BACHARACH MGS-401 Entrance Monitor

for Commercial & Industrial Applications

Fixed Gas Detection

P/N: 1100-2527 | Revision 1.0

User Manual

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If MSA Bacharach is to do the repair work, send the instrument, prepaid, to the closest service center. Prior to shipping equipment to MSA Bacharach, visit www.mybacharach.com for a Returned Merchandise Authorization Number (#). All returned goods must be accompanied by a RMA #. Pack the equipment securely (in its original packing, if possible), as MSA 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, MSA Bacharach has a policy of performing all needed repairs to restore the monitor to full operating condition.

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1. Introduction

1.1 About this Manual

Thank you for investing in a MSA Bacharach MGS-401 Entrance Monitor. 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.

1.2 Conventions

1.2.1 Iconography

Alert	Icon	Description
WARNING		Potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION		Potentially hazardous situation which, if not avoided, could result in minor or moderate physical injury.
IMPORTANT		Additional information on how to use the product.

1.3 General Safety Statements

WARNING: Read this manual carefully before using the device. The device will perform as designed only if it is used and maintained in accordance with the manufacturer's instructions. Otherwise, it could fail to perform as designed.

WARNING: Make sure any personnel who will be installing, using, or maintaining this device have access to the user manual. If electronic access to the user manual is not possible, print a copy of the manual and keep it in an accessible location near the device.

Failure to obey the following guidelines and/or incorrect installation, operation, servicing, or maintenance of the device can cause incorrect operation of the device, and personnel who rely on this product for their safety can sustain serious personal injury or death.

WARNING: Install, operate, and maintain the device in strict accordance with its labels, cautions, warnings, instructions, and stated limitations.

The device contains no replaceable or serviceable parts. Repair or alteration of the system beyond the scope of these instructions or by anyone other than authorized personnel can cause incorrect operation of the device.

The device is intended for indoor use only. Do not use the device for outdoor applications.

Make sure the device is not located in areas that contain a flammable mixture of gas and air. Otherwise, an explosion can occur.

The device is not intrinsically safe. Do not use the device in areas classified as hazardous or locations where explosive concentrations of combustible gases or vapors can occur.

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

Failure to follow these warnings can result in serious bodily injury or death.

2. Product Description

2.1 Product Overview

The MGS-401 Entrance Monitor is used to display the gas concentration in compressor rooms to ensure concentrations are known before workers enter the space.

The MGS-401 can display up to (4) different diffusion gas detectors on a single 3.5” LCD screen and communication is done through a digital Modbus network. In addition, the MGS-401 can be used on larger compressor room networks with multiple doors. The IP54 enclosure ensures environmental protection for indoor or outdoor applications at temperatures of -20ºC – 50ºC.

The MGS-401 is powered by 24VAC/DC and includes a 10A, 24VAC/DC relay to connect to ventilation, a silence pushbutton, and a forced alarm input. The instrument also includes a perimeter strobe and +85dB audible alarm for notification of personnel.

Warning: This instrument indicates gas concentration(s) that may be present in the space where the attached gas detectors are located. The primary instrument to alarm personnel of a low alarm or high alarm concentration level are the gas detectors that are monitoring the space. If the attached gas detectors indicate a low alarm or high alarm concentration level, DO NOT enter the monitored space.

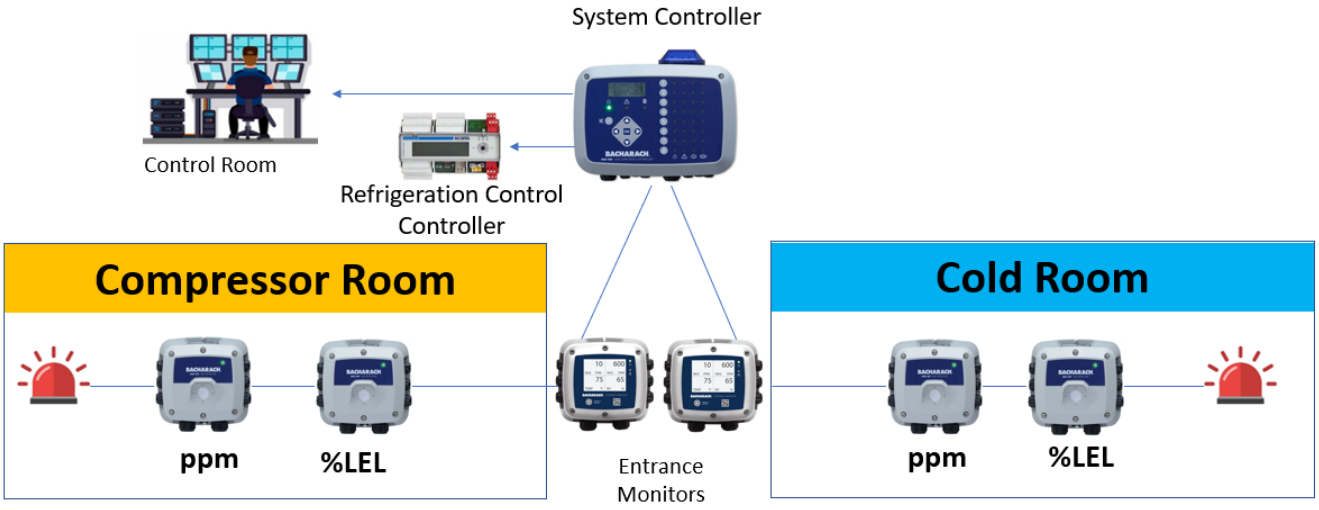
Failure to follow this warning can result in serious bodily injury or death.

Warning: If gas concentrations are increasing rapidly or are approaching OEL (Occupational Exposure Levels) or STEL (Short Term Exposure Limit) levels, evacuate the space and take measures to reduce gas concentrations to acceptable levels before re-entering.

Failure to follow this warning can result in serious bodily injury or death.

2.2 System Guidance

The MGS-401 Entrance Monitor is but one piece of a complete gas detection system. MGS-400 Series Gas detectors in the monitored area can signal via digital bus, relays and/or audible and visual output. The digital Modbus connection from the gas detectors provides the responses to the MGS-401, which in turn provides an audible and visual alarm outside the monitored space. In addition, the MGS-401 displays any gas concentration level in the space for additional information and visual monitoring. System configuration will determine whether the alarms signals are addressed in the monitored space or at a controller or BMS/BAS level. Consultation with local inspection authorities is recommended.



For recommended alarm levels refer to NIOSH (National Institute of Occupational Safety and Health) and OSHA (Occupational Safety and Health Administration) standards for OEL (Occupational Exposure Limit) and STEL (Short-Term Exposure Limit) gas exposure levels for best practice. In addition, ASHRAE 15/34, IIAR 2, EN378 and CSA-B52 provide recommended alarm levels for certain types of gases.

2.3 Design Features

Input Power	24VAC/DC, ±20%, 7W max.
Enclosure Rating	IP54
Operating Temperature	-20°C to 50°C
Relative Humidity	0 to 95% non-condensing
Altitude	6560 ft (2000 M)
Communications	RS485 Modbus RTU Client for Gas Detectors RS485 Modbus RTU Server for BMS
Visual / Audible Signals	Integrated high output visual strobe Integrated high output audible alarm
Output	(1) Relay, 10A @ 24VAC/DC
Inputs	Remote silence Forced alarm
Agency Approvals[1]	CE, EN 50270:2015, UL/CSA/EN 61010-1

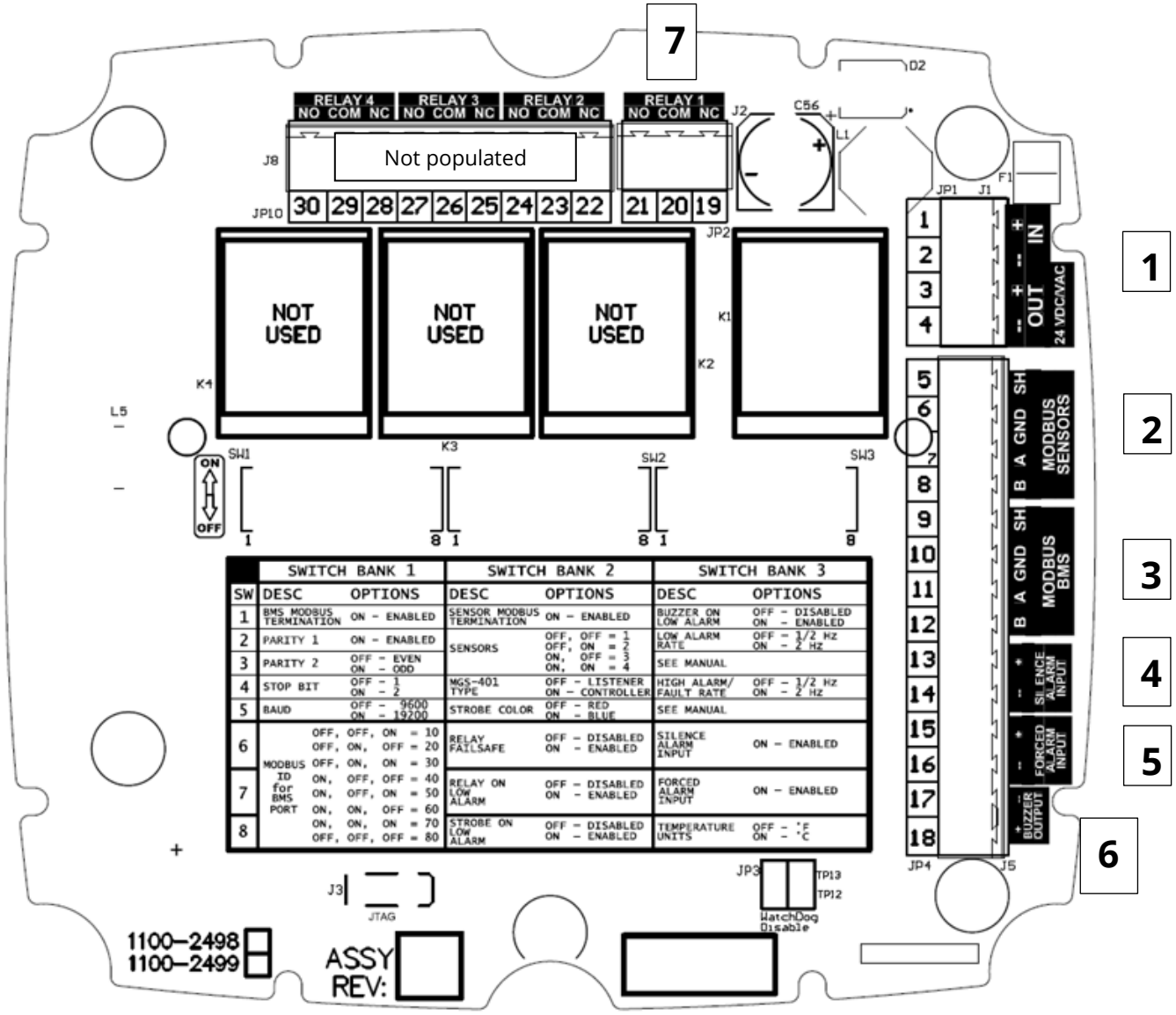
1 - MET Labs has not evaluated the efficacy of this device.

2.4 Front Panel

Figure 2-4 - *Front Panel Layout*

#	Front Panel Description
1	Integrated visual alarm in bezel
2	Controller Power & Fault LEDS
3	Mute alarm button
4	>80dB Alarm
5	½ " NPT Cable Glands (x2)

2.5 Back of Lid Components



SW	SWITCH BANK 1 DESC	OPTIONS	SWITCH BANK 2 DESC	OPTIONS	SWITCH BANK 3 DESC	OPTIONS
1	BMS MODBUS TERMINATION	ON – ENABLED	SENSOR MODBUS TERMINATION	ON – ENABLED	BUZZER ON LOW ALARM	OFF – DISABLED ON – ENABLED
2	PARITY 1	ON – ENABLED	SENSORS	OFF, OFF = 1 OFF, ON = 2 ON, OFF = 3 ON, ON = 4	LOW ALARM RATE	OFF – 1/2 Hz ON – 2 Hz
3	PARITY 2	OFF – EVEN ON – ODD			SEE MANUAL	
4	STOP BIT	OFF – 1 ON – 2	MGS-401 TYPE	OFF – LISTENER ON – CONTROLLER	HIGH ALARM/ FAULT RATE	OFF – 1/2 Hz ON – 2 Hz
5	BAUD	OFF – 9600 ON – 19200	STROBE COLOR	OFF – RED ON – BLUE	SEE MANUAL	
6	MODBUS ID for BMS PORT	OFF, OFF, ON = 10 OFF, ON, OFF = 20 OFF, ON, ON = 30	RELAY FAILSAFE	OFF – DISABLED ON – ENABLED	SILENCE ALARM INPUT	ON – ENABLED
7		ON, OFF, OFF = 40 ON, OFF, ON = 50 ON, ON, OFF = 60	RELAY ON LOW ALARM	OFF – DISABLED ON – ENABLED	FORCED ALARM INPUT	ON – ENABLED
8		ON, ON, ON = 70 OFF, OFF, OFF = 80	STROBE ON LOW ALARM	OFF – DISABLED ON – ENABLED	TEMPERATURE UNITS	OFF – °F ON – °C

Figure 2-5 - *MGS-401 Under Lid Connections and Configuration*

#	Component Description
2	Modbus to Gas Detectors
3	Modbus to BMS
4	Remote Silence Alarm Input
5	Forced Alarm Input
6	Aux. Buzzer Output
7	Alarm Relay

3. Installation

3.1 Warnings & Cautions

WARNING: Make sure the device is installed in a clean, dry area that is protected from vibration, including but not limited to a chiller, and heat sources.

Do not paint the device. Paint deposits can prevent correct operation of the device.

To prevent electrostatic discharge (ESD), connect an ESD wrist strap to the ESD connection point inside the device enclosure before doing work inside the enclosure. ESD can cause damage to the device.

Do not touch the electronic circuit boards.

Do not install or operate a device that has damage.

Disconnect all power sources before opening the device enclosure. Failure to do so can result in electrical shock. Electrical shock can cause damage to the device and injury to personnel.

Never operate the device without a protective ground. Operating the device without a protective ground can result in electrical shock. Electrical shock can cause damage to the device and injury to personnel.

Locate the device next to the entry door of the area where the MGS-family gas detection instrument(s) is installed and where it is easily visible to personnel entering the area where the MGS-family gas detection instrument(s) is installed.

Failure to follow these warnings can result in serious bodily injury or death.

3.2 Preliminary Inspection

The MGS-401 Entrance Monitor 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. Remove the top of the enclosure. Visually inspect the interior of the enclosure for loose components that may havebecome dislodged during shipment. If damage is discovered, please contact a qualified repair technician or the nearest MSA Bacharach Service Center for assistance.

3.3 Suitable / Appropriate Locations

The MGS-401 Entrance Monitor is design for use in mechanical rooms, warehouses, cold storage, or freezers to help comply with international safety standards *(EN 378, ASHRAE 15, CSA-B52)*. The MGS-401 is a IP54 *(poly carbonate)* rated enclosure and can be placed in environments from -20 ^{O}C to +50 ^{O}C ambient temperatures. Typical installations would be either insideor outside the door of an enclosed space to have local audible and visual alarms as required by safety standards.

3.4 Mounting the Gas Detection Controller

1. Mount the MGS-401 according to the product dimensions, maximum wiring

lengths andfollowing considerations:

- Environment: the full range of environmental conditions when selecting a location.
- Accessibility: the degree of accessibility required for maintenance purposes whenselecting a location.

2. Using a 5/32" *(4 mm)* hex key / Allen wrench *(not included),* remove the lid
3. Set the lid and rubber gasket aside to be reinstalled later.
4. Use the provided mounting screws to mount the enclosure base to the mounting surface.

3.5 Power Wiring

3.5.1 Connecting the 24VAC/DC Power

The MGS-401 Entrance Monitor features (2) ½" NPT cable fittings or 15mm cable glands that can be used for power entry wiring *(item 5 in "Figure 2-4 - MGS-401 Front Panel).* Alternately, ½ conduit could be used but the connection must be gasketed to ensure IP54 rating.

WARNING: Install a circuit breaker for the incoming power connections of the device. Put the circuit breaker in a location that is easy to access and near the device. Clearly mark the circuit breaker as the disconnecting unit for the device.

Ensure that grounding of the device is connected prior to starting the device.

A qualified electrician must do electrical wiring.

Wiring must comply with all applicable local electrical safety codes.

Make sure that the copper conductors used to supply mains meet all local electrical safety codes.

Failure to follow these warnings can result in serious bodily injury or death.

Locate the 24VAC/DC power input terminal block *(Item 1, "Figure 2-5 - MGS-401Connections and Configuration)* and remove it from the controller.

1. Ensuring that the main power is turned off at the upstream circuit breaker or disconnect switch, feed the incoming power leads through one of the ½ openings and into the appropriate terminals *(+ (Positive); – (Negative))* on the terminal block.

2. ***Do not reengage upstream circuit breaker or disconnect until all the connections in section 3.6 Other Electrical Connections have been addressed.***

3.6 Other Electrical Connections

The remaining electrical connections that are available are the alarm relay, Modbus to the BMS and Gas detectors, remote alarm silence and forced alarm inputs and also a remote buzzer output. The alarm relay is a standalone (3) wire terminal block, and the other connections are a common (14) wire terminal block (see *Figure 2-5 – MGS-401 Under Lid Connections and Configuration*). The connections can be made through one or two of the ½" NPT cable fittings or 15mm cable glands. In addition, the *MGS Series Cable Sizing and Selection Guide, Rev. 0, March 2021*, which can be found on www.mybacharach.com, can be used to assisting in cable sizing and layout.

3.6.1

For convenience there are two Modbus terminal block connections, Modbus BMS for connection to a

higher level BMS controller and a Modbus Sensors for connection to the monitors sensor(s). Follow standard Modbus practices for these connections. The Modbus configuration to the BMS and the Sensors or gas detectors must be completed. See section 4.1, MGS-401 Configuration for Modbus settings.

3.6.2

The alarm relay is rated 10A, 24V AC/DC and will respond to either high alarms (factory default) or, in addition, low alarms. In addition, the relay will change state and alarm if there are any faults detected with the MGS-401 Entrance Monitor or with any of the connected gas detectors. The relay can also be configured for failsafe response. See section 4.2, MGS-401 Configuration for relay settings.

3.6.3

The Remote silence alarm input is a terminal block where a momentary pushbutton/remote silence input would typically be connected is a normally open connection. The pushbutton, in a remote location, is used for personnel to silence the audible alarm momentarily with visual alarms still activated. The audible alarm will reengage if the alarm condition hasn't been cleared in 30 minutes. See section 4.2, MGS-401 Configuration for Remote Silence settings.

3.6.4

The Forced alarm input is terminal block where a momentary pushbutton/forced alarm input would typically be connected is a normally open pushbutton. The pushbutton, in a remote location, is used for personnel to force an alarm on the system to alert others of a potentially unsafe situation. The forced alarm will cause the gas detection system to engage both audible and visual alarm. See section 4.2, MGS-401 Configuration for Forced alarm settings.

3.6.5

The Buzzer output is a parallel connection to the on-board >80dB audible alarm. This terminal block is used if an additional buzzer is needed for a remote location. The remote buzzer will activate and be silenced as the on-board buzzer is configured.

4. MGS-401 Configuration

The configuration of the MGS-401 is done with (3) banks of DIP switches on the back of the MGS-401 lid. Through these switches the user can configure the Modbus settings, MGS-401 Entrance Monitor as well as many features of the perimeter strobe, on-board audible sounder as well as input and output configurations. Follow the directions below to configure your instrument.

	SWITCH BANK 1		SWITCH BANK 2		SWITCH BANK 3	
SW	DESC	OPTIONS	DESC	OPTIONS	DESC	OPTIONS
1	BMS MODBUS TERMINATION	ON – ENABLED	SENSOR MODBUS TERMINATION	ON – ENABLED	BUZZER ON LOW ALARM	OFF – DISABLED ON – ENABLED
2	PARITY 1	ON – ENABLED	SENSORS	OFF, OFF = 1 OFF, ON = 2 ON, OFF = 3 ON, ON = 4	LOW ALARM RATE	OFF – 1/2 Hz ON – 2 Hz
3	PARITY 2	OFF – EVEN ON – ODD			SEE MANUAL	
4	STOP BIT	OFF – 1 ON – 2	MGS-401 TYPE	OFF – LISTENER ON – CONTROLLER	HIGH ALARM/ FAULT RATE	OFF – 1/2 Hz ON – 2 Hz
5	BAUD	OFF – 9600 ON – 19200	STROBE COLOR	OFF – RED ON – BLUE	SEE MANUAL	
6	MODBUS ID for BMS PORT	OFF, OFF, ON = 10 OFF, ON, OFF = 20 OFF, ON, ON = 30	RELAY FAILSAFE	OFF – DISABLED ON – ENABLED	SILENCE ALARM INPUT	ON – ENABLED
7		ON, OFF, OFF = 40 ON, OFF, ON = 50 ON, ON, OFF = 60	RELAY ON LOW ALARM	OFF – DISABLED ON – ENABLED	FORCED ALARM INPUT	ON – ENABLED
8		ON, ON, ON = 70 OFF, OFF, OFF = 80	STROBE ON LOW ALARM	OFF – DISABLED ON – ENABLED	TEMPERATURE UNITS	OFF – °F ON – °C

Figure 4 MGS-401 DIP Switch configuration.

4.1 BMS Modbus Configuration

4.1.1

The MGS-401 Entrance Monitor can be used as a standalone device to monitor up to (4) MGS gas sensors or it can be used as part of a higher-level Building Automation System. Switch bank 1, positions 1 through 8 (see figure 2.5, **MGS-401 Under Lid Connections and Configuration**) are used to configure the BMS Modbus Server settings when use with higher level controls. Please refer to Modbus best practice when making these choices. ***It is important ALL of the following instrument settings corresponded to the BMS settings for proper operation.***

1. Bank 1, Switch 1 is used to enable the BMS Modbus terminating resistor. The default is 'disabled' or OFF.
2. Bank 1, Switch 2 is used to enable the parity of the Modbus network. The default is 'disabled', 'no parity' or OFF.
3. Bank 1, Switch 3 is used to set the parity of the Modbus network to either 'even' – OFF switch position or 'odd' – ON switch position. The default is 'even' parity or OFF.
4. Bank 1, Switch 4 is used to set the Stop Bit of the Modbus network to either '1' or '2'. The default is STOP BIT '1' or OFF.
5. Bank 1 Switch 5 is used to set the Baud Rate of the Modbus network to either '9600' or '19200'. The default Baud Rate is '9600' or OFF.
6. Bank 1, Switches 6, 7 and 8 are used to assign a Modbus ID to the MGS-401 when used on a BMS

network. The Modbus ID is a combination of all three switch positions. The default setting for the Modbus ID is '80' or OFF, OFF, OFF.

4.2 MGS-401 Configuration

4.2.1

The MGS-401 can be configured as a 'Controller' or as a 'Listener'. If there are no other Modbus 'controllers' on the network, the MGS-401 must be configured as a 'Controller', see configuration advice below. As a 'Controller' the MGS-401 will actively seek changes to the network data in the connected gas detectors. If there is a Modbus controller on the network (MGS-408, MGS-402 or another Modbus controller) other than the MGS-401, the MGS-401 must be configured as a 'Listener'. When configured as a 'Listener' the MGS-401 not seek network data on the Modbus network but will respond to the activity between the controller that is seeking the network data from the connected gas detectors. You can have more than (1) MGS-401 Entrance Monitor on the network at one time – multiple entrances to a monitored space. If an MGS-401 is configured as a 'Controller' all other Entrance Monitors must be configured as 'Listeners'. The MGS-401 Entrance Monitor can monitor up to (4) different Modbus IDs on the network. **IMPORTANT** - ***When configured the Entrance Monitor is expecting the sensors to be Modbus address 01, 02, 03 and 04 depending on how many are configured.*** Other configuration features include perimeter strobe options, relay configuration, and enabling auxiliary inputs. These will be explained in this section.

1. Bank 2, Switch 1 is used to enable the Sensor Modbus Termination. Please refer to Modbus best practice when making these choice. The default is 'Not Enabled' or OFF
2. Bank 2, Switches 2 and 3 are used to configure the number of sensors the MGS-401 is expecting to be connected to, up to a maximum of 4. The default is one sensor or OFF, OFF
3. Bank 2, Switch 4 is used to configure the MGS-401 for 'Controller' mode or 'Listener' mode as described above. The default is 'Listener' or OFF.
4. Bank 2, Switch 5 is used to configure the color of the perimeter strobe to either 'Blue' or 'Red'. The default is 'Red' or OFF.
5. Bank 2, Switch 6 is used to configure the Alarm Relay to be 'Failsafe'. In failsafe mode the relay will change state when power is turned on and will change state again if power is lost or if there is an alarm or fault condition. The default is 'NOT Failsafe' or OFF.
6. Bank 2, Switch 7 is used to 'Enable' the Alarm Relay to change state on a LOW ALARM condition. The default is 'NOT Enabled'. NOTE – The MGS-401 will always alarm during a HIGH ALARM condition or a FAULT condition, this is not configurable and is required by safety standards.
7. Bank 2, Switch 8 is used to 'Enable' the Perimeter Strobe during a LOW ALARM condition. The factory default is 'DISABLED' or OFF.
8. Bank 3, Switch 1 is used to 'Enable' the >80dB buzzer during a LOW ALARM condition. The factory default is 'DISABLED' or OFF.
9. Bank 3, Switch 2 is used to configure the LOW ALARM Buzzer and Strobe rate to either '½ Hz' or '2 Hz'. The factory default is '½ Hz' or OFF.
10. Bank 3, Switch 3 is unused. The factory default is 'DISABLED' or OFF.
11. Bank 3, Switch 4 is used to configure the HIGH ALARM Buzzer and Strobe rate to either '½ Hz' or '2 Hz'. The factory default is '½ Hz' or OFF.
12. Bank 3, Switch 5 is unused. The factory default is 'DISABLED' or OFF.

13. Bank 3, Switch 6 is used to ENABLE the Silence Alarm input. The factory default is 'DISABLED' or OFF.

14. Bank 3, Switch 7 is used to ENABLE the Forced Alarm Input. The factory default is 'DISABLED' or OFF.

15. Bank 3, Switch 8 is used to set the temperature units on the MGS-401 Entrance Monitor to either °F or °C. The factory default is 'DISABLED' or °F.

4.3 MGS-401 Final Installation Check

4.3.1

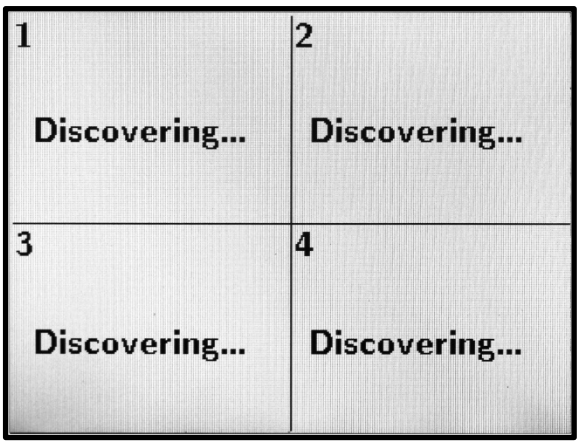
As a final check, ensure that all wiring and terminal blocks are secured. Ensure that none of the wires in any of the terminations have any strands of wire that could be potential short circuits. Carefully remove any of the slack from cable(s) through the ½" NPT cable fittings or 15mm cable glands.

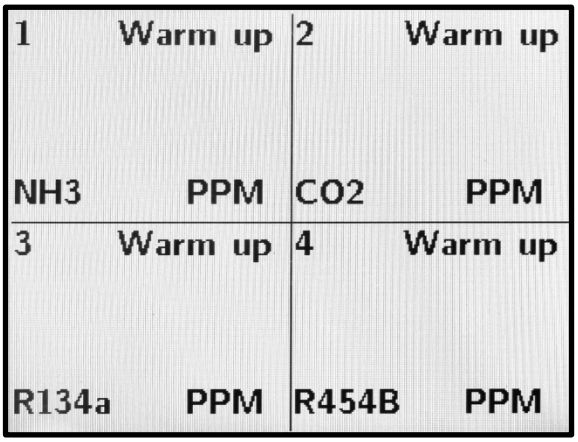
Replace the rubber gasket and lid onto the instrument base. Using a 5/32" (4 mm) hex key / Allen wrench (not included), secure the lid by tightening the (6) Hex Head screws in and 'X' pattern from top left to lower right, upper right to lower left and then the remaining center top and bottom screws. Torque all screws to 15 to 20 lbf in (1.5 to 2.0 Nm.).

5. Power Up

Once the MGS-401 Entrance Monitor has properly wired and configured and the lid is installed, the power can be turned on at the circuit break or disconnect.

1. Once powered up the MGS-401 will attempt to 'discover' all the MGS Gas Detectors that it is configured to monitor, up to (4). Once discovered on the network each gas detector will show 'Warm Up' in the upper right of the gas detector quadrant. This will change to 'Active' once the gas detectors have completed their warmup procedure. Some gas detectors may take up to a few minutes to complete the warm-up cycle.



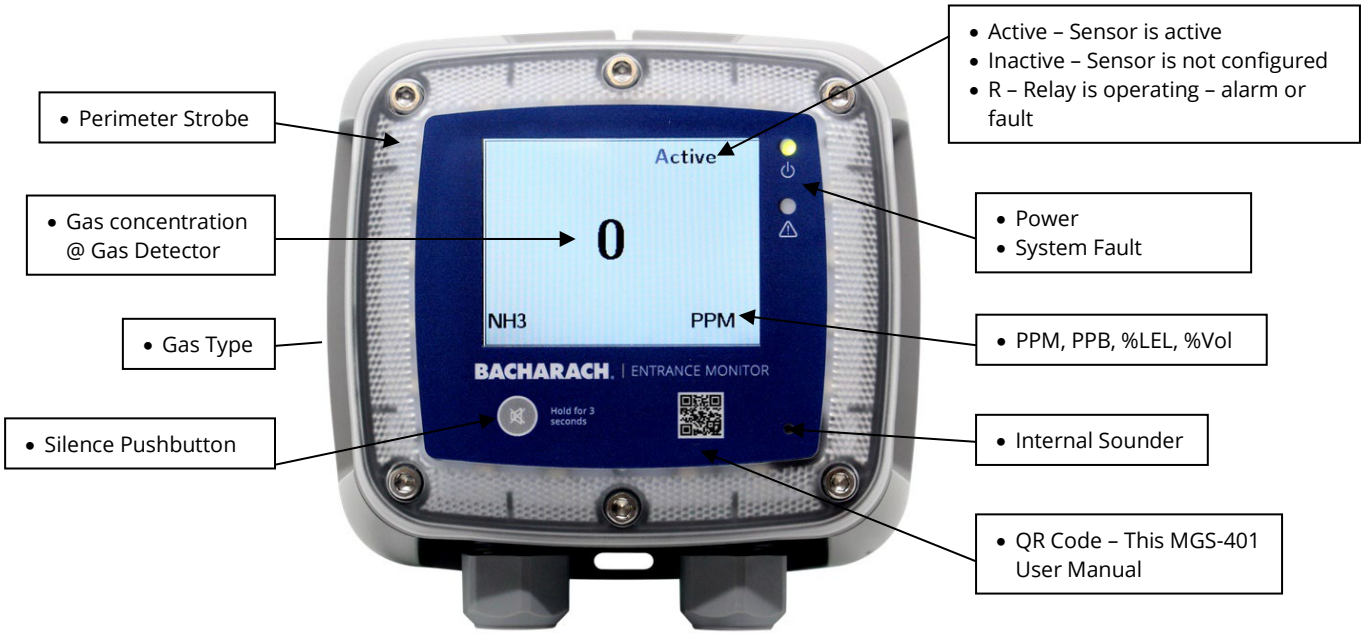


2. If one gas detector is configured to the MGS-401 the entire LCD screen will be populated as shown below. If 2-4 gas detectors are configured to the MGS-401 the LCD screen will be populated in quadrants. If only 2-3 gas detectors are configured, then the remaining quadrants will show 'Inactive'.

5.2 Operation

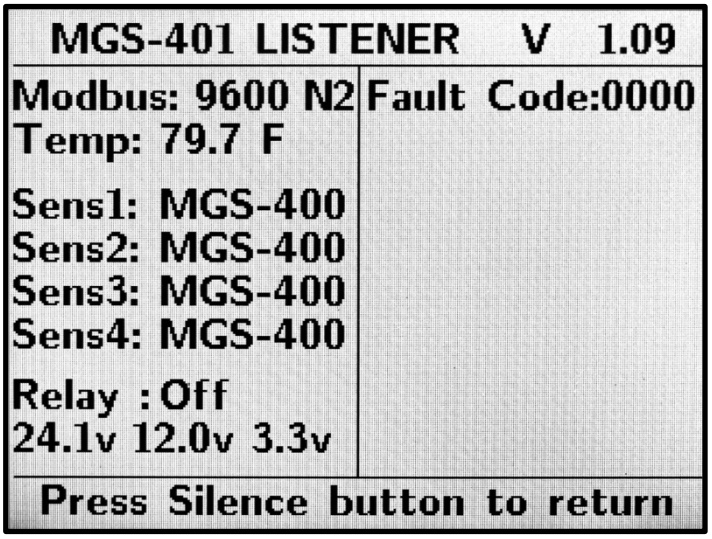
5.2.1

During normal operation the MGS-401 will monitor the connected gas detector(s) and display the monitored location gas concentration as provided by the gas detectors in the location. If the gas detectors in the monitored area respond to any preset alarm level or a fault occurs on the system the MGS-401 Entrance Monitor will display that information on the LCD and respond with audible and visual alarms, configured relay response and other countermeasures that are connected or configured. The following graphic shows details of a single configured gas detector.



6. Trouble shooting

6.1.1 The System screen can be accessed by pressing the Silence button on the MGS-401 front panel (3) consecutive times within 3 seconds. The System screen will show some of the configuration of the MGS401. In addition, it will display any MGS-401 Fault Codes that may be present. See Section 6.1.2 Fault Codes for Fault Code details.



6.1.2 Fault codes

MGS-401 Sentinel Entrance Monitor Fault Codes		
Code	**Description**	**Possible Causes**
0002	RS485 CLNT BUFR	Buffer overflow communicating with detectors
0004	RS485 SRVR BUFR	Buffer overflow communicating with BMS
0008	RS485 CLNT CRC	CRC error communicating with sensors
0010	RS485 SRVR CRC	CRC error communicating with BMS
0020	RS485 SRVR TMOUT	Modbus timeout communicating with BMS
0040	EEPROM ERROR	EEPROM read error
0080	STUCK BUTTON	External Silence button is stucked
0200	SENSOR FAULT	One or more of the connected sensors are in fault
0400	SENSOR_RESPONSE_FAULT	One or more of the sensors showing a comms fault
0800	DISPLAY ERROR	The display board is not detected
2000	POWER SUPPLY	One or more Power supply voltages out of range
4000	MPU CLK	MPU clock fault
8000	DIAGNOSTIC	Diagnostic fault (FLASH CRC, memory, etc.)

7. Modbus Map

READ	WRITE	Register Address	Func Code 04 (read input registers)	Type	Item Group	Notes
R	X	30001	Sensor 1 is monitored flag	DYN	Sensor 1	0=NOT MONITORED 1=MONITORED
R	X	30002	Sensor 1 communication status	DYN	Sensor 1	1=COM NORMAL, 2=COM FAIL
R	X	30003	Sensor 1 modbus error code	DYN	Sensor 1	Exception code from Modbus standard
R	X	30004	Sensor 1 concentration	DYN	Sensor 1	0-65535
R	X	30005	Sensor 1 status code	DYN	Sensor 1	0=OFFLINE 1=WARMUP 2=ONLINE
R	X	30006	Sensor 1 Fault code (high byte)	DYN	Sensor 1	Sensor specific
R	X	30007	Sensor 1 sensor fault code	DYN	Sensor 1	Sensor specific
R	X	30008	Sensor 1 degC	DYN	Sensor 1	Sensor specific
R	X	30009	Sensor 1 Cal expired flag	DYN	Sensor 1	0=Cal Valid, 1=Cal expired
R	X	30010	Sensor 1 Low alarm flag	DYN	Sensor 1	0=No alarm, 1=Alarm
R	X	30011	Sensor 1 High alarm flag	DYN	Sensor 1	0=No alarm, 1=Alarm
R	X	30012	Sensor 1 Saturation flag	DYN	Sensor 1	0=Unsaturated, 1=Saturated
R	X	30013	Sensor 1 Underflow flag	DYN	Sensor 1	0=Normal, 1=Underflow
R	X	30014	Sensor 1 Instrument Type code	STA	Sensor 1	0=MGS250,1=MGS410,2=MGS450,3=MGS460,4=MGS550-S1,5=MGS550-S2
R	X	30015	Sensor 1 Node Address	STA	Sensor 1	Node address is fixed. Sensor 1 - Node 1, Sensor 2 - Node 2, Sensor 3 - Node 3, Sensor 4 - Node 4
R	X	30016	Sensor 1 Sensor Type code	STA	Sensor 1	Sensor specific
R	X	30017	Sensor 1 Concentration Units	STA	Sensor 1	1=ppm,2=ppb,3=%VOL,4=%LEL
R	X	30018	Sensor 1 Scale Factor	STA	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	STA	Sensor 1	ASCII characters
R	X	30020	Sensor 1 Gas Type Text Char 3,4	STA	Sensor 1	ASCII characters
R	X	30021	Sensor 1 Gas Type Text Char 5,6	STA	Sensor 1	ASCII characters
R	X	30022	Sensor 1 Gas Type Text Char 7,8	STA	Sensor 1	ASCII characters
R	X	30023	Sensor 1 Gas Type Text Char 9,10	STA	Sensor 1	ASCII characters
R	X	30024	Sensor 1 SID Text Char 1,2	STA	Sensor 1	ASCII characters
R	X	30025	Sensor 1 SID Text Char 3,4	STA	Sensor 1	ASCII characters
R	X	30026	Sensor 1 SID Text Char 5,6	STA	Sensor 1	ASCII characters
R	X	30027	Sensor 1 SID Text Char 7,8	STA	Sensor 1	ASCII characters
R	X	30028	Sensor 1 UID Text Char 1,2	STA	Sensor 1	ASCII characters
R	X	30029	Sensor 1 UID Text Char 3,4	STA	Sensor 1	ASCII characters
R	X	30030	Sensor 1 UID Text Char 5,6	STA	Sensor 1	ASCII characters
R	X	30031	Sensor 1 UID Text Char 7,8	STA	Sensor 1	ASCII characters
R	X	30032	Sensor 1 Alias Text Char 1,2	STA	Sensor 1	ASCII characters
R	X	30033	Sensor 1 Alias Text Char 3,4	STA	Sensor 1	ASCII characters
R	X	30034	Sensor 1 Alias Text Char 5,6	STA	Sensor 1	ASCII characters
R	X	30035	Sensor 1 Alias Text Char 7,8	STA	Sensor 1	ASCII characters
R	X	30036	Sensor 1 Alias Text Char 9,10	STA	Sensor 1	ASCII characters
R	X	30037	Sensor 1 Alias Text Char 11,12	STA	Sensor 1	ASCII characters
R	X	30038	Sensor 1 Alias Text Char 13,14	STA	Sensor 1	ASCII characters
R	X	30039	Sensor 1 Alias Text Char 15,16	STA	Sensor 1	ASCII characters
R	X	30051-	SENSOR 2 DATA GROUP (REPEAT OF SENSOR 1)		Sensor 2	
R	X	30101-	SENSOR 3 DATA GROUP (REPEAT OF SENSOR 1)		Sensor 3	
R	X	30151-	SENSOR 4 DATA GROUP (REPEAT OF SENSOR 1)		Sensor 4	
R	X	31000	Sensor 1 Concentration	DYN	Sensor 1	
R	X	31001	Sensor 2 Concentration	DYN	Sensor 2	
R	X	31002	Sensor 3 Concentration	DYN	Sensor 3	
R	X	31003	Sensor 4 Concentration	DYN	Sensor 4	
R	X	31032	Sensor 1 Fault code (high bytes)	DYN	Sensor 1	
R	X	31033	Sensor 1 Fault code	DYN	Sensor 1	
R	X	31034	Sensor 2 Fault code (high bytes)	DYN	Sensor 2	
R	X	31035	Sensor 2 Fault code	DYN	Sensor 2	
R	X	31036	Sensor 3 Fault code (high bytes)	DYN	Sensor 3	
R	X	31037	Sensor 3 Fault code	DYN	Sensor 3	
R	X	31038	Sensor 4 Fault code (high bytes)	DYN	Sensor 4	
R	X	31039	Sensor 4 Fault code	DYN	Sensor 4	

			Func Code 03/06 Read/preset		Item Group	
R	X	40000	Future unused	STA	Controller-related	return zero always
R	X	40001	MGS-401 Type	STA	Controller-related	0=Listener, 1=Controller
R	X	40002	RS-485 Node Address	STA	Controller-related	8 addresses (10, 20, 30, ..., 80)
R	X	40003	Baud Rate	STA	Controller-related	0=9600 1=19200
R	X	40004	Stop Bits	STA	Controller-related	1 or 2
R	X	40005	Parity	STA	Controller-related	0=none 1=odd 2=even
R	W	40006	Controller UID Char 1,2	STA	Controller-related	ASCII characters
R	W	40007	Controller UID Char 3,4	STA	Controller-related	ASCII characters
R	W	40008	Controller UID Char 5,6	STA	Controller-related	ASCII characters
R	W	40009	Controller UID Char 7,8	STA	Controller-related	ASCII characters
R	X	40010	16 bit Current Fault Code Controller	DYN	Controller-related	0-65535
R	X	40011	16 bit Last Fault Code Controller	DYN	Controller-related	0-65535
R	X	40012	Software Version Major Controller	STA	Controller-related	X100
R	X	40013	Software Version Minor Controller	STA	Controller-related	X100
R	X	40014	Software Version Build Controller	STA	Controller-related	X100
R	X	40015	Relay 1 Contact Behaviour / Failsafe	DYN	Controller-related	0=normal 1=Failsafe
R	X	40018	24V supply voltage x 100	DYN	Diagnostics	2400=24.00V
R	X	40019	Display voltage x 100	DYN	Diagnostics	2100=21.00V
R	X	40020	12 voltage x 100	DYN	Diagnostics	1200=12.0V
R	X	40021	Controller 3.3V supply voltage x100	DYN	Diagnostics	330=3.30V
R	X	40022	Controller temperature x100	DYN	Diagnostics	2500=25.00 °C/°F
R	X	40023	Controller Temperature (External) x 100	DYN	Diagnostics	2500=25.00 °C/°F
R	X	40027	Relay on Low Alarm Enabled	STA	Controller-related	0=Disabled 1=enabled
R	X	40028	Strobe on Low Alarm Enabled	STA	Controller-related	0=Disabled 1=enabled
R	X	40029	Buzzer on Low Alarm Enabled	STA	Controller-related	0=Disabled 1=enabled
R	X	40030	Low Alarm Visual/Audio Mode	STA	Controller-related	3=0.5Hz PULSE, 2=2Hz PULSE
R	X	40031	High Alarm/Fault - Visual/Audio Mode	STA	Controller-related	3=0.5Hz PULSE, 2=2Hz PULSE
R	X	40032	Silence Alarm Input Enabled	STA	Controller-related	0=Disabled 1=enabled
R	X	40033	Forced Alarm Input Enabled	STA	Controller-related	0=Disabled 1=enabled
R	X	40034	Dip switch group 1 settings	STA	Controller-related	8 bit positions 0=OFF, 1=ON
R	X	40035	Dip switch group 2 settings	STA	Controller-related	8 bit positions 0=OFF, 1=ON
R	X	40036	Dip switch group 3 settings	STA	Controller-related	8 bit positions 0=OFF, 1=ON
R	X	40037	Temperature units	STA	Controller-related	0 = °F, 1 = °C
R	X	40038	MODBUS BMS Termination	STA	Controller-related	0=Disabled 1=enabled
R	X	40039	MODBUS Sensor Termination	STA	Controller-related	0=Disabled 1=enabled
R	X	40040	Number of Sensors connected	STA	Controller-related	1-4 Sensors
R	X	40041	Strobe Color	STA	Controller-related	0=RED, 1=BLUE

			Func Code 02 (read input status)		Item Group	
R	X	10001	Sensor 1 Low Alarm Flag (0 or 1 = alarm)	DYN	Sensor 1	
R	X	10002	Sensor 2 Low Alarm Flag (0 or 1 = alarm)	DYN	Sensor 2	
R	X	10003	Sensor 3 Low Alarm Flag (0 or 1 = alarm)	DYN	Sensor 3	
R	X	10004	Sensor 4 Low Alarm Flag (0 or 1 = alarm)	DYN	Sensor 4	
R	X	10033	Sensor 1 High Alarm Flag (0 or 1 = alarm)	DYN	Sensor 1	
R	X	10034	Sensor 2 High Alarm Flag (0 or 1 = alarm)	DYN	Sensor 2	
R	X	10035	Sensor 3 High Alarm Flag (0 or 1 = alarm)	DYN	Sensor 3	
R	X	10036	Sensor 4 High Alarm Flag (0 or 1 = alarm)	DYN	Sensor 4	
R	X	10065	Sensor 1 Any Alarm Flag (0 or 1 = alarm)	DYN	Sensor 1	
R	X	10066	Sensor 2 Any Alarm Flag (0 or 1 = alarm)	DYN	Sensor 2	
R	X	10067	Sensor 3 Any Alarm Flag (0 or 1 = alarm)	DYN	Sensor 3	
R	X	10068	Sensor 3 Any Alarm Flag (0 or 1 = alarm)	DYN	Sensor 4	
R	X	10097	Sensor 1 Fault Flag (0 or 1 = fault)	DYN	Sensor 1	
R	X	10098	Sensor 2 Fault Flag (0 or 1 = fault)	DYN	Sensor 2	
R	X	10099	Sensor 3 Fault Flag (0 or 1 = fault)	DYN	Sensor 3	
R	X	10100	Sensor 4 Fault Flag (0 or 1 = fault)	DYN	Sensor 4	
R	X	10129	Sensor 1 enabled flag (0=disabled 1=enabled)	DYN	Sensor 1	
R	X	10130	Sensor 2 enabled flag (0=disabled 1=enabled)	DYN	Sensor 2	
R	X	10131	Sensor 3 enabled flag (0=disabled 1=enabled)	DYN	Sensor 3	
R	X	10132	Sensor 4 enabled flag (0=disabled 1=enabled)	DYN	Sensor 4	
R	X	10161	Sensor 1 No Comms Flag (0 = No Comms, 1=	DYN	Sensor 1	
R	X	10162	Sensor 2 No Comms Flag (0 = No Comms, 1=	DYN	Sensor 2	
R	X	10163	Sensor 3 No Comms Flag (0 = No Comms, 1=	DYN	Sensor 3	
R	X	10164	Sensor 4 No Comms Flag (0 = No Comms, 1=	DYN	Sensor 4	
R	X	10200	Relay 1 State (0 or 1 = energised)	DYN	Controller-related	
			Func Code 43/14		Item Group	
R	X	0x00	Vendor name "Bacharach"	STA	Controller-related	
R	X	0x01	Product code "MGS-401"	STA	Controller-related	
R	X	0x02	Major minor rev "NN.nn.bb"	STA	Controller-related	

8. Parts Numbers and Service

8.1 Part Numbers

Part #	Description
6702-8030	MGS-401 Entrance Monitor
6600-8950	Sunshield for outdoor locations
1100-2534	Security Kit
1100-8950	Security Screws ((6) pcs. and driver bit)
6900-0010	>100dB External sounder (mounted in MGS-401 Cable Gland)

8.2 Service Center Locations

Prior to shipping equipment to MSA Bacharach, visit www.mybacharach.com for a Returned Merchandise Authorization Number *(RMA #)*. All returned goods must be accompanied by an RMA #. Pack the equipment securely *(in its original packing, if possible)*, as MSA Bacharach cannot be held responsible for any damage incurredduring 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	MSA Bacharach, Inc. 621 Hunt Valley Circle New Kensington, PA 15068, USA ATTN: Service Department
Europe	Phone: +353 1 284 6388	MSA Bacharach, Inc. Unit D12 & D13 Santry Business Park, Swords Road Santry, Dublin, Ireland ATTN: Service Department
Canada	Phone: +1 416 620 4225	MSA Bacharach, Inc. 100 Westmore Drive Unit 23 Etobicoke, Ontario M9V 5C3 ATTN: Service Department