SEVERN TRENT SERVICES

Disinfection Products

CAPITAL CONTROLS®
Gas Feed Systems
Series High Capacity NXT3000
1,000 - 3,000 PPD (20-60 kg/h)

The Series NXT3000 High Capacity Gas Feed System is a family of vacuum-operated, solution-feed, gas dispensing components including a vacuum regulator, meter assembly and ejector to meet customer needs for feeding chlorine, sulfur dioxide, ammonia or carbon dioxide gas. The Series NXT3000 is a versatile, high quality system which operates at sonic conditions eliminating the need for differential pressure regulation across the rate control valve. Proven design, rugged construction, and the use of the best available materials assures precise gas feeding, low maintenance and dependable operation for the life of the equipment.

Chlorinator feed rates are dependent on the maximum withdrawal rates from gas containers and the location of the vacuum regulator. The vacuum regulator is provided for manifold mounting to your gas source. A liquid trap and heater are provided to prevent liquefied gas from reaching the regulator.

As required for the application, meter assemblies can be provided. Meter assemblies are remotely mounted. Only one control valve (manual or automatic) may be installed in the system. 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.

When automatic control is required a Chloromatic™ valve can be provided which will respond to control signals from a water flow transmitter and/or chlorine residual analyzer controller.

Several vacuum source choices are available for the Series NXT3000 system. The 2" flanged ejectors (3" for 3000 PPD) and EJ17 for ammonia can be used for general applications. These incorporate a back-flow check valve and an emergency overflow drain valve within the ejector which prevents water or process liquid from entering the gas (vacuum) line when the ejector is not operating. In addition, a CHLOR-A-VAC® chemical induction unit can be used as the vacuum source for the system.

For applications requiring uninterrupted gas feed, a built-in automatic changeover function is provided in every vacuum regulator. All that is required is two vacuum regulators. No separate changeover module or valve is required.

Only one vacuum regulator is required to feed maximum capacities up to 3,000 PPD (60 kg/h) for chlorine. Units similar to those for feeding chlorine but with different materials of construction are available for feeding sulfur dioxide – max capacity 2,000 PPD/40 kg/h (capacity limited by metering tube, vacuum regulator can feed up to 3,000 PPD) ; ammonia – max capacity 1,000 PPD (20 kg/h); Carbon Dioxide – max capacity 1,500 PPD (30 kg/h). The maximum feed capacity is dependent on the gas source.

DESIGN FEATURES

- **Modern Design**: Operates on the sonic principle. No D/P regulation required. Fewer parts mean better reliability and improved ease of maintenance.
- **Modularity**: System consists of vacuum regulator, meter assembly and ejector.
- **Inlet Valve Body and Spring:** Both are manufactured from Hastelloy-C and warranted for life.
- **Control Signals:** The Chloromatic valve insures positive response to electrical 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.
- **Versatility**: System adapts to automatic vacuum changeover by simply adding a second vacuum regulator. No separate changeover module required.
- **Safe Operation**: All vacuum operation prevents escape of gas to atmosphere.
- **Minimum Maintenance**: Simple design minimizes routine maintenance. PM kits available for all major components.



ENGINEERING SPECIFICATIONS

Capacities: Standard metering tubes are available with the following maximum capacities: 1000, 2000 and 3000 PPD (20, 40 and 60 kg/h) of chlorine gas. Metering tubes have dual scales in English and metric units. Any combination of capacities may be used on multiple feed point applications as long as the total does not exceed the capacity of the vacuum regulator.

Flowmeter Rangeability: 20 to 1 for any one metering tube. Scale length for all capacities is 10 inches (25.4 cm) for easy readability. All tubes for chlorine, sulfur dioxide and ammonia are direct reading.

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. 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. Reference should be made to pipe manufacturer's product literature for decreased pressure ratings of PVC piping. Ejectors provided can handle back pressures up to 200 psig (1380 kPa) depending on capacity. The ejector is wall mounted and is supplied with a check valve and an emergency drain connection to prevent water from reaching the vacuum regulator.

Mounting: The vacuum regulator is wall or manifold mounted. The unit is protected from liquid chlorine damage (up to the volume of one full ton container eductor tube) by means of a combination manifold trap filter assembly. Trapped liquid chlorine is vaporized by a 25W electric heater. Automatic control valves (Chloromatic™) are furnished separately for direct wall mounting. The manifold contains a 5.9 sq. in., 0.01 micron cartridge filter.

Automatic Changeover: 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 "Empty" condition.

Control Modes: The gas feeder can be controlled either manually or automatically by the use of a rate control valve. For a manual control application, a manual rate control valve is provided as part of the meter assembly. For automatic control a separate control valve (The Chloromatic Valve – see below) is provided.

Chloromatic Valve: The Chloromatic valve has two major components: the control valve and the control valve operator. 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 mAdc; 1-5, 0-4, or 0-5 Vdc (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. Temperature limits on the Chloromatic valve are 20 to 125°F (–7 to +52°C). Reference bulletin 100.0310 for more information.

Options: Include a gas pressure gauge and a low temperature switch to sense liquefied gas presence having contacts rated at 10W, 120V max.

Connections:

Vacuum Regulator:
- *Gas Outlet:* 1" NPTE PVC
- *Vent:* ¼" NPT X 5/8" OD tubing

Meter Assembly:
- *Gas Inlet and Outlet:* 1" FNPT

2" Ejector up to 2000 PPD (40kg/h) as chlorine:
- *Water inlet:* 2" threaded (female)
- *Solution outlet:* 2" threaded (male)
- *Gas vacuum inlet:* 1" NPT union
- *Emergency drain:* ¾" NPT or 1" hose

3" Ejector, 2000-3000 PPD (40-60 kg/h) as chlorine:
- *Water inlet and solution outlet:* 3" flanged
- *Gas vacuum inlet:* 1-1/2" NPT union
- *Emergency drain:* ¾" NPT or 1" hose

EJ17, up to 1000 PPD - ammonia only:
- *Water inlet:* 1" NPT
- *Solution outlet:* 3/4" NPTE or 1" hose
- *Gas Vacuum inlet:* 5/8" tubing
- *Emergency drain:* 5/8" tubing

Electrical Requirements:
Heater furnished with a 10-foot (3.3 M) cord for either 120 Vac (plug) or 240 Vac (hardwired). Heater is 25W and requires 0.21 A at 120 Vac or 0.10 A at 240 Vac.
Chloromatic valve requires 0.3A at 120 Vac or 0.15A at 240 Vac

Materials of Construction: See Bulletin 100.3201.

Temperature Limits:
Ambient maximum: 130°F (54°C)
Ejector water maximum: *100°F (38°C)
Normal vacuum regulator operating range: 38 - 130°F (2-54°C)
*Ejector performance will be impaired due to decrease in gas solubility if water temperature is above 77°F (25°C).

Shipping Weight:

	Shipping Weight	Volume
Vacuum Regulator	7 lb (3.2 kg)	1.7 cu.ft. (0.05 m^3)
Liquid Trap	7 lb (3.2 kg)	1.0 cu.ft. (0.03 m^3)
Meter Assembly	12 lb (5.4 kg)	1.0 cu.ft. (0.03 m^3)
Ejector, 2" or 3"	10 lb (4.5 kg)	2.0 cu.ft. (0.06 m^3)
Ejector, EJ17	3 lb (1.5 kg)	1.0 cu.ft. (0.03 m^3)

ACCESSORIES:

Standard:

1 - Ammonia leak test bottle
1 - Insect screen for vent line
4 - Spare lead gaskets
1 - Multipurpose wrench
1 - Instruction bulletin and parts list

Options:

Gas Pressure gauge
Out of gas alarm switch
Preventative Maintenance Kits
Chloromatic valve (100.0310)
Chloralert Plus™ Chlorine Gas Detector (Bulletin 325.0025)
MicroChem®2 Series 4000 Chlorine Residual Analyzer (Bulletin 210.0100)

DESCRIPTION OF OPERATION

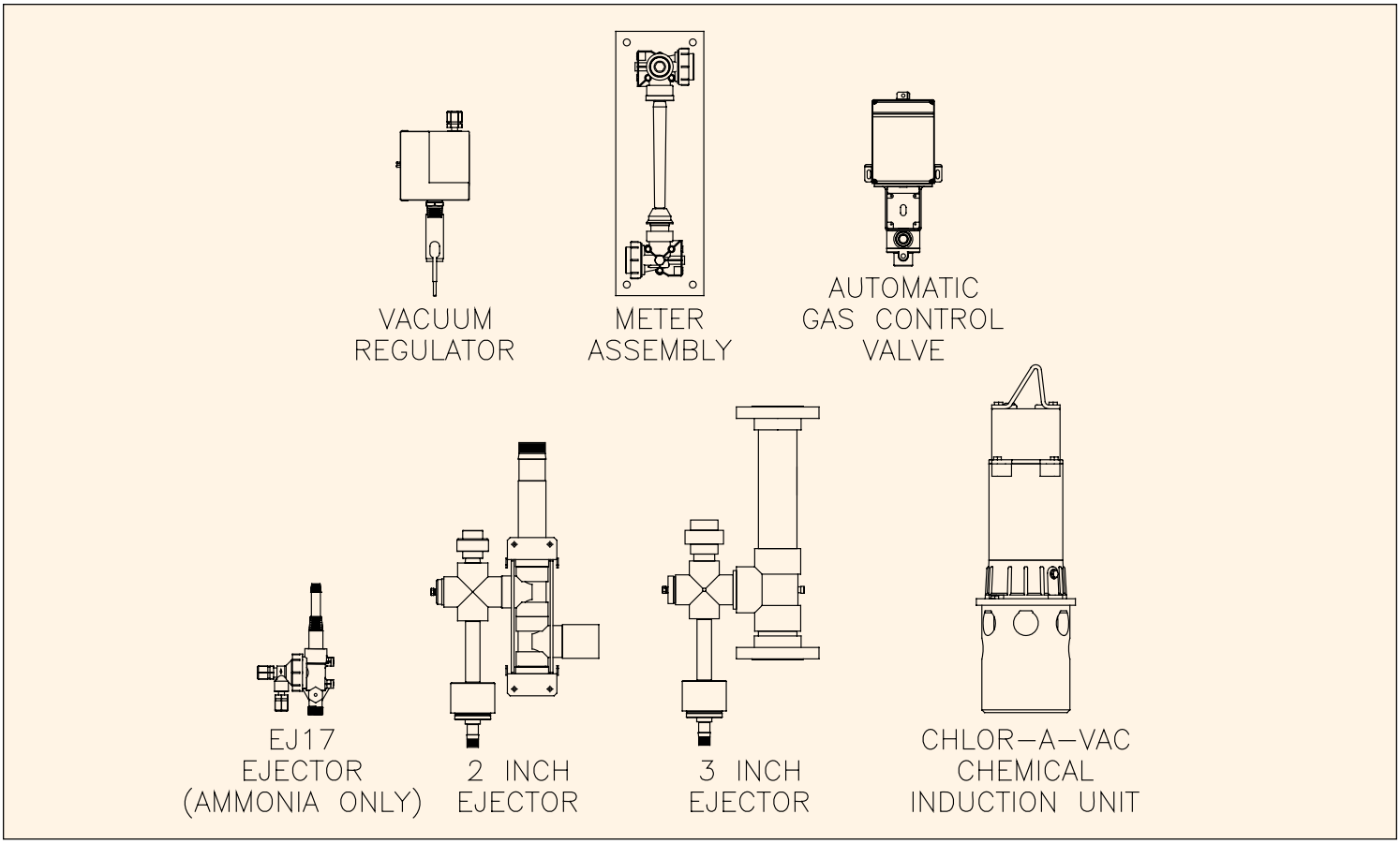
The chlorine gas from the source enters the manifold where it is filtered to remove any foreign material which might be present. Water flowing through the ejector creates a vacuum which opens the inlet valve of the vacuum regulator to admit the gas into the regulator. A diaphragm regulates the vacuum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

The gas passes through the flowmeter(s) and the rate control valves (either manual or automatic) and then goes to the ejector or ejectors where it is thoroughly mixed and dissolved in the motive water and carried to the application point as a solution. When 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 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 excessive vacuum levels from developing upstream of the vacuum regulator and also prevents any moisture from being drawn back into the operating components or the gas supply lines.

At the same time, an indicating lever on the side of the vacuum regulator shows that the gas supply has been exhausted.

When the 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 automatically opens to allow gas feed to continue. Each regulator has an indicator to show whether it is in the “RESERVE”, “OPERATING”, or “EMPTY” mode.



Brief Description

The gas feed system shall be a vacuum-operated, solution feed type with a feed range of___ to ___ PPD of _____ gas. It shall be of the sonic flow design.

The vacuum regulator shall be suitable for wall mounting and shall be provided with an integrally mounted manifold trap with built-in electric heater with ten foot cord. Power requirement shall be 120 Vac or 240 Vac, 50/60 Hz. The manifold shall have a 5.9 square inch, removable filter cartridge having a 0.01 micron pore size.

A positive tight shut-off valve with Hastelloy®C body shall be provided within the vacuum regulator to isolate gas under pressure from the control system should there be a loss of vacuum. A spring-loaded pressure relief valve shall be provided to prevent the build-up of pressure within the gas control system. An excess vacuum shut-off valve shall be provided as an integral part of the vacuum regulator to automatically isolate the regulator from the meter assembly and ejector on loss of gas supply pressure. Provisions for automatic changeover shall be incorporated within the vacuum regulator without the need for an external valve. An indicator shall provide visual indication when the chlorine gas supply is exhausted or interrupted.

A meter assembly having a 20:1 range shall be provided to indicate the gas feed rate. The meter shall be calibrated for the gas being fed and shall be direct reading in both English and metric units and the meter scale shall be 10 inches (25.4 cm). It shall be suitable for mounting on the wall. It shall be provided with a manual rate valve for manual control. When the system is automatically controlled no manual valve is provided. When required for automatic operation a Chloromatic™ control valve shall be provided (reference bulletin 100.0310 for equipment description).

An ejector shall be furnished with the system. The ejector nozzle and throat shall be sized for the application and have a check valve and emergency drain valve to prevent water or solution from flooding the chlorinator. The ejector shall be designed for the following conditions:

Water supply pressure: _____psig
Maximum water flow: _____gpm
Maximum back pressure: _____psig

The vacuum regulator, meter assembly, rate control valve (manual or automatic), and ejector assembly shall be manufactured from materials resistant to corrosion from the chemicals being fed. All components shall be manufactured in a facility certified to meet the requirements of ISO9001 International Standards.

The following accessories shall be supplied: Insect screen, bottle for test solution, four spare lead gaskets, universal wrench, thread lubricant, and instruction manual and parts list.

The gas feed system shall be Severn Trent Services Series High Capacity NXT3000, or approved equal.

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