

Operating Manual

ALTAIR 5 – Multi Gas Detector



Manufactured by
MSA
P.O. Box 427, Pittsburgh, Pennsylvania 15230, USA





WARNING

Read this manual carefully before using the instrument. The instrument 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 and persons who rely on this instrument for their safety could sustain serious personal injury or death.

Contents

1.	Instrument Safety	5
1.1.	Correct Use	5
1.2.	Safety and Precautionary Measures to be Adopted	6
1.3.	Warranty.....	9
2.	Description	10
2.1.	Instrument Overview	10
2.2.	Device Hardware Interfaces	12
2.3.	On-Screen Indicators	13
2.4.	Viewing Optional Displays.....	17
2.5.	Sensor Missing Alarm	20
2.6.	Monitoring Toxic Gases.....	21
2.7.	Monitoring the Oxygen Concentration	22
2.8.	Monitoring Combustible Gases	23
3.	Operation	24
3.1.	Environmental Factors	24
3.2.	Turning ON and Fresh Air Setup.....	25
3.3.	Measurement Mode (Normal Operation).....	28
3.4.	Instrument Setup.....	29
3.5.	Data Logging.....	37
3.6.	Function Tests on the Instrument.....	37
3.7.	Safe LED.....	38
3.8.	Calibration Check.....	38
3.9.	Calibration	38
3.10.	Instrument Shutdown	41

CONTENTS

4.	Maintenance.....	42
4.1.	Troubleshooting	43
4.2.	Verifying Pump Operation	44
4.3.	Replacing the Battery	45
4.4.	Live Maintenance Procedure - Replacing and Adding a Sensor ...	46
4.5.	Cleaning the Instrument	48
4.6.	Storage.....	48
4.7.	Shipment.....	48
5.	Technical Specifications/Certifications.....	49
5.1.	Technical Specifications.....	49
5.2.	Factory-set Alarm thresholds	50
5.3.	Certifications	52
5.4.	Performance Specification	53
6.	Order Information	55
7.	Appendix – Flow Charts.....	57
7.1.	Start Up Sequence (Power ON).....	57
7.2.	Normal Operation.....	58
7.3.	Options from Main Page.....	59
7.4.	Password Protected Options.....	60
7.5.	Menu Sequence from Main page	61
7.6.	Calibration Sequence	63
7.7.	Calibration Options.....	64
7.8.	Alarm Options	65
7.9.	Instrument Options.....	67

1. Instrument Safety

1.1. Correct Use

The ALTAIR 5 Multigas Detector is for use by trained and qualified personnel. It is designed to be used when performing a hazard assessment to:

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

The ALTAIR 5 Multigas Detector can be equipped to detect:

- Combustible gases and certain combustible vapors
- Oxygen-deficient or oxygen-rich atmospheres
- Specific toxic gases for which a sensor is installed.

While the instrument can detect up to 25 % oxygen in ambient air, it is approved for use only up to 21 % oxygen.

WARNING

Read and follow all instructions carefully.

- **Check calibration before each day's use and adjust if necessary.**
- **Check calibration more frequently if exposed to silicone, silicates, lead-containing compounds, hydrogen sulfide, or high contaminant levels.**
- **Recheck calibration if unit is subjected to physical shock.**
- **Use only to detect gases/vapors for which a sensor is installed.**
- **Do not use to detect combustible dusts or mists.**
- **Make sure adequate oxygen is present.**
- **Do not block sensors or pump inlet.**
- **Have a trained and qualified person interpret instrument readings.**
- **Do not remove battery pack from instrument while in a hazardous atmosphere.**
- **Do not recharge Li Ion battery in a combustible atmosphere.**
- **Do not replace alkaline batteries in a hazardous location.**
- **Do not alter or modify instrument.**
- **Use only MSA-approved sampling lines.**
- **Do not use silicone tubing or sampling lines.**
- **Wait sufficient time for the reading; response times vary, based on gas and length of sampling line.**

INCORRECT USE CAN CAUSE SERIOUS PERSONAL INJURY OR DEATH.

1.2. Safety and Precautionary Measures to be Adopted

WARNING

Carefully review the following safety limitations and precautions before placing this instrument in service. Incorrect use can cause serious personal injury or death.

The ALTAIR 5 Multigas Detector is designed to:

- Detect gases and vapors in air only
- Detect only specified toxic gases for which a sensor is installed (available sensors see Section 6).

Check function (see section 3.6) each day before use. MSA recommends carrying out a routine inspection prior to use each day before use.

Perform calibration check (see section 3.8) before each day's use to verify proper instrument operation. Adjust calibration if the readings are not within the specified limits.

Check calibration more frequently if the unit is subjected to physical shock or high levels of contaminants. Also, check calibration more frequently if the tested atmosphere contains the following materials, which may desensitize the combustible gas sensor and reduce its readings:

- Organic silicones
- Silicates
- Lead-containing compounds
- Hydrogen sulfide exposures over 200 ppm or exposures over 50 ppm for one minute.

- The minimum concentration of a combustible gas in air that can ignite is defined as the Lower Explosive Limit (LEL). A combustible gas reading of "100" or "5.00" indicates the atmosphere is above 100 % LEL or 5.00 %vol CH₄, and an explosion hazard exists. Move away from hazardous area immediately.
- Do not use the ALTAIR 5 Multigas Detector to test for combustible or toxic gases in the following atmospheres as this may result in erroneous readings:
 - Oxygen-deficient or oxygen-rich atmospheres
 - Reducing atmospheres
 - Furnace stacks
 - Inert environments
 - Atmospheres containing combustible airborne mists/dusts.
- Do not use the ALTAIR 5 Multigas Detector 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.
- Do not block sensor openings 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 sensor holes, as the pressure may damage the sensors.
- Allow sufficient time for unit to display accurate reading. Response times vary based on the type of sensor being utilized (see Section 5.4, "Performance Specifications"). Additionally, when using a sample pump, 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 instrument readings and information must be interpreted by someone trained and qualified in interpreting instrument readings in relation to the specific environment, industrial practice and exposure limitations.

Risk of explosion: Do not recharge instrument in hazardous area.
Do not replace batteries in hazardous area.

Observe proper battery maintenance

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

Use of the GALAXY™ Automated Test System is an alternate approved method for calibrating ALTAIR 5 instruments.

Be aware of environmental conditions

A number of environmental factors may affect the oxygen sensor readings, including changes in pressure, humidity and temperature.

Pressure and humidity changes affect the amount of oxygen actually present in the atmosphere.

Be aware of the procedures for handling electrostatically sensitive electronics

The instrument contains electrostatically sensitive components. Do not open or repair the unit without using appropriate electrostatic discharge (ESD) protection. The warranty does not cover damage caused by electrostatic discharges.

Be aware of the product regulations

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

Be aware of the warranty regulations

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

1.3. Warranty

ITEM	WARRANTY PERIOD
Chassis and electronics	Two years*
COMB, O ₂ , H ₂ S, CO, Cl ₂ sensors	Two years*
CIO ₂ , NH ₃ , HCN, NO ₂ , PH ₃ , SO ₂ sensors	One year*

* For extended warranty offerings please contact MSA

1.3.1 Warranty

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 IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, AND IS STRICTLY LIMITED TO THE TERMS HEREOF. SELLER SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

1.3.2 Exclusive Remedy

It is expressly agreed that Purchaser's sole and exclusive remedy for breach of the above warranty, for any tortious conduct of Seller, or for any other cause of action, shall be the replacement at Seller's option, of any equipment or parts thereof, which after examination by Seller is proven to be defective.

Replacement equipment and/or parts will be provided at no cost to Purchaser, F.O.B. Seller's Plant. Failure of Seller to successfully replace any nonconforming equipment or parts shall not cause the remedy established hereby to fail of its essential purpose.

1.3.3 Exclusion of Consequential Damage

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

2. Description

2.1. Instrument Overview



Figure 2-1 Instrument view

- | | |
|--------------------------|------------------------|
| 1 Alarm LEDs (2) | 8 Button |
| 2 MSA link Communication | 9 Button |
| 3 Sensor Inlets | 10 Belt Clip |
| 4 Pump Cap | 11 Charging Connection |
| 5 Horn | 12 Screws |
| 6 Display | 13 Pump inlet |
| 7 Button | 14 Filter |

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

It is available with a maximum of four sensors, which can display readings for five separate gases (one Dual Toxic Sensor provides both CO and H₂S sensing capabilities in a single sensor).

While the instrument can detect up to 25 % oxygen in ambient air, it is approved for use only up to 21 % oxygen.

The alarm levels for the individual gases are factory-set and can be changed through the instrument Setup Menu. These changes can also be made through MSA Link™ Software. Ensure that the latest version of the MSA Link™ software has been downloaded from MSA's website www.msanet.com.

2.2. Device Hardware Interfaces

Instrument operation is dialog driven from the display with the aid of the three function buttons (see Figure 2-1).

2.2.1 Button Definitions

Button	Description
[⏎]	The [⏎] button is used to turn instrument ON or OFF and to confirm user action selections.
[▼]	The [▼] Button is used to move forward through data screens or to decrease the values in Set-up mode. When the [▲] button and the [▼] button are pressed simultaneously while in normal measure mode, the Options Setup Mode displays. Holding this button for 3 seconds while in Normal Measure Mode will activate the InstantAlert™ alarm.
[▲]	The [▲] button is used to reset peak, STEL TWA and alarms (where possible) or access calibration in measuring mode. It is also used as page up or to increase the values in set-up mode.

2.2.2 LED Definitions

LED	Description
GREEN	The Safe LED flashes once every 15 seconds to notify the user that the instrument is ON and operating under the conditions defined in section 3.7. This option can be turned OFF through the MSA Link™ software.
RED	The red LEDs are visual indications of an alarm condition or any type of error in the instrument.

2.2.3 Vibrating Alarm

The instrument is equipped with a vibrating alarm.

2.2.4 Backlight

The backlight automatically activates when any button is pressed. The backlight remains ON for the duration of the user-selected timeout. This ON/OFF duration can be set through MSA Link™ software.

2.2.5 Horn

The horn provides an audible alarm.

2.3. On-Screen Indicators

2.3.1 Monochrome Display

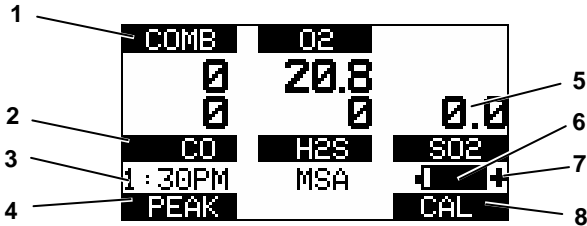


Figure 2-2 Monochrome Display

1	Gas Concentration Units	5	Numeric Indicator
2	Gas Type	6	Battery Condition
3	Current Time	7	Motion Alert Icon
4	Next Page	8	Previous Page

COMB	COMB - Gas Concentration Unit	NO2	NO ₂ Sensor – Indicates the NO ₂ channel use.
O2	O ₂ Sensor – Indicates the O ₂ channel use.	20.8	Numeric Value – Indicates the reading or set value of gas concentration
CO	CO Sensor – Indicates the CO channel use.	1:30 PM	Indicates current time
H2S	H ₂ S Sensor – Indicates the H ₂ S channel use.	PEAK	Indicates the name of next page – here a PEAK reading mode

2.3.2 Color Display

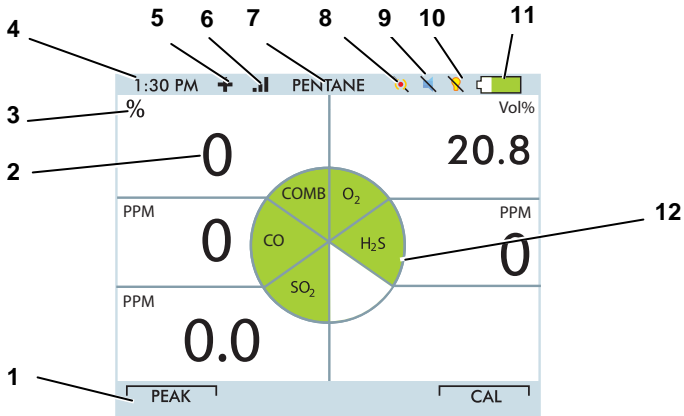



Figure 2-3 Color display

1	Next Page	7	Combustible Gas type
2	Numeric Indicator	8	Vibration off
3	Gas Concentration Units	9	Horn off
4	Current Time	10	LED off
5	+ Motion Alert symbol	11	Battery Condition
6	.l Wireless strength signal	12	Gas Type

2.3.3 Battery Life Indicator

The battery condition icon continuously displays in the upper right-hand corner of the display. A bar represents the charging level of the battery, if the battery is empty only the battery icon outline remains.

Battery Warning

 **WARNING**

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

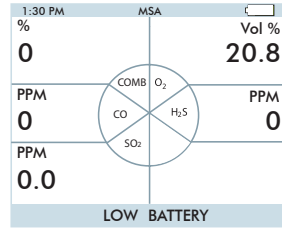
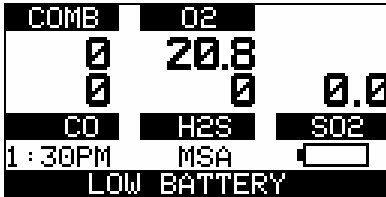


Figure 2-4 Battery Warning

The nominal run-time of the instrument (COMB, O₂, H₂S, with pump and monochrome display) at room temperature is 14 hours. Actual run-time will vary depending on ambient temperature and alarm conditions.

A Low Battery Warning indicates that a nominal 30 minutes of operation remain before the battery's charge is depleted.

The duration of remaining instrument operation during a Low Battery Warning depends on ambient temperatures.

When the instrument goes into battery warning the:

- battery life indicator continuously blinks
- alarm sounds
- alarm LEDs flash
- display shows "LOW BATTERY"
- instrument continues to operate until the instrument is turned OFF or battery shutdown occurs.

Battery Shut Down

WARNING

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

The instrument goes into battery shutdown mode 60 seconds before final shutdown (when the batteries can no longer operate the instrument):

- "BATTERY ALARM" and battery life indicator flash on the display
- Alarm sounds and lights flash
- No other pages can be viewed; after approximately one minute, the instrument automatically turns OFF.

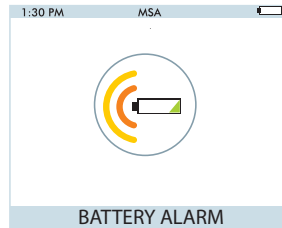
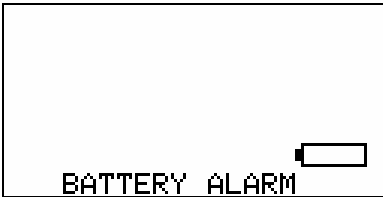


Figure 2-5 Battery Shut Down

When battery shutdown condition occurs:

- (1) Leave the area immediately.
- (2) Recharge the battery.

Battery Charging

WARNING

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

WARNING

Use of any charger, other than the Charger supplied with the instrument, may damage or improperly charge the batteries.

- The charger is capable of charging a completely depleted pack in less than four hours in normal, room-temperature environments.
NOTE: Allow very hot or cold instruments to stabilize for one hour at room temperature before attempting to charge.
- Minimum and maximum ambient temperature to charge the instrument is 10°C/50°F and 35°C/95°F, respectively.
- For best results, charge the instrument at room temperature (23°C).

To Charge the Instrument

- Firmly insert the charger connector into the charge port on the back of the instrument.
- An LED in the Battery is used to check on the charge status. Red = charging, Green = charged, Amber = fault
- If a problem is detected during charging (LED turns amber). Disconnect the charger momentarily to reset the charge cycle.

2.3.4 Operating Beep

This operating beep activates every 30 seconds by momentarily beeping the horn and flashing the alarm LEDs under the following conditions:

- Operating beep is enabled
- Instrument is on normal Measure Gases page
- Instrument is not in battery warning
- Instrument is not in gas alarm.

2.4. Viewing Optional Displays

The Main Screen appears at instrument turn-ON.

Optional displays can be viewed by pressing the [▼] button to move to:

(For the monochromatic display the name of the page is displayed, for the color version it is represented by an icon.)

2.4.1 Peak Readings (PEAK page)

Monochromatic display

PEAK

Color display



This page shows the highest levels of gas recorded by the instrument since turn-ON or since peak readings were reset.

To reset the peak readings:

- (1) Access the PEAK page.
- (2) Press the [▲] button.

2.4.2 Minimum Readings (MIN page)

Monochromatic display

MIN

Color display



This page shows the lowest level of oxygen recorded by the instrument since turn-ON or since the MIN reading was reset.

To reset the MIN readings:

- (1) Access the MIN page.
- (2) Press the [▲] button.

2.4.3 Short Term Exposure Limits (STEL page)

WARNING

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

Monochromatic display

STEL

Color display




This page shows the average exposure over a 15-minute period.

When the amount of gas detected by instrument is greater than the STEL limit:

- Alarm sounds, alarm lights flash.
- Alarm LEDs flash
- "STEL ALARM" message flashes.

To reset the STEL:

- (1) Access the STEL page.
- (2) Press the [>] button.

The STEL alarm is calculated over a 15-minute exposure.

STEL calculation examples:

Assume the instrument has been running for at least 15 minutes:

15-minute exposure of 35 ppm:

$$\frac{(15 \text{ minutes} \times 35 \text{ ppm})}{15 \text{ minutes}} = 35 \text{ ppm}$$

10-minute exposure of 35 ppm and 5 minutes exposure of 15 ppm:

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

2.4.4 Time Weighted Average (TWA page)

WARNING

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

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

Monochromatic display

TWA

- Alarm sounds,
- Alarm LEDs flash
- “TWA ALARM” message flashes.

Color display



To reset the TWA:

- (1) Access the TWA page.
- (2) Press the [**▲**] button.

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

TWA calculation examples:

1-hour exposure of 50 ppm:

$$\frac{(1 \text{ hour} \times 50 \text{ ppm}) + (7 \text{ hours} \times 0 \text{ ppm})}{8 \text{ hours}} = 6.25 \text{ ppm}$$

4-hour exposure of 50 ppm and 4-hour exposure of 100 ppm:

$$\frac{(4 \text{ hours} \times 50 \text{ ppm}) + (4 \text{ hours} \times 100 \text{ ppm})}{8 \text{ hours}} = 75 \text{ ppm}$$

12-hour exposure of 100 ppm:

$$\frac{(12 \text{ hours} \times 100 \text{ ppm})}{8 \text{ hours}} = 150 \text{ ppm}$$

2.4.5 Date Display

Current date appears on the display in the format: **MMM-DD-YY**.

2.4.6 Last Cal Page

Displays the instrument's last successful calibration date in the format: **MMM-DD-YYYY**

2.4.7 Cal due page

Displays the days until the instrument's next calibration is due (user selectable).

2.4.8 Motion Alert Activation

To activate or deactivate the Motion Alert feature, press the [**▲**] button while the Motion Alert Activation page is displayed. When the Motion Alert feature is active, the **+** symbol will appear. The instrument will enter pre-alarm when no motion is detected for 20 seconds. This condition can be cleared by moving the instrument.

After 30 seconds of inactivity, the full Motion Alert alarm is triggered. This alarm can only be cleared by pressing the [**▲**] button.

2.5. Sensor Missing Alarm

The instrument enters the Sensor Missing alarm if the instrument detects that an enabled sensor is not properly installed in the instrument.

For the toxic sensors, the Sensor Missing feature is checked when the instrument is turned ON.

The combustible Sensor Missing feature is continually monitored.

Monochromatic display
SENSOR MISSING

Color display
SENSOR MISSING

If a sensor is detected as missing, the following occurs:

- "SENSOR MISSING" flashes on the display.
- The flag above the sensor detected as missing flashes on the display.
- Alarm sounds and lights flash.
 - The alarm can be silenced for five seconds by pressing the [**▲**] button; no other pages can be viewed.
 - If there is a sensor error at startup, the instrument shuts OFF in 60 seconds.

2.6. Monitoring Toxic Gases

The instrument can monitor the concentration of a variety of toxic gases in ambient air. Which toxic gases are monitored depends on the installed sensors.

The instrument displays the gas concentration in parts per million (PPM) or mg/m³ on the Measuring page until another page is selected or the instrument is turned OFF.

⚠ WARNING

If an alarm is triggered while using the instrument, leave the area immediately.

Remaining on site under such circumstances can cause serious personal injury or death.

The instrument has four gas alarms:

- HIGH Alarm
- LOW Alarm
- STEL Alarm
- TWA Alarm

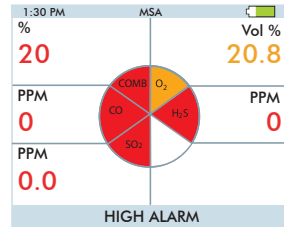
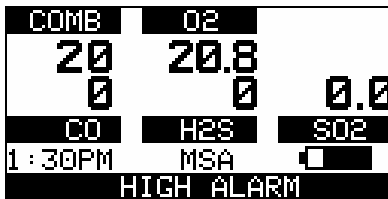


Figure 2-11 Alarm Conditions (here High Alarm)

If the gas concentration reaches or exceeds the alarm setpoint, the instrument:

- backlight turns on
- the alarm message displays and flashes in combination with the corresponding gas concentration
- enters an alarm state
- alarm sounds
- alarm LEDs flash
- a vibration alarm triggers

2.7. Monitoring the Oxygen Concentration

The instrument monitors the oxygen concentration in ambient air. The alarm setpoints can be set to activate on two different conditions:

- Enriched - oxygen concentration > 20.8 % or
- Deficient - oxygen concentration < 19.5 %.

While the instrument can detect up to 25% oxygen in the ambient air, it is approved for use only up to 21% oxygen-content.



WARNING

If an alarm activates while using the instrument, leave the area immediately.

Remaining on site under such circumstances can cause serious personal injury or death.

When the alarm setpoint is reached for either of the above conditions:

- an alarm sounds
- alarm LEDs flash
- a vibrating alarm triggers
- instrument displays and flashes the alarm message along with the corresponding oxygen concentration.

The LOW alarm (oxygen deficient) is latching and will not reset when the O₂ concentration rises above the LOW setpoint. To reset the alarm press the [] button. If the alarm is latching, the [] button silences the alarm for five seconds.

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

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

2.8. Monitoring Combustible Gases

The instrument can monitor the concentration of a variety of combustible gases in ambient air. Which combustible gases are monitored depends on the installed sensors.

The instrument displays the gas concentration in % LEL or % CH₄ on the Measuring page until another page is selected or the instrument is turned OFF.

WARNING

If an alarm activates while using the instrument, leave the area immediately.

Remaining on site under such circumstances can cause serious damage to health or can even lead to death.

The instrument has two alarm setpoints:

- HIGH Alarm
- LOW Alarm

If the gas concentration reaches or exceeds the alarm setpoint, the instrument:

- backlight turns on
- displays and flashes the alarm message either LOW alarm or the HIGH alarm
- enters an alarm state.

When gas reading exceeds 100% COMB or 5.00% CH₄, the instrument enters a Lock Alarm state and displays "XXX" in place of the actual reading. This state can only be reset by turning the instrument OFF and ON.

WARNING

A combustible gas reading of "XXX" indicates the atmosphere is above 100 % COMB or 5.00 %vol CH₄ and an explosion hazard exists. Move away from contaminated area immediately.

In such cases, the instrument LockAlarm feature activates.

3. Operation

Instrument operation is dialog driven from the display with the aid of the three Function buttons (see Section 2.2.1).

3.1. Environmental Factors

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

Pressure Changes

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

Humidity Changes

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

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

Temperature Changes

The oxygen sensor has built-in temperature compensation. However, if temperature shifts dramatically, the oxygen sensor reading may shift. Zero the instrument at a temperature within 86°F (30°C) of the work site temperature for the least effect.

3.2. Turning ON and Fresh Air Setup

Instrument operation is dialog driven from the display with the aid of the three Function buttons (see Section 2.2.1).

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

Turn the instrument ON with the [ϕ] button.

The instrument performs a self test and then goes to Fresh Air Setup:

- display is checked
- audible alarm sounds
- alarm LEDs light.

During the self test, the instrument checks for missing sensors.

In case of a missing sensor, the instrument displays the Sensor Missing screen (see 2.5) and alarms until it is turned OFF.

Otherwise, the turn-ON sequence continues.

The instrument displays:

- MSA logo
- Software version, instrument name and serial number, company name, department and user
- Combustible gas type and sensor units (monochrome display only)
- Alarm setpoints Low Alarm
- Alarm setpoints High Alarm
- Alarm setpoints STEL Alarm
- Alarm setpoints TWA Alarm
- Settings for calibration cylinder
- Current date
- Last calibration date
- CAL due date
- Sensor warm-up period
- Fresh Air Setup option.

Refer to flowchart in Appendix, Section 7.1

3.2.1 Screen Displays during Startup

During the power-up sequence, all automatic page display timeouts are preset to a range from two to four seconds.

Several sequences and screens occur during start up:

Instrument Name and Software version

Software version and instrument name display.

Gas Type

The gas type for combustible sensor is shown.

Alarm Setpoints

Alarm setpoints for all installed and activated sensors display.

LOW alarm setpoints display, followed by HIGH alarm setpoints.

All of the screens displayed during this sequence are static values and cannot be changed at this level of instrument operation.

STEL and TWA Setpoints

The preset STEL and TWA values for installed and activated sensors display.

Calibration Gas Setpoints

The set values for calibration gases display.

Date

The date displays in a month, day and year format.

Last Cal Date

The Last Cal date displays in a month, day and year format.

CAL Due

This display option can be set by MSA Link™ software. If this option is not set, this screen is not displayed.

Sensor Warm Up

The time for sensor Warm Up is shown by a progressing bar.

Fresh Air Setup

The FAS screen is prompted (see Section 3.2.2)

3.2.2 Fresh Air Setup (FAS)

The **Fresh Air Setup (FAS)** is for automatic ZERO calibration of the instrument.

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

Do not perform a Fresh Air Setup within 30 minutes of removing the instrument from charge. If the charge cycle is interrupted, do not perform a Fresh Air Setup within 30 minutes. Fresh Air Setup can be performed immediately if the charge cycle was completed (4 hours for a fully discharged battery).

⚠ WARNING

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

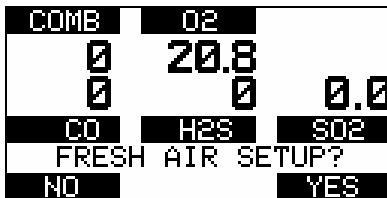
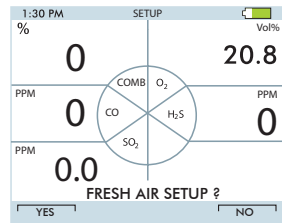


Figure 3-1 Fresh Air Setup








If this option is enabled through the MSA Link™ software, the instrument displays a blinking "FRESH AIR SETUP?", prompting the user to perform a Fresh Air Setup:

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

3.3. Measurement Mode (Normal Operation)

In Normal Operation mode the user can check the Minimum and Peak readings prior to clearing the STEL and TWA values or performing a Span and Zero Calibration.

The following options pages can be executed from the Normal Operation screen (for further information see Section 7.5):

Peak Page		This page shows the peak readings for all sensors.
Min Page		This page shows the minimum readings for the oxygen sensor.
STEL Page		This page shows the calculated STEL readings of the instrument.
TWA Page		This page shows the calculated TWA readings of the instrument.
Date Page		This page shows actual date settings of the instrument.
Last Cal Date		This page shows the date of the last calibration.
Cal Due		This page shows the set date for the next calibration
Motion Alert		This page allows the Motion Alert Feature to be activated or deactivated.

Using the three instrument buttons, the user can navigate through each sub-menu in a top/down sequence.

Refer to section 2.4 and 7.5 in the appendix for detailed instructions on navigating through these screens.

3.4. Instrument Setup

The instrument allows the user to access and modify the following parameters through direct button interface:

- Calibration Options
- Alarm Options
- Instrument Options
- Main Page

All other configuration options are available only through the Options Setup menus. These menus can be accessed only from the main page by pressing and holding the [▼] and [▲] buttons simultaneously.

The operation is as follows:

- (1) Turn the instrument ON and wait until the turn-ON sequence is finished.
 - The Main Page displays
- (2) Press the [▼] and [▲] buttons simultaneously.
 - The user is asked to enter a password

The default password is "672".

Monochromatic display

PASSWORD



000

Color display

PASSWORD



000

- (3) Enter the first digit by pressing the [▼] or [▲] button and confirm with the [⏏] button.
 - The cursor jumps to the second digit.
- (4) Enter the second as well as the third digit.
 - Incorrect password: instrument returns to the Main Page.
 - Correct password: user can set the instrument options.

The password can be changed with a PC through the MSA Link™ software.

The following options are available by pressing the [▼] and [▲] buttons:

- Calibration options - see Section 3.4.1
- Alarm options - see Section 3.4.2
- Instrument options - see Section 3.4.3

3.4.1 Calibration Options

Monochromatic display CALIBRATION OPTIONS



Color display CALIBRATION OPTIONS



The Calibration Options menu allows the user to:

- modify the calibration cylinder settings (CYLINDER SETUP)
- enable/disable calibration due and to set the number of days (CAL DUE OPTIONS)
- enable/disable the option to show the last cal date at turn on and (LAST CAL DATE)
- enable/disable the option for password protected calibration (CAL PASSWORD)

Press

- the [▼] button go to next page
- the [▲] button to go previous page
- the [⏏] button to enter setup.

Setting Calibration Cylinder

This option has a dialog similar to the span calibration dialog.

The display shows all active sensors.

- (1) Press the [⏏] button to enable/disable this option.
 - The screen for the first calibration cylinder displays.
- (2) Press
 - the [▼] or [▲] button to change the value.
 - the [⏏] button to confirm the setup.

With this confirmation the instrument automatically moves to the next cylinder setting.

- (3) Repeat the sequence for changing the required settings for all necessary gas values.

After the last setting is performed, the instrument returns to the Calibration Options menu.

Setting Cal Due Options

- (1) Press the [ϕ] button to enter setup.
- (2) Press the [\blacktriangledown] or [\blacktriangle] button to enable/disable this option.
- (3) Press the [ϕ] button to confirm.
- (4) After confirmation the instrument prompts the user to enter the number of days for the reminder.
- (5) Change number of days by pressing the [\blacktriangledown] or [\blacktriangle] button.
- (6) Press the [ϕ] button to go to the next menu.

Setting Last Cal Date

- (1) Press the [ϕ] button to enable/disable this option.
- (2) Press the [\blacktriangledown] button to go to the next page.
- (3) Press the [\blacktriangle] button to go to the previous page.

Setting Calibration Password

- (1) Press the [ϕ] button to enable/disable this option.
- (2) Press the [\blacktriangledown] button to go to the next page.
- (3) Press the [\blacktriangle] button to go to the previous page.

Back To Main Menu

- (1) Press the [ϕ] button to go to Instrument Setup Menu
 - The Cal Options screen displays
- (2) Press the [\blacktriangledown] button to go to the next (Alarm options) or the [\blacktriangle] button to exit the Setup menu.

3.4.2 Alarm Options

Monochromatic display ALARM OPTIONS



Color display ALARM OPTIONS



The Alarm Options Menu allows the user to:

- enable/disable the Vibrate
- enable/disable the Horn
- enable/disable the Alarm LED
- enable/disable the Motion Alert Feature and
- set Sensor Alarms.

Press

- the [▼] button go to next page
- the [▲] button to go previous page
- the [⏏] button to enter setup.

Setting Vibrate

Press the [⏏] button to enable/disable this option.

Setting Horn

Press [⏏] button to enable/disable this option.

Setting LEDs

Press [⏏] button to enable/disable this option.

Setting Motion Alert

Press [⏏] button to enable/disable this option.

Setting Sensor Alarms

This page allows modifying the preset alarm values of:

- LOW Alarm
- HIGH Alarm
- STEL Alarm and
- TWA Alarm.

- (1) Press the [⏏] button to enter Sensor Alarm setup.
 - LOW Alarm Setup screen displays.

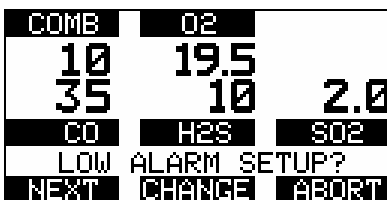
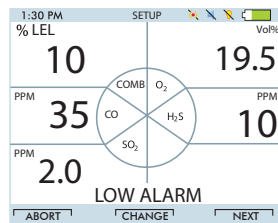


Figure 3-5 Sensor Alarm Setup



- (2) Press
 - the [▼] button to abort the operation or
 - the [▲] button to go to next alarm setup or
 - the [⏻] button to change the alarm setup.
 - Alarm Value for the first Sensor displays.

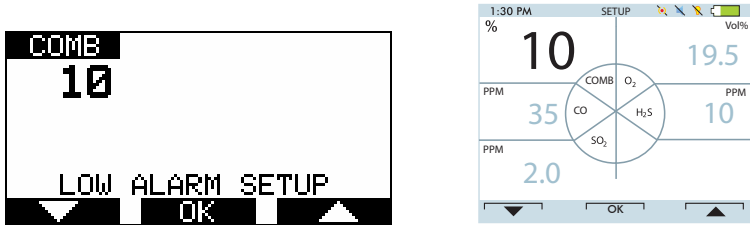


Figure 3-6 Sensor Alarm Setup

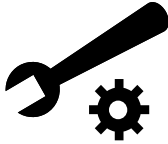
- (3) Set values for Sensor Alarm by pressing the [▼] or [▲] button.
- (4) Press the [⏻] button to confirm set values.
- (5) Repeat setting for all other sensors.
- (6) Press the [▲] button to return to the Alarm Options menu.
- (7) Repeat setting for all other alarm types.

60% L.E.L. or 3.0% volume of methane is the maximum High Alarm set point that can be programmed by the user.

The combustible alarm can be turned OFF by the user in the instrument setup. When the combustible alarm is turned OFF, the only indicator to the user that the combustible alarm is turned OFF occurs during power up of the instrument at which a startup screen will indicate that the combustible alarm is turned OFF. When turned ON, the combustible high alarm is latching. The combustible alarm can be silenced momentarily by pressing the [▲] button. However, if the gas concentration causing the alarm is still present, the unit will go back into alarm.

3.4.3 Instrument Options

Monochromatic display ALARM OPTIONS



Color display ALARM OPTIONS



The Instrument Options menu allows modifying different instrument options:

- Sensor Setup (enable/disable the channel)
- Language Setup
- Time Date Setup
- Datalog Intervals
- Stealth Mode
- Confirmation Beep (operating beep) and
- Backlight Options.

Press

- the [▼] button go to next page (EXIT MENU)
- the [▲] button to go previous page (ALARM OPTIONS)
- the [⏏] button to enter setup.

Setting Sensor Options

- (1) Press the [ϕ] button to enter setup.
 - Following screen displays:

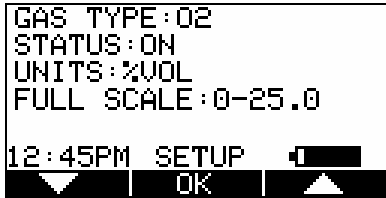
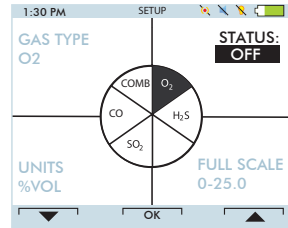


Figure 3-8 Sensor Options



- (2) Press the [∇] button to select sensor.
 - The status displays, the sensor can be enabled or disabled.

NOTICE

Other operations such as changing the gas type (Methane, Butane, Propane etc. for the combustible sensor) and units (ppm to mg/m^3) are only possible using the MSA Link™ software.

- (3) Change status by pressing the [∇] or [\blacktriangle] button.
- (4) Press the [ϕ] button to confirm and enter next screen (next sensor).
- (5) Perform the sequence for all other sensors.
 - After setting up the last sensor the instrument goes to the next Setup Page.

Language Setup

This option is for setting the language of the instrument.

- (1) Press the [ϕ] button to enter setup.
- (2) Change language by pressing the [∇] or [\blacktriangle] button.
- (3) Confirm by the [ϕ] button.
 - The instrument goes to the next Setup Page.

Time and Date Setup

This option is for setting the instrument time and date. The instrument first prompts to set the time and then it prompts for the date.

NOTICE

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

- (1) Press the [ϕ] button to enter setup.
- (2) Change hours by pressing the [\blacktriangledown] or [\blacktriangle] button.
- (3) Confirm by the [ϕ].button.
- (4) Change minutes by pressing the [\blacktriangledown] or [\blacktriangle] button.
- (5) Confirm by the [ϕ] button.
 - The instrument goes to the Set Date Page.
- (6) Change month, date and year by pressing the [\blacktriangledown] or [\blacktriangle] button and confirming with the [ϕ] button.
 - The instrument goes to the next Setup Page.

Setting Datalog Intervals




This option is for setting the time at which all the readings will be logged. After selecting this option, the instrument prompts the user to set the new log time.

- (1) Press the [ϕ] button to enter setup.
- (2) Change interval by pressing the [\blacktriangledown] or [\blacktriangle] button.
- (3) Confirm by the [ϕ] button.
 - The instrument goes to the next Setup Page.







Setting Stealth Mode

- (1) Press the [ϕ] button to change mode.
- (2) Press the [\blacktriangledown] button to go to the next page or the [\blacktriangle] button to return to previous page.

Setting Conf Beep




- (1) Press the [] button to change mode.
- (2) Press the [] button to go to the next page or the [] button to return to previous page.

Setting Backlight

- (1) Press the [] button to enter setup.
- (2) Change option by pressing the [] or [] button.
- (3) Press the [] button to enter timeout setup.
- (4) Change timeout by pressing the [] or [] button.
 - The instrument goes to the next Setup Page.

Back To Main Menu

There are three options at this point:

- | | |
|--|--|
| the [] button | Sensor Options menu |
| the [] button | Previous Setup page in the Instrument Options menu |
| the [] button | Instrument Options menu |

3.5. Data Logging

Connecting Instrument to PC

- (1) Switch ON the ALTAIR 5 and align the Datalink Communication port on the ALTAIR 5 to the IR interface of the PC.
- (2) Start the MSA Link™ software on the PC and start connection by clicking the connect icon.

See MSA Link™ documentation for detailed instructions.

3.6. Function Tests on the Instrument

Alarm Test

- (1) Turn ON the instrument. The user should verify that:
 - alarm LEDs flash
 - horn sounds briefly
 - vibrating alarm triggers briefly.

3.7. Safe LED

The instrument is equipped with a green "SAFE LED". This green SAFE LED flashes every 15 seconds under the following conditions:

- the green SAFE LED is enabled
- instrument is on the normal Measure Gases page
- combustible reading is 0% LEL or 0%CH₄
- Oxygen (O₂) reading is 20.8%
- Toxic sensor reading (CO, H₂S, SO₂ etc.) reading is 0 ppm
- no gas alarms are present (low or high)
- instrument is not in Low Battery warning or alarm
- Toxic sensor reading (CO, H₂S, SO₂ etc.) STEL and TWA readings are 0 ppm.

3.8. Calibration Check

The calibration check is simple and should only take about one minute. Perform this calibration check before each day's use for each installed sensor.

- (1) Turn ON the ALTAIR 5 Multigas Detector in clean, fresh air.
- (2) Verify that readings indicate no gas is present.
- (3) Attach regulator (supplied with calibration kit) to the cylinder.
- (4) Connect tubing (supplied with calibration kit) to the regulator.
- (5) Attach other end of tubing to the instrument.
- (6) Open the valve on the regulator, if so supplied.
 - The reading of the ALTAIR 5 Multigas Detector display should be within the limits stated on the calibration cylinder or limits determined by your company.
 - If necessary, change cylinder to introduce other calibration.
 - If readings are not within these limits, the ALTAIR 5 Multigas Detector requires recalibration (see Section 3.9).

3.9. Calibration

CSA requires (per 22.2 NO. 152) that the instrument's sensitivity be tested before each day's use on a known concentration of methane equivalent to 25-50% of full scale concentration. Accuracy must be within 0 to +20% of actual. Correct accuracy by performing the calibration procedure within this manual.

The ALTAIR 5 can be calibrated either manually using this procedure or automatically using the GALAXY™ test stand. Refer to 7.7 of the appendix. Calibration must be performed using a flow regulator with a flow rate set to 0.25 liters per minute.

After charging, wait 30 minutes before calibration to allow the instrument to return to normal temperature.

3.9.1 Zero calibration

To skip the ZERO procedure and move directly to the calibration span procedure, push the [▲] button. If no button is pushed for 30 seconds, the instrument prompts user to perform a SPAN calibration before instrument returns to the Normal Operation mode.

- (1) Press the [▲] button in Normal Operation mode for more than three seconds.
 - ZERO screen displays.
- (2) Press the [▼] button to confirm the ZERO screen, i. e. to execute zero calibration.

- LEDs flash
- “ZERO CALIBRATION” blinks
- ZERO calibration starts.
- A progress bar shows the user how much of the calibration has already been completed.

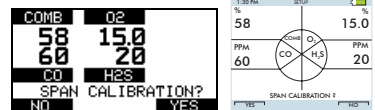
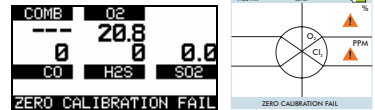
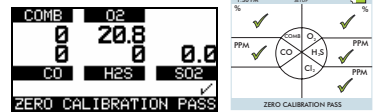
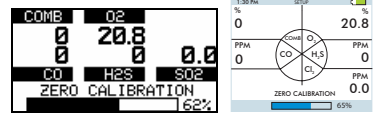
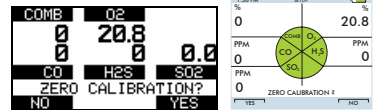
- After the ZERO calibration is completed the instrument displays either

“ZERO CALIBRATION PASS”

or

“ZERO CALIBRATION FAIL”.

- Only if the instrument passes the zero calibration the SPAN screen displays.




3.9.2 Span Calibration

To skip the Span procedure, push the [▲] button.

If no button is pushed for 30 seconds, the instrument returns to the Measuring mode.

Because of the different combinations of gases it is possible to perform single-channel calibration for the exotic sensors.

- (1) Once the zero is set, the span screen displays.
 
- (2) Connect the appropriate calibration gas to the instrument.
- (3) Attach the calibration cap to the instrument, if equipped.
 - Connect one end of the tubing to the calibration cap or pump inlet.
 - Connect other end of tubing to the cylinder regulator (supplied in the calibration kit).
 - Ensure that the calibration cap is correctly oriented, if equipped.
- (4) Open the valve on the regulator.

- (5) Press the [▼] button to calibrate (span) the instrument.

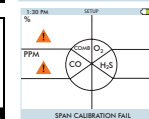
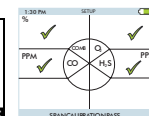
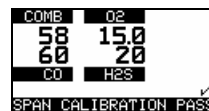
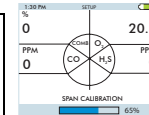
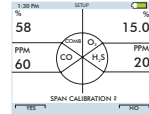
- LEDs flash
- “SPAN CALIBRATION” blinks
- SPAN calibration starts.
- A progress bar shows the user how much of the calibration has already been completed.
- After the SPAN calibration is completed, the instrument displays either

“SPAN CALIBRATION PASS”

or

“SPAN CALIBRATION FAIL”

- The instrument returns to Measuring mode.



3.9.3 Finishing Calibration

- (1) Close the valve on the regulator.
- (2) Remove the calibration cap.

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

3.9.4 Autocalibration Failure

If the instrument cannot calibrate one or more sensor(s), it goes into the Calibration Failure page and remains in alarm for 10 seconds.

Sensors that could not be calibrated are indicated by dashed lines on the concentration display.

If the combustible sensor fails calibration after the full calibration procedure in this manual has been performed, replace the combustible sensor.

3.10. Instrument Shutdown

For instrument shutdown press and hold the [ϕ] button for more than one second.

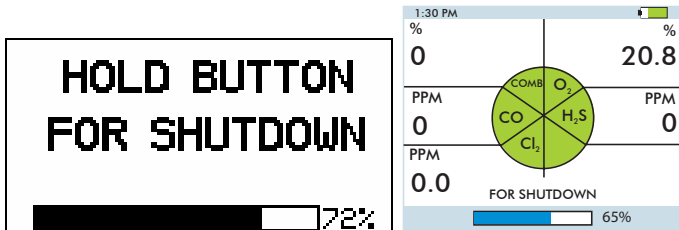


Figure 3-10 Instrument Shutdown

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

4. Maintenance

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

⚠ WARNING

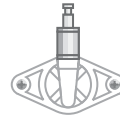
Repair or alteration of the ALTAIR 5 Multigas Detector, beyond the procedures described in this manual or by anyone other than a person authorized by MSA, could cause the instrument to fail to perform properly. Use only genuine MSA replacement parts when performing any maintenance procedures described in this manual. Substitution of components can seriously impair instrument performance, alter intrinsic safety characteristics or void agency approvals.

FAILURE TO FOLLOW THIS WARNING CAN RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

Monochromatic display

PUMP ERROR

Color display



PUMP ERROR

For all other errors the error code is shown, accompanied with the error icon for the color display.

Monochromatic display



ERROR CODE

Color display



ERROR CODE

4.1. Troubleshooting

Problem	Description	Reaction
Alternating display		
ERROR TEMP	Temperature is below -40 °F (-40 °C) or above 167 °F (75 °C).	Return to normal temperature range and recalibrate. Contact MSA
ERROR ADC	Sensor measurement error	Contact MSA
ERROR COMB	Combustible sensor power supply error.	Contact MSA
ERROR MEM	External Memory error	Contact MSA
ERROR PROG	Program error	Contact MSA
ERROR RAM	RAM error	Contact MSA
	LOW BATTERY	Battery warning repeats every 15 seconds.
	BATTERY ALARM	Battery is completely discharged.
Instrument Low does not turn ON	Charge instrument battery	Remove from service as soon as possible and recharge battery

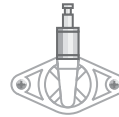
4.2. Verifying Pump Operation

- (1) Turn ON the ALTAIR 5 Multigas Detector.
 - The pump motor starts fast and then slows down as the instrument adjusts the power to run the pump.
- (2) Once gas readings are displayed, plug the free end of the sampling line or probe.
 - The pump motor shuts down and an alarm sounds.
 - PUMP ERROR will flash on the display.

Monochromatic display

PUMP ERROR

Color display



PUMP ERROR

When the pump inlet, sample line or probe is blocked, the pump alarm must activate.

If the alarm does not activate:

- a. Check the sample line and probe for leaks.
- b. Once leak is fixed, recheck pump alarm by blocking the flow.

WARNING

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

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

Never let the end of the sampling line touch or go under any liquid surface. If liquid is sucked into the instrument, readings will be inaccurate and instrument could be damaged. We recommend the use of an MSA sample probe (P/N 10042621, 10042622, 10040589, or equivalent) containing a special membrane filter, permeable to gas but impermeable to water, to prevent such an occurrence.

- (5) Press the [] button to reset the alarm and restart the pump.

During operation, a pump alarm may occur when the:

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

To Clear Pump Alarm

- (1) Correct any flow blockage.
- (2) Press the [▲] button.
 - The Pump will now restart.

4.3. Replacing the Battery

⚠ WARNING

Never replace the battery in a hazardous area. There is a risk of injury arising from the electric current.

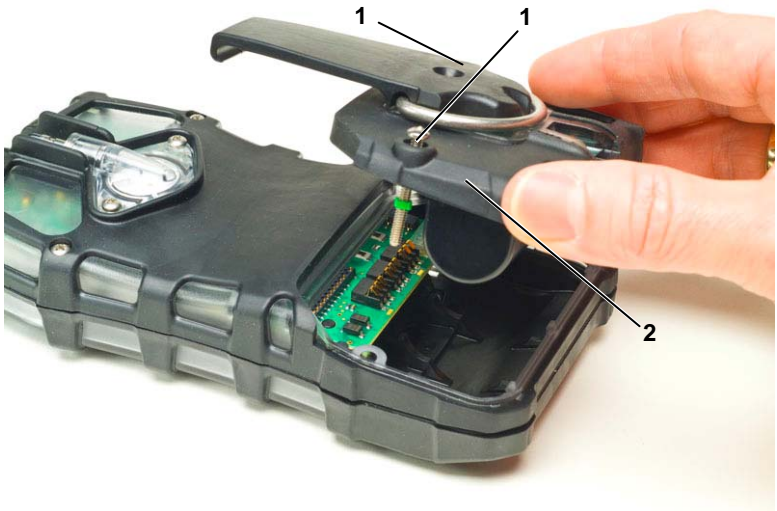


Figure 4-2 *Battery Replacement*

1 *Captive screw*

2 *Battery pack*

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

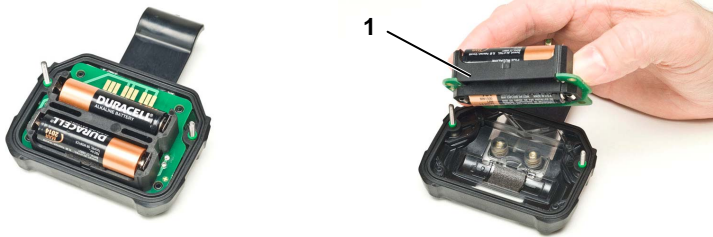


Figure 4-2 Battery Replacement

1 Battery holder

- (3) For alkaline battery packs:
- Remove the battery holder circuit board from the instrument
 - Replace the 3 batteries, using only batteries listed on the label. Be sure to observe proper polarity on the batteries.
 - Place the battery holder circuit board back in the instrument and reinstall the door.
 - Tighten the 2 screws.

4.4. Live Maintenance Procedure - Replacing and Adding a Sensor

NOTICE

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

⚠ WARNING

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

To add a sensor to an instrument that is not already equipped with a full array of sensors, remove the sensor plug from in front of the formerly unused sensor housing.

NOTICE

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

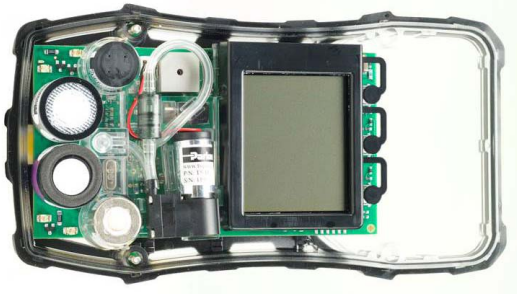


Figure 4-2 Sensor Replacement

- (1) Verify that the instrument is turned OFF.
- (2) Remove the battery pack.
- (3) Remove the two remaining case screws, and remove the case front.
- (4) Gently lift out and properly discard the sensor to be replaced.
 - Using fingers only, gently remove the tox, combustible or oxygen sensor.
- (5) Carefully align the new sensor contact pins with the sockets on the printed circuit board.
- (6) Press the new sensor into place.
 - Insert the tox sensor by placing it in the right-hand side of the sensor holder.
 - Insert the O₂ sensor by placing it in the left-center place of the sensor holder.
 - Insert the combustible sensor by placing it in the left-hand side of the sensor holder. Ensure groove in combustible sensor is aligned with notch in sensor slot.
 - If a sensor is not to be installed, ensure that a sensor plug is installed properly in place.

- (6) If replacing sensor filter at this time:
 - Carefully peel off old filter taking care not to damage the inside of the case.
 - On new filter peel off backing exposing adhesive. Note proper orientation of filter and apply to inside of front case adhesive side against case.
 - Press filter into place taking care not to damage filter surface.
- (7) Reinstall the sensor gasket in the case front.

Ensure sensor gasket is properly installed.

- (8) Re-install the screws.
- (9) Go into the sensor setup and turn ON the sensor.
- (10) Verify calibration response and re-calibrate.

Allow sensors to stabilize at least 30 minutes before calibration.

WARNING

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

4.5. Cleaning the Instrument

Clean the exterior of the instrument regularly using only a damp cloth. Do not use cleaning agents.

4.6. Storage

When not in use, store the instrument in a safe, dry place between 65°F and 86°F (18 °C and 30 °C). After storage, always recheck instrument calibration before use.

4.7. Shipment

Pack the instrument in its original shipping container with suitable padding. If the original container is unavailable, an equivalent container may be substituted.

5. Technical Specifications/Certifications

5.1. Technical Specifications

Weight	1 lb (0.45 kg) - instrument with battery and clip			
Dimensions (inches)	6.69 x 3.49 x 1.79 pumped, without fastening clip 6.69 x 3.49 x 1.58 diffusion, without fastening clip			
Alarms	Two LEDs, an audible alarm and a vibrating alarm			
Volume of audible alarm	95 dB typical			
Displays	Monochrome version Color version			
Battery types	Rechargeable Li ION battery Replaceable AA alkaline Li ION battery can not be charged in Ex area.			
Instrument run time	14 + hours at 77°F (25 °C)			
Charging time	≤ 6 hours The maximum safe area charging voltage Um = 6.7 Volts D.C.			
Temperature range	-4°F – 122°F (-20 °C to 50 °C)			
Humidity range	15 - 90% relative humidity, non-condensing, 5 - 95% RH intermittent			
Atmospheric pressure range	11.6 to 17.4 PSIA (800 kPA to 1200 kPA)			
Ingress protection	IP 65			
Measuring methods	Combustible gases:	Catalytic sensor		
	Oxygen:	Electrochemical sensor		
	Toxic gases	Electrochemical sensor		
Warranty	Standard two years. Extended options available (see full warranty for specific limitations).			
Measuring range	H₂S	CO	O₂	Combustible
	0-200 ppm	0-999 ppm	0-25 % Vol.	0-100% LEL 0-5.00% CH ₄

Measuring range	SO ₂	NO ₂	NH ₃	*PH ₃
	0-20.0 ppm	0-200 ppm	0-100 ppm	0-5.00 ppm
	HCN	Cl ₂	ClO ₂ *	
	0-30.0 ppm	0-20.0 ppm	0-1.00 ppm	

*check with MSA for sensor availability

5.2. Factory-set Alarm thresholds

Sensor	LOW alarm	HIGH alarm	STEL	TWA
COMB	10 % LEL	20 % LEL	--	--
CO	25 ppm	100 ppm	100 ppm	25 ppm
H ₂ S	10 ppm	15 ppm	15 ppm	10 ppm
O ₂	19.5 %	23.0 %	--	--
SO ₂	2.0 ppm	5.0 ppm	50 ppm	2.0 ppm
NO ₂	2.0 ppm	5.0 ppm	5.0 ppm	2.0 ppm
NH ₃	25 ppm	50 ppm	35 ppm	25 ppm
PH ₃	0.3 ppm	1.0 ppm	1.0 ppm	0.3 ppm
Cl ₂	0.5 ppm	1.0 ppm	1.0 ppm	0.5 ppm
ClO ₂	0.10 ppm	0.3 ppm	0.8 ppm	0.10 ppm
HCN	4.5 ppm	10.0 ppm	10 ppm	4.5 ppm

Sensor	Min. alarm setpoint	Max. alarm setpoint	Auto-cal values
COMB	5% LEL	60% LEL	58% LEL
CO	20 ppm	950 ppm	60 ppm
H ₂ S	5 ppm	175 ppm	20 ppm
O ₂	5.0%	24%	15.0%
SO ₂	2.0 ppm	17.5 ppm	10.0 ppm
NO ₂	2.0 ppm	17.5 ppm	10.0 ppm
NH ₃	15 ppm	75 ppm	25 ppm
PH ₃	0.3 ppm	3.75 ppm	0.50 ppm
Cl ₂	0.5 ppm	17.5 ppm	10.0 ppm
ClO ₂	0.10 ppm	0.90 ppm	0.80 ppm
HCN	4.5 ppm	20.0 ppm	10.0 ppm

This instrument is not approved for use in atmospheres containing >21 % oxygen.

5.3. Certifications

See instrument label for the approvals that apply to your specific unit.

USA and Canada

USA



Exia

Class I, Div. 1, Groups A, B, C, D, Class II, F, G
Ambient temperature: -4°F to +122°F; T4

Canada



Exia

Class I, Div. 1, Groups A, B, C, D
Ambient temperature: -20°C to +50°C; T4


ONLY THE COMBUSTIBLE DETECTION PORTION OF THIS INSTRUMENT HAS BEEN ASSESSED FOR PERFORMANCE BY THE CANADIAN STANDARDS ASSOCIATION (C.S.A.).

Other Countries

Australia Ex ia S (Zone O) IIC T4
Ambient temperature: 122°F

European Community

The product ALTAIR 5 complies with the following directives, standards or standardized documents:

Directive 94/9/EC (ATEX) : II 2G Ex ia d IIC T4
 -20 °C ≤ Ta ≤ +50 °C
 EN 50 014, EN 50 020, EN 50291,
 EN 45544-1, EN 45544-2

Directive 89/336/EC (EMC) : EN 50 270 Type 2, EN 61 000-6-3



5.4. Performance Specification

Sensor	Range	Resolution	Reproducibility	Response time
Combustible Gas	0 to 100 % COMB or 0 to 5 % CH ₄	1 % COMB or 0.05 vol% CH ₄	normal temperature range: 3 % COMB, 0 % to 50 % COMB reading or 0.15 % CH ₄ , 0.00 % to 2.50 % CH ₄ 5 % COMB, 50 % to 100 % COMB reading or 0.25 % CH ₄ , 2.50 % to 5.00 % CH ₄	90 % of final reading in less or equal than 30 sec (normal temperature range)
			extended temperature range: 5 % COMB, 0 % to 50 % COMB reading or 0.25 % CH ₄ , 0.00 % to 2.50 % CH ₄ 8 % COMB, 50 % to 100 % COMB reading or 0.40 % CH ₄ , 2.50 % to 5.00 % CH ₄	
Oxygen (The oxygen sensor has built-in temperature compensation. However, if temperature shifts dramatically, the oxygen sensor reading may shift. Zero the instrument at a temperature within 86°F (30 °C) of the work place temperature for the least effect.)	0 – 25% O ₂	0.1% O ₂	0.7% O ₂ for 2 – 25% O ₂	90% of final reading 30 seconds (normal temperature range 3 minutes (extended temperature range)

Sensor	Range	Resolution	Reproducibility	Response time
Carbon Monoxide	0 - 999 ppm CO	1 ppm CO, for 0 to 500 ppm CO	normal temperature range: ± 5 ppm CO or 10 % of reading, whichever is greater 0 to 300 ppm CO ± 15 % >300 ppm CO	60 second (normal temperature range)
			extended temperature range: ± 10 ppm CO or 20 % of reading, whichever is greater	
Hydrogen Sulfide	0 - 200 ppm H ₂ S	1 ppm H ₂ S, for 3 to 200 ppm H ₂ S	normal temperature range: ± 2 ppm H ₂ S or 10 % of reading, whichever is greater 0 to 100 ppm H ₂ S ± 15 % >100 ppm H ₂ S	60 second (normal temperature range)
			extended temperature range: ± 5 ppm H ₂ S or 10 % of reading, whichever is greater	
Sulfur Dioxide	0 - 20. ppm SO ₂	0.1 ppm SO ₂		
Nitrogen Dioxide	0 - 20. ppm NO ₂	0.1 ppm NO ₂		
Ammonia	0 - 100. ppm NH ₃	1 ppm NH ₃		
Phosphine	0 - 5.0 ppm PH ₃	0.05 ppm PH ₃		
Hydrogen Cyanide	0 - 30.0 ppm HCN	0.5 ppm HCN		
Chlorine	0 - 20.0 ppm Cl ₂	0.1 ppm Cl ₂		
Chlorine Dioxide	0 - 1.00 ppm ClO ₂	0.02 ppm ClO ₂		

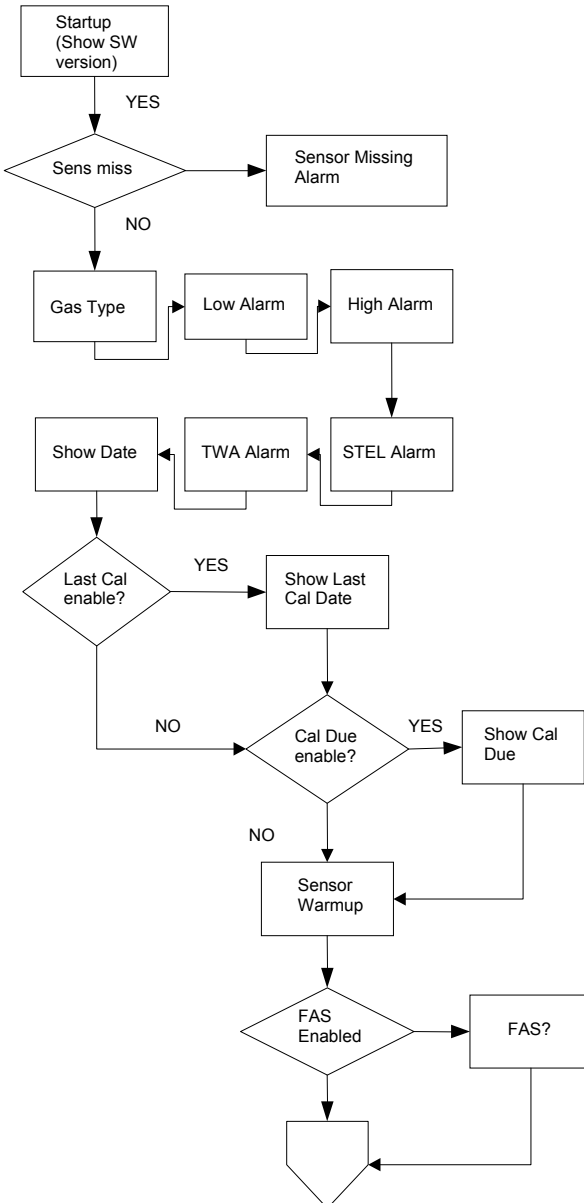
6. Order Information

Description	Part No.
Four Gas Econocal (1.45% CH ₄ , 15.0% O ₂ , 60 ppm CO, 20 ppm H ₂ S)	10048280
Three Gas Econocal (1.45% CH ₄ , 15.0% O ₂ , 20 ppm H ₂ S)	10048790
Four Gas Econocal (2.50% CH ₄ , 15.0% O ₂ , 60 ppm CO, 20 ppm H ₂ S)	10048981
Three Gas Econocal (2.50% CH ₄ , 15.0% O ₂ , 20 ppm H ₂ S)	10048888
Three Gas Econocal (1.45 % CH ₄ , 15.0% O ₂ , 60 ppm CO)	10048789
Three Gas RP (1.45 % CH ₄ , 15.0% O ₂ , 20 ppm H ₂ S)	10048788
Four Gas RP (1.45 % CH ₄ , 15.0% O ₂ , 60 ppm CO, 20 ppm H ₂ S)	10045035
Three Gas RP 2.50 % CH ₄ , 15.0% O ₂ , 60 ppm H ₂ S)	813718
Three Gas RP 2.50 % CH ₄ , 15.0% O ₂ , 20 ppm H ₂ S)	10048889
Four Gas RP 2.50 % CH ₄ , 15.0% O ₂ , 60 ppm CO, 20 ppm H ₂ S)	10048890
Universal Pump Probe, North America	10046528
Universal Pump Probe, Europe	10047596
Calibration Assembly	
Regulator, 0.25 LPM, Model RP	467895
Regulator, Combination, 0.25 LPM, Model RP	711175
Demand Regulator	710288
IR USB dongle (Datalog)	10082834
Infrared Datalogging Software	10088099

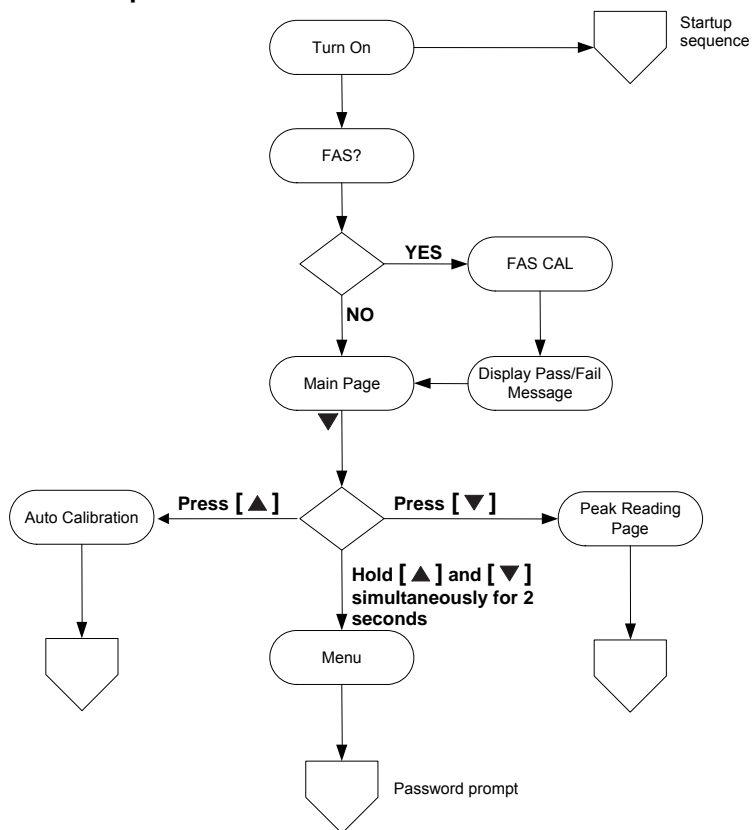
Description	Part No.
Cylinder, 10 ppm NO ₂ Econocal	711068
Cylinder, 10 ppm NO ₂ RP	808977
Cylinder, 10 ppm SO ₂ Econocal	711070
Cylinder, 10 ppm SO ₂ RP	808978
Cylinder, 25 ppm NH ₃ Econocal	711078
Cylinder, 25 ppm NH ₃ RP	814866
Cylinder, 10 ppm Cl ₂ Econocal	711066
Cylinder, 10 ppm Cl ₂ RP	806740
Cylinder, 2 ppm Cl ₂ Econocal	711082
Cylinder, 2 ppm Cl ₂ RP	10028080
Cylinder, 10 ppm HCN Econocal	711072
Cylinder, 10 ppm HCN RP	809351
Cylinder, 0.5 ppm PH ₃ Econocal	711088
Cylinder, 0.5 ppm PH ₃ RP	710533
Case assembly, upper, with label	10095081
Case, lower, pumped	10083583
Case, lower, diffusion	10083582
Battery pack assy	10090521
Kit, belt clip replacement	10094830
Filter cover assembly	10083591
Display assembly, monochrome	10083589
Display assembly, color	10080506
Kit, maintenance	10094829
Sensor bracket assembly with pump (includes vibrator motor)	10088609
Sensor bracket assembly (includes vibrator motor)	10088523
Kit, pump cap replacement	10095051
Printed circuit board assembly, ALTAIR 5	10078703
Kit, replacement, CO-H ₂ S, O ₂ , COMB sensors	10095052
Alkaline battery pack (includes belt clip)	10083507

7. Appendix – Flow Charts

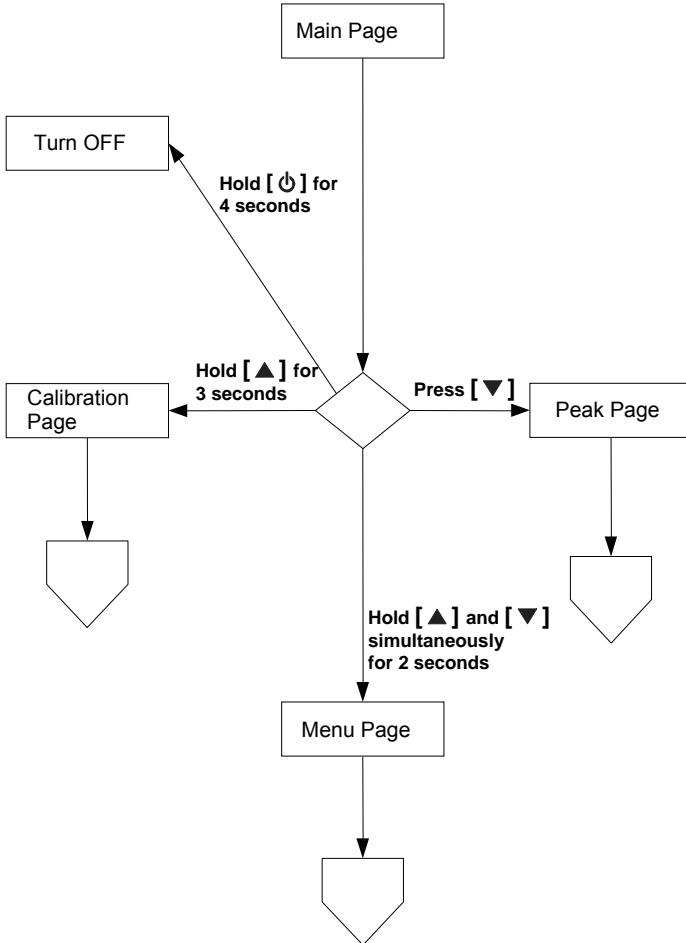
7.1. Start Up Sequence (Power ON)



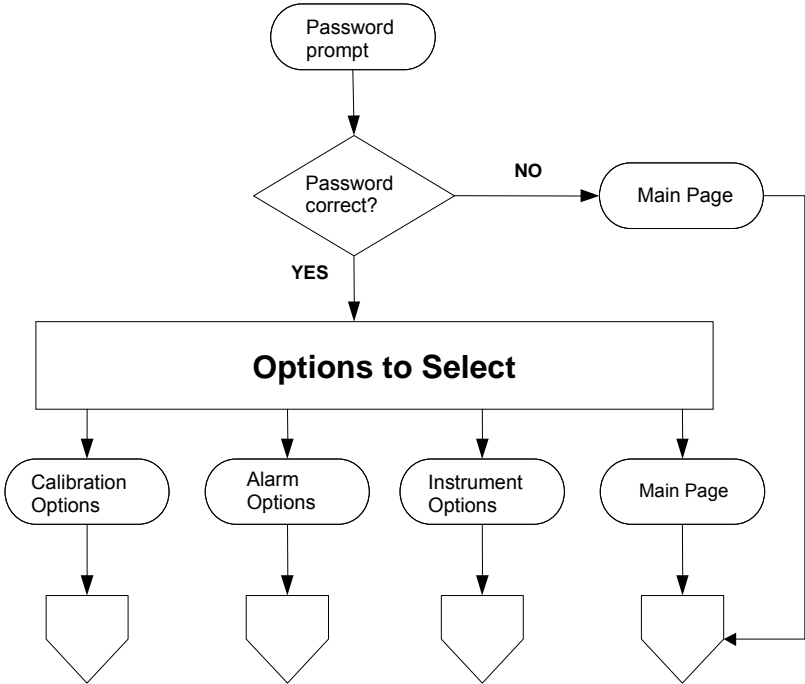
7.2. Normal Operation



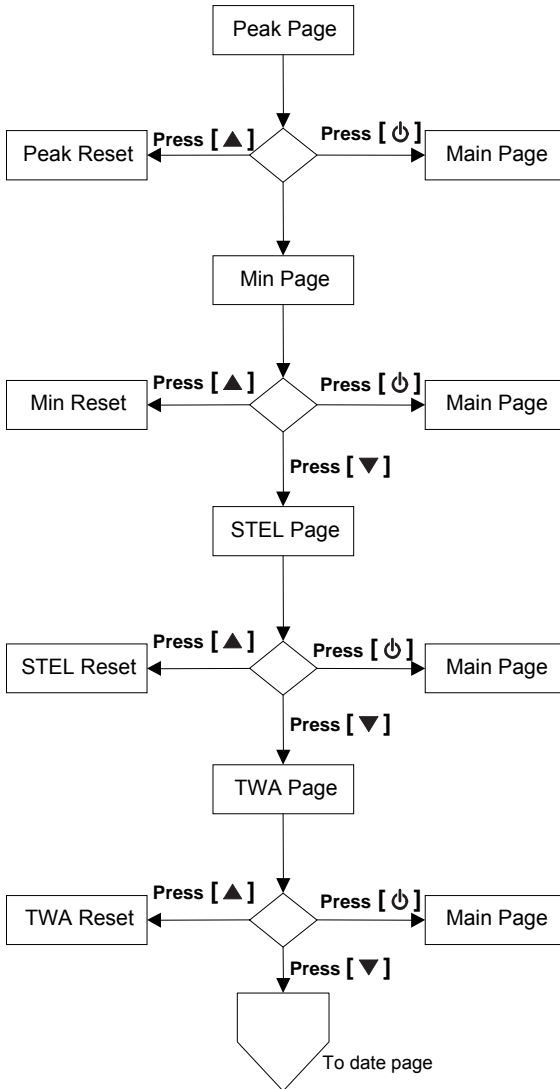
7.3. Options from Main Page

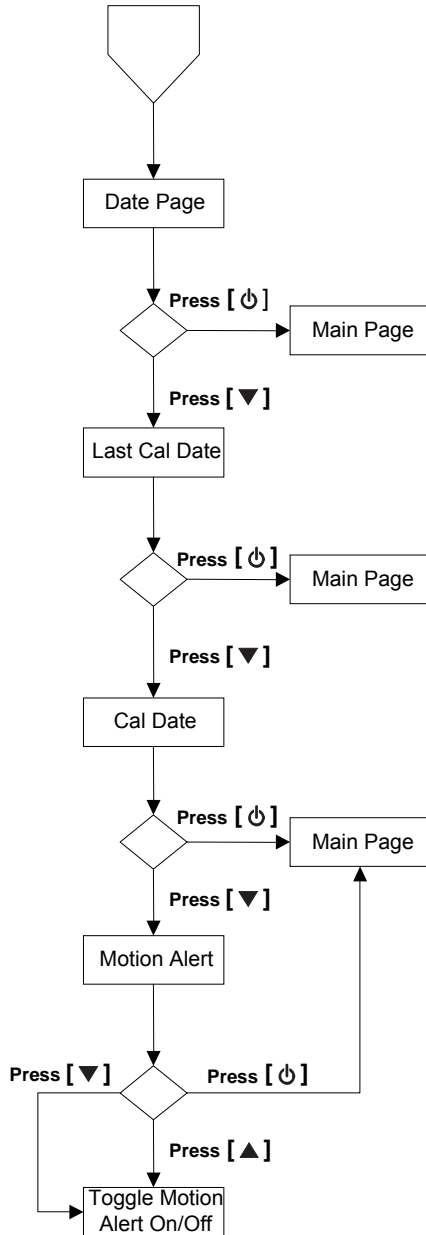


7.4. Password Protected Options

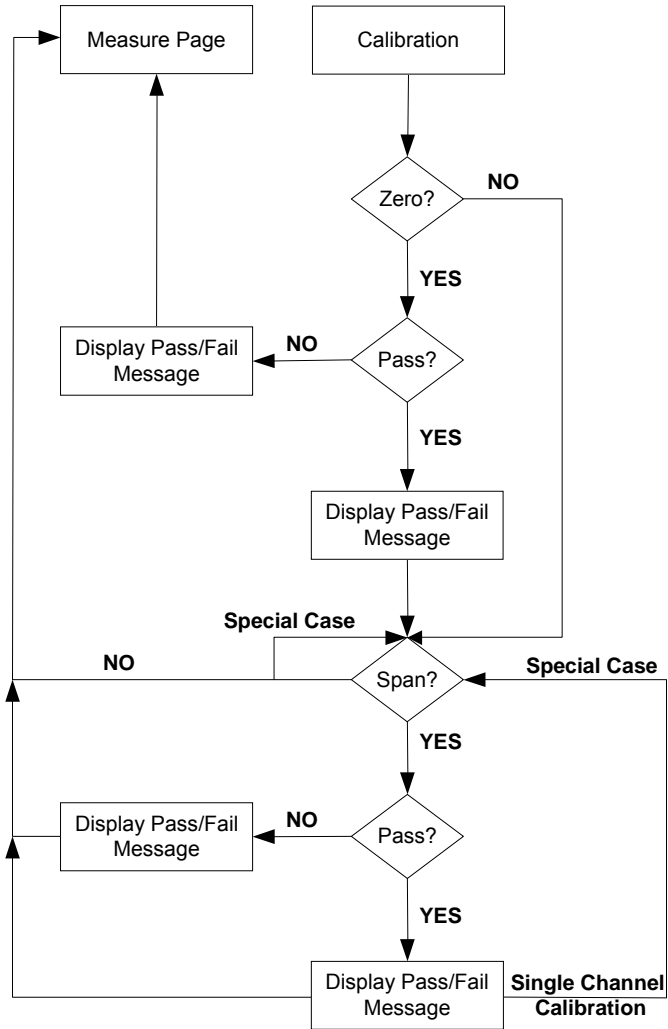


7.5. Menu Sequence from Main page

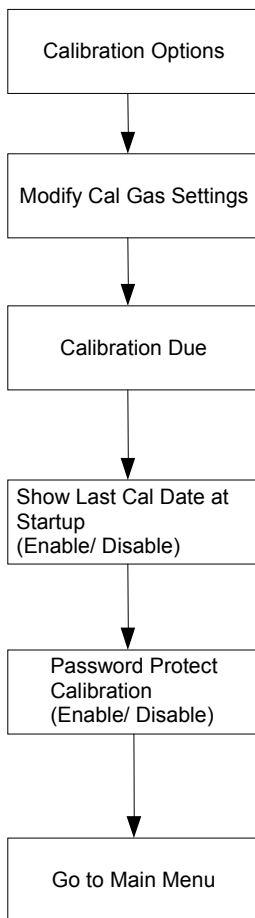




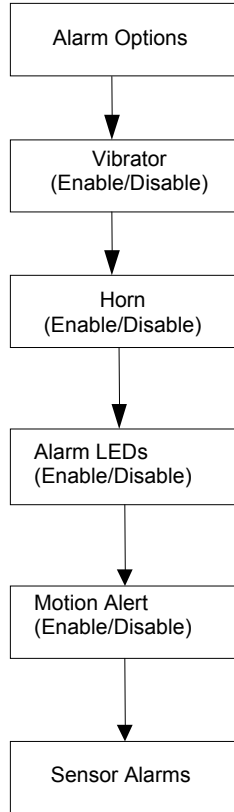
7.6. Calibration Sequence



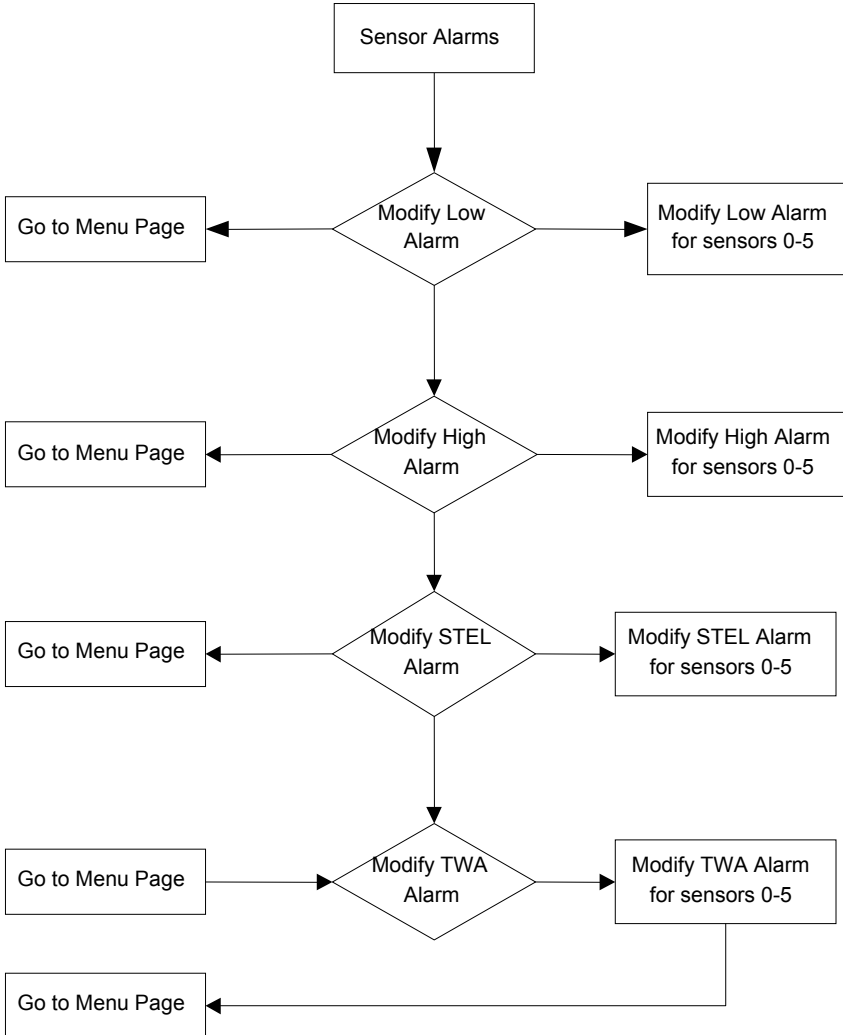
7.7. Calibration Options



7.8. Alarm Options



7.8.1 Sensor Alarm Options



7.9. Instrument Options

