OPERATING INSTRUCTIONS

HTL-CTS-002
Calibration Rig
5/25K Standard Torque
SAFETY

Please read this manual before operating the equipment.

This unit must only be used for the intended purpose of calibrating torque wrenches.

The unit operates by simulating normal operation of torque tools.

A number of pins are supplied for use in different positions depending on tool size and type.

Misuse

The unit has been designed for the testing and calibration of hydraulic torque tools. The unit should not be used for anything other than its specified use. Do not disassemble the unit during loading and unloading. Loads must be lifted using suitable assistance and avoiding manual handling as much as possible.

HTL will not be held responsible for any damage or harm caused by misuse of the equipment.

General safety information

This equipment is manufactured in accordance with the Supply of Machinery Safety Regulations 2006/42/EC. The user should ensure that this equipment conforms with local and national legislation if used outside of the European Economic Area (EEA).

Only competent, authorised personnel should install, set, operate, maintain, and decommission this equipment.

This equipment is designed for use in dry conditions. **DO NOT USE OUTSIDE.**

Warnings
Any residual risks are identified within this manual with the equipment marked where appropriate. Ensure these warnings are adhered.

The following labels are displayed on the unit for your safety, please observe all warnings.

- You can be injured if you do not obey the safety instructions as indicated on warning stickers.
- Observe all safety instructions and warnings attached to the unit.
- Replace unreadable or missing labels.
- Keep warnings and instruction labels clean.

- Unit CE plate

- This following label indicates the maximum static weight (loaded) of the unit with a component in it.

- The unit should only be transported empty, with no components inside.

- This warning indicates that there is a potential crush hazard and to keep away from moving parts.

**STAY ALERT.** Watch what you are doing. Do not use power equipment under the influence of any mood altering substances.

**WARRANTY**

HTL Group Ltd guarantees its products against all design and manufacturing defects for 1 year from the date of shipment. The guarantee does not include the ordinary wear of both metal and non-metal parts, abuse, using the equipment beyond its rated capacity and any wear or damage incurred as a result of using a hydraulic fluid which is not recommended by HTL Group Ltd.

Please note that if the equipment is disassembled or serviced by anyone other than an authorised service dealer or by HTL Group Ltd, this guarantee is rendered null and void.

In the event of a warranty claim, return the equipment to HTL Group Ltd or the authorised dealer which sold you the hydraulic equipment. HTL Group Ltd will repair or replace the faulty equipment, whichever is deemed most appropriate.
INSTRUCTIONS BEFORE USE

READ CAREFULLY: Most malfunctions in new equipment are the result of improper operation and/or set-up assembly.

PREPARATION: Remove your Calibration Unit from the shipping container using a forklift truck or suitable lifting device, with a lifting capacity of at least 750kg.

INSPECTION: Visually inspect all components for shipping damage. If any damage is found, notify our sales office immediately.

Transportation

The unit is designed to be transported by installed castors. The unit should be carried unloaded. The weight of the unit unloaded is 500kg. The maximum loaded weight of the unit and any tools to be calibrated is 1000kg.

Positioning the unit

When positioning the unit be sure to leave adequate room for operation. The area must be free from obstructions or other hazards that may affect operation. At least 1m clear space is required around the front and sides of the unit to be able to operate it safely. The unit must be on level ground with adequate local lighting, with no glare or stroboscopic effects, of at least an average of 100 lux. Once in position castors can be set in place by rotating the orange wheel to lower the feet.

Ensure that all hydraulic connections are securely connected. Verify that the hoses are not kinked and that walkways are clear.

Connecting the system (torque tool)

The hydraulic torque wrench and the power pack are connected by a 10,000 psi (700 Bar) operating pressure twin line hose assembly. The safety ratio of the Hydraulic Hose is 4:1. On each twin Hydraulic Hose, one line must be MALE-MALE and the other line must be FEMALE-FEMALE in order to ensure a correct interconnection between pump and torque tool. The 10,000 psi (700 Bar) high pressure couplers on the pump and on the torque wrench are Male couplers, others are Female couplers.

IMPORTANT:
- Never use two twin hydraulic hoses between pump and tool. If so, you cross couple the hoses and have the high pressure on the retract side of your tool, which will cause seals on the front of tool to burst.
- To avoid tool malfunction, do not reverse connectors.
- Do not try to slacken the swivel assembly at any time.

Connect the twin line hose to the swivel as shown below:
Ensure connectors are fully engaged and screwed snugly and completely together.

Control plate legend

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hold to operate</td>
</tr>
<tr>
<td>2</td>
<td>Pump start up</td>
</tr>
<tr>
<td>3</td>
<td>Pump stop</td>
</tr>
<tr>
<td>4</td>
<td>Pendant control</td>
</tr>
<tr>
<td>5</td>
<td>Pressure adjust</td>
</tr>
<tr>
<td>6</td>
<td>10K PSI gauge</td>
</tr>
<tr>
<td>7</td>
<td>Emergency stop / main power off</td>
</tr>
<tr>
<td>8</td>
<td>Main power on</td>
</tr>
</tbody>
</table>

Connecting the system

The hydraulic wrench and power pack are connected by a 10,000 psi (700 Bar) operating pressure hose assembly. The safety ratio of the hose is 4:1. Connect the single male screw connect to the female connect located on the rear of the unit. Be sure to set the pump pressure to 700 Bar max. The utilised pump incorporates a permanent safety relief valve rated to 700 Bar max to prevent damage to the unit.

Do not try to untighten the swivel assembly at any time when in use.

Ensure the hose connectors are fully engaged and screwed snugly and completely together.

Switch on power to the unit (blue button). Cycle the tool to ensure proper function by pressing the hand control advance button.

Ensure correct female square adaptor (fig. A) or male hex adaptor (fig. B) is installed for the tool to be calibrated.
Locate the torque tool assembly securely on reaction points. Be sure the reaction arm is fully engaged. Be sure all hoses are free of the reaction points. Pressurise the system for a test; if the tool tends to “ride-up” or to “creep”, stop and re-adjust the reaction arm to a more solid and secure position.

**NOTE:** Remain clear of the reaction arm during operation and never put body parts between reaction arm and reaction surface.

Always use quality impact sockets in good condition which are the correct size and fully engage the nut. Hidden flaws, however, remain a possibility which could cause breakage, so stay clear of sockets during operation.

Do not hammer or lever any part of the tool to enhance performance.

Proper reaction is required. Adjust the reaction plate to fit firmly against the reaction pin provided. In case of questions, consult with your local distributor.

### Working pressure (torque tool)

The tool’s maximum working pressure is 10,000 psi (700 Bar).

Make sure that all hydraulic equipment (pumps, hoses, couplers) used with this tool are rated for at least 10,000 psi (700 Bar) working pressure but that the power pack to be used is not able to reach more than 10,000 psi (700 Bar).

### Hydraulic connections

HTL Hydraulic Pumps are equipped with a zero pressure regulating valve. When connecting or disconnecting hoses from tools and pump, ensure that there is no pressure within the hoses.

When making connections with the quick release couplings, always make sure that the couplings are fully tightened. While using equipment, keep checking that the couplings are tight as if not, this may cause equipment to malfunction.

Always ensure that threaded fittings on the pump, tool and hoses are tight and leak free.

**CAUTION:** Loose or improper threaded fittings can be dangerous if pressurised. Severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way, come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause serious injury.

### OPERATION

The unit operates by simulating the normal operation of the torque tool while producing a pressure and torque reading.

The method employed to simulate the tool operation is to place the tool over a hex adaptor or directly into an input square.
NOTE: The Calibration rig will not open whilst the canopy is open. This must be securely closed for the calibration rig to operate.

Torque tool controls consists of a two way valve and a “hold to run” actuator yellow button advance.
Normal shut down procedure

- Switch off power to pump (red button).
- Using appropriate lifting equipment, remove torque tool from calibration unit and store safely.
- Check for oil/contaminant leakage.

Emergency shut down

Immediately shut down unit by hitting emergency stop.

**WARNING:** Do not put any persons at risk of injury; always remove all sources of energy before inspecting or interacting with the unit.

Setting the pressure

To set the pressure on the pump, follow this procedure:

1. Loosen the lock nut below the “T” handle on the pump’s external pressure regulator. Then turn the “T” handle (shown below) counter clockwise until it turns freely and easily.

2. Turn the pump “on”. Using the pump’s remote control pendant, push down the advance button and hold it.

3. While holding the pump in the advance mode, slowly turn the “T” handle clockwise and observe the pump pressure gauge rise.

**NOTE:** Always adjust the regulator in order to increase the pressure up - never down. Never adjust the regulation with the tool on the application.

4. When your gauge reaches the desired pressure stop turning the “T” handle and let the gauge settle out.

5. If the pressure continues to rise, release the advance button and back off your pressure by turning counter clockwise on the “T” handle. Then re-dress the advance switch on your remote and slowly bring pressure to desired value.

6. When the pressure is correct, turn the pump “off” and tighten the lock nut provided under the “T” handle. This sets pump pressure, which determines torque tool output.

Once the target pressure is set and locked, cycle the pump once more to ensure that the pressure setting did not change as you turned down the knurled knob.
POWER PACKS (GENERAL) (Premium models only)

Working pressure

The pump’s maximum working pressure is 10,000 psi (700 Bar). Make sure all hydraulic equipment and accessories are rated for 10,000 psi (700 Bar) operating pressure.

Hydraulic connections

Never disconnect or connect hydraulic hoses or fittings without first unloading the torque wrench. Ensure pump unit is switched off, and open all hydraulic controls several times to ensure that the system has been depressurised. If the system includes a gauge, double check the gauge to ensure pressure has been released.

When making a connection with quick disconnect couplings, make sure the couplings are fully engaged threaded connections such a fittings, gauges etc. must be clean and securely tightened and leak free.

CAUTION: Loose or improperly threaded couplers can be potentially dangerous if pressurised, however, severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause injury. Do not subject the hose to potential hazards such as sharp surfaces, extreme heat or heavy impact. Do not allow the hose to kink and twist. Inspect the hose for wear before it is used.

Prior to use

Check hydraulic oil (use grade 46) level to prevent possible pump burnout. Open the filler plug located on the reservoir plate. Look at the oil fill level on the oil sight gauge. The oil level should be approximately 2” from the top of the reservoir plate with motor off. Add oil as necessary. Do not mix different grades of oil.

Make sure all desired gauge, valve, hose and quick coupler connections are tight and secure before operating.

The use of a pressure gauge is required for normal pump operation. Mounted on the manifold, the gauge permits the operator to monitor the load on the wrench. +/-3% calibrated gauges are available for most applications.

Operation

Before starting your pump, connect your hydraulic hoses to the torque wrench.

To start the pump, press the green button on the hand control. This will start the electric motor and put the torque wrench in retract position. To advance and retract the torque wrench, press the yellow button on and off. To stop the pump, press the red button.

Noise
The noise level of this unit during operation is 80 dB(A).


**Vibration levels**

The vibration levels are less than 2.5M/sec² r.m.s.

**Environmental safety**

Electrically powered hydraulic power packs should not be used in an atmosphere which can be considered potentially explosive.

**NOTE:** Metal contact can cause sparks, precautions should be taken.

It is essential that the service intervals detailed in the maintenance procedures are followed to ensure that this equipment operates as efficiently as possible.

**Consumable materials**

Only use hydraulic oils as specified by the manufacturer/supplier.

**Unit disposal**

This unit must only be disposed of at a specialist unit breaker or by HTL Group Ltd. All metal parts are recyclable, hoses and parts contaminated with oil must be disposed of in a safe manner.

**MAINTENANCE RECOMMENDATION**

**Isolation**

When undertaking maintenance and repair work, the unit must be first made safe.

Switch off the unit at the main isolation point, unplug unit from mains. Implement lockout procedures.

Attach a warning sign to the unit in appropriate positions.

**Hydraulic equipment**

Work on hydraulic equipment must only be carried out by persons with specialist knowledge and experience of hydraulic systems.

Check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately.

Always relieve pressure from the hydraulic system before carrying out any kind of maintenance
or adjustment.

Hydraulic components must be installed and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the pipes and hoses must comply with technical requirements.

Only fit replacement components of a type recommended by the manufacturer.

Always practice extreme cleanliness when servicing hydraulic components.

Hydraulic oil can penetrate the skin causing serious injury. If oil is injected under the skin, seek medical help immediately.

Never run hands over hoses to find leaks.

**Draining**

The HTL Calibration Unit is designed to collect leakage of oil and fluids from the hydraulic tool, or from leaks within the unit. There is a drain plug in the base of the drip tray which is located under the base of the unit. A suitable container should be placed underneath, and the drain plug removed to drain the drip tray. Residual oil should be cleaned before use.

**Maintenance - torque tool**

Tool failure, although rare, does occur. Such failure is most often in the hydraulic couplers or hoses. These items are repairable or replaceable immediately, since they are available universally. Failures of structural members of the tool are quite rare, but replacement parts are available from stock. All repairs to HTL tools may be made by competent experienced individuals according to the instructions.

- **Lubrication** - All moving parts should periodically be coated with a good quality lubricant such as Lithium EP Complex. Under harsh environmental conditions, cleaning and lubricating should be performed more frequently.

- **Hydraulic hoses** - Hoses should be checked for cracks and leaks after each job. Hydraulic fittings can become plugged with dirt and should be flushed regularly. Kinks in hoses can cause internal parts of hose to collapse and restrict flow which often leads to hose bursting.

- **Quick-connects** - Fittings should be kept clean and not allowed to be dragged along the ground or floor, as even small particles of dirt can cause the internal valves to
malfunction.

- **Springs** - Springs are used for the drive pawl assembly and other internal parts. These springs can be replaced if necessary.

- **Cylinder seals** - If the cylinder requires disassembly, it is recommended that the cylinder seals be replaced at the same time. Seal kits are readily available.

- **Structural members** - All structural parts on the tool should be inspected once a year to determine if there are any cracks, chips or deformities. If so, immediate replacement is required.

**Maintenance - main unit**

Ensure hinges are lubricated and gas struts are kept in good condition. All surfaces should be kept free from contaminants. Inspect transducer housings for damage.

- Inspect cylinders before use. Visually assess for signs of leakage around seals and corrosion which is excessive and is likely to affect its safe functioning. Replace cylinders if necessary.

**Hydraulic pipes and unions**

All pipes and unions are manufactured to accepted standards; BS EN 10305-4 and DIN 2413 and fitted by experienced technicians. High pressures are utilised within the unit and therefore in order to minimise risk to safety please observe the following.

- Inspect and visually assess all hydraulic lines for leakage, pay attention to junctions and unions. Signs of corrosion on hydraulic pipes should be considered and piping should be replaced where it is deemed necessary. Replace defective parts.

- Contact your HTL distributor to replace any pipe work that has been damaged.

**WARNING:** Do not operate the unit if any hydraulic components are faulty or fitted incorrectly.

**Frame and structural components**

The main cabinet assembly which comprises the majority of the unit is constructed from steel. Great care has been taken to ensure that the unit is capable of functioning without failure. The transducer housing is subject to large forces when in operation and therefore care should be taken to ensure the following inspections are undertaken.

- Inspect before every use for cracks, permanent deflection of structural members and noticeable distortion of any kind. Extra attention should be paid to welded joints and reaction areas.

**NOTE:** If the unit displays any of the aforementioned, cease all operation and report
the fault to supplier of the unit.

**Maintenance - hydraulic power pack**

HTL Hydraulic Power Packs are precision-built units and, as such, do require care and maintenance. The following is general information, as other power packs may be used.

Be sure to read the Instruction Manual that came with the power pack that is being used.

- **Hydraulic oil** - Oil should be completely changed after every 40 hours of operation, or at least twice a year. Always make sure the reservoir is filled with fluid. If additional oil is required, use only high-grade hydraulic oil such as grade 46. The oil should never get to a milky colour state.

- **Quick-disconnects** - Fittings should be checked periodically for leaks. Dirt or foreign materials should be kept away from fittings. Clean before use.

- **Hydraulic gauge** - Some gauges are liquid filled. Should this liquid level drop, it indicates external leakage, and replacement is necessary. Should the gauge fill with hydraulic oil, it indicates internal failure and it should be discarded. HTL recommends that gauges are calibrated every 12 months.

- **Filter on pump** - The filter should be replaced twice a year in normal use and up to 4 times yearly if used daily.

- **Remote control** - The switch buttons should be checked periodically if any indications of problems exist.

- **Armature** - (electric motor) Check yearly.

- **Pumping unit** - The pump should be overhauled every 12 months. This can be done by your local distributor.

**TROUBLESHOOTING GUIDE**

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool will not retract.</td>
<td>Voltage to electric pump is too low due to line drop or inadequate amperage is available.</td>
<td>Get shorter extension cord or upgrade to 4mm², 25 amp rating or better. If shop power is adequate, draw power from welding machine or cal rod transformer. Replace parts as necessary.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive pawl are broken.</td>
<td></td>
</tr>
<tr>
<td>Gauge shows pressure build up but the tool will not cycle.</td>
<td>Couplings loose or inoperative.</td>
<td>Tighten and/or replace couplings. Use test #1 listed below to isolate problem.</td>
</tr>
<tr>
<td></td>
<td>Solenoid inoperative.</td>
<td>Check using test #2 below. If solenoid is not working, repair.</td>
</tr>
<tr>
<td>SYMPTOM</td>
<td>PROBABLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Defective gland seal.</td>
<td>Replace gland seal.</td>
</tr>
<tr>
<td>Tool operates backwards.</td>
<td>Couplings reversed.</td>
<td>Run test #4. Replumb system as necessary.</td>
</tr>
<tr>
<td></td>
<td>Multiple hoses in even numbers.</td>
<td>As plumbed, HTL hoses may only be joined together in odd numbers ONLY.</td>
</tr>
<tr>
<td>Ratchet will not take successive strokes.</td>
<td>Broken or otherwise inoperative drive pawl or spring</td>
<td>Replace drive pawl and/or spring.</td>
</tr>
<tr>
<td></td>
<td>Cylinder not retracting completely.</td>
<td>Remove tool from nut and cycle freely for several strokes. If problem persists, check pawls.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive plates is broken</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge records no pressure.</td>
<td>Gauge connection loose.</td>
<td>Tighten coupling.</td>
</tr>
<tr>
<td></td>
<td>Bad gauge.</td>
<td>Replace gauge.</td>
</tr>
<tr>
<td></td>
<td>Pump will not build pressure.</td>
<td>Tool will not build pressure - see “pump will not build pressure”.</td>
</tr>
<tr>
<td></td>
<td>Tool seals are blown.</td>
<td>Replace defective seals.</td>
</tr>
<tr>
<td>Pump will not build pressure.</td>
<td>Electric supply is low.</td>
<td>Check voltage.</td>
</tr>
<tr>
<td></td>
<td>Defective relief or regulator valve.</td>
<td>Replace valve.</td>
</tr>
<tr>
<td></td>
<td>Low oil or clogged filter.</td>
<td>Fill reservoir and clean filter.</td>
</tr>
<tr>
<td></td>
<td>Internal leak in oil line from external relief valve to pump body.</td>
<td>Open reservoir, inspect oil line while trying to build pressure - if leaking tighten fittings or replace.</td>
</tr>
<tr>
<td>Motor sluggish and inefficient “sounds sick” slow to build</td>
<td>Electric supply is low.</td>
<td>See test #1 in preceding block.</td>
</tr>
<tr>
<td></td>
<td>Clogged filter.</td>
<td>Clean or replace filter.</td>
</tr>
<tr>
<td>Pump heats up.</td>
<td>Improper use.</td>
<td>Operator is continuing to hold down on the advance stroke after the cylinder has reached end of stroke - this causes a lot of oil to go through a very small hole in relief valve causing heat build up. Have operator release advance stroke after accuracy assurance levers springs forwards.</td>
</tr>
<tr>
<td></td>
<td>Remote control is left in “on” position when pump is not actively in use.</td>
<td>Turn pump off whenever not actually being used. NO NOT leave pump running when tool is not in use.</td>
</tr>
<tr>
<td>SYMPTOM</td>
<td>PROBABLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tool will not build pressure.</td>
<td>Oil blow in wrench (piston seal, seal leak, blown o-ring, cracked piston).</td>
<td>Replace defective parts.</td>
</tr>
<tr>
<td></td>
<td>Pump problem.</td>
<td>Remove top cover screws on pump, lift pump slightly so that you can see inside. Operate pump looking inside for leaking fittings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If no leaking fittings, turn pressure regulating valve up to max. test pump if no pressure build up. Check and replace regulator parts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check 10,000 psi pressure relief valve. If it leaks oil at low pressure, replace it.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check to see if oil is returning back to tank from solenoid valve tube. Constant flow of oil shows problem lies within solenoid valve. Check operation, if it doesn’t work, repair or replace solenoid.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is hand control working on electric pump. Faulty cartridges. Replace if necessary. Check hand control wiring</td>
</tr>
<tr>
<td>Hose or tool fitting is damaged or leaks.</td>
<td>Broken or melted plastic outer covering.</td>
<td>If underlying kevlar or steel is still intact, continue operation. Inspect frequently.</td>
</tr>
<tr>
<td></td>
<td>Frayed kevlar or steel strands.</td>
<td>Cut hose in half and discard. Replace hose.</td>
</tr>
<tr>
<td></td>
<td>Oil leaks through fibres.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Broken fittings.</td>
<td>Remove old fitting and replace with steel high pressure fittings only. After changing fittings, always run test#4 to ensure proper plumbing</td>
</tr>
</tbody>
</table>

**TESTS**

**Test #1**

Attach hoses to pump and tool in the normal manner. Press the advance button and hold it down. If the pump pressure builds and the hoses “flex” but the tool still refuses to cycle, the problem is most likely a loose or defective coupling connection. To find out where the bad coupling is, remove the tool from the hoses and marry the loose ends together and cycle the pump. If the gauge pressure reads no more than 500 psi, then the bad fitting is on the tool. A significantly greater pressure indicates that the problem is in either the pump or a hose fitting.
Test #2

Remove screws from pump motor to reservoir, slide pump motor to the back while keeping pistons in oil. Turn pump on. If you have no oil coming out from the solenoid tube, change the solenoid.

Tighten the regulating valve to maximum, push on the advance button and while holding down, look to see if any oil is coming out from the regulating tube. If oil is coming out, change the regulating valve.

Test #3

Remove tool from hoses. Cycle pump. If pump fails to build pressure, the problem is with the pump. If it does build pressure, the problem is with hydraulic blow-by in the tool.

Test #4

NOTE: THIS TEST SHOULD BE RUN PRIOR TO EVERY USE OF A HTL TOOL.

Connect the tool, pump and hoses together as normal. Cycle the pump several times. Cycle the system once more and observe the sequence of operation. As you depress the advance button, the tool drive should turn about 24 degrees. At this point, release the advance button. You should see no further movement and after a moment you will hear another audible “click”. This is how the tools are designed to operate. If you observe any other sequence of operation, the system is out of order. Take immediate corrective action. For reference, tools and pumps that are designed from the factory are plumbed as follows:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Advance Side - Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
<tr>
<td>Hose</td>
<td>Advance Side - Female to Female</td>
</tr>
<tr>
<td></td>
<td>Retract Side - Male to Male</td>
</tr>
<tr>
<td>Pump</td>
<td>Advance Side - Male</td>
</tr>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
</tbody>
</table>

This ensures that the tool, pump and ONE hose cannot possibly be connected up incorrectly.

NOTE: Connecting two (or any even numbers) of hoses together creates “one” hose which is plumbed backwards. Male to Female and Female to Male. This will cause the system to operate backwards. If your hose isn’t long enough, connect 3 hoses together, move your pump or call HTL for a longer hose assembly.
DECLARATION

EC DECLARATION OF CONFORMITY

Name of Manufacturer: HTL Group
Address: 45 Colbourne Avenue, Nelson Park Ind. Estate, Cramlington, Northumberland NE23 1WD United Kingdom

Description of product: Calibration/Tensioner Test Unit

Model No's: CTS-***

We declare that this product complies with the appropriate ESR's of the following directives,

- 2006/42 EC Machinery Safety Directive
  - BS EN ISO 12100: 2010 - Safety of machinery, basic concepts, general principles for design, risk assessment & risk reduction
  - BS EN 4413:2010 - Hydraulik fluid power - general rules and safety requirements for systems & their components.
  - BS EN ISO 4414: 2010 - Pneumatic fluid power - general rules and safety requirements for systems & their components.
  - ISO 3744:1994 - Sound power level measurements

- 2006/95 EC Low Voltage Directive
- 2000/198 EC EMC Directive
- 2002/95 EC ROHS Directive
- 2014/68 EU Pressure Equipment Directive
  - Category 1 (Module A)

HTL Group, is the person authorised to compile and retain the Technical File for 10 years.

HTL Group, the manufacturer / supplier, undertake to transmit and/or make available in response to reasoned request, technical file details and other relative information to EEC National Authorities, in electronic or hard copy format.

Installation and operation of this equipment must be in accordance with the installation and operating instructions provided.

Name: Mike Johnson
Position: Group Director of Engineering
Signature: M. Johnson
Date: 1st March, 2016
OPERATING INSTRUCTIONS

HTL-CTS-003
Calibration Rig
5/50K Standard Torque
Please read this manual before operating the equipment.

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HTL will not be held responsible for any damage or harm caused by misuse of the equipment.

**General safety information**

This equipment is manufactured in accordance with the Supply of Machinery Safety Regulations 2006/42/EC. The user should ensure that this equipment conforms with local and national legislation if used outside of the European Economic Area (EEA).

Only competent, authorised personnel should install, set, operate, maintain, and decommission this equipment.

This equipment is designed for use in dry conditions. **DO NOT USE OUTSIDE.**

**Warnings**
Any residual risks are identified within this manual with the equipment marked where appropriate. Ensure these warnings are adhered.

The following labels are displayed on the unit for your safety, please observe all warnings.

- You can be injured if you do not obey the safety instructions as indicated on warning stickers.
- Observe all safety instructions and warnings attached to the unit.
- Replace unreadable or missing labels.
- Keep warnings and instruction labels clean.

- Unit CE plate

- This following label indicates the maximum static weight (loaded) of the unit with a component in it.

- The unit should only be transported empty, with no components inside.

- This warning indicates that there is a potential crush hazard and to keep away from moving parts.

**STAY ALERT.** Watch what you are doing. Do not use power equipment under the influence of any mood altering substances.

**WARRANTY**

HTL Group Ltd guarantees its products against all design and manufacturing defects for 1 year from the date of shipment. The guarantee does not include the ordinary wear of both metal and non-metal parts, abuse, using the equipment beyond its rated capacity and any wear or damage incurred as a result of using a hydraulic fluid which is not recommended by HTL Group Ltd.

Please note that if the equipment is disassembled or serviced by anyone other than an authorised service dealer or by HTL Group Ltd, this guarantee is rendered null and void.

In the event of a warranty claim, return the equipment to HTL Group Ltd or the authorised dealer which sold you the hydraulic equipment. HTL Group Ltd will repair or replace the faulty equipment, whichever is deemed most appropriate.
READ CAREFULLY: Most malfunctions in new equipment are the result of improper operation and/or set-up assembly.

PREPARATION: Remove your Calibration Unit from the shipping container using a forklift truck or suitable lifting device, with a lifting capacity of at least 750kg.

INSPECTION: Visually inspect all components for shipping damage. If any damage is found, notify our sales office immediately.

**Transportation**

The unit is designed to be transported by installed castors. The unit should be carried unloaded. The weight of the unit unloaded is 500kg. The maximum loaded weight of the unit and any tools to be calibrated is 1000kg.

**Positioning the unit**

When positioning the unit be sure to leave adequate room for operation. The area must be free from obstructions or other hazards that may affect operation. At least 1m clear space is required around the front and sides of the unit to be able to operate it safely. The unit must be on level ground with adequate local lighting, with no glare or stroboscopic effects, of at least an average of 100 lux. Once in position castors can be set in place by rotating the orange wheel to lower the feet.

Ensure that all hydraulic connections are securely connected. Verify that the hoses are not kinked and that walkways are clear.

**Connecting the system (torque tool)**

The hydraulic torque wrench and the power pack are connected by a 10,000 psi (700 Bar) operating pressure twin line hose assembly. The safety ratio of the Hydraulic Hose is 4:1. On each twin Hydraulic Hose, one line must be MALE-MALE and the other line must be FEMALE-FEMALE in order to ensure a correct interconnection between pump and torque tool. The 10,000 psi (700 Bar) high pressure couplers on the pump and on the torque wrench are Male couplers, others are Female couplers.

**IMPORTANT:**

- Never use two twin hydraulic hoses between pump and tool. If so, you cross couple the hoses and have the high pressure on the retract side of your tool, which will cause seals on the front of tool to burst.
- To avoid tool malfunction, do not reverse connectors.
- Do not try to slacken the swivel assembly at any time.

Connect the twin line hose to the swivel as shown below:
Ensure connectors are fully engaged and screwed snugly and completely together.

Control plate legend

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hold to operate</td>
</tr>
<tr>
<td>2</td>
<td>Pump start up</td>
</tr>
<tr>
<td>3</td>
<td>Pump stop</td>
</tr>
<tr>
<td>4</td>
<td>Pendant control</td>
</tr>
<tr>
<td>5</td>
<td>Pressure adjust</td>
</tr>
<tr>
<td>6</td>
<td>10K PSI gauge</td>
</tr>
<tr>
<td>7</td>
<td>Emergency stop / main power off</td>
</tr>
<tr>
<td>8</td>
<td>Main power on</td>
</tr>
</tbody>
</table>

Connecting the system

The hydraulic wrench and power pack are connected by a 10,000 psi (700 Bar) operating pressure hose assembly. The safety ratio of the hose is 4:1. Connect the single male screw connect to the female connect located on the rear of the unit. Be sure to set the pump pressure to 700 Bar max. The utilised pump incorporates a permanent safety relief valve rated to 700 Bar max to prevent damage to the unit.

Do not try to untighten the swivel assembly at any time when in use.

Ensure the hose connectors are fully engaged and screwed snugly and completely together.

Switch on power to the unit (blue button). Cycle the tool to ensure proper function by pressing the hand control advance button.

Ensure correct female square adaptor (fig. A) or male hex adaptor (fig. B) is installed for the tool to be calibrated.

Figure A (Female Square Adaptor)  Figure B (Male Hex Adaptor)
Locate the torque tool assembly securely on reaction points. Be sure the reaction arm is fully engaged. Be sure all hoses are free of the reaction points. Pressurise the system for a test; if the tool tends to “ride-up” or to “creep”, stop and re-adjust the reaction arm to a more solid and secure position.

**NOTE:** Remain clear of the reaction arm during operation and never put body parts between reaction arm and reaction surface.

Always use quality impact sockets in good condition which are the correct size and fully engage the nut. Hidden flaws, however, remain a possibility which could cause breakage, so stay clear of sockets during operation.

Do not hammer or lever any part of the tool to enhance performance.

Proper reaction is required. Adjust the reaction plate to fit firmly against the reaction pin provided. In case of questions, consult with your local distributor.

**Working pressure (torque tool)**

The tool’s maximum working pressure is 10,000 psi (700 Bar).

Make sure that all hydraulic equipment (pumps, hoses, couplers) used with this tool are rated for at least 10,000 psi (700 Bar) working pressure but that the power pack to be used is not able to reach more than 10,000 psi (700 Bar).

**Hydraulic connections**

HTL Hydraulic Pumps are equipped with a zero pressure regulating valve. When connecting or disconnecting hoses from tools and pump, ensure that there is no pressure within the hoses.

When making connections with the quick release couplings, always make sure that the couplings are fully tightened. While using equipment, keep checking that the couplings are tight as if not, this may cause equipment to malfunction.

Always ensure that threaded fittings on the pump, tool and hoses are tight and leak free.

**CAUTION:** Loose or improper threaded fittings can be dangerous if pressurised. Severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way, come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause serious injury.

**OPERATION**

The unit operates by simulating the normal operation of the torque tool while producing a pressure and torque reading.

The method employed to simulate the tool operation is to place the tool over a hex adaptor or directly into an input square.
NOTE: The Calibration rig will not open whilst the canopy is open. This must be securely closed for the calibration rig to operate..

Operating the unit

Torque tool controls consists of a two way valve and a “hold to run” actuator yellow button advance.
Normal shut down procedure

- Switch off power to pump (red button).
- Using appropriate lifting equipment, remove torque tool from calibration unit and store safely.
- Check for oil/contaminant leakage.

Emergency shut down

Immediately shut down unit by hitting emergency stop.

**WARNING:** Do not put any persons at risk of injury; always remove all sources of energy before inspecting or interacting with the unit.

Setting the pressure

To set the pressure on the pump, follow this procedure:

1. Loosen the lock nut below the “T” handle on the pump’s external pressure regulator. Then turn the “T” handle (shown below) counter clockwise until it turns freely and easily.

![Image of pump](image)

2. Turn the pump “on”. Using the pump’s remote control pendant, push down the advance button and hold it.

3. While holding the pump in the advance mode, slowly turn the “T” handle clockwise and observe the pump pressure gauge rise.

**NOTE:** Always adjust the regulator in order to increase the pressure up - never down. Never adjust the regulation with the tool on the application.

4. When your gauge reaches the desired pressure stop turning the “T” handle and let the gauge settle out.

5. If the pressure continues to rise, release the advance button and back off your pressure by turning counter clockwise on the “T” handle. Then re-dress the advance switch on your remote and slowly bring pressure to desired value.

6. When the pressure is correct, turn the pump “off” and tighten the lock nut provided under the “T” handle. This sets pump pressure, which determines torque tool output.

Once the target pressure is set and locked, cycle the pump once more to ensure that the pressure setting did not change as you turned down the knurled knob.
POWER PACKS (GENERAL) (Premium models only)

Working pressure

The pump’s maximum working pressure is 10,000 psi (700 Bar). Make sure all hydraulic equipment and accessories are rated for 10,000 psi (700 Bar) operating pressure.

Hydraulic connections

Never disconnect or connect hydraulic hoses or fittings without first unloading the torque wrench. Ensure pump unit is switched off, and open all hydraulic controls several times to ensure that the system has been depressurised. If the system includes a gauge, double check the gauge to ensure pressure has been released.

When making a connection with quick disconnect couplings, make sure the couplings are fully engaged threaded connections such a fittings, gauges etc. must be clean and securely tightened and leak free.

**CAUTION:** Loose or improperly threaded couplers can be potentially dangerous if pressurised, however, severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause injury. Do not subject the hose to potential hazards such as sharp surfaces, extreme heat or heavy impact. Do not allow the hose to kink and twist. Inspect the hose for wear before it is used.

Prior to use

Check hydraulic oil (use grade 46) level to prevent possible pump burnout. Open the filler plug located on the reservoir plate. Look at the oil fill level on the oil sight gauge. The oil level should be approximately 2” from the top of the reservoir plate with motor off. Add oil as necessary. Do not mix different grades of oil.

Make sure all desired gauge, valve, hose and quick coupler connections are tight and secure before operating.

The use of a pressure gauge is required for normal pump operation. Mounted on the manifold, the gauge permits the operator to monitor the load on the wrench. +/-3% calibrated gauges are available for most applications.

Operation

Before starting your pump, connect your hydraulic hoses to the torque wrench.

To start the pump, press the green button on the hand control. This will start the electric motor and put the torque wrench in retract position. To advance and retract the torque wrench, press the yellow button on and off. To stop the pump, press the red button.

Noise
The noise level of this unit during operation is 80 dB(A).


**Vibration levels**

The vibration levels are less than 2.5M/sec² r.m.s.

**Environmental safety**

Electrically powered hydraulic power packs should not be used in an atmosphere which can be considered potentially explosive.

**NOTE:** Metal contact can cause sparks, precautions should be taken.

It is essential that the service intervals detailed in the maintenance procedures are followed to ensure that this equipment operates as efficiently as possible.

**Consumable materials**

Only use hydraulic oils as specified by the manufacturer/supplier.

**Unit disposal**

This unit must only be disposed of at a specialist unit breaker or by HTL Group Ltd. All metal parts are recyclable, hoses and parts contaminated with oil must be disposed of in a safe manner.

**MAINTENANCE RECOMMENDATION**

**Isolation**

When undertaking maintenance and repair work, the unit must be first made safe.

Switch off the unit at the main isolation point, unplug unit from mains. Implement lockout procedures.

Attach a warning sign to the unit in appropriate positions.

**Hydraulic equipment**

Work on hydraulic equipment must only be carried out by persons with specialist knowledge and experience of hydraulic systems.

Check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately.

Always relieve pressure from the hydraulic system before carrying out any kind of maintenance
or adjustment.

Hydraulic components must be installed and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the pipes and hoses must comply with technical requirements.

Only fit replacement components of a type recommended by the manufacturer.

Always practice extreme cleanliness when servicing hydraulic components.

Hydraulic oil can penetrate the skin causing serious injury. If oil is injected under the skin, seek medical help immediately.

Never run hands over hoses to find leaks.

**Draining**

The HTL Calibration Unit is designed to collect leakage of oil and fluids from the hydraulic tool, or from leaks within the unit. There is a drain plug in the base of the drip tray which is located under the base of the unit. A suitable container should be placed underneath, and the drain plug removed to drain the drip tray. Residual oil should be cleaned before use.

**Maintenance - torque tool**

Tool failure, although rare, does occur. Such failure is most often in the hydraulic couplers or hoses. These items are repairable or replaceable immediately, since they are available universally. Failures of structural members of the tool are quite rare, but replacement parts are available from stock. All repairs to HTL tools may be made by competent experienced individuals according to the instructions.

- **Lubrication** - All moving parts should periodically be coated with a good quality lubricant such as Lithium EP Complex. Under harsh environmental conditions, cleaning and lubricating should be performed more frequently.

- **Hydraulic hoses** - Hoses should be checked for cracks and leaks after each job. Hydraulic fittings can become plugged with dirt and should be flushed regularly. Kinks in hoses can cause internal parts of hose to collapse and restrict flow which often leads to hose bursting.

- **Quick-connects** - Fittings should be kept clean and not allowed to be dragged along the ground or floor, as even small particles of dirt can cause the internal valves to
malfunction.

- **Springs** - Springs are used for the drive pawl assembly and other internal parts. These springs can be replaced if necessary.

- **Cylinder seals** - If the cylinder requires disassembly, it is recommended that the cylinder seals be replaced at the same time. Seal kits are readily available.

- **Structural members** - All structural parts on the tool should be inspected once a year to determine if there are any cracks, chips or deformities. If so, immediate replacement is required.

**Maintenance - main unit**

Ensure hinges are lubricated and gas struts are kept in good condition. All surfaces should be kept free from contaminants. Inspect transducer housings for damage.

- Inspect cylinders before use. Visually assess for signs of leakage around seals and corrosion which is excessive and is likely to affect its safe functioning. Replace cylinders if necessary.

**Hydraulic pipes and unions**

All pipes and unions are manufactured to accepted standards; BS EN 10305-4 and DIN 2413 and fitted by experienced technicians. High pressures are utilised within the unit and therefore in order to minimise risk to safety please observe the following.

- Inspect and visually assess all hydraulic lines for leakage, pay attention to junctions and unions. Signs of corrosion on hydraulic pipes should be considered and piping should be replaced where it is deemed necessary. Replace defective parts.

- Contact your HTL distributor to replace any pipe work that has been damaged.

**WARNING:** Do not operate the unit if any hydraulic components are faulty or fitted incorrectly.

**Frame and structural components**

The main cabinet assembly which comprises the majority of the unit is constructed from steel. Great care has been taken to ensure that the unit is capable of functioning without failure. The transducer housing is subject to large forces when in operation and therefore care should be taken to ensure the following inspections are undertaken.

- Inspect before every use for cracks, permanent deflection of structural members and noticeable distortion of any kind. Extra attention should be paid to welded joints and reaction areas.

**NOTE:** If the unit displays any of the aforementioned, cease all operation and report
the fault to supplier of the unit.

**Maintenance - hydraulic power pack**

HTL Hydraulic Power Packs are precision-built units and, as such, do require care and maintenance. The following is general information, as other power packs may be used.

Be sure to read the Instruction Manual that came with the power pack that is being used.

- **Hydraulic oil** - Oil should be completely changed after every 40 hours of operation, or at least twice a year. Always make sure the reservoir is filled with fluid. If additional oil is required, use only high-grade hydraulic oil such as grade 46. The oil should never get to a milky colour state.

- **Quick-disconnects** - Fittings should be checked periodically for leaks. Dirt or foreign materials should be kept away from fittings. Clean before use.

- **Hydraulic gauge** - Some gauges are liquid filled. Should this liquid level drop, it indicates external leakage, and replacement is necessary. Should the gauge fill with hydraulic oil, it indicates internal failure and it should be discarded. HTL recommends that gauges are calibrated every 12 months.

- **Filter on pump** - The filter should be replaced twice a year in normal use and up to 4 times yearly if used daily.

- **Remote control** - The switch buttons should be checked periodically if any indications of problems exist.

- **Armature** - (electric motor) Check yearly.

- **Pumping unit** - The pump should be overhauled every 12 months. This can be done by your local distributor.

**TROUBLESHOOTING GUIDE**

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool will not retract .</td>
<td>Voltage to electric pump is too low due to line drop or inadequate amperage is available.</td>
<td>Get shorter extension cord or upgrade to 4mm², 25 amp rating or better. If shop power is adequate, draw power from welding machine or cal rod transformer.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive pawl are broken.</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge shows pressure build up but the tool will not cycle.</td>
<td>Couplings loose or inoperative.</td>
<td>Tighten and/or replace couplings. Use test #1 listed below to isolate problem.</td>
</tr>
<tr>
<td></td>
<td>Solenoid inoperative.</td>
<td>Check using test #2 below. If solenoid is not working, repair.</td>
</tr>
<tr>
<td>SYMPTOM</td>
<td>PROBABLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>---------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Defective gland seal.</td>
<td>Replace gland seal.</td>
</tr>
<tr>
<td>Tool operates backwards.</td>
<td>Couplings reversed.</td>
<td>Run test #4. Replumb system as necessary.</td>
</tr>
<tr>
<td></td>
<td>Multiple hoses in even numbers.</td>
<td>As plumbed, HTL hoses may only be joined together in odd numbers ONLY.</td>
</tr>
<tr>
<td>Ratchet will not take successive strokes.</td>
<td>Broken or otherwise inoperative drive pawl or spring.</td>
<td>Replace drive pawl and/or spring.</td>
</tr>
<tr>
<td></td>
<td>Cylinder not retracting completely.</td>
<td>Remove tool from nut and cycle freely for several strokes. If problem persists, check pawls.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive plates is broken.</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge records no pressure.</td>
<td>Gauge connection loose.</td>
<td>Tighten coupling.</td>
</tr>
<tr>
<td></td>
<td>Bad gauge.</td>
<td>Replace gauge.</td>
</tr>
<tr>
<td></td>
<td>Pump will not build pressure.</td>
<td>Tool will not build pressure - see “pump will not build pressure”.</td>
</tr>
<tr>
<td></td>
<td>Tool seals are blown.</td>
<td>Replace defective seals.</td>
</tr>
<tr>
<td>Pump will not build pressure.</td>
<td>Electric supply is low.</td>
<td>Check voltage.</td>
</tr>
<tr>
<td></td>
<td>Defective relief or regulator valve.</td>
<td>Replace valve.</td>
</tr>
<tr>
<td></td>
<td>Low oil or clogged filter.</td>
<td>Fill reservoir and clean filter.</td>
</tr>
<tr>
<td></td>
<td>Internal leak in oil line from external relief valve to pump body.</td>
<td>Open reservoir, inspect oil line while trying to build pressure - if leaking tighten fittings or replace.</td>
</tr>
<tr>
<td>Motor sluggish and inefficient “sounds sick” slow to build pressure</td>
<td>Electric supply is low.</td>
<td>See test #1 in preceding block.</td>
</tr>
<tr>
<td></td>
<td>Clogged filter.</td>
<td>Clean or replace filter.</td>
</tr>
<tr>
<td>Pump heats up.</td>
<td>Improper use.</td>
<td>Operator is continuing to hold down on the advance stroke after the cylinder has reached end of stroke - this causes a lot of oil to go through a very small hole in relief valve causing heat build up. Have operator release advance stroke after accuracy assurance levers springs forwards.</td>
</tr>
<tr>
<td></td>
<td>Remote control is left in “on” position when pump is not actively in use.</td>
<td>Turn pump off whenever not actually being used. NO NOT leave pump running when tool is not in use.</td>
</tr>
</tbody>
</table>
Test #1

Attach hoses to pump and tool in the normal manner. Press the advance button and hold it down. If the pump pressure builds and the hoses “flex” but the tool still refuses to cycle, the problem is most likely a loose or defective coupling connection. To find out where the bad coupling is, remove the tool from the hoses and marry the loose ends together and cycle the pump. If the gauge pressure reads no more than 500 psi, then the bad fitting is on the tool. A significantly greater pressure indicates that the problem is in either the pump or a hose fitting.
**Test #2**

Remove screws from pump motor to reservoir, slide pump motor to the back while keeping pistons in oil. Turn pump on. If you have no oil coming out from the solenoid tube, change the solenoid.

Tighten the regulating valve to maximum, push on the advance button and while holding down, look to see if any oil is coming out from the regulating tube. If oil is coming out, change the regulating valve.

**Test #3**

Remove tool from hoses. Cycle pump. If pump fails to build pressure, the problem is with the pump. If it does build pressure, the problem is with hydraulic blow-by in the tool.

**Test #4**

**NOTE:** THIS TEST SHOULD BE RUN PRIOR TO EVERY USE OF A HTL TOOL.

Connect the tool, pump and hoses together as normal. Cycle the pump several times. Cycle the system once more and observe the sequence of operation. As you depress the advance button, the tool drive should turn about 24 degrees. At this point, release the advance button. You should see no further movement and after a moment you will hear another audible “click”. This is how the tools are designed to operate. If you observe any other sequence of operation, the system is out of order. Take immediate corrective action. For reference, tools and pumps that are designed from the factory are plumbed as follows:

<table>
<thead>
<tr>
<th></th>
<th>Tool</th>
<th>Advance Side - Male</th>
<th>Retract Side - Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hose</td>
<td>Advance Side - Female to Female</td>
<td>Retract Side - Male to Male</td>
</tr>
<tr>
<td></td>
<td>Pump</td>
<td>Advance Side - Male</td>
<td>Retract Side - Female</td>
</tr>
</tbody>
</table>

This ensures that the tool, pump and ONE hose cannot possibly be connected up incorrectly.

**NOTE:** Connecting two (or any even numbers) of hoses together creates “one” hose which is plumbed backwards. Male to Female and Female to Male. This will cause the system to operate backwards. If your hose isn’t long enough, connect 3 hoses together, move your pump or call HTL for a longer hose assembly.
DECLARATION

EC DECLARATION OF CONFORMITY

Name of Manufacturer: HTL Group
Address: 45 Colbourne Avenue, Nelson Park Ind. Estate, Cramlington, Northumberland NE23 1WD United Kingdom

Description of product: Calibration/Tensioner Test Unit

Model No's: CTS-***

We declare that this product complies with the appropriate ESR's of the following directives,

• 2006/42 EC Machinery Safety Directive
  o BS EN ISO 12100: 2010 - Safety of machinery, basic concepts, general principles for design, risk assessment & risk reduction
  o BS EN 4413:2010 - Hydraulic fluid power - general rules and safety requirements for systems & their components.
  o BS EN ISO 60204: 2008 - Safety of machinery electrical equipment.
  o BS EN ISO 4414: 2010 - Pneumatic fluid power - general rules and safety requirements for systems & their components.
  o ISO 3744:1994 - Sound power level measurements

• 2006/95 EC Low Voltage Directive

• 2000/158 EC EMC Directive

• 2002/95 EC ROHS Directive

• 2014/80 EU Pressure Equipment Directive
  o Category 1 (Module A)

HTL Group, is the person authorised to compile and retain the Technical File for 10 years.

HTL Group, the manufacturer / supplier, undertake to transmit and/or make available in response to reasoned request, technical file details and other relative information to EEC National Authorities, in electronic or hard copy format.

Installation and operation of this equipment must be in accordance with the installation and operating instructions provided.

Name: Mike Johnson
Signature: [Signature]
Position: Group Director of Engineering
Date: 1st March, 2016
OPERATING INSTRUCTIONS

HTL-CTS-004-110
Calibration Rig
5/25K Premium Torque 110v
SAFETY

Please read this manual before operating the equipment.

This unit must only be used for the intended purpose of calibrating torque wrenches.

The unit operates by simulating normal operation of torque tools.

A number of pins are supplied for use in different positions depending on tool size and type.

Misuse

The unit has been designed for the testing and calibration of hydraulic torque tools. The unit should not be used for anything other than its specified use. Do not disassemble the unit during loading and unloading. Loads must be lifted using suitable assistance and avoiding manual handling as much as possible.

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Ensure that all hydraulic connections are securely connected. Verify that the hoses are not kinked and that walkways are clear.

Connecting the system (torque tool)

The hydraulic torque wrench and the power pack are connected by a 10,000 psi (700 Bar) operating pressure twin line hose assembly. The safety ratio of the Hydraulic Hose is 4:1. On each twin Hydraulic Hose, one line must be MALE-MALE and the other line must be FEMALE-FEMALE in order to ensure a correct interconnection between pump and torque tool. The 10,000 psi (700 Bar) high pressure couplers on the pump and on the torque wrench are Male couplers, others are Female couplers.

IMPORTANT:

• Never use two twin hydraulic hoses between pump and tool. If so, you cross couple the hoses and have the high pressure on the retract side of your tool, which will cause seals on the front of tool to burst.

• To avoid tool malfunction, do not reverse connectors.

• Do not try to slacken the swivel assembly at any time.

Connect the twin line hose to the swivel as shown below:
Ensure connectors are fully engaged and screwed snugly and completely together.

Control plate legend

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hold to operate</td>
</tr>
<tr>
<td>2</td>
<td>Pump start up</td>
</tr>
<tr>
<td>3</td>
<td>Pump stop</td>
</tr>
<tr>
<td>4</td>
<td>Pendant control</td>
</tr>
<tr>
<td>5</td>
<td>Pressure adjust</td>
</tr>
<tr>
<td>6</td>
<td>10K PSI gauge</td>
</tr>
<tr>
<td>7</td>
<td>Emergency stop / main power off</td>
</tr>
<tr>
<td>8</td>
<td>Main power on</td>
</tr>
</tbody>
</table>

Connecting the system

The hydraulic wrench and power pack are connected by a 10,000 psi (700 Bar) operating pressure hose assembly. The safety ratio of the hose is 4:1. Connect the single male screw connect to the female connect located on the rear of the unit. Be sure to set the pump pressure to 700 Bar max. The utilised pump incorporates a permanent safety relief valve rated to 700 Bar max to prevent damage to the unit.

Do not try to untighten the swivel assembly at any time when in use.

Ensure the hose connectors are fully engaged and screwed snugly and completely together.

Switch on power to the unit (blue button). Cycle the tool to ensure proper function by pressing the hand control advance button.

Ensure correct female square adaptor (fig. A) or male hex adaptor (fig. B) is installed for the tool to be calibrated.
Locate the torque tool assembly securely on reaction points. Be sure the reaction arm is fully engaged. Be sure all hoses are free of the reaction points. Pressurise the system for a test; if the tool tends to “ride-up” or to “creep”, stop and re-adjust the reaction arm to a more solid and secure position.

**NOTE:** Remain clear of the reaction arm during operation and never put body parts between reaction arm and reaction surface.

Always use quality impact sockets in good condition which are the correct size and fully engage the nut. Hidden flaws, however, remain a possibility which could cause breakage, so stay clear of sockets during operation.

Do not hammer or lever any part of the tool to enhance performance.

Proper reaction is required. Adjust the reaction plate to fit firmly against the reaction pin provided. In case of questions, consult with your local distributor.

**Working pressure (torque tool)**

The tool’s maximum working pressure is 10,000 psi (700 Bar).

Make sure that all hydraulic equipment (pumps, hoses, couplers) used with this tool are rated for at least 10,000 psi (700 Bar) working pressure but that the power pack to be used is not able to reach more than 10,000 psi (700 Bar).

**Hydraulic connections**

HTL Hydraulic Pumps are equipped with a zero pressure regulating valve. When connecting or disconnecting hoses from tools and pump, ensure that there is no pressure within the hoses.

When making connections with the quick release couplings, always make sure that the couplings are fully tightened. While using equipment, keep checking that the couplings are tight as if not, this may cause equipment to malfunction.

Always ensure that threaded fittings on the pump, tool and hoses are tight and leak free.

**CAUTION:** Loose or improper threaded fittings can be dangerous if pressurised. Severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way, come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause serious injury.

**OPERATION**

The unit operates by simulating the normal operation of the torque tool while producing a pressure and torque reading.

The method employed to simulate the tool operation is to place the tool over a hex adaptor or directly into an input square.
NOTE: The Calibration rig will not open whilst the canopy is open. This must be securely closed for the calibration rig to operate.

Operating the unit

Torque tool controls consists of a two way valve and a “hold to run” actuator yellow button advance.
Normal shut down procedure

• Switch off power to pump (red button).
• Using appropriate lifting equipment, remove torque tool from calibration unit and store safely.
• Check for oil/contaminant leakage.

Emergency shut down

Immediately shut down unit by hitting emergency stop.

**WARNING:** Do not put any persons at risk of injury; always remove all sources of energy before inspecting or interacting with the unit.

Setting the pressure

To set the pressure on the pump, follow this procedure:

1. Loosen the lock nut below the “T” handle on the pump’s external pressure regulator. Then turn the “T” handle (shown below) counter clockwise until it turns freely and easily.

2. Turn the pump “on”. Using the pump’s remote control pendant, push down the advance button and hold it.

3. While holding the pump in the advance mode, slowly turn the “T” handle clockwise and observe the pump pressure gauge rise.

**NOTE:** Always adjust the regulator in order to increase the pressure up - never down. Never adjust the regulation with the tool on the application.

4. When your gauge reaches the desired pressure stop turning the “T” handle and let the gauge settle out.

5. If the pressure continues to rise, release the advance button and back off your pressure by turning counter clockwise on the “T” handle. Then re-dress the advance switch on your remote and slowly bring pressure to desired value.

6. When the pressure is correct, turn the pump “off” and tighten the lock nut provided under the “T” handle. This sets pump pressure, which determines torque tool output.

Once the target pressure is set and locked, cycle the pump once more to ensure that the pressure setting did not change as you turned down the knurled knob.
POWER PACKS (GENERAL)

Working pressure

The pump’s maximum working pressure is 10,000 psi (700 Bar). Make sure all hydraulic equipment and accessories are rated for 10,000 psi (700 Bar) operating pressure.

Hydraulic connections

Never disconnect or connect hydraulic hoses or fittings without first unloading the torque wrench. Ensure pump unit is switched off, and open all hydraulic controls several times to ensure that the system has been depressurised. If the system includes a gauge, double check the gauge to ensure pressure has been released.

When making a connection with quick disconnect couplings, make sure the couplings are fully engaged threaded connections such as fittings, gauges etc. must be clean and securely tightened and leak free.

**CAUTION:** Loose or improperly threaded couplers can be potentially dangerous if pressurised, however, severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause injury. Do not subject the hose to potential hazards such as sharp surfaces, extreme heat or heavy impact. Do not allow the hose to kink and twist. Inspect the hose for wear before it is used.

Prior to use

Check hydraulic oil (use grade 46) level to prevent possible pump burnout. Open the filler plug located on the reservoir plate. Look at the oil fill level on the oil sight gauge. The oil level should be approximately 2” from the top of the reservoir plate with motor off. Add oil as necessary. Do not mix different grades of oil.

Make sure all desired gauge, valve, hose and quick coupler connections are tight and secure before operating.

The use of a pressure gauge is required for normal pump operation. Mounted on the manifold, the gauge permits the operator to monitor the load on the wrench. +/-3% calibrated gauges are available for most applications.

Operation

Before starting your pump, connect your hydraulic hoses to the torque wrench.

To start the pump, press the green button on the hand control. This will start the electric motor and put the torque wrench in retract position. To advance and retract the torque wrench, press the yellow button on and off. To stop the pump, press the red button.

Noise
The noise level of this unit during operation is 80 dB(A).


**Vibration levels**

The vibration levels are less than 2.5M/sec² r.m.s.

**Environmental safety**

Electrically powered hydraulic power packs should not be used in an atmosphere which can be considered potentially explosive.

**NOTE:** Metal contact can cause sparks, precautions should be taken.

It is essential that the service intervals detailed in the maintenance procedures are followed to ensure that this equipment operates as efficiently as possible.

**Consumable materials**

Only use hydraulic oils as specified by the manufacturer/supplier.

**Unit disposal**

This unit must only be disposed of at a specialist unit breaker or by HTL Group Ltd. All metal parts are recyclable, hoses and parts contaminated with oil must be disposed of in a safe manner.

**MAINTENANCE RECOMMENDATION**

**Isolation**

When undertaking maintenance and repair work, the unit must be first made safe.

Switch off the unit at the main isolation point, unplug unit from mains. Implement lockout procedures.

Attach a warning sign to the unit in appropriate positions.

**Hydraulic equipment**

Work on hydraulic equipment must only be carried out by persons with specialist knowledge and experience of hydraulic systems.

Check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately.

Always relieve pressure from the hydraulic system before carrying out any kind of maintenance
Hydraulic components must be installed and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the pipes and hoses must comply with technical requirements.

Only fit replacement components of a type recommended by the manufacturer.

Always practice extreme cleanliness when servicing hydraulic components.

Hydraulic oil can penetrate the skin causing serious injury. If oil is injected under the skin, seek medical help immediately.

Never run hands over hoses to find leaks.

**Draining**

The HTL Calibration Unit is designed to collect leakage of oil and fluids from the hydraulic tool, or from leaks within the unit. There is a drain plug in the base of the drip tray which is located under the base of the unit. A suitable container should be placed underneath, and the drain plug removed to drain the drip tray. Residual oil should be cleaned before use.

**Maintenance - torque tool**

Tool failure, although rare, does occur. Such failure is most often in the hydraulic couplers or hoses. These items are repairable or replaceable immediately, since they are available universally. Failures of structural members of the tool are quite rare, but replacement parts are available from stock. All repairs to HTL tools may be made by competent experienced individuals according to the instructions.

- **Lubrication** - All moving parts should periodically be coated with a good quality lubricant such as Lithium EP Complex. Under harsh environmental conditions, cleaning and lubricating should be performed more frequently.

- **Hydraulic hoses** - Hoses should be checked for cracks and leaks after each job. Hydraulic fittings can become plugged with dirt and should be flushed regularly. Kinks in hoses can cause internal parts of hose to collapse and restrict flow which often leads to hose bursting.

- **Quick-connects** - Fittings should be kept clean and not allowed to be dragged along the ground or floor, as even small particles of dirt can cause the internal valves to
malfunction.

- **Springs** - Springs are used for the drive pawl assembly and other internal parts. These springs can be replaced if necessary.

- **Cylinder seals** - If the cylinder requires disassembly, it is recommended that the cylinder seals be replaced at the same time. Seal kits are readily available.

- **Structural members** - All structural parts on the tool should be inspected once a year to determine if there are any cracks, chips or deformities. If so, immediate replacement is required.

### Maintenance - main unit

Ensure hinges are lubricated and gas struts are kept in good condition. All surfaces should be kept free from contaminants. Inspect transducer housings for damage.

- Inspect cylinders before use. Visually assess for signs of leakage around seals and corrosion which is excessive and is likely to affect its safe functioning. Replace cylinders if necessary.

### Hydraulic pipes and unions

All pipes and unions are manufactured to accepted standards; BS EN 10305-4 and DIN 2413 and fitted by experienced technicians. High pressures are utilised within the unit and therefore in order to minimise risk to safety please observe the following.

- Inspect and visually assess all hydraulic lines for leakage, pay attention to junctions and unions. Signs of corrosion on hydraulic pipes should be considered and piping should be replaced where it is deemed necessary. Replace defective parts.

- Contact your HTL distributor to replace any pipe work that has been damaged.

**WARNING:** Do not operate the unit if any hydraulic components are faulty or fitted incorrectly.

### Frame and structural components

The main cabinet assembly which comprises the majority of the unit is constructed from steel. Great care has been taken to ensure that the unit is capable of functioning without failure. The transducer housing is subject to large forces when in operation and therefore care should be taken to ensure the following inspections are undertaken.

- Inspect before every use for cracks, permanent deflection of structural members and noticeable distortion of any kind. Extra attention should be paid to welded joints and reaction areas.

**NOTE:** If the unit displays any of the aforementioned, cease all operation and report
the fault to supplier of the unit.

Maintenance - hydraulic power pack

HTL Hydraulic Power Packs are precision-built units and, as such, do require care and maintenance. The following is general information, as other power packs may be used.

Be sure to read the Instruction Manual that came with the power pack that is being used.

- **Hydraulic oil** - Oil should be completely changed after every 40 hours of operation, or at least twice a year. Always make sure the reservoir is filled with fluid. If additional oil is required, use only high-grade hydraulic oil such as grade 46. The oil should never get to a milky colour state.

- **Quick-disconnects** - Fittings should be checked periodically for leaks. Dirt or foreign materials should be kept away from fittings. Clean before use.

- **Hydraulic gauge** - Some gauges are liquid filled. Should this liquid level drop, it indicates external leakage, and replacement is necessary. Should the gauge fill with hydraulic oil, it indicates internal failure and it should be discarded. HTL recommends that gauges are calibrated every 12 months.

- **Filter on pump** - The filter should be replaced twice a year in normal use and up to 4 times yearly if used daily.

- **Remote control** - The switch buttons should be checked periodically if any indications of problems exist.

- **Armature** - (electric motor) Check yearly.

- **Pumping unit** - The pump should be overhauled every 12 months. This can be done by your local distributor.

TROUBLESHOOTING GUIDE

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool will not retract</td>
<td>Voltage to electric pump is too low due to line drop or inadequate amperage is available.</td>
<td>Get shorter extension cord or upgrade to 4mm², 25 amp rating or better. If shop power is adequate, draw power from welding machine or cal rod transformer.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive pawl are broken.</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge shows pressure build up but the tool will not cycle.</td>
<td>Couplings loose or inoperative.</td>
<td>Tighten and/or replace couplings. Use test #1 listed below to isolate problem.</td>
</tr>
<tr>
<td></td>
<td>Solenoid inoperative.</td>
<td>Check using test #2 below. If solenoid is not working, repair.</td>
</tr>
<tr>
<td>SYMPTOM</td>
<td>PROBABLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>--------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tool operates backwards.</td>
<td>Couplings reversed.</td>
<td>Run test #4. Replumb system as necessary.</td>
</tr>
<tr>
<td></td>
<td>Multiple hoses in even numbers.</td>
<td>As plumbed, HTL hoses may only be joined together in odd numbers ONLY.</td>
</tr>
<tr>
<td>Ratchet will not take successive strokes.</td>
<td>Broken or otherwise inoperative drive pawl or spring.</td>
<td>Replace drive pawl and/or spring.</td>
</tr>
<tr>
<td></td>
<td>Cylinder not retracting completely.</td>
<td>Remove tool from nut and cycle freely for several strokes. If problem persists, check pawls.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive plates is broken.</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge records no pressure.</td>
<td>Gauge connection loose.</td>
<td>Tighten coupling.</td>
</tr>
<tr>
<td></td>
<td>Bad gauge.</td>
<td>Replace gauge.</td>
</tr>
<tr>
<td></td>
<td>Pump will not build pressure.</td>
<td>Tool will not build pressure - see “pump will not build pressure”.</td>
</tr>
<tr>
<td></td>
<td>Tool seals are blown.</td>
<td>Replace defective seals.</td>
</tr>
<tr>
<td>Pump will not build pressure.</td>
<td>Electric supply is low.</td>
<td>Check voltage.</td>
</tr>
<tr>
<td></td>
<td>Defective relief or regulator valve.</td>
<td>Replace valve.</td>
</tr>
<tr>
<td></td>
<td>Low oil or clogged filter.</td>
<td>Fill reservoir and clean filter.</td>
</tr>
<tr>
<td></td>
<td>Internal leak in oil line from external relief valve to pump body.</td>
<td>Open reservoir, inspect oil line while trying to build pressure - if leaking tighten fittings or replace.</td>
</tr>
<tr>
<td>Motor sluggish and inefficient “sounds sick” slow to build pressure</td>
<td>Electric supply is low.</td>
<td>See test #1 in preceding block.</td>
</tr>
<tr>
<td></td>
<td>Clogged filter.</td>
<td>Clean or replace filter.</td>
</tr>
<tr>
<td>Pump heats up.</td>
<td>Improper use.</td>
<td>Operator is continuing to hold down on the advance stroke after the cylinder has reached end of stroke - this causes a lot of oil to go through a very small hole in relief valve causing heat build up. Have operator release advance stroke after accuracy assurance levers springs forwards.</td>
</tr>
<tr>
<td></td>
<td>Remote control is left in “on” position when pump is not actively in use.</td>
<td>Turn pump off whenever not actually being used. NO NOT leave pump running when tool is not in use.</td>
</tr>
</tbody>
</table>
### SYMPTOM: Tool will not build pressure.

<table>
<thead>
<tr>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
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</thead>
<tbody>
<tr>
<td>Oil blow in wrench (piston seal, seal leak, blown o-ring, cracked piston).</td>
<td>Replace defective parts.</td>
</tr>
</tbody>
</table>

### SYMPTOM: Hose or tool fitting is damaged or leaks.

<table>
<thead>
<tr>
<th>PROBABLE CAUSE</th>
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</thead>
<tbody>
<tr>
<td>Broken or melted plastic outer covering.</td>
<td>If underlying kevlar or steel is still intact, continue operation. Inspect frequently.</td>
</tr>
<tr>
<td>Frayed kevlar or steel strands.</td>
<td>Cut hose in half and discard. Replace hose.</td>
</tr>
<tr>
<td>Oil leaks through fibres.</td>
<td>Remove old fitting and replace with steel high pressure fittings only. After changing fittings, always run test#4 to ensure proper plumbing</td>
</tr>
<tr>
<td>Broken fittings.</td>
<td></td>
</tr>
</tbody>
</table>
Test #2

Remove screws from pump motor to reservoir, slide pump motor to the back while keeping pistons in oil. Turn pump on. If you have no oil coming out from the solenoid tube, change the solenoid.

Tighten the regulating valve to maximum, push on the advance button and while holding down, look to see if any oil is coming out from the regulating tube. If oil is coming out, change the regulating valve.

Test #3

Remove tool from hoses. Cycle pump. If pump fails to build pressure, the problem is with the pump. If it does build pressure, the problem is with hydraulic blow-by in the tool.

Test #4

**NOTE:** THIS TEST SHOULD BE RUN PRIOR TO EVERY USE OF A HTL TOOL.

Connect the tool, pump and hoses together as normal. Cycle the pump several times. Cycle the system once more and observe the sequence of operation. As you depress the advance button, the tool drive should turn about 24 degrees. At this point, release the advance button. You should see no further movement and after a moment you will hear another audible “click”. This is how the tools are designed to operate. If you observe any other sequence of operation, the system is out of order. Take immediate corrective action. For reference, tools and pumps that are designed from the factory are plumbed as follows:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Advance Side - Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hose</th>
<th>Advance Side - Female to Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Male to Male</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pump</th>
<th>Advance Side - Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
</tbody>
</table>

This ensures that the tool, pump and ONE hose cannot possible be connected up incorrectly.

**NOTE:** Connecting two (or any even numbers) of hoses together creates “one” hose which is plumbed backwards. Male to Female and Female to Male. This will cause the system to operate backwards. If your hose isn’t long enough, connect 3 hoses together, move your pump or call HTL for a longer hose assembly.
DECLARATION

EC DECLARATION OF CONFORMITY

Name of Manufacturer: HTL Group
Address: 45 Colbourne Avenue, Nelson Park Ind. Estate, Cramlington, Northumberland NE23 1WD United Kingdom

Description of product: Calibration/Tensioner Test Unit

Model No's: CTS-***

We declare that this product complies with the appropriate ESR's of the following directives,

- 2006/42 EC Machinery Safety Directive
  - BS EN ISO 12100: 2010 - Safety of machinery, basic concepts, general principles for design, risk assessment & risk reduction
  - BS EN 4413:2010 - Hydraulic fluid power – general rules and safety requirements for systems & their components.
  - BS EN ISO 4414: 2010 - Pneumatic fluid power – general rules and safety requirements for systems & their components.
  - ISO 3744:1994 – Sound power level measurements
- 2006/95 EC Low Voltage Directive
- 2000/198 EC EMC Directive
- 2002/95 EC ROHS Directive
- 2014/68 EU Pressure Equipment Directive
  - Category 1 (Module A)

HTL Group, is the person authorised to compile and retain the Technical File for 10 years.

HTL Group, the manufacturer / supplier, undertake to transmit and/or make available in response to reasoned request, technical file details and other relative information to EEC National Authorities, in electronic or hard copy format.

Installation and operation of this equipment must be in accordance with the installation and operating instructions provided.

Name: Mike Johnson Position: Group Director of Engineering

Signature: [Signature] Date: 1st March, 2016
OPERATING INSTRUCTIONS

HTL-CTS-004-220
Calibration Rig
5/25K Premium Torque 220v
Please read this manual before operating the equipment.

This unit must only be used for the intended purpose of calibrating torque wrenches.

The unit operates by simulating normal operation of torque tools.

A number of pins are supplied for use in different positions depending on tool size and type.

**Misuse**

The unit has been designed for the testing and calibration of hydraulic torque tools. The unit should not be used for anything other than its specified use. Do not disassemble the unit during loading and unloading. Loads must be lifted using suitable assistance and avoiding manual handling as much as possible.

HTL will not be held responsible for any damage or harm caused by misuse of the equipment.

**General safety information**

This equipment is manufactured in accordance with the Supply of Machinery Safety Regulations 2006/42/EC. The user should ensure that this equipment conforms with local and national legislation if used outside of the European Economic Area (EEA).

Only competent, authorised personnel should install, set, operate, maintain, and decommission this equipment.

This equipment is designed for use in dry conditions. **DO NOT USE OUTSIDE.**

**Warnings**
Any residual risks are identified within this manual with the equipment marked where appropriate. Ensure these warnings are adhered.

The following labels are displayed on the unit for your safety, please observe all warnings.

- You can be injured if you do not obey the safety instructions as indicated on warning stickers.
- Observe all safety instructions and warnings attached to the unit.
- Replace unreadable or missing labels.
- Keep warnings and instruction labels clean.
- Unit CE plate
- This following label indicates the maximum static weight (loaded) of the unit with a component in it.
- The unit should only be transported empty, with no components inside.
- This warning indicates that there is a potential crush hazard and to keep away from moving parts.

STAY ALERT. Watch what you are doing. Do not use power equipment under the influence of any mood altering substances.

WARRANTY

HTL Group Ltd guarantees its products against all design and manufacturing defects for 1 year from the date of shipment. The guarantee does not include the ordinary wear of both metal and non-metal parts, abuse, using the equipment beyond its rated capacity and any wear or damage incurred as a result of using a hydraulic fluid which is not recommended by HTL Group Ltd.

Please note that if the equipment is disassembled or serviced by anyone other than an authorised service dealer or by HTL Group Ltd, this guarantee is rendered null and void.

In the event of a warranty claim, return the equipment to HTL Group Ltd or the authorised dealer which sold you the hydraulic equipment. HTL Group Ltd will repair or replace the faulty equipment, whichever is deemed most appropriate.
INSTRUCTIONS BEFORE USE

READ CAREFULLY: Most malfunctions in new equipment are the result of improper operation and/or set-up assembly.

PREPARATION: Remove your Calibration Unit from the shipping container using a forklift truck or suitable lifting device, with a lifting capacity of at least 750kg.

INSPECTION: Visually inspect all components for shipping damage. If any damage is found, notify our sales office immediately.

Transportation

The unit is designed to be transported by installed castors. The unit should be carried unloaded. The weight of the unit unloaded is 500kg. The maximum loaded weight of the unit and any tools to be calibrated is 1000kg.

Positioning the unit

When positioning the unit be sure to leave adequate room for operation. The area must be free from obstructions or other hazards that may affect operation. At least 1m clear space is required around the front and sides of the unit to be able to operate it safely. The unit must be on level ground with adequate local lighting, with no glare or stroboscopic effects, of at least an average of 100 lux. Once in position castors can be set in place by rotating the orange wheel to lower the feet.

Ensure that all hydraulic connections are securely connected. Verify that the hoses are not kinked and that walkways are clear.

Connecting the system (torque tool)

The hydraulic torque wrench and the power pack are connected by a 10,000 psi (700 Bar) operating pressure twin line hose assembly. The safety ratio of the Hydraulic Hose is 4:1. On each twin Hydraulic Hose, one line must be MALE-MALE and the other line must be FEMALE-FEMALE in order to ensure a correct interconnection between pump and torque tool. The 10,000 psi (700 Bar) high pressure couplers on the pump and on the torque wrench are Male couplers, others are Female couplers.

IMPORTANT:

• Never use two twin hydraulic hoses between pump and tool. If so, you cross couple the hoses and have the high pressure on the retract side of your tool, which will cause seals on the front of tool to burst.
• To avoid tool malfunction, do not reverse connectors.
• Do not try to slacken the swivel assembly at any time.

Connect the twin line hose to the swivel as shown below:
Ensure connectors are fully engaged and screwed snugly and completely together.

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</table>

Connecting the system

The hydraulic wrench and power pack are connected by a 10,000 psi (700 Bar) operating pressure hose assembly. The safety ratio of the hose is 4:1. Connect the single male screw connect to the female connect located on the rear of the unit. Be sure to set the pump pressure to 700 Bar max. The utilised pump incorporates a permanent safety relief valve rated to 700 Bar max to prevent damage to the unit.

Do not try to untighten the swivel assembly at any time when in use.

Ensure the hose connectors are fully engaged and screwed snugly and completely together.

Switch on power to the unit (blue button). Cycle the tool to ensure proper function by pressing the hand control advance button.

Ensure correct female square adaptor (fig. A) or male hex adaptor (fig. B) is installed for the tool to be calibrated.

Figure A (Female Square Adaptor)  Figure B (Male Hex Adaptor)
Locate the torque tool assembly securely on reaction points. Be sure the reaction arm is fully engaged. Be sure all hoses are free of the reaction points. Pressurise the system for a test; if the tool tends to “ride-up” or to “creep”, stop and re-adjust the reaction arm to a more solid and secure position.

**NOTE:** Remain clear of the reaction arm during operation and never put body parts between reaction arm and reaction surface.

Always use quality impact sockets in good condition which are the correct size and fully engage the nut. Hidden flaws, however, remain a possibility which could cause breakage, so stay clear of sockets during operation.

Do not hammer or lever any part of the tool to enhance performance.

Proper reaction is required. Adjust the reaction plate to fit firmly against the reaction pin provided. In case of questions, consult with your local distributor.

**Working pressure (torque tool)**

The tool’s maximum working pressure is 10,000 psi (700 Bar).

Make sure that all hydraulic equipment (pumps, hoses, couplers) used with this tool are rated for at least 10,000 psi (700 Bar) working pressure but that the power pack to be used is not able to reach more than 10,000 psi (700 Bar).

**Hydraulic connections**

HTL Hydraulic Pumps are equipped with a zero pressure regulating valve. When connecting or disconnecting hoses from tools and pump, ensure that there is no pressure within the hoses.

When making connections with the quick release couplings, always make sure that the couplings are fully tightened. While using equipment, keep checking that the couplings are tight as if not, this may cause equipment to malfunction.

Always ensure that threaded fittings on the pump, tool and hoses are tight and leak free.

**CAUTION:** Loose or improper threaded fittings can be dangerous if pressurised. Severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way, come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause serious injury.

**OPERATION**

The unit operates by simulating the normal operation of the torque tool while producing a pressure and torque reading.

The method employed to simulate the tool operation is to place the tool over a hex adaptor or directly into an input square.
**NOTE:** The Calibration rig will not open whilst the canopy is open. This must be securely closed for the calibration rig to operate.

Operating the unit

Torque tool controls consists of a two way valve and a “hold to run” actuator yellow button advance.
Normal shut down procedure

- Switch off power to pump (red button).
- Using appropriate lifting equipment, remove torque tool from calibration unit and store safely.
- Check for oil/contaminant leakage.

Emergency shut down

Immediately shut down unit by hitting emergency stop.

**WARNING:** Do not put any persons at risk of injury; always remove all sources of energy before inspecting or interacting with the unit.

Setting the pressure

To set the pressure on the pump, follow this procedure:

1. Loosen the lock nut below the “T” handle on the pump’s external pressure regulator. Then turn the “T” handle (shown below) counter clockwise until it turns freely and easily.

![T Handle Diagram](image)

2. Turn the pump “on”. Using the pump’s remote control pendant, push down the advance button and hold it.

3. While holding the pump in the advance mode, slowly turn the “T” handle clockwise and observe the pump pressure gauge rise.

**NOTE:** Always adjust the regulator in order to increase the pressure up - never down. Never adjust the regulation with the tool on the application.

4. When your gauge reaches the desired pressure stop turning the “T” handle and let the gauge settle out.

5. If the pressure continues to rise, release the advance button and back off your pressure by turning counter clockwise on the “T” handle. Then re-dress the advance switch on your remote and slowly bring pressure to desired value.

6. When the pressure is correct, turn the pump “off” and tighten the lock nut provided under the “T” handle. This sets pump pressure, which determines torque tool output.

Once the target pressure is set and locked, cycle the pump once more to ensure that the pressure setting did not change as you turned down the knurled knob.
POWER PACKS (GENERAL)

Working pressure

The pump’s maximum working pressure is 10,000 psi (700 Bar). Make sure all hydraulic equipment and accessories are rated for 10,000 psi (700 Bar) operating pressure.

Hydraulic connections

Never disconnect or connect hydraulic hoses or fittings without first unloading the torque wrench. Ensure pump unit is switched off, and open all hydraulic controls several times to ensure that the system has been depressurised. If the system includes a gauge, double check the gauge to ensure pressure has been released.

When making a connection with quick disconnect couplings, make sure the couplings are fully engaged threaded connections such a fittings, gauges etc. must be clean and securely tightened and leak free.

CAUTION: Loose or improperly threaded couplers can be potentially dangerous if pressurised, however, severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause injury. Do not subject the hose to potential hazards such as sharp surfaces, extreme heat or heavy impact. Do not allow the hose to kink and twist. Inspect the hose for wear before it is used.

Prior to use

Check hydraulic oil (use grade 46) level to prevent possible pump burnout. Open the filler plug located on the reservoir plate. Look at the oil fill level on the oil sight gauge. The oil level should be approximately 2” from the top of the reservoir plate with motor off. Add oil as necessary. Do not mix different grades of oil.

Make sure all desired gauge, valve, hose and quick coupler connections are tight and secure before operating.

The use of a pressure gauge is required for normal pump operation. Mounted on the manifold, the gauge permits the operator to monitor the load on the wrench. +/-3% calibrated gauges are available for most applications.

Operation

Before starting your pump, connect your hydraulic hoses to the torque wrench.

To start the pump, press the green button on the hand control. This will start the electric motor and put the torque wrench in retract position. To advance and retract the torque wrench, press the yellow button on and off. To stop the pump, press the red button.

Noise
The noise level of this unit during operation is 80 dB(A).


Vibration levels

The vibration levels are less than 2.5M/sec² r.m.s.

Environmental safety

Electrically powered hydraulic power packs should not be used in an atmosphere which can be considered potentially explosive.

NOTE: Metal contact can cause sparks, precautions should be taken.

It is essential that the service intervals detailed in the maintenance procedures are followed to ensure that this equipment operates as efficiently as possible.

Consumable materials

Only use hydraulic oils as specified by the manufacturer/supplier.

Unit disposal

This unit must only be disposed of at a specialist unit breaker or by HTL Group Ltd. All metal parts are recyclable, hoses and parts contaminated with oil must be disposed of in a safe manner.

MAINTENANCE RECOMMENDATION

Isolation

When undertaking maintenance and repair work, the unit must be first made safe.

Switch off the unit at the main isolation point, unplug unit from mains. Implement lockout procedures.

Attach a warning sign to the unit in appropriate positions.

Hydraulic equipment

Work on hydraulic equipment must only be carried out by persons with specialist knowledge and experience of hydraulic systems.

Check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately.

Always relieve pressure from the hydraulic system before carrying out any kind of maintenance
Hydraulic components must be installed and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the pipes and hoses must comply with technical requirements.

Only fit replacement components of a type recommended by the manufacturer.

Always practice extreme cleanliness when servicing hydraulic components.

Hydraulic oil can penetrate the skin causing serious injury. If oil is injected under the skin, seek medical help immediately.

Never run hands over hoses to find leaks.

**Draining**

The HTL Calibration Unit is designed to collect leakage of oil and fluids from the hydraulic tool, or from leaks within the unit. There is a drain plug in the base of the drip tray which is located under the base of the unit. A suitable container should be placed underneath, and the drain plug removed to drain the drip tray. Residual oil should be cleaned before use.

**Maintenance - torque tool**

Tool failure, although rare, does occur. Such failure is most often in the hydraulic couplers or hoses. These items are repairable or replaceable immediately, since they are available universally. Failures of structural members of the tool are quite rare, but replacement parts are available from stock. All repairs to HTL tools may be made by competent experienced individuals according to the instructions.

- **Lubrication** - All moving parts should periodically be coated with a good quality lubricant such as Lithium EP Complex. Under harsh environmental conditions, cleaning and lubricating should be performed more frequently.

- **Hydraulic hoses** - Hoses should be checked for cracks and leaks after each job. Hydraulic fittings can become plugged with dirt and should be flushed regularly. Kinks in hoses can cause internal parts of hose to collapse and restrict flow which often leads to hose bursting.

- **Quick-connects** - Fittings should be kept clean and not allowed to be dragged along the ground or floor, as even small particles of dirt can cause the internal valves to
malfunction.

- **Springs** - Springs are used for the drive pawl assembly and other internal parts. These springs can be replaced if necessary.

- **Cylinder seals** - If the cylinder requires disassembly, it is recommended that the cylinder seals be replaced at the same time. Seal kits are readily available.

- **Structural members** - All structural parts on the tool should be inspected once a year to determine if there are any cracks, chips or deformities. If so, immediate replacement is required.

**Maintenance - main unit**

Ensure hinges are lubricated and gas struts are kept in good condition. All surfaces should be kept free from contaminants. Inspect transducer housings for damage.

- Inspect cylinders before use. Visually assess for signs of leakage around seals and corrosion which is excessive and is likely to affect its safe functioning. Replace cylinders if necessary.

**Hydraulic pipes and unions**

All pipes and unions are manufactured to accepted standards; BS EN 10305-4 and DIN 2413 and fitted by experienced technicians. High pressures are utilised within the unit and therefore in order to minimise risk to safety please observe the following.

- Inspect and visually assess all hydraulic lines for leakage, pay attention to junctions and unions. Signs of corrosion on hydraulic pipes should be considered and piping should be replaced where it is deemed necessary. Replace defective parts.

- Contact your HTL distributor to replace any pipe work that has been damaged.

**WARNING:** Do not operate the unit if any hydraulic components are faulty or fitted incorrectly.

**Frame and structural components**

The main cabinet assembly which comprises the majority of the unit is constructed from steel. Great care has been taken to ensure that the unit is capable of functioning without failure. The transducer housing is subject to large forces when in operation and therefore care should be taken to ensure the following inspections are undertaken.

- Inspect before every use for cracks, permanent deflection of structural members and noticeable distortion of any kind. Extra attention should be paid to welded joints and reaction areas.

**NOTE:** If the unit displays any of the aforementioned, cease all operation and report
the fault to supplier of the unit.

**Maintenance - hydraulic power pack**

HTL Hydraulic Power Packs are precision-built units and, as such, do require care and maintenance. The following is general information, as other power packs may be used.

Be sure to read the Instruction Manual that came with the power pack that is being used.

- **Hydraulic oil** - Oil should be completely changed after every 40 hours of operation, or at least twice a year. Always make sure the reservoir is filled with fluid. If additional oil is required, use only high-grade hydraulic oil such as grade 46. The oil should never get to a milky colour state.

- **Quick-disconnects** - Fittings should be checked periodically for leaks. Dirt or foreign materials should be kept away from fittings. Clean before use.

- **Hydraulic gauge** - Some gauges are liquid filled. Should this liquid level drop, it indicates external leakage, and replacement is necessary. Should the gauge fill with hydraulic oil, it indicates internal failure and it should be discarded. HTL recommends that gauges are calibrated every 12 months.

- **Filter on pump** - The filter should be replaced twice a year in normal use and up to 4 times yearly if used daily.

- **Remote control** - The switch buttons should be checked periodically if any indications of problems exist.

- **Armature** - (electric motor) Check yearly.

- **Pumping unit** - The pump should be overhauled every 12 months. This can be done by your local distributor.

**TROUBLESHOOTING GUIDE**

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool will not retract</td>
<td>Voltage to electric pump is too low due to line drop or inadequate amperage is available.</td>
<td>Get shorter extension cord or upgrade to 4mm², 25 amp rating or better. If shop power is adequate, draw power from welding machine or cal rod transformer.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive pawl are broken.</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge shows pressure build up but the tool will not cycle.</td>
<td>Couplings loose or inoperative.</td>
<td>Tighten and/or replace couplings. Use test #1 listed below to isolate problem.</td>
</tr>
<tr>
<td></td>
<td>Solenoid inoperative.</td>
<td>Check using test #2 below. If solenoid is not working, repair.</td>
</tr>
<tr>
<td>SYMPTOM</td>
<td>PROBABLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Defective gland seal.</td>
<td>Replace gland seal.</td>
</tr>
<tr>
<td>Tool operates backwards.</td>
<td>Couplings reversed.</td>
<td>Run test #4. Replumb system as necessary.</td>
</tr>
<tr>
<td></td>
<td>Multiple hoses in even numbers.</td>
<td>As plumbed, HTL hoses may only be joined together in odd numbers ONLY.</td>
</tr>
<tr>
<td>Ratchet will not take successive</td>
<td>Broken or otherwise inoperative drive pawl or spring.</td>
<td>Replace drive pawl and/or spring.</td>
</tr>
<tr>
<td>strokes.</td>
<td>Cylinder not retracting completely.</td>
<td>Remove tool from nut and cycle freely for several strokes. If problem persists, check pawls.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive plates is broken.</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge records no pressure.</td>
<td>Gauge connection loose.</td>
<td>Tighten coupling.</td>
</tr>
<tr>
<td></td>
<td>Bad gauge.</td>
<td>Replace gauge.</td>
</tr>
<tr>
<td></td>
<td>Pump will not build pressure.</td>
<td>Tool will not build pressure - see “pump will not build pressure”.</td>
</tr>
<tr>
<td></td>
<td>Tool seals are blown.</td>
<td>Replace defective seals.</td>
</tr>
<tr>
<td>Pump will not build pressure.</td>
<td>Electric supply is low.</td>
<td>Check voltage.</td>
</tr>
<tr>
<td></td>
<td>Defective relief or regulator valve.</td>
<td>Replace valve.</td>
</tr>
<tr>
<td></td>
<td>Low oil or clogged filter.</td>
<td>Fill reservoir and clean filter.</td>
</tr>
<tr>
<td></td>
<td>Internal leak in oil line from external relief valve to pump body.</td>
<td>Open reservoir, inspect oil line while trying to build pressure - if leaking tighten fittings or replace.</td>
</tr>
<tr>
<td>Motor sluggish and inefficient “sounds sick” slow to build pressure</td>
<td>Electric supply is low.</td>
<td>See test #1 in preceding block.</td>
</tr>
<tr>
<td></td>
<td>Clogged filter.</td>
<td>Clean or replace filter.</td>
</tr>
<tr>
<td>Pump heats up.</td>
<td>Improper use.</td>
<td>Operator is continuing to hold down on the advance stroke after the cylinder has reached end of stroke - this causes a lot of oil to go through a very small hole in relief valve causing heat build up. Have operator release advance stroke after accuracy assurance levers springs forwards.</td>
</tr>
<tr>
<td></td>
<td>Remote control is left in “on” position when pump is not actively in use.</td>
<td>Turn pump off whenever not actually being used. NO NOT leave pump running when tool is not in use.</td>
</tr>
<tr>
<td>SYMPTOM</td>
<td>PROBABLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tool will not build</td>
<td>Oil blow in wrench (piston seal, seal leak, blown o-ring, cracked piston).</td>
<td>Replace defective parts.</td>
</tr>
<tr>
<td>pressure.</td>
<td>Pump problem.</td>
<td>Remove top cover screws on pump. Lift pump slightly so that you can see inside. Operate pump looking inside for leaking fittings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If no leaking fittings, turn pressure regulating valve up to max. Test pump if no pressure build up. Check and replace regulator parts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check 10,000 psi pressure relief valve. If it leaks oil at low pressure, replace it.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check to see if oil is returning back to tank from solenoid valve tube. Constant flow of oil shows problem lies within solenoid valve. Check operation, if it doesn't work, repair or replace solenoid.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is hand control working on electric pump. Faulty cartridges. Replace if necessary. Check hand control wiring for damage or wires loose in hand set.</td>
</tr>
<tr>
<td>Hose or tool fitting is</td>
<td>Broken or melted plastic outer covering.</td>
<td>If underlying kevlar or steel is still intact, continue operation. Inspect frequently.</td>
</tr>
<tr>
<td>damaged or leaks.</td>
<td>Frayed kevlar or steel strands.</td>
<td>Cut hose in half and discard. Replace hose.</td>
</tr>
<tr>
<td></td>
<td>Oil leaks through fibres.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Broken fittings.</td>
<td>Remove old fitting and replace with steel high pressure fittings only. After changing fittings, always run test#4 to ensure proper plumbing</td>
</tr>
</tbody>
</table>

**TESTS**

**Test #1**

Attach hoses to pump and tool in the normal manner. Press the advance button and hold it down. If the pump pressure builds and the hoses “flex” but the tool still refuses to cycle, the problem is most likely a loose or defective coupling connection. To find out where the bad coupling is, remove the tool from the hoses and marry the loose ends together and cycle the pump. If the gauge pressure reads no more than 500 psi, then the bad fitting is on the tool. A significantly greater pressure indicates that the problem is in either the pump or a hose fitting.
Test #2

Remove screws from pump motor to reservoir, slide pump motor to the back while keeping pistons in oil. Turn pump on. If you have no oil coming out from the solenoid tube, change the solenoid.

Tighten the regulating valve to maximum, push on the advance button and while holding down, look to see if any oil is coming out from the regulating tube. If oil is coming out, change the regulating valve.

Test #3

Remove tool from hoses. Cycle pump. If pump fails to build pressure, the problem is with the pump. If it does build pressure, the problem is with hydraulic blow-by in the tool.

Test #4

**NOTE:** THIS TEST SHOULD BE RUN PRIOR TO EVERY USE OF A HTL TOOL.

Connect the tool, pump and hoses together as normal. Cycle the pump several times. Cycle the system once more and observe the sequence of operation. As you depress the advance button, the tool drive should turn about 24 degrees. At this point, release the advance button. You should see no further movement and after a moment you will hear another audible “click”. This is how the tools are designed to operate. If you observe any other sequence of operation, the system is out of order. Take immediate corrective action. For reference, tools and pumps that are designed from the factory are plumbed as follows:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Advance Side - Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hose</th>
<th>Advance Side - Female to Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Male to Male</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pump</th>
<th>Advance Side - Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
</tbody>
</table>

This ensures that the tool, pump and ONE hose cannot possible be connected up incorrectly.

**NOTE:** Connecting two (or any even numbers) of hoses together creates “one” hose which is plumbed backwards. Male to Female and Female to Male. This will cause the system to operate backwards. If your hose isn’t long enough, connect 3 hoses together, move your pump or call HTL for a longer hose assembly.
DECLARATION

EC DECLARATION OF CONFORMITY

Name of Manufacturer: HTL Group
Address: 45 Colbourne Avenue, Nelson Park Ind. Estate, Cramlington, Northumberland NE23 1WD United Kingdom

Description of product: Calibration/Tensioner Test Unit

Model No's: CTS-***

We declare that this product complies with the appropriate ESR's of the following directives,

- 2006/42 EC Machinery Safety Directive
  - BS EN ISO 12100: 2010 - Safety of machinery, basic concepts, general principles for design, risk assessment & risk reduction
  - BS EN 4413:2010 - Hydraulik fluid power - general rules and safety requirements for systems & their components.
  - BS EN ISO 4414: 2010 - Pneumatic fluid power - general rules and safety requirements for systems & their components.
  - ISO 3744:1994 - Sound power level measurements

- 2006/95 EC Low Voltage Directive

- 2000/198 EC EMC Directive

- 2002/95 EC ROHS Directive

- 2014/68 EU Pressure Equipment Directive
  - Category 1 (Module A)

HTL Group, is the person authorised to compile and retain the Technical File for 10 years.

HTL Group, the manufacturer / supplier, undertake to transmit and/or make available in response to reasoned request, technical file details and other relative information to EEC National Authorities, in electronic or hard copy format.

Installation and operation of this equipment must be in accordance with the installation and operating instructions provided.

Name : Mike Johnson  Position : Group Director of Engineering
Signature : M. Johnson  Date : 1st March, 2016
OPERATING INSTRUCTIONS

HTL-CTS-005-110
Calibration Rig
5/50K Premium Torque 110v
Please read this manual before operating the equipment.

This unit must only be used for the intended purpose of calibrating torque wrenches.

The unit operates by simulating normal operation of torque tools.

A number of pins are supplied for use in different positions depending on tool size and type.

Misuse

The unit has been designed for the testing and calibration of hydraulic torque tools. The unit should not be used for anything other than its specified use. Do not disassemble the unit during loading and unloading. Loads must be lifted using suitable assistance and avoiding manual handling as much as possible.

HTL will not be held responsible for any damage or harm caused by misuse of the equipment.

General safety information

This equipment is manufactured in accordance with the Supply of Machinery Safety Regulations 2006/42/EC. The user should ensure that this equipment conforms with local and national legislation if used outside of the European Economic Area (EEA).

Only competent, authorised personnel should install, set, operate, maintain, and decommission this equipment.

This equipment is designed for use in dry conditions. **DO NOT USE OUTSIDE.**

Warnings
Any residual risks are identified within this manual with the equipment marked where appropriate. Ensure these warnings are adhered.

The following labels are displayed on the unit for your safety, please observe all warnings.

- You can be injured if you do not obey the safety instructions as indicated on warning stickers.
- Observe all safety instructions and warnings attached to the unit.
- Replace unreadable or missing labels.
- Keep warnings and instruction labels clean.
- Unit CE plate

- This following label indicates the maximum static weight (loaded) of the unit with a component in it.
- The unit should only be transported empty, with no components inside.

- This warning indicates that there is a potential crush hazard and to keep away from moving parts.

STAY ALERT. Watch what you are doing. Do not use power equipment under the influence of any mood altering substances.

WARRANTY

HTL Group Ltd guarantees its products against all design and manufacturing defects for 1 year from the date of shipment. The guarantee does not include the ordinary wear of both metal and non-metal parts, abuse, using the equipment beyond its rated capacity and any wear or damage incurred as a result of using a hydraulic fluid which is not recommended by HTL Group Ltd.

Please note that if the equipment is disassembled or serviced by anyone other than an authorised service dealer or by HTL Group Ltd, this guarantee is rendered null and void.

In the event of a warranty claim, return the equipment to HTL Group Ltd or the authorised dealer which sold you the hydraulic equipment. HTL Group Ltd will repair or replace the faulty equipment, whichever is deemed most appropriate.
INSTRUCTIONS BEFORE USE

READ CAREFULLY: Most malfunctions in new equipment are the result of improper operation and/or set-up assembly.

PREPARATION: Remove your Calibration Unit from the shipping container using a forklift truck or suitable lifting device, with a lifting capacity of at least 750kg.

INSPECTION: Visually inspect all components for shipping damage. If any damage is found, notify our sales office immediately.

Transportation

The unit is designed to be transported by installed castors. The unit should be carried unloaded. The weight of the unit unloaded is 500kg. The maximum loaded weight of the unit and any tools to be calibrated is 1000kg.

Positioning the unit

When positioning the unit be sure to leave adequate room for operation. The area must be free from obstructions or other hazards that may affect operation. At least 1m clear space is required around the front and sides of the unit to be able to operate it safely. The unit must be on level ground with adequate local lighting, with no glare or stroboscopic effects, of at least an average of 100 lux. Once in position castors can be set in place by rotating the orange wheel to lower the feet.

Ensure that all hydraulic connections are securely connected. Verify that the hoses are not kinked and that walkways are clear.

Connecting the system (torque tool)

The hydraulic torque wrench and the power pack are connected by a 10,000 psi (700 Bar) operating pressure twin line hose assembly. The safety ratio of the Hydraulic Hose is 4:1. On each twin Hydraulic Hose, one line must be MALE-MALE and the other line must be FEMALE-FEMALE in order to ensure a correct interconnection between pump and torque tool. The 10,000 psi (700 Bar) high pressure couplers on the pump and on the torque wrench are Male couplers, others are Female couplers.

IMPORTANT:

- Never use two twin hydraulic hoses between pump and tool. If so, you cross couple the hoses and have the high pressure on the retract side of your tool, which will cause seals on the front of tool to burst.
- To avoid tool malfunction, do not reverse connectors.
- Do not try to slacken the swivel assembly at any time.

Connect the twin line hose to the swivel as shown below:
Ensure connectors are fully engaged and screwed snugly and completely together.

Control plate legend

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hold to operate</td>
</tr>
<tr>
<td>2</td>
<td>Pump start up</td>
</tr>
<tr>
<td>3</td>
<td>Pump stop</td>
</tr>
<tr>
<td>4</td>
<td>Pendant control</td>
</tr>
<tr>
<td>5</td>
<td>Pressure adjust</td>
</tr>
<tr>
<td>6</td>
<td>10K PSI gauge</td>
</tr>
<tr>
<td>7</td>
<td>Emergency stop / main power off</td>
</tr>
<tr>
<td>8</td>
<td>Main power on</td>
</tr>
</tbody>
</table>

Connecting the system

The hydraulic wrench and power pack are connected by a 10,000 psi (700 Bar) operating pressure hose assembly. The safety ratio of the hose is 4:1. Connect the single male screw connect to the female connect located on the rear of the unit. Be sure to set the pump pressure to 700 Bar max. The utilised pump incorporates a permanent safety relief valve rated to 700 Bar max to prevent damage to the unit.

Do not try to untighten the swivel assembly at any time when in use.

Ensure the hose connectors are fully engaged and screwed snugly and completely together.

Switch on power to the unit (blue button). Cycle the tool to ensure proper function by pressing the hand control advance button.

Ensure correct female square adaptor (fig. A) or male hex adaptor (fig. B) is installed for the tool to be calibrated.
Locate the torque tool assembly securely on reaction points. Be sure the reaction arm is fully engaged. Be sure all hoses are free of the reaction points. Pressurise the system for a test; if the tool tends to “ride-up” or to “creep”, stop and re-adjust the reaction arm to a more solid and secure position.

**NOTE:** Remain clear of the reaction arm during operation and never put body parts between reaction arm and reaction surface.

Always use quality impact sockets in good condition which are the correct size and fully engage the nut. Hidden flaws, however, remain a possibility which could cause breakage, so stay clear of sockets during operation.

Do not hammer or lever any part of the tool to enhance performance.

Proper reaction is required. Adjust the reaction plate to fit firmly against the reaction pin provided. In case of questions, consult with your local distributor.

**Working pressure (torque tool)**

The tool’s maximum working pressure is 10,000 psi (700 Bar).

Make sure that all hydraulic equipment (pumps, hoses, couplers) used with this tool are rated for at least 10,000 psi (700 Bar) working pressure but that the power pack to be used is not able to reach more than 10,000 psi (700 Bar).

**Hydraulic connections**

HTL Hydraulic Pumps are equipped with a zero pressure regulating valve. When connecting or disconnecting hoses from tools and pump, ensure that there is no pressure within the hoses.

When making connections with the quick release couplings, always make sure that the couplings are fully tightened. While using equipment, keep checking that the couplings are tight as if not, this may cause equipment to malfunction.

Always ensure that threaded fittings on the pump, tool and hoses are tight and leak free.

**CAUTION:** Loose or improper threaded fittings can be dangerous if pressurised. Severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way, come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause serious injury.

**OPERATION**

The unit operates by simulating the normal operation of the torque tool while producing a pressure and torque reading.

The method employed to simulate the tool operation is to place the tool over a hex adaptor or directly into an input square.
NOTE: The Calibration rig will not open whilst the canopy is open. This must be securely closed for the calibration rig to operate.

Torque tool controls consists of a two way valve and a “hold to run” actuator yellow button advance.
Normal shut down procedure

• Switch off power to pump (red button).
• Using appropriate lifting equipment, remove torque tool from calibration unit and store safely.
• Check for oil/contaminant leakage.

Emergency shut down

Immediately shut down unit by hitting emergency stop.

WARNING: Do not put any persons at risk of injury; always remove all sources of energy before inspecting or interacting with the unit.

Setting the pressure

To set the pressure on the pump, follow this procedure:

1. Loosen the lock nut below the “T” handle on the pump’s external pressure regulator. Then turn the “T” handle (shown below) counter clockwise until it turns freely and easily.

2. Turn the pump “on”. Using the pump’s remote control pendant, push down the advance button and hold it.

3. While holding the pump in the advance mode, slowly turn the “T” handle clockwise and observe the pump pressure gauge rise.

NOTE: Always adjust the regulator in order to increase the pressure up - never down. Never adjust the regulation with the tool on the application.

4. When your gauge reaches the desired pressure stop turning the “T” handle and let the gauge settle out.

5. If the pressure continues to rise, release the advance button and back off your pressure by turning counter clockwise on the “T” handle. Then re-dress the advance switch on your remote and slowly bring pressure to desired value.

6. When the pressure is correct, turn the pump “off” and tighten the lock nut provided under the “T” handle. This sets pump pressure, which determines torque tool output.

Once the target pressure is set and locked, cycle the pump once more to ensure that the pressure setting did not change as you turned down the knurled knob.
POWER PACKS (GENERAL)

Working pressure

The pump’s maximum working pressure is 10,000 psi (700 Bar). Make sure all hydraulic equipment and accessories are rated for 10,000 psi (700 Bar) operating pressure.

Hydraulic connections

Never disconnect or connect hydraulic hoses or fittings without first unloading the torque wrench. Ensure pump unit is switched off, and open all hydraulic controls several times to ensure that the system has been depressurised. If the system includes a gauge, double check the gauge to ensure pressure has been released.

When making a connection with quick disconnect couplings, make sure the couplings are fully engaged threaded connections such a fittings, gauges etc. must be clean and securely tightened and leak free.

CAUTION: Loose or improperly threaded couplers can be potentially dangerous if pressurised, however, severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause injury. Do not subject the hose to potential hazards such as sharp surfaces, extreme heat or heavy impact. Do not allow the hose to kink and twist. Inspect the hose for wear before it is used.

Prior to use

Check hydraulic oil (use grade 46) level to prevent possible pump burnout. Open the filler plug located on the reservoir plate. Look at the oil fill level on the oil sight gauge. The oil level should be approximately 2” from the top of the reservoir plate with motor off. Add oil as necessary. Do not mix different grades of oil.

Make sure all desired gauge, valve, hose and quick coupler connections are tight and secure before operating.

The use of a pressure gauge is required for normal pump operation. Mounted on the manifold, the gauge permits the operator to monitor the load on the wrench. +/-3% calibrated gauges are available for most applications.

Operation

Before starting your pump, connect your hydraulic hoses to the torque wrench.

To start the pump, press the green button on the hand control. This will start the electric motor and put the torque wrench in retract position. To advance and retract the torque wrench, press the yellow button on and off. To stop the pump, press the red button.

Noise
The noise level of this unit during operation is 80 dB(A).


Vibration levels

The vibration levels are less than 2.5M/sec² r.m.s.

Environmental safety

Electrically powered hydraulic power packs should not be used in an atmosphere which can be considered potentially explosive.

NOTE: Metal contact can cause sparks, precautions should be taken.

It is essential that the service intervals detailed in the maintenance procedures are followed to ensure that this equipment operates as efficiently as possible.

Consumable materials

Only use hydraulic oils as specified by the manufacturer/supplier.

Unit disposal

This unit must only be disposed of at a specialist unit breaker or by HTL Group Ltd. All metal parts are recyclable, hoses and parts contaminated with oil must be disposed of in a safe manner.

MAINTENANCE RECOMMENDATION

Isolation

When undertaking maintenance and repair work, the unit must be first made safe.

Switch off the unit at the main isolation point, unplug unit from mains. Implement lockout procedures.

Attach a warning sign to the unit in appropriate positions.

Hydraulic equipment

Work on hydraulic equipment must only be carried out by persons with specialist knowledge and experience of hydraulic systems.

Check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately.

Always relieve pressure from the hydraulic system before carrying out any kind of maintenance
Hydraulic components must be installed and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the pipes and hoses must comply with technical requirements.

Only fit replacement components of a type recommended by the manufacturer.

Always practice extreme cleanliness when servicing hydraulic components.

Hydraulic oil can penetrate the skin causing serious injury. If oil is injected under the skin, seek medical help immediately.

Never run hands over hoses to find leaks.

**Draining**

The HTL Calibration Unit is designed to collect leakage of oil and fluids from the hydraulic tool, or from leaks within the unit. There is a drain plug in the base of the drip tray which is located under the base of the unit. A suitable container should be placed underneath, and the drain plug removed to drain the drip tray. Residual oil should be cleaned before use.

**Maintenance - torque tool**

Tool failure, although rare, does occur. Such failure is most often in the hydraulic couplers or hoses. These items are repairable or replaceable immediately, since they are available universally. Failures of structural members of the tool are quite rare, but replacement parts are available from stock. All repairs to HTL tools may be made by competent experienced individuals according to the instructions.

- **Lubrication** - All moving parts should periodically be coated with a good quality lubricant such as Lithium EP Complex. Under harsh environmental conditions, cleaning and lubricating should be performed more frequently.

- **Hydraulic hoses** - Hoses should be checked for cracks and leaks after each job. Hydraulic fittings can become plugged with dirt and should be flushed regularly. Kinks in hoses can cause internal parts of hose to collapse and restrict flow which often leads to hose bursting.

- **Quick-connects** - Fittings should be kept clean and not allowed to be dragged along the ground or floor, as even small particles of dirt can cause the internal valves to
malfunction.

- **Springs** - Springs are used for the drive pawl assembly and other internal parts. These springs can be replaced if necessary.

- **Cylinder seals** - If the cylinder requires disassembly, it is recommended that the cylinder seals be replaced at the same time. Seal kits are readily available.

- **Structural members** - All structural parts on the tool should be inspected once a year to determine if there are any cracks, chips or deformities. If so, immediate replacement is required.

### Maintenance - main unit

Ensure hinges are lubricated and gas struts are kept in good condition. All surfaces should be kept free from contaminants. Inspect transducer housings for damage.

- Inspect cylinders before use. Visually assess for signs of leakage around seals and corrosion which is excessive and is likely to affect its safe functioning. Replace cylinders if necessary.

### Hydraulic pipes and unions

All pipes and unions are manufactured to accepted standards; BS EN 10305-4 and DIN 2413 and fitted by experienced technicians. High pressures are utilised within the unit and therefore in order to minimise risk to safety please observe the following.

- Inspect and visually assess all hydraulic lines for leakage, pay attention to junctions and unions. Signs of corrosion on hydraulic pipes should be considered and piping should be replaced where it is deemed necessary. Replace defective parts.

- Contact your HTL distributor to replace any pipe work that has been damaged.

**WARNING:** Do not operate the unit if any hydraulic components are faulty or fitted incorrectly.

### Frame and structural components

The main cabinet assembly which comprises the majority of the unit is constructed from steel. Great care has been taken to ensure that the unit is capable of functioning without failure. The transducer housing is subject to large forces when in operation and therefore care should be taken to ensure the following inspections are undertaken.

- Inspect before every use for cracks, permanent deflection of structural members and noticeable distortion of any kind. Extra attention should be paid to welded joints and reaction areas.

**NOTE:** If the unit displays any of the aforementioned, cease all operation and report
the fault to supplier of the unit.

**Maintenance - hydraulic power pack**

HTL Hydraulic Power Packs are precision-built units and, as such, do require care and maintenance. The following is general information, as other power packs may be used.

Be sure to read the Instruction Manual that came with the power pack that is being used.

- **Hydraulic oil** - Oil should be completely changed after every 40 hours of operation, or at least twice a year. Always make sure the reservoir is filled with fluid. If additional oil is required, use only high-grade hydraulic oil such as grade 46. The oil should never get to a milky colour state.

- **Quick-disconnects** - Fittings should be checked periodically for leaks. Dirt or foreign materials should be kept away from fittings. Clean before use.

- **Hydraulic gauge** - Some gauges are liquid filled. Should this liquid level drop, it indicates external leakage, and replacement is necessary. Should the gauge fill with hydraulic oil, it indicates internal failure and it should be discarded. HTL recommends that gauges are calibrated every 12 months.

- **Filter on pump** - The filter should be replaced twice a year in normal use and up to 4 times yearly if used daily.

- **Remote control** - The switch buttons should be checked periodically if any indications of problems exist.

- **Armature** - (electric motor) Check yearly.

- **Pumping unit** - The pump should be overhauled every 12 months. This can be done by your local distributor.

**TROUBLESHOOTING GUIDE**

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool will not retract.</td>
<td>Voltage to electric pump is too low due to line drop or inadequate amperage is available.</td>
<td>Get shorter extension cord or upgrade to 4mm², 25 amp rating or better. If shop power is adequate, draw power from welding machine or cal rod transformer.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive pawl are broken.</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge shows pressure build up but the tool will not cycle.</td>
<td>Couplings loose or inoperative.</td>
<td>Tighten and/or replace couplings. Use test #1 listed below to isolate problem.</td>
</tr>
<tr>
<td></td>
<td>Solenoid inoperative.</td>
<td>Check using test #2 below. If solenoid is not working, repair.</td>
</tr>
<tr>
<td>SYMPTOM</td>
<td>PROBABLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Defective gland seal.</td>
<td>Replace gland seal.</td>
</tr>
<tr>
<td>Tool operates backwards.</td>
<td>Couplings reversed.</td>
<td>Run test #4. Replumb system as necessary.</td>
</tr>
<tr>
<td></td>
<td>Multiple hoses in even numbers.</td>
<td>As plumbed, HTL hoses may only be joined together in odd numbers ONLY.</td>
</tr>
<tr>
<td>Ratchet will not take successive strokes.</td>
<td>Broken or otherwise inoperative drive pawl or spring.</td>
<td>Replace drive pawl and/or spring.</td>
</tr>
<tr>
<td></td>
<td>Cylinder not retracting completely.</td>
<td>Remove tool from nut and cycle freely for several strokes. If problem persists, check pawls.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive plates is broken.</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge records no pressure.</td>
<td>Gauge connection loose.</td>
<td>Tighten coupling.</td>
</tr>
<tr>
<td></td>
<td>Bad gauge.</td>
<td>Replace gauge.</td>
</tr>
<tr>
<td></td>
<td>Pump will not build pressure.</td>
<td>Tool will not build pressure - see “pump will not build pressure”.</td>
</tr>
<tr>
<td></td>
<td>Tool seals are blown.</td>
<td>Replace defective seals.</td>
</tr>
<tr>
<td>Pump will not build pressure.</td>
<td>Electric supply is low.</td>
<td>Check voltage.</td>
</tr>
<tr>
<td></td>
<td>Defective relief or regulator valve.</td>
<td>Replace valve.</td>
</tr>
<tr>
<td></td>
<td>Low oil or clogged filter.</td>
<td>Fill reservoir and clean filter.</td>
</tr>
<tr>
<td></td>
<td>Internal leak in oil line from external relief valve to pump body.</td>
<td>Open reservoir, inspect oil line while trying to build pressure - if leaking tighten fittings or replace.</td>
</tr>
<tr>
<td>Motor sluggish and inefficient “sounds sick” slow to build pressure</td>
<td>Electric supply is low.</td>
<td>See test #1 in preceding block.</td>
</tr>
<tr>
<td></td>
<td>Clogged filter.</td>
<td>Clean or replace filter.</td>
</tr>
<tr>
<td></td>
<td>Improper use.</td>
<td>Operator is continuing to hold down on the advance stroke after the cylinder has reached end of stroke - this causes a lot of oil to go through a very small hole in relief valve causing heat build up. Have operator release advance stroke after accuracy assurance levers springs forwards.</td>
</tr>
<tr>
<td></td>
<td>Remote control is left in “on” position when pump is not actively in use.</td>
<td>Turn pump off whenever not actually being used. NO NOT leave pump running when tool is not in use.</td>
</tr>
</tbody>
</table>
### SYMPTOM
**Tool will not build pressure.**

<table>
<thead>
<tr>
<th>PROBABILE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil blow in wrench (piston seal, seal leak, blown o-ring, cracked piston).</td>
<td>Replace defective parts.</td>
</tr>
<tr>
<td>Broken or melted plastic outer covering.</td>
<td>If underlying kevlar or steel is still intact, continue operation. Inspect frequently.</td>
</tr>
<tr>
<td>Frayed kevlar or steel strands.</td>
<td>Cut hose in half and discard. Replace hose.</td>
</tr>
<tr>
<td>Oil leaks through fibres.</td>
<td>Remove old fitting and replace with steel high pressure fittings only. After changing fittings, always run test#4 to ensure proper plumbing</td>
</tr>
<tr>
<td>Broken fittings.</td>
<td></td>
</tr>
</tbody>
</table>

### TESTS

**Test #1**

Attach hoses to pump and tool in the normal manner. Press the advance button and hold it down. If the pump pressure builds and the hoses “flex” but the tool still refuses to cycle, the problem is most likely a loose or defective coupling connection. To find out where the bad coupling is, remove the tool from the hoses and marry the loose ends together and cycle the pump. If the gauge pressure reads no more than 500 psi, then the bad fitting is on the tool. A significantly greater pressure indicates that the problem is in either the pump or a hose fitting.
**Test #2**

Remove screws from pump motor to reservoir, slide pump motor to the back while keeping pistons in oil. Turn pump on. If you have no oil coming out from the solenoid tube, change the solenoid.

Tighten the regulating valve to maximum, push on the advance button and while holding down, look to see if any oil is coming out from the regulating tube. If oil is coming out, change the regulating valve.

**Test #3**

Remove tool from hoses. Cycle pump. If pump fails to build pressure, the problem is with the pump. If it does build pressure, the problem is with hydraulic blow-by in the tool.

**Test #4**

**NOTE:** THIS TEST SHOULD BE RUN PRIOR TO EVERY USE OF A HTL TOOL.

Connect the tool, pump and hoses together as normal. Cycle the pump several times. Cycle the system once more and observe the sequence of operation. As you depress the advance button, the tool drive should turn about 24 degrees. At this point, release the advance button. You should see no further movement and after a moment you will hear another audible “click”. This is how the tools are designed to operate. If you observe any other sequence of operation, the system is out of order. Take immediate corrective action. For reference, tools and pumps that are designed from the factory are plumbed as follows:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Advance Side - Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hose</th>
<th>Advance Side - Female to Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Male to Male</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pump</th>
<th>Advance Side - Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
</tbody>
</table>

This ensures that the tool, pump and ONE hose cannot possibly be connected up incorrectly.

**NOTE:** Connecting two (or any even numbers) of hoses together creates “one” hose which is plumbed backwards. Male to Female and Female to Male. This will cause the system to operate backwards. If your hose isn’t long enough, connect 3 hoses together, move your pump or call HTL for a longer hose assembly.
DECLARATION

EC DECLARATION OF CONFORMITY

Name of Manufacturer: HTL Group
Address: 45 Colbourne Avenue, Nelson Park Ind. Estate, Cramlington, Northumberland NE23 1WD United Kingdom

Description of product: Calibration/Tensioner Test Unit
Model No's: CTS-***

We declare that this product complies with the appropriate ESR’s of the following directives,

- 2006/42 EC Machinery Safety Directive
  - BS EN ISO 12100:2010 - Safety of machinery, basic concepts, general principles for design, risk assessment & risk reduction
  - BS EN 4413:2010 – Hydraulic fluid power – general rules and safety requirements for systems & their components.
  - BS EN ISO 4414: 2010 - Pneumatic fluid power – general rules and safety requirements for systems & their components.
  - ISO 3744:1994 – Sound power level measurements

- 2006/95 EC Low Voltage Directive
- 2000/198 EC EMC Directive
- 2002/95 EC ROHS Directive
- 2014/68 EU Pressure Equipment Directive
  - Category 1 (Module A)

HTL Group, is the person authorised to compile and retain the Technical File for 10 years.

HTL Group, the manufacturer / supplier, undertake to transmit and/or make available in response to reasoned request, technical file details and other relative information to EEC National Authorities, in electronic or hard copy format.

Installation and operation of this equipment must be in accordance with the installation and operating instructions provided.

Name: Mike Johnson
Position: Group Director of Engineering
Signature: [Signature]
Date: 1st March, 2016
SAFETY

Please read this manual before operating the equipment.

This unit must only be used for the intended purpose of calibrating torque wrenches.

The unit operates by simulating normal operation of torque tools.

A number of pins are supplied for use in different positions depending on tool size and type.

Misuse

The unit has been designed for the testing and calibration of hydraulic torque tools. The unit should not be used for anything other than its specified use. Do not disassemble the unit during loading and unloading. Loads must be lifted using suitable assistance and avoiding manual handling as much as possible.

HTL will not be held responsible for any damage or harm caused by misuse of the equipment.

General safety information

This equipment is manufactured in accordance with the Supply of Machinery Safety Regulations 2006/42/EC. The user should ensure that this equipment conforms with local and national legislation if used outside of the European Economic Area (EEA).

Only competent, authorised personnel should install, set, operate, maintain, and decommission this equipment.

This equipment is designed for use in dry conditions. DO NOT USE OUTSIDE.

Warnings
Any residual risks are identified within this manual with the equipment marked where appropriate. Ensure these warnings are adhered.

The following labels are displayed on the unit for your safety, please observe all warnings.

- You can be injured if you do not obey the safety instructions as indicated on warning stickers.
- Observe all safety instructions and warnings attached to the unit.
- Replace unreadable or missing labels.
- Keep warnings and instruction labels clean.

- Unit CE plate

- This following label indicates the maximum static weight (loaded) of the unit with a component in it.

- The unit should only be transported empty, with no components inside.

- This warning indicates that there is a potential crush hazard and to keep away from moving parts.

**STAY ALERT.** Watch what you are doing. Do not use power equipment under the influence of any mood altering substances.

**WARRANTY**

HTL Group Ltd guarantees its products against all design and manufacturing defects for 1 year from the date of shipment. The guarantee does not include the ordinary wear of both metal and non-metal parts, abuse, using the equipment beyond its rated capacity and any wear or damage incurred as a result of using a hydraulic fluid which is not recommended by HTL Group Ltd.

Please note that if the equipment is disassembled or serviced by anyone other than an authorised service dealer or by HTL Group Ltd, this guarantee is rendered null and void.

In the event of a warranty claim, return the equipment to HTL Group Ltd or the authorised dealer which sold you the hydraulic equipment. HTL Group Ltd will repair or replace the faulty equipment, whichever is deemed most appropriate.
INSTRUCTIONS BEFORE USE

READ CAREFULLY: Most malfunctions in new equipment are the result of improper operation and/or set-up assembly.

PREPARATION: Remove your Calibration Unit from the shipping container using a forklift truck or suitable lifting device, with a lifting capacity of at least 750kg.

INSPECTION: Visually inspect all components for shipping damage. If any damage is found, notify our sales office immediately.

Transportation

The unit is designed to be transported by installed castors. The unit should be carried unloaded. The weight of the unit unloaded is 500kg. The maximum loaded weight of the unit and any tools to be calibrated is 1000kg.

Positioning the unit

When positioning the unit be sure to leave adequate room for operation. The area must be free from obstructions or other hazards that may affect operation. At least 1m clear space is required around the front and sides of the unit to be able to operate it safely. The unit must be on level ground with adequate local lighting, with no glare or stroboscopic effects, of at least an average of 100 lux. Once in position castors can be set in place by rotating the orange wheel to lower the feet.

Ensure that all hydraulic connections are securely connected. Verify that the hoses are not kinked and that walkways are clear.

Connecting the system (torque tool)

The hydraulic torque wrench and the power pack are connected by a 10,000 psi (700 Bar) operating pressure twin line hose assembly. The safety ratio of the Hydraulic Hose is 4:1. On each twin Hydraulic Hose, one line must be MALE-MALE and the other line must be FEMALE-FEMALE in order to ensure a correct interconnection between pump and torque tool. The 10,000 psi (700 Bar) high pressure couplers on the pump and on the torque wrench are Male couplers, others are Female couplers.

IMPORTANT:

• Never use two twin hydraulic hoses between pump and tool. If so, you cross couple the hoses and have the high pressure on the retract side of your tool, which will cause seals on the front of tool to burst.
• To avoid tool malfunction, do not reverse connectors.
• Do not try to slacken the swivel assembly at any time.

Connect the twin line hose to the swivel as shown below:
Ensure connectors are fully engaged and screwed snugly and completely together.

Control plate legend

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hold to operate</td>
</tr>
<tr>
<td>2</td>
<td>Pump start up</td>
</tr>
<tr>
<td>3</td>
<td>Pump stop</td>
</tr>
<tr>
<td>4</td>
<td>Pendant control</td>
</tr>
<tr>
<td>5</td>
<td>Pressure adjust</td>
</tr>
<tr>
<td>6</td>
<td>10K PSI gauge</td>
</tr>
<tr>
<td>7</td>
<td>Emergency stop / main power off</td>
</tr>
<tr>
<td>8</td>
<td>Main power on</td>
</tr>
</tbody>
</table>

Connecting the system

The hydraulic wrench and power pack are connected by a 10,000 psi (700 Bar) operating pressure hose assembly. The safety ratio of the hose is 4:1. Connect the single male screw connect to the female connect located on the rear of the unit. Be sure to set the pump pressure to 700 Bar max. The utilised pump incorporates a permanent safety relief valve rated to 700 Bar max to prevent damage to the unit.

Do not try to untighten the swivel assembly at any time when in use.

Ensure the hose connectors are fully engaged and screwed snugly and completely together.

Switch on power to the unit (blue button). Cycle the tool to ensure proper function by pressing the hand control advance button.

Ensure correct female square adaptor (fig. A) or male hex adaptor (fig. B) is installed for the tool to be calibrated.

Figure A (Female Square Adaptor)  Figure B (Male Hex Adaptor)
Locate the torque tool assembly securely on reaction points. Be sure the reaction arm is fully engaged. Be sure all hoses are free of the reaction points. Pressurise the system for a test; if the tool tends to “ride-up” or to “creep”, stop and re-adjust the reaction arm to a more solid and secure position.

**NOTE:** Remain clear of the reaction arm during operation and never put body parts between reaction arm and reaction surface.

Always use quality impact sockets in good condition which are the correct size and fully engage the nut. Hidden flaws, however, remain a possibility which could cause breakage, so stay clear of sockets during operation.

Do not hammer or lever any part of the tool to enhance performance.

Proper reaction is required. Adjust the reaction plate to fit firmly against the reaction pin provided. In case of questions, consult with your local distributor.

### Working pressure (torque tool)

The tool’s maximum working pressure is 10,000 psi (700 Bar).

Make sure that all hydraulic equipment (pumps, hoses, couplers) used with this tool are rated for at least 10,000 psi (700 Bar) working pressure but that the power pack to be used is not able to reach more than 10,000 psi (700 Bar).

### Hydraulic connections

HTL Hydraulic Pumps are equipped with a zero pressure regulating valve. When connecting or disconnecting hoses from tools and pump, ensure that there is no pressure within the hoses.

When making connections with the quick release couplings, always make sure that the couplings are fully tightened. While using equipment, keep checking that the couplings are tight as if not, this may cause equipment to malfunction.

Always ensure that threaded fittings on the pump, tool and hoses are tight and leak free.

**CAUTION:** Loose or improper threaded fittings can be dangerous if pressurised. Severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way, come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause serious injury.

### OPERATION

The unit operates by simulating the normal operation of the torque tool while producing a pressure and torque reading.

The method employed to simulate the tool operation is to place the tool over a hex adaptor or directly into an input square.
NOTE: The Calibration rig will not open whilst the canopy is open. This must be securely closed for the calibration rig to operate.

Torque tool controls consists of a two way valve and a “hold to run” actuator yellow button advance.
Normal shut down procedure

- Switch off power to pump (red button).
- Using appropriate lifting equipment, remove torque tool from calibration unit and store safely.
- Check for oil/contaminant leakage.

Emergency shut down

Immediately shut down unit by hitting emergency stop.

**WARNING:** Do not put any persons at risk of injury; always remove all sources of energy before inspecting or interacting with the unit.

Setting the pressure

To set the pressure on the pump, follow this procedure:

1. Loosen the lock nut below the “T” handle on the pump’s external pressure regulator. Then turn the “T” handle (shown below) counter clockwise until it turns freely and easily.

2. Turn the pump “on”. Using the pump’s remote control pendant, push down the advance button and hold it.

3. While holding the pump in the advance mode, slowly turn the “T” handle clockwise and observe the pump pressure gauge rise.

**NOTE:** Always adjust the regulator in order to increase the pressure up - never down. Never adjust the regulation with the tool on the application.

4. When your gauge reaches the desired pressure stop turning the “T” handle and let the gauge settle out.

5. If the pressure continues to rise, release the advance button and back off your pressure by turning counter clockwise on the “T” handle. Then re-dress the advance switch on your remote and slowly bring pressure to desired value.

6. When the pressure is correct, turn the pump “off” and tighten the lock nut provided under the “T” handle. This sets pump pressure, which determines torque tool output.

Once the target pressure is set and locked, cycle the pump once more to ensure that the pressure setting did not change as you turned down the knurled knob.
POWER PACKS (GENERAL)

Working pressure

The pump’s maximum working pressure is 10,000 psi (700 Bar). Make sure all hydraulic equipment and accessories are rated for 10,000 psi (700 Bar) operating pressure.

Hydraulic connections

Never disconnect or connect hydraulic hoses or fittings without first unloading the torque wrench. Ensure pump unit is switched off, and open all hydraulic controls several times to ensure that the system has been depressurised. If the system includes a gauge, double check the gauge to ensure pressure has been released.

When making a connection with quick disconnect couplings, make sure the couplings are fully engaged threaded connections such a fittings, gauges etc. must be clean and securely tightened and leak free.

**CAUTION:** Loose or improperly threaded couplers can be potentially dangerous if pressurised, however, severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause injury. Do not subject the hose to potential hazards such as sharp surfaces, extreme heat or heavy impact. Do not allow the hose to kink and twist. Inspect the hose for wear before it is used.

Prior to use

Check hydraulic oil (use grade 46) level to prevent possible pump burnout. Open the filler plug located on the reservoir plate. Look at the oil fill level on the oil sight gauge. The oil level should be approximately 2” from the top of the reservoir plate with motor off. Add oil as necessary. Do not mix different grades of oil.

Make sure all desired gauge, valve, hose and quick coupler connections are tight and secure before operating.

The use of a pressure gauge is required for normal pump operation. Mounted on the manifold, the gauge permits the operator to monitor the load on the wrench. +/-3% calibrated gauges are available for most applications.

Operation

Before starting your pump, connect your hydraulic hoses to the torque wrench.

To start the pump, press the green button on the hand control. This will start the electric motor and put the torque wrench in retract position. To advance and retract the torque wrench, press the yellow button on and off. To stop the pump, press the red button.
The noise level of this unit during operation is 80 dB(A).


Vibration levels

The vibration levels are less than 2.5M/sec² r.m.s.

Environmental safety

Electrically powered hydraulic power packs should not be used in an atmosphere which can be considered potentially explosive.

NOTE: Metal contact can cause sparks, precautions should be taken.

It is essential that the service intervals detailed in the maintenance procedures are followed to ensure that this equipment operates as efficiently as possible.

Consumable materials

Only use hydraulic oils as specified by the manufacturer/supplier.

Unit disposal

This unit must only be disposed of at a specialist unit breaker or by HTL Group Ltd. All metal parts are recyclable, hoses and parts contaminated with oil must be disposed of in a safe manner.

MAINTENANCE RECOMMENDATION

Isolation

When undertaking maintenance and repair work, the unit must be first made safe.

Switch off the unit at the main isolation point, unplug unit from mains. Implement lockout procedures.

Attach a warning sign to the unit in appropriate positions.

Hydraulic equipment

Work on hydraulic equipment must only be carried out by persons with specialist knowledge and experience of hydraulic systems.

Check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately.

Always relieve pressure from the hydraulic system before carrying out any kind of maintenance
Hydraulic components must be installed and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the pipes and hoses must comply with technical requirements.

Only fit replacement components of a type recommended by the manufacturer.

Always practice extreme cleanliness when servicing hydraulic components.

Hydraulic oil can penetrate the skin causing serious injury. If oil is injected under the skin, seek medical help immediately.

Never run hands over hoses to find leaks.

Draining

The HTL Calibration Unit is designed to collect leakage of oil and fluids from the hydraulic tool, or from leaks within the unit. There is a drain plug in the base of the drip tray which is located under the base of the unit. A suitable container should be placed underneath, and the drain plug removed to drain the drip tray. Residual oil should be cleaned before use.

Maintenance - torque tool

Tool failure, although rare, does occur. Such failure is most often in the hydraulic couplers or hoses. These items are repairable or replaceable immediately, since they are available universally. Failures of structural members of the tool are quite rare, but replacement parts are available from stock. All repairs to HTL tools may be made by competent experienced individuals according to the instructions.

- **Lubrication** - All moving parts should periodically be coated with a good quality lubricant such as Lithium EP Complex. Under harsh environmental conditions, cleaning and lubricating should be performed more frequently.

- **Hydraulic hoses** - Hoses should be checked for cracks and leaks after each job. Hydraulic fittings can become plugged with dirt and should be flushed regularly. Kinks in hoses can cause internal parts of hose to collapse and restrict flow which often leads to hose bursting.

- **Quick-connects** - Fittings should be kept clean and not allowed to be dragged along the ground or floor, as even small particles of dirt can cause the internal valves to
malfunclion.

- **Springs** - Springs are used for the drive pawl assembly and other internal parts. These springs can be replaced if necessary.

- **Cylinder seals** - If the cylinder requires disassembly, it is recommended that the cylinder seals be replaced at the same time. Seal kits are readily available.

- **Structural members** - All structural parts on the tool should be inspected once a year to determine if there are any cracks, chips or deformities. If so, immediate replacement is required.

**Maintenance - main unit**

Ensure hinges are lubricated and gas struts are kept in good condition. All surfaces should be kept free from contaminants. Inspect transducer housings for damage.

- Inspect cylinders before use. Visually assess for signs of leakage around seals and corrosion which is excessive and is likely to affect its safe functioning. Replace cylinders if necessary.

**Hydraulic pipes and unions**

All pipes and unions are manufactured to accepted standards; BS EN 10305-4 and DIN 2413 and fitted by experienced technicians. High pressures are utilised within the unit and therefore in order to minimise risk to safety please observe the following.

- Inspect and visually assess all hydraulic lines for leakage, pay attention to junctions and unions. Signs of corrosion on hydraulic pipes should be considered and piping should be replaced where it is deemed necessary. Replace defective parts.

- Contact your HTL distributor to replace any pipe work that has been damaged.

**WARNING:** Do not operate the unit if any hydraulic components are faulty or fitted incorrectly.

**Frame and structural components**

The main cabinet assembly which comprises the majority of the unit is constructed from steel. Great care has been taken to ensure that the unit is capable of functioning without failure. The transducer housing is subject to large forces when in operation and therefore care should be taken to ensure the following inspections are undertaken.

- Inspect before every use for cracks, permanent deflection of structural members and noticeable distortion of any kind. Extra attention should be paid to welded joints and reaction areas.

**NOTE:** If the unit displays any of the aforementioned, cease all operation and report
HTL Hydraulic Power Packs are precision-built units and, as such, do require care and maintenance. The following is general information, as other power packs may be used.

Be sure to read the Instruction Manual that came with the power pack that is being used.

- **Hydraulic oil** - Oil should be completely changed after every 40 hours of operation, or at least twice a year. Always make sure the reservoir is filled with fluid. If additional oil is required, use only high-grade hydraulic oil such as grade 46. The oil should never get to a milky colour state.

- **Quick-disconnects** - Fittings should be checked periodically for leaks. Dirt or foreign materials should be kept away from fittings. Clean before use.

- **Hydraulic gauge** - Some gauges are liquid filled. Should this liquid level drop, it indicates external leakage, and replacement is necessary. Should the gauge fill with hydraulic oil, it indicates internal failure and it should be discarded. HTL recommends that gauges are calibrated every 12 months.

- **Filter on pump** - The filter should be replaced twice a year in normal use and up to 4 times yearly if used daily.

- **Remote control** - The switch buttons should be checked periodically if any indications of problems exist.

- **Armature** - (electric motor) Check yearly.

- **Pumping unit** - The pump should be overhauled every 12 months. This can be done by your local distributor.

**TROUBLESHOOTING GUIDE**

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool will not retract .</td>
<td>Voltage to electric pump is too low due to line drop or inadequate amperage is available.</td>
<td>Get shorter extension cord or upgrade to 4mm², 25 amp rating or better. If shop power is adequate, draw power from welding machine or cal rod transformer.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive pawl are broken.</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge shows pressure build up but the tool will not cycle.</td>
<td>Couplings loose or inoperative.</td>
<td>Tighten and/or replace couplings. Use test #1 listed below to isolate problem.</td>
</tr>
<tr>
<td></td>
<td>Solenoid inoperative.</td>
<td>Check using test #2 below. If solenoid is not working, repair.</td>
</tr>
<tr>
<td>SYMPTOM</td>
<td>PROBABLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Defective gland seal.</td>
<td>Replace gland seal.</td>
</tr>
<tr>
<td>Tool operates backwards.</td>
<td>Couplings reversed.</td>
<td>Run test #4. Replumb system as necessary.</td>
</tr>
<tr>
<td></td>
<td>Multiple hoses in even numbers.</td>
<td>As plumbed, HTL hoses may only be joined together in odd numbers ONLY.</td>
</tr>
<tr>
<td>Ratchet will not take successive strokes.</td>
<td>Broken or otherwise inoperative drive pawl or spring.</td>
<td>Replace drive pawl and/or spring.</td>
</tr>
<tr>
<td></td>
<td>Cylinder not retracting completely.</td>
<td>Remove tool from nut and cycle freely for several strokes. If problem persists, check pawls.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive plates is broken.</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge records no pressure.</td>
<td>Gauge connection loose.</td>
<td>Tighten coupling.</td>
</tr>
<tr>
<td></td>
<td>Bad gauge.</td>
<td>Replace gauge.</td>
</tr>
<tr>
<td></td>
<td>Pump will not build pressure.</td>
<td>Tool will not build pressure - see “pump will not build pressure”.</td>
</tr>
<tr>
<td></td>
<td>Tool seals are blown.</td>
<td>Replace defective seals.</td>
</tr>
<tr>
<td>Pump will not build pressure.</td>
<td>Electric supply is low.</td>
<td>Check voltage.</td>
</tr>
<tr>
<td></td>
<td>Defective relief or regulator valve.</td>
<td>Replace valve.</td>
</tr>
<tr>
<td></td>
<td>Low oil or clogged filter.</td>
<td>Fill reservoir and clean filter.</td>
</tr>
<tr>
<td></td>
<td>Internal leak in oil line from external relief valve to pump body.</td>
<td>Open reservoir, inspect oil line while trying to build pressure - if leaking tighten fittings or replace.</td>
</tr>
<tr>
<td>Motor sluggish and inefficient “sounds sick” slow to build pressure</td>
<td>Electric supply is low.</td>
<td>See test #1 in preceding block.</td>
</tr>
<tr>
<td></td>
<td>Clogged filter.</td>
<td>Clean or replace filter.</td>
</tr>
<tr>
<td>Pump heats up.</td>
<td>Improper use.</td>
<td>Operator is continuing to hold down on the advance stroke after the cylinder has reached end of stroke - this causes a lot of oil to go through a very small hole in relief valve causing heat build up. Have operator release advance stroke after accuracy assurance levers springs forwards.</td>
</tr>
<tr>
<td></td>
<td>Remote control is left in “on” position when pump is not actively in use.</td>
<td>Turn pump off whenever not actually being used. NO NOT leave pump running when tool is not in use.</td>
</tr>
</tbody>
</table>
Attach hoses to pump and tool in the normal manner. Press the advance button and hold it down. If the pump pressure builds and the hoses “flex” but the tool still refuses to cycle, the problem is most likely a loose or defective coupling connection. To find out where the bad coupling is, remove the tool from the hoses and marry the loose ends together and cycle the pump. If the gauge pressure reads no more than 500 psi, then the bad fitting is on the tool. A significantly greater pressure indicates that the problem is in either the pump or a hose fitting.
Test #2

Remove screws from pump motor to reservoir, slide pump motor to the back while keeping pistons in oil. Turn pump on. If you have no oil coming out from the solenoid tube, change the solenoid.

Tighten the regulating valve to maximum, push on the advance button and while holding down, look to see if any oil is coming out from the regulating tube. If oil is coming out, change the regulating valve.

Test #3

Remove tool from hoses. Cycle pump. If pump fails to build pressure, the problem is with the pump. If it does build pressure, the problem is with hydraulic blow-by in the tool.

Test #4

NOTE: THIS TEST SHOULD BE RUN PRIOR TO EVERY USE OF A HTL TOOL.

Connect the tool, pump and hoses together as normal. Cycle the pump several times. Cycle the system once more and observe the sequence of operation. As you depress the advance button, the tool drive should turn about 24 degrees. At this point, release the advance button. You should see no further movement and after a moment you will hear another audible “click”. This is how the tools are designed to operate. If you observe any other sequence of operation, the system is out of order. Take immediate corrective action. For reference, tools and pumps that are designed from the factory are plumbed as follows:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Advance Side - Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
<tr>
<td>Hose</td>
<td>Advance Side - Female to Female</td>
</tr>
<tr>
<td></td>
<td>Retract Side - Male to Male</td>
</tr>
<tr>
<td>Pump</td>
<td>Advance Side - Male</td>
</tr>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
</tbody>
</table>

This ensures that the tool, pump and ONE hose cannot possible be connected up incorrectly.

NOTE: Connecting two (or any even numbers) of hoses together creates “one” hose which is plumbed backwards. Male to Female and Female to Male. This will cause the system to operate backwards. If your hose isn’t long enough, connect 3 hoses together, move your pump or call HTL for a longer hose assembly.
DECLARATION

EC DECLARATION OF CONFORMITY

Name of Manufacturer: HTL Group
Address: 45 Colbourne Avenue, Nelson Park Ind. Estate, Cramlington, Northumberland NE23 1WD United Kingdom

Description of product: Calibration/Tensioner Test Unit

Model No's: CTS-***

We declare that this product complies with the appropriate ESR’s of the following directives,

- 2006/42 EC Machinery Safety Directive
  - BS EN ISO 12100: 2010 - Safety of machinery, basic concepts, general principles for design, risk assessment & risk reduction.
  - BS EN 4413:2010 - Hydraulic fluid power – general rules and safety requirements for systems & their components.
  - BS EN ISO 4414: 2010 - Pneumatic fluid power – general rules and safety requirements for systems & their components.
  - ISO 3744:1994 – Sound power level measurements

- 2006/95 EC Low Voltage Directive

- 2000/18 EC EMC Directive

- 2002/95 EC ROHS Directive

- 2014/68 EU Pressure Equipment Directive
  - Category 1 (Module A)

HTL Group, is the person authorised to compile and retain the Technical File for 10 years.

HTL Group, the manufacturer / supplier, undertake to transmit and/or make available in response to reasoned request, technical file details and other relative information to EEC National Authorities, in electronic or hard copy format.

Installation and operation of this equipment must be in accordance with the installation and operating instructions provided.

Name: Mike Johnson  Position: Group Director of Engineering
Signature: [Signature]
Date: 1st March, 2016

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SAFETY

Please read this manual before operating the equipment.

This unit must only be used for the intended purpose of calibrating torque wrenches.

The unit operates by simulating normal operation of torque tools.

A number of pins are supplied for use in different positions depending on tool size and type.

Misuse

The unit has been designed for the testing and calibration of hydraulic torque tools. The unit should not be used for anything other than its specified use. Do not disassemble the unit during loading and unloading. Loads must be lifted using suitable assistance and avoiding manual handling as much as possible.

HTL will not be held responsible for any damage or harm caused by misuse of the equipment.

General safety information

This equipment is manufactured in accordance with the Supply of Machinery Safety Regulations 2006/42/EC. The user should ensure that this equipment conforms with local and national legislation if used outside of the European Economic Area (EEA).

Only competent, authorised personnel should install, set, operate, maintain, and decommission this equipment.

This equipment is designed for use in dry conditions. DO NOT USE OUTSIDE.

Warnings

Any residual risks are identified within this manual with the equipment marked where
appropriate. Ensure these warnings are adhered.

The following labels are displayed on the unit for your safety, please observe all warnings.

- You can be injured if you do not obey the safety instructions as indicated on warning stickers.
- Observe all safety instructions and warnings attached to the unit.
- Replace unreadable or missing labels.
- Keep warnings and instruction labels clean.

- Unit CE plate

- This following label indicates the maximum static weight (loaded) of the unit with a component in it.

- The unit should only be transported empty, with no components inside.

- This warning indicates that there is a potential crush hazard and to keep away from moving parts.

**STAY ALERT.** Watch what you are doing. Do not use power equipment under the influence of any mood altering substances.

**WARRANTY**

HTL Group Ltd guarantees its products against all design and manufacturing defects for 1 year from the date of shipment. The guarantee does not include the ordinary wear of both metal and non-metal parts, abuse, using the equipment beyond its rated capacity and any wear or damage incurred as a result of using a hydraulic fluid which is not recommended by HTL Group Ltd.

Please note that if the equipment is disassembled or serviced by anyone other than an authorised service dealer or by HTL Group Ltd, this guarantee is rendered null and void.

In the event of a warranty claim, return the equipment to HTL Group Ltd or the authorised dealer which sold you the hydraulic equipment. HTL Group Ltd will repair or replace the faulty equipment, whichever is deemed most appropriate.
INSTRUCTIONS BEFORE USE

READ CAREFULLY: Most malfunctions in new equipment are the result of improper operation and/or set-up assembly.

PREPARATION: Remove your Calibration Unit from the shipping container using a forklift truck or suitable lifting device, with a lifting capacity of at least 750kg.

INSPECTION: Visually inspect all components for shipping damage. If any damage is found, notify our sales office immediately.

Transportation

The unit is designed to be transported by installed castors. The unit should be carried unloaded. The weight of the unit unloaded is 500kg. The maximum loaded weight of the unit and any tools to be calibrated is 1000kg.

Positioning the unit

When positioning the unit be sure to leave adequate room for operation. The area must be free from obstructions or other hazards that may affect operation. At least 1m clear space is required around the front and sides of the unit to be able to operate it safely. The unit must be on level ground with adequate local lighting, with no glare or stroboscopic effects, of at least an average of 100 lux. Once in position castors can be set in place by rotating the orange wheel to lower the feet.

Ensure that all hydraulic connections are securely connected. Verify that the hoses are not kinked and that walkways are clear.

Connecting the system

The hydraulic torque wrench and the power pack are connected by a 10,000 psi (700 Bar) operating pressure twin line hose assembly. The safety ratio of the Hydraulic Hose is 4:1. On each twin Hydraulic Hose, one line must be MALE-MALE and the other line must be FEMALE-FEMALE in order to ensure a correct interconnection between pump and torque tool. The 10,000 psi (700 Bar) high pressure couplers on the pump and on the torque wrench are Male couplers, others are Female couplers.

IMPORTANT:

- Never use two twin hydraulic hoses between pump and tool. If so, you cross couple the hoses and have the high pressure on the retract side of your tool, which will cause seals on the front of tool to burst.
- To avoid tool malfunction, do not reverse connectors.
- Do not try to slacken the swivel assembly at any time.

Connect the twin line hose to the swivel as shown below:
Ensure connectors are fully engaged and screwed snugly and completely together.

Control plate legend

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hold to operate</td>
</tr>
<tr>
<td>2</td>
<td>Pump start up</td>
</tr>
<tr>
<td>3</td>
<td>Pump stop</td>
</tr>
<tr>
<td>4</td>
<td>Pendant control</td>
</tr>
<tr>
<td>5</td>
<td>Pressure adjust</td>
</tr>
<tr>
<td>6</td>
<td>10K PSI gauge</td>
</tr>
<tr>
<td>7</td>
<td>Emergency stop / main power off</td>
</tr>
<tr>
<td>8</td>
<td>Main power on</td>
</tr>
</tbody>
</table>

Connecting the system

Gauge calibration

The three test gauge stations are as follows:

1. The high pressure test gauge hand pump is located on the left hand side of the unit. This has a maximum working pressure of 40,000psi and operates the test station inside the canopy on the left.

2. The standard pressure test gauge pump is located on the right hand side of the unit. This has a maximum working pressure of 10,000psi and operates the test station inside the canopy on the right.

3. The air test gauge hand pump is provided loose and connects to the port on the front of the unit. This has a maximum working pressure of 130psi and operates the test gauge inside the canopy in the centre.

NOTE: Do not use any gauges rated below the maximum working pressure of the station as this could cause damage or injury.

Torque Calibration

The hydraulic wrench and power pack are connected by a 10,000 psi (700 Bar) operating pressure hose assembly. The safety ratio of the hose is 4:1. Connect the single male screw connect to the female connect located on the rear of the unit. Be sure to set the pump pressure to 700 Bar max. The utilised pump incorporates a permanent safety relief valve rated to 700 Bar.
max to prevent damage to the unit.

Do not try to untighten the swivel assembly at any time when in use.

Ensure the hose connectors are fully engaged and screwed snugly and completely together.

Switch on power to the unit (blue button). Cycle the tool to ensure proper function by pressing the hand control advance button.

Ensure correct female square adaptor (fig. A) or male hex adaptor (fig. B) is installed for the tool to be calibrated.

![Figure A (Female Square Adaptor)](image1)  ![Figure B (Male Hex Adaptor)](image2)

Locate the torque tool assembly securely on reaction points. Be sure the reaction arm is fully engaged. Be sure all hoses are free of the reaction points. Pressurise the system for a test; if the tool tends to “ride-up” or to “creep”, stop and re-adjust the reaction arm to a more solid and secure position.

**NOTE:** Remain clear of the reaction arm during operation and never put body parts between reaction arm and reaction surface.

Always use quality impact sockets in good condition which are the correct size and fully engage the nut. Hidden flaws, however, remain a possibility which could cause breakage, so stay clear of sockets during operation.

Do not hammer or lever any part of the tool to enhance performance.

Proper reaction is required. Adjust the reaction plate to fit firmly against the reaction pin provided. In case of questions, consult with your local distributor.

**Working pressure (torque tool)**

The tool’s maximum working pressure is 10,000 psi (700 Bar).

Make sure that all hydraulic equipment (pumps, hoses, couplers) used with this tool are rated for at least 10,000 psi (700 Bar) working pressure but that the power pack to be used is not able to reach more than 10,000 psi (700 Bar).

**Hydraulic connections**

HTL Hydraulic Pumps are equipped with a zero pressure regulating valve. When connecting or
disconnecting hoses from tools and pump, ensure that there is no pressure within the hoses.

When making connections with the quick release couplings, always make sure that the couplings are fully tightened. While using equipment, keep checking that the couplings are tight as if not, this may cause equipment to malfunction.

Always ensure that threaded fittings on the pump, tool and hoses are tight and leak free.

**CAUTION:** Loose or improper threaded fittings can be dangerous if pressurised. Severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way, come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause serious injury.

**OPERATION**

The unit operates by simulating the normal operation of the torque tool while producing a pressure and torque reading.

The method employed to simulate the tool operation is to place the tool over a hex adaptor or directly into an input square.

**NOTE:** The Calibration rig will not open whilst the canopy is open. This must be securely closed for the calibration rig to operate.
Operating the unit

Torque tool controls consists of a two way valve and a “hold to run” actuator yellow button advance.

Normal shut down procedure

- Switch off power to pump (red button).
- Using appropriate lifting equipment, remove torque tool from calibration unit and store safely.
- Check for oil/contaminant leakage.

Emergency shut down

Immediately shut down unit by hitting emergency stop.

WARNING: Do not put any persons at risk of injury; always remove all sources of energy before inspecting or interacting with the unit.

Setting the pressure

To set the pressure on the pump, follow this procedure:

1. Loosen the lock nut below the “T” handle on the pump’s external pressure regulator. Then turn the “T” handle (shown below) counter clockwise until it turns freely and easily.

2. Turn the pump “on”. Using the pump’s remote control pendant, push down the advance button and hold it.

3. While holding the pump in the advance mode, slowly turn the “T” handle clockwise and observe the pump pressure gauge rise.

NOTE: Always adjust the regulator in order to increase the pressure up - never down. Never adjust the regulation with the tool on the application.

4. When your gauge reaches the desired pressure stop turning the “T” handle and let the
gauge settle out.

5. If the pressure continues to rise, release the advance button and back off your pressure by turning counter clockwise on the “T” handle. Then re-dress the advance switch on your remote and slowly bring pressure to desired value.

6. When the pressure is correct, turn the pump “off” and tighten the lock nut provided under the “T” handle. This sets pump pressure, which determines torque tool output.

Once the target pressure is set and locked, cycle the pump once more to ensure that the pressure setting did not change as you turned down the knurled knob.

POWER PACKS (GENERAL)

Working pressure

The pump’s maximum working pressure is 10,000 psi (700 Bar). Make sure all hydraulic equipment and accessories are rated for 10,000 psi (700 Bar) operating pressure.

Hydraulic connections

Never disconnect or connect hydraulic hoses or fittings without first unloading the torque wrench. Ensure pump unit is switched off, and open all hydraulic controls several times to ensure that the system has been depressurised. If the system includes a gauge, double check the gauge to ensure pressure has been released.

When making a connection with quick disconnect couplings, make sure the couplings are fully engaged threaded connections such a fittings, gauges etc. must be clean and securely tightened and leak free.

CAUTION: Loose or improperly threaded couplers can be potentially dangerous if pressurised, however, severe over tightening can cause premature thread failure. Fittings need to be only tightened secure and leak free. Never grab, touch or in any way come in contact with a hydraulic pressure leak. Escaping oil can penetrate the skin and cause injury. Do not subject the hose to potential hazards such as sharp surfaces, extreme heat or heavy impact. Do not allow the hose to kink and twist. Inspect the hose for wear before it is used.

Prior to use

Check hydraulic oil (use grade 46) level to prevent possible pump burnout. Open the filler plug located on the reservoir plate. Look at the oil fill level on the oil sight gauge. The oil level should be approximately 2” from the top of the reservoir plate with motor off. Add oil as necessary. Do not mix different grades of oil.

Make sure all desired gauge, valve, hose and quick coupler connections are tight and secure before operating.

The use of a pressure gauge is required for normal pump operation. Mounted on the manifold, the gauge permits the operator to monitor the load on the wrench. +/-3% calibrated gauges are
available for most applications.

**Operation**

Before starting your pump, connect your hydraulic hoses to the torque wrench.

To start the pump, press the green button on the hand control. This will start the electric motor and put the torque wrench in retract position. To advance and retract the torque wrench, press the yellow button on and off. To stop the pump, press the red button.

**Noise**

The noise level of this unit during operation is 80 dB(A).


**Vibration levels**

The vibration levels are less than 2.5M/sec² r.m.s.

**Environmental safety**

Electrically powered hydraulic power packs should not be used in an atmosphere which can be considered potentially explosive.

**NOTE:** Metal contact can cause sparks, precautions should be taken.

It is essential that the service intervals detailed in the maintenance procedures are followed to ensure that this equipment operates as efficiently as possible.

**Consumable materials**

Only use hydraulic oils as specified by the manufacturer/supplier.

**Unit disposal**

This unit must only be disposed of at a specialist unit breaker or by HTL Group Ltd. All metal parts are recyclable, hoses and parts contaminated with oil must be disposed of in a safe manner.

**MAINTENANCE RECOMMENDATION**

**Isolation**

When undertaking maintenance and repair work, the unit must be first made safe. Switch off the unit at the main isolation point, unplug unit from mains. Implement lockout procedures.
Attach a warning sign to the unit in appropriate positions.

**Hydraulic equipment**

Work on hydraulic equipment must only be carried out by persons with specialist knowledge and experience of hydraulic systems.

Check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately.

Always relieve pressure from the hydraulic system before carrying out any kind of maintenance or adjustment.

Hydraulic components must be installed and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the pipes and hoses must comply with technical requirements.

Only fit replacement components of a type recommended by the manufacturer.

Always practice extreme cleanliness when servicing hydraulic components.

Hydraulic oil can penetrate the skin causing serious injury. If oil is injected under the skin, seek medical help immediately.

Never run hands over hoses to find leaks.

**Draining**

The HTL Calibration Unit is designed to collect leakage of oil and fluids from the hydraulic tool, or from leaks within the unit. There is a drain plug in the base of the drip tray which is located under the base of the unit. A suitable container should be placed underneath, and the drain plug removed to drain the drip tray. Residual oil should be cleaned before use.

**Maintenance - torque tool**

Tool failure, although rare, does occur. Such failure is most often in the hydraulic couplers or hoses. These items are repairable or replaceable immediately, since they are available universally. Failures of structural members of the tool are quite rare, but replacement parts are available from stock. All repairs to HTL tools may be made by competent experienced individuals according to the instructions.

- **Lubrication** - All moving parts should periodically be coated with a good quality lubricant such as Lithium EP Complex. Under harsh environmental conditions, cleaning and lubricating should be performed more frequently.
• **Hydraulic hoses** - Hoses should be checked for cracks and leaks after each job. Hydraulic fittings can become plugged with dirt and should be flushed regularly. Kinks in hoses can cause internal parts of hose to collapse and restrict flow which often leads to hose bursting.

• **Quick-connects** - Fittings should be kept clean and not allowed to be dragged along the ground or floor, as even small particles of dirt can cause the internal valves to malfunction.

• **Springs** - Springs are used for the drive pawl assembly and other internal parts. These springs can be replaced if necessary.

• **Cylinder seals** - If the cylinder requires disassembly, it is recommended that the cylinder seals be replaced at the same time. Seal kits are readily available.

• **Structural members** - All structural parts on the tool should be inspected once a year to determine if there are any cracks, chips or deformities. If so, immediate replacement is required.

**Maintenance - main unit**

Ensure hinges are lubricated and gas struts are kept in good condition. All surfaces should be kept free from contaminants. Inspect transducer housings for damage.

• Inspect cylinders before use. Visually assess for signs of leakage around seals and corrosion which is excessive and is likely to affect its safe functioning. Replace cylinders if necessary.

**Hydraulic pipes and unions**

All pipes and unions are manufactured to accepted standards; BS EN 10305-4 and DIN 2413 and fitted by experienced technicians. High pressures are utilised within the unit and therefore in order to minimise risk to safety please observe the following.

• Inspect and visually assess all hydraulic lines for leakage, pay attention to junctions and unions. Signs of corrosion on hydraulic pipes should be considered and piping should be replaced where it is deemed necessary. Replace defective parts.

• Contact your HTL distributor to replace any pipe work that has been damaged.

**WARNING:** Do not operate the unit if any hydraulic components are faulty or fitted incorrectly.

**Frame and structural components**

The main cabinet assembly which comprises the majority of the unit is constructed from steel. Great care has been taken to ensure that the unit is capable of functioning without failure. The transducer housing is subject to large forces when in operation and therefore care should be
taken to ensure the following inspections are undertaken.

- Inspect before every use for cracks, permanent deflection of structural members and noticeable distortion of any kind. Extra attention should be paid to welded joints and reaction areas.

**NOTE:** If the unit displays any of the aforementioned, cease all operation and report the fault to supplier of the unit.

**Maintenance - hydraulic power pack**

HTL Hydraulic Power Packs are precision-built units and, as such, do require care and maintenance. The following is general information, as other power packs may be used.

Be sure to read the Instruction Manual that came with the power pack that is being used.

- **Hydraulic oil** - Oil should be completely changed after every 40 hours of operation, or at least twice a year. Always make sure the reservoir is filled with fluid. If additional oil is required, use only high-grade hydraulic oil such as grade 46. The oil should never get to a milky colour state.

- **Quick-disconnects** - Fittings should be checked periodically for leaks. Dirt or foreign materials should be kept away from fittings. Clean before use.

- **Hydraulic gauge** - Some gauges are liquid filled. Should this liquid level drop, it indicates external leakage, and replacement is necessary. Should the gauge fill with hydraulic oil, it indicates internal failure and it should be discarded. HTL recommends that gauges are calibrated every 12 months.

- **Filter on pump** - The filter should be replaced twice a year in normal use and up to 4 times yearly if used daily.

- **Remote control** - The switch buttons should be checked periodically if any indications of problems exist.

- **Armature** - (electric motor) Check yearly.

- **Pumping unit** - The pump should be overhauled every 12 months. This can be done by your local distributor.

### TROUBLESHOOTING GUIDE

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Defective gland seal.</td>
<td>Replace gland seal.</td>
</tr>
<tr>
<td>SYMPTOM</td>
<td>PROBABLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>-------------------------------</td>
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<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tool will not build pressure.</td>
<td>Oil blow in wrench.</td>
<td>Replace defective parts.</td>
</tr>
<tr>
<td></td>
<td>Pump problem.</td>
<td>Remove top cover screws on pump, lift pump slightly so that you can see inside. Operate pump looking inside for leaking fittings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If no leaking fittings, turn pressure regulating valve up to max. test pump if no pressure build up. Check and replace regulator parts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check 10,000 psi pressure relief valve. If it leaks oil at low pressure, replace it.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check to see if oil is returning back to tank from solenoid valve tube. Constant flow of oil shows problem lies within solenoid valve. Check operation, if it doesn’t work, repair or replace solenoid.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is hand control working on electric pump. Faulty cartridges. Replace if necessary. Check hand control wiring for damage or wires loose in hand set.</td>
</tr>
<tr>
<td>Hose or tool fitting damaged or leaks.</td>
<td>Broken or melted plastic outer covering.</td>
<td>If underlying kevlar or steel is still intact, continue operation. Inspect frequently.</td>
</tr>
<tr>
<td></td>
<td>Frayed kevlar or steel strands. Oil leaks through fibres.</td>
<td>Cut hose in half and discard. Replace hose.</td>
</tr>
<tr>
<td></td>
<td>Broken fittings.</td>
<td>Remove old fitting and discard with steel high pressure fittings only. After changing fittings, always run test#4 to ensure proper plumbing</td>
</tr>
<tr>
<td>Gauge shows pressure build up but the tool will not cycle.</td>
<td>Couplings loose or inoperative.</td>
<td>Tighten and/or replace couplings. Use test #1 listed below to isolate problem.</td>
</tr>
<tr>
<td></td>
<td>Solenoid inoperative.</td>
<td>Check using test #2 below. If solenoid is not working, repair.</td>
</tr>
<tr>
<td>Tool will not retract.</td>
<td>Voltage to electric pump is too low due to line drop or inadequate amperage is available.</td>
<td>Get shorter extension cord or upgrade to 4mm², 25 amp rating or better. If shop power is adequate, draw power from welding machine or cal rod transformer.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive pawl are broken.</td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Tool operates backwards.</td>
<td>Couplings reversed.</td>
<td>Run test #4. Replumb system as necessary.</td>
</tr>
<tr>
<td></td>
<td>Multiple hoses in even numbers.</td>
<td>As plumbed, HTL hoses may only be joined together in odd numbers ONLY.</td>
</tr>
<tr>
<td>SYMPTOM</td>
<td>PROBABLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ratchet will not take successive strokes.</td>
<td>Broken or otherwise inoperative drive pawl or spring.</td>
<td>Replace drive pawl and/or spring.</td>
</tr>
<tr>
<td></td>
<td>Cylinder not retracting completely.</td>
<td>Remove tool from nut and cycle freely for several strokes. If problem persists, check pawls.</td>
</tr>
<tr>
<td></td>
<td>Linkage between piston rod and drive plates is broken.</td>
<td>Operator not allowing adequate time for cylinder to retract fully.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace parts as necessary.</td>
</tr>
<tr>
<td>Gauge records no pressure.</td>
<td>Gauge connection loose.</td>
<td>Tighten coupling.</td>
</tr>
<tr>
<td></td>
<td>Bad gauge.</td>
<td>Replace gauge.</td>
</tr>
<tr>
<td></td>
<td>Pump will not build pressure.</td>
<td>Tool will not build pressure - see “pump will not build pressure”.</td>
</tr>
<tr>
<td></td>
<td>Tool seals are blown.</td>
<td>Replace defective seals.</td>
</tr>
<tr>
<td>Pump will not build pressure.</td>
<td>Electric supply is low.</td>
<td>Check voltage.</td>
</tr>
<tr>
<td></td>
<td>Defective relief or regulator valve.</td>
<td>Replace valve.</td>
</tr>
<tr>
<td></td>
<td>Low oil or clogged filter.</td>
<td>Fill reservoir and clean filter.</td>
</tr>
<tr>
<td></td>
<td>Internal leak in oil line from external relief valve to pump body.</td>
<td>Open reservoir, inspect oil line while trying to build pressure - if leaking tighten fittings or replace.</td>
</tr>
<tr>
<td>Motor sluggish and inefficient “sounds sick” slow to build pressure</td>
<td>Electric supply is low.</td>
<td>See test #1 in preceding block.</td>
</tr>
<tr>
<td></td>
<td>Clogged filter.</td>
<td>Clean or replace filter.</td>
</tr>
<tr>
<td>Pump heats up.</td>
<td>Improper use.</td>
<td>Operator is continuing to hold down on the advance stroke after the cylinder has reached end of stroke - this causes a lot of oil to go through a very small hole in relief valve causing heat build up. Have operator release advance stroke after accuracy assurance levers springs forwards.</td>
</tr>
<tr>
<td></td>
<td>Remote control is left in “on” position when pump is not actively in use.</td>
<td>Turn pump off whenever not actually being used. NO NOT leave pump running when tool is not in use.</td>
</tr>
</tbody>
</table>

**TESTS**

**Test #1**

Attach hoses to pump and tool in the normal manner. Press the advance button and hold it down. If the pump pressure builds and the hoses “flex” but the tool still refuses to cycle, the problem is most likely a loose or defective coupling connection. To find out where the bad coupling is, remove the tool from the hoses and marry the loose ends together and cycle the
pump. If the gauge pressure reads no more than 500 psi, then the bad fitting is on the tool. A significantly greater pressure indicates that the problem is in either the pump or a hose fitting.

Test #2

Remove screws from pump motor to reservoir, slide pump motor to the back while keeping pistons in oil. Turn pump on. If you have no oil coming out from the solenoid tube, change the solenoid.

Tighten the regulating valve to maximum, push on the advance button and while holding down, look to see if any oil is coming out from the regulating tube. If oil is coming out, change the regulating valve.

Test #3

Remove tool from hoses. Cycle pump. If pump fails to build pressure, the problem is with the pump. If it does build pressure, the problem is with hydraulic blow-by in the tool.

Test #4

NOTE: THIS TEST SHOULD BE RUN PRIOR TO EVERY USE OF A HTL TOOL.

Connect the tool, pump and hoses together as normal. Cycle the pump several times. Cycle the system once more and observe the sequence of operation. As you depress the advance button, the tool drive should turn about 24 degrees. At this point, release the advance button. You should see no further movement and after a moment you will hear another audible “click”. This is how the tools are designed to operate. If you observe any other sequence of operation, the system is out of order. Take immediate corrective action. For reference, tools and pumps that are designed from the factory are plumbed as follows:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Advance Side - Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hose</th>
<th>Advance Side - Female to Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Male to Male</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pump</th>
<th>Advance Side - Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retract Side - Female</td>
</tr>
</tbody>
</table>

This ensures that the tool, pump and ONE hose cannot possible be connected up incorrectly.

NOTE: Connecting two (or any even numbers) of hoses together creates “one” hose which is plumbed backwards. Male to Female and Female to Male. This will cause the system to operate backwards. If your hose isn’t long enough, connect 3 hoses together, move your pump or call HTL for a longer hose assembly.
DECLARATION

EC DECLARATION OF CONFORMITY

Name of Manufacturer: HTL Group
Address: 45 Colbourne Avenue,
Nelson Park Ind. Estate,
Cramlington,
Northumberland
NE23 1WD
United Kingdom

Description of product: Calibration/Tensioner Test Unit

Model No's: CTS-***

We declare that this product complies with the appropriate ESR’s of the following directives,

- 2006/42 EC Machinery Safety Directive
  - BS EN ISO 12100: 2010 - Safety of machinery, basic concepts, general principles for design, risk assessment & risk reduction
  - BS EN 4413:2010 - Hydraulic fluid power - general rules and safety requirements for systems & their components.
  - BS EN ISO 4414: 2010 - Pneumatic fluid power - general rules and safety requirements for systems & their components.
  - ISO 3744:1994 - Sound power level measurements

- 2006/95 EC Low Voltage Directive
- 2000/18 EC EMC Directive
- 2002/95 EC ROHS Directive
- 2014/68 EU Pressure Equipment Directive
  - Category 1 (Module A)

HTL Group, is the person authorised to compile and retain the Technical File for 10 years.

HTL Group, the manufacturer / supplier, undertake to transmit and/or make available in response to reasoned request, technical file details and other relative information to EEC National Authorities, in electronic or hard copy format.

Installation and operation of this equipment must be in accordance with the installation and operating instructions provided.

Name: Mike Johnson
Position: Group Director of Engineering
Signature: [Signature]
Date: 1st March, 2016
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