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Creative Gas Detection Solutions



ISA-60M with MRI-5175

Operation and Maintenance Manual

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Reference Information:

NOTE: *[important information about use of instrument]*

CAUTION: *[affects equipment – if not followed may cause damage to instrument, sensor etc.…]*

WARNING: *[affects personnel safety – if not followed may cause bodily injury or death.]*


Attention / Warning


Earth Ground


Refer to Manual for Service

1.0 Introduction

The **ISA-60M w/MRI-5175** is an ambient air monitoring system that measures oxygen concentrations in magnetic resonance imaging environments. The **ISA-60M** control panel is capable of monitoring from 1 to 3 **MRI-5175** remote sensors. Note: The **ISA-60M** and **MRI-5175** are produced as an aligned set and should be installed as such. Some features of the monitoring system are as follows:

- continuous monitoring of the sample air and continuous LCD display oxygen concentrations, at **ISA-60M**
- menu driven operational and maintenance controls
- menu driven calibration procedure
- audio and visual alarms indicate unsafe conditions
- alarm relay contacts available on terminals
- a fault relay and visual fault alarm
- alarm acknowledgement capability including audio defeat, **ISA-60M** control only
- mA output for each channel
- internal non-magnetic metallic coating of MRI-5175 to minimize RFI/EMI

NOTE: *All specifications stated in this manual may change without notice.*

1.1 IEC 60601-1 Classifications

Type of protection against electrical shock: Class 1.
Degree of protection against electrical shock: No Applied Parts

- Equipment not suitable for use in presence of flammable anesthetic mixture with air or with oxygen or nitrous oxide.
- Mains power quality should be that of a typical commercial or hospital environment.
- Power frequency magnetic fields should be at levels characteristic of a typical location in a commercial or hospital environment.

1.2 Unpack

Unpack the **ISA-60M** and examine it for shipping damage. If such damage is observed, notify both ***ENMET*** customer service personnel and the commercial carrier involved immediately.

Regarding Damaged Shipments

NOTE: *It is your responsibility to follow these instructions. If they are not followed, the carrier will not honor any claims for damage.*

- This shipment was carefully inspected, verified and properly packaged at ***ENMET*** and delivered to the carrier in good condition.
- When it was picked up by the carrier at ***ENMET***, it legally became your company's property.
- If your shipment arrives damaged:
  - Keep the items, packing material, and carton "As Is." Within 5 days of receipt, notify the carrier's local office and request immediate inspection of the carton and the contents.
  - After the inspection and after you have received written acknowledgment of the damage from the carrier, contact ***ENMET*** Customer Service for return authorization and further instructions. Please have your Purchase Order and Sales Order numbers available.
- ***ENMET*** either repairs or replaces damaged equipment and invoices the carrier to the extent of the liability coverage, usually $100.00. Repair or replacement charges above that value are your company's responsibility.
- The shipping company may offer optional insurance coverage. ***ENMET*** only insures shipments with the shipping company when asked to do so in writing by our customer. If you need your shipments insured, please forward a written request to ***ENMET*** Customer Service.

Regarding Shortages

If there are any shortages or questions regarding this shipment, please notify ***ENMET*** Customer Service within 5 days of receipt at the following address:

ENMET
680 Fairfield Court
Ann Arbor, MI 48108
734-761-1270 Fax 734-761-3220
Toll Free: 800-521-2978

1.3 Check Order

Check, the contents of the shipment against the purchase order. Verify that the **ISA-60M** is received as ordered. If there are accessories on the order, ascertain that they are present. Check the contents of calibration kits. Notify ***ENMET*** customer service personnel of any discrepancy immediately.

1.4 Serial Numbers

Each **ISA-60M** and **MRI-5175** is serialized. These numbers are on tags on the equipment and are on record in an ***ENMET*** database.

2.0 Instrument Features

2.1 ISA-60M Exterior Features

The exterior of the instrument is shown in **Figure 1**. The exterior features are as follows:

Feature	Description
Enclosure	Engineered thermoplastic, approximately 11x9x6, with a clear hinged front cover.
Strain Relief	Entrance for wiring to Remote Sensor
Audio Alarm	A loud horn activated by certain alarm conditions.
Mounting Flanges	Flanges with holes for mounting the enclosure to a vertical surface.

2.2 Display ISA-60M Front Panel Features

The display panel, shown in **Figure 1**, is viewed through the clear front cover of the enclosure, and is accessed by opening the cover. Features are as follows:

Feature	Description
Display	2 line, 16 character per line, LCD with backlight. The numerical values of gas concentrations, and other information are displayed.
Visual Alarms & Indicators	On either side of the display: A red alarm LED for each sensor transmitter installed to the instrument, Alarm 1. The top center: A red alarm LED for all sensor transmitters, Alarm 2. Near the center of the panel: A green power indicator LED A red fault alarm LED
Pushbutton Switches	There are three of these, located near the center of the panel; they are yellow rectangular membrane switches. They are:
☐**OPTION Switch**	The top left switch. 
☐**SELECT Switch**	Directly to the right of the **OPTION** switch. 
☐**AUDIO DEFEAT / ALARM ACKNOWLEDGE Switch**	Directly below the **OPTION** switch. 

2.3 MRI-5175 Features

The exterior and panel of the sensor/transmitter is shown in **Figure 1**. Internal features are shown in **Figure 4**.

Feature	Description
Enclosure	Fiberglass-reinforced polyester with non-magnetic RFI/EMI shielding and hardware
Strain Relief	Nickel plated brass, entrance for wiring to **ISA-60M** control unit
Mounting Flanges	Flanges with holes for mounting the enclosure to a vertical surface.
MENU Switch	The left most pushbutton switch 
SELECT Switch	The right most pushbutton switch 
Power/Fault LED	Red/Green LED, Green indicating power on and red indicating a fault condition
Visual Alarm LED	3 Red LED, Triggered at level of alarm
Sensor	Long life electrochemical oxygen sensor
Audio Alarm (Optional)	A loud horn activated by certain alarm conditions.

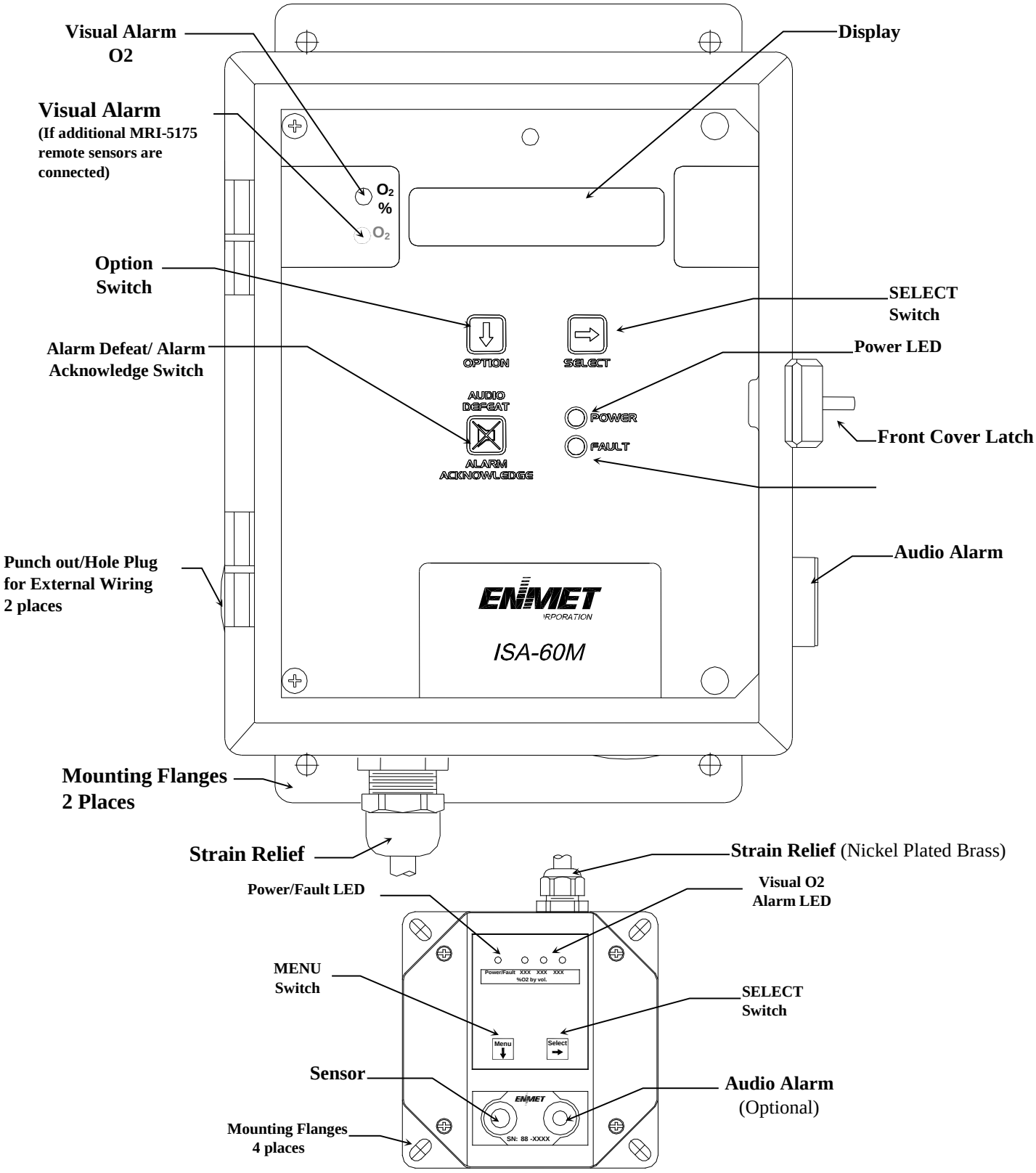


Figure 1: ISA-60M & MRI-5175 External Features

2.3 Circuit Board Features

The Display Panel is hinged on the left and is released by unscrewing the 2 Philips screws located in the top and bottom right corners. After releasing the panel, it is swung to the left, exposing the interior of the enclosure. The Circuit Board is mounted on a plate at the back surface of the enclosure interior. Features are shown in **Figure 2**.

Feature	Description
Relay Terminals	This group of terminals is located at the left side of the Circuit Board. For the contacts for each of four alarm relays, and for the contacts of a fault relay.
Output Terminals	There are two for each of the 4-20 mA outputs.

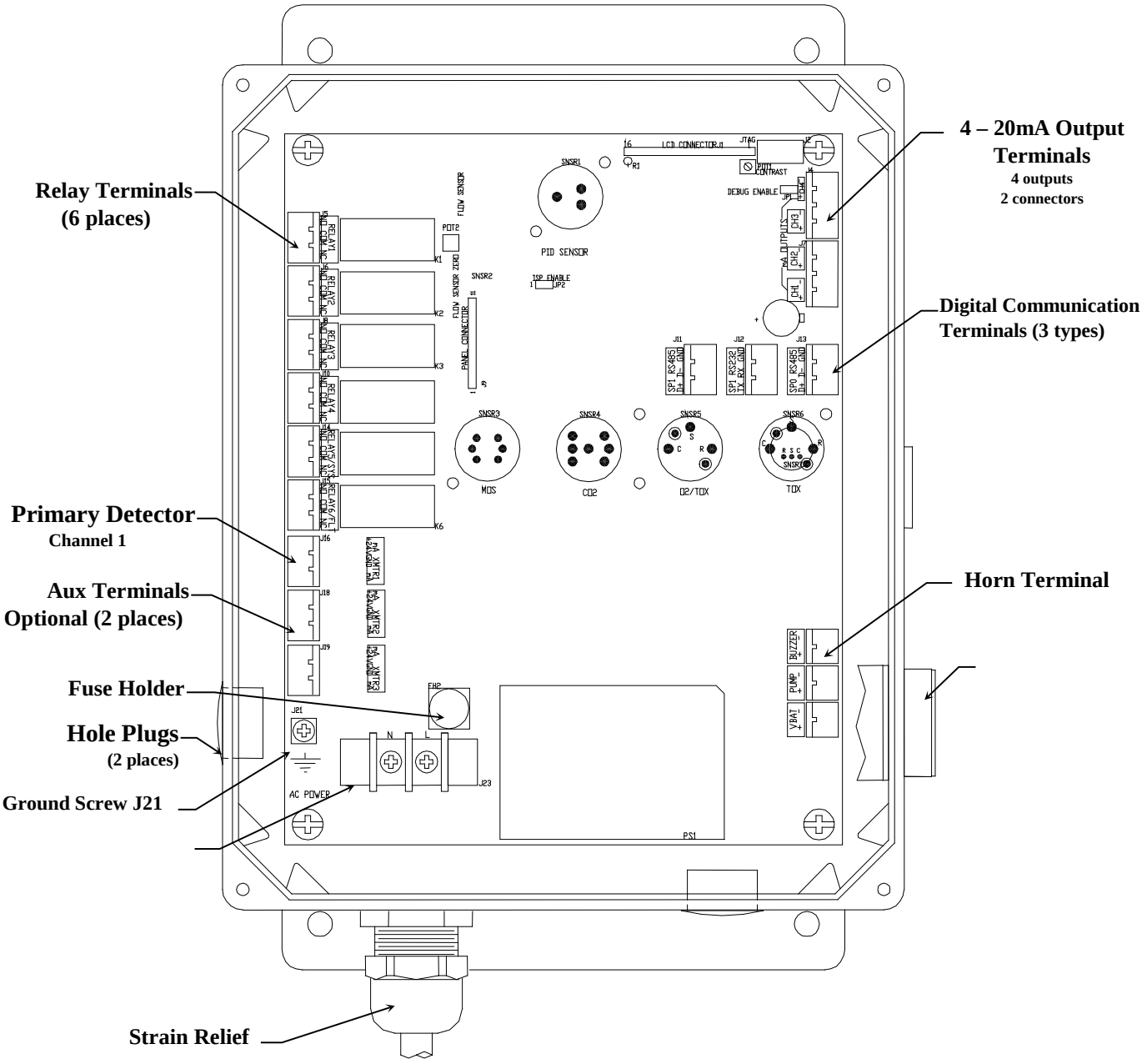


Figure 2: ISA-60M Interior Features

3.0 Installation

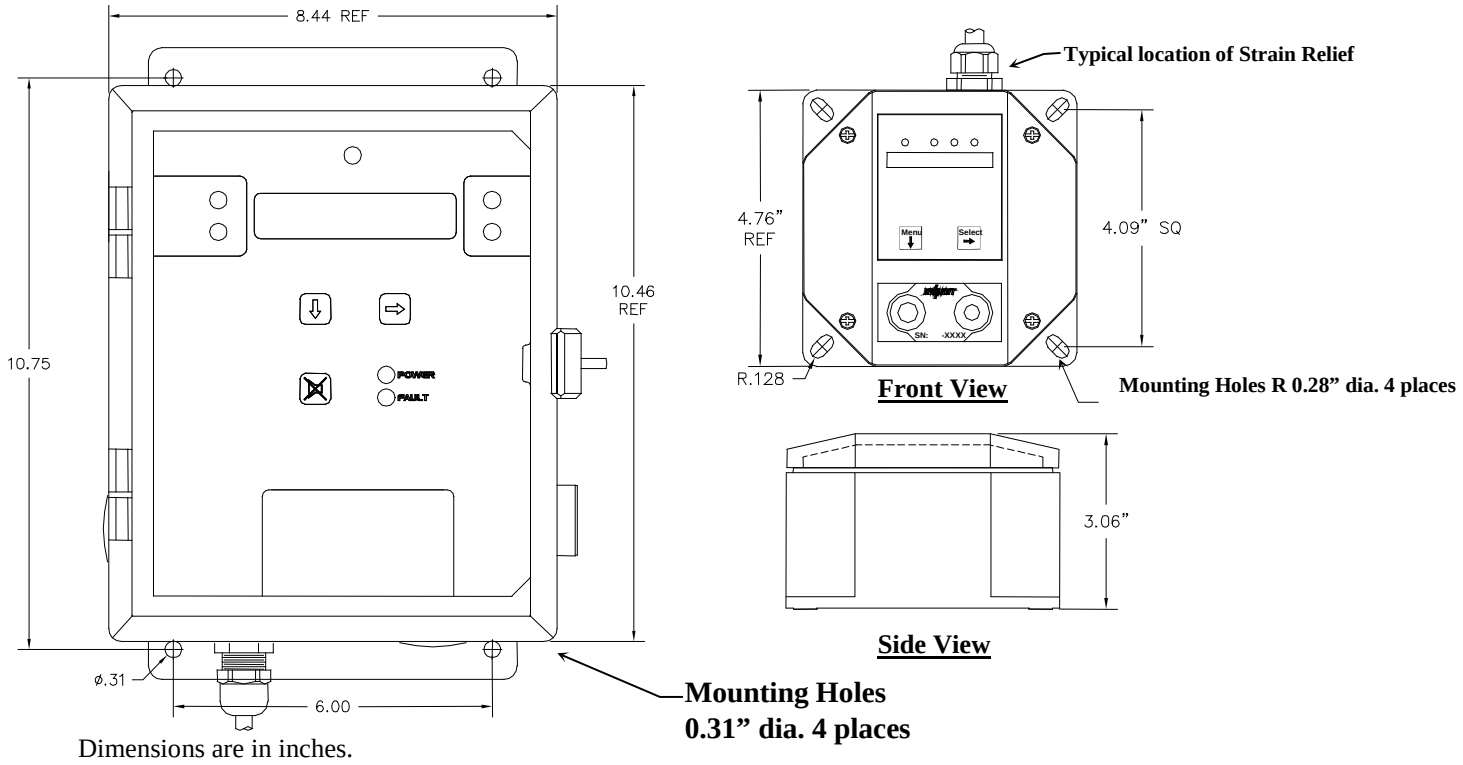
Installation is to be performed by qualified service personnel only.

3.1 Mounting of Instrument

Mount the **ISA-60M** and **MRI-5175** instrument on an appropriate vertical surface using the mounting flanges provided. Avoid areas with excessive vibration or temperature extremes. **See Figure 3.**

It is recommended to use #8 drywall anchors and screws for mounting the **ISA-60M** and **MRI-5175** to a drywall/sheetrock surface.

Non-magnetic mounting hardware is required for control panels located in the magnet room.



Dimensions are in inches.

Figure 3: ISA-60M Control & MRI-5175 Remote Sensor Mounting Dimensions

NOTE: Remote Sensor - Each must be connected to a 4-20mA input inside the **ISA-60M**. UL listed type CM, PLTC or TC cable shall be used for wiring between the **MRI-5175** and the **ISA-60M** control panel. Three conductor, 18 gauge ***shielded*** wiring for runs up to 1000 feet. For 500 feet or shorter wiring runs, 20 gauge ***shielded*** wiring is acceptable. The supplied strain reliefs are rated for cable with an OD between 0.20 – 0.35 inches.

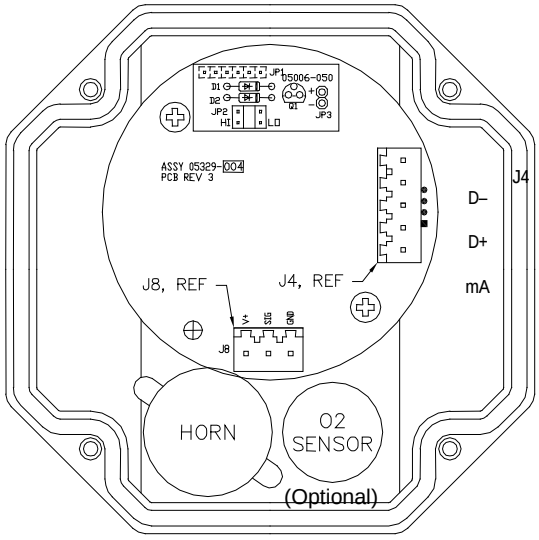
Refer to Section 7 for Technical Instillation Data.

3.2 Wiring ISA-60M to MRI-5175

Wiring for the **MRI-5175** alarm, relay contacts and 4-20mA outputs may be routed through one of the two enclosure punch-outs on the side or bottom of the enclosure. See **Figure 1**. Follow state and local guidelines when selecting appropriate strain relief, conduit and wiring.

Remote Sensor: Each must be connected to a 4-20mA input inside the **ISA-60M**. UL listed type CM, PLTC or TC cable shall be used for wiring between the **MRI-5175** and the **ISA-60M** control panel. Three conductor, 18 gauge ***shielded*** wiring for runs up to 1000 feet. For 500 feet or shorter ***shielded*** wiring runs, 20-gauge wiring is acceptable. The supplied strain reliefs are rated for cable with an OD between 0.20 – 0.35 inches. Refer to Section 7.0 for typical wiring information.

> ***CAUTION*:** Be careful not to scratch or otherwise damage the internal metallic coating of the MRI-5175 during installation.

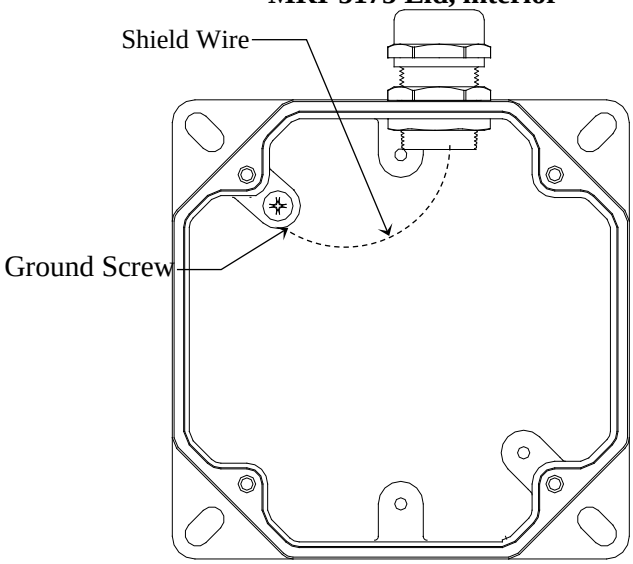


MRI-5175 Lid, interior

Table 1: Wiring ISA-60M to MRI-5175

ISA-60M		MRI-5175
Channel 1, J16		**Channel 1, J4**
+24V (1)	Power	+24V
GND (2)	Ground	GND
mA (3)	Signal	mA *
Channel 2, J18		**Channel 2, J4**
+24V	Power	+24V
GND	Ground	GND
mA	Signal	mA *
Channel 3, J19		**Channel 3, J4**
+24V	Power	+24V
GND	Ground	GND
mA	Signal	mA *

***Shielding wire to Ground Screw of **MRI-5175** Ground Screw



MRI-5175 enclosure, interior view

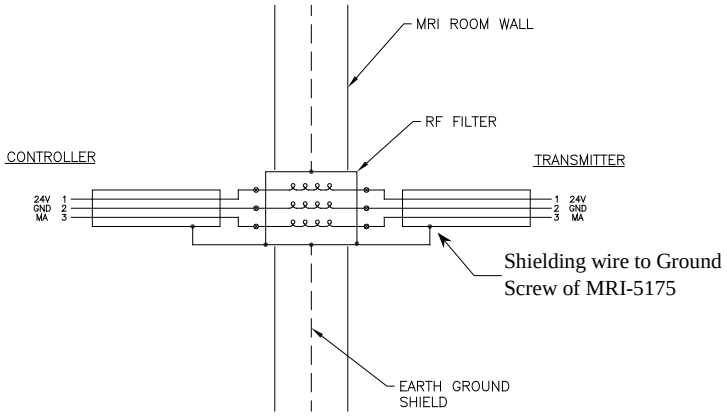


Figure 4: MRI-5175 Ground for Shielded Cable

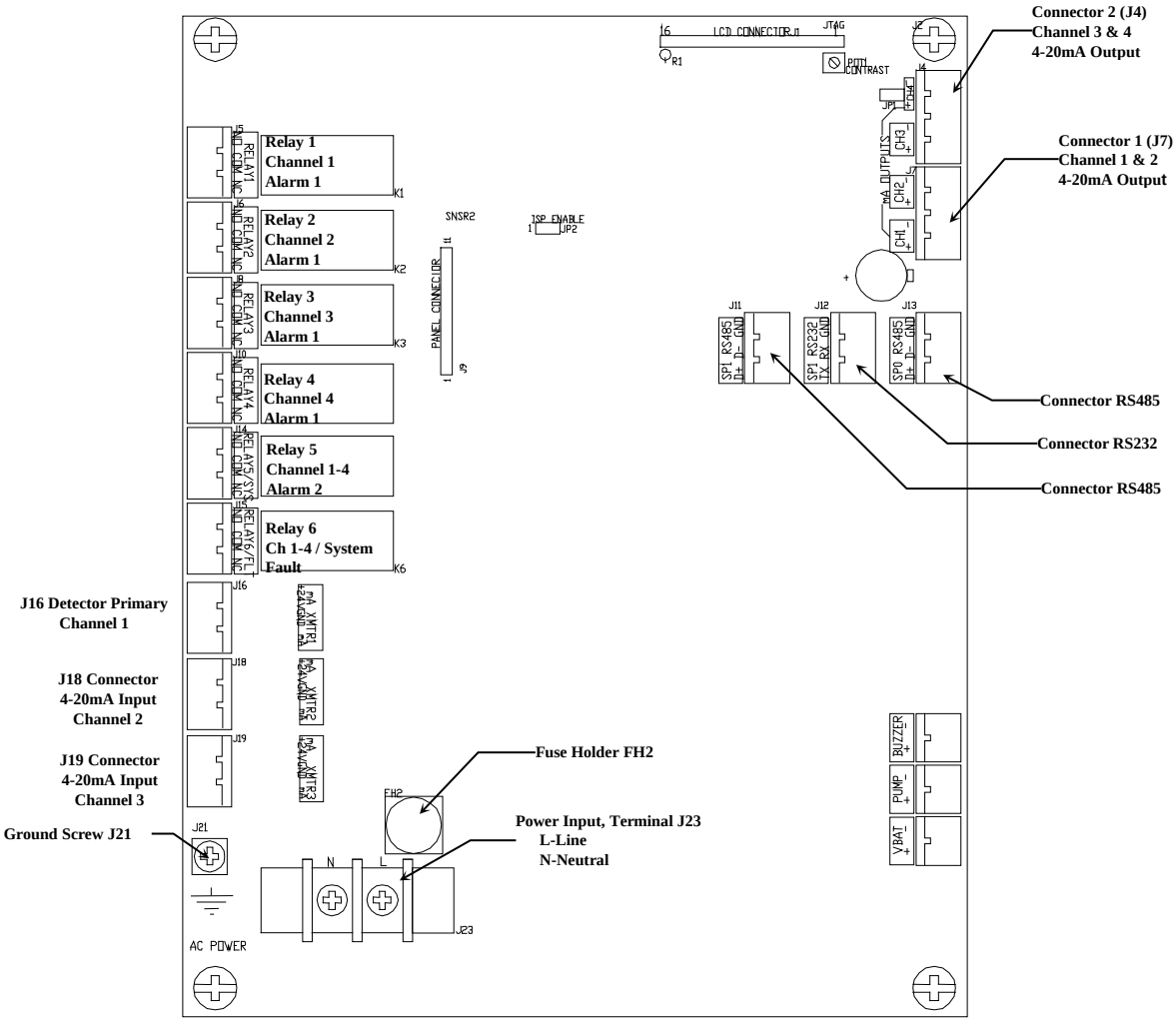


Figure 5: ISA-60M Relay and Input/ Output Terminals

3.2.1 Outputs

Two types of alarm outputs are available, relay contacts and 4-20mA outputs.

3.2.2 ISA-60M Relay Contacts

Relay contacts are available for each alarm; these are SPDT, rated at 10Amp at 110VAC or 10Amp at 30VDC for restive loads, and may be latching or non-latching as required by the application. They are accessed on the terminals next to each relay see **Figure 2 & 5**. The contact positions are noted on the circuit board next to each terminal.

These relay coils are energized when they are in the non-alarm state; the contact conditions given above are for the non-energized state, which is identical to the alarm state.

In addition, there is a fault relay, which changes state whenever the instrument is in a fault condition. The contact positions are noted on the circuit board next to each terminal. The coil of this relay is energized when the instrument is in the non-fault state; the contact conditions given on the circuit board next to the terminal, are for the non-energized state, which is identical to the fault state.

The PC Board is labeled for the relays in their un-energized state. If the relay is configured for failsafe, then this is also the alarm condition state. Non-failsafe configured relays in the alarm state, are the reverse of the PC board labeling. Note that the Fault(FLT) relay cannot be set to operate in a Non-Failsafe mode. Please see the **Table 2** below

Table 2: Relay Failsafe Settings

Position		Failsafe-Alarm	Non-Failsafe-Alarm
J5	Relay 1 - NO	Normally Open	Normally Closed
J5	Relay 1 - COM	Common	Common
J5	Relay 1 - NC	Normally Closed	Normally Open
J6	Relay 2 - NO	Normally Open	Normally Closed
J6	Relay 2 - COM	Common	Common
J6	Relay 2 - NC	Normally Closed	Normally Open
J8	Relay 3 - NO	Normally Open	Normally Closed
J8	Relay 3 - COM	Common	Common
J8	Relay 3 - NC	Normally Closed	Normally Open
J10	Relay 4 - NO	Normally Open	Normally Closed
J10	Relay 4 - COM	Common	Common
J10	Relay 4 - NC	Normally Closed	Normally Open
J14	Relay 5 - NO	Normally Open	Normally Closed
J14	Relay 5 - COM	Common	Common
J14	Relay 5 - NC	Normally Closed	Normally Open
J15	Relay 6/FLT - NO	Normally Open	N/A
J15	Relay 6/FLT - COM	Common	N/A
J15	Relay 6/FLT - NC	Normally Closed	N/A

These relay contacts can be used to operate auxiliary alarms or other functions.

3.2.3 4-20mA Outputs

Isolated 4-20 mA outputs are available for data logging or other purposes. An output is supplied for each sensor supplied in an instrument, and can be added when a sensor is added in the field. These outputs are available on the Connector 1(J7) for channels 1 & 2 and Connector 2(J4) for channels 3 & 4.
4mA corresponds to the sensor reading of 0 at the bottom of the range.
20mA corresponds to a full scale reading of 30.
Wiring requirements are the same as for the relays.

3.2.4 Digital Outputs

The RS232 & RS485 connections are used for firmware updates and digital communications. The **ISA-60M** is designed to operate as a Modbus slave. Contact the ***ENMET*** for further information on wiring for the digital outputs.

3.3 Power Supply

The input power can vary from 100 to 240VAC, 50/60 Hz. Mains power should be connected to the Power Input Terminal J23 and the ground screw J21. Se**e Figure 5** for location.

> ***WARNING*:** Continuous gas detection and alarm systems become inoperative upon loss of primary power.

Upon supplying power to the **ISA-60M**:

- The green power on LED is lit.
- The display backlight is lit, and instrument will step through a start-up sequence: unit serial number, software revision and gases monitored may be shown on the display.

The instrument may go into alarm briefly, but the sensors stabilize quickly. If the instrument persists in alarm, acknowledge the alarm by pressing the **AUDIO DEFEAT /ALARM ACKNOWLEDGE** switch. If alarm persists longer than 30 minutes, call ***ENMET*** customer service personnel.

Mains power line is fused for power supply protection. Fuse is 5 x 20mm, 0.630Amp is located in FH2, see **Figure 5**

3.4 Permanent Installation

Follow all local electrical codes for proper installation: 100-240VAC, 50/60Hz at .45A.

This equipment is designed to be permanently installed using a minimum 18AWG (0.75mm2) (60 Deg. C) UL listed wire. Additionally, the unit is required to have a switch or circuit breaker that is clearly marked as the disconnecting device for the unit. The switch or circuit breaker must be suitably located and easily reaching in respect to the unit.

3.5 Initial Calibration

All instruments are calibrated at the factory. You may, if a calibration kit is available, calibrate the **MRI-5175** 3 – 4 hours after installation. **See Section 5.0**, Maintenance, for calibration instructions.

4.0 Operation

4.1 Normal Operation Condition

With the **ISA-60M** installed as described in **Section 3**, and in clean air, the POWER green LED is on, the display is lit, and the information on the display is as shown in **Figure 6,** for the sensor(s) installed in the **ISA-60M**. The red alarm and fault LEDs are not lit.

Example of display

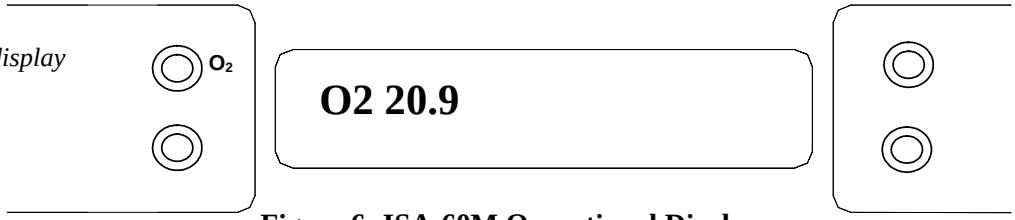


Figure 6: ISA-60M Operational Display

4.2 Alarm Set Points

There are two alarm set points for each active oxygen channel. They are adjustable from 16.0 to 24.9. The standard factory settings of these alarm set points are:

Alarm 1 is 19.5 % by volume, indicated by Flashing LED and audio alarm.

Alarm 2 is 17 % by volume, indicated by Steady LED and alarm 1 LED changes from flashing to steady.

The alarm set points can be changed within limits; see the maintenance section of this manual for the procedure.

- If the oxygen content of the sample air decreases below an alarm set point, the associated red LED activates, the associated relay changes state, and the audio alarm is activated.

Differential Setting (Non-Factory)

Differential is an optional alarm relay configuration where when an alarm has been triggered, the relay will remain in alarm state until the sensor reading has moved the differential "value" in the non-alarm direction. See example below.

- The Alarm 1 differential value is the delay of the **ISA-60M** staying in alarm condition until after the measured reading has returned past the alarm point by the differential value. *Example*: If the alarm point is **V** 19.5 and the differential is 2, the **ISA-60M** will go into alarm at 19.5 and stay in alarm until the reading has risen above 19.7.

CAUTION: Setting the alarm points to the differential setting disables the audio alarm for alarm point 1. The differential Setting has no effect on alarm relays or on the audio alarm for alarm point 2.

4.3 Fault Indications

Fault indications are associated with sensor zero and calibration activities, and are described in the maintenance **section 5.0** of this manual.

4.4 Alarm Latching

An instrument is shipped with the alarms in the latching mode. The alarms may be independently configured in the non-latching mode or differential setting by use of the maintenance menu. ***See Section 5.2.2***, for setting alarm 1 and alarm 2.

Standard Setting

- IN THE LATCHING MODE: at the cessation of the condition which causes an alarm, the alarm indications do not cease, and the alarm relay contacts do not revert to the non-alarm state, until the ALARM ACKN/AUDIO DEFEAT switch is pressed. An alarm can also be acknowledged by pressing the switch during the alarm condition; then at the cessation of the alarm condition, alarm indications cease and alarm relays revert to the non-alarm state. After an alarm is acknowledged, alarms in the latching configuration are re-armed to latch at the next alarm condition.
- IN THE NON-LATCHING MODE: at the cessation of the condition that causes an alarm, the alarm indications automatically cease, and the alarm relay contacts revert to the non-alarm state.

4.5 Audio Defeat

Pressing the **AUDIO DEFEAT / ALARM ACKNOWLEDGE** switch during an alarm temporarily silences the audio alarm on the **ISA-60M** not on the **MRI-5175**. Relays and alarm LEDs continue to function, in the alarm state, during an alarm condition. As long as the alarm condition persists, the audio alarm will "chirp" every 20 seconds. After the alarm condition clears, the audio will continue to "chirp" until the audio switch is pressed.

- If after 15 minutes the alarm condition continues the audio alarm will reactivate at full intensity.
- If any other alarm condition occurs while the audio alarm has been silenced it will force the audio alarm to reactivate immediately.

4.6 Display

In clean air a display is shown in **Figure 6**. This position of the display is termed the "**operational display**". As explained below, the display can be changed to furnish other information by using the OPTION and SELECT switches.
Oxygen concentration is given in percent by volume.

4.7 Operational Menu

The operational menu allows the user to:

- View alarm set point concentration values
- View alarm latching configurations
- Enter the maintenance menu with the proper Password.

The operational menu is accessed with the OPTION and SELECT switches. The operational menu flow chart is shown in **Figure 7**,

- Pressing the OPTION switch is indicated with a "**O**"
- Pressing the SELECT switch is indicated with a "**S**".

If the instrument is left at any location in the operational or maintenance menus, other than the operational display, with no action taken for a period of 45 seconds, it returns to the operational display.

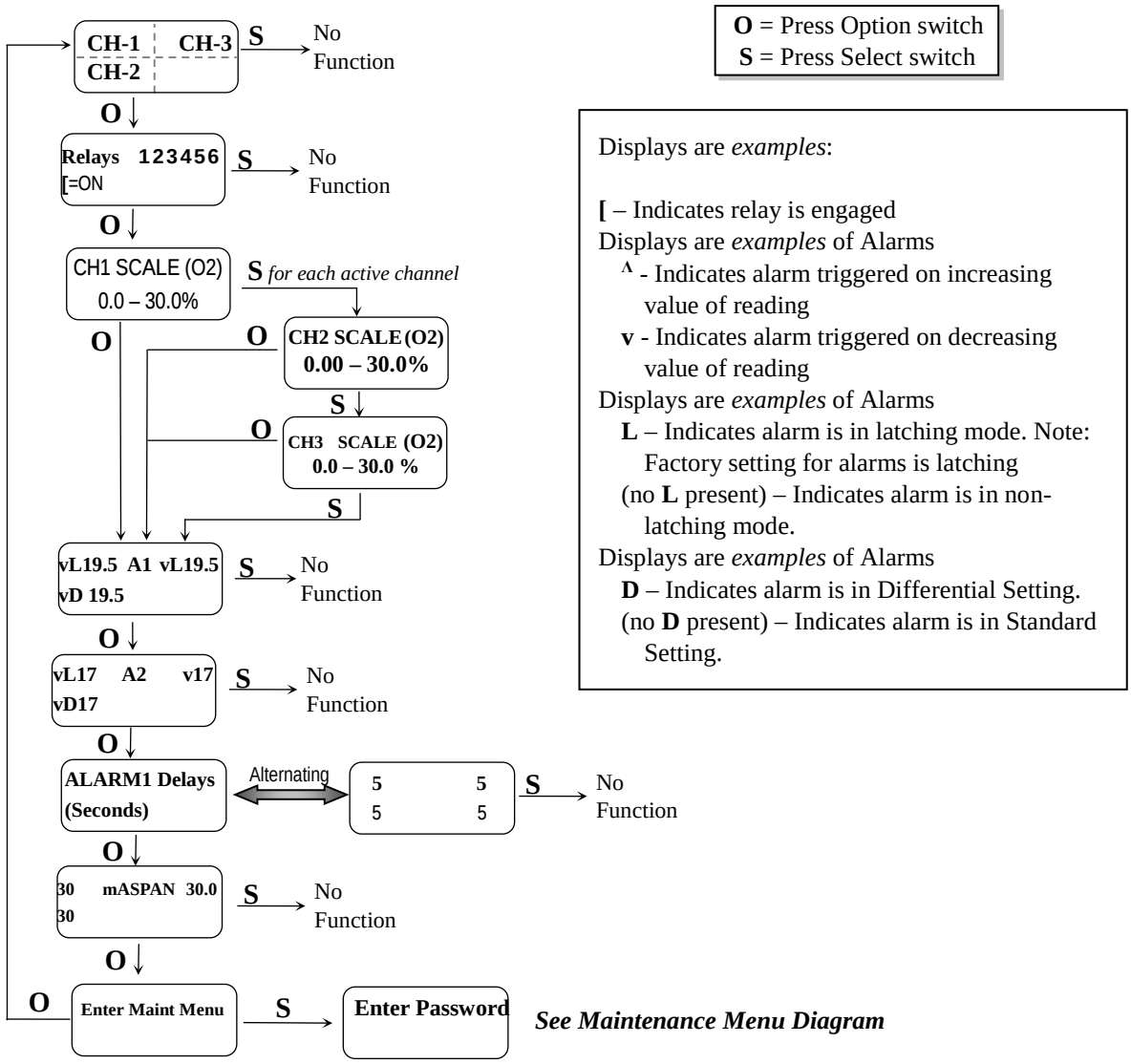


Figure 7: ISA-60M Operation Menu Flow Chart

5.0 Maintenance

The **ISA-60M** has no specific preventative maintenance requirements. Entering the maintenance menu, as outlined in **Section 5.2** may change instrument configurations.
The **MRI-5175** sensor will require periodic calibration and replacement. Oxygen sensor calibration should be performed on at least a quarterly basis. The sensor has an estimated lifetime of 5 years. The sensor should be replaced when it will not calibrate or shortly before the 5-year time frame, to ensure continuous instrument operation. Sensor calibration instructions can be found in **Section 6.0**.

5.1 Cleaning Instructions

CAUTION: Never spray a cleaning solution on the surfaces of the **ISA-60M** or **MRI-5175** devices.

Clean the exterior of the **ISA-60M** and **MRI-5175** enclosures with a mild soap solution on a clean, damp cloth. Do not soak the cloth with solution so that moisture drips onto, or lingers on, external surfaces.
Under no circumstances should organic solvents such as paint thinner be used to clean instrument surfaces.

5.2 Maintenance Menu ISA-60M

The maintenance menu diagram is shown in **Figure 8 Maintenance Menu Flow Chart**. From the operational display, press the OPTION switch 4 times; "Enter MAINTENANCE Menu" is displayed.

O = Press Option
S = Press Select

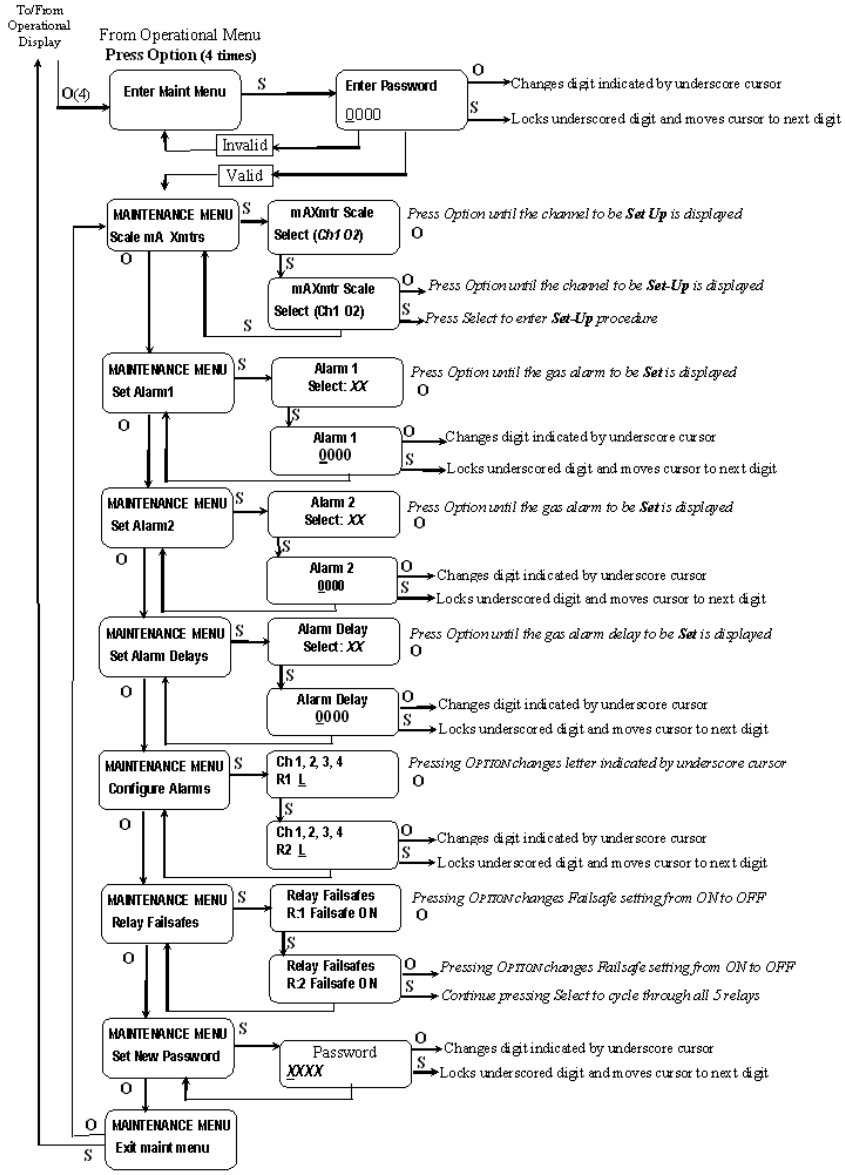


Figure 8: ISA-60M Maintenance Menu Flow Chart

5.2.1 Set 4 –20mA Transmitter Scale

This section of the maintenance menu is for aligning the external sensor/transmitters **MRI-5175** to the **ISA-60M** controller. This function is normally performed at the factory and is not usually required in the field unless a new transmitter is installed.

5.2.2 MRI-5175 Calibration

Calibration is performed at the **MRI-5175** remote sensor/transmitter.
Calibration is the process of setting the instrument up to read accurately when exposed to a target gas.
Wait at least 3 – 4 hours after initially supplying power to the **MRI-5175** sensor/transmitter before calibration, Overnight stabilization is preferred before calibration. The **MRI-5175** has been pre-calibrated at the factory, and initial field calibration should result in only fine tuning the circuit, as well to check that installation is successful. It is not necessary to open the enclosure to make adjustment. The calibration functions are operated through the **MENU** and **SELECT** switches. See **Table 5** for Power/Fault LED Sequence codes and **Figure 9** Calibration **MRI-5175**.

ENMET recommends quarterly, but not less than annual, calibration of **MRI-5175** transmitter.

5.2.3 Standard Calibration

See **next page** for Standard Calibration Flow Chart.

The following procedure is suitable for altitudes below 4500 ft (1372 meters):
1. Press and hold the Menu switch for 3 to 5 seconds, the Power /Fault led will flash red- green, red- green, red- green….
2. Assemble the cylinder flow regulator and MRI calibration adapter.

To calibrate:
3. Press and release the Menu switch, then press and release the Select switch. This places the transmitter into the calibration Span operation. The Power/ Fault led will flash Green-red-red-red, Green-red-red-red…
4. Attach the MRI calibration adaptor, part number 03620-021 to the sensor, then pull the trigger on the cylinder of 20.9% Oxygen part number 03100-029 and partially inflate the bellows.
5. The MRI-5175 transmitter begins to look for signal stabilization; this process lasts from 60 to 120 seconds. Observe the Power/ Fault led during this time. When the signal has stabilized, the Power/Fault led will show green for 3 seconds, indicating a successful calibration, and then flash red-green, red-green… If the calibration was unsuccessful, following the 60 to 120 second stabilization time the Power/Fault led will show Red for 3 seconds and then flash red-green, red-green, red-green…
6. Press and release the Select switch to exit calibration and return to operation mode. If the calibration was completed successfully the Power/Fault led will show steady Green. If the calibration Failed the Power/Fault led will flash a Slow red-green, red-green… Continue to flow the 20.9 Oxygen. Go to **Section 5.2.5**

5.2.4 Altitude Calibration

1. Press and HOLD the MENU switch for 3 to 5 seconds. This places the transmitter into the Maintenance Menu. The LED sequence on the transmitter will be Red, Green, Red, Green…
2. Press the Menu Switch and release. This places the instrument into Calibration Span window. The LED sequence remains Red, Green, Red, Green…
3. Press and HOLD the Menu switch again for 3 to 5 seconds, this places the transmitter into the FACTORY Span window. The LED sequence will be Red, Red, Red, Red…
4. Apply the 20.9% O2 to the sensor and wait 30 to 100 seconds.
5. Press and release the SELECT switch, this initiates the calibration of the sensor. The LED sequence will be Green, Red, Red, Red, Red… wait a few seconds.
6. Press and release the SELECT switch, this acknowledges the calibration procedure.
7. If the calibration was successful the LED sequence will be a solid GREEN LED for 2 seconds followed by Red, Green, Red, Green… If the calibration failed the LED sequence will be a solid RED LED for 2 seconds followed by Green, Red, Green, Red…
8. If the calibration was successful, press the SELECT switch to exit the maintenance window and return to normal operation. The LED will be a solid GREEN.

NOTE: *If the calibration failed, retry the calibration process. If it fails again, verify that the sensor has been installed correctly and/or contact your service provider or ENMET.*

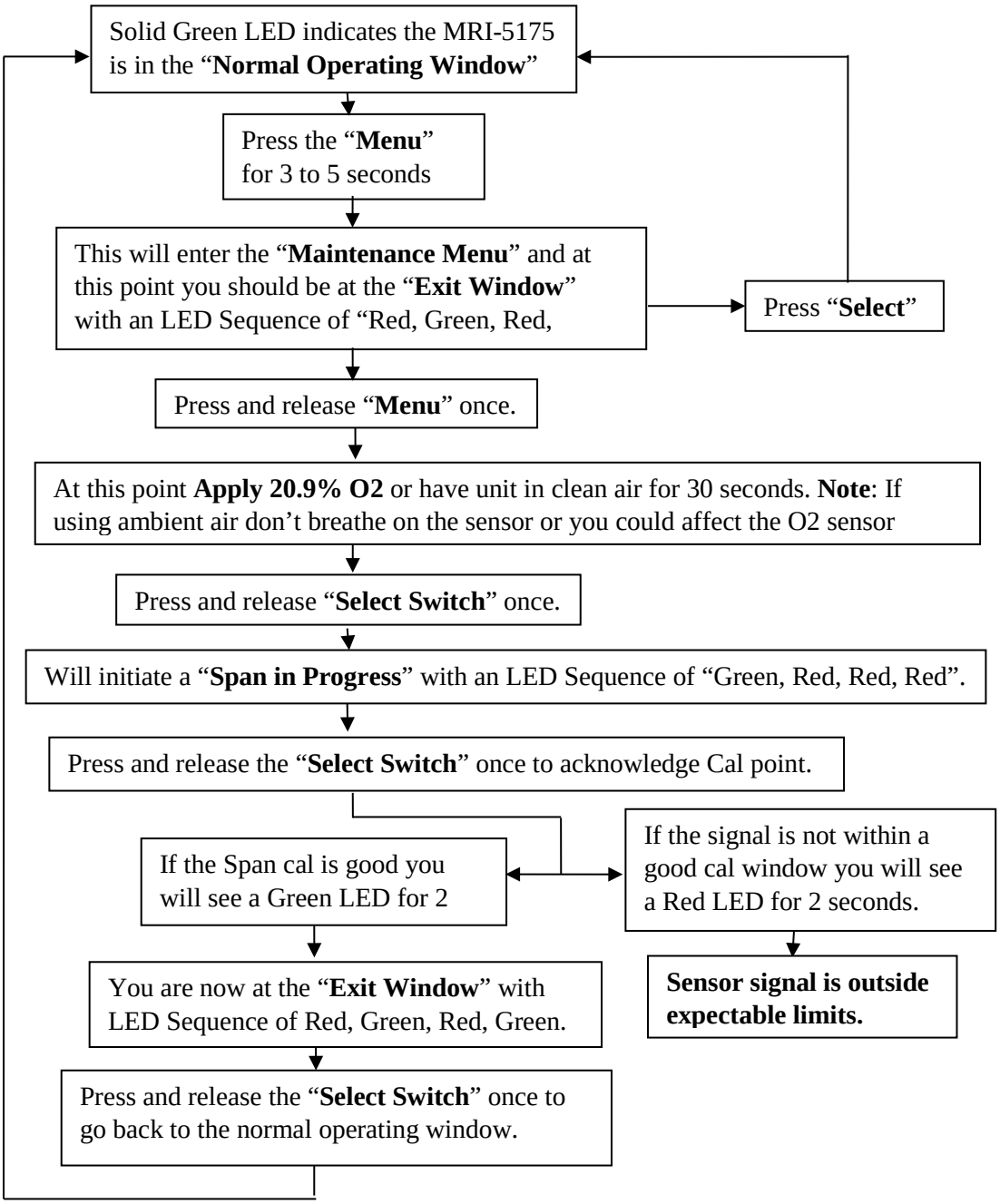


Figure 9: Standard Calibration Flow Chart

Table 3: Fault LED Code Sequence

Power/Fault LED Code	Indication Sequence
Exit	Green-red – green-red – green red-…
Span	Green-red-red-red – green-red-red-red – green-red-red-red…
Cal OK	Green for 3 seconds
Bad Cal	Red for 3 seconds

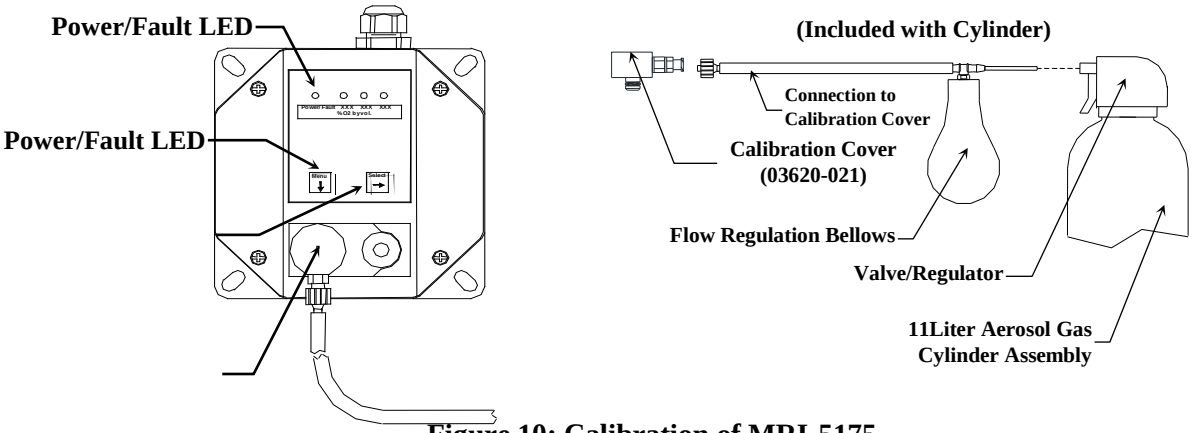


Figure 10: Calibration of MRI-5175

5.2.5 ISA-60M Controller

Entering a valid password into maintenance menu, the Scale mA Xmtrs section is the second menu section, if it is installed, enter by pressing the SELECT switch

- Press the SELECT switch "mA Xmter Scale: Select *Ch1:O2*" is displayed.
- Press the OPTION switch, if needed, to change the channel to be set up.
- Press the SELECT switch, "Ch#: mAXmter: 4mA: 00" is displayed
- Press the SELECT switch, that moves the cursor one digit to the right when the last digit is accepted the display move to the full-Scale mA Xmtrs menu, the display reads
- Press the SELECT switch, which moves the cursor one digit to the right when the last digit is accepted the display will read "Ch#: O2 mAXmter NA Trim?"
- Press the SELECT switch to enter. The display will read "O2:20.8, 3029, Trim Val:20.7?" (note this number will vary)
- Press the SELECT switch, to move the cursor, use the OPTION switch to adjust the numbers to 20.9
- Repeat these steps for each 4 –20mA transmitter.
- Press the OPTION switch, to continue to the next section of the Maintenance Menu.

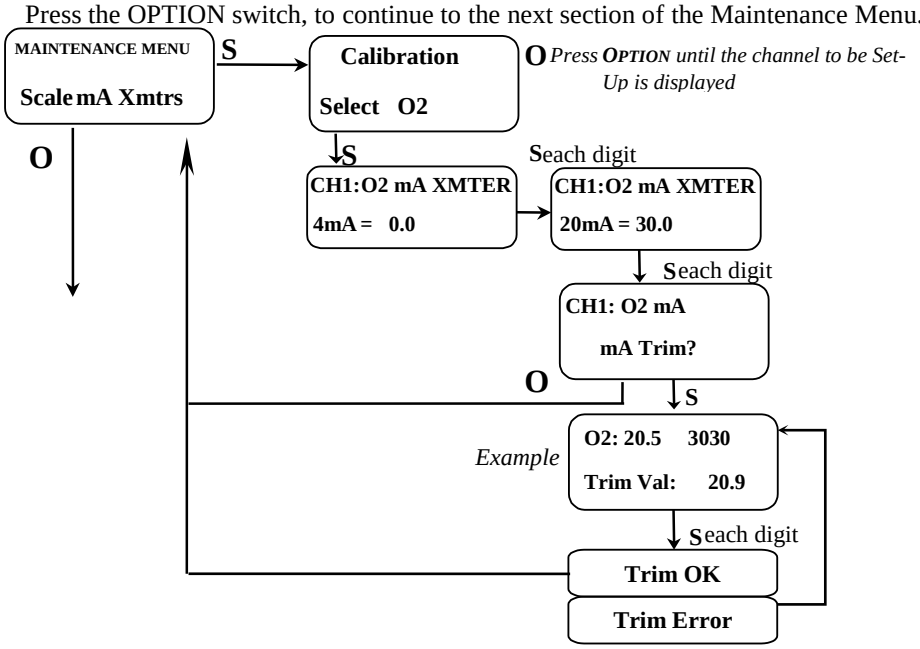


Table 4: Set up Values

Gas	4mA	20mA
O_2	0	30

Example: Sensor/Transmitter Set Up Flow Chart ←

5.2.6 Set Alarm Points

Factory alarm set points are discussed in Section 4.2, See Table 2. To change the alarm points, you must enter the maintenance menu.

NOTE: *Changing the alarm points on the **ISA-60M** will NOT change the alarm points on the **MRI-5175** sensor transmitter.*

Entrance to the maintenance menu is guarded with a four-digit Password. The factory default setting of the password is 1270. When a valid numerical password is inserted, the user can enter the maintenance menu.
In the "Enter Maint Menu" position

- Press the **SELECT** switch "Enter Password □0" is displayed. Press **SELECT** switch once, to move cursor to next digit, this will be the first digit of the password.
- In the □000 position, the underline cursor is under the left digit.
- Press the **OPTION** switch to change the left digit; select the correct digit.
- Press the **SELECT** switch, which locks the digit in place and moves the cursor one digit to the right.

Continue this process until the four-digit password is complete. When a valid password is inserted in this manner, the display is transferred to the "Calibration" portion of the menu. If an invalid password is inserted, you are returned to the Enter Maint Menu display.

After entering a valid password:

- Press the **OPTION** switch until; “Maintenance Menu Set Alarm1” appears on display.
- Press the **SELECT** switch, "ALARM1 Select: O2" is displayed.
- Press the **SELECT** switch; "ALARM 1 **V** " is displayed, with the indicator flashing, **Λ** for ascending trigger point or **V** for descending trigger point indicator.
- Press the **OPTION** switch to toggle between **Λ** and **V**; select the correct indicator.
- Press the **SELECT** switch to lock in the correct indicator. "ALARM 1 **STD**" is displayed
- Press the **OPTION** switch to toggle between **STD** and **DIFF**; select the correct indicator.
- Press the **SELECT** switch to lock in the correct indicator.
  - IF: **STD** is selected, "ALARM 1 **V L** " is displayed.
    The next character is the latching indicator **L** or **NOL** press the **OPTION** switch to toggle the latching mode.
  - The next characters are the alarm 1 value, press the **OPTION** switch to select each digit of the value
    When the last digit is accepted display returns to the Maintenance Menu "Set Alarm1" position.

IF: **DIFF** is selected, "ALARM 1 **V DIFF 19.5**" is displayed, Factory default setting.

- The next characters are the alarm 1 value, press the **OPTION** switch to select each digit of the value
- Move the cursor to the first digit and, Press the **SELECT** switch to lock in the correct character and move the cursor to the right.
- "ALARM 1 **DIFF BAND 0.0**" is displayed, to *set alarm 1 differential.* With **SELECT** switch move cursor to left.
- Press the **OPTION** switch to select each digit of the value.

NOTE: *The Alarm 1 differential value is the delay of the **ISA-60M** staying in alarm condition until after the measured reading has returned past the alarm point by the differential value. Example: If the alarm set point is **V** 19.5 and the differential is 2, the **ISA-60M** will go into alarm at 19.5 and stay in alarm until the reading has risen above 19.7.*

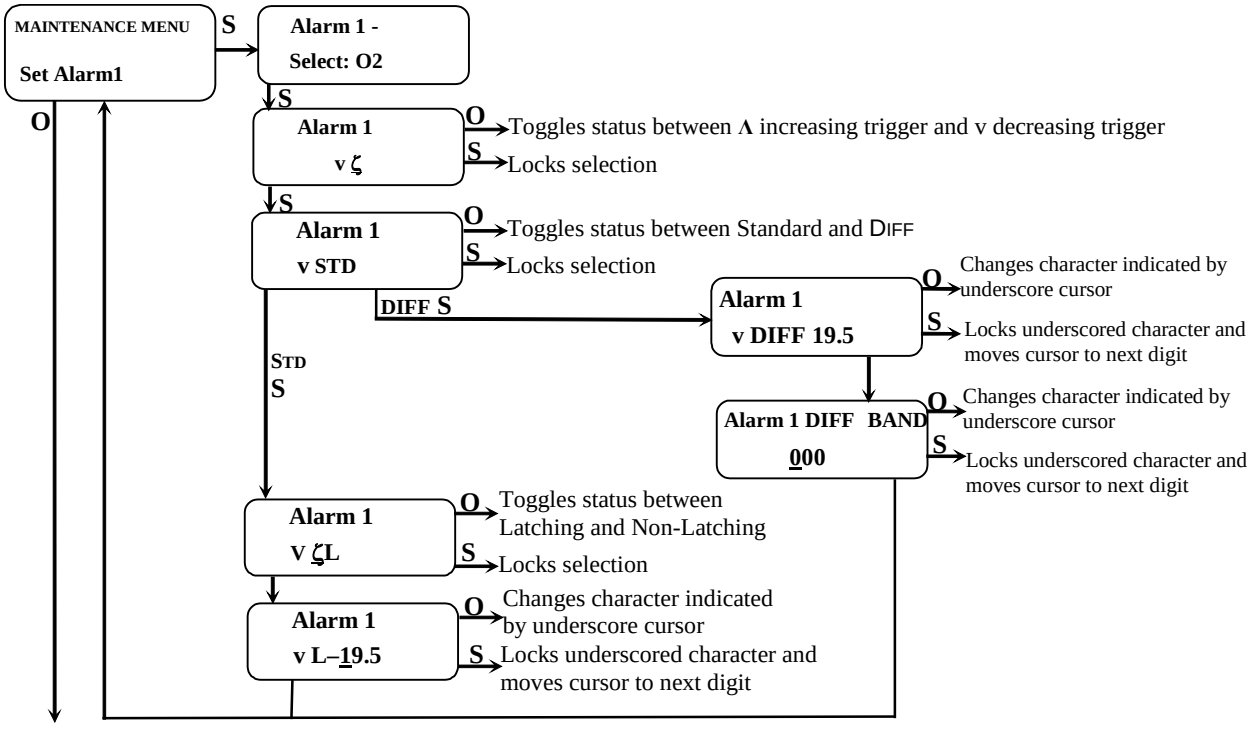
- Repeat the above procedure for each sensor alarm 1 to be changed.
- Press the **OPTION** switch to move to alarm 2, "Set ALARM2" is displayed.
- Repeat as for alarm 1 using the **STD** section. Alarm Diff is not available for Alarm 2.
- Press **OPTION** switch until “Exit Maint Menu” appears, then press **SELECT** switch to return the instrument to the Operational Display

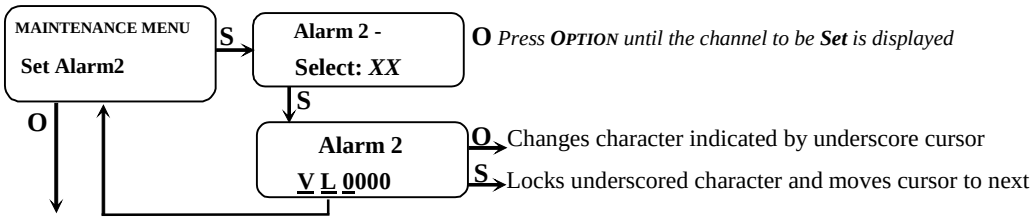
CAUTION: *Setting the alarm points to the differential setting disables the audio alarm for alarm point 1. The differential Setting has no effect on alarm relays or on the audio alarm for alarm point 2.*

Example: Set Alarms Flow Chart
Displays shown are factory default settings.

O = Press Option
S = Press Select

Λ - Indicates alarm triggered on increasing value of reading
v - Indicates alarm triggered on decreasing value of reading
L- Indicates alarm is set for latching
NOL- Indicates alarm is set for non-latching
STD – Indicates alarm in standard setting, can be set in latched or non-latched mode
DIFF – Indicates alarm in differential setting, instrument will stay in alarm beyond the alarm set point by the differential value





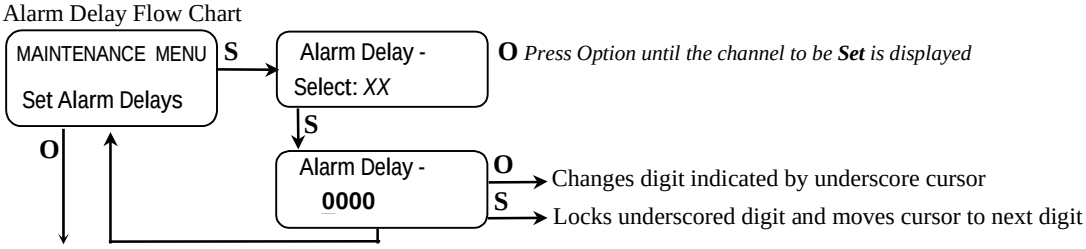
5.2.7 Set Alarm "Delay On"

The alarms may be set to delay activation by 1 second increments.
Factory set default value is 5 seconds.

After entering a valid password:

- Press the OPTION switch until; "Maintenance Menu Set Alarm Delay" appears on display.
- Press the SELECT switch, "ALARM Delay Select: O2" is displayed.
- Press the SELECT switch; "ALARM Delay = □005" is displayed, with the underscore cursor under the left position.
- Press the SELECT switch to move the cursor and the OPTION switch to lock in the correct digit and move the cursor one digit to the right. Press the SELECT switch when the last digit is accepted display returns to the "Set Alarm Delay" position.
- Press the OPTION switch to continue to the Set New Password section

Example: Set Alarm Delay Flow Chart



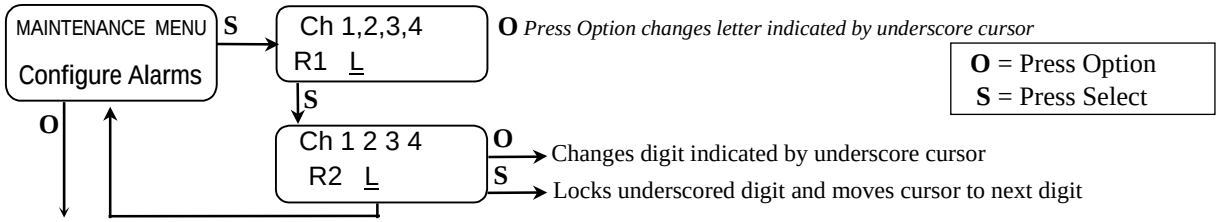
5.2.8 Relay Configuration

To change a relay configuration, you must enter the maintenance menu. Press the **OPTION** switch until "Enter Maint Menu" is displayed then press **SELECT** switch for the Enter Password menu. Enter the valid password as described below.

In the "Enter Maint Menu" position

- Press the **SELECT** switch "Enter Password □ 0" is displayed. Press **SELECT** switch once, to move cursor to next digit, this will be the first digit of the password.
- In the □000 position, the underline cursor is under the left digit.
- Press the **OPTION** switch to change the left digit; select the correct digit.
- Press the **SELECT** switch, which locks the digit in place and moves the cursor one digit to the right.
  Continue this process until the four-digit password is complete. When a valid password is inserted in this manner, the display is transferred to the "Calibration" portion of the menu. If an invalid password is inserted, you are returned to the Enter Maint Menu display.
  After entering a valid password:
- Press the **OPTION** switch until "Configure Alarms" is displayed
  L = Low Alarm = Alarm 1, **H** = High Alarm = Alarm 2, **B** = Both Alarms, □= No Relay linked to channel

Example: Set Relay Configuration Flow Chart



The **Table 4** below shows the default relay links.

Table 5: Default Relay Links

	Channel 1	Channel 2	Channel 3	Channel 4
Relay 1	Low Alarm			
Relay 2		Low Alarm		
Relay 3			Low Alarm	
Relay 4				Low Alarm
Relay 5	High Alarm	High Alarm	High Alarm	High Alarm

Relays can be linked to specific alarms.
NOTE: *Each operating channel must be linked to at least 1 relay.*

5.2.9 Failsafe Configuration

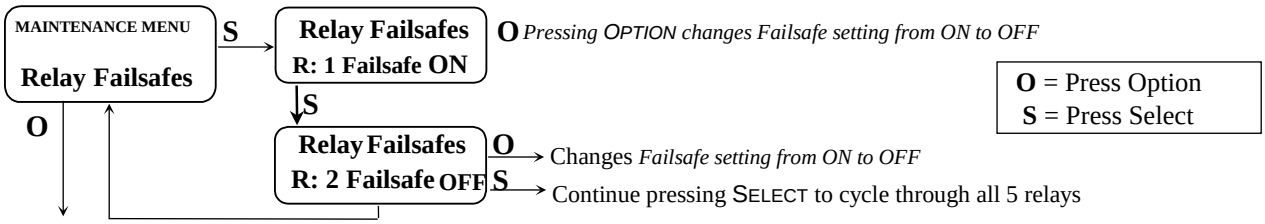
The **ISA-60M** is factory set in a failsafe configuration. This means that if power is disconnected to the unit, or the relay fails to properly engage, it fails in such a way that it is in the alarm position. ***ENMET*** recommends leaving the relay in a failsafe configuration. However, relay 1 – 5 can be re-configured by using the following procedure.

To change a relay failsafe configuration, you must enter the maintenance menu. Press the **OPTION** switch until "Enter Maint Menu" is displayed then press **SELECT** switch for the Enter Password menu. Enter the valid password as described below.

In the "Enter Maint Menu" position

- Press the **SELECT** switch "Enter Password _ 0" is displayed. Press **SELECT** switch once, to move cursor to next digit, this will be the first digit of the password.
- In the _000 position, the underline cursor is under the left digit.
- Press the **OPTION** switch to change the left digit; select the correct digit.
- Press the **SELECT** switch, which locks the digit in place and moves the cursor one digit to the right.
  Continue this process until the four-digit password is complete. When a valid password is inserted in this manner, the display is transferred to the "Calibration" portion of the menu. If an invalid password is inserted, you are returned to the Enter Maint Menu display.
  After entering a valid password:
- Press the **OPTION** switch until "Relay Failsafes" is displayed

Example: Set Relay Failsafe Configuration Flow Chart



5.2.10 Set New Password

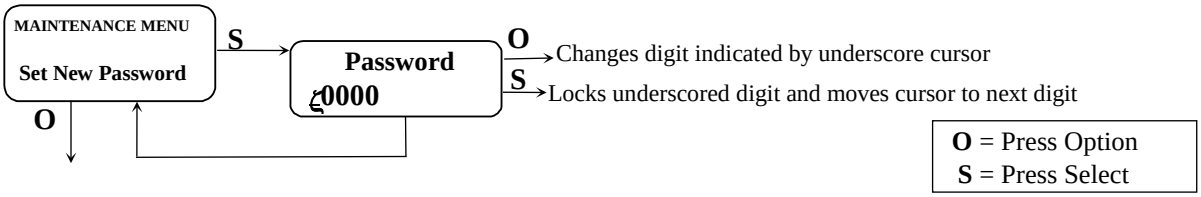
To change the password, you must enter the maintenance menu. Press the **OPTION** switch until "Enter Maint Menu" is displayed then press **SELECT** switch for the Enter Password menu. Enter the valid password as described in Section 5.2.1.

To set a new password, after inserting a valid password,

- Press the **OPTION** switch until; "Set New Password" is displayed.
- Press the **SELECT** switch; "Password _1270" is displayed, with the underscore cursor under the left digit.
- Use the **OPTION** switch to change the left digit, when the desired digit is displayed.
- Press the **SELECT** switch to lock the digit in place and move the cursor one digit to the right.
  When all four digits of the new password have been selected, "Set New Password" is displayed.

  Record the new password; without it, the maintenance menu cannot be reentered once you exit the Maintenance Menu. If the password is lost, call ***ENMET*** customer service personnel.
  From the "Password *XXXX*" position,
- Press the **SELECT** switch to return to Set New Password section.
- Press the **OPTION** switch; to continue to "exit MAINTENANCE Menu"

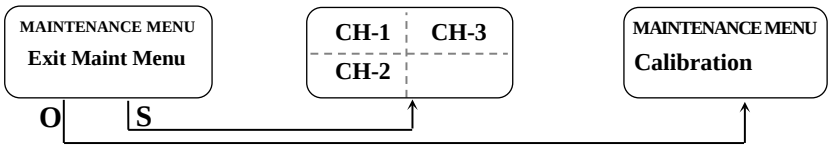
Example: Set Password Flow Chart



5.2.11 Exit Maintenance Menu

From the "exit MAINTENANCE Menu" position
Press the SELECT switch to resume the operational display.
Press the OPTION switch to reenter the maintenance menu at the "Calibration" position.

Example: Exit Maintenance Menu Flow Chart



5.3 MRI-5175 Sensor Transmitter

The **MRI-5175** is supplied with 3 alarm points:
2 are factory set to match the **ISA-60M**
The 3rd is set at 23.5 as an oxygen abundance indicator.
The alarm points are not field adjustable.
When equipped with an audio alarm for safety reasons this alarm cannot be silenced when triggered by an unsafe condition.

5.4 Channel Activation/Deactivation

Each channel of the **ISA-60M** can be deactivated and activated as needed.

CAUTION: *Deactivated channels will not display or respond to connected sensor transmitters.*

A fault indication occurs when a transmitter is not connected to an active channel of the **ISA-60M**.
To Activate or deactivate a channel of the **ISA-60M:**

- Enter the maintenance menu as described in **Section 5.2** and press the **OPTION** switch until Exit Maint Menu appears.
- Press and ***Hold*** the **OPTION** switch until "ADV Maint Menu" is displayed.
- Press the **SELECT** switch to locate the channel to be changed.
- Press the **OPTION** switch to change the status of that channel.
- Press the **SELECT** switch to accept the change in status. "ADV Maint Menu Exit" is displayed.
- Press the **SELECT** switch to return to the operational menu.

6.0 Maintenance MRI-5175 – Sensor Replacement

⚠ *Installation and replacement of the O2 sensor is to be performed by qualified service personnel only.*

The sensor has an estimated lifetime of 5 years. The sensor should be replaced when it will not calibrate or shortly before the 5-year time frame, to ensure continuous instrument operation.

6.1 MRI-5175 Calibration

Calibration is performed at the **MRI-5175** remote sensor/transmitter.
Calibration is the process of setting the instrument up to read accurately when exposed to a target gas.

Calibration: Wait at least 3 – 4 hours after sensor replacement and supplying power to the **MRI-5175** sensor/transmitter. Overnight stabilization is preferred before calibration. It is not necessary to open the enclosure to make adjustment. The calibration functions are operated through the **MENU** and **SELECT** switches. See **Table 5** for Power/Fault LED Sequence codes.

ENMET recommends quarterly, but not less than annual, calibration of the **MRI-5175** transmitters.

6.1.1 Calibration for Sensor Replacement

See Flow Chart on Next Page.

9. Press and HOLD the MENU switch for 3 to 5 seconds. This places the transmitter into the Maintenance Menu. The LED sequence on the transmitter will be Red, Green, Red, Green…
10. Press the Menu Switch and release. This places the instrument into Calibration Span window. The LED sequence remains Red, Green, Red, Green…
11. Press and HOLD the Menu switch again for 3 to 5 seconds, this places the transmitter into the FACTORY Span window. The LED sequence will be Red, Red, Red, Red…
12. Apply the 20.9% O2 to the sensor and wait 30 to 100 seconds.
13. Press and release the SELECT switch, this initiates the calibration of the sensor. The LED sequence will be Green, Red, Red, Red, Red… wait a few seconds.
14. Press and release the SELECT switch, this acknowledges the calibration procedure.
15. If the calibration was successful the LED sequence will be a solid GREEN LED for 2 seconds followed by Red, Green, Red, Green… If the calibration failed the LED sequence will be a solid RED LED for 2 seconds followed by Green, Red, Green, Red…
16. If the calibration was successful, press the SELECT switch to exit the maintenance window and return to normal operation. The LED will be a solid GREEN.

NOTE: *If the calibration failed, retry the calibration process. If it fails again, verify that the sensor has been installed correctly and/or contact your service provider or ENMET.*

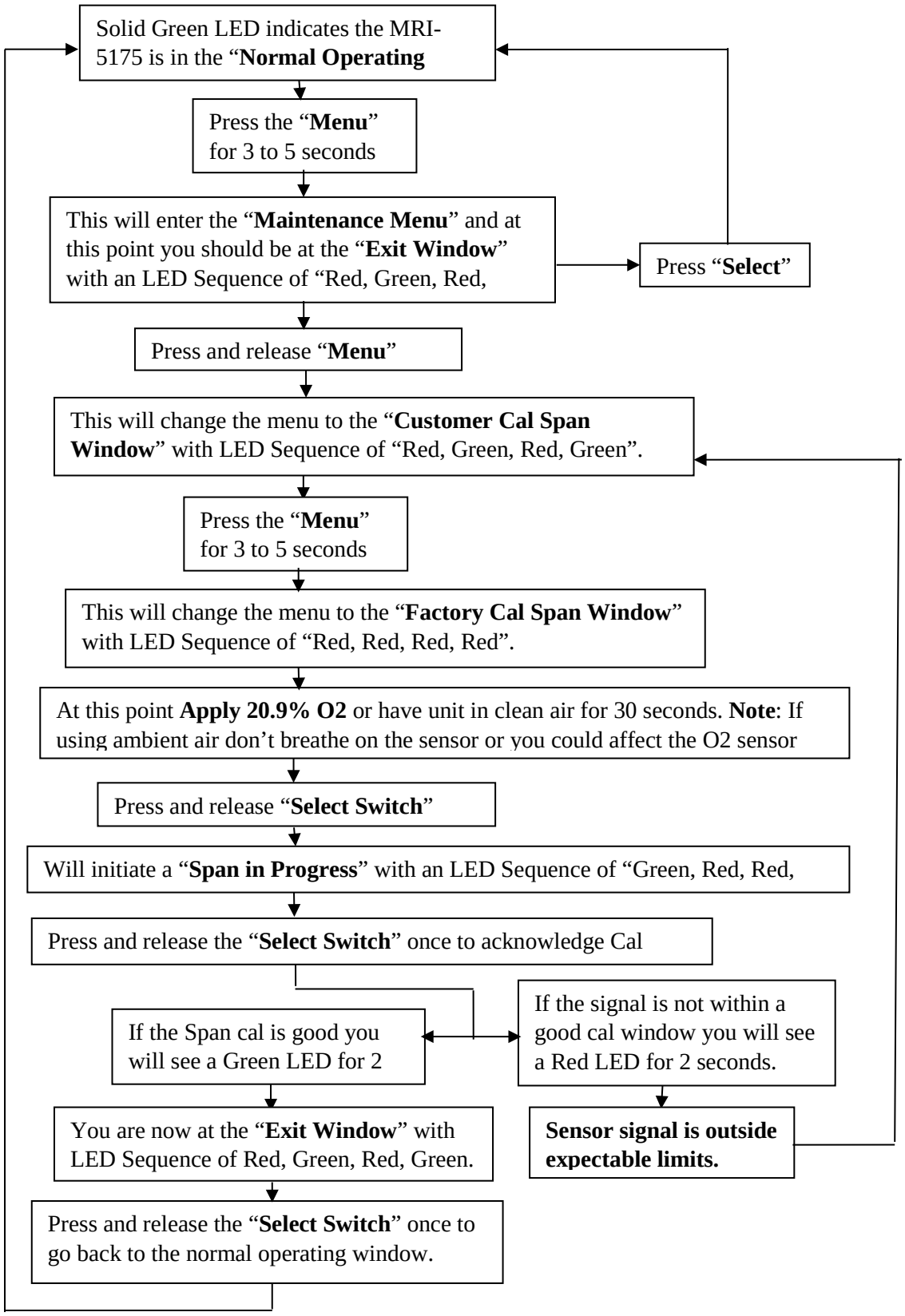
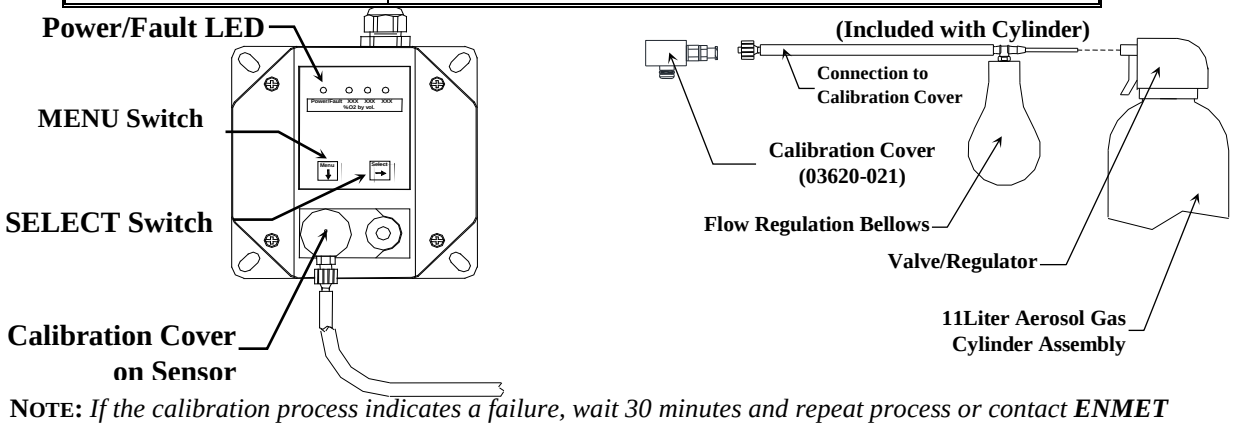


Figure 11: Sensor Replacement Calibration Flow Chart

Table 6: Fault LED Code Sequence

Power/Fault LED Code	Indication Sequence
Exit	Green-red – green-red – green red-…
Span	Green-red-red-red – green-red-red-red – green-red-red-red…
Cal OK	Green for 3 seconds
Bad Cal	Red for 3 seconds



NOTE: *If the calibration process indicates a failure, wait 30 minutes and repeat process or contact **ENMET***

Figure 12: Calibration MRI-5175

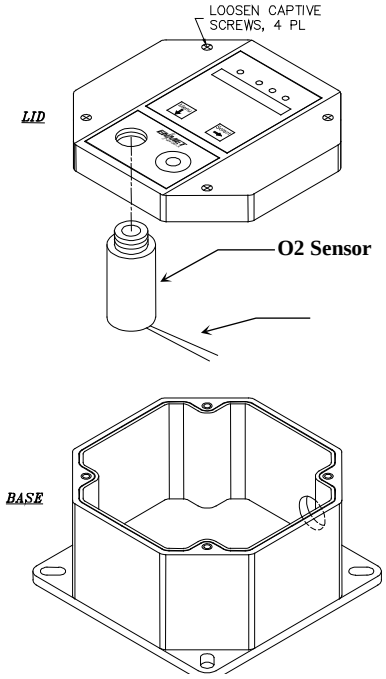
6.2 Sensor Replacement

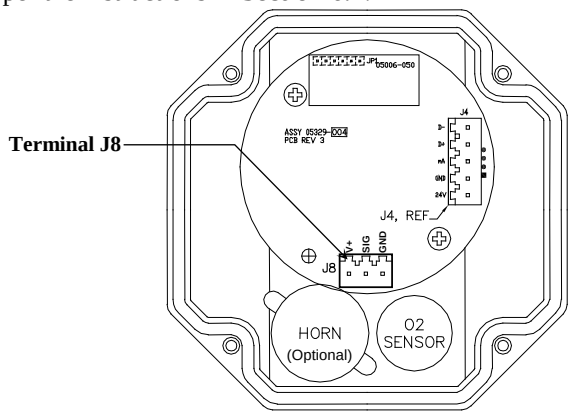
Replacement of the O2 sensor is to be performed by qualified service personnel only.

An Oxygen sensor must be replaced when it can no longer be calibrated. Typical sensor life is 3 to 5 years in a 20.9% oxygen environment.

To replace a sensor, perform the following steps:

- Turn off the electrical power.
- Open the display panel and remove the four cover (lid) retention screws and remove the lid. See **Figure 10**.
- Remove the old O_2 sensor, by unscrewing it, and replace it with a new sensor. See **Figure 10**.
- Replace cover(lid) with retention screws.
- Turn on the electrical power.
- Wait 3 – 4 hours, then recalibrate the sensor per the instructions in **Section 6.1**.





MRI-5175 Lid, Interior View

Sensor Wiring

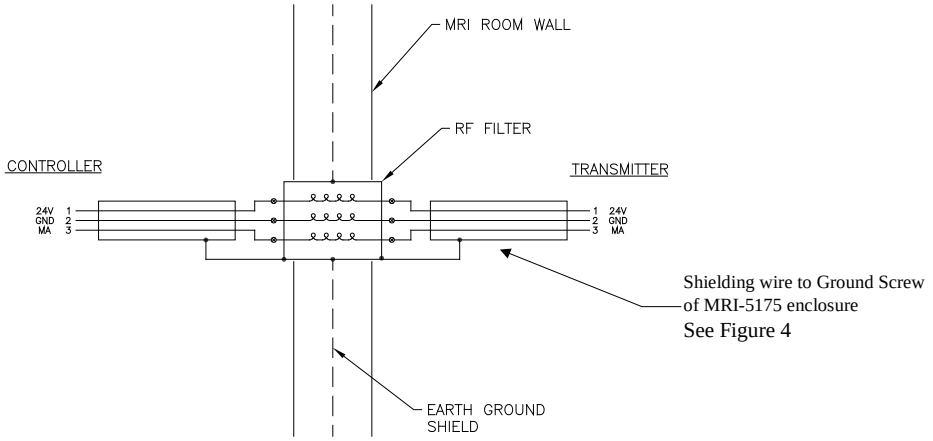
J8	Sensor Wires
V+	Not Used
Sig	Red wire
Gnd	Black wire

Figure 13: MRI-5175 Sensor Replacement

7.0 Technical Data and Specifications

Electrical Power	15 Amp fused branch circuit	
	100-240 VAC	
	0.9 A	
	50/60 Hz	
	Board Mounted Fuse FH2, 0.630A, 5 x 20mm	
Storage and Transport	*(to also be included on shipping box)*	
	Temperature:	-20□to +60□C (-4□to +140□F)
	preferred	0□to +20□C (32□to 68□F)
	Relative Humidity	10-99% RH, non-condensing
	Atmospheric Pressure	20 to 36 inHg (68 to 133 kPa)
Operation	Temperature:	0□to +40□C (32□to +104□F)
	Relative Humidity	10-99% RH, non-condensing
	Atmospheric Pressure	20 to 36 inHg (68 to 133 kPa)
Mechanical		
ISA-60M	Dimensions:	11 x 9 x 6 inches (4.3 x 3.5 x 2.4 cm)
	Weight:	8 lbs (3.6 kg)
	Strain relief:	5 – 12 mm OD
	Material:	Engineered thermoplastic with hinged front cover Non-magnetic hardware
MRI-5175	Dimensions:	5 x 5 x 4 inches (2 x 2 x 1.6 cm)
	Weight:	2 lbs (0.9 kg)
	Strain relief:	5 – 12 mm OD
	Material:	Fiberglass-reinforced polyester with Non-magnetic RFI/EMI shielding and hardware
Outputs		
ISA-60M	Relays:	SPDT Resistive Load Inductive Load 10A at 110 VAC 7.5A at 110 VAC 10A at 30 VDC 5A at 30 VDC
	Analog:	4-20 mA x 3
	Digital:	RS-232 – Modbus RS-485 – Modbus
	Audio:	90 db at 2 ft
MRI-5175	Analog	4-20 mA
	Digital:	RS-485 – Modbus
	Audio:	90 db at 2 ft

Example of controller to* MRI-5175 *wiring



NOTE: *All specifications stated in this manual may change without notice.*

8.0 Replacement Part Numbers

ENMET part numbers for replacement parts:

Part number	Description
67016-1152	Sensor, Oxygen
64002-630	Fuse, 0.630 Amp 5x20mm
03100-209	Gas Cylinder, 20.9% oxygen in nitrogen, 11 liters
03100-185	Gas Cylinder, 18.5% oxygen in nitrogen, 11 liters (Alarm Point Check)
03620-021	Calibration Cover, **MRI-5175**
65057-011	Terminal plug, 3 position
65057-012	Terminal plug, 4 position
65057-010	Terminal plug, 2 position

NOTES:

9.0 Terms and Conditions

9.1 Ordering Information

Address orders to:

ENMET
Attention: Customer Service Department
680 Fairfield Court
Ann Arbor, MI 48108

Email Orders: orderentry@enmet.com
Phone: 734-761-1270 Fax: 734-761-3220

You may also contact our customer service department by email info@enmet.com. MINIMUM ORDER IS $50.00.

9.2 Delivery

Unless Seller otherwise specifies, delivery will be made: FOB Ann Arbor, MI and/or FOB Bowling Green, KY. Title and risk of loss shall pass to Buyer at that point. Shipping and handling charges will be Prepaid and Added to Buyer's invoice. Buyer may request shipping be charged to their own account with a preferred carrier. Seller shall have the right to choose means of transportation and to route shipment when specific instructions are not included with Buyer's order. Seller agrees to deliver the goods and services, within the time, in accordance with specifications, at the prices specified on the face hereof. Buyer's orders to this quotation are not subject to cancellation or deferment of delivery without indemnification of loss to the Seller resulting there from. Seller shall not be liable to Buyer for any loss or damage sustained on account of this delay or nonperformance due to causes beyond Seller's control and without his fault or negligence. Where performance of the terms here is contingent upon timely delivery of goods or services by the Buyer and such delivery is in default, Seller shall be indemnified for any damage or loss resulting there from, and/or by extension of Seller's delivery commitment, as applicable.

9.3 Payment Terms

Payment Terms are Net 30 Days from the date of shipment from Seller unless otherwise noted. All shipping and handling costs will be charged to Buyer on a Prepaid and Add basis. Buyer has the option of paying for shipping by charging its own account with a carrier

9.4 Warranty Information and Guidelines

The Seller warrants new instruments to be free from defects in workmanship and material under normal use for a period of one year from date of shipment. The warrant covers both parts and labor excluding calibration and expendable parts such as filters, detector tubes, batteries, etc. If the inspection by the Seller confirms that the product is defective, it will be repaired or replaced at no charge, within the stated limitations, and returned prepaid to any location in the United States. The Seller shall not be liable for any loss or damage caused by the improper use or installation of the product. The Buyer indemnifies and saves harmless the Seller with respect to any loss or damages that may arise through the use by the Buyer or others of this equipment. This warranty is expressly given in lieu of all other warranties, either expressed, implied or statutory, including that of merchantability, and all other obligations, or liabilities of ENMET, LLC for damages arising out of or in connection with the use or repair or performance of the product. In no event shall ENMET, LLC, be liable for any indirect, incidental, special or consequential damages or for any delay in the performance by ENMET, LLC, which may arise in connection with this equipment. ENMET neither assumes nor authorizes any representatives or other persons to assume for it any obligation or liability other than that which is set forth herein. Buyer agrees to indemnify and save harmless Seller for any damage or loss from lawsuits against Seller by reason of manufacture of sale of materials, parts, or use of processes resulting from Buyer's design specifications. Any patent, design, pattern, tool, die, jig, fixture, drawing, test equipment, or process furnished by Seller; whether possessed by the Seller before the date of this quotation, or devised or acquired by Seller during performance of the terms of this quotation, shall remain the property of the Seller except by specific stipulation on the face hereof. Seller reserves the right, without liability, for damage or loss, to destroy Buyer's drawings, specifications, patterns and special tools supplied by Buyer for performance of the terms on the face hereof, unless Buyer gives notice of the disposition of such items.

9.5 Return Policy

All returns for credit must be approved in advance by ENMET, LLC. Such returns are subject to a minimum $50.00 or 20% restocking charge, whichever is greater. **Approval of equipment for return is totally at the discretion of ENMET, LLC.** All requests for return/exchange must be made no later 30 days of the original shipping date from ENMET. The actual amount of any resulting credit will not be determined prior to a complete inspection of the equipment by ENMET. Calibration gas cylinders cannot be returned or restocked.

10.0 Instructions for Returning an Instrument for Service

Contact the ENMET Service Department for all service requests.
Phone: 734-761-1270
Email: repair@enmet.com

Fill out the "Service Request Form" found at the end of this manual and return with your instrument for all needs. Please send your instrument for service to the site in which the product was purchased. A new "Service Request Form" may be requested if the one found in the manual is not available. All instruments should be shipped prepaid to ENMET.
Address for Service:

Michigan Location:

ENMET
Attention: Service Department
680 Fairfield Court
Ann Arbor, MI 48108

Kentucky Location:

ENMET
62 Corporate Court
Bowling Green, KY 42103

Providing the "Service Request Form" assists in the expedient service and return of your unit and failure to provide this information can result in processing delays. ***ENMET*** charges a one hour minimum billing for all approved repairs with additional time billed to the closest tenth of an hour. All instruments sent to ***ENMET*** are subject to a minimum evaluation fee, even if returned unrepaired. Unclaimed instruments that ***ENMET*** has received without appropriate paperwork or attempts to advise repair costs that have been unanswered after a period of 60 days may, be disposed of or returned unrepaired COD and the customer will be expected to pay the evaluation fee. Serviced instruments are returned by UPS/FedEx Ground and are not insured unless otherwise specified. If expedited shipping methods or insurance is required, it must be stated in your paperwork.

NOTE: *Warranty of customer installed components.*

For Warranty Repairs, please reference ***ENMET's*** "Warranty Information and Guidelines" (found earlier in this section).

Mailing/Shipping Address:
ENMET
680 Fairfield Court
Ann Arbor, MI 48108
repair@enmet.com

Phone: 734.761.1270
Fax: 734.761.3220

Service Request Form

Product Name or Number:
Product Serial Number:

Describe Problem or Needed Service:

Warranty Claim? ☐ Yes ☐ No

CUSTOMER INFORMATION

Billing Address:

Shipping Address:

Contact Name: _____ **Phone #:** _____
Email: _____ **Fax #:** _____
PO/Reference #: _____

PAYMENT METHOD

☐ COD ☐ VISA/MasterCard ☐ American Express

_____ _____ _____
Card Number Exp. Date Security Code:

Name as it Appears on Card: _____

RETURN SHIPPING METHOD

☐ UPS Ground ☐ UPS 3 Day Select ☐ UPS Next Day Air ☐ UPS ND Air Saver ☐ UPS 2 Day Air

UPS Account #: _____

☐ FedEx Ground ☐ FedEx Air Express Saver ☐ FedEx Air Overnight Std. ☐ FedEx Air 2 Day ☐ FedEx Air Overnight P-1

FedEx Account #: _____

Insure Shipment: ☐ Yes ☐ No

Insurance Amount: $ _____

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