

# Universal Opacity Monitor

## FEATURES

- Modbus communications.
- 4-20 mA DC output signal.
- Calibrated adjustment of alarm trip point and time delay.
- Percent opacity calibration with autocalibration mode.
- Easy to align, easy to install.
- Commercially available long-life lamp.
- DEP approved; UL and CUL pending.

## APPLICATION

The **Hays Cleveland Model A-08740 Universal Opacity Monitor** provides reliable, continuous measurement of the density of confined particulates such as dust or smoke. It is easy to calibrate and requires no routine maintenance other than occasionally cleaning the sight glass.

The basic system consists of an electronics unit and two breeching components. A light source directs a beam through the measured particulate, and a light sensor receives the beam, detects changes in opacity, and sends a proportional signal to the electronics unit. The wide-beam light source and narrow-view receiver make installation easy: alignment of the breeching units does not need to be precise. The electronics produces a digital readout of percent opacity and a 4-20 mA DC output signal suitable for recording, display, or indication. SPDT contacts are also provided for remote alarm or control functions. A contact closure is provided for a remote alarm (which can be purchased separately: **Hays Cleveland L-05500-00**). The operator can select manual or automatic alarm reset. **Modbus communications** for interface with a SCADA system (Supervisory Control and Data Acquisition system) or other controls is standard. A standard serial printer port is provided. The electronics unit is available in open-mount, surface-mount, and flush-mount formats. It can be installed in any dry, convenient area within 250 feet of the light source and receiver units. The standard model has a vacuum fluorescent display with three status LED's. There are four LED indicators on units equipped with **auxiliary functions** (described below).

The **Burner Cutoff Auxiliary Function** is a delayed de-energization timer that shuts the burner down if an alarm condition (opacity exceeding 20%) persists for 120 seconds. The timer can be manually reset only after reduction of opacity: it cannot be reset when opacity is above 20%. (This feature meets **the requirements of the New York City air pollution control code** for alarm and burner control functions). **Model A-08740 Opacity Monitors** equipped with the



**MODEL**  
**A-08740 OPACITY MONITOR**  
**ELECTRONICS**

burner cutoff function have four LED indicators on the front of the electronics panel, marked **Clear**, **Smoke**, **Alarm**, and **Burner Off**. In addition, an audible alarm with adjustable trip point and delay is mounted on the front face of the electronics unit.

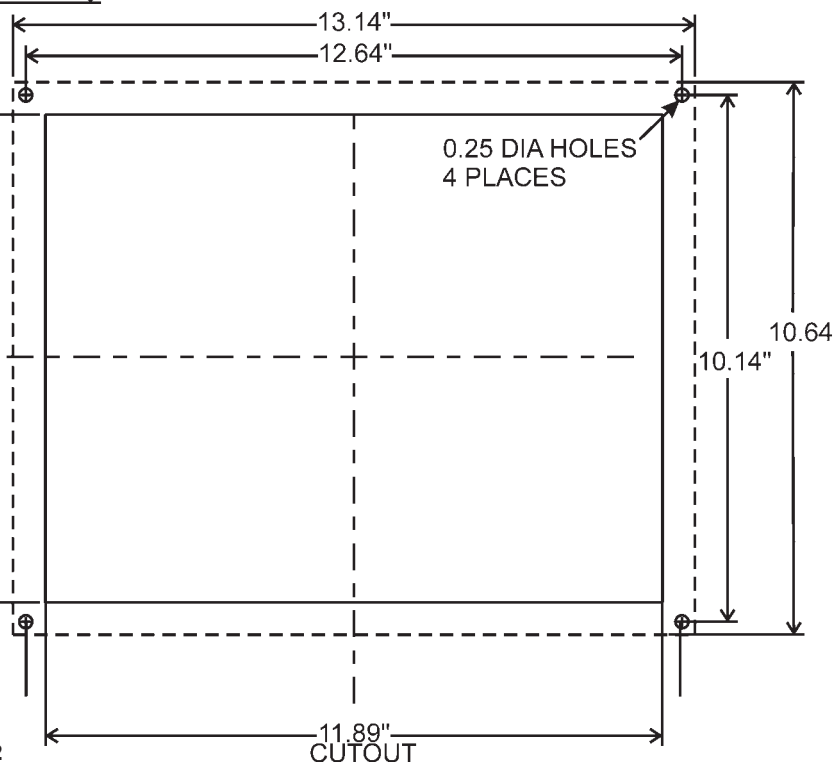
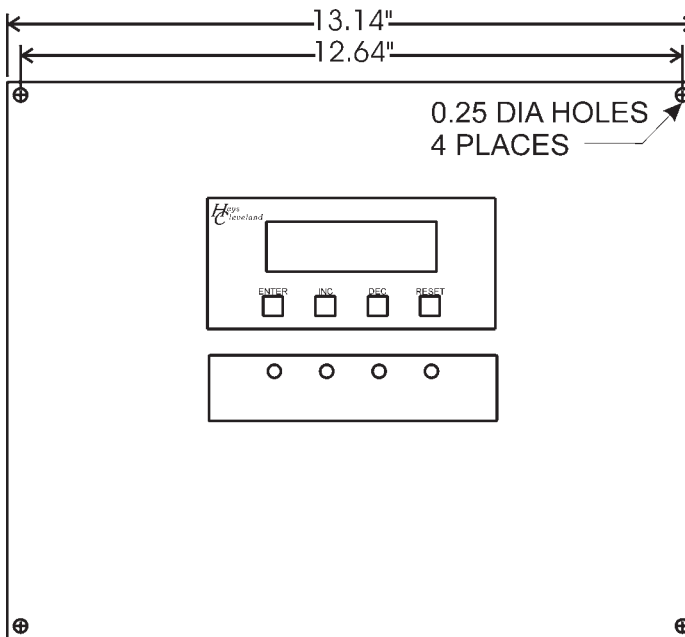
The **Overfire Air Timer Auxiliary Function** is a delayed de-energization timer that provides relay contacts for the control of smoke-reduction air in **coal-fired installations**. As soon as opacity exceeds the alarm trip point, the relay is energized. It remains energized as long as the alarm condition persists. After the alarm condition is corrected, the relay remains energized for an adjustable period up to five minutes. **Model A-08740 Opacity Monitors** equipped with the overfire air timer function have four LED indicators on the front of the electronics panel, marked **Clear**, **Smoke**, **Alarm**, and **Overfire Air**.



**Light Receiver**



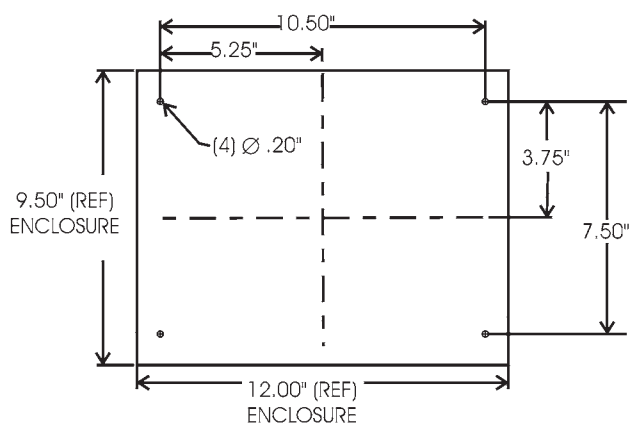
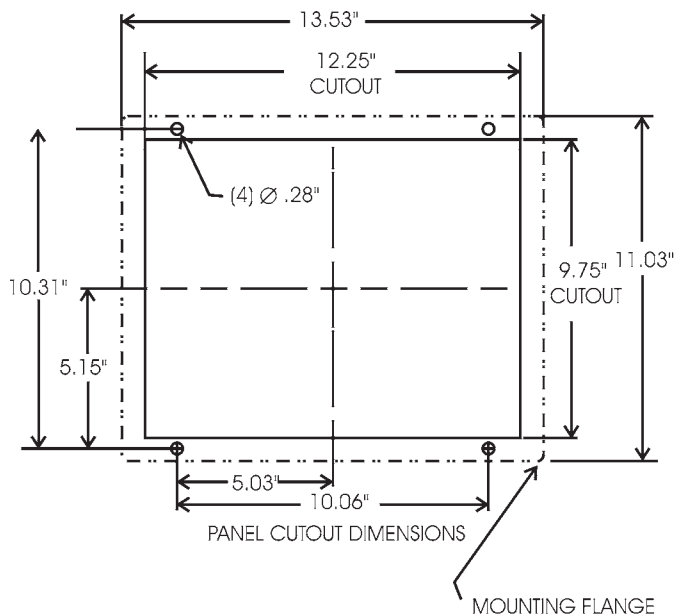
**Light Source**



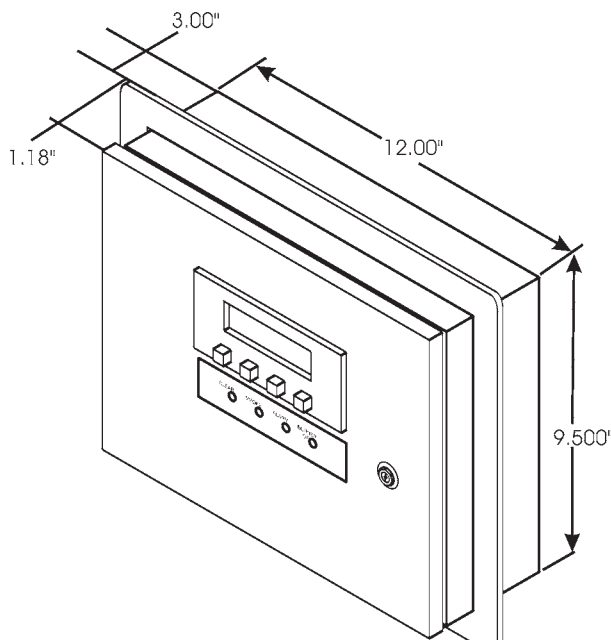
Panel Insertion Depth < 6".

Open-mounted A-8740 Opacity Monitor.

**Dimensions for surface-mount and semi-flush mount models.**

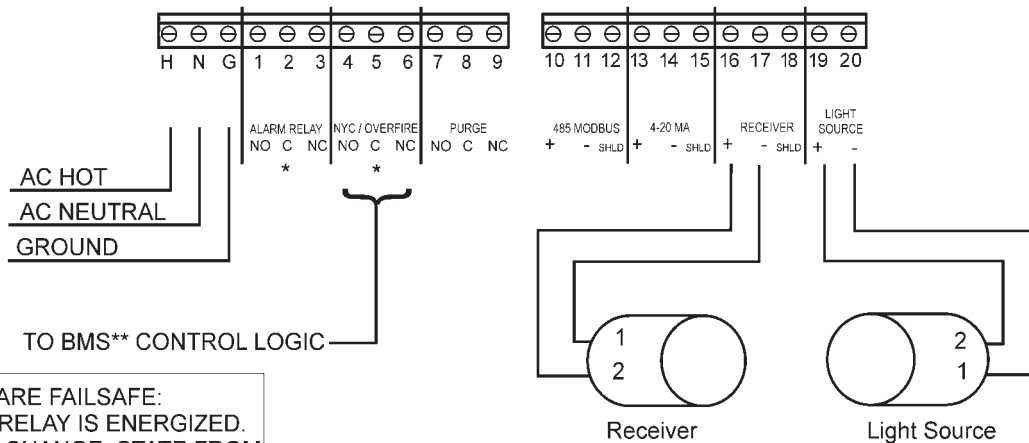


SURFACE MOUNTING DIMENSIONS



MOUNTING FLANGE FOR SEMI-FLUSH (PANEL-MOUNTING) ONLY

**A-08740 UNIVERSAL OPACITY MONITOR  
ELECTRONICS UNIT**



**\*NOTE: RELAYS ARE FAILSAFE:  
ON POWER UP, RELAY IS ENERGIZED.  
THE CONTACTS CHANGE STATE FROM  
NO TO NC AND NC TO NO.**  
\*\*BMS = Burner Management System.

The light source and receiver operate at less than 24 VDC.  
Light source wiring: two 14 AWG stranded wires.  
Light receiver wiring: one shielded 16 AWG pair.  
Wiring/cable length must not exceed 250 ft. (76 m.).  
Install with a minimum of 3 feet (1m.) of flexible conduit  
at both the light source and receiver.

## SPECIFICATIONS

**Power requirements:** 120 V AC  $\pm$  10%, 50/60 Hz.

**Ambient temperature ranges:** 32–130F (0–54C) for electronics unit.  
32–160F (0–70C) for light source and receiver units.

**Fuse:** One, @ 1 amp.

**Measurement range:** 0 to 100% opacity.

**Retransmit Output range:** 4–20 ma DC, 750 ohms maximum load.  
Directly proportional to measurement range, where 4 ma = 0% and  
20 ma = 100%. **Output is grounded (not isolated.)**

**Resolution:** Digital meter reads 0–100% opacity with 1% resolution.

**Response time:** 1 second for 90% of actual change in opacity.

**Accuracy:**  $\pm$ 5% opacity under all specified operating conditions.

**Light source to receiver distance:** **minimum** 4 ft. (1.2 m.), to  
maximum 20 ft. (6.0 m.).

**Light source lamp life:** 1 year minimum.

**Spectral response of photocell:** 350–1100 nm.

**Cable length:** 250 ft. (76 m.) maximum.

### Indicators:

**Green:** “Clear” LED.

**Yellow:** “Smoke” LED and flashing display.

**Red:** “Alarm” LED and flashing display.

**Alarm timer:** adjustable 0–300 second delay.

**Alarm trip point:** adjustable 0–99% opacity.

**Alarm reset:** automatic. Can be field-configured to **manual**.

**Alarm contacts:** isolated SPDT, 10 amp, 120 V AC resistive, failsafe.

**Purge delay timer:** adjustable 1–600 second delay.

**Overfire air timer (optional):** maintains contact closure after smoke  
abatement for a period adjustable from 1–300 seconds.

**Overfire air contacts:** isolated SPDT, 10 amp, 120 V AC resistive,  
failsafe.

**Housing for enclosed models:** NEMA 1.

**Relative Humidity:** 0–90%, non-condensing.

**Printer port:** RS232 serial port, DB9-M connector, 9600 baud, N81 (no  
parity, 8 data bits, 1 stop bit). Output format: 5 sequence #, blank space,  
3 digit opacity, “%” symbol, carriage return, line feed. Output adjustable,  
generated every 0–60 minutes, where 0 = disabled.

Example: 01234 011% c/r 1/f.

**Shipping Weight:** varies with options.

Electronics units in enclosures are 7.5 to 8.5 lbs.

Open-mounted electronics units are 6.5 to 8.0 lbs.

Light source and receiver, combined, are 9 lbs.

**Approvals:** NYC DEP. UL & CUL pending.

**Modbus Communication:** RTU. 9600 or 19200 Baud rate. N/8/1 (no  
parity, 8 databits, 1 stop bit).

**Specifications Subject to Change.**



## HOW TO ORDER

The basic catalog number for the **Hays Cleveland Model A-08740 Universal Opacity Monitor** is shown below. Replace suffixes **A** and **B** with selections from the table below.

**A-08740-\*0 -AB**

(\*0 = Current Model).

The standard base unit includes light source and receiver units. The electronics unit has a vacuum fluorescent display with 3 LED's (standard: Clear, Smoke, and Alarm) or 4 LED's (if an auxiliary function is present). Standard features include: adjustable alarm trip point and delay, field-selectable auto/manual alarm reset, **a contact closure for a remote alarm** (customer-supplied or quoted separately with **Hays Cleveland L-05500-00**), retransmitted 4–20 ma DC output, a serial printer port (printer not included), and Modbus communication. The **Model A-08740 Universal Opacity Monitor** replaces **Model A-08711**.

### A: Auxiliary Application Functions

0. None.

1. Burner Cutoff Timer with **audible alarm on front of electronics** and “Burner Off” LED. **NYC DEP approved.**
2. Overfire Air Timer with “Overfire Air” LED (for stoker applications).

### B: Housing

0. Open-mounted (for OEM applications).
1. Surface-mount (for wall-mounting). NEMA 1.
2. Semi-flush mount (for panel-mounting). NEMA 1.

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