CLASS 1 INC.
Building Better Healthcare™

Genesys® Series Manifold Installation and Operating Manual

Ver. 2012 - Rev. 1004

Class 1 Inc.

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CLASS 1 INC.
Building Better Healthcare™

Operator's Manual

Genesys® Series Manifolds

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Technical Assistance (800) 242-9723 or (519) 650-2355

Features and 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
- ✓ **Economizer software**; ensures empty portable bulk vessels will not be put back into reserve
- ✓ **Economizer hardware;** allows head pressure from secondary portable bulk vessels to be used instead of vented
- ✓ **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
- ✓ **Circuit board triggers all alarms required by CSA**; simplifying wiring and reducing cost
- ✓ **Unit includes hi/low line pressure transducer**; eliminating need to purchase hi/low pressure switch
- ✓ **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 with 20 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**
- ✓ **Dual line pressure regulators on CSA 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**

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Operator's Manual

Genesys® Series Manifolds

Introduction

Class 1 Inc. 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. Class 1 Inc. manifolds are built in accordance with the CSA, the National Fire Protection Association and Compressed Gas Association guidelines.

Warranty
All Class 1 Inc. 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 CSA, the National Fire Protection Association, the Compressed Gas Association, OSHA, and all applicable local codes. Carbon Dioxide and Nitrous Oxide manifolds and cylinders should not be placed in a location where the temperature will exceed 120° F (49° C) or fall below 20° F (-7° C). The manifolds for all other gas services should not be placed in a location where the temperature will exceed 120° F (49° C) or fall below 0° F (-18° 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 these 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.

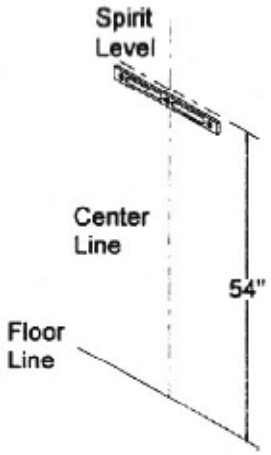
✓ Oxygen manifolds and cylinders should be grounded. Static discharges and lightning may ignite materials in an oxygen atmosphere, creating a fire or explosive force.

✓ 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.

Installation: Mounting

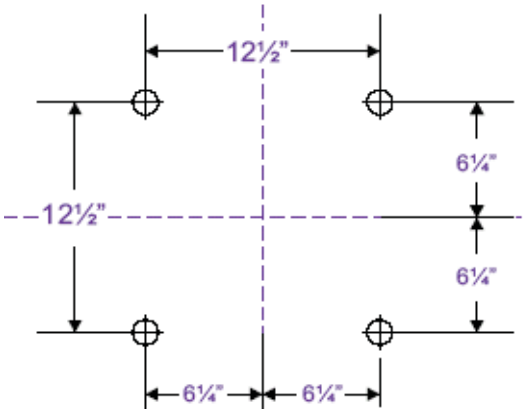
Control Cabinet Installation



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

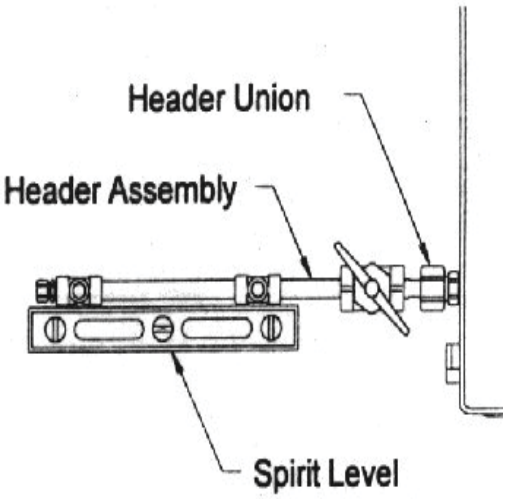
2. Measure from the floor to a point 60" in height* above the finished floor of this vertical line. Using a level, mark a horizontal line at this point extending approximately 7" to the left and 7" to the right of center. This line indicates the location for the bottom two mounting bolts of the manifold control cabinet. (* - suggested manifold height. Wall mounting heights may vary depending on available space, cylinder height, etc.)

3. Draw another horizontal line 12 ½" above and parallel to the lower horizontal line. This line should also extend 7" to the left and 7" to the right of center. This line indicates the location for the upper two mounting bolts of the manifold control cabinet.



4. Measuring from the vertical center line, along the two horizontal lines, make a mark at 6 ¼" to the left and another at 6 ¼" to the right of the vertical center line. These four locations are the mounting hole locations for the manifold control cabinet. Install the manifold control cabinet using fasteners suitable for the type of wall construction.

Header Installation



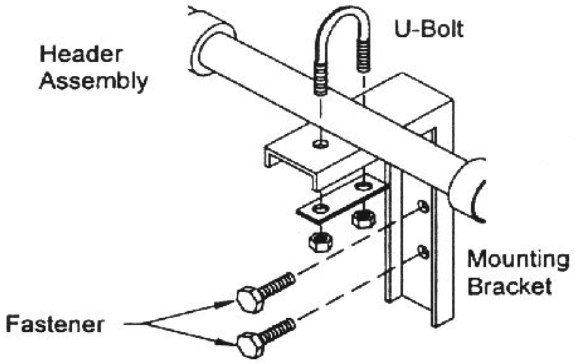
1. Attach the headers to the union on each side of the manifold control cabinet. Using a level, mark the placement of mounting brackets while keeping the header on a horizontal plane.

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.

Installation: Plumbing

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 CCC

1. The outlet of the manifold is located at the top center of the unit as shown here. The outlet connection is ½ NPT female. It is recommended that a ½ NPT male union should be installed between the outlet of the manifold cabinet and the pipeline system. This union is available as an accessory from Tri-Tech Medical (part # 17-0169).

2. A 6" x ½ NPT brass pipe nipple has been provided (on CC models) to extend the intermediate relief piping outside the cabinet wall.

3. 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 CCC manifold. See Appendix F, pg 28.

4. The intermediate relief valve extension pipe nipple must be installed. It is bagged and shipped inside of the cabinet for protection during shipment.

Installation: Plumbing

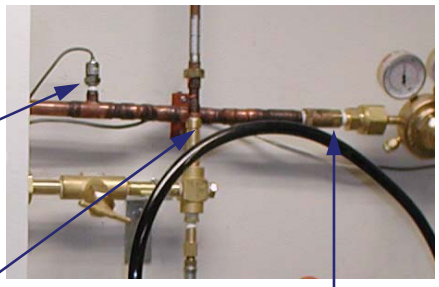
Plumbing: Model LLC

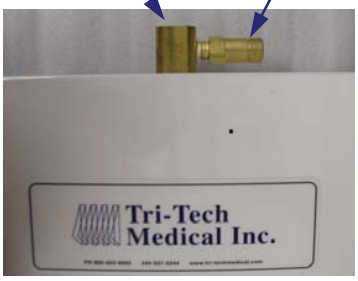
1. In addition to connecting the left & right primary and secondary portable bulk vessel supply banks, the LL models must also have a high pressure reserve bank of cylinders connected to the cabinet to be in compliance with CSA & NFPA 99 guidelines.

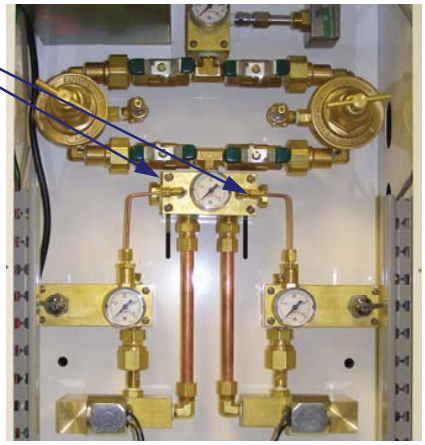
2. The model LLC has one ½ NPT female line pressure relief valve connection and two 3/8 NPT female intermediate pressure relief valve connections. (This installation is typical – with the two intermediate relief vent lines and the line pressure relief vent line brought together as a common vent line that exits the facility either thru an exterior wall or the roof). See Appendix F, pg 28.

3. A check valve (part number CV-050F) must be installed between the emergency reserve in use pressure transducer and the high pressure reserve regulator.

4. The intermediate block has two ½ NPT plugs which may be removed to allow the emergency reserve to be piped in thru either the left or the right side of the cabinet. Slots have been provided on both the left and right sides of the control cabinet to allow for the high pressure reserve piping.

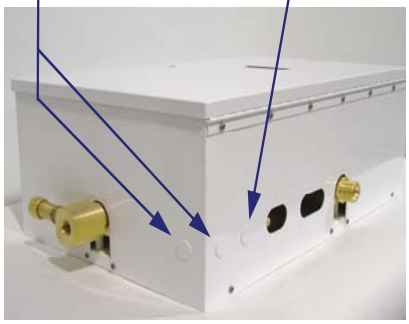






Installation: Electrical

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).**



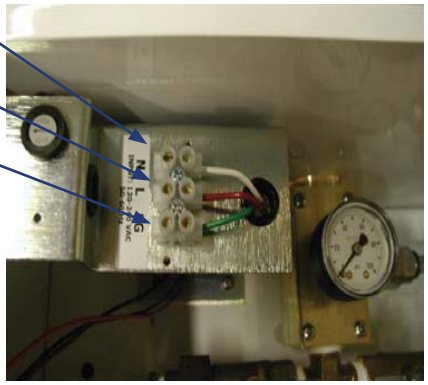
2. Remove the power supply cover by loosening the screw located at the top of the cover and then sliding the power supply cover to the right until the screw is in the center of the tear-drop shaped cut out. Next, pull the cover forward until it clears the screw head and the fuse. **Note: the bottom of 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



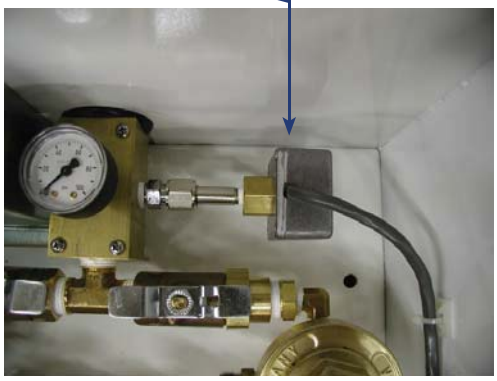
4. Connect the 120 VAC facility **emergency power source** electrical wiring to the terminal strip provided on the front of the power supply mounting bracket (per photos right). (N = neutral, L = load, FG = field ground)

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.

Installation: Wiring Remote Alarms

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.**

2. If you are installing a model CCC (cylinder x cylinder) cabinet there are three alarm signals recommended per CSA & NFPA 99, High Line Pressure, Low Line Pressure and Reserve in Use. The CCC 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 CSA & 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.

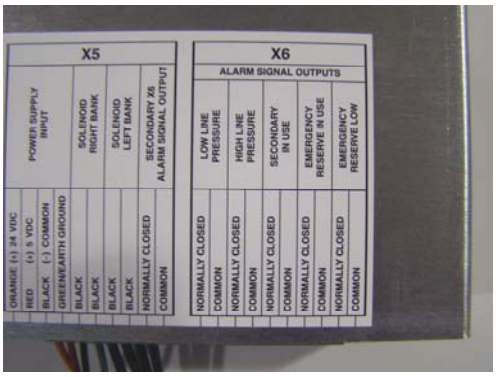


3. As an option the line pressure transducer may also be mounted inside the cabinet (as shown here). In this arrangement, a hi/low pressure switch (sold separately) may be ordered if the customer chooses to do so. **Note: The hi/low pressure switch would be wired directly to the master alarm panels – 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 27.

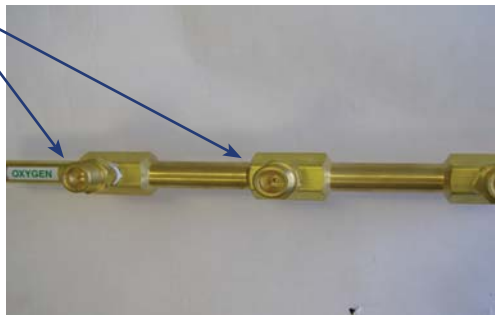
6. **Note:** An additional set of dry contacts labeled "Secondary Alarm Signal Output" has been provided on the X5 terminal to provide an alarm condition should the 120 VAC become disconnected.



Installation: Pigtails & Cylinders CCC 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.

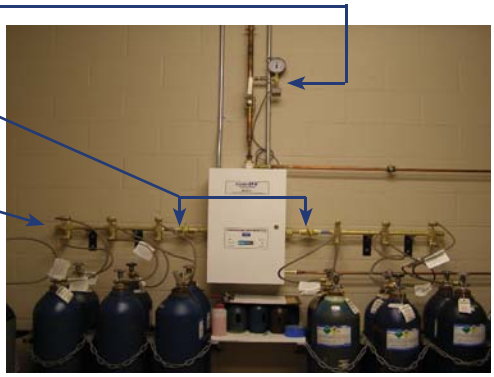
Check valve outlet fittings



Line transducer mounted on patient side of source valve using PSM-04 N2O assembly

Master shut-off valves

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



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

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. **S-L-O-W-L-Y** 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).

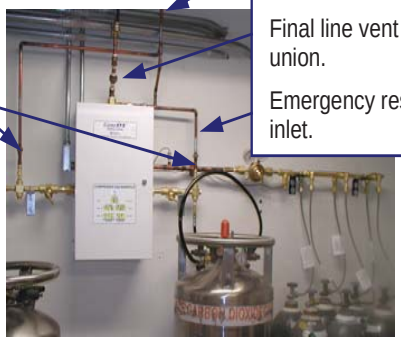
WARNING!

For CO2 High Pressure Cylinders:

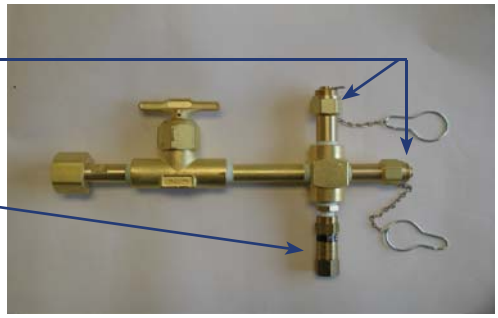
ONLY use Non-Siphoning High Pressure Cylinders

Installation: Pigtails & Cylinders LLC Models

1. This photo shows a completed installation. Note the copper tubing and unions are installed and furnished by the installer.



2. 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. Attach the pigtails to the check valve outlet fittings on the manifold header bars.



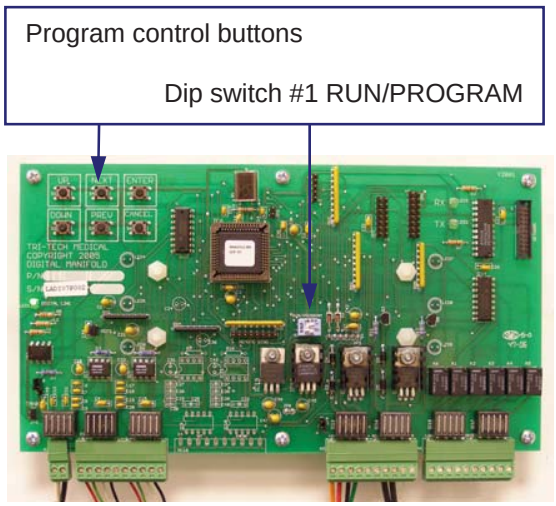
3. Connect the other end of the pigtail to the "Use" valve mating fitting on the portable bulk vessel. Open the use valve (turn counter-clockwise to open). The pressure building valve or regulator should be turned on or opened for all vessels connected to the manifold (both service and reserve banks). Allow approximately 1 hour for the portable bulk vessel(s) to build pressure.

4. Check all cylinder and pigtail connections for leaks using an oxygen safe leak test solution (any bubbles forming around connections indicate leakage).

5. Verify that the pressure being supplied to the manifold cabinet exceeds the minimum inlet pressure requirements per the table on page 27.

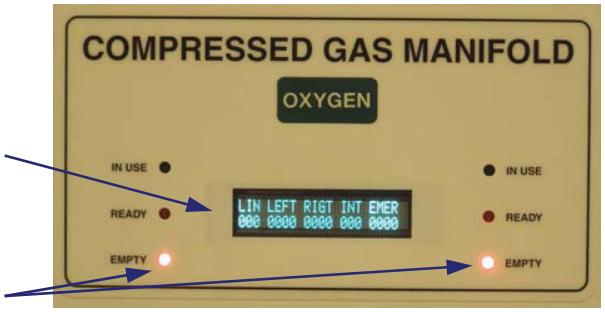
Start Up & Checking Procedures

The manifold is pre-programmed (per page 27) and tested before it is shipped. You may, however, wish to modify some of the programming (see page 16). The unit has been designed to allow some programming to be simply and safely altered in the field.



1. Start with all portable bulk vessels and 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.

2. Turn on the 120 VAC to the unit. For model CCC 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. **S-L-O-W-L-Y** 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. **S-L-O-W-L-Y** 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.

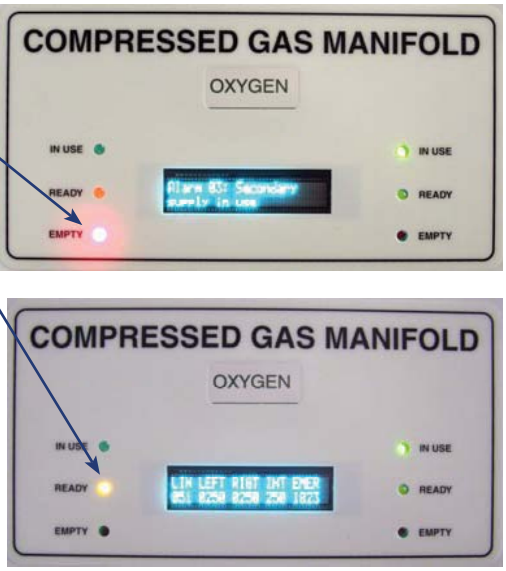
Start Up & Checking Procedures Continued

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).

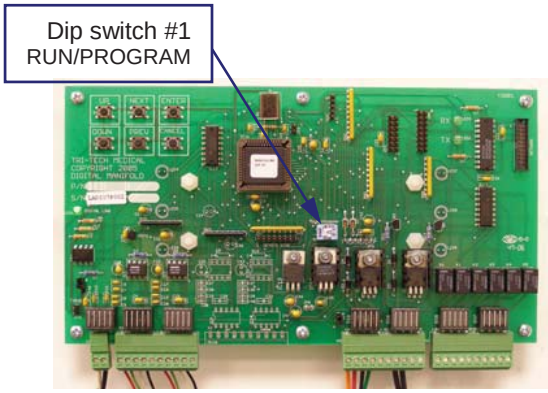
6. **S-L-O-W-L-Y** reopen the cylinders on the left bank. The left bank pressure gauge and digital display should return to full pressure. The left bank yellow (Ready) LED will illuminate simultaneously the left bank red (Empty) will extinguish. All remote secondary supply in use alarms will be canceled.

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

8. If the unit is a model LL, it will also display pressures for the intermediate area (INT) and the emergency reserve (EMER) and trigger the master alarm signal for "Emergency Reserve in Use" and "Emergency Reserve Low". To properly adjust the emergency reserve regulator the primary and secondary banks must both be shut off and the cabinet pressure drained. **SLOWLY** open one cylinder on the emergency reserve bank and observe the EMER pressure display and check to make sure it agrees with the gauge on the emergency reserve regulator. Adjust the delivery pressure from the emergency reserve regulator following the table on page 27 (if this is a 50 psig line pressure application this regulator should be set to 65 psig). **When testing the Emergency Reserve in Use and Emergency Reserve Low master alarms please note – there is a 10 second delay designed into the manifold logic.** The Emergency Reserve in Use alarm will be triggered when the INT pressure falls below 70 psig (50 psig line pressure application) for more than 10 seconds. The Emergency Reserve Low alarm will be triggered when the EMER pressure falls below 1200 psig for more than 10 seconds. Test the Emergency Reserve in Use alarm by first pressurizing both the primary & secondary and the emergency reserve banks, close the valves on both the primary & secondary bank vessels, establish a gas flow thru the manifold. Approximately 10 seconds after the primary then secondary banks deplete to empty, the Emergency Reserve in Use alarm should be triggered.



9. 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.



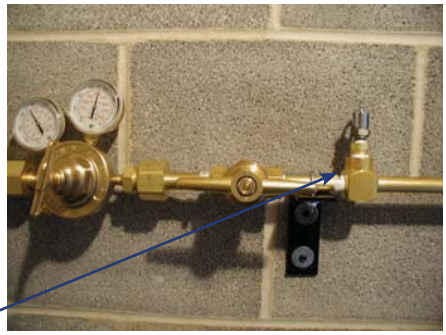
Model LLC - Emergency Reserve Plumbing & Wiring

1. The model LLC includes digital displays for the emergency reserve bank pressure and the intermediate area pressure. (Refer to appendix E – page 27)

Remote master alarms will be triggered by the model LLC for the five required CSA & NFPA 99 alarms; high line pressure, low line pressure, secondary in use, emergency reserve in use and emergency reserve low.

Refer to the appendix D on page 26 for information on setting the delivery (outlet) pressure of the emergency reserve regulator and pre-programmed emergency reserve in use and emergency reserve low alarm set points.

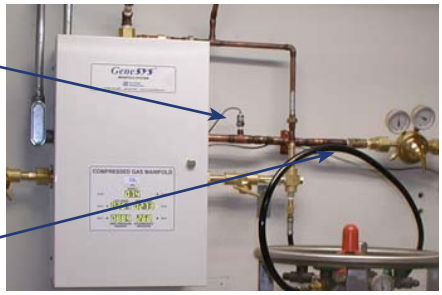
2. The emergency reserve low bank pressure transducer (part # 14-3001) should be installed on the extra port on the RWP series manifold. This port is located prior (upstream) to the master valve and the regulator. Note: If the 14-3001 and 14-3002 transducers are not used (and pressure switches are used instead or not used at all because a reserve manifold is not being used) the "Reserve Alarms" programming option (see page 16) must be disabled and the 35-3013 high pressure reserve jumper kit must be installed or else error codes will be displayed by the circuit board.



Emergency reserve low bank pressure transducer (14-3001)

Emergency reserve in use pressure transducer (14-3002)

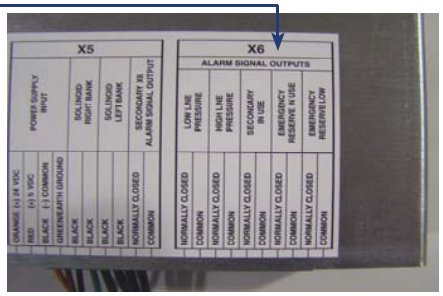
3. The emergency reserve in use pressure transducer (part # 14-3002) should be installed on copper tubing (provided by plumbing contractor) after (downstream) of the check valve (part # CV-050F).



Check valve (part # CV-050F)

Master alarm signal wiring (use X6 terminals on circuit board)

4. Both the emergency reserve bank pressure transducer and the emergency reserve in use transducer must be wired to the manifold circuit board as indicated by the labeling instruction. Remote master alarm signal and common wires must also be connected to the manifold circuit board as indicated by the labeling instruction.



Cylinder Replacement & Line Pressure Adjustment

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.

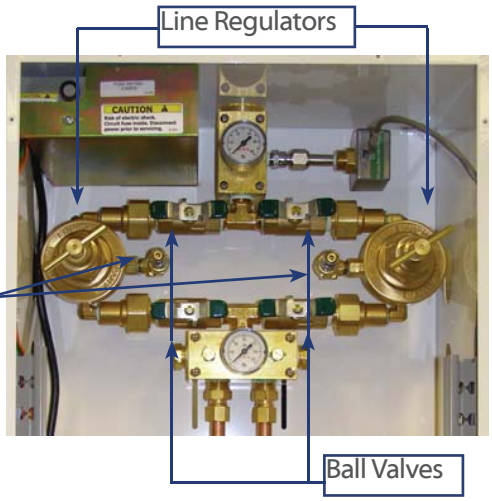
8. Observe the following conditions: The red (Empty) LED is extinguished and the yellow (Ready) LED is illuminated and the secondary in use alarm is cancelled.

9. The manifold supply bank is now replenished and automatically placed in "reserve".

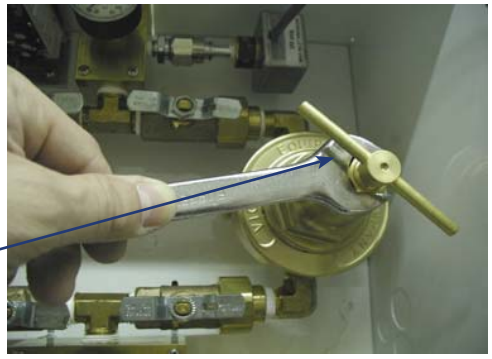
Line Delivery Pressure Adjustment

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. Inside the manifold locate the line pressure regulators. Normally one regulator is set for 50psi (on-line) and the other set for 40psi (back-up) – Nitrogen is the exception where the settings are 170psi and 140psi. To identify which regulator is set for which pressure, you must first isolate each regulator individually. There are two ball valves on each side of each regulator, one inlet ball valve (bottom side of the regulator) and one outlet ball valve (top side of the regulator). Turn off the two ball valves to isolate one selected regulator. On the inside of the line regulators is a DISS demand valve fitting. To vent off the selected line regulator, press on the internal plunger on the DISS demand valve fitting with a blunt screw driver tip, pen, key, etc. Monitor the gauge attached to the line regulator. The pressure should fall to 0 PSI (zero PSI). S-L-O-W-L-Y, re-open the inlet ball valve. The gauge will now show the set pressure of the selected line regulator. S-L-O-W-L-Y, re-open the outlet ball valve. Repeat the same procedure for the other line regulator.



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). Close 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 and 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: the low line pressure alarm set point, the high line pressure alarm set point, the emergency reserve low alarm set point (LL models only),the reserve alarms (for both Emergency Reserve in Use and Emergency Reserve Low) may be disabled, the units of measure (psig, bar or kPa), the calibration of the line pressure sensor, the display scroll time (in seconds) and the logic software (this should only be changed if the unit is being converted).

Program control buttons

Dip switch #1 RUN/PROGRAM

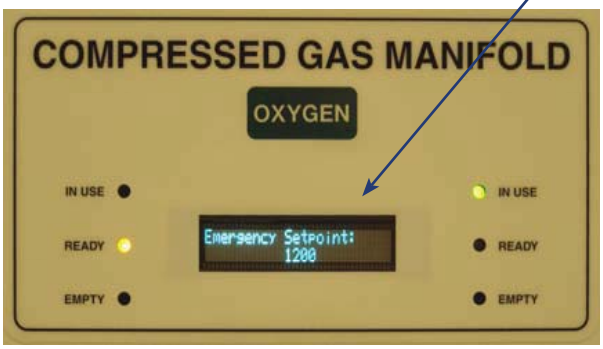
1. To make any programming change, the cover must be removed from the circuit board and the top #1 dip switch must be switched from the RUN mode to the PROGRAM mode.

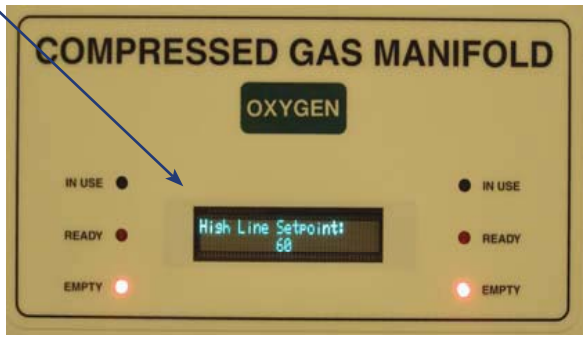
2. Once the #1 dip switch has been changed from the RUN mode to the PROGRAM mode, the display should look like this

3. 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





General Maintenance & Error Codes

	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.	
Every 4 Yrs		➢ Replace all pigtails

Error Codes, Alarm Codes & Information Codes

Code	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 03	Intermediate pressure out of range	This condition is activated when the intermediate sensor's raw readings are at either extreme. Can be caused by a disconnected, wired incorrectly, bad, or over-pressurized sensor. (LL models only).
Error 04	Emergency reserve out of range	This condition is activated when the emergency sensor's raw readings are at either extreme. Can be caused by a disconnected, wired incorrectly, bad, or over-pressurized sensor. (LL models only)
Error 05	Left bank pressure high	In CC models this message is displayed whenever the left inlet bank pressure exceeds 3,000 psi. In LL models this message is displayed whenever the left inlet bank pressure exceeds 500 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. In LL models this message would be displayed if either inlet bank pressure exceeds 500 psi.
Error 07	Intermediate pressure high	Message is displayed whenever the intermediate pressure exceeds 500 psi. (LL models only).
Error 08	Emergency reserve pressure high	Message is displayed whenever the high pressure emergency reserve bank pressure exceeds 3,000 psi. (LL models only).
Error 09	Line sensor noise detected	Message is displayed if a gas 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 13	Emergency reserve leak detected	Message is displayed when a leak is detected in the emergency reserve bank. (LL 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 & Information Codes

Error Codes, Alarm Codes & Information Codes Continued

Code	Message Displayed	Explanation
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.
Alarm 04	Emergency reserve in use	Message is displayed and emergency in use relay activated whenever the intermediate pressure is below the programmed emergency in use pressure alarm set point. (LL models only).
Alarm 05	Emergency reserve pressure low	Message is displayed and emergency low relay activated whenever the emergency pressure is below the programmed emergency reserve low pressure alarm set point. (LL models only).
Info 01	Economizer in use – see manual	Message is displayed whenever the ready bank pressure exceeds the service bank pressure by 50 psig or more. The logic compares the service and ready bank pressures once a second. (LL models only).
	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 CSA 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

Replacement Parts

Item	P/N	Description
Primary Regulator & Repair Kit	68-0003	Primary regulator
	68-0003RK	Primary regulator repair/rebuild kit
Line Regulators & Repair Kits	68-0004	Line regulator standard flow 5 - 125 psig
	68-0004RK	Standard flow line regulator repair/rebuild kit
	68-0002	Line regulator high flow 5 - 125 psig
	68-0002RK	High flow line regulator repair/rebuild kit 5 - 125 psig
	68-0001	Line regulator high flow 10-200 psig
	68-0001RK	High flow line regulator repair/rebuild kit 10 - 250 psig
Circuit Boards	35-1001	LL series PLC board with digital displays
	35-1002	CC series PLC board with digital displays
	35-1003	CC series PLC board with text display
	35-1004	LL series PLC board with text display
Power Supply	AA400-C	Power supply
Transducers/Sensors	14-3001	0 - 2,500 psig transducer with 12' cable ER Reserve Low
	14-3002	0 - 500 psig transducer with 8' cable ER Reserve in Use
	14-3003	0 - 250 psig transducer with 10' cable N2 for old style units
	14-3004	0 - 100 psig transducer with 10' cable Oxygen for old style units
	14-3005	0 - 100 psig transducer with 10' cable Med Air for old style units
	14-3006	0 - 100 psig transducer with 10' cable N2O for old style units
	14-3007	0 - 100 psig transducer with 10' cable CO2 for old style units
	14-3024	0 - 250 psig transducer with 1.5' cable N2 for new style units
	14-3025	0 - 100 psig transducer with 1.5' cable Oxygen for new style units
	14-3026	0 - 100 psig transducer with 1.5' cable Med Air for new style units
	14-3027	0 - 100 psig transducer with 1.5' cable N2O for new style units
	14-3028	0 - 100 psig transducer with 1.5' cable CO2 for new style units
Solenoid Valves	48-1007	Solenoid valve for CC series
	48-1008	Left solenoid valve for LL series
	48-1009	Right solenoid valve for LL series
Check Valve	17-4003	Intermediate check valve ½" NPT male x ½" OD tube
Tubes & Compression Fittings	17-4012	Compression Sleeve ½" OD tube - glass filled Teflon
	17-4005	Compression Nut for 17-4012
	Q1100-1	½" OD copper tube x 7"
	17-4013	Compression sleeve ⅜" OD tube; glass filled teflon
	17-4024	Compression nut for 17-4013
Gauges	14-1018	0 - 4,000 psig 1½" x ⅛" MNPT center back gauge
	14-1016	0 - 400 psig 2" x ¼" MNPT bottom port gauge
	14-1017	0 - 400 psig 1½" x ⅛" MNPT center back gauge
	14-1009	0 - 300 psig 1 1/2" x ⅛" MNPT center back gauge
	14-1008	0 - 100 psig 1 1/2" x ⅛" MNPT center back gauge

Replacement Parts

Item	P/N	Description
Relief Valves	PRV-50-75-O2	75 psig x ½" NPT inlet x ¾" outlet with pipe away adaptor
	PRV-50-150-O2	150 psig x ½" NPT inlet x ¾" outlet with pipe away adaptor
	PRV-50-200-O2	200 psig x ½" NPT inlet x ¾" outlet with pipe away adaptor
	PRV-50-250-O2	250 psig x ½" NPT inlet x ¾" outlet with pipe away adaptor
	PRV-50-350-O2	350 psig x ½" NPT inlet x ¾" outlet with pipe away adaptor
Pigtails for CC, TMC, RWP & RSP Models	20-1001	24" single loop rigid copper O2 – CGA 540
	20-0001	24" Flexible stainless braided O2 - CGA 540
	20-0001CV	24" Flexible stainless braided O2 - CGA 540 w/ Check valve
	20-1002	24" single loop rigid copper N2O – CGA 326
	20-0002	24" Flexible stainless braided N2O - CGA 326
	20-0002CV	24" Flexible stainless braided N2O - CGA 326 w/ Check valve
	20-0003	24" Flexible stainless braided CO2 – CGA 320
	20-0003CV	24" Flexible stainless braided CO2 - CGA 320 w/ Check valve
	20-0004	24" Flexible stainless braided AIR – CGA 346
	20-0004CV	24" Flexible stainless braided Air - CGA 346 w/ Check valve
	20-0005	24" Flexible stainless braided Inert – CGA 580
	20-0005CV	24" Flexible stainless braided Inert - CGA 580 w/ Check valve
Pigtails for LL & TML Models	20-2001	72" Flexible – O2 – CGA 540
	20-2002	72" Flexible – N2, Air, He– CGA 580
	20-2003	72" Flexible – CO2 – CGA 320
	20-2004	72" Flexible – N2O – CGA 326
Union for Vent Lines	17-0169	Union 3 piece ½" M npt x ½" M npt 1 ¼ - 14 UNS
Master Valve	GMV-1001	Master Valve 1/2" F npt x 1/2 F npt
Master Valve Repair Kit	GMV-1001RK	Master valve rebuild kit
	35-3013	High Pressure Reserve Jumper Kit
Heater Element	35-2001	Ceramic Heater
Accessory	35-3012	Manifold buzzer kit

Trouble-Shooting Guide

Note: Trouble-shooting and repairs should be done by qualified personnel ONLY !

Issue: Cabinet Indicator Lights

Symptom	Probable Cause	Remedy or Check
Indicator lights on front panel **DO NOT** illuminate when power is connected	Power input	Check electrical supply
	Internal wiring disconnected	Check all wiring connections
	Circuit board defective	Replace circuit board with new
RED indicator lights (empty) are on, but both banks are full	Master valve or cylinder valves on bank are closed	Open valves **SLOWLY**
	Pigtails are installed in wrong direction	Close cylinder and re-install pigtails in proper flow direction
	Bank pressure is not sufficient for logic board to place it 'In Use' or 'Ready' status (see Appendix E; minimum inlet pressures, pg. 27)	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
Error code(s) being displayed	Loose or disconnected or broken wire, misconnected 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 page 17). If all wires are connected properly and located properly – it may be necessary to replace a transducer.

Issue: Loss of Cylinder Contents

Symptom	Probable Cause	Remedy or Check
Audible or inaudible gas leakage (origin unknown)	Leakage in manifold cabinet, headers or pigtails	Locate leak using oxygen compatible leak test solution, tighten, reseal or replace leaking fitting(s) or pigtails
	Leakage thru manifold solenoid vent / relief	Replace solenoid valve
	Leakage around regulator bonnet	Tighten regulator bonnet
	Regulator with bad seat	Rebuild or replace regulator
	Leaking gauge	Replace gauge
Venting at relief valve	Regulator set too high	Set delivery pressure per specifications (see p. 27)
	Overpressure due to failed regulator seat	Rebuild or replace regulator
	Regulator freeze-up (N2O or CO2) / heater failure	Repair heater or add heater and consider adding additional cylinders

Trouble-Shooting Guide Continued

Note: Trouble-shooting and repairs should be done by qualified personnel ONLY !

Issue: Cabinet Indicator Lights

Symptom	Probable Cause	Remedy or Check
Both banks feeding gas	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
	Model CC: primary regulator(s) out of adjustment	Set delivery pressure to specifications per chart on pg. 27
	Model LL: inlet pressure to control cabinet is too low	Verify that minimum inlet pressure requirements are met per chart on pg. 27
	Model LL: portable bulk venting	Gas usage no high enough to justify portable bulk reserve
	Model LL: gas flowing thru economizer circuit	This is normal when the reserve bank pressure is 50 psig greater than the service bank pressure; no correction is needed to manifold control cabinet. May consider reducing the number of liquid vessels on each bank if reserve bank is more than 35% depleted at time it is placed in service 'In Use' If gas is flowing thru economizer when the reserve bank pressure is not 50 psig greater than service bank pressure, the economizer check valve needs to be replaced.
	Manifold is unable to support required flow	Increase manifold flow capacity (call factory for assistance)

Issue: Changeover Occurs; 'Reserve in Use' alarm is triggered and then clears

Symptom	Probable Cause	Remedy or Check
Changeover occurs; 'Reserve in Use' alarm is triggered and then clears	Model LL: portable bulk vessel(s) are unable to support required flow.	Increase bank size. If using two or more portable bulk vessels per bank currently, connect pigtail(s) (no check valve) from vent to vent of all vessels on the same bank and open the vent valves. This will equalize the head pressure of the vessels and utilize the combined vaporization capacity – not just the capacity of the vessel with the highest delivery pressure set point.

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 and CSA Z7396.1 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.

CSA **Canadian Standards Association**
An organization engaged in standards development in Canada.

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.

NFPA 99 **National Fire Protection Association**
An organization engaged in standards development in the United States.

Appendix B: Technical Specifications

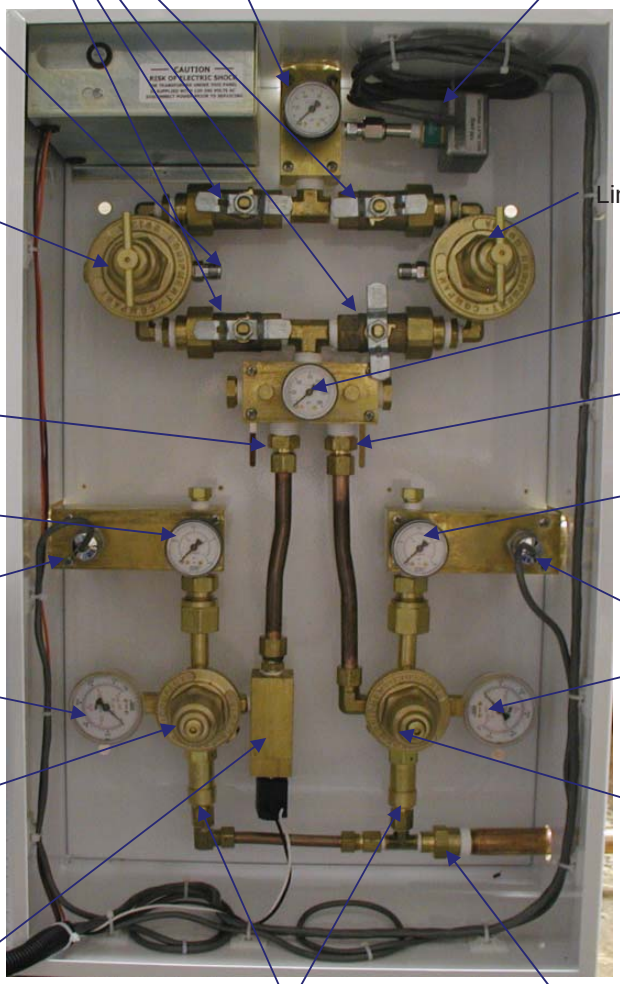
	Model CCC	Model LLC
Maximum Inlet Pressure	2,500 psig	400 psig
Operating Ambient Temperature Range	0ºF (-18ºC) to 130ºF (54.4ºC) **All gases except N2O & CO2**	-20ºF (-29ºC) to 130ºF (54.4ºC)
	20ºF (-7ºC) to 130ºF (54.4ºC) **N2O & CO2**	

Storage Temperature	-4ºF (-20ºC) to 185ºF (+85ºC)
AC Input	120 VAC; 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
Solenoid Valve	24VDC; Normally Open (Valve opens when de-energized)

Pressure Measurement Accuracy		
Transducer	**Accuracy**	**Gas(es)**
0 - 100 PSIG	± 1% of full scale: Line Pressure	Oxygen, Nitrous Oxide, Medical Air, Carbon Dioxide
0 - 250 PSIG	± 1% of full scale: Line Pressure	Nitrogen
0 - 500 PSIG	± 2% of full scale: Bank & Intermediate Pressures (model LLC only)	
0 – 2,500 PSIG	± 2% of full scale: Bank Pressures (model CCC) ± 2% of full scale:Emergency Reserve Bank Pressure (model LLC only)	

Control Cabinet Dimensions			
	Width	**Height**	**Depth/Length**
Excluding inlet & outlet fittings	15 ⅜"	25"	9 ¼"
Including inlet & outlet fittings	17 ¼"	27"	9 ¼"
Line Pressure Transducer Dimensions (incl. inlet fittings)			
Housing Dimensions	1.990"	1.990"	3.625"

Appendix C: Piping Schematics; Model CC



Appendix D: Piping Schematics; Model LL

Appendix E: Operational Pressure Specifications

(all pressures shown in psig)

Minimum inlet pressure requirements for CCC Manifold

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

Minimum inlet pressure requirements for LLC Manifold

Manifold delivery pressure	Minimum inlet pressure	Relief valve setting on vessel
50	135	235
80	135	235
170	250	350

Alarm Pressure Settings for CCC 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	204	136	300 left bank / 250 right bank

Alarm Pressure Settings for LLC 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	95 both banks
80	150	96	64	95 both banks
170	250	204	136	190 both banks

Alarm Pressure Settings for LLC Models Emergency Reserve In Use & Emergency Reserve Low

Manifold Delivery Pressure	Recommended Emergency Reserve Regulator Delivery Pressure Setting	Pre-programmed Emergency Reserve in Use alarm set point	Pre-programmed Emergency Reserve Low alarm set point (may be re-programmed – see page 28)
50	65	75	1200
80	70	80	1200
190	170	180	1200

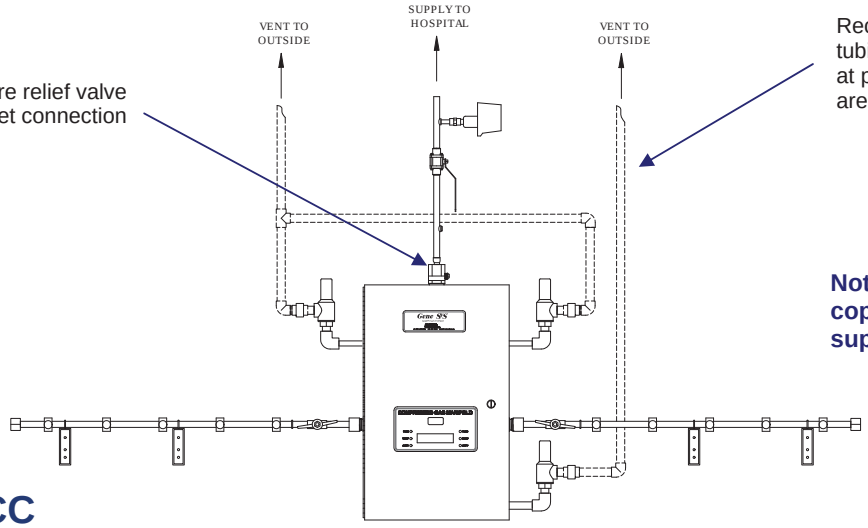
Primary Regulator Settings (CC & Models)

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 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

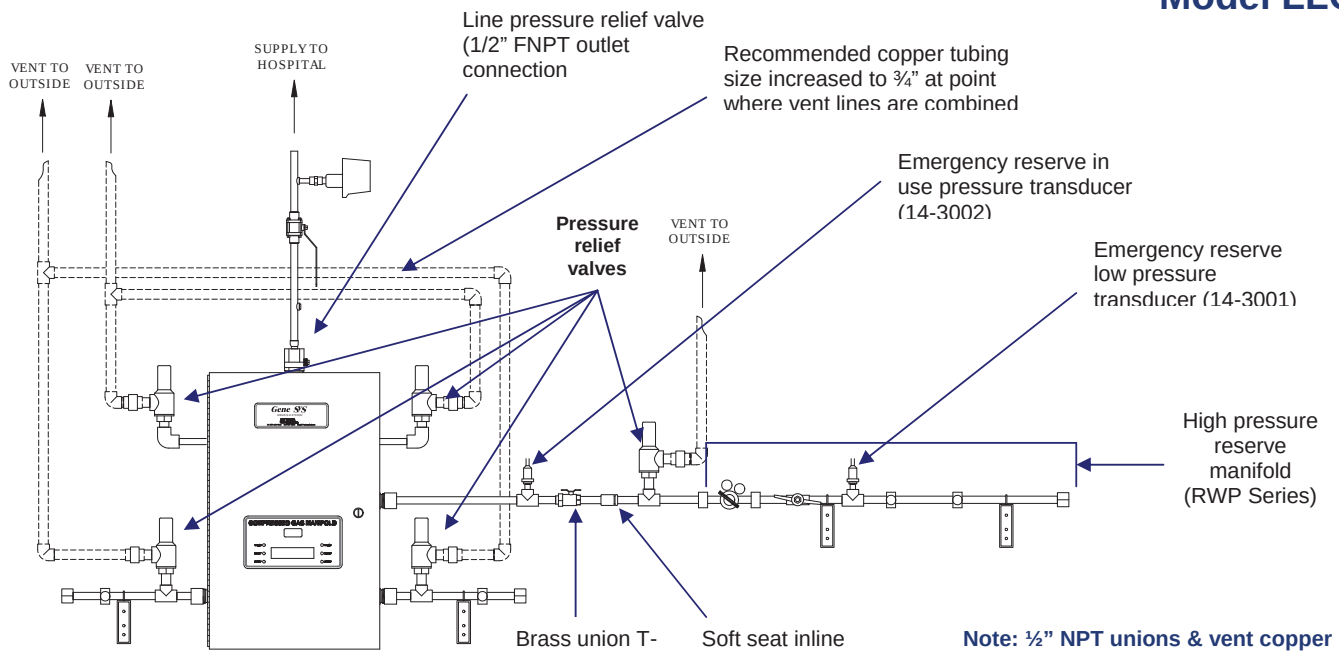
Appendix F: Relief Vent Plumbing

Recommended plumbing of relief and vent lines



Model CCC

Model LLC



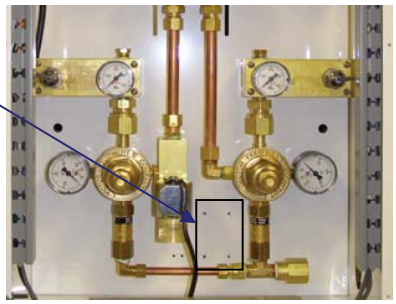
Note: All pressure relief valves to be installed in the vertical position

Appendix G: T-Net Installation

Class 1 Inc. 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.

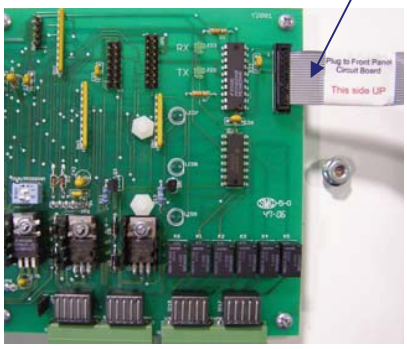
The Ethernet Interface board is shown here left and the Wireless board is shown here right.

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.

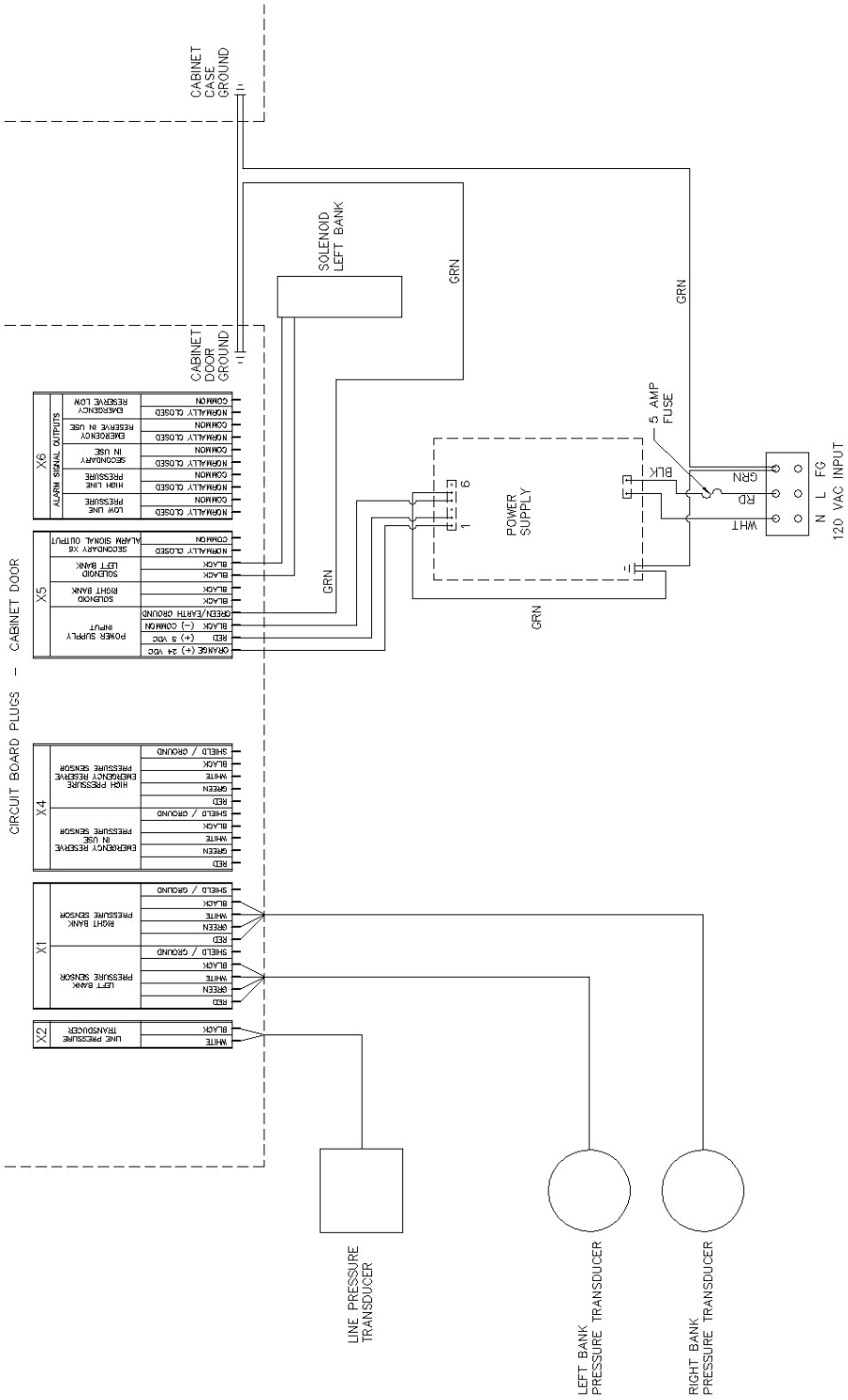
The cable must be installed into the socket on the top right corner of the circuit board marked "network" – per the instructions on the cable.

Following the Field Adjustments instructions on page 16 the manifold circuit board must be programmed with a unique identification number.

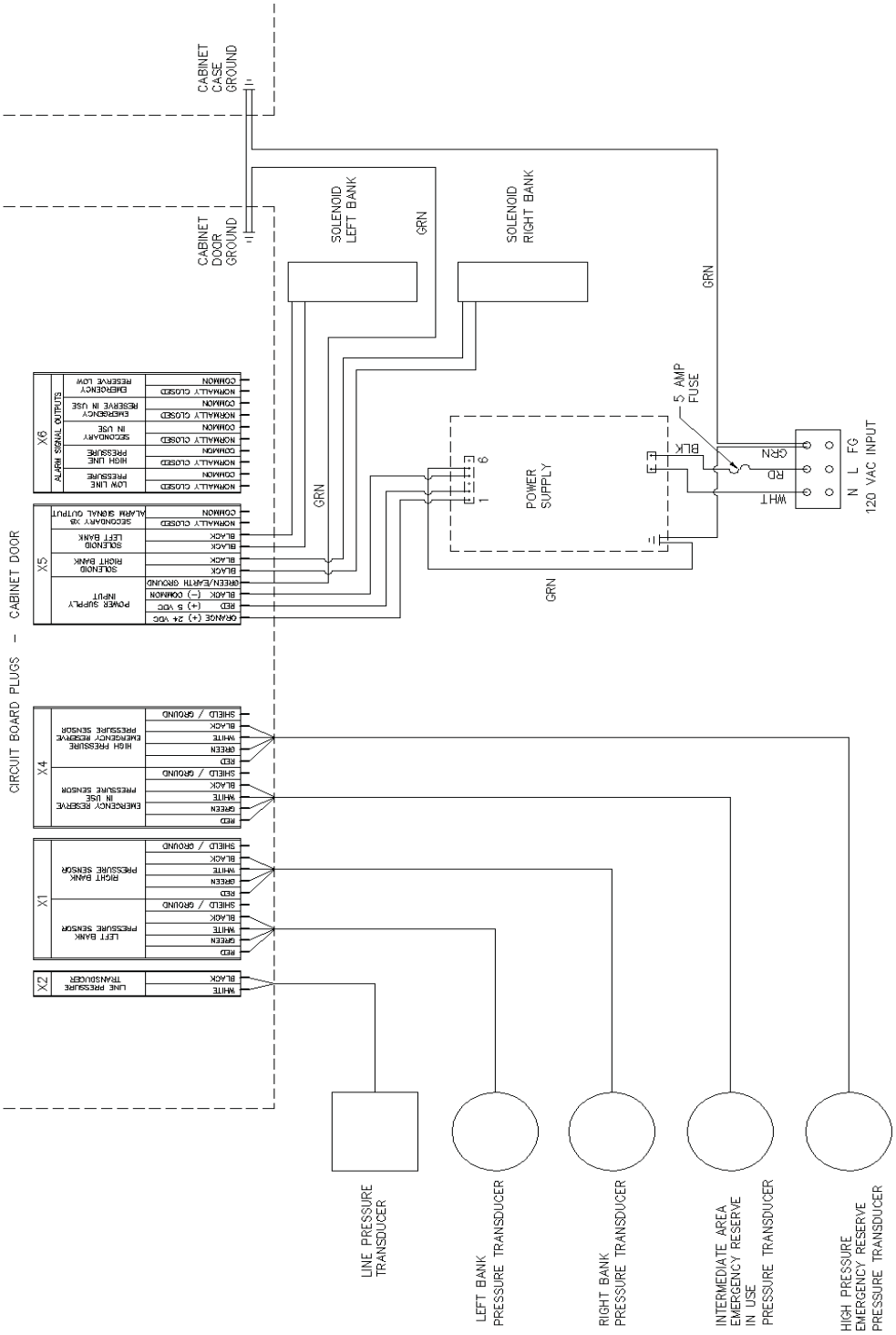


The power may now be restored to manifold. The manifold is fully functional – even if the T-Net software is not yet installed on a PC or is out of service. The manifold will automatically place the bank with the least pressure "In Use". Refer to the notation made before power was disengaged. In the case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

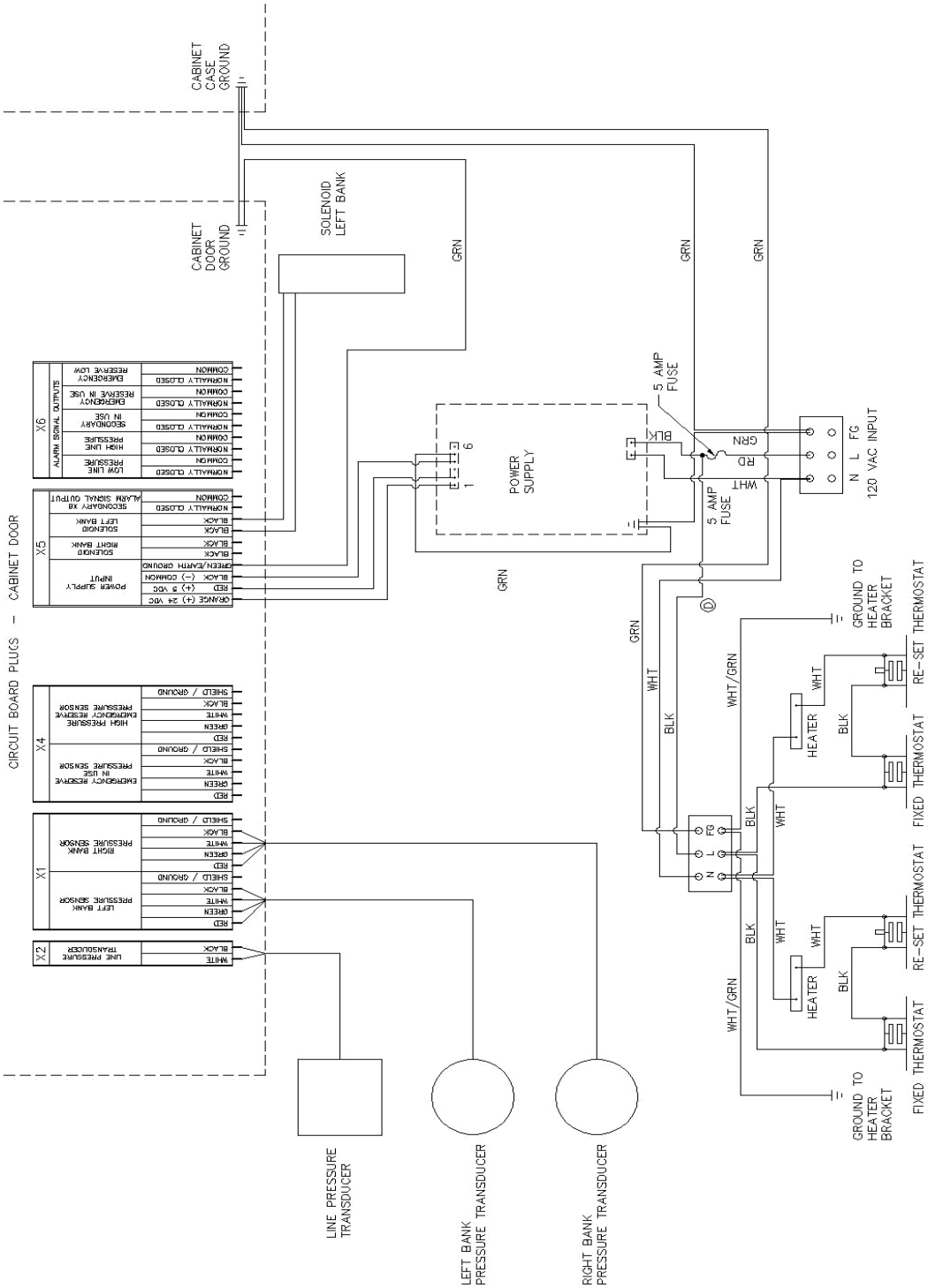
Wiring Diagram - Model CCC



Wiring Diagram - Model LLC

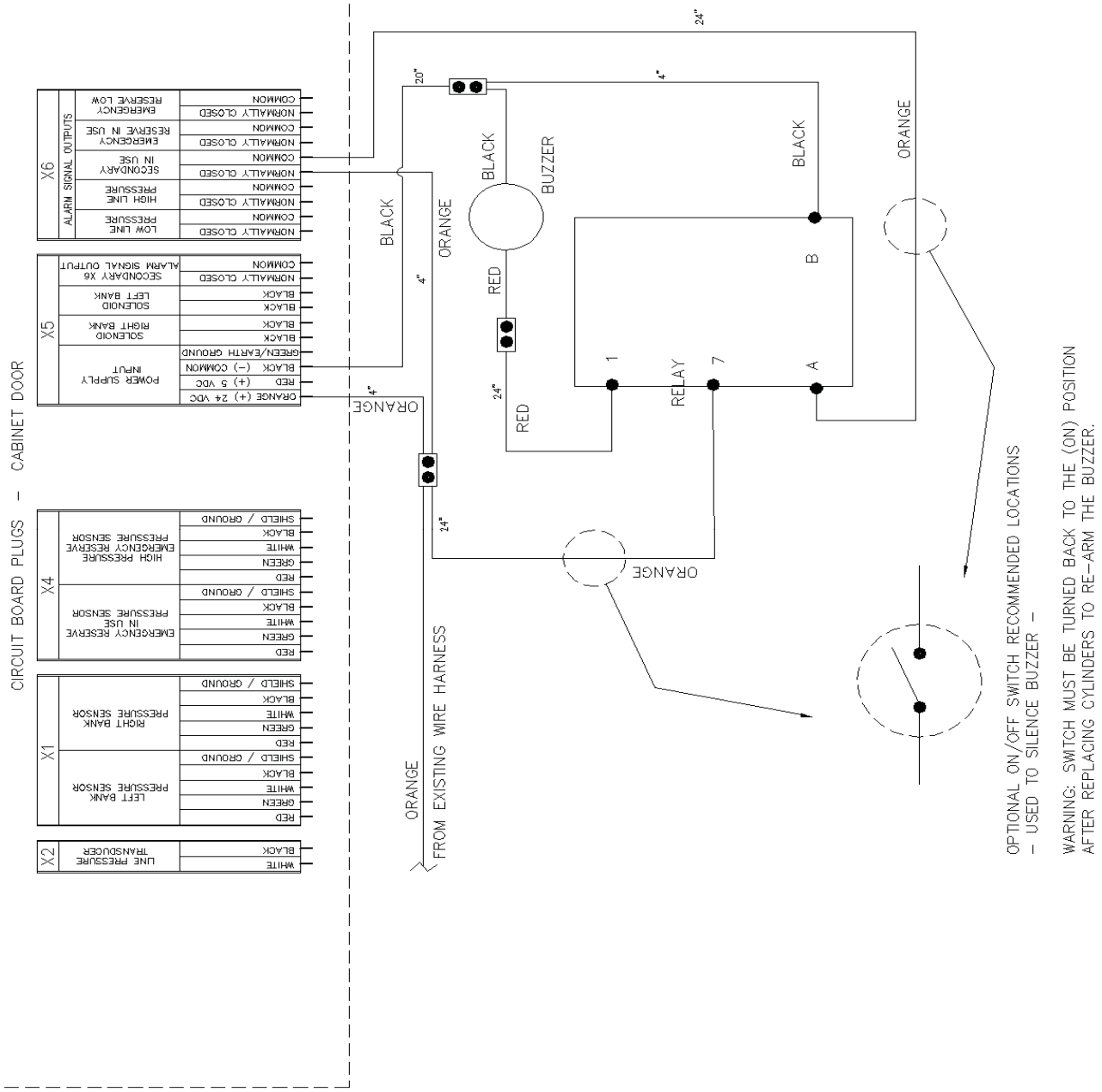


Wiring Diagram - Model CCC with Heaters



Wiring Diagram - Manifold Buzzer Kit

Buzzer kit part # 35-2012



Model LLC; Reverse Jumper Kit Instructions

Additional Installation Instructions for Model LL Manifolds

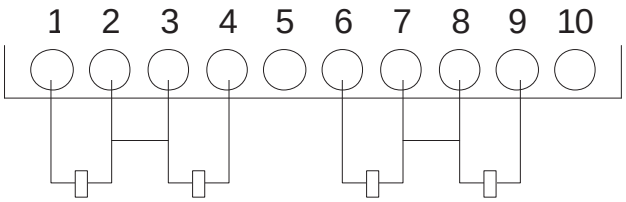
The following instructions and enclosed components are only to be used when "Emergency Reserve in Use" (part # 14-3002) and "Emergency Reserve Low" (part # 14-3001) pressure transducer sensors are not used with the model LL series manifold. When the 14-3002 & 14-3001 transducers are not used with the LL series manifold, a 35-3013 High Pressure Reserve Jumper Kit must be installed in the Genesys Digital Series manifold, or error codes and switching errors will occur.

Note: If the above mentioned are not used, the manifold will display error message "ERR 0003" or "ERR 0004" as part of the text display sequence. To stop the error code from being displayed, either the proper transducers must be installed, or the enclosed kit of resistors and jumpers must be installed.

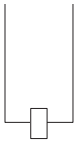
Installation Instructions:

1. Remove power to the manifold by removing the fuse holder (push it in, then turn 1/8 turn counter-clockwise) located on the power supply at the top left corner inside the control cabinet. **CAUTION: The fuse holder is spring loaded, so carefully release the pressure off the fuse. It is not necessary to completely remove the fuse holder.**
2. Locate the terminal connection blocks labeled X4 on the bottom edge of the circuit board. The circuit board is located on the inside of the cabinet door.
3. Install the resistors and jumper wires from the enclosed kit into the correct screw terminal positions on the X4 terminal connection blocks as shown below.
4. Restore power to the manifold by re-installing the fuse holder (push it in, then turn it 1/8 turn clockwise).

X4



Symbol Explanations



= 2.1k or 2.2k ohm resistor

= jumper wire

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