**Chlortrol™**
**Formerly Fischer & Porter**

***SPECIFICATION***

***CHEMICAL FEED EQUIPMENT***
***Series 70C1760/80***

# *CHLORINATORS WITH AUTOMATIC CONTROL; CYLINDER, WALL OR TON CONTAINER MOUNTED*

The Series 70C1760 and 80 chlorinators are vacuum operated, solution feed, sonic flow devices which provide automatic control of gas flow in response to transmitted control signals. Each chlorinator includes a vacuum regulator, a flowmeter, a ***Chloromatic™*** control valve and an ejector.

The vacuum regulator may be cylinder, wall or ton container mounted. A cylinder mounted unit can feed up to 100 lb/day (2 kg/h); the wall or ton container mounted unit can feed up to 500 lb/day (10 kg/h).

The flowmeter is available in a wide selection of capacities and may be mounted on the vacuum regulator or a wall.

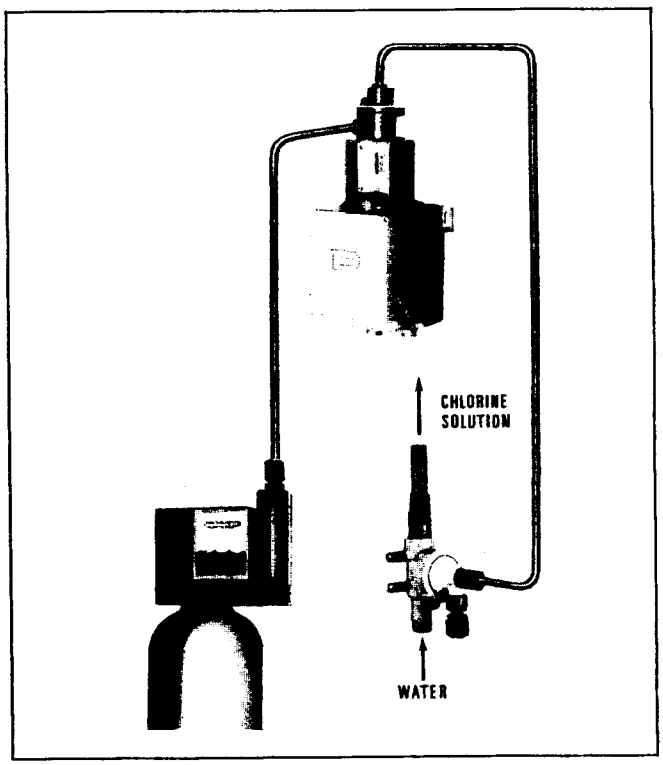
The ***Chloromatic™*** control valve is wall mounted and responds to control signals from a water flow transmitter and/or a chlorine residual analyzer controller. Valve characteristics are provided to accept a pacing signal proportional to flow.

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.

The four components described above may be used to construct systems 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 each point being either manually or automatically controlled.

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

Similar units of different materials may be used for feeding ammonia, carbon dioxide and sulfur dioxide gases. The maximum capacities for these feeders are approximately 50%, 75% and 100% respectively of the chlorinator capacity, e.g., the ammonia feeder is rated at 250 lb/day maximum.




## *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.
- **Control Signals:** The ***Chloromatic*** valve insures positive response to a wide variety of electric signals representing either water flow or chlorine residual measurement. Optionally, both flow pacing and residual control signals can be accepted simultaneously in the ***Chloromatic*** valve.
- **Versatility:** Optional second vacuum regulator adapts the feeder to automatic changeover without an extra valve. Additional flowmeters and ejectors allow for multipoint application.
- **Vacuum Operation:** Provides safety for operating personnel and equipment. Any leak will cause air to enter the system rather than gas to escape from it.

## *Engineering Specifications*

**Capacities:** Standard metering tubes are available with the following maximum capacities: 10, 25, 50, 100, 200, and 300 and 500 lb/day (200 and 500 g/h; 1, 2, 4, 6 and 10 kg/h) of chlorine gas. Additionally 1 or 3 lb/day (20 or 60 g/h) capacities are available for manual control. Cylinder mounted units are limited to 100 lb/day (2 kg/h) maximum.

## *Engineering Specifications (cont'd)*

**Flowmeter Rangeability:** 20 to 1 for any one metering tube. The metering tube scale length is 4 inches (100 mm) for easy readability, and is protected from accidental breakage by a plastic shield.

**Ejector Requirements:** Reasonably clean water at pressures of 4 psig (28 kPa) or greater is required to operate the ejector. Water consumption and required inlet pressure are dependent upon chlorinator capacity and ejector discharge pressure (back pressure). Refer to ejector sizing tables (available upon request) for details. The ejector supply pressure is limited to 300 psig (2070 kPa). The back pressure limit is 200 psig (1380 kPa). An ejector is normally required for each metering tube and rate valve. The standard ejector is not suitable for alkaline solutions. For this service a special ejector is provided.

### Mounting

The chlorinator vacuum regulator is mounted on a wall or on the gas valve of a 150 lb cylinder or ton container. The metering tube assembly may be mounted either on the side of the vacuum regulator or on a wall. Temperature limits on the vacuum regulator are 2° to 54°C (35° to 130°F). The ejector may be wall or pipeline mounted. If high temperature water is used (above 25°C, 77°F) 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. Pipeline mounting is limited to 100 lb/day maximum. The ***Chloromatic*** valve is wall mounted.

**Control Modes:** All automatic chlorinators utilize the ***Chloromatic*** valve. This unit has two major components, the control valve and the electric 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 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. Note that the ***Chloromatic*** valve does not provide the loop current power source.

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 shut off, the valve can be operated manually by means of 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.

## *Sizing Diskette*

*An easy to use sizing diskette for chlorinator ejectors is available from Fischer & Porter Co. Please contact your nearest sales office.*

## *Connections*

**Chlorine Gas Inlet:** ¾-inch NPT (wall mounted 70C1780 only)

**Ejector Water Inlet:** 1-inch NPT

**Solution Outlet:** ¾-inch NPT and 1-inch hose or 1½-inch NPT and 2-inch hose. Size is determined by water flow required to operate chlorinator. Alternate 1-inch NPT thread may be used for in-line ejector mounting. This alternate is usually reserved for 100 lb/day max. capacity.

**Interconnecting Vacuum Tubing:** ⅝-inch O.D.

**Safety Vent:** ⅝-inch O.D. tubing

## *Electrical Requirements:*

For ***Chloromatic*** Valve 0.3 A at 120 V ac; 0.15 A at 240 V ac, 50/60 Hz. For gas inlet heater (70C1780 only) 0.25 A at 120 V ac, 0.13 A at 240 V ac.

## *Materials of Construction:*

Cycolac™, Borg Warner Inc., Valox™ General Electric Co., PVC, Silver Tantalum alloy, Viton™ E.I. Du Pont Co., Hastelloy C-276™ Cabot Corp., Teflon™ E.I. Du Pont Co., KYNAR® Pennwalt Corp., transparent Polycarbonate, silver-plated brass, and borosilicate and Pyrex™ glass are used in the construction of the chlorinator and ejector. The mounting manifold is ductile iron with corrosion-resistant coating. The ***Chloromatic*** valve is PVC, KYNAR® and Fluorosint™ Polymer Corp. The valve operator is in a cast aluminum housing.

## *Shipping Weights and Cubage:*

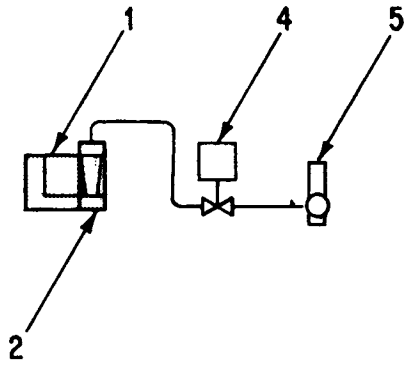
70C1760; 25 lb (11 kg), 3.5 ft³ (0.10m³)
70C1780; 32 lb (15 kg), 5.2 ft³ (0.15 m³)

## *Accessories:*

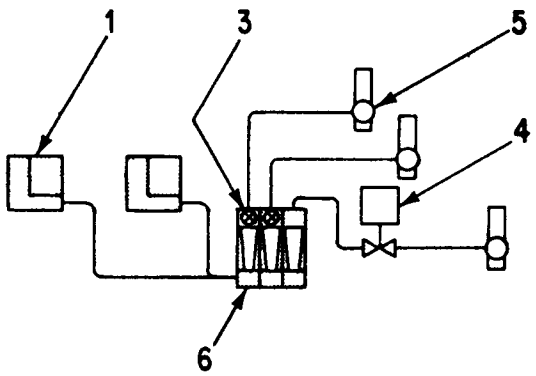
Standard
50 ft. (15 m) ⅝-inch tubing and insect screen
Bottle for ammonia solution
Six spare gas filter pads (for 70C1760 only)
Spare gaskets, thread lubricant and wrench

Optional
Alarm contacts in the ***Chloromatic*** valve
Additional Flowmeters and Ejectors for Multiple Point Application
Amperometric Titrator
Automatic Changeover System
Booster Pumps
***Chloralert*** Chlorine Gas Detector Diffusers
Gas pressure gauge (for 70C1780 only)
Ejector with Integral Anti-Siphon Valve
Out-of-gas switch contact (rated at 4 A at 120 or 240 V ac)

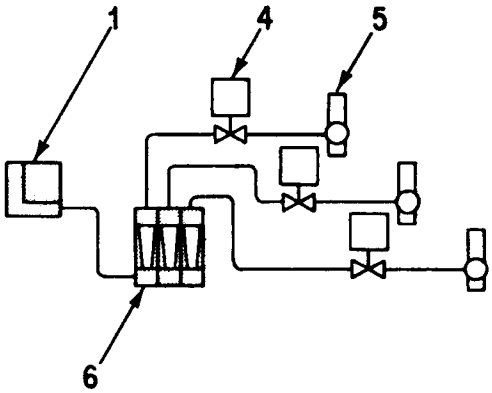
# TYPICAL ARRANGEMENTS




ONE METER




CHANGEOVER SYSTEM
UP TO THREE METERS

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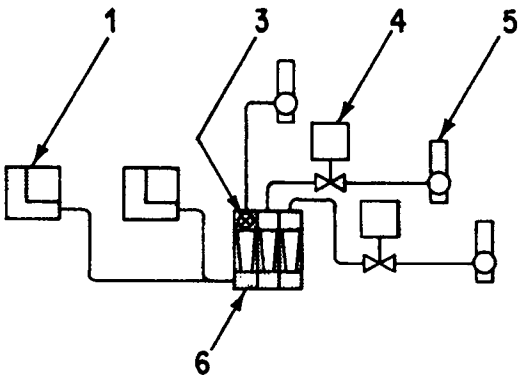


CHANGEOVER SYSTEM
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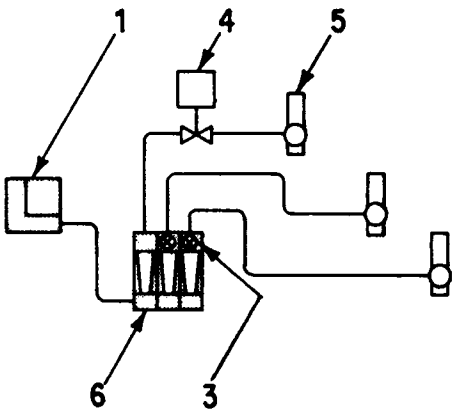
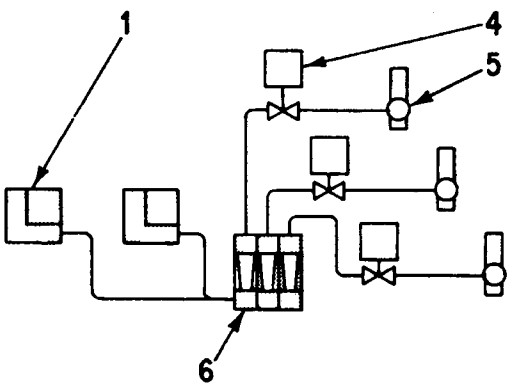
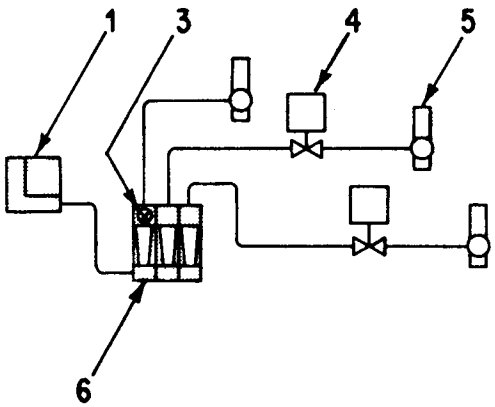



UP TO THREE METERS




CHANGEOVER SYSTEM
UP TO THREE METERS




UP TO THREE METERS

LEGEND

1 - VACUUM REGULATOR(S)

2 - FLOWMETER MOUNTED ON VACUUM REGULATOR

3 - MANUAL CONTROL VALVE(S)

4 - CHLOROMATIC CONTROL VALVE(S)

5 - EJECTOR(S)

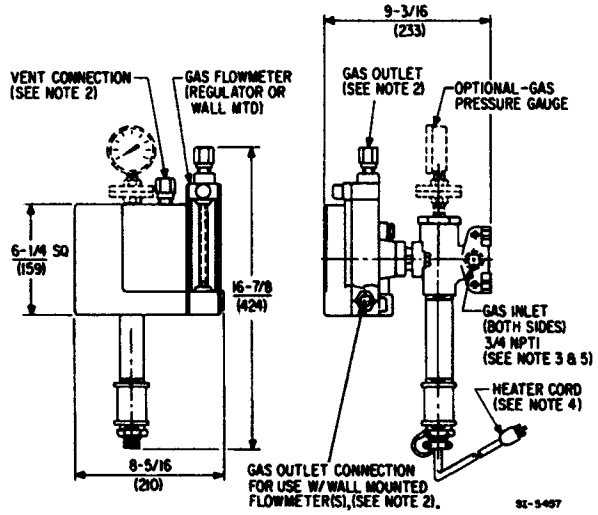
6 - FLOWMETER(S) MOUNTED ON WALL

NOTE:
ARRANGEMENTS OF THIS SYSTEM ARE NOT LIMITED TO THE ILLUSTRATIONS SHOWN; ARRANGEMENTS MAY VARY TO CUSTOMER'S SPECIFIC APPLICATION.

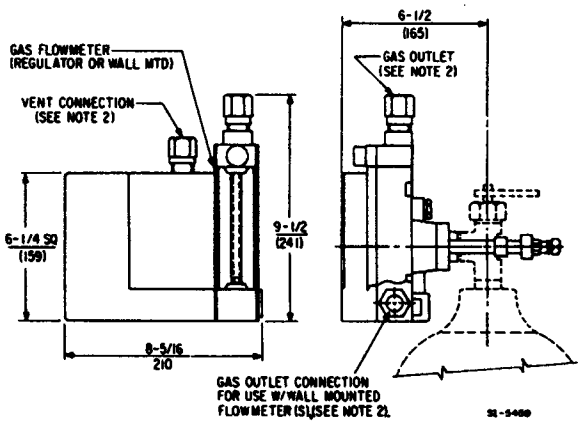
GI 2717

# DIMENSIONS

## Vacuum Regulator, Wall or Ton Container Mounted




## Vacuum Regulator, Cylinder Mounted




NOTES:

1. All dimensions are in inches (mm)
2. Adapter provided for ⅜-inch tubing
3. One side provided with a plug. Other side provided with adapter for union nut coupling
4. 10 foot 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.

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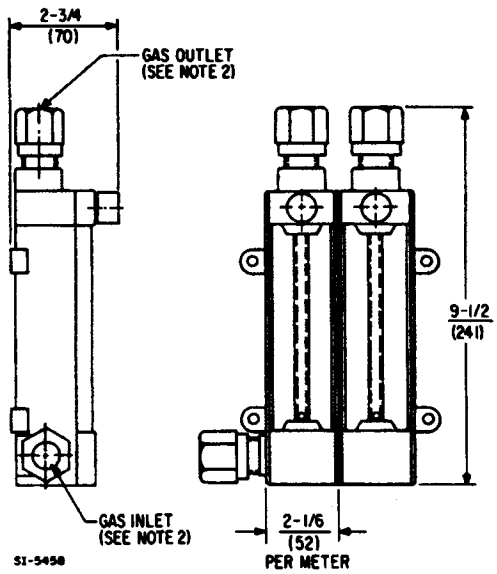
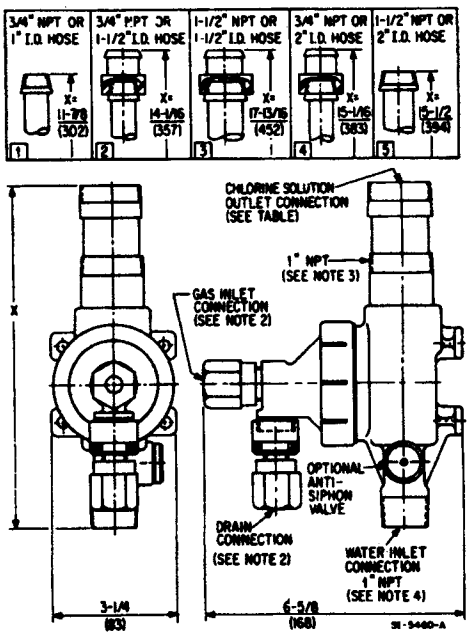
## Flowmeter




## Ejector




NOTES:

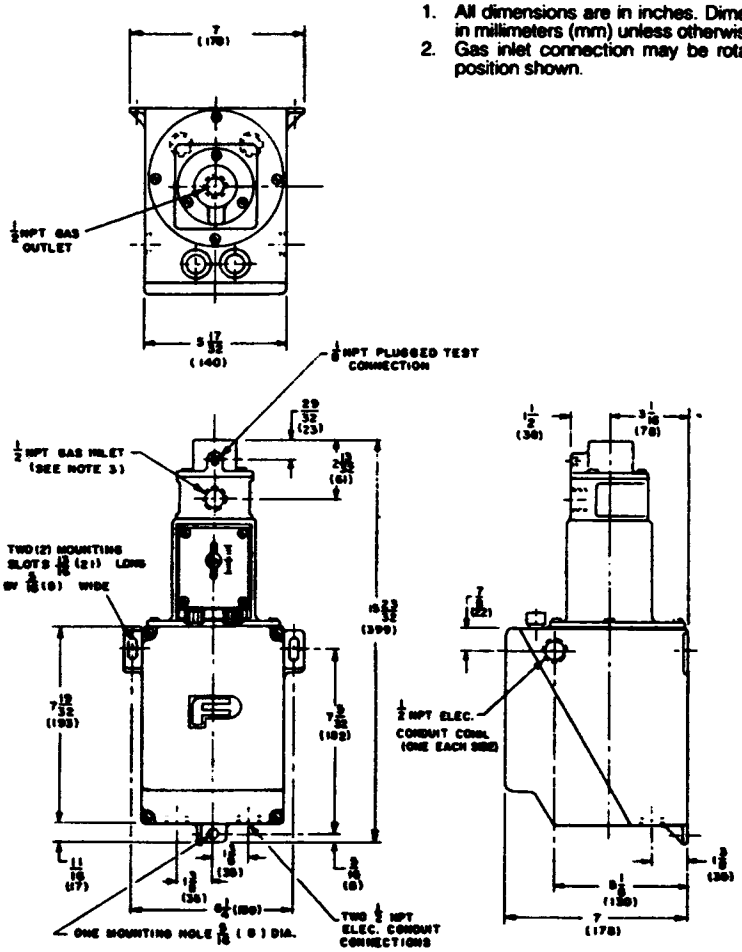
1. All dimensions are in inches (mm).
2. Adapter provided for ⅜ inch tubing.
3. For pipeline mounting of ejector. Limited to 100 lb/day max. and lines 6 inches in diameter or larger.
4. Water inlet piping normally should be no smaller than solution outlet size.
5. Special ejector supplied for alkaline service.

## DIMENSIONS (cont'd.)

*Chloromatic* Valve

NOTES:

1. All dimensions are in inches. Dimensions in parenthesis ( ) are in millimeters (mm) unless otherwise indicated.
2. Gas inlet connection may be rotated at intervals of 120° from position shown.




## *Description of Operation*

The chlorine gas from the source enters the chlorinator vacuum regulator where it is filtered to remove any foreign material which might be present. Water flowing through the ejector creates a vacuum which opens the inlet valve to admit the gas into the regulator. A diaphragm regulates the vacuum at this point to a closely controlled value.

The gas passes through the flowmeter and the *Chloromatic* valve, and then to the ejector. 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 upstream of the vacuum regulator and also to prevent any moisture from being drawn back into the operating components or the gas supply lines. At the same time an indicator on the side of the vacuum regulator shows that the gas supply has been interrupted.

When the vacuum regulators are used in an automatic changeoever system, either vacuum regulator is selected by the station operator allowing gas to flow until the chlorine source is exhaused. At that point, the second vacuum regulator automatically opens to allow gas feed to continue. Each regulator has an indicator to show whether it is in "Reserve", "Operating" or a "Empty" condition.

Within the ejector there are dual check valves and an emergency drain connection to prevent water from reaching the regulator.

# Chlortrol™
**Formerly Fischer & Porter**

## MODEL NUMBER DESIGNATION

70 17 D 4

*Chemical Service*
- Ammonia — A
- Chlorine — C
- Sulfur Dioxide — S
- Carbon Dioxide — B

*Regulator Mounting and Type of Control*
- Cylinder Mtd., w/Auto Control — 6
- Wall or Ton Container Mtd. w/Auto Control — 8

*Ejector (water pH)*
- Std. (OK for ammoniators) — X
- Hi pH (pH above 9) — 1

*No. of Rate Values, Ejectors and Type of Control*

| No. of Rate Valves / No. of Ejectors | Mode of Control | |
|---|---|---|
| 1 | Manual | 11 |
| 2 | Manual | 22 |
| 3 | Manual | 33 |
| 4 | Manual | 44 |
| 5 | Manual | 55 |
| 1 | Auto | 16 |
| 2 | Auto | 26 |
| 3 | Auto | 36 |
| 2 | Auto/Man | 27 |
| 3 | Auto/Auto/Man | 37 |
| 3 | Auto/Man/Man | 38 |

*2nd Vac. Reg. for Auto Changeover*
- Not Required — X
- Wall Mtd. — 1
- Ton Container Mtd. — 2
- Cylinder Mtd. — 3

*Chloromatic Valve Options*
- Chloromatic Not Required — X
- No Options — 1

| Valve Limit Alarm Contacts | Dual Input | |
|---|---|---|
| Yes | None | 2 |
| Yes | Yes | 3 |
| None | Yes | 8 |

*Power Requirements*
- 120 V — 1
- 240 V — 2

*Gas Pressure Gauge*
- Not Required — X
- Required — 1

*Units*
- Metric — C
- English — B

## *Ordering Information*

Please specify the following:

Cylinder, ton container or wall mounted vacuum regulator
Flowmeter Capacity (for each ejector)
Water supply and back pressure (for each ejector)
Automatic Changeover (2nd vacuum regulator)
Number of Flowmeters (used with ***Chloromatic*** valves)
Electrical Characteristics
Number of Flowmeters (used with manual control)
Number of Ejectors
Optional Accessories
Maximum pH of ejector water supply

## *Equipment Description*

*The chlorinator shall be a vacuum operated solution feed type with a feed range of ____ to ____ lb/day of chlorine gas. A flowmeter having a 20:1 range shall be provided to indicate the chlorine feed rate. It shall be suitable for mounting on the wall or on the chlorinator vacuum regulator, and equipped with a Chloromatic control valve for automatic operation.*

*The vacuum regulator shall be suitable for 150 lb. cylinder, ton container or wall mounting. When not cylinder mounted it shall include an integral manifold trap complete with a built-in electric heater with a ten foot cord, and a removable chlorine filter with a 5 square inch filtering area and 90 micron pore size.*

*A positive tight shut-off valve shall be provided within the chlorinator to isolate gas under pressure from the control system should there be a loss of vacuum. An easily removable fiberglass filter shall be included upstream of the inlet valve. A spring-operated pressure relief valve shall be provided to prevent the build-up of pressure within the gas control system. An excess vacuum shut-off valve which isolates the regulator and gas supply system from the ejector on loss of gas pressure shall be supplied. Provisions for automatic changeover shall be incorporated within the vacuum regulator without the need for an external valve. An indicator shall provide a visual signal when the chlorine gas supply is exhausted or interrupted.*

*The Chloromatic valve shall be stepping motor operated with the motor and electronic components mounted in a corrosion resistant enclosure. 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 primary input signal shall be (4-20) (0-16) (0-20) mA dc or (1-5) (0-4) (0-5) V dc. When dual electric inputs are utilized, the second input shall be (4-20) (0-16) (0-20) mA dc or (1-5) (0-4) (0-5) V dc. With dual signals, a 3 position switch for selecting the first input, second input or dual inputs shall be provided. An electric on-off switch shall be provided and the device shall be equipped with a hand-wheel which shall quickly position the valve manually without the necessity of disconnecting linkages.*

*The ejector shall be provided with dual check valves as well as an emergency drain valve to protect against flooding of the vacuum regulator. The unit shall be supplied with the following accessories: 50 ft. of 5/8-inch polyethylene tubing for vent and vacuum lines, insect screen, bottle for ammonia solution, spare gaskets, thread lubricant, and a universal wrench. The chlorinator shall be Bailey-Fischer & Porter Company Series 70C17 (60), (80).*

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