PRODUCT SPECIFICATION

MSA GasGard® XL Gas Monitoring System

1.0   **System Configuration** - The system design, consisting of monitor/readout units and gas sensors/transmitters and/or flame detectors, shall conform to Paragraphs 2.0 through 4.0. Deviations are not acceptable. Paragraph 5.0 is included for system layout and product ordering assistance.

2.0   **General** - The Gas Monitoring System shall measure and display gas concentration for up to eight gas sensors/transmitters and/or flame detectors. The system shall provide audible and visual alarms when preset limits are exceeded. Relay outputs for alarms and both an Ethernet interface configurable for Modbus TCP/IP protocol, and an RS485 interface configurable for Modbus RTU protocol shall be available.

3.0   **Monitor/Readout Unit** - The Monitor/Readout Unit must comply with Paragraphs 3.1 through 3.7.

    3.1   **Monitor/Readout Description** - The system shall consist of a Monitor/Readout Unit and separate gas sensor/transmitter units and/or flame detectors. The monitor shall have separate and independent electronics for each channel of readout. The sensor/transmitter units and/or flame detectors shall be capable of being located remotely from the monitor/readout unit by up to 4,000 feet. Sensor/transmitter units and/or flame detectors shall receive power from, and send signal corresponding to gas values or condition to, the monitor/readout unit. All sensor /transmitter outputs must be 4-20mA, in two-wire or three-wire configuration.

        3.1.1   The monitor must be field-serviceable and upgradeable for additional points of gas detection measuring up to a maximum of eight (8) channels.

    3.2   **Monitor/Readout Configuration** - The Monitor/Readout Unit shall be an enclosed wall-mounted type. It shall conform to Paragraphs 3.2.1 through 3.2.6.

        3.2.1   **Number of Gas Sensors/Transmitters and/or Flame Detectors per Enclosure** - Each monitor/readout shall be capable of monitoring up to eight sensors/transmitters as described in Paragraph 3.1.

        3.2.2   **Type of Enclosure** - The enclosure shall be rated NEMA 4X, suitable for general-purpose type areas, and be made of ABS housing material that is flame-retardant rated VO UL. Access to the inside of the enclosure, monitor front panel and wiring connections shall be through a front panel. The panel shall have a shatterproof window of sufficient size to allow the viewing of the graphic display, gas readings, and alarm indicator lights. **They shall not be mounted in hazardous locations as defined by the National Electric Code (NEC)**.

        3.2.3   **Enclosure Size** - The enclosure shall be not greater than 20 inches in any dimension.

        3.2.4   **Mounting Provisions** – The unit shall mount to a flat surface through mounting holes located on the back of the unit.

3.2.5 **External Controls** - An external sealed push button shall be provided to enable alarm reset and audio alarm silencing without opening the enclosure. There must be a connection for wiring an external alarm reset and audio alarm-silencing switch.

3.2.6 The Monitor/Readout Unit must have cCSAus, EC-ATEX, or SIL2 approval or certification. Instrument manufacture must be certified according to ISO 9001 provisions.

3.3 **Monitor/Readout Requirements**

3.3.1 **Readout Displays** - A common liquid crystal display (LCD) with separate four-digit LCD readout shall be provided for displaying the gas value from the sensors. The value displayed shall be a direct reading of the gas concentration indicated on the sensor/transmitter. The readout must also be able to be configured to read any value between 0.1 through 8,000 ppm for ppm levels, or 0-100% for percentage levels. Flame detectors shall have a distinct indicator symbol on the display.

3.3.2 **Visual Alarm Indicators** - The monitor shall have separate visual alarms for indicating two levels of alarm, power indicator and a fault indicator for each of the eight possible inputs. The lights shall be color-coded. Blue and white shall not be used.

3.3.3 **Alarm Set Point Levels** – Two separate alarm set point levels shall be provided for each sensor. The set points shall be independently adjustable for any value in the readout range. The set points shall provide drive signals to user-interface relays. Both of the alarm set points shall be able to provide the user with a choice of latching or non-latching mode, alarm on upscale or downscale, and energized or de-energized mode through software-selectable options. TWA and STEL levels can be set based on the gas of interest and be part of the voting capability for alarms.

3.3.4 **Common Relay Outputs:** Two common alarm relays, and two common horn relays with one common fault relay shall be standard.

    3.3.4.1 The common alarm and horn relays shall be SPDT rated at 5 amps resistive at 30 VDC or 250 VAC.

    3.3.4.2 The two common horn relays shall be silenced by means of the common Acknowledge push button on the front of the monitor.

3.3.5 **Optional Discrete Relay Outputs** - The alarm set point drive signals shall activate user relays as specified in Paragraphs 3.3.5.1 through 3.3.5.3.

    3.3.5.1 **Number of Relays** - As a minimum, one relay for each set point level shall be provided.

    3.3.5.2 **Contact Rating** - All relays shall be Form C, single-pole, double-throw. Contacts shall be rated for 5 amps resistive at 30 VDC or 250 VAC.

    3.3.5.3 **Contact Selection** - The contacts shall be capable of being selected normally open or normally closed, normally energized or normally de-energized, latching or non-latching, and increasing or decreasing activation. Voting and grouping of relays shall be configurable through the keypad or software provided.

3.3.6   **Malfunctions Indication** - System trouble indication shall be provided in accordance with Paragraph 3.3.6.1.

    3.3.6.1   **Trouble Relay** - A common relay shall be provided to indicate trouble for all inputs when any of the following conditions exist:

        3.3.6.1.1   System power loss.
        3.3.6.1.2   Signal loss from any sensor.
        3.3.6.1.3   Signal greater than 5% of full scale or lower than 5% below zero.
        3.3.6.1.4   Control module malfunction or removal.

3.3.7   **Display Indication** - The readout display described in Paragraph 3.3.1 shall display a separate unique character when an over-range or under-range of greater than 5% exists.

3.3.8   **Audible Alarm** - An 85 dB audible buzzer shall be provided when an alarm condition occurs.

3.3.9   **Output Signals**

    3.3.9.1   Ethernet output configurable for Modbus TCP/IP.
    3.3.9.2   RS-485 output configurable for Modbus RTU protocol.
    3.3.9.3   USB configurable for ModBus RTU.

3.3.10   **Battery Back Up Option:**

A battery back up option shall be available and supplied if required by the engineer and shown on the drawing.

    3.3.10.1   Battery back up shall supply up to twenty minutes of back up when configured with up to eight catalytic combustible sensors. (Maximum current draw)
    3.3.10.2   Battery charger circuit shall be part of the standard main circuit board for the monitor.

3.3.11   **Operating Modes and Parameter Selection** - The selections listed in this paragraph shall be accomplished by the use of software and/or push button type controls located on the front panel of the monitor. Access to the software shall be password protected.

    3.3.11.1   Sensor range value.
    3.3.11.2   Alarm levels for two of the alarm set points.
    3.3.11.3   Alarm on upscale or downscale for two of the alarm set points.
    3.3.11.4   Setting relay contacts energized or de-energized.
    3.3.11.5   Latching or non-latching alarms for two of the alarm set points.
    3.3.11.6   Time delay of up to 180 seconds, prior to alarm inhibit.
    3.3.11.7   Setting audible alarm on or off.
    3.3.11.8   Setting external wiring for external alarm reset switch or a flow failure fault indictor.
    3.3.11.9   Time and date.
    3.3.11.10   Settings for TWA and STEL for Common Alarm 2.
    3.3.11.11   Password code change and reset.

3.3.12 **Front Panel Controls** - The functions listed in this paragraph shall be accomplished using push button type controls readily accessible on the front panel:

  3.3.12.1 Acknowledge button that silences audible alarms.
  3.3.12.2 Acknowledge button that resets latching alarm conditions after alarm condition has cleared.
  3.3.12.3 Test button that displays all software-selectable programming.

3.3.13 **Sensor Input Signal** - The sensor signal shall be a 4-20mA input signal.

3.3.14 **System Power Requirements** - The system shall operate on 85 to 260 VAC, 43 to 63 Hz. Power shall not exceed 100 VA.

3.4 **Maximum System Maintenance Requirements** - The system shall require no periodic maintenance other than checking of sensor unit function. Periodic sensor checking, calibration, or actual adjustment of the sensor units shall be capable of being accomplished by one person at the sensor unit location.

3.5 **Approvals** - The monitor/readout unit must have cCSAus, EC-ATEX, or SIL2 approval or certification.

3.6 **Manufacturer Capability Requirements** - As a minimum, the Gas Monitoring Equipment manufacturer must meet the requirements outlined in paragraphs 3.6.1 through 3.6.5.

3.6.1 Capable of supplying all equipment used to check or calibrate the sensor units.

3.6.2 Capable of providing on site service with factory-trained personnel and include on-site warranty.

3.6.3 Capable of providing on-site training for the owner/operator.

3.6.4 Capable of supplying in-house service and assistance.

3.6.5 Instrument manufacture must be certified according to ISO 9001 provisions.

3.7 The Monitor/Readout Unit shall be a Mine Safety Appliances Company Gasgard XL Gas Monitor or equal.

4.0 **Sensors/Transmitters** - The gas sensors/transmitters and/or flame detectors used in conjunction with the Gasgard XL monitor must have two-wire or three-wire 4-20mA output and must comply with location requirements for all areas of installation. The sensor/transmitter and/or flame detectors must meet all requirements of the Gasgard XL monitor.