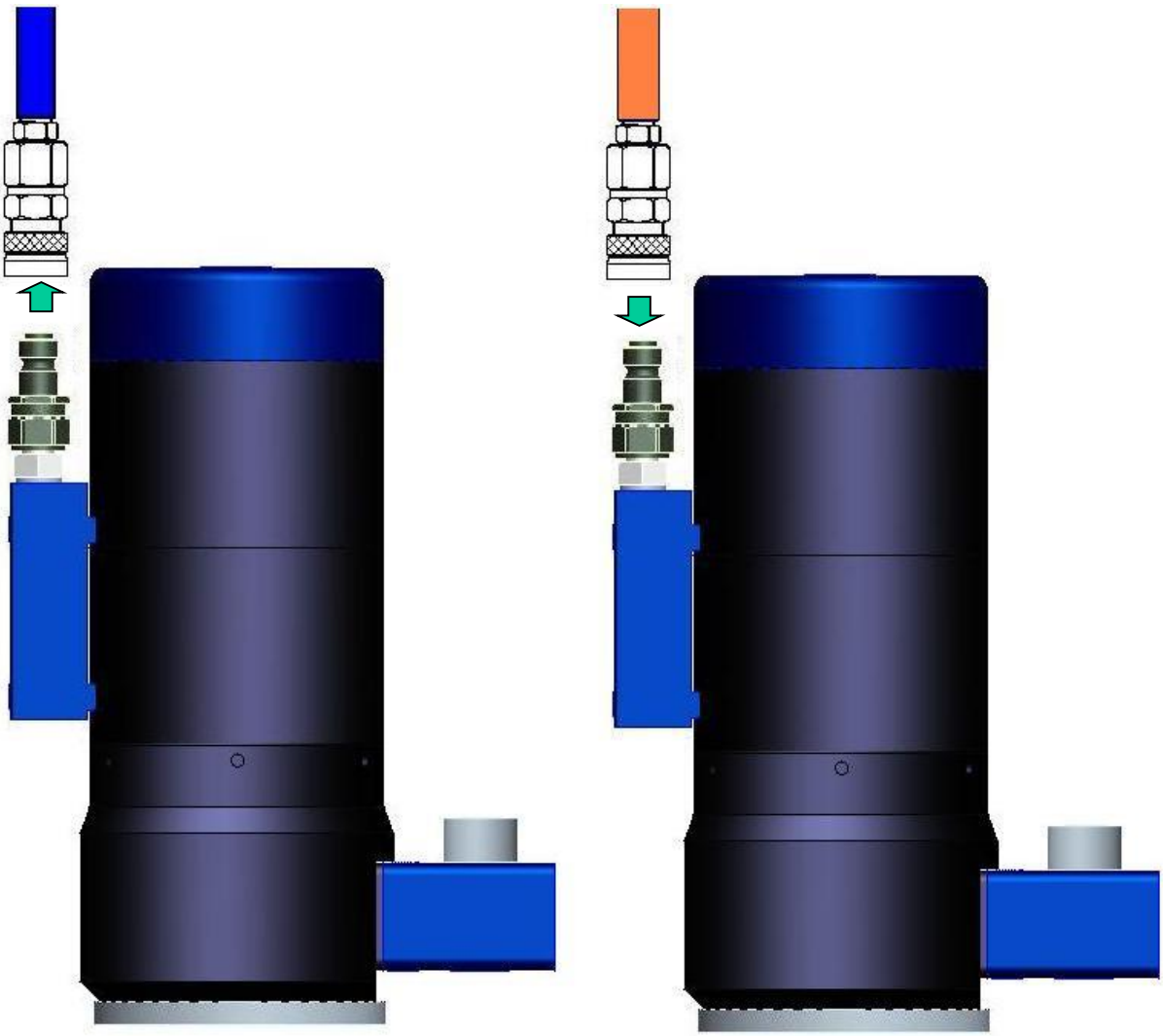
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STEP 9 TIGHTENING A BOLT



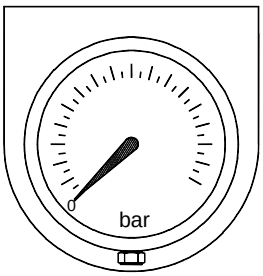
The spring retract system will now fully retract the tensioning tool.

OPTIONAL - If available, connect a Low Pressure Oil Return Hose. The hose is connected between the tool and the top of the oil reservoir on the air driven pump. This will allow the tool to retract more quickly than if the hydraulic hoses are used.



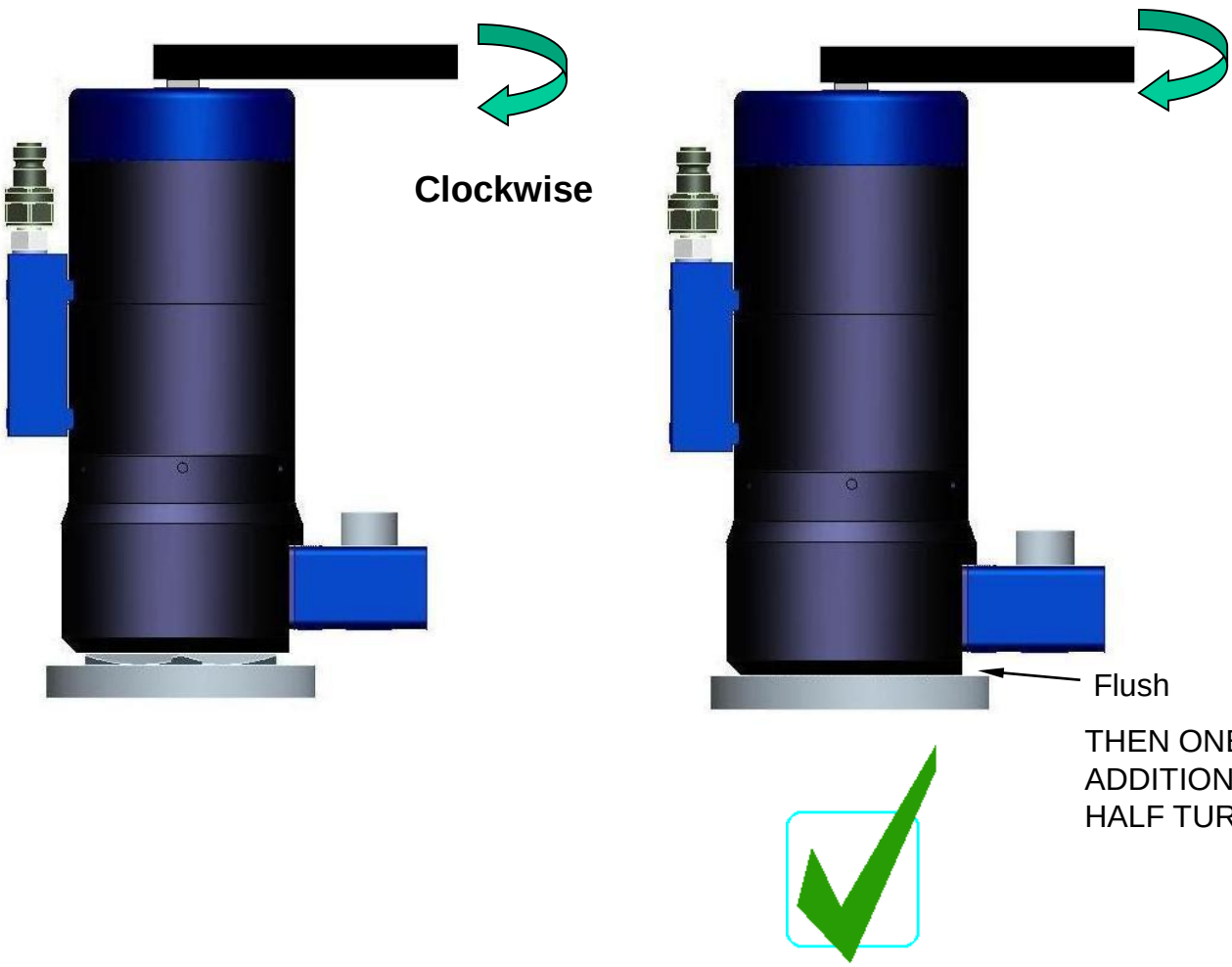
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STEP 10 TIGHTENING A BOLT



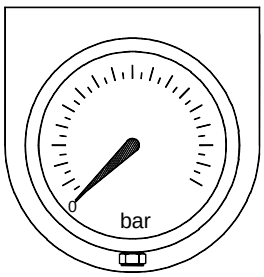
The Tensioner will have retracted upwards since the bolt will have elongated. The tool will need reengaging onto the flange.

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



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STEP 10 TIGHTENING A BOLT

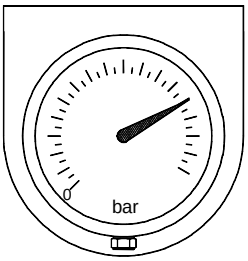


Reconnect the hydraulic hose.



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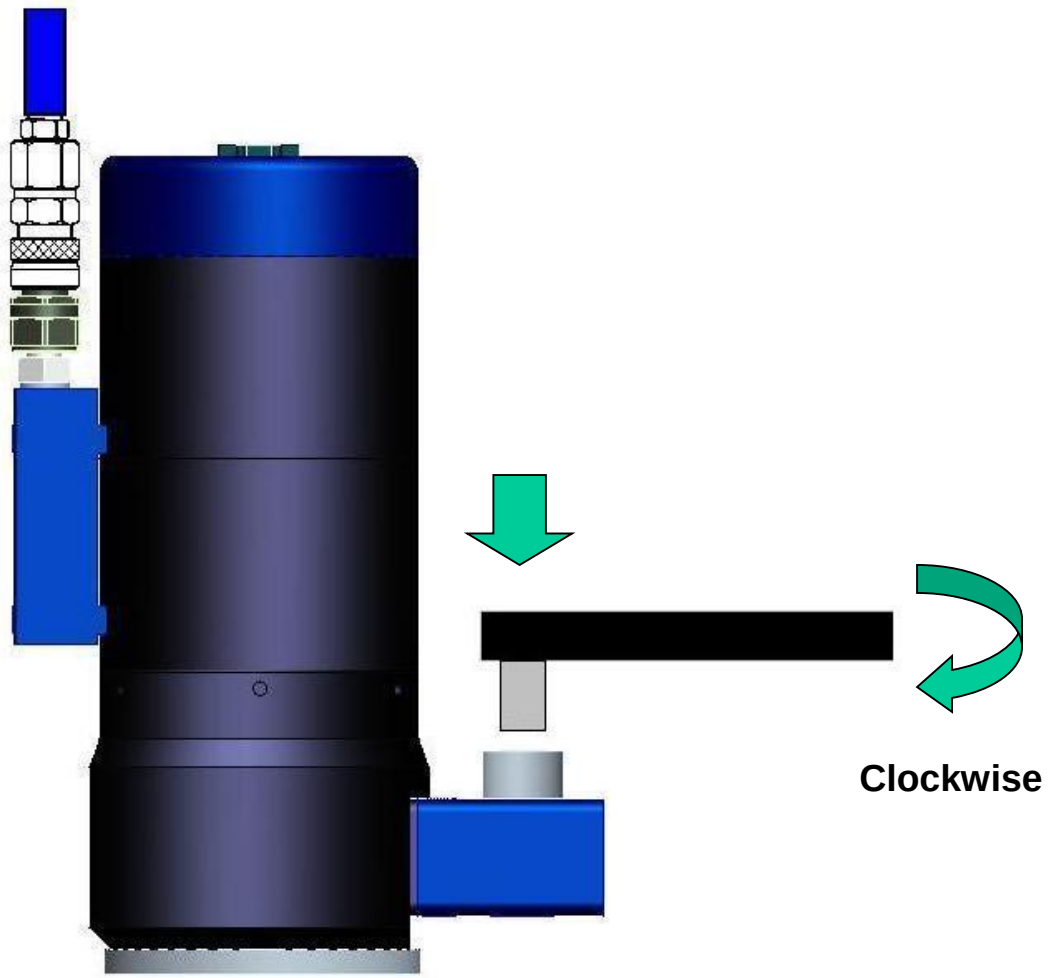
STEP 11 TIGHTENING A BOLT



Apply the correct hydraulic pressure again, and wind the nut again once this is achieved.

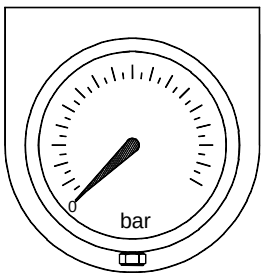
DO NOT exceed the maximum stroke of 7mm. This is indicated by stroke indicators around the top of the Puller

DO NOT exceed 1350 bar pressure.



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STEP 12 TIGHTENING A BOLT



Slowly release the hydraulic pressure.

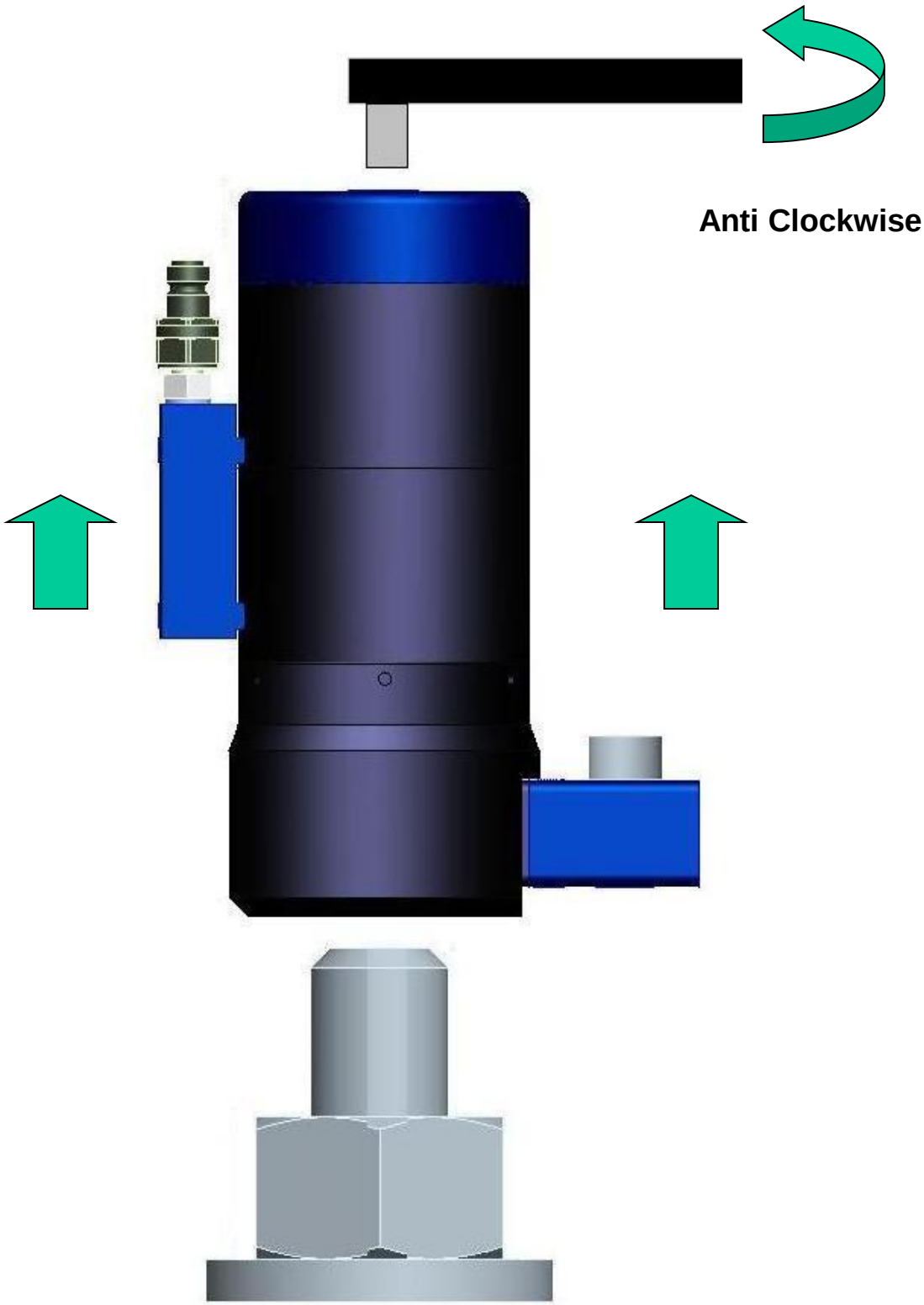
If a Low Pressure Oil Return Hose is available, attach it to accelerate retraction following the procedure outlined in Step 9. Otherwise, allow the tool to retract through the hydraulic hose and then remove once the stroke has returned to zero.



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STEP 13 TIGHTENING A BOLT

Remove the Tensioner using the 1/2in Square Drive in the top of the Puller.



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OPERATING INSTRUCTIONS

HOW TO LOOSEN A BOLT

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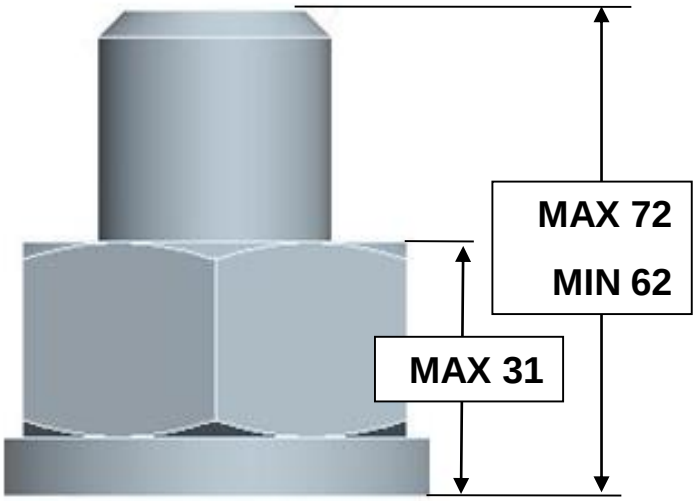
STEP 1 LOOSENING A BOLT

Before commencing the bolt de-tensioning operation read and comply with all of the Health & Safety Instructions in Section 2. Operators should also be familiar with the 'Important Information' literature in Sections 1 and 5.

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STEP 2 LOOSENING A BOLT



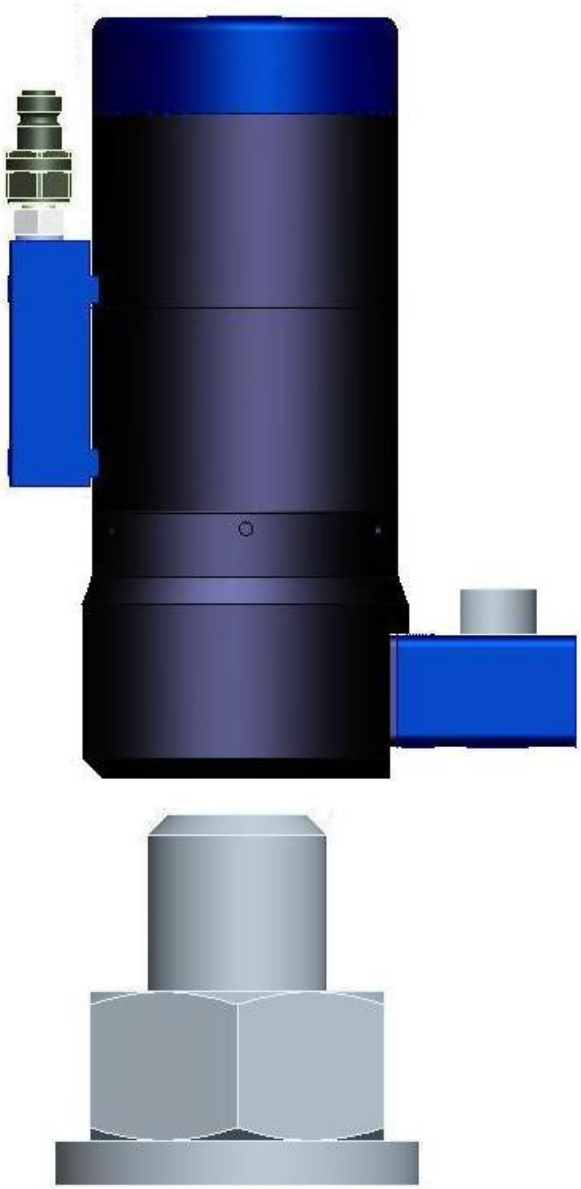


Ensure that there is a minimum of 62 mm protruding bolt for the Tensioner to engage with.

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STEP 3 LOOSENING A BOLT

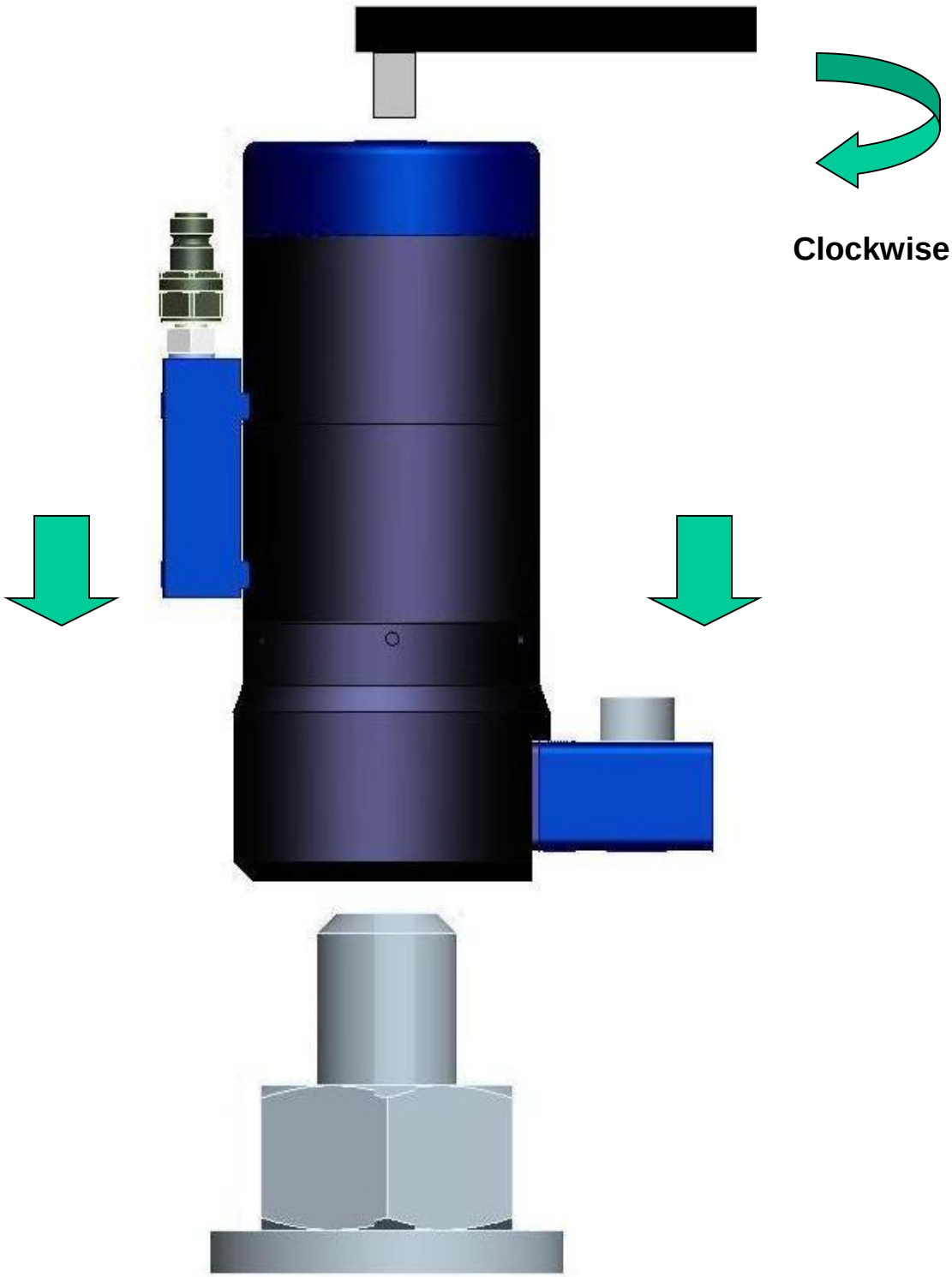
Position the Tensioner over the bolt to be tightened. Orient the tensioner so that manifold is accessible, and such that the bridge window allows tommy bar access to the nut.



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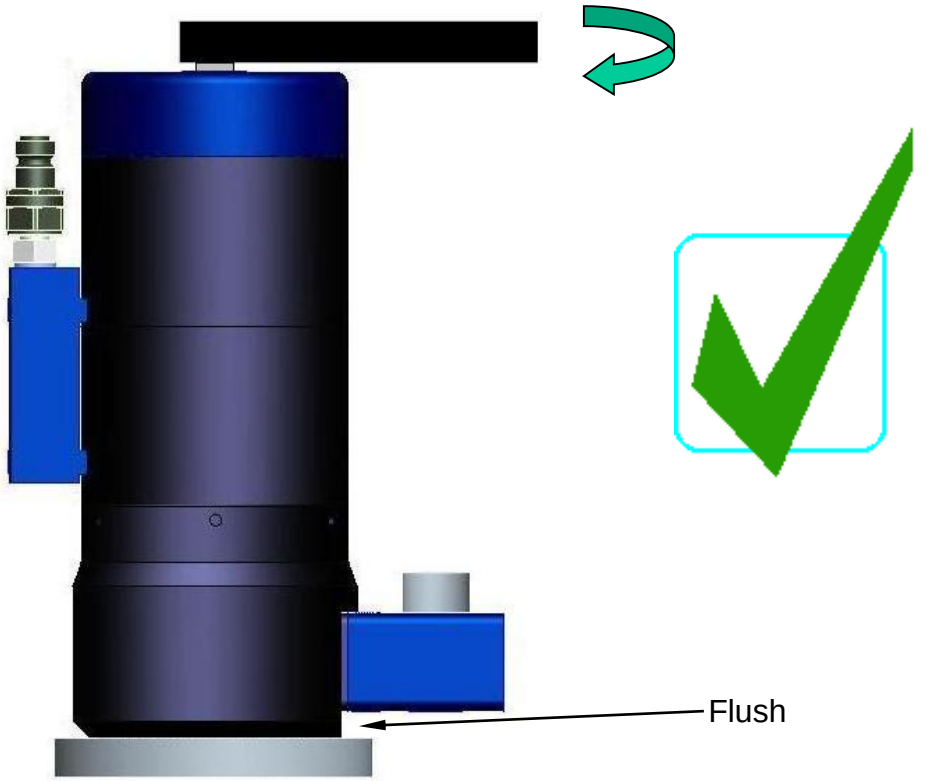
STEP 3 LOOSENING A BOLT

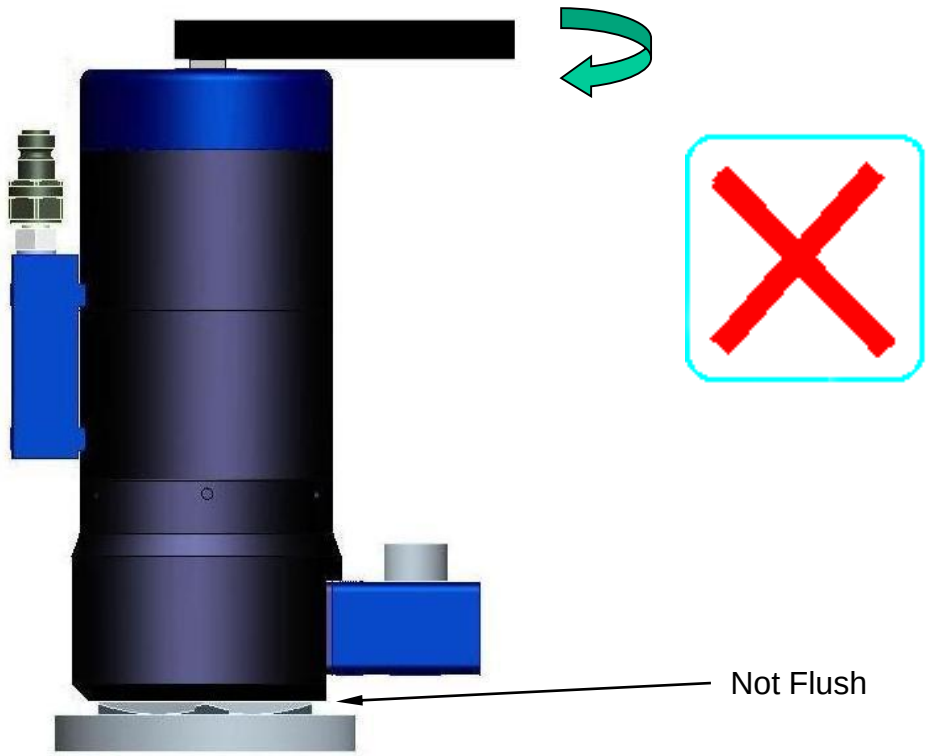
Engage the Puller with the bolt. A 1/2in Square Socket is provided in the top of the Puller Bar so that the Tensioner orientation can be maintained whilst the Puller engages the bolt.



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Continue rotating the Puller, 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.





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STEP 4 LOOSENING A BOLT

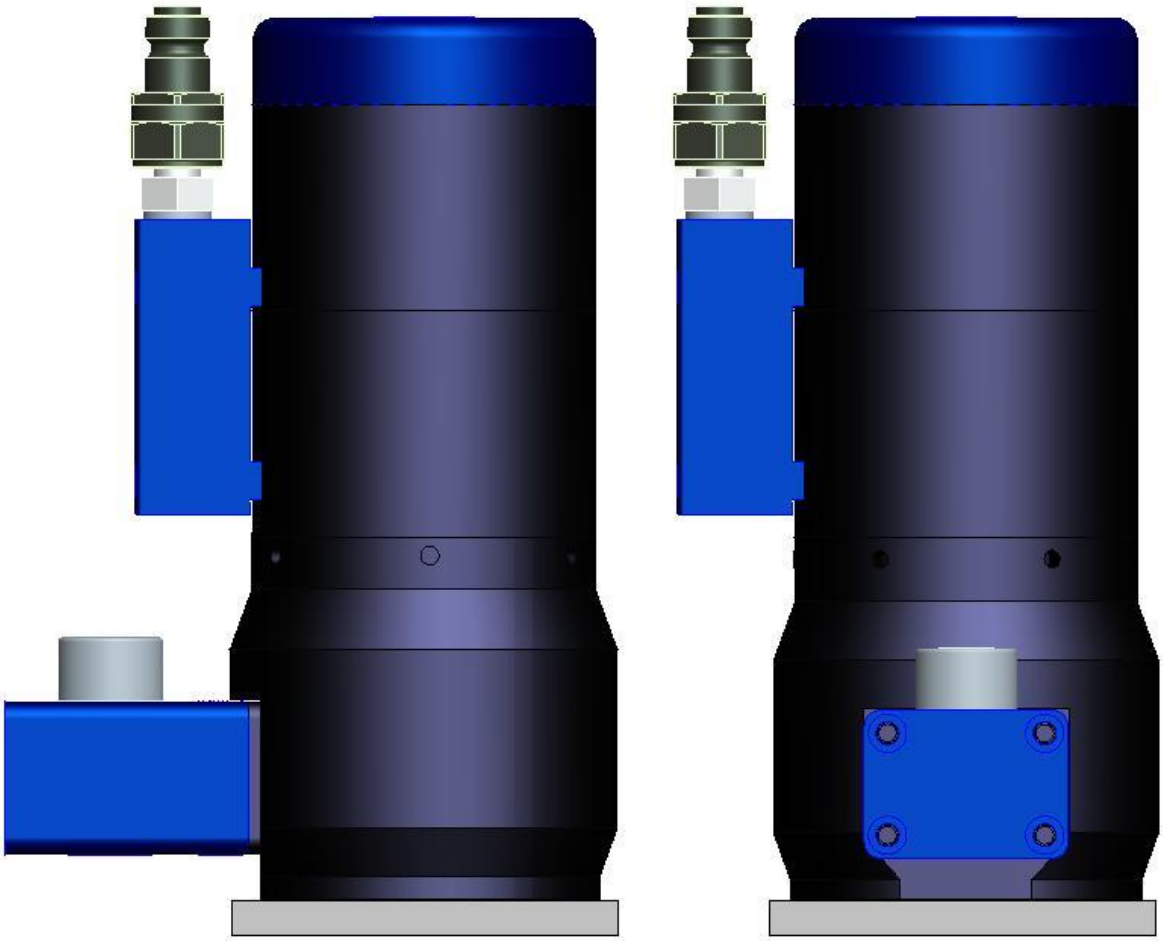
Now rotate the Puller ANTI-CLOCKWISE BY HALF A TURN. This is to prevent the Tensioner from locking onto the stud.

Anti Clockwise half a turn



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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.



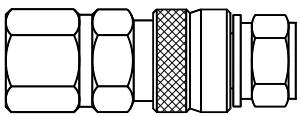
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Using Quick Connect Couplings

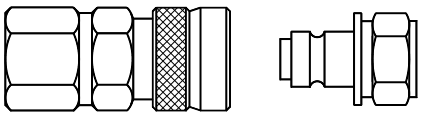
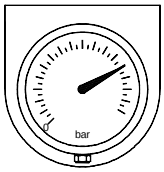
YOU MUST ENSURE YOUR COUPLINGS ARE COMPATIBLE WITH THE CEJN 116 NIPPLE FEATURED ON THIS TENSIONER!

DO NOT pressurise the connectors when they are disconnected

Check there is no pressure in the system before attempting to connect or disconnect the couplings.

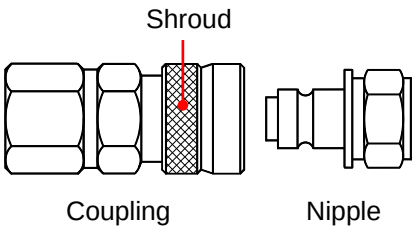




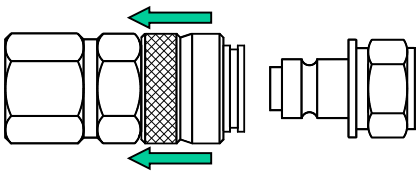


To connect the Quick Connect Coupling and Nipple, first check there is no pressure in the system. Then pull back the shroud by hand and push the coupling onto the nipple. When together, release the shroud which will spring back to lock the Coupling and Nipple together. To disconnect, first check there is no pressure in the system. Pull back the shroud, by hand, and pull the coupling and nipple apart. Release the shroud when apart.



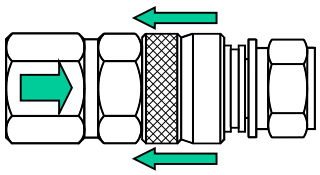
Pull the shroud back to retract





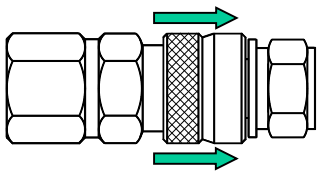
Coupling and Nipple with the shroud retracted





Coupling and nipple pushed together with the shroud still retracted



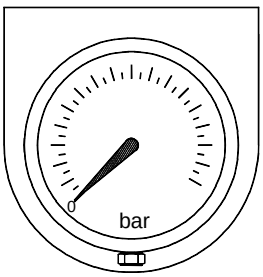


Shroud released - Coupling and Nipple are now locked together and safe to use.



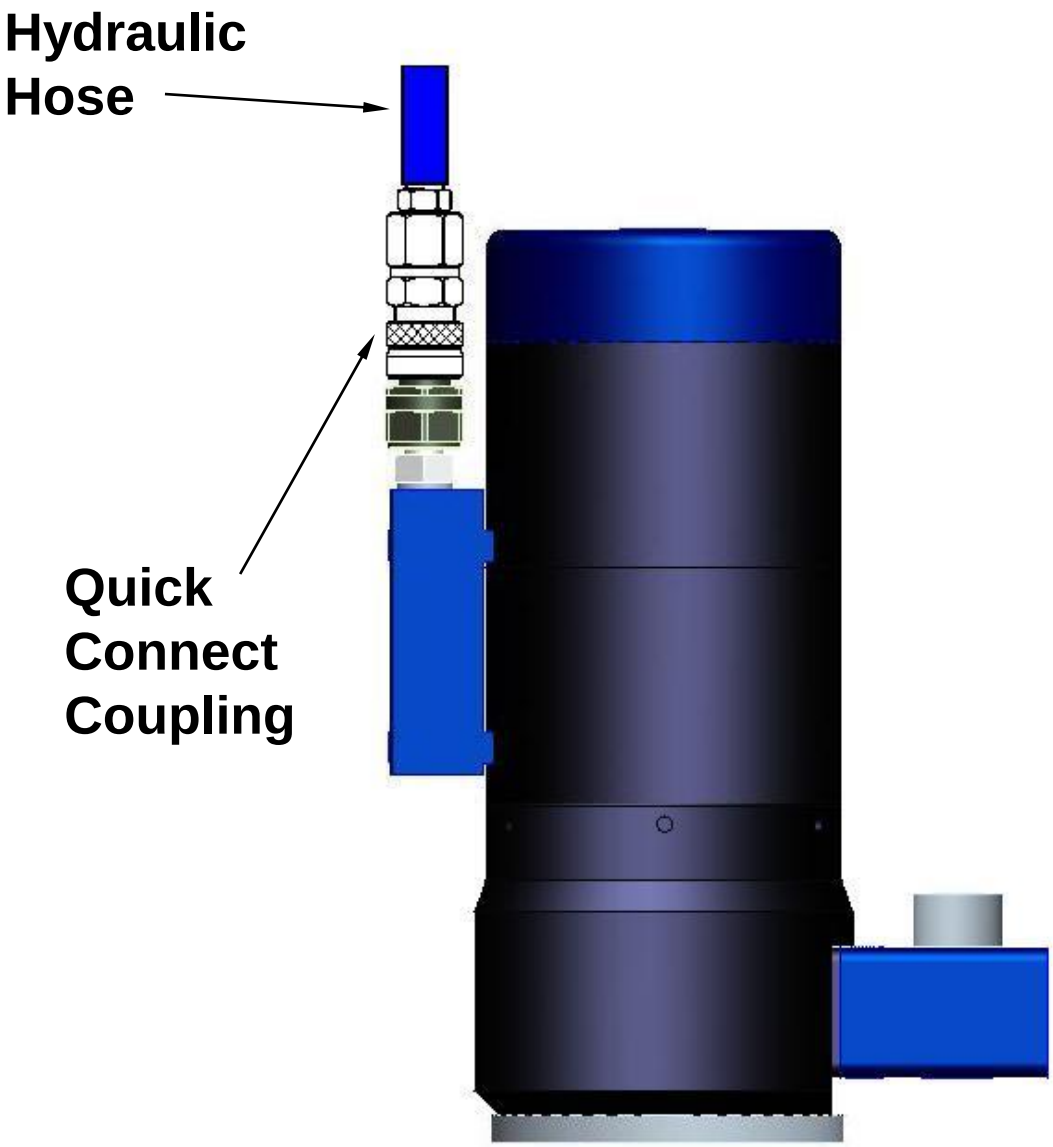
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STEP 5 LOOSENING A BOLT



Connect a SUITABLE high pressure hydraulic hose.

Make sure the quick connect coupling is fully engaged.



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THINK SAFETY

MOST IMPORTANT - HEALTH & SAFETY

The Tensioner is now ready to be pressurised. Before proceeding, operators must familiarise themselves with the Health & Safety Instructions given in this manual, and proceed as follows:-

Clear all personnel from the area where the bolt tensioning operation is to be performed. Position the pump a safe distance away from the bolt tensioners. Set up barriers and warning signs, or make other adequate arrangements to prevent unauthorised personnel from accidentally straying into the bolt tensioning area.

Ensure that nobody is allowed to stand near to a bolt tensioning tool during pressurisation. At no time should anyone allow any part of their body to be positioned over the bolt axis of a bolt tensioner whilst the pressure is rising or when it is pressurised. Do not allow anyone to stand anywhere in or near the axis of a bolt during the tensioning operation.

Do not approach a bolt tensioning tool whilst it is being pressurised. Remember that a damaged bolt or tool is most likely to fail at this critical time. When the operating pressure has been reached, approach a pressurised bolt tensioning tool only for as long as is necessary to rotate the ring nut. Ensure that when rotating the nut you are well outside of the tensioner's vertical axis.

PPE (Personal Protective Equipment) must be worn by all personnel using bolt tensioning tools. SAFETY GLASSES and GLOVES are essential. OVERALLS and a HARD HAT are recommended.

Never leave a pressurised bolt tensioning tool unattended.

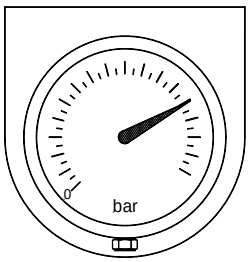
Release the oil pressure immediately if any unauthorised person moves into the bolt tensioning area and especially if anyone stands in the axis of a bolt being tensioned.

Determine the correct working pressure for the bolts to be tightened.

Proceed with the following operations keeping the bolt tensioning tools under pressure for the minimum time necessary to complete the bolt tightening operation.

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STEP 6 LOOSENING A BOLT



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.

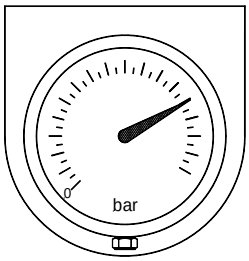
DO NOT exceed the maximum stroke of 7mm. This is indicated by stroke indicators around the top of the Puller.

DO NOT exceed 1350 bar pressure.



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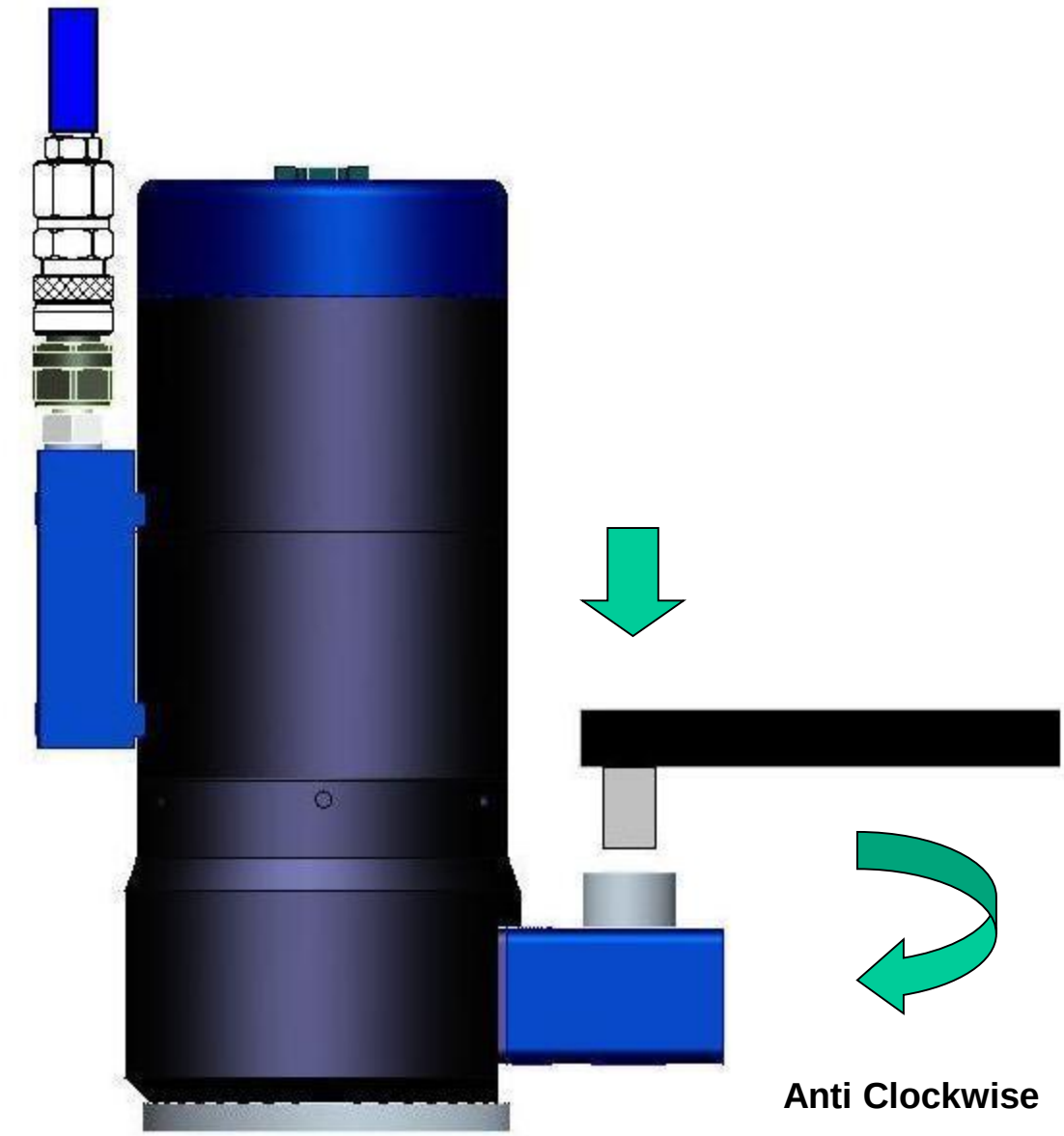
STEP 7 LOOSENING A BOLT



Use a ½" Drive

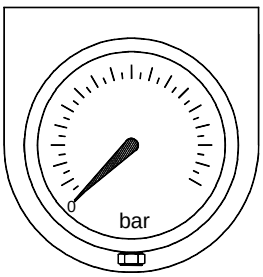
Insert the Drive into Drive Socket on the top of the Gearbox.

Rotate the Socket until the nut is loose and clear of the flange.

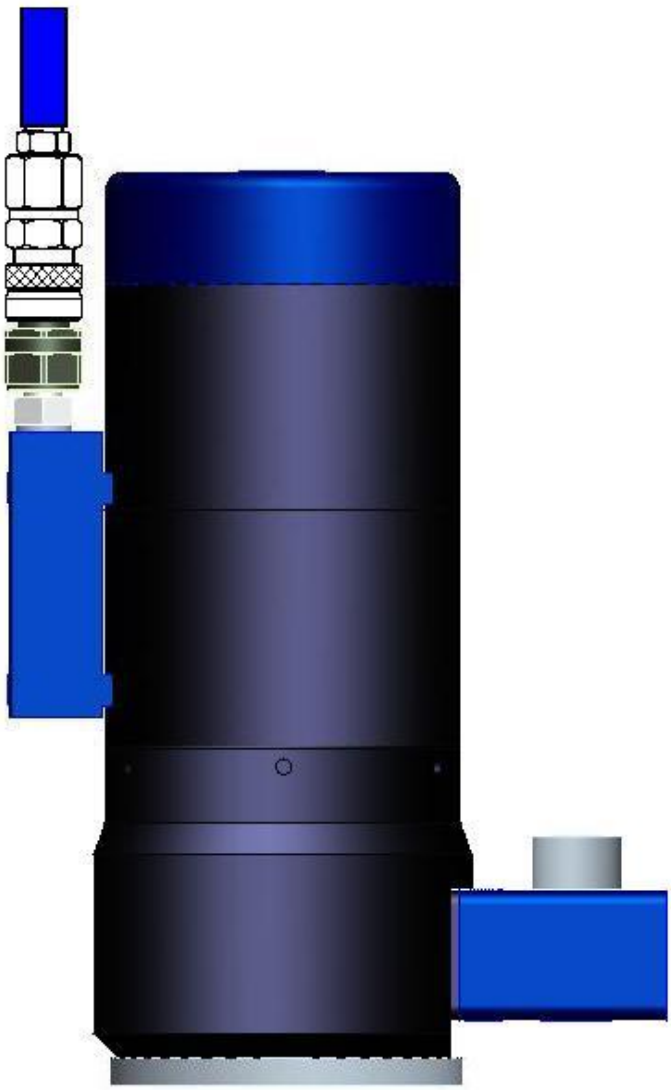


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STEP 8 LOOSENING A BOLT

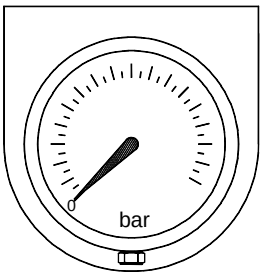


Slowly release the hydraulic pressure.



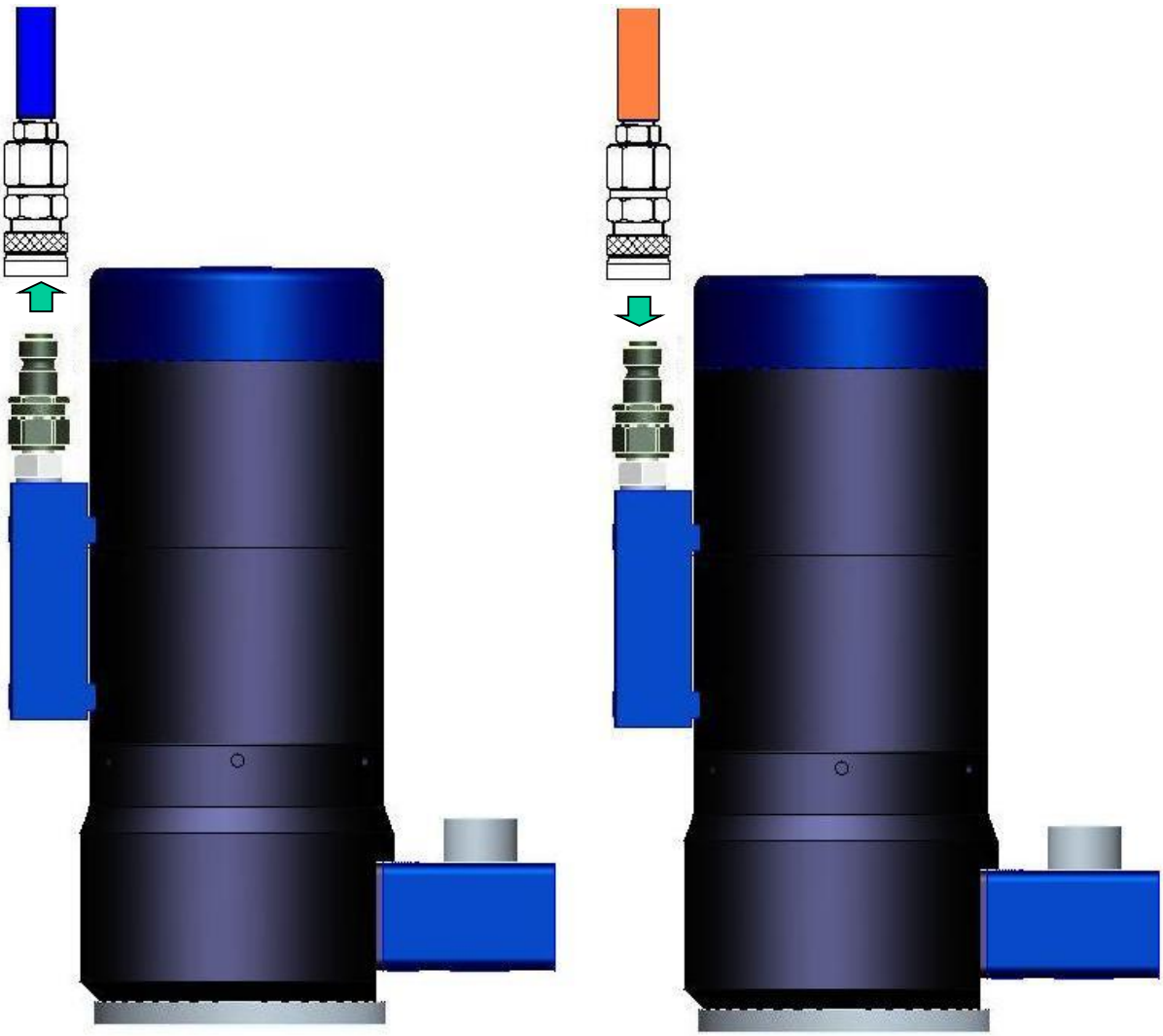
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STEP 9 LOOSENING A BOLT



The spring retract system will now fully retract the tensioning tool.

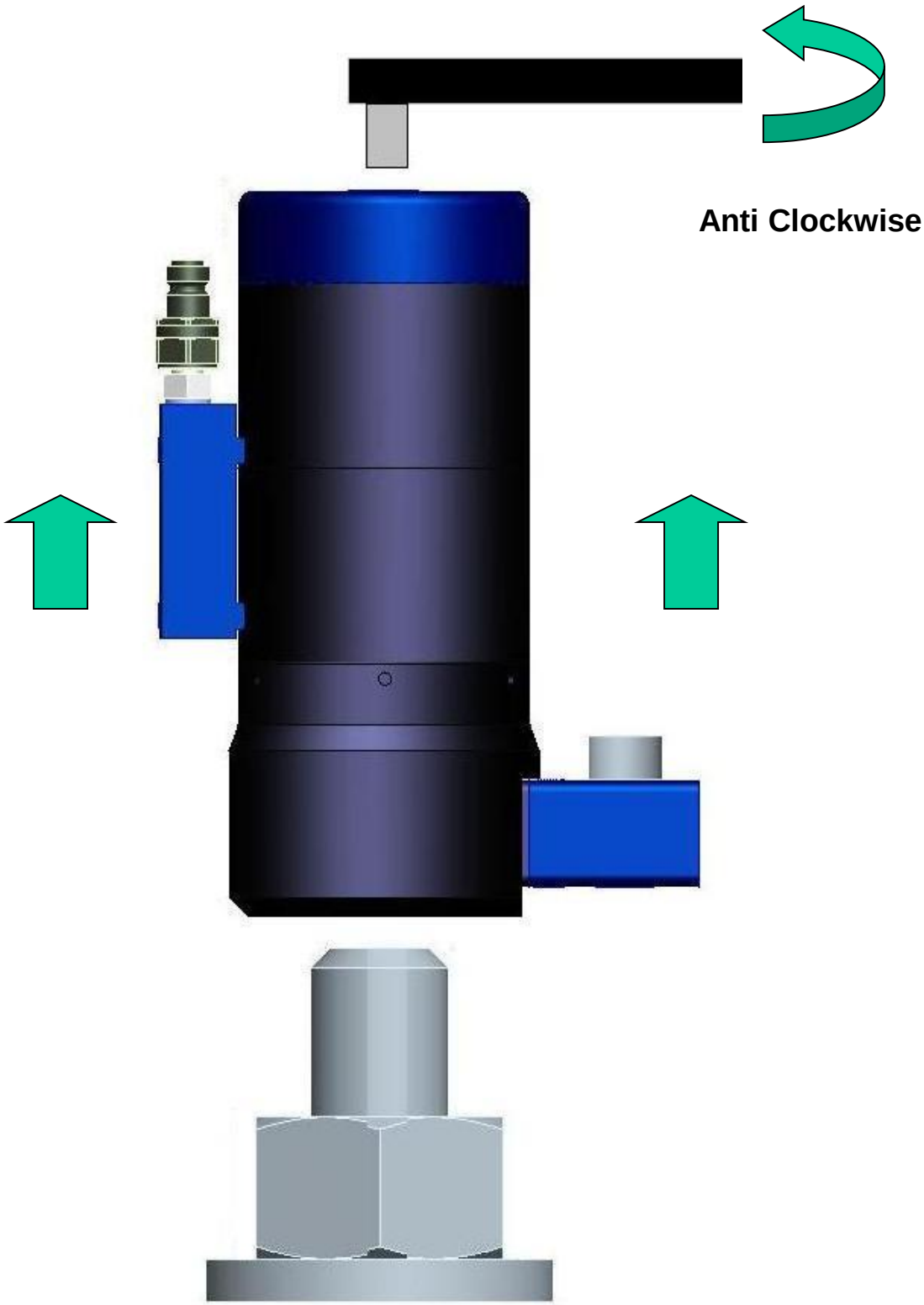
OPTIONAL - If available, connect a Low Pressure Oil Return Hose. The hose is connected between the tool and the top of the oil reservoir on the air driven pump. This will allow the tool to retract more quickly than if the hydraulic hoses are used.



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STEP 10 LOOSENING A BOLT

Remove the Tensioner using the 1/2in Square Drive in the top of the Puller.



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SECTION 4

MAINTENANCE AND STORAGE

General Information Page 2

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MAINTENACE AND STORAGE

General Information

A hydraulic bolt tensioning tool will provide many years of trouble free service if used, maintained and stored correctly.

Storage

Your tools were chemically blacked before leaving the factory. This provides a degree of corrosion protection but additional protection should be applied when the tools are to be stored for any period of time. It is recommended that, before storage, the tools should be checked for damage and if OK, lightly oiled.

Prior to storage, the tensioner must be retracted to zero stroke and the hydraulic connection must have its plastic protective cap fitted. The hydraulic bolt tensioner should be stored upright in a clean, dry environment. The tensioners were delivered in wooden cases and these can be used to store the tools.

Maintenance

Very little maintenance is required for a bolt tensioning tool. The only items which may require changing will be the seals and the quick connect fittings. However, the seals have a very long life and are not expected to require attention during the life of the bolt tensioning tool. If the seals fail to hold pressure it may be necessary to change them, however owing to the complexity of the tensioner it is not recommended that the tools are dismantled and any maintenance performed by the customer.

Boltight recommend that tools are periodically returned for factory refurbishment. Please contact us for details.

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SECTION 5
PRESSURE LOAD DATA FOR TTM-M030-05-00

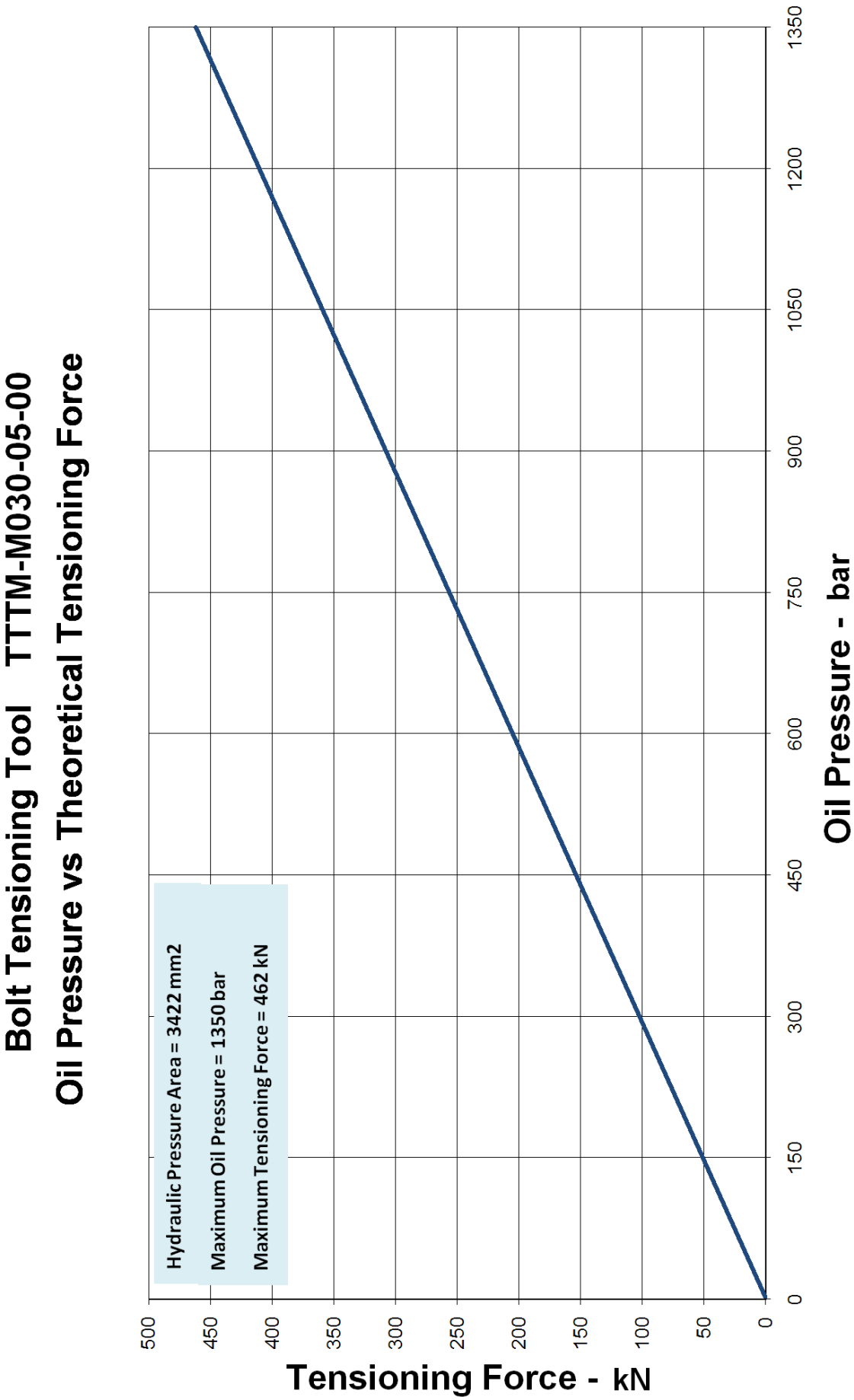
Graph – Oil Pressure vs. Applied Load Page 2

Technical Information Page 3

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Tool Specification

M30 x 3.5

Tool No	**TTM-M030-05-00**	
Thread Size	**M30 x 3.5**	
Tensioner Outer Diameter	**72 mm**	**(2.83 in)**
Bridge Outer Diameter	**83.5 mm**	**(3.29 in)**
Tensioner Height	**206 mm**	**(8.11 in)**
Hydraulic Pressure Area	**3422 mm^2**	**(5.30 in^2)**
Maximum Pressure	**1350 bar**	**(19580 psi)**
Maximum Load @ 1350 bar	**462.0 kN**	**(104 klbf)**
Maximum Stroke	**7 mm**	**(0.276 in)**
Tensioner Weight	**5.7 kg**	**(12.6 lb)**
Maximum Pressure Cycles	**10,000**	

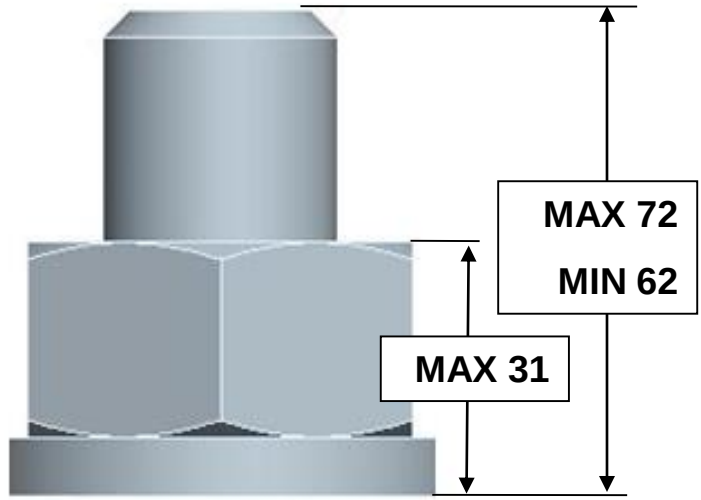


M30 x 3.5 Multi-Stage Tensioner

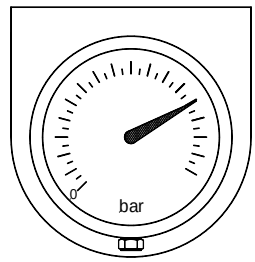
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IMPORTANT INFORMATION

1. ONLY EVER USE THE TOOL WHERE THE STUD PROTRUSION IS BETWEEN 62 AND 72mm, AND WHERE THE COMBINED NUT AND WASHER HEIGHT IS NO GREATER THAN 31mm.



2. NEVER PRESSURISE THE TOOL BEYOND ITS MAXIMUM WORKING PRESSURE OF 1350 bar (19580 psi).



> 1350 bar



3. DO NOT EXCEED THE MAXIMUM STROKE OF 7mm. EVEN THOUGH THE TOOL FEATURES AN ANTI-OVERSTROKE FACILITY, THE OPERATOR SHOULD NEVER INTENTIONALLY OVERSTROKE THE TOOL.