

# PMX

## PARTICULATE MONITOR

OPERATING INSTRUCTIONS



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## Cautions and Warnings



The discrete output must not be connected to outputs from other sensors (i.e. outputs from multiple sensors must not be connected in parallel). Parallel connections may damage sensor output circuitry.

***Refer servicing to qualified service personnel.***

### **IMPORTANT:**

This product is an accessory or part of a system. Always read and follow the manufacturer's instructions for the equipment before connecting this product. Comply with all applicable codes and safety regulations. Failure to do so may result in damage, injury or death.

## Product Overview

Monitor smoke and airborne particulates with the PMX sensor. The device combines proven sensor technology with innovative hardware to provide an easy-to-use system for monitoring light transmission in a wide variety of applications. Ideal for industrial ventilation hoods and commercial kitchen ventilation applications.

The PMX is available in two styles: circuit boards for OEM applications and NEMA 4X housing to protect the components while providing a high quality, durable window for light transmission measurement. The transmitter is mounted up to 10 meters from the receiver module, then aligned and adjusted to focus the light onto the receiver. The illumination level is adjusted for the optimum operation at the distance and light transmission range necessary for the specific application. An adjustable threshold level allows the operator to set the discrete output switching point.

The PMX features a 2-digit display that provides an indication of signal strength making set-up and integration quick and easy. The sensor provides both a discrete PNP/NPN output and a 0-5V analog output. The analog output can be monitored allowing the external system to log variations and take action such as activating exhaust fans.

The transmitter is wired to the receiver with a suitable cable. The receiver is provided with a 5 conductor cable, including a shield.



## Specifications

Specifications	
Light Source	Green LED
Sensing Distance (transmitter-to-receiver)	Up to 30ft
Sensitive Area (sensor lens dia.)	18mm
Response Time	<150uS
Switching Frequency	6kHz
LED Intensity	Trimmer adjustment in RX
Relative Intensity Display Range	00 to 99
Sensitivity	Adjustable
Signal Level	Two 7 segment digits
Detection Threshold	Two 7 segment digits
Digital Output	Auto-Detect PNP / NPN
Output Function	NO/NC selectable
Analog Output	0...5V
Security	LOCK / UN-LOCK keypad
Power Indicator	Green LED
Detect Indicator	Red LED
Programming Indicator	Yellow LED
Data Retention	EEPROM non—volatile memory
<b>PMX-RX (receiver)</b>	
Dimensions	130mm x 77mm x 79mm (5.1" x 3.0" x 3.1")
Weight	455 g (1.0 lbs.)
<b>PMX-TX (transmitter)</b>	
Dimensions	130mm x 77mm x 79mm (5.1" x 3.0" x 3.1")
Weight	363g (0.8 lbs.)
Supply Voltage	10...24 VDC
Operating Current	60 mA
Short Circuit Protection	Discrete output
Overload / Reverse Polarity Protection	Supply voltage
Operating Temperature	-20°C...55°C
Storage Temperature	-20°C...70°C
Housing	Metal alloy
Mechanical Protection	IP65 NOT FOR PRESSURE WASHDOWN

## Applications

- Demand control kitchen ventilation (DCKV)
- Ventilation systems
- Commercial cooking hoods
- Factory venting
- Exhaust systems
- Environmental monitoring

## Quickstart Guide

1. The display range is 00 through 99. The RED LED above the display indicates that the opacity level drops below the threshold setting.
2. Connect the pre-wired power supply to power. Verify prewired transmitter wiring. Reference wiring diagram.
3. Apply power; sensor will initialize and perform its power up sequence.
4. Best results are achieved when transmitter is properly aligned with the receiver. The light source must be positioned directly across from the sensor with the particulates passing between.
5. If possible, introduce smoke or particulate into the light path and note the relative transmission reading on the display.
6. Various adjustments may be made to increase or decrease sensitivity; refer to the Sections Calibration Adjustment and LED Intensity Level. Refer to Section: Threshold, to alter threshold setting.
7. User programmable parameters are discussed in detail in the following sections.

## Operation

### Power up

Upon power up, the sensor initializes by turning on all segments on the display and sequencing through red, yellow and green on the status LED located above the display.

### Intensity display mode

During normal operation, the sensor display will indicate the relative opacity of a target within its field of view. The range of the relative opacity display is 00 through 99.

### Calibration Adjustment

The calibration feature allows the displayed measurement to be adjusted to the desired value by the user.

#### ***Adjusting the measured value:***

1. Place target in sensor's field-of-view. The sensor will display the current reading.
2. Press either key (for less than 3 seconds); while the current reading is displayed the value is flashed slowly indicating that the sensor is in the adjustment mode.
3. Press T/+ to increment the reading and P/- to decrement the reading.
4. Stop pressing either key or the sensor returns to normal operating mode in 3 seconds.

#### ***Note:***

- While adjusting the reading, when a limit is reached the display flashes at a faster rate.
- The selected gain is stored in memory and is retained when power is removed.

## Operation (continued)

### Local Lock

The local lock feature allows the sensor to be locked out, preventing adjustments by unauthorized personnel. To lock the sensor, press the **P/-** and **T/+** buttons for 3 seconds until **LL** is displayed. To un-lock the sensor, press the **T/+** and **P/-** for 3 seconds until **LL** is not displayed. While the sensor is locked, pressing either **P/-** or **T/+** will result in **LL (Local Lock)** indication on the display.

## Programmable Parameters

All adjustments made to these parameters are stored in memory and are retained when power is removed. To enter programming mode press and hold the **P/-** key for several seconds, the current threshold setting will be displayed. Press and release the **P/-** key to scroll through the various settings. Press and release the **T/+** key to change a particular setting. Press and hold the **P/-** for several seconds to return to the normal intensity display mode. The user programmable items are described below.

### Threshold

When the relative opacity level exceeds the threshold setting the red status LED will turn on and the discrete output will activate, indicating this condition. When the relative opacity level drops below the threshold (as determined by the hysteresis setting), the red LED will extinguish and the discrete output will de-activate. The threshold setting allows the user to select the detection level. The default setting is 15.

To adjust the threshold, enter programming mode, press and hold the **P/-** key for several seconds, the current threshold setting will be displayed. Press and release the **T/+** key to increase the threshold level, to decrease the threshold level, continue to hold the **T/+** key until the value approaches 99 then wraps around to 00.

### LED Intensity Level (U)

NOT USED – The receiver provides a trimmer pot adjustment located at one end of the terminal block. Rotate clockwise to increase the illumination level and counter-clockwise to decrease the illumination level. See illustration for trimmer adjustment on the CONNECTIONS diagram.

## Programmable Parameters (continued)

### Hysteresis Level (H)

The hysteresis setting is indicated by H0 through H9. The hysteresis level is how far below the threshold the signal must drop to de-activate or un-detect. The hysteresis can be set from 0 to 9. For example, if the threshold is set at 25 and the increases to 25 or higher, the sensor will detect and activate its output. With the hysteresis set to 4, the signal must drop to 20 to un-detect. This feature is useful in cases where there may be variation within a target that might cause the intensity to increase above the threshold slightly; the hysteresis allows the output to remain activated until the level increases significantly. Press and release the **T/+** key to change the hysteresis setting. The default setting is 2.

### Discrete Output Configuration

This setting allows the user to select either normal open (no) or normally closed (nc) configuration. The normally open configuration de-activates the output during normal un-detect operation, and activates the output upon detect. The normally closed configuration activates the output during normal un-detect operation, and de-activates the output upon detect. Press and release the **T/+** key to toggle through the selections. Default is normally open.

## I/O Signals

### Discrete Output

The discrete output is a PNP/NPN configuration allowing the user to provide a load on this output that is either pulled high to VDC or low to ground. The sensor monitors this level and automatically determines whether to operate the PNP/NPN driver. This output is typically connected to a PLC. The output remains active as long as the intensity level exceeds the threshold, in high-speed applications it may be useful to use the Extend Output Pulse feature to lengthen the signal duration to meet acquisition requirements of the PLC.

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### Analog Output

The analog output is 0-5V with 20mV resolution (8-bit). Any standard analog input channel typically available on a PLC may monitor this output. The analog output signal is useful in applications where simply triggering on the threshold is insufficient. For example, constant real-time monitoring of intensity in process allows minor fluctuations or trends to be detected permitting corrective action to be taken.

## I/O Signals (continued)

### Extend Output Pulse (P)

This feature allows extending the minimum length of time that the discrete output remains active following target detection. The sensor response can be in the 25uS (microsecond) range, i.e. a target can move through the sensing range in 25uS and the discrete output would active for only that duration. A slower acquisition system (PLC) may not sample its inputs at a fast enough rate to capture the signal. The discrete output pulse can be extended from 0 to 90mS (milliseconds) in 10 mS increments as indicated by P0 though P9 on the display. Press and release the **T/+** key to toggle through the selections.

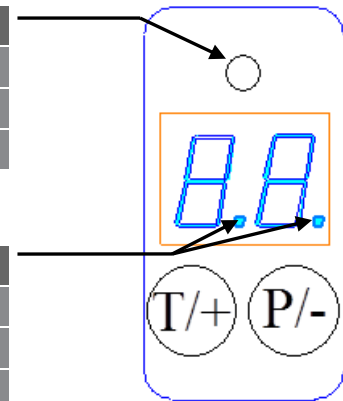
### Null Offset (nu)

*Not used*

## Display Indicators

Indicators	
Green LED	Threshold Mode while in Undetect
Red LED	Detect
Yellow LED	Threshold Mode while in Detect

Display decimal points	
None illuminated	LED low intensity
One illuminated	LED medium intensity
Two illuminated	LED high intensity



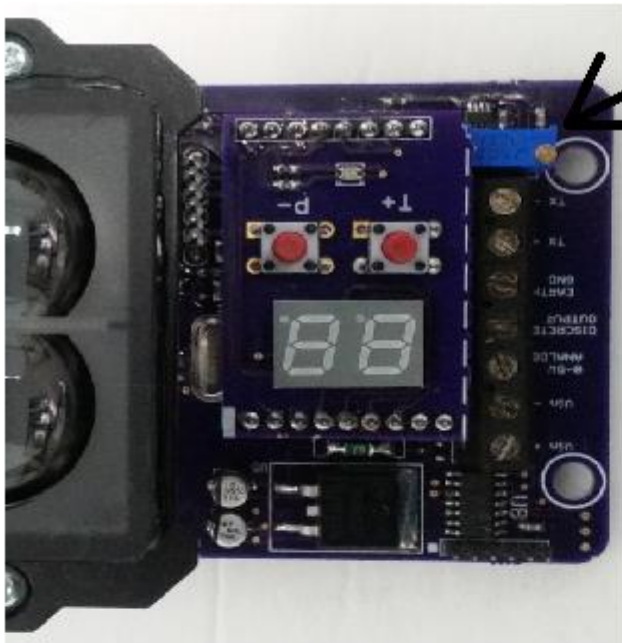


## Installation

Mount the receiver (RX) and the transmitter (TX) directly across from each other. Remove the cover, and insert mounting screws into the cover holes and mount the unit to a bracket or similar surface. After mounting, reinstall the cover. Connect the power and apply power to the system. The 2 digit display provides an indication of relative signal strength on a scale of 0-99. A reading of 99 indicates a very strong signal.

- 1) After mounting the RX, it may be necessary to adjust/aim the TX to direct the light beam onto the RX.
- 2) Adjust the TX positioning as necessary to assure alignment with the RX. A sheet of white copy paper may be placed over the RX to aid in alignment.
- 3) Once the TX and RX are mounted in fixed positions, check the value on the display. Increase or decrease the illumination level (with the adjustment potentiometer) to display a value of 50 (mid-scale)
- 4) Connect to the 0-5V analog output with a DVM or analog to digital convertor to monitor the output from the sensor.

# Connections



ILLUMINATION ADJUSTMENT  
CW to INCREASE

DESCRIPTION	WIRE COLORS
TX -	BLACK
TX+	RED
Shield	GREEN
Discrete (NPN/PNP) output	WHITE
0-5V Analog output	RED
Power -	BLUE
Power +	BROWN

## RECEIVER CONNECTIONS



DESCRIPTION	WIRE COLORS
TX+	RED
TX -	BLACK

## TRANSMITTER CONNECTIONS

## Ordering Information

PMX	Particulate monitor - transmitter and receiver in NEMA 4X enclosure
PMX-TX	Transmitter, NEMA 4X
PMX-RX	Receiver, NEMA 4X
PMX-TX-BD	Transmitter board with optics
PMX-RX-BD	Receiver board with optics

## Accessories

IRB-325-SP      Liquid tight strain relief connectors (set of 2)



## Warranty

EMX Industries Incorporated warrants all products to be free of defects in materials and workmanship for a period of two years under normal use and service from the date of sale to our customer. This warranty does not cover normal wear and tear, abuse, misuse, overloading, altered products, damage caused by incorrect connections, lightning damage, or use other than intended design.

There is no warranty of merchantability. There are no warranties expressed or implied or any affirmation of fact or representation except as set forth herein.

EMX Industries Inc. sole responsibility and liability, and the purchaser's exclusive remedy shall be limited to the repair or replacement at EMX Industries option of a part or parts found not conforming to the warranty. In no event shall EMX Industries Inc. be liable for damages, including but not limited to damages resulting from non-conformity, defect in material or workmanship.

Effective date: January 1<sup>st</sup>, 2002

