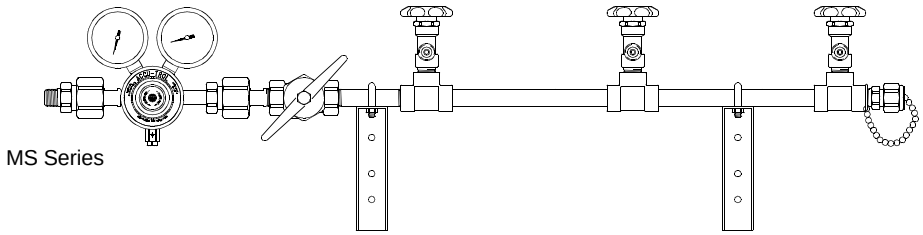
WESTERN INNOVATOR

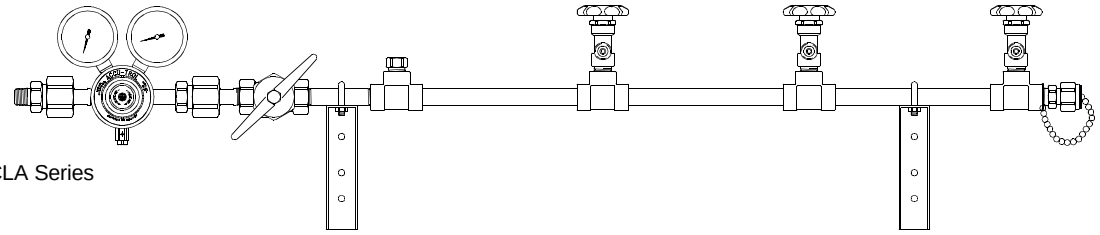
Installation and Operating Instructions For

MANUAL MANIFOLDS

MS, MSHP, CLA and CLAHP SERIES



MS Series



CLA Series

INTRODUCTION

Western manifold systems are cleaned, tested and prepared for the indicated gas service and are built in accordance with the National Fire Protection Association and Compressed Gas Association guidelines. The manifold consists of a regulator and a header, to provide an increased supply of gas for the specific gas application. The manifold is designed and built to allow expansion to meet future needs. Pressure gauges show system status and alert the need to replace depleted cylinders. The CLA manifold incorporates a port for installing a pressure switch. This switch may be connected to any remote alarm system. Features of the manifold system include a regulator, flexible pigtails with check valves, headers and complete mounting hardware.

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 and ignite when in contact with some gases — particularly oxygen and nitrous oxide.
- Cylinder, header, and master valves should always be opened very s-l-o-w-l-y. Heat of recompression may ignite combustible materials.
- 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. Some materials may react and ignite 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 with great force.
- Oxygen manifolds and cylinders should be grounded. Static discharges and lightning may ignite materials in an oxygen atmosphere, creating and explosive force.
- Welding should not be performed near nitrous oxide piping. Excessive heat may cause the gas to dissociate, creating an explosive force.

WARRANTY

All Western manifolds are warranted against defects in materials and workmanship for the period of one year from date of purchase. See back cover for details of limited warranty.

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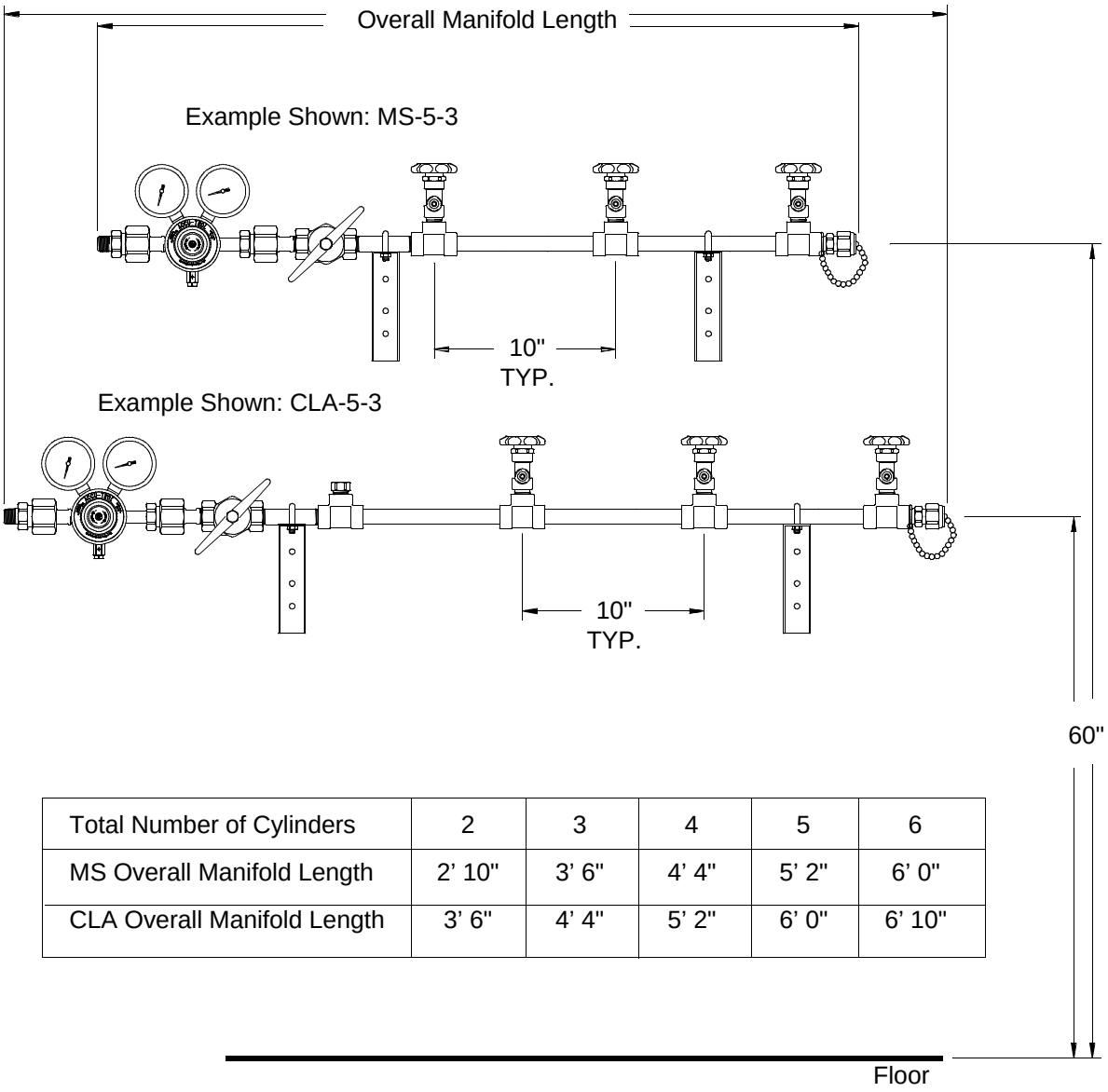
GENERAL INSTRUCTIONS

Manifolds should be installed in accordance with guidelines stated by the National Fire Protection Association, the Compressed Gas Association, OSHA, Canadian Standards Association, and all applicable local codes. The carbon dioxide and nitrous oxide manifolds 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 gases 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 rays of the sun.

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

CAUTION:

- Remove all protective caps prior to assembly. The protective cap may ignite due to heat of recompression in oxygen systems.



Total Number of Cylinders	2	3	4	5	6
MS Overall Manifold Length	2’ 10"	3’ 6"	4’ 4"	5’ 2"	6’ 0"
CLA Overall Manifold Length	3’ 6"	4’ 4"	5’ 2"	6’ 0"	6’ 10"

FIGURE 1

MANIFOLD ASSEMBLY

1. Assemble the manifold outlet fitting to the regulator outlet (Figure 2).

2. Assemble the header assembly to the regulator inlet oriented as shown in Figure 2.

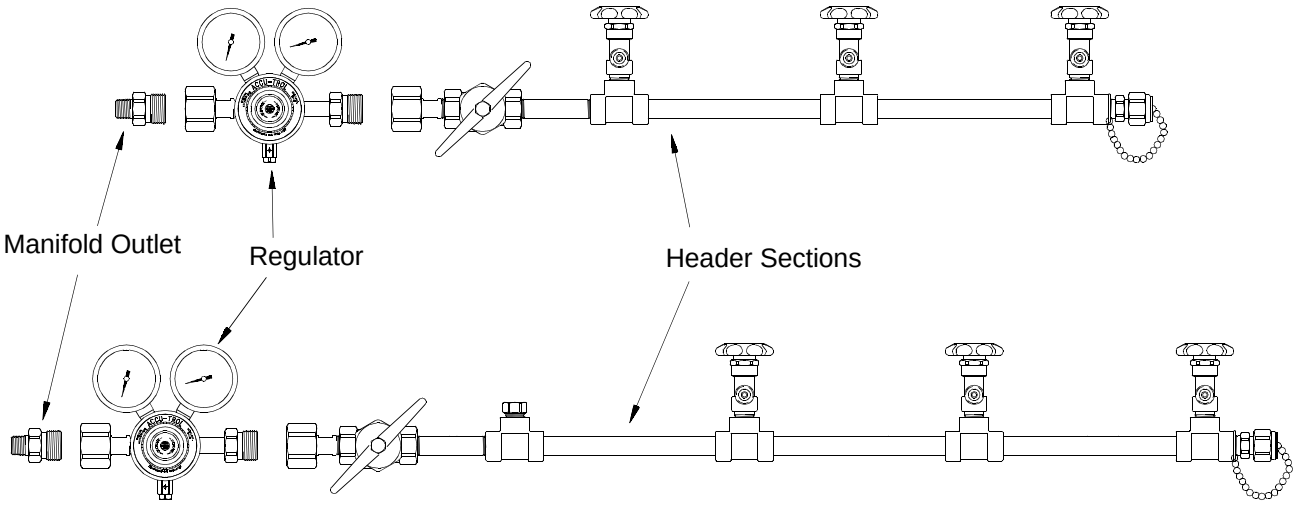
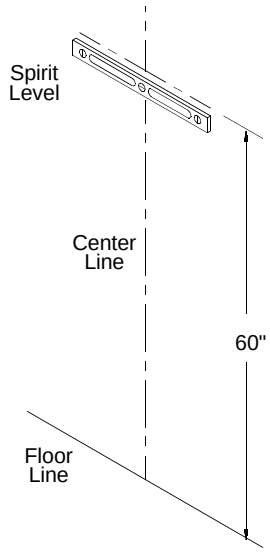


FIGURE 2

MANIFOLD INSTALLATION - INDUSTRIAL APPLICATIONS



1. Determine and mark the vertical center line for installation of the manifold (Figure 2).

2. Measure from the floor to a point 60" in height* of this vertical line. Using a level, mark a horizontal line at this point extending approximately 15" to the left and 15" to the right of center.

   (* ---- Suggested manifold height. Wall mounting heights may vary from one installation to another depending on available space, cylinder height, etc.)

3. Remove the U-bolt assemblies from the mounting brackets. Position the bracket so that the top of the bracket is aligned with the horizontal line.

4. Mark the mounting holes and install fasteners suitable for the type of wall construction. (Figure 4)

5. Measure the header and mark a distance that would place the bracket near the end.

6. Mark the mounting holes and install fasteners suitable for the type of wall construction. (Figure 4)

7. Mount the manifold by placing the header on the bracket. Fit the U-bolt over the header pipe and tighten the mounting nuts. (Figure 5)

8. Using a level, mark the placement of any additional mounting brackets while keeping the header on a horizontal plane. (Figure 5)

9. 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 header inlets. Brackets should be equally spaced to provide the most support and stability.

10. Mark the mounting hole and install fasteners suitable for the type of wall construction. (Figure 4)

11. Fit the U-bolt over the header piping and tighten the two mounting nuts.

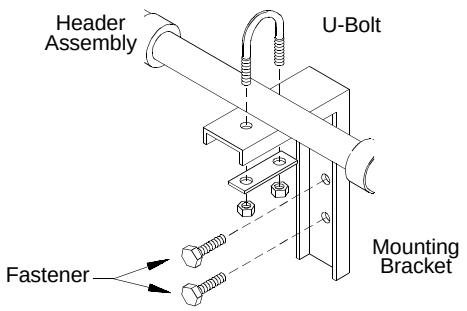


FIGURE 4

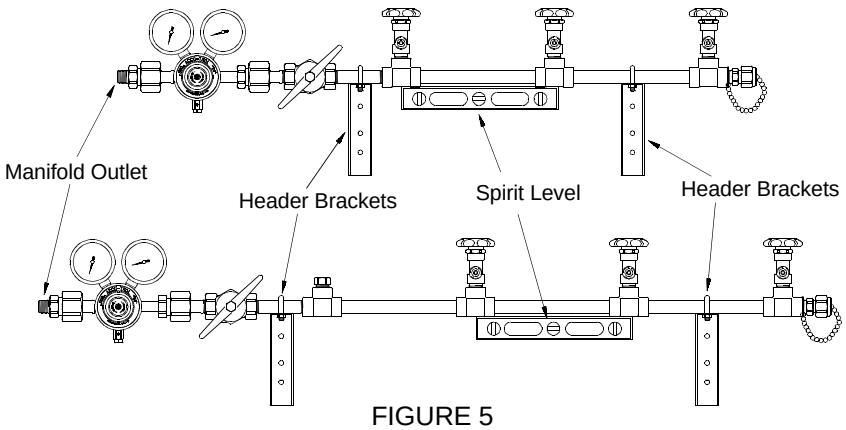


FIGURE 5

MS & CLA INSTALLATION ONTO AN LC MANIFOLD

NOTE: If using a single bank LC manifold with high pressure secondary cylinders as the right bank, the following modifications to the manifold unit are necessary. (see Figure 6)

NOTE: When installation must meet NFPA 99 requirements the reserve high pressure manifold as shown in Figure 7 is still required when installing a MS or CLA manifold as the secondary supply.

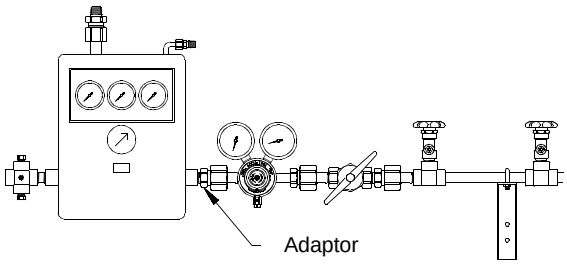


FIGURE 6

1. Remove the right side inlet cross and adaptor using a 1 1/4" hex wrench to stabilize the inlet block and a pipe wrench to grip the adaptor.

2. Remove all debris from the inside of the inlet block. Apply teflon tape or a suitable oxygen safe pipe thread sealant to the male pipe thread on the straight adaptor provided with the high pressure reserve manifold.

3. Install the adaptor in the inlet block using a 1 1/4" hex wrench to stabilize the inlet block and a 1 3/8" wrench to grip the adaptor.

4. Attach the header to the regulator union on the right side of the manifold control. Using a spirit level, mark the placement of mounting brackets while keeping the header on a horizontal plane.

5. 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 brackets\ should be placed as close to the last cylinder as possible to provide the most support and stability.

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

7. Fit the u-bolt over the header piping and tighten the two mounting nuts.

MANIFOLD INSTALLATION - HEALTH CARE INSTALLATIONS - HIGH PRESSURE RESERVE

1. Install the manifold per industrial installations

2. Refer to Figure 6 for the schematic showing the location for additional components and the location where the manifold tees into the system.

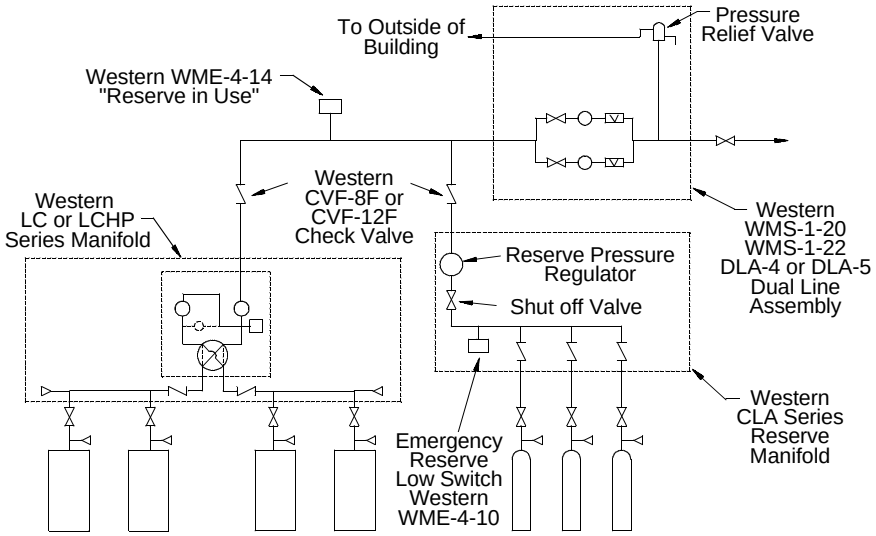


FIGURE 7

PLUMBING

1. A 1/2" NPT male union is supplied with the control and is located at the outlet of the pressure regulator. Connect this union to the pipeline system. The union provided permits removal of the manifold for service. (Figure 8)

INSTALLATION OF OPTIONAL EQUIPMENT

PRESSURE SWITCH INTO CLA STYLE MANIFOLDS

1. Install an orifice bushing into the 1/2 NPT tee (Figure 8).

2. Install the pressure switch onto the orifice bushing (Figure 8).

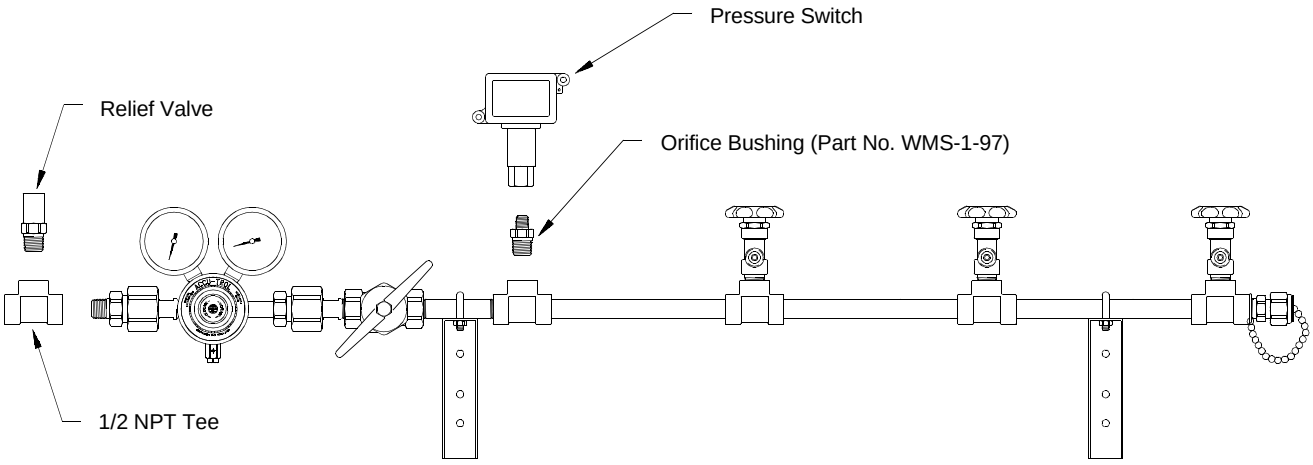


FIGURE 8

RELIEF VALVES

A relief valve may be installed into the manifold outlet as shown in Figure 8.

1. Install a 1/4 NPT female tee onto the manifold outlet using Teflon tape (Figure 8).

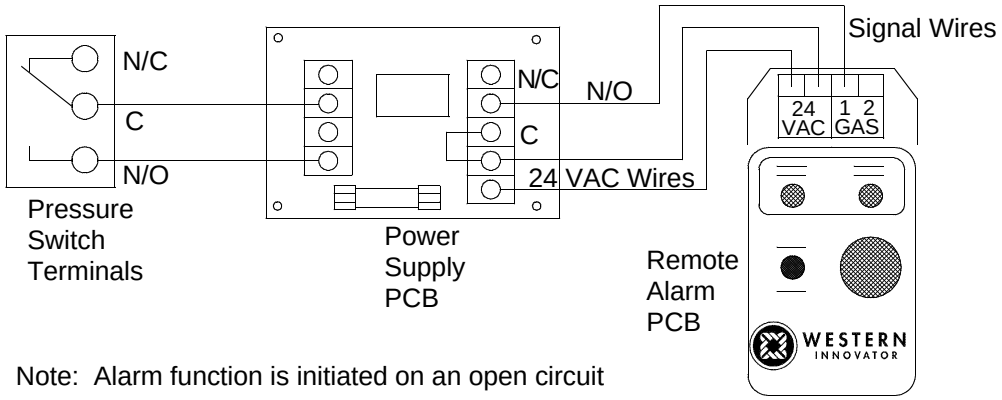
2. Install the relief valve into the tee (Figure 8).

REMOTE ALARM HOOKUP

Western CLA manifolds may be connected to an alarm system provided a pressure switch is installed into the manifold. The pressure switch provides isolated (dry) remote alarm contacts. Wiring diagrams for remote audio/visual alarms are included with the alarms. Listed below are three different remote alarm configurations.

WESTERN'S ALARM

1. Western's alarms (#BIA-1, BIA-2, and BIA-3) require a 24 VAC power supply (P/N WMS-9-25C).
2. Connect one 24 VAC wire from the right side of the circuit board in the power supply box to the first 24 VAC terminal on the remote alarm printed circuit board (PCB).
3. Connect the other 24 VAC wire from the right side of the power supply box to the second 24 VAC terminal on the remote alarm PCB.
4. Connect a jumper wire from the 24 VAC terminal used in step 3 to the common (C) terminal on the power supply.
5. Connect a signal wire from the normally open (N/O) terminal on the Power supply to the GAS 1 terminal on the remote alarm PCB.
6. Connect the Second terminal on the left side of the power supply to the common terminal on the pressure switch.
7. Connect the fourth terminal on the left side of the power supply to the normally open (N/O) terminal on the pressure switch.

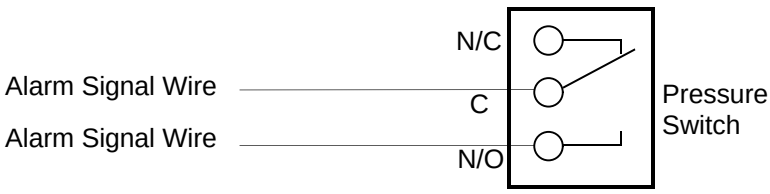


Note: Alarm function is initiated on an open circuit

FIGURE 9 Western's Remote Alarm

In some instances the power supply for the remote alarm is normally a part of the electrical contract on proposed constructions and exists in any furnished hospital. The following procedure should be followed:

1. Two alarm signal wires requiring dry contacts should run to the manifold location.
2. Connect one signal wire to the common (C) terminal on the pressure switch. (Figure 9)
3. Connect the other signal wire to the normally open (N/O) terminal on the pressure switch.



Note: Alarm function is initiated on an open circuit

FIGURE 10 Signal Wire Installation

If the remote alarm requires a power supply for operation, then connect the alarm as follows: (Also see WESTERN'S ALARM section.)

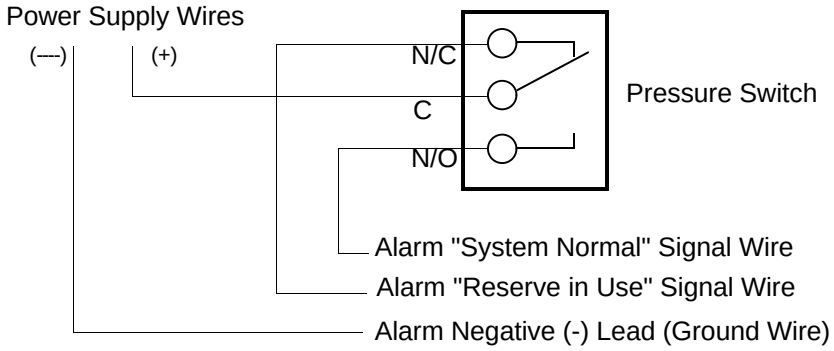
1. The power supply will be determined by the remote alarm operating voltage. If the remote alarm is designed for 115 VAC service then the existing 115 VAC power source can be utilized directly.(Figure 11)
   If the remote alarm is designed for other than the existing AC power source, then it is necessary to install a transformer in the system to provide the proper operating voltage. (Figure 12)

2. Connect the positive lead (+) from the power supply to the common (C) terminal on the pressure switch.

3. Connect the ground wire from the alarm to the negative (-) lead from the power supply.

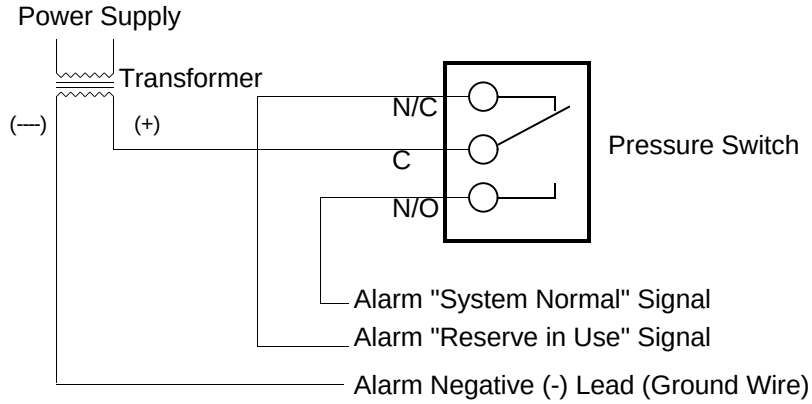
4. Connect the "reserve in use" signal wire from the alarm to the normally closed (N/C) terminal on the pressure switch.

5. If a "system normal" signal is also employed, connect that signal wire to the normally open (N/O) terminal on the pressure switch.



Note: Alarm function is initiated on a closed circuit

FIGURE 11 115 VAC Power



Note: Alarm function is initiated on a closed circuit

FIGURE 12 User Supplied Power

INSTALLING PIGTAILS AND ATTACHING CYLINDERS

1. Establish the CGA and the manifold ends of the pigtails.

2. Connect the manifold end of the pigtails to the manifold header.

3. Check the master valve to be certain it is open.

4. Back out the regulator adjusting screw. This will protect the system from being over pressurized when opening cylinders.

5. Attach full cylinders to the pigtail connections as explained in "Cylinder Replacement & Handling" on page 10.

6. Open header valves (turn counter-clockwise to open). Note; Oxygen manifolds have check valves instead of header valves.

7. S-L-O-W-L-Y turn all cylinders on fully (turn counter-clockwise to open). Check all cylinder and pigtail connections for leaks using Western leak detector LT-100 or an oxygen safe solution. (Any bubbles around connections indicate leakage.)

START UP AND CHECKING PROCEDURES

The MS & CLA series manifolds are designed to provide an increased supply of gas as well as higher flow rates than can be achieved using a single cylinder.

1. S-L-O-W-L-Y open the cylinder valves (turn counter-clockwise to open). The high pressure gauge will show the pressure of the bank of cylinders. (Figure 13)

2. Adjust the delivery pressure of the regulator to the desired pressure. The selection of the regulator set pressure may vary due to application requirements. If a pressure setting less than 20 psig is required then a line regulator must be installed at the manifold outlet.

3. If a pressure switch has been installed in the system, after the regulator, the switch setting should be 10 - 15 psig less than the regulator setting.

4. If a switch has been installed in a CLA manifold it will monitor bank pressure. The switch should be set to activate when there is only one day supply left in the bank. The pressure setting for each installation will vary depending on the number of cylinders and the amount of usage.

5. Simulate a depleted bank by closing the cylinder valves and creating a flow of gas through the manifold. The pressure readings on the gauges will drop. Any alarms connected to the system monitoring bank pressure will activate.

6. S-L-O-W-L-Y open the cylinder valves (turn counter-clockwise to open).

7. The manifold is now ready to supply your system.

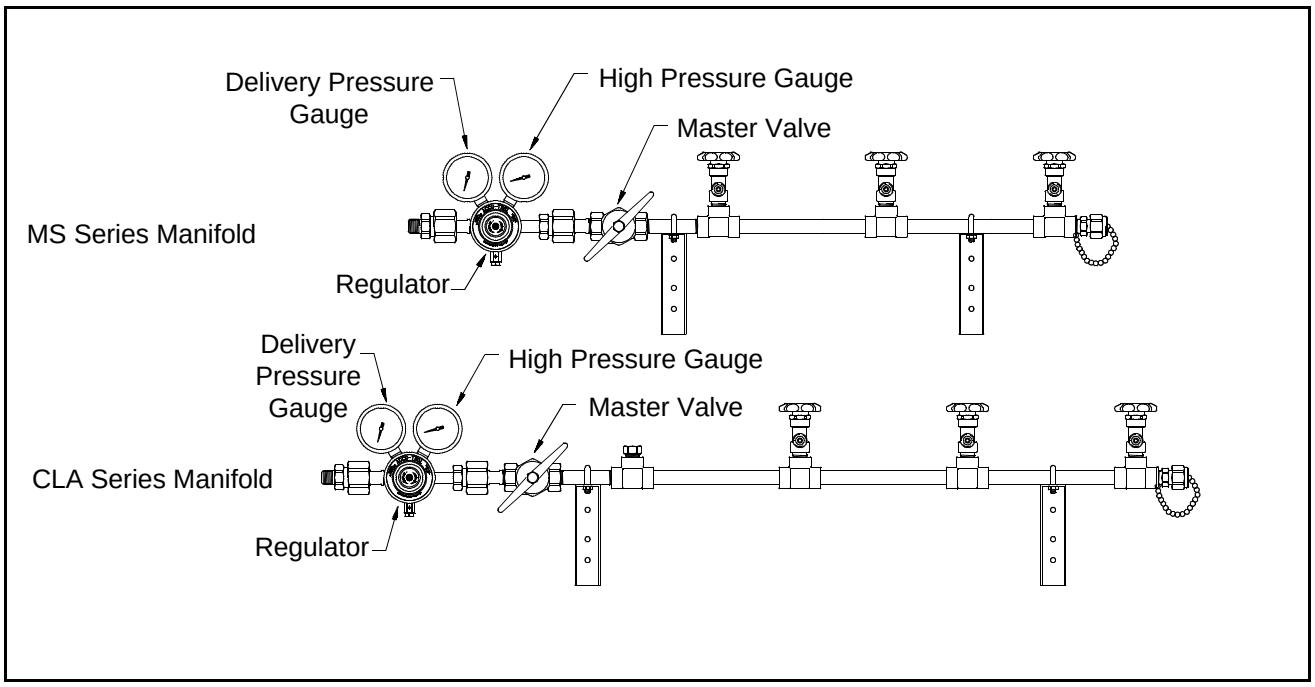


FIGURE 13

MANIFOLD OPERATION

The manifold control includes the following components and features: regulator, flexible pigtails with check valves and headers designed to be easily expanded. The manifold is designed to use a line regulator (optional item) which can be mounted on the manifold outlet for delivery pressures less than 20 psig.

Gas flows through the manifold to the primary regulator and then through the line regulator (if installed). Final delivery pressure is controlled by the either the line regulator or by the primary regulator should the application not require a line regulator. A line regulator is not provided with the manifold.

As cylinders deplete the high pressure gauge on the regulator along with any alarm systems installed will indicate that the bank of cylinders should be changed.

After replacing empty cylinders, the manifold is immediately ready for service.

To insure proper operation, observe the following guidelines:

1. Carefully follow all instructions.
2. Establish proper flow direction of check valves.
3. Be sure the header master shut-off valve is fully opened. NOTE: These valves are provided for emergency shut off only.
4. Be sure cylinder valves are fully opened.
5. Replace empty cylinders as soon as practical after the manifold has depleted.

CYLINDER REPLACEMENT & HANDLING

1. Shut off all cylinder valves and header valves as well as the master valve on depleted cylinders.
2. S-L-O-W-L-Y loosen and remove the pigtail connection from the depleted cylinders.
3. Remove depleted cylinders and replace protective caps.
4. Remove protective cylinder caps from full replacement cylinders. With the valve outlet pointed away from you or anyone else, slowly open each cylinder valve slightly to blow out any dirt or contaminants which may have become lodged into the cylinder valve.
5. Place and secure full cylinders into position using chains, belts, or cylinder stands.
6. Connect pigtails to cylinder valves and tighten with wrench.
7. Open master valve. S-L-O-W-L-Y turn each cylinder valve until each cylinder is fully on.
8. The manifold supply bank is now replenished and may be put in service by following instructions on page 9 (START UP AND CHECKING PROCEDURES).

GENERAL MAINTENANCE

1. Main section
   a) Daily - record line pressure.
   b) Monthly
      1) Check regulators and valves for external leakage.
      2) Check valves for closure ability.
   c) Annually - check relief valve pressures.
      - replace regulator seats.

2. Manifold header
   a) Daily - 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.
   b) Monthly
      1) Inspect valves for proper closure.
      2) Check cylinder pigtails for cleanliness, flexibility, wear, leakage, and thread damage. Replace damaged pigtails immediately.
      3) Inspect pigtail check valves for closure ability.
   c) Every 4 Years
      1) Replace all pigtails

TROUBLE-SHOOTING (Only qualified repair personnel should make repairs)

SYMPTOM	PROBABLE CAUSE	REMEDY OR CHECK
SYSTEM DEPLETES PREMATURELY		
Alarms signaling empty bank actuate and system has not depleted.	The pressure setting of the pressure switch is too close to the MS supply primary regulator setting.	Increase the pressure differential between the primary regulator and the pressure switch.
	The pressure setting is above cylinder pressure on CLA manifolds.	Lower the switch setting (not lower than 1 day supply for medical installations).
SYSTEM DOES NOT FLOW		
Manifold does not flow and delivery gauges drop down to 0.	Primary regulator set at 0 psig.	Reset the primary regulator following instructions on page 9 (Start up and checking procedures).
LOSS OF CYLINDER CONTENTS		
Audible or inaudible gas leakage (unknown origin).	Leakage at manifold piping connections.	Tighten, reseal or replace.
	Leakage in downstream piping system.	Repair as necessary.
	Leakage at cylinder valve.	Replace cylinder.
	Gauge leaks.	Reseal or replace.
	Regulator leaks.	Repair or replace.
Venting at relief valve. (optional item)	Regulator setting too high.	Set delivery pressure to specifications.
	Over pressure due to creeping or faulty regulation by regulator.	Replace regulator seat and nozzle components.
	Over pressure due to creeping or faulty regulation by line regulator.	Replace regulator seat and nozzle components.
	Regulator freeze-up. (Nitrous oxide or carbon dioxide)	Reduce the flow demand or increase the number of supply cylinders.
Gas leakage around regulator body or bonnet.	Loose bonnet.	Tighten bonnet.
	Diaphragm leak on regulator.	Replace diaphragm.

MANIFOLD MAINTENANCE & REPAIR PARTS

NOTE:

- Western manifold systems are designed and tested for optimal performance and adherence to safety specifications. We recommend the use of Western replacement components to maintain the standards of performance and the safety of the product.

REPLACEMENT PIGTAILS

24" Stainless Steel Flexible Braid with Check Valves

PF-16CVFA-24R ..... CGA 300 with flash arrestor for Acetylene Service
PF-320CV-24R ..... CGA 320 for Carbon Dioxide (CO_2) Service
PF-326CV-24R ..... CGA 326 for Nitrous Oxide (N_2O) Service
PF-83CV-24R ..... CGA 350 (Except Hydrogen Service)
PF-15CVFA-24R ..... CGA 510 with flash arrestor for Acetylene Service
PF-15CV-24R ..... CGA 510 for Liquid Fuel Gas Service
PF-63CV-24 ..... CGA 540 for Oxygen (O_2) Service
PF-92CV-24R ..... CGA 580 for Nitrogen (N_2) Service
PF-93CV-24R ..... CGA 590 for Industrial Air Service
PF-83CV-24RV ..... CGA 350 for Argon/Methane Mixture Service

24" Synthetic Fiber Braid Hose with Check Valve

PFS-83CV-24R ..... CGA 350 for Hydrogen Service
PFS-92CV-24R ..... CGA 580 for Helium (He) Service

REGULATORS AND REGULATOR REPAIR KITS

RM-1-1 ..... Primary Regulator Acetylene
RM-2-4 ..... Primary Regulator for Compressed Air
RM-4-4 ..... Primary Regulator for CO_2
RM-6-4 ..... Primary Regulator for Hydrogen
RM-7-4 ..... Primary Regulator for Argon, Nitrogen and Helium
RM-7A-4 ..... Primary Regulator for Compressed Air
RM-8-4 ..... Primary Regulator for N_2O
RDM-9-4 ..... Primary Regulator for Oxygen
RM-10-2 ..... Primary Regulator for LPG Fuel Gas
RDM-11-4 ..... Primary Regulator for Medical Breathing Mixtures
RWC-3-59 ..... Replacement Cartridge for RM-1-1 & RM-10-2
RWC-3-49 ..... Replacement Cartridge for RM-2-4, RM-7-4, RM-4-4, RM-8-4, RM-6-4 & RM-7A-4
RWD-2-19 ..... 1st Stage Replacement Cartridge for RDM-9-4 & RDM-11-4
RWD-2-36 ..... 2nd Stage Replacement Cartridge for RDM-9-4 & RDM-11-4

VALVES AND VALVE REPAIR KITS

WMS-1-53 ..... CGA 540 Spud Check Valve
WMV-2-16 ..... Master Valve
WMV-2-3 ..... CGA 580 Header Valve
RK-1085 ..... Repair Kit for WMV-2-16 (430B & C)
WMV-2-14 ..... CGA 326 Header Valve
WMV-2-4 ..... CGA 346 Header Valve
WMV-2-7 ..... CGA 320 Header Valve

LIMITED WARRANTY

WARRANTY: The Seller expressly warrants that the products manufactured by it will be free from defects in material, workmanship and title at the date of shipment. This Warranty is exclusive and is IN LIEU OF ALL IMPLIED OR STATUTORY WARRANTIES (INCLUDING WITHOUT LIMITATION, WARRANTIES AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR ARISING FROM COURSE OF DEALING OF USAGE OR TRADE) or any other express or implied warranties or representations. All claims under this warranty must be made in writing and delivered to the Seller prior to the expiration of 1 year from the date of shipment from the factory, or be barred. Upon receipt of a timely claim, the Seller shall inspect the item or items claimed to be defective, and Seller shall, at its option, modify, repair, or replace free of charge, any item or items which the Seller determines to have been defective at the time of shipment from the factory, excluding normal wear and tear. Inspection may be performed at the Seller's plant and in such event, freight for returning items to the plant shall be paid by Buyer. Seller shall have no responsibility if such item has been improperly stored, installed, operated, maintained, modified and/or repaired by an organization other than the Seller. adjustments for products not manufactured by Seller shall be made to the extent of any warranty of the manufacturer or supplier thereof. The foregoing shall be the Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for any breach of warranty or for any other claim based on any defect in, or non-performance of, the products whether based on breach of contract or in tort, including negligence or strict liability.

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