



**INSTRUMENTS**

**M2A Transmitter  
UL 2075 Version  
Operator's Manual**

**Part Number: 71-0379**

**Revision: P2**

**Released: 6/25/21**

## **WARNING**

Read and understand this instruction manual before operating instrument. Improper use of the gas monitor could result in bodily harm or death.

Periodic calibration and maintenance of the gas monitor is essential for proper operation and correct readings. Please calibrate and maintain this instrument regularly! Frequency of calibration depends upon the type of use you have and the sensor types. Typical calibration frequencies for most applications are between 3 and 6 months, but can be required more often or less often based on your usage.

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## Product Warranty

RKI Instruments, Inc. warrants gas alarm equipment sold by us to be free from defects in materials, workmanship, and performance for a period of one year from date of shipment from RKI Instruments, Inc. Any parts found defective within that period will be repaired or replaced, at our option, free of charge. This warranty does not apply to those items which by their nature are subject to deterioration or consumption in normal service, and which must be cleaned, repaired, or replaced on a routine basis. Examples of such items are:

- a) Absorbent cartridges
- b) Pump diaphragms and valves
- c) Fuses
- d) Batteries
- e) Filter elements

Warranty is voided by abuse including mechanical damage, alteration, rough handling, or repair procedures not in accordance with the operator's manual. This warranty indicates the full extent of our liability, and we are not responsible for removal or replacement costs, local repair costs, transportation costs, or contingent expenses incurred without our prior approval.

*THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF RKI INSTRUMENTS, INC. INCLUDING BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL RKI INSTRUMENTS, INC. BE LIABLE FOR INDIRECT, INCIDENTAL, OR CONSEQUENTIAL LOSS OR DAMAGE OF ANY KIND CONNECTED WITH THE USE OF ITS PRODUCTS OR FAILURE OF ITS PRODUCTS TO FUNCTION OR OPERATE PROPERLY.*

This warranty covers instruments and parts sold to users by authorized distributors, dealers, and representatives as appointed by RKI Instruments, Inc.

We do not assume indemnification for any accident or damage caused by the operation of this gas monitor, and our warranty is limited to the replacement of parts or our complete goods.

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# Chapter 1: Introduction

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## Overview

This chapter briefly describes the M2A Transmitter. This chapter also describes the *M2A Transmitter Operator's Manual* (this document). Table 1 at the end of this chapter lists the specifications for the M2A.

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## About the M2A Transmitter

The M2A transmitter is a fixed mount, continuous-monitoring detector head. All user adjustable parameters may be accessed using push button switches. In addition, calibration may be performed non-intrusively by use of a magnetic wand accessory which activates magnetic switches through a window at the front face of the detector head.

The M2A displays the current gas reading on an OLED display which is visible through the window in the cover (front face) and provides a 4 - 20 mA signal which indicates the target gas reading for use by a recording device. Three sets of relay contacts, two controlled by the gas alarms and one by the fail alarm, rated at 115 VAC 5 amps are available for controlling devices such as lights or horns or for controlling higher rated relays.

Three operating modes allow you to display and change setup and calibration settings and change the gas type. They are Calibration Mode, Configuration Mode, and Gas Type Mode.

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## About this Manual

The *M2A Transmitter Operator's Manual* uses the following conventions for notes, cautions, and warnings.

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**NOTE:** Describes additional or critical information.

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**CAUTION:** Describes potential damage to equipment.

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**WARNING:** Describes potential danger that can result in injury or death.

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## Specifications

Table 1 lists specifications for the M2A.

**Table 1: M2A Specifications**

<b>Target Gas/Detection Range</b>	CH <sub>4</sub> : 0 - 100% LEL, 1% LEL increments
<b>Alarm Settings (Alarm 1/Alarm 2)</b>	10 %LEL/50 %LEL
<b>Construction (housing)</b>	Explosion-proof Junction Box, NEMA 4X
<b>Area Classification</b>	Explosion-proof for Class I, Groups B, C, and D
<b>Sampling Method</b>	Diffusion
<b>Input Power</b>	10 - 30 VDC
<b>Controls</b>	<ul style="list-style-type: none"><li>• Three push button switches</li><li>• Three magnetic switches for non-intrusive calibration</li></ul>
<b>Weight</b>	4.5 lbs.
<b>Signal Output</b>	<ul style="list-style-type: none"><li>• 4 to 20 mA with impedance maximums listed below<ul style="list-style-type: none"><li>-12 VDC input: 500 ohms impedance max</li><li>-24 VDC input: 1000 ohms impedance max</li></ul></li></ul>
<b>Operating Temperature</b>	-40°C to 50°C
<b>Accuracy</b>	± 5% of reading or ± 2% of full scale (whichever is greater)
* These are the RKI factory settings. You can change the alarm settings in Configuration Mode. See “Viewing & Changing M2A Parameters” on page 24.	

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**WARNING:** *When using the M2A, you must follow the instructions and warnings in this manual to assure proper and safe operation of the M2A and to minimize the risk of personal injury. Be sure to maintain and periodically calibrate the M2A as described in this manual.*

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# Chapter 2: Description

## Overview

This chapter describes external and internal components of the M2A Transmitter.

## External Description

This section describes the junction box and all external components of the M2A transmitter.

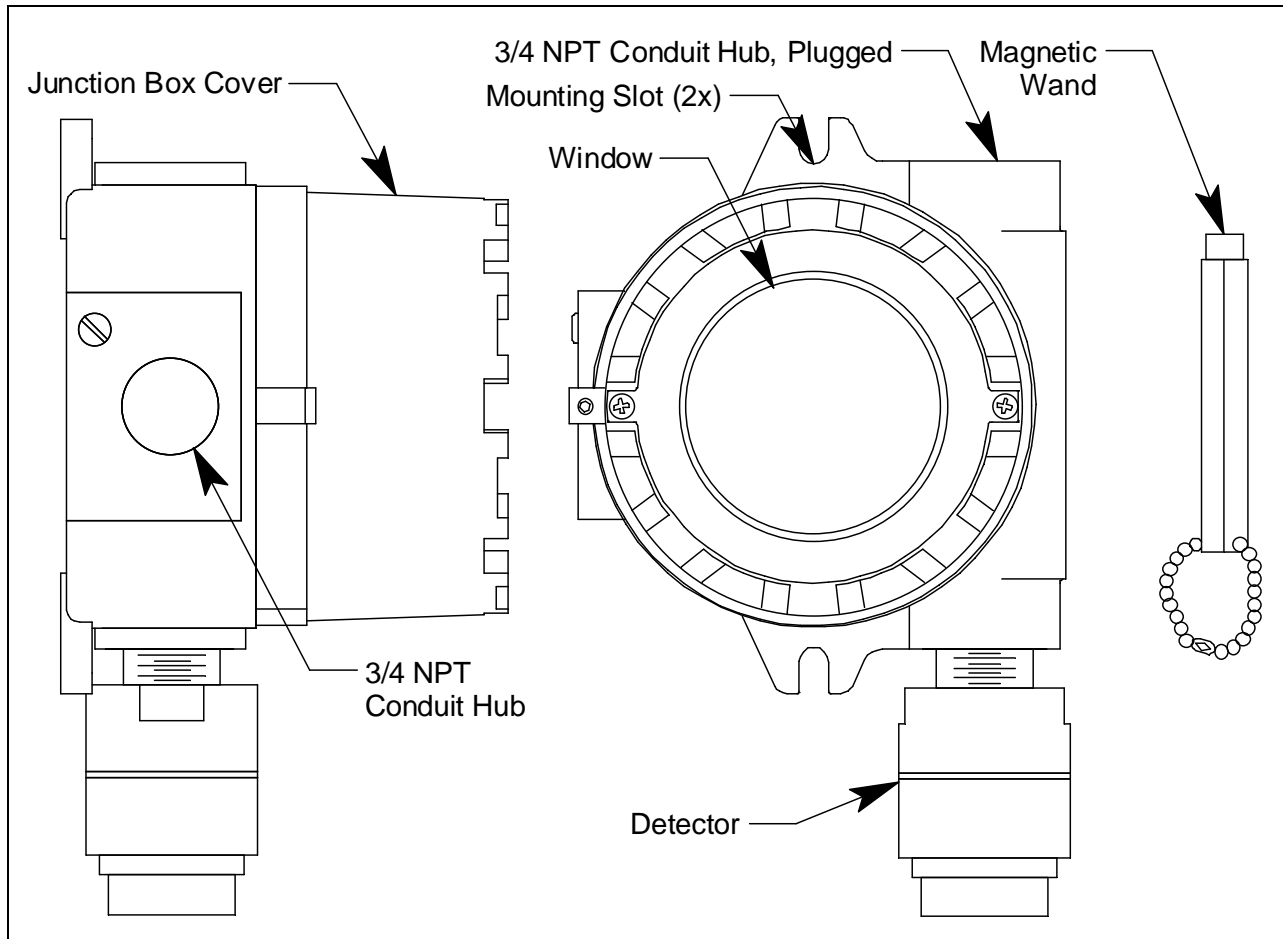


Figure 1: M2A External Components



## Junction Box

The M2A's cast aluminum junction box is dust and weather resistant. The junction box also protects the M2A and all connections made to it. Use the three 3/4 NPT conduit ports to mount the detector to the junction box (factory installed in the bottom port) and connect wiring from an external device (left port). The top port is shipped with a factory installed and sealed conduit plug to avoid leaks into the junction box. If necessary, the conduit plug can be removed and the top port can be used for wiring.

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**WARNING:** *If the top conduit port is used for wiring, be sure to seal the threads to ensure water does not enter the junction box. See "Wiring the M2A Transmitter" on page 15 for complete wiring instructions.*

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Use the junction box's two mounting holes to mount the M2A to a vertical surface at the monitoring site. The window in the cover on the front of the junction box allows you to view the OLED display and use the magnetic wand to actuate the magnetic control switches so you can perform non-intrusive calibration. Removing the cover allows you to access the interior of the junction box.

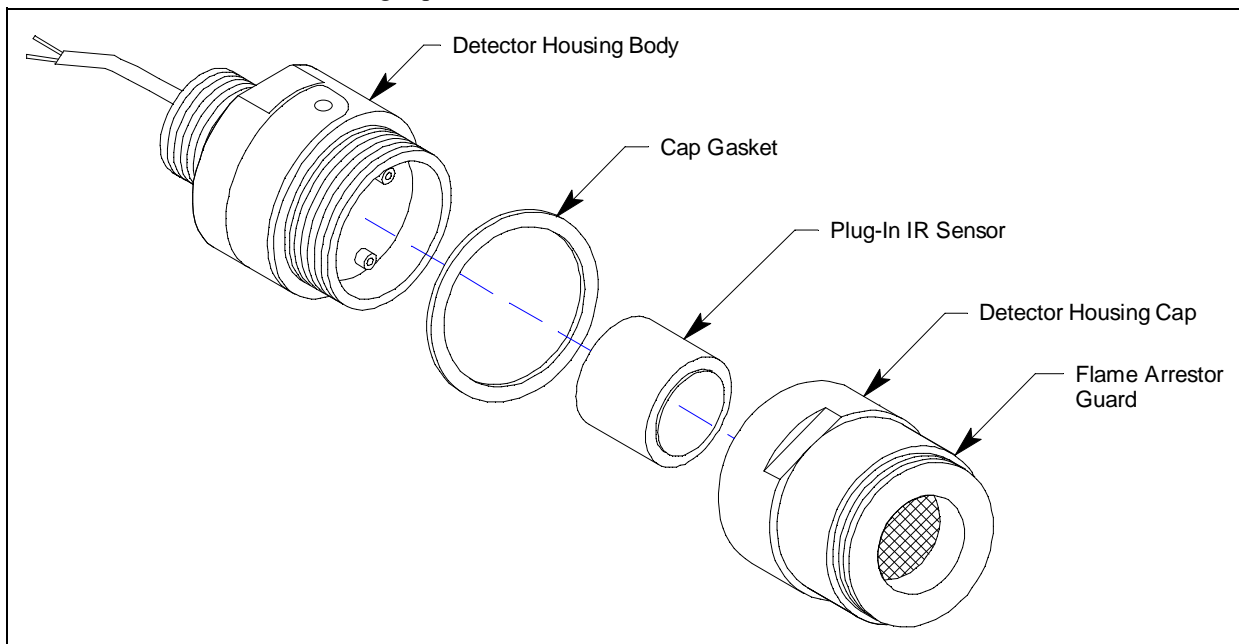
## Magnetic Wand

The magnetic wand is a short plastic rod with a magnet in one end. It is used to actuate the magnetic control switches on the control PCB while the junction box cover is still installed so that non-intrusive calibration can be performed.

## Gas Detector

The gas detector senses the target gas and is mounted in a 3/4 NPT conduit port on the right bottom side of the M2A. The IR combustible detectors are generally used instead of the catalytic combustible detectors in applications where there may be catalyst poisons such as silicone present or where oxygen is not present in the monitoring environment.

The IR detector has a replaceable plug-in sensor inside the detector housing. A sensor gasket seals the sensor face to the detector housing cap.



**Figure 2: Detector Component Location**

## Internal Description

This section describes the internal components of the M2A. The internal components of the M2A include the terminal PCB which provides for all the wiring connections to the M2A and the control PCB which displays the gas reading and has the control buttons.

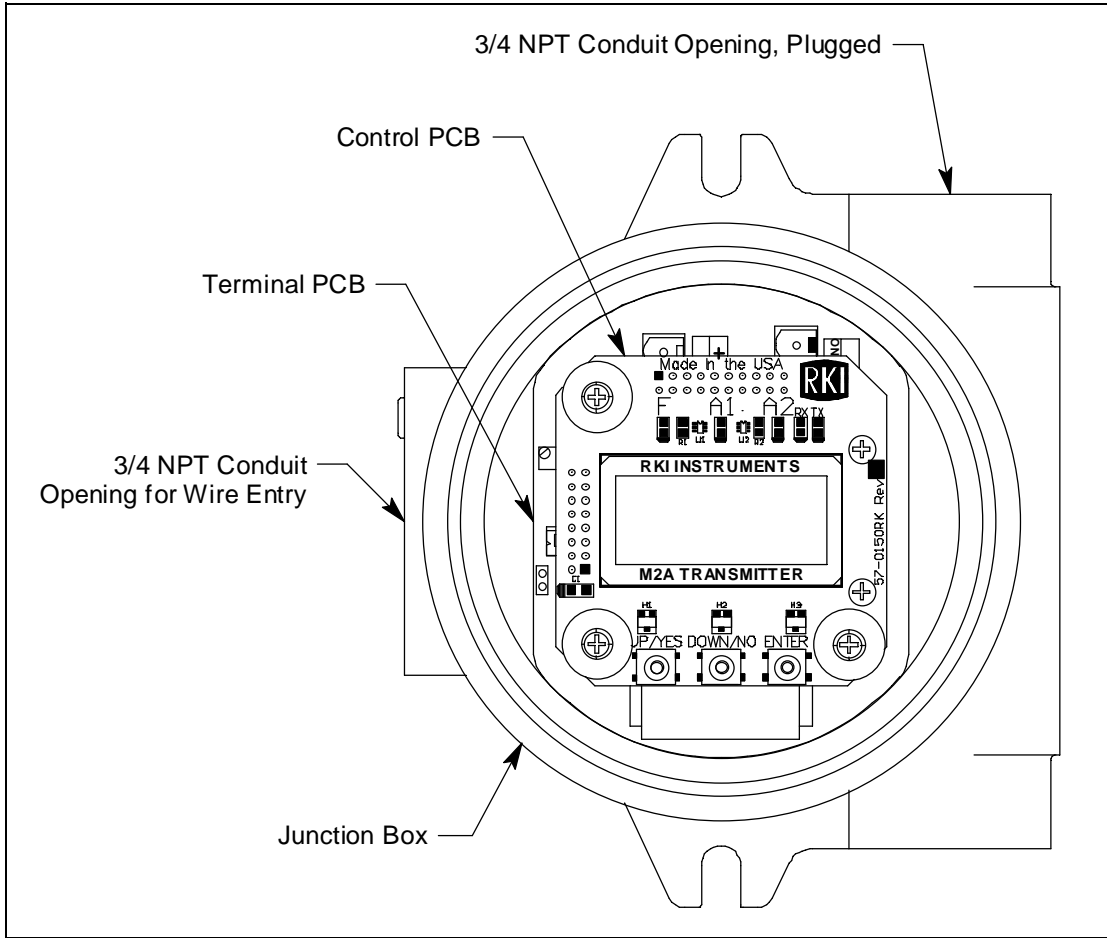
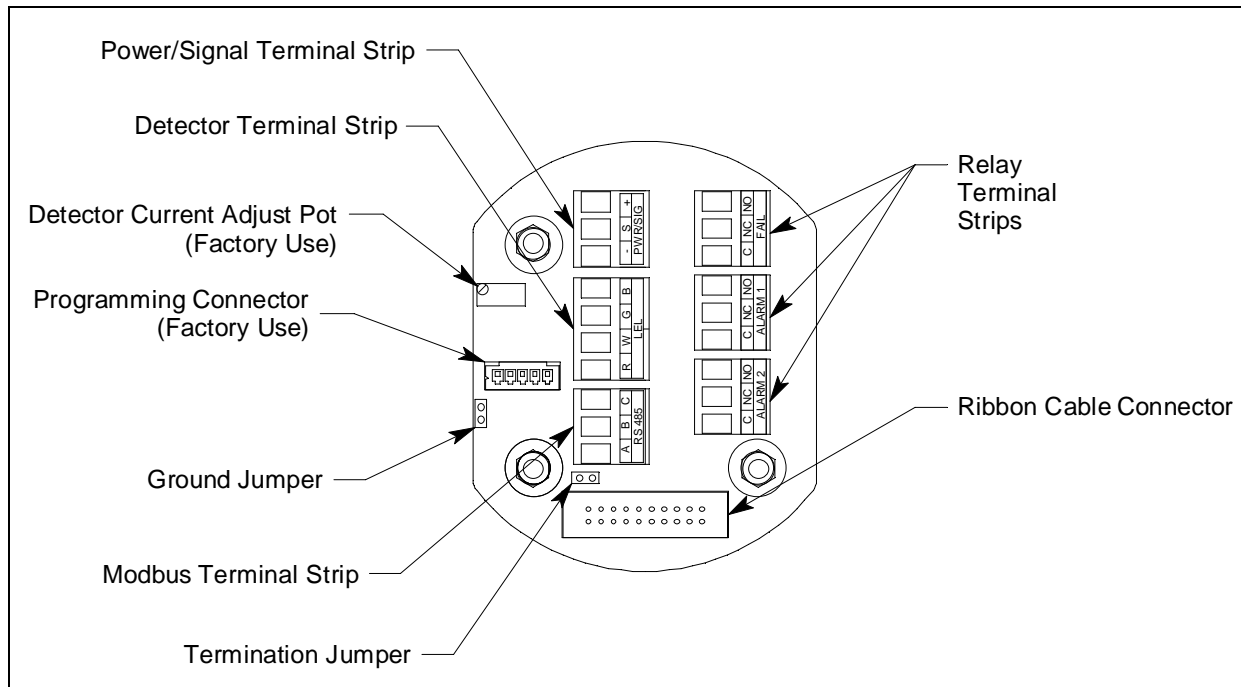


Figure 3: M2A Internal Components

### Terminal PCB

The terminal PCB is encapsulated in epoxy for protection against moisture and physical damage. It is mounted into the rear of the junction box with three standoffs and rests on a thin layer of foam. A banana jack is screwed into each of the standoffs and used for mounting the control PCB. The terminal PCB converts the electrical output from the detector to a signal which can be displayed by the OLED display and a 4 - 20 mA signal (that is proportional to the detection range). The 4 - 20 mA signal may be used by a recording device. The terminal PCB also controls three relays, one fail and two gas alarm relays.

Two columns of plug-in style terminal strips are used to make all wiring connections to the M2A. The column on the left consists of the power/signal, detector, and Modbus terminal strips. The column on the right consists of the relay terminal strips. A 20 position connector at the bottom of the terminal PCB is used to connect the terminal PCB to the control PCB with a ribbon cable. A 5 position connector on the left side of the terminal PCB is used by factory or field service personnel to program the M2A. On the combustible and CO<sub>2</sub> versions of the M2A, a factory adjust pot just above the programming connector is used to set the detector current.



**Figure 4: Terminal PCB Component Location**

#### ***Power/Signal Terminal Strip***

The power/signal terminal strip is a three position plug-in style terminal strip located at the top of the left terminal column. It is used to connect 24 VDC power to the M2A and to connect the 4 - 20 mA output signal to a device.

The signal output, the S terminal, does not have to be connected for the M2A to function. The S terminal is used if you want to connect the 4 - 20 mA output signal to a recording device.

#### ***Detector Terminal Strip***

The detector terminal strip is a four position plug-in style terminal strip and is the middle terminal strip in the left terminal column.

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**NOTE:** The detector is factory-wired to the M2A. See “Wiring the M2A Transmitter” on page 15 for all wiring procedures related to M2A.

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#### ***Modbus Terminal Strip***

The Modbus terminal strip is a three position plug-in style terminal strip and is the bottom terminal strip in the left terminal column. This terminal strip is not used in this version of the M2A.

#### ***Relay Terminal Strips***

The right column of terminal strips consists of, from top to bottom, the fail, alarm 1, and alarm 2 relay terminal strips. They are three-position plug-in style terminal strips. The relay terminal strips are used to connect devices such as lights and horns that are controlled by the relay contacts. The relay contacts are rated at 115 VAC, 5 amps. The relay contacts may also be used to control higher rated relays.

#### ***Termination Jumper***

A two pin header with a termination jumper installed is located below the Modbus terminal strip. This jumper has no function in this version of the M2A and should be left alone.

### **Ground Jumper**

A two pin header with a jumper installed is located along the left side of the terminal PCB. This jumper has no function in this version of the M2A and should be left alone.

### **Control PCB**

The OLED display and control switches are located on the control PCB. It is installed on top of the terminal PCB by lining up its three spacing standoffs with the banana jacks in the terminal PCB mounting standoffs and pushing it onto the banana jacks. The jacks retain the control PCB.

### **OLED Display**

The OLED display is located at the top of the control PCB. It indicates the current gas reading and displays messages and parameters in the M2A's programs.

### **Control Buttons**

The M2A includes three push button switches that allow you to enter the M2A's operating modes, navigate through the modes, update settings, and save changes to the settings. The push button switches are located along the bottom edge of the control PCB (see Figure 3). The UP/YES button is on the left, the DOWN/NO button is in the middle, and the ENTER button is on the right.

**Table 2: M2A Control Button Functions**

<b>Switch</b>	<b>Function</b>
UP (YES)	<ul style="list-style-type: none"><li>• Saves settings</li><li>• Changes the displayed setting</li><li>• Enters the Calibration Program</li><li>• Enters Gas Type Mode (press with DOWN/NO button)</li><li>• Enters Configuration Mode (press with ENTER button)</li></ul>
DOWN (NO)	<ul style="list-style-type: none"><li>• Cancels setting changes</li><li>• Changes the displayed setting</li><li>• Enters Gas Type Mode (press with UP/YES button)</li><li>• Displays the Information Screen</li></ul>
ENTER	<ul style="list-style-type: none"><li>• Initiates operations</li><li>• Enters Configuration Mode (press with UP/YES button)</li><li>• Functions as an alarm reset switch</li></ul>

Just above each push button switch is a magnetic switch with the same function as the push button switch below it. The magnetic switches are for use in non-intrusive calibration. They are actuated by bringing the magnetic wand close enough to them to actuate them. Although the magnetic switches have the same functions as the push button switches, it is not practical to use them for operations other than calibration because it is not possible to actuate two magnetic switches at once with only one magnetic wand. Since displaying the Information Screen only requires the use of one switch, the wand may be used to show the Information Screen (see "Information Screen" on page 19).

### **Status LEDs**

The M2A includes five status LEDs that are located above the display (see Figure 3).

- Fail LED

The fail LED turns on when the M2A is experiencing a fail condition. A fail condition can be caused by a detector failure or low detector signal.

- Alarm 1 LED

The alarm 1 LED is on when the M2A is experiencing an alarm 1 condition.

- Alarm 2 LED

The alarm 2 LED is on when the M2A is experiencing an alarm 2 condition.

- RX & TX LED's

These LED's do not have any function in this version of the M2A.

# Chapter 3: Installation & Startup

## Overview

This chapter describes procedures to mount the M2A Transmitter in the monitoring environment and wire it to input power and devices.

## Mounting the M2A Transmitter

1. Select a mounting site that is representative of the monitoring environment. Consider the following when you select the mounting site.
  - Select a site where the M2A is not likely to be bumped or disturbed. Make sure there is sufficient room to perform start-up, maintenance, and calibration procedures.
  - Select a site where the target gas is likely to be found first. For lighter gases, mount the detector near the ceiling; for heavier gases, mount the detector near the floor.
2. At the monitoring site, use #10 screws through the junction box's two mounting holes to secure the junction box to a vertical surface. Figure 5 shows the outline and mounting dimensions. Mount the M2A with the detector facing down as shown in the figure below.

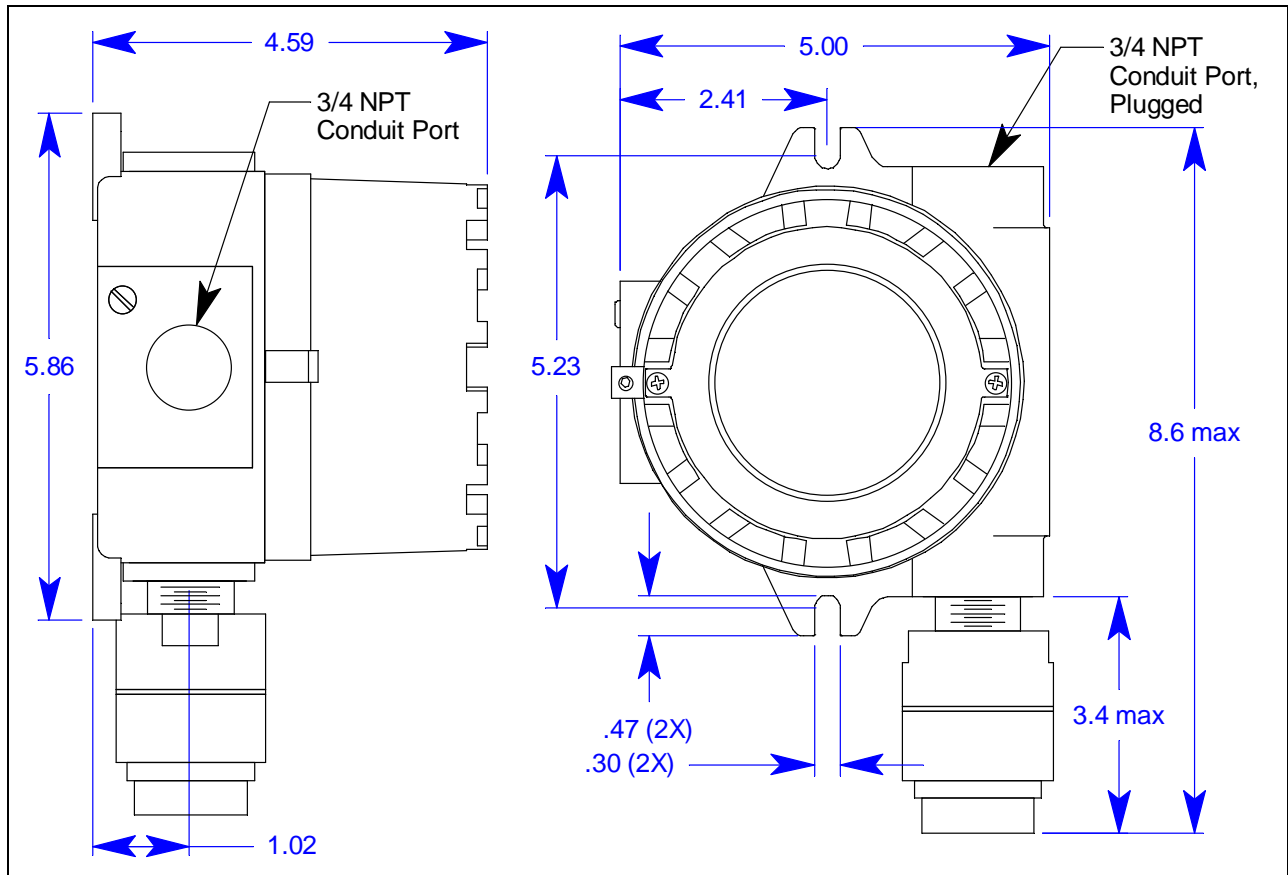


Figure 5: Outline & Mounting Dimensions

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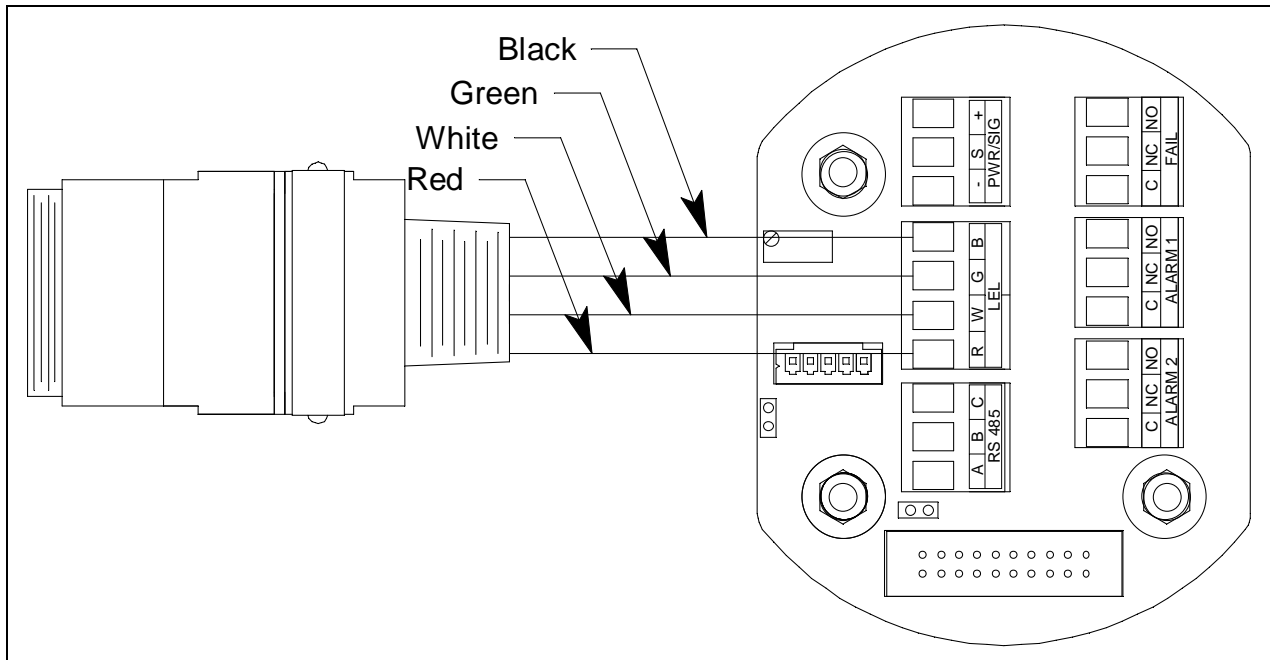
## Wiring the M2A Transmitter

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**WARNING:** Always verify that the power source is **OFF** before making any wiring connections.

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1. Remove the junction box cover.
2. Grasp the control PCB by its edges.
3. Gently pull until the control PCB is pulled away from the banana jacks. Take care not to pull too hard and damage the cable which connects the control and terminal PCBs.
4. Let the control PCB hang by the cable. The terminal strips are now visible on the terminal PCB. The control PCB may be left hanging while wiring is done. If desired, the control PCB may be disconnected from the cable and set aside while wiring.
5. The detector leads are factory wired. Verify that the detector leads are wired to the detector terminal strip as shown in the figure below.
  - Red wire to terminal labeled LEL R, white wire to terminal labeled LEL W, green wire to terminal labeled LEL G, black wire to terminal labeled LEL B.



**Figure 6: Detector Wiring**

6. To gain access to a plug-in terminal strip for wiring, pull it out of its socket by grasping the wall between two terminal positions with needle nose pliers and pulling. Be careful not to exert too much force on the wall to avoid damage to the terminal strip. The detector terminal strip and the alarm 1 relay terminal strip may be removed by grasping them with your fingers if the adjacent terminal strips have been removed.

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**WARNING:** If the M2A is installed in a hazardous location, use appropriately rated conduit, conduit fittings, and appropriate construction technique that complies with the local electrical code. In addition, use appropriately rated conduit, conduit fittings, and appropriate construction technique to maintain the NEMA 4X environmental rating of the junction box and avoid water entering the junction box at the conduit ports.

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**WARNING:** *To maintain the explosion proof classification of the M2A, a conduit seal must be used within 18 inches of the junction box conduit hub used for wiring. Do not install the detector in an environment with acetic acid.*

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7. Guide multi conductor shielded cable or cables or wires in conduit through the conduit port on the left side of the junction box.

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**WARNING:** *If the top conduit port is used for wiring, be sure to seal the threads to ensure water does not enter the junction box. A conduit seal, which is normally required to maintain the junction box's hazardous location rating, will also help to prevent water from entering through the top port.*

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The number of cables or wires needed will depend on whether the M2A is wired to a recording device or just to power and whether any relays are used.

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**NOTE:** If the M2A is being wired to a PLC or DCS device, see "Appendix B: PLC and DCS Device Wiring" on page 38, then continue with step 8.

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Use the following recommendations to determine how to wire the M2A:

- If only the PWR/SIG connections will be used, use a two or three conductor shielded cable or two or three wires in conduit for connections to the power/signal terminal strip depending on whether or not the signal (S) terminal is used. The S terminal has a 4 - 20 mA output, but if you do not need to monitor this signal and do not connect to the S terminal to access this signal, the M2A will still function completely.

Table 3: Wire Size for PWR/SIG Connections

Max Distance to Recording Device or Power w/18 Gauge Wire	Max Distance to Recording Device or Power w/16 Gauge Wire	Max Distance to Recording Device or Power w/14 Gauge Wire
2,500 ft.	5,000 ft.	8,000 ft.

- If the PWR/SIG connections and one or more relays are used, route the connections to the M2A in conduit. Use shielded cable in the conduit for the PWR/SIG connections and unshielded cable or individual wires for the relay connections. Make sure any wire or cable used for relay wiring is appropriately rated for the power that it will carry.

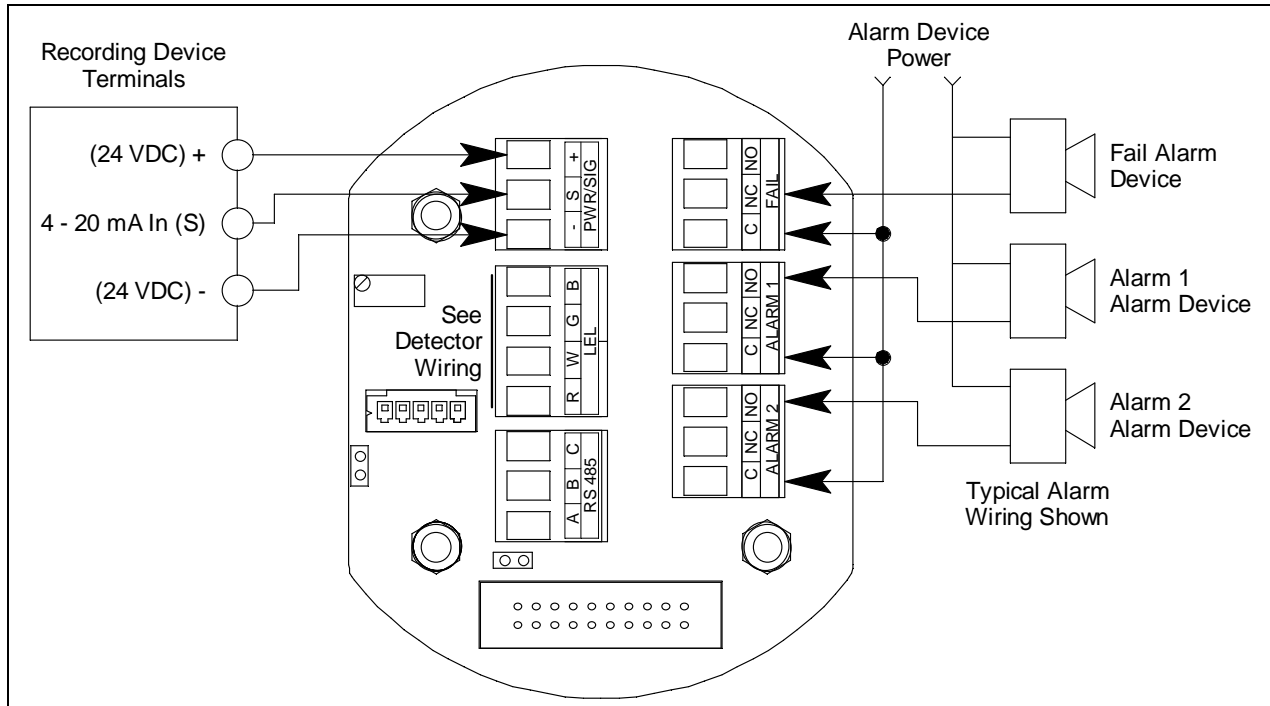
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**NOTE:** If shielded cable is used for the PWR/SIG connections, leave the cable shield's drain wire insulated and disconnected at the M2A. You will connect the opposite end of the cable's drain wire at the recording device.

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See Figure 7 below for field wiring connections to the M2A.



**Figure 7: Wiring the M2A to a Recording Device and Alarm Devices**

8. Re-install the control PCB (and ribbon cable if necessary). Be sure the ribbon cable is routed down below the control PCB so it will not be damaged by the cover when it is screwed back on.
9. Secure the junction box cover to the junction box.
10. Make recording device and relay connections as appropriate. If shielded cable is used for the PWR/SIG connections, connect the cable shield's drain wire to an available chassis ground at the recording device.

## Start Up

### Introducing Incoming Power

1. Complete the installation procedures described earlier in this manual.
2. Verify that all wiring connections are correct and secure.
3. Turn on the incoming power.
4. If necessary, turn on the recording device that is connected to the M2A.
5. The OLED display will indicate the firmware version when the M2A is first powered up and will then count down a one minute warm-up period before normal operation begins. During normal operation, the display will indicate the target gas and current gas reading. Verify that the display is indicating the target gas and current gas reading after the warm-up period is complete and normal operation begins.

METHANE  
0 %LEL

**NOTE:** Allow the M2A's detector to warm up for 15 minutes before you continue with the next section, "Adjusting the Fresh Air Reading."

## Adjusting the Fresh Air Reading

When the M2A is shipped from RKI Instruments, Inc., it is factory calibrated. If a full calibration is desired at startup, see “Calibration” on page 32.

Verify that the M2A is in a fresh air environment (environment known to be free of the target gas and combustible or toxic gas vapors and of normal oxygen content, 20.9%).

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**CAUTION:** *If you suspect the presence of combustible gas, CO<sub>2</sub>, toxic gas, or that the oxygen content is not normal in the monitoring environment, use the calibration kit and the zero air calibration cylinder to introduce “fresh air” to the detector and verify an accurate fresh air setting. See the “Calibration” on page 32 or “Replacing Components of the M2A” on page 34 for instructions on how to use a zero air cylinder when performing a fresh air adjustment.*

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### Non-Intrusive Fresh Air Signal Adjustment

If the M2A is installed in a classified area and non-intrusive zero adjustment is required, follow the instructions below, **but do not remove the junction box cover**. Use the magnetic wand accessory to actuate the magnetic switches instead of pushing the control switch buttons. To actuate a magnetic switch and perform the same operation as pressing a control switch button, touch the magnet in the end of the magnetic wand to the M2A’s glass cover directly over the magnetic switch you wish to actuate. Touching the glass and removing the wand is the same as pressing and releasing a button. Touching the glass and keeping the wand in place is the same as pressing and holding a button.

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**WARNING:** *The M2A is not an active gas monitoring device during the fresh air adjustment procedure. The 4-20 mA output signal will “freeze” at 3.5 mA for a toxic, combustible gas, or CO<sub>2</sub> M2A, or at 17.4 mA for an oxygen M2A, and all relays will remain in their non-alarm state while the M2A is in Calibration Mode. The output signal will not indicate current readings and the relays will not resume operating normally until the M2A is in normal operation again.*

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**NOTE:** While in the calibration program, if there is no switch activity for the calibration time-out period the unit will return to normal operation. The factory set time-out is 15 minutes. If you want a different time-out period, see “Viewing & Changing M2A Parameters” on page 24 for instructions to change the calibration time-out.

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### Adjusting the Fresh Air Reading

1. While in normal operation, press and hold the UP/YES button for 5 seconds to enter Calibration Mode. Release the button when the following screen appears.

Calib? YES/NO
------------------

2. Press and release the UP/YES button to continue. The display will indicate the target gas and **CAL Mode** for a few seconds before showing **FreshAir Adjust?**.
3. Press and release the UP/YES button. **ENTER** will alternate with **FreshAir** on the top display line and the current gas reading will be on the bottom display line.
4. Press and release the ENTER button. The M2A will perform a zero operation and the display will indicate **SPAN w/Cal Gas?**.
5. Press and release the DOWN/NO button. The display will indicate **Leaving CAL Mode** and the M2A will return to normal operation.

# Chapter 4: Operation

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## Overview

This chapter describes the M2A in normal operation. This chapter also describes the M2A in alarm 1, alarm 2, and fail conditions and suggests responses to these conditions.

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## Normal Operation

Normal operation is defined as follows:

- The start-up procedure is complete.
- The M2A is not indicating an alarm 1, alarm 2, or fail condition.
- The M2A is not in Calibration, Configuration, or Gas Type modes.

During normal operation, the M2A simultaneously displays the current gas reading, unit of measure, and target gas. The example below illustrates a typical combustible gas M2A.

METHANE 0 %LEL
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## Information Screen

The Information Screen displays the M2A's operating voltage and firmware and hardware information. To display the Information Screen, do the following:

1. Press and hold the DOWN/NO button for 3 seconds. The Information Screen will appear.

24.2V v6.0L 2A
-------------------

2. Continue holding the DOWN/NO button to keep the Information Screen on the display. The top line indicates the operating voltage that is connected to the M2A. The second line indicates the firmware that is running, version 6.0 in this example, and the M2A's hardware version, version 2A in this example. This information may be useful if you need to contact the factory with questions about the M2A.
3. Release the DOWN/NO button when you are done viewing the Information Screen. The display will return to the normal operation screen within a couple of seconds.

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## 4 - 20 mA Signal Output Operation

The output at the S terminal of the power/signal terminal strip is a 4 - 20 mA signal that corresponds to the detection range of the M2A. During normal operation, this signal tracks the gas concentration on the OLED display.

There are several circumstances where the signal output will not track the display reading but will behave as follows:

- When the M2A is in its warm-up period, the signal output will be fixed at 1.2 mA.
- When the M2A's gas type is changed, the M2A will enter Configuration Mode for you to verify the parameter settings. When you exit Configuration Mode, the display will indicate **NEEDS CALIBRATION** and will continue to indicate this until Calibration Mode is entered and a calibration is performed. In this situation, the signal output will be fixed at 3.5 mA from the time Gas Type Mode is entered until the M2A is calibrated and returns to normal operation.
- If you enter Calibration Mode, Configuration Mode, or Gas Type Mode, the signal output will be fixed at 3.5 mA until the M2A returns to normal operation.
- If the M2A's input power decreases below 9.5 volts so that the M2A is in a low power alarm, the signal output is fixed below 2.4 mA until the low power alarm is cleared.
- If the M2 goes into a fail condition, after a 30 second delay, the signal output is fixed below 2.4 mA until the fail alarm is cleared. During the 30 second delay, the signal output follows the detector output. In the case of a downscale reading, the display and the signal output continue to track the reading down to -99% of full scale (1.15 mA).

## Alarm Indications

**NOTE:** The M2A includes alarm on and alarm off delay settings for alarm 1 and alarm 2. The alarm indications described in this section operate according to the factory set alarm settings. See Table 5 on page 24 for all the factory settings.

**Table 4: Visual and Audible Alarm Indications**

Condition	Cause	Visual Indication(s)
Alarm 1 <sup>1</sup>	Increasing gas reading at or above the alarm 1 setpoint	<ul style="list-style-type: none"> <li>A1 LED is on</li> <li>Gas reading alternates with <b>ALARM-1</b> message</li> </ul>
Alarm 2 <sup>1</sup>	Increasing gas reading at or above the alarm 2 setpoint	<ul style="list-style-type: none"> <li>A2 LED is on</li> <li>Gas reading alternates with <b>ALARM-2</b> message</li> </ul>
Fail	<ul style="list-style-type: none"> <li>Disconnected or misconnected detector wiring</li> <li>Display reading at -10% of full scale or lower</li> <li>Defective components</li> </ul>	<ul style="list-style-type: none"> <li>F LED is on</li> <li><b>FAIL</b> message replaces gas reading</li> </ul> <p><i>NOTE: There is a 30 second delay on the fail condition.</i></p>
Low Power	DC power source less than 9.5 volts.	<ul style="list-style-type: none"> <li>F LED is on</li> <li><b>LowPower</b> message and actual voltage of incoming DC power</li> </ul>
<p>* <sup>1</sup><i>If the M2A is in both an alarm 1 and an alarm 2 condition, both alarm LEDs are on and the display alternates between the gas reading and the ALMS 1&amp;2 message.</i></p>		

**NOTE:** You can select normally energized (N. EN) or normally de-energized (N. DE-EN) alarm 1 and alarm 2 relay settings in Configuration Mode. The following sections describe the standard factory setting for these relays which is N. DE-EN.

The fail relay is factory set as N. EN and is not user-adjustable.

### Alarm 1 Condition

#### Alarm 1 Condition Indications

When the gas reading reaches the alarm 1 setpoint, the M2A senses an alarm 1 condition. The M2A alerts you to an alarm 1 condition as follows:

- The A1 LED turns on.
- The gas reading alternates with the **ALARM-1** message.
- The alarm 1 relay energizes.

#### Responding to an Alarm 1 Condition

- Follow your established procedure for a low level combustible or toxic gas condition or a decreasing oxygen concentration condition.
- After the gas reading falls below the alarm 1 setpoint, press the ENTER button to reset the alarm 1 circuit. Resetting the alarm 1 circuit turns off the A1 LED, resets the OLED display, and de-energizes the alarm 1 relay.

---

**NOTE:** If the ENTER button is pressed while the M2A is in an alarm 1 condition, the A1 LED will flash but all other indications will remain unchanged.

You cannot de-energize the alarm 1 relay until the gas reading falls below the alarm 1 setpoint.

---

## **Alarm 2 Condition**

### ***Alarm 2 Condition Indications***

When the gas reading reaches the alarm 2 setpoint, the M2A senses an alarm 2 condition. The M2A alerts you to an alarm 2 condition as follows:

- The A2 LED turns on.
- The gas reading alternates with the **ALARM-2** message.
- The alarm 2 relay energizes.

---

**NOTE:** If the M2A is in both an alarm 1 and alarm 2 condition, both the A1 and A2 LEDs will be on, the gas reading will alternate with the **ALMS 1&2** message, and both alarm relays will energize.

---

### ***Responding to an Alarm 2 Condition***

1. Follow your established procedure for a high level combustible or toxic gas condition or an increasing oxygen concentration condition.
2. After the gas reading falls below the alarm 2 setpoint, press the ENTER button to reset the alarm circuit. Resetting the alarm circuit turns off the A2 light, resets the OLED display, and de-energizes the alarm 2 relay.

---

**NOTE:** If the ENTER button is pressed while the M2A is in an alarm 2 condition, the A2 LED will flash but all other indications will remain unchanged.

You cannot de-energize the alarm 2 relay until the gas reading falls below the alarm 2 setpoint.

---

## **Fail Condition**

### ***Fail Condition Indications***

The M2A indicates a fail condition for any of the following:

- The detector wiring is disconnected or incorrectly connected.
- The display reading is -10% of full scale or lower.

When the M2A senses a fail condition, it alerts you as follows:

- The F LED turns on.
- The gas reading is replaced by the **FAIL** message.
- The fail relay de-energizes.

---

**NOTE:** The fail alarm has a 30 second delay.

---

### ***Responding to a Fail Condition***

1. Verify that the detector wiring is correctly and securely connected.
2. If the M2A has a replaceable plug-in sensor, verify that the replaceable plug-in sensor in the detector housing is properly installed.

## **Low Power Alarm**

### ***Low Power Alarm Indications***

The M2A senses a low power condition when the DC power source is 9.5 volts or less.

---

***WARNING:***     *While in a low power condition, the M2A is not an active gas monitor.*

---

When the M2A senses a low power condition, it alerts you as follows:

- The F LED turns on.
- The message **LowPower** is indicated on the top line of the OLED display and the input voltage is displayed on the bottom line of the OLED display.
- The fail relay de-energizes.

---

***NOTE:***     The low power alarm cannot be cleared using the ENTER button.

---

When the voltage increases to 10.0 volts, the low power alarm is cleared and the M2A will begin its warm-up sequence.

### ***Responding to a Low Power Condition***

1. Determine and correct the cause of the low power condition.
2. When the input power increases above 10.0 volts, the M2A will begin its warm-up sequence.
3. Verify that the M2A enters normal operation after its warm-up sequence. If necessary, perform a fresh air adjustment. See “Adjusting the Fresh Air Reading” on page 18.

# Chapter 5: Configuration Mode

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## Overview

This chapter describes how to view and change M2A parameters using Configuration Mode. It is accessed using the program buttons.

Configuration Mode includes a 5-minute time-out feature. If you do not press a control button for 5 minutes, the M2A automatically returns to normal operation.

---

**NOTE:** If the M2A returns to normal operation because of a time-out, it enters a warm-up period just as it does when it is first turned on.

If you are installing a new M2A, it has been setup at the factory. Use Configuration Mode only if you want to change the M2A's setup. If you want to change the detector type see "Chapter 6: Gas Type Mode" on page 27.

---

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## Viewing & Changing M2A Parameters

1. While in normal operation, simultaneously press and hold the UP/YES and ENTER buttons for 5 seconds to enter Configuration Mode. Release the buttons when the following screen appears.

Enter  
Config?

2. If you want to exit Configuration Mode, press and release the DOWN/NO button and the M2A will return to normal operation.

If you want to continue in Configuration Mode, press and release the UP/YES button. The target gas and the full scale will be displayed for a few seconds before the first adjustable parameter, the alarm 1 setpoint, is displayed.

3. If you want to change the currently displayed parameter, use the UP/YES and DOWN/NO buttons to adjust it to the desired setting, then press ENTER to continue to the next parameter.

If the currently displayed parameter is OK, press the ENTER button to proceed to the next parameter.

Table 5 lists the M2A parameters you can set. Table 5 also lists the factory set value for each parameter.

**Table 5: Configuration Parameters**

<b>Parameter (Factory Set Value)</b>	<b>Description</b>
ALARM-1 (level) (10% LEL)	The gas reading at which the M2A initiates an alarm 1 condition.
ALARM-1 (activation) (Increase)	Indicates if the alarm 1 circuit is activated by gas readings increasing ( <b>Increase</b> ) or decreasing ( <b>Decrease</b> ) to the ALARM-1 Level.



**Table 5: Configuration Parameters (Continued)**

<b>Parameter (Factory Set Value)</b>	<b>Description</b>
ALARM-1 (relay action) (N. DE-EN)	If set as <b>N. DE-EN</b> , the alarm 1 relay is de-energized in normal operation and energizes when an alarm 1 condition is initiated. If set as <b>N. EN</b> , the alarm 1 relay is energized in normal operation and de-energizes when an alarm 1 condition is initiated.
ALARM-1 (relay reset) (LATCH)	If set as <b>LATCH</b> , you must press the ENTER button to reset the alarm 1 circuit after the alarm 1 condition passes. If set as <b>SELF-RST</b> , the M2A automatically resets the alarm 1 circuit after the alarm 1 condition passes.
A1 OnDy (alarm 1 on delay) (1 secs)	The amount of time the M2A delays activation of the alarm 1 circuit once an alarm 1 condition is initiated. It can be set in 1 second increments from 0 - 60 seconds, in 1 minute increments from 1 - 15 minutes, and in 15 minute increments from 15 - 60 minutes.
A1 OffDy (alarm 1 off delay) (0 sec.)	The amount of time the M2A delays turning off the alarm 1 circuit once an alarm 1 condition passes. This parameter appears only if the alarm 1 relay reset setting is set to <b>SELF-RST</b> . It can be set in 1 second increments from 0 - 60 seconds, in 1 minute increments from 1 - 15 minutes, and in 15 minute increments from 15 - 60 minutes.
ALARM-2 (level) (50% LEL)	The gas reading at which the M2A initiates an alarm 2 condition.
ALARM-2 (activation) (Increase)	Indicates if the alarm 2 circuit is activated by gas readings increasing ( <b>Increase</b> ) or decreasing ( <b>Decrease</b> ) to the ALARM-1 Level.
ALARM-2 (relay action) (N. DE-EN)	If set as <b>N. DE-EN</b> , the alarm 2 relay is de-energized in normal operation and energizes when an alarm 2 condition is initiated. If set as <b>N. EN</b> , the alarm 2 relay is energized in normal operation and de-energizes when an alarm 2 condition is initiated.
ALARM-2 (relay reset) (LATCH)	If set as <b>LATCH</b> , you must press the ENTER button to reset the alarm 2 circuit after the alarm 2 condition passes. If set as <b>SELF-RST</b> , the M2A automatically resets the alarm 2 circuit after the alarm 2 condition passes.
A2 OnDy (alarm 2 on delay) (1 secs)	The amount of time the M2A delays activation of the alarm 2 circuit once an alarm 2 condition is initiated. It can be set in 1 second increments from 0 - 60 seconds, in 1 minute increments from 1 - 15 minutes, and in 15 minute increments from 15 - 60 minutes.
A2 OffDy (alarm 2 off delay) (0 sec.)	The amount of time the M2A delays turning off the alarm 2 circuit once an alarm 2 condition passes. This parameter appears only if the alarm 2 relay reset setting is set to <b>SELF-RST</b> . It can be set in 1 second increments from 0 - 60 seconds, in 1 minute increments from 1 - 15 minutes, and in 15 minute increments from 15 - 60 minutes.
ZeroSupp (2% of the <b>detection range</b> in terms of the detection units)	The zero suppression feature helps prevent “jumpy” readings near the fresh air reading. For example, if the zero suppression setting is <b>2.0% LEL</b> , the M2A will display a reading of 0% LEL for gas readings from -2% LEL to 2% LEL. It is settable from 0 to 6% of the detection range.

**Table 5: Configuration Parameters (Continued)**

<b>Parameter (Factory Set Value)</b>	<b>Description</b>
FILTER (5 secs)	The filter feature helps “smooth out” jumpy or noisy signals from the detector. You can set the filter from 0 seconds to 60 seconds in 5 seconds increments. The displayed gas reading is the average reading over the previous time period defined by the filter setting. So if the filter is set to 5 seconds, the displayed gas reading is the average over the past 5 seconds.
CAL Time (15 mins)	The calibration time-out sets the amount of time after the last button push while in Calibration Mode that the M2A will wait before returning to normal operation. If the calibration time-out is set to <b>15 mins</b> , then M2A will return to normal operation automatically 15 minutes after the last button push.
Auto Zero (Enabled)	If set to <b>Enabled</b> , the M2A’s firmware will monitor the zero (fresh air) reading and make automatic zero adjustments under precisely specified conditions if it determines that a reading change is due to normal sensor drift. If set to <b>Disabled</b> , the Auto Zero function is turned off.

4. When you have scrolled through all the adjustable parameters, **SAVE IT? YES/NO** appears on the display.
5. If you do not wish to save the adjustments and want to exit Configuration Mode, press and release the DOWN/NO button. The **DO OVER? YES/NO** message will display. Press and release the DOWN/NO button. The **ABORT? YES/NO** message will display. Press the UP/YES button to return to normal operation.

If you wish to change some of the adjustments made, press and release the DOWN/NO button. The **DO OVER? YES/NO** message will display. Press and release the UP/YES button. The **Re-do Config** message will display and the M2A will return to the first adjustable parameter. Go back to step 3 and continue.

If you wish to save the adjustments made, press and release the UP/YES button. **Config Saved** is indicated on the display for a few seconds and the M2A returns to normal operation.

# Chapter 6: Gas Type Mode

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## Overview

This chapter describes how to use Gas Type Mode to select the M2A's gas type. The gas type determines the target gas and detection range. The combustible gas/CO<sub>2</sub> and toxic/oxygen M2As have a different terminal PCB and run on different firmware. Your M2A will only have gas type choices available that it can support.

Gas Type Mode includes a 5-minute time-out feature. If you do not press a button for 5 minutes, the M2A automatically returns to normal operation.

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**NOTE:** If the M2A enters normal operation because of a program time-out, it enters a warm-up period just as it does when it is first turned on.

---

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## Selecting the Gas Type

1. While in normal operation or during the warm-up sequence, press and hold the UP/YES and DOWN/NO buttons for five seconds. Release them when the following screen appears.

Select  
GasType?

2. If you want to exit Gas Type Mode, press and release the DOWN/NO button. The display will indicate **NO CHANGE** and the M2A will return to normal operation.

If you want to continue in Gas Type Mode, press and release the UP/YES button. The top display line will indicate **GasType?** and the bottom display line will indicate the target gas choice.

3. Use the UP/YES or DOWN/NO button to scroll through the choices of target gas. Table 6 below lists the choices of target gas for the M2A.

**Table 6: Combustible Gas/CO<sub>2</sub> Gas Types**

<b>Gas Type Choices</b>	<b>Detection Range</b>
HC	0 - 100% LEL
iBUTANE	0 - 100% LEL
PROPANE	0 - 100% LEL
HEXANE	0 - 100% LEL
HYDROGEN	0 - 100% LEL
METHANE	0 - 100% Volume
METHANE	0 - 100% LEL
CO2	0 - 5,000 ppm
CO2	0 - 9,000 ppm

**Table 6: Combustible Gas/CO<sub>2</sub> Gas Types**

<b>Gas Type Choices</b>	<b>Detection Range</b>
CO2	0 - 100% volume
CO2	0 - 50.0% volume
CO2	0 - 5.00% volume
METHANE	0 - 5.00% volume
METHANE	0 - 8980 ppm*
*Use this gas type for 0-9000 ppm CH <sub>4</sub> . 8980 ppm is the highest displayed value. Anything higher is displayed as <b>OVER</b> .	

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**NOTE:** Consult factory for availability of detectors for toxic M2A types not listed in “M2A Specifications” on page 7.

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4. When the desired target gas is on the display, press and release the ENTER button. The display will ask **SAVE IT? YES/NO**.
5. To discard the gas type change, press and release the DOWN/NO button. The display will ask **DO OVER? YES/NO**. Press the DOWN/NO button. The display will ask **ABORT? YES/NO**. Press the UP/YES button. The M2A will return to normal operation without changing the gas type.  
  
To save the gas type, press and release the UP/YES button. The display will indicate **Gas Type Updated**, the display will indicate the target gas and the detection range for a few seconds, and then the M2A will enter Configuration Mode automatically so that the parameter settings in Configuration Mode can be verified or changed.
6. While in Configuration Mode press and release the ENTER button to accept the displayed parameter setting and move to the next one. Use the UP/YES and DOWN/NO buttons to adjust a setting. See “Chapter 5: Configuration Mode” on page 24 for a complete description of Configuration Mode.
7. When you have reviewed and accepted the last item in Configuration Mode by pressing the ENTER button, display will ask **SAVE IT? YES/NO**.
8. To save the configuration settings, press and release the UP/YES button. The display will indicate **Config Saved** and the M2A will begin its warm-up sequence.  
  
To discard the settings and review them again, press the DOWN/NO button. The display will ask **DO OVER? YES/NO**. Press the UP/YES button and the display will indicate **Re-do Config**, then display the target gas and the detection range for a few seconds before returning to Configuration Mode. Repeat steps 6 - 8 until the settings are as desired.
9. After the M2A completes its warm-up sequence, the display will indicate **CAL NEEDED**. Since the gas type has been changed, a successful calibration must be performed before the M2A can enter normal operation.
10. Press and release the UP/YES button to enter Calibration Mode. Normally, you must hold the UP/YES button for 5 seconds to enter Calibration Mode, but since a calibration is required, only a momentary push is needed to enter Calibration Mode after changing the gas type.

11. See “Calibration” on page 32 for calibration instructions.

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**NOTE:** When calibrating an M2A after changing the gas type, the M2A will not ask if you want to calibrate, or whether you want to perform a fresh air adjustment, span adjustment or zero adjustment. Since a complete calibration is required, the calibration sequence will proceed without asking if you want to perform certain operations.

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# Chapter 7: Maintenance

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## Overview

This chapter describes procedures for performing preventive maintenance, troubleshooting, calibrating the M2A, and replacing field replaceable parts.

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## Preventive Maintenance

This section describes a recommended preventive maintenance schedule to ensure the optimum performance of the M2A. It includes daily and biannual procedures.

### Daily

Verify a display reading of zero. Investigate significant changes in the reading.

### Biannually

Calibrate the M2A as described in “Calibration” on page 32. See “Calibration Frequency” on page 31 for a discussion of calibration frequency guidelines.

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## Troubleshooting

The troubleshooting guide describes symptoms, probable causes, and recommended action for problems you may encounter with the M2A.

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**NOTE:** This troubleshooting guide describes M2A problems only. If the M2A is connected to a recording device, see the recording device operator’s manual for problems you may encounter with the recording device.

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**Table 7: Troubleshooting the Combustible Gas Detector**

Condition	Symptom(s)	Probable Causes	Recommended Action
No Power	The display backlight is off and the display screen is blank.	<ul style="list-style-type: none"><li>The power wiring is disconnected or misconnected.</li><li>The display cable is disconnected or misconnected.</li></ul>	<ol style="list-style-type: none"><li>Verify that the wiring to the power source or recording device is correct and secure.</li><li>Verify that the ribbon cable connecting the terminal PCB to the control PCB is securely installed. This ribbon cable plugs into a connector on the top edge of the control PCB and on the bottom of the terminal PCB.</li><li>If the power difficulties continue, contact RKI for further instruction.</li></ol>
Frequent or Suspect Alarms	The M2A alerts you to frequent or suspect alarms while the fresh air readings remain on zero.	<ul style="list-style-type: none"><li>The M2A is experiencing false readings due to RFI or EMI.</li><li>The detector wiring is disconnected, misconnected, or intermittent.</li></ul>	<ol style="list-style-type: none"><li>Verify that the M2A wiring is properly shielded. See “Wiring the M2A Transmitter” on page 15.</li><li>Verify that the detector wiring is correct and secure.</li><li>Increase the alarm on delay setting in Configuration Mode.</li><li>If the frequent or suspect alarm difficulties continue, contact RKI for further instruction.</li></ol>

**Table 7: Troubleshooting the Combustible Gas Detector (Continued)**

Condition	Symptom(s)	Probable Causes	Recommended Action
Flickering Display	The display reading flickers often.	<ul style="list-style-type: none"> <li>The M2A is experiencing false readings due to RFI or EMI.</li> <li>The noise filter setting is too low.</li> <li>The zero suppression setting is too low.</li> <li>The display screen is malfunctioning.</li> </ul>	<ol style="list-style-type: none"> <li>Verify that the M2A wiring is properly shielded. See “Wiring the M2A Transmitter” on page 15.</li> <li>Verify that the detector wiring is correct and secure.</li> <li>Increase the filter setting in Configuration Mode.</li> <li>Increase the zero suppression setting in Configuration Mode.</li> <li>If the display difficulties continue, contact RKI for further instruction.</li> </ol>
Fail Condition	<ul style="list-style-type: none"> <li>M2A indicates a fail condition.</li> </ul>	<ul style="list-style-type: none"> <li>The detector wiring to the terminal PCB is disconnected or misconnected.</li> <li>The detector fresh air signal is low enough to cause a fail condition.</li> <li>The detector is malfunctioning.</li> <li>The terminal or display PCB is malfunctioning.</li> </ul>	<ol style="list-style-type: none"> <li>Verify that the detector wiring is correct and secure.</li> <li>Calibrate the M2A.</li> <li>If the fail condition continues, replace the detector.</li> <li>If the fail condition continues, contact RKI for further instruction.</li> </ol>
Slow or No Response/ Difficult or Unable to Calibrate	<ul style="list-style-type: none"> <li>Unable to successfully set the fresh air or span (zero for oxygen) reading during calibration.</li> <li>M2A requires frequent calibration.</li> </ul> <p><i>Note: See “Calibration Frequency” on page 31 for calibration frequency guidelines.</i></p>	<ul style="list-style-type: none"> <li>The calibration cylinder is low, out-dated, or defective.</li> <li>The detector is malfunctioning.</li> <li>The terminal PCB is malfunctioning.</li> </ul>	<ol style="list-style-type: none"> <li>Verify that the calibration cylinder contains an adequate supply of a fresh test sample.</li> <li>If the calibration/response difficulties continue, replace the detector.</li> <li>If the calibration/response difficulties continue, contact RKI for further instruction.</li> </ol>

## Calibration Frequency

Although there is no particular calibration frequency that is correct for all applications, a calibration frequency of every 6 to 12 months is adequate for most M2A applications. Unless experience in a particular application dictates otherwise, RKI Instruments, Inc. recommends a calibration frequency of every 6 months.

If an application is not very demanding, for example detection in a clean, temperature controlled environment where the toxic or combustible target gas is not normally present, and calibration adjustments are minimal at calibration, then a calibration frequency of every 12 months is adequate.

If an application is very demanding, for example if a combustible or toxic gas is present often and in significant concentrations or the environment is not well controlled, then more frequent calibration than every 6 months may be necessary.

---

## Calibration

This section describes how to calibrate the combustible gas M2A. It includes procedures to prepare for calibration, enter Calibration Mode, adjust the fresh air (zero) setting, adjust the span setting, and return to normal operation.

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**NOTE:** The detector must be calibrated with a gas concentration between 10% and 100% of the channel's full scale value (ie. a 0 - 100% LEL CH<sub>4</sub> detector must be calibrated with a CH<sub>4</sub> concentration between 10% and 100% LEL).

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**WARNING:** *The M2A is not an active gas monitoring device during the calibration procedure. The 4-20 mA output signal will “freeze” at 3.5 mA and all relays will remain in their non-alarm state while the M2A is in Calibration Mode. The output signal will not indicate current readings and the relays will not resume operating normally until the M2A is in normal operation again.*

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### Preparing for Calibration

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**NOTE:** The following procedure assumes the use of a calibration kit which includes a calibration gas cylinder, a zero air cylinder, a fixed flow regulator with an on/off knob, a calibration cup for the appropriate sensor, and a short piece of sample tubing to connect the regulator to the calibration cup.

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**NOTE:** While in the calibration program, if there is no switch activity for the calibration time-out period the unit will return to normal operation. See “Viewing & Changing M2A Parameters” on page 24 for instructions to set the calibration time-out.

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**NOTE:** The following procedure assumes that the target gas is present in a high enough concentration to affect the fresh air (zero) reading. If a fresh air environment can be verified, applying zero air to the detector is not necessary when setting the zero (span for oxygen) reading.

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1. Connect the calibration kit sample tubing to the calibration cup hose barb.
2. Screw the calibration cup onto the detector.
3. Connect the fixed flow regulator to the calibration cup using the sample tubing.

### Non-Intrusive Calibration

If the M2A is installed in a classified area and non-intrusive calibration is required, follow the instructions below, but do not remove the junction box cover. Use the magnetic wand accessory to actuate the magnetic switches instead of pushing the control switch buttons. To actuate a magnetic switch and perform the same operation as pressing a control switch button, touch the magnet in the end of the magnetic wand to the M2A's glass cover directly above the magnetic switch you wish to actuate. Touching the glass and removing the wand is the same as pressing and releasing a button. Touching the glass and keeping the wand in place is the same as pressing and holding a button.



## Calibration Gas Response Memory Feature

The M2A has the capability to “remember” the detector’s response to the calibration gas after the gas is removed from the detector during the fresh air and span adjustment procedure. This feature enables one person to perform a calibration if the detector is mounted remotely from the M2A. When zero air is applied to the M2A during a fresh air adjustment, the M2A will freeze the display reading at the lowest response and the M2A will continue to display this reading and retain it in its memory until the fresh air adjustment procedure is completed. When calibration gas is applied to the M2A during a span adjustment, the M2A will freeze the display reading at the highest response to the calibration gas. The calibration gas can then be removed and the M2A will continue to display this reading and retain it in its memory until the span adjustment procedure is completed.

### Adjusting the Fresh Air Reading

1. While in normal operation, press and hold the UP/YES button for 5 seconds to enter Calibration Mode. Release the button when the following screen appears.

Calib? YES/NO
------------------

2. If you want to continue with calibration, press and release the UP/YES button. The display will indicate the target gas and **CAL Mode** for a few seconds before showing **FreshAir Adjust?**.  
If you want to exit Calibration Mode, press and release the DOWN/NO button. The M2A will indicate **Leaving CAL Mode** and the M2A will return to normal operation.
3. To continue with adjusting the fresh air reading, press and release the UP/YES button. **ENTER** will alternate with **FreshAir** on the top display line and the current gas reading will be on the bottom display line.  
To skip adjusting the fresh air reading, press and release the DOWN/NO button. The display will indicate **SPAN w/Cal Gas?**. Skip to the next section, “Adjusting the Span Setting”.
4. Screw the zero air cylinder into the fixed flow regulator.
5. Turn the regulator knob counterclockwise to open the regulator.
6. Allow zero air to flow for two minutes. If there was gas present causing a reading on the M2A, the reading should decrease and stabilize after two minutes.
7. Turn the regulator knob clockwise to close the regulator.
8. Unscrew the zero air cylinder from the fixed flow regulator leaving the calibration cup on the detector. The M2A will continue to display the minimum gas response on the display and retain the response level in its memory.
9. Press and release the ENTER button. The M2A will perform a fresh air adjustment and the display will indicate **SPAN w/Cal Gas?**.

---

**NOTE:** If the fresh air adjustment fails, see “Troubleshooting” on page 30 for recommended actions.

---

### Adjusting the Span Setting

1. If you want to continue with adjusting the span setting, press and release the UP/YES button. **APPLY** will alternate with **SPAN Gas** on the top display line and the current gas reading will be on the bottom display line.  
If you want to skip adjusting the span reading, press and release the DOWN/NO button. The display will indicate **Leaving Cal Mode** and the M2A will return to normal operation.
2. Screw the calibration gas cylinder into the fixed flow regulator.
3. Turn the regulator knob counterclockwise to open the regulator.

4. Allow calibration gas to flow for two minutes. The gas reading should be stable after two minutes.
5. Turn the regulator knob clockwise to close it.
6. Unscrew the calibration gas cylinder from the fixed flow regulator and unscrew the calibration cup from the detector. The M2A will continue to display the maximum gas response on the display and retain the response level in its memory.
7. **Adjust the gas reading up or down to match the calibration gas cylinder concentration by using the UP/YES and DOWN/NO buttons, then press and release the ENTER button.**
8. The M2A will perform a span operation. The display will indicate **SPAN Gas PASS** for a few seconds, then indicate **SPAN Gas SAVED** before indicating **Leaving CAL Mode** for a few seconds.

---

**NOTE:** If the span adjustment fails, see “Troubleshooting” on page 30 for recommended actions.

---

9. The display will now alternate between the normal operation screen and the message **REMOVE CAL GAS** for 1 minute. If the calibration gas has not been removed from the detector, remove it now to avoid unwanted alarms.  
  
During this 1 minute period, the signal output will remain fixed at 3.5 mA and the relays will remain in their non-alarm state to avoid unwanted alarms while the calibration gas clears from the detector. At the end of the 1 minute period, the **REMOVE CAL GAS** message will stop appearing and the M2A will return to normal operation.
10. Store the components of the calibration kit in a safe place.

---

## Replacing Components of the M2A

### Replacing the Gas Detector

1. Turn off or disconnect power to the M2A.
2. Remove the junction box cover.
3. Grasp the control PCB by its edges.
4. Gently pull until the control PCB is pulled away from the banana jacks. Take care not to pull too hard and damage the cable which connects the control and terminal PCBs.
5. Let the control PCB hang by the cable. The terminal strips are now visible on the terminal PCB. The control PCB may be left hanging while wiring is done. If desired, the control PCB may be disconnected from the cable and set aside while wiring.
6. Remove the detector terminal strip from its socket.
7. Disconnect the detector leads from the detector terminal strip. Note the position of the color-coded leads as you remove them.
8. Unscrew the detector from the junction box.
9. Guide the replacement detector leads through the bottom conduit port of the junction box, then screw the mounting threads of the detector into the conduit port.
10. Connect the detector leads to the detector terminal strip as follows:
  - Red wire to terminal labeled LEL RED, white to terminal labeled LEL WHT, green wire to terminal labeled LEL GRN, black wire to terminal labeled LEL BLK.
11. Re-install the detector terminal strip into its socket.
12. Re-install the control PCB (and ribbon cable if necessary). Be sure the ribbon cable is routed down below the control PCB so it will not be damaged by the cover when it is screwed back on.

13. Secure the junction box cover to the junction box.
14. Turn on or reconnect power to the M2A.

---

**NOTE:** Allow the replacement detector to warm up for 15 minutes before you continue with the next step.

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15. Calibrate the replacement detector as described in “Calibration” on page 32.

### Replacing the Plug-In Sensor

1. Turn off or disconnect power to the M2A.
2. Unscrew the detector cap from the detector housing body. Take care not to lose the cap gasket. See Figure 2 for an illustration of the detector.
3. Unplug and remove the sensor.
4. Carefully match the replacement sensor’s pins with the socket pattern in the top section and plug it in.
5. Make sure the cap gasket is in place and screw the detector cap back on to the detector housing.
6. Turn on or reconnect power to the M2A.

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**NOTE:** Allow the replacement sensor to warm up for 15 minutes before you continue with the next step.

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7. Calibrate the detector as described in “Calibration” on page 32.

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## Parts List

Table 8 lists replacement parts and accessories for the M2A Transmitter.

**Table 8: Parts List**

Part Number	Description
06-1248RK	Calibration kit sample tubing (3/16 in. x 5/16 in.; specify length when ordering)
07-0033RK	Cap gasket
07-0144	IR sensor gasket
18-0431-01-01	Junction box with foam pad, label, and conduit plug
45-6132RK	Termination and group jumper
61-0206-CH4	Replacement detector assembly, IR CH <sub>4</sub> 0 - 100% LEL, includes plug-in sensor
61-5039RK-CH4	Plug-in IR CH <sub>4</sub> sensor 0 - 100% LEL
71-0379	<i>M2A UL 2075 Version Transmitter Operator’s Manual (this document)</i>
81-0012RK-01	Calibration cylinder, 50% LEL methane in air, 34 liter steel
81-0012RK-03	Calibration cylinder, 50% LEL methane in air, 103 liter steel
81-0076RK-01	Zero air calibration cylinder, 34 liter steel
81-0076RK-03	Zero air calibration cylinder, 103 liter
81-1050RK	Regulator, with gauge and knob, 0.5 LPM, for 17 liter and 34 liter steel calibration cylinders (cylinders with external threads)

**Table 8: Parts List**

<b>Part Number</b>	<b>Description</b>
81-1051RK	Regulator, with gauge and knob, 0.5 LPM, for 34 liter aluminum/58 liter/103 liter calibration cylinders (cylinders with internal threads)
81-1117RK	Calibration cup

## Appendix A: Control Button Quick Reference Guide

The M2A's control buttons allow access to operational modes, resetting of alarms, and display of the Information Screen. Table 9 shows which button combinations perform these functions and which parameters are available for adjustment while in the operational modes. While in these modes, display prompts showing a "?" require you to respond by pressing either the UP/YES (for yes) or DOWN/NO (for no) button. To change parameter settings, use the UP/YES and DOWN/NO buttons to get the desired setting, then press and release the ENTER button to accept the setting.

**Table 9: Control Button Quick Reference Chart**

<b>Mode Entered or Function Performed</b>	<b>Button Combination</b>	<b>Adjustable or Viewable Parameters</b>
Alarm Reset	Press and Release ENTER	n/a
Show Information Screen	Press and Hold DOWN/NO	<ul style="list-style-type: none"> <li>• Input Voltage</li> <li>• M2A Version/Revision Information</li> </ul>
Calibration Mode	Press and Hold UP/YES for 5 seconds	<ul style="list-style-type: none"> <li>• Fresh Air Adjust</li> <li>• Span Adjust with Calibration Gas</li> </ul>
Configuration Mode	Press and Hold UP/YES & ENTER for 5 seconds	<ul style="list-style-type: none"> <li>• Alarm Levels</li> <li>• Increasing or Decreasing Alarms</li> <li>• Normally Energized or Normally De-energized Relays</li> <li>• Latching or Self-resetting Alarms</li> <li>• Alarm On Delay</li> <li>• Alarm Off Delay (if self-resetting)</li> <li>• Zero Suppression</li> <li>• Noise Filter</li> <li>• Calibration Time-out Period</li> </ul>
Gas Type Mode	Press and Hold UP/YES and DOWN/NO for 5 seconds	Gas Type

# Appendix B: PLC and DCS Device Wiring

The M2A can be wired to a PLC or DCS device if desired.

1. Guide multi conductor shielded cable or cables or wires in conduit through the top conduit port of the junction box. The number of cables or wires needed will depend on whether any relays are used. Use the following recommendations to determine how to wire the M2A:
  - If only the PWR/SIG terminal strip connections will be used, use four conductor shielded cable or four wires in conduit for connections to the power/signal terminal strip.

**Table 10: Wire Size for PWR/SIG Connections**

<b>Max Distance to Recording Device or Power w/18 Gauge Wire</b>	<b>Max Distance to Recording Device or Power w/16 Gauge Wire</b>	<b>Max Distance to Recording Device or Power w/14 Gauge Wire</b>
2,500 ft.	5,000 ft.	8,000 ft.

- If the PWR/SIG terminal strip connections and one or more relays are used, route the connections to the M2A in conduit. Use shielded cable in the conduit for the PWR/SIG connections and unshielded cable or individual wires for the relay connections. Make sure any wire or cable used for relay wiring is appropriately rated for the power that it will carry.

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**NOTE:** If shielded cable is used for the PWR/SIG connections, leave the cable shield's drain wire insulated and disconnected at the M2A. You will connect the opposite end of the cable's drain wire at the recording device.

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See Figure 8 below for field wiring connections to the M2A.

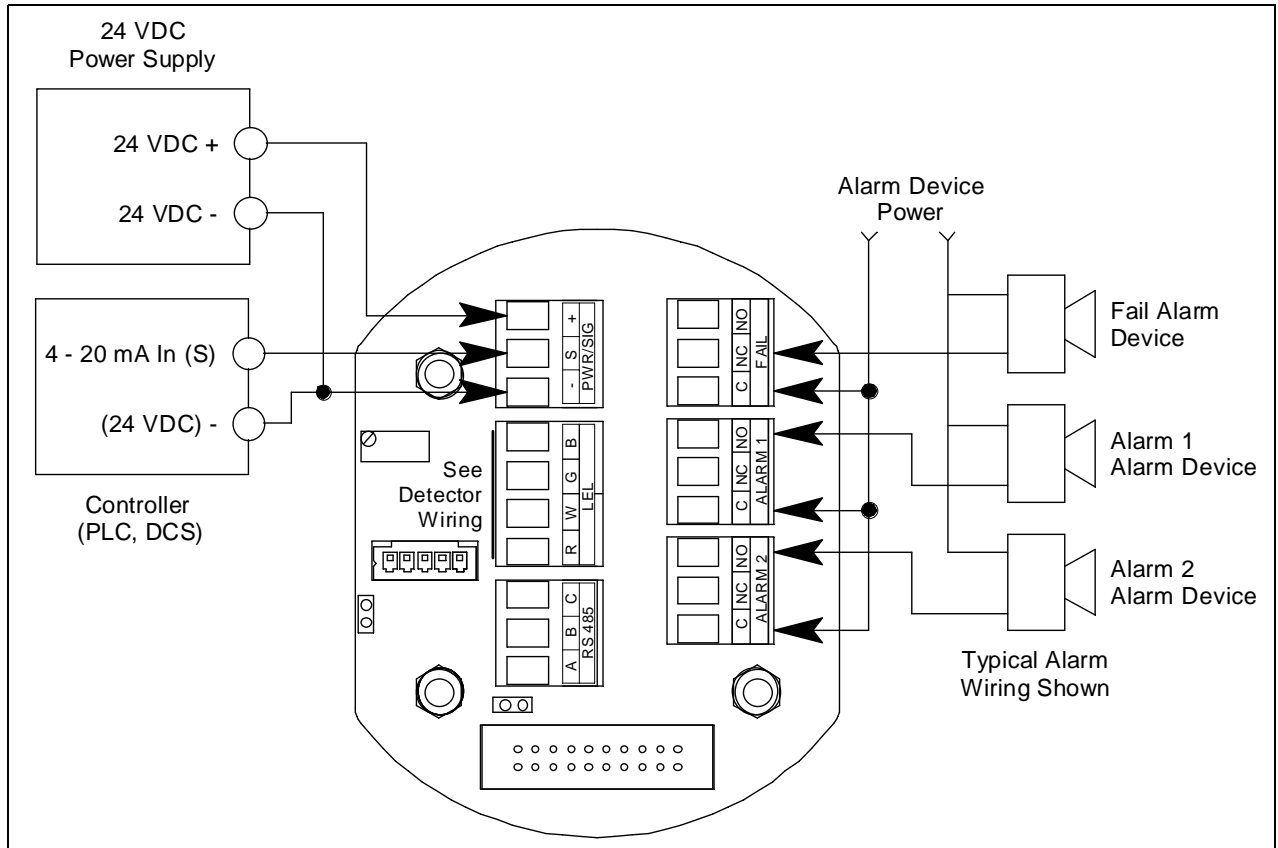


Figure 8: PLC and DCS Device Wiring