



EMS Guardian Smoke Opacity Detector Manual



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September 2026

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Warnings

This manual is intended to help trained and competent personnel install 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 or responsible for any consequential damage arising from the installation or use of this equipment.
- All examples and diagrams in the manual are intended to aid understanding; they do not guarantee operation.
- Environmental Monitor Service, Inc. accepts no responsibility for actual use of this product based on these examples.
- Due to the wide variety of applications for this equipment, the user must assess the suitability of this product for specific applications.
- Establish safety procedures for safely stopping connected equipment if the controller malfunctions or is damaged.
- Do not replace electrical parts or try to repair this product in any way.
- Only qualified, factory-trained service personnel trained in the equipment's operation should perform 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 to the equipment if you ignore any of these safety precautions.
- Proceed with wiring on page 8.

Application

The EMS Guardian Smoke Opacity Detector detects smoke or other contaminants in flues and provides instant warnings. Applications include crematoriums, furnaces, and heating boilers fueled by oil, gas, or coal. The system comprises an LED unit, a detector unit, and an IP65-rated enclosure that houses the main board. The instant alarm circuit activates when smoke opacity or contamination exceeds a predetermined, selectable limit of about 5%, 10%, 15%, or 20%. The relays remain active until the process returns to a value below the setpoint.

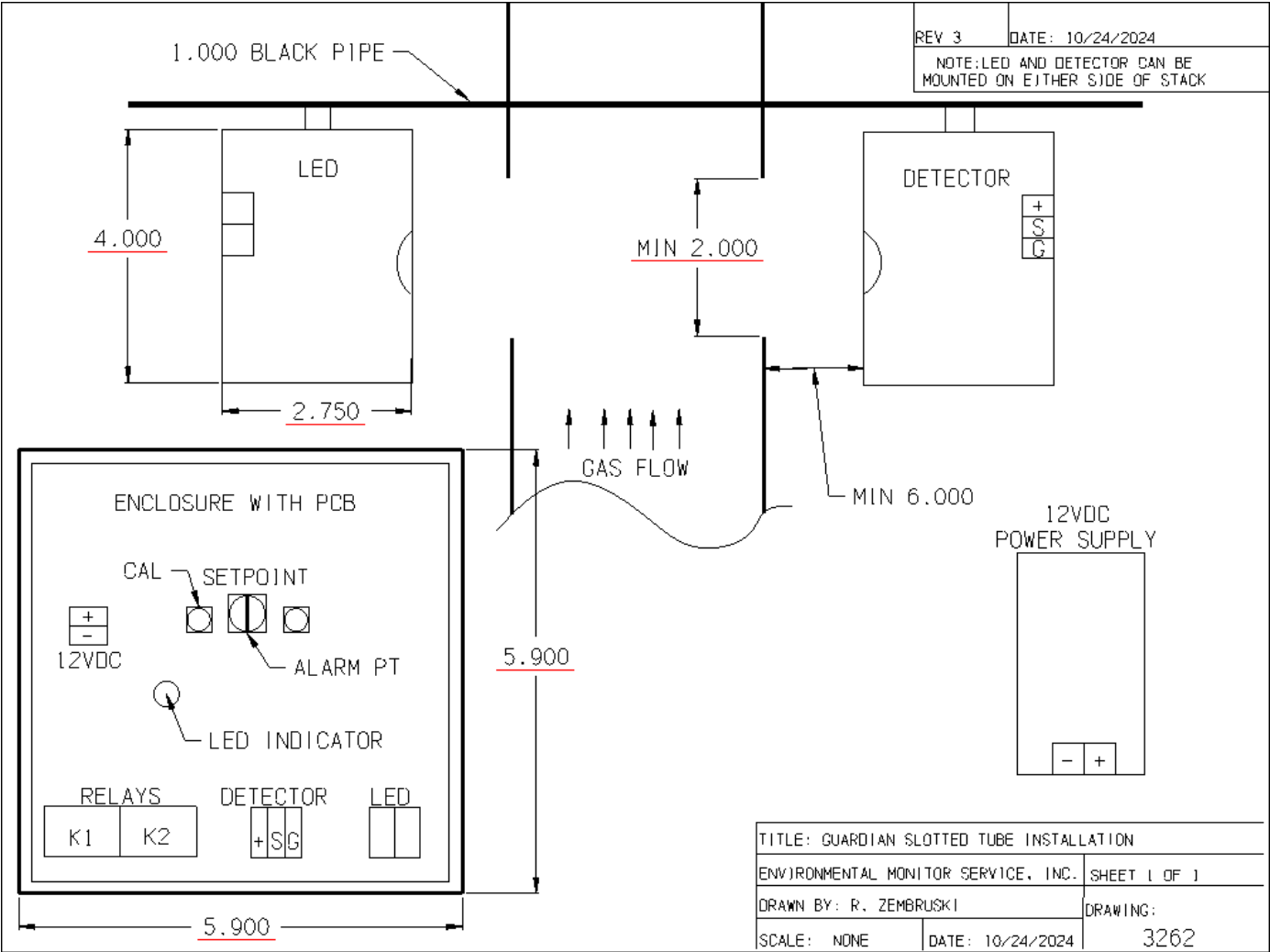
What Is Included

1. LED unit
2. Detector unit
3. Pipe mounting straps (2)
4. Electronic enclosure with a digital board, automatic calibration, an adjustable setpoint, and 2 relays
5. 12 VDC power supply
6. Surface mounting hardware
7. 2 cord grips
8. 1 bubble level

Before Installation

- Check that all parts have identical serial numbers.
- Read the instructions first to familiarize yourself with the instrument before startup. Primary considerations for choosing a site are accessibility, ambient environmental conditions, and the unit's location to obtain a representative process sample.
- Consider the sensor's height relative to platforms, walkways, and decks. Ensure the platform or walkway is accessible.
- Locate the stack-mounted units in an area with ambient temperatures between -4 °F and +130 °F. Clean, dry areas are desirable. Avoid areas with condensation, excessive vibration, or shock.
- Locate the control unit in an easily accessible area with temperatures between +32 °F and 122 °F.

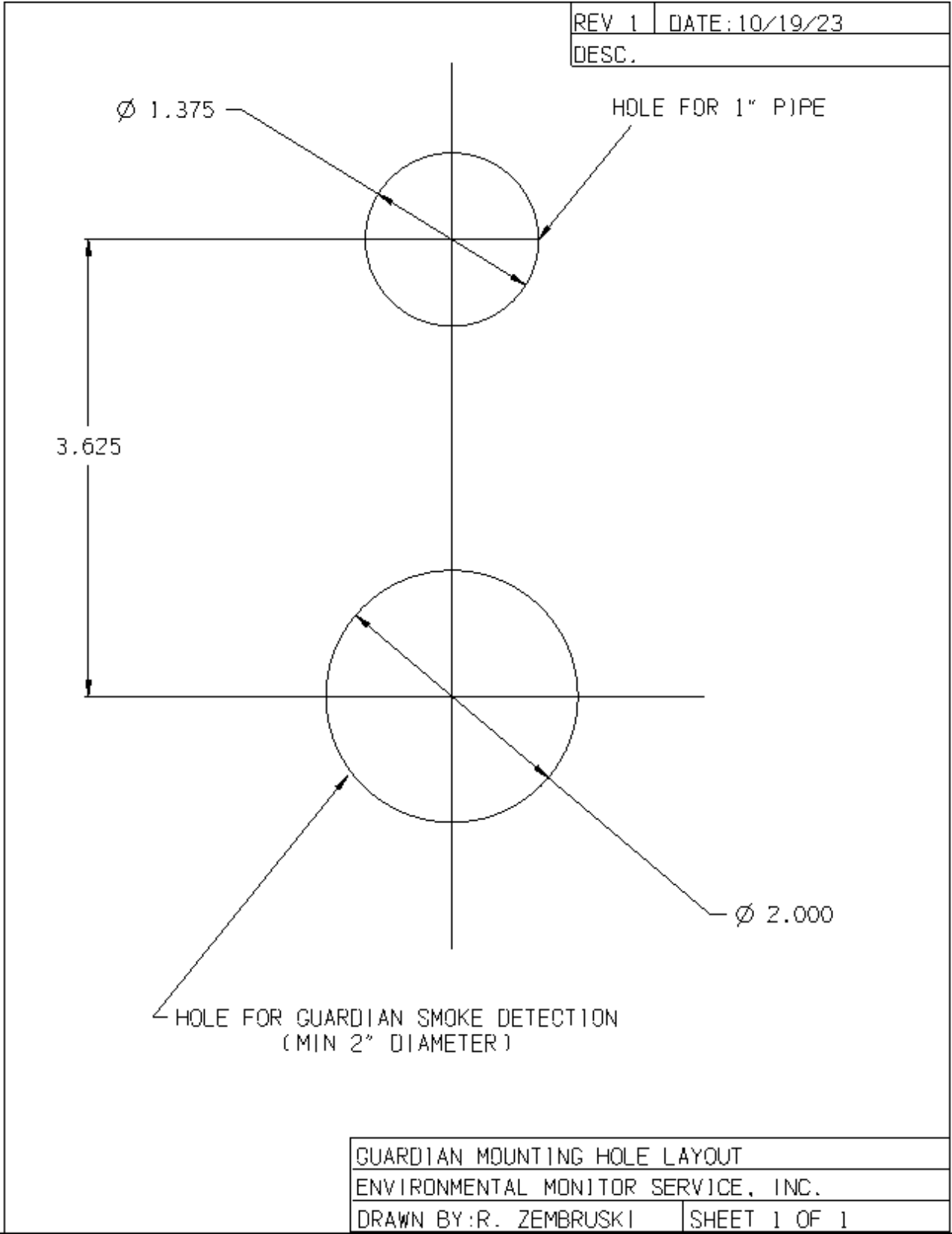
System Components and Installation Specifications



Installation and Wiring Instructions

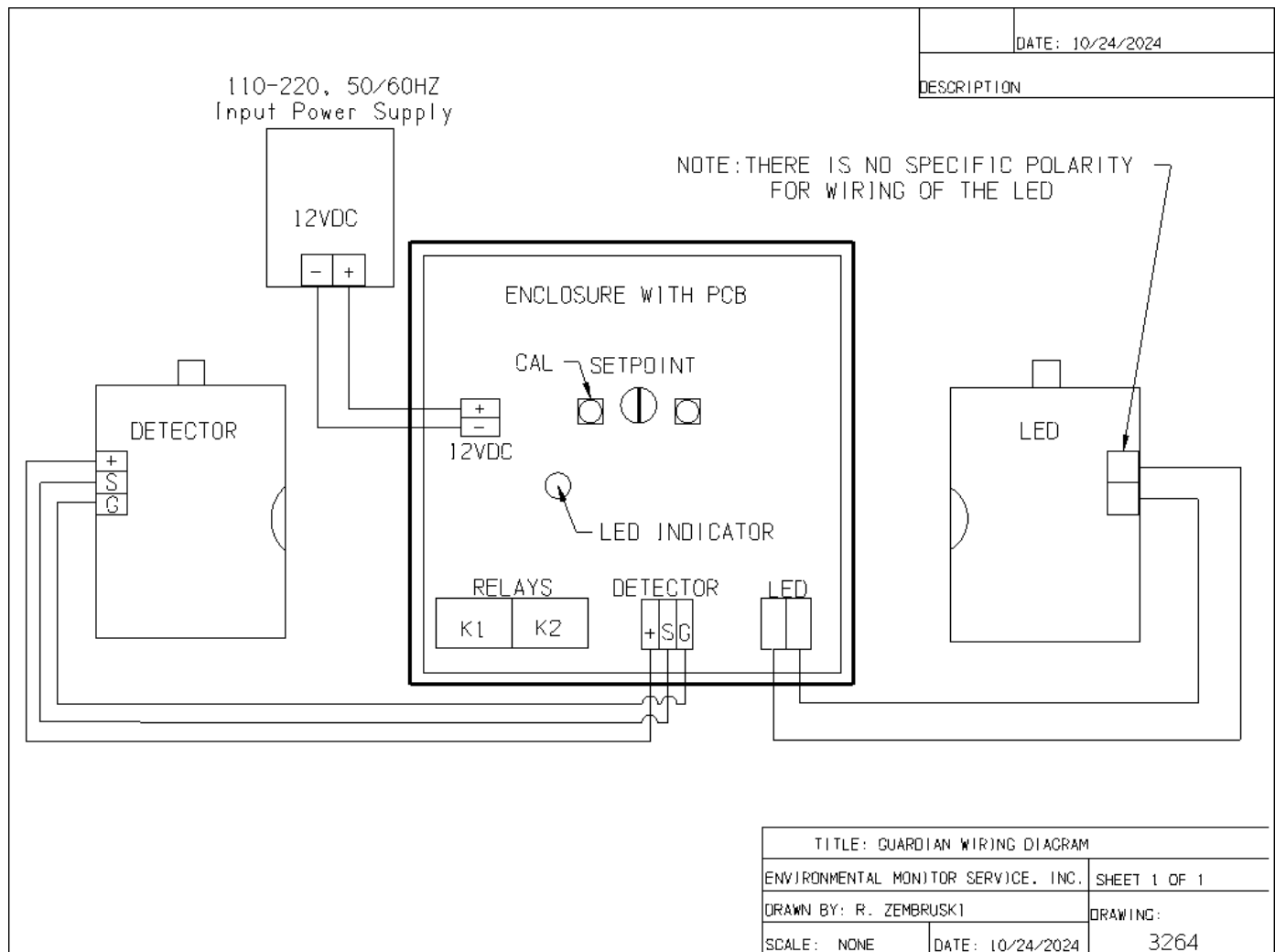
1. Select a suitable mounting location. An ideal location is a stack/breeching in an easily accessible area, away from the heat source and any fans or dampers.
2. Prepare the 1-inch supporting pipe. Measure the width of the stack/breeching, including insulation, and add 3 ft to provide an 18-inch overhang on each side. Cut a 1-inch black pipe to this total length.
3. Drill two holes on each side of the stack/breeching: one 1 3/8-inch-diameter hole for the 1-inch supporting pipe and one 2-inch-diameter hole for the Guardian sight line. See drawing 3263.
4. Insert the 1-inch pipe through both 1 3/8-inch holes, ensuring that it extends an equal distance on each side. Place retainers on both sides of the pipe and lock them against the stack/breeching.
5. Install the LED unit on one side of the 1-inch pipe, at least 6 inches from the stack/breeching. Center it on the 2-inch hole for proper operation. Secure the LED unit to the 1-inch pipe with the included pipe straps.
6. Install the detector unit using the same procedure.

Mounting Hole Layout and Measurements



Wiring

- The EMS Guardian is supplied with a universal 12 VDC power supply.
- The IP65 enclosure may be panel- or wall-mounted.
- Remove the covers from the detector and LED units.
- Route the wiring from the main board through the cord grips and connect it to the PC board as shown below.
- Use 16–24 AWG, two-conductor, shielded twisted-pair cable (Belden P/N 8451 or similar) for wiring between the LED/detector and the PC board. The maximum cable length is 75 ft.
- Once the wiring is connected, secure the covers to the LED and detector units.



Initial Setup and Calibration

Complete the following steps after installing and wiring the detector:

1. Use the included bubble level to ensure that the emitter and detector are aligned. The green LED light should pass through the stack/breeching to the detector on the opposite side.
2. Open the main board enclosure and confirm that the red “alive” LED indicator is flashing steadily.
3. Press the calibrate button until the red LED flashes rapidly. This indicates that the detector is calibrating. Once calibration is complete, in 5–30 seconds, the red LED will resume flashing steadily.
4. The EMS Guardian is now digitally calibrated and ready to trigger an alarm at the selected setpoint.
5. Repeat this process when adjusting the distance between the emitter and detector.

Relays

The EMS Guardian includes two relays, labeled K1 and K2. Each relay is rated for 4 A at 125 VAC and 2 A at 30 VDC and can be wired as normally open (NO) or normally closed (NC). Both relays are instantaneous. Their state changes when the alarm point is exceeded, and they remain active until the process returns to a value below the alarm setpoint.

Window Dust Compensation

The EMS Guardian can digitally compensate for window dust, eliminating the need for frequent, time-consuming cleaning. If one or both relays activate while the process is running normally, press and hold the calibrate button until the red LED flashes rapidly. Once the red LED resumes flashing steadily, the EMS Guardian is recalibrated. Repeat this process until the light is approximately 30% lower than when the system was first set up. Then clean the lenses and repeat the calibration process.

Relay Setpoint

The Guardian is preset at the factory to the customer's requested alarm point. To change it, follow the instructions below.

1. Calibrate the Guardian using the instructions above.
2. Turn the "setpoint" potentiometer clockwise to 20% using a small screwdriver.
3. Place a certified neutral density filter with the selected value directly in front of the LED or detector.
4. Slowly turn the "setpoint" potentiometer counterclockwise until the relay condition changes.
5. The EMS Guardian's relays are now set to the selected opacity value.
6. Repeat this process only when changing the setpoint value. It is not necessary when changing the distance or performing calibration.