



Remote Monitoring for Business



Air Quality PM 2.5 Meter **USER GUIDE**

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I. ABOUT THE AIR QUALITY PM 2.5 METER

The [ALTA Air Quality PM 2.5 um Meter](#) measures concentrations in the air and transmits the measurement to iMonnit.

The Air Quality Meter works by turning on a small fan at the beginning of a measurement cycle to bring in a volume of ambient air and measuring the particulate matter (PM) content of that sample volume. The meter measures PM content using a laser that scatters based on the number and size of particles suspended in the air. It is important to keep the inlet ports of the sensor clear to ensure proper readings.

AIR QUALITY SENSOR 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)
- All ALTA sensors now have up to 3200 readings:
 - 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

EXAMPLE APPLICATIONS

- Building/Room Air Quality
- Pollution Sensing
- Mines and Quarries
- Cement Factories
- Construction/Demolition Sites
- Petrochemicals
- Agricultural/Waste
- [Additional applications](#)

II. SENSOR SECURITY

Security is paramount for the sensor when it comes to managing your data and transferring it to sensors. iMonnit is the online software and central hub for configuring your device settings. All data is secured on dedicated servers operating Microsoft SQL Server.

Data Security on the Sensor

The fortified sensor secures your data from attackers and secures the sensor from becoming a relay for malicious programs. Even when the sensor is at rest, the sensor is designed to prevent prying eyes from accessing the data. The sensor does not run on an off-the-shelf multi-function OS (operating system). Instead it runs a purpose-specific real-time embedded state machine that can't be hacked to run malicious processes. It also provides no active interface listeners that can be used to gain access to the device over the network.

iMONNIT Security

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.

III. 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 follow the steps below to make sure you are performing your set-up correctly.

SET-UP STEPS

1. Register your gateway on iMonnit.

Your gateway must be registered first to verify communication between the device and iMonnit. Any sensors or meters you wish to add onto your network must come after the gateway.

2. Register your sensor on iMonnit.

Add your sensor to the iMonnit account (see page 3 for step-by-step directions).

3. Connect the Ethernet and optional power cords to the sensor.

Plug in powered Ethernet cable. Depending on your facility, you might need to plug in both the Ethernet cable and power cord.

4. Mount your sensor.

Place your sensor in the desired location using screws or double-sided tape.

Note: Each step 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.

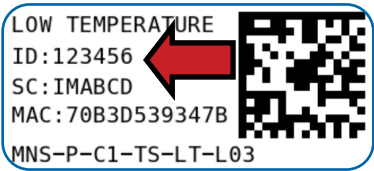


Figure 1

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.

Unlike most sensors, choosing a use case in Step 2 of adding this sensor does not give you the option to customize your settings. These will need to be adjusted in the settings tab for your device. See page 9 for instructions.

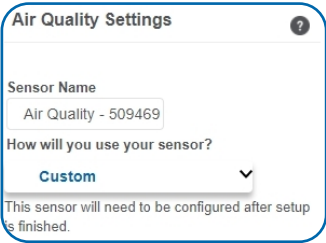


Figure 3

Select the **Skip** button when completed.

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.

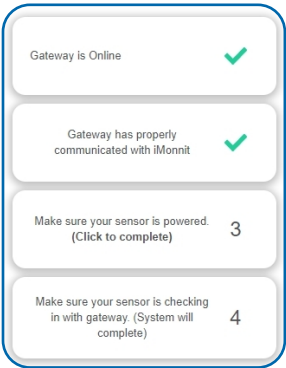


Figure 4

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 8 for how to set actions for your sensor.

Select the **Done** button when completed.

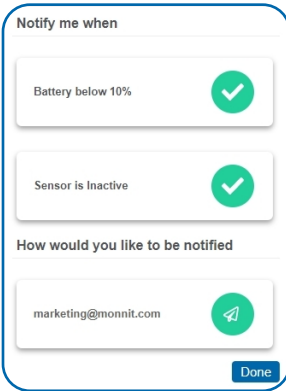


Figure 5

V. SENSOR OVERVIEW

Select Sensors from the main navigation menu on iMonnit to access the sensor overview page and begin adjusting your sensors.

MENU SYSTEM

Details - Displays a graph of recent sensor data

History - List of all past heartbeats and readings

Actions - List of all actions attached to this sensor

Settings - Editable levels for your sensor

Calibrate - Reset readings for your sensor

Scale - Change the scale of readings for your sensor

Directly under the tab bar is an overview of your sensor. This allows you to see the signal strength 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 is 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, possibly due to a missed heartbeat check-in.

Details View

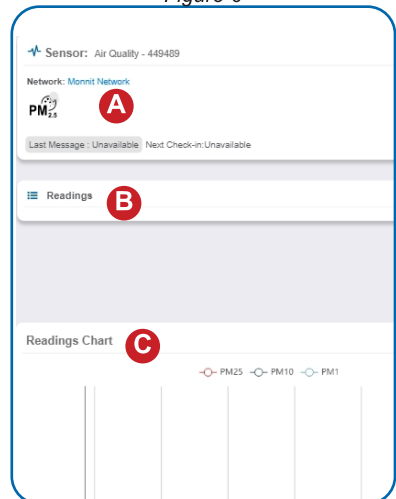
The Details View will be the first page you see upon selecting which sensor you would like to modify. See Figure 6.

A. The Sensor Overview section is at the top of 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. The Readings Chart displays 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.

Figure 6



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 integer 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.

Using a temperature sensor as an example:

If the sensor is using factory calibrations, the Calibrate Active field is set True (1) so the bit values are 00010000 and it is represented as 16.

If the sensor is outside the Min or Max Threshold, the Aware State is set True (1) so the bit values are 00000010 and it is represented as 2.

If the user has calibrated the sensor, the Calibrate Active field is set 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 it is 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

To edit the operational settings for a sensor, choose the **Sensor** option in the main navigation menu and then select the **Settings Tab** to access the configuration page. See Figure 8.

A. Sensor Name: is the unique name you give the sensor to easily identify it in a list along with any notifications.

B. Heartbeat Interval: is how often the sensor communicates with the server if no activity is recorded. The default heartbeat interval is 120 minutes or two hours.

C. Aware State Heartbeat: is how often the sensor communicates with the server while in an Aware State.

D. Assessments per Heartbeat: is how many times between heartbeats a sensor will check its measurements against its thresholds to determine whether it will enter the Aware State.

E. PM 2.5 Threshold: is the maximum threshold for air particulate readings. Data above this threshold will send the meter into an aware state.

F. PM 10 Threshold: the maximum threshold for air particulate 10 readings. Data above this threshold will send the meter into an aware state.

G. PM 1.0 Threshold: the maximum threshold for air particulate 1.0 readings. Data above this threshold will send the meter into an aware state.

H. Show full Data Value: Shows the value of your reading.

I. Synchronize: is a setting that in small sensor networks synchronizes communication. The default setting OFF allows the sensors to randomize their communications therefore maximizing communication robustness. Setting this will synchronize the communication of the sensors.

The screenshot shows the 'Air Quality Settings' page. It contains several input fields and toggle switches, each labeled with a letter in a red circle: 'A' points to the 'Sensor Name' field (containing 'Air Quality - 449489'); 'B' points to the 'Heartbeat Interval (Minutes)' field (containing '120'); 'C' points to the 'Aware State Heartbeat (Minutes)' field (containing '120'); 'D' points to the 'Assessments per Heartbeat' field (containing '1'); 'E' points to the 'PM2.5 Threshold µg/m³' field (containing '1000'); 'F' points to the 'PM10 Threshold µg/m³' field (containing '1000'); 'G' points to the 'PM1.0 Threshold µg/m³' field (containing '1000'); 'H' points to the 'Show Full Data Value' toggle switch (set to 'Off'); and 'I' points to the 'Synchronize' toggle switch (set to 'Off').

Figure 7

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.

VI. 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 8.

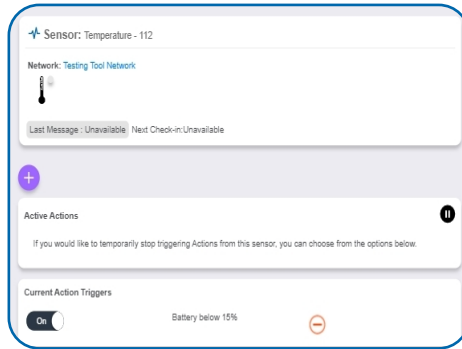


Figure 8

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 9

- 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.

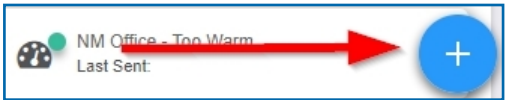


Figure 10

Step 1: What triggers your action?

The drop-down menu will have the following options for Action Types (See Figure 11):

- **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.

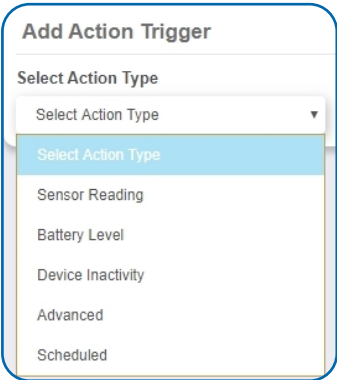


Figure 11

- 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 **Air Quality** in the drop-down menu. Choose **2.5** in the drop-down menu for "Select Reading."
- Next, you will be asked to input the trigger settings. You have the option of setting this trigger to detect "Greater Than, Equal To, or Less Than" a desired reading.

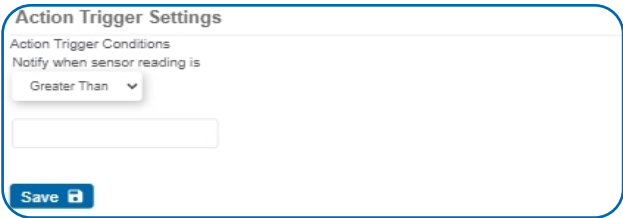


Figure 12

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 action triggers.
- **System Action:** Assign actions for the system to process when this action triggers.
- Choose **Notification Action** from the notification list.

A. Input the subject for the notification.
See Figure 13.

B. Customize the message body
for the notification. See Figure 13.

C. Recipient list identifies who will
receive the notification.
See Figure 14.

Notification Settings

Subject **A**
Micrograms Greater Than xxxx

Message: **B**
Micrograms Greater Than
Device: {Name} ({ID})
Reading: {Reading}

Figure 13

Recipient **C** Email SMS Voice

Click on icon to enable or disable

Name		
John Doe		
Monnit Marketing		
Test Test		5m

Figure 14

- 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 15.

- 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.

Activate: Enable an action trigger.

Deactivate: Disable an action trigger.

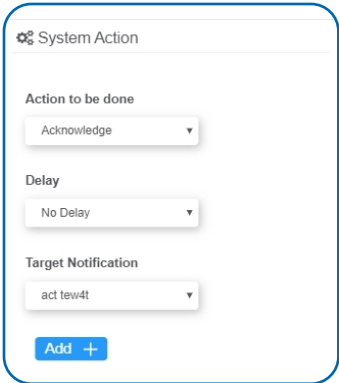


Figure 15

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 16.
- 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.

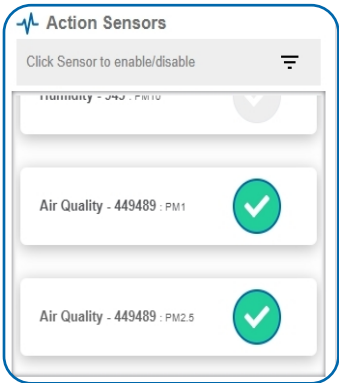


Figure 16

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

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.

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, aircraft, 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 European Community provides some Directives for the electronic equipment introduced on the market. All the relevant information's is available on the European Community website:

<http://ec.europa.eu/enterprise/sectors/rtte/documents/>

The text of the Directive 99/05 regarding telecommunication equipment is available, while the applicable Directives (Low Voltage and EMC) are available at: <http://ec.europa.eu/enterprise/sectors/electrical>

Additional Information and Support

For additional information or more detailed instructions on how to use your Monnit Sensors or the iMonnit Online System, please visit us on the web at <https://www.monnit.com/support/documentation>.



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