

### CHEMICAL FEED EQUIPMENT Series 70-5500

#### FLOOR-MOUNTED CHLORINATORS FOR CAPACITIES TO 10,000 lb/day (190 kg/h)

Bailey-Fischer & Porter Series 70-5500 Floor Mounted chlorinators are vacuum operated, solution feed 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 the gas source. The flowmeter, mounted in the control module is available in a wide selection of capacities. Maximum chlorinator capacities range from 2,000 to 10,000 lb/day (40 to 190 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.

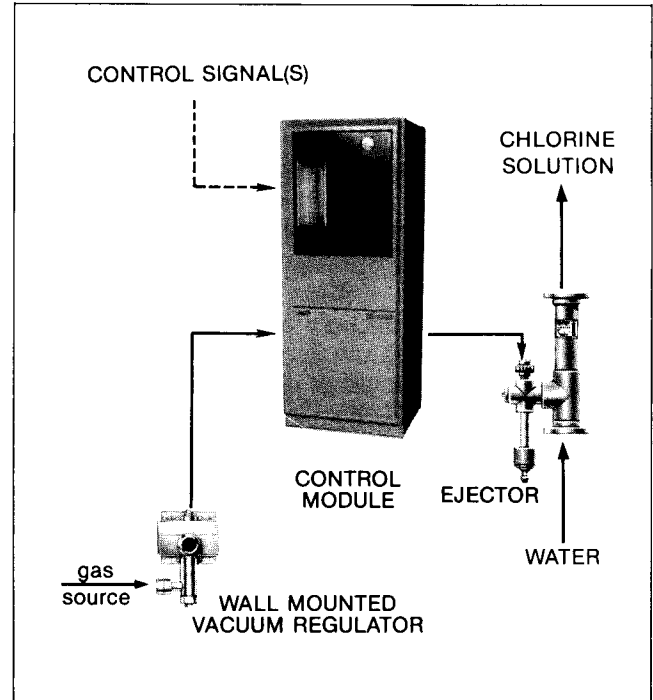
The ejector has a fixed diameter nozzle and throat, the size of which depends on the maximum chlorine feed rate and the hydraulic conditions existing in the water supply and chlorine solution lines.

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 all application points cannot exceed 10,000 lb/day (190 kg/h).

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 9500 lb/d for sulfur dioxide, 4800 lb/d for ammonia, and 6200 lb/d for carbon dioxide.

#### Design Features

- **Modern Design:** The chlorinators feature compact modular design with cabinets identical in size and color to other B-F&F chlorinators and analyzers. Integrated circuits and a single corrosion resistant electrical enclosure increase reliability of the automatically controlled models.



- **Control Signals:** The *Chloromatic™* valve insures positive response to electric signals representing either water flow or chlorine residual measurement. 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 is for wall mounting as close to the chlorine source as possible. Temperature limits are 2 to 54°C (35 to 130°F). An optional pressure gauge mounted on the inlet manifold is available. The inlet manifold heater rating is 30 W.

Another option is a low temperature switch having contacts rated at 10W, 120V.

## Engineering Specifications (cont'd)

### 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, a manual or automatically controlled rate valve and a differential pressure regulator. Each application point also requires an ejector. Any combination of capacities may be used as long as the total does not exceed 10,000 lb/day (190 kg/h).

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 120 V.

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: 2000, 4000, 6000, 8000 and 10,000 lb/day of chlorine gas. The equivalent metric capacities are 40, 80, 120, 160 and 190 kg/h. Metering tubes have dual scales in English and metric units. Should lower capacities be required on multipoint applications, they are available by using Series 70C4400 chlorinator control modules. Refer to Specification 70C4400.

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 tapered glass tube and a disk type plug. The plug is positioned within the tube 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 30 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 53MC5000 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 71-9006.

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 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 70C5500 Chlorinators are supplied with ejectors for solution lines with back pressures up to 80 psig (550 kPa) depending on capacity. The maximum allowable ejector supply pressure is 150 psig (1040 kPa).

**Materials of Construction:** PVC, Tantalum, Viton™ E.I. Du Pont Co., Hastelloy® C-276 Haynes International, Inc., Teflon™ E.I. Du Pont Co., KYNAR® Pennwalt Corp., silver, leaded naval brass, and extra heavy duty borosilicate glass are used in the construction of the chlorinator and ejector. The mounting manifold is ductile iron with corrosion resistant paint. The control valve tapered tube is glass, the plug material is tantalum and the valve operator is in a cast aluminum housing.

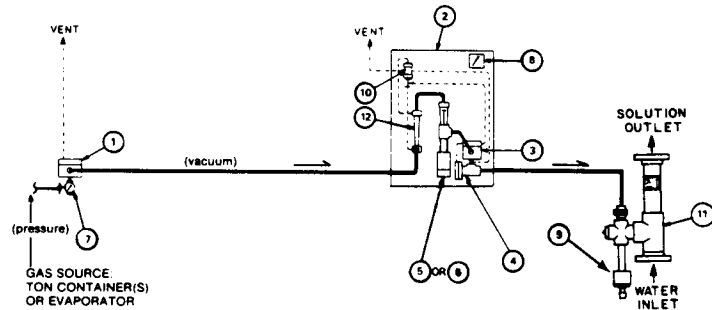
## MODEL NUMBER DESIGNATION

	70	55	C
Chemical Dispenser _____	70		
<b>Chemical Service</b>			
Ammonia _____	A		
Carbon dioxide _____	B		
Chlorine _____	C		
Sulfur dioxide _____	S		
<b>Control Module Mounting/Capacity</b>			
Floor Mtg., 10,000 lb/d (190 kg/h) chlorine max. _____	55		
<b>Vacuum Regulator</b>			
Wall Mounted with gauge _____	2		
Wall Mounted _____	3		
None _____	9		
<b>Type of Control:</b>			
Manual _____	1		
Automatic _____	4		
Automatic with Integral Controller _____	5		

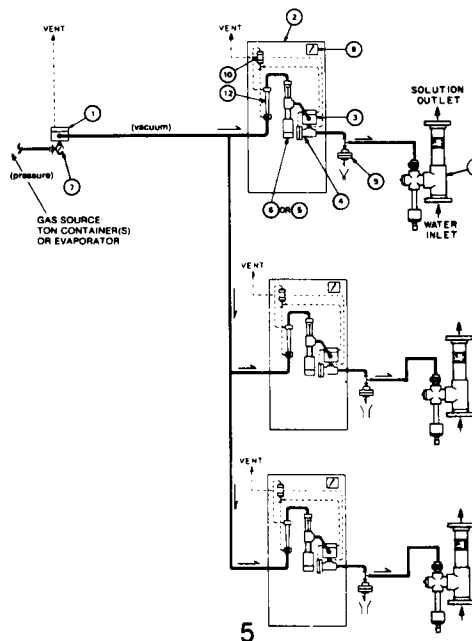
### Typical Arrangements

- |                                       |  |
|---------------------------------------|--|
| 1. Vacuum regulator                   | 8. Vacuum gauge                            |
| 2. Control module                     | 9. Emergency drain relief valve            |
| 3. Differential regulator             | 10. Vacuum relief valve and vacuum breaker |
| 4. Vacuum stabilizing valve           | 11. Ejector with check valve               |
| 5. <i>Chloromatic</i> ™ rate valve    | 12. Flowmeter                              |
| 6. Manual rate valve (not shown)      |  |
| 7. Gas pressure gauge (when supplied) |  |

### BASIC INSTALLATION



### INSTALLATION FOR MULTIPoint APPLICATION



## 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 differential across this rate valve is closely controlled by a differential regulating valve. Close control is augmented by the use of a vacuum stabilizing 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, multiple control modules 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.

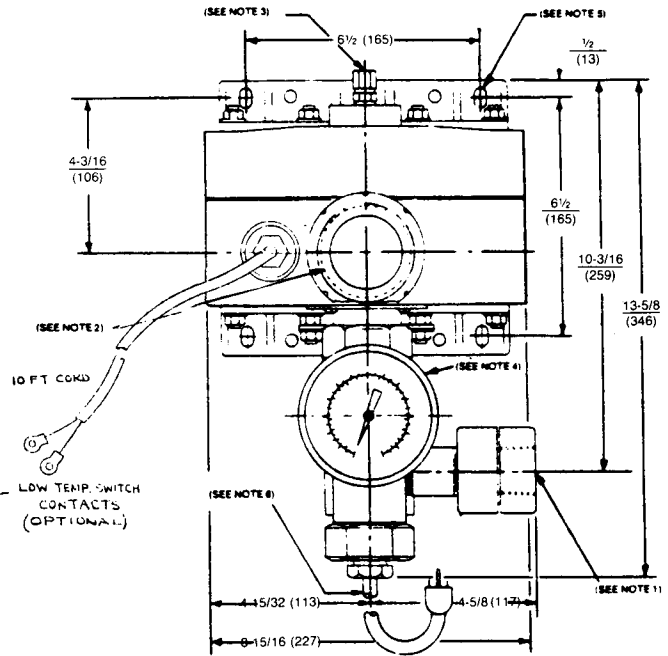
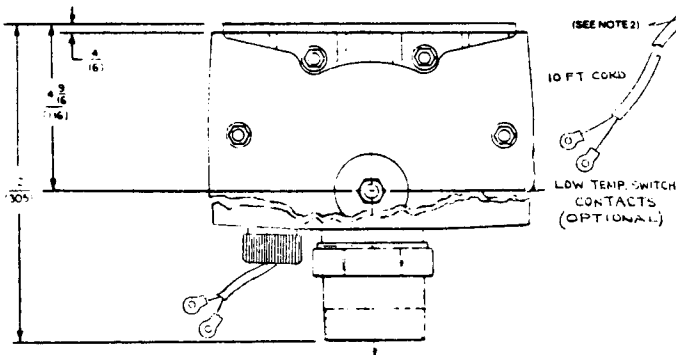
The system is completely under a partial vacuum from the ejector to the gas inlet valve during operation. If the water supply to the ejector is stopped, or the operating vacuum is lost for any other reason, the spring-loaded gas inlet valve immediately closes to isolate the chlorinator from the gas supply. 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, or the gas port plugged, an excess vacuum valve in the control module protects the system from damage.

The ejector is supplied with a check valve and an emergency drain connection to prevent water from reaching the control module.

## WALL MOUNTED VACUUM REGULATOR DIMENSIONS & CONNECTIONS

### NOTES:

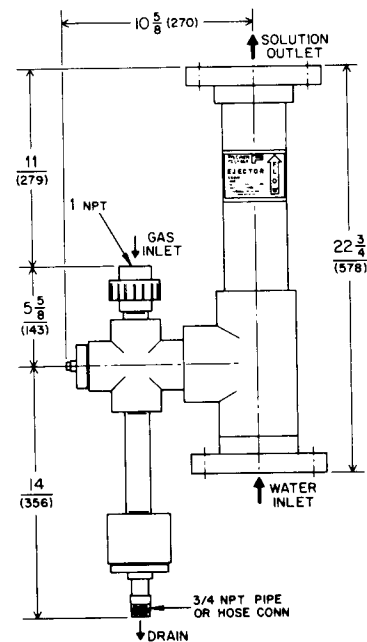
1. Gas inlet connection, 1-inch NPT ammonia flange.
2. Gas outlet connection, 2-inch NPT.
3. Vent connection,  $\frac{3}{8}$ -inch (16 mm) tubing fitting
4. Gas pressure gauge with chemical protector (optional).
5. Four  $1\frac{1}{32}$ -inch (9.0 mm)  $\times$   $\frac{9}{16}$ -inch (14.0 mm) mounting slots.
6. Heater cord, 10 feet (3 m) long with three pin (grounded) plug. 120/240 V ac, 50/60 Hz required.
7. All dimensions are in inches (mm are in parenthesis).



## EJECTOR — DIMENSIONS & CONNECTIONS

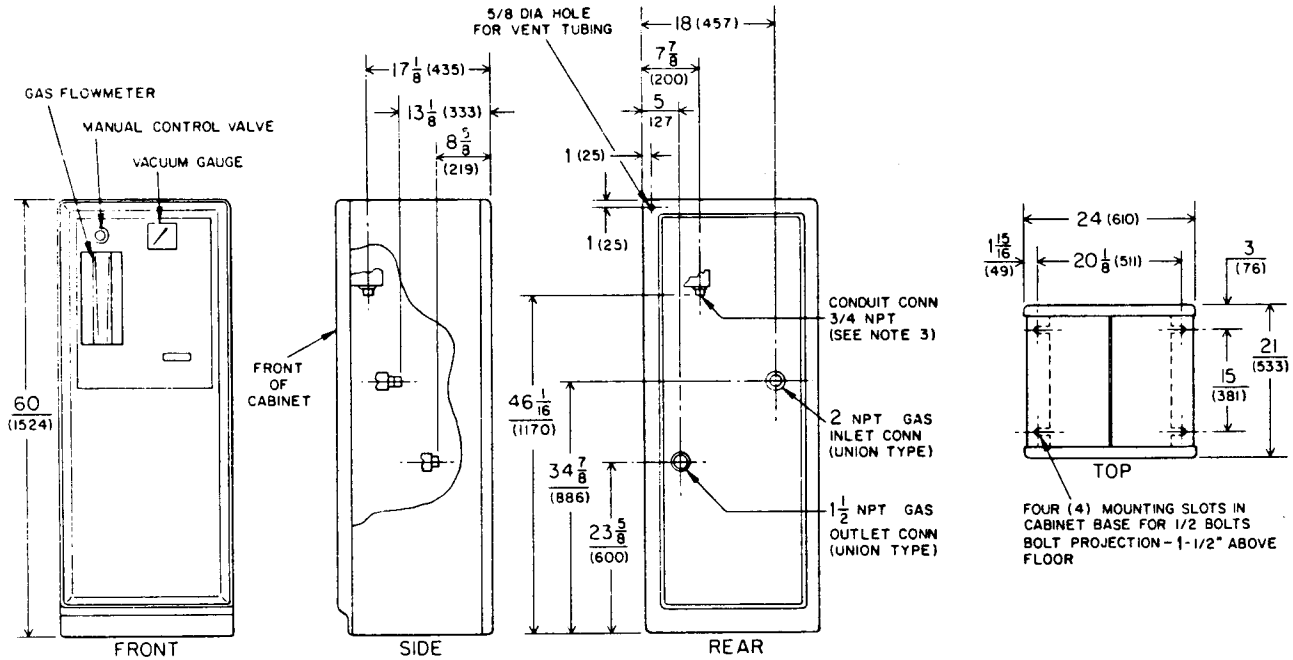
### NOTES:

1. All dimensions are in inches (mm are in parenthesis).
2. Connection flanges for 3 inch pipe class 125/150.



## DIMENSIONS & CONNECTIONS

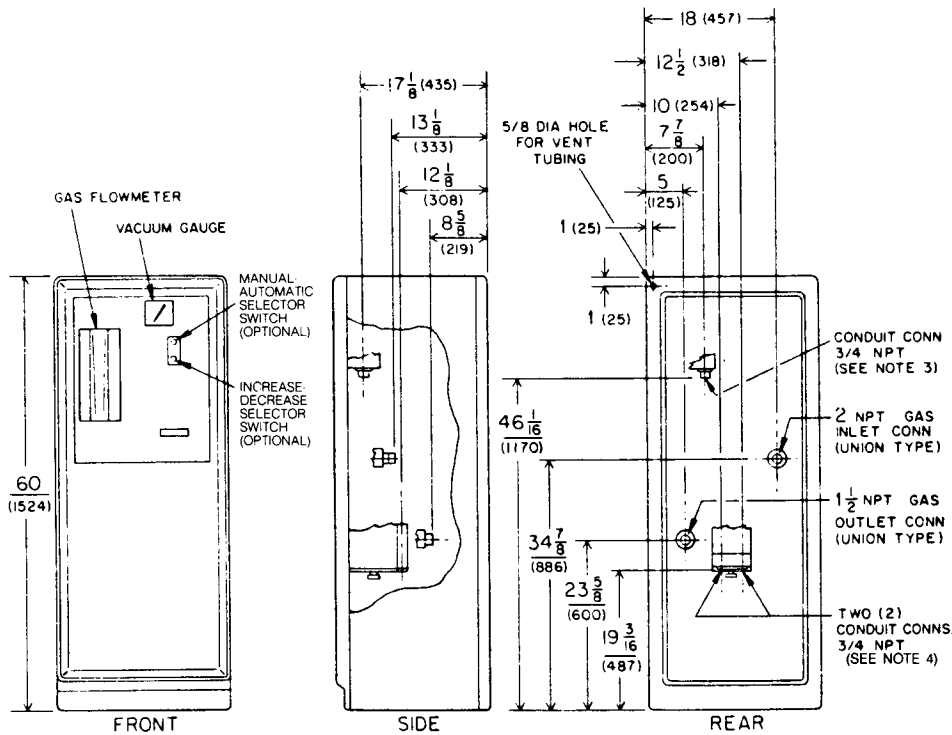
### MANUAL CONTROL MODULE



#### NOTES:

1. ALL DIMENSIONS ARE IN INCHES (mm ARE IN PARENTHESIS).
2. MINIMUM CLEARANCE OF 18" (457) MUST BE PROVIDED IN FRONT AND REAR OF CABINET.
3. USE FOR INTERCONNECTIONS TO LOSS-OF AND/OR EXCESS VACUUM ALARM.
4. USE FOR SIGNAL INPUT, SIGNAL OUTPUT, VALVE LIMIT ALARM AND POWER SUPPLY - REFER TO MANUFACTURING DATA FOR POWER REQUIREMENTS.

### AUTOMATIC CONTROL MODULE



# Chlortrol™

Formerly Fischer & Porter

## Shipping Weight and Cubage

200 lb (91 kg), 42 ft<sup>3</sup> (1.2 m<sup>3</sup>)

## Accessories and Options

### 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 (Specification 71-9002/3)  
Booster Pumps  
**Chloralert™** Chlorine Gas Detector (Specification 17CA1000)  
Chlorine Evaporators (Specification 71V1000)  
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:

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

## 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 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 provided with an easily removable filter screen. A combination trap and heater assembly shall be furnished. A diaphragm operated pressure relief valve shall be provided to prevent the build up of pressure within the gas control system. An excess vacuum relief valve shall also be provided.

When required for automatic operation, a **Chloromatic™** control valve shall be mounted within the control module. It shall consist of a precision tapered glass tube, a corrosion resistant plug 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 on 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 30 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 control module. The chlorinator shall be Bailey-Fisher & Porter Co. Series 70-5500.

## 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.