

EMS WatchDog 800 Manual August 2025

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Section 1

Warnings and Safety Guidelines

This manual is intended to aid trained and competent personnel in the installation of this equipment. Only a technician or engineer trained in the local and national electrical standards should perform tasks associated with the electrical wiring of this device.

- Under no circumstances will Environmental Monitor Service Inc. be liable for or responsible for any consequential damage that may arise because of the installation or use of this equipment.
- All examples and diagrams shown in the manual are intended to aid understanding. They do not guarantee operation.
- Environmental Monitor Service Inc. accepts no responsibility for the actual use of this product based on these examples.
- Due to the vast variety of possible applications for this equipment, the user must assess the suitability of this product for specific applications.
- Make sure to have safety procedures in place to stop any connected equipment safely if the controller should malfunction or become damaged for any reason.
- Do not replace electrical parts or try to repair this product in any way.
- Only qualified factory-trained service personnel trained in this operation should open the device's housing or carry out repairs.
- The manufacturer is not responsible for problems resulting from improper or irresponsible use of this device.
- You may cause an electric shock, fire, or damage the equipment if you ignore any of these safety precautions.
- The serial numbers of the components within the Opacity system all need to match. Do not mix serial numbers between systems. **THIS WILL VOID THE PRODUCT WARRANTY.**

Customer service

We strive to provide efficient and expedient service when an instrument or component is returned for repair. Your assistance helps us provide better service.

To process your factory repairs and return goods efficiently, we need your help. Before shipping any equipment to our factory, please call our Service Response Center at **1-800-864-2814**. This lets us complete the necessary paperwork and process your equipment correctly when it arrives at our dock.

- When you call, please be prepared to provide the following information:
- Your name and telephone number.
- Your company name and shipping address
- The number of items being returned
- The part number of each item
- The model number or a description of each item
- The serial number of each item
- A description of the problem you are experiencing, whether factory repair is needed, or the reason you are returning the equipment (e.g., sales return, warranty return, etc.)
- The original sales order number or invoice related to the equipment
- Whether repair work is under warranty or is to be billed, and a purchase order number for any work to be billed
- When you call in, our Customer Service Representative will assign an RMA (Return Material Authorization) number for your shipment and initiate the necessary paperwork to process your equipment as soon as it reaches us. Please include this RMA number with the equipment you return, preferably both inside and outside the shipping container. This will ensure that your equipment receives the fastest attention possible.
- Your assistance in this matter will enable us to serve you better. We appreciate your cooperation and support in our products and services.

Claims for damaged shipments

Inspect all instruments thoroughly on receipt. Check the material in the container (s) against the enclosed packing list. If the contents are damaged and/or the instrument fails to operate correctly, notify the carrier and Environmental Monitor Service immediately.

The following documents are necessary to support claims:

- Original freight bill and bill of lading
- Original invoice or photocopy of original invoice
- Copy of packing list
- Photographs of damaged equipment and the container
- You may want to keep a copy of these documents for your records, too.
- Refer to the instrument name/model number, serial number, sales order number, and your purchase order number on all claims. Upon receipt of a claim, we will advise you of the disposition of your equipment for repair or replacement.

Shipping discrepancies

Check all containers against the packing list immediately on receipt. If a shortage or other discrepancy is found, notify the carrier and Environmental Monitor Service immediately. We will not be responsible for shortages against the packing list unless they are reported promptly.

Section 2

Principle of Operation

Read this manual before attempting installation!

The light source and detector are mounted on opposite sides of the path length to be measured, with the light beam focused on the detector. Smoke or dust passing through the light beam attenuates it, reducing the intensity of the light reaching the detector. A signal is transmitted to the microprocessor control unit, which continuously calculates the opacity percentage. Included as standard: a 4- 20 mA output, an Alarm contact with an adjustable set point.

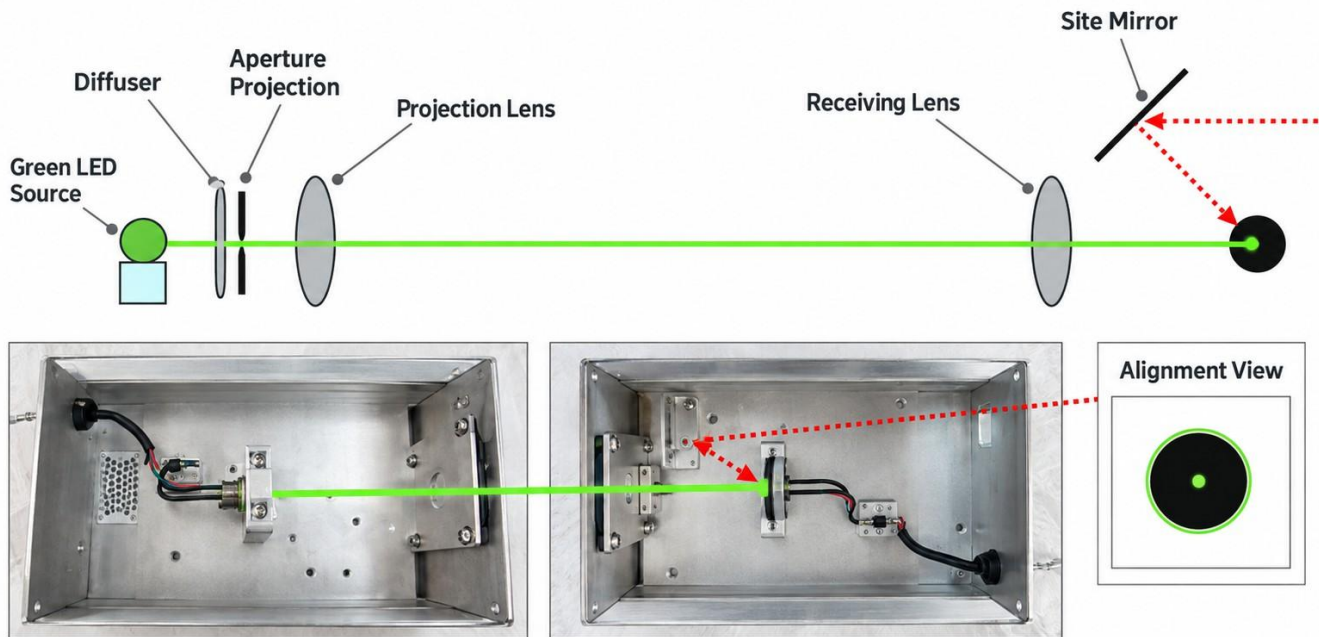
Control Instrument

A hinged door provides access to the Sensor PC board located in the NEMA 4X enclosure. The electronics are solid-state and include all components and calibration adjustments for the sensors.

Sensors

It consists of a Light Source and a Photo Detector. The Source is modulated to prevent interference from ambient light.

Green LED Transceiver



Factory Selection of Internal Optical Elements

EMS factory personnel test optical and electrical systems to configure and calibrate all systems. Once EMS receives site information from the user, the selection, appropriate projection, and other optical considerations are site-specific. The user should not attempt to align the optical system's internal elements. Minor changes ($\pm 10\%$) in the flange-to-flange calibration distance, discovered by the user, may be compensated for by contacting the EMS factory (or EMS service personnel in the field) to ensure that appropriate optical elements can be compensated or to receive a recommendation on how to proceed.

CAUTION: Completing internal optics, electronics, and other components may require returning the equipment to the factory. EMS has special tooling not available to the user. Under normal conditions, once the user has received the system from EMS, there should be no need to perform any internal optical service.

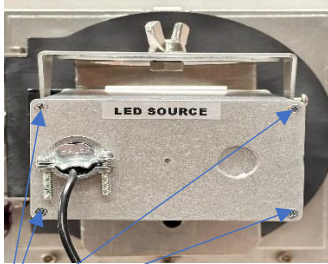
Section 3

Wiring connection for Detector and Light Source

This chapter describes a typical installation. Contact the factory if you need assistance with other installations.

Refer to diagram 3191 for the wiring connections of the Light Source and the Detector.

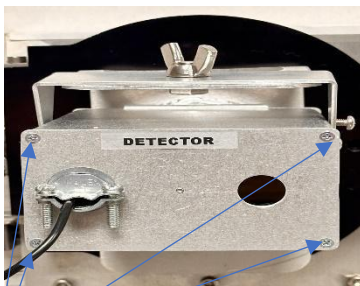
- Remove four screws from the back plate to access the two-pin terminal inside the Light Source. Connect the positive signal wire to the (+) terminal and the negative signal wire to the (-) terminal. **DO NOT CONNECT CABLE SHIELD**



Remove



- Remove four screws from the back plate to access the two-pin terminal inside the Detector. Connect the positive signal wire to the (+) terminal and the negative signal wire to the (-) terminal. **DO NOT CONNECT CABLE SHIELD**



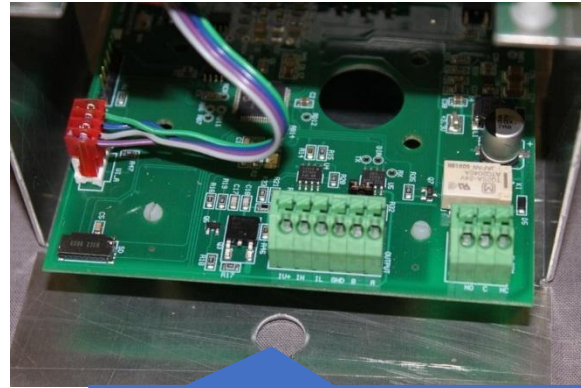
Remove



Control Unit wiring connection



Remove DIN power supply.



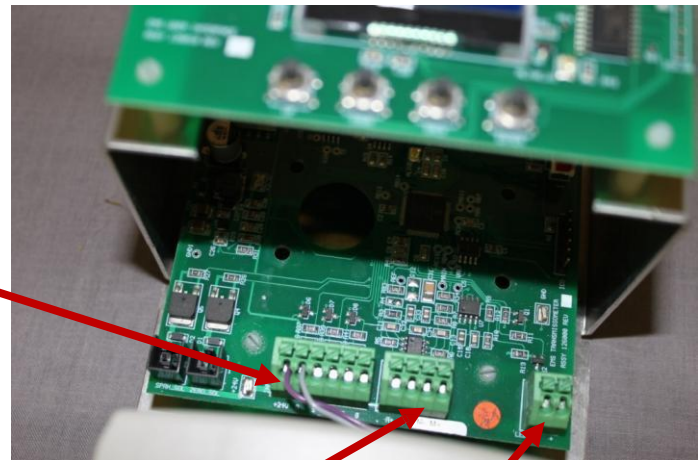
Chassis is held in place by top/bottom screws. Loose each and adjust chassis to position over keyhole and lift.

- Ensure there is clearance between the enclosure and the chassis for the wires.
- Wires should be of enough length to allow connections to be made while the chassis is out of the enclosure.



24VDC Power Supply

Positive Wire +V to 24V
Negative Wire -V to G



Detector

LED Source

Positive Wire **M+**
Negative Wire **M-**
Shield Wire **G**

Positive Wire **+**
Negative Wire **-**
No Shield Wire

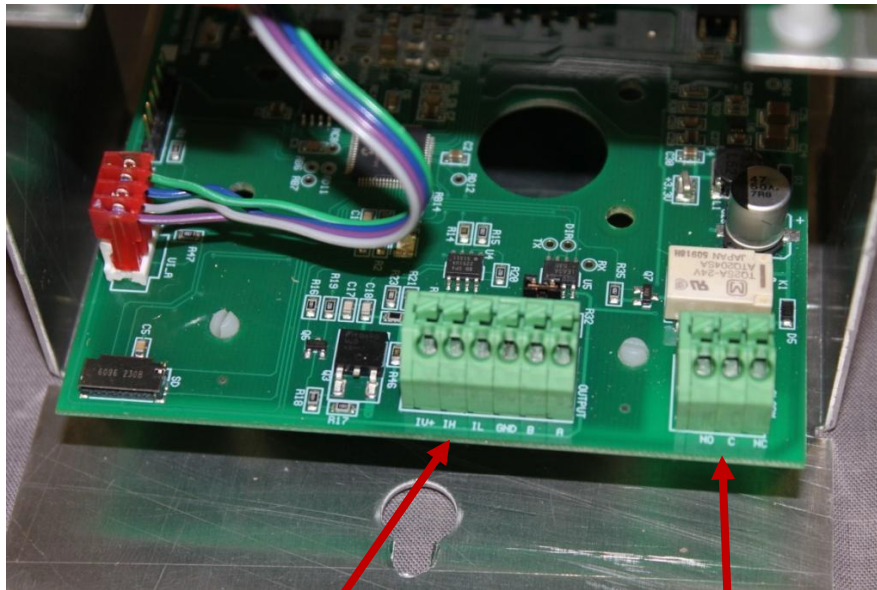
Wire power to the 24VDC power supply terminals, Neutral, Line, and earth ground (110- 220VAC).

24VDC power supply comes connected to main board from the factory.

Terminals will accept 24- 18 AWG wire.

RCU 4- 20mA analog output cable and relay wiring:

Standard cabling for Analog output is acceptable, with a Maximum length of 1000ft. For greater than 1000ft, contact the factory for information.



4- 20mA output wiring from the recorder

Recorder Positive Wire (+) connect to **IH**

Recorder Negative Wire (-) connect to **IL**

No Shield Wire

Customers can connect N.O. or N.C. alarm contacts and the relay's common terminal.

Relay rating 125Vac 2A (resistive load). See drawing 3191

The PCB relay connector will accept 24-18 AWG wire.

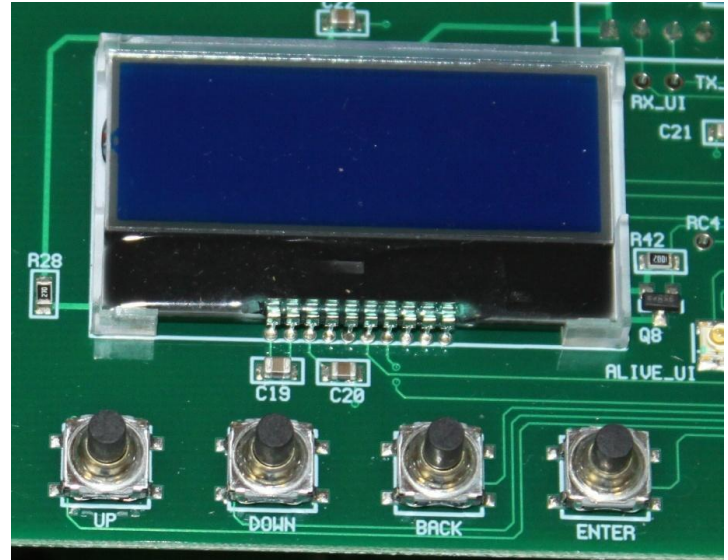
Normal Field Calibration of Zero (clear path)

After the installation has been completed, you can commission the system

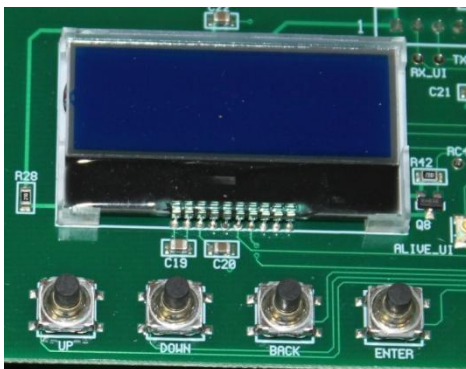
After all the installation steps have been completed, you are now ready to zero the system. Make sure that the measured path is clear of any smoke (zero opacity). That the sensors are correctly aligned. Power has been applied for 15 minutes to stabilize the system.

When power is applied, the program version will be displayed. (Sample: Rev 32).

1. With a clear condition, press ENTER and scroll down to "Cal", press ENTER
2. Select "Cal Zero" and press ENTER. Set the across path value to nominal 0-1% opacity by pressing the up/down buttons. Press ENTER. Press BACK to return to the main display. If you do not have an ND Filter Kit, skip to step 7.
3. If you have an ND filter kit, place the highest value filter(75% opacity) in the path to set the span.
4. Press ENTER and scroll down to "Cal." Press ENTER
5. Select "Cal Span" and press ENTER. Set the value of the span filter % opacity by pressing the up/down buttons. Press ENTER. Press BACK to return to the main display.
6. Now you can check the system with other filters by inserting them in the path.
7. Calibration is complete; the system will now display the path of smoke.



Alarm setup with UI (User Interface) PCB



To set a **high opacity alarm**, press the Enter button and use the Up/Down button to maneuver to Alarm Set. Press Enter and use the Up/Down button to set the % opacity point as displayed on the DPM. The factory alarm set point is 20%, with a range of 1-75%, and there is no delay.

When the opacity alarm set point is exceeded, the relay energizes. When opacity falls below the set point, the relay will immediately de-energize; this is called auto-reset.

Section 4, Sensor alignment

Mount the sensors opposite, vertically, or horizontally, keeping the light source and detector in direct correlation with each other.

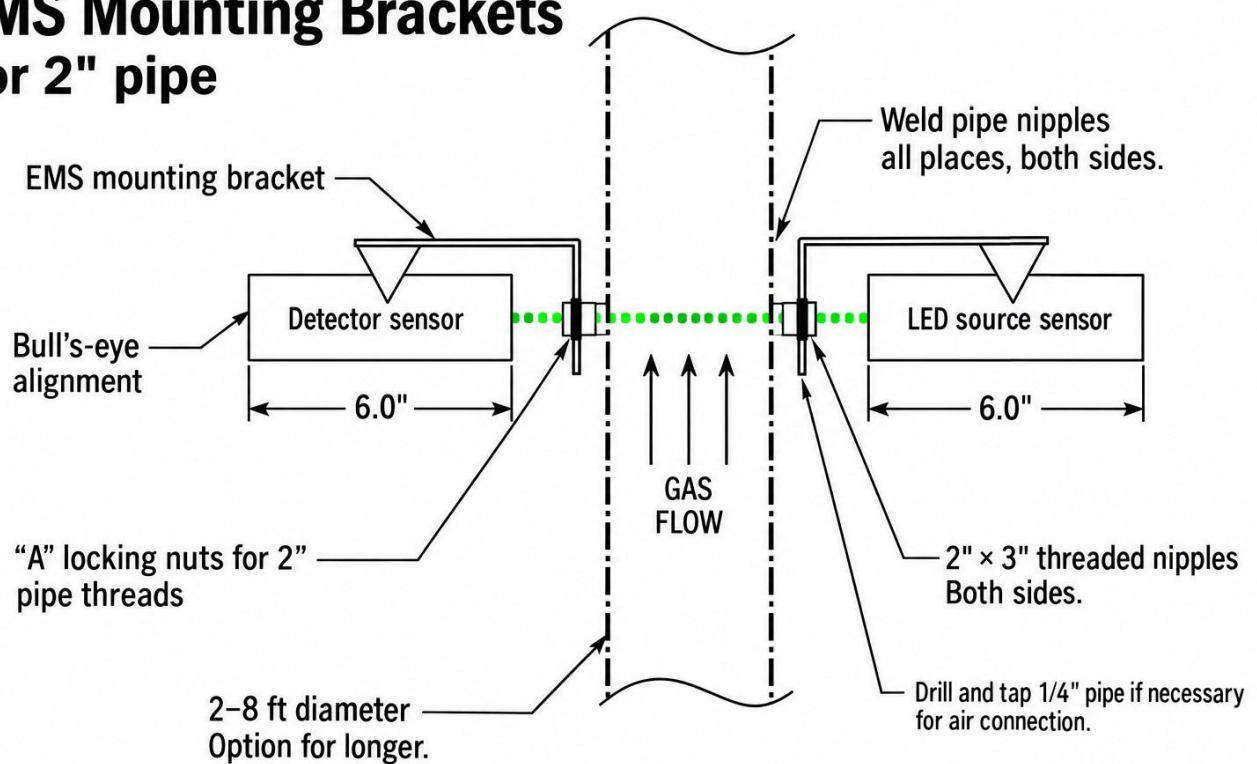


Alignment: View the back of the Detector window, align and adjust to center the green beam on the detector diode.

Sensor mounting Drawings.

Drawing 3147, Standard Mounting

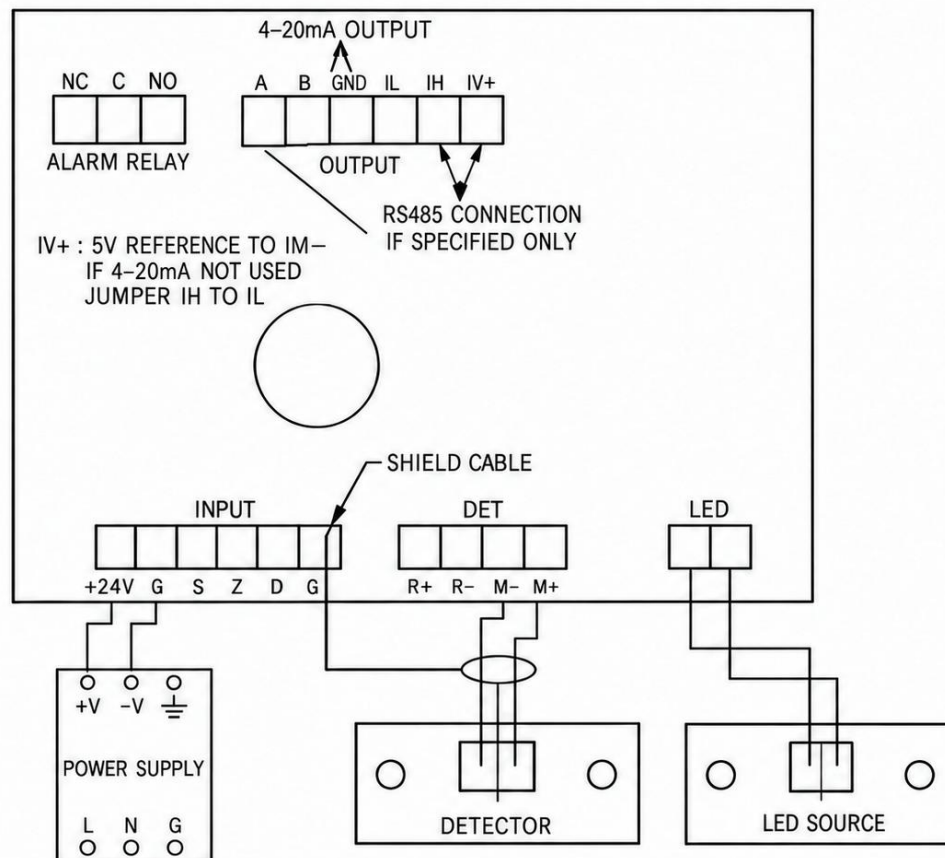
EMS Mounting Brackets For 2" pipe



WatchDog 800 wiring diagram

We recommend a flexible cable from the RCU to the sensors.

EMS 800 Series Wiring Diagram



Maintenance Intervals

Daily:

Check for fault conditions

Monthly or as required:

Clean Light Source and Detector windows

Check alignment, correct if necessary

Quarterly:

All daily and monthly checks

Check all bolts for tightness

Check that all electrical connections are secure

Every 3-5 Years (Depending on Facility Conditions)

Return to the factory for Optical Alignment, Calibration, and Cleaning Service