



# Monnit Wireless Range Extender User Guide

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

## Information to Users

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.

**RF EXPOSURE WARNING:** To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance are not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna or transmitter.

The primary function of the Range Extender is to act as a range extender in places where wireless sensors are out of range of a Monnit wireless gateway.

## Inside the Box

You should find the following items in the box:

- Monnit Wireless Range Extender
- Antenna
- Power Supply

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## I. ABOUT THE WIRELESS RANGE EXTENDER

Monnit Wireless Range Extenders allow you to extend the coverage area (range) of your wireless sensor network by relaying data between your wireless sensors and the wireless gateway.

On power up, the range extender will locate a wireless gateway that has the “best” signal available. The device then auto-configures itself to communicate and link with this gateway. After linking with the parent gateway, the range extender then establishes itself as a sub-network with its own dedicated channel to the gateway, relieving congestion from multi-sensor networks.

As data is generated in the range extender’s sub-network, it will intelligently store and forward this information to its parent gateway. This conserves battery power on the wireless sensors, increases network reliability, and intelligently manages network traffic to avoid cluttering.

When a Monnit wireless sensor is locating a network, it will search for the “best” wireless signal. If the best signal is a range extender, the sensor will auto-configure itself to link with the range extender (no user intervention required). A range extender will permit a wireless sensor to link if one of the following conditions is met:

- The range extender already knows the wireless sensor and permits linking.
- The range extender confirms the wireless sensor’s permissions from its parent gateway.

## MONNIT WIRELESS RANGE EXTENDER FEATURES

- Extends the coverage area of your wireless sensor network.
- Supports up to 99 wireless devices.
- Supports up to 6 messages / minute.
- Built in memory can queue up to 30,000 messages for delivery to the gateway.
- AC powered. No batteries necessary.

## EXAMPLE APPLICATIONS

- Facilities / Building Operations
- Property Management
- Warehouse Monitoring
- Hotel / Motel Monitoring
- Food Chain Monitoring
- Restaurants / Food Services
- Convenience Stores
- Asset Management
- Agriculture and Greenhouses

## II. RANGE EXTENDER SECURITY

Security is paramount for the Wireless Range Extender when it comes to managing your environment and equipment. Great care and attention to detail has been taken to keep the exchange of data secure on the gateway and in gateway communications.

### DATA SECURITY ON A GATEWAY

Even when the data is at rest, a gateway is designed to prevent prying eyes from accessing the data. Gateways do 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. The fortified gateway secures your data from attackers and secures the gateway from becoming a relay for malicious programs.

### GATEWAY COMMUNICATION SECURITY

Communication between your gateway and iMonnit is tightly secured by packet level encryption. The gateway and server establish a unique key using ECDH-256 for data encryption. The packet level data is encrypted end to end removing additional requirements to configure specialized cellular VPN’s. The gateway can still operate within a VPN if it is present.

### iMONNIT SECURITY

iMonnit is the online software and central hub for configuring your device settings. All data is secured on dedicated servers operating Microsoft SQL Server. 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 blanket of protection to encrypt all data exchanged between iMonnit and you. The same encryption is available to you whether you are a Basic user or Premiere user of iMonnit. You can rest assured that your data is safe with iMonnit.

\* **Important** - If the range extender is unplugged or loses power, all sensor messages stored on the device will be lost!

### III. USING THE WIRELESS RANGE EXTENDER

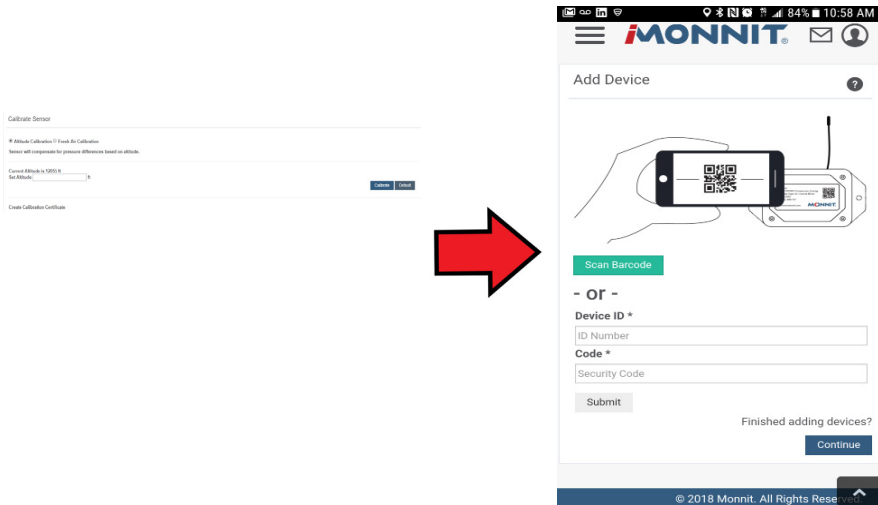
#### ADDING A WIRELESS RANGE EXTENDER TO A NETWORK

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 for an iMonnit account, please consult the iMonnit User Guide viewable at [monnit.com/support/documentation](http://monnit.com/support/documentation).

You will need to enter the **Device ID** and the **Security Code** from your Range Extender 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 you are accessing the online portal through a desktop computer, 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 (SC)** on your device. A security code will be all letters, no numbers. It can also be found on the barcode label of your gateway.

When completed, select the **"Submit"** button.



Once the range extender has been added to your network, you will need to update and push the sensor device list to your range extender so it knows what sensors to allow communication with. For a USB gateway, go to the Monnit gateway application/service and click "Download Sensor Updates". For an Ethernet gateway, power cycle the device by unplugging it, waiting 10 seconds then plugging it back in. For a Cellular gateway, use the power button to turn it off, wait 10 seconds then turn it back on.

After resetting the gateway, plug the range extender into an AC wall outlet. The range extender will have a green light when it has found the network. If the light is steady red, check the network, unplug it and try again.

#### WIRELESS RANGE EXTENDER LIGHT INDICATOR

- Flashing **Red/Green** – the range extender is looking for a gateway to join.
- Solid **Red** - no network found.
- Solid **Green** – range extender has joined a network.
- Flashing **Green** – sensor data traffic is intercepted and relayed.

#### WIRELESS RANGE EXTENDER DATA

Date	Signal	Battery	Sensor Reading
7/16/2012 4:17 PM	39	100	DCnt:7 Rxm:7 Fls:0 Qu:1 Chan:24
7/16/2012 4:16 PM	39	100	DCnt:7 Rxm:7 Fls:0 Qu:1 Chan:24
7/16/2012 4:15 PM	36	100	DCnt:7 Rxm:7 Fls:0 Qu:1 Chan:24

The range extender reports on five data parameters. The first, DCnt, is for *Device Count* and indicates how many sensors the range extender is able to recognize as being in the network. This count may add up to all sensors in the network, or it may only indicate those sensors that are talking through it, depending on how the range extender was able to provision its network.

Rxm stands for *Received Messages*. In the above example, there were 7 messages that were picked up by the range extender and sent through to the network.

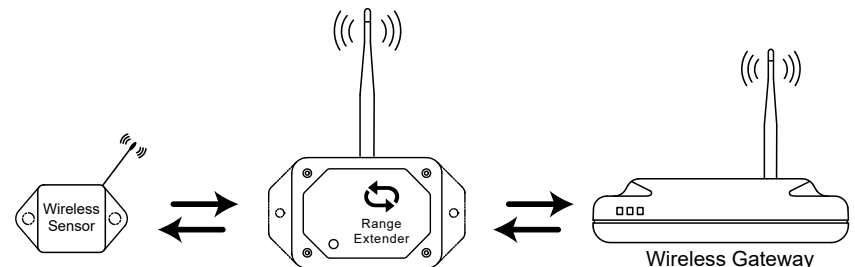
Fls stands for *Failures*. In the event that network traffic overwhelms the range extender, the number of messages that were attempted to be delivered but failed are recorded.

Qu stands for *Queue*. If the range extender is overwhelmed with message traffic, it will report on the number of messages it has queued, but has not delivered up to the network. As the range extender recovers, this number will dwindle until it gets back to 1 as messages are successfully delivered up to the network.

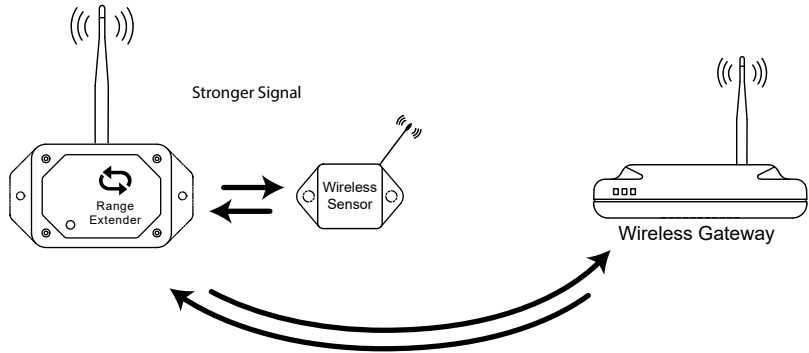
Chan stands for *Channel*. In the process of forming a sub network, the range extender picks a different channel to communicate to the sensors on, to help avoid accumulating too much traffic on the same network.

#### WIRELESS RANGE EXTENDER – DETERMINING CONNECTIONS

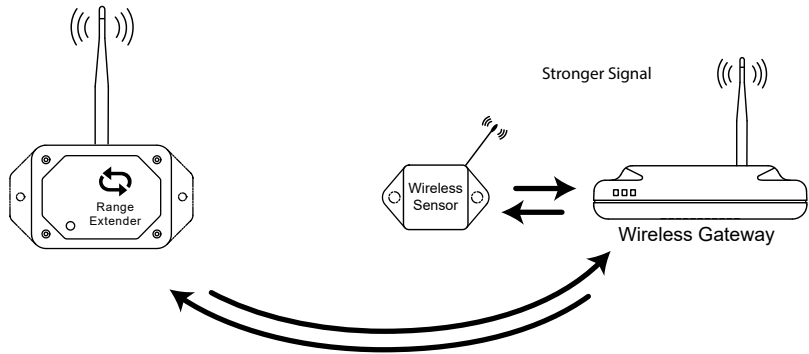
When using sensors with a wireless range extender, the sensors will automatically connect to the device with the strongest signal. The range extender should be placed between the sensor and the gateway.



If the sensor detects a stronger signal from the range extender, it will automatically connect to the range extender.



If the sensor detects a stronger signal from the gateway, it will automatically connect to the gateway and ignore the range extender.



Monnit Wireless Range Extender Specifications	
<b>Power</b>	
Standard Operating Range	100-240 VAC
Max Operating Range	90-264 VAC
Input Frequency	50/60Hz +/- 3Hz
Max Power Consumption	1.0W
<b>Wireless Operation</b>	
Maximum Wireless Devices Per Gateway	Up to 100 Total Wireless Devices Per Gateway
Maximum Sensors Per Range Extender	Up to 99 Wireless Devices (Range extenders count as wireless devices)
Message Storage / Memory	30,000 Messages
Recommended Network Communications	Up to 6 Messages Per Minute
Range Extender Communication Delay	Up to 30 Seconds (At number of recommended network communications)
<b>Mechanical</b>	
LEDs	Single LED H/W Status / Activity - Flashing Red/Green (looking for a gateway to join) - Solid Red (no network found) - Solid Green (has joined a network) - Flashing Green (sensor data is intercepted and relayed)
Enclosure	ABS Plastic UL94V-0 Flame Rating
Dimensions	3.09 x 2.085 x 1.417 in. (78.486 x 52.959 x 35.992 mm)
Weight	4.5 ounces
<b>Environmental</b>	
Operating Temperature	-40° to +85° C (-40° to +185° F)
FCC Approval:	ZTL- RFSC1

## IV. WIRELESS RANGE EXTENDER FAQ

### **Will the range extender work with my current iMonnit Gateway and Monnit Express software?**

It is advised to upgrade your Monnit Gateway and Monnit Express software to the latest version to help avoid issues while setting up and using your wireless sensors through a range extender. To update your software, please visit [monnit.com/support](http://monnit.com/support).

### **How can I tell if I need a range extender?**

Use a Monnit Button Sensor to assess the expected range of your environment. If the button sensor struggles to communicate with the gateway by flashing red, it is likely that any other sensor placed in the same location will struggle. You can also view the history of an operating sensor to see if you are getting good signal strength. If the signal strength is less than 50, or your button sensor is flashing red, even just occasionally, placing a range extender in between is advised.

### **Is the repeater compatible with my existing network?**

If your existing network version begins with 2.x.x.x, the range extender is compatible. Any previous versions, 1.2.xxx, are not compatible.

### **What is the increase in range?**

The range essentially doubles when a range extender is placed on the network. Depending on the environment, the range extender could increase the range of a sensor by up to 1600 ft. Multiple range extenders can be chained together to allow for even further range. (Note that in multiple range extender networks, for every relay point the number of messages doubles.)

### **Does the range extender lose data if it is not able to deliver immediately?**

No, as long as the range extender has not lost communication with the network. If the range extender still has a link to the network, but has been unable to deliver a message because of network traffic or due to failures, it has the ability to store all data messages coming in. They will be delivered one after another as soon as the communication link is clear again.

## SUPPORT

For technical support and troubleshooting tips, please visit our support knowledge base online at [monnit.com/support](http://monnit.com/support). If you are unable to solve your issue using our online support, email Monnit support at [support@monnit.com](mailto:support@monnit.com) with your contact information and a description of the problem, and a support representative will contact you within about one business day.

For error reporting, please email a full description of the error to [support@monnit.com](mailto:support@monnit.com).

## WARRANTY INFORMATION

(a) Monnit warrants that Monnit-branded products (Product) 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.

(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

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*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

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**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.

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## 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: 8595A2AGQN-4NNN) 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/support](http://monnit.com/support).



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