Bid Specifications: *Ultima XL (Non-Display* Gas Monitor with HART)

PHYSICAL CHARACTERISTICS	
Size	Unit shall not exceed 7.08"W x 8.81"H x 4.07"D in total size with the Intrinsically Safe Port
Weight	Unit shall not exceed 7.7 lbs (3.49kg).
Enclosure Type	Enclosure Type - The enclosure shall be a 316 Stainless Steel Explosion Proof Enclosure.
Housing Entries	Transmitter shall have three conduit entries, $^3/_4$" NPT or 25 mm.
Mounting Provisions	Sensor / transmitter units will have provisions for attaching the unit to a flat surface with an available mounting bracket, mounting strap or duct mount kit.

ENVIRONMENTAL	
Temperature	Toxics and oxygen: -20° to +40°C (-20° to +104°F) Typical range for some gases may differ. Combustible: -40° to +60°C (-40° to +140°F).
Humidity	Operating Humidity range 15-95% RH, non-condensing.

SENSOR REQUIREMENTS	
Catalytic Bead Type Combustible Sensor	The catalytic bead type combustible sensor must have a demonstrated resistance to degradation of silicones and reduced sulfur gases. The catalytic combustible sensor/transmitter shall detect for an above 100%LEL condition (over-range). The interconnect wiring from the combustible transmitter to the sensor shall be a 5-wire cable.
Electrochemical (Toxic and Oxygen) Sensors	The electrochemical sensor/transmitters shall not require the periodic addition of reagents. The interconnect wiring from the electrochemical transmitter to the sensor shall be a 5-wire cable.

SENSOR / TRANSMITTER OPERATING REQUIREMENTS	
Operating Voltage	The sensor/transmitter can operate between 8-30 VDC.
PCB	Sensor/transmitter electronics shall consist of one PCB. The single PCB shall not require tools for installation or removal. The single PCB must be self-aligning in the enclosure.
Wiring Configurations	3-wire cable for all (toxic, oxygen and combustible sensors) units configured with LED's and without relay options.
Latching alarms	Sensor/transmitter shall allow for optional reset through the pushbutton method or the HART communicator.
Start-up / Set-up	Set-up and start-up of the sensor/transmitter will be so that the enclosure need not be opened during this process.
Contents	Sensor/transmitter shall contain no pots, jumpers or switches.
Output capability	4 to 20mA output with full range scaling. The combustible sensor/transmitter will be a sourcing type of signal capable of operating into a 230-500-ohm load. The toxic gas or oxygen sensor/transmitter will operate on a 3-wire current loop. Shall provide bi-directional HART communications over a network. This output shall be in conjunction with the standard 4-20 ma output and utilize the same wires concurrently with the 4-20ma. This output shall be compatible with the HART Communications Foundation (HCF) FSK Physical Layer Specification HCF_SPEC-54.

SMART SENSOR TECHNOLOGY

Mounting	Sensors shall be contained in sensor modules mounted external to the main enclosure. All sensor modules (except XIR) shall have the capability of replacement while the unit is under power (hazardous areas) without the need for tools.
Contents	Sensor modules shall contain all relevant sensor information within the module. This information shall include sensor manufacturer date, gas type, gas range, calibration data, and default relay parameters.
Calibration Data	Sensor module shall store all calibration data so that the module may be calibrated off site and installed in the field without the necessity of re-calibration. The sensor module shall not require a battery or power source to store this data.

SENSOR / TRANSMITTER DISPLAY

HART Communicator	Shall provide a means for a local interface / display indicating the gas type being monitored and the concentration of gas present.
Diagnostic Check / Fault	HART network shall indicate all diagnostic check/fault conditions. Error codes shall not be used.
Alarm Levels	Sensor/transmitter will maintain 3 levels of alarm. Alarm levels will be adjustable by means of a HART communications tool.
Gas Concentrations	Sensor/transmitter will be capable of storing and transmitting average, minimum and maximum gas concentrations over selected periods of time.
End of life notification	The sensor/transmitter will give an indication of when sensor is nearing the end of its useful life by means of the HART network. This indication that the sensor is nearing its useful life will be based on the sensor output. It shall not be based on the time the sensor was in service.

MAINTENANCE REQUIREMENTS

Maximum System Maintenance	The system shall require no periodic maintenance other than periodic checking of sensor response to a known concentration of gas.

CALIBRATION REQUIREMENTS

Calibration Protocol	The handheld communicator will instruct the user on when to apply zero and span gas. The system will automatically adjust its internal settings to the proper calibration values without further intervention by the user. Upon completion of a successful calibration, the system will exit the calibration mode. Date stamp of last successful calibration will be retained in the system internal memory, with capability to be displayed on display. If calibration is unsuccessful for any reason, the handheld communicator must show an unsuccessful calibration attempt and revert to its previous calibration settings. Use of flashlight type devices, magnets or clamp-on devices to achieve calibration is not acceptable. The acceptable method uses a transmitter employing HART Protocol Rev 6.
HART communicator	Will let the user perform sensor zeroing, calibration, setting parameters and activate all functions and features of the sensor/transmitter.
Push-Button Calibration	There will be an option to calibrate the sensor through a push-button accuator located on the main PCB. The push-button shall allow for zero and span capabilities.

PUMPING MODULES

Pump	Pumping modules will be either DC pumped or Aspirated and be specifically designed in 316 Stainless or Plastic Nema 4X style enclosures.

POWER REQUIREMENTS

External Power Supply	Sensor/transmitter shall be powered by stand-alone supply either: 85-256VAC / 12VDC or 85-256 VAC / 24 VDC

GAS TYPES AND RANGES				
Gas Type	Range/ Full Scale 1	Range/ Full Scale 2	Range/ Full Scale 3	Range/ Full Scale 4
Arsine (ASH3)	0-2 PPM			
Carbon Monoxide (CO)	0-100 PPM	0-500 PPM	0-1000 PPM	
Combustible Gas – Natural Gas & H2	0-100% LEL			
Combustible Gas – Natural Gas & H2 EURO – CH4	0-100% LEL 4.40%			
Combustible Gas – Petroleum Vapors	0-100% LEL			
Combustible Gas – Petroleum Vapors EURO - Propane	0-100% LEL 1.70%			
Combustible Gas – Solvents	0-100% LEL			
Combustible Gas – Solvents EURO - Propane	0-100% LEL 1.70%			
Combustible Gas – IR Non-Methane	0-100% LEL			
Germane (GeH4)	0-3 PPM			
Hydrogen (H2)	0-1000 PPM			
Hydrogen Cyanide (HCN)	0-50 PPM			
Hydrogen Sulfide (H_2S)	0-10 PPM	0-50 PPM	0-100 PPM	0-500 PPM
Hydrogen Sulfide, Solid State	0-100 PPM			
IR combustible – Methane EURO – CH4	0-100% LEL 4.40%			
IR combustible – Methane	0-100% LEL			
IR combustible – Non Methane EURO-Propane	0-100% LEL 1.70%			
IR combustible – Propane	0-100% LEL			
Nitric Dioxide (NO_2)	0-10 PPM			
Nitric Oxide (NO)	0-100 PPM			
Oxygen (O2)	0-10%	0-25%		
Phosphine (PH3)	0-2 PPM			
Silane (SiH4)	0-25 PPM			
Sulfur Dioxide	0-25 PPM	0-100 PPM		

USER INTERFACES

HART Network	The interface with a Ultima X with HART shall be with an approved HART communications device. It shall show the following indications upon being interrogated: 1. Gas Value & Engineering units 2. Calibration operations (zero & span) 3. Sensor end of life (when applicable) 4. Minimum, maximum, and average gas values 5. Date and time 6. Indication of trouble 7. Indication of possible network communication 8. Sensor address 9. Individual alarms (1,2,3) 10. Additional info per HART specification
4-20mA Current	Shall provide gas value and fault indication.
Internal Push-button	Shall provide local calibration.

INSTRUMENT ALARMS AND STATUS LEDs

Alarm Set Point Levels	Alarm Set Point Levels - Three separate alarm set point levels shall be provided. The set points shall be independently adjustable for any value in the readout range. The set points shall provide alarm indication to HART network. The alarm set points shall have the capability of providing the user a selection of latching or non-latching mode. Combustible sensors can not be set above 60% LEL.

LED / RELAY OPTIONS

LEDs	Sensor/transmitter shall have internal LED's, accessible by removing the enclosure cover. The LED's shall operate as follows: Solid green LED – normal operation (measure mode) Solid red LED – fault condition, span or ical Blinking green LED - zero calibration, span, ucal or squawk Blinking red LED – Alert, ucal or squawk

APPROVALS

US (FM Approvals)	Gas monitor shall comply with FM3600, FM3610, FM3611, FM3615, FM3810, FM6310,6320, FM6340, ANSI/ISA-12.13.01, ANSI/ISA-60079-0, ANSI/ISA-60079-1, ANSI/ISA-60079-11, ANSI/ISA-60079-15, ANSI/NEMA 250, ANSI/IEC 60529
CANADA (FM Approvals)	Gas monitor shall comply with C22.2 No. 0.4.04, C22.2 No. 0.5, C22.2 No 30, C22.2 No. 94, C22.2 No. 142, C22.2 No. 152, C22.2 No. 157, C22.2 No. 213, CAN/CSA-E60079-0-02, CAN/CSA-E60079-1-02, CAN/CSA-E60079-11-02, CAN/CSA-E60079-15-02, CAN/CSA C22.2 No. 60529, CAN/CSA C22.2 61010-1
Europe (FM Approvals)	Gas monitor shall comply with EN50104, EN 50271, EN 60079-0, EN60079-1, EN 60079-11, EN 60079-15, EN 60529, EN61010-1, EN61779-1, EN 61779-4

MANUFACTURER

Instrument Supply	The manufacturer must be capable of supplying all equipment used to check or calibrate the sensor/transmitter units (except HART communicator).
Product Service	The manufacturer must be capable of providing on-site service with factory trained personnel.
On-site Training	The manufacturer must be capable of providing on site training for owner/operator.

WARRANTY

Full Replacement Warranty	Instrument shall have one year parts and labor standard warranty with extended one year warranty available.