BACHARACH

MGS-408

Gas Detection Controller

for Commercial & Industrial Applications

Refrigerant Leak Detection

P/N: 1100-2295 | February 2019 Revision 0

User Manual

WARRANTY POLICY

Bacharach, Inc. warrants to buyer that at the time of delivery this product will be free from defects in material and manufacture and will conform substantially to Bacharach, Inc.'s applicable specifications. Bacharach's liability and buyer's remedy under this warranty are limited to the repair or replacement, at Bacharach's option, of this product or parts thereof returned to seller at the factory of manufacture and shown to Bacharach, Inc.'s reasonable satisfaction to have been defective; provided that written notice of the defect shall have been given by buyer to Bacharach, Inc. within one (1) year after the date of delivery of this product by Bacharach, Inc.

Bacharach, Inc. warrants to buyer that it will convey good title to this product. Bacharach's liability and buyer's remedy under this warranty of title are limited to the removal of any title defects or, at the election of Bacharach, to the replacement of this product or parts thereof that are defective in title.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE GIVEN AND ACCEPTED IN LIEU OF (I) ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE: AND (II) ANY OBLIGATION, LIABILITY, RIGHT, CLAIM OR REMEDY IN CONTRACT OR TORT, WHETHER OR NOT ARISING FROM BACHARACH'S NEGLIGENCE, ACTUAL OR IMPLIED. The remedies of the buyer shall be limited to those provided herein to the exclusion of any and all other remedies including, without limitation incidental or consequential damages. No agreement varying or extending the foregoing warranties, remedies or this limitation will be binding upon Bacharach, Inc. unless in writing, signed by a duly authorized officer of Bacharach.

Register Your Warranty by Visiting: www.mybacharach.com

SERVICE POLICY

Bacharach, Inc. maintains a service facility at the factory. Some Bacharach distributors / agents may also have repair facilities; however, Bacharach assumes no liability for service performed by anyone other than Bacharach personnel. Repairs are warranted for 90-days after date of shipment (sensors, pumps, filters and batteries have individual warranties). Should your analyzer require non-warranty repair, you may contact the distributor from whom it was purchased or you may contact Bacharach directly.

If Bacharach is to do the repair work, send the monitor, prepaid, to the closest service center. Prior to shipping equipment to Bacharach, visit www.mybacharach.com for a Returned Merchandise Authorization Number (RMA #). All returned goods must be accompanied by a RMA #. Pack the equipment securely (in its original packing, if possible), as Bacharach cannot be held responsible for any damage incurred during shipping to our facility. Always include your RMA #, shipping address, telephone number, contact name, billing information and a description of the defect as you perceive it. You will be contacted with a cost estimate for

expected repairs prior to the performance of any service work. For liability reasons, Bacharach has a policy of performing all needed repairs to restore the monitor to full operating condition.

NOTICES

Product improvements and enhancements are on-going, therefore the specifications and information contained in this document may change without notice.

Bacharach, Inc. shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Bacharach, Inc.

Table of Contents

1. Introduction

1.1 About this Manual

Thank you for investing in a Bacharach MGS-408 Gas Detector Controller. To ensure operator safety and the proper use of the controller, please read the contents of this manual for important information on the operation and maintenance of the instrument.

IMPORTANT: Before using this product, carefully read and strictly follow the instructions in the manual. Ensure that all product documentation is retained and available to anyone operating the instrument.

1.2 Conventions

1.2.1 Short Form Instructions

This document uses a short form for describing steps (e.g. executing a command).

Example:

Clearing the current fault.

Short Form Instructions:

To clear the current fault: Main Menu > Diagnostics > Clear Fault > press “OK”

Steps Required:

1. Press “OK” to access the Main Menu.
2. Select “Diagnostics.”
3. Select “Clear Fault.”
3. When prompted, press “OK” to clear the current fault.

1.2.2 Iconography

Danger		Imminently hazardous situation which, if not avoided, will result in death or serious injury.
Warning		Potentially hazardous situation which, if not avoided, could result in death or serious injury.
Warning		Potential electrical shock hazard which, if not avoided, could result in death or serious injury.
Caution		Potentially hazardous situation which, if not avoided, could result in physical injury or damage to the product or environment. It may also be used to alert against unsafe practices.
Important		Additional information on how to use the product.

1.3 General Safety Statements

IMPORTANT: Before using this product, carefully read and strictly follow the instructions in the manual. Ensure that all product documentation is retained and available to anyone operating the instrument.

DANGER: This instrument is neither certified nor approved for operation in oxygen-enriched atmospheres. Failure to comply may result in personal injury or death.

WARNING: Under no circumstances should this product be operated without connection to a protective ground. Failure to comply may result in a potential shock hazard and is a violation of electrical safety standards applicable to this category of equipment.

WARNING: Extreme care should be exercised when accessing the product's interior. Only qualified electrical maintenance personnel should perform connections and adjustments. Always remove AC power before working inside the MGS-408's enclosure.

WARNING: Use a DRY CLOTH to clean the outside of this product. DO NOT use soap and water or other detergents. Failure to comply may result in a potential shock hazard.

CAUTION: The protection provided by this product may become impaired if it is used in a manner not specified by the manufacturer. Modifications to this instrument, not expressly approved, will void the warranty.

CAUTION: In case of malfunction, DO NOT continue to use this equipment if there are any symptoms of malfunction or failure. In the case of such occurrence, de-energize the power supply and contact a qualified repair technician or the nearest Bacharach
Service Center.

CAUTION: Use ONLY the provided cable glands for electrical and communication wiring. Drilling into the box will void the warranty.

IMPORTANT: This device is designed for operation at or below and altitude of 6,562 ft (2,000 m). Operation above this elevation may impair product performance.

1.4 Communication Options

The MGS-408 Gas Detection Controller features full two-way communications via an RS-485 interface. MODBUS RTU is the communication protocol standard. The controller can be connected to a Building Management System or it may be operated as a stand-alone system with Bacharach's gas monitors.

2. Product Description

2.1 Product Overview

The MGS-408 Gas Detection Controller displays comprehensive information about the status of all connected gas detectors. A maximum of 8 Bacharach gas detectors can be connected to the MGS-408 via Modbus RTU. Compatible gas detectors are:

- MGS-410
- MGS-450
- MGS-460
- MGS-250
- MGS-550

The MGS-408 can be used to provide power to each connected, compatible gas detector, negating the need for separate power supply at the location of the gas detector.

The MGS-408 displays status via an LCD screen and LEDs. For each connected gas detector, status is clearly indicated via dedicated LEDs to indicate:

- Power & connectivity
- High alarm
- Low alarm
- Fault

The LCD screen will display the current gas reading and gas type for the selected channel, or will indicate fault and/or alarm status. The LCD screen is also used for configuration of the MGS-408 via the integrated keypad.

In addition to the visual alarm status displayed, the MGS-408 includes an integrated audible alarm. An optional audio-visual alarm beacon can be installed, mounted in the top of the enclosure, to enhance local alarm indication.

The MGS-408 provides relays (indicating any high alarm, low alarm or fault status) and can act as a Modbus slave device. This allows connection to a third-party device such as a Building Management System (BMS) or Programmable Logic Controller (PLC).

Data logging is available on the MGS-408 via the integrated SD card, which can be removed to allow download of the logged data to a computer.

WARNING: This instrument is neither certified nor approved for operation in oxygen-enriched atmospheres. Failure to comply may result in EXPLOSION.

WARNING: This instrument has not been designed to be intrinsically safe for use in areas classified as being hazardous locations. For your safety, DO NOT use it in hazardous (classified) locations.

2.2 Intended Use

The MGS-408 is intended to be used to provide audio-visual alerts and information on the status of a network of gas detectors in a centralized location. This allows clear at-a-glance visualization of any alarm or fault status on a connected gas detector in a location outside of the monitored space, as required by many regulatory codes and standards.

2.3 Design Features

Power options:

- 100 - 240 VAC, 50/60 Hz, 80W (max.)
- Provides power for 1 - 8 compatible Bacharach gas detectors

Output / Communications:

- RS485 Modbus RTU Master for Gas Detectors
- Diagnostic/status LEDs
  - Controller (power; fault)
  - Gas detectors (power & connectivity; fault; low alarm; high alarm)
- Optional: integrated high output horn/strobe

- Configurable output signal options
  - 3× relays (universal: high alarm / low alarm / fault)
  - RS485 Modbus RTU Slave

Data logging via SD card

User interface:

- LCD display screen
- Integrated keypad

2.4 Components

#	Component Description
1	AC Power Terminal Block
2	Power Supply
3	Cooling Fan
4	SD Card Slot
5	Coin Cell Battery
6	Reset Switch

7	High Alarm Relay
8	Low Alarm Relay
9	Fault Relay
10	Sensor Power Connector
11	Sensor Data Connector
12	BMS Data Connector
13	AV Beacon Connector *(external beacon not shown)*

3. Installation

3.1 Warnings & Cautions

WARNING: Explosion hazard! Do not mount the MGS-408 Gas Detection 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.

WARNING: Electrical installation should be performed by a certified electrician, and should comply with all applicable NEC/CEC and local electrical safety codes.

WARNING: The AC power ground wire must first be connected to the monitor's ground terminal. Under no circumstances should this monitor be operated without a protective ground. Doing so poses a potential shock hazard, and is also a violation of electrical safety standards applicable to this type of equipment.

WARNING: Shock hazard! Always turn off AC power before working inside the monitor.

CAUTION: Drilling holes in the MGS-408 Gas Detection Controller enclosure may damage the unit and will void the warranty. Please use provided cable glands for electrical connections.

CAUTION: The MGS-408 Gas Detection Controller contains sensitive electronic components that can be easily damaged. Be careful not to touch or disturb any of these components.

3.2 Preliminary Inspection

The MGS-408 Gas Detection Controller has been thoroughly inspected and tested prior to shipment from the factory. Nevertheless, it is recommended that the instrument be re-checked prior to installation. Inspect the outside of the enclosure to make sure there are no obvious signs of shipping damage. Loosen the two screws on the top of the enclosure lid and open the front panel. Visually inspect the interior of the enclosure for loose wires or components that may have become dislodged during shipment. If damage is discovered, please contact the nearest Bacharach Service Center for assistance.

3.3 Suitable / Appropriate Locations

The MGS-408 Gas Detection Controller should be centrally located in the facility (preferably outside of the mechanical room) and should be easily accessible for visual monitoring and servicing. This is the "split architecture design" for safety of the operator.

Dirt, grease, and oils can adversely affect the operation of the MGS-408 Gas Detection Controller. The MGS-408 Gas Detection Controller should be installed out of direct sunlight in a clean, dry area that is not subject to temperature or humidity extremes. Installation in a mechanical room is acceptable provided reasonable environmental conditions exist. If there is a question, consider installing the unit outside of the mechanical room in a cleaner area of the facility.

The MGS-408 Gas Detection Controller can be located up to 4500 feet (1372 m) from the furthest gas monitor when using RS485 communications. The available distance is less when using the controller as the power supply for downline gas transmitters. The total power available for gas detectors is 51W. Careful attention to voltage drop over distance with a suitable wire gauge employed is also required.

The MGS-408 Gas Detection Controller provides an interface by which you can monitor, acknowledge alarms, and observe conditions inside the mechanical room.

3.4 Mounting the Gas Detection Controller

The MGS-408 Gas Detection Controller should be installed plumb and level and securely fastened to a rigid mounting surface. The enclosure utilizes four mounting holes designed for #6 (or M3.5 or M4) pan head fasteners (included). Mounting holes are located in the four corners of the enclosure, accessed by opening the front panel. Install and adjust the screws as necessary to hold the unit securely against the mounting surface.

3.5 Electrical Wiring

The controller enclosure features M20 two cable glands that are intended for power entry. If conduit is preferred simply remove one of the M20 glands and install a suitable ½" conduit adapter.

Locate the AC power and Ground on the power input terminal block. Secure the incoming AC power neutral (white/blue) and live (black/brown) and ground wires to the appropriate terminals using a screwdriver on the press to release tabs as shown below.

WARNING: Electrical installation should be performed by a certified electrician, and should comply with all applicable NEC/CEC and local electrical safety codes.

WARNING: Copper conductors for connection to supply mains must be made in accordance with NEC/CEC and local codes.

CAUTION: Drilling holes in the MGS-408 Gas Detection Controller enclosure may damage the unit and will void the warranty. Please use cable glands provided for electrical connections.

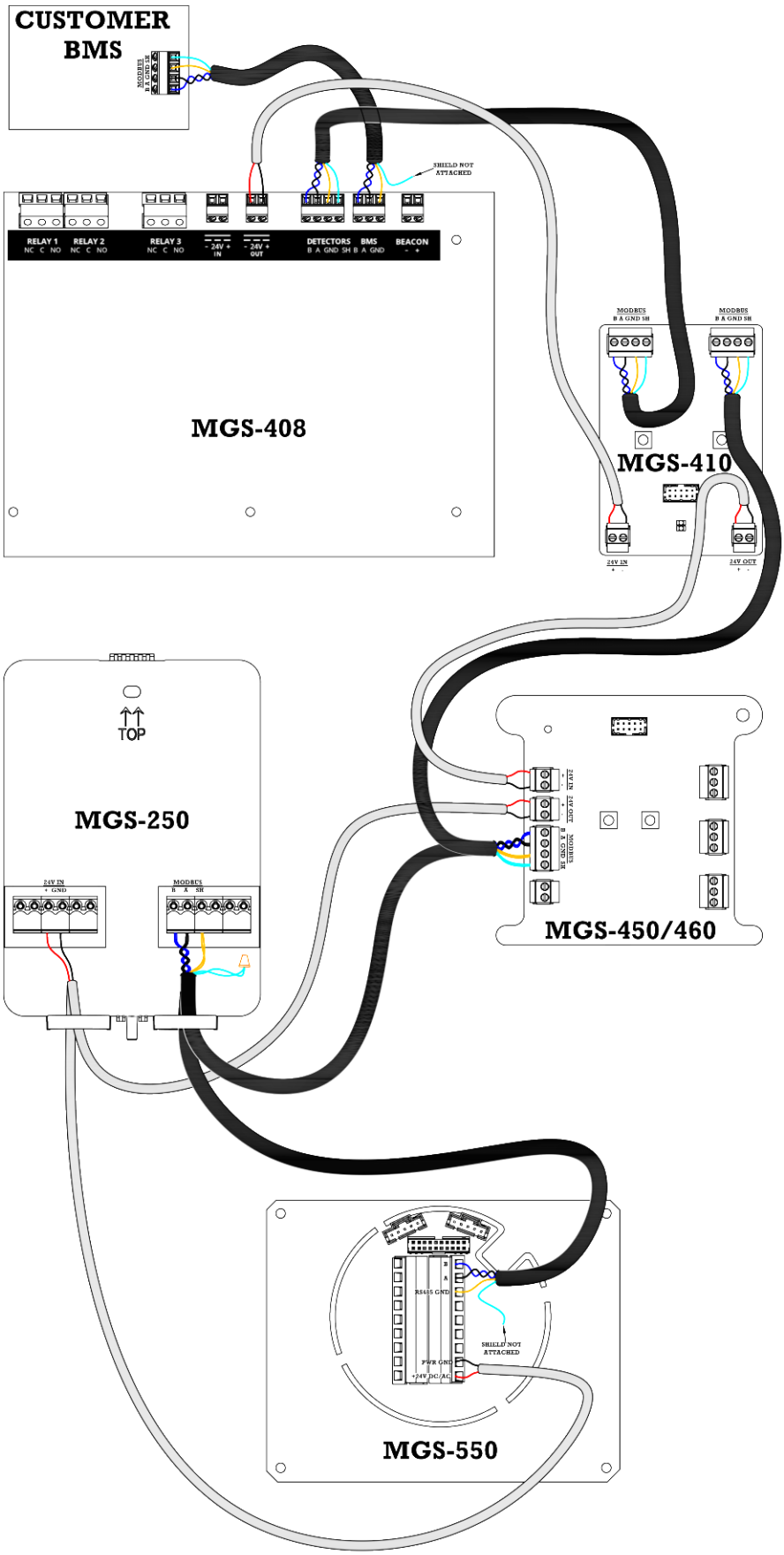
NOTE: A certified AC power disconnect or circuit breaker should be mounted near the controller and installed following applicable local and national codes. If a switch is used instead of a circuit breaker, a properly rated CERTIFIED fuse or current limiter is required to be installed as per local or national codes. Markings for positions of the switch or breaker should state (I) for on and (O) for off.

3.6 Communications Connections

3.6.1 MGS-408 Gas Detection Controller Network

The MGS-408 Gas Detection Controller is connected to MGS400/550/250 gas detectors using a shielded twisted pair instrument cable (Belden 3106A or equivalent) The maximum distance between the furthest gas detector and MGS-408 Gas Detection Controller is 4500 feet (1372 m) when only using Modbus communications. The available distance is less when using the controller as the power supply for gas detectors. The total power available for gas detectors is 51W. Careful attention to voltage drop over distance with a suitable wire gauge employed is also required. Use any of the remaining cable glands to gain access to the interior of the unit. The RS-485 communication wiring between the gas monitor and MGS-408 Gas Detection Controller must be connected in the following manner:

1. Locate the RS-485 connector in the gas monitor (See appropriate gas monitor manual).
2. Connect one lead of a twisted shielded pair to the “B” connection point; note the wire color.
3. Connect the second wire to the “A” connection point; note the wire color.
4. Connect the ground to the “GND” connection point
5. Connect the shield or drain wire to the “SH” connection point.


CUSTOMER BMS
MODBUS B A GND SH
SHIELD NOT ATTACHED
RELAY 1 NC C NO
RELAY 2 NC C NO
RELAY 3 NC C NO
- 24V + IN
- 24V + OUT
DETECTORS B A GND SH
BMS B A GND
BEACON - +
MGS-408
MODBUS B A GND SH
MODBUS B A GND SH
MGS-410
24V IN + -
24V OUT + -
TOP
MGS-250
24V IN + GND
MODBUS B A SH
24V IN
24V OUT
MODBUS B A GND SH
MGS-450/460
B
A
RS485 GND
PWR GND
+24V DC/AC
SHIELD NOT ATTACHED
MGS-550

Locate the RS-485 connectors in the MGS-408 Gas Detection Controller. The left RS-485 connector is for downstream “slave” devices (includes a dedicated shield position) and the right RS-485 connector is used to connect to “master” devices upline, such as building management controls.

3.6.2 Integration with Building Management System

A second RS‑485 connector allows a Building Management System to communicate with the MGS-408 Gas Detection Controller via Modbus protocol (see Section 5.2 for register mapping). The connection is established using a shielded twisted pair cable such as Belden 3106A. Use any of the remaining service cable glands to gain access to the interior of the MGS-408 Gas Detection Controller. Locate the RS‑485 upline connector. Secure the wire leads to the connector in the orientation as displayed on the board. Check to make sure the polarity matches the wiring to the Building Management System. The shield connection should only be grounded at the BMS device and should not be connected at the controller.

3.7 Connecting External Alarms

3.7.1 Overview

One switched 24V DC contact marked “BEACON” is available for the connection of an external alarm device. The terminals can sink up to 300 mA at 24V DC. Bacharach accessory light P/N 1100-23XX is intended for use with the terminal. Form C relay contacts are provided for FAULT, LOW ALARM and HI ALARM conditions.

3.7.2 Connection Procedure

Use the remaining cable glands to gain access to the interior of the MGS-408 Gas Detection Controller. Locate the relay connectors. Secure the wire leads to the connectors

---

NOTE: Power for the external alarms can be tapped off the AC IN connector.

NOTE: The relay contacts are rated 5A at 250VAC (N.O. contact) and 2A at 250VAC (N.C. contact).

---

4. Operation

4.1 Overview

4.1.1 Main Function

Every 5 seconds the MGS-408 Gas Detection Controller collects gas concentration and status information from each connected gas detector. Gas concentration appears on the LCD display and connection status, fault and alarm conditions are indicated by the LED matrix for each channel. When an SD card is installed, concentration and status information is logged every 10 seconds for all connected gas detectors. Detector data and controller status information can also be communicated via MODBUS, to a master or BMS device.

4.1.2 Post

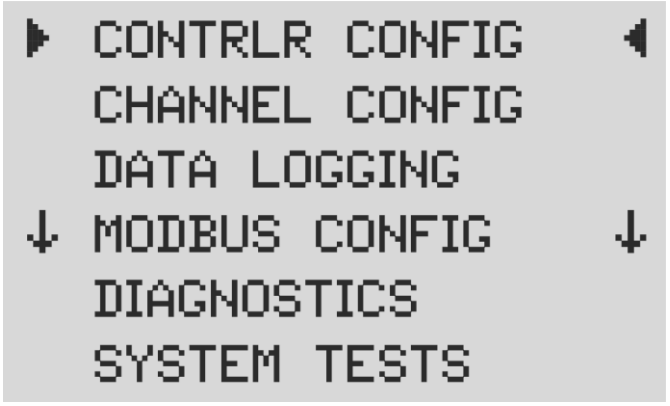
After power up, the firmware revision level will be indicated on the LCD followed by an LED/LCD and beacon self test. The controller will then begin scanning connected detectors and display their reported gas concentration on the LCD and status information on the LED matrix.

4.1.3 Channel number keys

Pressing a Channel number key will bring up a scrollable channel detail screen with detector specific information. Pressing the channel number key a second time will access the channel setup menu.

4.1.4 Menu access and navigation

The system level menu is accessed by pressing the OK key while the main screen is being displayed. The currently selected menu item is indicated with triangle pointers to the left and right of the description. If the menu list is longer than can be displayed, up and down arrow keys on the right side of the screen will indicate additional items are available by either scrolling up or down.



Some of the screens you will access will require data entry, such as the date/time setup or location description. These screens will appear with a character selected, as displayed below. Use the up/down Arrow keys to scroll through the characters provided for that character's place. Use the left/right Arrow keys to move the cursor to the next character. When all character selections for the screen are completed, press ENTER to accept the entries.

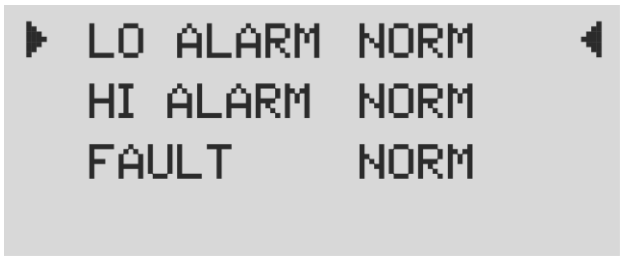
4.2 Controller Setup

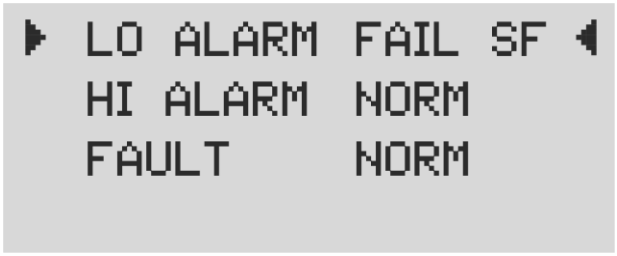
4.2.1 Setup Parameters

Before using the controller various parameters must be set by the user based on how the controller has been wired. These parameters are accessed from the main menu by selecting "CONTRLR CONFIG".

4.2.2 Relay Setup

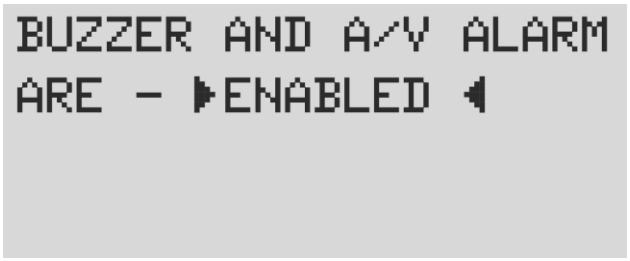
From the RELAY menu, each of the three relays can be configured for either normal or failsafe operation. The default is normal, meaning normally open contacts will close with the event corresponding the relay designation. If fail safe is selected the relay will be normally energized and will be de-energized with the relays designated event or a power failure.





4.2.3 AV Alarm

The beacon, if installed, and the internal buzzer may be enabled to indicate an alarm condition. When enabled, the beacon will be energized, and the buzzer will beep, if either a low or high alarm condition exists.

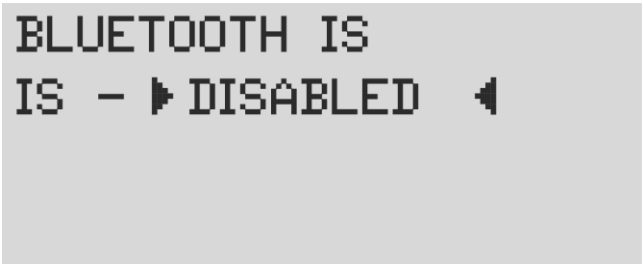


4.2.4 Fault Latching

Fault latching defaults to DISABLED, allowing the fault indication to clear with the condition without user intervention. When ENABLED the fault indication will persist after the condition has cleared, until a user clears the current faults by selecting “CLEAR FAULT” from the diagnostic menu.

4.2.5 Bluetooth

To use the Bacharach smart phone app, before connecting you must ENABLE Bluetooth from this menu screen.



4.2.6 LCD Contrast

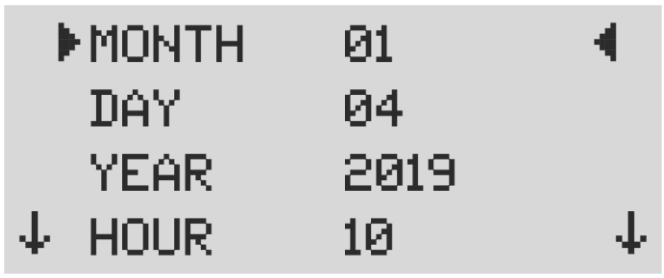
From the LCD contrast setting screen, use the arrow keys to adjust the contrast from 1-63, with 30 being the default.

4.2.7 LED Brightness & Auto-dimming

The brightness of front panel LEDs can be adjusted from 0-10. A full bright setting of 10 will be visible from a long distance but may be too bright when the user is operating the keypad. For this reason, when the keypad is in use the LED brightness will auto-dim to a comfortable level, and resume the programmed brightness setting after a period of keypad inactivity

4.2.8 Date/Time

The real time clock should be checked and set after installation or when the coin cell battery is changed. Enter or edit the month, day, year, hour and minute by scrolling the menu.



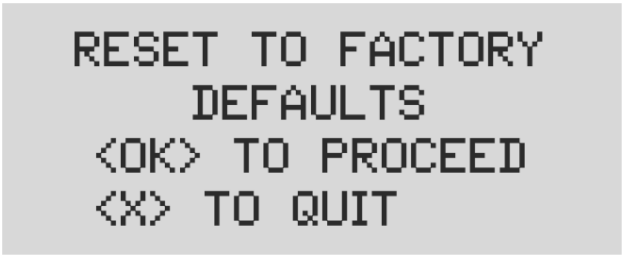
4.2.9 Password Protection

The MGS-408 Gas Detection Controller can be password protected to prevent the unauthorized editing of setup parameters. When password protection is enabled, an operator may still navigate between screens to observe settings or monitor network status. The unit is shipped with password protection OFF. Entering a 3 digit (non-zero) password enables password protection. After protection is enabled, the user will be prompted to enter the password when an attempt is made to edit a setup parameter. After entering the password, a 30 minute time period will be allowed for entries, after which the user will again be prompted to re-enter the password. To disable password protection, simply change the password to all zero's (000). An emergency

IMPORTANT: Make note of your password and save it.

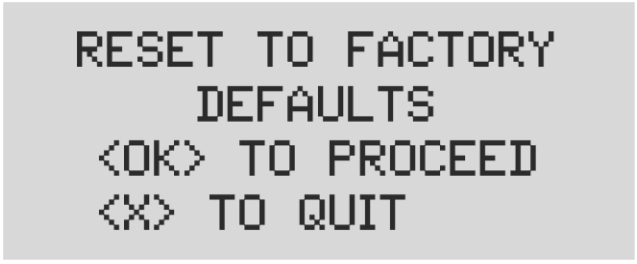
4.2.10 Factory Reset

Selecting FACTORY RESET will revert all user settings to their factory out of box defaults. A confirmation screen will ask the user to confirm their intent since user settings will be lost and you will need to re-configure each channel. For this reason record settings in each channel edit screen before performing a reset.



4.2.11 Update Firmware

When updated firmware is available, it can be installed via the SD card. Select ‘SD EJECT’ from the ‘DATA LOGGING’ menu and remove the SD card. Using a PC or Laptop, rename the new firmware image file to MGS408.txt and copy it onto the SD card. Re-install the SD card into its slot in the controller and select ‘UPDATE FIRMWARE from the ‘CONTRLR CONFIG’ menu. The new firmware will first be copied to flash memory, verified and moved to the application space followed by a reboot. This process may take several minutes.

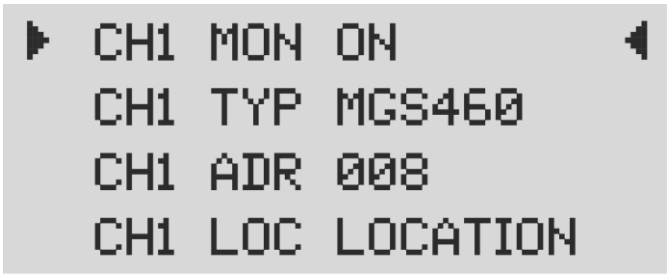


4.3 Channel Summary and Setup

Pressing a CHx key from the main screen will bring up a channel summary screen with detailed information collected from the gas detector assigned to that channel.

4.3.1 Channel Setup Overview

Prior to setting channel parameters, the installer should verify and record the instrument type, node address and baud rate for each connected detector. All detectors must be set for the same baud rate, either 9600 (default) or 19200, and must have a unique node address. The MASTER BAUD setting in the MODBUS CONFIG menu must match the settings of the detectors. The channel setup screen may be accessed either by selecting CHANNEL CONFIG from the main menu or by pressing the channel number key twice at the main screen. For each detector channel there are 4 parameters the user set MON, TYP, ADR, LOC.



4.3.2 CHx MON (Monitor)

This parameter set to ON or OFF, enables or disables the monitoring of the gas detector assigned to that channel. When set to ON the controller will attempt to collect data, every 5 seconds, from the gas detector type and at the node address specified in the corresponding channel parameters. Successful communication will be indicated with a solid green LED next to the channel number key. Each time data is collected the LED will flicker to indicate communication access. Failed communication will be indicated by a blinking green LED and yellow system fault LED. Failed communication can be caused by a mismatch of either node address, instrument type or baud rate settings between the controller and the detector, or an unpowered detector. Setting the MON parameter to OFF will exclude the gas detector assigned to that channel from being scanned. If all channels have monitor parameters set to OFF a system level fault will be triggered to indicate no detectors are being monitored.

NOTE: All gas monitors on the network must have the same baud rate.

4.3.3 CHx TYP (Instrument Type)

The instrument type parameter indicates what instrument model is connected to CHx, there are 6 supported instrument types, MGS250, MGS410, MGS450, MGS460, MGS550S1, MGS550S2. For MGS 550 models the S1 and S2 designation specify which of the two sensors connected, are to be assigned to CHx.

4.3.2 CHx ADR (Node Address)

Each connected detector must have a unique node address (see detector instruction manual for how to set the detector node address). Select the node address corresponding to the detector assigned to CHx, valid addresses are 1-247.

4.3.2 CHx LOC (Location)

For each channel a 16 character string may be defined to describe the name or location of the detector assigned to that channel. This string will appear in the CHx detail summary screen as an aid to identify the location of the associated gas detector.

4.4 Data Logging

4.4.1 Data Logging Overview

With an SD card installed, the MGS408 will log concentration, units of measure, gas name, low alarm state, high alarm state, detector fault code and controller fault code, every 10 seconds.

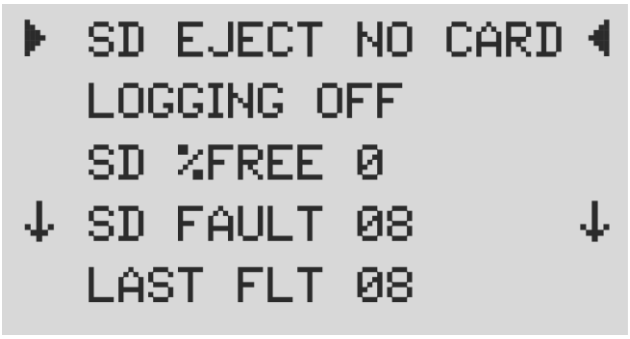
Log data is buffered for 10 minutes before writing to the SD card, so it is important to use the ‘SD EJECT’ menu item before removing the SD card, this will write the contents of the buffer and turn off data logging, so the card is ready to be removed. Log data is divided into weekly files using the naming convention MGS408_LOG_WEEK_XXX_OF_YYYY.csv, where XXX is the week number (1-52) and YYYY is the year. The file format is comma delimited text which can be opened directly in Microsoft Excel. Row 1 will contain a descriptive header for each column. The supplied 32Gb SD card can hold up to 10 years of log data.

4.4.2 SD Card Requirements\

The MGS408 comes with a 32Gb SD card installed, which can hold up to 10 years worth of log data. A compatible SD card will have 32GB or less capacity and be formatted in the FAT32 format.

4.4.3 Data Logging Menu

From the data logging menu the user can safely eject the SD card, turn logging ON or OFF, view the percentage of free space remaining on the SD card, and view any current or historical fault codes.



4.4.3.1 SD EJECT

Select this option just prior to removing the SD card. This will write any buffered log data to the card and turn off logging. Logging will automatically resume when the SD card is re-installed.

4.4.3.2 LOGGING (ON/OFF)

Enable or disable data logging by setting this item to ON or OFF.

4.4.3.3 SD %FREE

Shows the percentage of free space remaining on the installed SD card

4.4.3.4 SD FAULT (XX)

Any faults associated with the SD card will display as a two digit code next to this menu item, and selecting it will bring up a scrollable list of faults in English. Selecting a fault item will bring up a suggested remedy. SD card specific faults include:

- SD CARD MISSING (01)
- SD POWER FAIL (02)
- SD CARD FULL (04)
- SD MOUNT FAIL (08)
- SD FILE FAIL (10)
- SD WRITE FAIL (20)
- SD CAP READ (40)
- SD WRITE PROTECT (80)

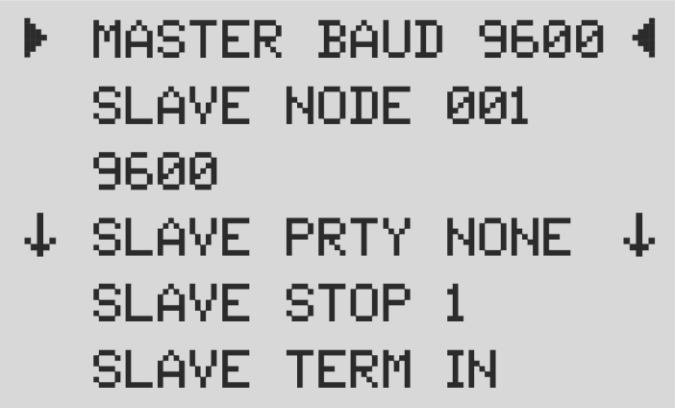
4.4.3 LAST FLT (XX)

This item displays a two digit fault history code, and selecting it will bring up a scrollable list of faults in English. Selecting a fault item will bring up a suggested remedy. The code may be cleared from the diagnostic menu by selecting “CLR LAST SDFAULT”.

5. MODBUS

5.1 MODBUS Overview

MODBUS RTU protocol is utilized both for downstream detector communication and upstream BMS communication. Communication parameters may be set from the MODBUS CONFIG menu.



The MGS-408 controller acts as a MODBUS master device on the detector side, and as a MODBUS slave device on the BMS side.

5.1.1 MASTR BAUD (XXXX)

Slave devices (gas detectors) communicate with the master device (MGS4088 Controller) at this baud rate, either 9600(default) or 19200.

5.1.2 SLAVE NODE (XXX)

This is the Modbus node address (1-247) that the upstream BMS will need to use when sending queries to the controller.

5.1.3 SLAVE BAUD (XXXX)

The MGS408 controller will us this baud rate to communicate with the upstream BMS or MODBUS master device, either 9600(default) or 19200.

5.1.4 SLAVE PRTY (XXXX)

This PARITY setting should match the BMS PARITY (NONE, EVEN or ODD).

5.1.5 SLAVE STOP (X)

The number of stop bits (1 or 2) must match the BMS setting.

5.1.6 SLAVE TERM

A 120 ohm termination resistor can be enabled on the BMS connection. This is typically only required for cable lengths in excess of 1000', for shorter distances set this termination to OUT.

5.2 MODBUS Registers

READ	WRITE	Register Address	Func Code 04 (read input registers)	Type	Item Group	Notes
R	W	30001	Sensor 1 is monitord flag		Sensor 1	**0=NOT MONITORED 1=MONITORED**
R	X	30002	Sensor 1 communicatin status		Sensor 1	**1=COM NORMAL, 2=COM FAIL**
R	X	30003	Sensor 1 modbus error code		Sensor 1	**Exception code from Modbus standard**
R	X	30004	Sensor 1 concentration		Sensor 1	**0-65535**
R	X	30005	Sensor 1 status code		Sensor 1	**0=OFFLINE 1=WARMUP 2=ONLINE**
R	X	30006	Sensor 1 Fault code (high byte)		Sensor 1	**Sensor specific**
R	X	30007	Sensor 1 sensor fault code		Sensor 1	**Sensor specific**
R	X	30008	Sensor 1 ° C		Sensor 1	**Sensor specific**
R	X	30009	Sensor 1 Cal expired flag		Sensor 1	**0=Cal Valid, 1=Cal expired**
R	X	30010	Sensor 1 Low alarm flag		Sensor 1	**0=No alarm, 1=Alarm**
R	X	30011	Sensor 1 High alarm flag		Sensor 1	**0=No alarm, 1=Alarm**
R	X	30012	Sensor 1 Saturation flag		Sensor 1	**0=Unsaturated, 1=Saturated**
R	X	30013	Sensor 1 Underflow flag		Sensor 1	**0=Normal, 1=Underflow**
R	W	30014	Sensor 1 Instrument Type code		Sensor 1	**0=MGS250,1=MGS400, 2=MGS450,3=MGS460, 4=MGS550-S1,5=MGS550-S2**
R	W	30015	Sensor 1 Node Address		Sensor 1	**1-254**
R	X	30016	Sensor 1 Sensor Type code		Sensor 1	**Sensor specific**
R	X	30017	Sensor 1 Concentration Units		Sensor 1	**1=ppm,2=ppb,3=%VOL ,4=%LEL**
R	X	30018	Sensor 1 Scale Factor		Sensor 1	**Power of 10 used on concentration, divide conc by 10^x for**

						correct value (MGS550 only)
R	X	**30019**	Sensor 1 Gas Type Text Char 1,2		Sensor 1	**ASCII characters**
R	X	**30020**	Sensor 1 Gas Type Text Char 3,4		Sensor 1	**ASCII characters**
R	X	**30021**	Sensor 1 Gas Type Text Char 5,6		Sensor 1	**ASCII characters**
R	X	**30022**	Sensor 1 Gas Type Text Char 7,8		Sensor 1	**ASCII characters**
R	X	**30023**	Sensor 1 Gas Type Text Char 9,10		Sensor 1	**ASCII characters**
R	X	**30024**	Sensor 1 SID Text Char 1,2		Sensor 1	**ASCII characters**
R	X	**30025**	Sensor 1 SID Text Char 3,4		Sensor 1	**ASCII characters**
R	X	**30026**	Sensor 1 SID Text Char 5,6		Sensor 1	**ASCII characters**
R	X	**30027**	Sensor 1 SID Text Char 7,8		Sensor 1	**ASCII characters**
R	X	**30028**	Sensor 1 UID Text Char 1,2		Sensor 1	**ASCII characters**
R	X	**30029**	Sensor 1 UID Text Char 3,4		Sensor 1	**ASCII characters**
R	X	**30030**	Sensor 1 UID Text Char 5,6		Sensor 1	**ASCII characters**
R	X	**30031**	Sensor 1 UID Text Char 7,8		Sensor 1	**ASCII characters**
R	X	**30032**	Sensor 1 Alias Text Char 1,2		Sensor 1	**ASCII characters**
R	X	**30033**	Sensor 1 Alias Text Char 3,4		Sensor 1	**ASCII characters**
R	X	**30034**	Sensor 1 Alias Text Char 5,6		Sensor 1	**ASCII characters**
R	X	**30035**	Sensor 1 Alias Text Char 7,8		Sensor 1	**ASCII characters**
R	X	**30036**	Sensor 1 Alias Text Char 9,10		Sensor 1	**ASCII characters**
R	X	**30037**	Sensor 1 Alias Text Char 11,12		Sensor 1	**ASCII characters**
R	X	**30038**	Sensor 1 Alias Text Char 13,14		Sensor 1	**ASCII characters**
R	X	**30039**	Sensor 1 Alias Text Char 15,16		Sensor 1	**ASCII characters**
R	X	**30040**	RESERVED		Sensor 1	
R	X	**30041**	RESERVED		Sensor 1	
R	X	**30042**	RESERVED		Sensor 1	
R	X	**30043**	RESERVED		Sensor 1	
R	X	**30044**	RESERVED		Sensor 1	
R	X	**30045**	RESERVED		Sensor 1	
R	X	**30046**	RESERVED		Sensor 1	
R	X	**30047**	RESERVED		Sensor 1	
R	X	**30048**	RESERVED		Sensor 1	
R	X	**30049**	RESERVED		Sensor 1	
R	X	**30050**	RESERVED		Sensor 1	
R	X	**30051-30100**	SENSOR 2 DATA GROUP (REPEAT OF SENSOR 1)		Sensor 2	
R	X	**300101-30150**	SENSOR 3 DATA GROUP (REPEAT OF SENSOR 1)		Sensor 3	
R	X	**30151-30200**	SENSOR 4 DATA GROUP (REPEAT OF SENSOR 1)		Sensor 4	

R	X	**30201-30250**	SENSOR 5 DATA GROUP (REPEAT OF SENSOR 1)		Sensor 5	
R	X	**30251-30300**	SENSOR 6 DATA GROUP (REPEAT OF SENSOR 1)		Sensor 6	
R	X	**30301-30350**	SENSOR 7 DATA GROUP (REPEAT OF SENSOR 1)		Sensor 7	
R	X	**30351-30400**	SENSOR 8 DATA GROUP (REPEAT OF SENSOR 1)		Sensor 8	
R	X	**31000**	Sensor 1 Concentration		Sensor 1	
R	X	**31001**	Sensor 2 Concentration		Sensor 2	
R	X	**31002**	Sensor 3 Concentration		Sensor 2	
R	X	**31003**	Sensor 4 Concentration		Sensor 3	
R	X	**31004**	Sensor 5 Concentration		Sensor 4	
R	X	**31005**	Sensor 6 Concentration		Sensor 5	
R	X	**31006**	Sensor 7 Concentration		Sensor 6	
R	X	**31007**	Sensor 8 Concentration		Sensor 7	
R	X	**31008-31031**	RESERVED		Future sensors	
R	X	**31032**	Sensor 1 Fault code (high bytes)		Sensor 1	
R	X	**31033**	Sensor 1 Fault code		Sensor 1	
R	X	**31034**	Sensor 2 Fault code (high bytes)		Sensor 2	
R	X	**31035**	Sensor 2 Fault code		Sensor 2	
R	X	**31036**	Sensor 3 Fault code (high bytes)		Sensor 3	
R	X	**31037**	Sensor 3 Fault code		Sensor 3	
R	X	**31038**	Sensor 4 Fault code (high bytes)		Sensor 4	
R	X	**31039**	Sensor 4 Fault code		Sensor 4	
R	X	**31040**	Sensor 5 Fault code (high bytes)		Sensor 5	
R	X	**31041**	Sensor 5 Fault code		Sensor 5	
R	X	**31042**	Sensor 6 Fault code (high bytes)		Sensor 6	
R	X	**31043**	Sensor 6 Fault code		Sensor 6	
R	X	**31044**	Sensor 7 Fault code (high bytes)		Sensor 7	
R	X	**31045**	Sensor 7 Fault code		Sensor 7	
R	X	**31046**	Sensor 8 Fault code (high bytes)		Sensor 8	
R	X	**31047**	Sensor 8 Fault code		Sensor 8	
R	X	**31048-31096**	RESERVED		Future sensors	

		Register Address	**Func Code 03/06 Read/preset**		**Item Group**	**Notes**
R	W	**40000**	Future unused		Controller-related	**return zero always**

R	W	**40001**	Future unused		Controller-related	**return zero always**
R	W	**40002**	RS-485 Node Address		Controller-related	**1-254**
R	W	**40003**	Baud Rate		Controller-related	**0=9600 1=19200**
R	W	**40004**	Stop Bits		Controller-related	**1 or 2**
R	W	**40005**	Parity		Controller-related	**0=none 1=odd 2=even**
R	W	**40006**	Controller UID Char 1,2		Controller-related	**ASCII characters**
R	W	**40007**	Controller UID Char 3,4		Controller-related	**ASCII characters**
R	W	**40008**	Controller UID Char 5,6		Controller-related	**ASCII characters**
R	W	**40009**	Controller UID Char 7,8		Controller-related	**ASCII characters**
R	X	**40010**	16 bit Current Fault Code Controller		Controller-related	**0-65535**
R	X	**40011**	16 bit Last Fault Code Controller		Controller-related	**0-65535**
R	X	**40012**	Software Version Controller		Controller-related	**X100**
R	W	**40013**	Relay 1 Contact Behavior / Failsafe		Controller-related	**0=normal 1=Failsafe**
R	W	**40014**	Relay 2 Contact Behavior / Failsafe		Controller-related	**0=normal 1=Failsafe**
R	W	**40015**	Relay 3 Contact Behavior / Failsafe		Controller-related	**0=normal 1=Failsafe**
R	X	**40016**	24V supply voltage x 100		Diagnostics	**2400=24.00V**
R	X	**40017**	24V supply output to sensors voltage x 100		Diagnostics	**2400=24.00V**
R	X	**40018**	Battery voltage x 100		Diagnostics	**300=3.0V**
R	X	**40019**	Controller 5V supply voltage x100		Diagnostics	**500=5.00V**
R	X	**40020**	Controller 3.3V supply voltage x100		Diagnostics	**330=3.30V**
R	X	**40021**	Controller temperature x100		Diagnostics	**2500=25.00degC**
R	X	**40022**	Controller tact and mag switch state		Diagnostics	**Sum of activated switch values**
R	W	**40023**	Buzzer enable		Controller-related	**0=Disabled 1=enabled**
R	W	**40024**	Data Logging Enabled		Controller-related	**0=Disabled 1=enabled**
R	W	**40025**	Fault Latching Enabled		Controller-related	**0=Disabled 1=enabled**

			Func Code 02 (read input status)		**Item Group**
R	X	**10001**	Sensor 1 Low Alarm Flag (0 or 1 = alarm)		Sensor 1
R	X	**10002**	Sensor 2 Low Alarm Flag (0 or 1 = alarm)		Sensor 2
R	X	**10003**	Sensor 3 Low Alarm Flag (0 or 1 = alarm)		Sensor 3
R	X	**10004**	Sensor 4 Low Alarm Flag (0 or 1 = alarm)		Sensor 4
R	X	**10005**	Sensor 5 Low Alarm Flag (0 or 1 = alarm)		Sensor 5
R	X	**10006**	Sensor 6 Low Alarm Flag (0 or 1 = alarm)		Sensor 6
R	X	**10007**	Sensor 7 Low Alarm Flag (0 or 1 = alarm)		Sensor 7
R	X	**10008**	Sensor 8 Low Alarm Flag (0 or 1 = alarm)		Sensor 8
R	X	**10009-10032**	RESERVED		Sensor 9-

					32(future)
R	X	**10033**	Sensor 1 High Alarm Flag (0 or 1 = alarm)		Sensor 1
R	X	**10034**	Sensor 2 High Alarm Flag (0 or 1 = alarm)		Sensor 2
R	X	**10035**	Sensor 3 High Alarm Flag (0 or 1 = alarm)		Sensor 3
R	X	**10036**	Sensor 4 High Alarm Flag (0 or 1 = alarm)		Sensor 4
R	X	**10037**	Sensor 5 High Alarm Flag (0 or 1 = alarm)		Sensor 5
R	X	**10038**	Sensor 6 High Alarm Flag (0 or 1 = alarm)		Sensor 6
R	X	**10039**	Sensor 7 High Alarm Flag (0 or 1 = alarm)		Sensor 7
R	X	**10040**	Sensor 8 High Alarm Flag (0 or 1 = alarm)		Sensor 8
R	X	**10041-10064**	RESERVED		Sensor 9-32(future)
R	X	**10065**	Sensor 1 Any Alarm Flag (0 or 1 = alarm)		Sensor 1
R	X	**10066**	Sensor 2 Any Alarm Flag (0 or 1 = alarm)		Sensor 2
R	X	**10067**	Sensor 3 Any Alarm Flag (0 or 1 = alarm)		Sensor 3
R	X	**10068**	Sensor 4 Any Alarm Flag (0 or 1 = alarm)		Sensor 4
R	X	**10069**	Sensor 5 Any Alarm Flag (0 or 1 = alarm)		Sensor 5
R	X	**10070**	Sensor 6 Any Alarm Flag (0 or 1 = alarm)		Sensor 6
R	X	**10071**	Sensor 7 Any Alarm Flag (0 or 1 = alarm)		Sensor 7
R	X	**10072**	Sensor 8 Any Alarm Flag (0 or 1 = alarm)		Sensor 8
R	X	**10073-10096**	RESERVED		Sensor 9-32(future)
R	X				
R	X	**10097**	Sensor 1 Fault Flag (0 or 1 = fault)		Sensor 1
R	X	**10098**	Sensor 2 Fault Flag (0 or 1 = fault)		Sensor 2
R	X	**10099**	Sensor 3 Fault Flag (0 or 1 = fault)		Sensor 3
R	X	**10100**	Sensor 4 Fault Flag (0 or 1 = fault)		Sensor 4
R	X	**10101**	Sensor 5 Fault Flag (0 or 1 = fault)		Sensor 5
R	X	**10102**	Sensor 6 Fault Flag (0 or 1 = fault)		Sensor 6
R	X	**10103**	Sensor 7 Fault Flag (0 or 1 = fault)		Sensor 7
R	X	**10104**	Sensor 8 Fault Flag (0 or 1 = fault)		Sensor 8
R	X	**10105-10128**	RESERVED		Sensor 9-32(future)
R	W	**10129**	Sensor 1 enabled flag (0=disabled 1=enabled)		Sensor 1
R	W	**10130**	Sensor 2 enabled flag (0=disabled 1=enabled)		Sensor 2
R	W	**10131**	Sensor 3 enabled flag (0=disabled 1=enabled)		Sensor 3
R	W	**10132**	Sensor 4 enabled flag (0=disabled 1=enabled)		Sensor 4
R	W	**10133**	Sensor 5 enabled flag (0=disabled 1=enabled)		Sensor 5
R	W	**10134**	Sensor 6 enabled flag (0=disabled 1=enabled)		Sensor 6

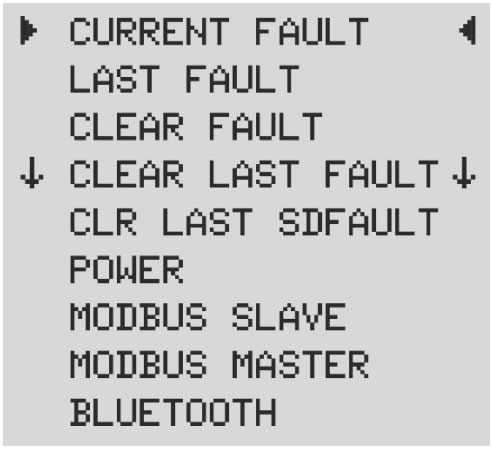
R	W	**10135**	Sensor 7 enabled flag (0=disabled 1=enabled)		Sensor 7
R	W	**10136**	Sensor 8 enabled flag (0=disabled 1=enabled)		Sensor 8
R	W	**10137-10160**	RESERVED		Sensor 9-32(future)
R	X	**10200**	Relay 1 State (0 or 1 = energized)		Controller-related
R	X	**10201**	Relay 2 State (0 or 1 = energized)		Controller-related
R	X	**10202**	Relay 2 State (0 or 1 = energized)		Controller-related

			Func Code 01/05 (Read/force coil)		Item Group
R		**00001**	UNUSED	DYN	
R		**00002**	UNUSED	DYN	
R		**00003**	UNUSED	DYN	
		00004	Relay Closed Test. Setting this flag to one closes all 3 relays simultaneously for 5 seconds. At the end of the test the relays revert to their normal operation. During the test the Modbus flag will remain ON. When the test is completed the flag will turn OFF	DYN	
		00005	Relay Opened Test. Setting this flag to one opens all 3 relays simultaneously for 5 seconds. At the end of the test the relays revert to their normal operation. During the test the Modbus flag will remain ON. When the test is completed the flag will turn OFF		
		00006	UNUSED		
		00007	UNUSED		
		00008	UNUSED		
			Func Code 43/14		
R	X	**0x00**	Vendor name "Bacharach"	STA	Controller-related
R	X	**0x01**	Product code "MGS-408"	STA	Controller-related
R	X	**0x02**	Major minor rev "NN.nn"	STA	Controller-related

6. Diagnostics and Troubleshooting

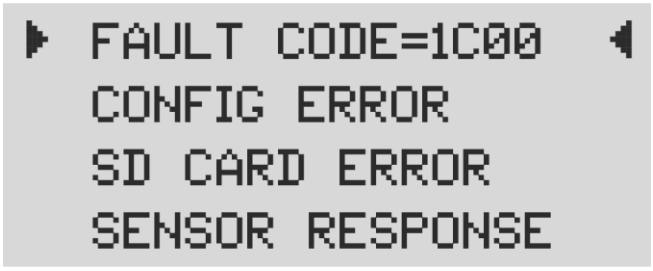
6.1 Diagnostic Menu

From the diagnostic menu the user can review and clear current and historical faults, view power supply voltages, and watch live Modbus traffic for both master, slave and Bluetooth connections. The diagnostic menu appears on page 2 of the main menu.



6.1.1 CURRENT FAULT

Displays the current active controller fault code along with a list of fault descriptors. Scroll and select a descriptor for more detailed information about the fault and possible remedies.



6.1.2 LAST FAULT

Displays historical fault code and listing, selecting a fault descriptor will bring up more details, same as current fault screen. Intermittent fault conditions can be review here.

6.1.3 CLEAR FAULT

Resets the current active fault code to zero (no faults). Use to clear faults when FAULT LATCHING is enabled from the CONTRLR CONFIG menu.

6.1.4 CLEAR LAST FAULT

Reset the historical last fault code to zero. Use to catch recurring intermittent fault conditions.

6.1.5 CLR LAST SD FAULT

Resets the historical SD card fault code. Use to catch recurring intermittent fault conditions with the SD card or data logging.

6.1.6 POWER

Displays live power supply voltages and chassis temperature. Use when a SUPPLY VOLTS ERR or CHASSIS TEMP HI is indicated as a fault.
Voltage tolerances are as follows:

- SUPPLY IN=24V ± 3
- SUPPLY OUT=24V ± 3
- 5V=5V ± 0.3
- 3.3V=3.3V ± 0.3V
- BAT= 1.8V to 3.6V (Coin cell voltage)
- T=60 to -20degC (Internal chassis temperature)

6.1.7 MODBUS SLAVE

Displays the live Modbus traffic for the BMS connection. Use when troubleshooting communication problems with upstream master devices. The OK key will clear the screen to view the next query and response. For each query received by the controller from a master device or BMS, the number of bytes transmitted TX=, the function code used FUNC=, the register address requested ADDR=, and any errors or exceptions on the bottom line.

6.1.8 MODBUS MASTER

Displays the live Modbus traffic for each channel. Use when troubleshooting communication problems with detectors on the slave network. Up and down arrow keys will switch channel numbers, the OK key will clear the screen to view the next query and response. For each query sent by the controller the number of bytes transmitted TX=, the function code used FUNC=, the register address requested ADDR=, and any errors or exceptions on the bottom line.

6.1.9 BLUETOOTH

Displays the live Modbus traffic for the Bluetooth interface. Use when troubleshooting communication problems with Bluetooth devices. The OK key will clear the screen to view the next query and response. For each query received by the controller the number of bytes transmitted TX=, the function code used FUNC=, the register address requested ADDR=, and any errors or exceptions on the bottom line.

6.2 FAULT CODES

Code	Critical Fault	Possible Causes	Remedy
0001	CHASSIS TEMP HI	Chassis temperature outside the range of -20 to 60° C	Reduce ambient temperature or check for power supply malfunction.
0002	RS485 MSTR BUFR	Buffer overflow communicating with detectors	Disable all but one channel, use MODBUS MASTER traffic screen to one CH at a time.
0004	RS485 SLAVE BUFR	Buffer overflow communicating with BMS	Use MODBUS SLAVE traffic screen to diagnose.
0008	RS485 MSTR CRC	CRC error communicating with detectors	Disable all but one channel, use MODBUS MASTER traffic screen to one CH at a time.
0010	RS485 SLAVE CRC	CRC error communicating with BMS	Use MODBUS SLAVE traffic screen to diagnose.
0020	BT SLAVE CRC	CRC error communicating with Bluetooth APP	Use BLUETOOTH traffic screen to diagnose.
0040	RS485 SL TMOUT	Modbus timeout communicating with BMS	Use MODBUS SLAVE traffic screen to diagnose.
0080	BLE EEPROM	Error configuring Bluetooth transceiver	Reset, or Reboot controller, if fault persists, consult factory.
0100	BT SLAVE BUF	Buffer overflow communicating with Bluetooth APP	Use MODBUS SLAVE traffic screen to diagnose.
0200	STUCK KEY ERROR	On or more keys on the keypad are stuck down	Use KEYPAD TEST to determine stuck key, consult factory.

0400	CONFIG ERROR	All detectors are disabled or there are duplicate node addresses	Enable one or more channels, or check for duplicate node address assignment.
0800	SD CARD ERROR	SD card interface is reporting an error (see section X.X.X)	Select SD FAULT from DATA LOGGING menu for details.
1000	SENSOR RESPONSE	One or more detectors are not responding to queries	Disable all but one channel, use MODBUS MASTER traffic screen to test one CH at a time
2000	SUPPLY VOLTS ERR	One or more power supply voltages are out of range	Check POWER screen in diagnostic menu, if SUPPLY OUT is <23.7V check for short or overload on detector supply feed. If battery voltage is less than 1.8V replace coin cell. Otherwise consult factory.
4000	CPU ERROR	Microcontroller malfunction	Reset or reboot controller, if fault persist, consult factory.
8000	EEPROM ERROR	EEPROM malfunction	Consult factory.

6.3 SYSTEM TESTS

To facilitate installation and troubleshooting the following test are available from the SYSTEM TEST menu

6.3.1 RELAY TEST

Manually toggle each relay using the CH key indicated.

6.3.2 LED TEST

Using the OK key, all front panel LED will illuminate when pressed

6.3.3 KEYPAD TEST

Key designation will be indicated on the screen for each key pressed

6.3.4 STROBE TEST

Manually toggle the strobe, if installed, using up and down arrow keys

6.3.5 FAN TEST

Manually toggle the chassis cooling fan using the up and down arrow keys

7. Additional Information

7.1 Disposing of Instrument

EU-wide regulations governing the disposal of electrical and electronic appliances which have been defined in the EU Directive 2012/19/EU and in national laws have been effective since August 2012 and apply to this device.

Common household appliances can be disposed of using special collecting and recycling facilities. However, this device has not been registered for household usage. Therefore it must not be disposed of through these channels. The device can be returned to your national Bacharach Sales Organization for disposal. Contact Bacharach if you have any questions.

7.2 Technical Specifications

Product Type	8 Channel Gas Detector Controller
Number of Channels	1-8
Display	4 × 20 LCD w/ Backlight
Ambient Temperature Range	-20 to +50° C
Power Supply	80-264VAC 70W max
Power Output	24VDC 51W max
Accessory Alarm	A/V Strobe 24VDC 300ma max
Relays	1-Fault, 1-LO Alarm, 1-HI Alarm, Form C contacts rated 5A at 250VAC (N.O. contact) and 2A at 250VAC (N.C. contact).
Communications	1-Modbus Master, 1- Modbus Slave, RTU protocol, 9600 or 19200 baud.
Housing	Nema 1 Wall Mount
Approvals	UL/CSA/IEC/EN 61010-1 CE

8. Parts & Accessories

8.1 Part Numbers

8.1.1 MGS-408 Configurations

Part Number	Description
6702-8000	MGS-408 gas detection controller, 8 channels
1100-2307	Optional horn/strobe, mounts directly onto MGS-408, red lens
1100-2308	Optional horn/strobe, mounts directly onto MGS-408, green lens
1100-2309	Optional horn/strobe, mounts directly onto MGS-408, blue lens
1100-2310	Optional horn/strobe, mounts directly onto MGS-408, yellow lens

8.1.2 MGS-400 Series Accessories

Part Number	Description
3015-8041	Horn + strobe 24 V DC; blue lens
3015-8044	Strobe; blue lens; MP120K 120 V AC adapter
3015-8043	Horn + strobe 24 V DC; red lens
3015-8046	Strobe; red lens; MP120K 120 V AC adapter
3015-8042	Horn + strobe 24 V DC; amber lens
3015-8045	Strobe; amber lens; MP120K 120 V AC adapter

8.2 Service Center Locations

Prior to shipping equipment to Bacharach, visit www.mybacharach.com for a Returned Merchandise Authorization Number (RMA #). All returned goods must be accompanied by a RMA #. Pack the equipment securely (in its original packing, if possible), as Bacharach cannot be held responsible for any damage incurred during shipping to our facility.

Location	Contact Information	Shipping Address
United States	Phone: +1 724 334 5000 Toll Free: +1 800 736 4666 Fax: +1 724 334 5001 Email: help@mybacharach.com	Bacharach, Inc. 621 Hunt Valley Circle New Kensington, PA 15068, USA ATTN: Service Department
Europe	Phone: +353 1 284 6388 Fax: +353 1 284 6389 Email: help@mybacharach.com	Bacharach, Inc. 114A Georges Street Lower Dun Laoghaire, Dublin, Ireland ATTN: Service Department
Canada	Phone: +1 905 882 8985 Fax: +1 905 882 8963 Email: support@bachcan.ca	Bacharach, Inc. 10 West Pearce Street, Unit 4 Richmond Hill, Ontario L4B 1B6, Canada ATTN: Service Department