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Manual ₹

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**Petasense Vibration Mote Wireless Condition Monitoring Sensor** 



# **Specifications**

• Accelerometer: Tri-axial MEMS

• Frequency Response: 2 to 6,000 Hz (+/- 3 dB)

• Measurement Range: +/- 2g to +/- 16g

• AD Conversion Sensitivity: 16 Bit

• Sampling Rate: 26.7 kHz

• Temperature Sensor Measurement Range: TBD

• Magnetic Sensor: Full scale adjustable from +/- 4 gauss to +/- 16 gauss

• Magnetic Field Sampling Rate: Up to 1 KHz

• **Dimensions:** Height: 90mm, S-ring diameter: 38.7 mm (1.52 inches)

Weight: TBD

• Power Source: 2x CR123A (CR17345) 3V Lithium

• **Connectivity:** WiFi (2.4 GHz, 802.11 b/g/n)

• Processor: Dual Core 32-Bit Processor

#### **How to Install Vibration Motes**

1. **Overview:** Mounting Petasense Motes is simple and does not require any special skills.

### 2. 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
- Silicone/Lithium Grease

### **Revision History**

Version	Date	Notes	Contributor
1.0	May 1, 2024	Pre-Release	Harsha Mokkarala

#### **Data Sheet**

	Model 4
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	TBD
AD Conversion	16 Bit
Sensitivity	0.061 mg/LSB
Sampling Rate	26.7 kHz
Resolution	

# **TEMPERATURE SENSOR**

TEMPERATURE SENSOR	
	-40°C to 80°C (-40°F to 185°F)
Measurement Range	(+/- 5% accuracy)

# **MAGNETIC SENSOR**

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

PHYSICAL	
Dimensions	Height: 90mm

	S-ring diameter: 38.7 mm (1.52 inches)
Weight	

Mounting (recommend ep oxy or stud)	Epoxy: Steel-enforced two-part epoxy  Stud: 6.35 mm (1/4 inch) 28 UNF
Materials	Cover: UV Stabilized, Flame Retardant Polycarbonate Ba se, Mount and S-ring: SS316

### **ENVIRONMENTAL**

ENVIRONMENTAL	
Operating Temperature R ange	-40°C to 80°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**

POWER	
Source	2x 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

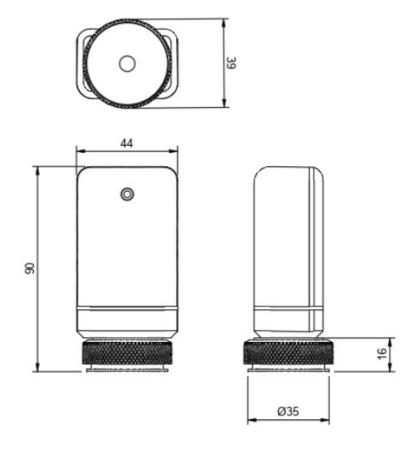
# CONNECTIVITY

Wireless Protocol	WiFi (2.4 GHz, 802.11 b/g/n) Bluetooth (Pro models only)
Antenna	WiFi/Bluetooth Antenna   5 dBi max gain
Processor	Dual Core 32-Bit Processor

# **ACCESSIBILITY**

ACCESSIBILITY	
User Interface	Web: Internet browser access  Mobile: iOS application available in the App Store

	Security	TLS 1.2 with AES encryption	
- 1			



# **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
  - Silicone/Lithium Grease



#### **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

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")

- 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**

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.



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

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



Step 3. Mix the epoxy

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.





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



## Step 4. Mount the Mote

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



**Note:** The Mote must be mounted with the Petasense logo facing the direction of the machine's shaft for orientation purposes

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 it 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

- Install the Petasense App
- Using your iOS mobile device, install the Petasense App from the App Store.
- Log in 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

- Navigate to Blink Up
- On the main dashboard page, select More from the bottom-right corner of the screen.
   Then select Blink Up.
- Enter yoWi-Fi credentialsals
- Select Configure WiFi and enter the SSID and password of your WiFi network.
- Then select Next.

#### Step 3: Power up the Vibration Mote

- 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.
- Insert the battery
- Insert one 3V CR123a battery into the battery compartment.
- Confirm a successful power. r-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 ap, ears; remove the battery, wait 15 seconds, and reinsert the battery.

### Step 4: Initiate Blink Up

- Select Start on your mobile device.e
- 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.
- Place the Mote (LED side) on the screen of your mobile device.ce 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.
- 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

- 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.t
- Measurement option.
- 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!

- Federal Communication Commission (FCC) Radiation Exposure Statement
- When using the product, maintain a distance of 20cm from the body to ensure compliance with RF exposure requirements.
- 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.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, under part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy and, if not installed and used according to the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the

user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**FCC Caution:** Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

### **Frequently Asked Questions**

Q: What is the recommended battery type for the Mote Model 3?

**A:** The recommended battery type is CR123A 3V Lithium, with Duracell batteries being suggested for longer battery life.

# **Documents / Resources**



Petasense Vibration Mote Wireless Condition Monitoring Sensor [pdf] Use r Manual

VM4P, 2AJW7-VM4P, Vibration Mote Wireless Condition Monitoring Sens or, Vibration Mote, Wireless Condition Monitoring Sensor, Condition Monitoring Sensor, Monitoring Sensor, Sensor

#### References

- User Manual
- Petasense
- 2AJW7-VM4P, Condition Monitoring Sensor, Monitoring Sensor, Petasense, Sensor, Vibration Mote, Vibration Mote Wireless Condition Monitoring Sensor, VM4P, Wireless Condition Monitoring Sensor

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