WALLACE & TIERNAN®

SERIES V-2000 WALL-MOUNTED CHLORINATOR

FEATURES

- Capacity of up to 3,000 pounds chlorine per day
- Wall-mounted design saves space
- Total front access to internal components via lift-off front panel
- Rugged exterior housing made of high-strength, rigid, flame-resistant thermoplastic
- Integrally mounted automatic controls
- All-vacuum operation using reliable V-notch gas flow control
- Large 10-inch scale rotameter
- Also available for feeding ammonia, sulfur dioxide, or carbon dioxide

OVERVIEW

The same reliable, accurate performance and feature capabilities provided by Wallace & Tiernan's line of V-2000 modular mounted chlorinators is available in a high-capacity, wall-mounted, space-saving unit. The V-2000 Wall-Mounted Chlorinator is the product of extensive research which focused on our customers' need for easy access, simple maintenance, and compact, sturdy construction.

The V-2000 Wall-Mounted Chlorinator has a capacity of up to 3,000 pounds chlorine per day and mounts conveniently on the wall — making it ideal for applications where space is at a premium but higher feed rates are required. Its design complies with recommendations of the Chlorine Institute and conforms to applicable current NEC and NEMA standards. In addition to chlorine feed, the V-2000 can also be used as a sulfur dioxide, ammonia, or carbon dioxide gas feeder.

APPLICATIONS

Water treatment

- disinfection of potable water
- disinfection of boiler make-up water
- intermittent or continuous treatment of cooling water to inhibit slime buildup in piping, heat exchangers, and cooling towers

Waste treatment

- treatment of domestic and municipal sewage
- disinfection of municipal wastewater
- treatment of cyanide and other wastes from metal-finishing processes
- treatment of pulp and paper, chemical, and petrochemical plant wastes
- treatment of recirculated or discharged water in food canning, food freezing, brewing, and bottling operations

Process water treatment

- taste and odor control in soft-drink bottling plants and breweries
- disinfection of process water and bleaching of raw materials in pulp and paper mills
- tempering-water treatment and bleaching in flour mills
- bleaching in textile mills
- high-purity water in the electronics, pharmaceuticals, and cosmetics industries.

WARNING: Do not use the V-2000 chlorinator for swimming pool, water park, or other recreational applications. It is not sold for such use.

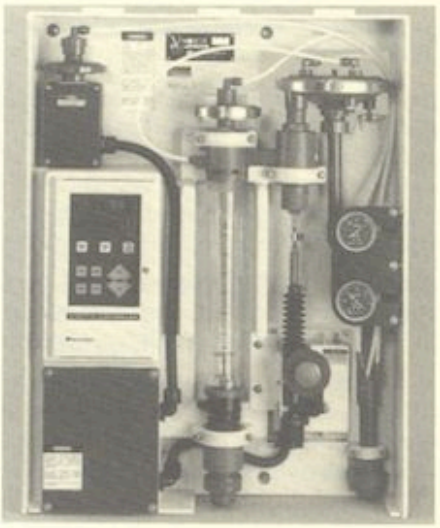
FEATURES

A high-capacity chlorinator in a wall-mounted configuration
Wallace & Tiernan developed the V-2000 Wall-Mounted Chlorinator in response to customers' need for a unit that combines the high capacity of larger free-standing chlorinators with the installation flexibility of a wall-mounted system that saves up to 50% of the floor space.

Rated at 3,000 pounds of chlorine per day, the V-2000 Wall-Mounted Chlorinator is more compact than free-standing units, making it the system of choice for applications where space is limited. We retained the proven technology of our successful line of V-2000 chlorinators and designed a customer-inspired wall-mounted configuration. The result is optimum performance in applications for which a wall-mounted chlorinator is preferred.

Rugged, easy-to-remove exterior housing
The front panel is made from a rigid thermoset plastic that's durable yet easy to remove without tools for quick access to internal components. The material is fire-resistant, with a U.L.-94 flammability rating, and offers excellent impact strength even at extreme temperatures.

Component assembly designed for maximum serviceability
In the V-2000 Wall-Mounted Chlorinator, valve housings employ a unique clamp-type fastening device; no nuts, bolts, or washers are used. This enables quick disassembly for fast and easy maintenance of interior valve components. The system's spring-mounted rotameter snaps in and out quickly and easily.



V-notch gas-flow control
Wallace & Tiernan's unique V-notch orifice consists of a precisely grooved plug sliding in a fitted ring. Changing the position of the plug in the ring results in a specific orifice size and corresponding chlorine feed rate.

The V-notch is made of chemical-resistant, self-lubricating plastic to prevent sticking and corrosion. The plug moves three inches to ensure ease of adjustment.

Reliable all-vacuum operation
In the W&T V-2000 Wall-Mounted Chlorinator, gas leaving the vacuum regulator moves under vacuum throughout the rest of the system. Because there are no lines or components carrying gas under pressure, risk of gas leakage is virtually eliminated.

Dual check valves help prevent gas venting
With a unique system of dual built-in check valves, the W&T V-2000 Wall-Mounted Chlorinator is specifically engineered to prevent venting of gas to the atmosphere.

Loss of vacuum causes the vacuum-regulating valve to shut the gas supply; a spring-diaphragm device built into the valve is designed to contain gas under pressure. A secondary spring-diaphragm check, built into the vacuum regulator, provides further protection against gas leakage should the first valve stick or fail.

Built-in automatic switchover
To minimize the number of components to be wall-mounted, the W&T V-2000's automatic switchover system is built into the vacuum regulator, not designed as a separate unit.

When the current gas supply runs low, the system automatically switches to a standby gas supply; however, gas continues to be withdrawn from the primary supply until that supply is exhausted. The automatic switchover extends between-service periods, reduces the possibility of interrupting treatment, enables gas supplies to be replaced with no process shut-down required, and ensures that each gas supply is fully used.

Backflood protection
The V-2000's injectors use a combination of spring-diaphragm check valves, ball checks, and vacuum relief to prevent injector water from back-flooding into the control unit upon injector shut-down.

Automatic control
The controlling component of the V-2000 Wall-Mounted Gas Chlorinator is either Wallace & Tiernan's Flow-Proportional Control System or Automatic Residual Control System.

The microprocessor-based automatic residual control system features a convenient membrane touch-keypad and software-controlled menus, making it easy for operators to quickly calibrate the unit and set operating parameters. High-resolution bar graph and LED read-outs display setpoints, flow rate, actuator position, chlorine residual concentration, and other important information clearly and precisely. Four control modes — flow proportional, direct residual, compound loop, and feed forward (used in dechlorination only) — enable the controller to adjust feed rate in response to changes in gas concentration, water flow rate, or both. The controller changes the feed rate by sending an electrical signal to the motor-driven NEMA 4X actuator, which in turn positions the V-notch plug to adjust the size of the orifice through which gas is fed.

DESIGN AND CONSTRUCTION

Front-panel indicators and controls
Front-panel indicators and gauges include:

- a gauge indicating the injector vacuum
- a gauge showing the system vacuum (a high reading on this gauge indicates interrupted or exhausted chlorine supply)
- a large, 10-inch-scale rotameter indicating the gas feed rate
- operator controls for the automatic control system.

Vacuum-regulating valves
A vacuum-regulating valve enables manual shut-off of the gas supply. This allows you to change gas supplies without shutting off the injector or admitting air, dirt, or moisture into the control unit.

Vacuum-regulating valves are made of rugged plastics and metals to withstand full supply pressures and rough handling during gas supply changes. The valves are factory-set to reduce gas pressure to optimum operating vacuum, but can be field-adjusted. Disassembly, cleaning, and replacement of valve components does not disturb the adjustment.

The Wallace & Tiernan V-2000 Wall-Mounted Chlorinator can be equipped with either a 3,000 pound per day vacuum regulator or, for applications requiring lower capacities, a 200 or 500 pound per day vacuum regulator. On the 200 and 500 ppd valves, an optional "trap and filter" system prevents gas impurities from contaminating the valve interior.

When used with an evaporator, the vacuum regulator is configured with an optional electric operator. The electric operator ensures positive shut-off of the chlorine supply in case of power failure. If the unit is subject to temperatures lower than the safe operating limit, a low-temperature switch closes the electric operator and sets off an alarm.

By using one vacuum-regulating valve to feed several V-2000 chlorinators, you can achieve chlorination at multiple points. However, the total capacity for all points is still limited to 3,000 pounds of chlorine per day for the 3,000-pound valve.

Automatic switchover
Automatic switchover is achieved by a pair of optional vacuum-regulating valves, each attached to a different gas supply. The valve on the standby gas supply is held closed by a detent-type lockout.

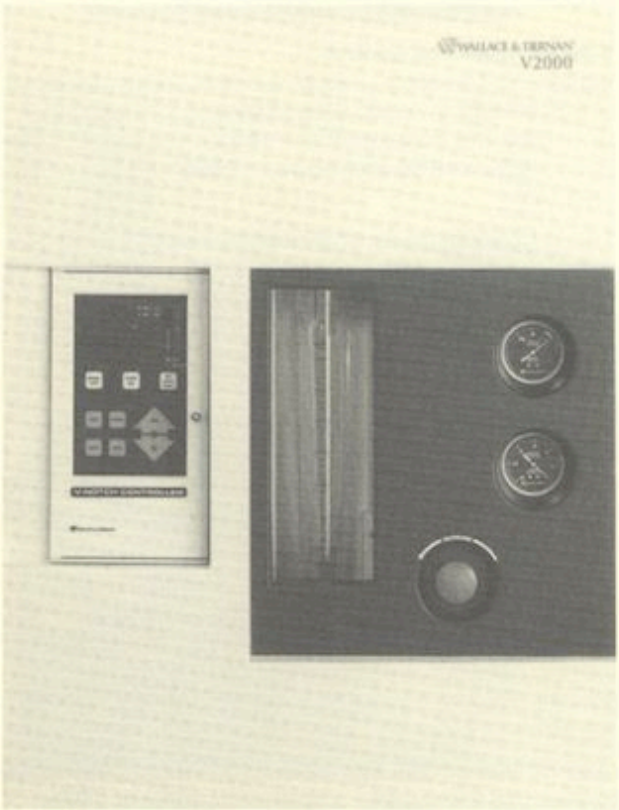
When the gas in the current supply is exhausted, system vacuum rises to a higher-than-normal level, which overcomes the latching force of the detent-type lockout. As a result, the standby gas supply comes on-line along with the original gas supply. Feeding from both gas supplies assures complete emptying of both containers, ensuring that no chemical is returned to the supplier.

Injectors
The injectors create a powerful operating vacuum that pulls gas into the water. This eliminates pressure in system components and piping, prevents gas leakage, saves water, and reduces the amount of pumping required.

The V-2000 Wall-Mounted Chlorinator is typically used with a 2-inch injector rated 3,000 pounds per day. The 2-inch injector can be PVC with an adjustable throat or bronze with a Bellofram water-pressure-operated adjustable throat for start-stop operation.

Adjustable-throat injectors allow you to adjust throat size to fit plant flow conditions for maximum operating flexibility. Start-stop or program control of the chlorinator requires an optional shut-off valve or solenoid to stop the flow of injector water. A secondary check valve prevents backflooding.

For applications requiring lower capacities, the V-2000 Wall-Mounted Chlorinator is used with a ¾-inch or 1-inch fixed-throat PVC injector.



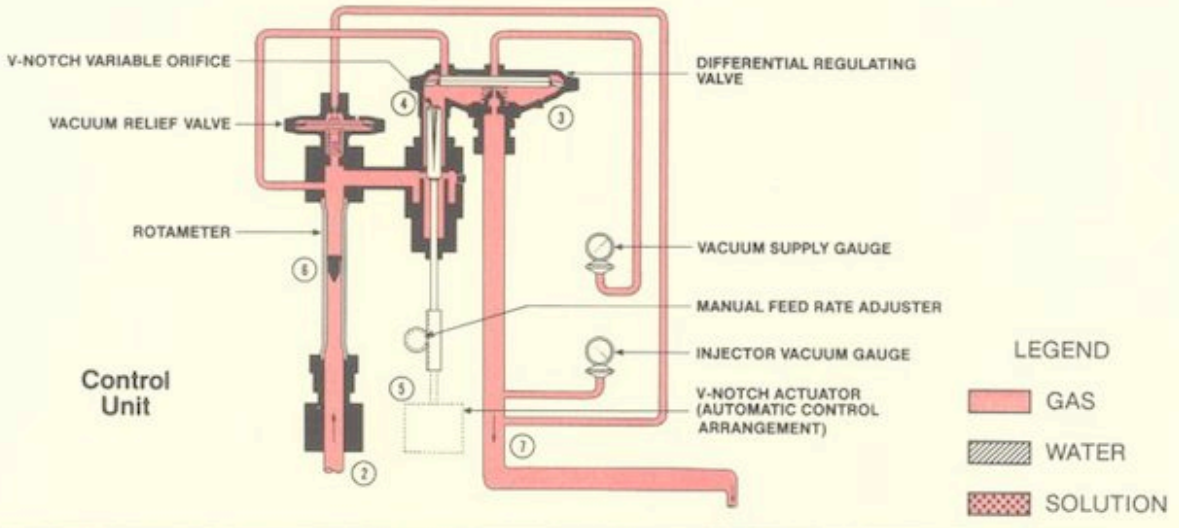
OPERATION

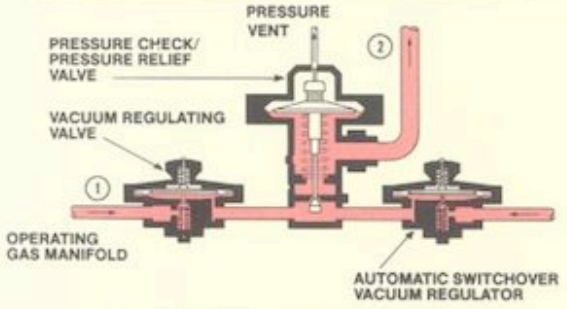
The Wallace & Tiernan V-2000 Wall-Mounted Chlorinator is designed to:

- control gas feedrate
- inject and mix the gas with water.

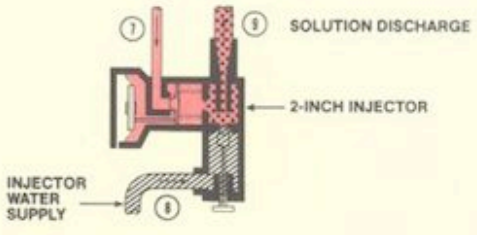
Operation is as follows:

1. Gas under pressure enters the vacuum regulator. A vacuum-regulating valve at the gas supply reduces gas pressure to a vacuum at once. The vacuum-regulating valve is equipped with a secondary spring-diaphragm check valve designed to confine the gas should the first valve stick because of dirt build-up on the seat.
2. Dry gas moves under vacuum from the vacuum regulator through connecting pipes to the control unit.
3. In the control unit, the vacuum differential regulating valve throttles the injector vacuum to maintain a constant differential pressure drop, at less than atmospheric pressure, across the V-notch variable orifice.
4. The feed rate of gas through the orifice is a function of the size of the orifice as determined by the position of the V-notch plug. Actuator position can be adjusted manually or automatically.
5. To adjust feed rate to the desired level automatically, an electric actuator moves the plug in response to a signal from the automatic controller. The controller adjusts actuator position based on plant flow rate, measurement of residual, or both, depending on the mode of control.
6. Gas moving through the control unit causes the rotameter's float to rise; the level of the float indicates the gas feed rate in pounds per day.
7. From the control unit, gas passes to the injector. The injector produces a vacuum to draw gas through the system and mix the gas with water flowing through the injector.
8. For the injector to operate properly, the inlet pressure must be higher than the discharge pressure. The injector has a built-in spring-diaphragm check device that prevents back-flow of water into the control unit when the injector water supply is shut off or the injector discharge line becomes restricted.
9. Chlorinated water is discharged to the point of application.





3000 PPD Vacuum Regulator



2-Inch Injector

METHODS OF CONTROL

Manual control
By turning a knob on the front of the chlorinator, the operator can change the position of the V-notch plug. This increases or decreases the orifice size to establish the feed rate indicated by the rotameter.

Start-stop or program control
In the start-stop control mode, the chlorinator is controlled by interrupting the injector-water supply to shut off the operating vacuum. A solenoid valve, used to stop the flow of injector water, is wired into the control ciruit of a pump, switch, controller, or timer.

Flow proportional control
In the flow-proportional mode of operation, the controller varies the chlorine feed rate in proportion to the process fluid flow as measured by a flowmeter.

The dosage can be adjusted from 20 to 200 percent of full flow, enabling the operator to maintain the full dose of chlorine should the plant flow rate become less than or greater than the normal full-flow rate.

Direct residual control
In the direct-residual mode, the feed rate is adjusted by the controller based on the residual (concentration of chlorine in milligrams per liter) as measured by a chlorine analyzer and compared to an operator-defined chlorine residual setpoint.

The direct-residual control mode is used to maintain a desired concentration of chlorine in applications where the flow is constant or changes only gradually.

Compound-loop control
In the compound-loop control mode, the controller adjusts the chlorinator's gas feed rate in response to plant flow rate and chlorine residual.

The controller accepts input signals from both a flowmeter and a chlorine analyzer, then multiplies these signals to calculate the desired feed rate in accordance with a chlorine residual setpoint.

The compound-loop control mode is used in applications where flow rates and demand vary rapidly over a wide range.

Remote manual control
The controller can be mounted in the front-panel of the V-2000 Wall-Mounted Chlorinator or remotely. When it's mounted remotely, the operator can manually adjust the feed rate independent of the selected control mode.

TECHNICAL DATA

Accuracy
4% of indicated flow

Capacity
50 to 3,000 pounds of chlorine per day

Pressure at point of application
75 psi maximum with flexible polyethylene for the solution line

160 psi maximum with high-pressure hose or rigid pipe for the solution line

Minimum injector inlet pressure
20 psi is required by the 2-inch pressure-operated plug shut-off injector.

Maximum injector inlet pressure
¾" PVC injector: 300 psi to 100° F, 150 psi to 130° F
1" PVC injector: 300 psi to 100° F, 150 psi to 130° F
2" PVC injector: 125 psi to 100° F, 65 psi to 130° F
2" bronze injector: 250 psi to 100° F, 125 psi to 130° F
3" injector: 175 psi to 100° F, 90 psi to 130° F

Weight
80 pounds

Dimensions
27½" wide by 12¼" deep by 36⅜" long

Operating range
Manual, 20:1
Automatic, 10:1

Rotameters available

Chlorine:	50, 75, 100, 150, 250, 500, 1,000, 2,000, and 3,000 pounds per 24 hours
Sulfur dioxide:	50, 75, 100, 150, 225, 475, 950, 1,425, 1,900, and 2,800 pounds per 24 hours
Ammonia:	23, 35, 45, 70, 120, 240, and 475 pounds per 24 hours
Carbon dioxide:	35, 55, 75, 110, 190, 390, 750, 1,150, 1,500, and 2,250 pounds per 24 hours

Control
Manual, remote manual, start-stop, and program. Also the following automatic modes: flow proportional with manual dosage control, direct residual, and compound-loop.

Distance from gas supply to chlorinator
Gas supply and vacuum-regulating valve may be located up to several hundred feet away from the control unit, depending on the diameter of the connecting piping or tubing and the maximum gas feed rate required.

Injector operating water
Operating water must be reasonably clean. Pressure and flow depend on injector size and back-pressure at application point. For ammonia service, operating water with a hardness higher than 35 mg/l may require softener.

Pressure at application point
75 psi maximum allowable back-pressure with flexible plastic pipe or hose; 75 to 160 psi with high-pressure hose or rigid pipe used as the solution line. A solution pump after the injector allows application of chlorinated solution against higher pressures.

Vacuum-regulating valves
Available in 200-lb, 500-lb and 3,000-lb capacities

Vacuum-regulating valve options

Optional automatic switchover
A pair of vacuum-regulating valves switch from empty gas supply to fresh gas supply automatically. Liquid changeover systems available for use with evaporators.

Optional trap-and-filter unit
Removable filter strains contaminants from gas. Available on 200-lb and 500-lb vacuum-regulating valve.

Optional Ton-container kit
Adapts the vacuum-regulating valve for mounting on a ton-container valve. Has a drip leg to trap initial spurts of liquid and a heater to evaporate them. Available for 200-lb and 500-lb vacuum-regulating valve.

Optional electric operator
Evaporator arrangement has electric operator for positive gas shut-off in case of power failure, low-evaporator temperature, or liquid chlorine carry-over. Available for 3,000-lb vacuum-regulating valve.

Vacuum-regulating valve connections (3000 ppd)

Inlet:	1" female NPT
Outlet:	Reversible adapter for 1" female NPT or 1" female socket
Vent:	Threaded-compression fitting for ¼" x ⅜" tubing

Control unit connections

Inlet and outlet:	1" socket connection

2" PVC injector connections

Gas inlet:	¾" female NPT
Water inlet:	2" female NPT
Water discharge:	1½" female pipe or 2" hose

Electrical, control unit
120 volts ±10%, 0.3 amp or 240 volts ±10%, 0.15 amps

Electrical, heater on vacuum-regulating valve
115 volts, 50/60 Hz, 15 watts

Items furnished
- Control unit
- Vacuum-regulating valve
- Injector
- Operating-vacuum gauge
- Injector-vacuum gauge
- Rotameter
- Vent screen
- Wall-mounting bracket and heater for vacuum-regulating valve
- Removable gas filter
- Lubricant
- Bottle of ammonia solution
- Gaskets
- Wrenches
- Instruction books

Other system requirements
Plastic pipe or tubing for gas supply, polyethylene vent tubing, rigid pipe or high-pressure hose for injector inlet and discharge, and main connection or fittings for point of application are needed to complete installation and, as an option, can be supplied.

Optional 2-inch bronze injector
Has Bellofram-operating adjustable throat for start-stop operation.

Related options
- Cylinder and ton-container valves and connections
- Header valves with manifolding and connections
- Vent and injector inlet and outlet lines and clamps
- Main connections
- Alarms
- Solution and booster pumps
- Water-line solenoid valves
- Water-line pressure gauge
- High-low vacuum switch and alarm
- Gas-line solenoid valves
- Safety equipment
- On-line residual analyzers
- Residual test kits and instruments
- Chlorine detector
- Two-cylinder scales
- Evaporators
- Spare parts
- Maintenance tools

CHLORINE WARNING: All unattended chlorine containers and chlorination equipment should be continuously monitored for leaks. Sensitive chlorine detectors which respond quickly to the presence of chlorine in the ambient air should be installed at each site (see Technical Data Sheet TDS 50.135).

CARBON DIOXIDE WARNING: Because of the high pressure under which carbon dioxide is contained, the vacuum-regulating valve cannot be directly mounted on a carbon dioxide container. A pressure-reducing valve must be installed between the carbon dioxide supply and the vacuum-regulating valve.

GENERAL SPECIFICATION

The gas feeder shall be a Wallace & Tiernan Series V-2000 Wall-Mounted Chlorinator with a maximum capacity of 3,000 ppd. The gas feeder is an all-vacuum operated solution feed type having a feed range of 20:1 manual and 10:1 automatic. The gas feeder shall consist of a vacuum regulator, wall-mounted gas feedrate control unit, and remote injector.

The vacuum regulator shall be installed at the gas supply and is capable of reducing gas supply pressure to a vacuum with no venting. A secondary check unit shall be provided to minimize the possibility of venting should the vacuum regulator's primary check unit fail or stick.

A non-isolating automatic switchover system for changing over to a new gas supply as the on-line supply is depleted shall consist of two vacuum-regulating connected to a single pressure check/pressure relief valve. When switchover is accomplished, gas shall continue to be drawn from the former source until it is fully depleted.

The control unit shall be wall-mounted in a cabinet constructed of flame-retardant structural foam NORYL. A lift-off cover shall provide easy access to all internal components without the use of tools. Components of the control unit shall include a 10-inch scale glass rotameter, differential regulating valve, vacuum relief valve, a V-notch actuator and orifice, and either a flow proportional or direct residual/compound loop automatic controller.

The flow proportional controller shall be capable of accepting a 4-20 mA flow signal and allow dosage adjustment from 20 to 200% of full-scale flow.

The direct residual/compound loop controller shall be capable of accepting a flow signal and a residual signal. It shall be microprocessor-based and software programmable via a membrane touch keypad. The controller shall be capable of operating in four control modes: flow proportional, direct residual, compound loop, and feedforward (for dechlorination).

Each W&T V-2000 Wall-Mounted Chlorinator shall have a remote mounted 2-inch injector in PVC or bronze to supply the operating vacuum for the system. A secondary remote-mounted ¾-inch ball-check valve shall be installed in the gas suction line to the injector to prevent backflooding. *For the complete equipment specification, request ES25.056.*

AFTER-SALE SUPPORT

To keep your equipment operating at top efficiency, Wallace & Tiernan offers the most comprehensive after-sale support in the industry.

Replacement parts
Genuine Wallace & Tiernan replacement parts not only protect your investment in W&T equipment but also offer assurance against failure in critical applications.

Avoid the hazard and hidden costs of cheap imitations. Wallace & Tiernan offers fast delivery of original-quality replacement parts from a large parts inventory or from stocking distributors nationwide.

Use of genuine W&T replacement parts helps maintain equipment in good working order, eliminating equipment breakdowns anad costly downtime.

Preventive-maintenance kits
These kits contain original Wallace & Tiernan replacements for those parts most susceptible to wear or most often replaced. They facilitate scheduled maintenance and emergency repairs.

Preventive maintenance contracts
To help keep your equipment running like new with minimum downtime and at reasonable cost, Wallace & Tiernan offers two preventive-maintenance plans.

The basic plan includes periodic visits for inspection, cleaning, calibration, adjustment, and lubrication followed by a written report. The premium plan includes the above plus parts installation. Demand-repair service is also available.

Service work is done by factory-trained personnel from our nationwide chain of direct-factory-service representatives, service organizations, and contractors.

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Printed in USA