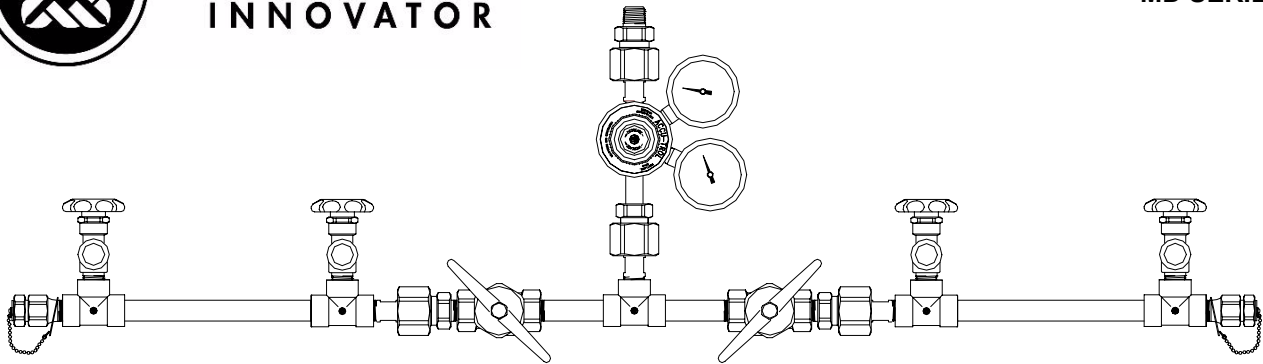




WESTERN
INNOVATOR

Installation and Operating Instructions For
MANUAL MANIFOLDS
MD 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 two headers, to provide an increased supply of gas for the specific gas application. The manifold is designed and 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 regulator, flexible pigtails with check valves, wall-mounted 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 when 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 causing physical injury and/or damage or break off the cylinder valve which may propel the cylinder with great force.
- Oxygen manifolds 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 and 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.

TABLE OF CONTENTS

GENERAL INSTRUCTIONS	3
MANIFOLD ASSEMBLY	4
MANIFOLD INSTALLATION.....	4
PLUMBING	5
FUEL GAS MANIFOLDS-FLASH ARRESTORS.....	6
GENERAL	6
OPERATION	6
INSTALLATION.....	6
TEST	6
MAINTENANCE	7
INSTALLING PIGTAILS AND ATTACHING CYLINDERS	7
START UP AND CHECKING PROCEDURES.....	7
MANIFOLD OPERATION	8
CYLINDER REPLACEMENT & HANDLING	9
GENERAL MAINTENANCE	9
TROUBLE-SHOOTING	10
MANIFOLD MAINTENANCE & REPAIR PARTS	11
REPLACEMENT PIGTAILS	11
REGULATOR GAUGES	11
REGULATORS AND REGULATOR REPAIR KITS	11
VALVES AND VALVE REPAIR KITS	11
WARRANTY	12

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 an oxygen system.

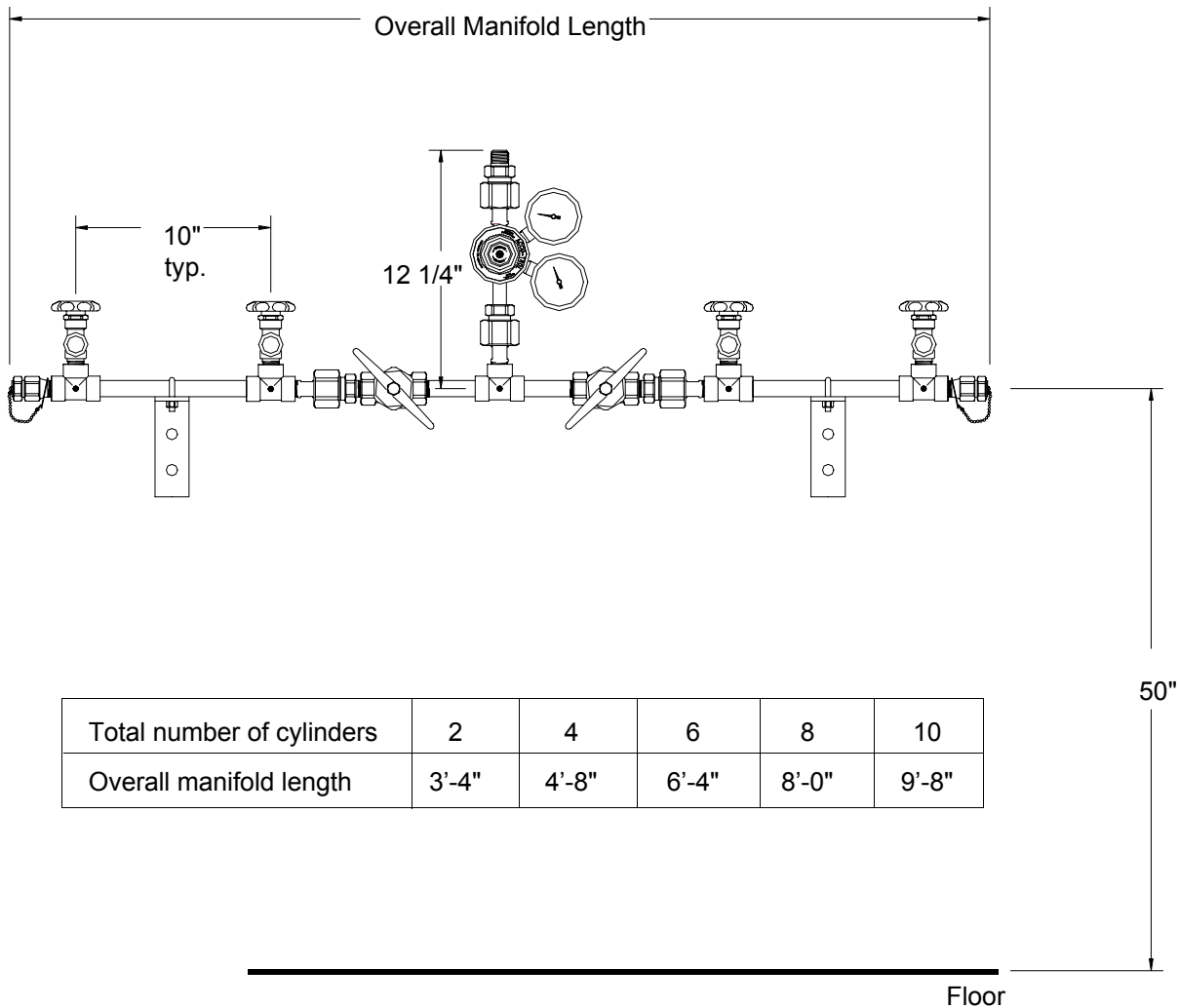


FIGURE 1

MANIFOLD ASSEMBLY

1. Assemble the regulator to the control section (Figure 2).
2. Assemble the headers to the control section inlets as shown in Figure 2.

NOTE:

- For long headers it may be easier to mount the headers before assembling to the control section.

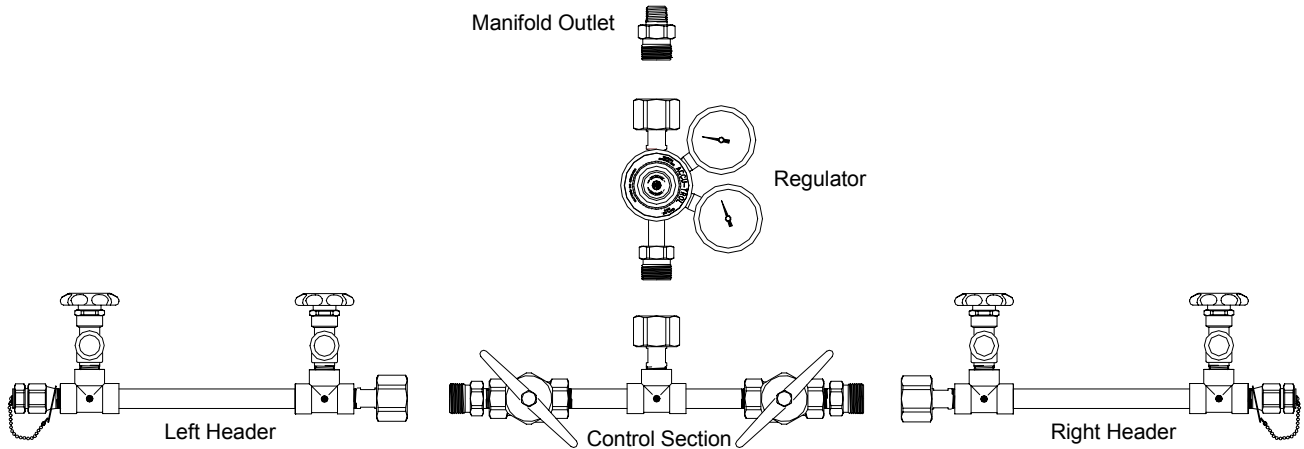


FIGURE 2

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 25" to the left and 25" 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 a distance of 17" to the right and left of the center line. Mark the mounting holes and install brackets using fasteners suitable for the type of wall construction. (Figure 4)

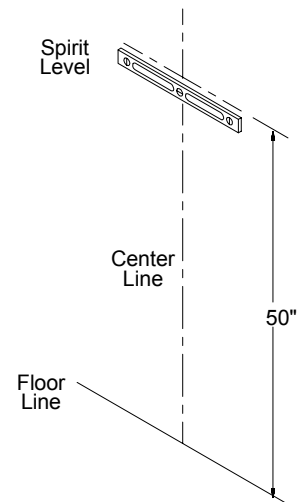


FIGURE 3

NOTE:

- Actual distance may vary, depending on configuration and the number of cylinders.

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

7. 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. Brackets should be equally spaced to provide the most support and stability.
8. Mark the mounting hole and install fasteners suitable for type of wall construction. (Figure 4)
9. Fit the U-bolt over the header piping and tighten the two mounting nuts.

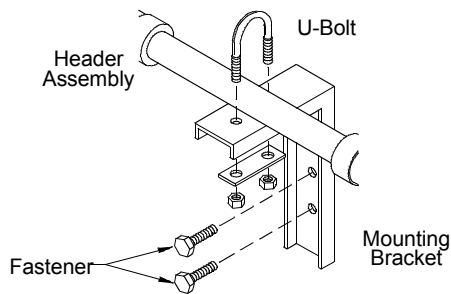


FIGURE 4

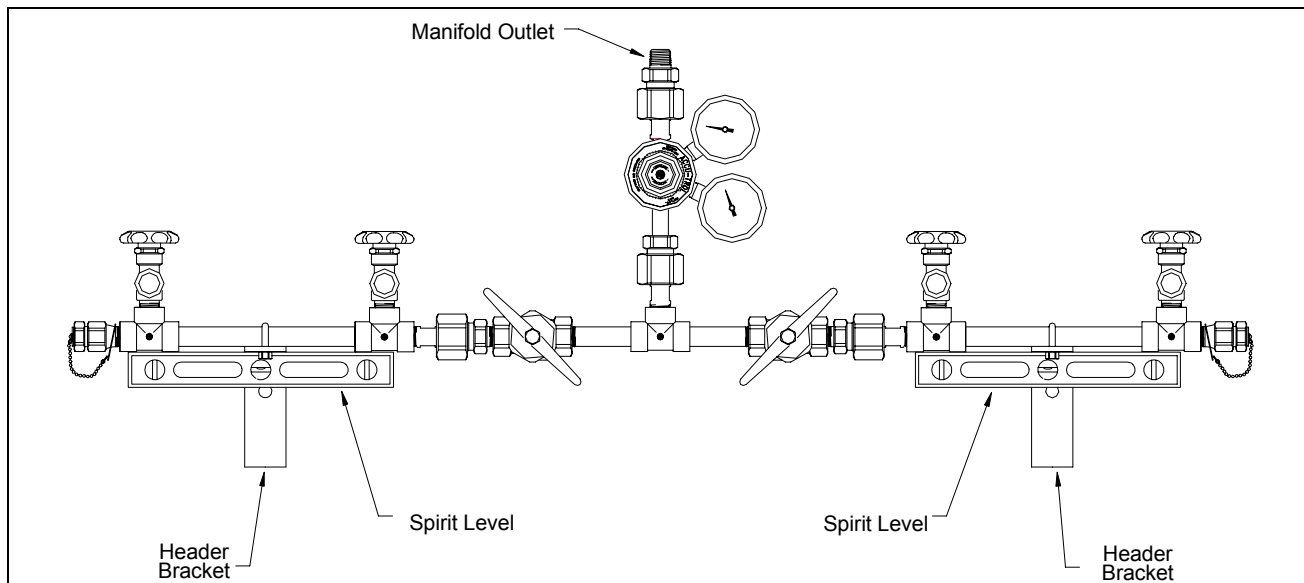


FIGURE 5

PLUMBING

1. A 1/2" NPT male union is supplied with the control and is located at the upper most part of the manifold control. Connect this union to the pipeline system. Sweat joints must be silver soldered. Use BAg series silver solder (DO NOT USE SOFT SOLDER). Heat the entire joint evenly. Apply enough heat favoring heavy sections, so that solder flows freely around the joint leaving no pin holes. The piping shall be purged during the brazing process. (Purging will prevent scale from forming on the inside of the piping during the brazing process). The union provided permits removal of the manifold control for service. (Figure 6)

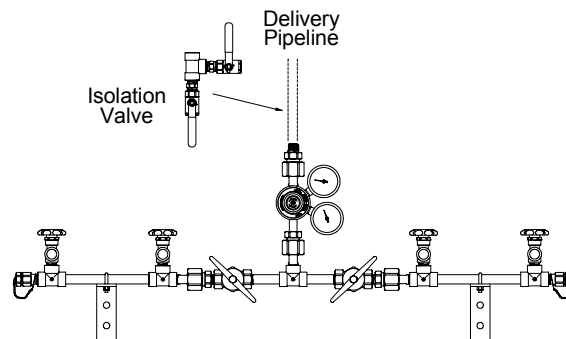


FIGURE 6

CAUTION:

- Brazed piping shall be properly cleaned for the intended gas service. Unclean piping may react and ignite when in contact with some gases - particularly oxygen and nitrous oxide.

2. The piping for oxygen systems should be cleaned for oxygen service prior to connecting oxygen cylinders.
3. If the manifold is installed in a closed area, vent piping should be attached to relief valves.
4. Installation of a shut-off valve to isolate the pipeline during service to the manifold is recommended. (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 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 out and away 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.

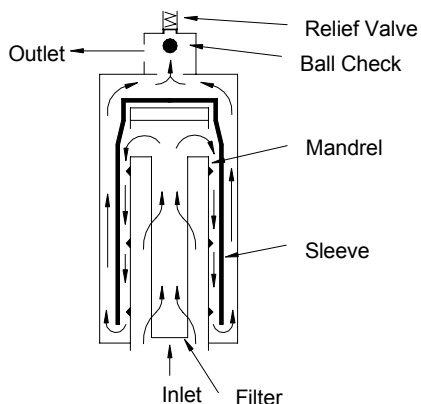


FIGURE 7

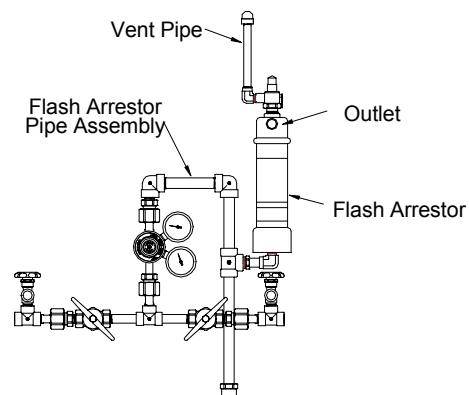


FIGURE 8

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 15).
3. The vent piping must be galvanized and have galvanized fittings. It must be at least 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 openings in the building, and as far as possible from sources of ignition such as flues or chimneys. Its end must 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 standards for the installation and operation of oxygen/fuel gas systems for welding and cutting.)

TEST FOR LEAKS

1. Connect a torch to the service outlet of the flash arrestor.
2. Close the torch valves.
3. Be sure there is normal operating 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 Westerns 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 any other 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.

INSTALLING PIGTAILS AND ATTACHING CYLINDERS

1. Establish the flow direction of the check valves in the pigtails.
2. Connect the pigtails to the header valves with the flow direction of the check valve from the cylinder to the header end of the pigtails.

NOTE:

- If pigtails are installed backwards, gas will not flow from the cylinders.
- Oxygen and medical mixture (CGA 280) manifolds do not incorporate header valves. Manifolds without header valves are constructed using check valve outlet bushings.

3. Check the master valves to be certain they are closed.
4. Attach full cylinders to the pigtail connections as explained in "Cylinder Replacement & Handling" on page 10.
5. Open header valves (turn counter-clockwise to open).
6. S-L-O-W-L-Y open all cylinders 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.)
7. Back out the regulator adjusting knob. This will prevent the downstream system from being over-pressurized when opening cylinders.
8. S-L-O-W-L-Y open the master valve on the bank that is to be in service. (turn counter-clockwise to open).
9. Adjust the regulator to deliver the desired line pressure.

START UP AND CHECKING PROCEDURES

The MD 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 pressure of the bank of cylinders. (Figure 9)
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. Simulate a depleted bank by closing the right 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.
4. S-L-O-W-L-Y open the master valve (turn counter-clockwise to open) on the service bank.
5. The manifold is now ready to supply your system.

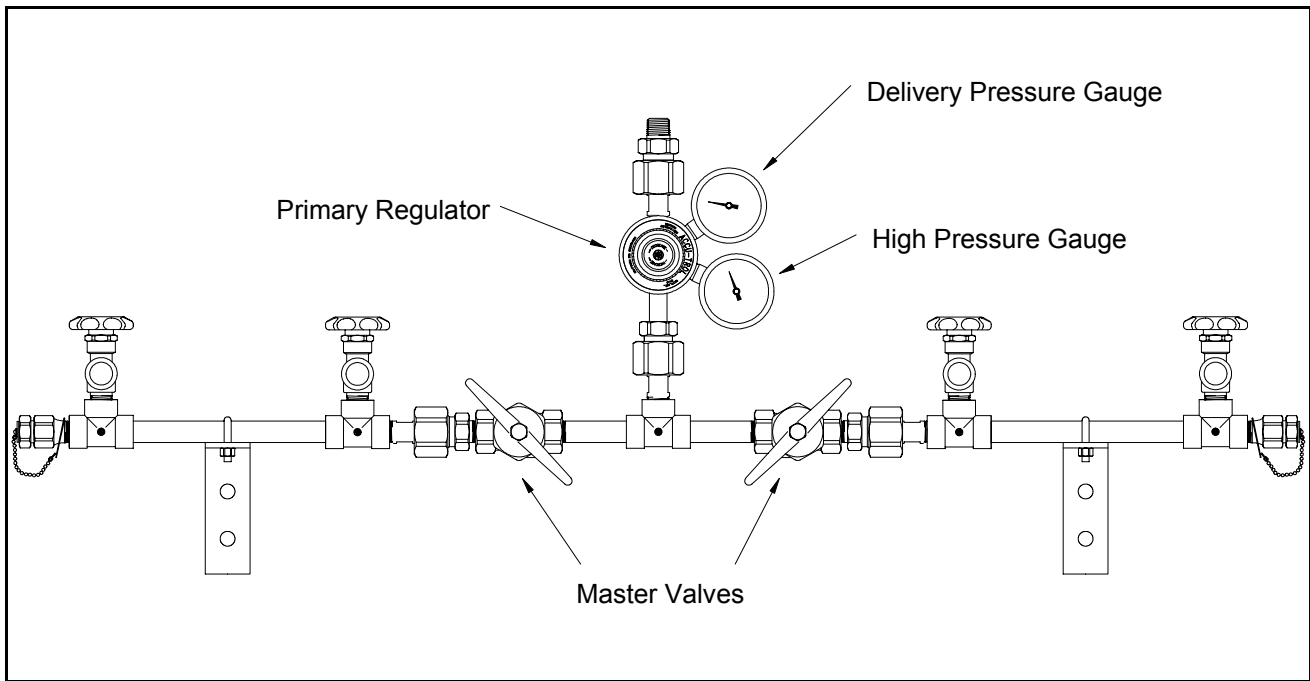


FIGURE 9

MANIFOLD OPERATION

The manifold control includes the following components and features: regulator, flexible stainless steel braided pigtailed 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 header into the master shut off valve. The gas flows through the open valve to the regulator and then through the line regulator (if installed). Final delivery pressure is controlled by either the line regulator or by the manifold 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. Just before the supply bank goes empty the master valve on the reserve bank should be S-L-O-W-L-Y opened. This will ensure that the delivery of gas to the application is not interrupted.

Prior to replacing empty cylinders, close the master valve. This will hold your fresh cylinders in reserve until they are needed.

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.
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 the bank with the 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. 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 is being held in reserve. This bank may be put in service by S-L-O-W-L-Y opening the master valve by following instructions on page 7 (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.
 - 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 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 less of line pressure and system has not depleted.	The pressure setting of the pressure switch is too close to the regulator setting.	Increase the pressure differential between the regulator and the pressure switch.
SYSTEM DOES NOT FLOW		
Manifold does not flow and delivery gauges drop to 0.	Master valves closed.	Open master valves.
	Pigtails installed backwards.	Reverse direction of pigtails.
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 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 ₂ O) 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

REGULATOR GAUGES — 2 " Diameter, 1/4" NPT Bottom mount

G-25-200W	200 psi	G-25-30RLW	15 psi
G-25-4000W	4000 psi	G-25-600W	600 psi

REGULATORS AND REGULATOR REPAIR KITS

RM-1-1	Regulator for acetylene
RM-2-4	Regulator for air
RM-4-4	Regulator for CO ₂
RM-7-4	Regulator for all inert gases (Nitrogen, Helium, and argon)
RM-7A-4	Regulator for O/P Nitrogen
RM-8-4	Regulator for N ₂ O
RDM-9-4	Regulator for oxygen
RM-10-2	Regulator for air
RDM-11-4	Regulator for Medical Gas Mixtures
RS-300-MAN	Regulator for MDHP (Air, Argon, CO ₂ , Helium, Nitrogen and N ₂ O)
RWC-3-59	Regulator replacement cartridge for RM-1-1 and RM-10-2
RWC-3-49	Regulator replacement cartridge for RM-2-4, RM-4-4, RM-7-4, RM-8-4 and RM-7A-4
RWD-2-19	1st stage regulator replacement cartridge for RDM-9-4 and RDM-11-4
RWD-2-36	2nd stage regulator replacement cartridge for RDM-9-4 and RDM-11-4
RK-1020	Repair Kit for RS-300-MAN

VALVES AND VALVE REPAIR KITS

WMS-1-53	CGA 540 Check Valve Outlet	WMV-2-14	CGA 326 Header Valve
WMV-2-16	Master Valve	WMV-2-4	CGA 346 Header Valve
RK-1085	Repair Kit for WMV-2-16 (430B & C)	WMV-2-3	CGA 580 Header Valve
WMV-2-31	CGA 300 Header Valve	WMV-2-7	CGA 320 Header Valve
WMV-2-30	CGA 510 Header Valve	WMV-2-19	CGA 350 Header Valve
WMS-1-64	CGA 280 Check Valve Outlet	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 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.



WESTERN
INNOVATOR

875 Bassett Road
Westlake, Ohio 44145-1142
(800) 783-7890
FAX: (440) 835-8283