

Engineering Specification for the Ultima[®] MOS-5 Hydrogen Sulfide Intelligent Sensing and Transmitting Unit

1.0 GENERAL DESCRIPTION

The Intelligent Sensing and Transmitting Unit shall contain microprocessor-based electronics, field connection terminations, dual-redundant ModBus or HART and three 8A relays in a single explosion-proof housing. The sensing element shall be of the diffusion, adsorption, metal oxide semiconductor (MOS) type. This unit shall be available with a 3-digit digital display window in the cover. The transmitter shall be capable of interfacing with industrial equipment that can receive a 4 to 20 mA signal.

2.0 SENSOR SPECIFICATIONS

- 2.1 The semiconductor sensor shall be suitable for detecting and measuring the concentration of hydrogen sulfide. It shall have a precision of ± 2 ppm or 10% of the applied gas, whichever is greater.
- 2.2 The sensor shall also have a response time (T_{50}) of less than one minute for screen-covered sensors and less than two minutes for sintered sensors.
- 2.3 The MOS sensor shall meet the performance standards of ISA 92.0.01 Part 1 – 1998 requirements.
- 2.4 The available sensor ranges shall be: 0 to 20 ppm, 0 to 50 ppm, or 0 to 100 ppm.

3.0 ELECTRICAL SPECIFICATIONS

- 3.1 The input power shall be 24 VDC nominal, 20 to 36 VDC, 350 mA maximum. Three-wire shielded cable (14 to 20 AWG) shall be used for cable runs from the power supply and readout/relay module to the unit. The unit shall be capable of receiving power through cable running up to 2,240 feet from the power supply using 14 AWG wire.
- 3.2 The output signal shall be an analog signal with a range of 0 to 22 mA and a maximum resistance of 650 Ohms. The unit shall be capable of transmitting the output signal through the cable up to 8,000 feet to a readout/relay module.
- 3.3 The alarm and malfunction relays shall be SPDT contacts with electrical ratings of 8A @ 250 VAC, 8A @ 30 VDC resistive max.
- 3.4 Alarm option selections allow for changes in the field:
 1. Energized or De-Energized
 2. Latching or Non-Latching
 3. Alarm Trip Level (Low and High)
- 3.5 The unit shall be equipped with dual ModBus and will be suitable for linking up to 128 units or up to 247 units with repeaters. The unit shall be HART registered and compatible with Emerson Process Management's AMS Intelligent Device Manager. The HART communication must indicate unit conditions and ppm levels. It also must be capable of receiving calibration and cal check commands.

4.0 CALIBRATION

- 4.1 This unit shall be capable of calibration without having to de-classify an area and without any adjustments by the operator. This unit shall be capable of one-person calibration.
- 4.2 Calibration shall be initiated by the application of a magnet to the cover, to an external switch, ModBus command or HART command.
- 4.3 Calibration shall be a simple procedure and shall be listed on the cover of the unit.

5.0 ENVIRONMENTAL SPECIFICATIONS

5.1 This unit shall be capable of operating within a temperature range of -40°F to +167°F (-40°C to +75°C) for hazardous locations and a humidity range of 5% to 100% relative humidity, non-condensing.

5.2 The unit shall meet the following operating temperature standards:

CSA/FM: T6 ($T_{amb} = -40^{\circ}\text{C}$ to $+75^{\circ}\text{C}$) hazardous locations

CSA/FM: T6 ($T_{amb} = -40^{\circ}\text{C}$ to $+60^{\circ}\text{C}$) performance

ATEX: T5 ($T_{amb} = -40^{\circ}\text{C}$ to $+70^{\circ}\text{C}$)

6.0 MALFUNCTION INDICATIONS

6.1 The malfunction indications shall be a remote analog signal indication uniquely different than the operational signal and a visible signal to the operator.

6.2 The malfunction conditions that are monitored shall be:

- Failed Complete Calibration
- Flash Checksum Error
- Sensor Heater Open Error or Sensor Amplifier Error
- Sensor Heater Shorted Error
- Low Supply Voltage
- EEPROM Verification Failure
- Failure to Complete Setup
- Gas Check Period Exceeded
- Switch Error
- Internal Error

7.0 APPROVALS

7.1 The complete unit must be approved by the Canadian Standards Association (CSA), Factory Mutual (FM), ATEX and have the CE mark.

7.2 This unit shall be capable of operating in Class I, Division 1, Groups B, C or D and Class 1, Zone 1, Group IIB+H₂, T6, hazardous classified locations.

7.3 The detector shall be suitable for SIL 2 and 3 environments.

8.0 WARRANTY

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

9.0 DIMENSIONS

9.1 The unit shall not exceed the following dimensions: 6.4" (L), 3.4" (H), 4.1" (W)

9.2 The unit shall not exceed 5.5 pounds

10.0 REMOTE HOUSING

10.1 This unit shall be capable of remote mounting of the sensor up to 4,000 ft with 14 AWG.

11.0 MANUFACTURER

11.1 The manufacturer must be capable of supplying all equipment used to check or calibrate the sensor/transmitter units.

11.2 The manufacturer must be capable of providing on-site training for owner/operator.