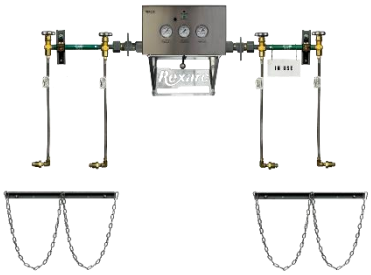
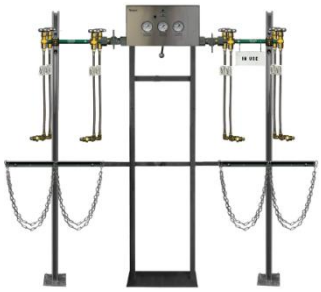
OXYGEN-INERT GAS

AUTOMATIC CHANGEOVER DISCHARGING MANIFOLD SYSTEMS



4-04-0136



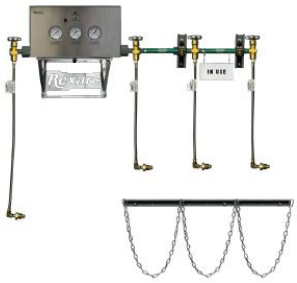
4-04-0136S



4-04-0170



4-04-0169S



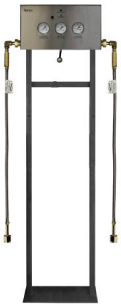
4-04-0151



4-04-0151S



4-04-0147



4-04-0147S

INSTALLATION • START-UP • OPERATING INSTRUCTIONS

4-04-0136 • 4-04-0170 • 4-04-0151 • 4-04-0147

Designed in accordance with NFPA 51 and applicable CGA guidance

⚠ DANGER! ⚠

Failure to install, maintain, or operate this equipment properly may result in FIRE, EXPLOSION, SERIOUS INJURY, OR DEATH

⚠ WARNING! ⚠

Install and service only by qualified, trained personnel.

Gases are available in many types. Some are toxic, oxidizing, corrosive, flammable, and may have other hazardous elements which can cause serious or fatal injury and property damage. Consult your gas supplier for proper handling and safety precautions for the gas being used before operating this manifold.

Valves opened quickly on high-pressure cylinders can rupture or damage equipment and cause personal injury and property damage. Open all cylinder, header, and master valves SLOWLY, ONE AT A TIME.

Ensure these instructions are attached to the manifold and are available to all operating personnel.

Rexarc manifolds used with liquid dewars are designed for gas-phase service only and must **NOT** be connected to the liquid outlet valve. Connecting a manifold to the liquid outlet valve may damage equipment or injure personnel.

Install the Automatic Changeover Manifold indoors only. Do not install it outdoors or under an open shelter. The control box has no NEMA enclosure rating and its electrical components are not protected against water ingress.

Before connecting the inert gas manifold to the plant supply line, the supply line must be thoroughly purged with oil-free air or oil-free nitrogen to remove any foreign material.

Before connecting an oxygen manifold to the plant supply line, the supply line must be cleaned as outlined in CGA Pamphlet G-4.1 (available from Compressed Gas Association, Inc.)

⚠ CAUTION ⚠

Manifold and cylinders, if not located in a separate room, should be protected by location, or otherwise, from contact with moving objects or unauthorized personnel.

All installations should comply with local jurisdictional codes/requirements and National Fire Protection Association 55.

Secure all cylinders to the holding rack with the chain provided before opening any valves.

A readily accessible shut-off valve is required between the manifold and the plant supply line.

Pressurize the piping system as specified in NFPA 55 and check for leaks. When leaks are found, relieve pressure, repair, and retest.

Part Number Series

Rexarc Automatic Changeover Manifolds are furnished in several mounting and header-connection configurations. Locate “Part Number Series” of the system to be installed and reference applicable pages. If you have any questions, please contact customer support at 937.839.4604

4-04-0136 – Wall Mount Manifold

Operating Principle.....pg. 8

Control Box Mounting.....pg.15

Header Mounting.....pg.16

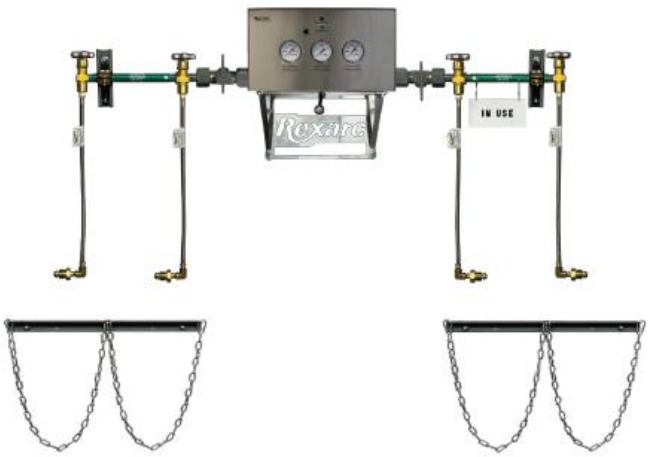
Electrical.....pg.30

Service Piping.....pg.28

Start-Up: Initial/Daily.....pg.32

Shutdown: Cylinder Change.....pg.34

Shutdown: End of Day.....pg.37



4-04-0136S – Floor Mount Manifold

Operating Principle.....pg. 8

Control Box Mounting.....pg.15

Header Mounting.....pg.24

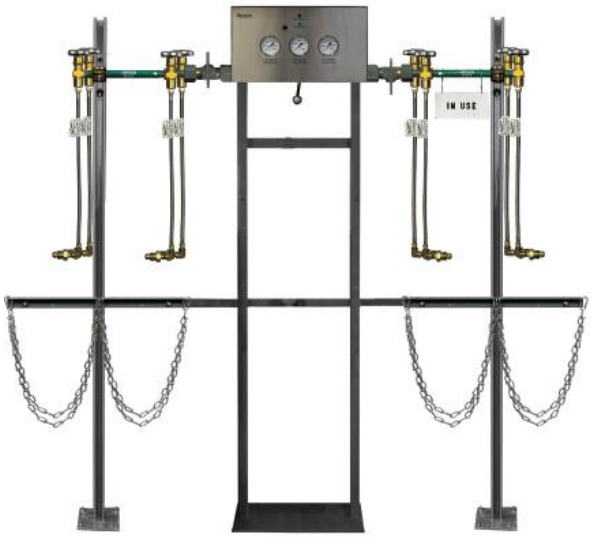
Electrical.....pg.30

Service Piping.....pg.28

Start-Up: Initial/Daily.....pg.32

Shutdown: Cylinder Change.....pg.34

Shutdown: End of Day.....pg.37



4-04-0170 – Wall Mount Manifold

Operating Principle.....pg. 8

Control Box Mounting.....pg.15

Header Mounting.....pg.16

Electrical.....pg.30

Service Piping.....pg.28

Start-Up: Initial/Daily.....pg.32

Shutdown: Cylinder Change.....pg.34

Shutdown: End of Day.....pg.37



4-04-0169S – Floor Mount Manifold

Operating Principle.....pg. 8

Control Box Mounting.....pg.15

Header Mounting.....pg.N/A

Electrical.....pg.30

Service Piping.....pg.28

Start-Up: Initial/Daily.....pg.32

Shutdown: Cylinder Change.....pg.34

Shutdown: End of Day.....pg.37



4-04-0151 – Wall Mount Manifold

Operating Principle.....pg. 8

Control Box Mounting.....pg.15

Header Mounting.....pg.16

Electrical.....pg.30

Service Piping.....pg.28

Start-Up: Initial/Daily.....pg.32

Shutdown: Cylinder Change.....pg.34

Shutdown: End of Day.....pg.37



4-04-0151S – Wall Mount Manifold

Operating Principle.....pg. 8

Control Box Mounting.....pg.15

Header Mounting.....pg.24

Electrical.....pg.30

Service Piping.....pg.28

Start-Up: Initial/Daily.....pg.32

Shutdown: Cylinder Change.....pg.34

Shutdown: End of Day.....pg.37



4-04-0147 – Wall Mount Manifold

Operating Principle.....pg. 8

Control Box Mounting.....pg.15

Header Mounting.....pg.N/A

Electrical.....pg.30

Service Piping.....pg.28

Start-Up: Initial/Daily.....pg.32

Shutdown: Cylinder Change.....pg.34

Shutdown: End of Day.....pg.37



4-04-0147S – Wall Mount Manifold

Operating Principle.....pg. 8

Control Box Mounting.....pg.15

Header Mounting.....pg.N/A

Electrical.....pg.30

Service Piping.....pg.28

Start-Up: Initial/Daily.....pg.32

Shutdown: Cylinder Change.....pg.34

Shutdown: End of Day.....pg.37



Handling

Handling Instructions

Inspect the manifold upon receipt for any damage that may have occurred during shipment. Inspect all components, fittings, piping connections, and fasteners for damage or loose connections.

If the manifold was damaged during shipment:

- Notify carrier immediately and file a claim.
- Consult Rexarc before installing the manifold

Use safe lifting practices when handling the manifold. Select personnel, lifting methods, and lifting equipment appropriate for the weight of the unit and the work environment in accordance with applicable regulations and your company's safety procedures.

Do not lift the manifold by piping, valves, relief valve, or other attached components. These components are not designed to support the weight of the unit and may be damaged.

Storage Instructions

If this unit is to be placed in storage before it is installed, it should be stored indoors and covered with a tarpaulin to keep it clean. The location should be free from corrosive substances and extreme humidity, which can cause damage to the unit.

Do not place any objects on the manifold that could damage any components.

If outside storage is required, the unit must be adequately covered to prevent rain or snow from accumulating on the manifold and accompanying items. The unit must be placed on a paved or elevated surface to keep it out of standing water and mud.

Safety

Personal Protective Equipment (PPE)

Personnel working with or around this manifold shall comply with all applicable company policies and federal, state, and local regulations governing the use of personal protective equipment (PPE). Proper PPE must be worn at all times as required by the task, work environment, and applicable safety procedures. Depending on the application and work environment, appropriate PPE may include eye protection, hand protection, protective footwear, head protection, hearing protection, or other equipment as determined by the employer's hazard assessment and applicable regulations.

General Precautions

- Make certain only authorized personnel service this manifold, and that they have been properly trained in correct operating procedures.
- Consult your gas supplier for proper handling and safety precautions for the specific gas being used before operating this manifold.
- Manifold and cylinders, if not located in a separate room, should be protected by location, or otherwise, from contact with moving objects or unauthorized personnel.
- Secure all cylinders to the holding rack with the chain provided.

Operating Principle

Function

The Rexarc Oxygen / Inert Gas Automatic Changeover Discharging Manifold supplies gas to a plant piping system at a regulated pressure. Gas is drawn from a bank of cylinders or from the gas space of a cryogenic liquid (dewar) system. In every configuration the manifold handles gas only.

The manifold draws from two independent supply sides and transfers between them automatically, so the plant continues to receive gas while an exhausted supply is replaced.

Supply Sides

The manifold has two supply sides, left (L) and right (R). On cylinder-supplied manifolds, cylinders are connected in banks to the left and right headers through flexible pigtails. Header style varies by configuration.

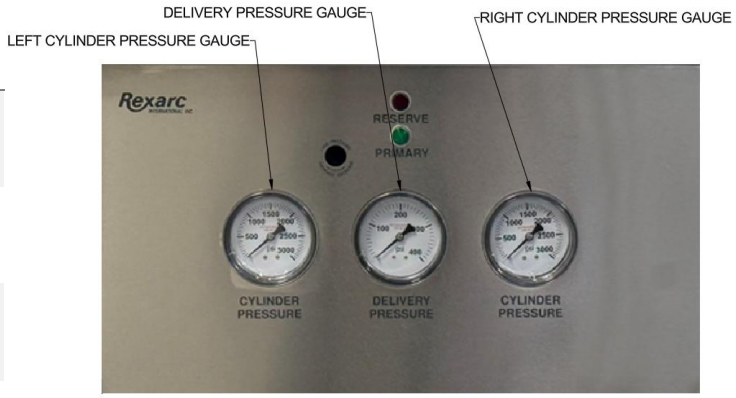
A selector valve inside the control box designates which side is currently supplying gas. The side the selector valve points to is the primary, or in-use, side; the opposite side is the reserve. Because only one side supplies gas at a time, the reserve side can be replaced with full cylinders while the manifold remains online and in service.

The two supply sides do not have to draw from the same type of source. Some configurations are supplied mixed, a cryogenic liquid dewar on one side and high-pressure cylinders on the other. In a mixed configuration each side is equipped for its own source: the cylinder side has a header and master valve, and the dewar side connects directly to the control box.

On a mixed configuration the two sides are not interchangeable. The cryogenic liquid dewar is always the primary side and the high-pressure cylinders are always the reserve.

Three gauges on the control box show the state of the system at a glance:

Gauge	Reads
Left cylinder pressure	Supply pressure on the left side
Delivery pressure	Regulated pressure delivered to the plant piping system
Right cylinder pressure	Supply pressure on the right side



Automatic Changeover – High Pressure Gas Supply (Left & Right)

Changeover is driven by a pressure differential between the two sides.

While the primary side holds above the changeover setpoint, it supplies the plant and the reserve side remains closed. When the primary side falls below the pressure switch setpoint, the reserve side, which is set to a higher pressure, begins supplying gas automatically. Gas flow to the plant is not interrupted, and nothing downstream indicates that a transfer has occurred.

The manifold is now drawing gas from the reserve side while the selector valve still points at the depleted side. In this condition, the red RESERVE light is on. The reserve side does not become the primary side until the selector valve is moved to that side of the manifold.

To return the manifold to normal operation, move the selector valve to the side now supplying gas, then replace the cylinders on the depleted side. That side becomes the primary side, the replenished side becomes the reserve, and the manifold is ready for the next changeover.

Automatic Changeover – Cryogenic Gas Supply (Left) High Pressure Gas Supply (Right)

On a mixed gas pressure configuration the sides do not alternate: the cryogenic liquid dewar remains the primary side and the high-pressure cylinders remain the reserve.

On a mixed gas pressure configuration the sequence is:

- The dewar depletes below the changeover setpoint. The cylinder side begins supplying gas automatically and the red RESERVE light illuminates. The plant continues to be supplied from the cylinders while the dewar is replaced.
- Once the replacement dewar is connected and in service, the dewar is again the primary source and the cylinders are again the reserve.

The changeover setpoint and the set pressure for each side are preset at the factory and are not field-adjustable. No adjustment is required to place the manifold in service, and none should be attempted.

The delivery pressure supplied to the plant piping system is separate from these settings and is adjustable at the control box to suit the requirements of the downstream system.

Indicator-Light Warning System

The control box provides two indications that cylinders require replacement: the indicator lights, which give an immediate visual alert, and the cylinder pressure gauges, which show how much gas remains on each side.

Two lights are located at the top center of the control box face: a red light marked RESERVE above a green light marked PRIMARY. A pressure switch monitors the primary side and drives the lights. The lights are energized only while the control box is powered.

Indication	Meaning
PRIMARY (green) illuminated	The primary side is supplying gas above the pressure-switch setpoint. Normal operation.
RESERVE (red) illuminated	The primary side has fallen below the setpoint. The manifold has transferred to the reserve side and is running on it. Cylinders/dewars require replacement.

NOTE: If both lights are dark, the control box has no power and the warning system is not functioning.



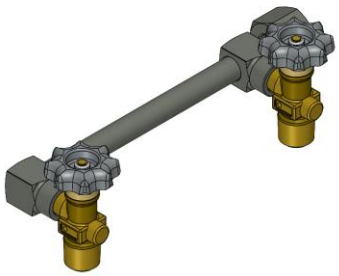
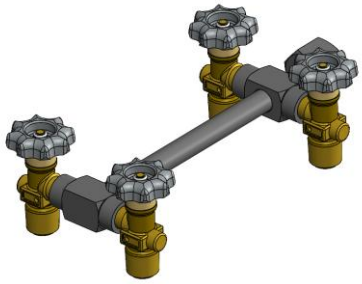
Remote Alert Options

A remote alert allows the manifold's status to be monitored from a location away from the control box. Remote alerts are an optional addition and are not fitted to every Automatic Changeover Manifold. Refer to the Rexarc catalog for options.
Remote alerts are wired to the indicator-light circuit. When the red RESERVE light illuminates at the control box, the remote alert activates at the same time. A remote alert does not monitor the manifold independently — it repeats what the control box lights are already reporting.

NOTICE
Remote alerts share the indicator-light circuit and therefore depend on the same power supply. If the control box loses power, the control box lights and any remote alert are both inoperative. A silent remote alert is not confirmation that the manifold is operating normally.

Header Styles

A header collects gas from the cylinders on one side of the manifold and delivers it to the control box through that side's master valve. Header style is determined by the manifold configuration.

Header style		Used on	Description
Standard single-row header		Wall-mount manifolds	A horizontal header carrying a single row of cylinder connections. Each header valve serves one pigtail and one cylinder.
Cross-type header		Floor-mount manifolds	A horizontal header carrying two rows of cylinder connections. Header valves are arranged in pairs, so that two pigtails connect at each station instead of one. The header is supported by the floor-mount stand.
No header — direct connection		Cryogenic liquid (dewar) systems	The dewar connects directly to the control box through a flexible pigtail with the corresponding CGA connection. There is no header and no master valve. See Section 3.7.

The number of cylinders a header can serve depends on the configuration supplied. Refer to the layout drawing furnished with the manifold.

Header style is a property of each side, not of the manifold as a whole. On a mixed configuration, the cylinder side has a header and the dewar side does not.

Cryogenic Liquid (Dewar) Supply

Some configurations of the Automatic Changeover Manifold are supplied for use with cryogenic liquid dewars. In these configurations the dewar is the source of the gas, but the manifold itself receives gas only. It draws from the gas space of the dewar, not from the liquid.

⚠ WARNING

The Automatic Changeover Manifold is rated for gas service only. It is not designed for use with cryogenic liquid and must not be connected to a liquid withdrawal connection.
Connect the manifold only to the gas withdrawal connection of the dewar. Verify the connection before placing the manifold in service.

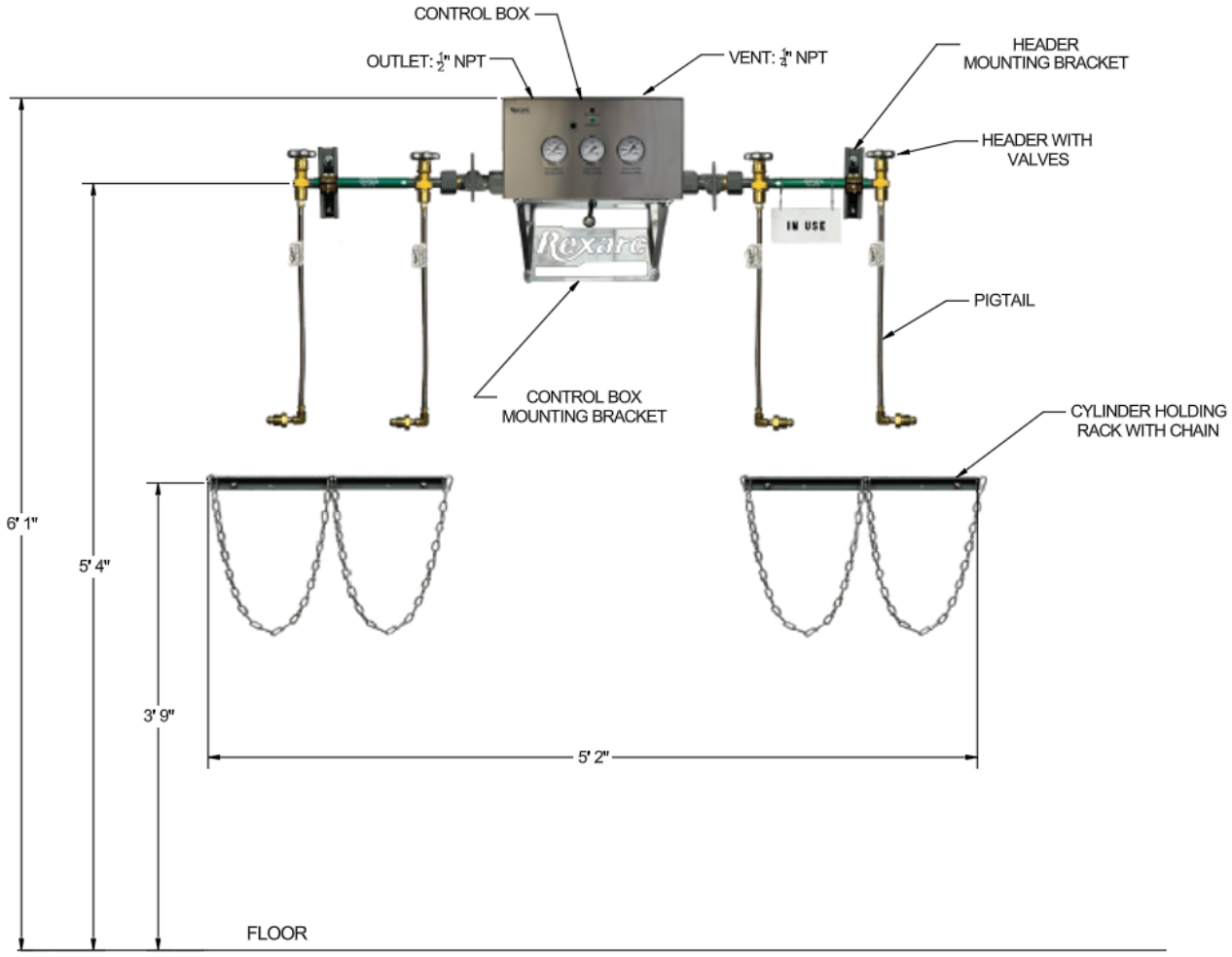
Dewar-supplied configurations have no cylinder headers and no master valves. The dewar connects directly to the control box through a flexible pigtail with the corresponding CGA connection.

A manifold may also be supplied mixed, with a cryogenic liquid dewar on one side and high-pressure cylinders on the other. Both sides still supply gas only, and the warning above applies to the dewar side of a mixed manifold exactly as it does to a fully dewar-supplied manifold.

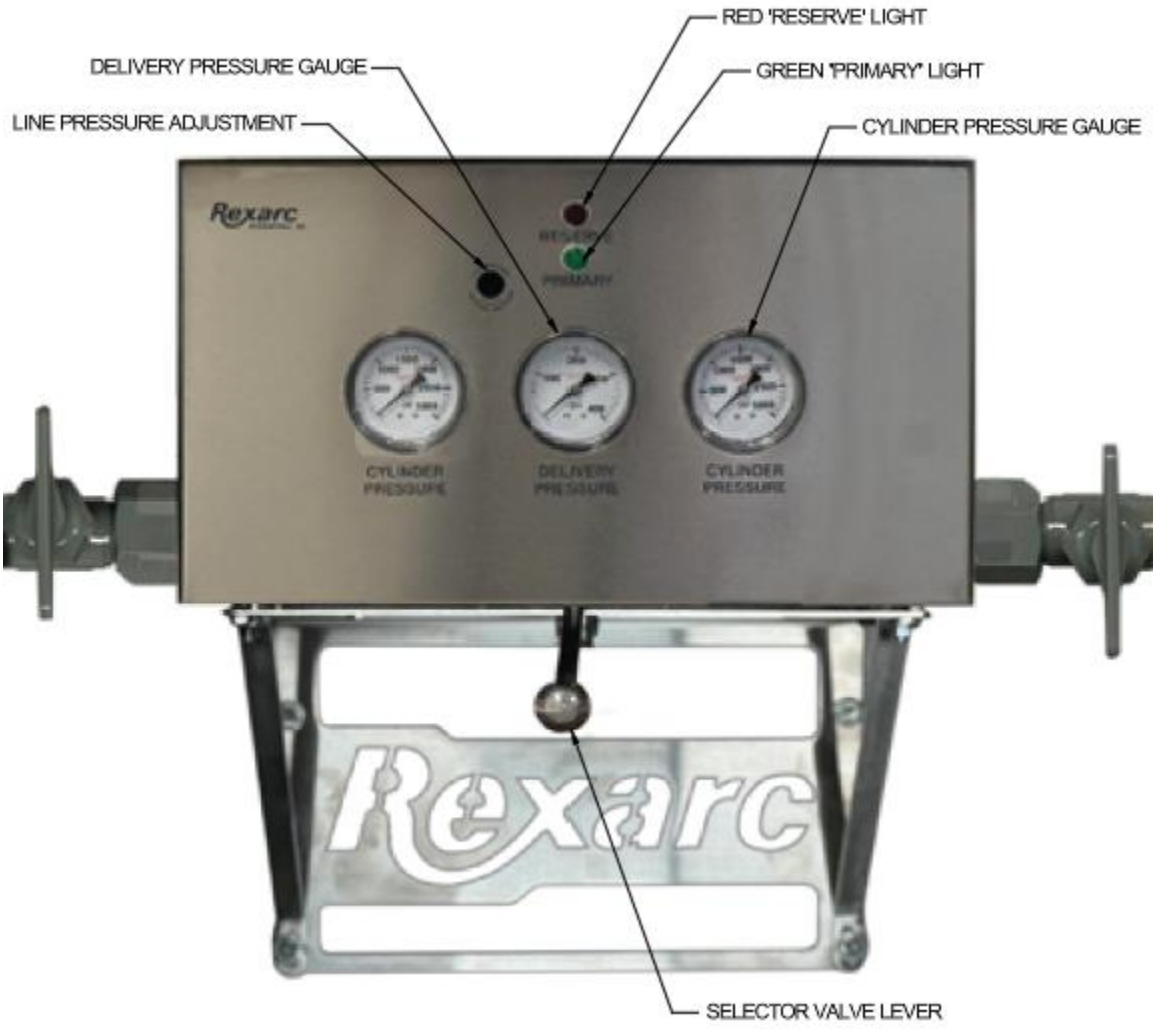
On a mixed configuration the dewar is always the primary source and the high-pressure cylinders serve as the reserve. The cylinders supply the plant only while the dewar is depleted or being replaced. The two sides do not alternate in normal service.

Installation

Typical Wall Mount Manifold Layout

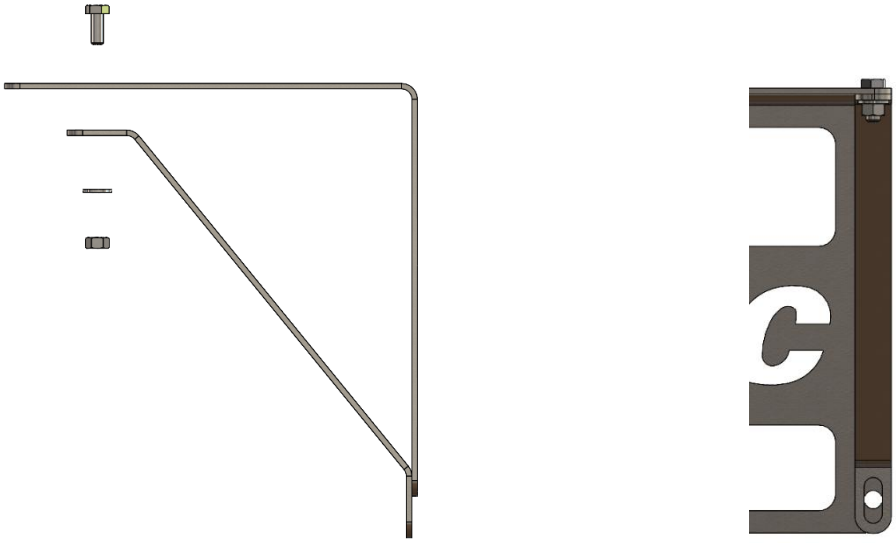


Control Box


RED 'RESERVE' LIGHT
DELIVERY PRESSURE GAUGE
GREEN 'PRIMARY' LIGHT
LINE PRESSURE ADJUSTMENT
CYLINDER PRESSURE GAUGE
Rexarc
PRIMARY
CYLINDER PRESSURE
DELIVERY PRESSURE
CYLINDER PRESSURE
Rexarc
SELECTOR VALVE LEVER

1. Control Box and Headers

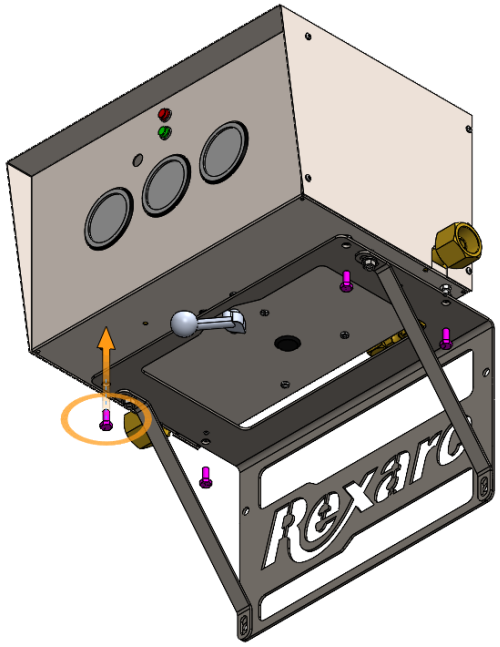
a. Assemble the control box bracket. Connect the (2) support arms to the bracket using the supplied hardware.



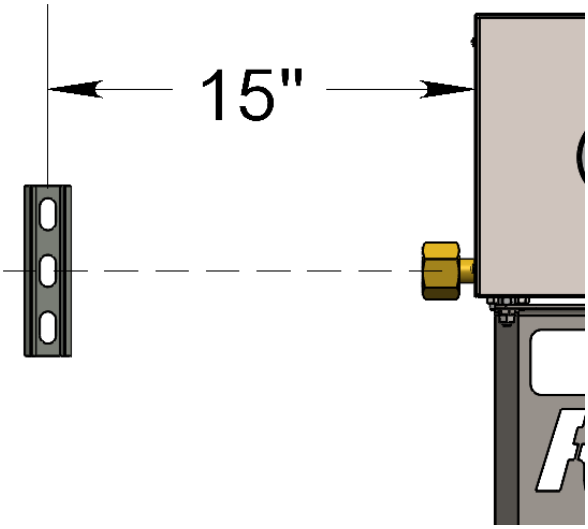
b. Locate and install the control box mounting bracket using the (4) supplied hardware. The hardware supplied is for concrete or block wall only. Separate hardware is required with other building materials.



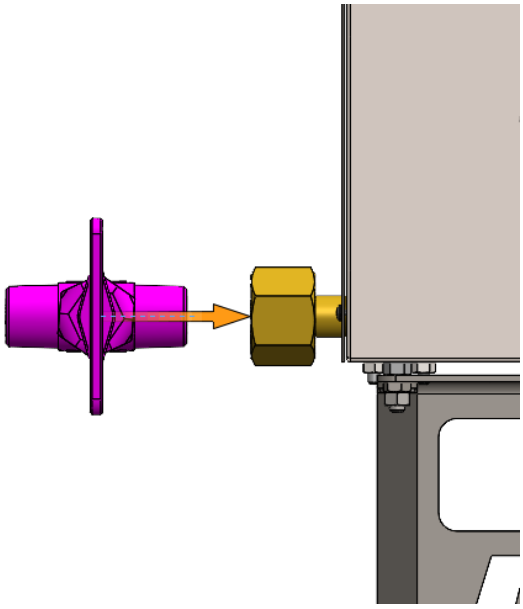
c. Attach control box to the mounting bracket using (4) supplied hardware.



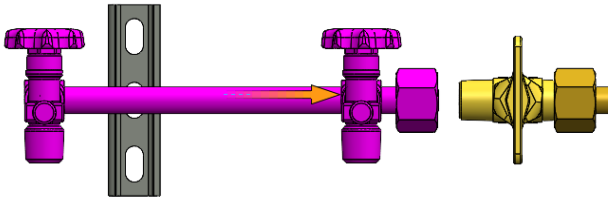
d. Attach the header mounting brackets to the wall using supplied hardware. The hardware supplied is for concrete or block wall only. Separate hardware is required with other building materials.



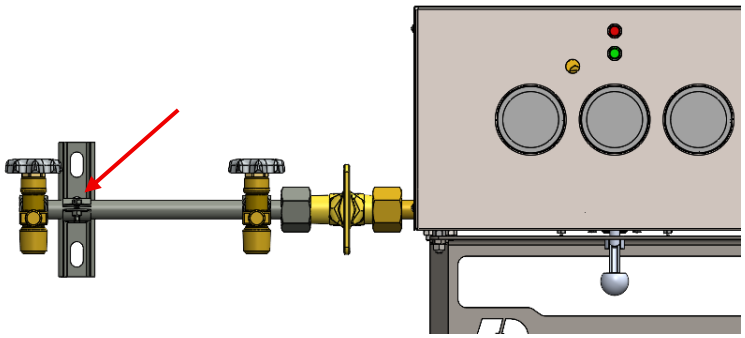
e. Connect the master shutoff valves to the control box. Do NOT use any thread sealant when assembling these valves. Use two wrenches to ensure tightness



f. Connect the headers to the master shutoff valves. Ensure the headers are connected to the correct side of the control box. Do NOT use any thread sealant when assembling the headers. Use two wrenches to ensure tightness. The left header will connect to the left side of the control box and valves will point down. The right header will connect to the right side of the control box and valves will point down.

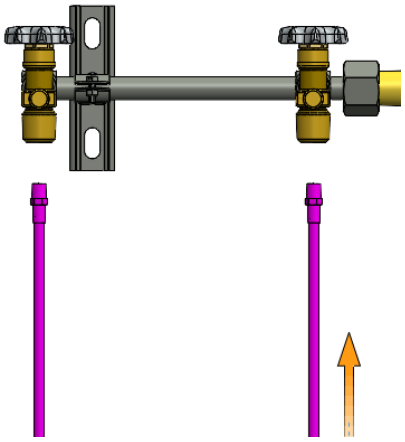


g. Attach the headers to the header mounting brackets using the supplied pipe clamps.

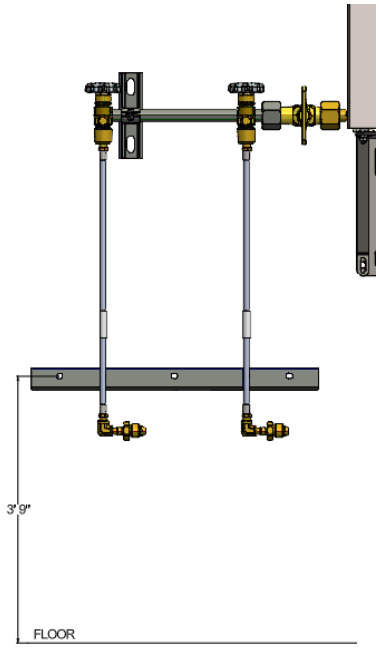


2. Cylinder Racks and Pigtails

a. Connect all pigtails to the header manifold valves. Connect pigtails to the control box outlet for liquid manifolds. Use only approved thread sealants compatible with the gas used.



b. Locate cylinder holding racks shown in the ‘Wall Mount’ layout drawing. Attach the cylinder holding racks to the wall using supplied hardware. The hardware supplied is for concrete or block wall only. Separate hardware is required with other building materials. Ensure the cylinder holding racks are located directly under the header valves.

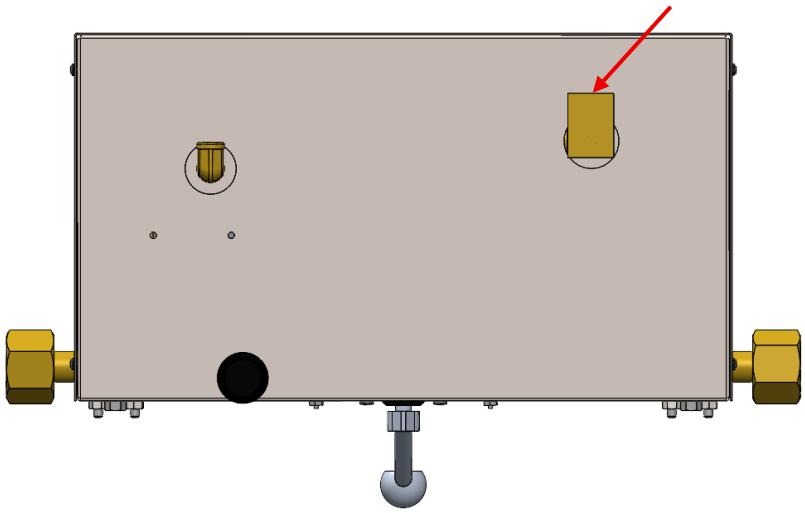


c. Connect cylinder chains and carabiners. Every cylinder must be restrained by a chain while it is in the rack. Secure each cylinder as it is placed, before connecting its pigtail. Connect a carabiner to each end of the chain and clip one end to the left side of the cylinder rack. Move the cylinder into position, wrap the chain across the front of the cylinder, and clip the free carabiner to the middle of the rack. Repeat for each cylinder.



3. Outlet Connection

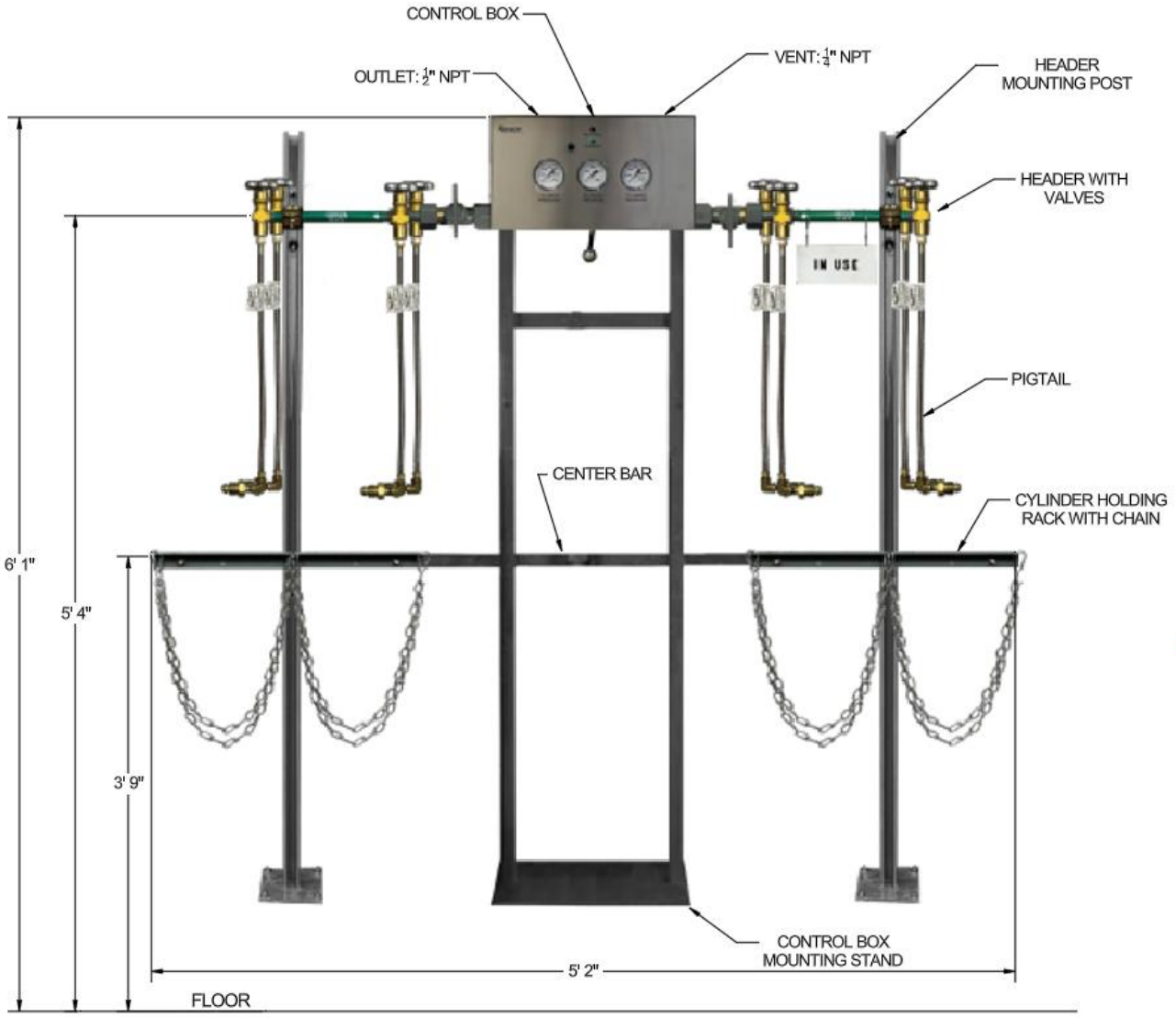
a. Connect the outlet to the downstream piping system. The outlet at the back of the control box is the discharge point for the delivery regulator. Install 1/2" pipe or fittings using approved thread sealant compatible with the gas in service. Pipe and fittings must be a minimum of Class 150. When tightening fittings into the control box, hold the outlet block with a second wrench so that the block is not bent and the fitting seals are not broken.



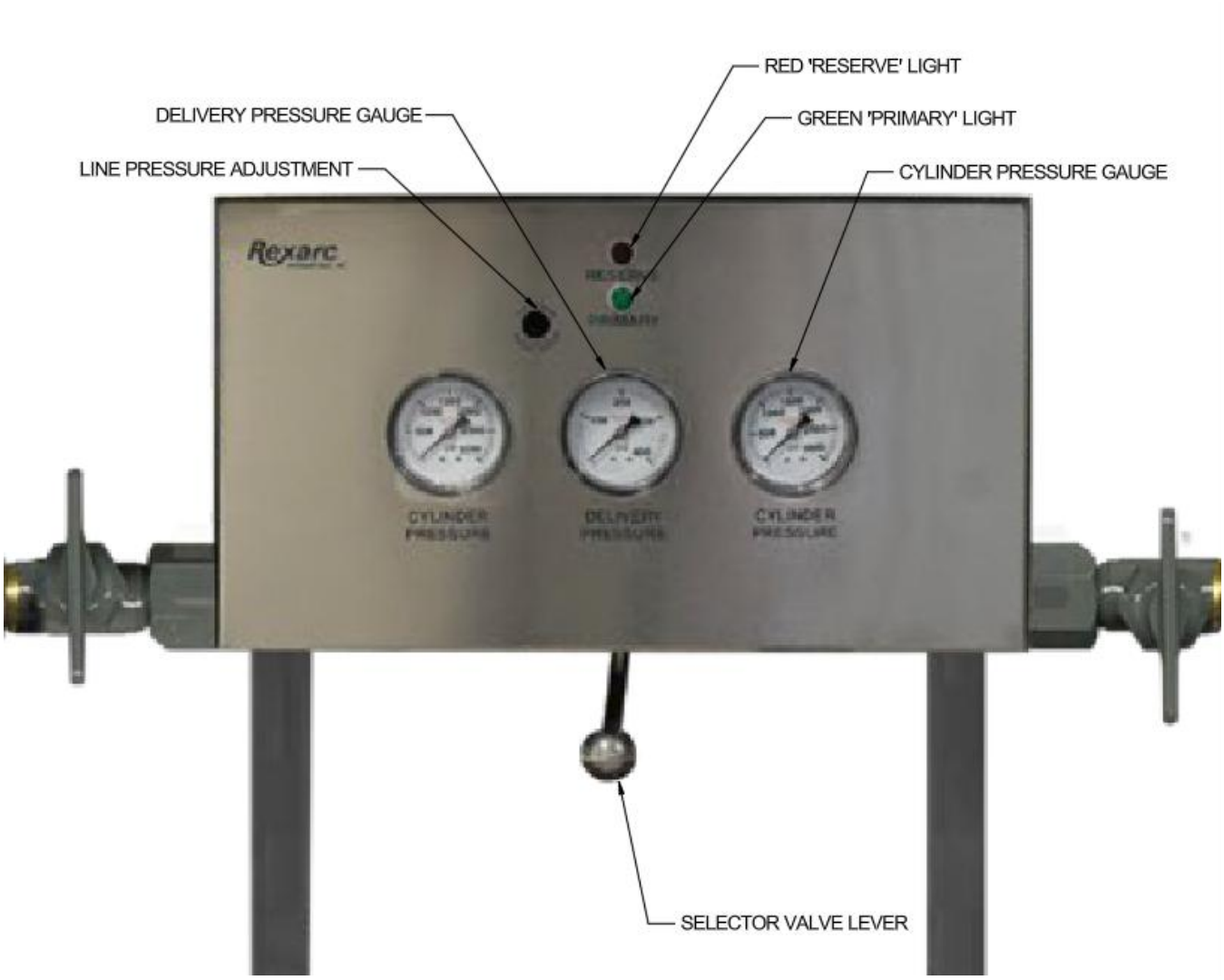
4. Final Checks

a. All connections must be checked for installation accuracy.
b. For oxygen service: ensure all pipe and fittings are purged and cleaned for oxygen service according to CGA G-4.1.
c. When the above is complete, move to **Operation** section on page 32 for next steps.

Typical Floor Mount Manifold Layout

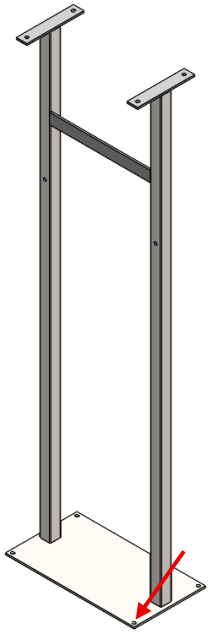


Control Box

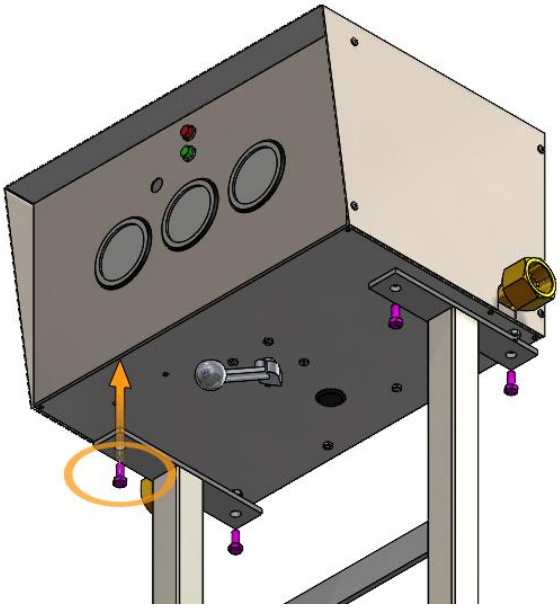

RED 'RESERVE' LIGHT
DELIVERY PRESSURE GAUGE
GREEN 'PRIMARY' LIGHT
LINE PRESSURE ADJUSTMENT
CYLINDER PRESSURE GAUGE
Rexarc
SELECTOR VALVE LEVER

1. Control Box and Headers

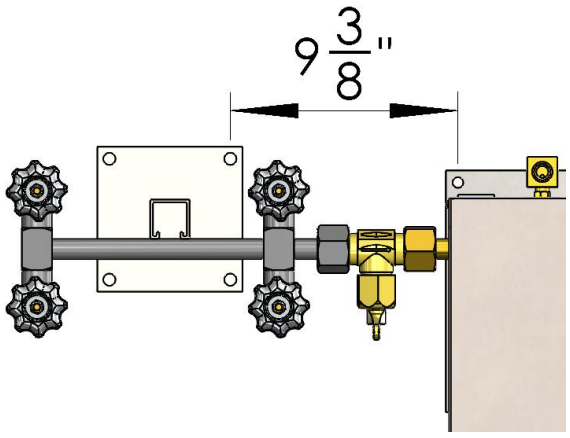
a. Locate and install the control box mounting stand using the (4) supplied hardware to the ground. The hardware supplied is for concrete only. Separate hardware is required with other building materials. Ensure appropriate clearance around the stand to allow for access to change empty cylinders.



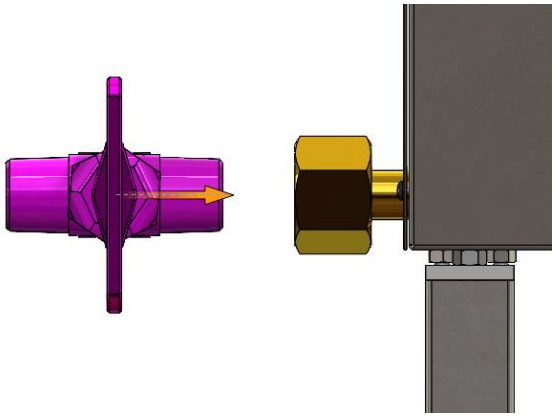
b. Attach control box to the mounting stand using (4) supplied hardware.



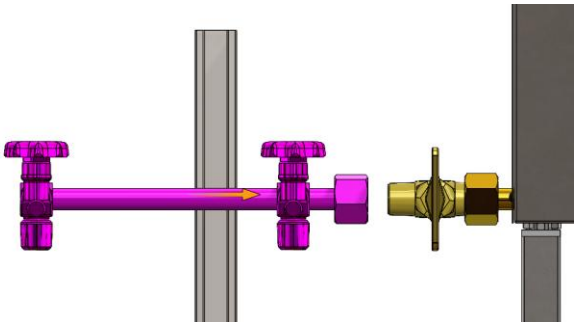
c. Attach the header mounting posts to the ground using supplied hardware. The hardware supplied is for concrete only. Separate hardware is required with other building materials. Ensure the posts are aligned to allow the headers to mount via pipe clamp.



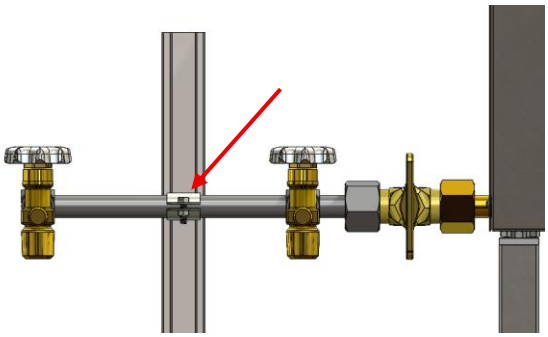
d. Connect the master shutoff valves to the control box. Do NOT use any thread sealant when assembling these valves. Use two wrenches to ensure tightness



e. Connect the headers to the master shutoff valves. Ensure the headers are connected to the correct side of the control box. Do NOT use any thread sealant when assembling the headers. Use two wrenches to ensure tightness. The left header will connect to the left side of the control box and valves will point down. The right header will connect to the right side of the control box and valves will point down.

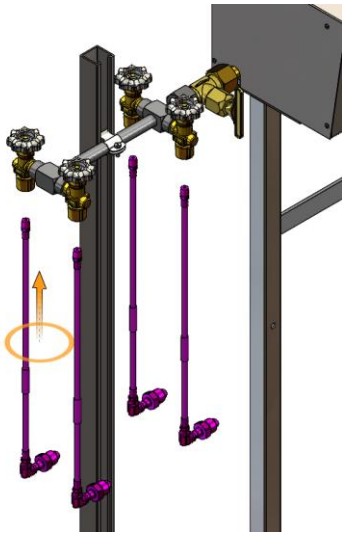


f. Attach the headers to the header mounting brackets using the supplied pipe clamps.

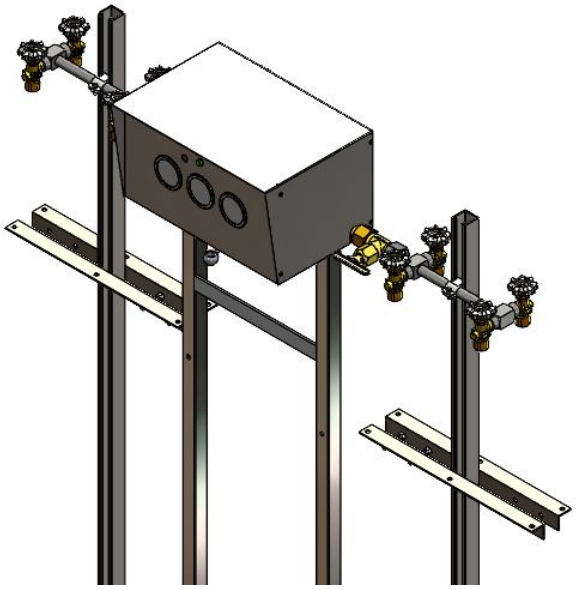


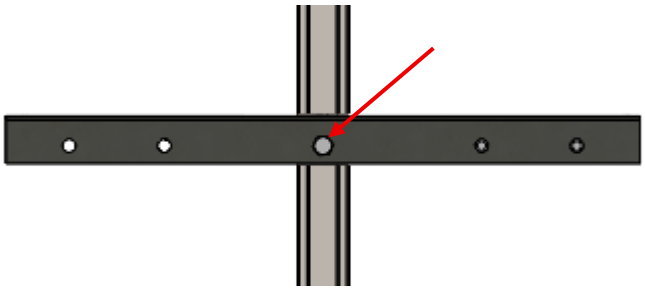
2. Cylinder Racks and Pigtails

a. Connect all pigtails to the header manifold valves. Connect pigtails to the control box outlet for liquid manifolds. Use only approved thread sealants compatible with the gas used.

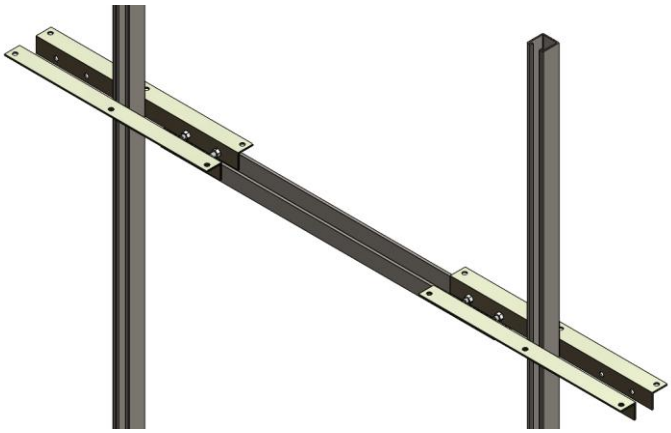


b. Locate cylinder holding racks shown in the ‘Floor Mount’ layout drawing. Attach the cylinder holding racks to the header mounting posts using supplied hardware. The cylinder holding racks will connect through a hole in each header mounting post.



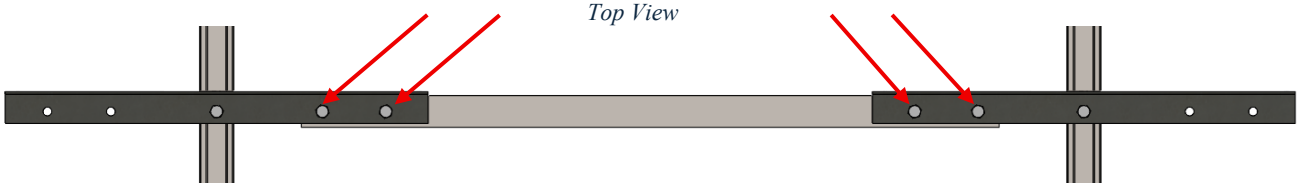


c. Locate center bar shown in the ‘Floor Mount’ layout drawing. Attach the center bar to the cylinder holding racks using supplied hardware.





Top View



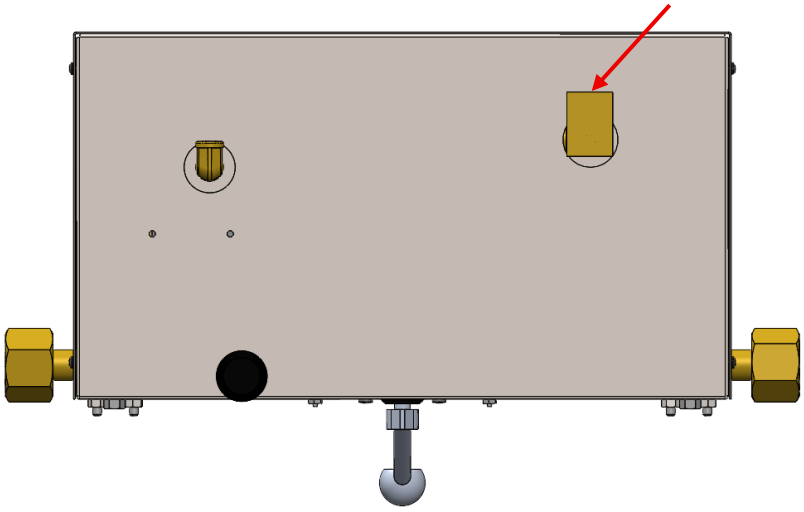
Front View

d. Connect cylinder chains and carabiners. Every cylinder must be restrained by a chain while it is in the rack. Secure each cylinder as it is placed, before connecting its pigtail. Connect a carabiner to each end of the chain and clip one end to the left side of the cylinder rack. Move the cylinder into position, wrap the chain across the front of the cylinder, and clip the free carabiner to the middle of the rack. Repeat for each cylinder.



3. Outlet Connection

a. Connect the outlet to the downstream piping system. The outlet at the back of the control box is the discharge point for the delivery regulator. Install 1/2" pipe or fittings using approved thread sealant compatible with the gas in service. Pipe and fittings must be a minimum of Class 150. When tightening fittings into the control box, hold the outlet block with a second wrench so that the block is not bent and the fitting seals are not broken.



4. Final Checks

a. All connections must be checked for installation accuracy.
b. For oxygen service: ensure all pipe and fittings are purged and cleaned for oxygen service according to CGA G-4.1.
c. When the above is complete, move to **Operation** section on page 32 for next steps.

Service Piping

To ensure adequate flow rates, the main supply and branch piping in the gas distribution system must be properly sized. Piping that is undersized for the connected demand causes pressure loss between the manifold and the point of use. The manifold may deliver the correct pressure at the control box while equipment at the far end of the system is starved.

Two NFPA standards apply to these installations:

- NFPA 51, Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes.
- NFPA 55, Compressed Gases and Cryogenic Fluids Code.

Refer to both standards and to applicable federal, state, and local codes for piping design and installation requirements. Visit www.nfpa.org for further information.

The manifold is rated for 500 SCFH. Size the piping for the total simultaneous demand of all connected equipment, not for a single station, and verify that the total simultaneous demand does not exceed the manifold rating.

A readily accessible shut-off valve is required between the manifold and the plant supply line.

Connection Sizes (all configurations)

Connection	Size
Outlet	1/2" NPT
Vent	1/4" NPT

CAUTION

Before connecting an inert gas manifold to the plant supply line, make sure the supply line has been thoroughly blown out with oil-free air or oil-free nitrogen to remove any foreign material.

Before connecting an oxygen manifold to the plant supply line, make sure the supply line was cleaned as recommended in G-4.1, available from the Compressed Gas Association at www.cga.org.

Vent Piping

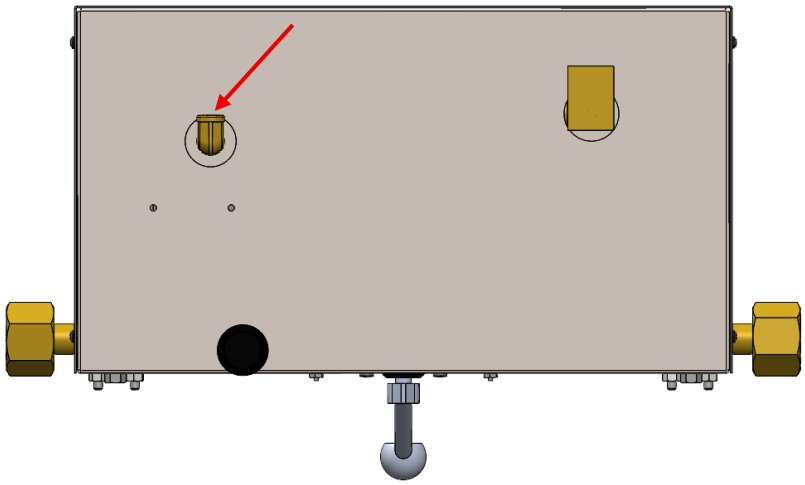
The control box contains an internal relief valve. The 1/4" vent connection on the back of the control box is the discharge point for that relief valve. Vent piping from this connection is required on every installation.

Install the vent piping before placing the manifold in service. The relief valve cannot discharge to a safe location until the vent piping is in place.

Install vent piping as follows:

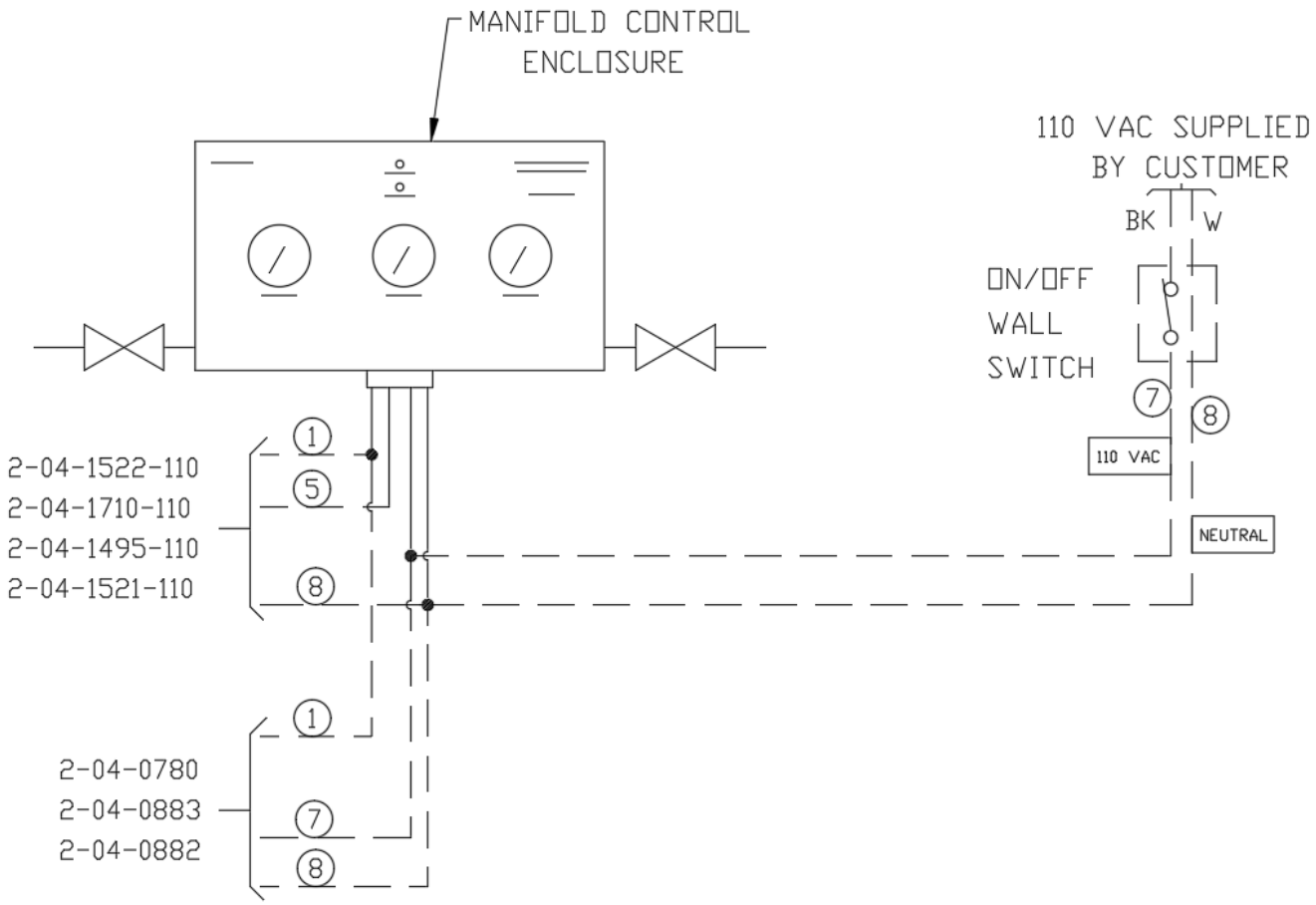
- Connect 1/4" pipe to the vent connection on the control box.

- Use vent piping the same size as, or larger than, the vent connection. Do not reduce the line.
- Do not install shut-off valves, flow-restricting devices, or other obstructions in the vent piping.
- Support the vent piping independently. The vent connection shall not carry the weight of the vent piping.
- Route vent piping separately from all other vent lines.
- Extend the vent piping to a safe location.
- Terminate the vent piping with a downward-facing elbow to minimize the accumulation of rainwater, condensation, or debris.
- Protect the discharge end so that it cannot become closed or obstructed.



5. Electrical

a. Connect electrical wiring for the built-in indicator-light warning system and any optional Remote Alert Systems.



Pre-Startup Checklist:

	STEP VERIFICATION
☐	Verify the manifold is installed indoors and protected by location or barrier from moving objects and unauthorized personnel.
☐	Verify the control box is secured with the (4) supplied fasteners to its wall-mounted bracket (wall mount) or to the ground-anchored floor stand (floor mount), and that clearance around the manifold allows access to change empty cylinders.
☐	Verify anchors are installed and appropriate for the building material. Supplied hardware is for concrete or block only.
☐	Verify header supports are installed and the headers are secured with the supplied pipe clamps: wall-mounted header brackets or ground-anchored header mounting posts aligned for pipe-clamp mounting.
☐	Verify cylinder holding racks are installed: anchored to the wall directly under the header valves (wall mount) or pinned through the hole in each header mounting post with the center bar attached (floor mount).
☐	Verify the left header is connected to the left side of the control box and the right header to the right side, with header valves pointing down.
☐	Verify master valve and header joints were made with NO thread sealant and tightened.
☐	Verify all pigtails are connected using only thread sealant approved for the gas in service. On liquid manifolds, verify the pigtail is connected at the control box.
☐	Verify the dewar pigtail is connected to the GAS WITHDRAWAL connection with the correct CGA fitting. The manifold is gas service only and must not be connected to a liquid withdrawal connection.
☐	Verify the plant supply line was blown out with oil-free air or nitrogen (inert gas service). For oxygen service, verify the supply line and all manifold pipe and fittings were cleaned and purged per CGA G-4.1.
☐	Verify the outlet is connected with 1/2" pipe or fittings, Class 150 minimum and that a readily accessible shut-off valve is installed between the manifold and the plant supply line.
☐	Verify service piping is sized for total simultaneous demand and that demand does not exceed the manifold rating of 500 SCFH.
☐	Verify 1/4" vent piping, rated 300 psi minimum, is installed with no reduction, no valves or restrictions, and is independently supported.
☐	Verify the vent is routed separately from all other vent lines to a safe location and terminates in a protected, downward-facing elbow.
☐	Verify the indicator-light warning system and any remote alert are wired per the wiring diagram supplied with the manifold.
☐	Verify Instruction Manual is attached to the manifold for ease of reference

Operation

Initial Start-Up

1. Close every valve on the manifold: all cylinder valves, all header valves, and the master valve on each header where fitted.
   ***Verify**: All three control box gauges indicate 0 psi before any cylinder is connected.*
2. Inspect the valve outlet on each cylinder before connecting it to a pigtail. The outlet must be clean, dry, and free of oil, grease, dirt, moisture, and thread damage. Do not connect a cylinder whose valve outlet is damaged or contaminated.
3. Secure each cylinder to the holding rack with the retaining chain before connecting any pigtail. Fasten the chain so that no cylinder can tip, roll, or shift. Each cylinder requires its own chain.
4. Connect each cylinder to its pigtail. Start each connection nut by hand to confirm the threads engage cleanly, then tighten with the correct wrench. Do not use an extension on the wrench handle.
5. Move the selector valve handle to the right.
   ***Verify**: The right side is now the primary side. The side the selector valve points to is the primary side; the opposite side is the reserve.*
6. Hang the IN-USE tag on the right header.

> **⚠ WARNING! ⚠**
>
> Valves opened quickly on high-pressure cylinders can rupture or damage equipment and cause personal injury and property damage.

7. Open the cylinder valves **SLOWLY**, **ONE AT A TIME**. Allow the pressure in each pigtail to equalize before opening the next cylinder valve.
8. Open the header valves connected to the pigtails **SLOWLY**, **ONE AT A TIME**.
9. Open the master valves **SLOWLY**, **ONE AT A TIME**.
10. Read the left gauge. This gauge indicates cylinder pressure in the left header.
    ***Verify:** The left gauge indicates pressure consistent with full cylinders. A reading at or near 0 psi with the left header valves open indicates a closed cylinder valve, an empty cylinder, or a leak.*
11. Read the right gauge. This gauge indicates cylinder pressure in the right header.
    ***Verify:** The right gauge indicates pressure consistent with full cylinders. A large difference between two banks of full cylinders indicates a closed valve or a leak.*
12. Leak-test every connection under pressure: each cylinder valve to pigtail connection, each pigtail to header connection, each header valve, each master valve, and each union.
    a. If a leak is detected, close the cylinder valve and the header valve serving that connection.
    b. Relieve the pressure trapped in the affected section before loosening any connection.
    c. Repair the connection, then repressurize and retest.
    d. Do not place the manifold in service until every connection tests leak-free.

13. Set the delivery pressure. The adjuster is on the control box face, labeled **LINE PRESSURE — INCREASE / DECREASE**. Insert an 8” screwdriver or 3/16” allen wrench through the 5/8” adjustment opening in the upper left of the control box to set the pressure. Turn clockwise to increase pressure and counterclockwise to decrease the pressure. The center gauge, engraved **DELIVERY PRESSURE**, indicates the pressure delivered to the plant piping.

NOTICE
Do not set the delivery pressure above the rating of any downstream piping, regulator, hose, or device.

14. With gas flowing to the plant, make the final adjustment to the required delivery pressure.
    Verify: *The center gauge holds the required delivery pressure with the plant drawing gas.*
15. Move the selector valve handle back to the right.
    Verify: *The IN-USE tag is on the right header and the selector valve points to the right side.*
16. Adequately purge all piping from the manifold to the point of use. Purging removes air from the piping so that downstream equipment receives only the service gas when the manifold is placed in operation.
    a. With the system open and pressurized, open the outlet valve at each workstation, one at a time, to purge all air from the piping. Ensure the flow rate during purge does not surpass the flow rating of the manifold.
    b. Continue until the piping is properly purged of air from each workstation.
17. Test the function of the changeover indicator lights.
    a. Close the master valve on the right header and allow the gas supply to the control box to deplete.
    b. Verify the red RESERVE light illuminates, indicating the manifold is running on reserve gas.
    c. Open the master valve on the right header to replenish the gas supply.
    d. Verify the green PRIMARY light illuminates.
18. Confirm normal operation. The manifold supplies gas from the right header and the green PRIMARY light is illuminated. The right side continues to supply gas until its pressure falls below the factory-set changeover pressure. Changeover to the left side then occurs automatically and without interruption to the plant: the red RESERVE light illuminates and the right gauge indicates low cylinder pressure.

NOTE
Changeover setpoints and each side's set pressure are preset at the factory and are not field-adjustable. Only the delivery pressure is adjustable in the field.
Nothing downstream of the manifold indicates that a changeover has occurred. The red RESERVE light and the cylinder pressure gauges are the only indications.

19. When the red **RESERVE** light illuminates, reset the manifold: replace the depleted cylinders on the right header first, then move the selector valve handle to the left and move the **IN USE** tag to the left header.

Shutdown Procedures

Selecting the Correct Shutdown Procedure

PROCEDURE	USE WHEN	WHAT IS SHUT DOWN	GAS SUPPLY TO THE PLANT
CYLINDER CHANGE (SINGLE-SIDE SHUTDOWN)	The primary side has depleted and the red RESERVE light is illuminated, or cylinders on one side must be removed for any other reason.	The depleted side only: its cylinder valves, header valves, and master valve. The opposite side stays in service.	The plant is supplied from the full side throughout the change.
END-OF-DAY / WEEKEND SHUTDOWN	Gas demand stops for a planned period — shift end, weekend, plant shutdown. No work is performed on the manifold.	Both sides: all cylinder valves, all header valves, both master valves, plus the shut-off valve between the manifold and the plant supply line.	The manifold is isolated from the plant piping.

Cylinder Change (Single-Side Shutdown)

Use this procedure to shut down one side of the manifold so that gas cylinders can be replaced. The opposite side continues to supply the plant throughout. This procedure covers the shutdown, the cylinder replacement, and the return of that side to service as the reserve.

Prerequisites

- Full cylinders of the correct gas are available at the manifold.
- The side to be changed has been identified — normally the side the selector valve points to when the red RESERVE light is illuminated.
- The opposite side has cylinders connected and its cylinder, header, and master valves are open.

High Pressure Gas Supply (Left & Right)

Identify the depleted side

1. Confirm the red RESERVE indicator light is illuminated. The red light means the primary side has fallen below the pressure-switch setpoint and the manifold has transferred to the reserve side.
2. Confirm which side is depleted by reading the two cylinder pressure gauges. The gauge on the depleted side indicates low cylinder pressure.

   ***Verify**: the low-reading gauge is on the same side the selector valve handle points to.*

Transfer the manifold to the full side

3. Move the selector valve handle to the full side. The side the selector valve points to is the primary side, so this step makes the full side primary and takes the depleted side out of the primary position.

   ***Verify**: the green PRIMARY indicator light is illuminated and the red RESERVE light is out.*
4. Move the IN-USE tag to the header on the full side.

CAUTION

Moving the selector valve handle clears the red RESERVE light whether or not the depleted cylinders have been replaced. A green PRIMARY light after the transfer does not confirm that a full reserve is available. Complete the cylinder replacement in the same work period; do not leave the manifold running with one side depleted.

Isolate the depleted side

Close valves on the depleted side only. Do not close any valve on the side now supplying the plant.

5. Close all cylinder valves on the depleted side, ONE AT A TIME.
6. Close all header valves on the depleted side, ONE AT A TIME. Each header valve isolates one pigtail from the header.
7. Close the master valve on the depleted side. Every manifold supplied with a header has a master valve between the header and the control box. Cryogenic liquid dewar configurations have no header and no master valve.

   ***Verify**: the cylinder pressure gauge for the isolated side no longer responds. The opposite side continues to supply the plant and the green PRIMARY light remains illuminated.*

Replace the cylinders

8. Disconnect the pigtail from each cylinder valve on the isolated side.
9. Install the cylinder valve outlet cap and the cylinder protective cap on each empty cylinder.
10. Release one cylinder at a time. Unclip the free carabiner, unwrap the chain from the front of the cylinder, and move the empty cylinder out of the rack. Keep every remaining cylinder chained until it is removed.
11. Move the empty cylinders to the designated storage or return area in accordance with facility procedures.
12. Inspect the outlet on each full cylinder valve and confirm it is clean before the cylinder is placed in the rack.
13. Place each full cylinder in the rack and secure it before connecting its pigtail. Clip one carabiner to the left side of the cylinder rack, move the cylinder into position, wrap the chain across the front of the cylinder, and clip the free carabiner to the middle of the rack.

CAUTION

Secure every cylinder to the holding rack with the chain provided before connecting its pigtail and before opening any valve.

14. Connect the pigtails to each cylinder valve.
15. Inspect the pigtails for kinks, flattening, corrosion, or damage to the connections before returning the side to service. Replace any damaged pigtail.

Return the side to service as the reserve

16. SLOWLY open the cylinder valves on the changed side, ONE AT A TIME.
17. SLOWLY open the header valves on the changed side, ONE AT A TIME.
18. SLOWLY open the master valve on the changed side.

    ***Verify**: the cylinder pressure gauge for the changed side indicates full cylinder pressure.*
19. Check every cylinder connection on the changed side for leaks using an approved leak-test solution compatible with the gas in service. When a leak is detected, relieve pressure, repair, and retest.
20. Leave the selector valve handle on the side that is supplying the plant. The changed side is now the reserve and will supply gas automatically when the primary side depletes.

    ***Verify**: the green PRIMARY light is illuminated, the red RESERVE light is out, both cylinder pressure gauges indicate cylinder pressure, and the IN-USE tag is on the side supplying the plant.*

Automatic Changeover – Cryogenic Gas Supply (Left) High Pressure Gas Supply (Right)

Close valves on the depleted side only. Do not close any valve on the side now supplying the plant.

1. Close gas outlet valves on the depleted side, ONE AT A TIME.
2. Close all header valves on the depleted side, ONE AT A TIME. Each header valve isolates one pigtail from the header.
3. Close the master valve on the depleted side. Every manifold supplied with a header has a master valve between the header and the control box. Cryogenic liquid dewar configurations have no header and no master valve.

   ***Verify**: the cylinder pressure gauge for the isolated side no longer responds. The opposite side continues to supply the plant and the green PRIMARY light remains illuminated.*

Replace the cylinders

4. Disconnect the pigtail from the gas outlet valve on the isolated side.
5. Move the empty dewar to the designated storage or return area in accordance with facility procedures.
6. Inspect the outlet valve and confirm it is clean before the cylinder is placed in the rack.
7. Place full dewar in the designated spot next to the manifold mounting.
8. Connect the pigtails to the gas outlet valve.
9. Inspect the pigtails for kinks, flattening, corrosion, or damage to the connections before returning the side to service. Replace any damaged pigtail.

Return the side to service as the reserve

10. SLOWLY open the gas outlet valves on the changed side, ONE AT A TIME.
11. SLOWLY open the header valves on the changed side, ONE AT A TIME.
12. SLOWLY open the master valve on the changed side.

    ***Verify**: the cylinder pressure gauge for the changed side indicates full cylinder pressure.*
13. Check every cylinder connection on the changed side for leaks using an approved leak-test solution compatible with the gas in service. When a leak is detected, relieve pressure, repair, and retest.

End-of-Day / Weekend Shutdown

Use this procedure when gas demand stops for a planned period and no work will be performed on the manifold. Both sides are shut off and the manifold is isolated from the plant supply line. The manifold remains charged with gas.

Procedure

1. Note the selector valve handle position and the location of the IN-USE tag. Both remain as they are; the manifold restarts on the same primary side.
2. Close all cylinder valves on both sides, ONE AT A TIME.
3. Close all header valves on both sides, ONE AT A TIME.
4. Close both master valves, ONE AT A TIME.
5. Close the shut-off valve between the manifold and the plant supply line.
   ***Verify**: gas flow to the plant stops. The delivery pressure gauge holds a static pressure.*
6. Leave the control box energized. The indicator lights remain functional.

Returning to service

1. SLOWLY open both master valves, ONE AT A TIME.
2. SLOWLY open all header valves, ONE AT A TIME.
3. SLOWLY open all cylinder valves, ONE AT A TIME.
4. Check each cylinder connection for leaks using an approved leak-test solution compatible with the gas in service. When a leak is detected, relieve pressure, repair, and retest.
5. Verify the green PRIMARY indicator light is illuminated.
6. Verify both cylinder pressure gauges indicate cylinder pressure, and that the delivery pressure gauge reads the appropriate pressure for downstream equipment.
7. Open the shut-off valve between the manifold and the plant supply line.
   ***Verify**: the delivery pressure gauge holds the set delivery pressure under flow.*

Maintenance

ITEM	FREQUENCY
LEAK INSPECTION (ALL CONNECTIONS, HEADER VALVES, MASTER VALVES/UNIONS)	Monthly unless issues arise
INDICATOR-LIGHT / GAUGE FUNCTION CHECK	
SELECTOR VALVE OPERATION CHECK	
VENT PIPE OBSTRUCTION CHECK	

How to Order Parts

To order parts, contact Rexarc International: 937-839-4604, or send email to customerservice@rexarc.com.

When contacting Rexarc International representatives, the following information is necessary:

- Customer information
- System number or model number

Technical Support

Rexarc International, Inc.

Phone: 937.839.4604

Email: customerservice@rexarc.com Web: www.rexarc.com

Have the following information ready before you call:

- Manifold part number and serial number (see Equipment Record below)
- Gas in service
- Indicator light condition: PRIMARY (green), RESERVE (red), or both dark
- All three control box gauge readings: left cylinder, delivery, right cylinder
- Description of the condition and when it began

Equipment Record

Complete this record at commissioning. Keep this page with the manifold.

ITEM	ENTRY
MANIFOLD PART NUMBER	
SERIAL NUMBER	
GAS IN SERVICE	
CYLINDER CONNECTION (CGA NUMBER)	
MOUNTING CONFIGURATION (WALL / FLOOR)	
SUPPLY TYPE (CYLINDER / DEWAR / MIXED)	
INSTALLATION DATE	
INSTALLED BY	
COMMISSIONED BY	
DELIVERY PRESSURE SETTING (PSI)	
REMOTE ALERT FITTED (Y / N)	
PLANT SUPPLY SHUT-OFF VALVE LOCATION	

LIMITED WARRANTY

1. Rexarc International, Inc. (“Rexarc”) warrants that the products purchased from Rexarc (the “Products”) are free from defects in material and workmanship. This warranty is given only to the original purchaser from Rexarc. The duration of this warranty is one (1) year for electrical components and seven (7) years for other parts and components, in each case starting from the date of shipment to the original purchaser.

2. Rexarc’s liability in connection with this warranty or other claim relating to the Products shall be limited to the repair, or at Rexarc’s option, the replacement or refund of the purchase price, of any Product that is returned to Rexarc in West Alexandria, Ohio, freight prepaid, and is determined to be defective after examination by Rexarc. No product or parts or components may be returned to Rexarc without first receiving return authorization from Rexarc. Products or parts or components thereof which are repaired or replaced by Rexarc will be returned to the purchaser freight collect.

3. Rexarc does not warrant any Product, components or parts not manufactured by Rexarc. Also, the Rexarc warranty does not apply to defects or damage caused by or arising from: (a) use of a Product for purposes other than those for which it was designed, (b) improper installation,
(c) accidents or disasters such as fire or flood, (d) unauthorized attachments or modification,
(e) shipment, (f) normal wear or tear, or (g) any abuse or misuse of the Product.

4. EXCEPT AS EXPRESSLY STATED HEREIN, REXARC MAKES NO WARRANTY, EXPRESS OR IMPLIED, WHETHER OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR USE OR OTHERWISE, ON THE PRODUCTS, OR ON ANY PARTS OR LABOR FURNISHED DURING THE SALE, DELIVERY OR SERVICING OF THE PRODUCTS.

5. This warranty is not intended to cover consumer products, as defined in the Magnuson-Moss Warranty-Federal Trade Commission Improvement Act, which are purchased by the purchaser for purposes other than resale. If the purchaser does not intend to resell the Products, and if the Products are consumer products as defined in the Magnuson-Moss Act, the foregoing warranty, but not the limitation of Rexarc’s liability, shall be null and void.

6. Any action for breach of this warranty must be commenced within 15 months following
shipment of the Product to the original purchaser.

7. IN NO EVENT SHALL REXARC BE LIABLE TO THE PURCHASER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT REXARC’S WRITTEN CONSENT, REGARDLESS OF WHETHER SUCH CLAIM THEREFOR IS BASED UPON BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT TORT OR ANY OTHER LEGAL THEORY. IN NO EVENT SHALL REXARC’S LIABILITY UNDER ANY CLAIM MADE BY THE PURCHASER EXCEED THE PURCHASE PRICE OF THE PRODUCTS IN RESPECT OF WHICH DAMAGES ARE CLAIMED.

8. Some states do not allow limits on warranties or on remedies for breach in certain transactions. In such states, the limits in paragraphs (4) and (7) may not apply.

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