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## **HNOFC062490400 – M170 x 3**

# **Operation and Maintenance Instructions**



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## 1. Introduction

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In a world of rapidly increasing technological change, HYDRATIGHT is at the forefront of bolt tightening development. It is only through extensive research together with accumulated experience that a more efficient customer service and a reputation for high quality products can be maintained.

HYDRATIGHT has a policy of continual research and development, which enables us to offer innovative precision equipment that meets the rigorous demands of industry world-wide.

HYDRATIGHT series of bolt tensioners offer the following benefits:

<b>ACCURACY</b>	The method of tightening is independent of the frictional conditions of the bolted assembly, thereby giving accurate and consistent bolt loads.
<b>UNIFORMITY</b>	Any number of HYDRATIGHT bolt tensioners can be linked together for simultaneous bolt tightening. This is particularly beneficial on flange applications where uniform loading on the gasket is essential in ensuring leak-free connections.
<b>TIME SAVING</b>	By tightening many bolts simultaneously the time to make up multi-bolted connections is significantly reduced. The length of stroke available reduces the number of times the Tensioner needed to be closed.
<b>COMPACT, LIGHT WEIGHT TOOLS</b>	Careful design has enabled the development of an effective yet lightweight and compact tool.
<b>LABOUR SAVING</b>	HYDRATIGHT bolt tensioners can be used easily by one operator with a minimum of effort
<b>SAFETY</b>	Consistent quality control procedures ensure that HYDRATIGHT tools and equipment are safe in both design and use.
<b>SIMPLICITY</b>	A minimum of moving parts leads to trouble free, simple operation and easy maintenance.
<b>RELIABILITY</b>	All HYDRATIGHT tools and equipment are safety tested including a full pressure test prior to despatch.

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## 2. Safety Notes for Use with Hydraulic Nuts

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High Pressure Hydraulics should be treated with respect. Please ensure that the following basic rules are followed:

1. **ALWAYS WEAR SAFETY GLASSES** when working near a pressurised hydraulic system. Your eyesight is important - **PROTECT IT**.
2. **ALWAYS** check the following points before pressurising a hydraulic system:
  - (a) Check that the hydraulic harness is fully connected. There should be no loose ends and every male nipple should be connected to its corresponding female coupling.
  - (b) Check that each female coupling is securely locked in position on the corresponding nipple by physically pulling the connection.

**IT IS DANGEROUS TO PRESSURISE THE BACK OF AN UNCOUPLED QUICK DISCONNECT NIPPLE OR COUPLING. ALL CONNECTIONS MUST BE CONNECTED OR BLANKED OFF BEFORE PRESSURISING.**

(c) Check that the bolt material is capable of taking the initial load to be applied. The tools are powerful and are capable of yielding or breaking studs/bolts if tensile/yield properties are not sufficient to support the load applied.

(d) Check that the threaded portion of the nut tool is screwed on the stud, and that the thread engagement is sufficient. (See Data Sheet)

**NOTE:** Thread engagement should usually be a minimum of 1 x dia of stud. Check that the tensioner is seated squarely on the bridge piece and that the bridge is seated squarely on the work piece.

3. **NEVER** exceed the maximum working pressure specified for the equipment. (See Data Sheet)

**NOTE:** The maximum safe working pressure specified for the tool does not necessarily represent the maximum safe load, which may be induced into the bolt/stud.
4. **NEVER** exceed the maximum extension quoted for the equipment. (See Data Sheet)

**NOTE:** An indicator will appear when the tool is close to maximum extension.
5. **ALWAYS** take care when pressurising a system. Always observe the gauge and be ready. Pressure can rise faster than you think.
6. **NEVER** leave a pressurised system unattended. If you must leave the area release the pressure and ensure that the return to tank valve on the pump unit is fully open.
7. **NEVER** bend the hydraulic hoses less than six times their own diameter. Do not use kinked hoses.

8. **NEVER** stand in line with the bolt axis whilst tensioning is in progress.  
**NOTE:** Personnel must be aware of this point at all times.
  
9. When working on site the work area should be roped off and all personnel not connected with the site operation should be kept clear of the working area.
  
10. High pressure hydraulic equipment can be very dangerous if misused. Keep away from oil leakages at high pressure. Liquid escaping from highly pressurised equipment has sufficient power to penetrate the skin, which can cause blood poisoning. In the case of such an accident **IMMEDIATE** medical attention must be sought.

**REMEMBER :**

**TAKE CARE! HIGH PRESSURE HYDRAULICS ARE PERFECTLY SAFE IF THE BASIC SAFETY RULES ARE FOLLOWED.**

**PLEASE NOTE:**

**MODIFICATION TO ANY EQUIPMENT COVERED BY THIS MANUAL SHOULD NOT BE ATTEMPTED BY THE CUSTOMER**

**IF MODIFICATIONS ARE REQUIRED TO SUIT A SPECIFIC APPLICATION, CONSULT HYDRATIGHT SWEENEY LTD BEFORE MAKING THEM.**

**INAPPROPRIATE MODIFICATIONS MADE RENDER THE EQUIPMENT DANGEROUS**

## 3. Operation of the Hydraulic Nut

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### 3.1. Tightening Procedure for Oil Filled Nuts.

Proceed as follows to install the Oil Filled Hydraulic Nut:

- 1) Tighten the nuts firmly with a tommy bar. It is important to take up all the slack in the bolted assembly and to close the gap between the piston and the nut body.
- 2) Assemble one end of the high-pressure flexible hose by means of the female snap coupling to the male nipple in the nut. When assembling the male snap nipple in the nut, tighten firmly, but do not over-tighten as this may cause damage to the cone seating of the connection.
- 3) Assemble the other end of the flexible hose to the hydraulic connection on the pump.
- 4) Tighten the pressure release valve on the pump.
- 5) Apply a pressure to the system to produce a gap in the nut equivalent to the thickness of the shims.
- 6) Release the pressure slowly. If released too quickly then the seal may be broken. This will cause oil to flow out of the nut between the piston and nut body.
- 7) Slightly loosen the hydraulic connection on the nut.
- 8) Re-tighten the nuts firmly with a tommy bar. It is important to take up all the slack in the bolted assembly and to close the gap between the piston and the nut body.
- 9) Re-tighten hydraulic connection.
- 10) Apply sufficient pressure to the nut to just produce a gap to accept the shims.
- 11) Insert the shims.
- 12) Slowly release pressure.
- 13) Remove all hydraulic connections.

### 3.2. Release Procedure for Oil Filled Nuts.

Proceed as follows to remove Oil Filled Hydraulic Nut.

- 1) Re-connect the nut to the pump unit.
- 2) Apply only sufficient pressure to allow the shims to be removed.
- 3) Remove the shims.
- 4) Reduce the pressure slowly allowing the nut gaps to close.
- 5) When the pressure has fallen to zero, remove the hydraulic connections.

**There is now no load in the bolts and the nuts may be unscrewed with a tommy bar.**

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### 3.3. Trouble Shooting Guide

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<b>PROBLEM/ SYMPTOM</b>	<b>PROBABLE CAUSE</b>	<b>CORRECTIVE ACTION</b>
<b>Oil is leaking from the hydraulic connection.</b>	The connection is not seating properly.	Tighten the connection. Where applicable replace connection components, see GA.
<b>Oil is leaking from the Nut body.</b>	Seal failure.	Change the seals - See Section 4
<b>The nut will not return to zero stroke.</b>	<ol style="list-style-type: none"><li>1. The oil Return-To-Tank valve is not open.</li><li>2. One of the connections is not connected properly.</li></ol>	<ol style="list-style-type: none"><li>1. Ensure that the oil Return-To-Tank valve is open fully.</li><li>2. Check that the hydraulic connections are secure.</li></ol>



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## 4. Maintenance Instructions

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

It is strongly recommended that in the event of seal failure the tensioners are returned to Hydratight for seal replacement, however if this is not possible then the enclosed procedure should be followed.

### 4.1 Precautions to Replace Hydraulic Seals

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

1. Avoid sharp edges (cover threaded areas).
2. Remove all dust, dirt, swarf and foreign particles.
3. Do not use sharp edged tools.
4. Lubricate all components before assembly.

### Hydraulic Seals Component Parts

The seal kit comprises an inner seal and outer seal complete with o-rings.

### Hydraulic Seals - Disassembly of Head Assembly

Throughout the following instructions refer to drawing HNOFC062490400C.

5. Remove the ram from the body using the M8 x 1.25-6H jacking screw holes in the top face of the ram.
6. Remove the seals and 'o'-rings from the ram, if necessary use a flat bladed tool such as a screwdriver.

### Seal Assembly

The pictures enclosed are for guidance only and may not be of the actual component parts.

7. Place the ram on a clean flat surface with the jacking screw holes facing downwards.
8. Place the inner seal o-ring into the seal groove.
9. Insert part of the inner seal into the seal groove on one side of the ram, ensuring that the chamfer on the seal is adjacent to the seal groove retaining lip chamfer, and feed in and around the seal groove and snap into place.
10. Simply stretch the outer o-ring over the outer seal groove retaining lip chamfer of the ram into the groove.

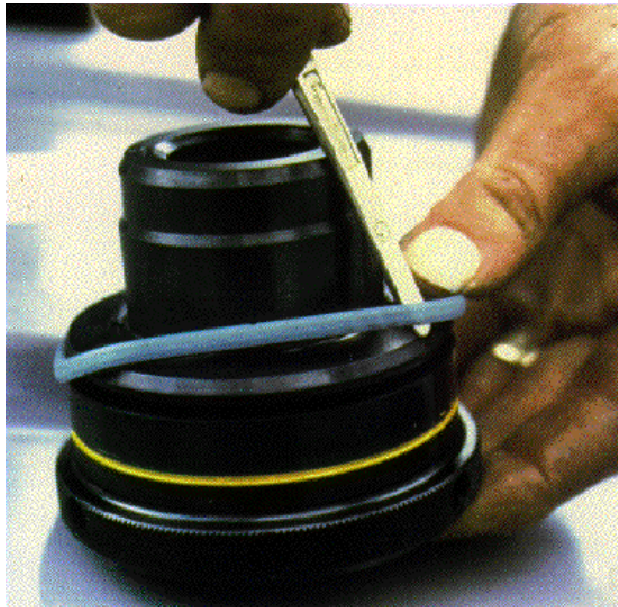
**Note**

If necessary, use a flat bladed tool such as a screwdriver.

11. Locate part of the outer seal in the seal groove and work around the outside diameter stretching it over the seal groove retaining lip, as shown below, until it completely slips into the groove.

**Note**

If the seal is chamfered on both faces it may be inserted in the seal groove either way round, however if only chamfered on one face the chamfer should be adjacent to the ram seal groove chamfer.



## Hydraulic Seals - Reassembly of Hydraulic Head

12. Ensure that all surfaces of the ram and inner surfaces of the body are free from dirt and other foreign particles.
13. Lubricate all inner faces concentrating on the seals and seal contact faces, preferably using hydraulic oil.
14. Position the ram assembly into the body assembly with jacking screw holes facing upwards, ensuring that squareness between the components is maintained, apply pressure until the ram assembly is fully engaged with the body assembly.

**Note**

It may be possible to press the two assemblies together by hand but if necessary use a small bench press.

## Hydraulic Fittings

Hydraulic connections are of the following types:

15. Hydraulic head assembly – the connection in the tool is coned with 3/8" BSP female thread. If there is a slight leak it can usually be solved by applying the correct torque of 70-80 Nm or 620-708 lbf.in.

16. Hose – the hose end connection is a ¼” BSP female swivel with male cone. A seal is effected by screwing down on to the mating adaptor with sufficient pressure. Any problems are usually minimal and normally solved by ensuring that the correct torque of 40-50 Nm or 354-443 lbf.in is applied.

**Note**

If the problem persists then the threads should be checked and repaired if possible and where applicable the bonded seal should be replaced. If the threads cannot be repaired the component part(s) will need replacing. In the event of any further problems please consult with Hydratight for advice.

## 4.2 Procedure for the Emergency Removal of the Nuts

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Equipment Required: -

- 1 - Grease gun.
- 1 - Grease nipple and adaptor.
- 1 – High pressure hydraulic hose c/w fittings.
- 1 – High pressure hydraulic pump unit.

Supply one of the following compounds: -

Amoco Rycon R	-	Rheoptetic Grease
Sealastic	-	Flexible Sealing Compound

### Procedure

- 1) Remove hydraulic connection.
- 2) Screw in special adaptor with grease nipple fitted.
- 3) Using a commercial grease gun pump in sealing compound or grease until nut has been completely filled and a pressure of several hundred psi. has been built up with the hand grease gun.
- 4) Rapidly remove the special adaptor and connect the hydraulic pump unit directly to the failed nut. Sealing compound or grease will be extruded from the connection when the adaptor is removed; try to limit this to a minimum.

**Note:** It is important to connect the pump unit directly to the failed nut, because if the pump is left connected to the number of nuts used in the stressing operation, then the flow rate will not be sufficient to overcome the leakage.

- 5) Pressurise the nut in the normal way, but ensure that the pump is turned fully on to obtain maximum flow.
- 6) If leakage still occurs, repeat the operation, but pump in the grease or sealastic to a greater pressure.

## 5. Storage of Equipment

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### Hydraulic Puller Type Tensioner

17. Store tools fully retracted.
18. 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.
19. Cover the internal threads on the inside of the pullers with a rust inhibitor.
20. Store tools upright.
21. Keep dust caps on the oil inlet nipples.

### Hydraulic Harness and Hoses

22. Wipe all hoses clean and apply a light coating of oil or suitable rust inhibitor to all nipples, couplings and tee blocks.
23. Always keep dust caps fitted to nipples and couplings.

### Air Driven Pump

24. Always store the pump upright.
25. Apply a light oil coating or suitable rust inhibitor to all exposed unplated metal items.
26. Leave the oil return to tank valve in the open position.
27. Leave the air control valve in the open position.
28. Always keep dust caps on inlet and outlet hydraulic fittings.

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## 6. Attachments

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### 6.1 Technical Data Sheet

<b>TOOL SIZE:</b>	<b>M170 x 3</b>	
<b>TENSIONER ITEM No.</b>	<b>HNOFC062490400</b>	
<b>NUT O.D.</b>	<b>270 mm</b>	<b>10.63 in</b>
<b>OVERALL NUT HEIGHT</b>	<b>64 mm</b>	<b>2.52 in</b>
<b>SEAL OD</b>	<b>245 mm</b>	<b>9.65 in</b>
<b>SEAL ID</b>	<b>196 mm</b>	<b>7.72 in</b>
<b>TOTAL HYDRAULIC AREA:</b>	<b>16972 mm<sup>2</sup></b>	<b>26.31 in<sup>2</sup></b>
<b>MAX OPERATING PRESSURE:</b>	<b>1000 bar</b>	<b>14500 psi</b>
<b>MAX INITIAL LOAD:</b>	<b>1697.0 kN</b>	<b>170.3 tonf</b>
<b>MAX STROKE:</b>	<b>12 mm</b>	<b>0.47 in</b>

#### CALCULATION OF REQUIRED OPERATING PRESSURE

$$\text{Operating Pressure} = \frac{\text{Initial load}}{\text{Hydraulic Area}}$$

IF IN DOUBT CONSULT HYDRATIGHT FOR FURTHER INFORMATION

## 6.2 General Arrangement Drawing

