

Introduction

Tri-Tech Medical manifolds are cleaned, tested and prepared for the indicated gas service and are built in accordance with the Compressed Gas Association guidelines. The manifold consists of a regulator and a header, to provide an increased supply of gas for the specific application. Pressure gauges show system status and alert the need to replace depleted cylinders. Features of the manifold systems include a regulator, flexible pigtails (copper pigtails supplied with oxygen system – per NFPA 99) with check valves and mounting hardware.



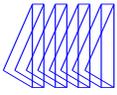
Model TSD shown above

Warranty: All Tri-Tech Medical manifolds are warranted against defects in materials and workmanship for the period of five years from date of purchase.

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 with explosive force when ignited while in contact with some gases – particularly Oxygen and Nitrous Oxide.
- Cylinders, header and master valves should always be opened very **S-L-O-W-L-Y**. Heat of recompression may ignite combustible materials creating an explosive force.
- Pigtails should never be kinked, twisted or bent into a radius smaller than 3 inches. Mistreatment may cause the pigtail to burst.
- Do not apply heat. Oil and grease may react with explosive force when ignited 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 from its current position with great force.
- Oxygen manifolds and cylinders should be grounded. Static discharges and lighting may ignite materials in an oxygen atmosphere, creating an explosive force.
- Welding should not be performed near Nitrous Oxide piping. Excessive heat may cause the gas to dissociate, creating an explosive force.



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 -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.

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.

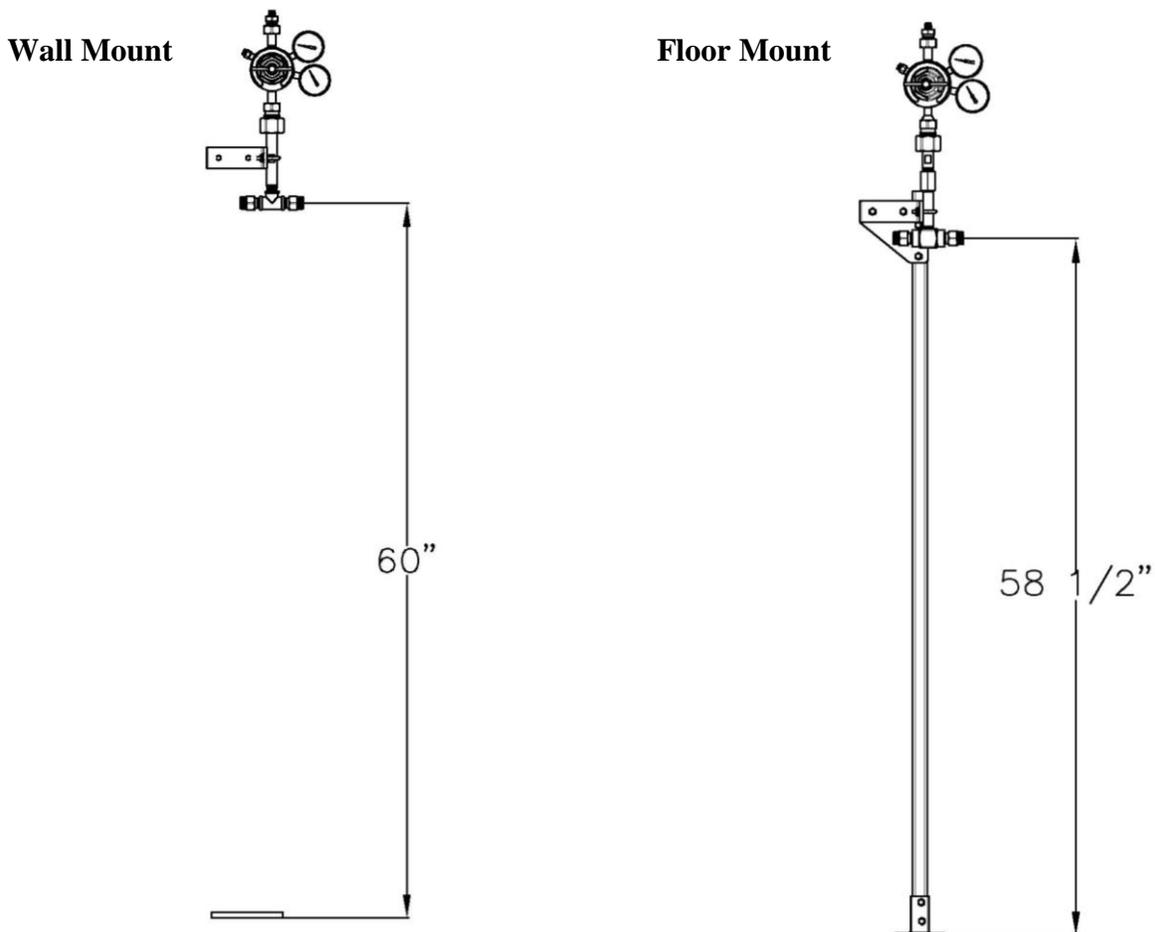
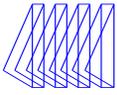


FIGURE 1

Note: Mark the manifold on the wall from the center of the header bar to the floor is **60"**



MANIFOLD ASSEMBLY

1. Assemble the manifold outlet fitting to the regulator outlet (Figure 2).
2. Assemble the headers assembly to the regulator inlet oriented as shown in Figure 2.

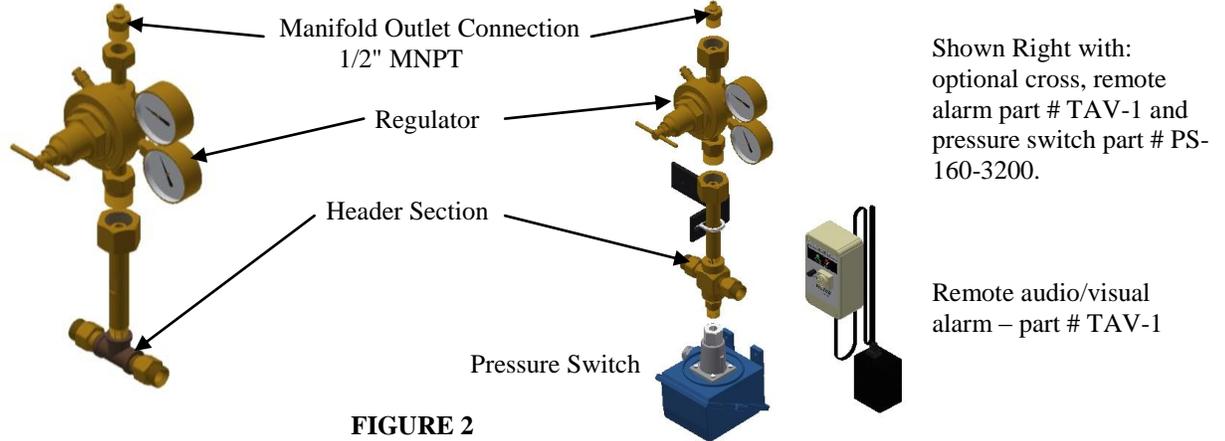


FIGURE 2

Note: In some applications a relief valve may be required downstream of the manifold. The relief valve is not included, it would be sold separately i.e. part no. RV-22-075 75 PSI, RV-22-150 150PSI or RV-22-250 250PSI.

MANIFOLD INSTALLATION – Wall Mount Applications

1. Determine and mark the vertical center line for installation of the manifold. (Figure 3).
2. Measure from the floor to a point 60" in height* of this vertical line. Using a level, mark a horizontal line at this point extending approximately 3" to the left and 3" 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 the mounting holes and install fasteners suitable for the type of wall construction.
5. Mount the manifold by placing the header on the bracket. Fit the U-Bolt over the header pipe and tighten the mounting nuts.

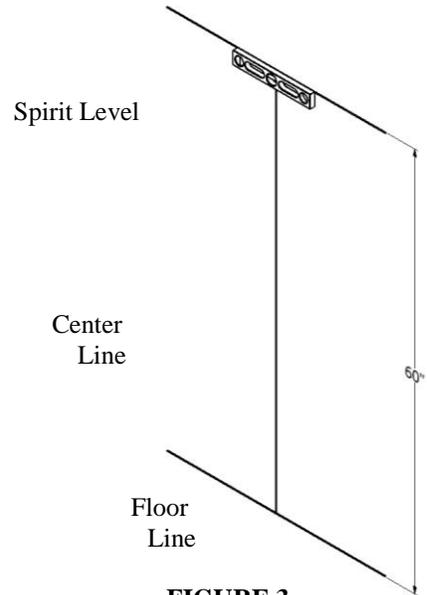
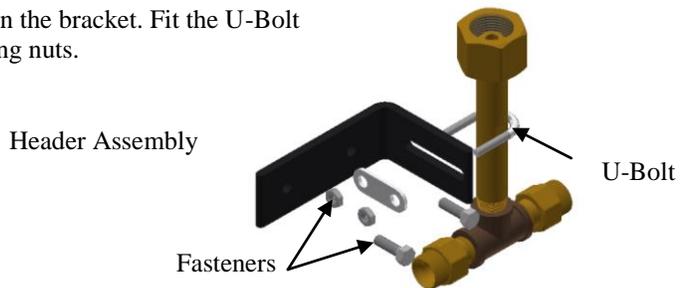
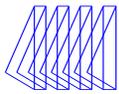


FIGURE 3





MANIFOLD OPERATION

The TSD series manifolds are designed to operate in two ways; to provide an increased supply of gas as well as higher flow rates than can be achieved using a single cylinder, or to provide a manual changeover to a reserve cylinder.

1. Install the two pigtails provided to the TSD manifold. Connect the two cylinders intended to be used. Following the cylinder replacement guidelines on page 5.
2. S-L-O-W-L-Y open both cylinder valves (turn counter-clockwise to open). The high pressure gauge will show the pressure of the cylinder having the highest pressure. (Figure 5)
3. Check the system connections for leaks using an oxygen compatible leak test solution. Correct any leaks immediately.
4. 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.
5. Simulate a depleted bank by closing the cylinder valves and creating a flow of gas through the manifold. The pressure reading on the gauges will drop.
6. S-L-O-W-L-Y open one of the cylinder valves (turn counter-clockwise to open). Note: this manifold is designed so that one side is in service (cylinder valve open) while the second side is held in reserve (cylinder valve closed).
7. The manifold is now ready to supply your system.

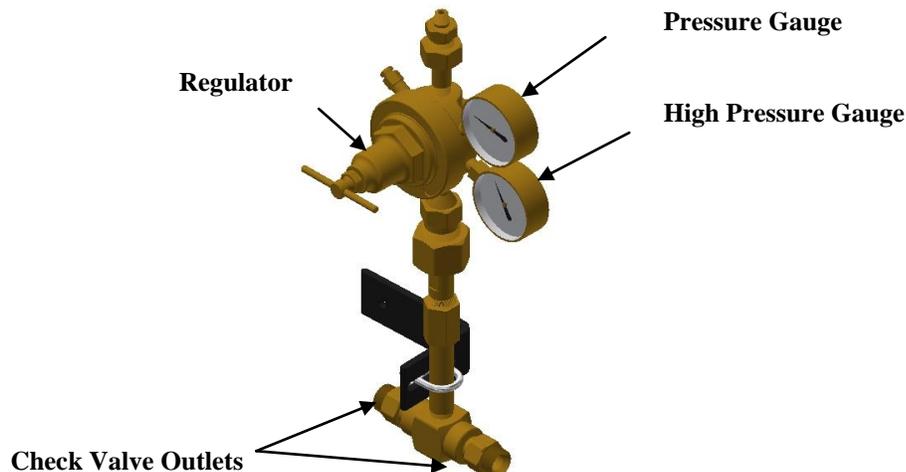


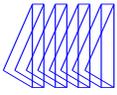
FIGURE 5

The manifold control includes the following components and features; regulator, flexible stainless steel braided pigtails (or copper pigtails with oxygen systems) with check valve outlets. The manifold is designed to use a line regulator (optional item) which can be mounted on the manifold outlet for delivery pressure less than 20 psig.

Gas flows through the manifold to the primary regulator and then through the line regulator (if installed). Final delivery pressure is controlled by either the line regulator or by the primary regulator should the application not require a line regulator. (A line regulator is not provided with the manifold.)

As cylinders deplete the high pressure gauge on the regulator along with any alarm systems installed will indicate that the bank of cylinders should be changed.

After replacing empty cylinder, the manifold is immediately ready for service.



To insure proper operation, observe the following guidelines:

1. Carefully follow all instructions.
2. Be sure cylinder valve is fully opened.
3. Replace empty cylinder as soon as practical after the manifold has depleted, and the full reserve cylinder valve has been opened, placing it in service.

CYLINDER REPLACEMENT AND HANDLING

1. Shut off cylinder valve on depleted cylinder.
2. **S-L-O-W-L-Y** loosen and remove the pigtail connection from the depleted cylinder.
3. Remove the depleted cylinder and replace the protective caps.
4. Remove the protective cylinder cap from the full replacement cylinder. With the valve outlet pointed away from you or anyone else, slowly open each cylinder valve slightly, blow out any dirt or contaminants which may have become lodged into the cylinder valve.
5. Place and secure full cylinders into position using chains, belts, or cylinder stands.
6. Connect pigtails to cylinder valves and tighten with wrench.
7. Open the header valve. **S-L-O-W-L-Y** turn the cylinder valve until each cylinder is fully on.
8. The manifold supply bank is now replenished and may be put in service by following the instructions on page 4. (MANIFOLD OPERATION).

GENERAL MAINTENANCE

1. Main Section

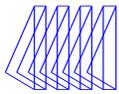
- a) Daily –record line pressure.
- b) Monthly
 - 1a. Check regulators and valves for external leakage.
 - 1b. Check valves for closure ability.
- c) Annually
 - 1a. Check relief valve pressures.
 - 1b. Check regulator seats.

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
 - 1a. Check cylinder pigtails for cleanliness, flexibility, wear, leakage, and thread damage. Replace damage pigtails immediately.

3. Every 4 years

- a) Replace all pigtails.



Replacement Parts

Item	Part Number	Description
Regulator	68-0005	3,000 psig inlet , 0 – 125 psig outlet for Oxygen, N2, Med Air, Argon
	68-0006	3,000 psig inlet , 0 – 125 psig outlet for N2O or CO2
	68-0010	3,000 psig inlet , 0 – 200 psig outlet for Oxygen, N2, Med Air, Argon
Gauges	G-25-200W	Gauge, 0-200 PSI Bottom Port 1/4 npt male - 2.5" diameter
	G-25-400W	Gauge, 0-400 PSI Bottom Port 1/4 npt male - 2.5" diameter
	G-25-4000W	Gauge, 0-4,000 PSI Bottom Port 1/4 npt male - 2.5" diameter
Pigtails	20-1001	36" (pre-bend) single loop rigid copper O2 (w/o check) – CGA 540
	20-1002	36" single loop rigid copper N2O – CGA 326
	20-0002	24" Flexible stainless braided N2O - CGA 326 with captured fittings
	20-0003	24" Flexible stainless braided CO2 – CGA 320 with captured fittings
	20-0004	24" Flexible stainless braided AIR – CGA 346 with captured fittings
	20-0005	24" Flexible stainless braided N2 – CGA 580 with captured fittings
Outlet Union Adapter	17-0234	½" M npt x ½" M npt 1" 11 ½ NPS
Accessories	PS-160-3200	Pressure switch adjustable from 200 – 3,000 psig
	TAV-1	Remote audio / visual alarm
	RV-22-075	Relief valve - 75 psig x ½ M npt inlet with pipe away adaptor
	RV-22-150	Relief valve - 150 psig x ½ M npt inlet with pipe away adaptor
	RV-22-250	Relief valve - 250 psig x ½ M npt inlet with pipe away adaptor

Troubleshooting

Symptom	Remedy
Pigtails won't connect to cylinders or TSD manifold tee	Check CGA numbers on the cylinder valve or the TSD manifold tee and the pigtail fittings. The numbers must match – this ensures there will not be an improper gas connected to the system. Contact you supplier for assistance.
Leaks	Fittings may need to be tightened or the fittings may need to be replaced if the seating surface is scratched or scared. In the case of CO2 pigtails there is a seal washer that is required at each connection. If the seal washer is missing, it will leak. If the regulator is leaking, contact you supplier for assistance. The regulator may need to be replaced.
Broken / non-functioning gauge	Replace
Unable to decrease delivery pressure	Create a slight flow of gas downstream of the manifold and turn the regulator adjusting knob counter-clockwise.