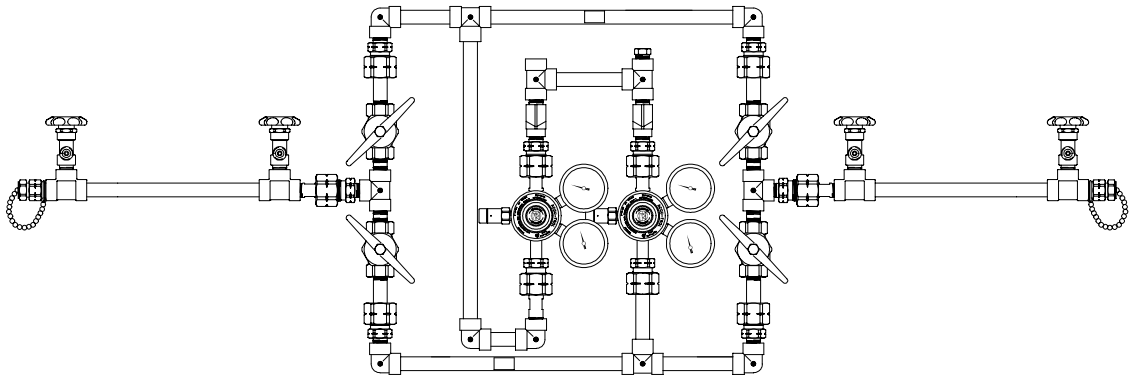
WESTERN INNOVATOR

Installation and Operating Instructions For MANUAL MANIFOLDS AD & ADHP SERIES



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 two regulators and two supply bank headers, one service and one secondary supply to provide an uninterrupted supply of gas for the specific gas application. The manifold control unit is designed and built with features providing automatic changeover from the depleted "Service" bank to the "Reserve" supply with a predetermined drop in delivery pressure. Pressure gauges show system pressure status and display the need to replace depleted cylinders. The manifold incorporates a port for installing a pressure switch for monitoring changeover. This switch may be connected to any remote alarm system. Features of the manifold system include regulators, flexible pigtails with check valves, headers, and complete mounting hardware.

CAUTION

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

- Never permit oil, grease, or any other combustible material to come in contact with cylinders, manifold, and connections. Oil and grease may react and ignite while 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 enriched atmosphere, creating a fire or explosion.
- 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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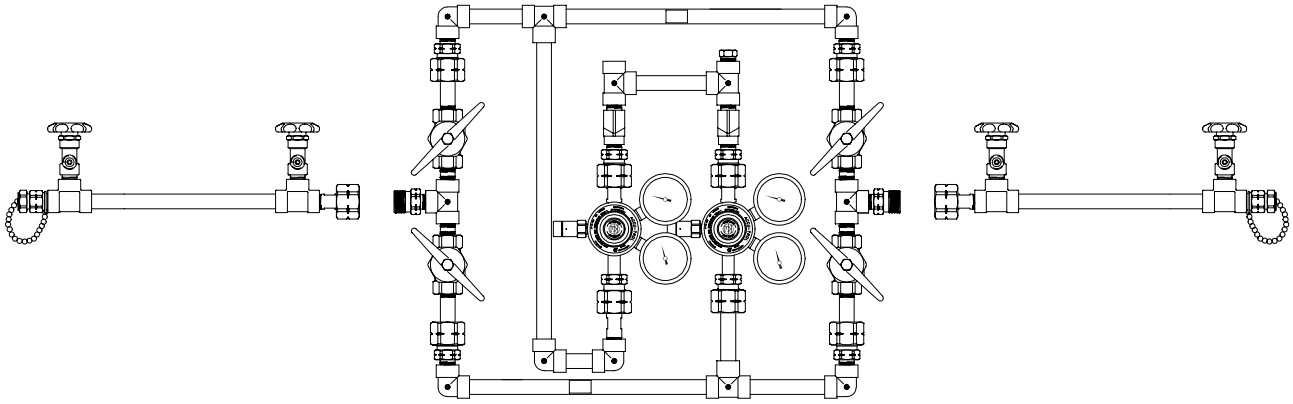
GENERAL INSTRUCTIONS

Manifolds should be installed in accordance with guidelines stated by the National Fire Protection Association, Compressed Gas Association, Occupation Safety Health Administration, 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° (49° C) or fall below -20° F (-29° C). A manifold placed in an open location should be protected against adverse weather conditions, including direct rain, snow, and heavy moisture. During winter, protect the manifold from ice and snow. In summer, shade the manifold and cylinders from continuous exposure to direct rays and heat of the sun.

Leave all manifold 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	4	6	8	10	12
AD manifold overall length	5’ - 8” (1.73m)	7’ - 4” (2.24m)	9’ - 0” (2.74m)	10’ - 8” (3.25m)	12’ - 0” (3.66m)
AD Staggered overall length	4’ - 10” (1.47m)	5’ - 8” (1.73m)	6’ - 6” (1.98m)	7’ - 4” (2.24m)	7’ - 10” (2.39m)
AD vertical crossover overall length	4’ - 0” (1.22m)	N/A	5’ - 8” (1.73m)	N/A	7’ - 4” (2.24m)

Figure I

MANIFOLD INSTALLATION

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

2. Measure from the floor to a point 71” in height* of this vertical line. Using a level, mark a horizontal line at this point extending approximately 8.5” to the left and 8.5” 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 brackets so that the top of the bracket is aligned with the horizontal line.

4. Marking the mounting holes and install fasteners suitable for the type of wall constructions. (Figure 3)

5. Mount the AD control section on the two brackets. (Figure 4)

6. Place brackets against the bottom of the AD control piping section. Mark mounting holes and install fasteners suitable for the type of wall construction. (Figure 4)

7. Measure the header and mark a distance that would equally space the brackets.

8. Measure approximately 10.75 inches from the top control section for mounting headers. (Figure 4)

9. Mark the mounting holes and install fasteners suitable for the type of wall construction. (Figure 3)

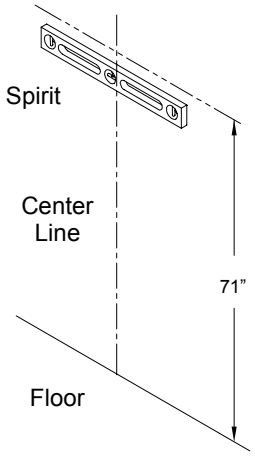


Figure 2

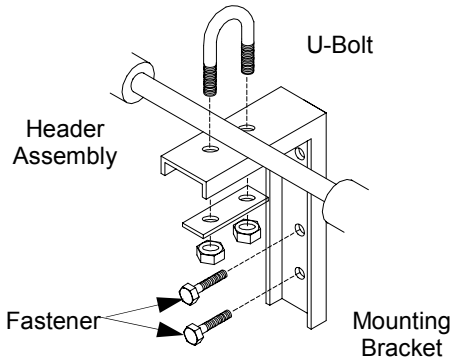


Figure 3

10. Mount the header on the bracket. Fit U-bolt over the header pipe and tighten the mounting nuts. (Figure 4)

11. Using a level mark the placement of any additional mounting brackets while keeping the header on a horizontal plane (Figure 4)

12. 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 equally spaced to provide the most support and stability.

13. Mark the mounting hole and install fasteners suitable for the type of wall construction. (Figure 3)

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

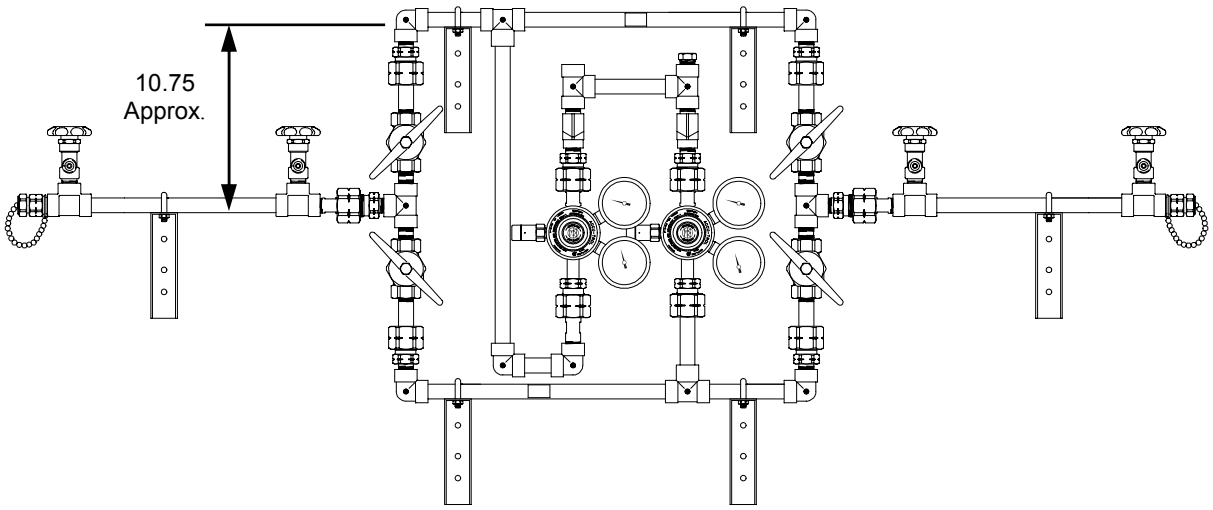


Figure 4

MANIFOLD ASSEMBLY

1. Assemble the right and left header assemblies to the AD inlet oriented as shown in Figure 5.

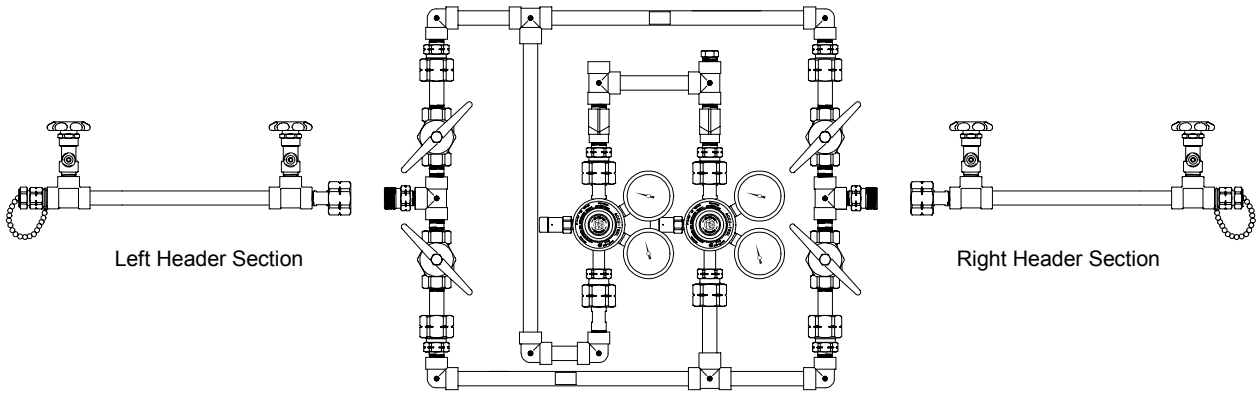


Figure 5

MANIFOLD OUTLET

1. The outlet of the manifold is 1/2” female NPT (L.H. manifold union for Acetylene systems) located at the outlet of the pressure regulator, and shall be connected to the distribution pipeline system. (Figure 6)

INSTALLATION OF OPTIONAL EQUIPMENT

PRESSURE SWITCH

1. Install an orifice bushing into the 1/2 NPT tee. (Figure 6)

2. Install the pressure switch onto the orifice bushing. (Figure 6)

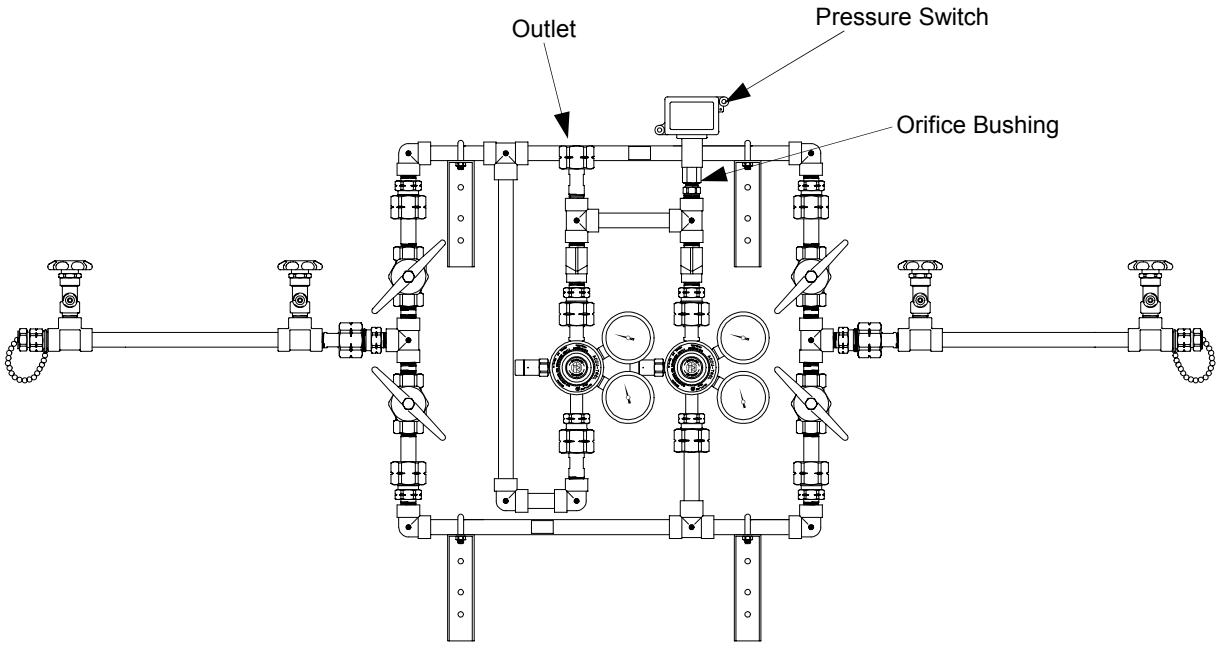


Figure 6

FUEL GAS MANIFOLDS—FLASHBACK ARRESTORS

GENERAL

A dry flash arrestor is provided with all Western acetylene manifolds. A flash arrestor shall also be used on all fuel gas manifolds (not provided with the manifold) used in applications with oxygen. Installed in the main gas line or at the head of each branch line, the arrestor protects the main gas supply from the dangers of reverse flow and flashbacks. The safety relief valve is installed on the outlet side of the flash arrestor. Should excessive pressure occur, the gas is then vented to a safe location.

OPERATION

In normal flow, as shown (Figure 7) the flexible sleeve is not in contact with the mandrel. If back pressure occurs, the ball check closes and the sleeve is forced tightly against the ridges on the mandrel, creating what is in effect, a “multi-chamber” barrier. This effectively checks backflow and flashback. The excess pressure is vented through the relief valve.

FLASH ARRESTOR INSTALLATION

1. Install the flash arrestor to the supplied flash arrestor piping using an approved pipe sealant.

2. Secure the flash arrestor pipe assembly to the manifold outlet. (Figure 8)

3. The vent piping must be galvanized and have galvanized fittings. It must be at lease 3/4 inch pipe size. A 3/4 inch street elbow should be used to connect the vent pipe to the outlet on the side of the relief valve. The vent pipe must extend to the outside of the building and terminate not less than 12 ft. above the ground, remote from any windows or opening in the building, and as far as possible from sources of ignition such as flues or chimneys. Its end just be fitted with a return bend or elbow opening downward, preferably screened to prevent obstruction. The vent pipe must be installed without traps. The vent pipes from two or more back pressure check valves supplied through a common branch of the supply line may be connected to a common vent pipe header.

4. The piping from the “outlet” of the flash arrestor to the distribution system can now be completed. (The National Fire protection Association in its bulletin, NFPA #51 outlines standard for the installation and operation of oxygen/fuel gas systems for welding and cutting).

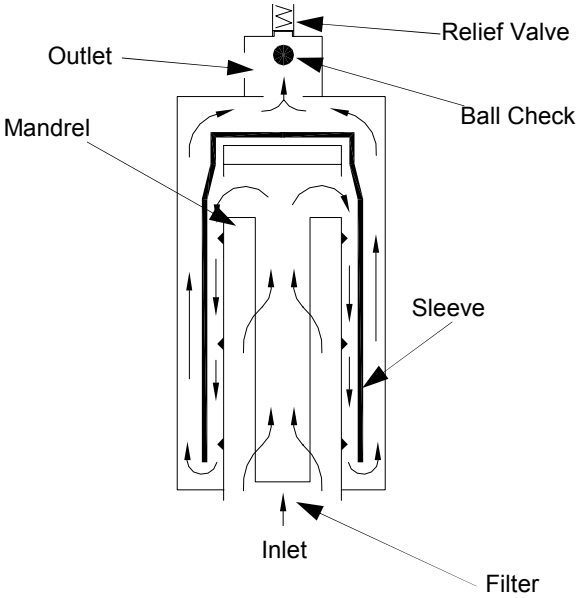


Figure 7

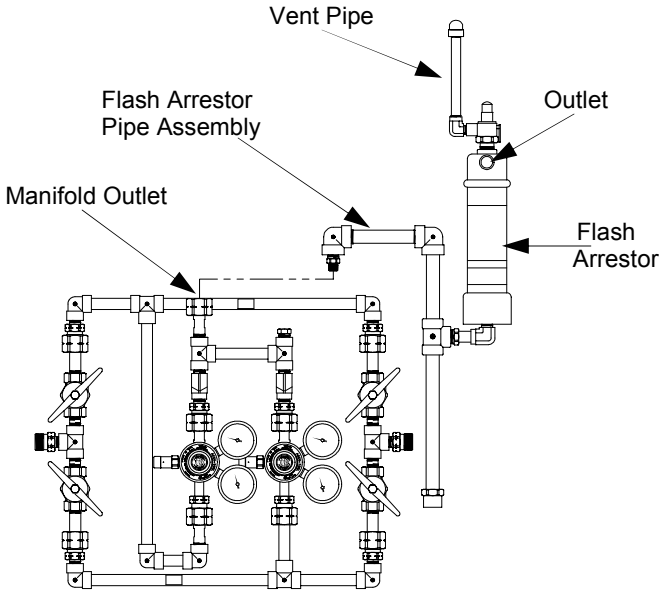


Figure 8

TEST FOR LEAKS

1. Connect a torch or equipment to the service outlet of the flash arrestor.
2. Close the torch valves or equivalent
3. Be sure there is normal operation pressure in the supply line.
4. Open the station shut off valve.
5. Test for leaks around the flash arrestor joints and also the joints in the supply line. Use Western's leak test solution LT-100 or soapy water to test for leaks. **Never test for leaks with an open flame.**
6. Eliminate all leaks before equipment at the station is used.

MAINTENANCE

1. Periodically, lift the lever on the side of the relief valve slowly and release gas only for an instant. Allow the valve to close on its own spring force. This will assure that the valve is not sticking and will operate properly in case of excess pressure.
2. Check all joints and connections for leakage periodically with leak test solution or equivalent solution suitable for oxygen service. Also apply a film of the leak solution over the opening of the outlet. Bubbling of the solution will indicate leakage. Do not continue operating until leakage is corrected. If leakage was noted around valve joints or at the outlet, the o-rings in the relief valve should be replaced.

ELECTRICAL

NOTE: AD Series Manifolds DO NOT include any electrical components.

FUEL GAS ALARM KITS

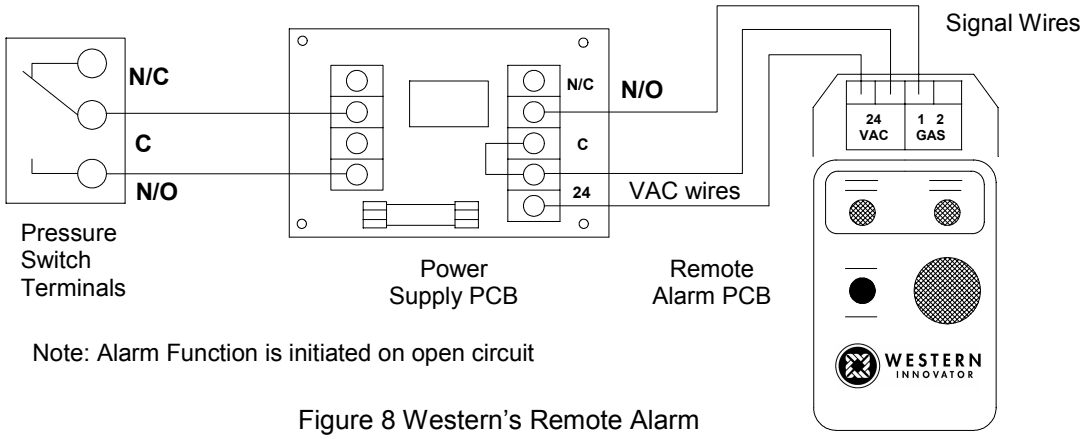
1. Installation should be per instructions provided with kit.

REMOTE ALARM HOOKUP

Western AD 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.
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.

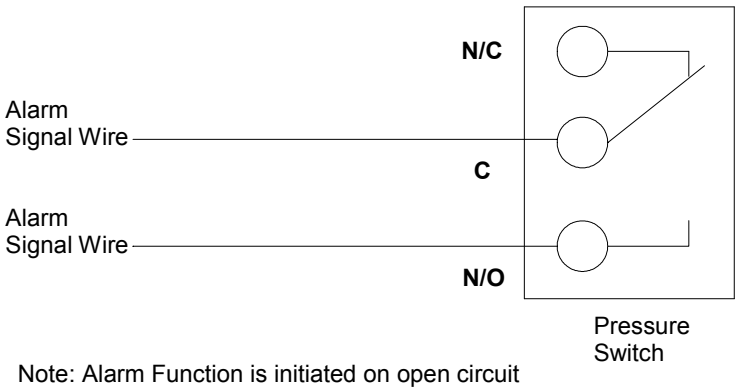


Note: Alarm Function is initiated on open circuit

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 may already exist in an end-user facility. 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 open circuit

Figure 9 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.)

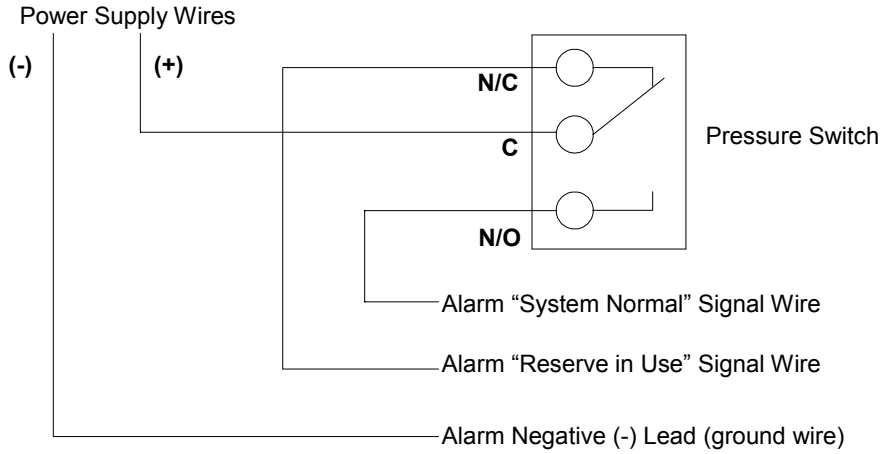
1. The power supply will be determined by the remote alarm operating voltage. If the remote alarm is designed for 115 VAC service, then the existing 115 VAC power source can be utilized directly. (Figure 10) If the remote alarm is designed for other than the existing AC power source, then it is necessary 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.

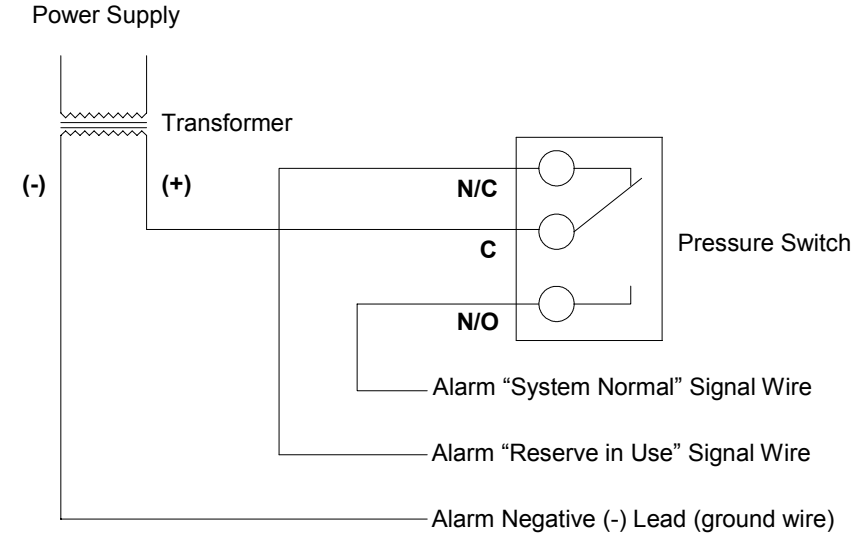
4. Connect the "reserve in use" signal wire from the alarm to the normally closed (N/C) terminal switch on the pressure switch.

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 open circuit

Figure 10 115 VAC Power



Note: Alarm Function is initiated on open circuit

Figure 11 User Supplied Power

INSTALLING PIGTAILS AND ATTACHING CYLINDERS

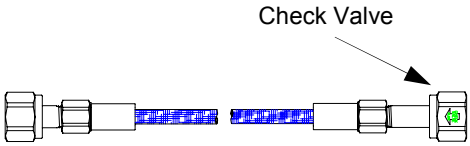


Figure 12

1. Establish the inlet and outlet ends of the pigtails. The flow direction stamped on the CGA nut will provide the flow direction. (Figure 12)

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

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

4. Attach full cylinders to the pigtail connections as explained in “Cylinder Replacement & Handling” on page 13.

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

6. Chose a service and reserve bank (Figure 13)
   - Right service and left reserve: open valves “B” & “C”, close valves “A” & “D”.
   - Left service & right reserve: open valves “A” & “D”, close valves “B” & “C”.

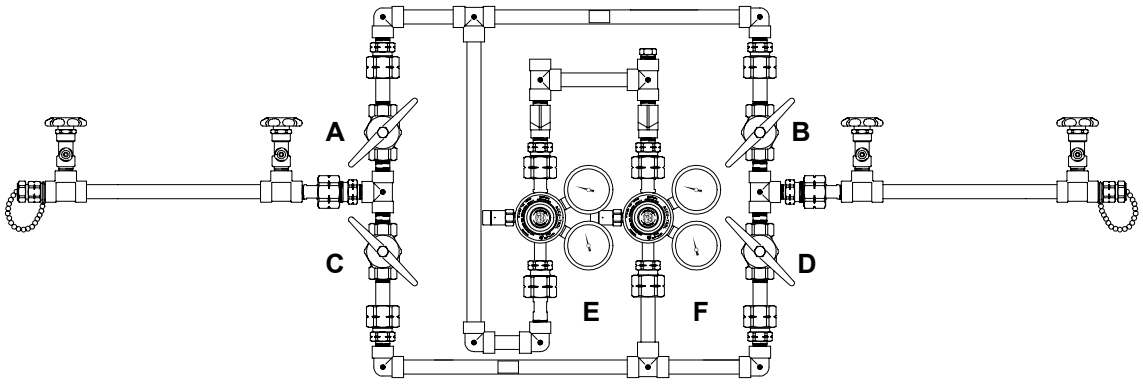


Figure 13

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

1. Choose a service and reserve bank. (Figure 14)
   - Right service and left reserve: open valves “B” & “C”, close valves “A” & “D”.
   - Left service & right reserve: open valves “A” & “D”, close valves “B” & “C”.

2. S-L-O-W-L-Y open the cylinder valves on reserve bank (turn counter-clockwise to open). The high pressure gauge on regulator “F” will show the pressure of the bank of cylinders. (Figure 13)

3. Adjust the delivery pressure of the regulator “F” to the desired pressure (20-125 psig). 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.

4. S-L-O-W-L-Y open the cylinder valves on the service bank (turn counter-clockwise to open). The high pressure gauge on regulator “E” will show the pressure of the service bank of cylinders.

5. Adjust the delivery pressure of the regulator “E” about 20 psig higher than the reserve bank. The selection of the regulator set pressure may vary due to application requirements.

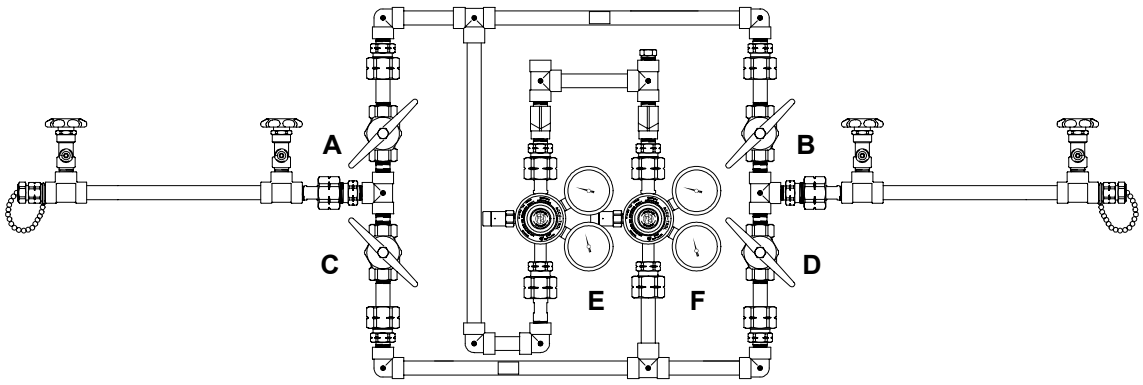
6. If a pressure switch has been installed in the system, the switch setting should be set between the two regulator settings.

7. Simulate a depleted bank by closing the service bank cylinder valves and creating a flow of gas through the manifold. The pressure reading on the gauges will drop and the reserve bank will start to feed. Any alarms connected to the system should signal that changeover has occurred.

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

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

Note: In the following explanation, regulator settings were chosen for purpose of example. It is understood that once installed, the manifold regulators will have to be set to deliver pressure for the specific application. These actual setting may be either higher or lower than those listed in the example below.



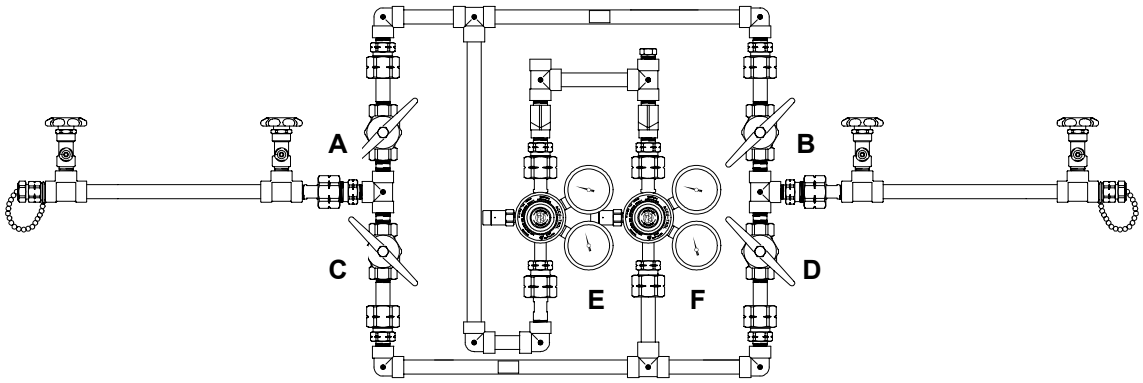
Example: Preset regulator “E” to deliver 100 psig
Preset regulator “F” to deliver 75 psig
Open master valves “A” & “D” (left service)
Open master valves “B” & “C” (right reserve)

Figure 14

MANIFOLD OPERATION

The AD series manifold is designed to changeover from one bank to another automatically, provided a sufficient differential is maintained between the two primary regulators.

Note: In the following explanation regulator settings were chosen for purpose of example. It is understood that once installed the manifold regulators will have to be set to deliver pressure for the specific application. These actual setting may be either higher or lower than those listed in the example below.



Example: Preset regulator “E” to deliver 100 psig
Preset regulator “F” to deliver 75 psig
Open master valves “A” & “D” (left service)
Open master valves “B” & “C” (right reserve)

The pressure from the right bank will be directed through regulator “F” which is set at 75 psig. The left bank pressure is routed through regulator “E” which is set at 100 psig. Since regulator “E” has a 25 psig advantage, the left bank becomes the “service” side. The left bank (service side) will preferentially flow until the cylinder pressure can no longer support the regulator setting of 100 psig and begins to fall. The delivery pressure will continue to fall until it reaches roughly 75 psig, at which point regulator “F” will open and begin to flow. Gas is now being withdrawn from the right bank (reserve side).

After changeover has occurred one needs only close master valves “A” & “D” and open valves “B” & “C”. The right bank is now routed through regulator “E” (100 psig) and becomes the new service side.

After exhausted cylinders on the right bank are replaced and cylinder/header valves opened, the replenished right bank becomes the new “reserve” side and a new cycle repeats.

After the second changeover cycle has occurred one may repeat the same sequence outlined above remembering to carefully open and close the correct alternating valves in order to place the proper bank in service.

To ensure proper operation, observe the following guidelines:

1. Carefully follow all instructions

2. Establish proper flow direction of check valves.

3. Be sure cylinder valves are fully opened.

4. 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 11. (START UP AND CHECKING PROCEDURES).

GENERAL MAINTENANCE

1. Main Section
   a) Daily - record delivery pressure.
   b) Monthly
      1) Check regulators and valves for external leakage.
      2) Check valves for closure ability.
   c) Annually - check relief valve pressures.
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

SYMPTOM		
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 service regulator setting.	Increase the pressure differential between the primary regulator and the pressure switch.
SYSTEM DOES NOT FLOW		
Manifold does not flow and delivery gauges drop down to 0.	Regulators set a 0 psig.	Reset the regulator following instructions on page 11. (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.
Gas leakage around regulator body or bonnet.	Loose bonnet	Tighten bonnet
	Diaphragm leak on regulator.	Replace diaphragm.
System feeds from both banks.	Service and reserve regulators set too close.	Adjust settings to proved a higher differential.

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) and Argon (Ar) 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 (H_2) service
PFS-92CV-24R ..... CGA 580 for Helium (He) service

REGULATORS AND REGULATOR REPAIR KITS

RM-1-1 ..... Primary Regulator for Acetylene
RM-2-4 ..... Primary Regulator for Compressed Air (R.H.)
RM-4-4 ..... Primary Regulator for CO2
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 (L. H.)
RM-8-4 ..... Primary Regulator for N2O
RDM-9-4 ..... Primary Regulator for Oxygen
RM-10-2 ..... Primary Regulator for LPG Fuel Gas
RDM-11-4 ..... Primary Regulator for Medical Breathing Mixture
RWC-3-49 ..... Replacement Cartridge for RM-2-4, RM-7-4, RM-4-4, RM-8-4 RM-6-4 & RM-7A-4
RWC-3-59 ..... Replacement Cartridge for RM-1-1 & RM-10-2
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
RS-300-MAN ..... Regulator for ADHP (Air, CO2, Argon, Nitrogen, Helium, Nitrous Oxide)
SG-450-MAN ..... Regulator for ADHP (Oxygen)

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
WMV-2-19 ..... CGA 350 Header Valve
WMV-2-30 ..... CGA 510 Header Valve
WMV-2-31 ..... CGA 300 Header Valve
WMV-2-32 ..... CGA 590 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 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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