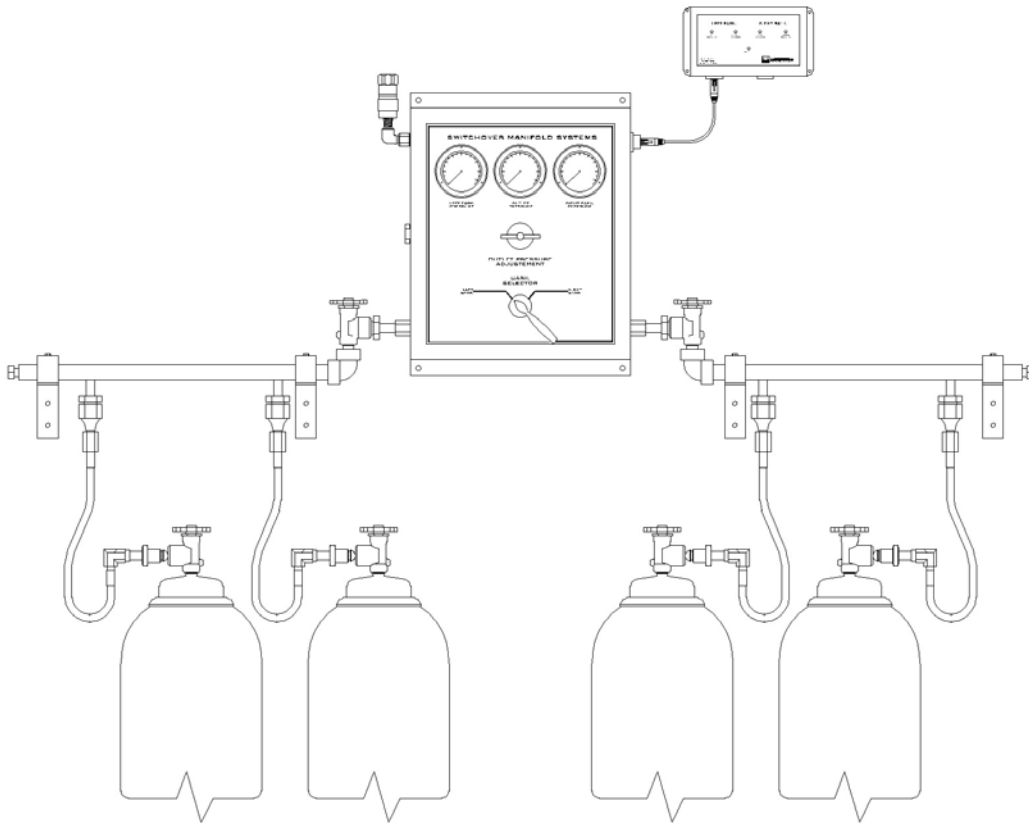




WESTERN
INNOVATOR

Installation and Operating Instructions For AUTOMATIC SWITCHOVER MANIFOLDS FOR 3000 PSIG CYLINDERS (ASM3000 INDUSTRIAL SERIES)

THIS BOOKLET CONTAINS PROPRIETARY INFORMATION OF WESTERN AND IS PROVIDED TO THE PURCHASER SOLELY FOR USE IN CONJUNCTION WITH SWITCHOVER MANIFOLDS (ASM30000 INDUSTRIAL SERIES).



IMPORTANT

These instructions are for experienced operators who know the general principles and safety precautions to be observed in handling compressed gases. If you are not certain you fully understand the safety precautions for handling gases, we urge you to obtain and read the Material Safety Data Sheet (MSDS) for each gas being used.

Do not permit untrained persons to install, operate, or maintain these manifolds. Do not attempt to install or operate these manifolds until you have read and fully understood these instructions. If you do not fully understand these instructions, contact Western.

Be sure this information reaches the operator. Your supplier has extra copies.

1- SAFETY PRECAUTIONS

Protect yourself and others. Read and understand the following instructions before attempting to use this equipment. Failure to understand and follow these instructions could result in serious personal injury and/or damage to equipment. Because of the many potential hazards associated with gases, read the Material Safety Data Sheet for each gas you will be using.

- Know and understand the physical and chemical properties of the gas being used.
- Observe general precautions for the use of gases.
- Observe safety precautions for the gas being used.
- Read and follow precautions on cylinder labels.
- Never use these manifolds with gases not compatible with the materials of construction. The use of gases not compatible with the materials of construction may cause damage to equipment or injury to personnel.
- If flammable gases are used with this equipment do not locate it near open flames or any other source of ignition.
- If toxic or flammable gases are used with this equipment, emergency equipment applicable to the gases in use should be available in operating area.
- Many gases can cause asphyxiation by displacing oxygen in the atmosphere. Make certain the area where these manifolds are operated is well ventilated. Provide a device to warn personnel of oxygen depletion in the work area.
- Do not release toxic or flammable gases in the vicinity of personnel. Use this equipment only in well ventilated areas. Vent gases to the outside atmosphere, and in an area away from personnel. Be sure that venting and disposal methods are in accordance with Federal, State, Provincial and local requirements. Locate and construct vent lines to prevent condensation or gas accumulation. Be sure the vent outlet cannot be obstructed by rain, snow, ice, insects, birds, etc. Do not inter-connect vent lines; if more than one vent is needed, use separate lines.
- Relief devices should be installed and properly vented in all gas handling systems to protect against equipment failure and over-pressurization.
- Never connect this equipment to a supply source having a pressure greater than the maximum rated pressure. Refer to the Product Specifications for maximum inlet pressures.
- Never permit oil, grease, or other combustible materials to come in contact with cylinders, manifolds, 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.
- Flexible hoses should never be kinked, twisted, or bent into a radius smaller than 3 inches. Mistreatment may cause the flexible hoses 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 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.
- Do not use leak test solution that contains ammonia. Solutions containing ammonia may cause brass tubing to crack.
- Always use oxygen compatible leak test solution on oxygen or nitrous oxide service equipment.

2- MANUFACTURER STATEMENT

The information contained in this instruction booklet has been compiled by Western, from what it believes are authoritative sources and is offered solely as a convenience to its customers. While Western believes that this information is accurate and factual as of the date printed, the information including design specifications is subject to change without prior notice.

3- INTRODUCTION

Western manifold systems are cleaned, tested and prepared for indicated gas service and are built following National Fire Protection Association and Compressed Gas Association guidelines. The manifold consists of a control box and two supply bank headers, one service and one reserve supply, to provide an uninterrupted supply of gas for the specific gas application. The control box is designed and built with features providing automatic switchover from the depleted "Service" supply bank to the "Reserve" supply. Pressure gauges, alarm signal connections and lights show system status and alert the need to replace depleted cylinders. Features of the automatic system include an adjustable line regulator, hoses with check valves, rigid wall-mounted headers and complete mounting hardware.

4- DESCRIPTION

All ASM3000 Series automatic switchover manifolds are designed to supply an uninterrupted flow of industrial gases. These systems automatically switch to the reserve bank without an interruption in gas supply. A simple rotation of the primary bank handle redesignates the reserve bank as the new primary source. The old primary bank waits in reserve once the empty cylinders have been replaced.

Optional alarm

The optional remote alarm indicates the pressure status of each cylinder bank (green LED for normal pressure and red LED for low pressure). The red LEDs along with a built-in buzzer indicate when the cylinder bank is depleted and needs to be changed. The silence buzzer kills the buzzer but the red LED remains on.

How to order - part number matrix

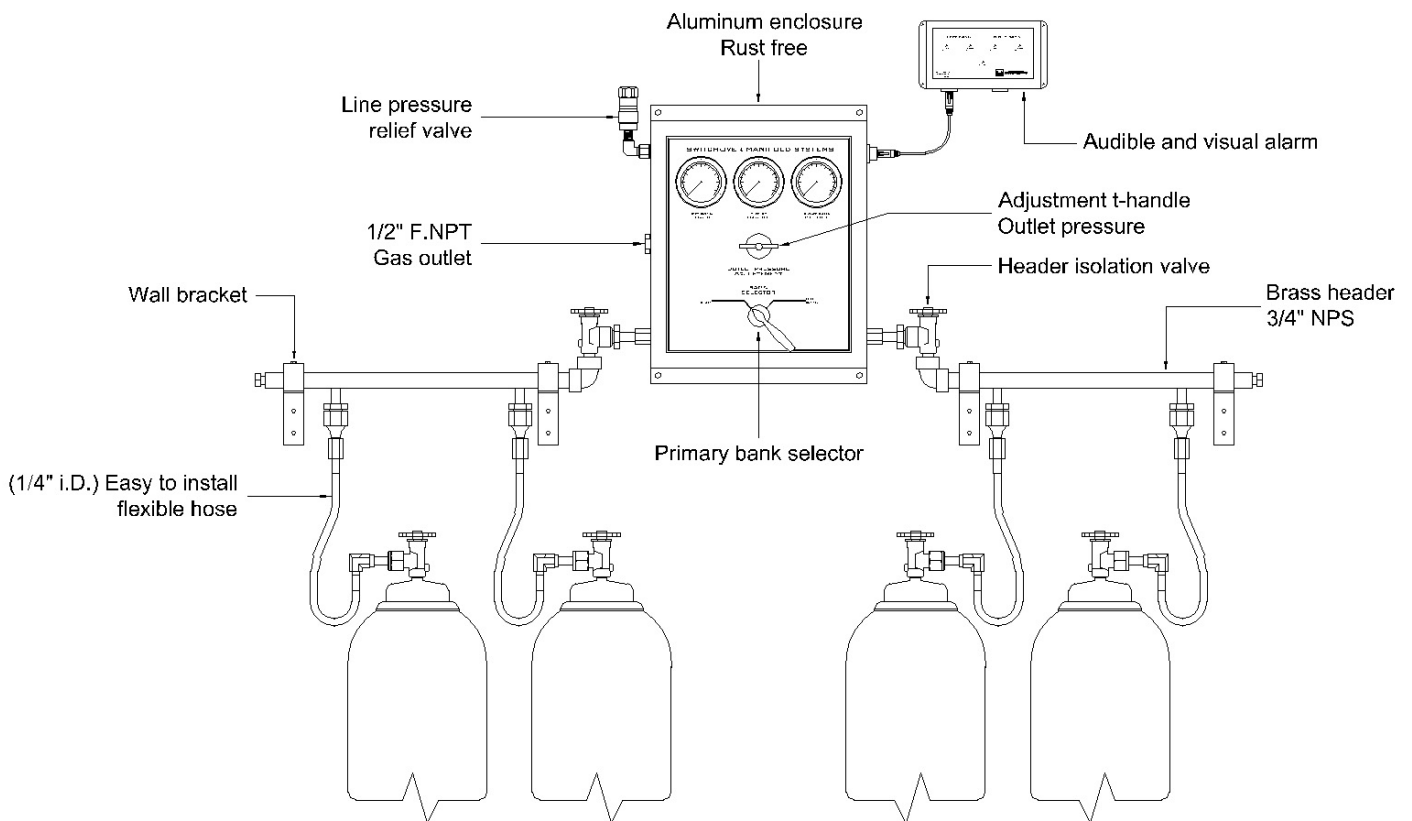
ASM3000	-		-		-		-		-	
Basic series		Fluid		Left bank (no. of cyl.)		Right bank (no. of cyl.)		Alarm		Configuration
		<input checked="" type="checkbox"/> Argon = 3						<input checked="" type="checkbox"/> Standard alarm = RA2		<input checked="" type="checkbox"/> Standard = none
		<input checked="" type="checkbox"/> Carbon dioxide = 4						<input checked="" type="checkbox"/> Wireless alarm = Rf2		<input checked="" type="checkbox"/> "L" shaped = L
		<input checked="" type="checkbox"/> Helium = 5								<input checked="" type="checkbox"/> "U" shaped = U
		<input checked="" type="checkbox"/> Hydrogen = 6						<i>Explosion proof pressure switch</i>		<input checked="" type="checkbox"/> Long = E
		<input checked="" type="checkbox"/> Nitrogen = 7						<i>Not explosion proof alarm box</i>		<input checked="" type="checkbox"/> Short = S
		<input checked="" type="checkbox"/> Oxygen = 9						<input checked="" type="checkbox"/> Standard alarm = RA2 (EP)		<input checked="" type="checkbox"/> Crossover = C
								<input checked="" type="checkbox"/> Wireless alarm = RF2 (EP)		
								Leave blank if none		

5- GENERAL INSTRUCTIONS

Manifolds should be installed in accordance with guidelines stated by the National Fire Protection Association, the Compressed Gas Association, OSHA, 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 -20°F (-29°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. The manifold should be located in a clean, well ventilated area which is free of oil and combustible materials.

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.

All safety relief valves shall be piped/vented outside.



6- SPECIFICATIONS

Description

Service fluids	Refer to part number matrix
Maximum inlet pressure	3000 psig
Maximum outlet pressure	150 psig
Flow	Cv = 0.75
Operating temperature	-40° F to 100° F
Pressure gauge size	2½" - dial
Pressure relief valve	175 psig
Inlet connection	Gas related CGA fittings
Outlet connection	½" F.NPT
Audible and visual alarm	Optional
Header diameter	¾" NPS

7- FLEXIBLE HOSE LENGTH

When connected to:	Hose length
Cylinders	30 inches
Clusters (bulk packs)	72 inches

8- MATERIALS OF CONSTRUCTION

Parts

Enclosure	Alumunium
Headers	Brass CDA 360 ASTM B16
Tubing	Stainless steel TP304 – copper ASTM B280/B819
Fittings	Brass ASTM B16/B453 – stainless steel 316
Flexible hoses (<i>selection according to service gas</i>)	
Nylon hose (Thermoplastic)	Innecore : Nylon – fitting : steel – Specification SAE J517 100R8
Teflon hose	Innecore : Virgin PTFE smooth bore tubing – overbraid : stainless steel – fitting brass
All stainless steel hose	Innecore : 321 stainless steel – overbraid : 304 stainless steel – fitting : 316L staineless steel
Header valves	Body : brass UNS 37700 – bonnet : brass UNS 36000 – lower plug : Teflon/brass 48500 - lower plug seat : Zytel 101 – “O” – ring : nitrite – Packing : virgin Teflon
Crossover valve	Body, trunnion, stem, stem brushing, seat retainer: stainless steel – stem packing, seat washer: viton – seats thrust washer: Nylatron – bearing : Nylon / TFE – wave washer – ball detent : SS 302
Relief valve	Body, seat retainer: brass ASTM B16 – adjusting screw, springs : stainless steel 316 – Disc : PTFE
Regulators	Body: forged brass – diaphragm : stainless steel – housing cap: forged brass – inlet filter : bronze
Pressure switches	Piston : stainless steel – “O”-ring : Buna-N – connection : brass

9- FACTORY STANDARD SETTING

Inlet gauges	0-4000 psig
Outlet gauges	0-200 psig
Outlet pressure relief valve	175 psig
Switchover set point	200 psig
Alarm set point	205-210 psig decreasing
Outlet pressure range	5-150 psig

10- STANDARD CONFIGURATIONS

Hydrogen & helium flexible hoses

Helium and hydrogen are very small molecules that permeate through Teflon and Nylon. All Western gas cylinder stationary discharging stations are mounted with stainless steel hoses on helium and hydrogen service.

Aluminium cabinet

Our equipment is mounted in an aluminium cabinet with a lexan sticker:

- Hides and protects pressure switches, tubing and alarm wires;
- No more rust or paint chipping;
- Easy wall and stand mounting.

Name tag

Each equipment bears a nametag telling you important information about:

- Gas service
- Alarm setpoints
- Pressure settings
- Year of manufacture
- Model number
- Switchover setpoint

Flexible Hoses

Flexible hose selection is critical to get the best from your manifold. We offer three types:

- Thermoplastics
- Teflon
- Stainless Steel

For additional safety, stainless steel hoses are available with:

- Armor guard

As standard features, each hose has:

- A check valve in the CGA nipple (except 680)
- An elbow to avoid kinking of the hose (installed when necessary)
- An adaptor to the outlet to ease connection to the manifold

Finally, we offer three cylinder hose connections (all CGA / gas related)

- Standard CGA nut & nipple
- Quick connects (zip nuts)
- Hand tight nuts

11- OXYGEN SERVICE EQUIPMENT

All oxygen service equipment made by Western is cleaned as per the requirements of CGA G-4.1-1996. The flexible hoses installed on oxygen service discharging stations are teflon innercore, stainless steel overbraid with brass end connections.

CAUTION:
Remove all protective caps prior to assembly. The protective cap may ignite due to heat of recompression in an oxygen system.

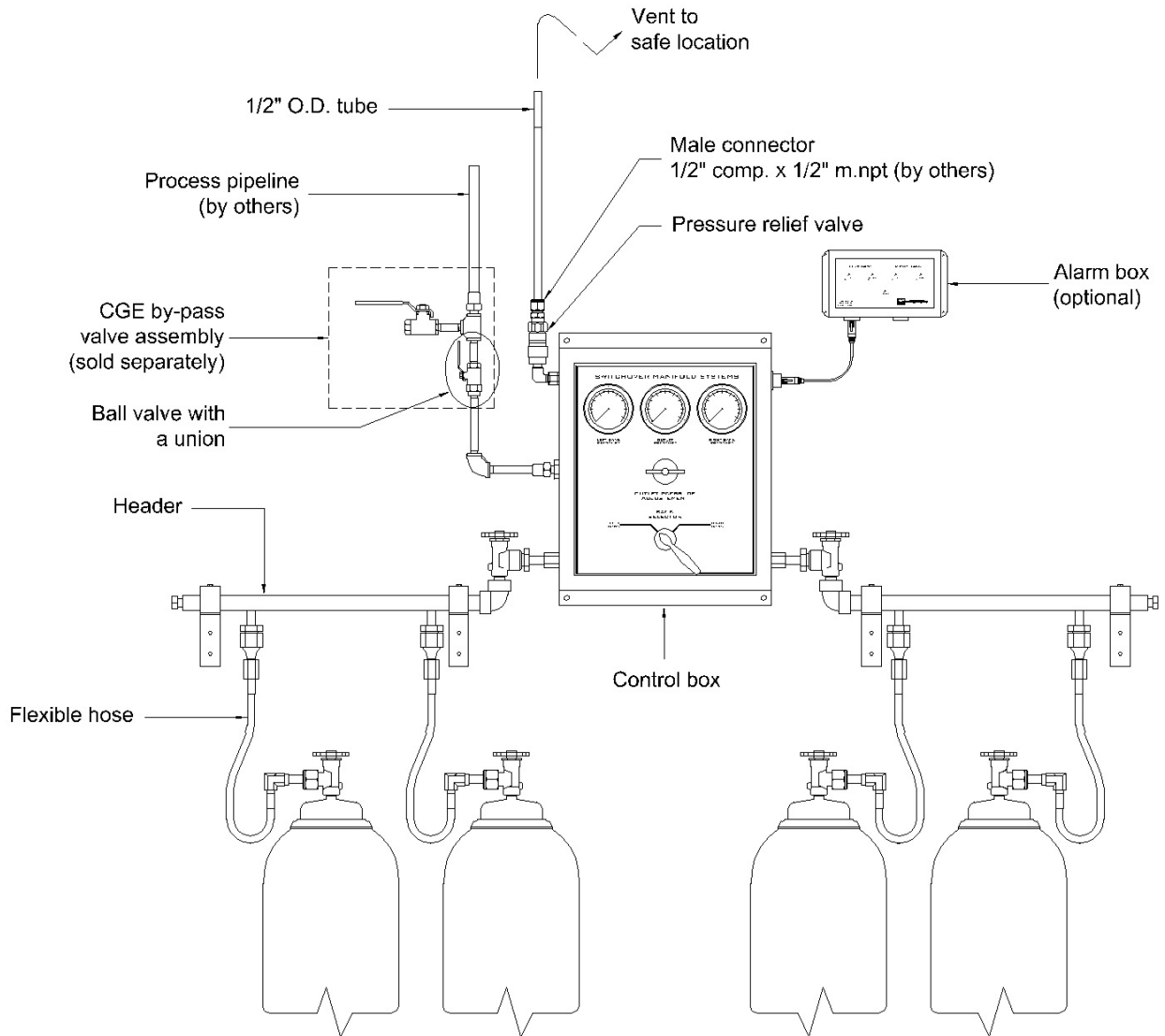
12- PLUMBING

1. The manifold outlet port is ½" F.NPT and is located on the left side of the manifold control box. Hereunder are our recommendations for the isolation valve to be installed at the outlet of the control box:
 - a. Good: Install a ball valve or even better a single union end ball valve.
 - b. Better: Install a by-pass valve assembly. The second valve would allow you to tie in to the pipeline either for gas sampling, pressure test or temporary back-up supply during service of the ASM3000.
2. Copper sweat joints must be silver soldered. Use bag series specification 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. (See National Fire Protection Association Pamphlet Number 99).

CAUTION:
Brazed piping shall be properly cleaned prior to pressurizing. Unclean piping may react and ignite when in contact with some gases – particularly oxygen and nitrous oxide.

3. If the manifold is installed in an enclosed area, vent piping must be attached to the control box relief valves located at the top right of the control box. The vent connection is ½" NPT female.

4. Other type of piping could be considered. Material compatibility, flow and pressure must be taken into account while designing the piping system.



13- INSTALLATION

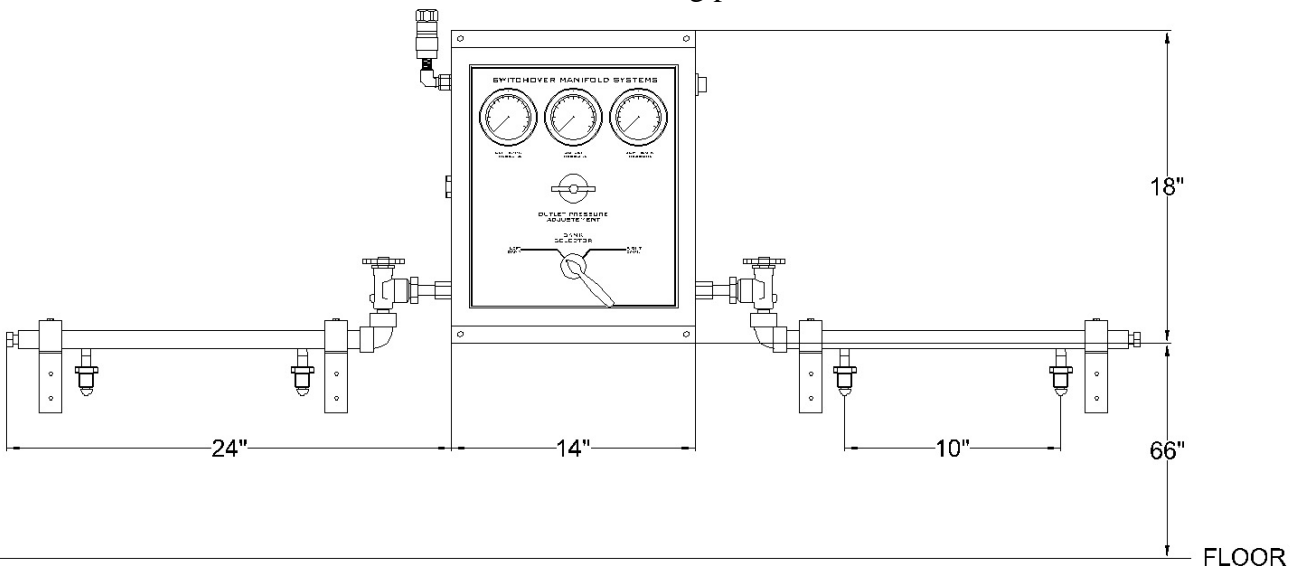
The ASM3000 Series Manifolds can be used either with two cylinders by connecting the inlet flexible hoses directly to each of the cylinders or with several cylinders by connecting the flexibles hoses to the ends of two single-row manifolds as shown in figures 1 and 2.

*** NOTE:**

The ASM3000 Series is factory preset to changeover at approximately 200 psig (switchover pressure may differ depending on your specific equipment – consult product data sheet provided with your equipment). Contact your Western distributor if higher factory settings are required.

1. Securely mount the control box to a wall or stand. The control box should be located such that the primary bank selector handle is at eye level with the operator (approximately 70 inches.).
2. Connect the process line (downstream piping) to the ½ in. NPT outlet port of the manifold control box. Use Teflon tape on pipe threads to prevent galling.
3. Attach the flexible hoses or headers to the control module by inserting the CGA connector to its corresponding adaptor. The inlet flexible hoses may be carefully bent to align them with the manifold or cylinder valve fittings. Avoid sharp bends that could kink the hoses. For multi-cylinder header installation, mount the headers (leveled) on each side of the control box to a wall or stand prior to connecting them to the control box.
4. Provide a means of securely supporting the cylinders connected to the system. The clamping brackets, chains, straps, etc. used must be capable of holding the cylinders in place to prevent them from falling.
5. Close the two inlet isolation valves by turning the hand knobs fully clockwise. Close the line regulator by turning the switchover regulator “T-handle” counter-clockwise on the ASM Series.

After the switchover manifold system is installed and the down-stream piping is connected, the system connections should be leak tested at the maximum working pressure.



Total number of cylinders	4	6	8	10	12
Overall manifold length	62"	82"	102"	122"	142"

CAUTION:

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

Figure 1 – Typical layout of a single-cylinder bank on each side

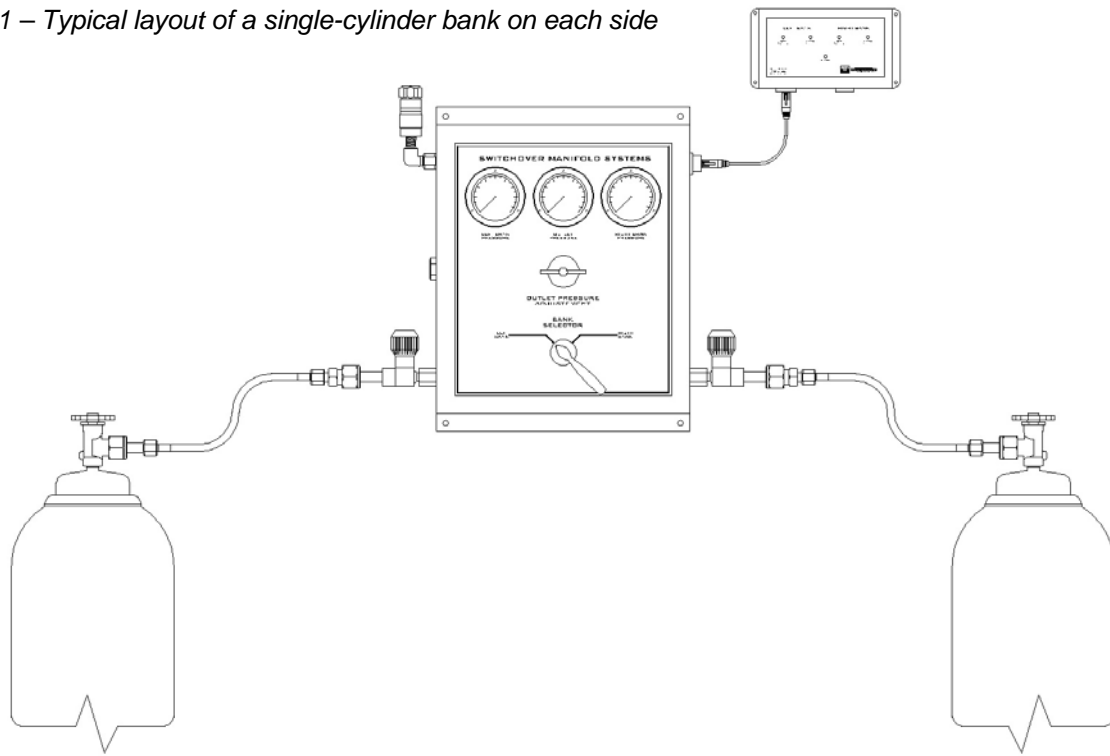
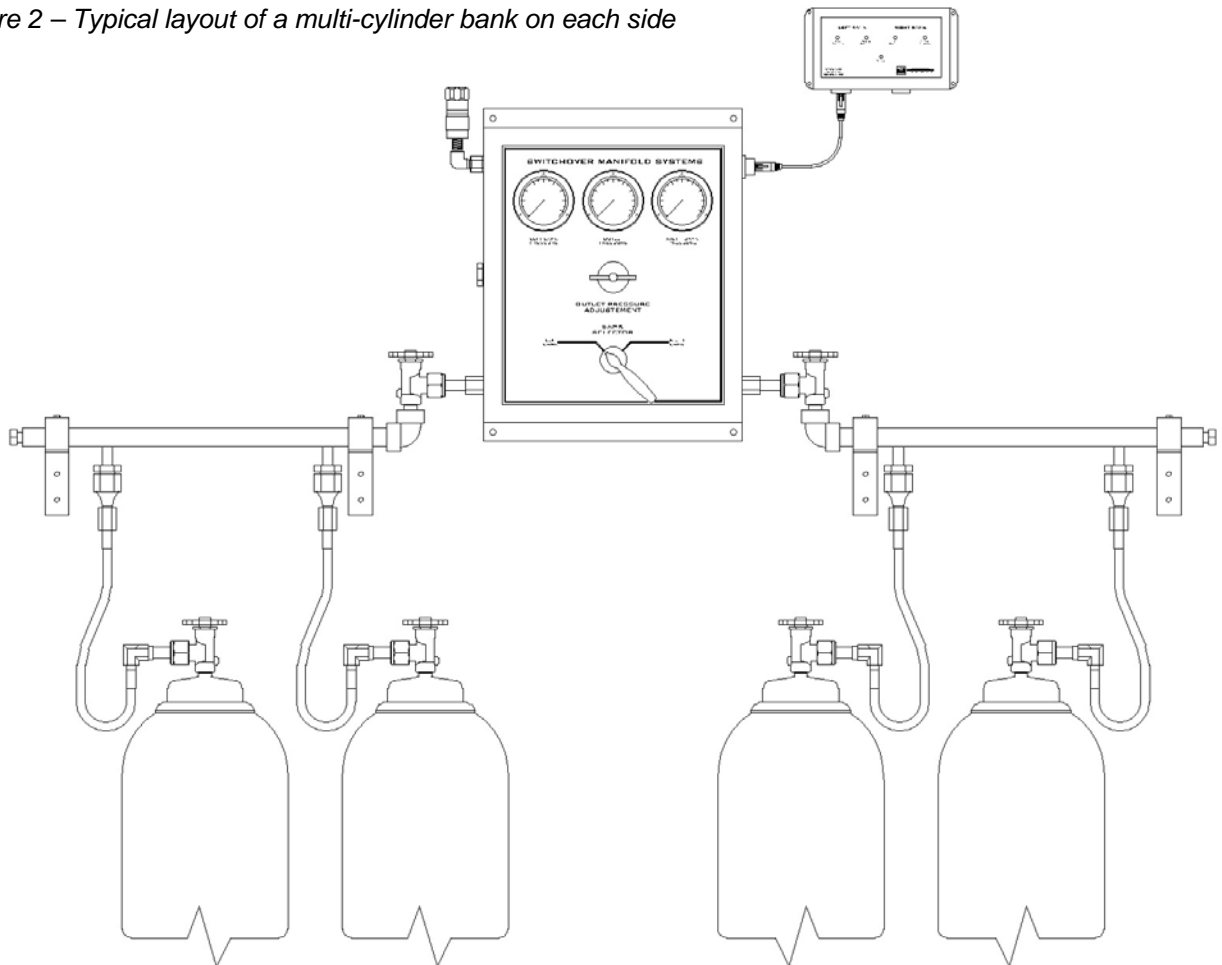
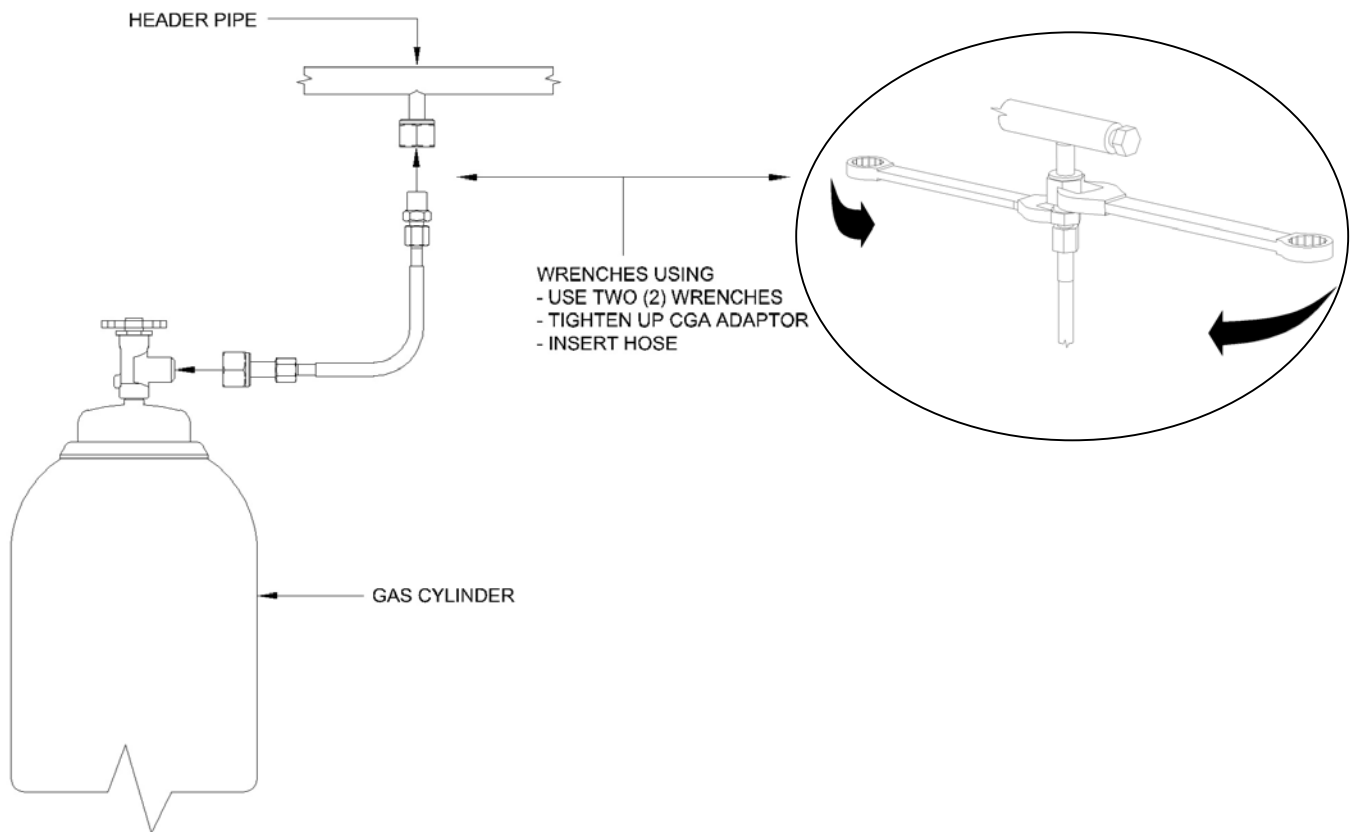


Figure 2 – Typical layout of a multi-cylinder bank on each side



14- INSTALLING FLEXIBLE HOSES AND ATTACHING CYLINDERS

1. Establish the flow direction of the flexible hoses.
2. Connect flexible hoses to header.
3. Check header valves to be certain they are closed.
4. Attach full cylinders to the flexible hoses connections as explained below.
5. Open header valves*(turn counter-clockwise to open).
6. S-L-O-W-L-Y turn all cylinders on fully (turn counter-clockwise to open). Check all cylinder and flexible hoses connections for leaks using an oxygen safe solution. (Any bubbles around connections indicate leakage)



CAUTION:

Care should be exercised when bending flexible hoses to connect them to cylinders.

15- LEAK TESTING AND PURGING

1. Connect cylinders to flexible hoses and connections provided.

CAUTION:

Flexible hoses containing check valves can be pressurized with system pressure only up to the check valve seat. The threaded joints on the flexible hose, including the CGA connection will not be pressurized with the process gas.

2. Use the process gas to leak test and purge the system. If the process gas is hazardous (flammable, toxic and/or corrosive) or sensitive to atmospheric contaminants, use clean dry nitrogen as a purge gas to leak test and purge the manifold system.
3. Isolate downstream side of the switchover control box by closing a downstream process isolation valve.
4. Stand to the side of the switchover control box and slowly open the gas cylinder valves from the left side of the control box. Open the isolation valve located on the left side header and check inlet gauge for pressure into the control box. Repeat the same procedure for the right side of the manifold.
5. On the ASM system, open the line regulator by turning the pressure adjusting T-handle clockwise until the desired pressure is indicated on the outlet gauge.
6. With cylinders connected but with the cylinder valves closed, leak test all connections with either a soap solution or a gas leak detector such as a snoop® r.
7. Purge both right and left sides of the switchover system if the process gas is hazardous or sensitive to atmospheric contaminants. Turn the bank selector handle to the desired primary side. This will allow gas to flow from the left side first.
8. Vent the system to atmospheric pressure. Close both header isolation valves by turning the hand knobs fully clockwise. On the ASM Series, close the line regulator by turning T-handle counterclockwise until it reaches the stop.

16- OPERATION

WARNING:

Never operate a gas handling system under any circumstances if it is leaking or otherwise malfunctioning. DO NOT repair any leaks while system is under pressure. Damage to equipment and /or injury to personnel may result.

1. Close the two header isolation valves by turning the hand knobs fully clockwise. Turn the primary bank selector handle to choose a side to become the primary side. The side chosen will function as the primary side (bank no. 1). On the ASM System, close the line regulator by turning the pressure adjusting T-handle counterclockwise until it reaches the stop.
2. Ensure that any purge or system vents are closed.
3. Isolate downstream side of the control box by closing the downstream process isolation valve.
4. Stand to the side of the regulator and slowly open the cylinder gas from the primary side (bank no.1) of the control box. Open the primary side header isolation valve and check inlet gauge for pressure into the control box. Repeat the same procedure for the reserve side (bank no 2.) of the control box.
5. On the ASM Series, open the line regulator by turning the pressure adjusting knob clockwise until the desired pressure is indicated on the outlet gauge.

6. Open the downstream process isolation valve to allow gas to flow from the switchover control box to the use point.

The system is now in operation with gas being supplied from the primary side (bank no. 1), which is indicated by the primary bank selector. The reserve side (bank no.2) remains closed.

When the gas from the primary bank has been exhausted (200 psig on the ASM systems), the switchover manifold will automatically switch to the reserve bank.

7. Once a switchover has occurred, the primary bank selector handle on the control module should be turned to the other bank side to put it into primary service. This also resets the switchover control module with bank no. 2 becoming the primary bank. A fluctuation in outlet pressure should occur at this point at the final line regulator.

17- CHECKING PROCEDURES

1. Turn the primary bank selector to the right until you hear “click” and the handle sits easily. S-L-O-W-L-Y open the right header valve (turn counter-clockwise to open). S-L-O-W-L-Y OPEN ONE CYLINDER VALVE ON THE RIGHT BANK. The right bank pressure gauge should show the full pressure of the right bank cylinder. The green LED “Normal Pressure” light comes on, extinguishing the red “Low Pressure” LED.
2. S-L-O-W-L-Y open the left header valve fully. S-L-O-W-L-Y open one cylinder valve on the left bank. The left bank pressure gauge will show the full pressure of the left bank cylinder.
3. Create a slight flow of gas in the delivery pipeline system. Close the right cylinder valve to simulate a depleting right bank. Observe the following:
 - The right bank gauge pressure slowly falls and the control automatically switches over to the left bank.
 - Delivery pressure remains constant.
 - Green “Normal Pressure” LED is extinguished.
 - Red “Low Pressure” LED comes on.
 - Buzzer comes on
 - Any remote alarms should be activated at this time.
4. S-L-O-W-L-Y reopen the right cylinder valve. Observe the following:
 - Right bank pressure gauge returns to full pressure.
 - Green “Normal Pressure” LED comes on
 - Red “Low Pressure” LED is extinguished
 - Buzzer is extinguished
 - Any remote alarms should be canceled.
5. Turn the primary bank selector handle to the left and repeat procedure 3 and 4 to simulate an empty left bank.

18- CYLINDER REPLACEMENT

1. Shut off all cylinder valves and header valves on depleted cylinder bank
2. S-L-O-W-L-Y loosen and remove the flexible hose connections 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 in the cylinder valve.
5. Place and secure full cylinders into position using chains, belts, or cylinder stands
6. Connect flexible hoses to cylinder valves and tighten with a wrench.
7. Open header valves. S-L-O-W-L-Y turn each cylinder valve until each cylinder is fully on.
8. Observe the following conditions:
 - A red "Low Pressure" LED goes out, and the green "Normal Pressure" LED comes on.
9. The manifold supply bank is now replenished. Turn the primary bank selector to the opposite bank to indicate the service bank. This will place the new cylinders in "reserve".

19- LINE PRESSURE ADJUSTMENT

The delivery line pressure (center gauge) can be adjusted by the operator by turning clockwise the T-handle located in the middle of the control box.

20- GENERAL MAINTENANCE

CAUTION:

Do not use leak test solution that contains ammonia.
Solutions containing ammonia may cause brass tubing to crack.

1. Main section
 - a. Daily-record of line pressure
 - b. Monthly
 - 1) Check regulators and valves for external leakage.
 - 2) Check valves for closure ability
 - c. Annually
 - 1) Check relief valve pressures
 - 2) Check regulator seats
2. Manifold header
 - a. Daily-observe nitrous oxide and carbon dioxide systems for cylinder frosting and 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 flexible hoses for cleanliness, flexibility, wear, leakage, and thread damage. Replace damaged flexible hoses immediately.
 - 3) Inspect flexible hoses check valves for closure ability.
 - c. Every 4 years
 - 1) Replace all flexible hoses

21- SHUTDOWN

WARNING:

Hazardous gases must be discharged into a safety vent. Be sure to use a venting procedure that is environmentally acceptable and complies with Federal, State, Provincial and local requirements.

1. Close all cylinder valves.
2. Vent the system pressure to 0 psig. If a hazardous gas is used, purge the entire system with clean dry nitrogen gas. Continue purging until the hazardous gas level in the system is below the TLV for the gas.
3. Close all system valves by turning the knobs fully clockwise.
4. On the ASM Series, close the line regulator by turning the T-handle counterclockwise until it reaches the stop.

22- REPAIRS

If the manifold or any part of the switchover leaks or malfunctions, take it out to service immediately. Repairs should be made by Western who have the special tools, test equipment and trained personnel required to make a safe repair. Tampering with switchover manifolds voids the warranty. Contact Western to arrange for repair.

Repairs to switchover manifolds done after the initial warranty period has expired are chargeable to the customer. Upon receipt at the factory, the switchover manifolds will be inspected and you will be contacted with a repair cost estimate. No item will be repaired until approval is received. There will be an evaluation charge assessed for equipment not repaired. All repairs should be arranged through your Western supplier.

NOTE: All equipment being returned must be purged of all hazardous materials using a clean, dry inert gas (e.g. Dry Nitrogen) prior to return.

23- TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	REMEDY OR CHECK
PRIMARY REGULATOR		
Venting at relief valve.	Overpressure due to creeping or faulty regulation of primary regulator.	Replace or rebuild regulator.
Gas leakage around primary pressure regulator body and bonnets.	Loosen bonnet(s).	Tighten Bonnet(s).
	Diaphragm leak on regulator.	Replace Diaphragm
FOUR WAY-VALVE		
Gas leakage around joint in valve body halves.	Body halves not joined tightly enough.	Tighten screws.
	O-rings worn.	Replace valve.
Gas leakage through body wall.	Porosity holes developed in body.	Replace valve.
Both banks feeding.	Four-way valve seats leaking heavily.	Replace valve.
INTERMEDIATE PRESSURE REGULATOR		
Gas leakage around regulator body/bonnet.	Loose bonnet.	Tighten bonnet.
Required gas flow not available after switchover occurs.	Intermediate regulator not set correctly.	Adjust intermediate regulator per specifications.
Both banks feeding.	Intermediate regulator set at too high a delivery pressure.	Adjust intermediate regulator per specifications.
	Flow demand too high.	Reduce flow demand.
LINE PRESSURE REGULATOR		
Gas leakage around regulator body/bonnet.	Loosen bonnet.	Tighten bonnet.
Pipeline not at desired pressure.	Line regulator not set correctly.	Set delivery per specifications.
Required gas flow not available	Line regulator not set correctly.	Set delivery pressure per specifications.
	Flow demand too high.	Reduce flow demand.

24- REPAIRS

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25- WARNING

Our equipment is primarily intended for use in compressed gas systems. Western products are designed for use by persons technically trained in the proper use and safe handling of gas delivery systems. Due to the high pressure and hazardous gases employed in these processes, misapplication could result in injury or death. WESTERN expressly warns against the sale to, or use of our products by, anyone other than professionally trained personnel. Do not use this equipment where pressures and temperatures can exceed those listed under **Specifications**.

Through misuse, age, or malfunction, components used with inert, combustible, corrosive, toxic, or oxidizing gases can fail in various modes. **The system designer is warned to consider the failure modes of all component parts used with the above mentioned gases and to provide adequate safeguards to prevent personal injury or damage to equipment in the event of such failure modes.** Adequate safeguards can be, but are not limited to:

- Pressure relief devices adequately piped to a safe location;
- Gas detection devices connected to a proper warning audible and visual alarm;
- Automatic shutoff valves and/or manual shutoff valves with an emergency stop push button;
- Self-contained breathing apparatus;
- Pipeline purge system with inert gas;
- Fire extinguishers and/or automatic sprinklers.

System designers must provide a warning to end users in the systems instructional manual if protection against a failure mode cannot be adequately provided.

It should be recognized that warnings are valid for any equipment, regardless of manufacturer, and are not restricted to equipment manufactured by Western. Western's reputation for equipment quality performance is well established. We feel we have the additional obligation to provide information or warnings to customers to assist them in applying our equipment in a reasonable and safe manner.

26- DESIGN CHANGES

In line with our commitment to continuous improvement, Western reserves the right to make design modifications or discontinue manufacture of any equipment without prior notice.

Trademarks used in our instruction manuals are:

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Swagelock is a trademark of Crawford Fitting Company
Hastelloy is a trademark of Union Carbide Corporation
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LIMITED WARRANTY

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