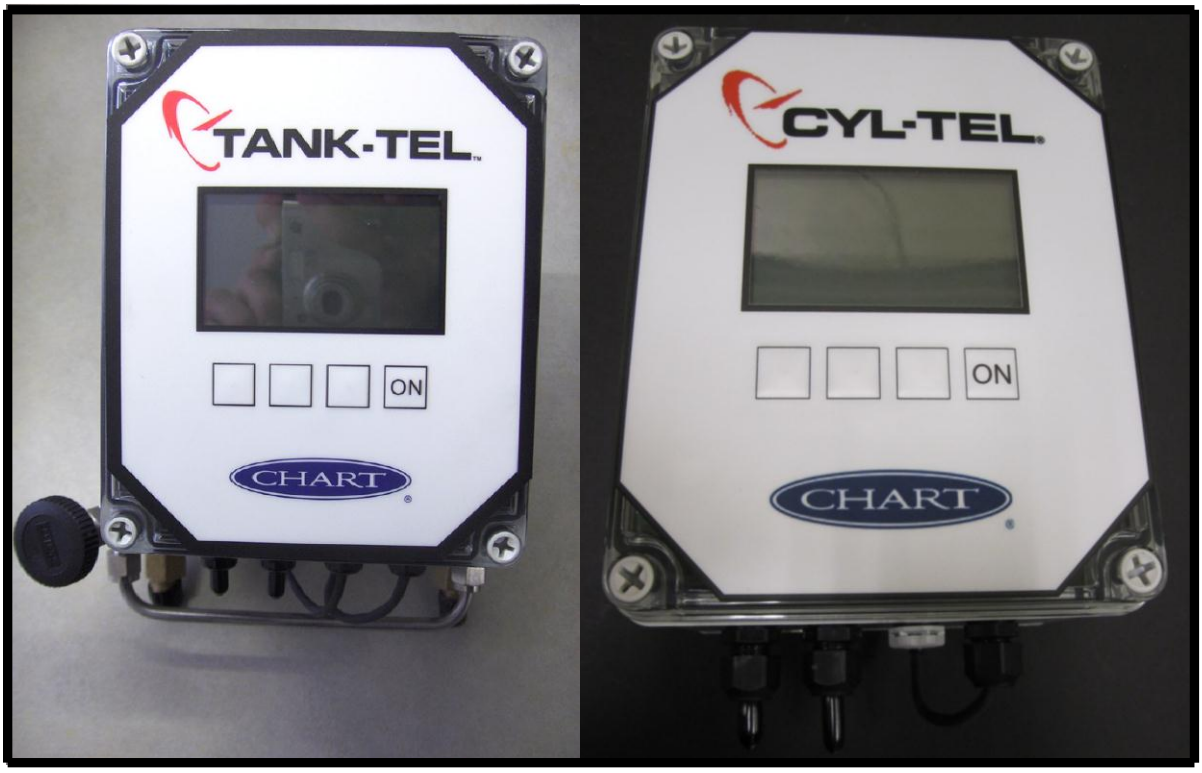


Digital Liquid Level Gauge

Installation and Operating Manual

Rev A

P/N 20575145

Tank-Tel & Cyl-Tel III Quick-Start Instructions

Note: TANK-TEL III and CYL-TEL III share common working instructions in a lot of aspects. Unless specified otherwise, the instructions are applicable on both.

1. Keypad Operation

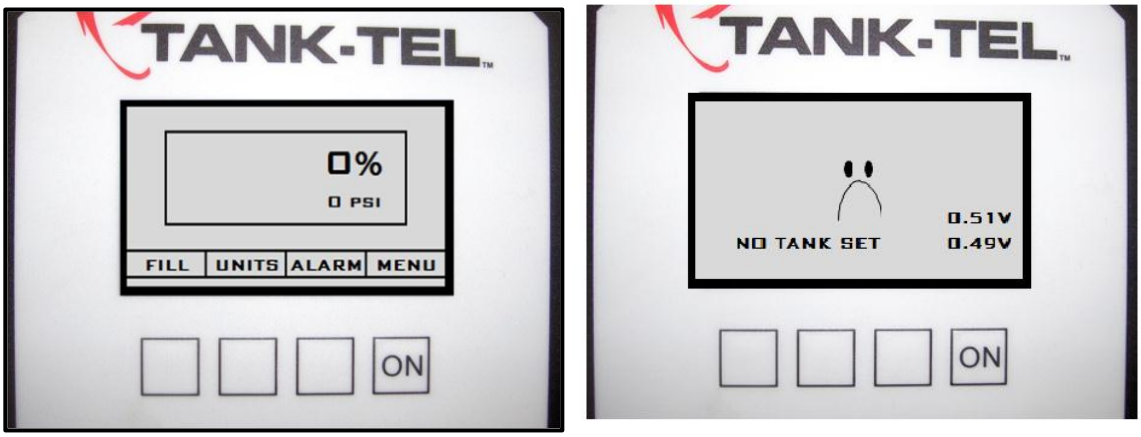


Figure 1 - Normal Start-Up - & - No Tank Set (First Time Set up)

1.1: ON Key.

→ If you PRESS the ON key the TANK-TEL III/CYL-TEL III will run through its startup diagnostics and tests. When the test is complete the screen will have the tank's liquid and pressure level (pressure display is optional on CYL-TEL III) displayed (Main Display) or a No Tank Set Warning (see Figure 1).

→ With the level displayed PRESS and HOLD the ON/MENU key for 10 seconds you can access the MAIN MENU.

→ If the "**NO TANK SET**" warning is displayed (First time using TANK-TEL/CYL-TEL III Gauge) see section 2.6.

1.2: Keypad Use.

→ At the bottom on the TANK-TEL III display there are four outlined text boxes that correspond with the buttons located directly under the display screen.

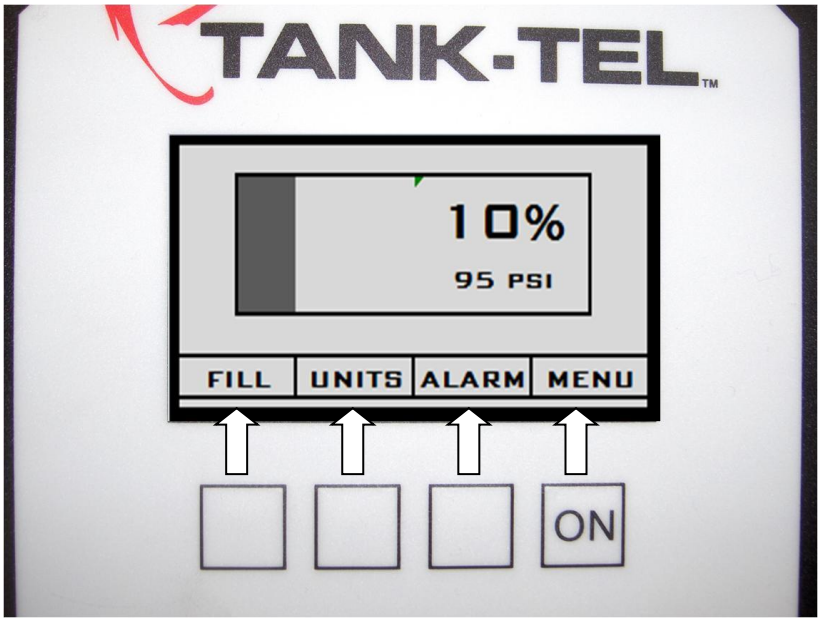


Figure 1.2.1: Arrows indicate each button's function.

2. TANK-TEL/CYL-TEL Configuration.

2.1: Changing Liquid Level Displayed Units.

→ Press the UNITS button to change the unit of measurement.

2.2: Setting Alarms (Alarms are only active with wired power – Inactive on Battery Power).

1) Press and Hold the MENU key for 10 seconds. This will allow you to access the MAIN MENU.
2) On the MAIN MENU screen use the ⇧ / ⇩ keys to select the ALARMS option and press the NEXT key.
3) On the SETUP ALARMS screen select ALARM 1, ALARM 2, or ALARM 3 using the ⇧ / ⇩ and press the NEXT key to set the selected alarm.
4) Under the ALARM text a "*****" will be highlighted with the alarm number next to it. Press the ⇨ key to select the number next to the "*****".
5) Use the ⇧ / ⇩ to set the alarm to go off when the tank is greater (>) or lesser (<) than a desired value.
6) Press the ⇨ key to select the number next to the "%". Use the ⇧/⇩ to set the value for which the alarm will go off at.
7) After the alarm parameters have been set select the SAVE option and press the NEXT button.

Note: From the Main Display press the button under "ALARM" label and the active alarms will be displayed. Pressing the "ALARM" button a second time will hide the active alarms.

2.3: Standard Tank Configuration

1) Press and Hold the MENU key for 10 seconds to access the MAIN MENU.
2) On the MAIN MENU screen select SET TANK and press the NEXT key. This will allow you to access the SETUP STD TANK menu.
3) On the SETUP STD TANK menu use the ⇧⇩ keys to toggle through the tank profiles. Select the tank that you will be using and press the NEXT key.
4) The next screen is the SET CONTENTS menu, here you use the ⇧⇩ to select the liquid that the tank will contain. Press the NEXT button once the desired liquid is selected.
5) On the SETUP DISPLAY screen select the default units you wish to have the level displayed. After you have set the unit to be displayed select the SAVE option and press the NEXT key.

2.4: CYL-TEL III Only Configuration

2.4.1: Set Zero

1) Turn the 5-way valve to the Equalization/Service position.
2) Press and Hold the MENU key for 10 seconds to access the MAIN MENU.
3) On the MAIN MENU select MORE and press the NEXT key.
4) On the MORE FEATURES menu select SET ZERO and press the NEXT key.
5) Press the NEXT key again to set the zero, then select SAVE and press the NEXT key.

2.5: TANK-TEL III Only Configuration

2.5.1: Custom Tank Configuration.

1) Press and Hold the MENU key for 10 seconds to access the MAIN MENU.
2) From the Main Menu select the use the ⇧⇩ to select the SET CUSTOM menu. Press the NEXT button to display the menu.
3) Use the ⇧⇩ to select the **LENGTH** and press the NEXT button to select.
4) Use the ⇦⇨ to highlight the value to change and use the ⇧⇩ to change the value (Repeat as needed).
5) Press the ⇨ until Exit and Next are displayed
6) Use the ⇧⇩ to select the **DIAMETER** and press the NEXT button to select.
7) Use the ⇦⇨ to highlight the value to change and use the ⇧⇩ to change the value (Repeat as needed).
8) Press the ⇨ until Exit and Next are displayed
9) Use the ⇧⇩ to select the ▯▭ (Orientation) and press the NEXT button to select.
10) Use the ⇦⇨ to highlight the value (▯ or ▭) use the ⇧⇩ to change to change the value (▯ Vertical Tank - ▭ Horizontal Tank).
11) Press the ⇨ until Exit and Next are displayed
12) Use the ⇧⇩ to select **SAVE** and press the NEXT button to select.
13) The next screen is the SET CONTENTS menu, here you use the ⇩⇧ to select the liquid that the tank will contain. Press the NEXT button once the desired liquid is selected.
14) On the SETUP DISPLAY screen select the default units you wish to have the level displayed. After you have set the unit to be displayed select the SAVE option and press the NEXT key.

Note: For more information on determining the dimensions of the tank, see Appendix D.

2.5.2: Set Differential Pressure Zero Point.

1) Assure there is no differential pressure by: Closing the phase line isolation valves and open the equalization valve.
2) Press and Hold the MENU key for 10 seconds to access the MAIN MENU.
3) On the MAIN MENU select MORE and press the NEXT key.
4) On the MORE FEATURES menu select SET ZERO and press the NEXT key.
5) Press the NEXT key again to set the zero, then select SAVE and press the NEXT key to exit.

2.5.3: Set Pressure Zero Point.

1) Assure there is no pressure by: Closing the phase line isolation valves, open the equalization valve and loosen a fitting to vent the assembly to zero.
2) Press and Hold the MENU key for 10 seconds to access the MAIN MENU.
3) On the MAIN MENU select DISPLAY/PR and press the NEXT key.
4) On the DISPLAY/PR FEATURES menu select PRESSURE and press the NEXT key.
5) On the PRESSUR FEATURES menu select PR ZERO and press the NEXT key.
6) Press the NEXT key again to set the zero, then select SAVE and press the NEXT key to exit.
7) Press Exit to return to the Main Display.

2.6: Standard Tank First Time Setup (No Tank Set Display – Figure 1)

1) With the No Tank Set screen displayed, Press and hold the On button for 10 seconds (Please Wait will Display).
2) On the SETUP STD TANK menu use the ⇧⇩ keys to toggle through the tank profiles. Select the tank that you will be using and press the NEXT key.

3) The next screen is the SET CONTENTS menu, here you use the ⇧⇩ to select the liquid that the tank will contain. Press the NEXT button once the desired liquid is selected.

4) On the SETUP DISPLAY screen select the default units you wish to have the level displayed. After you have set the unit to be displayed select the SAVE option and press the NEXT key.

Contents

1. INTRODUCTION

1.1: WHAT IS THE TANK-TEL/CYL-TEL III SYSTEM?

The TANK-TEL/CYL-TEL Liquid Level Gauge is the latest in digital liquid level monitoring and reporting. The TANK-TEL/CYL-TEL System will significantly improve your liquid distribution system, reducing your delivery costs and customer concerns. The TANK-TEL/CYL-TEL System can be installed on any cryogenic tank that utilize a differential pressure gauge (TANK-TEL/CYL-TEL) and that has similar plumbing. The gauge is preloaded with the Chart Ind. tank parameters and has a custom tank setup function for tanks not manufactured by Chart. The gauge is programmable and can be used with a variety of cryogenic liquids (LO_2, LN_2, LAR, LCO_2, and LN_2O). The system consists of the following key features:

- → Programmable tank parameters, displayed units, and 3 programmable level alerts.
- → A telemetry device that can be programmed to notify your computer when alarms occur.
- → Multiple inputs for use with various pressure, temperature, and differential pressure sensors.
- → Durability. The TANK-TEL/CYL-TEL System is outfitted with robust sensors and components requiring little maintenance.
- → User friendly software with a large LCD display that makes configuring the TANK-TEL/CYL-TEL System quick and easy.
- → Has the same dimensions and mounting bracket as existing TANK-TEL/CYL-TEL gauge making upgrading to the TANK-TEL/CYL-TEL III simple and quick.
- → Wireless data transmission capability to allow for remote display and data transmission to other devices.
- → Improved processing capability and speed to allow for increased tank monitoring capabilities.
- → Low powered components to ensure an extended battery life.

1.2: TANK-TEL/CYL-TEL GAUGE SPECIFICATIONS

1.2.1: Physical

- Approximately 5.50"W x 6.69"H x 5.75"D.
- Mounting, compatible with existing TANK-TEL/CYL-TEL differential pressure gauges used on Chart products.
- Gauge is enclosed within a NEMA-4X (water-resistant, dust tight) enclosure.

1.2.2: Electrical Inputs

- 12VAC Wall Plug Power Supply.
  12VDC @ 500mA output to TANK-TEL.
- Battery Power - (2) AA batteries
- Differential Pressure Sensor (0.5-4.5V)

1.2.3: Outputs

- 2 independent programmable alarm levels, programmable in 5% increments from 0% to 100%. *See alarms configuration.*
- Low Battery Indicator.
- Units of Measure Indicator.
- Pressure Indicator.
- Large LCD Display (128x64 resolution).

1.2.4: Sensor Accuracy

- ±2.0% of Full Scale 0˚C to 70˚C.

1.2.5: Operating Conditions

- Operating Temperature: -30˚C to +70˚C
- Operating Pressure: 0 - 50 bar
- Operating Differential Pressure: 0 – 30 psi
- Maximum Operating Differential Pressure: 500 PSID
- Operator Interface: Keypad (4 buttons)

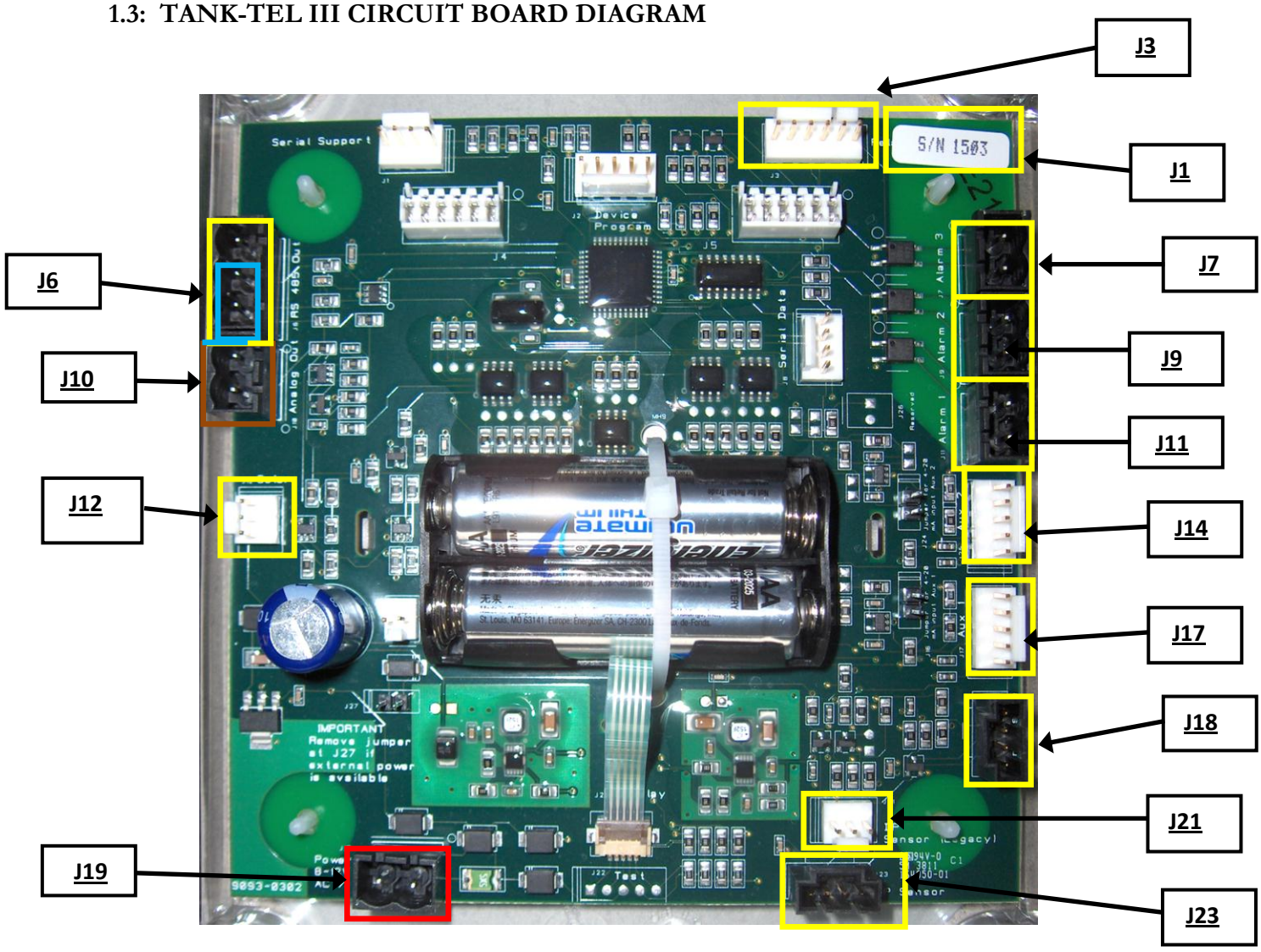
1.2.6: Programmable Features

- Product Type:
  - LN_2, N_2O, LAR, O_2, CO_2
- Units of Measurement Level:
  - Percent Full (% Full)
  - Liters (L)
  - Gallons (Gal.)
  - Pounds (Lbs.)
  - Kilograms (Kg.)
  - Standard Cubic Feet (SCF)
  - Inches H_2O
  - Normal Cubic Meters (NM^3)
- Units Pressure Measurement (Optional on CYL-TEL):
  - PSI
  - BAR
- Alarm Programmability
  - Alarm #1 programmable from 0% to 100% in 5% increments.
  - Alarm #2 programmable from 0% to 100% in 5% increments.
  - Alarm #3 programmable from 0% to 100% in 5% increments.
- Tank Parameters:
  - Length
  - Diameter
  - Pressure
  - Orientation (Vertical or Horizontal)

1.2.7: Display Resolution.

- % Full 5%
- Liters 1
- Gal. 1
- Kg 1
- Lbs. 1
- SCF 10
- NM^3 1
- inH_2O 0.7

1.3: TANK-TEL III CIRCUIT BOARD DIAGRAM



→ **J6** - RS 485 Out
Telemetry Pulse Output
(Connection to Scout 1.4 and Interface Board)

→ **J10** - Analog Out (0-5V)

→ **J12** - Solar Power

→ **J19** - External Power
(12VDC) - **Polarity irrelevant**

→ **J23** - DP Sensor AST

→ **J21** - DP Sensor LEGACY

→ **J18** - Pressure Sensor

→ **J17** - Aux #1

→ **J14** - Aux #2

→ **J11** - Alarm #1

→ **J9** - Alarm #2

→ **J7** - Alarm #3

→ **J3** - Relay Board

→ **J1** – Serial Number (S/N)

2. EQUIPMENT

2.1: CYL-TEL EQUIPMENT

2.1.1: SUGGESTED EQUIPMENT FOR CYL-TEL III

The equipment below is recommended for the installation of the Chart Ind. CYL-TEL Gauge.

No.	Quantity	Unit	Size	Tool Description
1	2	EA	$^{5}/_{8}$"	Open End Wrench (or 2ea 8" Crescent Wrench)
2	2	EA	$^{9}/_{16}$"	Open End Wrench
3	1	EA	$^{7}/_{16}$"	Open End Wrench
4	1	EA	#2	Phillips Screwdriver
5	1	EA	#1	Phillips Screwdriver
6	1	EA	$^{1}/_{8}$" x 2"	Slotted Screwdriver
7	1	EA		Roll of PTFE Thread Sealant Tape, $^{1}/_{2}$" Wide
8	1	EA		Liquid Leak Detector
9	1	EA		Wire Stripper for 22AWG Wire

2.1.2: ADDITIONAL COMPONENTS

Recommended items to be used when installing a Chart Ind. CYL-TEL Gauge.

2.1.2-1: 5-Way Valve Installation Kit

No.	Description	P/N
1	5-Way Valve Installation for Perma-Cyl 230/300/450	13830775
2	5-Way Valve Installation Kit for Perma-Cyl 700	13830783
3	5-Way Valve Installation Kit for Perma-Cyl 1000 & 1500	13830791
4	5-Way Valve Installation Kit for Perma-Cyl 2000-3000	15072795

2.1.3: CYL-TEL SYSTEM COMPONENTS

No.	Description	P/N
1	CYL-TEL Liquid Level Gauge	15087831
2	Optional Power Supply	11061378
3	Optional CYL-TEL Wire	11080860
4	Optional CYL-TEL Remote Display	13307263
5	5-Way Valve Installation Kit	Multiple
6	Optional CYL-Tel Gauge Wall Mount Bracket Kit	11085302
6	Optional CYL-Tel Gauge Bulk Tank Mount Bracket Kit	11085290

2.2 TANK-TEL EQUIPMENT

2.2.1: SUGGESTED EQUIPMENT

The equipment below is recommended for the installation of the Chart Ind. TANK-TEL Gauge.

No.	Quantity	Unit	Tool Description
1	1	EA	Open End Wrench
2	1	EA	Open End Wrench
3	1	EA	Philips Screwdriver
4	1	EA	Philips Screwdriver
5	1	EA	Slotted Screwdriver
6	1	EA	Roll of PTFE Thread Sealant, 1/2" Wide
7	1	EA	Liquid Leak Detector
8	1	EA	Wire Stripper for 22AWG Wire.

2.2.2: ADDITIONAL COMPONENTS

Recommended items to be used when installing a Chart Ind. TANK-TEL Gauge.

2.2.2-1: HOSE SET INSTALLATION
Vertical Tank

P/N		Overall Length	End Tube Size	End Connections
Set	Individual			
	11680654	45"	0.313"OD x 0.035" WALL	1/2-20UNF
11683038	11680646	47"	0.375"OD x 0.035" WALL	9/16-18UNF

Horizontal Tank

P/N		Overall Length	End Tube Size	End Connections
Set	Individual			
	11680638	28-1/2"	0.313"OD x 0.035" WALL	1/2-20UNF
11682991	11680611	25-1/2"	0.375"OD x 0.035" WALL	9/16-18UNF

2.2.3: TANK-TEL GAUGE ASSEMBLY

No.	Quantity	Unit	Description	P/N
1	1	EA	TANK-TEL III GAUGE UNIVERSAL	15088640
2	1	EA	TEE STREET BRS 1/4NPT	1211702
3	2	EA	ELBOW STREET BRS 90D 1/4MPT	1210462
4	2	EA	NIPPLE BRS 1/4NPTX3	1310172
5	2	EA	TEE STREET BRS 1/4NPT	1211702
6	1	EA	CONN BRS 5/16ODTX1/4FPT 37D FL	11680523
7	1	EA	CONN BRS 3/8ODTX1/4FPT 37D FL	11682457
8	1	EA	ELBOW BRS 90D 1/4ODTX1/4MPT	10501335
9	1	EA	VALVE NEEDLE BRS 1/4MPT(ANGLE)	10907239
10	1	EA	CONN BRS 1/4ODTX1/4FPT	10501061
11	1	EA	SOFT COPPER TUBING	6910693
12	1	EA	MNL TANK-TEL III	20576507

3. GAUGE INSTALLATION

3.1: CYL-TEL III GAUGE INSTALLATION

3.1.1: CYL-TEL III INSTALLATION PREPARATIONS

Note: Installation is for a 1500-liter tank. Installations on different sized tanks may vary.

3.1.1-1: Preparing Differential Pressure Sensor for Installation.

1) Install (1) ea. Male Elbow Brass $^{1}/_{4}$" ODT x $^{1}/_{4}$" MPT (P/N 1213122) on the High and Low sides of the DP sensor.

a. Use a small amount of PTFE Thread Sealant Tape on the elbows. This will help ensure there are no leaks.

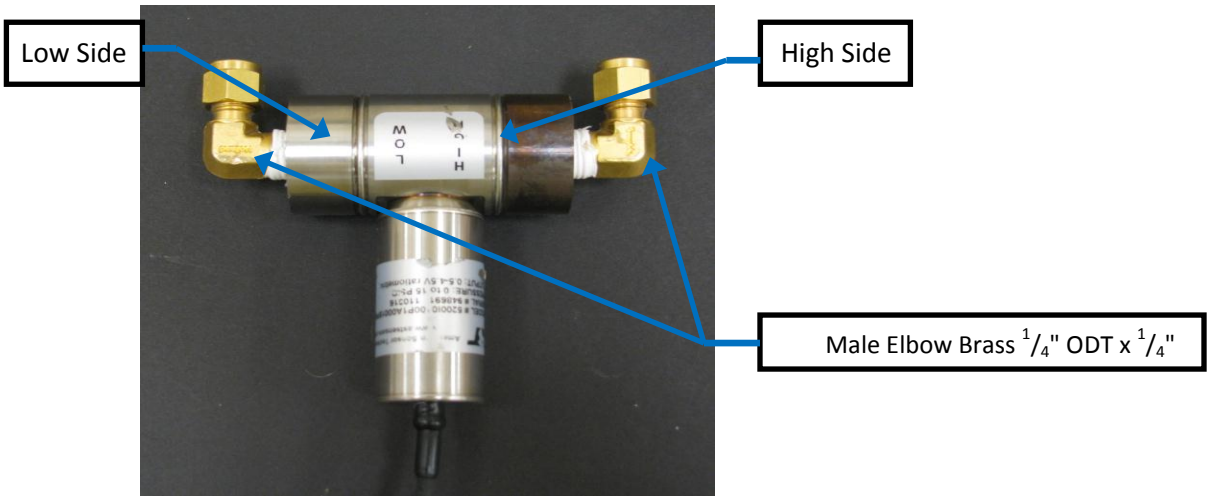


Figure 3.1.1-1: Elbows installed on the high/low sides of the DP sensor.

2) Slide the DP sensor into the aluminum block located on the back of the CYL-TEL.

3) Verify that the HIGH/LOW sticker on the DP sensor is facing away from the CYL-TEL enclosure and tighten the nylon screw that secures it in places.

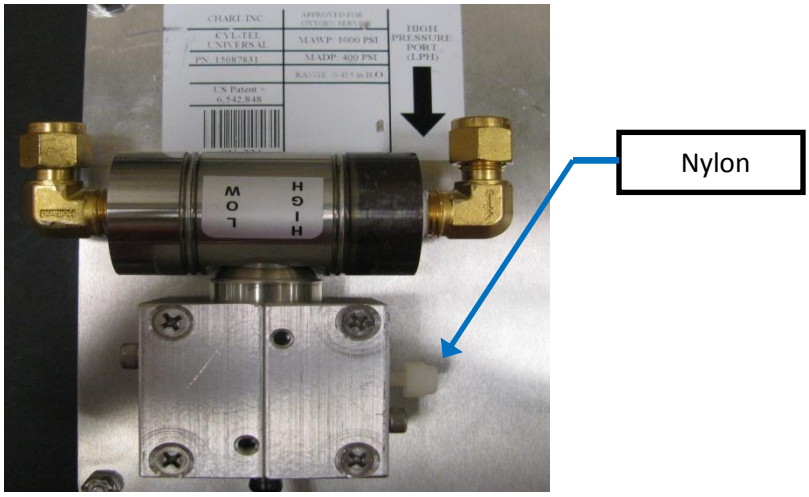


Figure 3.1.1-2: DP sensor installed onto the CYL-TEL enclosure.

4) Feed the wire that is connected to the DP sensor through one of the ports on the bottom of the CYL-TEL enclosure and connect it to the CYL-TEL circuit board, refer to section 5.1.

3.1.2: REPLACING EXISTING CYL-TEL WITH CYL-TEL III

NOTE: Installation is for a 1500-liter tank. Installations on different sized tanks may vary.

3.1.2-1: Removing Existing CYL-TEL

1) Verify that the 5-way valve (P/N 13830791) is in the Equalization/Service position.

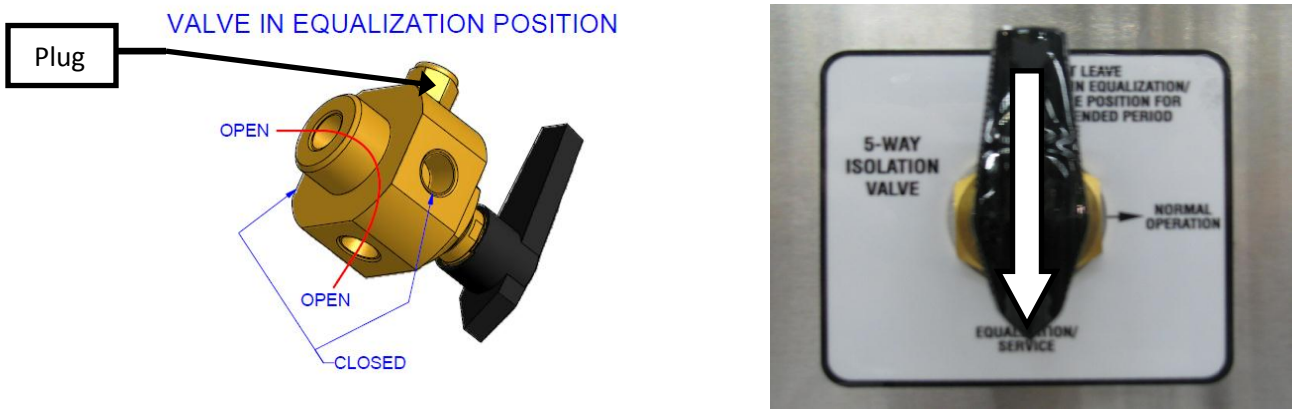


Figure 3.1.2-1: 5-way valve in the Equalization/Service position. Use the plug on the top port of the 5-way valve as a reference point.

2) Disconnect the SS braided pressure line labeled CYL-TEL HIGH from the DP sensor.

3) Disconnect the SS braided pressure line labeled CYL-TEL LOW from the DP sensor.

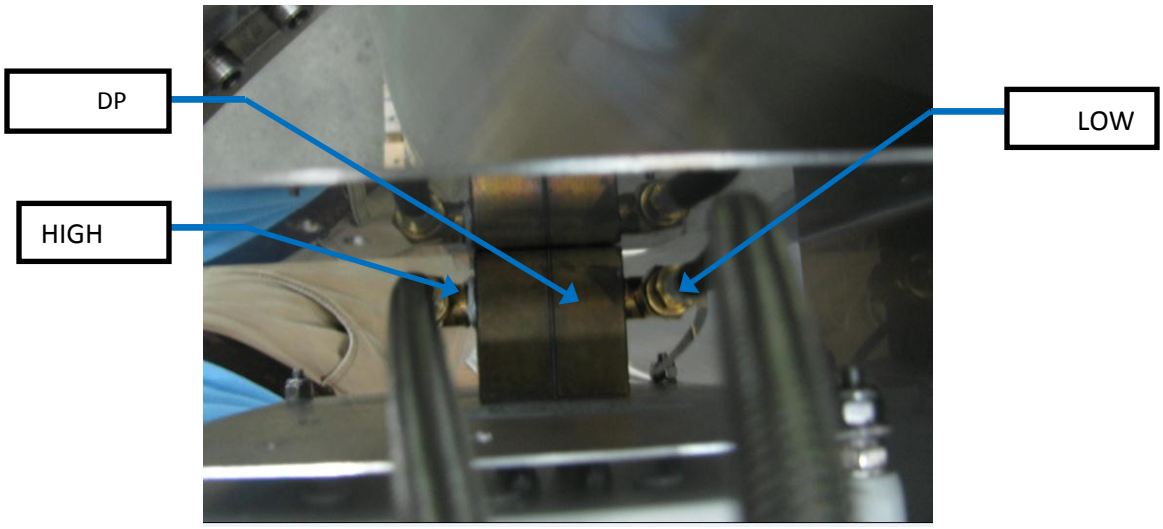


Figure 3.1.2-2: Disconnect the high/low pressure lines from the DP sensor.

4) Remove the four bolts that secure the bulk mounting bracket with the CYL-TEL attached to it to the tank.
5) Remove the bulk tank mounting bracket (P/N 11085290) from the CYL-TEL.

Figure 3.1.2-3: A) Red boxes indicate the 4 bolts that need to be removed. B) Black boxes indicate the 2 screws that secure the mounting bracket to the CYL-TEL.

3.1.2-2: CYL-TEL III Installation onto Tank.

1) Take the bulk mounting bracket that was removed from the CYL-TEL and attach it to the CYL-TEL III (P/N 15087831).
2) Secure the CYL-TEL III onto the tank with the mounting bracket.

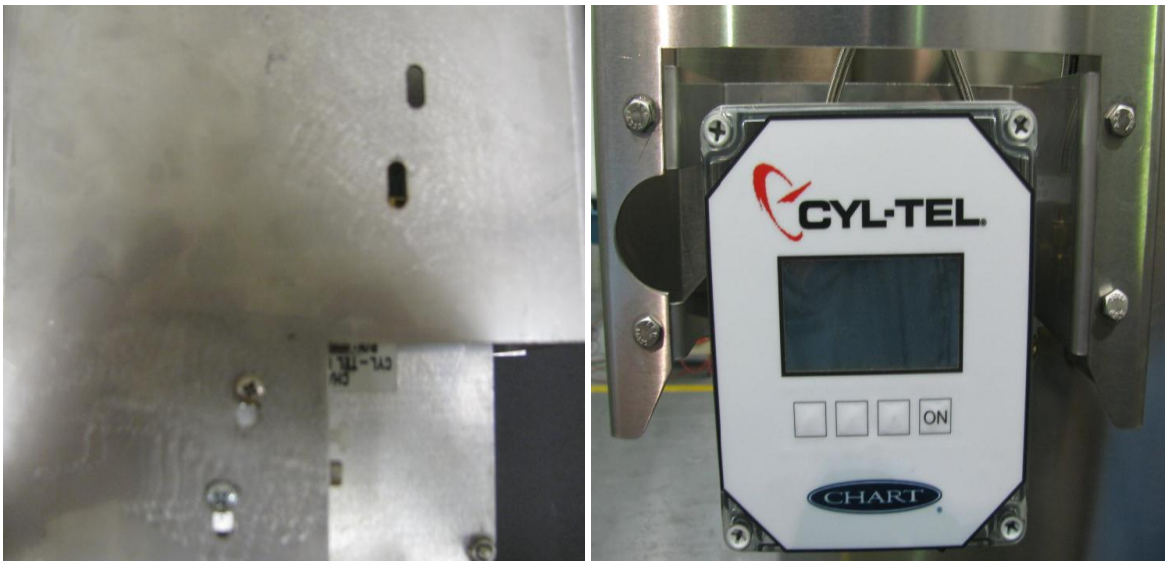


Figure 3.1.2-4: A) Bulk mounting bracket secured to the DP sensor block. B) CYL-TEL III installed onto tank with the mounting bracket.

3) Verify that the 5-way valve is in the Equalization/Service position. Refer to Figure 3.2.1.

4) Connect the SS braided pressure line labeled CYL-TEL HIGH to the DP sensor side labeled HIGH.

5) Connect the SS braided pressure line labeled CYL-TEL LOW to the DP sensor side labeled LOW.

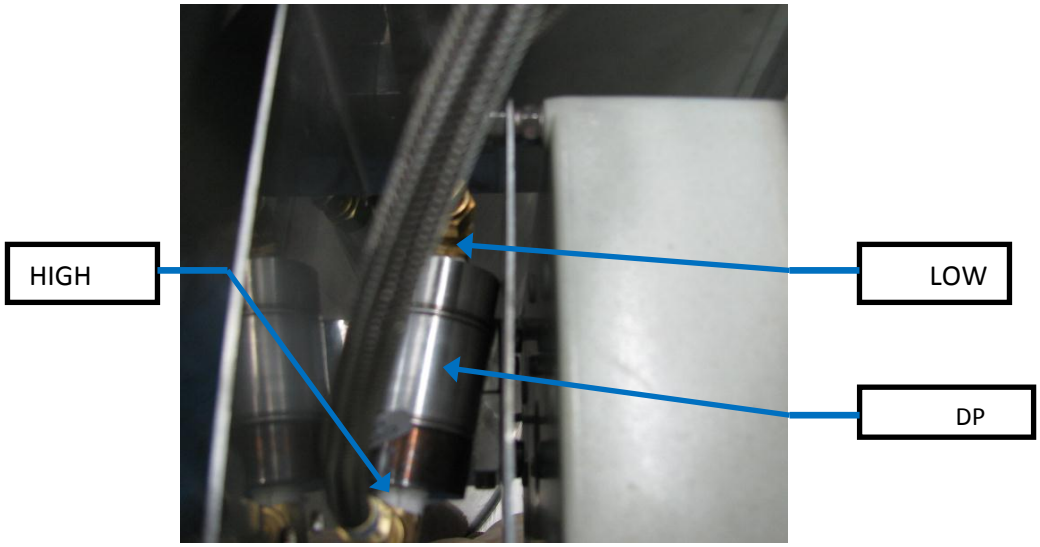
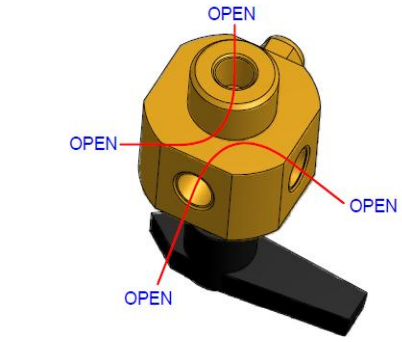


Figure 3.1.2-5: High/Low pressure lines connected to High/Low sides of DP sensor.

6) Turn the 5-way valve to the Normal Operation position.



VALVE IN NORMAL OPERATION POSITION

Figure 3.1.2-6: 5-way valve in the Normal Operation position. Use the plug on the top port of the 5-way valve as a reference point.

7) Check ALL fittings and pressure line connections for leaks using a liquid leak detector.
   a. If a leak is detected turn the 5-way valve to the Equalization/Service position and tighten the areas where the leak was detected. Then repeat step 7.

8) Once all fittings and pressure line connections are leak free, turn the 5-way valve to the Equalization/Service position.

9) Refer to section 6.3 to set up the tank parameters and section 6.5 to set the zero on the CYL-TEL Gauge.

3.1.2-3: Upgrading CYL-TEL Faceplate to CYL-TEL III Faceplate

1) Verify that the 5-way valve is in the Equalization/Service position. Refer to Figure 3.2.1.

2) Unscrew the 4 plastic screws that secure the CYL-TEL faceplate to the CYL-TEL housing.

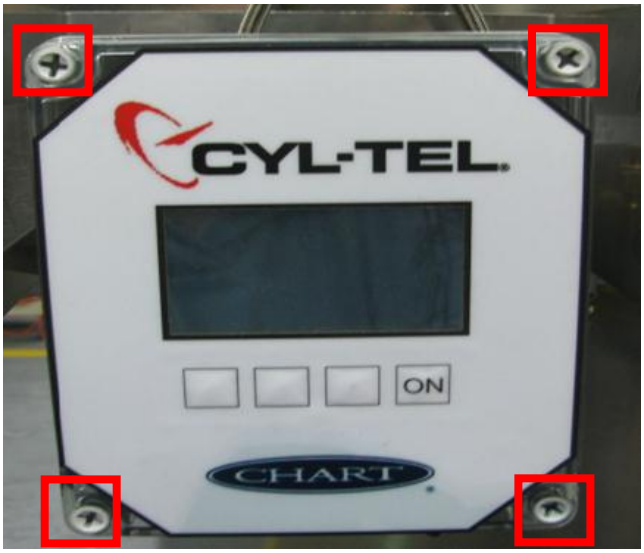


Figure 3.1.2-7: Red boxes indicate the 4 plastic screws that need to be unscrewed.

3) Disconnect the DP sensor connector form the CYL-TEL board.
4) Connect the DP sensor connector to the CYL-TEL III board.
5) Use the 4 plastic screws attached to the CYL-TEL III faceplate to secure it to the housing.

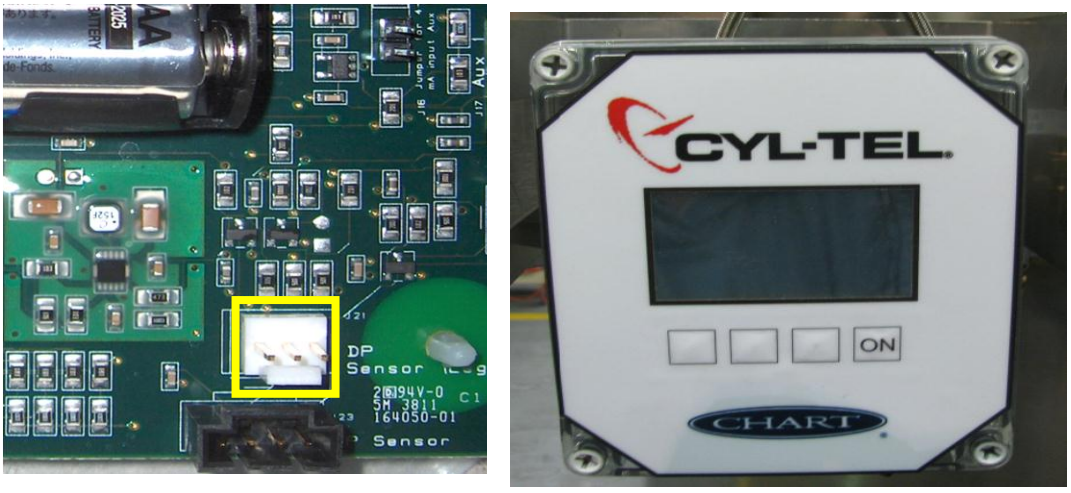


Figure 3.1.2-8: A) Yellow box indicates input J21, connect the LEGACY DP sensor there. B) Installation of CYL-TEL III onto the CYL-TEL housing.

6) Refer to section 6.3 for programming the tank parameters and section 6.2 to select the LEGACY DP sensor.
7) Once you have the correct DP sensor selected refer to section 6.5 to set the zero on the CYL-TEL Gauge.

3.1.3: CYL-TEL WITH 5-WAY VALVE AND PRESSURE GAUGE INSTALLATION

NOTE: Installation is for a 1500-liter tank. Installations on different sized tanks may vary.

3.1.3-1: Installation on tank

1) Connect the 12" SS braided pressure line attached to the 5-way valve (P/N 13830791) labeled CYL-TEL HIGH to the DP sensor side labeled HIGH (right side).
2) Connect the 12" SS breaded pressure line attached to the 5-way valve labeled CYL-TEL LOW to the DP sensor side labeled LOW (left side).

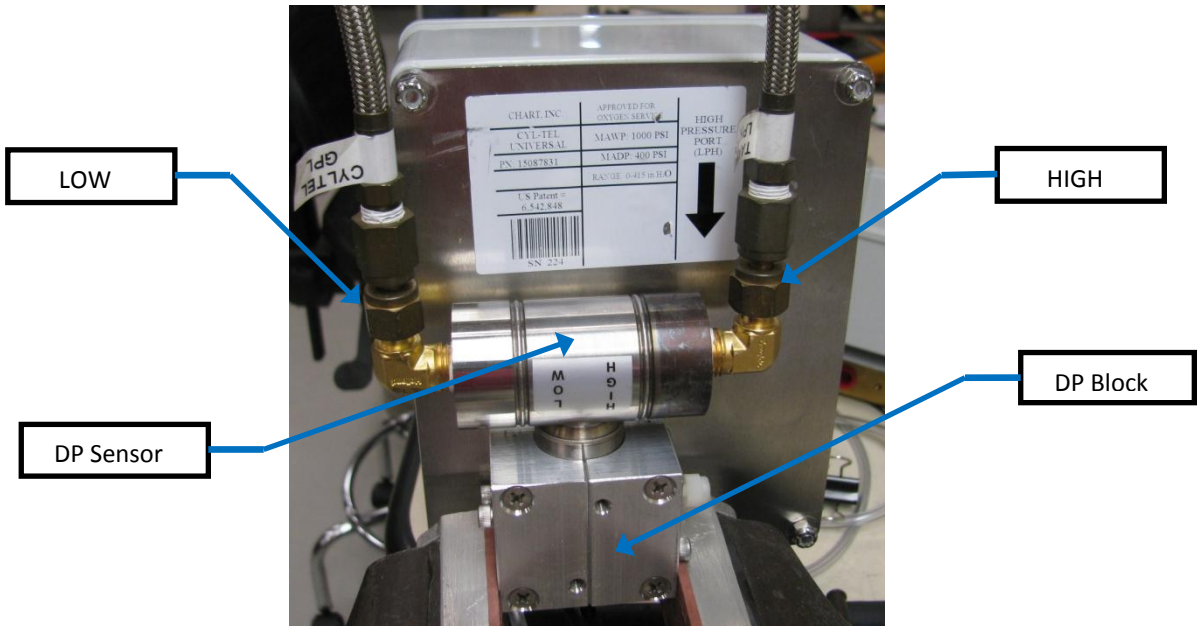


Figure 3.1.3-1: High/Low pressure lines attached to 5-way valve connected to the high/low sides of the DP sensor.

3) Attach the bulk tank mounting bracket onto the CYL-TEL using the two screw holes located on the DP block.

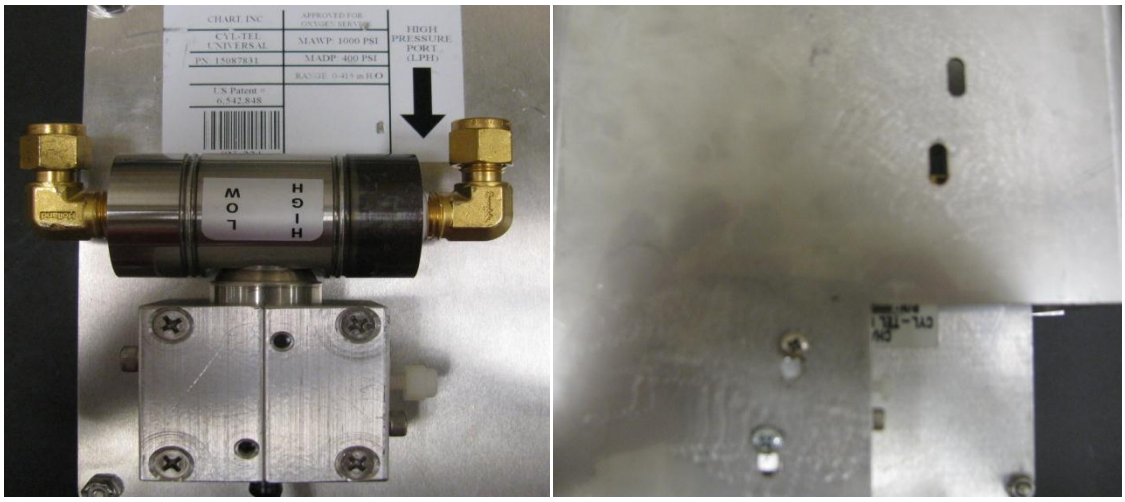


Figure 3.1.3-2: A) Screw holes for mounting bracket on DP sensor block. B) Mounting bracket installed onto the DP sensor block.

4) Verify that the CYL-TEL is level on the mounting bracket.
5) Connect the 12" SS braided pressure line attached to the 5-way valve labeled GAUGE to the analog pressure gauge.
6) Place the CYL-TEL onto the tank using the bulk tank mounting bracket (P/N 11085290) to secure it to the tank.

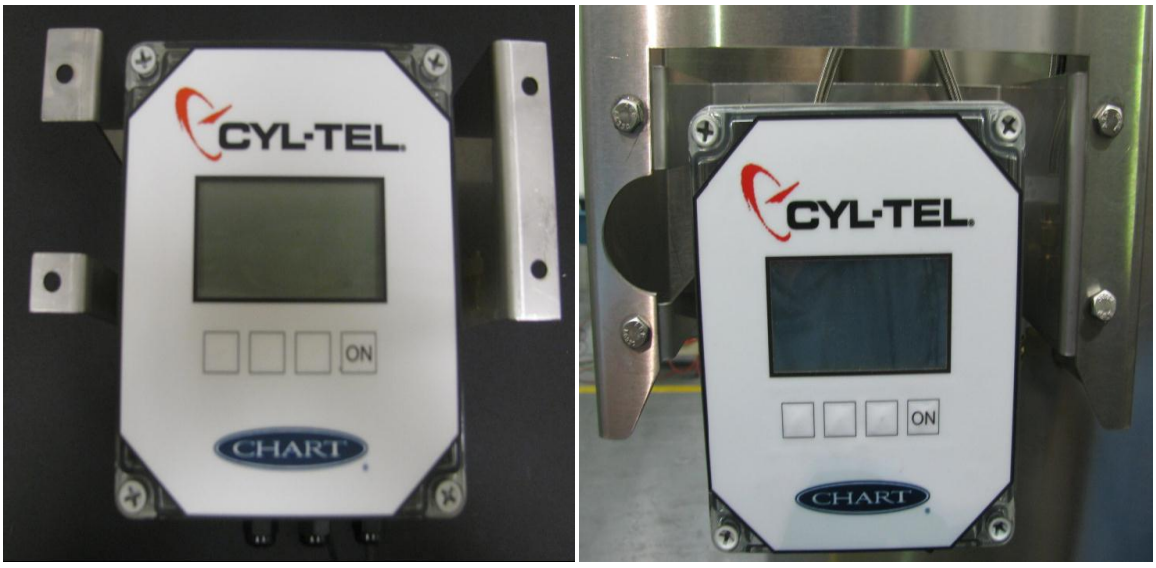


Figure 3.1.3-3: CYL-TEL mounted onto the tank using the bulk mounting bracket.

7) Place the 5-way valve orientation sticker onto the tank.
8) Attach the 5-way valve to the tank using the hole where the 5-way valve orientation sticker is located (plug on 5-way should be facing up).

Figure 3.1.3-4: A) Use the nut on the 5-way valve to secure it to the tank. B) After the 5-way valve is secured to the tank place the black plastic knob back onto it.

9) Attach the analog pressure gauge onto the tank using the larger hole to the right of the 5-way valve mounting hole.

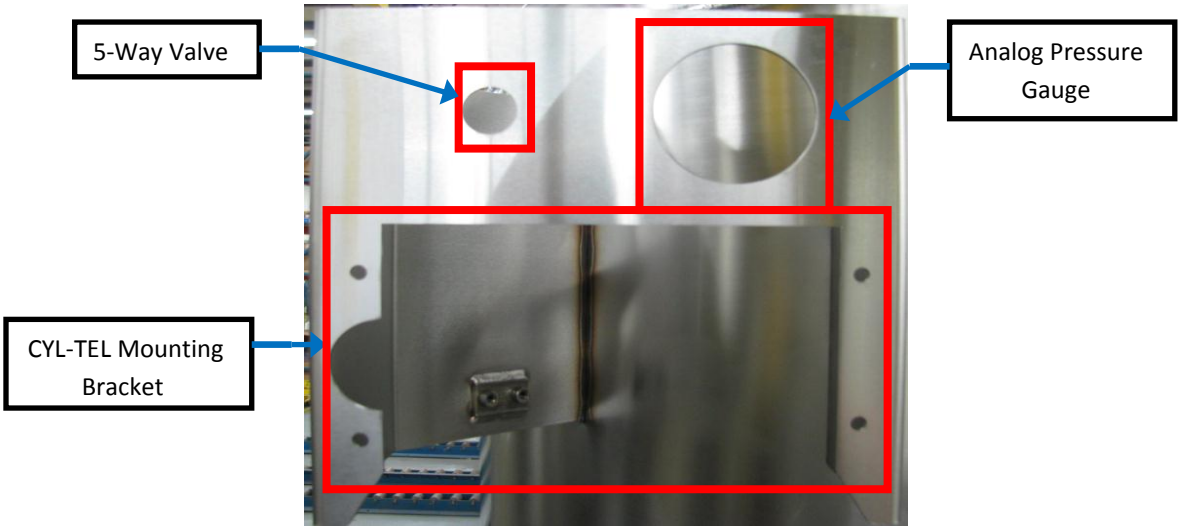


Figure 3.1.3-5: Tank fixture for CYL-TEL bracket, analog pressure gauge, and 5-way valve.

10) Connect the 60" SS braided pressure line labeled TANK LOW to the analog pressure gauge.

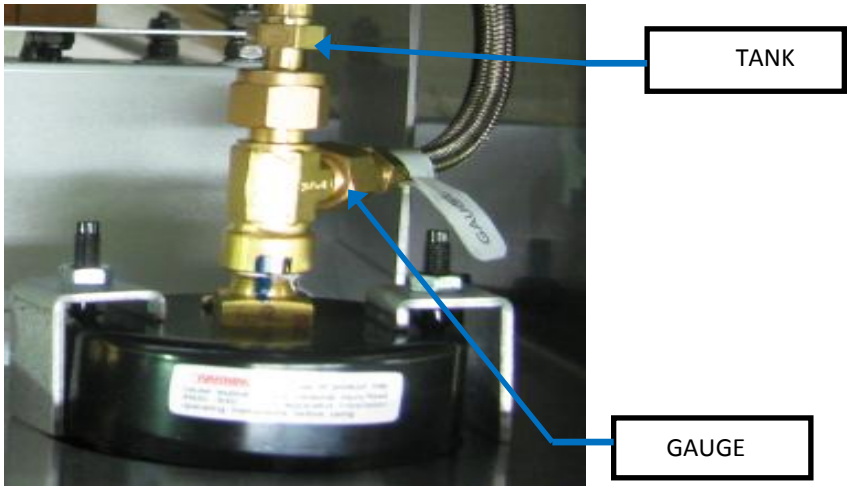


Figure 3.1.3-6: TANK LOW and GAUGE pressure lines connected to the analog pressure gauge.

11) Connect the 60" SS braided pressure line attached to the 5-way valve labeled TANK HIGH to the high pressure output of the tank.

12) Connect the 60" SS braided pressure line attached to the analog pressure gauge labeled TANK LOW to the low pressure output of the tank.

13) Secure the TANK HIGH and TANK LOW SS braided pressure lines to the piping on the tank.

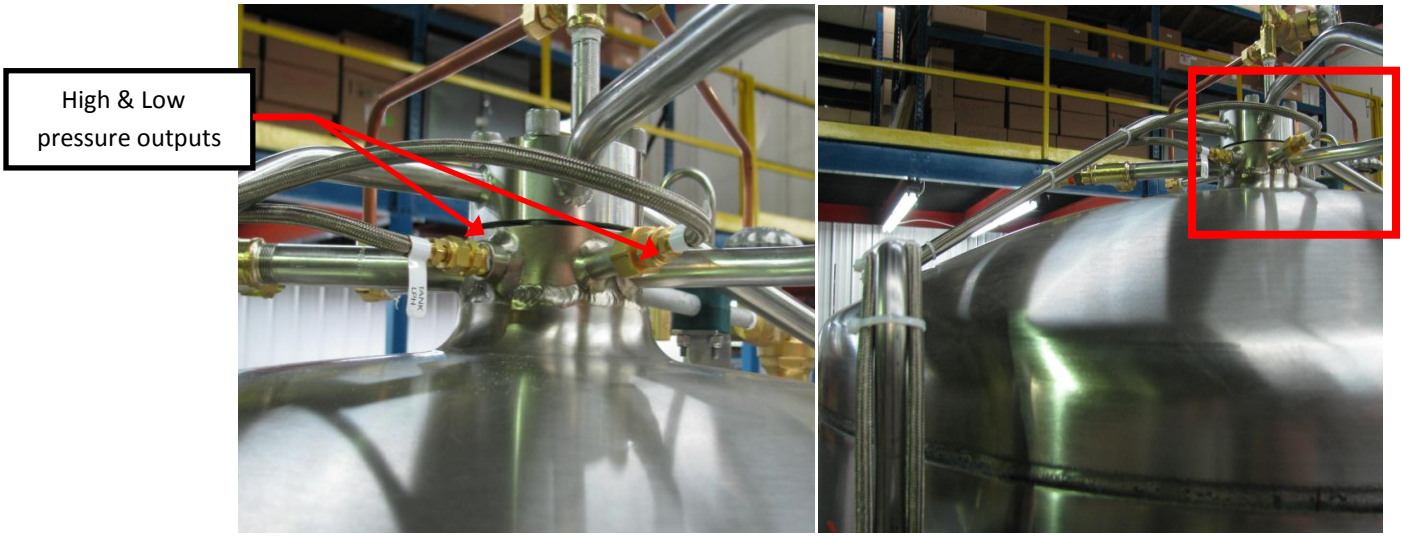


Figure 3.1.3-7: High and low pressure lines connected to high and low pressure outputs of the tank.

14) Verify that the 5-way valve is in the Normal Operation position.

15) Check ALL fittings and pressure line connections for leaks using a liquid leak detector.

a. If a leak is detected turn the 5-way valve to the Equalization/Service position and tighten the areas where the leak was detected. Then repeat steps 14 & 15.

16) Once all fittings and pressure line connections are leak free, turn the 5-way valve to the Equalization/Service position.

17) With 5-way valve at Equalization/Service position program the CYL-TEL for the tank it is connected to and set the zero on the CYL-TEL. Refer to section 6.3 to setup the tank parameters and section 6.5 to set the zero.

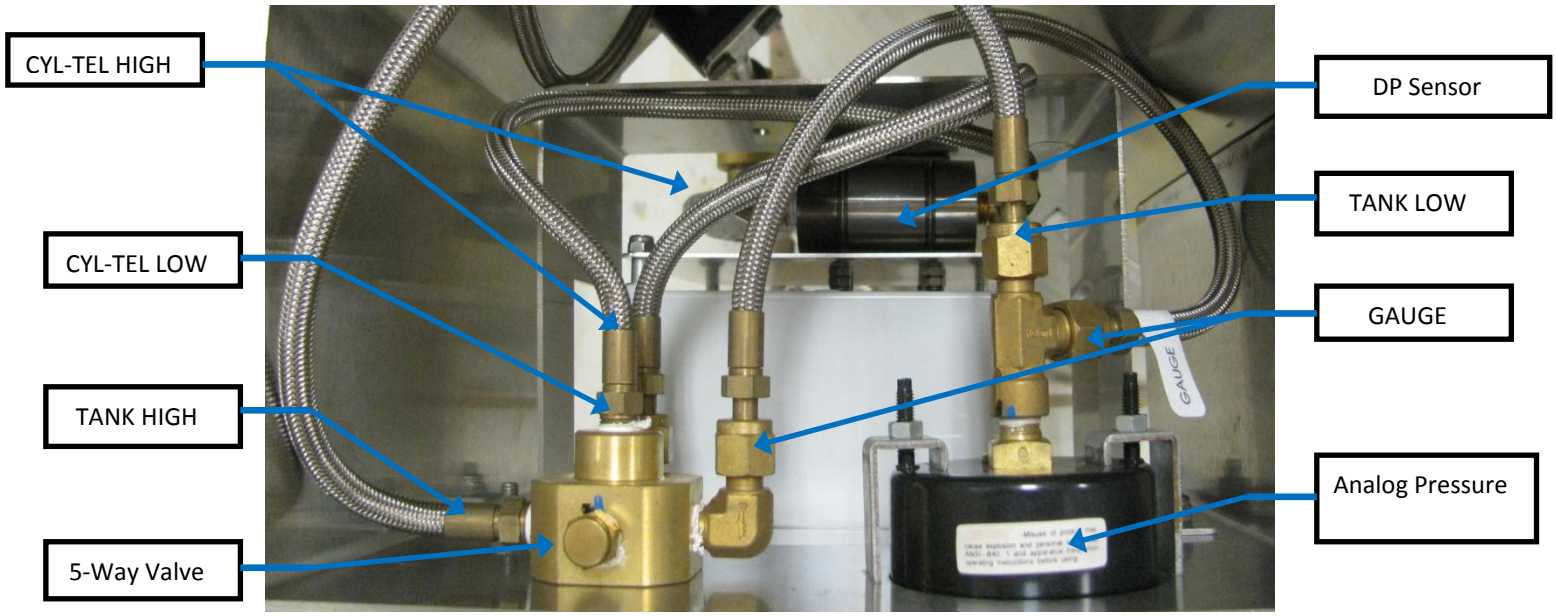


Figure 3.1.3-8: 5-way valve and analog pressure gauge pressure lines diagram.

3.1.4: CYL-TEL III WITHOUT 5-WAY VALVE INSTALLATION

Note: Installation is for a 450-liter tank. Installations on different sized tanks may vary.

3.1.4-1: CYL-TEL Installation.

1) Open the Vent Valve and vent the tank to 0 PSIG.

2) While the tank is venting cut one 16" long $^{1}/_{8}$" OD copper tube and one 18" long $^{1}/_{8}$" OD copper tube.

3) With the tank vented to a pressure of 0 PSIG connect the 16" long $^{1}/_{8}$" OD copper tube to the LOW pressure output on the tank next to the analog pressure gauge.

4) Connect the 18" long $^{1}/_{8}$" OD copper tube to the HIGH pressure output on the tank.

5) Connect one Male Elbow Brass $^{1}/_{8}$" ODT x $^{1}/_{4}$" MPT (P/N 10501634) to the HIGH and LOW pressure inputs on the DP sensor.

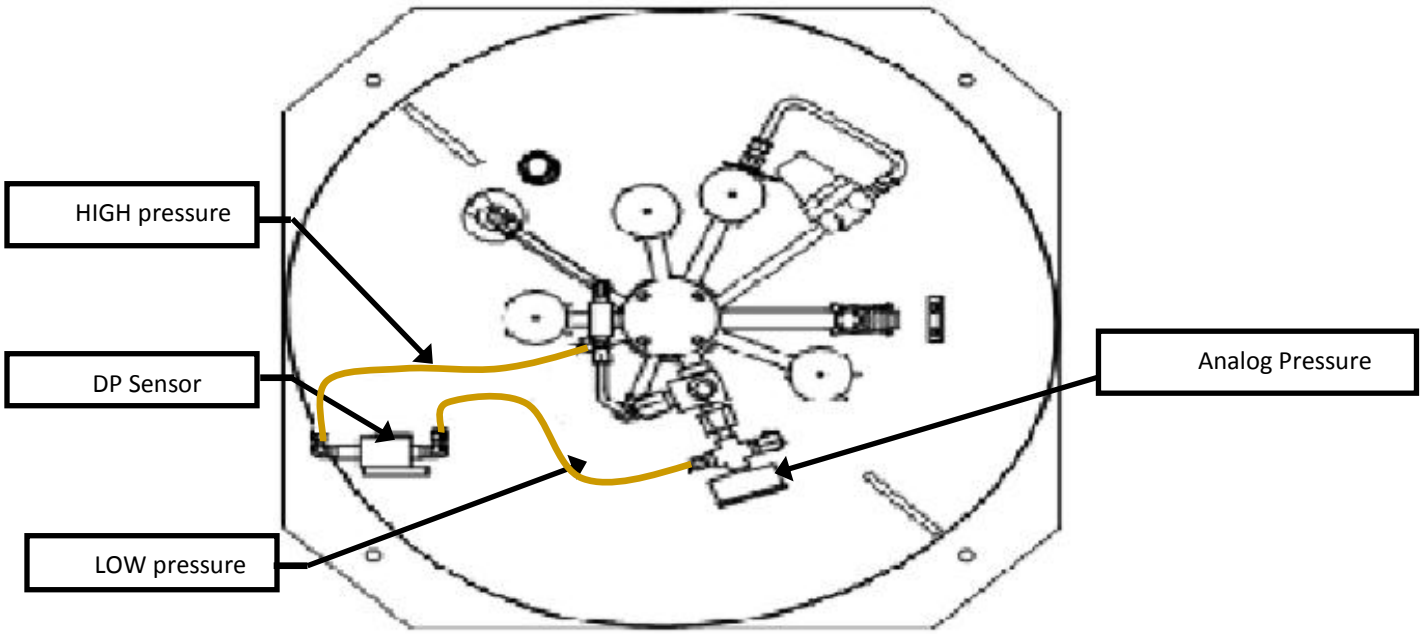
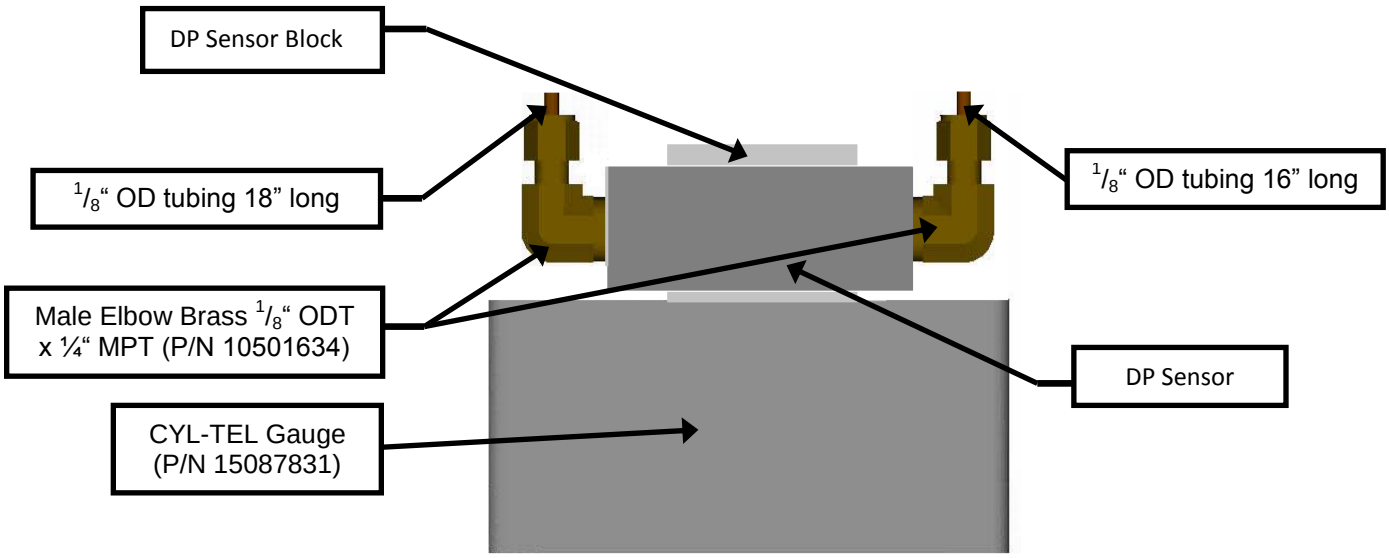


Figure 3.1.4-1: HIGH and LOW pressure lines coming from the tank connected to the CYL-TEL DP sensor.

6) Install the CYL-TEL gauge onto the tank using the two screws on the DP sensor block to secure it to the tank.
7) Connect the 16" long $^{1}/_{8}$" OD copper tube that is attached to the tank's LOW pressure output to the LOW pressure side of the DP sensor.
8) Connect the 18" long $^{1}/_{8}$" OD copper tube that is attached to the tank's HIGH pressure output to the HIGH pressure side of the DP sensor.

‘



NOTE: Use a small amount of PTFE Thread Sealant Tape on the elbows. This will help ensure there are no leaks

Figure 3.1.4-2: HIGH and LOW pressure lines connected to the DP sensor.

9) Once the CYL-TEL gauge has been installed and plumbed check all fittings and tubing connections for leaks using a liquid leak detector.
   a. If a leak is detected tighten the areas where it was detected then check it again with the liquid leak detector.

10) With all the fittings and tubing connections leak free set the zero on the CYL-TEL liquid level gauge. Refer to section 6.5.

11) Program the CYL-TEL for the tank that it is installed on. Refer to section 6.3.

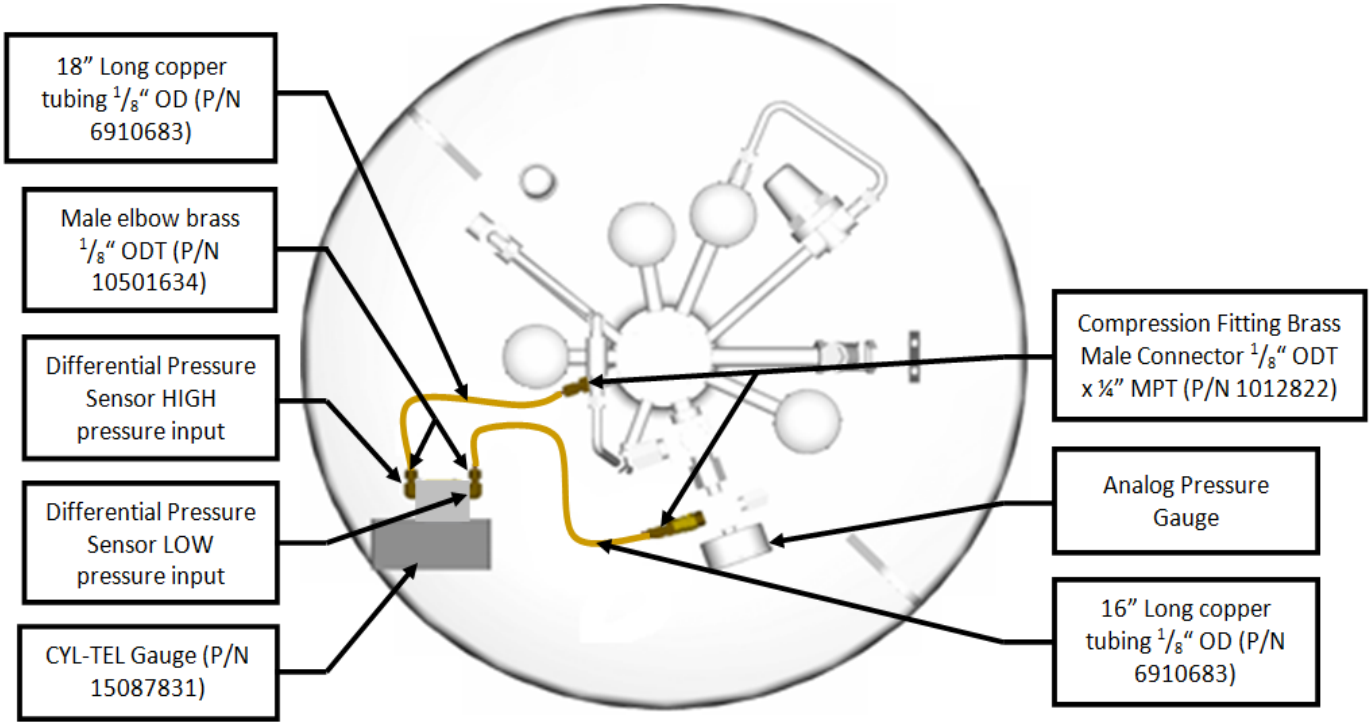
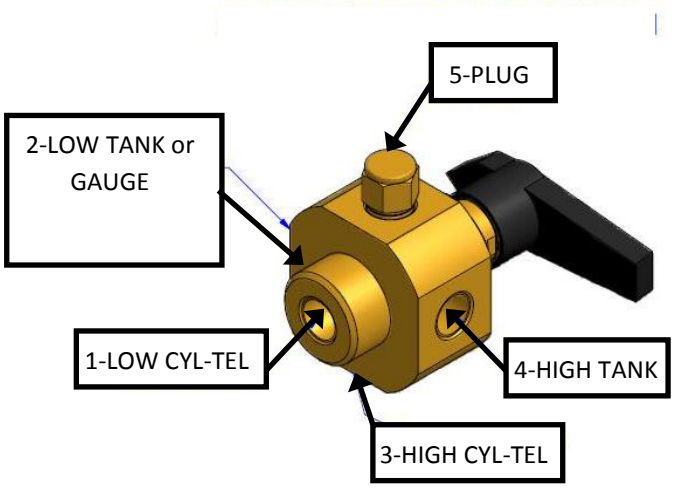


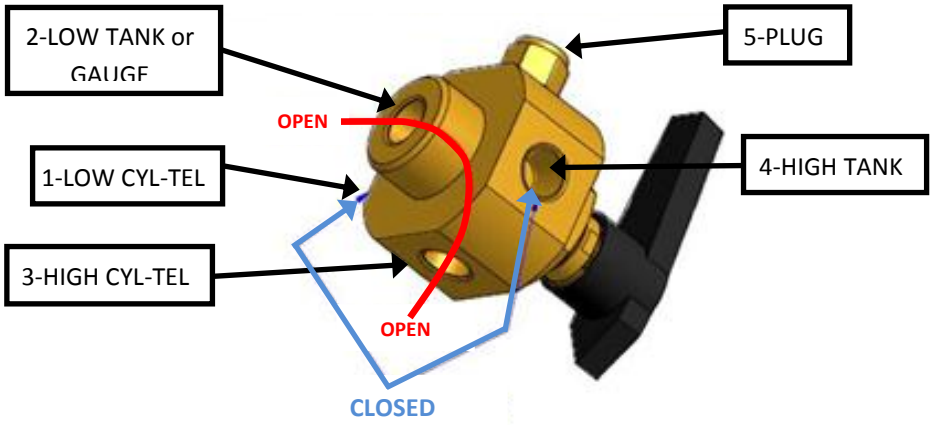
Figure 3.1.4-3: Diagram of completed CYL-TEL installation without 5-way valve.

3.1.5: 5-WAY VALVE CONFIGURATION

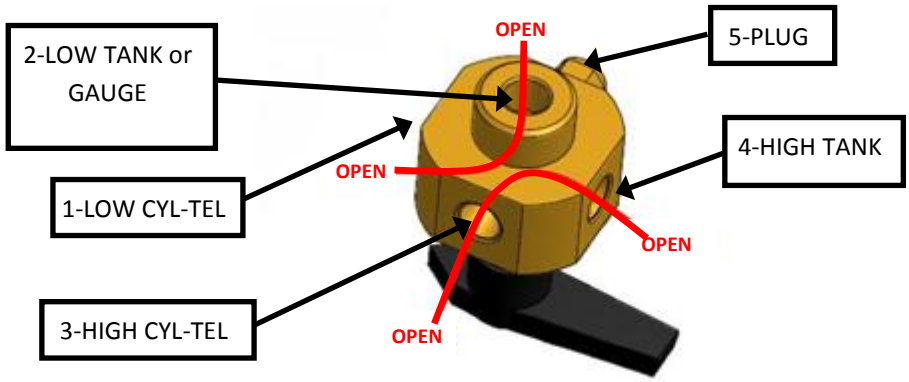
3.1.5-1: 5-Way Valve Port Configuration.



3.1.5-2: Valve in Equalization/Service Position.



3.1.5-3: Valve in Normal Operation Position



3.2 TANK-TEL III GAUGE INSTALLATION

3.2.1 TANK-TEL III INSTALLATION PREPARATIONS

3.2.1-1: Preparing Differential Pressure Sensor for Installation.

1. Apply small amount of PTFE Thread Sealant Tape to all tee fittings, nipples and elbows. This is to make sure that there are no leaks.
2. Install Elbow Street BRS 9O/D 1/4MPT (P/N 1210462) on the HIGH side of the DP Sensor.
3. Install Tee Street BRS 1/4NPT (P/N 1211702) on the LOW side of the DP Sensor.
4. Assemble all tee fittings, nipples and elbows according to the Figure 3.3.1 below.

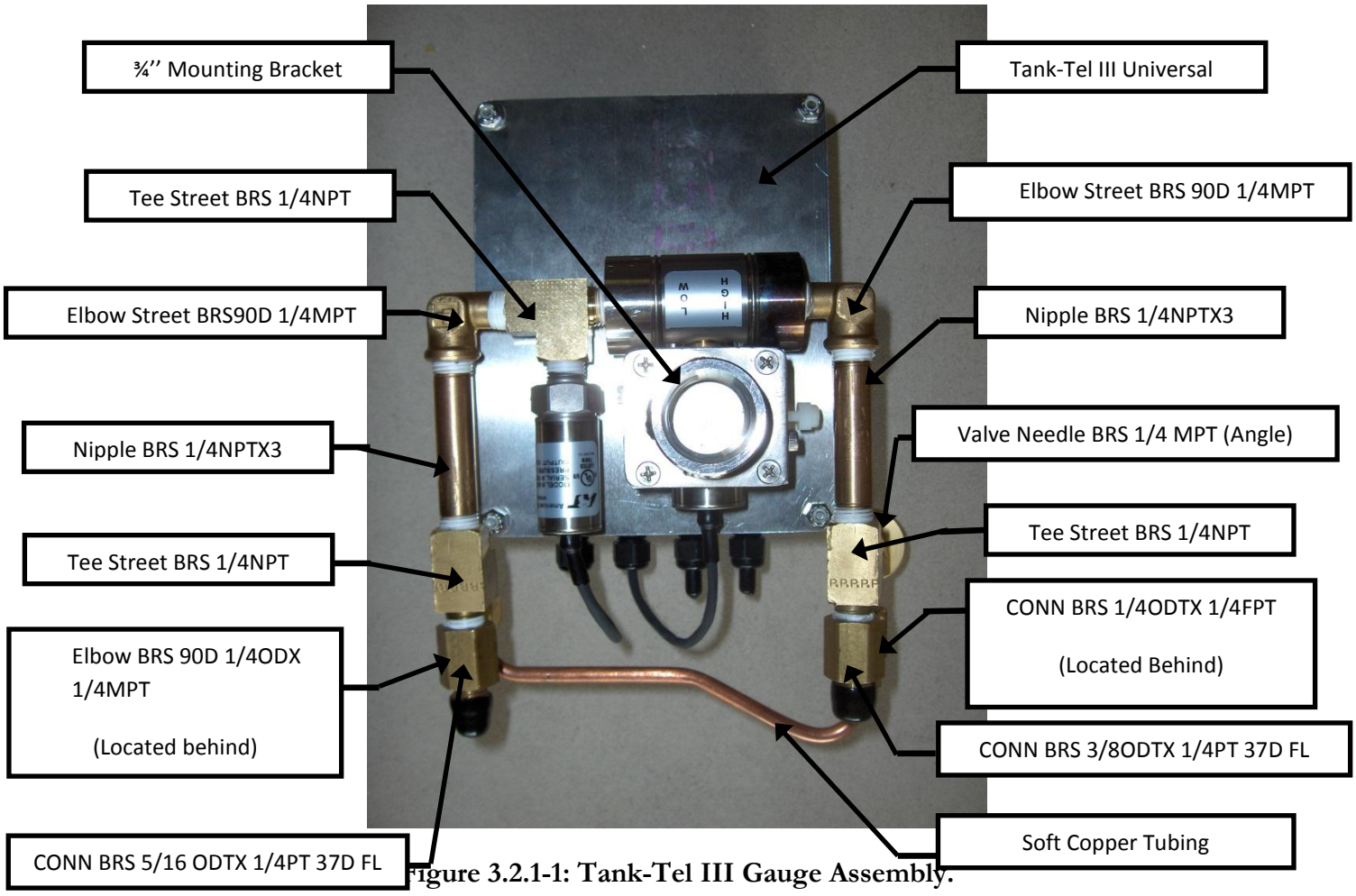


Figure 3.2.1-1: Tank-Tel III Gauge Assembly.

5. Install the Tank-Tel III assembly to tank by threading the ¾"mounting adapter onto the ¾" toe nipple attached to the tank.

Figure3.2.1-2: Tank-Tel III Gauge Assembly mounted onto tank.

6. Feed the wire that is connected to the DP sensor through one of the ports on the bottom of the TANK-TEL enclosure and connect it to the TANK-TEL circuit board, refer to section 4.1.

3.2.2.: HOSE SET INSTALLATION

3.2.2-1: Vertical Tank Hose Set Installation

Vertical Tank Hose Set (P/N 11683038) comprises of two components: 0.313"OD x 0.035" WALL (P/N 11680654) and 0.375"OD x 0.035" WALL (P/N 11680646).

1. Connect 0.313"OD x 0.035" WALL (P/N 11680654) to CONN BRS 5/16ODTX1/4FPT 37D FL (P/N 11680523). Tighten both ends with 11/16" Wrench.
2. Connect 0.375"OD x 0.035" WALL (P/N 11680646) to CONN BRS 3/8ODTX1/4FPT 37D FL (P/N 11682457). Tighten both ends with 5/8" Wrench.

3.2.2-2: Horizontal Tank Hose Set Installation

Horizontal Tank Hose Set (P/N 11682991) comprises of two components: 0.313"OD x 0.035" WALL (P/N 11680638) and 0.375"OD x 0.035" WALL (P/N 11680611).

1. Connect 0.313"OD x 0.035" WALL (P/N 11680638) to CONN BRS 5/16ODTX1/4FPT 37D FL (P/N 11680523). Tighten both ends with 11/16" Wrench.
2. Connect 0.375"OD x 0.035" WALL (P/N 11680611) to CONN BRS 3/8ODTX1/4FPT 37D FL (P/N 11682457). Tighten both ends with 5/8" Wrench.

Figure 3.1.2-1: Tighten 0.375"OD x 0.035" WALL (P/N 11680611) ends with 5/8" Wrench.

Figure 3.1.2-2: Tighten 0.313"OD x 0.035" WALL (P/N 11680638) ends with 11/16" Wrench.

4. TANK-TEL/CYL-TEL POWER AND ALARM WIRING

4.1: EXTERNAL POWER INSTALLATION

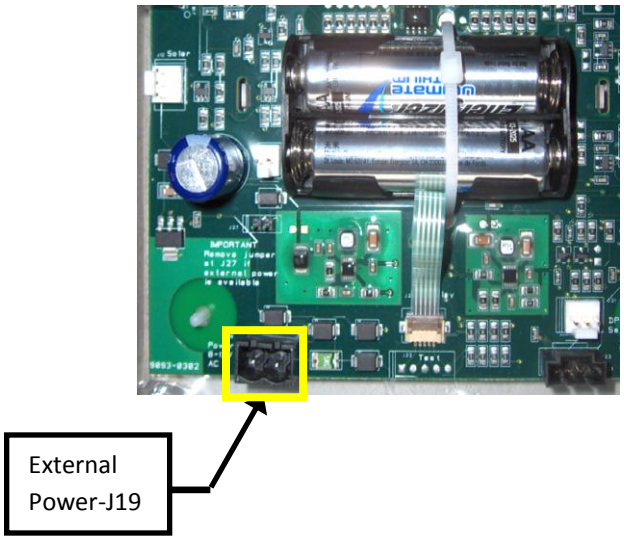
4.1.1: Preparing Wire

1) Remove the faceplate form the TANK-TEL/CYL-TEL gauge (P/N 15087831) using a #1 Phillips head screwdriver.
2) Disconnect the DP sensor cable from the TANK-TEL/CYL-TEL board to separate the faceplate from the housing for easier installation.
3) Route the power cable from the AC Power Pack (P/N 11061378) and its outlet to the TANK-TEL/CYL-TEL gauge.
4) With the cover removed, route the power cable through one of the black liquid tight connectors. Leave enough wire for you to connect the wire to the external power terminal on the TANK-TEL/CYL-TEL board, approximately 5".
5) Strip back about 2" of the cable jacket from each cable this will expose all of the insulated wires. On each wire remove approximately $^{1}/_{8}$" of the insulation.

4.1.2: Connect Power Wires to the CYL-TEL Gauge

1) Inside of the faceplate you will find the TANK-TEL/CYL-TEL circuit board. Locate the external power connector.
2) Connect the wires to connector J19.

Note: The polarity of the connector is irrelevant.



4.2: BATTERY POWER

4.2.1: Battery Installation

1) Unscrew the four plastic screws that secure the TANK-TEL/CYL-TEL faceplate to the enclosure.
2) Locate the battery holder on the TANK-TEL/CYL-TEL circuit board. (Figure 4.1.1)
3) Use the diagrams on the battery holder to correctly install the two AA batteries that will power the TANK-TEL/CYL-TEL.
4) Once you have the batteries installed correctly secure the TANK-TEL/CYL-TEL faceplate to the enclosure with the four plastic screws located on the TANK-TEL/CYL-TEL faceplate.

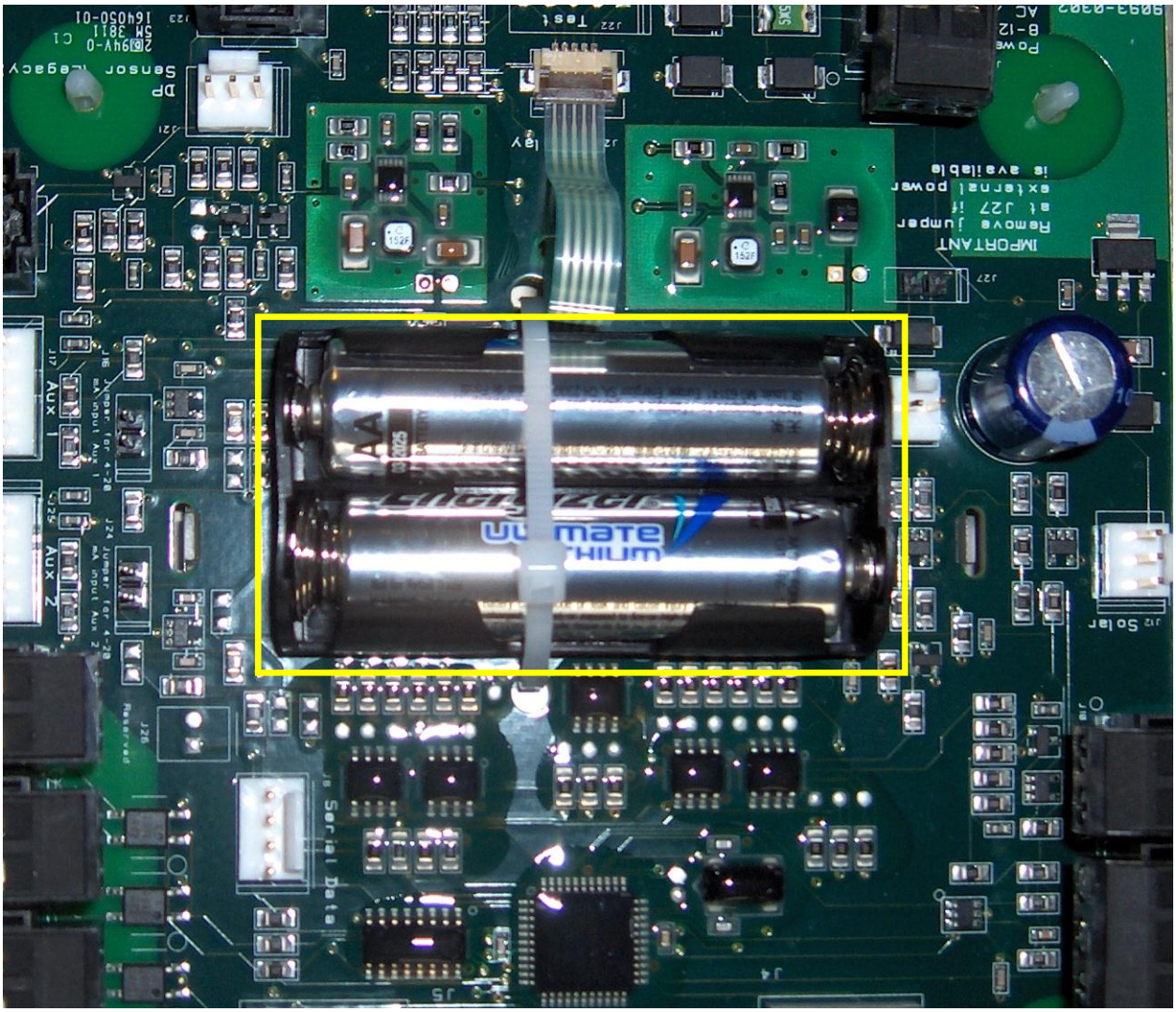


Figure 4.2.1: Yellow box indicates the battery holder on the CYL-TEL circuit board.

5. TANK-TEL GAUGE OPTIONAL FEATURES WIRING

5.1: DIFERENTIAL PRESSURE SENSORS

5.1.1: AST Differential Pressure Sensor

1) Locate the DP sensor connector.
2) On the TANK-TEL/CYL-TEL circuit board locate the input for the AST DP sensor labeled J23.
3) Using the grooves on the input plug connect the AST DP sensor connector to the TANK-TEL/CYL-TEL circuit board.
4) Once you have the DP sensor connected to the TANK-TEL/CYL-TEL board use a #1 Phillips head screwdriver to secure the TANK-TEL/CYL-TEL faceplate to the enclosure with the four plastic screws.
5) Refer to section 6.2 to select the appropriate DP sensor and refer to section 6.5 to set the zero on the TANK-TEL/CYL-TEL Gauge.

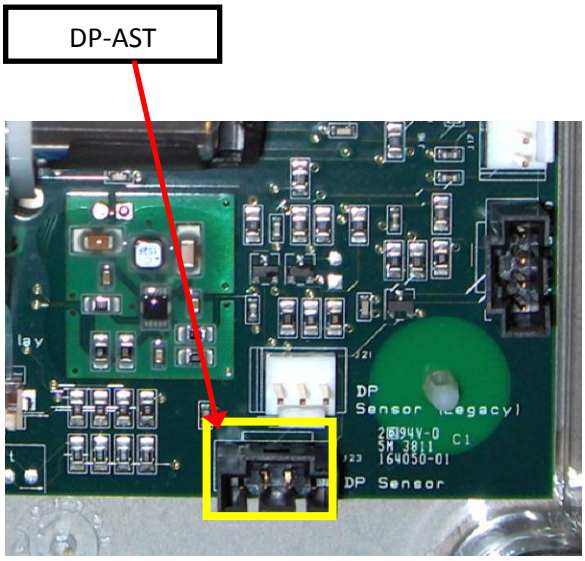


Figure 5.1.1: Yellow box indicates the AST DP input J23.

5.1.2: LEGACY Differential Pressure Sensor. (Cyl-Tel Only)

1) Locate the DP sensor connector.
2) On the CYL-TEL circuit board locate the input for the LEGACY DP sensor labeled J21.
3) Connect the LEGACY DP sensor connector to the CYL-TEL circuit board.
4) Once you have the DP sensor connected to the CYL-TEL board use a #1 Phillips head screwdriver to secure the CYL-TEL faceplate to the enclosure with the four plastic screws.

5) Refer to section 6.2 to select the appropriate DP sensor and refer to section 6.5 to set the zero on the CYL-TEL Gauge.

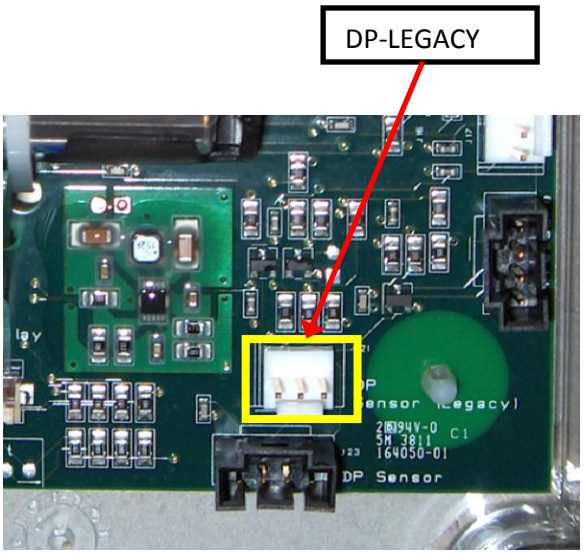
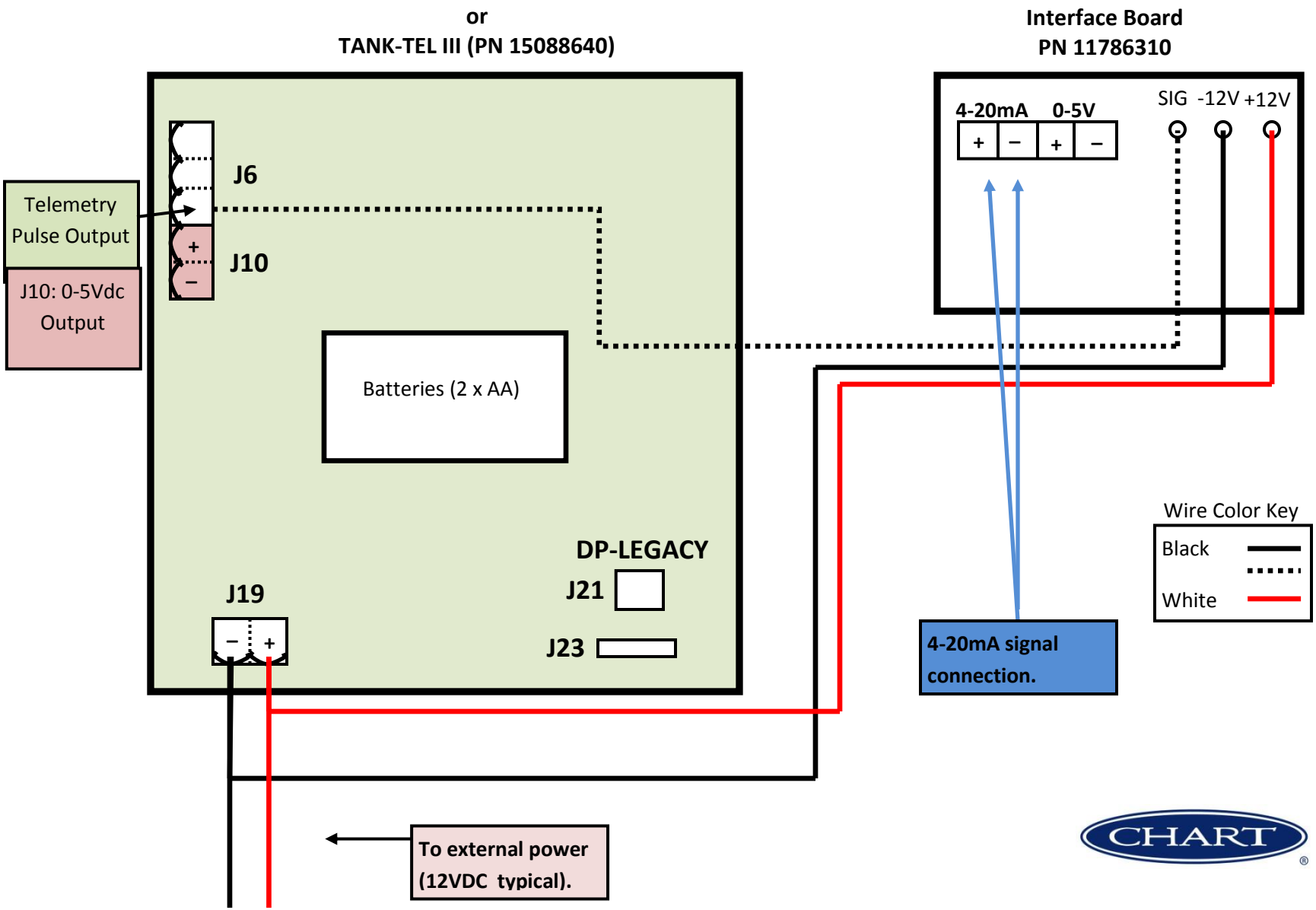


Figure 5.1.2: Yellowbox indicates the LEGACY DP input J21.

6. TANK-TEL/CYL-TEL INTERFACE BOARD INSTALLATION



Once the wiring is complete (from TANK-TEL/CYL-TEL to interface board), activate the TANK-TEL/CYL-TEL telemetry outputs. The TANK-TEL/CYL-TEL will not provide any output signals without activating the telemetry outputs through the programming menu.

Activate Telemetry Outputs

1. Access the MAIN MENU by pressing and holding the MENU key for ten seconds.
2. On the MAIN MENU screen select the TELEMETRY option and press the NEXT key.
3. On the MORE FEATURES screen select the TELEMETRY option and press the NEXT key.
4. Use the UP/DOWN arrow keys to switch between the OFF (telemetry outputs deactivated) and ON (telemetry outputs activated).
5. Once you have ON selected press the NEXT key.
6. To save your settings go to the SAVE option on the MORE FEATURES screen and press the NEXT key.
7. Press EXIT to exit the MAIN MENU.

7. TANK-TEL/CYL-TEL III GAUGE OPERATION & SETUP

7.1: OPERATING THE TANK-TEL/CYL-TEL GAUGE

7.1.1: General Operation

→ When the ON key is pressed the TANK-TEL/CYL-TEL Gauge will run through its startup diagnostics tests. When the test is complete the screen will have the tank's liquid level displayed.

→ Once the TANK-TEL/CYL-TEL is on their will be four text boxes at the bottom of the screen that line up with the four keys below the LCD display.

- FILL: Pressing the FILL key will put the TANK-TEL/CYL-TEL in FILL mode and keep the display on as long as it is in FILL mode. Use the FILL mode when the tank is being refilled.
- UNITS: Pressing the UNITS key will change the unit of measurement that the amount of liquid is displayed in.
- ALARM: Pressing the ALARM key will display the set alarms and if they are activated on the left side of the LCD screen.
- MENU: Pressing and holding the MENU key for 10 seconds will allow you to access the MAIN MENU of the TANK-TEL.

Note: The display screen of TANK-TEL and CYL-TEL may vary slightly but both share relatively similar controls.

7.2: DIFFERENTIAL PRESSURE SENSOR SELECTION

7.2.1: Setting the TANK-TEL/CYL-TEL's Differential Pressure Sensor

1) Access the MAIN MENU by pressing and holding the MENU key for more than 10 seconds.

2) On the MAIN MENU screen select the MORE option and press the NEXT key. (Figure 6.2.1)

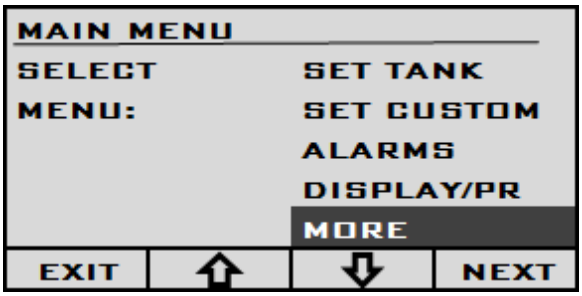


Figure 6.2.1: MORE option.

3) On the MORE FEATURES screen select the SET SENSOR option and press the NEXT key.

4) Use the UP/DOWN arrow keys to switch between the LEGACY (TANK-TEL/CYL-TEL) and AST (TANK-TEL/CYL-TEL III) DP sensor. (Figure 6.2.2)

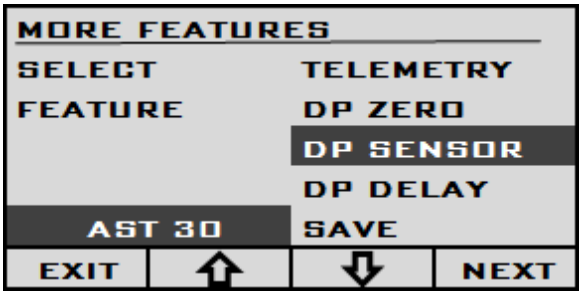


Figure 6.2.2: SET SENSOR option.

5) Once you have the DP sensor selected press the NEXT key.

6) To save your DP sensor selection go to the SAVE option on the MORE FEATURES screen and press the NEXT key. (Figure 6.2.3)

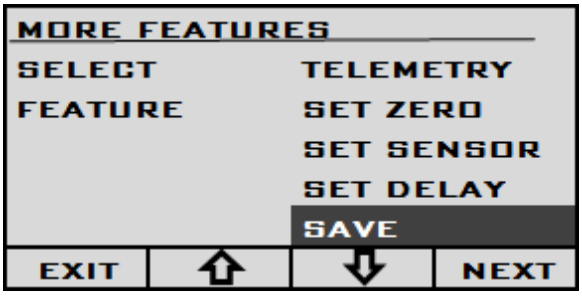


Figure 6.2.3: SAVE option.

7.3: SETTING UP TANK PARAMETERS

7.3.1: Setting Standard Tank Parameters

1) Access the MAIN MENU by pressing and holding the MENU key for ten seconds.

2) On the MAIN MENU screen select the SET TANK option and press the NEXT key. (Figure 6.3.1)

3) On the SETUP STD TANK screen use the UP/DOWN arrow keys to browse the various types of tanks. Once you have found the specific tank that the TANK-TEL will be used on press the NEXT key. (Figure 6.3.2)

4) On the SET CONTENTS screen use the UP/DOWN arrow keys to select the liquid gas the tank will contain (N2, O2, Ar, CO2, N2O). Once you have selected the liquid gas press the NEXT key. (Figure 6.3.3)

5) On the SETUP DISPLAY screen use the UP/DOWN arrow keys to select the desired unit to be displayed on the screen. (Figure 6.3.4)

6) To have the pressure displayed on the screen select the PRESSURE option and use the UP/DOWN arrow keys to turn it on/off.

7) Once you have the display set up select the SAVE option and press the NEXT key. (Figure 6.3.5)

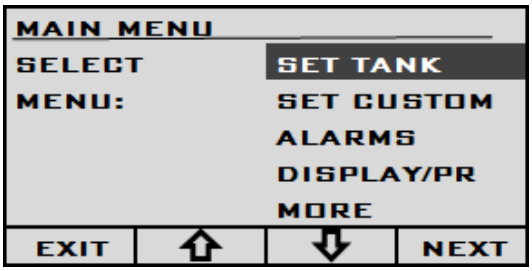


Figure 6.3.1: SET TANK option

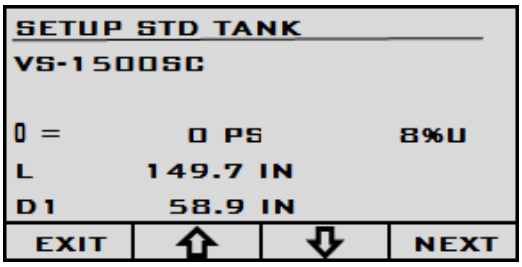


Figure 6.3.2: Select tank.

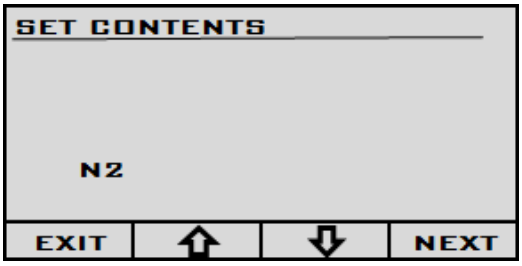


Figure 6.3.3: Select contents.

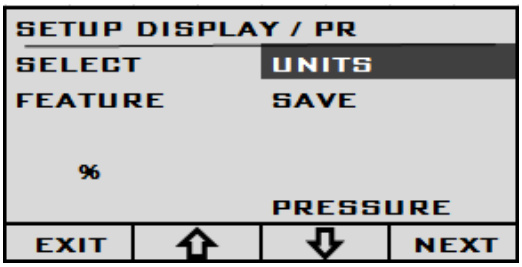


Figure 6.3.4: Select units.

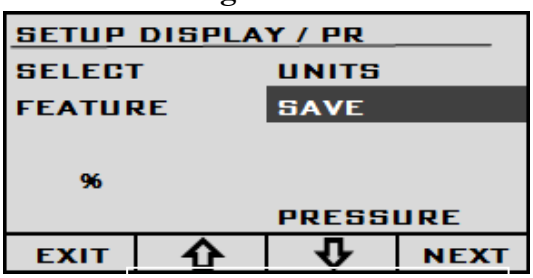


Figure 6.3.5: SAVE option.

7.3.2: Setting Custom Tank Parameters

1) Access the MAIN MENU by pressing and holding the MENU key for ten seconds.

2) On the MAIN MENU screen select the SET CUSTOM option and press the NEXT key.

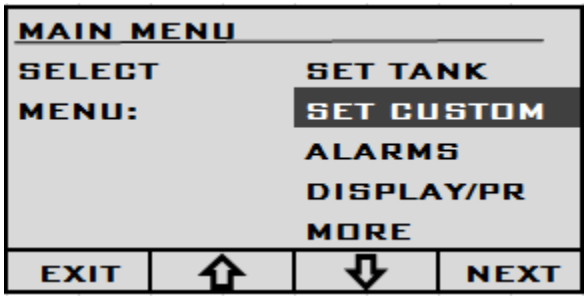


Figure: 6.3.6: SET CUSTOM tank option.

3) On the SETUP CUSTOM TANK screen select the LENGTH option and press the NEXT key. Use the arrow keys to set the tank's length. Once the tank's length is set press the RIGHT arrow key until the "*" around the length's value withdraw.

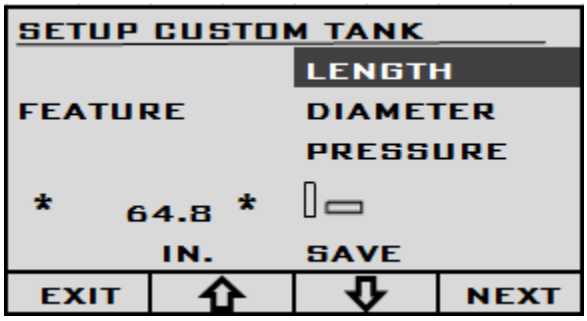


Figure 6.3.7: Input tank's length.

4) Select the DIAMETER option and press the NEXT key. Use the arrow keys to set the tank's diameter. Once the tank's diameter is set use the RIGHT arrow key until the "*" around the diameter's value withdraw.

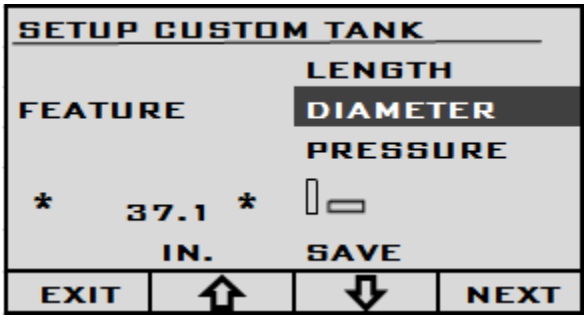


Figure 6.3.8: Input tank's diameter.

5) Select the PRESSURE option and press the NEXT key. Use the UP/DOWN arrow keys to set the tank's saturation pressure. Once you have the set the saturation pressure press the NEXT key.

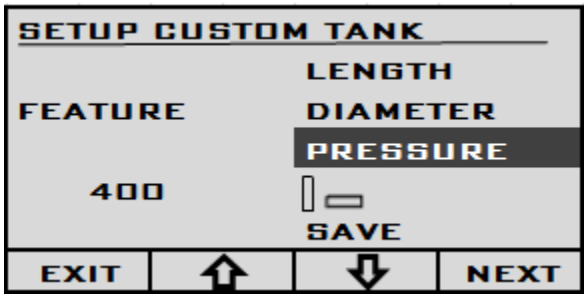


Figure 6.3.9: Input tank's pressure.

6) To set the tank's orientation select the option below the PRESSURE option that has a vertical and horizontal rectangle and press the NEXT key. Use the arrow keys to set the orientation of the tank. Once the orientation has been set use the RIGHT arrow key until the "*" around the vertical and horizontal rectangles withdraw. The ▭ rectangle stands for horizontal tanks and the ▯ rectangle stands for vertical tanks.

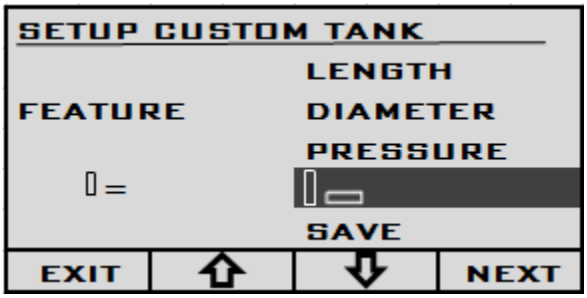


Figure 6.3.10: Input tank's orientation.

7) Once the tank's length, diameter, pressure, and orientation parameters have been set select the SAVE option and press the NEXT key.

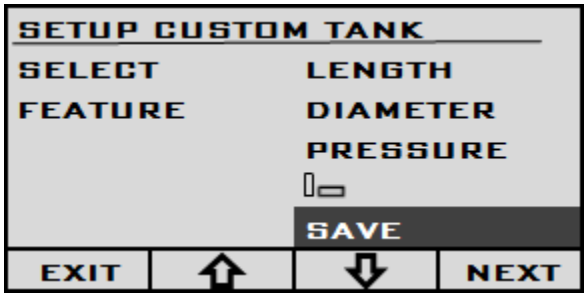


Figure 6.3.11: SAVE option.

8) On the SET CONTENTS screen use the UP/DOWN arrow keys to select the liquid gas the tank will contain (N2, O2, Ar, CO2, N2O). Once you have selected the liquid gas press the NEXT key.

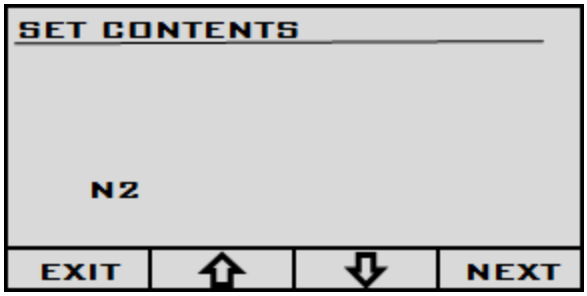


Figure 6.3.12: Select tank's contents.

9) On the SETUP DISPLAY screen use the UP/DOWN arrow keys to select the desired unit to be displayed on the screen.

10) To have the pressure displayed on the screen select the PRESSURE option and use the UP/DOWN arrow keys to turn it on/off. Once you have the display set up select the SAVE option and press the NEXT key.

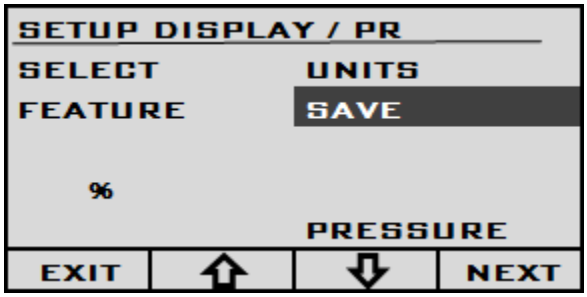


Figure 6.3.13: SAVE option.

Note: To determine the values of "L" and "d" for custom tanks, see Appendix D for more information.

7.4: DISPLAY CONFIGURATION

7.4.1: Setting Up TANK-TEL/CYL-TEL Display

1) Access the MAIN MENU by pressing and holding the MENU key for ten seconds.

2) On the MAIN MENU screen use the UP/DOWN arrow keys to select the DISPLAY option and press the NEXT key. (Figure 6.4.1)

3) On the SETUP DISPLAY screen select the UNITS option and press the NEXT key.

4) Use the UP/DOWN arrow keys to select the desired unit to be displayed on the screen (%, PSI, "H2O, L, GAL, LBS, KG, NM^3, or SCF). (Figure 6.4.2)

5) Once the desired unit to be displayed has been selected press the NEXT key.

6) Select the PRESSURE option to turn the pressure display on the screen on/off. To turn the pressure display select the appropriate pressure sensor. (Figure 6.4.3)

7) Once the screen display has been set up select the SAVE option and press the NEXT key. (Figure 6.4.4)

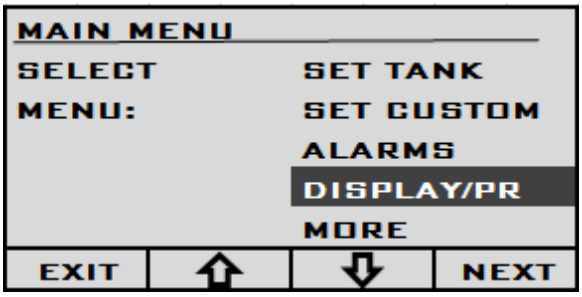


Figure 6.4.1: Display option.

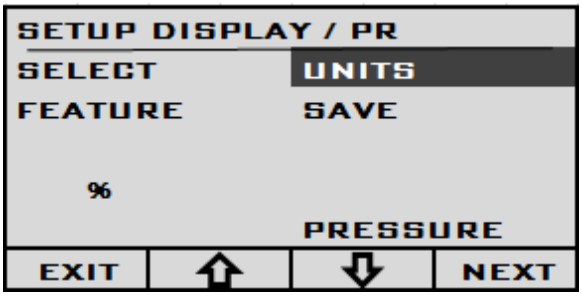


Figure 6.4.2: Select unit.

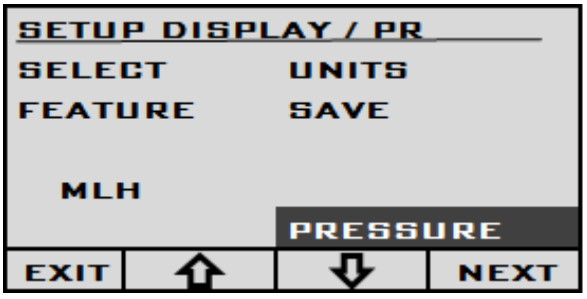


Figure 6.4.3: Pressure option.

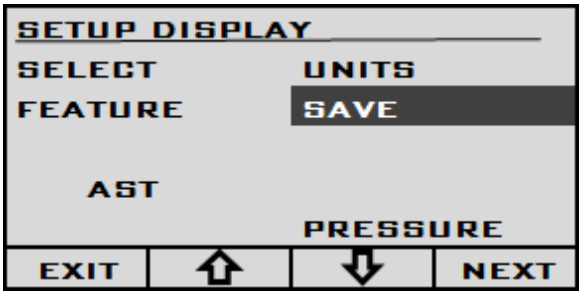


Figure 6.4.4: SAVE option.

7.5: SET ZERO FUNCTION

7.5.1: Setting the TANK-TEL/CYL-TEL's Zero

8) Access the MAIN MENU by pressing and holding the MENU key for ten seconds.

9) On the MAIN MENU screen use the UP/DOWN arrow keys to select the MORE option and press the NEXT key. (Figure 6.5.1)

10) On the MORE FEATURES screen select the SET ZERO option and press the NEXT key. (Figure 6.5.2)

11) After pressing the NEXT key "PLEASE WAIT" will be displayed at the bottom of the screen while a reading is taken from the DP sensor. (Only when using battery power)

12) The value that was taken from the DP will be displayed under the ZERO value next to "DP=". To set the ZERO value to the DP value press the NEXT key. (Figure 6.5.3)

13) After the NEXT key is pressed the value for the ZERO will change and will be equal to the DP value. (Figure 6.5.4)

14) Once the ZERO has been set select the SAVE option on the MORE FEATURES screen and press the NEXT key. (Figure 6.5.5)

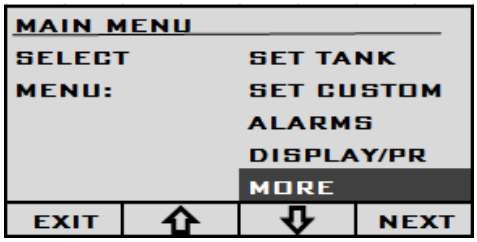


Figure 6.5.1: MORE option.

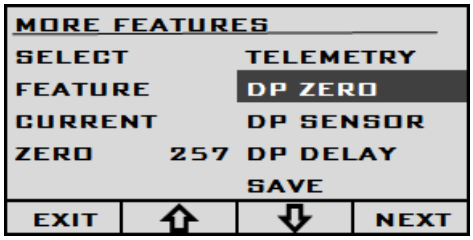


Figure 6.5.2: SET ZERO option.

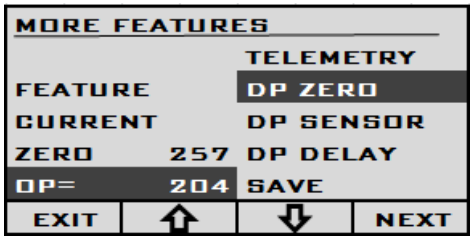


Figure 6.5.3: Setting the zero.

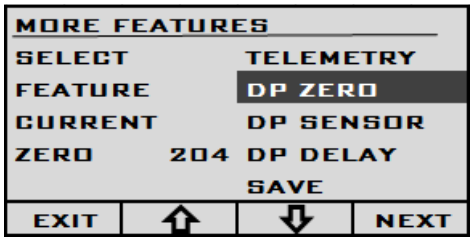


Figure 6.5.4: Setting the zero.

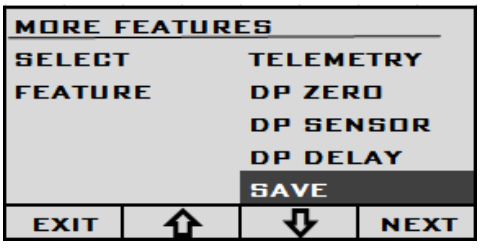


Figure 6.5.5: SAVE option.

7.6: ALARMS CONFIGURATION

7.6.1: Setting Up Alarms

15) Access the MAIN MENU by pressing and holding the MENU key for ten seconds.

16) On the MAIN MENU screen select the ALARMS option and press the NEXT key. (Figure 6.6.1)

17) On the SETUP ALARMS screen select alarm one, two, or three and press the NEXT key. (Figure 6.6.2)

18) Once you have selected an alarm use the arrow keys to set the alarm. Select the greater than symbol (>) to have the alarm activate when the tank's level is above the set value. Select the less than symbol (<) to have the alarm activate when the tank's level is below the set value. Use the UP/DOWN arrow keys to change the percentage at which the alarm will activate. (Figure 6.6.3 & Figure 6.6.4)

19) Once you have set the alarm use the RIGHT arrow key until the "*" next to the alarm value withdraw. Select the SAVE option and press the NEXT key. (Figure 6.6.5)

20) To display the alarms on the screen press the ALARMS key. The alarms that have a "*" next to them are active.

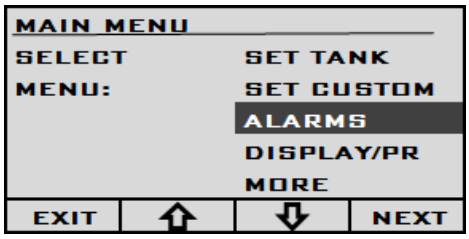


Figure 6.6.1: ALARMS option.

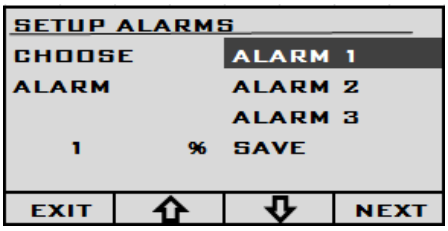


Figure 6.6.2: Select alarm.

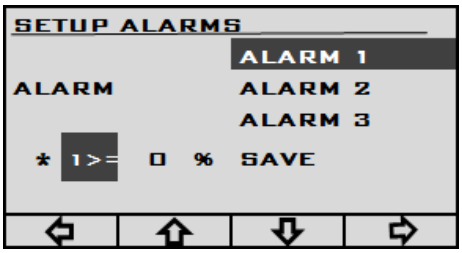


Figure 6.6.3: Select when alarm is active.

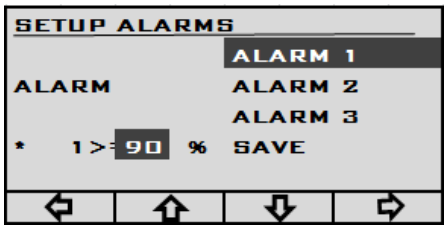


Figure 6.6.4: Set alarm value.

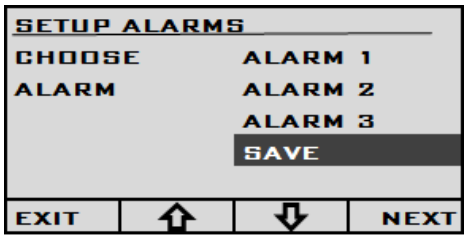


Figure 6.6.5: SAVE option.

8. PARTS INDEX

8.1 CYL-TEL PARTS INDEX

No.	Item Description	P/N
1	CYL-TEL Liquid Level System	15087831
2	Differential Pressure Sensor (LEGACY)	13275126
3	Male Elbow Brass 1/4" ODT x 1/4" MPT	1213122
4	Male Elbow Brass 1/8" ODT x 1/4" MPT	10501634
5	5-Way Valve Installation Kit	13830791
6	CYL-TEL Bulk Tank Mounting Bracket	11085290
7	CYL-TEL Wall Mount Bracket	11085302
8	AC Power Pack Supply	11061378
9	CYL-TEL Wire (For alerts and 12VDC) (100ft spool)	11080860
10	CYL-TEL Remote Display	13307263

8.2 TANK-TEL PARTS INDEX

No.	Item Description	P/N
1	TANK-TEL III GAUGE UNIVERSAL	15088640
2	TEE STREET BRS 1/4NPT	1211702
3	ELBOW STREET BRS 90D 1/4MPT	1210462
4	NIPPLE BRS 1/4NPTX3	1310172
5	TEE STREET BRS 1/4NPT	1211702
6	CONN BRS 5/16ODTX1/4FPT 37D FL	11680523
7	CONN BRS 3/8ODTX1/4FPT 37D FL	11682457
8	ELBOW BRS 90D 3/8ODTX1/4MPT	10501685
9	VALVE NEEDLE BRS 1/4MPT(ANGLE)	10907239
10	CONN BRS 3/8ODTX1/4FPT	10501511
11	SOFT COPPER TUBING	6910693
12	Vertical Hose Set	11683038
13	Horizontal Hose Set	11682991

**TANKTEL PART INDEX INCOMPLETE

9. TROUBLESHOOTING

Symptom	Possible Cause	Remedy
TANK-TEL/CYL-TEL gauge does not turn on.	Battery dead, low, installed incorrectly or missing.	Replace battery
	Transformer not plugged in or faulty wiring.	Inspect wiring and insure transformer Is plugged in. Reset circuit breaker.
	Electrical supply circuit breaker tripped.	Replace TANK-TEL/CYL-TEL front.
	Faulty TANK-TEL/CYL-TEL	Replace TANK-TEL/CYL-TEL front.
	Physical keypad not connected to CYL-TEL circuit board.	Verify that the ribbon cable for the keypad is connected to the CYL-TEL circuit board.
TANK-TEL/CYL-TEL display is powered, but stays at zero.	No product in cylinder.	Ensure there is liquid in cylinder.
	5-way valve in "Equalizer/ Service" position (CYL-TEL only).	Turn valve to "Normal Operation" position.
	5-way valve installed incorrectly. (CYL-TEL only).	See user manual to confirm proper installation.
	Tank parameters are improperly set.	Verify each parameter setting. The pressure setting as well as the inner dimensions can affect the accuracy of the gauge.
	Faulty TANK-TEL/CYL-TEL	Replace TANK-TEL/CYL-TEL front.
TANK-TEL/CYL-TEL display always reads full.	Parameters are improperly set.	Verify each parameter setting/ The pressure setting as well as the inner dimensions can affect the accuracy of the gauge.
	Faulty TANK-TEL/CYL-TEL.	Replace TANK-TEL/CYL-TEL front.
Liquid level oscillates with 5-way valve in either position.	5-way valve leaking externally.	Replace 5-way valve.

Liquid level display does not zero when 5-way valve is in "Equalization/Service" position.	TANK-TEL/CYL-TEL zero not set.	Refer to TANK-TEL/CYL-TEL manual.
Liquid level displayed not accurate	TANK-TEL/CYL-TEL zero not set. Incorrect differential pressure sensor selected.	Refer to CYL-TEL manual. Verify that the CYL-TEL is setup with the correct differential pressure sensor selected.
TANK-TEL/CYL-TEL display shows "Open Loop".	Differential pressure sensor not connected to CYL-TEL circuit board. Incorrect differential pressure sensor selected.	Verify that the differential pressure sensor is connected to the TANK-TEL/CYL-TEL board at the appropriate connector. Verify that the TANK-TEL/CYL-TEL is setup with the correct differential pressure sensor selected.
Pressure display always read zero.	Incorrect pressure sensor selected on TANK-TEL/CYL-TEL Gauge. Pressure sensor not connected to the CYL-TEL circuit board.	Verify that the correct pressure sensor is selected on the CYL-TEL Gauge on the SETUP DISPLAY menu. Verify that the pressure sensor is connected to the CYL-TEL circuit board at the appropriate input.

10. APPENDIX

A. TANK-TEL III MODEM BOARD INSTALLATION INSTRUCTIONS

1. Remove the front panel of the Tank-Tel (Figure 1).

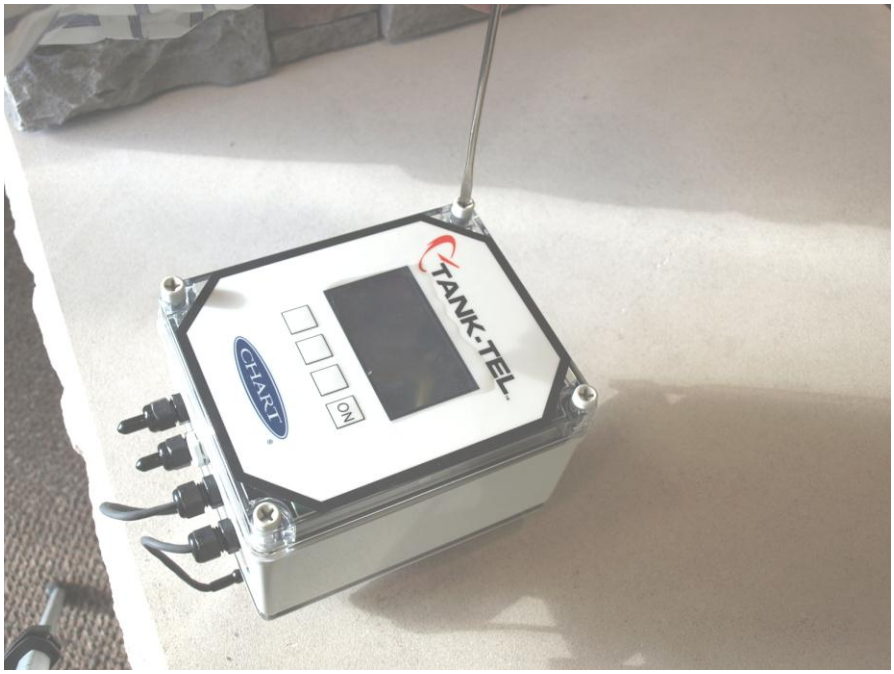


Figure A-1

2. Position the Modem Board on the Stand-offs in the main enclosure (Figure 2).

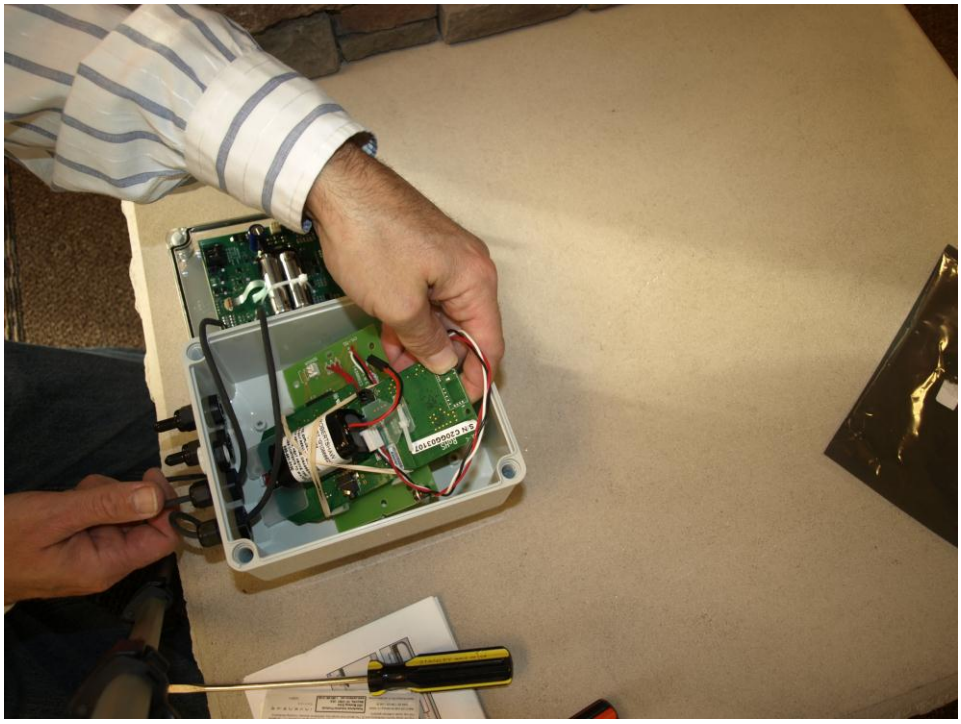


Figure A-2

3. Anchor the Modem Board with the supplied screws into the stand-offs in the main enclosure (Figure 3).

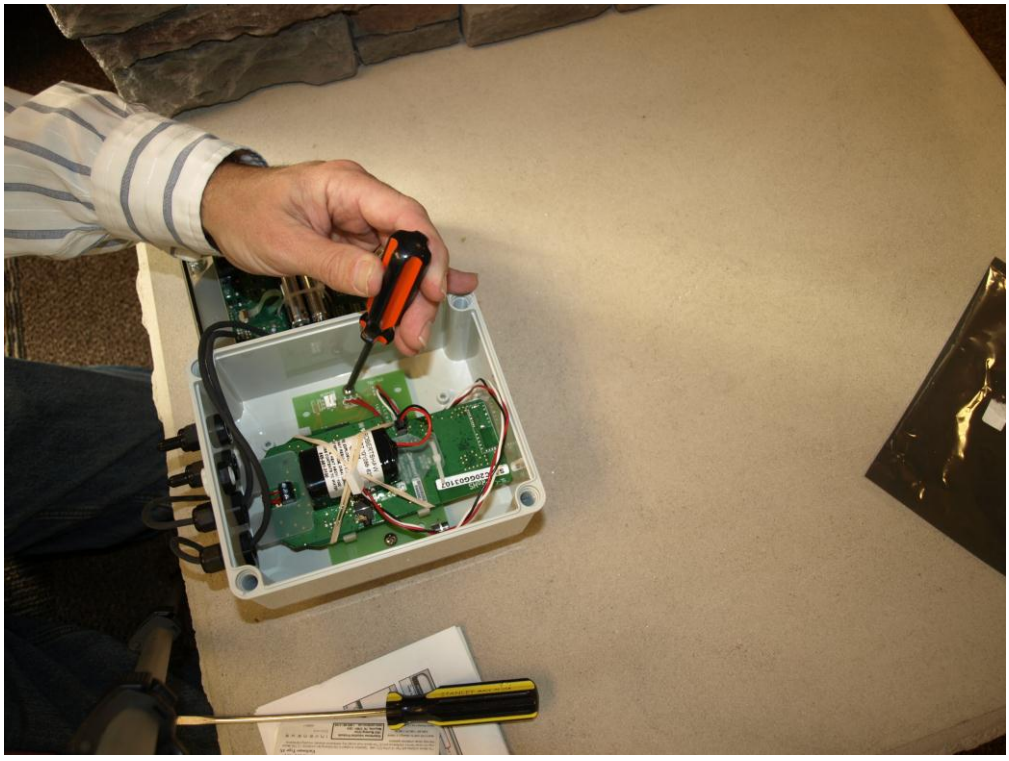


Figure A-3

4. Remove the DP Sensor Connector from the Tank-Tel Main Board (Figure 4).

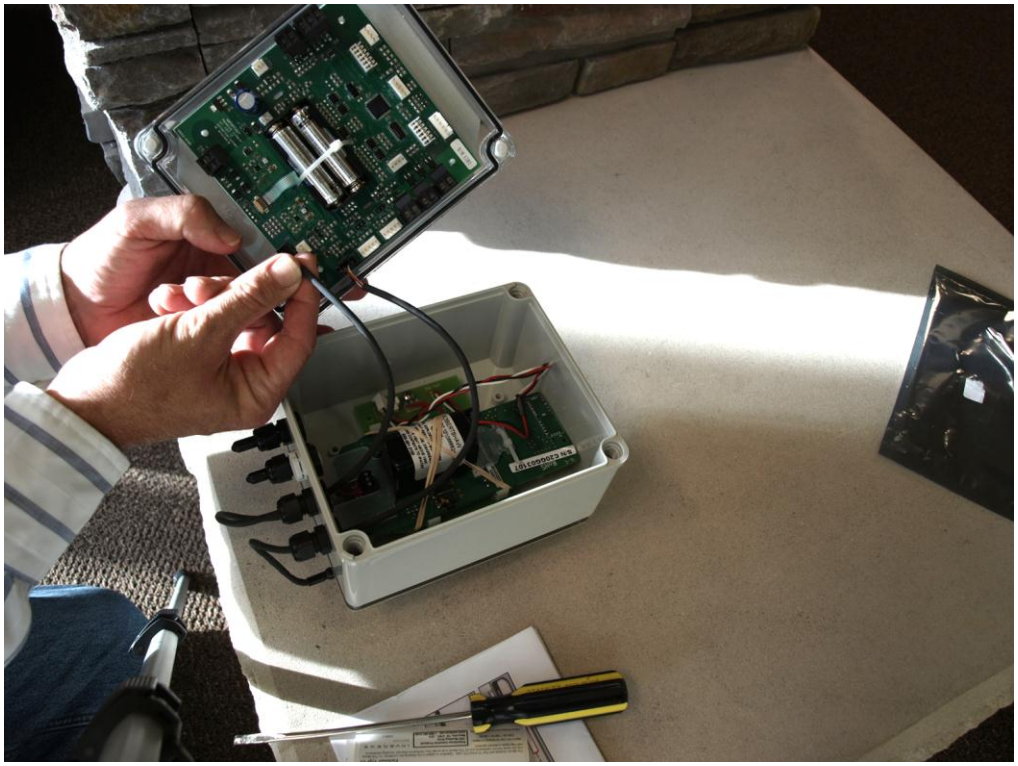


Figure A-4

5. Install the DP Connector from the Modem Board into the 3 pin connector labeled "DP Sensor (Legacy)" of the Tank-Tel Main Board (lower right corner of circuit board)(Figure 5).

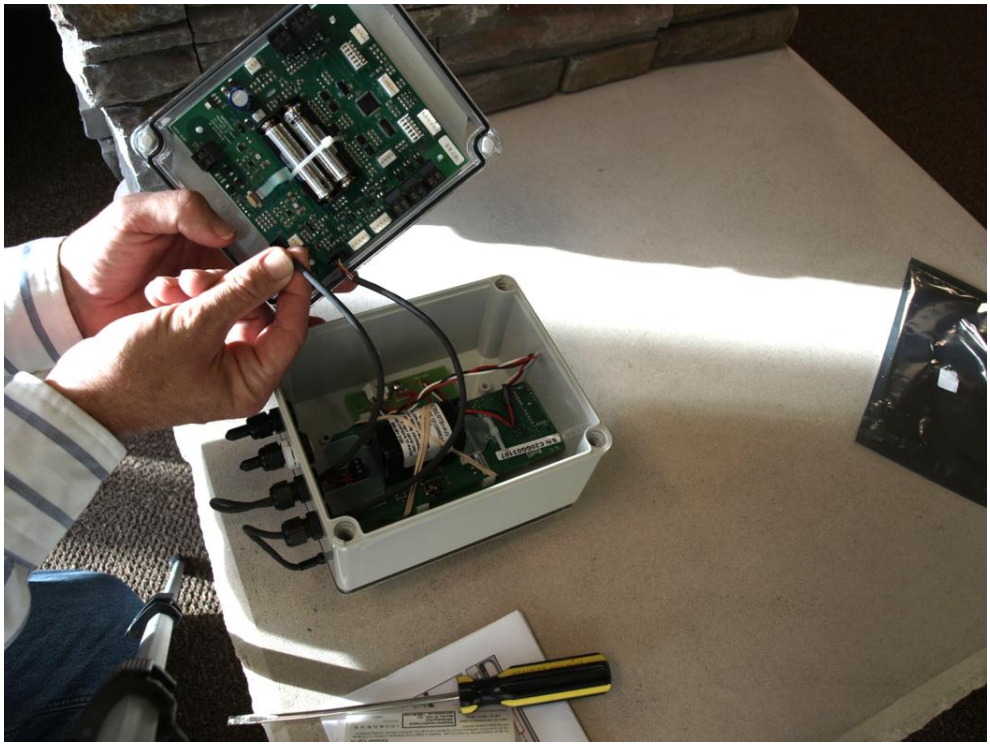


Figure A-5

6. Connect the 4 pin DP Sensor Connection to the Modem Board Connection J1 (Figure 6).

Figure A-6

7. Connect the 2 pin Power Connector to the Modem Board (Figure 7).

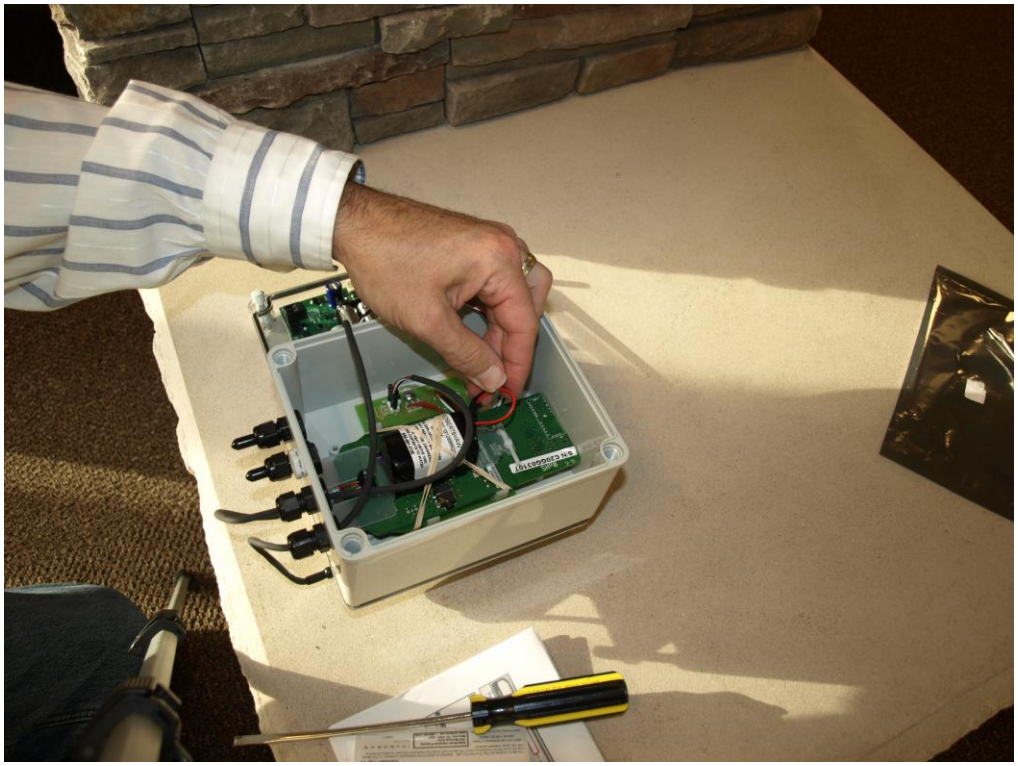


Figure A-7

8. Remove the Activation Magnet from its holder (Figure 8).

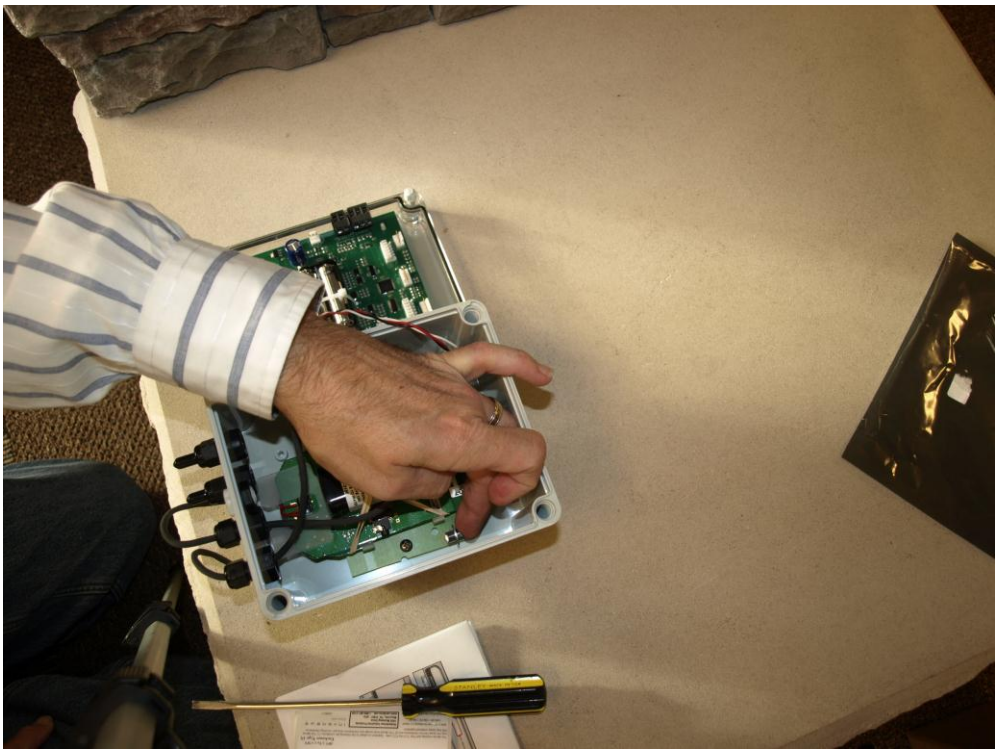


Figure A-8

9. Touch the magnet to the area near the Power Connection on the Modem Circuit Board. A red light will turn on briefly then blink for a short time when the activation is successful (Figure 9).

Figure A-9

10. Return the magnet to its holder and replace the front cover (Figure 10).

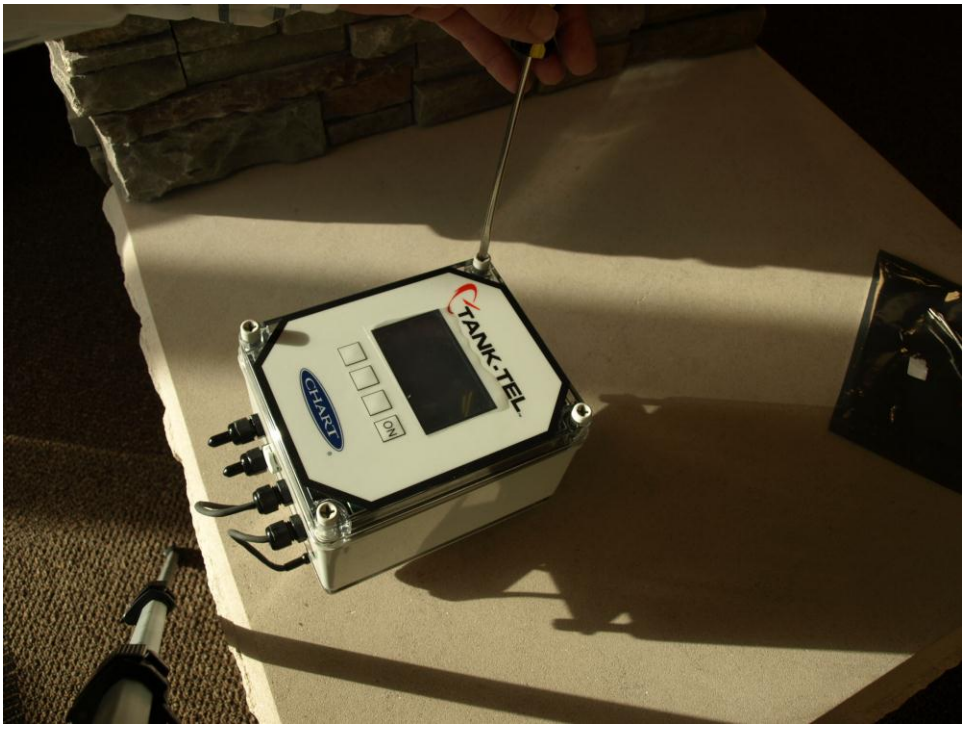


Figure A-10

B. CYL-TEL PRESSURE TRANSDUCER INSTALLATION INSTRUCTIONS

The Pressure Transducer Package includes a pressure sensor, a threaded screw and a lock nut.

8. Apply PTFE Thread Sealant Tape to the Pressure Transducer to ensure there is no leakage.
9. Install the Pressure Transducer onto Tee Street BRS 1/4 NPT (P/N 1211702).

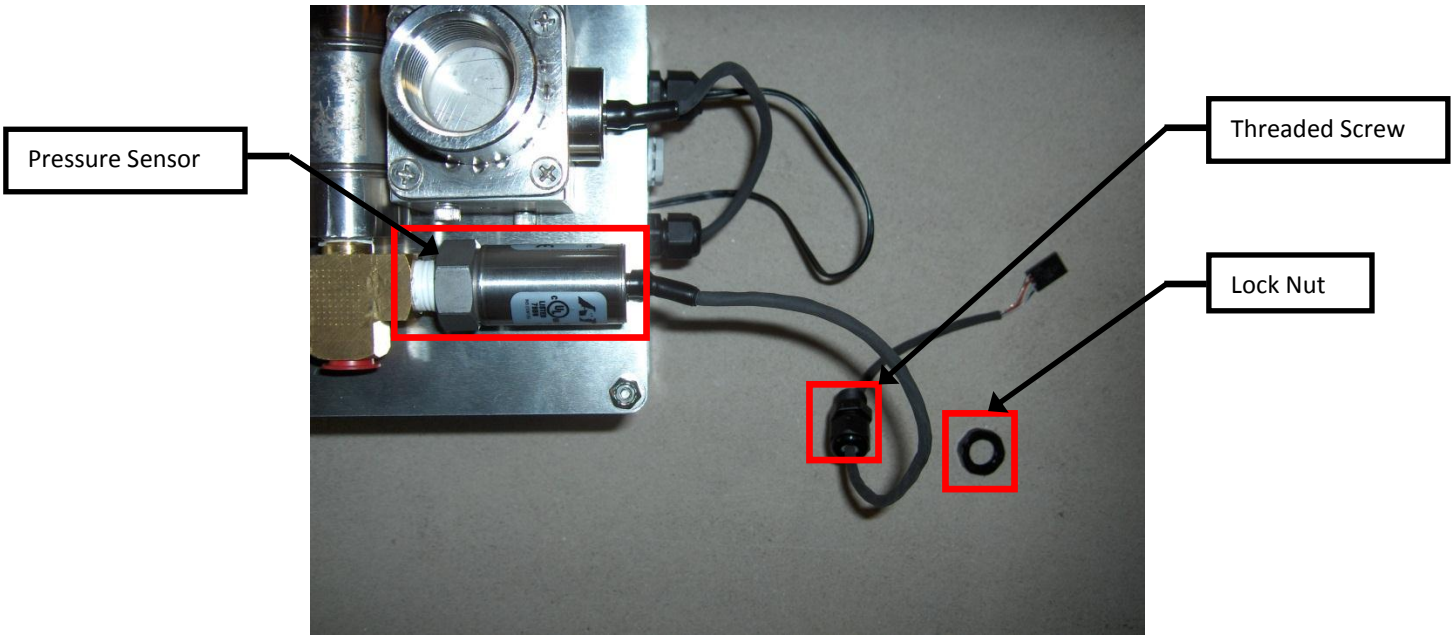


Figure B-1

10. Remove the front panel of CYL-TEL III.
11. Insert the free end of the Pressure Transducer through the hole on the bottom of the CYL-TEL III gauge.

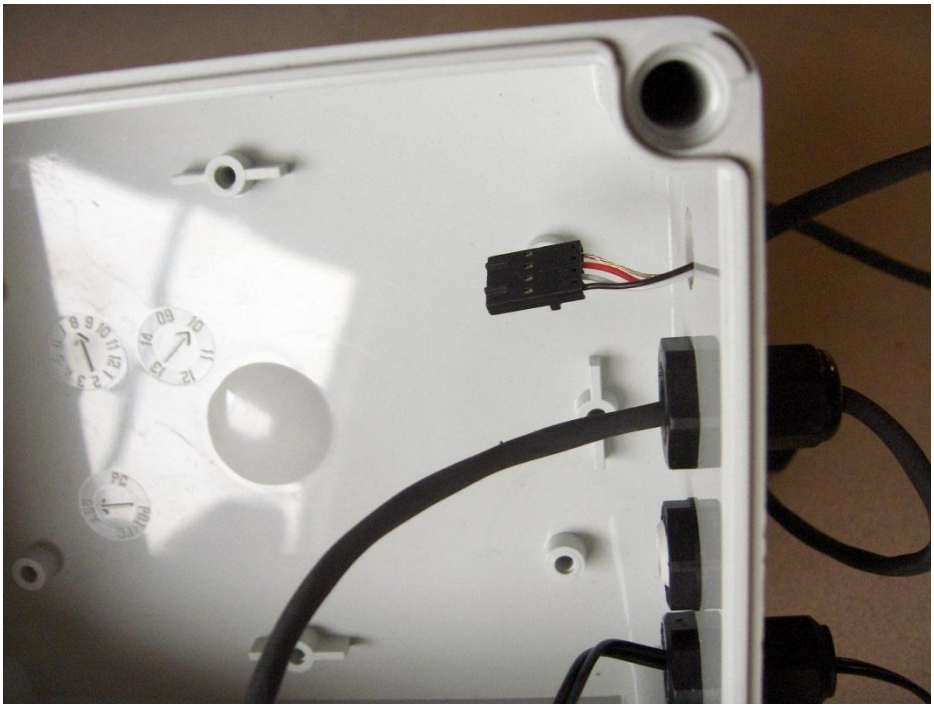


Figure B-2

12. Thread and tighten the lock nut.

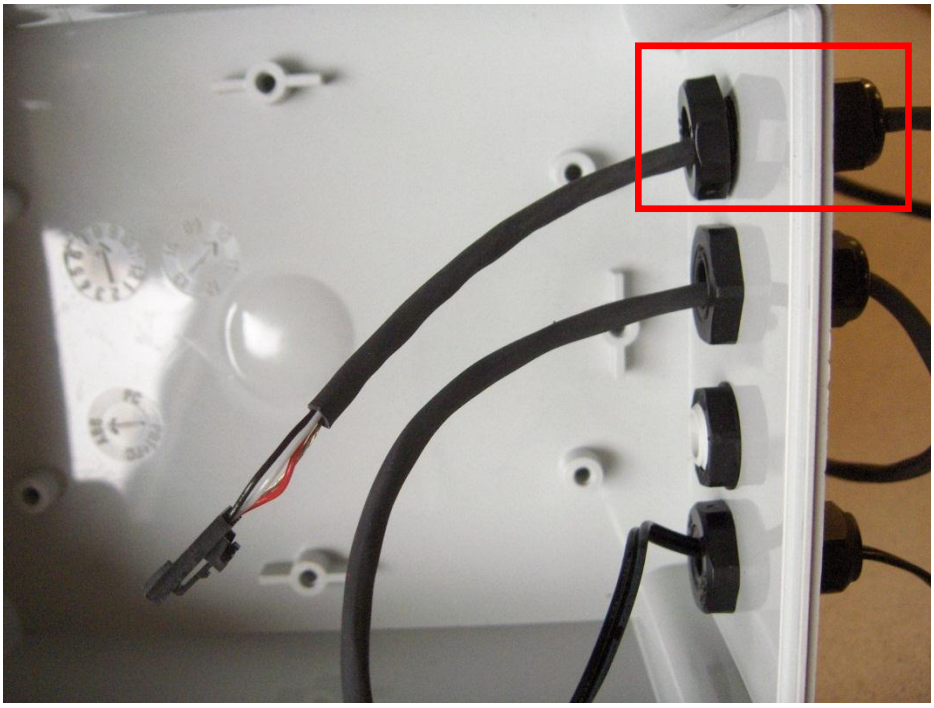


Figure B-3

13. Plug the free end into slot J18 (Pressure Sensor).

Figure B-4

14. Replace the front panel of CYL-TEL III.

C. PRE-2009 CHART STANDARD BULK TANK DIMENSIONS

Table C-1:

Vertical	Inner Diameter	Overall Length
Atmospheric Vessels	ID (in)	OAL (in)
VS-525	60.0	55.6
VS-900	60.0	87.6
VS-1500	60.0	141.6
VS-2000	76.0	178.0
VS-3000	75.5	178.0
VS-6000	75.5	330.5
VS-9000 (91")	90.2	360.0
VS-9000 (102")	101.1	291.5
VS-11000(91")	90.2	434.0
VS-11000(102")	101.1	350.5
VS-13000 (102/119)	101.1	409.5
VS-15000 (102/119)	101.1	468.5

Table C-2:

Horizontal	Inner Diameter	Overall Length
Atmospheric Vessels	ID (in)	OAL (in)
HS-1500	60.0	141.0
HS-3000	75.3	178.0
HS-6000	75.3	330.5
HS-9000	101.1	291.5
HS-11000	101.1	350.5
HS-13000	101.1	409.5
HS-15000	101.1	468.5

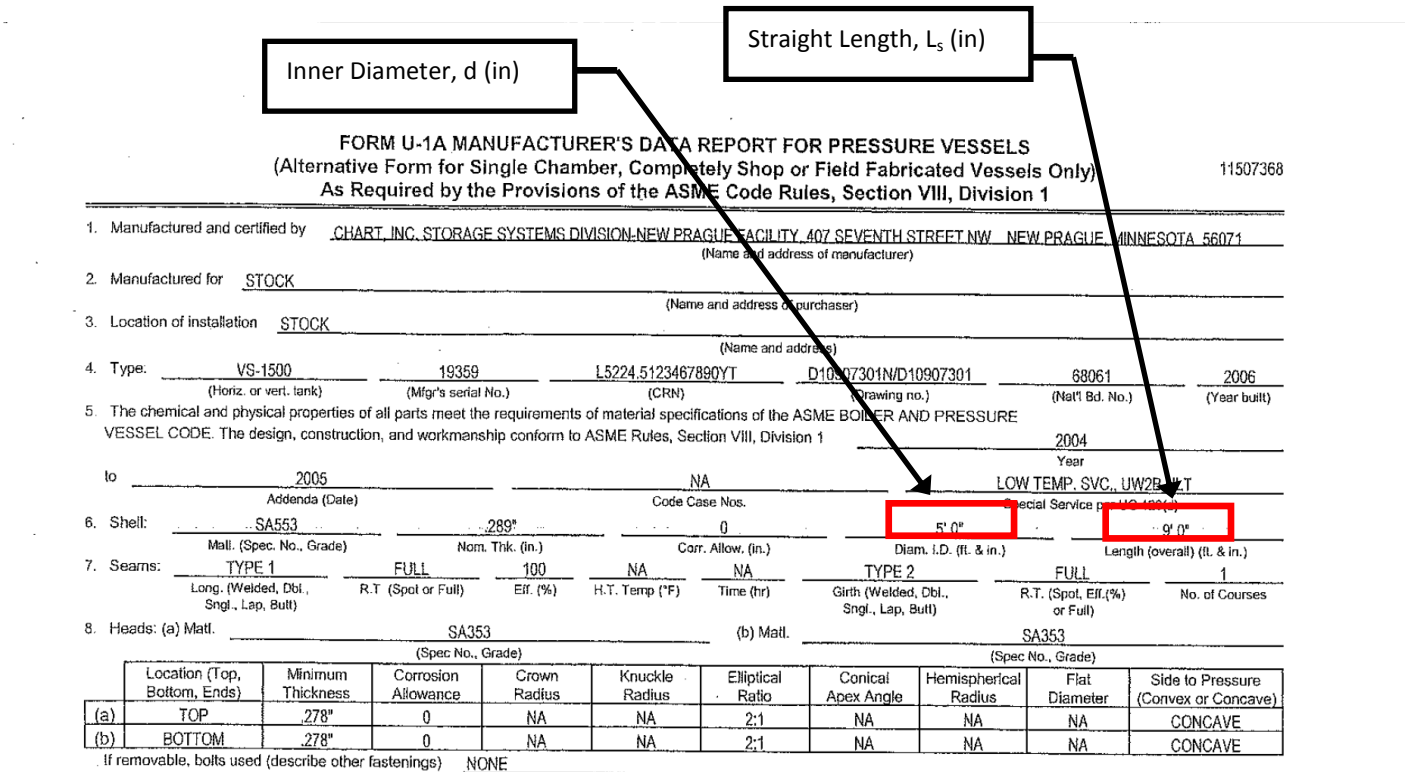
Table C-3:

Vertical	Inner Diameter	Overall Length
CO2 Vessels	ID (in)	OAL (in)
VS-6TON	60.0	141.6
VS-14TON	74.8	178.0
VS-30TON (91")	89.5	290.0
VS-30TON (102")	100.4	232.5
VS-50TON (91")	89.5	434.0
VS-50TON (102")	100.4	350.5
VS-50TON 1299/833	96.4	380.5

Table C-4:

Horizontal	Inner Diameter	Overall Length
CO2 Vessels	ID (in)	OAL (in)
HS-6TON	60.0	141.6
HS-14TON	74.8	178.0
HS-30TON (102")	100.4	232.5
HS-50TON (102")	100.4	350.5
VHR 120	27.6	51.3
VHR 260	37.2	44.2
VHR 400	44.0	70.5

D. DETERMINING THE VALUES OF "L" AND "d" FOR CUSTOM TANL SETUP



FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS
(Alternative Form for Single Chamber, Completely Shop or Field Fabricated Vessels Only)
As Required by the Provisions of the ASME Code Rules, Section VIII, Division 1

11507368

1. Manufactured and certified by CHART, INC. STORAGE SYSTEMS DIVISION-NEW PRAGUE FACILITY, 407 SEVENTH STREET NW NEW PRAGUE, MINNESOTA 56071 (Name and address of manufacturer)
2. Manufactured for STOCK (Name and address of purchaser)
3. Location of installation STOCK (Name and address)
4. Type: VS-1500 (Horiz. or vert. tank) | 19359 (Mfgr's serial No.) | L5224.5123467890YT (CRN) | D10907301N/D10907301 (Drawing no.) | 68061 (Nat'l Bd. No.) | 2006 (Year built)
5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME Rules, Section VIII, Division 1 2004 (Year)
   to 2005 (Addenda (Date)) | NA (Code Case Nos.) | LOW TEMP. SVC., UW2B, UHT (Special Service per UG-120(c))
6. Shell: SA553 (Matl. (Spec. No., Grade)) | .289" (Nom. Thk. (in.)) | 0 (Corr. Allow. (in.)) | 5' 0" (Diam. I.D. (ft. & in.)) | 9' 0" (Length (overall) (ft. & in.))
7. Seams: TYPE 1 (Long. (Welded, Dbl., Sngl., Lap, Butt)) | FULL (R.T. (Spot or Full)) | 100 (Eff. (%)) | NA (H.T. Temp (°F)) | NA (Time (hr)) | TYPE 2 (Girth (Welded, Dbl., Sngl., Lap, Butt)) | FULL (R.T. (Spot, Eff.(%) or Full)) | 1 (No. of Courses)
8. Heads: (a) Matl. SA353 (Spec No., Grade) (b) Matl. SA353 (Spec No., Grade)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)	TOP	.278"	0	NA	NA	2:1	NA	NA	NA	CONCAVE
(b)	BOTTOM	.278"	0	NA	NA	2:1	NA	NA	NA	CONCAVE

If removable, bolts used (describe other fastenings) NONE

Figure D-1: Example of U-1A Form

D.i. Determining the values of "L" and "d" based on U-1A Form:

$$Overall\ Length, L = Straight\ Length, L_s + 4'' + \frac{Inner\ Diameter, d}{2}$$

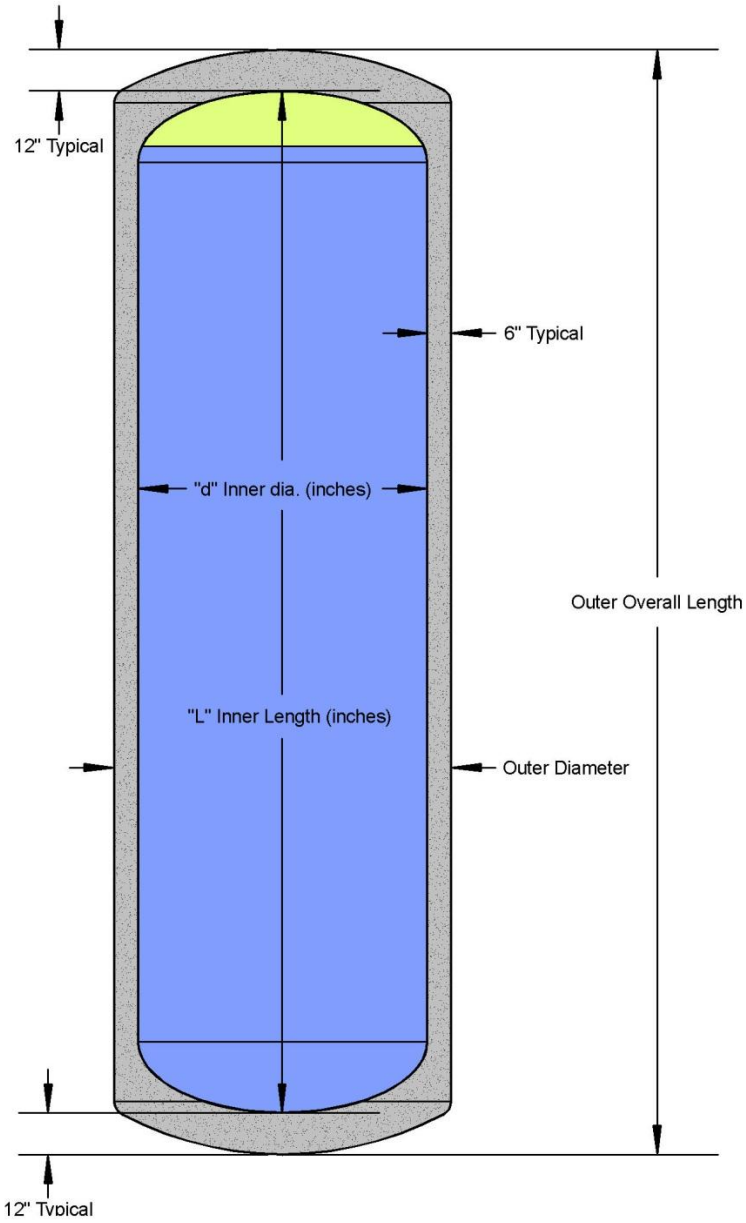


Figure D-2: Schematic drawing of a typical Bulk Tank.

D.ii. Determining the values of "L" and "d" based on schematic drawing of a bulk tank:

$$Inner\ Length, L = Outer\ Overall\ Length - (2\ \times 12'')$$

$$Inner\ Diameter, d = Outer\ Diameter - (2\ \times 6'')$$

Note: If facing problems on determining "L" and "d" values, please call Chart Inc. customer service for immediate assistance.

E. DECLARATION OF CONFORMITY

CE

Declaration of Conformity
EMC Directive 2004/108/EC

Manufacturer: Chart Inc.
Address: 1300 Airport Drive
Ball Ground, GA 30107

EC Representative: Chart Ferox, a.s.
Radek Rosenbaum
Ustecka 30
405 30 Decin
Czech Republic

Equipment Designation: CylTel ®
TankTel ®

We certify that the enclosed units have been manufactured in conformance with the EMC Directive 2004/108/EC

Chart Ferox, a.s.
Ústecká 30
CZ-405 30, Děčín V

Rosenbaum — 27.1.2012
Name (printed) — Date

Figure E-1: Sample of CE