

# Series *NXT3000* Gas Feed System



## CAPITAL CONTROLS



### DESIGN FEATURES

- **Modern Design:** Operates on sonic principle. No DP regulation required. Fewer parts means better reliability and improved ease of maintenance.
- **Modularity:** System consists of vacuum regulator, meter assembly and ejector. One vacuum regulator for all capacities up to 500 PPD.
- **Inlet Valve Body and Spring:** Both are manufactured from Hastelloy-C and warranted for life.
- **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.
- **Superior Warranty:** Vacuum regulator and meter assembly carry 3-year warranty.

The *Series NXT3000* Gas Feed System is a family of vacuum-operated, solution-feed gas dispensing components including a vacuum regulator, meter assembly, and a selection of ejectors 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 regulating differential pressure 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.

The vacuum regulator mounts directly on a 150 lb. cylinder, a ton container, or on the wall. When ton container or wall mounted a liquid trap and heater are provided to prevent liquified gas from reaching the regulator.

As required for the application, one meter assembly may be integrally mounted and a second remotely mounted in series. Only one control valve (manual or automatic) may be installed in the system. The meter assemblies are designed to permit ganging multiple meters for wall mounting to multiple feed points.

Several ejector choices are available for the *Series NXT3000* system. The EJ100/200/500 ejectors can be used for general applications. These incorporate an O-ring and diaphragm type check valve. For more demanding applications – for on-off service, anti-siphon and high back pressure, up to 200 psig (1380 kPa), the EJ17 ejector can be used. 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, but for complex vacuum changeover systems the *Series NXT3000* vacuum regulators can be used with the Capital Controls series of automatic vacuum switchover modules.

Only one vacuum regulator is required to feed maximum capacities up to 500 PPD (chlorine). Maximum capacities for other gases are as follows: Sulfur Dioxide – same as chlorine; Ammonia – 250 PPD; Carbon Dioxide – 375 PPD. The maximum feed capacity is dependent on the gas source.

## ENGINEERING SPECIFICATIONS

**Capacities:** Standard metering tubes are available with the following maximum capacities: 1, 3, 10, 25, 50, 100, 200, 300, and 500 PPD (20, 60, 200, 500 g/h, 1, 2, 4, 6 and 10 kg/h) of chlorine gas. Any combination of capacities may be used on multiple feed point applications as long as the total does not exceed 500 lb/day (10 kg/h).

**Flowmeter Rangeability:** 20 to 1 for any one metering tube. For example, a chlorinator with a maximum capacity of 50 lb/day can measure and control gas feed over the range from 2.5 to 50 lb/day. Scale length for all capacities is 4 inches (100 mm) for easy readability, and all mount in the same universal meter assembly. All tubes for chlorine, sulfur dioxide and ammonia are direct reading. An easily removable plastic shield is provided to protect operating personnel from accidental tube breakage.

**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/nozzle curves for details. An ejector is normally required for each point of solution application. For swimming pool applications or where the solution discharge point is at a lower elevation than the ejector throat discharge elevation, an ejector with an integral anti-siphon valve is required.

**Mounting:** The vacuum regulator is designed for mounting on the gas valve of either a 100 or 150 lb cylinder or a ton container. The meter assembly can be integrally mounted on the vacuum regulator or remotely wall mounted. The ejector may be wall mounted for all capacities up to 500 PPD and up to 100 PPD for pipe mounting. Automatic control valves can be furnished separately for direct wall mounting, or as part of wall panel or wall cabinet installations.

**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. Where there are two meters in series in the same vacuum line, only one will have a rate control valve. There are numerous methods of automatic control. For all of these an automatic control valve consisting of a valve assembly (body, precision plug and valve seat) and an electric actuator is used. The actuator receives an electronic signal (typically from a flow meter or a residual controller) and positions the valve plug to permit an automatically regulated flow of gas to the process. Please contact your local Capital Controls representative for assistance with your control applications.

### Connections:

Vacuum Regulator Gas Outlet and Vent: 5/8" tubing  
 Meter Assembly Gas Inlet and Outlet: 5/8" tubing  
 Ejector:

	Gas Inlet	Water Inlet	Solution Outlet	Emergency Drain
EJ100	3/8" tubing	3/4" NPTE or 1" hose	3/4" NPTE or 1" hose	N/A
EJ200	1/2" or 5/8" tubing	1 1/4" NPT or 1 1/2" hose	1 1/4" NPT or 1 1/2" hose	NA
EJ500	5/8" tubing	1 1/4" NPT or 1 1/2" hose	1 1/4" NPT or 1 1/2" hose	N/A
EJ17	5/8" tubing	1" NPT	3/4" NPTE or 1" hose	5/8" tubing

**Note:** Vacuum regulator, meter assembly and ejector are furnished with an adaptor kit to permit reducing or increasing tubing sizes consistent with gas flow requirements.

**Electrical Requirements:** For wall or ton container mounting vacuum regulators 120 Vac or 240 Vac is required for operation of the 25 W electric heater on the liquid trap. Heater is furnished with a 10-foot (3.3 M) cord.

**Materials of Construction:** See 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 cf (0.05 M <sup>3</sup> )
Liquid Trap	7 lb (3.2 kg)	1.0 cf (0.03 M <sup>3</sup> )
Meter Assembly	1 lb (0.5kg)	1.0 cf (0.03 M <sup>3</sup> )
Ejector	3 lb (1.5kg)	1.0 cf (0.03 M <sup>3</sup> )

### ACCESSORIES:

Standard:

- 1 - Ammonia leak test bottle
- 1 - Insect screen for vent line
- 4 - Spare lead gaskets
- 6 - Inlet valve filters
- 1 - Multipurpose wrench
- 1 - Tubing adaptor kit containing various tubing connectors (one kit for each component)
- 1 - Instruction bulletin and parts list

Options:

- Amperometric titrator
- Out of gas alarm switch
- Preventative Maintenance Kits

## DESCRIPTION OF OPERATION

The chlorine gas from the source enters the gas 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.

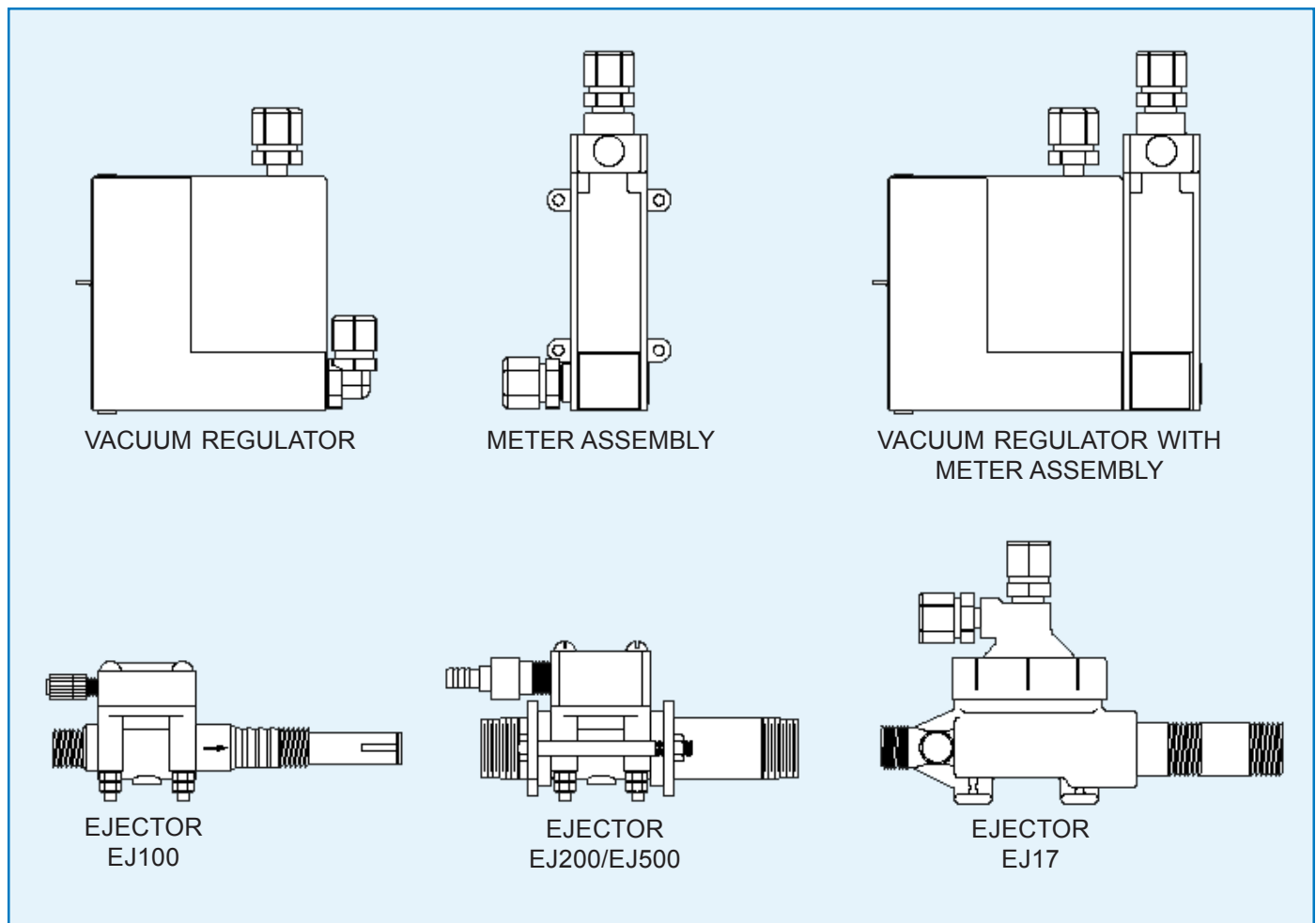
The gas passes through the flowmeter(s) and the rate control valves and then goes to the ejector or ejectors where it is thoroughly mixed and dissolved in the water and carried to the application point as a solution. When multiple metering tubes and ejectors are used, each operates independently of the 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.



## Equipment Description

The gas feed system shall be a vacuum-operated, solution feed type with a feed range of \_\_\_ to \_\_\_ lb/d of \_\_\_ gas.

The vacuum regulator shall be suitable for cylinder, ton container or wall mounting. When ton container or wall mounted it shall be provided with an integrally mounted manifold trap with built-in electric heater with ten foot cord. Power requirement shall be 120 Vac, 50/60 Hz. The manifold shall have a 5 square inch, removable filter having 90 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. An easily removable fiberglass filter shall be included upstream of the inlet valve. 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 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 a visual signal 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. It shall be suitable for mounting on the wall or on the vacuum regulator. The meter assembly shall be fitted with a protective plastic shield. It shall be provided with a manual rate valve for manual control. When the system is automatically controlled no manual valve is provided.

An ejector shall be furnished with the system. The ejector nozzle and throat shall be sized for the application. The type of ejector to be supplied shall be application dependent. 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 vacuum regulator, meter assembly and ejector shall be furnished with connections for 5/8-inch tubing. Capacity adaptor kits shall be supplied with each to permit use of reduced tubing size as necessary. The following accessories shall be supplied: Insect screen, bottle for test solution, six spare filter pads, four spare lead gaskets, universal wrench, meter assembly mounting accessories, and instruction manual and parts list.

The gas feed system shall be Capital Controls Series *NXT3000* or approved equal.

Design improvements may be made without notice.

Represented by:



## CAPITAL CONTROLS

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