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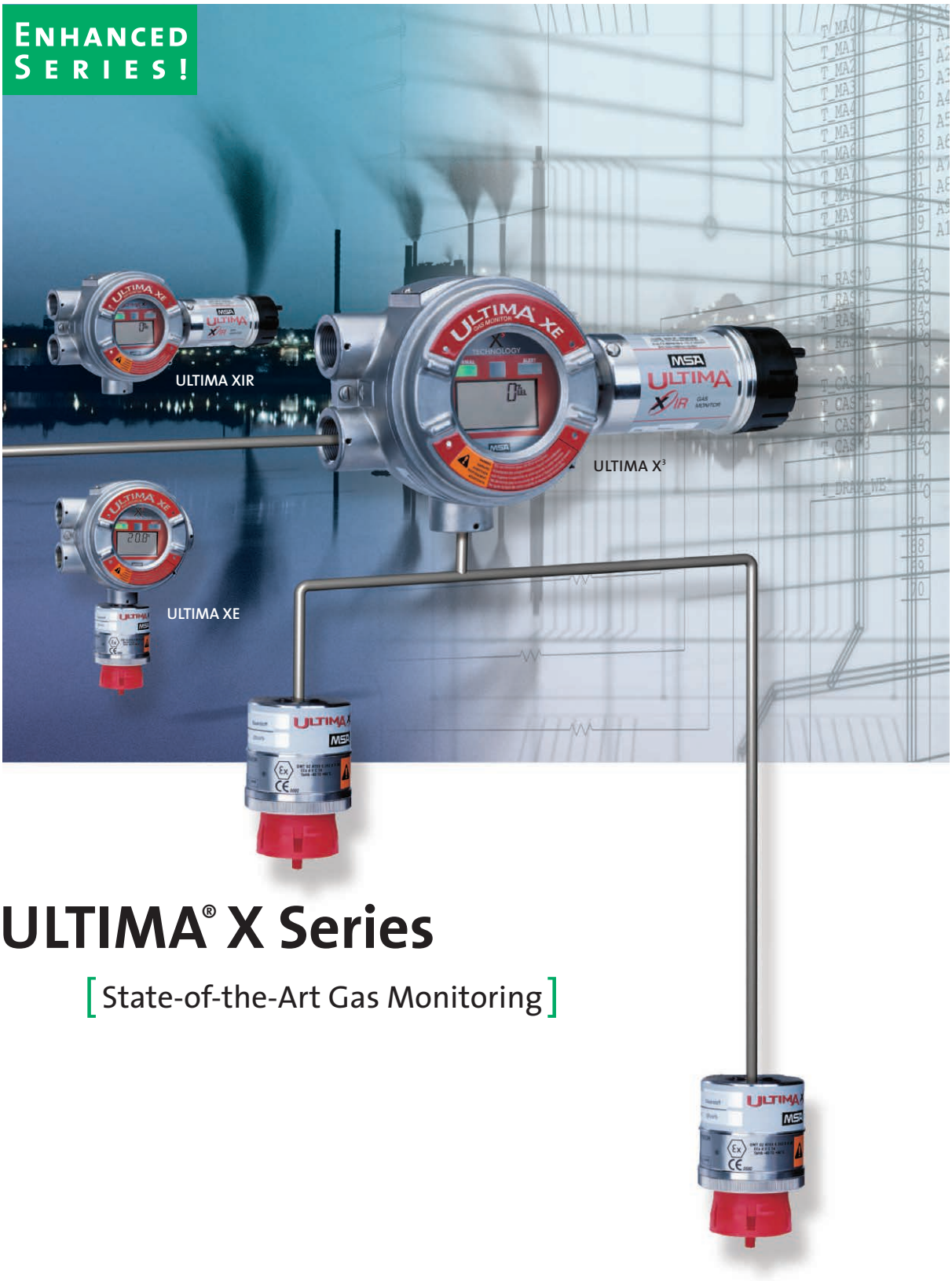

ULTIMA® X Series

[State-of-the-Art Gas Monitoring]

Registered Address
ABLE Instruments & Controls Ltd
Cutbush Park, Danehill, Lower Earley,
Reading, Berkshire, RG6 4UT. UK.

Reading
Tel: +44 (0)118 9311188 | Email: info@able.co.uk

Aberdeen
Tel: +44 (0)1224 725999 | Email: ab@able.co.uk

Web
able.co.uk

E-commerce
247able.com

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.

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[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

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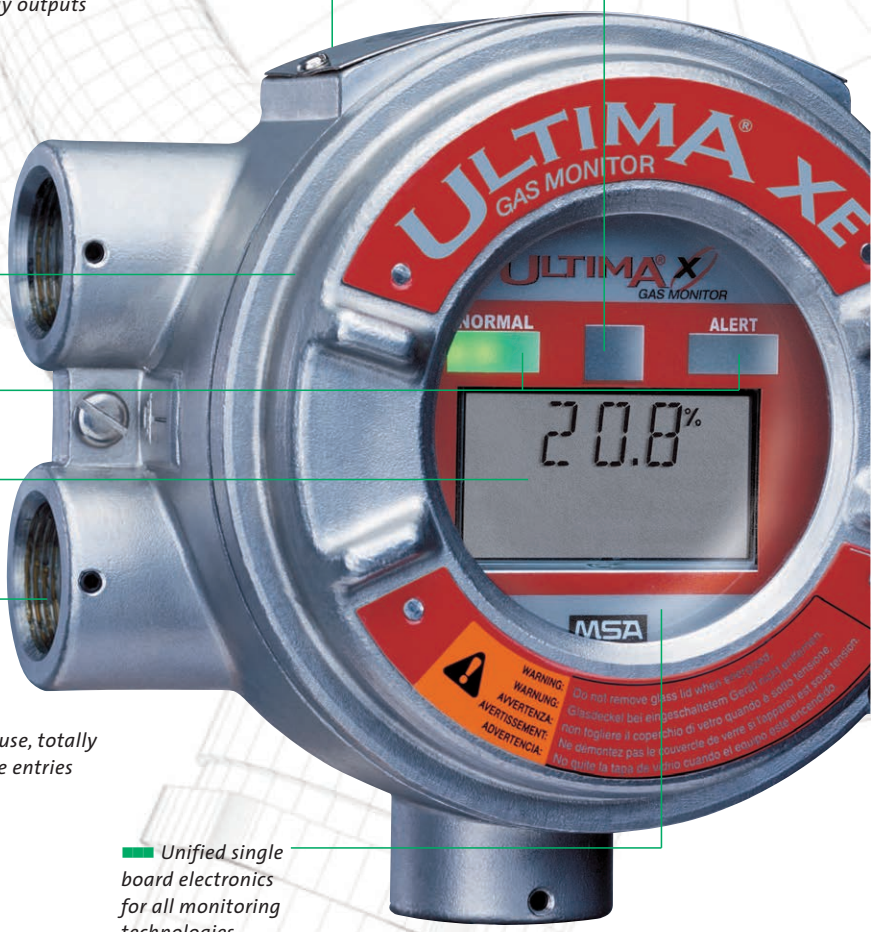
Durable stainless steel enclosure for even the toughest requirements

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

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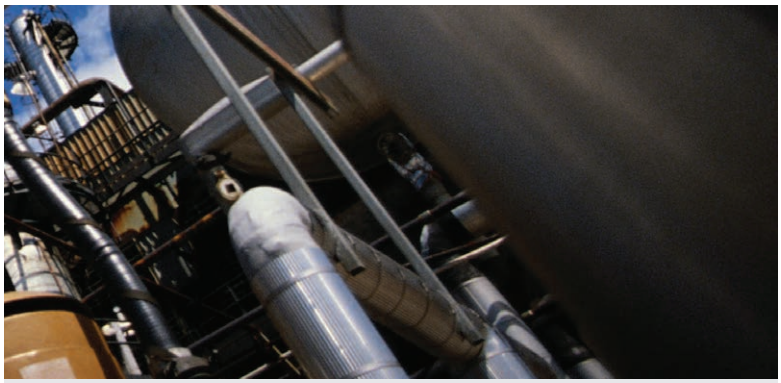

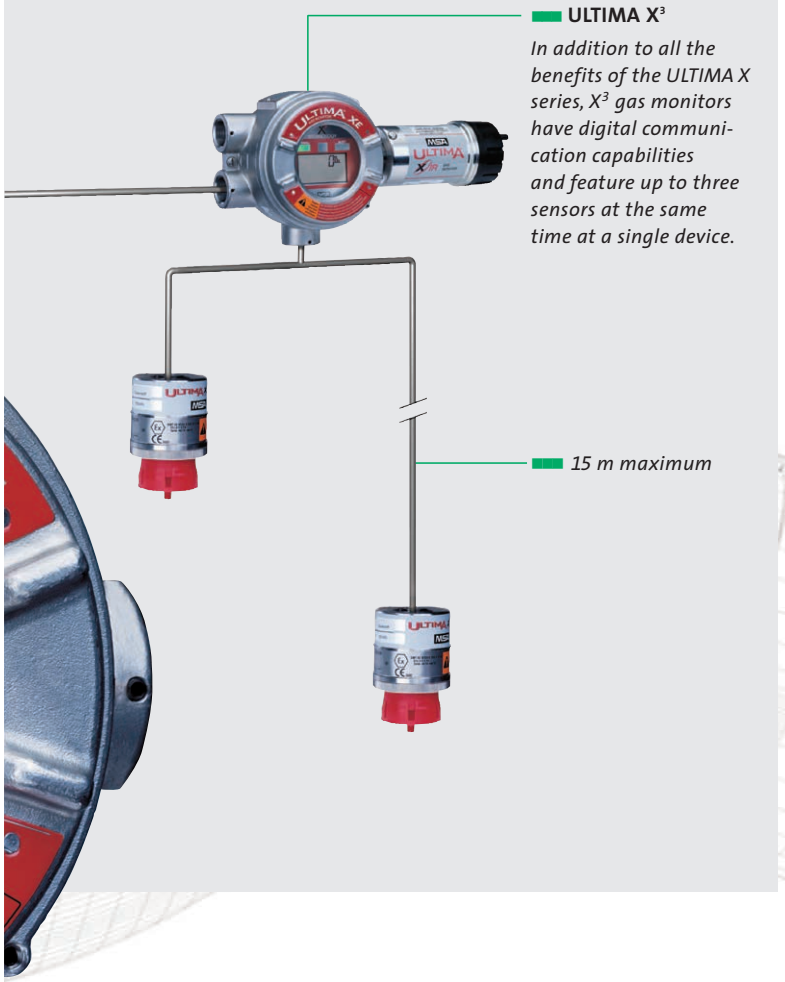

ULTIMA® X

[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.

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[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

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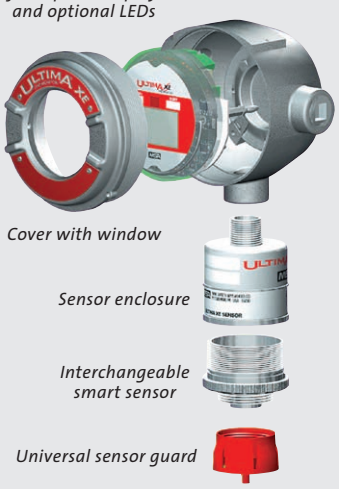
Sensors

[Installation and Operation]

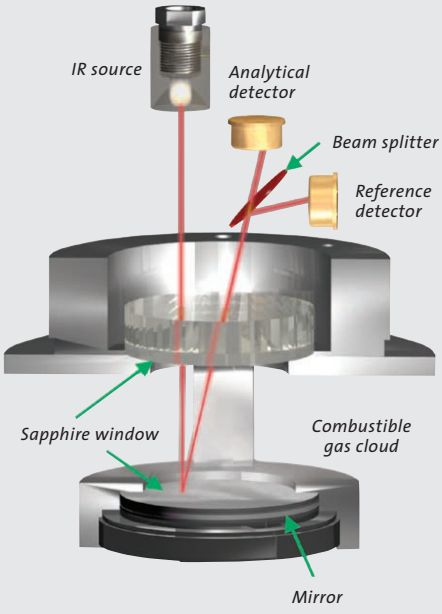
Allowing for variable sensor placement, ULTIMA X series gas monitors have multiple enclosure entries for left, right or bottom wiring. The monitors are also suitable for remote sensing applications, with up to 15 m between sensor and electronics.

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.

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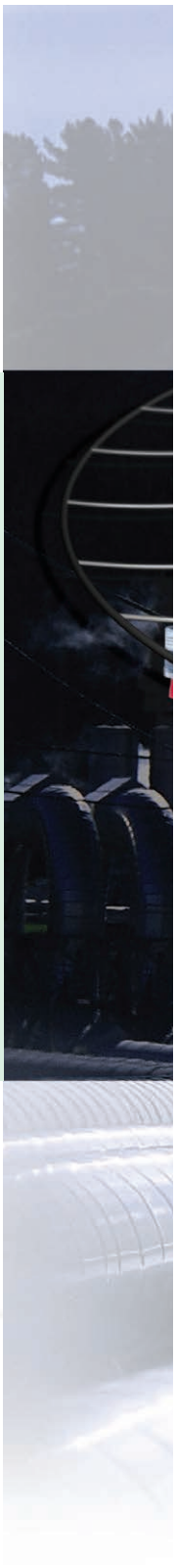
ULTIMA® X³ Technology

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

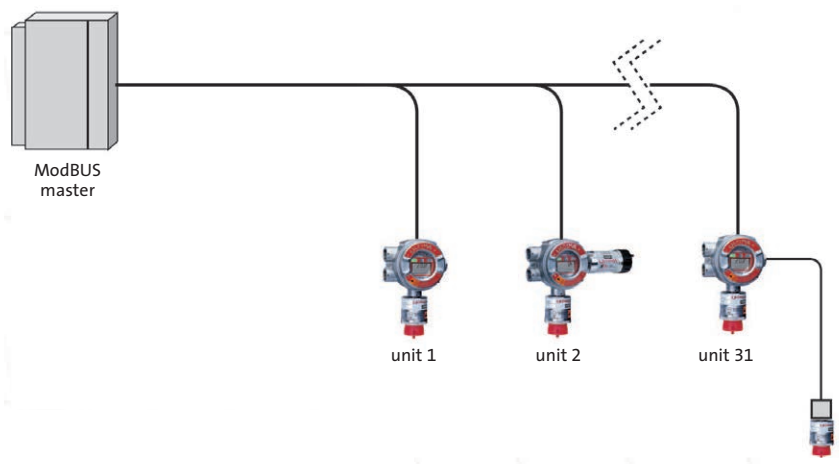
The ULTIMA X³ has all the benefits of the ULTIMA X series and is also capable of digital communication. A maximum of 31 ULTIMA X³ transmitters can be connected to the same line via ModBUS RTU. Since ULTIMA X³ units can be equipped with up to 3 sensors each, 93 sensors in all can share a single signal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



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[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.

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[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/X³	CE Low Voltage Directive: 73/23/EEC
ULTIMA XE/XIR/X³	CE ATEX Directive: 94/9/EC
and Remote Sensor	CE EMC Directive: 89/336/EEC
ULTIMA XE/XIR/X³	Ⓔx II 2G EEx d IIC T5 [main enclosure] Ⓔx II 2G EEx d IIC T4 [sensor excluding IR] Ⓔx II 2G EEx d IIC T5 [IR sensor] Ⓔx 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 60079-29-1:2007 EN 50104:2002 [PFG-No. 41301103P] EN 50271:2002
ULTIMA Calibrator	Ⓔx II 2G EEx ib IIC T3/T4/T5
ULTIMA Controller	Ⓔx 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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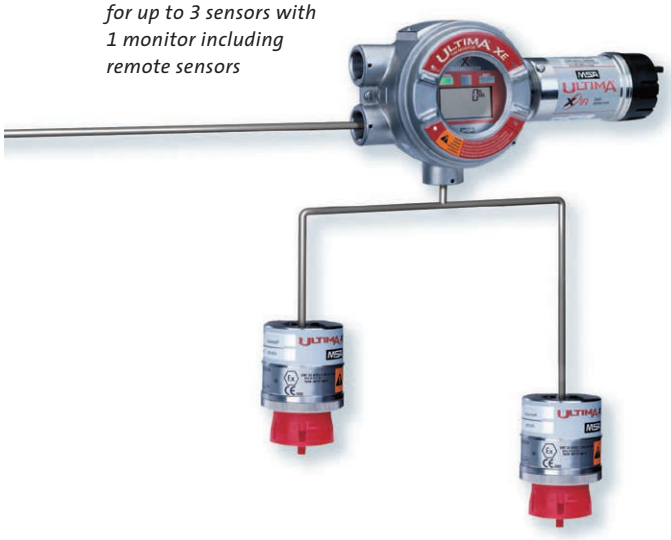
[Sensor & System Options]

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
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		

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[Ordering Information]

		Cable Gland Thread Type 3/4″ NPT	Cable Gland Thread Type 25 mm metric	Please choose from the options to create your ULTIMA X
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.

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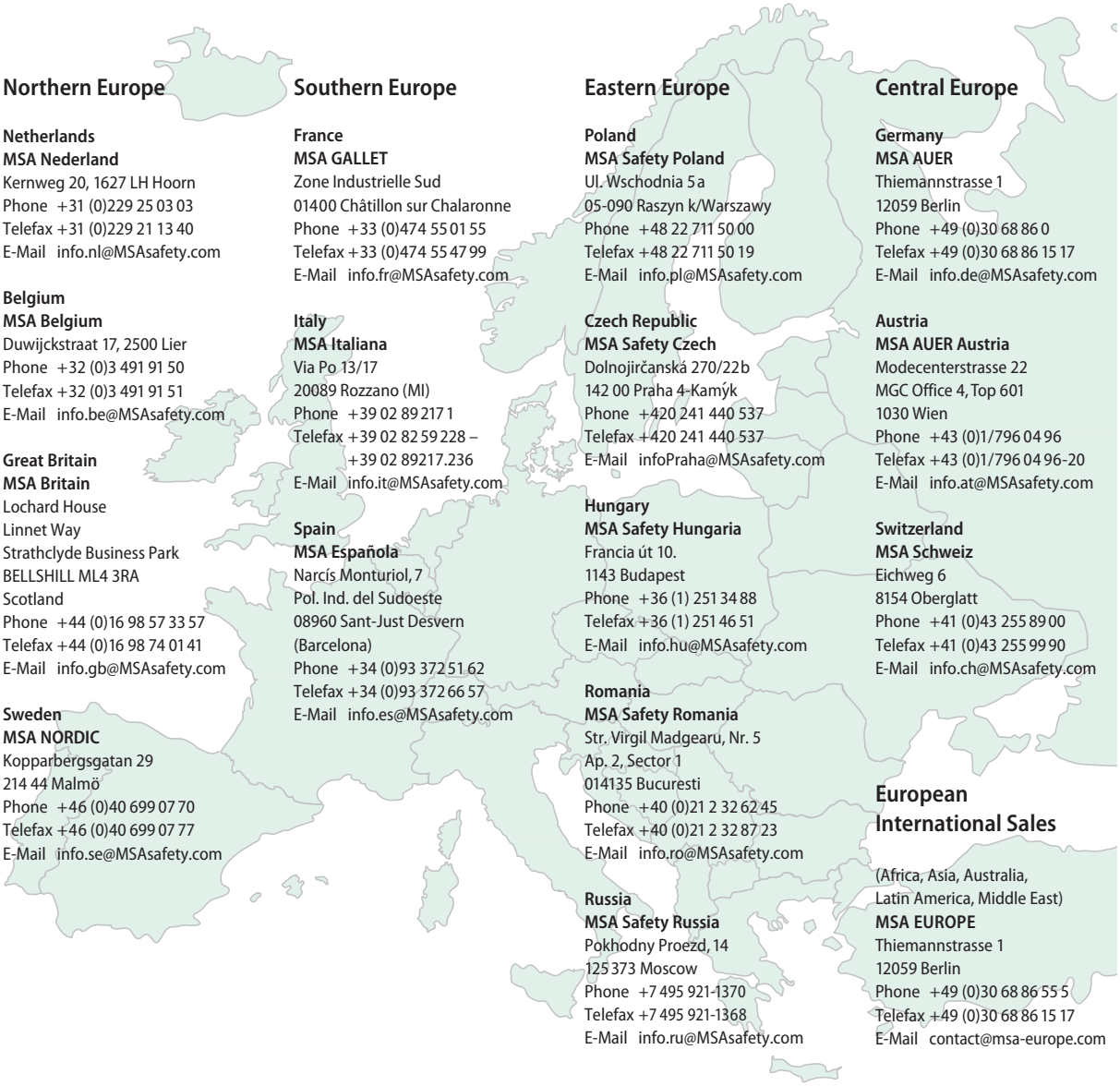

Northern Europe

Netherlands
MSA Nederland
Kernweg 20, 1627 LH Hoorn
Phone +31 (0)229 25 03 03
Telefax +31 (0)229 21 13 40
E-Mail info.nl@MSAsafety.com

Belgium
MSA Belgium
Duwijckstraat 17, 2500 Lier
Phone +32 (0)3 491 91 50
Telefax +32 (0)3 491 91 51
E-Mail info.be@MSAsafety.com

Great Britain
MSA Britain
Lochard House
Linnet Way
Strathclyde Business Park
BELLSHILL ML4 3RA
Scotland
Phone +44 (0)16 98 57 33 57
Telefax +44 (0)16 98 74 01 41
E-Mail info.gb@MSAsafety.com

Sweden
MSA NORDIC
Kopparbergsgatan 29
214 44 Malmö
Phone +46 (0)40 699 07 70
Telefax +46 (0)40 699 07 77
E-Mail info.se@MSAsafety.com

Southern Europe

France
MSA GALLET
Zone Industrielle Sud
01400 Châtillon sur Chalaronne
Phone +33 (0)474 55 01 55
Telefax +33 (0)474 55 47 99
E-Mail info.fr@MSAsafety.com

Italy
MSA Italiana
Via Po 13/17
20089 Rozzano (MI)
Phone +39 02 89 217 1
Telefax +39 02 82 59 228 –
+39 02 89217.236
E-Mail info.it@MSAsafety.com

Spain
MSA Española
Narcís Monturiol, 7
Pol. Ind. del Sudoeste
08960 Sant-Just Desvern
(Barcelona)
Phone +34 (0)93 372 51 62
Telefax +34 (0)93 372 66 57
E-Mail info.es@MSAsafety.com

Eastern Europe

Poland
MSA Safety Poland
Ul. Wschodnia 5a
05-090 Raszyn k/Warszawy
Phone +48 22 711 50 00
Telefax +48 22 711 50 19
E-Mail info.pl@MSAsafety.com

Czech Republic
MSA Safety Czech
Dolnojirčanská 270/22b
142 00 Praha 4-Kamýk
Phone +420 241 440 537
Telefax +420 241 440 537
E-Mail infoPraha@MSAsafety.com

Hungary
MSA Safety Hungaria
Francia út 10.
1143 Budapest
Phone +36 (1) 251 34 88
Telefax +36 (1) 251 46 51
E-Mail info.hu@MSAsafety.com

Romania
MSA Safety Romania
Str. Virgil Madgearu, Nr. 5
Ap. 2, Sector 1
014135 Bucuresti
Phone +40 (0)21 2 32 62 45
Telefax +40 (0)21 2 32 87 23
E-Mail info.ro@MSAsafety.com

Russia
MSA Safety Russia
Pokhodny Proezd, 14
125 373 Moscow
Phone +7 495 921-1370
Telefax +7 495 921-1368
E-Mail info.ru@MSAsafety.com

Central Europe

Germany
MSA AUER
Thiemannstrasse 1
12059 Berlin
Phone +49 (0)30 68 86 0
Telefax +49 (0)30 68 86 15 17
E-Mail info.de@MSAsafety.com

Austria
MSA AUER Austria
Modecenterstrasse 22
MGC Office 4, Top 601
1030 Wien
Phone +43 (0)1/796 04 96
Telefax +43 (0)1/796 04 96-20
E-Mail info.at@MSAsafety.com

Switzerland
MSA Schweiz
Eichweg 6
8154 Oberglatt
Phone +41 (0)43 255 89 00
Telefax +41 (0)43 255 99 90
E-Mail info.ch@MSAsafety.com

European International Sales

(Africa, Asia, Australia,
Latin America, Middle East)
MSA EUROPE
Thiemannstrasse 1
12059 Berlin
Phone +49 (0)30 68 86 55 5
Telefax +49 (0)30 68 86 15 17
E-Mail contact@msa-europe.com

Registered Address
ABLE Instruments & Controls Ltd
Cutbush Park, Danehill, Lower Earley,
Reading, Berkshire, RG6 4UT. UK.

Reading
Tel: +44 (0)118 9311188 | Email: info@able.co.uk

Aberdeen
Tel: +44 (0)1224 725999 | Email: ab@able.co.uk

Web
able.co.uk

E-commerce
247able.com