

USER MANUAL

Vibration Mote (Model 3)

WIRELESS CONDITION MONITORING SENSOR
FOR ROTATING EQUIPMENT



THREE SENSORS IN ONE



TEMPERATURE



TRI-AXIAL VIBRATION



MAGNETIC FIELD

PetaSense

www.petasense.com

FCC ID: 2AJW7-00002

Revision History

Version	Date	Notes	Contributor
1.0	Dec 5, 2019	Initial Release	Kevin Du

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Data Sheet

	Model 3
Accelerometer	Tri-axial MEMS
Frequency Response	2 to 6,000 Hz (+/- 3 dB)
Frequency Response Accuracy	At X Hz: X% At Y Hz: Y%
Measurement Range	+/- 2g to +/- 16g
Transverse Sensitivity	
AD Conversion	16 Bit
Sensitivity	0.061 mg/LSB
Sampling Rate	26.7 kHz
Resolution	

TEMPERATURE SENSOR

Measurement Range	-40°C to 85°C (-40°F to 185°F) (+/- 5% accuracy)
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MAGNETIC SENSOR

Digital Output	i2C
Magnetic Field	Full scale adjustable from +/- 4 gauss to +/- 16 gauss
Sampling Rate	Up to 1 KHz

PHYSICAL

Dimensions	<i>Height:</i> 58.1 mm (2.29 inches) <i>S-ring diameter:</i> 38.7 mm (1.52 inches)
Weight	125 g
Mounting (recommend epoxy or stud)	<i>Epoxy:</i> Steel-enforced two-part epoxy <i>Stud:</i> 6.35 mm (¼ inch) 28 UNF
Materials	<i>Cover:</i> <i>Base, Mount and S-ring:</i>

ENVIRONMENTAL

Operating Temperature Range	-40°C to 85°C (-40°F to 185°F)
Storage Temperature	< 85°C (185°F) without battery
Shock Resistance	2 meter fall, 16 g continuous vibration
Certifications	Class I Div 2 (ABCD), IP67, NEMA 4, FCC, CE, RoHS compliant

POWER

Source	CR123A (CR17345) 3V Lithium
Battery Life	1-2 years with 8 measurements per day ~20% reduced battery life if operating below -10°C (15°F)

CONNECTIVITY

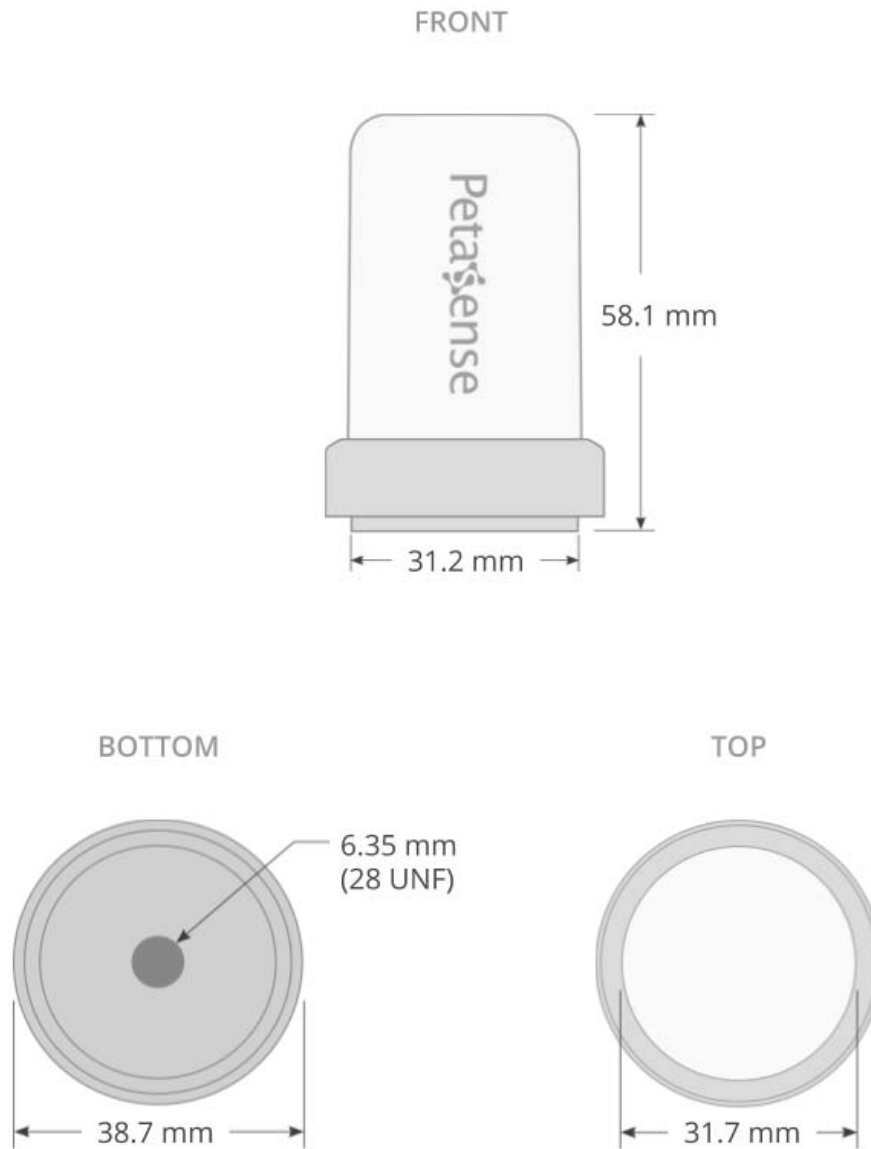
Wireless Protocol	WiFi (2.4 GHz, 802.11 b/g/n) (Bluetooth can be used to trigger on-demand readings)
Antenna	WiFi: Chip Antenna -0.4 dBi max gain Bluetooth: PCB Antenna 2.0 dBi max gain

Processor	32-bit 144 MHz ARM Cortex M4F (remote firmware updates)
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ACCESSIBILITY	
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User Interface	Web: Internet browser access Mobile: iOS application available in App Store
Security	TLS 1.2 with AES encryption

VIBRATION MOTE DIMENSIONS



How to Install Vibration Motes

Overview

Mounting Petasense Motes is simple and does not require any special skills. Each Mote takes about 5-10 minutes to mount. Start monitoring the health of your industrial machines in four simple steps:

Step 1. Power up the Mote

Step 2. Prepare the machine surface

Step 3. Mix the epoxy

Step 4. Mount the Mote

What you will need:

- Petasense Motes
- CR123A 3V Batteries (Duracell recommended for longer battery life)
- Handheld rotary tool with sanding attachment (Dremel recommended)
- 2-part steel-enforced epoxy (JB Weld SteelStik recommended) - Safety Datasheet
- X-Acto knife
- Rubber gloves (for mixing epoxy)
- Soap Water (1:4 soap to water mixture)
- Shop towels
- Protective glasses
- Protective gloves
- Dust Mask
- *Not Pictured* Silicone/Lithium Grease (Model 2 Only)



Mote Components:

These instructions will reference specific components of the Mote as follows:



Before Getting Started

0.1 Confirm that your WiFi network has coverage in the machine areas. If possible, perform a brief site survey with a mobile device.

0.2 Prepare the appropriately sized pieces of 2-part steel-enforced epoxy. Each Mote requires a 2.5 – 3-gram piece of epoxy. Each tube of JB-Weld SteelStik will contain enough epoxy for approximately 20 Motes.

0.3 Document the allocation of your Motes very carefully. Keep a record of the serial numbers of your Motes and which machines they are mounted on. This attention to detail is essential for any successful asset monitoring program.

Note: Before handling Petasense Motes, be sure to wash your hands to avoid getting dirt or other particles inside the device.

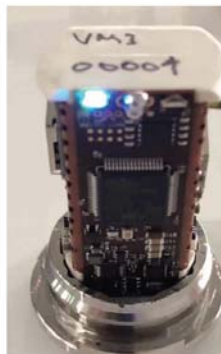
Now, let's get started.

Step 1. Power up the Mote

1.1 Remove the Mote cover and insert a new CR123A battery. The Mote will blink a series of yellow and red LEDs, ending with a slow, blinking green LED, indicating that the Mote has successfully connected to WiFi. If the Mote only blinks yellow and/or red, you will need to configure the Mote with the appropriate WiFi credentials before continuing. (See "How to Connect Vibration Motes to WiFi")

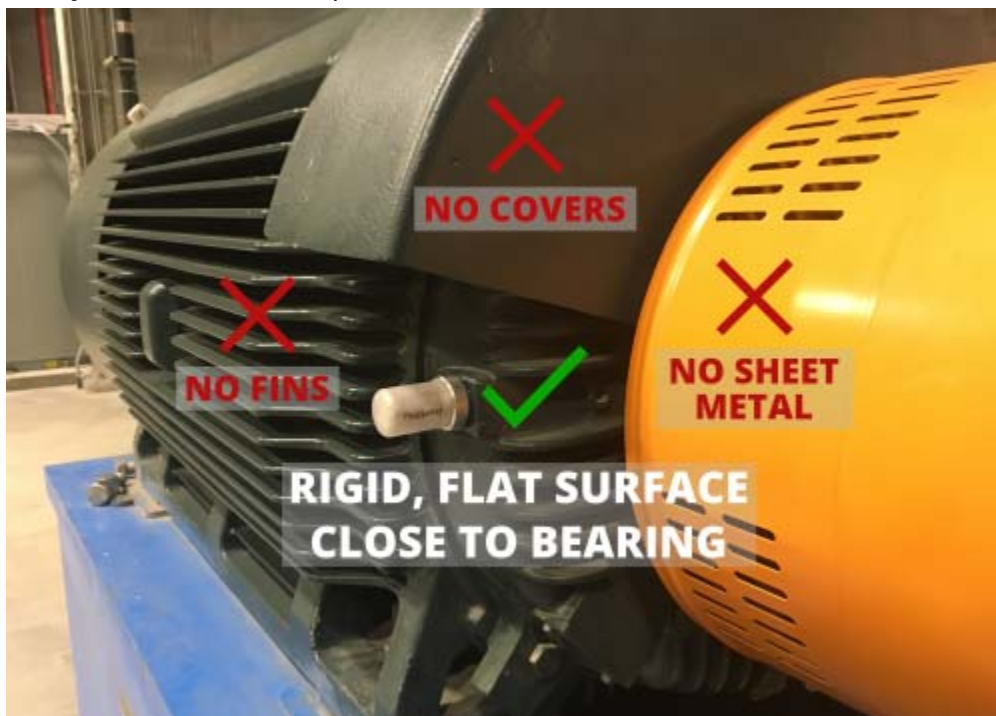
1.2 Once the Mote has connected to WiFi, replace the cover, place the device on the mount, place the S-ring over the top of the device and thoroughly tighten the S-ring clockwise at the base.

If using Model 2, please see further instructions below.



Step 2. Prepare the machine surface

2.1 Identify a mounting location close to where the bearing is located on the machine. The ideal mounting location will be a rigid, flat surface. Avoid mounting on sheet metal covers, fins or other flimsy surfaces that are prone to rattle.



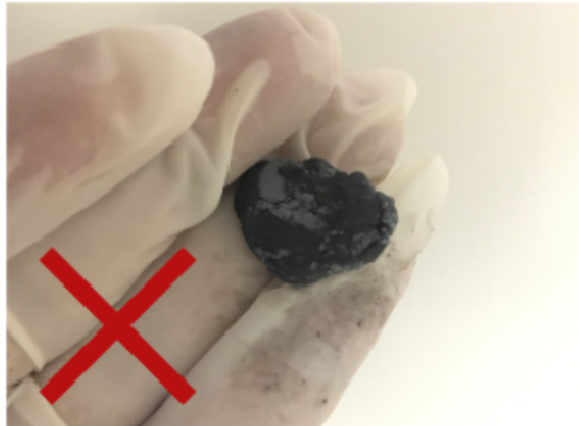
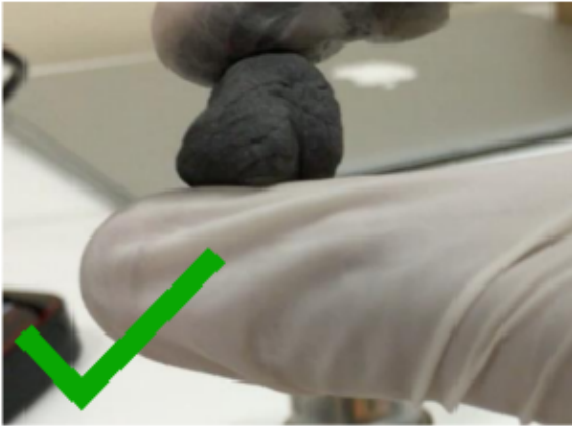
2.2 Use the rotary tool to strip the paint from the mounting location on the machine.

2.3 Apply Soap Water to a shop towel and wipe off any dirt or particles from the sanded mounting location.



Step 3. Mix the epoxy

3.1 Wearing rubber gloves, knead one piece of 2-part steel-enforced epoxy thoroughly in your hand until the color is uniform. Ensure that the epoxy is in good condition (firm and slightly moist, not too hard or crumbly). Once the epoxy is mixed, you will need to apply it to the Mote quickly or it will start to harden.



3.2 Roll epoxy into a 2-3 inch strip, then form a ring on the bottom of the Mote mount.



Step 4. Mount the Mote

4.1 Place the Mote on the mounting location with the Petasense logo facing the closest machine shaft. Press down firmly for 15-20 seconds.



Note: It is important that the Mote is mounted with the Petasense logo facing the direction of the machine's shaft for orientation purposes

4.2 Visually check that the epoxy is only bonding to the base of the Mote, not touching the knurled S-ring above the mount. If it is touching the S-ring, use the X-Acto knife to push the edges of the epoxy down toward the machine surface, so that the S-ring can be removed in the future for battery changes.

Mounting Complete!



How to Remove Petasense Motes

Overview:

Petasense Motes will need to be removed and reinstalled from time to time as your equipment will require maintenance or replacement. There are a few options when it comes to removing your Motes safely and efficiently.

Option 1: Temporary removal of the Petasense Motes for equipment repairs/maintenance:

If your equipment will be removed temporarily and reinstalled with the same configuration, Petasense Motes may also be removed and stored without going through the whole installation process.

Step 1: With safety gloves on, secure the Mote with one hand and remove the S-Ring by turning counter-clockwise with your other hand. Once removed, please store the Mote and S-Ring together until re-mounting. The Mount can remain on the machine component for re-mounting later.



Step 2: Remove the CR123a Battery for storage or discard/recycle properly if spent.

Step 3: After the equipment is reinstalled, re-insert a CR123a Battery and verify it has taken a reading with the Petasense Mobile App.

Step 4: Remount the Mote by placing in the correct orientation on the mount and then fastening the S-Ring tightly (clockwise).

Option 2: Permanent removal of Petasense Motes and Mounts

In the case your equipment will be replaced with new components, you can safely remove the Mote and recover the Mount.

Step 1: Follow the steps above to remove the Petasense Mote from the mount.

Step 2: With a chisel and rubber hammer you can gently chip away the SteelStik Epoxy easily and recover the Mount. A Flathead Screwdriver can also be used in place of a chisel.



Step 3: Clean the Mount by chipping away any leftover epoxy residue with the Chisel/Rubber Hammer. A Handheld Grinder can also be used to clean the Mount.

Blink Up - How to Connect Vibration Motes to WiFi

How to Connect Vibration Motes to WiFi



Connecting Vibration Motes to your WiFi network is a quick and simple process, which utilizes a technology called Blink Up. This is a method of using your mobile device to optically communicate WiFi login credentials to a Vibration Mote.

* Note: If your WiFi network was provided by Petasense, your Vibration Motes should already be configured to the wireless network when you receive them.

Summary

1. Log in to the Petasense App
2. Configure your WiFi credentials
3. Power up the Vibration Mote
4. Initiate Blink Up
5. Confirm a successful WiFi connection

What you will need

- Petasense Vibration Mote

- iOS mobile device
- 3V CR123a batteries
- WiFi network access (see network requirements)

Pro Tip: Perform Blink Up in a low-light area

Indoors, away from any windows or ambient lights, best results in a shaded area (e.g. underneath a desk)

Step 1: Log in to the Petasense App

1-1. Install the Petasense App

Using your iOS mobile device, install the Petasense App from the App Store.

1-2. Login using your email and password

If you have not set up a personal Petasense Login, contact your Petasense Account Admin to gain access.

Step 2: Configure your WiFi credentials

2-1. Navigate to Blink Up

On the main dashboard page, select More from the bottom-right corner of the screen. Then select Blink Up.

2-2. Enter your WiFi Credentials

Select Configure WiFi and enter the SSID and password of your WiFi network. Then select Next.

Step 3: Power up the Vibration Mote

3-1. Access the battery compartment of the Mote

Unscrew the steel S-ring and slide it over the top of the Mote. Remove the Mote from the steel mount and carefully pull off the plastic cover.

3-2. Insert the battery

Insert one 3V CR123a battery into the battery compartment.

3-3. Confirm a successful power-up

On the opposite side of the battery compartment, you will notice a flashing red LED on the top-right corner of the Mote, indicating that the Mote was successfully powered up and ready to receive WiFi credentials. If no light appears; remove the battery, wait 15 seconds and reinsert the battery.

Step 4: Initiate Blink Up

4-1. Select Start on your mobile device

After selecting Start, there will be a 3-second countdown on-screen before Blink-Up starts. You will need to quickly perform the next step before the countdown ends.

4-2. Place the Mote (LED side) on the screen of your mobile device

With your mobile device on a table or in your palm, place the Mote on top with the blinking red LED facing the screen. If the Blink Up sequence starts before you place the Mote on the screen, wait until the sequence is over, select the back arrow and try again.

4-3. Confirm a successful Blink Up

As soon as the Blink Up sequence is over, pick up the Mote and check the LED. You should immediately see a flashing green LED, indicating that the Mote successfully received your WiFi credentials.

Step 5: Confirm a successful WiFi connection

5-1. Confirm a recent measurement on the Petasense App

To confirm that the mote has taken a measurement select the Sensors option at the bottom of your screen. Then select the Sort option at the top left of the screen. From there select Serial Number - Ascending/Descending. Find the serial number of the mote you are attempting to connect and verify that a measurement has been taken by checking the Last Measurement option.

5-2. Reassemble the Mote

Once you have confirmed the connection, you may remove the battery until it is time to install the Mote on a machine. Then replace the plastic cap and place the Mote on the steel mount. Lastly, place the steel S-ring over the top of the Mote and tighten clockwise at the base.

Success! Your Vibration Mote is now connected to WiFi!

RF exposure information:

To maintain compliance with FCC RF exposure requirements, use the product that maintain a 20cm separation distance between the user's body and the host.

MPE limit for RF exposure at prediction frequency is 1mW/cm² for 2.4GHz WLAN/BT .
The MPE for 2.4GHz WLAN is 0.001mW/cm², Bluetooth is 0.000mW/cm² . It satisfy RF exposure compliance.

FCC statements:

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications or changes to this equipment. Such modifications or changes could void the user's authority to operate the equipment.