Operating Manual

ALTAIR® 5X MSHA – Multigas Detector

Order No.: 10150945/00
WARNING

THIS MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR USING OR SERVICING THE PRODUCT. Like any piece of complex equipment, this device will perform as designed only if it is used and serviced in accordance with the manufacturer’s instructions. OTHERWISE, IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE PERSONAL INJURY OR DEATH.

The warranties made by Mine Safety Appliances Company with respect to the product are voided if the product is not used and serviced in accordance with the instructions in this manual. Protect yourself and others by following them. We encourage our customers to write or call regarding this equipment prior to use or for any additional information relative to use or repairs.
Contents

1 Safety Regulations ........................................................................................................ 6
  1.1 Correct Use .......................................................................................................... 6
  1.2 Liability Information ............................................................................................ 7
  1.3 Safety and Precautionary Measures .................................................................. 7
  1.4 Warranty ................................................................................................................ 9
    1.4.1 Exclusive Remedy ......................................................................................... 9
    1.4.2 Exclusion of Consequential Damage ............................................................ 9

2 Description .............................................................................................................. 10
  2.1 Overview ............................................................................................................. 10
  2.2 Device Hardware Interfaces .............................................................................. 11
    2.2.1 Button Definitions ........................................................................................ 11
    2.2.2 LED Definitions ............................................................................................ 11
    2.2.3 Alarms .......................................................................................................... 12
  2.3 On-Screen Indicators ......................................................................................... 13
    2.3.1 Monochrome Display ................................................................................. 13
    2.3.2 Battery Indicator ......................................................................................... 13
    2.3.3 Battery Charging ......................................................................................... 15
  2.4 Viewing Additional Pages .................................................................................... 16
    2.4.1 Bump Test (BUMP Page) .......................................................................... 16
    2.4.2 Peak Readings (PEAK Page) ................................................................... 17
    2.4.3 Minimum Readings (MIN Page) ................................................................. 17
    2.4.4 Short Term Exposure Limits (STEL Page) ................................................ 17
    2.4.5 Time Weighted Average (TWA Page) ......................................................... 18
    2.4.6 Date Display ............................................................................................... 19
    2.4.7 LAST CAL Page ......................................................................................... 19
    2.4.8 CAL DUE Page ......................................................................................... 19
    2.4.9 MotionAlert Activation Page ..................................................................... 19
  2.5 Sensor Missing Alarm ......................................................................................... 19
  2.6 Monitoring Toxic Gases ...................................................................................... 20
  2.7 Monitoring Oxygen Concentration ..................................................................... 21
  2.8 Monitoring Combustible Gases .......................................................................... 21
  2.9 Gas Exposure of 100 % LEL ............................................................................ 22
3 Operation ........................................................................................................... 23
3.1 Environmental Factors ...................................................................................... 23
3.2 Turning ON and Fresh Air Setup ........................................................................ 24
3.2.1 Sampling System Safety Test ......................................................................... 24
3.2.2 Fresh Air Setup (FAS) at Device Turn-ON ......................................................... 25
3.2.3 Special Consideration for Oxygen Sensor ......................................................... 26
3.3 Measurement Mode (Normal Operation) ............................................................. 26
3.4 Device Setup ..................................................................................................... 26
3.4.1 Calibration Options ......................................................................................... 27
3.4.2 Alarm Options ................................................................................................. 28
3.4.3 Instrument Options ......................................................................................... 30
3.5 MSA Link Operation .......................................................................................... 32
3.6 Function Tests on the Device ............................................................................. 32
3.7 Calibration Check ............................................................................................ 32
3.7.1 Equipment ..................................................................................................... 32
3.7.2 Performing a Calibration Check ....................................................................... 32
3.8 Calibration ....................................................................................................... 33
3.8.1 Zero Calibration ............................................................................................. 33
3.8.2 Span Calibration ............................................................................................ 34
3.8.3 Finishing Successful Calibration ..................................................................... 35
3.9 Calibration with the GALAXY® GX2 Test System ............................................. 36
3.10 Device Shutdown ............................................................................................ 36

4 Maintenance ..................................................................................................... 37
4.1 Troubleshooting ............................................................................................... 37
4.2 Verifying Pump Operation .................................................................................. 38
4.3 Replacing the Battery ....................................................................................... 39
4.4 Live Maintenance Procedure - Sensor Replacement ............................................ 40
4.5 Replacing the Pump Filter .................................................................................. 42
4.6 Cleaning the Device Exterior ............................................................................. 42
4.7 Storage .............................................................................................................. 42
4.8 Shipment .......................................................................................................... 42
1 Safety Regulations

1.1 Correct Use

The ALTAIR 5X and ALTAIR 5X IR Multigas Detectors, hereafter also referred to as device, are for use by trained and qualified personnel. They are designed to be used when performing a hazard assessment to:

- assess potential worker exposure to combustible and toxic gases and vapors as well as low level of oxygen,
- determine the appropriate gas and vapor monitoring needed for a workplace.

The ALTAIR 5X Multigas Detector can be equipped to detect:
- combustible gases and certain combustible vapors
- oxygen-deficient or oxygen-rich atmospheres
- specific toxic gases for which a sensor is installed.

The ALTAIR 5X IR Multigas Detector can also contain one infrared sensor to detect CO₂ or specific combustible gases up to 100 % Vol.

WARNING

- Perform a blocked flow test before each day's use.
- Perform a calibration check before each day's use and adjust if necessary.
- Perform a calibration check more frequently if exposed to silicone, silicates, lead-containing compounds, hydrogen sulfide or high contaminant levels.
- Recheck calibration if unit is subjected to physical shock.
- Use only to detect gases/vapors for which a sensor is installed.
- Do not use to detect combustible dusts or mists.
- For accurate catalytic combustible readings, make sure adequate oxygen is present (>10 % O₂).
- Never block pump inlet, except to perform a sampling system safety test.
- Have a trained and qualified person interpret device readings.
- Risk of Explosion: Do not remove battery pack, recharge Li Ion battery, or replace alkaline batteries in a hazardous location.
- Do not alter or modify device.
- Use only MSA-approved sampling lines.
- Do not use silicone tubing or sampling lines.
- Wait sufficient time for the reading; response times vary based on gas and length of sampling line.
- Do not use the device for prolonged periods in an atmosphere containing a concentration of fuel or solvent vapors that may be greater than 10 % LEL.

Incorrect use can cause death or serious personal injury.

This Class A digital apparatus complies with Canadian ICES-003.

It is imperative that this operating manual be read and observed when using the product. In particular, the safety instructions, as well as the information for the use and operation of the product, must be carefully read and observed. Furthermore, the national regulations applicable in the user's country must be taken into account for safe use.

Alternative use, or use outside this specification will be considered as non-compliance. This also applies especially to unauthorized alterations to the product and to commissioning work that has not been carried out by MSA or authorized persons.
1.2 Liability Information
MSA accepts no liability in cases where the product has been used inappropriately or not as intended. The selection and use of this product must be under the direction of a qualified safety professional who has carefully evaluated the specific hazards of the jobsite where it will be used and who is completely familiar with the product and its limitations. The selection and use of this product and its incorporation into the safety scheme of the jobsite is the exclusive responsibility of the employer. Product liability claims, warranties also as guarantees made by MSA with respect to the product are voided, if it is not used, serviced or maintained in accordance with the instructions in this manual.

1.3 Safety and Precautionary Measures

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carefully review the following safety limitations and precautions before placing this device in service. Incorrect use can cause death or serious personal injury.</td>
</tr>
</tbody>
</table>

- Check function (see section 3.6) each day before use. MSA recommends carrying out a routine inspection prior to each day's use.
- Perform a calibration check (see section 3.7) before each day's use to verify proper device operation. The device must pass the calibration check. If it fails the test, perform a calibration (see section 3.8) before using the device.
- The ALTAIR 5X Multigas Detectors are designed to detect gases and vapors in air only.
- Perform a calibration check more frequently if the device is subjected to physical shock or high levels of contaminants. Also, perform a calibration check more frequently if the tested atmosphere contains the following materials, which may desensitize the combustible gas sensor and reduce its readings:
  - Organic silicones
  - Silicates
  - Lead-containing compounds
  - Sulfur compound exposures over 200 ppm or exposures over 50 ppm for one minute.
- The minimum concentration of a combustible gas in air that can ignite is defined as the Lower Explosive Limit (LEL). A combustible gas reading of "XXX" indicates the atmosphere is above 100 % LEL or 5.00 % Vol CH₄ and an explosion hazard exists. Move away from hazardous area immediately.
- Do not use the ALTAIR 5X and ALTAIR 5X IR Multigas Detectors to test for combustible or toxic gases in the following atmospheres as this may result in erroneous readings:
  - Oxygen-deficient or oxygen-rich atmospheres
  - Reducing atmospheres
  - Furnace stacks
  - Inert environments (only IR sensors acceptable for use).
- Do not use the ALTAIR 5X and ALTAIR 5X IR Multigas Detectors to test for combustible gases in atmospheres containing vapors from liquids with a high flash point (above 38 °C, 100 °F) as this may result in erroneously low readings.
- Allow sufficient time for device to display accurate reading. Response times vary based on the type of sensor being utilized (see section 5.2). Allow a minimum of 1 second per foot (3 seconds per meter) of sample line to allow the sample to be drawn through the sensors.
- Sampling lines made from 0.062 inch (1.57 mm) inner diameter tubing provide fast transport times to the device; however, they must be limited to 50 feet (15 m) in length.
- Sampling of reactive toxic gases (Cl₂, ClO₂, NH₃) must only be done with the reactive gas sample line and probe kits listed in section 6.2.
- All device readings and information must be interpreted by someone trained and qualified in interpreting device readings in relation to the specific environment, industrial practice and exposure limitations.
- Use of the GALAXY® GX2 Automated Test System is an alternate MSHA-approved method for calibrating MSHA-approved ALTAIR 5X devices.
- Use only calibration gas that is 2.5% Methane with an accuracy of +5% when calibrating MSHA-approved ALTAIR 5X devices.
- GALAXY® GX2 Automated Test Setup Mode must be set to Calibration Only or Calibration Check/Cal on Fail when calibrating MSHA-approved ALTAIR 5X devices.
- For 30 CFR Part 75 determinations, the GALAXY® GX2 Automated Test System Test Setup Mode must be set to Calibration Only or Calibration Check/Cal on Fail so that 19.5% oxygen can be detected with an accuracy of +0.5% when calibrating MSHA-approved ALTAIR 4X devices.

**Observe Proper Battery Maintenance**

Use only battery chargers made available by MSA for use with this device; other chargers may damage the battery pack and the device. Dispose of in accordance with local health and safety regulations.

**Be Aware of Environmental Conditions**

A number of environmental factors may affect the sensor readings, including changes in pressure, humidity and temperature. Pressure and humidity changes also affect the amount of oxygen actually present in the atmosphere.

**Be Aware of the Procedures for Handling Electrostatically Sensitive Electronics**

The device contains electrostatically sensitive components. Do not open or perform maintenance on the device without using appropriate electrostatic discharge (ESD) protection. The warranty does not cover damage caused by electrostatic discharges.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**WARNING**

This is a class A product in accordance with CISPR 22.
In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

This Class A digital apparatus complies with Canadian ICES-003.

**Be Aware of the Product Regulations**

Follow all relevant national regulations applicable in the country of use.

**Be Aware of the Warranty Regulations**

The warranties made by Mine Safety Appliances Company with respect to the product are voided if the product is not used and maintained in accordance with the instructions in this manual. Please protect yourself and others by following them. We encourage our customers to write or call regarding this equipment prior to use or for any additional information relative to use or service.
1.4 Warranty

<table>
<thead>
<tr>
<th>Item</th>
<th>Warranty Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chassis and electronics</td>
<td>Three years</td>
</tr>
<tr>
<td>XCell COMB, O₂, H₂S, CO, SO₂, NO₂, and MSA IR sensors</td>
<td>Three years</td>
</tr>
<tr>
<td>XCell Cl₂, NH₃ sensors</td>
<td>Two years</td>
</tr>
<tr>
<td>Series 20 ClO₂, HCN, NO, NO₂, PH₃ sensors</td>
<td>One year</td>
</tr>
</tbody>
</table>

This warranty does not cover filters, fuses, etc. As the battery pack ages, there will be a reduction in usable device run time. Certain other accessories not specifically listed here may have different warranty periods. This warranty is valid only if the product is maintained and used in accordance with Seller's instructions and/or recommendations.

The Seller shall be released from all obligations under this warranty in the event repairs or modifications are made by persons other than its own or authorized service personnel or if the warranty claim results from physical abuse or misuse of the product. No agent, employee or representative of the Seller has any authority to bind the Seller to any affirmation, representation or warranty concerning this product. Seller makes no warranty concerning components or accessories not manufactured by the Seller, but will pass on to the Purchaser all warranties of manufacturers of such components. **THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, AND IS STRICTLY LIMITED TO THE TERMS HEREOF. SELLER SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.**

1.4.1 Exclusive Remedy

It is expressly agreed that Purchaser's sole and exclusive remedy for breach of the above warranty, for any tortious conduct of Seller, or for any other cause of action, shall be the replacement at Seller's option, of any equipment or parts thereof, which after examination by Seller is proven to be defective. Replacement equipment and/or parts will be provided at no cost to Purchaser, F.O.B. Seller's Plant. Failure of Seller to successfully replace any nonconforming equipment or parts shall not cause the remedy established hereby to fail of its essential purpose.

1.4.2 Exclusion of Consequential Damage

Purchaser specifically understands and agrees that under no circumstances will seller be liable to purchaser for economic, special, incidental or consequential damages or losses of any kind whatsoever, including but not limited to, loss of anticipated profits and any other loss caused by reason of nonoperation of the goods. This exclusion is applicable to claims for breach of warranty, tortious conduct or any other cause of action against seller.
2 Description
2.1 Overview

The device monitors gases in ambient air and in the workplace.

The ALTAIR 5X Detectors are available with a maximum of four sensors, which can display readings for five separate gases (one Two-Tox Sensor provides both CO and H₂S sensing capabilities in a single package).

The ALTAIR 5X IR is available with a maximum of five sensors, which can display readings for six separate gases (one Two-Tox Sensor provides both CO and H₂S sensing capabilities in a single package).

The ALTAIR 5X Detectors are available with a monochrome display.

The alarm levels for the individual gases are factory-set and can be changed through the Instrument Setup Menu. These changes can also be made through MSA Link Software. Ensure that the latest version of the MSA Link software has been downloaded from MSA’s website www.msasafety.com. It is recommended that after making changes using MSA Link software, the device should be turned OFF and ON.
### 2.2 Device Hardware Interfaces

Device operation is dialog driven from the display with the aid of the three function buttons (see Fig. 1). The device has three buttons for user operation.

#### 2.2.1 Button Definitions

The ALTAIR 5X and ALTAIR 5X IR devices have three buttons for user operation. Each button can function as a "soft key", as defined immediately above the button.

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Φ</td>
<td>The Φ button is used to turn the device ON or OFF and to confirm user action selections.</td>
</tr>
<tr>
<td>▼</td>
<td>The ▼ button is used to page down through data screens or to decrease the values in setup mode. This button is also used to initiate a Bump Test for the installed sensors, directly from the MEASURING page. If the user is granted access to the MotionAlert setting feature, this button can be used to activate the InstantAlert™ alarm.</td>
</tr>
<tr>
<td>▲</td>
<td>The ▲ button is used to reset Peak, STEL, TWA and alarms (where possible) or perform calibration in measuring mode. It is also used as page up or to increase the values in setup mode.</td>
</tr>
</tbody>
</table>

When the ▲ button and the ▼ button are pressed simultaneously while in normal measure mode, the Setup mode can be entered after the password is confirmed.

#### 2.2.2 LED Definitions

<table>
<thead>
<tr>
<th>LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED (Alarm)</td>
<td>The red alarm LEDs are visual indications of an alarm condition or any type of error in the device.</td>
</tr>
</tbody>
</table>
| GREEN (Safe) | The Safe LED flashes once every 15 seconds to notify the user that the device is ON and operating under the conditions defined below:  
- The green SAFE LED is enabled  
- Combustible reading is 0 % LEL or 0% Vol  
- Oxygen (O₂) reading is 20.8 %  
- Carbon Dioxide (CO₂) reading is ≤ 0.03 %  
- All other sensor readings are 0 ppm  
- No gas alarms are present (low or high)  
- Device is not in Low Battery warning or alarm  
- STEL and TWA readings are 0 ppm  
This option can be turned OFF through the MSA Link software. |
| YELLOW (Fault) | The Fault LED activates if any of several fault conditions are detected during device operation. This includes:  
- A device memory error  
- A sensor determined to be missing or inoperative  
- A pump fault.  
These faults are also indicated by activation of device alarm LEDs, horn, and vibrating alarm. |
2.2.3 Alarms

The device is equipped with multiple alarms for increased user safety:

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibrating Alarm</td>
<td>The device vibrates when any alarm condition is active. This can be turned OFF through the SETUP- ALARM OPTIONS menu (see section 3.4.2).</td>
</tr>
<tr>
<td>Horn</td>
<td>The device is equipped with an audible alarm. The horn can be turned OFF through the SETUP- ALARM OPTIONS menu (see section 3.4.2).</td>
</tr>
<tr>
<td>Instant-Alert™ Alarm</td>
<td>The InstantAlert exclusive feature allows the user to manually activate an audible alarm to alert those nearby to potentially dangerous situations. Holding the button for approximately 5 seconds while in Normal Measure Mode activates the InstantAlert alarm. Access to this feature may be restricted. See section 3.4.2 for means to allow/disallow user access.</td>
</tr>
<tr>
<td>MotionAlert™ Alarm</td>
<td>If MotionAlert is turned ON (+ = ON) (see section 3.4.2), the device activates a &quot;Man Down&quot; alarm if motion is not detected within 30 seconds. The Alarm LEDs flash, and the horn activates with an increasing audible frequency. MotionAlert is always turned OFF when the device is turned OFF. It must always be turned ON prior to use. Access to this feature may be restricted by user settings. See section 3.4.2 for means to allow/disallow user access.</td>
</tr>
<tr>
<td>Stealth Mode</td>
<td>Stealth Mode disables the visual, audible and vibrating alarms. MSA recommends that this feature be left in its default &quot;OFF&quot; state. Stealth mode can be turned ON through the SETUP - INSTRUMENT OPTIONS menu (see section 3.4.3). The message &quot;Alarms OFF&quot; flashes on the monochrome display when Stealth mode is ON.</td>
</tr>
<tr>
<td>Sensor Life Alarm</td>
<td>The device evaluates the condition of the sensors during Calibration. As the end of a sensor's life approaches, a warning is provided. While the sensor is still fully functional, the warning gives the user time to plan for a replacement sensor to minimize downtime. The Sensor Life indicator displays during ongoing operations as a reminder of a sensor's pending end of life. When a sensor's end-of-life is reached, sensor calibration will not be successful, and the user is then alerted by a Sensor Life Alarm. A flashing Sensor Life indicator displays during ongoing operations until the sensor is replaced and/or successfully calibrated. On the monochrome display, the Sensor Life indicator appears on the display at the same position as the MotionAlert indicator. If MotionAlert is enabled (the + indicator displays) and a Sensor Life warning or alarm occurs, the Sensor Life indicator takes priority and is shown instead. See section 3.8 for additional details on Sensor Life determination and indication.</td>
</tr>
<tr>
<td>Backlight</td>
<td>The backlight automatically activates when any front panel button is pressed and remains ON for the duration of user-selected timeout. This duration can be changed using the SETUP - INSTRUMENT SETUP (see section 3.4.3) or through MSA Link software.</td>
</tr>
<tr>
<td>Operating Beep</td>
<td>This Operating Beep activates every 30 seconds by momentarily beeping the horn and flashing the alarm LEDs under the following conditions:</td>
</tr>
<tr>
<td></td>
<td>- Operating Beep is enabled</td>
</tr>
<tr>
<td></td>
<td>- Device is on NORMAL MEASURE GASES page</td>
</tr>
<tr>
<td></td>
<td>- Device is not in battery warning</td>
</tr>
<tr>
<td></td>
<td>- Device is not in gas alarm.</td>
</tr>
</tbody>
</table>
2.3 On-Screen Indicators
2.3.1 Monochrome Display

On a monochrome display, a message appears every 30 seconds if the Vibration, Horn or LED alarms are turned OFF.

2.3.2 Battery Indicator
The battery icon continuously displays in the lower right-hand corner of the monochrome display. A bar represents the charging level of the battery. The nominal run-time of the device (COMB, O₂, CO, H₂S, with pump and monochrome display) at room temperature is 17 hours. Actual run-time will vary depending on ambient temperature, battery and alarm conditions.
Low Battery Warning

**WARNING**

If battery warning alarm activates while using the device, leave the area immediately as the end of battery life is approaching. Failure to follow this warning can result in serious personal injury or death.

![Fig. 3 Battery Warning](image)

The duration of remaining device operation during a Low Battery Warning depends on ambient temperatures, battery condition alarm status. When the device goes into battery warning the:
- battery life indicator continuously flashes
- alarm sounds and alarm LEDs flash every 30 seconds
- Safe LED no longer flashes
- device continues to operate until it is turned OFF or battery shutdown occurs.

**Battery Shutdown**

**WARNING**

If battery alarm displays, stop using the device as it no longer has enough power to indicate potential hazards, and persons relying on this product for their safety could sustain serious personal injury or death.

The device goes into battery shutdown mode 60 seconds before final shutdown (when the batteries can no longer operate the device):
- "BATTERY ALARM" flashes on the display
- Alarm sounds
- Alarm LEDs flash
- Fault LED is ON
- No other pages can be viewed; after approximately one minute, the device automatically turns OFF.

![Fig. 4 Battery Shutdown](image)

When battery shutdown condition occurs:
(1) Leave the area immediately.
(2) Recharge or replace the battery pack.
### 2.3.3 Battery Charging

**WARNING**

Risk of explosion: Do not recharge device in hazardous area.

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of any charger, other than the charger supplied with the device, may damage or improperly charge the batteries.</td>
</tr>
</tbody>
</table>

- The charger is capable of charging a completely depleted pack in less than six hours in normal, room-temperature environments.
  
  **NOTE:** Allow very hot or cold devices to stabilize for one hour at room temperature before attempting to charge.

- Minimum and maximum ambient temperature to charge the device is 10 °C (50 °F) and 35 °C (95 °F), respectively.
- For best results, charge the device at room temperature.

**To Charge the Device**

- Firmly insert the charger connector into the charge port on the back of the device.
- An LED in the battery pack is used to indicate on the charge status:
  - Red = charging, Green = charged, yellow = fault
- If a problem is detected during charging (LED turns yellow):
  - Disconnect the charger momentarily to reset the charge cycle.
- The battery pack may be charged separately from the device.
- During periods of non-use, the charger may remain connected to the device/battery pack.

**NOTE:** The charger must be disconnected for the device to operate.
### 2.4 Viewing Additional Pages

The Main Screen appears at device turn-ON.

Additional displays can be viewed by pressing the \( \downarrow \) button to move to the screen as indicated by the "soft key".

(For the monochrome display, the name of the page is displayed.)

The sequence of pages are as follows and are described below:

![Diagram showing the sequence of pages]

#### 2.4.1 Bump Test (BUMP Page)

This page allows the user to perform an automated Bump Test on the device. To perform the test, the \( \bigcirc \) (YES) button is pressed.

See section 3.7 for details on performing the Calibration Check.

If the \( \downarrow \) button is pressed, the Bump Test is not performed, and the display shows the next page in the sequence (PEAK).

If the \( \uparrow \) button is pressed, the Bump Test is not performed, and the display reverts back to the normal MEASURE page.
2.4.2 Peak Readings (PEAK Page)

Monochromatic display symbol: PEAK

This page shows the highest levels of gas recorded by the device since turn-ON or since peak readings were reset.
To reset the peak readings:
(1) Access the PEAK page.
(2) Press the ▲ button.

NOTE: This page can be de-activated through MSA Link software.

2.4.3 Minimum Readings (MIN Page)

Monochromatic display symbol: MIN

This page shows the lowest level of oxygen recorded by the device since turn-ON or since the MIN reading was reset. It is only shown if an oxygen sensor is installed and enabled.
To reset the MIN reading:
(1) Access the MIN page.
(2) Press the ▲ button.

2.4.4 Short Term Exposure Limits (STEL Page)

WARNING
If the STEL alarm activates, leave the contaminated area immediately; the ambient gas concentration has reached the preset STEL alarm level. Failure to follow this warning will cause over-exposure to toxic gases and persons relying on this product for their safety could sustain serious personal injury or death.

Monochromatic display symbol: STEL

This page shows the average exposure over a running 15-minute period.
When the amount of gas detected by device is greater than the STEL limit:
- Alarm sounds
- Alarm LEDs flash
- “STEL ALARM” message flashes.
To reset the STEL:
(1) Access the STEL page.
(2) Press the ▲ button.
The STEL alarm is calculated over a 15-minute exposure.
STEL calculation examples:
Assume the device has been running for at least 15 minutes:

15 minute exposure of 35 ppm:
\[
\frac{(15 \text{ minutes} \times 35 \text{ ppm})}{15 \text{ minutes}} = 35 \text{ ppm}
\]

10 minute exposure of 35 ppm and 5 minute exposure of 15 ppm:
\[
\frac{(10 \text{ minutes} \times 35 \text{ ppm}) + (5 \text{ minutes} \times 5 \text{ ppm})}{15 \text{ minutes}} = 25 \text{ ppm}
\]

NOTE: This page can be de-activated through MSA Link software.

2.4.5 Time Weighted Average (TWA Page)

WARNING
If the TWA alarm activates, leave the contaminated area immediately; the ambient gas concentration has reached the preset TWA alarm level. Failure to follow this warning will cause over-exposure to toxic gases and persons relying on this product for their safety could sustain serious personal injury or death.

This page shows the average exposure over 8 hours since the device was turned ON or since the TWA reading was reset. When the amount of gas detected is greater than the eight-hour TWA limit:

Monochromatic display symbol: TWA
- Alarm sounds
- Alarm LEDs flash
- “TWA ALARM” message flashes.

To reset the TWA Readings:
(1) Access the TWA page.
(2) Press the button.

The TWA alarm is calculated over an eight-hour exposure.

TWA calculation examples:

1 hour exposure of 50 ppm:
\[
\frac{(1 \text{ hour} \times 50 \text{ ppm}) + (7 \text{ hours} \times 0 \text{ ppm})}{8 \text{ hours}} = 6.25 \text{ ppm}
\]

4 hour exposure of 50 ppm and 4 hour exposure of 100 ppm:
\[
\frac{(4 \text{ hours} \times 50 \text{ ppm}) + (4 \text{ hours} \times 100 \text{ ppm})}{8 \text{ hours}} = 75 \text{ ppm}
\]

12 hour exposure of 100 ppm:
\[
\frac{(12 \text{ hours} \times 100 \text{ ppm})}{8 \text{ hours}} = 150 \text{ ppm}
\]

NOTE: This page can be de-activated through MSA Link software.
2.4.6 Date Display  
Current date appears on the display in the format: **MM-DD-YY**.

2.4.7 LAST CAL Page  
Displays the device last successful calibration date in the format: **MM-DD-YY**. This page can be de-activated through MSA Link software or the SETUP - CAL OPTIONS page.

2.4.8 CAL DUE Page  
Displays the days until the device's next calibration is due (user selectable). This page can be de-activated through MSA Link software or the SETUP - CAL OPTIONS page.

2.4.9 MotionAlert Activation Page  
When the MotionAlert feature is active, the + symbol appears. The device enters pre-alarm when no motion is detected for 20 seconds. This condition can be cleared by moving the device.  
**MotionAlert is turned OFF each time the device is powered OFF.**

After 30 seconds of no motion, the full MotionAlert alarm is triggered. This alarm can only be cleared by pressing the ▲ button. This page displays if it was selected in Setup Mode.

To activate or deactivate the MotionAlert feature, press the ▼ button while the MOTIONALERT ACTIVATION page is displayed.

2.5 Sensor Missing Alarm  
Enabled IR and XCell sensors are continuously monitored for proper function. If, during operation, the IR or an XCell sensor is detected as failed or disconnected, this alarm message appears.
If the IR or an XCell sensor is detected as missing or failed, the following occurs:
- "SENSOR MISSING" flashes on the display.
- The problematic sensor is indicated.
- The alarm sounds and the Fault and Alarm LEDs flash.
- The alarm can be silenced by pressing the ▲ button; no other pages can be viewed.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>When this alarm occurs, the device is inoperative for measuring gases. The user must exit the hazardous area, the device must be powered down, and the sensor situation must be corrected.</td>
</tr>
</tbody>
</table>

---

**US**
2.6 Monitoring Toxic Gases

The device can monitor the concentration of a variety of toxic gases in ambient air. Which toxic gases are monitored depends on the installed sensors. The device displays the gas concentration in parts per million (ppm) or mg/m³ on the MEASURING page.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>If an alarm is triggered while using the device, leave the area immediately. Remaining in the area under such circumstances can cause serious personal injury or death.</td>
</tr>
</tbody>
</table>

The device has four gas alarms:
- HIGH Alarm
- LOW Alarm
- STEL Alarm
- TWA Alarm

![Alarm Conditions](image)

*Fig. 5 Alarm Conditions (here High Alarm)*

If the gas concentration reaches or exceeds the alarm set point or the STEL or TWA limits, the:
- alarm message displays and flashes in combination with the corresponding gas concentration
- backlight turns on
- alarm sounds (if active)
- alarm LEDs flash (if active)
- vibrating alarm triggers (if active).
2.7 Monitoring Oxygen Concentration

The device monitors the oxygen concentration in ambient air. The alarm set points can be configured to activate on two different conditions:
- Enriched - oxygen concentration > 20.8 Vol % or
- Deficient - oxygen concentration < 19.5 Vol %.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>If an alarm activates while using the device, leave the area immediately. Remaining in the area under such circumstances can cause serious personal injury or death.</td>
</tr>
</tbody>
</table>

When the alarm set point is reached for either of the above conditions:
- the alarm message displays and flashes in combination with the oxygen gas concentration
- backlight turns ON
- alarm sounds (if active)
- alarm LEDs flash (if active)
- vibrating alarm triggers (if active)

The LOW alarm (oxygen deficient) is latching and will not automatically reset even when the O₂ concentration rises above the LOW set point. To reset the alarm, press the button. If the alarm is latching, the button silences the alarm for five seconds. Alarms can be made latching or unlatching via MSA Link software.

False oxygen alarms can occur due to changes in barometric pressure (altitude), humidity or extreme changes in ambient temperature.

It is recommended that an oxygen calibration be performed at the temperature and pressure of use. Be sure that the device is in known fresh air before performing a calibration.

2.8 Monitoring Combustible Gases

The device can be equipped with a catalytic combustible sensor that detects a variety of combustible gases up to 100 % LEL and displays the reading as either % LEL or % CH₄. The ALTAIR 5X IR can also contain an IR combustible sensor. The IR sensor displays the reading in % Vol.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>If an alarm is triggered while using the device, leave the area immediately. Remaining in the area under such circumstances can cause serious personal injury or death.</td>
</tr>
</tbody>
</table>

The catalytic combustible sensor has two alarm setpoints:
- HIGH Alarm
- LOW Alarm

If the gas concentration reaches or exceeds the alarm setpoint, the device:
- alarm message displays and flashes in combination with the corresponding gas concentration:
- backlight turns ON
- alarm sounds (if active)
- alarm LEDs flash (if active)
- vibrating alarm triggers (if active).

The 100 % Vol IR sensors have no alarm setpoints.
2.9 **Gas Exposure of 100 % LEL**

When the reading from the catalytic combustible sensor reaches 100 % of the lower explosive limit (LEL), the device enters a LockAlarm state and displays “XXX” in place of the actual reading.

<table>
<thead>
<tr>
<th><strong>WARNING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A catalytic combustible gas reading of “XXX” indicates the atmosphere may be above 100 % LEL or 5.00 % Vol CH₄ and an explosion hazard exists. Move away from contaminated area immediately.</td>
</tr>
</tbody>
</table>

For ALTAIR 5X IR devices with an enabled 100 % Vol methane IR sensor, the LockAlarm will clear, and the catalytic combustible again displays combustible concentrations when the gas sample drops to a lower level.

For devices without an enabled 100 % Vol methane IR sensor, the user can clear the LockAlarm state only by turning the device OFF, and then ON again in a fresh air environment.

When catalytic combustible gas reading digits appear, the device is available for measuring gases once again.

**NOTE:** LockAlarm of the catalytic combustible sensor occurs during Bump Testing and calibration of a % Vol combustible IR sensor. After the IR sensor Bump Test, the LockAlarm must be cleared (as described above) before the catalytic combustible sensor is again able to measure and provide readings.
3 Operation

Device operation is dialog driven from the display with the aid of the three function buttons (see section 2.2.1).

3.1 Environmental Factors

A number of environmental factors may affect the gas sensor readings, including changes in pressure, humidity and temperature. Pressure and humidity changes affect the amount of oxygen actually present in the atmosphere.

Pressure Changes

If pressure changes rapidly (e.g., stepping through airlock), the oxygen sensor reading may temporarily shift and possibly cause the device to go into alarm. While the percentage of oxygen may remain at or near 20.8 % Vol, the total amount of oxygen present in the atmosphere available for respiration may become a hazard if the overall pressure is reduced by a significant degree.

Humidity Changes

If humidity changes by any significant degree (e.g., going from a dry, air conditioned environment to outdoor, moisture laden air), oxygen readings can be reduced by up to 0.5 % due to water vapor in the air displacing oxygen.

The oxygen sensor has a special filter to reduce the effects of humidity changes on oxygen readings. This effect will not be noticed immediately, but slowly impacts oxygen readings over several hours.

Temperature Changes

The sensors have built-in temperature compensation. However, if temperature shifts dramatically, the sensor reading may shift temporarily.
3.2 Turning ON and Fresh Air Setup

Device operation is dialog driven from the display with the aid of the three function buttons (see section 2.2.1).

For more information, see the flow charts in section 7.

Turn the device ON with the \textit{q} button.

The device performs self tests:
During the self test, the device checks alarm LEDs, audible alarm, vibrating alarm and installed sensors.

The device displays:
- Startup logo
- Software version, device serial number, company name, department and user names
- Sampling system safety test (see section 3.2.1.)

During the turn-ON sequence, if a sensor was changed since the previous device operation, the current listing of the installed sensors displays and user interaction is required.

- The user must accept the new configuration by pressing the \textit{\pi} button.
- If the current sensor configuration is not accepted, the device alarms and is not usable.

- Combustible gas type and installed sensor indication
- Combustible gas type and sensor units (monochrome display only)
- Low Alarm setpoints
- High Alarm setpoints
- STEL Alarm setpoints (if enabled)
- TWA Alarm setpoints (if enabled)
- Settings for calibration cylinder
- Current date
- Last calibration date (if enabled)
- CAL due date. If the calibration due date is enabled, the message "\textit{CAL DUE; X DAYS}" appears on the device display.
  - \(X = \text{the number of days until a calibration is due, user selectable for 1 to 180 days.}\)
  - If the number of days until calibration is due reaches 0, an alert occurs and "\textit{CAL DUE, NOW}" displays.
  - Press the \textit{\pi} button to clear the alert.
- Sensor warm-up period
- Fresh Air Setup option (if enabled).

The Main Measure Page will appear.

The presence of a \textit{\heartsuit} indicator on the display means a sensor is approaching or has reached its end-of-life. See section 2.2.3 for details on the Sensor Life Alarm situation.

Refer to flowchart in section 7.1.

3.2.1 Sampling System Safety Test

\textbf{WARNING}

Do not use the pump, sample line, or probe unless the pump alarm activates when the flow is blocked. Lack of an alarm is an indication that a sample may not be drawn to the sensors, which could cause inaccurate readings.

Failure to follow the above can result in serious personal injury or death.

Never let the end of the sampling line touch or go under any liquid surface. If liquid is drawn into the device, readings will be inaccurate and device could be damaged. We recommend the use of an MSA sample probe containing a special membrane filter, permeable to gas but impermeable to water, to prevent such an occurrence.

Upon startup, an alarm (visual, audible and vibrating) is triggered and the customer is prompted to block the pumps/sampling system of the device within 30 seconds.

When the device detects a pump flow block, it will display a "\textit{PASS}" message. The startup sequence will resume.
If the device does not detect a pump flow block, it will display an error message. The device will shut OFF after the customer acknowledges this message by pressing the ▲ button. Check your sampling system if this occurs and contact MSA as needed.

Users can check the operation of the sampling system anytime during operation by blocking the sampling system to generate a pump alarm.

### 3.2.2 Fresh Air Setup (FAS) at Device Turn-ON

![Fig. 6 Fresh Air Setup](image)

The Fresh Air Setup (FAS) is for device ZERO adjustment. The FAS has limits. If a hazardous level of gas is present, the device ignores the FAS command and the device alarm activates.

The ability to perform an FAS at device turn-ON can be disabled by using MSA Link software.

**NOTE:** The Fresh Air Setup does not apply to the CO2 sensor.

**WARNING**

Do not perform the Fresh Air Setup unless you are certain you are in fresh, uncontaminated air. Otherwise, inaccurate readings can occur which can falsely indicate that a hazardous atmosphere is safe. If you have any doubts as to the quality of the surrounding air, do not use the Fresh Air Setup feature. Do not use the Fresh Air Setup as a substitute for daily calibration checks. The calibration check is required to verify span accuracy. Failure to follow this warning can result in serious personal injury or death.

The device displays a flashing "FRESH AIR SETUP?", prompting the user to perform a Fresh Air Setup:

1. Press the ▲ button to bypass the Fresh Air Setup.
   - The Fresh Air Setup is skipped and the device goes to the MEASURING page (MAIN page).
2. Press the ▼ button to perform the Fresh Air Setup.
   - The device starts the FAS sequence and the FAS screen displays.
   - A progress bar shows the user how much of the FAS has been completed.
   - At the end of the FAS, the device displays either "FRESH AIR SETUP PASS" or "FRESH AIR SETUP FAIL".

If the FAS fails, perform a zero calibration (see section 3.8.1).
### 3.2.3 Special Consideration for Oxygen Sensor

Under the following situations, the oxygen sensor display reading may be suppressed for up to 30 minutes at device turn-ON as a sensor 'cook down' is performed.

This could occur if:
- the oxygen sensor was just installed
- the battery pack was allowed to be deep-discharged
- the battery pack was removed from the device.

During this time, the oxygen sensor numeric position on the display indicates "PLEASE WAIT". While this message displays, the device cannot respond to a:
- Fresh Air Setup
- Calibration
- Calibration Check Test procedure.

When the numeric oxygen reading appears, the FAS, calibration or Calibration Check Test procedures may be performed.

### 3.3 Measurement Mode (Normal Operation)

The following OPTION pages can be executed from the Main Measurement screen:

For further information see section 2.4.

<table>
<thead>
<tr>
<th>Page</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUMP page</td>
<td>This page allows user to perform a Bump Test on installed sensors.</td>
</tr>
<tr>
<td></td>
<td>See section 3.7.</td>
</tr>
<tr>
<td>PEAK Page*</td>
<td>This page shows the peak readings for all sensors.</td>
</tr>
<tr>
<td>MIN Page</td>
<td>This page shows the minimum readings for the oxygen sensor.</td>
</tr>
<tr>
<td>STEL Page*</td>
<td>This page shows the calculated STEL readings of the device.</td>
</tr>
<tr>
<td>TWA Page*</td>
<td>This page shows the calculated TWA readings of the device.</td>
</tr>
<tr>
<td>Date Page</td>
<td>This page shows actual date settings of the device.</td>
</tr>
<tr>
<td>LAST CAL</td>
<td>This page shows the date of the last calibration.</td>
</tr>
<tr>
<td></td>
<td>If the device does not have a valid calibration, it will display &quot;LAST CAL INVALID&quot;.</td>
</tr>
<tr>
<td>CAL DUE*</td>
<td>This page shows the set date for the next calibration.</td>
</tr>
<tr>
<td>MOTIONALERT</td>
<td>This page allows the MotionAlert Feature to be activated or deactivated.</td>
</tr>
</tbody>
</table>

* The display of these pages can be de-activated through MSA Link software.

### 3.4 Device Setup

The device has provisions to access and modify the following parameters through direct button interface:
- Calibration Options
- Alarm Options
- Instrument Options

These menus can be accessed only from the MEASURE page by pressing and holding the ▼ and ▲ buttons simultaneously until you are prompted for a password.

The operation is as follows:

1. Turn the device ON and wait until the MEASURE page appears.
2. Simultaneously press and hold the ▼ and ▲ buttons for approximately five seconds.
   - The default password is "6722".
3. Enter the first digit by pressing the ▼ or ▲ button and confirm with the ◇ button.
   - The cursor jumps to the second digit.
4. Enter the second and the third digits.
   - Incorrect password: device returns to the MAIN Page.
   - Correct password: user can enter the Setup mode.

The password can be changed with a PC through the MSA Link software.
If the password is forgotten, it can be reset by using MSA Link software. Contact MSA Customer Service for assistance.

The following Options are available by pressing the ▼ and ▲ buttons:
- Calibration Options - see section 3.4.1
- Alarm Options - see section 3.4.2
- Instrument Options - see section 3.4.3.

3.4.1 Calibration Options
The Calibration Options menu has provisions to:
- modify the calibration cylinder settings (CYLINDER SETUP)
- enable/disable calibration due date notification and to set the number of days (CAL DUE OPTIONS)
  When enabled, the number of days until due date of device calibration displays during the turn-ON process.
- enable/disable the option to show the last cal date at turn on and (LAST CAL DATE)
  When enabled, the date of the last device calibration displays during the turn-ON process.
- enable/disable the option for password protected calibration (CAL PASSWORD)
  When enabled, the device setup password must be entered prior to calibration.

Press:
- the ▼ button go to next page
- the ▲ button to go previous page
- the ⓧ button to enter setup.

Setting Calibration Cylinder
This option has a dialog similar to the span calibration dialog. The display shows all active sensors.
(1) Press the ⓧ button to enter setup.
  ▶ The screen for the first calibration cylinder displays.
(2) Press
  ▶ the ▼ or ▲ button to change the value.
  ▶ the ⓧ button to confirm the setup.
With this confirmation the device automatically moves to the next cylinder setting.
(3) Repeat the sequence for changing the required settings for all necessary gas values.
  ▶ After the last setting is performed, the device returns to the Calibration Options menu.

Setting Cal Due Options
(1) Press the ⓧ button to enter setup.
(2) Press the ▼ or ▲ button to enable/disable this option.
(3) Press the ⓧ button to confirm.
  ▶ After confirmation, the device prompts the user to enter the number of days for the reminder.
(4) Change number of days by pressing the ▼ or ▲ button.
(5) Press the ⓧ button to go to the next menu.

Setting Last Cal Date
(1) Press the ⓧ button to enable/disable this option.
(2) Press the ▼ button to go to the next page.
(3) Press the ▲ button to go to the previous page.
Setting Calibration Password
(1) Press the \( \phi \) button to enable/disable this option.
(2) Press the \( \downarrow \) button to go to the next page.
(3) Press the \( \uparrow \) button to go to the previous page.

Back To Main Menu
(1) Press the \( \phi \) button to go to Device Setup Menu.
   \( \triangleright \) The Cal Options screen displays.
(2) Press the \( \downarrow \) button to go to the next page (Alarm options) or the \( \uparrow \) button to exit the Setup menu.

3.4.2 Alarm Options
The Alarm Options Menu allows user to:
- enable/disable the vibrating alarm
- enable/disable the audible alarm (horn)
- enable/disable the Alarm LEDs
- enable/disable the MOTIONALERT SELECTION page.
   If disabled, the user cannot change the device MotionAlert setting.
- set Sensor Alarms.
Press
- the \( \downarrow \) button go to next page
- the \( \uparrow \) button to go previous page
- the \( \phi \) button to enter setup.

Setting Vibrating Alarm
Press the \( \phi \) button to enable/disable this option.

Setting Horn Alarm
Press \( \phi \) button to enable/disable this option.

Setting LED Alarm
Press \( \phi \) button to enable/disable this option.

Setting MotionAlert Access
Setting this parameter allows the user to access the MOTIONALERT page from the MEASURE page.
If access is denied here:
- the user cannot access the MOTIONALERT page to enable or disable that feature
- the InstantAlert feature (see section 2.2.3) cannot be activated.
(1) To grant or deny user access to the MOTIONALERT page, use the button to change the indicated selection.
   User access is:
   \( \triangleright \) permitted when the setting indicates ON.
   \( \triangleright \) denied when the setting indicates OFF.
(2) The selection is confirmed by pressing either the \( \downarrow \) or \( \uparrow \) button.
Setting Sensor Alarms
This page allows modifying the preset alarm values of:
- LOW Alarm
- HIGH Alarm
- STEL Alarm
- TWA Alarm.

**NOTE:** Factory-set alarm values are shown in section 5.2

1. Press the \( \varnothing \) button to enter Sensor Alarm setup.
   - LOW Alarm Setup screen displays.

2. Press:
   - the \( \nabla \) button to abort the operation or
   - the \( \triangleleft \) button to go to next alarm setup or
   - the \( \varnothing \) button to change the alarm setpoints.
   - Alarm Value for the first Sensor displays.

3. Set values for Sensor Alarm by pressing the \( \nabla \) or \( \triangleleft \) button.
4. Press the \( \varnothing \) button to confirm set value.
5. Repeat setting for all other sensors.
6. Press the \( \triangleleft \) button to return to the Alarm Options menu.
7. Repeat setting for all other alarm types.
3.4.3 Instrument Options

The Instrument Options menu allows the user to modify different device options:
- Sensor Setup (enable/disable the channel)
- Language Setup
- Time and Date Setup
- Datalog Intervals
- Stealth Mode
- Operating Beep
- Display Contrast (monochrome only)
- Backlight Options

Press
- the button go to next page
- the button to go previous page
- the button to enter setup.

Setting Sensor Options

(1) Press the button to enter setup.
▷ The following screen displays:

![Sensor Options Setup]

Fig. 9 Sensor Options Setup

(2) Press the button to select sensor, press the button to make changes.
▷ The sensor information is displayed and the sensor can be enabled or disabled.

NOTE: Other operations such as changing the gas type (Methane, Butane, Propane etc. for the combustible sensor) and units (ppm to mg/m3) are only possible using the MSA Link software.

(3) Change status by pressing the button.
(4) Press the button to confirm and advance to next screen (next sensor).
(5) Perform the sequence for all other sensors.
▷ After setting up the last sensor, the device goes to the next Setup Page.

Language Setup

This option is for setting the language of the device.

(1) Press the button to enter setup.
(2) Change language by pressing the button.
(3) Confirm with the button.
▷ The device goes to the next Setup Page.
Time and Date Setup
This option is for setting the device time and date. The device first prompts to set the time and then it prompts for the date.

NOTE: The time can be set up for either regular AM/PM or military time (through MSA Link software). AM/PM time is the default setting.

(1) Press the button to enter setup.
(2) Change hours by pressing the or button. Increment through noon for PM hours.
(3) Confirm with the button.
(4) Change minutes by pressing the or button.
(5) Confirm with the button.
(6) Change month, date and year by pressing the or button and confirming with the button.
(7) Confirm with the button.

Setting Datalog Intervals
This option is for setting the intervals at which all the readings are logged.

(1) Press the button to enter setup.
(2) Change interval by pressing the or button.
(3) Confirm with the button.

Setting Stealth Mode
Stealth mode disables the visual, audible and vibrating alarms.

(1) Press the button to change mode (ON/OFF).
(2) Press the button to go to the next page or the button to return to the previous page.

Setting Operating Beep
(1) Press the button to change mode (ON/OFF).
(2) Press the button to go to the next page or the button to return to the previous page.

Setting Display Contrast (monochrome display)
(1) Press or button to adjust the contrast level.
(2) Press button to confirm the contrast level.

Setting Backlight
(1) Press the button to enter setup.
(2) Change option by pressing the or button.
(3) Press the button to enter.
(4) Change timeout by pressing the or button.
(5) Press button to confirm timeout.

Back To Main Menu
There are three options at this point:

the button Sensor Options menu
the button PREVIOUS SETUP Page in the Instrument Options menu
the button Instrument Options menu
3.5 **MSA Link Operation**  
**Connecting device to PC**  
(1) Switch ON the device and align the Datalink Communication port on the device to the IR interface of the PC.  
(2) Start the MSA Link software on the PC and start the connection by clicking the connect icon.  
**NOTE:** See MSA Link documentation for detailed instructions.

3.6 **Function Tests on the Device**  
**Alarm Test**  
(1) Turn ON the device.  
The user should verify that:  
- alarm LEDs flash  
- horn sounds briefly  
- vibrating alarm triggers briefly.

3.7 **Calibration Check**

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform a Calibration Check before each day’s use to verify proper device operation. Failure to perform this test can result in serious personal injury or death.</td>
</tr>
</tbody>
</table>

This test quickly confirms that the gas sensors are functioning. Perform a full calibration periodically to ensure accuracy and immediately if the device fails the Calibration Check.  
The GALAXY® GX2 Test System can also be used to perform a Calibration Check.  
**NOTE:** The GALAXY® GX2 cannot test the following sensors: Chlorine Dioxide.  
For these sensors, use this Calibration Check procedure.

3.7.1 **Equipment**  
See section 6.2 for ordering information for these components.  
- Calibration Check Gas Cylinder(s)  
  See section 5.4 for calibration gas target values and appropriate MSA calibration gas cylinders.  
- Demand Flow Regulator(s)  
- Tubing appropriate for the gases to be tested  
- Kits containing tubing and regulators suitable for reactive and non-reactive gases are available from MSA.

3.7.2 **Performing a Calibration Check**  
The calibration check is simple and should only take about one minute.  
Perform this calibration check before each day’s use.  
For ALTAIR 5X IR units with combustible % Vol IR sensors, the following gas level should not be exceeded when used for daily Calibration Checks:  
IR Methane 100% Vol - 20% Methane Cal Check gas  
(1) Turn ON the device in clean, fresh air.  
(2) Verify that readings indicate no gas is present.  
(3) Attach demand regulator (supplied with calibration kit) to the cylinder.  
(4) Connect tubing (supplied with calibration kit) to the regulator.  
(5) Attach calibration tube to the ALTAIR 5X Multigas Detector pump inlet.  
  ▶ The reading on the device display should be within the limits stated on the calibration cylinder or limits determined by your company.  
  ▶ If necessary, change cylinder to introduce other calibration gases.  
  ▶ If readings are not within these limits, the device requires recalibration. See section 3.8.  
If a device fails the Calibration Check, calibrate the device as described in section 3.8.
3.8 Calibration
The ALTAIR 5X instrument can be calibrated either manually by using this procedure or automatically by using the GALAXY® GX2 Test System. See section 3.9 for additional GALAXY® GX2 information. The use of the demand regulators listed in section 6.2 is recommended.

If a new sensor has been installed, the battery pack has been depleted or a new battery pack has been installed, allow sensors to stabilize for 30 minutes before calibration is performed.

3.8.1 Zero Calibration

**WARNING**
Special conditions with toxic gases!
If the device is to be checked or calibrate for reactive gases, prerequisites are required; otherwise, incorrect calibration would result in incorrect device operation.
Reactive toxic gases (e.g., chlorine, ammonia, chlorine dioxide) have the property of diffusing into the rubber and plastic tubes so that the volume of test gas available in the device would no longer be sufficient to correctly perform device calibration.

When calibrating the device with toxic gases, certain prerequisites are required, otherwise incorrect calibration could result:
- A special pressure regulator
- Shortest possible connection tubes between the pressure regulator and the device
- Connection tubes made from a material that does not absorb the test gases (e.g., PTFE).

**NOTE:** If using normal tubes and pressure regulators, expose them to the required test gas for an extended time period. Keep these materials dedicated for use with that test gas only; do not use them for other gases.

For example: for chlorine, allow the entire contents of a test gas cylinder to flow through the pressure regulator and tubes before using to calibrate the device. Mark these materials for use with chlorine only.

(1) Press the ▲ button for five seconds in NORMAL MEASUREMENT page.
△ ZERO screen displays.

To skip the ZERO procedure and move directly to the span calibration procedure, push the ▲ button.
If no button is pushed for 30 seconds, the device prompts user to perform a SPAN calibration before device returns to the NORMAL MEASUREMENT page.

To perform ONLY a Fresh Air Setup at this time, press the ◐ button. The device then performs a Fresh Air Setup as described in section 3.2.2. When the Fresh Air Setup is complete, the device returns to the normal Measure screen.

(2) Press the ▼ button to confirm the ZERO screen, i.e. to execute zero calibration.
△ The message "SENSOR REFRESH" displays, followed by the message "ZERO CALIBRATION".
△ The "REFRESH" message does not appear if a catalytic combustible sensor is not installed.
△ ZERO calibration starts.
△ A progress bar shows the user how much of the calibration has been completed.

**NOTE:** During the first moments of a ZERO calibration, the combustible sensor reading may be replaced by a moving display of "PLEASE WAIT". This is normal.
After the ZERO calibration is completed, the device displays either “ZERO CALIBRATION PASS” or “ZERO CALIBRATION FAIL”.

Only if the device passes the zero calibration, the SPAN screen displays.

3.8.2 Span Calibration

To skip the Span calibration procedure, push the ▲ button.

**NOTE:** If the SPAN calibration of the combustible sensor is skipped after a successful ZERO calibration, the combustible sensor reading may be replaced with a moving display of “PLEASE WAIT” for a few moments. This is normal and the device is fully operational once a combustible gas reading reappears.

If no button is pushed for 30 seconds, span calibration is skipped. Because of the different possible combinations of gases that are possible, skipping a Span calibration could advance the user to the Span calibration of another installed sensor, or back to Measuring mode. When calibrating with combustible gases > 100 % LEL, select the “Yes” option to prompt “Span Calibration?” BEFORE applying gas to the device.

(1) Connect one end of tubing to the cylinder regulator (supplied in the calibration kit).
(2) Connect the other end of the tubing to the pump inlet.
(3) Press the ▼ button to calibrate (span) the device.
   ▶ “SPAN CALIBRATION” flashes
   ▶ SPAN calibration starts.
   ▶ A progress bar shows the user how much of the calibration has already been completed.
After the SPAN calibration is completed, the device displays either
“SPAN CALIBRATION PASS”
or
“SPAN CALIBRATION FAIL”

- The device returns to Measuring mode.

If a sensor is nearing its end-of-life, the "PASS" display is followed by the Sensor Life indicator.

- While the sensor is still fully functional, this warning gives the user time to plan for a replacement sensor to minimize downtime.
- The sensor indicator blinks as the device returns to Measure mode.
- After 15 seconds, the blinking stops, but the indicator continues to display during ongoing operations as a reminder of a sensor's pending end-of-life.

If a span calibration fails:
- The Sensor Life Indicator blinks to show a sensor has reached its end-of-life and should be replaced.
- The device remains in the Sensor Life alarm condition until the button is pressed.
- After the alarm is cleared, the device enters Measure mode and the Sensor Life indicator blinks during ongoing operations until the sensor is replaced and/or successfully calibrated.

Span calibration can fail for reasons other than a sensor at the end of its life. If a span calibration failure occurs, verify items such as:
- sufficient gas remaining in the calibration cylinder
- gas expiration date
- integrity of calibration tubing/fittings, etc.

**NOTE:** Retest the span calibration before replacing the sensor.

### 3.8.3 Finishing Successful Calibration

Remove the calibration tube from pump inlet.

- The calibration procedure adjusts the span value for any sensor that passes the calibration test. Sensors that fail calibration are left unchanged.
- In the ALTAIR 5X IR, a combustible IR sensor calibration causes the catalytic combustible sensor to enter the LockAlarm condition.
  - A device with a % Vol methane IR sensor automatically recovers from LockAlarm. For other devices, the Lock-Alarm state is cleared by turning the device OFF, then ON while in a fresh air environment. See section 2.9 for details.
- Since residual gas may be present, the device may briefly go into an exposure alarm after the calibration sequence is completed.
  - Clear the alarm as necessary.
- A ✓ symbol displays on the MEASURE page.
- This ✓ symbol:
  - appears on the monochrome display in the lower right corner
  - remains on the display for 24 hours after the calibration
  - goes OFF after 24 hours.
3.9 Calibration with the GALAXY® GX2 Test System
The device can be calibrated using the GALAXY® GX2 Automated Test System - contact MSA for a list of compatible gases and concentrations.

Similar to the successful (manual) calibration described in section 3.8.3, a √ symbol displays on the MEASURE page after successful GALAXY® GX2 calibration.

This √ symbol:
- appears on the monochrome display in the lower right corner
- remains on the display for 24 hours after the calibration
- goes OFF after 24 hours.

3.10 Device Shutdown
For device shutdown press and hold the button.

![HOLD BUTTON FOR SHUTDOWN]

*Fig. 10  Shutdown*

The device displays a blinking "HOLD BUTTON FOR SHUTDOWN" and a progress bar shows the user how much longer to hold the button to complete the shutdown.
4 Maintenance

If irregularities occur during operation, use the displayed error codes and messages to determine appropriate next steps.

4.1 Troubleshooting

<table>
<thead>
<tr>
<th>Error State</th>
<th>Details</th>
<th>Recommended Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERROR ADC</td>
<td>Analogue measurement error</td>
<td>Contact MSA</td>
</tr>
<tr>
<td>ERROR MEM</td>
<td>Memory error</td>
<td>Contact MSA</td>
</tr>
<tr>
<td>ERROR PROG</td>
<td>Program error</td>
<td>Contact MSA</td>
</tr>
<tr>
<td>ERROR RAM</td>
<td>RAM error</td>
<td>Contact MSA</td>
</tr>
<tr>
<td>LOW BATTERY</td>
<td>Battery Warning repeats every 30 seconds</td>
<td>Remove from service as soon as possible and recharge or replace battery</td>
</tr>
<tr>
<td>BATTERY ALARM</td>
<td>Battery is completely discharged</td>
<td>Device is no longer sensing gas; remove from service and recharge or replace battery.</td>
</tr>
<tr>
<td>Device does not turn ON</td>
<td>Battery fully discharged</td>
<td>Remove from service as soon as possible and recharge or replace battery pack</td>
</tr>
<tr>
<td>MISSING SENSOR</td>
<td>Sensor damaged or missing</td>
<td>Replace sensor</td>
</tr>
<tr>
<td>NO SENSORS</td>
<td>No sensors are enabled</td>
<td>Device must have at least one sensor enabled at all times</td>
</tr>
<tr>
<td>Sensor warning</td>
<td>Sensor warning</td>
<td>Sensor is near its end-of-life</td>
</tr>
<tr>
<td>PUMP ERROR</td>
<td>Pump malfunction or flow path blockage</td>
<td>Check flowpath for blockage. If error persists, remove from service.</td>
</tr>
<tr>
<td>INVALID CONFIGURATION</td>
<td>Sensor(s) installed in incorrect location.</td>
<td>Install sensors as shown in Fig. 13.</td>
</tr>
</tbody>
</table>
4.2 Verifying Pump Operation

Users can check operation of the sampling system any time during operation by blocking the sampling system to generate a pump alarm. When the pump inlet, sample line or probe is blocked, the pump alarm must activate. Once gas readings are displayed, plug the free end of the sampling line or probe.

- The pump motor shuts down and an alarm sounds.
- “PUMP ERROR” flashes on the display.
- Press the ▲ button to reset the alarm and restart the pump.

If the alarm does not activate:
- Check the sample line and probe for leaks.
- Once leak is fixed, recheck pump alarm by blocking the flow.
- Press the ▲ button to reset the alarm and restart the pump.

During operation, a pump alarm may occur when the:
- Flow system is blocked
- Pump is inoperative
- Sample lines are attached or removed.

To Clear Pump Alarm
1. Correct any flow blockage.
2. Press the ▲ button.
   ▶ The Pump will now restart.

WARNING
Do not use the pump, sample line, or probe unless the pump alarm activates when the flow is blocked. Lack of an alarm is an indication that a sample may not be drawn to the sensors, which could cause inaccurate readings. If a sample line or probe is installed and the pump alarm does not activate, remove the line or probe and repeat the test. This will provide information on where the blockage is located.

Failure to follow the above can result in serious personal injury or death.

Never let the end of the sampling line touch or go under any liquid surface. If liquid is drawn into the device, readings will be inaccurate and device could be damaged. We recommend the use of an MSA sample probe containing a special membrane filter, permeable to gas but impermeable to water, to prevent such an occurrence.
4.3 Replacing the Battery

**WARNING**
Never replace the battery in a hazardous area. This could result in an explosion.

---

**Fig. 11 Battery Replacement**

(1) Unscrew the two captive screws on the rear of the device.
(2) Pull the battery pack out of the device by gripping the sides and lifting it up and away from the device.

---

**Fig. 12 Battery Replacement**

For alkaline battery packs (ALTAIR 5X only):
(3) Remove the battery holder circuit board from the pack door.
(4) Replace the 3 cells, using only those listed on the label.
   ▶ Be sure to observe proper polarity on the cells.
(5) Place the battery holder circuit board back in the pack door, and re-install the door into the device.
(6) Tighten the two screws.
4.4 Live Maintenance Procedure - Sensor Replacement

Any factory-installed Series 20 sensor may be removed or replaced with a like type. The user may not change the type of any sensor. If the type of any sensor (including the IR sensor) is to be changed, the device must be returned to an authorized service center. See figure 13 for sensor placement.

**CAUTION**

Before handling the PC board, ensure you are properly grounded; otherwise, static charges from your body could damage the electronics. Such damage is not covered by the warranty. Grounding straps and kits are available from electronics suppliers.

**WARNING**

Remove and re-install sensors carefully, ensuring that the components are not damaged; otherwise device intrinsic safety may be adversely affected, wrong readings could occur, and persons relying on this product for their safety could sustain serious personal injury or death.

**CAUTION**

While device case is open, do not touch any internal components with metallic/conductive objects or tools. Damage to the device can occur.

Fig. 13 Possible positions for sensor replacement

<table>
<thead>
<tr>
<th>Position</th>
<th>Sensor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Combustible sensor</td>
</tr>
<tr>
<td>2</td>
<td>O₂, CO-H₂S sensor</td>
</tr>
<tr>
<td>3</td>
<td>NH₃, CL₂, SO₂ sensor (position with adapter)</td>
</tr>
<tr>
<td>4</td>
<td>CO-H₂S sensor</td>
</tr>
</tbody>
</table>
(1) Verify that the device is turned OFF.
(2) Remove the battery pack.
(3) Remove the two remaining case screws, and remove the case front.
(4) Gently remove the sensor to be replaced.
(5) Carefully align the new sensor contact pins with the sockets on the printed circuit board.
(6) Press the new sensor into place.
(7) Note the position restrictions in the table above.
   - Adapter (P/N 10110183) is required for XCell usage in Position #3.
   - Ensure that a sensor plug is properly installed in any position that does not have a sensor.
   - The plug for XCell positions is P/N 10105650.
   - The Series 20 plug is P/N 10088192.
(8) Re-install the sensor gasket in the case front.
(9) Re-install the front case, screws, and battery pack.
   If a change in XCell Sensor configuration is detected during the device turn-ON process:
   - The "ACCEPT?" prompt appears on the display
   - The ▼ button accepts the sensor configuration
   - The ▲ button rejects the sensor configuration; the device is not operational.
   When an XCell sensor is replaced, the device automatically enables the sensor after the change has been accepted. If a Series 20 sensor is replaced, it must be manually enabled (see section 3.4.3).
   If the oxygen sensor was replaced, see section 3.2.3 regarding the oxygen reading display.
(10) After installation of new sensors, allow them to stabilize at least 30 minutes before calibration.
(11) Calibrate device before use.

<table>
<thead>
<tr>
<th>SENSOR</th>
<th>OPERATIONAL ONLY IN POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>XCell combustible sensor</td>
<td>#1</td>
</tr>
<tr>
<td>XCell O₂ sensor</td>
<td>#2</td>
</tr>
<tr>
<td>XCell CO-H₂S Two-tox sensor</td>
<td>#2 or #4</td>
</tr>
<tr>
<td>XCell SO₂, Cl₂, NH₃</td>
<td>#3 or #4</td>
</tr>
<tr>
<td>XCell CO-HC</td>
<td>#4</td>
</tr>
<tr>
<td>Series 20 sensor</td>
<td>#3</td>
</tr>
</tbody>
</table>

WARNING
Calibration is required after a sensor is installed; otherwise, the device will not perform as expected and persons relying on this product for their safety could sustain serious personal injury or death.
4.5 **Replacing the Pump Filter**

1. Turn OFF the device.
2. Unscrew the two captive screws from the clear filter cover on the back of the device to access the filter.
3. Carefully lift out the O-ring and the filter disk.
4. Use both the paper-like filter and the fibrous dust filter (the thicker disk) as supplied in Maintenance Kit (P/N 10114949) if the device is NOT configured to use a reactive toxic gas sensor (does not have a Cl₂, ClO₂, or NH₃ sensor). Use ONLY the paper filter supplied in the Reactive Gas Maintenance Kit (P/N 10114950) if the device IS configured to use a reactive toxic gas sensor (Cl₂, ClO₂, or NH₃). Place the new paper-like filter into the recess in the back of the device. If it is to be used, place the fibrous dust filter into the clear filter cover.

5. Replace the O-ring in the recess.
6. Re-install the clear filter cover on the back of the device.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of the fibrous dust filter or the incorrect paper filter for the measurement of reactive gases could cause erroneous readings.</td>
</tr>
</tbody>
</table>

4.6 **Cleaning the Device Exterior**

Clean the exterior of the device regularly using only a damp cloth. Do not use cleaning agents as many contain silicones which will damage the combustible sensor.

4.7 **Storage**

When not in use, store the device in a safe, dry place between 65 °F (18 °C) and 86 °F (30 °C). After storage, always recheck device calibration before use. If not to be used in 30 days, remove battery pack or connect it to a charger.

4.8 **Shipment**

Pack the device in its original shipping container with suitable padding. If the original container is unavailable, an equivalent container may be substituted.
### Technical Specifications/Certifications

#### 5.1 Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight</strong></td>
<td>1 lb. (0.45 kg) - device with battery and clip (ALTAIR 5X unit)</td>
</tr>
<tr>
<td><strong>Weight (with IR Sensor)</strong></td>
<td>1.1 lb. (0.5 kg)</td>
</tr>
<tr>
<td><strong>Dimensions (cm)</strong></td>
<td>6.69&quot; H x 3.49&quot; W x 1.79&quot; D without belt clip (ALTAIR 5X unit)</td>
</tr>
<tr>
<td><strong>Dimensions (cm)</strong></td>
<td>6.68&quot; H x 3.52&quot; W x 1.92&quot; D (with IR Sensor)</td>
</tr>
<tr>
<td><strong>Alarms</strong></td>
<td>LEDs, audible alarm, vibrating alarm</td>
</tr>
<tr>
<td><strong>Volume of audible alarm</strong></td>
<td>95 dB typical</td>
</tr>
<tr>
<td><strong>Displays</strong></td>
<td>Monochrome</td>
</tr>
<tr>
<td><strong>Battery types</strong></td>
<td>Rechargeable Li ION battery</td>
</tr>
<tr>
<td></td>
<td>Replaceable AA alkaline (ALTAIR 5X only)</td>
</tr>
<tr>
<td><strong>Charging time</strong></td>
<td>≤ 6 hours</td>
</tr>
<tr>
<td></td>
<td>The maximum safe area charging voltage; Um = 6.7 Volts DC</td>
</tr>
<tr>
<td><strong>Normal Temperature range</strong></td>
<td>14 °F to 104 °F (-10 °C to 40 °C)</td>
</tr>
<tr>
<td><strong>Extended Temperature range</strong></td>
<td>-4 °F to 122 °F (-20 °C to 50 °C) Monochrome display</td>
</tr>
<tr>
<td></td>
<td>-4 °F to 104 °F (-20 °C to 40 °C) for devices with ClO2 sensors</td>
</tr>
<tr>
<td><strong>Short Term Operations (15 minutes) temperature range</strong></td>
<td>-40°F to 122°F (-40°C to 50°C)</td>
</tr>
<tr>
<td><strong>Humidity range</strong></td>
<td>15-90 % relative humidity, non-condensing, 5-95 % RH intermittent</td>
</tr>
<tr>
<td><strong>Atmospheric pressure range</strong></td>
<td>11.6 to 17.4 PSIA (80 to 120 kPA)</td>
</tr>
<tr>
<td><strong>Ingress protection</strong></td>
<td>IP 65</td>
</tr>
<tr>
<td><strong>Measuring methods</strong></td>
<td>Combustible gases - Catalytic or Infrared sensor</td>
</tr>
<tr>
<td></td>
<td>Oxygen and Toxic gases - Electrochemical or Infrared sensor</td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td>See section 1.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring Range</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ClO2</td>
<td>0-1.00 ppm</td>
</tr>
<tr>
<td>Cl2</td>
<td>0-10 ppm</td>
</tr>
<tr>
<td>CO</td>
<td>0-2000 ppm</td>
</tr>
<tr>
<td>CO - HC</td>
<td>0-10,000 ppm</td>
</tr>
<tr>
<td>Combustible</td>
<td>0-5.00 % CH4</td>
</tr>
<tr>
<td>H2S</td>
<td>0-200 ppm</td>
</tr>
<tr>
<td>H2S - LC</td>
<td>0-100 ppm</td>
</tr>
<tr>
<td>HCN</td>
<td>0-30 ppm</td>
</tr>
<tr>
<td>NH3</td>
<td>0-100 ppm</td>
</tr>
<tr>
<td>NO</td>
<td>0-200 ppm</td>
</tr>
<tr>
<td>NO2 (S20)</td>
<td>0-20.0 ppm</td>
</tr>
<tr>
<td>NO2 (XCell)</td>
<td>0-50.0 ppm</td>
</tr>
<tr>
<td>O2</td>
<td>0-30 % Vol.</td>
</tr>
<tr>
<td>PH3</td>
<td>0-5.00 ppm</td>
</tr>
<tr>
<td>PID</td>
<td>0-2000 ppm</td>
</tr>
<tr>
<td>SO2</td>
<td>0-20.0 ppm</td>
</tr>
</tbody>
</table>
### 5.2 Factory-set Alarm Thresholds and Setpoints

<table>
<thead>
<tr>
<th>Sensor</th>
<th>LOW alarm</th>
<th>HIGH alarm</th>
<th>SETPOINT min</th>
<th>SETPOINT max</th>
<th>STEL</th>
<th>TWA</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMB</td>
<td>0.5 % CH₄</td>
<td>1 % CH₄</td>
<td>0.1 % CH₄</td>
<td>3 % CH₄</td>
<td>--¹</td>
<td>--¹</td>
</tr>
<tr>
<td>CO</td>
<td>25 ppm</td>
<td>100 ppm</td>
<td>10 ppm</td>
<td>1700 ppm</td>
<td>100 ppm</td>
<td>25 ppm</td>
</tr>
<tr>
<td>H₂S</td>
<td>10 ppm</td>
<td>15 ppm</td>
<td>5 ppm</td>
<td>175 ppm</td>
<td>15 ppm</td>
<td>10 ppm</td>
</tr>
<tr>
<td>H₂S-LC</td>
<td>5 ppm</td>
<td>10 ppm</td>
<td>1 ppm</td>
<td>70 ppm</td>
<td>10 ppm</td>
<td>1 ppm</td>
</tr>
<tr>
<td>O₂</td>
<td>19.5 %</td>
<td>23.0 %</td>
<td>5.0 %</td>
<td>24.0 %</td>
<td>--¹</td>
<td>--¹</td>
</tr>
<tr>
<td>SO₂</td>
<td>2.0 ppm</td>
<td>5.0 ppm</td>
<td>2.0 ppm</td>
<td>17.5 ppm</td>
<td>5.0 ppm</td>
<td>2.0 ppm</td>
</tr>
<tr>
<td>NO</td>
<td>25</td>
<td>100</td>
<td>10</td>
<td>200</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>NO₂</td>
<td>2.0 ppm</td>
<td>5.0 ppm</td>
<td>1.0 ppm</td>
<td>17.5 ppm</td>
<td>5.0 ppm</td>
<td>2.0 ppm</td>
</tr>
<tr>
<td>NO₂ (XCell)</td>
<td>2.5 ppm</td>
<td>5.0 ppm</td>
<td>1.0 ppm</td>
<td>47.5 ppm</td>
<td>5.0 ppm</td>
<td>2.5 ppm</td>
</tr>
<tr>
<td>NH₃</td>
<td>25 ppm</td>
<td>50 ppm</td>
<td>10 ppm</td>
<td>75 ppm</td>
<td>35 ppm</td>
<td>25 ppm</td>
</tr>
<tr>
<td>PH₃</td>
<td>0.3 ppm</td>
<td>1.0 ppm</td>
<td>0.3 ppm</td>
<td>3.75 ppm</td>
<td>1.0 ppm</td>
<td>0.3 ppm</td>
</tr>
<tr>
<td>Cl₂</td>
<td>0.5 ppm</td>
<td>1.0 ppm</td>
<td>0.3 ppm</td>
<td>7.5 ppm</td>
<td>1.0 ppm</td>
<td>0.5 ppm</td>
</tr>
<tr>
<td>ClO₂</td>
<td>0.1 ppm</td>
<td>0.3 ppm</td>
<td>0.1 ppm</td>
<td>0.9 ppm</td>
<td>0.3 ppm</td>
<td>0.1 ppm</td>
</tr>
<tr>
<td>HCN</td>
<td>4.5 ppm</td>
<td>10.0 ppm</td>
<td>2.0 ppm</td>
<td>20.0 ppm</td>
<td>10 ppm</td>
<td>4.5 ppm</td>
</tr>
<tr>
<td>IR - CO₂ (10 % Vol)</td>
<td>0.5 %Vol</td>
<td>1.5% Vol</td>
<td>0.2 % Vol</td>
<td>8 % Vol</td>
<td>0.5 % Vol</td>
<td>1.5 % Vol</td>
</tr>
<tr>
<td>IR - Methane (100 % Vol)</td>
<td>--²</td>
<td>--²</td>
<td>--²</td>
<td>--²</td>
<td>--¹</td>
<td>--¹</td>
</tr>
</tbody>
</table>

¹STEL and TWA not applicable for combustible and oxygen gases.
²No alarm thresholds are possible for the 0-100 % Vol Methane sensor. In environments with >100 % LEL combustible gas present, devices with a catalytic combustible LEL sensor will be in a latching over-range alarm, and the 100 % Vol IR sensors will display the % Vol gas reading.
**5.3 Performance Specifications**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Range</th>
<th>Resolution</th>
<th>Reproducibility</th>
<th>Response time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Combustible (LEL)</strong></td>
<td>0-5 % CH₄</td>
<td>0.05 Vol % CH₄</td>
<td>Normal temp range: ±0.10 % CH₄, 0.00 % CH₄</td>
<td>90 % of final reading</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>±0.15 % CH₄, 0.25 % CH₄</td>
<td>&lt; 10 seconds (Methane) (normal temp. range)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>±0.15 % CH₄, 0.50 % CH₄</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>±0.20 % CH₄, 1.00 % CH₄</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>±0.20 % CH₄, 2.00 % CH₄</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>±0.30 % CH₄, 3.00 % CH₄</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>±0.30 % CH₄, 4.00 % CH₄</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>±0.30 % CH₄, 4.50 % CH₄</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>90 % of final reading</td>
<td></td>
</tr>
<tr>
<td><strong>Oxygen</strong></td>
<td>0-30 % O₂⁻</td>
<td>0.1 % O₂</td>
<td>0.7 % O₂ for 0-30 % O₂</td>
<td>t(90) &lt; 10 sec (normal temp.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.7 % O₂ for O₂ ≤ 15 % (MSHA version only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.5 % O₂ for O₂ ≤ 15 % ≤ O₂ &lt; 30 % (MSHA version only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>t(90) &lt; 10 sec (normal temp.)</td>
<td></td>
</tr>
<tr>
<td><strong>Carbon Monoxide</strong></td>
<td>0-2000 ppm CO</td>
<td>1 ppm CO</td>
<td>Normal temp. range: ±5 ppm CO or 10 % of reading, whichever is greater</td>
<td>t(90) &lt; 15 sec (normal temp.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Extended temp. range: ±10 ppm CO or 20 % of reading, whichever is greater</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>t(90) &lt; 15 sec (normal temp.)</td>
<td></td>
</tr>
<tr>
<td><strong>Hydrogen Sulfide</strong></td>
<td>0-200 ppm H₂S</td>
<td>1 ppm H₂S,</td>
<td>Normal temp. range: ±2 ppm H₂S or 10 % of reading, whichever is greater</td>
<td>t(90) &lt; 15 sec (normal temp.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for 3-200 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>H₂S</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Extended temp. range: ±20 ppm H₂S or 20 % of reading, whichever is greater</td>
<td></td>
</tr>
</tbody>
</table>

**IR Sensors**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Range</th>
<th>Resolution</th>
<th>Reproducibility of the zero point</th>
<th>Reproducibility of the measured value</th>
<th>Response time at 20 °C t90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>0-10 % Vol</td>
<td>0.01 % Vol</td>
<td>≤ ± 0.01 % Vol</td>
<td>≤ ±4 %</td>
<td>≤ 35 s</td>
</tr>
<tr>
<td>Methane</td>
<td>0-100 % Vol</td>
<td>1 % Vol</td>
<td>≤ ± 5 % Vol</td>
<td>≤ ±2% Vol or ±10% of reading, whichever is greater</td>
<td>≤ 34 s</td>
</tr>
</tbody>
</table>
### Additional Toxic Sensors

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Range (ppm)</th>
<th>Resolution (ppm)</th>
<th>Normal temperature range</th>
<th>Extended temp. range</th>
<th>Nominal response *</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cl₂</strong> Chlorine</td>
<td>0-10</td>
<td>0.05</td>
<td>±0.2 ppm or 10 % of reading, whichever is greater</td>
<td>±0.5 ppm or 20 % of reading, whichever is greater</td>
<td>t(90) &lt; 30 s</td>
</tr>
<tr>
<td><strong>ClO₂</strong> Chlorine dioxide</td>
<td>0-1</td>
<td>0.01</td>
<td>±0.1 ppm or 10 % of reading, whichever is greater</td>
<td>±0.2 ppm or 20 % of reading, whichever is greater</td>
<td>t(90) &lt; 2 min</td>
</tr>
<tr>
<td><strong>CO-HC</strong> Carbon Monoxide</td>
<td>0-10000</td>
<td>5</td>
<td>±5 ppm or 10 % of reading, whichever is greater</td>
<td>±10 ppm or 20 % of reading, whichever is greater</td>
<td>t(90) &lt; 15 s</td>
</tr>
<tr>
<td><strong>H₂S-LC</strong> Hydrogen Sulfide</td>
<td>0-100</td>
<td>0.1</td>
<td>±0.2 ppm or 10 % of reading, whichever is greater</td>
<td>±0.5 ppm or 20 % of reading, whichever is greater</td>
<td>t(90) &lt; 15 s</td>
</tr>
<tr>
<td><strong>HCN</strong> Hydrogen cyanide</td>
<td>0-30</td>
<td>0.5</td>
<td>±1 ppm or 10 % of reading, whichever is greater</td>
<td>±2 ppm or 20 % of reading, whichever is greater</td>
<td>t(90) &lt; 30 s</td>
</tr>
<tr>
<td><strong>NH₃</strong> Ammonia</td>
<td>0-100</td>
<td>1</td>
<td>±2 ppm or 10 % of reading, whichever is greater</td>
<td>±5 ppm or 20 % of reading, whichever is greater</td>
<td>t(90) &lt; 40 s</td>
</tr>
<tr>
<td><strong>NO₂</strong> Nitrogen dioxide (S 20)</td>
<td>0-20</td>
<td>0.1</td>
<td>±2 ppm or 10 % of reading, whichever is greater</td>
<td>±3 ppm or 20 % of reading, whichever is greater</td>
<td>t(90) &lt; 40 s</td>
</tr>
<tr>
<td><strong>NO₂</strong> Nitrogen dioxide (XCell)</td>
<td>0-50</td>
<td>0.1</td>
<td>±1 ppm or 10 % of reading, whichever is greater</td>
<td>±2 ppm or 20 % of reading, whichever is greater</td>
<td>t(90) &lt; 15 s</td>
</tr>
<tr>
<td><strong>NO</strong> Nitric oxide</td>
<td>0-200</td>
<td>1</td>
<td>±5 ppm or 10 % of reading, whichever is greater</td>
<td>±10 ppm or 20 % of reading, whichever is greater</td>
<td>t(90) &lt; 40 s</td>
</tr>
<tr>
<td><strong>PH₃</strong> Phosphine</td>
<td>0-5</td>
<td>0.05</td>
<td>±0.2 ppm or 10 % of reading, whichever is greater</td>
<td>±0.25 ppm or 20 % of reading, whichever is greater</td>
<td>t(90) &lt; 30 s</td>
</tr>
<tr>
<td><strong>SO₂</strong> Sulfur dioxide</td>
<td>0-20</td>
<td>0.1</td>
<td>±2 ppm or 10 % of reading, whichever is greater</td>
<td>±3 ppm or 20 % of reading, whichever is greater</td>
<td>t(90) &lt; 20 s</td>
</tr>
</tbody>
</table>

* Response time is for normal temperature range with sensor in position #3
5.4 Calibration Specifications
See section 6.1 for MSA gas cylinder part numbers.

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Zero Gas</th>
<th>Zero Cal Value**</th>
<th>Span Cal Gas</th>
<th>Span Cal Value</th>
<th>Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMB Methane (0-5 % Vol)</td>
<td>Fresh Air</td>
<td>0</td>
<td>2.5 % Vol Methane</td>
<td>2.5 %</td>
<td>1</td>
</tr>
<tr>
<td>O₂</td>
<td>Fresh Air</td>
<td>20.8 %</td>
<td>15 % O₂</td>
<td>15 %</td>
<td>1</td>
</tr>
<tr>
<td>CO</td>
<td>Fresh Air</td>
<td>0</td>
<td>60 ppm CO</td>
<td>60 ppm</td>
<td>1</td>
</tr>
<tr>
<td>H₂S</td>
<td>Fresh Air</td>
<td>0</td>
<td>20 ppm H₂S</td>
<td>20 ppm</td>
<td>1</td>
</tr>
<tr>
<td>SO₂</td>
<td>Fresh Air</td>
<td>0</td>
<td>10 ppm SO₂</td>
<td>10 ppm</td>
<td>1</td>
</tr>
<tr>
<td>Cl₂</td>
<td>Fresh Air</td>
<td>0</td>
<td>10 ppm Cl₂</td>
<td>10 ppm</td>
<td>2</td>
</tr>
<tr>
<td>NO</td>
<td>Fresh Air</td>
<td>0</td>
<td>50 ppm NO</td>
<td>50 ppm</td>
<td>4</td>
</tr>
<tr>
<td>NO₂</td>
<td>Fresh Air</td>
<td>0</td>
<td>10 ppm NO₂</td>
<td>10 ppm</td>
<td>2</td>
</tr>
<tr>
<td>NH₃</td>
<td>Fresh Air</td>
<td>0</td>
<td>25 ppm NH₃</td>
<td>25 ppm</td>
<td>2</td>
</tr>
<tr>
<td>PH₃</td>
<td>Fresh Air</td>
<td>0</td>
<td>0.5 ppm PH₃</td>
<td>0.5 ppm</td>
<td>1</td>
</tr>
<tr>
<td>HCN</td>
<td>Fresh Air</td>
<td>0</td>
<td>10 ppm HCN</td>
<td>10 ppm</td>
<td>4</td>
</tr>
<tr>
<td>**ClO₂</td>
<td>Fresh Air</td>
<td>0</td>
<td>2 ppm Cl₂</td>
<td>0.8 ppm</td>
<td>6</td>
</tr>
<tr>
<td>IR CO₂ (10 % Vol)</td>
<td>Fresh Air</td>
<td>0.03 %</td>
<td>2.5 % CO₂</td>
<td>2.5 %</td>
<td>2</td>
</tr>
<tr>
<td>IR Methane (100 % Vol)</td>
<td>Fresh Air</td>
<td>0</td>
<td>50 % Vol Methane</td>
<td>50 % Vol</td>
<td>2</td>
</tr>
</tbody>
</table>

Span values can be changed if using different gas cylinders than those listed. Changes can be made using MSA Link software.

*See section 5.6.
**For most accurate results, calibration with ClO₂ is recommended.
***Zero cal time is one minute if a catalytic combustible or an IR sensor is installed - 30 seconds if not.

5.5 Certifications
See device label for the certifications that applies to your specific device.

USA (Mining)  MSHA 30 CFR Part 22, Methane Detector.
Approved for 30 CFR Part 75 Determination testing for methane and oxygen deficiency

5.6 XCell Sensor Patents

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Part No.</th>
<th>Patent Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustible</td>
<td>10106722</td>
<td>Patent Pending</td>
</tr>
<tr>
<td>Oxygen</td>
<td>10106729</td>
<td>Patent Pending</td>
</tr>
<tr>
<td>Carbon Monoxide / Hydrogen Sulfide</td>
<td>10106725</td>
<td>Patent Pending</td>
</tr>
<tr>
<td>Ammonia</td>
<td>10106726</td>
<td>Patent Pending</td>
</tr>
<tr>
<td>Chlorine</td>
<td>10106728</td>
<td>Patent Pending</td>
</tr>
<tr>
<td>Sulphur Dioxide</td>
<td>10106727</td>
<td>Patent Pending</td>
</tr>
</tbody>
</table>
## Order Information

### 6.1 Gas Cylinder Parts List

<table>
<thead>
<tr>
<th># Gases</th>
<th>Gas Mix</th>
<th>MSA P/N</th>
<th>Recommended CAL Gas for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10 % CO₂ in N₂</td>
<td>10081603</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>50 % Vol Methane in N₂ (103L)</td>
<td>10075804</td>
<td>100 % Vol Methane IR</td>
</tr>
<tr>
<td>1</td>
<td>100 % Vol Methane</td>
<td>711014</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>10 ppm NO₂ in Air</td>
<td>711068</td>
<td>808977</td>
</tr>
<tr>
<td>1</td>
<td>10 ppm SO₂ in Air</td>
<td>711070</td>
<td>808978</td>
</tr>
<tr>
<td>1</td>
<td>25 ppm NH₃ in N₂</td>
<td>711078</td>
<td>814866</td>
</tr>
<tr>
<td>1</td>
<td>10 ppm Cl₂ in N₂</td>
<td>711066</td>
<td>806740</td>
</tr>
<tr>
<td>1</td>
<td>2 ppm Cl₂ in N₂</td>
<td>711082</td>
<td>10028080</td>
</tr>
<tr>
<td>1</td>
<td>10 ppm HCN in N₂</td>
<td>711072</td>
<td>809351</td>
</tr>
<tr>
<td>1</td>
<td>0.5 ppm PH₃ in N₂</td>
<td>711088</td>
<td>710533</td>
</tr>
<tr>
<td>3</td>
<td>2.50 % CH₄, 15.0 % O₂, 20 ppm H₂S</td>
<td>10048888</td>
<td>10048889</td>
</tr>
<tr>
<td>3</td>
<td>2.50 % CH₄, 15.0 % O₂, 60 ppm CO</td>
<td>10049056</td>
<td>813718</td>
</tr>
<tr>
<td>4</td>
<td>2.50 % CH₄, 15.0 % O₂, 60 ppm CO, 20 ppm H₂S</td>
<td>10048981</td>
<td>10048890</td>
</tr>
<tr>
<td>4</td>
<td>2.50 % CH₄, 15.0 % O₂, 60 ppm CO, 10 ppm NO₂</td>
<td>10058172</td>
<td></td>
</tr>
</tbody>
</table>
## 6.2 Accessories Parts List

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calibration Accessories</strong></td>
<td></td>
</tr>
<tr>
<td>Demand Regulator Kit</td>
<td>710288</td>
</tr>
<tr>
<td>Cl₂/NH₃/ClO₂ Demand Regulator Kit</td>
<td>10034391</td>
</tr>
<tr>
<td><strong>Interface &amp; Carrying Accessories</strong></td>
<td></td>
</tr>
<tr>
<td>MSA Link USB dongle</td>
<td>10082834</td>
</tr>
<tr>
<td>MSA Link Datalogging Software</td>
<td>10088099</td>
</tr>
<tr>
<td>Shoulder Strap</td>
<td>474555</td>
</tr>
<tr>
<td>Retractable Line with Belt Clip</td>
<td>10050976</td>
</tr>
<tr>
<td>Holster, leather</td>
<td>10099648</td>
</tr>
<tr>
<td><strong>Charging Accessories</strong></td>
<td></td>
</tr>
<tr>
<td>Charger only (North America)</td>
<td>10087913</td>
</tr>
<tr>
<td>Charging Cradle with Barrier- (North America)</td>
<td>10093055</td>
</tr>
<tr>
<td>Charging Cradle - (North America)</td>
<td>10093054</td>
</tr>
<tr>
<td>Vehicle Charger Cradle</td>
<td>10099397</td>
</tr>
<tr>
<td>Cradle Only - (no charger)</td>
<td>10093053</td>
</tr>
<tr>
<td>4-Unit Multi-Unit Charger NA Plug</td>
<td>10127427</td>
</tr>
<tr>
<td><strong>Sample Lines &amp; Probes</strong></td>
<td></td>
</tr>
<tr>
<td>Probe, 1 ft. straight PEEK</td>
<td>10042621</td>
</tr>
<tr>
<td>Probe, 3 ft. straight PEEK</td>
<td>10042622</td>
</tr>
<tr>
<td>Polyurethane Sample Line, 10 ft.</td>
<td>10040665</td>
</tr>
<tr>
<td>Polyurethane Sample Line, 25 ft.</td>
<td>10040664</td>
</tr>
<tr>
<td>Polyurethane Sample Line, 3 ft. Coiled</td>
<td>10040667</td>
</tr>
<tr>
<td>(Cl₂, ClO₂, NH₃) 5 ft. PU Coiled Sample line &amp; probe, kit</td>
<td>10105210</td>
</tr>
<tr>
<td>(Cl₂, ClO₂, NH₃) 5 ft. PU Sample line &amp; probe, kit</td>
<td>10105251</td>
</tr>
<tr>
<td>(Cl₂, ClO₂, NH₃) 10 ft. Teflon Sample line &amp; probe, kit</td>
<td>10105839</td>
</tr>
<tr>
<td>Replacement Filters for probe, 10 pack</td>
<td>801582</td>
</tr>
<tr>
<td>ALTAIR Hand Probe</td>
<td>10153041</td>
</tr>
<tr>
<td>Quick Connector, ALTAIR Hand Probe</td>
<td>10161755</td>
</tr>
<tr>
<td>Sampling line, 5ft, PU, non-conductive</td>
<td>10153217</td>
</tr>
<tr>
<td>Sampling line, 10ft, PU, non-conductive</td>
<td>10153218</td>
</tr>
<tr>
<td>Sampling line, 15ft, PU, non-conductive</td>
<td>10153219</td>
</tr>
</tbody>
</table>
6.3 Device Replacement Parts
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Case assembly, upper, with label</td>
<td>10114853</td>
</tr>
<tr>
<td>2</td>
<td>Battery pack, rechargeable, MSHA, ALTAIR 5X</td>
<td>10147308</td>
</tr>
<tr>
<td></td>
<td>Battery pack, alkaline, MSHA, ALTAIR 5X</td>
<td>10114837</td>
</tr>
<tr>
<td></td>
<td>Battery pack, rechargeable, MSHA, ALTAIR 5X IR</td>
<td>10147309</td>
</tr>
<tr>
<td>3</td>
<td>Kit, belt clip replacement, (ALTAIR 5X rechargeable)</td>
<td>10094830</td>
</tr>
<tr>
<td></td>
<td>Kit, maintenance (includes filters, o-ring, screws)</td>
<td>10114949</td>
</tr>
<tr>
<td></td>
<td>Kit, maintenance, reactive gas (Cl₂, ClO₂, NH₃) (includes filters, o-ring, screws)</td>
<td>10114950</td>
</tr>
<tr>
<td>4</td>
<td>Filter cover assembly</td>
<td>10083591</td>
</tr>
<tr>
<td>5</td>
<td>Display assembly, monochrome</td>
<td>10111389</td>
</tr>
<tr>
<td>6</td>
<td>Sensor bracket assembly with pump, ALTAIR 5X (includes vibrator motor)</td>
<td>10114804</td>
</tr>
<tr>
<td></td>
<td>Sensor bracket assembly with pump, ALTAIR 5X IR (includes vibrator motor)</td>
<td>10114805</td>
</tr>
<tr>
<td>7</td>
<td>Kit, pump cap replacement</td>
<td>10114855</td>
</tr>
<tr>
<td>8</td>
<td>Sensor, HCN (Series 20)</td>
<td>10106375</td>
</tr>
<tr>
<td></td>
<td>XCell Sensor, Cl₂</td>
<td>10106728</td>
</tr>
<tr>
<td></td>
<td>Sensor, ClO₂ (Series 20)</td>
<td>10080222</td>
</tr>
<tr>
<td></td>
<td>XCell Sensor, SO₂</td>
<td>10106727</td>
</tr>
<tr>
<td></td>
<td>Sensor, NO₂ (Series 20)</td>
<td>10080224</td>
</tr>
<tr>
<td></td>
<td>XCell Sensor, NH₃</td>
<td>10106726</td>
</tr>
<tr>
<td></td>
<td>Sensor, PH₃ (Series 20)</td>
<td>10116638</td>
</tr>
<tr>
<td></td>
<td>XCell Sensor, COMB</td>
<td>10121212</td>
</tr>
<tr>
<td></td>
<td>XCell Sensor, O₂</td>
<td>10106729</td>
</tr>
<tr>
<td></td>
<td>XCell Sensor, CO-H₂S, Two-Tox</td>
<td>10106725</td>
</tr>
<tr>
<td></td>
<td>XCell Sensor, CO/ NO₂</td>
<td>10177766</td>
</tr>
<tr>
<td></td>
<td>XCell Sensor, CO-HC</td>
<td>10121216</td>
</tr>
<tr>
<td></td>
<td>XCell Sensor, H₂S-LC/CO</td>
<td>10121213</td>
</tr>
<tr>
<td></td>
<td>XCell Sensor, CO⁻H₂ Res/H₂S</td>
<td>10121214</td>
</tr>
<tr>
<td></td>
<td>Sensor, NO (Series 20)</td>
<td>10114750</td>
</tr>
<tr>
<td></td>
<td>XCell Sensor plug</td>
<td>10105650</td>
</tr>
<tr>
<td></td>
<td>20 mm sensor plug</td>
<td>10088192</td>
</tr>
<tr>
<td>9</td>
<td>XCell adapter socket</td>
<td>10110183</td>
</tr>
<tr>
<td>Description</td>
<td>Part No.</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>IR sensors – must be repaired or replaced at a Certified Service Center</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO\textsubscript{2}</td>
<td>0-10 % Vol</td>
<td>10145738-SP</td>
</tr>
<tr>
<td>CH\textsubscript{4}</td>
<td>0-100 % Vol (Methane)</td>
<td>10145752-SP</td>
</tr>
</tbody>
</table>
7 Flow Charts
7.1 Basic Operation

FLOW CHARTS

TURN-ON OR BATTERY ATTACH

PUMP TEST

SENSOR DISCOVERY

SENSOR AND CALIBRATION INFORMATION

FRESH AIR SETUP? *

BUMP TEST / INFORMATIONAL PAGES

MAIN MEASURE PAGE

CALIBRATE

SETUP

InstantAlert™ *

TURN OFF

* IF ENABLED
7.2 Bump Test / Informational Pages

BUMP TEST / INFORMATIONAL PAGES

PERFORM SENSOR BUMP TEST

BUMP TEST?

MAIN MEASURE PAGE

Press ▲

Press ▼

PEAK *

Press ▲

Press ▼

MIN

Press ▲

Press ▼

STE L *

Press ▲

Press ▼

TWA *

Press ▲

Press ▼

MAIN MEASURE PAGE

* IF ENABLED (NOT VALID FOR ALL SENSORS)
Flow Charts

Continued

DATE

LAST CAL DATE *

CAL DUE DATE *

MOTION ALERT STATUS *

TOGGLE ON/OFF

TOGGLE ON/OFF

WIRELESS **

MAIN MEASURE PAGE

* IF ENABLED

** IF WIRELESS IS INSTALLED
7.3 Calibrations

Flow Charts

- **CALIBRATE**
  - **PASSWORD ?** (IF REQUIRED)
    - **PASSWORD FAIL**
      - **ZERO CAL ?**
        - **ZERO CALIBRATION**
          - Press ▼
        - Press ▲
      - **SPAN CAL ?** (REPEATS AS NECESSARY)
        - **SPAN CALIBRATION**
          - Press ▼
        - Press ▲
    - **MAIN MEASURE PAGE**
      - Press ▼
      - Press ▲
  - **PERFORM FRESH AIR SETUP**
    - Press ▼
    - Press ▲
7.4 Setup

- SETUP
  - ENTER PASSWORD
    - PASSWORD FAIL
      - CALIBRATION OPTIONS ?
        - Press ▼
          - ALARM OPTIONS ?
            - Press ▼
              - INSTRUMENT OPTIONS ?
                - Press ▼
                  - EXIT ?
                    - Press ❌
                      - MAIN MEASURE PAGE
                    - Press ✅
                      - CALIBRATION OPTIONS
                        - Press ✅
                          - ALARM OPTIONS
                            - Press ✅
                              - INSTRUMENT OPTIONS
                                - Press ✅
7.5 Calibration Options

CALIBRATION OPTIONS

CYLINDER SETTINGS

Press \( \downarrow \)

CALIBRATION DUE

Press \( \downarrow \)

SHOW LAST CAL DATE AT STARTUP

Press \( \downarrow \)

PASSWORD PROTECTED CALIBRATION

Press \( \downarrow \)

BACK TO SETUP?

Press \( \downarrow \)

RETURN TO SETUP

SET SPAN GAS FOR EACH SENSOR

ON / OFF, SET # OF DAYS

TOGGLE ON / OFF

TOGGLE ON / OFF

Press \( \downarrow \)

Press \( \downarrow \)

Press \( \downarrow \)

Press \( \downarrow \)

Press \( \downarrow \)

Press \( \downarrow \)
7.6 Alarm Options

- **VIBRATOR**
  - TOGGLE ON/OFF
  - Press \( \text{on} \) \( \text{off} \)

- **HORN**
  - TOGGLE ON/OFF
  - Press \( \text{on} \) \( \text{off} \)

- **ALARM LEDS**
  - TOGGLE ON/OFF
  - Press \( \text{on} \) \( \text{off} \)

- **USER ACCESS TO MOTION ALERT**
  - TOGGLE ON/OFF
  - Press \( \text{on} \) \( \text{off} \)

- **SENSOR ALARMS?**
  - SENSOR ALARM SETUP
  - Press

- **BACK TO SETUP?**
  - RETURN TO SETUP
  - Press \( \text{on} \) \( \text{off} \)
7.7 Sensor Alarm Setup

NOTE: STEL AND TWA ARE NOT VALID FOR ALL SENSORS
Flow Charts

7.8 Instrument Options

INSTRUMENT OPTIONS

SENSOR SETUP

Press

LANGUAGE

Press

TIME / DATE

Press

DATALOG INTERVAL

Press

STEALTH MODE

Press

SENSOR SETUP

SELECT

SET HH:MM
MM:DD:YY

SET MM:SS

TOGGLE ON/OFF

Press
Continued

OPERATING BEEP

TOGGLE ON/OFF

Press

Press

CONTRAST (MONO ONLY)

ADJUST

Press

Press

BACKLIGHT

ON / OFF TIMEOUT PERIOD

Press

Press

BACK TO SETUP ?

RETURN TO SETUP

Press

Press
7.9 Sensor Setup

SENSOR SETUP

COMB SENSOR **

TOXIC SENSOR ** (REPEATS AS NECESSARY)

IR SENSOR **

RETURN TO DEVICE OPTIONS

SHOW STATUS

TOGGLE SENSOR ON/OFF

Press \(^\downarrow\) Press \(^\uparrow\)

Press \(^\downarrow\) Press \(^\uparrow\)

Press \(^\downarrow\) Press \(^\uparrow\)

** IF INSTALLED
# Changeable Feature Summary

<table>
<thead>
<tr>
<th>Feature</th>
<th>Initial Setting</th>
<th>Setup Path to Change this Setting</th>
<th>See sections:</th>
<th>Change with MSA link?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup Password</td>
<td>672</td>
<td>No</td>
<td>3.4</td>
<td>Yes</td>
</tr>
<tr>
<td>Vibrating Alarm</td>
<td>ON</td>
<td>ALARM OPTIONS</td>
<td>2.2.3, 3.4.2</td>
<td>Yes</td>
</tr>
<tr>
<td>Horn Alarm</td>
<td>ON</td>
<td>ALARM OPTIONS</td>
<td>2.2.3, 3.4.2</td>
<td>Yes</td>
</tr>
<tr>
<td>LED Alarm</td>
<td>ON</td>
<td>ALARM OPTIONS</td>
<td>2.2.3, 3.4.2</td>
<td>Yes</td>
</tr>
<tr>
<td>Safe LED (green)</td>
<td>ON</td>
<td>No</td>
<td>2.2.3</td>
<td>Yes</td>
</tr>
<tr>
<td>Operating Beep (alarm LEDs &amp; horn)</td>
<td>OFF</td>
<td>INSTRUMENT OPTIONS</td>
<td>2.2.3, 3.4.3</td>
<td>Yes</td>
</tr>
<tr>
<td>Stealth</td>
<td>OFF</td>
<td>INSTRUMENT OPTIONS</td>
<td>2.2.3, 3.4.3</td>
<td>No</td>
</tr>
<tr>
<td>MotionAlert - Access</td>
<td>Allowed</td>
<td>ALARM OPTIONS</td>
<td>2.4.9, 3.4.2</td>
<td>No</td>
</tr>
<tr>
<td>MotionAlert</td>
<td>OFF</td>
<td>Use ▼ button from MEASURE page</td>
<td>2.2.3</td>
<td>No</td>
</tr>
<tr>
<td>Sensor Alarm Levels</td>
<td>See section 5.4</td>
<td>ALARM OPTIONS / SENSOR ALARM SETUP</td>
<td>2.6, 2.7, 2.8, 2.8, 3.4.2</td>
<td>Yes</td>
</tr>
<tr>
<td>Enable / Disable High &amp; Low Alarms</td>
<td>Enabled</td>
<td>No</td>
<td>2.6, 2.7, 2.9</td>
<td>Yes</td>
</tr>
<tr>
<td>Turn Sensors ON / OFF</td>
<td>ON</td>
<td>INSTRUMENT OPTIONS</td>
<td>2.6, 2.7, 3.4.3</td>
<td>Yes</td>
</tr>
<tr>
<td>Show Peak</td>
<td>ON</td>
<td>No</td>
<td>2.4.2</td>
<td>Yes</td>
</tr>
<tr>
<td>Show STEL, TWA</td>
<td>ON</td>
<td>No</td>
<td>2.4.4, 2.4.5</td>
<td>Yes</td>
</tr>
<tr>
<td>Cal Cylinder Setup</td>
<td>See section 5.3</td>
<td>CAL OPTIONS</td>
<td>3.4.1</td>
<td>Yes</td>
</tr>
<tr>
<td>Show Last Cal Date</td>
<td>ON</td>
<td>CAL OPTIONS</td>
<td>2.4.7, 3.4.1</td>
<td>Yes</td>
</tr>
<tr>
<td>Show Cal Due</td>
<td>ON</td>
<td>CAL OPTIONS</td>
<td>2.4.8, 3.4.1</td>
<td>No</td>
</tr>
<tr>
<td>Cal Password Required</td>
<td>Not req'd.</td>
<td>CAL OPTIONS</td>
<td>3.4.1</td>
<td>No</td>
</tr>
<tr>
<td>Backlight</td>
<td>Enabled</td>
<td>No</td>
<td>2.2.3, 3.4.3</td>
<td>No</td>
</tr>
<tr>
<td>Backlight Duration</td>
<td>10 secs</td>
<td>INSTRUMENT OPTIONS</td>
<td>3.4.3</td>
<td>Yes</td>
</tr>
<tr>
<td>Display Contrast</td>
<td>Factory-set</td>
<td>INSTRUMENT OPTIONS</td>
<td>3.4.3</td>
<td>No</td>
</tr>
<tr>
<td>Language</td>
<td>User-set</td>
<td>INSTRUMENT OPTIONS</td>
<td>3.4.3</td>
<td>No</td>
</tr>
<tr>
<td>Date, Time</td>
<td>User-set</td>
<td>INSTRUMENT OPTIONS</td>
<td>3.4.3</td>
<td>Yes</td>
</tr>
<tr>
<td>Datalog Interval</td>
<td>3 min</td>
<td>INSTRUMENT OPTIONS</td>
<td>3.4.3</td>
<td>Yes</td>
</tr>
<tr>
<td>Device S/N</td>
<td>Factory-set</td>
<td>No</td>
<td>3.2</td>
<td>Yes</td>
</tr>
<tr>
<td>Company Name</td>
<td>Blank</td>
<td>No</td>
<td>3.2</td>
<td>Yes</td>
</tr>
<tr>
<td>Dept./User Name</td>
<td>Blank</td>
<td>No</td>
<td>3.2</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Because every life has a purpose...

For local MSA contacts, please visit us at MSAsafety.com