Specification

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Toxic Gas Detection System Series HVS4000 (Jupiter) for Chlorine and Sulfur Dioxide Hazardous Gas Detection

1. Scope

This specification describes the Series HVS 4000 (Jupiter) Gas Detector System for the detection of toxic gases such as Chlorine and Sulfur Dioxide provided by Halogen Valve Systems, Inc. This system has been designed for installations that need or accept direct LED visual readings as well as 4-20mA output, relays and MODBUS connections. These outputs can provide information and relay contacts for emergency action that can alert personnel and directly activate automatic gas shutoff or scrubber systems.

2. Description

The Jupiter HVS4000 Intelligent Sensing and Transmitting Unit shall contain microprocessor-based electronics, field connection terminations, dual-redundant MODBUS communications, and two relays in a single explosion-proof housing. The HVS4000 is a 24VDC-powered toxic gas detector that consists of a Base Unit, Interface Module, and Electrochemical Cell (sensor). The HVS4000 supports a wide range of electrochemical cells, and operates as a universal toxic gas detector by simply replacing and calibrating sensors.

The microprocessor-based electronics of the Interface Module processes information at the sensor site and communicates detected gas values to the Base Unit for data control and display. The HVS4000 Base Unit shall be available with a 3-digit digital display window in the base unit cover. This gas detection system shall be capable of one-person calibration. The transmitter shall be capable of interfacing with industrial equipment that can receive a 4 to 20mA signal. This system shall be capable of remote mounting of the Interface Module with sensor up to 9000 ft.

The Jupiter gas detection system must be CSA approved, and shall be capable of operating in Class I, Divisions 1 and 2, Groups B, C or D and Class 1, Zones 1 and 2, Group IIB+H2 hazardous classified locations.

3. Detector Components

3.1 Microprocessor

Microprocessor-based electronics monitors for fault conditions, processes input signals for the sensor and provides outputs in the form of display codes and an analog signal.

3.2 One person - Calibration

This unit shall be capable of calibration without having to de-classify an area and without any adjustments by the operator. Calibration shall be initiated by the application of a magnet to the cover or to an external switch. Calibration shall be a simple procedure and shall be listed on the cover of the unit.

3.3 Self- Diagnostics

The HVS4000 malfunction indications shall be a remote analog signal indication separate from operational signals and a visible signal to the operator. The system conditions that are monitored shall be:

- Low DC Supply
- Calibration Faults
- Switch Error

3.4 4 to 20mA Output

The 4 to 20mA output transmits fault, calibration and gas concentration levels to a remote display, computer or other device.

3.5 Plug-in Sensors

The HVS4000 uses a three-electrode electrochemical cell mated with a sensor identification board to provide a stable and accurate gas detector reading. The gas diffusing into the cell reacts at the sensing electrode by reduction or oxidation depending on the sensor type. The corresponding reaction causes the sensor to detect the gas and provide the appropriate signal.

4. Environmental Design

This unit shall be capable of operating within a temperature range of -4°F to 122°F (-20°C to 50°C). Ammonia operating specifications are –4°F to +104°F (-20°C to+40°C). The unit shall operate within a humidity range of 15% to 90% relative humidity, non-condensing and a pressure range of +/- 10% atmospheric.

5. Electrical Design

The input power shall be 24 VDC nominal, 20 to 36 VDC, 600 ohms maximum. Cable requirements shall be 14 to 20 AWG for cable runs from the power supply and readout/relay module to the unit. The output signal shall be an analog signal with a range of 0 to 22mA and a maximum load rating of 600 ohms.

The unit shall be capable of receiving power through cable running up to 2000 feet from the power supply. The unit shall be capable of transmitting the output signal through the cable up to 9000 feet to a readout/relay module. The alarm and malfunction relays shall be SPDT contacts with electrical ratings of 8A @ 250VAC, 8A @ 30VDC resistive max.

The dual-redundant MODBUS communications interface shall be based on the RS-485 standard and shall allow two-way addressable communications. It will be suitable for linking up to 128 units or up to 247 units with repeaters.

5.1 Digital Display

This bright, outdoor readable, display Indicates gas concentration, calibration prompts, and (12) fault codes to allow on-site calibration and problem solving.

5.2 Outputs

A.

- 600 Ω maximum @ 24VDC
- Signal Range: 0-22mA
- Fault: < 1.0mA
- Start-up: 4mA
- Calibration: 1.5mA
- Detection Range: 4-20mA
- Over-range: 22mA

B. 2) SPDT Alarm relay contacts, 8A @ 250 VAC, 8A @ 30 VDC res. max.

C. (1) SPDT Malfunction relay contact, 8A @ 250 VAC, 8A @ 30 VDC res. max

D. RS485 Serial Interface, Dual Redundant MODBUS RTU

5.3 Magnetic Calibration

The HVS4000 sensor calibration and mode changes are magnetically initiated and controlled. This provides a non-intrusive single point entry with no manual mode adjustments allowed.

5.4 Additional Modes

A. Test gas mode option is magnetically initiated, analog signal at 1.5mA and displays concentration when gas is applied while inhibiting the outputs.

B. Alarm mode option gives selection for relays allowing for changes in the field:
   1. Energized or De-Energized
   2. Latching or Non-Latching
   3. Alarm Trip Level

5.5 Malfunctions Monitored

The system monitors and displays Low DC supply, sensor faults, calibration faults and switch errors.

6. System Specifications

This HVS4000 system shall accept the following sensors and meet these Gas Detection Performances:

Gas Name	Formula	Range-ppm	Time-sec.
Ammonia	NH_3	0-50/100	T90<90
Chlorine	Cl_2	0-10/20	T90<60
Carbon Monoxide	CO	0-100	T90<30
		0-500	T90<30
Ozone	O_3	0-1	T90<90
Sulfur Dioxide	SO_2	0-20	T90<10
Chlorine Dioxide	ClO_2	0-3	T90<60
Oxygen Deficiency	O_2	0-25%	T90<15

7. Accessories

Optional accessories for each HVS4000 Gas Detector shall include (1) Junction Box, (2) Splashguard, (3) Flow Plug Assembly and Calibration cup.

8. Warranty

This system shall have a two-year warranty on the electronics, one-year electrochemical cell sensing element. The manufacturer shall warrant this system to be free from defects in workmanship and material under normal use and service within the warranty period from the date of shipment.