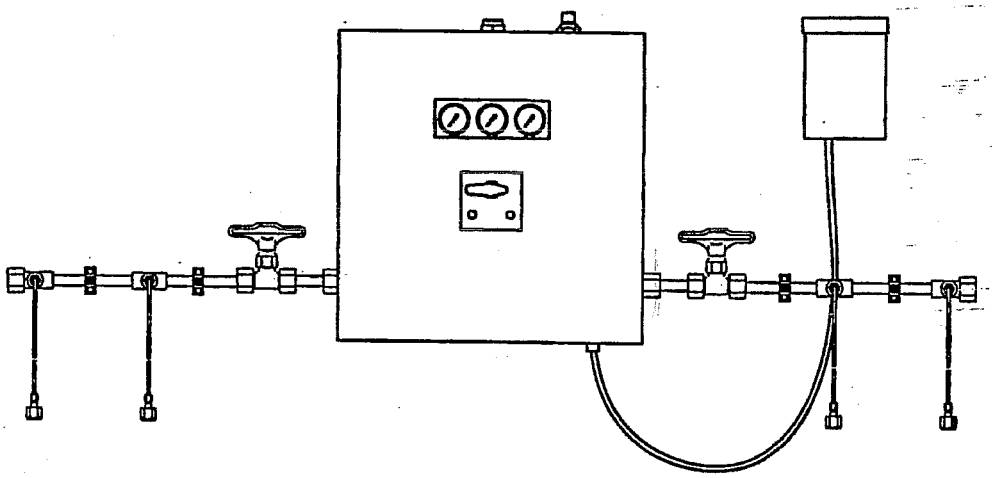
NELLCOR
PURITAN
BENNETT.

0056-1723

# MEGA® 2000™ SEMI-AUTOMATIC SWITCHOVER MANIFOLD

## INSTALLATION AND OPERATING INSTRUCTIONS



### FOREWORD:

The following procedures are recommended for the safe installation and operation of the automatic switchover manifold. These automatic switchover manifolds are designed and manufactured in accordance with National Fire Protection Association and Compressed Gas Association requirements to insure optimum protection for personnel and property.

**The following words in this manual have special significance.**

**WARNING:** Means there is a possibility of injury or death to yourself or others.
**CAUTION:** Means there is the possibility of damage to the unit or other property.
**NOTE:** Indicates points of particular interest for more efficient and convenient installation or operation.

### WARNING

- Working with high pressure gas can be hazardous. Very high temperatures and pressures will result if the valve is not opened slowly. These temperatures and pressures can damage the manifold system, and may cause injury to the operator. Always open valves slowly.
- Keep oil and grease away from manifold control cabinet, headers and cylinder connections.
- Do not use a flame or "sniff" test for leaks.
- Cylinders should be secured with racks, chains or straps.

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# KEY ELEMENTS OF THE AUTOMATIC SWITCHOVER MANIFOLD

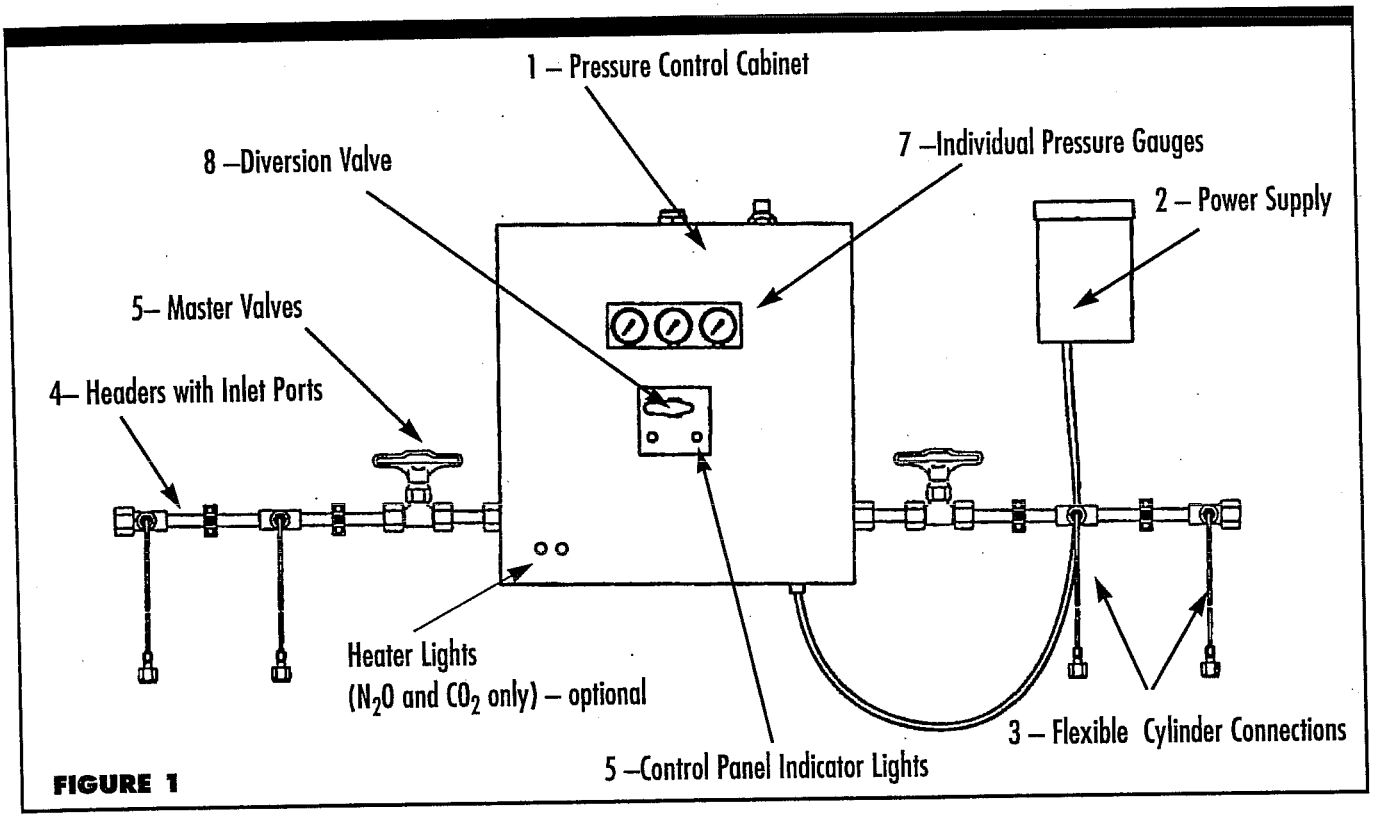



**FIGURE 1**

- A pressure control cabinet (1) that maintains constant pressure to the pipeline and enables smooth uninterrupted switchover from the "service" to the "reserve" cylinders.
- A 115 VAC input, 24 VAC output power supply (2). Power supply includes dry contacts for local and remote alarm connections.
- Flexible cylinder connections (3) with built-in check valves.
- Headers (4) with an individual check valve at each inlet port (4). Headers are modular construction to facilitate future expansion.
- Master valves (5) used to shut off gas in emergency situations. Should normally be left open.
- Control panel indicator lights (6) indicate manifold status. Green light "SYSTEM NORMAL" indicates both banks have pressure. Red light "RESERVE IN USE" indicates one bank of cylinders is depleted.
- Individual pressure gauges (7) allow monitoring of left and right cylinder bank pressure as well as pipeline delivery pressure.
- Diversion valve (8) – Diversion valve lever points toward the primary cylinder bank.
- Carbon Dioxide and Nitrous Oxide Manifolds have two additional amber lights indicating "Power on" and "Heater is Active".

# MANIFOLD OPERATION

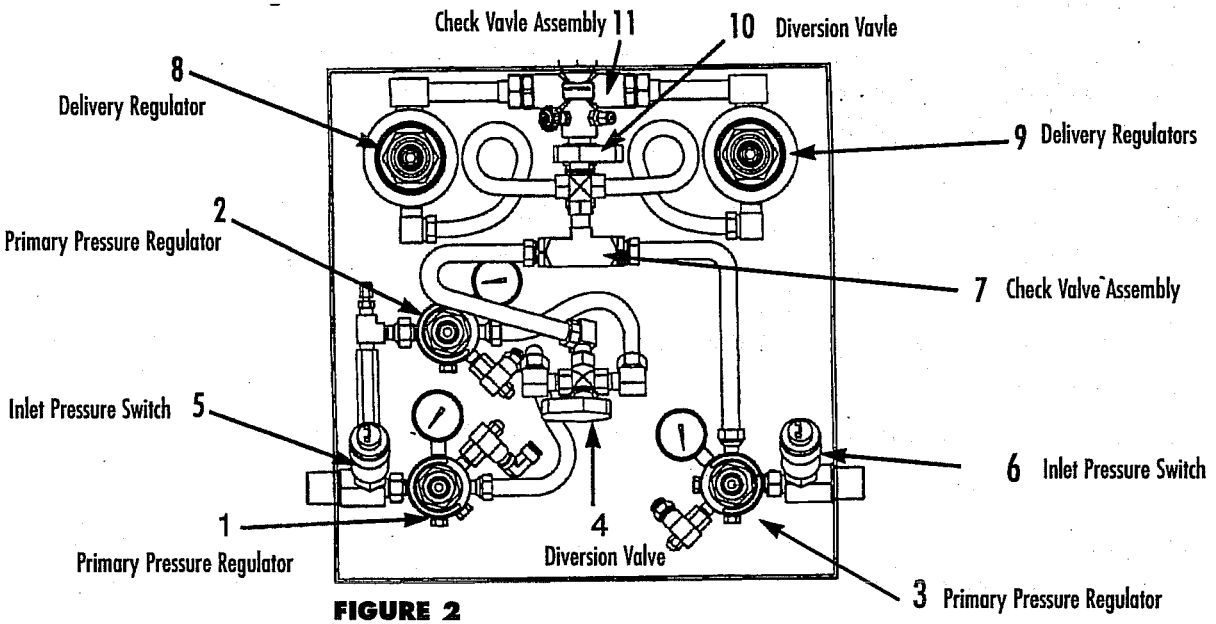



**FIGURE 2**

The switchover control operation is based on the pressure settings of the three primary supply regulators, items (1), (2) and (3) on the chart above. The primary bank (or "supply") is controlled by the position of the diversion valve (4), whose position indicates the cylinder bank from which gas is being drawn.

Regulator (1) is preset at 300 psig. Regulator (2) is preset at 200 psig, and regulator (3) is preset at 250 psig.

In operation, when the diversion valve (4) points to the left side, regulator (1), which is preset at 300 psig, overides delivery from regulator (3), which is preset at 250 psig. When the diversion valve points to the left, regulator (2) is not in the flow circuit.

As gas is depleted from the left cylinder bank, regulator (1) delivery pressure will eventually drop to less than the preset of regulator (3) (250 psig). At that point, gas starts being supplied through regulator (3).

The inlet pressure switch on the left side (5) measures the gas pressure and at its preset point (300-500 psig) its contacts open and the red "RESERVE IN USE" light is activated on the cabinet front. The green "SYSTEM NORMAL" light goes off. The dry contacts in the power supply box also open, activating a remote alarm if one is attached.

When the gas cylinders on the left side are replaced, pressure on regulator (1) returns to normal. At that point, the operator should turn the diversion valve to point to the right side of the pressure control cabinet. This will cause gas to continue to be supplied through regulator (3) on the right side. The red "RESERVE IN USE" light will go out, and the green "SYSTEM NORMAL" light will relight when pressure is applied to the left side.

When the diversion valve is pointed to the right cylinder bank, regulator (2) and regulator (3) are in the flow circuit. Regulator (3) is preset at 250 psig, which overides regulator (2) which is preset at 200 psig.

As gas is depleted from the right cylinder bank, regulator (3) delivery pressure will eventually drop below the preset of regulator (2), at which point gas starts being supplied through regulator (2). The inlet pressure switch on the right side (6) measures the gas pressure and at its preset point (300-500 psig) its contacts open and the red "RESERVE IN USE" light in the pressure control cabinet front activates, as described previously.

The control circuitry of the pressure control cabinet continues to cycle in this manner as each bank of cylinders empties and is then refilled.

The check valve assembly (7) prevents reverse flow of gas at cylinder changeover and if one of the primary regulators must be removed for repair.

Items (8) and (9) are L700E delivery regulators, with a delivery range of 5-180 psig. Diversion valve (10) located on the inside of the cabinet, controls which of these regulators deliver pressure. If it becomes necessary to repair the active regulator, diversion valve (10) must be switched to make the other L700E the supply regulator. At that point, the L700E regulator needing repair may be removed for repair. Check valve assembly (11) isolates the regulator so the system can still deliver pressure while the regulator is being removed and repaired.

The check valve assembly (11) also contains a vent valve, relief valve, and a 1/2" NPTF outlet port.

# INSTALLATION:

The manifold should be installed in accordance with guidelines stated by the National Fire Protection Association, Compressed Gas Association, Occupational Safety and Health Administration, and all applicable state and local codes.

**WARNING:** To avoid potential shock hazard do not attempt to hook-up or repair this device in the presence of water, such as rain. Power supply and cabinet should be properly installed and grounded per the National Electrical Code as well as state and local guidelines.

This equipment has been cleaned for oxygen service. Care must be taken during handling so that oil, grease and dirt do not contact parts. If cleaning is necessary, refer to Compressed Gas Association Pamphlet G-4.1, "Cleaning Equipment For Oxygen Service" for directions.

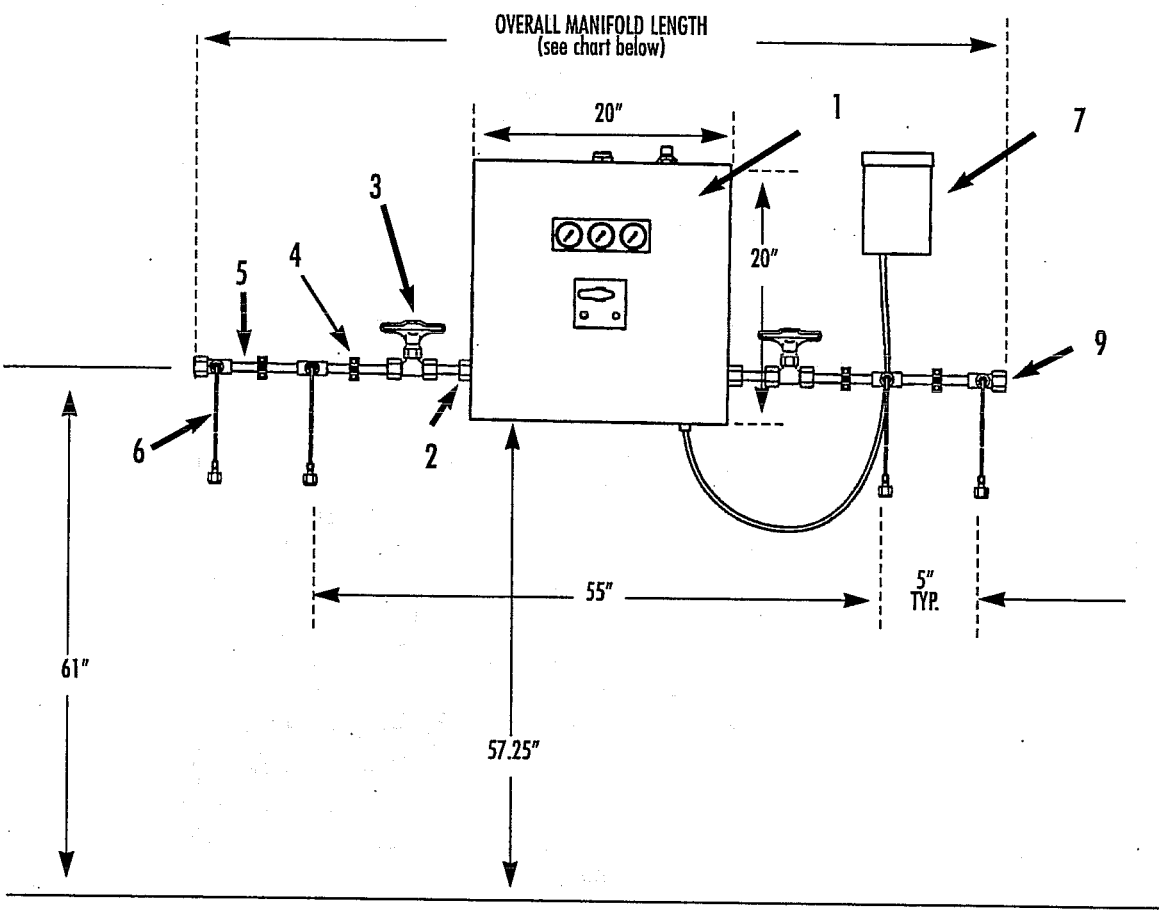
The manifold components are designed to work best over a temperature range of 32-140° F. Wider temperature variations may cause leaks or malfunctions to occur.

The pressure control cabinet is designed to be water resistant, but it is not waterproof. The pressure control cabinet should be mounted in a location protected from moisture. Water and excessive moisture will not affect the manifold headers and pigtails.

**Refer to Figure 3 on the next page when following the instructions below:**

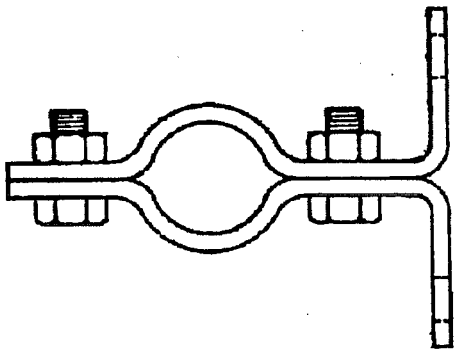
- Mount pressure control cabinet (1) to wall using cabinet mounting hardware supplied.
- Remove the nut and plug (9) from each inlet of the pressure control cabinet (1).
- Attach the adaptor (2) and master valve (3) to each manifold inlet.
- Hold each header in position and mark the location of each mounting bracket (4). Securely attach each mounting bracket to the mounting surface. (See mounting bracket detail figure 4 on page 8.)
- Attach each header (5) to each inlet. Attach each nut and plug to the end of each inlet header. Note: The radiused end of the plug is the sealing surface and should be oriented toward the header. Tighten all manifold connections to 55-65 ft. lbs. torque.
- Tighten all header mounting hardware.
- Attach each pigtail assembly (6) to each header port, and tighten to 15-25 ft. lbs. torque.
- Mount power supply (7) in a location convenient to the pressure control cabinet and connect 115 VAC power wiring to the free leads of the power supply as shown in the electrical drawing (fig. 5).
- Some Nitrous Oxide and Carbon Dioxide units come equipped with a six (6) foot power cord. This unit must be plugged into a standard 115VAC socket. The gas heater pulls a maximum 6 amps at 480 Watts.
- For remote alarm electrical connection, use electrical wiring drawing shown in fig. 6.

**FIGURE 3**




## Manifold Overall Length Chart
## Total Length (inches)

| Number of Stations Per Side | 5" Header Spacing | 10" Header Spacing |
|---|---|---|
| 1 | 50 | 60 |
| 2 | 60 | 80 |
| 3 | 70 | 100 |
| 4 | 80 | 120 |
| 5 | 90 | 140 |
| 6 | 100 | 160 |
| 7 | 110 | NA |
| 8 | 120 | NA |
| 9 | 130 | NA |
| 10 | 140 | NA |



Wall Mounting Bracket Detail
**FIGURE 4**

## Connect Electrical Service to Free Leads of Power Supply

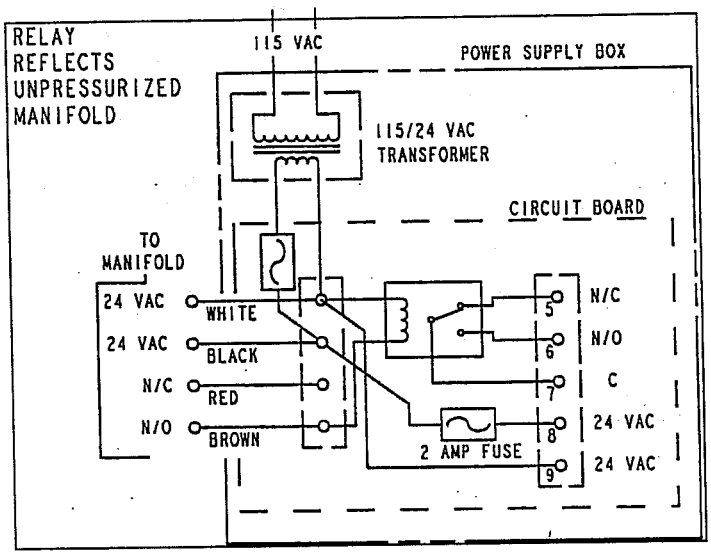
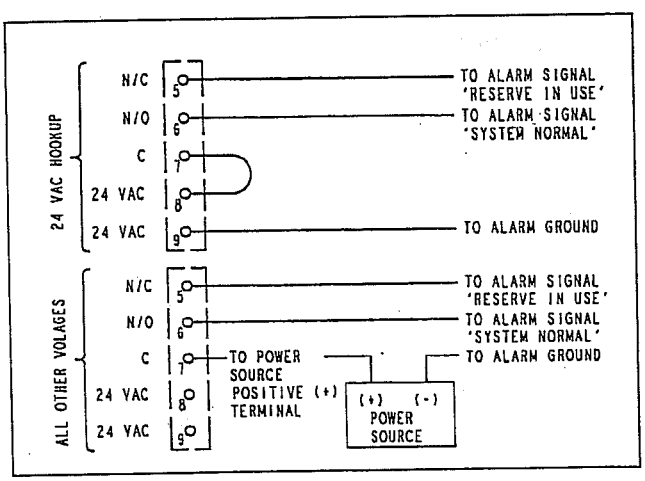
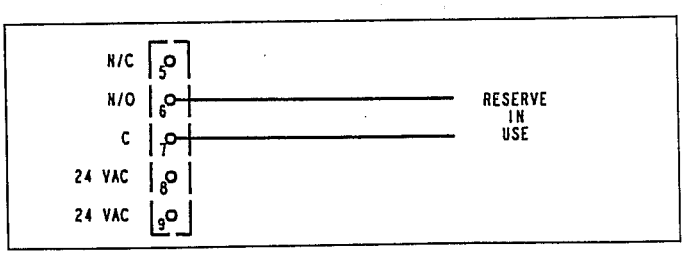



**FIGURE 5**




Typical Wiring Examples




Nellcor Puritan Bennett
Mega Alarm System

**FIGURE 6**

# INITIAL POWER-UP

**WARNING:** Make sure all of the previous installation procedures are completed before beginning operation of the manifold.

1. Plug the circular four-prong plug from the power supply into the plug receptacle on the lower right bottom of the pressure control cabinet. Tighten the nut on the plug to secure the plug to the pressure control cabinet.
2. Apply 115 VAC to the power supply.
3. With no pressure applied, as soon as power is switched on, both red and green lights on the front of the manifold control cabinet should light.
4. Apply pressure to one of the inlet sides of the pressure control cabinet. (Refer to cylinder replacement instructions.)

**Warning:** At initial installation, the headers, manifold, and possibly any piping downstream of the manifold will be filled with ambient atmosphere. Provisions should be made to completely purge the entire system with the gas intended for service before the system is put into use. If this is not done an improper gas may be administered until the system is purged, with possibly injurious results.

5. When over 500 psig of gas is applied to both of the manifold box inlets, the red light on that side should go off, and the green "IN SERVICE" light stay lit. The red and green lights on the un-pressurized side should stay on.

**NOTE:** When both sides of the manifold are pressurized, perform leak test.

# LEAK TEST

1. Shut off the flow at the outlet of the pressure control cabinet.
2. Shut off all cylinders supplying pressure to the supply headers.
3. Monitor pressure on the three gauges on the pressure control cabinet.
4. If any of the gauges drop in pressure, a leak is occurring.
5. Leaks may be detected audibly, or an approved leak detector solution may be used.
6. If a leak detector solution is used to detect leaks inside the pressure control cabinet, use caution to ensure the solution does not get into electrical components.
7. If leaks are detected, bleed all pressure from the manifold before repairing the leak.
8. Leaking joints utilizing metal-to-metal seals should be disassembled and examined. If dents, scratches, or other damage to the seals are the cause of the leak, the damaged components should be replaced and the manifold connection properly reassembled.
9. Leaking joints utilizing pipe threads should have the threaded component removed, the old tape removed, and new teflon tape applied to the threads. The component should then be reinstalled, the manifold re-pressurized, and re-tested for leaks.
10. Leaking joints utilizing o-ring seals should be disassembled and the o-ring examined. If the o-ring is cut, dented, or otherwise damaged, the o-ring should be replaced, the joint reassembled, the manifold re-pressurized, and the joint re-tested for leaks.
11. All leaking components must be repaired or replaced.

# CYLINDER REPLACEMENT

**WARNING:** Never permit oil, grease or other combustible material to come in contact with cylinders, manifolds and connections. Oil and grease may react with explosive force in the presence of some gases, particularly oxygen and nitrous oxide, resulting in damage to the equipment and possible injury to nearby personnel. Keep tools and equipment clean. Valves **MUST** be opened **slowly**. Pigtails must never be kinked, twisted or bent into a radius smaller than 3 inches. Do not apply heat to any part of the manifold or cylinders. Close pipeline shut-off valve in emergency only.

1. Turn off all valves on depleted cylinders. Do not turn off header or master valves.
2. **Slowly** loosen, and then remove the pigtail connections from the depleted cylinders.
3. Remove the depleted cylinders and reinstall protective caps.
4. Secure full cylinders in place using chains, belts or cylinder stands. Refer to Compressed Gas Association Pamphlet P-1 for more information.
5. Remove the protective caps from full replacement cylinders. Point the cylinder valve away from you or anyone else. **Slowly** open and quickly close (cracking) each valve slightly to blow out any dirt or contaminates which may become lodged in the cylinder valve.
6. Connect the manifold pigtails to the cylinder valves and tighten with a wrench. Make sure master valve is open. **Slowly** open cylinder valve farthest from the manifold. Wait 60 seconds. **Slowly** open remaining cylinder valves.
7. Observe the following conditions:

   "REPLACE CYLINDERS" light goes out.

   "READY FOR USE" light comes on.

## NELLCOR PURITAN BENNETT LIMITED WARRANTY

Nellcor Puritan Bennett medical gas manifolds are warranted against defects in material and workmanship for one year in accordance with Nellcor Puritan Bennett warranty, Form AA 256. Nellcor Puritan Bennett assumes no responsibility for service or repair not performed by qualified Nellcor Puritan Bennett service engineers. No charges for labor or repairs will be allowed without prior written authorization from Nellcor Puritan Bennett.

*Note: Product data, materials, specifications and availability subject to change without notice.*



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