ENHANCED SERIES!

ULTIMA® X Series

[State-of-the-Art Gas Monitoring]

MSA

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.

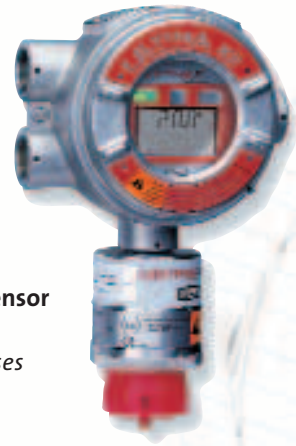
All ULTIMA X series monitors are protected by a rugged, explosion proof stainless steel enclosure and are suitable for indoor and outdoor applications in virtually any industry including offshore operations.

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 X^3 range now supports ModBUS RTU communication with PLC, DCS or other control systems.

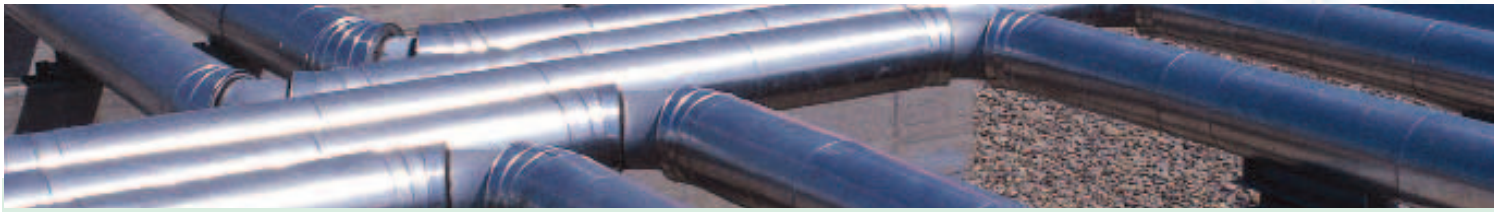
Three Sensing Options in one single Device

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

Contact MSA for additional gases

Durable stainless steel enclosure for even the toughest requirements

Infrared remote control interface

Optional field-configurable relay outputs

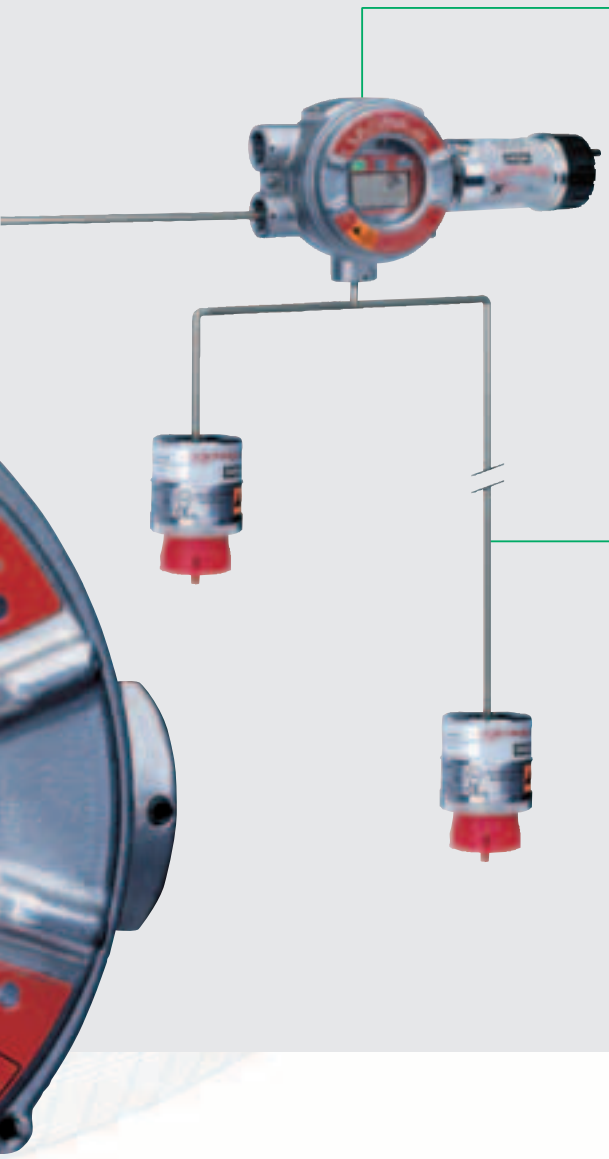
Optional super bright "quick check" LEDs for enhanced visibility

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 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.

15 m maximum

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.

[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

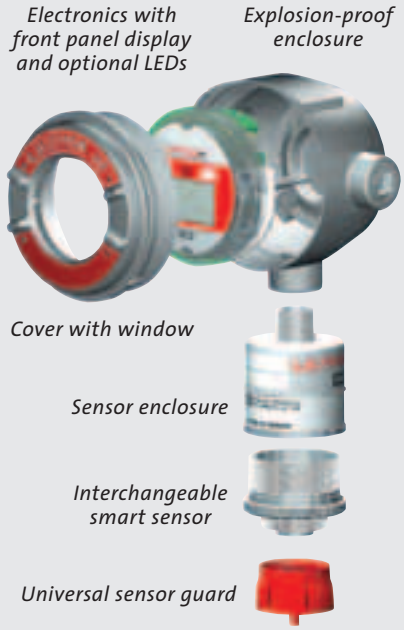
Sensors

[Installation and Operation]

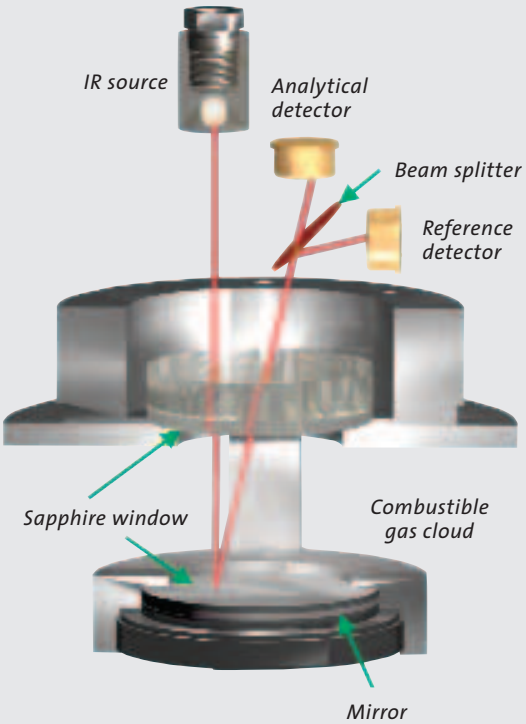
Allowing for variable sensor placement, ULTIMA X series gas monitors have multiple enclosure entries for left, right or bottom wiring. The monitors are also suitable for remote sensing applications, with up to 15 m between sensor and electronics.

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.



Electrochemical / Catalytic Sensor



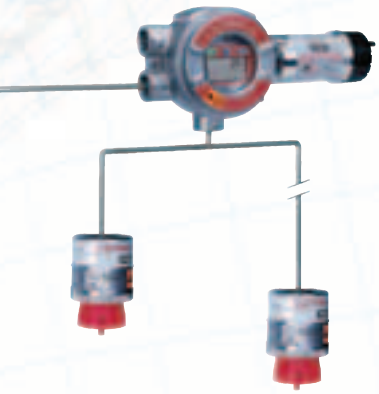
[ULTIMA X IR Technology]

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 combustible 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 combustible reading.

ULTIMA® X³ Technology

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

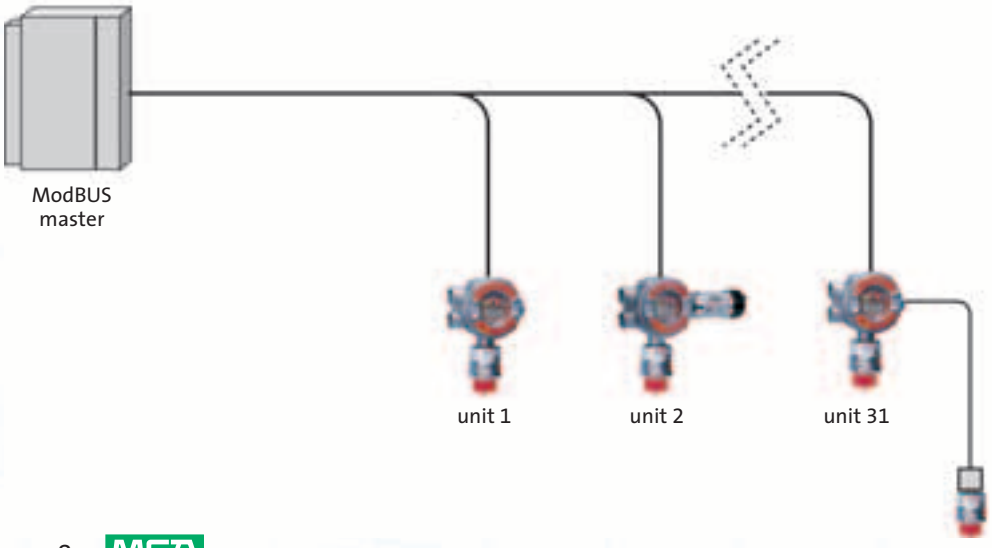
The ULTIMA X³ has all the benefits of the ULTIMA X series and is also capable of digital communication. A maximum of 31 ULTIMA X³ transmitters can be connected to the same line via ModBUS RTU. Since ULTIMA X³ units can be equipped with up to 3 sensors each, 93 sensors in all can share a single signal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



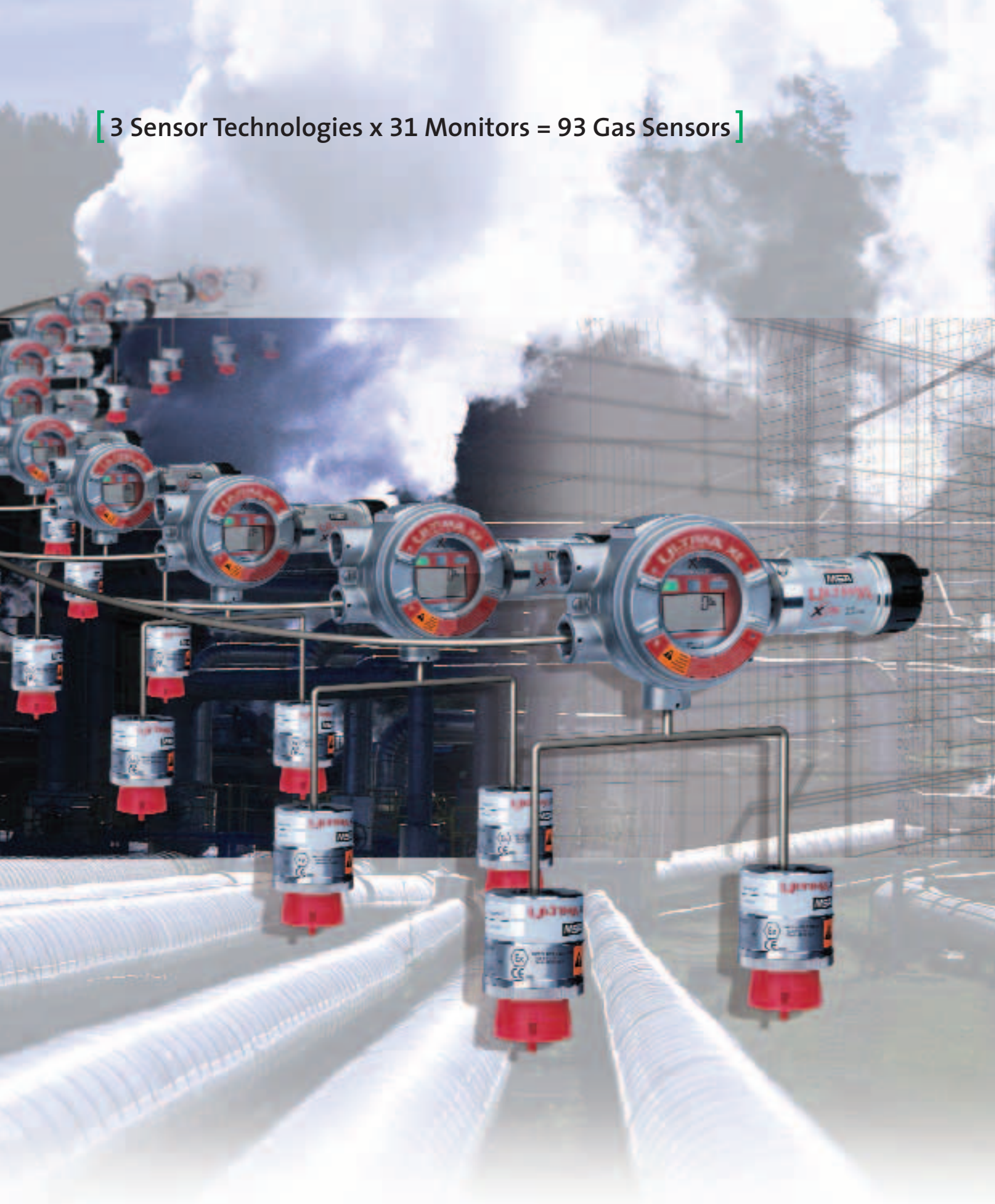
[Multi-Sensing System]

- 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 X^3 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

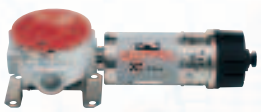
For toxic and catalytic sensors with connection for option to apply calibration gas remotely [for ULTIMA XE].

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]	⟨Ex⟩ II 2G EEx d IIC T5 [main enclosure] ⟨Ex⟩ II 2G EEx d IIC T4 [sensor excluding IR] ⟨Ex⟩ II 2G EEx d IIC T5 [IR sensor] ⟨Ex⟩ II 2G EEx ia IIC T4 [sensor with safety barrier] –40 °C Ta +60 °C
EC-Type Examination Certificate	DMT 02 ATEX E 202 X
ULTIMA XE/XIR	Performance approval EN 61779-1: 2001 EN 61779-4: 2001 EN 50104: 2002 [PFG-No. 41301103P] EN 50271: 2002
ULTIMA Calibrator	⟨Ex⟩ II 2G EEx ib IIC T3/T4/T5
ULTIMA Controller	⟨Ex⟩ II 2G EEx ib IIC T4
Warranty:	24 months on all components including IR sensor [does not include catalytic or electrochemical sensor modules]

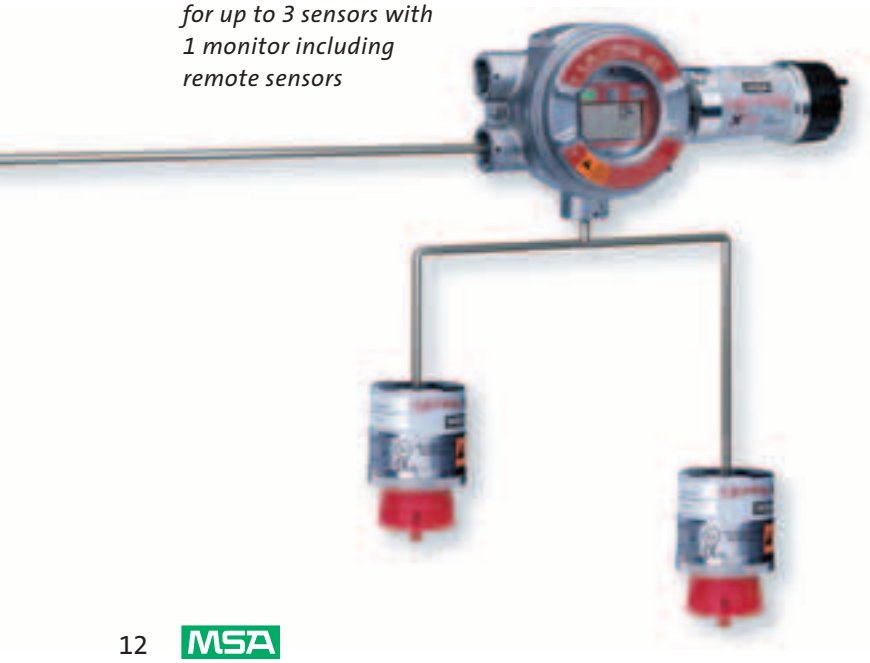
Sensor & System Options

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
Acrylnitrile	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		Pentane	4
[R 152a]	4	Propane	3
Dimethylamine	4	Propionaldehyde	4
Dimethyl Ether	4	Propyl Acetate	4
Epichlorohydrin	4	Propylene	3
Ethane	3	Propylene Oxide	4
Ethanol	4	Styrene	4
Ethyl Acetate	4	Tetrahydrofuran	4
Ethylene	3	Toluene	4
Ethylene Oxide	3	Trichloroethane-1,1,1	4
Heptane	4	Triethylamine	4
Hexane	4	Trimethylamine	4
Isobutane	3	Vinyl Acetate	4
Isobutylene	4	Xylenes [O-Xylene]	4
Isopropanol	4		

[Ordering Information]

		Cable Gland Thread Type		Please choose from the options to create your ULTIMA X
		3/4″ NPT	25 mm metric	
Enclosure Type				
Enclosure without terminal strips		10044380	10044382	→
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	→
ULTIMA XE/XIR	LEDs and relays, 3-wire output	10044384	
ULTIMA X³ ModBUS-PCB	no LEDs and no relays	10062613	
ULTIMA X³ ModBUS-PCB	LEDs and no relays	10062614	
ULTIMA X³ ModBUS-PCB	Relays and no LEDs	10062615	
ULTIMA X³ ModBUS-PCB	LEDs and relays	10062616	

Installation Options		
Instrument mounting bracket	10047561	
Housing for remote sensor installation, 3/4″NPT	10044457	→
Housing for remote sensor installation, 25 mm metric	10044458	
Reducer M25/M20 EEx de	10045881	
Cable Gland M20 EEx d	10045880	

Accessories		
ULTIMA Controller	10044459	
ULTIMA Calibrator	10044470	
Reset push button [external]	10074014	
ULTIMA XE Calibration cap	10020030	→
ULTIMA XE Flow adapter	10041866	
ULTIMA XE SensorGard	10028904	
ULTIMA XIR Calibration cap	10041533	
ULTIMA XIR Flow cap	10042600	
ULTIMA XIR SensorGard	10041265	

*Please see specifications. More gas types, options and accessories available on request.

Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.

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