

# ENVIROMUX-VSSR-10 Vibration Monitor User's Manual



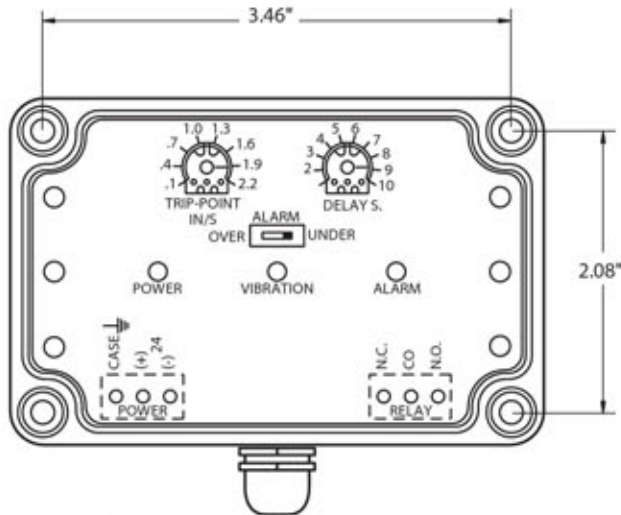
## Description

The Vibration Monitor combines sensor, circuitry and isolated npn output into a compact NEMA 4X package. It monitors the machine surface to which it is attached and alarms when vibration levels either exceed or fall below the trip-point setting (depending on the ALARM switch setting).

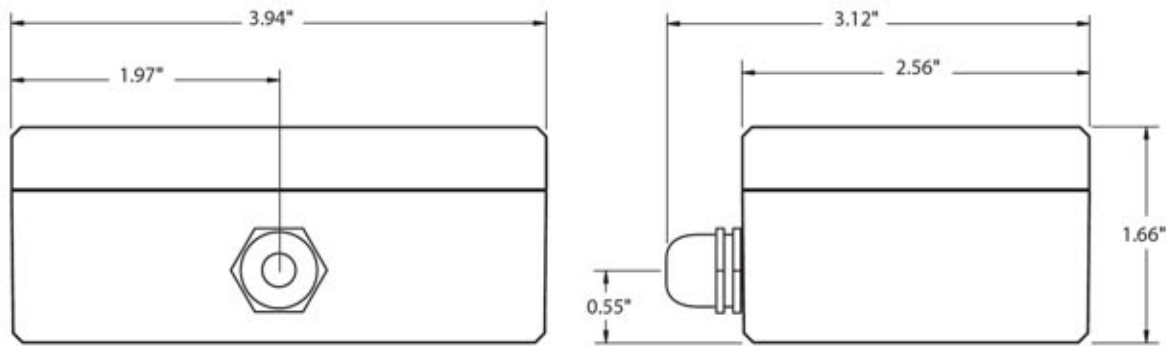
## Operator Interface/Dimensions

The setting dials and switch are located under the waterproof cover. Remove the cover to change settings and replace when finished.

### Cover Removed



### Cover Attached



## Installation

### Orientation

The ENVIROMUX-VSSR-10 senses vibration along the axis indicated by the SENSING DIRECTION arrow. Orient the **sensor** with the arrow parallel to the vibration axis to be monitored.

### Mounting

The enclosure has four mounting holes. The mounting holes are the same as the cover attachment holes (located directly underneath the captive cover screws when the cover is on). Remove the cover to access the mounting holes (see Operator Interface/Dimensions). Use four 8-32 UNC (or M4 metric) hex socket-head cap screws to mount the **sensor**. Rigid, tight attachment is necessary for any vibration-sensing device. For this reason the **sensor** must be securely fastened to a smooth, flat surface. Use all four screws: mounting with fewer can allow error-causing resonance when high-frequency vibrations are present.

### Cabling

The **sensor** comes standard with a 10' cable. When extending the cable to a longer length, terminate it in an appropriate junction box with proper terminal strips. The cable wires have the following color code:

#### Power

<b>Green</b>	Case
<b>Red</b>	DC Power (+)
<b>Black</b>	DC Power (-)

#### NPN Output

<b>Blue</b>	Collector Protection Cathode
<b>Orange</b>	Emitter
<b>White</b>	Collector

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## Operation

**Power LED (Green)**..... Indicates power applied to the **sensor**

**Vibration LED (Green)** ..... Indicates vibration at or above the minimum detectable level (0.1 in/s nominal).

**Alarm LED (Red)**..... Indicates an alarm condition.

Note: Alarms are not latching – an alarm condition persists only while the vibration magnitude stays at alarm levels.

**Alarm OVER/UNDER Switch** ..... Selects the alarm functionality.

Over: Alarms while vibration magnitude is above the trip-point setting.  
Under: Alarms while vibration magnitude is below the trip-point setting.

**Trip-Point Dial** ..... Sets the alarm level threshold in inches-per-second RMS.

**Delay Dial** ..... Sets the alarm delay in seconds.

An alarm occurs DELAY seconds after detecting vibration magnitude at alarm level. The vibration magnitude must remain at alarm levels for at least DELAY seconds for an alarm to occur.

**NPN Output** ..... The isolated NPN output is connected for failsafe operation (NPN on when powered and not alarmed).

It operates as follows:

Conducting (ON) when **sensor** is powered and not alarmed

Not conducting (OFF) when **sensor** is unpowered or alarmed.

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## Settings

With the **sensor** tightly mounted, the cover removed, and 24 Vdc power applied\*, complete the following steps:

1. Set the ALARM OVER/UNDER switch as required.
2. Set the TRIP-POINT. If the desired RMS velocity alarm value is known, set the trip point to that value, otherwise it can be set experimentally relative to your machine's current (acceptable) vibration level. The following gives an example (ALARM set to OVER):
  - a. Set the DELAY to minimum (1 second).
  - b. Start the machine to be monitored.  
Note: The VIBRATION LED should light, indicating vibrations above the minimum detectable level (0.1 in/s).  
Wait for any/all transient vibrations to die out.
  - c. Slowly increase the TRIP POINT setting until the ALARM LED darkens (if already alarmed).
  - d. Slowly decrease the TRIP POINT setting until the ALARM LED begins to light. This setting is your current vibration level.  
Note: These last two steps may need to be repeated. Adjust the TRIP POINT slowly since there is a minimum of 1 second response time.
  - e. Increase the TRIP POINT to a value proportional to the current vibration level. For example, if the current vibration level is 0.5 in/s and you want the **sensor** to alarm at 40% above that, set the trip point to 0.7 in/s.
3. Set the DELAY. This may also have to be determined experimentally, depending on the duration of vibration transients to be ignored.
4. Re-attach the cover tightly.

\* Note: There is a 2-3s. delay from application of DC power to becoming operational (to allow internal circuitry to charge).

## Specifications

### LED Indicators

Power .....	Green
Vibration .....	Green - Indicates vibration above min. detectable level (0.1 in/s rms)
Alarm .....	Red - indicates output in alarm state

### Settings/Ranges

Alarm trip point.....	0.1 - 2.2 in/s (2.5 - 55 mm/s) rms
Alarm delay.....	1 - 10 seconds
Alarm .....	Over/under select switch

### Operational Limits

Min. vibration frequency (-3db) .....	10 Hz
Max. vibration acceleration.....	± 50 g peak

### Power Requirements

Voltage .....	24 Vdc (18 - 30 Vdc)
Current (max).....	30 mA @ 24 Vdc

(24Vdc/1.1A power supply included)

### Isolated NPN Output

Current .....	50 mA
$V_{CE}$ (max @ 50 mA).....	1.0 V
$BV_{CEO}$ (breakdown volts).....	100 V
$P_D$ (max power over temp).....	100 mW
$I_{CEO}$ (max leakage over temp).....	100 $\mu$ A
Failsafe.....	Transistor ON when powered and not alarmed

### Terminals/Connections

Cable .....	6 conductor, unshielded, 22 AWG
Green .....	Case
Red .....	DC Power (+)
Black.....	DC Power (-)
Blue.....	Collector Protection Cathode
Orange .....	Emitter
White.....	Collector

### Environmental

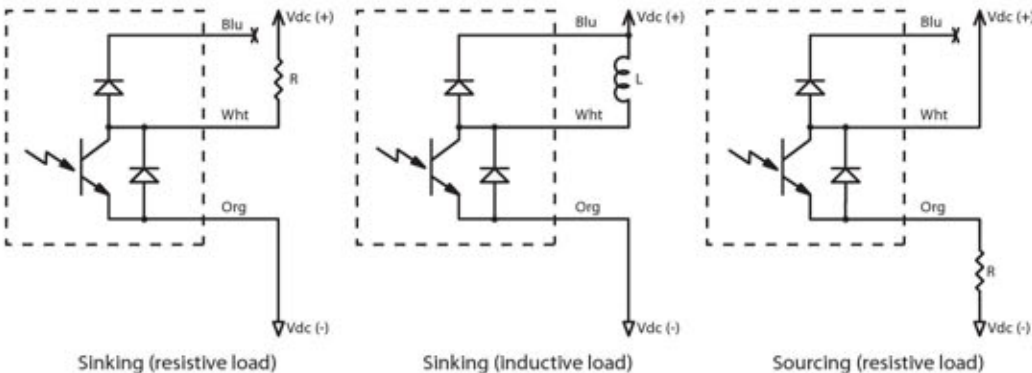
Operating Temperature .....	-40°C to 65°C (-40°F to 149°F)
Enclosure type.....	Cast aluminum, NEMA 4X

### Mechanical

Weight .....	0.75 lb (0.34 kg)
Dimensions.....	3.94" x 2.56" x 1.66"

Specifications subject to change without notice.

## NPN Output Schematic and Possible Connections



The NPN output is electrically isolated from the DC power inputs and case. The NPN output may be externally connected to the same supply as the DC power inputs or to a different supply.

## Useful Conversion Formulas

### Definitions:

<b>CPM</b>	Machine cycles per minute
<b>f</b>	Frequency
<b>Stroke</b>	Max machine travel (peak to peak)
<b>Disp<sub>pk</sub></b>	Peak displacement from center position (Stroke / 2)

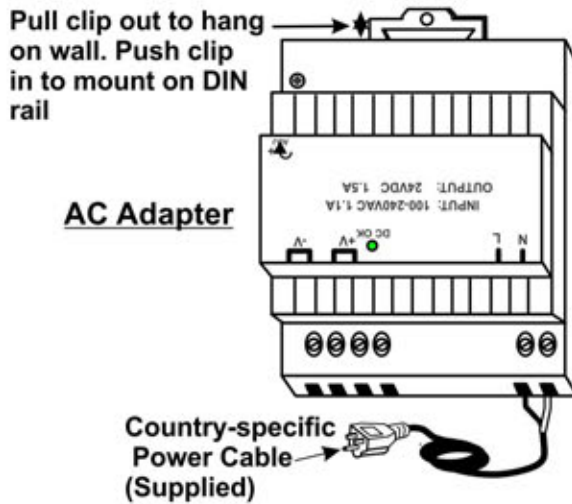
### Formulas:

<b>f (frequency in Hz)</b>	<b>= CPM / 60</b>	
<b>Vel<sub>rms</sub> (rms velocity in in/s)</b>	<b>= 4.44 * Disp<sub>pk</sub> * f</b>	Disp <sub>pk</sub> must be in inches, f must be in Hz
<b>Accel (peak acceleration in g's)</b>	<b>= 0.103 * Disp<sub>pk</sub> * f<sup>2</sup></b>	Disp <sub>pk</sub> must be in inches, f must be in Hz
<b>Accel (peak acceleration in g's)</b>	<b>= 0.0231 * Vel<sub>rms</sub> * f</b>	Vel <sub>rms</sub> must be in in/s rms, f must be in Hz

### Note:

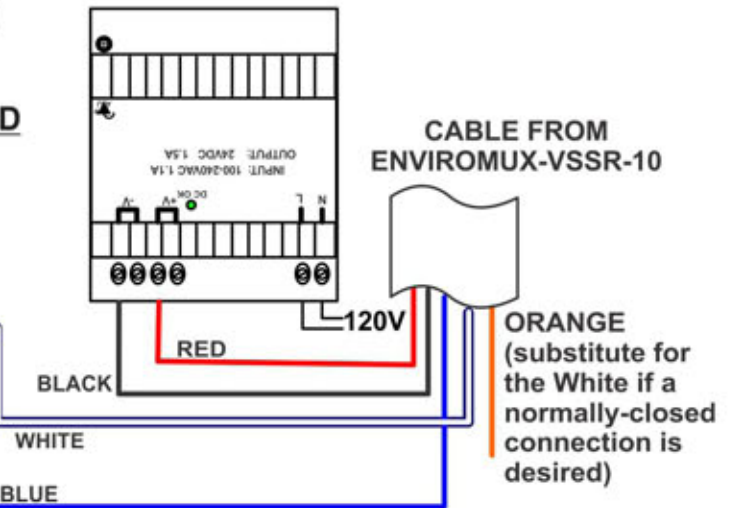
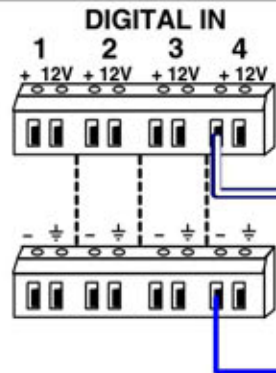
All formulas based on sinusoidal motion.

# WIRING FROM ENVIROMUX-VSSR-10 TO ENVIROMUX-2D/-5D/-16D (Wired for a Normally-Open contact configuration)

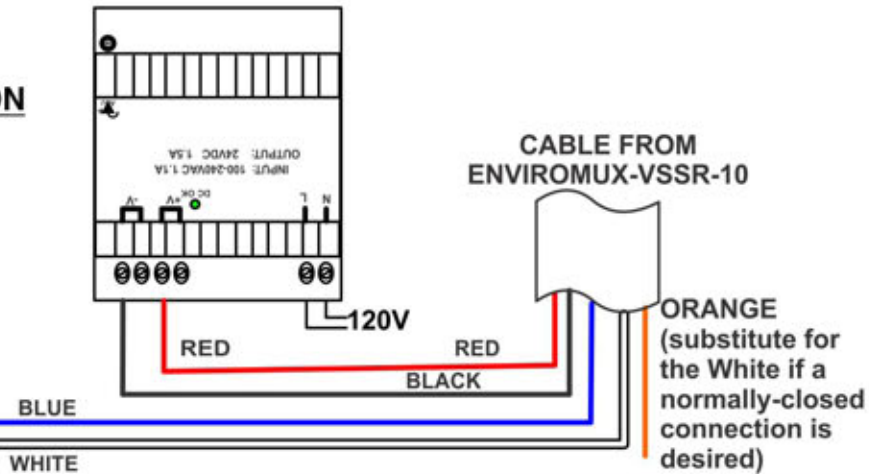
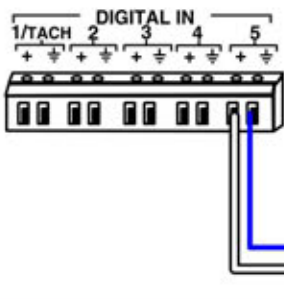


## VIEW OF TERMINALS ON ENVIROMUX-16D

CONNECT THE ENVIROMUX-VSSR-10 SENSOR CONTACT TERMINALS TO ANY SET OF DIGITAL IN TERMINALS ON THE ENVIROMUX-16D (1-8)



## VIEW OF TERMINALS ON ENVIROMUX-5D



## VIEW OF TERMINALS ON ENVIROMUX-2D

