Operating Manual

ALTAIR io™ 6 Multigas Detector



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US

MSAsafety.com

WARNING!

These instructions must be provided to users before use of the product and retained for ready reference by the user. Read this manual carefully before using or maintaining the device. The device will perform as designed only if it is used and maintained in accordance with the manufacturer's instructions. Otherwise, it could fail to perform as designed, and persons who rely on this device could sustain serious injury or death.

The warranties made by MSA with respect to the product are voided if the product is not installed and used in accordance with the instructions in this manual. Please protect yourself and your employees by following the instructions.

Please read and observe the WARNINGS and CAUTIONS inside. For additional information relative to use or repair, call 1-800-MSA-2222 during regular working hours.

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1 Safety Notices

1.1 General Notices

- For Declaration of Conformity, please visit the product page on MSAsafety.com.
- This product incorporates Bluetooth wireless technology.
- Alternative use or use outside manufacturer specifications will be considered non-compliance. This also applies to unauthorized alterations of the product and to commissioning work that has not been carried out by MSA or authorized persons.

NOTICE

- Use of any charger other than the charger supplied with the device or sold by MSA for use with the ALTAIR io 6 may damage or improperly charge the battery.

⚠ WARNING!

- Cellular connectivity is dependent upon signal availability and strength of the wireless service(s) necessary to maintain the communication link. Loss of cellular connectivity will prevent remote communication of alerts and other data from the device to the Grid as well as from the Grid to the device. Low signal strength will delay remote communication of alerts and other data from the device to the Grid as well as from the Grid to the device. Take appropriate precautions in the event of a loss of cellular connectivity or low signal strength.
- When cellular connectivity is restored, data from the time period without cellular connectivity is transmitted to the cloud before the device begins communicating current alerts and data to the Grid. This may result in a delay between when cellular connectivity is restored and when the device can be monitored on the Grid.

NOTE: The gas detection function of the device is not impaired by cellular connectivity.

Failure to follow these warnings can result in serious personal injury or death.

1.2 Liability

MSA accepts no liability in cases where the device has been misused, used inappropriately or not used as intended. MSA accepts no liability in cases where damage or injury is caused by wear and tear, neglect or failure to carry out inspection and maintenance procedures. The selection and use of the device are the exclusive responsibility of the employer and/or individual operator. Warranties and guarantees made by MSA with respect to the device are voided, if it is not used, serviced or maintained in accordance with the instructions in this manual.

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.

Changes and modifications not expressly approved by the manufacturer will void the user's authority to operate the equipment.

Follow all relevant national regulations applicable in country of use.

1.3 Before You Start

⚠ WARNING!

- Carefully review the following safety limitations and precautions before placing this device in service. Do not alter or modify the device.
- Please read this user guide carefully before using the device.
- The device will perform as designed only if it is used and maintained in accordance with the manufacturer's instruction. Otherwise, it could fail to perform as designed.
- In addition to manufacturer instructions, applicable national regulations should be considered for safe use.

Failure to follow this warning can result in serious personal injury or death.

1.3.1 General Warnings and Precautions

⚠ WARNING!

- Use the device only to detect gases/vapors for which a sensor is installed.
- Do not use the device to detect combustible dusts or mists.
- Do not open the device in an explosive atmosphere.
- Perform a blocked flow test before each day's use.
- Recheck calibration if unit is subjected to physical shock.
- Charging the device in a hazardous environment poses a risk of explosion. Do not charge the device in a hazardous area.
- For accurate catalytic combustible readings, make sure adequate oxygen is present (>10 % O2). The combustible sensor will display XXX when oxygen levels below 10% are detected.
- Never block pump inlet, except to perform a sampling system safety test. Have a trained and qualified person interpret device readings.
- Use only MSA-approved sampling lines.
- 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.
- Do not use the device if:
  - the function test is unsuccessful,
  - the device is damaged,
  - a competent servicing/maintenance has not been completed, or
  - genuine MSA spare parts have not been used.
- If the device is subjected to physical shock, the device must pass calibration before continuing use.
- Do not use lubricants, including silicone-type lubricants when assembling the detector, and do not allow silicone vapors to be drawn into the flow system while in operation. Silicone can desensitize the combustible gas sensor, thereby giving erroneously low readings.
- 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.
- Wait sufficient time for the reading; response times vary based on gas and length of sampling line.
- Allow sufficient time for device to display accurate reading. Response times vary based on the type of sensor being utilized. 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.
- 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.

Failure to follow these warnings can result in serious personal injury or death.

NOTE: Outside the US: The device is suitable and certified for the measurement of the oxygen concentration in gas mixtures for inertisation according to EN 50104 without alarm function.

NOTE: For Brazil Only: This equipment is not entitled to protection against harmful interference and may not cause interference to properly licensed systems. For more information, see ANATEL's website at https://www.gov.br/anatel/pt-br/

1.3.2 Functional Check

Before each day’s use, check the function of the device. To power on the device to check its functionality, refer to the Power On and Off section. Once the device is powered on, the display will activate and the device will complete a start-up sequence, during which you should observe proper function of the:

- Display
- Alert LEDs
- Horn
- Vibration
- Pump

1.3.3 Gas Measurement

Combustible Gas

⚠ WARNING!

- Do not use the device 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.

Failure to follow this warning can result in serious personal injury or death.

NOTE: CSA requires (per CAN/CSA-C22.2 No. 60079-29-1) that combustible sensor sensitivity be tested before each day's use on a known concentration of methane equivalent to 25 to 50 % of full-scale concentration. Accuracy must be within 0 to +20 % of actual.

When the combustible gas sensor reading reaches its maximum range, the device enters a locked alarm state to protect the sensor, the sensor shuts down, and the user interface displays "overrange" in the combustible sensor tile. This state can be reset by turning the device off and on in a fresh-air environment. Keep the device in the fresh air environment until sensor readings have stabilized and then zero the sensors.

⚠ WARNING!

- 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. Move away from the hazardous area immediately.

Failure to follow this warning can result in serious personal injury or death.

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 “overrange" indicates that the atmosphere is above 100% LEL and an explosion hazard exists.

1.3.4 Physical Shock

If the device is subjected to a physical shock, complete the steps in Calibration.

1.3.5 Sensors

- Do not block pump inlet as this may cause inaccurate readings.
- Do not press on the face of the sensors, as this may damage them and cause erroneous readings.
- Do not use compressed air to clean the filters.

Allow sufficient time for device to display accurate reading. Response times vary based on the type of sensor being utilized.

NOTE: While the device can detect up to 30% oxygen in ambient air, it is approved for use only up to 21% oxygen in hazardous locations.

1.3.6 Sampling Lines

⚠ WARNING!

- Use only MSA-approved sampling lines.
- Do not use silicon tubing or sampling lines.

Failure to follow these warnings can result in serious personal injury or death.

Wait sufficient time for the reading; response times vary based on gas and length of sampling line.

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.

For lengths greater than 50 feet (15 m) up to 100 feet (30 m), sampling lines made from .125 inch (3 mm) must be used

Sampling of reactive toxic gases (Cl2, ClO2, NH3) must only be done with the reactive gas sample line and probe kits.

1.3.7 Battery

Use only battery chargers made available by MSA for use with this device; other chargers may damage the battery pack and the device. As the battery pack ages, there will be a reduction in usable device runtime.

⚠ WARNING!

- If a Critical Battery Alarm activates while using the device, leave the area immediately, as the end of battery life is approaching.
- Do not remove battery pack, recharge battery, or replace batteries in a hazardous location. Do not alter or modify device.

Failure to follow these warnings can result in serious personal injury or death.

1.3.8 Environmental Conditions

General

⚠ WARNING!

- Do not use the device to test for combustible or toxic gases in the following atmospheres as this may result in erroneous readings:
  - Reducing atmospheres.
  - Furnace stacks.
  - Inert environments - only IR sensors are acceptable for use or with the use of a dilution tube.
  - Atmospheres containing combustible airborne mists/dusts.
- Do not use the device to test for toxic gases in oxygen-deficient (<19.5 % vol) or oxygen-rich (>20.8 % vol) atmospheres, as this may result in erroneous readings.
- Do not use the device to test for combustible gases in atmospheres <10% vol oxygen, as this may result in erroneous readings.
- Use the device only to detect gases/vapors for which a sensor is installed.

Failure to follow these warnings can result in serious personal injury or death.

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

Pressure

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.

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

Humidity

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

The sensors have built-in temperature compensation. However, if temperature shifts dramatically, the sensor reading may shift. Zero the device at the work site temperature to minimize the effect of temperature changes.

1.3.9 Storage

When not in use, store the device in a safe, dry place between 18 °C (64 °F) and 30 °C (86 °F).

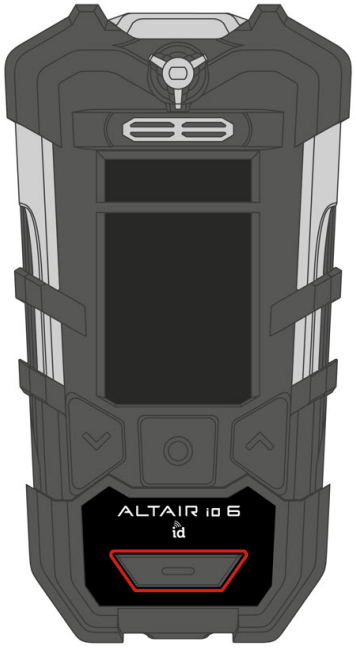
⚠ WARNING!

DO NOT store the device where silicone vapors are present or in the presence of silicone components, lubricants, cleaners or other substances containing silicone. Silicone can desensitize the combustible gas sensor, thereby giving erroneously low readings. Calibrate the detector upon removal from storage and prior to use.

Failure to follow this warning can result in serious personal injury or death.

2 Welcome

The ALTAIR io 6 is a Multigas Detector capable of monitoring ambient air with enhanced safety features to help protect the user. It is for use by trained and qualified personnel. It can be configured to include up to 5 sensors, which can detect up to 6 gases.



2.1 ALTAIR io 6 Design

The ALTAIR io 6 was designed to simplify and improve your gas detection experience. The device leverages cellular connectivity to assist with gas detection and other safety features. ALTAIR io 6 design features include:

- Every device is powered by integrated cellular connectivity.
- Grid, a cloud-based industrial safety software platform, is a deeply integrated and necessary part of the ALTAIR io 6 experience.
- Device data is streamed to the cloud and accessible from your Grid account.
- Configuration of 1, 10 or 10,000 devices can be done with the click of a button through Grid and each device's cellular connection—anywhere in the world.
- MSA id dramatically simplifies device assignment.

2.2 Grid Introduction

Grid is a cloud-based industrial safety software platform. Every ALTAIR io 6 includes and requires a Grid account because it's an integral part of the experience. All device access, configuration, software updates, and enhanced safety services are provided through your account. Additionally, as a software-as-a-service (SaaS) platform, Grid is continually delivering new features, enhancements, and updates. Some of what you can accomplish with Grid includes:

- Activate and add devices to your Grid fleet.
- Access factory calibration certificates.
- Access warranty information.
- Create, edit and apply over-the-air ALTAIR io 6 configuration to a single device or groups of devices.
- Access any ALTAIR io 6 device data logs in your Grid account.
- Create and assign MSA id Tags through the Grid mobile app.
- Manage your fleet with the Grid Fleet Manager service.
- Monitor your fleet in near-real time with the Grid Live Monitor service.
- Access and push over-the-air firmware updates to your entire fleet.

⚠ WARNING!

- The MSA Grid is not a replacement for worker response to local alarms from their personal safety devices. The MSA Grid is a supplement to a defined safety program for the use of personal safety devices.
- Cellular connectivity is dependent upon signal availability and strength of the wireless service(s) necessary to maintain the communication link. Loss of cellular connectivity will prevent remote communication of alerts and other data from the device to the Grid as well as from the Grid to the device. Low signal strength will delay remote communication of alerts and other data from the device to the Grid as well as from the Grid to the device. Take appropriate precautions in the event of a loss of cellular connectivity or low signal strength.
- When cellular connectivity is restored, data from the time period without cellular connectivity is transmitted to the cloud before the device begins communicating current alerts and data to the Grid. This may result in a delay between when cellular connectivity is restored and when the device can be monitored on the Grid.

Failure to follow these warnings can result in serious personal injury or death.

2.3 ALTAIR io™ DOCK Introduction

ALTAIR io DOCK is a rugged automated test system that simplifies bump testing and calibration via its plug and play design. Simply place the ALTAIR io 6 into the cradle and let the device do the work. It tells Dock what test it needs to run and starts it automatically. Once complete, the Dock indicates the test results to allow the user to interpret and move forward with their work based on the results.

2.4 MSA id Introduction

Replacing paper-based processes, MSA id provides a comprehensive solution to digitally assign a device by tapping it to an MSA id Tag, and digitally return a device by simply plugging it into the ALTAIR io CHARGE.

2.5 MSA id Tags Introduction

MSA id Tags are RFID tags that can be assigned to each worker. By tapping an ALTAIR io 6 to an MSA id tag, the device is now assigned. Every ALTAIR io 6 includes one MSA id Tag.

2.6 ALTAIR io™ Charging Accessories

There are various ALTAIR io Charging Accessories to fit multiple applications and make charging ALTAIR io products simple. Refer to the linked manual for specifications & instructions related ALTAIR io Charging Accessories. URL: https://msasafety.info/ALTAIRioChargingAccessories

2.7 Applications

The ALTAIR io 6 is intended for workers exposed to and/or who are sampling potentially hazardous environments in construction, oil and gas, mining, fire service, and general industry. The instrument is cloud-connected and can provide real-time information about gas readings and alarms via the Grid, allowing information to be viewed remotely.

3 Getting Started

3.1 Overview

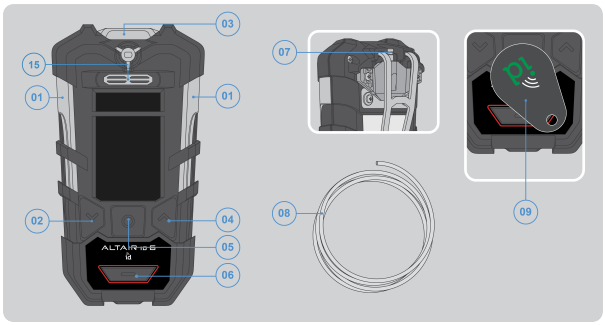
3.1.1 Device Management with Grid

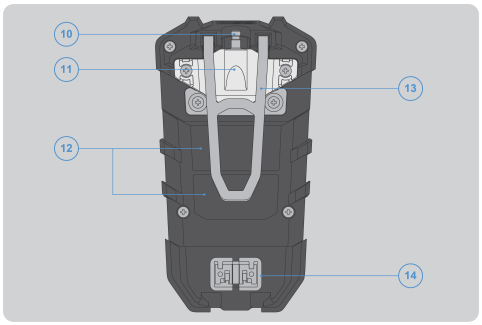
Device management is done entirely through your included MSA Grid account, over-the-air via the device's cellular connection. To get started, please set up your account and download the Grid Mobile App from the App Store or Google Play Store.

3.1.2 In the Box

- ALTAIR io 6 Gas Detection Wearable
- Quick-Start Guide with Certifications
- MSA id Tag
- USB Power Cable
- USB Power Adapters
- Calibration Tube

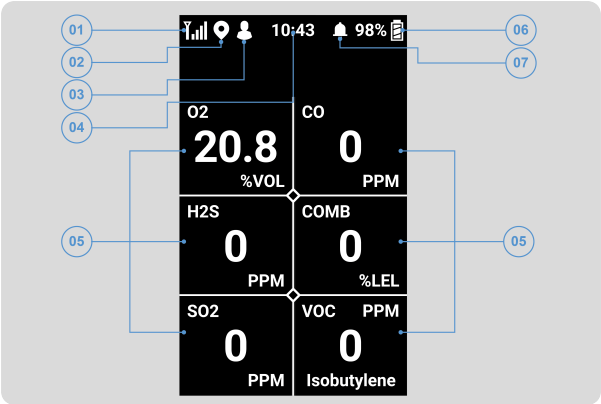
3.1.3 Hardware Overview





01	Left and Right LEDs	08	Calibration Tube
02	Menu / Navigational Down Button	09	MSA id Tag (RFID Reader Location)
03	Safe LED	10	Sample Line Attachment (Gas is detected through this inlet)
04	Dark - Light Mode / Navigational Up Button	11	Filter Cover
05	Select / Power Button	12	Product Label
06	Alert Button	13	Stainless Steel Clip
07	Sample Line Attachment (Gas is detected through this inlet)	14	Magnetic Charging Interface
		15	Exhaust Port (Gas is NOT detected through this orifice)

3.1.4 Home Screen



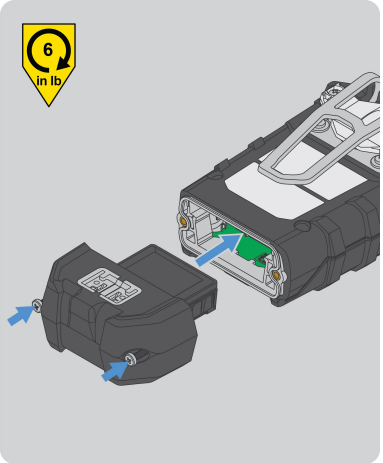
01	Cellular Connection	05	Gas Measurement Tiles
02	GPS Location	06	Battery Charge Indicator
03	Device Assigned	07	Notification
04	Time		

3.2 Commissioning

Commissioning devices is the process of adding assets to your Grid account and activating their cellular connectivity. Typically, devices are commissioned to the appropriate Grid account automatically at order fulfillment. However, if automatic commissioning is not performed, your Grid account can be used to complete this setup.

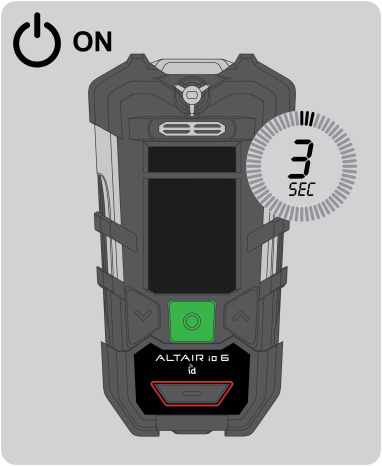
3.3 Operation

3.3.1 Power On and Off



The ALTAIR io 6 ships from the factory with the battery uninstalled:

1. Install the battery prior to use.
2. Install the battery pack into the instrument and torque the two external battery pack screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).
3. The device will automatically power on when the battery is installed.



To power on the device:

1. Press and hold for 3 second.
2. The device will proceed to the startup sequence.

The startup sequence includes the following:

- Introduction screens
- Self-testing
- Sensor alert setpoints
- Pump Block Test
- Bump test and calibration information
- Fresh Air Baseline (if enabled)
- Lock-outs (if enabled and active)

NOTE: During power on, the device performs a self-test. This self-test ensures properly functioning display, audible horn, LEDs and vibration.



To power off the device:

1. Press and hold for 3 second.
2. To Confirm power off, select Yes on the next screen

3.3.2 Sampling System Safety Test

WARNING!

- Do Not use the pump, sample line, or probe unless the pump alarm activates when the flow is blocked. Lack of a pump alarm is an indication that a sample may not be drawn to the sensors, which could cause inaccurate readings.
- Do Not let the end of the sampling line touch or be submerged in any liquid. If liquid is drawn into the device, readings will be inaccurate and device could be damaged. MSA only recommends the use of an MSA sample probe because it contains a special membrane filter, permeable to gas but impermeable to water. See 6.2 Accessories and Spare Parts

Failure to follow these warnings can result in serious personal injury or death.

Upon startup, an alert (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 "pass" message. The startup sequence will resume.

If the device does not detect a pump flow block within 30 seconds, a second user prompt (visual, audible, and vibrating) to block the pump/sampling system of the device is displayed. If the device again does not detect a pump flow block after the additional 30 seconds device will enter pump alarm, 'Pump fault service required' is displayed. Device will shut off after the customer acknowledges this message by pressing the acknowledge button. Check you sampling system if this occurs and contact MSA as needed.

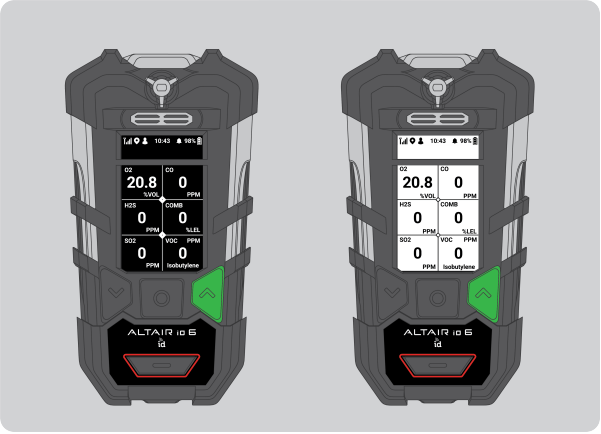
Users can check the operation of the sampling system anytime during operation by blocking the sampling system to generate a pump alarm.

3.3.3 Navigation

1. To access the device menu, press the left navigation button.
2. To navigate the device menu, press the left or right navigation button.
3. To select a device menu option, press the left or right navigation button until the option is highlighted and then press the 0 navigation button.
4. To acknowledge an alert, press the Alert button.
5. To activate the emergency alarm, hold the Alert button for 3 seconds.

3.3.4 Display

- Illumination
  - To temporarily illuminate the display backlight, press the right navigation button once. The backlight will automatically shut off after a finite period of time.
- Color Inversion of the Home Screen
  - While the backlight is illuminated, pressing the right navigation button once will invert the colors. Pressing it again will invert it back to the original state.

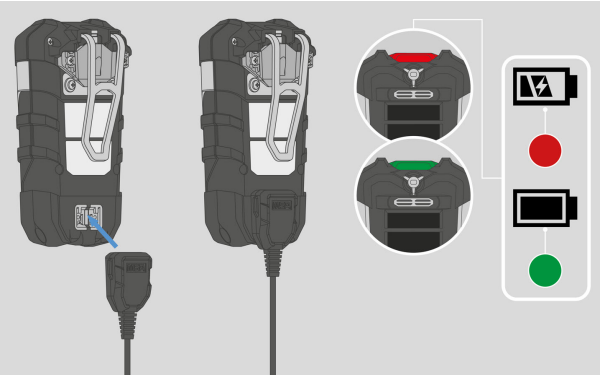


3.3.5 Safe LED

The Safe LED is used to indicate the device is safe and operational. If the device is operational, compliant, and without any active alerts, the Safe LED will slowly pulse green to intuitively communicate this to the user.

3.3.6 Charging

1. Plug the charging cable into the power source.
2. Attach the device to the magnetic charging contacts.



Status	Device Indicator	Battery Pack Indicator
Charging	Static red Safe LED	Static Red
Fully Charged	Static green Safe LED	Static Green
Charging Error	Flashing red Safe LED	Flashing Red/Green
Software Update in Progress	Flashing yellow Safe LED (Not applicable for charging of battery pack alone)	N/A

During periods of non-use, the charger may remain connected to the device

The battery pack can be charged while removed from the device.

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 0 °C (32 °F) and 40 °C (104 °F) respectively. For best results, charge device at room temperature of 23 °C (73 °F).

Charging may be interrupted when ambient temperature moves outside of the charging temperature. In this case, the device will show an error. To resolve the error, remove the device from the charger and cease charging until the ambient temperature is within the approved temperature range of 0 °C (32 °F) to 40 °C (104 °F).

3.3.7 Battery Care

Actual battery run-time will vary depending on cellular coverage, GPS coverage, ambient temperature, and usage.

If the device shuts down due to battery depletion while in use:

1. Leave any hazardous location immediately.
2. Recharge the battery.

Allow very hot or cold devices to stabilize for one hour at room temperature before attempting to charge.

3.4 Bump Test and Calibration

3.4.1 Bump Test

A bump test quickly confirms that the gas sensors are functioning. Perform a full calibration to ensure accuracy.

There are two methods to perform a bump test on the ALTAIR io 6:

- Automatically through the ALTAIR io DOCK
- Manually using proper calibration gas, demand regulator and tubing.

Bump test frequency is often stipulated by national or corporate regulations; however, bump testing before each day's use is generally the accepted best safety practice. Perform a bump test more frequently if the device is subjected to physical shock or high levels of contaminants.

⚠ WARNING!

- Perform the bump test per the instructions in this user guide. Do not continue operation of a detector that is not able to pass a bump test.
- If the device fails the bump test, Do Not use the device and perform a calibration to check sensor accuracy per the Calibration section.
- Perform a bump test more frequently if the tested atmosphere contains the following materials, which may desensitize the combustible gas sensor and cause erroneous readings:
  - Organic silicones
  - Silicates
  - Lead-containing compounds
  - Hydrogen sulphide exposures over 200 ppm or exposures over 50 ppm for one minute.

Failure to follow these warnings can result in serious personal injury or death.

For these devices, clear the LockAlarm state by turning the device OFF, then ON while in a fresh air environment.

ALTAIR io DOCK Bump Test

To perform the automatic bump test:

1. Insert the ALTAIR io 6 into the ALTAIR io DOCK Test Stand with the display facing inwards.
2. Push the device down against the gray spring-loaded part and rotate it until the front of the device is flush with the test stand housing.
3. Allow the gray spring-loaded part to push the device up and into the stainless steel test stand inlet.
4. The appropriate test runs automatically based on Grid-configured settings and indicates the calibration results upon completion.
5. Remove the device by pushing down against the gray spring-loaded part and rotating the device out.

Manual Bump Test

The manual bump test requires the following equipment:

- Proper, Unexpired Calibration Gas Cylinder
- 1/8” ID Superthane Ester Tubing
- Demand Flow Regulator

To perform the manual bump test:

1. Verify the gas concentrations displayed match the calibration gas cylinder.
2. Navigate to the bump test menu option.
3. Connect the calibration tubing to the gas regulator.

4. Select the gases to apply by scrolling to each gas and hitting the 0 navigation button. Once all gases are selected, select Proceed to Calibration.
5. Connect the other end of the tubing to the metal barb on the io 6 filter cover and select Start.
6. The device will display the bump test results.
7. Repeat steps 4-6 as needed depending on the sensor configuration.
8. Remove the tubing from the io 6 when instructed.

3.4.2 Calibration

There are two methods to perform a calibration on the ALTAIR io 6

- Automatically through the ALTAIR io DOCK
- Manually using proper calibration gas, demand regulator and tubing.

Manual calibration must be performed using a demand flow regulator.

MSA recommends calibration at least every six months; however, many countries and/or organizations have their own calibration guidelines. The ALTAIR io 6 calibration interval can be configured to adapt to these requirements.

During zero calibration, the O_2 sensor is also span calibrated to 20.8% O_2 fresh air, adjusting the calibration curve as needed. During span calibration, the O_2 sensor's accuracy is checked against a known oxygen gas concentration without adjusting the calibration curve.

The calibration procedure adjusts the span value for any sensor that passes the calibration test; sensor span values that fail calibration are left unchanged. Since residual gas may be present, the device may briefly go into an exposure alarm after the calibration sequence is completed.

If a sensor is nearing its end of life, the device will communicate a notification to the user after a successful calibration.

If a calibration is unsuccessful for two subsequent calibrations, the device will communicate an end of sensor life warning to the user. Note that a span calibration can fail for many reasons other than a sensor at the end of its life. If a span calibration failure occurs, factors such as remaining gas in the calibration gas cylinder, gas expiration date, security of the calibration tubing, etc. should be verified, and a calibration should be repeated prior to replacing the sensor.

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.

⚠ WARNING!

- Perform a calibration per the instructions in this user guide. Do not continue operation of a detector that is not able to pass calibration.
- When calibrating the device with toxic gases, certain prerequisites are required, otherwise incorrect calibration could result: See 6.2 Accessories and Spare Parts.
    - 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)

Failure to follow these warnings can result in serious personal injury or death.

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.

ALTAIR io DOCK

1. Insert the ALTAIR io 6 into the ALTAIR io DOCK Test Stand with the display facing inwards.

2. Push the device down against the gray spring-loaded part and rotate it until the front of the device is flush with the test stand housing.
3. Allow the gray spring-loaded part to push the device up and into the stainless steel test stand inlet.
4. The appropriate test runs automatically based on Grid-configured settings and indicates the calibration results upon completion.
5. Remove the device by pushing down against the gray spring-loaded part and rotating the device out.

Manual Calibration

The manual calibration test requires the following equipment:

- Proper, Unexpired Calibration Gas Cylinder
- Demand Flow Regulator
- 1/8” ID Superthane Ester Tubing

To perform the manual calibration test:

1. Verify the gas concentrations displayed match the calibration gas cylinder.
2. Navigate to the calibration menu option.
3. On the Zero Sensors screen, select **Start** when in fresh air.
4. After the Zero Sensors is complete, connect the calibration tubing to the gas regulator.
5. Select **Next**.
6. Select the gases to apply by scrolling to each gas and hitting the 0 navigation button. Once all gases are selected, select Proceed to Calibration.
7. Connect the other end of the tubing to the metal barb on the io 6 filter cover and select Start.
8. The device will display the calibration results upon completion.
9. Repeat steps 6-8 as needed depending on the sensor configuration.
10. Remove the tubing from the io 6 when instructed.

3.4.3 Fresh Air Baseline

⚠ WARNING!

- Do not activate Fresh Air Baseline 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 Baseline feature.
- Do not use Fresh Air Baseline 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 has the ability to run a Fresh Air Baseline as part of its start-up sequence. This will baseline the sensors at zero (or 20.8% for oxygen) as long as the current sensor readings are within safe thresholds determined by the device. Fresh Air Baseline can be configured in Grid to run automatically, require user input to execute, or be turned off.

3.4.4 Zero Sensors

⚠ WARNING!

- Do not activate zero sensors 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 zero sensors feature.
- Do not use zero sensors 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.

Zero sensors will calibrate the zero readings (or 20.8% volume for oxygen) of the device. Zero sensors can be accessed from the device's menu. Zero sensors allows for wider sensor tolerances than a Fresh Air Baseline when it is performed.

To zero the sensors:

1. Navigate to the Zero Sensors menu option.
2. Confirm you are in fresh air.
3. Press **0**.

4 Features

4.1 Alerts

The ALTAIR io 6 has three types of alerts that are used to notify the wearer of the device and those in its vicinity:

- Notifications: indicate action that needs to be taken soon.
- Warnings: indicate a heightened state of awareness and action may be required.
- Alarms: indicate the highest state of awareness and the user must immediately leave the area being monitored.

These alerts are used to communicate increasing levels of urgency.

Each alert type has three styles in addition to being communicated through the device display:

- Audible—through the ALTAIR io 6 horn.
- Vibrational—through the ALTAIR io 6 vibrational motor.
- Visual—through the ALTAIR io 6 LEDs.

⚠ WARNING!

If a gas exposure alert of any type activates while using the device, follow your company's operational protocols.

Failure to follow this warning can result in serious personal injury or death.

4.1.1 Notifications

Notifications are used to indicate action that may need to be taken soon or to alert the wearer of contextual information. Notifications should be used to drive proactive compliance and maintenance. Notifications can be acknowledged by pressing the Alert button. If the alert is not acknowledged, it will be visible in the Notification screen. Alerts remain in the Notification screen until they are no longer considered active.

Notification Delivery

Delivery Type	Description
Safe LED	Green flash
Audible	Casual Ringtone
Vibration	Casual Vibration
User Interface	Backlight illuminates and display communicates relevant notification in status bar

Notification Types

Notification Type	Description	Post-Acknowledgement Safe LED
Bump Test Due Now	Grid-configured bump test interval has expired.	Breathing Yellow
Calibration Due Now	Grid-configured calibration interval has expired.	Breathing Yellow
Replace Sensor Soon*	Sensor should be replaced soon but continues to be functional.	Breathing Green
Replace Sensor Now*	Sensor should be replaced now. Triggered by two consecutive failed calibrations.	Breathing Yellow
Cellular Disconnected	Cellular has been disconnected for greater	Breathing Yellow

Notification Type	Description	Post-Acknowledgement Safe LED
	than the Grid-configured threshold time.	
Low Battery Level	Battery level is < 5%.	Breathing Yellow
Device Configuration Update	Device has received an updated configuration from Grid.	Breathing Green

*Indicates that the device detects a loss of sensor sensitivity during calibration. In addition to true loss of sensor sensitivity, the device may issue these notifications if calibration gas is expired, misapplied or not used during the span calibration. Ensure the quality of the calibration gas delivery system. Proper recalibration may remove these notifications.

Viewing Active Notifications

1. Press the left navigation button.
2. Navigate to the notifications menu..
3. Press the **0** button.

4.1.2 Warnings

⚠ WARNING!

DO NOT ignore any alerts or warnings. If an alert of any type activates follow your company's operational protocols.

Failure to follow this warning can result in serious personal injury or death.

Warnings are used to indicate a heightened state of awareness and action may be required. Warnings can be acknowledged by pressing the Alert button.

Warning Delivery

Delivery Type	Description
360° LEDs	Medium Intensity Yellow LED Pattern
Audible	Medium Intensity Ringtone
Vibration	Medium Intensity Vibration
User Interface	Backlight illuminates and display communicates relevant warning in status bar and gas measurement tile, if applicable.

Warning Types	Description
Gas Warnings	
Low Gas Exposure Warning	Measurement greater than the warning threshold.
O_2 Enrichment Warning	Measurement greater than the warning threshold.
O_2 Deficiency Warning	Measurement less than warning threshold.
Underrange Warning	Measurement is below the underrange threshold of the sensor for greater than one minute.

Warning Types	Description
Enhanced Safety Warnings	
Motion Detection Check-In	No detected movement within the configured threshold time.
Maintenance Warnings	
Invalid Tag Read	An invalid tag was used to assign the device.

4.1.3 Alarms

Alarms are used to indicate the highest state of awareness and action may be required. Alarms can be acknowledged by pressing the Alert button.

⚠ WARNING!

- If an alarm is triggered while using the device, leave the area immediately.
- 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.
- 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.
- If Critical Battery Level alarm activates while using the device, leave the area immediately as the end of battery life is approaching.
- If a Sensor Error alarm activates while using the device, leave the area immediately as the device will be unable to utilize the effected sensor.

Failure to follow these warnings can result in serious personal injury or death.

Alarm Delivery

Delivery Type	Description
360° LEDs	High Intensity Red LED Pattern
Audible	High Intensity Tone
Vibration	High Intensity Vibration
User Interface	Backlight illuminates and display communicates relevant warning in status bar and gas measurement tile, if applicable.

Alarm Types	Description
Gas Alarms	
High Gas Exposure	Measurement greater than the alarm threshold.
O_2 Enrichment	Measurement greater than the alarm threshold.
O_2 Deficiency	Measurement less than the alarm threshold.
Short-Term Exposure Limit (STEL)	Short-term exposure greater than the alarm threshold.
Time-Weighted Average (TWA)	Time-weighted average greater than the alarm threshold.
Overrange	Measurement greater than the sensor range.

Alarm Types	Description
Enhanced Safety Alarms	
Emergency	Manually activated by pressing Alert button for 3 seconds.
Evacuation	Alarm remotely activated from Grid.
Motion Detection - No Check-In	Motion Detection Check-In not acknowledged.
Pump Fault	Pump has failed, gas detection capabilities are not functional
Maintenance Alarms	
Critical Battery Level	Battery level has less than 10 minutes remaining.
Sensor Error	Sensor is not properly installed or is not functional.

4.2 Gas Detection

4.2.1 Time-Weighted Average (TWA)

The device can monitor the time-weighted average (TWA) of exposure to toxic gases which calculates the average exposure since the device was turned on or since the TWA calculation was reset.

The current TWA exposure calculation can be viewed and reset through the device menu and can be configured through Grid to calculate using two different methods: Rolling Window and Cumulative Average.

NOTE: Power cycling the device will reset the time-weighted average calculation

Rolling Window

When Rolling Window is selected, the TWA is calculated based off the exposure during most recent configured shift length. This is OSHA's typically recommended TWA calculation.

Example Calculation

- Device powered on for 12 hours
- 4 hours of exposure at 50 ppm in hours 0 – 4
- 4 hours of exposure of 0 ppm in hours 4 - 8
- 4 hours of exposure at 50 ppm in hours 8 – 12
- 8 hour shift length selected

$$\frac{(4hours * 0ppm) + (4hours * 50ppm)}{8hours} = 25ppm$$

Cumulative Average

When cumulative average is selected, the TWA is calculated based off the exposure during the entire time the device has been on without power cycling while dividing by the configured shift length, regardless of how long the device is powered on. This is the ACGIH / EH40 typically recommended TWA calculation.

Example Calculation

- Device powered on for 12 hours
- 4 hours of exposure at 50 ppm in hours 0 – 4
- 4 hours of exposure of 0 ppm in hours 4 - 8
- 4 hours of exposure at 50 ppm in hours 8 - 12
- 8 hour shift length selected

$$\frac{(4hours * 50ppm) + (4hours * 0ppm) + (4hours * 50ppm)}{8hours} = 50ppm$$

4.2.2 Short-Term Exposure

The device can monitor the short-term exposure of toxic gases which calculates the average exposure over the most recent 15 minute period since the device was turned on or since the short-term exposure calculation was reset.

The current short-term exposure calculation can be viewed and reset through the device menu.

NOTE: Power cycling the device will reset the short-term exposure calculation

Example Calculation

- 15 minutes of exposure at 35 ppm:

$$\frac{15minutes * 35ppm}{15minutes} = 35ppm$$

- 10 minutes of exposure at 35 ppm and 5 minutes of exposure at 5 ppm:

$$\frac{(10minutes * 35ppm) + (5minutes * 5ppm)}{15minutes} = 25ppm$$

4.2.3 Reading Adjustment Factor

Adjustment factors provide the ability to provide gas readings to a target gas that may differ from gas used for calibration. The ALTAIR io 6 simplifies the use of adjustment factors through its device configuration.

To utilize adjustment factors:

1. Calibrate the ALTAIR io 6 to Methane (CH_4) or Propane (C_3H_8), depending on the target gas.
2. In the Combustible Sensor section of the configuration profile, select *Direct Combustible Reading*.
3. In the drop down Scaling Factor text box, enter the applicable adjustment factor found in the tables below.
4. Save the configuration. After saving, the devices associated with this configuration will automatically be updated immediately or at the next power-on, if the device is currently off.

ALTAIR io 6 Adjustment Factors
Standard Combustible Sensor

Calibration Gas	Target Gas	Adjustment Factor
Methane	Methane	1.00
	Butane	1.74
	Propane	1.72
	Pentane	1.84
	Hydrogen	1.06
	Ethanol	1.20

Adjustment Factors were calculated by calibrating an ALTAIR io 6 to 1.45% Methane (CH_4) and measuring the response to a known concentration of the relevant target gas found in the table. The response to the target gas was divided by the response to Methane.

Response Notes

- These conversion factors should be used only if the target gas is known.

WARNING!

- Some compounds may reduce the sensitivity of the combustible gas sensor by poisoning or inhibiting the catalytic action or by polymerizing on the catalytic surface.
- These conversion factors are typical. Individual units may vary by ±25 % from these values.
- The results are intended for guidance only. For the most accurate measurements, a device should be calibrated using the target gas.

Failure to follow these warnings can result in serious personal injury or death.

4.3 Device Compliance

NOTE: The term "Compliance" as it relates to this section is in regard to Bump Test Lock-out and Calibration Lock-out and how a user configures the device. A user must follow their company's Operation Protocols for safety compliance.

4.3.1 Bump Test Lock-Out

To promote compliance with bump test requirements, the device can be configured to not enter standard measurement mode until the device has been bump tested per the Grid-configured schedule. In the lock-out state, a reminder notification will sound every 15 seconds, flash the Safe LED, and vibrate. Once a bump test is complete, the device will fully turn on.

4.3.2 Calibration Lock-Out

To promote compliance with calibration requirements, the device can be configured to not enter standard measurement mode until the device has been calibrated per the Grid-configured schedule. In the lock-out state, a reminder notification will sound every 15 seconds, flash the Safe LED, and vibrate. Once a calibration is complete, the device will fully turn on.

4.3.3 Device Assignment Lock-Out

To promote device assignment to worker, the device can be configured to not enter standard measurement mode until the device has been assigned to an MSA id Tag. In the lock-out state, a reminder notification will sound every 15 seconds, flash the Safe LED, and vibrate. Once the device has been assigned, the device will fully turn on.

4.4 Enhanced Safety Features

4.4.1 Motion Detection

The device can monitor worker movement if enabled through Grid. If the device detects no movement beyond the Grid-configured threshold, the device will warn the user to check-in with the Alert button.

If the warning is not acknowledged within the configured acknowledgment threshold, the device will escalate into alarm.

4.4.2 Worker Emergency

The device can be put into emergency alarm on command by pressing the Alert button for 3 seconds.

4.4.3 Remote Evacuation

Through Grid, devices can be remotely notified to evacuate. When activated from Grid, devices will enter alarm state. See Alerts for more information.

4.5 Device Configuration Profile

The ALTAIR io 6 is highly configurable to meet the needs of your safety program. Device configuration profiles can be created, selected, and saved through your Grid account. These configuration profiles can be applied and kept in sync with desired devices directly through Grid’s web application or through the mobile app. When a configuration profile is pushed to selected devices, the new configuration is immediately applied if powered on with a cellular connection, or if powered off it will be applied at next power on with a cellular connection.

4.6 Device Precision Configuration

Through the Grid mobile app, a configuration profile can be selected and applied to a subset of chosen devices that you have on hand to configure. This work flow is advantageous for easily configuring select devices with physical interaction.

4.7 Data Storage

The device sends all available data including geo-tagged events, alerts, and readings to its commissioned Grid account where it is accessible.

4.8 MSA id

MSA id allows users to digitally assign and return devices, providing visibility into who is using which device and tying all device data to the user. MSA id can be managed through your Grid account.

4.8.1 MSA id Tags

With the use of personal-issued MSA id Tags, the ALTAIR io 6 can be digitally assigned to worker personnel – providing historical and up-to-date digital transparency.

4.8.2 Assigning an MSA id Tag to a Worker

To assign an MSA id Tag to a user, use your Grid account.

NOTE: A mobile device equipped with an RFID reader is required.

4.8.3 Assigning an ALTAIR io 6 to an MSA id Tag

To assign device to MSA id Tag, tap the MSA id tag to the MSA id symbol, which is located on the front face of the battery pack, to MSA id tag.



4.8.4 Returning an Assigned ALTAIR io 6

To return a device, insert the device into the ALTAIR io CHARGE. The device will be authenticated, making sure the ALTAIR io CHARGE is assigned to the same Grid account as the device, and then automatically returned.

4.9 Over-the-Air Updates

The ALTAIR io 6 supports over-the-air software updates that will be pushed out over time, delivering new functionality, features, and optimization to your device. Once a software update is available, you will be notified through your Grid account. You can choose when this update is delivered and select the devices it is delivered to. Once you release this software update, the associated devices will download and install the software updates at the beginning of their next charging cycle with a cellular connection.

NOTE: It is recommended that all software updates be made as soon as possible.

⚠ WARNING!

If a software update is identified as critical, required, important or otherwise necessary for continued safe use of the product, the update must be installed on all devices within the time frame stipulated in communications from MSA or at the next charging cycle, whichever is earlier.

Failure to follow this warning can result in serious personal injury or death.

NOTICE

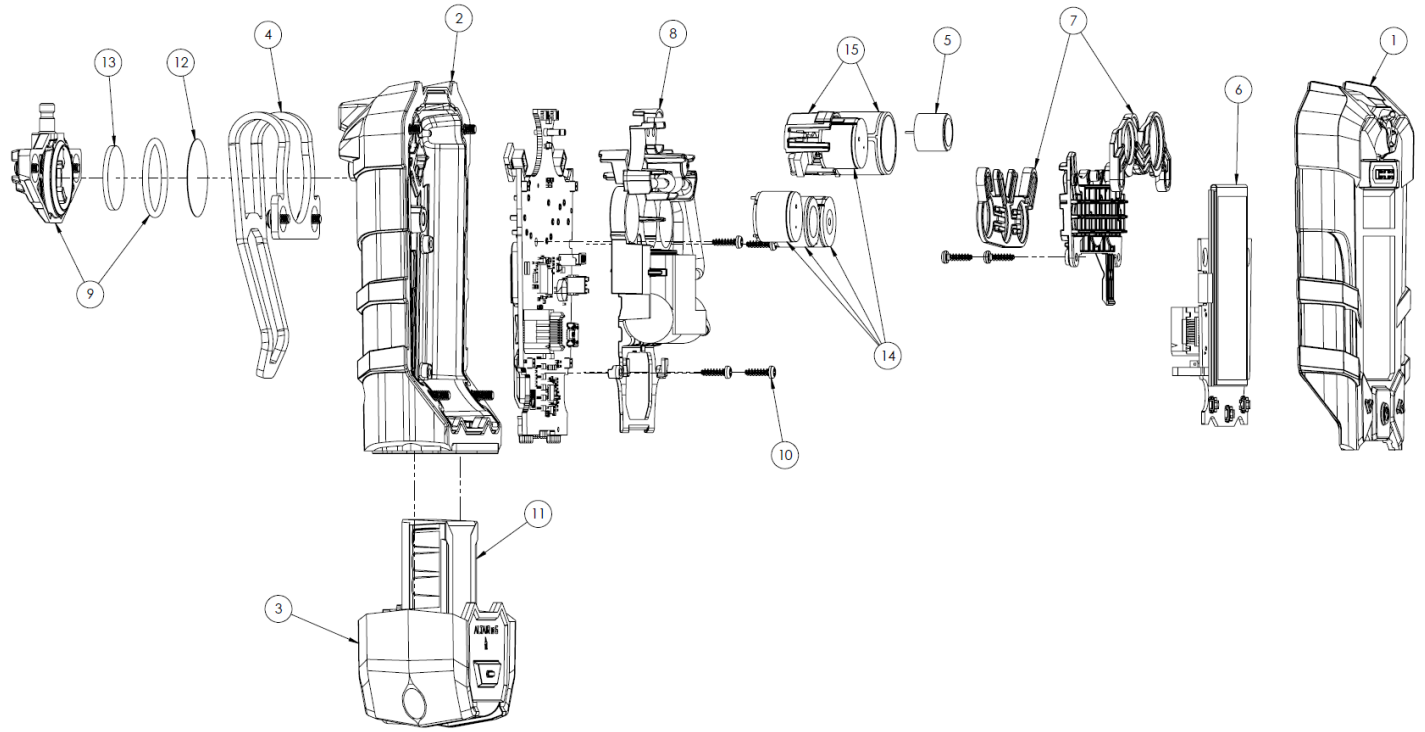
- To avoid disruption, the device will only download and install software updates while charging. If the device is removed from the charger before the download and installation is complete, the update is halted and the last firmware version will be utilized.
- The device checks for an available software update at the beginning of each charging cycle, and does not check again. If a software update is released while a device is in the midst of charging, it will not download and install on this device until it checks for this update at the beginning of its next charging cycle.
- Over-the-Air updates will not be installed if charging only the replaceable battery pack. the battery pack must be connected to the device during charging to receive the over-the-air update.
- MSA makes no warranty of any kind that any update will meet user's or any person's requirements, achieve any intended result, be compatible or work with any software, system, or other services, or be secure, accurate, complete, free of harmful code, or error free.

5 Device Care

5.1 Serviceable Items - Altair io 6

NOTE: For Figure 1 number identification see 6.2 Accessories and Spare Parts

Figure 1 Altair io 6 Exploded View



5.2 Maintenance

WARNING!

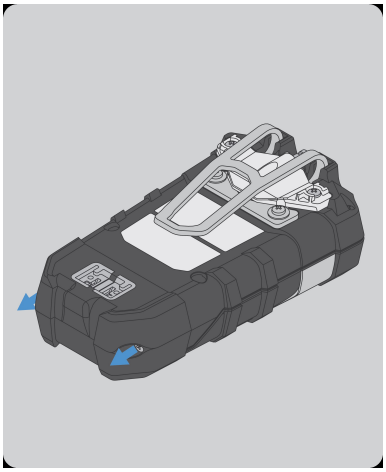
- Repair or alteration of the device beyond the procedures described in this user guide or by anyone other than a person authorized by MSA, could cause the unit to fail to perform properly. Use only genuine MSA replacement parts when performing any maintenance procedures on the device. Substitution of components can seriously impair performance, alter intrinsic safety characteristics or void agency approvals.
- Do not open or repair the device without using the appropriate electrostatic discharge (ESD) protection. This device contains electrostatically sensitive components. Electrostatic discharge can damage sensitive components and result in erroneous gas readings or inability to detect a gas event. The warranty does not cover damage caused by electrostatic discharge.
- Do not open the device or replace components in a hazardous area. Opening the device and replacing components in a hazardous environment poses a risk of explosion.
- Remove and install all components carefully, ensuring that the components are not damaged. Otherwise device intrinsic safety may be adversely affected, wrong readings could occur, and persons relying on the device for their safety could sustain serious personal injury or death.
- Perform a calibration after performing maintenance on the device.

Failure to follow these warnings can result in serious personal injury or death.

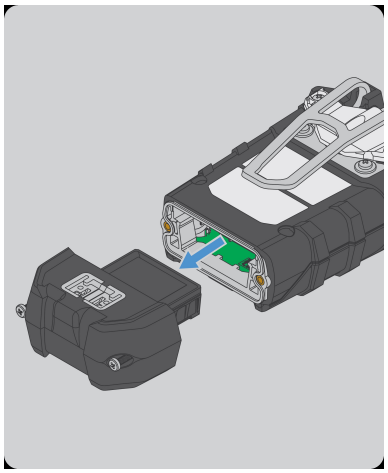
Table 1 ALTAIR io 6 Service Guide

Service Activity	For Service On	MSA	RITE - Certified CP	End User
Sensor Replacement, Slots 1-3	Sensors in slots 1-3	X	X	X
Sensor Replacement, Slots 4-5	Sensors in slots 4-5	X	X	X
Clip Replacement	Clip	X	X	X
Front housing Replacement	Front housing	X	X	X
Horn Replacement	Horn	X	X	X
Display Replacement	Display	X	X	X
Back Housing Replacement	Back housing	X	X	X
Pump Replacement	Pump	X	X	X
Filter Replacement	Filter cover filters	X	X	X
Sensor Gasket Replacement	Upper sensor gasket, lower sensor gasket	X	X	X
Battery Pack Replacement	Battery pack	X	X	X
Filter Cover Replacement	Filter cover	X	X	X
Screw Replacement	All screws (internal/external)	X	X	X
Battery Pack Housing Replacement	Battery pack housing	X	X	X
Calibration Tube Replacement	Calibration tubing	X	X	X
PCBA Pin Replacement	Main PCBA Pins	X		

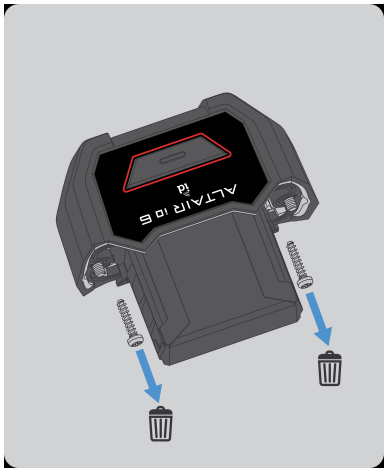
5.2.1 Battery Pack Housing Replacement



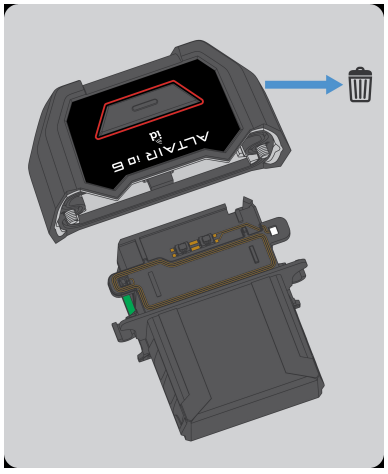
1. Loosen the two external battery pack screws with a Phillips head #1 screwdriver. Remove the battery pack.



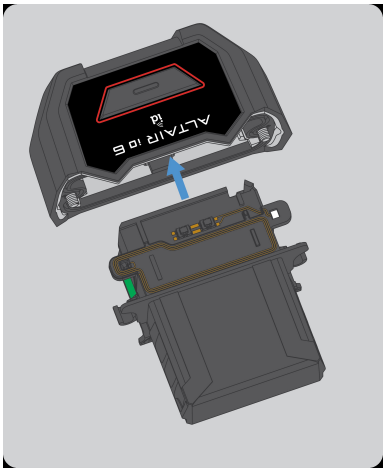
2. Remove the battery pack.



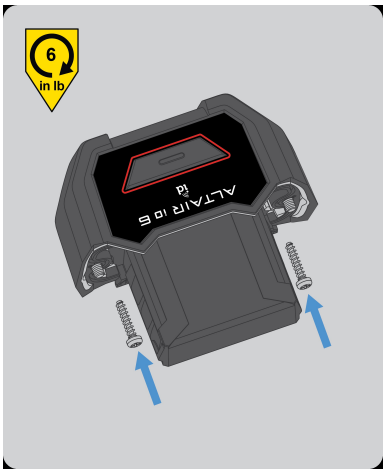
3. Remove the two internal battery pack screws with a Phillips head #1 screwdriver and discard.



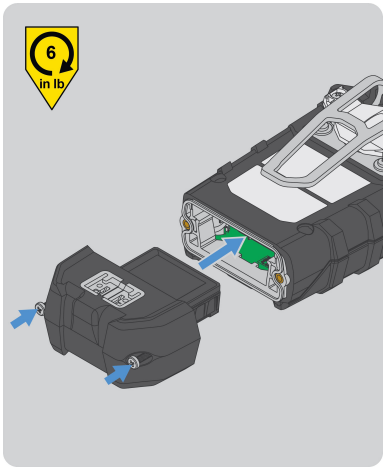
4. Remove the battery assembly by pulling it out of the battery pack housing. Discard battery pack housing.



5. Install the battery assembly into the new battery pack housing.

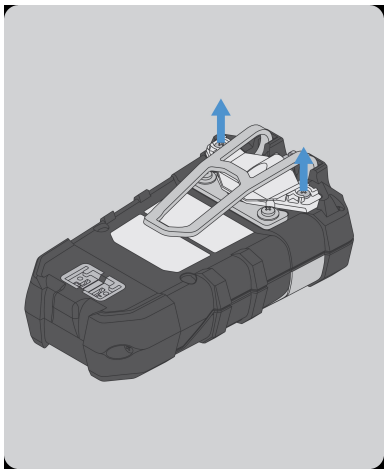


6. Install the two new internal battery pack housing screws with a Phillips head #1 torque screwdriver. Torque to 6 in-lbs (0.68 Nm).

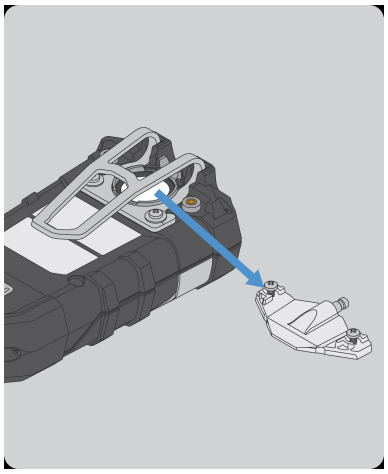


7. Install the battery pack into the instrument and torque the two external battery pack screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).

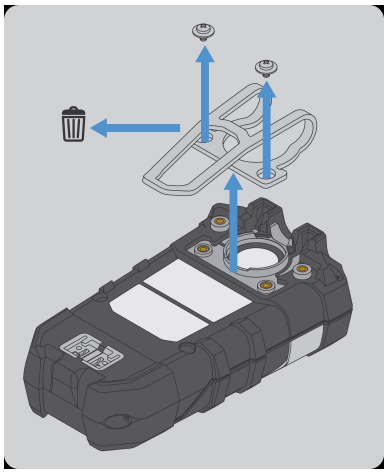
5.2.2 Clip Replacement



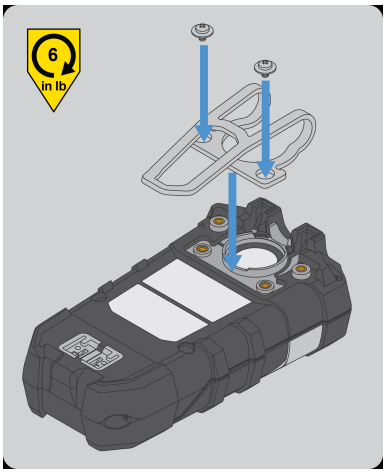
1. Loosen the two filter cover captive external screws with a Phillips #1 screwdriver.



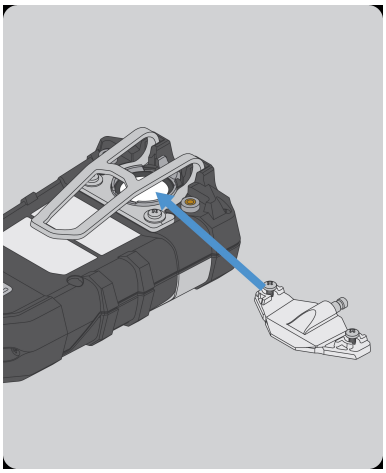
2. Remove the filter cover by sliding it out underneath the clip. Retain the filter cover for reassembly.



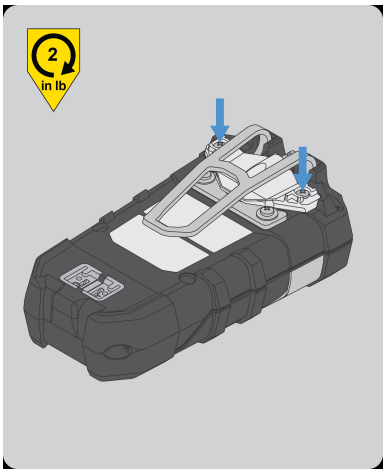
3. Remove the two clip screws and washers and discard. Remove the clip and discard.



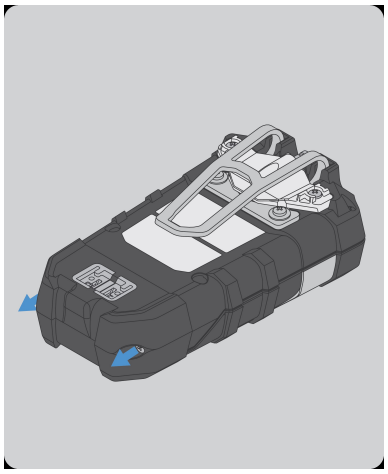
4. Install the new clip and washers/screws with a Phillips #1 head torque screwdriver. Torque screws to 6 in-lbs (0.68 Nm).



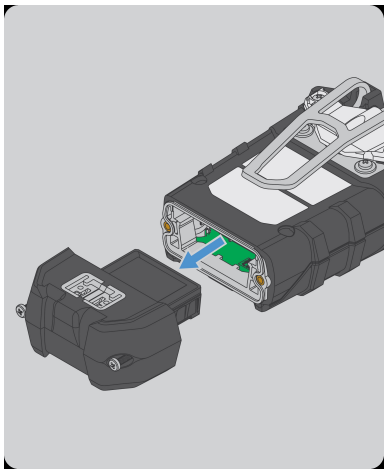
5. Slide the filter cover underneath the new clip and reinstall on the back of the device with a Phillips #1 head torque screwdriver. Torque screws to 2 in-lbs (0.23 Nm).
6. Calibrate the device after sensors have stabilized.



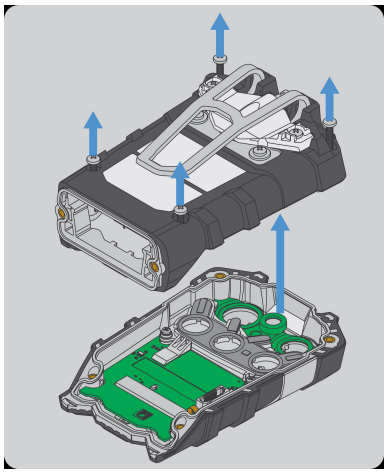
5.2.3 Display Replacement



1. Loosen the two external battery pack screws with a Phillips head #1 screwdriver.

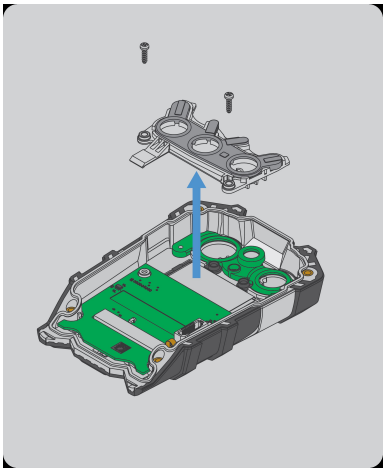


2. Remove the battery pack.

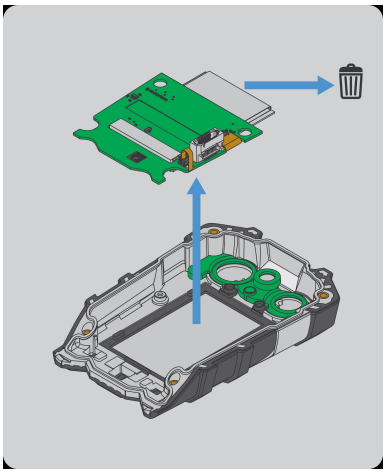


3. Loosen the four external instrument screws with a Phillips head #1 screwdriver and remove the front housing assembly.

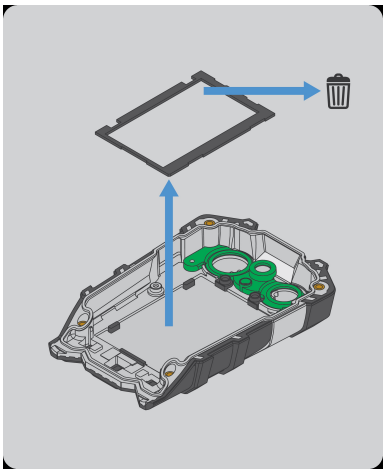
   NOTE: The horn may stick to the gasket when the front housing is removed. If this occurs, (see step 12 of Horn Change) to reinstall the horn.



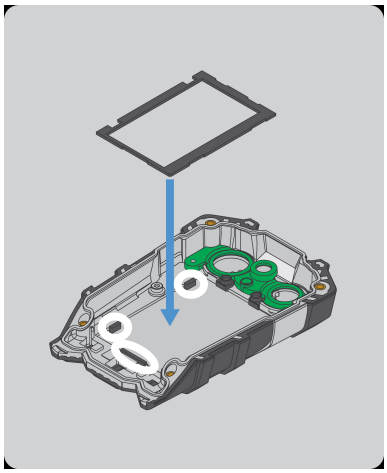
4. Loosen the two internal front housing assembly screws with a Phillips head #1 screwdriver and remove the clear bracket and gray gasket assembly in the front housing assembly. Retain parts for reassembly.



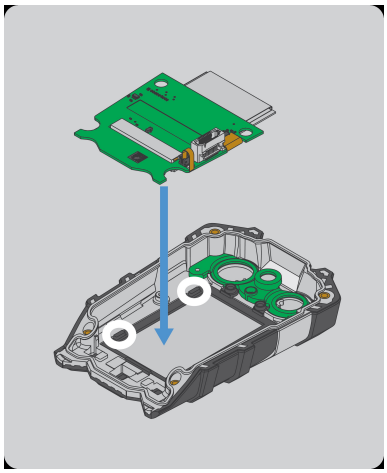
5. Remove the display PCBA and display assembly from the front housing. Discard according to local regulations.



6. Remove the foam from the front housing and discard.

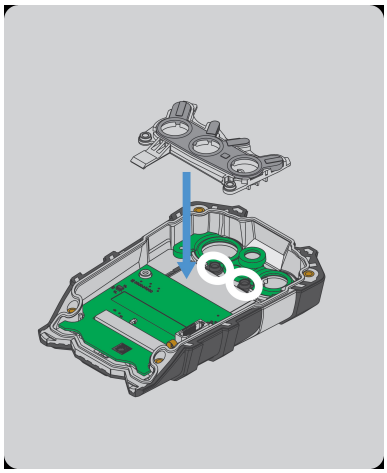


7. Install the new foam into the front housing assembly. Align the cut outs in the foam with the black rubber features in the front housing as shown in the graphic.

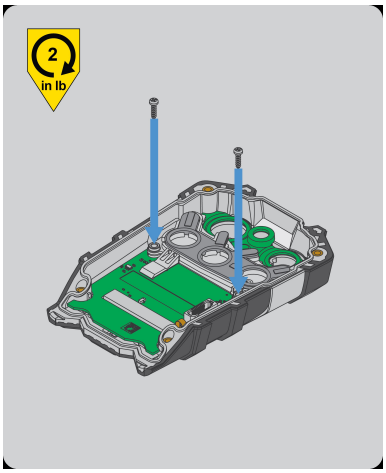


8. Install the new display PCBA and display assembly into the front housing assembly. Align the edges of the display with the black rubber features in the front housing as shown in the graphic. Align the display PCBA into the front housing using the two front housing posts and two display PCBA holes.

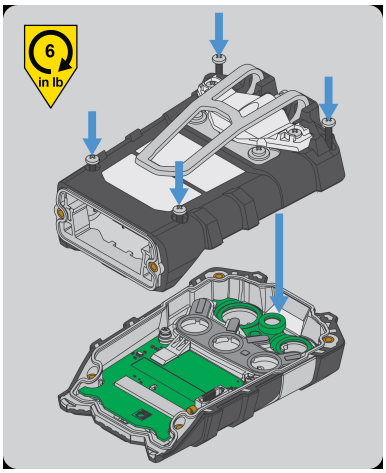
   NOTE: Be careful to not damage the display cables during installation by pulling or straining them.



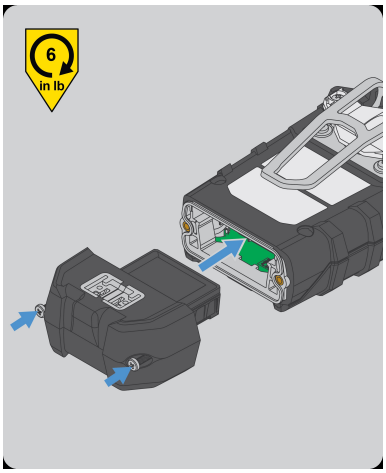
9. Install the clear bracket and gray gasket in the front housing assembly by aligning the two posts with the two front housing features shown in the graphic. Push the clear bracket down to engage the posts with the front housing features.



10. Install the two internal front housing assembly screws with a Phillips head #1 torque screwdriver. Torque to 2 in-lbs (0.23 Nm).



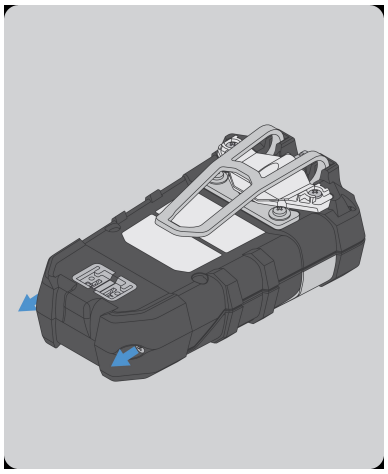
11. Install the front housing assembly and torque the four external instrument screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).



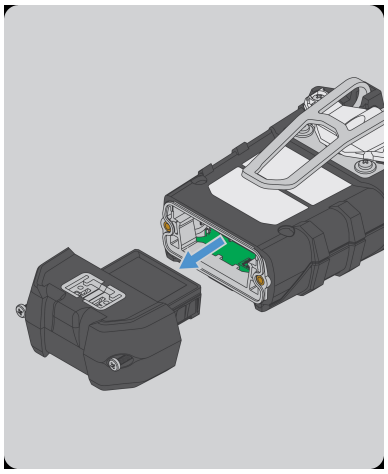
12. Install the battery pack and torque the two external battery pack screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).
13. Calibrate the device after sensors have stabilized.

    NOTE: Allow sensors to stabilize at room temperature for at least 30 minutes before calibration.

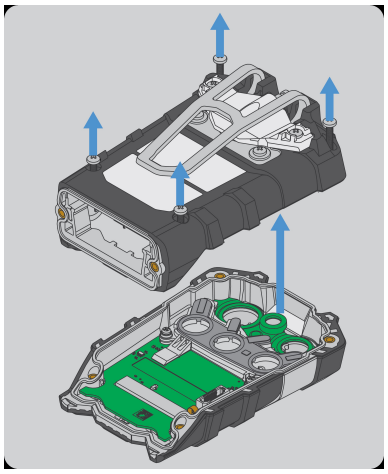
5.2.4 Front Housing Replacement



1. Loosen the two external battery pack screws with a Phillips head #1 screwdriver.

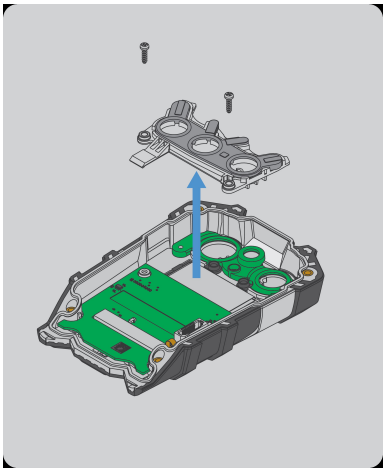


2. Remove the battery pack.

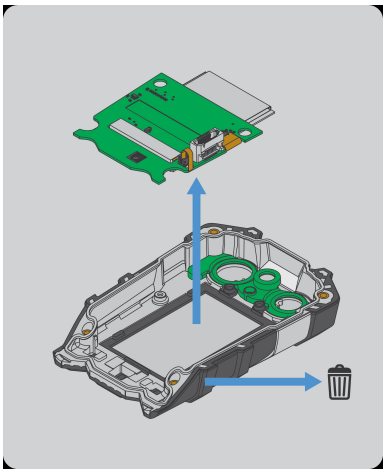


3. Loosen the four external instrument screws with a Phillips head #1 screwdriver and remove the front housing assembly.

   NOTE: The horn may stick to the gasket when the front housing is removed. If this occurs, see step 12 of Horn Change to reinstall the horn.



4. Loosen the two internal front housing assembly screws with a Phillips head #1 screwdriver and remove the clear bracket and gray gasket assembly in the front housing assembly. Retain the parts for reassembly.

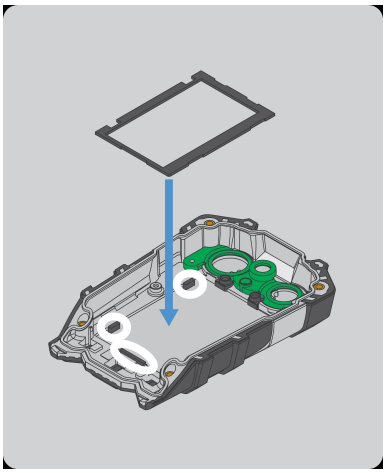


5. Remove the display PCBA and display assembly from the front housing. Discard remaining front housing assembly.

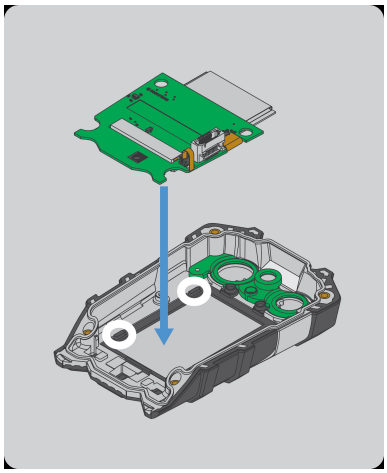
   NOTE: Be careful to not damage the display cables when removing the display assembly from the front housing.

6. Ensure the new gasket is fully installed into the front housing. Push down on the gasket to engage it with all the channels of the front housing.

   NOTE: The gasket should be secure to the front housing before proceeding. To check, flip the front housing upside down and ensure the gasket does not fall out.

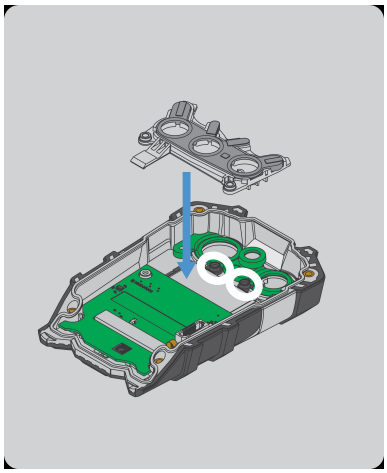


7. Install the new foam into the new front housing assembly. Align the cut outs in the foam with the black rubber features in the front housing as shown in the graphic.

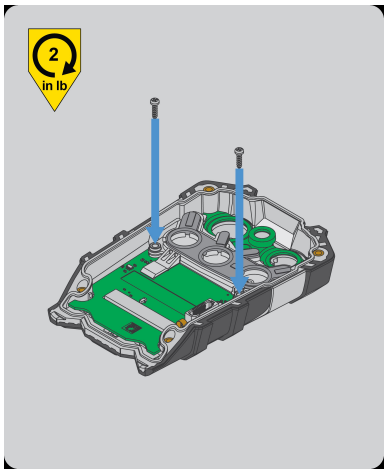


8. Install the display PCBA and display assembly into the new front housing assembly. Align the edges of the display with the black rubber features in the front housing as shown in the graphic. Align the display PCBA into the front housing using the two front housing posts and two display PCBA holes.

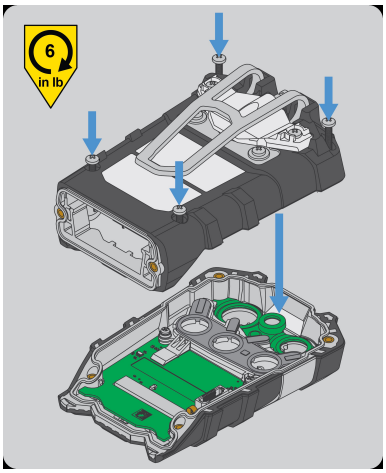
   NOTE: Be careful to not damage the display cables during installation by pulling or straining them.



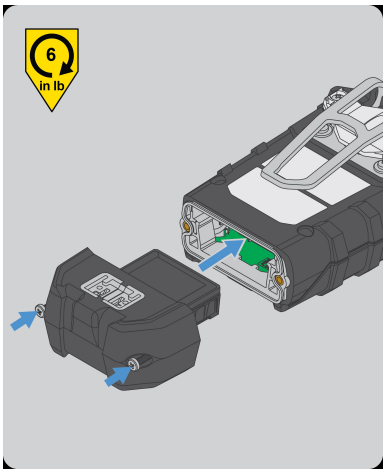
9. Install the clear bracket and gray gasket assembly in the new front housing assembly by aligning the two posts with the two front housing features shown in the graphic. Push the clear bracket down to engage the posts with the front housing features.



10. Install the two internal front housing assembly screws with a Phillips head #1 torque screwdriver. Torque to 2 in-lbs (0.23 Nm).



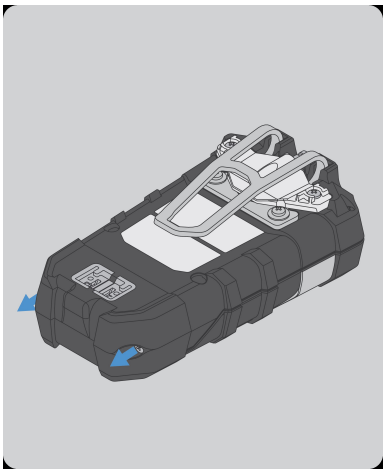
11. Install the new front housing assembly and torque the four external instrument screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).



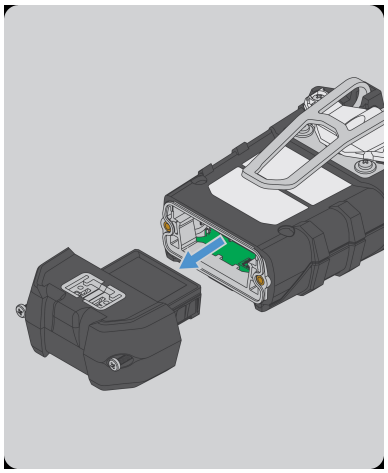
12. Install the battery pack and torque the two external battery pack screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).
13. Calibrate the device after sensors have stabilized.

    NOTE: Allow sensors to stabilize at room temperature for at least 30 minutes before calibration.

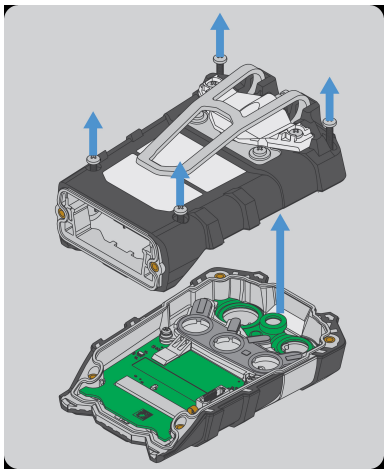
5.2.5 Back Housing Replacement



1. Loosen the two external battery pack screws with a Phillips head #1 screwdriver.

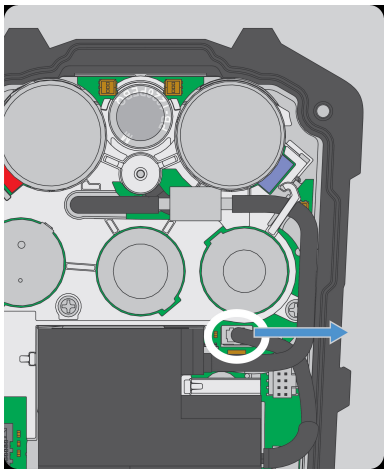


2. Remove the battery pack.

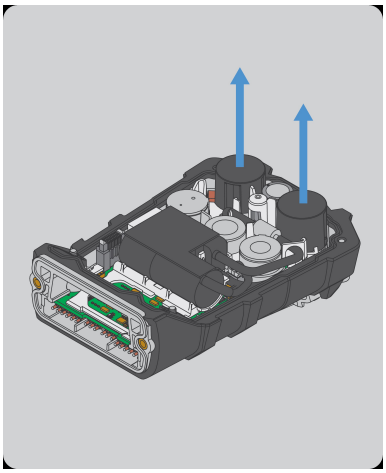


3. Loosen the four external instrument screws with a Phillips head #1 screwdriver and remove the front housing assembly.

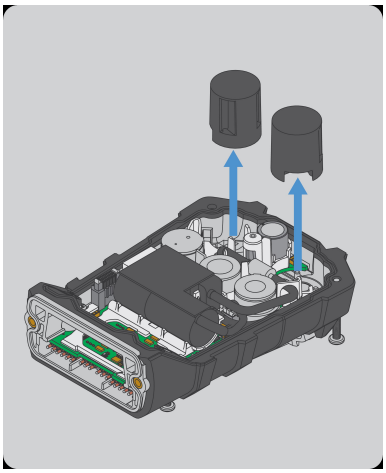
   NOTE: The horn may stick to the gasket when the front housing is removed. If this occurs, (see step 12 of Horn Change) to reinstall the horn.



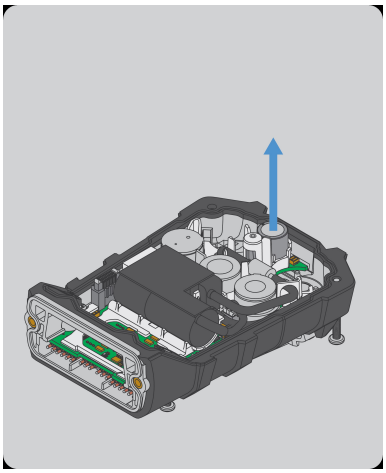
4. Disconnect the pump connector from the PCBA.



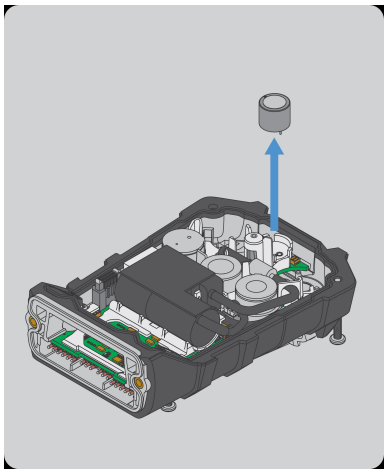
5. Remove the sensors/sensor blanks in slots 4 and 5 by pulling them up and clear of the bracket.

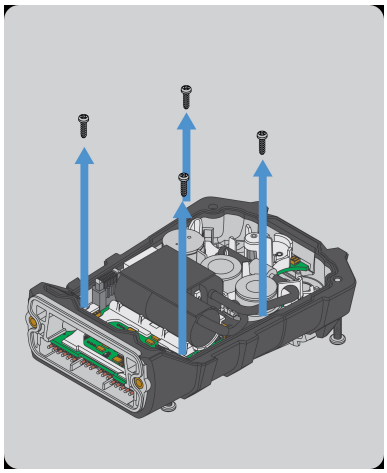


6. If removing an Xcell sensor, be sure to remove both the sensor and the adapter assembly (PCBA + red bracket), as the adapter assembly may remain in the instrument. Retain parts for reassembly.

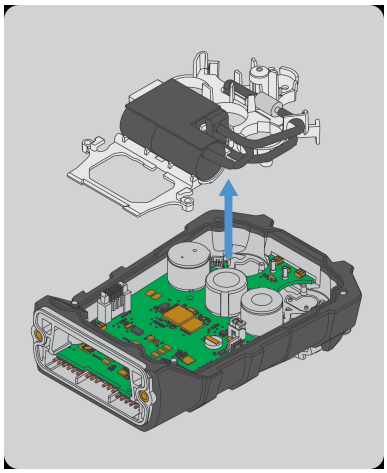


7. Remove the horn from the back housing assembly by pulling it up and clear of the bracket. Retain horn for reassembly.

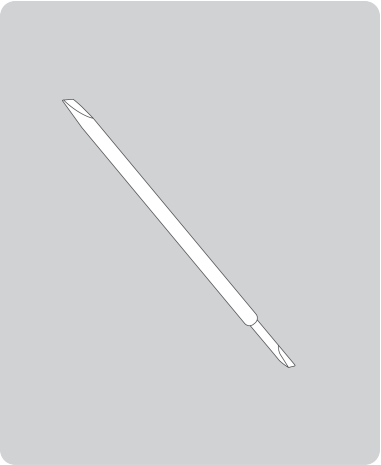




8. Remove the four internal back housing assembly screws with a Phillips head #1 screwdriver. Retain screws for reassembly.



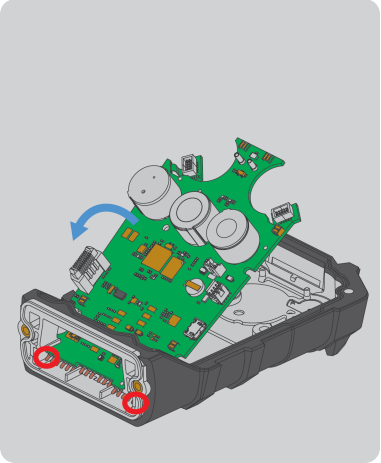
9. Remove the clear bracket and pump assembly by holding the PCBA down and pulling the clear bracket straight up and out of the back housing assembly. Retain for reassembly.



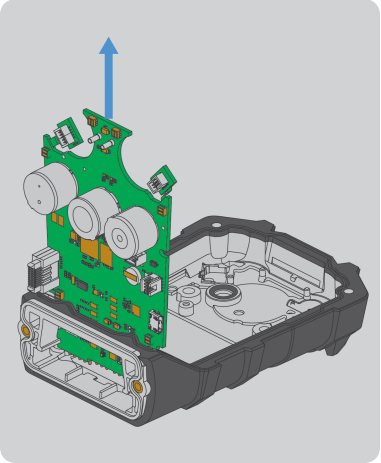
CAUTION!

Pogo pin spring force may create resistance during the rotation of the PCBA in the back housing. Do not force or pry the PCBA at any time. Applying excessive force can damage the pogo pins or other PCBA components. If pogo pins are damaged, send device to MSA Service Center for repair.

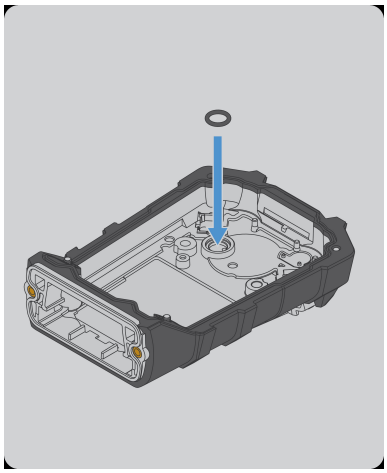
10. Locate the plastic pick included with the back housing replacement kit.



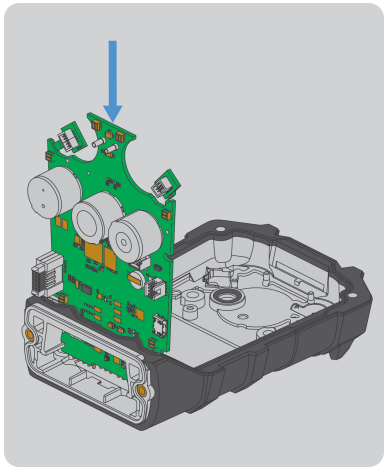
11. Begin removing the PCBA by gently rotating it upward at the angle shown in the graphic. If resistance is felt, stop rotating immediately. Use the plastic pick tool to apply light pressure to the outermost pogo pins on either side of the PCBA as shown by the circles in the graphic until the PCBA is able to rotate freely



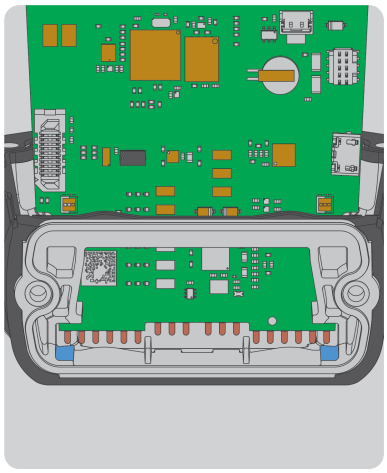
12. Once the PCBA is fully vertical, gently pull straight up as shown in the graphic to remove it.



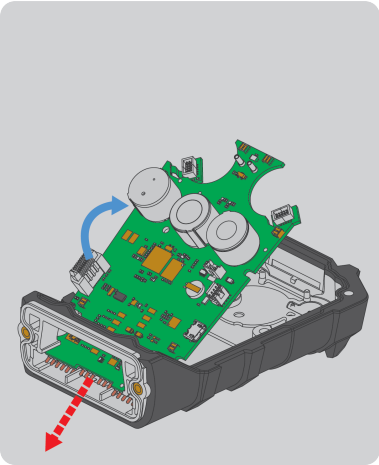
13. Install the black O-ring from the back housing replacement kit in the new back housing in the location shown in the graphic.



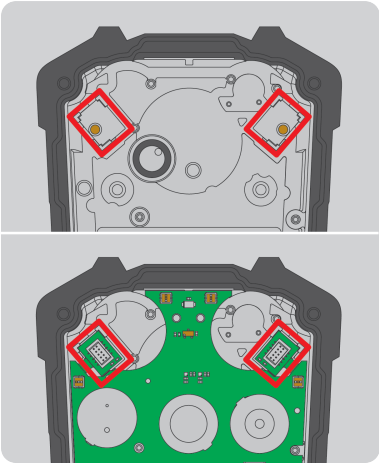
14. Locate the new back housing. Install the PCBA into the new back housing by first gently inserting it vertically as shown in the graphic.



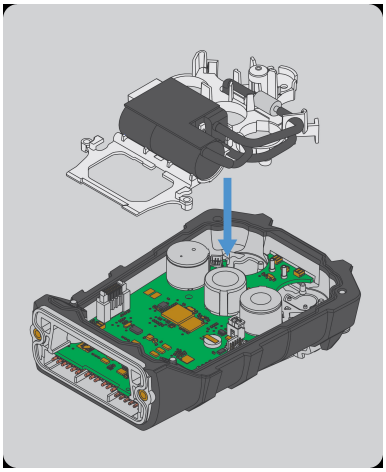
15. Once the PCBA is fully inserted vertically, visually check that the PCBA is centered by ensuring the outermost pogo pins on either side of the PCBA are seated on the flat surfaces highlighted blue in the graphic. If not, realign the PCBA so that they are.



16. Gently rotate the PCBA down at an angle as shown in the graphic. If resistance is felt, stop rotating immediately and gently press the PCBA downward (direction of the red dotted arrow in the graphic) to compress the pogo pins against the back housing before starting to rotate again. If resistance is still felt, remove the PCBA from the back housing and repeat steps 4-5.

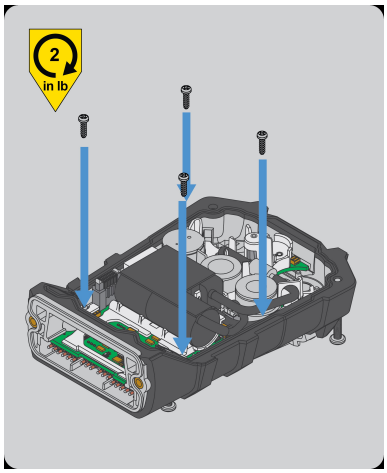


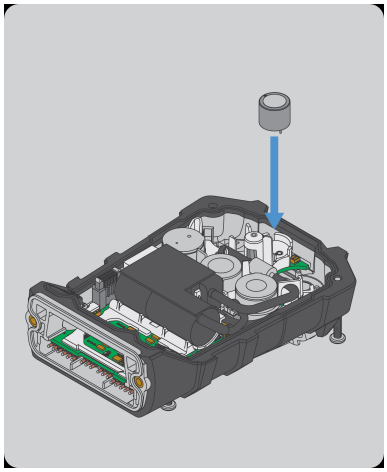
17. Once the PCBA is flat in the back housing, align the two flexible regions of the PCBA with the corresponding recessed rectangular regions shown in the graphics. Gently press each flexible region into its recessed area until fully seated. If needed, the plastic pick may be used to apply light pressure.

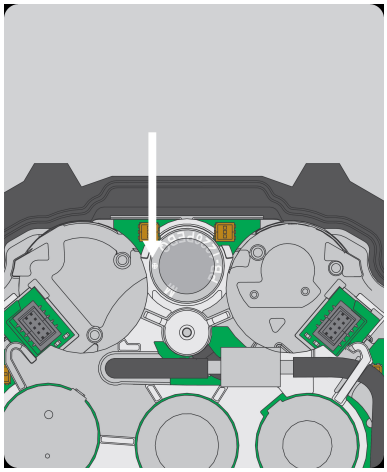


18. Install the clear bracket and pump assembly to the new back housing using the four internal screws with a Phillips head #1 torque screwdriver. Torque to 2 in-lbs (0.23 Nm).

    NOTE: Make sure the small black O-ring is seated in the clear bracket prior to installing the assembly into the back housing.

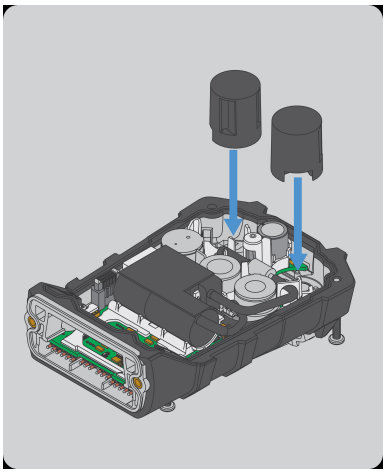




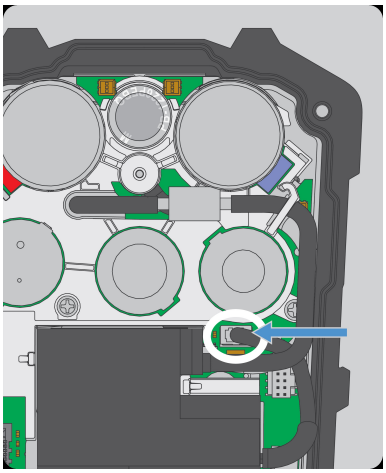


19. Install the horn by pushing it down into the clear bracket.

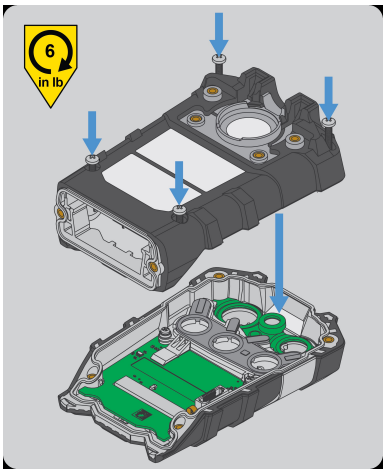
    NOTE: Make sure to align the two pins with the two receptacles. Install the horn so the text on the top surface of the horn is aligned as shown in the graphic.



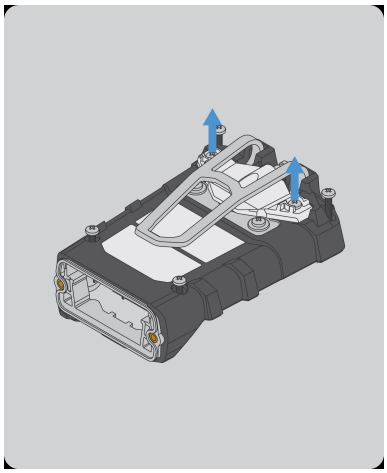
20. Install the sensors/sensor blanks in slots 4 and 5 according to Sensor change (Slots 4-5) or Sensor blank change (Slots 4-5) step 4



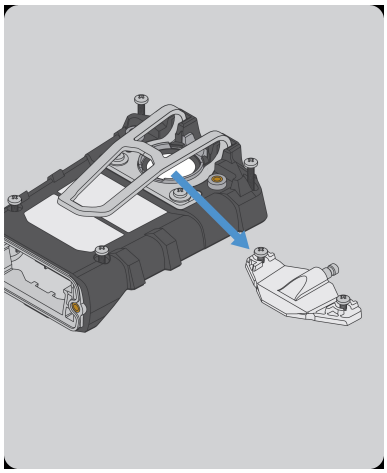
21. Connect the pump to the PCBA at the location shown.



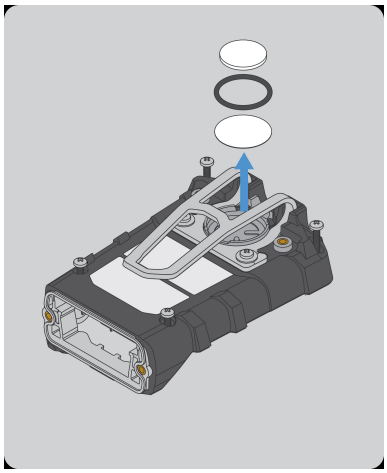
22. Install the front housing assembly and torque the four external instrument screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).



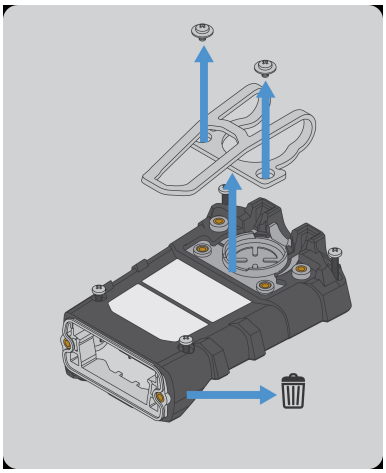
23. On the old back housing, loosen the two filter cover captive external screws with a Phillips #1 screwdriver.



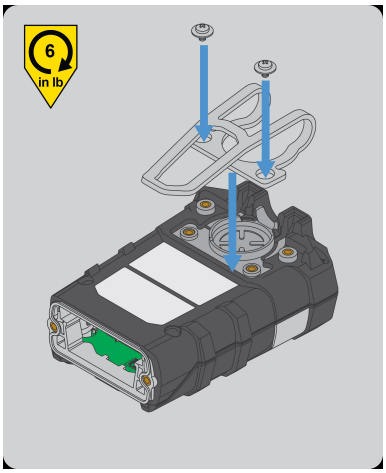
24. Remove the filter cover by sliding it out underneath the clip. Retain the filter cover and screws for reassembly.



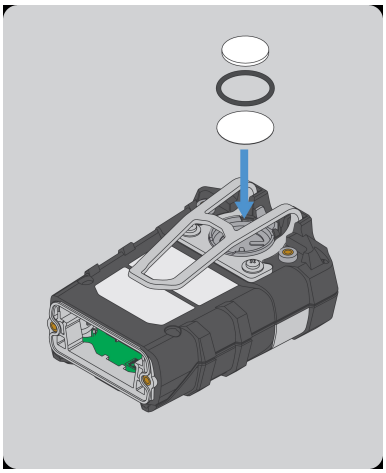
25. Carefully lift out the O-ring and the filter disk(s). Retain the o-ring and filter disk (s) for reassembly.



26. Remove the two clip screws and clip from the old back housing. Retain the parts for reassembly. Discard the old back housing.



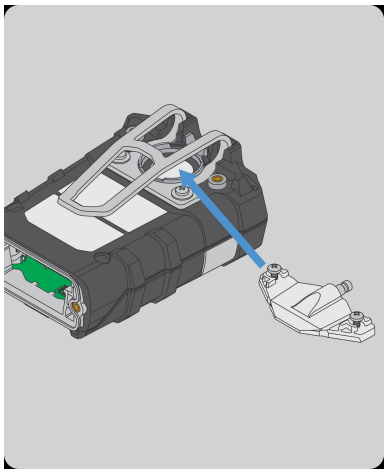
27. Install the clip and washers/screws on the new back housing with a Phillips #1 head torque screwdriver. Torque screws to 6 in-lbs (0.68 Nm).



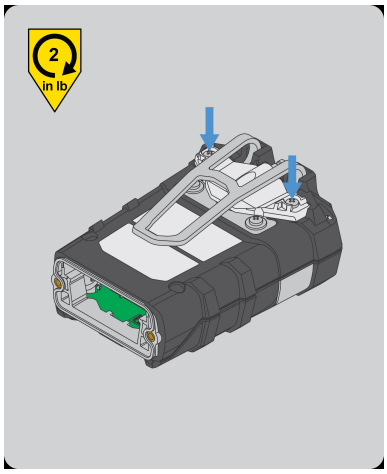
28. Place the paper-like filter into the recess in the new back housing. If it is to be used, place the fibrous dust filter into the filter cover.

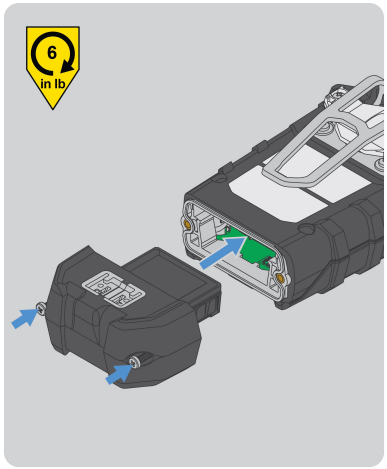
    NOTE: Use both the paper-like filter and the fibrous dust filter (the thicker disk) as supplied in the filter cover replacement kit if the device is NOT configured to use a reactive toxic gas sensor (does not have Cl2, ClO2, or NH3 sensor).

29. Place the O-ring in the recess in the new back housing on top of the paper-like filter.



30. Slide the filter cover underneath the clip and install on the back of the device with a Phillips #1 head torque screwdriver. Torque screws to 2 in-lbs (0.23 Nm).

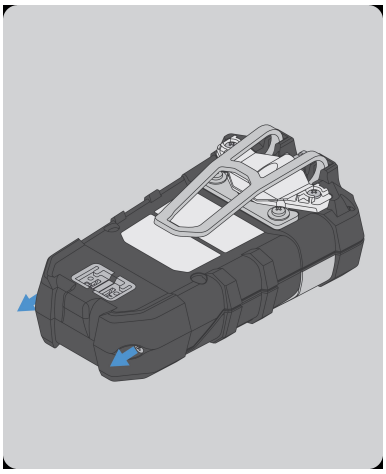




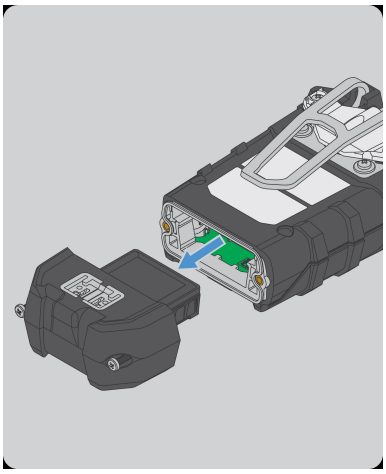
31. Install the battery pack and torque the two external battery pack screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).
32. Check functionality of the alert button and calibrate the device after sensors have stabilized.

    NOTE: Allow sensors to stabilize at room temperature for at least 30 minutes before calibration.

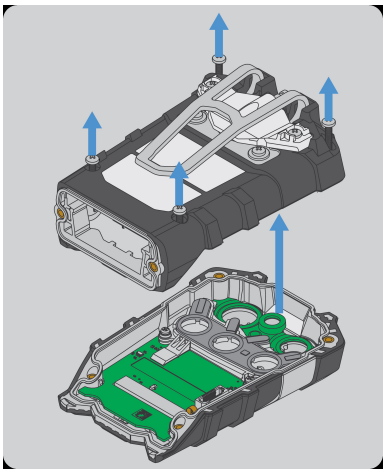
5.2.6 Horn Change



1. Loosen the two external battery pack screws with a Phillips head #1 screwdriver.

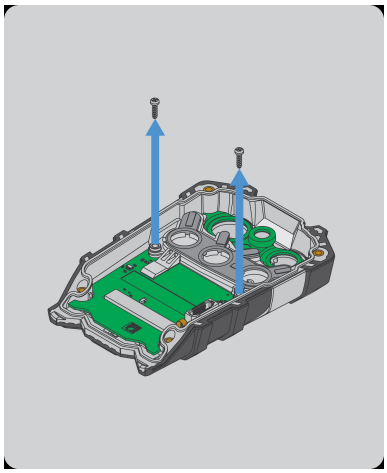


2. Remove the battery pack.

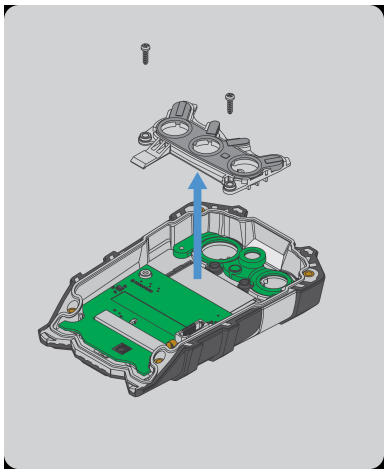


3. Loosen the four external instrument screws with a Phillips head #1 screwdriver and remove the front housing assembly.

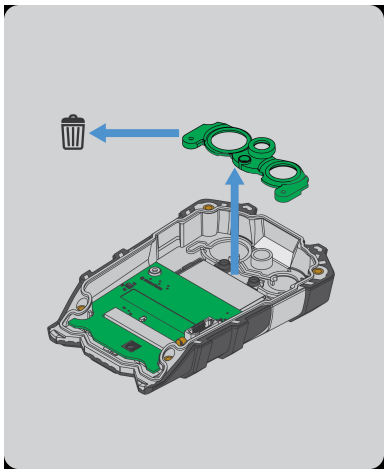
   NOTE: The horn may stick to the gasket when the front housing is removed.



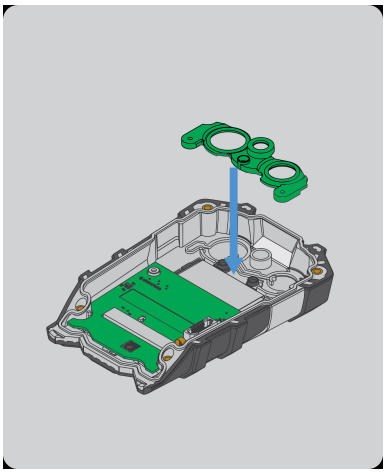
4. Loosen the two internal front housing assembly screws with a Phillips head #1 screwdriver.



5. Remove the clear bracket and gray gasket assembly in the front housing assembly. Retain the parts for reassembly.

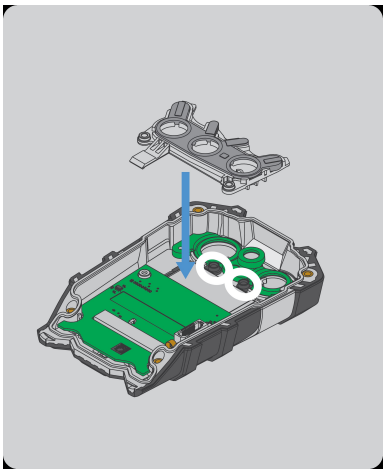


6. Remove the gasket from the front housing and discard.

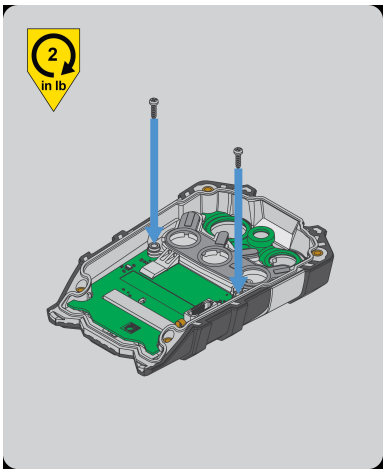


7. Install the new gasket into the front housing. Push down on the gasket to engage it with all the channels of the front housing.

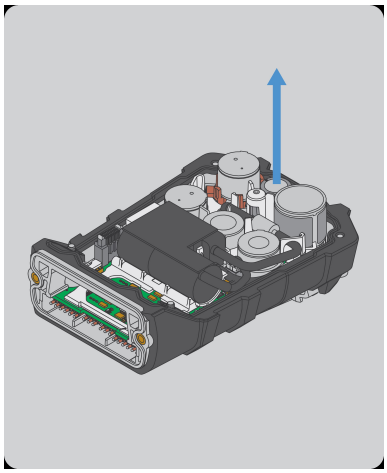
   NOTE: The gasket should be secure to the front housing before proceeding. To check, gently place a finger on the display assembly to secure it and flip the front housing upside down and ensure the gasket does not fall out.



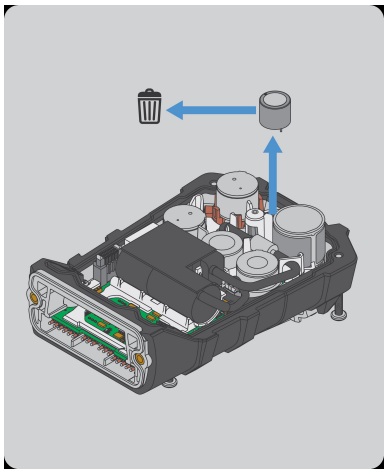
8. Install the clear bracket and gray gasket assembly in the front housing assembly by aligning the two posts with the two front housing features shown in the graphic. Push the clear bracket down to engage the posts with the front housing features.



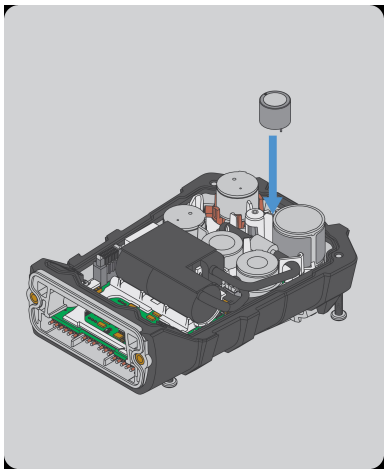
9. Install the two internal front housing assembly screws with a Phillips head #1 torque screwdriver. Torque to 2 in-lbs (0.23 Nm).



10. Remove the horn from the back housing assembly by pulling it up and clear of the bracket.

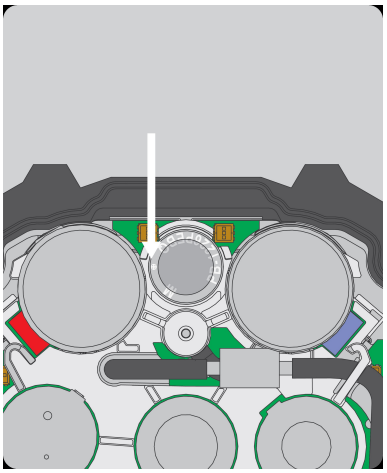


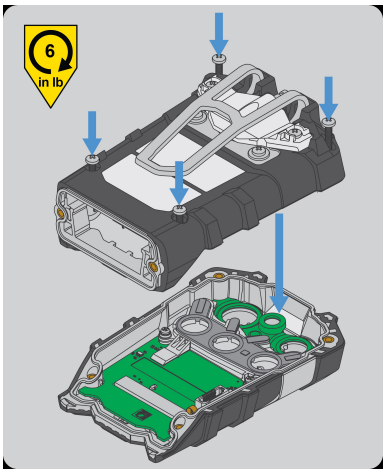
11. Discard horn according to local regulations.



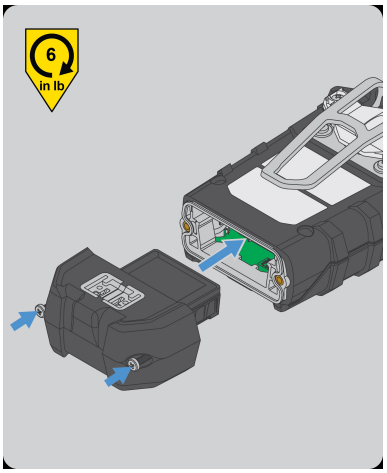
12. Install the replacement horn by pushing it down into the clear bracket.

    NOTE: Make sure to align the two pins with the two receptacles. Install the horn so the text on the top surface of the horn is aligned as shown in the graphic.





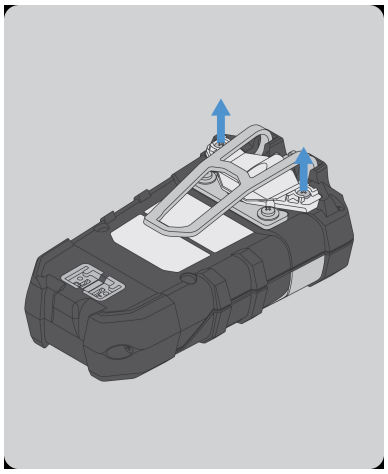
13. Install the front housing assembly and torque the four external instrument screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).



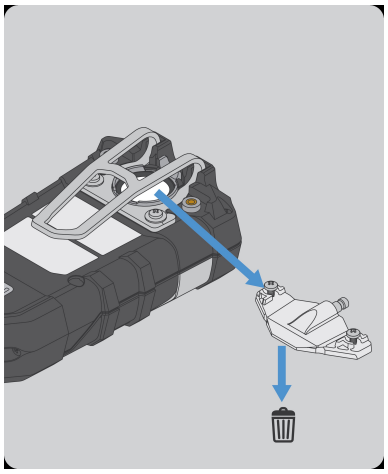
14. Install the battery pack and torque the two external battery pack screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).
15. Calibrate the device after sensors have stabilized.

    NOTE: Allow sensors to stabilize at room temperature for at least 30 minutes before calibration.

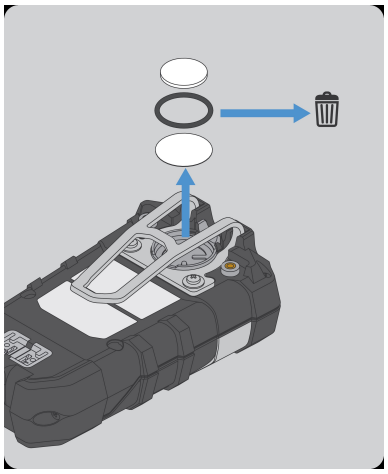
5.2.7 Filter Cover Replacement



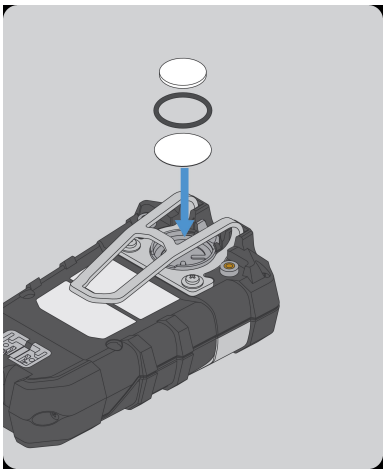
1. Loosen the two filter cover captive external screws with a Phillips #1 screwdriver.



2. Remove the filter cover by sliding it out underneath the clip and discard.



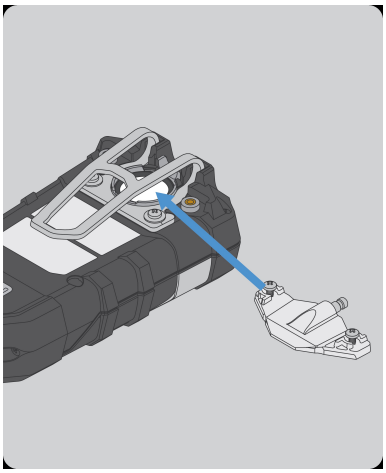
3. Carefully lift out the O-ring and the filter disk(s) and discard.



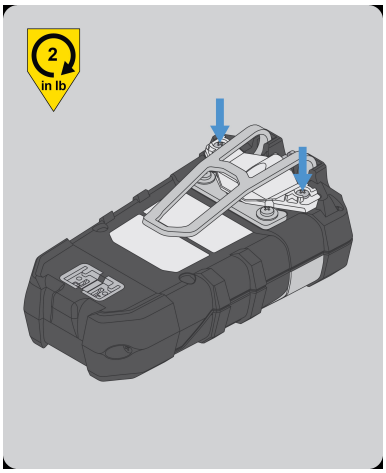
4. Place the new paper-like filter into the recess in the back of the device. If it is to be used, place the fibrous dust filter into the filter cover.

   NOTE: Use both the paper-like filter and the fibrous dust filter (the thicker disk) as supplied in the filter cover replacement kit if the device is NOT configured to use a reactive toxic gas sensor (does not have Cl_2, ClO_2, or NH_3 sensor).

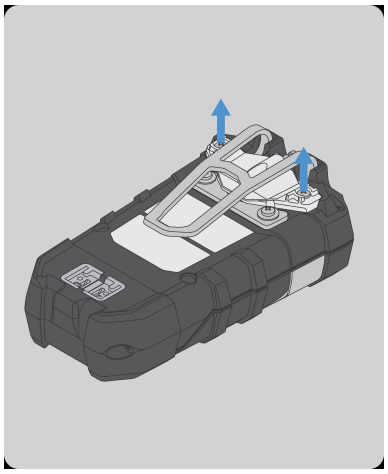
5. Place the new O-ring in the recess in the back of the device on top of the paper-like filter.



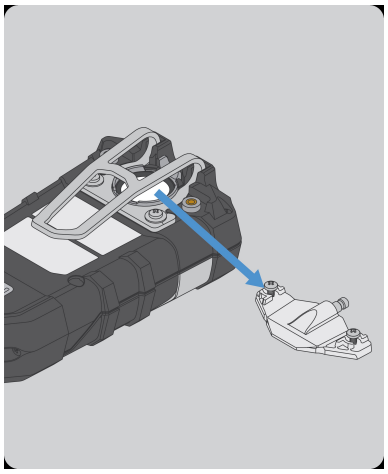
6. Slide the new filter cover underneath the clip and install on the back of the device with a Phillips #1 head torque screwdriver. Torque screws to 2 in-lbs (0.23 Nm).
7. Calibrate the device after sensors have stabilized.



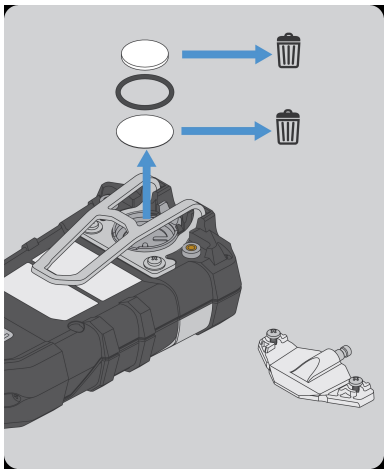
5.2.8 Filter Replacement



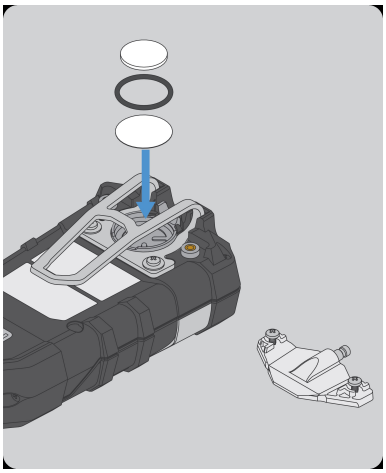
1. Loosen the two filter cover captive external screws with a #1 screwdriver.



2. Remove the filter cover by sliding it out underneath the clip. Retain the filter cover for reassembly



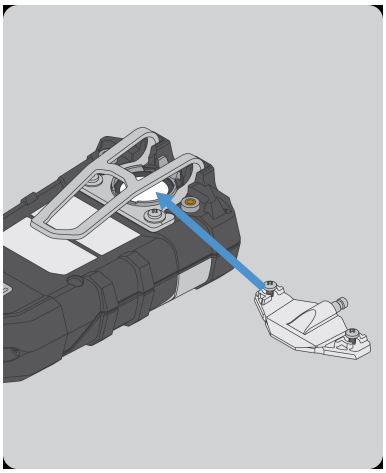
3. Carefully lift out the O-ring and the filter disk(s). Discard filter disk(s) to be replaced.



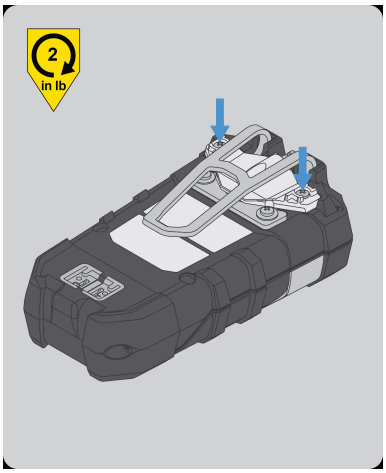
4. Place the new paper-like filter into the recess in the back of the device. If it is to be used, place the fibrous dust filter into the filter cover.

   NOTE: Use both the paper-like filter and the fibrous dust filter (the thicker disk) as supplied in the maintenance kit if the device is NOT configured to use a reactive toxic gas sensor (does not have Cl_2, ClO_2, or NH_3 sensor).

5. Replace the O-ring in the recess in the back of the device on top of the paper-like filter.



6. Slide the filter cover underneath the clip and reinstall on the back of the device with a Phillips #1 head torque screwdriver. Torque screws to 2 in-lbs (0.23 Nm).
7. Calibrate the device after sensors have stabilized.



ALTAIR io 6 Filter Guide						
		What It Does	**How Often to Change**	**Gas Consideration**	**Detector Ships With**	**Replacement Kit PN**
Paper-like PTFE Filter (item #12 on exploded image in 5.1 Serviceable Items - Altair io 6)		prevents water and small particulate from entering	as needed, but less frequently	For use with all gas types	1 installed (4 spares with ALTAIR io 6 Multigas Detectors with NH3, Cl2, or ClO2 sensors)	5 PACK - 10214033 1 PACK - 808935
Fibrous Filter (item #13 on exploded image in 5.1 Serviceable Items - Altair io 6)		acts as a "pre-filter" and captures larger particles	as needed, but more frequently	Not for use with NH3, Cl2, ClO2	1 installed and 4 spares in the box (not installed in ALTAIR io 6 Multigas Detectors with NH3, Cl2, or ClO2 sensors)	5 PACK - 808935

5.2.9 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.

NOTE: If the pump alarm does not activate, remove from service and contact MSA Safety.

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 Alarm", as well as "Check for blockage and restart pump" will flash on the display.

1. Press the 0 ↓button to reset the alarm and restart the pump.

NOTE: Pressing the Acknowledge button silences the alarm and stops vibration.

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.

2. Press the 0 ↓button to reset the alarm and restart the pump.

⚠ WARNING!

- Do not use the device, 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 these warnings can result in serious personal injury or death.

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.

NOTICE

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, see 6.2 Accessories and Spare Parts, containing a special membrane filter, permeable to gas but impermeable to water, to prevent such an occurrence.

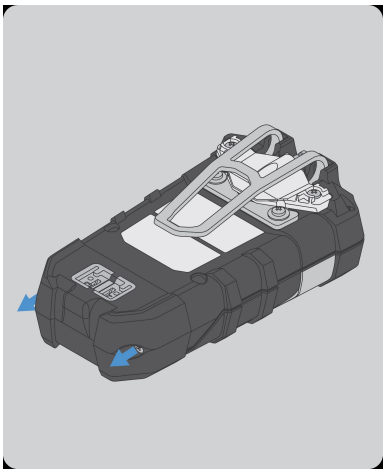
During operation, a pump alarm may occur when the:

- Flow system is blocked
- Pump is inoperative
- Sample lines are attached or removed.

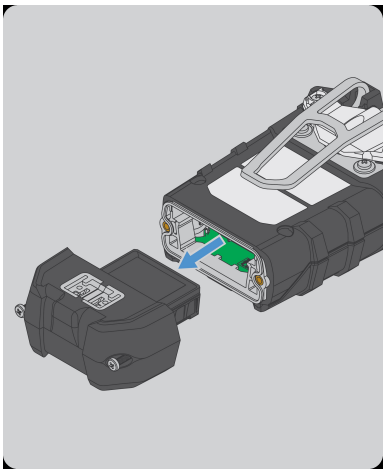
To Clear Pump Alarm

1. Correct any flow blockage.
2. Press the 0 ↓button.
    - The Pump will now restart.

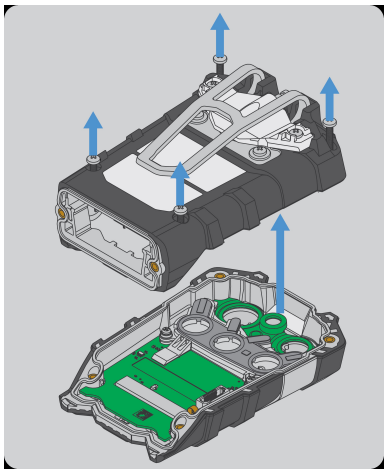
5.2.10 Pump Replacement



1. Loosen the two external battery pack screws with a Phillips head #1 screwdriver .

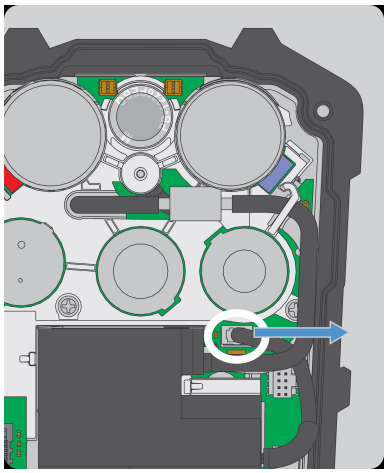


2. Remove the battery pack.

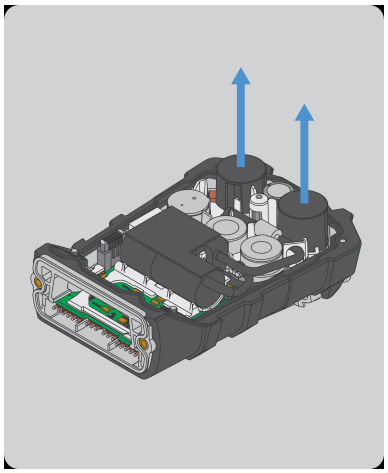


3. Loosen the four external instrument screws with a Phillips head #1 screwdriver and remove the front housing assembly.

   NOTE: The horn may stick to the gasket when the front housing is removed. If this occurs, see step 12 of Horn Change to reinstall the horn.

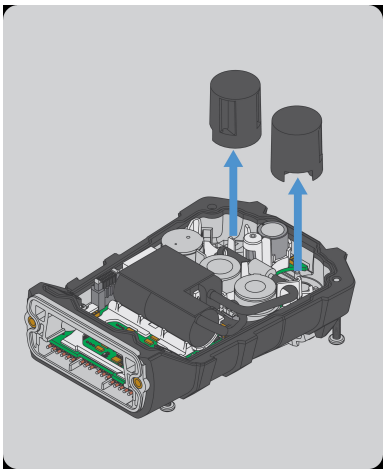


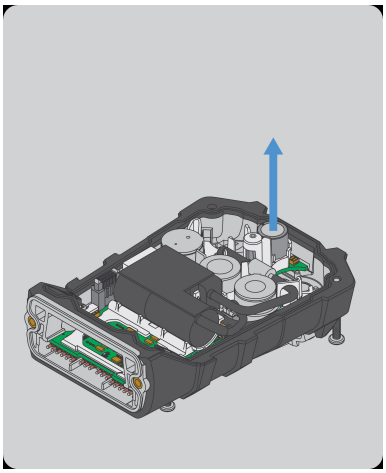
4. Disconnect the pump connector from the PCBA.

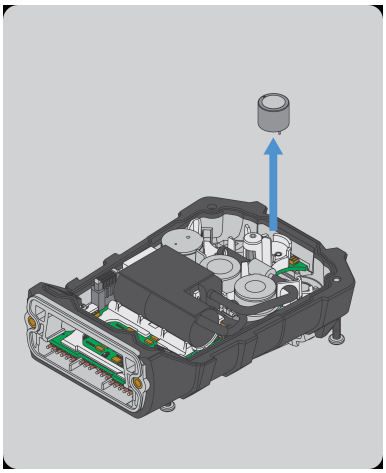


5. Remove the sensors/sensor blanks in slots 4 and 5 by pulling them up and clear of the bracket.

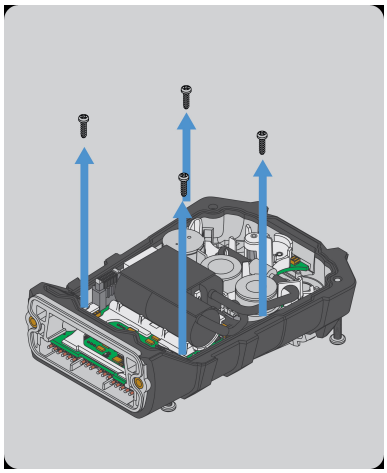
   NOTE: If removing an Xcell sensor, be sure to remove both the sensor and the adapter assembly (PCBA + red bracket), as the adapter assembly may remain in the instrument. Retain parts for reassembly.



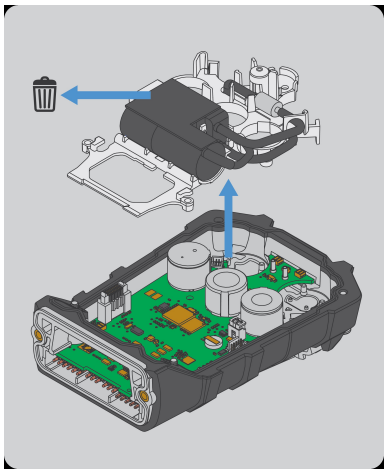




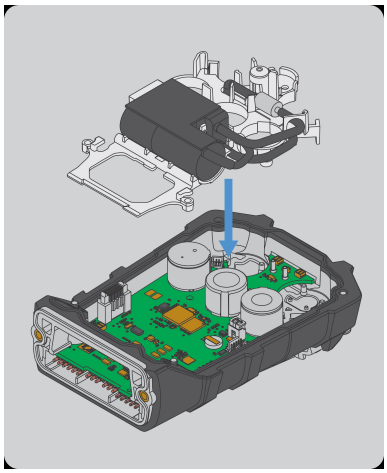
6. Remove the horn from the back housing assembly by pulling it up and clear of the bracket. Retain horn for reassembly.



7. Remove the four internal back housing assembly screws with a Phillips head #1 screwdriver. Retain screws for reassembly.

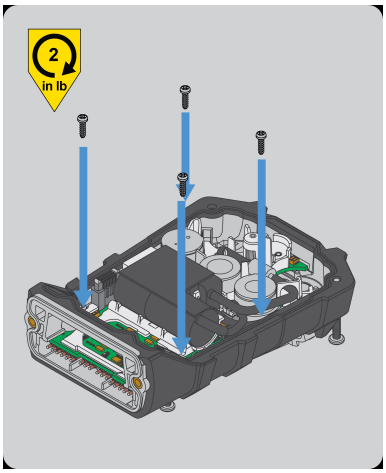


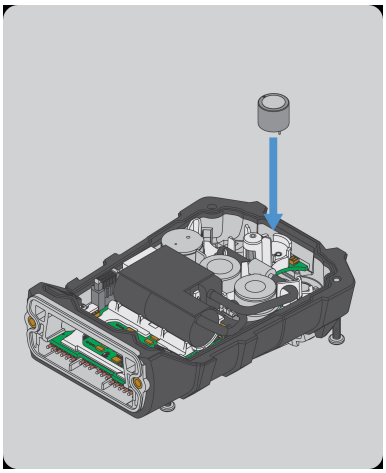
8. Remove the clear bracket and pump assembly by holding the PCBA down and pulling the clear bracket straight up and out of the back housing assembly. Discard according to local regulations.

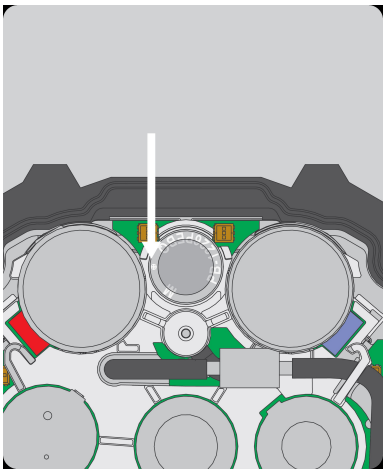


9. Install the new clear bracket and pump assembly to the back housing using the four internal screws with a Phillips head #1 torque screwdriver. Torque to 2 in-lbs (0.23 Nm).

   NOTE: Make sure the small black O-ring is seated in the new clear bracket prior to installing the assembly into the back housing.

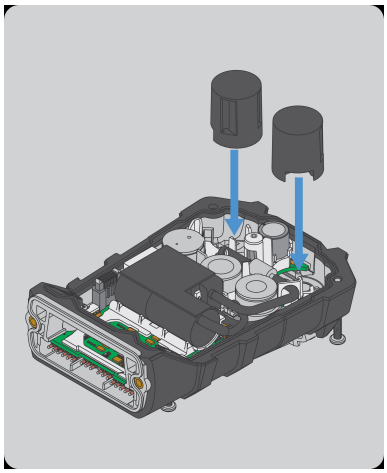




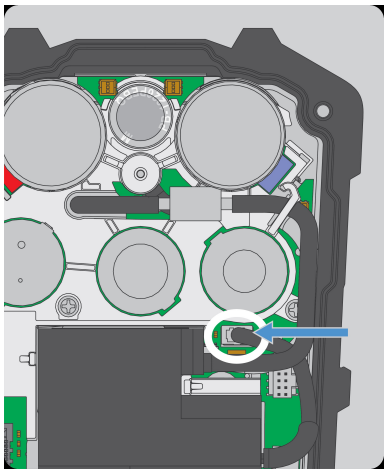


10. Install the replacement horn by pushing it down into the clear bracket.

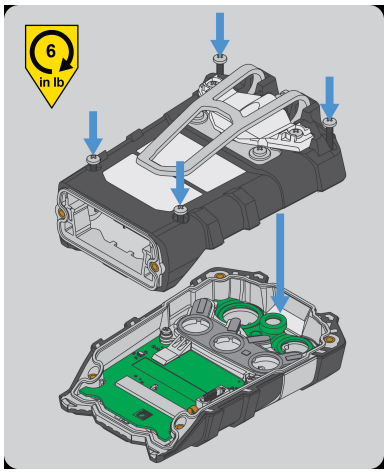
    NOTE: Make sure to align the two pins with the two receptacles. Install the horn so the text on the top surface of the horn is aligned as shown in the graphic.



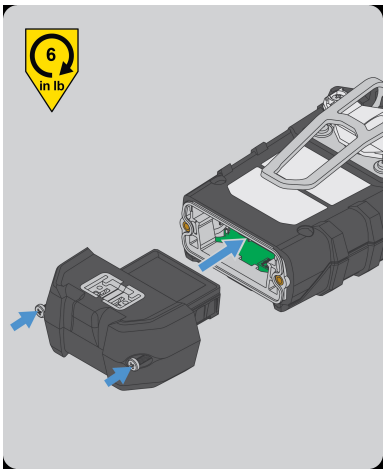
11. Install the sensors/sensor blanks in slots 4 and 5 according to Sensor change (Slots 4-5) or Sensor blank change (Slots 4-5) step 4.



12. Connect the pump to the PCBA at the location shown.



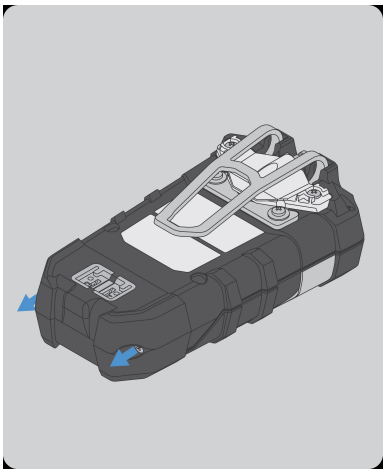
13. Install the front housing assembly and torque the four external instrument screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).



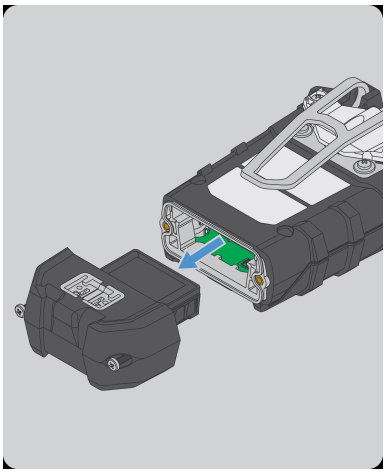
14. Install the battery pack and torque the two external battery pack screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).
15. Calibrate the device after sensors have stabilized.

    NOTE: Allow sensors to stabilize at room temperature for at least 30 minutes before calibration.

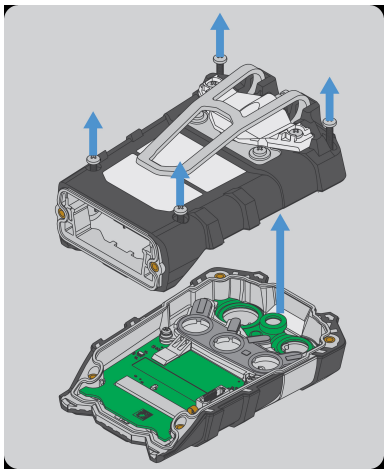
5.2.11 Sensor Gasket Replacement



1. Loosen the two external battery pack screws with a Phillips head #1 screwdriver.

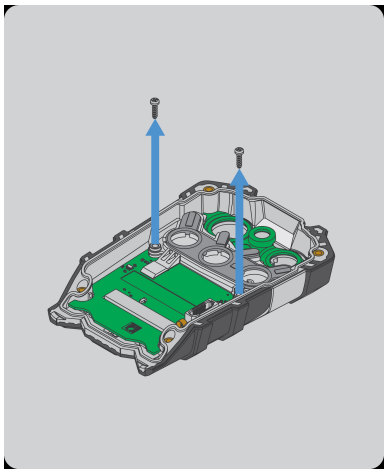


2. Remove the battery pack.

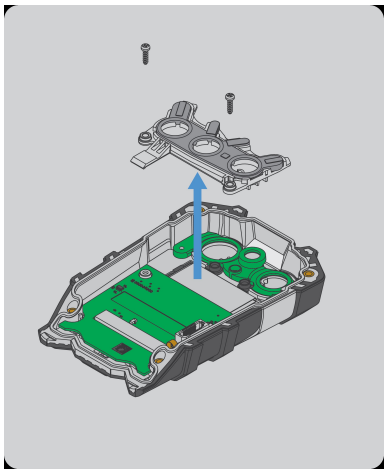


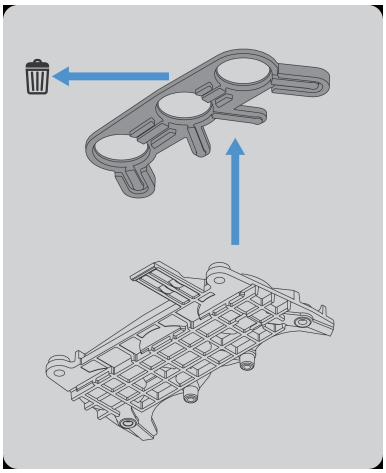
3. Loosen the four external instrument screws with a Phillips head #1 screwdriver and remove the front housing assembly.

   NOTE: The horn may stick to the gasket when the front housing is removed. If this occurs, see step 12 of Horn Change to reinstall the horn.

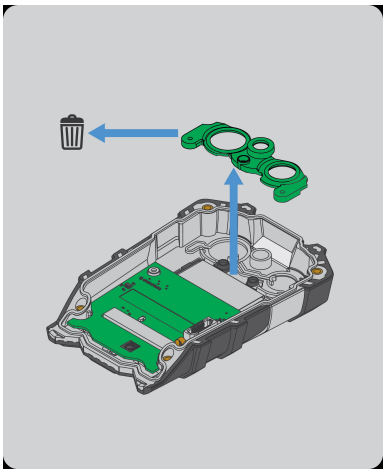


4. Loosen the two internal front housing assembly screws with a Phillips head #1 screwdriver and remove the clear bracket in the front housing assembly.

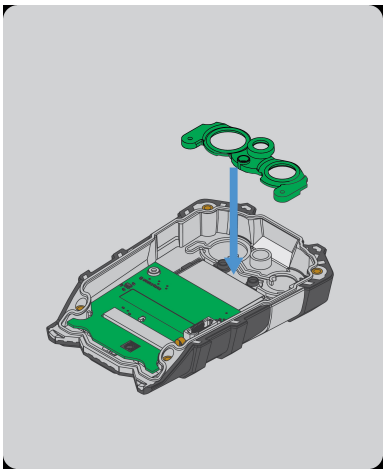




5. Remove the gray gasket from the clear bracket and discard. Retain the clear bracket for reassembly.

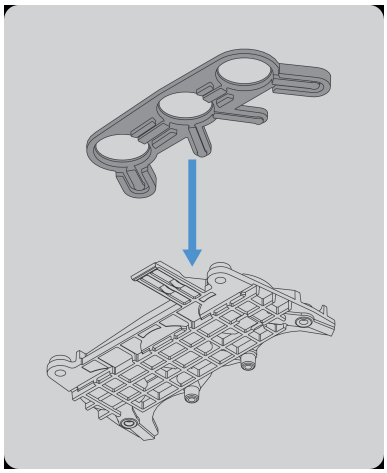


6. Remove the gasket from the front housing and discard.



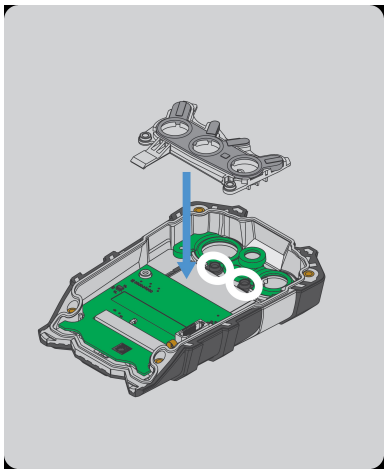
7. Install the new gasket into the front housing. Push down on the gasket to engage it with all the channels of the front housing.

   NOTE: The gasket should be secure to the front housing before proceeding. To check, gently place a finger on the display assembly to secure it and flip the front housing upside down and ensure the gasket does not fall out.

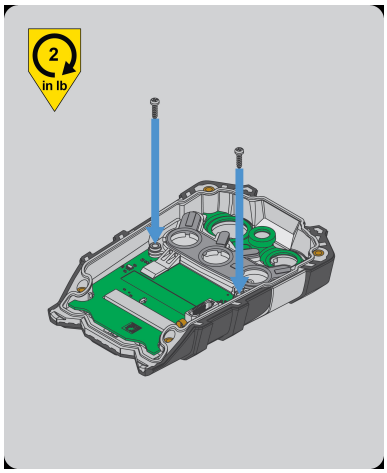


8. Install the new gray gasket into the clear bracket. Push down on the gasket to engage it with all the channels of the clear bracket.

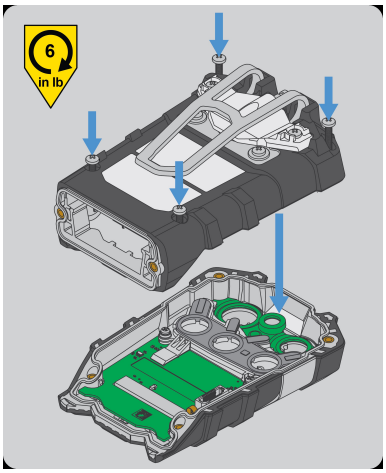
   NOTE: The gray gasket should be secure to the clear bracket before proceeding. To check, flip the clear bracket assembly upside down and ensure the gray gasket does not fall out.



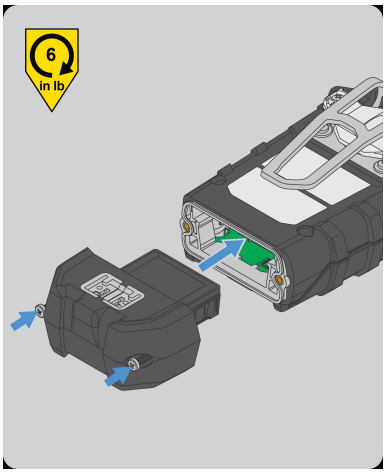
9. Install the clear bracket in the front housing assembly by aligning the two posts with the two front housing features shown in the graphic. Push the clear bracket down to engage the posts with the front housing features.



10. Install the two internal front housing assembly screws with a Phillips head #1 torque screwdriver. Torque to 2 in-lbs (0.23 Nm).



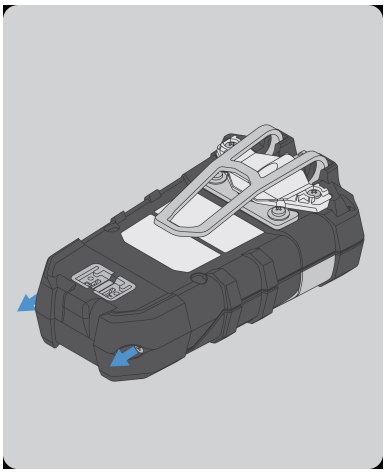
11. Install the front housing assembly and torque the four external instrument screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).



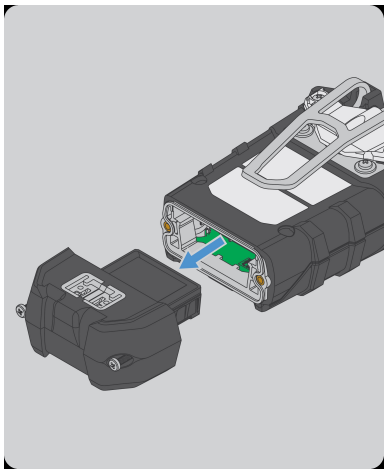
12. Install the battery pack and torque the two external battery pack screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).
13. Calibrate the device after sensors have stabilized.

    NOTE: Allow sensors to stabilize at room temperature for at least 30 minutes before calibration.

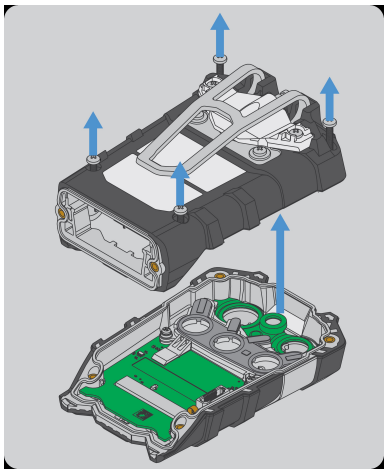
5.2.12 Sensor Replacement Slots 1-3



1. Loosen the two external battery pack screws with a Phillips head #1 screwdriver.

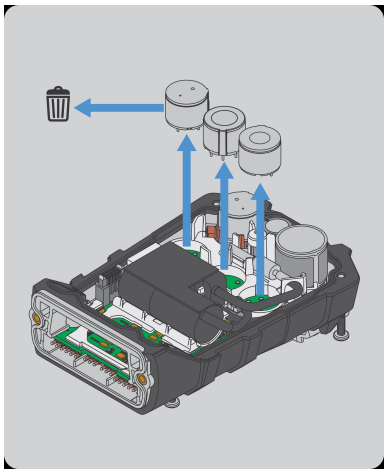


2. Remove the battery pack.

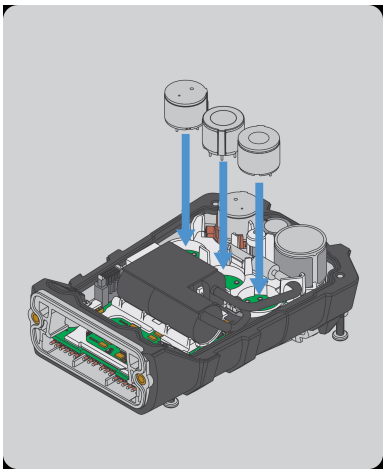


3. Loosen the four external instrument screws with a Phillips head #1 screwdriver and remove the front housing assembly.

   NOTE: The horn may stick to the gasket when the front housing is removed. If this occurs, (see step 12 of Horn Change) to reinstall the horn.

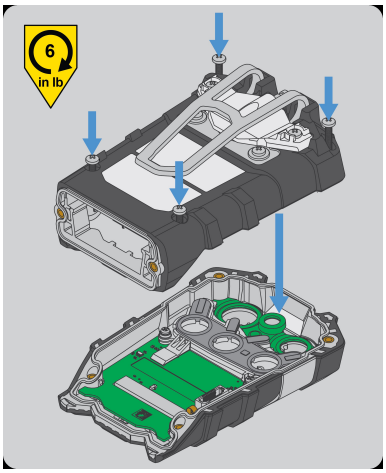


4. Remove the sensor(s) you plan on replacing by pulling it up and clear of the bracket. Discard sensor(s) according to local regulations.

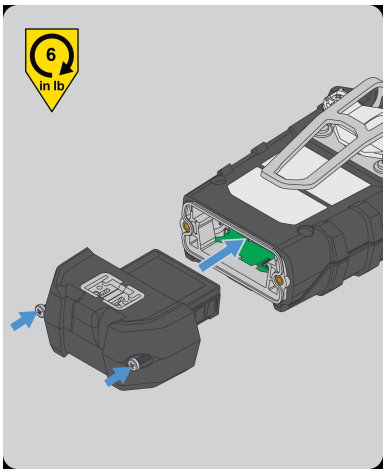


5. Install the replacement sensor(s) by pushing it down into the clear bracket.

   NOTE: Make sure to align the keying feature of the sensor with the keying slot in the clear bracket. Be careful not to break the sensor pins by forcing the sensor into the clear bracket.



6. Install the front housing assembly and torque the four external instrument screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).

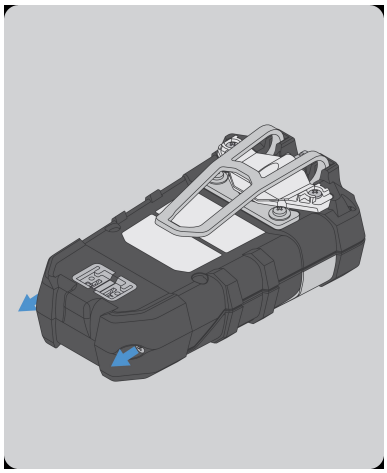


7. Install the battery pack and torque the two external battery pack screws with a Phillips #1 torque screwdriver. Torque to 6 in-lbs (0.68 Nm).
8. Calibrate the device after sensors have stabilized.

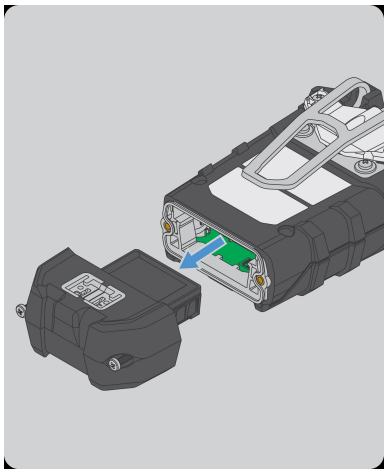
   NOTE: Allow sensors to stabilize at room temperature for at least 30 minutes before calibration.

5.2.13 Sensor Replacement Slots 4-5

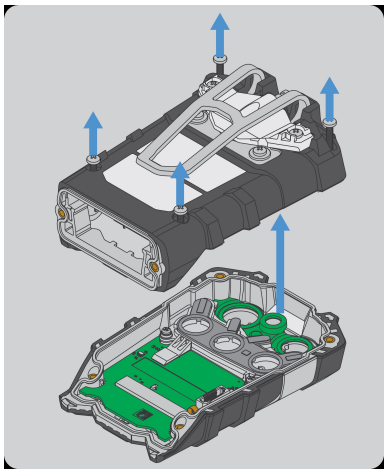
Sensor Blank Replacement



1. Loosen the two external battery pack screws with a Phillips head #1 screwdriver.

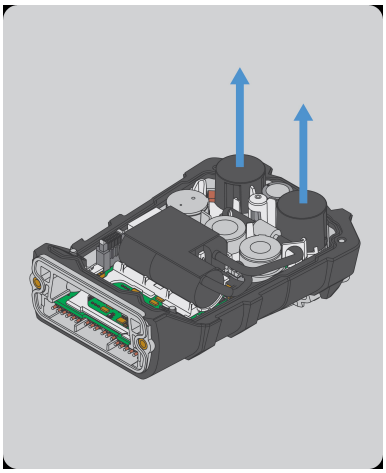


2. Remove the battery pack.

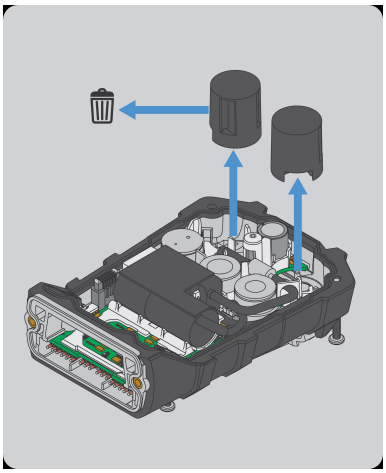


3. Loosen the four external instrument screws with a Phillips head #1 screwdriver and remove the front housing assembly.

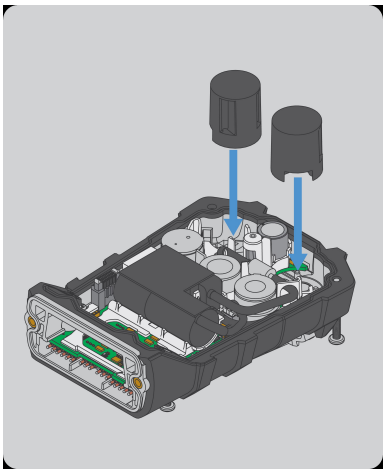
   NOTE: The horn may stick to the gasket when the front housing is removed. If this occurs, (see step 12 of Horn Change) to reinstall the horn.



4. Remove the sensor blank you plan on replacing by pulling it up and clear of the bracket.

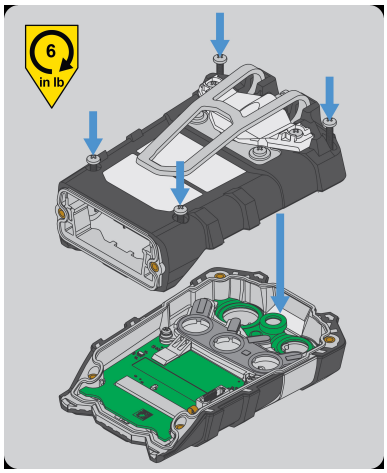


5. Discard sensor blank.

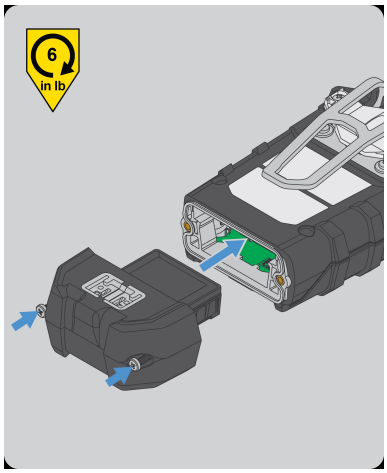


6. Install the replacement sensor blank by pushing it down into the back housing.

   NOTE: Make sure to align the two keying holes on the bottom of the sensor blank with the keying posts in the back housing. Be careful not to break the keying posts by forcing the sensor blank into the back housing.



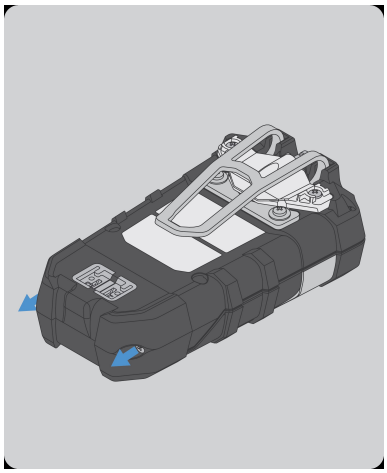
7. Install the front housing assembly and torque the four external instrument screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).



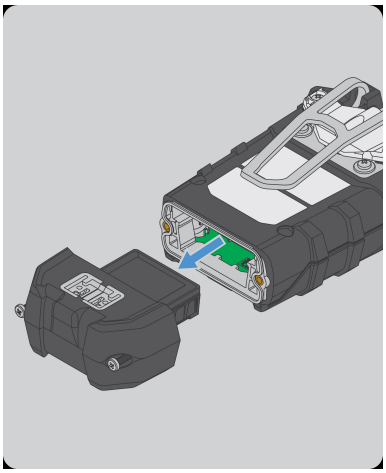
8. Install the battery pack and torque the two external battery pack screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).
9. Calibrate the device after sensors have stabilized.

   NOTE: Allow sensors to stabilize at room temperature for at least 30 minutes before calibration.

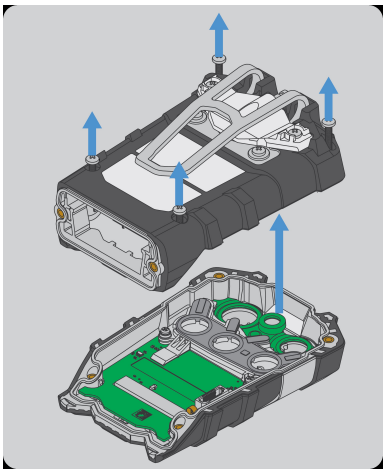
XCell/PID/IR/20 Series Sensor Replacement



1. Loosen the two external battery pack screws with a Phillips head #1 screwdriver.

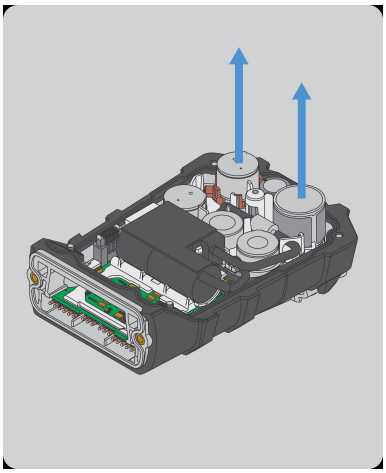


2. Remove the battery pack.

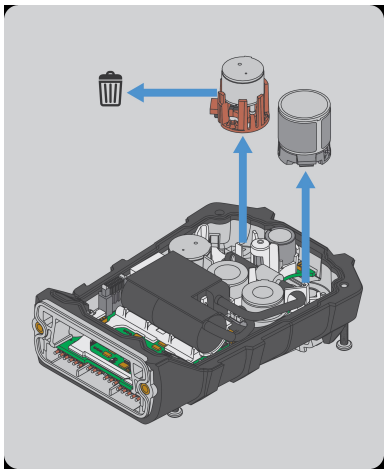


3. Loosen the four external instrument screws with a Phillips head #1 screwdriver and remove the front housing assembly.

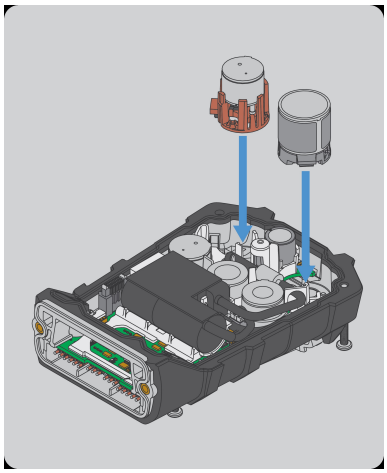
   NOTE: The horn may stick to the gasket when the front housing is removed. If this occurs, (see step 12 of Horn Change) to reinstall the horn.



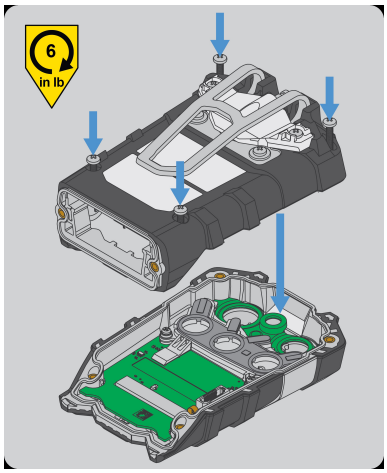
4. Remove the sensor(s) you plan on replacing by pulling it up and clear of the bracket. If removing an Xcell sensor, be sure to remove both the sensor and the adapter assembly (PCBA + red bracket), as the adapter assembly may remain in the instrument.



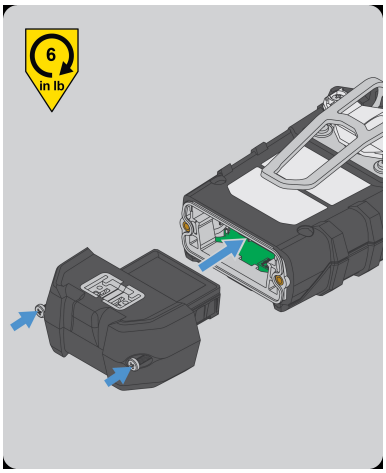
5. Discard sensor(s) according to local regulations.



6. Install the replacement sensor(s) by pushing it down into the back housing. Ensure that the sensor assembly PCBA connector fully engages with the instrument PCBA connector.



7. Install the front housing assembly and torque the four external instrument screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).



8. Install the battery pack and torque the two external battery pack screws with a Phillips #1 torque screwdriver to 6 in-lbs (0.68 Nm).
9. Calibrate the device after sensors have stabilized.

   NOTE: Allow sensors to stabilize at room temperature for at least 30 minutes before calibration.

5.2.14 Cleaning

Routine Cleaning

Clean the exterior of the device regularly using only a damp cloth. Do not use cleaning agents, as many contain silicone or alcohol, which can damage the sensors.

Dust and Dirt Exposure

Use a dry, soft bristled brush to remove any dust or dirt that has accumulated on the device, especially at the sensor openings. If there is a buildup of dust or dirt particles remaining in the sensor area after brushing, use a vacuum to remove remaining particles, but maintain at least a 1/2 inch (1.3 cm) distance from the gas detector.

Water Exposure

If the apparatus is exposed to water, turn the device sensor side down and gently shake water off the sensor area. Any remaining water can be removed with a clean dry cloth.

5.2.15 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 that will damage the combustible sensor, or alcohols that will temporarily influence certain electrochemical sensor readings.

5.2.16 Storage

When not in use, store the device in a safe, dry place between 18 °C (65 °F) and 30 °C (86 °F). 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.

5.3 Troubleshooting

There may be instances where your ALTAIR io 6 screen displays an error message. If this occurs, take the following troubleshooting steps:

1. Follow the troubleshooting prompts on the screen as they appear.
2. If the troubleshooting steps do not resolve the error, contact MSA:

1000 Cranberry Woods Drive

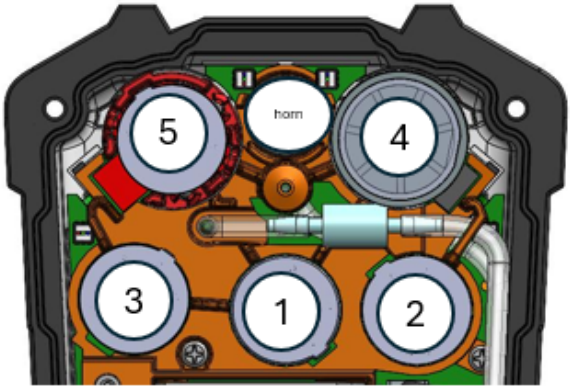
Cranberry Township, PA 16066

USA

Phone 1-800-MSA-2222

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

5.4 Sensor Position Guidelinies



Position	Sensor	Notes
1. Combustible	XCell Combustible	
2. O2	XCell O2	
3. Toxic - (XCell Sensors Only)	CO/H2S, CO, H2S	If using H2S and NO2 in the same device, H2S must be in position 5
	SO2	
	CO/NO2, NO2	
	CO/H2S-LC, H2S-LC	If using H2S and NO2 in the same device, H2S must be in position 5
	CO-H_2 Res/H_2S, CO-H_2 Res	If using H2S and NO2 in the same device, H2S must be in position 5
4. Specialty & Exotic	PID	
	Infrared	
	Series 20	
5. Exotic & Toxic	CO/H2S, H2S	If using H2S and NO2 in the same device, H2S must be in position 5 Requires use of XCELL SLOT 5 ADAPTER 10253493
	SO2	Requires use of XCELL SLOT 5 ADAPTER 10253493
	Cl2	Requires use of XCELL SLOT 5 ADAPTER 10253493
	NH3	Requires use of XCELL SLOT 5 ADAPTER 10253493
	H_2S-LC	If using H2S and NO2 in the same device, H2S must be in position 5; Requires use of XCELL SLOT 5 ADAPTER 10253493
	CO-H_2 Res	Requires use of XCELL SLOT 5 ADAPTER 10253493
	Additional Specialty and Exotic Sensors	

6 Learn More

6.1 Calibration Gas

Gases	Mix	34 L Cylinder Size	58 L Cylinder Size
4	1.45% CH_4, 15.0% O_2, 60 ppm CO, 20 ppm H_2S	10048280	10045035 (NA) 10053022 (EU)
4	2.50 % CH_4, 15.0 % O_2, 60 ppm CO, 20 ppm H_2S	10048981	10048890
5	1.45 % CH_4, 15 % O_2, 60 ppm CO, 20 ppm H_2S, 10 ppm SO_2	10098855 (NA) 10122425 (EU)	10117738 (NA) 10122426 (EU)
3	1.45 % CH_4, 15.0 % O_2, 60 ppm CO	10048789	478191 (100 L)
3	2.50 % CH_4, 15.0 % O_2, 60 ppm CO	10049056	813718 (100 L)
4	1.45 % CH_4, 15.0 % O_2, 60 ppm CO, 10 ppm NO_2	10058036	10058034
4	2.50 % CH_4, 15.0 % O_2, 60 ppm CO, 10 ppm NO_2	10058172	
1	10 ppm Cl_2 in N_2	711066	806740
1	25 ppm NH_3 in N_2	711078	814866
1	10 ppm NO_2 in Air	711068	808977
1	10 ppm SO_2 in Air	711070	808978

6.2 Accessories and Spare Parts

		Part Number	Description	Notes
ALTAIR io 6 Replacement Parts	1	10250789	FRONT HOUSING REPLACEMENT, KIT, io 6	
	2	10250790	BACK HOUSING REPLACEMENT, KIT, io6	
	3	10250791	BATTERY HOUSING REPLACEMENT, KIT, io 6	
	4	10250792	CLIP, REPLACEMENT, KIT, io 6	
	5	10253515	HORN REPLACEMENT io 6	
	6	10250793	DISPLAY REPLACEMENT, KIT, io 6	
	7	10250795	SENSOR GASKETS REPLACEMENT, KIT, io 6	
	8	10250796	PUMP REPLACEMENT, KIT, io 6	
	9	10250797	FILTER COVER REPLACEMENT KIT, io 6	
	10	10250798	SCREW REPLACEMENT X10, KIT, io 6	
	11	10250799	BATTERY PACK REPLACEMENT, KIT, io 6	
	12	710917 10214033	Paper Filter (Single) Paper Filter (5 PACK)	For use with all gases
	13	808935	Fibrous Dust Filter	Do not use with Cl_2, NH_3, ClO_2
	14	10250801	XCELL BLANK SENSOR REPLACEMENT, KIT, io 6	Required for all non-utilized sensor slots 1, 2, or 3
	15	10250802	SLOT 4-5 BLANK SENSOR REPLACEMENT, io 6	Required for all non-utilized sensor slots 4 or 5
Replacement XCell Sensors		10253493	XCELL SENSOR SLOT 5 ADAPTER, io 6	Required with XCell sensors install in slot 5
		10106722	Ex (combustible sensor)	
		10106729	O_2	
		10106725	CO/H_2S	
		10106727	SO_2	
		10121217	CO/NO_2	
		10106726	NH_3	
		10106728	CL_2	
		10121213	H_2S-LC/CO	
		10121214	CO-H_2 Res/H_2S	
Manual Calibration		10250803	CLIBRATION TUBE REPLACEMENT, KIT, io 6	
		10034391	Universal Demand Regulator kit	Also acceptable for reactive gases

		Part Number	Description	Notes
Standard Sampling (NOT for reactive gas)		10042621	12" probe	
		10042622	36" probe	
		10040667	3' coiled line	
		10040665	10' line	
		10040664	25' line	
			50' line	connect two 10040664 together
		603806 customer length	TUBING, POLYURETHANE, 1/8 INCH ID	These 3 items can be assembled to create a > 50’ up to 100’ sampling line
		10053294	FITTING:QCK DISCONNECT,INTRNAL,3/16 BARB (female)	
		10151722	QUICK DISCONNECT,EXTRNL,3/16 TUBING BARB (male)	
		801582	probe filters (water stop)	
Reactive Sampling for NH_3/Cl_2		10105839	10'	Probe and Line included
		10049057	25'	
		10103191	30 cm probe	
		10103188	1.5 m line	
		10103189	3.0 m line	
		10103190	5.0 m line	
		10159430	20 m line	
		10159431	30 m line	
Float		10082307	5 m with float probe	Not for use with reactive gases.
Dilution Tube		813514	Dilution Tube	For sampling with the combustible sensor in environments with O_2 less than 10%. All 3 parts are required.
		10049060	Adapter Threaded (female)	
		10049059	Adapter Threaded (male)	

See msasafety.com for 5-device multi-unit chargers

Charging Accessories	10253408	ALTAIR io™ Cradle Charger	Has a USB Plug. For Vehicle and Desktop Use
	10220401	ALTAIR io USB + Wall Charger, NA, EU, UK	Contains wall charger and NA, EU, UK USB Adapters
	10222424	ALTAIR io USB + WALL CHARGER, AR, AU/NZ	Contains wall charger and AR, AU/NZ USB Adapters
	10235559	12V-USB Vehicle Adapter Pkg, ALTAIR io	Cigarette plug-to-USB

Carry Cases	474555	Shoulder Strap	
	10040586	Carrying Case, Cordura	

6.3 Disposal and Recycling

Dispose the device and batteries in accordance with local health and safety regulations.

6.4 Warranty

The warranties made by MSA 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 contact MSA regarding this equipment prior to use or for any additional information relative to use or repairs.

Item	Warranty Period (Purchased Device)	Warranty Period (MSA+ Device Subscription)
Chassis and electronics	MSA warrants that this product will be free from mechanical defects and faulty workman ship for 4 years from device activation or 54 months from manufacturing date, whichever comes first.	MSA warrants that this product will be free from mechanical defects and faulty workmanship for the term of the MSA+ subscription agreement.
All sensors (unless otherwise specified)	MSA warrants that this product will be free from mechanical defects and faulty workman ship for 4 years from device activation or 54 months from manufacturing date, whichever comes first.	MSA warrants that this product will be free from mechanical defects and faulty workmanship for the term of the MSA+ subscription agreement.
Cl_2 sensors, NH_3 sensors	Warranty Period (Purchased Device) MSA warrants that this product will be free from mechanical defects and faulty workmanship for 3 years from device activation or 42 months from manufacturing date, whichever comes first.	MSA warrants that this product will be free from mechanical defects and faulty workmanship for the term of the MSA+ subscription agreement.

This warranty does not cover filters, fuses, etc. 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 EXCLUSIVE AND 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, TITLE, AND NON-INFRINGEMENT, AND ALL WARRANTIES ARISING FROM COURSE OF DEALING, USAGE, OR TRADE PRACTICE. SELLER MAKES NO WARRANTY OF ANY KIND THAT THE PRODUCT OR ANY SOFTWARE THEREIN OR USED IN CONNECTION WITH THE PRODUCT WILL MEET PURCHASER'S OR ANY OTHER PERSON'S REQUIREMENTS, OPERATE WITHOUT INTERRUPTION, ACHIEVE ANY INTENDED RESULT, BE COMPATIBLE OR WORK WITH ANY SOFTWARE, SYSTEM OR OTHER SERVICES, OR BE SECURE, ACCURATE, COMPLETE, FREE OF HARMFUL CODE, OR ERROR FREE.

Without an active Grid subscription, MSA recommends taking the device out of use. While the device will still operate locally as a gas detector, without an active subscription, devices will have limited functionality, including, but not limited to, inability to be configured, access data logs, or receive updates. Additionally, some local device functionality may be impaired, including, but not limited to, the ability to unlock the device if MSA ID assignment is enabled or repeated cellular connection lost notifications.

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 repair or replacement at Seller's option (including replacement with upgraded equipment at Seller's discretion), of any equipment or parts thereof, which after examination by Seller is proven to be other than as warranted. Replacement equipment and/or parts per the previous sentence 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 or later any limitation of liability found herein.

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.

This equipment is not entitled to protection against harmful interference and may not cause interference in properly authorized systems.