

SPEC-MASTER AUTOCHANGE INSTALLATION & OPERATING INSTRUCTIONS

Warning : An appropriately sized pressure relief device downstream of the regulator should be installed in your system to prevent damage to equipment and/or injury to personnel should an internal failure of the regulator occur.

Warning : For regulators with tube fittings, select the appropriate tubing. Use seamless tubing with the proper consideration given to wall thickness and material. Please contact your gas supplier for more information.

This instruction sheet is to be read in conjunction with the Spec-master regulator operating instructions (LAB11054), the Spec-master purge valves installation and operating instructions (LAB11059) and the Spec-master gas cylinder autochange monitor instructions (LAB11064).

USER RESPONSIBILITY

This equipment will perform in conformity with the description contained in this manual and accompanying marking, labels and/or inserts when installed, operated and maintained in accordance with the instructions provided. This product is 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. It is the users responsibility to ensure that the manifold is suitable for the gas being used. This equipment must be checked periodically. Improperly working equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Gas-Arc recommends that a telephone or written request for service advice be made to Gas-Arc Customer Service, Vinces Road, Diss Norfolk, IP22 4WW UK Telephone + 44 1379 652263.

E-mail enquiries@gas-arc.co.uk

This equipment or any of its parts should not be altered without prior written approval by Gas-Arc. The user of this equipment shall have the sole responsibility for any malfunction that results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than Gas-Arc or a service facility designated by Gas-Arc.

CUSTOMER SERVICE

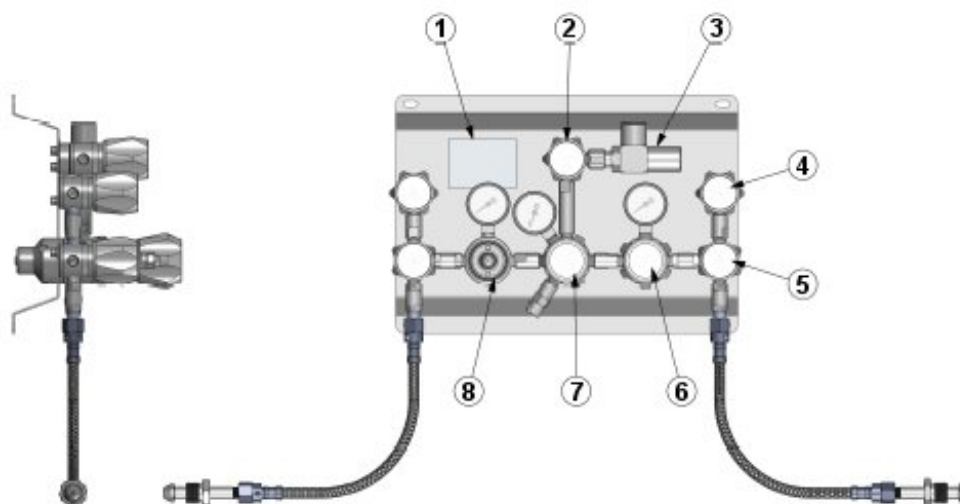
In the event of equipment failure, call Gas-Arc Customer Service. Please be prepared to provide the model number of the equipment involved, in addition to some details regarding its application.

DESCRIPTION OF PRODUCT

The Spec-master Autochange is an automatic switchover system designed to provide a continuous supply of high purity gas. This unit may be used with one cylinder per side, or used with a manifold that has increased storage capacity. If constant regulated outlet pressure is required, a regulator will need to be installed as part of the switchover system, or down stream after the switchover system.

TYPICAL LAYOUT

Depending on specification, the actual layout may vary from that shown below.



- 1 – Identification plate
- 2 – Line isolation valve
- 3 – Safety relief valve
- 4 – Purge/vent valve
- 5 – HP isolation valve
- 6 – RH bank regulator with duty bank selector
- 7 – Outlet pressure regulator
- 8 – LH bank regulator (non-adjustable)

INTENDED USE OF PRODUCT

Spec-Master autochange is designed for use in high purity gas applications. It is not suitable for use with toxic or corrosive gases. Please note the safety information shown in the later sections.

Things to consider before removing the system from the box.....

1. Know the properties and special handling requirements of the gas being used. Many speciality gases are quite dangerous (flammable, asphyxiant or oxidizers). Equipment failure or misuse may lead to problems such as a release of gas through the relief valve or regulator diaphragm. Proper safety measures, such as the use of gas cabinets or gas detectors, should be established to handle these and other component failures.
2. Be sure that the assembly purchased is suitable for the gas and type of service intended. The manifold label provides the following information:
 - a. Serial number
 - b. Maximum inlet pressure
 - c. Gas purity
3. Inspect the assembly upon receipt to be sure that there is no damage or contamination. Pay particular attention to connecting threads. While Gas-Arc assembles system components to exacting leak-tight standards, the customer should also inspect for any loosening of parts that may occur in shipping or installation. Loose parts may be dangerously propelled from an assembly. If there are adverse signs (leakage or other malfunction), return the assembly to the supplier.
4. Before system start-up, it is recommended that all systems be pressure tested, leak tested and purged with an inert gas such as Nitrogen. To accomplish this, it may be necessary to use an adaptor. The recommended use of an adaptor is for temporary use, for start-up and system checks only. Adaptors should never be used on a permanent basis.

GENERAL SAFETY PRACTICES

- ✓ Comply with precautions listed in British Compressed Gases Association codes of practice.
- ✓ Consult the cylinder distributor for the proper use of cylinders and for any restrictions on their use (such as flow rate and temperature requirements).
- ✓ Store cylinders with valve caps screwed on, and cylinders chained to a supporting wall or column.
- ✓ Handle cylinders carefully and only with valve caps screwed on. The cap will reduce the chance that the cylinder valve will break off if the cylinder is accidentally dropped or falls over. The cap also protects the cylinder valve from damage to screw threads, which could cause leaky connections.
- ✓ All manifolds used with flammable gases should be provided with approved flashback arrestors to stop any burning gas in the pipeline from getting back to the manifold or cylinders.
- ✓ No smoking should be permitted near Oxygen, Nitrous Oxide, any other oxidiser, flammable gases or flammable mixtures, or in areas where cylinders are stored.
- ✓ Where an oxidiser (such as NO₂ or O₂) is used, the manifold and cylinders must be kept clean. No oil, grease or combustible substances should come in contact with Oxygen or Nitrous Oxide storage or handling equipment. Such materials in contact with Oxygen or Nitrous Oxide are readily ignitable and when ignited, will burn intensely.
- ✓ Never lift gas cylinders with a magnetic lifting device.
- ✓ Never use an open flame when leak testing.
- ✓ Always open valves slowly when high-pressure gases are being used.
- ✓ Always be sure that a cylinder contains the correct gas before connecting it to any manifold.
- ✓ Always leak-test any manifold or distribution pipeline before using.
- ✓ Always be sure that the gas in a pipeline is the correct gas for the intended use.
- ✓ Always close all cylinder valves before disconnecting cylinders from a manifold.
- ✓ Always remove all empty cylinders from a manifold before connecting full cylinders.
- ✓ Always test cylinders to be sure the cylinders are full before connecting to a manifold.

INSTALLATION

Keep all cylinders and manifolds away from any source of high temperature, over 50°C or possible fire hazards. High-pressure gas contained in a closed cylinder becomes increasingly dangerous when exposed to high temperature because pressure increases and the strength of the cylinder decreases. Manifolds installed in open locations should be protected from weather conditions. During winter, protect the manifold from ice and snow. In summer, shade the manifold and cylinders from continuous exposure to direct sunlight. Always leave access to the manifold for cylinder replacement.

The site chosen for the manifold installation shall be level, well ventilated and at a safe distance from sources of flames, sparks and excessive heat. The manifold should not be placed in an area that may subject the manifold to damage from passing forklifts, trucks or other heavy machines. Oxygen manifolds must not be installed under shafting, belting, or other places where oil can drip on them. For other location guidelines, consult the British Compressed Gases Association.

Consider the following when installing the system.

1. Be sure to consider all factors when selecting materials.
2. Do not use oil or grease on fittings.
3. Be sure that all fittings are secure and leak tight. PTFE tape should be used on pipe threads.
4. If constant regulated pressure is required, a regulator will need to be installed either with the switchover system, or downstream after the switchover system.
5. Capture vent kit: When used with toxic, corrosive, or flammable gases, the captured vent kit shall be added to each of the regulators of the autochange. This vent kit is added to the bonnet to redirect gas in the event of a diaphragm failure. When installing the vent kit, be sure to connect suitable tubing from the vent kit fitting to the safe discharge area.
6. Purge devices: These devices are optional. Purge devices are used to remove toxic, corrosive or flammable gases from the customer's system to a safe discharge area. This is particularly helpful when an internal problem occurs (such as regulator malfunction).
7. Contact alarm gauges: These devices are optional. Used in conjunction with a remote alarm, they provide a warning that one or both of the cylinder banks is about to be depleted. The contact alarm gauges have a normally open switch. When the indicated pressure is above the gauge set point, the switch is closed and will allow current flow in the circuit. Refer to the Gas Cylinder Autochange Monitor instruction sheet for wiring details.



**MAX POWER 10W, 10VA
SWITCHING CURRENT - 0.5 AMPS
(NON-INDUCTIVE)**

Use an open-end wrench, not a pipe wrench, to install accessories to the autochange system. ¼" NPT connections require the use of PTFE tape on the threads to make a gas tight seal. On stainless steel connections, the thread sealant helps prevent the connections from galling together when tightening or loosening. GAS-ARC uses PTFE tape on all its regulator NPT connections. Follow these rules when using PTFE tape.

Inspect the NPT threads and if necessary, clean the fittings to remove any dirt or thread sealant that remains on the threads. Start the PTFE tape on the second thread as shown in Figure 4; make sure the tape does not overlap the end of the fitting. As the tape is wrapped in the direction of the thread spiral, pull tightly on the end of the tape so that the tape conforms to the threads. Wrap the tape around the threads twice. Cut off the excess tape and press the end firmly into the threads. (See Figure 4 below)

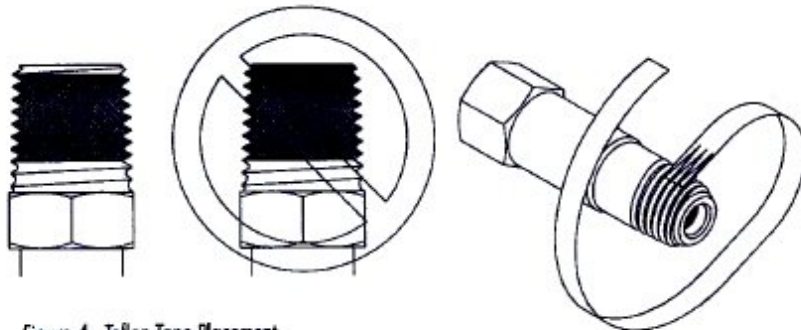


Figure 4. Teflon Tape Placement

Connecting to a cylinder:

1. Before removing the cylinder cap, move the cylinder of gas to the work site:
 - a. Secure cylinder to the floor, wall or bench with appropriate chain, strap or stand to prevent toppling.
 - b. Remove the cylinder cap.
 - c. Be sure the cylinder valve is tightly closed (clockwise)
 - d. Remove the cylinder valve plug, if any.
 - e. Inspect the cylinder valve and threads for damage or contamination.
2. Secure the cylinder connection to the cylinder in the following manner:
 - a. Do not force. Tightening the nut onto the cylinder connection should be easy. If it is not, the connection may be wrong for the type of gas being used.
 - b. Left-hand threads are used on some cylinder connections. A notch in the middle of the hex nut typically indicates a left-hand thread.
 - c. Gaskets are used on some inlet connections. Be sure the gasket is in good shape. Do not over-tighten to avoid squashing the gasket into the gas line. Keep extra gaskets on hand.
 - d. Never use oil or grease on regulator or cylinder fittings, as it may contaminate pure gases, or create a fire hazard.

Installing the outlet connection:

The standard system has the outlet connection at the top of the autochange system. The connection is a female ¼" NPT.

Pressurizing the system for the first time (non-manifold use):

Before system start-up, it is recommended that all systems be pressure tested, leak tested and purged with an inert gas such as Nitrogen. To accomplish this, it may be necessary to use an adaptor. The recommended use of an adaptor is for temporary use only, for system start up and checks. Adaptors should never be used on a permanent basis.

1. Wear safety glasses and gloves.
2. Be sure that both ends of all hoses or pigtailed are secured before pressurising. Turn the line regulator knob anti-clockwise until the knob stops turning.
3. When first pressurising, do not stand in front of or contact the switchover system. Slowly open the cylinder valve. Observe the high pressure gauge for a rise in pressure up to full cylinder pressure. Warning – if this system is equipped without the line regulator, the outlet will pressurise when the cylinder valve is opened.
4. Keep the hand wheel or wrench on the open cylinder valve at all times, to allow prompt emergency shut-off.
5. Inspect all connections for leaks and fix any leaks. A leak detection solution may be applied to the connections (if compatible with the application), which indicates leaks by bubbling. To further check for leaks, or if the leak detection solution cannot be used, close the cylinder valve for a period of time (recommended 24 hours), and observe the high pressure gauge for a drop in pressure. If so indicated, recheck the connection and all other high-pressure port connections
6. Never attempt to fix a leak under pressure. If leaks are detected, depressurise the system and retighten the connection. Begin again at step 3.
7. Slowly turn the line regulator knob clockwise. This will increase the pressure of the line. Adjust to the desired working pressure and again check for leaks using the methods described above.

OPERATION

The arrow on the duty bank selector always points to the duty side; the bank opposite the duty side is considered the reserve side. Starting with the arrow pointing to the right side, gas will flow from the right side cylinder. As the gas in the duty side is depleted, the gas pressure will drop on the gauge of the duty regulator. When the pressure drops to the pressure setting of the reserve side regulator, flow will begin from the reserve cylinder; the inlet pressure on the duty side will stabilise. This is called a changeover. At this point, the gas pressure on the reserve side (preset regulator) will drop. This indicates that its time to change the cylinders on the primary side.

Before removing the nearly depleted duty cylinder, the duty bank selector should be rotated 180°. This makes the reserve cylinder the duty source. Remove the depleted cylinder and replace with a full cylinder. Before removing the cylinder be sure to close the cylinder valve and any other valves that connect the cylinder to the system. The full, replacement cylinder is now the reserve cylinder. Note: while changing cylinders on one side, there will be no interruption in flow.

Gas will continue to flow from the duty side until the outlet pressure of the preset regulator matches the pressure of the priority valve regulator. (The pressure setting of the priority valve regulator changes when the knob is turned 180°). When the gas pressure stops dropping on the preset regulator and starts to drop on the priority valve regulator, it is time to change the left cylinder. The knob is rotated 180° to the right before the left cylinder is changed. It is helpful to maintain a log of cylinder pressure, noting which direction the arrow is pointing on the duty bank selector. When the pressure gauge is very low and the reserve side indicates that gas has begun to flow from the reserve cylinder, it is time to rotate the knob and attach a full cylinder in reserve.

If the knob is not rotated before the empty cylinder is changed, two things can happen. First, gas may flow from the changed cylinder to the existing cylinder. This is because the pressure setting of the regulator on the primary side allows the regulator main valve to remain open. Second, when the cylinder is changed, gas will begin to flow from the new cylinder, stopping flow from the existing cylinder. This means the existing cylinder may be partially empty. After several cycles, it is possible that the reserve cylinder may empty shortly after a switchover occurs. Always remember to rotate the knob on the duty bank selector **before** changing a depleted cylinder.

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.

Weekly Inspection (by the user)

Check that:

1. visually, equipment is in good order, is being correctly used and all the required equipment is fitted.
2. manifold, framework and chains are in good condition.
3. pigtailed and flexible hoses are not corroded or damaged.
4. valves shut off and open correctly.
5. regulators are identified as being suitable for the gas and pressures and are not damaged.
6. 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.
7. 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:

1. all repairs and modifications (including removals and additions of components) and extensions carried out conform to this Code of Practice.
2. 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.
3. there is adequate identification of above ground pipework/pipelines and route markers for buried pipework/pipelines.
4. the system is free from leaks by testing at the designated operating pressure.
5. buried pipelines are in ground which is free from encroachment by other services, buildings or civil structures.
6. filters are in good condition and are not blocked. Clean or replace them where necessary.

GAS SAFETY

OXYGEN: USE NO OIL OR GREASE, ENSURE ADEQUATE VENTILATION

FLAMMABLE GAS: CONTROL IGNITION SOURCES, ENSURE ADEQUATE VENTILATION

INERT GAS: ENSURE ADEQUATE VENTILATION

SERVICE

A unit, which is not functioning properly, should not be used until all required repairs have been completed and the unit has been tested to ascertain that it is in proper operating order. We will not accept any Spec-master products returned to us without prior authorisation.

Test regulator for leaks on a routine schedule.

TROUBLE SHOOTING

Symptoms	Probable Causes
Gas leakage at the regulator outlet when the adjusting screw is turned fully anti clockwise.	Seat leak or creep, have regulator repaired.
With no flow through the system (downstream valve closed), outlet pressure increases steadily above the set pressure.	Seat leak or creep, have regulator repaired.
Gas leakage from ring assembly or bonnet	Diaphragm failure, have regulator repaired.
Excess drop in outlet pressure with regulator flow open.	Blockage in seat assembly or inlet filter. Have regulator repaired.
Gas leakage from any pipe thread joint.	Loose fitting - remove connection, clean, re-apply PTFE tape and re-tighten.
Gas leakage from relief valve.	Possible faulty relief valve, replace. Possible seat leak or creep, have regulator repaired.
Inconsistent repeat reading.	Seat sticking, have regulator repaired. Possible bad pressure gauge.
Inlet or outlet pressure gauge does not return to zero with no pressure applied to the regulator.	Gauge has suffered physical damage, replace gauge.

WARRANTY INFORMATION

Gas-Arc Group Ltd sells this equipment under the warranties set forth in our Standard Terms & Conditions of Sale (available on request).

Gas-Arc Group Ltd's sole and exclusive obligation and Buyer's sole and exclusive remedy under the above warranties is limited to repairing or replacing free of charge, at Gas-Arc Groups option, the equipment or part, which is reported to its Authorised Distributor from whom purchased, and which if so advised, is returned with a statement of the observed deficiency, and proof of purchase of equipment or part not later than seven (7) days after the expiration date of the applicable warranty, to the nearest designated service facility during normal business hours, transportation charges pre-paid, and which upon examination, is found not to comply with the above warranties. The Buyer shall pay return trip transportation charges for the equipment or part.

GAS-ARC GROUP LTD SHALL NOT BE OTHERWISE LIABLE FOR ANY DAMAGES INCLUDING BUT NOT LIMITED TO: INCIDENTAL DAMAGES, CONSEQUENTIAL DAMAGES OR SPECIAL DAMAGES, WHETHER SUCH DAMAGES RESULT FROM NEGLIGENCE, BREACH OF WARRANTY OR OTHERWISE.

THERE ARE NO EXPRESS OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE WARRANTIES HEREIN ABOVE SET FORTH. GAS-ARC GROUP LTD MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE EQUIPMENT OR PARTS THEREOF.

Spec-Master High Purity (99.9999%) Regulator Operating Instructions

It is important that only experienced and properly trained persons should handle these compressed gases. They should be conversant with the relevant safety instructions including the current British Compressed Gases Association code of practice CP4 and the gas safety instructions from the gas supplier. To help maintain the purity integrity of the product, prior to use these regulators should be stored in a clean dry and warm environment. The regulator should be kept in its sealed protective plastic packaging until use.

Markings

The regulator is marked with the following:-

- Maximum inlet pressure (pressure service)
- Rated outlet pressure

Fitting the regulator

Before fitting the regulator, ensure all connections are clean and free from contaminants including dirt, oil and water and if fitted, fully release the regulator adjusting knob by winding anticlockwise. Right hand thread is employed for oxygen and permanent gas cylinders and left hand thread is used for fuel gas cylinders. Use only the correct size of spanner and finally tighten by applying two blows to the end of the spanner with the heel of the hand.

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 regulator 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 approximately 0.5 bar and hold for a period of 2 to 5 minutes.

Note! To avoid Oxygen depletion or enrichment of the local environment, ensure all purging gases are safely vented.

Operating

After fitting of the downstream equipment, open the cylinder or inlet isolation valve slowly, this is a critical operation and must be done slowly to be safe. If fitted, adjust the regulator knob to the required outlet pressure and purge hoses, make the final adjustments when the gas is flowing. It is vital to ensure that any audible vibration or freezing of the regulator is avoided during operation. Check for leaks at all joints with a leak detection spray.

NEVER:

- Use a regulator showing any signs of damage
- Allow cylinders to become heated
- Use pressure gauges that are damaged, not smooth in operation or not zeroing
- Remove or change any component parts of a regulator

ALWAYS:

- Check the whole system for damage and leaks at frequent intervals
- Comply with BCGA codes of practice. To purchase copies, telephone 01491 825533

Before installing or operating, read and comply with these instructions

USER RESPONSIBILITY

This equipment will perform in conformity with the description contained in this manual and accompanying labels and/or markings when installed, operated, and maintained in accordance with the instructions provided. This equipment must be checked periodically. Improperly working equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. GAS-ARC GROUP LTD recommends that a telephone or written request for service advice be made to GAS-ARC GROUP LTD Customer Service Phone : 01379 652263, Fax : 01379 644235 or E-mail : mail@gas-arc.co.uk.

This equipment or any of its parts should not be altered without prior written approval by GAS-ARC GROUP LTD. The user of this equipment shall have the sole responsibility for any malfunction that results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than GAS-ARC GROUP LTD or a service facility designated by GAS-ARC GROUP LTD.

CUSTOMER SERVICE

In the event of equipment failure, call GAS-ARC GROUP LTD Customer Service. Please be prepared to provide the model number and serial number of the equipment involved, in addition to some details regarding its application.

GENERAL SAFETY PRACTICES

1. Comply with precautions listed in B.C.G.A Codes of Practice.
2. Consult the cylinder distributor for the proper use of cylinders and for any restrictions on their use (such as flow rate and temperature requirements).
3. Never use an open flame when leak testing.
4. Always open valves slowly when high-pressure gases are being used.
5. Always be sure that a cylinder contains the correct gas before connecting it to any regulator.
6. Always leak-test any manifold or distribution pipeline before using.
7. Always be sure that the gas in the system is the correct gas for the intended use.

INSTALLATION

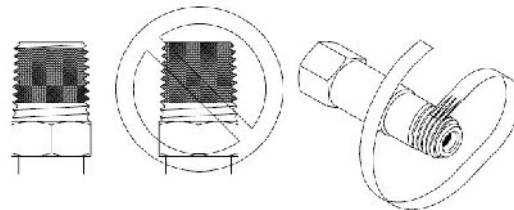


Figure 1. Tape
Installation
procedures.

Please observe the previously mentioned safety precautions before actual installation.

When installing NPT connections, use an open-end spanner not a pipe spanner to install fittings. ¼ NPT connections require the use of PTFE tape on the threads to make a gas tight seal. On stainless steel connections, the thread sealant helps prevent the connections from galling together when tightening or loosening. Inspect the NPT threads and if necessary clean the fitting to remove any dirt or thread sealant that remains on the threads. Start the PTFE tape on the second thread as shown above; make sure the tape does not overlap the end of the fitting. As the tape is wrapped in the direction of the thread spiral, pull tightly on the end of the tape so that the tape conforms to the threads. Wrap the tape around the threads twice. Cut off the excess tape and press the end firmly into the threads.

MAINTENANCE

At regular intervals, the valve should be checked for leaks and proper function (see TROUBLE SHOOTING). Any leaks in the system should be corrected immediately.

A unit that is not functioning properly should not be used until all required repairs have been completed and the unit has been tested to ascertain that it is in proper operating order.

TROUBLE SHOOTING

Typical symptoms listed below indicate malfunctions needing rectification. Replace system components immediately.

1. Gas leakage from any joint.
2. Valve fails to cut off gas supply when closed.

CHEM-MASTER & SPEC-MASTER GAS CYLINDER AUTOCHANGE MONITOR



Gas-Arc Group Ltd
Vinces Road
Diss, Norfolk
UK, IP22 4WW

INSTALLATION DETAILS FOR NON HAZARDOUS AREA INSTALLATIONS ONLY

This wiring diagram is for 2 contact alarm gauges, each with a single normally open switch at low pressure. The control panel must be in a gas free zone within a weather protected building. Fix the control panel to the wall using 4 screws, one in each corner of the panel in the slots provided. Mains supply cable must be 3 core Live (Brown) Neutral (Blue) and Earth (Green/Yellow). NOT less than 1.0 sq mm. UNIT MUST BE CONNECTED TO A CLEAN DEDICATED SUPPLY AND MUST BE EARTHED.

Input cable from the gas switch must be a twisted pair per channel (Telephone Type Cable)
KEEP THE INPUT CABLE RUN AS FAR AWAY AS POSSIBLE FROM ANY MAINS CABLE.

Test and Commission Instructions

1. Check all wiring connections
2. Switch on the 'ON/OFF' switch. The alarm may sound; if so, then press mute which will stop the alarm sounding.
3. If gas cylinder is low, the low pressure indicator will remain illuminated.
4. To prove system on normal pressure cylinder, turn off cylinder and allow pressure to fall. The alarm should sound and the low pressure indicator will illuminate. Mute the alarm with the mute button, this stops the alarm, but the indicator will remain on until cylinder is turned back on. NOTE: The reserve indicator is not used in this wiring configuration.
5. Test all channels as above
6. PLEASE NOTE THAT IF ANY ALARM HAS ALREADY BEEN MUTED THE ALARM WILL STILL SOUND ON ANY FURTHER FAULTS BEING ACTIVATED.

