

FLOOR-MOUNTED CHLORINATORS FOR CAPACITIES TO 2000 lb/day (39 kg/h)

Bailey-Fischer & Porter Series 70C4400 floor mounted chlorinators are vacuum operated, solution feed, sonic flow devices available with either manual or automatic control. Each chlorinator is composed of three parts; a vacuum regulator, a control module and an ejector. The blue and gray cabinet which encloses the control module is constructed of fiberglass-reinforced polyester and has a smooth, easily maintained finish. No paint is used.

Chlorinator feed rates are dependent on the maximum withdrawal rates from gas containers and the location of the vacuum regulator. Wall, cylinder or ton container mounted vacuum regulator locations may be selected for the best system design. The flowmeter, mounted in the control module is available in a wide selection of capacities. Maximum chlorinator capacities range from 10 to 2000 lb/day (0.2 to 39 kg/h).

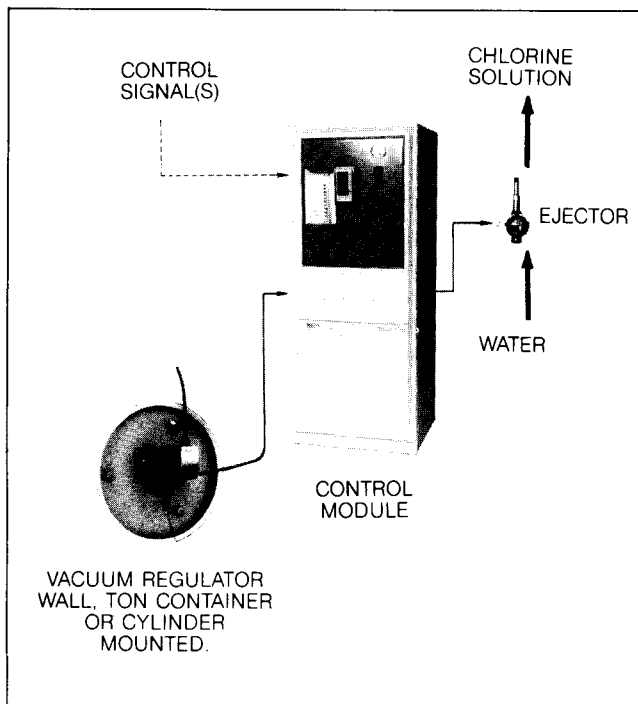
When automatic control is required, the *Chloromatic™* valve, mounted within the control module responds to control signals from a water flow transmitter and/or a chlorine residual analyzer controller.

The ejector has a fixed diameter nozzle and throat, the size of which depends on the maximum chlorine feed rate and the hydraulic conditions existing in the water supply and chlorine solution lines.

Several control modules may be used together to construct a system for multipoint application of chlorine. The gas flow from the vacuum regulator may be divided to feed more than one application point with the flow to that point being either manually or automatically controlled. The sum of the flows to each application point cannot exceed the capacity of the vacuum regulator.

Automatic changeover systems use two vacuum regulators without the necessity of a separate changeover valve.

Units similar to those for feeding chlorine (but with different materials of construction) are available for feeding sulfur dioxide, ammonia and carbon dioxide gases. The maximum capacity of the feeders is 1900 lb/d of sulfur dioxide, 975 lb/d of ammonia, and 1500 lb/d of carbon dioxide.



Design Features

- **Modern Design:** The chlorinators feature sonic flow differential pressure control requiring no moving parts resulting in increased life expectancy and dependability. Integrated circuits and a single corrosion resistant electrical enclosure increase reliability of the automatically controlled models.
- **Inlet Valve Body:** Inlet valve body is composed of Hastelloy® C-22 which has a lifetime guarantee against chlorine corrosion.
- **Control Signals:** The *Chloromatic* valve insures positive response to electric signals representing either water flow or chlorine residual control. Optionally, both flow pacing and residual control signals can be accepted simultaneously by the *Chloromatic* valve.
- **Safety:** Vacuum operation provides protection for plant operating personnel and equipment. Built-in design features prevent damage to the chlorinator under abnormal operation conditions.
- **Versatility:** The availability of separate chlorinator components allows for the selection and mounting in locations most suitable for the operation of the chlorination system.

Engineering Specifications

Vacuum Regulator

The vacuum regulator may be mounted on a wall or directly on a cylinder valve or the gas valve of a ton container. When mounted on a cylinder valve, the regulator is limited to 100 lb/day (2 kg/h) maximum of chlorine. When mounted on the gas valve of a ton container, the regulator is limited to 500 lb/day (10 kg/h) maximum of chlorine.

On wall or ton container mounted vacuum regulators, the unit is protected from liquid chlorine damage (up to one full ton container eductor tube) by means of a combination manifold trap. Trapped liquid chlorine is evaporated by an electric heater, rated at 30 W.

Two vacuum regulators are used in an automatic changeover system. Either vacuum regulator is selected by the station operator allowing gas to flow until the chlorine source is exhausted. At that point the second vacuum regulator opens to allow gas feed to continue. Each regulator has an indicator to show whether it is in "Reserve", "Operating" or a "No gas" condition.

Temperature limits are 2 to 54 °C (35 to 130 °F). An indicator shows when the gas supply is exhausted or interrupted. Options include a gas pressure gauge and a low temperature switch having contacts rated at 10W, 120V max.

Control Module

Ejector vacuum level is indicated by a gauge reading in English and metric units mounted on the front of the control module.

For multipoint application of chlorine solution, each point requires a separate control module containing a flowmeter and a manual or automatically controlled rate valve. Each application point also requires an ejector. Any combination of capacities may be used as long as the total does not exceed the capacity of the vacuum regulator.

On automatically controlled units, optional switches may be provided on the front of the control module for switching to either automatic or manual control. Included with these switches is a computer compatible "handshake" contact rated at 5 A at 120V.

Available optionally are alarm switches to provide indication of loss of vacuum in the event of ejector failure, or excess vacuum as would occur when the gas supply is interrupted or depleted. These switches are rated at 10 A 120 V.

Flowmeter

Standard metering tubes are available with the following maximum capacities: 10, 25, 50, 100, 200, 300, 500, 1000 and 2000 lb/day of chlorine gas. The equivalent metric capacities are 200 g/h, 500 g/h, and

1, 2, 4, 6, 10, 20 and 39 kg/h. Metering tubes have dual scales in English and metric units. Should it be desired to reduce the quantity, or eliminate control modules for feed rates of 500 lb/day (10 kg/h) and below, wall mounted flowmeters and control valves are available. Refer to Specifications 70C1730 and 70C1760/80 and Drawing No. I.D. 70-1250 for additional details.

Flowmeter rangeability is 20:1 for any one metering tube.

Chloromatic Valve

The **Chloromatic** valve has two major components: the control valve and the control valve operator. The control valve consists of a housing, a shaped precision plug and a corrosion resistant plastic seat. The plug is positioned with respect to the seat by the valve operator, to provide precise control of chlorine feed rates in accordance with the electric input signal(s) to the valve operator. The valve moves from full open to full closed position in 15 seconds.

The control valve operator consists of a solid state electronic circuit, a stepping motor and a mechanism to position the control valve plug. Two versions of the operator are available; one for a single input signal and one for dual input signals. The single input valve operator can be adapted to respond to any one of the following signals: 4-20, 0-16 or 0-20 mA dc; 1-5, 0-4 or 0-5 V dc (normally from a flow transmitter).

The dual input valve operator is designed to respond to any two of the signals listed above. Normally the second signal is from a chlorine residual controller. Within the valve operator an electronic multiplying circuit combines the two inputs into a single motor drive signal.

Alternately the B-F&P Series 71RC5000 controller can combine the water flow transmitter signal with the chlorine residual analyzer signal and send a single signal to the **Chloromatic** valve.

A dosage adjustment knob is provided to set the chlorine to water ratio to compensate for differences in chlorine demand. The dosage adjustment is combined with an on-off switch for power shut-off to the motor. On dual input valve operators, a 3 position switch is provided to select the first signal, second signal or dual signals.

With power to the motor disconnected, the valve can be operated manually by a knob connected to the motor drive shaft.

Temperature limits on the **Chloromatic** valve are -7 to +52 °C (20 to 125 °F).

As an option, valve alarm contacts are available to indicate full open or full closed position of the valve. These contacts rated at 0.1 A, close on alarm.

If recording or totalizing of chlorine gas flow is required, an optionally available 4-20 mA dc signal proportional to gas flow is available. Included with this option are the loss-of-vacuum and excess vacuum alarm switches which are used to induce a zero flow signal in the event of ejector failure or gas supply interruption. Additional contacts are available on these same switches to provide an alarm function. Refer to Specification 71-1006.

A dc power supply for the instrument loop is not provided by the **Chloromatic** valve as this function is normally provided in either the flow transmitting or receiving instruments. Refer to Dwg. SC-70-1279 for details.

Electrical Requirements

For gas inlet heater 0.25 A at 120 V ac, 0.13 A at 240 V ac. For **Chloromatic** valve 0.3 A at 120 V ac; 0.15 A at 240 V ac.

Ejector Requirements

Water passing through the ejector generates the vacuum required to operate the chlorinator. Water consumption and required inlet pressure are dependent on the amount of chlorine being fed and the ejector back pressure created by the chlorine solution piping system. Water passing through the ejector must be reasonably clean. If high temperature water is used, (above 80°F) (26°C), ejector performance will be impaired due to decreased solubility of the gas and reference should be made to Technical Information Bulletin 71-3 for decreased pressure ratings of PVC piping. Series 70C4400 chlorinators are supplied with ejectors for solution lines with back pressures up to 200 psig (1380 kPa) depending on capacity. The ejector may be wall mounted and if the capacity does not exceed 100 lb/day (2 kg/h), it may be pipeline mounted. The ejector is supplied with a check valve and an emergency drain connection to prevent water from reaching the regulator.

Materials of Construction: Cynolac™, Borg Warner Inc., Valox™ General Electric Co., PVC, Silver Tantalum alloy, Viton™ E.I. Du Pont Co., Hastelloy® Haynes International, Inc., Teflon™ E.I. Du Pont Co., KYNAR® Pennwalt Corp., borosilicate and Pyrex™ Corning Glass are used in the construction of the chlorinator and ejector. The mounting manifold is ductile iron with corrosion-resistand coating. The **Chloromatic** valve is PVC, KYNAR® and Fluorosint™ Polymer Corp., and the valve operator is in a cast aluminum housing.

Description of Operation

Water flowing through the ejector creates a partial vacuum which acts on a diaphragm assembly to open the inlet valve admitting gas from the source into the vacuum regulator. A spring-opposed diaphragm regulates the vacuum to a closely controlled value. At this point the gas flow may or may not be divided to feed chlorine gas to one or more locations. For each application point, the gas passes through a flowmeter to either a manual or an automatically controlled rate valve. The controlled flow then goes to the ejector where it is thoroughly mixed and dissolved in the water and carried to the application point as a solution.

When the flow is divided and multiple metering tubes and ejectors are used, each operates independently of the others. Adjustment of one of the gas flow rates has no effect on the other rates.

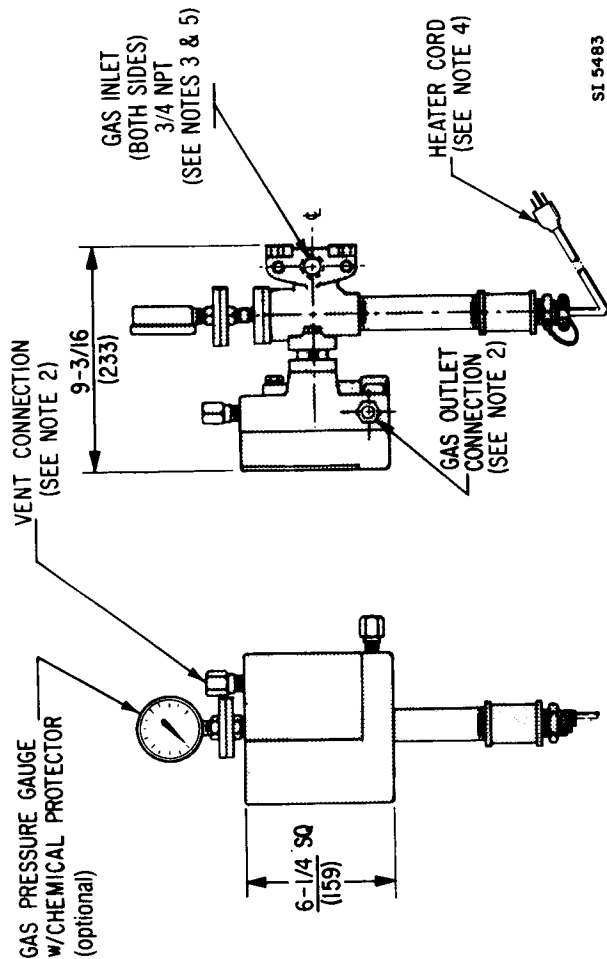
The system is completely under a partial vacuum from the ejector to the gas inlet valve during operation. If the water supply to the ejector is stopped, or the operating vacuum is lost for any other reason, the spring-loaded gas inlet valve immediately closes to isolate the chlorinator from the gas supply. Any gas under pressure which might enter the regulator is vented from the system through the built-in pressure relief valve. If the source of chlorine gas is exhausted, the gas port closes to prevent excess vacuum levels from developing in the chlorine source(s).

MODEL NUMBER DESIGNATION

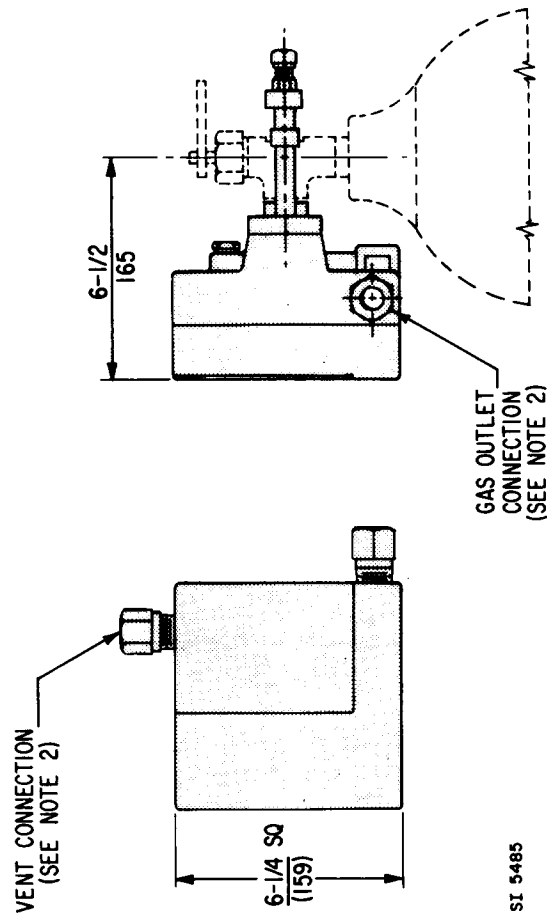
	70	44	C
Chemical Dispenser _____	70		
Chemical Service			
Ammonia _____	A		
Carbon dioxide _____	B		
Chlorine _____	C		
Sulfur dioxide _____	S		
Control Module Mounting/Capacity			
Floor Mtg., 2000 lb/day (39 kg/h) chlorine max. _____		44	
Vacuum Regulator			
Wall Mtg. with gauge _____			2
Ton Container Mtg. with gauge _____			3
Cylinder Mtg. _____			4
Wall Mtg. _____			5
Ton Container Mtg. _____			6
None _____			9
Type of Control			
Manual _____			1
Automatic _____			4
Automatic with Integral Controller _____			5

VACUUM REGULATOR — DIMENSIONS & CONNECTIONS

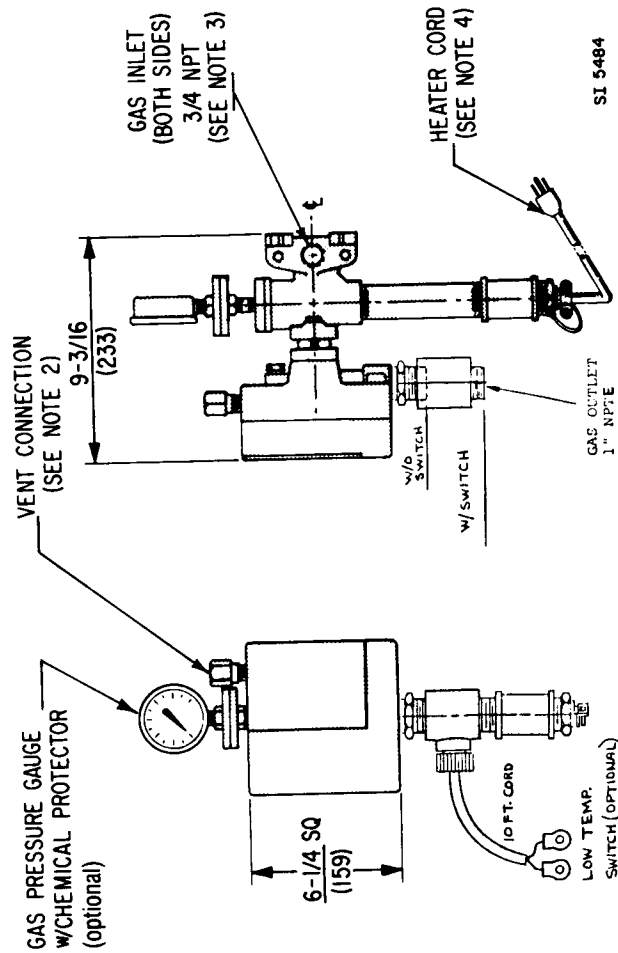
Wall or Ton Container Mounted — 500 lb/day (10 kg/h) Maximum



Cylinder Mounted - 100 lb/day (2 kg/h) Maximum



Wall Mounted — 1000 and 2000 lb/day (20 and 39 kg/h)



NOTES:

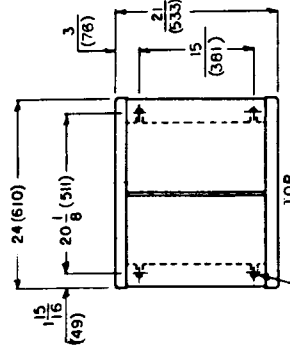
1. All dimensions are in inches (mm).
2. Adapter provided for 3/8-inch tubing.
3. One side provided with a plug. Other side provided with adapter for union nut coupling.
4. 10-foot(3m)-long cord and three pin plug.
5. For ton container mounting, the manifold is attached to the ton container gas valve using a yoke connection provided with the chlorinator.

FLOOR MOUNTED CONTROL MODULE — DIMENSIONS & CONNECTIONS

NOTES:

- 1. All dimensions are in inches (mm are in parentheses)
- 2. Use for interconnections to loss of and/or excess vacuum alarm.
- 3. Use for signal input, signal output, valve limit alarm and power supply - refer to manufacturing data for power requirements.
- 4. Minimum clearance of 18" (457) must be provided in front and rear of cabinet.

MAXIMUM CAPACITY	GAS INLET AND OUTLET DIMENSIONS			
	CONN. SIZE	A	B	C
500 lb/day (10 kg/h)	1/2 NPT x 3/8 ELBOW	12 1/2 (317)	37 1/2 (953)	14 7/16 (367)
2000 lb/day (39 kg/h)	1" NPT	14 1/8 (359)	37 1/2 (953)	11 7/16 (290)

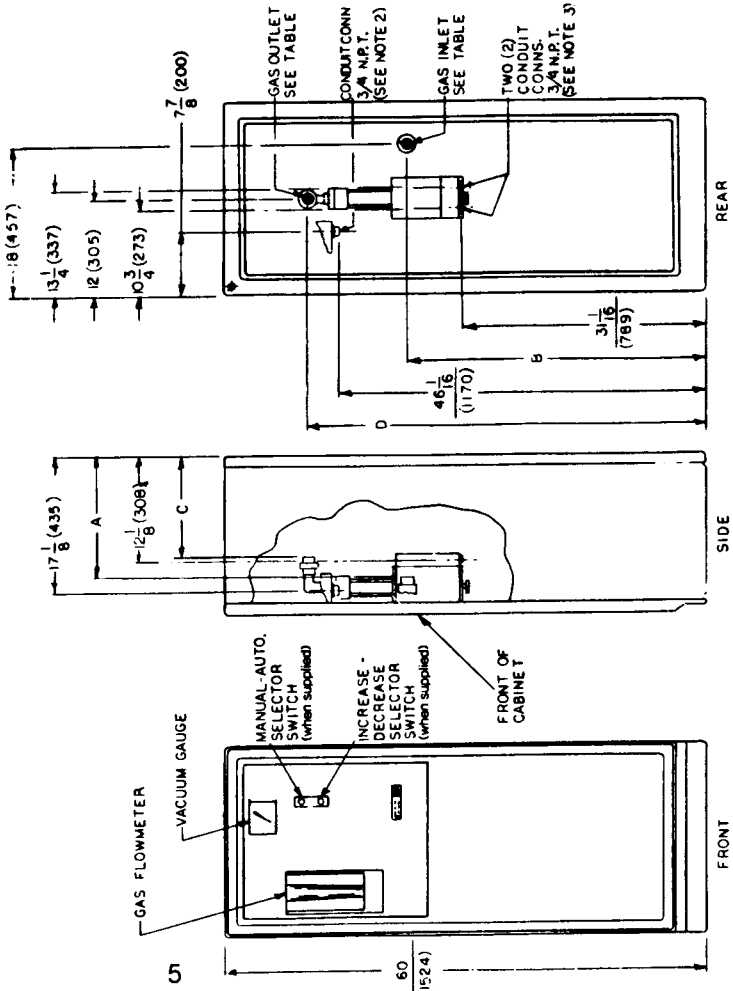


FOUR (4) MTG. SLOTS IN CABINET BASE FOR 1/2 BOLTS

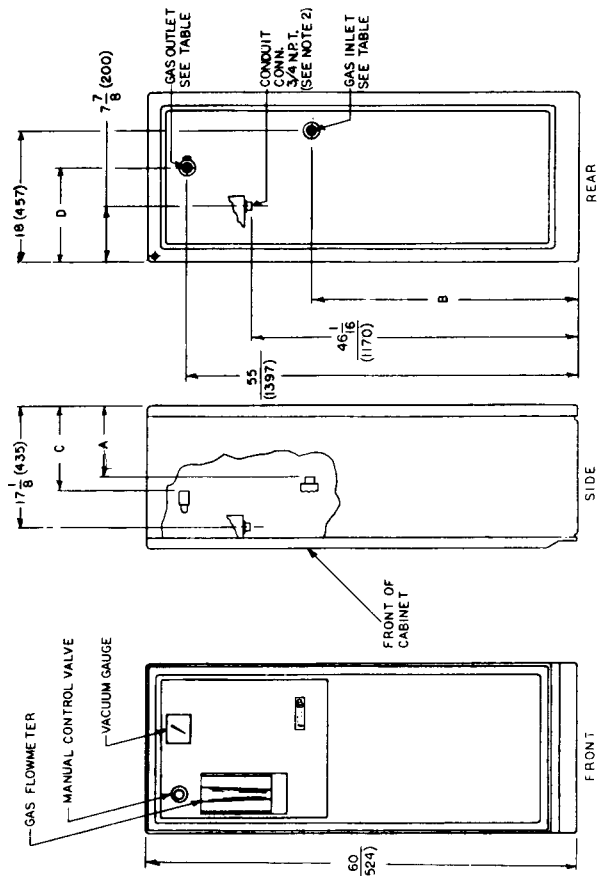
MAXIMUM CAPACITY	GAS INLET & OUTLET DIMENSIONS			
	CONN. SIZE	A	B	C
500 lb/day (10 kg/h)	1/2 NPT x 3/8 ELBOW	12 1/2 (317)	37 1/2 (953)	15 5/16 (389)
2000 lb/day (39 kg/h)	1" NPT	14 1/8 (359)	37 1/2 (953)	15 3/16 (386)

NOTES:

- 1. All dimensions are in inches (mm are in parentheses)
- 2. Use for interconnections to loss of and/or excess vacuum alarm.
- 3. Minimum clearance of 18" (457) must be provided in front and rear of cabinet.

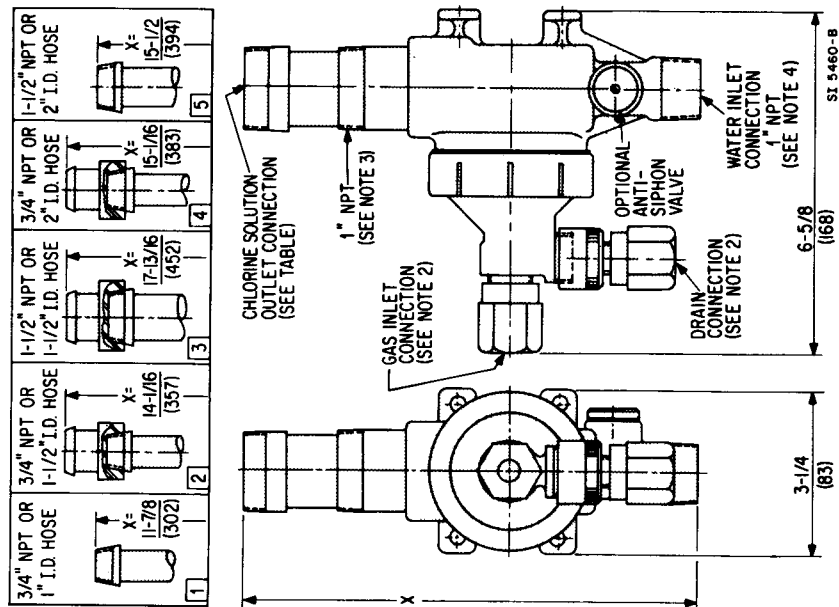


Automatic Control Module



Manual Control Module

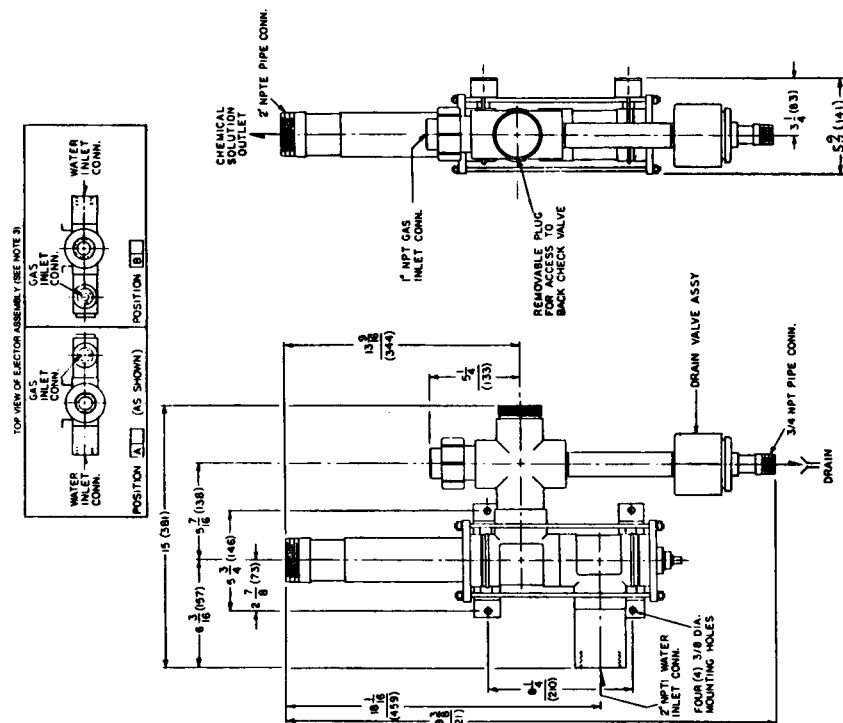
EJECTORS — DIMENSIONS & CONNECTIONS



Chlorine Capacity: 500 lb/day maximum

NOTES:

1. All dimensions are in inches (mm).
2. Adapter provided for 3/4 inch tubing.
3. For pipeline mounting of ejector. Limited to 100 lb/day max. and lines 6 inches in diameter or larger.
4. Water inlet piping normally should be no smaller than solution outlet size.
5. Special ejector supplied for alkaline service.



Chlorine Capacity: 2000 lb/day maximum

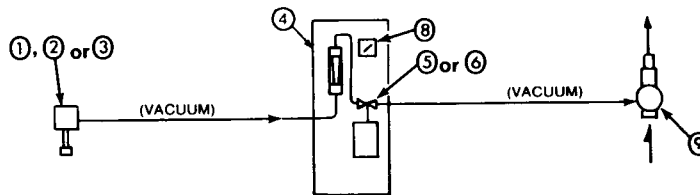
NOTES:

1. All dimensions are in inches (mm).
2. Solution outlet, 2-inch NPT or 2-1/2-inch (63.5 mm) I.D. hose.
3. Emergency drain connection, 3/4-inch NPT or 1-inch I.D. hose (25.4 mm).
4. Water inlet piping normally should be no smaller than solution outlet size.

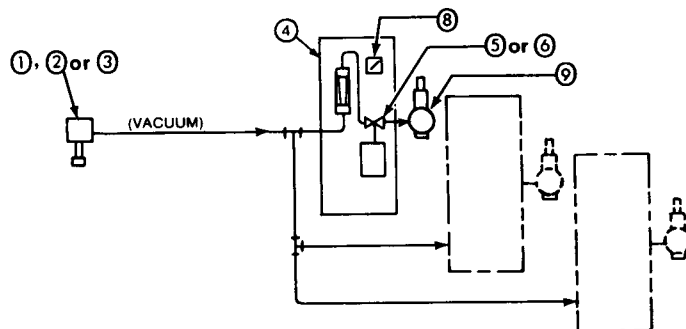
Typical Arrangements

- | | |
|---|----------------------|
| 1. Ton container mounted vacuum regulator | 6. Manual rate valve |
| 2. Wall mounted vacuum regulator | 8. Vacuum gauge |
| 3. Cylinder mounted vacuum regulator | 9. Ejector |
| 4. Control module | |
| 5. <i>Chloromatic</i> valve | |

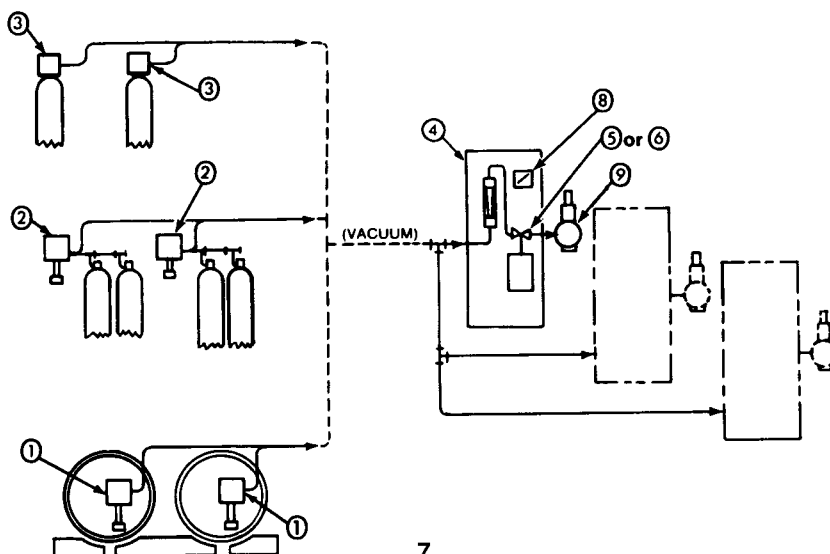
INSTALLATION WITH CYLINDER, WALL OR TON CONTAINER MOUNTED VACUUM REGULATOR



INSTALLATION FOR MULTIPPOINT APPLICATION



INSTALLATION WITH AUTOMATIC CHANGEOVER SYSTEM



Shipping Weight and Cubage

180 lb (82 kg), 42 ft³ (1.2 m³)

Accessories

Standard

Insect screen for vent line
Bottle for ammonia solution
Spare gaskets
Tube of thread lubricant
Universal wrench

Optional

Additional Control Modules and Ejectors for
Multipoint Application
Amperometric Titrator (Specification 17T2000)
Anachlor™ II Chlorine Residual Analyzer
(Specification 17PC1000)
Automatic Changeover System (2nd Vac. Reg.)
Booster Pumps
Chloralert™ Chlorine Gas Detector (Specification
17CA1000)
Chlorine Evaporators (Specification 71V2000)
Chlorine Pressure Reducing Valves (Specification
71P1100)
Chlortrol 5000™ Residual Chlorine Analyzer
with Bare Electrode Cell (Specification 17B5000)
Chlortrol 5000™ Cabinet Mounted Residual
Chlorine Analyzer (Specification 17SB5000)
Diffusers
Flexible Connectors and Manifolds
Gas Flow Transmission (Specification 71-9006)
Integral Residual Controller for Automatic Chlorinators
and Sulfonators (Specification 71-9007)
Low Temperature Switch in Vacuum Regulator
Pressure Gauge Mounted on Vacuum
Regulator
Switches for Electric-Manual Operation on Automatic
Models
Vacuum Switches (High and/or Low)
Valve Alarm Contacts

Ordering Information

Please specify the following:

Vacuum Regulator Mounting Location
Flowmeter Capacity (for each meter)
Water Supply and Back Pressure (for each ejector)
Automatic Changeover (if required)
Number of Control Modules with Automatic Control
Electrical Characteristics
Number of Control Modules with Manual Control
Optional Accessories
Maximum pH of ejector water supply

Equipment Description

The chlorinator shall be a vacuum operated solution feed type with a capacity of ___ to ___ (lb/day) (kg/h) of chlorine gas. It shall be of sonic flow design suitable for (manual control) (automatic pacing from flow rate) (automatic control from flow rate and residual control) and equipped with a rotameter having an integral scale and a 20:1 range. Ejector vacuum level shall be indicated on a 2½-inch gauge mounted on the front of the floor mounted control module. Both the rotameter and all gauges shall have dual scales in both English and metric units. The floor mounted control module housing shall be of fiberglass-reinforced polyester plastic with a smooth easy to maintain finish. Blue and gray colors, shall be impregnated in the housing and no paint shall be required.

The chlorinator vacuum regulator shall be (cylinder) (ton container) (wall) mounted and be suitable for automatic changeover systems without using an external valve. Filtration of the chlorine shall be through an easily removable cartridge filter except when cylinder mounting is used. A combination trap and heater assembly shall be supplied except when cylinder mounting is used. The heater shall be a cartridge type. When required for automatic operation, a Chloromatic control valve shall be mounted within the control module. It shall consist of a precision tapered corrosion resistant plug and seat and an electric stepping motor operator contained in a single corrosion resistant housing. It shall be used for both emergency manual and automatic control alleviating the need for a separate manual control valve. The electronic components of the operator shall be mounted on printed circuit boards of the latest electrical design including integrated circuits. All circuit boards shall be coated with Humiseal with a minimum thickness of 0.002" to meet the requirements of MIL-E-5272, thus increasing the corrosion resistance of the boards. The motor operator shall be wired to a terminal strip within the housing to which all electrical connections shall be made. Valve travel time between limits shall be 15 seconds. A dosage adjustment, located within the control module to prevent unauthorized tampering, shall be provided. The operator shall operate on 120/240 V, 50/60 Hz and shall respond to the following signal(s); _____
An ejector shall be provided having a check valve and emergency drain valve to prevent water or solution from flooding the chlorinator. The chlorinator shall be Fischer & Porter Co. Series 70C4400.

Sizing Diskette

An easy to use sizing diskette for chlorinator ejectors, and all water flow meters (closed pipe and open channel types) used to pace automatic chlorinators, is available from Bailey-Fischer & Porter Co. Please contact your nearest sales office.

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