Gas Monitor Remote Display

Instruction Manual

⚠ WARNING

THIS MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR USING OR SERVICING THE PRODUCT. Like any piece of complex equipment, this instrument will perform as designed only if it is used and serviced in accordance with the manufacturer's instructions. OTHERWISE, IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE PERSONAL INJURY OR DEATH.

The warranties made by Mine Safety Appliances Company with respect to the product are voided if the product is not used and serviced in accordance with the instructions in this manual. Please protect yourself and others by following them. We encourage our customers to write or call regarding this equipment prior to use or for any additional information relative to use or repairs.

IN NORTH AMERICA: 1-800-MSA-INST. or FAX (724) 776-9783
IN CANADA: 1-800-267-0672 or FAX (416) 663-5908
MSA INTERNATIONAL (412) 967-3354 or FAX (412) 967-3373

This manual is available on the internet at www.msanet.com

Manufactured by

MSA NORTH AMERICA

P.O. Box 427, Pittsburgh, Pennsylvania 15230

(L) Rev 1 **10098052**

MSA Permanent Instrument Warranty

1. **Warranty-** Seller warrants that this product will be free from mechanical defect or faulty workmanship for a period of two years from date of shipment, provided it is maintained and used in accordance with Seller's instructions and/or recommendations. This warranty does not apply to expendable or consumable parts whose normal life expectancy is less than one (1) year such as, but not limited to, non-rechargeable batteries, filament units, filter, lamps, fuses etc. The Seller shall be released from all obligations under this warranty in the event repairs or modifications are made by persons other than its own or authorized service personnel or if the warranty claim results from physical abuse or misuse of the product. No agent, employee or representative of the Seller has any authority to bind the Seller to any affirmation, representation or warranty concerning the goods sold under this contract. Seller makes no warranty concerning components or accessories not manufactured by the Seller, but will pass on to the Purchaser all warranties of manufacturers of such components.
   THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, AND IS STRICTLY LIMITED TO THE TERMS HEREOF. SELLER SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANT ABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.
2. **Exclusive Remedy-** It is expressly agreed that Purchaser's sole and exclusive remedy for breach of the above warranty, for any tortious conduct of Seller, or for any other cause of action, shall be the repair and/or replacement at Seller's option, of any equipment or parts thereof, which after examination by Seller is proven to be defective. Replacement equipment and/or parts will be provided at no cost to Purchaser, F.O.B. Seller's Plant. Failure of Seller to successfully repair any non-conforming product shall not cause the remedy established hereby to fail of its essential purpose.
3. **Exclusion of Consequential Damage-** Purchaser specifically understands and agrees that under no circumstances will seller be liable to purchaser for economic, special, incidental or consequential damages or losses of any kind whatsoever, including but not limited to, loss of anticipated profits and any other loss caused by reason of non-operation of the goods. This exclusion is applicable to claims for breach of warranty, tortious conduct or any other cause of action against seller.

⚠ WARNINGS

1. The Remote Display described in this manual must be installed, operated, and maintained in strict accordance with its labels, cautions, warnings, instructions, and within the limitations stated.
2. The Remote Display must not be installed in outdoor areas or in areas or locations where explosive concentrations of combustible gases or vapors might occur in the atmosphere: Class I, Group A, B, C, and D areas as defined by the NEC. Because the Remote Display is not explosion-proof, they must be located in non-hazardous areas.
3. Use only genuine MSA replacement parts when performing any maintenance procedures provided in this manual. Failure to do so may seriously impair instrument performance. Repair or alteration of the Gas Monitor Remote Display, beyond the scope of these maintenance instructions or by anyone other then an authorized MSA service person, could cause the product to fail to perform as designed, and persons who rely on this product for their safety could sustain serious personal injury or death.
4. The Remote Display must be installed, located and operated in accordance to all applicable codes. These codes include, but are not limited to, the National Fire Prevention Code and National Electric Code.
5. Protect the Remote Display from vibration and heating; otherwise, improper operation may result, which can result in personal injury or death.
6. Do not exceed the relay contact ratings listed in Chapter 1, TABLE 1-1. Otherwise, relay operation may fail, which can result in personal injury or death.

FAILURE TO FOLLOW THE ABOVE WARNINGS CAN RESULT IN SERIOUS PERSONAL INJURY OR DEATH.

Table of Contents

Chapter 1,
General Information

The Gas Monitor Remote Display unit is an information module which can communicate with the Chillgard RT, Chemgard, Chillgard LC, or Chillgard LE instruments. The Gas Monitor Remote Display can be installed remotely from the main instruments, thus enabling remote visual and audio indication, alarm silence and latched alarm reset.

The Gas Monitor Remote Display comes in two major versions, based on the power supply in the unit:

- 24 Volt AC/DC version (P/N 10098217) used with the Chillgard LC/LE Monitor (user must confirm the Chillgard LC/LE power supply has enough capacity to power the unit) or with external 24 Volt supply.
- 110/220 VAC version (P/N 10098216) used with any Chillgard or Chemgard Monitor.

NOTE: The 12 volt supply in the Chillgard RT or Chemgard Monitors cannot be used.

Table 1-1.
Gas Monitor Remote Display General Operating Specifications

OPERATING SPECIFICATIONS	
VOLTAGE RATING	100 to 240 VAC, 50-60 Hz, 25 W 24 VDC +10% -0% 24 VAC +10%
POWER REQUIREMENTS	.15 amps at 120 VAC .10 amps at 240 VAC 0.6 amps at 24 VAC 0.1 amps at 24 VDC Minimum wire size: #18 AWG
TROUBLE RELAY	Normally energized, Form C contact: 240 VAC, 5 amp resistive SPDT
ALARM 1 RELAY	One relay, Form C contacts: 240 VAC, 5 amps resistive SPDT normally de-energized
ALARM 2 RELAY	One relay, Form C contacts: 240 VAC, 5 amps resistive SPDT normally de-energized
ALARM 3 RELAY	One relay, Form C contacts: 240 VAC, 5 amps resistive SPDT normally de-energized
AUDIO ALARM DRIVE OUTPUT	24 VDC 50-ohm load maximum
OPERATING TEMPERATURE	0 to 40°C (32 to 104°F)
STANDARD VERSION DIMENSIONS	7.5" high x 12.5" wide x 3.5" deep 19.05 cm high x 31.75 cm wide x 8.89 cm deep
STANDARD VERSION WEIGHT	3.5 pounds (1.59 kilograms)
TRANSPORT AND STORAGE CONDITIONS	
TEMPERATURE	-40 to +60°C (-40 to +140°F)
HUMIDITY	99% RH non-condensing
POLLUTION DEGREE AND INSTALLATION CATEGORY	2

Connection of the Chillgard or Chemgard Instruments Using RS-485 Communications

The Gas Monitor Remote Display acts as the Slave device in the network. The Chemgard, Chillgard LE, Chillgard RT or Chillgard LC instrument initiates and controls all communications on the network.

Single Sensor Modules with a Gas Monitor Remote Display

In a simple system using a single Chemgard, Chillgard LE, Chillgard RT or Chillgard LC module with a Remote Display, the two modules are connected together via two-wire RS-485; both units have the RS-485 terminators "IN" (FIGURE 1-1).

NOTE: The total length of the RS-485 cable cannot exceed 1000 feet (304 meters). MSA recommends Belden #9841 low-capacitance cable.

Multiple Gas Monitor Remote Displays with a Chillgard or Chemgard Instrument (Daisy Chain or Home Run Wired)

Up to two Gas Monitor Remote Displays can be home run wired to a Chemgard or Chillgard Monitor. Up to eight Gas Monitor Remote Displays can be daisy chained to a Chemgard, Chillgard LE, Chillgard RT or Chillgard LC Monitor. See FIGURE 1-2.

NOTE: The unit furthest from the monitor should have the terminator "IN".

- Modules in the middle must have terminators OUT.
- RS-485 connections in the Chillgard network must have no more than two terminations.

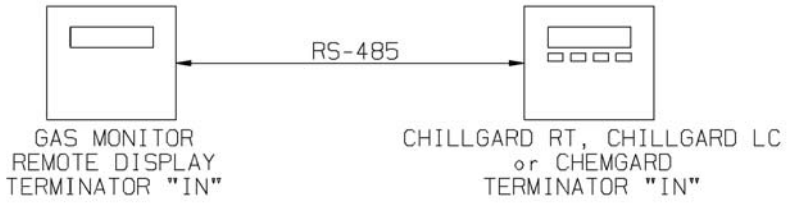

Figure 1-1. Connection of the Sensor and Remote Display Chillgard RT, Chillgard LC, Chillgard LE or Chemgard Instruments Using RS-485 Communications

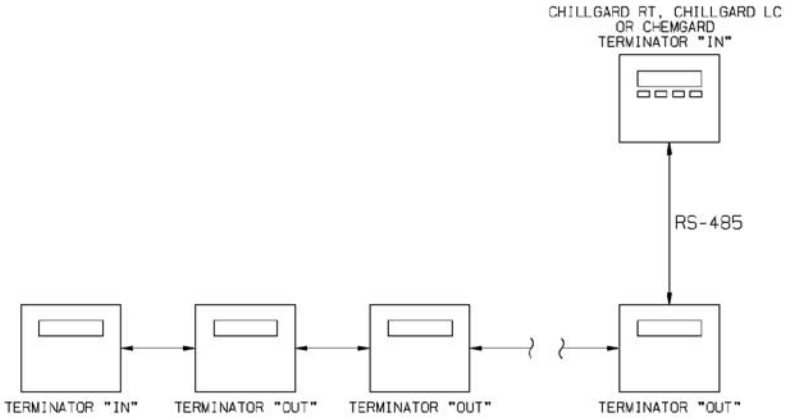

Figure 1-2. Multiple Gas Monitor Remote Displays with a Chillgard or Chemgard Monitor

Chapter 2,
Installation and Set-up

Receiving

Unpacking the System

To unpack the equipment:

1. Carefully remove the Gas Monitor Remote Display from its shipping container(s) in order to prevent damage to sensitive electrical components. If any damage is found, report it to the shipper immediately.

   ⚠ WARNING

   Do not install or operate a damaged unit. It may not function properly and may not alert you to any gas conditions.

2. Search through all packing material and containers to avoid inadvertently discarding usable or valuable parts. Report any shortages immediately to MSA.

Initial Inspection

With the front door open, carefully inspect components and assemblies inside the enclosure. If damage or shortage is evident, advise and promptly file the proper claim with the carrier.

Location of the Remote Display

⚠ WARNING

Explosion Hazard!

Unit must not be located in areas that may contain a flammable mixture of gas and air; failure to follow this requirement can result in death, serious injury, or equipment or property damage.

The Remote Display can be used to display the status of the Chemgard or Chillgard Refrigerant Monitors to a control room or as protection for an enclosed area, such as a mechanical room.

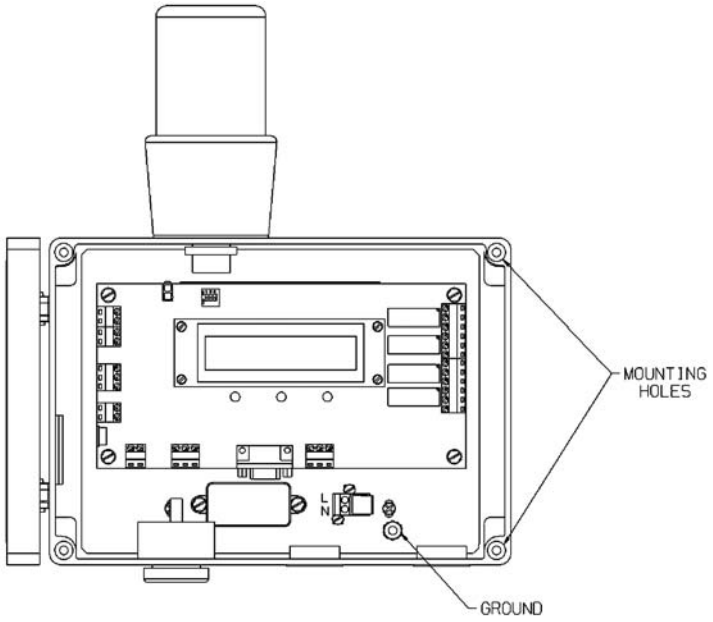

Figure 2-1. Basic Remote Display Module with Door Open

Wiring Connections

Opening the Unit

All wiring to the Gas Monitor Remote Display is made via the bottom entries. Open the unit to provide complete access to all wiring connections.

⚠ NOTICE

Monitor components must be protected from splashing, spraying, or dripping water. Failure to do so may cause damage to internal components.

Unit Power Wiring

⚠ NOTICE

Correct power voltage must be connected to the instrument. Failure to use correct voltage may result in instrument damage.

110 Volt Version

A separate, dedicated power source is recommended for the Gas Monitor Remote Display to ensure that the unit remains powered when other circuits are shut down for servicing, routine maintenance, or shift changes, the AC supply earthground is installed on the lug first and all component earthgrounds are connected afterwards.

The Remote Display uses a wide range power supply which can accept AC power from 100 to 240 volts, 50 or 60 Hz. If the 110/220 Volt power option is available, power can be supplied to terminal block as shown in FIGURES 2-2 through 2-3

24 Volt Version

If 24 Volt AC or DC is available, power can be supplied directly to the control board (FIGURE 2-2). The 24 Volt power source used with this equipment must be separated from mains by double or reinforced insulation.

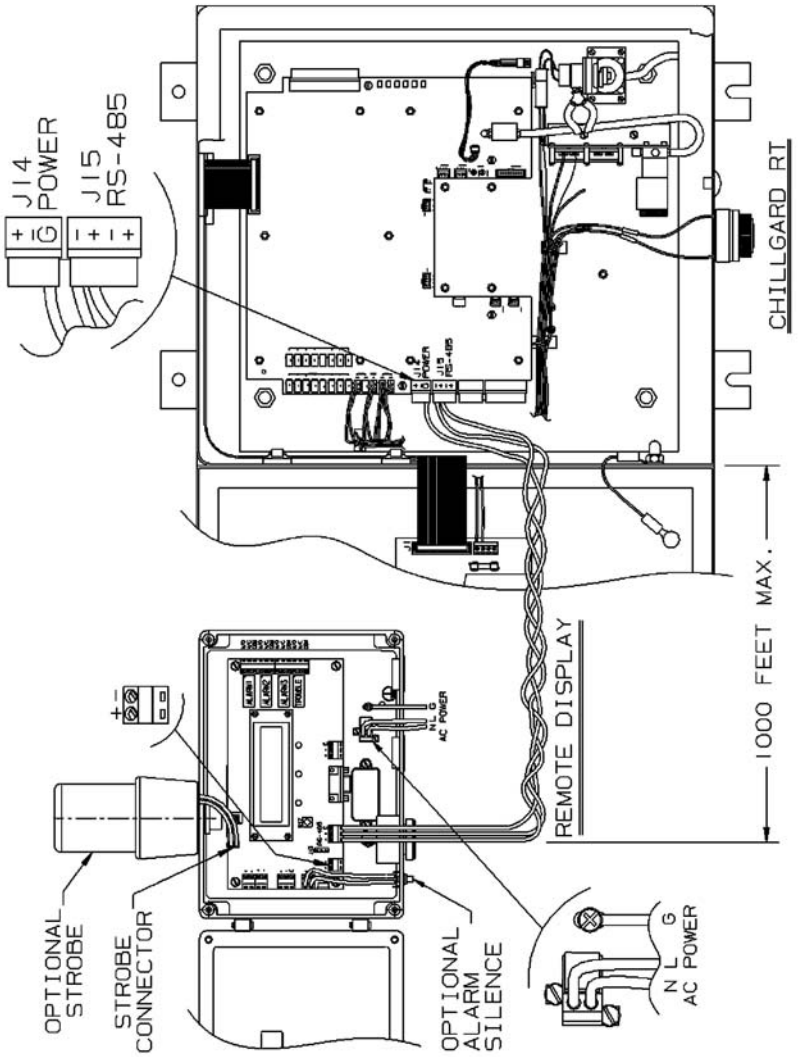

Figure 2-2. Connection to a Chillgard RT or Chemgard Monitor

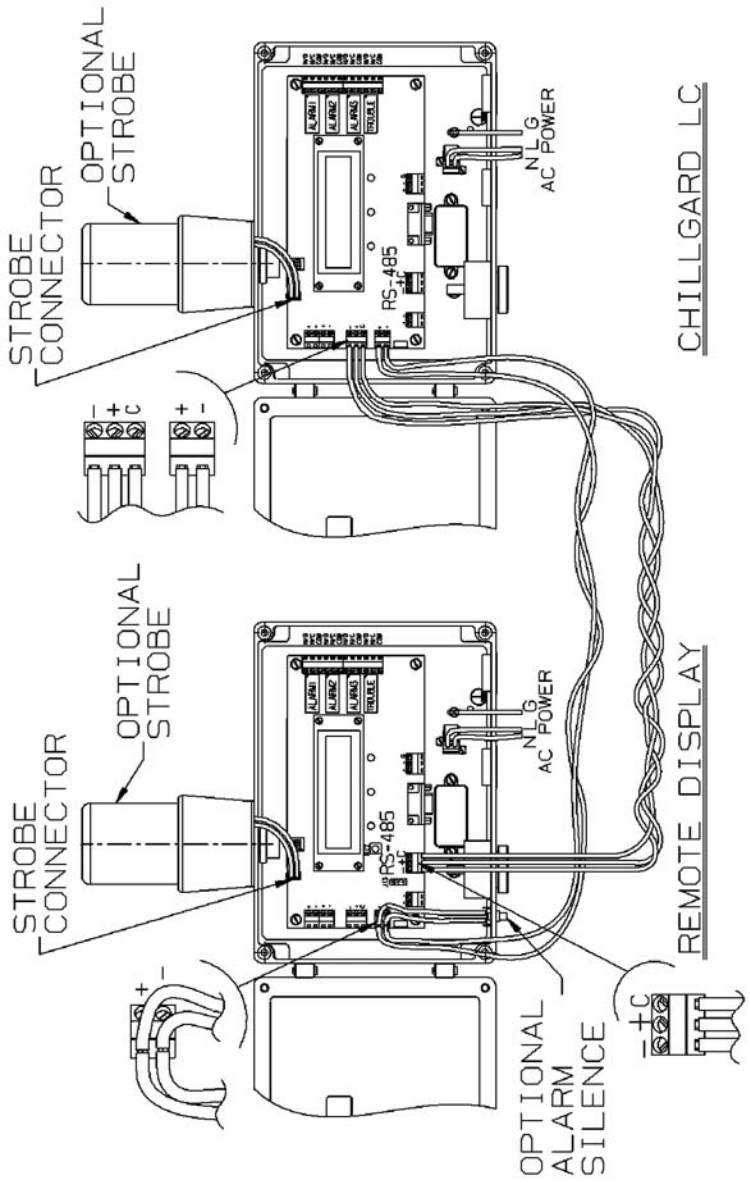

Figure 2-3. Connection to a Chillgard LE or Chillgard LC Monitor

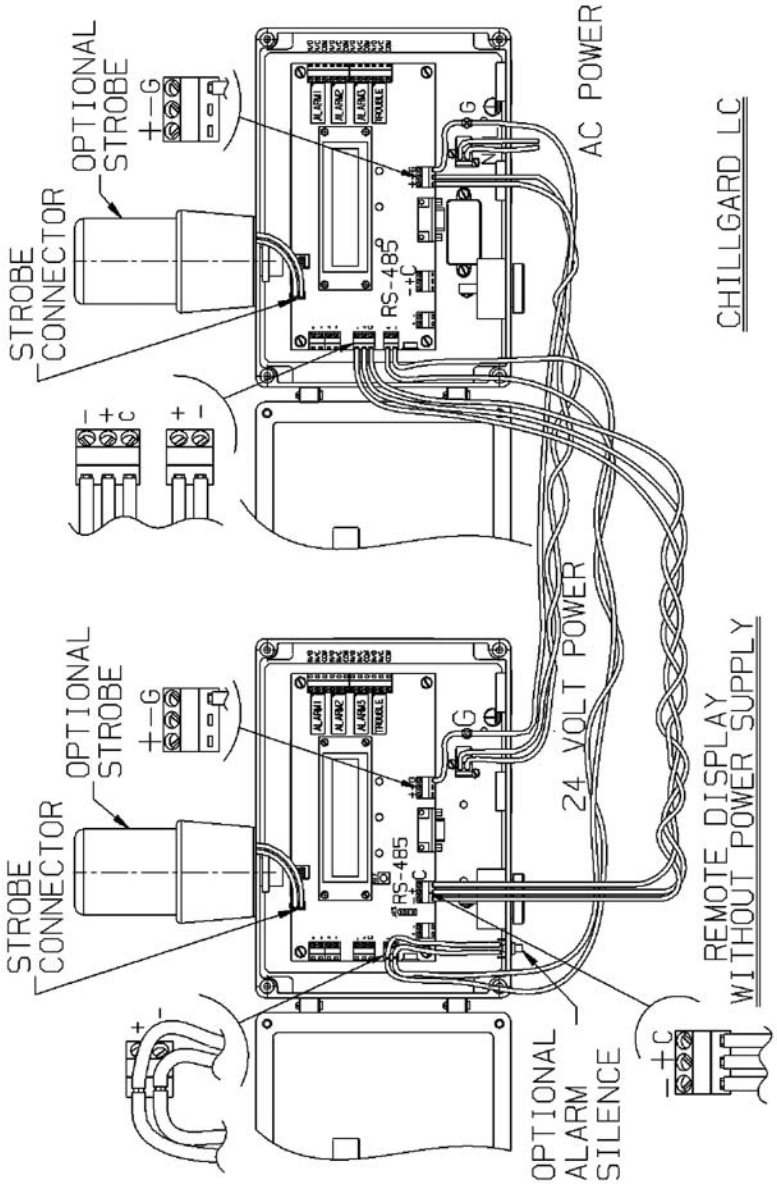

Figure 2-4. Connection to a Chillgard LE or Chillgard LC Monitor Using the Low Voltage Power Supply

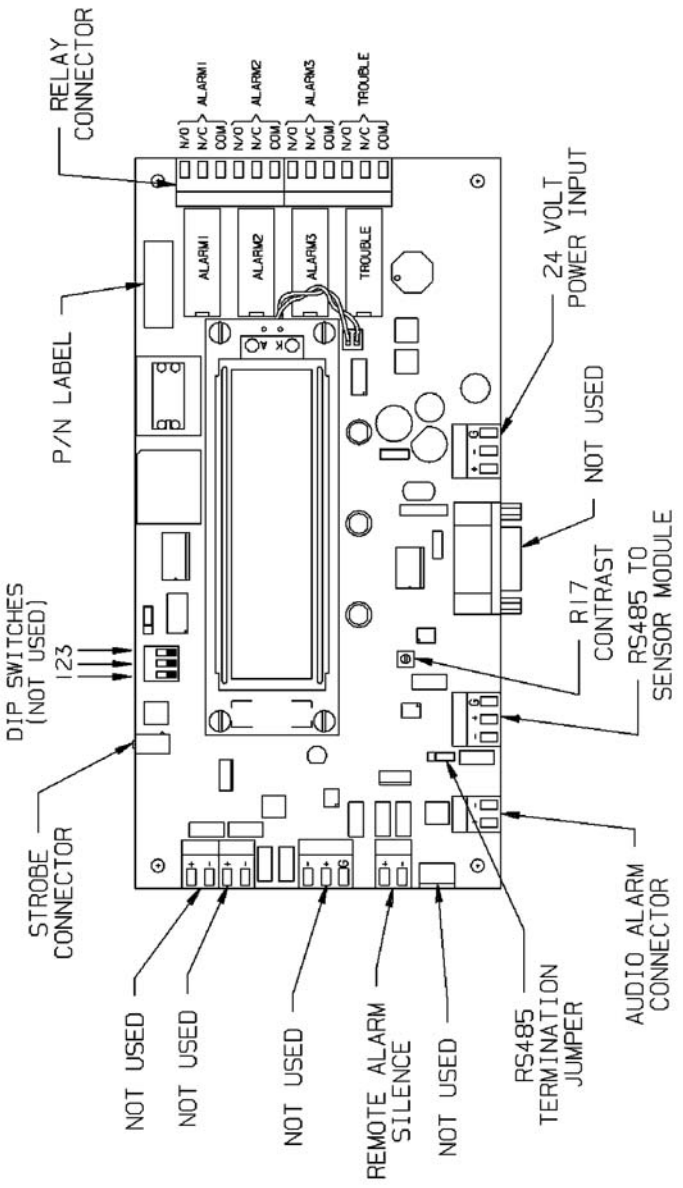

Figure 2-5. Identifying Printed Circuit Board Assembly

⚠ CAUTION

Bundle low voltage wiring together (lower than 30 volts), separate from high voltage wiring (higher than 30 volts).

Relay Outputs

Alarm Relays

There are three alarm relay outputs:

- **Alarm 1** (Caution)
- **Alarm 2** (Warning)
- **Alarm 3** (Alarm)

Each relay is set up as non-latching and normally de-energized. Contacts are Form C at 240 Volts AC 5 amps resistive.

- The relay contacts have gold plating for low voltage operation. If high current or high voltages are switched, low voltage operation will not be reliable.
- The alarm trip points are controlled by the Chillgard RT, Chemgard, Chillgard LC, or Chillgard LE front panels.

Alarm Relay Connections Wiring

Three gas level alarm relay outputs are provided. All alarm relays are Form C, SPDT normally de-energized relays which can be wired to either closed or opened contacts in an alarm condition. Use copper conductors only.

Each relay has contacts for:

- NORMALLY OPEN (NO)
- COMMON (COM)
- NORMALLY CLOSED (NC)

The function of each relay connector terminal is indicated on FIGURE 2-5.

NOTE: The maximum wire size that these connectors can accept is #12 AWG.

Fault Relay

There is one Fault relay within the unit that indicates that a trouble or start-up condition exists. This relay is configured from the factory and operates in a normally-energized mode.

This relay is energized when the instrument is:

- normally operating,
- in the calibration mode, or
- in the setup condition.

The relay is de-energized when:

- a fault is detected,
- the unit is in the start-up state, or
- the main power is lost.

It is not possible to change the configuration of the Trouble relay.

The relay connector function or identification:

- NORMALLY OPEN (NO),
- COMMON (COM),
- NORMALLY CLOSED (NC)

refers to the relay contacts as if the relay is de-energized or in the trouble condition. A relay contact is provided between the Normally Closed (NC) and Common (COM) position. This contact will be made in the event that main power to the unit is lost or any other trouble condition exists.

Remote Reset Switch Installation and Operation with Chillgard LE/Chillgard LC Instruments

If needed, a normally-closed, momentary remote reset switch can be attached to the Gas Monitor Remote Display to reset audio and visual alarm indications (for example, C&K components #8533 or 8534 SPST, 1 Amp, normally-closed push-button switches). Manufacturer specifications must be observed when selecting and using a remote reset switch. The Reset switch is to be connected to the Remote Display and Chillgard LE/LC instruments as shown in FIGURE 2-3.

NOTE: When wiring the Reset switch to the Remote Display and Chillgard LC/LE instruments, wire position 1 of the Reset switch connector on the Remote Display to position 1 of the same connector on the Chillgard LC/LE instrument. Do the same for the second position of the connectors. If these wires are crossed, the Reset switch will NOT activate a reset of the Remote Display or the Chillgard device.

For each alarm level triggered, the Remote Display horn and strobe trigger together, according to the Audio Alarm settings on the Chillgard LC/LE instrument. The horn and strobe also triggers for a Trouble (fault) according to the Audio Alarm setting on the Chillgard LC/LE instrument.

If the Reset switch is pressed after an alarm is activated, both the Remote Display's horn and strobe turn OFF. The horn and strobe reactivate if a subsequent alarm is triggered.

- The Remote Display's red LED remains ON until the concentration falls below the Alarm Level 1 setpoint, regardless of whether the Chillgard instrument's relays are configured as latching or non-latching. The Remote display's Yellow LED remains ON until the fault condition is removed for a Trouble/fault.
- The Reset switch has no affect on the Remote Display's relays. These relays change state when the concentration falls below their respective setpoints or, in the case of a Trouble, when the Trouble condition is removed.

If the Reset switch is not pressed, and the alarms are set to Latching on the Chillgard LC/LE instrument:

- The Remote Display's horn and strobe remain ON even if the concentration falls to zero. The red LED turns OFF when the concentration falls below the Alarm 1 threshold. The Remote Display's relays turn OFF when the concentration falls below the respective setpoints.

- To reset the Remote Display's horn and strobe in this state, press the Reset button.

Remote Reset Switch Installation and Operation with Chillgard RT or Chemgard Instruments

If needed, a normally-closed, momentary Remote Reset switch can be attached to the Gas Monitor Remote Display to reset audio and visual alarm indications (for example, C&K components #8533 or 8534 SPST, 1 Amp, normally-closed push-button switches). Manufacturer specifications must be observed when selecting and using a remote reset switch. The Remote Reset switch can be wired to both the Remote Display and the Chillgard RT/Chemgard instruments independently. See FIGURE 2-2 for wiring to the Chillgard RT/Chemgard instrument.

For each alarm level triggered on the Chillgard RT/Chemgard instrument, pressing either Reset switch turns OFF the Remote Display's horn and strobe. The Remote Display's horn and strobe are both activated according to the Audio Alarm settings on the Chillgard RT/Chemgard instrument. If a subsequent alarm is triggered after a lower-level alarm is silenced, the Remote Display's horn and strobe turn back ON, according to the Audio Alarm settings on the Chillgard RT/Chemgard instrument.

- The Remote Display's red LED remains ON until the concentration reading falls below the Caution setpoint, regardless of whether the Chillgard RT/Chemgard instrument's relays are configured as latching or non-latching.
- The Remote Display's relays are independent of the Reset switch. They remain active until the concentration reading falls below the Chillgard RT instrument's respective alarm setpoints.
- If either Reset switch is pressed during a fault or alarm, the horn and strobe on the Remote Display and the Chillgard RT/Chemgard instrument turn OFF.
- If the Reset switch is not pressed and the alarms are set to Latching on the Chillgard RT/Chemgard instrument:
  - The Remote Display horn and strobe remain ON, even after the concentration falls to zero, until either Reset switch is pressed.
  - The Remote Display's Red LED remains ON until the concentration falls below the Caution setpoint.
  - The Remote Display's relays deactivate when the concentration falls below the respective setpoints.

Audible Alarm Output

An output is provided to drive the buzzer on the bottom of the unit.

⚠ CAUTION

All field wiring must be done in accordance with national and local electrical codes.

Start-Up

The following steps outline the procedures to power-ON the Gas Monitor Remote Display:

1. Before applying power to the unit, verify proper voltage will be applied to the unit.
2. Turn the instrument ON at the circuit breaker or fuse that supplies power to the instrument. (The instrument does not have a power switch.)
   - The unit needs at least one "message" from the Chemgard or Chillgard Monitor before it will leave the Startup screen.
   - A green LED indicates that a 'non Fault' message is received.

NOTE: The display will begin to indicate the gas concentration of each point as it is sampled.

Chapter 3, Maintenance

General Maintenance

Under normal operating conditions, the Gas Monitor Remote Display requires minimal maintenance.

Obtaining Replacement Parts

To obtain replacement parts, address the order or inquiry to:

MSA North America
P.O. Box 427, Pittsburgh, PA 15230

or call, toll-free, 1-800-MSA-INST.

⚠ WARNING

Use only genuine MSA replacement parts when performing any maintenance procedures. Failure to do so may seriously impair unit performance. Repair or alteration of the Gas Monitor Remote Display, beyond the scope of these instructions or by anyone other than authorized MSA service personnel, could cause the product to fail to perform as designed and persons who rely on this product for their safety could sustain serious personal injury or death.

Table 3-1. Replacement Parts

PART	PART NO.
Display Assembly, Gas Monitor Remote Display	10039866
Printed Circuit Board Assembly	Contact MSA Service Personnel
Strobe Light, red, 24 VDC	634674
Buzzer	637123

⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

Table 3-2. Troubleshooting Guidelines

TROUBLE	DESCRIPTION	SOLUTION
Unit will not turn ON	No power	Check AC power to unit
		Verify AC power to unit is wired properly
		Check for loose wires on terminal barrier input
		Check wiring to the unit power supply. Remove power supply cover and check fuse; replace fuse if necessary
		Check input cable to main board on power supply
		Check for 24 VDC power supply output
Beacon will not light	Beacon alarm	Check that plug is connected to circuit board
		Replace beacon assembly
Display failure	Display communications	Repower unit
		Check for broken or cracked display
		Adjust contrast (R17)
		Replace display
Audio alarm failure	Audio alarm	Check output terminals
		Check for faulty horn buzzer
Strange messages or behavior	Password or Reset	Keep dip switches low
		Missing Alarm Reset switch or jumper
Comm Failure	Communication with Monitor disrupted	Check RS485 wiring.
		Verify RS485 Termination Jumpers are installed correctly
		Verify power is applied to Chillgard / Chemgard monitors
		Verify total cable length does not exceed 1000 ft.

Appendix A,
Installation Outline Drawing

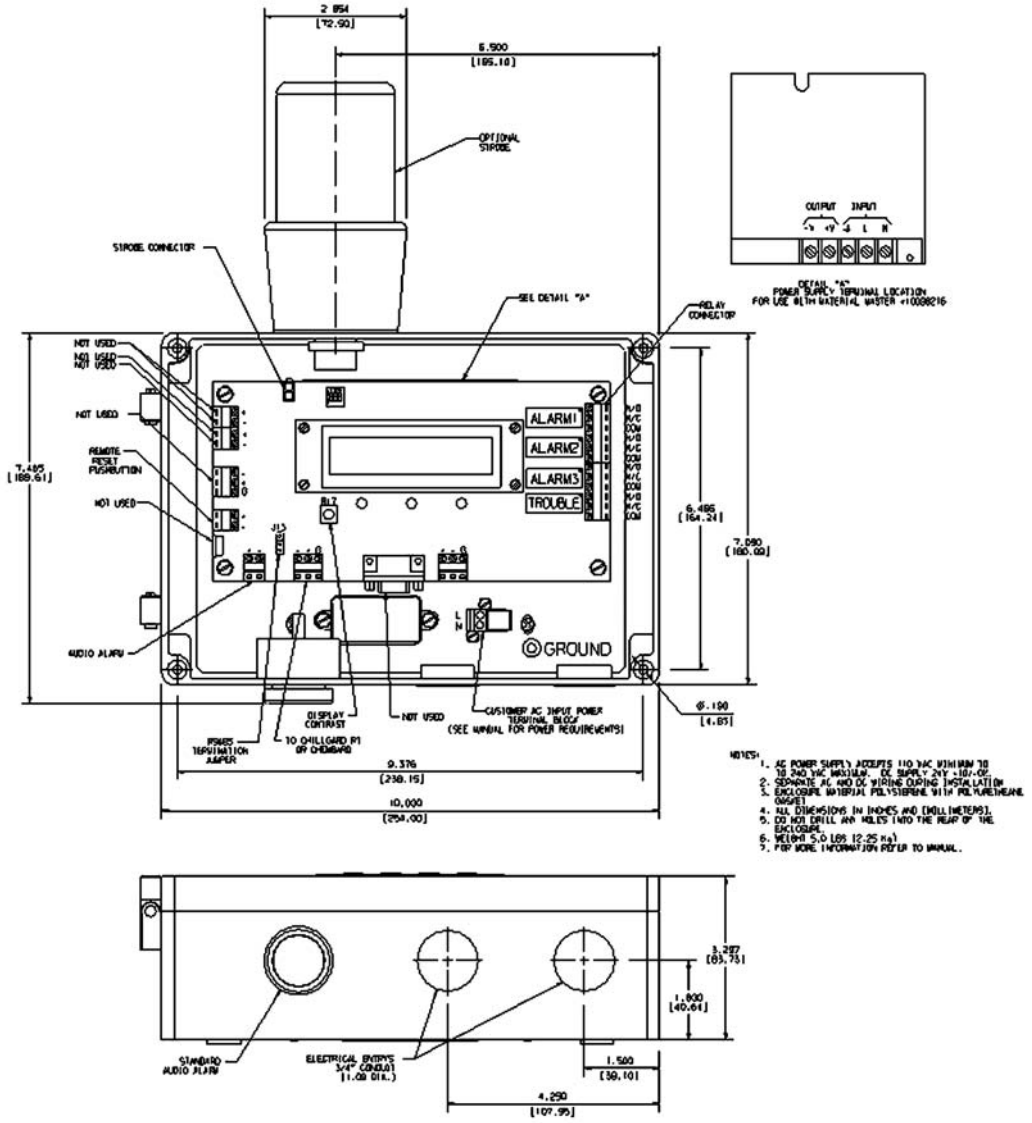

Figure A-1. Installation Drawing for Standard Version