



Remote Monitoring for Business



Wireless Accelerometer
Advanced Vibration Meter
USER GUIDE

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I. ABOUT THE WIRELESS ADVANCED VIBRATION METER

The [ALTA Wireless Advanced Vibration Meter](#) uses an [accelerometer](#) to measure vibration and frequency on 3 axes. The sensor reports vibration (acceleration, velocity, displacement, or acceleration peak), frequency (Hz/RPM), and crest factor on all three axes, and duty cycle (how much of the report interval was vibration present), and temperature. This sensor can be used to manage vibration in assembly lines and monitor seismic activity in bridges.

The ALTA Advanced Vibration Meter measures vibration (acceleration, velocity, displacement, or acceleration peak), frequency (Hz/RPM), and crest factor on all three axes, duty cycle (how much of the report interval vibration was present), and temperature of the system to which it is attached. The sensor uses an accelerometer to capture g-force on all axes and then calculates vibration, frequency, and crest factor from that acceleration data. The Vibration Meter reports the duty cycle as a percentage of how long the vibration was present during the heartbeat. A single measurement consists of gathering 256 acceleration data points, analyzing those data points to produce vibration data, then taking a temperature measurement. The sensor will take a measurement based on a configurable Measurement Interval. Only the most recent set of data points is reported on each heartbeat.

- Three Axis Measurement
- Capable of Measuring Acceleration, RMS, Velocity RMS, Displacement, or Acceleration Peak
- Configurable Frequency Range
- Configurable Rectangular, Hanning, or Flat Top Window Filters
- Measure Up to 4800 Hz / 288,000 RPM
- Configurable Measurement Interval as Low as 1 second
- Configurable Critical Vibration Aware Threshold
- Runtime Indication via Duty Cycle
- Leaded and Non-Leaded Options Available

ALTA WIRELESS ADVANCED VIBRATION METER FEATURES

- Wireless range of 1,200+ feet through 12+ walls *
- Frequency-Hopping Spread Spectrum (FHSS)
- Improved interference immunity
- Improved power management for longer battery life **
- Encrypt-RF® Security (Diffie-Hellman Key Exchange + AES-128 CBC for sensor data messages)
- Onboard data memory stores up to 512 readings per sensor:
 - 10-minute heartbeats = 22 days
 - 2-hour heartbeats = 266 days
- Over-the-air updates (future proof)
- Free iMonnit basic online wireless sensor monitoring and notification system to configure sensors, view data and set alerts via SMS text and email

* Actual range may vary depending on environment.

** Battery life is determined by sensor reporting frequency and other variables. Other power options are also available.

EXAMPLE APPLICATIONS

- Vibration monitoring
- Smart machines, smart structures & smart materials
- Bridge and building seismic activity monitoring
- Assembly line monitoring
- [Additional applications](#)

II. ORDER OF OPERATIONS

It is important to understand the order of operations for activating your sensor. If performed out of sequence, your sensor may have trouble communicating with iMonnit. Please perform the steps below in the order indicated to make sure you are performing your set-up correctly.

- 1. Create iMonnit Account (If new user).**
- 2. Register all sensors and gateways to a network in iMonnit.**
Sensors can only communicate with gateways on the same iMonnit network.
- 3. Connect/power on gateway and wait till it checks into iMonnit.**
- 4. Power on sensor and verify it checks into iMonnit.**
We recommend powering the sensor on near the gateway then moving to the installation location, checking signal strength along the way.
- 5. Configure sensor for use (This can be done at any point after step 2)**
- 6. Install sensor in final location.**

Note: For information on setting up iMonnit and the gateway refer to the iMonnit User Guide and the gateways user guide.

Note: Device specific setup is covered in more detail in the following sections.

III. SETUP AND INSTALLATION

If this is your first time using the iMonnit online portal, you will need to create a new account. If you have already created an account, start by logging in. For instructions on how to register and setup your iMonnit account, please consult the [iMonnit User Guide](#).

STEP 1: ADD DEVICE

1. Add the sensor on iMonnit.

Add the sensor to your account by choosing **Sensors** in the main menu. Navigate to the **Add Sensor** button.



Desktop



Mobile

2. Find the device ID. See Figure 1.

The Device ID (ID) and Security Code (SC) are necessary to add a sensor. These can both be located on the label on the side of your device.

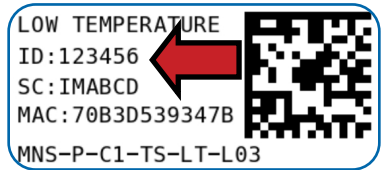


Figure 1

3. Adding your device. See Figure 2.

You will need to enter the Device ID and the Security Code from your Sensor in the corresponding text boxes. Use the camera on your smartphone to scan the QR code on your device. If you do not have a camera on your phone, or the system is not accepting the QR code, you may enter the Device ID and Security Code manually.

- The Device ID is a unique number located on each device label.
- Next, you'll be asked to enter the Security Code from your device. A security code consists of letters and must be entered in upper case (no numbers). It can also be found on the barcode label of your device.



Figure 2

When completed, select the **Add Device** button.

STEP 2: SETUP

Select your use case. See Figure 3.

To get you up and running fast, your sensor comes with preset use cases. Choose from the list or create your own custom settings. You will see the heartbeat interval, and aware state settings (see page 9 for definitions).

Select the **Skip** button when completed.

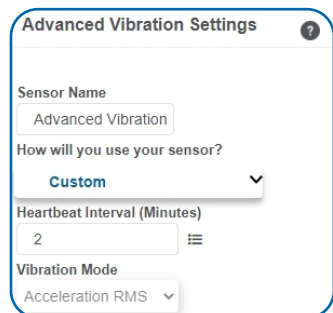


Figure 3

STEP 3: VALIDATION

Check your signal. See Figure 4.

The validation checklist will help you ensure your sensor is communicating with the gateway properly and you have a strong signal.

Checkpoint 4 will only complete when your sensor achieves a solid connection to the gateway. Once you insert the batteries (or flip the switch on an industrial sensor) the sensor will communicate with the gateway every 30 seconds for the first few minutes.

Select the **Save** button when completed.



Figure 4

STEP 4: ACTIONS

Choose your actions. See Figure 5.

Actions are the alerts that will be sent to your phone or email in the event of an emergency. Low battery life and device inactivity are two of the most common actions to have enabled on your device. See page 12 for how to set actions for your sensor.

Select the **Done** button when completed.

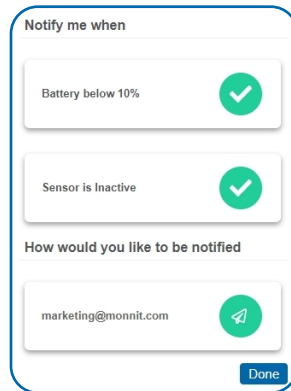


Figure 5

IV. SETTING UP YOUR ADVANCED VIBRATION METER

When you are finished adding the sensor to your account, the next step is to insert the battery. The type of battery you use will depend on the category of your sensor. ALTA Wireless Advanced Vibration Meters are powered by AA batteries and industrial lithium batteries.

INSTALLING BATTERIES

ALTA commercial sensors are powered by AA batteries. Industrial sensors need a 3.6V Lithium battery supplied from Monnit or another industrial battery supplier. Monnit encourages customers to recycle all old batteries.

AA Batteries

AA meter offer both leaded and non-leaded options. Batteries are installed the same way on both models.



Figure 6

Leaded

The leaded model of the advanced vibration meter comes with a cube linked directly to the sensor by a long cord. The cube enables it easier to slip inside machinery for closer monitoring of processes.

Non- Leaded

The non-leaded model does not have a cube.

While the leaded version can sit a bit outside, the non-leaded model should be installed directly on, in, or under, the application being monitored to gather accurate readings.



Figure 7

The standard version of this sensor is powered by two replaceable 1.5 V AA sized batteries (included with purchase). The typical battery life is up to 10 years.

This sensor is also available with a line power option. The line powered version of this sensor has a barrel power connector allowing it to be powered by a standard 3.0–3.6 V power supply. The line powered version also uses two standard 1.5 V AA batteries as backup for uninterrupted operation in the event of line power outage.

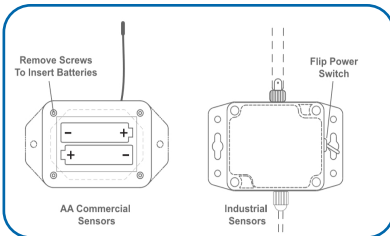


Figure 8

Power options must be selected at time of purchase, as the internal hardware of the sensor must be changed to support the selected power requirements.

Place batteries in the device by first taking the sensor and sliding the battery door open. Insert fresh AA batteries in the carriage, then shut the battery door.

Complete the process by opening up iMonnit and selecting **Sensors** from the main navigation menu. Verify that iMonnit is showing the sensor has a full battery level.

Industrial Batteries



Figure 9

The industrial model only comes in the leaded option. 3.6V Lithium batteries for the Industrial Wireless Advanced Vibration Meter is supplied by Monnit. The ALTA battery life for the Industrial battery is up to 7 years.

The Industrial sensor does not need to have batteries installed. The batteries are already in the sensors when they are shipped.

Open iMonnit and select **Sensors** from the main navigation menu. Verify that iMonnit is showing the sensor has a full battery level. Replace the battery door by screwing in the four corners.

In order for the sensor to function properly, you will need to attach the included antenna. Simply screw the antenna onto the barrel connector on the top of the device. Make sure to snug the antenna connection, but do not over tighten. When placing the sensor, make sure to mount the sensor with the antenna oriented straight up (vertical) to ensure the best wireless radio signal.

Since the electronics are sealed within the sensor housing, we have added an "On/Off" switch to the unit for your convenience. If you are not using the sensor, simply leave the button in the off position to preserve battery life. If the sensor needs to be reset for any reason, you can simply cycle the power by turning the switch to the "Off" position and waiting 30 seconds before powering back on.

MOUNTING PROCEDURE

Wireless Advanced Vibration Meters can be used in a host of applications where knowing vibration is required. Monnit wireless sensors feature mounting flanges and can be attached to most surfaces using the included mounting screws or double-sided tape.

The cube on leaded models can be adhered to surfaces using screws, glue, or double-sided tape. It measures vibration on three axis, then transmits that data directly to the meter.

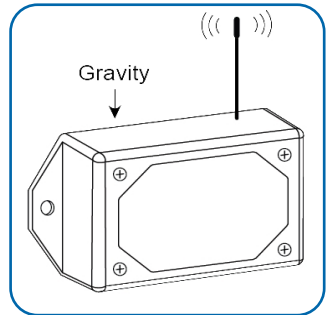
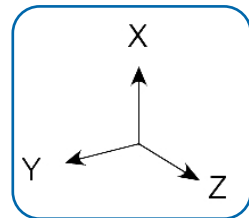


Figure 10



ANTENNA ORIENTATION

In order to get the best performance out of your ALTA Wireless Sensors, it is important to note proper antenna orientation and sensor positioning. Antennas should all be oriented in the same direction, pointing vertically from the sensor. If the sensor is mounted flat on its back on a horizontal surface, you should bend the antenna as close to the sensor housing as possible giving you the most amount of antenna pointing vertical. You should make the antenna wire as straight as possible, avoiding any kinks and curving of the wire. Sensors must be at least 3 ft. away from other sensors and the wireless gateway to function.

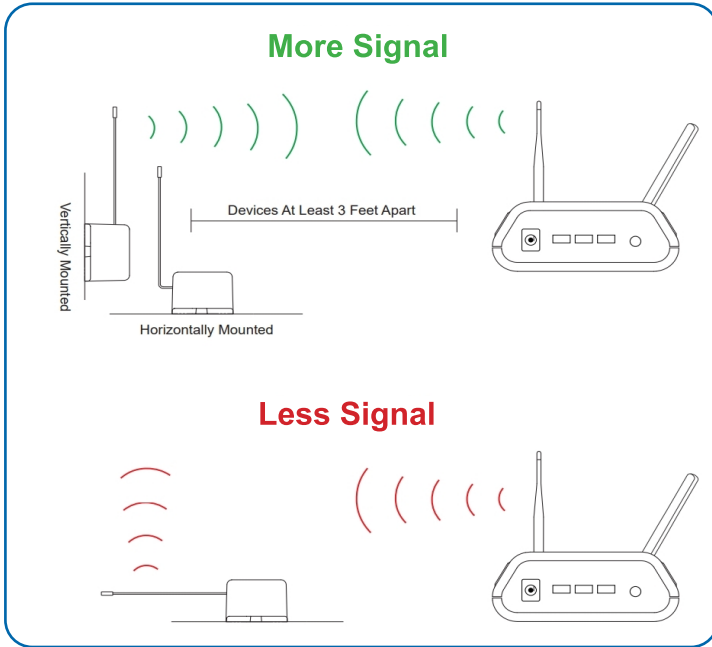


Figure 11

V. SENSOR OVERVIEW IN iMONNIT

Select **Sensors** from the main navigation menu on iMonnit to access the sensor overview page and begin making adjustments to your Advanced Vibration Meter.

MENU SYSTEM

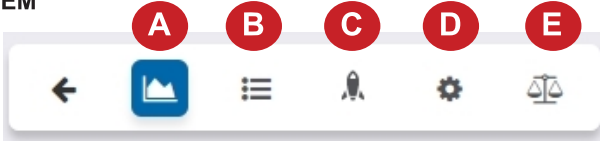


Figure 12

- A. Details** - Displays a graph of recent sensor data
- B. History** - List of all past heartbeats and readings
- C. Events** - List of all events attached to this sensor
- D. Settings** - Editable levels for your sensor
- E. Scale** - Set the scale your sensor will take readings at

Directly under the tab bar is an overview of your sensor. This allows you to see the signal strength and the battery level of the selected sensor. A colored dot in the left corner of the sensor icon denotes its status.

- **Green** indicates the sensor is checking in and within user-defined safe parameters.
- **Red** indicates the sensor has met or exceeded a user-defined threshold or triggered event.
- **Gray** indicates that no sensor readings are being recorded, rendering the sensor inactive.
- **Yellow** indicates that the sensor reading is out of date, due to perhaps a missed heartbeat check-in.

Details View

The Details View will be the first page you see upon selecting which sensor you would like to modify.

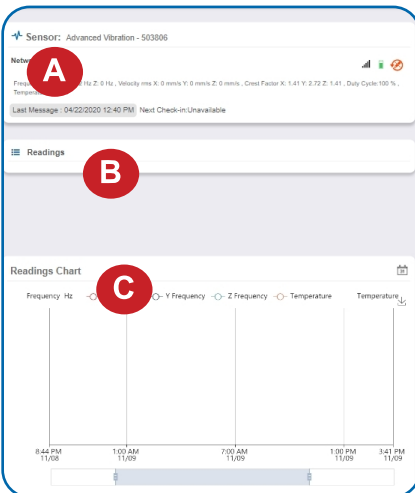


Figure 13


A. The sensor overview section will be above every page. This will consistently display the present reading, signal strength, battery level, and status.

B. The Recent Readings section below the chart shows your most recent data received by the sensor.

C. This graph charts how the sensor fluctuates throughout a set date range. To change the date range displayed in the graph, navigate up to the top of the Readings Chart section on the right-hand corner to change the from and/or to date.

Readings View

Selecting the **Readings Tab** within the tab bar allows you to view the sensor's data history as time stamped data.

- On the far right of the Sensor History Data is a cloud icon. () Selecting this icon will export an Excel file for your sensor into your download folder.

Note: Make sure you have the date range for the data you need input in the "From" and "To" text boxes. This will be the previous day by default. Only the first 2,500 entries in the selected date range will be exported.

The data file will have the following fields:

MessageID: Unique identifier of the message in our database.

Sensor ID: If multiple sensors are exported, you can distinguish between the sensors using this number — even if the names are the same.

Sensor Name: The name you have given the sensor.

Date: The date the message was transmitted from the sensor.

Value: Data presented with transformations applied, but without additional labels.

Formatted Value: Data transformed and presented as it is shown in the monitoring portal.

Raw Data: Raw data as it is stored from the sensor.

Sensor State: Binary field represented as an integer containing information about the state of the sensor when the message was transmitted. (See "**Sensor State**" explained below.)

Alert Sent: Boolean indicating if this reading triggered a notification to be sent from the system.

Sensor State

The value presented here is generated from a single byte of stored data. A byte consists of 8 bits of data that we read as Boolean (True (1) / False (0)) fields.

When broken into individual bits, the State byte contains the following information:

aaaabcde

STS: This value is specific to the sensor profile and is often used to indicate error states and other sensor conditions.

UNUSED: This sensor does not use these bits.

AWARE: Sensors become aware when critical sensor specific conditions are met. Going aware can cause the sensor to trigger and report before the heartbeat and cause the gateway to forward the data to the server immediately resulting in near immediate transmission of the data.

TEST: This bit is active when the sensor is first powered on or reset and remains active for the first 9 messages when using default configurations.

STS Specific Codes:

0 = No problems, sensor is functioning normally.

1 = Open circuit detected in lead.

2 = Short circuit detected in lead.

3 = Range error. Temperature is reading outside of -40 F and 257 F (-40 C and 125 C).

If the user has calibrated the sensor, the Calibrate Active field is set to False (0) and the sensor is operating inside the Min and Max Thresholds, the bits look like 00000000, this is represented as 0.

If the sensor is using factory calibrations and it is outside the threshold, the bit values are 00010010 and are represented as 18(16+2 because both the bit in the 16 value is set and the bit in the 2 value is set).

Settings View

Advanced Vibration Settings

Sensor Name: Advanced Vibration - 41 **A**

Heartbeat Interval: 0.25 **B**

Aware State Heartbeat: 0.17 **C**

Vibration Mode: Velocity RMS **D**

Vibration Aware Threshold (mm/s): 655.35 **E**

Vibration Hysteresis (mm/s): 0 **F**

Minimum Sensitivity (g): 0.01 **G**

Window Function: Rect **H**

Accelerometer Range: 8 g **I**

Measurement Interval (Seconds): 60 **J**

Sample Rate: 400 Hz **K**

Frequency Range Minimum: 9.3 **L**

Frequency Range Maximum: 150 **M**

Failed transmissions before mode **N**

To edit the operational settings for a sensor, choose the “**Sensor**” option in the main navigation menu then select the “**Settings**” tab to access the configuration page.

- A. Sensor Name** is a unique name you give the sensor to easily identify it in a list and in any notifications.
- B.** The **Heartbeat Interval** is how often the sensor communicates with the gateway if no activity is recorded.
- C. Aware State Heartbeat** is how often the sensor communicates with the gateway while in an Aware State.
- D. Vibration Mode** determines whether the sensor will become aware when vibration goes above this value.
- E. Vibration Aware Threshold** is the maximum allowable level of vibration. Readings above this integer will send the meter into an aware state.
- F. Vibration Hysteresis** is a buffer to prevent the sensor from bouncing between Standard Operation and Aware State when the assessments are very close to a threshold.
- G. Minimum Sensitivity** will set the lowest level of vibration to be recorded. Values below this setting are ignored. No analysis will occur and will not count towards duty cycle. Setting this to 0 will force the sensor to analyze every time, including noise and the duty cycle will always be 100 percent.
- H. Window Function** determines which window to use to filter the FFT results. If the sample rate and window function for velocity and acceleration are the same, one set of samples will be taken instead of two saving power and reducing measurement time.
- I. Accelerometer Range** is the maximum observable g-force.
- J. Measurement Interval** is the interval in seconds between measurements.
- K. Sample Rate** sets the sample rate of the accelerometer. As the sample rate decreases, the amount of time it takes to sample increases. Example: 25 Hz sample time is 10.24 seconds and at 6.25 Hz it is 40.96 seconds. Keep this in mind when setting the measurement interval.

Figure 14

L. Frequency Range Minimum is the lowest allowable frequency to consider when measuring vibration.

M. Frequency Range Maximum is the highest allowable frequency to consider when measuring vibration.

N. Failed Transmissions Before Link Mode is the number of transmissions the sensor sends without response from a gateway before it goes to battery saving link mode. In link mode, the sensor will scan for a new gateway and if not found will enter battery saving sleep mode for up to 60 minutes before trying to scan again. A Lower number will allow sensors to find new gateways with fewer missed readings. Higher numbers will enable the sensor to remain with its current gateway in a noisy RF environment better. Zero will cause the sensor to never join another gateway to find a new gateway, the battery will have to be cycled out of the sensor.

The default heartbeat interval is 120 minutes or two hours. It is recommended that you do not lower your heartbeat level too much because it will drain the battery.

Finish by selecting the **Save** button.

Note: Be sure to select the Save button anytime you make a change to any of the sensor parameters. All changes made to the sensor settings will be downloaded to the sensor on the next sensor heartbeat (check-in). Once a change has been made and saved, you will not be able to edit that sensor's configuration again until it has downloaded the new setting.

Scale View

Advanced Vibration Meter settings are influenced by frequency. The scale option will be available in the tab bar. To change the unit of measurement select the Scale tab.

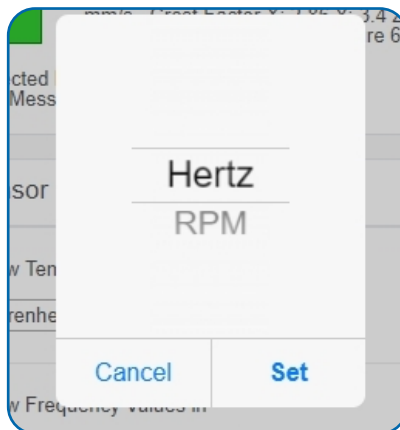


Figure 15

Choose the text box to trigger a pop-up window allowing you to change the scale. Select the scale you prefer and push "Set."

Press the "Save" button to complete your adjustment.

V. ACTIONS OVERVIEW

Device notifications can be created, deleted, and edited by selecting the **Actions Tab** in the tab bar.

You can toggle the Action Trigger on or off by selecting the switch under Current Action Triggers. See Figure 16.

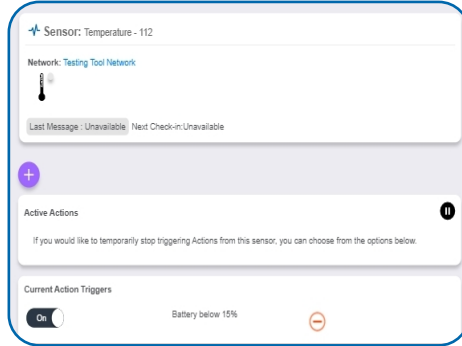


Figure 16

CREATING AN ACTION

- Actions are triggers or alarms set to notify you when a sensor reading identifies that immediate attention is needed. Types of actions include sensor readings, device inactivity, and scheduled data. Any one of these can be set to send a notification or trigger an action in the system.

Choose **Actions** in the main navigation menu.



Figure 17

- A list of previously created actions will display on the screen. From here, you have the ability to filter, refresh, and add new actions to the list.

Note: If this is your first time adding an action, the screen will be blank.

From the Actions page, tap **Add Action** in the left hand corner.



Figure 18

Step 1: What triggers your action?

The drop-down menu will have the following options for Action Types (See Figure 19):

- **Sensor Reading:** Set actions based on activity or reading.
- **Device Inactivity:** Actions when the device doesn't communicate for an extended period of time.
- **Advanced:** Actions based on advanced rules, such as comparing past data points with current ones.
- **Scheduled:** These actions are performed at a time set basis.

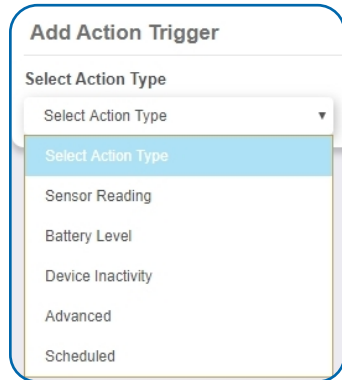


Figure 19

- Select Sensor Reading from the drop-down menu.
- A second drop-down menu will appear. From here, you will be able to see a list of the different type of sensors registered to your account. Choose **Vibration Meter** in the drop-down menu.
- Choose whether you wish to detect **X-Axis Speed, Y-Axis Speed, Z-Axis Speed, X-Axis Frequency, Y-Axis Frequency, Z-Axis Frequency, and Duty Cycle**.
- Next, you will be asked to input the trigger settings. You have the option of setting this trigger to detect greater than or less than or equal to a desired reading.

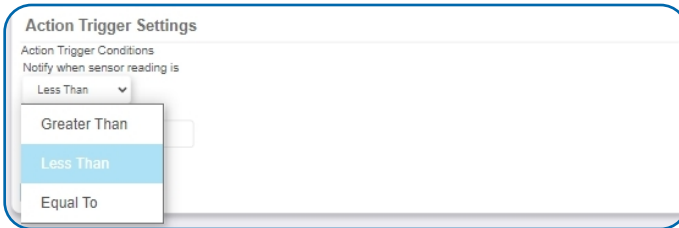


Figure 20

Press the **Save** button.

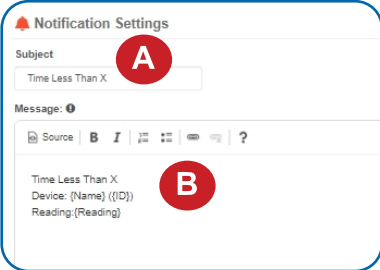
Step 2: Actions

- Press the **Add Action** button under the information header, available action types will then be presented in a select list.
- **Notification Action:** Specify account users to receive notification when this event triggers.
- **System Action:** Assign actions for the system to process when this event triggers.
- Choose **Notification Action** from the notification list.

A. Input the subject for the notification.
See Figure 21.

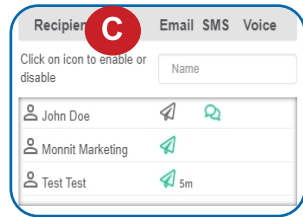
B. Customize the message body
for the notification. See Figure 21.

C. Recipient list identifies who will
receive the notification.
See Figure 22.



The screenshot shows the 'Notification Settings' form. It has a title bar with a bell icon and the text 'Notification Settings'. Below the title bar, there is a 'Subject' field with a placeholder 'Time Less Than X' and a red circle 'A' next to it. Below the subject field is a 'Message:' section with a rich text editor toolbar containing icons for source, bold, italic, underline, list, link, image, video, and help. Below the toolbar is a preview of the message body with the text: 'Time Less Than X', 'Device: {Name} ({ID})', and 'Reading:{Reading}'. A red circle 'B' is next to the preview area.

Figure 21



The screenshot shows the 'Recipient' list. It has a title bar with a red circle 'C' next to the word 'Recipient', and buttons for 'Email', 'SMS', and 'Voice'. Below the title bar, there is a text input field for 'Name' and a label 'Click on icon to enable or disable'. Below this is a table with three rows of recipients: 'John Doe', 'Monnit Marketing', and 'Test Test'. Each row has a person icon, a green checkmark icon, and a green checkmark icon with a delay of '5m'.

Figure 22

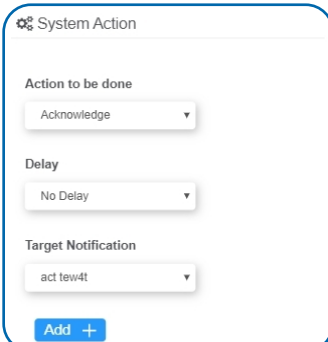
- Select the icon next to a user to specify how they will be notified.
- Choose if you want notifications sent immediately, when triggered, or if you want a delay before sending and press **Set**.
- A **green** icon indicates that the users that will receive the notifications.
- If a delay has been selected, the delay time will display beside the icon.

Select **System Action** from the Add Action list. See Figure 23.

- Scroll down to the System Action section.
- The Action to be done select list has the following options:

Acknowledge: Automatically signals that you have been notified of an action. When an action has been triggered, alerts will continue processing until the action returns to a value that no longer triggers an action.

Full Reset: Reset your trigger so it is armed for the next reading.



The screenshot shows the 'System Action' configuration form. It has a title bar with a gear icon and the text 'System Action'. Below the title bar, there is a dropdown menu for 'Action to be done' with 'Acknowledge' selected. Below this is a dropdown menu for 'Delay' with 'No Delay' selected. Below this is a dropdown menu for 'Target Notification' with 'act test4t' selected. At the bottom, there is a blue 'Add +' button.

Figure 23

Activate: Enable an action trigger.

Deactivate: Disable an action trigger.

Step 3: Action Name and Devices

- By default, the sensor(s) will not be assigned to the action conditions you've just set. To assign a sensor, find the device(s) you want to designate for this action and select. Selected sensor boxes will turn green when activated. Choose the sensor box again to unassign the sensor from the action. See Figure 24.
- Continue toggling the sensor(s) corresponding to this new action until you are satisfied with your selection. These can be adjusted later by returning to this page.

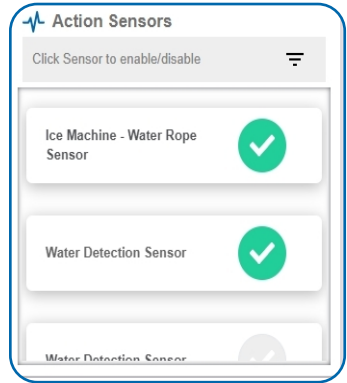


Figure 24

Press the **Check-mark** button to complete the process.

VII. SECURITY

Data security and integrity is paramount at Monnit. Each layer of the system is secured using encryption and protocols designed to protect customer data and information. The system consists of sensor(s), gateway(s), and iMonnit software. One or more sensors communicate with iMonnit software through a gateway.

SENSOR TO GATEWAY

Sensor and gateway radio modules are purpose built devices with proprietary unreadable firmware, which means the sensor cannot be physically hacked or re-purposed for malicious purposes. This adds a strong level of inherent security even before considering encryption. Data transmission between the sensor and gateway are secured using Encrypt-RF Security (Diffie-Hellman Key Exchange + AES-128 CBC for sensor data messages). Beyond the encryption, data transmissions are also structurally verified and CRC checked before they are passed up to iMonnit or down to the sensor, this ensures the integrity of the data itself.

GATEWAY TO IMONNIT

Data transmissions between the gateway and iMonnit software are secured using 256-bit, bank level encryption.

iMONNIT

Access is granted through the iMonnit user interface, or an Application Programming Interface (API) safeguarded by 256-bit Transport Layer Security (TLS 1.2) encryption. TLS is a blanket of protection to encrypt all data exchanged between iMonnit and you. The same encryption is available to you whether you are a Basic or Premiere user of iMonnit. You can rest assured that your data is safe with iMonnit.

SENSOR PRINTS

Sensor prints utilize a shared key between the software and the sensor to ensure that once the data comes to iMonnit it is guaranteed to be from the device identified by the sensor print. If this feature is purchased for the device (via iMonnit software) the devices data becomes impossible to spoof by any malicious device.

SUPPORT

For technical support and troubleshooting tips please visit our support library online at monnit.com/support/. If you are unable to solve your issue using our online support, email Monnit support at support@monnit.com with your contact information and a description of the problem, and a support representative will call you within one business day.

For error reporting, please email a full description of the error to support@monnit.com.

WARRANTY INFORMATION

(a) Monnit warrants that Monnit-branded products (Products) will be free from defects in materials and workmanship for a period of one (1) year from the date of delivery with respect to hardware and will materially conform to their published specifications for a period of one (1) year with respect to software. Monnit may resell sensors manufactured by other entities and are subject to their individual warranties; Monnit will not enhance or extend those warranties. Monnit does not warrant that the software or any portion thereof is error free. Monnit will have no warranty obligation with respect to Products subjected to abuse, misuse, negligence or accident. If any software or firmware incorporated in any Product fails to conform to the warranty set forth in this Section, Monnit shall provide a bug fix or software patch correcting such non-conformance within a reasonable period after Monnit receives from Customer (i) notice of such non-conformance, and (ii) sufficient information regarding such non-conformance so as to permit Monnit to create such bug fix or software patch. If any hardware component of any Product fails to conform to the warranty in this Section, Monnit shall, at its option, refund the purchase price less any discounts, or repair or replace nonconforming Products with conforming Products or Products having substantially identical form, fit, and function and deliver the repaired or replacement Product to a carrier for land shipment to customer within a reasonable period after Monnit receives from Customer (i) notice of such non-conformance, and (ii) the non-conforming Product provided; however, if, in its opinion, Monnit cannot repair or replace on commercially reasonable terms it may choose to refund the purchase price. Repair parts and replacement Products may be reconditioned or new. All replacement Products and parts become the property of Monnit. Repaired or replacement Products shall be subject to the warranty, if any remains, originally applicable to the product repaired or replaced. Customer must obtain from Monnit a Return Material Authorization Number (RMA) prior to returning any Products to Monnit. Products returned under this Warranty must be unmodified.

Customer may return all Products for repair or replacement due to defects in original materials and workmanship if Monnit is notified within one year of customer's receipt of the product. Monnit reserves the right to repair or replace Products at its own and complete discretion. Customer must obtain from Monnit a Return Material Authorization Number (RMA) prior to returning any Products to Monnit. Products returned under this Warranty must be unmodified and in original packaging. Monnit reserves the right to refuse warranty repairs or replacements for any Products that are damaged or not in original form. For Products outside the one year warranty period repair services are available at Monnit at standard labor rates for a period of one year from the Customer's original date of receipt.

(b) As a condition to Monnit's obligations under the immediately preceding paragraphs, Customer shall return Products to be examined and replaced to Monnit's facilities, in shipping cartons which clearly display a valid RMA number provided by Monnit. Customer acknowledges that replacement Products may be repaired, refurbished or tested and found to be complying. Customer shall bear the risk of loss for such return shipment and shall bear all shipping costs. Monnit shall deliver replacements for Products determined by Monnit to be properly returned, shall bear the risk of loss and such costs of shipment of repaired Products or replacements, and shall credit Customer's reasonable costs of shipping such returned Products against future purchases.

(c) Monnit's sole obligation under the warranty described or set forth here shall be to repair or replace non-conforming products as set forth in the immediately preceding paragraph, or to refund the documented purchase price for non-conforming Products to Customer. Monnit's warranty obligations shall run solely to Customer, and Monnit shall have no obligation to customers of Customer or other users of the Products.

Limitation of Warranty and Remedies.

THE WARRANTY SET FORTH HEREIN IS THE ONLY WARRANTY APPLICABLE TO PRODUCTS PURCHASED BY CUSTOMER. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. MONNIT'S LIABILITY WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY, IN NEGLIGENCE OR OTHERWISE SHALL NOT EXCEED THE PURCHASE PRICE PAID BY CUSTOMER FOR THE PRODUCT. UNDER NO CIRCUMSTANCES SHALL MONNIT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES. THE PRICE STATED FOR THE PRODUCTS IS A CONSIDERATION IN LIMITING MONNIT'S LIABILITY. NO ACTION, REGARDLESS OF FORM, ARISING OUT OF THIS AGREEMENT MAY BE BROUGHT BY CUSTOMER MORE THAN ONE YEAR AFTER THE CAUSE OF ACTION HAS ACCRUED.

IN ADDITION TO THE WARRANTIES DISCLAIMED ABOVE, MONNIT SPECIFICALLY DISCLAIMS ANY AND ALL LIABILITY AND WARRANTIES, IMPLIED OR EXPRESSED, FOR USES REQUIRING FAIL-SAFE PERFORMANCE IN WHICH FAILURE OF A PRODUCT COULD LEAD TO DEATH, SERIOUS PERSONAL INJURY, OR SEVERE PHYSICAL OR ENVIRONMENTAL DAMAGE SUCH AS, BUT NOT LIMITED TO, LIFE SUPPORT OR MEDICAL DEVICES OR NUCLEAR APPLICATIONS. PRODUCTS ARE NOT DESIGNED FOR AND SHOULD NOT BE USED IN ANY OF THESE APPLICATIONS.

CERTIFICATIONS

United States FCC

This equipment has been tested and found to comply with the limits for a Class B digital devices, 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 instruction manual, 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 of 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.*

Warning: *Changes or modifications not expressly approved by Monnit could void the user's authority to operate the equipment.*

RF Exposure



WARNING: To satisfy FCC RF exposure requirements for mobile transmitting devices, the antenna used for this transmitter must not be co-located in conjunction with any antenna or transmitter.

Monnit and ALTA Wireless Sensors:

This equipment complies with the radiation exposure limits prescribed for an uncontrolled environment for fixed and mobile use conditions. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and the body of the user or nearby persons.

All ALTA Wireless Sensors Contain FCC ID: ZTL-G2SC1. Approved Antennas

ALTA devices have been designed to operate with an approved antenna listed below, and having a maximum gain of 14 dBi. Antennas having a gain greater than 14 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

- *Xianzi XQZ-900E (5 dBi Dipole Omnidirectional)*
- *HyperLink HG908U-PRO (8 dBi Fiberglass Omnidirectional)*
- *HyperLink HG8909P (9 dBd Flat Panel Antenna)*
- *HyperLink HG914YE-NF (14 dBd Yagi)*
- *Specialized Manufacturing MC-ANT-20/4.0C (1 dBi 4" whip)*

Canada (IC)

English

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the Equivalent Isotropically Radiated Power (E.I.R.P.) is not more than that necessary for successful communication.

The radio transmitters (IC: 9794A-RFSC1, IC: 9794A-G2SC1, IC: 4160a-CNN0301, IC: 5131A-CE910DUAL, IC: 5131A-HE910NA, IC: 5131A-GE910 and IC: 8595A2AGQN4NNN) have been approved by Industry Canada to operate with the antenna types listed on previous page with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

This device complies with Industry Canada licence-exempt RSS standard(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.

French

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la Puissance Isotrope Rayonnée Équivalente (P.I.R.É) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteurs radio (IC: 9794A-RFSC1, IC: 9794A-G2SC1, IC: 4160a-CNN0301, IC: 5131A-CE910DUAL, IC: 5131A-HE910NA, IC: 5131A-GE910 et IC: 8595A2AGQN4NNN) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne figurant sur la page précédente et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

SAFETY RECOMMENDATIONS - READ CAREFULLY

Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and has to be avoided in the following areas:

- *Where it can interfere with other electronic devices in environments such as hospitals airports, aircrafts, etc.*
- *Where there is risk of explosion such as gasoline stations, oil refineries, etc.*

It is responsibility of the user to enforce the country regulation and the specific environment regulation.

Do not disassemble the product; any mark of tampering will compromise the warranty validity. We recommend following the instructions of this user guide for correct setup and use of the product.

Please handle the product with care, avoiding any dropping and contact with the internal circuit board as electrostatic discharges may damage the product itself. The same precautions should be taken if manually inserting a SIM card, checking carefully the instruction for its use. Do not insert or remove the SIM when the product is in power saving mode.

Every device has to be equipped with a proper antenna with specific characteristics. The antenna has to be installed with care in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (23 cm). In case this requirement cannot be satisfied, the system integrator has to assess the final product against the SAR regulation.

The European Community provides some Directives for the electronic equipments introduced on the market. All the relevant information's is available on the European Community website: <http://ec.europa.eu/enterprise/sectors/rte/documents/>

Additional Information and Support

For additional information or more detailed instructions on how to use your Monnit Wireless Sensors or the iMonnit Online System, please visit us on the web at monnit.com .