Installation & Operating Instructions for Genesys2 CC Series Manifolds

Features & Benefits

- Fully automatic changeover – no valves or levers to reset after each changeover
- Compatible with Tri-Tech Medical T-Net medical gas monitoring system saving you time and improving safety
- Field upgradeable design – kits allow unit to be changed from - i.e. cylinders to portable bulk or from standard flow to high flow or from lower delivery pressure to higher delivery pressure
- Field adjustable high/low line pressure alarms – using convenient buttons on circuit board.
- Circuit board triggers all required NFPA 99 alarms – simplifying wiring and reducing cost
- Unit includes hi/low line pressure transducer – eliminating need to purchase hi/low pressure switch, improving alarm accuracy and improving safety (manifold will automatically alarm if transducer goes bad)
- Easy to service layout/design
- Microprocessor based control panel incorporates LED's and illuminated text display readable even in poor lighting conditions
- Electronic monitoring of circuits, error, alarm or information messages displayed for ease of maintenance
- Accurate, long life pressure transducers for monitoring of line pressure and bank pressures
- Analog gauges also provided for use in event of power failure
- Pressures may be displayed in PSIG / kPa / BAR
- Built in DISS gas specific emergency feed ports
- Built in emergency reserve bank ports
- Input power 120 VAC, 50 to 60 Hz, (120-240 VAC 50 to 60 Hz on all models without heaters)
- Dual line pressure regulators on NFPA 99 models
- Gas specific header bar with integral check valves and cylinder pigtail assemblies
- Variety of header configurations available to meet the available space requirements of your installation
- Available in weatherproof cabinet for outdoor installation

Contents

Technical Assistance----

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E-mail **sales@tri-techmedical.com**

Introduction

Tri-Tech Medical manifolds are cleaned for use with oxygen. Each system is tested for changeover, triggering of alarms and leakage. Each unit is designed and prepared for the indicated gas service. Tri-Tech Medical manifolds are built in accordance with the National Fire Protection Association and Compressed Gas Association guidelines.

Warranty

All Tri-Tech Medical manifolds are warranted against defects in material and workmanship for the period of one year from date of purchase. All circuit boards are warranted against defects in material and workmanship for the period of three years from date of purchase.

General Instructions/Location & Shelter

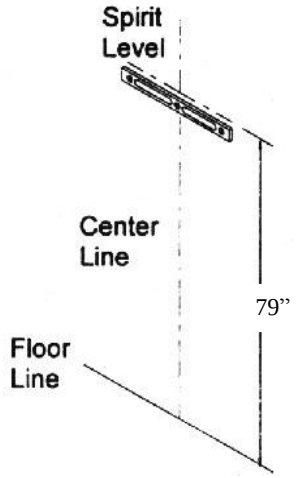
Manifolds should be installed in accordance with guidelines stated by the National Fire Protection Association, the Compressed Gas Association, OSHA, and all applicable local codes. Central supply systems and cylinders should not be installed in a location where the temperature will exceed 125° F (51.6° C) or fall below -20° F (-29° C). A manifold placed in an open location should be protected against weather conditions. During winter, protect the manifold from ice and snow. In summer, shade the manifold and cylinders from continuous exposure to direct sunlight.

Leave all protective covers in place until their removal is required for installation. This precaution will keep moisture and debris from the piping interior.

Caution
Failure to follow the following instructions can result in personal injury or property damage:

- Never permit oil, grease, or other combustible materials to come in contact with cylinders, manifold, and connections. Oil and grease may react with explosive force when ignited while in contact with some gases – particularly oxygen and nitrous oxide.
- Cylinder and master valves should always be opened very slowly. Heat of recompression may ignite combustible materials creating an explosive force.
- Pigtails should never be kinked, twisted, or bent into a radius smaller than 3 inches. Mistreatment may cause the pigtail to burst.
- Do not apply heat. Oil and grease may react with explosive force when ignited while in contact with some gases – particularly oxygen and nitrous oxide.
- Cylinders should always be secured with racks, chains, or straps. Unrestrained cylinders may fall over and damage or break off the cylinder valve which may propel the cylinder from its current position.
- Oxygen manifolds and cylinders should be grounded. Static discharges and lightning may ignite materials in an oxygen atmosphere, creating a fire or explosive force.
- Welding should not be performed near nitrous oxide piping. Excessive heat may cause the gas to dissociate, creating an explosive force.
- Remove all protective caps prior to assembly. The protective cap may ignite due to heat of recompression in an oxygen system.

Control Cabinet Installation

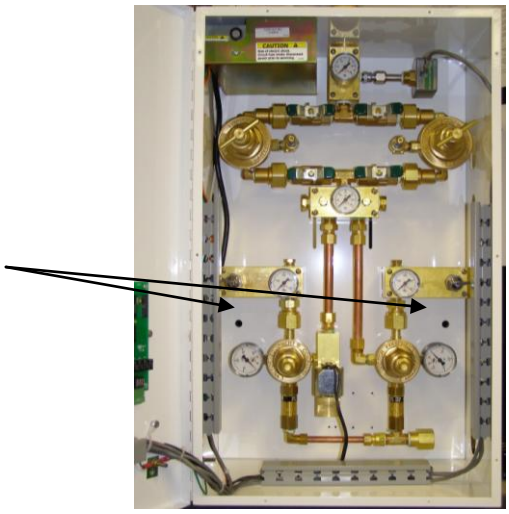


1. Determine and mark the vertical center line for installation of the manifold control cabinet.

2. If you wish to place cylinders under the manifold cabinet, measure from the floor to a point 79” in height above the finished floor of this vertical line. Using a level, mark a horizontal line at this point extending approximately 7” to the left and 7” to the right of center. This line indicates the location for the bottom two mounting bolts of the Z mounting bracket. Mounting the Z bracket @ 79” aff* will result in the bottom of the manifold cabinet being 60” aff – allowing cylinders to be placed under the manifold cabinet. If you do not wish to place cylinders under the manifold cabinet, measure from the floor to a point 58 ½” aff and follow the same steps above.

3. Mount the Z mounting bracket to the wall using fasteners suitable for the type of wall construction.

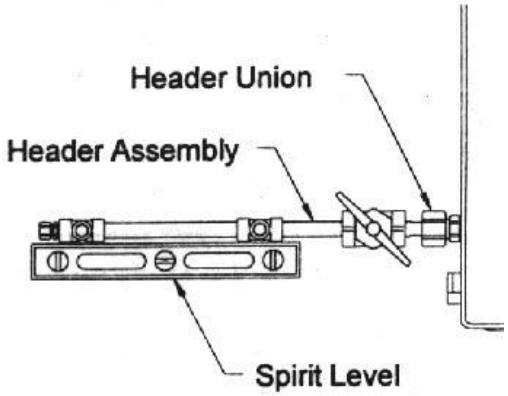
4. Temporarily hang the manifold cabinet on the Z bracket just installed, mating it with the Z bracket on the back of the manifold cabinet. Mark the locations of the two lower cabinet mounting holes on the wall.



5. Remove the manifold cabinet and install female portion of suitable fasteners for lower cabinet mounting holes.

6. Re-hang the manifold cabinet and install suitable fasteners in the lower cabinet mounting holes.

Header Installation



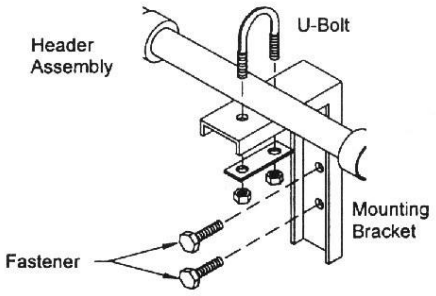
1. Attach the headers to the union on each side of the manifold control cabinet. Using a level, mark the placement of mounting brackets while keeping the header on a horizontal plane.

2. Remove the U – bolt assemblies from the header mounting brackets. Position the brackets so that the top of the bracket is aligned with the bottom of the headers and is centered between the cylinder connections. The end bracket should be placed as close to the last cylinder as possible to provide the most support and stability.

* aff = above finished floor

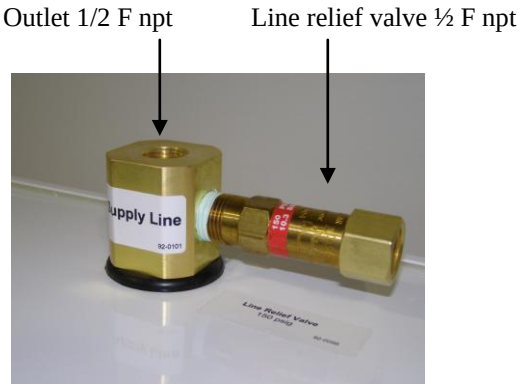
1. Mark the mounting hole and install fasteners suitable for type of wall construction.

2. Fit the U – bolt over the header piping and tighten the two mounting nuts.



Plumbing – Model CC

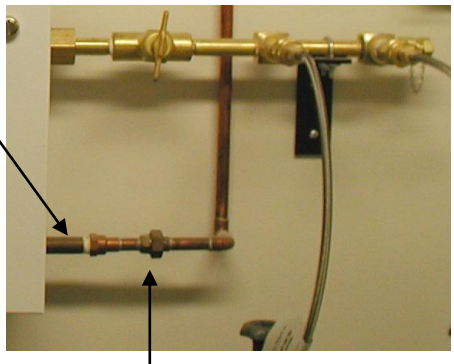
1. The outlet of the manifold is located at the top center of the unit as shown here. The outlet connection is 1/2 NPT female. A source valve 1/2 M NPT x ¾ tube extension has been provided with all NFPA 99 compliant models (part # 48-0023) and should be installed in the manifold outlet. It may be necessary to install a 1/2 NPT 90° street elbow (part # 17-0300 sold separately) to meet the confines of the installation site.



2. Source valve part # 48-0023

3. A ½ npt brass pipe nipple has been provided (on CC models) to extend the intermediate relief piping outside the cabinet wall. The intermediate relief valve extension pipe nipple must be installed. It is bagged and shipped inside of the cabinet for protection during shipment.

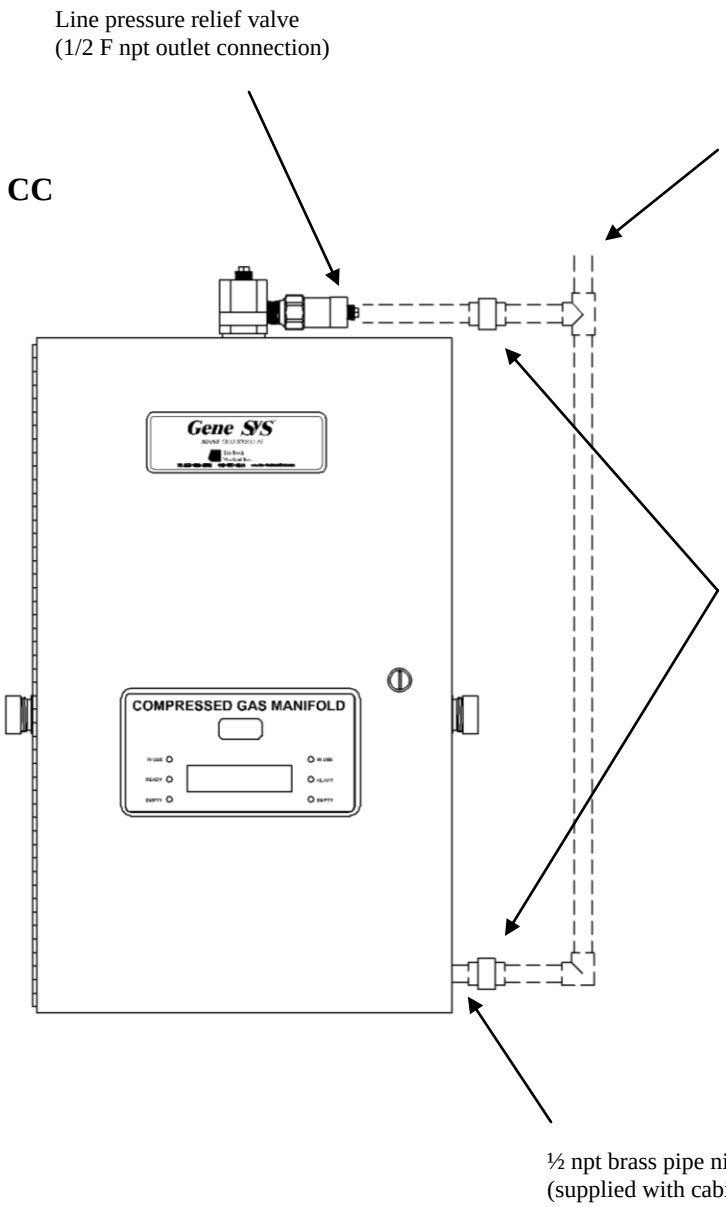
4. It is also recommended that unions (part # 17-0169) be installed between all relief valves and the relief (vent) pipeline system(s). There are two ½ NPT relief valve connections on the model CC manifold. See drawing at bottom of page 7.



Recommended plumbing of relief and vent lines

(Items shown as dotted lines and unions are NOT supplied with CC manifold)

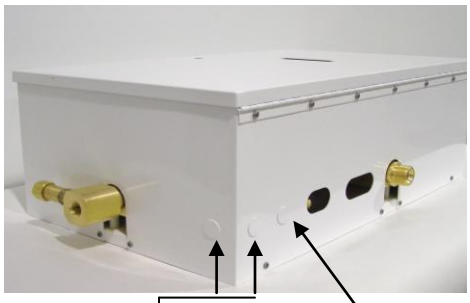
Model CC



Electrical

1. Use one of the two ½" conduit knock-outs provided located nearest to the top left corner of the cabinet to route conduit to supply 120 VAC to the power supply. **Note: Separate conduit should be used for low voltage wires (use knock outs provided on the left side of the box)**.

   120-240 / 1 / 50 – 60 Hz may be used with all units EXCEPT those with heaters. Units with heaters may only be wired to 120/1/50-60. An additional transformer (sold separately part # 35-3004) is required to connect units with heaters to 240 VAC

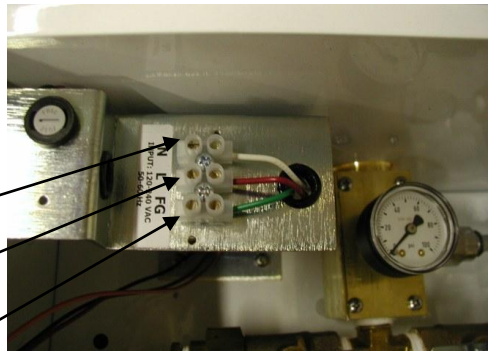


Conduit knockouts for 120 VAC

Conduit knockout for low voltage alarm signals

2. Remove the power supply cover by loosening the screw located at the top of the cover and then sliding the power supply cover to the right until the screw is in the center of the tear-drop shaped cut out. Next, pull the cover forward until it clears the screw head and the fuse. Note: the bottom of the cover inserts into a slot in the back plate. Allow the cover to rest on the dual line regulator assembly plumbing just below the power supply.

3. Route wires of proper gauge (per local building code requirement) through the power supply conduit, thru the grommet on the power supply bracket and into the terminal strip.

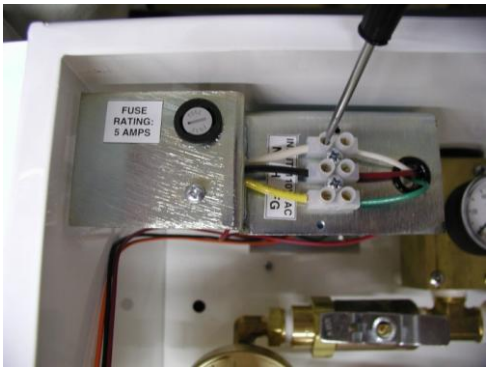


Neutral

Load

Field Ground

4. Connect the 120 VAC facility **emergency power source** electrical wiring to the terminal strip provided on the front of the power supply mounting bracket (per photos right). (N = neutral, L = load, FG = field ground)



Note: The ground must be a solid earth ground with little or no resistance. A "noisy" earth ground may affect the digital display of the manifold.

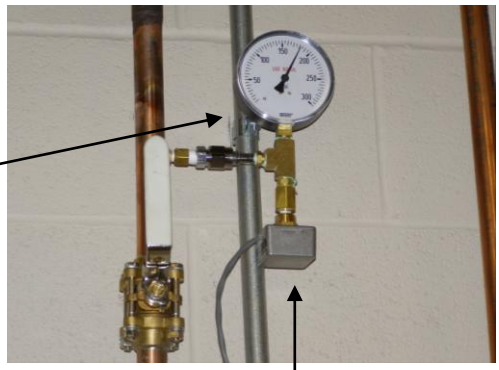
Wiring – remote alarms

Caution: Never connect or disconnect any electrical components with the power on. This may result in damage to components and is not covered under warranty

1. Wires for remote alarms should be brought into the cabinet thru conduit or shielded cables (check local code requirements) thru the knockouts on the left side of the cabinet shown here. **Note: Separate conduit should be used for high voltage wires – never run low voltage wires in the same conduit as high voltage wires.**

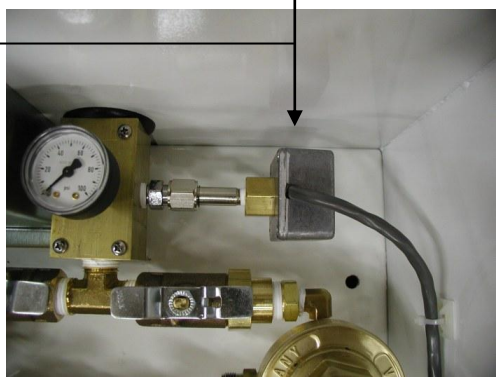
Knock out for low voltage remote alarm wiring

2. If you are installing a model CC (cylinder x cylinder) cabinet there are three alarm signals required per NFPA 99, High Line Pressure, Low Line Pressure and Secondary in Use. The CC circuit board will trigger all three of these alarms (no hi/low pressure switch is required). The line pressure transducer must be installed outside of the cabinet – downstream of the source or main line valve with the cable being wired to the manifold circuit board to comply with NFPA 99. In this photo the line pressure transducer has been assembled into our PSM-XX assembly and connected to the gauge port on the downstream (patient side) of the source valve and wired to the manifold circuit board.



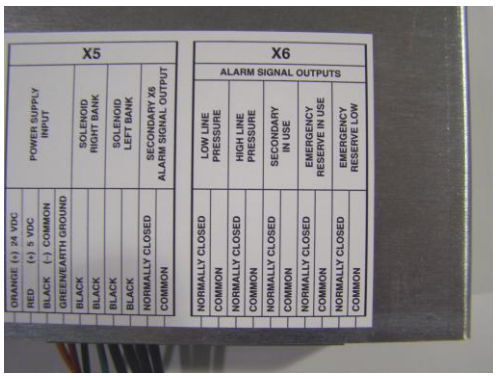
Line pressure transducer

3. The line pressure transducer may also be mounted inside the cabinet (as shown here). In this arrangement, a hi/low pressure switch (sold separately) will be required to meet the NFPA 99 recommendations. Note: the hi/low pressure switch would be wired directly to the master alarm panels – not to the manifold circuit board.



4. Remote alarm wires are connected to the circuit board at the terminal gate labeled X6. Signal wires and Common wires for Low Line Pressure, High Line Pressure and Secondary in Use should be connected to the terminals as indicated.

5. Note: all remote alarm terminals are normally closed when the gas pressure is in the normal range. The hi/low set points pre-programmed into the manifold circuit board logic chip are as per the charts on page 22. If desired, the high and low line pressure alarm set points may be adjusted by following the instructions on page 14.

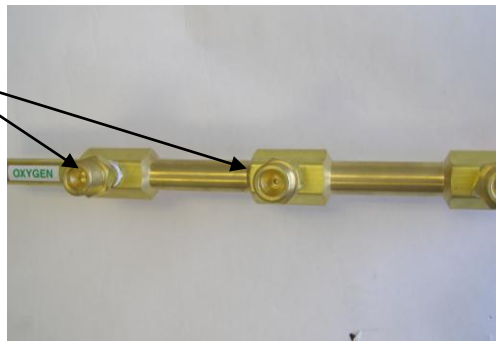


Installing pigtails & attaching cylinders – CC models

1. The check valve outlet fittings on the manifold header bars are CGA (Compressed Gas Association) gas specific threads. Each of these fittings has an integral check valve. Make sure the 3 digit CGA number stamped on the outer perimeter of these fittings matches the CGA number stamped on the mating CGA fittings on the pigtails.

2. Connect the pigtails to the check valve outlets on the manifold headers.

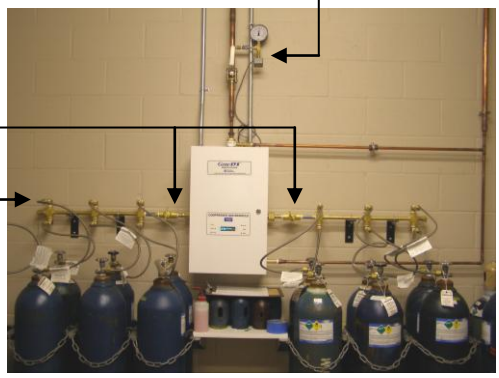
Check valve outlet fittings



Line transducer mounted on patient side of source valve using PSM-04 N_2O assembly.

Master valves

Attach pigtails to header check valve outlets using 1-1 /8" open end wrench



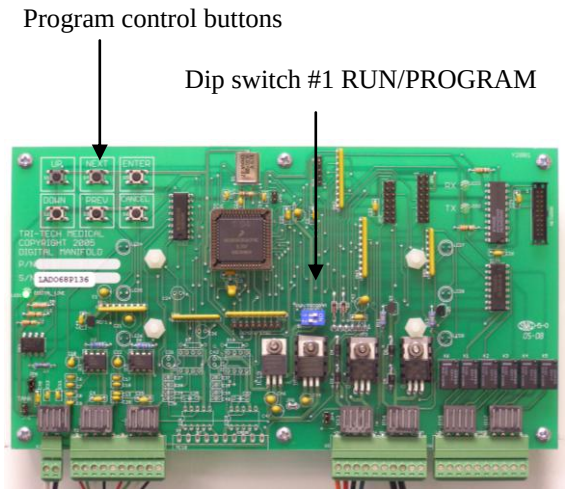
3. Check the master valves to be certain they are open (turn counter-clockwise to open). (Note: the master valve should always be left open. It is to be used only in the event of an emergency).

4. SLOWLY open all cylinder valves (turn counter-clockwise to open). Check all cylinder and pigtail connections for leaks using an oxygen safe leak test solution (any bubbles forming around connections indicate leakage).

5. Note: The manifold has been tested for leaks at the factory, but the installer MUST check for leaks at all connections made during installation.

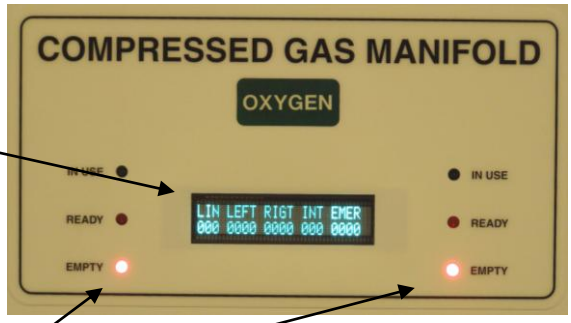
Start up & checking procedures

The manifold is pre-programmed (per page 22) and tested before it is shipped. You may, however, wish to modify some of the programming (see page 14). The unit has been designed to allow some programming to be simply and safely altered in the field.

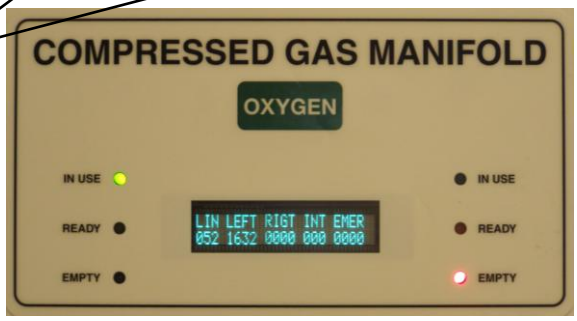


1. Start with all cylinders turned off and with zero pressure supplied to the manifold cabinet. To conduct the initial start-up testing of the manifold, it is simpler and faster if the circuit board is switched from the standard 'cycling view' (this is the mode in which it is shipped) to the 'global view'. To do this, the cover must be removed from the circuit board and the top #1 dip switch must be switched from the RUN mode to the PROGRAM mode. (Note: local alarms are **not** displayed when in the global view mode).

2. Turn on the 120 VAC to the unit. For model CC the display should illuminate showing all zeros for the Line Pressure (LIN), Left Bank Pressure (LEFT) and Right Bank Pressure (RIGHT). The intermediate (INT) and emergency reserve (EMER) displays should also display zeros. The INT and EMER displays will always display zeros on the global view screen of CC models and will not display when the mode is switched to the cycling view. (CC models). The INT and EMER displays are only activated on LL models. Both the left & right bank Red (Depleted) LED's should be illuminated. Both the left and right bank Green (In Use) and Yellow LED's (Ready) should be extinguished.



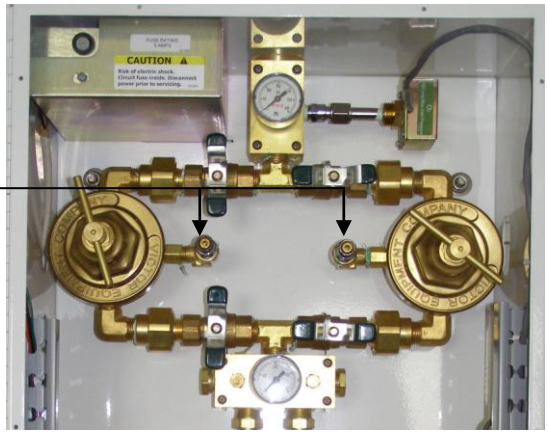
3. SLOWLY open one cylinder valve on the left bank. The left bank pressure gauge (inside the cabinet) and the text display (on the outside of the cabinet) should show the full pressure of the cylinder. The Red (Depleted) LED for the left bank should have extinguished leaving only the Green (In Use) LED illuminated.

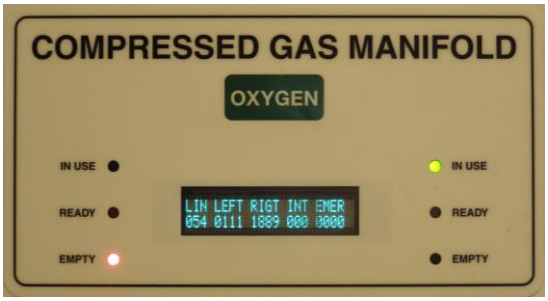


4. SLOWLY open one cylinder valve on the right bank. The right bank pressure gauge (inside the cabinet) and the digital display (on the outside of the cabinet) should show the full pressure of the cylinder. The Red (Depleted) LED for the right bank should have been extinguished and the Yellow (Ready) LED should have illuminated.

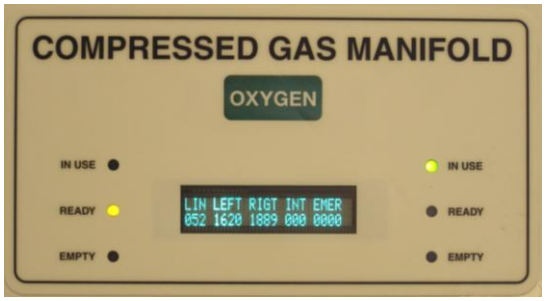
Start up & checking procedures (cont'd)

5 Turn off all open left bank cylinder valves. Create a slight flow of gas in the delivery pipeline system. DISS demand valves have been provided on the line regulators. Mating DISS fittings may be used to create a flow of gas within the manifold cabinet. The left bank pressure text display and pressure gauge should fall and the control automatically switches over to the right bank. Delivery pressure remains constant. The left bank Red (Empty) LED will illuminate. The secondary supply in use alarm should activate on the master alarm(s). The right LED will switch from Yellow (Ready) to Green (in Use)



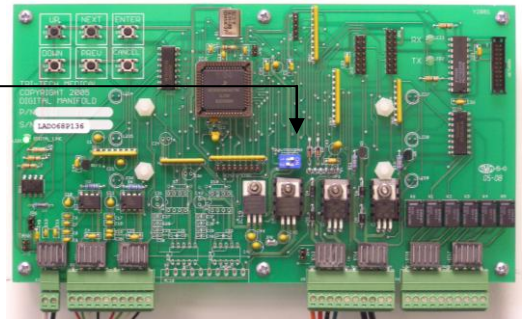


6 SLOWLY reopen the cylinders on the left bank. The left bank pressure gauge and digital display should return to full pressure. The left bank yellow (Ready) LED will illuminate simultaneously the left bank red (Empty) will extinguish. All remote secondary supply in use alarms will be canceled.



7 Repeat steps 5 & 6 to simulate an empty right bank.

8 After you are satisfied that the manifold is functioning properly and that all master alarm signals are being triggered properly, the manifold circuit board should be returned to the 'cycling view' mode. This is achieved by moving the dip switch from the PROGRAM to the RUN position.

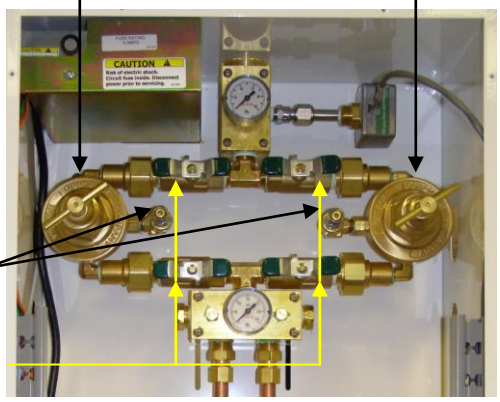


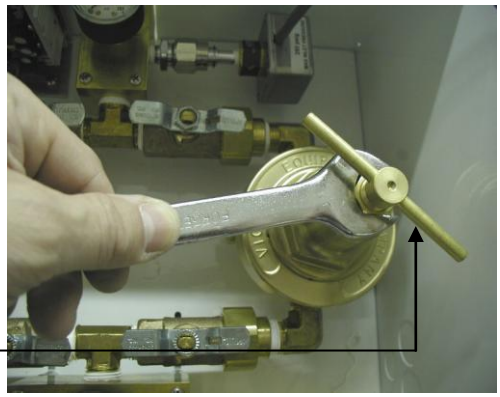
Cylinder replacement & handling

1. Close all cylinder valves on the depleted bank.
2. SLOWLY loosen and remove the pigtail connection from the depleted cylinders.
3. Remove depleted cylinders and replace protective caps.
4. Place and secure full cylinders into position using chains, belts or cylinder stands.
5. Remove protective cylinder caps from full replacement cylinders. With the valve outlet pointed away from all people in the area, slowly open each cylinder valve slightly for a split second to blow out any dirt or contaminants that may have become lodged into the cylinder valve.
6. Connect pigtails to cylinder valves and tighten with wrench.
7. SLOWLY turn each cylinder valve until each cylinder is fully on.
8. Leak test the connections using an oxygen approved leak test solution.
9. Observe the following conditions: The red (Empty) LED is extinguished and the yellow (Ready) LED is illuminated and the secondary in use alarm is cancelled.
10. The manifold supply bank is now replenished and automatically placed in “reserve”.

Line delivery pressure adjustment

1. Leave the manifold in full operational status.
2. Create a flow condition in the delivery piping system. DISS demand valves have been provided on the line regulators for this purpose. Mating DISS fittings may be used to create a flow of gas within the manifold cabinet.
3. Open the manifold cabinet door and locate the line pressure regulators. Ball valves on the inlet and outlet sides of each regulator determine which regulator is “on line” and which is “off line”. Note: when the ball valve handle is perpendicular to the pipeline, the ball valve is closed. One line regulator should be valved closed and the other valved open. The line regulators on-line and off-line should be alternated every other month to ensure each is excercised.
4. Turn the T – bar handle clockwise to increase pressure or counter-clockwise to decrease pressure. It may be necessary to use a 3/4” open-end wrench, loosen the locknut on the adjusting screw (on high flow models only).
5. After adjustment, retighten the locknut on the adjusting screw and close the cabinet door.





Programming Adjustments

The manifold is pre-programmed and tested before it is shipped. You may, however, wish to modify some of the programming. The unit has been designed to allow some programming to be simply and safely altered in the field. The aspects of the program which may be altered include:

- ✓ Low line pressure set point
- ✓ High line pressue set point
- ✓ Units of measure (psig, bar or kPa)
- ✓ Calibrate line sensor
- ✓ Display scroll time (seconds)
- ✓ Application logic (this should only be changed if the unit is being converted to a new application – in conference with a factory technician)

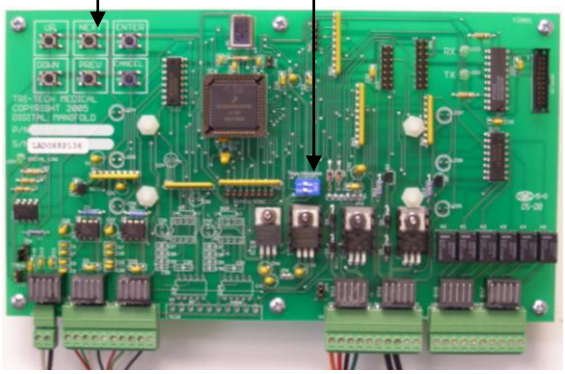
1. To make any programming change, the cover must be removed from the circuit board and the top #1 dip switch must be switched from the RUN mode to the PROGRAM mode.

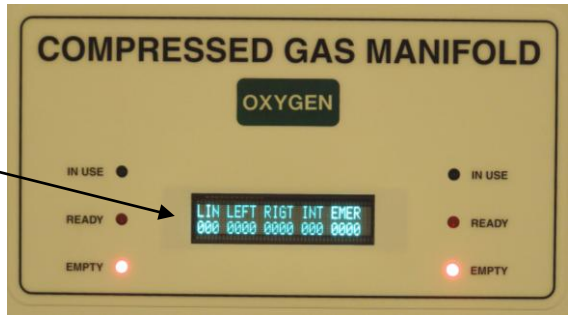
2. Once the #1 dip switch has been changed from the RUN mode to the PROGRAM mode, the display should look like this

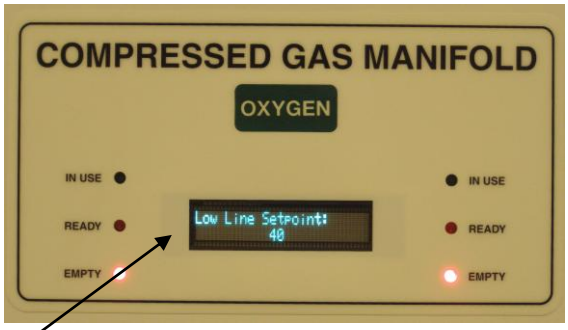
3. While viewing the display on the front of the cabinet door, use the NEXT or PREVIOUS buttons to toggle thru the menu choices. When you find the item you wish to reprogram, use the UP or DOWN buttons to display the new setting desired and then use the ENTER button to save changes to the programming. **Note – if the ENTER button is not pressed for each and every change, that programming change will not be saved**. The display will display the word SAVED when you have successfully saved a programming change.

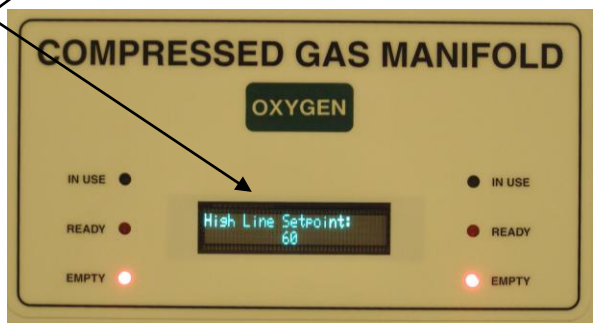
4. Return the dip switch to the RUN position and replace the circuit board cover when you are finished making changes to the programming.

Displays showing common pre-programmed alarm set points









Error Codes, Alarm Codes & Information Codes

Code Displayed	Message Displayed	Explanation
Error 01	Left bank sensor out of range	This condition is activated when the left sensor's raw readings are at either extreme. Can be caused by a disconnected, wired incorrectly, bad, or over-pressurized sensor.
Error 02	Right bank sensor out of range	This condition is activated when the right sensor's raw readings are at either extreme. Can be caused by a disconnected, wired incorrectly, bad, or over-pressurized sensor.
Error 05	Left bank pressure high	In CC models this message is displayed whenever the left inlet bank pressure exceeds 3,000 psi.
Error 06	Right bank pressure high	In CC models this message would be displayed if the right inlet bank pressure exceeds 3,000 psi.
Error 09	Line sensor noise detected	Message is displayed if the circuit board detects noise in the signal from it's digital sensor. Noise is detected if the protocol checksums do not match.
Error 10	Line sensor failed to respond	Message is displayed if a line sensor is not responding.
Error 11	Line sensor is disconnected	Message is displayed whenever a line sensor is disconnected.
Error 12	Secondary supply leak detected	Message is displayed when a leak is detected in the secondary bank. (CC models only).
Error 14	Gas type mismatch	This error code is triggered by a mismatch in gas type between the line sensor and user selected gas type in setup of the manifold circuit board.
Alarm 01	Line pressure low	Message is displayed and low line pressure relay activated whenever the line pressure is below the programmed low line pressure alarm set point.
Alarm 02	Line pressure high	Message is displayed and high line relay activated whenever the line pressure is above the programmed high line pressure alarm set point (high line pressure alarm is triggered).
Alarm 03	Secondary supply in use	Message is displayed and secondary in use relay activated when the manifold has switched over to the secondary bank. Clears when tank is replaced.
	XX% Remains	(CC models only - except for N2O & CO2 services). It calculates the percent of gas remaining in the service bank.

Definitions and clarifications

Alarm Code – Alarm conditions per NFPA 99C and Z7396.1 guidelines.

Error Code – Messages that provide diagnostic information to assist in resolving system problems.

Information Codes – Messages that provide information regarding the operation of the system.

Item	Part Number	Description
Primary Regulator & Repair Kit	68-0003R	Primary regulator
	68-0003RK	Primary regulator repair/rebuild kit
Line Regulators & Repair Kits	68-0004R	Line regulator standard flow 5 - 125 psig
	68-0004RK	Standard flow line regulator repair/rebuild kit
	68-0002R	Line regulator high flow 5 - 125 psig
	68-0002RK	High flow line regulator repair/rebuild kit 5 - 125 psig
	68-0001R	Line regulator high flow 10-200 psig
	68-0001RK	High flow line regulator repair/rebuild kit 10 - 250 psig
Circuit Board	35-1003R	CC series PLC board with single text display
Power Supply	35-2013R	Power supply
Transducers/Sensors	14-3001R	0 - 2,500 psig transducer with 3' cable for left or right banks
	14-3024	0 - 250 psig transducer with 1.5' cable N2
	14-3025	0 - 100 psig transducer with 1.5' cable Oxygen
	14-3026	0 - 100 psig transducer with 1.5' cable Med Air
	14-3027	0 - 100 psig transducer with 1.5' cable N2O
	14-3028	0 - 100 psig transducer with 1.5' cable CO2
Solenoid Valves	48-1007R	Solenoid valve for CC series
Check Valve	17-4003R	Intermediate check valve 1/2 npt male x 1/2 OD tube
Tubes & Compression Fittings	17-4012	Compression Sleeve 1/2 OD tube - glass filled Teflon
	17-4005	Compression Nut for 17-4012
	Q1100-1	1/2 OD copper tube x 7"
	17-4013	Compression Sleeve 3/8 OD tube - glass filled Teflon
	17-4024	Compression Nut for 17-4013
Gauges	14-1018	0 - 4,000 psig 1 1/2" x 1/8 m npt center back gauge
	14-1016	0 - 400 psig 2" x 1/4 m npt bottom port gauge
	14-1017	0 - 400 psig 1 1/2" x 1/8 m npt center back gauge
	14-1009	0 - 300 psig 1 1/2" x 1/8 m npt center back gauge
	14-1008	0 - 100 psig 1 1/2" x 1/8 m npt center back gauge
Relief Valves	RV-22-075	75 psig x ½ M npt inlet with pipe away adaptor
	RV-22-150	150 psig x ½ M npt inlet with pipe away adaptor
	RV-22-250	250 psig x ½ M npt inlet with pipe away adaptor
	RV-11-400	400 psig x ¼ M npt inlet with pipe away adaptor
Pigtails	20-1001	36” (pre-bend) single loop rigid copper O2 (w/o check) – CGA 540
	20-1002	36” single loop rigid copper N2O – CGA 326
	20-0002	24” Flexible stainless braided N2O - CGA 326 with captured fittings
	20-0003	24” Flexible stainless braided CO2 – CGA 320 with captured fittings
	20-0004	24” Flexible stainless braided AIR – CGA 346 with captured fittings
	20-0005	24” Flexible stainless braided N2 – CGA 580 with captured fittings
Union	17-0169	Union 3 piece ½” M npt x ½” M npt 1” 11 ½ NPS
Master Valve	17-0256	Master Valve 1/2" F npt x 1/2 F npt
Master Valve Repair Kit	GMV-1001RK	Master valve rebuild kit
Heater element	35-2001	Ceramic Heater
Accessory	35-3012	Manifold buzzer kit

Note: trouble-shooting and repairs should be done by qualified personnel only.

Component	Symptom	Probable Causes	Remedy or Check
Circuit board	No indicator lights on front panel illuminate when power is connected.	Wiring connection. Power input out of range Bad circuit board	Check wiring connections. Check electrical power supply output voltages. Replace power supply or circuit board.
Circuit board	Red indicator lights are on but both banks are full	Master valve or cylinder valves on bank are closed. Pigtails are installed with check valves in wrong direction Bank pressure is not sufficient for logic board to place it in "In Use" or "Ready" status (see appendix E minimum inlet pressures page 27)	Open valves SLOWLY Close cylinders and re-install pigtails in proper flow direction Replace cylinders with full cylinders. Or, if using portable bulk vessels, open pressure building valve on vessel or replace portable bulk vessel with higher delivery pressure portable bulk vessel
Circuit board	Error code(s) being displayed	Loose or disconnected or broken wire, mis-connected wire, a bad transducer, a calibration problem or an over-pressure situation.	Check wires for good and correct location connection to circuit board (See ERROR CODES pg 15) If all wires are connected properly and located properly – it may be necessary to replace a transducer.
Entire manifold	Loss of cylinder contents	Leakage in manifold cabinet, headers or pigtails. Leakage thru manifold solenoid vent / relief Leakage around regulator bonnet Regulator with bad seat Leaking gauge Regulator set too high Overpressure due to failed regulator seat Regulator freeze-up (N2O or CO2) / heater failure	Locate leak using oxygen compatible leak test solution, tighten, reseal or replace leaking fitting(s) or pigtails. Replace solenoid valve Tighten regulator bonnet Rebuild or replace regulator Replace gauge Set delivery pressure per specifications (see page 27) Rebuild or replace regulator Flow rate exceeds manifold design capacity or cylinder withdrawl capacity – add cylinders. Repair heater or add heater and consider adding additional cylinders

Note: trouble-shooting and repairs should be done by qualified personnel only.

Component	Symptom	Probable Causes	Remedy or Check
Loss of cylinder contents	Both banks feeding	Leaking header/pigtail connection	Tighten fitting or re-tape with Oxygen safe Teflon tape (if npt fitting) and tighten.
		Leaking intermediate check valve	Replace check valve
		Leaking solenoid valve	Replace solenoid valve
		Primary regulator(s) out of adjustment	Set delivery pressure to specifications per chart on page 22
System	Changeover occurs, secondary in use alarm is triggered and then clears placing empty or near empty bank into reserve	Manifold is unable to support required flow (N2O or CO2 units)	Increase manifold flow capacity (call factory for assistance)
			Increase bank size

General Maintenance

	Control Cabinet	Headers & Pigtail
Daily	Record line and bank pressures	Observe nitrous oxide and carbon dioxide systems for cylinder frosting or surface condensation. Should excessive condensation or frosting occur it may be necessary to increase manifold capacity.
Monthly	Check regulators, compression fittings and valves for external leakage. Check valves for closure ability. Alternate line regulator in use (if dual).	Inspect valves for proper closure. Check pigtails for cleanliness, flexibility, wear, leakage, kinked, pinched or twisted and thread damage. Replace damaged pigtails immediately. Inspect header check valve outlets for closure ability.
Annually	Check relief valve pressures Check regulator seats.	Check pigtails for cleanliness, flexibility, wear, leakage, kinked, pinched or twisted and thread damage. Replace damaged or worn pigtails immediately.
	Tighten regulator bonnets approximately 1/8”.	
Every 4 years		Replace all pigtails

Appendix A

Glossary of Terms

AC ***Alternating Current***
An electric current that reverses direction or polarity at regular intervals.

Alarm Code
Alarm conditions per NFPA 99C guidelines.

BAR ***Bar***
A measurement of the force in a compressed gas system.
1 BAR = 14.7 psig (1 atmosphere)

Check Valve
A valve which operates mechanically and automatically to stop a reverse flow of gas

DC ***Direct Current***
An electric current that flows in one direction. The current can be steady or pulse.

Economizer Circuit
A mechanical piping circuit which allows built up reserve gas to be used in low volume rather than allowing the gas to vent to atmosphere.

Error Code
Messages that provide diagnostic information to assist in resolving system problems.

Information Code
Messages that provide information regarding the operation of the system.

kPa ***Kilopascals***
A measurement of the force in a compressed gas system.
1 kPa = .14 PSI

LED ***Light Emitting Diode***
A semiconductor diode that converts applied voltage to light.

NFPA ***National Fire Protection Association***
The National Fire Protection Association is an association engaged in standards development.

NO ***Normally Open***
An electrical circuit in which the switch is normally open. No current flows through the circuit in normal operation. Only when the switch is closed is the flow of current started.

A normally open solenoid valve is one designed so that it is open when there is no power to the solenoid and closed when it is energized.

NC ***Normally Closed***
An electrical circuit in which the switch is normally closed. Current flows through the circuit in normal operation. Only when the switch is opened is the flow of current stopped.

PSI ***Pounds per Square Inch***
A measurement of the force in a compressed gas system.
1 PSI = 6.9 kPa

Solenoid Valve
A valve that is opened or closed electromagnetically.

Transducer
A device that converts pressure into an electrical signal.

Transient Signal
An intermittent and brief signal that quickly corrects and returns the alarm to a normal operating mode before monitoring personnel can silence the alarm

V ***Voltage***
Voltage is electrical pressure or force. One volt is equal to the difference of electrical potential between two points on a conducting wire carrying a constant current of one ampere when the power dissipated between the points is one watt.

Appendix B – Technical Specifications

Maximum Inlet Pressure: Models CC: 3,000 psig
Model LL: 400 psig

Operating Ambient Temperature range:

Model CCU: -20 F (-29 C) to 125 F (54.4 C) all gas services

Model LLU -20 F (-29 C) to 125 F (54.4 C)

Storage Temperature: -4 F (-20C) to + 185F (85 C)

AC Input: 120 volts AC - 50-60 Hz

Input Fuse: 5 amp input AC line fuse protects the input wiring to power supply

Power Consumption: 45W (0.4 amps using 120 VAC) maximum without heaters
245W (2.1 amps using 120 VAC) maximum with heaters

Full Load Amps: .375 without heaters
2.10 with heaters

Pressure Measurement Accuracy:

0-100 PSIG transducer +/-1% of full scale - Line Pressure
Oxygen, Nitrous Oxide, Medical Air, Carbon Dioxide

0-250PSIG transducer +/-1% of full scale - Line Pressure - Nitrogen

0 500 PSIG transducer +/-2% of full scale – Bank & Intermediate Pressures model LL only

0 – 2,500 PSIG transducer +/-2% of full scale –
Bank Pressures model CC, Emergency Reserve Bank Pressure model LL

Solenoid Valve: 24VDC – Normally Open (Valve opens when de-energized)

Dimensions

Control Cabinet: Dimensions excluding inlet & outlet fittings
15 3/8" W x 25" H x 9 ¼" D

Dimensions including inlet & outlet fittings
17 ¼" W x 27" H x 9 ¼" D

Line Pressure Transducers: Housing dimensions: 1.25" Diameter x 3.75" Length including inlet fittings

Weatherproof Control Cabinet

Dimensions excluding inlet & outlet fittings
17 ¼" W (cabinet) 18 ¾:W (door) x 26 3/4" H x 11" D

Dimensions including inlet & outlet fittings
20 ¼" W x 29" H x 11" D

Ball valves

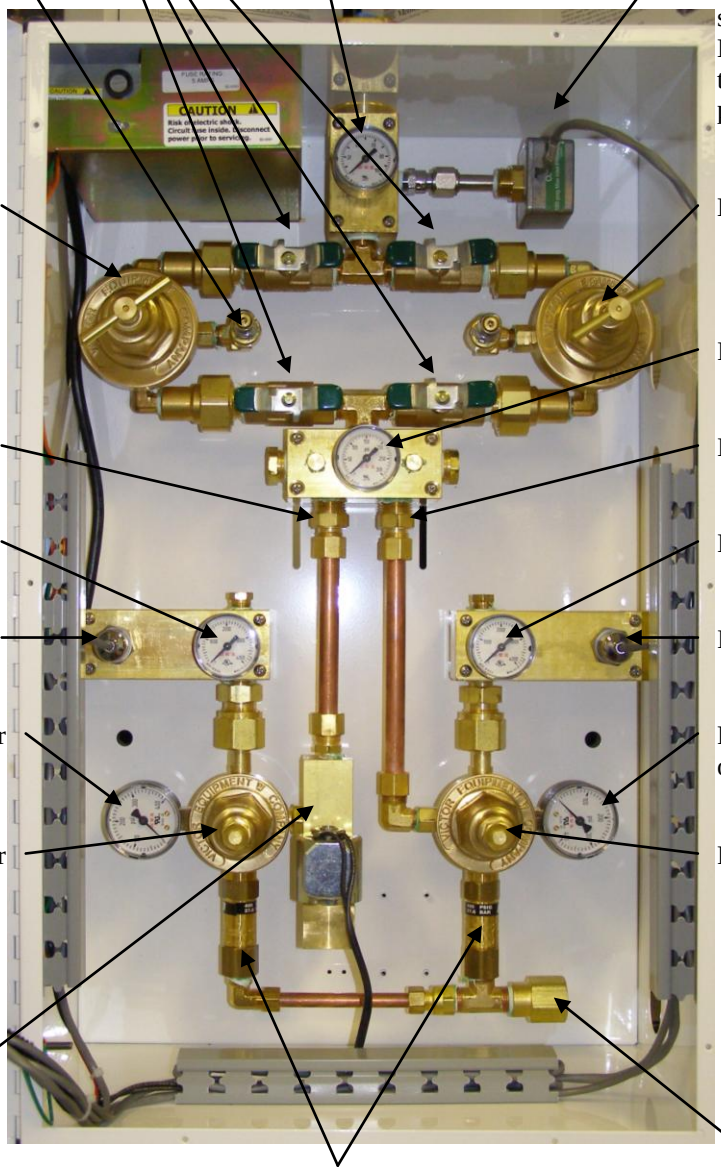
Line pressure gauge

Outlet – ½ F npt (not visible in this photo)

Line pressure relief valve ½ F npt (not visible in this photo)

DISS demand valves – may be used to bleed line pressure during service and as emergency feed ports for the facility

Line pressure transducer – may be installed downstream of manifold source valve with PSM-xx assembly to eliminate separate hi/low pressure switch. Manifold PCB board will trigger master alarm hi/low line pressure alarms



Line pressure regulator

Line pressure regulator

Intermediate pressure gauge

Intermediate check valve

Intermediate check valve

Inlet pressure gauge

Inlet pressure gauge

Inlet pressure transducer

Inlet pressure transducer

Left bank primary regulator outlet pressure gauge

Right bank primary regulator outlet pressure gauge

Left bank primary regulator

Right bank primary regulator

Solenoid valve

Intermediate pressure relief valves

Intermediate relief outlet – ½ F npt with ½ npt x 6” brass nipple shipped uninstalled with manifold but not shown in this photo

Appendix D – Operational Pressure Specifications

(all pressures shown in psig)

Minimum inlet pressure requirements for CC Manifold

Manifold delivery pressure	Minimum inlet pressure Left bank	Minimum inlet pressure Right bank
50	200	150
80	300	250
170	300	250

Alarm Pressure Settings for CC Models

Normal Delivery Press	Line Relief Setting	High Line Press Set Point	Low Line Press Set Point	Secondary In Use Set Point
50	75	60	40	200 left bank / 150 right bank
80	150	96	64	300 left bank / 250 right bank
170	250	200	140	300 left bank / 250 right bank

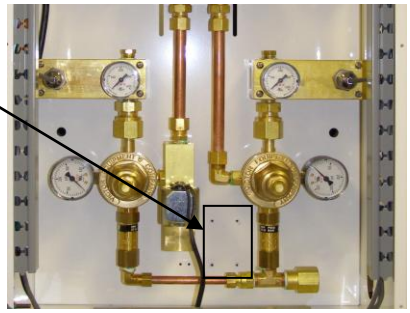
Primary Regulator Settings (CC Models) Note: All settings done with full cylinder pressure and with slight gas flow thru the manifold. DISS demand valves have been provided on the line regulators and may be used to create a slight flow. Primary regulator outlet pressure will vary with varying inlet pressures. (The outlet pressure will rise up to 30 psig above set point as the cylinder pressure decreases).

Normal Delivery Pressure (factory delivery pressure)	Left Primary Regulator Set Point	Right Primary Regulator Set Point
50	160	120
80	260	220
170	260	220

Tri-Tech Medical Genesys series manifolds may be ordered without T-Net Interface Circuit boards. The T-Net Interface Circuit boards may be installed later. The first step is to record the "In Use", "Ready" or "Empty" status of each bank. Before installing the interface board, the 120 VAC power to the manifold should be turned off. The fuse on the power supply may be removed by inserting a screwdriver in the slot , pushing inward with slight pressure, then turning the fuse cap cover approximately 1/8 turn counter clockwise. When you release, the fuse should pop-out about ¼ ". This should disengage the power**. NOTE: this will not interfere with the flow of medical gases to the facility. It will trigger all of the master alarm signals that the manifold is providing.**

120 VAC Fuse Cap.

Stand-offs for mounting T-Net interface circuit board.



You will be installing one of three types of interface circuit boards, and cable connector; Ethernet, Wireless or RS485.

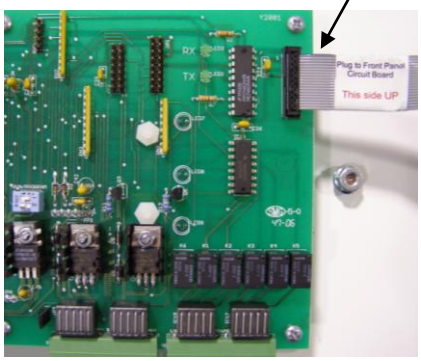
The Ethernet Interface board is shown here left and the Wireless board is shown here right.

Any of the three types install into the manifold cabinet as shown.

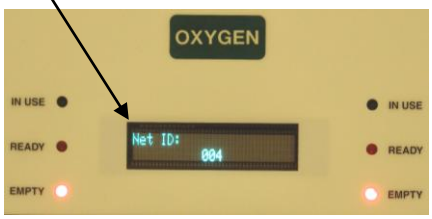
The wireless antenna mounts in a hole in the bottom of the cabinet.

The cable must be installed into the socket on the top right corner of the circuit board marked "network" – per the instructions on the cable.

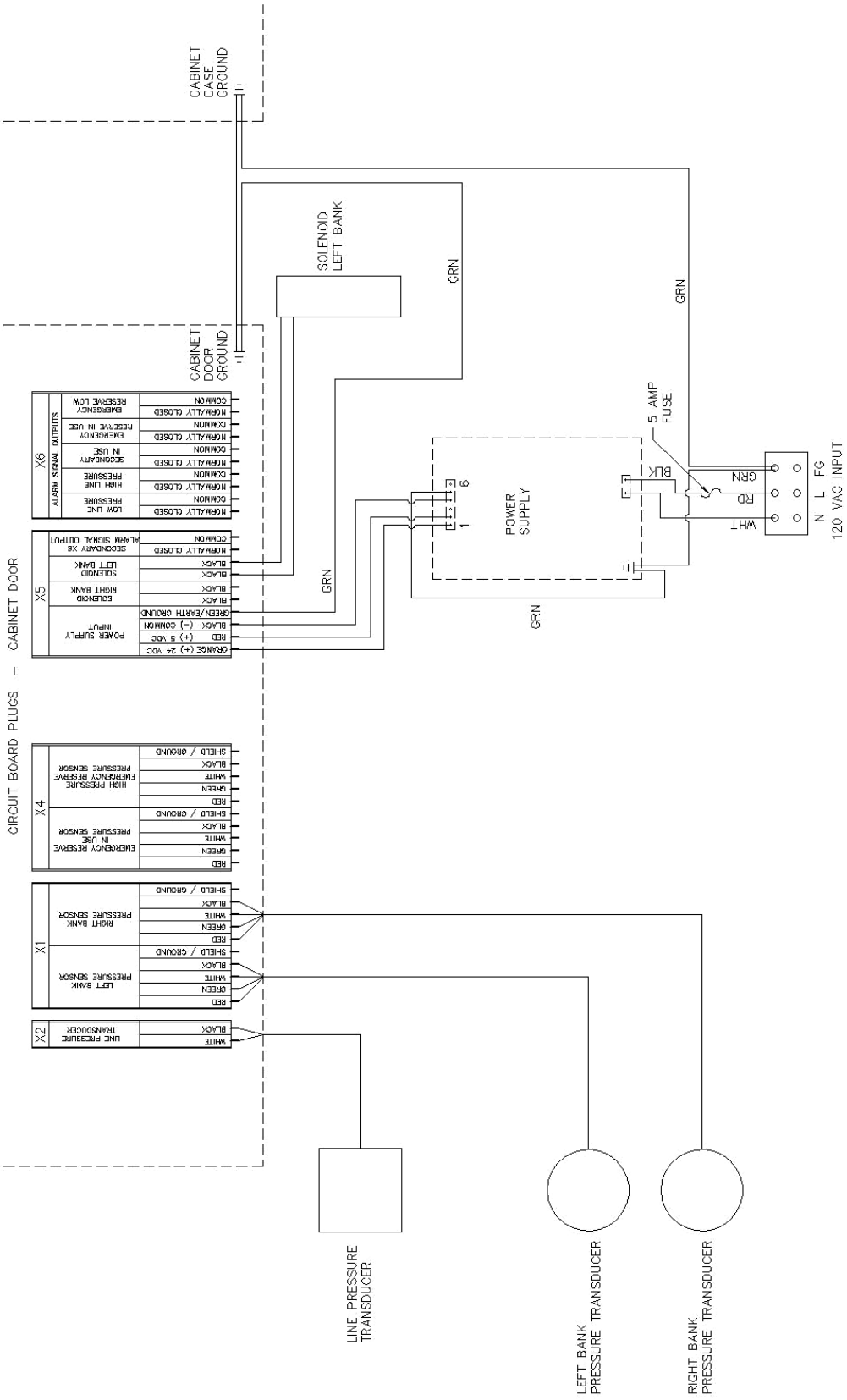
Following the Field Adjustments instructions on page 14 the manifold circuit board must be programmed with a unique identification number.

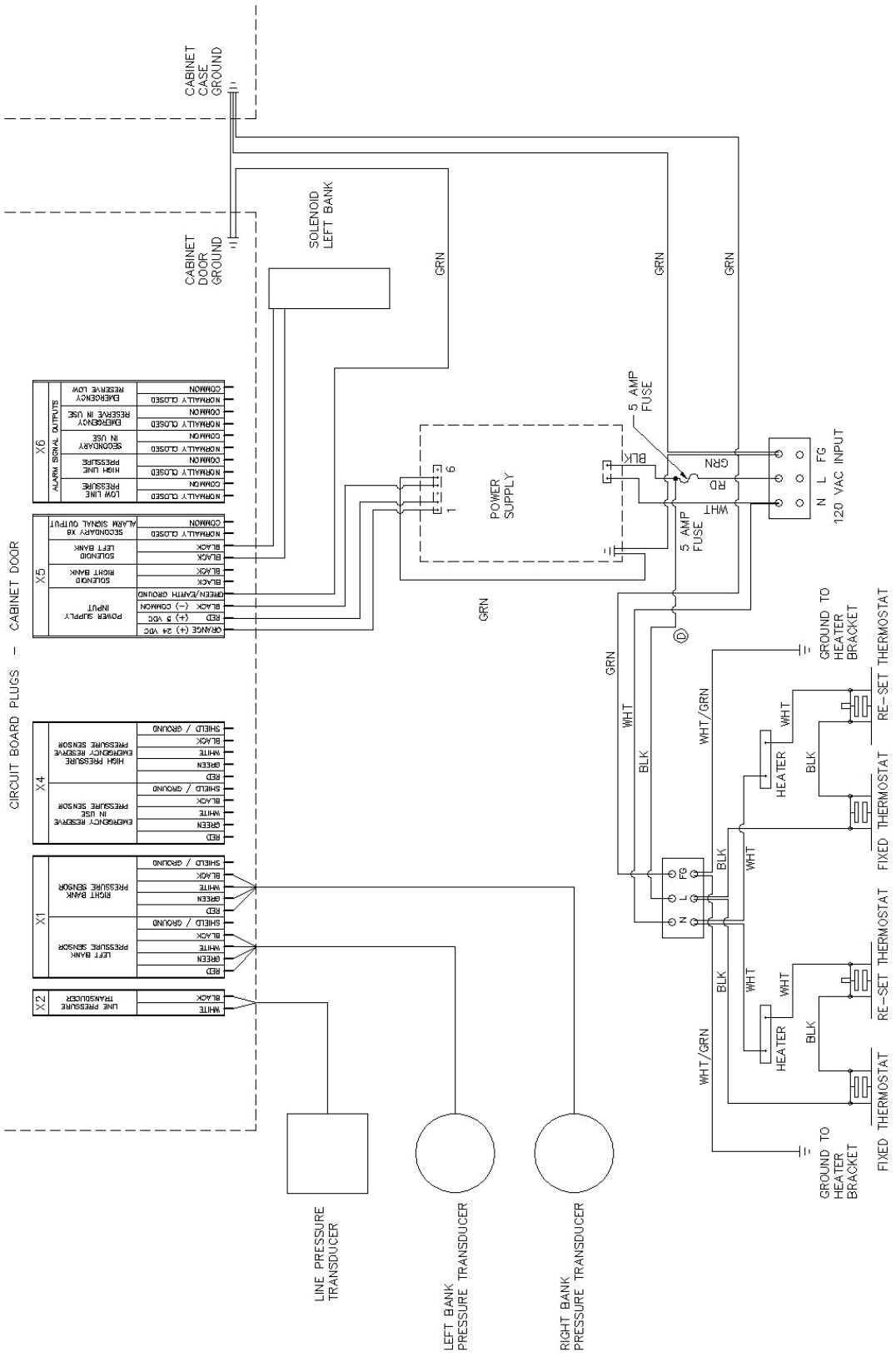


The power may now be restored to manifold. The manifold is fully functional – even if the T-Net software is not yet installed on a PC or is out of service. The manifold will automatically place the bank with the least pressure "In Use". Refer to the notation made before power was disengaged. In the case of liquefied gases, it may be necessary to manually cycle the manifold so that the original bank is "In Use".



Note: For additional information – see T-Net Manual # 99-0314.


CABINET CASE GROUND
SOLENOID LEFT BANK
GRN
CABINET DOOR GROUND
5 AMP FUSE
POWER SUPPLY
BLK
GRN
RD
WHT
N L FG
120 VAC INPUT
CIRCUIT BOARD PLUGS – CABINET DOOR
X6
ALARM SIGNAL OUTPUTS
X5
X4
X1
X2
LINE PRESSURE TRANSDUCER
LEFT BANK PRESSURE TRANSDUCER
RIGHT BANK PRESSURE TRANSDUCER


CABINET CASE GROUND
CABINET DOOR GROUND
SOLENOID LEFT BANK
GRN
5 AMP FUSE
POWER SUPPLY
120 VAC INPUT
N L FG
BLK
GRN
RD
WHT
CIRCUIT BOARD PLUGS – CABINET DOOR
X6
ALARM SIGNAL OUTPUTS
LOW LINE PRESSURE
HIGH LINE PRESSURE
SECONDARY IN USE
EMERGENCY RESERVE IN USE
EMERGENCY RESERVE LOW
COMMON
NORMALLY CLOSED
X5
POWER SUPPLY INPUT
ORANGE (+) 24 VDC
RED (+) 5 VDC
BLACK (–) COMMON
GREEN/EARTH GROUND
RIGHT BANK SOLENOID
LEFT BANK SOLENOID
SECONDARY X8 ALARM SIGNAL OUTPUT
X4
HIGH PRESSURE EMERGENCY RESERVE PRESSURE SENSOR
EMERGENCY RESERVE IN USE PRESSURE SENSOR
SHIELD / GROUND
BLACK
WHITE
GREEN
RED
X1
LEFT BANK PRESSURE SENSOR
RIGHT BANK PRESSURE SENSOR
X2
LINE PRESSURE TRANSDUCER
WHT
BLK
WHT/GRN
HEATER
RE–SET THERMOSTAT
FIXED THERMOSTAT
GROUND TO HEATER BRACKET
LINE PRESSURE TRANSDUCER
LEFT BANK PRESSURE TRANSDUCER
RIGHT BANK PRESSURE TRANSDUCER

Buzzer kit part # 35-2012