WAITES

SM6 SENSOR MOTE USER GUIDE

MODELS:

SM6-1150
SM6-2250
SM6-0864

VERSION 1.1

Updated July 2023

For questions regarding content in this guide or for any other support related items, contact **support@waites.net** or call **1-800-574-WAITES**

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1 SM6 Overview

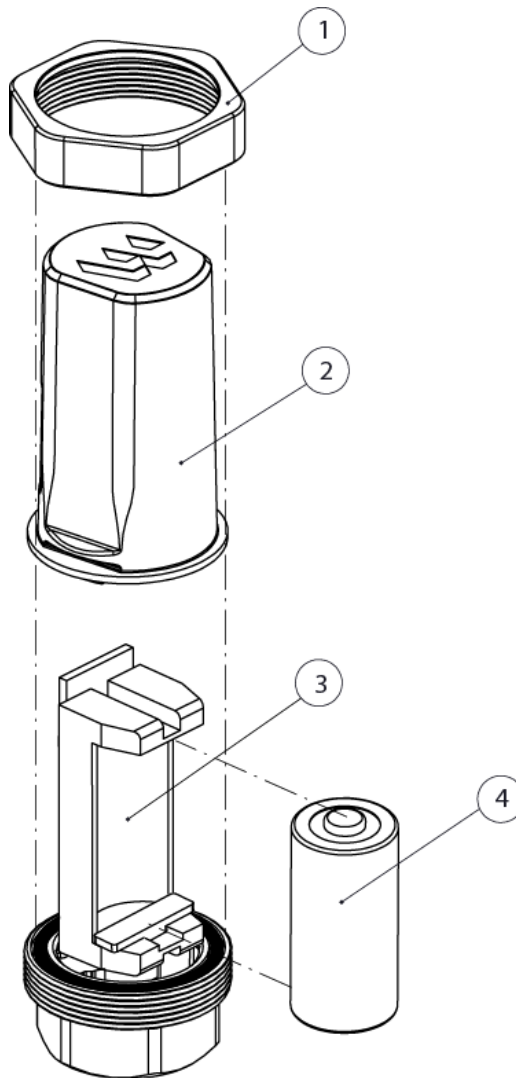The SM6 is a high-frequency, high-G, 3-axis wireless vibration sensor that helps keep your equipment running properly by alerting you before unexpected failures occur. This all-in-one condition monitoring device is made to withstand the harshest conditions.

The image below identifies the main parts of a SM6:

        1 - SM6 Compression Ring
        2 - SM6 Cap
        3 - SM6 Base
        4 - Battery

2 Installing and Configuring the SM6

All SM6 models will arrive to your facility in hibernation mode with batteries pre-installed to conserve power.

This chapter provides information on how to install and configure the SM6.

Note the following:

- If a SM6 needs to be replaced, you must replace it with the same model number (for example, SM6-1150) unless otherwise instructed by a Waites support associate.
- You should avoid touching the board inside the SM6 as much as possible, and the use of gloves is highly recommended.
- If you need to replace a battery in a SM6, you must use the required battery type. See "Replacing the Battery in the SM6" on page 7 for details.
- There is no need for you to open the SM6 prior to installation, unless directed by Waites personnel.
- You must bring the SM6 out of hibernation mode before installation. See "Performing Pre-Installation Steps" on page 3 for details.

Performing Pre-Installation Steps

Note: There is no need for you to open a SM6 prior to installation, unless directed by Waites personnel.

Once you are ready to install a SM6, you must bring the SM6 out of hibernation mode.

To bring a SM6 out of hibernation mode:

- Hold a magnet over the top of the SM6 and do not remove it until the indicator light comes on and goes back off (usually takes about 3-5 seconds). If the light stays on longer than 10 seconds with the magnet nearby, then it is already out of hibernation mode and ready to connect.

  Note: There will be additional flashes after the magnet is removed while the SM6 syncs with the network.

The standard boot sequence performs a power-on self-test immediately on start-up and will turn on the LED light with a long flash if the self-test passes and a short flash if the self-test fails. If the self-test fails, try again and contact Waites Support if you need additional help. Next, the device will start searching for a gateway. If a gateway is found, it rapidly flashes the LED light indicating that it is paired with a gateway.

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A quick magnet swipe will invoke the standard boot sequence. If you invoke another magnet swipe prior to completing the operation, the SM6 will restart the sequence from the beginning.

Hibernation mode cannot be reactivated once the standard boot sequence has been initiated.

Locating the Sensor Installation Point

After your SM6 has been added in the Waites Self-Service Dashboard, the next step is to determine the physical installation point.

Note: The sensor installation point should have enough space for the sensor to sit without touching any other part of the equipment other than the point being monitored. This prevents equipment from picking up additional background vibrations.

To determine an installation point for a SM6:

- Locate a flat area that is approximately 1 sq. in (6.45 sq. cm) that provides the most metal-to-metal contact between the equipment and the base of the SM6.
- Identify the SM6 axes and note that the X-axis is the most sensitive axis.

Preparing the Sensor Installation Point Location

After you have located a sensor installation point, you must prepare the location.

To prepare the sensor installation point location:

1. Clean the location of the sensor installation point by removing all dirt and grease on any exposed surface of the equipment. If the equipment surface is painted, remove the paint as well.
2. If required, grind down the equipment surface to create a flat area for the sensor to be mounted. Optionally, you can use the mill attachment in the Accelerometer Installation Tool Kit to create a flat surface area of 1.25 inches in diameter.

Selecting a Mounting Technique

After you have prepared the sensor installation point location, you must select a mounting technique: stud mount, mounting pad, or direct epoxy.

Stud Mount

The stud mount technique is recommended whenever possible, since it provides the most metal surface area contact between the machine and the sensor. This technique involves screwing the sensor directly into a 1/4"-28 stud tap and drilling the tap into the equipment, but it allows you to easily remove and replace the sensor on the equipment.
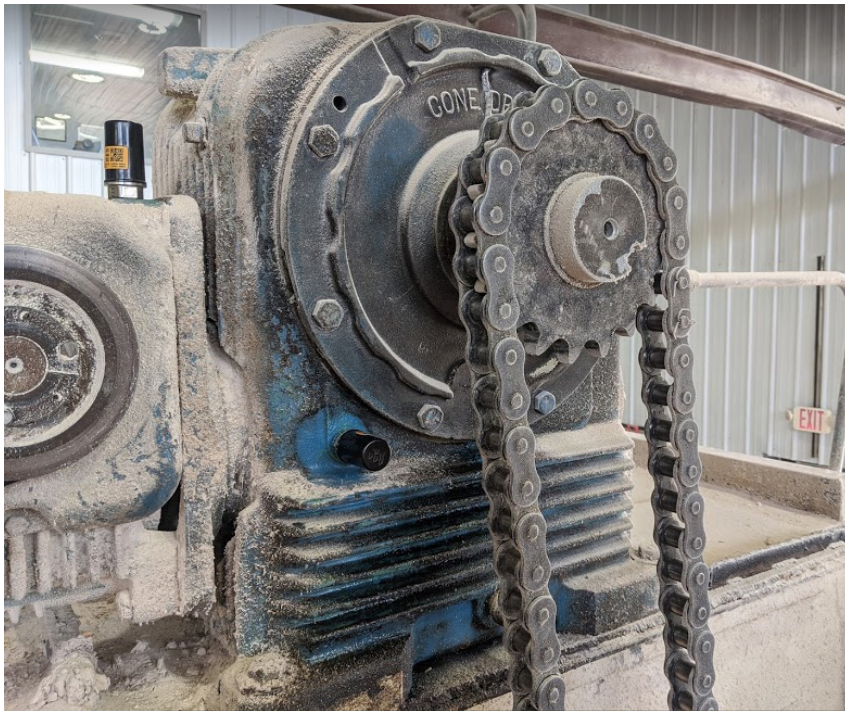
Mounting Pad

The mounting pad technique is recommended when you cannot drill a tap into the equipment. This technique allows you to easily remove and replace the sensor on the mounting pad.

Direct Epoxy

The direct epoxy technique is the most common technique. This technique requires an installation point that has a large amount of flat metal-to-metal surface area contact (for example, 1 in. sq./6.45 cm sq.) between the equipment and sensor.

Mounting the SM6

This section provides instructions on how to mount a SM6 on the installation point using each mounting technique.

Note: If a SM6 needs to be replaced, you must replace it with the same model number unless otherwise instructed by a Waites support associate.

Your SM6 will be online if the equipment is installed properly and the SM6 ID is correctly associated with the installation point. It is recommended that you take photos and upload them to the Waites Self-Service Dashboard for better installation point identification and analysis.

Using a Stud Mount

To mount a SM6 using a stud mount:

1. Have a mechanical fitter install the stud mount cap and note that a 1/4"-28 UNF threaded hole is sufficient. The recommended height for the stud cap is 5 mm.
2. Associate the SM6 ID to the installation point.
3. Screw the SM6 onto the mounting stud after the following has occurred:
    - The SM6 ID is associated with the installation point.
    - The SM6 is powered on.
    - The mounting stud is secure.
4. Confirm that the axes on the SM6 line up with the equipment and that the metal base of the SM6 is firmly pressed against the metal face of the equipment.
5. Reboot the SM6 by holding a magnet to the top of the SM6 cap for 3 seconds. The SM6 should blink again after you remove the magnet.

Using a Mounting Pad

To mount a SM6 using a mounting pad:

1. Tightly fasten the mounting pad onto the SM6 and confirm that the metal face of the mounting pad has solid contact with the metal base of the SM6.

    Note: A 1-inch crescent wrench or similar is required to securely fasten or remove the SM6.
2. Position the mounting pad and SM6 on the equipment in the desired installation point location and line up the monitored axes. Make note of the position and orientation of the mounting pad by marking the mounting pad.
3. Remove the SM6 from the mounting pad.
4. Apply a small bead of Loctite AA330 epoxy on the center of the mounting pad and lightly spray the bead of epoxy with the Loctite SF 7387 activator.
5. Line up the mounting pad using the marking created in Step 2, then press the plate directly onto the equipment. Hold the mounting pad in place until the epoxy is cured enough to fully support the weight of the mounting pad, which should take approximately 1-2 minutes. Make sure the mounting pad does not shift after you release it.
6. Continue to let the epoxy cure for another 2-3 minutes before proceeding. The full cure time is 6 hours at 77° F (25° C).
7. While waiting for the mounting pad to become secure, associate the SM6 ID with the installation point.

8. Screw the SM6 onto the mounting pad after the following has occurred:
   - The SM6 ID is associated with the installation point.
   - The SM6 is powered on.
   - The mounting pad is secure.
9. Confirm that the axes on the SM6 line up with the equipment and that the metal base of the SM6 is firmly pressed against the metal face of the mounting pad.
10. Release the SM6 and allow the epoxy to continue to cure. During this time, make sure the position and orientation of the SM6 do not shift. The SM6 should be secure after 5 minutes, and the full cure time is 6 hours at (77° F) (25° C).
11. Reboot the SM6 by holding a magnet to the top of the SM6 cap for three seconds. The SM6 should blink again after you remove the magnet.

Using Direct Epoxy

To mount a SM6 using direct epoxy:

1. Confirm that the SM6 ID is associated with the installation point.
2. Apply a very thin layer of Loctite AA330 epoxy around the metal base of the SM6 and lightly spray the bead of epoxy with the Loctite SF 7387 activator.
3. Line up the axes of the SM6 with the prepared installation point, then press the SM6 directly onto the installation point. Be sure the epoxy distributes across the base of the SM6 evenly.
4. Hold the mounting SM6 in place until the epoxy is cured enough to fully support the weight of the SM6, which should take approximately 2-3 minutes.
5. Release the SM6 and allow the epoxy to continue to cure. During this time, make sure the position and orientation of the SM6 do not shift. The SM6 should be secure after 5 minutes, and the full cure time is 6 hours at (77° F) (25° C).
6. Reboot the SM6 by holding a magnet to the top of the SM6 cap for 3 seconds. The SM6 should blink again after you remove the magnet.

Replacing the Battery in the SM6

The battery inside the SM6 is designed to work for 3-5 years; however, there may be times when you need to replace it sooner.

To replace the battery in the SM6:

1. Unscrew the compression ring and note that a compression ring seal exists between the stainless steel base and cap and the compression ring.
2. Gently remove the old battery out of the battery clip and retainer.

3. Insert a new battery after confirming the following:

- You are using a 3V approved CR123A Industrial Lithium battery.
- You are inserting it correctly (that is, the plus (+) side is on the top and the negative (-) side is on the bottom).
- The indicator light flashes on the board after you insert the battery.

4. Check that the compression ring seal is clean and note the following:

- To keep the compression ring in position and prevent it from cracking, you can apply additional Super Lube Silicone O-Ring Lubricant (93003) or equivalent from the factory.
- If required, you can order replacement compression rings from Waites.

5. Insert the cover and observe the correct orientation.

6. Insert the compression ring and manually rotate clockwise until it's no longer possible.

7. Tighten the compression ring to 30 ft-lbs.

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3 Removing and Reinstalling the SM6

This chapter provides information on how to remove and reinstall the SM6.

Safety Requirements:
- Proper PPE must be worn
- Identify potential hazards
- Perform all necessary lock out tag out (LOTO) tasks
- Verify the equipment has been properly locked out

Required PPE:
- Gloves
- Safety goggles

Required Tools:
- Hammer
- Scraper
- Screwdriver
- Machinist file
- Emery cloth
- Loctite AA 330 epoxy
- Loctite SF 7387 activator

Note: Before you remove the SM6, take a picture of it so you can refer to the photo during reinstallation for proper placement and orientation.

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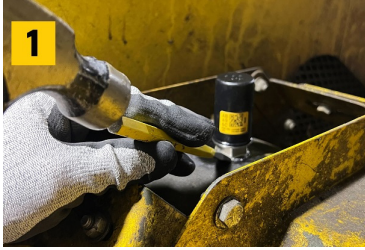
1 Place the scraper between the SM6 and equipment. Tap the scraper with a hammer until the SM6 is freed from the equipment.

2 Remove any remaining epoxy from the SM6 using an emery cloth.

3 Identify the proper location on the equipment (and avoid the cover) and then prepare the location for paint removal by wiping it down with a rag. Note: The motor location acceptable for the drive and non-drive side is green. In rare cases, you will need to modify the cover if there isn't a flat surface.

4 Remove all remaining paint from the equipment. If desired, use a wire brush attachment with the drill.

If the replacement component is a different shape, you should do the following to obtain better data:
- Attach the SM6 where there is a direct connection to the bearing being monitored.
- Attach the SM6 to the flattest surface possible.

If the replacement component is the same shape, you should attach the SM6 to the exact location it was removed from, in the same orientation.

5 Clean the surface of the equipment where the SM6 is to be mounted using alcohol wipes and allow the surface to fully dry.

6 Apply a small amount of epoxy to the SM6 base and evenly spread it on the face of the SM6. Coat the epoxy with the activator spray to begin cohesion.
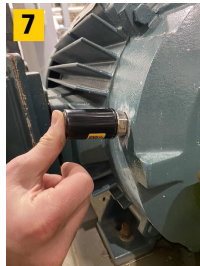
7 Apply the SM6 to the proper location using medium pressure until it is secure (3-5 minutes). Verify the SM6 is properly mounted and secure.

8 Ensure the Z-axis is running directly along the shaft. In this example, the Z-axis is facing the camera; therefore, it is running along the shaft.

4 Troubleshooting the SM6

If you encounter problems when installing or configuring the SM6, Waites recommends that you trigger a resynchronization to the gateway by tapping/swiping a magnet on the top of the SM6. This is the first thing you should try if the SM6 isn't working properly.

Also, keep in mind that you should avoid touching the board that is inside the SM6 as much as possible to avoid future problems and use gloves at all times.

For information on how to replace SM6 batteries, see "Replacing the Battery in the SM6" on page 7. For information on how to remove and replace the SM6, see "Removing and Reinstalling the SM6" on page 10.

If you are still encountering issues after performing these tasks, contact Waites technical support at support@waites.net.

A FCC Compliance Statement

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.

Any changes or modifications not expressly approved by the party responsible for compliance 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, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with 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 into 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 Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body.

Industry Canada (IC) Regulatory Information:

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.