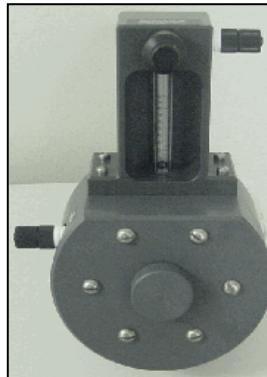




OPERATION & MAINTENANCE Series E6000 PRESSURE FEEDER



◆ **Superior materials of construction:**

Hastelloy rate valve, corrosion-resistant yoke, tantalum springs

◆ **Reliable: Over 25 years of experience**

◆ **Versatility: Open Channel or Pipeline**

*Ejector diffuser available for open channel feed with
Porous stone diffuser or pipeline addition with fine hole spray.*

◆ **Ease of maintenance: Simplicity of design**

◆ **Portable: Emergency and stand-by operation.**

Operates without electricity or water pressure

Flowmeter: For capacities 40 PPD (0.75 kg/h), the minimum feed capacity for every gas flowmeter is 1/20 the of the maximum capacity and 1/10 the maximum capacity for capacities 15 PPD (280 g/h) and below. Accuracy is within $\pm 4\%$ of maximum flowmeter capacity.

Maximum Back Pressure: 10 psig (0.7 bar)

Recommended Gas Pressure Line: 25 ft. (8 m)

Mounting: Direct cylinder only

Check Valve-Diffuser Assembly:

1. Check valve with 3/4" NPT male thread for connection to pipeline. Diffuser has fine hole for spray applications.
2. Check valve with 2" diameter porous stone diffuser recommended for clearwell or open channel applications. A double stone arrangement is supplied with 100 PPD (2 kg/h) units.

3. Depth of water at point of application -The check valve-diffuser should be at least 4 feet (1 meter) below water level. In general, the higher the feed rate, the greater should be the depth, up to a maximum of 23 feet (7 meters). It is possible that some chlorine gas will not be completely absorbed in the water and may escape from the surface. Chlorine gas absorption is influenced by temperature, quality of water or wastewater, gas bubble size and other factors. Always choose the deepest point to ensure the best possible absorption.

Accuracy: $\pm 4\%$ of maximum flowmeter capacity

Repeatability: $\pm 1\%$

Shipping Weight: 13 lbs. (6 kgs)

Standard Equipment:

1. Cylinder mounted pressure regulator with gas flowmeter, rate valve and gas filter assembly.
2. Manual exhaust valve.
3. 50' (15 m) 3/8" polyethylene pressure and vent tubing.
4. 12 lead gaskets.
5. One set of spare parts.
6. Check valve with porous stone diffuser or check valve with fine-hole spray diffuser.

Gas Flowmeter Capacities:

- 100 PPD (2 kg/h)
- 75 PPD (1.4 kg/h)
- 40 PPD (0.75 kg/h)
- 15 PPD (280 g/h)
- 6 PPD (120 g/h)
- 2 PPD (50 g/h)

Pressure and Vent Connections: 3/8" (Vent from regulator [1] and exhaust valve [1])

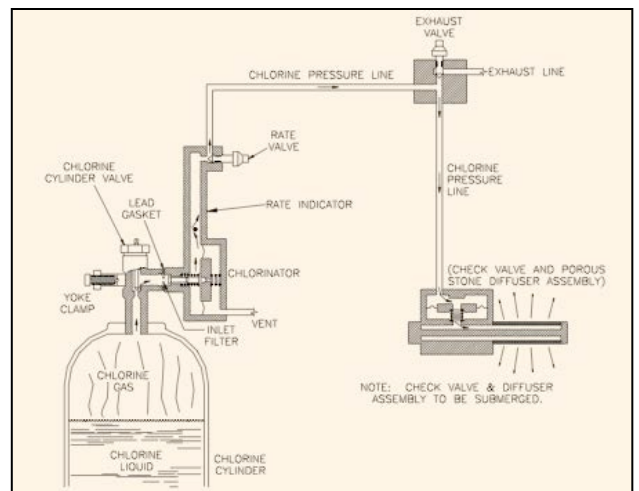


Figure 1

Principle of Operation

Chlorine gas at cylinder pressure enters the regulator through the inlet valve and filter assembly where the pressure is reduced and controlled to approximately 20 psig (1.4 bar). The gas then moves through the inlet pressure-regulating valve, chlorine gas flowmeter and manually controlled rate valve to the check valve/diffuser assembly. The pressure causes the check valve to open, and gas enters the water or process fluid through a porous stone diffuser or fine spray diffuser. (See Figure 1) A pressure relief valve is contained within the chlorinator to prevent excessive pressure build-up in the system. A manual exhaust valve, installed in the pressure line between the chlorinator and the check valve is used to exhaust the pressure from the system prior to removing the chlorinator from the cylinder. Both the relief valve and pressure exhaust valve must be relieved to a safe place.

A Series 6000 gas feeder system consists of a pressure regulator, chlorine gas flowmeter, flow control rate valve, gas filter assembly, excess pressure relief valve, manual exhaust valve, diffuser/check valve assembly and pressure and vent tubing to make a complete system.

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1 INTRODUCTION

1.1 General

The Series E6000 is used to dispense gaseous chlorine at a manually controlled feed rate, from the source to the point of application. The Series E6000 direct gas pressure feed chlorinator mounts directly on the valve of a chlorine cylinder . Attachment is by means of a

positive yoke assembly with single lead gasketed seal. The Series E6000 is applicable where: There is a lack of electric power to operate a booster pump or sufficient water pressure to operate an ejector. Six feed capacities are available up to 100 PPD (25 kg/h) with a maximum backpressure of up to 10 psig (0.7 bar) at the point of application.

1.2 Model Information Code

Model **E6 1 X 1C**

Maximum Capacity:

1 - 100 PPD (2 kg/h)

Capacity:

B=0-2ppd, D=0-6ppd, E=0-15ppd, G=0-40ppd, I=0-75ppd, J=0-100ppd

Gas Handled

B - Carbon Dioxide

C - Chlorine

1.3 Component Description

1.3.1 The chlorine gas pressure feeder consists of a pressure reducing valve with integral flowmeter, manual rate valve, and vent system. A positive yoke inlet assembly permits attachment of the feeder directly on an chlorine gas valve.

1.3.2 The chlorine gas exhaust valve is mounted in the gas line between the pressure regulator and the check valve-diffuser assembly.

1.3.1 The chlorine gas check valve and diffuser

a. Pipeline Type. The check valve is a perforated tube type.

b. Open Tank or Open Channel Type. The check valve is a perforated stone diffuser type.

1.4 Specifications

Series E6000 consists of the following components:

Gas pressure regulator with yoke assembly, gas flowmeter with manual rate valve, pressure relief valve and gas filter, vent and pressure connections.

Manual exhaust valve. , 25' (8m) of 3/8" vent tubing. 12 lead gaskets. One (1) set of spare parts, Multi-purpose cylinder wrench

The Series E6000 meters and controls the dispensing of chlorine from the source of the gas to the point of gas application under a reduced positive pressure.

Control Pressure: Factory Set at 20 psig (1.4 bar)

Maximum Back Pressure: 10 psig (0.7 bar) or 23 ft. (7 m) of water head over the diffuser

Mounting: Gas pressure reducing rate control unit is clamped to a chlorine gas valve by means of a positive yoke type clamp.

Accuracy: Within $\pm 4\%$ of full scale flow rate

Pressure and Vent Connections: 3/8" (Vent from regulator [1] and exhaust valve [1])

2 INSTALLATION

2.1 Gas Cylinder

Chlorine gas cylinders shall be positioned vertically to deliver gas to the Series E6000 Gas Chlorinator. The cylinder user is cautioned to ensure that gas, not liquid, will be discharged when the valve is opened.

NOTE: Never position chlorine cylinders horizontally when used with Series E6000 feeders. Chlorine cylinders must be positioned vertically to deliver gas.

The maximum filling density for chlorine cylinder is 54%. At about 65°F (18°C), this filling density corresponds to 88% of the cylinder volume. Due to the high coefficient of expansion of liquid chlorine, a cylinder filled in accordance with the filling density regulation would be liquid full at about 145°F (63°C) with a danger of bursting from hydrostatic pressure if any further temperature rise occurred. Cylinders should not be permitted to reach a temperature higher than 125°F (52°C). If cylinders are stored in a hot place or in the sun, the chlorine will increase in temperature and expand raising the liquid level. The construction materials of the Series E6000 chlorine gas feeder are not suitable for continuous exposure to liquid chlorine and every effort must be made to ensure that only gaseous chlorine enters the regulator.

Gas is potentially dangerous, and the following rules must always be adhered to:

2.1.1 Never move a cylinder unless the valve protection cap is screwed on tightly.

2.1.2 Locate the cylinders where they will not be bumped or damaged.

2.1.3 A safety chain should be placed around the cylinders and secured to a wall or support.

2.1.4 When the pressure regulator is mounted directly on the gas cylinder valve, the cylinder and pressure regulator need not be located in a heated room. For outdoor installations when temperature exceeds 100° F (38° C), the cylinder should be shaded from direct sunlight.

2.1.5 Never locate chlorine cylinders and anhydrous ammonia cylinders in the same enclosed area.

2.1.6 Never reuse the lead gasket at the yoke/gas valve pressure connection.

2.2 Pressure Regulator Mounting - (See Figure 1)

The yoke assembly must be compatible with the chlorine gas valve. Do not attempt to alter a yoke assembly or chlorine gas valve if they are not compatible. Contact your gas feeder and chlorine suppliers.

2.2.1 Cylinder Mounting

a. Unscrew the valve protection cap from the gas cylinder.

b. Before removing the cap nut, which covers the gas valve outlet, check to be sure, the gas valve is closed, then remove the cap nut.

c. Remove all shipping tape from the pressure regulator. Do NOT remove the fiberglass filter inserted in the pressure regulator inlet.

d. Remove any dirt that may be in the valve outlet or on the outlet gasket surface.

e. Unscrew the yoke screw until the valve plate can be pulled all the way back.

f. Place a 1/16" lead gasket over the gas inlet of the pressure regulator. Never use other types of gaskets or gasket materials. Never reuse the lead gasket. Replace the lead gasket each time the gas cylinder is changed.

g. Mount the pressure regulator on the cylinder valve by placing the yoke over the valve, engage the pressure regulator inlet with the cylinder valve outlet. Tighten the yoke screw. Excessive tightening will squeeze the lead gasket out of the joint and should be avoided.

2.3 Check Valve-Diffuser Assembly Installation (See Figure 1)

There are two basic types of installation for each check valve-diffuser assembly, pipeline and open channel. The first incorporates a perforated tube for installation in a pipeline. The second has a perforated diffuser stone for open channel installations. The two types are not interchangeable.

2.3.1 Pipeline Installation

a. Unscrew the diffuser from the assembly. Do not install the diffuser when assembled; damage may occur.

b. Put Liquid Teflon or similar non-hardening pipe dope or Teflon® tape on the pipe threads

and screw the diffuser into the pipe by hand. Tighten carefully with pliers, making sure the diffuser perforations are in the main stream.

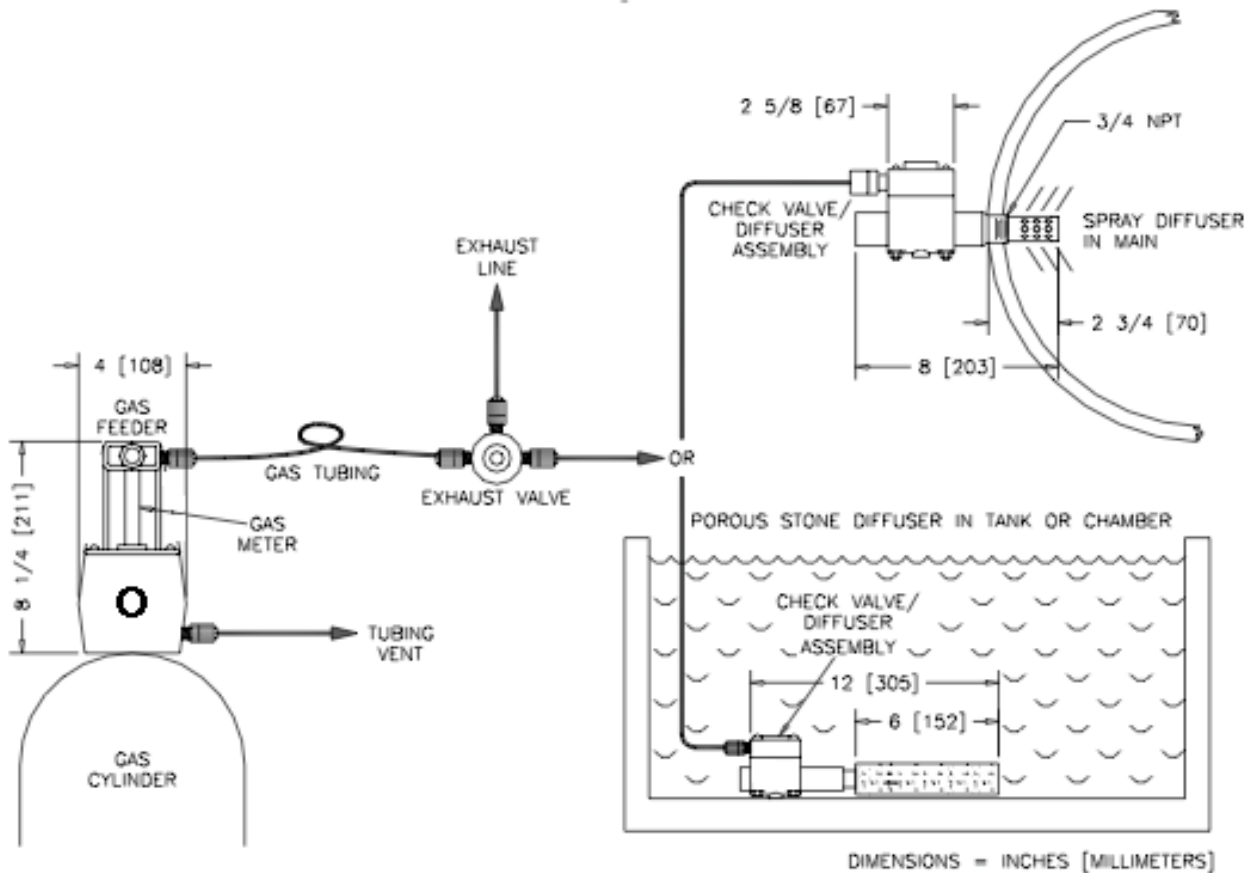
c. Reconnect the check valve assembly to the diffuser. The adapter extends through the assembly from either side. A gasket should be on each side. Screw the adaptor into the diffuser. Do NOT tighten excessively or the threads may be stripped.

2.3.2 Open Channel Installation

a. Lower the diffuser into the water channel or chamber.

b. Submergence should be a minimum of 4 ft. (1 m) to minimize gas bubbles escaping from the

surface. Sometimes the use of a weight (e.g. cinder block) may be useful to position the diffuser. A nylon rope or chain to hold the diffuser and weight may also be necessary.



2.4 Exhaust Valve Installation (Manual Pressure Relief Valve)

When changing gas cylinders, some gas remains in the system under pressure. Locate the exhaust valve at a safe location to discharge trapped gas to the atmosphere.

Install the exhaust valve in the gas line so gas passes straight through under normal operation and exhausts through a fitting located at right angles to normal flow.

2.5 Interconnections

NOTE: When using plastic tubing for the gas line between the pressure regulator, exhaust valve, check valve and emergency vent, and be sure to use enough length for each component for movement of the pressure regulator from one cylinder to another.

2.5.1 Regulator and Exhaust Valve

- a. Utilizing the 3/8" plastic tubing provided with the equipment, remove the 3/8" tubing connector nut from the pressure regulator and slip it onto the tubing. Push the tubing onto the connector and tighten the connector nut **HAND TIGHT**.
- b. The upper connector on the pressure regulator is for connecting the pressure regulator to the exhaust valve and check valve. The lower connector is for the vent line.
- c. Connect the vent tubing to the lower connector. Terminate the vent at a safe location. Do not elevate the vent line more than 10 feet (3 meters) above the vent connection. Install an insect screen over the end of the tubing to prevent blockage. No other equipment should be connected to the vent line.

2.5.2 Vent

The pressure regulator and exhaust valve are provided with 3/8" tubing connectors. Tubing from each of these components must terminate at a safe location where the discharge of chlorine gas can be tolerated. No other equipment should be connected to the vent line.

2.6 Capacity Conversion

Each dispensing system is custom designed to provide gas flow requirements to the point of application. The limit of the gas flow is indicated by the calibrated scale on the gas flowmeter. Should the gas flow requirements change, it is usually possible to substitute re-sized parts, provided the new requirements are within the maximum capacity of the pressure regulator, exhaust valve, and diffuser assembly. Consult your local representative or Enchlor Inc..

3 OPERATION

3.1 General

Series E6000 meters and controls chlorine gas feed when the gas valve is open and gas under source pressure is available at the inlet.

3.2 Components

3.2.1 Pressure Regulator

The manual rate valve is adjusted to the desired rate of feed as indicated by the float in the flowmeter.

3.2.2 Exhaust Valve

The exhaust valve is normally closed and must not be opened unless the gas supply valve is closed. When shutting down the system, some gas remains in the system under pressure.

Opening the exhaust valve discharges the chlorine gas in the system until the pressure of the chlorine gas reduces to atmospheric pressure. Close the gas supply valve and open the exhaust valve before changing cylinder or performing maintenance on the system. Some residual chlorine gas will be detected if any pressure connections are disconnected.

3.2.3 Check valve and Diffuser Assembly

The check valve opens when gas is being dispensed and closed when the gas supply valve is closed or gas supply is exhausted. The diffuser disperses the gas into the water to be chlorinated.

3.3 Start-Up

3.3.1 Ensure the exhaust valve is closed.

3.3.2 Close the gas feed rate adjustment valve on the pressure regulator. **DO NOT CLOSE TOO TIGHT OR DAMAGE TO THE VALVE SEAT CAN OCCUR.**

3.3.3 Open the cylinder valve 1/4 turn and close immediately.

3.3.4 Utilizing a squeeze bottle 1/4 full of household ammonia, hold below the lead gasket inlet connection and below the valve bonnet and squeeze. If gas is leaking, smoke will appear, similar to cigarette smoke. Tighten the bonnet or replace the gasket to eliminate leaks. Check all other connections in the system.

3.3.5 Open the gas cylinder valve 1/4 turn and leave open. Recheck for gas leaks.

3.3.6 Open the gas feed rate adjustment valve and set to the desired rate. Gas flow is read on the meter scale at the center of the ball.

3.4 Shutdown

3.4.1 To shut-down the system, close the gas cylinder valve. **NEVER USE THE RATE ADJUSTMENT VALVE TO SHUT OFF THE GAS SUPPLY.**

3.5 Changing Gas Cylinders

3.5.1 Close the cylinder valve (NOT the rate valve).

NOTE: The gas cylinder valve packing can become very dry and bind on the valve stem, giving a feeling that the valve is closed. **ENSURE THE VALVE IS CLOSED TIGHTLY.** Use the cylinder wrench provided to aid in tightening. Never tighten the valve with any wrench over 8". Use the palm of the hand against the wrench to ensure tightness.

3.5.2 Open the exhaust valve by turning the exhaust valve knob counter-clockwise approximately two (2) turns. This exhausts the remaining gas out through the exhaust line.

3.5.3 Change the gas cylinder and close the exhaust valve by turning the exhaust valve knob clockwise.

3.5.4 Check for gas leaks as described under Start-Up.

4 SERVICE

The E6000 gas feeder will require a minimum of service if operated with reasonable care.

4.1 Gas Leak

There are a few possible points of gas pressure leaks. These are not usual, but if a leak is detected, it should be immediately located and stopped. Even a small leak can create a safety hazard and cause serious corrosion to equipment in the area.

4.1.1 Gas Cylinder or Manifold Valve Packing

The gas cylinder or manifold valve is a high quality valve designed specifically for gas service. Gas suppliers service the cylinder valve at each filling, and leakage at this point is unusual. Should a leak in either a cylinder or manifold valve develop, tighten the valve-packing nut, using the cylinder wrench provided, without exerting excessive force. If this does not eliminate the leak, close the valve, replace valve cover and call the gas supplier or manifold supplier.

4.1.2 Lead Gasket Seal Between the Gas Feeder and the Gas Supply Valve

A leak at this point is caused by reusing a lead gasket, dirt on the gasket surfaces, under or over tight connection, or installations without a gasket. Use a new lead gasket. Make certain the gasket and gasket surfaces are clean and smooth. Tighten clamp, but not excessively.

4.2 No Gas Supply or Reduced Gas Flow

When the gas supply is exhausted, the float in the metering tube will not indicate any gas feed. Because the rate of heat transfer is greater through the portion of the cylinder walls that are wetted by liquid chlorine, the condensation that takes place on humid days indicates fairly closely, the liquid level in the cylinder. If, due to a high vaporization rate, the temperature of chlorine in the cylinder is lower than 32°F (0°C), frost will form on the cylinder wall. If frost forms on a cylinder or manifolded cylinders, it is evident that chlorine gas is being withdrawn too rapidly. Frost formation may be diminished by increasing air circulation around the cylinder using a fan.

4.3 Plugged Gas Feeder Inlet Filter (Refer to Figures 3 & 4)

Dirt from the supply may completely plug the fiberglass filter. Pick out the fiberglass and replace being careful not to lose the screen under the fiberglass. Fiberglass may be obtained from Enchlor Inc..

4.4 Cleaning or Replacement of the Gas Flowmeter (Refer to Figures 3, 4 & Parts Lists)

4.4.1 Remove the four screws in the back body through the flowmeter housing.

4.4.2 Pull the flowmeter housing straight out, disengaging it from the back body.

4.4.3 Unscrew the flowmeter inlet plug and remove the gas flowmeter.

4.4.4 Bend a paper clip or wire and pull out the ball stops on each end of the glass tube.

ENSURE THE METERING BALL IS NOT LOST.

4.4.5 Clean the inside of the glass tube with a pipe cleaner, and the metering ball, using wood alcohol, a solvent, and rinse thoroughly with warm water. Dry thoroughly.

4.4.6 Reinstall the ball and ball stops.

4.4.7 Reinstall the flowmeter by tightening the meter inlet plug making sure that it is on center with the top and bottom gaskets. NOTE: The flowmeter gaskets can usually be reused. Turn the gaskets over.

4.4.8 Before re-assembling the flowmeter housing, check the condition of the meter inlet o-rings and the meter housing o-ring ensuring they are free of imperfections. Apply a thin film of fluorolube grease to these o-rings.

4.5 Adjustment of Regulated Pressure (See Figures 2 & 4)

The regulating pressure is factory set and under normal conditions, should not require adjustment unless the pressure regulator is disassembled.

CAUTION: THE BODY PRESSURE SHOULD NEVER BE SET HIGHER THAN 20 PSIG (1.4 BAR). If it is necessary to adjust, refer to Parts List and Figure 4, and proceed as follows.

4.5.1 Prepare a gauge assembly using a gas pressure gauge (0-30 psig range) and shut-off valves.

NOTE: Use of an air manifold with a chlorine type valve and 90-100 psi air (6.2-6.9 bar) in place of the gas source is recommended. If unavailable, ensure the outlet from the gas valve is piped to a suitable location where a gas discharge can be tolerated.

4.5.2 Attach the pressure regulator to the air manifold or gas supply valve using a new lead gasket.

4.5.3 Mount the gauge assembly and pipe as required.

4.5.4 Remove the face plate, body plug and o-ring from the front body. (This provides access to the adjusting screw assembly.)

4.5.5 With the pressure regulator rate valve open to its maximum position, and the gauge assembly valve closed, open the gas supply valve.

4.5.6 The pressure reading on the gauge should be 19-20 psig (1.3-1.4 bar). Use a screwdriver or suitable spanner wrench to turn the adjusting screw (counter-clockwise to decrease the pressure and clockwise to increase the pressure). Open the gauge assembly valve slightly to start gas flow. Close the valve and adjust the pressure screw, if necessary. Open and closed the valve several times until the required pressure is obtained without re-adjustment.

4.5.7 Replace the body plug and o-ring.

4.5.8 Remove the pressure regulator from the air manifold, remove the gauge assembly, replace the lead gasket. Attach the pressure regulator the gas supply and reconnect all tubing connections.

