

## INTRODUCTION

Western manifold systems are cleaned, tested and prepared for the indicated gas service and are built following National Fire Protection Association and Compressed Gas Association guidelines. The manifold consists of a manifold control and a heater, to provide an increase supply of gas for the specific gas application. The manifold is designed to allow expansion to meet future needs. Pressure gauges show system status and alert the need to replace depleted cylinders. Features of the manifold system include a stainless steel regulator, stainless steel inner core flexible pigtails with check valves, wall-mounted header 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 cylinder, manifold, and connections. Oil and grease may react and ignite while in contact with some gases-particularly oxygen an 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. Oil and grease may react with and ignite while in contact with some gases-particularly oxygen an 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 discharge and lightning my 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.

## 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 cylinder 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.

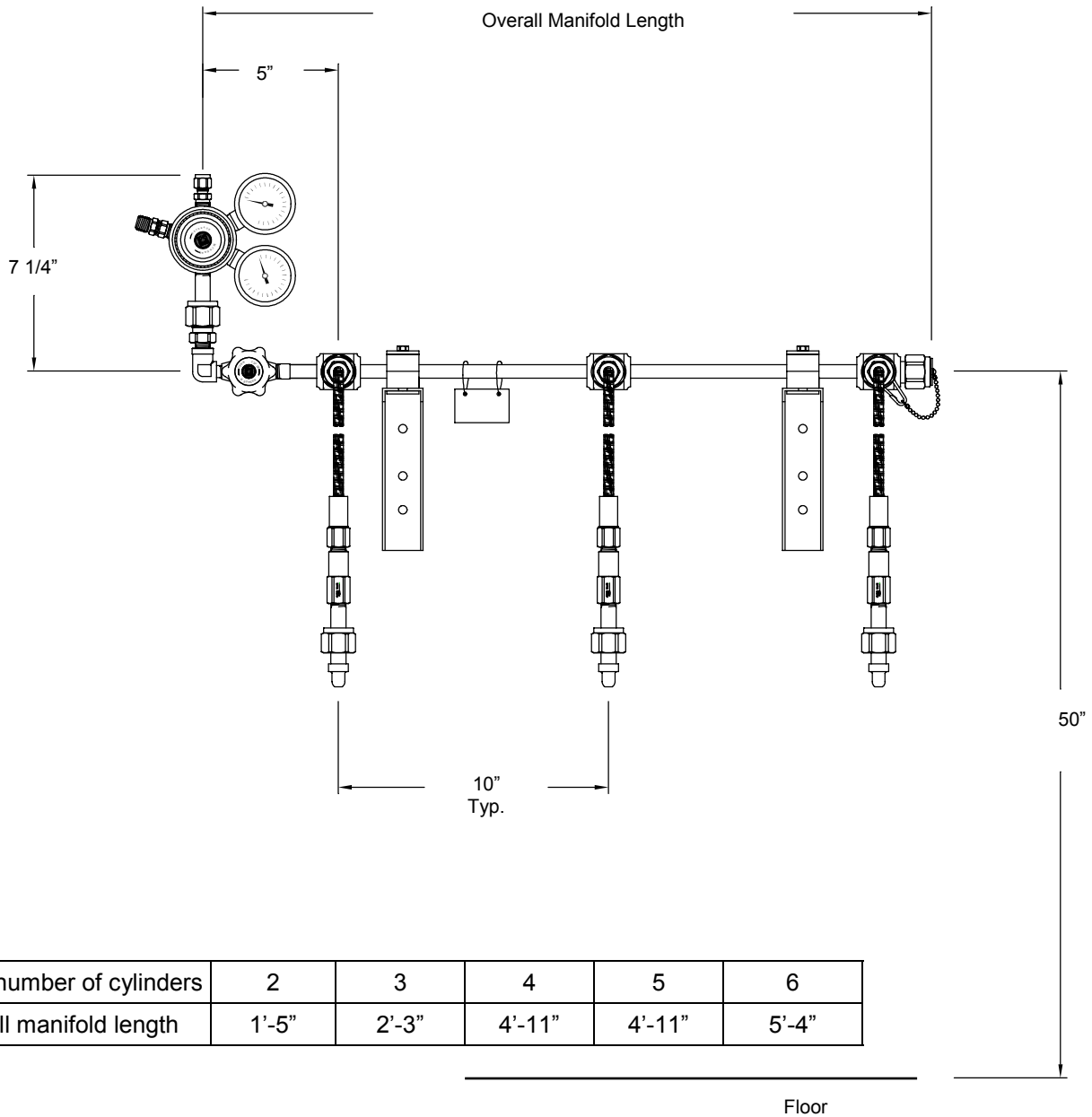


FIGURE 1

## MANIFOLD ASSEMBLY

Leave all components in their protective polybags until the component is to be assembled.

1. Assemble the regulator to the header assembly (Figure 2).

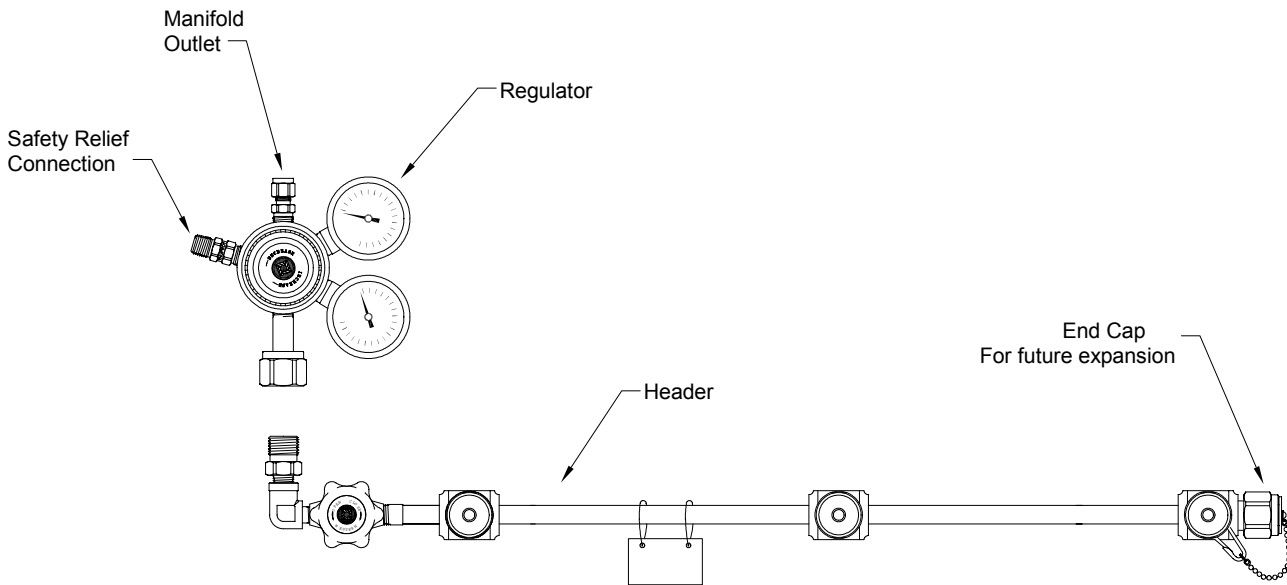


FIGURE 2

## MANIFOLD INSTALLATION

1. Determine and mark the vertical center line for installation of the manifold (Figure 3).
2. Measure from the floor to a point 50" 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 clamp assemblies from the mounting brackets. Position the bracket so that the top of the bracket is aligned with the horizontal line.

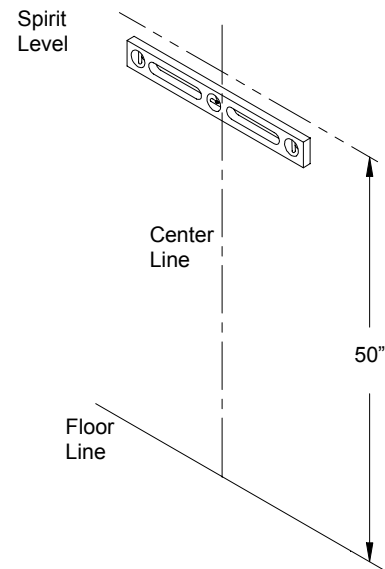


FIGURE 3

4. Mark the mounting holes and install fasteners suitable for the type of wall constructions. (Figure 4)
5. Mount the manifold by placing the header section in the clamp and tighten the mounting bolts. (Figure 4).
6. Mark the placement of any additional mounting brackets while keeping the header on a horizontal plane. (Figure 5)
7. Remove the clamp assemblies from the header mounting brackets. Position the brackets and bottom half of the clamp so that they are aligned with the bottom of the headers and are centered between the header sections. The brackets should be evenly placed to provide the most support and stability.
8. Mark the mounting hole and install fasteners suitable for the type of wall construction. (Figure 5)
9. Fit the top of the clamp over the header piping and tighten the two mounting bolts.

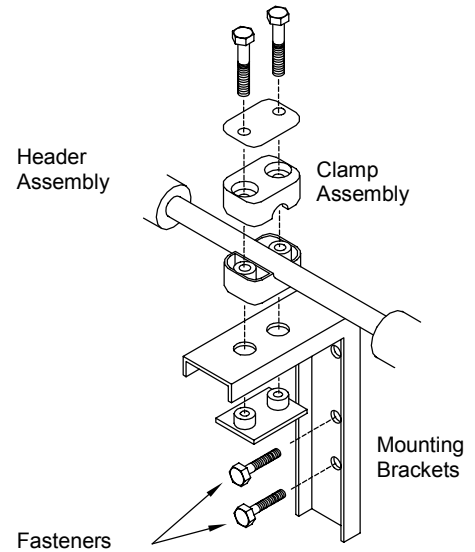


FIGURE 4

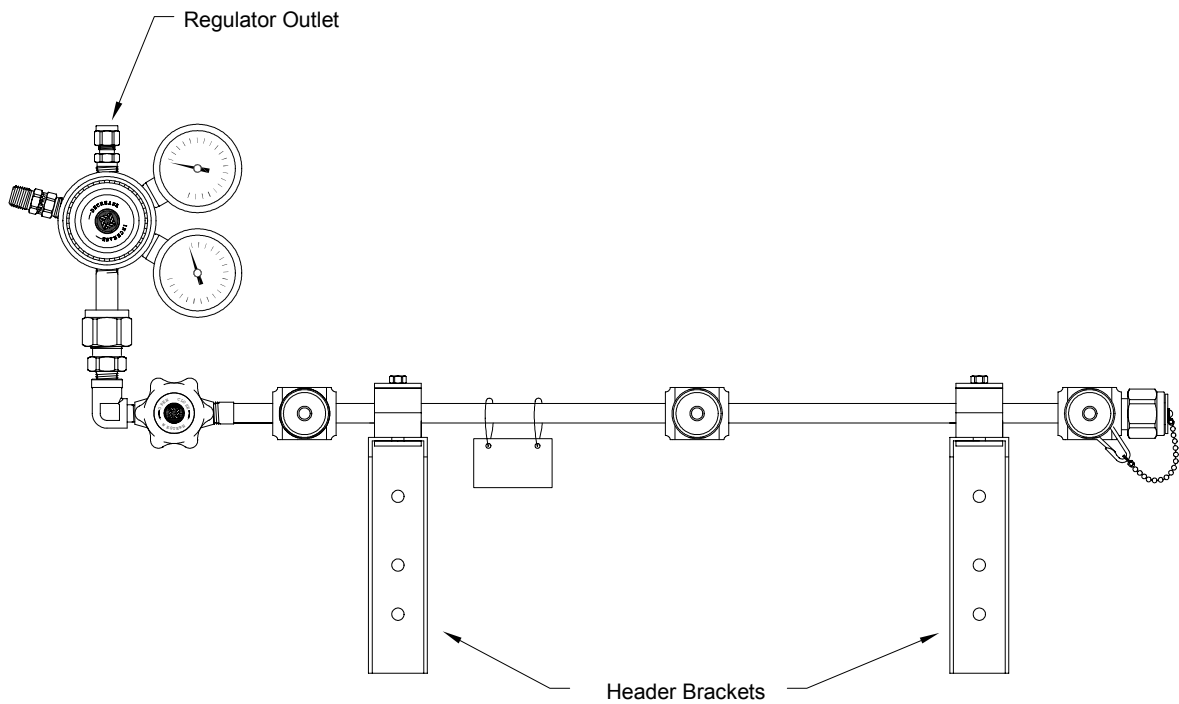


FIGURE 5

## PLUMBING

1. A 1/4" tube compression fitting is supplied with the control and is located at the outlet of the pressure regulator. Connect the pipeline system to this fitting. The fitting provided permits removal of the manifold for service. (Figure 5)

## INSTALLATION OF OPTIONAL EQUIPEMENT

### PRESSURE SWITCH (refer to Figure 6)

1. Remove the 1/4" tube fitting from the regulator outlet.
2. Install a 1/4 NPT street tee into the regulator outlet port.
3. Install the 1/4" tube fitting into the street tee.
4. Install a 1/4 NPT bushing into the 1/4 NPT street tee.
5. Install the pressure switch onto the 1/2 NPT busing.

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### PURGE ASSEMBLIES (refer to Figure 6)

1. Remove the cap on the ends of the manifold header.
2. Connect the purge assembly to the ends of the header.

### RELIEF VALVES (refer to Figure 7)

Note: the relief valve installed in the regulator is sized to protect the regulator only, an additional relief valve may be required to protect downstream equipment.

1. Remove the compression fitting from the regulator outlet.
2. Install a 1/4 NPT street tee onto the manifold outlet using Teflon® tape.
3. Install the relief valve onto the tee.
4. Install the compression fitting into the street tee.

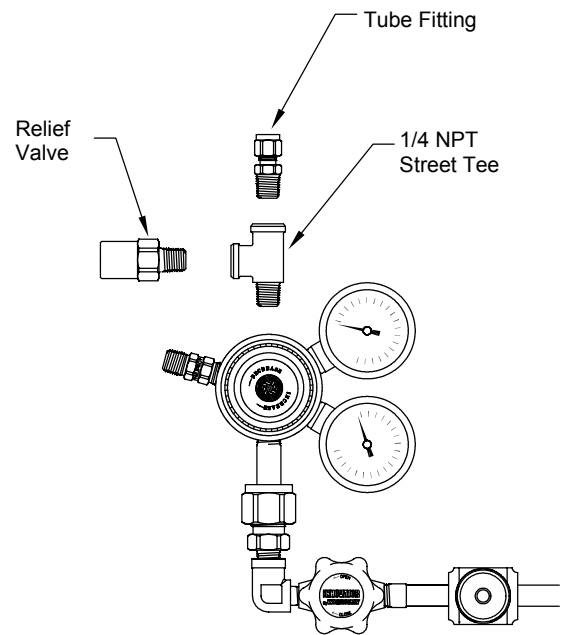


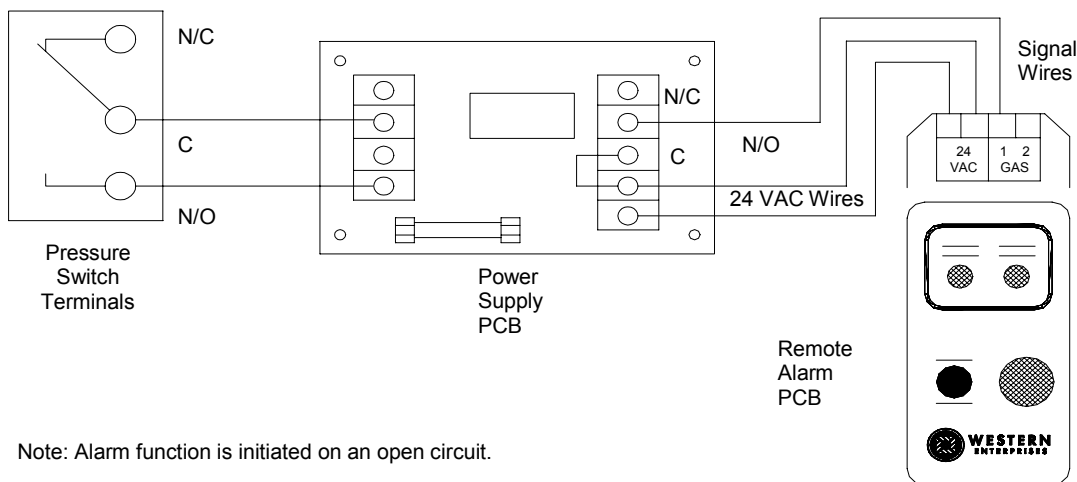
FIGURE 7

## REMOTE ALARM HOOKUP

Western HSMS2 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 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-11-36).
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 aused 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.

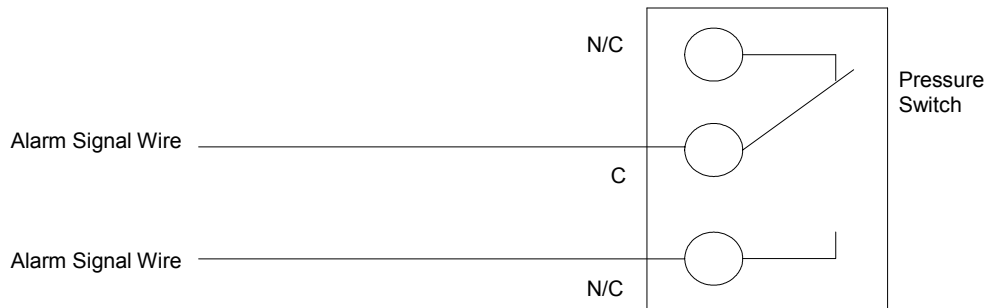


Note: Alarm function is initiated on an open circuit.

FIGURE 8 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 exist 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 (N/O) terminal on the pressure switch.



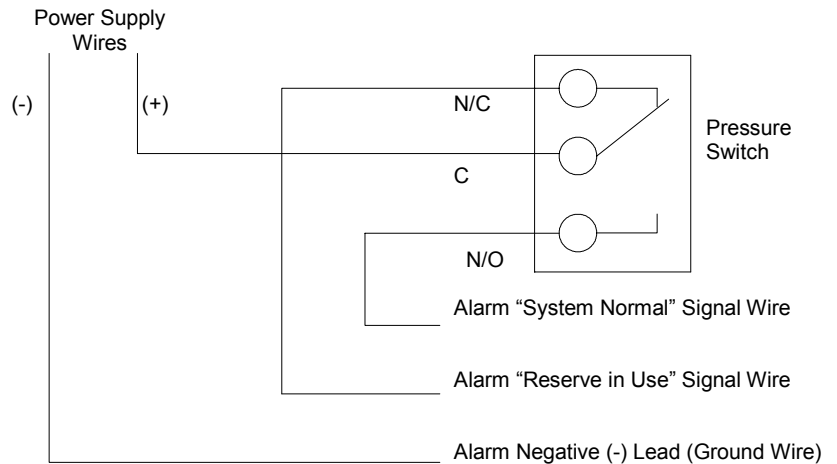
Note: Alarm function is initiated on an open circuit.

FIGURE 9

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

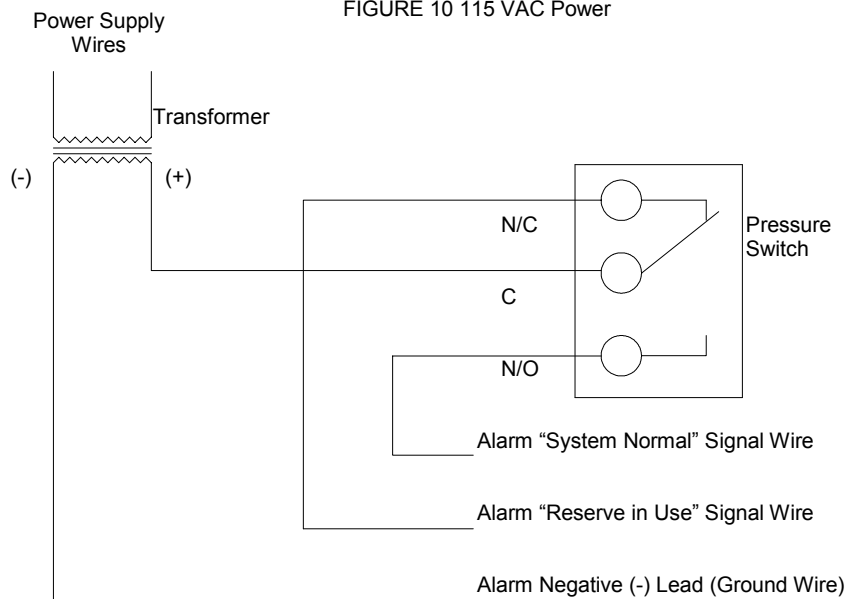
**WESTERN'S ALARM**

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 10) 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 11)
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 close circuit.

FIGURE 10 115 VAC Power



Note: Alarm Function is initiated on a close circuit.

FIGURE 11 User Supplied Power

**INSTALLING PIGTAILS AND ATTACHING CYLINDERS**

1. Establish the CGA and the manifold ends of the pigtails.
2. Connect the manifold ends of the pigtails to the manifold header.
3. Check the master valves to be certain they are open.
4. Attach full cylinders to the pigtail connections as explained in "Cylinder Replacement & Handling" on page 10.
4. Open section header valves (turn counter-clockwise to open).
5. S-L-O-W-L-Y turn all cylinder on fully (turn counter-clockwise to open). Check all cylinder and pigtail connections for leaks using Western leak detector LT-100 or any oxygen safe solution. Any bubbles around connections indicates leakage.

## START UP AND CHECKING PROCEDURES

The HSMS2 series manifold is 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 master valve (turn counter-clockwise to open) The high pressure gauge will show the full pressure of the right bank of cylinders. (Figure 12)
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 the switch should be 10-15 psig less than the regulator setting.
4. Simulate a depleted bank by closing the master valve 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.
5. S-L-O-W-L-Y open the master valve (turn counterclockwise to open)
6. The manifold is now ready to supply your system.

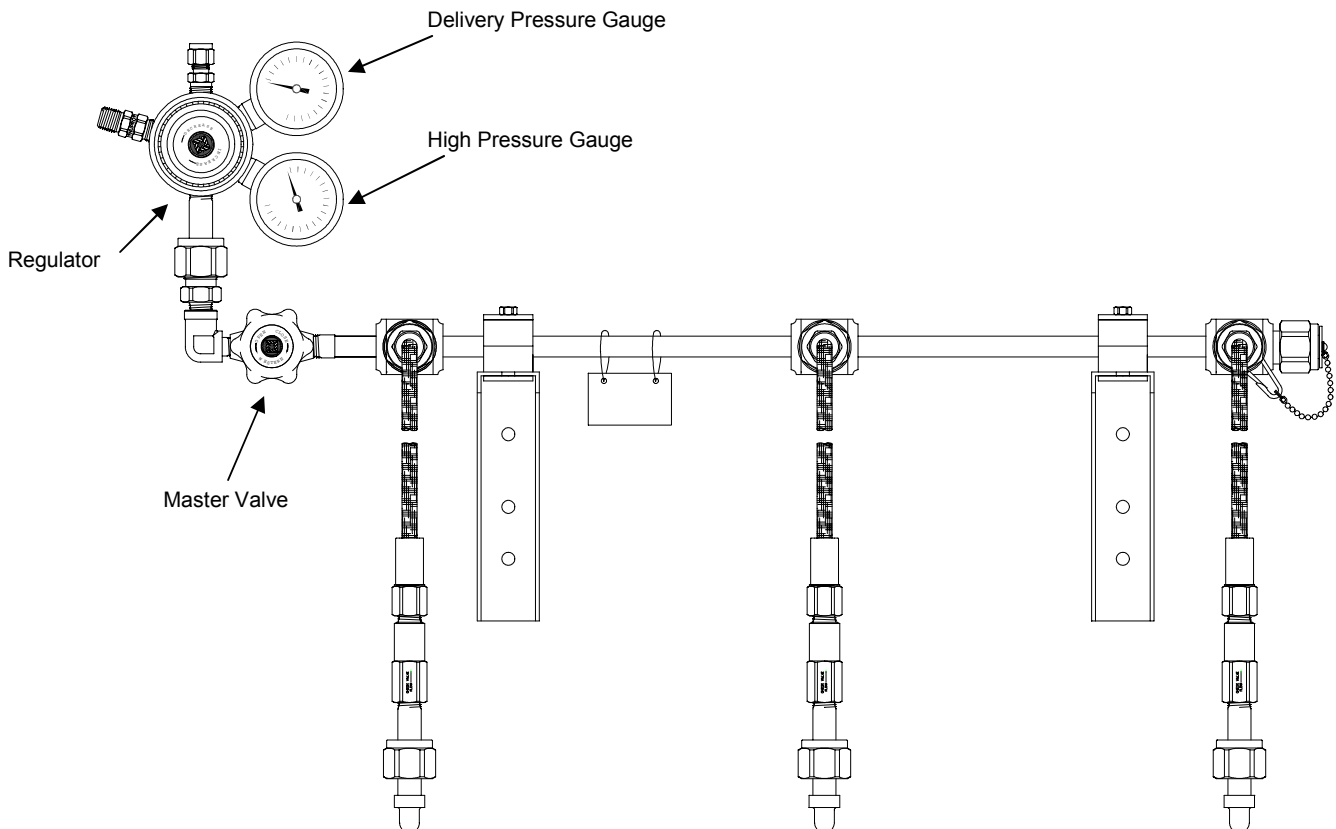


FIGURE 12

## **MANIFOLD OPERATION**

The manifold control includes the following components and features: orbital welded fittings, stainless steel regulator with stainless steel diaphragm, stainless inner core flexible pigtailed with check valves, headers designed to be easily expanded, and the header construction allows installation of purge assembly. 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 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 header master shut-off valves are fully open.
4. Be sure cylinder valves are fully opened.
5. Replace empty cylinders as soon as practical after the manifold has depleted.

## **CYLINDER REPLACEMENT AND HANDLING**

1. Shut off all cylinder valves and header valves as well as the master valve on depleted cylinder 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. Removed 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 contaminations 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 pigtailed 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. It is recommended that the system be purged and/or vented to remove any air that may have entered the system during cylinder changeout.
9. 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 valve for external leakage.
    - 2) Check valves for closure ability.
  - c) Annually
    - 1) Check relief valve pressures.
    - 2) Check regulators for crawl (inability to maintain a set delivery pressure)
  
2. Manifold header
  - a) Daily - observe nitrous oxide and carbon dioxide systems for cylinder 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 cylinders 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)

<b>SYMPTOM</b>	<b>PROBABLE CAUSES</b>	<b>REMEDY OR CHECK</b>
<b>SYSTEM DEPLETES PREMATURELY</b>		
Alarms signaling changeover actuate and system has not depleted.	The pressure setting of the pressure switch is too close to the supply primary regulator setting.	Increase the pressure differential between the primary regulator and the pressure switch.
<b>SYSTEM DOES NOT FLOW.</b>		
Manifold does not flow and delivery gauges drop down to 0.	Regulator set at 0 psig.	Reset the regulator following instructions on page 9. "Start Up and Checking Procedure"
<b>LOSS OF CYLINDER CONTENTS</b>		
Audible or inaudible gas leakage (unknown origin).	Leakage at manifold piping connection.	Tighten, reseal or replace.
	Leakage at manifold tubing connection.	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.	Reseal 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.
	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

#### Flexible Stainless Steel Inner Core Pigtails with Check Valves

HSPF-320CV-24A.....	CGA 320 Pigtail with Check Valve
HSPF-326CV-24A.....	CGA 326 Pigtail with Check Valve
HSPF-346CV-24A.....	CGA 346 Pigtail with Check Valve
HSPF-83CV-24A.....	CGA 350 Pigtail with Check Valve
HSPF-63CV-24A.....	CGA 540 Pigtail with Check Valve
HSPF-92CV-24A.....	CGA 580 Pigtail with Check Valve

### MANIFOLD FITTINGS

WLF-3-37SS ..... 1/4 tube x 1/4 NPT Female

### REGULATORS

WMS-12-59 ..... Primary Regulator for all gases except CO2 and N2O  
 WMS-12-60 ..... Primary Regulator for CO2 and N2O

### OPTIONAL EQUIPMENT

#### PRESSURE SWITCHES

WME-4-16 ..... General Purpose: 20 - 200 psig pressure setting range (250 psig max inlet)  
 WME-4-17 ..... General Purpose: 100 - 1700 psig pressure setting range (2500 psig max inlet)  
 WME-4-18 ..... High / Low Switch: 0 - 200 psig pressure setting range (250 psig max inlet)

#### POWER SUPPLY

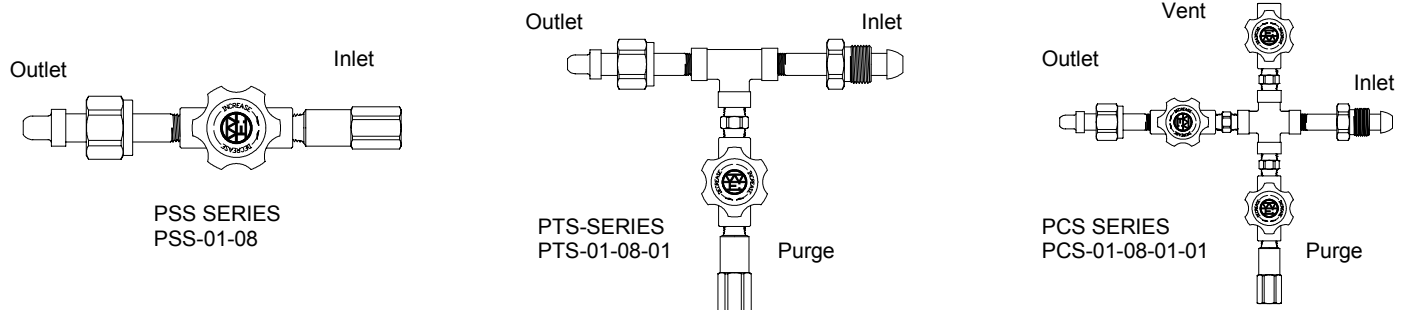
WMS-11-36 ..... 24 VAC Power Supply

#### REMOTE ALARMS—24 VAC Service

BIA-1 ..... Visual - 1 Gas  
 BIA-2 ..... Audio/Visual - 2 Gases  
 BIA-3 ..... Audio/Visual - 1 Gas

#### PURGE ASSEMBLIES

PSS-01-08..... 1/4 NPT inlet and manifold header connection outlet.  
 PTS-06-08-01..... CGA 580 inlet by manifold connection outlet with 1/4 NPT female purge.  
 PCS-06-08-01-01..... CGA 580 inlet by manifold connection outlet with 1/4 NPT female purge and vent.  
 (Other inlet, outlet, purge, and vent connections available)



## 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 supplied 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, or non-performance of, the products whether based on breach of contract or in tort, including negligence or strict liability.



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