GE's EVT* PRO 2.0

ELECTRONIC VALVE TESTER

OPERATIONS AND TECHNICAL MANUAL

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SECTION 1

AUTHORIZED USE / EVT PRO 2.0® FIELD TEST (IN-SITU) TESTING PROCEEDURE

I. Scope:

This instruction outlines recommended field testing procedures for establishing set pressure for installed Pressure Relief Valves (PRV) in a field environment using the Electronic Valve Tester, EVT PRO 2.0®

II. Technician Responsibilities:

1. Prior to using the EVT PRO 2.0®, all technicians should be trained and certified in the use of the equipment. Additionally, technicians should be GTC certified in the various classes for which the work applies and on record as being up to date in their respective training. Technicians should be familiar with:
    a. PRV installation, operation, maintenance, and trouble-shooting;
    b. GE procedures outlined in Assembly Instructions, Performance Test Instructions, and Engineering Instructions, and;
    c. The applicable manufacturer's testing/maintenance instructions for the PRV being tested.
2. Technicians should ensure that all test equipment; including pressure measuring devices, have a current calibration traceable to the standards outlined in the NBIC Section 3, 4.5.2 (or other regional calibration standards) Equipment serial numbers and calibration dates are recorded on the final test report. Technicians should provide current calibration documents for customer review upon request.
3. Technicians should properly notify all associated plant personnel, and ensure that the required PPE is worn, review of best practices for hazardous environments, and complete all site specific safety training and LOTO required by the customer prior to conducting in-situ testing.

III. Test Requirements:

4. Technicians should ensure that all documentation; JSA, work permits and/or safe work practices are completed and discussed prior to beginning in-situ testing. This includes verifying that the area where testing will occur is free of hazards, and has proper access and egress.
5. Technicians performing in-situ testing should ensure that there is direct communication between themselves and plant operations throughout the entire testing event. Technicians also should ensure that the system pressure and system stability are within the requirements established by the GTC or Plant for in-situ testing. It is highly recommended that PRVs with an inlet pressure less than 50% of set pressure or in excess of 90% of set pressure should not be tested.
   NOTE: For dangers of testing below 50% or above 90% of set pressure, see warning in Section 2 on page 3.
6. It is recommended that PRVs that display an indication of leaking should not be tested. If leakage can be stopped in a safe manner, i.e., initial lift to remove trash from seats, minor adjustment of the compression screw, etc., and the integrity of the PRV is not suspect, in-situ testing can continue provided no additional hazards exist. Technicians should remain cognizant of any open discharges and/or drains when conducting in-situ testing.

IV. EVT PRO 2.0® Inspection, Set-up, and Use:

7. Technicians should verify that the EVT PRO 2.0® is calibrated, batteries are charged, fluid levels are topped off, and cables and end connectors are not damaged. Ensure hardware, including mounting bracket and adaptors, is complete and in good working order.

8. CAUTION: It is highly recommended when testing PRVs containing a bellows in a closed system, steps must be taken to ensure that the bellows is intact and no pressure exists in the bonnet area of the PRV. Non bellows PRVs exposed to built-up or superimposed back pressure should not be tested unless the media contained in the discharge system poses no threat to the environment or the technicians conducting the test.

V. Recommended EVT PRO 2.0® Test Sequence:

9. Remove cap and lift nut, if applicable. If necessary, remove cap gasket and install the spindle adaptor on the spindle. Slowly lower the test bracket, onto the bonnet or yoke of the PRV as outlined in this EVT PRO 2.0® User's Manual. Connect hydraulic lines to the cylinder and the pump. Connect the color-coded leads to the load cell, lift sensor, and the acoustic sensor on the test bracket and to the corresponding leads on the pump. Connect the pump to the EVT PRO 2.0® computer using the Wi-Fi link-up.

10. Once the equipment is mounted and all connections are made, verify inlet pressure from either the Control Room or through the use of a local gauge. Ensure that inlet pressure is between 50-90% of PRV set pressure before starting the test. Communications should be maintained with the Control Room throughout the EVT PRO 2.0® testing sequence. NOTE: For dangers of testing below 50% or above 90% of set pressure, see warning in Section 2 on page 3.

11. Using slow and deliberate pumping strokes increase the load on the PRV spindle to the pre calculated value determined by the EVT PRO 2.0® computer until an audible or visual indication of set point is reached. Once set point is reached, stop pumping and release the hydraulic pressure. If the determined set point is within the popping pressure tolerance established by the appropriate section of the ASME Code, conduct two additional tests and verify the same standards are met.

12. If adjustments to set point are necessary, remove the test bracket and make the adjustments. Use caution to prevent the spindle from rotating or causing the PRV to go into full lift. If it is determined that ring adjustments are required, gag the valve before making any adjustments. Once complete, resume testing as described in 11 above.

13. Once testing is complete, restore the PRV to its operational condition ensuring both the cap and lift nut are installed, if applicable. If reinstalling a lift-nut, ensure the proper gap is established between the lift-nut and lift-lever per manufacturer's instructions. Seal all external adjustment points, and tag the PRV per approved GTC procedures as outlined in the National Board Inspection Code.

VI. Job Completion:

14. It is recommended that technicians complete all required documentation, obtain customer signature(s) as required, and provide customer with copies of documentation. Ensure final test data is entered in ValvKeep as the GTC requires, either at the customer site or upon return to base.

SECTION 2

EVT PRO 2.0® PRECAUTIONS

Keep this EVT PRO 2.0® operations and instruction manual available at all times.

Observe and comply with recognized safety measures and obligatory regulations regarding accident prevention and environmental protection.

Consider additional factors including, but not limited to, organization of work, plant production schedule, and use of additional qualified personnel when using the EVT PRO 2.0® .

Inspect the EVT PRO 2.0® periodically during operation to ensure safe operation and accurate test results.

The EVT PRO 2.0® system contains two batteries. One supplies power to the laptop (actually 2 batteries in one), and the other supplies power to the pump assembly electronics. The average battery life of both batteries is eight (8) hours of continuous use or 300 tests @ 15 min each. Be advised that extreme heat or cold could degrade battery life. Use common sense when testing with the EVT PRO 2.0® – if the environmental conditions are unsuitable for personal to work, then the conditions are unsuitable for use of the EVT PRO 2.0® also. Only trained and certified valve technicians should use the EVT PRO 2.0®

Always wear appropriate PPE when using the EVT PRO 2.0®.

Do NOT use the EVT PRO 2.0® during periods of inclement weather, i.e., dense fog, rain, sleet, slow, etc. Immediately abort the use of the EVT PRO 2.0® if lightning occurs.

DANGERS OF TESTING BELOW 50% OR ABOVE 90% OF SET PRESSURE

GE policy has always been to **NOT** conduct EVT testing below 50% or above 90% of set pressure.

When testing below 50% of set pressure 2 negative possibilities exist:

- Potential for mechanical damage can occur as a result of too much hydraulic force required to lift the spindle. (ASME recommends 75% inlet pressure).
- Inaccurate set point determined due to the large gap between inlet pressure and set pressure. Set point accuracy improves as the gap between inlet pressure and set pressure decreases.

When testing above 90% of set pressure, 3 negative possibilities exist:

- PRV goes full open as a result of pulling on spindle.
- Damage to equipment occurs as a result of sudden opening of the PRV.
- Safety of technicians is compromised due to sudden opening of PRV.

SECTION 3

EVT PRO 2.0® TECHNICIAN RESPONSIBILITIES

Ensure all personnel adhere to the following additional safety precautions during EVT PRO 2.0® testing:

- DO NOT stand in front of the discharge side of a PRV (Pressure Relief Valve) when testing. Serious injury and/or DEATH may result!

- EXERCISE EXTREME CARE when examining a pressure relief valve for visible leakage.

- KNOW the points of possible media exhaust or leakage for the valve being tested. Some valves exhaust media at locations other than the valve outlet.

- ENSURE that installed PRVs have adequate access around the valve to include overhead clearance for equipment mounting. ASME and other regulatory bodies suggest 19 inches of overhead clearance over a PRV – the minimum height of the EVT PRO 2.0® test stack is 13 inches. It was designed with this requirement in mind.

- USE CAUTION when testing PRVs installed in flammable or toxic environments. Ensure appropriate protective measures are being implemented.

- PREREQUISITE: EVT PRO 2.0® operators must at a minimum be a VALVE TECHNICIAN 2; or be supervised by a certified LEVEL 3 VALVE TECHNICIAN.

- **DO NOT OPERATE THE EVT PRO 2.0® IF SAFETY OF THE DEVICE OR PERSONNEL IS EVER QUESTIONABLE!**

DISCLAIMER

GE Consolidated is not responsible for damage or personal injury caused by failure to follow the instructions contained in this manual, poor maintenance of the* EVT PRO 2.0® *, or improper use of the equipment.

GE Consolidated emphasizes that working with high pressure media is dangerous and can cause serious injury or death. The operator of the* EVT PRO 2.0® *must be aware of this danger and be trained and qualified to operate the* EVT PRO 2.0® *accordingly"

SECTION 4

EVT PRO 2.0® UPGRADES OVER PREVIOUS EVT VERSIONS

The EVT PRO 2.0® unit has several upgrades over the previous EVT version which facilitates state of the art engineering, hardware, and software advances. The following is an overview of these advances:

- State of the art industrial laptop which is lighter, and has extended battery life. The laptop battery can be hot-swapped thereby vastly extending operational time between charges.

- Automatic wireless Wi-Fi communications between the laptop and the Hand Pump electronics. This eliminates the USB cable, and greatly extends the range…allowing test monitoring to occur from safe distances outside of hazardous zones.

- Pump case battery life is vastly extended to over 8 hours of continuous use. (approx. 300 tests @ 15 min. per test)

- Engineering configuration of the Test Bracket now has a time-saving claw clamp. The claw clamp grasps the lifting nut adapter, for quick connection to valves, and the bracket has turnbuckle style screws for fast micro-controlled height adjustments without the need to remove the assembly from the valve.

- Cable connections are color coded and keyed in such a way that only the proper cable will fit into the receptacle. There are no pins, so the problem of bent pins in the connections has been eliminated.

GE Oil & Gas

Consolidated* EVT* PRO 2.0 and EVT PRO 2.0 X Electronic Valve Tester

As the designer and manufacturer of these valves, GE has the in-depth expertise to develop proven technology that can test and verify the valves are working properly.

Overview

EVT PRO 2.0 is the next generation of electronic valve tester offered by GE's Consolidated business. Over the years only Consolidated has offered an OEM valve test device. As the designer and manufacturer of these valves, GE has the proven expertise to offer a device to test and verify they are working properly.

GE's new EVT PRO 2.0 is a lightweight semi-auto electronic valve tester that offers a custom-style pump for smooth acting application of hydraulic force to accurately test the valve. The EVT PRO 2.0 is not approved for "intrinsic safe" environments but offers the same features as the EVT PRO 2.0 X version, which is intrinsic safe, meeting both CSA and ATEX certifications. The carrying case and lightweight designs offer easy maneuverability for convenience when testing in plants.

The EVT PRO 2.0 is more advanced than its predecessor and offers these key new features to make testing faster, more accurate and easier than ever before:

- A new time-saving "claw clamp, micro-controlled fixture" for quick connection to valves.
- An integrated super-charged battery system extending life 10X over the previous generation, with WiFi connectivity.
- A smaller/thinner yet rugged laptop with a new hot-swap battery system to extend run time for those long testing days.
- A redesigned end connector system.
- Advanced proprietary software for testing GE valves and competitors.
- Lower profile fixture for fitting into those tight spots at plants.
- The EVT PRO 2.0 X is intrinsic safe to meet both CSA and ATEX certifications.

fact sheet

Key Features

- Ability to test gas, liquid and air/steam
- Tests all brands of pressure relief valves
- GE OEM data pre-loaded; most other valve data loaded too
- Multiple force transducer (1 kN, 10 kN, 20 kN, 50 kN) with matching hydraulic cylinder reduces accidental overloading
- User-friendly, custom OEM software
- Easy and fast interface to ValvKeep* software, supporting data import and export
- Aircraft alloy fixture; rugged yet lightweight
- New Claw Clamp feature makes connecting to valve fast and efficient
- Easy-to-read reports; customize with logo
- Powerful graphics offer quick interpretation of test data
- Custom color-coded cables and connectors for rapid and easy hookup; new connector design reduces time to connect and reduces damage to pins
- Small profile acoustic sensor offers an additional indication of set pressure
- Newly designed battery offers 10x the battery life of the old
- Increased temperature resistance for those tough high temperature boiler applications
- Fingerprint program offers linear regression capability similar to EVT 3 for testing unknown valves
- Emergency shut-down/force-closing feature
- TSA-approved air cargo carrying case
- CSA Certified for Class 1, Division 2, Group D and is ATEX certified as II 3G ia T4 (Group II Category 3G ia Temperature range 4)
- Consult plant and local agencies for necessary approvals before testing.

Industrial Computer

Our fully rugged computer notebook offers exceptional performance to service tough environments—including drops, water, heat, dust, vibrations and shock regimens.

- Intel® Core i5 processor with turbo boost technology and Intel smart cache, 11.6" TFT LCD (1366 x 768) LumiBond® 2.0 sunlight readable LED display ; touchscreen
- 4 GB DDR3 expandable to 16 GB3 memory
- Hot swappable Dual Li-Ion battery (2100 mAh) x 2; up to 13.6 hours of battery life
- Intel Dual Band Wireless-AC 7265 (802.11 ac) 10/100/1000 base-T Ethernet
- Bluetooth
- Glove-friendly, multi-touch LCD
- MIL-STD 810G certified and IP65 compliance
- Full magnesium alloy case with hand strap
- Operating Temperature: -5.8°F to 140°F/-21°C to 60°C
- Dimension and Weight: 11.7" x 8.78" x 1.34" (299 x 223 x 34 mm) 4.36 lbs (1.98 Kg)

*The above computer spec will vary for the EVT PRO "X" configuration to meet intrinsic safe CSA requirements or ATEX certifications. Computer features and weight will vary with the most notable difference being the ATEX unit utilizes a Tablet computer vs. a Laptop

Ownership

Available for Green Tag Centers* only.

GEA30597B (06/2016)

SECTION 5

HARDWARE COMPONETS OF THE EVT PRO 2.0® SYSTEM

The EVT PRO 2.0® Valve testing system consists of 4 distinct hardware items. They are as follows:

- Load cell assembly case – (Figure 5.1)
- Bracket assembly case – (Figure 5.2)
- Pump case with laptop – (Figure 5.3 and 5.4)
- Cable assembly – (Figure 5.5)

Figure 5.1 – Load cell assembly case

Figure 5.2 – Bracket assembly case

Figure 5.3 – Pump case

Figure 5.4 – Getac V110 Laptop

Figure 5.5 – Cable Assembly (shown connected to bracket, Orange cable insulation sheathing not shown)

SECTION 6

EVT PRO 2.0® LOAD CELL CASE

The EVT PRO 2.0® Load Cell Case is a Pelican style case which houses the 4 load cells and hydraulic lifting cylinders 1 and 3. The lifting cylinders are separated between the Load Cell case and the Bracket Case for better weight distribution for transport. Various other items are housed in this case. Please refer to Figure 6.1 below for part identification.

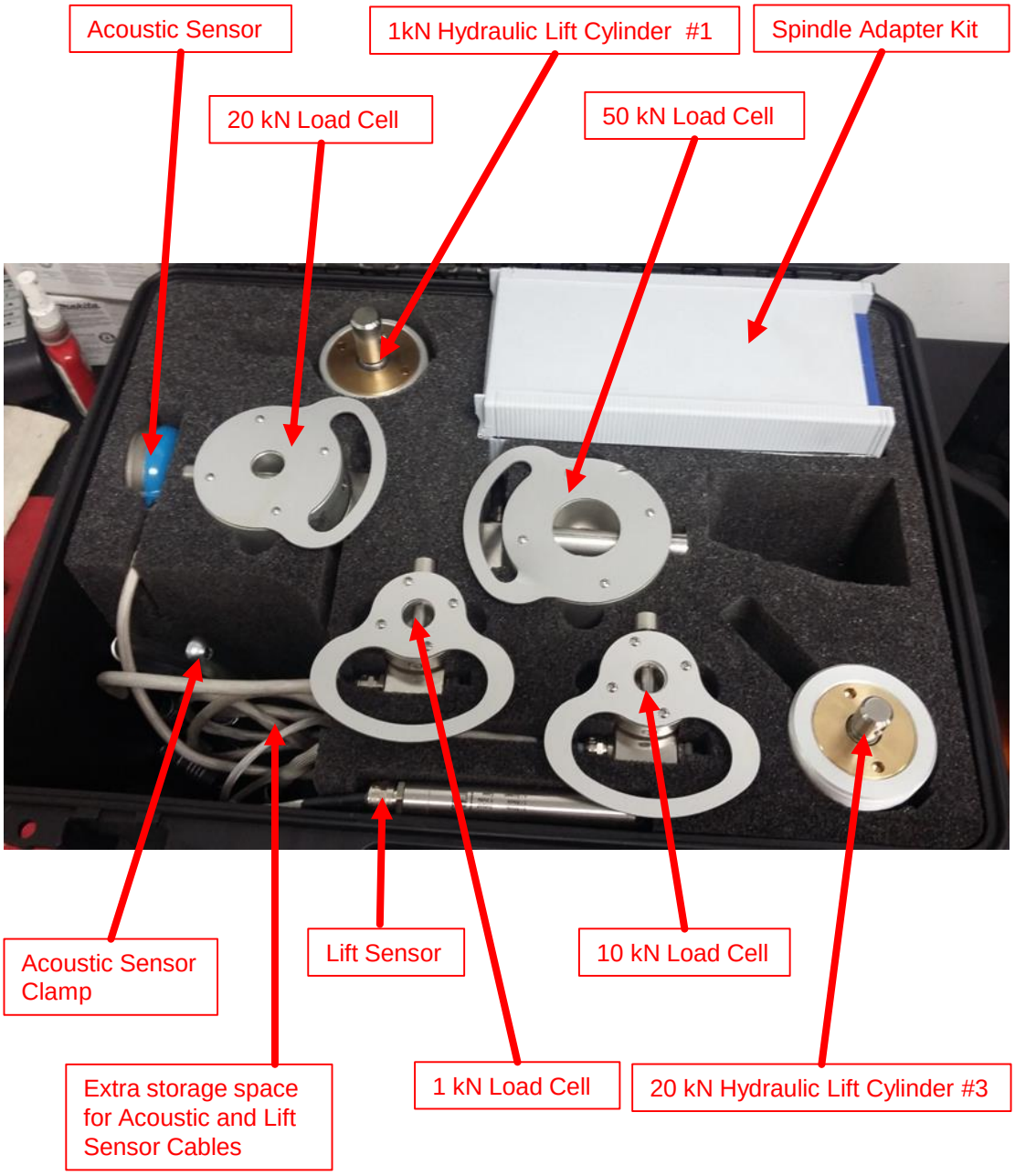


Figure 6.1 – EVT PRO 2.0® Load Cell Case Assembly

SECTION 7

EVT PRO 2.0 ® - LOAD CELLS

The EVT PRO 2.0® utilizes 4 different load cells, each with a specified span, in order to provide the optimum span and data resolution. Each measures load (force) in Kilo-Newtons (kN).

Each load cell is "married" to only one hydraulic cylinder. The 1 kN load cell only works with cylinder 1, etc. Also, the total output force of the cylinder will never exceed the load limit of the load cell. Thus you cannot "blow" a load cell by pumping alone. Each hydraulic lifting cylinder and load cell are engraved accordingly for easy identification.

NOTE: The EVT PRO 2.0® comes standard with 4 load cells and 4 hydraulic lifting cylinders. If a greater lifting and measuring capability is needed, a fifth, 100 kN load cell and hydraulic lifting cylinder can be requested. It uses a separate bracket assembly and is issued upon special request.

The 4 load cells and the associated hydraulic lifting cylinders of the EVT PRO 2.0® system are:

- Hydraulic lifting cylinder 1 kN / 1 kN Load cell / Approx. 220 lbF
- Hydraulic lifting cylinder 10 kN / 10 kN Load cell / Approx. 2204 lbF
- Hydraulic lifting cylinder 20 kN / 20 kN Load cell / Approx. 4400 lbF
- Hydraulic lifting cylinder 50 kN / 50 kN Load cell / Approx. 7500 lbF

Option:

- 50 kN Bracket (Heavy Duty) / 50kN Load cell / Approx. 11,000 lbF

Figure 7.1 below shows one of the load cells. It is shown mounted to the Load Cell Claw Assembly which will be discussed later.

Figure 7.1 – Example of Load Cell mounted to Load Cell Claw Assembly

SECTION 8

EVT PRO 2.0 ® BRACKET CASE

The EVT PRO 2.0® Bracket Case is a Pelican style case which houses the EVT PRO 2.0® Bracket, Hydraulic Lifting Cylinders 2 and 4, load cell claw assemblies, and various other items. Please refer to Figure 8.1 below for part identification.

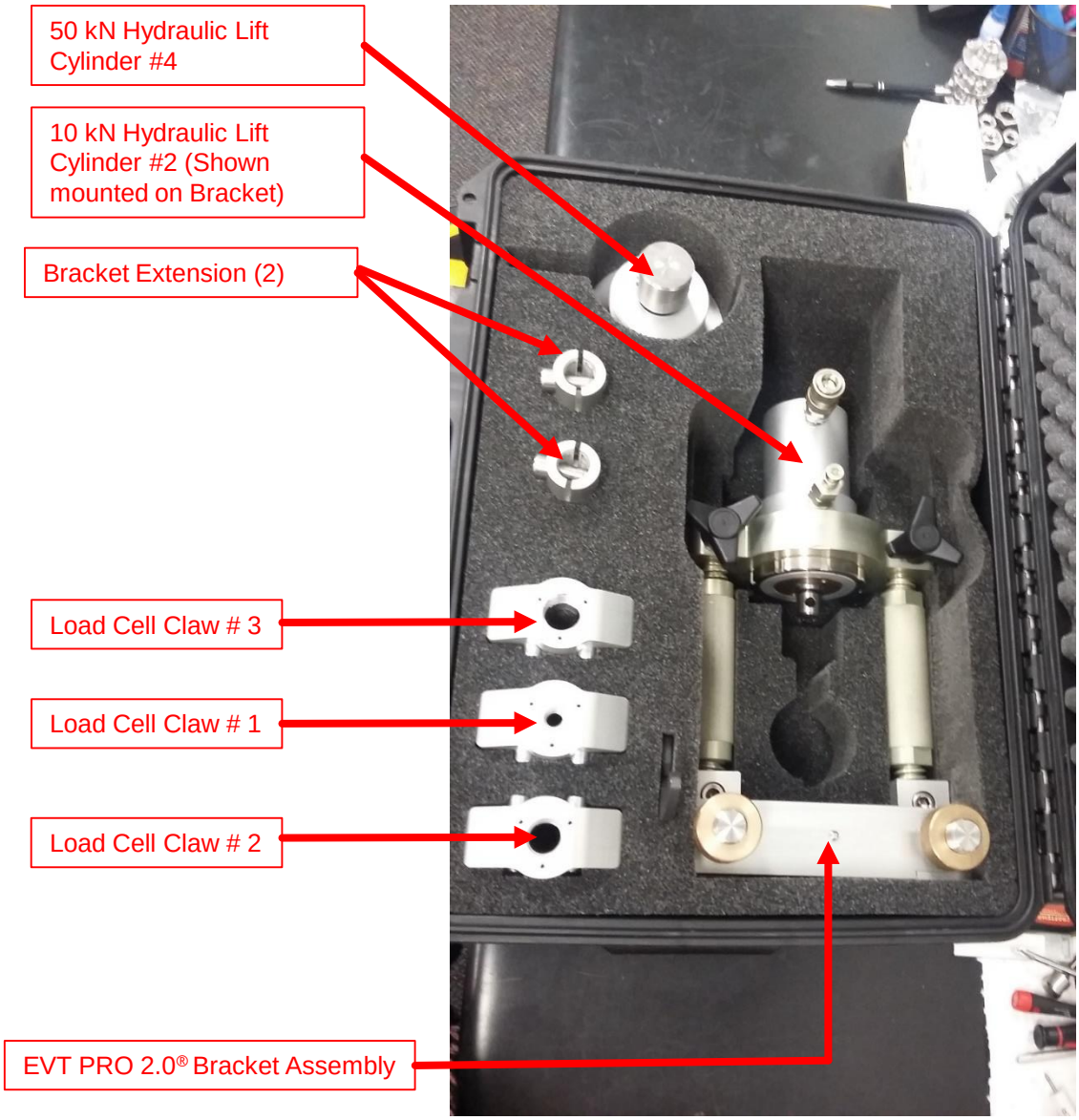


Figure 8.1 – Bracket Case

SECTION 9

EVT PRO 2.0 ® BRACKET ASSEMBLY

The EVT PRO 2.0® Bracket assembly is vastly improved over previous versions. It utilizes turn screw micro height adjustment which **allows for a minimum height of just 13 inches. This is well below the 19 inch PRV overhead clearance requirement as stipulated by NBIC Section 3, API RP 520, and ASME Sec 1, VII, and VIII.** The mounting adapter to the PRV spindle has been improved to provide quick and universal mating, and the Bracket Pin lanyards have been eliminated and replaced with pins which have slot and groove tracks with mechanical stops.

SECTION 10

EVT PRO 2.0 ® HAND PUMP CASE

The EVT PRO 2.0® Hand Pump Case has several key advancements over the previous version. The case itself is a soft sided case with internal frame. The case itself houses the EVT PRO 2.0® upgraded pump assembly, electronics motherboard, battery supply, and the Getac V110 laptop computer. Refer to figure 10.1.

The EVT PRO 2.0® Hand Pump Case with electronics is a state of the art assembly. It is assembled from lightweight aircraft aluminum and consists of a hydraulic pump, a directional control lever, and an electronics interface that sends test data to the computer via a wireless Wi-Fi connection. The hand pump generates a maximum working pressure of 1160 psi (80 bar).

The Hand Pump Case electronics can operate at temperatures between -4˚F (-20˚C) and 140F (60˚C). However, the rule of thumb is to use environmental situation awareness. If a certain job site is too hot, cold or wet, for you to safely work, then the job site is also too hot, cold, or wet for the EVT Pro 2.0 ® Hand Pump Case and the electronics.

The Pump case has an average run time of 8 hours under battery power, or about 300 tests which are 15 minutes for each test.

The pump can be filled with any ISO46 or AW46 or higher rated hydraulic tool oil. This can be purchased locally from a lube shop.

Figure 10.1 – Hand Pump Case

SECTION 11

EVT PRO 2.0 ® HAND PUMP CASE BATTERY

The EVT PRO 2.0® Hand Pump Case Battery is a new generation, rapid charging LiCAD battery which slides into a receptacle on the side of the Hand Pump case, and is locked into place using a retaining tab. A stand alone charger is provided with universal AC adapters for worldwide adaptability to the AC supply grid. Refer to Section 7.2 for parts identification.

- **1 charge is good for 8 hours of continuous use**, or approx. 300 tests lasting 15 minutes each.
- **Operating temperature is between -4˚F (-20˚C) and 140F (60˚C). However, the rule of thumb is to use environmental situation awareness.** Also, temperature extremes will degrade the battery charge faster.

EVT PRO 2.0 ® HAND PUMP CASE BATTERY

Figure 11.1 – Hand Pump Case Battery

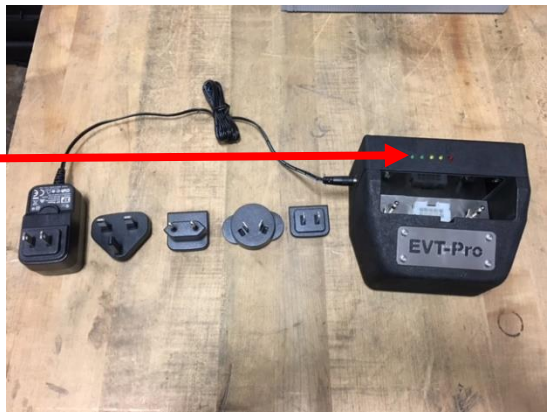


Figure 11.2 – Universal Battery Charger

Battery Charging LED Status lights

The EVT PRO 2.0® Hand Pump Case Battery is actually two (2) batteries enclosed in one battery case. Refer to figure 11.1. The battery charger is equipped with LED charging status lights to indicate each of the batteries charging status. The battery charger LED status light meaning is as follows:

- Red – Power is on, Adapter is on.
- Green 1 – Battery 1 is OK.
- Green 2 – Battery 2 is OK.
- Blinking Yellow 1 – Charging Battery 1.
- Faster Blinking Yellow 1 – Charging Battery 1 is almost full.
- Blinking Yellow 2 – Charging Battery 2.
- Faster Blinking Yellow 2 – Charging Battery 2 is almost full.

- Both Green (2) and Red LED's on – Battery 1 and 2 fully charged

NOTE 1: If you only see one (1) Green LED, that means the battery pack is bad.
"Two is a GO, One is a NO"

NOTE 2: If the battery pack is fully loaded and you place the battery on the charger again, Only the RED LED will show because the battery pack is overload protected.

The Hand Pump Case Battery receptacle is located on the interface panel, which is on the side panel of the Hand Pump case.

This mechanical lock device holds the battery firmly in place, and prevents accidental disconnection.

SECTION 12

EVT PRO 2.0 ® HAND PUMP INTERFACE PANEL

The EVT PRO 2.0® Hand Pump Interface Panel contains the Electronic Main Power Button, and Wi-Fi Status light, unit hydraulic connections, various cable connections, a communications link up button, and a flow restriction valve. The electrical connections are color coded and designed in such a way so that they are pin-less. This eliminates one of the major issues with the previous unit – being bent connection pins in both the interface panel and the cables. Each receptacle is also keyed, so only the proper cable will fit into it's corresponding receptacle. Refer for figure 12.1 below for Interface Panel component identification.

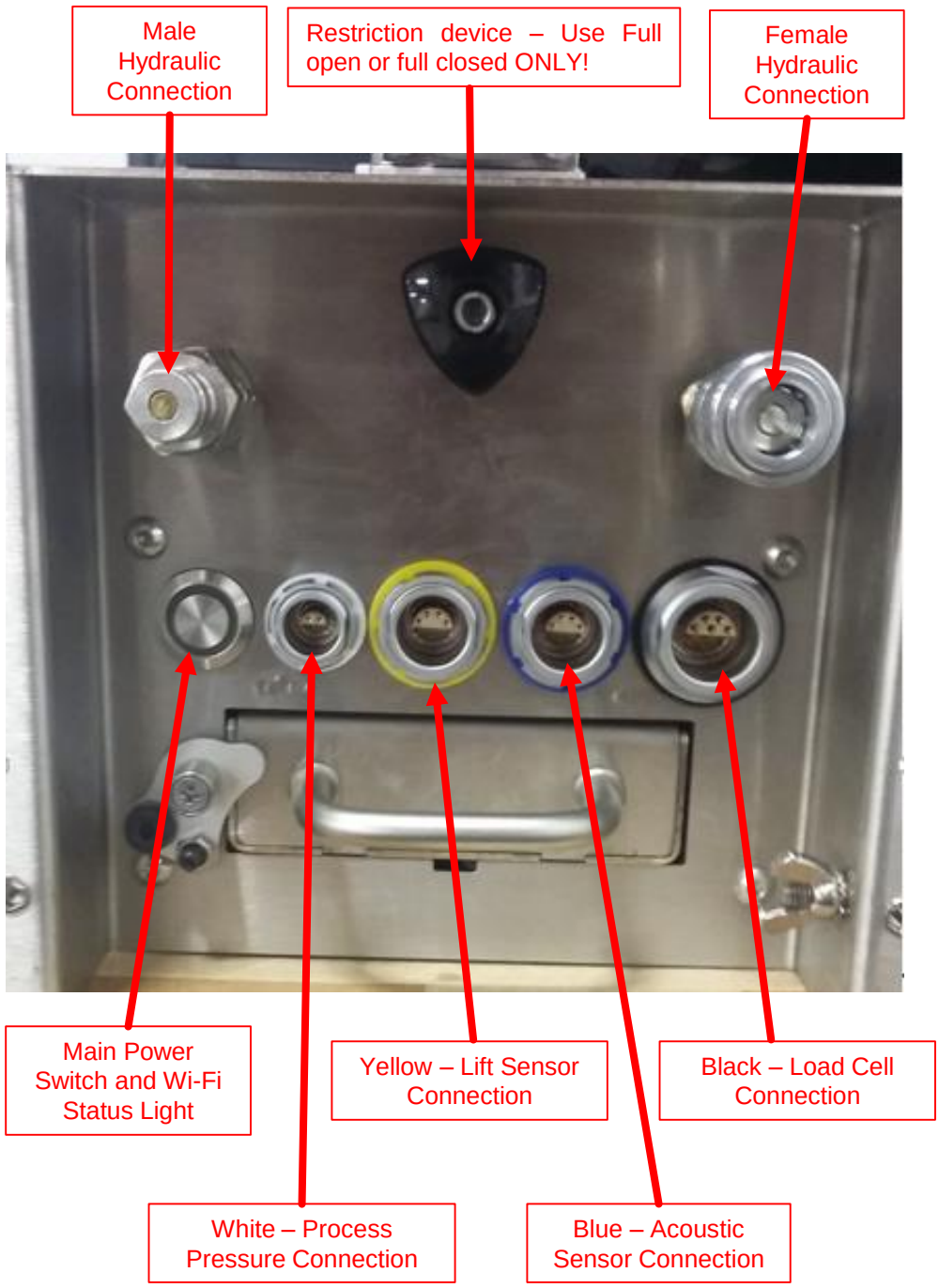


Figure 12.1 – Interface Panel

SECTION 13

EVT PRO 2.0® LAPTOP USER INTERFACE – GeTac V110

The laptop used with the EVT PRO 2.0® is a Getac V110 series design. It is a ruggedized computer capable of withstanding rough treatment and exposure to moisture. **It is water resistant, not waterproof!**

- It can be used as either a laptop or a PC tablet as the screen rotates and fold down in tablet mode.
- Can operate at temperatures between -4˚F (-20˚C) and 140˚F (60˚C). However, use environmental situational awareness, to ensure proper electronic operation.
- The Getac V110 has an average run time of 8 hours under battery power, per battery, which can be hot-swapped during operation without interruption.
- Wi-Fi wireless communications link. Eliminates the USB cable and limitations of the previous unit. The Wi-Fi data link is low power and CSA approved.
- Large 11.6" LumiBond® 2.0 sunlight readable display
- 6th generation Intel® Core™ processor
- Intel HD graphics 520
- Full-size 88 key backlit keyboard
- MIL-STD 810G and IP65 certified

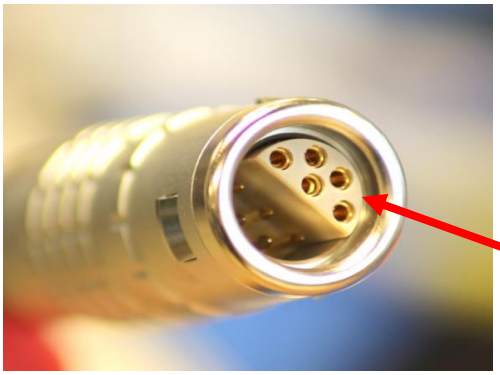
Figure 13.1 – EVT Pro 2.0 Laptop with Wi-Fi data link

SECTION 14

EVT PRO 2.0® CABLE ASSEMBLY

The EVT PRO 2.0® Cable Assembly consists of 2 hydraulic hoses and 4 electronic sensor cables. Male and female connections on the hydraulic hoses prevent them from being connected incorrectly. The connectors on the electronic cables are color coded and keyed, to ensure that they can only be connected to the correct sensing device, or correct receptacle on the interface panel. Refer to figure 14.1 and 14.2.

- The cable is coated in heat RESISTANT Neoprene. It can withstand TEMPORARY (less than 5 seconds) contact with surfaces up to 400°F
- A protective Orange sheath is provided with the Cable Assembly on all US units. This sheath can withstand temperatures up to 1832°F (1000°C) for up to 30 seconds.
- The recessed electrical connections are a pin-less design which eliminates the problem of bent pins.
- Use the Velcro straps which are provided with the cable to secure the cable out of the way from heat sources during testing.
- Protect the cable ends. Connect the ends when the cable is not in use to prevent dirt intrusion and burring.
- Do not drag the cable ends on the ground or on grating.
- The EVT PRO 2.0® cable and the cable from the previous units IS NOT compatible with each other.

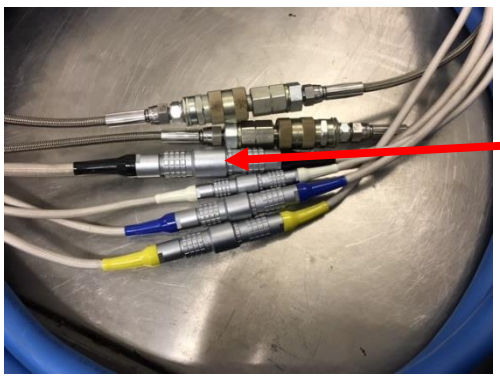


EVT Pro 2.0® Cable Color Code

Black – Load Cell
Blue – Acoustic Sensor
Yellow – Lift Sensor
White – Process Pressure Sensor

Each EVT Pro 2.0® electronic sensor connection has a unique connection which prevents bent pins.

Figure 14.1 – EVT PRO 2.0® electronic cable connections seen face on.

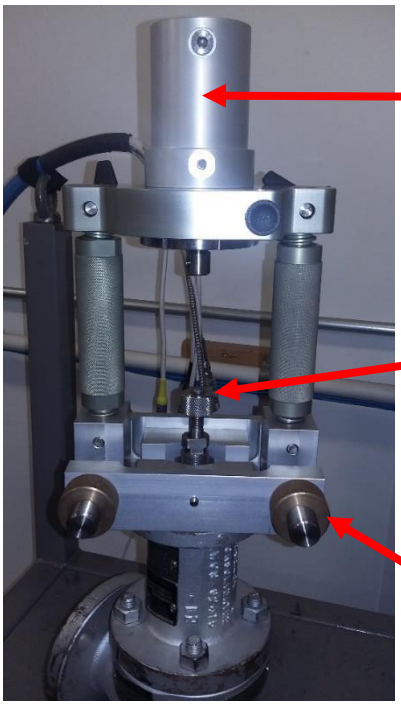


When not in use, store the cable with the ends connected. Doing this prevents dirt intrusion and protects the cable electrical connections from dirt and the elements.

Figure 14.2 Proper cable storage

SECTION 15

EVT PRO 2.0® - MOUNTING THE BRACKET TO A VALVE



Step 1

Select the software indicated Hydraulic Lifting Cylinder and install on bracket. Tighten the locking ring till just snug.

Step 2

Select the correct Spindle Adapter for the valve and install onto the valve spindle. NOTE: Use of the Spindle Adapters is highly recommended to ensure proper contact area for the claw fingers to adequately grasp.

Step 3

Turn the brass thumb screws to open the bracket base and fit it onto the valve. Tighten the thumbscrews for a secure fit.

NOTE: When placing the Bracket Assembly onto the valve, make sure to verify that the columns and the bracket are aligned with the spindle. A misaligned Bracket Assembly can cause the claws to slip off to one side during testing.

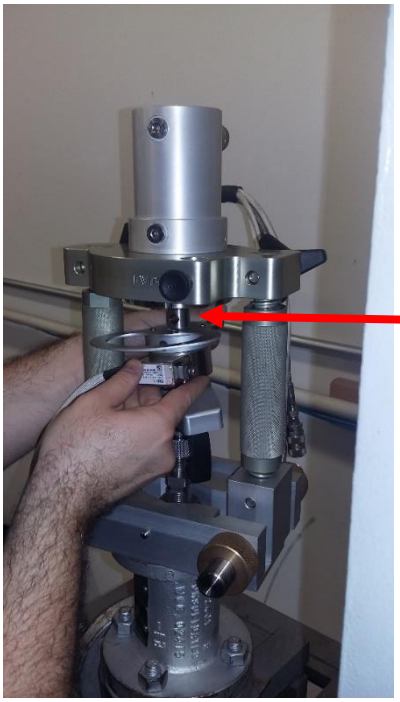
Step 4

Select the correct load cell as indicated by the software.

Step 5

Select the correct Load Cell Claw device which matches the load cell. Screw the Claw device onto the load cell as shown.

EVT PRO 2.0® - MOUNTING THE BRACKET TO A VALVE



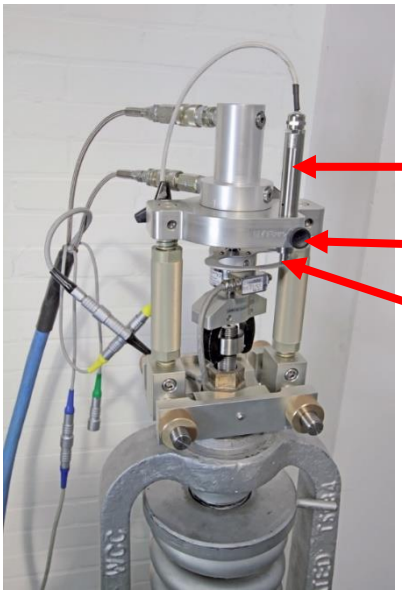
Step 6

Install the Load Cell and Clamp assembly onto the Hydraulic Lifting Cylinder using the pin retainer. Insure that the Lifting Sensor platform if facing the side of the bracket that has the hole for the Lifting Sensor.

Step 7

Use the height adjustment turn screws to lower the claw device so that the claws reach under the spindle adapter. Then using the height adjustment screws raise the claw assembly to that it is snug but not applying any loading of the spindle.

EVT PRO 2.0® - MOUNTING THE BRACKET TO A VALVE

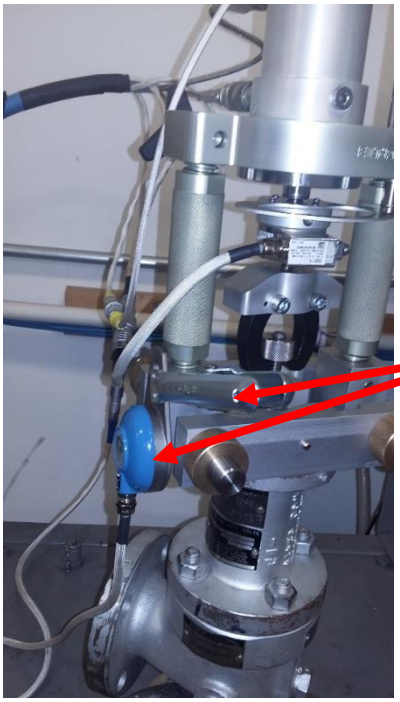


Step 8

Install the Lift Sensor as shown.

Use the thumbscrew to secure the Lift Sensor at the needed height.

The end of the Lift Sensor should rest upon the Load cell plate and have free travel.



Step 9

Use the clamp to secure the Acoustic Sensor to the Bracket Assembly as shown. Testing trials have shown that this is the best location to place the Acoustic Sensor. Ensure a good metal to metal contact.

Step 10

Insure NO part of the cable is in contact with hot surfaces. Use the Velcro straps (not shown) to secure the cable if needed so that the cable and sensor leads are supported and out of the way for testing.

SECTION 16

EVT PRO 2.0® LOAD CELL UTILIZATION

As previously stated, the EVT PRO 2.0® utilizes "married" load cells and hydraulic lifting cylinders to provide greater resolution of data points and accuracy. This principle is illustrated in the software as shown in Figure 16.1 below.

A "rule of thumb" is to select the cylinder with the most green space showing. This method will ensure the greatest data point resolution and accuracy.

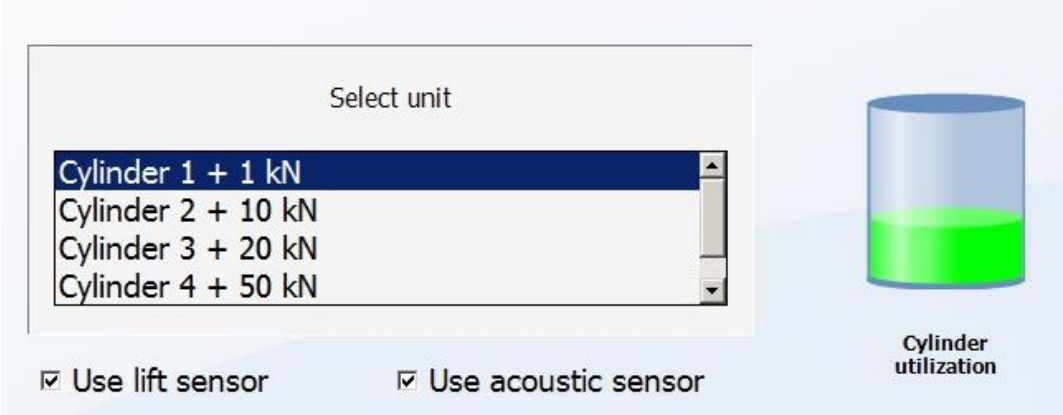


Figure 16.1 – Example of Cylinder Utilization

SECTION 17

INFLUENCE OF PROCESS PRESSURE UPON ACCURACY

During in situ testing, accuracy increases when the difference between process pressure and PRV set pressure is minimal. However, technicians and plant personnel must realize that the possibility of putting a PRV into full lift also increases when process pressure is close to PRV set pressure.

Do not conduct in situ testing when the process pressure is less than 50% or greater than 90% of the PRV set pressure. See Warnings in Section 2, page 3.

SECTION 18

EVT PRO 2.0® LOAD CELL ACCURACY

The transducers provided with the EVT PRO 2.0® are calibrated in a dedicated test facility and are delivered with a certificate of calibration**. The accuracy of the force transducers is greater than 0.1% F.S.** To maintain this high level of accuracy, GE Energy/Consolidated® requires the EVT PRO 2.0® be calibrated on an annual basis. They are to be returned for calibration per instructions found under the EVT PRO 2.0® Tab on GTC.Net.

SECTION 19

EVT PRO 2.0® OVERALL SYSTEM ACCURACY

The overall accuracy of in situ testing is based upon the accuracy of the test equipment used, the accuracy of the gauged inlet pressure, and the accuracy of the effective seat area. Of the three, effective seat area is the most critical element in determining an accurate set pressure. **Typically the accuracy of the EVT PRO 2.0® is within 1% of expected set pressure.**

SECTION 20

EVT PRO 2.0® - THEORY OF OPERATION

The ability to accurately determine PRV set pressure during in situ testing relies on three known factors: (Refer to figure 20.1)

- Hydraulic force generated by test equipment
- Inlet pressure resulting from process pressure
- Effective seat area of PRV

$$\textit{Set Pressure} = \textit{(Process Pressure)} + \frac{\textit{Lifting force}}{\textit{Valve Seat Area}}$$

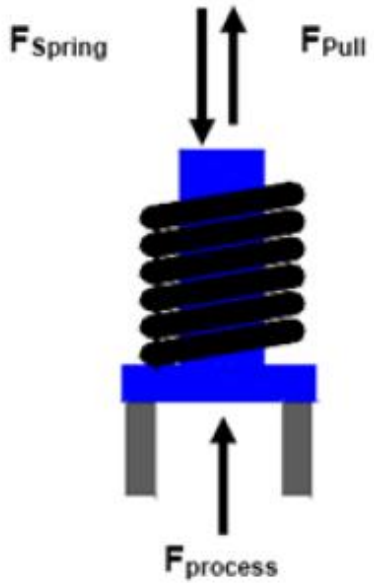


Figure 20.1 – Theory of Operation / Force Analysis

SECTION 21

EVT PRO 2.0® - EXPLANATION OF GRAPH

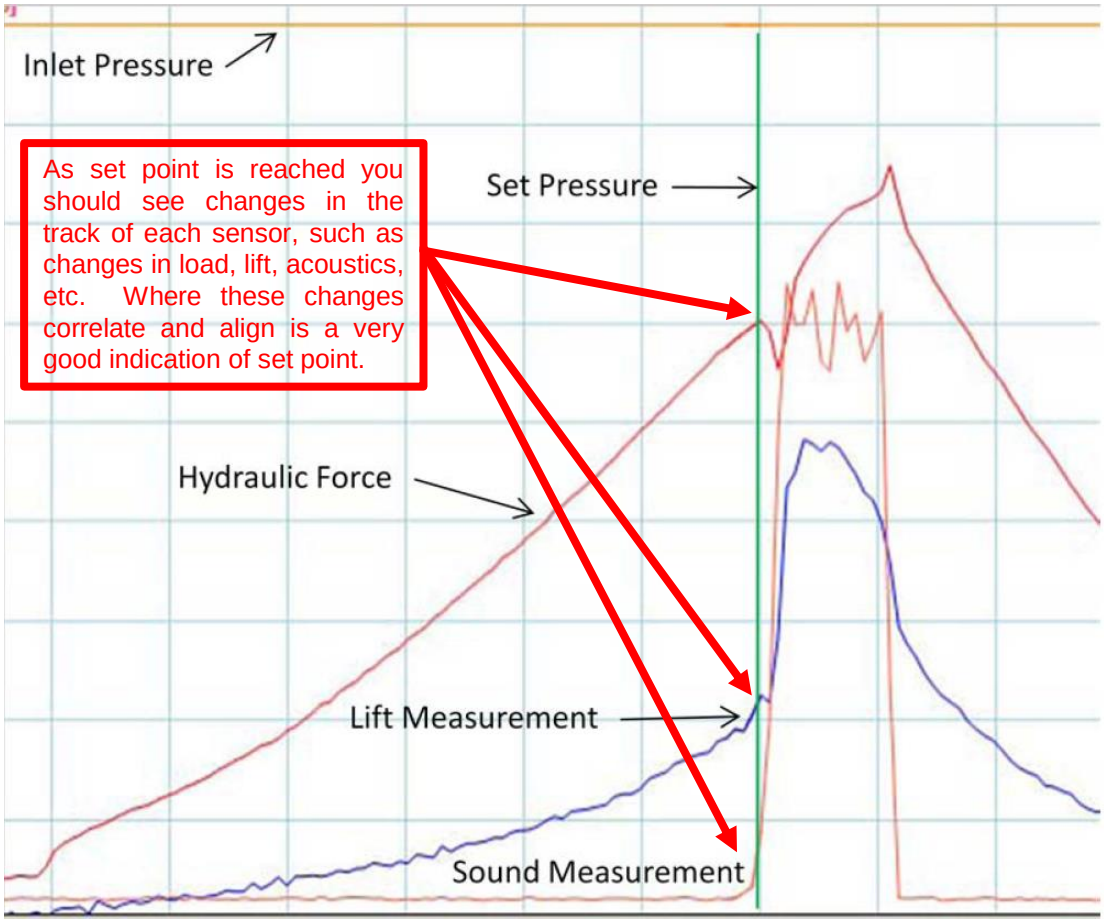


Figure 21.1 – Example of Valve Test Graph Results

Explanation of Graph

In Situ PRV testing enables the technician to accurately determine the PRV's set pressure without removing the PRV from the installation. The test result obtained during in situ testing is considered the 'hot set pressure', not the 'cold set pressure', given that normal operating conditions are present during testing.

During in situ testing, hydraulic force is applied to the PRV spindle, fractionally lifting the disc off the seat. An installed force transducer, records the hydraulic force necessary to lift the disc from the seat. The EVT PRO 2.0® combines this measurement with an indication of lift and an increase in sound produced by flow through the PRV to determine the PRV set pressure.

Graphic evaluation of the hydraulic force, lift, and sound enables the technician to accurately determine the PRV set pressure (Fig. 21.1).

Hydraulic Force Line – During testing, the hydraulic force gradually increases. When the PRV is closed, inlet pressure applies a static force on the disc contained between the area of the nozzle and disc seat. Upon opening, media flow applies an additional kinetic force on the disc against a larger area known as the huddling chamber. This additional kinetic force along with the greater area now exposed to the pressure, causes a momentary decrease to the measured hydraulic force as indicated in the graph.

SECTION 21 (Continued)

EVT PRO 2.0® - EXPLANATION OF GRAPH

Lift line – From the start of the test, the lift line slowly increases. This increase is a result of flexing (only millimeters) in the EVT PRO 2.0® bracket and the extension of the PRV spindle and hardware connections. A significant increase in lift occurs at the moment the PRV opens.

Acoustic Line – The acoustic line responds to vibrations travelling through the PRV caused by flow that occurs when the PRV opens. A spike will occur in the acoustic line indicating that the PRV has opened.

For PRV's in compressed media service, both the hydraulic force and lift line can be used to identify set point. In some cases, only one line may provide a clear indication of set point. The acoustic line may also be used to assist in identifying set point, however, the acoustic signal responds to the first indication of lift (leak point) and should not be used as the only indication of set point.

For PRV's in liquid service, the acoustic line is the primary indicator for set pressure. Both the hydraulic force line and the lift line can be used to assist in identify set point in liquid service, however, since liquid does not expand, they cannot be used as the sole indicators for determining set point.

SECTION 22

EVT PRO 2.0® FUNCTIONAL (EFFECTIVE) SEAT AREA

Accuracy of the functional seat area is critical to the overall accuracy of in situ testing. The EVT PRO 2.0® software contains various methods for determining functional seat area. There are four (4) databases available for selecting the functional seat area along with three (3) additional methods for calculating the functional seat area.

The databases are:

User Defined Seat Dimensions – this database is populated via data input by the technician.

EVT PRO 2.0® Database Seat Dimensions – this database contains functional seat areas provided by Consolidated®.

Competitor's Database Seat Dimensions – this database contains functional seat areas for competitor valves. This data has not been lab tested and is based on field information only.

Standard Orifice Size – this database contains functional seat areas based on the standard orifice size of the PRV. This method should only be used when the difference between operating pressure and set pressure is minimal and a relatively large orifice PRV is being tested. The software will determine if the test criteria meets allowable standards and a green light (refer to figure 22.1) on the data screen will indicate testing can continue.

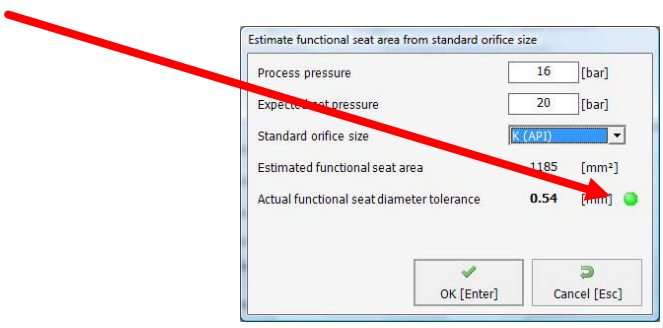


Figure 22.1 – Example of Allowable Standards Light

SECTION 23

EVT PRO 2.0® METHODS OF CALCULATING FUNTIONAL SEAT AREA

The EVT PRO 2.0® has three (3) methods of calculating a valve's functional (effective) seat area (refer to figure 23.1 AND 23.2 below) when the exact manufacture's values are not known. The EVT PRO 2.0® methods for calculating functional seat area are:

Functional Seat Diameter – requires manual input of the functional seat diameter.

Inner, Outer Seat Diameter – requires manual input of the inner, then outer seat diameter.

Finger Print Test (Linear Regression) – requires testing the PRV at a minimum of three different inlet pressures. Upon successful completion, the software will calculate the functional seat area of the PRV and normal testing can continue. Be aware that the use of this method will require coordination with the plant in order to achieve the 3 different inlet pressures needed.

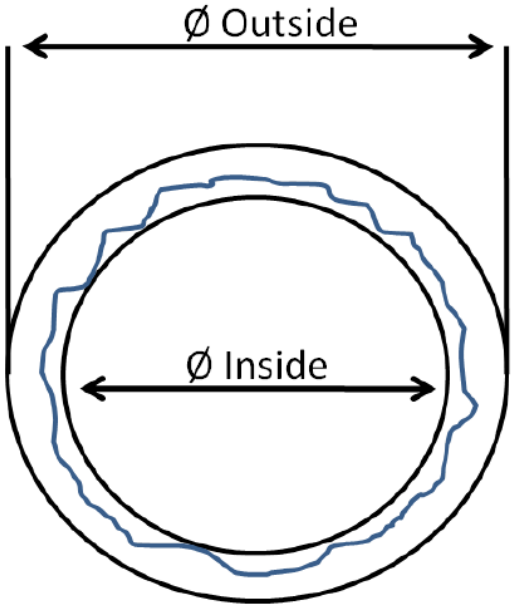
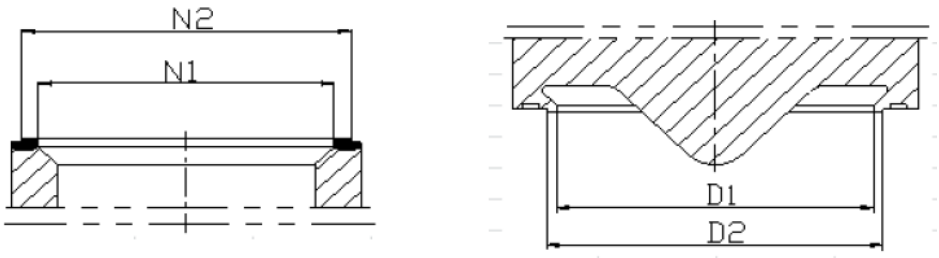


Figure 23.1 – Example of Valve Functional (Effective) Seat Area



Style/size	Nozzle		Disc	
	N1(in.)	N2(in.)	D1(in.)	D2(in.)
1.5J2.5 HL-	1.535433	1.732283	1.574803	1.692913
4N6 HL-48	2.854331	3.149606	2.893701	3.090551
2H3-HSJ-46	1.134	1.292	1.164	1.254

Figure 23.2 – Example of Valve Functional (Effective) Seat Area

SECTION 24

EVT PRO 2.0® PRV DATA MANAGEMENT (EDIT DATABASE)

The PRV data management section of the EVT PRO 2.0® software, provides access to the database where the PRV data is stored. Entering PRV data prior to arriving at the job site reduces the amount of time spent on site and minimizes the mistakes made when entering data. Changed process conditions, i.e. process or line pressure, can be changed to the actual conditions prior to testing the PRV.

PRV data is stored under its unique serial number and additional PRV data fields contained in the software. A search function enables the technician to enter PRV data to locate the appropriate PRV.

The EVT PRO 2.0® software stores PRV data under the specific client (customer) name and location. Upon selecting a specific client and location, the software will display all PRV data for that client and location.

The software stores all relevant test information for a particular PRV with a corresponding link to that PRV. As a result, technicians can easily generate a historic overview of all test information for a PRV. Test reports are available for print at any time. Unlike previous versions of the EVT, previous PRV test data is not overwritten when new test data is stored.

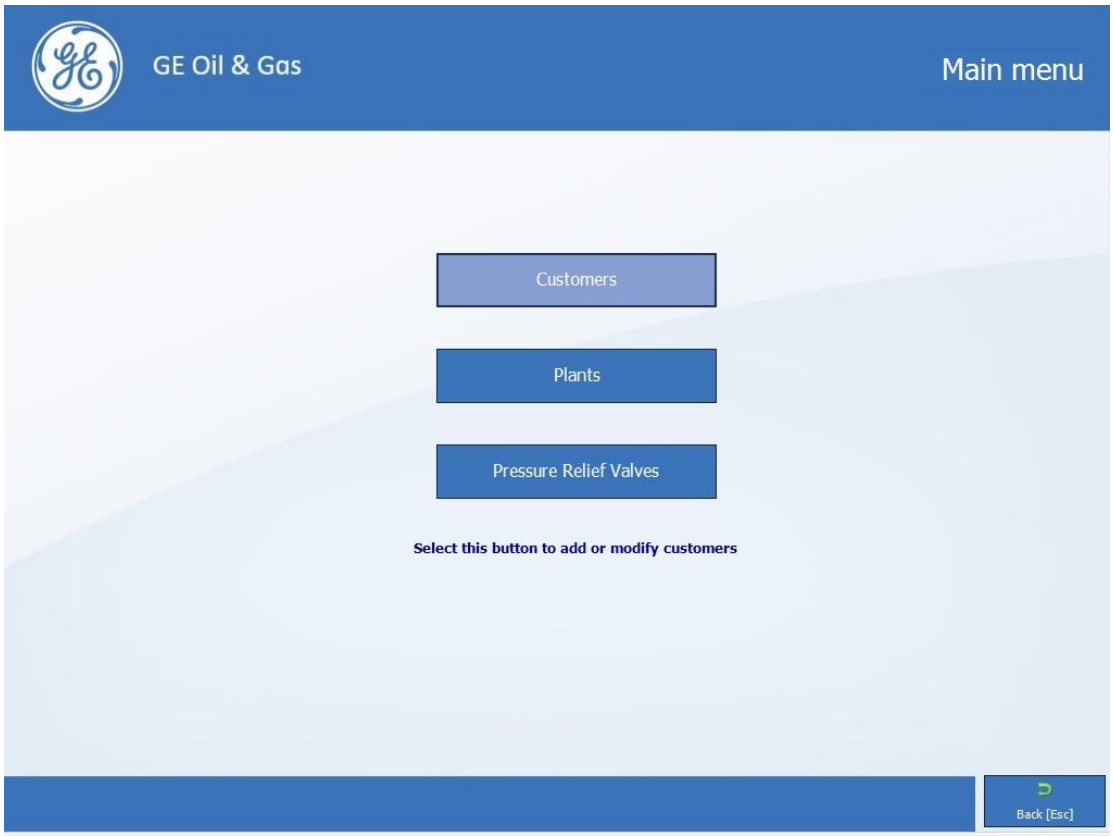


Figure 24.1 Main Menu (Edit Database) Screen

SECTION 25

EVT PRO 2.0® PRV DATA ENTRY

The EVT PRO 2.0® software requires the entry of specific PRV data in a specific order to perform in situ testing.

Required information to "build" a valve in the database:

1. **Valve Serial Number**
2. **Functional Seat Area**
3. **Line / Process Pressure**
4. **Expected Set Pressure**

It is assumed that the operator can navigate the program using the instructions provided below. Step by step pictures of each screen is repetitive and adds unnecessary bulk to this manual. Use the following steps to enter desired PRV data. Examples of the final data screens are provided for clarity.

Adding a new Customer to the database: (Refer to figure 25.1)
Main Menu → Edit Database → Customers
Activate the New action [F1] button;
Enter all applicable information;
Activate the Save action [F5] button to store the data.

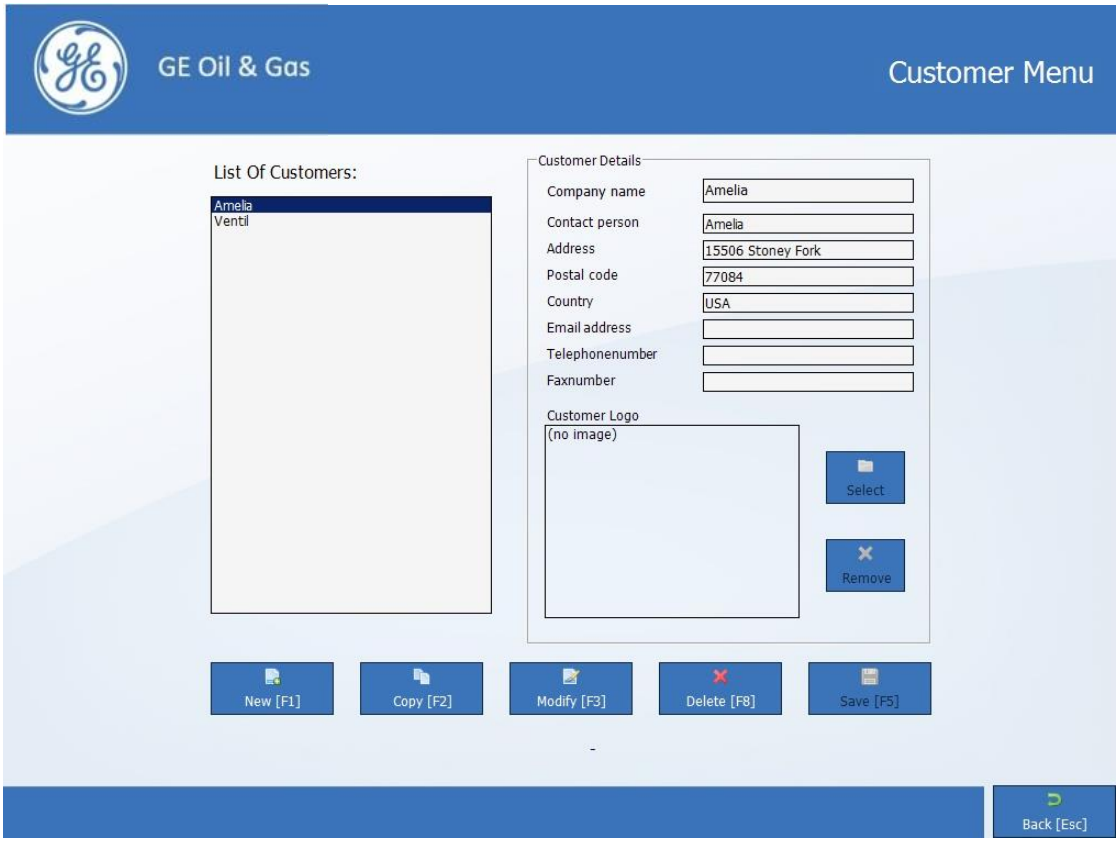


Figure 25.1 Customer Menu Screen

Adding a new Plant to the database: (Refer to figure 25.2)
Main Menu → Edit Database → Locations
Select the applicable Client;
Activate the New action button;
Enter all applicable information;
Activate the Save action button to store the data.

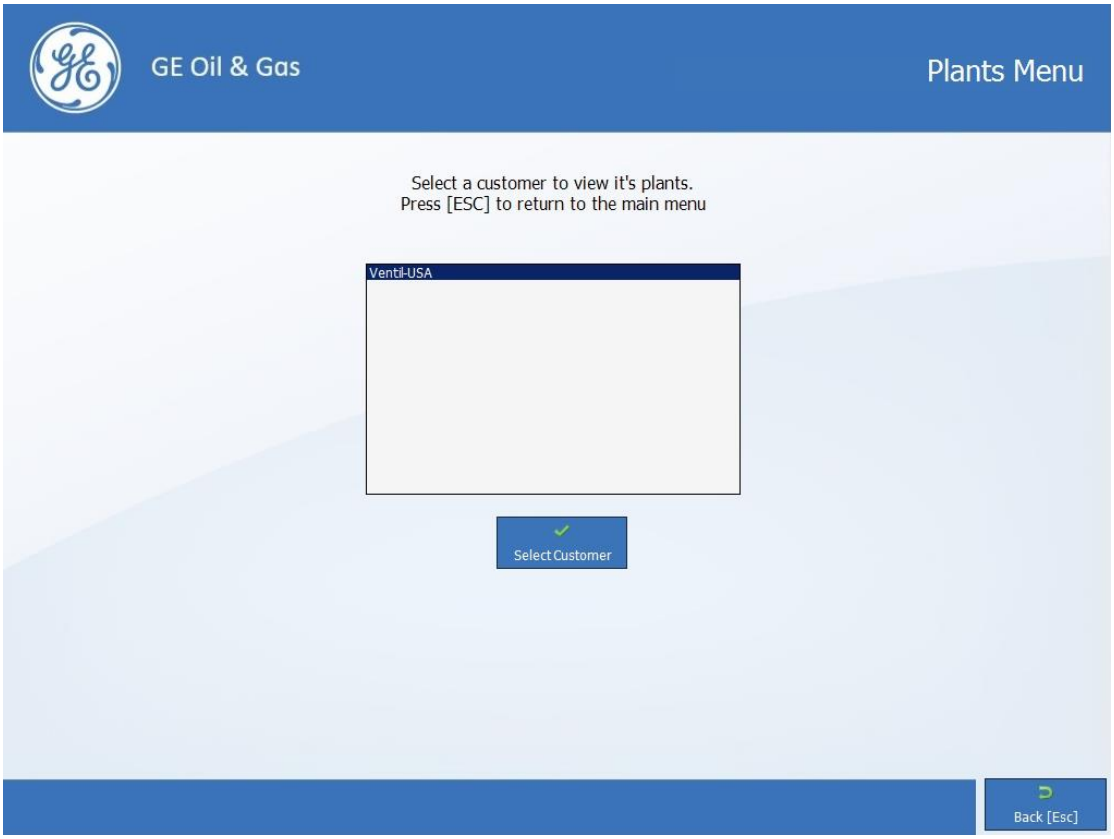


Figure 25.2 Plants Menu

Adding a new PRV to the database: (Refer to figure 25.3)
Main Menu → Edit Database → Safety Valves
Select the applicable Client;
Select the applicable Plant;
Activate the Add Valve [F1] action button;
Enter all required/applicable PRV data;
Activate the Save action button to store the data.

Modifying Existing Valve Details and/or Test Parameters: (Refer to figure 25.3)
Main Menu → Edit Database → Safety Valves
Select the applicable Client;
Select the applicable Plant;
Highlight the applicable PRV and activate the Modify [F3] action button;
Enter/revise all applicable information;
Activate the Save action button.

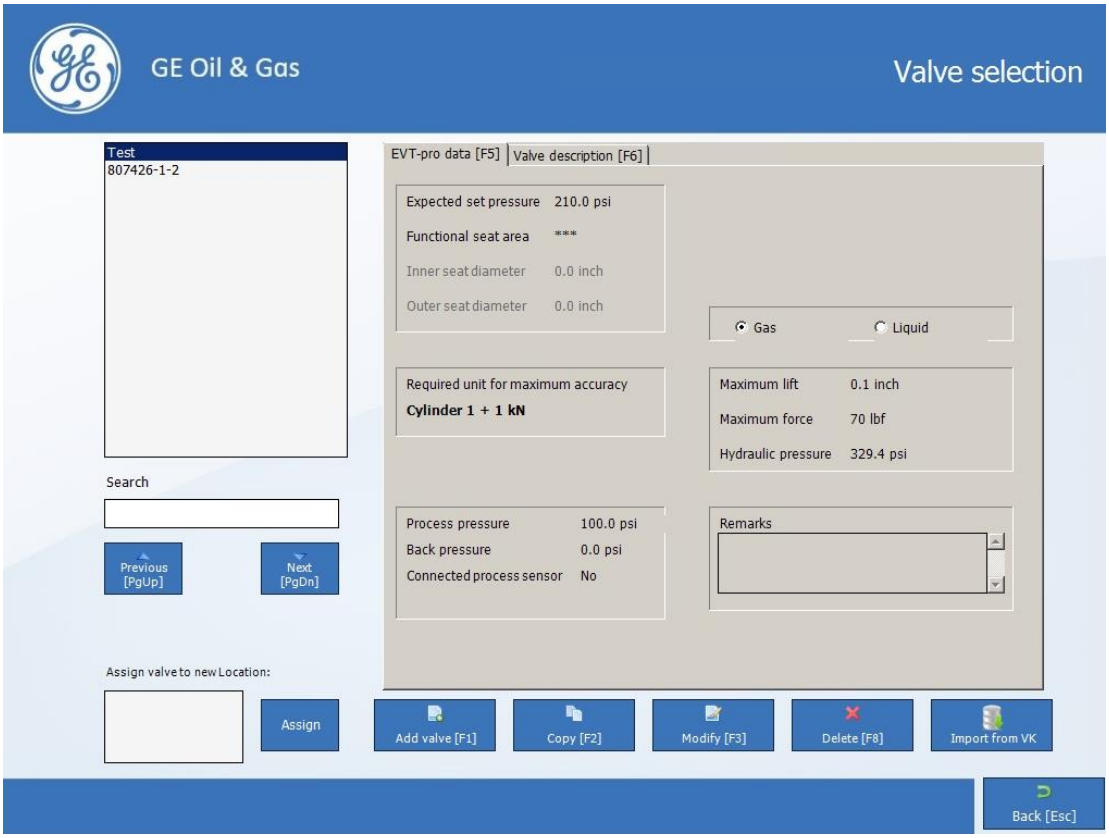


Figure 25.3 Adding / Modifying a Valve in the Database

SECTION 26

EVT PRO 2.0® PERFORMING A TEST

The following steps provide a EVT PRO 2.0® checklist for testing PRV's and to ensure that the test results using the EVT PRO 2.0® are accurate:

1. Select the appropriate hardware (load cell, hydraulic lifting cylinder, spindle adapter, lift sensor, acoustic sensor, bracket) necessary to perform the test.

2. Assemble the Bracket using the required hardware for the PRV to be tested. (Refer to Section 15.0)

3. Attach the EVT PRO 2.0® Hand Pump Case to the Bracket using the cable provided. Ensure both the hydraulic adapters and color coded electronic leads are securely connected.

4. Ensure the vent on the hydraulic pump is open (close for transport).

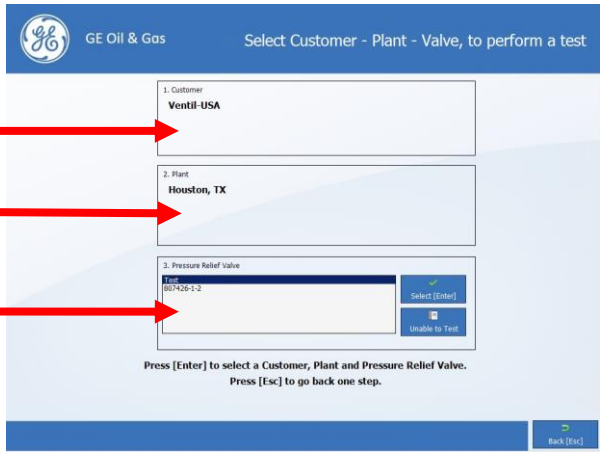
5. Ensure the laptop is powered on with the EVT PRO 2.0® software running. Verify that the Hand Pump Case Electronics automatically established communications with the laptop by verifying for Green data link light on the electronics interface panel. If not linked follow manual communications datalink procedure as found in Section 35 to establish the datalink.

6. Securely attach the Bracket to the PRV. Install the lift sensor and check for both freedom of travel and a lift indication on the laptop. Attach the Acoustic Sensor to the side of the bracket as shown in Section 15 step 9.

7. Double click the EVT PRO 2.0® icon on the computer screen to open the program.

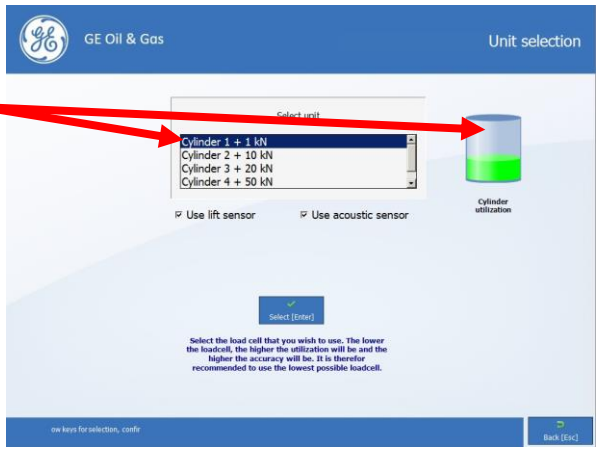
8. On the Main Menu screen, activate the "Start Test" action button.

9. Select the desired Customer, Plant, and Pressure Relief Valve.

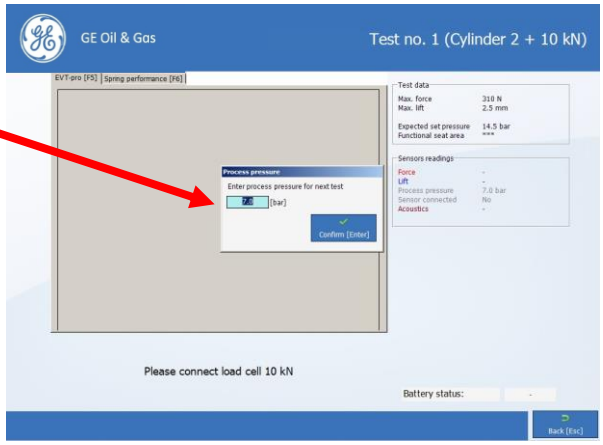


10. Select the appropriate cylinder

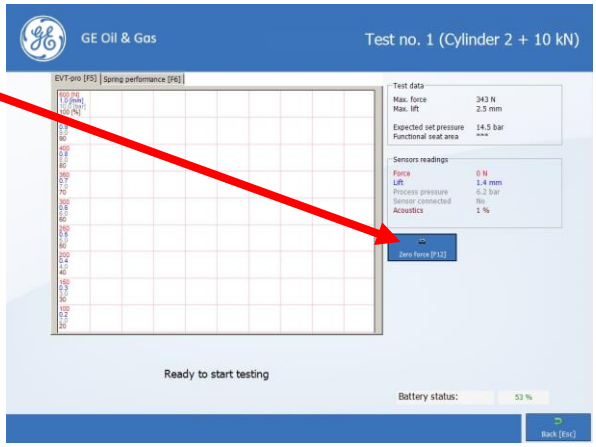
    (Note: For maximum accuracy and safety, select the cylinder that displays the largest utilization range.)



11. Enter the Process Pressure.



12. Ensure there is no load on the load cell and activate the **Zero Force** action button on the test screen.



Testing can begin by either pressing the space bar on the keyboard or by slowly pumping the hand pump.

13. Make slow, complete strokes using the hand pump while pulling the hydraulic force direction lever rearward. Quick, short strokes can negatively influence test results and possibly damage the pump.

14. Once the PRV opens, release the hydraulic force direction lever to release the hydraulic pressure being applied (See Notes Below).

15. Activate the spacebar to stop the measuring process.

NOTE: **HYDRAULIC CLOSURE OF PRV:** The EVT PRO 2.0® can be used to hydraulically close the PRV in the event the PRV hangs open. This is done by pushing the hydraulic force direction lever forward to apply downward pressure on the PRV spindle. In the event force-closing capability may be necessary, it is imperative that the technician ensure the hardware bracket is securely mounted to the PRV. GE/Consolidated recommends securing the mounting bracket underneath the compression screw locknut to prevent the hardware bracket from pulling off the PRV when downward pressure is applied.

NOTE: **FLOW RESTRICTION**: The EVT PRO 2.0® Hand pump is designed to open the PRV using a limited amount of pumping strokes. In order to generate a smooth force line, hydraulic fluid is pumped through a restriction inside the pump. If it becomes necessary to move the hydraulic cylinder quickly, the restriction can be by-passed by closing the Black Knob (flow restriction device) located on the interface panel. (Refer to figure 12.1) During normal operation, this check valve should remain open.

(FOR THE FOLLOWING REFER TO FIGURE 26.1)

16. Once the measuring process has been stopped, the test graph is ready for evaluation

17. If a change in inlet pressure occurred before the valve was tested, or if the wrong inlet pressure value was entered, activate the Correct Line Pressure action button and enter the correct inlet pressure.

NOTE: To magnify a section of the test graph, click on the Zoom action button, which is the button with the magnifying glass and highlight an area of the test graph to zoom.

18. Activate the Set pressure action button to display the green vertical line and use the mouse to position the line at the point where set point was measured as indicated on the graph. Refer to the section on Explanation of Graph for interpretation. In the event the green vertical line is positioned incorrectly, reactivate the Set Pressure action but to enable repositioning the line.

19. Activate the Reseat Pressure action button to display a second vertical line to indicate reseat pressure. It is important to understand that this is **only an indication of reseat pressure** and that actual reseat pressure may be different.

20. **Conduct a minimum of 3 tests to verify set point repeatability**. Click on the Complete Certificate action button to view and print the test certificate.

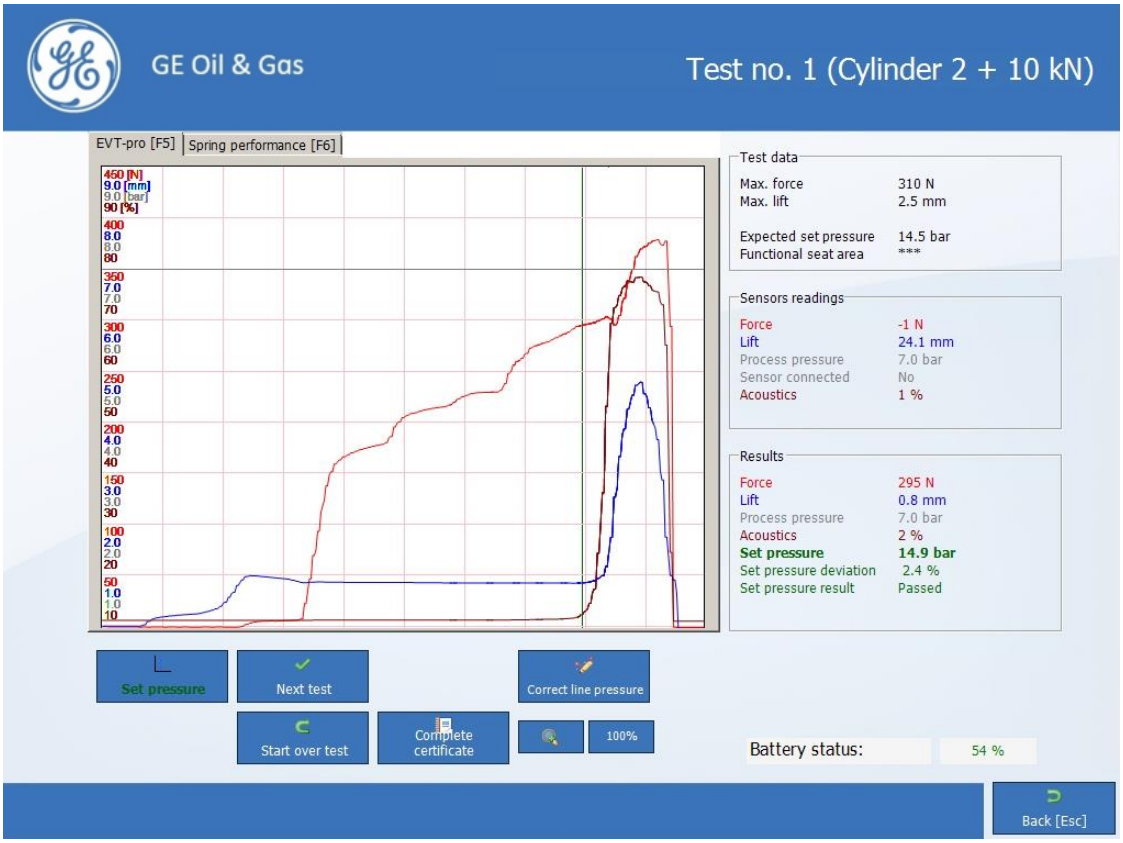
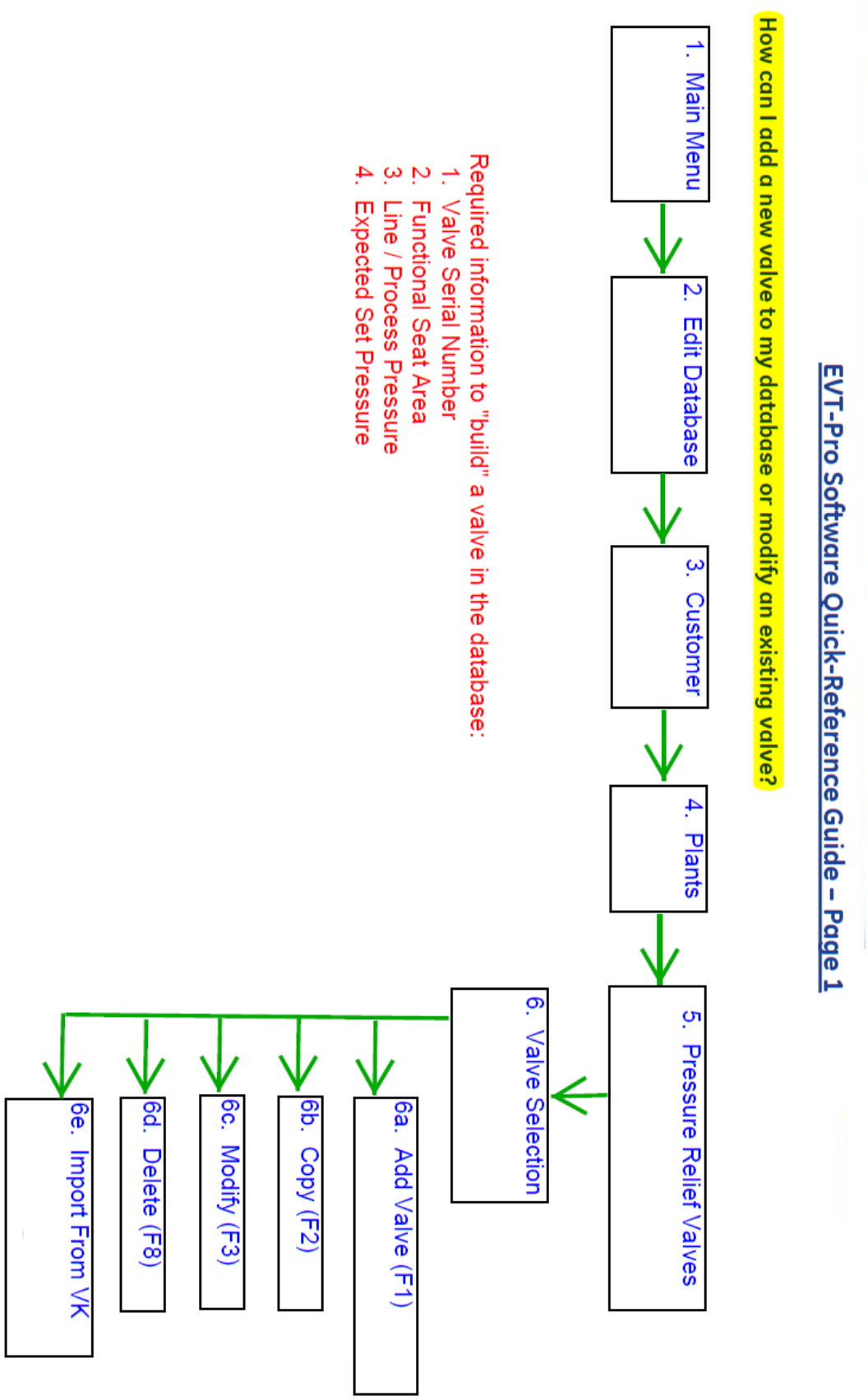
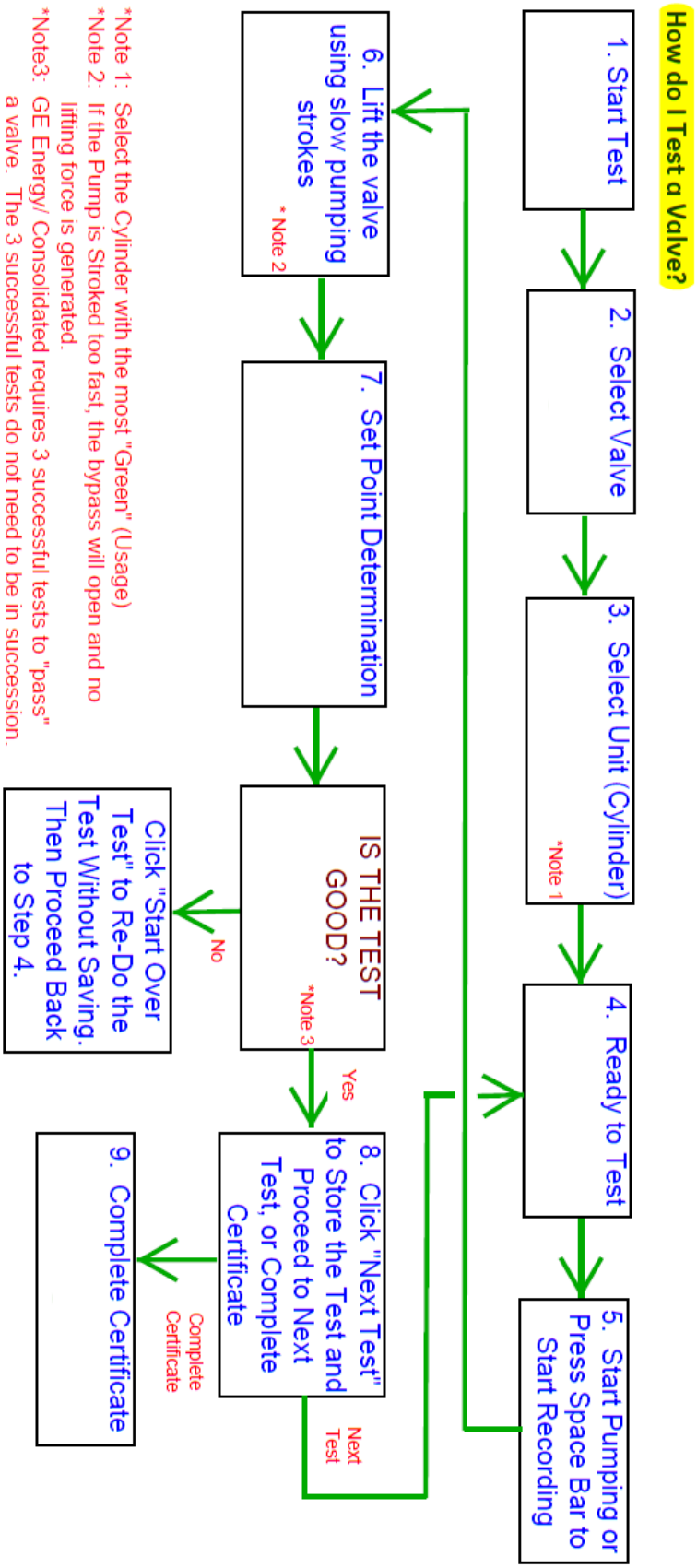


Figure 26.1 Example of Test Results Screen

Below is a simplified flow diagram of the steps used to add a new valve to the database or modify an existing valve.



Below is a simplified flow diagram of the steps used test a valve.

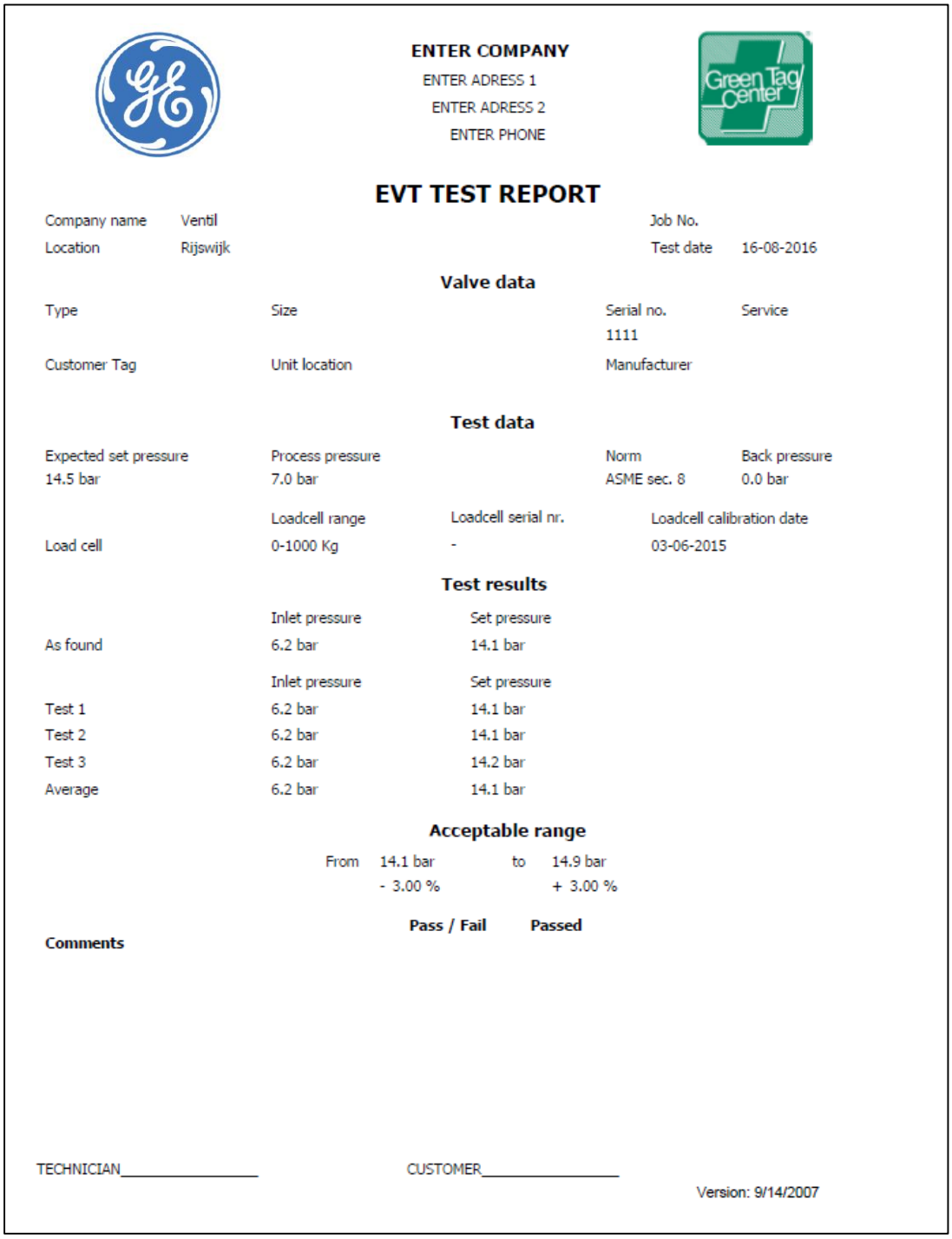


SECTION 28

EVT PRO 2.0® CERTIFICATE MANAGEMENT

Test reports can be viewed, printed, and saved as a PDF in the Certificate Management window. Search for reports using Client/Location; Selection Test Dates, or using PRV Serial Number.

A Test Certificate is available after a valve is tested. It is not necessary to complete all three (3) valve tests to generate a certificate with test results however GE Consolidated requires three tests of a valve in order to certify set point. Refer to figures 28.1 and 28.2 for examples of the Test Certificate.



ENTER COMPANY
ENTER ADRESS 1
ENTER ADRESS 2
ENTER PHONE

EVT TEST REPORT

Company name	Ventil	Job No.	
Location	Rijswijk	Test date	16-08-2016

Valve data

Type	Size	Serial no.	Service
		1111	
Customer Tag	Unit location	Manufacturer	

Test data

Expected set pressure	Process pressure	Norm	Back pressure
14.5 bar	7.0 bar	ASME sec. 8	0.0 bar

	Loadcell range	Loadcell serial nr.	Loadcell calibration date
Load cell	0-1000 Kg	-	03-06-2015

Test results

	Inlet pressure	Set pressure
As found	6.2 bar	14.1 bar
	Inlet pressure	**Set pressure**
Test 1	6.2 bar	14.1 bar
Test 2	6.2 bar	14.1 bar
Test 3	6.2 bar	14.2 bar
Average	6.2 bar	14.1 bar

Acceptable range

From 14.1 bar to 14.9 bar
- 3.00 % + 3.00 %

Pass / Fail **Passed**

Comments

TECHNICIAN_____ CUSTOMER_____

Version: 9/14/2007

Figure 28.1 Test Certificate – Page 1

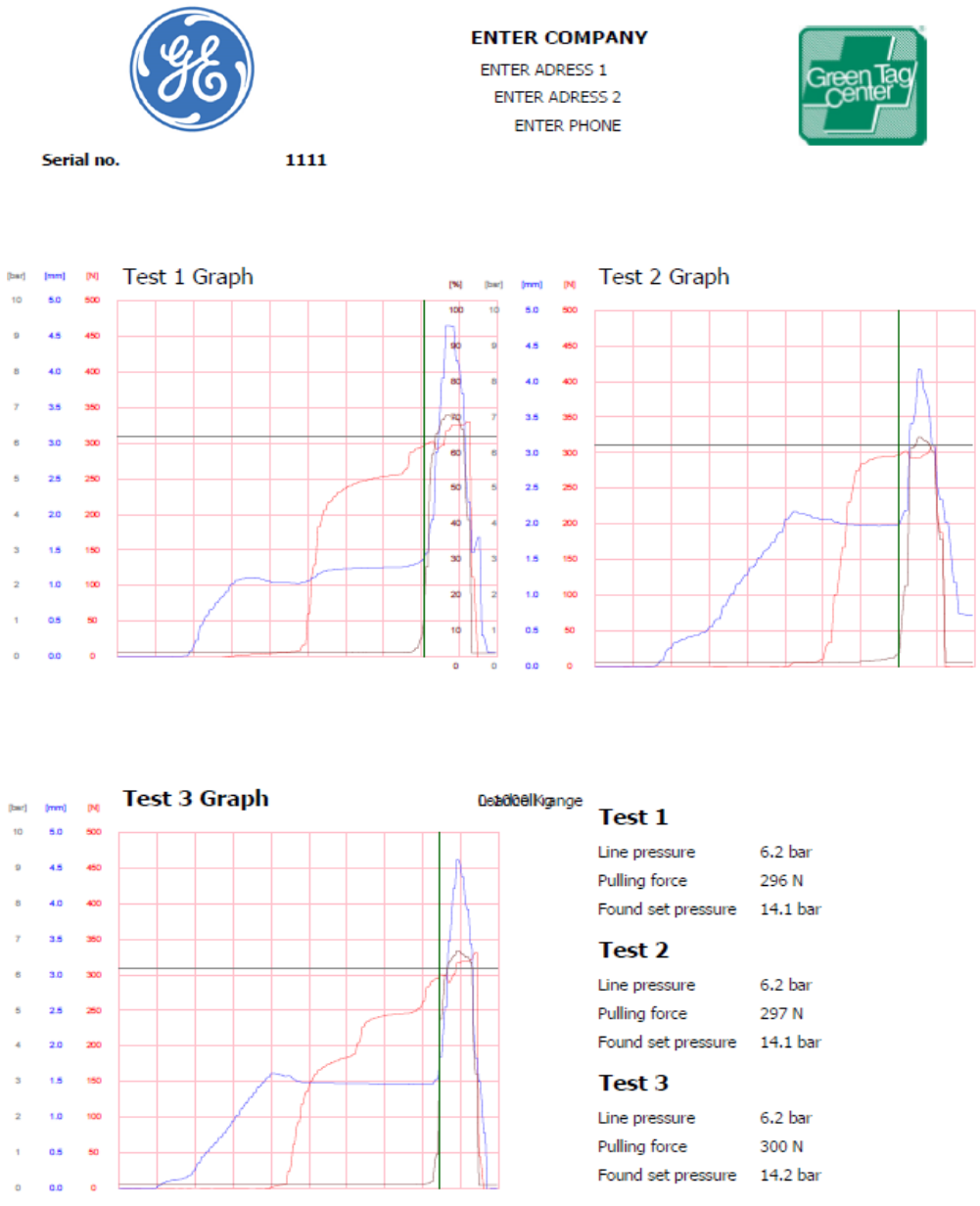


Figure 28.2 Test Certificate – Page 2

NOTE: The data shown and the format of the Test Certificate is totally customizable. It can be modified by making changes to the global template which is found under the Options section of the software. It is not recommended that you change the Global Template. Refer to Section 30 if you wish to customize the Global Test Certificate.

SECTION 29

EVT PRO 2.0® OPTIONS MENU

Use the EVT PRO 2.0® Options menu selection to change various options which are user defined such as hardware settings, software settings, graph settings, report generator settings, etc. Access to the Options menu is password protected.

From the Main Menu Screen select the Options action button. You will be asked to enter the Password.

THE FACTORY DEFAULT PASSWORD IS 2204.

DO NOT CHANGE THIS PASSWORD!

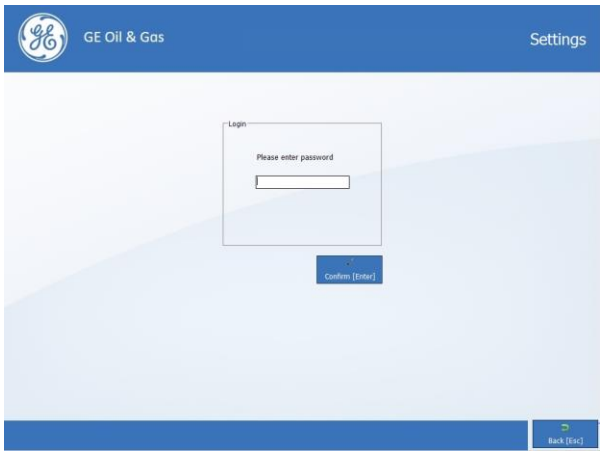


Figure 29.1 Options Password Screen

Once the Password is entered the user will be taken to the Options/Settings main menu screen.

Hardware settings are only available to the Manufacturer. This is where sensor specific data is stored which affects unit performance.

Figure 29.2 Options/Settings Main Menu Screen

Clicking on the Software Settings action button will take you to the Graph Settings screen.

Clicking on each graph option listed, enables the user to change widths and pen colors of various graphs and curves.

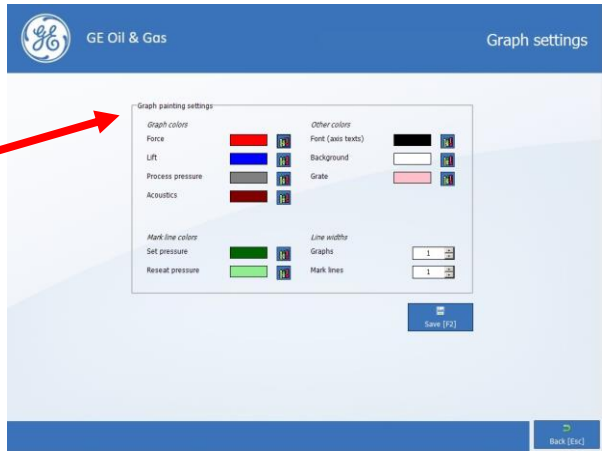


Figure 29.3 Graph Settings Screen

Standard unit settings from the factory are in SI units. The unit settings for each sensor can be changed on the Category Settings screen. Both measured units and rounding of significant digits can be user defined and changed.

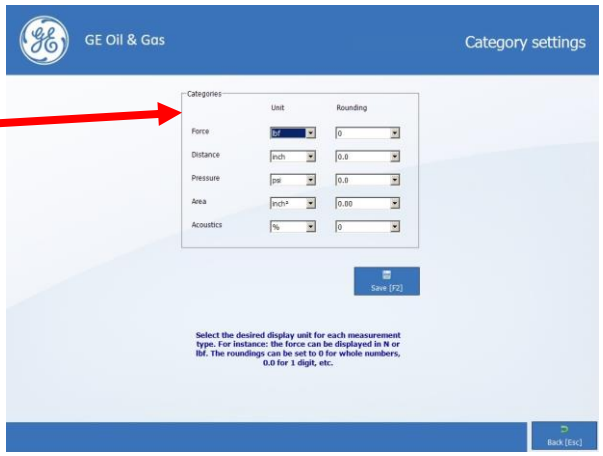


Figure 29.4 Category Settings Screen

Back-Up Database Settings – The software will automatically create a back-up of the database based on an indicated interval. The interval can be changed here.

Only change the back-up location if necessary.

To recover a backed-up database, activate the Recover action button and select the appropriate back-up from the list.

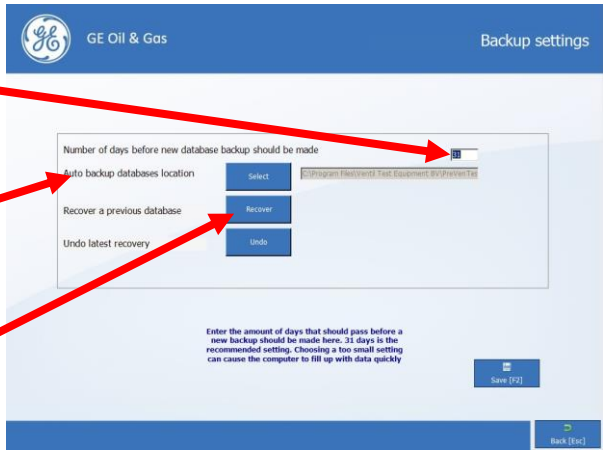


Figure 29.5 Backup Settings Screen

GE/ Consolidated highly recommends that backups to the EVT PRO 2.0® database be stored on other external drives or storage devices, in case of hard disk failure.

CONTINUED ON NEXT PAGE

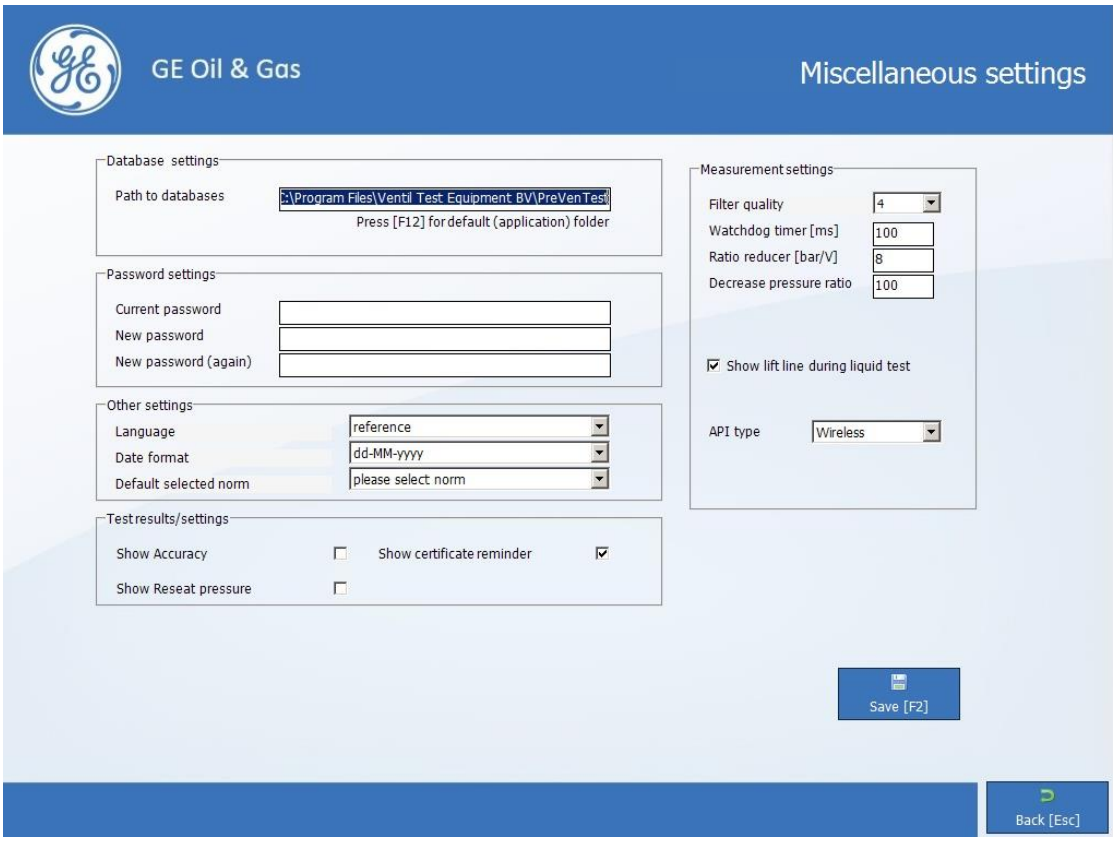


Figure 29.6 Miscellaneous Settings Screen

For the following please refer to Figure 29.6 which is an example of the Miscellaneous Settings Screen. This screen allows the user to change the database storage location, password, language, date format, select the display of system accuracy, reseat pressure, change watchdog settings, and select is the lift line is to be displayed during tests with liquid process. Below is an explanation of each function:

Path to Database – Path is automatically set, but can be changed if necessary.

Password Settings – Default password is 2204. **DO NOT CHANGE THE PASSWORD!**

Language – Default language is English. Contact Consolidated® if required language is not available in pull-down menu.

Date Format – Select required date format.

Show Accuracy – Displays results based on calculations of set pressure using inner/outer seat diameters. Normally, this box is not checked.

Show Reseat Pressure – Enables the software to display a secondary vertical line to indicate reseat pressure.

Show Certificate Reminder – Enables a prompt to appear reminding the user that test data has not been saved if the Escape action button is activated in the Test Screen.

Measurement Settings – These settings are set by the Manufacturer.

Show Lift Line During Liquid Test – If unchecked, lift will not be displayed during liquid testing.

SECTION 30

EVT PRO 2.0® REPORT GENERATOR

The EVT PRO 2.0® software enables the user to create custom made certificates/test reports. This is done by accessing the Report generator screens under the Options heading. The Report Generator utilizes the Windows™ drag and drop principle. Highlight the appropriate text or database field, depress the left mouse button and simultaneously move the mouse to the desired location. Text editing can be done by clicking on the desired text using the right mouse button. In editing mode, both font type and color can be changed using the toolbox provided. Switch off editing mode by activating the Enter key.

Test reports can be generated with a maximum of 4 images or pictures. The size of the box can be adjusted by activating the box using the left mouse button and adjusting the dimensions using the toolbox provided. Confirm the changed value by activating the Enter key before leaving the Report Generator. Images or pictures can be loaded by clicking in the box using the right mouse button and browsing to the file location. Refer to figures 30.1 and 30.2 for further information.

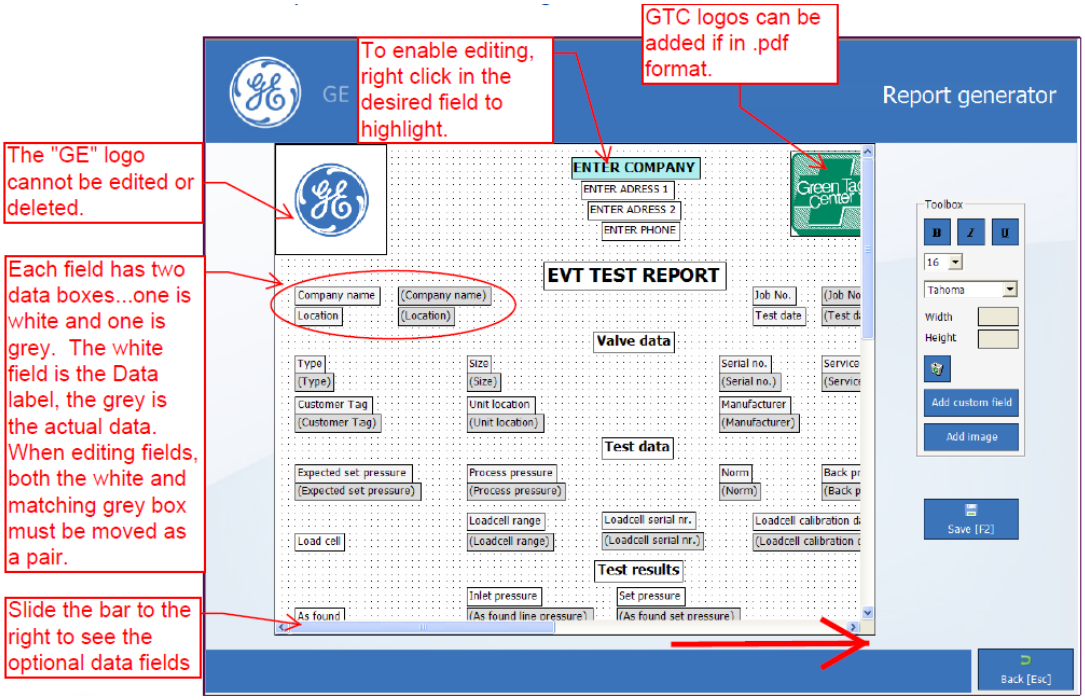


Figure 30.1 Report Generator Screen – Page 1

NOTE: Changes made to the EVT PRO 2.0® Test Report Global Template will be reflected on all unsaved and new test reports. Reports which are already saved in memory are not changed.

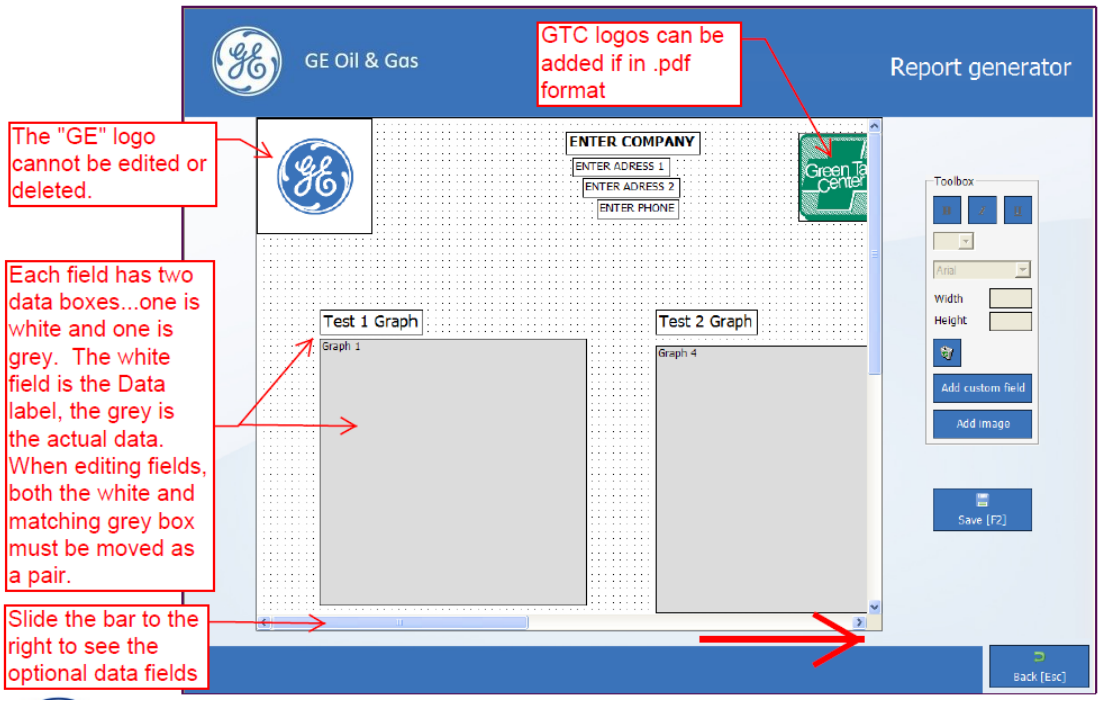


Figure 30.2 Report Generator Screen – Page 2

SECTION 31

EVT PRO 2.0® HYDRAULIC HOSE AND HAND PUMP BLEEDING PROCEEDURE

Bleeding the hydraulic hoses and/or venting the hand pump, may be required as a result of frequent use of the EVT PRO 2.0® due to air accumulation. Bleed the hydraulic hoses in the following manner:

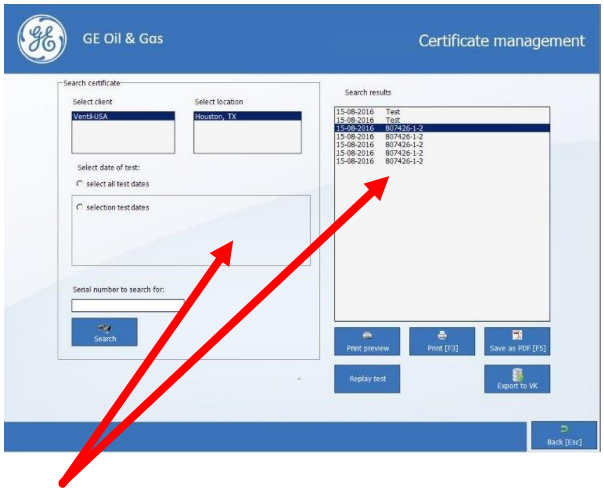
1. Connect both hydraulic hoses to the pump.
2. Interconnect the hydraulic hoses on the cylinder end.
3. Stroke the hand-pump allowing the excess air to vent into the pump tank.
4. Pump the hand pump until the air bubble clears.
5. Close the vent cap,
6. If testing, reconnect the hydraulic hoses to the lifting cylinder.

SECTION 32

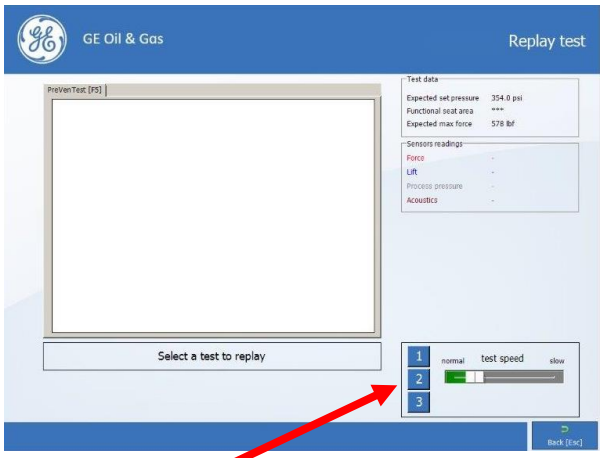
EVT PRO 2.0® TEST PLAYBACK FEATURE

The EVT PRO 2.0® has a new feature which enables ANY test that is stored on the unit to be played back in real time. The speed of the playback is operator selectable. To use the playback feature, follow the steps below:

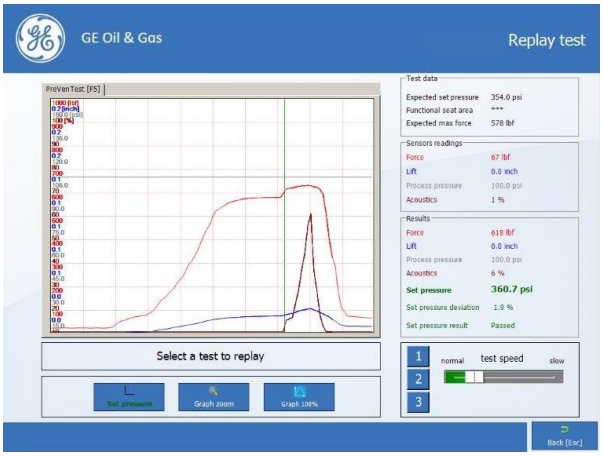
Step 1: From the Main Menu Screen select the Certificate Management Option.



Step 2: On the left side of the screen, select the client, location, date, or serial number for the test you wish to display. Then, on the right side of the screen, select the desired test you wish to playback.



Step 3: Next, select the desired playback speed. Three (3) speeds are provided.



Step 4: The selected test will then be replayed at the selected playback rate. It can be replayed as many times as needed.

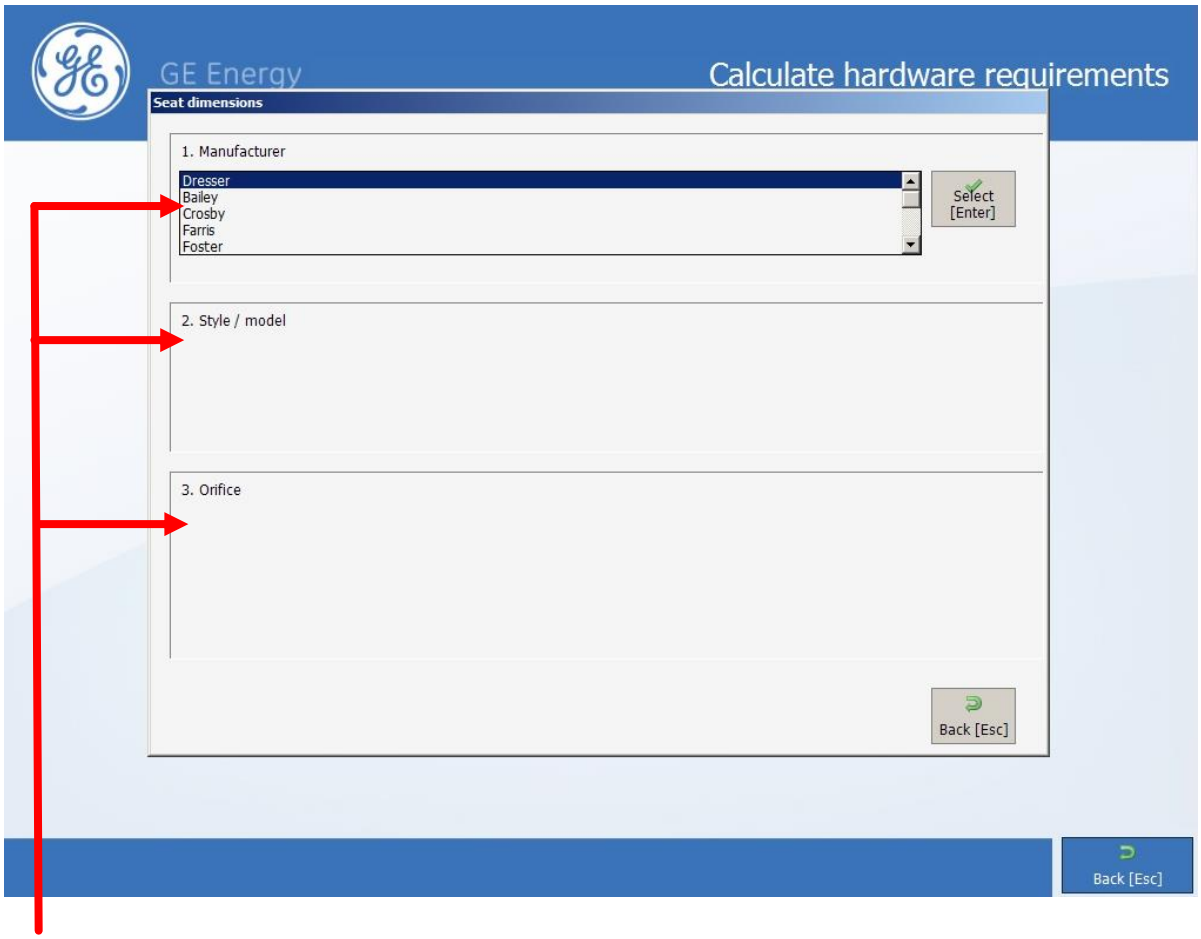
SECTION 33

EVT PRO 2.0® CALCULATE HARDWARE FUNCTION

The EVT PRO 2.0® is equipped with a calculate hardware function which allows the user to enter a valve in the system with it's expected set-point and process pressure, and the system will calculate the hardware needed to test the selected valve at those parameters.

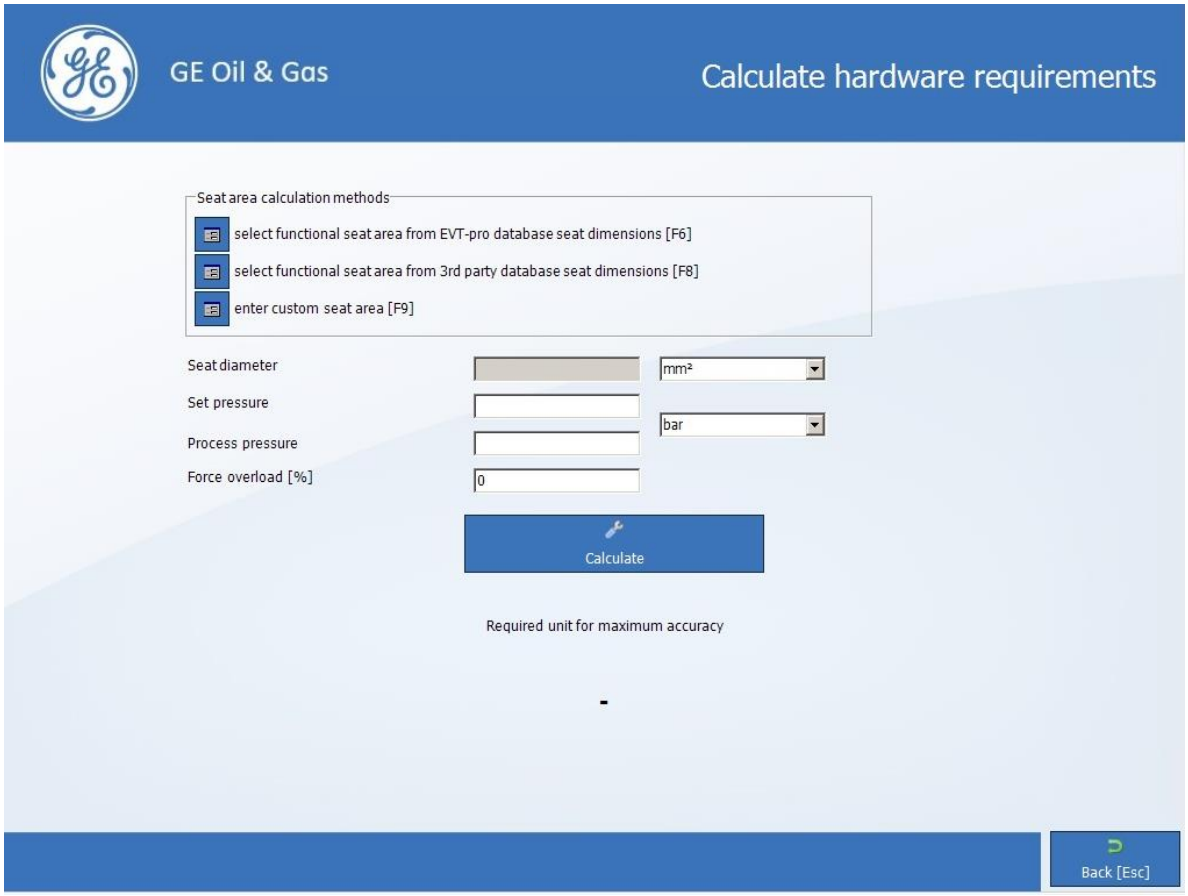
This function allows the user to be able to select and assemble all necessary hardware prior to arriving on the job site. It also lessons the equipment which needs to be carried to the actual valve site. This is a great advantage when carrying the unit up several levels at a plant location.

Main Menu → Calculate Hardware Requirements



The first steps when utilizing the calculate hardware function is to select the valve's manufacturer, style/model, and to select the valve's orifice.

CONTINUED ON NEXT PAGE



The user will then select one of 3 methods to calculate the valve's seat area. The user can select a functional seat area from the EVT PRO 2.0® database [F6], or from the 3rd party Ventil database [F8], or entering a custom seat area [F8].

Next enter the seat diameter if needed. Enter the expected set pressure and select the appropriate units from the drop down bar. Then enter the expected process pressure and likewise select the appropriate units from the dropdown bar options. Finally, enter a force overload value. GE/ Consolidated always recommends using a 10% force overload value.

Once all required data is entered, press the calculate action button. The EVT PRO 2.0® software will then calculate the required load cell and lifting cylinder needed to test the selected valve with the entered parameters. The result will be displayed under the Calculate action button.

SECTION 34

EVT Pro 2.0 X® CSA CERTIFIED, INTRINSIC SAFE (IS) UNITS, AND ATEX UNITS

The EVT PRO® is available in two Models: the EVT PRO 2.0® and the EVT PRO 2.0 "X"®.

- EVT PRO 2.0® standard version is a non-Intrinsic Safe Unit and is essentially the same as the "X" version described below, just not certified as Intrinsic Safe.
- EVT PRO 2.0 "X"® version is intrinsic safe and certified by either Canadian Standards Association (CSA) or by European body ATEX. Consult your region to determine the model or version acceptable for use. NOTE: it is incumbent on the user to determine which of the above models will meet the user need where the EVT PRO 2.0 is going to be utilized. Always consult with the end user before proceeding to ensure acceptance.

The EVT PRO 2.0 "X"® model for CSA is certified to Class I, Division 2, Group D environments.

The EVT PRO 2.0 "X"® model for ATEX is certified to Group II, Category 3Gia, T4 environments.

* See Appendix for more details on interpreting CSA & ATEX codes listed above

Consult local requirements/agencies to see which approval is appropriate for use in your region. In either case the components used on the EVT PRO 2.0 "X"® unit or Intrinsic Safe unit have been engineered and tested to meet specific electrical standards. The units have "special" electronics, barriers, sensors, grounding devices built into them to meet this intrinsic safe requirement. At no point, ever, shall any component be inter-changed or replaced without authorization from the manufacturer.

Appropriate engineering practices shall be applied when in hazardous environments to include best practices for grounding, tools, ignition sources, static electricity. Always consult local authorities and plant engineering to ensure compliance.

IMPORTANT! - If the job site poses a risk of flammable atmosphere please seek approvals from the customer or plant facility before any testing is attempted. Ensure all plant approvals are secured before testing begins

SECTION 35

EVT PRO 2.0® ESTABLISHING THE COMMUNICATIONS DATA LINK

Upon start-up of the EVT PRO 2.0® Hand Pump Case electronics and the EVT PRO 2.0® laptop, the two devices should automatically establish the Wi-Fi communications data link. This automatic link-up can take up to 1 minute. However, sometimes it may be necessary to manually establish communications. Follow the procedure below in order to manually establish the Bluetooth communications data link:

1. Make sure the Hand Pump Case electronics is switched on.
2. After switching on the Hand Pump Case electronics, the Main Power Button Wi-Fi Status Light (Refer to Figure 12.1 for location) will start flashing red.
3. Manually reset the Hand Pump Electronics by pressing the Wi-Fi Communications Linkup Button for 5 seconds.
4. The Electronics has now been reset, and the red status light will flash red.
5. When the Wi-Fi connection has been established, the status light will glow solid green. This may take up to 1 minute.

Note – If communications have not been established, repeat this procedure. If at that point no connection has been established, please contact the Ventil Service Desk at http://oms.ventil.nl/ClientLogIn.aspx

SECTION 36

EVT PRO 2.0® SOFTWARE UPDATES

Upon start-up, if the EVT PRO 2.0® detects an internet connection, it will automatically check for the latest version of software. If updates need to be made, then it will give the user the option to install the downloaded new software version.

The software updating process is very user friendly and self explanatory. The system will display the currently installed software version and the new downloaded software version. The user can then decide if the new downloaded software version is to be installed by following the on screen instructions.

SECTION 37

EVT PRO 2.0® CALIBRATION REQUIREMENTS

Any device which is used to measure and determine quantitative measurements for the purpose of quality should be calibrated annually to certify results. This is typical language used by any certifying body for ISO, PED, or other quality group such as NB or ASME.

As such it is recommended that the EVT PRO 2.0® be calibrated annually to ensure compliance and adherence to ASME / NB and other standards globally.

SECTION 37 (Continued)

EVT PRO 2.0® CALIBRATION REQUIREMENTS

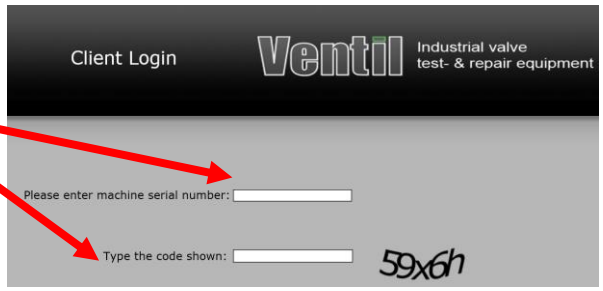
All calibrations are completed by Ventil. It is the responsibility of the GTC to ship the necessary items for annual calibration. For calibration purposes and to reduce shipping costs the only items required for calibration are the transducers or load sensors used on the EVT PRO 2.0® . There are four of them and all four will need to be returned. When the calibration is completed both a paper Certificate of Calibration and an electronic one will be available for the owner On the Ventil Client Website.

SECTION 38

EVT PRO 2.0® CALIBRATION CERTIFICATES - VENTIL CLIENT WEBSITE

To to obtain a copy of the unit's calibration report, simply log onto the following website: http://oms.ventil.nl/ClientLogIn.aspx and follow the steps below:

First enter the serial number of the EVT PRO 2.0® unit, then enter the displayed security code as shown.



Next, select the option for "Download Transducer Calibration Reports"

Now the calibration certificates for the unit are displayed. Highlight and select the desired transducer to view or print.

SECTION 39

EVT PRO 2.0® ANNUAL CALIBRATION

All calibrations are completed by Ventil at one of the addresses located below. Select the one which is closest to your facility. It is the responsibility of the GTC to ship the necessary items for annual calibration. For calibration purposes and to reduce shipping costs the only items required for calibration will be the transducers or load sensors used on the EVT Pro. There are four of them and all four will need to be returned. When the calibration is completed both a paper copy and an electronic one will be provided for the owner.

Location to Ship for Calibration

Ventil USA INC	**Ventil Test Equipment B.V.**
906 Gemini Street	Polakweg 6
Houston Texas 77058	2288 GE Rijswijk
USA	The Netherlands

Cost and Turn-around Time

- Price: $1,450.00 USD (excluding courier service)
- Ventil USA – 5 to 7 day turn around time + shipping, (if Venil NL – 2 days + shipping.)

Other Notes

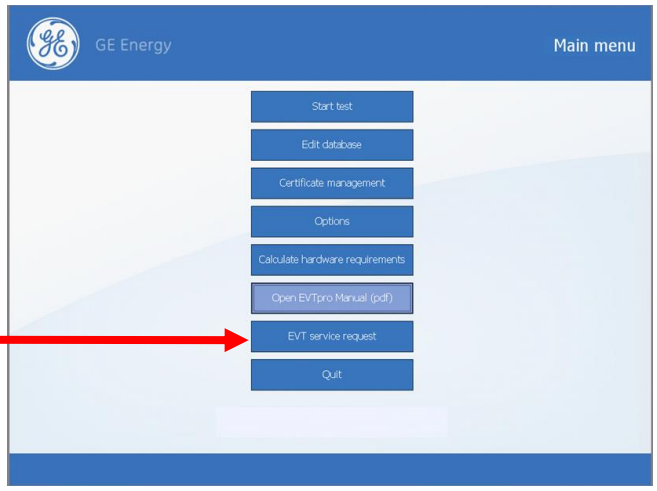
- Remember to provide return shipping information and carrier for shipping (pre-paid)
- Provide a contact and telephone number

SECTION 40

EVT PRO 2.0® SERVICE REQUESTS AND KEY CONTACTS

With the release of software 5.2.10 version Ventil has added key Service contacts on line to your EVT PRO 2.0® device. This will allow you to easily find your contacts should any issues arise. To access from the Main Menu screen simply click on the EVT Service Request Option as shown below in Figure 35.1.

EVT Service Request option



EVT PRO 2.0® SERVICE REQUESTS AND KEY CONTACTS

In the event that a service issue is required for your EVT PRO 2.0® device, the flowchart below will provide a step by step process for how to proceed. Additionally, below you will find key contacts at Ventil across the globe for servicing the unit.

Service Rate Information

- If the unit is under warranty then no charge for service.
    - Ventil warrants the equipment parts and machine parts against errors and defects for a period of 12 months from the date of delivery IF the unit is used in accordance with this operation manual and GE training.
- If the unit is under warranty but the defect is a result of improper use or negligence, then service charges will apply on a time and material basis per the rate schedule below.
- Service rate charge is $65 USD per hour. Premiums may apply for certain after hour requests.
- GTC is responsible for all shipping and other related charges.

Location	Email	Telephone
America's	evt-service@ventil.nl	1-281-280-0141
Europe / MEA	evt-service@ventil.nl	+31 88 11 30 930
M. East / Africa	evt-service@ventil.nl	+971 506 260 955
Asia Pac		+971 506 260 944

Figure 40.1 – Regional Contact Information

How to Make a Request for Service

1. Use one of the key contacts above, either e-mail or telephone.
2. Be prepared with your EVT PRO 2.0® serial number, GTC name and address.
3. Provide a follow up email and contact info also.
4. Ensure you advise Ventil of the urgency of the issue. For example is it for calibration or service of the device?
5. The flow chart on the next page will guide you to options available for service. (Figure 40.2)

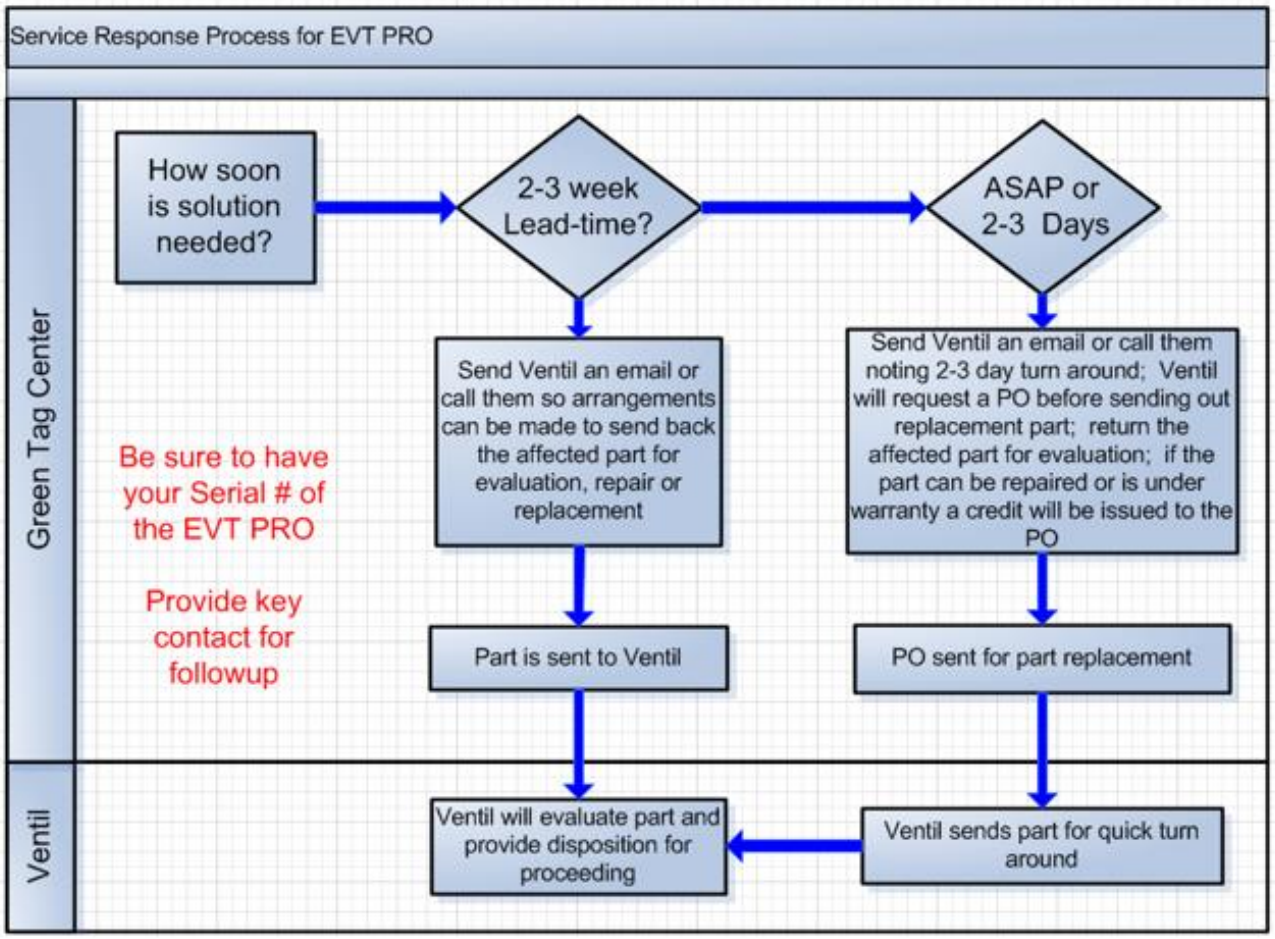


Figure 40.2 Service Response Process Flowchart

Additionally, regional support for basic training and software usage questions should be directed to your local GE Training team which is listed below:

Region	Key Contact	Email	Telephone
America's	Robert Lynn	Robert.R.Lynn@GE.com Thomas.Cardy@GE.com	281-685-1783 +1 281 542 3646
Europe	Steve Moss	Stephen.Moss1@ge.com	44 (0)1695 52643
Middle East	Pradeep Kumar	pradeepkumart@ge.com	9 714 899 1725
Asia Pac	Shavinder Singh	Shavinder.Singh@GE.com	60 322 608 8716

Figure 40.3 Regional Support Key Contacts

GE's EVT* PRO 2.0

ELECTRONIC VALVE TESTER

OPERATIONS AND TECHNICAL MANUAL

EVT* PRO 2.0

APPENDIX INFORMATION

Hazardous Environments: Guidelines & Observations

- EVT PRO Intrinsic Safe models have been designed and approved for either CSA or ATEX requirements
- ALWAYS consult local agencies for approvals needed beyond what has been provided
- ALWAYS consult plant personnel before testing to ensure compliance – especially in areas where hazardous gases, liquids are in use.
- Secure all proper permits and approvals before testing; obtain hot works permits
- Best engineering practices should be adhered to in hazardous environments such as the use of PPE, non-sparking tools, no flames, and other. Consult local plant personnel.
- Seek out additional "specialized" training when testing in hazardous environments
- **This overview is not intended to serve as training on Hazardous environments rather to advise of its danger and the need for additional training, consulting and approvals.**

Hazardous Area Classifications and Protections (USA NEC Code ref.)

- Class—The Class defines the general nature of the hazardous material
  - Class I—Locations in which flammable gases or vapors may or may not be in sufficient quantities to produce explosive or ignitable mixtures.
  - Class II—Locations in which combustible dusts (either in suspension, intermittently, or periodically) may or may not be in sufficient quantities
  - Class III—Locations in which ignitable fibers may or may not be in sufficient quantities to produce explosive or ignitable mixtures.
- **Division—The Division defines the probability of the hazardous material being able to produce an explosive or ignitable mixture based upon its presence.**
  - Division 1 indicates that the hazardous material has a high probability of producing an explosive or ignitable mixture due to it being present continuously, intermittently, or periodically or from the equipment itself under normal operating conditions.
  - Division 2 indicates that the hazardous material has a low probability of producing an explosive or ignitable mixture and is present only during abnormal conditions for a short period of time.
- Group—The Group defines the type of hazardous material in the surrounding atmosphere. Groups A-G (consult Hazardous Environment classes separately)
  - Group D—Atmospheres containing a flammable gas, flammable liquid-produced vapor, or combustible liquid-produced vapor whose MESG is greater than 0.75 mm or MIC ration is greater than 0.80. Typical gases include acetone, ammonia, benzene, butane, ethanol, gasoline, methane, natural gas, naphtha, and propane.
- **The EVT PRO 2.0 "X"® model for CSA is certified to Class I, Division 2, Group D environments.**

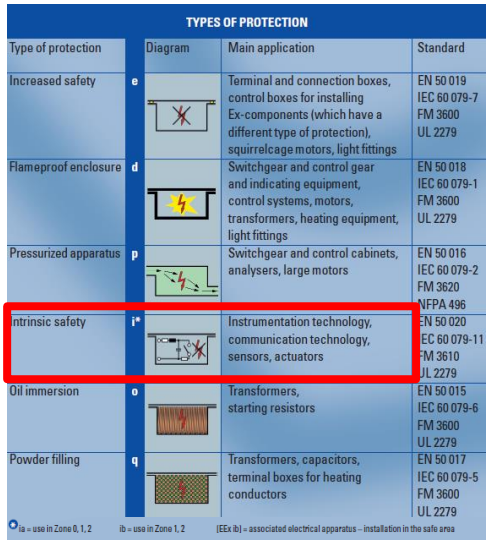
Appropriate engineering practices shall be applied when in hazardous environments to include Always consult local authorities and plant engineering to ensure compliance.

ATEX / CE Marking

How to read the code - below

- **The EVT PRO 2.0 "X"® model for ATEX is certified to Group II, Category 3 G ia, T4 environments**

EQUIPMENT-GROUP II (other explosive atmospheres)						
	Category 1* very high level of protection		Category 2* high level of protection		Category 3* normal level of protection	
Sufficient Safety	by means of 2 protective measures / 2 faults		frequently occuring equipment faults / 1 fault		during normal operation	
Can be used in	Zone 0	Zone 20	Zone 1	Zone 21	Zone 2	Zone 22
Atmosphere G=Gas, D=Dust	G	D	G	D	G	D



TYPES OF PROTECTION

Type of protection		Diagram	Main application	Standard
Increased safety	e		Terminal and connection boxes, control boxes for installing Ex-components (which have a different type of protection), squirrelcage motors, light fittings	EN 50 019 IEC 60 079-7 FM 3600 UL 2279
Flameproof enclosure	d		Switchgear and control gear and indicating equipment, control systems, motors, transformers, heating equipment, light fittings	EN 50 018 IEC 60 079-1 FM 3600 UL 2279
Pressurized apparatus	p		Switchgear and control cabinets, analysers, large motors	EN 50 016 IEC 60 079-2 FM 3620 NFPA 496
Intrinsic safety	i*		Instrumentation technology, communication technology, sensors, actuators	EN 50 020 IEC 60 079-11 FM 3610 UL 2279
Oil immersion	o		Transformers, starting resistors	EN 50 015 IEC 60 079-6 FM 3600 UL 2279
Powder filling	q		Transformers, capacitors, terminal boxes for heating conductors	EN 50 017 IEC 60 079-5 FM 3600 UL 2279

ia = use in Zone 0, 1, 2 ib = use in Zone 1, 2 [EEx ib] = associated electrical apparatus – installation in the safe area

TEMPERATURE CLASSES	
Maximum surface temperature	CENELEC IEC USA (NEC 505)
450°C	T1
300°C	T2
200°C	T3
135°C	T4
100°C	T5
85°C	T6

Appropriate engineering practices shall be applied when in hazardous environments to include best practices for grounding, tools, ignition sources, static electricity. Always consult local authorities and plant engineering to ensure compliance.