

Wallace & Tiernan® Gas Chlorination V10k™ Gas Feed System

PRODUCT OVERVIEW

The V10k™ system is a remote vacuum solution feeder for use with four of the most commonly used gases for the disinfection and treatment of municipal and industrial water and wastewater. This unit has been built to continue the long standing proven design and features of its predecessor and adds more. The versatility of wall mounting, front access of all components and maximum capacity of 750 PPD (15 kg/hour chlorine) have all been enhanced by this new design.

The V10k gas feed system consists of a vacuum regulator mounted at the gas supply, a wall-mounted gas control unit with a rotameter for indication of feed rate and a water-operated injector that provides the vacuum source to drive the entire system. Using automatic switchover regulators, the V10k provides an uninterrupted supply of gas to maintain continuous disinfection/treatment.

FEATURES

- **Versatility**—a wall-mounted gas feeder available in a configuration to meet your water treatment requirements
- **Proven V-Notch Flow Control Technology**—for accuracy and repeatability
- **Premium Construction**—features a one-piece molded headblock for reliability and endurance
- **Large 5" and 10" Rotameters**—available in 10 capacities up to 750 PPD Cl₂ for the highest degree of readability
- **Serviceability**—components easily accessible for servicing without tools
- **Flexible Control Modes**—manual to fully automatic control schemes
- **Differential-Type Regulation**—allows for lower vacuum levels and efficient, economical injector operation
- **Handles All Water Treatment Gases**—chlorine, ammonia, sulfur dioxide and carbon dioxide



KEY BENEFITS

- Unique, versatile wall-mounted configuration provides for operator convenience and stable control platform
- Integral, automatic switchover to a fresh gas supply insures continuous operation
- Large 5" and 10" flowmeters for the highest degree of readability and accurate indication of feed rate
- Flexible control options from manual to fully automatic systems
- Easily services without the need for special tools

APPLICATIONS

- Municipal and Industrial water and wastewater treatment
- Treatment of industrial waste from chemical processing
- Industrial process water
- Recreational pools

Control Methods

Feed rate of any V10k™ Chlorinator is controlled by either one or both of these methods: interrupting the injector-water supply to shut off the chlorinator's operating vacuum; changing v-notch orifice area (by positioning the v-grooved plug in its ring) while holding vacuum differential across the orifice constant.

- **Manual Control**—Manual control by changing orifice area (v-notch-plug position) via an adjustment knob on the chlorinator.
- **Start-Stop or Program Control**—This type of control is achieved with simple implementation. A V10k™ Chlorinator's operating vacuum is started and stopped by interrupting the injector water supply. A solenoid valve or motorized valve is wired into the control circuit of a pump, switch, controller, or timer. Similar to this, a special vacuum line solenoid valve can be used in the gas line to the injector.
- **Automatic Control**—The V10k system can be provided with automatic feed rate control ranging from simple to complex control schemes. The control system can consist of a simple direct mA control V-notch actuator or a more sophisticated control including an actuator and a controller (choice of either an SFC-SC (signal Conditioning unit) or a SFC-PC (Process Control Unit). Either controller can be remote mounted or on the panel with the V10k system.

Automatic Controls

DIRECT 4-20 MA INPUT CONTROL

(See WT.040.050.000.UA.PS)

- Direct 4-20mA input signal from an external control device
- Compact integral design
- Internal dosage capability

SFC-SC

(See WT.050.590.010.IE.PS)

- **Operating Modes:** flow proportional, manual
- **Inputs:** 4-20 mA DC (from flow transmitter)
- **Outputs:** Control out to actuator; also 4-20 mA output for retransmission of gas feed rate (actuator position)
- **Control Capability:** Dosage and flow scaling

SFC-PC

(See WT.050.590.020.IE.PS)

- **Operating Modes:** Direct residual feed back, compound loop, feed forward, flow proportional, manual

- **Ranges:** Setpoints up to 50 mg/L and center-zero capability for dechlorination
- **Inputs:** Up to 3 analog (flow, residual, spare); 2 digital
- **Outputs:** Control out to actuator; plus user-configurable 4-20 mA; RS-485 serial communications
- **Control Logic:** Proportional and integral with lag
- **Alarms:** Four user-configurable for 16 different conditions

Operation

The V10k gas feed system operates under a vacuum that is produced at the injector and transmitted through the control unit to the vacuum regulating valve located at the gas supply. Gas enters the vacuum regulating valve and moves toward the flow control components under a vacuum.

Gas next passes through the rotameter, where its flow rate is measured and the V-Notch orifice, where feed rate is controlled manually or by an automatic positioner. At the injector, the metered gas is dissolved in the water stream. The resultant solution is discharged to the point of application.

1) VACUUM REGULATORS

Vacuum regulating valves, mounted on the gas supply containers, immediately reduce the pressurized gas to a vacuum. Three capacity regulators are available for both standard and switchover applications: 200 PPD, 500 PPD, and 3000 PPD. The 200 and 500 PPD regulators feature:

- **Positive Indication of Operating Status**—A unique lever mechanism and front panel knob provide the operator with a quick indication of 3 or 4 operation modes operating, low gas supply, off, and standby for automatic switchover arrangements). An additional built-in red indicator becomes visible in the low/out-of-gas situation and an optional contact is available for remote indication.
- **Secondary Pressure Check**—The 500 PPD regulator has a unique, built-in additional check valve, designed to confine gas under pressure should dirt build up on the primary valve seat
- **Local or Remote Vent Valve**—The pressure relief vent is built into the regulator housing to keep all vent lines in the gas supply room

2) ROTAMETER

Large scale, 5" and 10" rotameter tubes provide clear and accurate indication of feed rate, with 10 capacities available for chlorine.

3) DIFFERENTIAL REGULATING VALVE

Maintains the proper vacuum differential across the V-Notch orifice for consistent feed rate, regardless of changes in operating vacuum.

4) AUTOMATIC POSITIONER

For automatic control, this positioner moves the V-Notch plug up to 3" (compared to a fraction of an inch for competitive systems) in precise linear response to the application requirements. Features include:

- NEMA 4X enclosure
- Manual override is achieved by simply pulling the knob to disengage the drive motor
- Three sets of customer contacts for system interface: Manual Override, MAX position and MIN position
- Internal feedback potentiometer for precise operation with the SFC-SC or SFC-PC controllers

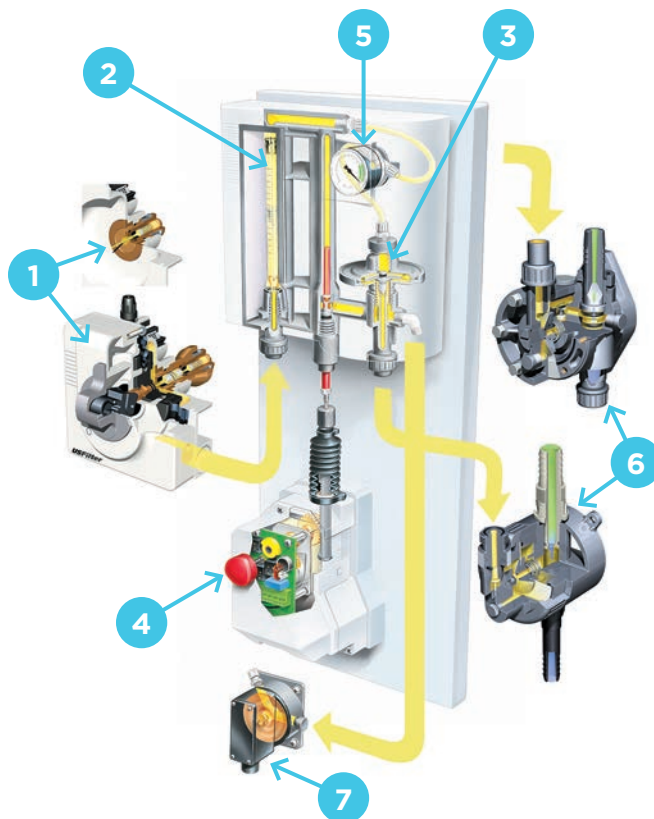
5) VACUUM GAUGE

Provides indication of operating vacuum level. A direct acting diaphragm mechanism eliminates liquid-filled chambers.

6) INJECTORS

Fixed throat, differential-type injectors create a powerful operating vacuum to drive the V10k™ system. Three capacity injectors are available: 3/4" for capacities up to 200 PPD (90 kg/day), 1" up to 500 PPD (225 kg/day), and a 2" up to 750 PPD (340 kg/day) (not shown). These injectors feature:

- Built-in Double Check Valves for superior protection against backflowing. A spring-loaded diaphragm with a spherical seat for positive sealing and a spring-loaded poppet check work together to maintain system integrity.
- Flexible Mounting Orientation for convenient installation. The gas inlet connection can be rotated to provide pipe entry at selected angles. The injector can also be mounted in horizontal or vertical planes. It features an integral mounting bracket and can be disassembled for service without removal from the wall or disconnecting the inlet/outlet piping.



- Optional Anti-siphon injector for negative backpressure applications. These injectors require a minimum inlet water pressure of 20 psi (1.4 bar) for operation.

7) VACUUM SWITCH

A remote mounted vacuum switch provides an alarm in the event of a high or low vacuum condition signifying a loss of gas feed.

TECHNICAL DATA

Accuracy	Gas feed is $\pm 4\%$ of the indicated flow
Operating Range	Manual 20:1 for any rotameter; Automatic 10:1
Rotameters	Choice of 5" or 10" scale length
Operating Vacuum	10" to 50" water
Operating Temperature Range	10° to 130°F (-12° to 55°C)
Mounting	Wall or panel mounted. Panel mounted arrangement can be configured with a panel mounted controller (for automatic control version). An optional vacuum switch can also be remote mounted.
Control Modes	Manual control, start-stop or program, flow proportional, direct residual and compound-loop control
Distance, Supply to Control Panel	For flexibility, it is not necessary to install the vacuum regulating valve close to the control panel. They can be a few feet to several hundred feet apart, depending on maximum feed rate, the diameter of the connecting pipe or tubing and system performance requirement.
Injectors	For capacities up to 200 PPD (90 kg/day), a 3/4" injector is used. For capacities up to 500 PPD (225 kg/day), a 1" injector is used. Injectors. For capacities up to 750 PPD (340 kg/day), a 2" injector is used.
Injector Operating Water	This must be reasonable clean. Injectors are fixed-throat differential type. Maximum inlet pressure is 300 psi to 100°F; 150 psi to a maximum of 130°F
Pressure at Application Point	Maximum pressure with hose or polyethylene tubing is 75 psi, but highpressure hose or rigid pipe will allow application against backpressure of 75 to 160 psi.
Electrical Requirements	Controller requires 120 volts $\pm 10\%$ (200 mA) or 230 volts $\pm 10\%$ (100 mA), 50/60 Hz, single phase.

Options

GAS FLOW TRANSMITTER

Non-inferential measurement of the rate of gas flow through any V10k™ gas feeder. Consists of a NEMA 4X sensor transmitter with a 4-20 mA output directly proportional to gas flow. See publication WT.050.114.000.UA.PS.

AUTOMATIC SWITCHOVER

A pair of non-isolating vacuum-regulating valves designed to switch to a fresh gas supply from an empty container.

TON-CONTAINER KIT

Adapts the vacuum-regulating valve for mounting on a ton container for gas withdrawal.

VACUUM SWITCH

A low vacuum switch or a high, high/low vacuum switch is available to indicate loss of gas feed. Each switch contains two, s.p.s.t. contacts rated 5 amps at 250V.

RELATED OPTIONS

Related options include: cylinder and ton container valves and connections; header valves with manifolding and connections; vent, injector-water and injector outlet lines

and clamps; main connections; solenoid valves; water-line pressure gauge; on-line residual analyzers; residual test kits; injector vacuum gauge; spare parts; booster pumps; chlorine detector; two cylinder scale.

CHLORINE GAS WARNING

All unattended chlorine gas containers and chlorination equipment should be monitored for leaks. Sensitive chlorine detectors, which respond quickly to chlorine in the atmosphere, should be installed at each site. Request publications WT.050.130.000.UA.PS.

CARBON DIOXIDE WARNING

Because of the high pressure in carbon dioxide containers, the vacuum regulating valve cannot be mounted directly on the cylinder. A pressure reducing valve must be installed between the cylinder and the vacuum regulating valve.

COMPLIANCE

Gas feeder, controller and actuator are designed to conform to all applicable NEC and NEMA specifications and Chlorine Institute and Compressed Gas Association recommendations.

OVERALL DIMENSIONS

	Weight	Dimensions
Chlorinator Panel mounted	manual: 20 lbs (9 kg) automatic: 25 lbs (11 kg)	manual: 34 5/8" × 17" × 7 5/16" automatic: 34 5/8" × 17" × 10"
Chlorinator Wall mounted	10 lbs (4.5 kg)	5": 12 3/8" × 13 7/16" × 6" 10": 19 7/8" × 13 7/16" × 6"
Controller		SFC-SC: 8 3/4" × 6 1/2" × 3 5/8" SFC-PC: 8 3/4" × 6 1/2" × 9 1/8"

GASES AND CAPACITIES

Rotameter	Chlorine lb/24 hr	Carbon Dioxide lb/24 hr	Sulfur Dioxide lb/24 hr	Ammonia lb/24 hr
5" (125mm)	3/10/20/25/50/100/ 200/250/500/750	2.4/8/16/40/80/ 160/200/400	2.7/9/18/27/45/90/180/ 225/450	1.3/4.5/9/22.5/45/95/ 112/240
10" (250mm)	3/10/20/50/100/ 200/250/500/750	2.4/8/16/40/80/ 200/400	2.7/9/18/45/90/180/ 225/475	1.3/4.5/9/22.5/45/95/ 112.5/240

All Rotameter tubes are dual scale and include metric calibration in Gm/Hr or Kg/Hr.