



LIQUID LEVEL GAUGE

INSTALLATION AND OPERATING INSTRUCTION MANUAL

Cyl-Tel Quick-Start Instructions

Keypad Operation

1 Single Key Operations.

1.1 **ON** Key.

If you *PRESS* and *HOLD* the **ON** key for 10 seconds the CYL-TEL will run through its startup diagnostics tests. When the test is complete, all the red LED's will turn off unless an alarm is present.

1.2 **SELECT** Key.

This key allows you to select a variable that you have incremented to and advances you to the next field.

1.3 $\uparrow$ Key.

This key allows you to scroll through all available options within a field.

2 Multiple Key Operations.

2.1 Changing Displayed Units.

While holding the **SELECT** and **ON** keys, press the $\uparrow$ key to toggle between units.

The line of green LED's on the left side of the box defines which units are being used. When no LED is lit, the display is in "*inches of H₂O*".

2.2 Setting Alerts.

- 1) *PRESS* and *HOLD* the $\uparrow$ and **SELECT** keys for 5 seconds. This will allow you to enter the Alert menu. The first digit of the alarm setting will be blinking.
- 2) Set the first digit to the desired setting using the $\uparrow$ key to increment.
- 3) Use the **SELECT** key to move to the next digit. Use the $\uparrow$ key to increment that digit.
- 4) Continue until Alarms 1 and 2 are set. The CYL-TEL will now read liquid level.

2.3 Configure liquid parameters.

- 1) *PRESS* and *HOLD* the $\uparrow$ and **SELECT** keys for 10 seconds, bypassing the alarm setting menu.
- 2) Choose the correct liquid type for the tank by incrementing with the $\uparrow$ key.
- 3) The **SELECT** key will move to the tank configuration menus.

2.4 Configure tank parameters.

- 1) The tank parameter menus are entered after the liquid type is chosen.
- 2) Enter tank length using the $\uparrow$ key to set the parameter and the **SELECT** key to move to the next digit.
- 3) After the tank length is complete, the tank diameter should be entered using the $\uparrow$ and **SELECT** keys.
- 4) Choose the tank orientation, horizontal or vertical, using the $\uparrow$ key. Press the **SELECT** key when complete.
- 5) Bypass the tank calibration menu for the time being by pressing the **SELECT** key. (Factory setting : 0)
- 6) Enter the liquid density pressure using the $\uparrow$ key to increment and the **SELECT** key to finish.

2.5 Calibrating the CYL-TEL

With the 5-way valve in equalization position, take a reading of % full off the meter.

Note: The calibration constant must be changed if the reading is different than 0%.

- 1) Enter the calibration menu by passing through the tank parameter menus until the calibration constant menu is reached.
- 2) The calibration constant can be any number between -9 and 9 with each step being approximately 3%. Change the constant from 0, using the $\uparrow$ key, to achieve the proper reading.
- 3) Continue until the meter reads 0% full.
- 4) The 4-way valve should be opened for operation when complete.

NOTE: NEVER leave the 4-way valve in the equalization position for extended periods of time.

Reference Information

Display read-outs

Cyl-Tel Operational Settings Display Reference Table		
Alarms	18000 #1	28000 #2
Liquid Types	dn_n2 Nitrogen	dn-02 Oxygen
	dn-Ar Argon	dnCO2 Carbon Dioxide
	dnN2O Nitrous Dioxide	
Orientation	0r--- Horizontal	0r Vertical
Operating Pressure	P 100 *Operating Pressure	
Calibration	CAL 0 Calibration Mode	

(Select pressure closest to the saturation pressure of liquid for best level of accuracy.)

CAUTION: The gauge sensor CANNOT be exposed to a differential pressure greater than 30PSIG. If exposed to a differential pressure greater than 30PSIG the sensor will be permanently damaged.

NOTICE

The CYL-TEL gauge is approved for use on Perma-Cyl, Mega-Cyl, HL (small) and Dura-Cyl series tanks, in liquid nitrogen, oxygen, argon, carbon dioxide, and nitrous oxide service. Chart Industries does not approve the use of this gauge on small bulk or large bulk tanks. Any other use of this gauge is the responsibility of the user.

TABLE of CONTENTS

I	INTRODUCTION	9
1.1	What is the CYL-TEL System?	9
1.2	CYL-TEL Gauge Specifications. (P/N 11018142)	10
II	EQUIPMENT	12
2.1	Suggested Equipment.	12
2.2	Additional Components	12
2.3	4/5-way Valve Installation Kit. (P/N 11076414).....	12
2.4	CYL-TEL SYSTEM Components.....	12
III	GAUGE INSTALLATION WITH OPTIONAL 4/5-WAY VALVE KIT	13
3.1	Prepare Items for Installation on tank.	13
3.2	Installation on tank.	13
	Figure 1.....	14
	Figure 2.....	14
IV	CYL-TEL GAUGE POWER & ALERTS WIRING.....	16
4.1	Prepare Wire.	19
4.2	Connect Power Wires to the Gauge.....	21
	Figure 5.....	21
	Figure 6.....	21
4.3	Wire the Power Pack to the CYL-TEL Gauge.	21
	Figure 7.....	22
4.4	Connect Phone Transmitter Wires to the Gauge.....	22
	Figure 8.....	23
	Figure 9.....	23
	Figure 10.....	
VIII	CYL-TEL ELECTRICAL QUICK DISCONNECT	24
8.1	Electrical Disconnect Kit.....	24
8.2	Panel Mount End Connections.....	24
	Figure 12.....	24
8.3	Cable End Connections.....	24

Figure 13.....	25
IX CYL-TEL GAUGE OPERATION	25
9.1 Keypad Operation.	26
9.2 Multiple Key Functions.....	26
9.3 Configure Alerts.	26
9.4 Configure Liquid Type.	27
9.5 Configure Tank Length.	28
9.6 Configure Tank Diameter.	28
9.7 Configure Tank Orientation.	29
9.8 Configure the Calibration Parameter.....	29
9.9 Configure Liquid Density Pressure.	29
X CALIBRATING CYL-TEL GAUGE.....	30
10.1 Calibrating CYL-TEL Gauge with 5-Way Valve on Tank.	30
10.2 Calibrating CYL-TEL Gauge WITHOUT 5 Way Valve on Tank.....	31
XIV CHART IND. TANK DIMENSIONS	32
XV SPARE PARTS	41
15.1 CYL-TEL Gauge Spare Parts.	34
XVI TROUBLESHOOTING	44

CYL-TEL Manual Revision Schedule

Revision Level	Date of Revision	Reason for change
A	12/15/1999	Initial Release
B	01/17/2000	Added transmitter programming instructions
C	03/28/2000	Added electrical quick disconnect information
D	04/24/2000	Added laptop programming instructions
E	05/18/2000	Updated for 12 VDC Phone Transmitter
F	06/19/2000	Added technical bulletin for paging
G	07/19/2000	General update
H	2/20/2002	Updated for new tank offerings
I	4/14/2003	Misc. Updates including Windows Scully
J	8/12/2003	Added OnSite web guide and Troubleshooting
K	9/3/2003	General update
L	10/28/2003	General update
P	4/25/2005	Update with Perma-Cyl 2000 dimensions
Q	5/16/2008	Modified to improve usability
	10/21/2009	Update with Perma-Cyl 265 & 3000 dimensions
R	2/25/2010	Modified formatting and deleted obsolete components (phone transmitter, satellite receiver).

CHART STORAGE SYSTEM DIVISION

New Prague, Minnesota 56071

CYL-TEL[®] GAUGE WARRANTY

The CYL-TEL[®] gauge and transmitters manufactured by Chart Ind. are warranted to be free from defects in workmanship for a period of one (1) year from date of shipment to original purchaser. Chart Ind. warrants materials and component parts furnished or manufactured by others for the same time and extent, but only if so warranted and guaranteed by the respective suppliers and manufacturers.

Purchaser agrees to fully inspect all goods immediately upon delivery, and further agrees to give Chart Ind. written notice of any claim or defect within ten (10) days after discovery of such defect, and return of said defective equipment, freight prepaid, to plant of manufacture. If after inspection by Chart Ind. such equipment is proven to be defective, and provided that said equipment has been operated in accordance with generally accepted practice and all operating instructions issued by the manufacturer, Chart Ind. will at its option and as purchaser's exclusive and sole remedy, repair or replace such equipment or any defective component or part thereof F.O.B. plant of manufacture, or refund the purchase price of said equipment or any component part thereof which proves to be defective. Alterations or repairs by others, unless authorized in writing by Chart Ind., shall void this warranty. Chart Ind. shall not be liable for defects caused by the effects of normal wear and tear, erosion, corrosion, fire, or explosion.

This warranty shall be effective only if purchaser fully and promptly makes all required payments to Chart Ind. upon the purchase price. Chart Ind. exclusive liability under this warranty shall not exceed repair, replacement, or in any event a refund, at the net purchase price paid by the purchaser and Chart Ind. is not liable for any other losses, damages, or delays. THERE ARE NO OTHER WARRANTIES OR GUARANTIES, EXPRESSED OR IMPLIED, OTHER THAN OR WHICH EXTEND BEYOND THOSE EXPRESSED HEREIN.

NOTICE PERTAINING TO CE Certificate of Conformity, FCC, & CSA

This device has been tested and complies with the appropriate directives to fulfill the CE mark requirement. Documents available upon request.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

CYL-TEL SYSTEM INTRODUCTION

1.1 What is the CYL-TEL SYSTEM?

CONGRATULATIONS, you have purchased the latest in digital liquid level monitoring and reporting. This product will aid you in your liquid distribution system, reducing your delivery costs and customer concerns.

The CYL-TEL System can be installed easily on any Chart Ind. Perma-Cyl, Mega-Cyl, Dura-Cyl or other tanks that utilize a differential pressure gauge (CYL-TEL) and similar plumbing. (Vessel top phase line connections) The gauge is programmable and can be used with a variety of cryogenic liquids. (e.g. LO₂, LN₂, LAr, LCO₂, and LN₂O) The system consists of 4 major components:

- (1) A programmable gauge with 2 level alerts.
- (2) A telemetry device that can be programmed to call your computer when alarm occurs. This device also can be configured to call-in on a regular basis even if an alert has not been triggered.
- (3) A special modem connected to your computer that will store data for up to 2 days when the program is not running.
- (4) Custom PC software for the phone or satellite system.

1.1.1 CYL-TEL Gauge.

The CYL-TEL Gauge is rated for indoor or outdoor use. It must be configured for each tank. Before use, the following parameters must be input in the CYL-TEL Gauge: *tank orientation, liquid type, tank dimensions, alert 1 and 2 levels, and the unit of measurement to be displayed (in % full, Liters, Gallons, Kilograms, Pounds, Standard Cubic Feet, Normal Cubic Meters, or Inches of Water)*. More will be discussed on programming the CYL-TEL Gauge in section 1.29. The CYL-TEL Gauge is compatible with either the CYL-TEL Phone transmitter or the CYL-TEL Satellite Transmitter.



1.2 CYL-TEL Gauge Specifications. (P/N 11018142)

Physical

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

Electrical Inputs

- 120VAC Wall Plug Power Supply.
12VDC @ 500mA output to CYL-TEL.
- 230VAC Wall Plug Power Supply.
12VDC @ 500mA output to CYL-TEL.
- Optional Battery Powered (9V).
In battery operation Alert1 and Alert2 are disabled.

Outputs

- 2 independent programmable alert levels, programmable in 5% increments from 0% to 100%. *See programmable features.*
- Low Battery Indicator.
- Unit of Measure Indicator.
- Large 5 Character x 0.4" High LCD Display.

Sensor Accuracy

± 2.5% of Full Scale 0°C to 70°C.

Operating Temperature:	-30°C to +70°C
Operating Pressure:	0 - 500 PSIG
Operating Differential Pressure:	0 - 160 inches of water column
Maximum Operating Differential Pressure:	30 PSIG
Operator Interface:	Keypad (3 button - ↑, SEL, ON)

Programmable Features

- **Product Type:**
LN₂, N₂O, LAr, O₂, CO₂
- **Unit of Measurement:**
 - *Percent Full (% Full)*
 - *Liters (L)*
 - *Gallons (Gal.)*
 - *Pounds (Lbs.)*
 - *Kilograms (Kg.)*
 - *Standard Cubic Feet(SCF)*
 - *Inches H₂O*
 - *Normal Cubic Meters (NM³)*
- **Alert Programmability***
 - *Alert 1 programmable from 0% to 100% in 5% increments.*
 - *Alert 2 programmable from 0% to 100% in 5% increments.*

* If two or three CYL-TEL Gauges are connected to one CYL-TEL Phone Transmitter, only one alert can be used per CYL-TEL gauge.
- **Tank Dimensions:**
Length and Diameter
- **Tank Orientation:**
Vertical or Horizontal

Display Resolution

% Full	5%
Liters	1
Gal.	1
Kg	1
Lbs.	1
SCF	10
NM ³	1
"H ₂ O	0.7

EQUIPMENT

1.3 Suggested Equipment.

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

- 1) 2 ea. $\frac{5}{8}$ " Open End Wrench. (or 2ea 8" Crescent Wrench)
- 2) 2 ea. $\frac{9}{16}$ " Open End Wrench.
- 3) 1 ea. $\frac{7}{16}$ " Open End Wrench.
- 4) 1 ea. #2 Phillips Screwdriver.
- 5) 1 ea. #1 Phillips Screwdriver.
- 6) 1 ea. $\frac{1}{8}$ " x 2" Slotted Screwdriver.
- 7) 1 ea. Roll of PTFE Thread Sealant Tape, $\frac{1}{2}$ " Wide.
- 8) Liquid Leak Detector.
- 9) 1 ea. Wire Stripper for 22AWG Wire.

1.4 Additional Components

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

NOTE: *The CYL-TEL Gauge is interchangeable with existing Analog gauges. Additional parts should not be required. All fittings and tubing must have a minimum pressure rating of 600 PSIG.*

1.5 5-way Valve Installation Kit. (P/N 11076414)

- 1) 2 ea. Compression Fitting Brass Male Connector $\frac{1}{8}$ " ODT x $\frac{1}{4}$ " MPT. P/N 1012822
- 2) 1 ea. Hex Nipple Brass $\frac{1}{4}$ " MPT. P/N 130092
- 3) 4 ea. Male Elbow Brass $\frac{1}{8}$ " ODT x $\frac{1}{4}$ " MPT. P/N 10501634
- 4) 39 in. Copper tubing $\frac{1}{8}$ " ODT. P/N 6910683
- 5) 100 ft. 4 Conductor Cable. P/N 11080860
- 6) 1 ea. Valve 5-Way, w/ one port plugged. P/N 11627651

1.6 CYL-TEL SYSTEM Components

- 1) 1 ea. CYL-TEL Gauge. P/N 11018142.
- 2) 1 ea. Optional Power Supply. P/N 11061378.
- 3) 1 ea. Optional CYL-TEL Wire. (For alerts and 12 VDC) (100 ft. spool)
P/N 11080860
- 4) 1 ea. Optional CYL-TEL Phone Transmitter. P/N 11041705
- 5) 1 ea. Optional CYL-TEL Satellite Transmitter. Contact factory for P/N.
- 6) 1 ea. Optional CYL-TEL Satellite Transmitter Tank View Software.
P/N 11192458
- 7) 1 ea. Optional 5-way valve isolation kit. P/N 11076414

- 8) 1 ea. Optional CYL-TEL Gauge wall mount bracket kit. P/N 11085302
- 9) 1 ea. Optional CYL-TEL Gauge bulk tank mount bracket kit. P/N 11085290

1.7 Optional 4-way Valve Installation Kit. (P/N 11076414)

- 7) 2 ea. Compression Fitting Brass Male Connector $\frac{1}{8}$ " ODT x $\frac{1}{4}$ " MPT. P/N 1012822
- 8) 1 ea. Hex Nipple Brass $\frac{1}{4}$ " MPT. P/N 130092
- 9) 4 ea. Male Elbow Brass $\frac{1}{8}$ " ODT x $\frac{1}{4}$ " MPT. P/N 10501634
- 10) 39 in. Copper tubing $\frac{1}{8}$ " ODT. P/N 6910683
- 11) 100 ft. 4 Conductor Cable. P/N 11080860
- 12) 1 ea. Valve 4-Way, 90 Degree Rotation w/Handle. P/N 11026353

GAUGE INSTALLATION WITH OPTIONAL 5-WAY VALVE KIT

NOTE: Installation is for a 450-liter tank. Installations on 1000-liter tanks may vary.

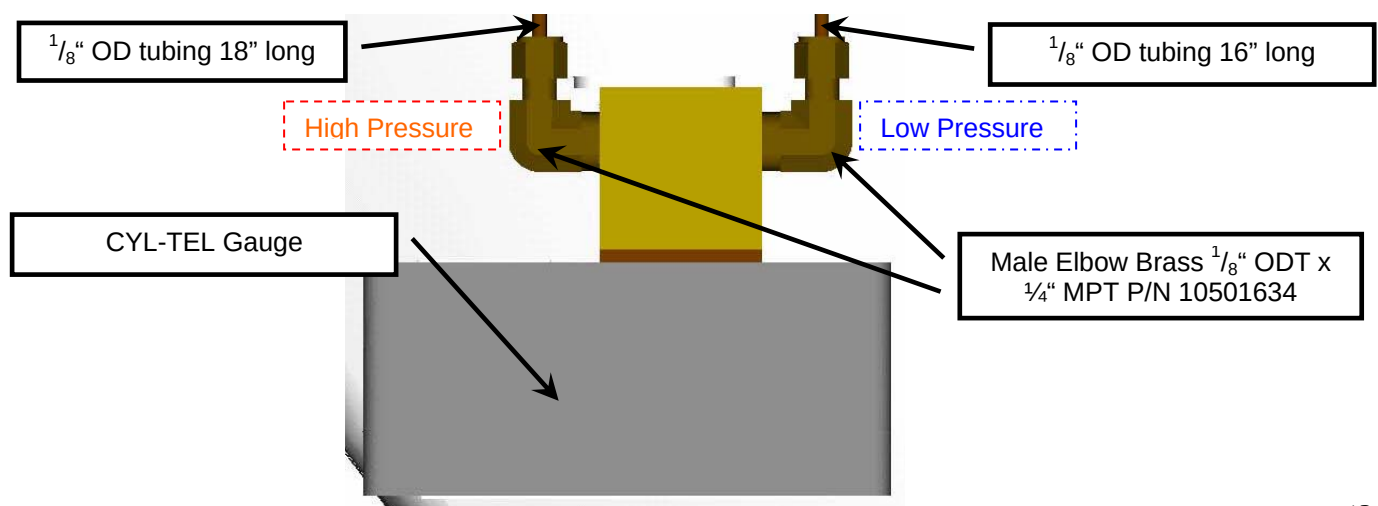
1.8 Prepare Items for Installation on tank.

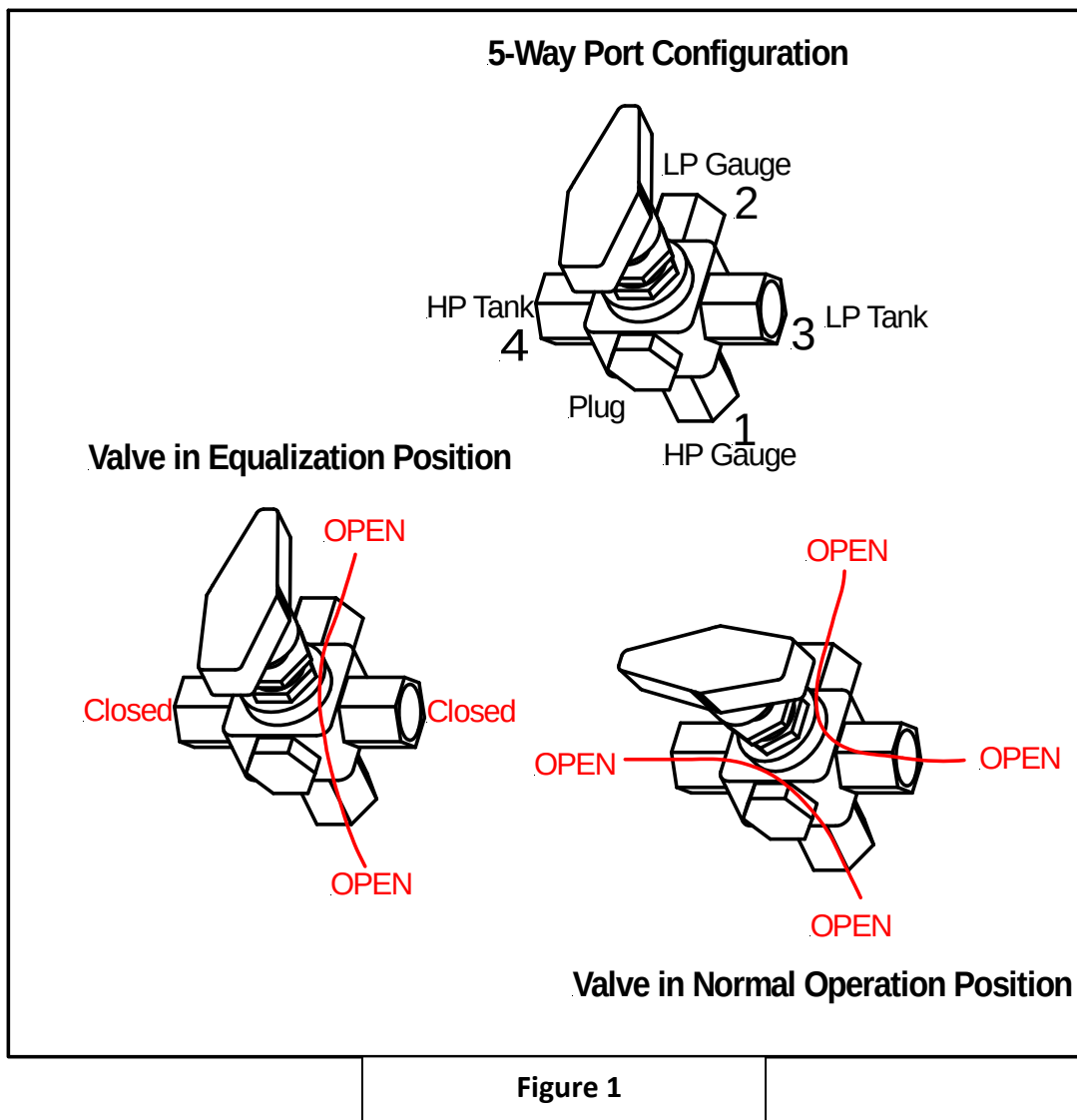
- 1.8.1 Open the Vent Valve and vent the tank to 0 PSIG.
- 1.8.2 While the tank is being vented, cut one (1) each 16" length of $\frac{1}{8}$ " OD copper tubing.
- 1.8.3 Cut one (1) each 18" length of $\frac{1}{8}$ " OD copper tubing.
- 1.8.4 Cut one (1) each 10" length of $\frac{1}{8}$ " OD copper tubing.
- 1.8.5 Clean and debur tubing ends, preparing them for installation.

1.9 Installation on tank.

- 1.9.1 Install one (1) ea. Male Elbow Brass $\frac{1}{8}$ " ODT x $\frac{1}{4}$ " MPT (P/N 10501634) on each side of the gauge's Sensor Assembly Block.

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





- 1.9.2** Connect the 18" piece of tubing to the left-hand side (High Pressure) of the CYL-TEL Gauge.
- 1.9.3** Connect the 16" piece of tubing to the right-hand side (Low Pressure) of the CYL-TEL Gauge.
- 1.9.4** Install the following fittings to the 5-Way Valve.
- Install one (1) each Male Elbow Brass $\frac{1}{8}$ " ODT x $\frac{1}{4}$ " MPT (P/N 10501634) to ports 1 and 4 of the valve.

Figure 1

NOTE: To identify valve ports, rotate handle to the position shown. Ports 2&3 communicate and ports 1&4 communicate. For valve in service position (equalization), the handle points to port 2.

- Install one male connector Brass $\frac{1}{8}$ " ODT x $\frac{1}{4}$ " MPT (P/N 1012822) to port 2.

- c) Install 1 ea. Hex Nipple Brass $\frac{1}{4}$ " MPT on the tee that the tank pressure gauge is installed on and port 3.

NOTE: Depending on tank version you may have to rearrange components on this tee. The nipple must be facing toward the analog gauge when installed.

- 1.9.5** With the tank vented to a pressure of 0 PSIG (by leaving the vent valve open), remove the existing analog gauge.
- 1.9.6** Install the new CYL-TEL Gauge on the tank using the screws from the old gauge removed in step 1.9.5.
- 1.9.7** Connect the right-hand (Low Pressure) side of the gauge to connection 2 of the 5-way valve using the piece of 16" long $\frac{1}{8}$ " OD copper tubing installed in step 1.9.3.
- 1.9.8** Connect the left-hand (High Pressure) side of the gauge to connection 1 of the 5-way valve using the piece of 18" long $\frac{1}{8}$ " OD copper tubing installed in step 0.
- 1.9.9** Connect the High Pressure output of the tank to connection 4 of the 5-way valve using the piece of 10" long $\frac{1}{8}$ " OD copper tubing.
- 1.9.10** Connect the input tee of the tank pressure gauge to connection 3 of the 5-way valve using the $\frac{1}{4}$ " MPT Hex nipple.

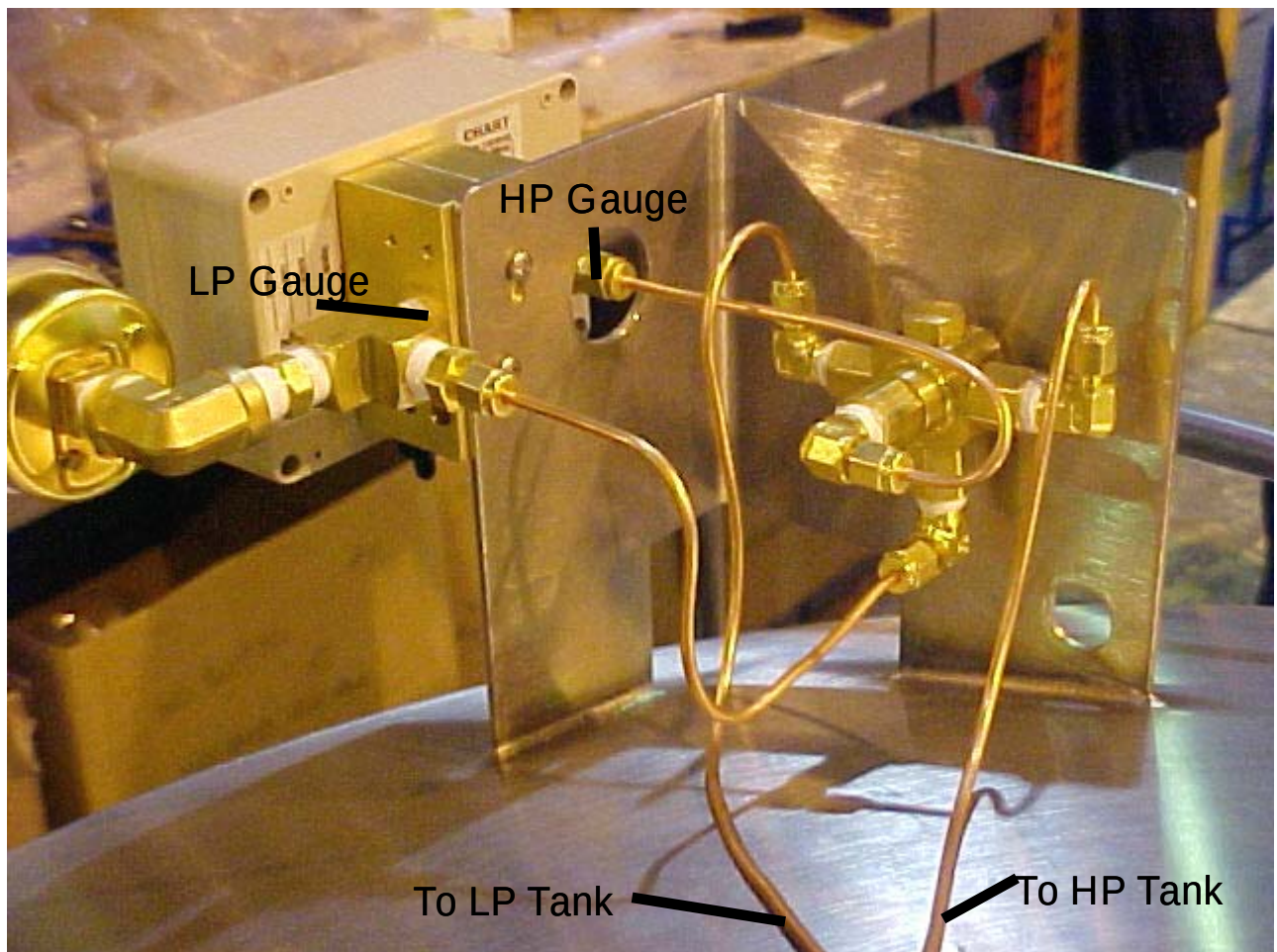


Figure 2

- 1.9.11** Once the CYL-TEL Gauge has been installed and plumbed. Check all fittings and tubing connections for leaks using a liquid leak detector.

NOTE: *If installing CYL-TEL Gauge without the 5-way isolation valve, connect low-pressure from the tank directly to the gauge low-pressure side (right). Then connect the high-pressure line from the tank directly to the high-pressure side (left) of the gauge.*

GAUGE INSTALLATION WITH OPTIONAL 4-WAY VALVE KIT

NOTE: *Installation is for a 450-liter tank. Installations on 1000-liter tanks may vary.*

1.10 Prepare Items for Installation on tank.

- 1.10.1** Open the Vent Valve and vent the tank to 0 PSIG.
- 1.10.2** While the tank is being vented, cut one (1) each 16" length of $\frac{1}{8}$ " OD copper tubing.
- 1.10.3** Cut one (1) each 18" length of $\frac{1}{8}$ " OD copper tubing.
- 1.10.4** Cut one (1) each 10" length of $\frac{1}{8}$ " OD copper tubing.
- 1.10.5** Clean and debur tubing ends, preparing them for installation.

1.11 Installation on tank.

- 1.11.1** Install one (1) ea. Male Elbow Brass $\frac{1}{8}$ " ODT x $\frac{1}{4}$ " MPT (P/N 10501634) on each side of the gauge's Sensor Assembly Block.

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

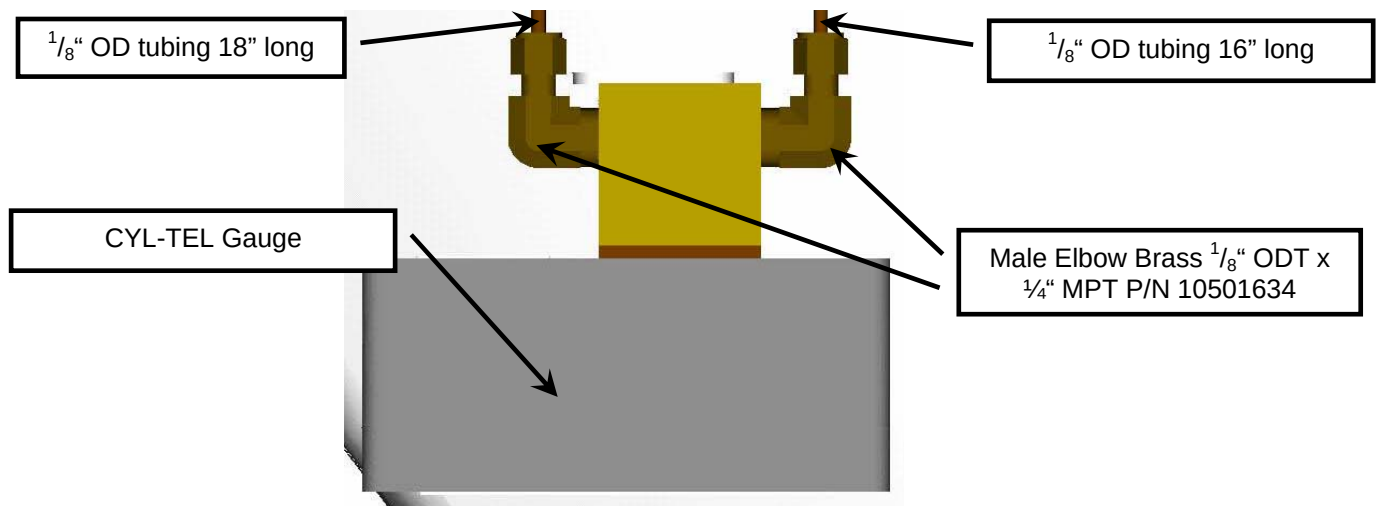


Figure 3

- 1.11.2** Connect the 18" piece of tubing to the left-hand side (High Pressure) of the CYL-TEL Gauge.
- 1.11.3** Connect the 16" piece of tubing to the right-hand side (Low Pressure) of the CYL-TEL Gauge.
- 1.11.4** Install the following fittings to the 4-Way Valve.

- d) Install one (1) each Male Elbow Brass $\frac{1}{8}$ " ODT x $\frac{1}{4}$ " MPT (P/N 10501634) to port 1 and 3 of the valve.

Valve in Normal Operation Position

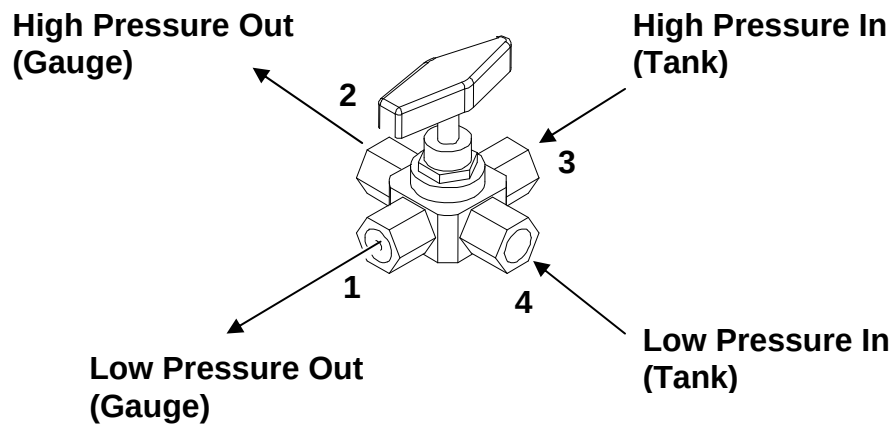
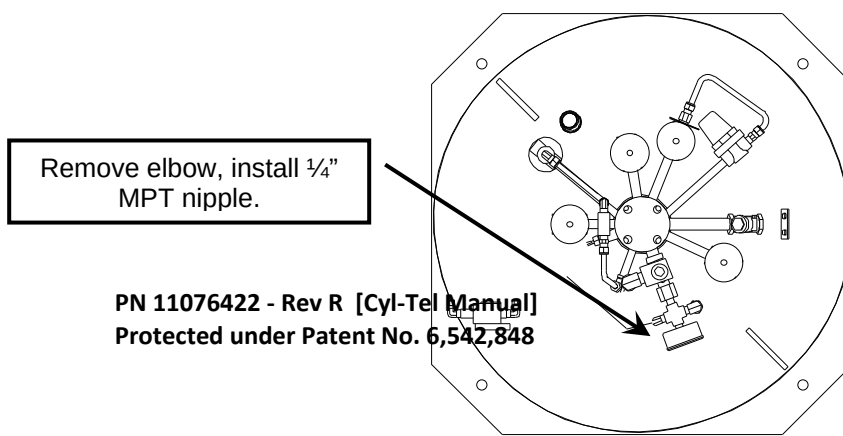


Figure 4

NOTE: To identify valve ports, rotate handle to the position shown. Ports 2&3 communicate and ports 1&4 communicate. For valve in service position, the handle points to port 4.

- e) Install one male connector Brass $\frac{1}{8}$ " ODT x $\frac{1}{4}$ " MPT (P/N 1012822) to port 2.
- f) Install 1 ea. Hex Nipple Brass $\frac{1}{4}$ " MPT on the tee that the tank pressure gauge is installed on.

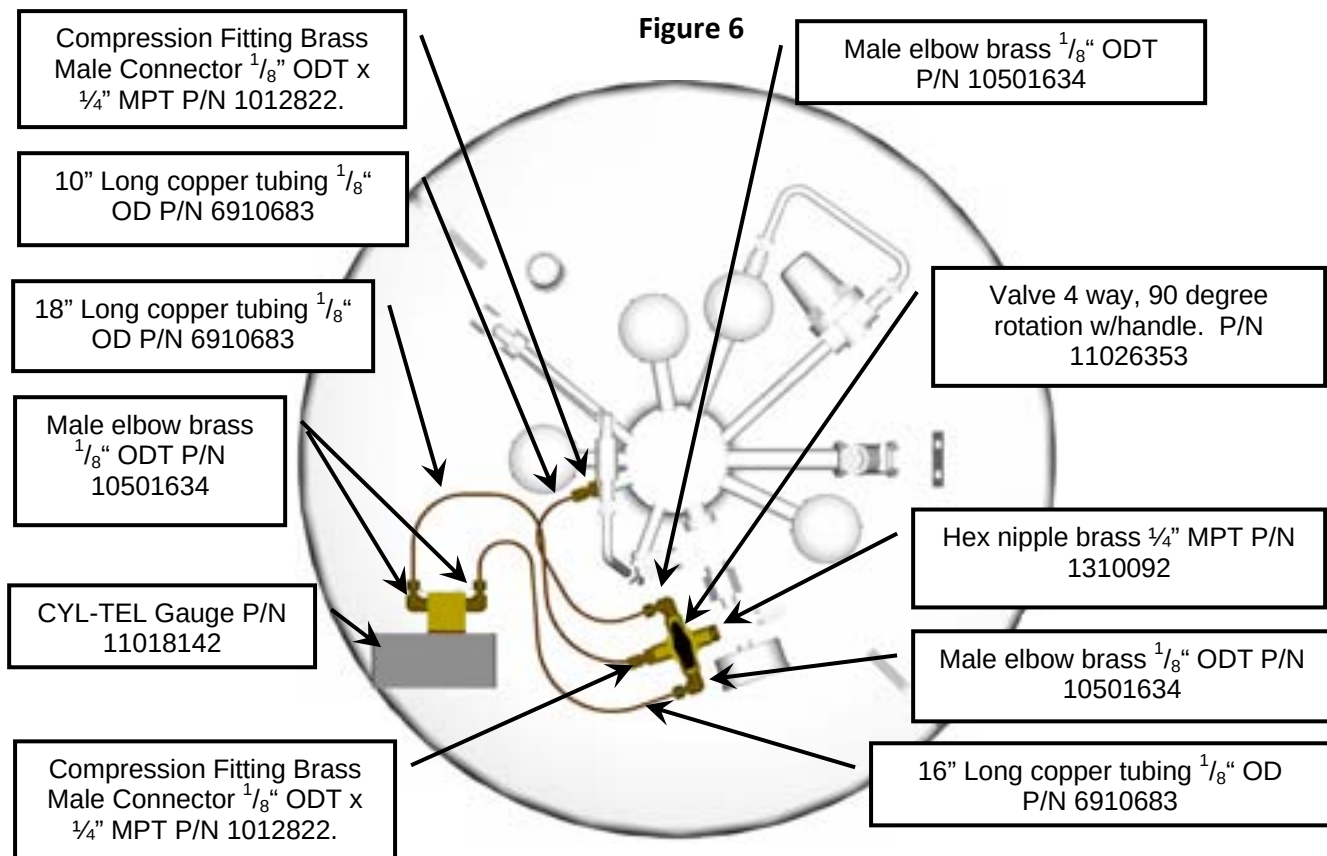
NOTE: Depending on tank version you may have to rearrange components on this tee. The nipple must



be facing toward the analog gauge when installed.

Figure 5

- 1.11.5** With the tank vented to a pressure of 0 PSIG, leaving the vent valve open, remove the existing analog gauge.
- 1.11.6** Install the new CYL-TEL Gauge on the tank using the screws from the old gauge removed in step 1.9.5.
- 1.11.7** Connect the right-hand (Low Pressure) side of the gauge to connection 1 of the 4-way valve using the piece of 16" long $\frac{1}{8}$ " OD copper tubing installed in step 1.9.3.
- 1.11.8** Connect the left-hand (High Pressure) side of the gauge to connection 2 of the 4-way valve using the piece of 18" long $\frac{1}{8}$ " OD copper tubing installed in step 0.
- 1.11.9** Connect the High Pressure output of the tank to connection 3 of the 4-way valve using the piece of 10" long $\frac{1}{8}$ " OD copper tubing.
- 1.11.10** Connect the input tee of the tank pressure gauge to connection 4 of the 4-way valve using the $\frac{1}{4}$ " MPT Hex nipple.
- 1.11.11** See Figure 6 for the installation diagram.



- 1.11.12** Once the CYL-TEL Gauge has been installed and plumbed, check ALL fittings and tubing connections for leaks using a liquid leak detector.

NOTE: *4-Way valve is shown in open position on Chart Ind. Perma-Cyl 450.*

- 1.11.13** The complete valve plumbing is shown in operating position in Figure 7.

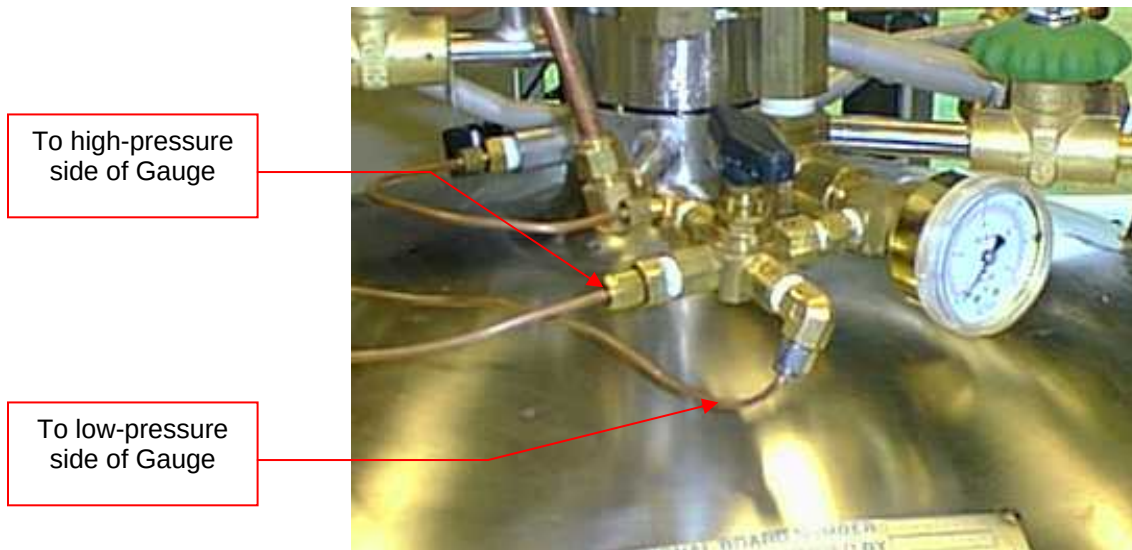


Figure 7

NOTE: *If installing CYL-TEL Gauge without the 4-way isolation valve, connect low-pressure from the tank directly to the gauge low-pressure side (right). Then connect the high-pressure line from the tank directly to the high-pressure side (left) of the gauge.*

CYL-TEL GAUGE POWER & ALERTS WIRING.

1.12 Prepare Wire.

- 1.12.1** Remove the cover from the CYL-TEL Gauge using a #1 Phillips screwdriver.
- 1.12.2** Open the cover and disconnect the sensor cable from the board to separate the cover from the body for easier installation.
- 1.12.3** If you wish to install a 9V battery, place the battery into the battery holder at this time.
- 1.12.4** Route the power cable (4 conductor) from the AC Power pack and its outlet to the CYL-TEL Gauge.
- 1.12.5** Route the signal cable (4 conductor) from the CYL-TEL Transmitter to the CYL-TEL Gauge.
- NOTE:** *Each of these cables can be up to 500 feet long.*
- 1.12.6** With the cover removed, route the power cable through the gray liquid tight connector. Leave enough wire for you to connect to the power terminal block, approximately 5".
- 1.12.7** With the cover removed, route the signal cable through the black liquid tight feed through. Leave enough wire for you to connect to the signal terminal block, approximately 5".

- 1.12.8** Strip back about 2" of the cable jacket from each cable, this will expose all of the insulated wires. On each wire, remove about $\frac{1}{8}$ " of the insulation.

1.13 Connect Power Wires to the Gauge.

1.13.1 Inside of the cover you will find the CYL-TEL Gauge circuit board. Locate the power connector. See Figure 8 and

1.13.2 Figure 9.

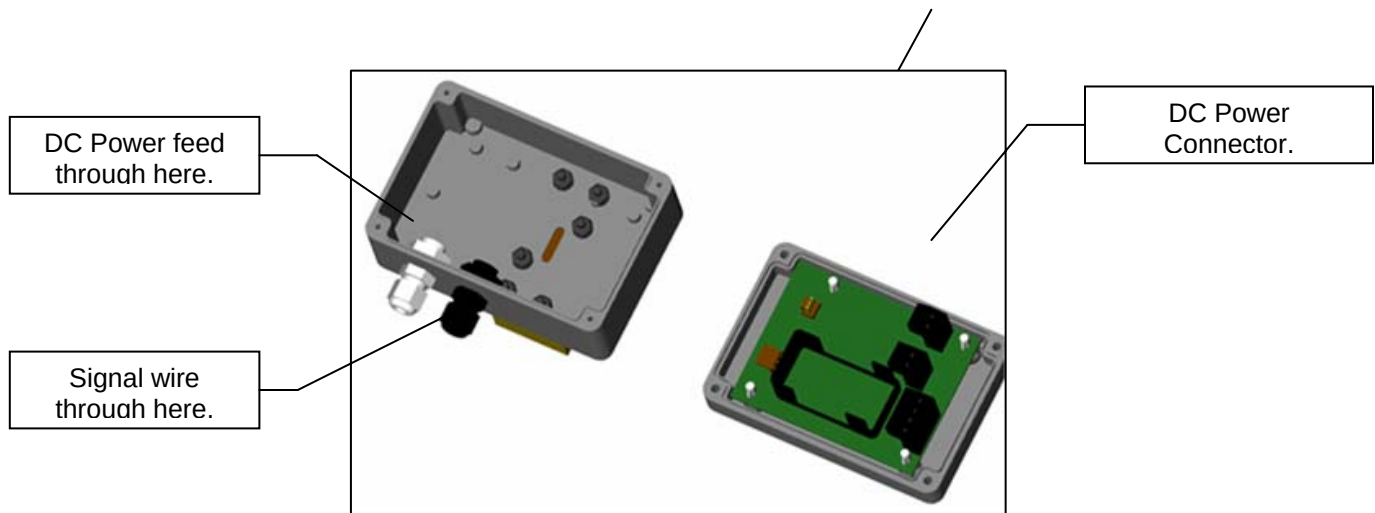


Figure 8

1.13.3 Connect the positive (+) 12VDC power wire (Black) to position #2 of connector J1. See

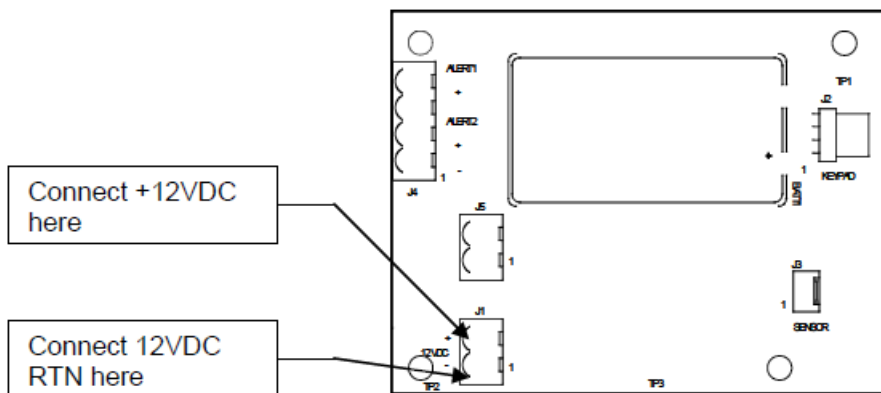
1.13.4 Figure 9.

1.13.5 Connect the negative (-) 12VDC (RTN) power wire (White) to position #1 of connector J1. See

1.13.6 Figure 9.

1.13.7 The green grounding wire is not used with the CYL-TEL Gauge so it can be cut off at this time.

Figure 9



1.14 Wire the Power Pack to the CYL-TEL Gauge.

- 1.14.1** Connect the positive (+) 12VDC power wire (Black) to the “+12V” output of the power pack. See Figure 10.
- 1.14.2** Connect the negative (-) 12VDC (RTN) wire (White) to the “RTN” output of the power pack. See Figure 10.
- 1.14.3** The GND output of the power pack is not currently used.

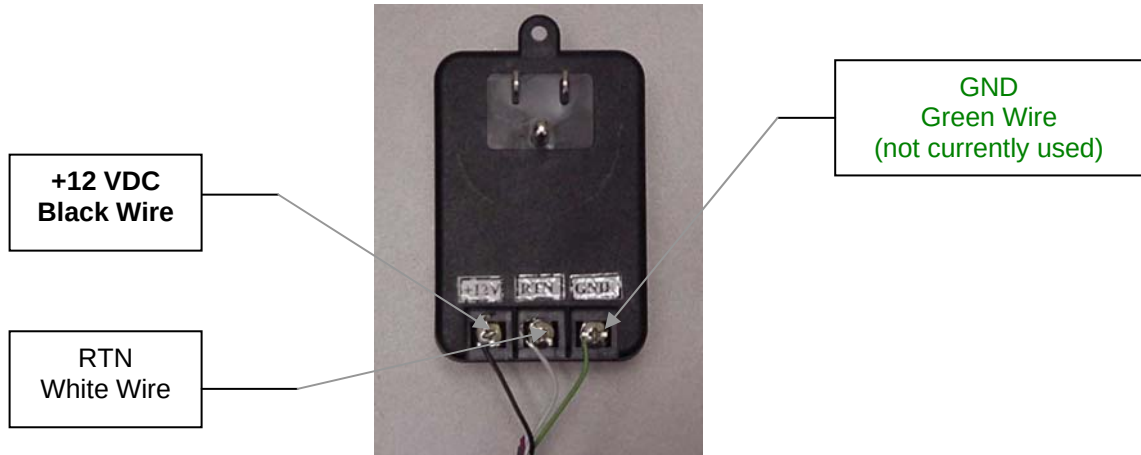
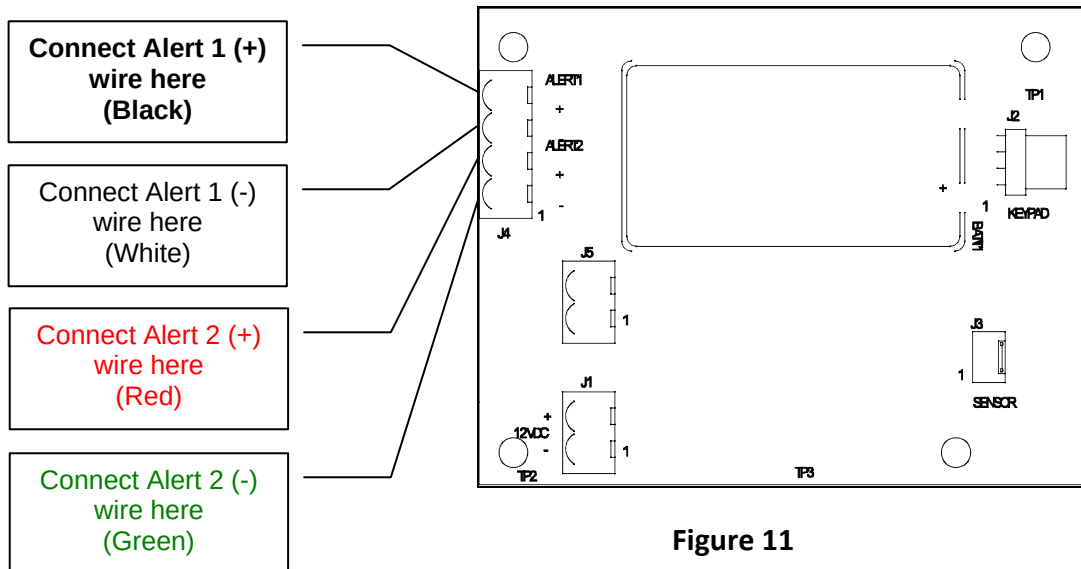


Figure 10

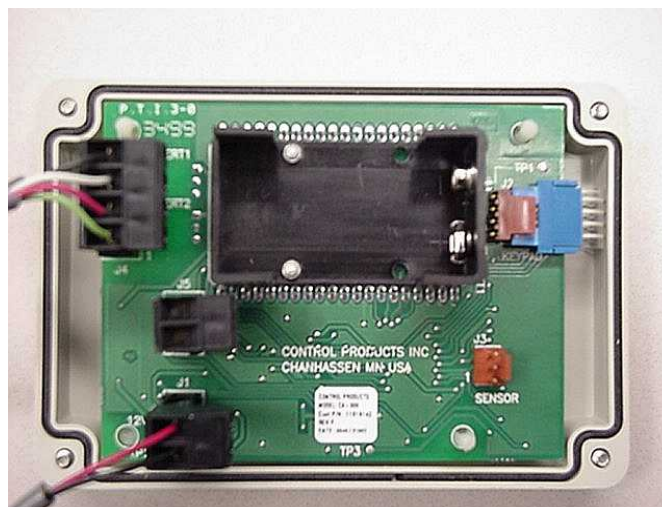
NOTE: Continuous 12 VDC power is required for telemetry operation. For liquid level use only, a 9 VDC battery can be installed.

1.15 Connect Phone Transmitter Wires to the Gauge.

- 1.15.1** Connect the black signal wire to positive (+) Alert 1 position of connector J4. See Figure 11.
- 1.15.2** Connect the white signal wire to negative (-) Alert 1 position of connector J4. See Figure 11.
- 1.15.3** Connect the red signal wire to positive (+) Alert 2 position of connector J4. See Figure 11.
- 1.15.4** Connect the green signal wire to negative (-) Alert 2 position of connector J4. See Figure 11.



1.15.5 The finished gauge wiring is depicted in Figure 12.



CYL-TEL ELECTRICAL QUICK DISCONNECT

1.16 Electrical Disconnect Kit.

The CYL-TEL electrical quick disconnect is designed to be used on cylinders that are moved from the point of use to be filled. The disconnect system allows all electrical connections to be left behind leaving the cylinder free to be moved. One part of the connector is made to be panel mounted on the Perma-Cyl 230/Liquid Cylinder bracket and the other end stays on the end of the cable.

1.17 Panel Mount End Connections.

- 1) Connect wires to CYL-TEL Gauge as described in this manual.
- 2) Cut both power and signal wires approximately 8" from the gauge.
- 3) Strip off approximately 2" of the cable jacket from the end of each cable.
- 4) Strip off approximately 1/8" of insulation from each wire.
- 5) Cut the black shrink tube into six equal size pieces and place one over each wire.
- 6) Using general purpose solder, solder the Alert 1 (+) wire (black) in connection 1
- 7) Solder the Alert 1 (-) wire (white) in connection 2.
- 8) Solder the Alert 2 (+) wire (red) in connection 3.
- 9) Solder the Alert 2 (-) wire (green) in connection 4.
- 10) Solder the 12VDC (+) wire (black) in connection 5.
- 11) Solder the 12VDC (-) wire (white) in connection 6.
- 12) Slide shrink tube over each connection and use a heat source to tighten fit.



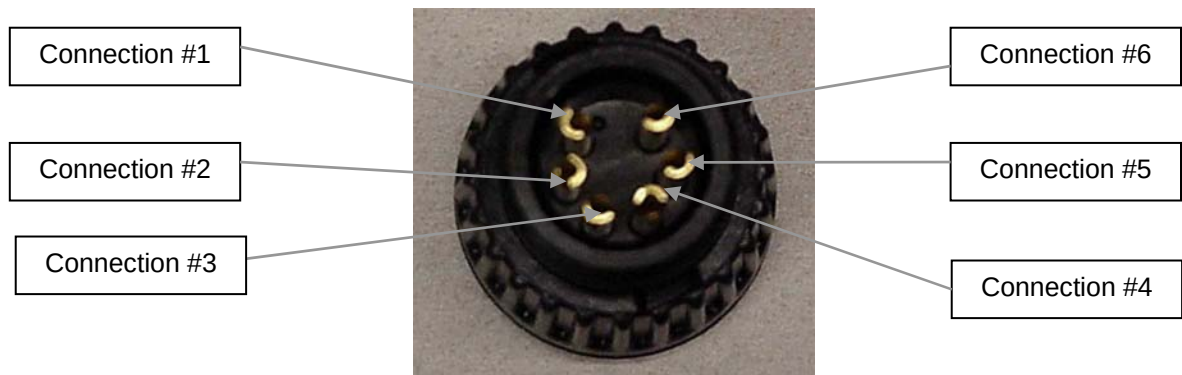
Figure 13

1.18 Cable End Connections.

- 1) Run wires from both the power supply and the CYL-TEL Transmitter to the location of the tank.
- 2) Strip off approximately 2" of the cable jacket from the end of each cable.
- 3) Strip off approximately 1/8" of insulation from each wire.
- 4) Cut the black shrink tube into six equal size pieces and place one over each wire.
- 5) Using general purpose solder, solder the Alert 1 (+) wire (black) in connection 1
- 6) Solder the Alert 1 (-) wire (white) in connection 2.
- 7) Solder the Alert 2 (+) wire (red) in connection 3.
- 8) Solder the Alert 2 (-) wire (green) in connection 4.
- 9) Solder the 12VDC (+) wire (black) in connection 5.

- 10) Solder the 12VDC (-) wire (white) in connection 6.
11) Slide shrink tube over each connection and use a heat source to tighten fit.

Figure 14



CYL-TEL GAUGE OPERATION

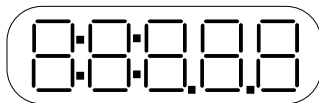
1.19 Keypad Operation.

There are three keys on the gauge: "ON", "SELECT", and "↑". Each key or combination of keys performs a different function.

1) **ON** - Key.

In battery mode this key will turn the gauge on. The gauge will remain on for 20 seconds after a key has been depressed.

If you *PRESS* and *HOLD* the **ON** key for 10 seconds the gauge will start its power up diagnostic tests. The display test will display all 8's then other characters.



All LED's will also turn on, then off once the test is completed and no alarms are present.

2) **SELECT** - Key

This key allows you to select a variable that you have incremented to and will then advance you to the next field.

3) **↑** - Key

This key allows you to scroll through all available options within the field.

1.20 Multiple Key Functions.

When a combination of two (2) or more keys are used, special functions or features become available. See the listings below for key combinations and their effects.

1.21 Configure Alerts.

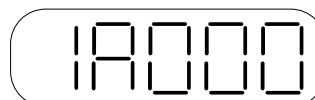
1.21.1 Power up the CYL-TEL Gauge, it will display its power up diagnostics.

1.21.2 After the power up diagnostics is complete, the liquid level will be displayed.

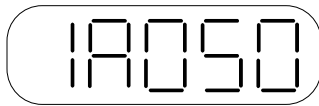
1.21.3 At this time *PRESS* and *HOLD* the **↑** and **SELECT** keys for 5 seconds, the gauge will display the "**Alert 1**" configuration menu.

- 1) Release the keys to change the settings. Once displayed, the first variable position will be blinking. To increment the displayed values press the **↑** key once. When the desired value is indicated, press the **SELECT** key to accept the value. The display will now blink in the next digit position. Again increment or select the

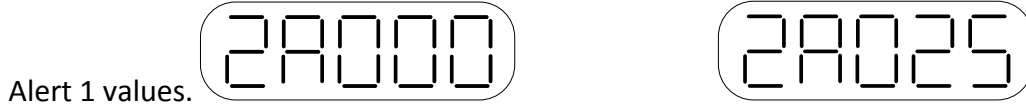
displayed value. Repeat this for all values.



- 2) *Example:* To configure Alert 1 for a value of 50%, press the following key combinations in the Alert 1 menu. With the display blinking in the 100's position, press the **"SELECT"** key once. The display will now blink in the 10's position. Press the $\uparrow$ key "5" times, the number "5" will now be blinking. Press the **SELECT** key to move to the 1's position. The display will now indicate



- 10) Press the select key again to accept the 1's position value of "0" and change to the "Alert 2" configuration.
- 3) The Alert 2 configured values will be displayed at this time with the 100's place blinking. Change each position value in the same fashion as described above when configuring the



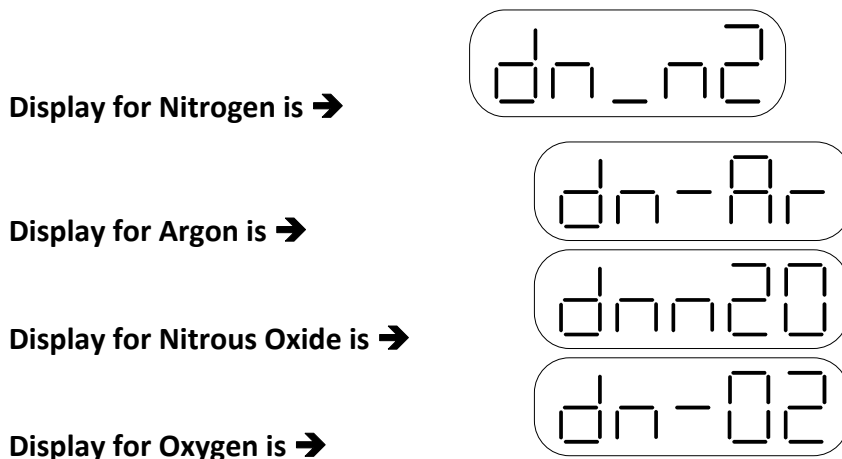
Once the Alert 2 value has been set, the unit will return to displaying the liquid level within the tank.

1.22 Configure Liquid Type.

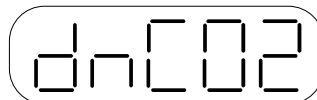
NOTE: You must configure all parameters for the gauge to display the correct liquid levels.

- 1.22.1** To configure or change the gauge's tank parameters *PRESS* and *HOLD* the $\uparrow$ and **SELECT** keys for 10 seconds. The gauge will display the **"Alert 1"** configuration menu after 5 seconds, continue to hold the keys until the Liquid Type menu is displayed. To change the liquid density to a different type press the $\uparrow$ key until the desired liquid type is displayed. Once the correct liquid type is displayed, press the **SELECT** key to accept this parameter.

NOTE: The liquid type menu starts with the Nitrogen display.



Display for Carbon Dioxide is ➔

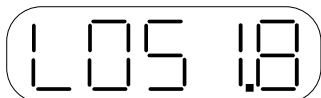


1.23 Configure Tank Length. (See section XIV for model information)

- 1.23.1 Once you have selected the liquid type, the gauge will display the tank dimension entry



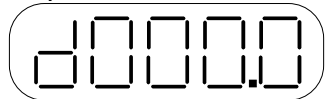
- 1.23.2 Any length dimension previously entered will be indicated by the display.
- 1.23.3 To change the length dimension, use the $\uparrow$ key to increment the number and the **SELECT** key to enter the value and move to the next field position.
- 1.23.4 *Example:* To enter a length dimension of 51.8" (dimension of the Perma-CYL 450VHP) perform the following sequence.
- 1) When first entering the tank length field the 100's place digit will be blinking. At this time press the **SELECT** key once, the 10's place will now be blinking.
 - 2) At this time use the $\uparrow$ key to increment the 10's place until a value of "5" is displayed and then press the **SELECT** key.
 - 3) The display will now be blinking the 1's place. Use the $\uparrow$ key to increment the numeric value to "1" then press the **SELECT** key.
 - 4) The display will now blink the 10ths-digit field. Use the $\uparrow$ key to increment the numeric value to "8" then press the **SELECT** key.



- 5) The display will now advance to the diameter input display.

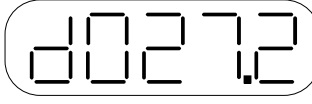
1.24 Configure Tank Diameter.

- 1.24.1 Any diameter dimension previously entered will be indicated by the display.

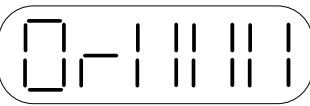
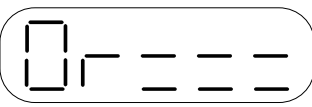


- 1.24.2 To change the diameter dimension use the $\uparrow$ key to increment the number and the **SELECT** key to enter the value and move to the next field position.
- 1.24.3 *Example:* To enter a diameter dimension of 27.2" (dimension of the Perma-Cyl 450VHP) perform the following sequence.
- 1) When first entering the tank diameter field, the 100's place digit will be blinking. At this time press the **SELECT** key once, the 10's place will now be blinking.

- 2) At this time use the $\uparrow$ key to increment the 10's place until a value of "2" is displayed then press the **SELECT** key.
- 3) The display will now be blinking the 1's place. Use the $\uparrow$ key to increment the numeric value to "7" then press the **SELECT** key.
- 4) The display will now blink the 10ths-digit field. Use the $\uparrow$ key to increment the numeric

value to "2" then press the **SELECT** key. 

1.25 Configure Tank Orientation.

- 1.25.1** There are two tank orientations available: "Vertical"  indicated by vertical lines, and "Horizontal" indicated by horizontal lines. 

- 1.25.2** To change the displayed tank orientation, use the $\uparrow$ key.

- 1.25.3** To accept the displayed orientation, press the **SELECT** key.

1.26 Configure the Calibration Parameter.

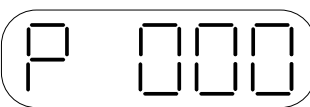
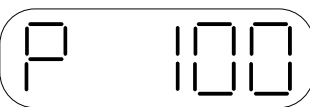
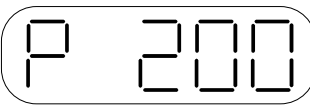
- 1.26.1** The calibration should not be done at this time because other tank parameters are required first. For now, press the **SELECT** key to accept the displayed value, and continue with the parameter setups.

See Calibrating CYL-TEL Gauge with 5-Way Valve on Tank. ON PAGE 30 or Calibrating CYL-TEL Gauge WITHOUT 5 Way Valve on Tank. ON PAGE 31.

1.27 Configure Liquid Density Pressure.

- 1.27.1** At this time, the display will be indicating the liquid pressure configuration. The purpose of inputting this valve is to improve the gauge accuracy by selecting the best saturation pressure of the liquid that the tank will operate at.

- 1.27.2** The available values for this parameter are:

"000"  "100" 
 "200"  "300" 
 "400"  PSIG.

- 1.27.3 Using the $\uparrow$ key scroll through the available values until the display indicates the value desired. Once the desired value is displayed, press the **SELECT** key to enter the value.
- 1.27.4 This completes the gauge configuration and now the gauge will display the liquid level in the tank.

CALIBRATING CYL-TEL GAUGE

Calibration is required periodically to maintain published accuracy of the Gauge.

CAUTION: The GAUGE Sensor cannot be exposed to a differential pressure greater than 30PSIG. If exposed to a differential pressure greater than 30PSIG the sensor will be damaged.

NOTE: This calibration process can be done with or without product in the tank. With product in the tank the 5 Way Valve will act as a pressure builder. DO NOT LEAVE VALVE in this position for extended periods of time. Venting the Tank to 0 PSIG is not necessary.

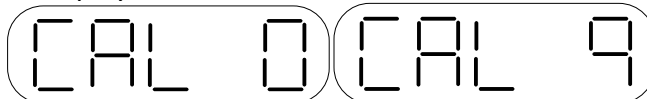
1.28 Calibrating CYL-TEL Gauge with 5-Way Valve on Tank.

- 1.28.1 Change the units displayed to % Full. This is done by holding the **SELECT** and **ON** keys then pressing the $\uparrow$ key. The unit being displayed is indicated by a Green LED to the left of the unit description.

NOTE: No Green LED will be lit if you are displaying levels in "Inches of H₂O".

- 1.28.2 Note the value displayed: 0%, 5%, 10%, etc.
- 1.28.3 Close the 5 Way Valve. (See Figure 6 for orientation)
- 1.28.4 Press and hold the $\uparrow$ and **SELECT** keys for 10 seconds, the gauge will enter the tank parameter setup mode.
- 1.28.5 Without changing any values, press the **SELECT** key for each tank variable displayed until

the display indicates "CAL" and some number between -9 and 9.



- 1.28.6 Using the $\uparrow$ key, scroll to the desired value then press the select key. Each calibration constant corresponds to approximately 3% of a full tank.

Example: If the original % Full displayed was 5% with the valve closed then you would calibrate the gauge by selecting either -1 or -2. It is recommended for increased accuracy you select -1, open the valve and check the displayed reading.

- 1.28.7** Once the value has been selected, open the 5 Way Valve and check the level reading. If the reading is 0% then the unit is calibrated. If the value is something other than 0%, you will have to enter a new calibration constant.
- 1.28.8** Repeat the above process until 0% is displayed when the valve is closed.

1.29 Calibrating CYL-TEL Gauge WITHOUT 5 Way Valve on Tank.

Calibration is required periodically to maintain published accuracy of the Gauge.

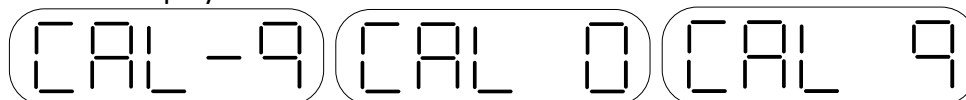
CAUTION: The GAUGE Sensor cannot be exposed to a differential pressure greater than **30PSIG**. If it is exposed to a pressure greater than 30PSIG the sensor will be damaged.

NOTE: This calibration process must be done with an empty tank.

- 1.29.1** Change the units displayed to % Full. This is done by holding the **SELECT** and **ON** keys then pressing the $\uparrow$ key. The unit being displayed is indicated by a Green LED to the left of the unit description.

NOTE: No Green LED will be lit if you are displaying levels in "In. H₂O".

- 1.29.2** Note the value displayed: 0%, 5%, 10%, etc.
- 1.29.3** Press and hold the $\uparrow$ and **SELECT** keys for 10 seconds, the gauge will enter the tank parameter setup mode.
- 1.29.4** Without changing any values press the **SELECT** key to accept each tank variable displayed until the display indicates "CAL" and some number between -9 and 9.



- 1.29.5** Using the $\uparrow$ key scroll to the desired value then press the select key. Each calibration constant corresponds to approximately 3% of a full tank.

Example: If the original % Full readout displayed was 5%, then typically you would calibrate the gauge by selecting either -1 or -2. It is recommended for increased accuracy you select -1 check the displayed reading, and change the value to -2 only if you have to.

- 1.29.6** Once the value has been selected check the level reading. If the reading is 0% then the unit is calibrated. If the value is 5% or something other than 0%, then you will have to enter a new calibration constant.
- 1.29.7** Repeat the above process until 0% is displayed.

XVI CHART IND. TANK DIMENSIONS

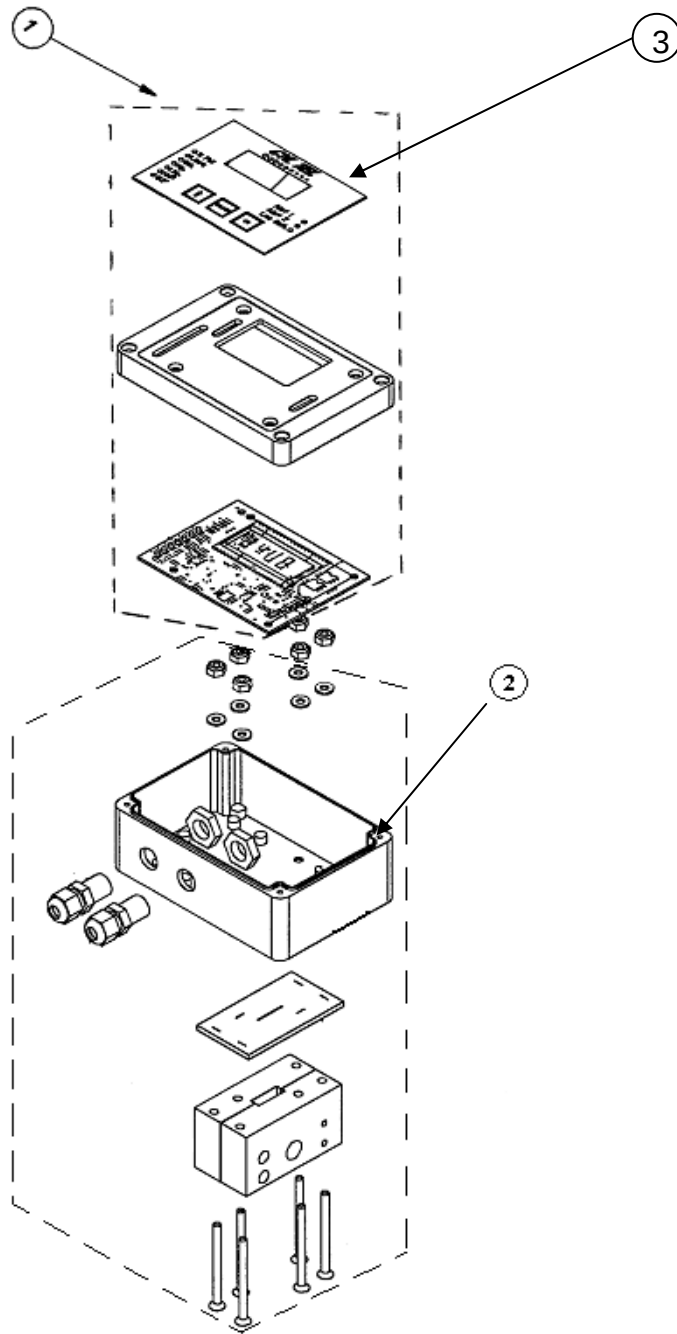
PART NO.	TANK MODEL	INR LENGTH	INR DIA	ORIENTATION	RV SETTING	*PB SETTING	**CYLP
10867206	FNL PERMA-CYL 230B SB	37.1	24	VERTICAL	250 PSI	125 PSI	100 PSI
10874086	FNL PERMA-CYL 230B FR	37.1	24	VERTICAL	250 PSI	125 PSI	100 PSI
11011389	FNL PERMA-CYL 230B SBU	37.1	24	VERTICAL	235 PSI	125 PSI	100 PSI
11051364	FNL PERMA-CYL 230 ADM SB	37.1	24	VERTICAL	250 PSI	125 PSI	100 PSI
10939687	FNL PERMA-CYL 230C	37.1	24	VERTICAL	230 PSI	125 PSI	100 PSI
10982263	FNL PERMA-CYL 230C	37.1	24	VERTICAL	350 PSI	300 PSI	100-300 PSI

PART NO.	TANK MODEL	INR LENGTH	INR DIA	ORIENTATION	RV SETTING	*PB SETTING	**CYLP
11529508	PERMA-CYL 300MP	49.1	24.0	VERTICAL	250 PSI	120 PSI	100 PSI
10914877	PERMA-CYL 450MP	50.9	27.6	VERTICAL	250 PSI	120 PSI	100 PSI
10899005	PERMA-CYL 450HP	50.4	27.6	VERTICAL	350 PSI	300 PSI	100-300 PSI
10907634	PERMA-CYL 450VHP	51.8	27.2	VERTICAL	500 PSI	450 PSI	100-400 PSI
	DURA-CYL 265MP	42.2	24.0	VERTICAL	230 PSI	100 PSI	100-300 PSI
	DURA-CYL 265MP	42.2	24.0	VERTICAL	350 PSI	100 PSI	100-300 PSI
11684305	PERMA-CYL 700HP	47.5	37.3	VERTICAL	350 PSI	300 PSI	100-300 PSI
10879864	PERMA-CYL 1000MP	65.2	37.4	VERTICAL	250 PSI	120 PSI	100 PSI
10923909	PERMA-CYL 1000HP	65.0	37.3	VERTICAL	350 PSI	300 PSI	100-300 PSI
11075024	PERMA-CYL 1000VHP	64.8	37.1	VERTICAL	500 PSI	450 PSI	100-400 PSI
11501804	PERMA-CYL 1500HP	69.0	44.0	VERTICAL	350 PSI	300 PSI	100-300 PSI
11202441	PERMA-CYL 1500VHP	69.0	44.0	VERTICAL	500 PSI	450 PSI	100-400 PSI
11844313	PERMA-CYL 2000VHP	94.2	44.0	VERTICAL	500 PSI	450 PSI	100-400 PSI
14401278	PERMA-CYL 3000HP	98.0	50.4	VERTICAL	350 PSI	300 PSI	100-300 PSI
14507523	PERMA-CYL 3000VHP	98.0	50.4	VERTICAL	500 PSI	450 PSI	100-400 PSI

PART NO.	TANK MODEL	INR LENGTH	INR DIA	ORIENTATION	RV SETTING	*PB SETTING	**CYLP
10672951	MEGA-CYL 450MP	50.4	27.6	VERTICAL	250 PSI	120 PSI	100 PSI
10588979	MEGA-CYL 450HP	50.4	27.6	VERTICAL	350 PSI	300 PSI	100-300 PSI
10473573	MEGA-CYL 600MP	51.5	33.5	VERTICAL	250 PSI	120 PSI	100 PSI
10513758	MEGA-CYL 600HP	51.3	33.3	VERTICAL	350 PSI	300 PSI	100-300 PSI
10485283	MEGA-CYL 800MP	55.5	37.4	VERTICAL	250PSI	120 PSI	100 PSI
10671262	MEGA-CYL 800HP	55.9	37.2	VERTICAL	350 PSI	300 PSI	100-300 PSI
10858975	MEGA-CYL 1000MP	65.2	37.4	VERTICAL	250 PSI	120 PSI	100 PSI
10752281	MEGA-CYL 1000HP	65.2	37.4	VERTICAL	350 PSI	300 PSI	100-300 PSI
10619659	LASER-CYL 450VHP	50.4	27.4	VERTICAL	500 PSI	450 PSI	100-400 PSI

* Factory Setting of Pressure Builder (PB)

** Recommended CYL-TEL Pressure Setting (CYLP), for improved accuracy. For pressures below 100 PSI, configure the CYL-TEL GAUGE pressure @ 0 PSI. For pressures above 100 PSI, configure the CYL-TEL GAUGE pressure at typical liquid saturation pressure, not operating pressure.



XVII SPARE PARTS

1.30 CYL-TEL Gauge Spare Parts.

INDEX NUMBER	QTY	DESCRIPTION	COMPONENT NUMBER
1	1	Circuit Board Top Enclosure Assy	11520503
2	1	CYL-TEL Back Enclosure Assy	11520511
3	1	CYL-TEL Keypad	11018206
Not Shown	1	CYL-TEL Sensor Assy	11837076

Troubleshooting the Cyl-Tel Gauge

Symptom	Possible Cause	Remedy
Cyl-Tel gauge does not turn on.	Battery dead, low, installed incorrectly or missing. Transformer not plugged in or faulty wiring. Electrical supply circuit breaker tripped. Faulty Cyl-Tel.	Replace battery. Inspect wiring and insure transformer is plugged in. Reset circuit breaker. Replace Cyl-Tel front (P/N 11520503). www.chartparts.com
Cyl-Tel display is powered, but stays at zero.	No product in cylinder. Four-way valve in "maintenance" position Four-way valve installed incorrectly Parameters are improperly set Sensor plug not on pins inside Cyl-Tel. Faulty Cyl-Tel.	Ensure there is liquid in cylinder. Turn valve to "service" position See user manual to confirm proper installation Verify EACH parameter setting. The "P" setting as well as the inner dimensions can affect the accuracy of the gauge. Open Cyl-Tel and verify sensor plug is attached to pins. Replace (P/N 11018142). Call 1-800-400-4683.
Cyl-Tel display always reads full.	Parameters are improperly set. Wires to brown sensor plug pulled out. Faulty Cyl-Tel (Sensor may be damaged).	Verify EACH parameter setting. The "P" setting as well as the inner dimensions can affect the accuracy of the gauge. Push in wires so chrome connector is not showing Replace Sensor (P/N 11837076) or back gauge (P/N 11520511) www.chartparts.com
Alerts do not operate.	Alerts improperly set, or not set.	Verify alert settings. Refer to Cyl-Tel manual.
Liquid level oscillates with Four-way valve in either position.	Four-way valve leaking externally	Replace Four-way valve.
Liquid level display does not zero when Four-way valve is in "maintenance" position	Calibration point needs adjusting.	Adjust "Cal" setting. Refer to Cyl-Tel manual.

	Four-way valve leaks internally	Replace Four-way valve.
Liquid level displayed not accurate.	Wrong "P" setting. Calibration point needs adjusting.	Change setting to reflect the proper saturation pressure. Refer to Cyl-Tel manual for details. Adjust "Cal" setting. Refer to Cyl-Tel manual.