

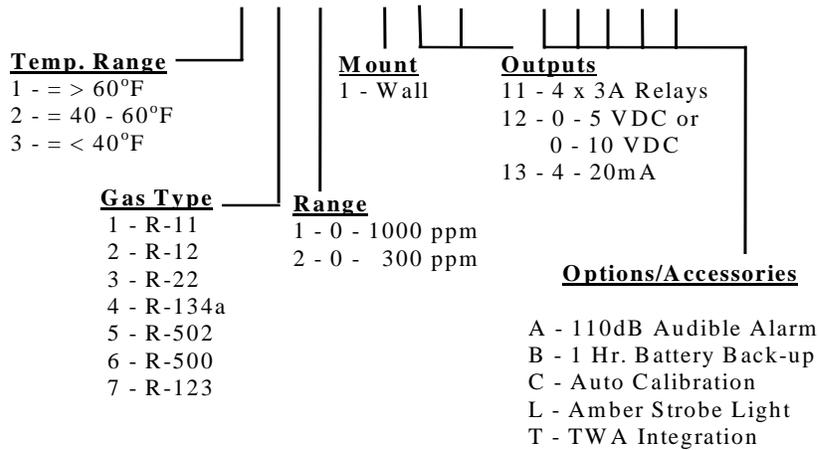
HALOGUARD™ MONITOR

INSTRUCTION MANUAL



SERIAL NO. _____

MODEL NO. _____ - _____ + _____



L - Strobe Light

THERMAL GAS *Systems* inc.

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IMPORTANT
READ ENTIRE BOOKLET BEFORE
INSTALLING OR OPERATING
HALOGUARD™ MONITOR

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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 sensor 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. (4) No. 8 x 1" Screw (minimum)
 - d. Digital VOM
3. Select the site for the measurement:
 - a. Power requirements: Provide a clean source of 115-230 VAC, 50/60 Hz, single phase circuit rated 15A minimum.
 - b. Sensor should be mounted near potential leaks in a quiet area or downstream from leak source in area with air movement.
 - c. Sensor should be mounted 18" - 24" above the floor for halocarbons. Maximum extended sensor cable length is 300 Ft.
 - 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).

IMPORTANT

SENSOR ELEMENT CAN BE DESTROYED BY IMMERSION IN LIQUIDS OR EXPOSURE TO SILICONE. COVER SENSOR WITH A PLASTIC BAG WHEN SILICONE VAPORS ARE PRESENT IN MONITORED AREA. IMMERSION OR SILICONE EXPOSURE INVALIDATES SENSOR LIFE WARRANTY.

- e. Sensors will respond to presence of alcohol, hydrogen, carbon monoxide, paint thinner, and many toxic and combustible gases. For accurate refrigerant leak detection select a location free from above fumes or temporarily disable sensor as above when they are present.
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. Selectors, LCD/LED Displays, and Relays

- a. **POWER LED**- Green LED indicates Haloguard® is receiving AC power. LED turns Yellow when on (optional) Battery Back-up power.
- b. **FAULT Alarm LED and Relay** - Indicates out of calibration or sensor failure. LCD indicates specific type of failure (See Figure 4).
- c. **TEST Push-button** - Energizes lights & relays. Depress button five (5) times to sequence through each alarm type.
- d. **Alarm LED** - Alarm 1/Alarm 2 LEDs and Relays - Factory set for specific refrigerant (See Figure 9 for set-up). User adjustable as follows:

RANGE	1 PPM INCREMENTS	10 PPM INCREMENTS
0 - 300 ppm	30 -100	100 - 300
0 - 1000 ppm	100 - 300	300 - 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 Alarm LED and Relay** - Factory set at a value 2 - 3 times the full scale (See Figure 9).
 - f. **RESET Push-button** - Silences alarms, 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 battery back-up is provided.).
- 6. Optional Features:**
- a. **AutoCalibration** - Haloguard® compares Temperature and RH every 4 hours to compensate for changes in ambient conditions.
 - b. **TWA Integration** - Haloguard® calculates an 8 hr. Time Weighted Average (TLV-TWA), displays this value on LCD, activates Alarm 1 LED and relay if preprogrammed PPM value is exceeded. **(Must be powered up for 8 hrs. to build data base before operating).** Alarm 1 is pre-programmed to the TLV-TWA for specified gas.

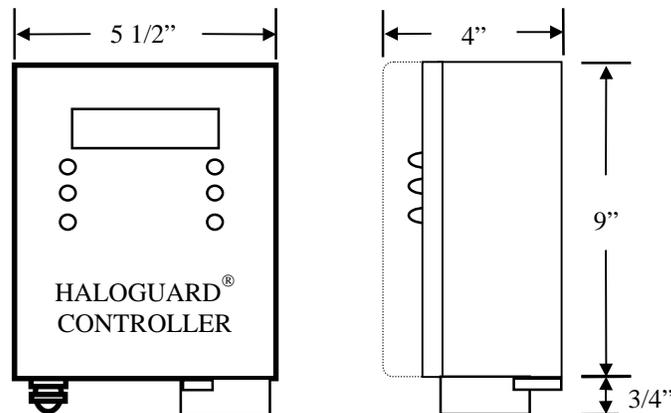


Figure 1 - Dimensional Drawing

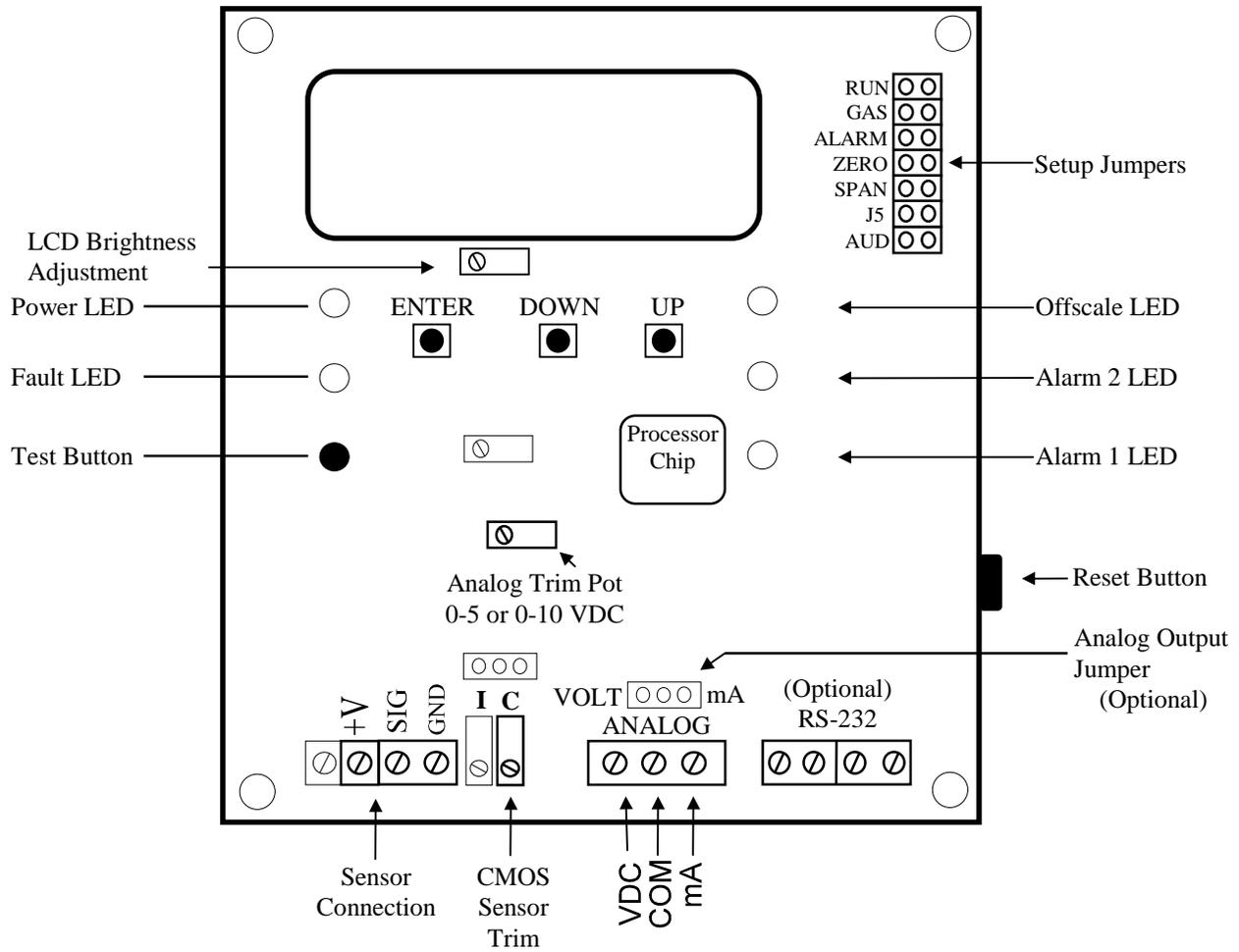


Figure 2 - Controller Upper Circuit Board

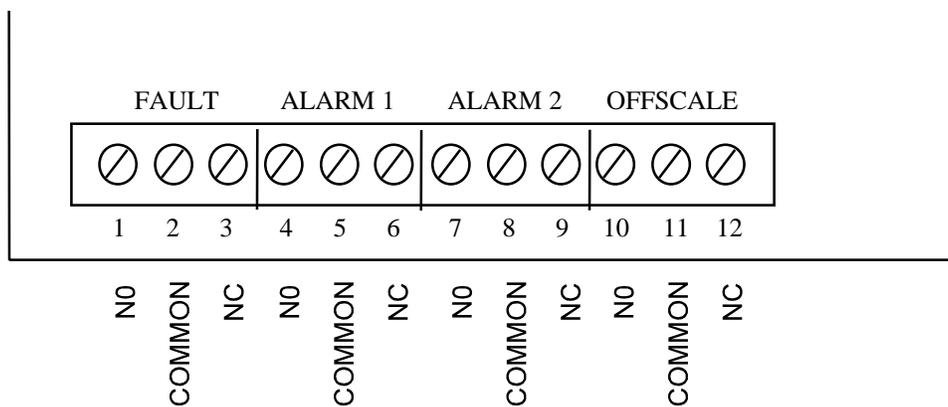


Figure 3 - Controller Lower Circuit Board

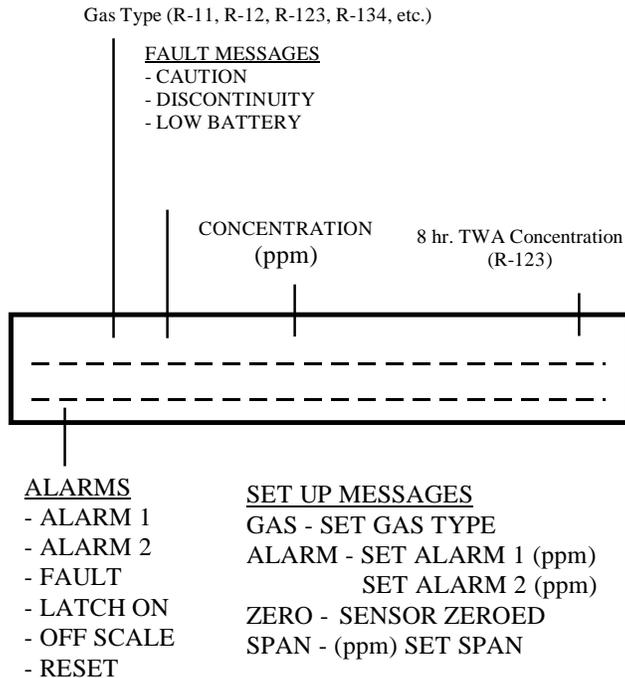


Figure 4 - Controller LCD Display Features

INSTALLATION

1. Check power supply. (See Section “Before Installation 3a”)
2. Disconnect power before beginning.
3. Installation of Haloguard® Controller (**Standard Factory Settings. See Section 4, Page 8, if extension cable is required.**):
 - a. To mount Haloguard® Controller
 1. Remove Plastic cover.
 2. Install No. 8 x 1” screw (minimum) wall fastener through cover screw holes.

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

- b. Wiring Instructions:
 1. Remove face plate from Haloguard® Controller using screw driver.
 2. Attach Sensor cable to Haloguard® Controller. Eight feet (8FT.) of cable with DIN connectors standard; optional extension cables are available (**Follow instruction in Section 4, Page 8, 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) - Factory installed. Connect 18 ga. twisted shielded pair to Controller Upper Circuit Board (See Figure 2), as follows:

Analog Output Range	Wire Terminations	
0-5VDC or 0-10VDC	VDC (+)	COM (-)
4 - 20mA	mA (+)	COM (-)

Figure 5 - Analog Jumper and Terminal Settings

5. **Battery Back-Up** (Optional) - Connect battery to Molex connector located at Haloguard[®] Controller.
6. **Stroke Light** (Optional)) - Connect battery to Molex connector located at Haloguard[®] Controller.
- c. For 20 minutes after initial power up all alarm relays and alarm are automatically disabled. During initial power-up, **RESET** and 20 minute count down will appear **on LCD**. Whenever power is disrupted, **RESET MODE** will be automatic (unless battery back-up is supplied) to protect against false alarms.
- d. 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 Set - For Internal Use Only
SPAN	Factory Set - For Internal Use Only
J5	For Internal Use Only
AUD	Audible Alarm Disable

Figure 6 - 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). If refrigerant type has changed, follow menu to scroll to correct settings.
 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 set. Follow instruction under Zero Calibration.
 5. **SPAN** - Factory set.
 6. **AUD** - Audible Alarm (optional) is factory installed to activate internal audible alarm circuit. To disable alarm remove "AUD" jumper.
- e. System Set-up:
1. **Relay Setup** - Factory setting is Unlatched Mode; 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 JP** setting. 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 - 5VDC, 0 - 10VDC or 4 - 20mA as ordered. To connect to BAS/EMS System, make sure that system is configured to receive the type analog output ordered. To test analog output:
 - a. With VOM set on proper scale (mA or VDC), connect VOM to mAor VDC and COM terminal as required (See Figure 5).
 - b. Press TEST button once VOM value should indicate ZERO value in table below. Press TEST button again, VOM should indicate OFFSCALE value in table below.

	PPM	0-5 VDC	0-10 VDC	**4-20mA
Zero	0	0	0	0
Span	Full Scale*	4.5 V	9 V	18 mA
Offscale		5.0 V	10 V	20 mA

* See Initial Factory Settings Figure 9 for Full Scale Settings.
 ** Factory Set. Not adjustable.

Figure 7 - Analog Output Linear Scale Settings

- c. If VOM for VDC setting **only** does not indicate values above, adjust Analog Trim Pot (Refer to Figure 2) to reflect the Offscale Value for corresponding Analog Output.
- 3. **LCD display adjustment** changes brightness - Factory set. If necessary, adjust potentiometer (See Figure 2- Controller Upper Circuit Board).
- 4. Installation of Haloguard[®] Controller and **(Extended Cable Procedure)**

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

DO NOT CUT SUPPLIED CABLE
Maximum Extension wire 300 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 C0455 or equal. Use 3/4” conduit if required.

- b. To extend sensor beyond the provided length, remove 18” cable with DIN connector from controller Lower 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
+V	Red	Red	7.5 VDC
SIG	White	White	Signal
GND	Blk./Blk	Black	Ground

Figure 8 - Sensor Cable Terminal Connection

Remove Alarm Jumper “AUD” before beginning calibration.

- c. Calibrate with a digital VOM as follows:

(Unit must be operating for at least twenty-four (24) hours before calibration.)

- 1. Open cover on the **Haloguard[®] Controller** and remove faceplate.
- 2. With VOM on 5 VDC scale, place VOM probe on SIG (+) and GND (-) Test points on Controller (see Figure 2 Controller Upper Circuit Board).

Adjust “C” potentiometer on Controller Upper Circuit Board, with screwdriver until it reads 1.000 VDC.

- 3. Replace AUD jumper to activate alarms circuit.

Remove Alarm Jumper “AUD” before beginning calibration.

ZERO CALIBRATION

ROOM AIR MUST BE CLEAN OF GAS OR OTHER CONTAMINANTS.

1. Remove jumper from RUN jumper and place on ZERO jumper.
2. Place sensor in clean air source (clean ambient air or Zero gas) for two minutes then follow procedures on display.
3. When complete remove jumper on **Haloguard® Controller** from ZERO and replace on RUN.
4. Replace AUD jumper to activate alarms circuit.

SPAN CALIBRATION

Span calibration is factory set. Span calibration is **not required** for operation in typical machine room environments. Instructions for span gas calibration are furnished with calibration kit.

TESTING

The Haloguard™ should be tested periodically and 30 minutes after each alarm level condition has been corrected.

- a. **Alarm Test** - Push TEST button five times to check; alarm relays, lights, audible and remote alarms (if equipped) will activate.
- b. **Reset Test** - Push RESET 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.

TROUBLESHOOTING

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

- a. Too short a warm-up time.
- b. Poor sensor location.
- c. Failure to follow SET-UP procedures properly.
- d. Sensor cable is not wired and/or trimmed properly when extended beyond factory supplied length.

To periodically 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 and insert sensor into bag.

Follow Zero procedures under “Calibration” Section. Remove sensor from bag and observe LCD response.

If PPM then moves higher, look for possible sources of interfering gases (See “Before Installation” section 3e). and relocate sensor.

We wish to aid with any problems you might experience with the Haloguard® line of products. When contacting Thermal Gas Systems, Inc. Service Department, your assistance is requested to provided the following information.

1. Model Number and Serial Number.
2. Description of problem.
3. Remove faceplate from Controller (Figures 2 and 3) . Place jumper on Alarm setting. Scroll through menu by depressing ENTER push-button, and record settings.
4. Using (Figure 2 - Controller Lower Circuit Board) as a guide, measure voltage between SIG and GND. Write down values.
5. Advise the condition of all LED’s and any information displayed on the LCD.
6. Place Jumper on J5 - Record Code Version Number and Sensor Type.

SPECIFICATIONS

Technology: CMOS (Ceramic Metal Oxide Semiconductor)

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, 0-10 VDC or 4-20mA

Alarm Outputs: Three Level Contact Closure

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

Accuracy: 10% Full Scale

Ranges: 0 - 1000 ppm R-11,R- 12, R-22, R-134a, R-500, R-502
0 - 300 ppm R-22, R-123, R-134a

Response Time: < 1 Minute

Recovery Time: < 3 Minutes

Operating Conditions:
CMOS Sensor -20°F to +120°F Non-condensing
Controller 0°F to +120°F Non-condensing

Fault Diagnostics: Indicator Light or Readout for Malfunction which include: (See Figure 4)

Materials:
Controller Polystyrene, NEMA 12/13, IP65 Design
Sensor PVC and porous PP

Weight:
Controller: 5 lbs. (Add 2 lbs. optional battery)

Dimensions:
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

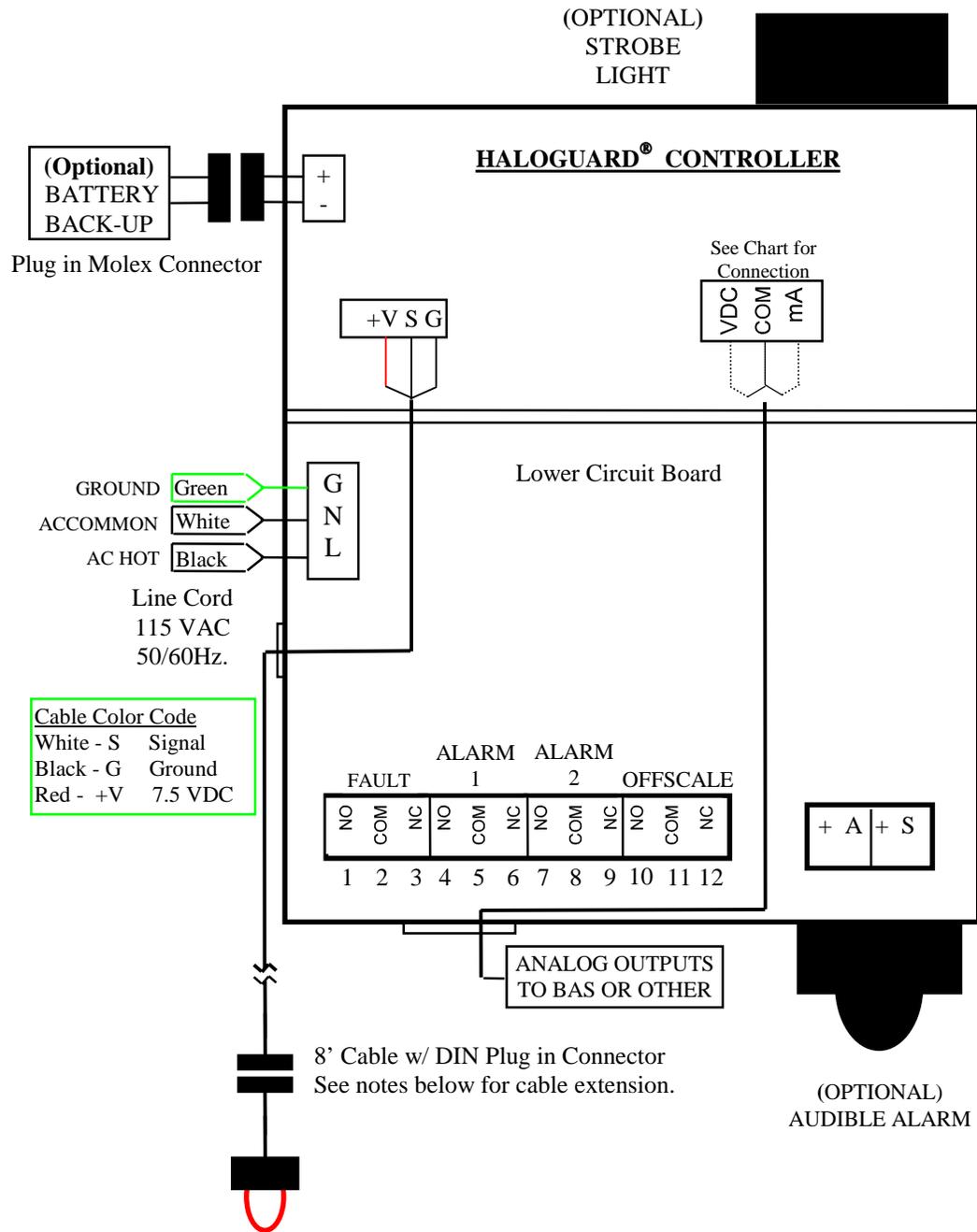
GAS	TLV-TWA*	CEIL	PEL
R-11	•	1000	•
R-12	1000	•	1000
R-22	1000	•	1000
R-123	30	•	•
R-134a	1000	•	1000
R-500	1000	•	1000
R-502	1000	•	•

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

GLOSSARY

1. **AEL** - Allowable Exposure Limits - The employee's average airborne exposure in any 8-hr work shift of a 40 hr. work week, which shall not be exceeded. (Recommended by refrigerant manufacturer).
2. **CMOS** - Ceramic Metal Oxide Semiconductor
3. **CONTROLLER** - Processor mounted on wall which includes LCD Display, LED Alarms Relays, and other functions
4. **SPAN** - A full-scale reading on the LCD display.
5. **SPANNING** - The process of placing a full-scale reading on the LCD display.
6. **SPAN GAS** - The gas concentration that gives the instrument a full scale value. Used for calibration standard.
7. **TLV** - ACGIAH Threshold limit value.
8. **TWA** - Time weighted average.
9. **TLV-TWA** - The time -weighted average concentration of a refrigerant or other chemical in air for a normal 8 hr. workday and a 40 hr. workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effects.
10. **ZERO** - An indication on the display indicating the presence or non-presence of CFC's, HCFC's or HFC's.
11. **ZEROING** - The process of placing a zero indication on the LCD display.



WARNING

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

- 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® Controller and CMOS Sensor - Maximum Length 300FT. Use 3 conductor 18 or 20ga. w/ foil shield.
 4. Analog Outputs (Optional) are either 0 - 5VDC, 0 - 10VDC, or 4 - 20mA.

Figure 11 - Wiring Diagram