

CHEM-MASTER REGULATORS 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 : Maximum allowable working pressure indicated on product marking is for the regulator only. Ratings for peripherals/accessories may be less than the pressure indicated on the product marking. Do not exceed the pressure ratings of the attached peripherals/accessories and the regulator's maximum allowable working pressure. Please contact your gas supplier for more information.

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.

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, maintained and repaired 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 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.

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

1 Know the properties and special handling requirements of the gas being used. Many gases are quite dangerous (flammable, toxic, corrosive, simple asphyxiant or oxidisers). Equipment failure or misuse may lead to problems such as a release of gas through the relief valve or regulator diaphragm. Proper safety measures should be established to handle these and other component failures.

Be sure that the assembly purchased is suitable for the gas and type of service intended. The regulator marking and labelling provides information on the product type and the maximum inlet pressure.

Be sure that the equipment received conforms to the order specifications. The user is responsible for selecting equipment compatible with the gas in use, and conditions of pressure, temperature, flow etc. Selection information can be found in Gas-Arc technical data sheets. In addition, Gas-Arc representatives are trained to aid in the selection process.

2 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.

3 Before system start-up, it is recommended that all systems be pressure tested, leak tested and purged with an inert gas such as nitrogen.

If the regulator includes gas specific inlet connections, their purpose is to prevent usage on the wrong gases. Adaptation or alteration for use on gases can be dangerous, and is not recommended.

GENERAL SAFETY PRACTICES

Comply with precautions listed in B.C.G.A Codes of Practice

Consult the gas/cylinder supplier for the proper use of cylinders and for any restrictions on their use (such as flow rate and temperature requirements).

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 to any regulator.

Always leak-test any manifold or distribution pipeline before using.

Always be sure that the gas in the system is the correct gas for the intended use.

INSTALLATION

Please observe the previously mentioned safety precautions before actual installation.

- 1.1 Before removing the cylinder cap/plug move the cylinder of gas to the work site:
 - a. Secure cylinder to floor, wall or bench with appropriate chain or stand to prevent toppling.
 - b. Remove the cylinder cap/plug
 - 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
- 1.2 Following procedures below, secure the regulator inlet connector to the outlet connector on the cylinder.
 - a. The connection should be easily threaded. Do not force. If it is not easy, you may have the wrong regulator for the gas you are using.
 - b. LEFT HAND THREADS are used on some inlet connectors and are indicated by a notch in the middle of the hex nut.
 - c. GASKETS are used on some inlet connectors. If so, it will be provided with the regulator. Be sure the gasket is in good shape. Do not over tighten to avoid squashing the gasket into the gas line. You may want to order an extra supply of these gaskets from your supplier.
 - d. Never use oil or grease on regulator or cylinder fittings, as you may contaminate pure gases or create a fire hazard.
- 1.3 Close the regulator by turning the pressure control knob or handle anti clockwise. As the control knob is closed, turning should become easier.
- 1.4 Shut the regulator outlet valve (if supplied) by turning the knob on the valve clockwise.
- 1.5 Observing the following procedures; make connections from the regulator outlet to your downstream equipment;
 - a. BE SURE TO CONSIDER ALL FACTORS WHEN SELECTING MATERIALS. For example, if you have both high pressure and corrosive service, select material that is suitable for both.
 - b. Do not use oil or grease on fittings, especially not on oxidising gas service equipment.
 - c. Be sure that all fittings are secure and leak tight. PTFE tape should be used on pipe fittings, but avoid impinging on the gas stream. Before applying PTFE tape, 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 and 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. Apply two overlapping layers of PTFE tape. Cut off the excess tape and press the end firmly into the threads.
 - d. CAPTURED VENT RING ASSEMBLY. Some regulators have captured vent ring assembly. If you are using corrosive, toxic or flammable gases, be sure to connect suitable tubing from the vent fitting to a safe discharge area. Consult instructions for captured vent kit for installation.
 - e. RELIEF VALVE. Some regulators are equipped with a relief valve. The purpose of a relief valve is to protect the regulator and its components. If there is pressure sensitive equipment downstream of the regulator it is recommended that a relief valve be installed in the line to protect this equipment. If you are using toxic, corrosive or flammable gases, it is recommended that the exhaust from the valve be piped to a safe discharge area.
 - f. PURGE DEVICES (Optional). If your regulator includes a purge, review the safety operation in the specific instruction manual for your regulator. Purge devices are highly recommended when using toxic or corrosive gases.

OPERATION

Read the "Safety" and "Installation" sections before operating your equipment.

- 2.1 It is advised that high purity, toxic and corrosive systems be thoroughly purged before use.
- 2.2 The regulator-adjusting knob should be turned fully anti-clockwise (see 1.3) and the outlet valve should be closed (see 1.4).
- 2.3 Put on safety glasses and gloves.
- 2.4 Position yourself with the cylinder between you and the regulator. Keep hands off the regulator while opening the cylinder valve.
- 2.5 To avoid damage to regulator parts, slowly open the cylinder valve. Observe the high pressure gauge for a rise in pressure up to full cylinder pressure.
- 2.6 Observe all connections for leaks

- 2.7
- A suitable leak detection solution may be applied to the connections, if **compatible to your usage**. Bubbling indicates leaks.
 - To further check for leaks, or if you cannot use the leak detection solution, close the cylinder valve for five minutes, and observe the high pressure gauge for a drop in pressure. If so indicated, re-check the inlet connection and all other high-pressure port connections.
- 2.8 (Open the cylinder valve fully in order to form a good seal at the cylinder valve packing). Keep the valve hand wheel or spanner on the open cylinder valve at all times to allow prompt emergency shut off.
- 2.9 Adjust to the desired working pressure by turning the pressure control knob or handle clockwise, while observing the delivery pressure gauge for the approximate desired setting.
- Do not exceed the maximum delivery pressure indicated on the regulator
 - Again check for leaks on the low pressure ports
 - Check the delivery pressure gauge for any drop in pressure. If a drop is indicated, check all low-pressure ports for leakage.
- 2.9 Again set the delivery pressure, open the outlet valve if any, and check your system for leaks and otherwise proper functioning.
- With gas flowing through your system, some adjustment to delivery pressure may be required.
 - TWO-STAGE REGULATORS.** After the above final setting of delivery pressure, no further adjustment should be required as the cylinder depletes.
 - SINGLE-STAGE REGULATORS.** After the above final setting of delivery pressure, you may have to periodically adjust delivery pressure as the cylinder depletes.
 - As a general rule, a cylinder should be considered EMPTY when the cylinder pressure drops to a value of two (2) times the delivery pressure or less. This avoids the possibility of dangerous suck-back conditions. However, particular system requirements may indicate greater or less margin than the recommendation. Contact your Gas-Arc representative if you have any questions.

SHUTDOWN AND DISASSEMBLY

As indicated in the "Operation" section, a cylinder should be regarded as empty when the cylinder pressure has dropped to twice the delivery pressure or less. This will avoid the possibility of dangerous suck-back conditions, where other system gases are pulled back into the regulator and cylinder.

- 3.1 **BRIEF SHUTDOWN** (less than 30 minutes). Simply close the regulator outlet valve (if supplied). If the regulator does not have an outlet valve use procedure 3.2.
- 3.2 **EXTENDED SHUTDOWN** (beyond 30 minutes).
- NORMALLY OPEN SYSTEM** or **COMPLETE SYSTEM DIS-ASSEMBLY.** This section applies when there is no concern about entry of atmospheric gases into the system.
 - Close the gas cylinder valve
 - Shut down any other gas supplies which may be connected to your system
 - Turn the adjusting knob clockwise and open the outlet valve to drain the line through your usage points ensuring that **HAZARDOUS GASES** are safely vented to atmosphere. Both regulator gauges should descend to zero.
 - With **HAZARDOUS GASES** run an inert purging gas through the regulator and system before disassembly.
 - After venting (and purging when applicable), turn the adjusting knob fully anti clockwise and close the outlet valve.
 - Disconnect downstream equipment
 - In disassembling, slowly loosen the cylinder valve connection, while listening for gas seepage. If leaking is evident, re-tighten the connection and check for effective closing of the cylinder valve.
 - Cap/plug the cylinder after disconnecting the regulator. Mark the cylinder "EMPTY" if this is the case, and move it to the storage area for return cylinders.
 - If **HAZARDOUS GASES** have been used, and there has not been a purging procedure as recommended, some benefit can be gained by directing a stream of Oxygen Free Nitrogen through the fully opened regulator. When using **HAZARDOUS GASES** or when in a **CONFINED AREA**, be sure to provide a safe discharge area when clearing the regulator.
 - Install a new cylinder, if called for.
 - When a regulator is out of service, close the pressure control knob by turning anti clockwise until the spring tension relieves and close the outlet valve. Also cap open ends of the regulator, or if removed, store it in a plastic bag to prevent contamination, especially by unobserved particulate build up inside the regulator.
 - ISOLATED GAS SYSTEMS.** Some practices (especially on high purity systems), demand that ambient air be excluded from the system. There are several methods in use:-
 - Seal the usage gas in the system*
 - Exert a vacuum on the system after shut down
 - Replace the system gas with an inert gas

*This method should not be used with hazardous gases for more than a brief time.
 - CYLINDER CHANGE – ISOLATED GAS SYSTEMS.** For cylinder change on ISOLATED GAS SYSTEMS, a valve upstream of the regulator is required and is provided when an upstream purge device such as the Gas-Arc Deep Purge is used.
 - Tightly close the gas cylinder valve
 - Close the valve upstream of the regulator (the centre or master valve on the Deep Purge

- With hazardous gases, purge the cylinder valve cavity using procedures contained in the specific instruction manual for your purge assembly
- Under section 3.2a: Follow steps 7, 8 and 9.
- Under section 3.2b, step 2, maintaining a vacuum after shut down, requires that the system be well sealed, as any leaks will pull impurities into the system.
- Under section 3.2b step 3, filling the system with an inert gas, provides the advantage of maintaining positive pressure on the system, greatly reducing the probability of entry of impurities.

GENERAL

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.

SERVICE

Gas-Arc Chem-Master products are designed to work with corrosive and toxic gases. To protect our staff and to comply with the Control of Substance Hazardous to Health regulations (COSHH), we must be fully informed of all gases and substances that have been in contact with the product. If you wish to return product to us, for any reason, you must contact Gas-Arc to obtain a "Chem-Master Request for Authorisation to Return Product" form (QC23). Once the completed form has been returned to us we will consider your request. Where gases and substance that have been in contact with the product are unknown to us, we will require you to supply us with the appropriate safety data before we can decide if we can grant authorisation for you to return the product. If authorisation is granted for the product to be returned to us, we will supply you with a returns number and instructions on how to send it back to us.

We will not accept any Chem-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).

With the following exception:

In regard to equipment in corrosive service for a period of 90 days to buyer or to buyer's order, this equipment is warranted to be free from functional defects in materials and workmanship and to conform to the description of this equipment contained in this manual and any accompanying marking, labels and/or inserts, provided that the same is properly operated under conditions of normal use and that regular periodic maintenance and service is performed or replacements made in accordance with the instructions provided. The foregoing warranties shall not apply if the equipment has been repaired: other than by Gas-Arc Group Ltd or a designated service facility or in accordance with written instructions provided by Gas-Arc Group Ltd, or altered by anyone other than Gas-Arc Group Ltd or if the equipment has been subject to abuse, misuse, negligence or accident.

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.

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