

Lab-Master Automatic Changeover Manifolds - (Excluding Acetylene)

System Description

Gas-Arc products are designed to supply and/or protect piping of a nominal diameter of less than 25mm and therefore meet the PED criteria "Sound Engineering Practice" and will not be CE marked.

Autochange manifolds of all sizes are designed as illustrated in our recommended spares section. Manifolds can be supplied either as wall or floor mounted options.

When wall-mounted, the manifold support frame is bolted directly onto the wall through the wall plates. When floor mounted the manifold is supported on legs, which are bolted down to the floor.

The autochange unit is mounted on the wall centrally above the manifold. The unit consists of two primary regulators, two cylinder bank isolating valves, a line regulator contact alarm gauges, pipeline pressure safety relief valve, LP purge/sample valve, line isolation valve and pipeline connection.

With cylinder valves open, gas at high pressure (up to 300 bar g) discharges from the gas cylinders (minimum of one gas cylinder to each bank) through tailpipes/hoses, connected to the cylinders by bull nose connectors and to the manifold header, then through to the autochange unit.

Gas from the 'Working' bank of cylinders is reduced by the primary regulators to the required distribution pipeline pressure. When the 'Working' bank is depleted, gas will be supplied automatically from the 'Standby' bank of cylinders and an alarm if fitted will indicate when changeover has occurred. Movement of the operating lever to the extreme opposite position, followed by closure of the empty cylinder valves and manifold isolating valve, will allow the empty cylinders to be replaced by full ones. With cylinder valves and manifold isolation valve open, the full cylinders become the new 'Standby' bank.

Non return valves prevent the backflow of gas into any cylinder.

Manifolds are supplied with the correct number of tailpipes/hoses. Normally both LH and RH banks contain an equal number of cylinders and the banks may be of any size. Standard sizes available are 2 x 1 up to a 2 x 6 cylinder configuration.

An alarm panel, sited in the working area, will indicate when automatic cylinder bank changeover has occurred. For fuel gases systems, the alarm panel must form part of an intrinsically safe barrier enclosure installation. Further details of alarm panels are given in Data Sheet No. LAB11046 and LAB11047.

Autochange manifolds conform to BCGA Code of Practice CP4.

Installation & Commissioning Instructions

Manifolds when shipped from the factory are partially disassembled for ease of carriage and to prevent damage. The autochange unit is packed separately.

The manifold header pipework complete with all end and intermediate mounting blocks, as well as other fittings, is mounted in position on the manifold frame. The tailpipes (flexible hoses or rigid copper pipework) are supplied but not attached to the manifold.

Orifices of all pipework, blocks and tailpipes are protected by plugging or capping with plastic seals or similar blanks, which protect the threads from damage and prevent contamination by ingress of foreign material. These blanks must be left in position until a permanent connection is made to the component.

Wall mounted manifolds should be secured to soundly constructed walls BEFORE the components are attached. The height to the underside of the manifold rail is 1200 mm.

The manifold is usually commissioned in conjunction with the distribution pipeline by a responsible engineer, who will ensure that:

- the manifold area is clear of all foreign material
- relevant instruction cards and warning notices are displayed
- the manifold has been tested satisfactorily.

The following instructions for commissioning the manifold should be read in conjunction with BCGA Code of Practice CP4.

- 1 Stand a full cylinder in place in each position on the manifold and fasten with the securing chain. Momentarily open each cylinder valve slightly, releasing a puff of gas (with the exception of fuel gases) to remove residual moisture and dirt from the outlet connection.

Note! Only full cylinders are to be used to ensure correct functioning of the Autochange.
- 2 Screw the bull nose connector of each tailpipe into the cylinder valve, then tighten firmly with the spanner provided.

Note! Use a spark proof spanner for fuel gas connections, which have a LH thread.
- 3 Check that the autochange high pressure isolating valves are closed.

Note! Earth yourself in close proximity to the installation before proceeding with fuel gas systems.
- 4 Open each cylinder valve slowly and check for leaks, using an approved leak test solution. If bubbles appear, tighten the joint further but not beyond 50 lbs/ft when leakage should be cured.
- 5 Check that:
 - (i) Low pressure distribution pipework is connected to the outlet of the autochange pressure reduction package.
 - (ii) All outlet point valves are closed.
 - (iii) All connections and joints are leaktight, using an approved leak test solution.
- 6 Open one valve in the distribution pipe work system, ensuring that any gas discharge will be safe and create no hazards.
- 7 Open both the autochange high pressure isolating valves slowly.
- 8 Adjust the pressure screw on the outlet regulator to the required distribution pipeline operating pressure.



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- 9 Leak test the complete manifold and distribution system.
- 10 Close the cylinder valve on the bank supplying gas, to simulate gas depletion, and observe automatic changeover to the opposite bank. **(Note!** Lever does not move automatically).
- 11 Move the operating lever to the opposite position, indicating that the cylinder on the other bank is now supplying gas.
- 12 Re-open first cylinder valve to simulate a new full cylinder being connected and now close the duty bank cylinder valve.
- 13 Return the operating lever to the original position, so that the full cylinder bank is now supplying gas. You have now ensured the manifold is changing over correctly.
- 14 Close the outlet point valve, which was opened at Step 6.
- 15 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. Purging - It is critical that all high purity equipment be thoroughly purged before use to ensure that any residual moisture is removed from the system. The following procedure should be carried out:
 - Pressurise the manifold/regulator assembly to its maximum outlet operating pressure and then with the inlet pressure isolated, reduce the outlet pressure to 1 bar. Repeat this process 3 times.
 - Finally at a minimum operating pressure of approximately 1 bar, purge the regulator until the operating pressure falls to 0.5 bar and hold for a period of 2/3 minutes.

Note! To avoid Oxygen depletion or enrichment of the local environment, ensure all purging gases are safely vented.
- 16 Display suitable instruction cards, adjacent to the manifold, explaining correct operation of valves, controls, working and standby cylinders.
- 17 Commission the alarm unit as described in Data Sheet No. LAB11046 and LAB11047.
 - The installation must generally conform to the minimum requirements of BCGA Code of Practice CP4, including:
 - The following also give guidance and instructions for keeping of LPG in cylinders:
 - The Highly Flammable Liquids and LPG Regulations 1972 (Statutory Instrument 917)
 - Home Office Code of Practice for keeping LPG in cylinders and similar containers
 - LPG ITA Code of Practice CP7 and CP22
 - HSE Guidance Note CS4
 - Siting of manifold and routing of pipework in a safe area.
 - Correct identification of gas service in accordance with BS1710.
 - Anti-confusion check, if cross-connection of gas service is possible.
 - Purging into service with an inert gas.
 - Testing for leaks, strength and pressure variation by pneumatic or hydraulic means.
 - Checking stop valves, non-return valves, changeover valves and cut-off devices for leak-tightness, security of attachment and correct operation.

Now refer to the Operating Instructions.

Operating & Maintenance Instructions

The manifold should be operated in accordance with the following instructions and the requirements of BCGA Code of Practice CP4.

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

- 1 Push the operating lever to one extreme position (the arrow will indicate the primary bank supplying gas).
- 2 Ensure the autochange high pressure isolating valves are open.
- 3 Leak test all connections, using an approved leak test solution.
- 4 If fitted 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 autochange high pressure isolating valves.

When alarm panel indicates that the manifold has changed over to the reserve bank:

- 6 Move the operating lever to the other extreme position (the arrow will indicate the second bank supplying gas).
- 7 Close all cylinder valves on the depleted cylinder bank and the manifold isolating valve.
- 8 Disconnect all tailpipes/hoses from the empty cylinders by unscrewing the bull nose connectors.

Note! Use a spark proof spanner for fuel gas 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 chain, and transfer to the empty cylinder location.
- 11 Place a full cylinder in each empty position on the manifold, correctly orientated to connect to the tailpipe, and fasten the retaining chain as tightly as is practicable.

Note! Only full cylinders are to be used to ensure correct functioning of the Autochange.

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- 12 With all cylinders in position, remove the cylinder valve caps and sniff (crack open the cylinder valve momentarily with the exception of fuel gases) each cylinder. This removes any residual water and dirt from the outlet connection.
- 13 Connect each tailpipe/hose to the adjacent cylinder by tightening the bull nose connector into the cylinder valve, with the spanner provided.
- 14 When all connections have been made, open each cylinder valve slowly, followed by the manifold isolating valve.
- 15 As each valve is opened, check the bull nose connection for leakage, using an approved leak test solution. If bubbles form, tighten further but not beyond 50 lbs/ft when leakage should be cured.
- 16 Check the autochange 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.

Maintenance

Weekly checks may be done by an operator instructed in the tasks. Six-monthly and annual maintenance should be performed by a competent person, who fully understands the operation of the cylinder manifold and the hazards involved.

A record of all maintenance should be kept.

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

Periodic Checks:-

Weekly Inspection (by the user)

Check that:

- i) visually, equipment is in good order, is being correctly used and all the required equipment is fitted.
- ii) manifold, framework and chains are in good condition.
- iii) pigtailed and flexible hoses are not corroded or damaged.
- iv) valves shut off and open correctly.
- v) regulators are identified as being suitable for the gas and pressures and are not damaged.
- vi) the system is operating normally, i.e. report if the system is using more gas than normal, if there is an unusual drop in pressure or if there is a smell of gas which could indicate a malfunction or leak.
- vii) the manifold house is free from oil and combustible materials and is not used as a store room.

Annual Inspection (by a person with appropriate experience and knowledge)

Check that:

- i) all repairs and modifications (including removals and additions of components) and extensions carried out conform to this Code of Practice.
- ii) changes in the vicinity of the installation do not affect its operation or safety.
Examples are location of heat sources or burners, moving of machines or work places, occurrence of vibrations, use of a pipeline as an electrical earth or as a support for other items, proximity to electrical installations and to other piping systems.
- iii) there is adequate identification of above ground pipework/pipelines and route markers for buried pipework/pipelines.
- iv) the system is free from leaks by testing at the designated operating pressure.
- v) buried pipelines are in ground which is free from encroachment by other services, buildings or civil structures.
- vi) filters are in good condition and are not blocked. Clean or replace them where necessary.

Note! For replacement component parts refer to Recommended Spares Section.

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