



Medical Gas Cylinder Pressure and Flow Control Regulators

INSTALLATION AND OPERATION INSTRUCTIONS

Before Installing or Operating, Read and Comply with These Instructions

Controls Corporation of America
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USER RESPONSIBILITY

This equipment will perform in conformity with the description contained in this manual and accompanying 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. CONCOA recommends that a telephone or written request for service advice be made to CONCOA Customer Service in Virginia Beach, Virginia, PHONE: 1-800-225-0473, FAX: 1-757-422-3125, or E-MAIL: info@concoa.com.

This equipment or any of its parts should not be altered without prior written approval by CONCOA. 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 CONCOA or a service facility designated by CONCOA.

CUSTOMER SERVICE

In the event of equipment failure, call CONCOA 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.

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

1. Know the properties and special handling requirements of the gas being used. 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.
2. Be sure that the assembly purchased is suitable for the gas and type of service intended. The system label provides the following information:
 - a. Model number
 - b. Serial number
 - c. Maximum inlet pressure
 - d. Gas service

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 CONCOA technical data sheets. In addition, CONCOA representatives are trained to aid in the selection process.

3. Inspect the assembly upon receipt to be sure that there is no damage or contamination. Pay particular attention to connecting threads. While CONCOA 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. While it is advised that soiled regulators be returned for cleaning, simple external dust or grease may be removed by a clean cloth and if required with aqueous detergent suitable for the application. If there are signs of internal contamination, return to the supplier.
4. Before system start-up, it is recommended that all systems be pressure tested and leak tested.

GENERAL SAFETY PRACTICES

Comply with precautions listed in C.G.A. Pamphlet P-1, Safe Handling of Compressed Gases in Containers.

Consult the cylinder distributor 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 it 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.

For the United States, some applicable safety rules and precautions are listed below:

1. Local Ordinances
2. O.S.H.A. Standard 29 CFR
3. C.G.A. Pamphlet C-4, American National Standard Method of Marking Portable Compressed Gas Containers to Identify the Material Contained.
4. C.G.A. Pamphlet G-4, Oxygen – Information on the properties, manufacture, transportation, storage, handling, and use of oxygen.
5. C.G.A. Pamphlet G-4.1, Equipment Cleaned for oxygen service.
6. C.G.A. Pamphlet G-4.4, Industrial Practices for Gaseous Oxygen Transmission and Distribution Piping Systems.
7. C.G.A. Pamphlet G-6, Carbon Dioxide – Information on the properties, manufacture, transportation, storage, handling, and use of carbon dioxide.
8. C.G.A. Pamphlet G-6.1, Standard for Low Pressure Carbon Dioxide Systems at Consumer Sites.
9. C.G.A. Pamphlet P-1, Safe Handling of Compressed Gases in Containers.
10. C.G.A. Safety Bulletin SB-2, Oxygen Deficient Atmospheres.

*C.G.A. pamphlets can be obtained from the Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202-3239, (703) 979-0900. Publications: (703) 979-4341. Fax: (703) 979-0134.

This equipment must be used in accordance with the following safety precautions, the safety precautions on the cylinder label, and with the safety precautions provided with the equipment connected to the regulator outlet or flowmeter regulator outlet.

Specific procedures for the safe use of regulators are listed below. The user can form habits thereby that will prevent an accident due to confusion over changing service needs.

1. Never subject the regulator to inlet pressure greater than it is rated inlet pressure, as shown on the regulator.
2. Never use the regulator for gases other than those for which it is intended.
3. Check the cylinder outlet valve and the regulator inlet fittings before attaching the regulator to the cylinder. Do not use the cylinder and/or regulator if oil, grease or dirt is present.

4. Do not allow oil, oil-bearing materials, or other combustibles that can ignite readily in the presence of oxygen, to contaminate the inside or outside of oxygen regulators. Do not place an internally contaminated regulator into oxygen service.
5. Use oxygen regulator WITH equipment suitable for and used only for oxygen service.
6. Never pressurize a regulator that has loose or damaged parts or is in questionable condition. Never loosen a connection or attempt to remove a part until gas pressure has been relieved. Under pressure gas can dangerously propel a loose part.



CAUTION

Oxygen and Nitrous oxide are both oxidizers which vigorously accelerate combustion. All precautions listed below for oxygen also apply to nitrous oxide. DO NOT SMOKE IN THE AREA WHERE OXYGEN IS IN USE.

7. Secure the gas cylinder to a wall, stand or cart designed for cylinder transport. Before transporting cylinders that are not secured on a cart not designed for such transport, remove regulator and recap the cylinder.
8. Keep cylinder handwheel or wrench on open cylinder valve at all times, for prompt emergency shutoff.
9. Do not attempt to clean or change parts of a regulator. Have regulator repaired.
10. The regulator relief valve is designed to protect the regulator only, and nothing else. Be sure that equipment connected to the regulator outlet is provided with relief devices to protect such downstream equipment against possible over pressurization.
11. Check regulator and ALL connections for leaks after installation periodically thereafter, and after any service in which parts or connections were loosened.
12. No repair should ever be undertaken by anyone not having qualifications described in the SERVICE section of these instructions.

This manual provides specific information for the safe installation and operation of CONCOA Medical Regulators.

CGA 870 RECOMMENDATIONS

FDA and NIOSH recommend that plastic crush gaskets never be reused, as they may require additional torque to obtain the necessary seal with each subsequent use. This can deform the gasket, increasing the likelihood that oxygen will leak around the seal and ignite.

The following general safety precautions should also be taken to avoid explosions, tank rupture and fires from oxygen regulators.

1. Always “crack” cylinder valves (open the valve just enough to allow gas to escape for a very short time) before attaching regulators in order to expel foreign matter from the outlet port of the valve.
2. Always follow CONCOA's instructions for attaching the regulator to an oxygen cylinder.
3. Always use the sealing gasket specified by CONCOA.
4. Always inspect the regulator and CGA 870 seal before attaching it to the valve to insure that the regulator and seal are in good condition and the regulator is equipped with only one integral metal and rubber seal that is in good condition. Avoid plastic seals.
5. Tighten the CGA870 yoke T-handle firmly by hand, but do not use wrenches or other hand tools that may over-torque the handle.
6. Open the post valve slowly, while maintaining a grip on the valve wrench so that it can be closed quickly if gas escapes at the juncture of the regulator and valve.

INTRODUCTION

These regulators are designed to control and reduce the high gas pressure of a cylinder to the required working pressure or flow. This manual provides specific information for the safe installation and operation of CONCOA Medical Regulators.

Configuration

According to the specific model's design the regulator is equipped with one or more of the following features:

1. A pressure or flow adjusting knob or Tee Screw.
2. A built-in pressure relief valve to protect the regulator.
3. Flowmeter or Flowgauge to measure the gas flow.
4. An inlet fitting of proper design for the service gas the regulator was designed to control.



CAUTION

Flowgauge regulators come equipped with special outlet fitting which contain a precise size orifice. This outlet fitting must be in place to ensure flowgauge accuracy.

Note: The accuracy of a flowgauge regulator is not dependant on the indicating needle sitting on the gauge's pin stop. The flowgauge is tested for accuracy at specified ranges within the working range of the gauge. Typically a 2-15 LPM flowgauge would not be used below 2 LPM.

INSTALLATION

Please observe the previously mentioned safety precautions before actual installation.

1.1 Before removing the cylinder cap, 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.
- 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. Use an open-end wrench, not a pipe wrench.

- 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 overtighten to avoid squashing the gasket into the gas line. You may want to order an extra supply of these gaskets from your gas supplier.
- d. Never use oil or grease on regulator or cylinder fittings, as you may contaminate pure gases, or create a fire hazard.

- e. Before connecting a flowmeter regulator, close the flowmeter outlet valve. For flowgauge regulators release the adjusting screw tension by turning the adjusting knob counterclockwise.
- f. For regulators with wrench-tightening connectors, support the regulator and hand start the regulator's inlet gland nut on the cylinder's outlet valve. Using an appropriate size wrench, firmly, but not excessively, tighten the nut.
- g. For regulators with a yoke inlet connection, check to ensure the required sealing washer is installed and in good condition. **DO NOT USE MORE THAN ONE WASHER AT A TIME.** Slide the yoke over the post valve on the cylinder and mate the yoke's indexing pins with the matching holes in the post valve. **HAND TIGHTEN THE T-HANDLE.**
- h. For regulators with hand-tight (hand wheel) inlet connection, check that the soft nose on the inlet gland is in place and in good condition. Support the regulator while **HAND TIGHTENING THE HAND WHEEL.**

1.3 Close the regulator by turning the pressure control knob, or handle, counterclockwise. 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.

OPERATION

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

2.1 The regulator adjusting knob should be turned fully counterclockwise (see 1.3) and the outlet valve should be closed (see 1.4).

2.2 Put on safety glasses and gloves.

2.3 Position yourself with the cylinder between you and the regulator. Keep hands off the regulator while opening the cylinder valve.

2.4 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.

2.5 Observe all connections for leaks.

- a. An approved leak detection solution may be applied to the connections, if compatible to your usage. Leaks are indicated by bubbling.
- b. To further check for leaks, or if you cannot use the leak detection solution, reclose the cylinder valve for five minutes, and observe the high pressure gauge for a drop in pressure. If so indicated, recheck the CGA connection and all other high pressure port connections.

2.6 Open the cylinder valve fully in order to form a good seal at the cylinder valve packing. Keep the valve hand wheel or wrench on the open cylinder valve at all times to allow prompt emergency shutoff.

2.7 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.

- a. Do not exceed the maximum delivery pressure indicated on the regulator label.
- b. Again check for leaks on the low pressure ports.
- c. Check the delivery pressure gauge for any drop in pressure. If a drop is indicated, check all low pressure ports for leakage.



CAUTION

Gas will flow from outlet of fixed-pressure regulator when valve is opened.

2.8 Again set the delivery pressure, open the outlet valve if any, and check your system for leaks and otherwise proper functioning.

- a. With gas flowing through your system, some adjustment to delivery pressure may be required.
- b. After the above final setting of delivery pressure, you may have to periodically adjust delivery pressure as the cylinder depletes.
- c. 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 CONCOA representative if you have any questions.



CAUTION

Do not discharge oxygen in the presence of flame, lit cigarettes, or other sources of ignition. Do not discharge oxygen towards personnel.

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 SYSTEMS or COMPLETE SYSTEM DISASSEMBLY. This section applies when there is no concern about entry of atmospheric gases into the system.

- a. Close the gas cylinder valve.
- b. Shut down any other gas supplies which may be connected to your system.
3. Turn the adjusting knob clockwise and open the outlet valve to drain the line (including flowmeters if applicable) through your usage points. Both regulator gauges should descend to zero.
4. After venting (and purging when applicable) turn the adjusting knob fully counterclockwise and close the outlet valve. (Release adjusting screw on flowgauge regulator.)
5. Disconnect downstream equipment.
6. In disassembling, slowly loosen the cylinder valve connection, while listening for gas seepage. If leaking is evident, retighten the connection, and check for effective closing of the cylinder valve.
7. Cap 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.
8. Install a new cylinder, if called for.
9. When a regulator is out of service, close the pressure control knob by turning counterclockwise 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 buildup inside the regulator.

SERVICE

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.

It is recommended that all servicing be done by a service facility authorized by CONCOA. Contact the CONCOA Customer Service Department in Virginia Beach or the nearest CONCOA District Sales Office for assistance.

If so advised, the unit should be sent to a service facility authorized by CONCOA, adequately packaged, in the original shipping container if possible, and shipped prepaid, with a statement of observed deficiency. The gas service that the equipment has been subjected to must be clearly identified. All equipment must be purged before shipment to protect the transporter and service personnel. The purging is especially important if the equipment has been in hazardous or corrosive gas service. Return trip transportation charges are to be paid by Buyer. In all cases other than where warranty is applicable, repairs will be made at current list price for the replacement part(s) plus a reasonable labor charge.

Test regulator for leaks on a routine schedule.



CAUTION

Inspection and troubleshooting of this equipment must be undertaken by a competent individual having specific experience in the maintenance and repair of equipment of this nature.



CAUTION

Do not sterilize the Medical Gas Regulator. Clean the regulator after each use or as specified by hospital policy.



CAUTION

Submerging the regulator or allowing liquids (water, cleaning solutions, etc.) to leak into it causes severe damage. Wipe all exterior surfaces with a solution of water and mild detergent.

Trouble Shooting

In addition, typical symptoms in the following table indicates possible regulator malfunctions requiring repair. Replace immediately with a clean, repaired and tested, or new regulator.

Symptoms

Probable Cause

- | | |
|---|---|
| 1. Gas leakage at the regulator outlet when the adjusting screw is turned fully counterclockwise. | 1. Seat leak or creep, have regulator repaired. |
| 2. With no flow through the system (downstream valves closed), outlet pressure increases steadily above the set pressure. | 2. Seat leak or creep, have regulator repaired. |
| 3. Gas leakage from spring case or bonnet. | 3. Diaphragm failure, have regulator repaired. |
| 4. Excess drop in outlet pressure with regulator flow open. | 4. Blockage in seat assembly or inlet filter. Have regulator repaired. |
| 5. Gas leakage from any pipe thread joint. | 5. Loose fitting, remove connection clean, reapply PTFE tape and retighten. |
| 6. Gas leakage from relief valve. | 6. Possible faulty relief valve, replace. Possible seat leak or creep, have repaired. |
| 7. Inconsistent repeat reading | 7. Seat sticking, have regulator repaired. Possible bad pressure gauge. |
| 8. Inlet or outlet pressure gauge does not return to zero with no pressure applied to the regulator | 8. Gauge has suffered physical damage, replace gauge. |

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Warranty Information

This equipment is sold by CONTROLS CORPORATION OF AMERICA under the warranties set forth in the following paragraphs. Such warranties are extended only with respect to the purchase of this equipment directly from CONTROLS CORPORATION OF AMERICA or its Authorized Distributors as new merchandise and are extended to the first Buyer thereof other than for the purpose of resale.

For a period of one (1) year from the date of original delivery (90 days in corrosive service) 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 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 CONTROLS CORPORATION OF AMERICA or a designated service facility or in accordance with written instructions provided by CONTROLS CORPORATION OF AMERICA, or altered by anyone other than CONTROLS CORPORATION OF AMERICA, or if the equipment has been subject to abuse, misuse, negligence or accident.

CONTROLS CORPORATION OF AMERICA'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 CONTROLS CORPORATION OF AMERICA's option, the equipment or part, which is reported to its Authorized 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 prepaid, and which upon examination, is found not to comply with the above warranties. Return trip transportation charges for the equipment or part shall be paid by Buyer.

CONTROLS CORPORATION OF AMERICA 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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