



INSTRUCTION  
MANUAL

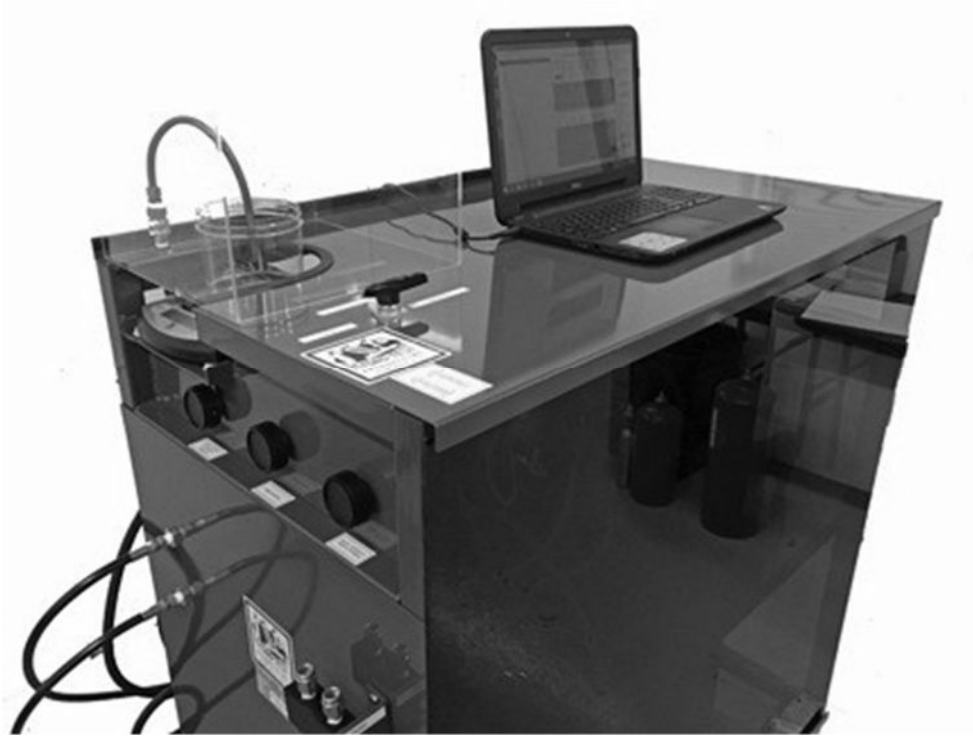
# AUTOMATED VOLUMETRIC WATER JACKET TEST SYSTEM

MODEL  
507-SERIES



HYDRO-TEST PRODUCTS LLC  
85 HUDSON ROAD, STOW, MA 01775 U.S.A.

# 507-Series Automated Water Jacket Volumetric Test System



This manual incorporates the following models manufactured by Hydro-Test Products LLC. Please carefully read this entire manual before operating the equipment for the first time. Should you have any questions or concerns, please contact Hydro-Test Products prior to operating. Models listed below are **HP for High Pressure**, but YOUR SYSTEM MAY BE an **LP for Low Pressure** or **LHP for Low-and High-Pressure System**.

Model No.	Water Jacket Size		Maximum Cylinder Size		Type of Water Jacket Lid Closure
	Dia (")	Height (")	Dia (")	Height (")	
<b>507-HP-14S-M</b>	14	40	12	34	Manual
<b>507-HP-14S-P</b>	14	40	12	34	Pneumatic
<b>507-HP-14-M</b>	14	66	12	60	Manual
<b>507-HP-14-P</b>	14	66	12	60	Pneumatic
<b>507-HP-18S-M</b>	18	40	16	34	Manual
<b>507-HP-18S-P</b>	18	40	16	34	Pneumatic
<b>507-HP-18-M</b>	18	72	16	66	Manual
<b>507-HP-18-P</b>	18	72	16	66	Pneumatic
<b>507-HP-24S-M</b>	24	40	22	34	Manual
<b>507-HP-24S-P</b>	24	40	22	34	Pneumatic
<b>507-HP-24-M</b>	24	72	22	66	Manual
<b>507-HP-24-P</b>	24	72	22	66	Pneumatic
<b>507-HP</b>	Test Console Only - No Water Jacket, Calibrated Cylinder or Test Adapters				

**Your Model Number:** \_\_\_\_\_

**Your Serial Number:** \_\_\_\_\_

**Dated Shipped:** \_\_\_\_\_

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## Introduction

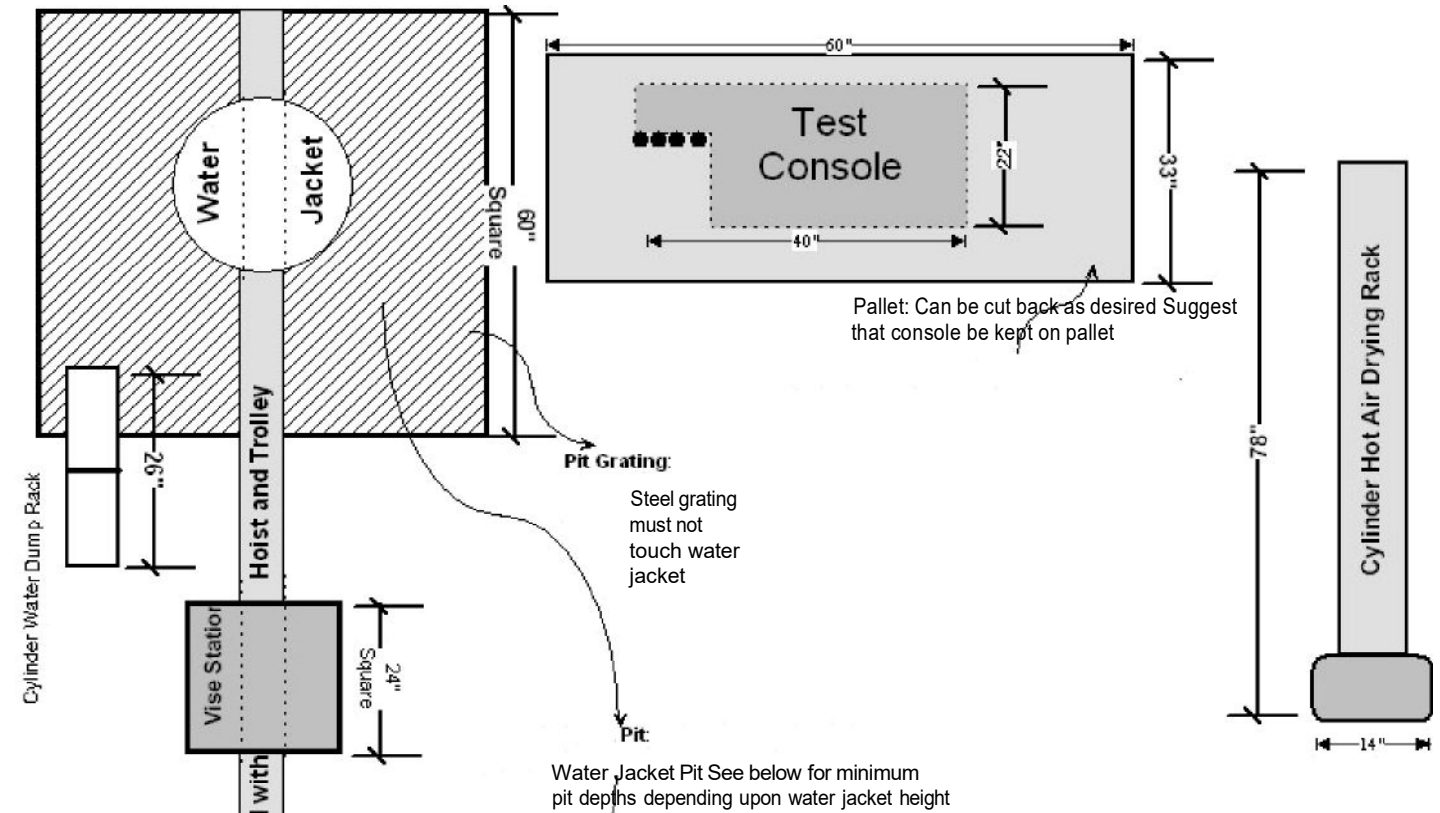
Water Jacket Volumetric Testing has been a method of re-qualifying compressed gas cylinders since the early 1900's. The test is designed to measure the expansion value of a cylinder at its designed test pressure (typically 5/3rds the operating pressure) and measure any residual expansion after the pressure is released. If the residual expansion value is greater than a percentage (typically 10%) of the expansion value at the test pressure the cylinder fails, the test. The determination of failure is due to excessive permanent expansion which indicates that the cylinder walls have thinned during the life of the cylinder and thus has been deemed dangerous to be refilled with pressurized gas.

With the influx of specialized software designs, automated software driven test systems are more common to the cylinder testing industry. Hydro-Test has been supplying automated test systems since the 1980's and with the 507-series has completely re-designed the software taking advantage of today's technology.

**Please note, we strongly suggest a formal training seminar from experts in your industry. Reach out to our team at Hydro-Test Products for more information.**

### Utilities required checklist:

- 100psi @ 8CFM of pre-regulated shop air to back of test console
- Inlet water supply to back of test console
- Pit for water jackets over 40" tall - see next page for typical floor and pit plan
- Overhead I-beam with hoist and trolley
- 115V-60Hz-15 amp dedicated electrical outlet within 6' of test console
- Any additional utilities that may be required for options or additional equipment purchased - see quotation or manuals for those requirements.



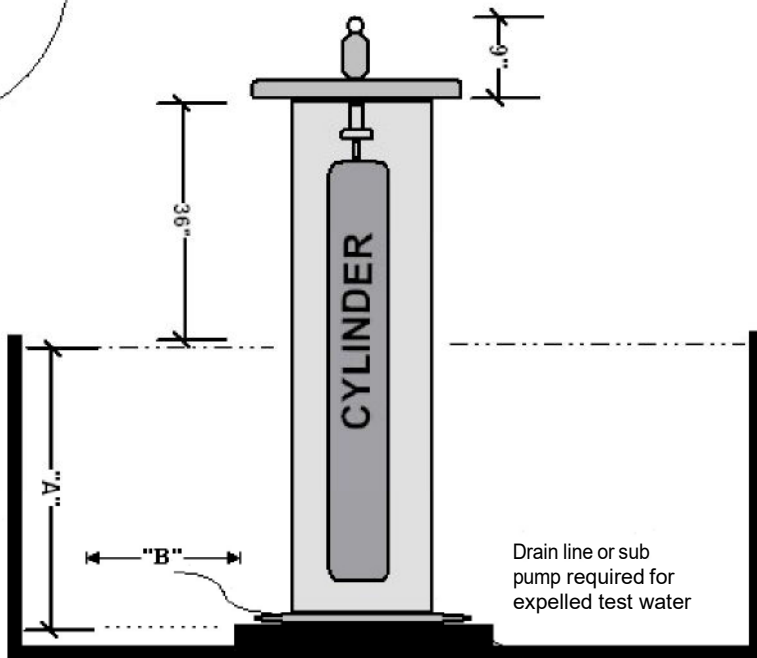
Length of Jacket	Dia of Jacket	Pit Depth ("A")	Base Plate Dia ("B")
40"	14"	No Pit Required	30"
40"	18"	No Pit Required	36"
40"	24"	No Pit Required	42"
66"	14"	30"	30"
72"	18"	36"	36"
72"	24"	36"	42"

### IMPORTANT NOTES

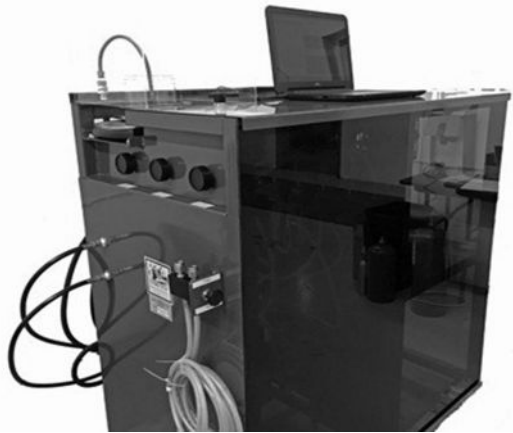
The above dimensions are for our standard size water jackets. If your water jacket size is not listed, please call us and we will be pleased to advise you on a floor plan and pit size.

Pit is shown 60" x 60". You may want to go larger for future expansion, or you may want to go smaller in size due to room size constraints.

Pit depths are predicated upon 12' height from floor to underside of I-beam. If I-beam / ceiling are lower than 12' you may need to increase the depth of your pit.



# Identifying Major Components of 507-Series Test System



**Test Console:** Houses the electronics, pump, expansion device, valves, hoses, etc...



**Water Jacket:** Also referred to as a test chamber. Available in a variety of diameters and heights.



**Expansion Device:** A digital scale that is used to measure the expansion values of a cylinder under test pressure.



**Calibrated Cylinder:** Used to verify system accuracy daily



**Dial Gauge:** Used when operating the system in manual mode and to periodically calibrate the electronic pressure transducer

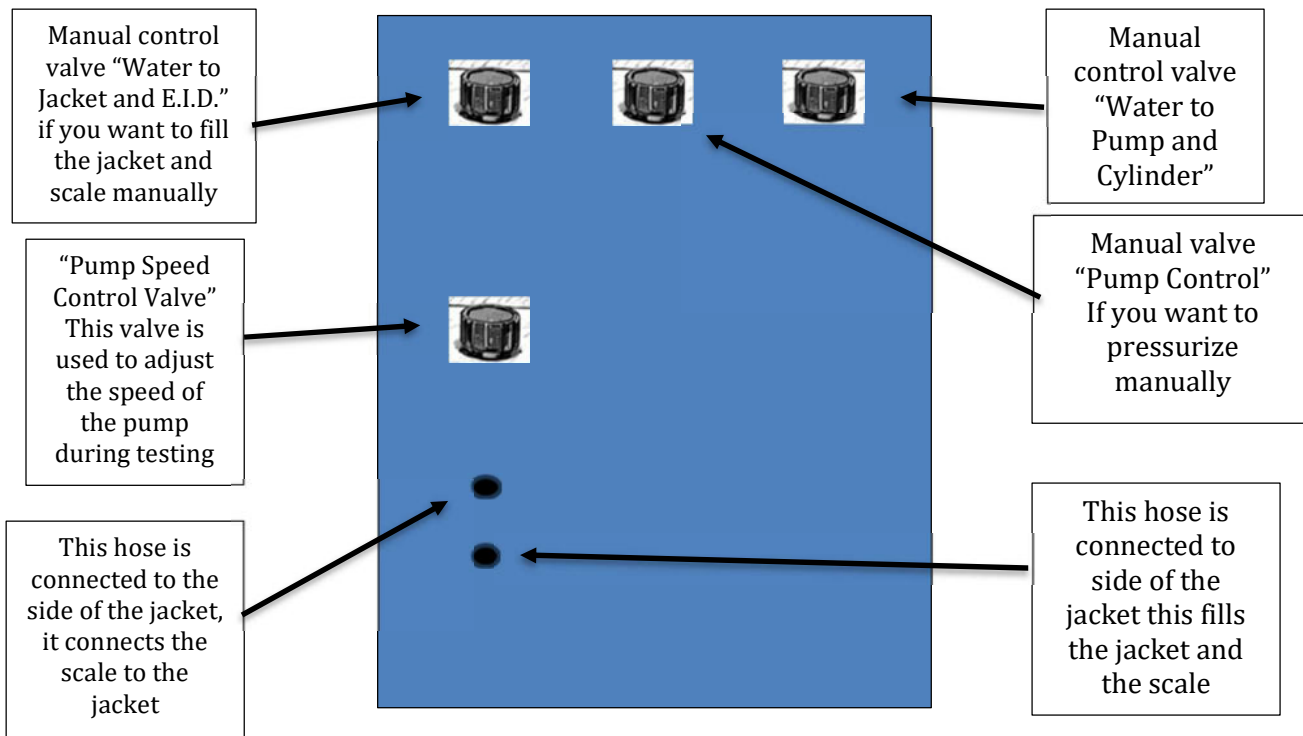


**Pressure Pump:** Is what creates pressure to the cylinder under test. Includes soft seated check valves, lubricator, inlet air regulator

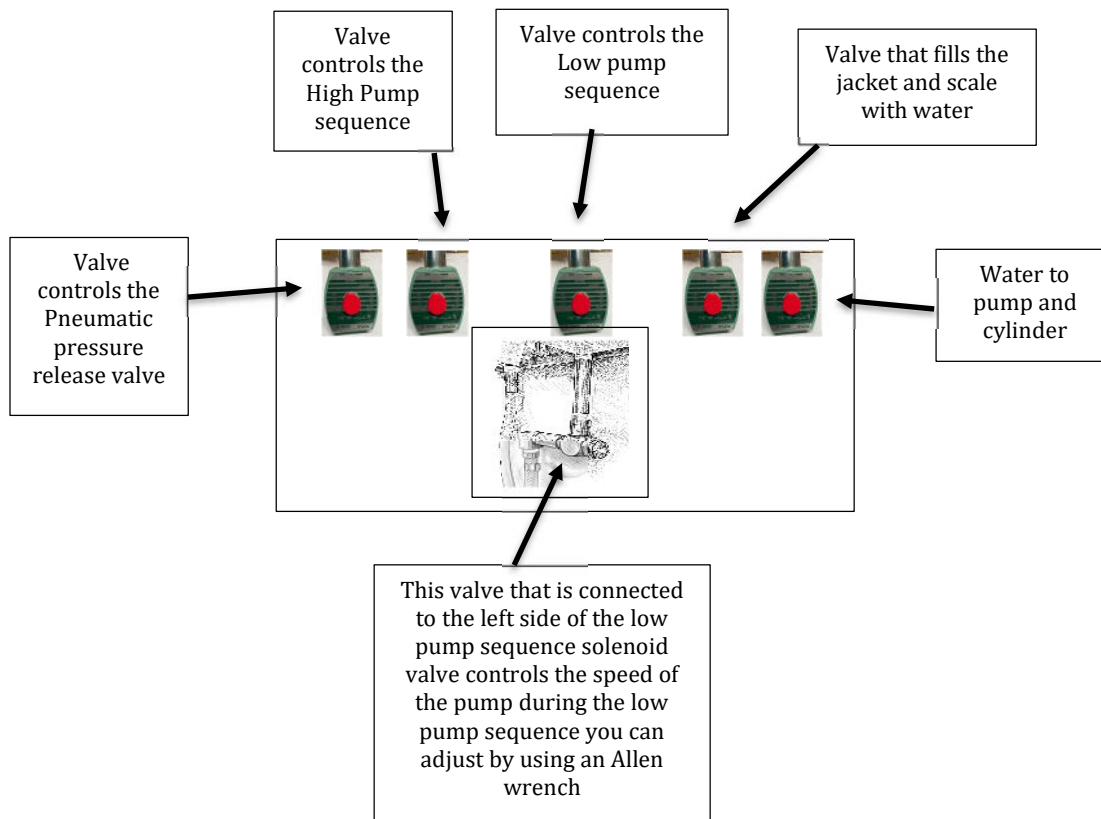


**Test Adapters:** A standard set is sent with each complete test system. Many additional adapters are available for purchase.

## Side View of Test Console



## Inside View of Test Console Solenoid Valves



## Set-Up of Test System

Before operating the 507-series test system, there are electrical, water and air connections that are made. There are also connections between the water jacket and test console. All connections are tagged with a short description of where they are to be connected. The following steps should be taken only after the equipment is in its operating position, water jacket pit has been constructed (if required) and overhead I-beam with hoist is in place and operational.

### Step 1:

- a) Locate spare parts box and remove all the items.
- b) Attach the (2) 1/4"(m) x 3/8"(m) to each of the ball valves - be sure to Teflon tape the fittings
- c) Tighten the fitting and the ball valves into the two lower openings on the water jacket as pictured (*see fig.1c*)
- d) Turn both ball valves to the open position

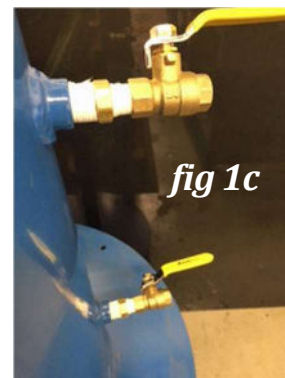


fig 1c

### Step 2:

On test console locate the 2 hoses on the side of the console (*see fig 2a*) Teflon tape the hose fittings and tighten into ball valves on water jacket valves from Step 1  
(Connect upper hose to upper valve and lower to lower)



fig 2a

### Step 3:

On back of test console locate water inlet fitting. Securely fasten your water supply to the 1/4" female coupling (**do not turn water on**) (*see fig.3a*) On back of test console locate air inlet fitting. Securely fasten your inlet air supply (100psi @ 8CFM) to the 1/4" female coupling (**do not turn on air supply**) - (*see fig. 3b*)



fig 3a



fig 3b

### Step 4:

- a) Locate expansion scale, remove **red sticker**, and turn locking mechanism to unlock position and place platform on scale. Locate the RS-232 cable and connect to scale, connect the other end of the RS-232 cable to main control board (*see fig 4a*). Connect the power cord to scale.
- b) Locate weight bowl and dip tube assembly. Place the scale on the test console as pictured (*see fig. 4B*), level the scale by adjusting the feet on the scale. Quick connect the dip tube as pictured (*see fig.4b*). Be sure the beaker is on top of scale and the copper siphon tube is securely coupled in place. The bottom of the copper tube should be as close to the bottom of the beaker without touching, **approximately 1/8" of an inch from the bottom of the beaker**



fig 4B



Fig 4a



Fig. 4b

## Set-Up of Test System (continued)

- c. A Plexiglas cover is supplied to assist in stabilizing the scale readings in adverse conditions where heat or air conditioning breeze is blowing towards test system.
- d. Locate the laptop and remove from package. Place laptop on top of test cabinet. Connect USB cable from laptop to the main control board (see *fig 4c*).
- e. Place printer on side shelf. Connect printer USB cable to laptop. **Note:** Printer software has already been installed on your laptop. Connect supplied power cords to laptop, printer, and scale

### Step 5:

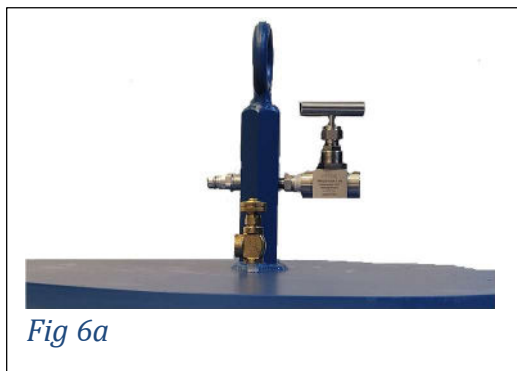
- a) Unpack Uninterrupted Power Supply (UPS) electrical box. Have a minimum 15 amp - 115V electrical outlet nearby. Position the UPS device so that all electrical outlets from the machine can reach.
- b) Connect power cords from scale, laptop, printer, and electronics board to the UPS in the available outlets
- c) Connect the power cord from the UPS to the 115V electrical outlet and turn the UPS on. Then turn on each component (scale, laptop, printer, electronics board) to verify electrical connections.



*Fig 4c*

### Step 6:

- a) Locate the high- and low-pressure water jacket lid bleed valves and quick disconnect fitting part #110-016. Teflon tape and tighten into the appropriate openings on the water jacket lid. (see *fig. 6a*).
- b) Locate 1/2" quick coupler, part no. 110-001. Teflon tape exposed spud on the underside of water jacket lid and tighten the 1/2" quick coupler onto spud. **To open clamps, go to page 32 for instructions**
- c) Once fittings are tightened, bring hoist hook over to top of lid and connect to eyebolt. Use hoist to lift lid off water jacket.
- d) Remove O-ring from water jacket lid and lightly lubricate with an O-ring lubricant such as Parker O-Lube or equivalent. Return O-ring to O-ring groove.



*Fig 6a*

### Step 7:

- a) Fill the water jacket with water. This can be done by either placing a garden hose directly into the water jacket (**recommended**) or by turning on the main water supply to the test console and opening the valve on left side of cabinet labeled "Water to Water Jacket and E.I.D.". (see *fig.7a*)

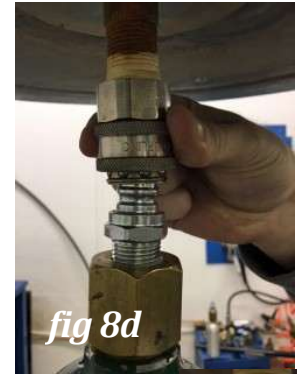


*fig 7a*

## Set-Up of Test System (continued)

### Step 8:

- a) Locate the calibrated cylinder and fill with water by placing a garden hose into the cylinder opening. Cal Cyl should always be filled with water.
- b) Attach test adapter (Located in Cal Cyl Box) by first Teflon taping and then tightly thread into cylinder opening.
- c) Place calibrated cylinder under I-beam and position water jacket lid over cylinder.
- d) Carefully lower lid to approximately 1" above quick disconnect coupler on test adapter. With forefinger and thumb lift the quick coupler until bearings are visible. Slowly lower coupler down to mate to nipple. Once mated, release the quick coupler so that it is attached to nipple. Raise lid and connected cylinder a few inches off the ground and lightly pull down on cylinder to confirm quick coupler is engaged. (see *figs.8d & 8e*)
- e) Slowly raise lid and calibrated cylinder slightly above water jacket and lower into water jacket until the lid meets the main O-ring and slack is felt on hoist chain.



*fig 8d*



*fig 8e*

### Step 9:

Locate the drain hose that is attached to the Pneumatic bleed valve in the back of the console (see *fig 9a*) and securely fasten the end of hose to your drain or pit.



*Fig 9a*

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## Software Review

The software that operates the test system is a Windows based operating system and has been pre-loaded onto the laptop shipped with the test system. The software is also sent to you on a USB stick along with a video on the operation. Please keep this USB in a safe place in case you are required to re-install the software.

**Some requirements for operating the laptop and software under Windows protocol are:**

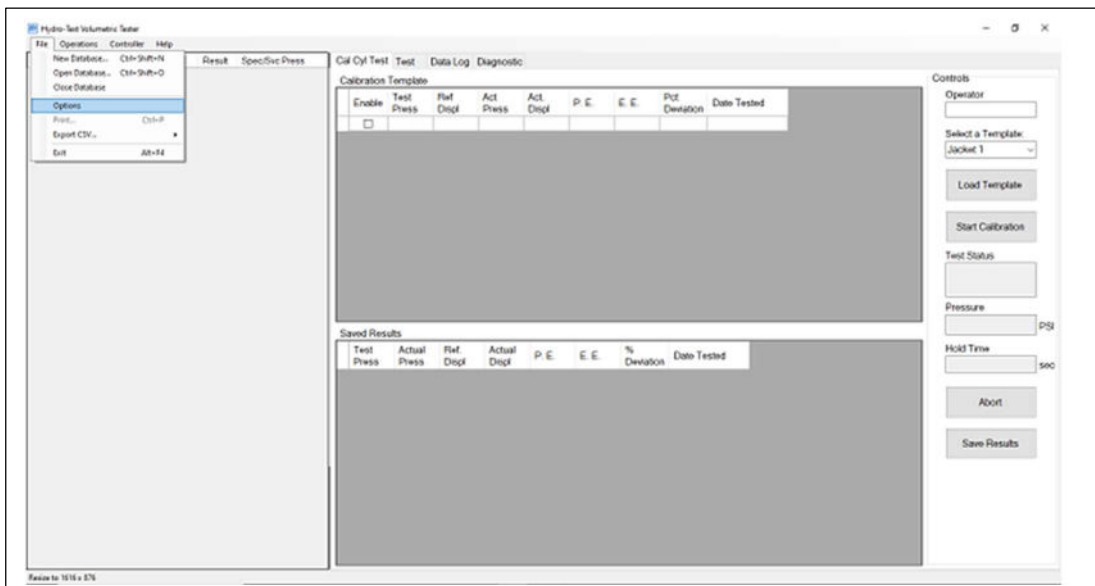
- The software cannot be used as a server application. Due to Windows software requirements, all files must be saved to the laptop hard drive or an attached drive. Saving files to a server is not possible.
- **Laptop should NOT be connected to internet.** May corrupt software.
- We highly recommend that the laptop used to run your 507-series test system be dedicated for that purpose only. It is possible that the addition of other software may conflict or corrupt the hydrotest files.
- As with any data it is important that you have a backup plan in place. There are many 3rd party backup options that can be used. These are discussed in our video and during a formal training session.
- A thorough cleaning of the laptop and printer should be performed regularly.
- The software is saved as a shortcut to the desktop; it is pre-loaded onto the "C" drive and the records by default are saved to **"My Documents" "Test Records"** folder

## Software Setup

**The software settings have been pre-loaded, but verification is recommended**

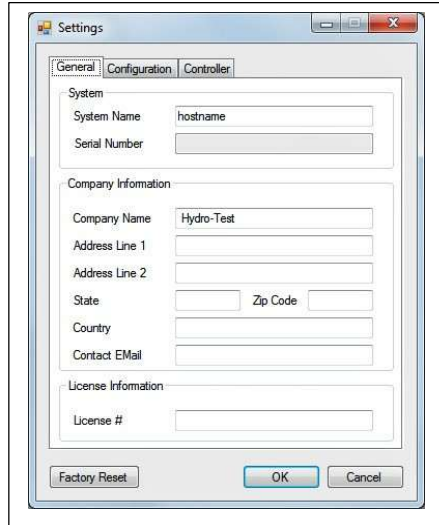
**To start the software: "double click" on the Volumetric Tester Icon on Desktop**

**Step 1: Click "File" Tab and Select "Options"**

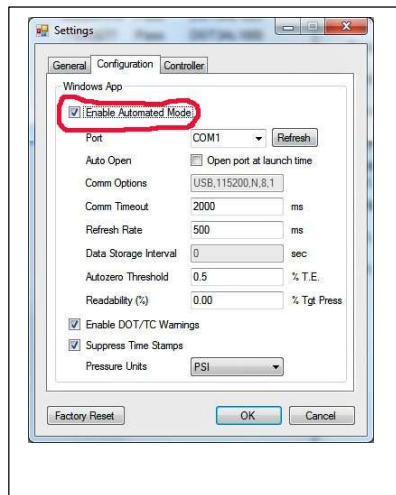


## Software Setup (continued)

- a) In “Options” screen under sub menu “General” tab review and Change your company data as needed. Name your 507-tester any Name you choose. To change serial number double click on the words Serial Number **Be accurate** as this information will print on your test record forms



- b) Click “Configuration” sub menu and verify that "Enable Automated Mode" is checked. Verify that “Auto Open” “Open Port at Launch Time” is checked. If you are testing DOT/TC requirements, be sure the "Enable DOT/TC warnings" box is checked



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## Software Setup (continued)

### c) In “Control” tab.

**(i) “Low Pump Threshold” field is set at 350psi.**

This parameter indicates the transition point between the high pump and low pump sequence, at 350psi, **before** the designated test pressure the pump will decelerate for the remaining 350 psi on a test, this deceleration is referred to as the low pump sequence.

**(ii) “Stabilization Time” Is set at 30 seconds,**

After the jacket/scale is filled and before pressurization of the cylinder begins, this is the hold time. If after the hold time, the scale is not stable, the system will automatically keep adding an additional 10 seconds (*see fig 8f*). It will continue to add 10 seconds until the scale is stable.

**(iii) “Scale Limits Min. 70g Max. 350g Overfill 1100g”**

These parameters are pre-loaded and utilized within the program to ascertain whether the jacket or scale requires water. If the scale’s reading falls below 70 grams, the program will initiate the filling of the jacket and scale until it reaches that specific value (70). Upon reaching 70 grams, the program will cease filling the jacket and scale and commence the hold and stabilization period. During this stabilization period, the scale will increase and stabilize, necessitating a range between 70 and 350 grams, which will be automatically achieved. Once the hold time has elapsed and the cylinder is ready for pressurization, the program will perform an internal tare (zeroing) of the scale (**manual zeroing before every test is not required**) and proceed with the test. Upon completion of the test, the cylinder will be removed from the jacket, and the copper tube within the beaker will automatically siphon water from the beaker to a level below 70 grams for the subsequent test (manual zeroing of the scale is not necessary). This process will automatically repeat for each test. The 1100 Overfill parameter, if the scale’s reading exceeds 1100 grams at any point during the test, the test will be terminated due to overfilling the jacket or scale.

**Note: Run the system before any changes are made.  
The remaining fields should not be changed.  
Contact Hydro Test for any questions.**

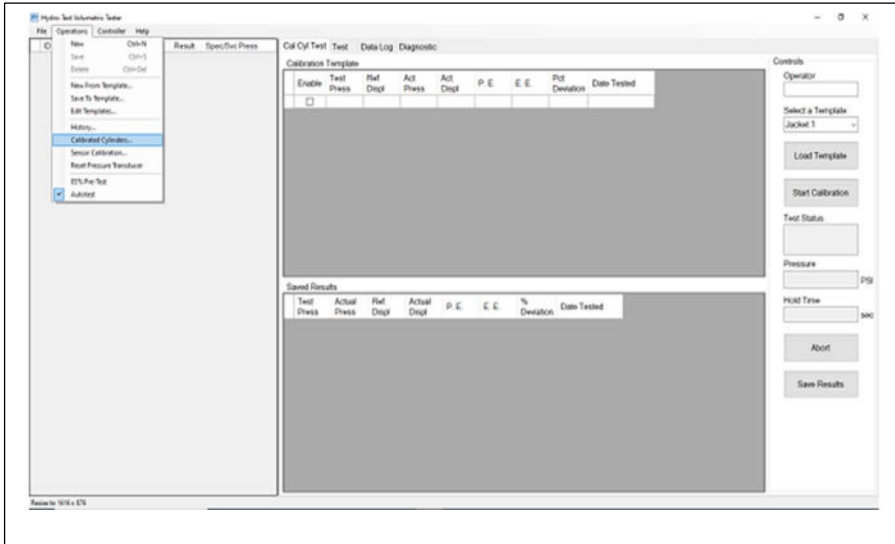
The screenshot shows a software configuration window titled 'Controller' with three tabs: 'General', 'Configuration', and 'Controller'. The 'Controller' tab is active, displaying 'Controller Settings' with the following parameters:

Sample Time	125	ms
Loop Time	250	ms
Comm Lost Timeout	10	sec
Comm Reset Timeout	600	sec
Low Pump Threshold	350	PSI
Max Test Pressure	10000	PSI
Pump Timeout	15000	ms
Perm Exp Hold Time	30	sec
Cal Cyl TE Hold Time	30	sec
Stabilization Time	30	sec
Scale Limits	Min: 70 g, Max: 350 g, Overfill: 1100 g	

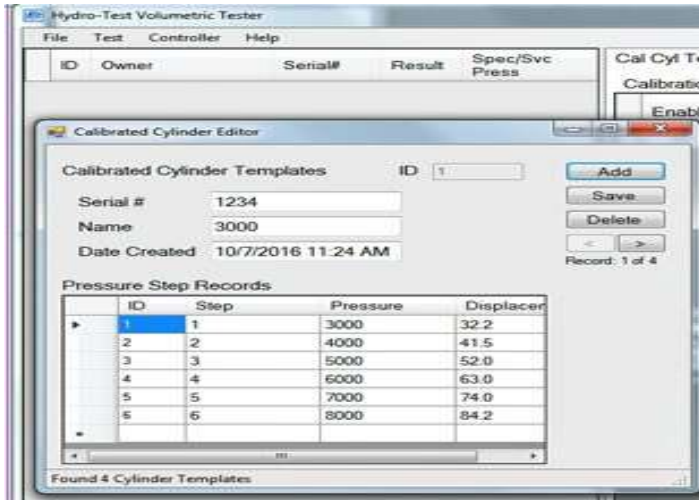
At the bottom of the window, there are three buttons: 'Factory Reset', 'OK', and 'Cancel'.

# Software Setup (continued)

**Step 2: Click “Operations” Tab and Select “Calibrated Cylinders”**



- a) A template screen is used to enter data for your calibrated cylinder(s). Refer to your certificate of calibration for values. This data is pre-loaded at the factory. However, if you replace or have multiple calibrated cylinders you will need to enter this information here. Click on “Add” fill out “Name” and “Serial #” click “Save” and use the tab key to forward to the “Step” box and each data box. Once data is entered click “Save” again.



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## System Operation

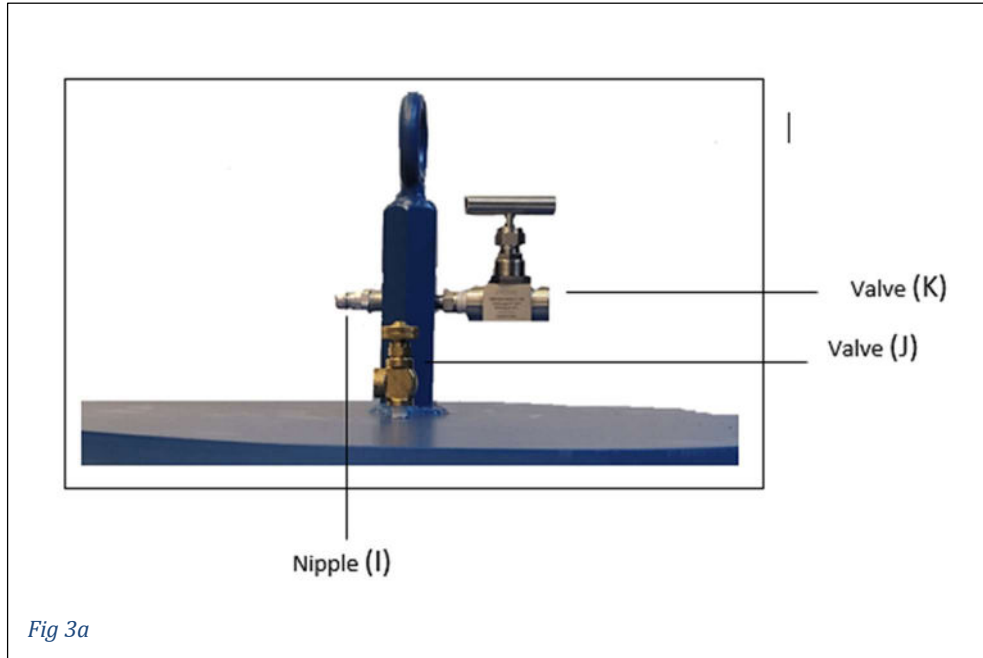
**Step 1:** Connect the Calibrated Cylinder to the bottom of the Lid via the Quick Coupler.

**Step 2:** Lower Lid into place and lock clamps down.

**Step 3:** Connect High Pressure Hose from the Test Console to Nipple (*see fig 3a (I) nipple*).

The High-pressure valve (*see fig 3a valve (k)*) should always be in a closed position.

**Step 4:** Open the Brass Bleed Valve (*see fig 3a valve (J)*) on top of the lid. You must open this valve every time you lift the lid to purge jacket of air.



**Step 5:** Turn the Scale "ON" with the beaker on scale platform. **Note:** Beaker will be on the scale when you turn it on. Leave the scale on. **The scale is NOT required to be re-zeroed after every test it does an automatic internal tare of the scale.** The scale determines if the jacket needs to be filled or not, see "Software Setup" (*Step 1(c)(ii)*) for explanation.

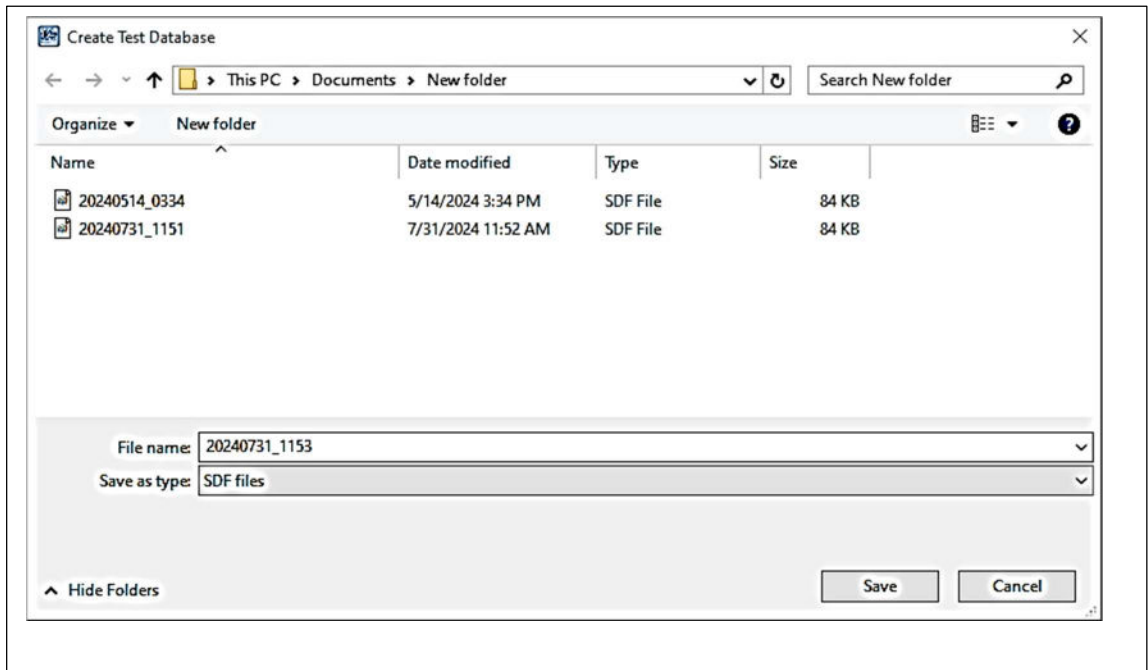
**Step 6:** Start program "Double click" on the **Volumetric Icon** on Desktop

**Step 7:** Click "**File**" Tab and "**New Database**"



## System Operation (continued)

- a) When a new database is opened it will be automatically named with the date and time in a year/month/day/time format for easier sorting. In this example: 20171129\_1150 is November 29, 2017 11:50am. We strongly suggest that you take the default name. Click **“Save”**

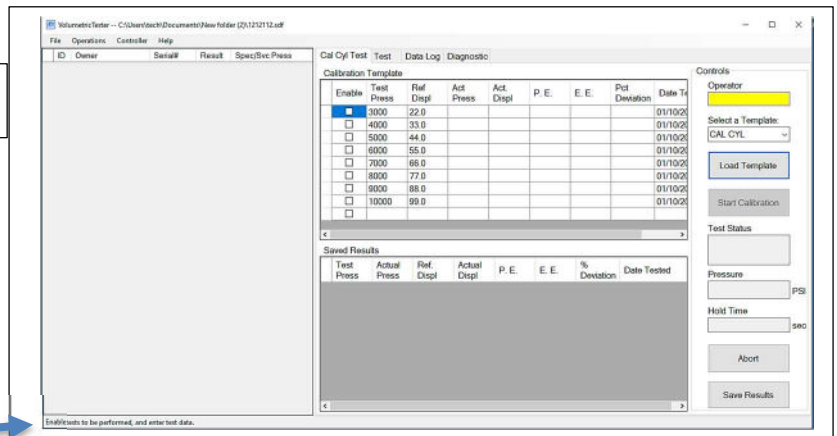


**Step 8: Verification.** Click on the **“Cal Cyl Test”** tab (see Fig 8a)

- Enter an operator’s name or initials
- Click **“Load Template”** tab. If you have more than one calibrated cylinder loaded, you will be able to choose what Calibrated Cylinder you want to use.
- In the middle of the screen Check the box or boxes of pressures you want to verify at.
- Click **“Start Calibration”** tab. The test system will then automatically start to fill the jacket with water.
- Once water starts to flow out of the Brass Bleed Valve on top of lid (Valve(J) (Step 4)) close that valve.
- After the initial **“Hold Time”**, the system will wait until the scale is stable for 10 seconds before it starts to pressurize the cylinder. You can observe the countdown on the bottom left of the program (see fig 8f), once stable it will do an internal tare of the scale and pressurize the calibrated cylinder to each checked off pressure point(s).

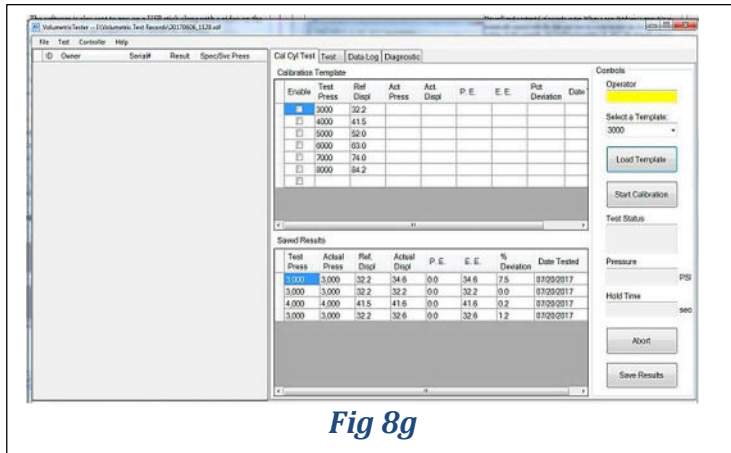
**Fig 8a**

**Fig 8f**



## System Operation (continued)

- g) Click **“Save Results”** tab if the results are acceptable. If you need to rerun the verification, simply click **“Start Calibration”** tab again. The saved results will be shown at the bottom of the screen under **“Saved Results”** (See *fig 8g*)

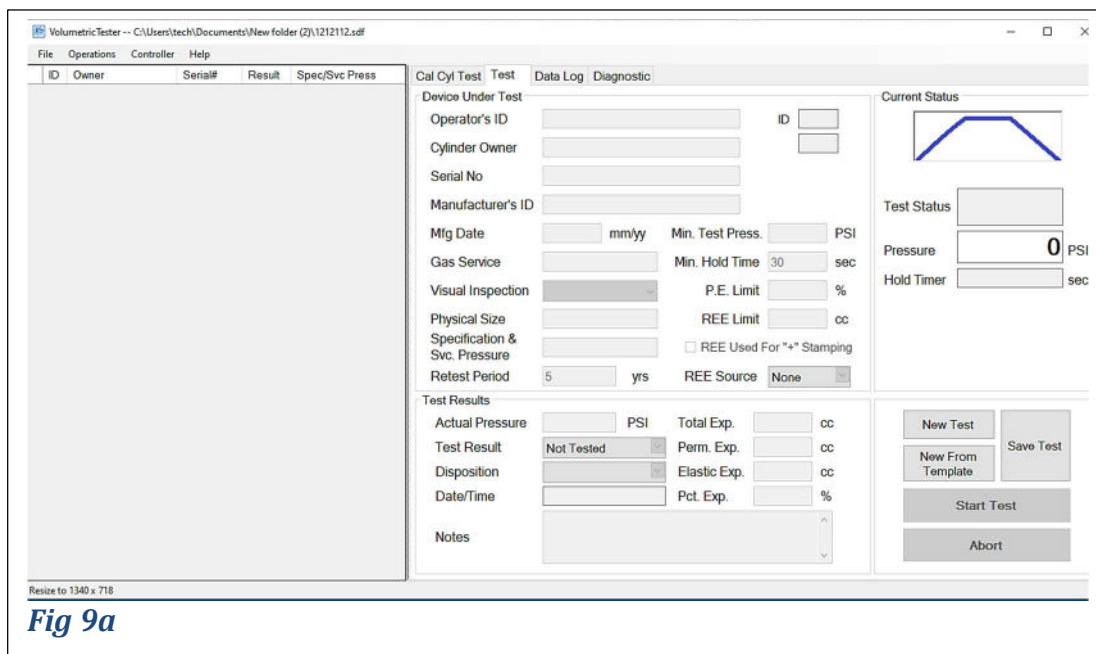


**Fig 8g**

**Note:** System will release the pressure and record total, elastic, and permanent expansion values. The software will compensate for any overshooting of target pressure and calculate a new expansion value based on the actual pressure that was registered. After the test is completed, the results are shown on the screen. Once the results are saved, if the "enable DOT / TC warnings" box is checked in options then the screen will automatically advise you if the run met the requirements or not.

**Warning:** DOT/TC regulations require successful verification before proceeding.

### Step 9: Loading Data to Test Cylinders click **“Test”** tab (*see fig 9a*)



**Fig 9a**

- a) Click **“New Test”** located at bottom right; you can start entering data for cylinders that you will be testing. The screen is self-explanatory and requires all fields to be filled in.

**BELOW ARE EXPLANATIONS OF THE FIELDS: Use the “Tab” key on your keyboard to navigate through the fields.**

**Operator’s ID:** RETESTER’S NAME

**Cylinder Owner:** Owner of the cylinder

## System Operation (continued)

**Serial NO:** Insert serial no. of cylinder

**Manufacturer's ID:** Identify by symbol, name, or M-number of the manufacturer of the cylinder

**Manufactures date:** Date cylinder was manufactured 2-digit month/2-digit year

**Gas Service:** Gas inside cylinder

**Visual Inspection:** Choose Pass or Fail

**Physical Size:** Physical size (diameter x length) of cylinder

**Specification & Service Pressure :** DOT/ICC or Exemption Classification & Service Pressure :

Example: DOT 3AL-1800, DOT-SP10945-4500, etc...

**Minimum Test Pressure:** Pressure cylinder will be tested to

**Minimum Hold Time:** Amount of time the test pressure will be held for.

**P.E. Limit %:** Permanent Expansion Percentage. If not required, you must type in "0" (zero)

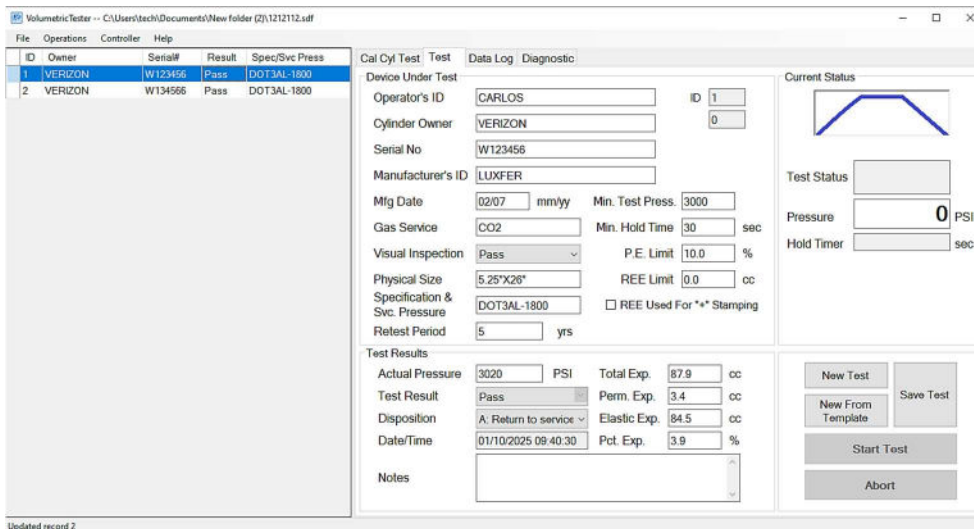
**REE Limit:** May or may not be required based on specification of cylinder. Ex: plus stamping of steel cylinders or pass/fail criteria for some specifications. If not required, you must type in "0" (zero)

**REE Used for "+" Stamping:** Put a check mark in the box if the REE is going to be used for "+" stamping cylinders.

**REE Source:** Will appear if "REE Used for "+" Stamping" is checked. Choose where REE was obtained from.

b) Click "**Save Test**" (*see fig 9b*)

**Note:** The data entry can be done for a single cylinder and then test that cylinder or for several cylinders and then test them as they are ready. Prior to testing any cylinder, remember to perform a complete external and internal visual inspection.



**Fig 9b**

**"Test Results" (bottom of Screen) will be automatically populated when you run the test**

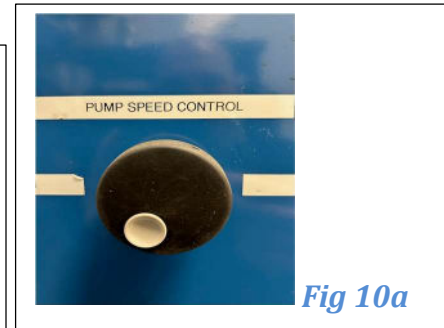
### Step 10: Testing Cylinder

- a) Fill cylinder with water and attach proper adapter.
- b) Connect Cylinder to the bottom of the Lid via the Quick Coupler.
- c) Lower Lid into place and lock clamps down.

## System Operation(continued)

- d) Connect High Pressure Hose from the Test Console to Nipple (*see fig 3a (I) nipple*).
- e) Open the Brass Bleed Valve (*see fig 3a valve (J)*) on top of the lid. You must open this valve every time you lift the lid to purge jacket of air.
- f) Choose the cylinder to be tested highlighted blue (*see fig 9b*)
- g) Click **“Start Test”** Once water starts to flow out of the Brass Bleed Valve on top of lid (*see fig 3a Valve(J)*), close valve (J). After the initial “Hold Time”, the system will wait until the scale is stable for 10 seconds before it starts to pressurize the cylinder. You can observe the countdown on the bottom left of the program (*see fig 8f*), once stable it will do an internal tare of the scale and pressurize the cylinder. **Warning:** Once system starts it will pressurize at full speed, this is referred as the high pump sequence, which you can control the speed through the “Pump Speed Control” valve on the console (**See Fig. 10a**). This valve must be adjusted to avoid over-pressurization when testing smaller cylinders.

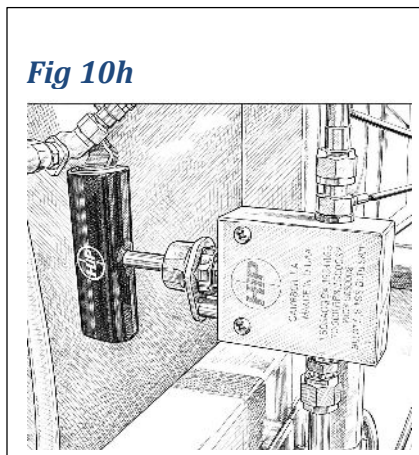
**WARNING:** It is the responsibility of the operator not to **Over-Pressurize the Cylinder**. May need to adjust speed of pump or additional equipment may be required, like an accumulator tank, for info contact Hydro-Test Products. Also< See Parts List.  
**Note:** Cylinder may need to be tested in Manual Mode.



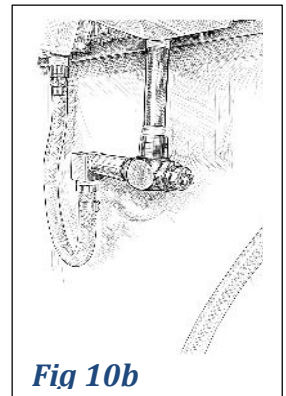
*Fig 10a*

**Note:** At 350psi before the designated test pressure the pump will slow down (**if you want to change when the low pump sequence begins, see “Software Setup” section c (i)**), This is referred as the low pump sequence. If the pump is going too fast or too slow, you can adjust the rate of speed by simply opening or closing the low pump speed control valve located on the solenoid valve (*see fig 10b*) and turn it either clockwise to slow the pump, or CCW to speed it up.

- h) The pressure will release on its own, but you can control the relief rate by adjusting the T-handle valve located on the brass manifold (*see fig 10h*). If the cylinder pressure is releasing too slow open the valve a ¼ turn counterclockwise at a time. If the cylinder is releasing too fast turn the valve clockwise ¼ turn at a time.



*Fig 10h*

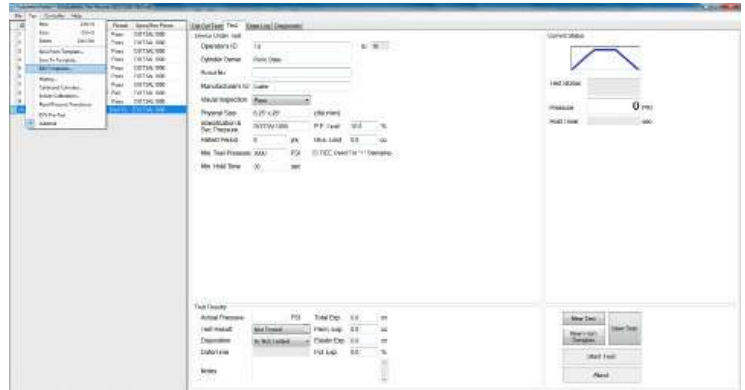


*Fig 10b*

## System Operation (continued)

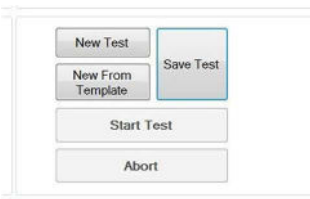
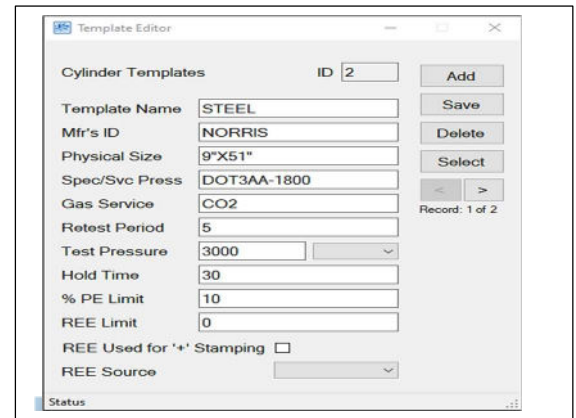
One of the **Advanced Options** that are included in the software is the ability to make user defined templates of popular cylinders that you company test. This is not required but may be an option that your company will decide to use if testing the same type of cylinder daily. As an example, a company that has a contract to re-qualify CO2 carbonic cylinders, as 90% of these are DOT3AL-1800 cylinders of the same size, this will alleviate you from having to type in the cylinder information for each test.

**To access cylinder templates:** Click on "Operations" tab and select "Edit Templates".



The add template screen allows you to add, edit and delete templates. By clicking on the "Add" box, use the tab key to enter all the required information. You can name the template anything that you want. We suggest something relative to the cylinder for ease in recognizing. **As an example:** Coca Cola 20LB CO2.

This screen allows you to make up a template for any type of cylinder. It includes REE limit and whether that value is to be used for star stamping.



To access the templates on the test record screen, simply select "New From Template" and click "Select" rather than New Test.

**Note:** Many companies will most likely not utilize the Template option. In normal operation all the information of the last cylinder tested will carry-over to a New Test, excluding the serial number and test results.

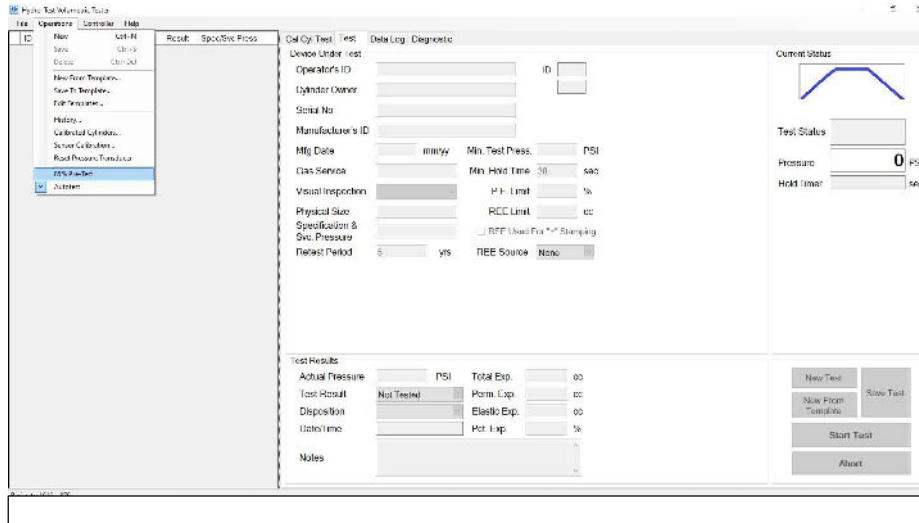
# System Operation (continued)

## Advanced Options

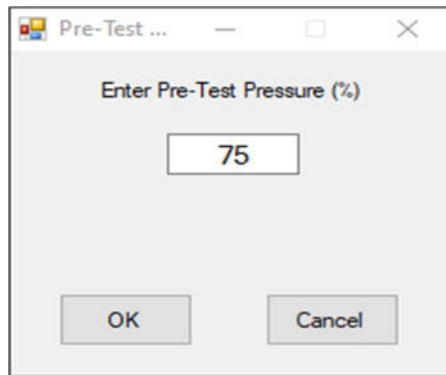
Pretest on a cylinder. A system check may be performed at or below 90% of test pressure prior to the retest of a cylinder, in the case of a malfunction of the test equipment or operator error. **Warning: Not all cylinders are 90%, check the specification requirements.**

To do a pretest on a cylinder:

**Step 1.** Click on “Operations” tab



**Step 2.** Click on “% Pre-Test” and type in the percentage you want to pre-test the cylinder, click “OK”



**Note:** System will pressurize a little higher than the % chosen, due to pump speed and cylinder size. Choose % well below specification requirements for a Pre-Test.

**Step 3.** Simply follow the steps for testing a cylinder. Except in “Test” screen it will now say “Start Pre-Test”



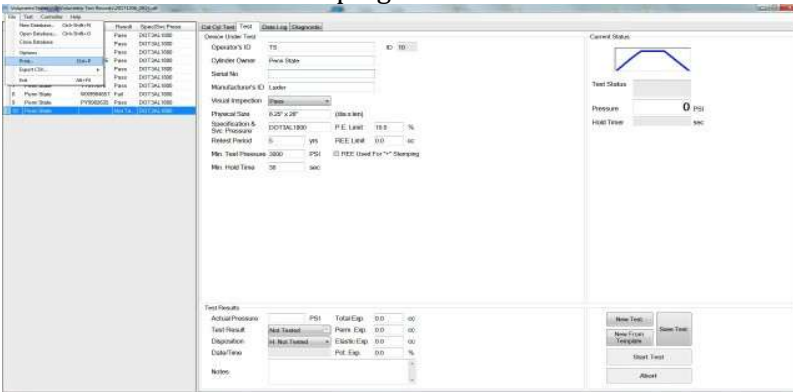
**To go back to normal operation, simply click “Operations” tab and choose “AutoTest”**

*There are other advanced options that can be used to make the software more streamlined. There are also some calibration, readability and accuracy options that should not be changed unless instructed to do so by Hydro-Test Products. These advance options are covered in our formal training classes – please see page 36 for more information on the training opportunities that we currently offer.*

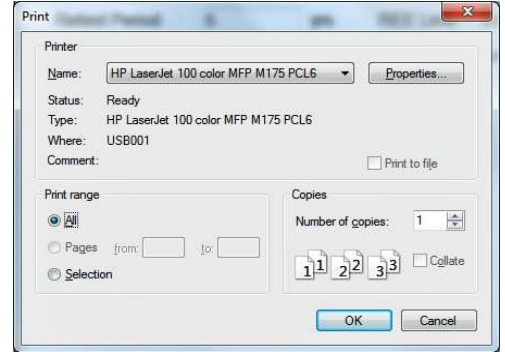
# System Operation(continued)

**Printing:** The Hydro-Test software allows printing from either the daily record keeping screen or the history screen. To print records from a previous day, go to **“File” “Open Database”** and choose the file.

From main record keeping screen select file tab -Print



Standard windows print screen appears – select appropriate printer. You can also select print all or just selected files.



When printing from the test record form screen - the daily verification report associated with this file will automatically print as page 1.

Test System: hostname  
Test Machine Serial#:   
License:

### Calibrated Cylinder Test Data Hydrostatic Volumetric Test Method

Hydro-Test

Calibrated Cylinder: 3000  
Serial Number: 1234

ID	Target Pressure	Actual Pressure	Reference T.E.	Corrected T.E.	Actual T.E. @ Pressure	Elastic Expansion	Permanent Expansion	Percent Deviation	Date/Time	Operator
1	3000	3000	32.2	32.2	32.3	32.3	0.0	0.3	12/06/2017	TS
2	4000	4000	41.5	41.5	41.4	41.4	0.0	0.2	12/06/2017	TS
3	5000	5000	52.0	52.0	52.0	52.0	0.0	0.0	12/06/2017	TS

Every test for that day's file will print if the **“ALL”** box is checked in the print screen. If only the **“Selected”** box is checked then only those records selected will print. Selection of multiple records can be made by holding down the "ctrl" key and clicking on records prior to going to file-print screen.

Test System: hostname  
Test Machine Serial#:   
License:

### Cylinder Retest Data Sheet Hydrostatic Volumetric Test Method Report

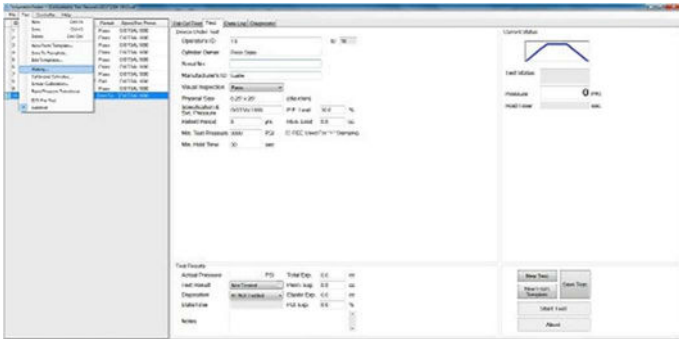
Hydro-Test

Test ID	Cylinder Owner	Serial #	Mfg'r's ID	Size (D x L)	Spec/Svc Press	Visual Insp.	Test Time	Actual Press	Total Exp.	Perm. Exp.	Elastic Exp.	REE	Pct Exp.	Test Result
1	Penn State	X556487	Luxfer	6.25" x 26"	DOT3AL1800	Pass	30	3040 PSI	55.2	2.3	52.9	0.0	4.2	Pass
	12/06/2017	5	TS	A: Return to service	Notes: CHANGE VALVE									
2	Penn State	6654845	Luxfer	6.25" x 26"	DOT3AL1800	Pass	30	3020 PSI	54.2	2.3	51.9	0.0	4.2	Pass
	12/06/2017	5	TS	A: Return to service	Notes:									
3	Penn State	Z4545656	Luxfer	6.25" x 26"	DOT3AL1800	Pass	30	3040 PSI	58.2	2.1	56.1	0.0	3.6	Pass
	12/06/2017	5	TS	A: Return to service	Notes:									
4	Penn State	D35564445	Luxfer	6.25" x 26"	DOT3AL1800	Pass	30	3000 PSI	60.2	3.8	56.4	0.0	6.3	Pass
	12/06/2017	5	TS	A: Return to service	Notes:									
5	Penn State	P4545677	Luxfer	6.25" x 26"	DOT3AL1800	Pass	30	3040 PSI	58.2	1.5	56.7	0.0	2.6	Pass
	12/06/2017	5	TS	A: Return to service	Notes:									
6	Penn State	sx889797	Luxfer	6.25" x 26"	DOT3AL1800	Pass	30	3000 PSI	62.5	4.0	58.5	0.0	6.4	Pass
	12/06/2017	5	TS	A: Return to service	Notes:									
7	Penn State	TT577876	Luxfer	6.25" x 26"	DOT3AL1800	Pass	30	3020 PSI	54.2	1.5	52.7	0.0	2.8	Pass
	12/06/2017	5	TS	A: Return to service	Notes:									
8	Penn State	WX9984657	Luxfer	6.25" x 26"	DOT3AL1800	Pass	30	3000 PSI	61.2	7.8	53.4	0.0	12.7	Fail
	12/06/2017	5	TS	D: Condemned	Notes: Failure: Excessive expansion percentage.									
9	Penn State	PY9982635	Luxfer	6.25" x 26"	DOT3AL1800	Pass	30	3000 PSI	48.8	4.2	44.6	0.0	8.6	Pass
	12/06/2017	5	TS	A: Return to service	Notes:									
10	Penn State		Luxfer	6.25" x 26"	DOT3AL1800	Pass	30	0 PSI	0.0	0.0	0.0	0.0	0.0	Not Tested

## System Operation (continued)

**Another option of printing is to use the history screen.**

The history screen is a powerful tool that can be used to sort by fields, by date or date range. You can also select a file or a group of files by pointing your cursor at the table and while holding down the mouse key select a group of files. These selected files can then be copied with the "ctrl c" keyboard shortcut and then pasted, by keyboard shortcut "ctrl v" into other software such as Microsoft Excel for further report writing capabilities.



To access the history screen - click on the "Operations" tab and select "History".

The history screen will open and display all tests. You can easily find the test date range needed by using the start and end dates of the date filter boxes. Click on any of the test data headers (Owner, Serial#, etc.) to sort based on the header name. This feature will allow you to print just specified customers, cylinder spec, pass/fail or any other field required.

ID	Owner	Serial #	Mfg ID	Size	Spec/Svc. Press	Mfg Date	Gas Service	Min. Test Pressure	Hold Time	Actual Pressure	Visual Inspection	Test Result	Disposition
20	billyw	1111111A	TEST	5	5	02/15	n2	3,000	30	3,000	Pass	Pass	A: Return ...
21	HYDR	123	LUXFER	5X24	DOT3AL1800	02/04	N2Q	3,000	30	3,020	Pass	Pass	A: Return ...
22	1	1	TEST	TEST	TEST	1	1	3,000	30	3,000	Pass	Pass	A: Return ...
23	c	c	c	c	c	c	c	3,000	30	3,000	Pass	Pass	A: Return ...
24	1	1	1	1	1	1	1	3,000	30	3,000	Pass	Pass	A: Return ...
25	1	1	1	1	1	1	1	3,000	30	3,000	Pass	Pass	A: Return ...
26	1	9	1	1	1	1	1	3,000	30	3,000	Pass	Pass	A: Return ...
27	1	9	1	1	1	1	1	3,000	30	3,000	Pass	Pass	A: Return ...
28	CUSTOMER	W123456	LUXFER	5"X26"	DOT3AL-1800	01/07	CO2	3,000	30	3,020	Pass	Pass	A: Return ...
29	CUSTOMER	123456	LUXFER	5"X26"	DOT3AL-1800	01/07	CO2	3,000	30	3,020	Pass	Pass	A: Return ...
30	CUSTOMER	95555	LUXFER	5"X26"	DOT3AL-3000	01/07	AIR	5,000	30	5,020	Pass	Pass	A: Return ...
31	1	1	1	1	1	1	1	3,000	30	3,020	Pass	Pass	A: Return ...
32	1	1	1	5	5	1	1	3,000	30	3,000	Pass	Pass	A: Return ...
33	1	1	1	1	1	14	41	3,000	30	3,000	Pass	Fail	D: Conde...
34	1	1	1	1	1	1	1	15,000	30	3,000	Pass	Pass	A: Return ...
35	1	1	1	1	1	1	1	15,000	30	15,000	Pass	Pass	A: Return ...
36	PENN STATE UNI...	W1234567	LUXFER	7"X19"	DOT 3AL-1800	02/07	CO2	3,000	30	3,020	Pass	Pass	A: Return ...
37	VERIZON	W123456	LUXFER	5.25"X26"	DOT3AL-1800	02/07	CO2	3,000	30	3,020	Pass	Pass	A: Return ...
38	VERIZON	W134566	LUXFER	5.25"X26"	DOT3AL-1800	02/07	CO2	3,000	30	3,015	Pass	Pass	A: Return ...

After sorting, you can further narrow down the records you want to print or export by clicking on any of the rows and pressing down the "ctrl" key click on another row. This allows printing or exporting of only records you require. Once selection is completed, click on the "print" button and the standard windows print screen will appear as discussed on previous page.

You can also select a continuous group of records by selecting the first record of your group and while holding down the "Shift" key scroll for the last record of your desired group and click on it. All the records between the first and last click are selected and can be printed or exported by the "ctr c" and "ctr v" keyboard shortcut.

## System Operation (continued)

ID	Owner	Serial #	Mfg ID	Size	Spec/Svc. Press	Min. Test Pressure	Hold Time	Actual Pressure	Visual Inspection	Test Result	Disposition	Date Tested	Operator
31	Penn State	X556487	Luxfer	6.25" x 26"	DOT3AL1800	3,000	30	3,040	Pass	Pass	A: Return ...	12/06/2017	TS
32	Penn State	6654845	Luxfer	6.25" x 26"	DOT3AL1800	3,000	30	3,020	Pass	Pass	A: Return ...	12/06/2017	TS
33	Penn State	Z4545656	Luxfer	6.25" x 26"	DOT3AL1800	3,000	30	3,040	Pass	Pass	A: Return ...	12/06/2017	TS
34	Penn State	D35564445	Luxfer	6.25" x 26"	DOT3AL1800	3,000	30	3,000	Pass	Pass	A: Return ...	12/06/2017	TS
35	Penn State	P4545677	Luxfer	6.25" x 26"	DOT3AL1800	3,000	30	3,040	Pass	Pass	A: Return ...	12/06/2017	TS
36	Penn State	sx889797	Luxfer	6.25" x 26"	DOT3AL1800	3,000	30	3,000	Pass	Pass	A: Return ...	12/06/2017	TS
37	Penn State	TT577876	Luxfer	6.25" x 26"	DOT3AL1800	3,000	30	3,020	Pass	Pass	A: Return ...	12/06/2017	TS
38	Penn State	WX9984657	Luxfer	6.25" x 26"	DOT3AL1800	3,000	30	3,000	Pass	Fail	D: Conde...	12/06/2017	TS
39	Penn State	PY9982635	Luxfer	6.25" x 26"	DOT3AL1800	3,000	30	3,000	Pass	Pass	A: Return ...	12/06/2017	TS

**Please note:** The history screen is not designed to be used as a daily print function - this should be done as discussed on the previous page from the test record entry page. The history screen does not have the capabilities of accessing the verification reports. During an audit the inspectors will most likely want to see verification reports as well as tests.

### Exporting Daily Records

From Export Option

1. Open Database
2. Choose Export-Cylinder Tests
3. File name is highlighted you can change it if you want
4. At the top of the task bar choose where you want to save it to (Desktop)
5. Press save and the file will be on the Desktop
6. Then Copy it and transfer it to USB

Note. You need the same program on both computers to open records. Example Hydrotest Program to Hydrotest Program, or Excel to Excel. Verification needs to be exported if you are using it for DOT purposes.

From History Option

1. Open History
2. Choose how you want to sort (date is best option)
3. Shift Key with mouse selects all records, Control key with mouse selects individual records
4. Control key and C to copy
5. Open Excel
6. Click in first box 1-A
7. Control V to paste

Note. You need the same program on both computers to open records. Example: Excel to Excel. Verification needs to be exported if you are using for DOT purposes use export Option.

From Documents Option

1. Go to documents
2. Copy Test Records
3. Paste to USB
4. Go to new computer paste on Desktop
5. Open Hydrotest Program
6. Open Database and choose from where(desktop), at the top on task bar

Note: You need Hydrotest Program

## Operation in Manual Mode

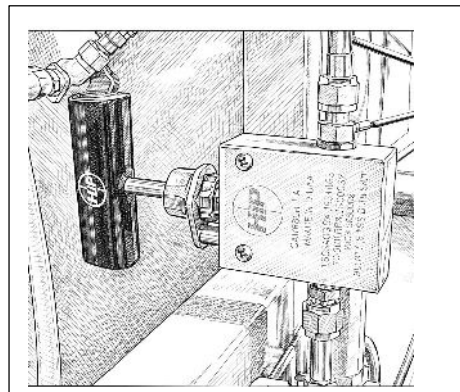
The 507-series test system allows the machine to be operated in a manual mode.

Typically, this is used for troubleshooting issues. By operating in manual mode this will isolate any possible electronic hardware or software issues. This mode may also be used when/if testing very small sized cylinders such as “M6” size Oxygen or SCUBA “Spare Air” cylinders. By operating in manual mode, you will have more control over pump speed so that grossly overshooting of test pressure is kept to a minimum.

**Step 1:** Locate main isolation valve on back of test console (*see fig 1*) and turn off (clockwise)

**Step 2:** Connect cylinder to lid and load into water jacket as normal.

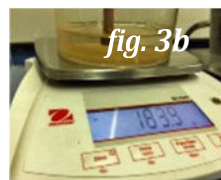
**Step 3:** Connect high pressure hose to dial pressure gauge and hose from dial pressure gauge to lid (*see fig. 3*). **Before continuing to Next Step see Page 28 for instructions on reading and adjusting the gauge.** Lock water jacket lid clamps in place. Turn on needle valve located on left side of cabinet labeled “water to water jacket” on (*see fig. 3a*). Observe the beaker on the expansion scale (*see fig. 3b*), once water is flowing into beaker and is a minimum of ½” over siphon tube – close the needle valve on console.



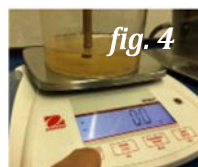
*Fig 1*



*Fig 3*

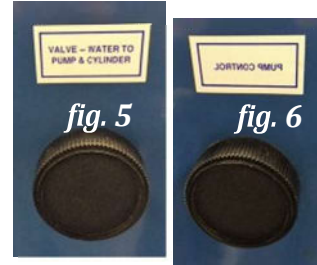


**Step 4:** Once readings have stabilized on scale, gently press the zero button to tare out the scale reading. (*see fig. 4*)

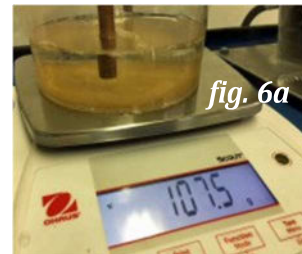


## Manual Mode (continued)

**Step 5:** Turn on needle valve located on left hand side of cabinet labeled “Water to Pump and Cylinder” (*see fig. 5*) and leave on. Notice that the expansion scale reading will increase. **DO NOT RE-ZERO** out the scale. This is city water pressure causing expansion. If you re-zero this will result in false lower expansion readings of the test.



**Step 6:** Slowly turn on needle valve located on left hand side of cabinet labeled “Pump Control” (*see fig. 6*). Pressure will now start to be applied to the cylinder. Observe the dial pressure gauge and turn off the needle valve when test pressure is reached. Hold the pressure for required time (typically 30 seconds) and record the expansion value on the scale. This is your total expansion value (*see fig. 6a*).



**Step 7:** Shut off the needle valve labeled “water to pump/cylinder”. Release the cylinder pressure by slowly opening high pressure bleed valve on water jacket lid (*see fig. 7*). Observe expansion reading on scale – once it has stabilized record this number – this is your permanent expansion (*see fig. 7a*).



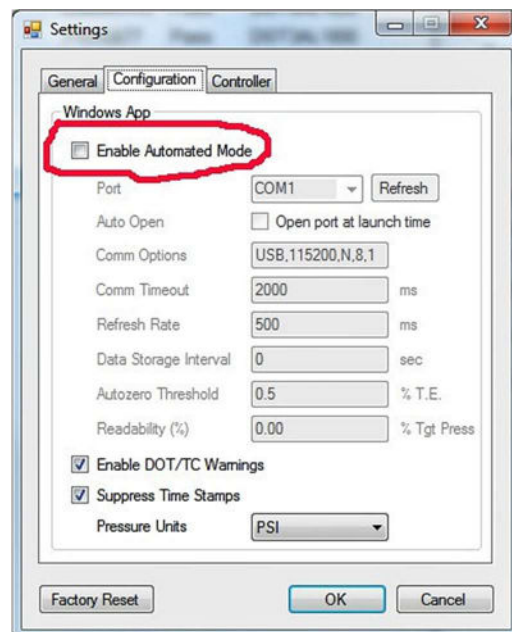
**Hydro-Test Products LLC**

[www.hydro-test.com](http://www.hydro-test.com) Tel: 800-225-9488  
978-897-4647 Fax: 978-897-1942

## Operation in Manual Mode (continued)

If the 507-series test system is being operated in manual mode, the software can still be used as a record keeping form. This will allow the manual test records to be incorporated in the history or daily reports just like they were tested in automated mode.

To do this the software automated mode must be turned off so that the software can be used in the standalone mode. This is done by going to the File-Options – Configuration screen and un-checking the “Enable Automated Mode” box.



In the standalone software mode – all pressures and expansion values will be required to be entered manually. The software will still calculate the test results and incorporate the DOT/TC warnings if enabled. Use the Tab key to move from each data box and remember to click on “Save Test” after entry of all fields.

**Note:** The manual mode can be used, utilizing the above software standalone feature at any time and for whatever reason.

It is recommended that the machine be used in automated mode whenever possible. If due to troubleshooting, small cylinder testing or employees that prefer to operate manually, the records kept manually will look identical and will be able to use all of the history features. They will be integrated into the software just as an automated record would be.

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## Digital Expansion Scale Re-Calibration Procedure

The scale is calibrated prior to shipping – re-calibrate scale periodically. Keep record of recalibration.

**Step 1:** Turn the scale off by pressing and holding the “ZERO” button (see fig. 1). Remove the plastic beaker from the scale and wipe any residue from the scale platform. Turn scale over and slide switch to unlocked position (see fig. 1a).

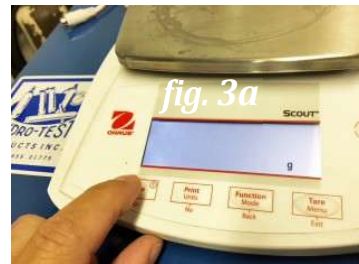


**Step 2:** Turn the scale back on by pressing and holding the “ZERO” button. Press and hold the “MENU” button until “MENU” shows on the display (see fig. 2)



Release the “MENU” button and the display will now show “CAL” (see fig. 2a)

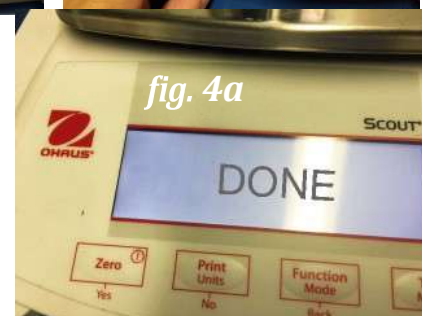
**Step 3:** Press the “YES” button to accept. “SPAN” will then show on display. (see fig. 3) Press the “YES” button again to begin the calibration. (see fig. 3a)



**Step 4:** Place the supplied 2000g and additional offset weight on scale. (see fig. 4) “C” will be displayed while the reading is being stored.



The display will then show “DONE” when calibration is finished. (see fig. 4a)



**Step 5:** Remove weights from the scale. Turn scale off by pressing and holding the “ZERO” button. (see fig. 1)



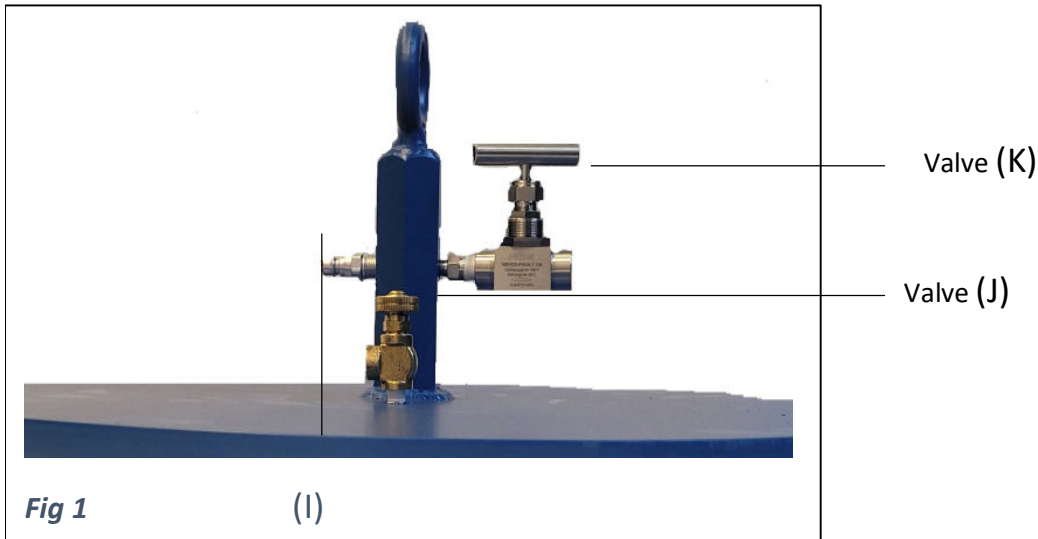
Turn scale back on and it is now ready to use.

### Notes:

- 1) Calibration of the scale should be done periodically. Do not send the scale out for periodic calibration as a calibration house will not use additional weight to compensate for the siphon tube being used.
- 2) After calibration of the scale - use your calibration cylinder to verify system accuracy before proceeding to test cylinders. Verification must be in accordance with 49CFR section 180.205(g).

# Calibration of Transducer

The different controls and where they are located. Valves (I), (J), and (K) are located on the Lid  
(see fig 1)



The following instructions will refer to the (KEY) letters for each valve and connection to simplify matters.

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## READING AND ADJUSTING THE MASTER GAUGE

**Before** starting, make sure you can read the gauge (see below: “Reading the Gauge” instructions), and figure out the “True Zero” point. The “True Zero” point **MAY** need adjusting, check Calibration Certificate for “True Zero” (Most gauge true zero readings are not 0, (may be +20, -10, etc...)).

**Note:** The “True Zero” point is where the needle should be pointing when it’s at zero pressure (see how to adjust “True Zero” point at the bottom of this page)

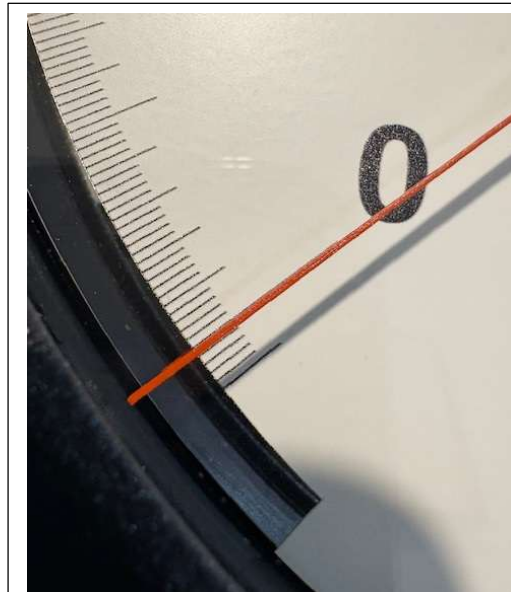
### READING THE GAUGE

- LOCATE THE NEEDLE,
- FIND THE MIRROR LOCATED ON THE OUTER EDGE OF THE DIAL FACE
- ALIGN THE NEEDLE WITH ITS OWN REFLECTION, BY MOVING YOUR HEAD UP, DOWN, LEFT OR RIGHT UNTIL THE NEEDLE AND ITS REFLECTION ARE PERFECTLY ALIGNED

**Example below is INCORRECT**



**Example below is CORRECT**




## If the “True Zero” adjustment is required follow steps below:

- Gently tap gauge face (to relieve any friction). Observe indicated pressure of pointer. Compare this reading to the “True Zero” reading found on the calibration certificate for this gauge. Most gauge true zero readings are not 0, (may be +20, -10, etc...).
- Adjusting the “True Zero” point, locate the knob in front of the gauge, turn small locking knob counterclockwise, then turn the large knob **on** front of gauge either clockwise or counterclockwise to adjust needle to true zero. **This adjustment is to be made only at the true zero point and never at test pressures**

Once “True Zero” is set and you can read the “Gauge” continue to next page.

# Calibration Procedure of Transducer


## Method 1

Step 1	Connect Calibrated Cylinder to the bottom of the Lid via the Quick Coupler, lower lid, and lock clamps.
Step 2	<p>Connect High Pressure Hose from the Test Console to Connection supplied on the Master Gauge and then connect the hose from the Master Gauge to the Water Jacket Lid (I). Close High pressure Bleed valve (K)</p> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="border: 1px solid black; padding: 5px; width: 200px;"> <p>The <b>“TRUE ZERO”</b> on the master gauge must be maintained, adjust as needed. (See Page 28)</p> </div> </div>
Step 3	Open program and click on <b>“Diagnostic”</b> screen located top, middle of screen, to control and observe the pressure on Transducer (P.I.D.).
Step 4	Click on the <b>“Relief”</b> button located on the bottom right
Step 5	Click on the <b>“Pump Low”</b> button to pressurize once you reach 2000psi on the Master Dial Gauge (or pressure you want to verify), click on <b>“Pump Low”</b> button to stop pressurizing.
Step 6	Record pressure from the Master Dial Gauge on a form like the one that was provided under the <b>“Pressure Applied to Master Gauge”</b> field, <b>OPERATING TIP:</b> You may have to tap the gauge face once you stop at a pressure to get an accurate reading on the gauge as there is always a small amount of friction in the movement of a gauge, also record the Transducer pressure from the <b>“Diagnostic”</b> screen on the same form under <b>“Pressure Indicated on Transducer (P.I.D.)”</b> .
Step 7	Click <b>“Pump Low”</b> button until you reach 3000psi on the Master Dial Gauge, and then click <b>“Pump Low”</b> button to stop pressurizing and record both the Master Gauge and Transducer pressures on your form. You will repeat this step at every 1000psi (2000psi, 3000psi, 4000psi, etc..)
Step 8	Click <b>“Relief”</b> button to release the pressure.

## If the Transducer is not within Tolerance. Go to Transducer Calibration Procedure Method 2

**Warning:** Following these steps Incorrectly can result in the Transducer being out of tolerance. **If you have any questions**, Contact Hydro Test Products

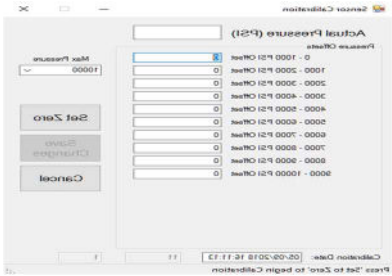
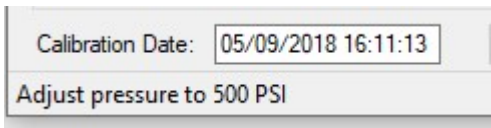
### Transducer Calibration Procedure Method 2

Step 1	Connect Calibrated Cylinder to the bottom of the Lid via the Quick Coupler, lower lid, and lock clamps.
Step 2	Connect High Pressure Hose from the Test Console to Connection supplied on the Master Gauge and then connect the hose from the Master Gauge to the Water Jacket Lid (I). Close High pressure Bleed valve (K)  <div data-bbox="911 1201 1214 1409" style="border: 1px solid black; padding: 5px; width: fit-content;"><p>The “TRUE ZERO” on the master gauge must be maintained, adjust as needed. (See Page 28)</p></div>

***Hydro-Test Products LLC***

[www.hydro-test.com](http://www.hydro-test.com) Tel: 800-225-9488 / 978-897-4647 Fax: 978-897-1942

## Transducer Calibration Procedure Method 2(continued)

Step 3	Open program and click on “ <b>Diagnostic</b> ” screen located top, middle of screen, to control and observe the pressure on Transducer (P.I.D.).
Step 4	Click on “ <b>Operations</b> ” Tab and choose “ <b>Sensor Calibration</b> ”  
Step 5	On top right-hand corner choose the Max pressure you are calibrating to (10000psi)
Step 6	Click “ <b>Set Zero</b> ” on that screen
Step 7	Click on the “ <b>Relief</b> ” button located on the bottom right in the “ <b>Diagnostic</b> ” screen.
Step 8	Click on the “ <b>Pump Low</b> ” button to pressurize, click on “ <b>Pump Low</b> ” button to stop pressurizing once you reach 500psi on the Master Dial Gauge (or the pressure that is indicated on the bottom left of the “Sensor Calibration” screen). <b>OPERATING TIP:</b> You may have to tap the gauge face once you stop at a pressure to get an accurate reading on the gauge as there is always a small amount of friction in the movement of a gauge.  
Step 9	Type in the pressure from the Master Dial Gauge into the “ <b>Actual Pressure (PSI)</b> ” box.
Step 10	Click on the “ <b>Pump Low</b> ” button to pressurize, click on “ <b>Pump Low</b> ” button to stop pressurizing once you reach 1500psi on the Master Dial Gauge (or the pressure that is indicated on the bottom left of the “Sensor Calibration” screen)
Step 11	Type in the pressure from the Master Dial Gauge into the “ <b>Actual Pressure (PSI)</b> ” box. You will stop at each pressure and repeat these steps at 2500psi, 3500psi, 4500psi etc. until 9500psi
Step 12	Click “ <b>Save Changes</b> ”
Step 13	Click “ <b>Relief</b> ” button to release the pressure.
Step 14	Close out of the program, come back into the program and redo steps from “Calibration Procedure Method 1” for records.

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## Sample Form for Transducer Calibration (Informative)

See CGA C-1 Pamphlet Appendix B for requirements

### TRANSDUCER CALIBRATION USING MASTER GAUGE

Serial# of P.I.D.(Transducer) \_\_\_\_\_ Serial # of Master Gauge \_\_\_\_\_

Accuracy Grade: \_\_\_\_\_

Reading #	Pressure Indicated on Transducer(P.I.D)	Pressure Applied to Master Gauge
#1		
#2		
#3		
#4		
#5		
#6		
#7		
#8		
#9		
#10		
#11		
#12		
#13		
#14		
#15		
#16		
#17		
#18		
#19		
#20		
#21		
#22		

Calibration Date: \_\_\_\_\_ Tech. \_\_\_\_\_

Last Calibration Date of Master Gauge: \_\_\_\_\_

## Water Jacket Clamp Adjustment Procedure

There are currently 3 different styles of clamps being used on the 507-series test systems.

**First identify your clamps as follows:**



**Part No. 210-040:**  
Used on 14" diameter water jackets



**Part No. 210-043:**  
Used on 18" & 24" diameter water jackets



**Part No. 210-115:**  
Optional pneumatic lid closure for all size water jackets

### Adjustments

The clamps are sent on the water jackets properly adjusted. However, over time you may need to re-adjust the clamps back to factory specifications. It is important to know that the water jacket does not see any pressure other than your incoming water pressure. All of the high pressure is being directed to the cylinder that is being tested. Therefore, there is no reason to overtighten the clamps. The manual clamps should be able to be closed with one hand.



1. Release all clamps to the open position. Back off the adjustment bolt all the way. Return clamps to closed position
2. Screw the adjustment bolt clockwise on all clamps until it touches the lid of the water jacket
3. Release all clamps to open position again
4. Further screw the adjustment bolt 2 turns on all clamps
5. Return the clamps to the closed position and they should now be able to be closed with one hand and a firm click should be heard.
6. Tighten the locking nut to avoid slippage of bolt



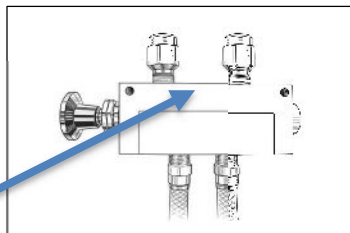
adjustment bolt



1. Release all clamps to the open position. Back off the adjustment bolt all the way. Return clamps to closed position
2. Screw the adjustment bolt clockwise on all clamps until it touches the lid of the water jacket
3. Release all clamps to open position again
4. Further screw the adjustment bolts 1.5 turns on all clamps
5. Return the clamps to the closed position and they should now be able to be closed with one hand and a firm click should be heard.
6. Tighten the locking nut to avoid slippage of bolt

### Set Up of pneumatic clamps:

1) Find the Air Control Valve mounted on the console with the 2 hoses, connect them to the #1 Clamp which should have 2 open connections. The body of the control valve has multiple ports with numbers labeled next to them. #4 port goes to the bottom connection on the #1 clamp. #2 port goes to the top connection on the #1 Clamp. #3 port and #5 port are vent holes with snubbers that slow the clamp during opening and closing and are not to be touched.



Air Control Valve

2) Connect air supply to the #1 port that is in between the snubbers on the Air Control Valve. Your air supply **MUST BE PREREGULATED** to 100 PSI before it is attached to the Air Control Valve inlet.

## Set-Up of Pneumatic Clamps(continued)

3) To open and close the clamps, you must push or pull the control knob on the Air Control Valve.

4) To adjust the clamps

- Pull the control knob out to open the clamps.
- Loosen the lock nuts on the bolts that are on the arm of the clamp
- Push the control knob in so that the clamps are in the closed position. At this point you should be able to move the bolt up and down because the locking nuts are loosened.
- Adjust the hold-down bolts with the lock nuts so that they are finger tight against the lid.
- Open the clamps.
- Re-adjust each clamp by turning the bottom lock nuts 1/4 turn more so that the hold-down bolts will put a slight amount of pressure on the lid. Check to see that the lock nuts are tight.
- Close the clamps. A distinctive click should be heard for all the clamps - if not repeat above but go 1/2 turn tighter on adjustment

REPLACEMENT PARTS JACKET ADDITIONAL PARTS PAGE 33

PART NO. DESCRIPTION

058-115 Repair Kit for Air Clamp

120-026 Control Valve

215-026 3/8"Mounting Bolt

215-203 3/8"Lock Washer

215-205 3/8"Hex Nut

215-032 1/2"Hold-Down Bolt

215-202 1/2"Hex Nut

215-302 1/2"Lock Washer

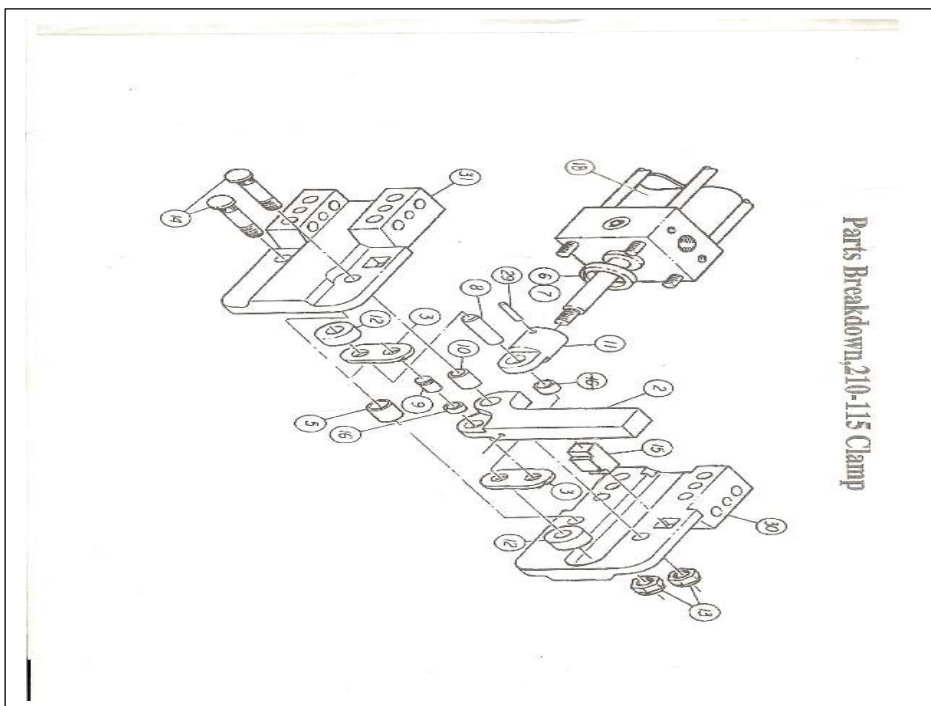
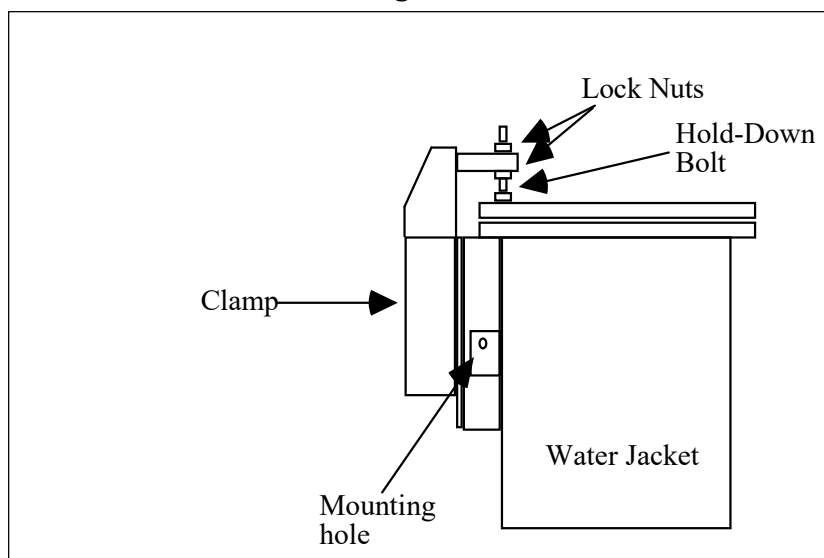
210-115 Replacement Air Clamp

210-240 Replacement Air Cylinder for Clamp

240-076 Snubber for vent

Parts List for 210-115 Air Powered Clamp

Key #	QTY	Part No.	Description
2	1	895421	90°Arm
3	2	895414	Link
5	1	895108	Spacer
6	1	895109	Ring
7	1	895190	Ring
8	1	895110	Roller Pin
9	1	895415	Arm Pin
10	1	895112	Arm Spacer
11	1	895106	Clevis
12	2	895114	Bearing
13	2	895115	Lock Nut
14	2	895116	Pivot Bolt
15	1	895117	Stop
16	2	895118	Bushing
18	1	Part No.	Stamped on Head
28	1	895392	Washer (not shown)
29	1	805021	Roll Pin
30	1	895101	Body, R.H.
31	1	895102	Body, L.H.
Not Shown	1	058-115	Seal Kit



## Parts List for 507-Series Test Console

Part No.	Description	Qty per System
100-224	Gauge Adapter	1
110-015	1/4" Quick Disconnect	3
110-016	Nipple, 1/4" Quick Connect	2
120-003	Ball Valve, Water Control	2
120-056	Needle Valve, Air Control	1
120-094	Check Valve Seal Kit	2
120-112	Safety Relief	1
120-300-24DC	2-Way Solenoid Valve	4
120-301-24DC	3-Way Solenoid Valve	1
120-306	High Pressure Bleed Valve	1
140-402	Master Dial Pressure Gauge	1
140-011	Inlet Air Pressure Gauge	1
140-500-15000	Pressure Transducer	1
140-501-Laptop	Laptop	1
140-501-Printer	Ink Jet Printer	1
120-034	Low Pumps Speed Valve	2
160-010	Inlet Air Filter/Regulator	1
160-013	Inlet Air Regulator	1
160-021	Replacement Gauge for 160-010	1
160-061	Oil Lubricator for Pump	1
160-064	Muffler for Pump	1
160-102	Inlet Water Pressure Regulator	1
160-103	Inlet Water Filter Assembly	1
170-117-24DC	24VDC Transformer	1
170-119-Proof	Controller Board	1
170-140	Battery Back-Up (UPS)	1
180-062	Replacement Beaker for Scale	1
190-416	Pressure Pump	1
200-100	Outlet Pressure Hose, 8'	1
230-501	Expansion Scale	1
393-507	Software, supplied on USB	1
505-500-6	Accumulator Tank (Not Shown)	1



#180-062



#170-119-Proof



#210-102



#230-501

#393-507

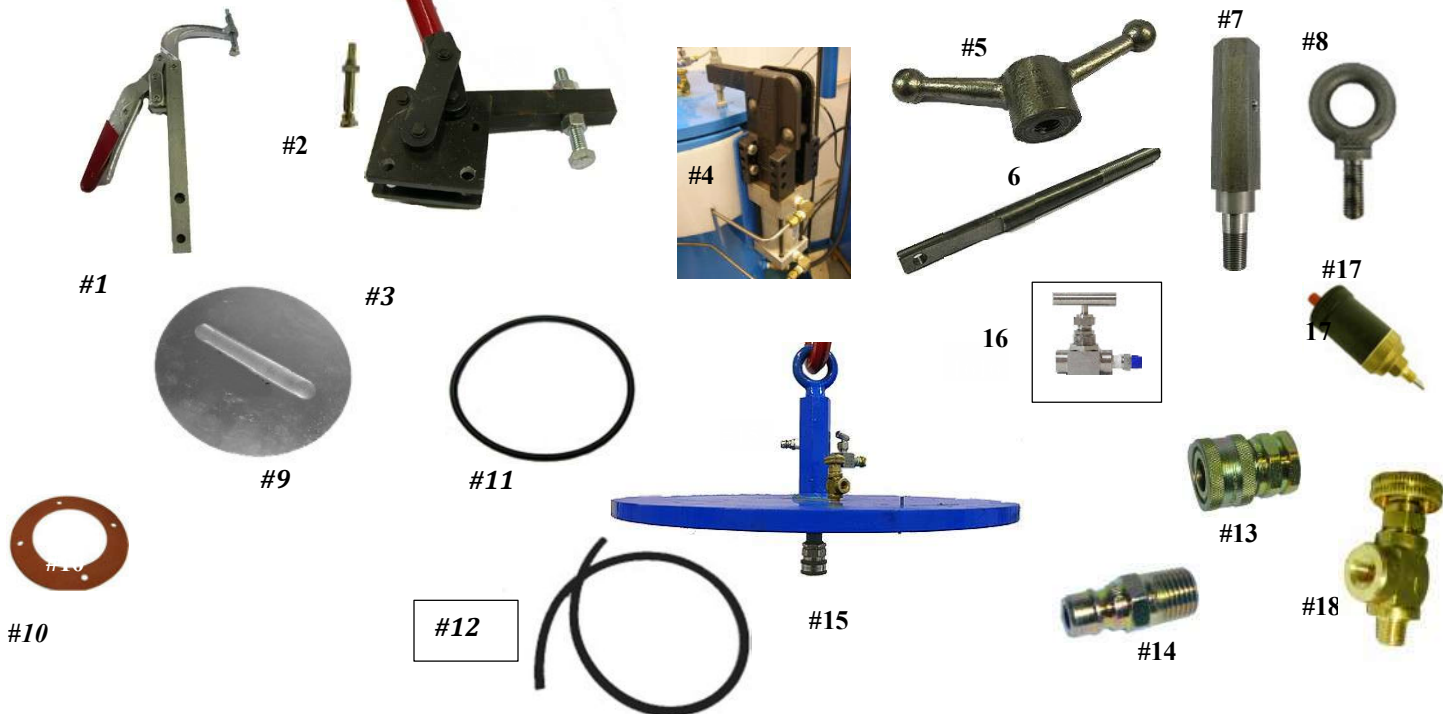


200-100



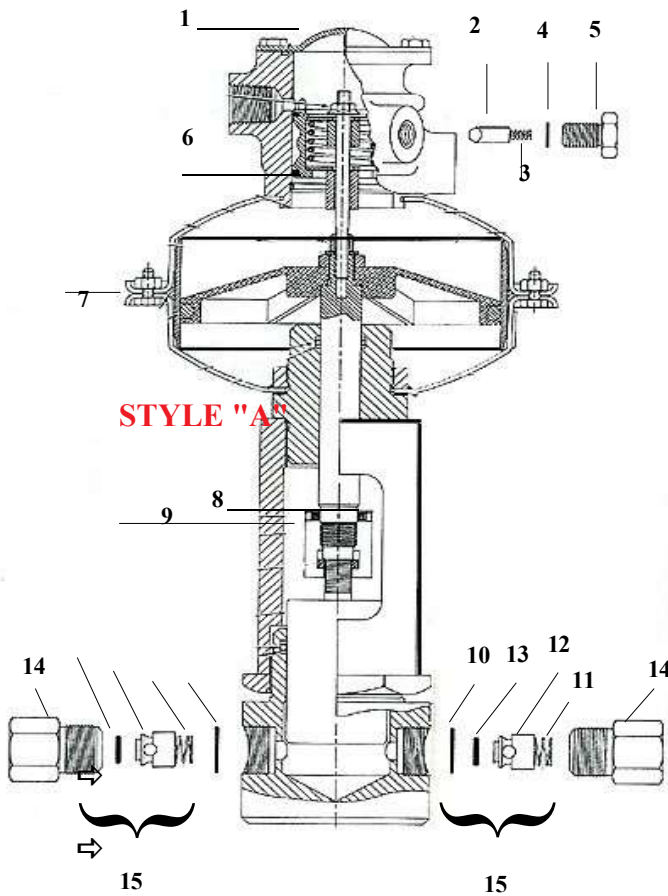
120-034

## Parts List for Water Jackets



Key	Part No.	Description	
<b>LID CLOSURES</b>			
1	210-040	Quick acting cam style clamp used on 10" & 14" diameter water jackets	
2	210-041	Replacement threaded swivel tip adjustment for 210-040 clamp	
3	210-043	Quick acting cam style clamps (heavy duty design) used on 18" & 24" diameter water jackets	
4	210-115	Pneumatic operated replacement clamp	
N/S	58-115	<i>Replacement seal kit for pneumatic clamp #210-115</i>	
5	240-129	Wing nut for Hydro-Test Products manufactured water jackets	
6	240-131	Swing bolt for Hydro-Test Products manufactured water jackets (3/4"-10 thread x 10" long)	
<b>COMPONENT ITEMS FOR WATER JACKETS</b>			
7	240-124	Replacement spud, 1/2"(M)NPT, with threaded ports for valve and nipple	
8	240-133	Eyebolt (lifting eye)	
9	300-055	Aluminum rupture disc for all Hydro-Test Products manufactured water jackets	
10	130-015	Rubber gasket for all Hydro-Test Products manufactured water jackets, 4 bolt hole pattern	
11	58-200	O-ring lid seal for 10" diameter water jacket: <i>Actual size of O-ring 11 5/8" ID x 12 5/8" OD</i>	
11	58-201	O-ring lid seal for 14" diameter water jacket: <i>Actual size of O-ring 14 7/8" ID x 15 7/8" OD</i>	
11	58-202	O-ring lid seal for 18" diameter water jacket: <i>Actual size of O-ring 19" ID x 20" OD</i>	
11	58-203	O-ring lid seal for 24" diameter water jacket: <i>Actual size of O-ring 25" ID x 26" OD</i>	
12	130-017	Non-collapsible rubber tubing, from jacket to expansion device ( <i>sold by the foot</i> )	
13	110-001	Quick coupler 1/2"FNPT plated steel	
14	110-002	Nipple 1/2"MNPT plated steel	
<b>COMPLETE LID ASSEMBLIES</b>			
15	500-880	<b>Water Jacket Lid Assembly</b>	For 10" diameter water jacket
15	500-882	<i>Includes:</i> Steel lid cover Spud & eyebolt Enamel painted finish	For 14" diameter water jacket
15	500-884		For 18" diameter water jacket
15	500-886		For 24" diameter water jacket
<b>VALVES</b>			
16	120-120	High pressure manual release valve for cylinder pressure release in manual mode	
17	120-080	Automatic air bleed valve for water jacket lid	
18	120-059	Manual air bleed valve for water jacket lid	

## Pressure Pump Parts Breakdown



Inlet Air  
Accessory Kit  
Part No. 190-  
450

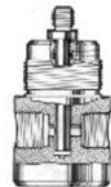
**Includes:**

- Air lubricator
- Air filter
- Regulator w/gauge
- Air control valve
  - Quart of oil
- Fittings/tubing

Replacement Pump Part No.	Pressure Rating (psi)
190-404	1850
190-408	6100
190-412	8800
190-416	16,000

**Rebuilt Kit Part#190-484**

If parts other than those illustrated are required, it is suggested that the pump assembly be returned to Hydro-Test for repair. Special tools are required for some internal adjustments.



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**For Pump Rated To: (psi)**

Key	Part No.	Description	Qty Rqd'	1000	1850	6100	8800	16,000
1	190-554	Gasket, top cover	1	•	•	•	•	•
2	190-080	Detent pin	4	•	•	•	•	•
3	190-079	Detent spring	4	•	•	•	•	•
4	190-560	Detent o-ring	4	•	•	•	•	•
5	190-559	Detent bolt	4	•	•	•	•	•
6	190-417	Spring	1	•	•	•	•	•
7	190-566	O-ring, housing	1	•	•	•	•	•
8	190-593	O-ring, piston	1					•
8	190-592	O-ring, piston	1				•	
8	190-591	O-ring, piston	1			•		
8	190-590	O-ring, piston	1		•			
8	190-589	O-ring, piston	1	•				
9	190-586	Teflon backup o-ring, piston	2					•
9	190-585	Teflon backup o-ring, piston	2				•	
9	190-584	Teflon backup o-ring, piston	2			•		
9	190-583	Teflon backup o-ring, piston	2		•			
9	190-582	Teflon backup o-ring, piston	2	•				
10	190-068	Brass washer for check valve body	2	•	•	•	•	•
11	210-067	Spring, check valve	2	•	•	•	•	•
12	240-115	Poppet shuttle, check valve	2	•	•	•	•	•
13	58-031	O-ring for poppet shuttle	2	•	•	•	•	•
14	240-114	Check valve body	2	•	•	•	•	•
15	120-090	Check valve assembly - includes items 10-14	2	•	•	•	•	•
N/S	120-091	Check valve rebuild kits - includes items 10-13	2	•	•	•	•	•
N/S	120-094	Check valve seal kit - includes items 10,13	2	•	•	•	•	•
16	190-081	Body / Piston assembly (1/2" diameter piston)	1					•
16	190-119	Body / Piston assembly (5/8" diameter piston)	1				•	
16	190-121	Body / Piston assembly (3/4" diameter piston)	1			•		
16	190-123	Body / Piston assembly (7/8" diameter piston)	1		•			
16	190-124	Body / Piston assembly (1" diameter piston)	1	•				

## Troubleshooting

When trouble shooting the system - the calibrated cylinder should be used. Do not attempt to trouble shoot with a customer's cylinder in place.

Problem	Cause	Solution
<p>Water in E.I.D. (scale) does not stabilize, it keeps rising without introducing any pressure to cylinder.</p>	<p>Leaking water valves from console to water jacket</p> <p>Deviation between water and ambient air temperatures.</p> <p>Lid closure clamps adjusted improperly.</p> <p>Water jacket O-ring has become too soft and is compressing.</p>	<p>Replace/repair "Water to Jacket and E.I.D." Valve, Solenoid Valve that fills the jacket</p> <p>In many cases air conditioning or heating the hydro area is necessary. Whatever can be done to keep air temperature stable will greatly assist in keeping water temperatures stable. In some instances, a hot/cold water mixing valve is required to regulate water temperature to ambient air temperature. Water tank to supply the system can help.</p> <p>Adjust clamps and they are locking</p> <p>Replace O-ring</p>
<p>Water in E.I.D. (scale) does not stabilize, it keeps dropping without introducing any pressure to the cylinder.</p>	<p>Physical leaks from E.I.D. to and including water jacket.</p> <p>Water Jacket not level Put level across jacket lid and shim jacket base until level</p> <p>Maintain consistent and stable air and water temperature.</p>	<ol style="list-style-type: none"> <li>1) Brass bleed valve on jacket lid</li> <li>2) Clamps need adjusting</li> <li>3) O-ring on lid seal</li> <li>4) Clean surface under the lid</li> <li>5) Clean groove of lid O-ring</li> <li>6) Rupture port disc</li> <li>7) Inlet/outlet water connections on side of jacket and side of console</li> <li>8) Quick coupler on scale</li> </ol>
<p>Calibrated cylinder not registering expansion numbers with 1%</p>	<p>See above causes <b>And:</b> Pressure gauge, Transducer and/or Scale may require re-calibration</p>	<p>See above solutions Contact our Tech Support Team for further information on re-calibration procedure</p>
<p>Pressure is not holding</p>	<ol style="list-style-type: none"> <li>a) Pneumatic high pressure release valve leaking (blue Valve)</li> <li>b) High pressure bleed valve on water jacket is leaking</li> <li>c) Outlet check valve on pressure pump is failing</li> <li>d) Visible leak on high pressure side of system</li> </ol>	<ol style="list-style-type: none"> <li>a) Repair/replace the valve</li> <li>b) Repair/replace the valve</li> <li>c) Remove and clean or replace seals on check valve</li> <li>d) Identify items that is leaking and repair or replace</li> </ol>
<p>Pressure is not holding and expansion scale values are rising. The permanent expansion is <b>positive</b>.</p>	<p>Leak inside the water jacket.</p>	<ol style="list-style-type: none"> <li>a) Replace quick coupler under the lid</li> <li>b) Tighten adapter or O-ring seal on cylinder</li> <li>c) Quick coupler nipple</li> <li>d) Pin hole in cylinder</li> <li>e) Quick coupler on the scale</li> <li>f) Nipple on the scale</li> </ol>

## Troubleshooting(continued)

After loading cylinder data, the "Start Test" button is greyed out	a) Software is not in enable automated mode b) A new test record database form was not started prior to entering information c) Com port is not configured properly or has lost connection with the hardware	a) In Options screen enable the automated mode b) Go to file - new database and start a new data- base for the day c) Change Com ports in program settings see below
--	--	--

### \*\*\*Steps to recover scale communication\*\*\*

1. Unlock locking mechanism under scale make sure you hear it click (leave unlocked).
2. Turn on scale
3. Press and hold menu until (MENU) is displayed, Release button
4. Display will show (C.A.L.) press NO button until display shows (P.r.i.n.t)
5. Display shows (P.r.i.n.t) press YES button
6. Display will show (RESET) press NO until (A. Print) is displayed
7. Display shows (A. Print) press YES
8. Display will show (OFF) blinking press NO until (CONT) is displayed
9. Display shows (CONT) press YES
10. (Content) is displayed press NO until (E.N.D) is displayed
11. (End) is displayed press YES
12. (R.S.2.3.2) is displayed press NO until (E.N.D) is displayed
13. (E.N.D) is displayed press YES

### Steps to recover communication

1. On the Main screen in the upper Middle of screen Go to "Diagnostics" Tab
2. Look in the middle of the screen, what port is it trying to open. Remember port
3. On upper right-hand corner under "Debug controls" Click "close"
4. Click "update"
5. Use little drop down window and choose a different port
6. Click "open"

Transducer shows pressure, with no pressure in system.

1. Go to "Operations"
2. Click on "Reset Pressure Transducer"

***The above are common issues with cylinder test systems. There may be other issues / problems that are not covered in the above. Hydro-Test has a dedicated technical support staff to assist you in troubleshooting your test system.***

## Maintenance

Maintenance Item	Maintenance Period
Check condition of all quick connections and replace as necessary	Daily
Perform back-up of test record files	Daily
Check condition of test adapter threads	Daily
Lubricate O-ring on water jacket with O-ring lubricant	Weekly
Check oil level in lubricator, (add if needed) for pressure test pump	Monthly
Change incoming water filter cartridge	Monthly (or as needed)
Replace high pressure water jacket pressure bleed valve	Bi-yearly (or as needed)
Replace high pressure hose from console to lid	Yearly (or as needed)
Have dial gauge re-calibrated to specification of AHJ ( <i>Authority Having Jurisdiction</i> )	Yearly (or as required by AHJ)
Calibrated cylinder - empty of water and inspect for excessive corrosion and thread distortion	Yearly (recommend replacing every 10 years)

## Training Requirements for U.S. Department of Transportation

In the USA, any employer / employee who performs re-qualification testing on DOT specification or DOT exemption / special permit cylinders is classified as a Hazmat employee.

The employer shall ensure that each Hazmat employee is trained to be knowledgeable of applicable hazardous materials and regulations.

Effective October 1, 1995 (and within three-year intervals thereafter) those who perform hydrostatic test on DOT cylinders must be fully trained, tested and certified.

Training is required covering a wide range of occupational duties, including, (but not restricted to) handling, recharging, transportation, etc... of hazardous materials. Our training relates only to the hydrostatic testing of cylinders when re qualified in accordance with 49CFR §180 Subpart C.

Training may be provided by the Hazmat employer or other public or private sources.

### Hazmat training shall include:



- General awareness & familiarity training
- Safety Training
- Function specific training
- Security awareness training
- In-Depth Security awareness training (in some instances)

Initial training is required within 90 days of an employee assuming the Hazmat task(s). During the 90 days the trainee can work under the direct supervision of a properly trained Hazmat employee.

Subsequent training must be provided at least once every three years.

### Training Opportunities Offered by Hydro-Test



Hydro-Test offers 4 options for training to meet DOT requirements for cylinder re-qualifiers under §172.704 of the 49CFR:

	Includes	
	Operational	Hazmat
At our facility in Stow, Massachusetts	X	X
At your facility	X	X
Zoom over the internet	X	
On-line course		X
Mail out training guide		X

All of the Hydro-Test Training includes the required components for Hazmat Training for cylinder re-testers. Training at our location and your location also includes hands on operational training.

email: [training@hydro-test.com](mailto:training@hydro-test.com) for a detailed quotation for desired training option

Please visit [www.tc.gc.ca](http://www.tc.gc.ca) for Transport Canada (TC) training requirements. To re qualify cylinders in Canada, or operate outside of Canada and be TC certified, an inspection of your facility is required after equipment is installed & operational and TC training has been completed.

## DOT Licensing and Inspection Procedure

An Independent Inspection Agency (IIA) must visit your facility and make recommendations to the Approvals Branch for your RIN number. The inspector will review the equipment for 1% accuracy and make sure that all the operators listed on the facility license can perform the re-qualification procedure properly and that they have been trained and tested to §172.704 requirements.

Inspection Company	E-mail	Telephone	Fax
Steigerwalt Associates	ees2@ptd.net	610-437-1704	610-437-4545
Authorized Testing, Inc	f.jensen@authorizedtesting.com	951-682-4110	951-682-6090
Cylinder Services, Inc.	cybserv@msn.com	414-479-0500	414-328-0500
Arrowhead Industrial Services	rgwilson@arrowheadindustrial.com	336-578-2777	336-578-2929
	rherbert@arrowheadindustrial.com	941-924-0109	941-924-6626
Professional Services, Inc.	paul.medwig@psiusa.com	412-922-4000	412-922-4043
T.H. Cochrane Laboratories, Ltd	john@cochranelabs.com	414-476-2500	414-464-1870

**There is a cost involved with this inspection. Pricing depends on many circumstances and should be negotiated directly with the Independent Inspection Agency providing the service.**

**It is suggested that you contact all the above for the best price / value for the inspection.**

**It is recommended that you secure an IIA that will assist you with any DOT questions or regulations that may occur during your 5-year license period.**

### **What will the Independent Inspection Agency (IIA) be looking for?**

- Test machine accuracy of 1%
- Certificates of calibration for pressure gauge(s) and calibrated cylinder
- All equipment to re-qualify cylinders (dryers, test adapters, vise, visual inspection parts, etc...)
- Proper record keeping of verification and retest.
- Compliance with requirements for hazmat training
- Certificate of training and training material for all cylinder re-testers
- Understanding of the regulations of section 180
- Proper CGA pamphlets cited under §171.7 and current title 49 CFR

**Most IIA's will provide a check o# list prior to the inspection. If the IIA does not offer a check o# list - ask for one.**

**You want to make sure that you are properly prepared for the inspection that you are paying for.**

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*We are the only company in the industry that continually keeps you advised of proposed rule makings. This allows you - the end user to voice your opinion before proposed rulings are written into the Code of Federal Regulations.*



## **HYDRO-TEST PRODUCTS, LLC TERMS AND CONDITIONS:**

**DEFINITIONS:** As stated herein:

The term "Seller" or "Manufacturer" shall mean Hydro-Test Products, LLC., the warranting party.

The term "Buyer" shall mean the person(s) or entity that purchases the product from the Seller.

The term "timely inspection" shall mean the Buyer(s) inspection five (5) day period to inspect the product upon receipt of the product and report any product damage(s) as described in the WARRANTY section to the freight carrier that delivered the product.

The term "product(s)" shall mean any and all products, parts, equipment, major equipment, or any other purchase made from Hydro-Test Products, LLC.

**PRICES:** ALL PRICES LISTED ARE IN U.S. DOLLARS. ANY PRICES LISTED ARE SUBJECT TO CHANGE WITHOUT NOTICE.

**MINIMUM BILLING:** MINIMUM BILLING IS \$25.00, exclusive of freight charges.

**TERMS:** • NET 30 DAYS TO PRE-ESTABLISHED ACCOUNTS • DISCOUNTS ARE OFFERED FOR PRE-PAYMENT • MASTER CARD - VISA AND AMERICAN EXPRESS ARE ACCEPTED. SELECTION AND USE OF CREDIT CARD FOR PAYMENT WILL INCUR AN ADDITIONAL 3% PROCESSING FEE.

**EXPORT TERMS:** PAYMENT IN U.S. DOLLARS WITH CHECK OR DIRECT TRANSFER. C.I.F. PROFORMA QUOTATIONS UPON REQUEST.

**SHIPPING:** ALL SALES ARE F.O.B. STOW, MA., AND BECOME PROPERTY OF THE BUYER UPON SHIPMENT. ALL SHIPMENTS ARE MADE BY THE MOST ECONOMICAL MEANS AS DETERMINED BY HYDRO-TEST PRODUCTS, LLC. PREMIUM FREIGHT (UPS AIR, FEDERAL EXPRESS, ETC...) SERVICE IS MADE AVAILABLE TO ESTABLISHED ACCOUNTS; OTHERWISE, CARRIER ACCOUNT NUMBER MUST BE SUPPLIED FOR FREIGHT BILLING. **OTHER CHARGES:** APPLICABLE TAXES (MA.), SPECIAL PACKAGING, EXPORT DOCUMENTATION, PREMIUM FREIGHT OR OTHER UNIQUE CHARGES ARE PAYABLE BY THE BUYER.

**RETURNS:** CONTACT HYDRO-TEST PRODUCTS, LLC PRIOR TO MAKING ANY RETURNS FOR R.A. #, AND INSTRUCTIONS. UNLESS OTHERWISE STATED IN THE QUOTATION, A MINIMUM RESTOCKING CHARGE OF 15% APPLIES TO ALL SALEABLE GOODS ACCEPTED AS AN ACCOMMODATION TO THE BUYER. UNAUTHORIZED RETURNS WILL NOT BE ACCEPTED. RETURNS ARE TO BE MADE TO: HYDRO-TEST PRODUCTS, LLC., 85 HUDSON ROAD, STOW, MA. 01775.

**LIMITED WARRANTY:** HYDRO-TEST PRODUCTS, LLC WARRANTS THAT ALL MERCHANDISE IS FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP WHEN SHIPPED FOR A PERIOD OF TWELVE (12) MONTHS ON MAJOR EQUIPMENT, AND THIRTY (30) DAYS ON CONSUMABLE REPLACEMENT COMPONENTS (I.E. VALVES, SEALS, HOSES, QUICK COUPLERS, ADAPTERS, ETC...), AND THOSE COMPONENTS ON MAJOR EQUIPMENT UNDER NORMAL USAGE.

FOR EQUIPMENT OR ITEMS NOT MANUFACTURED BY HYDRO-TEST PRODUCTS, LLC., THE ORIGINAL MANUFACTURERS WARRANTY SHALL BE IN EFFECT.

IT IS THE RESPONSIBILITY OF THE BUYER TO INSPECT THE PRODUCT WITHIN FIVE (5) DAYS OF RECEIPT OF THE PRODUCT, THIS INCLUDES ANY HIDDEN DAMAGE TO THE PRODUCT, AND THE BUYER UPON TIMELY INSPECTION SHALL REPORT KNOWN DAMAGE TO THE FREIGHT CARRIER. ALL WARRANTY WORK IS ON A FOB ("FREE ON BOARD") STOW, MASSACHUSETTS. BASIS AND EXCLUDES ANY / ALL FREIGHT SHIPPING COSTS. THERE ARE NO ADDITIONAL IMPLIED WARRANTIES AND IN NO EVENT WILL HYDRO-TEST PRODUCTS, LLC. BE LIABLE FOR INCIDENTAL OR COINCIDENTAL DAMAGES.

**VOID WARRANTY:** ALL WARRANTIES ARE VOID IF DUE TO SELLER MISUSE, OR WITH ANY ALTERATION, OR ACCIDENTAL DAMAGES TO THE MANUFACTURER'S PRODUCT(S).

**CHOIE OF LAW:** All legal disputes shall be resolved through binding arbitration in accordance with the laws of the State of Massachusetts, U.S.A.

**DISCLAIMER:** Seller is not responsible for ensuring Buyer is up to date and attending required regulatory training or safety training for use of proper use of the equipment or the products sold to Buyer. Buyer is solely responsible for scheduling Buyer's own training and ensuring that Buyer is competent with the current laws and regulations of the product(s) or equipment purchased and competent on use of the equipment and/or product(s) and competent to recognize the need for additional parts or products for updating purchased product(s) and equipment to meet ongoing updated federal and state regulations.

**INDEMNITY AND HOLD HARMLESS:**

**BUYER HEREBY AGREES TO INDEMNIFY, HOLD HARMLESS, AND DEFEND HYDRO-TEST PRODUCTS, LLC., ITS EMPLOYEES, HEIRS, ASSIGNS, AND ANY RELATED COMPANY IN PRIVITY WITH HYDRO-TEST PRODUCTS, LLC, FOR THE BUYER'S MISUSE OF THE EQUIPMENT; FAILURE TO UNDERSTAND, ACKNOWLEDGE, AND IMPLEMENT THE CURRENT FEDERAL REGULATIONS FOR ANY AND ALL PRODUCTS PURCHASED FROM HYDRO-TEST PRODUCTS LLC, INCLUDING DISTRIBUTION OF THE SAME; FAILURE TO ATTEND AND SCHEDULE REQUIRED FEDERAL DEPARTMENT OF TRANSPORTATION HAZMAT TRAINING AND REGULATORY INSTRUCTION OF ANY AND ALL PRODUCTS PURCHASED FROM HYDRO-TEST PRODUCTS, LLC; OR TO COMPLY WITH ANY OTHER FEDERAL REGULATORY DEPARTMENT. BUYER AGREES THAT IN NO EVENT SHALL HYDRO-TEST PRODUCTS, LLC BE LIABLE FOR PUNITIVE, SPECIAL, DIRECT, INDIRECT, INCIDENTAL, ACTUAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND, INCLUDING BUT NOT LIMITED TO LOSS OF USE, LOSS OF PROFIT OR REVENUE, LOSS OF GOOD WILL, OR OTHER COMMERCIAL LOSS INJURY WHETHER OR NOT HYDRO-TEST PRODUCTS, LLC HAS BEEN ADVISED OR OTHERWISE PUT ON NOTICE OF THE POTENTIAL FOR SUCH DAMAGES. HYDRO-TEST PRODUCTS, LLC SHALL NOT BE LIABLE FOR BUYER MISUSE, OR BUYER OR USER ALTERATIONS OF THE PRODUCTS; OR LACK OF EDUCATION TO PROPERLY AND SAFELY USE EQUIPMENT IN ACCORDANCE WITH THE EQUIPMENT HANDBOOK AND FEDERAL AND STATE REGULATORY REQUIREMENTS. MOREOVER, SELLER SHALL NOT BE RESPONSIBLE FOR THE BUYER'S FAILURE TO RECOGNIZE THE NEED FOR ADDITIONAL EQUIPMENT TO KEEP THE MAJOR EQUIPMENT AND MACHINES UP TO CURRENT REGULATORY CODE AND TO COMPLY WITH UPDATED AND NEW REGULATORY RULES AND REGULATIONS FOR ANY AND ALL TESTING REQUIREMENTS OR GUIDELINES. BUYER ACKNOWLEDGES THAT THE BUYER IS SOLELY RESPONSIBLE AND SOLELY LIABLE FOR ITS SAFE AND PROPER LEGAL USE OF THE EQUIPMENT IT PURCHASES FROM SELLER. FURTHER, BUYER HEREBY AGREES TO INDEMNIFY AND HOLD HARMLESS, AND DEFEND HYDRO-TEST PRODUCTS, LLC FOR ANY LOSS OR INJURIES CAUSED BY THE INSTALLATION OR USE OF PRODUCTS.**

**ARBITRATION: BY BUYING EQUIPMENT FROM HYDRO-TEST PRODUCTS, LLC. THE BUYER ACCEPTS THE TERMS AND AGREES TO BINDING ARBITRATION SUBJECT TO AND IN ACCORDANCE MASSACHUSETTS LAW, U.S.A, UNLESS BUYER OBJECTS TO ARBITRATION IN WRITING TO SELLER WITHIN 10 DAYS OF A PURCHASE FROM BUYER.**

**THIS AGREEMENT SHALL APPLY TO ANY AND ALL PRODUCTS PURCHASED FROM HYDRO-TEST PRODUCTS, LLC AND THIS AGREEMENT SHALL BE IN FULL EFFECT UPON THE PURCHASE OF ANY AND ALL PRODUCTS PURCHASED FROM HYDRO-TEST PRODUCTS, LLC.**

# HYDRO-TEST PRODUCTS LLC.

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## 507-Series Automated Cylinder Volumetric Expansion Test System



*Tech Manual 507 rev. 3.0*  
revision date: January 2025

**Hydro-Test Products LLC**

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