



# Radio Bridge LoRaWAN<sup>®</sup> Wireless Sensor

---

## Door Window Sensor User Guide



### LoRaWAN Wireless Door/Window Sensor

Model: RBS3010NA01BN00, RBS3010EU01BN00

Part Number: RB0005 Rev. 2.0

### Trademarks and Copyright

#### Copyright

This publication may not be reproduced, in whole or in part, without the specific and express prior written permission signed by an executive officer of Multi-Tech Systems, Inc. All rights reserved. Copyright © 2023 by Multi-Tech Systems, Inc.

#### Trademarks and Registered Trademarks

MultiTech, the MultiTech logo, DeviceHQ, and Conduit are registered trademarks of Multi-Tech Systems, Inc. All other products and technologies are the trademarks or registered trademarks of their respective holders.

#### Disclaimers

Information in this document is subject to change without notice and does not represent a commitment on the part of Multi-Tech Systems, Inc.. Multi-Tech Systems, Inc. provides this document “as is,” without warranty of any kind, expressed or implied, including, but not limited to, the implied warranties of fitness or merchantability for a particular purpose. Multi-Tech Systems, Inc. may make improvements and/or changes in this manual or in the product(s) and/or the software described in this manual at any time.

#### Legal Notices

See the [Legal Notices](#) section of the website for up-to-date information on MultiTech warranty, returns policy, privacy statement, terms of sale, and terms of service.

#### Customer Support

| Sales  | Support  |
|--|--|
| <a href="mailto:sales@multitech.com">sales@multitech.com</a> | <a href="mailto:support@multitech.com">support@multitech.com</a> |
| +1 (763) 785-3500  | +1 (763) 717-5863  |

#### Website

<https://www.multitech.com>

#### Knowledge Base

For immediate access to support information and resolutions for MultiTech products, visit <https://www.multitech.com/kb.go>.

#### Support Portal

To create an account and submit a support case directly to our technical support team, visit: <https://support.multitech.com>.

#### World Headquarters

Multi-Tech Systems, Inc.  
2205 Woodale Drive, Mounds View, MN 55112  
USA

# Contents

|  |           |
|--|-----------|
| <b>Chapter 1 – Overview .....</b>                                | <b>5</b>  |
| Sensor Overview .....  | 5         |
| Documentation .....  | 5         |
| Part Numbers .....   | 5         |
| <b>Chapter 2 – Quick Start .....</b>                             | <b>6</b>  |
| Preparing an RBS301 Sensor .....                                 | 6         |
| Quick Start .....  | 6         |
| Mounting the Sensor .....  | 7         |
| <b>Chapter 3 – Hardware Specifications and Information .....</b> | <b>8</b>  |
| Absolute Maximum Ratings .....                                   | 8         |
| Battery Life .....   | 8         |
| Replacing the Battery .....                                      | 9         |
| Mechanical Drawings .....  | 10        |
| Indoor RBSx01 Sensors .....                                      | 10        |
| <b>Chapter 4 – Safety .....</b>                                  | <b>11</b> |
| Lithium Battery Safety .....                                     | 11        |
| User Responsibility .....  | 11        |
| <b>Chapter 5 – Common Messages .....</b>                         | <b>12</b> |
| Common Messages .....  | 12        |
| Message Protocol .....   | 12        |
| Uplink Messages .....  | 12        |
| Reset Message (0x00) .....                                       | 13        |
| Supervisory Message (0x01) .....                                 | 14        |
| Tamper Message (0x02) .....                                      | 14        |
| Downlink ACK (0xFF) .....  | 15        |
| Link Quality Message (0xFB) .....                                | 15        |
| Downlink Messages .....  | 15        |
| General Configuration .....                                      | 16        |
| Device Info Request .....  | 19        |
| Link Quality Configuration (0xEE) .....                          | 19        |
| ADR Advanced Configuration .....                                 | 20        |
| Factory Reset (0xEC) .....                                       | 20        |
| Advanced Configuration (0xFC) .....                              | 20        |
| <b>Chapter 6 – Sensor-Specific Messages .....</b>                | <b>21</b> |
| Uplink Messages .....  | 21        |
| Downlink Messages .....  | 21        |

|  |           |
|--|-----------|
| <b>Chapter 7 – Regulatory Information</b>                        | <b>22</b> |
| 47 CFR Part 15 Regulation Class B Devices                        | 22        |
| Federal Communications Commission (FCC)                          | 22        |
| Industry Canada Class B Notice                                   | 23        |
| EMC, Safety, and R&TTE Directive (RED) Compliance                | 23        |
| Standards  | 23        |
| Harmonized Commodity Description (HS Code)                       | 24        |
| Export Control Classification Number (ECCN)                      | 24        |
| <b>Chapter 8 – Environmental</b>                                 | <b>25</b> |
| REACH-SVHC Statement   | 25        |
| Registration of Substances                                       | 25        |
| Waste Electrical and Electronic Equipment Statement              | 25        |
| WEEE Directive   | 25        |
| Instructions for Disposal of WEEE by Users in the European Union | 25        |
| Restriction of the Use of Hazardous Substances (RoHS)            | 26        |

# Chapter 1 – Overview

## Sensor Overview

The LoRaWAN Wireless Door/Window Sensor uses a magnetic Hall effect sensor to detect open/close events for doors and windows. When an open or close event is detected, an alert is sent over the wireless network.

## Documentation

The following documentation is available at <https://www.multitech.com/products/sensors>.

| Document         | Description  | Part Number |
|------------------|--|-------------|
| User Guide       | This document provides overview, safety and regulatory information, design considerations, schematics, and general hardware information. | RB00005     |
| Connection Guide | This document provides instructions and information on how to connect LoRaWAN Wireless sensors on gateways and networks.                 | RB00001     |

## Part Numbers

| Part Number     | Rating | Wireless | Region        |
|-----------------|--------|----------|---------------|
| RBS3010NA01BN00 | Indoor | LoRaWAN  | North America |
| RBS3010EU01BN00 | Indoor | LoRaWAN  | Europe        |

## Chapter 2 – Quick Start

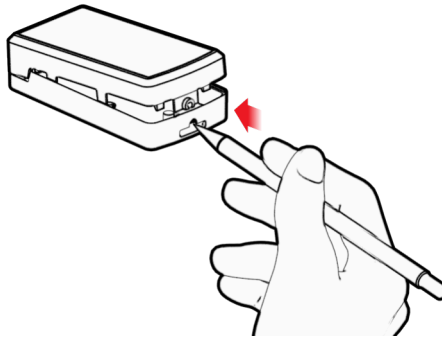
### Preparing an RBS301 Sensor

Sensors ship with batteries installed. There is a plastic tab over the battery, which needs to be removed.

- Pull the tab out of the sensor to connect the battery. If the tab does not pull out easily, you may need to open the case to remove it.

To open the case:

1. Use a pen or similar object to press the button on the opposite side of the case.



2. Remove the battery tab. You may need to remove the battery to remove the tab.
3. Re-insert the battery and close the case.

### Quick Start

Use your sensor through either the console or a third-party network. To use the console, use the following steps. To use a third-party network, refer to the *Connecting LoRaWAN Sensors on Gateways and Networks* (RB00001) , which is available through the sensor page at <https://www.multitech.com/products/sensors>

1. Create a console account at: <https://console.radiobridge.com/>
2. Click on **Devices** on the left.
3. Click **Add Device**.
4. Select the network you want to use.
5. Make sure Console Only Device is NOT selected.
6. Specify if you want to **Register Through Radio Bridge** or use an existing account with the network.
7. Enter the **Device Name**, **Device ID**, and **Device Key**.

**Note:** For easy Device ID and Key entry, scan the QR code on the yellow key card included with your device. Then copy and paste data into the console. With the QR code, the first line is the Device ID and the rest is the key.

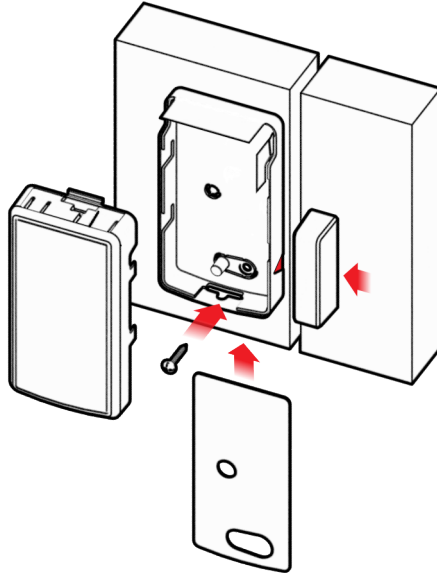
8. Select the model from the **Device Type** drop down. Model is on the device label.
9. Set the **Join EUI** to **7894E80000000000** and click **Continue**.
10. Review the summary and click **Confirmation**.

The console shows complete when the device is successfully added.

## Mounting the Sensor

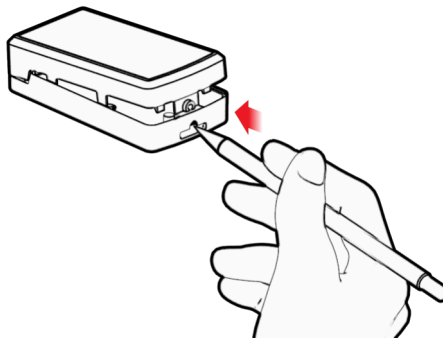
The window/door sensor includes a sensor and a magnet that need line up.

1. Use the included large adhesive pad to secure the sensor case on the door or window frame with the notch facing the door or window as shown.



For increased security using the included tamper screw:

1. Open the case. To do this, use a pen or similar object to press the button on the opposite side of the case.



2. Stick the adhesive pad where you want to install the sensor.
3. Attach the case over the adhesive using the included tamper screw as shown.
4. Reassemble the case.

The tab will break away and send a tamper alert if the case is forcibly removed.

5. Attach the magnet piece to the door so it aligns with the notch on the sensor.

## Chapter 3 – Hardware Specifications and Information

### Absolute Maximum Ratings

| Parameter                                       | Rating         |
|---|----------------|
| Operating ambient temperature (indoor version)  | -30°C to +70°C |
| Operating ambient temperature (outdoor version) | -40°C to +70°C |
| Storage ambient temperature                     | -40°C to +90°C |

### Battery Life

The sensor uses a lithium non-rechargeable battery, capable of an estimated 200,000+ messages.

**Note:** Refer to the Sensor Battery Estimator.xlsx spreadsheet on the on the sensor's product page for specific battery life estimates:

<https://radiobridge.com/documents/Sensor%20Battery%20Estimator.xlsx>

Battery life depends on the number of transmissions per day. Power required for a message transmission is greater than the “sleep current” for high power radio technologies (e.g, LoRaWAN).

Different battery chemical types deplete over time with different voltage profiles; a lithium battery maintains high voltage for the life of the battery with a rapid drop near the end of life, and an alkaline battery has gradual reduction in voltage over time. Sensors ship with a lithium battery, which is the recommended replacement type.

Recommended battery: Panasonic CR123A

Battery life estimates in the online spreadsheet assume room temperature, meaning temperatures near the maximum and minimum ratings negatively impact battery life. Battery voltage lowers in cold temperatures, and internal circuitry needs a minimum voltage to operate properly.

**Note:** Battery life will be reduced in cold environments leading to possible device shut down.

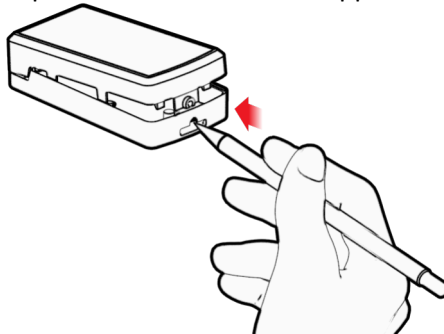
The battery voltage and a low battery indicator are reported by supervisory messages. Refer to the section on Message Protocol for details.



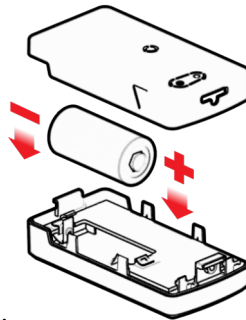
## Replacing the Battery

Replacement battery type is listed in the Battery Life topic. To replace the battery:

1. Use a pen or similar object to press the button on the opposite side of the case.



2. Remove the battery.



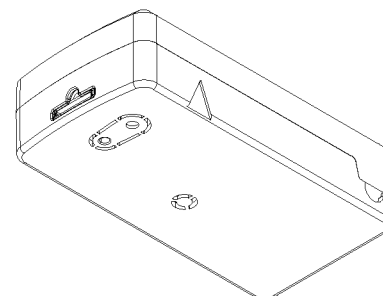
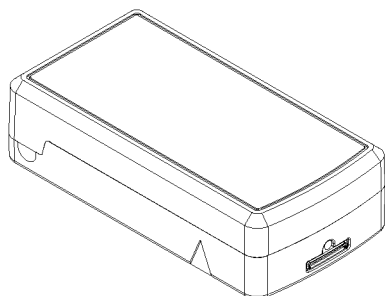
3. Insert the new battery as shown.
4. Close the case.

## Mechanical Drawings

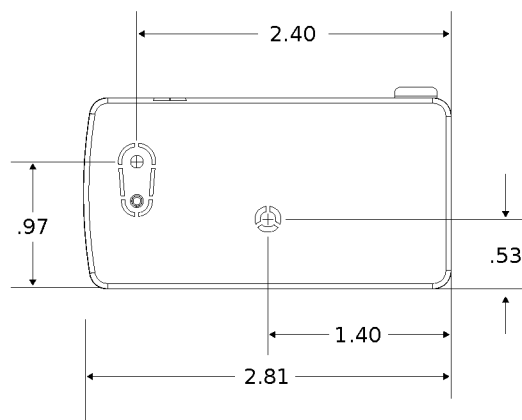
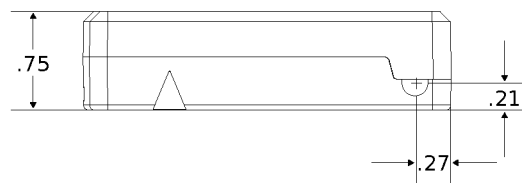
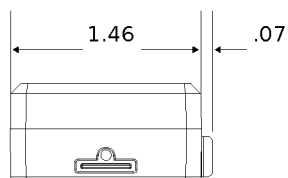
The mechanical drawings provided in this section are for the main body of the sensor. All dimensions use inches unless specified.

### Indoor RBSx01 Sensors

ISOMETRIC  
TOP VIEW



ISOMETRIC  
BOTTOM VIEW



---

## Chapter 4 – Safety

---

### Lithium Battery Safety

**CAUTION:** The battery used in this device may present a fire or chemical burn hazard if mistreated. Do not recharge, disassemble, heat above 100°C (212°F) or dispose of in fire. Replace battery with Panasonic CR123A. Use of another battery may present a risk of fire or explosion. Dispose of batteries according instructions.

**Attention:** La batterie utilisée dans cet appareil peut présenter un risque d'incendie ou de brûlure chimique si elle est maltraitée. Remplacez la batterie par une Panasonic CR123A. Ne pas démonter, incinérer ou exposer à des températures supérieures à 100°C. Jeter les piles utilisé conformément aux instructions.

Lithium cells and batteries are subject to the Provisions for International Transportation. Multi-Tech Systems, Inc. confirms that the Lithium batteries used in the MultiTech product(s) referenced in this manual comply with Special Provision 188 of the UN Model Regulations, Special Provision A45 of the ICAO-TI/IATA[1]DGR (Air), Special Provision 310 of the IMDG Code, and Special Provision 188 of the ADR and RID (Road and Rail Europe).

### User Responsibility

Keep the wireless sensor away from children.

Respect all local regulations for operating your wireless device. Use the security features to block unauthorized use and theft.

End user must operate product per country laws and rules

## Chapter 5 – Common Messages

### Common Messages

This chapter defines the protocol and message definitions common to all MultiTech wireless sensors. Common messages include basic error messages, tamper, supervisory, link quality, and downlink acknowledgments. Sensor specific messages are in the *Sensor Specific Messages* chapter.

### Message Protocol

This section defines the protocol and message definitions for the device.

**Note:** MultiTech provides a web-based console at [console.radiobridge.com](https://console.radiobridge.com) for configuring and monitoring devices. We recommend using this console rather than the protocols defined in this section.

If not using the console, use this topic to configure the device through downlink messages and decode the device data.

### Uplink Messages

The uplink messages (sensor to web application) have the following structure.

| Item             | Size              | Description  |
|------------------|-------------------|--|
| Protocol Version | 4 bits            | A constant 1, provides extensibility to the specific format of a message type.   |
| Packet Count     | 4 bits            | A sequential number starting at 0 for the first message sent from the sensor to the cloud. It increments by one for each subsequent message. When it reaches 0xF (15 decimal), it wraps back to 0. Packet count helps identify when a message is lost. For example, if the packet count goes 2,4 instead of 2,3,4, it indicates a message has been lost. It can also help identify out-of-order or duplicate messages. |
| Message Type     | 1 byte            | Byte format is 8 bits. Refer to next table.  |
| Message Payload  | 0-7 bytes         | Each message type has between 0 and 8 bytes of payload data specific to the sensor. Refer to the following table for payload information.  |
| 0x00             | 5-byte reset code | Device has reset. The reset cause is represented in the 5-byte reset code payload.   |
| 0x01             | >9 bytes          | Daily supervisory message (1-2 per day). The 9-byte payload contains current sensor status. Refer to <a href="#">Supervisory Message (0x01)</a> for payload details.   |

| Message Type | Payload      | Description  |
|--------------|--------------|--|
| 0x02         | 1-byte event | A tamper event has occurred. Refer to <a href="#">Tamper Message (0x02)</a> for details. |
| --           | Sensor event | Sensor events are defined in the <i>Sensor Specific Messages</i> chapter.                |

| Message Type | Payload       | Description   |
|--------------|---------------|---|
| 0xfb         | Link quality  | Sent after each downlink configuration (refer to <a href="#">Link Quality Message</a> ) or to periodically ping the network server (refer to <a href="#">Link Quality Check Period</a> ). |
| 0xfe         | --            | Reserved.   |
| 0xff         | 1-byte status | Downlink message ACK. Refer to <a href="#">Downlink ACK</a> for more detail.  |

## Reset Message (0x00)

Every time a sensor powers up it sends a reset message to the cloud.

The reset message payload is defined in the following table.

| Bytes | Description   |
|-------|---|
| 0     | Sensor type code, a product identifier sent as part of the reset message. (The following code is specific to your device).<br><br>Door/Window                      0x01 |
| 1     | Hardware version.   |
| 2-3   | Firmware version.   |
| 4-5   | Reset code. Used for factory diagnostics.   |

## Firmware Version

The 16-bit firmware version is constructed from reset payload Bytes 2-3, where Byte 2 is the most significant byte. Beginning with version 2.0, the format is as shown in the following table.

The original format is compatible by redefining the reserved most significant bit (Bit 15).

| Byte  | Description           |
|-------|-----------------------|
| 15    | Format (bit == 0)     |
| 14:8  | Major number (7 bits) |
| 7:0   | Minor number (8 bits) |
| 15    | Format (bit == 1)     |
| 14:10 | Major number (5 bits) |
| 9:5   | Minor number (5 bits) |
| 4:0   | Build number (5 bits) |

### 16-Bit Firmware Version Examples

- 0x0103 is decoded as Firmware Version 1.3
- 0x8823 is decoded as Firmware Version 2.1.3

## Supervisory Message (0x01)

Wireless sensors periodically (19 hours by default) send a supervisory message so the backend system can verify the device is still alive and report error conditions. The supervisory message payload include current sensor status.

You can also trigger a supervisory message. To do this:

- Place a magnet near the triangular notch on the side of the sensor.

The following table shows the supervisory message payload:

| Bytes | Description  |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |
|-------|--|------|-------------|-----|-----------|---|-----------------------------------|---|-----------------------|---|---------------------------|---|---------------------------|---|---|
| 0     | Supervisory error codes as follows: <table> <tr> <th>Bits</th><th>Description</th></tr> <tr> <td>7:5</td><td>Not used.</td></tr> <tr> <td>4</td><td>Tamper detected since last reset.</td></tr> <tr> <td>3</td><td>Current tamper state.</td></tr> <tr> <td>2</td><td>Error with last downlink.</td></tr> <tr> <td>1</td><td>Battery low (under 2.8v).</td></tr> <tr> <td>0</td><td>Radio communication error, communication with the integrated radio failed and the device was reset.</td></tr> </table> | Bits | Description | 7:5 | Not used. | 4 | Tamper detected since last reset. | 3 | Current tamper state. | 2 | Error with last downlink. | 1 | Battery low (under 2.8v). | 0 | Radio communication error, communication with the integrated radio failed and the device was reset. |
| Bits  | Description  |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |
| 7:5   | Not used.  |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |
| 4     | Tamper detected since last reset.  |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |
| 3     | Current tamper state.  |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |
| 2     | Error with last downlink.  |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |
| 1     | Battery low (under 2.8v).  |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |
| 0     | Radio communication error, communication with the integrated radio failed and the device was reset.  |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |
| 1     | Current sensor state, 1-byte. This is device specific, refer Sensor Specific Messages chapter for details. For other devices, use the periodic reporting feature.  |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |
| 2     | Battery level is a two-digit battery voltage. For example, if the battery voltage is 2.9V, byte 2 would be 0x29.   |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |
| 3-6   | Extended sensor state, 4-bytes. Allows sensors with higher precision or multiple values to report during a supervisory event. For other devices, use the periodic reporting feature.<br><b>Note:</b> For applications requiring periodic readings, using the periodic reporting feature is recommended. Refer to <i>Periodic Reports</i> . in Sensor Specific Downlink Messages.   |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |
| 7-8   | Event accumulation count is the number of sensor events since the last supervisory message. To improve battery life, can be used with the <b>Disable all sensor events</b> setting so only an event total is reported during a supervisory message, individual events are not reported as they occur. This feature is available in firmware v2.0 and beyond.   |      |             |     |           |   |                                   |   |                       |   |                           |   |                           |   |   |

## Tamper Message (0x02)

A sensor sends a message when the tamper switch has been opened or closed through either an enclosure tamper or a wall mount tamper. The tamper message contains a 1-byte payload as shown in the following table.

| Payload | Description           |
|---------|-----------------------|
| 0x00    | Tamper switch opened. |
| 0x01    | Tamper switch closed. |

## Downlink ACK (0xFF)

The cloud app uses this downlink ACK message to verify the that sensor received the downlink message received and it was considered valid.

The sensor replies to the downlink data with a 0xFF message (downlink ACK) with the payload shown in the following table.

| Command | Payload                          |
|---------|----------------------------------|
| 0x00    | Not used                         |
| 0x01    | Message was invalid or undefined |
| 0x02    | Message was valid                |

## Link Quality Message (0xFB)

The link quality message provides a signal strength and a signal to noise measurement at the device itself. The link quality message payload is shown in the following table.

| Bytes | Description  |
|-------|--|
| 0     | Current Sub-Band, sub-band currently joined and used for communication to the gateway and network server. Value ranges from 1-8 for US915. For other regions, value depends on available channels. |
| 1     | RSSI of last DOWNLINK received, signed integer format values in bytes 1 and 2 in two's complement format.  |
| 2     | SNR of last DOWNLINK received, signed integer format values in bytes 1 and 2 in two's complement format.   |

## Downlink Messages

Downlink messages are from the cloud to the sensor and are used to configure the sensor. The sensor initiates receiving downlink messages upon transmitting, since the sensor is typically sleeping with the radio turned off.

All downlink messages must contain 8 bytes, padded with zeroes.

A downlink will be received after any uplink within the receive window.

The following command messages can be sent back to the sensor as downlink.

| Command | Payload   | Description  |
|---------|-----------|--|
| 0x00    | Not used  | Not used   |
| 0x01    | 4 bytes   | General configuration  |
| --      | 0-7 bytes | Sensor configuration, refer to the <i>Sensor Specific Messages</i> chapter |
| 0xED    | 1 byte    | Device Info Request ( <i>Firmware version 3.0 or newer</i> )               |
| 0xEE    | 1 byte    | Link quality configuration ( <i>Firmware version 3.0 or newer</i> )        |
| 0xEF    | 4 bytes   | ADR Advanced configuration ( <i>Firmware version 3.0 or newer</i> )        |
| 0xFC    | 3 bytes   | Advanced configuration   |

## General Configuration

Use the general configuration command to configure parameters that apply to all sensor types.

| Byte | Description                           |
|------|---------------------------------------|
| 0x00 | Disable sensor events                 |
| 0x01 | Radio config                          |
| 0x02 | Supervisory period. Default 19 hours. |
| 0x03 | Sampling rate                         |



## Disable Sensor Events

The following table shows the disable sensor event bit definitions.

| Bit | Description               |
|-----|---------------------------|
| 7:1 | Not used                  |
| 0   | Disable all sensor events |

## Radio Config

The following table shows the radio config byte definition.

**Note:** Available in firmware version 1.4 or newer.

| Bits | Description  |
|------|--|
| 7    | Not used (reserved)  |
| 6    | Enable duty cycle requirement. <i>EU868 only</i> . To enforce the EU868 band duty cycle requirements, enable before production deployment. Cannot be disabled. Available in firmware 2.2.1 or later.   |
| 5:2  | Uplink retries. . The range for uplink retries is 1-8 for confirmed messages (ACK required) and does not apply to unconfirmed messages. Default 0 (leave unchanged). Available in firmware v1.4 and above.   |
| 1    | Use unconfirmed messages. If set to use the unconfirmed messages bit, the sensor does not look for an ACK from the network server. Default is 1 (unconfirmed messages, no ACK required). EU sensors can't use confirmed messages, setting this bit to 0 on an EU device causes an invalid downlink error (0xFF01). Available in firmware v1.4 and above. |
| 0    | Disable Adaptive Data Rate (ADR). To enable ADR, set to 0. To disable ADR, set to 1. Default is 0 (enabled). Available in firmware v1.3 and above.   |

**Important:** The duty cycle bit is always set for production deployments in the EU868 band. It cannot be changed.

## Supervisory Period

The general configuration command's supervisory period controls the time between supervisory messages as defined in the following table.

| Bit 7 | Bits 6:0  |
|-------|---|
| 0     | Period defined in hours (1-127 hours). Available in firmware v1.3 and above.    |
| 1     | Period defined in minutes (1-127 minutes) Available in firmware v1.3 and above. |

For example, to receive a report every 4 hours, set Byte 1 to 0x04. To receive a periodic report every 15 minutes, set Byte 1 to 0x8f.

## Sampling Rate

Sampling rate controls the frequency at which devices wake from low power sleep mode to check the sensor state. Some sensors require very little power to check the state and need to react quickly. Other sensors can be sampled at a lower rate, such 30-second or 30-minute intervals. Increasing the time between samples increases battery life.

Refer to the Battery Estimator for battery life estimates relative to sampling rate:

<https://radiobridge.com/documents/Sensor%20Battery%20Estimator.xlsx>

A value of 0 in this field leaves the sampling rate at the current value. Use the following table to determine the sampling rate if the value is not zero.

**Note:** Sampling period only applies to sensors that take measurements like temperature and tilt, it does not apply to sensors with binary inputs such as door/window sensors or push buttons.

This feature is available in firmware v2.0 and above.

| Bit 7:6 | Bits 5:0  |
|---------|---|
| 00      | Sampling period defined in increments of 250ms (0.25-15 seconds). |
| 01      | Sampling period defined in increments of seconds (1-63 seconds).  |
| 10      | Sampling period defined in increments of minutes (1-63 minutes).  |
| 11      | Sampling period defined in increments of hours (1-63 hours).      |

## Device Info Request

The Device Info Request command is a downlink to inform the gateway to report its downlink configuration information.

| Bit  | Description   |
|------|---|
| 0x00 | <p>Downlink configuration type to request.</p> <p>0-254: Request device info for specific downlink type to report.</p> <p>255: Request device info for all downlink configurations.</p> |

## Link Quality Configuration (0xEE)

The Link Quality configuration command configures the number of failed confirmed message attempts before re-entering the LoRaWAN join state.

| Byte | Description  |
|------|--|
| 0x00 | <p>Number of failed confirmed message transmits before the device re-enters a LoRaWAN join state. The default value is 12.</p> <p>When the device transmits a confirmed message and exhausts uplink retries without receiving an acknowledgment, the device increments an internal failed counter by 1. This counter not increment if the message being transmitted is not a confirmed message.</p> <p>If this counter does not exceed the threshold specified in this byte, the device attempts a retransmit.</p> <p>The default value is 12.</p> |

## ADR Advanced Configuration

The ADR configuration message overrides the LoRaWAN ADR\_ACK\_LIMIT and ADR\_ACK\_DELAY parameters.

| Byte | Description  |
|------|--|
| 0x00 | ADR_ACK_LIMIT value when running in Unconfirmed Mode. The default value is 64. |
| 0x01 | ADR_ACK_DELAY value when running in Unconfirmed Mode. The default value is 32. |
| 0x02 | ADR_ACK_LIMIT value when running in Confirmed Mode. The default value is 2.    |
| 0x03 | ADR_ACK_DELAY value when running in “Confirmed Mode”. The default value is 1.  |

For additional details with usage to ADR\_ACK\_LIMIT and ADR\_ACK\_DELAY, refer to *LoRaWAN Link Layer Specification v1.0.4 - Section 4.3.1.1: Adaptive data-rate control in frame header*.

## Factory Reset (0xEC)

Restores all setting to factory defaults. Does not preserve any custom configuration.

- In US915, the device returned the device information message.
- In EU868, the device returns that downlink confirmation.

## Advanced Configuration (0xFC)

Use this command for advanced configuration parameters that apply to all sensor types. The advanced configuration command is defined in the following table.

| Byte | Description               |
|------|---------------------------|
| 0x01 | Port number               |
| 0x02 | Link quality check period |

### Port Number

Byte 0x01 of the advanced configuration command changes the uplink port per the LoRaWAN protocol. The default port is 2, and a value of 0 in this field means to leave it at the default.

This feature is available in firmware v1.4 and above.

### Link Quality Check Period

. Setting this register causes the device to ping the network server periodically with a requested ack. Typically used with unconfirmed messages, this feature creates a periodic confirmed message and looks for the ack to ensure the device is still connected.

The following table shows this byte’s encoded bit definitions.

Available in firmware v2.0 and above.

| Bit 7 | Bits 6:0                                   |
|-------|--|
| 0     | Period defined in hours (1-127 hours).     |
| 1     | Period defined in minutes (60-127 minutes) |

## Chapter 6 – Sensor-Specific Messages

### Uplink Messages

The uplink message (sensor to web application) specific to the sensor is defined in following table. The common uplink messages are not included in this section (see common messages document).

| Event Payload | Description   |
|---------------|---|
| 0x00          | Sensor is “closed” meaning that the magnet is present |
| 0x01          | Sensor is “open” meaning that no magnet is present    |

### Downlink Messages

The downlink message (web application to sensor) specific to the sensor configuration is defined in following table. The common downlink messages are not included in this section (see common messages document).

| Event Payload | Description   |
|---------------|---|
| 0             | Disable events (see the table Disable Events Bit Definitions) |
| 1-2           | Open hold time  |
| 3-4           | Close hold time   |

The hold times are 16-bit values that represent the amount of time the sensor must be held in a particular position (open or closed) before a message is sent. An example of how this is would be used when monitoring a door to a refrigeration unit. When the door is open or shut with, say, 1 minute, no alerts are sent. When the door is left open for a longer period indicating that it was left open, an alert can be sent.

The hold time values range from 1-65535 and are represented in 250ms increments. This gives the hold times a range of 250 milliseconds – 4.5 hours. If the hold time is 0, the feature is disabled and an alert will be sent any time the state changes.

The table below describes the disable bit definitions which can selectively disable alerts for one orientation or another.

| Bits | Description  |
|------|--|
| 7:2  | Not used   |
| 1    | Disable close events. Set to disable, clear to enable. |
| 0    | Disable open events. Set to disable, clear to enable.  |

**Note:** Note that downlink messages for this door/window sensor are not sent after supervisory messages unlike other sensors as defined in the Common Messages document. For security purposes, the sensor can only be configured after a reset or tamper-open event.

## Chapter 7 – Regulatory Information

---

### 47 CFR Part 15 Regulation Class B Devices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**Warning:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### Federal Communications Commission (FCC)

Per FCC 15.19(a)(3) and (a)(4) This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Per FCC 15.21, Changes or modifications not expressly approved by MultiTech could void authority to operate the devices.

LoRaWAN RBS301 Wireless Sensor:

- FCC ID: AU792U22A05869
- IC: 125A-0066

## Industry Canada Class B Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement Canadien sur le matériel brouilleur.

This device complies with Industry Canada license-exempt RSS standard(s). The operation is permitted for the following two conditions:

1. the device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

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'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

## EMC, Safety, and R&TTE Directive (RED) Compliance



The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment;

and

Council Directive 2014/53/EU on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

and

Council Directive 2014/35/EU on the harmonization of the laws of Member States relating to Electrical Equipment designed for use within certain voltage limits.

MultiTech declares that this device is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU. The declaration of conformity may be downloaded at <https://www.multitech.com/red>

## Standards

| Directive                         | Description         | Applicable Standards       |
|-----------------------------------|---------------------|----------------------------|
| 2014/35/EU Art. 3,1<br>2011/65/EU | LVD                 | EN 62368-1:2014 + A11:2017 |
| 2014/53/EU                        | MPE /RF<br>Exposure | EN 62311:2008              |
|                                   | ROHS                | EN IEC 63000:2018          |

| Directive  | Description | Applicable Standards  |   |
|------------|-------------|---|---|
| 2014/53/EU | RED         | Art 3.1b<br>EN 301 489-1 V2.1.1 (General)<br>EN 301 489-3 V2.1.2 (SRD devices)<br>EN61326 (Lab Equip) | Art. 3.2<br>EN 300 220-2 V3.1.1 and v3.2.1(SRD devices) |

## Harmonized Commodity Description (HS Code)

The Harmonized Commodity Description and Coding System generally referred to as “Harmonized System” or simply “HS” is a multipurpose international product nomenclature developed by the World Customs Organization (WCO).

HS Code: 8531.90.9001

## Export Control Classification Number (ECCN)

ECCNs are five character alpha-numeric designations used on the Commerce Control List (CCL) to identify dual-use items for export control purposes. An ECCN categorizes items based on the nature of the product, i.e. type of commodity, software, or technology and its respective technical parameters.

ECCN: 5a992.c



## Chapter 8 – Environmental

### REACH-SVHC Statement

#### Registration of Substances

**Multi-Tech Systems, Inc.** confirms that none of its products or packaging contain any of the Substances of Very High Concern (SVHC) on the REACH Candidate List, in a concentration above the 0.1% by weight allowable limit.

For the current REACH-SVHC statement, refer to additional regulatory documents at:

<https://www.multitech.com/support/support>

### Waste Electrical and Electronic Equipment Statement

**Note:** This statement may be used in documentation for your final product applications.

#### WEEE Directive

The WEEE Directive places an obligation on EU-based manufacturers, distributors, retailers, and importers to take-back electronics products at the end of their useful life. A sister directive, ROHS (Restriction of Hazardous Substances) complements the WEEE Directive by banning the presence of specific hazardous substances in the products at the design phase. The WEEE Directive covers all MultiTech products imported into the EU as of August 13, 2005. EU-based manufacturers, distributors, retailers and importers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

#### Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

July, 2005



## Restriction of the Use of Hazardous Substances (RoHS)

**Multi-Tech Systems, Inc.**

### **Certificate of Compliance**

#### **2015/863**

Multi-Tech Systems, Inc. confirms that its embedded products comply with the chemical concentration limitations set forth in the directive 2015/863 of the European Parliament (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment - RoHS 3).

These MultiTech products do not contain the following banned chemicals<sup>1</sup>:

- Lead, [Pb] < 1000 PPM
- Mercury, [Hg] < 100 PPM
- Cadmium, [Cd] < 100 PPM
- Hexavalent Chromium, [Cr+6] < 1000 PPM
- Polybrominated Biphenyl, [PBB] < 1000 PPM
- Polybrominated Diphenyl Ethers, [PBDE] < 1000 PPM
- Bis(2-Ethylhexyl) phthalate (DEHP): < 1000 ppm
- Benzyl butyl phthalate (BBP): < 1000 ppm
- Dibutyl phthalate (DBP): < 1000 ppm
- Diisobutyl phthalate (DIBP): < 1000 ppm

Environmental considerations:

- Moisture Sensitivity Level (MSL) =1
- Maximum Soldering temperature = 260C (in SMT reflow oven)

<sup>1</sup>Lead usage in some components is exempted by the following RoHS annex, therefore higher lead concentration would be found in some modules (>1000 PPM);

- Resistors containing lead in a glass or ceramic matrix compound.