

MGS SERIES

Multi-Channel Input
Single and Dual Alarm
Controllers

Installation and Operation Manual
Instruction 6709-9000
Rev 2 – June 2014



Product Leadership • Training • Service • Reliability

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Section 1. Introduction

1.1. Overview

The MGS Series controllers provide local alarm status indications (via multi-colored, per-channel LEDs) as well as single-level or dual-level digital (relay) alarm outputs based on 1, 2, 4, or 6 input signals and 1 or 2 user-definable set-points.

1.2. 2-Channel and 6-Channel Models

MGS Controllers support multiple input sensors/transmitters (1, 2, 4, or 6 channels) based on the model of the controller. Inputs are standard 4-20 mA signals from MGS-series sensors or any standard, linear, 4-20 mA transmitter.



NOTE: The smaller MGS Controller supports up to two input channels (see Figure 1). The larger controller supports up to six channels (see Figure 2). The number of alarm LEDs on your controller will vary based on the flavor of device that is ordered.



IMPORTANT: If you are NOT using the maximum number of available channels (2 for the smaller controller, and 6 for the larger controller), you must connect a 3300 Ω resistor across pins 1 and 2 for each unused input channel.

1.3. Alarming

Regardless of the number of channels supported, each controller contains either 1 or 2 adjustable potentiometers (pots) for setting the alarm value(s). Single-level alarm controllers contain one pot which sets the controller's alarm threshold. Dual-level alarm controllers contain two pots which are used to set the low-level and high-level alarm thresholds.

As an individual channel's input signal exceed the controller's alarm threshold (set by the programmable pot(s)), the corresponding channel's alarm LED is illuminated, allowing a technician to visually inspect the controller for any alarm conditions on a channel-by-channel basis.

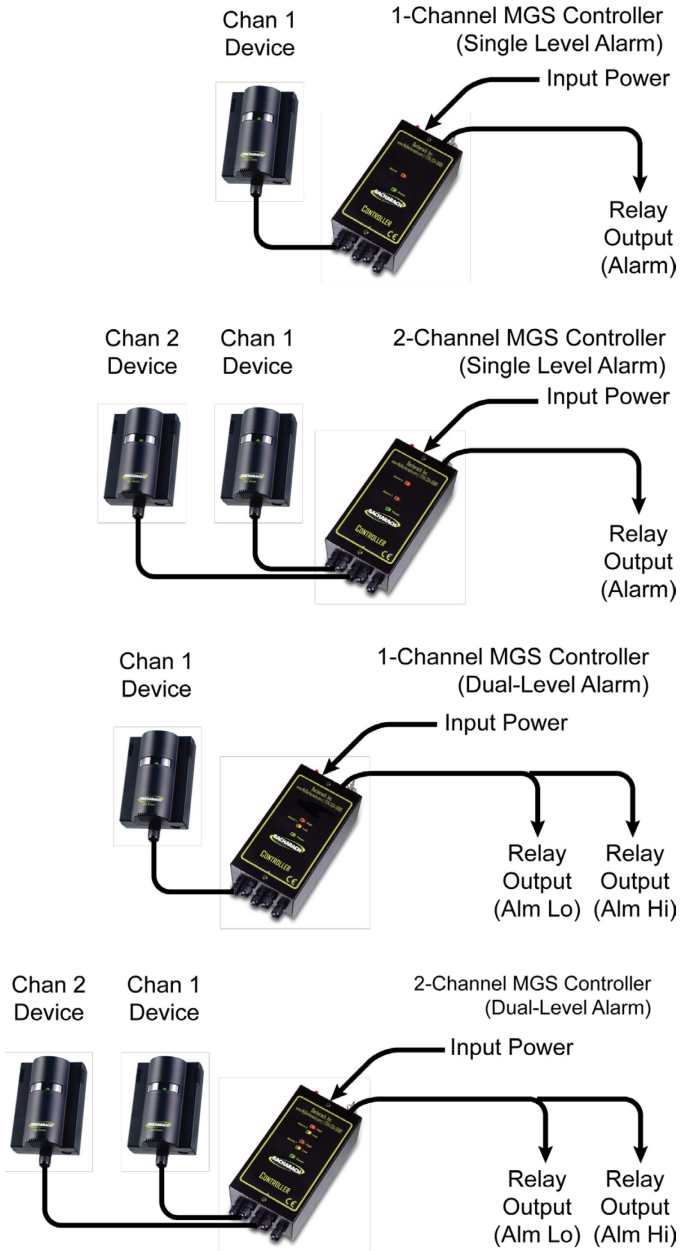


Figure 1. Sample Configurations (1,2-Channel)

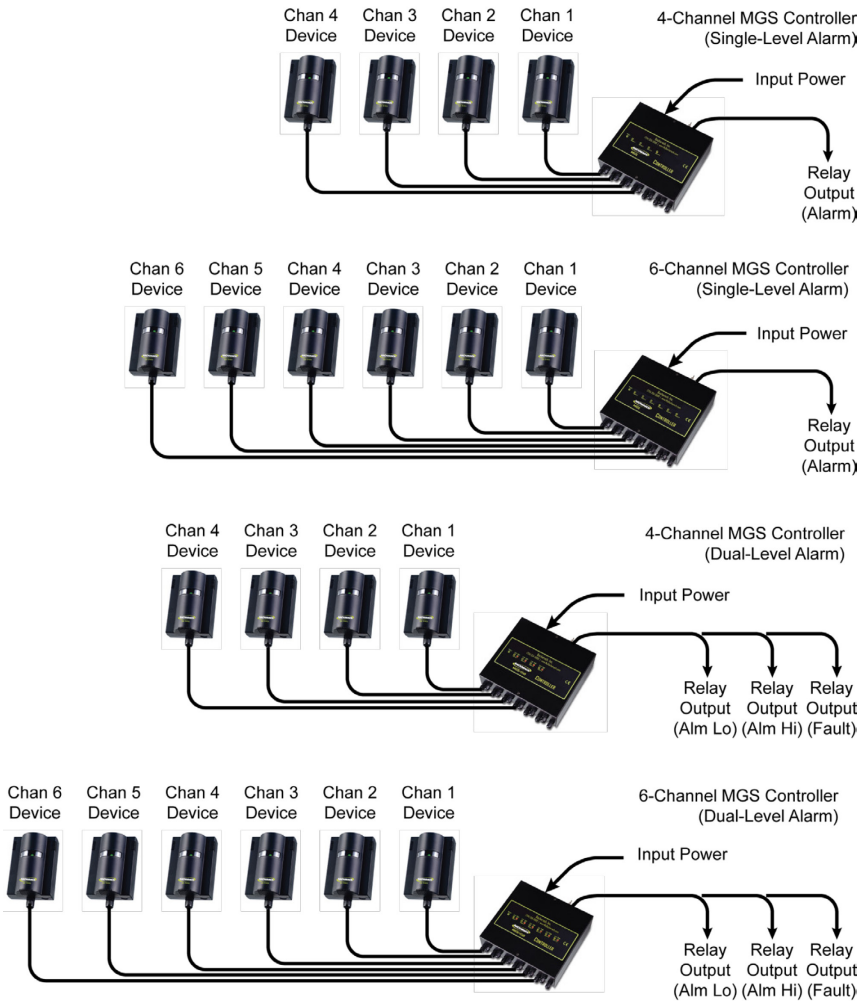


Figure 2. Sample Configurations (4,6-Channel)

MGS Controllers have either one or two relay outputs: one for single-level alarm controllers (“Alarm”), and 2 for dual-level alarm controllers (“Alarm High” and “Alarm Low”). Unlike the alarm LEDs that provide a channel-by-channel alarm status of each incoming transmitter’s signal, the relay output “trips” or “energizes” if *any* of the inputs exceed the alarm threshold set by the pot (that is, if *any* of the alarm LEDs is energized). Alarm relays can be used to activate warning lights, sirens, ventilation fans, etc.

For dual-alarm configurations, the Alarm Low relay output “trips” or “energizes” if *any* of the inputs exceed the alarm threshold set by the low alarm pot. Similarly, the Alarm High relay output “trips” or “energizes” if *any* of the inputs exceed the alarm threshold set by the high alarm pot.

All controllers have a green power LED that is on when the unit has power. The 4- and 6-channel 2-level units have a fault relay which “trips” or “energizes” if the controller experiences a fault condition. Like the alarm relays, the fault relay can be use to activate warning lights, sirens, ventilation fans, etc.

1.4. Components

The following is a summary of the MGS Controller’s hardware components. Note that features vary based on model and features (e.g., 1-2 channel units vs. 4-6 channel units, single-level alarms vs. dual-level alarms, etc.).

Components	Descriptions			
Power input	Provides power to the MGS Controller			
Power LED	Power status indicator			
Channels (max)	1-2 Channel Units		4-6 Channel Units	
Sensor input(s) max	2 max		6 max	
Alarm levels	Single	Dual	Single	Dual
Set point POT(s)	1	2	1	2
Alarm relay output(s)	1	2	1	2
Alarm LED(s) (max)	2	4	6	12
Fault relay output	N/A	N/A	N/A	1



NOTE: For single-alarm configurations, the Low Alarm LEDs are not present.

1.5. Specifications

Specification	1-2 Channel	4-6 Channel
Product Type	1-2 channel alarm controller	4-6 channel alarm controller
Max Channels	2	6
Inputs	4-20 mA	4-20 mA
Display	LED alarm indicators	LED alarm indicators
Ambient Temperature Range	-20 to +50 degrees C	-20 to +50 degrees C
Power Supply	100V-230V AC (50-60Hz) or 12V DC (Specify at time of order)	100V-230V AC (50-60Hz) or 12V DC (Specify at time of order)
Max Power	15 W Max	25 W Max
Audible Alarm	Integrated	12 VDC
Alarm Set points	User selectable. Common to all channels. Alarm level set point is based on 4-20 mA input signal.	User selectable. Common to all channels. Alarm level set point is based on 4-20 mA input signal.
Alarm Relays	One 10-A 30 VDC or 250 VAC resistive Form C relay. Two for dual-alarm configurations. Common low alarm and high alarm across channels.	One 10-A 30 VDC or 250 VAC resistive Form C relay. Two for dual-alarm configurations. Common low alarm and high alarm across channels. Common fault relay on dual-level alarm configurations.
Housing	NEMA 1 wall mount	NEMA 1 wall mount
Approvals	UL/CSA/IEC/EN 61010-1 CE	UL/CSA/IEC/EN 61010-1 CE



NOTE: If replacement of either main power fuse is required, use only a 2A 250V slow fuse (0.79 in/20mm) T2AL250V.

Section 2. Mounting Instructions

2.1. Installation Warnings



WARNING: Explosion hazard! Do not mount the MGS Controller in an area that may contain flammable liquids, vapors, or aerosols. Operation of any electrical equipment in such an environment constitutes a safety hazard.



CAUTION: The MGS Controller contains sensitive electronic components that can be easily damaged. Do not touch nor disturb any of these components.



NOTE: The mounting location of the MGS Controller should allow it to be easily accessible for visual monitoring and servicing.



NOTE: The MGS Controller must be connected by a marked, suitably located and easily reached switch or circuit-breaker as means of disconnection.



NOTE: Connect power and signaling terminals using wiring that complies with local electrical codes or regulations for the intended application.

2.2. Location Recommendations



NOTE: The MGS Controller should be installed plumb and level and securely fastened to a rigid mounting surface.

At a minimum, the MGS Controller must be located within the appropriate wire lengths from the sensors being monitored. In addition, consider environmental conditions and accessibility. Refer to Section 3 for more information on sensor wiring lengths.

Sensors must be located within the appropriate wire lengths from the central control unit (if used).

In all cases the sensor supplied is designed for maximum sensitivity to a particular gas. However, in certain circumstances false alarms may be

caused by the occasional presence of sufficiently high concentrations of other gaseous impurities. Examples of situations where such abnormalities may arise include the following:

- Plant room maintenance activity involving solvent or paint fumes or refrigerant leaks.
- Accidental gas migration in fruit ripening/storage facilities (bananas - ethylene, apples - carbon dioxide).
- Heavy localized exhaust fumes (carbon monoxide, dioxide, propane) from engine-driven forklifts in confined spaces or close to sensors.

Bacharach recommends setting the alarm delay to minimize false alarms. See Section 4.7 for more information.

2.3. Mounting Dimensions

The controllers contain a single teardrop cutout at the top center of the enclosure. Two smaller holes are located in the bottom corners of the enclosure. Refer to the mounting dimension figures that follow.

Each enclosure base provides a 1/2" standoff from the mounting surface to allow use of a power line knockout in back of enclosure base. Power wiring may also enter the enclosure via one of the input holes on the bottom of the enclosure.

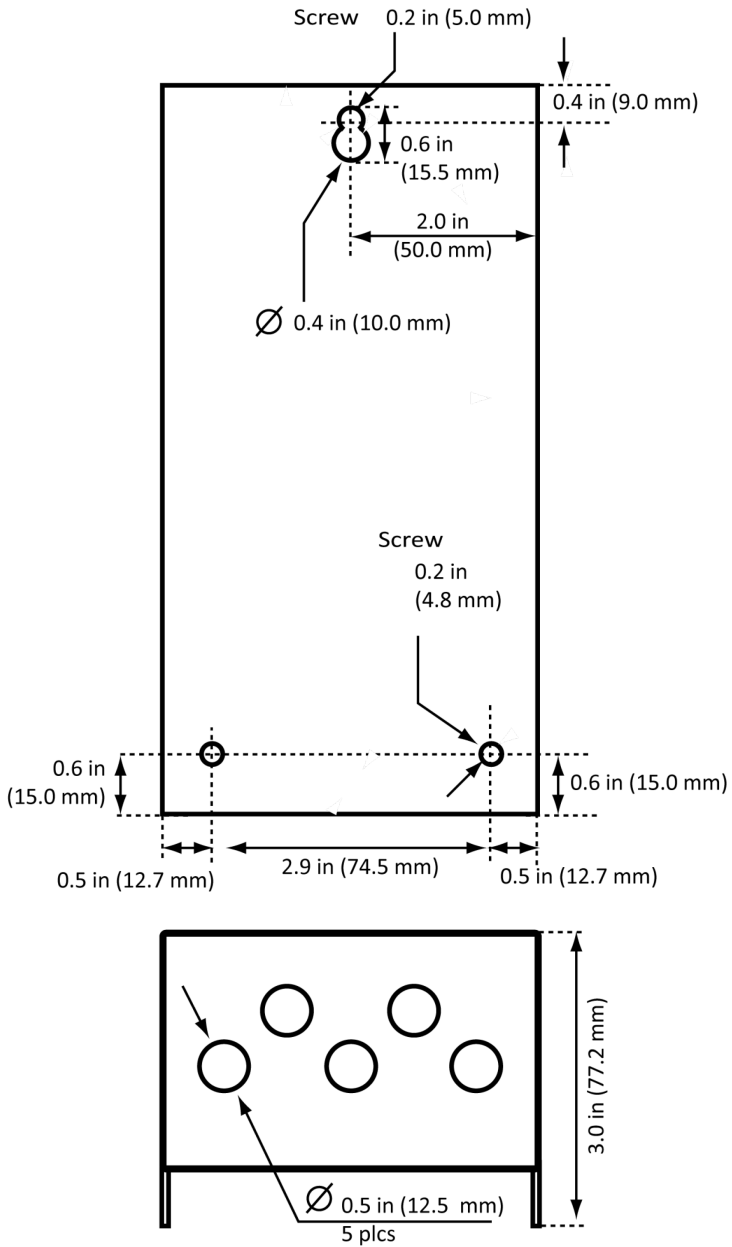


Figure 3. Mounting Dimensions (2-Channel Unit)

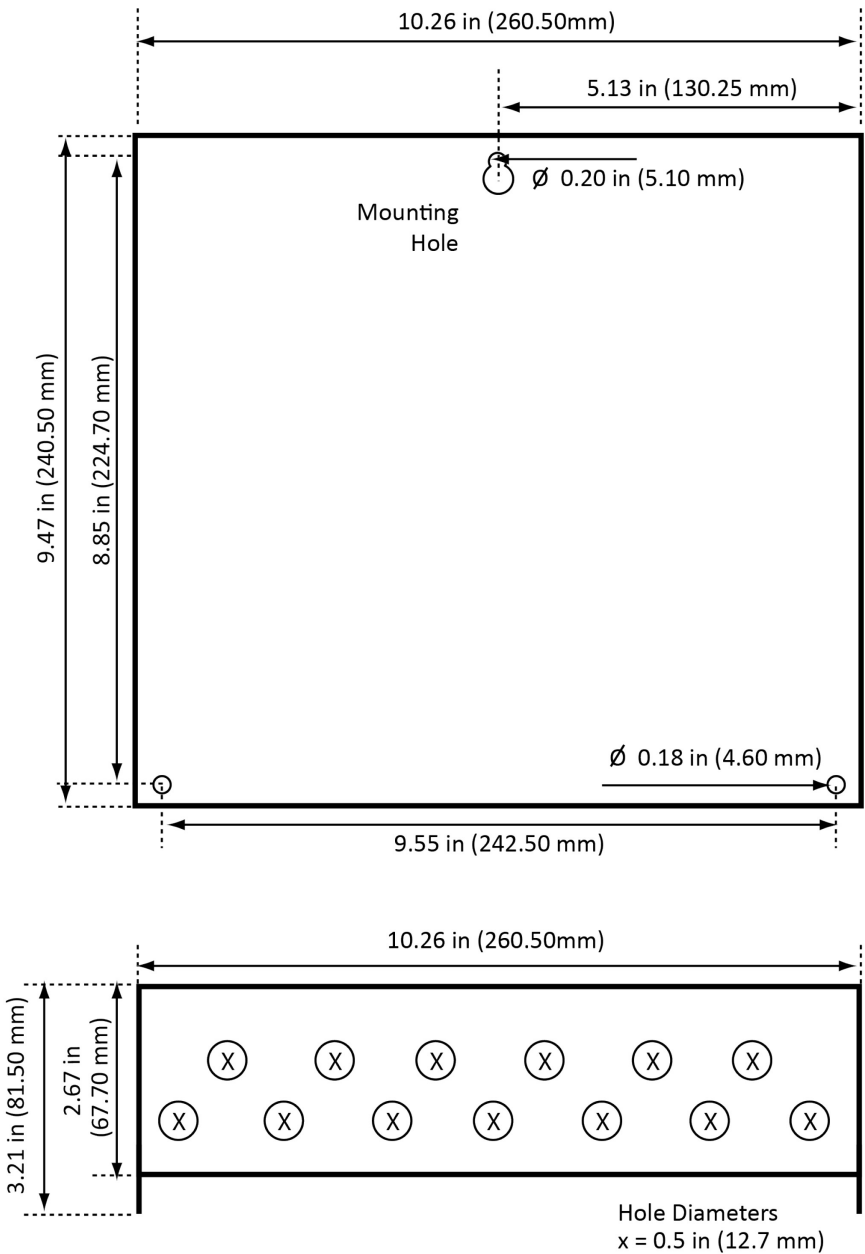


Figure 4. Mounting Dimensions (6-Channel Unit)

Section 3. Wiring

3.1. 1- and 2-Channel Units (Single- and Dual-Alarm)

Controller Terminal Block	Controller Pin Number	Signal	Sensor/ Transmitter
Sensor Connections	1	+Ve supply	+V in
	2	4-20 mA signal	4-20 mA out
	4	-Ve input	GND in

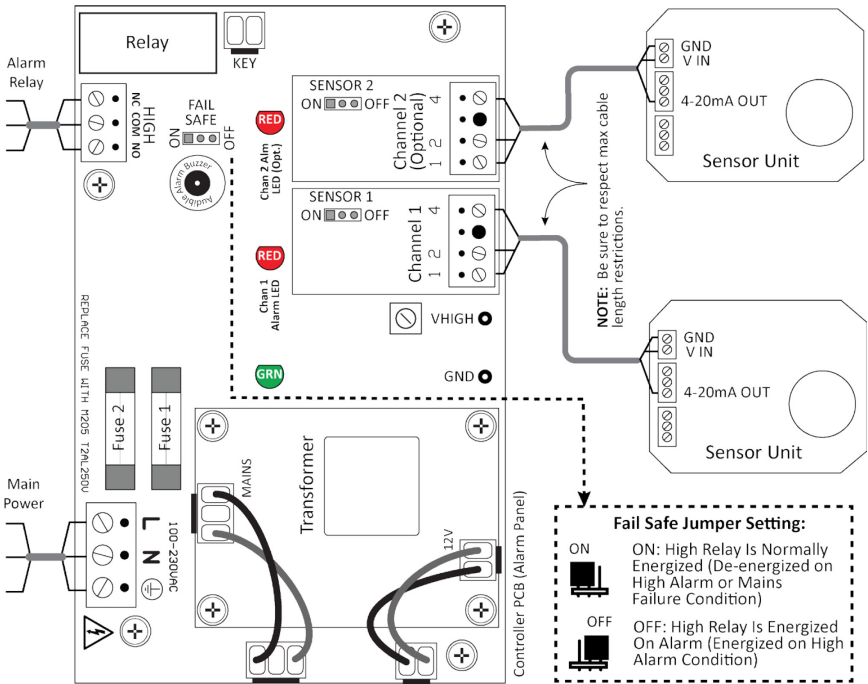


Figure 5. Wiring (2-Channel, Single-Alarm Unit Shown)



NOTE: The potential from -Ve to +Ve is approximately 15 VDC.

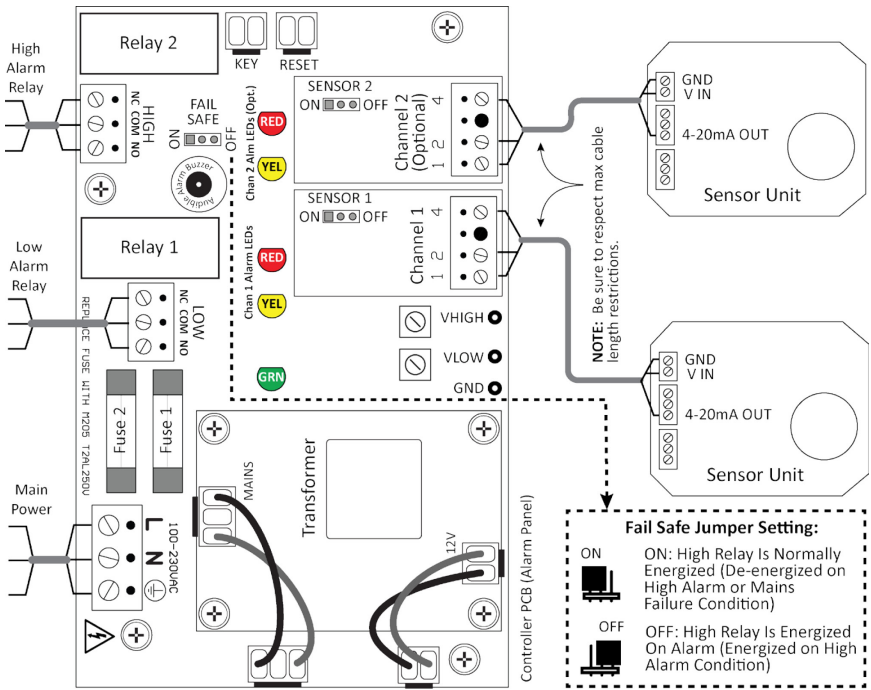


Figure 6. Wiring (2-Channel, Dual-Alarm Unit Shown)

3.2. 4- and 6-Channel Units (Single- and Dual-Alarm)

Wiring to Sensors

Controller Terminal Block	Controller Pin Number	Signal	Sensor/ Transmitter
CN1 – CN6	1	+Ve supply	+V in
	2	4-20 mA signal	4-20 mA out
	4	-Ve input	GND in

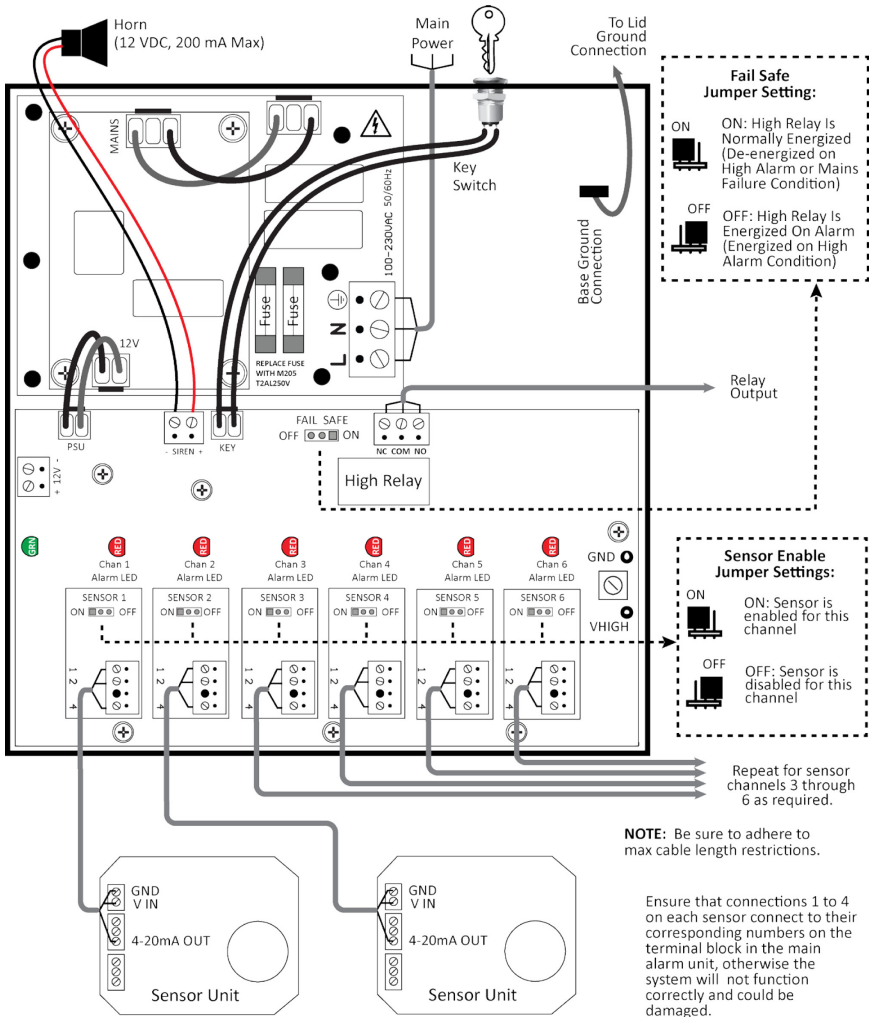


Figure 7. Wiring (6-Channel, Single-Alarm Unit Shown)

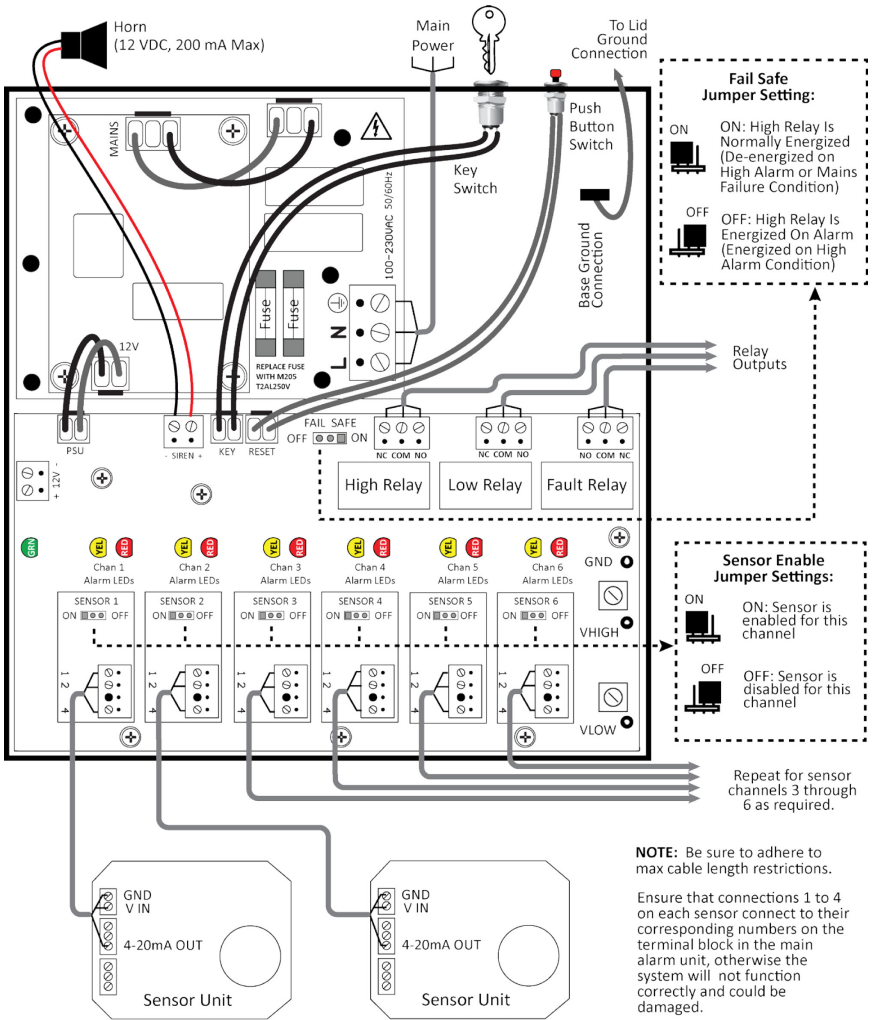
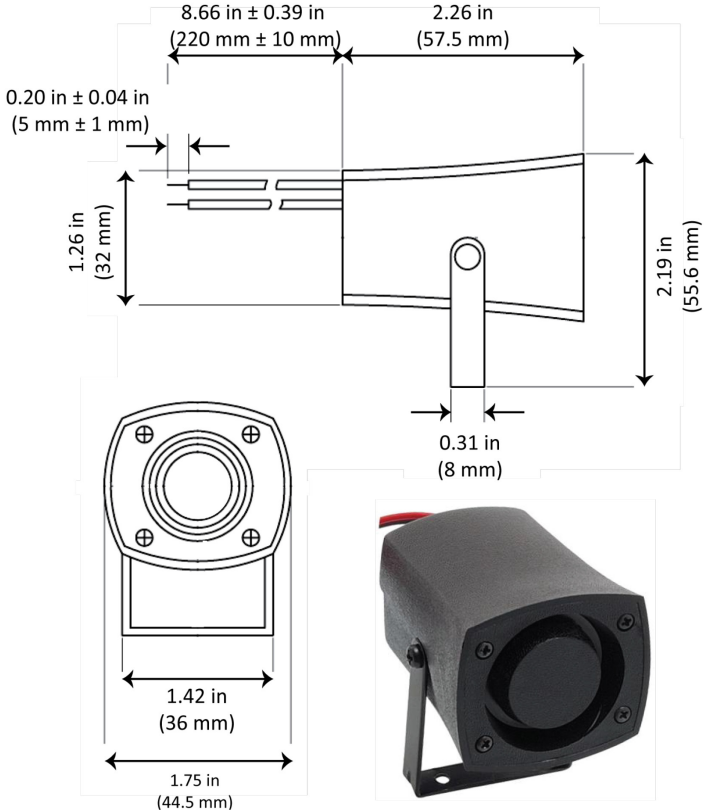


Figure 8. Wiring (6-Channel, Dual-Alarm Unit Shown)



NOTE: An external horn is provided with 4- and 6-channel units. Refer to the next section for details.

3.3. External Horn (for Audible Alarms)



Horn Specifications (Test Conditions at 25°C)

Specification	Description
Housing	Black ABS
Power Rating	10 W (RMS), 15 W (peak)
Voltage	12 VDC (Rated), 6-16 VDC range
Current	200 mA max (@ 12 VDC)
Sound Pressure Level	Minimum 100 dB at 1 meter (@ 12 VDC)
Connections	Red: +12 V, Black: Ground
Weight	2.3 ± 0.2 oz (65 ± 5 g)

Section 4. Configuration and Operation

4.1. Overview

The following topics are explained in this section:

- Changing alarm limits (pots and CAL header)
- Fail-safe operation (jumper)
- Muting the audible alarm (key)
- Resetting high alarms (button)

4.2. Introduction to Changing Alarm Level(s)

Items needed:

- voltmeter
- small flat-blade screwdriver

To monitor and adjust the alarm set point level(s), connect the voltmeter to the appropriate test points on the controller. Then adjust the appropriate potentiometer (HIGH POT for single-alarm configurations, or HIGH POT and LOW POT for dual-alarm configurations) using the flat-blade screwdriver until the desired alarm level is displayed on the voltmeter. The test points are used to monitor the alarm levels of the controller.

The alarm range is set over the voltage range of 0.4 V to 2.0 V. A voltage of 0.4 V equals 0 ppm and 2.0 V equals full scale such as 1000 ppm.

Calculation Example:

Desired Alarm Set Point = 500 ppm. Full scale range = 1000 ppm.

$$V = 0.4v + \left[\frac{\text{Alarm Voltage Range}}{\text{Full Scale PPM Range}} \right] \times \text{Desired Alarm SP}$$

$$V = 0.4v + \left[\frac{2.0v - 0.4v}{1000 \text{ ppm}} \right] \times 500 \text{ ppm}$$

$$V = 1.2 \text{ V (for a 500 ppm alarm level)}$$

4.3. Changing Alarm Level for 2-Channel, 1-Alarm Units

Step	Instructions
1	Connect voltmeter leads to the GND test point and HIGH test point.
2	Using the flat-blade screwdriver, adjust the corresponding HIGH potentiometer until the reading on the DC voltmeter corresponds to the desired input alarm level.



NOTE: When adjusting the alarm level, a 0.4 to 2.0 VDC reading on the voltmeter corresponds to a 4 to 20 mA value for the input alarm threshold.



NOTE: Both channels have the same alarm threshold.

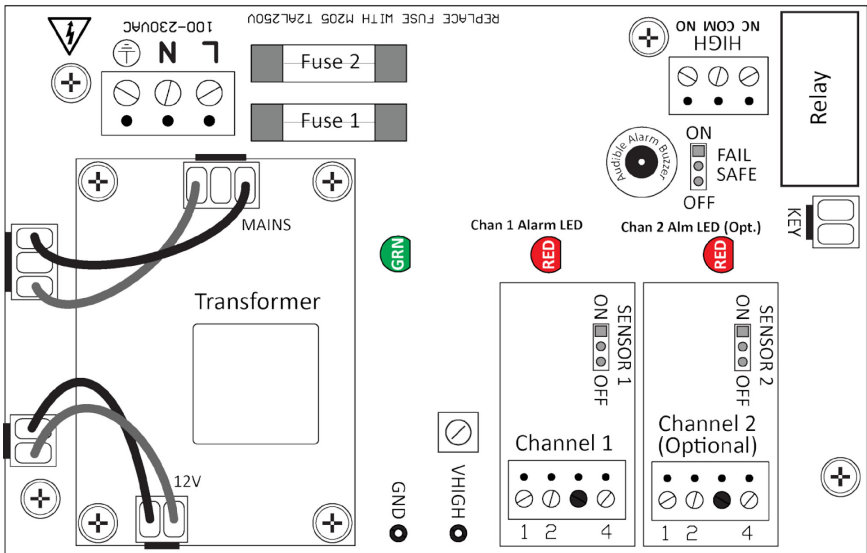


Figure 9. Hardware PCB Layout (2 Channel, 1 Alarm)

4.4. Changing Alarm Level for 2-Channel, 2-Alarm Units

Step	Instructions
1	Connect voltmeter leads to the GND test point and HIGH test point.
2	Using the flat-blade screwdriver, adjust the corresponding HIGH potentiometer until the reading on the DC voltmeter corresponds to the desired input high alarm level.
3	Connect voltmeter leads to the GND test point and LOW test point.
4	Using the flat-blade screwdriver, adjust the corresponding LOW potentiometer until the reading on the DC voltmeter corresponds to the desired input low alarm level.



NOTE: When adjusting the alarm level, a 0.4 to 2.0 VDC reading on the voltmeter corresponds to a 4 to 20 mA value for the input alarm threshold.

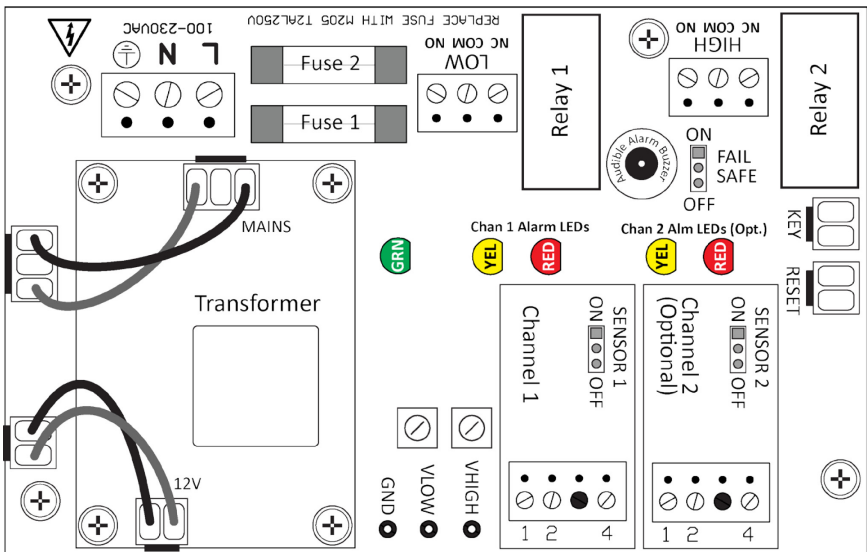


Figure 10. Hardware PCB Layout (2 Channel, 2 Alarm)



NOTE: Both channels have the same alarm thresholds.

4.5. Changing Alarm Level for 6-Channel, 1-Alarm Units

Step	Instructions
1	Connect voltmeter leads to the GND test point and HIGH test point.
2	Using the flat-blade screwdriver, adjust the corresponding HIGH potentiometer until the reading on the DC voltmeter corresponds to the desired input alarm level.



NOTE: When adjusting the alarm level, a 0.4 to 2.0 VDC reading on the voltmeter corresponds to a 4 to 20 mA value for the input alarm threshold.



NOTE: All channels have the same alarm threshold.

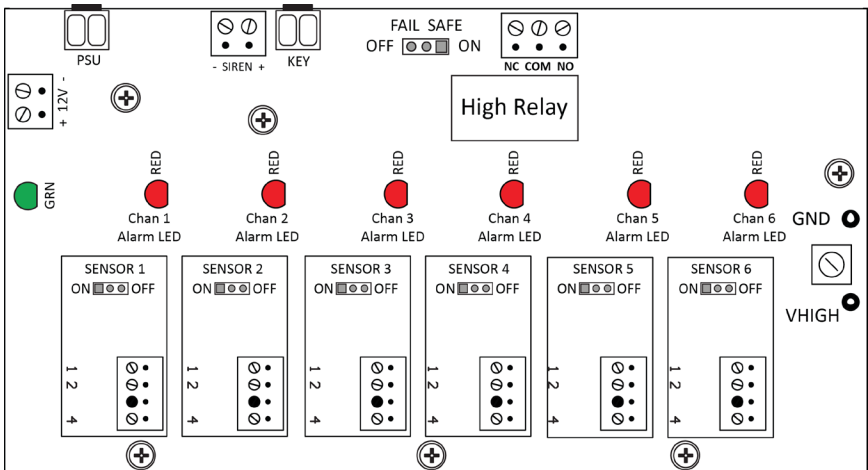


Figure 11. Hardware PCB Layout (6 Channel, 1 Alarm)

4.6. Changing Alarm Level for 6-Channel, 2-Alarm Units

Step	Instructions
1	Connect voltmeter leads to the GND test point and HIGH test point.
2	Using the flat-blade screwdriver, adjust the corresponding HIGH potentiometer until the reading on the DC voltmeter corresponds to the desired input high alarm level.
3	Connect voltmeter leads to the GND test point and LOW test point.
4	Using the flat-blade screwdriver, adjust the corresponding LOW potentiometer until the reading on the DC voltmeter corresponds to the desired input low alarm level.



NOTE: When adjusting the alarm level, a 0.4 to 2.0 VDC reading on the voltmeter corresponds to a 4 to 20 mA value for the input alarm threshold.



NOTE: All channels have the same alarm thresholds.

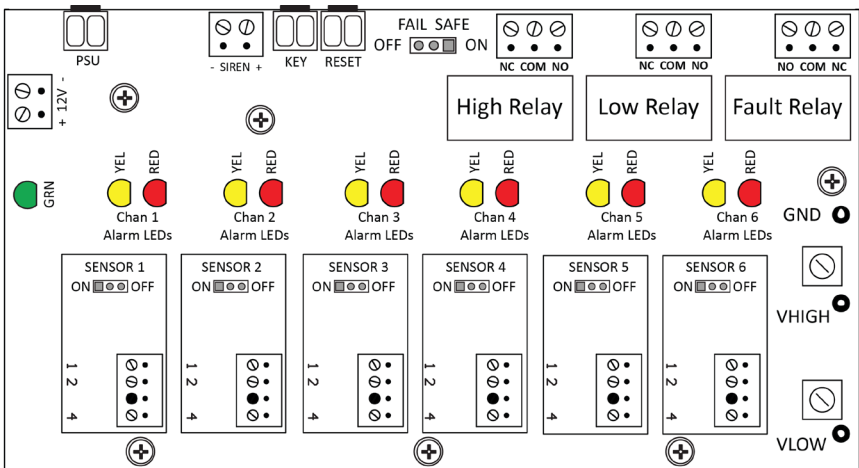




Figure 12. Hardware PCB Layout (6 Channel, 2 Alarm)

4.7. Output Delays

There is a fixed delay between the sensor output indicating an alarm and the controller registering this alarm condition as valid. This is to prevent false alarms on transient outputs. This delay period is fixed and is approximately 25 seconds for the low level and then another 25 seconds for the high level.

4.8. Fail Safe Operation

The fail safe jumper on all units is used to enable/disable the high-level alarm relay to operate in fail safe mode.

Fail Safe Jumper Position	Description
 OFF	High alarm relay is normally open. It is energized on a high alarm condition.
 ON	High alarm relay is normally closed. It is de-energized on high alarm condition OR power failure.

4.9. Muting the Audible Alarm (Key Switch)

If service is being carried out on the system or the user does not require a local audible alarm then it can be muted using the key switch. In the default position, the audible alarm is enabled. In the other position, the audible alarm is off/muted.



NOTE: The key switch can also be used to turn off the local audible alarm during bump tests.

4.10. Resetting High Alarms (Dual-Level Units Only)

The red pushbutton on the controller is used to acknowledge (reset) high alarms. Once the unit goes into a high alarm state the alarm latches. After the gas has cleared the reset button must be pushed to clear the alarm(s).



DECLARATION OF CONFORMITY

The manufacturer of the products covered by this declaration:	Bacharach, Inc. 621 Hunt Valley Circle New Kensington, PA 15068
Year conformity is declared:	2014 (IEC/EN61010), 2011 (EN61326)
Product(s):	MGS
Model(s):	MGS Controller

The undersigned hereby declares that the above referenced products are in conformity with the provisions of the following standard(s) and is in accordance with the following directive(s).

Directive(s):

2004/108/EC	Electromagnetic Compatibility (EMC) Directive
2006/95/EC	Low Voltage Directive (LVD)

Standard(s):

EN 61010-1:2010 IEC 61010-1:2010	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: general requirements
EN 61326-1:2006	EMC requirements for electrical equipment for measurement, control and laboratory use - Part 1: general requirements

Signature:  _____

Name: Aaron Kennison
Title: Engineering Manager
Date: June 11, 2014

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