FLUKE
Reliability

Fluke 3563 Analysis Vibration Sensor

Frequently asked questions

Q: Why should I use a vibration sensor, and what is the benefit?

A: Vibration anomalies are some of the first indications of misalignment, looseness, bearing wear, or imbalance faults within mechanical rotating equipment. By continuously monitoring assets, maintenance and reliability teams can better understand when maintenance repairs and replacement should be completed. Wireless sensors overcome the challenges faced by maintenance teams in all industries: limited time, resources, and access to machines (i.e., those behind panels, in high places, in hazardous areas, etc.). You can:

- Determine the fault causing a problem and decide critical next-step actions.
- Repair machines before failures occur to increase production revenue and lower energy waste and maintenance costs.

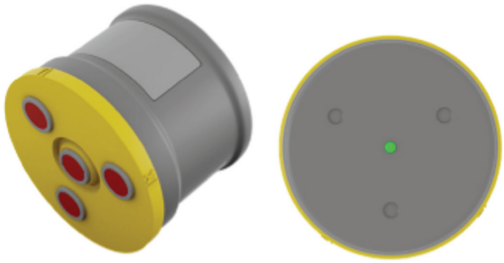
Q: What are the key features of the Fluke 3563 Analysis Vibration Sensor?

A: The 3563 features include a unique floating, piezoelectric sensor and:

- Smart battery management capability with a user-determined data transmission rate.
- Users can configure the sensor based on machine type for precise readings without manually entering severity thresholds.
- Powerful analysis capabilities of eMaint condition monitoring software to analyze both banded overall values and narrowband values.
- Wireless gateway possesses dual network connection capabilities—Wi-Fi and Ethernet—so your system can fit your facility.

Q: What are the component parts of the Fluke 3563 Analysis Vibration Sensor?

A: The sensor base comprises three strong magnets and a cylindrical stainless steel disc used to attach the sensor to a specially designed mounting adapter.



The sensor's top has an LED that shows the connection status between the sensor and the gateway.

Q: How many and what type of batteries are inside the sensor?

One year with transmission rate with Transmission of Overalls every 10 minutes and 2-second TWF every 30 minutes

A: The 3563 sensor is powered with six 1/2 AA batteries, with one battery as a standby battery.

6 x 3.6V ½ AA Li-SOCI 2 Battery (Replaceable) Radio
The standby battery is used if the five primary batteries' capacity falls below the required level.

It is recommended to replace all six batteries at the same time by unscrewing the housing.

Q: How is vibration measured?

A: The sensor is a battery-operated triaxial sensor that uses two MEMS sensors and a piezoelectric sensor. Measurements are made in three directions (frequency range is 2 Hz – 10,000 Hz: Z (0 Hz – 1,000 Hz: X, Y))

The two MEMS sensors are used to measure low-frequency vibrations in the X and Y orthogonal axes. The piezoelectric sensor measures both low— and high—frequency vibrations in the Z-axis, the main sensing axis. The result is sent to the eMaint condition monitoring software.

The sensor makes these measurements:

- Vibration measurements that include RMS and zero-to-peak (supported measurement quantities are velocity and acceleration)
- Time waveform

Q: How does the sensor work to measure Overall Vibration and time waveform?

A: The digitized vibration measurements are processed either as overall values or as raw data. The gateway can be triggered from the cloud-based Data Platform to instruct the sensor to record a time waveform signal. This raw signal is then transferred via the gateway and back to the Data Platform. Another portion of the raw signal is converted to overall values and compared with the overall threshold values. If the threshold values are exceeded, an alarm signal is sent to the gateway. The gateway will then send a request to the sensor to transfer the overall values, causing the alarm signal. If there is no alarm signal, the overall values are saved.

Q: What is the Fluke 3503 Wireless Gateway, and how does it work?

A: The system gateway is the central bridge between a 3563 Analysis Vibration Sensor and the Accelix™ cloud-based data platform.

The gateway collects measurement data from the sensors and transfers the data to Accelix. A single gateway communicates with up to 20 sensors.

The gateway uses a low-energy wireless protocol to communicate with the sensor. Communication between the gateway and Accelix is based on IoT technology (MQTT) and is bidirectional. The measurement data collected by the sensor is processed in Accelix.

To save energy, the low-energy wireless protocol connection between the sensor and the gateway is established on-demand only, except for alarm signals that are generated if specified thresholds are exceeded. In case of an alarm, the gateway requests the sensor's measured overall values and sends them to Accelix. At the same time, Accelix triggers the gateway to request the sensor to measure a time waveform signal (TWF).

NOTE: The TWF signal is never stored on the sensor but measured anew when requested by Accelix. Before any vibration or temperature measurements may be taken, the gateway must be configured. The configuration of the gateway and the measuring sensor takes place in eMaint condition monitoring.

Q: What are the frequency, communication, and interval from the sensor to the gateway?

A: Frequency: 2.4 GHz ISM band according to IEEE 802.15.1

- Sensor-to-Gateway communication range: Up to 100m line-of-sight, depending on environment
- Transmission Interval: Configurable, minimum default is every 10 minutes

Q: What are power options and communication options to the cloud for the gateway?

IP and temperature rating?

A: 3503 Gateway power supply options

- AC input 85–264 VAC, 0.35A/115V, 0.25A / 230V, 47–63 Hz
- Compliant with IEEE 802.3af

Wireless communication

- Wi-Fi: IEEE 802.11 ac/a/b/g/n
- Wi-Fi security: WPA/WPA2
- Ethernet: 10/100/1000 MBits/s

Ingress protection class: IP67

Temperature:

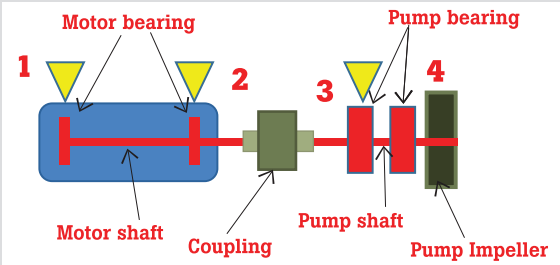
- Operation: -20°C to 60°C (-4°F to 140°F)
- Storage: -40°C to 80°C (-40°F to 176°F)

Q: Do I need to monitor all bearings on a machine?

A: No. Vibration can be transmitted up to 36 inches; thus, it is not necessary to use sensors on every bearing on small machines.

Larger machines may need more than one set of sensors. It is advised that equipment with 75 horsepower or more are equipped with a sensor on each bearing. If using only one sensor, install it on the motor's drive end and the drive end of the driven component (pump, fan, compressors, blower).

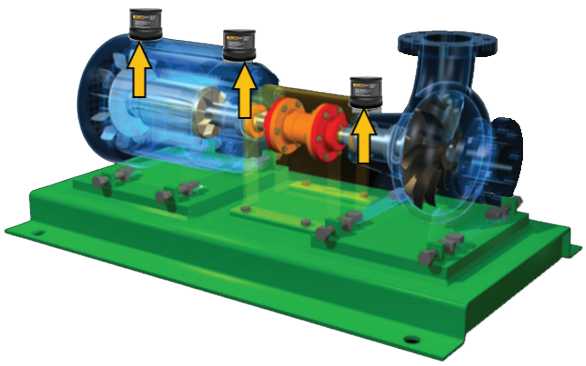
In the example below, one sensor is on each motor bearing, and one is on the pump—ensuring data from both components.



Q: How should I select the bearing location?

A: For vibration testing, locate the bearings on your rotating equipment. Mount the wireless sensor on each bearing location that needs monitoring.

Vibration from the inside transmits via bearings to the outside.



Q: Where do I mount the sensor on the bearing?

A: Sensors should be mounted on bearings to best detect triaxial vibration from rotating shafts in all three directions at the same time.

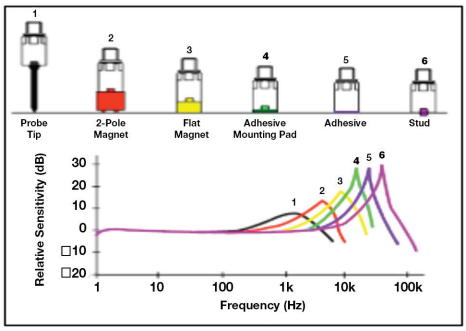
Mount sensors:

- As close to the bearing housings as possible
- Install on solid metal – not on covers, lead boxes, or cooling fans
- On the top, side, or end of the bearing housing

Note: Measurements should not be taken from the pump casing or in the middle of the motor. Vibration from impellers, windings, or other components will transmit down the shaft to the bearings.

Q: How is the sensor mounted?

In the frequency chart below, we see that the adhesive mounting pad (#4) has a slightly lower cut off frequency than the screw mount (#6)



With two options available for mounting the vibration sensor—which should you use?

- What is best? Highest frequency response; most secure; easiest to install; etc.
- It depends on the machine application, plant policies, and the quality of data needed.

A: To obtain the best measurement data, the sensor must be rigidly affixed to the test surface. Poor fixation to the measurement location can adversely affect the signal and restrict the frequency range. The sensor needs a friction-locked, resonance-free, and rigid connection to the measurement location, especially for high-frequency measurements.

When do you use screw mount or epoxy mount?

Screw Mount

- Best frequency response
- Most work needed to install
- Must drill a hole in surface

Epoxy Mount

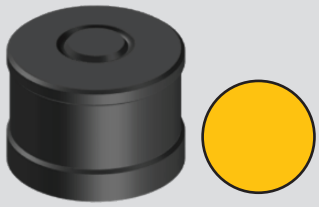
- Good frequency response
- No drilling, yet permanent
- Can remove sensor from base

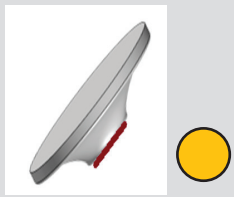
Below are some suggestions (but the final decision lies with the customer):

- Large, critical assets require the highest quality data and often have a thick metal surface (can drill): screw
- Medium, critical assets need quality data, but screw mount may not be acceptable: epoxy
- Medium/small, important assets need good data, but drilling may not be acceptable: epoxy

Q: Why are mounting adapters needed, and how does the adapter reduce the size of the sensor's footprint on the machine surface?

A: As most test surfaces are curved, the sensor uses a mounting adapter to provide the sensor with a smooth, even mounting surface. The preferred sensor installation method is to screw the mounting adapter into the measurement location. If screw mounting is not possible or not allowed, attach the adapter to the measurement location using an adhesive.



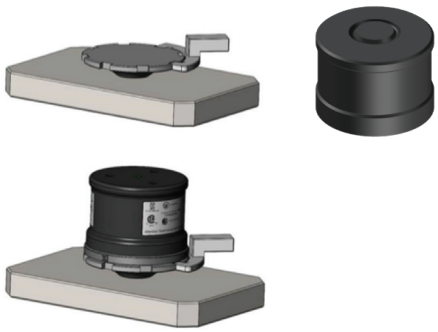


The sensor is 2.7" in diameter, which may pose concerns when installing it on smaller machines or if clearances are tight.

The adapter (screw mount and adhesive mount) reduces the sensor footprint on your machine from 2.7" to 0.8", making it much easier to mount on a wider variety of machines.

Q: Why are the sensors not designed to be semi–fixed?

If a motor is replaced, how do I move the sensor to the new motor?



Screw Mount

Epoxy Mount

A: With the adhesive well applied on the three magnets and the center disc, the sensor is pressed to the mounting adapter to form a firm permanent bond. Once bonded, the mounting adapter now becomes part of the sensor. (The sensor CANNOT be removed from the adapter.)

<u>What problems can occur if a sensor is moved from the machine's surface?</u>

- Removing the sensor could damage the sensor internals
- Permanent sensors are not good troubleshooting tools (use portable)

<u>What if a motor fails and is replaced? If I am careful, can I move the sensor?</u>

- To change the batteries or move the sensor to a new place, the screw mounting adapter must be unscrewed from the measurement location.
- If the adhesive mounting adapter is used, the adhesive's bond must be broken by carefully turning the adapter with the specially designed adapter wrench. Once the adapter and sensor are broken free from the machine surface, remove any residual adhesive from the adapter surface using a grinding wheel or a file.

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