

Electrically Heated Vaporizer Series 71V3000



CAPITAL CONTROLS

The Series 71V3000 electrically-heated vaporizer automatically vaporizes and superheats liquid chlorine, sulfur dioxide or ammonia at a rate controlled by the gas feed system. The vaporizer is designed and fabricated in accordance with Section VIII, Div. 1 of the ASME Boiler and Pressure Vessel Code, and is provided with an "L" stamp to meet the pressure vessel requirements of the code. Series 71V3000 also meets the recommendations of the Chlorine Institute. The vaporizer is housed in a corrosion-resistant and attractive, high impact polystyrene cabinet identical in size and color to the cabinet of our floor mounted gas dispensers.

Capital Controls Series 71V3000 vaporizers satisfies the testing and inspection requirements necessary to meet Part UW-2 of the ASME code which covers vessels built to contain lethal substances. The "L" stamp provides a chamber with the following certifications:

- W-L** - Welding meets lethal gas requirements.
- S-L** - Fabricated using seamless pipe for lethal gas.
- HT** - Whole vessel has been postweld heat treated.
- RT-1** - Complete vessel satisfies the full radiography requirements (100%) of all welded joints for lethal substances or design pressures exceeding 50 psi (345 kPa)

Design Features

- ◆ **Heavy Construction:** 1/2 inch wall thickness of the vaporizing chamber exceeds the ASME Code by more than 50%
- ◆ **Efficient:** Design affords good water circulation by natural convection; no circulators are required
- ◆ **Automatic:** Water chamber temperature is automatically controlled by a digital electronic temperature controller
- ◆ **Convenient:** Minimum attention is required by operating personnel



- ◆ **For Vaporization of Chlorine, Sulfur Dioxide or Ammonia**
- ◆ **Ranges to 10,000 PPD (200 kg/h)**
- ◆ **Heavy Construction**
- ◆ **Efficient Water Circulation Design**
- ◆ **Automatically Controlled Water Temperature**
- ◆ **User-Friendly Operator Interface**
- ◆ **Automatic Solid State Controlled Cathodic Protection**

The vaporizer is essentially a vaporizing chamber surrounded by a water jacket. The water is heated by an electric immersion heater, thermostatically controlled to maintain a constant temperature. Liquid chlorine, sulfur dioxide or ammonia enters the vaporizing chamber through the inlet tube and is piped to the bottom of the vaporizing chamber. After it emerges from the tube, the liquid absorbs heat from the hot water and vaporizes. The vapor rises to pass out of the chamber through the gas outlet. Prior to discharge from the chamber, the vapor is superheated by being forced against the hot chamber wall by the superheat baffle. The vapor demand of the gas feed system automatically regulates the level of liquid inside the vaporizing chamber. As vapor pressure inside the chamber increases, the rate at which the liquid enters the vaporizing chamber decreases. If the demand for vapor increases, the pressure inside the chamber decreases, permitting liquid to enter the chamber at a higher rate.

An equilibrium condition is soon achieved where the rate at which the liquid is being converted to gas, exactly equals the rate at which liquid enters the vaporizing chamber.

A low water level switch is wired to shut-off the heater should the water level drop to a preset low level in the water jacket.

An automatic pressure reducing and shut-off valve, controlled by the water low temperature and low water level switch, is installed in the gas line to the dispensing system. This valve will automatically close when the water chamber temperature falls below a preset limit or the water level drops below its low setpoint, preventing liquid from entering and flooding the gas dispensing system.

A pressure relief valve, installed in the gas discharge line, operates when the pressure within the gas chamber exceeds safe limits.

An optional diaphragm protected pressure switch will give a contact closure when the system pressure exceeds the design pressure of the rupture disc.

Gas Pressure Relief Valve

The Model BM-4060 (chlorine) BM-4060-1 (sulfur dioxide)* gas pressure relief valve is a safety device installed in the vaporizer discharge line to relieve excessive gas pressure. A pressure relief valve of this type is required for vaporizer installation to meet ASME code, Section VIII for Unfired Pressure Vessels. It also satisfies the recommendations of the Chlorine Institute.

*For ammonia, consult factory.

Operation

The pressure relief valve is factory set to open at 250 psig (1724 kPa). Therefore, as long as the gas pressure within the vaporizer remains at a safe level, the valve will remain closed. However, if the gas pressure should rise above this level, the valve will open and gas will be vented until the pressure falls below the factory setting.

Pressure Relief Valve:

Materials Handled: Chlorine or sulfur dioxide gas or any gas or mixture compatible with the materials of construction listed below

Materials of Construction:

Seat: aluminum silicon bronze: silver plated

Body: Low carbon steel

Spring Bolt: Glass-filled Teflon

Valve Plug: Kynar and silver

Spring: Silver plated carbon steel

O-Ring: Viton

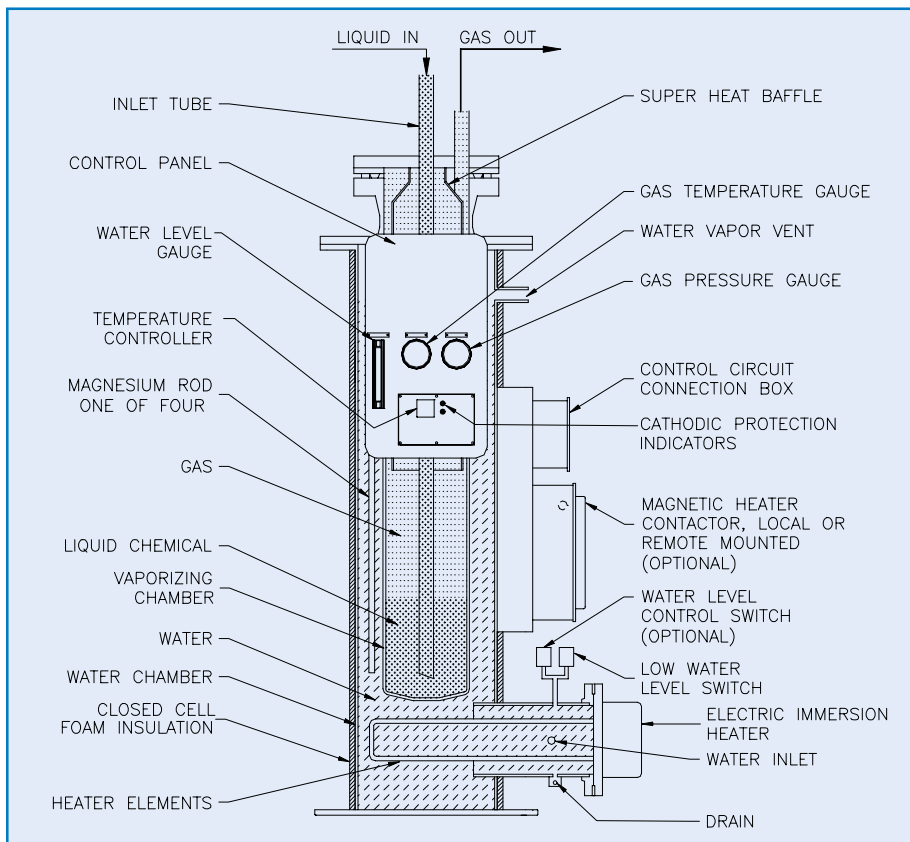


Figure 1 - Sectional Diagram

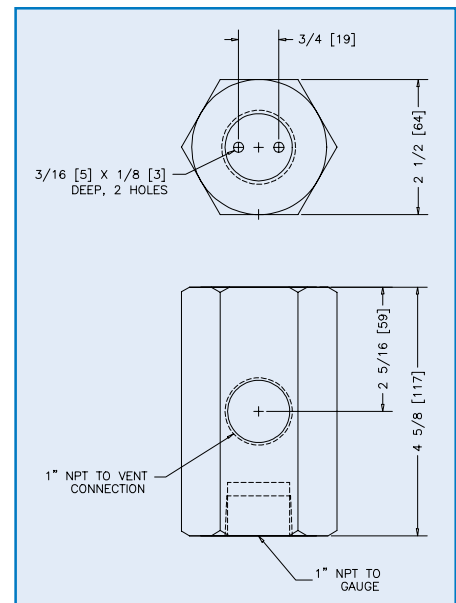


Figure 2 - Gas Pressure Relief Valve

Technical Data

Series 71V3000

GENERAL

Vaporizer:

Model	Capacity and Service						Heater Element Size
	Chlorine		Sulfur Dioxide		Ammonia		
	lb/day	kg/h	lb/day	kg/h	lb/day	kg/h	
71V3_3	6000	120	4500	85	1500	30	12 kW
71V3_2	8000	160	6000	115	2000	40	15 kW
71V3_1	10000	200	7500	140	2500	50	18 kW

Standard Unit Features:

- Electrical immersion heater
- High impact polystyrene cabinet
- PVC foam insulation
- Hot dip galvanized steel water chamber
- Gas pressure gauge (psi and kPa)
- Gas temperature gauge (°F and °C)
- Super-heat baffle
- “L” certified vaporizing chamber
- Water level sight gauge
- Water low level switch
- Digital electronic temperature controller
- Water low temperature contact
- Electronic cathodic protection system

Power Requirements: 220/440 or 240/480 Vac, 1 phase (12 kW only) or 3 phase standard for the heater elements. 120 Vac required for the control circuits. Other voltages optionally available.

Pressure Ratings:

Hydrostatic Test Pressure: 825 psig (5.7 mPa)
Design Pressure: 550 psi at 212°F (3.8 mPa at 100°C)

Required Accessories:

- Pressure reducing and shut-off valve
- Pressure relief valve
- Safety Head and Rupture Disk
- Magnetic contactor

Optional Accessories:

- Water level control switch
- Constant water feed rotameter with integral control valve.
- Liquid expansion tanks

Shipping Weight and Cubage: 900 lbs (408 kg), 86 ft³ (2.4 m³)

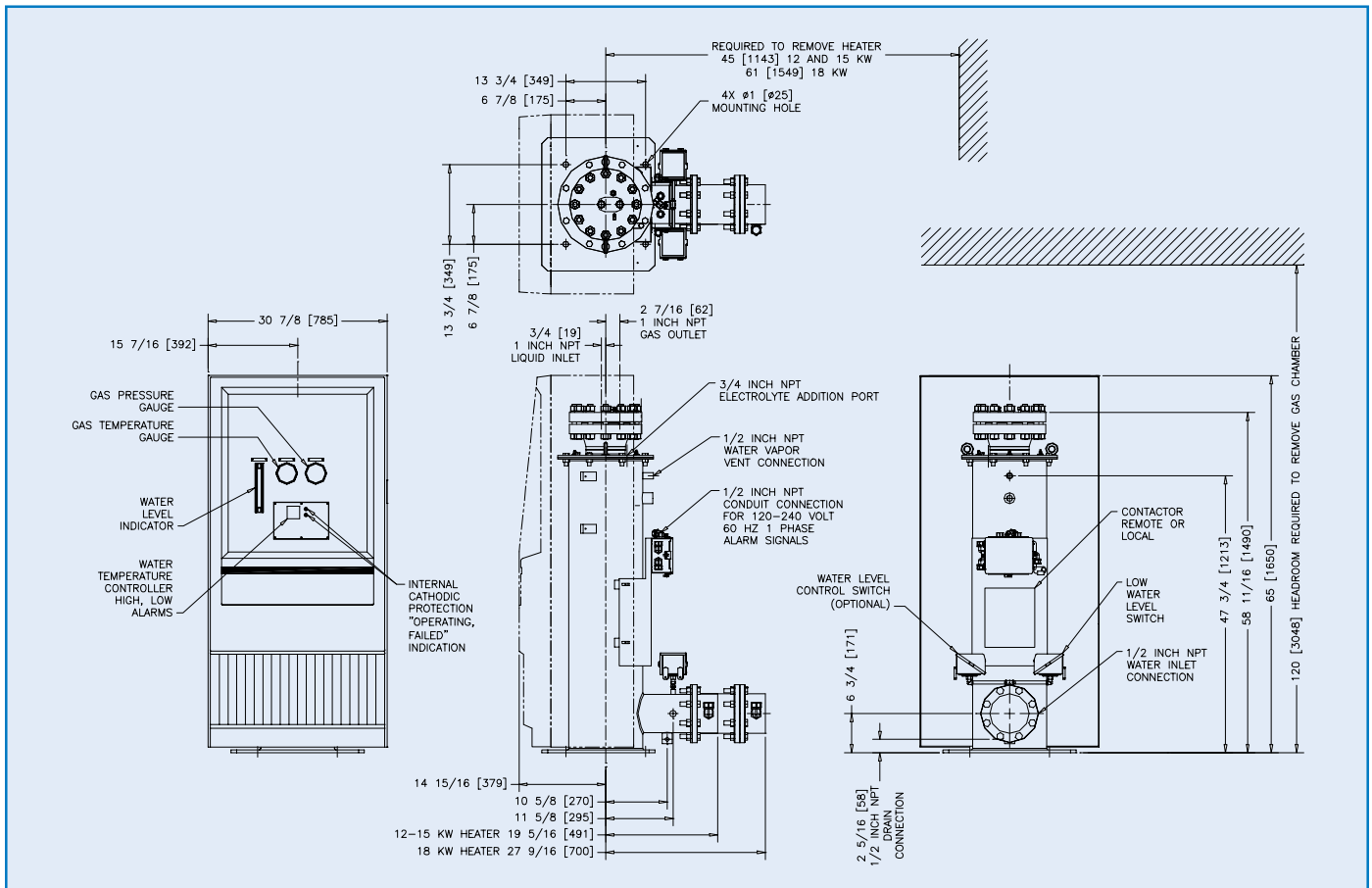


Figure 3 - Vaporizer Outline and Mounting Dimensions

Brief Specification

The vaporizer shall be of the electrically heated type, with the water chamber temperature controlled by an integral electronic temperature controller. The vaporizer shall automatically vaporize and superheat liquid _____ at a rate controlled by the using system and shall have a capacity of _____ pounds per 24 hours of _____ gas. The electrically heated vaporizer shall be Capital Controls Series 71V3000, or approved equal.

The vaporizing chamber shall be constructed of Schedule 80 welded steel pipe having a minimum wall thickness of _____ 1/2-inch. All fittings and flanges shall be forged steel. The chamber shall be designed, constructed and tested to conform to the lethal substances section of the ASME Code, Section VIII, for unfired pressure vessels. The chamber shall be supplied with an "L" Certification which includes the following additional stamps: "W-L" welding meets lethal gas requirements; "S-L" fabricated using seamless pipe; "HT" whole vessel has been post-weld heat treated; and "RT-1" complete chamber satisfies the full radiography requirements (100%) of all welded joints for lethal substances. The vaporizing chamber shall be hydrostatically tested at 825 PSIG. A gas pressure relief valve complete with a safety head/rupture disc and pressure switch with diaphragm protector shall be provided for emergency pressure relief.

The water jacket shall be constructed of hot-dip galvanized steel with a minimum wall thickness of 1/4-inch. The water heater shall be of the three-element, electric immersion type, _____ kW maximum capacity, designed for _____ VAC, _____ phase operation. The electric heater shall be mounted in the lower portion of the water jacket to insure proper heat distribution by natural convection. No additional circulating apparatus shall be required. The water chamber shall include both an integral overflow and a vapor vent. A magnetic contactor shall be required for operating the heater. The interior of the water chamber and the exterior of the vaporizing chamber shall be protected from corrosion by an electronic cathodic protection system.

The unit shall be equipped with a front panel-mounted electronic temperature controller, a water level sight gauge, and gas pressure and temperature gauges. A water level switch shall be provided for low alarm and for shut down of the heater and closure of the electrically actuated gas pressure reducing valve in the event of low level in the water chamber. The temperature controller shall cause the closing of the gas pressure reducing and shut-off valve in the event of low water temperature. The temperature controller shall have a direct reading digital display and alarms for high and low water temperature. Dry contacts for alarms shall be provided for actuation of both local display and remote annunciation. All control circuitry shall be 120 V, and shall be factory pre-wired to customer terminal strips. All controls and switches shall be rated NEMA 4X.

The vaporizer shall be housed in a corrosion-resistant, high impact polystyrene cabinet that shall be completely removable for service. The unit shall be supplied with PVC closed-foam insulation for the water chamber in order to conserve energy.

The gas pressure relief valve shall be a normally closed valve which shall open on increasing pressure at 250 psig. Upon decreasing pressure, the valve shall close. It shall be constructed of materials suitable for use with (_____) gas and be provided with 1" NPT internal threaded connections. This valve shall be supplied with a safety head/rupture disc and a diaphragm protected pressure switch.

Design improvements may be made without notice.

Represented by:



CAPITAL CONTROLS

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