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HGM-SZ
Halogen Gas Monitor - Single Zone

Instruction 3015-4256

Installation / Operation / Maintenance

Rev. 5 April 2009

CE ETL c LISTED us INTERTEK

Product Leadership • Training • Service • Reliability

WARRANTY

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Declaration of Conformity

Manufacturer's name & address:	Bacharach, Inc. 621 Hunt Valley Circle New Kensington, PA 15068

Product Name:	HGM-SZ (Halogen Gas Monitor Single Zone)
	European EMC Directive 2004/108/EC
	EN55011 – Emissions Product Specific Standard
	EN61326-1 – Immunity Product Specific Standard
	EN61010-1 – Safety requirements for Electrical Equipment
	      For Measurement, Control, and Laboratory
	      Use-Part 1: General Requirements

Table of Contents

1 Introduction

How to Use This Manual

Thank you for investing in a **BACHARACH** HGM-SZ (Halogen Gas Monitor - Single Zone).

This manual provides important information on how to install, operate, and service the HGM-SZ monitoring unit.

To assure operator safety and the proper use of the monitor, please read, understand, and follow the contents of this manual.

If you have a working knowledge of gas monitors, you will find this manual useful as a reference tool. If you are new to the use of gas monitors, you can educate yourself about the principles of gas detection and the proper operation of this device by reading this manual thoroughly.

Warning Statements

The use of the word **WARNING** in this manual denotes a potential hazard associated with the use of this equipment. It calls attention to a procedure, practice, or condition, or the like, which if not correctly performed or adhered to, could result in personal injury or death.

Caution Statements

The use of the word **CAUTION** in this manual denotes a potential hazard associated with the use of this equipment. It calls attention to a procedure, practice, condition, or the like, which if not correctly performed or adhered to, could result in damage to the equipment.

Hazard Symbols on Monitor

This symbol indicates the need to consult this operating instruction manual when opening the enclosure.

WARNING: A potential risk exists if the operating instructions are not followed.

This symbol indicates the presence of electric shock hazards when the enclosure is opened.

WARNING: To avoid risk of injury from electric shock, do not open the enclosure without first disconnecting AC power.

Safety Precautions

AC Power Supply

The HGM-SZ uses a universal power supply that is capable of accepting inputs of 100 to 240 VAC, 50/60 Hz. The monitor's power consumption is 15 Watts. It is highly recommended that the monitor be connected directly to the AC power source, preferably on its own circuit (with UPS or surge protection).

A switch or circuit breaker rated 1.0 A, 250 VAC, with a minimum terminal spacing of 3.0 mm must be attached to the monitor's AC power leads. This switch must also be located in close proximity to the monitor, and be in easy reach of the operator. This switch should also be clearly marked as the monitor's main AC disconnect device.

Protective Grounding

Under no circumstances should the HGM-SZ be operated without connection to 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.

Explosive Atmosphere

Do not operate this equipment in the presence of flammable liquids, vapors or aerosols. Operation of any electrical equipment in such an environment constitutes a safety hazard.

Proper Exhaust Venting

It is imperative that the monitor's exhaust port be vented as described in this manual. Failure to do so may constitute a safety hazard.

Accessing the Interior of the Monitor

Extreme care should be exercised when accessing the interior of the monitor. Only qualified electrical maintenance personnel should perform connections and adjustments. Always remove AC power before performing work inside the monitor.

Misuse & Modifications to the Monitor

The protection provided by the monitor may be impaired if the monitor is used in a manner not specified by Bacharach, Inc. Changes or modifications to this monitor, not expressly approved, will void the warranty.

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. Use ONLY the provided knockouts for electrical and communication wiring. Drilling into the box will void the warranty.

Fusing

F1, F2: 1.0 A, 250 V, Type "F"

Installation Category

Installation Category II, Pollution Degree II, as defined by UL.

Altitude Limit

6,562 ft (2,000 m)

Cleaning

To clean the outside of the case, **DO NOT** use soap and water. **USE** a dry cloth.

Functional Overview

General Description

Refrigerant monitors are specified to support compliance to federal, state and local safety codes governing gas emissions. Avoiding significant refrigerant loss reduces equipment replacement costs, maintains equipment efficiency, promotes safety, and protects the environment.

The Bacharach HGM-SZ (Halogen Gas Monitor Single Zone) is designed to continuously test for the presence of refrigerant gas in an area that is located up to 500 ft (15.2 m) away from the monitor. The HGM-SZ displays the type of gas being monitored, along with displaying both the current gas level and the peak gas level detected in that area on its front panel LCD. The monitor retains a log of previous readings that can be easily accessed for analysis.

An audible alarm and front panel indicators are provided to signal alarm and fault conditions, and relay contacts are provided that can be used to trigger external alarm devices in the event of a system fault, or if a leak (small), spill (medium), or evacuation (large) level of gas is detected. The system also includes a 4−20 mA current loop interface that can be connected to remote monitoring equipment.

The HGM-SZ requires only minor periodic maintenance such as the occasional replacement of filters. The monitor incorporates active diagnostics that continuously check the system for proper operation. A front panel indicator is provided to alert an operator of system malfunctions, and fault codes are generated that enable the operator to identify the cause of the fault.

Understanding Monitoring Levels

Effective use of this monitor requires an understanding of what constitutes reasonable alarm set points for the type of gas being monitored. Most systems leak some gas. In a good "tight" installation these background levels will be acceptably low and often do not require corrective action. You can reduce nuisance alarms and needless service calls if the alarm levels are set at practical limits.

The HGM-SZ is shipped with its leak, spill, and evacuate alarm levels set at 50, 150 and 300 ppm, respectively. Setting the monitor at these recommended alarm levels will satisfy the needs of most users. However, the ppm levels generated by system leaks into the environment are greatly influenced by the volume of air in the sampling area, air circulation, size of the leak, distance to the monitoring point, and a host of other variables. In some cases the alarm set points may need to be adjusted either up or down to achieve effective monitoring.

Suggested Location of Sampling Point

At the point of a refrigerant gas leak, the gas is nearly pure. As refrigerant gas is dispersed into the air, the gas molecules diffuse, causing a dilution of the original concentration. The HGM-SZ measures the gas concentration at the point the sample is collected. Therefore, if the termination of the collection line is not at the exact point of the gas leak, then the monitor will read a diluted mixture of refrigerant gas and air.

It should be noted that when refrigerant gas is cold, it is heaver than air and settles below the leak point. When the gas warms to room temperature, it becomes lighter than air and tends to collect above the leak point. Consequently, the sampling point should be located as close as possible to the source of a potential leak. If this is impractical, then the alarm set points should be adjusted to compensate for the dilution of the refrigerant gas.

The HGM-SZ should be mounted outside of the mechanical room or just inside a doorway to the room. This is the "split architecture design" for safety of the operator. The monitor should be readily accessible for easy visual monitoring and servicing. The total length of the sample line + exhaust line can be up to 500 ft (152.4 m). If the area around the monitor is not well ventilated, then an optional exhaust line and purge line can be run to an outside location. The total length of the exhaust line + the purge line cannot exceed 500 ft (152.4 m).

It may be necessary to perform a "smoke" test of the mechanical room to determine the best monitoring point. The smoke test would provide the pattern of air currents present in the room.

HGM-SZ Refrigerant Gas Leak Monitor Mechanical Room Placement
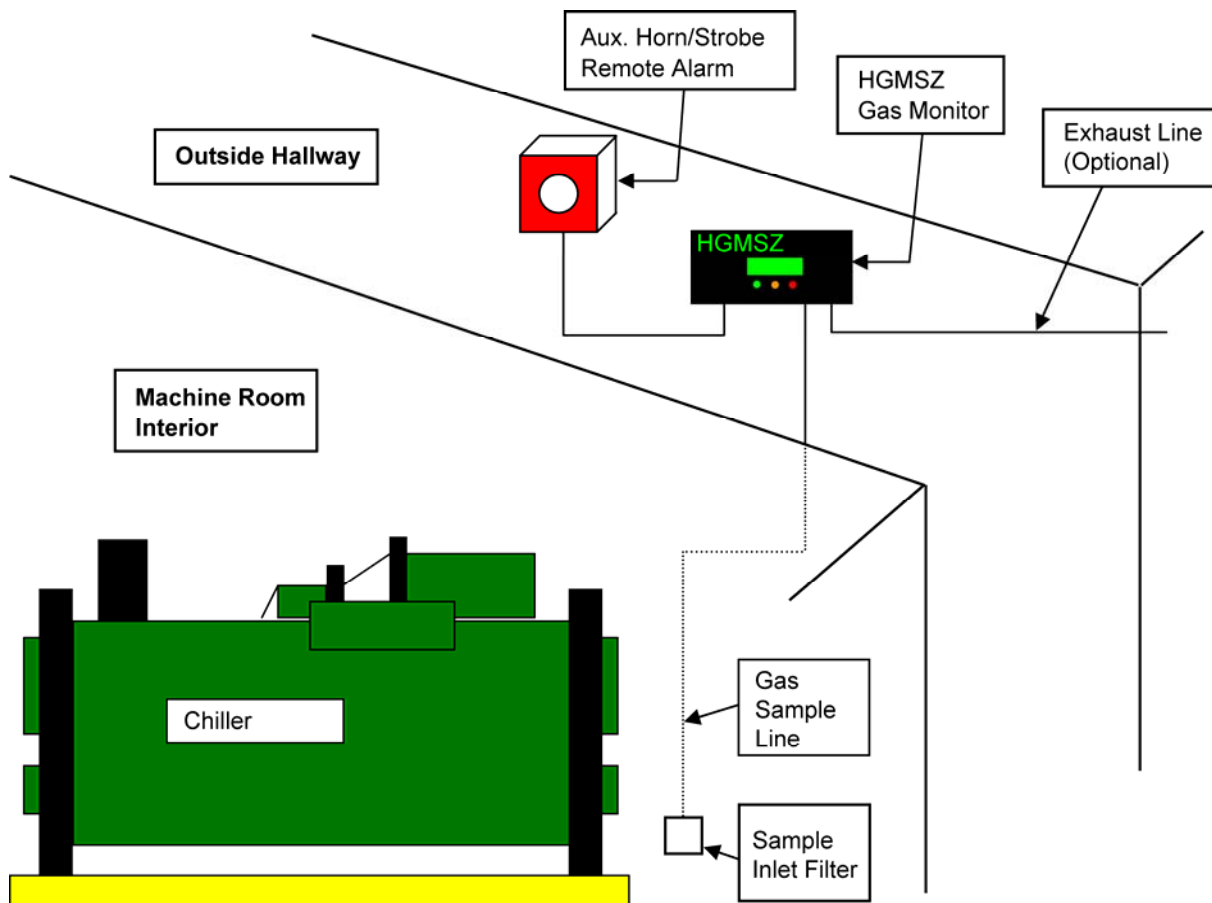
2 Installation

Installation Considerations

⚠ Warnings & Cautions

WARNING: *Explosion hazard! Do not mount the HGM-SZ 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: *Shock hazard! Always disconnect AC power before working inside the monitor.*

CAUTION: *Drilling holes in the HGM-SZ enclosure may damage the unit and will void the warranty. Please use knockouts provided for electrical connections.*

CAUTION: *The HGM-SZ contains sensitive electronic components that can be easily damaged. Be careful not to touch or disturb any of these components.*

Inspection

The HGM-SZ has been thoroughly inspected and tested prior to shipment from the factory. Nevertheless, it is recommended that the monitor be re-checked prior to installation. Inspect the outside of the enclosure to make sure there are no obvious signs of shipping damage. Open the enclosure and inspect the interior of the monitor for loose components that may have become dislodged during shipment. If damage is discovered, please contact the nearest Bacharach Service Center for assistance.

Location of the Monitor

Place the monitor in a location that will require no more than 500 ft (152.4 m) of tubing (total of sample line + exhaust) to reach the sampling area. Since the monitor uses ambient air to zero its gas sensor, the monitor should be located in an area that normally does not contain refrigerant gas. If an exhaust line is not used, then locate the monitor in a well ventilated area so that the exhaust gas does not accumulate around the monitor's ventilation holes.

The HGM-SZ should be operated in an environment that is between 32 and 122°F (0 and 50°C); has a relative humidity that is from 5 to 90% non-condensing; and is at an altitude of no more than 6,562 ft (2,000 m). The area should also be relatively free of dirt, grease, and oils that could adversely affect the operation of the monitor.

The location should allow the monitor to be easily accessible for visual monitoring and servicing.

Mounting Instructions

The HGM-SZ should be installed plumb and level and securely fastened to a rigid mounting surface.

The enclosure utilizes keyhole mounting designed for ¼ inch fasteners. Install the four screws as displayed in the diagram below or by using the provided mounting template. Allow the screw heads to protrude approximately ¼ inch.

Enclosure Mounting Specs
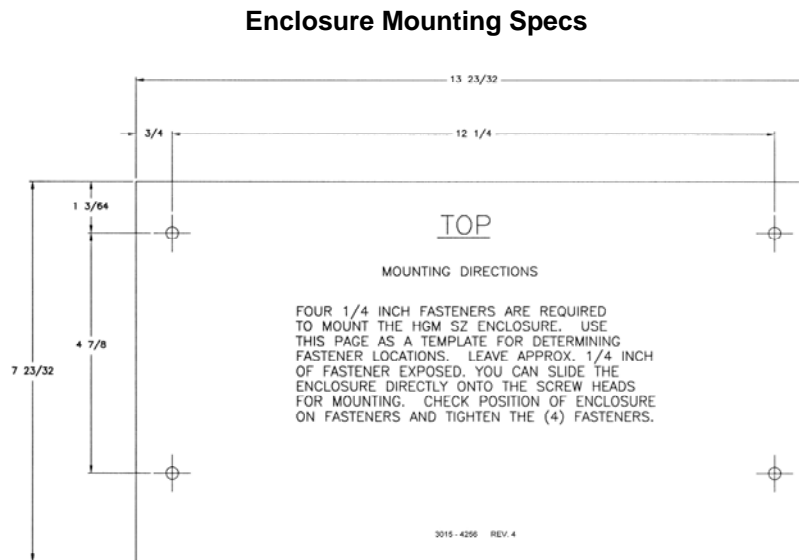
Hold the monitor flat against the mounting surface and allow it to slide down engaging the screw heads in the keyhole slots of the mounting brackets. Adjust the screws as necessary to hold the monitor securely against the mounting surface.

Connecting Gas Sample & Exhaust Lines

Overview

A single gas-sample line must be run from the HGM-SZ to the area of the facility to be monitored. And an optional exhaust line can be installed to vent the sample gas away from the monitor. All tubing connections are made on the bottom of the enclosure as displayed in the illustration below.

HGM-SZ Bottom View

Service Knockout

Gas Sample Inlet Port

½" / ¾" Service Knockout*

½" / ¾" Service Knockout*

Gas Sample Exhaust Port
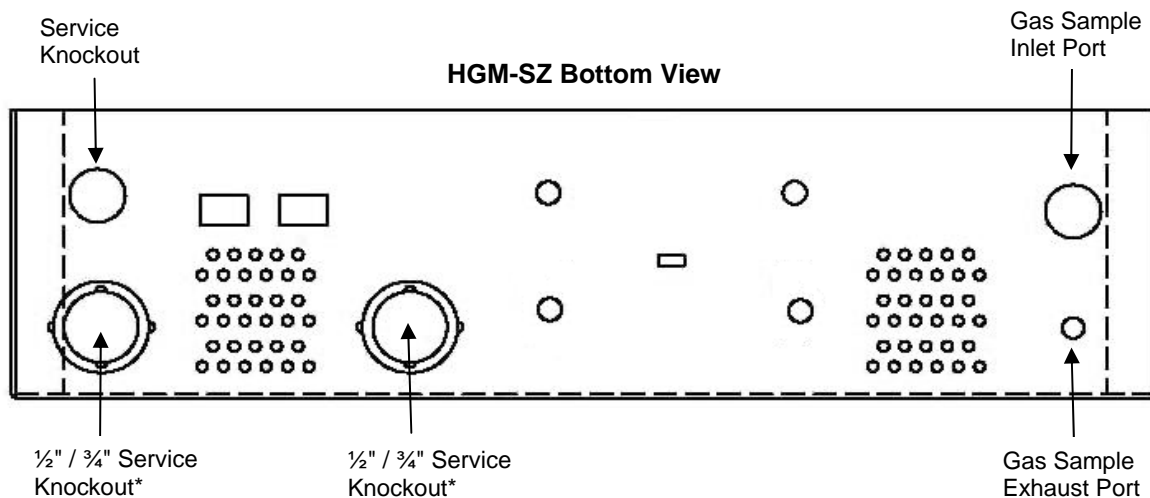
* There is an additional Service Knockout on top of the case

Tubing Considerations

Use ¼ in. outside diameter (0.040 in. wall) flex tubing for all air lines (P/N 304-2742 or equivalent). The tubing should be clean and free of moisture or other contaminants. The tubing should be cut cleanly with a sharp knife and care should be taken not to distort the tubing end.

IMPORTANT! *Due to the reactive nature of refrigerant gas, it is important to use materials that will not absorb the gas as it passes through the sampling system. The use of unauthorized tubing or any other materials in the gas-sampling stream may lead to erroneously low readings.*

All tubing bends should have a radius of no less than 5" to insure proper airflow. If kinks or obstructions occur in the line the monitor may not function properly.

Connecting the Gas-Sample Line

Please refer to Section *Suggested Location of Sampling Point* (Page 4) to learn more about where to take a gas sample.

The gas-sample line can be up to 500 ft (152.4 m) in length. The combined length of the sample line and exhaust line (if one is used) should not exceed 500ft.. The end of this line should be placed near the potential leak source and positioned to reduce the possibility of mists, aerosols, oil, water, dust, or other contaminates from being drawn into the monitor. For added protection, a termination filter (P/N 3015-3420) supplied with the monitor must be attached to the end of this line.

⚠ **CAUTION:** *The introduction of contaminants through the gas-sample line can result in serious and permanent damage to the monitor.*

Connecting the Exhaust Line

The exhaust line functions to carry the exhausted gas sample away from the monitor and is required if the monitor is located in a confined, poorly ventilated area. Note that if the monitor is exposed to an unusually high level of refrigerant gas for prolonged periods of time, its charcoal filter will quickly become saturated and no longer able to clean the purge-air of refrigerant gas.

The exhaust line can be up to 100 ft (30.52 m) in length. Ideally, this line should terminate outdoors in a location that is not exposed to the elements. Connect the exhaust line to the monitor by firmly pushing the tubing onto the Exhaust Port's barbed fitting. If the exhaust line terminates outside the building, position the tubing so that no water or moisture can enter the line. Note that this line does not require a termination filter.

Termination Filter (P/N 3015-3420)

FILTER ELEMENT   Tubing going to monitor

MOUNTING BRACKET

Interior Schematic

IR BENCH GAS OUT

UNIVERSAL POWER SUPPLY

SYSTEM BOARD

IR BENCH GAS IN

CLOCK BATTERY

AC INPUT GROUND STUD

AC INPUT TERMINALS

LINE FUSES 1.0A, 250V, F

CHARCOAL FILTER (Used to remove refrigerant gas from the purge air)

EXTERNAL ALARM RELAY CONNECTOR

*AIR SAMPLE PUMP

FACTORY DEFAULT SWITCH

4–20 mA (Output only - DO NOT apply power!)

HYDROPHOBIC FILTER

***NOTE**: *The plastic cable tie surrounding the air pump is to ensure safe handling during shipping. Please remove before operating.*

Electrical Wiring

The HGM-SZ uses a universal power supply that is capable of accepting inputs of 100 to 240 VAC, 50/60 Hz. The monitor's power consumption is 15 Watts. It is highly recommended that the monitor be connected directly to the AC power source, preferably on its own circuit. The connection should be completed with UL approved multi-conductor wire (minimum 16 AWG), rated 300 VAC at 105°C.

Locate a convenient service knockout and install electrical conduit in the typical manner.

Locate the AC Input Terminals and Ground Stud on the inside of the monitor (Page 8).

Secure the incoming AC power neutral (white) and live (black) wires to the LINE 1 and LINE 2 terminals.

Using the supplied crimp-on ring terminals, washers, and nuts, connect the incoming AC power ground wire (green) to the monitor's AC Input Ground Stud, and then install a separate wire between the ground stud and the GND terminal.

A switch or circuit breaker rated 1.0 A, 250 VAC, with a minimum terminal spacing of 3.0 mm must be attached to the monitor's AC power leads. This switch must also be located in close proximity to the monitor, and be in easy reach of the operator. This switch should also be clearly marked as the monitor's main AC disconnect device.

AC Power Connections

LINE 2 (LIVE)
LINE 1 (NEUTRAL)
GND

GND LINE1 NEUTRAL LINE2

100–240 VAC
15 W

Use supplied crimp-on ring terminals, washers, and nuts to connect AC ground wires to Ground Stud as shown to meet approval agency requirements

GROUND STUD

IMPORTANT! AC input ground wire always on bottom of Ground Stud
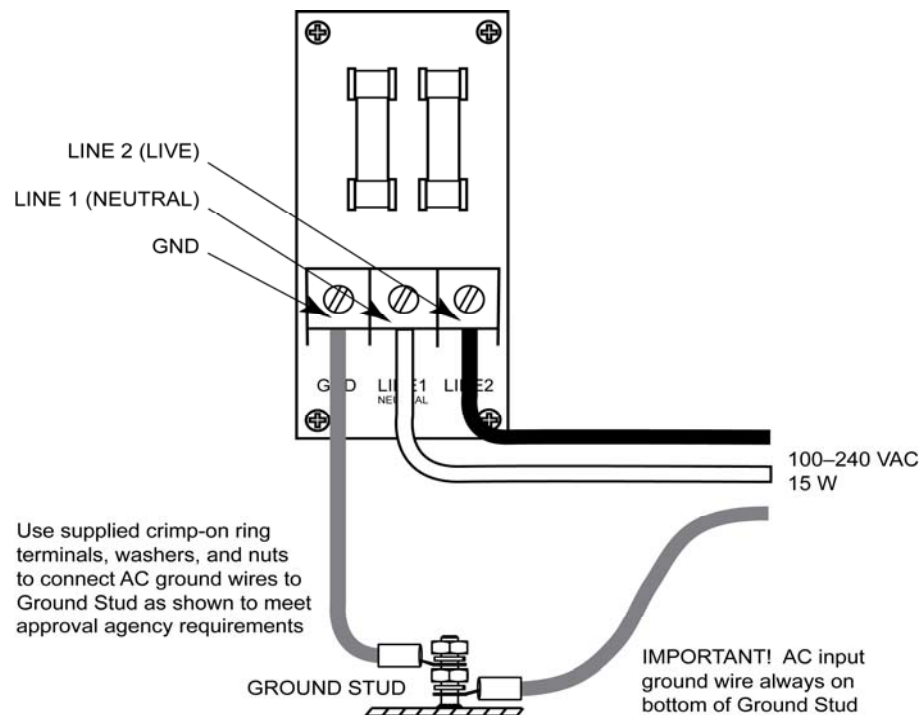
WARNING: *Electrical installation should be performed by a certified electrician, and should comply with all applicable NEC/CEC and local electrical safety codes.*

WARNING: *The AC power ground wire must first be connected to the monitor's ground stud. 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: *Copper conductors for connection to supply mains must be made in accordance with NEC/CEC and local codes*

CAUTION: *Drilling holes in the HGM-SZ enclosure may damage the unit and will void the warranty. Please use knockouts provided for electrical connections.*

Connecting External Alarms

Overview

The HGM-SZ includes four SPDT relays whose contacts are rated 2 A at 250 VAC. These relays are used for the connection of external alarm devices that are activated when the relay is energized. The relays are factory assigned to energize under the following conditions:

Relay #1	Leak	Alarm Point 100 ppm
Relay #2	Spill	Alarm Point 300 ppm
Relay #3	Evacuate	Alarm Point 500 ppm
Relay #4	Fault	System Fault Event

Note that the alarm points of relays #1, #2, and #3 are set using the monitor's **LEAKLVL**, **SPILLLVL**, and **EVACLVL** function screens (Page 16).

Connection

Use any of the service knockouts to gain cable access to the interior of the monitor. Locate the External Alarm Relay Connector (Page 8). Secure the leads from the external alarm device and its power source to the connector as shown in the diagram below.

The diagram on Page 11 shows a typical alarm device being connected to Relay 1. Note how power to this device is being tapped off the monitor's AC input.

External Alarm Relay Connector
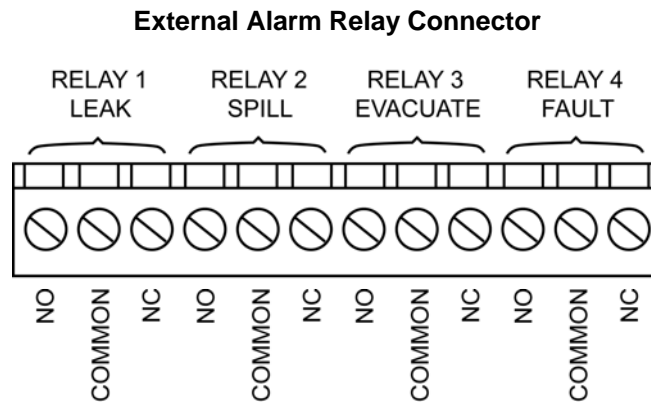
Each relay may be connected as normally open (NO), or normally closed (NC).

The relay contacts are rated 2 A at 250 VAC.

Power for the external alarm devices may be supplied from an external power source, or from the monitor's AC input terminals.

Typical External Alarm Relay 1 Wiring
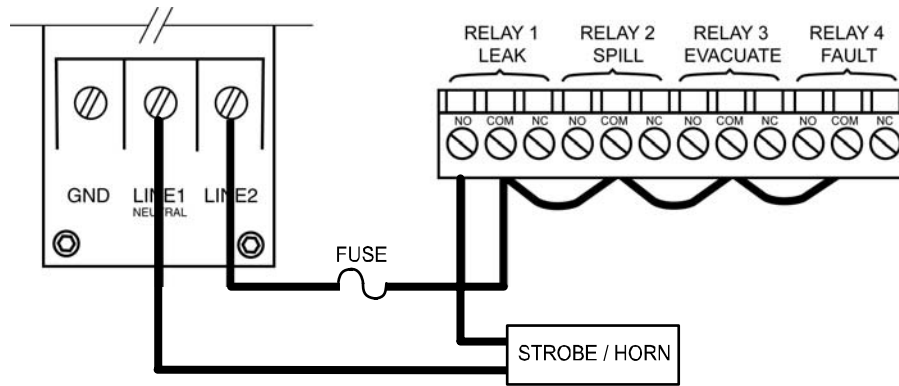
Jumper the 'Neutral' line of an external power source or the monitor's AC input to the 'Common' terminals on the relay connector.

Connect one end of the strobe or horn to the 'NO' terminal of whichever level of alarm is appropriate for the application.

The other end of the strobe or horn is connected to the other leg of the external power source. For protection, install an in-line fuse of the appropriate size and design for the external alarm device being used.

4–20 mA Current Loop Interface

An external 4–20 mA monitoring device (e.g., chart recorder) can be connected to the HGM-SZ using a shielded-twisted-pair cable. Use any of the service knockouts to gain access to the interior of the monitor. Locate the 4–20 mA Connector (Page 8), remove it from the circuit board, and then remove the resistor or shorting wire from its terminals.

IMPORTANT! *The monitoring device must be isolated from ground (floating).*

NOTE: *A 100 ohm, ¼ W resistor must be connected to the 4–20 mA connector if no external monitoring device is used. Failure to install this resistor may cause a loop fault code <0010> to occur (Page 19).*

Secure the wire leads from the external monitoring device to the 4–20 mA connector as shown in the diagram below, making sure that the polarity at this connector matches the wiring at the monitoring device.

The default current-to-ppm factor is set to 0.016 mA = 1 ppm, providing a measurement range 0 ppm (4 mA) to 1,000 ppm (20 mA). Note that the current-to-ppm factor can be changed using the monitor's **LOOP** function (Page 16).

To facilitate loop zero and span checking, note that when the **LOOP** function is selected the loop output is set to 20 mA, and upon exiting this function the loop output is set to 4 mA.

4–20 mA Current Loop Connector
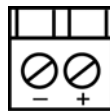
⚠ **CAUTION:** *Never apply power to the 4–20 mA Current Loop Connector from an external power supply. Connect only a load resistor and/or a floating measurement device.*

Notes:

3 Operation

Front Panel Display & Controls

Display Screen

ENTER
Press this button to:

1. Clear peak reading
2. Save a function screen's displayed value

SILENCE / QUIT
Press this button to:

1. Acknowledge a system fault or gas alarm by turning OFF the internal audible alarm and de-energizing the corresponding fault/alarm relay.
2. Return to the previous screen without saving data when in the function mode.

Keypad
Use these buttons to:

1. Enter function mode, then move arrow (>) on screen to the desired function
2. Scroll through data
3. Change a function's value

MONITOR ON
LED (Green)

1. Flashes during warm-up
2. Lights steady during normal operation

SYSTEM FAULT
LED (Yellow)

Flashes when one or more of the faults listed on Page 19 occur

ALARM Light
(Red)

Flashes when detected gas level exceeds any of three preset alarm points.

General Operation

Once the HGM-SZ has been installed, set up, and powered ON, the monitor will make measurements in the area being sampled for refrigerant gas without further operator intervention. The results of those measurements are shown on the front panel display.

```
MEASURE   00485 pk
    45ppm R134A
```

In the example shown above, **MEASURE** indicates that the HGM-SZ is actively monitoring for refrigerant gas, and that currently 45 ppm of R-134A (refrigerant gas) is being detected. This display also indicates that a peak measurement of 485 ppm has been made.

An operator can reset the peak value to zero by pressing the **ENTER** button.

A log of up to 200 previous measurements can be viewed using the **PPM LOG** function (Page 15).

If the detected gas level exceeds the preset Leak, Spill, or Evacuate alarm point, then the monitor responds by turning ON the front panel **ALARM** (red) light and energizing the corresponding alarm relay. If the internal audible alarm is turned ON, it too will activate (**AUDALRM** page 16). Optional external alarm devices can be connected to the alarm relays to alert personnel that a Leak, Spill, or Evacuate alarm condition has occurred (Page 10). Pressing the front panel **SILENCE** button will acknowledge an alarm and turn OFF all alarm indicators with the exception of the front panel **ALARM** light. The alarm circuit will reactivate, however, if the alarm condition is not cleared within the time period set by the **SILENCE** function (Page 16). The ALARM light will turn OFF after the detected gas level goes below the lowest alarm point and after the **SILENCE** button is pressed.

If a system fault occurs (see Fault Code list on Page 19), the monitor responds by turning ON the front panel **SYSTEM FAULT** (yellow) light and energizing the fault relay. If the internal audible alarm is turned ON, it too will activate (**AUDALRM** page 16). An optional external alarm device can be connected to the fault relay to alert personnel that a system fault has occurred (Page 10). Pressing the front panel **SILENCE** button will acknowledge the fault and turn OFF all alarm indicators with the exception of the front panel **SYSTEM FAULT** light. The alarm circuit will reactivate, however, if the fault condition is not cleared within the time period set by the **SILENCE** function (Page 16). The **SYSTEM FAULT** light will turn OFF only after the cause of the fault has been eliminated.

A log of the alarm and fault events can be viewed using the monitor's **ALARMS** and **FAULTS** function (Page 15).

Display Screens

Initial Power Up

When the HGM-SZ is first powered up all front panel lights are turned ON, and a splash screen appears showing the monitor's firmware revision level. After a brief moment the **Warm Up** screen is display along with the front panel **MONITOR ON** light (green) blinking.

```
   BACHARACH          WARM UP
  VERSION x.xx
```

The monitor takes 15 minutes to warm up; after which, the **MONITOR ON** light glows steadily and the **Data Display** screen is displayed.

Data Display Screen

```
MEASURE  00485pk     PURGE     00485pk     PRES CHK 00485pk
    0ppm R134A           0ppm R134A           0ppm R134A
```
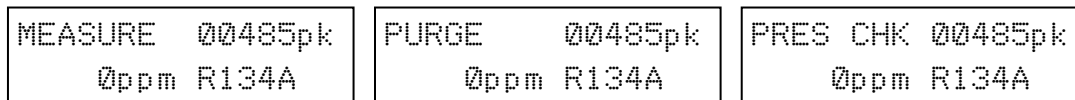
During normal operation, the **Data Display** screen shows when the monitor is performing the following three functions:

MEASURE indicates that the monitor is actively measuring for refrigerant gas. In the example screens shown above, the monitor is currently detecting 0 ppm of R-134A (refrigerant gas), and that a peak measurement of 485 ppm has occurred.

To reset the peak value to zero, press the **ENTER** button.

PURGE is displayed when the monitor is resetting its infrared detector to a baseline of 0 ppm using fresh (zero) air that is being drawn in through the Purge Air Inlet Port. This purging process is performed on an "as needed" basis, which is normally once every 6 to 8 minutes.

PRES CHK is displayed when the monitor is performing an atmospheric pressure check, which is done to ensure the accuracy of the gas measurement under varying atmospheric conditions. This pressure check is performed every 30 minutes.

Instruction 3015-4256

Function Screens

The Function screens are used to display stored data and to set up the monitor.

From the **Data Display** screen, press any **Keypad** button to display the first **Function Menu** screen. Next, use the **Keypad** buttons to move the arrow (>) on the display until it is next to the desired function, and then press the **ENTER** button to select that function.

```
>PPM LOG FAULTS       >LOG INT AUDALRM      >P-CHK
   ALARMS  DIAGNOS        LOOP     CLOCK
```

```
>GASTYPE SPILLVL      >SILENCE ZONETMP
   LEAKLVL EVACLVL        SQUELCH CAL
```

Once a function has been selected, use the **Keypad** to scroll through the displayed data or to change a parameter associated with that function. Press **ENTER** to save newly entered parameters. Press the **QUIT** button to return to the previous screen without saving.

Note that if no buttons are pressed within 90 seconds after selecting a function, the monitor returns to the **Data Display** screen.

PPM LOG – Contains records of the last 200 measurements. Each record shows the measurement's date, time, and ppm level. Note that the interval at which the measurements are logged is determined by the **LOG INT** function.

```
#025      425PPM @
11/07/08   15:35
```

Use the **Keypad Up** and **Down** buttons to change the record number by a factor of 1. Use the **Right** and **Left** buttons to change the record number by a factor of 10. Press **QUIT** to return to the previous screen.

In the example on the right, record #025 shows that a level of 425 ppm was measured on 11/07/08 at 15:35.

Note that the PPM Log can be cleared as described in Section *Clearing the Stored PPM Log, Alarm & Fault Data* (Page 20).

ALARMS – Contains records of the last 30 alarm events, with the monitor's most recent alarm being shown when the **Alarm** screen is first displayed. After 30 events have been recorded, the newest record overwrites the oldest. Each record displays either LEAK, SPILL, or EVAC including the date and time the alarm occurred. Use any of the **Keypad** buttons to scroll through the other alarm records. Press **QUIT** to return to the previous screen. Refer to *Gas Alarms* (Page 18).

```
#03       SPILL @
11/10/08   15:06
```

Note that the ppm levels at which alarms occur are set using the **LEAKLVL, SPILLLVL**, and **EVACLVL** functions.

In the example on the right, record #03 shows that a spill event occurred on 11/10/03 at 15:06.

FAULTS – Contains records of the last 30 fault events, with the monitor's current fault status being shown when the **Fault** screen is first displayed. After 30 events have been recorded, the newest record overwrites the oldest. Each record lists an event's numeric fault code plus the date and time the fault occurred. Use any of the **Keypad** buttons to scroll through the other fault records. Press **QUIT** to return to the previous screen. Refer to *System Faults* (Page 18).

```
#15 <1000> @
11/10/08   12:37
```

In the example on the right, record #15 shows that a Purge Flow Fault <1000> occurred on 11/10/08 at 12:37.

```
4.26500v  <0000>
24.5cD   14.00psi
```

DIAGNOS – Enters the diagnostic function. Press the **Up Arrow Keypad** button to toggle between the monitor's two diagnostic screens. Refer to

```
   0.4ppm   0.00
0.00002au 4.260v
```

The DIAGNOS Function (Page 22).

GAS TYPE – Used to select of any one of the refrigerant gas types listed for monitoring. (See the gas library in the Specifications section.) Factory default is R-134a. Use the **Keypad** to select the desired gas type, and then press **ENTER** to save the selection and return to the previous screen.

```
SELECT GAS TYPE
    R134A
```

LEAKLVL – Sets the Leak Alarm level, adjustable from 1 to 300 ppm. Factory default is 100 ppm. Note that the Leak Alarm level cannot be set higher than either the Spill or Evacuate Alarm levels. Refer to Appendix for recommended alarm settings for other gases. Use the **Keypad** to set the desired Leak Alarm level, and then press **ENTER** to save that level and return to the previous screen.

```
EDIT LEAK LEVEL
    0100 PPM
```

SPILLLVL – Sets the Spill Alarm level, adjustable from no lower than the Leak Alarm level to a maximum value of 500 ppm, but not higher than the Evacuate Alarm level. Factory default is 300 ppm. Refer to Appendix for recommended alarm settings for other gases. Use the **Keypad** to set the desired Spill Alarm level, and then press **ENTER** to save that level and return to the previous screen.

```
EDIT SPILL LEVEL
    0300 PPM
```

EVACLVL – Sets the Evacuate Alarm level, adjustable from no lower than the Spill Alarm level to 9999 ppm. Factory default is 500 ppm. Refer to Appendix for recommended alarm settings for other gases. Use the **Keypad** to set the desired spill level alarm level, and then press **ENTER** to save that level and return to the previous screen.

```
EDIT EVAC LEVEL
    0500 PPM
```

LOG INT – Sets the interval at which measurements are logged to memory from 1 to 9999 minutes. Factory default is 10 minutes. Note that the logged measurements can be viewed using the **PPM LOG** function. Use the **Keypad** to enter the desired value, and then press **ENTER** to save that value and return to the previous screen.

```
LOG INTERVAL IS
    0010 min
```

LOOP – Adjusts the loop factor of the 4–20 mA current loop. Factory default is 0.016 mA per ppm, which provides an output range of 0 ppm (4 mA) to 1,000 ppm (20 mA). Use the **Keypad** to set the desired loop factor, and then press **ENTER** to save that value and return to the previous screen.

```
EDIT LOOP FACTOR
   0.016 ma/PPM
```

To facilitate loop zero and span checking, note that when the **LOOP** function is selected the loop output is set to 20 mA, and upon exiting this function the loop output is set to 4 mA.

AUDALRM – Allows the monitor's internal audible alarm to be associated with any function of the monitoring system. Factory default is OFF. Use the **Keypad** to select the desired audible alarm function, and then press **ENTER** to save that value and return to the previous screen.

```
AUDIBLE ALARM IS
    OFF
```

Audible Alarm Settings: OFF, ANY ALARM, SYSTEM FAULT, LEAK ALARM, SPILL ALARM, EVAC ALARM, MONITOR STOPPED

NOTE: MONITOR STOPPED indicates there is a critical system fault, and the monitor is no longer functioning correctly.

CLOCK – Sets the monitor's date and time. Use the **Keypad** to enter the correct date and time, and then press **ENTER** to save those values and return to the previous screen. Note that time is displayed in a 24 hour format, while the date is displayed as mm/dd/yy.

```
SET DATE & TIME
11/10/08   15:30
```

SILENCE – Used to enter a length of time for which the internal audible alarm and the external alarm are turned OFF when the front panel **SILENCE** button is pressed. The factory default is 300 seconds (5 minutes). If the cause of the alarm/fault has not been cleared at the end of this time period, the internal audible alarm and the external alarm device are reactivated. Use the **Keypad** to enter the desired time period, and then press **ENTER** to save that value and return to the previous screen.

```
┌─────────────────────┐
│ SILENCE TIMEOUT     │
│      0300 sec       │
└─────────────────────┘
```

SQUELCH – Sets a value of between 0.0 and 99.9 ppm that prevents the display of measurements below that value. Factory default is 0 ppm. For example, if the squelch setting is set to 50 ppm, then the monitor will not display measurements that are below that value. Use the **Keypad** to enter the desired value, and then press **ENTER** to save that value and return to the previous screen.

```
┌─────────────────────┐
│ SQUELCH BELOW       │
│      50.0ppm        │
└─────────────────────┘
```

ZONETEMP – Used to enter the temperature of the area being monitored in °C, thus giving a more accurate ppm reading. The factory default is 25°C. Use the **Keypad** to enter the desired temperature, and then press **ENTER** to save that value and return to the previous screen.

```
┌─────────────────────┐
│ TEMP AT ZONE =      │
│       25 degC       │
└─────────────────────┘
```

CAL – Used to change the monitor's calibration factor. This function is to be used ONLY with instructions from a Bacharach Service Center. Factory default is 1.000.

```
┌─────────────────────┐
│  R134A CALFACTOR    │
│      1.000          │
└─────────────────────┘
```

P-CHK – This **Pressure Check** function displays the current manifold pressure and the stored ambient pressure in psia, along with the difference between these two pressures and the current fault code.

```
┌─────────────────────┐
│ 14.72 * AMB14.81    │
│  0.09dif   <0000>   │
└─────────────────────┘
```

Gas Alarms

Overview

If the refrigerant gas ppm level in the area being monitored exceeds its preset Leak, Spill, or Evacuate Alarm level (Page 16), the HGM-SZ will detect this alarm condition and turn ON the front panel **ALARM** light. Additionally, an external alarm device may activate and the monitor's internal audible alarm may sound if those features have been enabled (Pages 10 & 16).

Clearing / Silencing a Gas Alarm

Once the gas-alarm circuit has been triggered all alarm indicators remain turned ON, even after the detected gas level returns to normal. Press the **SILENCE** button to clear all gas-alarm indicators after the cause of the alarm has been cleared and the detected gas level has dropped below all alarm levels.

Pressing the **SILENCE** button while a gas-alarm condition still exists causes the internal audible alarm and all external alarm devices that are connected to the relays to turn OFF for a period of time as set by the **SILENCE** function (Page 16). This will allow ventilation equipment tied to the SPILL and EVAC relays to continue operating. The front panel **ALARM** light remains ON, however, as an indication that an alarm condition still exists, but will automatically turn OFF once the gas level returns to normal. The alarm circuit will reactivate at the end of the silence period if the detected gas level is still above an alarm level.

Viewing the Gas Alarm Log

From the **Data Display** screen, use the **Keypad** buttons to place the arrow (>) on the display next to the **ALARMS** function. Then press **ENTER** to display the alarm log.

The alarm log shows the type of alarm (LEAK, SPILL, or EVAC), plus the date and time it occurred. If CLEAR is displayed, this indicates that an alarm was acknowledged at the date and time shown.

Immediately after selecting the **ALARM** function, the most recent alarm event is displayed. In the example below, record #03 shows that a Spill Alarm occurred on 11/10/08 at 15:06. Note that if more than 30 alarm events have occurred, then the newest event overwrites the oldest.

```
#03      SPILL @
11/10/08  15:06
```

Note that the Alarm Log can be cleared as described in Section *Clearing the Stored PPM Log, Alarm & Fault Data* (Page 20).

System Faults

Overview

If a system malfunction occurs, the HGM-SZ will detect the problem and turn ON the front panel **SYSTEM FAULT** light. Additionally, an external alarm device may activate and the monitor's internal audible alarm may sound if those features have been enabled (Pages 10 & 16).

Clearing / Silencing a Fault Alarm

The **SYSTEM FAULT** light and all other fault indicators will automatically turn OFF after the cause of the fault has been eliminated.

Pressing the **SILENCE** button while a fault condition still exists causes the internal audible alarm and the external alarm device that is connected to the fault relay to turn OFF for a period of time as set by the **SILENCE** function (Page 16). The front panel **SYSTEM FAULT** light remains ON, however, as a reminder that a fault condition still exists. The alarm circuit will reactivate at the end of the silence period if the cause of the fault has not been corrected. The **SYSTEM FAULT** light will automatically turn OFF once the fault has been cleared.

Viewing the Fault Log

From the **Data Display** screen, use the **Keypad** buttons to place the arrow (>) on the display next to the **FAULTS** function. Then press **ENTER** to display the fault log.

```
#03 <0800> @
11/12/08   08:17
```

```
#04 <0000> @
11/12/08   08:30
```

The fault log shows the monitor's current fault status. If the fault is still present when the **FAULTS** function is selected, then the current cause of the fault is displayed along with the date and time it occurred. If the cause of the fault has been cleared, then the fault log will show <0000> along with the date and time the fault was cleared. Use the **keypad** buttons to scroll through the fault log. In the examples shown to the left, record #03 shows that a Zone Flow Fault (fault code <0800>) occurred on 11/12/08 at 08:17, while record #04 shows that the fault was cleared on 11/12/08 at 8:30.

```
FAULT CODE<1800>
12       ZONE FLOW
```

```
FAULT CODE<1800>
13       PURGE FLOW
```

The cause of the fault is identified by a numeric fault code. To convert the fault code into a text description of the fault, first press the **ENTER** button and then use the **Keypad** buttons to scroll through the display until the text description of the fault appears. If the fault code is a combination of two or more faults, then continue to use the **Keypad** buttons until all fault text descriptions have been displayed. For example, the fault code <1800> represents the combination of both a Zone Flow <0800> and a Purge Flow <1000> fault as shown to the left.

Note that the Fault Log can be cleared as described in Section *Clearing the Stored PPM Log, Alarm & Fault Data* (Page 20).

Fault Codes

FAULT CODES ARE ADDITIVE. For example: A fault code of <1800> indicates that both a Purge Flow Fault <1000> and a Zone Flow Fault <0800> have occurred**.**

<0001> Box Temperature Fault: Enclosure temperature is outside normal range (or IR detector has failed). Check that the monitor is not being subjected to extreme temperatures. Verify that the ventilation holes are not obstructed. Use the **DIAGNOS** function (Page 22) to check the Box Temperature.

<0002> Bench Temperature Fault: Optical bench is outside normal operating range (or IR detector has failed). Check that the monitor is not being subjected to extreme temperatures.

<0004> - Manifold Pressure Fault: The manifold pressure is outside normal operating range (or IR detector has failed). Enter the **DIAGNOS** function (Page 22) and record ALL data. Call the factory with this information for further instructions.

<0010> Loop Fault: The 4–20 mA current loop is open, or there is a high resistance in the circuit. Check the wiring to the load/monitoring circuit. If this feature is not being used, a 100 ohm resistor must be connected to the 4–20 mA connector (Page 11).

<0100> Zero Filter Fault: There is refrigerant gas present in the purge air. Locate the monitor in an area containing fresh air, or install a purge air line. Refer to *Location of the* Monitor (Page 5).

<0200> Gain Set Fault: The digipot autotune sequence has failed. This fault will only occur on first boot up or after a firmware upgrade. Call the factory for further instructions.

<0400> A/D Fault: A fault has occurred in the analog-to-digital circuitry. Contact the factory with this information for further instructions.

<0800> Zone Flow Fault: Check for: A kink in the gas-sample line or exhaust line; a blocked external termination filter; a blocked internal hydrophobic filter (Page 8); a failed pump.

<1000> Purge Flow Fault: Check for: A kink in the purge line; a blocked external termination filter; a blocked internal hydrophobic filter (Page 8); a failed pump. Once the blockage has been cleared, the monitor will return to normal operation after the monitor completes a purge cycle.

<4000> Zero Fault: The IR detector's output voltage is out of tolerance. Enter the **DIAGNOS** function (Page 22) and record ALL data. Call the factory with this information for further instructions.

<8000> Clipping Fault: The detector voltage may be out of tolerance. Use the **DIAGNOS** function (Page 22) to check the IR detector voltage. Call the factory with this information for further instructions.

Clearing the Stored PPM Log, Alarm & Fault Data

Up to 200 gas measurements, and 30 alarm and fault events are stored by the monitor.

To clear stored data, first display the data to be cleared by using the **PPM LOG**, **ALARMS** or **FAULTS** function (Page 15). Next, press the **Right Arrow Keypad** and **ENTER** buttons at the same time. A single, long tone should be heard when the data has been successfully cleared.

Reset to Factory Default Settings

IMPORTANT! *Performing this function will delete all program parameters, alarms, faults, and ppm log files.*

With AC power removed from the monitor, press and hold down the Factory Default Switch (Page 8). Apply AC power and listen for a beep and then a long tone. Release switch. At this time the monitor will purge the IR bench and auto set the IR detector voltage to its baseline 0 ppm value.

After warming up, reprogram the HGM-SZ to the desired settings as needed.

Factory Default Settings	
Parameter	**Factory Default**
Gas Type	R-134a
Leak Alarm	100 ppm
Spill Alarm	300 ppm
Evacuate Alarm	500 ppm
Log Interval	10 minutes
4–20 mA Factor	0.016 mA/ppm
Squelch	00.0 ppm
Zone Temperature	25°C
Calibration Factor	1.000

The P-CHK Function

Overview

The **P-CHK** function (Pressure Check Function) (Page 17) is useful to a service technician for troubleshooting a flow fault problem. The monitor will trigger a flow fault if the pressure drop from ambient is less than 0.02 psi during a purge cycle, and 0.06 psi during a measurement cycle.

Keypad Functions

From the **Data Display** screen, use the **Keypad** buttons to place the arrow (>) on the display next to the **P-CHK** function. Then press **ENTER** to display the **Pressure** screen.

The **Left Arrow Keypad** button toggles the purge valve open and closed. Note that an asterisk (∗) appears when the purge valve is open (purging).

The **Down Arrow Keypad** button toggles the pump ON and OFF.

Pressing the **ENTER** button stores the current manifold pressure shown on the left to the ambient pressure shown on the right (must be done with the pump OFF).

Screen Display

```
14.72 * AMB14.81
 0.09dif  <0000>
```

Manifold Pressure   *   Stored Ambient Pressure
Pressure Difference   Fault Code

Manifold Pressure – Current manifold pressure in psia.

Stored Ambient Pressure – Stored ambient pressure in psia.

Pressure Difference – The difference between the current manifold pressure and the stored ambient pressure.

Fault Code – Current fault code (Page 19).

Purge Valve Asterisk (∗) – When viewing the **Pressure** screen, the purge valve can be opened and closed by pressing the **Left Arrow Keypad** button. An asterisk appears on the display when the purge valve is *open*.

The DIAGNOS Function

Overview

The **DIAGNOS** function displays sensor data and status information useful to a service technician for troubleshooting various fault conditions. Explanations of the data shown in these screens are given below.

Keypad Functions

From the **Data Display** screen, use the **Keypad** buttons to place the arrow (>) on the display next to the **DIAGNOS** function. Then press **ENTER** to display the first of two **Diagnostic** screens.

Press the **Up Arrow Keypad** button to toggle between the **First** and **Second Diagnostic** screen.

First Diagnostic Screen

`4.26500v  <0000>`	Bench Voltage	Fault Code
`24.5cD* 14.72psi`	Detector Temperature °C	$*$ Manifold Pressure

`0.00250n  <0000>`	Noise	Fault Code
`29.5cB* 14.72psi`	Box Temperature °C	$*$ Manifold Pressure

In the first diagnostic screen, the user can toggle between displaying the Bench Voltage / Noise and Detector Temperature / Box Temperature by pressing the **Right Arrow Keypad** button.

Bench Voltage – This is the current peak-to-peak output of the IR detector. In the absence of refrigerant this value can range from 3.90000V to 4.50000V.

Noise – The Noise value is a 16 point running average of the noise portion of the IR detector's output. This reading is valuable mainly when refrigerant is NOT present.

Detector Temperature – This is the current detector temperature in °C.

Box Temperature – This is the current internal enclosure temperature in °C.

Fault Code – Current fault code. A value of <0000> indicates that no faults are being detected.

Manifold Pressure – Current manifold pressure in psia.

Purge Valve Asterisk (∗) – The purge valve can be opened and closed by pressing the **Left Arrow Keypad** button. An asterisk appears on the display when the purge valve is *open*.

Second Diagnostic Screen

`0.4ppm  0.00`	PPM Level	µMole/Liter
`0.00002au*4.260v`	Avg. Absorption Unit $*$	Detector Voltage

PPM Level – Parts Per Million Level is the current detected gas level, and is the volume concentration referenced to standard temperature and pressure.

Average Absorption Unit – This is the optical absorbency. In the absence of refrigerant the absorbency is 0.00000 au. When sampling refrigerants, its value varies proportionally with the refrigerant concentration.

µMoles/Liter – This is the absolute concentration in micro-moles per liter of refrigerant.

Detector Voltage – This is a running average of the IR detector's bench voltage as displayed in the **First Diagnostic** screen.

Purge Valve Asterisk (∗) – When viewing the diagnostic screen, the purge valve can be opened and closed by pressing the **Left Arrow Keypad** button. An asterisk appears on the display when the purge valve is *open*.

The Calibration Function

Overview

If greater than standard accuracy is desired, the factory's default calibration factor of 1.000 may be adjusted by performing the calibration procedure as described below, and then selecting the monitor's **CAL** function to enter the new calibration factor.

IMPORTANT! *Changing the calibration factor will VOID the factory calibration. Typically, the monitor will remain within the factory-calibrated accuracy indefinitely and no calibration is required. Complex software algorithms adjust for temperature drift, IR source aging, and pressure changes in order to keep the unit within factory accuracy specifications.*

Calibration Procedure

The calibration factor is determined by sampling a known dilution of refrigerant gas. The sample must be prepared to less than half the desired accuracy and the concentration must be corrected for ambient temperature and pressure at the time of measurement.

Calibration is best performed at or near full scale, it can however, be done at any concentration and ideally in the range where maximum accuracy is desired down to, but not below, 100 ppm.

A cylinder of a certified calibration gas must be used to ensure sampling occurs at ambient conditions. A minimum sample size of 5 liters is required.
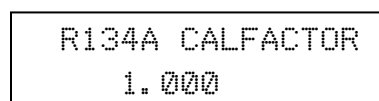
The HGM-SZ should be operating for at least one hour prior to performing a calibration.

Prepare the HGM-SZ for sampling by using the **CAL** function to set the calibration factor to 1.000. Also, use the **LOG INT** function to set the log interval to 1 minute.

With the HGM-SZ operating normally, connect the gas-sample bag directly to the gas-inlet port and allow the monitor to sample the entire bag. When sampling is complete, view the logged ppm values using the **PPM LOG** function. If the bag was large enough for multiple samples, average the most stable ones. The new calibration factor is computed by dividing the known gas concentration value by the measured value. Typically this number will be between 0.95 and 1.05. Use the **CAL** function as described below to enter the new calculated calibration factor

Adjusting Calibration Factor

From the **Data Display** screen, use the **Keypad** buttons to place the arrow (>) on the display next to the **CAL** function. Then press **ENTER** to display the **Calibration** screen.

```
   R134A CALFACTOR
       1.000
```

With the **Calibration** screen displayed, use the **Keypad** buttons to enter the new calibration factor.

Press **ENTER** to save this value.

4 Maintenance

⚠ Warnings & Cautions

WARNING: *Always disconnect AC power before working inside the monitor.*

CAUTION: *When working inside the monitor, be very careful not to dislodge any electrical wiring or pneumatic tubing. The HGM-SZ contains sensitive electronic components that can be easily damaged. Be careful not to touch or disturb any of these components.*

Charcoal Filter

The Charcoal Filter (Page 8) removes refrigerant gas from the purge-air stream during the purging process. Replace the charcoal filter (P/N 3015-4306) about every 6 months, when a zero filter fault occurs (fault code <0100>), or after the monitor itself has been exposed to unusually high levels of refrigerant gas, such as after an evacuation alarm.

Hydrophobic Filters

Hydrophobic Filters (Page 8) located in both the gas-sample and purge lines prevent water from entering the IR detector. A zone flow fault will occur (fault code <0800>) if the gas-sample filter becomes blocked, while a purge flow fault will occur (fault code <1000>) if the purge filter becomes blocked. Replace the appropriate filter as required (P/N 07-1650).

Servicing Air Lines & Termination Filters

The gas-sample line and the optional purge and exhaust lines should be periodically checked for obvious signs of kinks, damage, and contamination. Replace the tubing as required (P/N 304-2743).

The gas-sample line and purge-line termination filters prevent dust and dirt from entering the monitor. Both of these filters should be periodically checked and replaced when there are obvious signs of contamination. A zone flow fault will occur (fault code <0800>) if the gas-sample line filter becomes blocked, while a purge flow fault will occur (fault code <1000>) if the purge-line filter becomes blocked. To service the filter, simply remove it from the line and replace it with a new one (P/N 3015-3420).

Fuses

The HGM-SZ is protected from electrical damage by two, 1 A, 250 V, type "F" fuses (Page 8). Carefully remove the fuses from their fuse clips and visually inspect each fuse for damage. Replace the fuses as required (P/N 04-2620).

Clock Battery

The Clock Battery (Page 8) maintains the correct date and time when AC power is not applied to the monitor. Replace this battery about every 2 years (P/N 204-0020).

Sample Pump

The Sample Pump (Page 8) draws the gas sample into the monitor, through the IR detector, and discharges the sample out the monitor's exhaust port. When replacing the pump, remove its inlet and outlet tubing, disconnect the AC power wires from the pump itself, and remove pump from monitor. Install a new sample pump (P/N 3015-5176).

Bench Replacement

Items Required:

- Replacement IR Optical Bench Kit 3015-4572:
  - IR Bench Assembly:
    - 3015-5086 (550 mW)

  - Cable Ties (Qty. 2) 3015-2835
  - Instruction Sheet 3015-4571
- Medium Phillips Head Screwdriver
- Small Flat Blade Screwdriver
- Wire Cutter (for removing cable ties)

Removing the IR Bench

1. Find the AC power source for the HGMSZ and switch OFF the AC circuit breaker. Ensure that the monitor's front panel green MONITOR ON indicator is OFF.

2. Use a Phillips screwdriver to remove the monitor's two door screws, and then open the door.

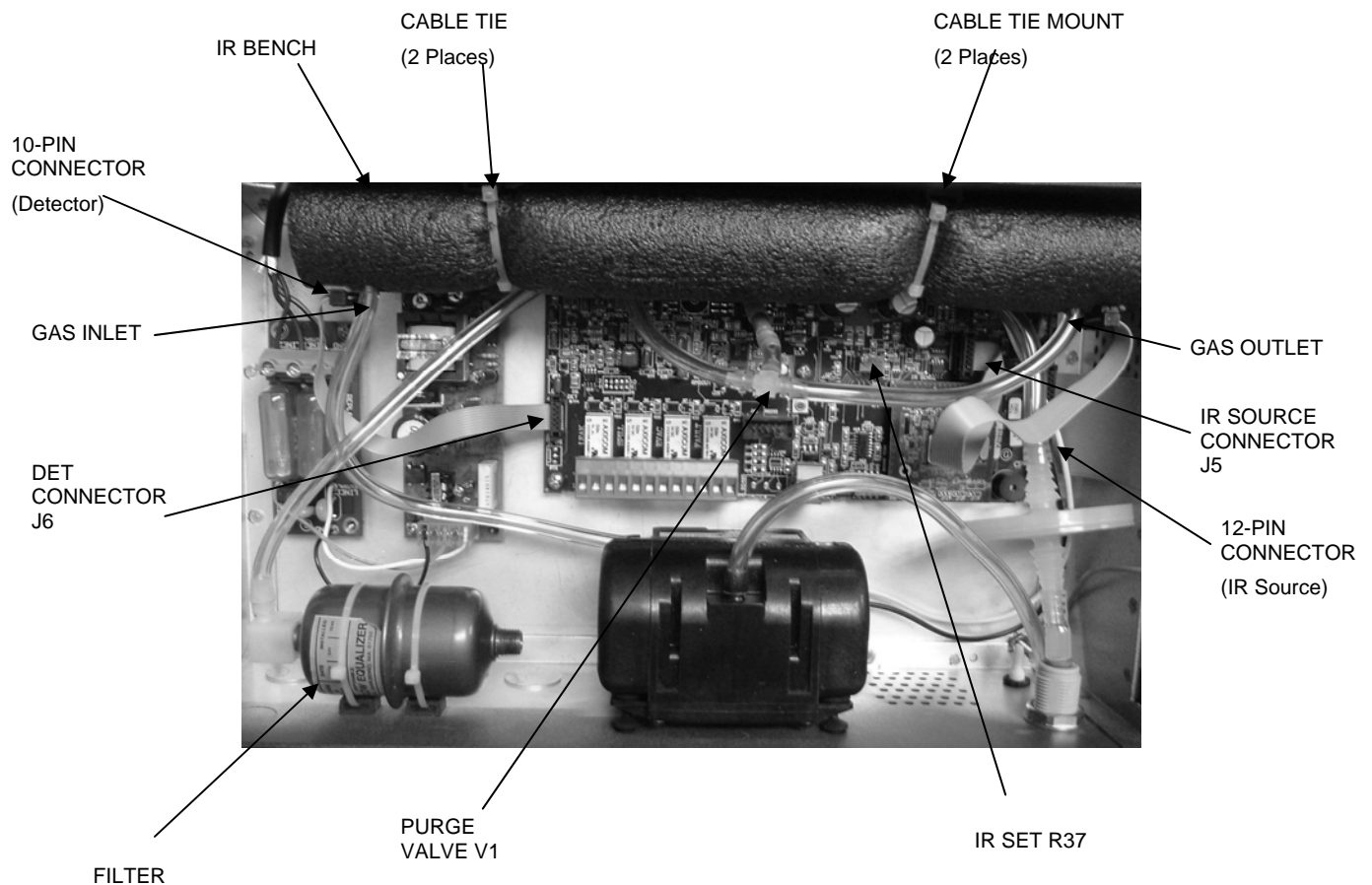3. Take time to familiarize yourself with the internal components of the HGMSZ shown in Figure 2.

Figure 2. HGMSZ Components

---

2. Refer to Figure 2 to perform the following steps to remove the old IR bench:

    a. Pull the 10-pin and 12-pin electrical connectors from their sockets on the IR bench. Note that these connectors may have been secured in place for shipping purposes with either hot-glue or cable ties. As necessary, either pry the hot-glue from each connector, or cut off the cable ties.

    b. Pull the tubing from the gas-inlet and gas-outlet fittings on the IR bench.

    c. Using wire cutters, cut the two cable ties that secure the IR bench to the enclosure, and then remove the bench.

Installing the New IR Bench

3. Perform the following to install the new IR bench:

    a. Remove protective caps from the gas-inlet and gas-outlet fittings on the new IR bench.

    b. Position the new bench inside the HGMSZ enclosure so that the end with the 12-pin electrical connector (IR Source) is located on the *right*, and that the gas fittings are facing upwards.

    c. Using the two cable ties supplied in the kit, secure the bench to the cable-tie mounts on the side wall of the enclosure. Cut off any cable-tie excess.

    d. Connect tubing from pump to the IR bench gas-outlet fitting, and connect tubing from purge valve V1 to the IR bench gas-inlet fitting.

    e. Plug the 12-conductor ribbon cable from IR SOURCE connector J5 on the main board into the 12-pin IR bench connector.

    f. Plug the 10-conductor ribbon cable from DET connector J6 on the main board into the 10-pin IR bench connector.

4. Check to ensure that the new IR bench is properly secured, and that all tubing and electrical connectors are tight.

5. Turn ON the HGMSZ's AC circuit breaker.

6. Allow the monitor to warm-up for at least ½ hour before proceeding.

Adjusting IR Bench Emitter Drive Power Level

7. This section explains how to access the IR screen, adjust the IR source power drive and exit up one level to then adjust the digipot as described below. First, access the monitor's set-up mode and display the IR emitter power adjustment screen as follows:

    a. With the monitor in its MEASURE mode, use the Keypad buttons to place the arrow (>) on the display next to the CAL function.

    b. Press the Right-Arrow and ENTER buttons at the same time to display the revision screen.

    c. Press the QUIT button to display the set-up screen.

    d. With the arrow (>) next to the IR function, press the ENTER button to display the IR emitter adjustment screen.

    e. Change IR emitter drive level to 550 mW or 700mW, corresponding to the user's version of the part as seen in the items required section containing the part numbers, by adjusting R37. If R37 is not present (newer motherboards), use the Up/Down arrow keys to adjust the emitter power.

    f. Press the ENTER button and then proceed to the next section and adjust the DIGIPOT as necessary.

Adjusting the IR Bench Voltage

8. Enter the monitor's set-up mode and display the IR bench voltage adjustment screen as follows:

    a. With the monitor in its MEASURE mode, use the Keypad buttons to place the arrow (>) on the display next to the CAL function.

    ```
    >DIGIPOT   MODEL
     P CAL     IR
    ```

    b. Press the Right-Arrow and ENTER buttons at the *same time* to display the revision screen.

    ```
    DIGIPOT=193
    IR VOLT=4.200
    ```

    c. Press the QUIT button to display the set-up screen.

    d. With the arrow (>) next to the DIGIPOT function, press the ENTER button to display the IR bench voltage adjustment screen.

    ```
    SILENCE   ZONETMP
    SQUELCH  >CAL
    ```

9. While observing the IR VOLT reading, use the Up- and Down-Arrow buttons to obtain a reading of 4.200 ±0.100 volts. Note that the DIGIPOT value may vary from what is shown in the display on the right.

    ```
    REV    M    D    Y
    x.xx at  HH:MM:SS
    ```

> **IMPORTANT!** If adjusting the DIGIPOT does not reach 4.2000±0.0500 volts then return to step 9 to lower the IR Emitter setting by 75mW. Next, repeat the DIGIPOT adjustment.

10. Press the ENTER button, and then press the QUIT button *twice* to exit the monitor's set-up mode.

11. Upon exiting the set-up mode a purge cycle will be performed; after which, the monitor will automatically return to its MEASURE mode.

12. Close and secure the enclosure door using the screws removed in Step 2.

13. The monitor can now be placed back into service.

Replacement Parts & Optional Accessories

Replacement Parts	
Item Description	**Part Number**
HGM-SZ complete assembly	3015-4200
Battery:	204-0020*
Filters:	

Charcoal, Zero Air
    Hydrophobic
    Termination
    (gas sample line)
	3015-4306
	07-1650
	3015-3420

Fuse: 1.0 A, 250 V, Type "F"	04-2620
Replacement Pump	3015-5176
Tubing: ¼ in OD by the foot 250 ft. roll	304-2743 3015-3235
***Warning**: In compliance with agency approvals & safety regulations, the battery must be replaced with the specified Bacharach replacement part.*	
Optional Accessories	
Item Description	**Part Number**
Surge Protectors:	
120 V 4-20 mA	3015-4121 3015-4123
Alarms:	
Audible/Visual 120 VAC	3015-3076
Interface Board, 4-20 mA	3015-5152

Service Centers

Replacement parts and service can be obtained by contacting one of the following Bacharach Service Centers.

United States

Bacharach, Inc.
621 Hunt Valley Circle
New Kensington, PA 15068
Phone: 724-334-5051
Fax: 724-334-5723
Email: help@bacharach-inc.com

Canada

Bacharach of Canada, Inc.
250 Shields Court Unit #3
Markham, Ontario L3R 9W7 Canada
Phone: 905-470-8985
Fax: 905-470-8963
Email: bachcan@idirect.com

México

Bacharach de México
Playa Regatas No. 473 Tercer Piso
Col. Militar Marte
Delegación Iztacalco, 08830
México D.F. México
Phones: +52-555-634-7740
           +52-555-634-7741
FAX: +52-555-634-7738
Email: bacharach@prodigy.net.mx

Appendix A

HGM-SZ Specifications	
Product Type	Multiple refrigerant gases and single area monitoring system for low level continuous monitoring of CFC, HCFC and HFC refrigerant gasses used in most commercial refrigeration systems. System design supports compliance to the refrigerant monitoring requirements of ANS/BSR ASHRE 15-1994.
Coverage	Single zone
Detector Type	Infrared, Non-Dispersive
Gas Library:	
CFC:	R-11, R-12, R-113, R-114, R-502, HFP
HFC:	R-404a (HP62), R-407a, R-407c (AC9000), R-134a, R-410a (AZ20), R-507 (AZ50), R-508b (SUVA95), R236FA, R125, R245Fa, R422a, R422d, R427a,R424A,R426A
HCFC:	R-22, R-123, R-124, R-500, R-503, R-401a (MP39), R-402a (HP80), R-402b (HP81), R-408a, R-409a, R-23, R21, R227
HALON:	H1301,H2402, H1211
Other:	FA188, FC72, N1230,HFO-1234YF
Sensitivity	All gasses 1 ppm (R11 ±10 ppm ±15% of reading 0-1000ppm)
Measuring Range	All gasses 0 to 10,000 ppm
Accuracy	±1ppm ±10% of reading from 0-1000ppm (R11 ±10ppm ±15% of reading 0-1000ppm)
Warm-up Time	15 minutes
Front Panel	3 Indicator lights: • Green = Monitor is powered on. LED glows during normal operation; flashes when unit is in warm-up mode • Red = Alarm. LED flashes when any point has exceeded the alarm setting. • Yellow = Fault. LED flashes when there is a system fault
Size/Weight	7.5"H x 13.5"W x 3.625"D / 5.5 lbs (190.5 x 343 x 92 mm / 2.5 kg)
Temperature Drift	±0.3% of reading per degrees C
Sampling Mode	Automatic or manual (hold)
Re-Zero	Auto or on zone change
Response Time	5 to 120 seconds – depending on air line length and number of zones
System Noise	Less than 40dB(A) @ 10 feet (3m)
Monitoring Distance	500 ft. maximum for combined length of sample + exhaust tubing (each zone)
Conditioned Signal	Dual optional 4-20mAdc isolated outputs. Channel 1 = zone area, Channel 2 = PPM
Alarms	Four SPDT alarm contacts are provided (rated 2A 250VAC) Three assigned to PPM level alarms, one assigned to system faults
Communications	Full two-way communication with HGM-RD Display Module or Building Management System via RS-485 serial interface. RS-232C communication port standard
Power Safety Mode	Fully automatic system reset. All programmed parameters retained.
Operating Temp	32 to 122 °F (0 to 50 °C)
Ambient Humidity	5% to 90% RH (non-condensing)
AC Power	100 to 240 VAC, 50/60 Hz, 15 Watts
Certification	UL 61010-1, CAN/CSA 22.2 No. 61010-1 & CE Mark
Warranty	2 years from date of shipment
Altitude Limit	6,562 ft (2,000 m)
Specifications subject to change without notice	

Specifications, Con't.

Response Time/Flow Rate (Dependent on gas-sample line length; 0.25" OD x 0.17" ID tubing)

Gas-Sample Line Feet (Meters)	Response Time Seconds
100 (30.5)	15
200 (61)	28
300 (91.4)	44
405 (123)	63
500 (152.4)	84

Recommended Alarm Settings & Gas Enumeration

Refrigerant	Leak PPM	Spill PPM	Evacuate PPM	Decimal	Hex
R11	100	300	500	0	00
R12	100	300	500	1	01
R22	100	300	500	2	02
R23	100	300	500	3	03
R113	100	300	500	4	04
R114	100	300	500	5	05
R123	25	35	50	6	06
R124	100	300	500	7	07
R134A	100	300	500	8	08
R401A	100	300	500	9	09
R402A	100	300	500	10	0A
R402B	100	300	500	11	0B
R404A	100	300	500	12	0C
R407A	100	300	500	13	0D
R407C	100	300	500	14	0E
R409A	100	300	500	15	0F
R410A	100	300	500	16	10
R500	100	300	500	17	11
R502	100	300	500	18	12
R503	100	300	500	19	13
R507	100	300	500	20	14
R508B	100	300	500	21	15
H1301	100	300	500	22	16
R408A	100	300	500	23	17
FA188	100	300	500	24	18
R236FA	100	300	500	25	19
N1230	100	300	500	26	1A
R227	100	300	500	27	1B
HFP	100	300	500	28	1C
FC72	100	300	500	29	1D
R21	100	300	500	30	1E
R125	100	300	500	31	1F
H1211	100	300	500	32	20
H2402	100	300	500	33	21
R245FA	100	300	500	34	22
R422A	100	300	500	35	23
R422D	100	300	500	36	24
R427A	100	300	500	37	25
HFO01234YF	100	300	500	38	26
R424A	100	300	500	39	27
R426A	100	300	500	40	28

Allowable Exposure Level (AEL) ASHRAE 34-1992.

NOTES:

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