

VOXiWatch II Controller

MP883 Dual-Channel Controller

User's Guide



IMPORTANT!

The full VOXiWatch II Controller User's Guide must be carefully read by all individuals who have the responsibility of using, maintaining, or servicing this product. The product will perform as designed only if it is used, maintained, and serviced in accordance with the manufacturer's instructions. The user should understand how to set the correct parameters and interpret the obtained results.

WARNINGS

The VOXiWatch II Controller (MP883) is NOT certified for use in hazardous gas locations. VOXI gas transmitters in hazardous locations may be connected to it with appropriate cabling.

Proper Product Disposal At End Of Life



The Waste Electrical and Electronic Equipment (WEEE) directive (2012/19/EU) is intended to promote recycling of electrical and electronic equipment and their components at end of life. This symbol (crossed-out wheeled bin) indicates separate collection of waste electrical and electronic equipment in the EU countries. This product may contain one or more Nickel-metal hydride (NiMH), Lithium-ion, or Alkaline batteries. Specific battery information is given in this user guide. Batteries must be recycled or disposed of properly.

At the end of its life, this product must undergo separate collection and recycling from general or household waste. Please use the return and collection system available in your country for the disposal of this product.

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1 Safety Precautions

IMPORTANT!

Read Before Installing

This Installation Guide is for wiring, installation, and testing of the VOXiWatch II Controller system only. For safe configuration, it must be used in conjunction with the VOXI EC, VOXI LEL, and/or VOXI VOC Monitor User's Guide, depending on your system. Applicable User's Guides are available at www.mpowerinc.com.

WARNINGS **Hazardous area**

This Manual must be carefully read by all individuals who have or will have the responsibility of using, maintaining, or servicing this product. The product will perform as designed only if it is used, maintained, and serviced in accordance with the manufacturer's instructions. The user should understand how to set the correct parameters and interpret the obtained results.

For safety reasons, this equipment must be operated and serviced by qualified personnel only. Read and understand the instruction manual completely before operating or servicing.

- The VOXiWatch II Controller (MP883) is NOT certified for use in hazardous gas locations. VOXI gas transmitters in hazardous locations may be connected to it with appropriate cabling.
- Use only mPower's sensors. Substitution of sensors may cause inaccurate readings.

Read Before Operating

This manual must be carefully read by all individuals who have or will have the responsibility of using, maintaining, or servicing this product. The product will perform as designed only if it is used, maintained, and serviced in accordance with the manufacturer's instructions. The user should understand how to set the correct parameters and interpret the obtained results.

CAUTION!

To reduce the risk of electric shock, turn the power off before performing service. Service this product only in an area known to be non-hazardous.

2 General Information

A VOXiWatch II system consists of a VOXiWatch II Controller and either one or two VOXI transmitters.

The VOXiWatch II Controller (MP883) is the central unit of a VOXI gas alarm system, which connects one or two gas transmitters with cables by Modbus® RTU protocol. The Controller shows real-time readings or statuses from connected gas transmitters, and automatically activates various alarms or devices when the monitored gases exceed the permitted health or safety levels. The Controller is housed in a NEMA 4X enclosure, and has a large easy-to-read color display, common or individual channel relays, and optional horn and strobe assemblies.

Key Features, Functions, And Benefits: VOXiWatch II Controller

- Wall-mounted enclosure with lock
- Large graphic color LCD
- Pushbutton interface on controller display panel
- One multi-color LED per channel for power, fault, and alarm Communication: EIA-485 Modbus® RTU (Remote Terminal Unit)
- Two 3-wire 4-20mA inputs from transmitters
- Strobe and Horn relays
- Three programmable dry-contact relays (two alarms, one fault)
- Up to 10 years of events logged

Refer to datasheets that apply to the monitors used in your VOXiWatch II Controller system.

Applications

- Oil and gas
- Petrochemical plants
- Utility facilities
- Energy storage
- Steel mills
- Water and air treatment
- Industrial safety
- Fence-line monitoring

3 Purpose Of This Guide

This guide is designed to provide information on installing and wiring the VOXiWatch II Controller Fixed Controller into a VOXiWatch II Controller system.

4 Flexible Configurations

The VOXiWatch II Controller can be configured to support one or two connected transmitters, depending on the facility or facilities being monitored. The VOXiWatch II Controller may be shipped as a pre-configured system that includes one or two transmitters.

5 VOXiWatch II Controller Installation

When mounting the VOXiWatch II Controller, ensure that it is in a safe place where it is unlikely to be damaged by machinery, maintenance activities, etc.

CAUTION!

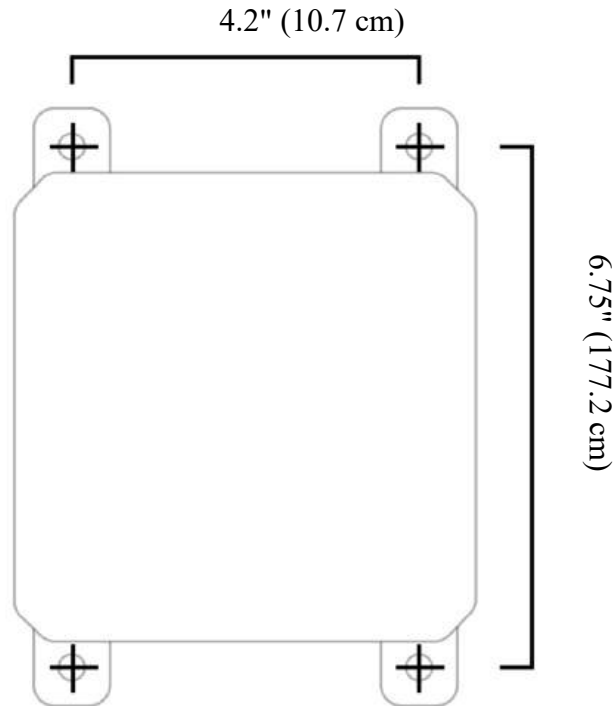
To reduce the risk of electric shock, turn the power off before opening this instrument or performing service. Never operate the instrument when the instrument is open. Service this product only in an area known to be non-hazardous.

- The VOXiWatch II Controller (MP883) is NOT certified for use in hazardous gas locations. VOXI gas transmitters in hazardous locations may be connected to it with appropriate cabling.

When locating the VOXiWatch II Controller for installation, make sure that there is approximately 12" (30 cm) of clearance on all sides of the VOXiWatch II Controller so that if it is equipped with an alarm horn, its sound is not attenuated, and if there is an LED Beacon, to ensure clear view.

6 Mounting The VOXiWatch II Controller

The VOXiWatch II Controller should be mounted on a flat surface, making sure there is at least 12" (30 cm) of clearance around the unit. When mounting the VOXiWatch II Controller on a wall, use heavy-duty steel screws located as indicated below.



Follow these steps:

1. Locate the VOXiWatch II Controller on a wall or other flat surface. Make sure there is at least 12" (30 cm) of clearance around the unit. Mark the mounting holes' locations.
2. Remove the VOXiWatch II Controller.
3. Drill pilot holes in the wall or mounting surface.
4. Hold the VOXiWatch II Controller firmly against the wall or mounting surface and insert and tighten the screws.

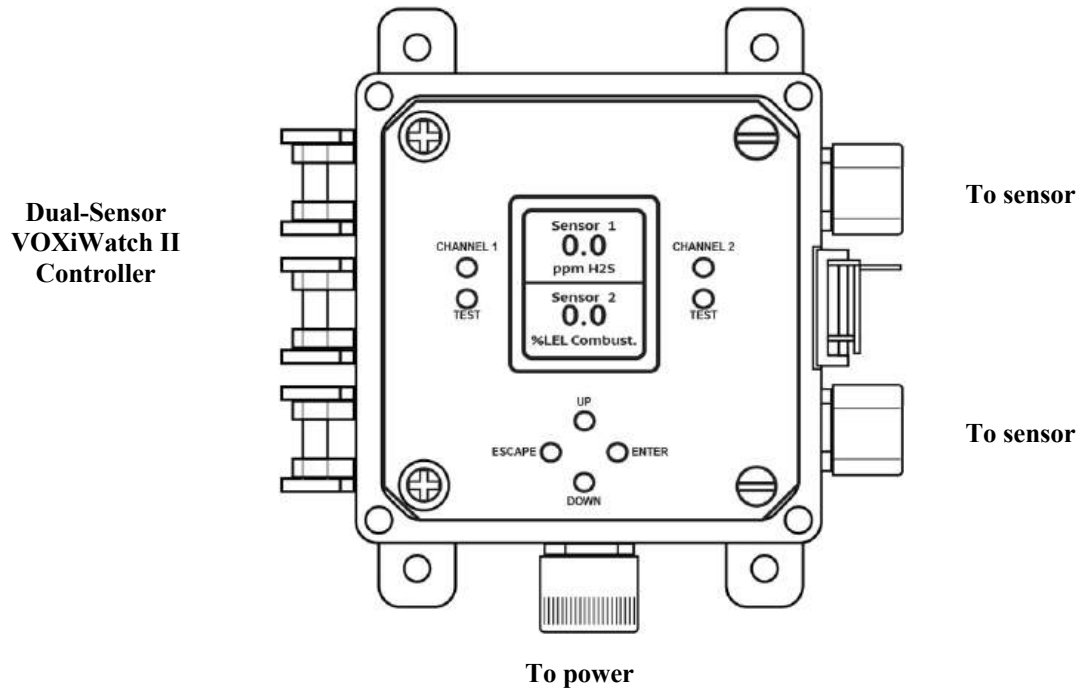
Note: Screw holes can accommodate screws with a diameter up to 0.3" (7.5mm).

The VOXiWatch II Controller is now ready for electrical wiring and testing.

7

VOXiWatch II Controller Wiring

Depending on the configuration ordered, the VOXiWatch II Controller may already have most wiring already done. It may be necessary only to connect the power supply wires and ground connection (according to local requirements). Power and internal grounding wires must be fed through a connector or gland at the bottom of the unit.

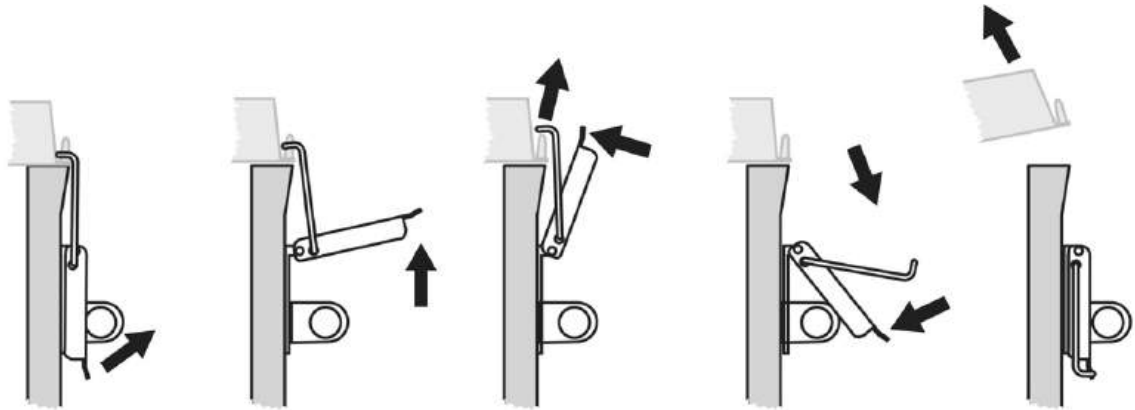
**IMPORTANT!**

Prior to factory shipment, the VOXiWatch II Controller is tested. However, the instrument should be tested after installation to ensure there was no damage in transport, to ensure proper wiring, and to check all functions before being used to monitor.

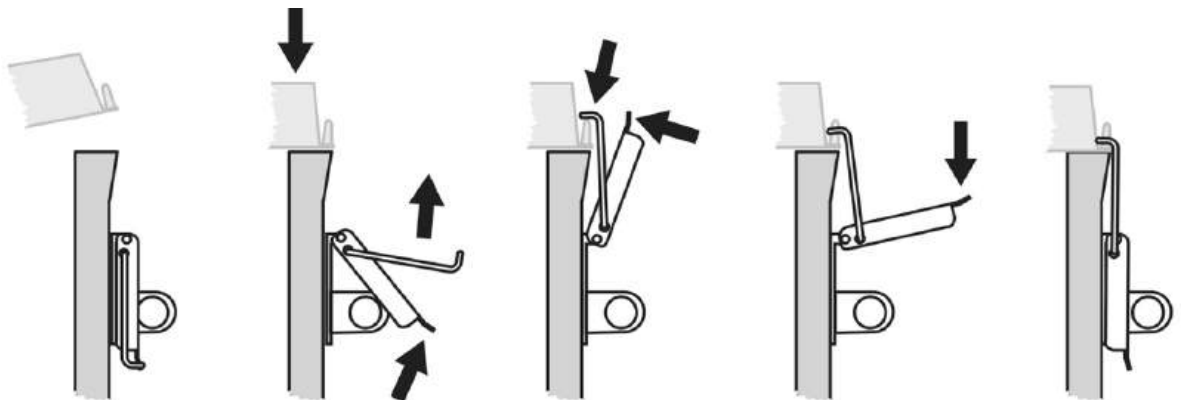
7.1 Opening & Closing The Enclosure

A latch is included to hold the hinged top of the enclosure snugly against the bottom portion of the enclosure. To open it:

1. Flip the tab up and lift it as shown in the following side views.
2. Move the latching bar away.
3. Flip the bar down and press the tab to lock it in place so that it does not get damaged.
4. Lift the hinged cover.

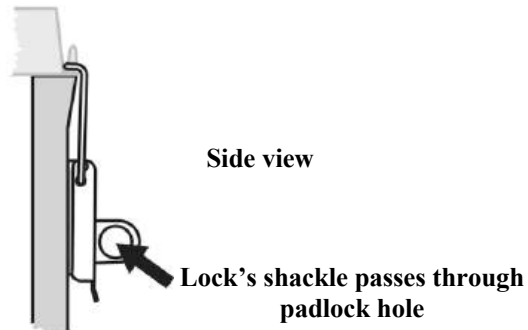


To latch the cover in place, reverse the procedure:

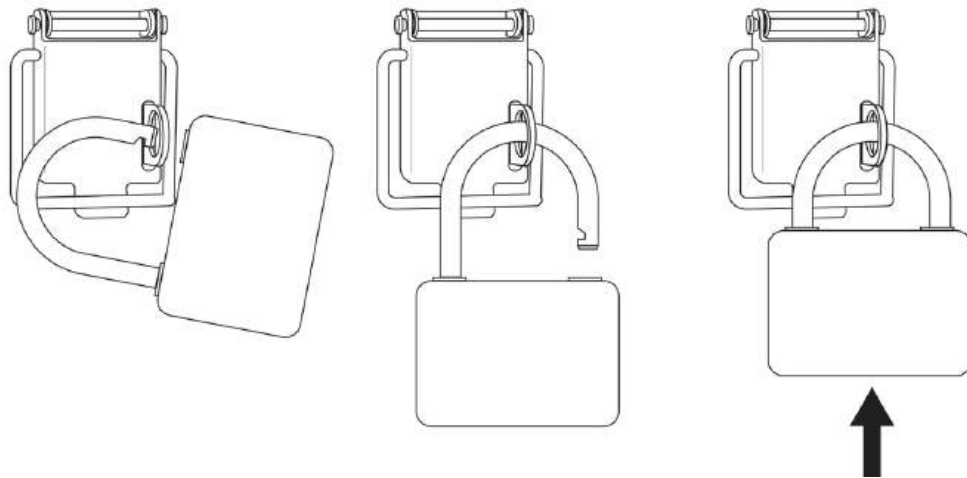


7.2 Locking The Enclosure

If extra security is required to ensure that the enclosure will not be opened, use a padlock (or combination lock).



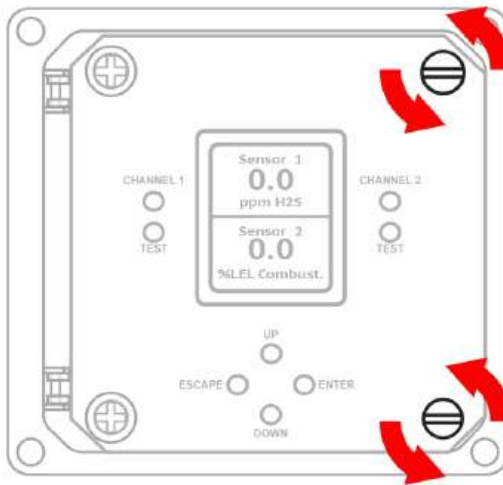
1. Make sure the VOXiWatch II Controller's lid is tightly closed and that the latch is secure.
2. Open the lock and pass the shackle through the padlock hole.
3. Press the lock's body up until the shackle clicks into its locked position.



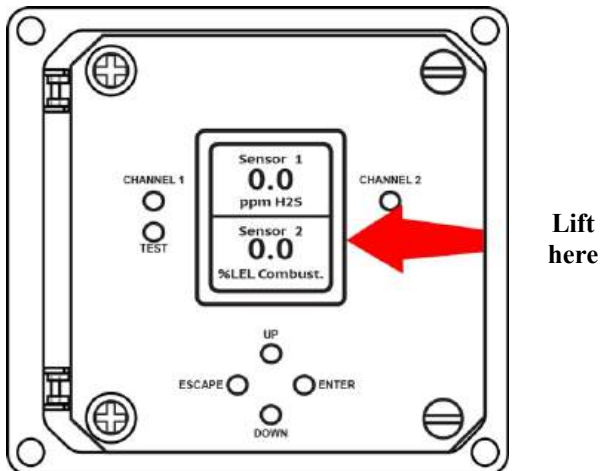
7.3 Accessing The Internal Connecting Points

All electrical connections and connections to external transmitter/sensors, horns, and strobe lights are made on the PC board, which is mounted to the back of the front panel. To access it, you must loosen the two capture screws and tilt it up on its hinges.

1. Loosen the two capture screws along the right side of the front panel:



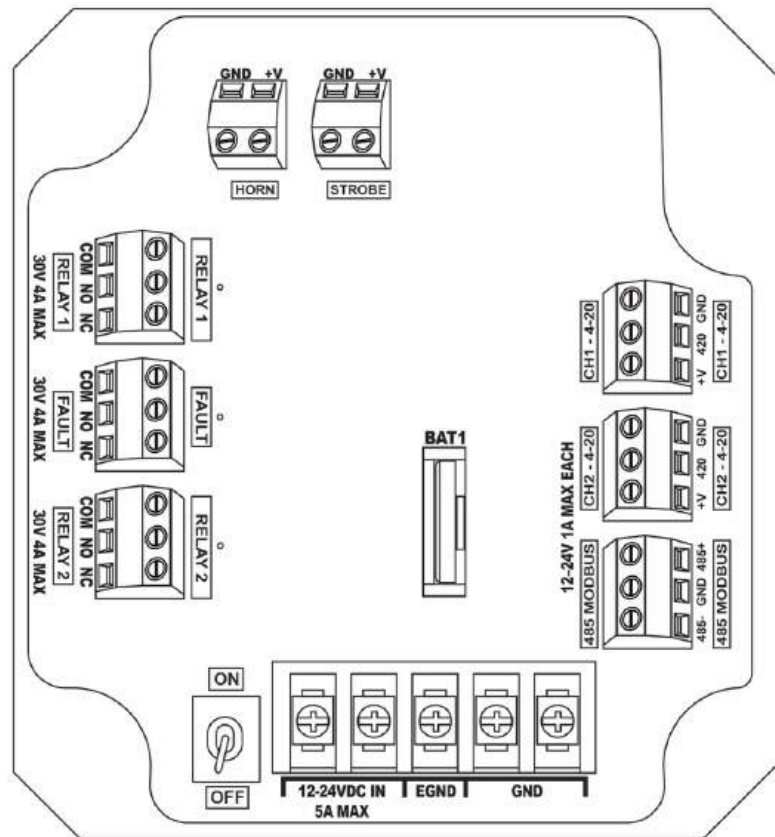
2. Lift the front panel from the right edge. It has hinges on the left side:



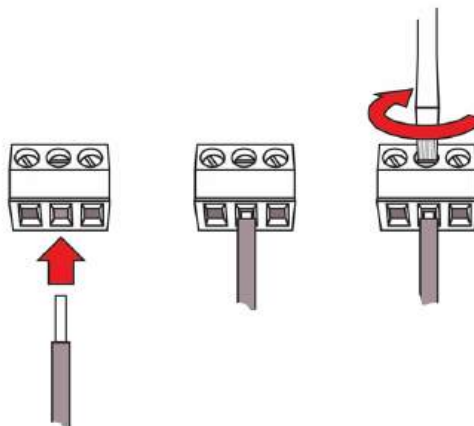
The PC board is now exposed and ready for wiring.

7.4 Wiring

The simplified drawing below shows the relay PC board of the VOXiWatch II Controller. All connections, including power, transmitter/sensors, horn, strobe light, and communications (RS-485 Modbus and 4-20), are made here.



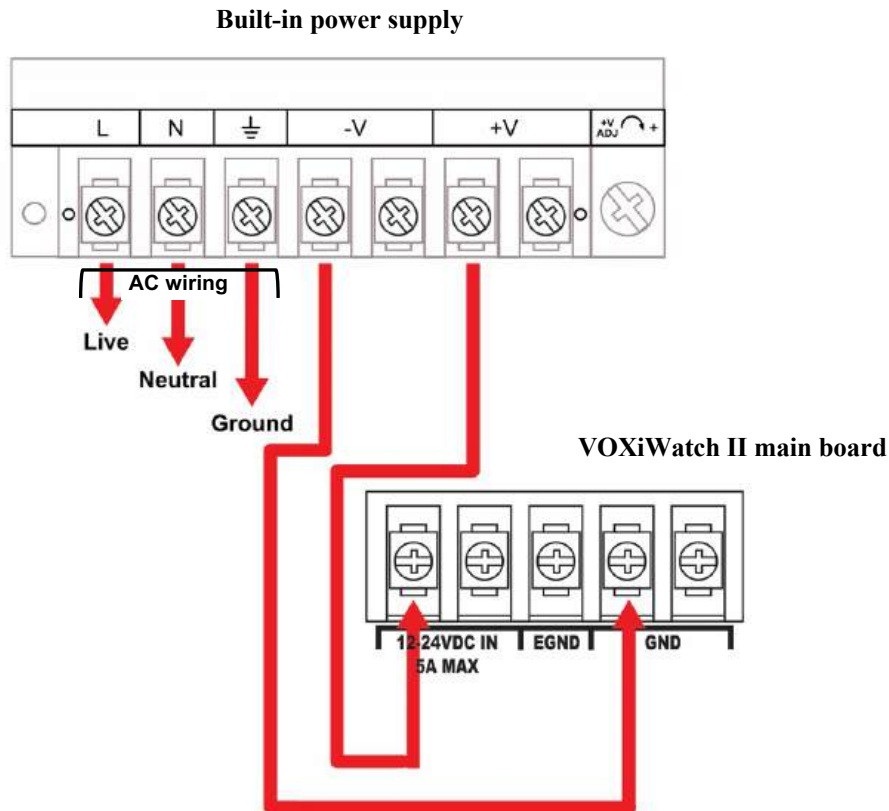
When connecting wires to the connection blocks, insert the wires inside the “square” opening and then tighten the screw to secure the wire.



7.5 Power Connections

Note: If the VOXiWatch II Controller was delivered with a built-in power supply, electrical wiring for powering the internal circuit boards is already done.

If the VOXiWatch II has a built-in power supply, then wiring to an AC source is required. AC power must be connected to the three points on the power supply: L, N, and $\perp$ (Ground/Earth).



Depending on local ordinance, wires typically are colored as follows:

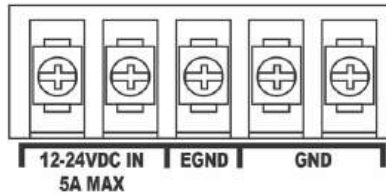
L (Line/Live) In the US, it is typically black or red, while in the UK and Europe, it is brown for single-phase circuits.

N (Neutral) Typically white or gray in the US, and blue in the UK and Europe.

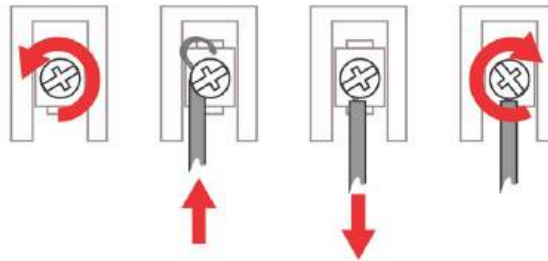
G (Ground) Green or bare copper wire.

VOXiWatch II Controller User's Guide

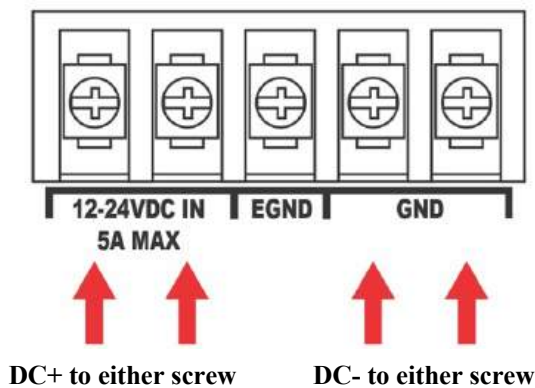
Electrical connections to provide DC power (12 to 24 volts) to the main board are made at its power block.



1. Loosen each screw that corresponds with a wire connection.
2. Loop the wire around screw.
3. Pull the wire to make sure the loop is completely under the screw.
4. Tighten the screw to secure the wire.



When wiring power connections to the block, connect the DC+ wire to the point labeled "12-24VDC IN" and DC- to the point labeled "GND." You can use either screw in these two sections.



The second screws for DC+ and DC- provide convenient connecting points for supplying power to the dry-contact relays.

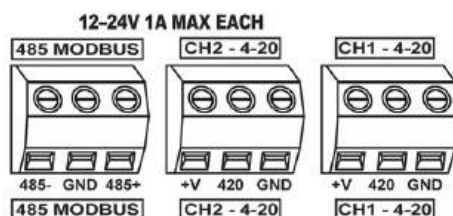
Note: A connection to earth ground (EGND) must be completed when the VOXiWatch II Controller is installed.

7.6 Earth Ground (EGND) Connection

A separate connection to earth ground is made by connecting a wire from the screw labeled “EGND” and an earth ground point (such as a cold water pipe or rod driven into the ground—check with local ordinance).

7.7 Sensor & Modbus Connections

There are three connector blocks in this area of the relay board. Two are intended for wired connection with mPower transmitters using 4-20mA current operation and are labeled “CH1 – 4-20” and “CH2 – 4-20”. They operate using three wires, indicated as +V, GND, and -V. Shielded wire is recommended.



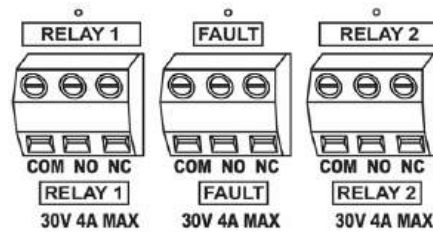
Note: The maximum wire length for a 4-20mA signal can generally reach up to 500 meters (around 1,600 feet), but the exact length depends on the specific application, cable type, and the loop impedance of the connected instruments. Therefore, shorter cable runs are recommended.

A third set of connectors is for RS-485 communication protocol interconnection. It is labeled “485 MODBUS.” In a setting using RS-485 communication, three wires should be connected to the block’s connections labeled “485-”, “GND”, and “485+”.

Note: The maximum permissible length between an RS-485 driver and receiver is 4,000 feet (or 1,200 meters). However, both cable quality and data rates impact this distance. As data rates increase, the signal is increasingly attenuated by the parasitic RC filter created by the cable. Therefore, keep the wires as short as possible and only use shielded, high-quality wire. The shield must be connected to ground at one end to provide best isolation from external noise.

7.8 Alarm & Fault Connections

Connections to three dry-contact relays are included in this section. There are one for Relay 1 and one for Relay 2 connection, and one for Fault connection. Wire each relay so that the COM (common) connection is made for power, and then connect the other wire to either NO (Normally Open) or NC (Normally Closed). When a programmed threshold in the VOXiWatch II Controller is passed, the relay changes state.



IMPORTANT!

All relays can be wired to provide both NO and NC operation (acting as two separate relays triggered at the same time).

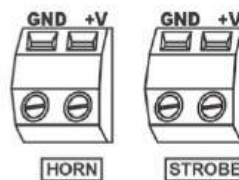
7.9 Horn And Strobe Connections

These connections are for driving a horn (sounder) and a strobe light. Note the polarity: Each block has two connection points. One is labeled “GND” for ground and the other is “+V” for positive voltage output.

The Horn and Strobe outputs deliver 12 to 24 volts DC (the same as the power coming into the controller). These outputs are designed to only power the provided horn and strobe or pre-approved alternatives. Ensure that any connected equipment is rated appropriately.

IMPORTANT!

These connections cannot be used as relays or to power other devices.



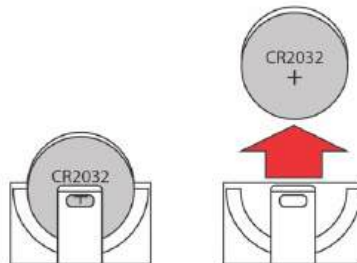
7.10 Battery Replacement

The battery provides power to back up the real-time clock when the VOXiWatch II Controller is turned off. Meanwhile, all operational data are stored on the SD card, and settings are stored in non-volatile memory.

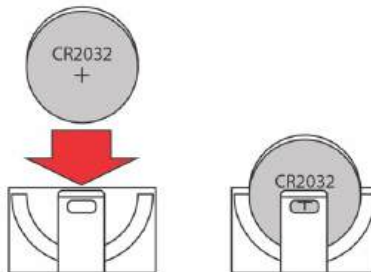
A battery should last several years. However, the battery should be replaced every year to ensure operation without disruption. If the battery goes dead, the real-time clock loses its correct time. Always use a high-quality CR2032 battery, and make sure it is clean and dry before inserting it into the socket, found on the relay PC board. It is labeled “BAT1.”



Remove the old battery by pulling it straight up from the socket. It fits very snugly, so it may require some effort. Do not twist the battery, and do not use tools such as a pliers.



Wipe the new battery with a clean, dry cloth. Pay attention to the orientation of the battery (the “+” side is labeled “CR2032”; there is usually a “+” symbol, as well). Orient the battery so that the labeled side is in contact with the socket’s metal retainer/tensioner. Press the battery into the socket until it is firmly seated.



IMPORTANT!

In the U.S., it is federally mandated under 16 CFR part 1263 that you dispose of the old battery properly, in a place where it cannot be ingested. If a button of this type is swallowed, it can cause devastating injuries including internal burns, tissue damage and even death if not treated promptly. For further information, refer to ANSI/UL Standard for Safety of Products Incorporating Button Batteries or Coin Cell Batteries, UL 4200A.

Relevant Standards:

- **ANSI/UL 4200A:** This US standard outlines specific requirements for button battery safety including packaging, battery compartment design, and warning labels.
- **IEC 62115:** An international standard covering safety requirements for button and coin batteries.
- **sAS/NZS/IEC 60065/60950/62368:** Standards relevant to button battery safety in Australia and New Zealand.

7.11 Set The Clock

After the battery is replaced, set the clock for correct time and date. Refer to page 16 for the steps necessary for setting the clock's time and date.

8 SD Memory Card Replacement

The VOXiWatch II Controller accommodates an SD card for storing log data. It electronically stores system files and reports on a standard SD memory card, as well as system-specific data.

A user-provided 32GB SD card (P/N M490-0178-000) can optionally be used to log events such as power on/off, calibration, alarms, and faults. If no SD card is present, the Channel 2 LED glows solid red during the 60-second power-on warmup period. Data can be downloaded on a PC using mPower Suite, available at www.mpowerinc.com. Once the software is installed, remove the SD card from the VOXiWatch II Controller and place it in the computer's SD card slot or use an external reader. Follow the instructions in the software for downloading. It is a good idea to download the data on a regular basis because the process will be faster, plus it enhances security.

IMPORTANT!

SD Card capacity should not be greater than 32GB.

Once data has been downloaded to a computer running mPowerSuite, data can be exported in CSV (comma-separated value) format for use/storage in spreadsheets such as Microsoft Excel.

Note: The SD card can only be used **for** VOXiWatch II Controller recording. Do not save other files to the SD card.

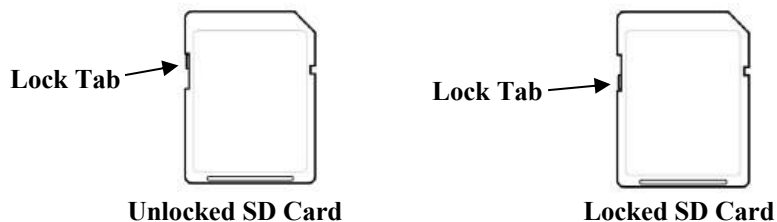
IMPORTANT!

The VOXiWatch II Controller does not store data without an SD card in its slot.

CAUTION!

Do not remove the SD card from its slot or insert an SD card into an empty slot while the VOXiWatch II Controller is running. This may damage the SD card or corrupt its data.

If the SD card is locked, the error message shown above is displayed. The VOXiWatch II Controller cannot write data to a locked SD card. Remove the SD card and unlock it by moving the lock tab upward; then reinsert the SD card.

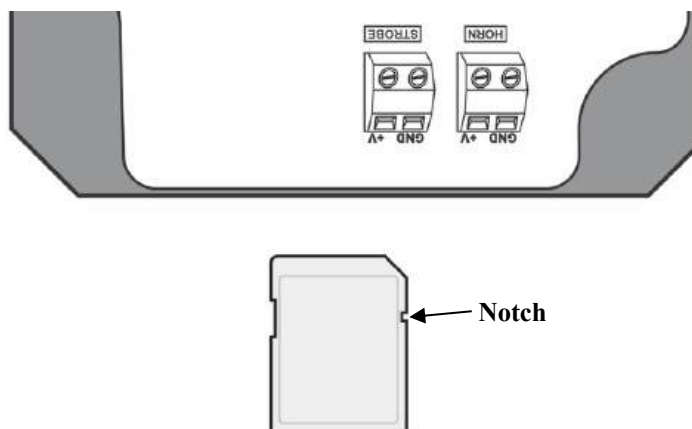


Note: When the SD card is full, the VOXiWatch II Controller automatically writes new data over the oldest data in a “first in/first out” fashion.

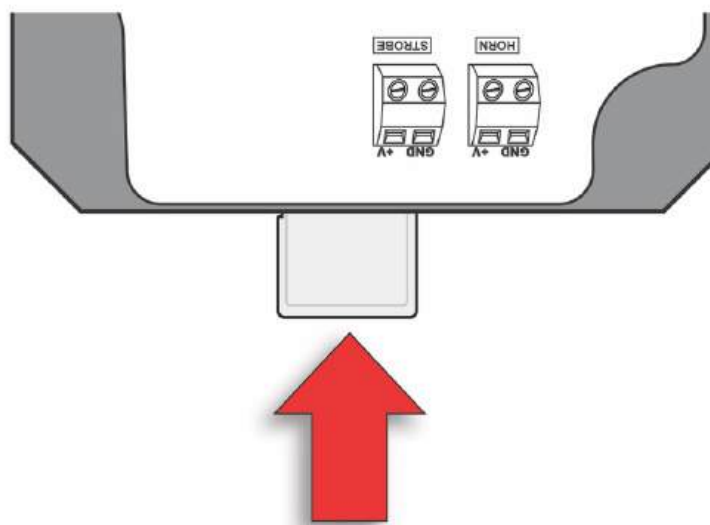
The SD Card Dock is on the lower PC board, almost directly under the block for connecting a strobe.

Before inserting the SD card, turn off the power to the VOXiWatch II Controller.

Align the SD card as shown, with the notched corner to the right.



Press the SD card into its dock until it clicks. It should now be secure.



To remove the SD card:

1. Turn off power to the VOXiWatch II Controller.
2. Press the SD card until it makes a click, unlatch, and push outward.
3. Grasp the SD card and remove it.

9

Start-Up

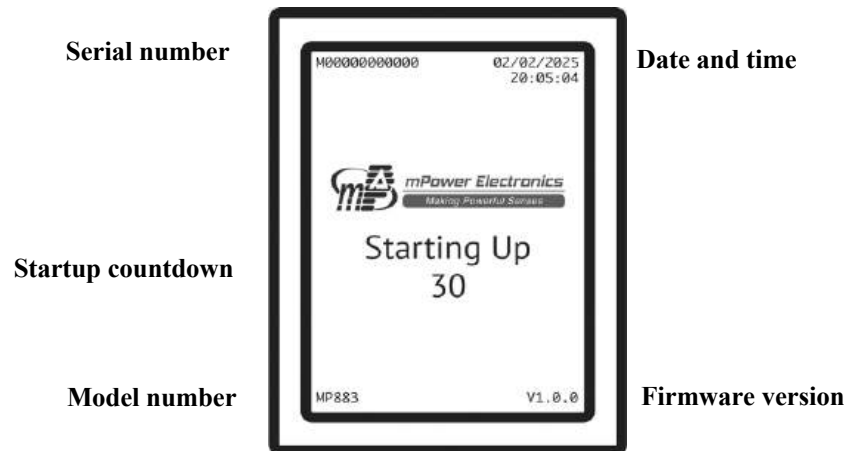
Once 12 to 24 volts DC power is connected and the internal power switch is set to “On,” the VOXiWatch II Controller’s display lights up and the system enters a 60-second warm-up.



A 60-second countdown is shown on the display:

Starting Up 59

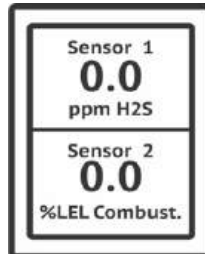
During the countdown, the system is checked for connections and any potential faults. It shows the serial number, real-time clock date/time, model number, and firmware version.



9.1 Successful Start-Up

The display changes to show the sensor(s) and reading(s), as well as the measurement unit and type of sensor.

When all readings are within normal range, the background color is green.



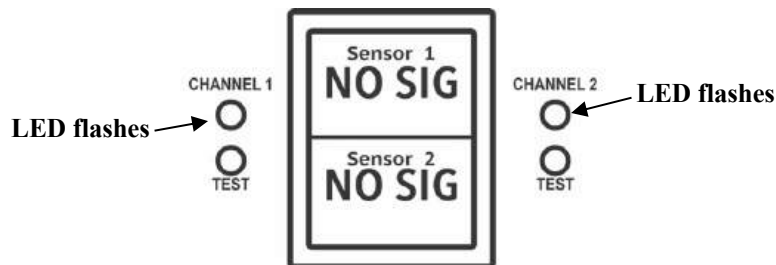
Depending on conditions that the VOXiWatch II Controller receives, the background changes and the LED glows different colors and it glows either continuously or it flashes. This chart shows conditions for the backlight color and LED color/state:

Condition	Backlight Color	LED
Normal	Green	Green Steady
Low Alarm	Orange	Yellow Flashing
High Alarm	Red	Red Flashing
High High Alarm	Red	Red Flashing
Sensor Warm Up	Light Blue	Blue Steady
Cal in Progress	Light Blue	Blue Steady
No Signal	Dark Blue	Blue Flashing
Sensor Fault	Dark Blue	Blue Flashing

9.2 Unsuccessful Start-Up

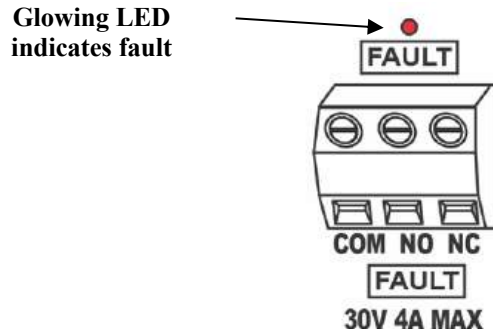
If the display does not light up, check power connections. Also check that the power source is delivering 12 to 24 volts DC.

If the display lights up but no signal is present, then the display alerts you and the Channel status LED associated with the channel with a problem flashes on and off. The background on the portion of the display showing a problem is dark blue.



If no signal is received from the sensor(s), check the connections inside the VOXiWatch II Controller, and then check the connections inside connected transmitters/sensors.

If there is a problem, the Fault LED on the main relay board inside the VOXiWatch II Controller glows continuously. At the same time, the relay is tripped to provide a downline fault indication to any equipment connected to the Fault relay.



If everything appears in order in the VOXiWatch II Controller, check the attached sensor transmitter(s).

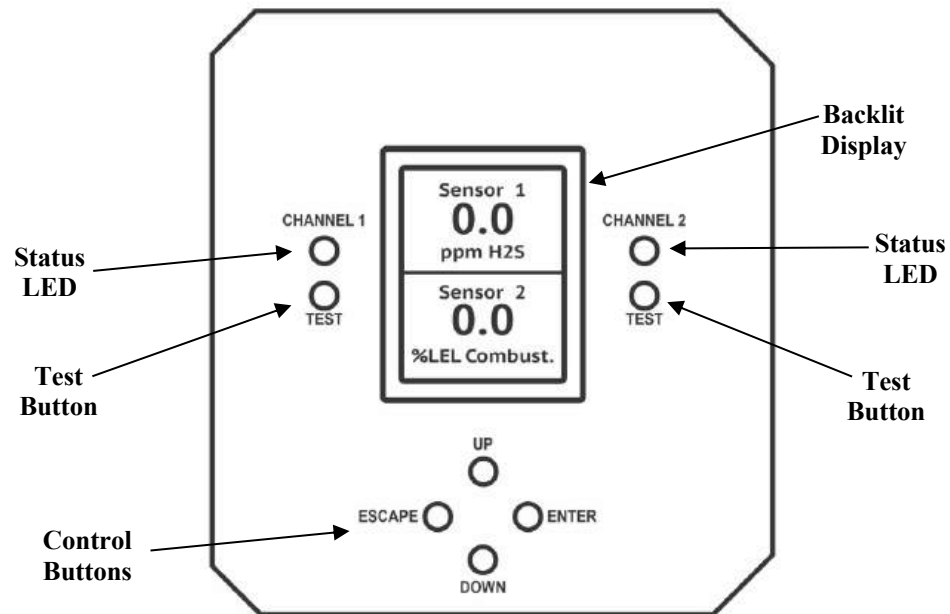
CAUTION!

Always turn off power to the system before opening any sensor, especially if the sensor is in a hazardous environment.

10 User Interface

The user interface consists of:

- Channel 1 status LED
- Channel 1 Test button
- Channel 2 status LED
- Channel 2 Test button
- Backlit display
- Control buttons (Escape, Up, Down, and Enter)



11 Programming Mode

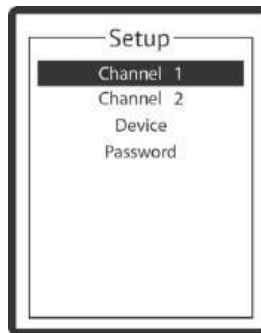
11.1 Navigation

Enter Programming Mode by pressing and holding ESCAPE for 5 seconds.

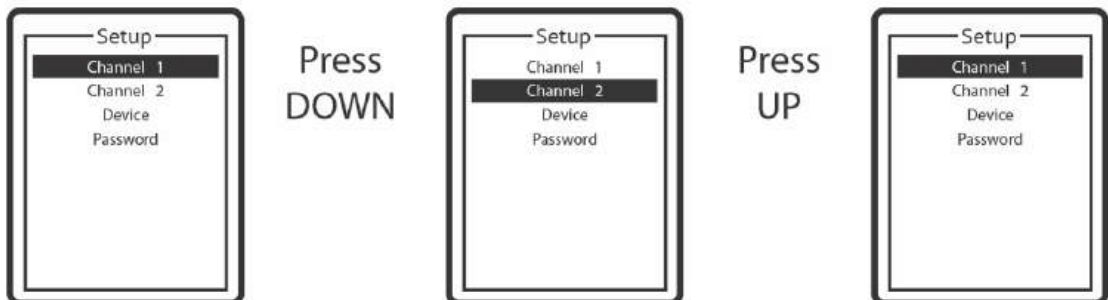
Note 1: When parameters are being edited/set, the VOXiWatch II Controller continues monitoring data from sensors.

Note 2: Programmed parameters are stored and are retained when power is turned off.

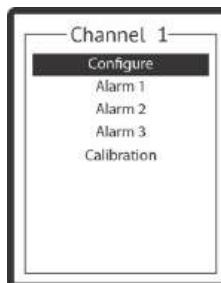
In programming mode, there is a top-level menu:



To scroll through the menu options, press the UP or DOWN button. The highlighting changes, showing you the current selection.



Once you have selected a menu, press ENTER. The menu item's submenu is shown. Press the UP and DOWN buttons to scroll up or down through the options.



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Press ENTER to enter the submenu item's parameters under this heading:

Ch1 Config

Name:	Sensor 1
Gas:	H2S
Measure:	ppm
Span:	200
Decimals:	0
Enabled:	YES
Save?	

- Press UP to scroll up through the parameters.
- Press DOWN to scroll down through the parameters.

Press DOWN

Press UP

The diagram shows three instances of the 'Ch1 Config' menu. In the first, 'Sensor 1' is underlined. In the second, 'H2S' is underlined. In the third, 'ppm' is underlined. Arrows indicate the direction of scrolling between these states.

Once you have selected a parameter to edit, press ENTER to enable editing. The first editable item (character, state, or parameter) is indicated by an underline. Press UP to increase the value or DOWN to decrease the value. This includes changing an alphabetic or numeric character or making a choice (such as between YES and NO or selecting an item in a list).

Press UP

Press DOWN

The diagram shows three instances of the 'Ch1 Config' menu with 'Sensor 1' underlined. In the first, 'H2S' is underlined. In the second, 'ppm' is underlined. In the third, '200' is underlined. Arrows indicate the direction of scrolling between these states.

Advance the cursor from one character to the next character by pressing ENTER.

When you reach the last character, press ENTER to highlight the entire option.

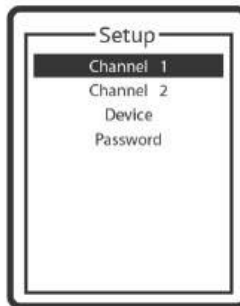
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Press DOWN to step to the next option.



Perform any changes in this screen and then scroll down to Save? and press ENTER when you want to save your changes.

If you do not want to save your changes, press UP to select another parameter on this screen to edit or press ESCAPE to return to the menu above this submenu.

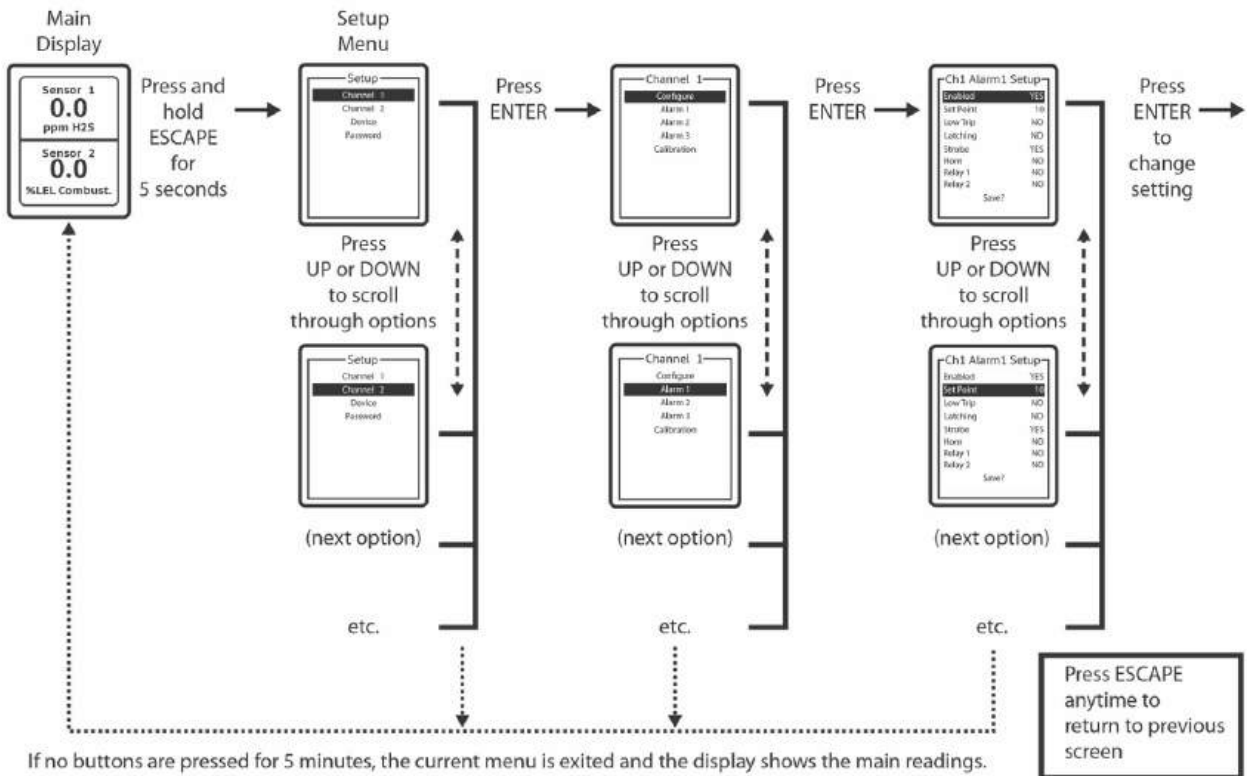


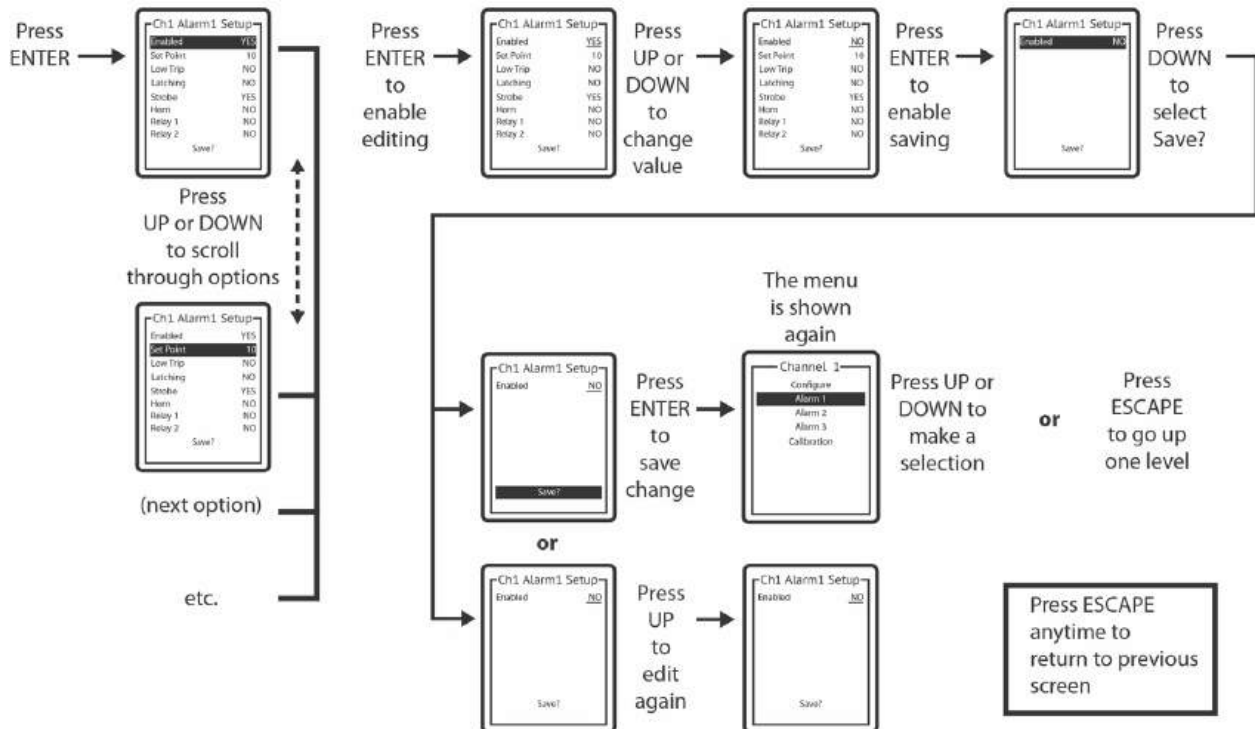
IMPORTANT!

Regardless of where you are in the menus and submenus, if you do not press a key for five minutes, the main display reverts to the main reading screen (without saving unsaved changes).

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The following two flowcharts show how the navigation works in a consolidated view:





If no buttons are pressed for 5 minutes, the current menu is exited and the display shows the main readings.

12 Testing

Once the VOXiWatch II Controller is operational, you can test the relays and connected horn and strobe light by pressing the front-panel TEST button for each channel.

Press and hold either TEST button for 5 seconds. The relays associated with the selected channel should activate. At the same time, any connected horn should sound and any connected strobe should light. The background on the main display associated with the channel under test should turn red and the channel's status LED should flash red.

WARNING!

If a horn is connected, it can be very loud. Therefore, wear hearing protection or otherwise cover your ears during the test.

IMPORTANT!

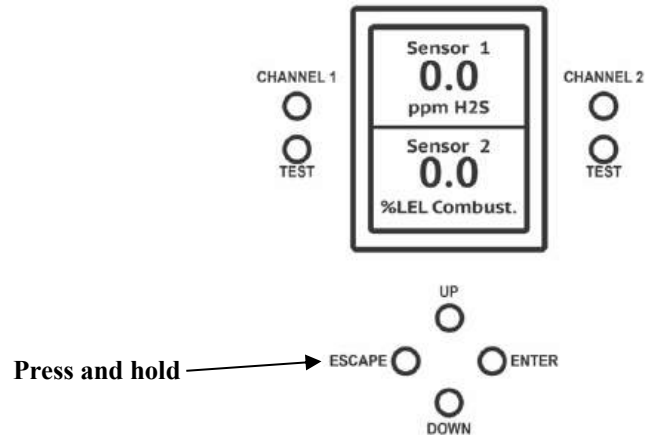
If any of the tests fails, check the wiring. If after repeated attempts the test does not pass, disconnect power and contact mPower Customer Support.

13 Programming

The VOXiWatch II Controller is designed for programmability and allows customization of its responses and actions when monitoring one or two connected sensors. **Note:** Programmed parameters are stored and are retained when power is turned off.

13.1 Enter Setup Menu

Press and hold the Escape button for 5 seconds.



If a password has been set, you will be prompted to supply it. The default password is 0000.

When the “Enter Password” screen is shown, the first digit is underlined.

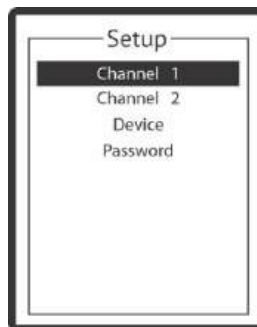
1. Press UP or DOWN to enter the correct number (0 through 9).
 2. Press ENTER to move the cursor to the second digit.
 3. Repeat for all 4 digits.
- If you input the correct four digits, then the Setup screen is shown.
 - If you did not input the correct four digits, you are prevented from entering Setup and the main display is shown.

13.2 Setup

All parameters are set and adjusted through the Setup menu. There are four options, each with submenus:

- Channel 1 (automatically selected when you enter Setup)
- Channel 2
- Device
- Password

When the Setup menu is displayed, the top item, Channel 1, is highlighted.



To select other options (Channel 2, Device, or Password), press DOWN.

Press ENTER to view the options in the selected menu item.

13.3 Channel 1 (Or Channel 2)

Channel 1 is dedicated to one transmitter/sensor. If your VOXiWatch II Controller has two channels, the available settings for Channel 2 are the same as Channel 1. However, settings are not duplicated. Therefore, they must be set separately.

IMPORTANT!

To avoid confusion if only one transmitter/sensor is to be connected to a two-channel VOXiWatch II Controller, it is a good idea to connect its wires to the Channel 1 block on the relay board.

The main menu for Channel 1 shows the following options:

Configure
Alarm 1
Alarm 2
Alarm 3
Calibration

The menu for Configure shows the following options:

Name
Gas
Measure
Span
Decimals
Enabled

Save?

Note: If the Values for Measure, Span, or Decimals are changed, the Gas name changes to add the word “Custom” before the Gas name. This extra word “Custom” disappears once the new values are saved or the screen is exited unsaved.

13.3.1 Name

The current transmitter/sensor name is highlighted. This name is commonly set to match the gas detected by the transmitter, but this is not necessary. It can be set to any name desired by the user to help identify the transmitter such as type, range, location, operator, or any other label.

- Press ENTER to edit the name. The first letter or character of the name is underlined with a cursor, indicating it is selected.
- Press UP or DOWN to scroll through the alphabet letters, numbers, and symbols.
- To advance the cursor to the next character, press ENTER.

Note 1: To return to the “Name” menu selection at any time, press ESCAPE.

Note 2: Upper-case and lower-case letters, a blank space, and the following symbols are available:

\ : ; < = > ? @ / . - , + * () ' & % \$ # “ ! ~ { } |

Rather than press repeatedly to advance through the characters, you may press and hold the UP or DOWN button to automatically step through characters one by one.

When you reach the final character, press ENTER. This brings you back to the “Name” menu selection.

- Press ENTER to continue editing the name.
- Press DOWN if you are done editing the name, and advance to “Gas.”

13.3.2 Gas

The current gas sensor type is highlighted.

IMPORTANT!

It is critical that the gas selected matches the actual type of sensor transmitter connected to the controller channel being programmed.

- Press ENTER to change the gas sensor type. The name of the gas is underlined.
- Press UP or DOWN to step through supported gas transmitter/sensors by name.
- Press ENTER when you are done selecting a gas transmitter/sensor's name.

Note: To return to the Gas menu selection at any time, press ESCAPE.

When you reach the final sensor option, press ENTER. This brings you back to the Gas menu selection. To continue selecting from sensor options, press ENTER.

When you are done selecting a sensor, you can advance to "Measure" by pressing DOWN.

Note: Currently, mPower offers only LEL and H₂S sensors for VOXiWatch II systems. Other sensor options in this Gas menu include Cl₂, HCN, NH₃, O₂ and SO₂, which may become available in the future. Check with mPower if any of these sensors are desired.

13.3.3 Measure

The current unit of measure is shown.

- Press ENTER to edit the unit of measure.

Choices include:

ppm	parts per million
ppb	parts per billion
%vol	percent by volume
%LEL	percent of lower explosive limit

1. Press ENTER when you are done changing the unit of measurement. The menu item is highlighted.

Note: To return to the Measure menu selection at any time without saving changes, press ESCAPE.

2. When you are sure that the unit of measurement is correct, press ENTER. This highlights the "Measure" menu selection.

If you are done changing the unit of measurement, you can advance to Span by pressing DOWN.

13.3.4 Span

The Span setting is used to enter the concentration of the gas used to calibrate the gas transmitter.

IMPORTANT!

The Span value set here must match the Span value in the transmitter/sensor that sends data to the VOXiWatch II Controller. Failure to match the values will result in incorrect readings.

1. Press ENTER to edit the gas' span value.
2. Press UP or DOWN to increase/decrease the numerical value.
3. Press ENTER when you are done changing the span value. The Span menu item is highlighted.
4. Press ENTER to advance to the next digit.

Note: To return to the menu selection, press ESCAPE.

5. When you are done editing the Span value, press ENTER. This brings you back to the Span menu selection. To continue editing the span value, press ENTER.
6. Press DOWN to advance to Decimals.

13.3.5 Decimals

1. Press ENTER to edit the decimal display value. You can select a whole number with no decimal point (such as 200) or a single-point decimal value (such as 200.0).
2. Press UP or DOWN to toggle between 1 (one decimal point) or 0 (no decimal point).
3. When you are done editing the decimal value, press ENTER. This brings you back to the "Decimals" menu selection. To continue editing the decimal value, press ENTER.
4. Press ENTER to advance to Enabled.

Note: Changing the decimal value does not make the sensor more or less sensitive or change the sensor range. It merely alters the number of decimal places visible on the display.

13.3.6 Enabled

You can enable or disable the transmitter/sensor by selecting “Yes” or “No.”

Yes = Enabled

No = Disabled

1. Press UP or DOWN to toggle the value between “Yes” and “No.”

Note: To return to the menu selection, press ESCAPE.

2. When you have made your choice, press ENTER. This brings you back to the Enabled menu selection. To toggle the value again, press ENTER.
3. Press DOWN to advance to Save?

13.3.7 Save?

You can save all your changes in the Channel 1 or 2 Section, or you can revert to the values that were in the VOXiWatch II Controller before you made edits.

- Press ENTER to save the changes. The changes are saved and the Configure menu item is selected.
- Press ESCAPE to step to the Configure menu without saving the changes.

13.4 Alarm 1 (or Alarm 2 or Alarm 3)

There are three Alarm menus: Alarm 1, Alarm 2, and Alarm 3. All three feature the same options for settings. Therefore, only Alarm 1 is covered here. Follow the same procedures for adjusting settings in all three.

13.5 Ch. 1 Alarm Setup

The main menu for Ch. 1 Alarm Setup shows the following options:

Enabled
Set Point
Low Trip
Latching
Strobe
Horn
Relay 1
Relay 2
Relay 3
Save?

13.5.1 Enabled

The alarm function can be on (enabled) or off (disabled).

Enable or disable Alarm 1 by selecting “Yes” or “No.”

Yes = Enabled

No = Disabled

Press UP or DOWN to toggle the value between “Yes” and “No.”

Once you are satisfied with the setting, press ENTER. The Enabled menu item is selected.

Press DOWN or UP to navigate to other menu items or press DOWN until Save? is highlighted.

Press ENTER to save the change or press ESCAPE to return to the top menu, Alarm 1, without saving the changed value.

13.5.2 Set Point

The Set Point is the threshold value set whether you want to trigger an alarm when a reading is above that point or below it.

Note: The unit of measure is set in the Configuration menu's submenus, Measure, Span, and Decimals.

With Set Point highlighted, press ENTER. The value is underlined.

Press UP to increase the value or press DOWN to decrease it.

Once you are satisfied with the value, press ENTER. The Set Point menu item is selected.

Press DOWN or UP to navigate to other menu items or press DOWN until Save? is highlighted.

Press ENTER to save the change or press ESCAPE to return to the top menu, Alarm 1, without saving the changed value.

13.5.3 Low Trip

The Low Trip setting determines whether the alarm triggers above the Set Point or below the Set Point.

When Low Trip is set to OFF, readings *above* the Set Point value trigger an alarm.

When the Low Trip is set to ON, readings *below* the Set Point value trigger an alarm.

Examples: Low Trip is most commonly set to OFF when monitoring a toxic or explosive gas such as H₂S or LEL, when you want to be alerted to elevated concentrations. Low Trip is typically set to ON when you are monitoring a critical ambient gas such as oxygen and you want to be alerted when the level drops below a baseline value (for instance, 19.5%).

Enable or disable Low Trip by selecting “Yes” or “No.”

Yes = Enabled

No = Disabled

Press UP or DOWN to toggle the value between “Yes” and “No.”

Once you are satisfied with the setting, press ENTER. The Low Trip menu item is selected.

Press DOWN or UP to navigate other menu items or press DOWN until Save? is highlighted.

Press ENTER to save the change or press ESCAPE to return to the top menu, Alarm 1, without saving the changed value.

13.5.4 Latching

The Latching setting determines whether the alarm sounds and then shuts off immediately when the Set Point has been crossed and then the alarm state no longer exists, or continues in the alarm state even after the alarm state clears.

- When Latching is set to NO, the alarm stops as soon as the alarm state returns to the normal value.
- When Latching is set to YES, the alarm continues after the alarm state has cleared.

IMPORTANT!

To shut off the alarm when Latching is enabled, press ESCAPE.

Once you are satisfied with the setting, press ENTER. The Latching menu item is selected.

Press DOWN or UP to navigate to other menu items or press DOWN until Save? is highlighted.

Press ENTER to save the change or press ESCAPE to return to the top menu, Alarm 1, without saving the changed value.

13.5.5 Strobe

The Strobe setting determines whether a connected strobe (flasher) is activated when the Set Point has been crossed.

- When Strobe is set to NO, the strobe is not activated in an alarm state.
- When Strobe is set to YES, the strobe is activated with any other alarms.

Once you are satisfied with the setting, press ENTER. The Strobe menu item is selected.

Press DOWN or UP to navigate to other menu items or press DOWN until Save? is highlighted.

Press ENTER to save the change or press ESCAPE to return to the top menu, Alarm 1, without saving the changed value.

13.5.6 Horn

The Horn setting determines whether a connected horn (sounder) is activated when the Set Point has been crossed.

- When Horn is set to NO, the horn is not activated in an alarm state.
- When Horn is set to YES, the strobe is activated with any other alarms.

Once you are satisfied with the setting, press ENTER. The Horn menu item is selected.

Press DOWN or UP to navigate to other menu items or press DOWN until Save? is highlighted.

Press ENTER to save the change or press ESCAPE to return to the top menu, Alarm 1, without saving the changed value.

13.5.7 Relay 1 & Relay 2

The Relay setting determines whether the Relay is toggled when the Set Point has been crossed.

IMPORTANT!

Check the wiring for the relays to ensure that they are in the NO or NC configuration that you want for your application.

- If the physical relay is wired as NO (normally open), the relay toggles to its closed state when an alarm is present.
- If the physical relay is wired as NC (normally closed), it toggles to its open state when an alarm is present.

IMPORTANT!

The relays can be wired to provide both NO and NC operation (acting as two separate relays triggered at the same time).

- When a relay (Relay 1 or Relay 2) is set to YES, it is toggled along with any other alarms.
 - When a relay (Relay 1 or Relay 2) is set to NO, it is not toggled in an alarm state.
1. Once you are satisfied with the setting, press ENTER. The Relay 1 or Relay 2 menu item is highlighted.
 2. Press DOWN or UP to navigate to other menu items or press DOWN until Save? is highlighted.
 3. Press ENTER to save the change and return to the top menu, Alarm 1, or press ESCAPE to return to the top menu, Alarm 1, without saving the changed value.
 4. Press DOWN to advance.

13.5.8 Save?

When Save? Is highlighted, press ENTER to save any or all changes or press ESCAPE to return to the top menu, Alarm 1, without saving the changed value(s).

13.6 Calibration

Sensor calibration should first be done on the LEL or H₂S Transmitters directly, while ensuring that the Span concentration is set to the same value on both Transmitter and Controller. See the manuals for VOXI EC and VOXI LEL for detailed instructions:

<https://mpowerinc.com/manuals-and-datasheets>

The Calibration menu on the Controller allows you to fine-tune the VOXiWatch II Controller to more closely match the concentrations displayed based on the 4-20 mA source signal that it receives from connected Transmitter(s). Such fine-tuning is sometimes necessary because the added cables and circuits between the Transmitters and Controller can have a small effect on the 4-20 mA signal.

The Calibration Menu has the following options:

Reading
Gain
Offset

The Reading shows the gas concentration to be displayed by the Controller, Gain sets the slope of the calibration line and Offset shifts the whole line up or down. Typically, only the Offset is adjusted here to fine-tune the display to 0.0 in clean air, while the Gain is set accurately by the transmitter calibration and does not need adjustment.

13.6.1 Reading

This read-only function shows the raw reading coming from an external source (EC and/or LEL Transmitters) via 4-20mA.

13.6.2 Gain

Gain adjustment is usually not needed, but if desired, proceed as follows:

1. Be sure the Span setting matches the calibration gas to be used.
2. With Calibration highlighted, press Enter. Gain is now highlighted.
3. Press ENTER. The numerical value is now underscored, meaning it is editable.
4. Apply Calibration Gas to the Transmitter and allow it to reach a stable reading.
5. Press UP or DOWN on the Controller to change the value to match the Transmitter display concentration.
6. Press ENTER to highlight Gain.
7. Press DOWN to advance to Offset or to advance to Save?

13.6.3 Offset

1. With Calibration highlighted, press Enter. Gain is now highlighted.
2. Press DOWN to advance to Offset.
3. Press ENTER. The numerical value is now underscored, meaning it is editable.
4. Be sure the Transmitter is exposed to clean air either from a cylinder of pure air or during a time when no detectable gases are present in the environment.
5. Press UP or DOWN to change the Offset value to 0.
6. Press ENTER to highlight Offset.

7. Press DOWN to advance to advance to Save?

13.6.3.1 Procedure For Calibrating

1. Connect a transmitter to the VOXiWatch II Controller.
2. Power the VOXiWatch II Controller and transmitter in known clean air (or while applying zero air to the transmitter, if necessary).
3. On the VOXiWatch II Controller, enter Setup select the correct channel and enter the Configure screen for that channel. Note the Span value.
4. On the VOXiWatch II Controller, enter Setup, select the correct channel, and go to the Calibration screen for that channel.
5. Adjust the Offset value up and down until the reading shows 0 (or as close to it as possible).
6. Apply a known quantity of gas (for example, 25ppm H₂S) to the transmitter, and adjust the Gain until you get the correct reading (or as close as possible).

13.6.4 Save?

When Save? Is highlighted, press ENTER to save any or all changes or press ESCAPE to return to the top menu, Calibration, without saving the changed value(s).

13.7 Channel 2

Channel 2 uses the same navigation and provides the same adjustable settings as Channel 1.

13.8 Device

Settings under the heading of Device are global, meaning that they affect the entire VOXiWatch II Controller.

Press ESCAPE until the Setup menu is shown in the display ("Channel 1" is highlighted):



Press DOWN until "Device" is highlighted.



Press ENTER.

Under Device are the following global settings and readings:

Clock
Modbus
Fault Relay
Serial Number
SD Diagnostics

Press ENTER to enter the menu items. The first item, Clock, is highlighted.

Note: Move up or down through the menu headings by pressing UP or DOWN.

13.9 Clock

The real-time clock has settings for date and time.

1. With Clock highlighted, press ENTER. Date is highlighted.
2. Press ENTER. The first part of the date, Month, is underscored.

13.9.1 Set The Date

1. Set the Month: Press UP or DOWN until the 2-digit month is correct.
2. Press ENTER to advance to the 2-digit day.
3. Set the Day: Press UP or DOWN until the 2-digit day is correct.
4. Press ENTER.
5. With the first two digits highlighted, set the date.
6. Press ENTER to advance to the 4-digit year.
7. Set the Year: Press UP or DOWN until the 4-digit year is correct.
8. Press ENTER.

Note: If you do not want to set the time, but only want to save changes to the date, press DOWN until Save? is highlighted. Then press ENTER.

13.9.2 Set The Time

1. Press ENTER.
2. With the first two digits highlighted, set the hour.
3. Press ENTER to advance to the 2-digit minute.
4. Press UP or DOWN until the 2-digit minute is correct.
5. Press ENTER.
6. Press UP or DOWN until the 2-digit second is correct.
7. Press ENTER to highlight "Time."
8. Press DOWN to highlight Save?
9. To save the date and year, press ENTER.

Note: To continue editing the date and year, press UP and repeat the editing process.

When the new date and time are saved, the display returns to the Device menu.

13.9.3 Save?

You can save all your changes, or you can revert to the values that were in the VOXiWatch II Controller before you made edits.

- Press ENTER to save the changes. The changes are saved, and the "Clock" menu item is selected.
- Press ESCAPE to step to the "Clock" menu without saving the changes.

13.10 Modbus

Modbus (or MODBUS) is a client/server data communications protocol. It was originally designed for use with programmable logic controllers (PLCs), but it has become a de facto standard communication protocol for communication between industrial electronic devices in a wide range of networks.

The VOXiWatch II Controller can use Modbus for interconnection with other electronic equipment, particularly PLCs. See Section 13 for more details on Modbus framing.

The VOXiWatch II Controller provides two Modbus settings, Baud and Address.

13.10.1 Baud

The baud rate must match the baud rate of any other connected device. The default value is 115200, but other baud rates can be selected.

Available baud rates: 9600, 14400, 19200, 38400, 57600, 115200 (default)

13.10.2 Address

The address pertains to the controller. It should be set to 1. In Modbus terms, the controller is the slave. A master device (typically, a PLC) sends requests to the slave device asking for contents of some of the slave's holding registers.

Every slave device on the Modbus network needs its own address. Typically, you wouldn't have both the controllers and the transmitters on the same Modbus network, but if they are, they each need unique addresses. In a traditional setup, only the controller would be connected to the Modbus network. The transmitters would communicate with the controller via the 4-20 mA signal, and the controller would communicate with the Modbus master. The controller has registers that contain all of the configuration and reading information for each channel.

13.10.3 Save?

You can save all your changes **Baud and Address changes**, or you can revert to the values that were in the **VOXiWatch II** Controller before you made edits.

- Press ENTER to save the changes. The changes are saved, and the "Modbus" menu item is selected.
- Press ESCAPE to step to the "Modbus" menu without saving the changes.

Note: For guidance on Modbus functions, refer to the MODBUS Message RTU section on page 46.

13.11 Fault Relay

The Fault Relay has one changeable setting, Fail Safe.

Fail Safe mode allows another device to determine whether the system is active and operational. When Fail Safe is enabled and the VOXiWatch II Controller is wired in a normally open (NO) configuration, the relay is energized when the controller is operational. Any failures cause the signal to drop.

Note: This is slightly different from a normally closed (NC) relay because it allows you to differentiate the device losing power from the device still being powered but turned off.

13.11.1 Fail Safe

When Fail Safe is highlighted, press ENTER. The current state (“Yes” or “No”) is underlined, indicating it is editable.

You can enable or disable Fail Safe by selecting “Yes” or “No.”

Yes = Enabled

No = Disabled

1. Press UP or DOWN to toggle the value between “Yes” and “No.”
2. Once you are satisfied with your choice, press ENTER. The Fail Safe menu item is selected.
3. To save your change, press DOWN to navigate to Save?

13.11.2 Save?

Press ENTER to save the change, or press ESCAPE to return to the top menu, Fault Setting, under Device, without saving the changed value.

13.12 Serial Number

This is where you can view the VOXiWatch II Controller's serial number.

13.12.1 Done

Because Serial Number is read-only, you cannot make changes. Therefore, there is no Save? function.

Press ENTER or ESCAPE to return to the “Serial Number” menu selection under Device.

13.13 SD Diagnostics

The VOXiWatch II Controller automatically tests write operations to the SD card. This testing does not require intervention, and the information is only used in diagnostic operations by mPower technicians.

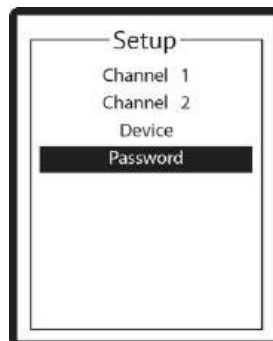
SD Diagnostics shows the number of attempts (Attempts) to write to the SD card, the number of successful write operations (Success), and the number of failures (Failures).

Because SD Diagnostics provides no user options, the only action you can take is to exit. Note: There is no Save? function.

Press ESCAPE to return to the “SD Diagnostics” menu selection.

13.14 Password

You can create a “gatekeeper” to prevent unauthorized changes to the VOXiWatch II Controller by setting a password.



13.14.1 Lock

You can enable or disable password access by selecting “Yes” or “No.”

Yes = Enabled

No = Disabled

When Lock is highlighted, press ENTER. The current state (“Yes” or “No”) is underlined, indicating it is editable.

Press UP or DOWN to toggle the value between “Yes” and “No.”

- When Lock is set to No, a password is not necessary to access settings.
 - When Lock is set to Yes, a four-digit password is required to alter settings.
1. Once you are satisfied with your choice, press ENTER. The Lock menu item is selected.
 2. Press DOWN to navigate to Password or press DOWN again until Save? is highlighted.
 3. Press ENTER to save the change or press ESCAPE to return to the top menu, Password under Setup, without saving the changed value.

13.14.2 Password

This is where you set a 4-digit password.

IMPORTANT!

Write down or otherwise save a copy of the password in a secure location. If you lose the password or cannot remember it, you cannot reset it yourself. The VOXiWatch II Controller must be returned to mPower to have its password reset.

1. When Password is highlighted, press ENTER. The first digit of the current password is underlined, indicating it is editable.
 2. Press UP or DOWN to increase or decrease the value (0 through 9).
 3. Press ENTER to move the cursor to the second digit.
 4. Repeat for all 4 digits.
- If you want to save the password, press DOWN to select Save?
 - If you do not want to save the password, press ESCAPE.

13.14.3 Save?

You can save your changes, or you can revert to the values that were in the VOXiWatch II Controller before you edited the password.

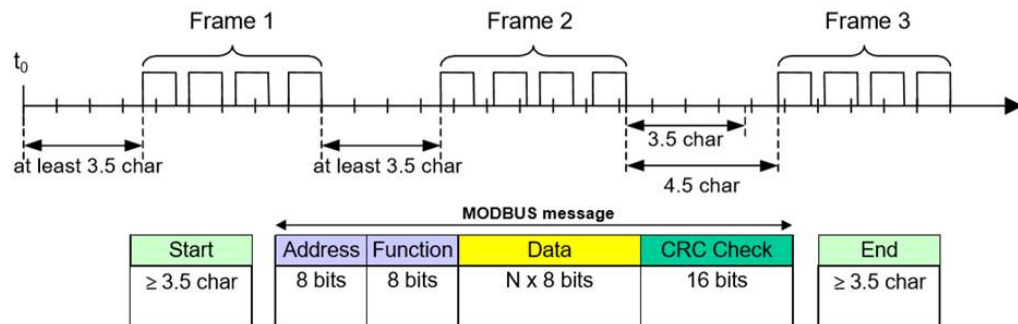
- Press ENTER to save the changes. The changes are saved, and the “Password” menu item is selected.
- Press ESCAPE to step to the “Password” menu without saving the changes.

14 Modbus Message

14.1 Modbus RTU Framing

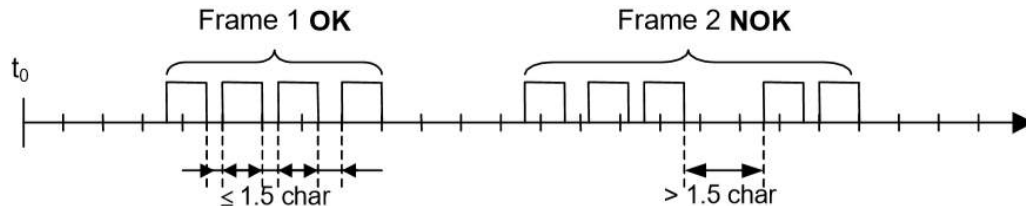
The VOXiWatch II Controller uses RTU framing for MODBUS messages. The following is an excerpt of the *MODBUS Over Serial Line Specification And Implementation Guide v1.02* (Dec.2006), with more information available at <http://www.Modbus.org/> and <http://www.Modbus.org/specs.php>.

A MODBUS message is placed by the transmitting device into a frame that has a known beginning and ending point. This allows devices that receive a new frame to begin at the start of the message, and to know when the message is completed. Partial messages must be detected, and errors must be set as a result. In RTU mode, message frames are separated by a silent interval of at least 3.5 character times. In the following sections, this time interval is called t3.5.



14.2 RTU Message Frame

The entire message frame must be transmitted as a continuous stream of characters. If a silent interval of more than 1.5 character times ($t_{1.5}$) occurs between two characters, the message frame is declared incomplete and should be discarded by the receiver.



Remark: The implementation of RTU reception driver may imply the management of a lot of interruptions due to the $t_{1.5}$ and $t_{3.5}$ timers. With high communication baud rates, this leads to a heavy CPU load. Consequently, these two timers must be strictly respected when the baud rate is equal to or lower than 19200 Baud. For baud rates greater than 19200 Baud, fixed values for the two timers should be used: It is recommended to use a value of 750 μs for the inter-character time-out ($t_{1.5}$) and a value of 1.750 ms for inter-frame delay ($t_{3.5}$).

14.3 Modbus RTU (Remote Terminal Unit) Communication Settings

The VOXiWatch II Controller supports RS-485 communication, as a Modbus RTU.

Mode: RTU

Baud rate: 9600, 14400, 19200, 38400, 57600, 115200 (default)

Start bits: 1

Data bits: 8, LSB first

Parity bit: none

Stop bits: 1

Detector ID: 1 to 247

14.4 Modbus RTU Functions

Detector supports function 0x03 (Read holding registers) only.

Request:

Device Address	Function Code	Register Address		Quantity of Registers		CRC	
		High Byte	Low Byte	High Byte	Low Byte	Low Byte	High Byte
Detector ID	3	Addr. H	Addr. L	Quantity. H	Quantity. L	CRC. L	CRC. H

Response:

Device Address	Function Code	Byte Count	Register Values	CRC	
Detector ID	3	N	N bytes data, Highest byte first	CRC.L	CRC.H

$N = 2 \times \text{Quantity of Registers}$

14.5 Modbus RTU Register Address

Register address	Register name	Description
0x0000	Firmware version	Read-only, every 4 bits represent a hexadecimal number, such as 0x1ABC for version V1.10.11.12
0x0001	High part of firmware build date	Read-only, year is represented by hexadecimal digits, such as 0x07E1 for 2017
0x0002	Low part of firmware build date	Read-only. The high byte represents the month, and the low byte represents the day. For example, 0x0C1E represents December 30
0x0003	MP8XX ID	Read-only, such as 0x0002
0x0006	MP8XX address	Read and write, used for MODBUS communication, valid value is 1-247. The default value is 0x88 (136 in decimal).
0x0007	MP8XX SN high byte	Read-only, 2 characters in ASCII
0x0008	MP8XX SN	Read-only
0x0009	MP8XX SN	Read-only
0x000A	MP8XX SN	Read-only
0x000B	MP8XX SN	Read-only
0x000C	MP8XX SN low byte	Read-only
0x0023	MP8XX gas concentration data high byte	Read-only, signed integer (bit16~bit31). For example, reading data = 0x12345678, this register returns 0x1234; Can read 2 registers data starts from address 0x0023 to get the whole reading data.
0x0024	MP8XX gas concentration data low byte	Read-only, signed integer (bit0~bit15). For example, reading data = 0x12345678, this register returns 0x5678
0x0025	Measurement unit and reading decimal point (DP)	Reading-only. High byte is Unit ID, low byte is decimal point (DP). For example, unit ID=2, DP=1, the register returns 0x0201.

		MP812/MP815 do not support register 0x0025, its Unit ID is always 2, DP is always 3. The display reading = data / (10 ^ DP), where data is the integer from register (0x0023 and 0x0024). For example, reading data = 0x12345678 (305419896 in decimal), unit ID = 2, DP=1, the display reading is 30541989.6 ppm.
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Unit ID	Unit Name	Remark	Unit ID	Unit Name	Remark
0x01	10 ⁻⁶		0x06	μmol/mol	Same as ppm in value
0x02	ppm		0x07	ppb	1/1000 ppm
0x03	%	For Oxygen sensor	0x08	μg/m ³	
0x04	%LEL	For LEL sensor	0x09	%VOL	For LEL sensor
0x05	mg/m ³				

15 Firmware Upgrade

The need for a Controller firmware upgrade is uncommon, but should it be desired, contact mPower to request a new SD Card with the new firmware. Power off the Controller and insert the new SD card. Once the Controller is powered back up, the new firmware should automatically install and run.

16 Specifications

Size	6" x 6" x 4" (152 x 152 x 102 mm)
Weight	5.6 lbs (2.5 kg)
Enclosure	Polycarbonate NEMA 4X indoor or outdoor
Mounting	Flat solid surface
Main Power	12 to 24 volts DC
Temperature Range	-4° to 159° F (-20° to 65° C)
Humidity Range	0% to 95% RH (non-condensing)
Display	2.4" (61mm) diagonal (240 x 320 pixels) Background color changes with alarm status: green, yellow, red, or blue
Channels	Two 4-20mA channels
Outputs	Strobe and Horn Two programmable alarm relays One programmable fault relay Modbus® RTU
Event Log	Up to 10 years logging of Power On, Calibrations, Alarms, Faults, Peaks
Relay Contact Rating	30 VDC 5A 120 VAC 10A
Power Draw	12 watts maximum power consumption with two transmitters
Warranty	2 years

* Due to ongoing research and product improvement, specifications are subject to change without notice.

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