

TESUCO[®]

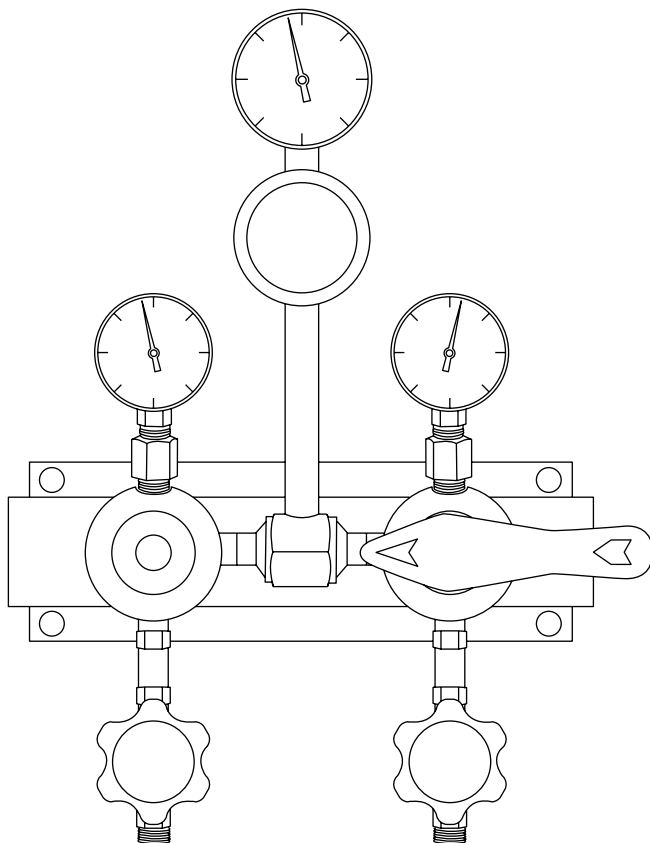
TECHNICAL SUPPLIES COMPANY

**OXYGEN & PERMANENT GASES
SEMI-AUTOMATIC
MANIFOLD**

**OPERATING
INSTRUCTIONS**

QUALITY GAS EQUIPMENT

tesuco.com.au



SYSTEM DESCRIPTION

Semi-automatic manifolds suitable for delivering a wide range of pressures are designed as illustrated. They consist of two primary regulators, an isolation valve on each side and a central supply block. They can be fitted with a dedicated delivery regulator, or they can be set up to connect directly to pipework.

One regulator is a set pressure regulator, the other is adjustable between two pressures either side of the set point of the set pressure regulator. Once set up, it is imperative that the set pressure regulator is not tampered with to ensure the consistent functionality of the manifold.

The manifolds may be either wall or floor mounted. Either way, the semi-automatic manifold should be securely mounted in such a position to allow each supply side to be easily connected to the inlets using flexible or rigid connection leads or hoses.

With valves open, gas at high pressure is supplied to the semi-automatic manifold system through high pressure connection leads or hoses connected directly to cylinders or packs, or through numerous cylinders connected to header rails depending on the supply needs of the system.

SYSTEM DESCRIPTION

Gas from the "IN USE" supply side is reduced by the primary regulator to the required outlet pressure. When this supply depletes to a pressure slightly less than the pressure being supplied by the "RESERVE" side, the system will automatically draw gas from the "RESERVE" supply side. If an alarm is fitted, it will indicate that changeover has occurred.

Turning the operating lever towards the "RESERVE" side until a stop is reached will indicate that the "RESERVE" side is now "IN USE" and vice versa. Closure of the empty cylinder valves and manifold isolating valve on what is now the "RESERVE" side, will allow the empty cylinders to be replaced by full ones. When the cylinder and manifold isolation valves are re-opened, the "RESERVE" supply side is ready for operation.

Semi-automatic manifolds may be supplied with header rail systems. Normally, supply banks on each side of a semi-automatic manifold contain an equal number of cylinders. The banks may be of any size, however standard sizes, for which stock parts are available, are 2 x 1, up to 2 x 6 cylinder configurations.

All connection leads or hoses will be supplied with the system for connection between the cylinders and the header rails. At each connection, the header rails have an integrated non-return valve and isolation valves to prevent the backflow of gas into any cylinder, should the pressure in the header rail exceed cylinder pressure.

End blocks on the header rails are fitted with blanking plugs; these positions may be used for fitting devices such as bursting discs, pressure transmitters or manifold extensions.

Contact gauges can be fitted to each of the primary regulators on the semi-automatic manifold and connected to an alarm panel, this will indicate when automatic cylinder bank changeover has occurred. For hydrogen systems, the alarm panel must form part of an intrinsically safe installation.

Note: Hydrogen is a fuel gas, therefore interface connections in the distribution system have left hand threads.

OXYGEN	USE NO OIL OR GREASE
FLAMMABLE GAS	CONTROL IGNITION SOURCES
INERT GAS	ENSURE ADEQUATE VENTILATION

INSTALLATION & COMMISSIONING INSTRUCTIONS

Semi-automatic manifolds may be supplied with header rails as part of a modular system. In these events, the components will be separated to reduce the risk of damage during transport. The pipework of each manifold header rail complete with all end and intermediate junction blocks is mounted in position on a stainless steel bracket. Cylinder retention chains and associated fittings are pre-installed onto the brackets. The connection leads or hoses are individually packaged and shipped along with the header rail to which they should be installed.

Orifices of all pipework and blocks are protected by plugging or capping with plastic seals or similar blanks, which protect the threads from damage and prevent contamination by ingress of any foreign material. These plugs and caps must be left in position until a permanent connection is made. Connection leads or hoses are individually sealed in plastic to ensure their integrity.

Manifold rails should be secured to soundly constructed walls before the components are attached. The height to the underside of the manifold rail should be 1200 mm.

When the manifold rails have been mounted, position the semi-automatic manifold on the wall, 300mm above and centrally between the manifold rails and secure with fixing bolts.

Connect the semi-automatic manifold to each of the supply sides with connection leads or hoses and connect each of the connection leads or hoses to the header rails, where required. All joints to the inlet of the semi-automatic manifold are high pressure connections; it is imperative to ensure each joint's gas tightness.

The following instructions for commissioning the manifold should be read in conjunction with Australian Standard AS 4289-1995.

- 1 Locate full cylinders or other supply at each bank and fasten into place, as required.
- 2 Slightly open each cylinder valve, releasing a puff of gas to remove residual moisture and dirt from the cylinder valve, then close.
- 3 Connect each connection lead or hose into the cylinder valve, then tighten firmly using a spanner.
Note: Use a spark proof spanner for hydrogen connections.
- 4 Check that both the isolating valves are closed on the semi-automatic manifold.
Note: Earth yourself in close proximity to the installation before proceeding with hydrogen systems.
- 5 Open each cylinder valve slowly and check for leaks, using an approved leak test solution. If bubbles appear, tighten the joint until leakage is cured.
- 6 Check that:
 - The pipework connected to each purge valve is venting to a safe area
 - The low pressure distribution pipework is connected to the outlet of the semi-automatic manifold or line regulator, if supplied.
 - All outlet point valves are closed.
 - All connections and joints are leak tight, using an approved leak test solution.
- 7 Open both the isolation valves on the semi-automatic manifold slowly.
- 8 Check the reading of the high pressure gauge with the pressure shown on the gas cylinder label. If there is a discrepancy, check against the pressure of another cylinder - if still incorrect, check pressure gauge for accuracy.

INSTALLATION & COMMISSIONING INSTRUCTIONS

- 9 Turn the pressure adjustment knob on the line regulator to adjust the pipeline pressure to the required operating pressure, if installed.
- 10 Leak test the complete manifold and distribution system.
- 11 Open one valve in the distribution pipe work system, ensuring that any gas discharge will be safe and create no hazards. If in doubt, connect a hose to the outlet point to take the gas discharge to a safe location outside the building.
- 12 Close the cylinder valve on the "IN USE" supply side, to simulate gas depletion and observe automatic changeover to the "RESERVE" supply side. This will occur when the supply pressure is depleted to a pressure slightly less than that being supplied by the "RESERVE" side.
- 13 Turn the operating lever through 180° until it hits a stop and is pointing towards the "RESERVE" supply, which will now become the "IN USE" supply. Conversely, the supply that was the "IN USE" supply prior to the movement of the lever, will now become the "RESERVE" supply.
- 14 Close the manifold isolation valve on what is now the "RESERVE" supply side and simulate the exchanging of cylinders by re-opening the cylinder valves and then the manifold isolation valve.
- 15 Repeat steps 12 through 14 to ensure changeover functionality on the second side of the manifold.
- 16 Close the outlet point valve, which was opened at step 11.
- 17 Open each outlet point in turn to ensure that the pipeline is thoroughly purged. Appropriate safety precautions must be taken to avoid dangerous concentrations of gas.
- 18 Display suitable instruction cards, adjacent to the manifold, explaining correct operation of valves and controls.
- 19 Now refer to Operating and Maintenance Instructions.

OXYGEN	USE NO OIL OR GREASE
FLAMMABLE GAS	CONTROL IGNITION SOURCES
INERT GAS	ENSURE ADEQUATE VENTILATION

OPERATING & MAINTENANCE INSTRUCTIONS

The manifolds should be operated in accordance with the following instructions and the requirements of Australian Standard AS 4289-1995.

The manifold should preferably be put into operation immediately after commissioning.

- 1 Turn the operating lever through 180° to either the left or right extreme position (until it hits a stop) and points towards the "IN USE" supply side.
- 2 Ensure the isolation valves on the semi-automatic manifold are open.
- 3 Leak test all connections, using an approved leak test solution.
- 4 Observe that the alarm panel is indicating the correct operating condition of the manifold.
- 5 At the end of each working period, check that all outlet point valves are closed, then close the isolation valves on the semi-automatic manifold and cylinders.

When the manifold supply changes to the "RESERVE" supply, as indicated by an alarm panel, if fitted:

- 6 Turn the operating lever towards the opposite side until it hits a stop (this will now indicate that the supply that was "RESERVE" is now "IN USE" and vice versa).
- 7 Close all cylinder valves on the depleted cylinder bank and the manifold isolating valve.
- 8 Disconnect all connection leads and hoses from the empty cylinders by unscrewing the connections at the cylinder valves.
Note: Use a spark proof spanner for hydrogen connections, which have a LH thread.
- 9 Mark all cylinders on the empty bank with chalk to show that they are "EMPTY".
- 10 Remove one cylinder at a time, by unhooking the retention chain and transfer each to the empty cylinder location.
- 11 Place a full cylinder in each empty position on the manifold, correctly orientated to connect to the connection lead or hose, and fasten into position with the retention chain.
- 12 With all cylinders in position, remove the cylinder valve caps and shift (crack open the cylinder valve momentarily) each cylinder. This removes any residual water and dirt from the outlet connection.
- 13 Connect each connection lead or hose to its corresponding cylinder by tightening the connection to the cylinder valve with a spanner.
- 14 When all connections have been made, open each cylinder valve slowly and check the connection for leakage, using an approved leak test solution. If bubbles form, tighten further until leakage is cured.
- 15 Check the Semi-Automatic high pressure gauge to ensure the reading is in accordance with the pressure shown on the gas cylinder label.
Note: The complete system should be left pressurised, other than during maintenance or prolonged periods of shutdown.

When maintaining hydrogen systems, always earth yourself in close proximity to the installation before commencing work, by touching the manifold.

PERIODIC CHECKS

Daily

- 1 Check the manifold is in good working order and free from leaks.
- 2 Ensure the safe working area around the manifold has not been disturbed.
- 3 Ensure instruction and warning notices are legible and displayed correctly.
- 4 Ensure the alarm system, if fitted, is indicating correctly.

Six-monthly

- 1 Check all isolating valves for full and free range of movement and effective shut off.
- 2 Check cylinder valves for correct operation - leave cylinder valves open.
- 3 Check the high pressure regulators and the outlet regulator for satisfactory operation.
- 4 Check pressure gauges for damage, free range of movement and correct indication.
- 5 Leak test all joints in the cylinder manifold and distribution pipework, using an approved leak test solution.

Note: Helium is an exceptionally penetrative gas; leak testing requires extreme care and vigilance.

- 6 Check operation of alarm system.

Annually

- 1 Complete all items of the six-monthly inspection.
- 2 Check all non-return valves for correct operation; rectify or renew, if defective.
- 3 Check connection leads or hoses for damage, and connectors for wear.
- 4 Ensure no item of equipment is overdue for inspection or testing (eg. pressure gauge calibration or cylinder test).
- 5 Ensure that spare parts for the next 12 month's operation are available.

A record of all maintenance should be kept.

TESUCO[®]

TECHNICAL SUPPLIES COMPANY

The information contained herein is provided to assist the operator in the safe use of the Tesuco[®] Semi Automatic Manifold. However, the ultimate responsibility for the safe use of this and any attached equipment lies solely with the operator, including any requirements of associated Australian Standards.

