

Gas Monitoring Alarm System

Manning GM-4 Instruction and Installation Manual

07/09

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About This Document

World Wide Web

The following Honeywell web sites may be of interest.

Honeywell Organization	WWW Address (URL)
Corporate	www.honeywell.com
Honeywell Analytics	www.honeywellanalytics.com
Manning Gas Detection	www.manningsystems.com

Telephone

Contact us by telephone at the numbers listed below.





Organization		Phone Number
United States	Honeywell Analytics Inc.	1-800-538-0363 1-913-712-5576 1-913-712-5580 Fax
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Sales Information

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Symbol Definitions

The following table lists those symbols used in this document to denote certain conditions.

Symbol	Definition
	ATTENTION: Identifies information that requires special consideration.
	TIP: Identifies advise or hints for the user, often in terms of performing a task.
	REFERENCE-EXTERNAL: Identifies an additional source of information outside of this bookset.
	REFERENCE-INTERNAL: Identifies an additional source of information within this bookset.

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Introduction

This manual has been prepared to help in the use and installation of the Manning GM-4 Gas Monitoring Alarm System. This manual will convey the operating principles of the alarm system, ensure proper installation, and demonstrate start-up and routine maintenance procedures for the system.



ATTENTION: This manual must be carefully followed by all individuals who have or will have the responsibility for using or servicing the Manning GM-4 alarm system. Warranties made by Honeywell

Analytics with respect to this equipment will be voided if the equipment is not used and serviced in accordance with the instructions in this manual. If in doubt about a procedure, please contact Honeywell Analytics before proceeding.

Please call Honeywell Analytics for help or advice with any questions that may arise during the installation.

Other manuals will be provided to cover details of sensors, auxiliary items, etc.

1 System Description

The Manning GM-4 is designed to accept up to four 4/20 mA current input signals, plus provide a regulated 24 VDC supply to operate all sensors manufactured by Honeywell Analytics.

Standard Manning GM-4

The standard Manning GM-4 unit has a 20 segment LED bargraph, a warning LED, an alarm LED, and a fault LED for each channel. Warning and alarm setpoints are field adjustable by the setpoint jumper block on the back side of each channel display.

The unit also has a common warning relay, a common alarm relay, a common fault relay, and an auxiliary horn relay. These relays will trip when any of the channels goes into the specified trip condition. The horn relay acts in conjunction with the local alarm buzzer and can be cleared by pressing the silence button, which will silence the horn until the next event triggers an alarm.

Optional Relay Board

The Manning GM-4 Relay Board, if supplied, provides an individual warning and alarm relay for each channel (total of 8 relays). Up to two relay boards can be supplied with the Manning GM-4 unit.

Optional Analog Output Board

The Manning GM-4 Analog Output Board, if supplied, provides an isolated 4/20 mA output for each channel for computer monitoring of each signal.

A Specifications

Base Unit

Electrical Power: 120 VAC, 60 Hz at 5 amps.
Optional 240 VAC, 1 phase, 50/60 Hz at 3 amps

Signal input: 4/20 mA

DC Power available for sensors: Heavy-duty internal 24 VDC, 5 amp maximum regulated supply

Enclosure: 16 gauge steel, gasketed, plexiglass window, 22" high x 12" wide x 6" deep, NEMA 1 enclosure for use in non-classified areas only

Weight: 30 lbs.

Operating Ambient Temperature range: +32° F to +105° F

Operating Humidity: 5-95% Relative Humidity, non-condensing

Push-button Controls:

- Silence – Silences buzzer and Horn Relay
- Reset – Clears latched functions (If warning, alarm, or fault condition exists, indications will not clear.)

Local Horn: 70 db @ two feet

1 System Description continued

LED Indications

Bargraphs:

- 20 segment LED concentration display
- Bottom segment always lighted to indicate power to channel
- Warning and alarm setpoints adjustable in 5% increments using jumpers on the back of each display. Optional down scale monitoring is available for oxygen monitoring.

Warning and Alarm LEDs:

- Individually DIP switch selectable to latch or not latch

Fault LEDs:

- Always latched

Common Relay Outputs

Common Warning Relay:

- 10 second on time delay
- 30 second off time delay
- DIP switch selectable to latch or not latch

Common Alarm Relay:

- 10 second on time delay
- 30 second off time delay
- DIP switch selectable to latch or not latch

Common Fault Relay:

- Fault indicated below 1.5 mA signal
- Always latches

Common Horn Relay:

- Acts in conjunction with buzzer on Manning GM-4
- Triggers on an alarm or fault
- Will clear until next event when silence button is pushed

Optional Relay Board:

- Provides individual warning and alarm relays for each channel. Total of 8 relays per board
- Up to two relay boards can be used with a single Manning GM-4

All Relays:

- Form C dry contact relays providing NO (normally open) or NC (normally closed) operation
- Energized in the normal position
- 10 second trip time delay
- 30 second clear time delay, unless cleared by the reset button
- Rated for 3 amps at 24 VDC or 120 VAC
- Have a green LED in the coil that when lighted indicates the relay is in the normal position

Optional Analog Output Board

- Provides isolated 4/20 mA output for each channel
- Power required: 24 VDC at 30 mA per channel provided by receiving equipment
- Signal: 2 wire 4/20 mA linear
- Input impedance: 250 ohms max at receiving equipment

2 Installation

A Locating Manning GM-4

Normally the main control unit will be shipped in one container and the sensor enclosures in a second container. Inspect all boxes and their contents for shipping damage. If any screws or other metal parts are missing, they must be found to ensure that the printed circuits will not be damaged when power is applied.



It is absolutely essential that the proper sensors be connected to their corresponding channels. The channels are numbered one through four on the terminal strips in the main control unit.

It is also important that the installer identify on a plant floor plan where each sensor is located, and the channel number to which each sensor reports.

The control unit is designed to be mounted on a solid (non-vibrating) wall through holes in the four mounting flanges. While the physical location must be determined in part by local conditions, it is important to consider the following:



IMPORTANT: Mount the unit in a location with access on sides and bottom for conduit entry. Make sure that mounting location allows for complete door swing. See Figure 2 for proper cable entry locations before mounting the Manning GM-4 unit.

Be sure to use the cable tray and tie wraps so proper display hinge movement is possible after installation.

- Mounting dimensions are shown in Figure 1.
- Protect the Manning GM-4 from rain, snow, water sprays, cleaning crews, and physical damage.
- Mount the unit on a solid wall (non-vibrating) at eye level for convenience in taking readings, servicing, etc.
- The Manning GM-4 is **NOT** explosion proof. **DO NOT MOUNT** in a hazardous atmosphere.


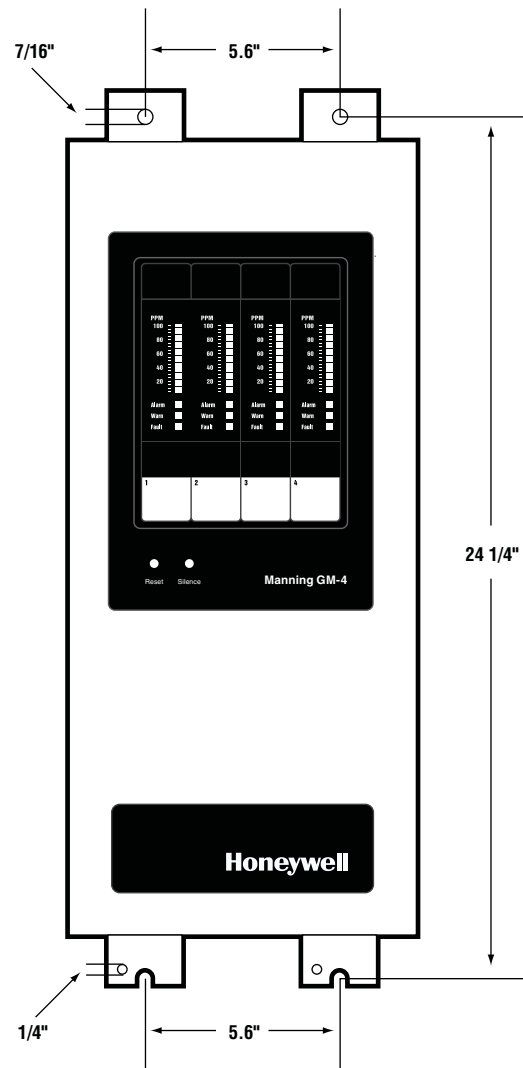
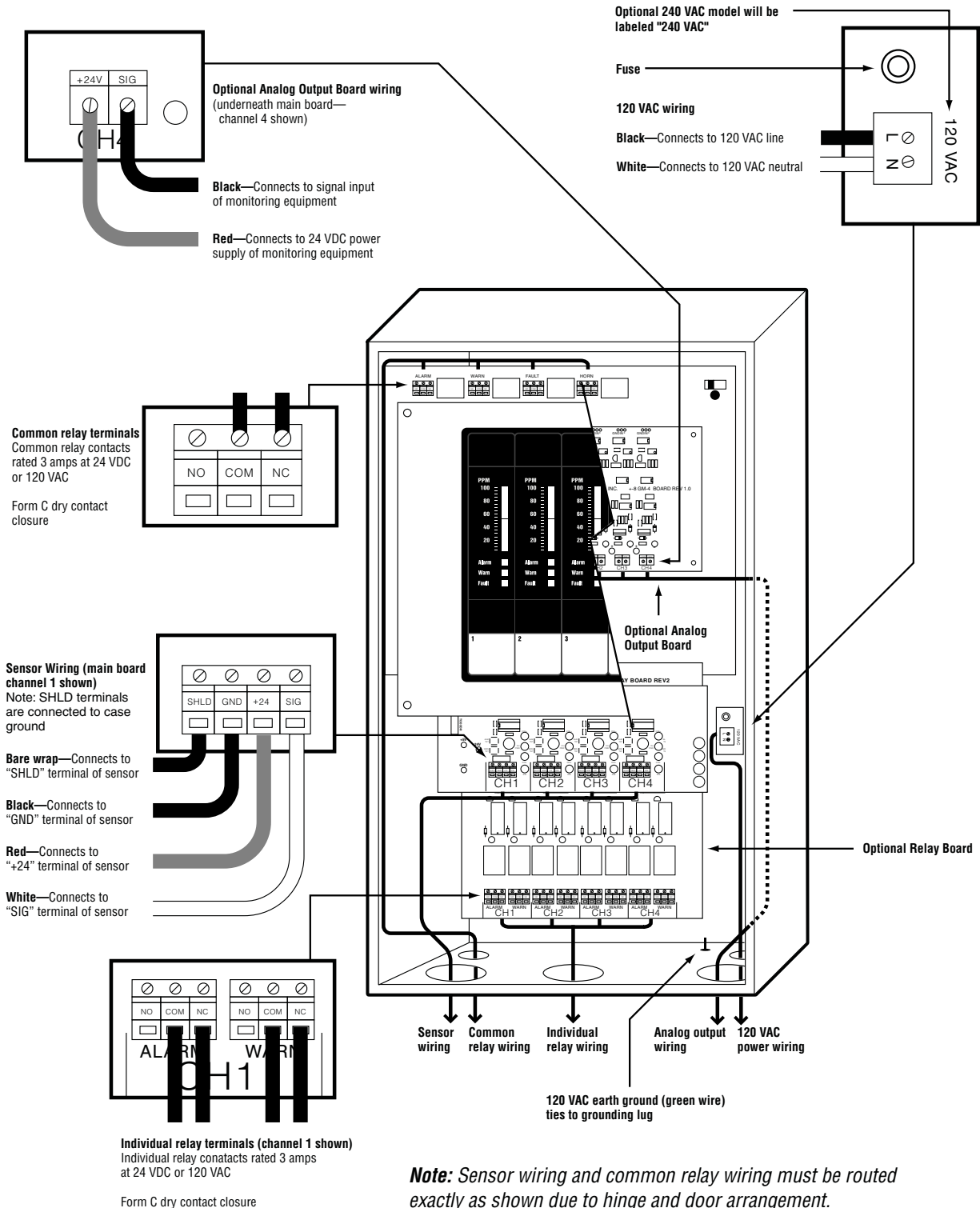
- Operating temperature for the Manning GM-4 is +32° F to +105° F.
- **DO NOT** drill holes in the top of the cabinet as this will void the warranty. 
- If hole drilling is required, be sure to remove all metal filings.
- Cable routing is shown in Figure 2. It is very important to follow routing diagram.

Figure 1: Mounting dimensions for the Manning GM-4 Gas Monitoring Alarm System



2 Installation continued

Figure 2: Cable Routing and Wiring for the Manning GM-4 Gas Monitoring Alarm System



2 Installation continued

B Wiring

Electrical wiring must comply with all applicable codes. Plant equipment that may be involved and operating conditions should be discussed with local operating personnel to determine if any special needs should be considered.

Nearly all start-up problems are due to improper wiring or monitor configuration. Please follow these guidelines carefully. Figure 2 presents a cable routing and wiring diagram for the Manning GM-4.



VERY IMPORTANT: Sensor wiring and common relay wiring must be routed exactly as shown in Figure 2 due to hinge and door arrangement.

Enclosure Penetrations:

All wiring entering or leaving the enclosure should utilize existing holes. Proper conduit hubs or cable connections must be used to maintain enclosure integrity.



AC Power Wiring:

- Use only stranded cable for AC power, relay outputs, and sensor input cables.
- The units must have a proper third wire ground for safety and sensor shielding. Be sure to follow local codes.
- Power should be provided from a readily accessible breaker which can be used as a means of disconnection for the Manning GM-4.
- All AC cables must be kept away from the incoming sensor cables, i.e., **do not** put AC cables inside conduit containing sensor cables.
- Keep all wiring away from variable speed drives and SCR control units to minimize electrical noise exposure.
- Honeywell Analytics recommends the use of an uninterruptible power supply for protection against power disturbances, outages, etc.

Relay Wiring:

All relays have Form C, dry contacts. Any required power source must be within the rating and fused or current limited to keep from damaging the contacts.

- All relays are rated for 3 amps at 120 VAC or 24 VDC.
- Relay wiring must be run in separate conduit from the sensor cable if the relay circuit is AC.

NOTE: All relays are energized in a non-alarmed condition so that a power loss in the Manning GM-4 will result in alarms.



Sensor Wiring:

- See sensor manual for proper sensor cable.
- Use 3 conductor, 18 AWG stranded, shielded cable (Belden #8770 or equivalent). In some cases 16 AWG may be required (Belden #8618 or equivalent). Review individual sensor manuals for details.
- See sensor manual for proper sensor location.
- Never run AC circuits in the same conduit as the sensor cable.



Analog Output Wiring:

- The analog output is a loop powered 4/20 mA signal for monitoring by customer's equipment.
- Use shielded 2-conductor cable compatible with receiving equipment.
- Never run AC circuits in the same conduits as the analog outputs.



3 Operation

A Display Panel

Figure 3 presents setpoint adjustments and DIP switch settings for the Manning GM-4.

A 20-segment *Bargraph Display* indicates the gas concentration level. The bottom LED is always lighted to indicate power to the channel. Any unused channels should be turned off using the Power DIP switch for that channel.

The *Warning LED* indicates the warning level has been exceeded as determined by the warning setpoint. A warning on any channel will trigger the common warning relay and the individual warning relay for that channel on the optional Relay Board. The *Warning LED*, *Common Warning Relay*, and optional *Individual Warning Relay* are individually switch selectable to latch or not latch.

The *Alarm LED* indicates the alarm level has been exceeded as determined by the alarm setpoint. An alarm on any channel will trigger the common alarm relay, the individual alarm relay for that channel on the optional Relay Board, and will trigger the common horn relay and buzzer. The *Alarm LED*, *Common Alarm Relay*, optional *Individual Alarm Relay* are individually switch selectable to latch or not latch.

The *Fault LED* indicates an improper signal from the sensor on that channel. A fault on any channel will trigger the common fault relay, the common horn relay, and the buzzer.

B Reset and Silence Buttons

Pushing the *Reset* button will attempt to clear any latched LEDs or relays. If the channel is still in alarm, the corresponding LED and relay will not clear.

Pushing the *Silence* button will silence the buzzer and clear the common horn relay until the next event occurs. The buzzer and horn relay operate together and are triggered by a fault or an alarm condition.

c DIP Switch Settings

The *Channel Power*, *Warning LED Latch*, and *Alarm LED Latch* switches are mounted on the back side of each channel. The display panel must be swung open to gain access (see Figure 3).



D Alarm Test and Warning Test Buttons

Each channel has an alarm test button and warning test button located beside the sensor terminal block (see Figure 4).



Pressing this button lights up the bargraph LED at the set point trip level. Continuing to hold this button for the 10 second time delay will cause the appropriate common and individual relays to trip. These buttons have no effect on the optional Analog Output Board.

E Alarm Setpoints

Each channel has a field adjustable warning setpoint and field adjustable alarm setpoint determined by the setpoint jumpers on the back of each display (see Figure 3).

To access the jumpers, open the main door, and swing open the display panel. The jumpers are located on the back side of each bargraph display. Each setpoint is adjustable in 5% increments throughout the range of the sensor (starting at 10%).

Place the alarm and warning jumpers at the desired percentage of full scale on the appropriate jumper block. If a jumper is not installed, that function will default to the alarm condition.

3 Operation continued

After making adjustments, push the alarm test button and warning test button for that channel while observing the bargraph to verify proper concentration setpoints (see Section F below).



The fault setpoints are factory set to trigger at any signal less than 1.5 mA.

Contact Honeywell Analytics if you have any questions or want help in determining setpoints for your particular sensor and application.

F Signals

The voltage between testpoint *GND* and testpoint *SIG* indicates the mA signal received from the sensor. The normal range is 0.4 volts to 2.0 volts, which corresponds with 4 to 20 mA. Figure 4 presents signal readings on the Manning GM-4. When testpoint *SIG* is at 0.4 VDC, only the bottom bargraph LED will be lighted. When testpoint *SIG* is at 2.0 VDC, all 20 bargraph LEDs will be lighted.

G Power-Up Procedures

Before applying power, make a final check of all wiring for continuity, shorts, grounds, etc. It is usually best to disconnect external alarms and other equipment from the unit until the initial power-up procedures are completed.

On most sensors it is normal for the bargraph to go full scale and slowly come back down in about one minute as the sensor stabilizes.

Power-Up Time Delay

The Manning GM-4 has a power-up time delay which holds all LEDs and relays in their normal state for five minutes after application of power or after a momentary power loss. This allows the connected sensors time to stabilize before alarms are enabled.

Honeywell Analytics recommends the use of an uninterruptible power supply to avoid alarm and control problems caused by power interruptions.

After power-up, allow 24 hours for the system to stabilize before testing the sensors. Because sensors are normally located at a distance from the monitoring unit, the test time required and accuracy of the response checks will be improved if two people perform the start-up procedures and use radio contact.

Start-Up Test

One person exposes each sensor to a small amount of the gas that is being monitored. The second person stays at the Manning GM-4 unit to determine that the sensor, when exposed to the gas fumes, is connected to the proper input, responds, and causes appropriate alarm functions.

H Calibration Mode

The Manning GM-4 can be put in "Calibration Mode" by moving the slide switch labeled "CAL" located on the upper right corner of the Manning GM-4 (see Figure 4). When placed in "Calibration Mode," the readouts for the sensors on the Manning GM-4 will all flash, indicating the unit is in "Calibration Mode," and the sensors can then be calibrated without tripping the relays on the Relay Board or the common relays on the GM-4 main board. This allows calibration without affecting plant equipment.

To return the unit to regular operation, slide the "CAL" switch back and push the small red "Calibration Reset Button." The readouts will quit flashing, indicating that the relays will trip if a sensor reaches the Warning or Alarm levels.

3 Operation continued

I Troubleshooting

Sensors

The unit will indicate a fault if the signal is less than 0.15 volts at testpoint *SIG* (see Figure 4, Note 3).

Some Manning sensors are configured to send a signal of 0.05 volts at testpoint *SIG* if a sensor fault exists. If testpoint *SIG* = 0.05 volts, this indicates a properly wired sensor in a fault condition. Proceed to investigate the sensor.

If testpoint *SIG* = 0.00 volts, this indicates no signal from the sensor. Check the fuse which supplies 24 VDC to that sensor's terminal block. If the channel power LED is not lighted green, then the fuse is blown. Four spare fuses are mounted to the right of channel four sensor wiring (see Figure 4). If the sensor terminal block has power, check for correct wiring or loose connections between the sensor and monitoring unit.

To verify proper sensor current draw, measure the voltage between the CD+ and CD- testpoints (see Figure 4, Note 1). Each 1.0 mV corresponds to 10 mA. Compare this reading to the factory data sheet to verify proper current draw of the sensor.

Figure 4 presents details on troubleshooting the Manning GM-4. Power supply voltages should be checked at the +5V (see Note 2) and +24V testpoints (see Note 5). All points should be DC Volts as labeled. The power supply to each sensor should be checked at each sensor terminal block. It should be 24 VDC.

If false signals or no signals are received from one or more sensors, check wiring and refer to the sensor manual's troubleshooting section.

Relays

Each relay has a green LED in its coil circuit that, when lighted, indicates the relay is in its "normal" position as marked on the terminal blocks.

If power is removed from the Manning GM-4 or a particular channel, the associated relays will default to the "not normal" position.

Pressing *Reset* will clear any relays that are latched only if the condition that tripped the relay has cleared.

Analog Outputs



The optional isolated analog outputs must be powered from the receiving equipment with 24 VDC. The analog outputs should be treated as a 2-wire, loop powered device. Maximum input impedance of the receiving equipment is 250 ohms.

The voltage between the testpoints on each analog output should be 40 mV to 200 mV (see Figure 4, Note 4), which corresponds to a signal of 4 to 20 mA.

If this signal is 0 mV, no current is flowing. Check 24 VDC loop power and receiving equipment input impedance.

If questions arise, call Honeywell Analytics.

J Maintenance

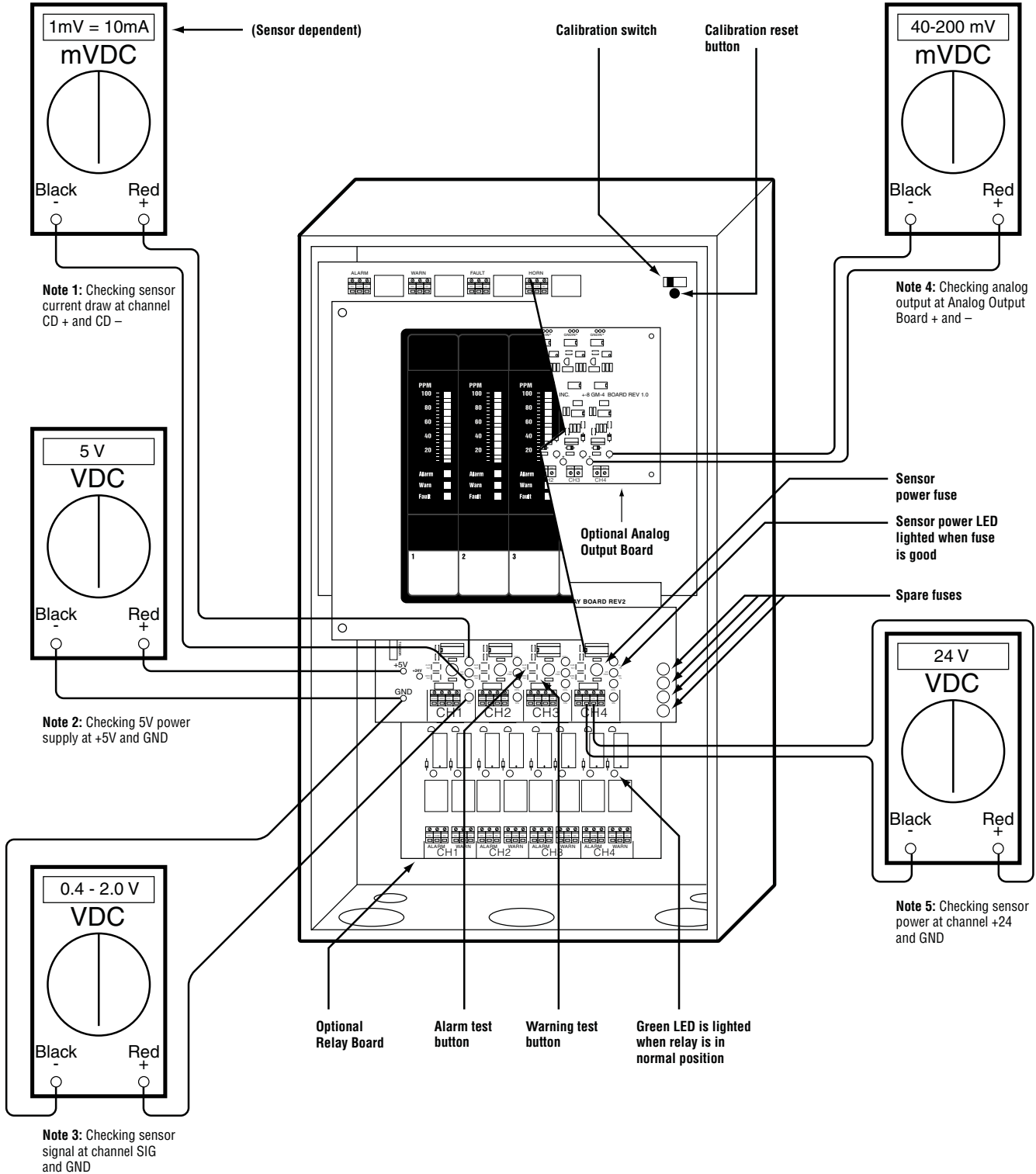
The Manning GM-4 is designed for long life and high reliability. Honeywell Analytics recommends checking signal voltages monthly and logging them on the data sheet included with your Manning GM-4. Additionally, the sensors being monitored should be exposed to certified calibration gas on a six-month basis while all alarm functions are verified at the Manning GM-4. This will test the sensor and any equipment connected to the relays, in addition to the Manning GM-4. Be sure to review the test requirements of individual sensors as more stringent testing may be required.

K Replacement Parts

For replacement parts, contact Honeywell Analytics. Be sure to give serial number and model number of unit.

3 Operation continued

Figure 4: Signals and Troubleshooting the Manning GM-4



4 Limited Warranty

1. Limited Warranty

Honeywell Analytics, Inc. warrants to the original purchaser and/or ultimate customer ("Purchaser") of Manning products ("Product") that if any part thereof proves to be defective in material or workmanship within eighteen (18) months of the date of shipment by Honeywell Analytics or twelve (12) months from the date of first use by the purchaser, whichever comes first, such defective part will be repaired or replaced, free of charge, at Honeywell Analytics' discretion if shipped prepaid to Honeywell Analytics at 405 Barclay Blvd., Lincolnshire, IL 60069, in a package equal to or in the original container. The Product will be returned freight prepaid and repaired or replaced if it is determined by Honeywell Analytics that the part failed due to defective materials or workmanship. The repair or replacement of any such defective part shall be Honeywell Analytics' sole and exclusive responsibility and liability under this limited warranty.

2. Exclusions

- A. If gas sensors are part of the Product, the gas sensor is covered by a twelve (12) month limited warranty of the manufacturer.
- B. If gas sensors are covered by this limited warranty, the gas sensor is subject to inspection by Honeywell Analytics for extended exposure to excessive gas concentrations if a claim by the Purchaser is made under this limited warranty. Should such inspection indicate that the gas sensor has been expended rather than failed prematurely, this limited warranty shall not apply to the Product.
- C. This limited warranty does not cover consumable items, such as batteries, or items subject to wear or periodic replacement, including lamps, fuses, valves, vanes, sensor elements, cartridges, or filter elements.

3. Warranty Limitation and Exclusion

Honeywell Analytics will have no further obligation under this limited warranty. All warranty obligations of Honeywell Analytics are extinguishable if the Product has been subject to abuse, misuse, negligence, or accident or if the Purchaser fails to perform any of the duties set forth in this limited warranty or if the Product has not been operated in accordance with instructions, or if the Product serial number has been removed or altered.

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