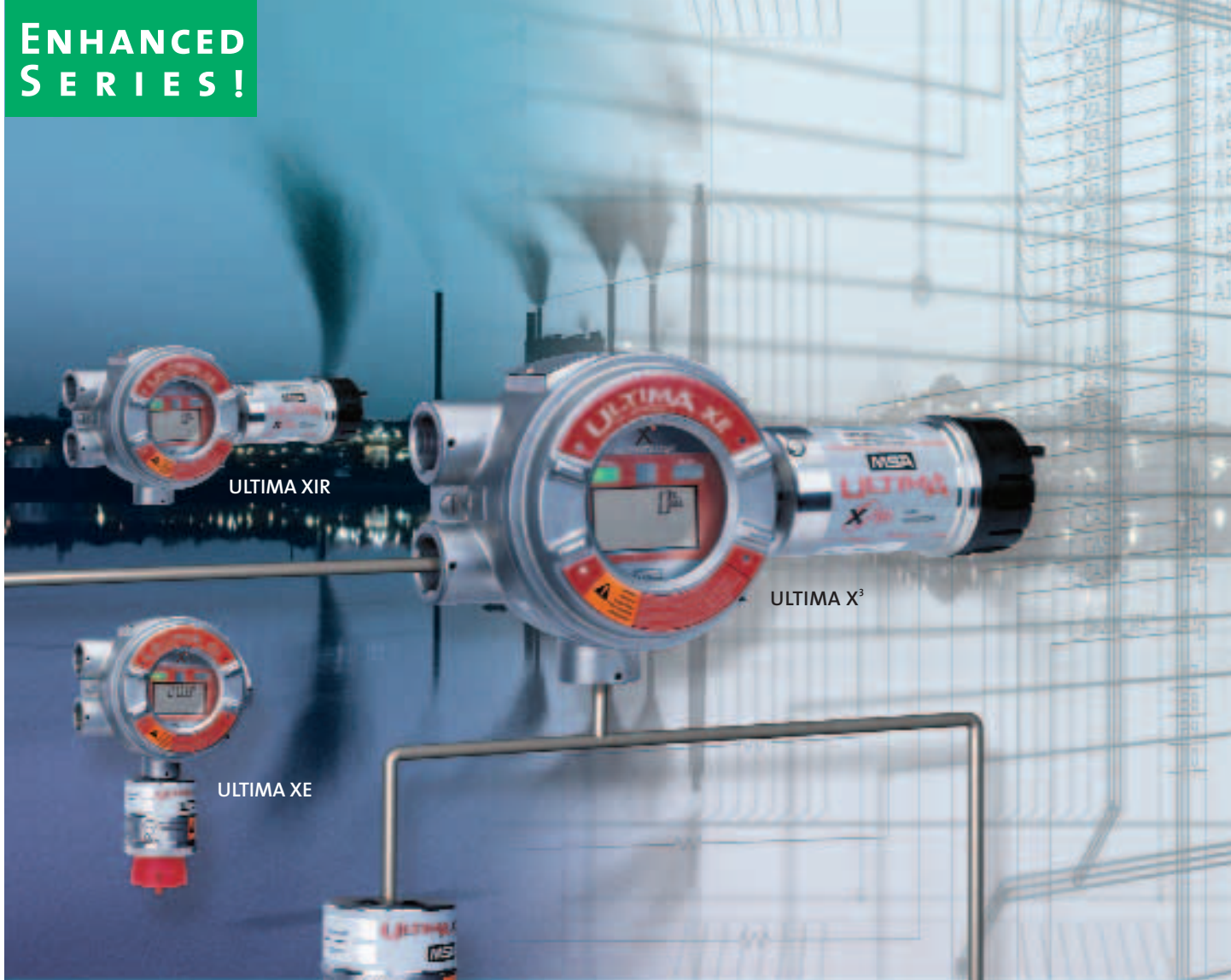


**ENHANCED
SERIES!**



ULTIMA XIR

ULTIMA X³

ULTIMA XE

ULTIMA[®] X Series

[State-of-the-Art Gas Monitoring]

ULTIMA® X Gas Monitors

[Providing a unique Range of Capabilities]

ULTIMA X are state-of-the-art gas monitors for continuous detection and monitoring of combustible gases, toxics and oxygen concentration.

The ULTIMA X series of gas monitors is available with catalytic sensors for combustible gas and electrochemical sensors for toxic and oxygen [ULTIMA XE] or infrared for combustible gas [ULTIMA XIR].

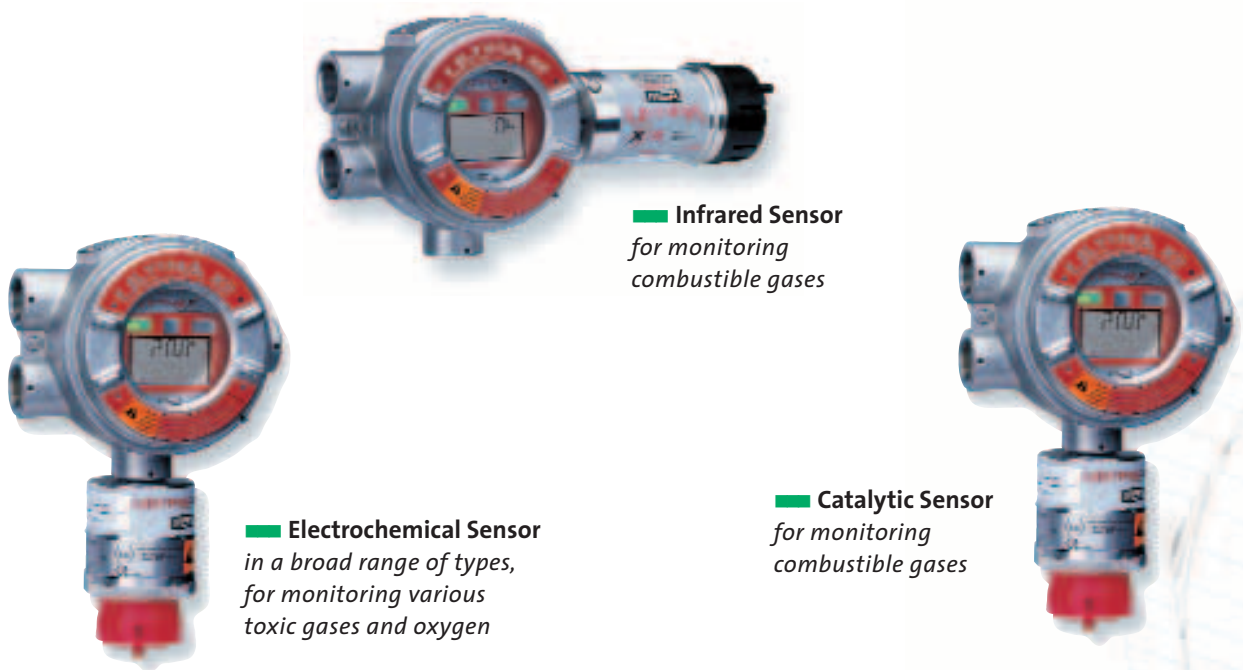
The state-of-the-art design provides ease of use and maintenance and notably the XIR technology's outstanding long term accuracy extends the calibration interval.

All ULTIMA X series monitors are protected by a rugged, explosion proof stainless steel enclosure and are suitable for indoor and outdoor applications in virtually any industry including offshore operations.

The monitors can be deployed as stand-alone units, but also provide a 4 to 20 mA output for connection to controllers. In addition, the ULTIMA X³ range now supports ModBUS RTU communication with PLC, DCS or other control systems.



[Three Sensing Options in one single Device]



Infrared Sensor
for monitoring
combustible gases

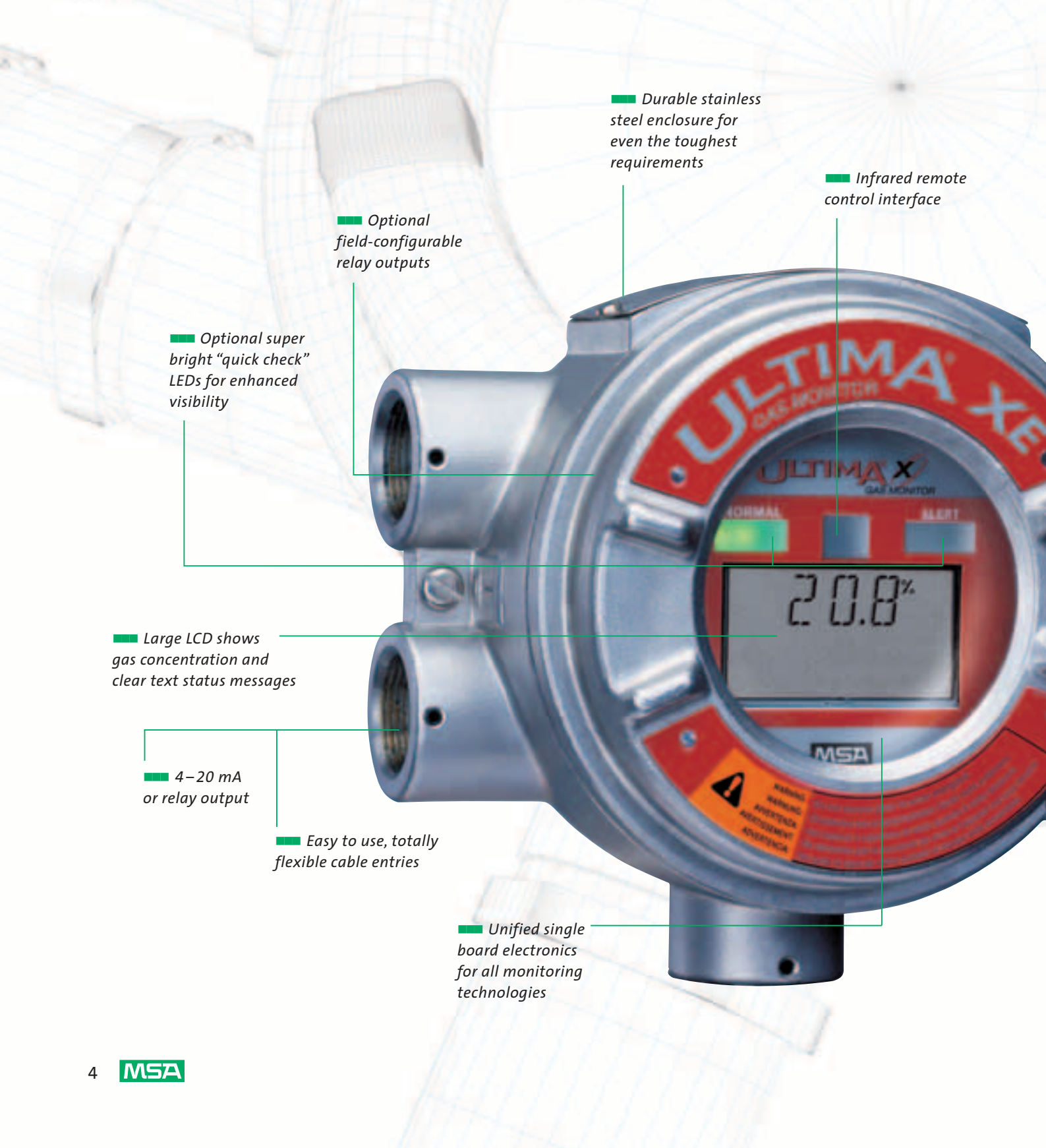
Electrochemical Sensor
in a broad range of types,
for monitoring various
toxic gases and oxygen

Catalytic Sensor
for monitoring
combustible gases



[Alphabetical List of Gases]

| | | | |
|--------------------------|-------------------|------------------------|--------------------------|
| A Acetaldehyde | Chlorine | H Heptane | Methyl Methacrylate |
| Acetic Acid | Chlorine Dioxide | Hexane | Methyl Propane |
| Acetone | Cyclohexane | Hexene | Methyl t-Butyl Ether |
| Acetylene | Cyclopentane | Hydrogen | N Nitric Oxide |
| Acrolein | D Diborane | Hydrogen Chloride | Nitrogen Dioxide |
| Acrylnitrile | Diethyl Ether | Hydrogen Cyanide | O Oxygen |
| Ammonia | Dimethoxyethane | Hydrogen Sulphide | P Pentane |
| Amyl Alcohol | Dimethyl Ether | I IsoButane | Pentene |
| Arsine | Dioxane | IsoButanol | Phosphine |
| B Benzene | E Ethane | Isoprene | Propane |
| Bromine | Ethanol | IsoPropanol | Propanol |
| Butadiene | Ethyl Acetate | J JP-4 | Propyl Acetate |
| Butane | Ethyl Acrylate | M MEK | Propylene |
| Butanol | Ethyl Benzene | Methane | Propylene Oxide |
| Butene | Ethylene | Methanol | S Silane |
| Butyl Acetate | Ethylene Oxide | Methyl Acetate | Styrene |
| Butyl Acrylate | F Fluorine | Methyl Ethyl Ketone | T Tetrahydrofuran |
| Butyraldehyde | G Gasoline | Methyl Formate | Toluene |
| C Carbon Monoxide | Germane | Methyl Isobutyl Ketone | X Xylenes |



■ Durable stainless steel enclosure for even the toughest requirements

■ Infrared remote control interface

■ Optional field-configurable relay outputs

■ Optional super bright "quick check" LEDs for enhanced visibility

■ Large LCD shows gas concentration and clear text status messages

■ 4–20 mA or relay output

■ Easy to use, totally flexible cable entries

■ Unified single board electronics for all monitoring technologies



ULTIMA[®] X

[Highlights]

■ Sensor Change under Power

MSA's patented sensor design allows for quick and easy sensor changes in the field, even in hazardous areas.
[catalytic and electrochemical sensors]

■ Interchangeable Smart Sensors

Pre-calibrated sensor modules are ready for installation out of the box. No tools are needed to mount them in the field. Sensor changes are recognised, signalled on the display and indicated by the LEDs.
[catalytic and electrochemical sensors]

■ Versatile Display

The liquid crystal display alternates between gas concentration and gas type, and features scrolling text diagnostic indications.

■ Unified Hardware Design

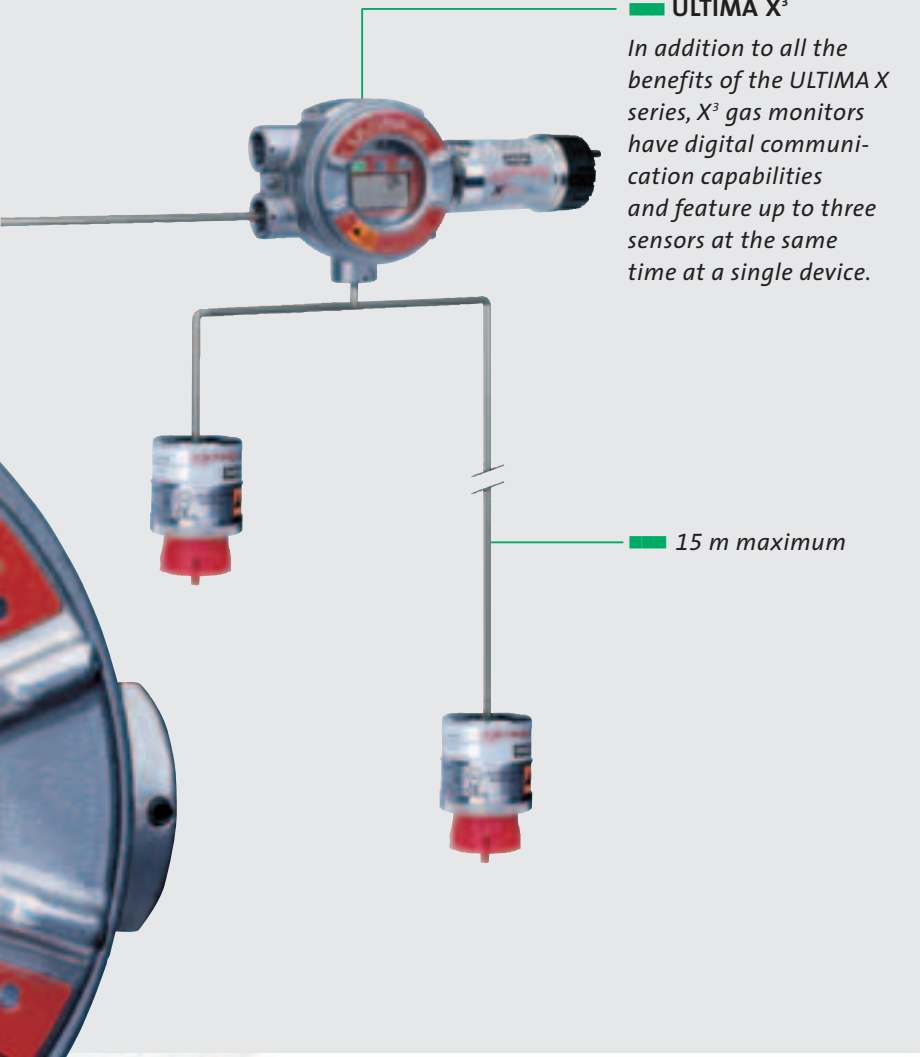
A single device with three sensing options: catalytic, electrochemical and infrared absorption. The ULTIMA X series with unified single board electronics marks the state-of-the-art in monitoring combustible and toxic gases and oxygen.

■ Onboard LEDs and Relays

Optional "quick check" LEDs at the display unit provide system condition indications at a glance, even from a distance. Four optional field-programmable relays provide three levels of alarm and fault output.

■ ULTIMA X³

In addition to all the benefits of the ULTIMA X series, X³ gas monitors have digital communication capabilities and feature up to three sensors at the same time at a single device.



[Features and Benefits]

- Stainless steel explosion-proof, multiple-entry enclosure
- Large LCD for numerical data as well as clear text messages
- Unified sensor electronics for multiple detection and monitoring technologies
- Single-board design greatly simplifies servicing
- “Quick-check” LEDs indicate system conditions, with good visibility even from a distance
- Optional field-programmable relays
- Remote sensor option
- Automatic compensation for changes in temperature and humidity
- All calibrations and adjustments made using non-invasive calibrator or controller [IR interface]
- Sensors can be changed under power in the field, even in hazardous areas [catalytic and electrochemical sensors]
- 4–20 mA output signal [ULTIMA XE]
- Digital ModBUS RTU communication [ULTIMA X³]
- Up to three sensors per monitor [ULTIMA X³]



[Applications]

ULTIMA X series gas monitors are suitable for indoor and outdoor applications in virtually any industrial environment including:

- Offshore installations
- Refineries
- Chemical and petrochemical facilities
- Steel mills
- Water and wastewater plants
- Automotive factories

[Hazards]

ULTIMA X series gas monitors protect against the following hazards:

- Combustible atmosphere
- Oxygen deficiency
- Toxic atmosphere
- Gas leaks



Sensors

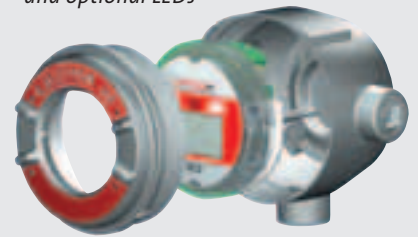
[Installation and Operation]

Allowing for variable sensor placement, ULTIMA X series gas monitors have multiple enclosure entries for left, right or bottom wiring. The monitors are also suitable for remote sensing applications, with up to 15 m between sensor and electronics.

The modular design allows for pre-installation and wiring of the main enclosure at early stages of site construction. Main electronics and calibrated sensors can be easily added at commissioning to reduce risk of loss or damage and maximise sensor life.

ULTIMA X catalytic and toxic "Smart Sensor" modules store all calibration data internally, allowing convenient sensor presetting and calibration in the workshop. Calibration in the field is also possible, e.g. if required by regulations. No tools are needed for connecting or disconnecting sensor modules, and power to the monitor can remain on.

Electronics with front panel display and optional LEDs
Explosion-proof enclosure



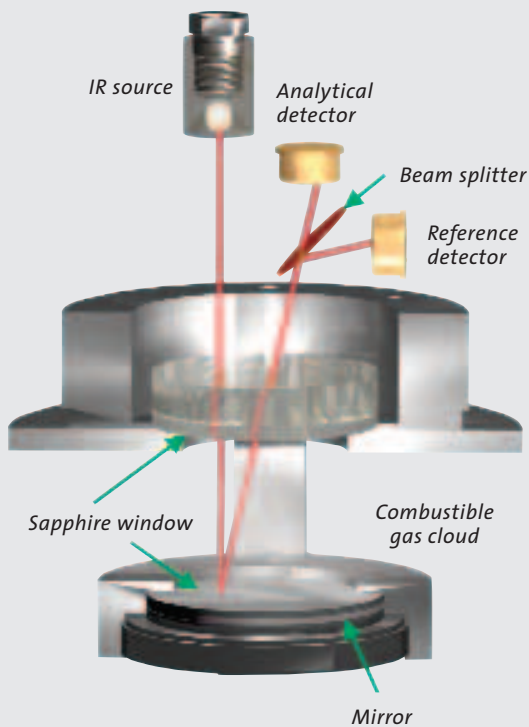
Cover with window

Sensor enclosure

Interchangeable smart sensor

Universal sensor guard

Electrochemical/Catalytic Sensor



[ULTIMA X IR Technology]

An electronically modulated source of infrared energy and two detectors convert the infrared energy into electrical signals. Each detector is sensitive to a different range of wavelengths in the infrared spectrum. The source emission is directed through a window in the main enclosure into an open volume. A mirror, protected by a second window, directs the energy back into the main enclosure

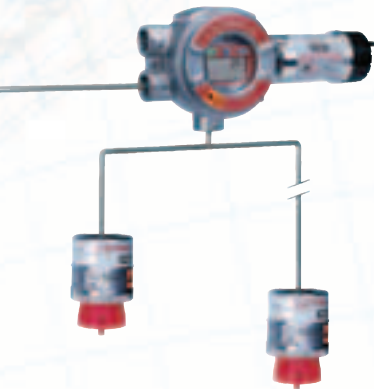
and onto the detectors. The presence of a combustable gas in the open volume will reduce the intensity of the source emission reaching the detector, but not the intensity of the source emission reaching the reference detector. The microprocessor monitors the ratio of these two signals and correlates this to a % LEL combustable reading.



ULTIMA[®] X³ Technology

[Digital Data Transfer and up to
3 Sensors per Monitor]

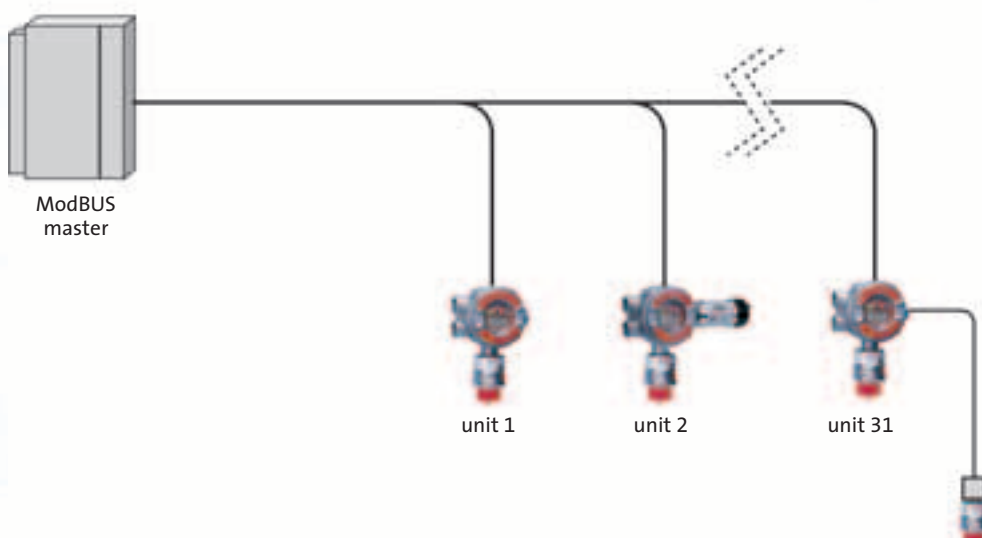
The ULTIMA X³ has all the benefits of the ULTIMA X series and is also capable of digital communication. A maximum of 31 ULTIMA X³ transmitters can be connected to the same line via ModBUS RTU. Since ULTIMA X³ units can be equipped with up to 3 sensors each, 93 sensors in all can share a single signal line. The wiring effort is minimal.



[Multi-Sensing System]

- Various combinations of electro-chemical, catalytic and infrared sensors available
- Remote diagnostics feasible thanks to sensor condition transmissions
- Gas monitor's "scrolling display" shows all its sensor types
- ULTIMA X³ monitor operates as slave device on the network
- Optional remote sensor installation allows for a maximum distance of 15 m for each sensor
- Internal relays can be configured for 3 different common alarms or one individual alarm for each sensor

[ModBUS Network Example]



[3 Sensor Technologies x 31 Monitors = 93 Gas Sensors]



[Accessories]

Calibrator

The easy to use 3 button ULTIMA Calibrator, with IR interface, offers the industry's simplest method of calibration. The intrinsically safe Calibrator can also be used to change the address of an ULTIMA X³ gas monitor.



Controller

The ULTIMA Controller has an IR interface and provides complete access to all features through its full function keypad.

Features include:

- Intrinsically safe
- Set/display alarm levels
- Set/display SPAN gas value
- Display minimum, maximum and average gas readings
- Calibration menu



Push Button [external]

The push button allows for quick browsing through key functions without the calibrator:

- Acknowledge Alarms
- Zero Calibration
- SPAN Calibration
- Initial Calibration [iCAL]
- Abort Calibration

Flow through Adaptor

For toxic and catalytic sensors with connection for option to apply calibration gas remotely [for ULTIMA XE].



Flow Cap

Used when there is a requirement to pump a sample through the sensing module [for ULTIMA XI and XIR].



Remote Sensor Options

The optional explosion-proof [NPT] or increased safety [metric] enclosure includes a terminal strip for easy wiring of power and signal.



[Technical Specifications]

| | |
|-----------------------------------|--|
| Gas Types: | Combustibles, toxics and oxygen |
| Temperature Range: | -40 °C to +60 °C [-40 °F to +140 °F] [typical, range for some gases may differ] |
| Drift: | |
| Zero Drift | < 5% per year, typical |
| Span Drift | <10% per year, typical |
| Accuracy: | |
| Repeatability | ± 1% Full Scale or 2 ppm, typical |
| Linearity | ± 2% Full Scale or 2 ppm [O ₂ , CO], typical ± 3% Full Scale [<50% LEL combustibles] ± 5% Full Scale [>50% LEL combustibles] ±10% Full Scale or 2 ppm [non-CO toxics], typical |
| Response Times: | |
| τ ₂₀ oxygen and toxics | <12 seconds [typically 6 seconds] |
| τ ₅₀ oxygen and toxics | <30 seconds [typically 12 seconds] |
| τ ₅₀ combustibles | < 8 seconds |
| τ ₉₀ combustibles | <20 seconds |
| τ ₉₀ XIR | < 5 seconds [without sensor guard] |
| Humidity: | 15%–95% RH, non-condensing |
| Sensor Life: | |
| Oxygen and toxics | 2 years typical |
| Combustibles | 3 years typical |
| Power Input: | 24 VDC [oxygen] 24 VDC @ 450 mA maximum [combustibles] 24 VDC @ 750 mA maximum [XIR] |
| Wiring Requirements: | |
| Combustibles [incl. XIR] | 3-wire |
| Oxygen and toxics | 2-wire; no LEDs or relays |
| Oxygen and toxics | 3-wire; LEDs and/or relays |

| | |
|---------------------------------|---|
| Signal Output: | |
| ULTIMA XE | 4–20 mA 2-wire current sink 4–20 mA 3-wire current source |
| Relay Contacts: | |
| Rating | 5 A @ 220 VAC; 5 A @ 30 VDC |
| Alarm | normally energised/de-energised, SPDT, upscale/downscale, latching/nonlatching |
| Fault | normally energised, SPDT, non-latching |
| Cable Entries: | Four, 3/4 inch NPT or 25 mm |
| Physical: | |
| Weight | 4.7 kg |
| Dimensions | 261 x 160 x 99 mm [H x W x D] |
| Material | 316 Stainless Steel |
| Approvals: | |
| ULTIMA XE/XIR/X ³ | CE Low Voltage Directive: 73/23/EEC |
| ULTIMA XE/XIR/X ³ | CE ATEX Directive: 94/9/EC |
| and Remote Sensor | CE EMC Directive: 89/336/EEC |
| ULTIMA XE/XIR/X ³ | Ⓢ II 2G EEx d IIC T5 [main enclosure] |
| | Ⓢ II 2G EEx d IIC T4 |
| | [sensor excluding IR] |
| | Ⓢ II 2G EEx d IIC T5 [IR sensor] |
| | Ⓢ II 2G EEx ia IIC T4 |
| | [sensor with safety barrier] |
| | -40 °C Ta +60 °C |
| EC-Type Examination Certificate | |
| ULTIMA XE/XIR | DMT 02 ATEX E 202 X Performance approval EN 61779-1: 2001 EN 61779-4: 2001 EN 50104: 2002 [PFG-No. 41301103P] EN 50271: 2002 |
| ULTIMA Calibrator | Ⓢ II 2G EEx ib IIC T3/T4/T5 |
| ULTIMA Controller | Ⓢ II 2G EEx ib IIC T4 |
| Warranty: | 24 months on all components including IR sensor [does not include catalytic or electrochemical sensor modules] |



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[Sensor & System Options]



Infrared Sensors
for monitoring group
3 or 4 combustibles



Electrochemical Sensors
for monitoring various
toxics and oxygen



Catalytic Sensor
for monitoring group 1
and 2 combustibles

ULTIMA X³
for up to 3 sensors with
1 monitor including
remote sensors



[List of Combustible Gases, Catalytic Sensor]

| Compound | Group | Compound | Group |
|-----------------|-------|------------------------|-------|
| Acetaldehyde | 2 | Gasoline | 2 |
| Acetic Acid | 2 | Heptane | 2 |
| Acetone | 2 | Hexane | 2 |
| Acetylene | 2 | Hexene | 2 |
| Acrylonitrile | 2 | Hydrogen | 1 |
| Amyl Alcohol | 2 | Isoprene | 2 |
| Benzene | 2 | JP-4 | 2 |
| Butadiene-1,3 | 1 | Methane | 1 |
| Butane-iso | 2 | Methanol | 2 |
| Butanol | 2 | Methyl Acetate | 2 |
| Butene-1 | 1 | Methyl Ethyl Ketone | 2 |
| Butene-2 | 1 | Methyl Isobutyl Ketone | 2 |
| Butyl Acetate | 2 | Methyl Methacrylate | 2 |
| Butyl Acrylate | 2 | Methyl Propane-2 | 1 |
| Butene | 1 | Methyl t-Butyl Ether | 2 |
| Butyraldehyde | 2 | Pentane-iso | 1 |
| Cyclohexane | 2 | Pentane-n | 1 |
| Diethyl Ether | 2 | Pentene | 1 |
| Dimethoxyethane | 2 | Propane | 1 |
| Dimethyl Ether | 2 | Propanol-iso | 2 |
| Dioxane-1,4 | 2 | Propanol-n | 2 |
| Ethane | 1 | Propyl Acetate | 2 |
| Ethanol | 2 | Propylene | 1 |
| Ethyl Acetate | 2 | Propylene Oxide | 2 |
| Ethyl Acrylate | 2 | Styrene | 2 |
| Ethyl Benzene | 2 | Tetrahydrofuran | 2 |
| Ethylene | 1 | Toluene | 2 |
| Ethylene Oxide | 1 | Xylenes | 2 |

[List of Combustible Gases, IR Sensor]

| Compound | Group | Compound | Group |
|--------------------------------|-------|-----------------------|-------|
| Acetone | 3 | Isopropyl Acetate | 4 |
| Allyl Alcohol | 4 | MEK | 4 |
| Benzene | 4 | Methane | 3 |
| Butadiene-1,3 | 3 | Methanol | 4 |
| Butane | 3 | Methyl Chloride | 4 |
| Butanol | 4 | Methylene Chloride | 4 |
| Cyclohexane | 4 | MIBK | 4 |
| Cyclopentane | 4 | MTBE | 4 |
| Diethyl Ether | 4 | Propanol-n | 4 |
| Difluoroethane-1,1 [R 152a] | 4 | Pentane | 4 |
| Dimethylamine | 4 | Propane | 3 |
| Dimethyl Ether | 4 | Propionaldehyde | 4 |
| Epichlorohydrin | 4 | Propyl Acetate | 4 |
| Ethane | 3 | Propylene | 3 |
| Ethanol | 4 | Propylene Oxide | 4 |
| Ethyl Acetate | 4 | Styrene | 4 |
| Ethylene | 3 | Tetrahydrofuran | 4 |
| Ethylene Oxide | 3 | Toluene | 4 |
| Heptane | 4 | Trichloroethane-1,1,1 | 4 |
| Hexane | 4 | Triethylamine | 4 |
| Isobutane | 3 | Trimethylamine | 4 |
| Isobutylene | 4 | Vinyl Acetate | 4 |
| Isopropanol | 4 | Xylenes [O-Xylene] | 4 |

[Ordering Information]

Please choose from the options to create your ULTIMA X

| | Cable Gland Thread Type | | |
|--|---|--------------|----------------------------|
| | 3/4" NPT | 25 mm metric | |
| Enclosure Type | | | |
| Enclosure without terminal strips | 10044380 | 10044382 | → <input type="checkbox"/> |
| Enclosure with terminal strips | 10044381 | 10044383 | |
| Gas Type | | | |
| Infrared Sensors | | | |
| IR Sensor for Combustible Gases, Group 3*: 0 – 100% LEL | 10044425 | 10044449 | |
| IR Sensor for Combustible Gases, Group 4*: 0 – 100% LEL | 10044426 | 10044450 | |
| Catalytic Sensors | | | |
| Catalytic Sensor for Combustible Gases, Group 1*: 0 – 100% LEL | 10044423 | 10044447 | |
| Catalytic Sensor for Combustible Gases, Group 2*: 0 – 100% LEL | 10044424 | 10044448 | |
| Electrochemical Sensors | | | |
| Ammonia | 0 – 50 ppm | 10044520 | 10044528 |
| Ammonia | 0 – 100 ppm | 10062612 | 10056992 |
| Arsine | 0 – 2 ppm | 10044428 | 10044452 |
| Bromine | 0 – 5 ppm | 10044518 | 10044526 |
| Carbon Monoxide | 0 – 100 ppm | 10044364 | 10044433 |
| Carbon Monoxide | 0 – 500 ppm | 10044365 | 10044434 |
| Chlorine | 0 – 5 ppm | 10044514 | 10044522 |
| Chlorine Dioxide | 0 – 3 ppm | 10044517 | 10044525 |
| Diborane | 0 – 50 ppm | 10044431 | 10044455 |
| Ethylene Oxide | 0 – 10 ppm | 10044521 | 10044529 |
| Fluorine | 0 – 10 ppm | 10044519 | 10044527 |
| Germane | 0 – 3 ppm | 10044430 | 10044454 |
| Hydrogen | 0 – 1000 ppm | 10044432 | 10044456 |
| Hydrogen Chloride | 0 – 50 ppm | 10044516 | 10044524 |
| Hydrogen Cyanide | 0 – 50 ppm | 10044422 | 10044446 |
| Hydrogen Sulphide | 0 – 10 ppm | 10044368 | 10044440 |
| Hydrogen Sulphide | 0 – 50 ppm | 10044369 | 10044442 |
| Hydrogen Sulphide | 0 – 100 ppm | 10044420 | 10044444 |
| Nitric Oxide | 0 – 100 ppm | 10044421 | 10044445 |
| Nitrogen Dioxide | 0 – 10 ppm | 10044515 | 10044523 |
| Oxygen | 0 – 10% | 10044366 | 10044436 |
| Oxygen | 0 – 25% | 10044367 | 10044438 |
| Phosphine | 0 – 2 ppm | 10044427 | 10044451 |
| Silane | 0 – 25 ppm | 10044429 | 10044453 |
| LED/Relay/Output Options | | | |
| ULTIMA XE/XIR | no LEDs and no relays, 2-wire output [only for toxics, not for combustibles] | 10044388 | |
| ULTIMA XE/XIR | no LEDs and no relays, 3-wire output | 10044386 | |
| ULTIMA XE/XIR | LEDs and no relays, 3-wire output | 10044385 | |
| ULTIMA XE/XIR | Relays and no LEDs, 3-wire output | 10044387 | → <input type="checkbox"/> |
| ULTIMA XE/XIR | LEDs and relays, 3-wire output | 10044384 | |
| ULTIMA X ³ ModBUS-PCB | no LEDs and no relays | 10062613 | |
| ULTIMA X ³ ModBUS-PCB | LEDs and no relays | 10062614 | |
| ULTIMA X ³ ModBUS-PCB | Relays and no LEDs | 10062615 | |
| ULTIMA X ³ ModBUS-PCB | LEDs and relays | 10062616 | |
| Installation Options | | | |
| Instrument mounting bracket | | 10047561 | |
| Housing for remote sensor installation, 3/4" NPT | | 10044457 | → <input type="checkbox"/> |
| Housing for remote sensor installation, 25 mm metric | | 10044458 | |
| Reducer M25/M20 EEx de | | 10045881 | |
| Cable Gland M20 EEx d | | 10045880 | |

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