

HALOGUARD™ IR MONITOR

(OPTIONAL) FOUR or EIGHT POINT SCANNER

INSTRUCTION MANUAL



SERIAL NO. _____

MODEL NO. _____ - _____ + _____

Temp. Range

- 1 - = > 60°F
- 2 - = 40 - 60°F
- 3 - = < 40°F

Gas Type

- 1 - R-11
- 2 - R-12
- 3 - R-22
- 4 - R-134a
- 5 -
- 6 -
- 7 - R-123

Mount

- 1 - Wall

Range

- 1 - 0 - 1000 ppm

Outputs

- 11 - 4 x 3A Relays
- 12 - 0 - 5 VDC or
0 - 10 VDC
- 13 - 4 - 20mA

Options/Accessories

- A - Audible Alarm
- B - UPS
- E - Inlet/Outlet Extension
- L - Strobe Light
- S - Scanner
- T - TWA Integration

THERMAL GAS *Systems* inc.

11285 Elkins Road Bldg. H-1
 Roswell, GA 30076
 TEL: 770-667-3865
 FAX: 770-667-3857
www.thermalgas.com

IMPORTANT
READ ENTIRE BOOKLET BEFORE
INSTALLING OR OPERATING
HALOGUARD™ IR MONITOR AND (OPTIONAL) SCANNER

TABLE OF CONTENTS

| | <u>Page</u> |
|--|--------------------|
| 1. Unpacking Instructions | 3 |
| 2. Before Installation | 3 |
| 3. Installation | 7 |
| 4. Calibration | 10 |
| 5. Testing | 10 |
| 6. Trouble Shooting | 10 |
| 7. Specifications | 11 |

FIGURES

| | <u>Page</u> |
|--|--------------------|
| 1. Dimension Drawing | 4 |
| 2. Controller Upper Circuit Board | 5 |
| 3. Controller Lower Circuit Board | 5 |
| 4. Controller LCD Display Features | 6 |
| 5. Infrared (IR) Module Circuit Boards | 6 |
| 6. Sensor Cable Terminal Connection | 9 |
| 7. Analog Output Jumper and Terminal Settings | 7 |
| 8. Function Jumper Settings | 8 |
| 9. Initial Factory Settings | 11 |
| 10. Exposure Limits | 11 |
| 11. Wiring Diagram | 12 |

UNPACKING INSTRUCTIONS

Haloguard™ monitors are carefully packed, inspected and delivered to the carrier in good condition. If damage occurs in transit it is the responsibility of the carrier.

Carefully inspect the unit upon receipt. Any damage should be reported to the carrier and an inspection requested. After inspection by the carrier and your receipt of his acknowledgment as to the damage, contact us for return authorization (RMA). We cannot file claims for damaged goods on your behalf, but we will assist you in any way we can.

In order to expedite our work, please provide serial number and purchase date when you call.

WE CANNOT ACCEPT RETURNS WITHOUT PRIOR APPROVAL.

BEFORE INSTALLATION

1. Remove Haloguard® Controller and IR Sensor Module from carton. Check contents against packing list. If shipment is incomplete, contact us immediately.
2. The following tools and hardware are required for installation and calibration.
 - a. Two standard & one philips screwdrivers; 1 - medium standard w/ long shaft, 1 - jewelers fine standard & 1 - medium philips.
 - b. Needle-nosed electrician's pliers
 - c. (8) No. 8 x 1" Screw (minimum)
 - d. Digital VOM
3. Select a site for the installation:
 - a. Power requirements: Provide a clean source of 115-230 VAC, 50/60 Hz, single phase circuit rated 15A minimum Haloguard® Controller and IR Sensor Module.
 - b. Infrared (IR) Sensor Module should be mounted near potential leaks in a quiet area or downstream from leak source in area with air movement.
 - c. Infrared (IR) Sensor Module sample tube end should be located 18" - 24" above the floor . If using optional scanner, locate IR Module at a point central to chiller locations. Install inlet extension tube out to each remote sample location (up to 200 Ft. from IR module). Make sure each sample tube is equipped with an end of line filter.
 - d. Make sure the area selected is not subject to flooding, potential impact or severe ambient temperature and humidity changes (i.e. boiler blow-down or near roll-up doors).
 - e. Infrared detector is highly selective but may respond to the presence of other gases (i.e. paint thinner, cleaning fluids and other refrigerants) if interfering gas reaches a high concentration. For accurate refrigerant leak detection select a location free from above fumes or temporarily disable sensor when they are present. Contact TGS for specific interference's.
4. The wall mounted controller should be installed indoors, approximately five feet above the floor or at a location easily visible to operators, in an area with minimal vibration, and with temperature and humidity changes like sensor location.

IMPORTANT

CONSULT LOCAL AND NATIONAL ELECTRICAL CODES FOR ANY SPECIAL REQUIREMENTS OR RESTRICTIONS BEFORE INSTALLING HALOGUARD®.

5. LED Indicators, Pushbuttons, LCD Displays, and Relays
 - a. POWER LED- Green LED indicates Haloguard® is receiving AC power.
 - b. FAULT LED and Relay - Indicates malfunction. LCD indicates specific type of failure (See Figure 4).
 - c. TEST Push-button - Energizes Alarm LED's & relays. Depress button five (5) times to sequence through each alarm level.
 - d. Adjustable Alarm LEDs & Relays -Indicate Alarm 1&Alarm 2 - Factory set for particular refrigerant (See Figure 9). User adjustable as follows:

| RANGE | 1 PPM INCREMENTS | 10 PPM INCREMENTS |
|--------------|------------------|-------------------|
| 0 - 1000 ppm | 10 - 100 | 100 - 1000 |

Note: Optional TWA Integration activates Alarm 1 LED and relay when installed.
 TLV-TWA Alarm is factory set and not user adjustable.

- e. OFFSCALE LED and Relay - Factory set at 1000ppm
 - f. RESET Push-button - Silences alarm, disables relays, and resets instrument for 20 minutes. LCD displays *CAUTION* and RESET with 20 minute countdown. Alarms are automatically reactivated if alarm condition is not corrected. Reset is automatically initiated on start-up and after power failure (Except when optional UPS is provided.).
6. Optional Features:
 - . TWA Integration - Haloguard® calculates an 8 hr. Time Weighted Average (TLV-TWA), displays this value on LCD, activates Alarm 1 LED and relay if factory set PPM value is exceeded. Only used for gases with TLV-TWA less than 1000ppm.

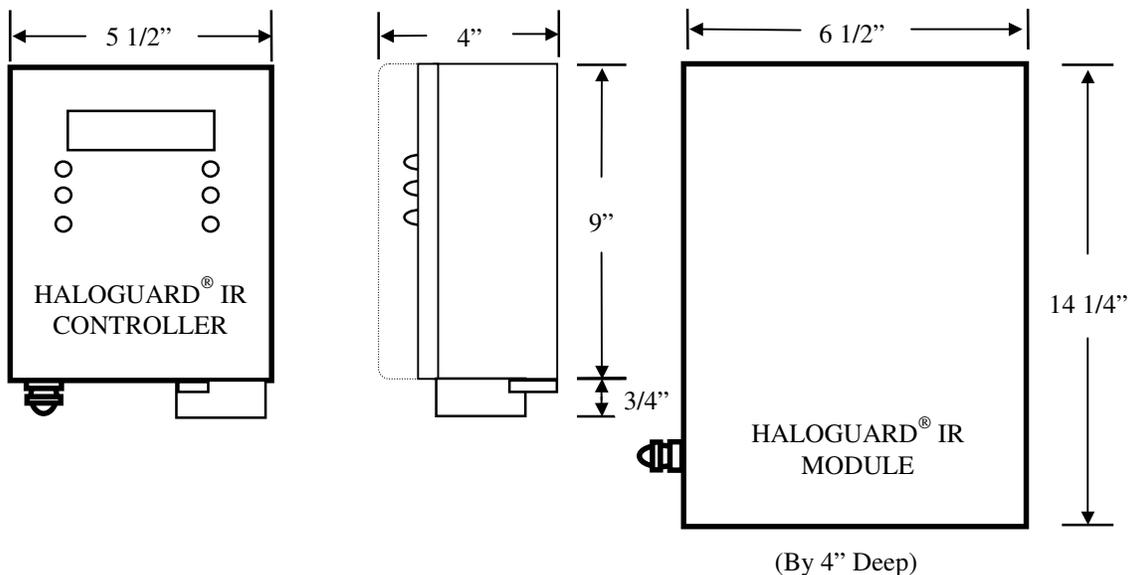


Figure 1 - Dimensional Drawing

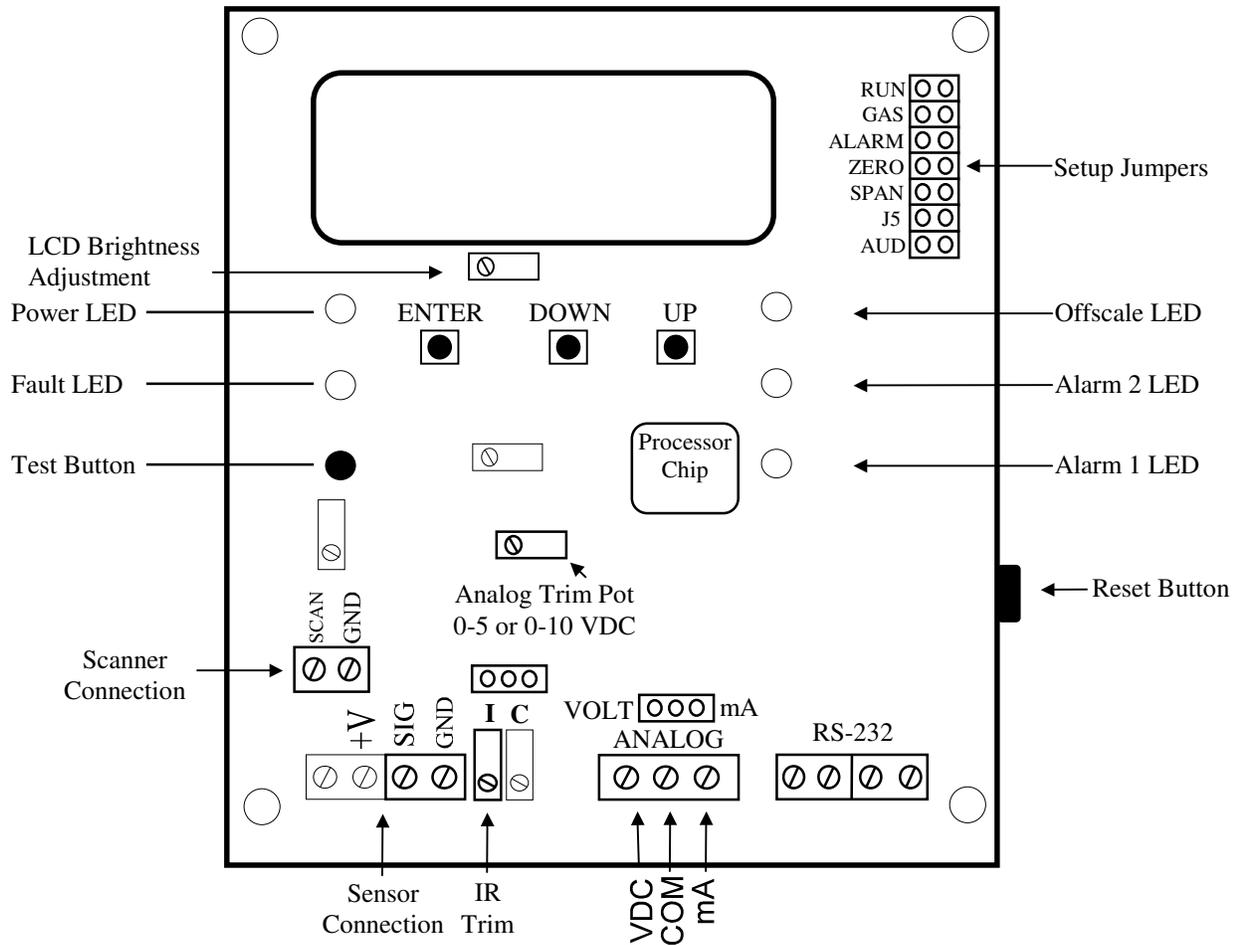


Figure 2 - Controller Upper Circuit Board

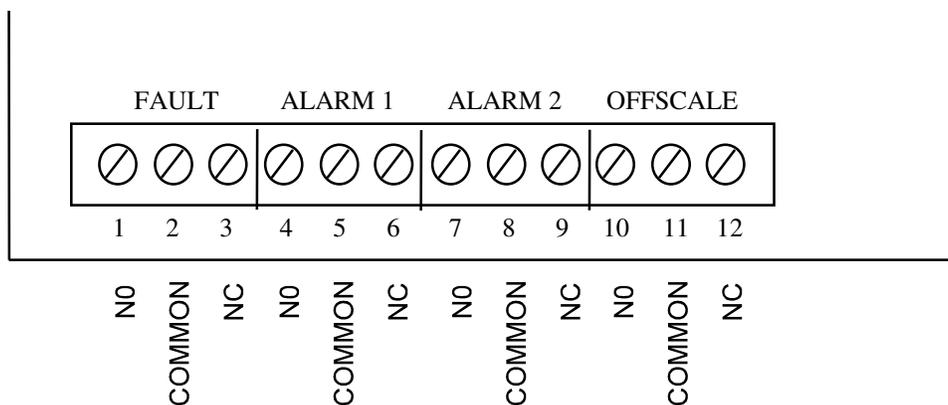


Figure 3 - Controller Lower Circuit Board

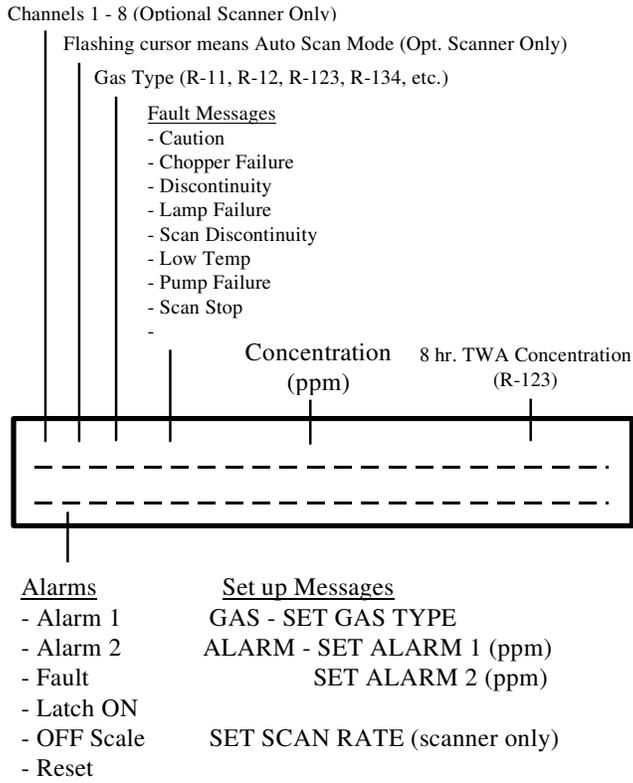


Figure 4 - Controller LCD Display Features

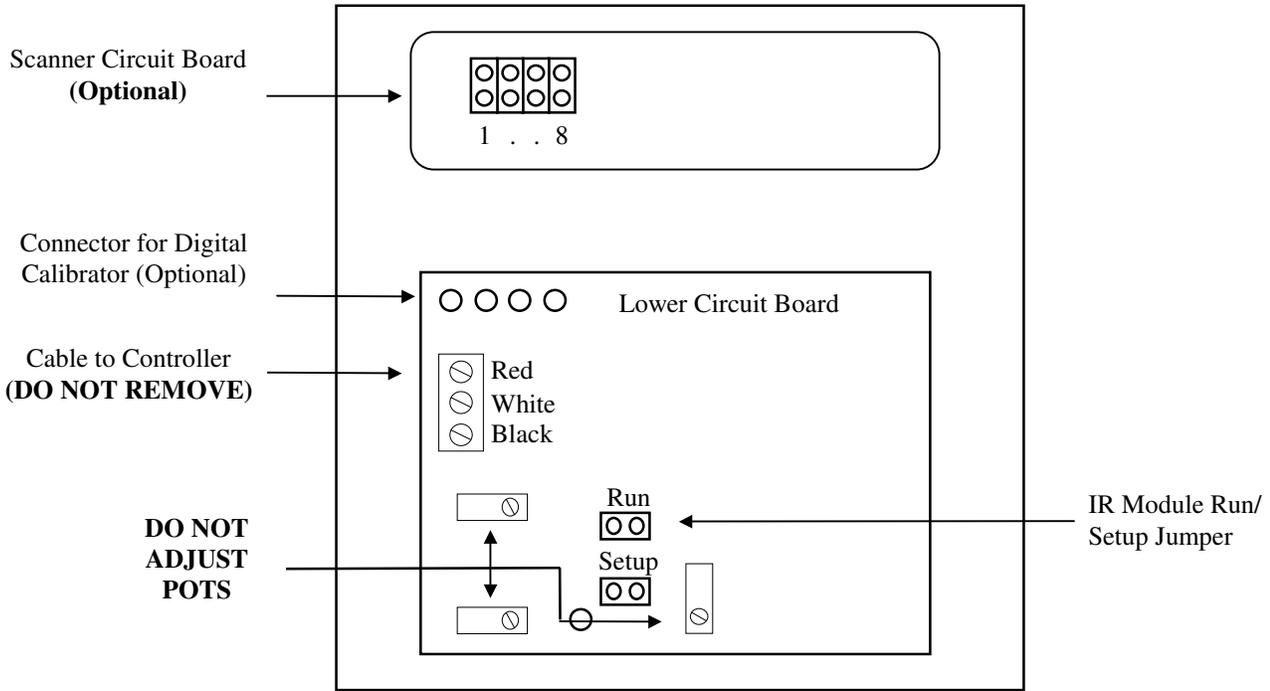


Figure 5 - IR Module Circuit Boards

INSTALLATION

1. Check power supply. (See Section “Before Installation 3a”)
2. Disconnect power before beginning.
3. Installation of Haloguard[®] Controller and IR Sensor Module
 - a. To mount Haloguard[®] Controller
 1. Remove Plastic cover.
 2. Install No. 8 x 1” screw (minimum) wall fastener through cover screw holes.
 3. Replace cover.

Refer to figures 2, 3, 4 and 5 before proceeding.

- b. To mount Haloguard[®] IR Sensor Module
 1. Mount IR Module in a **VERTICAL** position in a location not subject to vibration or extreme temperature or humidity fluctuation. Install sample tube to 18-24” above floor, install filter.
 2. IR Module Inlet/Exhaust Extension (optional) sample tube may be extended up to 200FT with 0.125” OD x 0.093” ID nylon, copper or stainless steel tubing. When extending sample tubing:
 - a. Keep sample lines as short as possible and free of kinks.
 - b. 30 micron Inlet Filter should be attached at end of line.
 - c. Exhaust to atmosphere. **DO NOT** install any device which might restrict the flow.
- c. Wiring Instructions:
 1. Remove cover and face plate from Haloguard[®] Controller and IR Sensor Module using screw driver.
 2. Run cable from Haloguard[®] Controller to IR Sensor Module location. Eight feet (8FT.) of cable with DIN connectors standard; optional extension cables are available (**Follow instruction in Section 4, Page 9, when extension cables are used**).
 3. Relay Terminals - Connect alarm relays (**NO or NC**) (Figure 3 - Controller Lower Circuit Board) as required.

| |
|---|
| **WARNING** analog output is a driven signal, do not connect any wire with voltage or current to analog output terminals |
|---|

4. Analog Output (Optional) - Connect 18 ga. twisted shielded pair to Controller Upper Circuit Board (Figure 2) as follows:

| Analog Output Range | Terminal Position |
|---------------------|-------------------|
| 0-5VDC or 0-10VDC | VDC and COM |
| 4 - 20mA | mA and COM |

Figure 7 - Analog Jumper and Terminal Settings

5. Uninterruptable Power Supply (Optional) - Connect Haloguard[®] Controller and IR module to UPS, IR module must be within 10ft. of controller.
- d. On power-up, **RESET** and 20 minute count down will appear on LCD. For 20 minutes after power up all alarms and relays are automatically disabled. Whenever power is disrupted, **RESET** mode will be automatic (unless optional UPS is supplied) to protect against false alarms. Allow 1 hour for warm-up from cold start.

- e. Locate Setup jumpers on Figure 2 - Controller Upper Circuit Board. Select required settings from the following:

| JP | FUNCTION |
|--------------|--|
| RUN | Select run for normal operation |
| GAS | Set Gas Type |
| ALARM | Alarm 1 and Alarm 2 Set Point Adjustment |
| ZERO | Factory Use Only |
| SPAN | Factory Use Only |
| J5 | Factory Use Only |
| AUD | Audible Alarm Disable |

Figure 8 - Function Jumper Settings

1. **RUN** - Remove jumper to initiate **Set-Up** Mode. Use jumper to initiate the following set-up modes. Replace jumper when finished.
 2. **GAS** - Gas type will be pre-set at the factory (See Figure 9).
 3. **Alarm** - Alarm levels will be pre-set at the factory. Scroll through menu to set up Alarm 1 and Alarm 2. Adjust alarm levels using UP/DOWN and ENTER push-buttons.
 4. **ZERO** - Factory only.
 5. **SPAN** - Factory only.
 6. **AUD** - Local Audible Alarm (optional) is factory installed. To disable alarm remove “AUD” jumper.
- f. System Configuration:
1. Relay Setup - Factory setting is Unlatched Mode; e.g., the alarm LEDs and relays will return to a normal status when gas concentration goes below alarm setpoint. To select Latched Mode place jumper on **ALARM** setting (Figure 8). Press TEST button until “LATCH ON” appears on the LCD Display. (LATCH ON mode requires manual RESET of all alarms.)
 2. Analog Output (optional) is factory set at 0 - 5 VDC or 4 - 20mA as ordered. Use Analog trim pot(Figure 2) to adjust for up to 0-10VDC range
 3. LCD display adjustment changes brightness - Adjust potentiometer (Figure 2).
 4. Four or Eight Point Scanner - (Optional) Scanner is factory installed. Scanner automatically sequences through each port (1 -4 or 1-8).
 - A. Manual Scan - While in RUN Mode,
 1. Press UP or DOWN button on controller. Each time the button is pressed, display will advance to next/previous sample point. Controller will return to automatic sequencing within 2 minutes.

When changing set-up on scanner, turn power off before proceeding.

- B. Scanner Jumper Setup - Factory setting is for four (4)or eight (8) sample ports. If 1,2,3,5,6 or 7 sample ports are required, place jumper on corresponding positions located on Scanner Circuit Board(s) in **IR Module** (Figure 5). IR Module Scanner will sequence through the selected port settings.
 5. Scan Rate - Scan rate is factory set at 4 seconds per point. Rate is adjustable from 0 to 10 seconds. To change scan display rate, from RUN mode at controller, press ENTER and then UP/DOWN to adjust. Press ENTER to return to RUN mode.

4. Installation of Haloguard[®] Controller and IR Sensor Module (**Extended Cable Procedure**)

Refer to FIGURE 2 - Controller Upper Circuit Board before proceeding.

DO NOT CUT SUPPLIED CABLE

Maximum Extension wire 1000 Feet.

- a. Controller is provided with 18” cable with DIN Connector and sensor is provided with 6-1/2’ cable. If cable extension is provided by customer, proceed as follows:

We recommend 3 conductor 18 ga. cable with foil shield, Carol C2535 or equal. Use 3/4” conduit if required.

- b. To extend sensor beyond the provided length, remove 18” cable with DIN connector from controller Upper Circuit Board . Splice or solder extension cable to end of 18” cable. Reconnect extended sensor cable to terminal block in upper circuit board of controller.

| Terminal | Provided Wire Color | Extension Wire Color | Function |
|----------|---------------------|----------------------|----------|
| SCAN | Red | Red | Scanner |
| SIG | White | White | Signal |
| GND | Blk./Blk | Black | Ground |

Note - SCAN Terminal is used with scanner Only.

Figure 6 - Sensor Cable Terminal Connection

To avoid nuisance alarms remove alarm jumper “AUD” before beginning.

- c. To compensate for line losses adjust signal voltage with a digital VOM as follows:
1. Open cover on Haloguard[®] IR Module. Move Jumper from RUN to SETUP (See Figure 5).
Wait approximately 1 minute before proceeding .
 2. Open cover on Haloguard[®] IR Controller and remove faceplate.
 3. With VOM on 5 VDC scale, place VOM probe on SIG (+) and GND (-) Test points on Controller (see Figure 2).

Adjust potentiometer “T” on Controller Upper Circuit Board, with screwdriver until it reads 4.975 +/-0.025 VDC.

Display will show FAULT if out of range and SETUP , if trimmed to 4.975+/-0.025 VDC.

4. When done, replace IR Module jumper in RUN mode.
5. Replace AUD jumper to activate alarms circuit.

CALIBRATION

Haloguard IR monitors are factory calibrated to the gas of interest; field recalibration is not required for operation in typical machine room environments during the first twelve months of operation unless drift exceeds more than 5ppm in a 30 day period.

For those who wish to check the factory calibration an optional Digital Calibrator and Span Gas Kit is available. Instructions for use are included with kit

TESTING

The Haloguard IR™ should be tested at start-up, after any changes to alarm protocol, and after each alarm level condition has been corrected. During Testing, display will indicate TEST MODE

- a. Alarm Test - Push TEST button five times to check all alarm levels sequentially. Alarm relays, lights, audible and remote alarms (if equipped) will activate.
- b. Reset Test - Push RESET/SILENCE button; alarm relays, audible and remote alarms (if equipped) will become inactive for 20 minutes. Display will read RESET and indicate minutes to completion of reset period.

TROUBLESHOOTING

The most frequent cause of nuisance alarms and faults is improper set-up, primarily due to:

- a. Failure to install in accordance with instructions.
- b. Not allowing sufficient warm-up time.
- c. Poor sensor location.

To check Zero Calibration, fill a clean plastic trash bag with clean outside air, tie off with twist-tie, let sample stabilize inside for 15 - 20 minutes. Insert sample tube into bag. For models equipped with scanner allow up to 2.5 minutes per channel for clean air sample analysis

Observe LCD response, if displayed PPM value drops lower then Haloguard IR is detecting the presence of the gas of interest or another gas which absorbs IR light at the same frequency.

Remove sample tube from bag and observe LCD response. If displayed PPM value moves higher, look for refrigerant leaks or possible sources of interfering gases (See "Before Installation" section 3e). and relocate sensor. Keep in mind that the Haloguard IR is much more sensitive than hand held leak detectors, it may detect a leak when hand held units show no response

We wish to aid with any problems you might experience with the Haloguard IR®. When contacting Thermal Gas Systems, Inc. Service Department, please have the following information ready

1. Model Number and Serial Number.
2. Description of problem.
3. Remove faceplate. Place jumper on Alarm setting function. and record settings.
4. Measure voltage between SIG and GND.(Fig. 2) in SETUP and RUN modes Write down values
5. Advise the condition of all LED's and all information displayed on the LCD.

SPECIFICATIONS

Technology: Photoacoustic Infrared

Electrical Supply: 115-230 VAC, 50-60Hz

Output Signal: Std. 4 x 3A Dry Contact Relays (either NO or NC)

Analog Output: Opt. 0 - 5 VDC or 4 - 20mA

Alarm Outputs: Three Level Contact Closure

Readout: Digital Meter, Displayed in PPM Gas Type, Range and Options

Display accuracy: 1ppm 0 - 100 ppm Range
10ppm 100 - 1000 ppm Range

Ranges: 0 - 1000 ppm R-11,R- 12, R-22, R123, R-134a,

Response Time: < 1 Minute single point
< 2.5 Minutes per point with optional scanner.

Operating Conditions:
IR Module +40°F to +110°F Non-condensing
Controller 0°F to +120°F Non-condensing

Fault Diagnostics: Indicator Light or LCD Readout for fault diagnostics See Figure 5)

Materials:
IR Module NEMA 4/12/13 IP 65 Design
Controller NEMA 4/12/13, IP65 Design

Weight:
IR Module 10 lbs.
Controller: 4 lbs

Dimensions:
IR Module 6-1/2" W x 14-1/4" H x 4" D
Controller 5- 1/2" W x 9" H x 4"D

Initial factory settings are:

| Function | Setting |
|------------------------|---------|
| Gas | |
| Alarm 1 | |
| Alarm 2 | |
| Full Scale PPM | |
| TWA Alarm Level | |

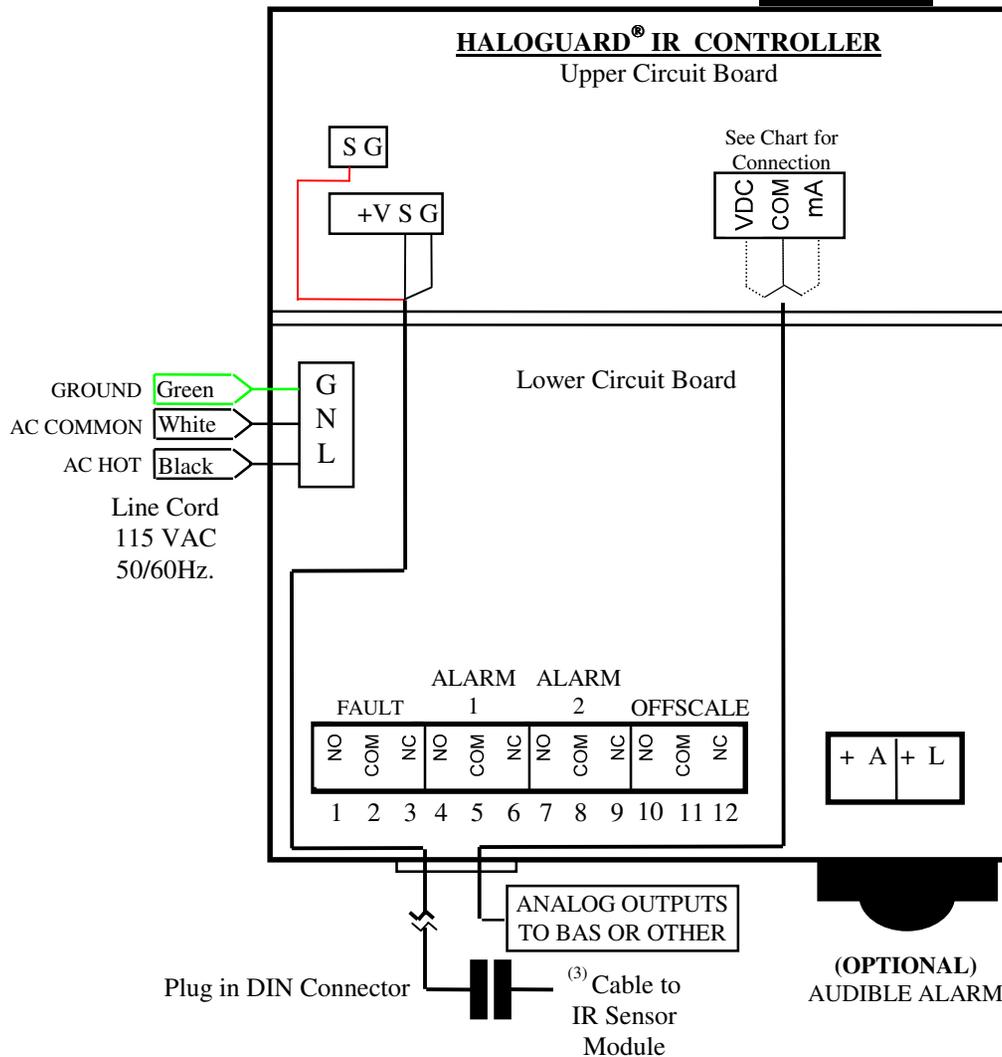
Figure 9 - Initial Factory Settings

| GAS | TLV-TWA* | CEIL | PEL |
|--------|----------|------|------|
| R-11 | • | 1000 | • |
| R-12 | 1000 | • | 1000 |
| R-22 | 1000 | • | 1000 |
| R-123 | 50 | • | • |
| R-134a | 1000 | • | 1000 |
| | | • | |
| | | • | • |

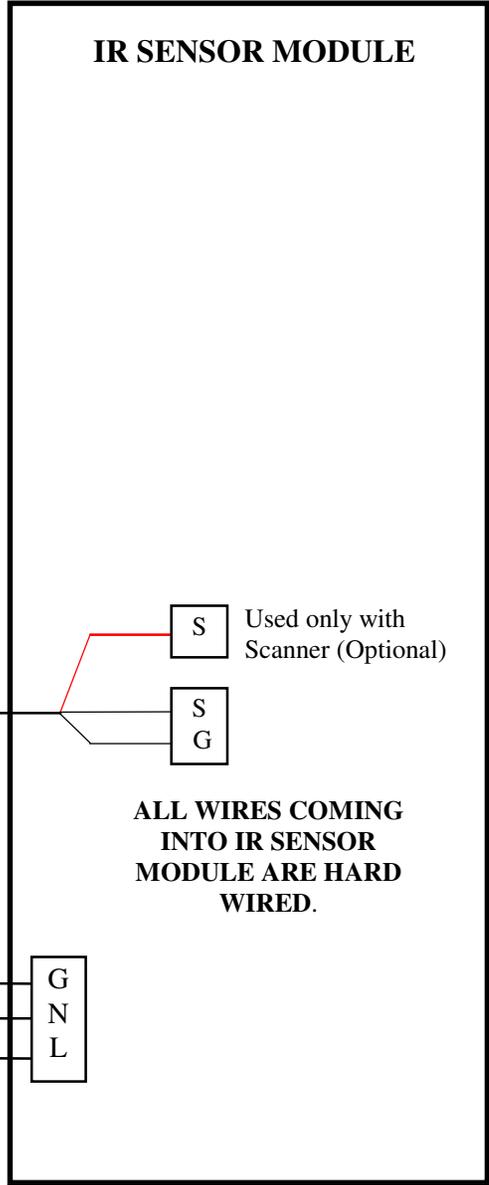
Other exposure limits are pending.
TLV-TWA = 8hr./day, 40hr./wk. avg. Short term exposures should not exceed 3 - 5 times the TWA for more than 30 min./day.
* ACGIH Trademark.

Figure 10 - Exposure Limits

(OPTIONAL)
STROBE LIGHT



WARNING
Analog output lines
must not be connected
to any kind of voltage
or current source,
serious damage will
result.



Cable Color Code
White - S Signal
Black - G Ground
Red - Scan Scanner(Only)

- Notes:
1. Power Cord - Provided w/ wall plug connector and 8 Ft. 3 conductor wire.
 2. Audible and Visual Alarm (Optional) factory wired. Remote Audible and Visual Alarms must be 120VAC and connected to terminal Strip on Lower Circuit Board.
 3. Sensor Cable between Haloguard® IR Controller and IR Sensor Module - Maximum Length 1000FT. Use, 3 conductor 18 or 20ga. w/ foil shield.
 4. Analog Outputs (Optional) are either 0 - 5 to 10VDC, and 4 - 20mA.
 5. If Optional scanner is installed, Red wire is connected to scanner terminal on upper circuit board.

Figure 11 - Wiring Diagram