

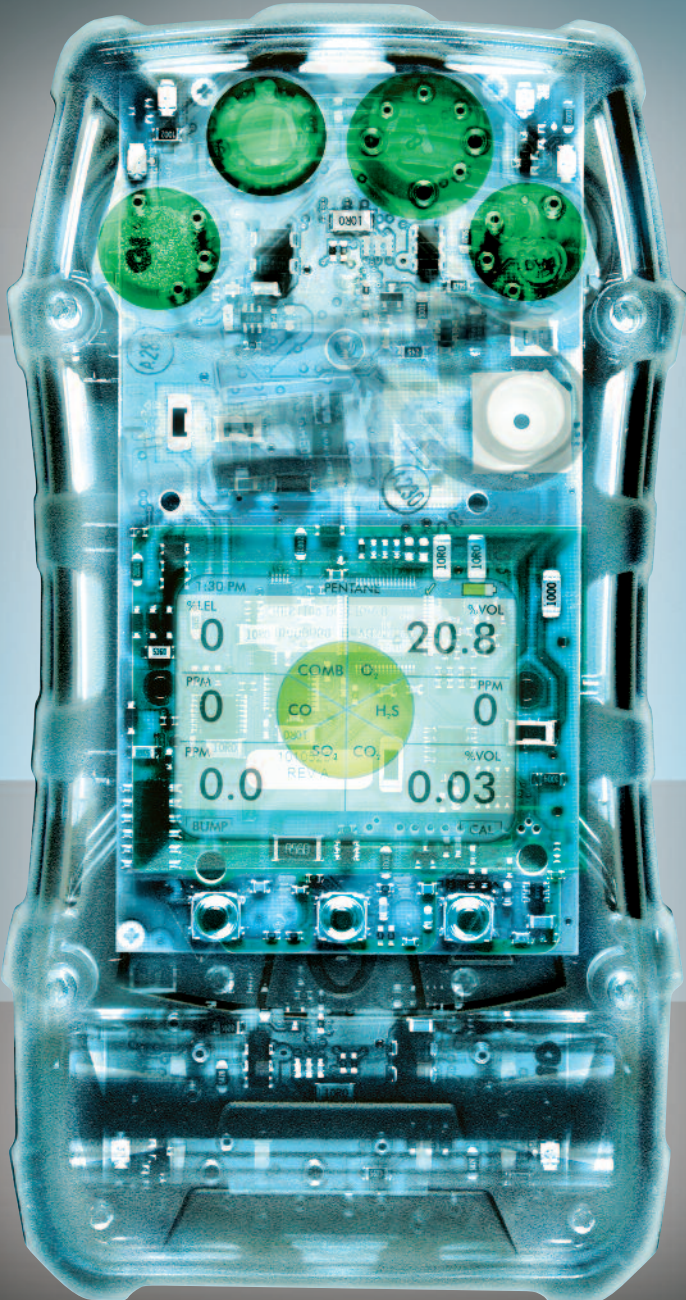


The Safety Company

# ALTAIR® 5X

## IT'S WHAT'S INSIDE THAT COUNTS

ALTAIR 5X Multigas Detector  
With MSA XCell® Sensor Technology



Fully compatible with MSA Link Software and MSA Galaxy Automated Test System

Variety of optional MSA infrared sensors

Robust integral pump for consistent flow

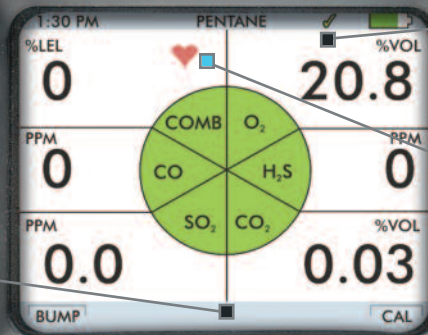
High contrast color or monochrome display

18 language options

Large buttons for easy operation

**MSA**  
The Safety Company

**ALTAIR 5X**



Advanced MotionAlert and InstantAlert safety features

High performance MSA XCell Sensors

24-hour bump checkmark

End of XCell Sensor life warning

Durable, rubberized housing for secure grip

■ MSA-exclusive feature

# IT'S WHAT'S INSIDE THAT COUNTS

**WORKERS** who face potentially dangerous situations deserve the best protection available. At MSA, we work tirelessly to build smarter, better gas detection instruments that people across the world rely on. First we introduced MSA's advanced technology with the ALTAIR 4X Multigas Detector with XCell Sensors. Now we're proud to introduce the expansion of the most advanced technology available in any portable gas detector on the market:  
**the ALTAIR 5X Multigas Detector with XCell Sensor Technology.**

## Built on Durability

The ALTAIR 5X Multigas Detector for LEL, O<sub>2</sub>, and toxic gas detection is as tough and functional as it looks. A rugged polycarbonate housing provides unsurpassed durability, including the ability to survive a 10-foot drop. Inside, a field-proven integral pump provides consistent gas flow without the problems of externally-attached components. Ergonomic design, glove-friendly buttons, and high-contrast display make the ALTAIR 5X Multigas Detector easy to use in all applications.

## Powered by Performance

Toughness and durability aren't the whole story. The real strength of the ALTAIR 5X Multigas Detector comes from new sensor technology. MSA XCell Sensors have a typical life of more than double the industry average, and are engineered using MSA's proprietary application-specific integrated circuit (ASIC) design. By miniaturizing the sensors' controlling electronics and placing them inside the sensor itself, MSA XCell Sensors offer superior stability, accuracy, and repeatability.

MSA XCell Sensors are a breakthrough in chemical and mechanical sensor design, enabling faster response and span calibration times. With less time spent on calibration and bump tests, you save calibration gas, maintenance costs, and in turn, save money. But most importantly, in your industry, saving seconds on response time can also mean saving lives.

In addition to MSA XCell Sensors, the ALTAIR 5X Multigas Detector can also be equipped with our wide variety of IR sensors covering many gases and ranges including CO<sub>2</sub>.

## Flexibility to Meet Your Needs

MSA's ALTAIR 5X Multigas Detector provides many options to fit various applications. The detector is configurable with either a high-resolution color or monochrome LCD display with multilingual capabilities. MSA's Logo Express<sup>®</sup> Service option is available to customize the color display. The detector is easily configurable with interchangeable plug-and-play sensor slots for MSA XCell Sensors. Up to six gases can be monitored simultaneously.

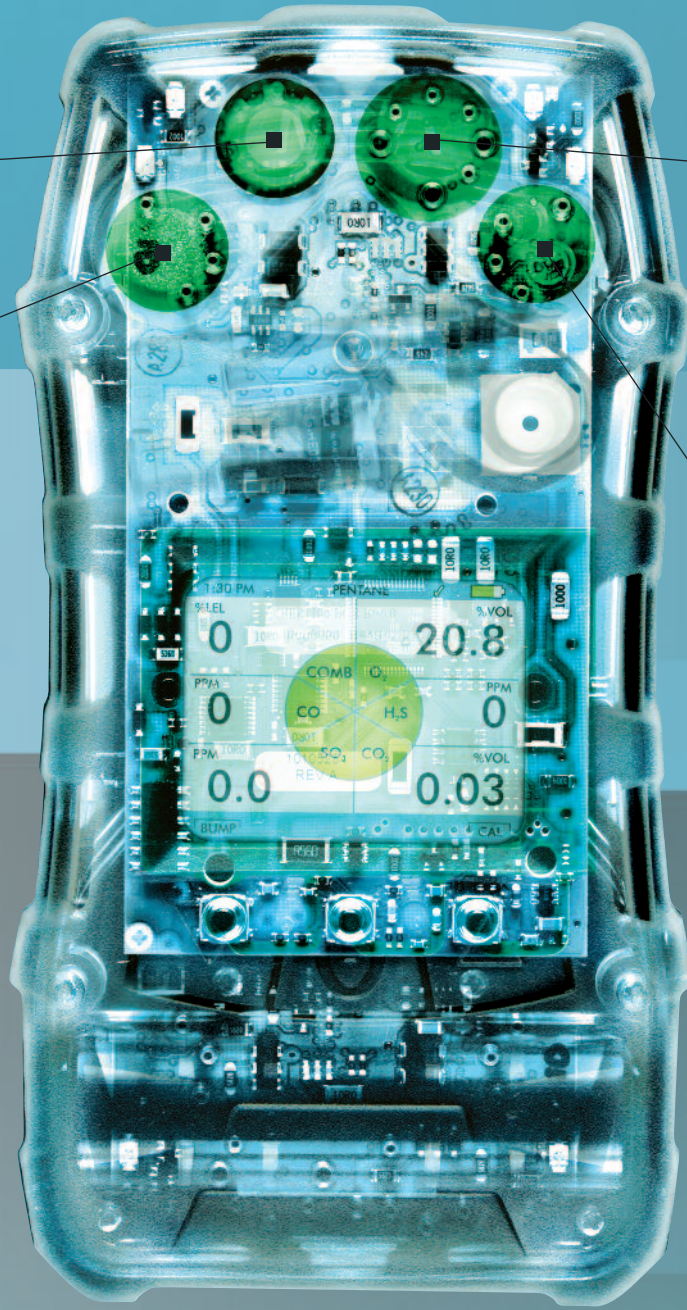
Furthermore, this multigas detector offers optional glow-in-the-dark instrument housing for IR sensor-equipped units. The ALTAIR 5x Multigas Detector's lithium-ion battery lasts up to 20 hours, allowing it to be used over multiple shifts. An alkaline battery pack is also available as an accessory. MSA's ALTAIR 5X Multigas Detector is fully compatible with the MSA GALAXY<sup>®</sup> Automated Test System and MSA Link<sup>™</sup> Software.

***"We liked how the total cost of ownership package was presented to us."***

***– Safety Director at energy company***

# XCell<sup>®</sup>

S E N S O R S



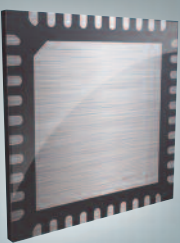
MSA XCell O<sub>2</sub> Sensor

MSA XCell Ex Sensor, combustible

MSA XCell SO<sub>2</sub>, Cl<sub>2</sub>, or NH<sub>3</sub> Sensor

Additional exotic sensors: ClO<sub>2</sub>, HCN, PH<sub>3</sub>, NO<sub>2</sub>

MSA XCell CO/H<sub>2</sub> Sensor



Adding microelectronics inside the sensors provides more control and higher performance than previous generations.



MSA XCell Sensors are a breakthrough in chemical and mechanical sensor design, enabling faster response and span calibration times.

**THE MSA COMMITMENT.** FROM THE LATEST IN SENSOR TECHNOLOGY TO INSTRUMENT DESIGN AND MANUFACTURING, MSA HAS THE CAPABILITIES AND EXPERTISE TO SUPPORT YOUR PORTABLE GAS DETECTION CHALLENGES.

## MSA XCell Technology:

# Save Time, Save Money, Save Lives

**Building on years of sensor design experience, MSA is revolutionizing sensor technology with breakthroughs in design that improve performance.**

- New XCell exotic SO<sub>2</sub>, Cl<sub>2</sub>, and NH<sub>3</sub> Sensors for expanded monitoring applications
- Sensor response and clear times in under 15 seconds for most common sensor configurations
- Bump test in under 15 seconds for most common sensor configurations
- Span calibration time of 60 seconds for most common sensor configurations
- Greater signal stability and repeatability under changing or extreme environmental conditions
- All XCell Sensors are capable of plug-and-play capabilities for easy reconfiguration

**With reliable, extended-life XCell Sensors, there's no need to replace sensors after two years.**

- Typical life greater than four years for combustible, O<sub>2</sub>, CO/H<sub>2</sub>S, and SO<sub>2</sub> sensors
- Typical life greater than three years for NH<sub>2</sub> and Cl<sub>2</sub> sensors
- Combustible sensor proprietary operating mode helps it stand up to poisons over the life of the sensor
- End-of-sensor-life warning gives advanced notice to user, reducing service outages

**Three-year back-to-back instrument warranty includes CO/H<sub>2</sub>S/O<sub>2</sub>/LEL/SO<sub>2</sub> and IR sensors**

**Two-year warranty on NH<sub>3</sub> and Cl<sub>2</sub>; minimum 12-month warranty on other sensors**

## Count on the ALTAIR 5X Detector

Exclusive MotionAlert™ and InstantAlert™ features make the ALTAIR 5X Multigas Detector ideal for applications such as confined space monitoring. MotionAlert feature activates when a user becomes disabled and motionless, quickly alerting others to the disabled user's location. And with a simple push of a button, InstantAlert feature enables users to manually alert others to potentially hazardous situations.

The ALTAIR 5X Multigas Detector outlasts the competition. To prove it, the instrument comes with a full three-year warranty\*, an entire year longer than the industry average, so that you can depend on the ALTAIR 5X Multigas Detector to withstand the wear and tear that other portable gas detectors can't.

\*Three year warranty is for most common sensor configurations.



### Online Training and Product Simulation

MSA's recent improvements to online training and Web content include the new ALTAIR 5X Multigas Detector media simulator which takes viewers through instrument operation. This tool is found at <http://www.msanet.com/altair5x>.

***"The three-year warranty is huge."***

***– Safety Manager at energy company***

## Technical Specifications

Gas type	Range	Resolution
Combustible	0-100%	LEL 1% LEL
Oxygen	0-30%Vol	0.1%Vol
Carbon monoxide	0-2000 ppm	1 ppm
Hydrogen sulfide	0-200 ppm	1 ppm
Sulfur dioxide	0-20 ppm	0.1 ppm
Chlorine	0-10 ppm	0.1 ppm
Ammonia	0-100 ppm	1 ppm
Nitrogen dioxide	0-20 ppm	0.5 ppm
Chlorine dioxide	0-1 ppm	0.01 ppm
Phosphine	0-5 ppm	0.1 ppm
Hydrogen cyanide	0-30 ppm	0.1ppm
Carbon dioxide, CO <sub>2</sub>	0-10%Vol	0.01%Vol
Butane, C <sub>4</sub> H <sub>10</sub>	0-25%Vol	0.1%Vol
Methane, CH <sub>4</sub>	0-100%Vol	1%Vol
Propane, C <sub>3</sub> H <sub>8</sub>	0-100%Vol	1%Vol

<b>Drop test</b>	10 feet
<b>Housing</b>	Rugged rubberized armor
<b>Weight</b>	1 lb (without IR sensor)
<b>Dimensions (L x W x D)</b>	6.69" H x 3.49" W x 1.79" D without belt clip (without IR sensor)
<b>Audible alarm</b>	>95 dB typical
<b>Visual alarm</b>	2 ultra-bright LEDs on top
<b>Vibrating alarm</b>	Standard
<b>MotionAlert &amp; InstantAlert features display</b>	Standard High-contrast monochrome or color display
<b>Backlight</b>	Adjustable time-out
<b>Battery</b>	Rechargeable li-ion or AA alkaline
<b>Run time</b>	20 hrs @ room temperature
<b>Charging time</b>	<= 6 hours
<b>Operating temperature</b>	-20 C to + 50C
<b>Short-period operation</b>	-40 C to + 50C
<b>Humidity</b>	15-90% RH non-condensing
<b>Ingress protection</b>	IP65
<b>Data log</b>	Adjustable 200 hrs minimum
<b>Event log</b>	Standard 1000 events
<b>Standard warranty</b>	3 years on CO, H <sub>2</sub> S, LEL, O <sub>2</sub> , SO <sub>2</sub> , and IR sensors 2 years on NH <sub>3</sub> , Cl <sub>2</sub> sensors 1 year on other sensors

## ALTAIR 5X Detector with 3-year warranty, monochrome display, data logging, charger, integral pump, and tubing

Approvals		
U.S.	Canada	Configuration
10116924	10115118	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S
10116925	10115119	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S, SO <sub>2</sub>

## ALTAIR 5X Detector Industrial Kits - monochrome display, integral pump, 10 ft sampling line, and 1 ft probe

10116926	10115120	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S
10116927	10115141	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S, SO <sub>2</sub>

## ALTAIR 5X Detector Deluxe Kits - color display, integral pump, 10 ft sampling line, and 1ft probe

10116928	10115142	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S
10116929	10115143	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S, SO <sub>2</sub>

## Altair 5X Galaxy Automated Test System

North America	Global	Configuration
10090603	10090606	Standard system
10090602	10090605	Standard system with charging capability and cylinder holder
10090594	10090595	Smart system (memory card)
10090592	10090591	Smart system (memory card) with charging and cylinder holder

## Calibration Gas

10048280	Calibration gas cylinder (34 l) 1.45% CH <sub>4</sub> , 15% O <sub>2</sub> , 60 ppm CO, 20 ppm H <sub>2</sub> S
10045035	Calibration gas cylinder (54 l) 1.45% CH <sub>4</sub> , 15% O <sub>2</sub> , 60 ppm CO, 20 ppm H <sub>2</sub> S
10117738	Calibration gas cylinder (58L), 1.45% CH <sub>4</sub> , 15% O <sub>2</sub> , 60 ppm CO, 20 ppm H <sub>2</sub> S, 10 ppm SO <sub>2</sub>
10098855	Calibration gas cylinder(34L), 1.45% CH <sub>4</sub> , 15% O <sub>2</sub> , 60 ppm CO, 20 ppm H <sub>2</sub> S, 10 ppm SO <sub>2</sub>

## Replacement Sensors

10080222	ClO <sub>2</sub> Sensor	10106726	XCell NH <sub>3</sub> Sensor
10080224	NO <sub>2</sub> Sensor	10106727	XCell SO <sub>2</sub> Sensor
10106375	HCN Sensor	10106728	XCell Cl <sub>2</sub> Sensor
10106722	XCell Ex Sensor, combustible	10106729	XCell O <sub>2</sub> Sensor
10106725	XCell CO/H <sub>2</sub> S Sensor	10116638	PH3 Sensor

## Accessories

10082834	USB IR receiver	10114837	Battery pack, Alkaline
10088099	MSA Link Software CD		

## Approvals

### USA / Canada

Class I, Division 1, Groups A, B, C & D  
Class II, Division 1, Groups E, F & G  
Class III, Division 1  
Ambient temperature: -40 C to +50 C; T4  
ALTAIR 5X Multigas Detector with alkaline battery pack T3/T4  
ALTAIR 5X or ALTAIR 5X iR Multigas Detector with rechargeable battery pack T4

### USA / Canada

Class I, Division 1, Groups A, B, C & D  
CAN/CSA C22.2 No. 152 Combustible Gas Detection Instruments  
C22.2 No. 152 Performance Ambient Temperature: -20 C to +50 C  
C22.2 No. 157 Intrinsic Safety Ambient Temperature: -40 C to +50 C  
ALTAIR 5X Multigas Detector with alkaline battery pack T3/T4  
ALTAIR 5X or ALTAIR 5X iR Multigas Detector with rechargeable battery pack T4

For additional customized versions and calibration gases, use MSA's ATO ordering sheet or contact MSA Customer Service at 1-800-MSA-2222.

**Note:** This bulletin contains only a general description of the products shown. While uses and performance capabilities are described, under no circumstances shall the products be used by untrained or unqualified individuals and not until the product instructions including any warnings or cautions provided have been thoroughly read and understood. Only they contain the complete and detailed information concerning proper use and care of these products.



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## Offices and representatives worldwide

For further information:



# ALTAIR® 5X Multigas Detector

With MSA XCell® Sensor Technology

IT'S WHAT'S INSIDE THAT COUNTS



MSA-U® Training Center, MSA's premier on-line training center, offers a wide range of training and informational materials. Register today at <http://msau.msanet.com>.



MSA's new ALTAIR 5X Multigas Detector is driven by the most advanced technology available in any portable gas detector on the market. Breakthroughs in design improve performance and ensure that the ALTAIR 5X Multigas Detector outlasts the competition.

## Built on Durability

- ➔ Only instrument in its class with internally-integrated pump
- ➔ Full three-year warranty on LEL, O<sub>2</sub>, H<sub>2</sub>S, CO, SO<sub>2</sub>, and IR sensors
- ➔ Rugged housing
- ➔ Withstands 10-foot drop test
- ➔ Easy to operate

## Powered by Performance

- ➔ Four-year sensor life on LEL, O<sub>2</sub>, CO, H<sub>2</sub>S, SO<sub>2</sub>, and IR sensors – 60% longer than industry average
- ➔ Three-year sensor life on NH<sub>3</sub> and Cl<sub>2</sub>
- ➔ MSA-exclusive instrument end-of-sensor-life warning
- ➔ MSA-exclusive MotionAlert™ & InstantAlert™ features
- ➔ 40% less calibration gas used per minute than industry average

## Flexibility to meet your Needs

- ➔ Interchangeable plug-and-play sensor slots (XCell sensors)
- ➔ Color or monochrome display options
- ➔ Monitors up to six gases simultaneously

## Revolutionizing Sensor Technology

- ➔ Industry-first 60-second span calibration time for LEL, O<sub>2</sub>, CO, H<sub>2</sub>S, and SO<sub>2</sub>
- ➔ Sensor response and clear times in under 15 seconds on LEL, O<sub>2</sub>, CO, H<sub>2</sub>S, and SO<sub>2</sub> – 50% faster than industry average
- ➔ Typical cost savings of over 50% on calibration gas, replacement sensors, and maintenance
- ➔ Greater signal stability and repeatability under changing or extreme environmental conditions

**ALTAIR 5X Detector with three-year warranty, monochrome display, data logging, charger, integral pump, and tubing**

### Approvals

U.S.	Canada	Configuration
10116924	10115118	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S
10116925	10115119	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S, SO <sub>2</sub>

**ALTAIR 5X Detector Industrial Kits - monochrome display, integral pump, 10 ft sampling line, and 1 ft probe**

10116926	10115120	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S
10116927	10115141	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S, SO <sub>2</sub>

**ALTAIR 5X Detector Deluxe Kits - color display, integral pump, 10 ft sampling line, and 1 ft probe**

10116928	10115142	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S
10116929	10115143	LEL, O <sub>2</sub> , CO, H <sub>2</sub> S, SO <sub>2</sub>

# ALTAIR® 5X Multigas Detector

With MSA XCell® Sensor Technology

## Frequently Asked Questions

### 1 MSA's ALTAIR 5X Multigas Detector uses NEW MSA XCell® Sensors. Aren't all electrochemical and catalytic bead sensors basically the same?

All sensors are **not** the same. Sensors are the heart of an instrument; sensor performance can vary greatly depending upon manufacturer. Most multigas detectors use the same sensors from the same few global suppliers. MSA has designed a superior gas detection sensor platform with built-in microelectronic control circuitry that is specifically optimized for MSA gas detectors. MSA XCell Sensors are designed for longer life, faster response, and higher performance when used with MSA's ALTAIR 5X Multigas Detector.

The MSA XCell Sensors used in ALTAIR 5X Multigas Detectors for combustible gas, O<sub>2</sub>, CO, and H<sub>2</sub>S are the same sensors used in ALTAIR 4X Multigas Detectors and are interchangeable among these instruments. In addition, three new XCell Sensors are now available for ALTAIR 5X Multigas Detectors for sulfur dioxide (SO<sub>2</sub>), ammonia (NH<sub>3</sub>), and chlorine (Cl<sub>2</sub>).

MSA has designed and manufactured gas detection sensors and instruments for decades. Our experts are there to support you with all product or application concerns, allowing you to focus on your core business.

### 2 What are the benefits of new MSA XCell Sensors for sulfur dioxide (SO<sub>2</sub>), ammonia (NH<sub>3</sub>), and chlorine (Cl<sub>2</sub>)?

The newest additions to MSA's XCell Sensor platform are SO<sub>2</sub>, NH<sub>3</sub>, and Cl<sub>2</sub>. These sensors have the same embedded controlling microelectronics, same digital output, and same form factor as other XCell Sensors. The key difference concerns new patent-pending electrolyte systems that generate longer-lasting, more stable sensors that also offer extremely fast response.

### 3 How does the ALTAIR 5X Multigas Detector's end-of-sensor-life warning and indicator work?

Following each calibration, a software algorithm calculates each sensor's approximate remaining life. When it is determined that the sensor is nearing its end-of-life, the instrument displays that sensor's end-of-life warning. Users are given advanced notice (four to six weeks of typical use) that a sensor is nearing its end of life in order to plan for sensor replacement.

**The instrument and sensor can continue to be used after the end-of-sensor-life warning, as long as regular bump tests are passed.**

If sensor output during calibration is too low, the unit will fail calibration and the end-of-sensor-life indicator will be displayed on the instrument screen. This information tells users that the end of the sensor's useful life has been reached and that the instrument should not be used until the sensor is replaced.

### 4 What primary applications should be considered when purchasing the ALTAIR 5X Multigas Detector's infrared (IR) sensor?

Catalytic combustible sensors are popular as they are extremely versatile in detecting an array of combustible gases and mixtures. They are simple to use, cost effective, and very reliable. They also detect hydrogen (H<sub>2</sub>), which typical IR sensors do not.

IR sensors play an important role in gas detection concerning certain situations and applications:

(a.) Inert gas sampling: catalytic combustible sensors need at least 10% O<sub>2</sub> content for proper functionality. For this application, either a dilution tube or an MSA IR sensor can be used. IR sensors do not need O<sub>2</sub> to function and are therefore ideal for inert sampling.

#### MSA XCell Sensor Quick Facts:

- Long life: four-year life (SO<sub>2</sub>), three-year life (NH<sub>3</sub>, Cl<sub>2</sub>)
- Both SO<sub>2</sub> and NH<sub>3</sub> use a non-consuming chemical reaction, resulting in no permanent loss of life with normal gas exposure
- Fast average t<sub>90</sub> response times: 10-second SO<sub>2</sub>, 40-second NH<sub>3</sub>, 30-second Cl<sub>2</sub>
- Maintain stable functionality in extreme temperatures and in extremely dry or wet environments



[www.MSAnet.com/ALTAIR5X](http://www.MSAnet.com/ALTAIR5X) | 1.800.MSA.2222

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- (b.) Sampling with background poisons: catalytic combustible sensors can be poisoned by particular substances (most commonly by silicones or lead compounds). IR sensors are not impacted by these poisons and are ideal for sampling in areas where it is known that catalytic sensors are non-functional.
- (c.) CO2 detection: CO2 is a toxic gas that is difficult to detect with electrochemical sensors. An ALTAIR 5X Multigas Detector CO2 sensor is ideal for this application.

## 5 Historically, oxygen (O2) sensor technology is seen as problematic and short-lived. How does MSA's XCell O2 Sensor actually achieve a typical lifespan of more than four years?

Most O2 sensors on the market today use a consumable chemical reaction wherein lead is consumed and converted to lead oxide. These sensors have a very finite life; once the lead is consumed, the sensor stops working.

MSA's XCell O2 Sensor uses a non-consumable chemical reaction; O2 is converted to water and then back to O2. The sensor does not "use itself up" each time it sees O2, generating a much longer shelf-life and overall lifespan.

## 6 The ALTAIR 5X Multigas Detector uses MSA XCell Sensors that offer fast response and clear times. How do I translate that into cost savings?

Over a product's life, customers spend more money on calibration time and gas usage than on initial instrument purchase. MSA's XCell Sensor's speed of response allows for faster calibration and bump test times. A perfect example of this is the industry-first 60-second LEL, O2, H2S, CO, and SO2 single-bottle span calibration and 10-second bump test. The ALTAIR 5X Multigas Detector also offers the industry's lowest gas flow rates, further adding to calibration gas savings.

For more detailed information regarding cost of ownership savings, download MSA's **cost of ownership calculator** from <http://msanet.com/ALTAIR5X/> or contact an MSA sales representative.

## 7 The ALTAIR 5X Multigas Detector uses an integral pump. What are the advantages of an integral pump over snap-on sampling solutions?

Although they are more expensive, integral pumps provide advantages that far outweigh the cost benefit of snap-on solutions, demonstrated by the ALTAIR 5X Multigas Detector's industry-leading durability and its ability to survive a 10-foot drop. Integral pumps allow instruments to be tightly packed so that the instrument's rugged over-molded housing can act as a pump-protecting shield.

Another important advantage is that pump integration achieves a better overall ergonomic design that allows for less cumbersome handling. Many competitive snap-on pump solutions are bulky and not easy to handle. Lastly, ease of maintenance and service is improved by having all instrument parts internally integrated.

## 8 Can the ALTAIR 5X Multigas Detector be configured for different languages?

The ALTAIR 5X Multigas Detector user interface is user-selectable for up to 18 languages, including English, Spanish, French, Portuguese, and others. When you first receive the instrument out-of-box, you will be prompted to select your language of choice. During regular operation, customers can also enter the setup menu or use MSA Link™ Software to update the instrument's language setting.

## 9 When and why do I need MotionAlert™ and InstantAlert™ features?

If you must work alone, be sure to have the instrument that alerts others. Only MSA offers these potentially life-saving features: MSA's **MotionAlert feature** to alert others in the area if a worker is down due to hazardous gas exposure or other threats. **InstantAlert feature** is a manual alarm activated by users to alert others of potentially hazardous situations.

MSA's MotionAlert feature operation is very similar to that of a PASS device; first warnings and second warnings can be reset by moving the device and will alarm after 20 and then 24 seconds of no detected movement. Final alarm sounds after 30 seconds of no detected movement and can be reset only by pressing the **DOWN** button.

MSA's InstantAlert feature is activated by pressing and holding the **DOWN** button for five seconds. This alarm can only be cleared by pressing the **UP** button.

## 10 How can I use MSA's Logo Express® Service option on the ALTAIR 5X Multigas Detector?

When you order an MSA ALTAIR 5X Multigas Detector and choose the Logo Express Service option, MSA will email you a Web link for you to use to upload your logo artwork. For security reasons, this site authenticates via your sales order number and customer account number. Once the logo has been successfully uploaded, instrument manufacturing will begin. Please note that the factory will **not** start a Logo Express Service unit build until the logo has been successfully uploaded to the Web site.

**Note:** This bulletin contains only a general description of the products shown. While uses and performance capabilities are described, under no circumstances shall the products be used by untrained or unqualified individuals and not until the product instructions including any warnings or cautions provided have been thoroughly read and understood. Only they contain the complete and detailed information concerning proper use and care of these products.

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## คุณลักษณะเฉพาะเครื่องวัดแก๊ส Altair 5X

### 1. ลักษณะทั่วไป

เป็นอุปกรณ์สำหรับตรวจวัดปริมาณแก๊สในบรรยากาศ รวมถึงพื้นที่อับอากาศ สำหรับผู้ที่เข้าปฏิบัติในพื้นที่นั้นๆ โดยสามารถใช้วัดปริมาณแก๊สก่อนเข้าพื้นที่ รวมถึงสำหรับพกติดตัวในระหว่างการปฏิบัติงาน

### 2. ข้อกำหนดของอุปกรณ์

#### 2.1. Multi- Gas Detector 4-Gas (Pump Type) รุ่น ALTAIR 5X ยี่ห้อ MSA

2.1.1 การวัดและค่าความละเอียดของเครื่องตรวจวัดก๊าซ ต้องสามารถตรวจวัดก๊าซได้พร้อมกัน 4 Sensor เป็นอย่างน้อย ดังนี้

ประเภทก๊าซ	ช่วงการวัด	ค่าความละเอียด	ชนิดของเซ็นเซอร์
ก๊าซไวไฟ	0 – 100 %LEL	1 %LEL	XCell Sensors
ก๊าซออกซิเจน	0 – 30 %Vol.	0.1 %Vol.	XCell Sensors
ก๊าซคาร์บอนมอนอกไซด์	0 – 2,000 ppm	1 ppm	XCell Sensors
ก๊าซไฮโดรเจนซัลไฟด์	0 – 200 ppm	1 ppm	XCell Sensors

- 2.1.2 มีปุ่มกดตัวอย่างอากาศสำหรับการวัดการรั่วของก๊าซติดตั้งภายในตัวเครื่อง
- 2.1.3 ความไวในการวัดของเซ็นเซอร์สำหรับวัดก๊าซไวไฟ (ช่วงการวัด 0-100 %LEL) ก๊าซคาร์บอนมอนอกไซด์ ไฮโดรเจนซัลไฟด์ และออกซิเจน (T90) ไม่เกิน 15 วินาที
- 2.1.4 จอภาพแสดงผลเป็น Backlight LCD แสดงชื่อชนิดก๊าซพร้อมหน่วยการวัด สามารถกำหนดการแสดงผลค่าการวัดสูงสุด ค่า TWA และ STEL ได้
- 2.1.5 มีระบบสัญญาณเตือนด้วยแสง ความสั่นสะเทือน และเสียงเมื่อถึงระดับค่าความเข้มข้นของก๊าซที่กำหนด
- 2.1.6 มีระบบสัญญาณเสียงและแสงแสดงสถานะการทำงานของเครื่องเป็นปกติ (Confidence Signals)
- 2.1.7 มีระบบสัญญาณเตือนเมื่อตัวเครื่องวัดก๊าซหยุดการเคลื่อนไหว (Motion Alert) ซึ่งเหมาะกับการใช้งานในพื้นที่อับอากาศ
- 2.1.8 มีปุ่มกดสัญญาณเตือนเพื่อขอความช่วยเหลือ (Instant Alert)
- 2.1.9 โครงสร้างของเครื่องมีความแข็งแรงทนทาน ผ่านการทดสอบการตกจากที่สูง (Drop Test) ที่ระยะ 3 เมตร หรือ 10 ฟุต
- 2.1.10 ระบบป้องกันน้ำและฝุ่นระดับ IP 65
- 2.1.11 อุปกรณ์ชุดหุ้ม (Housing) เครื่องตรวจวัดก๊าซต้องเป็นประเภท Explosion Proof
- 2.1.12 ได้รับการรับรองตามมาตรฐานสากล โดยยอมรับว่าสามารถนำไปใช้งานในพื้นที่อันตรายอันเนื่องมาจากมีก๊าซติดไฟปะปนได้อย่างปลอดภัย Class I, Division 1, Groups A, B, C & D

- 2.1.13 แบตเตอรี่ชนิดประจุไฟใหม่ได้ สามารถใช้งานแบบต่อเนื่องได้สูงสุดถึง 20 ชั่วโมง พร้อมมีระบบสัญญาณเตือนเมื่อระดับแบตเตอรี่ต่ำ
- 2.1.14 มีหน่วยความจำสำหรับบันทึกข้อมูลค่าเฉลี่ยการวัดในตัวเครื่องได้ไม่น้อยกว่า 200 ชั่วโมงเมื่อกำหนดช่วงเวลาในการวัดและบันทึกทุกๆ 1 นาที และบันทึกค่าเหตุการณ์ที่ผิดปกติในการวัด (Event) ได้ไม่น้อยกว่า 1,000 เหตุการณ์
- 2.1.15 มีสัญลักษณ์เตือนที่ตัวเครื่องเมื่อตัวเซ็นเซอร์ต่างๆหมดอายุการใช้งาน โดยแจ้งล่วงหน้า 4-6 สัปดาห์ก่อนเซ็นเซอร์หมดอายุ
- 2.1.16 การรับประกัน
  - รับประกัน 3 ปี สำหรับเครื่องวัดก๊าซและแบตเตอรี่ เซนเซอร์สำหรับวัดก๊าซไวไฟ คาร์บอนมอนอกไซด์ ไฮโดรเจนซัลไฟด์ ออกซิเจน และซัลเฟอร์ไดออกไซด์
  - รับประกัน 2 ปี สำหรับเซนเซอร์วัดก๊าซแอมโมเนียและคลอรีน
  - รับประกัน 1 ปี สำหรับเซนเซอร์ก๊าซอื่นๆที่ไม่ได้ระบุ

## 2.2. Sampling Probe/ Line

- 2.2.1. Sampling Probe มีความยาว 1 ฟุต
- 2.2.2. Sampling Line ทำจาก Polyurethane มีความยาว 10 ฟุต
- 2.2.3. Filter probe รวมอยู่ในอุปกรณ์ของ sampling probe

## 2.3. GAS Regulators

- 2.3.1. Body เป็น Stainless Steel
- 2.3.2. Diaphragm เป็น Teflon Lined 316L SS.
- 2.3.3. Flow Rate มีอัตรา 0.25 LPM
- 2.3.4. Gauge Pressure เท่ากับ 1000 PSIG (70 BAR)

## 2.4. Standard Mixture Gases ประกอบด้วย

Specification	
Composition	
Carbon Monoxide ( CO )	60 ppm
Methane ( CH <sub>4</sub> )	1.45% VOL ( 29%LEL )
Hydrogen Sulfide ( H <sub>2</sub> S )	20 ppm
Oxygen ( O <sub>2</sub> )	15 %VOL

Cylinder Specification	
Pressure Filling	34 bar ( 500 PSIG )
Type	Aluminium
Gases Contents	34 Litres/Cylinder

- 2.5. จัดทำ Manual และอบรมการใช้งานชุดอุปกรณ์ตรวจเช็คแก๊ส โดยจัดทำเป็นต้นฉบับ 1 ชุด สำเนา 1 ชุด และบันทึกลงแผ่น CD 1 ชุด
- 2.6. มีเอกสารแสดงการเป็นผู้แทนจำหน่ายโดยตรงจากบริษัทผู้ผลิต